



CONTRACT: C-23-B-002

South East Training Facility and Jobs Hub

Dubs and Co. Drive, Sorell, TAS, 7172

CLOSE OF TENDERS:

Saturday 26th June 2024, 2.00pm

Tender Box, Sorell Council

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Conditions of Tendering

Nature of Contract

The Contract for which a Tender in accordance with these conditions is to be made will be a Lump Sum Contract. The Lump Sum Tender is for the completion of the whole of the Works described and intended in the Tender Documents (described below) and executed in accordance therewith.

No adjustments will be made to the Contract price to cover rise and fall in labour, material and other costs.

Tender Documents

The Tender Documents shall be these Conditions of Tendering, AS2124-1992 General Conditions of Contract, the Tender Form, the Schedules, the Specification including Bill of Quantities, the Drawings and any drawings and written statements required by any of the aforesaid documents to be submitted by the Tenderer.

Construction Programme

Tenderers are required to provide a Gantt chart with their Tender which indicates their delivery of the various components of the Works.

Tenders requiring alterations to the proposed timetable must offer an alternative and give reasons.

Contents of Tender

The Tender submitted shall be prepared in accordance with the following requirements.

- (i) The Tender shall be submitted upon the Tender Form provided and all the Tender Documents shall be deemed to form part of the Tender. The Tenderer shall sign the Tender, or if the Tenderer be a Corporation, affix its common seal in the manner prescribed by its Articles of Association or otherwise have the Tender signed appropriately and formally.
- (ii) Each Tender shall contain a postal and an email address for service of any notice required to be given to the Tenderer in connection with their Tender.

Notwithstanding any other Conditions of Tendering the following documents shall be submitted with the Tender:

- Signed Tender Form
- Completed Bill of Quantities
- Signed Schedule of any proposed sub-contractors
- Signed Schedule of non-compliance for any alternative Tender including relevant drawings
- Signed Schedule of previous experience on similar work
- Construction programme including separate methodology statement of construction whilst keeping sports grounds operational
- Work Health & Safety and Environmental Management Plans

These shall be completed and signed in original ink.

Tenderers to Inform Themselves

Tenderers are required to be aware of all matters relating to the Contract, including the availability of all necessary materials, prior to submitting their Tender. The Principal will not accept claims for extra costs or extensions of time for delays caused by the unsuitability of material resources.

Tenderers shall be deemed to have inspected the site, to have assessed the conditions relating to the site, and to have allowed for such conditions in their Tender. This shall include investigation of suitable access roads for the safe transport of all materials and components required for the completion of the Works.

Bill of Quantities

The Bill of Quantities has been prepared by the consultant and Sorell Council to assist Tenderers in the preparation of their Tender.

The items and quantities are not warranted as correct and any bids submitted must be based on the Tenderer's own investigation and enquiries. In particular, Tenderers must allow for all work shown on the Drawings and included in the Specification including all work necessarily arising therefrom and should revise or amend, before tendering, the quantities and/or items contained in the Bill of Quantities if, in the opinion of the Tenderer the Bill does not correctly or fully represent all of the Works.

Anomalies, Interpretation and Omitted Items

All items, either indicated on the Drawings or written in the Specification, form part of the Contract.

Where a Tenderer has any doubt about the meaning of any portion of the Tender Documents or where a discrepancy exists between the Drawings and Specification, the Tenderer shall either:

- (i) ask for clarification, which shall only be valid if issued to the Tenderer in writing; or
- (ii) include a statement of interpretation upon which the Tender has been based.

Any clarification given in (i) may be issued to all prospective Tenderers as an addendum (Notice to Tenderers).

Provided that the Bill of Quantities omits an item(s), which should reasonably have been anticipated by an experienced and competent Tenderer, necessary for the satisfactory completion and performance of the Works, the Tenderer shall insert such omitted item(s) in the Bill with a price for each item. In the event of the failure of the Tenderer to do so, the cost of such item(s) will be deemed to be included within other items.

Alternative Tenders

Tenderers may submit proposals for alternatives to the design as documented or for other specified items as long as a conforming tender is also submitted.

Any alternative to the Tender must be listed separately, clearly identifying the changes offered (on the Schedule of Non-compliance form) and the revised Lump Sum.

Enquiries

All enquiries during the Tender period shall be directed to Mr Anthony Walters (03) 6269 0050 / 0417 307 451 at Sorell Council, or Jonathan Blood 0408 383 235 at LOCI Architecture.

Lodgement of Tenders

Tenders in writing are invited and will be received at the Sorell Council Office, 47 Cole Street, Sorell, Tasmania, up until 2pm, Wednesday 26th June 2023.

Tenders must be submitted in a sealed envelope and clearly marked "**Tender No. C-23-B-002**" and lodged in the Tender Box provided in the foyer of the Sorell Council or forwarded through Australia Post for delivery prior to the above date and time.

Late tenders or tenders submitted by facsimile machine or e-mail will **not** be accepted. **The lowest (nor any) tender will not necessarily be accepted.**

Tenders forwarded through Australia Post shall be addressed as follows:

"Tender No C-23-B-002"

Sorell Council

PO Box 126

Sorell TAS 7172

Late Tenders

Late Tenders will not be accepted.

Opening of Tenders

Tenders will be opened as soon as possible after the closing time. Tenderers will not be present at the opening.

Informal Tenders

Any Tender which does not comply with the requirements of the Tender Documents is likely to be rejected.

Errors in Tenders

Any errors in extension or addition (or both) discovered in the Bill of Quantities at evaluation of Tenders shall be corrected in a manner agreed to between the Principal and the Tenderer so that the total in the Bill of Quantities continues to equal the tendered Lump Sum.

Failure to reach agreement shall result in the Tender being rejected.

Selection Criteria

The evaluation process will be undertaken with the aim of determining the lowest price acceptable conforming tender, or an acceptable alternative tender that demonstrates best value for money. Tender will be assessed against the following evaluation criteria:

Complying tenders will be assessed by scoring and weighting of the following criteria:

1. ***Previous Experience (20%)*** - Tenderers with more extensive experience in work similar to that described in the specification and drawings will be more favourably scored. Details of relevant projects completed by the Tenderer, and/or individual staff, will enable the level of experience to be more accurately assessed.
2. ***Supervision and Quality Assurance (15%)***
 - ***Supervision*** - Tenderers are to provide details of the qualifications and experience of all supervisory staff to be utilised on the Contract, including the degree and nature of the supervision to be provided by each nominated staff member. The more comprehensive supervision will be more favourably scored.
 - ***Quality Assurance*** – Tenderers with third party ISO 9002 accreditation will be more favourably scored. In the absence of such accreditation details of any quality scheme in place to aid in achieving compliance with the Contract should be provided,

including detail of projects where the Tenderer has successfully utilised the quality scheme previously.

3. *Workplace Health Safety & Environment (W.H.S. & E.) (15%)* - Documented procedures to identify and exercise all necessary precautions for the health and safety of all personnel on site and be aware of and discharge its obligations under the Work Health and Safety Act 2012 and the related Regulations currently in force. Documented procedures to support Environmental relevant compliance with the Act and Codes of Practice.
4. *Price (50%)* - A weighting price score is calculated using the average price, the tenderers price and the price percentage. During the period of the evaluation process, we may negotiate with individuals or businesses quoting to vary their quotes either on the grounds of technical capability, cost effectiveness, or matters relating to the combination of one part of the quote with another part of the quote. We also reserve the right to negotiate with several individuals or businesses to finalise the commercial terms to form a contract.

No less than 6 can be scored for the *Workplace Health Safety & Environment* sub-criteria for the tender to be considered further.

The following scores will be used to assess the above criteria:

Score	Description	Full Description
9-10	Superior	Demonstrated strengths in all issues and few if any weaknesses. Offers many benefits. Low risk and/or risks can be managed with low cost.
6-8	Good	Demonstrated strengths in most issues and few weaknesses. Offers many benefits. Low-moderate risk and/or risks can be managed with low-moderate cost.
4-5	Adequate	Demonstrated strengths in some issues and some weaknesses. Offers some benefits. Moderate risk and/or risks can be managed with moderate cost.
1-3	Poor to deficient	Demonstrated little strength and many weaknesses. Offers few benefits. Moderate-high risk and/or risks can be managed with moderate-high cost.
0	Unacceptable	Provides little if any information that can be assessed. Contains many errors and/or omissions. Doesn't address criteria.

Tenderers are requested to provide sufficient additional information in their tender submission to enable detailed assessment of the above-mentioned criteria. Failure to provide such information will be interpreted as acknowledgment that the Tenderer has not reached a satisfactory standard in that area, and may incur the minimum score. There is no obligation on the Principal to pursue the Tenderer to provide additional information to that included in the tender.

Start Date

Start and finish dates for this project will be negotiated with the successful tenderer. Ideally the project will be completed by July 2025, in order to satisfy existing grant conditions and tenants occupancy requirements. You will need to provide a program that conforms to this.

Completion Time

The period for completion of the works is stated in the Annexure to the General conditions of contract conditions, AS2124-1992

The tenderer may submit different prices for different completion times.

Validity Period

Tenders shall remain valid for a period of **90 days** after the date of closing of Tenders.

Awarding of Contract

Before accepting a Tender, the Principal may require the Tenderer to submit any or all of the following:

- proof of resources and ability to carry out the Works;
- an estimated monthly cash flow; and
- evidence of safety, environmental and quality systems of work.

Should the Tenderer fail to submit any of the required information in the time specified by the Principal, the Tender may be rejected.

A Tender shall be deemed to be accepted when a notice in writing of such acceptance is delivered to the successful Tenderer.

The company nominated as sub-contractor on the tender form must be used to carry out the works during construction. If circumstances arise where the nominated sub-contractor can no longer carry out the works and another sub-contractor must be engaged, consent must be given by Council prior to engaging that sub-contractor.

The Contract shall come into force on the date of acceptance of the Tender as the written acceptance constitutes the Contract until a formal agreement is executed or on a date acceptable (in writing) to both parties.

Notwithstanding the foregoing, the Principal shall not be bound to accept the lowest or any other Tender.

TENDER FORM

Name of person,
firm or company
tendering:
(USE BLOCK LETTERS)

Address: _____ of _____

_____ hereby tender(s) to perform the work for.

Description **South East Training Facility and Jobs Hub**

_____ in accordance with the following documents:

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Specification Sheets (Access Hardware & Reece)

AS 2124-1992, AS 2125-1992 & AS 2127-1992

1. For the lump sum of

(\$..... – ex GST)

If Tenderer is a
firm the full names
of the individual
members of the firm
must be stated here

Insert date **DATED this day of2024**

.....
Signature of Tenderer

ANNEXURE to the Australian Standard

General Conditions of Contract

PART A

This Annexure shall be issued as part of the tender documents and is to be attached to the General Conditions of Contract and shall be read as part of the Contract.

The law applicable is that of
the State or Territory of:
(Clause 1)

TASMANIA

Payments under the Contract
shall be made at:
(Clause 1)

HOBART

The Principal: (Clause 2):

SORELL COUNCIL

The address of the Principal:

**47 COLE STREET
SORELL TAS 7172**

The Superintendent: (Clause 2)

**TBC
C/- SORELL COUNCIL**

The address of the Superintendent:

**47 COLE STREET
SORELL TAS 7172**

Limits of accuracy applying to
quantities for which the Principal
accepted rates: (Clause 3.3 (b))

No Limit

Bill of Quantities - the alternative
applying: (Clause 4.1)

Alternative 1

The time for lodgement of the
priced copy of the Bill of
Quantities: (Clause 4.2)

Not Applicable

Contractor shall provide security
in the amount of: (Clause 5.2) **Nil**

Principal shall provide security
in the amount of:(Clause 5.2)

Nil

The period of notice required of a
party's intention to have recourse to
retention moneys and/or to convert
security:
(Clause 5.5)

7 DAYS

The percentage to which the
entitlement to security and
retention moneys is reduced:
(Clause 5.7)

2.5%

Interest on retention moneys and

security - that alternative applying: (Clause 5.9)	Alternative 2
The number of copies to be supplied by the Principal: (Clause 8.3)	2
The number of copies to be supplied by the Contractor: (Clause 8.4)	Not Applicable
The time within which the Superintendent must give a decision and return the Contractor's copies (Clause 8.4)	Not Applicable
Work which cannot be sub-contracted without approval: (Clause 9.2)	Nil
The percentage for profit and attendance: (Clause 11 (b))	Nil
The amount or percentage for profit and attendance (Clause 11 (c))	Nil
Insurance of the Works - the alternative applying (Clause 18)	Alternative 1
The assessment for insurance purposes of the cost of demolition and removal of debris: (Clause 18 (ii))	\$10,000.00
The assessment for insurance purposes of consultants fees: (Clause 18 (iii))	10% of Contract Value
The value of materials to be supplied by the Principal: (Clause 18 (iv))	Nil
The additional amount or percentage: (Clause 18 (v))	33 1/3%
Public Liability Insurance - the alternative applying (Clause 19)	Alternative 1
The amount of Public Liability Insurance shall be not less than: (Clause 19)	\$20,000,000.00 any one occurrence
The time for giving possession of the Site: (Clause 27.1)	One week from date of notification of acceptance of tender, or as agreed by both parties
# The time for Practical Completion: (Clause 35.2)	52 weeks from possession of site to complete.
# Liquidated Damage per day per separable portion: (Clause 35.6)	\$500.00

# Limit of Liquidated Damages: (Clause 35.7)	No Limit
# Bonus per day for early Practical Completion: (Clause 35.8)	Nil
# Limit of bonus: (Clause 35.8)	Not Applicable
Extra costs for Delay or Disruption: Nil (Clause 36)	
# The Defects Liability Period (Clause 37)	52 calendar weeks
The day charge for overheads, profit etc. for Daywork: (Clause 41(f))	To be stated by Tenderer
Times for payment claims: (Clause 42.1)	Monthly
Unfixed plant and materials for which payment claims may be made notwithstanding that they are not on the Site: (Clause 42.1 (ii))	Nil
Retention Moneys on: (Clause 42.3) (a)	2 x Bank Guarantees valued at 5% each of the total contract sum
(b)	items on Site but not yet incorporated into the Works: n/a;
(c)	items off Site but in Australia: n/a;
(d)	items not in Australia : n/a;
(e)	disbursements incurred by the contractor for customs duties, freight, marine insurance, primage, landing and transport in respect of the work under the Contract : n/a
Unfixed Plant or Materials - the alternative applying: (Clause 42.4)	Alternative 2
The rate of interest on overdue payments: (Clause 42.9)	8%
The delay in giving possession of the Site which shall be a substantial breach: (Clause 44.7)	Four weeks
The alternative required in proceeding with dispute resolution: (Clause 47.2) The person to nominate an arbitrator: (Clause 47.3)	Alternative 1 Chairman, Institution of Engineers Tasmania Division
Location of arbitration: (Clause 47.3)	Hobart

THIS AGREEMENT is made on the day of 20 .

PARTIES:

SORELL COUNCIL (ABN 12 690 767 695) of 47 Cole Street, Sorell in Tasmania
("Council")

AND

("Contractor")

BACKGROUND

- A. The Council seeks to engage a suitable entity to provide the Services as an independent contractor.
- B. The Contractor seeks to be engaged by Council to provide the Services.
- C. The Council agrees to engage the Contractor to provide the Services in the capacity of an independent contractor in accordance with the terms and conditions of this Agreement.

1. DEFINITIONS AND INTERPRETATION

1.1 Definitions

- a. **Agreement** is a reference to this Formal Instrument of Agreement and includes any documents expressly incorporated by reference, schedules and annexures and to this Agreement, including but not limited to:
 - i. AS 4906-2002 Minor Works Contract Conditions (Principal Administered) which is annexed hereto as Appendix 1 ('**Standard Terms**');
 - ii. The submitted Tender of the Contractor which is annexed hereto as Appendix 2;
 - iii. Letter of acceptance from Council to the Contractor dated..... which is annexed hereto as Appendix 3.
- b. **Business Day** means a day, which is not a Saturday, Sunday or Public Holiday as taken under the *Statutory Holiday Act 2000* limited to the greater Hobart area;
- c. **Contractor** means the Contractor, and where appropriate its employees, sub-contractors, agents and any other persons or entities under the control or direction of the Contractor;

- d. **Principal** in the Standard Terms means the Council;
- e. **Services** is a collective reference to the works described and specified in the Tender;
- f. **Tender** means the tender document dated and provided by the Council which is annexed hereto as Appendix 4.

1.2 Interpretation

In this Agreement except to the extent that the context requires otherwise or the contrary intention appears:

- a. references to any legislation or to any provision of any legislation shall include any modification, consolidation or re-enactment of, or any provision substituted for, and all statutory instruments issued under such legislation or provisions;
- b. where in this Agreement a period of time dating from a given day, act or event is specified or allowed for any purpose, the time shall be reckoned exclusive of that day or of the day on which the act or event occurred but inclusive of the day on which that period expires or in the event that any day on which the work or payment is to be done is not a Business Day such act, matter or thing shall be done on the immediately succeeding Business Day;
- c. words importing the singular or plural shall include the plural and the singular respectively;
- d. words importing any gender shall include every gender;
- e. a reference to a person includes a reference to a corporation, firm, authority, government or governmental agent;
- f. clause headings do not affect the interpretation of this Agreement;
- g. where a word or phrase is given a particular meaning in this Agreement, other cognate parts of speech and grammatical forms of that word or phrase shall have a corresponding meaning;
- h. references to a clause, paragraph, schedule, annexure or part shall be a reference to a clause, paragraph, schedule, annexure or part of this Agreement;
- i. every contract or undertaking expressed or implied by which more than one person is bound shall bind those persons and any two or greater number of them jointly and each of them severally;

- j. references to a party shall include that party's executors, administrators and permitted assigns, or being a Council, its successors and permitted assigns and any other person deriving title under those persons or Councils;
- k. reference to time shall be reference to Tasmanian time.

2. AGREEMENT TO PROVIDE SERVICES

- 2.1 The Contactor agrees to provide the Services in accordance with the terms and conditions of this Agreement.
- 2.2 In consideration for providing the Services, the Council agrees to remunerate the Contractor in accordance with this Agreement.
- 2.3 The Contractor warrants that it:
 - a. is competent and has the skills, qualifications, expertise and experience appropriate to perform the duties and obligations of the Contractor under this Agreement and to provide the Services; and
 - b. has an Australian Business Number and is registered for GST.

3. INDEPENDENT CONTRACTOR RELATIONSHIP

- 3.1 The parties agree that the Contractor is engaged under this Agreement as an independent contractor and that the Contractor in performing its duties and obligations under this Agreement in no way is, or is intended to be, an employee, servant or agent of the Council.
- 3.2 The parties agree that the engagement of the Contractor is not an exclusive engagement. Whilst the Contractor does not provide the Services exclusively to the Council and is free to enter into other contracts with third parties, those other contracts:
 - a. must not place the Contractor in a conflict of interest, or possible conflict of interest, between the Contractor's obligations to the Council under this Agreement and the Contractor's obligations to the third party; and
 - b. must not take priority over the obligations of the Contractor under this Agreement.
- 3.3 When performing the Services the Contractor will adhere to the Council's policies regarding occupational health and safety, anti-discrimination, sexual harassment, drugs and alcohol, and any other matter as advised by the Council.

- 3.4 The Contractor will not, on behalf of its employees, sub-contractors, agents and any other persons or entities under the control or direction of the Contractor, claim upon the Council in respect of any leave entitlements, including (but not limited to) annual leave, public holidays, sick leave, long service leave, other entitlements or otherwise in respect of any claims under any relevant workers' compensation legislation, superannuation legislation or any other legislation or regulations affecting or relating to the relationship between an employer and employee.

4. **CONDUCT OF THE CONTRACTOR'S EMPLOYEES**

- 4.1 The Contractor, at all times whilst engaged in the provision of Services, must ensure that its employees, sub-contractors, agents and any other persons or entities under its control or direction:
- a. conduct themselves in a sober, civil, obliging and inoffensive manner;
 - b. perform the Services in as efficient a manner as possible;
 - c. be attired in a manner suitable to the performance of work being undertaken.
- 4.2 The Council is entitled to require any employee, sub-contractor, agent or any other persons or entity under the Contractor's control or direction to be excluded from any involvement with the provision of the Services if of the opinion the person concerned has persistently failed to comply with clause 4.1 of this Agreement.

5. **INSURANCE**

- 5.1 For the purposes of this Agreement the Contractor must take out and keep current at all times throughout the Term the following policies of insurance:
- a. A public liability policy of insurance in respect of the Contractors performance or non-performance of its obligations under this Agreement for an amount of \$20,000,000.
 - b. A workers compensation policy of insurance in accordance with the *Workers Rehabilitation and Compensation Act 1988* for any employees, sub-contractors, agents and any other persons or entities under the control or direction of the Contractor;
 - c. Compulsory third party insurance for injury to a person resulting from a motor vehicle accident.
- 5.2 The insurance policies required by clause 5.1 shall be taken out with an insurance company approved by the Council however the Council is not to unreasonably withhold approval.

5.3 If requested by the Council, the Contractor shall provide the Council with copies of the policies referred to in clause 5.1 from time to time and with the certificates of currency for such policies.

5.4 The Contractor shall not do or permit to be done anything as a result of which any insurance taken out by the Contractor or the Council may be rendered void or avoidable or which would cause the premium payable on any such insurance to increase.

6. CONTRACTOR'S INDEMNITY

6.1 The Contractor agrees to indemnify and keep indemnified, and to hold harmless the Council, its servants and agents, and each of them from and against all actions, costs, claims, charges, expenses and damages whatsoever which may be brought or made or claimed against them arising out of, or in relation to:

- a. any negligent act or omission of the Contractor in the provision of the Services;
- b. any loss or damage to property or any person, including the employees, sub-contractors, agents and any other persons or entities under the control or direction of the Contractor, incurred in the provision of the Services;
- c. any loss, expense or damage incurred by the Council, its employees or agents as a result of the provision of the Services;
- d. any material loss, expense or damage incurred by the Council arising out of or in relation to any breach of this Agreement by the Contractor;

provided that the Contractor's liability to indemnify the Council will be reduced proportionately to the extent that any act or omission of the Council or employees or agents of the Council may have contributed to the loss, death or injury.

6.2 This clause does not merge upon the expiration or completion of this Agreement.

7. CONTRACTOR'S WARRANTIES

7.1 The Contractor acknowledges that it has made and given the Warranties set out in this clause 7 with the intention of inducing the Council to enter into this Agreement and that the Council has entered into this Agreement in full reliance on the Warranties.

7.2 The Contractor hereby expressly warrants to the Council that:

- a. the Contractor will exercise reasonable professional skill and care when carrying out its obligations under this Agreement;

- b. the Contractor, its employees and agents are possessed of the necessary skills and expertise required to fulfil its obligations under this Agreement;
- c. the Contractor is possessed of, or is readily able to obtain, all plant, equipment and labour required in order to fulfil its obligations under this Agreement;
- d. the Contractor is apprised of all industry standards applicable to the delivery of the Services under this Agreement and will perform its obligations under this Agreement strictly in accordance those industry standards;
- e. the Contractor will maintain all of the policies of insurance required by clause 5 of this Agreement;
- f. the Contractor will be solely responsible for the health and safety of the Contractor's employees, sub-contractors, agents and any other persons or entities under its control or direction and will at all time comply with all statutory requirements and industry standards regarding the health and safety of its employees.

(collectively referred to as the **"Warranties"**).

7.3 The Contractor hereby indemnifies the Council against any claim or loss incurred or suffered by or brought or made or recovered against the Council (directly or indirectly) in connection with any inaccuracy in or any breach of any of the Warranties.

7.4 For the avoidance of doubt, the Warranties set out in this clause 7 are continuing in nature.

8. **DISRUPTION OF SERVICES**

8.1 If for whatever reason:

- a. the Contractor is unable to provide the Services in accordance with this Agreement; and
- b. such inability lasts for a period in excess of 14 days,

Council may engage any one or more third parties of its choosing to perform the Services until such time as the Contractor is able to reinstate provision of the Services.

8.2 All costs and expenses of engaging third parties pursuant to clause 8.1 (including legal costs and expenses on a full indemnity basis) (**'Costs'**) will, at the option of the Council, be payable by the Contractor.

9. COMPLIANCE WITH LEGISLATION

9.1 The Contractor must observe and comply with any legislation, regulations, by-laws or statutory requirements which are relevant to the performance of the Services under this Agreement including, but not limited to:

- a. *Local Government Act 1993;*
- b. *Environmental Management and Pollution Control Act 1994;*
- c. *Traffic Act 1925;* and
- d. *Work Health and Safety Act 2012.*

10. ASSIGNMENT

10.1 The Contractor must not assign its obligations under this Agreement without first obtaining the prior written approval of the Council to do so.

10.2 Prior to performing any assignment of its obligations under this Agreement, the Contractor must satisfy the following conditions:

- a. any monies payable by the Contractor to the Council under this Agreement must have been paid in full;
- b. the Contractor must not be in breach of this Agreement;
- c. the Contractor must obtain the execution by the assignee of an appropriate assignment or document in a form approved by the Council;
- d. the Contractor must pay all costs incurred in the preparation of the assignment; and
- e. where the proposed assignee is a company then the Council may require the directors and/or controlling shareholders of the company to enter into a deed guaranteeing the performance by that company of the terms of the assignment. Such guarantee must be in a form acceptable to the Council and the costs incurred by the Council in the preparation and execution of the guarantee shall be paid by the Contractor.

11. NOTICES

11.1 Any notice or other document required to be given or served under this Agreement:

- a. shall be signed by the party giving the notice or by that party's solicitor;

- b. shall be in writing addressed to the address of the recipient shown in this Agreement or to such other address as it may have notified the sender; and
- c. will be deemed to be duly given or made:
 - i. in the case of personal delivery, when delivered to the recipient;
 - ii. in the case of a letter which is posted, three (3) Business Days after posting to the last known place of business or abode of the recipient or the recipient's registered office if the recipient is a Council; or
 - iii. in the case of a facsimile or email, when dispatched, but if such delivery or receipt is later than 4.00 p.m. (local time) on a day on which business is generally carried on in the place to which such communication is sent, it shall be deemed to have been duly given or made at the commencement of business on the next Business Day in that place.

12. GENERAL PROVISIONS

12.1 Governing law

This Agreement shall be governed by the laws of Tasmania and the parties agree to submit to the non-exclusive jurisdiction of the Courts of Tasmania.

12.2 Remedies cumulative

Remedies provided in this Agreement in favour of Council or the Contractor arising because of an event of default by the Contractor or the Council or after a repudiation of this Agreement by the Contractor or the Council will not be deemed to be exclusive but will be cumulative and will be in addition to all other remedies existing at law, in equity or in bankruptcy. The election at any time to enforce any such remedies will in no way bar the later enforcement from time to time of any other such remedies.

12.3 No merger

None of the terms or conditions of this Agreement, nor any act, matter or thing done under or by virtue of, or in connection with this Agreement will operate as a merger of any of the rights and remedies of Council in or under this Agreement or otherwise. All such rights and remedies of Council will continue in full force and effect.

12.4 Delay

No failure or delay on the part of a party to exercise any power or right under this Agreement will operate as a waiver of that power or right. Nor will any single or partial exercise of any power or right under this Agreement preclude any other or further exercise of that power or right. A party will only be taken to have waived any

power or right under this Agreement, including (without limitation) any right in respect of any event of default by the other party, to the extent that the right or power has been expressly waived in writing by a director, secretary or other officer of that party, irrespective of any previous waiver of any other breach of the same or any other provision of this Agreement.

12.5 Entire Agreement

This Agreement is the entire agreement between the parties and may only be varied if such variation is in writing and signed by both parties.

12.6 Legal costs

Each party shall pay its own legal costs of and incidental to the preparation of this Contract.

12.7 Severance

Any provision of this Agreement which is prohibited, invalid or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such prohibition, invalidity or unenforceability but that shall not invalidate the remaining provisions of this Agreement or affect the validity or enforceability of such provision in any other jurisdiction.

EXECUTION CLAUSES

EXECUTED by the parties on the date of this Agreement

THE COMMON SEAL of THE)
SORELL COUNCIL)
was affixed in the presence of)

Witness sign

Witness name

CONTRACTOR)
)

Either

Witness sign

Witness name

OR

EXECUTED for and on behalf of }
CONTRACTOR }
in accordance with Section 127 of the }
Corporations Act 2001 (if applicable) }
 }

.....
*Name of director/company secretary

.....
*Signature of director/company secretary

.....
*Name of director/company secretary

.....
*Name of director/company secretary

Schedule 1 – Proposed Sub-Contractors

Contract No. C-23-B-002

The Tenderer is to advise the nature and extent of work proposed to be sub-contracted and the names of any proposed sub-contractors. Nominated sub-contractors cannot be changed without prior approval of Council.

Nature and value of work to be sub-contracted	Proposed sub-contractor (Name, ABN/ACN)	Relevant experiences & staffing details

Tenderers Name:
Signed:
Dated:

Schedule 2 – Statement of Non-Compliance

Contract No. C-23-B-002

The Tenderer is to signify whether or not its Tender conforms to the requirements of the Tender Documents by striking out below ** that which is not applicable.

*This Tender ** does/does not conform*

Should the Tender not conform with the requirements of the Tender Documents, the Tenderer shall list below all areas of non-conformance and the reasons for such non-conformance.

Area of Non-Conformance and Reason

Tenderers Name:
Signed:
Dated:

Schedule 3 – Previous Experience on Similar Work

Contract No. C-23-B-002

Please include details relating to the evaluation criteria such as profile and experience of project team and relevant experience (use additional pages if required).

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Tenderers Name:
Signed:
Dated:

Tenderers Name:
Signed:
Dated:

DOCUMENT A – SPECIFICATION

SECTION 1 - PRELIMINARIES AND GENERAL REQUIREMENTS

1.1 Contract

All Works are to be carried out in accordance with the Australian Standard General Conditions of Contract A.S. 2124-1992 together with A.S. 2125-1992 and A.S. 2127-1992, the Standard Specifications attached, the drawings nominated below and to the satisfaction of the Superintendent. The Contractor shall obtain and make themselves familiar with all relevant Council By-Laws.

This contract shall be a lump sum contract not subject to Rise and Fall.

Clauses in this specification where appropriate shall over-ride clauses in the General Conditions of Contract and notes and details on the contract drawings shall over-ride this specification.

The term Engineer, Consulting Engineer, Supervisor shall be read to be the Superintendent in all parts of the Contract Documents, similarly the term Builder shall be read to be Contractor.

Refer Annexure to the General Conditions of Contract, Part A included with these documents, for a summary of contractual information applicable to this contract.

1.2 Extent of Contract

This contract includes the construction of building, services and associated siteworks as specified in this document and shown on the drawings.

1.3 Site

47 Cole St, frontage off Dubs and Co Drive, Sorell – Refer Location Plan – Drawing CD03

1.4 Extent of Site

The Contractor shall confine activities, construction sheds etc. to areas adjacent to the works and to the approval of the Superintendent. Construction site to be fenced for the duration of the contract.

1.5 Insurances

The Contractor shall effect insurance in the joint names of the Principal, the Contractor and Sub-Contractors required by clauses 18 to 20 of the General Conditions of Contract.

The amounts of insurance cover shall be:-

- Insurance of works for full contract amount, plus an amount of \$10,000-00 for demolition and removal of debris, plus an additional percentage of 10% of the Contract Amount for fees.
- Public Liability Insurance for an amount of not less than \$20,000,000 per event.

- Workers Compensation Insurance as per the Workers Compensation Act in force in Tasmania and the Common Law Section of the policy shall be increased to an unlimited amount.

The Contractor will be required to produce all policies for inspection prior to any work commencing, and shall not proceed until approval of the policies has been granted.

The policies will be maintained until the Contractors liabilities and obligations cease, that is until the issue of the Final Certificate of Payment.

1.6 Worker Induction & Training

Council will coordinate with other contractors to ensure that a site specific induction and online induction is provided for all workers, including sub-contractors, before commencing works.

Contractor will:

- ensure workers are trained and competent for the work to be carried out;
- ensure workers are trained to deal with any risks associated with the work and understand the control measures in place;
- ensure all the workers have had relevant “White Card” training (or other appropriate training from another jurisdiction);
- ensure on-site training and supervision is provided;
- organise external training for specific tasks where required;
- seek high risk licences for all high risk work and maintain a register of licences; and
- communicate with other contractors to ensure their workers are appropriately trained and competent.

1.7 Extension of Time for Inclement Weather

The Contractor shall implement a system, mutually agreed with the Superintendent for recording lost time due to the inclement weather or conditions resulting from inclement weather.

Such lost time shall be recorded daily by the contractor when it occurs and he shall present his record to the Superintendent within two days of the event. The Superintendent will initial the record and confirm whether or not they agree with the claim.

Should a record as above not be made then it shall be deemed that no lost time has occurred.

1.8 Use of Explosives

Should the Contractor elect to make use of explosives during any stage of the works, then such use shall be subject to the requirements and the permission of all relevant Authorities and the approval of the Superintendent.

Use of explosives shall be at the sole risk of the Contractor.

1.9 Inspections

The Contractor shall give the Superintendent not less than 48 hours forward notice of all inspections required by Council. No additional work shall be done to cover up the work requiring inspection until that inspection has been carried out.

Should the Contractor neglect to give such notice, the Superintendent may at their discretion order any completed work to be demolished so that an inspection can be made and, in this event, the whole responsibility and cost for such demolition, and for any making good which may be required shall be the Contractors.

Should the Superintendent not order such demolition, the whole responsibility for any error, or omission found in or arising out of the work at any subsequent time and the cost of making it good shall be the Contractor's.

When directed, the Contractor shall open up or cut away any part of work for inspection.

If the work is found defective, it shall be removed and made good at the Contractor's expense, including cost of opening up.

The Engineer may require test pieces cut from any or all of the pieces of material, and may direct that certain tests be made to ascertain conformity with this specification.

The Contractor shall bear all costs involved in taking such test specimens and making such test and making any required restitution to the work as the Engineer may direct.

1.10 Drawings

LOCI Architecture & Planning:

- Architectural
 - CD 01 COVER N/A
 - CD 02 LOCATION PLANS 1:1000
 - CD 03 SITE PLANS 1:500
 - CD 04 PROPOSED FLOOR PLAN 1:50
 - CD 05 PROPOSED ELEVATIONS 1:100
 - CD 06 PROPOSED SECTIONS 01 1:50
 - CD 07 PROPOSED SECTIONS 02 1:50
 - CD 08 PROPOSED REFLECTED CEILING PLAN 1:50
 - CD 09 PROPOSED ROOF PLAN 1:50
 - CD 10 PROPOSED ROOF PLAN - CLERESTORY 1:50
 - CD 11 DDA TOILET 01 1:20
 - CD 12 WINDOW SCHEDULE 01 1:50
 - CD 13 WINDOW SCHEDULE 02 1:50
 - CD 14 DOOR SCHEDULE 01 1:50
 - CD 15 DOOR SCHEDULE 02 1:50
 - CD 16 CONSTRUCTION DETAILS 01 1:5
 - CD 17 CONSTRUCTION DETAILS 02 1:5
 - CD 18 CONSTRUCTION DETAILS 03 1:5
 - CD 19 CONSTRUCTION DETAILS 04 1:5
 - CD 20 CONSTRUCTION DETAILS 05 1:5
 - CD 21 CONSTRUCTION DETAILS 06 1:5
 - CD 22 CONSTRUCTION DETAILS 07 1:5
 - CD 23 CONSTRUCTION DETAILS 08 1:5
 - WHS01 WORKPLACE HEALTH & SAFETY REPORT N/A

Engineering Solutions Tasmania

- Electrical:
 - 23369-S1-E01
 - 23369-S1-E02

- 23369-S1-E03
- 23369-S1-E04
- 23369-S1-E05
- 23369-S1-E06
- Mechanical:
 - 23369-S1-M01
 - 23369-S1-M02
 - 23369-S1-M03

- Hydraulic:
 - 23369-S1-H01
 - 23369-S1-H02
 - 23369-S1-H03
 - 23369-S1-H04
 - 23369-S1-H05
 - 23369-S1-H06

Prima Engineering

- Structural
 - I.01 INDEX 0 27/05/24
 - EN.01 ENGINEERING NOTES 0 27/05/24
 - EN.02 WORKPLACE HEALTH & SAFETY NOTES 0 27/05/24
 - S01 FOOTINGS AND SLABS PLAN 0 27/05/24
 - S02 WALLS PLAN 0 27/05/24
 - S03 STEEL FRAMING PLAN 0 27/05/24
 - S04 ROOF FRAMING PLAN 0 27/05/24
 - S05 CLERESTORY PLAN 0 27/05/24
 - S06 BRACING AND LINTELS PLAN 0 27/05/24
 - S07 FOOTINGS AND SLAB DETAILS 0 27/05/24
 - S08 BRACING, WALLS TO TRUSSES CONNECTIONS AND TIE-DOWNS DETAILS 0 27/05/24
 - S09 STEEL FRAMING DETAILS - 1 0 27/05/24
 - S10 STEEL FRAMING DETAILS - 2 0 27/05/24

Specification Sheets

- Access Hardware (PENDING)
- Reece Plumbing

1.11 Duration of the Contract

All work included in this contract shall be completed within fifty two (52) weeks from the day that the Contractor takes possession of the site.

Work shall be undertaken as per the EPA guidelines - between the following hours:

Monday - Friday	7.00am - 6.00pm
Saturday	9.00am-6.00pm
Sunday/ Public Holidays	10.00am-6.00pm

The contract period is inclusive of all holiday periods. No work to be undertaken on Sundays or Public Holidays, without written permission of the Superintendent or their representative.

1.12 Temporary Services

The Contractor shall arrange for connection of any temporary services they may require and shall pay all charges in connection with installation and use.

1.13 Contingency Sum

The procedure for approval of variations to the contract shall be strictly in accordance with Item 1.18 of this document.

1.14 Damages for Non-Completion

The amount of liquidated and ascertained damages for delay in completion in accordance with Clause 35.6 of the General Conditions of Contract shall be \$500-00 per day for each separable portion of the works.

1.15 Programme of Works

Within 14 calendar days of notification of acceptance of the tender the Contractor shall provide three (3) copies of a chart showing the proposed planned construction programme. This shall be in an acceptable bar chart form showing planned weekly progress and have provision for entering comparative actual progress. If at any time during the carrying out of the works the actual progress for any item of work shown is less than that forecast by the bar chart, or the Superintendent considers that the bar chart does not show a satisfactory programme, the Contractors shall provide within 3 calendar days, a revised and satisfactory programme.

If it is necessary for the Contractor to work overtime to maintain the contract schedule all the additional costs caused by overtime or shift work shall be borne in full by the Contractor or the Sub-Contractor.

1.16 Site Meetings

The Superintendent shall arrange, chair and minute site meetings at intervals to be nominated for the duration of the Contract Period. (Usually fortnightly)

All minutes shall be enumerated and brought forward to the next meeting until satisfactorily discharged.

1.17 Field Instructions

During the currency of the contract any instructions and/or approvals shall be issued on the Superintendent's standard form for that purpose.

Should the Contractor and/or Sub-Contractor consider that any direction involves any time or cost variation, he shall so inform the Superintendent forthwith and before complying with the direction.

1.18 Variations to the Contract

Should any variation to the works be directed, or otherwise arise, associated cost variations will only be taken into account if the pertinent matter has been specifically the subject of a variation order issued by the Superintendent;

- i. Prior to the issue of a V.O. the Contractor shall submit a price for the work intended to be varied. For this purpose the Superintendent will give the Contractor a copy of a Site Instruction on which will be described the work which is intended to be the subject of the V.O.

The Site Instruction will include full information detailing the variation under consideration and will be accompanied by such drawing and other additional information as will be required for the execution of the proposed variation and for the detailed pricing of it by the Contractor.

- ii. The Contractor shall submit a detailed quotation on the variation to the Superintendent within 14 days of the date of issue of the Site Instruction, unless such time is not appropriate, in which case the quotation shall be submitted by such date as the Superintendent shall nominate. The quotation shall include or be accompanied by full supporting details on the pricing of individual items. The quotation shall use the rates quoted in the schedule of works, where applicable.
- iii. No work included in the proposed variation shall be commenced by the Contractor until such time as a duly certified Variation Order is issued to them. However, the issue of a Site Instruction will signify the intention to have such work carried out and the Contractor shall not continue nor commence any work which is in conflict with the variation under construction.
- iv. If a Site Instruction is issued with respect to a variation to the work of a nominated Sub-Contractor the foregoing procedure shall be adopted. However, a copy of the Nominated Sub-Contractor's quotation shall be forwarded to the Superintendent.

1.19 Fees and Regulations

The costs of all necessary permits and connections fees to all concerned authorities and the obtaining of these permits to cater for the works required in this tender ***shall be included in this quotation.***

The Contractor shall pay all fees and comply with all regulations as detailed in Clause 14 of the General Conditions of Contract.

The whole of the work is to be carried out in accordance with all By-Laws and Regulations of any Authorities having jurisdiction over the works.

1.20 Barriers

The Contractor shall provide, erect and maintain all necessary temporary barriers around footways and all trenches for the protection of the public. This work shall be completely removed at the completion of the Works.

1.21 Existing Services

The Contractor shall be responsible to prevent damage to any existing services on site. Any damage caused shall be made good to the satisfaction of the Superintendent.

1.23 Retention Monies

Council requires the Contractor to lodge two Bank Guarantees valued at 5% each to cover retention funds required during the course of the contract and/or the defects liability period.

1.24 Safety

The Contractor shall carry out the whole of the works in a thoroughly safe manner and in particular shall conform to the requirements of all occupational health and safety standards including relevant Acts and Statutes of Parliament, Regulations, By-Laws or Orders relating to the safety of persons on or about the site.

The Contractor shall ensure that all equipment necessary for execution of the works is of adequate strength and otherwise safe for use, and shall remove from the site any equipment which becomes, or is likely to become unsafe.

Please Note

- All machinery must be fitted with Burst Hose Protection on all hydraulic cylinders and fitted with a Roll Over Protection System (ROPS) or Fall Over Protection System (FOPS) Canopy.
- All trucks must have a roadworthy certificate, rotating safety lights.
- All submitted plant and machinery must comply with Workplace Health and Safety standards.
- All materials must be NATA certified.

Contractor shall submit a Safety Management Plan which will address the following:

- WHS requirements(eg. policies, procedures, incident notification, etc.)
- WHS roles and responsibilities of the contractor (including their management teams)
- Procedures for handling non-compliance with WHS policies, procedures and agreed work methods
- Process for eliminating or reducing WHS risks as far as practicable
- Reporting expectations, including:
 - Health and safety performance (e.g. incidents, near misses and hazards)
 - Site inductions and training
 - Minutes of consultation arrangements and issue resolution
 - Changing agreed actions or controls
- Procedures for handling changes to processes, procedures or controls
- Scheduling and procedures for inspections and audits of work
- Principal and contractor communications

- The requirement for Contractors to inform the Principal that their personnel are on-site
- Induction and training processes
- Methods or processes for dealing with:
 - Unexpected or previously unidentified hazards (such as sub surface asbestos) and the expectation that contractors shall implement effective risk management practices as per WHS regulatory requirements
- There will be high risk work associated with this contract which includes, but not limited to working at heights and electrical installation.

Standard of Plant, Machinery and Material

Sorell Council requires that all plant and machinery operating on designated works sites meet all statutory requirements relating to registration and insurance and are free from defects that may affect their safe operation. Plant and machinery that do not meet these requirements may be banned from the work site until the matter is remedied.

All materials supplied to Council need to conform with Australian Standards where applicable and proof of such qualification may be required prior to the material being accepted on the work site.

Any breaches of these standards may result in the issue of a non-conformance to the contractor or supplier.

1.25 Approved Sub-Contractors

The Contractor, shall submit for approval, a list of all Sub-Contractors to whom they intend subletting any portion of the works.

The company nominated as sub-contractor on the tender form must be used to carry out the works during construction. If circumstances arise where the nominated sub-contractor can no longer carry out the works and another sub-contractor must be engaged, consent must be given by Council prior to engaging that sub-contractor.

Any Sub-Contractor not approved shall not undertake any of the works covered by this Contract.

1.26 Making Good

The Contractor shall be responsible for making good any damage to fencing, drains, roads, footpaths and surfaces generally, and any other works which may be disturbed or injured by cartage or any other operation in carrying out this Contract.

1.27 Site Visit

The lodging of a tender shall infer that the Contractor has previously visited the site and become familiar with all work involved in this contract, together with existing conditions on and surrounding the site.

No claim for extra work or time will be considered as a result of neglect of the above provision.

1.28 Dimensions on Drawings

The Contractor shall check all dimensions before setting out any work on the site. Any discrepancies shall be referred immediately to the Superintendent. The drawings shall not be scaled.

1.29 Materials and Workmanship

Where applicable the latest SAA Code (with amendments) shall define the acceptable standards for materials and workmanship.

Where no standard exists the Contractor shall refer to the Superintendent for advice. The Superintendent reserves the right to reject any such work that does not meet with his approval.

All materials shall be new and to the approval of the Superintendent.

1.30 Samples

When requested, the Contractor shall furnish to the Superintendent for approval samples of all materials to be used in the execution of the works and of the finishes to be applied.

Materials and finishes used in the works, must be in accordance with and equal to the approved samples.

1.31 Contractor to Supply

The Contractor shall supply all equipment, labour and materials as may be required to ensure the proper execution of the whole of the works, unless noted elsewhere in the contract documents. All items shown on the drawings and/or specified are to be included in the Contract.

1.32 Foreman

The Contractor shall appoint a competent Foreman, Deputy or representative to whom instructions can be issued by the Superintendent for the duration of the Contract. The appointment shall be approved by the Superintendent and the Foreman shall not be changed without approval. The Foreman shall be available on site during working hours.

1.33 Cleaning and Finishing

During building operations the Contractor shall at all times keep the site and works clean and tidy. Spoil and debris must be removed as work proceeds and not allowed to accumulate.

On completion of works and prior to handing over to the Principal:-

- Remove all temporary structures, fences, services, plant and equipment.
- Remove all surplus materials and debris.
- Make good all damage and bring all surfaces to the specified finish.
- Clean the site.

1.34 Obvious Work

Where a construction or item of work is to be obviously inferred or is usual and proper in the class of work generalised in this Specification the same is to be included notwithstanding that such construction or such necessary item is not specially mentioned in this Specification or shown on the drawings.

1.35 Sealed Containers

No manufactured material or products which is sold in closed or sealed containers is to be taken onto the site of the works or on to any place where any part of the works is being carried out unless still in the original container and with the manufacturer's seal intact. Failure to comply with this requirement will result in rejection of the material or product.

1.36 Mounted Drawings

One set of all drawings required by the Contract is to be kept on the site of works by the Contractor and shall be suitably mounted and protected.

1.37 Import Duty

The Contract Sum shall be deemed to include allowance for Customs Duty (where same applied) on all imported goods, materials and fittings required or used in or forming part of the works.

1.38 Poisonous and Other Injurious Substances

Adequate precautions shall be taken to keep all poisonous and other injurious substances in places secured against access by unauthorised persons.

1.39 Existing Trees and Shrubs

Every endeavour must be made to preserve existing trees and shrubs. The Contractor is required to slash all vegetation with a trunk diameter less than 150mm, and to remove slashed material off site.

1.40 As Constructed Drawings

The Principal's Surveyor shall prepare "as constructed" drawings to the standard required by the local authority. The contractor shall supply a competent member of their workforce to assist the surveyor if required. No service may be backfilled or covered in any way prior to measurements being taken. Written authorisation to backfill is then required from the Principal's Surveyor and the Superintendent. This cost of this shall be covered within the Contract rates.

1.41 Charges and Fees

All charges of whatever description are deemed to be included in rates tendered in the contract schedules.

All Municipal fees and other lawful charges due or requisite on account of the work of contract shall be paid by the Contractor as part of his contract unless the Contractor

ascertains specifically from the relevant authority that the work is free of payment of such fees or dues.

TCBIB fee to be paid and receipt provided to Council before possession of site will be arranged.

1.42 Provision for Traffic and Services

The Contractor shall provide, erect and maintain such temporary fences, barriers, night lights, etc. as may be necessary to protect the general public and property and in this respect shall comply with any direction from the Superintendent.

The contractor shall similarly provide all works necessary to avoid interruption to all services such as drains, water pipes, gas pipes, electricity supply mains, telephone cables and sewers. Where existing pipes are passed under they are to be securely slung or underpinned as directed. Any damage to gas pipes, electric supply, water or telephone lines is to be repaired immediately to the Superintendent's satisfaction.

The Contractor shall accept full responsibility for any accidents arising from the neglect of any necessary precaution whether specified herein or not during the contract time until the end of the maintenance. He shall obey all directions given to him with regard to the provision of lighting and barriers but shall not be thereby relieved of responsibility for any accidents or damage.

On completion of the works or any section thereof all drains and surrounding surfaces shall be made good and restored to their original condition. In the event of the Contractor's refusal or failure to carry out any of these works the Superintendent may, after twenty-four (24) hours notice in writing have such works carried out at the Contractor's expense.

The cost of the above-mentioned work shall be deemed to be included in the scheduled rates for excavation.

1.43 Alteration of Services

The Contractor shall promptly arrange for the alteration, lowering etc. of any water, gas, or other service or drainage pipe from properties which may require adjustment owing to construction of these works.

The Contractor shall, however, as part of his Contract, expose all pipes, mains and fittings to be altered, excavate for all new trenches as directed, backfill and consolidate all trenches and maintain the whole work as specified. Arrangements to lift or lower any manhole cover, inspection shaft, fireplug or valve must be made by the Contractor with the Authority concerned and all costs of alterations shall be deemed to be included in the Contract.

1.44 Sufficient Employees, Plant Etc

The Contractor shall engage and have at work sufficient employees to enable the Contract to be completed within the time of completion. The Contractor shall have sufficient plant and arrange an adequate supply of tools, materials, etc., together with a satisfactory rate of delivery of culvert and drainage pipes etc. to maintain a rate of progress satisfactory to the Superintendent.

If, in the opinion of the Superintendent, the Contractor fails to employ an adequate number of workers, or has not sufficient plant, materials, equipment, etc. to keep up a satisfactory rate of progress then the Principal may withhold all progress payments wholly or in part until the Superintendent's requirements have been complied with.

1.45 Prime Cost Items and Provisional Sums

Tenderers shall include in their tenders the prime costs items and/or provisional sum items scheduled. Transaction regarding such items shall be made only after the Contractor has received written instructions from the Superintendent authorising expenditure on such items. Payment for such works shall be made after official receipts for payments made the contractor have been lodged with the Superintendent.

1.46 Work Outside Normal Hours

No works of the contract shall proceed outside normal working hours without the prior written approval of the Superintendent and such other Statutory Authorities as may be required. This applies to work before 7.00 a.m. on any day or later than 5.00 p.m. on any day, and on Saturdays, Sundays, Public Holidays and Bank Holidays. The Contractor shall pay the costs of any additional supervision or inspections made necessary by work outside the times specified.

1.47 Corner Pegs

Corner pegs disturbed, buried or removed during construction of works are to be replaced by the Principal's Surveyor. The Contractor shall check all lot dimensions against site measurements before using any corner pegs to set out works. Any discrepancies shall be referred immediately to the Superintendent.

1.48 Specification

Prior to any relevant works the Contractor shall refer immediately to the Superintendent any differences between this specification and the current specification of the relevant authority.

No claims for variations to the contract sum will be considered for any work resulting from a conflict between the above mentioned specifications.

1.49 Setting Out of the Works

The Contractor is responsible for setting out the works as shown on the drawings. The Principal's Surveyor will provide digital information for use by plant mounted with working GPS technology.

The Principal's Surveyor will provide lot pegs and markers at manhole centres, if applicable. The Principal's Surveyor will provide to the Contractor survey set out plans showing the lot pegs and dumpy pegs placed on the ground.

The Contractor is responsible for offsetting or repositioning temporary marks to allow construction to proceed.

1.50 Soil and Water Management

The Contractor is responsible for carrying out effective soil and water management practices in accordance with “Water Sensitive Urban Design in Engineering Procedures for Stormwater Management Procedures in Southern Tasmania” from www.derwentestuary.org.au and in accordance with the Soil and Water Management Drawing for this contract.

1.51 Hold Points

Hold Points will be negotiated with the successful tenderer at the pre-construction meeting.

1.52 Statutory Declaration

The Contractor shall provide to Council prior to Practical Completion being given, a Stat Dec stating that all subcontractors and material suppliers have been paid.

SOUTH-EAST TRAINING FACILITY

DUBS & CO DRIVE, SORELL, TASMANIA 7172

ARCHITECT: LOCI ARCHITECTURE & PLANNING

TITLE REFERENCE #: 164990/1

FLOOR AREA: 687m2

WIND CATEGORY (TO AS4055-2012): AS CLASSIFIED BY PRIME ENGINEERING

SOIL CLASSIFICATION : AS CLASSIFIED BY PRIME ENGINEERING

CLIMATE ZONE (TO NCC 2015 PART 1.1.1): 7

BAL RATING: N/A

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

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CD 05	PROPOSED ELEVATIONS	1:100
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CD 23	CONSTRUCTION DETAILS 08	1:5
WHS01	WORKPLACE HEALTH & SAFETY REPORT	N/A

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Mobile: 0408 383 235 Email: loci.hobart@gmail.com

PO BOX 705 NORTH HOBART 7002

Accreditation #: CC5364 H RAIA #: 48053

Project

SOUTH-EAST TRAINING FACILITY

Dubs & Co. Drive, Sorell, TAS 7172

Client

Sorell Council

47 Cole Street, Sorell, TAS 7172

Drawing

COVER PAGE

All work shall conform to the spec. & other relevant drawings. Figured dimensions take precedence over scaled dimensions. Check all dimensions on site. Shop drawings shall be submitted to this office for approval prior to the commencement of any fabrication.

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J.B.

DATE

28.05.24

PROJECT NO.

2403

SCALE

N/A

DRAWN NO.

CD01

REV.



01

-

LOCATION PLAN

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WHS01	WORKPLACE HEALTH & SAFETY REPORT	N/A

- NOTES:**
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 - Supply and install (hard wired) smoke alarms in accordance to AS 3786. Smoke alarms are not to be located within 300mm of wall and ceiling junctions. (refer also electrical plan)
 - Insulation - Fire retardant batts to Energy Assessment
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Roof R4.1 batts - insulate entire ceiling space with polyester fire retardant batts.
 - All exposed structural steelwork shall be hot dip galvanized.
 - Soil Classification: refer soil report (where relevant.)
 - Provide a minimum air space of 8000 mm² under door leafs to rooms with exhaust fans, unless otherwise noted.
 - Mechanical exhaust fans to sanitary areas are to have 25 l/s discharge.
 - Splashbacks to be a minimum of 200mm ht. Behind sinks, troughs, vanities, etc., unless otherwise detailed in the specification and/or drawings.
 - Provide flyscreens with black wire to all operable windows (refer to window schedule.)
 - Provide lift off hinges to new toilet doorways where door is less than 1200mm from pan
 - All work to comply with the WHS Act. Any present or predicted safety risks to be reported to the Architect immediately.
 - Wet areas are to be water proofed as per installation requirements of AS3740 2010 - installer to provide certification

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Accreditation #: CC5364 H RAIA #: 48053

Project

SOUTH-EAST TRAINING FACILITY

Dubs & Co. Drive, Sorell, TAS 7172

Client

Sorell Council

47 Cole Street, Sorell, TAS 7172

Drawing

LOCATION

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N

01

CD03

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J.B.

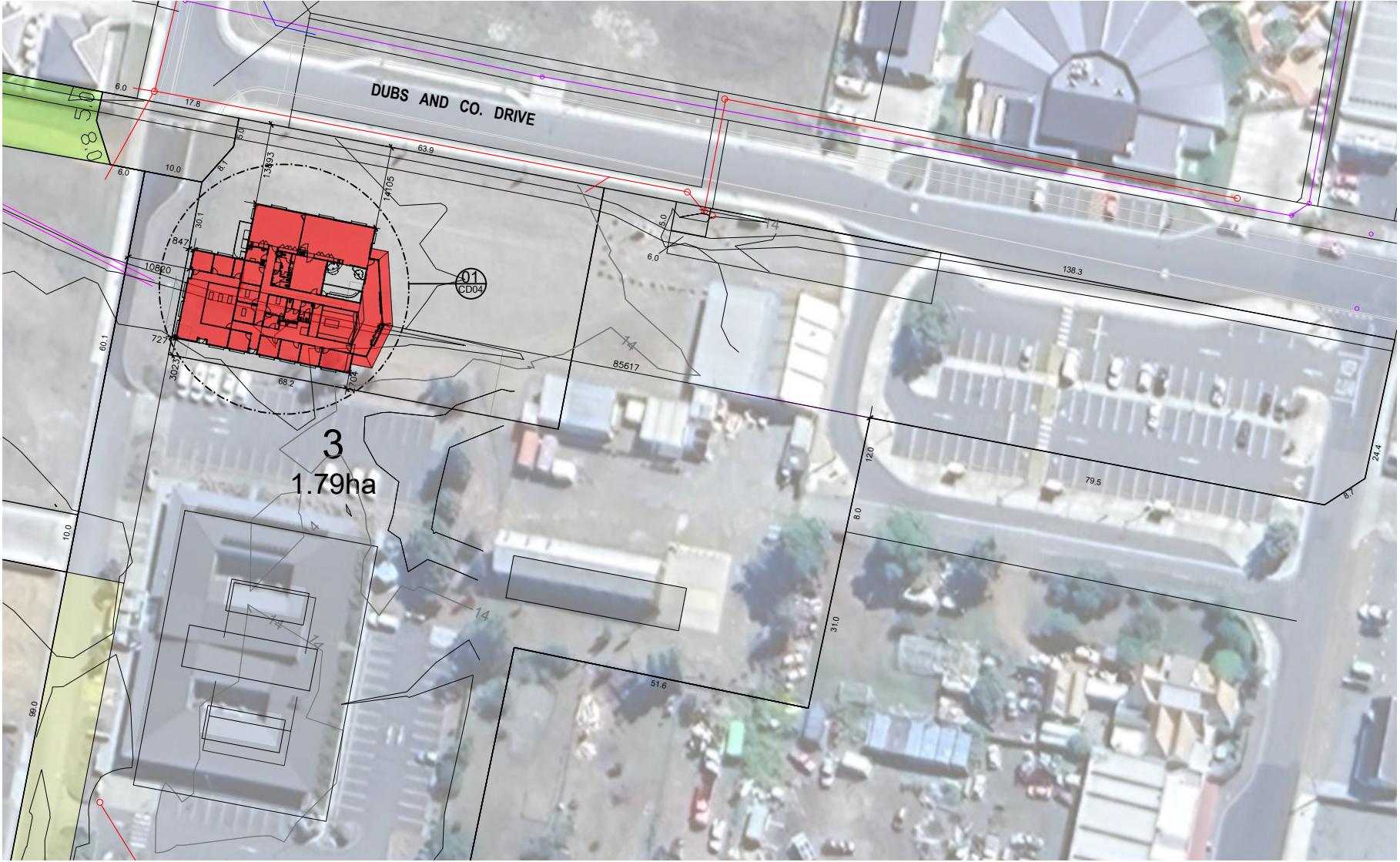
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PROJECT NO.
2403

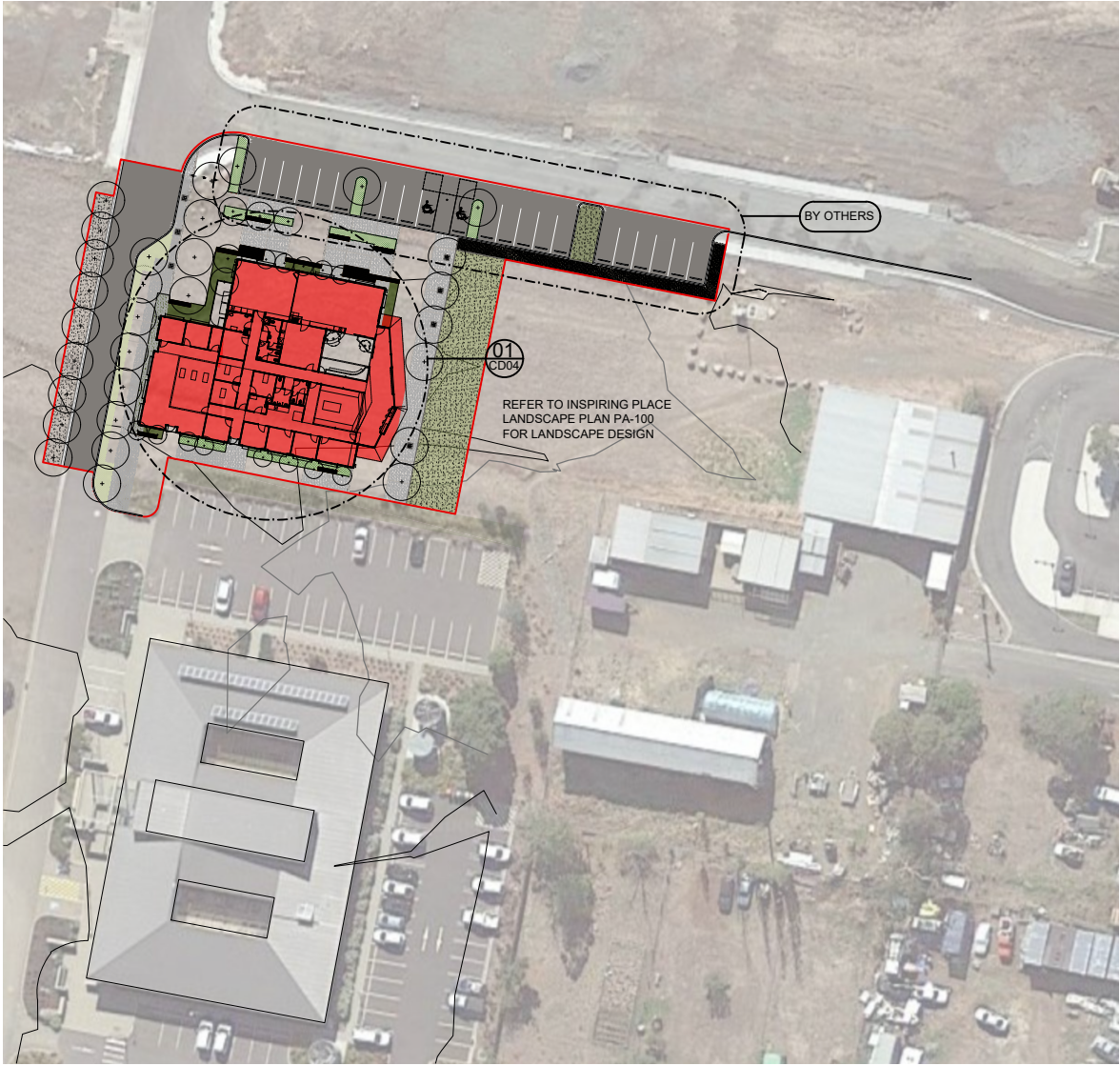
SCALE
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REV.
A

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!



01 SITE PLAN 01 - BUILDING LOCATION
CD02 SCALE 1:500



02 SITE PLAN 02 - LANDSCAPING & PARKING LOCATION.
CD02 SCALE 1:500

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WHS01	WORKPLACE HEALTH & SAFETY REPORT	N/A

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SOUTH-EAST TRAINING FACILITY
Dubs & Co. Drive, Sorell, TAS 7172

Client
Sorell Council
47 Cole Street, Sorell, TAS 7172

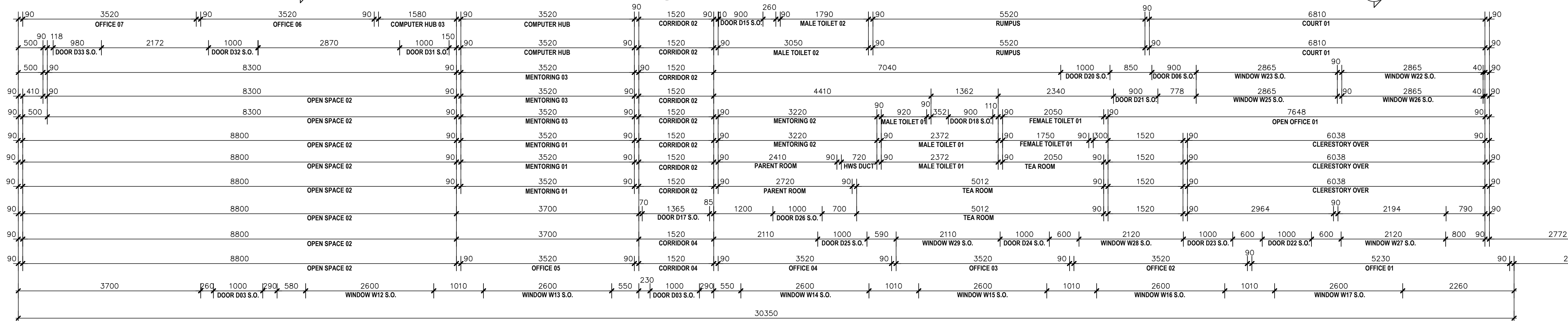
Drawing
SITE PLANS

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DATE 28.05.24	1:1,000@A3
PROJECT NO. 2403	REV. A
DRAWN NO. CD03	

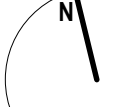
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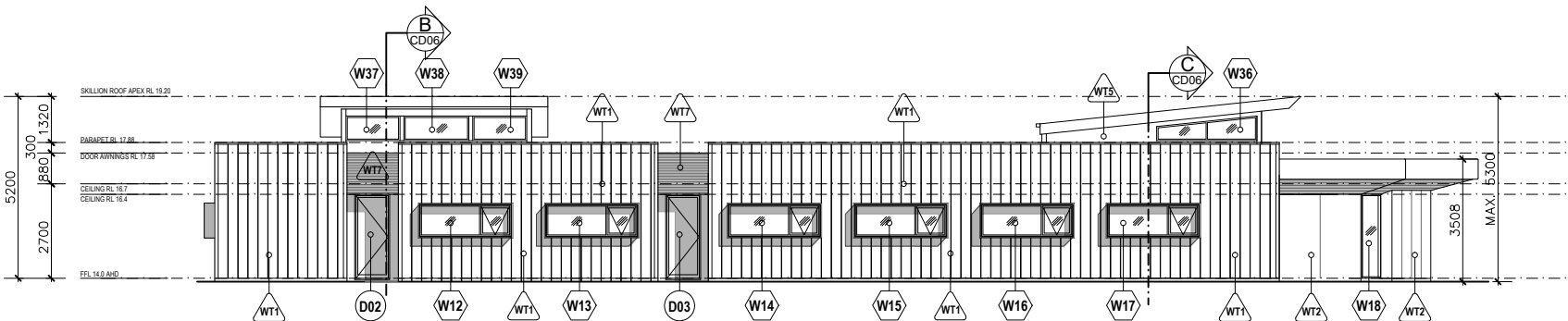
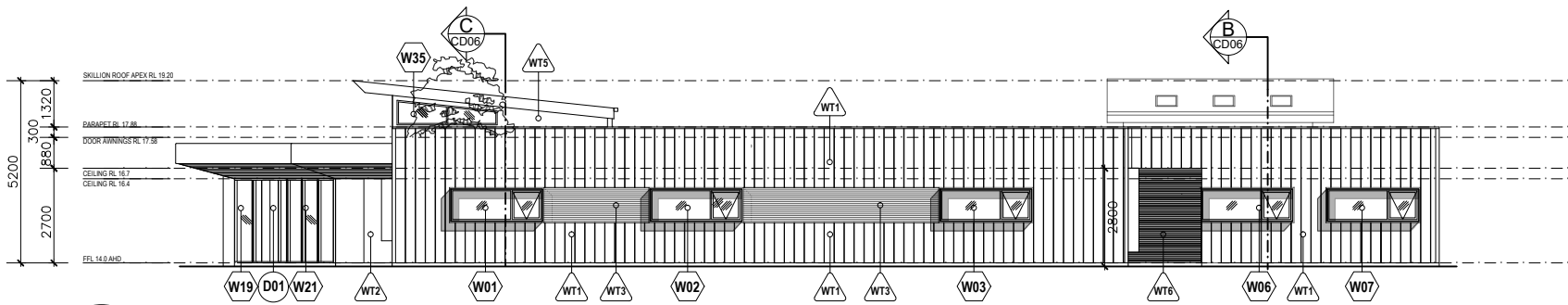
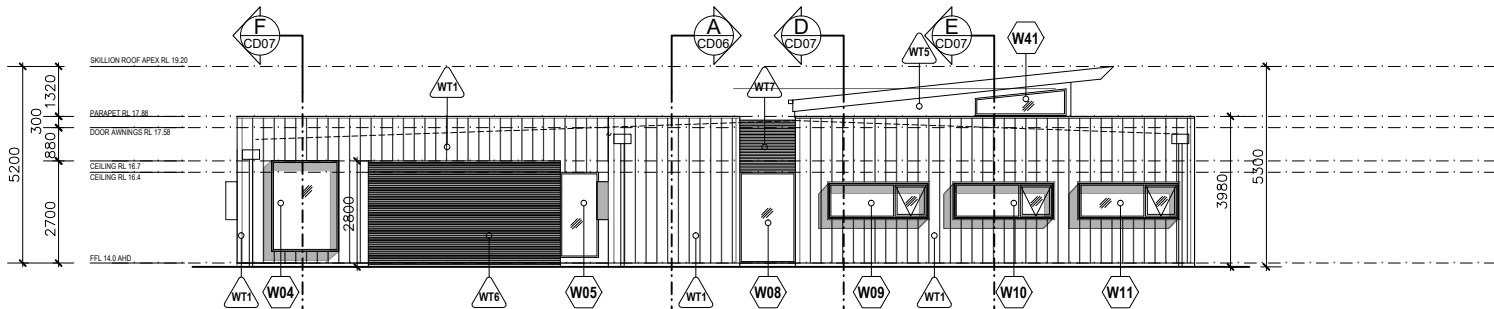
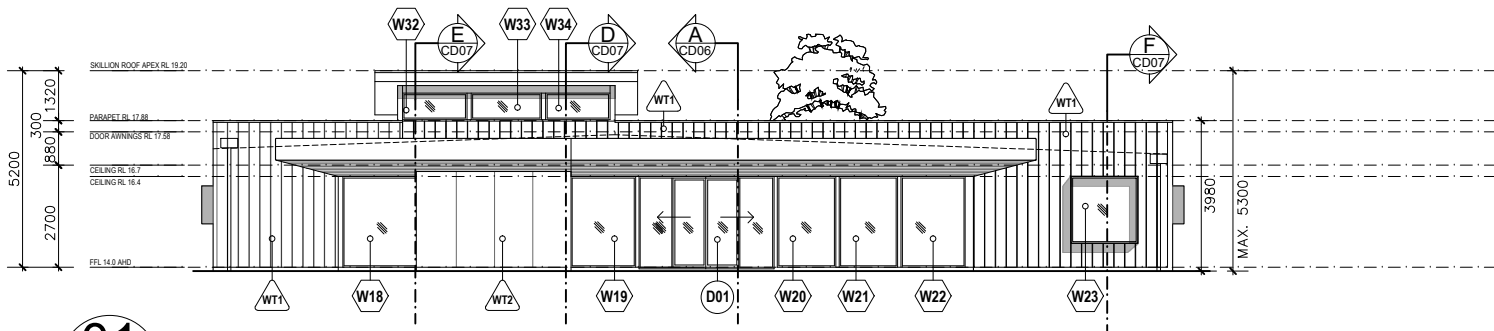
01 FLOOR PLAN
CD02 SCALE 1:50

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	DRAWN BY J.B.	SCALE
	DATE 28.05.24	1:50 @A0
	PROJECT NO.	1:100 @A3
	2403	

CD04	REV.
	A



LEGEND			
WT	REFER TO WALL TYPE LEGEND	C	REFER TO CONSTRUCTION DETAILS ON DRAWINGS CD16 - CD23
W	REFER TO WINDOW SCHEDULE ON DRAWINGS CD12 - CD13	J	REFER TO FUTURE JOINERY DETAILS
D	REFER TO DOOR SCHEDULE ON DRAWINGS CD14 - CD15	S	REFER TO SECTIONS ON DRAWINGS CD06 & CD07
		TAP	WATER TAP. CONFIRM LOCATION ON SITE
FINISHES SCHEDULE			
FLOOR			
FL1	CONC. SLAB. GRIND TO 800 GRIT FINISH. CLEAT POLYURETHANE FINISH.	FL2	COVERED SHEET VINYL. FLOORING. R10. POLYFLOR VERONA PUR. COLOUR: GLACIER S225.
FL3	CARPET TILES. MILLIKEN ONTERA MODEL # 203145. BATCH # ECL23.	FL4	POLYFLOR PALETTEONE SD. STATIC DISSIPATIVE VINYL. FLOORING. REFER NOTE 39. COLOUR: DOVE TAIL - 8607.
FL5	LANDSCAPING BY OTHERS. LEAVE LEVEL AND FREE OF DETRITUS.	FL6	CONC. SLAB. TROWEL FINISH. REFER TO STRUCTURAL ENGINEER'S DRAWINGS.
SKIRTING			
SK1	18mm x 96mm SQUARE SKIRTING WITH ARRS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL. PAINT FINISH COLOUR TBC.	SK2	150mm COVERED SHEET VINYL. POLYFLOR VERONA PUR. COLOUR: RAINSTORM.
CEILING			
CL1	10mm PLASTERBOARD. PAINT FINISH.	CL2	6mm VLLABOARD SOFFIT. PAINT FINISH.
CL3	10mm PLASTERBOARD ON RONDOL KEY-LOCK SUSPENDED CEILING SYSTEM. OR SIMILAR TO APPROVAL. INSTALL TO MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS. PAINT FINISH.		
CL4	MORTLOCK TIMBER PROPLANK TIMBER BATTEN LINING SYSTEM. TASAOK 40x20mm BLOCK PROFILE. 10mm SPACING. FINISH CUTEX CD50 CLEAR OIL. FIXED TO 9mm CEMENT SHEET. INSTALL TO MANUFACTURER'S INSTRUCTIONS & SPECIFICATIONS.		
CORNICE			
CN1	NEW SQUARE SET		

WALL TYPE LEGEND

- WT1 90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavibat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C05 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.
- WT2 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cementel Barestone Ash concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.
- WT3 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutex CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet on 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.
- WT4 90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.
- WT5 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.
- WT6 2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Cove- 50mm x 50mm Kabebani Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.
- WT7 70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutex CD50 clear oil to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.
- WT8 1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.
- These drawings are to be read in conjunction with all Engineers' drawings, Energy Assessment, Door & Window Schedules and Specification
 - Timber and/or steel members to be provided in accordance to Structural Engineer's details.
 - All glazing to be in accordance with AS 1288
 - All timber framing is to be in accordance with AS 1684 and Engineer's details.
 - All works are to comply with the Building Code of Australia and local requirements.
 - All dimensions and any given levels are to be checked on site prior to commencement of works. Written dimensions take precedence over scale - do not scale drawings. If in doubt, ask.
 - All plumbing, electrical and mechanical services to Engineering Solutions Tasmania's drawings and specifications.
 - Supply and install (hard wired) smoke alarms in accordance to AS 3786. Smoke alarms are not to be located within 300mm of wall and ceiling junctions. (refer also electrical plan)
 - Insulation - Fire retardant batts to Energy Assessment Walls R2.5 batts (or similar approved) Roof R4.1 batts - insulate entire ceiling space with polyester fire retardant batts.
 - All exposed structural steelwork shall be hot dip galvanized.
 - Soil Classification: refer soil report (where relevant.)
 - Provide a minimum air space of 8000 mm: under door leaves to rooms with exhaust fans, unless otherwise noted.
 - Mechanical exhaust fans to sanitary areas are to have 25 l/s discharge.
 - Splashbacks to be a minimum of 200mm ht. Behind sinks, troughs, vanities, etc., unless otherwise detailed in the specification and/or drawings.
 - Provide flyscreens with black wire to all operable windows (refer to window schedule.)
 - Provide lift off hinges to new toilet doorways where door is less than 1200mm from pan
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 - Wet areas are to be water proofed as per installation requirements of AS3740 2010 - installer to provide certification

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WHS01 WORKPLACE HEALTH & SAFETY REPORT	N/A

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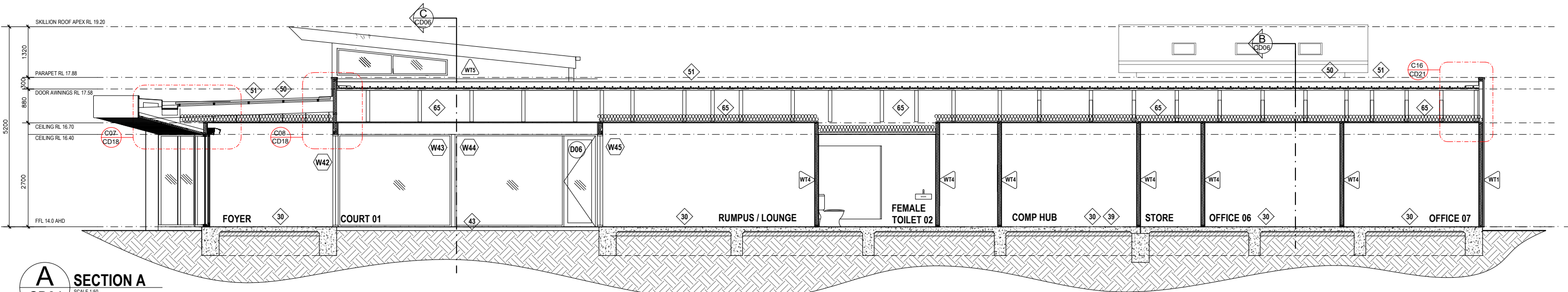
Drawing
PROPOSED ELEVATIONS

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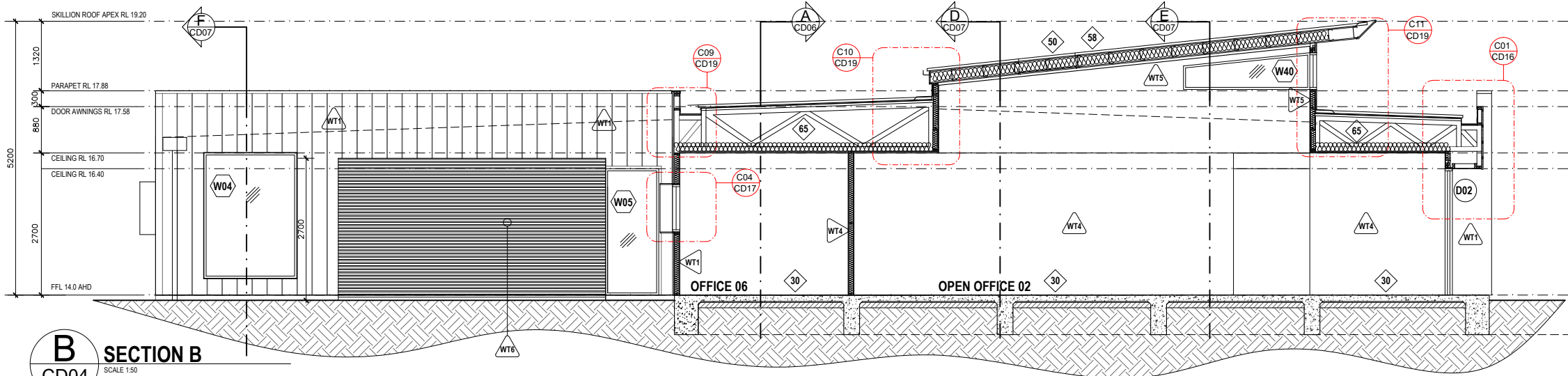
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DATE 28.05.24	REV.
PROJECT NO. 2403	CD05
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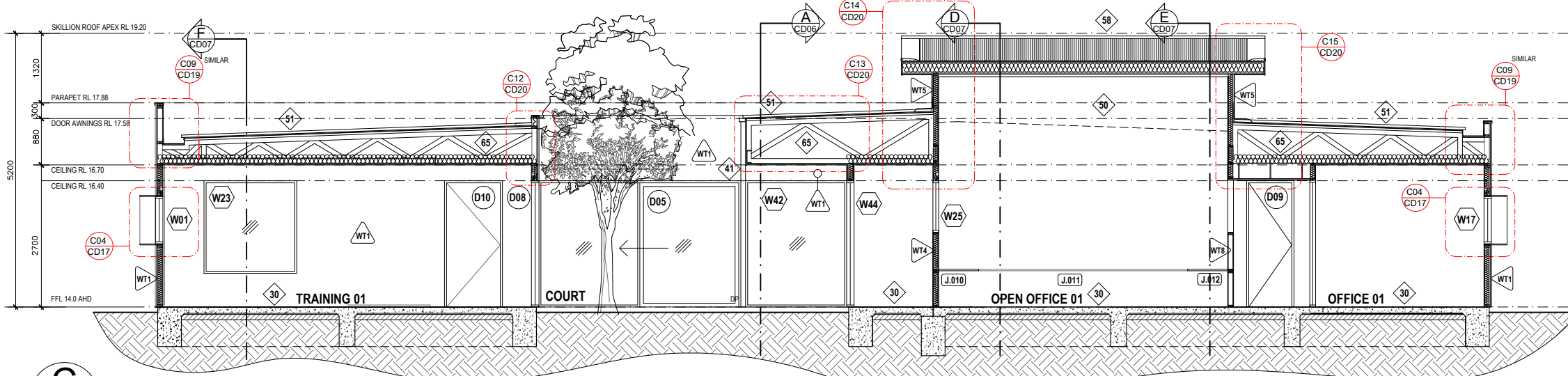
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A SECTION A
CD04
SCALE 1:50



B SECTION B
CD04
SCALE 1:50



C SECTION C
CD04
SCALE 1:50

WALL TYPE LEGEND



90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavibat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.



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90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet on 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Cove- 50mm x 50mm Kabebani Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.



70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.



1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.

FLOOR NOTES (30-44)

- 30 Refer to structural drawings for concrete slab and footing details.
- 31 Steel column to Engineer's Drawings & Specifications. Align to stud walls. plasterboard line internally. Unless otherwise detailed as Detail C06 on drawing CD17.
- 32 Externally exposed steel column to Engineer's Drawings & Specifications. Co-ordinate with window and door schedules and setbacks. Paint finish exposed surfaces. Colour: Monument.
- 33 665 x 1275 Velux FCM 2246 Skylight over. Install to manufacturer's specifications and instructions. Refer to Roof Plan. 10mm Plasterboard shaft- paint finish Colour TBC. Shaft to be insulated with R2.5 insulation. Coordinate size with truss setbacks prior to ordering.
- 34 1275 x 1275 Velux FCM 4646 Skylight over. Install to manufacturer's specifications and instructions. Refer to Roof Plan. 10mm Plasterboard shaft- paint finish Colour TBC. Shaft to be insulated with R2.5 insulation. Coordinate size with truss setbacks prior to ordering.
- 35 Co-ordinate operable wall setbacks and stacking with manufacturer, Structural Engineer's drawings, and joinery J.001 design.
- 36 New hot water cylinder to Hydraulic Engineer's drawings and specifications.
- 37 Seal total floor in wet area membrane extended 150mm min. up walls generally.
- 38 Slop-hopper to cleaners' cupboard. Connect to Hydraulic Engineer's drawings and specifications. Floor to Cleaners' Cupboard to be 150mm coved sheet vinyl flooring. Polyflor Polysafe Quattro PUR. Colour TBC.
- 39 Install Polyflor Palettone SD - Static Dissipative Vinyl Flooring to manufacturer's instruction and specifications including earth system connected to building earth by electrician.
- 40 Alcove soffit to be 6mm Villaboard. Paint finish: Monument.
- 41 Colorbond matt rectangular downpipe to Hydraulic Engineer's drawings & specifications. Install to manufacturer's instructions and specifications. Align to fascia gutter for straight run of downpipe from gutter. Colour Colorbond Monument.
- 42 90mmØ Downpipe and overflow downpipe from sump over, concealed within joinery. Connected to stormwater mains. Refer to Detail C05 on drawing CD17. Refer to Hydraulic Consultant's drawings.
- 43 Landscape design and scope for Court 01, and all door thresholds by others to the approval of Sorell Council and Holdfast Building Surveyors.
- 44 Provide adequate door circulation to comply with AS1428.1 to Building Surveyor's approval.

ROOF NOTES (50-65)

- 50 All roof framing to structural engineer's details.
- 51 Colorbond Lysaght Klip-lok 0.48 BMT tray roof at minimum 2 degree fall, fixed at max. 900 cts. Colour: Colorbond Monument. Install to manufacturer's specifications and instructions. Refer to Details on CD21 & CD22. All flashings and cappings to be Colorbond to match.
- 52 Colorbond parapet flashing 40mm turn down both sides. Colorbond flashing from under parapet flashing over inside face of parapet, extend 300mm over roof sheeting.
- 53 Colorbond flashing from under wall cladding. Extend 300mm over roof.
- 54 400w x 100mm deep Colorbond box gutter. 1:200 fall to sump. Refer to Hydraulic Consultant's drawings & Detail C22 on drawing CD23.
- 55 Min. 400W x 600mmL x 150mm deep Colorbond sump with overflow downpipe. Refer to Hydraulic Consultant's drawings & C21 on CD22.
- 56 450w x 120mm deep Colorbond box gutter, narrows to 300w x 120mm where indicated. Fall to rainwater head. Refer to Hydraulic Consultant's drawings & Detail C09 on drawing CD19.
- 57 Rainwater head connected to 120x80mm Colorbond downpipe connected to stormwater mains. Refer to Hydraulic Consultant's drawings.
- 58 Colorbond Custom Orb 0.48 BMT skillion roof at minimum 6 degree fall, fixed at max. 900 cts. Colour: Colorbond Monument. Install to manufacturer's specifications and instructions. Refer to Details on CD21 & CD22. All flashings and cappings to be Colorbond to match.
- 59 Square profile Colorbond matt Monument fascia gutter to Hydraulic Engineer's drawings & specifications. Install to manufacturer's instructions and specifications. Align to columns & downpipes for straight run of downpipe. Colour Colorbond Monument.
- 60 Square profile Colorbond matt Monument fascia gutter. Install to manufacturer's instructions and specifications. connected to spreader to lower roof. Refer to Hydraulic Consultant's drawings.
- 61 Colorbond flashing over roof sheeting 300mm. Turn down over fascia 40mm.
- 62 Colorbond ridge flashing over roof sheeting 300mm.
- 63 1275 x 1275 Velux FCM 4646 Skylight. Install to manufacturer's specifications and instructions. 10mm Plasterboard shaft- paint finish Colour TBC. Coordinate size with truss setbacks prior to ordering.
- 64 665 x 1275 Velux FCM 2246 Skylight. Install to manufacturer's specifications and instructions. 10mm Plasterboard shaft- paint finish Colour TBC. Coordinate size with truss setbacks prior to ordering.
- 65 Trusses by others. Refer to Structural Engineer's drawings and specifications for all fixings and structural support. Confirm levels and setbacks prior to commencing work.

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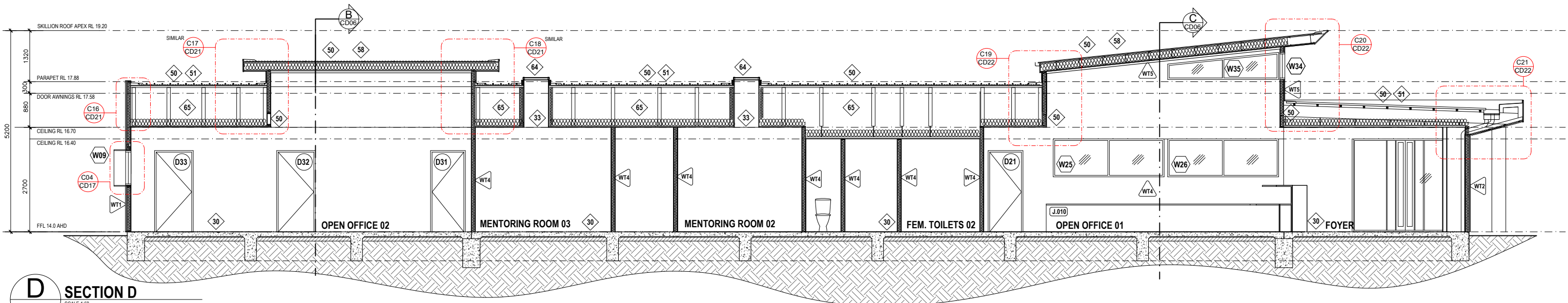
SOUTH-EAST TRAINING FACILITY
Dubs & Co. Drive, Sorell, TAS 7172

Client:
Sorell Council
47 Cole Street, Sorell, TAS 7172

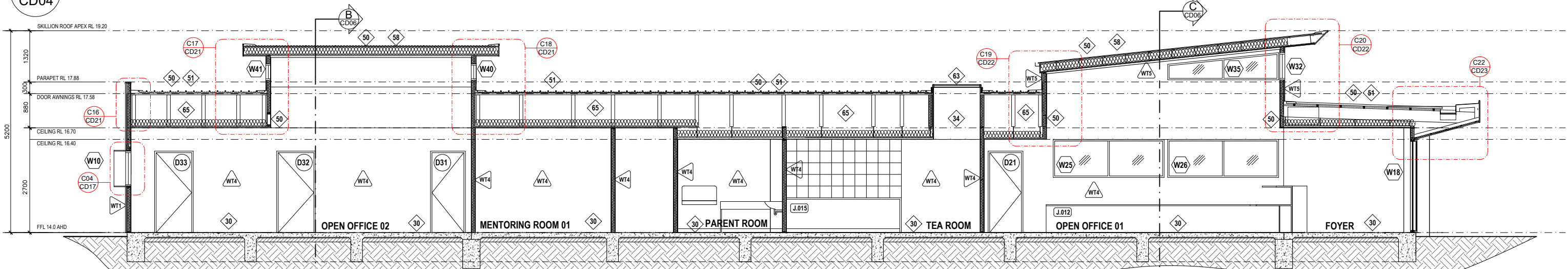
Drawing
PROPOSED SECTIONS 01

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DATE 28.05.24	1:100 @A3
PROJECT NO. 2403	REV.
DRAWN NO. CD06	A

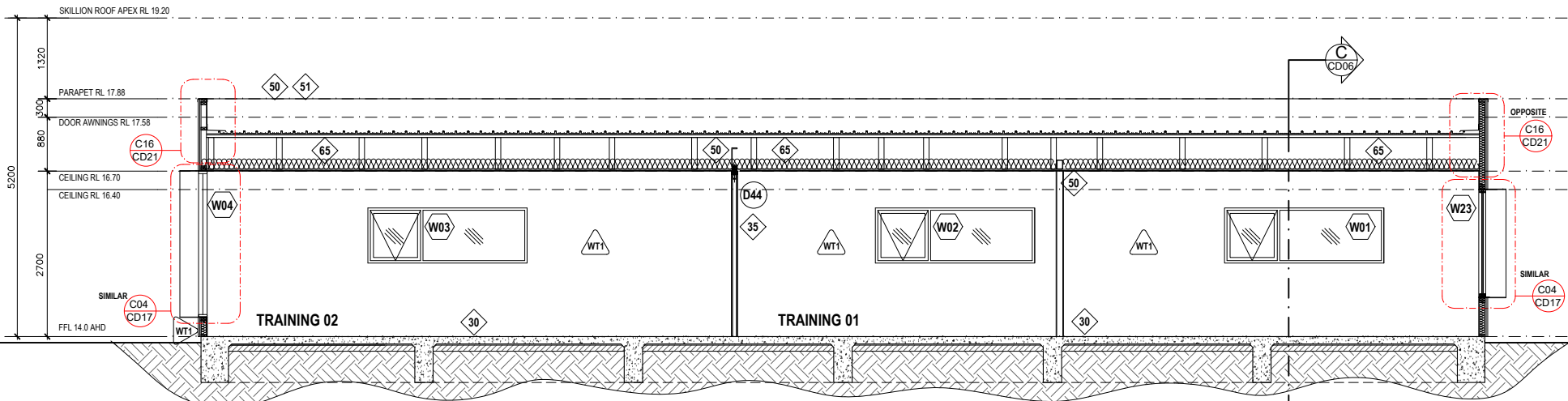
CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!



D SECTION D
CD04 SCALE 1:50



E SECTION E
CD04 SCALE 1:50



F SECTION F
CD04 SCALE 1:50

WALL TYPE LEGEND



90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cementil Barestone Ash concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet on 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type W1 nailstrip. Visible timber to align with window shade structures top & bottom.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Cove: 50mm x 50mm Kabebari Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.



70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.



1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.

FLOOR NOTES (30-44)

- 30 Refer to structural drawings for concrete slab and footing details.
- 31 Steel column to Engineer's Drawings & Specifications. Align to stud walls. plasterboard line internally. Unless otherwise detailed as Detail C06 on drawing CD17.
- 32 Externally exposed steel column to Engineer's Drawings & Specifications. Co-ordinate with window and door schedules and setbacks. Paint finish exposed surfaces. Colour: Monument.
- 33 665 x 1275 Velux FCM 2246 Skylight over. Install to manufacturer's specifications and instructions. Refer to Roof Plan. 10mm Plasterboard shaft-paint finish Colour TBC. Shaft to be insulated with R2.5 insulation. Coordinate size with truss setbacks prior to ordering.
- 34 1275 x 1275 Velux FCM 4646 Skylight over. Install to manufacturer's specifications and instructions. Refer to Roof Plan. 10mm Plasterboard shaft-paint finish Colour TBC. Shaft to be insulated with R2.5 insulation. Coordinate size with truss setbacks prior to ordering.
- 35 Co-ordinate operable wall setbacks and stacking with manufacturer, Structural Engineer's drawings, and joinery J.001 design.
- 36 New hot water cylinder to Hydraulic Engineer's drawings and specifications.
- 37 Seal total floor in wet area membrane extended 150mm min. up walls generally.
- 38 Slop-hopper to cleaners' cupboard. Connect to Hydraulic Engineer's drawings and specifications. Floor to Cleaners' Cupboard to be 150mm coved sheet vinyl flooring. Polyfor Polysafe Quattro PUR. Colour TBC.
- 39 Install Polyfor Palettone SD - Static Dissipative Vinyl Flooring to manufacturer's instruction and specifications including earth system connected to building earth by electrician.
- 40 Alcove soffit to be 6mm Villaboard. Paint finish: Monument.
- 41 Colorbond matt rectangular downpipe to Hydraulic Engineer's drawings & specifications. Install to manufacturer's instructions and specifications. Align to fascia gutter for straight run of downpipe from gutter. Colour Colorbond Monument.
- 42 90mmØ Downpipe and overflow downpipe from sump over, concealed within joinery. Connected to stormwater mains. Refer to Detail C05 on drawing CD17. Refer to Hydraulic Consultant's drawings.
- 43 Landscape design and scope for Court 01, and all door thresholds by others to the approval of Sorell Council and Holdfast Building Surveyors.
- 44 Provide adequate door circulation to comply with AS1428.1 to Building Surveyor's approval.

ROOF NOTES (50-65)

- 50 All roof framing to structural engineer's details.
- 51 Colorbond Lysaght Klip-lok 0.48 BMT tray roof at minimum 2 degree fall, fixed at max. 900 cts. Colour: Colorbond Monument. Install to manufacturer's specifications and instructions. Refer to Details on CD21 & CD22. All flashings and cappings to be Colorbond to match.
- 52 Colorbond parapet flashing 40mm turn down both sides. Colorbond flashing from under parapet flashing over inside face of parapet, extend 300mm over roof sheeting.
- 53 Colorbond flashing from under wall cladding. Extend 300mm over roof.
- 54 400w x 100mm deep Colorbond box gutter. 1:200 fall to sump. Refer to Hydraulic Consultant's drawings & Detail C22 on drawing CD23.
- 55 Min. 400W x 600mmL x 150mm deep Colorbond sump with overflow downpipe. Refer to Hydraulic Consultant's drawings & C21 on CD22.
- 56 450w x 120mm deep Colorbond box gutter, narrows to 300w x 120mm where indicated. Fall to rainwater head. Refer to Hydraulic Consultant's drawings & Detail C09 on drawing CD19.
- 57 Rainwater head connected to 120x80mm Colorbond downpipe connected to stormwater mains. Refer to Hydraulic Consultant's drawings.
- 58 Colorbond Custom Orb 0.48 BMT skillion roof at minimum 6 degree fall, fixed at max. 900 cts. Colour: Colorbond Monument. Install to manufacturer's specifications and instructions. Refer to Details on CD21 & CD22. All flashings and cappings to be Colorbond to match.
- 59 Square profile Colorbond matt Monument fascia gutter. Install to Hydraulic Engineer's drawings & specifications. Install to manufacturer's instructions and specifications. Align to columns & downpipes for straight run of downpipe. Colour Colorbond Monument.
- 60 Square profile Colorbond matt Monument fascia gutter. Install to manufacturer's instructions and specifications. connected to spreader to lower roof. Refer to Hydraulic Consultant's drawings.
- 61 Colorbond flashing over roof sheeting 300mm. Turn down over fascia 40mm.
- 62 Colorbond ridge flashing over roof sheeting 300mm.
- 63 1275 x 1275 Velux FCM 4646 Skylight. Install to manufacturer's specifications and instructions. 10mm Plasterboard shaft-paint finish Colour TBC. Coordinate size with truss setbacks prior to ordering.
- 64 665 x 1275 Velux FCM 2246 Skylight. Install to manufacturer's specifications and instructions. 10mm Plasterboard shaft-paint finish Colour TBC. Coordinate size with truss setbacks prior to ordering.
- 65 Trusses by others. Refer to Structural Engineer's drawings and specifications for all fixings and structural support. Confirm levels and setbacks prior to commencing work.

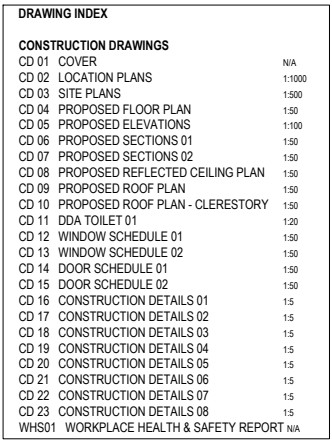
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CD 23 CONSTRUCTION DETAILS 08	1:5
WHS01 WORKPLACE HEALTH & SAFETY REPORT	N/A

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PO BOX 705 NORTH HOBART 7002
Accreditation #: CC5364 H RAIA #: 48053
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Dubs & Co. Drive, Sorell, TAS 7172

Client
Sorell Council
47 Cole Street, Sorell, TAS 7172
Drawing
PROPOSED SECTIONS 02
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DATE 28.05.24 REV. 1:100 @A3
PROJECT NO. 2403 DRAWN NO. CD07
2403 CD07 A

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!




Drawing

PROPOSED REFLECTED CEILING PLAN

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	DATE 28.05.24	1:50 @A3
	PROJECT NO. 2403	DRAWN NO. CD08
REVIEW A		

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. **WT3** Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structural Colobond MATT 25mm rib nailstrip 0.55 BMT 280mm trim sheeting. Concealed fixings to 18mm Cavitbat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colobond to match. Colour to be Colobond Monument. Refer to Structural Engineer's drawings & specifications.

90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. **WT2** Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement Barastone Ash concealed fixings to 18mm Cavitbat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.

90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. **WT3** Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet on 18mm Cavitbat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.

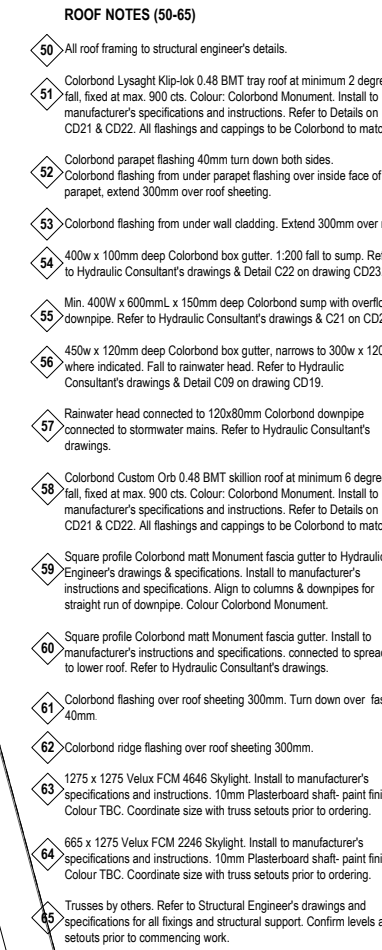
90 x 45 MGP10 Stud wall lined in 10mm plasterboard. **WT4** MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.

90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. **WT5** Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavitbat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.

280mm high glass batten screen. Align to top of window W04 head. Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Cove: 50mm x 50mm Kabekari Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.

70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.


1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.



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Accreditation #: CC5364 H RAIA #: 48053

Drawing

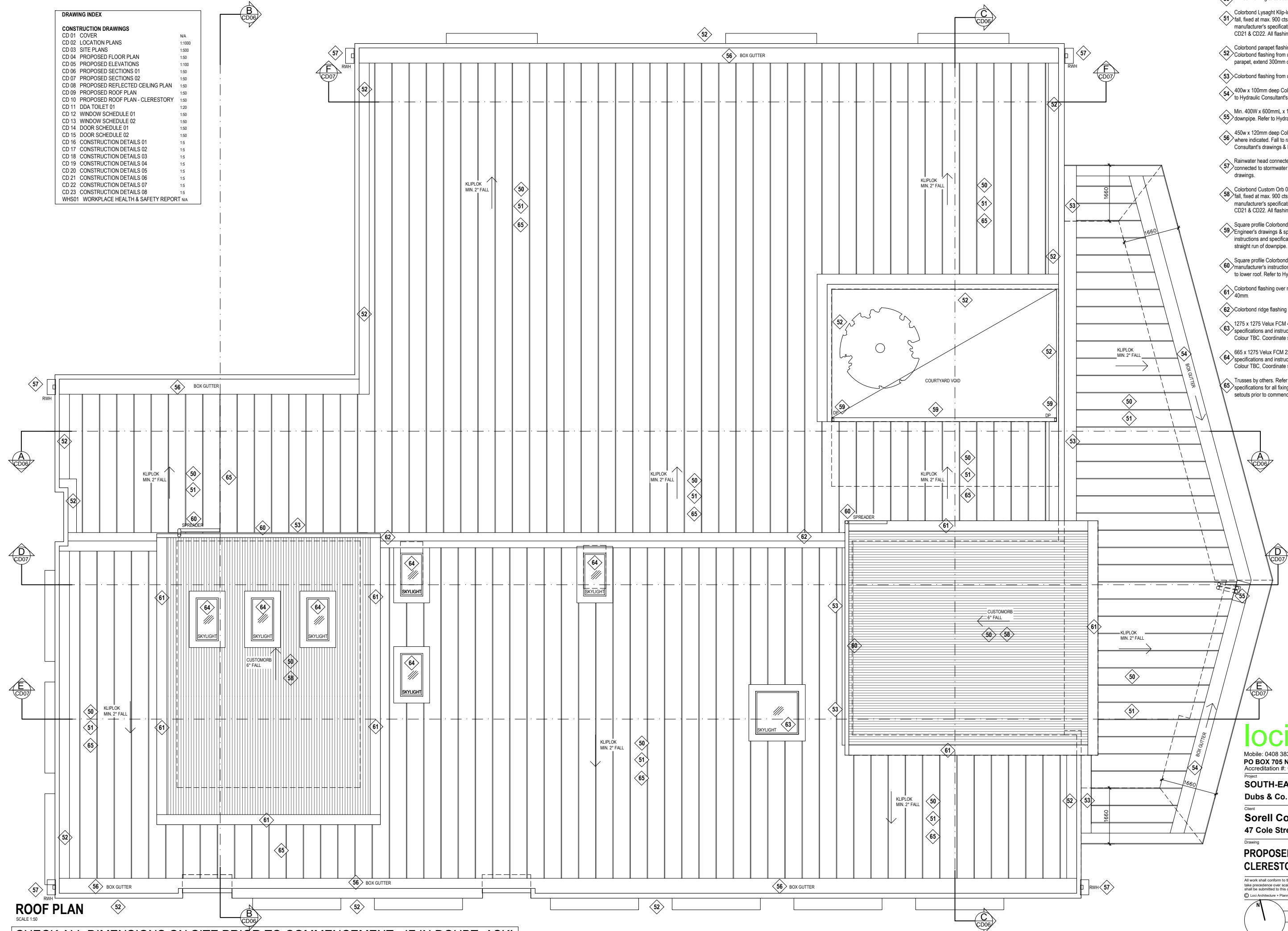
PROPOSED ROOF PLAN

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PROJECT NO. 2403	DRWN NO. CD09	REV. A

DRAWING INDEX		
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CD 22 CONSTRUCTION DETAILS 07	1:5	
CD 23 CONSTRUCTION DETAILS 08	1:5	
WHS01 WORKPLACE HEALTH & SAFETY REPORT	N/A	

ROOF NOTES (50-65)

- 50 All roof framing to structural engineer's details.
- 51 Colorbond Lysaght Klip-lok 0.48 BMT tray roof at minimum 2 degree fall, fixed at max. 900 cts. Colour: Colorbond Monument. Install to manufacturer's specifications and instructions. Refer to Details on CD21 & CD22. All flashings and cappings to be Colorbond to match.
- 52 Colorbond parapet flashing 40mm turn down both sides. Colorbond flashing from under parapet flashing over inside face of parapet, extend 300mm over roof sheeting.
- 53 Colorbond flashing from under wall cladding. Extend 300mm over roof.
- 54 400w x 100mm deep Colorbond box gutter. 1:200 fall to sump. Refer to Hydraulic Consultant's drawings & Detail C22 on drawing CD23.
- 55 Min. 400W x 600mmL x 150mm deep Colorbond sump with overflow downpipe. Refer to Hydraulic Consultant's drawings & C21 on CD22.
- 56 450w x 120mm deep Colorbond box gutter, narrows to 300w x 120mm where indicated. Fall to rainwater head. Refer to Hydraulic Consultant's drawings & Detail C09 on drawing CD19.
- 57 Rainwater head connected to 120x80mm Colorbond downpipe connected to stormwater mains. Refer to Hydraulic Consultant's drawings.
- 58 Colorbond Custom Orb 0.48 BMT skillion roof at minimum 6 degree fall, fixed at max. 900 cts. Colour: Colorbond Monument. Install to manufacturer's specifications and instructions. Refer to Details on CD21 & CD22. All flashings and cappings to be Colorbond to match.
- 59 Square profile Colorbond matt Monument fascia gutter to Hydraulic Engineer's drawings & specifications. Install to manufacturer's instructions and specifications. Align to columns & downpipes for straight run of downpipe. Colour Colorbond Monument.
- 60 Square profile Colorbond matt Monument fascia gutter. Install to manufacturer's instructions and specifications, connected to spreader to lower roof. Refer to Hydraulic Consultant's drawings.
- 61 Colorbond flashing over roof sheeting 300mm. Turn down over fascia 40mm.
- 62 Colorbond ridge flashing over roof sheeting 300mm.
- 63 1275 x 1275 Velux FCM 4646 Skylight. Install to manufacturer's specifications and instructions. 10mm Plasterboard shaft- paint finish Colour TBC. Coordinate size with truss setouts prior to ordering.
- 64 665 x 1275 Velux FCM 2246 Skylight. Install to manufacturer's specifications and instructions. 10mm Plasterboard shaft- paint finish Colour TBC. Coordinate size with truss setouts prior to ordering.
- 65 Trusses by others. Refer to Structural Engineer's drawings and specifications for all fixings and structural support. Confirm levels and setouts prior to commencing work.



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Project
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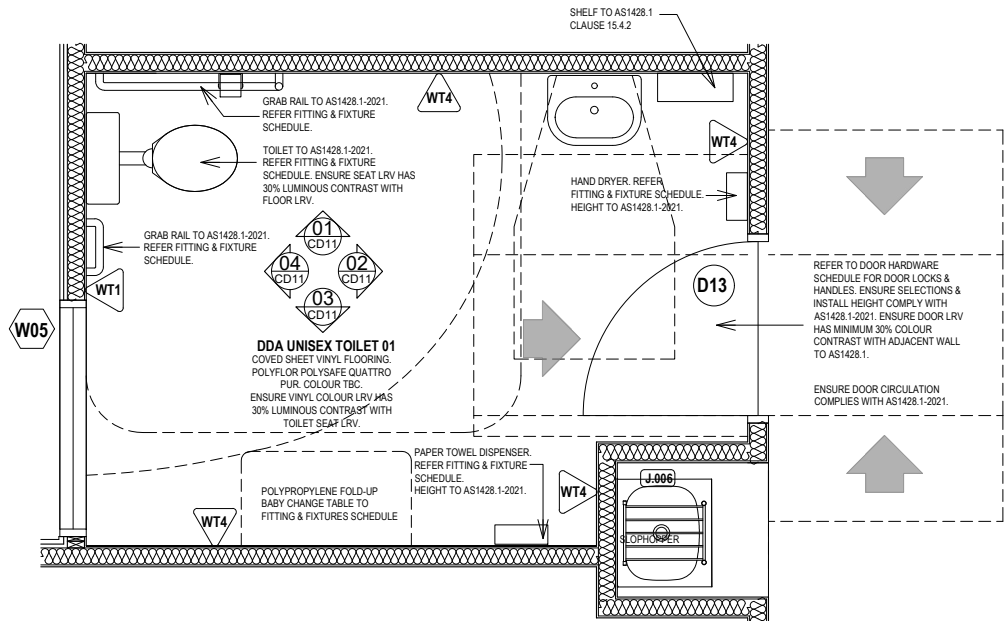
Client
Sorell Council
47 Cole Street, Sorell, TAS 7172

Drawing
PROPOSED ROOF PLAN - CLERESTORY

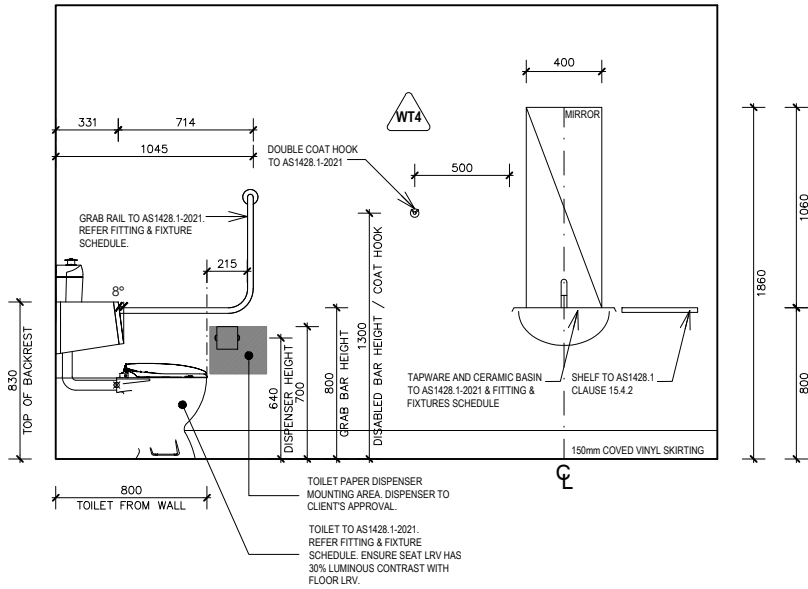
All work shall conform to the spec. & other relevant drawings. Figured dimensions take precedence over scaled dimensions. Check all dimensions on site. Shop drawings shall be submitted to this office for approval prior to the commencement of any fabrication.

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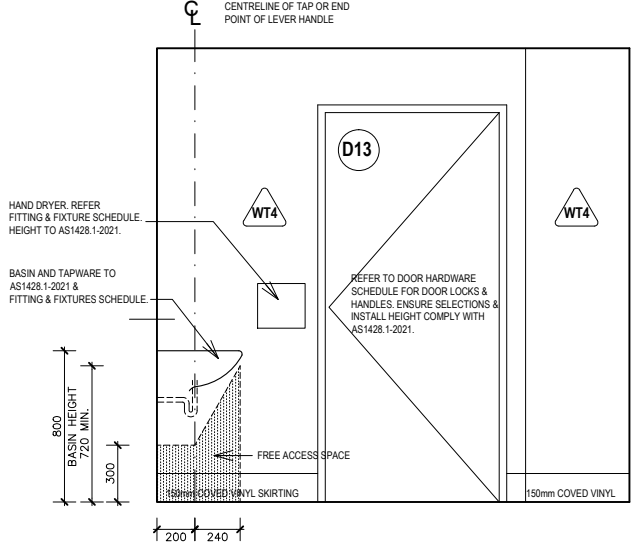
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DATE 28.05.24	1:100 @A3
PROJECT NO. 2403	REV. A
DRAWN NO. CD10	



DDA PLAN - DDA TOILET 01
CD04 SCALE 1:20



01 NORTH INTERNAL ELEVATION
CD11 SCALE 1:20



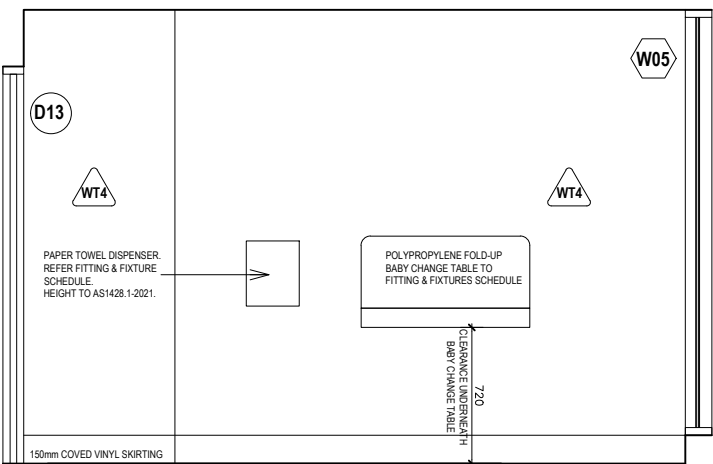
02 EAST INTERNAL ELEVATION
CD11 SCALE 1:20

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CD 22 CONSTRUCTION DETAILS 07		1:5
CD 23 CONSTRUCTION DETAILS 08		1:5
WHS01 WORKPLACE HEALTH & SAFETY REPORT		N/A

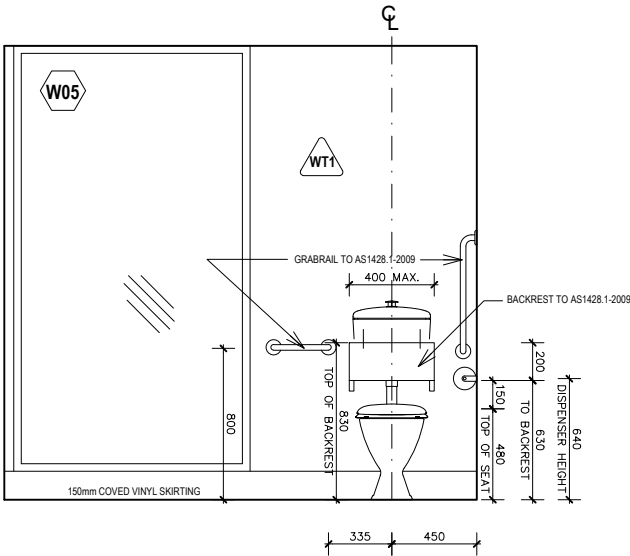
- NOTES:**
- These drawings are to be read in conjunction with all Engineers' drawings, Energy Assessment, Door & Window Schedules and Specification
 - Timber and/or steel members to be provided in accordance to Structural Engineer's details.
 - All glazing to be in accordance with AS 1288
 - All timber framing is to be in accordance with AS 1684 and Engineer's details.
 - All works are to comply with the Building Code of Australia and local requirements.
 - All dimensions and any given levels are to be checked on site prior to commencement of works. Written dimensions take precedence over scale - do not scale drawings. **If in doubt, ask.**
 - All plumbing, electrical and mechanical services to Engineering Solutions Tasmania's drawings and specifications.
 - Supply and install (hard wired) smoke alarms in accordance to AS 3786. Smoke alarms are not to be located within 300mm of wall and ceiling junctions. (refer also electrical plan)
 - Insulation - Fire retardant batts to Energy Assessment
Walls R2.5 batts (or similar approved)
Roof R4.1 batts - insulate entire ceiling space with polyester fire retardant batts.
 - All exposed structural steelwork shall be hot dip galvanized.
 - Soil Classification: refer soil report (where relevant.)
 - Provide a minimum air space of 8000 mm³ under door leats to rooms with exhaust fans, unless otherwise noted.
 - Mechanical exhaust fans to sanitary areas are to have 25 l/s discharge.
 - Splashbacks to be a minimum of 200mm ht. Behind sinks, troughs, vanities, etc., unless otherwise detailed in the specification and/or drawings.
 - Provide flyscreens with black wire to all operable windows (refer to window schedule.)
 - Provide lift off hinges to new toilet doorways where door is less than 1200mm from pan
 - All work to comply with the WHS Act. Any present or predicted safety risks to be reported to the Architect immediately.
 - Wet areas are to be water proofed as per installation requirements of AS3740 2010 - installer to provide certification

WALL TYPE LEGEND

- WT1** 90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavibat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.
- WT2** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cemental Barestone Ash concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.
- WT3** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet on 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.
- WT4** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.
- WT5** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.
- WT6** 2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Coveit- 50mm x 50mm Kabebari Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.
- WT7** 70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.
- WT8** 1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.



03 SOUTH INTERNAL ELEVATION
CD11 SCALE 1:20



04 WEST INTERNAL ELEVATION
CD11 SCALE 1:20

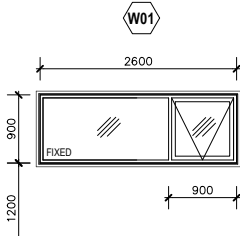
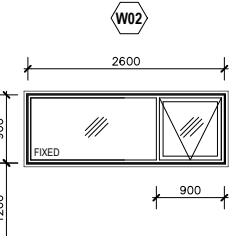
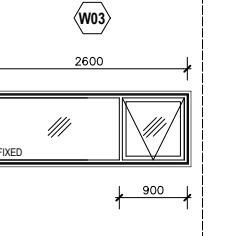
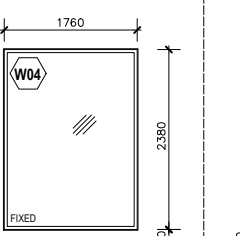
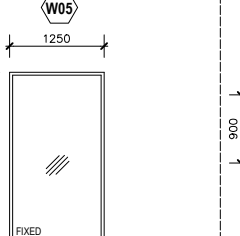
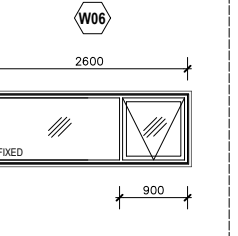
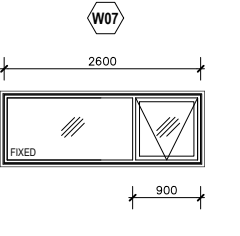
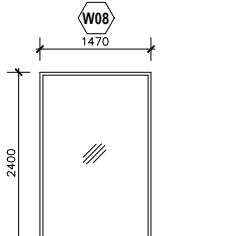
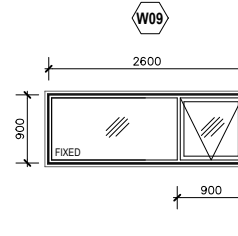
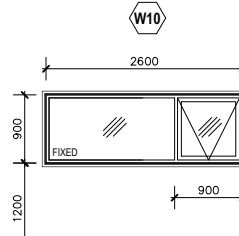
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Dubs & Co. Drive, Sorell, TAS 7172

Client
Sorell Council
47 Cole Street, Sorell, TAS 7172

Drawing
DDA TOILET 01

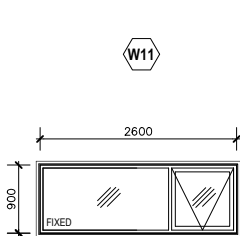
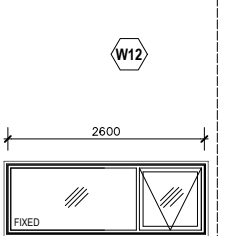
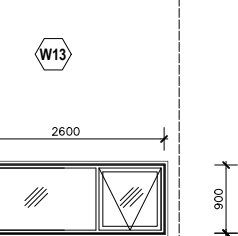
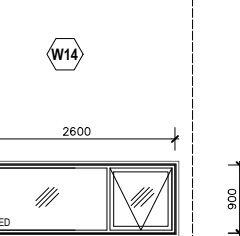
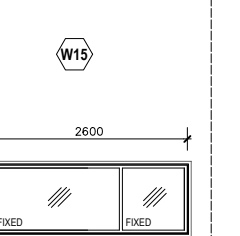
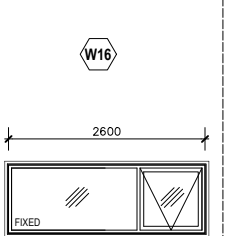
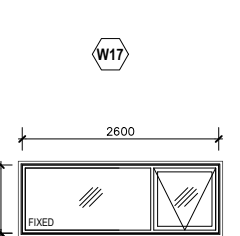
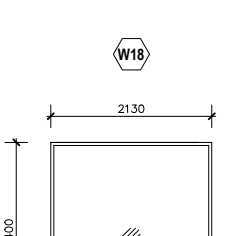
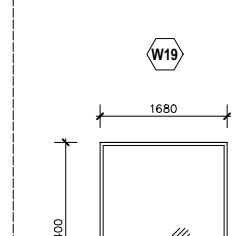
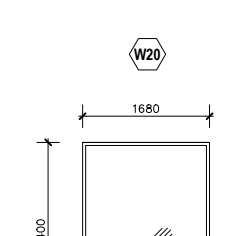
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DRAWN BY J.B.	SCALE 1:20 @A1 1:40 @A3
DATE 28.05.24	PROJECT NO. 2403
DRWN NO. CD11	REV. A

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

										
FINISHED FLOOR LEVEL										
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REMARKS / HARDWARE & ACCESSORIES	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-PLASTERBOARD REVEALS, NO ARCHITRAVES	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.

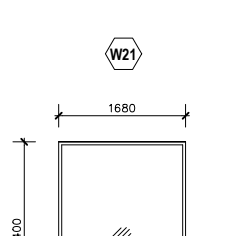
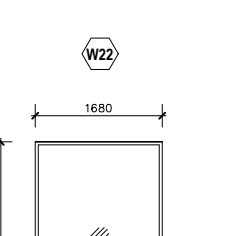
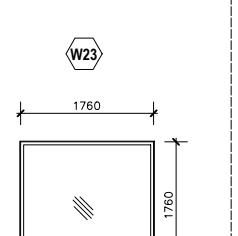

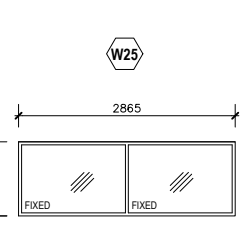
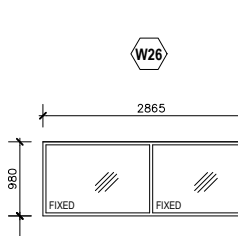
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REMARKS / HARDWARE & ACCESSORIES	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-MANUFACTURER'S LOCK -WINDER TO APPROVAL -PROJECTED SUNSHADE, REFER DETAIL C03 & C04 ON DRAWING CD17. CONFIRM STRUCTURAL INTEGRITY WITH STRUCTURAL ENGINEER.	-ALIGN HEAD AND SILL WITH HEAD AND SILL OF WINDOW W19.	-ALIGN HEAD AND SILL WITH HEAD AND SILL OF WINDOWS W18 & W20, AND DOOR D01.	-ALIGN HEAD AND SILL WITH HEAD AND SILL OF WINDOWS W19 & W21

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

						
FINISHED FLOOR LEVEL						
REF NO. & LOCATION	W21 FOYER 1 OFF	W22 FOYER 1 OFF	W23 TRAINING 01 1 OFF		W25 OPEN OFFICE 01 1 OFF	W26 OPEN OFFICE 01 1 OFF
TYPE	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.		CAPRAL AGS 400 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 400 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.
FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME		ALUMINIUM FRAME	ALUMINIUM FRAME
FINISH	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT		DULUX MONUMENT	DULUX MONUMENT
GLAZING	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR	CLEAR DOUBLE GLAZED LOW 'E' TO CODES		CLEAR SINGLE GLAZED: CAP-062-01: 6mm CLEAR	CLEAR SINGLE GLAZED: CAP-062-01: 6mm CLEAR
ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES		PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES
REMARKS / HARDWARE & ACCESSORIES	-ALIGN HEAD AND SILL WITH HEAD AND SILL OF WINDOWS W20 & W22.	-ALIGN HEAD AND SILL WITH HEAD AND SILL OF WINDOW W21.				

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

DRAWING INDEX	
CONSTRUCTION DRAWINGS	
CD 01 COVER	N/A
CD 02 LOCATION PLANS	1:1000
CD 03 SITE PLANS	1:500
CD 04 PROPOSED FLOOR PLAN	1:50
CD 05 PROPOSED ELEVATIONS	1:100
CD 06 PROPOSED SECTIONS 01	1:50
CD 07 PROPOSED SECTIONS 02	1:50
CD 08 PROPOSED REFLECTED CEILING PLAN	1:50
CD 09 PROPOSED ROOF PLAN	1:50
CD 10 PROPOSED ROOF PLAN - CLERESTORY	1:50
CD 11 DDA TOILET 01	1:20
CD 12 WINDOW SCHEDULE 01	1:50
CD 13 WINDOW SCHEDULE 02	1:50
CD 14 DOOR SCHEDULE 01	1:50
CD 15 DOOR SCHEDULE 02	1:50
CD 16 CONSTRUCTION DETAILS 01	1:5
CD 17 CONSTRUCTION DETAILS 02	1:5
CD 18 CONSTRUCTION DETAILS 03	1:5
CD 19 CONSTRUCTION DETAILS 04	1:5
CD 20 CONSTRUCTION DETAILS 05	1:5
CD 21 CONSTRUCTION DETAILS 06	1:5
CD 22 CONSTRUCTION DETAILS 07	1:5
CD 23 CONSTRUCTION DETAILS 08	1:5
WHS01 WORKPLACE HEALTH & SAFETY REPORT	N/A

NOTES:

MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE CURRENT EDITION OF THE RELEVANT AUSTRALIAN STANDARDS AND CODES, IN PARTICULAR AS1288, AND WILL BE REJECTED IF DEFECTIVE.

DESIGN WIND PRESSURE SHALL BE THE PERMISSIBLE STRESS DESIGN WIND PRESSURE DETERMINED IN ACCORDANCE WITH AS1170.2. REFER ENGINEER'S DRAWINGS FOR TERRAIN CATEGORY.

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ALL EXTERNAL DOORS & WINDOWS VIEWED FROM EXTERNAL SIDE

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

C.O.S. = CHECK ON SITE

**CONFIRM WINDOW SELECTIONS
COMPLY WITH ENERGY ASSESSMENT.
REPORT ANY DISCREPANCIES TO THE
BUILDING SURVEYOR FOR DIRECTION
BEFORE PROCEEDING.**

**CHECK ALL DIMENSIONS ON SITE
PRIOR TO COMMENCEMENT
- IF IN DOUBT, ASK!**

**REFER TO DRAWING CD 05 FOR
GENERAL NOTES**

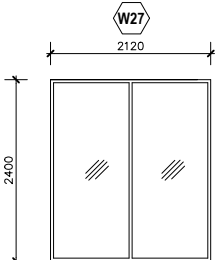
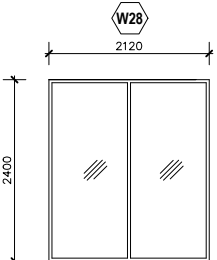
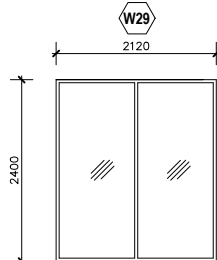
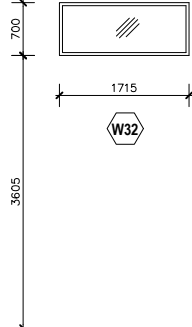
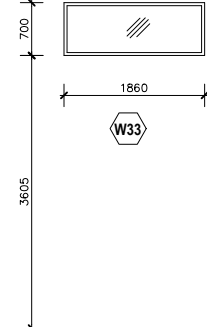
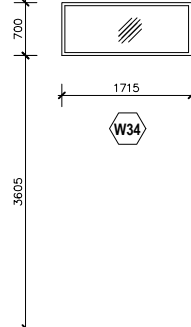
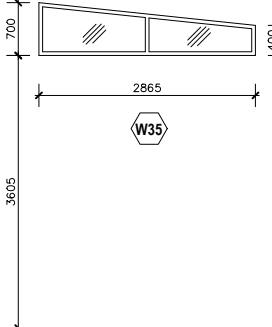
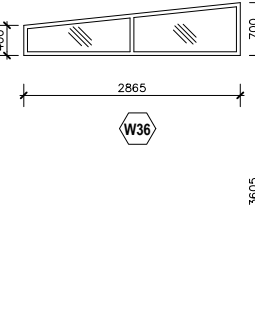
loci architecture + planning
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Accreditation #: CC5364 H RAIA #: 48053
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Dubs & Co. Drive, Sorell, TAS 7172

Client
Sorell Council
47 Cole Street, Sorell, TAS 7172

Drawing
WINDOW SCHEDULE 01

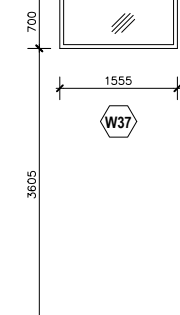
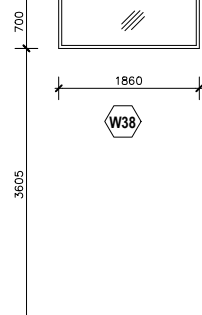
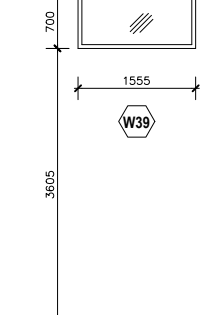
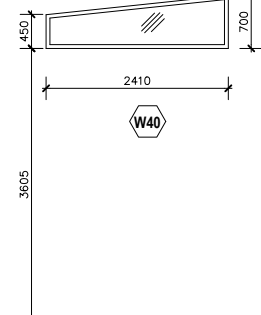
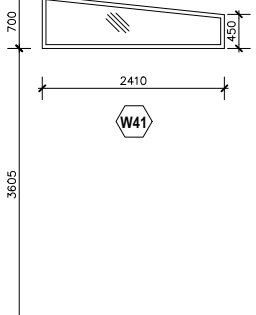
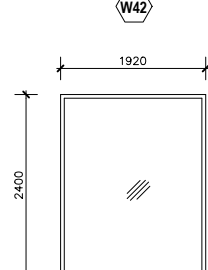
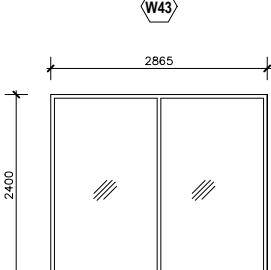
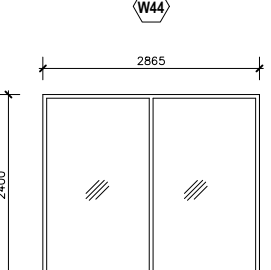
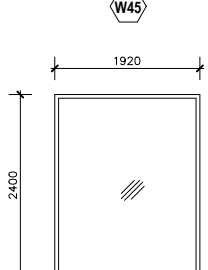
All work shall conform to the spec. & other relevant drawings. Figured dimensions take precedence over scaled dimensions. Check all dimensions on site. Shop drawings shall be submitted to this office for approval prior to the commencement of any fabrication.
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DRAWN BY J.B.	SCALE 1:50 @A1
DATE 28.05.24	1:100 @A3
PROJECT NO. 2403	REV. A

				DELETED W30	DELETED W31					
FINISHED FLOOR LEVEL										
REF NO. & LOCATION	W27 OFFICE 01 1 OFF	W28 OFFICE 02 1 OFF	W29 OFFICE 03 1 OFF			W32 OPEN OFFICE 01 (CLERESTORY) 1 OFF	W33 OPEN OFFICE 01 (CLERESTORY) 1 OFF	W34 OPEN OFFICE 01 (CLERESTORY) 1 OFF	W35 OPEN OFFICE 01 (CLERESTORY) 1 OFF	W36 OPEN OFFICE 01 (CLERESTORY) 1 OFF
TYPE & THICKNESS	CAPRAL AGS 400 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 400 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 400 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.			CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 400 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.
FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME			ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME
FINISH	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT			DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT
GLAZING	CLEAR SINGLE GLAZED: CAP-062-01: 6mm CLEAR	CLEAR SINGLE GLAZED: CAP-062-01: 6mm CLEAR	CLEAR SINGLE GLAZED: CAP-062-01: 6mm CLEAR			CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES
ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES							
REMARKS / HARDWARE & ACCESSORIES	-	-	-			ALIGN HEAD AND SILL WITH WINDOW W33	ALIGN HEAD AND SILL WITH WINDOWS W32 & W34	ALIGN HEAD AND SILL WITH WINDOW W33	ALIGN HEAD AND SILL WITH WINDOW W34	ALIGN HEAD AND SILL WITH WINDOW W32

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

									
FINISHED FLOOR LEVEL									
REF NO. & LOCATION	W37 OPEN OFFICE 02 (CLERESTORY) 1 OFF	W38 OPEN OFFICE 02 (CLERESTORY) 1 OFF	W39 OPEN OFFICE 02 (CLERESTORY) 1 OFF	W40 OPEN OFFICE 02 (CLERESTORY) 1 OFF	W41 OPEN OFFICE 02 (CLERESTORY) 1 OFF	W42 FOYER 1 OFF	W43 CORRIDOR 01 1 OFF	W44 CORRIDOR 01 1 OFF	W45 RUMPUS 1 OFF
TYPE & THICKNESS	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 425 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.
FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME	ALUMINIUM FRAME
FINISH	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT
GLAZING	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR DOUBLE GLAZED: CAP-063-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES
ARCHITRAVES									
REMARKS / HARDWARE & ACCESSORIES	ALIGN HEAD AND SILL WITH WINDOWS W38	ALIGN HEAD AND SILL WITH WINDOWS W37 & W39	ALIGN HEAD AND SILL WITH WINDOWS W38	ALIGN HEAD AND SILL WITH WINDOWS W37	ALIGN HEAD AND SILL WITH WINDOWS W39	-	-	-	-

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

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DRAWING INDEX	
CONSTRUCTION DRAWINGS	
CD 01 COVER	NA
CD 02 LOCATION PLANS	1:1000
CD 03 SITE PLANS	1:500
CD 04 PROPOSED FLOOR PLAN	1:50
CD 05 PROPOSED ELEVATIONS	1:100
CD 06 PROPOSED SECTIONS 01	1:50
CD 07 PROPOSED SECTIONS 02	1:50
CD 08 PROPOSED REFLECTED CEILING PLAN	1:50
CD 09 PROPOSED ROOF PLAN	1:50
CD 10 PROPOSED ROOF PLAN - CLERESTORY	1:50
CD 11 DDA TOILET 01	1:20
CD 12 WINDOW SCHEDULE 01	1:50
CD 13 WINDOW SCHEDULE 02	1:50
CD 14 DOOR SCHEDULE 01	1:50
CD 15 DOOR SCHEDULE 02	1:50
CD 16 CONSTRUCTION DETAILS 01	1:5
CD 17 CONSTRUCTION DETAILS 02	1:5
CD 18 CONSTRUCTION DETAILS 03	1:5
CD 19 CONSTRUCTION DETAILS 04	1:5
CD 20 CONSTRUCTION DETAILS 05	1:5
CD 21 CONSTRUCTION DETAILS 06	1:5
CD 22 CONSTRUCTION DETAILS 07	1:5
CD 23 CONSTRUCTION DETAILS 08	1:5
WHS01 WORKPLACE HEALTH & SAFETY REPORT	NA

NOTES:

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C.O.S. = CHECK ON SITE

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**REFER TO DRAWING CD 05 FOR
GENERAL NOTES**

loci architecture + planning
Mobile: 0408 383 235 Email: loci.hobart@gmail.com
PO BOX 705 NORTH HOBART 7002
Accreditation #: CC5364 H RAIA #: 48053
Project
SOUTH-EAST TRAINING FACILITY
Dubs & Co. Drive, Sorell, TAS 7172

Client
Sorell Council
47 Cole Street, Sorell, TAS 7172

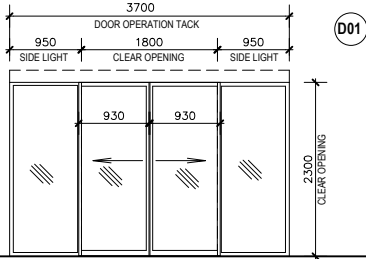
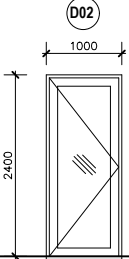
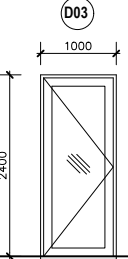
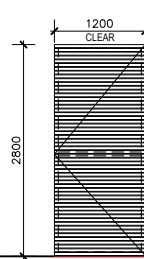
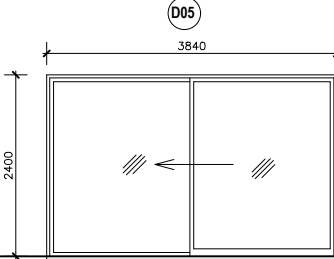
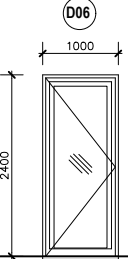
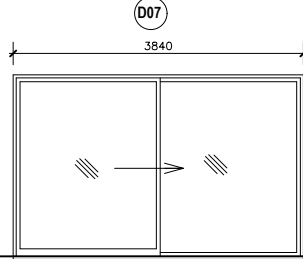
Drawing
WINDOW SCHEDULE 02

All work shall conform to the spec. & other relevant drawings. Figured dimensions take precedence over scaled dimensions. Check all dimensions on site. Shop drawings shall be submitted to this office for approval prior to the commencement of any fabrication

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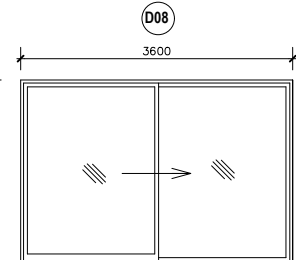
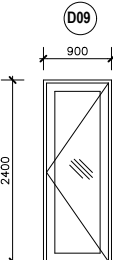
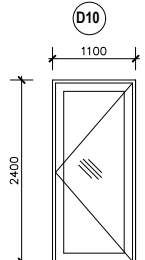
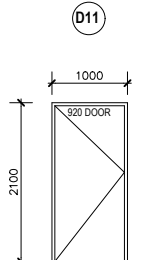
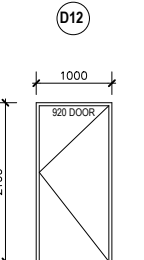
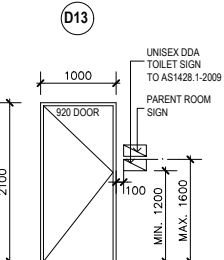
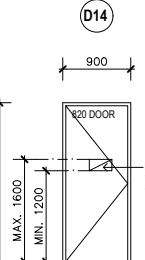
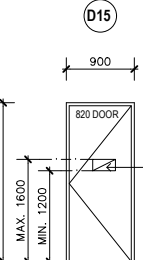
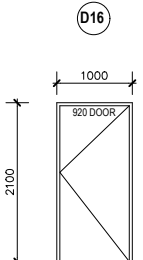
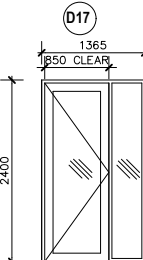
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DATE 28.05.24	1:100 @A3
PROJECT NO. 2403	REV. A

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

	 <div>D01</div>	 <div>D02</div>	 <div>D03</div>	 <div>D04</div>	 <div>D05</div>	 <div>D06</div>	 <div>D07</div>
FINISHED FLOOR LEVEL							
REF NO. & LOCATION	D01 FOYER 1 OFF	D02 OPEN OFFICE 02 1 OFF	D03 CORRIDOR 04 1 OFF	D04 SERVICE COURT 1 OFF	D05 FOYER 1 OFF	D06 CORRIDOR 01 1 OFF	D07 RUMPUS 1 OFF
TYPE & THICKNESS	DOOR: KONE AUTOMATIC SLIDING DOOR 30, DOUBLE SLIDING SIDE LIGHTS WINDOWS: CAPRAL AGS 225 NARROWLINE FRAMING SYSTEM OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 225 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 225 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	STEEL FRAME BATTEN GATE: CONVEY-KABEBARI CLADDING SQUARE BATTENS HORIZONTAL WITH 10MM SPACINGS. STEEL FRAME: REFER STRUCTURAL ENGINEER PAINT FRAME BLACK BATTENS COLOUR: BIERA OKU.	EXTERNAL GLAZED ALUMINIUM SLIDING DOORS: CAPRAL AGS 900 SERIES SLIDING DOOR OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 225 SERIES DOOR OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	EXTERNAL GLAZED ALUMINIUM SLIDING DOORS: CAPRAL AGS 900 SERIES SLIDING DOOR OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.
FRAME	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT		ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT
FINISH	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT		DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT
GLAZING	CLEAR DOUBLE GLAZED: CAP-003-01: 6mm CLEAR, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR LAMINATED DOUBLE GLAZED: CAP-S19-01: 6.38mm CLEAR LAMINATE, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR LAMINATED DOUBLE GLAZED: CAP-S19-01: 6.38mm CLEAR LAMINATE, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	-	CLEAR GRADE 'A' SAFETY GLASS DOUBLE GLAZED RETRACTABLE SLIDING ALUMINIUM FLYSCREEN- CENTOR S1 E ECO-SCREEN. FULL WIDTH, INCLUDING FIXED PANE. PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR LAMINATED DOUBLE GLAZED: CAP-S19-01: 6.38mm CLEAR LAMINATE, 12mm AIR GAP, 6mm CLEAR PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR GRADE 'A' SAFETY GLASS DOUBLE GLAZED RETRACTABLE SLIDING ALUMINIUM FLYSCREEN- CENTOR S1 E ECO-SCREEN. FULL WIDTH, INCLUDING FIXED PANE. PLASTERBOARD REVEALS, NO ARCHITRAVES
ARCHITRAVES							
REMARKS / HARDWARE & ACCESSORIES	-MANUFACTURER'S PROPRIETOR LOCK -AFTER HOURS DOOR RELEASE. LOCATION TO BE CONFIRMED.	-DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. -RAVEN WEATHER SEALS	-DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. -RAVEN WEATHER SEALS	-BATTENS INSTALLED TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS. -TO MATCH WALL TYPE W76. BATTENS TO ALIGN WITH THOSE OF W76. -DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE.	-LOCKS & HANDLES (REFER DOOR HARDWARE SCHEDULE) - RETRACTABLE SLIDING ALUMINIUM FLYSCREEN- CENTOR S1 E ECO-SCREEN. FULL WIDTH, INCLUDING FIXED PANE. - CO-ORDINATE HEAD HEIGHT AND VERTICAL S.O. WITH DETAIL C10 ON DRAWING WD10.	-DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. -RAVEN WEATHER SEALS	-LOCKS & HANDLES (REFER DOOR HARDWARE SCHEDULE) - RETRACTABLE SLIDING ALUMINIUM FLYSCREEN- CENTOR S1 E ECO-SCREEN. FULL WIDTH, INCLUDING FIXED PANE. - CO-ORDINATE HEAD HEIGHT AND VERTICAL S.O. WITH DETAIL C10 ON DRAWING WD10.

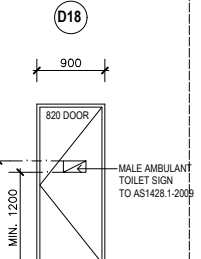
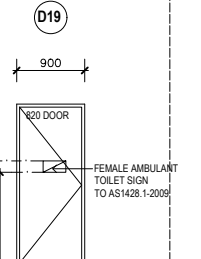
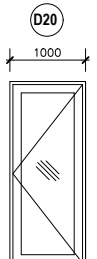
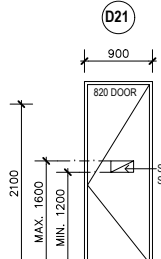
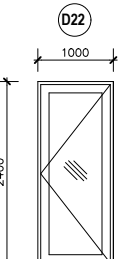
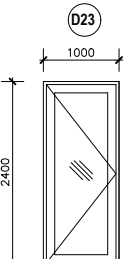
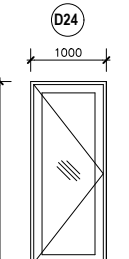
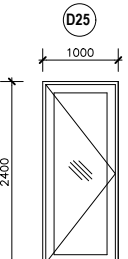
DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

	 <div>D08</div>	 <div>D09</div>	 <div>D10</div>	 <div>D11</div>	 <div>D12</div>	 <div>D13</div>	 <div>D14</div>	 <div>D15</div>	 <div>D16</div>	 <div>D17</div>
FINISHED FLOOR LEVEL										
REF NO. & LOCATION	D08 TRAINING 01 1 OFF	D09 FOYER 1 OFF	D10 FOYER 1 OFF	D11 TRAINING 01 1 OFF	D12 TRAINING 02 1 OFF	D13 DDA TOILET 01 1 OFF	D14 MALE TOILETS 02 35 THICK 1 OFF	D15 FEMALE TOILETS 02 35 THICK 1 OFF	D16 COMPUTER HUB 1 OFF	D17 CORRIDOR 04 1 OFF
TYPE & THICKNESS	EXTERNAL GLAZED ALUMINIUM SLIDING DOORS: CAPRAL AGS 900 SERIES SLIDING DOOR OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. WITH SIDELIGHT OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.
FRAME	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	ALUMINIUM FRAME DULUX MONUMENT
FINISH	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC	DULUX MONUMENT
GLAZING	CLEAR GRADE 'A' SAFETY GLASS DOUBLE GLAZED PLASTERBOARD REVEALS, NO ARCHITRAVES	CLEAR LAMINATED SINGLE GLAZED	CLEAR LAMINATED SINGLE GLAZED	N/A	N/A	N/A	N/A	N/A	N/A	CLEAR LAMINATED SINGLE GLAZED
ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	PLASTERBOARD REVEALS, NO ARCHITRAVES
REMARKS / HARDWARE & ACCESSORIES	-LOCKS & HANDLES (REFER DOOR HARDWARE SCHEDULE) - RETRACTABLE SLIDING ALUMINIUM FLYSCREEN- CENTOR S1 E ECO-SCREEN. FULL WIDTH, INCLUDING FIXED PANE. - CO-ORDINATE HEAD HEIGHT AND VERTICAL S.O. WITH DETAIL C10 ON DRAWING WD10.	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	PASSAGE SET & PRIVACY LATCH TO DOOR HARDWARE SCHEDULE - DISABLED TOILET LOGO & PARENT ROOM SIGNS TO APPROVAL - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	PASSAGE SET TO DOOR HARDWARE SCHEDULE - MALE AMBULANT TOILET LOGO SIGN TO APPROVAL - DOOR CLOSER TO APPROVAL	PASSAGE SET TO DOOR HARDWARE SCHEDULE - FEMALE AMBULANT TOILET LOGO SIGN TO APPROVAL - DOOR CLOSER TO APPROVAL	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. - ENSURE OPENING IS 850 MIN. CLEAR. - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

	 <div>D18</div>	 <div>D19</div>	 <div>D20</div>	 <div>D21</div>	 <div>D22</div>	 <div>D23</div>	 <div>D24</div>	 <div>D25</div>
FINISHED FLOOR LEVEL								
REF NO. & LOCATION	D18 MALE TOILETS 01 35 THICK 1 OFF	D19 FEMALE TOILETS 01 35 THICK 1 OFF	D20 RUMPUS 1 OFF	D21 OPEN OFFICE 01 35 THICK 1 OFF	D22 OFFICE 01 1 OFF	D23 OFFICE 02 1 OFF	D24 OFFICE 03 1 OFF	D25 OFFICE 04 1 OFF
TYPE & THICKNESS	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	INTERNAL SOLID CORE FLUSH PANEL DOOR	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES. OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL.
FRAME	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	ALUMINIUM FRAME DULUX MONUMENT	TIMBER FRAME HAND PAINT DULUX TBC	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT	ALUMINIUM FRAME DULUX MONUMENT
FINISH	DULUX TBC	DULUX TBC	DULUX MONUMENT	DULUX TBC	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT	DULUX MONUMENT
GLAZING	N/A	N/A	CLEAR LAMINATED SINGLE GLAZED	N/A	CLEAR LAMINATED SINGLE GLAZED	CLEAR LAMINATED SINGLE GLAZED	CLEAR LAMINATED SINGLE GLAZED	CLEAR LAMINATED SINGLE GLAZED
ARCHITRAVES	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL.	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL.	PLASTERBOARD REVEALS, NO ARCHITRAVES	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL.	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES	PLASTERBOARD REVEALS, NO ARCHITRAVES
REMARKS / HARDWARE & ACCESSORIES	PASSAGE SET TO DOOR HARDWARE SCHEDULE - MALE AMBULANT TOILET LOGO SIGN TO APPROVAL - DOOR CLOSER TO APPROVAL	PASSAGE SET TO DOOR HARDWARE SCHEDULE - FEMALE AMBULANT TOILET LOGO SIGN TO APPROVAL - DOOR CLOSER TO APPROVAL	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	LOCKS & HANDLES TO DOOR HARDWARE SCHEDULE - STAFF ONLY LOGO SIGN TO APPROVAL - DOOR CLOSER TO APPROVAL	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULE. - DOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009

NOTES:

MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE CURRENT EDITION OF THE RELEVANT AUSTRALIAN STANDARDS AND CODES, IN PARTICULAR AS1288, AND WILL BE REJECTED IF DEFECTIVE.

DESIGN WIND PRESSURE SHALL BE THE PERMISSIBLE STRESS DESIGN WIND PRESSURE DETERMINED IN ACCORDANCE WITH AS1170.2. REFER ENGINEER'S DRAWINGS FOR TERRAIN CATEGORY.

EXTERNAL GLAZING SHALL COMPLY WITH AS2047 FOR WATERPROOFING

ALL EXTERNAL DOORS AND WINDOWS TO BE TOTALLY FLASHED TO HEAD, SIDES AND SILL TO STANDARDS AND MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

ALL EXTERNAL DOORS & WINDOWS VIEWED FROM EXTERNAL SIDE

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

C.O.S. = CHECK ON SITE

**CONFIRM WINDOW SELECTIONS
COMPLY WITH ENERGY ASSESSMENT.
REPORT ANY DISCREPANCIES TO THE
BUILDING SURVEYOR FOR DIRECTION
BEFORE PROCEEDING.**

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

**CHECK ALL DIMENSIONS ON SITE
PRIOR TO COMMENCEMENT
- IF IN DOUBT, ASK!**

**REFER TO DRAWING CD 05 FOR
GENERAL NOTES**

lociarchitecture + planning

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PO BOX 705 NORTH HOBBART 7002
Accreditation #: CC5364 H RAIA #: 48053

Client
Sorell Council
47 Cole Street, Sorell, TAS 7172

Drawing
DOOR SCHEDULE 01

ALL work shall conform to the spec. & other relevant drawings. Figured dimensions take precedence over scaled dimensions. Check all dimensions on site. Shop drawings shall be submitted to this office for approval prior to the commencement of any fabrication.

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DRAWN BY
J.B.
DATE
28.05.24
PROJECT NO.
2403

SCALE
1:50 @A1
1:100 @A3
REV.

CD14
A

FINISHED FLOOR LEVEL										
REF NO. & LOCATION	D26 DDA TOILET 02 1 OFF	D27 OFFICE 05 1 OFF	D28 MENTORING 01 1 OFF	D29 MENTORING 02 1 OFF	D30 MENTORING 03 1 OFF	D31 STORE 1 OFF	D32 OFFICE 06 1 OFF	D33 OFFICE 07 1 OFF	D34 CORRIDOR 03 1 OFF	
TYPE & THICKNESS	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR WITH DOOR LITE VIEWING WINDOW	INTERNAL SOLID CORE FLUSH PANEL DOOR WITH DOOR LITE VIEWING WINDOW	INTERNAL SOLID CORE FLUSH PANEL DOOR WITH DOOR LITE VIEWING WINDOW	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	INTERNAL SOLID CORE FLUSH PANEL DOOR	CAPRAL AGS 215 SERIES DOOR WITH 110mm STILES WITH SIDELIGHT OR SIMILAR TO ARCHITECT, CLIENT AND BUILDING SURVEYOR APPROVAL	
FRAME	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	TIMBER FRAME HAND PAINT DULUX TBC	ALUMINIUM FRAME DULUX MONUMENT	
FINISH	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC	DULUX TBC		
GLAZING	N/A	N/A	CLEAR 6mm GLASS VIEW PANEL	CLEAR 6mm GLASS VIEW PANEL	CLEAR 6mm GLASS VIEW PANEL	N/A	N/A	N/A	CLEAR LAMINATED SINGLE GLAZED	
ARCHITRAVES	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	18mm x 66mm SQUARE ARCHITRAVES WITH ARRIS OR SIMILAR TO ARCHITECT & CLIENT'S APPROVAL	PLASTERBOARD REVEALS, NO ARCHITRAVES	
REMARKS / HARDWARE & ACCESSORIES	<ul style="list-style-type: none">PASSAGE SET & PRIVACY LATCH TO DOOR HARDWARE SCHEDULEDISABLED TOILET LOGO SIGN TO APPROVALDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009	<ul style="list-style-type: none">DOOR LOCKS AND HANDLES TO DOOR HARDWARE SCHEDULEDOOR HARDWARE, CLEARANCES, AND CIRCULATION SPACE TO COMPLY WITH AS1428.1-2009

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

FINISHED FLOOR LEVEL								
REF NO. & LOCATION	D37 MALE TOILETS 02 (AMBULANT CUBICLE) 1 OFF	D38 MALE TOILETS 02 (STANDARD CUBICLE) 1 OFF	D39 FEMALE TOILETS 02 (STANDARD CUBICLE) 1 OFF	D40 FEMALE TOILETS 02 (AMBULANT CUBICLE) 1 OFF	D41 MALE TOILETS 01 (AMBULANT CUBICLE) 1 OFF	D42 FEMALE TOILETS 01 (STANDARD CUBICLE) 1 OFF	D43 FEMALE TOILETS 01 (AMBULANT CUBICLE) 1 OFF	D44 TRAINING ROOM 01 1 OFF
TYPE & THICKNESS	POLYTEC OVERHEAD BRACED FLOOR MOUNTED PARTITIONING SYSTEM - AMBULANT DOOR	POLYTEC OVERHEAD BRACED FLOOR MOUNTED PARTITIONING SYSTEM - STANDARD DOOR	POLYTEC OVERHEAD BRACED FLOOR MOUNTED PARTITIONING SYSTEM - STANDARD DOOR	POLYTEC OVERHEAD BRACED FLOOR MOUNTED PARTITIONING SYSTEM - AMBULANT DOOR	POLYTEC OVERHEAD BRACED FLOOR MOUNTED PARTITIONING SYSTEM - AMBULANT DOOR	POLYTEC OVERHEAD BRACED FLOOR MOUNTED PARTITIONING SYSTEM - STANDARD DOOR	POLYTEC OVERHEAD BRACED FLOOR MOUNTED PARTITIONING SYSTEM - AMBULANT DOOR	100 THICK LOTUS OPERABLE WALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS
FRAME	13mm COMPACT LAMINATE	13mm COMPACT LAMINATE	13mm COMPACT LAMINATE	13mm COMPACT LAMINATE	13mm COMPACT LAMINATE	13mm COMPACT LAMINATE	13mm COMPACT LAMINATE	ACOUSTIC FABRIC TBC.
FINISH	CINDER	CINDER	CINDER	CINDER	CINDER	CINDER	CINDER	TBC
GLAZING	-	-	-	-	-	-	-	-
ARCHITRAVES	-	-	-	-	-	-	-	-
REMARKS / HARDWARE & ACCESSORIES	<ul style="list-style-type: none">CONCEALED SPRING HINGE300 SERIES LOCK & BUMPERHAT & COAT HOOKAMBULANT TOILET LOGO SIGN TO APPROVAL	<ul style="list-style-type: none">CONCEALED SPRING HINGE300 SERIES LOCK & BUMPERHAT & COAT HOOK	<ul style="list-style-type: none">CONCEALED SPRING HINGE300 SERIES LOCK & BUMPERHAT & COAT HOOK	<ul style="list-style-type: none">CONCEALED SPRING HINGE300 SERIES LOCK & BUMPERHAT & COAT HOOKAMBULANT TOILET LOGO SIGN TO APPROVAL	<ul style="list-style-type: none">CONCEALED SPRING HINGE300 SERIES LOCK & BUMPERHAT & COAT HOOKAMBULANT TOILET LOGO SIGN TO APPROVAL	<ul style="list-style-type: none">CONCEALED SPRING HINGE300 SERIES LOCK & BUMPERHAT & COAT HOOK	<ul style="list-style-type: none">CONCEALED SPRING HINGE300 SERIES LOCK & BUMPERHAT & COAT HOOK	<ul style="list-style-type: none">REFER TO MANUFACTURER'S DRAWINGS.CONFIRM PANEL SIZES WITH MANUFACTURER PRIOR TO ORDERING.CONFIRM SETOUTS ON SITE PRIOR TO ORDERING.PANELS TO STORE IN JOINERY WHEN OPEN, JOINERY DETAILS TBC.

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

10mm BUILDING IN ALL ROUND IS ASSUMED

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WHS01 WORKPLACE HEALTH & SAFETY REPORT	N/A

NOTES:

MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE CURRENT EDITION OF THE RELEVANT AUSTRALIAN STANDARDS AND CODES, IN PARTICULAR AS1288, AND WILL BE REJECTED IF DEFECTIVE.

DESIGN WIND PRESSURE SHALL BE THE PERMISSIBLE STRESS DESIGN WIND PRESSURE DETERMINED IN ACCORDANCE WITH AS1170.2. REFER ENGINEER'S DRAWINGS FOR TERRAIN CATEGORY.

EXTERNAL GLAZING SHALL COMPLY WITH AS2047 FOR WATERPROOFING

ALL EXTERNAL DOORS AND WINDOWS TO BE TOTALLY FLASHED TO HEAD, SIDES AND SILL TO STANDARDS AND MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

ALL EXTERNAL DOORS & WINDOWS VIEWED FROM EXTERNAL SIDE

DIMENSIONS ARE STRUCTURAL OPENING SIZE UNLESS OTHERWISE STATED

C.O.S. = CHECK ON SITE

**CONFIRM WINDOW SELECTIONS
COMPLY WITH ENERGY ASSESSMENT.
REPORT ANY DISCREPANCIES TO THE
BUILDING SURVEYOR FOR DIRECTION
BEFORE PROCEEDING.**

**CHECK ALL DIMENSIONS ON SITE
PRIOR TO COMMENCEMENT
- IF IN DOUBT, ASK!**

**REFER TO DRAWING CD 05 FOR
GENERAL NOTES**

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Client
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47 Cole Street, Sorell, TAS 7172

Drawing
DOOR SCHEDULE 02

All work shall conform to the spec. & other relevant drawings. Figured dimensions take precedence over scaled dimensions. Check all dimensions on site. Shop drawings shall be submitted to this office for approval prior to the commencement of any fabrication.
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PROJECT NO. 2403	DRWN NO. CD15 REV. A

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

C04
CD06

ELEVATION SECTION - WINDOW DETAIL

SCALE 1:5

C05
CD04

PLAN - CONCEALED DOWNPIPES AND WALL TYPE WT2

SCALE 1:5

C06
CD04

PLAN - COLUMN DETAIL

SCALE 1:5

loci architecture + planning

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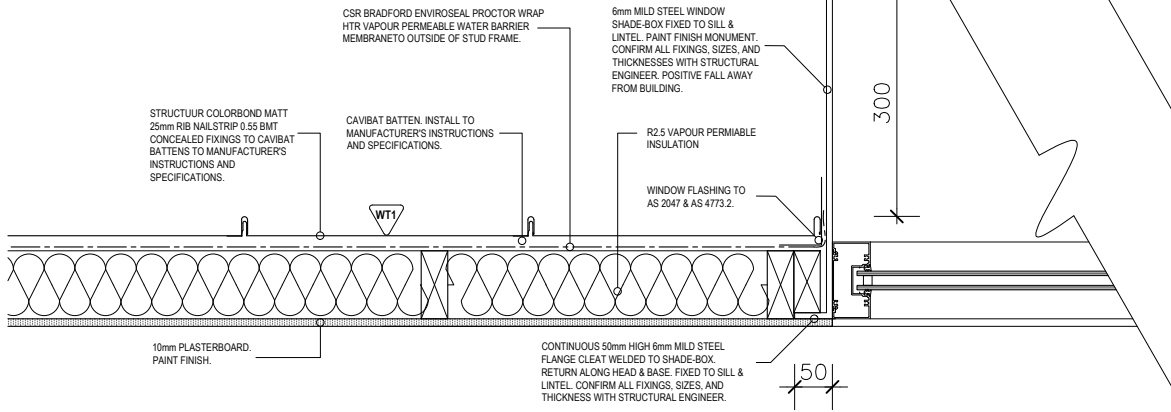
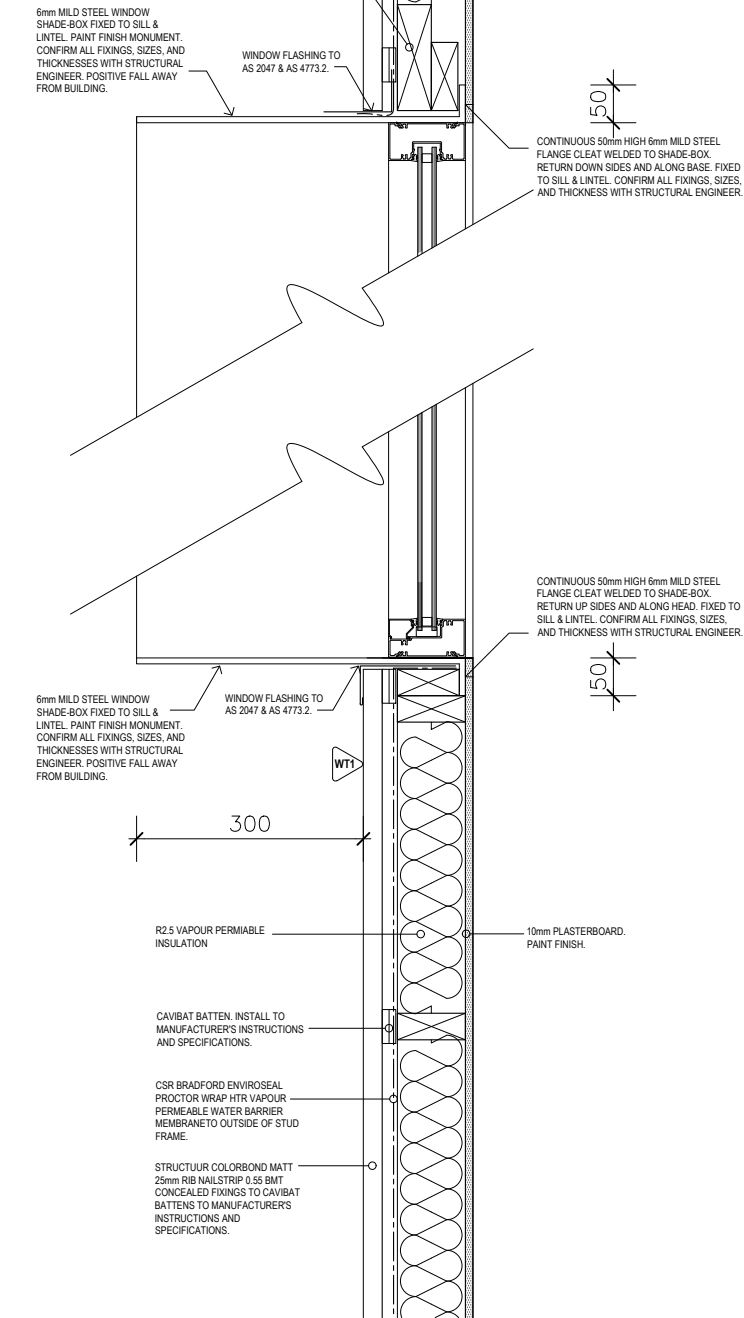
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Drawing
CONSTRUCTION DETAILS 02

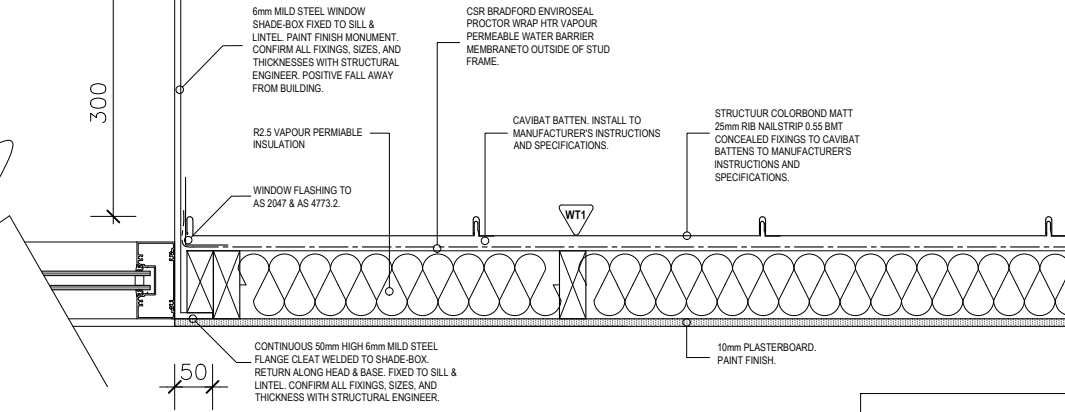
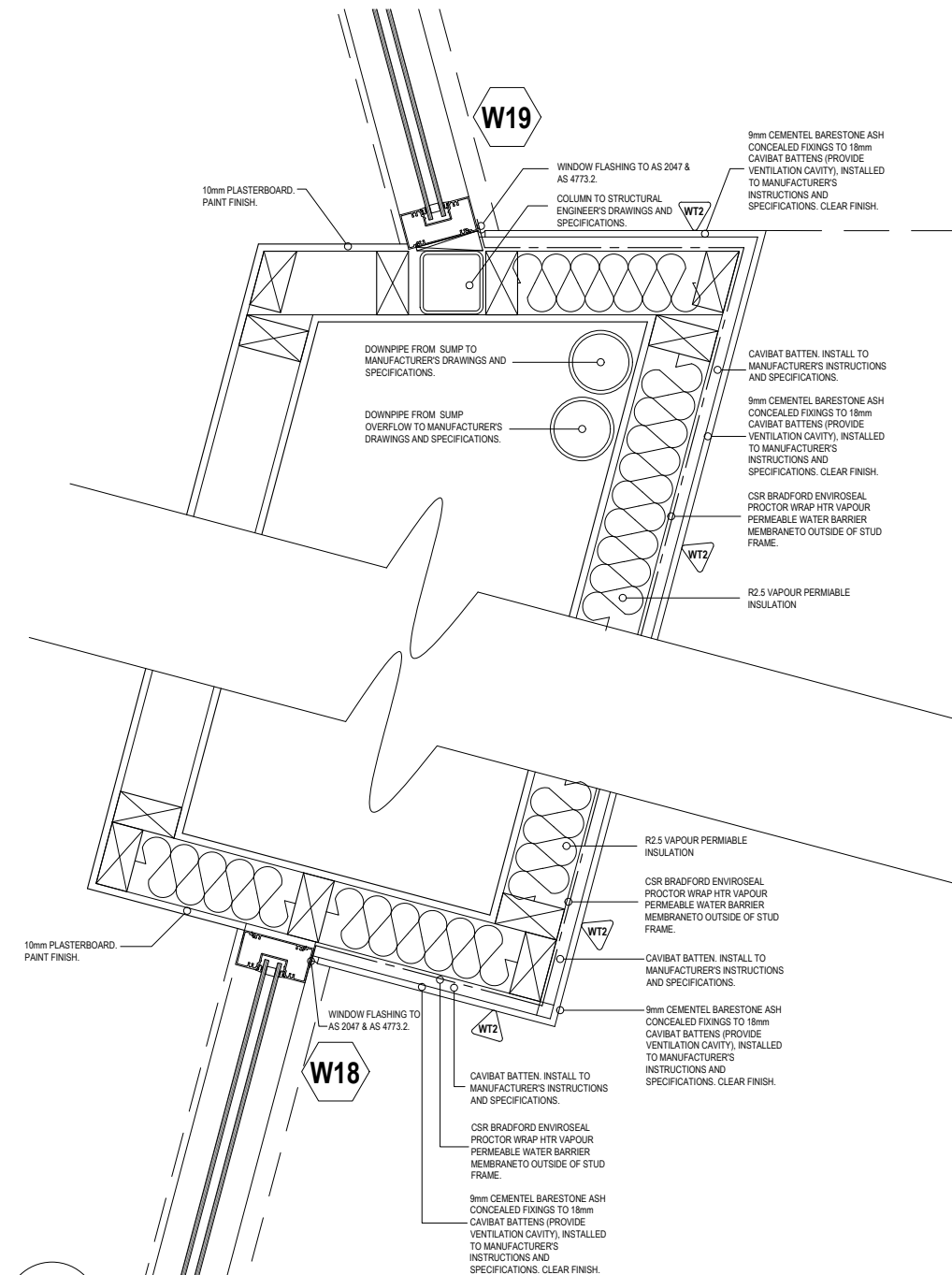
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DATE 28.05.24	1:10 @A3
PROJECT NO. 2403	REV.
DRAWN NO.	
CD17	A



C03 PLAN - WINDOW DETAIL

CD04 SCALE 1:5



WALL TYPE LEGEND

- WT1** 90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavibat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.
- WT2** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cementel Barestone Ash concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.
- WT3** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet on 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.
- WT4** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.
- WT5** 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.
- WT6** 2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Covet- 50mm x 50mm Kabebari Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.
- WT7** 70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm - Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.
- WT8** 1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.

NOTES:

- These drawings are to be read in conjunction with all Engineers' drawings, Energy Assessment, Door & Window Schedules and Specification
- Timber and/or steel members to be provided in accordance to Structural Engineer's details.
- All glazing to be in accordance with AS 1288
- All timber framing is to be in accordance with AS 1684 and Engineer's details.
- All works are to comply with the Building Code of Australia and local requirements.
- All dimensions and any given levels are to be checked on site prior to commencement of works. Written dimensions take precedence over scale - do not scale drawings. **If in doubt, ask.**
- All plumbing, electrical and mechanical services to Engineering Solutions Tasmania's drawings and specifications.
- Supply and install (hard wired) smoke alarms in accordance to AS 3786. Smoke alarms are not to be located within 300mm of wall and ceiling junctions. (refer also electrical plan)
- Insulation - Fire retardant batts to Energy Assessment
Walls R2.5 batts (or similar approved)
Roof R4.1 batts - insulate entire ceiling space with polyester fire retardant batts.
- All exposed structural steelwork shall be hot dip galvanized.
- Soil Classification: refer soil report (where relevant.)
- Provide a minimum air space of 8000 mm: under door leafs to rooms with exhaust fans, unless otherwise noted.
- Mechanical exhaust fans to sanitary areas are to have 25 l/s discharge.
- Splashbacks to be a minimum of 200mm ht. Behind sinks, troughs, vanities, etc., unless otherwise detailed in the specification and/or drawings.
- Provide flyscreens with black wire to all operable windows (refer to window schedule.)
- Provide lift off hinges to new toilet doorways where door is less than 1200mm from pan
- All work to comply with the WHS Act. Any present or predicted safety risks to be reported to the Architect immediately.
- Wet areas are to be water proofed as per installation requirements of AS3740 2010 - installer to provide certification

WALL TYPE LEGEND



90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structuur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavibat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cementel Barestone Ash concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tas oak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions, fixed to 9mm cement sheet on 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



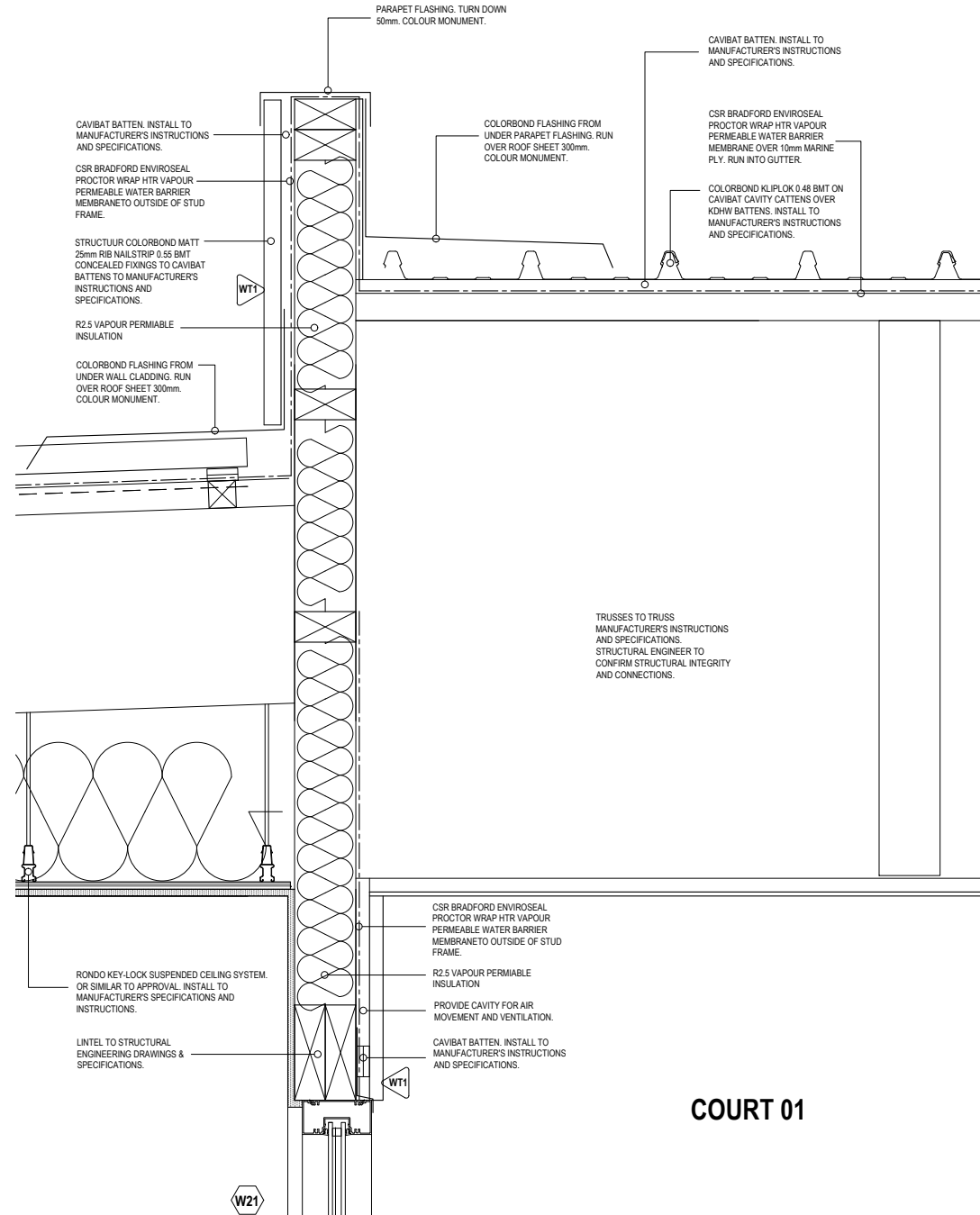
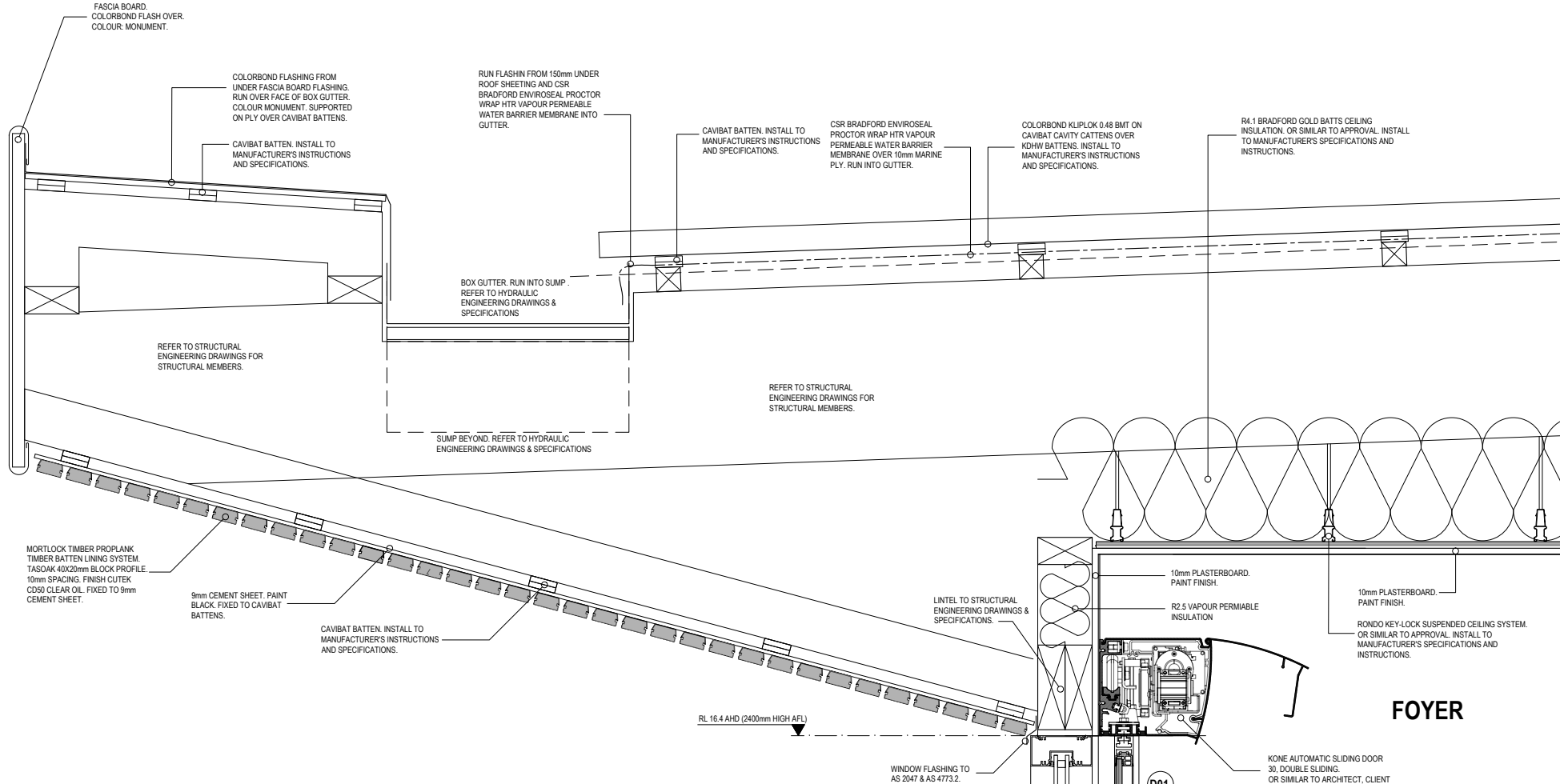
2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Cove: 50mm x 50mm Kabebari Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.



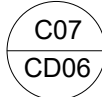
70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tas oak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions, fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.



1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.

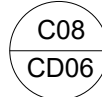


DRAWING INDEX		
CONSTRUCTION DRAWINGS		
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CD 23 CONSTRUCTION DETAILS 08	1:5	
WHS01 WORKPLACE HEALTH & SAFETY REPORT	N/A	



DETAIL SECTION - FOYER AWING & DOOR D01

SCALE 1:5



DETAIL SECTION - COURT 01 PARAPET

SCALE 1:5

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Drawing
CONSTRUCTION DETAILS 03

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PROJECT NO. 2403	REV. A

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

WALL TYPE LEGEND

WT1 90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structuur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavity battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.

WT2 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement Brestone Ash concealed fixings to 18mm Cavity battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.

WT3 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.

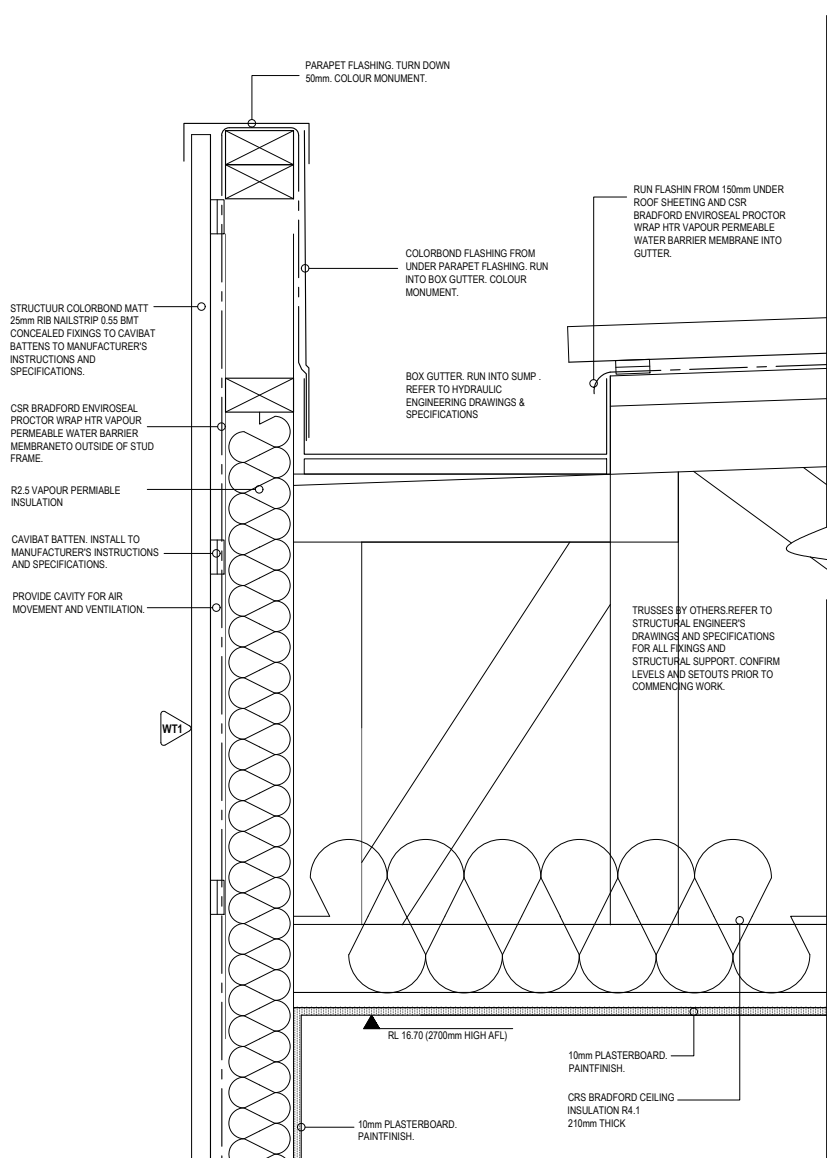
WT4 90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.

WT5 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavity battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.

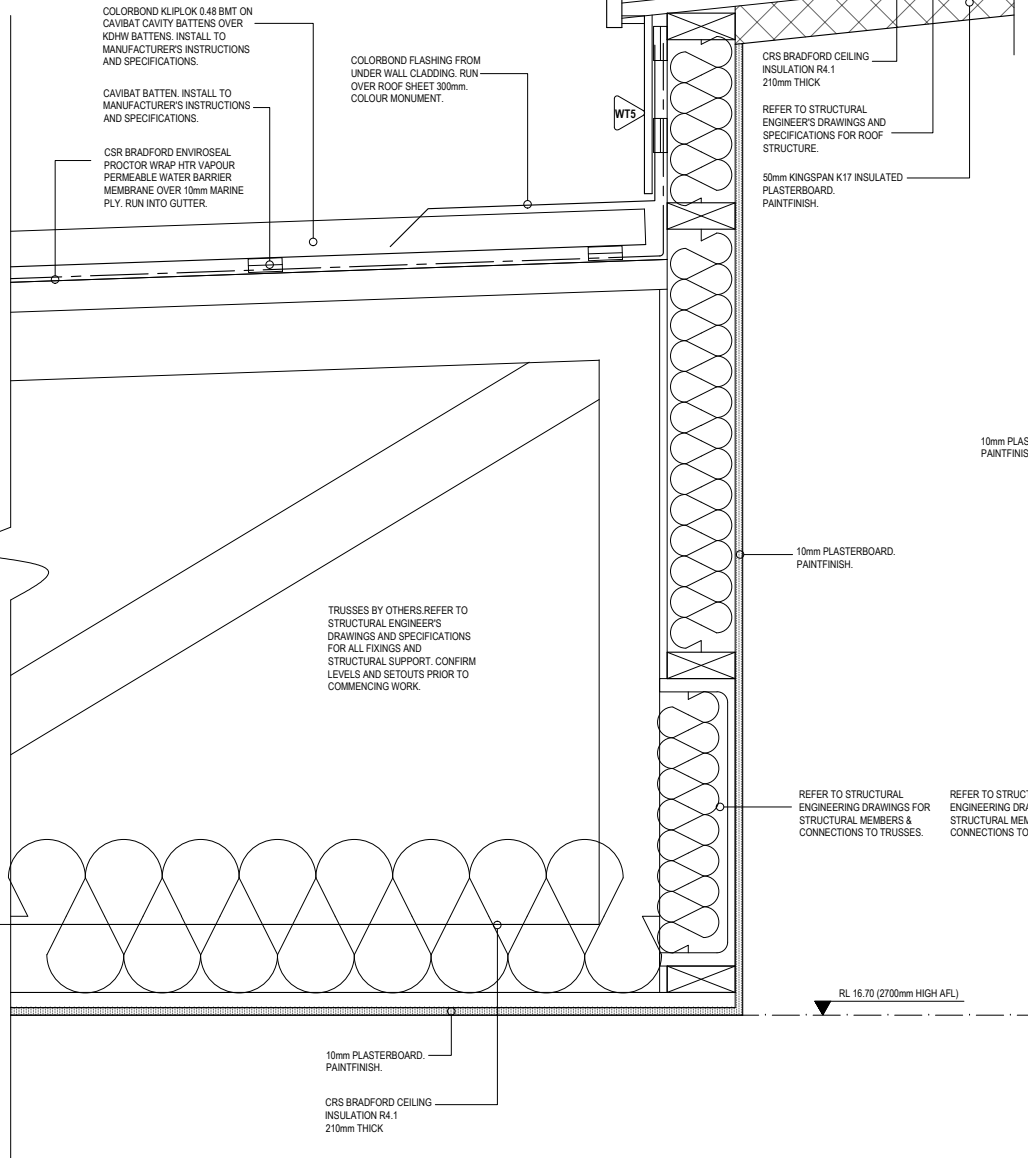
WT6 2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Coveit- 50mm x 50mm Kabebari Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.

WT7 70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.

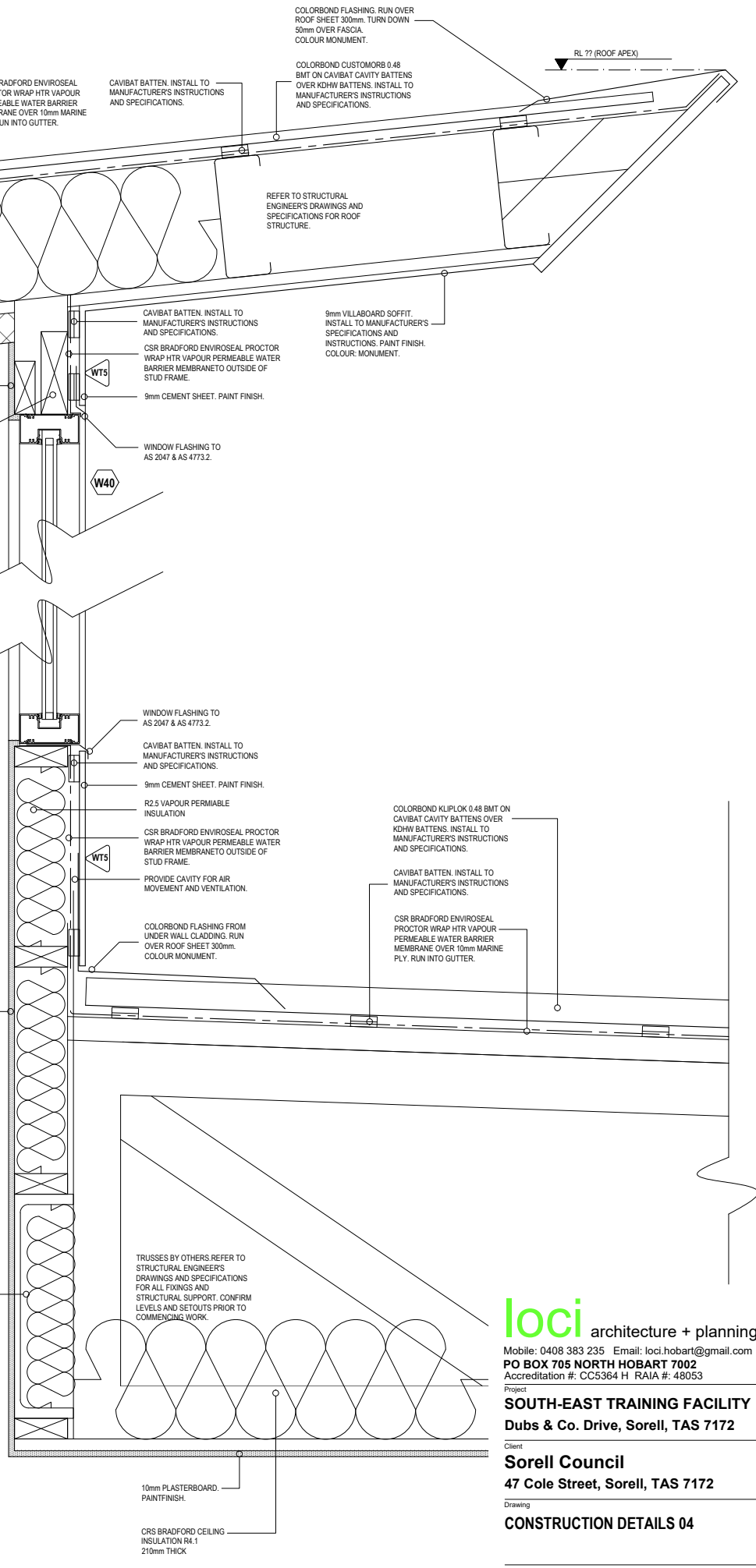
WT8 1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.



C09
CD06
SCALE 1:5
DETAIL SECTION - BOX GUTTER



C10
CD06
SCALE 1:5
DETAIL SECTION - OPEN OFFICE 02 CLERESTORY



C11
CD06
SCALE 1:5
DETAIL SECTION - BOX GUTTER

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Drawing
CONSTRUCTION DETAILS 04

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PROJECT NO. 2403	REV. A
CD19	

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

WALL TYPE LEGEND



90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structural Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeling. Concealed fixings to 18mm Cavitat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cementel Barestone Ash concealed fixings to 18mm Cavitat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions, fixed to 9mm cement sheet on 18mm Cavitat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavitat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Covelet 50mm x 50mm Kabebani Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.



70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions, fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.



1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.

COLORBOND KLIPOK 0.48 BMT ON CAVIBAT CAVITY BATTENS OVER KDHW BATTENS. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

CAVIBAT BATTEN OVER KDHW BATTENS. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

CSR BRADFORD ENVIROSEAL PROCTOR WRAP HTR VAPOUR PERMEABLE WATER BARRIER MEMBRANE OVER 10mm MARINE PLY. RUN INTO GUTTER.

PARAPET FLASHING. TURN DOWN MINIMUM 100mm OVER FACE. ALIGN BOTTOM OF TURNDOWN TO BOTTOM OF EAVES GUTTER FOR ALL WALLS OF COURT 01. COLOUR MONUMENT.

RUN FLASHIN FROM 150mm UNDER ROOF SHEETING AND CSR BRADFORD ENVIROSEAL PROCTOR WRAP HTR VAPOUR PERMEABLE WATER BARRIER MEMBRANE INTO GUTTER.

SQUARE PROFILE COLORBOND MATT EAVES GUTTER TO HYDRAULIC ENGINEER'S DRAWINGS & SPECIFICATIONS. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS. ALIGN TO COLUMNS & DOWNPIPES FOR STRAIGHT RUN OF DOWNPIPE. STRUCTUUR COLORBOND MATT 25mm RIB NAILSTRIP 0.55 BMT CONCEALED FIXINGS TO CAVIBAT BATTENS TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS. COLOUR MONUMENT.

CAVIBAT BATTEN. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

CSR BRADFORD ENVIROSEAL PROCTOR WRAP HTR VAPOUR PERMEABLE WATER BARRIER MEMBRANE TO OUTSIDE OF STUD FRAME.

PROVIDE CAVITY FOR AIR MOVEMENT AND VENTILATION.

9mm CEMENT SHEET. PAINT FINISH. COLOUR MONUMENT.

CSR BRADFORD ENVIROSEAL PROCTOR WRAP HTR VAPOUR PERMEABLE WATER BARRIER MEMBRANE TO OUTSIDE OF STUD FRAME.

CAVIBAT BATTEN. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

REFER TO STRUCTURAL ENGINEERING DRAWINGS FOR STRUCTURAL MEMBERS & CONNECTIONS TO TRUSSES.

R2.5 VAPOUR PERMEABLE INSULATION

FLASHING TO AS 2047 & AS 4773.2.

CSR BRADFORD ENVIROSEAL PROCTOR WRAP HTR VAPOUR PERMEABLE WATER BARRIER MEMBRANE TO OUTSIDE OF STUD FRAME.

STRUCTUUR COLORBOND MATT 25mm RIB NAILSTRIP 0.55 BMT CONCEALED FIXINGS TO CAVIBAT BATTENS TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS. COLOUR MONUMENT.

CAVIBAT BATTEN. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

FLASHING TO AS 2047 & AS 4773.2.

COLORBOND FLASHING. RUN OVER ROOF SHEET 300mm. RUN OVER FASCIA 50mm. COLOUR MONUMENT.

9mm VILLABOARD SOFFIT. INSTALL TO MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS. PAINT FINISH. COLOUR MONUMENT.

9mm CEMENT SHEET. PAINT FINISH. COLOUR MONUMENT.

CSR BRADFORD ENVIROSEAL PROCTOR WRAP HTR VAPOUR PERMEABLE WATER BARRIER MEMBRANE TO OUTSIDE OF STUD FRAME.

CAVIBAT BATTEN. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

COLORBOND FLASHING FROM UNDER WALL CLADDING. RUN OVER ROOF SHEET 300mm. COLOUR MONUMENT.

TRUSSES BY OTHERS REFER TO STRUCTURAL ENGINEER'S DRAWINGS AND SPECIFICATIONS FOR ALL FIXINGS AND STRUCTURAL SUPPORT. CONFIRM LEVELS AND SETOUTS PRIOR TO COMMENCING WORK.

REFER TO STRUCTURAL ENGINEERING DRAWINGS FOR STRUCTURAL MEMBERS & CONNECTIONS TO TRUSSES.

9mm VILLABOARD SOFFIT. INSTALL TO MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS. PAINT FINISH. COLOUR MONUMENT.

CSR BRADFORD ENVIROSEAL PROCTOR WRAP HTR VAPOUR PERMEABLE WATER BARRIER MEMBRANE TO OUTSIDE OF STUD FRAME.

CAVIBAT BATTEN. INSTALL TO MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

CSR BRADFORD CEILING INSULATION R4.1 210mm THICK

COLORBOND FLASHING FROM UNDER WALL CLADDING. RUN OVER ROOF SHEET 300mm. COLOUR MONUMENT.

TRUSSES BY OTHERS REFER TO STRUCTURAL ENGINEER'S DRAWINGS AND SPECIFICATIONS FOR ALL FIXINGS AND STRUCTURAL SUPPORT. CONFIRM LEVELS AND SETOUTS PRIOR TO COMMENCING WORK.

CSR BRADFORD CEILING INSULATION R4.1 210mm THICK

RONDO KEY-LOCK SUSPENDED CEILING SYSTEM. OR SIMILAR TO APPROVAL. INSTALL TO MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS.

CSR BRADFORD CEILING INSULATION R4.1 210mm THICK

loci architecture + planning

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PO BOX 705 NORTH HOBBART 7002
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Dubs & Co. Drive, Sorell, TAS 7172

Client
Sorell Council
47 Cole Street, Sorell, TAS 7172

Drawing
CONSTRUCTION DETAILS 05

All work shall conform to the spec. & other relevant drawings. Figured dimensions take precedence over scaled dimensions. Check all dimensions on site. Shop drawings shall be submitted to this office for approval prior to the commencement of any fabrication.
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DRAWN BY J.B.	SCALE 1:5 @A1
DATE 28.05.24	1:10 @A3
PROJECT NO. 2403	REV.
DRAWN NO. CD20	A

C12
CD06

DETAIL SECTION - COURT 01 SOFFIT

SCALE 1:5

C13
CD06

DETAIL SECTION - COURT 01 SOFFIT

SCALE 1:5

C14
CD06

DETAIL SECTION - OPEN OFFICE 01

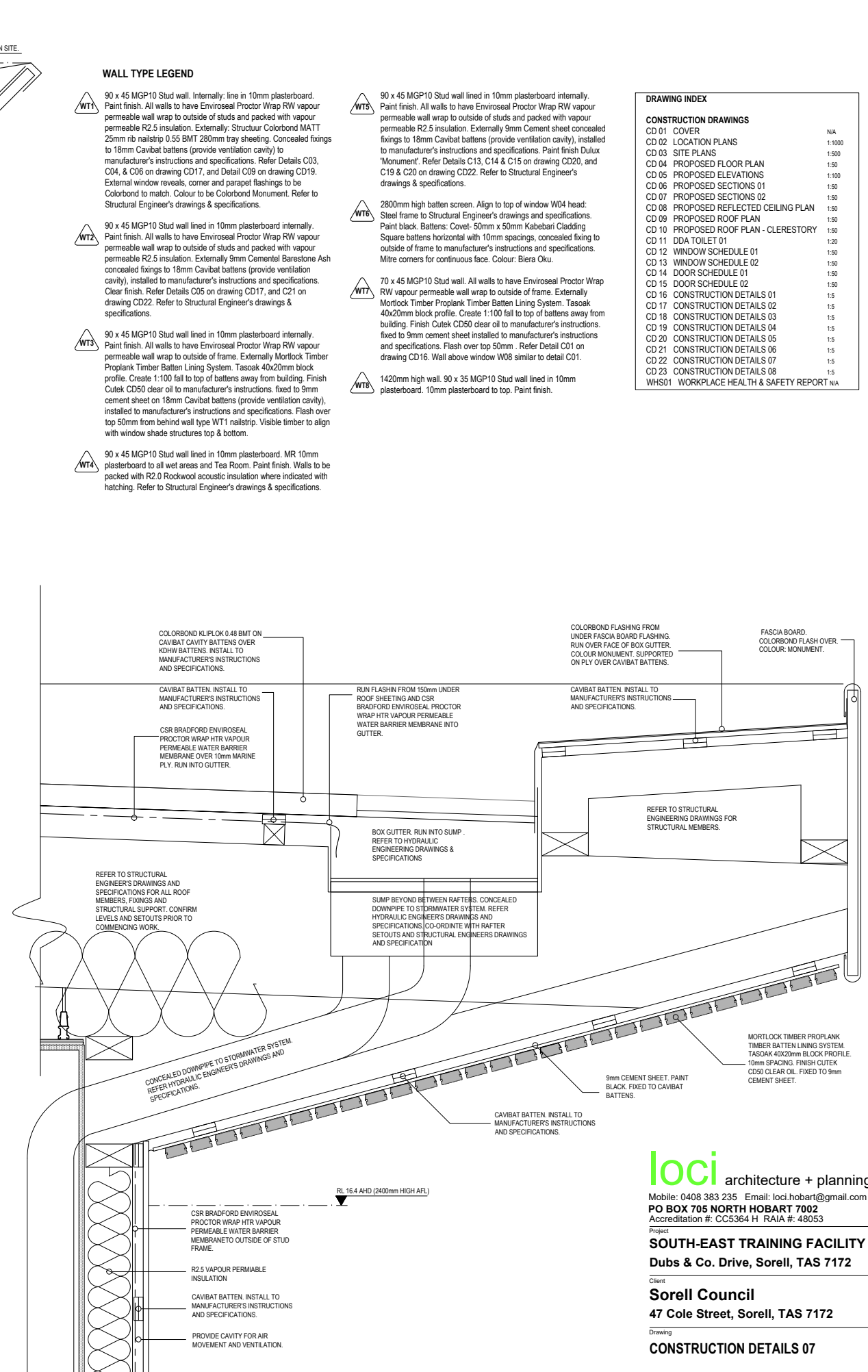
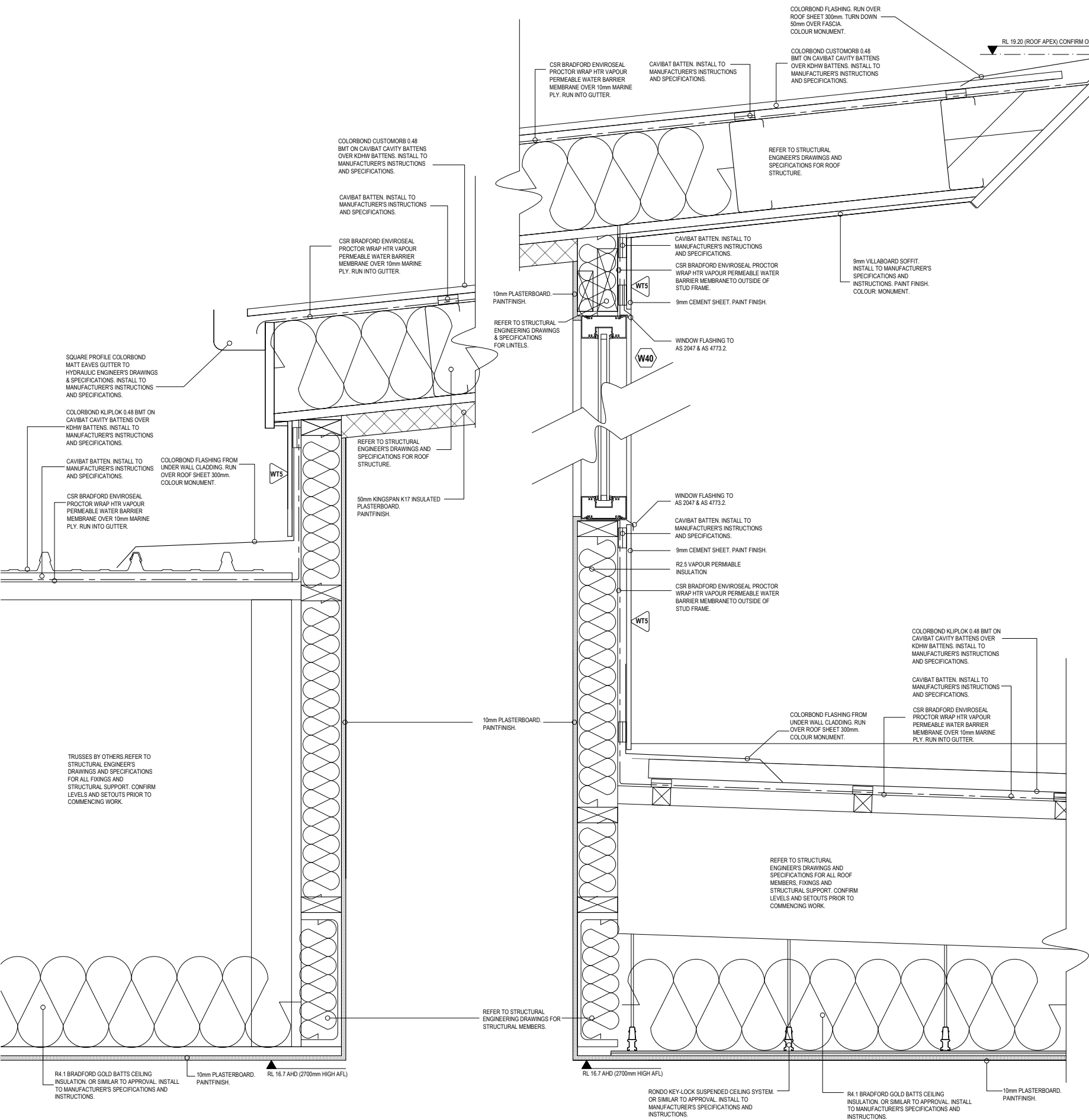
SCALE 1:5

C15
CD06

DETAIL SECTION - OPEN OFFICE 01

SCALE 1:5

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!



WALL TYPE LEGEND



90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structural Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavitat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement Barestone Ash concealed fixings to 18mm Cavitat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutex CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.



90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavitat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux 'Monument'. Refer Details C13, C14 & C15 on drawing CD20, and C18 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.



2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Coveit- 50mm x 50mm Kabebat Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.



70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutex CD50 clear oil to manufacturer's instructions. fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.



1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.

DRAWING INDEX

CONSTRUCTION DRAWINGS	
CD 01 COVER	N/A
CD 02 LOCATION PLANS	1:1000
CD 03 SITE PLANS	1:500
CD 04 PROPOSED FLOOR PLAN	1:50
CD 05 PROPOSED ELEVATIONS	1:100
CD 06 PROPOSED SECTIONS 01	1:50
CD 07 PROPOSED SECTIONS 02	1:50
CD 08 PROPOSED REFLECTED CEILING PLAN	1:50
CD 09 PROPOSED ROOF PLAN	1:50
CD 10 PROPOSED ROOF PLAN - CLERESTORY	1:50
CD 11 DDA TOILET 01	1:20
CD 12 WINDOW SCHEDULE 01	1:50
CD 13 WINDOW SCHEDULE 02	1:50
CD 14 DOOR SCHEDULE 01	1:50
CD 15 DOOR SCHEDULE 02	1:50
CD 16 CONSTRUCTION DETAILS 01	1:5
CD 17 CONSTRUCTION DETAILS 02	1:5
CD 18 CONSTRUCTION DETAILS 03	1:5
CD 19 CONSTRUCTION DETAILS 04	1:5
CD 20 CONSTRUCTION DETAILS 05	1:5
CD 21 CONSTRUCTION DETAILS 06	1:5
CD 22 CONSTRUCTION DETAILS 07	1:5
CD 23 CONSTRUCTION DETAILS 08	1:5
WHS01 WORKPLACE HEALTH & SAFETY REPORT	N/A

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Client
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47 Cole Street, Sorell, TAS 7172

Drawing
CONSTRUCTION DETAILS 07

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DRAWN BY J.B.	SCALE 1:5 @A1
DATE 28.05.24	1:10 @A3
PROJECT NO. 2403	REV. A
	CD22

C19 CD07	DETAIL SECTION - OPEN OFFICE 01 CLERESTORY SCALE 1:5
C20 CD07	DETAIL SECTION - OPEN OFFICE 01 CLERESTORY SCALE 1:5
C21 CD07	DETAIL SECTION - FOYER GUTTER SCALE 1:5

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

DRAWING INDEX		
CONSTRUCTION DRAWINGS		
CD 01	COVER	N/A
CD 02	LOCATION PLANS	1:1000
CD 03	SITE PLANS	1:500
CD 04	PROPOSED FLOOR PLAN	1:50
CD 05	PROPOSED ELEVATIONS	1:100
CD 06	PROPOSED SECTIONS 01	1:50
CD 07	PROPOSED SECTIONS 02	1:50
CD 08	PROPOSED REFLECTED CEILING PLAN	1:50
CD 09	PROPOSED ROOF PLAN	1:50
CD 10	PROPOSED ROOF PLAN - CLERESTORY	1:50
CD 11	DDA TOILET 01	1:20
CD 12	WINDOW SCHEDULE 01	1:50
CD 13	WINDOW SCHEDULE 02	1:50
CD 14	DOOR SCHEDULE 01	1:50
CD 15	DOOR SCHEDULE 02	1:50
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CD 17	CONSTRUCTION DETAILS 02	1:5
CD 18	CONSTRUCTION DETAILS 03	1:5
CD 19	CONSTRUCTION DETAILS 04	1:5
CD 20	CONSTRUCTION DETAILS 05	1:5
CD 21	CONSTRUCTION DETAILS 06	1:5
CD 22	CONSTRUCTION DETAILS 07	1:5
CD 23	CONSTRUCTION DETAILS 08	1:5
WHS01	WORKPLACE HEALTH & SAFETY REPORT	N/A

- NOTES:**
- These drawings are to be read in conjunction with all Engineers' drawings, Energy Assessment, Door & Window Schedules and Specification
 - Timber and/or steel members to be provided in accordance to Structural Engineer's details.
 - All glazing to be in accordance with AS 1288
 - All timber framing is to be in accordance with AS 1684 and Engineer's details.
 - All works are to comply with the Building Code of Australia and local requirements.
 - All dimensions and any given levels are to be checked on site prior to commencement of works. Written dimensions take precedence over scale - do not scale drawings. **If in doubt, ask.**
 - All plumbing, electrical and mechanical services to Engineering Solutions Tasmania's drawings and specifications.
 - Supply and install (hard wired) smoke alarms in accordance to AS 3786. Smoke alarms are not to be located within 300mm of wall and ceiling junctions. (refer also electrical plan)
 - Insulation - Fire retardant batts to Energy Assessment
Walls R2.5 batts (or similar approved)
Roof R4.1 batts - insulate entire ceiling space with polyester fire retardant batts.
 - All exposed structural steelwork shall be hot dip galvanized.
 - Soil Classification: refer soil report (where relevant.)
 - Provide a minimum air space of 8000 mm under door leafs to rooms with exhaust fans, unless otherwise noted.
 - Mechanical exhaust fans to sanitary areas are to have 25 l/s discharge.
 - Splashbacks to be a minimum of 200mm ht. Behind sinks, troughs, vanities, etc., unless otherwise detailed in the specification and/or drawings.
 - Provide flyscreens with black wire to all operable windows (refer to window schedule.)
 - Provide lift off hinges to new toilet doorways where door is less than 1200mm from pan
 - All work to comply with the WHS Act. Any present or predicted safety risks to be reported to the Architect immediately.
 - Wet areas are to be water proofed as per installation requirements of AS3740 2010 - installer to provide certification

WALL TYPE LEGEND

WT1 90 x 45 MGP10 Stud wall. Internally: line in 10mm plasterboard. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally: Structuur Colorbond MATT 25mm rib nailstrip 0.55 BMT 280mm tray sheeting. Concealed fixings to 18mm Cavibat battens (provide ventilation cavity) to manufacturer's instructions and specifications. Refer Details C03, C04, & C06 on drawing CD17, and Detail C09 on drawing CD19. External window reveals, corner and parapet flashings to be Colorbond to match. Colour to be Colorbond Monument. Refer to Structural Engineer's drawings & specifications.

WT2 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cementel Barestone Ash concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Clear finish. Refer Details C05 on drawing CD17, and C21 on drawing CD22. Refer to Structural Engineer's drawings & specifications.

WT3 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions, fixed to 9mm cement sheet on 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Flash over top 50mm from behind wall type WT1 nailstrip. Visible timber to align with window shade structures top & bottom.

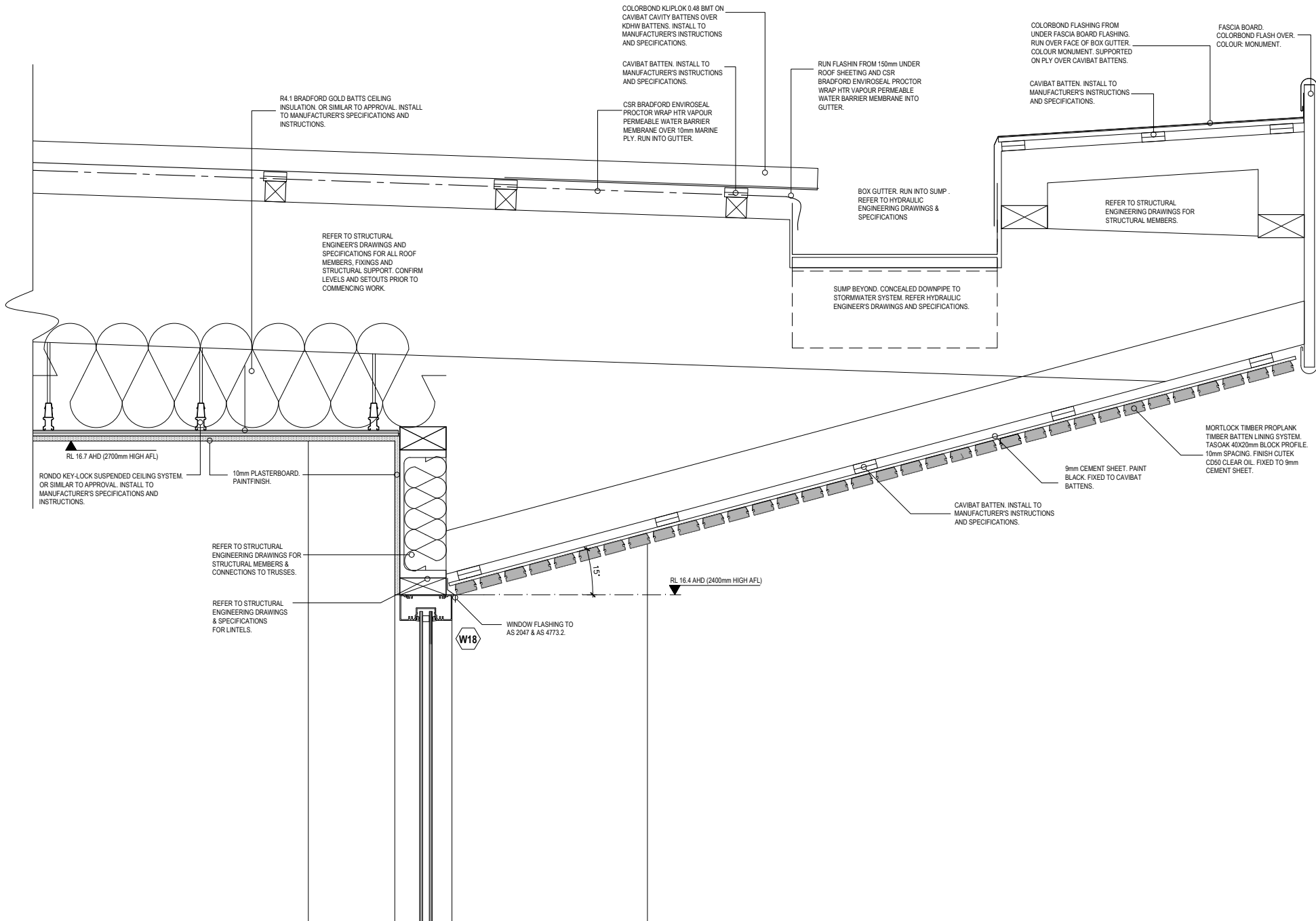
WT4 90 x 45 MGP10 Stud wall lined in 10mm plasterboard. MR 10mm plasterboard to all wet areas and Tea Room. Paint finish. Walls to be packed with R2.0 Rockwool acoustic insulation where indicated with hatching. Refer to Structural Engineer's drawings & specifications.

WT5 90 x 45 MGP10 Stud wall lined in 10mm plasterboard internally. Paint finish. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of studs and packed with vapour permeable R2.5 insulation. Externally 9mm Cement sheet concealed fixings to 18mm Cavibat battens (provide ventilation cavity), installed to manufacturer's instructions and specifications. Paint finish Dulux Monument. Refer Details C13, C14 & C15 on drawing CD20, and C19 & C20 on drawing CD22. Refer to Structural Engineer's drawings & specifications.

WT6 2800mm high batten screen. Align to top of window W04 head: Steel frame to Structural Engineer's drawings and specifications. Paint black. Battens: Covelet 50mm x 50mm Kabebari Cladding Square battens horizontal with 10mm spacings, concealed fixing to outside of frame to manufacturer's instructions and specifications. Mitre corners for continuous face. Colour: Biera Oku.

WT7 70 x 45 MGP10 Stud wall. All walls to have Enviroseal Proctor Wrap RW vapour permeable wall wrap to outside of frame. Externally Mortlock Timber Proplank Timber Batten Lining System. Tasoak 40x20mm block profile. Create 1:100 fall to top of battens away from building. Finish Cutek CD50 clear oil to manufacturer's instructions, fixed to 9mm cement sheet installed to manufacturer's instructions and specifications. Flash over top 50mm. Refer Detail C01 on drawing CD16. Wall above window W08 similar to detail C01.

WT8 1420mm high wall. 90 x 35 MGP10 Stud wall lined in 10mm plasterboard. 10mm plasterboard to top. Paint finish.



C22 CD07 DETAIL SECTION - FOYER GUTTER SCALE 1:5

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

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Drawing
CONSTRUCTION DETAILS 08

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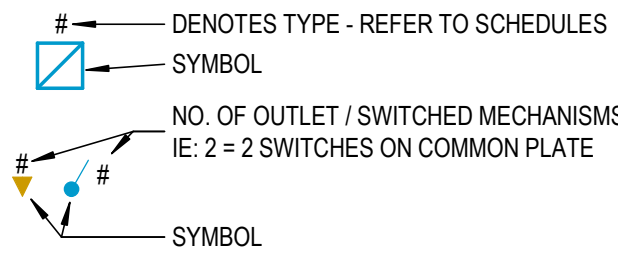
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PROJECT NO. 2403	DRAWN NO. CD23	REV. A	

CHECK ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT - IF IN DOUBT, ASK!

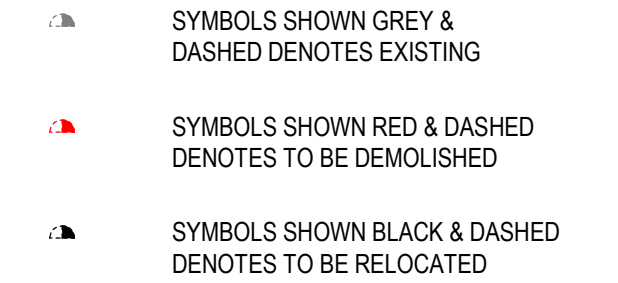
LEGEND

GENERAL

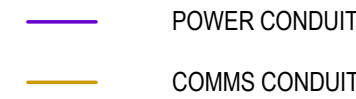
SYMBOLS



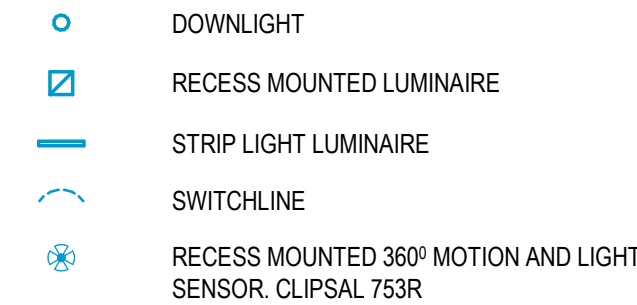
PHASING



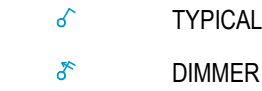
CONDUIT



LIGHTING

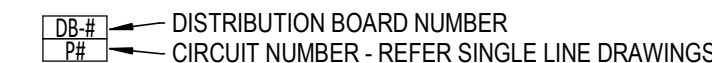


LIGHT SWITCHES

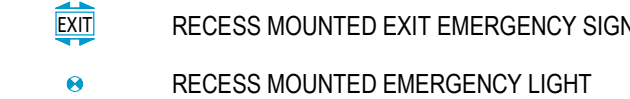


LIGHTING REFERENCE TAGS

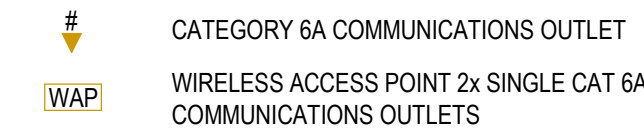
LIGHTING FIXTURE



EMERGENCY LIGHTING

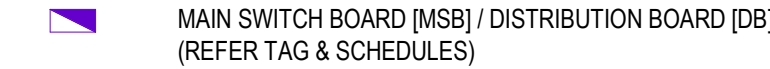


COMMUNICATIONS



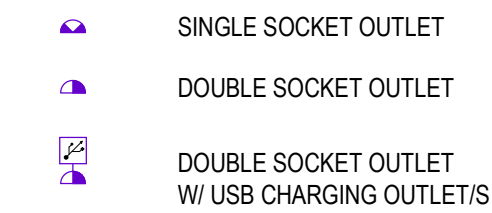
POWER

SWITCH BOARDS / DISTRIBUTION BOARDS



OUTLETS/CONNECTIONS

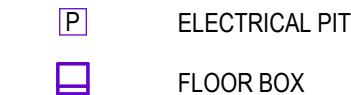
SINGLE PHASE (1PH)



THREE PHASE (3PH)

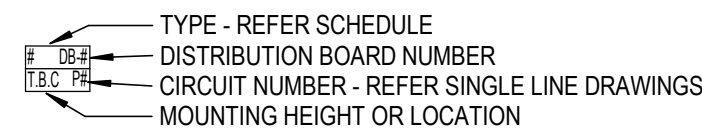


OTHER

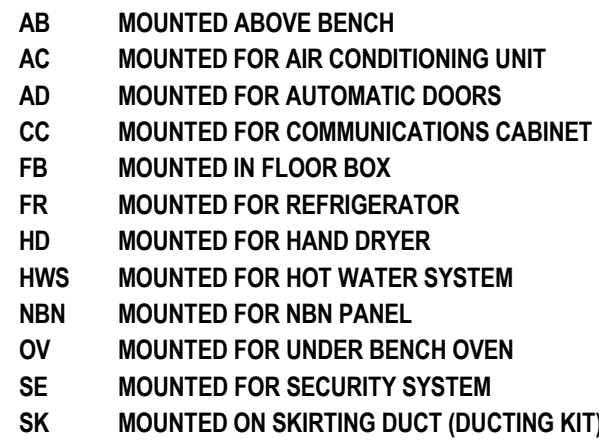


POWER REFERENCE TAGS

ELECTRICAL FIXTURE



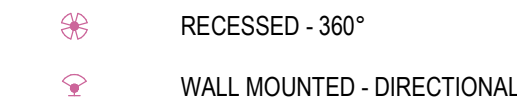
POWER LOCATIONS



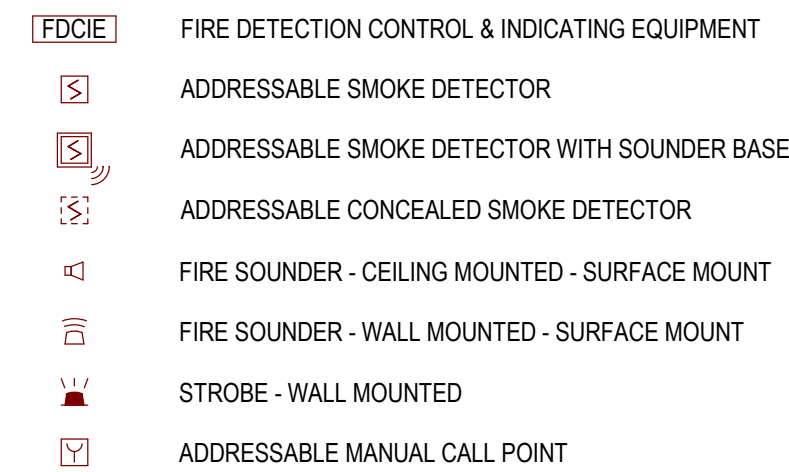
SECURITY



MOTION SENSORS



FIRE DETECTION



GENERAL ELECTRICAL NOTES

1. ALL WORKS TO COMPLY WITH AS/NZS 3000 AND TASNETWORK'S SERVICES INSTALLATION GUIDE.
2. ALL WORKS SHALL COMPLY WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA (NCC).
3. ALL FIRE DETECTION AND ALARM WORKS TO COMPLY WITH AS1670 AND TAS FIRE GUIDELINES.
4. CONTRACTOR TO ENSURE ALL CABLES ARE FULLY CONCEALED, CHASE WALLS WHERE REQUIRED AND MAKE GOOD.
5. MSB AND DB LAYOUTS ARE FOR GUIDANCE ONLY AND ALL CIRCUITS TO BE DISTRIBUTED EVENLY ACROSS ALL PHASES.

TENDER

DRAWING NOTES:

- DO NOT SCALE DIRECTLY OFF DRAWING. ALL MEASUREMENTS AND LOCATIONS OF EQUIPMENT ARE TO BE CONFIRMED ON SITE WITH THE SITE SUPERVISOR.
- THIS DRAWING IS TO BE VIEWED IN CONJUNCTION WITH SPECIFICATION, ARCHITECTURAL, STRUCTURAL AND ALL OTHER SERVICES DRAWINGS.
- SCHEDULE QUANTITIES/COUNTS ARE PROVIDED AS A GUIDE ONLY AND ACTUAL QUANTITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR
- THIS DRAWING IS REQUIRED TO BE VIEWED OR PRINTED IN COLOUR FOR THE FULL EXTENT OF THE SCOPE OF WORKS TO BE SHOWN
- ANY DISCREPANCIES DURING ANY PHASE OF THE WORKS BETWEEN THE DRAWINGS, SPECIFICATION AND OTHER DISCIPLINE'S DOCUMENTATION THE CONTRACTOR IS TO:
 - ASSUME THE MOST ONEROUS AND,
 - RAISE AN RFI TO CLARIFY THE DISCREPANCY

ALL LIABILITY DUE TO FAILURE TO OBSERVE THESE CLAUSES SHALL BE BORNE BY THE CONTRACTOR.

D.D	31/05/24	TENDER	T1
By	Date	Revision Description	Rev

REVISIONS



Client
SORELL COUNCIL

Project
SORELL JOBS HUB

Sheet Title
ELECTRICAL LEGEND & NOTES

ELECTRICAL SERVICES

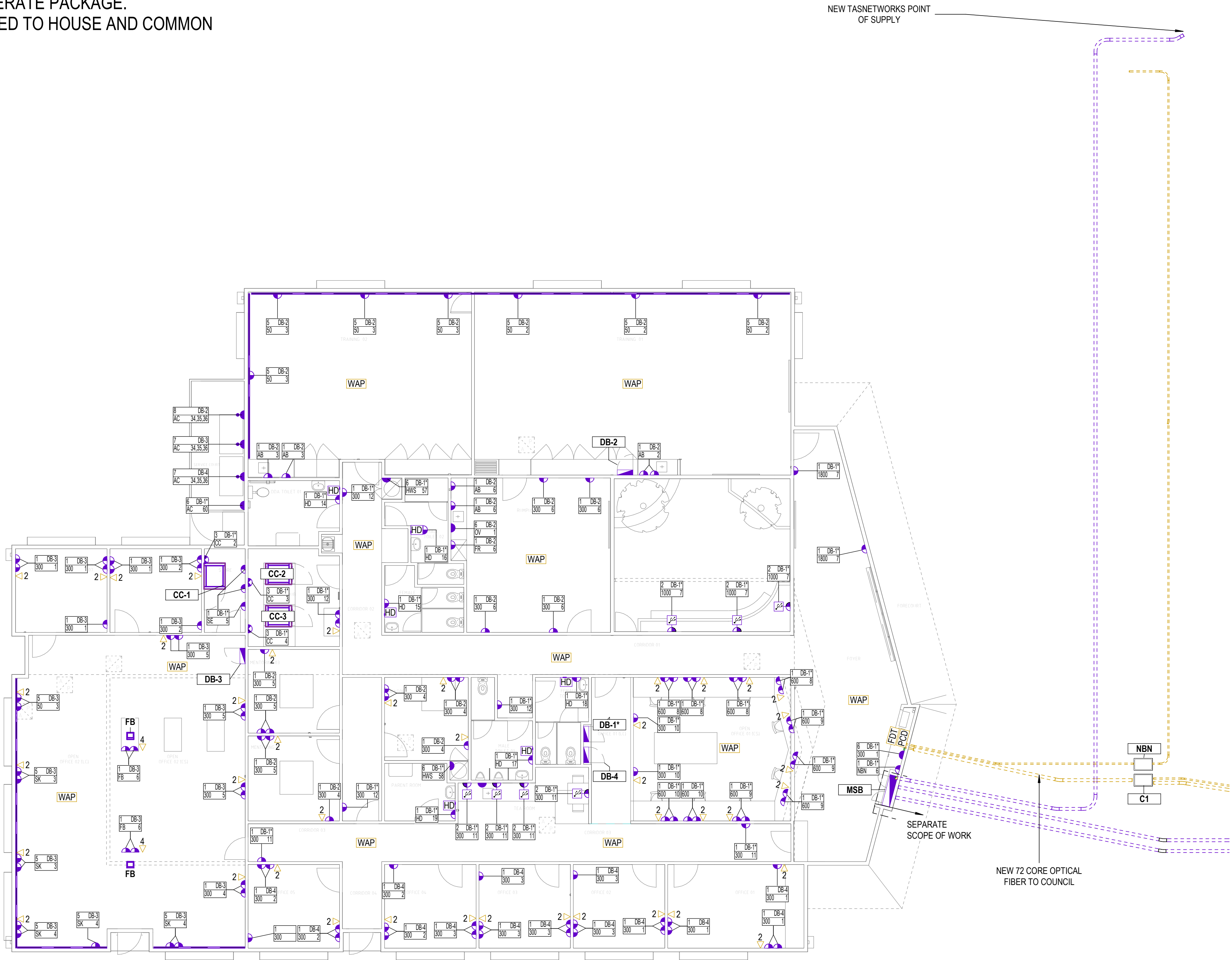
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	Checked By -	Revision T1
Scale 1 : 100 @ A1	Drawing No. 23369-S1-E01	

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SITE POWER DISTRIBUTION AND MAIN SWITCHBOARD ARE TO BE TENDERED AS A SEPERATE PACKAGE.
DB-1 SHALL BE ALLOCATED TO HOUSE AND COMMON SERVICES.



GROUND FLOOR - POWER & COMMUNICATIONS LAYOUT

1: 100

SCALE
1:100
0 2 4 6 8 10m

TENDER

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D.D	31/05/24	TENDER	T1
By	Date	Revision Description	Rev

REVISIONS

ENGINEERING SOLUTIONS TASMANIA

Client
SORELL COUNCIL

Project
SORELL JOBS HUB

Sheet Title
GROUND FLOOR - POWER & COMMUNICATIONS LAYOUT

ELECTRICAL SERVICES		
Designed By	D.E	Drawn By J.v.N
Checked By	-	Revision T1
Drawing No.	23369-S1-E03	
Scale	1: 100 @ A1	

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GROUND FLOOR - LIGHTING & FIRE DETECTION LAYOUT
1 : 100

SCALE
1:100
0 2 4 6 8 10m

TENDER

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 - RAISE AN RFI TO CLARIFY THE DISCREPANCY

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D.D	31/05/24		TENDER	T1
By	Date		Revision Description	Rev

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Client
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SORELL JOBS HUB

Sheet Title
GROUND FLOOR - LIGHTING & FIRE DETECTION LAYOUT

ELECTRICAL SERVICES

	Designed By D.E	Drawn By J.v.N
	Checked By -	Revision T1
Scale 1: 100 @ A1	Drawing No. 23369-S1-E04	

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LIGHTING FIXTURE SCHEDULE							
REF.	DESCRIPTION	MANUFACTURER	MODEL	FITTING COLOUR	WATTAGE	COLOUR TEMP	QTY.
A	RECESSED MOUNT LOW GLARE DOWNLIGHT 165MM	EAGLE	PLEIAD G4 165 BLACK REFLECTOR - MEDIUM BEAM	WHITE	9 W	4000 K	30
B	300x600 LED PANEL - PLASTER FLUSH MOUNT	THORN	T.B.CLED1500-940 6X3 HF FP	WHITE	13 W	4000 K	1
C	300x1200 LED PANEL - PLASTER FLUSH MOUNT	THORN	LED2700-940 12X3 HF FP	WHITE	24 W	4000 K	52
D	DOWNLIGHT - LARGE - BATHROOMS	MELEC	ML-1BOX-C2030	WHITE	20 W	4000 K	8
F	SUSPENDED DIRECT / INDIRECT LED EXTRUSION - XTA 3.0 Beam IP20 IK04, Proformax HO LED - L80B10 @ 83,000hrs, 25°C ambient temperature, texture white finish. Light down - Clear microprism diffuser, 4000K CCT, 140-350mA 1-10v dimming driver, factory adjusted to 245mA. Light up - Clear microprism diffuser, 4000K CCT, 140-350mA 1-10v dimming driver, factory adjusted to 245mA.	XERO	XTA 3.0	WHITE	195 W	3200 K	5
G	SURFACE MOUNT LED OYSTER FITTING - 500MM	THORN	NOVALINE STYLE 'LG'	BLACK	28 W	4000 K	7
H	SURFACE MOUNT LED OYSTER FITTING - 300MM	THORN	NOVALINE STYLE 'S'	WHITE	18 W	4000 K	4
I	RECESSED MOUNT LOW GLARE DOWNLIGHT 165MM	EAGLE	PLEIAD G4 165 BLACK REFLECTOR - MEDIUM BEAM	WHITE	9 W	4000 K	3
J	DOWNLIGHT - SMALL - BATHROOM STALLS	MELEC	ML-MR7-M	WHITE	7 W	4000 K	6
K	SURFACE MOUNTED LED OYSTER	THORN	NOVALINE STYLE 'm'	BLACK	18 W	4000 K	2
L	JOINERY RECESSED LED STRIP IN ALUMINIUM SECTION - OPAL DIFFUSER - COORDINATE WITH JOINERY SUPPLIER	MELEC	ML-VL-9.6-WW	WHITE	10 W	3000 K	2
M	FLOODLIGHT - HORIZONTAL MOUNT AT HIGH LEVEL - CURFEW RESTRICTED	MELEC	ML-NOX5-15-V4-WW	WHITE	50 W	3000 K	7
N	RECESSED MOUNT DUAL GIMBAL DOWNLIGHT IN RECTANGULAR FRAME - 60 DEGREE LENS - INSTALLED IN TIMBER BATTEN FEATURE	DECROLUX	WALTZ 20W LC3425B	BLACK	20 W	3000 K	7
O	RECESSED MOUNT GIMBAL DOWNLIGHT IN RECTANGULAR FRAME - 60 DEGREE LENS - INSTALLED EXTERNAL EAVE	DECROLUX	WALTZ 10W LC3420B	BLACK	10 W	3000 K	2

ELECTRICAL DEVICE FIXTURE SCHEDULE				
REF.	DESCRIPTION	MANUFACTURER	MODEL	QTY.
1	POWER POINT SWITCHED 2 GANG 10A 250V	TRADER	PUMA - PUPP2G	110
2	POWER POINT WITH DUAL USB CHARGER	TRADER	PUMA - PUPP2USB2G	7
3	POWER POINT SWITCHED 1 GANG DOUBLE POLE SHUTTERED 15A 250V VANDAL PROOF	TRADER	PUMA - PUPP151GVP	3
4	CLIENT SUPPLIED WALL MOUNTED HAND DRYER - CONTRACTOR TO INSTALL, PROVIDE 20 AMP POWER SUPPLY AND CONNECT.	DYSON	AIRBLADE V AB12 WHITE	1
5	POWER POINT SWITCHED 2 GANG 10A 250V	TRADER	PUMA - PUPP2G	18
6	WEATHERPROOF ISOLATOR 20A 250V - SINGLE POLE	TRADER	HIPPO - HPISWL120	6
7	SWITCH 32A 500V - THREE POLE INDUSTRIAL	TRADER	BUFFALO - BUSW332	2
8	SWITCH 50A 500V - THREE POLE INDUSTRIAL	TRADER	BUFFALO - BUSW350	1
9	WALL MOUNTED HAND DRYER - CONTRACTOR TO PROVIDE 20 AMP POWER SUPPLY AND CONNECT.	DYSON	AIRBLADE V AB12 WHITE	5
FB	RECESSED FLOOR BOX WITH CARPET INSERT	ECD	FB45DR	2

COMMUNICATIONS DEVICE SCHEDULE			
DESCRIPTION	MANUFACTURER	MODEL	QTY.
2 PORT CAT6A COMMUNICATIONS OUTLET	TRADER	COSWP2G + (2x) MERJ6CM	42
4 PORT CAT6A COMMUNICATIONS OUTLET	TRADER	COSWP4G + (4x) MERJ6CM	2
WIRELESS ACCESS POINT - 2 PORT CAT6A OUTLET	TRADER	COSWP2G + (2x) MERJ6CM	11

SECURITY DEVICE SCHEDULE				
REF	DESCRIPTION	MANUFACTURER	MODEL	QTY.
ST	BLUE STROBE - ROUND - EXTERNAL SIREN KIT - BLACK	GENERIC	GENERIC	1
CM	CAMERA	T.B.C	T.B.C	1
CR	CARD READER - PROXIMITY	INTEGRITY	SIFER	18
MD	CEILING MOUNTED RECESSED - 360° MOTION DETECTOR	T.B.A	T.B.A	5
CM	DOME CAMERA - CONNECT TO EXISTING MILESTONE SERVER VIA STRUCTURED CABLING (CC-1)	IDIS	DC-D4538WRA	4
ML	ELECTRIC MONITORED STANDARD MORTICE LOCK	LOCKWOOD	3570ELMOSC	17
K	KEYPAD	INTEGRITY	ELITE X	1
AD	OPTION CARD INTERFACE TO AUTODOOR	N/A	RELAY OUTPUT ON/Y	1
PS	PEIZO SCREAMER	GENERIC	GENERIC	3
R	REED SWITCH	SENTROL	1078-N	3
MD	WALL MOUNTED - 180° MOTION DETECTOR	OPTEX	FMX-ST	13

EMERGENCY LIGHTING SCHEDULE					
REF.	DESCRIPTION	MANUFACTURER	MODEL	LIGHT FITTING COLOUR	QTY.
EM1	RECESSED MOUNT LED EMERGENCY LIGHT	CLEVERTRONICS	CLIFE-PRO	WHITE	18
EM2	UNIVERSAL MOUNT BLADE EXIT LUMINAIRE	CLEVERTRONICS	CCBLADE	WHITE	7

COMMS RACK SCHEDULE			
PANEL NAME	DESCRIPTION	MANUFACTURER	MODEL
CC-1	42RU COMMUNICATIONS CABINET - 800(W) x 1000(D)	RACK TECHNOLOGIES	RTX8042S
CC-2	42RU COMMUNICATIONS CABINET - 800(W) x 1000(D)	RACK TECHNOLOGIES	RTX8042S
CC-3	42RU COMMUNICATIONS CABINET - 800(W) x 1000(D)	RACK TECHNOLOGIES	RTX8042S

SECURITY CONTROLLER SCHEDULE			
REF	DESCRIPTION	MANUFACTURER	MODEL
SEC	MAIN SECURITY CONTROLLER	INTEGRITY	IR
DCP	4 DOOR CONTROLLER	INTEGRITY	ILAM
DCP	4 DOOR CONTROLLER	INTEGRITY	ILAM
DCP	4 DOOR CONTROLLER	INTEGRITY	ILAM
DCP	4 DOOR CONTROLLER	INTEGRITY	ILAM
DCP	4 DOOR CONTROLLER	INTEGRITY	ILAM

NBN COMPLIANT SERVICES	
REF	DESCRIPTION
FDT	FIBRE DISTRIBUTION TERMINAL
PCD	PREMISIS CONNECTION DEVICE

FIRE ALARM DEVICE SCHEDULE	
DESCRIPTION	QTY.
ADDRESSABLE CONCEALED SMOKE DETECTOR	1
ADDRESSABLE SMOKE DETECTOR	17
ADDRESSABLE SMOKE DETECTOR WITH SOUNDER BASE	17
CONCEALED SMOKE DETECTOR	1
SMOKE DETECTOR	1
SURFACE MOUNTED SPEAKER / SOUNDER	1

TENDER			
DRAWING NOTES: <ul style="list-style-type: none">DO NOT SCALE DIRECTLY OFF DRAWING. ALL MEASUREMENTS AND LOCATIONS OF EQUIPMENT ARE TO BE CONFIRMED ON SITE WITH THE SITE SUPERVISOR.THIS DRAWING IS TO BE VIEWED IN CONJUNCTION WITH SPECIFICATION, ARCHITECTURAL, STRUCTURAL AND ALL OTHER SERVICES DRAWINGS.SCHEDULE QUANTITIES/COUNTS ARE PROVIDED AS A GUIDE ONLY AND ACTUAL QUANTITIES ARE THE RESPONSIBILITY OF THE CONTRACTORTHIS DRAWING IS REQUIRED TO BE VIEWED OR PRINTED IN COLOUR FOR THE FULL EXTENT OF THE SCOPE OF WORKS TO BE SHOWNANY DISCREPANCIES DURING ANY PHASE OF THE WORKS BETWEEN THE DRAWINGS, SPECIFICATION AND OTHER DISCIPLINE'S DOCUMENTATION THE CONTRACTOR IS TO:<ul style="list-style-type: none">ASSUME THE MOST ONEROUS AND,RAISE AN RFI TO CLARIFY THE DISCREPANCY <p>ALL LIABILITY DUE TO FAILURE TO OBSERVE THESE CLAUSES SHALL BE BORNE BY THE CONTRACTOR.</p>			

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Client SORELL COUNCIL		
Project SORELL JOBS HUB		
Sheet Title ELECTRICAL SERVICES - EQUIPMENT SCHEDULES		
ELECTRICAL SERVICES		
Scale	Designed By D.E	Drawn By J.v.N
	Checked By -	Revision T1
	Drawing No. 233369-S1-E05	

CHASSIS: DB-1*		NO. OF POLES: 60				MAIN SWITCH SIZE: 160.00 A						
CKT	CIRCUIT DESCRIPTION	TRIP	COMMENTS	POLES	A	B	C					CKT
								POLES	COMMENTS	TRIP	CIRCUIT DESCRIPTION	
1	FIRE ALARM SYSTEM	16.00 A		1								31
2	POWER - CC - 1	16.00 A		1								32
3	POWER - CC - 2	16.00 A		1								33
4	POWER - CC - 3	16.00 A		1								34
5	POWER - SECURITY SYSTEMS	16.00 A		1								35
6	NBN	16.00 A		1								36
7	POWER	16.00 A		1								37
8	POWER	16.00 A		1								38
9	POWER	16.00 A		1								39
10	POWER	16.00 A		1								40
11	POWER	16.00 A		1								41
12	POWER	16.00 A		1								42
13	POWER - UNDER BENCH OVEN - TEA ROOM	20.00 A		1								43
14	HAND DRYER DDA BATHROOM	16.00 A		1								44
15	HAND DRYER FEMALE TOILET 1	16.00 A		1								45
16	HAND DRYER FEMALE TOILET 2	16.00 A		1								46
17	HAND DRYER MALE TOILET	16.00 A		1								47
18	HAND DRYER FEMALE TOILET	16.00 A		1								48
19	HAND DRYER PARENT ROOM	16.00 A		1								49
20												50
21												51
22												52
23												53
24												54
25	LIGHTING	16.00 A		1								55
26	LIGHTING	16.00 A		1								56
27	LIGHTING	16.00 A		1				1		16.00 A	HWS 1	57
28	EXTERNAL LIGHTING	16.00 A		1				1		16.00 A	HWS 2	58
29	EXTERNAL LIGHTING - CURFEW	16.00 A		1				1		--	AC - INDOOR UNITS	59
30	LIGHTING CONTROL	--		1				1		25.00 A	AC OU4	60

CHASSIS: DB-2		NO. OF POLES: 36				MAIN SWITCH SIZE: 160.00 A									
CKT	CIRCUIT DESCRIPTION	TRIP	COMMENTS	POLES	A	B	C	POLES	COMMENTS	TRIP	CIRCUIT DESCRIPTION	CKT			
1	UNDER BENCH OVEN	20.00 A		1								19			
2	POWER	16.00 A		1											20
3	POWER	16.00 A		1											21
4	POWER	16.00 A		1											22
5	POWER	16.00 A		1											23
6	POWER	16.00 A		1											24
7	LIGHTING	16.00 A		1											25
8	LIGHTING	16.00 A		1											26
9	LIGHTING	16.00 A		1											27
10															28
11															29
12															30
13															31
14															32
15											1		--	AC INDOOR UNITS - 16A	33
16															34
17											3		32.00 A	AC OU1	35
18															36

CHASSIS: DB-3		NO. OF POLES: 36					MAIN SWITCH SIZE: 160.00 A							
CKT	CIRCUIT DESCRIPTION	TRIP	COMMENTS	POLES	A B C			POLES	COMMENTS	TRIP	CIRCUIT DESCRIPTION	CKT		
1	POWER	16.00 A		1								19		
2	POWER	16.00 A		1								20		
3	POWER	16.00 A		1								21		
4	POWER	16.00 A		1								22		
5	POWER	16.00 A		1								23		
6	POWER	16.00 A		1								24		
7	LIGHTING	16.00 A		1								25		
8	LIGHTING	16.00 A		1								26		
9	LIGHTING	16.00 A		1								27		
10												28		
11												29		
12												30		
13												31		
14												32		
15										1		--	AC INDOOR UNITS	33
16														34
17										3		25.00 A	AC OU2	35
18														36

CHASSIS: DB-4		NO. OF POLES: 36						MAIN SWITCH SIZE: 160.00 A						
CKT	CIRCUIT DESCRIPTION	TRIP	COMMENTS	POLES	A	B	C					CKT		
								POLES	COMMENTS	TRIP	CIRCUIT DESCRIPTION			
1	POWER	16.00 A		1								19		
2	POWER	16.00 A		1								20		
3	POWER	16.00 A		1								21		
4	LIGHTING	16.00 A		1								22		
5	LIGHTING	16.00 A		1								23		
6	LIGHTING	16.00 A		1								24		
7												25		
8												26		
9												27		
10												28		
11												29		
12												30		
13												31		
14												32		
15										1		--	AC INDOOR UNITS	33
16														34
17										3		25.00 A	AC OU3	35
18														36

TENDER

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Sheet Title
ELECTRICAL SERVICES -
SWITCHBOARD
SCHEDULES

ELECTRICAL SERVICES

	Designed By D.E	Drawn By J.v.N
	Checked By -	Revision T1
Scale	Drawing No. 23369-S1-E06	

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LEGEND

GENERAL

PHASING

-----	SYMBOLS, EQUIPMENT AND PIPEWORK SHOWN GREY & DASHED DENOTES EXISTING
-----	SYMBOLS, EQUIPMENT AND PIPEWORK SHOWN RED & DASHED DENOTES TO BE DEMOLISHED
---	SYMBOLS, EQUIPMENT AND PIPEWORK SHOWN DASHED DENOTES BELOW FLOOR

PIPEWORK

—	DOMESTIC COLD WATER (DCW)
—	DOMESTIC HOT WATER (DHW)
—	TEMPERED WATER (DTW)
—	SEWER (SEW)
—	STORMWATER (SW)
—	FIRE HOSE REEL

REFERENCE TAGS

EQUIPMENT TAG - GENERAL

EF-01	UNIT REFERENCE ID (REFER SCHEDULES)
XXX	ABBREVIATION / REF. / TYPE MARK (REFER SCHEDULES IF REF. OR TYPE MARK)
DNXXX	CONNECTION SIZE

PLUMBING FIXTURES & PIPE ACCESORIES TAG

XXX	ABBREVIATION / REF. / TYPE MARK (REFER SCHEDULES IF REF. OR TYPE MARK)
DNXXX	CONNECTION SIZE

ABBREVIATIONS

AAV	AIR ADMITTANCE VALVE
B	BASIN
BTH	BATH
CL	CLEANERS SINK
CO	CLEAN OUT
FHR	FIRE HOSE REEL
FW	FLOOR WASTE
HBC	HOSE BIBCOCK
HWC	HOT WATER CYLINDER
HP	HIGH POINT
IO	INSPECTION OPENING
ORG	OVERFLOW RELIEF GULLY
RPZD	REDUCED PRESSURE ZONE DEVICE
S	SINK
STY	SAFETY TRAY
SV	STOP VALVE
TUN	TUNDISH
TPV	TEMPERING VALVE
TMV	THERMOSTATIC MIXING VALVE
UR	URINAL
V	VENT
WC	WATER CLOSET
WTD	WALL TUNDISH

GENERAL NOTES:

1.

ALL WORKS SHALL COMPLY WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA (NCC).
2.

ALL WATER INSTALLATIONS SHALL COMPLY WITH AS/NZS3500.1:2021 & AS/NZS3500.4:2021.
3.

ALL SEWER INSTALLATIONS SHALL COMPLY WITH AS/NZS3500.2:2021.
4.

ALL STORMWATER INSTALLATIONS SHALL COMPLY WITH AS/NZS3500.3:2021.
5.

WHERE A METALLIC WATER SERVICE IS TO BE REPLACED USING NON METALLIC PIPE A LICENSED ELECTRICIAN SHALL ASSESS AFFECTED PROPERTY'S ELECTRICITY SUPPLY FOR DEFECTS AND THE LIKELY EFFECT ON EARTHING ADEQUACY. WORK CAN COMMENCE ONCE THE ELECTRICIAN DECLARES IN WRITING THAT IT IS SAFE TO PROCEED
6.

CONTRACTORS SHALL CO-ORDINATE WITH ARCHITECTURAL DRAWINGS FOR LOCATION OF TMVS, RPZDs, FLOORWASTES ETC.
7.

CONTRACTOR TO INSTALL PIPEWORK & EQUIPMENT WITH CONSIDERATION TO OTHERS SERVICES - LIASE WITH OTHER CONTRACTORS WHERE REQUIRED.
8.

ISOLATION VALVES SHALL BE INSTALLED IN ACCORDANCE WITH AS3500.
9.

IT IS THE CONTRACTORS RESPONSIBILITY TO OBTAIN "DIAL BEFORE YOU DIG" INFORMATION TO ASCERTAIN THE FULL EXTENT OF EXISTING SERVICES SURROUNDING THE SUBJECT PROPERTY. PRIOR TO ANY EXCAVATION THE RELEVANT AUTHORITIES (EG. TELSTRA, OPTUS, AGILITY, ETC.) ARE TO BE NOTIFIED OF ALL WORKS
10.

CONTRACTORS SHALL ALLOW TO PAY ALL FEES & CHARGES FOR ALL AUTHORITIES RELATING TO ALL WORKS DESIGNED & SPECIFIED.
11.

CONTRACTORS SHALL PROVIDE ALL NECESSARY TESTING AND INSPECTION OPENINGS.
12.

ALL PIPEWORK EXPOSED TO VIEW WITHIN THE OCCUPIED SPACE SHALL BE CHROME PLATED COPPER OR STAINLESS STEEL.
13.

CONTRACTORS SHALL ALLOW TO PREPARE & SUPPLY DETAILED PROFESSIONALLY DRAFTED "AS INSTALLED" DRAWINGS & MAINTENANCE MANUALS FOR ALL ASSOCIATED WORKS AS DETAILED IN THE SPECIFICATION.
14.

ALL HYDRAULIC SERVICES PIPEWORK, EQUIPMENT & VALVES SHALL BE LABELED AS PER AS3500 TO ENABLE THEM TO BE CLEARLY IDENTIFIED, LOCATIONS OF LABELS TO BE APPROVED BY ARCHITECT.
15.

ALL FIXTURES SHALL BE TRAPPED UNLESS DISCHARGING TO GULLY OR STATED OTHERWISE.
16.

ALL NEW ABOVE GROUND WATER RETICULATION PIPEWORK SHALL BE REHAU RAUTITAN WHERE CONCEALED AND COPPER WHERE EXPOSED TO VIEW EXCEPT THAT ALL FIRE HOSEREEL SERVICE SHALL BE COPPER.
17.

REFER TO ARCHITECTS DOCUMENTATION FOR LOCATIONS REQUIRING ACOUSTIC RATING OF PIPEWORK.
18.

ALL TRADE WASTE PIPEWORK TO BE HDPE OR EQUIVALENT.
19.

WALL MOUNTED PLUMBING EQUIPMENT LOCATED NOMINALLY. LOCATION & MOUNTING HEIGHTS TO BE CONFIRMED BY ARCHITECT.
20.

ALL PIPE DIAMETERS LISTED ARE NOMINAL INSIDE DIAMETER AND PIPES ARE TO BE SIZED ACCORDINGLY. (EG. DN25 EQUIVALENT TO 32mm PE-X AS PER AS3500.1).
21.

MAIN RUNS OF HOT WATER PIPEWORK TO BE INSULATED WITH 32mm WALL THICKNESS, BRANCH RUNS TO BE INSULATED WITH 25mm WALL THICKNESS.
22.

ALL EQUIPMENT (HOT WATER UNITS, TMVS, PUMPS ETC) TO BE CLEARLY LABELLED WITH UNIQUE ID FOR IDENTIFICATION & MAINTENANCE PURPOSES. NUMBER IN ACCORDANCE WITH ANY EXISTING FACILITY LABELLING SYSTEM.
23.

ALL FLEXIBLE HOSES FOR WATER CONNECTIONS TO BE BROMIC - "PEXPRO" (FOR 1/2" BSP STOP TAPS) OR "PEXCORE" (FOR MIXERS).
24.

ALL PIPEWORK & ACCESSORIES UPSTREAM OF & IN CONTACT WITH DRINKING WATER FIXTURES TO BE LEAD FREE AS PER WATERMARK SCHEDULE.
25.

REFER TO THE ARCHITECTS DOCUMENTATION FOR FIXTURE & TAPWARE SELECTIONS. SUPPLY & FIX ACCESSORIES NECESSARY FOR THE CORRECT INSTALLATION OF THE FIXTURES & EQUIPMENT.
26.

PROVIDE FIRE HOSE REELS AND FIRE HOSE REEL SYSTEMS TO AS2441: 2005.

HOT WATER CYLINDER SCHEDULE

REF.	MANUFACTURER	MODEL	DESCRIPTION	NOM. STORAGE CAPACITY	POWER	F.L.A	COMMENTS
HWC-01	RHEEM	491160	Electric Hot Water Cylinder	160.0 L	3.6 kW	15.65 A	
HWC-02	RHEEM	491160	Electric Hot Water Cylinder	160.0 L	3.6 kW	15.65 A	

MIXING VALVE SCHEDULE

REF.	DESCRIPTION	NOM. SIZE	MAKE	MODEL	QTY.	COMMENTS
TMV	THERMOSTATIC MIXING VALVE	15	ENWARE	ATMS700H-350	2	IN STAINLESS STEEL WALLBOX WITH HINGED LID
TPV	TEMPERING VALVE	20	TOMSON	20mm	2	

FLOOR WASTE SCHEDULE

REF.	NOM. SIZE	MANUFACTURER	MODEL	DESCRIPTION	QTY.	COMMENTS
FW	100	SPS	VH87CPA	100MM PUSH-IN VINYL FLOOR WASTE & CLEANOUT	3	

TUNDISH SCHEDULE

REF.	NOM. SIZE	MANUFACTURER	MODEL	DESCRIPTION	QTY.	COMMENTS
WTD	32	3MONKEEZ	C-TUND	IN-WALL TUNDISH - REFER DETAIL	3	

FIRE HOSE REEL SCHEDULE

REF.	DESCRIPTION	COUNT
FHR1	L/H SWING FIRE HOSE REEL - 36m HOSE	2

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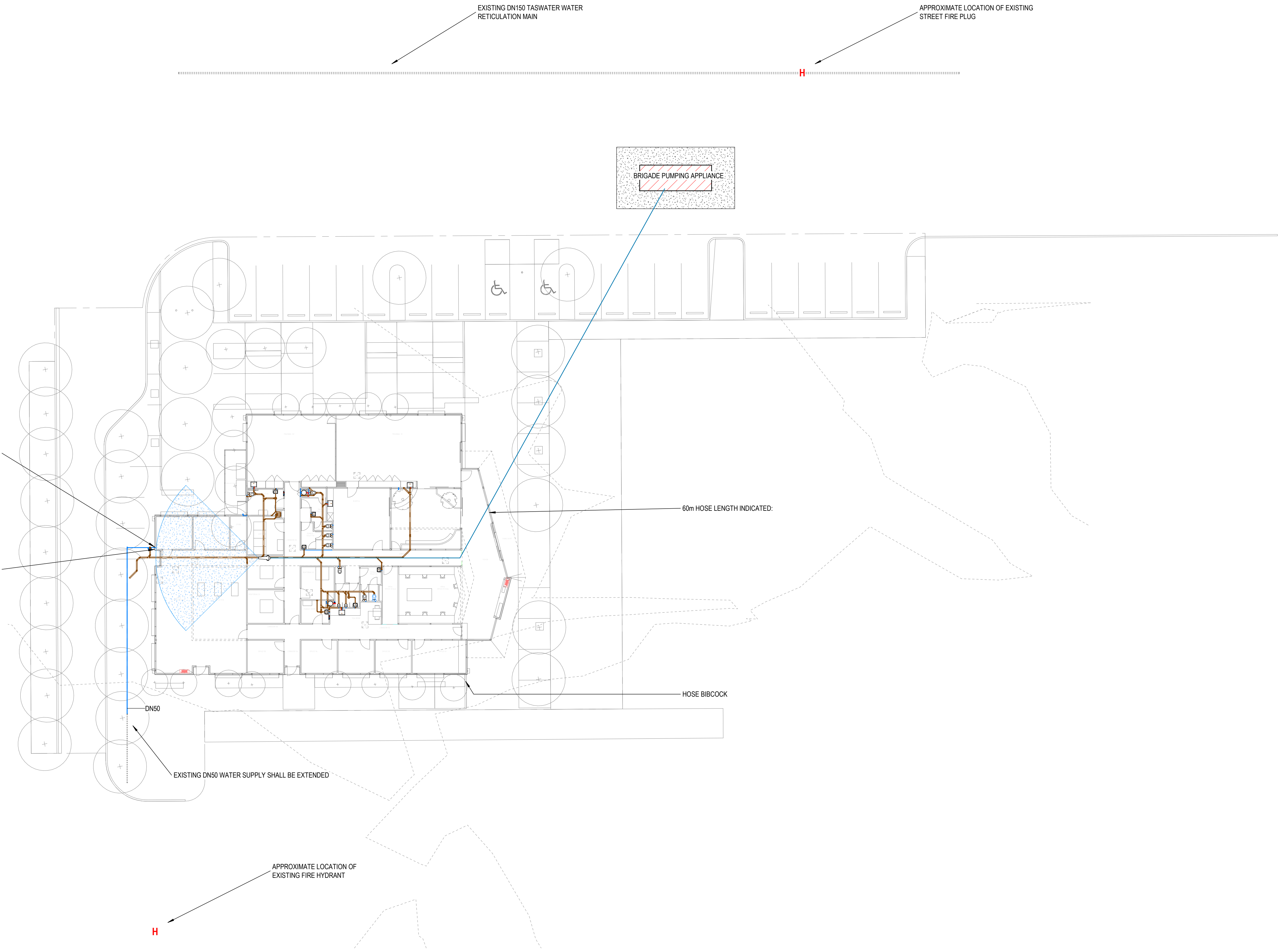
Sheet Title
HYDRAULIC LEGEND,
SCHEDULES & NOTES

HYDRAULIC SERVICES

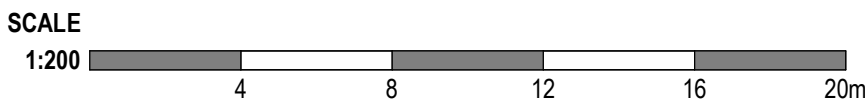
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	Checked By -	Revision T1
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HYDRAULIC SERVICES - SITE PLAN
1:200



TENDER

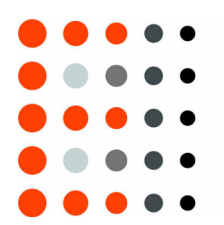
DRAWING NOTES:

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D.D	31/05/24		TENDER	T1
By	Date		Revision Description	Rev

REVISIONS



**ENGINEERING
SOLUTIONS
TASMANIA**

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SORELL COUNCIL

Project
SORELL JOBS HUB

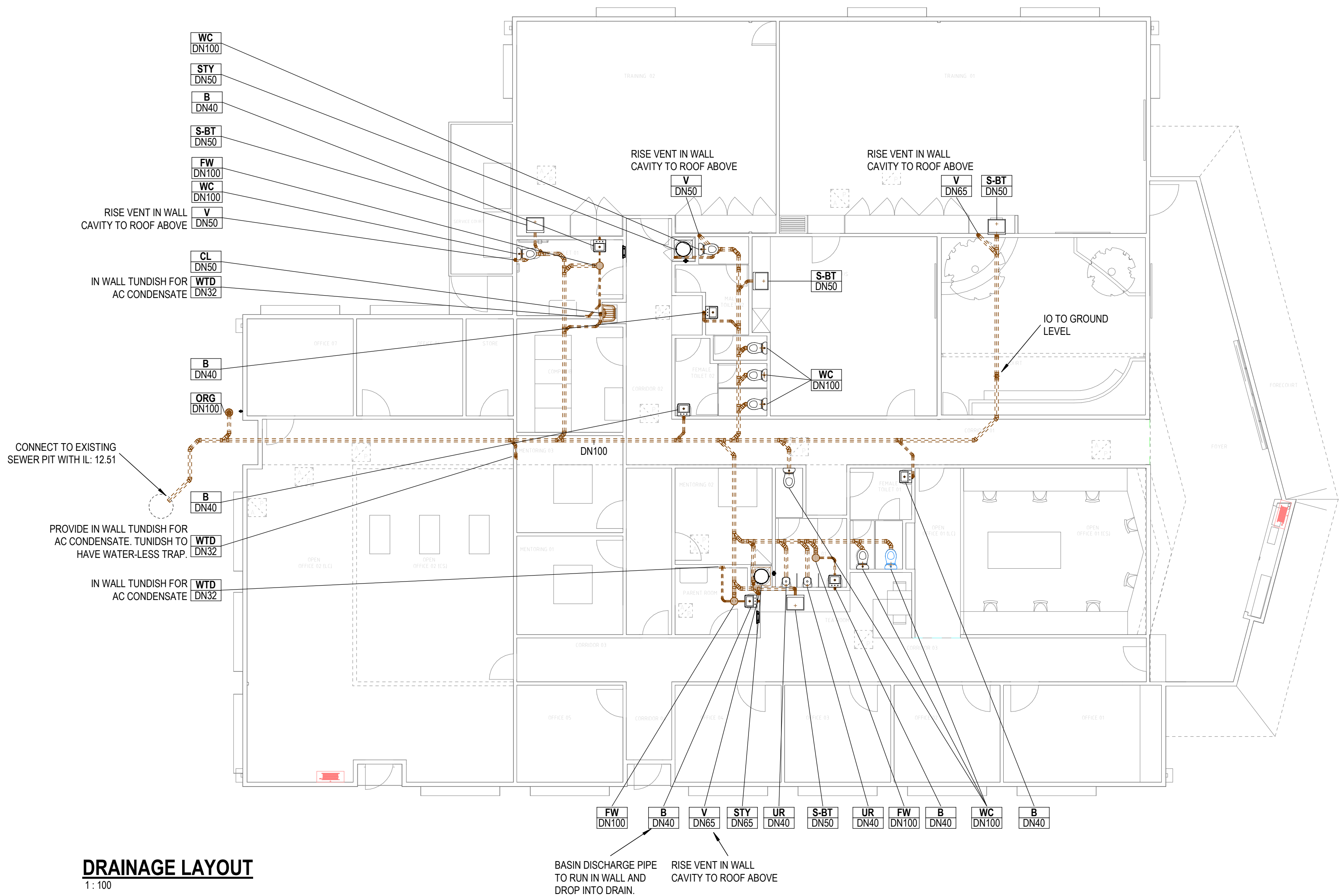
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HYDRAULIC SITE PLAN

HYDRAULIC SERVICES

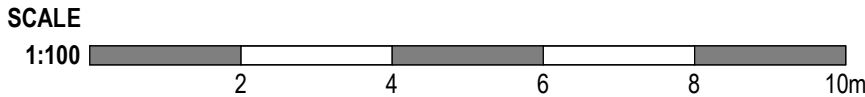
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Drawing No. 23369-S1-H02	

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DRAINAGE LAYOUT
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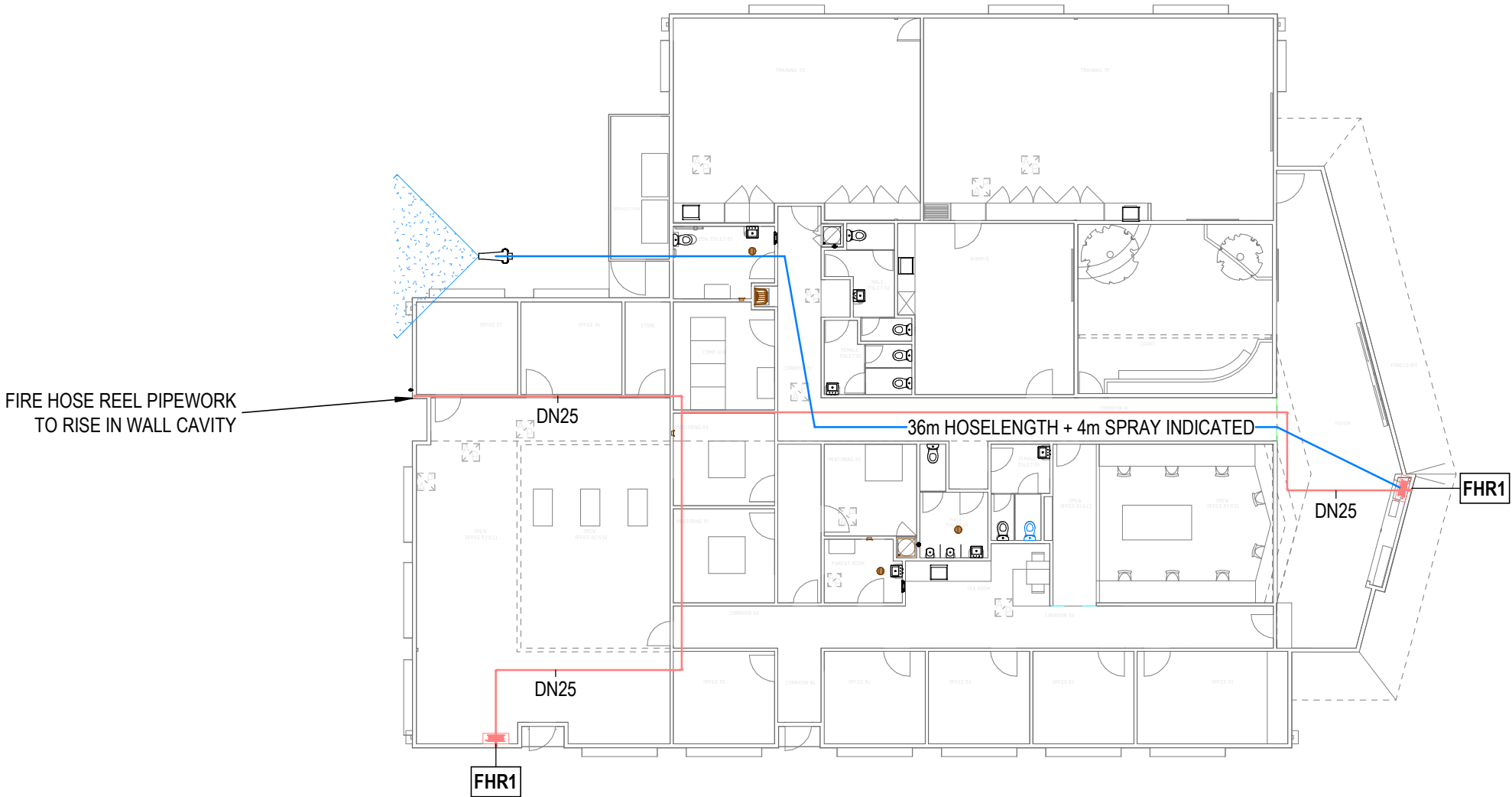
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HYDRAULIC SERVICES

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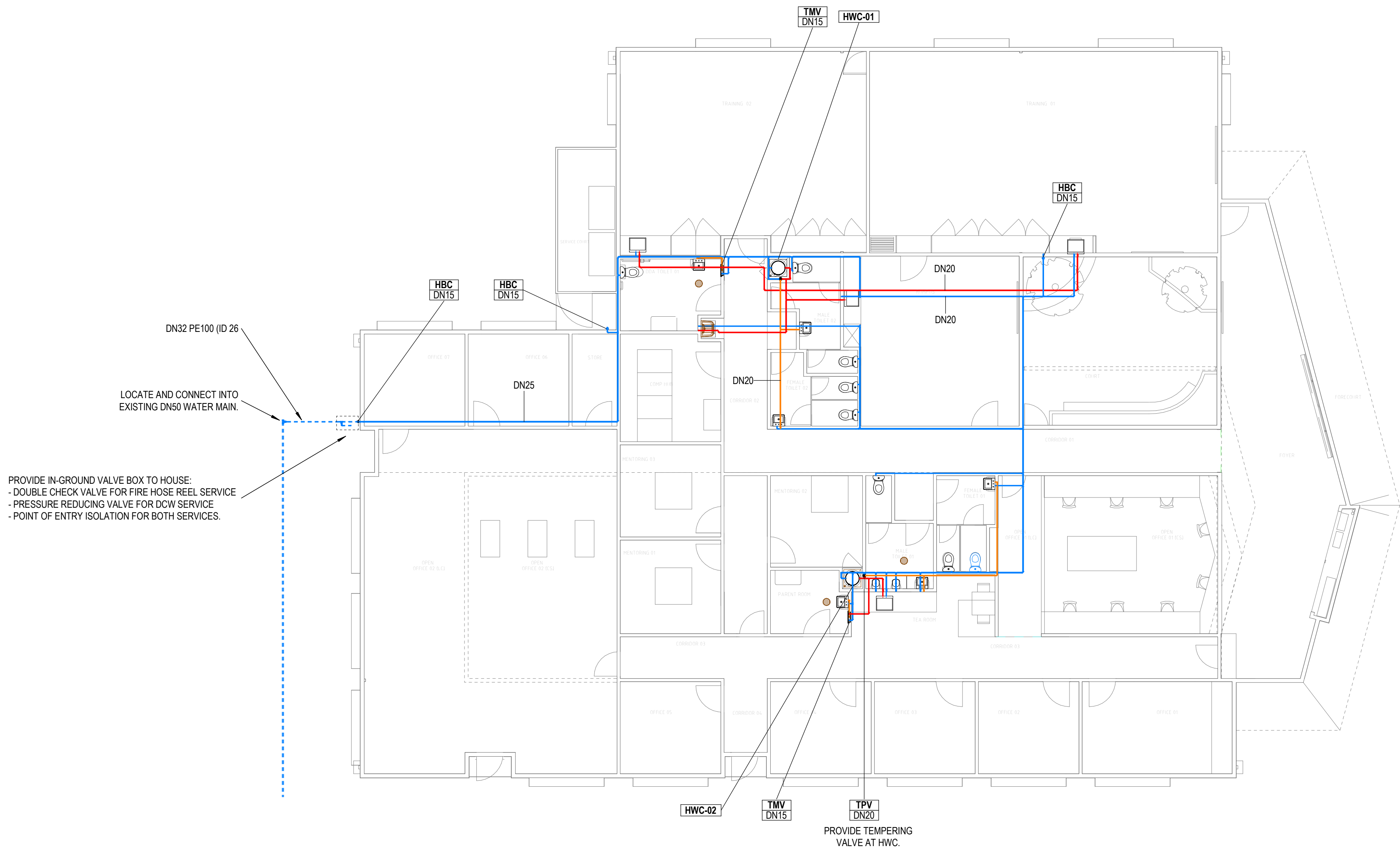
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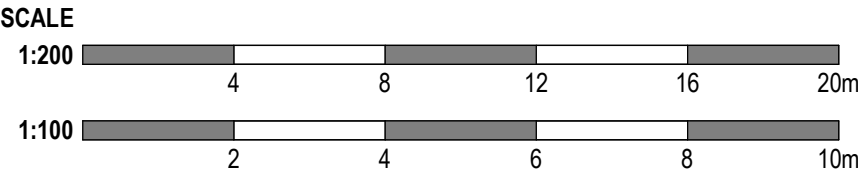
FIRE HOSEREEL LAYOUT

1:200



WATER RETICULATION LAYOUT

1:100



TENDER


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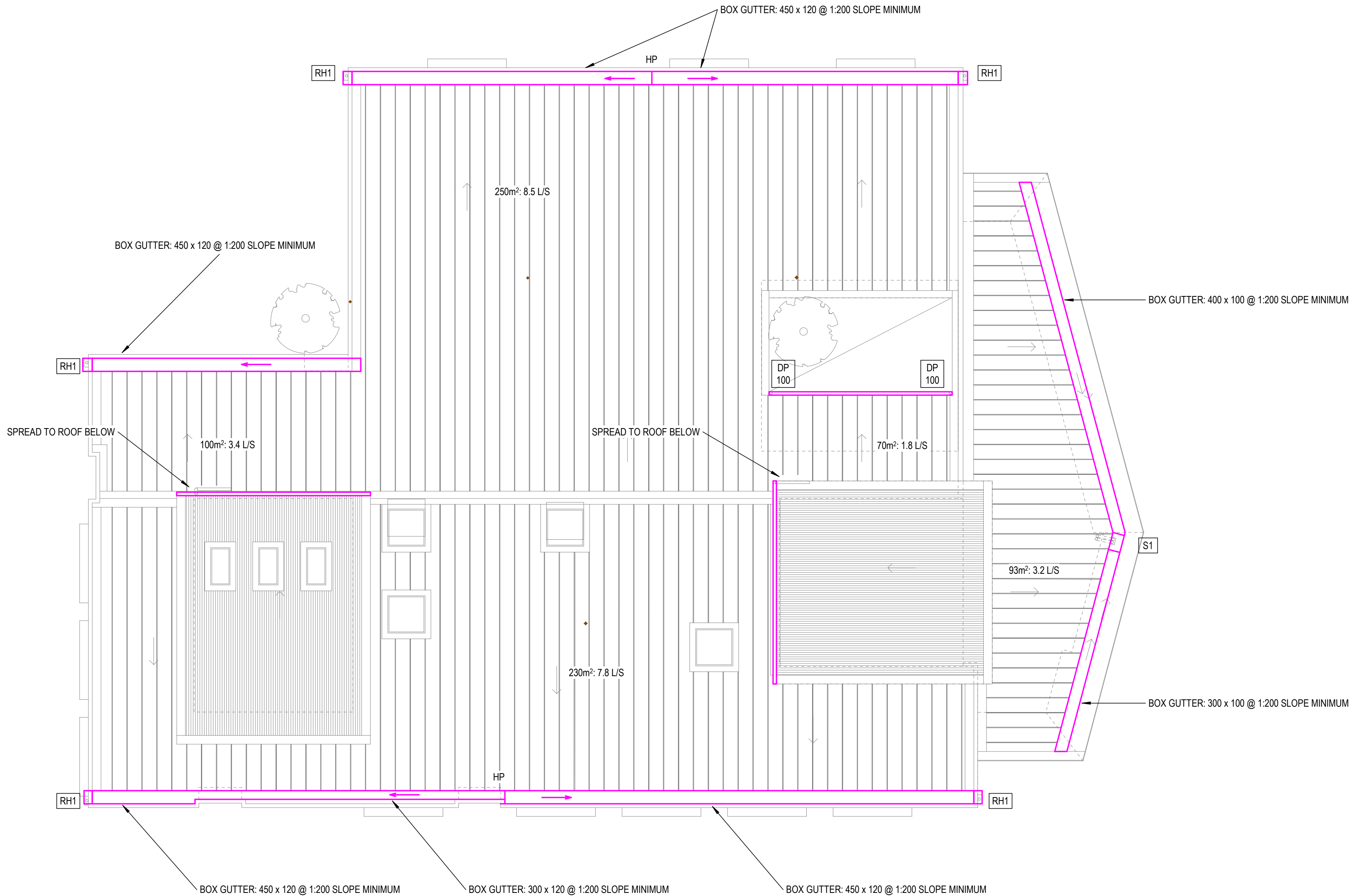
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HYDRAULIC SERVICES

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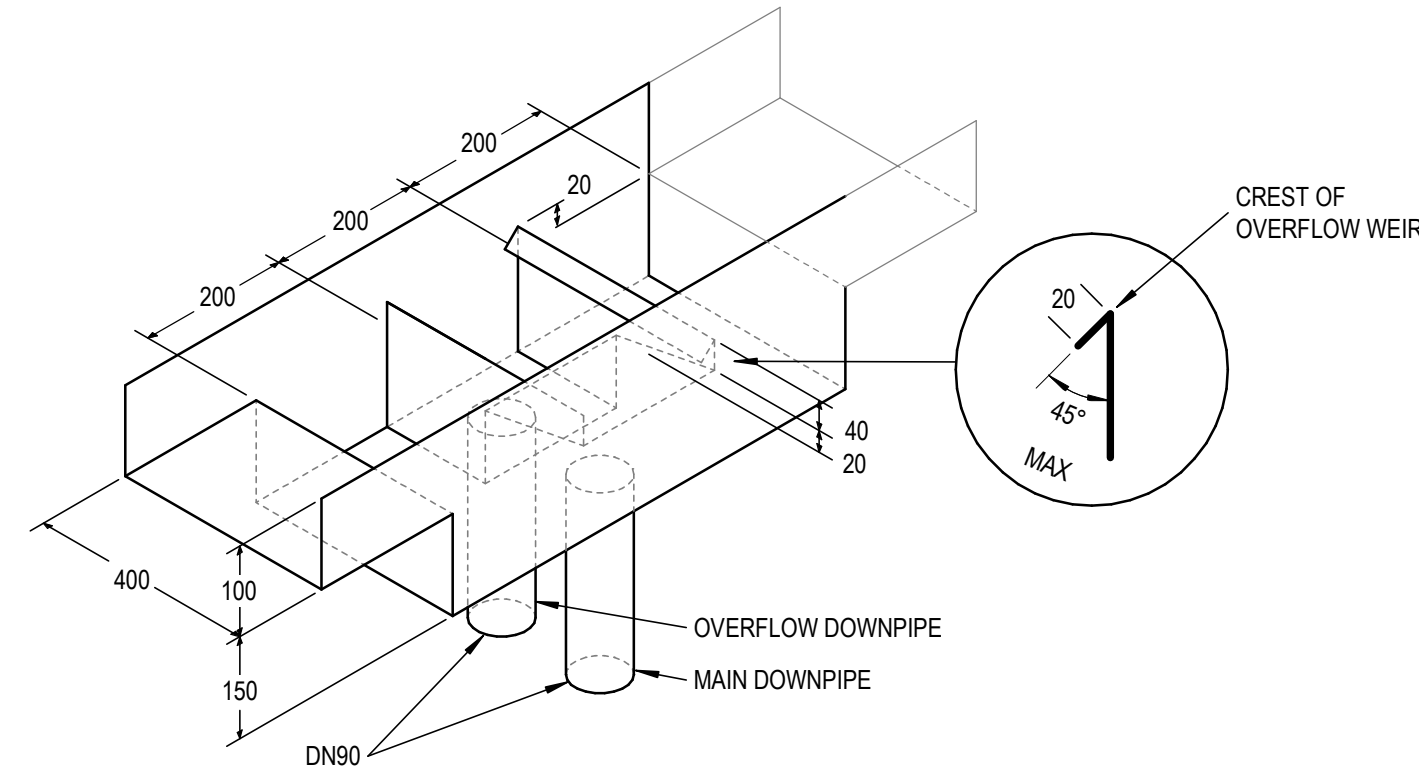
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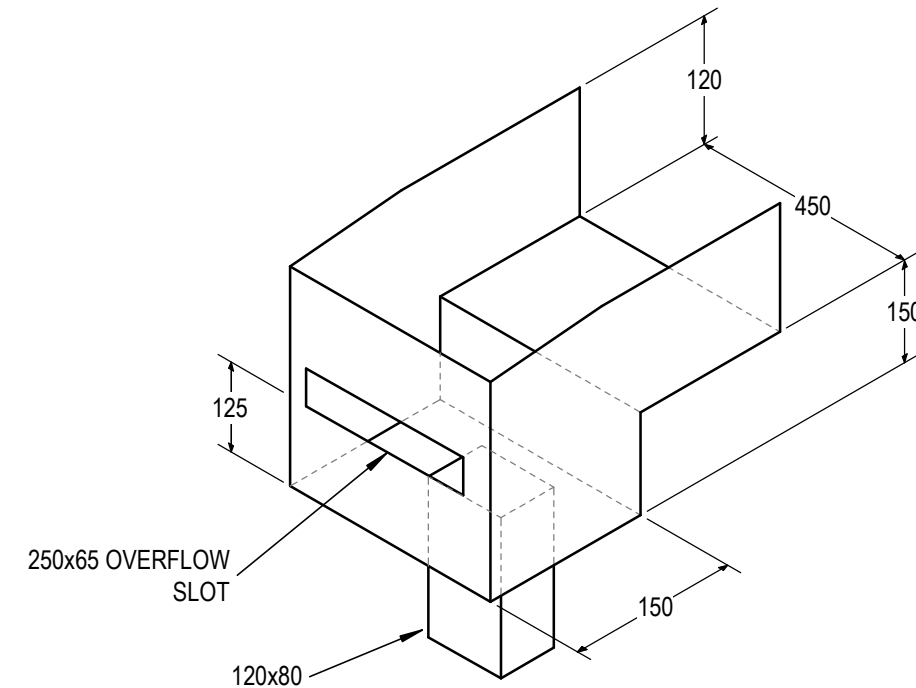
ROOF - STORMWATER LAYOUT

1:100



DETAIL - 2 SUMP S1

N.T.S



DETAIL - 3 - RAINHEAD RH1

N.T.S

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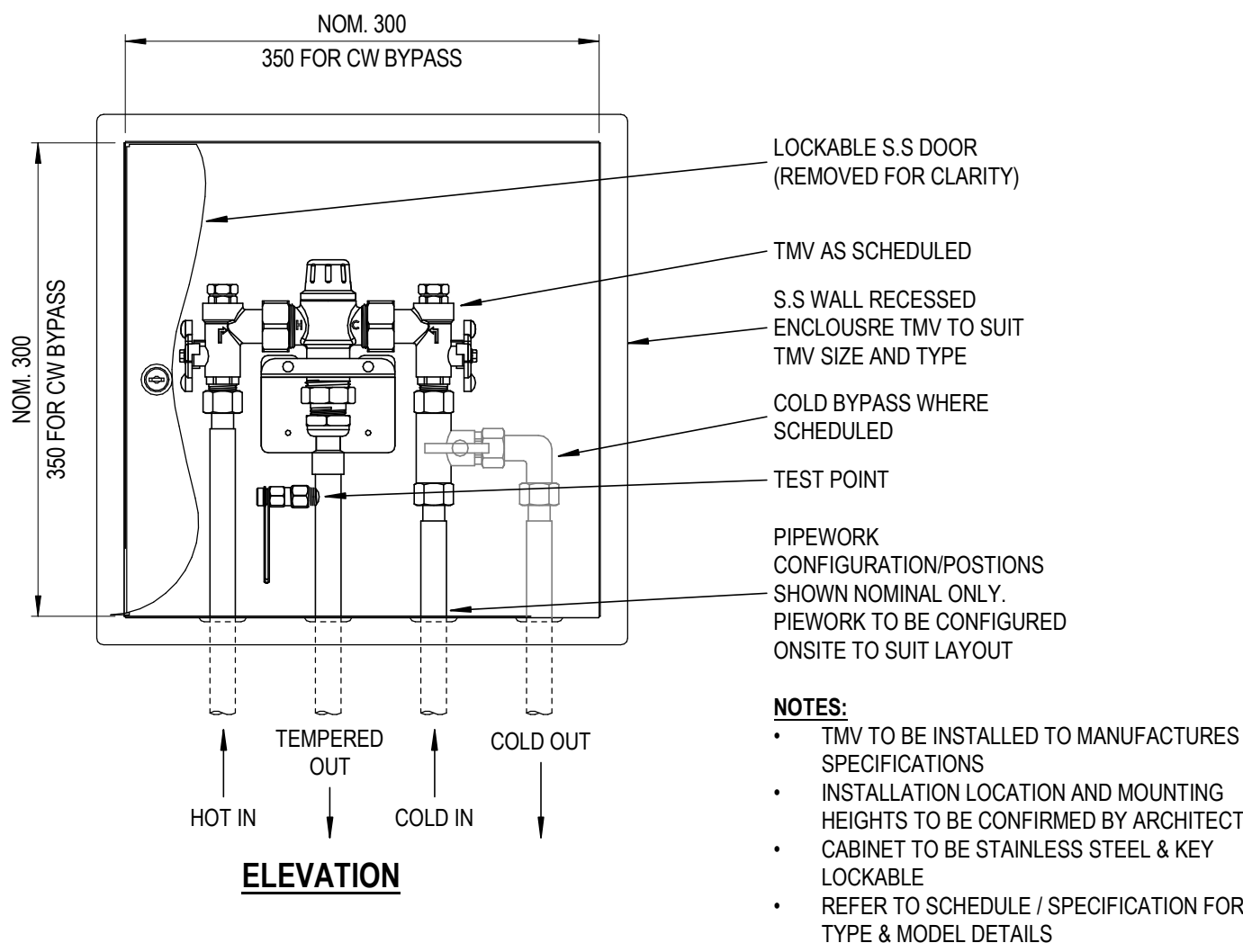
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ROOF - DRAINAGE LAYOUT & DETAILS

HYDRAULIC SERVICES

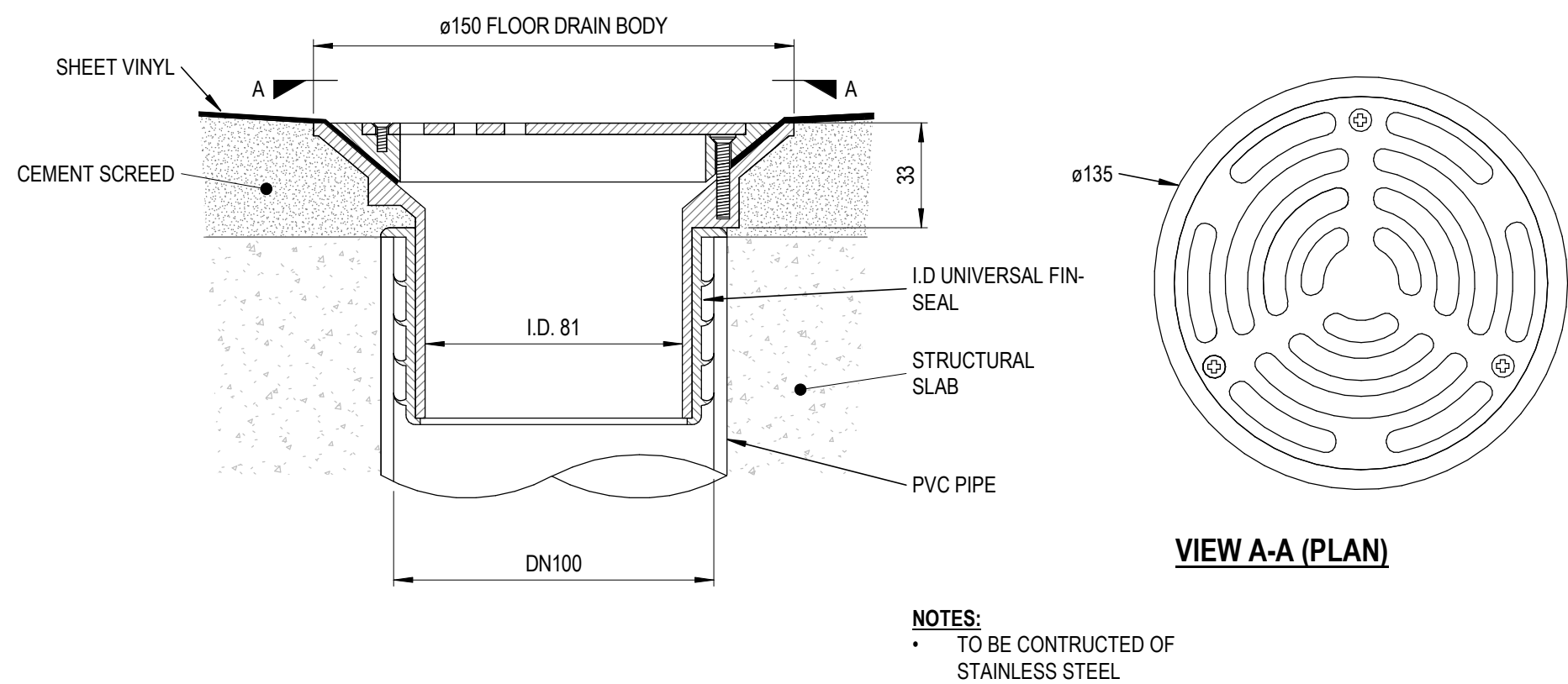
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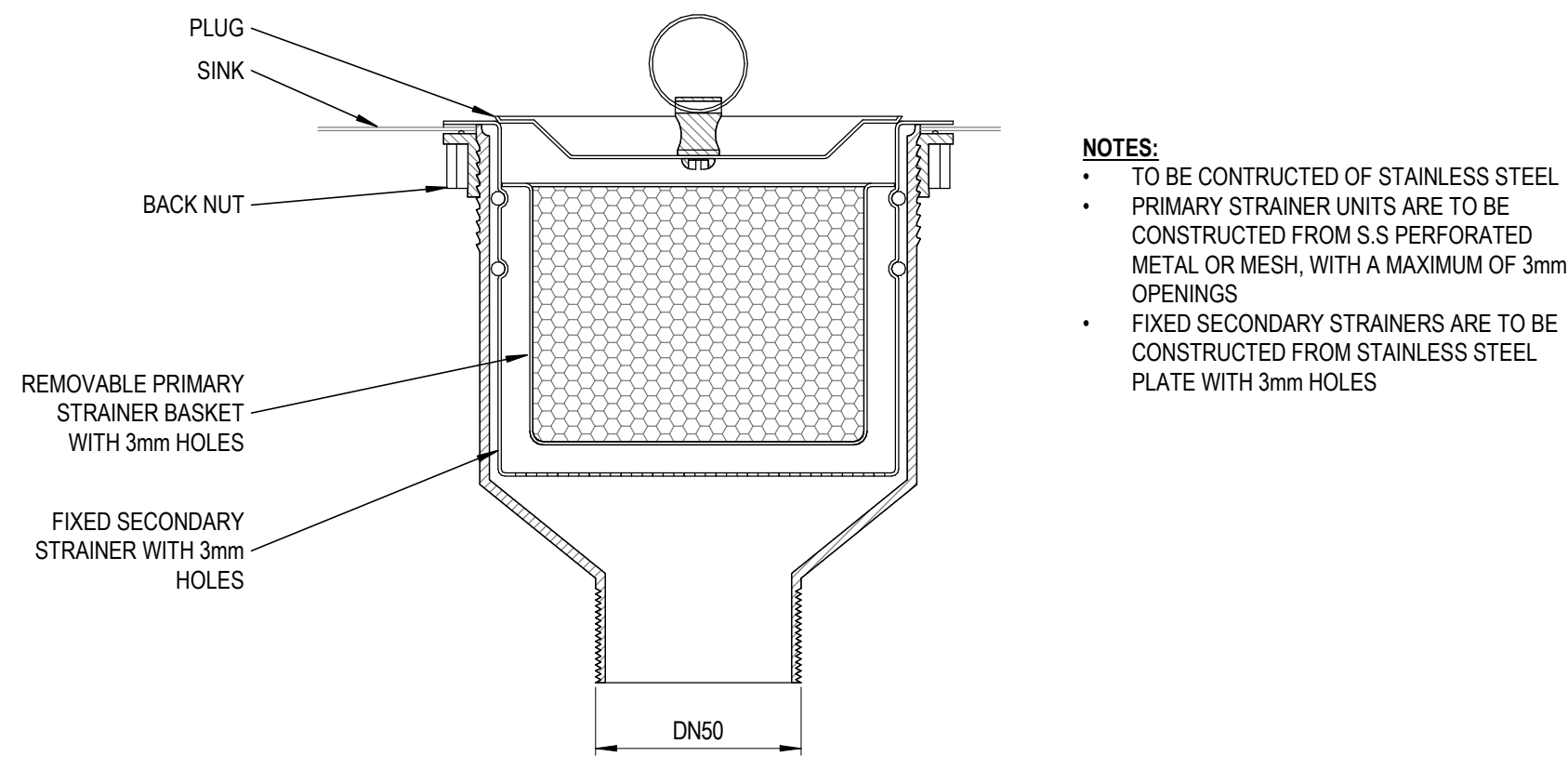
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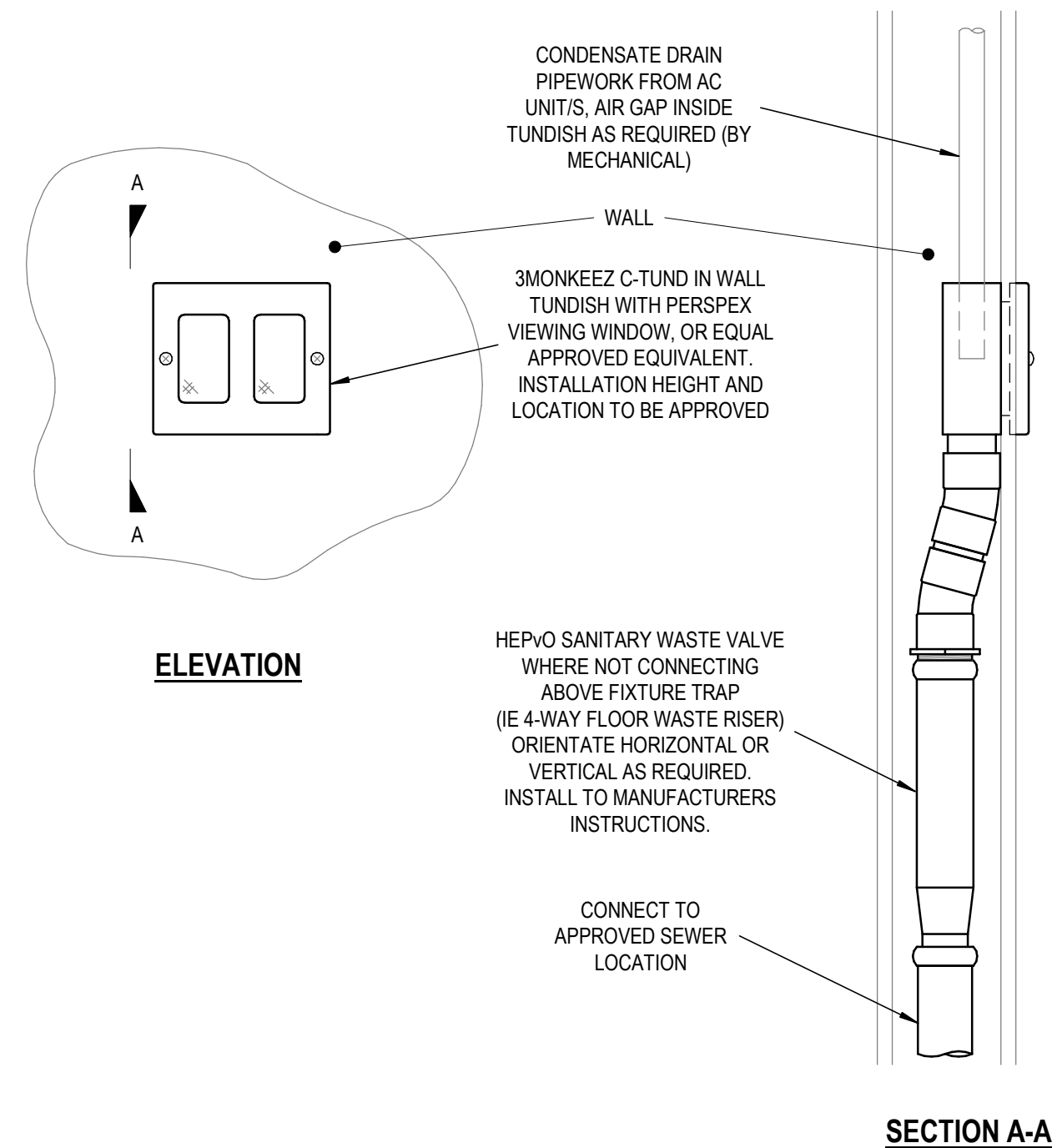
TYPICAL IN-WALL TMV DETAIL



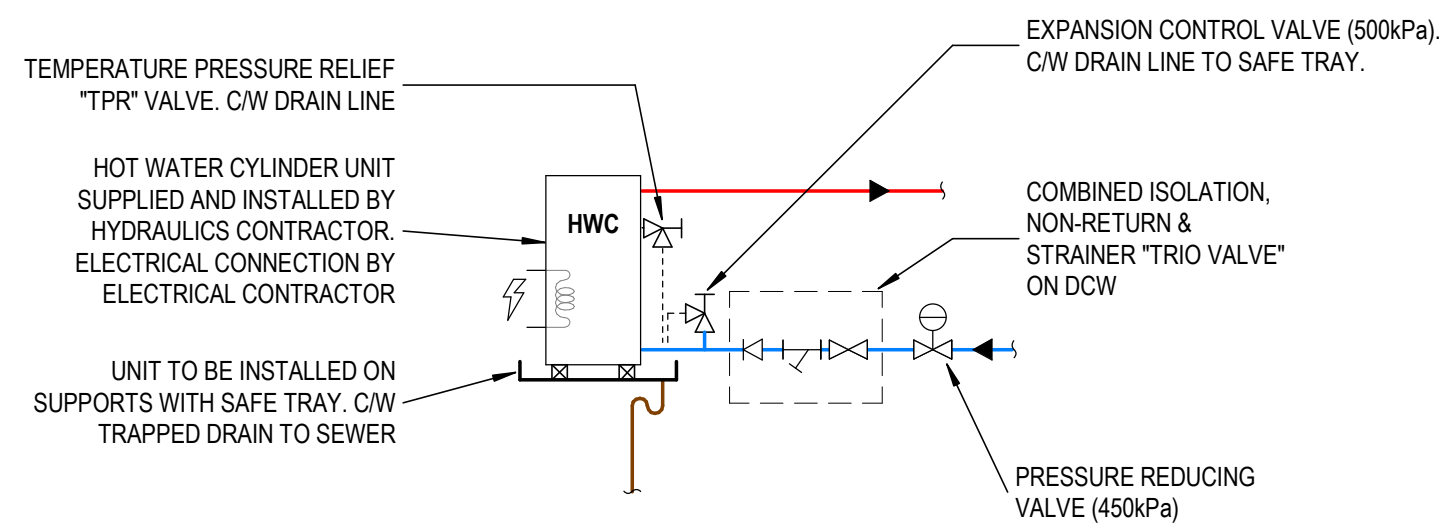
100mm ROUND PUSH-IN VINYL FLOOR WASTE & CLEANOUT



TYPICAL IN-SINK BASKET TRAP



3MONKEEZ - TYPICAL WALL TUNDISH DETAIL



TYP. HOT WATER CYLINDER INSTALLATION DETAIL

TENDER			
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Sheet Title	HYDRAULIC DETAILS
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HYDRAULIC SERVICES		
Designed By	D.D	Drawn By
Checked By	-	Revision
Drawing No.	23369-S1-H06	T1
Scale	AS SHOWN - A1	

DUCTWORK SYSTEM

- | | |
|---|-----------------------|
|  | EXHAUST AIR (E/A) |
|  | OUTSIDE AIR (O/A) |
|  | RETURN AIR (R/A) |
|  | SUPPLY AIR (S/A) |
|  | TRANSFER AIR (T/A) |
|  | TOILET EXHAUST (T/E) |
|  | KITCHEN EXHAUST (K/E) |

RIGID DUCTWORK


- | | |
|--|-------------------------------|
|  | EXTERNALLY INSULATED (LAGGED) |
|  | INTERNALLY INSULATED (LINED) |
|  | UNINSULATED |
|  | FIRE RATED INSULATION (LINED) |
| Min. 50mm THICK ROCKWOOL FIBRETEX 450 C/W | |
| STANDARD - 0.9mm GAL. PERF SHEET METAL LINER | |
| MEDICAL FACILITIES - 0.9mm 316 S.S SOLID SHEET METAL LINER | |

FLEXIBLE DUCTWORK






- INSULATED
- UNINSULATED

REFER INSULATION SCHEDULE,
SPECIFICATION & DRAWING NOTES FOR
REQUIREMENTS. DUCT/INSULATION
COLOUR DENOTES SERVICE AS ABOVE

PIPEWORK

- REFRIGERATION (RFG)
-  CONDENSATE (CON)

EQUIPMENT

- | | |
|--|--|
|  | TUNDISH (BY HYDRAULICS) |
|  | CEILING ACCESS PANEL (BY BUILDER) |
|  | MAIN SWITCH BOARD [MSB] / DISTRIBUTION BOARD [DB]
(BY ELECTRICAL) |
|  | MSB / DB WITH MECHANICAL CHASSIS
(BY ELECTRICAL) |
|  | MECHANICAL SERVICES SWITCH BOARD [MSSB]
(BY MECHANICAL) |

REFERENCE TAGS



GRILLE

- 88xXX.XX — GRILLE REFERENCE ID
1000 — AIRFLOW (L/s)

DOOR GRILLE & UNDERCUT

- GRILLE/UNDERCUT REFERENCE ID
(REFER SCHEDULES)

EQUIPMENT TAG

- | EF-01 | UNIT REFERENCE ID |
|---|--|
|  | WALL SWITCH |
|  | <u>SENSOR & CONTROLLER</u>
CP = WALL CONTROLLER
CC = CENTRAL CONTROLLER
CO2 = CARBON DIOXIDE
TH = THERMOSTAT
T = TEMPERATURE SENSOR |

NOTES:

GENERAL

1. ALL WORKS SHALL COMPLY WITH THE NATIONAL CONSTRUCTION CODE OF AUSTRALIA (NCC).
2. ALL VENTILATION AND AIR CONDITIONING SHALL COMPLY WITH AS1668 PARTS 1 AND 2.
3. ALL AIR FILTERS FOR GENERAL VENTILATION AND AIR CONDITIONING SHALL COMPLY WITH AS 1324 PART 1.
4. ALL DIMENSIONS ARE IN MILLIMETRES.
5. THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES TO ENSURE THAT ALL EQUIPMENT WILL FIT WITHIN THE DESIGNATED SPACE
6. ANY FAN STATIC PRESSURES ARE ESTIMATES ONLY. FINAL SYSTEM RESISTANCE SHALL BE DETERMINED BY THE MECHANICAL CONTRACTOR.
7. CONDENSATE PIPING TO BE VP20 WITH MINIMUM DOWNWARD FALL OF 1 : 100.
8. ALL CONDENSATE PIPING SHALL RUN TO SEWER OR APPROVED DRAIN. PROVIDE CONDENSATE PUMPS AS REQUIRED. USE INTERNALLY MOUNTED REFCO COMBI CONDENSATE PUMPS OR MANUFACTURERS CONDENSATE PUMP, **CONFIRM BEFORE PROCEEDING**
9. ALL WIRING & CONTROL SHALL BE PROVIDED BY THE SITE MECHANICAL CONTRACTOR AND INSTALLED TO ASINZS 3000
10. PROVIDE SPEED CONTROLLERS FOR ALL FANS FOR COMMISSIONING UNLESS NOTED OTHERWISE
11. CONTRACTOR TO PROVIDE AS INSTALLED OPERATION AND MAINTENANCE MANUALS ON COMPLETION.
12. ALL WORKS SHALL COMPLY WITH ASINZS 3666 1-3 IN REGARDS TO AIR-HANDLING AND WATER SYSTEMS OF BUILDING - MICROBIAL CONTROL.
13. CONTRACTOR TO PROVIDE TRAFFOLYTE LABELING FOR ALL EQUIPMENT, SWITCHES AND CONTROLLERS.
14. ALL PENETRATIONS THROUGH WALLS AND SLABS REQUIRING A FIRE/SMOKE RESISTANCE RATING TO HAVE FIRE/SMOKE PROTECTION TREATMENT TO NCC AND FIRE ENGINEERS REQUIREMENTS
15. ALL GRILLES COLOUR BY ARCHITECTS INSTRUCTION, ALLOW TO PAINT OR POWDERCOAT AS REQUIRED
16. ALL FLEXIBLE DUCT SHALL BE SIZED FOR AN AIR VELOCITY LESS THAN 3.4m/s

DUCTWORK

1. DUCT WORK AND INSULATION SHALL COMPLY WITH AS 4254.
2. ALL DUCTWORK DIMENSIONS SHOWN ARE CLEAR AIR WAY DIMENSIONS.
3. PROVIDE NON-RETURN DAMPERS TO ALL EXHAUST SYSTEMS.
4. ENSURE 6m SEPARATION BETWEEN EXHAUST OUTLETS AND FRESH AIR INLETS AT ALL TIMES.
5. FOR ALL DUCTWORK REQUIRED TO BE SUPPORTED FROM FLOOR/PLANT DECK ETC. (EG. LOW LEVEL DUCTWORK) TOP HAT SUPPORT TO BE MAXIMUM 200M AND MIN 1.2m GAL. SHEET METAL. USE CHANNEL STRUT OR HOT DIP GAL. WELDED SHS FRAMES FOR ALL SUPPORTS OVER 200M.
6. ALL CUSHION HEADS/PLENUMS TO BE PAINTED MATT BLACK INTERNALLY U.N.O
7. PROVIDE MECHANICAL PROTECTION FOR DUCTWORK INSULATION (LAGGING/MATERIAL) WHERE INSTALLED IN PLANTROOMS OR LOCATED LESS THAN 2.7m ABOVE FLOOR LEVEL IN ALL OTHER AREAS. UNLESS INSULATION (LAGGING/MATERIAL) IS USED FOR ACOUSTIC ATTENUATION CLADDING TO BE MIN. 0.6mm GAL. STEEL SHEET METAL OR MIN. 0.9mm ALUMINIUM.
8. FILTER PLENUM AND CUSTOM DUCT ACCESS PANELS SHALL HAVE SLASH FASTENERS FOR SECURING DOOR TO PLENUM. MIN. 4 SLASH FASTENERS PER DOOR (1 PER CORNER). MAX SPACING BETWEEN SLASH FASTENERS 200mm

A/C VRV/VRF SYSTEM SCHEDULE

REF.	MANUFACTURER	MODEL	CAPACITY		O/A FLOW	ELECTRICAL			WEIGHT	COMMENTS
			COOLING RATED TOTAL	HEATING RATED TOTAL		M.C.A	M.F.A	V. / PH. / FQ.		
AC1.1	MITSUBISHI	PLFY-P63VEM-PA-A	7.10 kW	8.00 kW		0.45 A	0.00 A	230 V / 1 / 50 Hz	21.00 kg	
AC1.2	MITSUBISHI	PLFY-P100VEM-PA-A	11.20 kW	12.50 kW		0.84 A	0.00 A	230 V / 1 / 50 Hz	24.00 kg	
AC1.3	MITSUBISHI	PLFY-P50VEM-PA-A	5.60 kW	6.30 kW		0.40 A	0.00 A	230 V / 1 / 50 Hz	19.00 kg	
AC1.4	MITSUBISHI	PEFY-P80VMHS-E	9.00 kW	10.00 kW	0 L/S	2.45 A	0.00 A	230 V / 1 / 50 Hz	45.00 kg	
BB1	MITSUBISHI	CMB-M106V				0.00 A	0.00 A	230 V / 1 / 50 Hz	0.00 kg	
OU1	MITSUBISHI	PURY-P300YNW-A-AU	32.60 kW	29.50 kW		23.00 A	32.00 A	380 V / 3 / 50 Hz	228.00 kg	
AC2.1	MITSUBISHI	PKFY-P20VLM-E	2.20 kW	2.50 kW		0.25 A	0.00 A	230 V / 1 / 50 Hz	11.00 kg	
AC2.2	MITSUBISHI	PKFY-P20VLM-E	2.20 kW	2.50 kW		0.25 A	0.00 A	230 V / 1 / 50 Hz	11.00 kg	
AC2.3	MITSUBISHI	PKFY-P20VLM-E	2.20 kW	2.50 kW		0.25 A	0.00 A	230 V / 1 / 50 Hz	11.00 kg	
AC2.4	MITSUBISHI	PEFY-P40VMHS-E	4.50 kW	5.00 kW	60 L/S	1.78 A	0.00 A	230 V / 1 / 50 Hz	35.00 kg	
AC2.5	MITSUBISHI	PEFY-P100VMHS-E	11.20 kW	12.50 kW	60 L/S	3.85 A	0.00 A	230 V / 1 / 50 Hz	51.00 kg	
BB2	MITSUBISHI	CMB-M106V				0.00 A	0.00 A	230 V / 1 / 50 Hz	0.00 kg	
OU2	MITSUBISHI	PURY-P200YNW-A-AU	21.50 kW	20.30 kW		16.00 A	25.00 A	380 V / 3 / 50 Hz	229.00 kg	
AC3.1	MITSUBISHI	PKFY-P20VLM-E	2.20 kW	2.50 kW		0.25 A	0.00 A	230 V / 1 / 50 Hz	11.00 kg	
AC3.2	MITSUBISHI	PKFY-P20VLM-E	2.20 kW	2.50 kW		0.25 A	0.00 A	230 V / 1 / 50 Hz	11.00 kg	
AC3.3	MITSUBISHI	PEFY-P50VMHS-E	5.60 kW	6.30 kW	55 L/S	1.78 A	0.00 A	230 V / 1 / 50 Hz	35.00 kg	
AC3.4	MITSUBISHI	PEFY-P80VMHS-E	9.00 kW	10.00 kW	55 L/S	2.45 A	0.00 A	230 V / 1 / 50 Hz	45.00 kg	
BB3	MITSUBISHI	CMB-M104V				0.00 A	0.00 A	230 V / 1 / 50 Hz	0.00 kg	
OU3	MITSUBISHI	PURY-P200YNW-A-AU	21.50 kW	20.30 kW		16.00 A	25.00 A	380 V / 3 / 50 Hz	229.00 kg	
AC4	MITSUBISHI	MSZ-GS35VFD-A1							8.50 kg	
OU4	MITSUBISHI	MUZ-GS35VFD-A1	3.50 kW	3.70 kW		0.00 A	10.00 A	230 V / 1 / 50 Hz	28.50 kg	

ERV SCHEDULE

REF.	MANUFACTURER	MODEL	S/A E/A DUTY	ELECTRICAL			WEIGHT	CONTROL	COMMENTS
				POWER	F.L.A	V. / PH. / FQ.			
HRV-1	ARMCOR	XCM125P1	120 L/S	600 W	3.00 A	230 V / 1 / 50 Hz	65 kg	OPERATE WITH AC1.1 AND WITH CO2 CONTROL	COMPLETE WITH INLET FILTERS
HRV-2	ARMCOR	XCM225P1	200 L/S	1000 W	3.00 A	230 V / 1 / 50 Hz	80 kg	OPERATE WITH AC1.1 AND WITH CO2 CONTROL	COMPLETE WITH INLET FILTERS
HRV-3	ARMCOR	XCM425P1	420 L/S	6000 W	4.60 A	230 V / 1 / 50 Hz	110 kg	INTERLOCK WITH SECURITY	COMPLETE WITH INLET FILTERS

GRILLE SCHEDULE

REF.	GRILLE TYPE	MANUFACTURER	MODEL	NECK SIZE	FACE SIZE	QTY.	COMMENTS
E1	EGGCRATE GRILLE	HOLYOAKE	EC-125	250x250	300 x 300	12	
E2	EGGCRATE GRILLE	HOLYOAKE	EC-125	400x400	450 x 450	2	
R1	EGGCRATE GRILLE	HOLYOAKE	EC-125	700x400	753 x 453	5	
R2	EGGCRATE GRILLE	HOLYOAKE	EC-125	800x500	853 x 553	1	
R3	EGGCRATE GRILLE	HOLYOAKE	EC-125	300x300	353 x 353	11	
R4	HALF CHEVRON	HOLYOAKE	EC-125	700x300	753 x 353	1	
R5	EGGCRATE GRILLE	HOLYOAKE	EC-125	700x400	753 x 453	3	
S1	ROUND FACE SWIRL DIFFUSER	SMARTAIR	HSC-FD-DN355-C-R3	355ø	500 x	9	
S2	ROUND FACE SWIRL DIFFUSER	SMARTAIR	HSC-FD-DN500-C-R1	500ø	710 x	5	
S3	DOUBLE DEFLECTION	T.B.C	T.B.C	400x200	450 x 250	4	
S4	EGGCRATE GRILLE	T.B.C	T.B.C	250x250	300 x 300	6	
S5	ROUND FACE SWIRL DIFFUSER	SMARTAIR	HSC-FD-DN355-C-R4	355ø	500 x	2	

DOOR UNDERC
SCHEDULE

SYMBOL	UNDERCUT SIZE (mm)
M	5
N	10
O	15
P	20
Q	25
R	30
S	35

FAN SCHEDULE

REF.	FAN TYPE	MANUFACTURER	MODEL	CAPACITY	CONTROL
KEF-1	ROOF MOUNT EXHAUST	FANTECH	ECE152	60 L/S @ 50Pa	MANUAL SWITCH
KEF-2	ROOF MOUNT EXHAUST	FANTECH	ECE152	60 L/S @ 50Pa	MANUAL SWITCH

FILTER SCHEDULE

REF.	TYPE	GRADE/ CLASS	FILTER QUANTITIES PER PLENUM (SIZES NOM.)			
			600x600	600x300	300x300	DEPTH
FB-1	PANEL	G4	0	1	0	50
FB-2	PANEL	G4	0	1	0	50
FB-3	PANEL	G4	0	1	0	50
FB-4	PANEL	G4	0	1	0	50
FB-6	PANEL	G4	0	1	0	50

ROOF COWL SCHEDULE

REF.	MANUFACTURER	MODEL	AIRFLOW	WEIGHT
RC-1	FANTECH	MRV2	120 L/s	3.00 kg
RC-2	FANTECH	MRV2	120 L/s	3.00 kg
RC-3	FANTECH	MRV2	200 L/s	3.00 kg
RC-4	FANTECH	MRV2	200 L/s	3.00 kg
RC-5	FANTECH	RV2	0 L/s	7.00 kg
RC-6	FANTECH	RV2	0 L/s	7.00 kg

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By	Date	Revision Description	Rev

REVISIONS



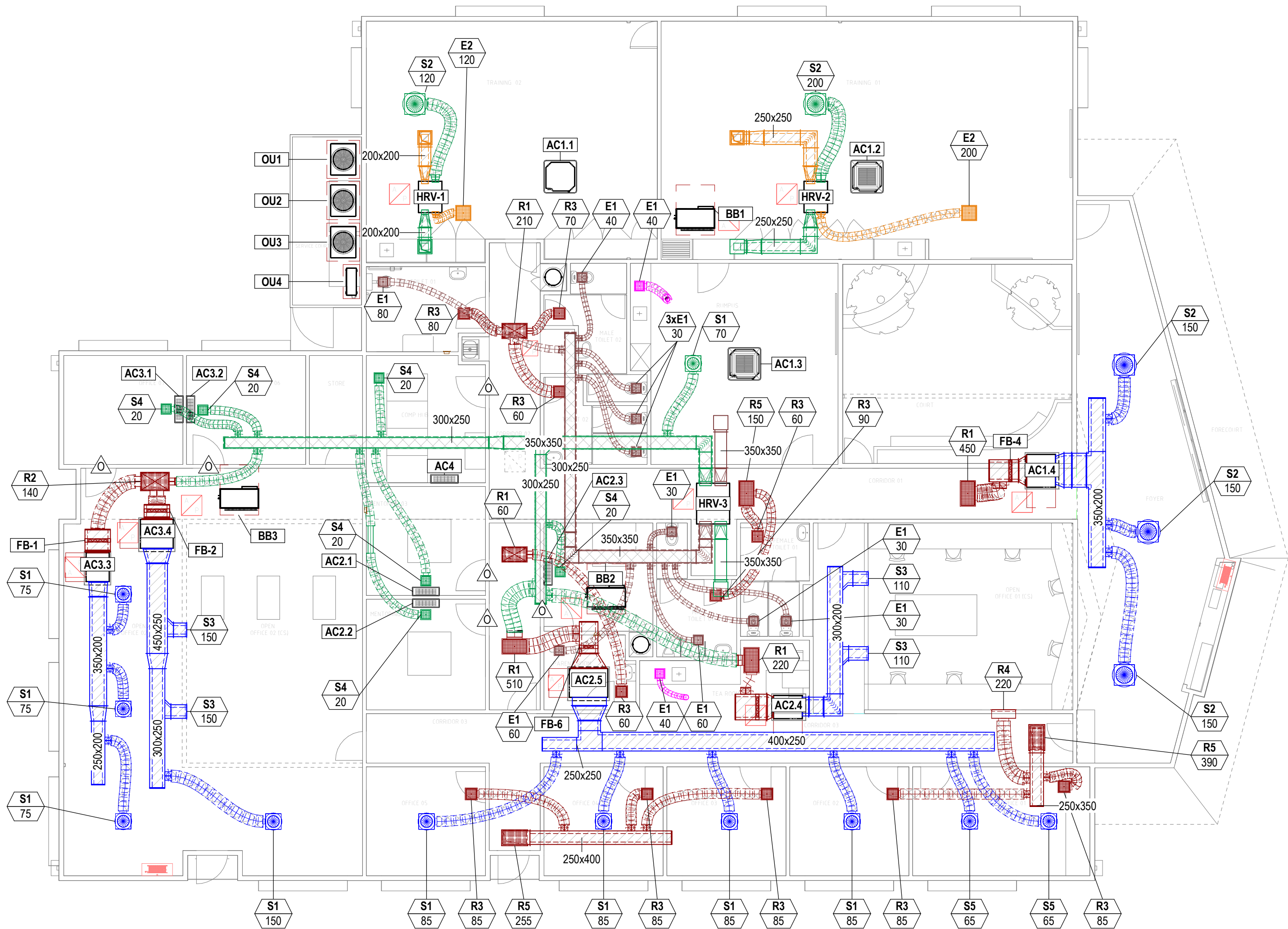
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Project SORELL JOBS HUB

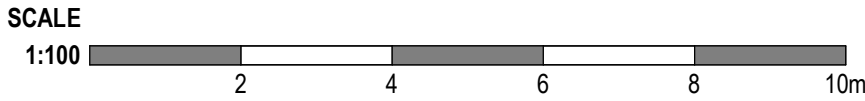
Sheet Title
MECHANICAL LEGEND,
SCHEDULES & NOTES

MECHANICAL SERVICES

	Designed By D.D	Drawn By D.D
	Checked By -	Revision T1
Scale AS SHOWN - A1	Drawing No. 23369-S1-M01	



MECHANICAL SERVICES - GROUND FLOOR LAYOUT
1:100



MECHANICAL SERVICES - ROOF LAYOUT
1:100

TENDER


DRAWING NOTES:

- DO NOT SCALE DIRECTLY OFF DRAWING. ALL MEASUREMENTS AND LOCATIONS OF EQUIPMENT ARE TO BE CONFIRMED ON SITE WITH THE SITE SUPERVISOR.
- THIS DRAWING IS TO BE VIEWED IN CONJUNCTION WITH SPECIFICATION, ARCHITECTURAL, STRUCTURAL AND ALL OTHER SERVICES DRAWINGS.
- SCHEDULE QUANTITIES/COUNTS ARE PROVIDED AS A GUIDE ONLY AND ACTUAL QUANTITIES ARE THE RESPONSIBILITY OF THE CONTRACTOR
- THIS DRAWING IS REQUIRED TO BE VIEWED OR PRINTED IN COLOUR FOR THE FULL EXTENT OF THE SCOPE OF WORKS TO BE SHOWN
- ANY DISCREPANCIES DURING ANY PHASE OF THE WORKS BETWEEN THE DRAWINGS, SPECIFICATION AND OTHER DISCIPLINE'S DOCUMENTATION THE CONTRACTOR IS TO:
 - ASSUME THE MOST ONEROUS AND,
 - RAISE AN RFI TO CLARIFY THE DISCREPANCY

ALL LIABILITY DUE TO FAILURE TO OBSERVE THESE CLAUSES SHALL BE BORNE BY THE CONTRACTOR.

D.D	31/05/24	TENDER	T1
By	Date	Revision Description	Rev

REVISIONS

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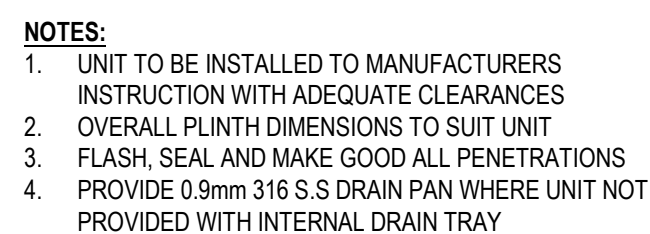
Sheet Title
MECHANICAL SERVICES - GROUND FLOOR & ROOF LAYOUTS

MECHANICAL SERVICES

Designed By D.D	Drawn By D.D
Checked By -	Revision T1
Drawing No. 23369-S1-M02	

Scale
1:100 @ A1

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SECTION

THRU ROOF* FAN OR COWL

DEKITE OR SIMILAR ROOF FLASHING

CORNER OF ROOF FLASHING TO ALIGN WITH PITCH OF ROOF

MOUNTING BRACKETS

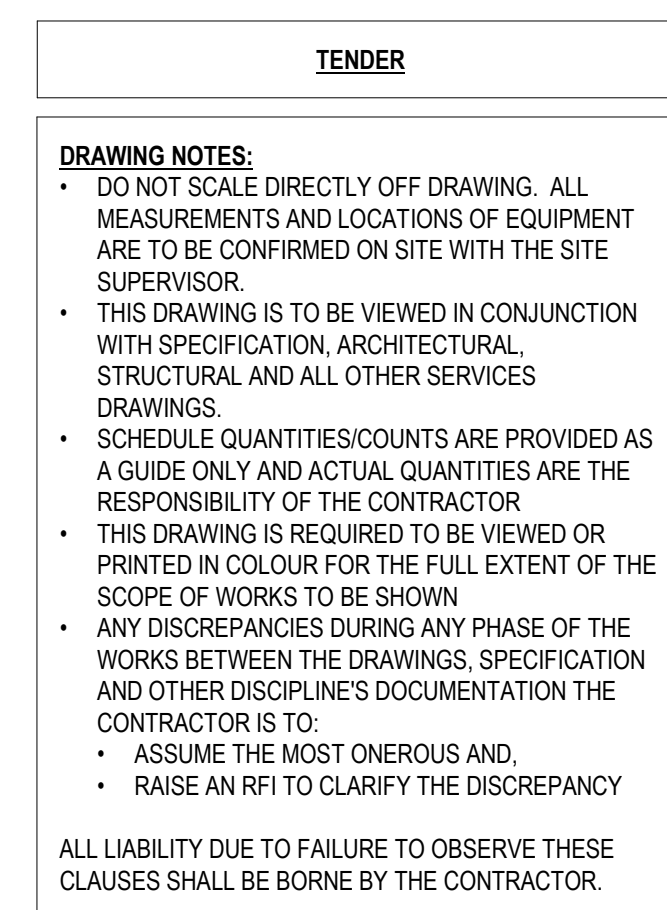
FLEXIBLE DUCT

VIEW A-A (PLAN)

PITCH OF ROOF

NOTES:

- ROOF PENETRATION AND ANY TRIMMER PURLINS REQUIRED BY BUILDER. ALL OTHER ITEMS SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR
- USE INSULATED FLEXIBLE DUCT WHERE SHOWN ON PLANS



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REVISIONS



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Sheet Title
**MECHANICAL SERVICES -
CONTROLS LAYOUT AND
DETAILS**

MECHANICAL SERVICES

	Designed By D.D	Drawn By D.D
	Checked By -	Revision T1
	Drawing No. 23369-S1-M03	
Scale As indicated A1		



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23369 – Sorell Jobs Hub

HYDRAULICS SPECIFICATION – Tender

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0801 HYDRAULIC SYSTEMS**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide the hydraulic services, as documented.

The Works shall comprise the design, supply, installation, testing, commissioning, maintenance and servicing of the hydraulic services installation shown on the drawings and specified herein together with the provision of all minor and incidental work, materials or fittings which is obviously necessary for the satisfactory and efficient functioning of the installation or which is generally provided in accordance with accepted trade practices even though such material or work may not be explicitly mentioned in the Specification.

The Scope of works shall include but not be limited to the following:

Water Services

- Cold water services.
- Heated water services
- All isolation valves to be accessible as per AS3500.1, contractor to install access panels to all valves as documented.
- Provide a PRV at the building entry points set at 500 kpa as per AS3500.
- Isolation valves to each building in valve box.

Sewer Services

- The contractor shall provide new sewer services as documented.
- Tundishes for Mechanical Services. Coordinate with the mechanical services contractor for these tundish requirements.
- Install all fixture connections to sewer as documented.
- Provide all inspection openings to surface so are visible. Provide appropriate surrounds depending on finished surface.

Trade waste

- Dry basket arrestors and basket floor wastes shall be provided to all sinks, troughs and floor wastes to TasWater requirements.

Fire Hosereel Systems

- Fire hosereel system as shown.

Stormwater Drainage

- New stormwater drainage systems to suit the new building works.
- All box gutters and sumps shall be fabricated from 0.8mm 304 grade Stainless Steel. Rivets shall be stainless steel to match.

Stainless Steel Cabinets

Provide stainless steel valve cabinets for the following items of equipment mounted within the occupied space:

- TMVs
- Tundishes

The valve cabinets shall have hinged removeable doors for access, RPZD and tundish cabinets with glass panel.

Miscellaneous

- Access Panels. All serviceable items (eg. HEPVO traps, AAVs, TMV's, Tundishes, isolation valves, etc.) shall be provided with access panels to the approval of the architect (eg. KAP01 290 x 290).
- Coordination and Design. Coordinate the final location of slab penetrations to suit the conditions within the ceiling space below the floor slab. Provide all design work required to meet the intent of these documents while providing this coordination. The hydraulic drawings show the indicative location of fixtures, pipe locations and penetrations only. Where discrepancies exist between the architectural drawings and the hydraulic drawings, the architectural drawings shall take precedence. Provide coordination of all hydraulic connections with the actual fixtures that are supplied.
- Arrangement for all inspections as required by the local Council. Works are to be in accordance with local Council plumbing conditions.
- Maintenance manuals including:
 - o Detailed technical information on all equipment installed
 - o Maintenance schedule stating items that need routine inspecting, details of what should be inspected, and intervals between inspection
 - o Professionally drafted "as installed" CAD drawings on A1 paper at a scale of 1:100 or larger (unless otherwise instructed). The drawings shall clearly show details of all work carried out and show invert levels and gradients of buried pipes and pits.
 - o An electronic copy in 'pdf' and 'dwg' format of the drawing CAD files on a clearly labelled CD or USB memory stick
 - o 12 months defects liability and maintenance commencing at the date of practical completion.

Liaise with mechanical, electrical and building trades for the duration of works. Ensure co-ordination of the hydraulic services installation with the rest of the project works. Any failure to comply, which results in an increase in the project cost to rectify aborted work, shall be considered the responsibility of the hydraulic contractor who shall then pay such additional costs.

The above scope is a guide only and some items may have been omitted. It shall be the responsibility of the hydraulic contractor to meet the intent of the specification and drawings. Any discrepancies, or apparent omissions, in the documentation shall be raised for clarification during the tender period and formally qualified in the tender submission.

1.2 SUPPORT OF PLANT AND EQUIPMENT

The Contractor is to ensure all equipment is seismically restrained and installed in accordance with AS1170.4 Section 8. The building has a Importance level of IL2 rating.

1.3 WORK DOCUMENTED ELSEWHERE**Electrical**

The following work is specified under the electrical services documentation.

Wiring of the following hot water units:

- 2 off hot water cylinders

Fixtures and Tapware

The fixtures and tapware are documented elsewhere

Civil Hydraulics

The hydraulics documentation shall be read in conjunction with the civil documentation which includes:

- Site stormwater works.

1.4 DESIGN**Hydraulic constraints**

Constraints: Site and other constraints on this project are as follows: [complete/delete]

1.5 PRECEDENCE**General**

Worksections and referenced documents:

- The requirements of other worksections of the specification override conflicting requirements of this worksection.
- The requirements of the worksections override conflicting requirements of their referenced documents.
- The requirements of the referenced documents are minimum requirements.

1.6 INTERPRETATION**Definitions**

General: For the purposes of this worksection the definitions given in the *General requirements* worksection apply.

1.7 STANDARDS**General**

Microbial control: To AS/NZS 3666.1, AS/NZS 3666.2 and the recommendations of SAA/SNZ HB 32.

Sanitary plumbing and drainage: To AS/NZS 3500.2.

Water supply: To AS/NZS 3500.1.

1.8 CONTRACT DOCUMENTS**General**

Requirement: Conform to the *General requirements* worksection.

1.9 INSPECTION**Notice**

Inspection: Give sufficient notice so that inspection may be made of the following:

- Excavated surfaces.
- Concealed or underground services.

1.10 SUBMISSIONS**General**

Requirement: Conform to the *General requirements* worksection.

Hydraulic services shop drawings

Requirement: Submit detail drawings at minimum 1:100 scale, showing the following:

- Pipework and equipment layout and sections showing the work to be installed on the level that the services are installed. Do not submit glass floor drawings.
- Long sections of below ground drainage.
- Riser layouts and sections.
- Piping and other schematic drawings including numbering of each valve to correspond to valve tags notation.
- Inclusions: Include the following on the drawings:
 - Access openings, cover plates, valve boxes and access pits.
 - Details of control panels including control and power diagrams.

- Insulation of piping, fittings and tanks.
- Location, capacity, type and other relevant details of water heaters, including supports and safe trays.
- Location, type, grade and finish of piping, fittings, valves, meters and pipe supports.
- On-site detention pondage areas.
- Provision of a temporary fire hydrant service in the construction period.
- Provision of blue metal back fill to seepage drain system.
- Provision of erosion control measures.
- Provision of road barriers and lighting.
- Provision of site treatment and fire vehicle parking as required adjacent to the fire hydrant booster inlet valve station.
- Provision of temporary sanitary accommodation for construction workers.
- Provision of trafficable cover plates in the public domain.
- Relevant survey levels.
- Site and floor set out points.
- Tank stands and supporting structures.

Electrical loading information for hydraulic services

General: Submit electrical loading information for all equipment before completion of the main switchboard shop drawings.

Loading and connection: Submit the information for items not supplied from the services switchboards.

Starting characteristics: Submit details for motors with reduced current starting. Ensure starting characteristics are within the characteristics of the respective submain protection devices.

Switchboards: Submit the following information for each building services switchboard:

- Board location and designation.
- For each submain connected to the board, submit the following for each item connected to it:
 - Submain designation.
 - Item designation and name.
 - Power rating in kW.
 - Number of phases.
 - Full load amps per phase.
 - Power factor.
 - Total amps on each phase for respective sub main.

Technical data

General: Documented pump heads are based on provisional equipment selections and estimated pressure drops.

Equipment: Before ordering equipment, calculate the respective system pressure losses based on the equipment offered and layouts shown on the shop drawings and submit the proposed selections.

Submissions: Submit technical data for all items of plant and equipment.

Data to be submitted: Include at least the following information in technical submissions:

- Assumptions.
- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.
- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of compliance with the applicable code or standard.
- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.
- Type-test reports.

2 PRODUCTS

2.1 GENERAL

General

Requirement: Conform to the *General requirements* worksection.

3 EXECUTION

3.1 GENERAL

General

Requirement: Conform to the *General requirements* worksection.

3.2 SUPPORT OF PLANT AND EQUIPMENT

Support of roof mounted plant and equipment

Platforms: If a horizontal platform is required, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable platform.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Roof level support: If any of the following apply to roof level support, obtain the advice of a professional engineer:

- The total load from any unit of plant or equipment exceeds 500 kg.
- The load from a unit of plant or equipment to any single support point exceeds 100 kg.
- The average loading of plant and equipment over the area extending 1 m on all sides beyond the plant and equipment exceeds 25 kg/m².

Sloping roofs:

- Roof slope $\geq 10^\circ$: Adopt the roof material manufacturer's documented installation procedures, or seek the advice of a professional engineer.
- Roof slope $< 10^\circ$: Provide appropriate continuous supporting members, compatible with the roof material, laid parallel to the span of the roof sheeting. Extend the continuous support members in both directions to the first purlin or joist that is > 1 m from the face of the plant or equipment it supports.

Support of ground level plant and equipment

Ground level:

- If the ground slope is $\geq 15^\circ$, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable slab or platform.
- In all other cases, provide proprietary plastic or concrete supports installed with falls that achieve a raised, impervious and water shedding bearing surface.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

0813 WATER HEATERS**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide water heaters, as documented.

1.2 STANDARDS**General**

Heated water services: To AS/NZS 3500.4.

Gas equipment: To AS 3645.

Microbial control

Standard: To AS/NZS 3666.1 and AS/NZS 3666.2.

1.3 SUBMISSIONS**Certification**

General: Submit evidence that proposed water heaters are listed in the WaterMark Product Database.

Warranties

Requirement: Submit the following:

- [complete/delete]

Warranties extending beyond the end of defects liability period: Make sure that the principal is named as the warrantee.

2 PRODUCTS**2.1 GENERAL****Insulation blowing agents**

Restricted agents: Conform to PRODUCTS AND MATERIALS, **GENERAL**, **Prohibited materials** in 0171 *General requirements*.

2.2 ELECTRIC STORAGE WATER HEATERS**Description**

General: Provide heaters, as documented.

Storage vessel: Stainless steel or vitreous glass coated mild steel, as documented.

Corrosion protection: Provide sacrificial anodes in each vitreous glass coated mild steel storage vessel, as documented.

Standards

General: To AS/NZS 4692.1.

Energy performance: To AS/NZS 4692.2.

Tariff

General: Install so that the heating system qualifies for the tariff concession or subsidy offered by the electricity distributor.

Warranties

Storage vessel:

- Stainless steel: Minimum 10 years.
- Vitreous glass coated mild steel: Minimum 5 years.

3 EXECUTION**3.1 INSTALLATION****General**

Standard: Install to AS/NZS 3500.4.

Manifolds

General: If multiple heaters are installed in banks use the manufacturer's standard manifold arrangement to provide equal flow thorough each heater in the bank.

3.2 COMMISSIONING**General**

Requirement: Commission to the manufacturer's recommendations.

4 SELECTIONS

4.1 WATER HEATERS

Refer to the drawings.

0821 STORMWATER – BUILDINGS**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide stormwater installation, as documented.

1.2 STANDARDS**Stormwater drainage**

Standard: To AS/NZS 3500.3.

1.3 INTERPRETATION**Abbreviations**

General: For the purpose of this worksection the following abbreviations apply:

- PE-HD: High density polyethylene.

Definitions

General: For the purposes of this worksection the following definitions apply:

- Embedment material: Includes bedding, haunch support and overlay material.
- Pipe surround: Includes pipe overlay, pipe side support, side zone and haunch zone.

1.4 SUBMISSIONS**Records**

Photographs: Submit photographic records to **SIPHONIC ROOF DRAINAGE SYSTEM INSTALLATION**.

Tests

Pre-completion tests: Submit results from pre-completion leak testing.

Certification: Submit certificate stating that network is leak free upon completion.

1.5 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made at the following stages:

- Concealed or underground services prior to being covered.
- Upon completion.

2 PRODUCTS**2.1 MATERIALS****Piping**

Requirement: As documented in the **Stormwater pipeline schedule**.

PVC-U: Provide pipe marked with *Best Environmental Practice* (BEP). PVC to AS/NZS 1260.

Surface drains – PVC-U channel drains, grating and sumps

General: Proprietary PVC-U channel drain complete with friction fit grating sections and matching sumps.

Surface drains – grated trenches

General: Precast or cast in situ concrete lined trenches with bitumen coated cast-iron or galvanized steel gratings.

Surface drains – half round pipe

General: Surface drains lined with half round pipe, including bedding and jointing, as documented in the **Surface drains – half round pipe schedule**.

Linear and grated drains

Requirement: As documented in the **Linear and grated drains schedule**.

Installation: Conform to the manufacturer's recommendations.

Rainwater outlets

Requirement: Proprietary rainwater outlets to roof and balcony areas and as documented.

Size: 100 mm diameter or as documented.

Concrete and mortar

Requirement: Concrete and mortar conforming to AS/NZS 3500.3 clause 2.9.

Filter material

General: Filter materials consisting of natural clean washed sands and gravels and screened crushed rock conforming to AS/NZS 3500.3 clause 2.13.1.

Embedment material

Site stormwater drains: Conform to AS/NZS 3500.3 clause 6.3.5.

Subsoil drains: Conform to AS/NZS 3500.3 clause 6.4.2.

2.2 SIPHONIC ROOF DRAINAGE SYSTEM MATERIALS**Standard**

Requirement: To AS/NZS 3500.3 clause 10.1.4.

Materials

Roof drainage system: PE-HD.

Source: Provide all materials of the same kind from the same manufacturer.

Replacement materials: Provide materials for which replacement parts are readily available.

Piping materials, fittings and jointing: To AS/NZS 3500.3.

Siphonic inlets and outlets

Leaf screens: Leaf screens designed to fit the siphonic inlets, exclude leaves, and minimise restriction to water flow.

Leaf screen material: Plastic, stainless steel or non-ferrous metal.

2.3 GEOTEXTILES**General**

Requirement: Polymeric fabric formed from plastic yarn composed of at least 85% by weight propylene, ethylene amide or vinylidene chloride and containing stabilisers or inhibitors which provide resistance to deterioration due to ultraviolet light.

Subsoil drainage

Filter: To AS/NZS 3500.3 clause 2.13.

2.4 PREFABRICATED PITS**General**

Requirement: Precast or prefabricated pits conforming to AS/NZS 3500.3 clauses 2.12.8 and 7.5.

Metal access covers and grates

Standard: To AS 3996.

3 EXECUTION

3.1 GENERAL**Service trenching**

Requirement: To 0223 *Service trenching*.

3.2 PIPING**General**

Laying: Lay lengths separately with the barrel bearing evenly on the prepared bedding.

Sockets: Lay with sockets pointing upstream.

Cleaning: Clean pipe interior of dirt, debris, mortar and other foreign matter.

Protection: Provide temporary caps over the ends of incomplete sections to prevent the entry of foreign matter.

Pipe supports

Materials: To AS/NZS 3500.3 clause 4.9.

Support spacing: To AS/NZS 3500.3 clause 4.9.

Siphonic drainage: Provide railed support system designed for siphonic drainage systems.

3.3 TOLERANCES

Pipeline tolerances table

	Permissible angular deviation from alignment	Permissible displacement from alignment
Horizontal	1:300	15 mm
Vertical	1:500	5 mm
Note: These tolerances are conditional on falls to outlets being maintained and no part of a pipeline having less than the documented gradient.		

3.4 STORMWATER DRAINS

Location

General: Provide stormwater drains to connect downpipes, surface drains, subsoil drains and drainage pits to the outlet point or point of connection. Make sure location of piping will not interfere with other services and building elements not yet installed or built. Subject to the preceding and documented layouts, follow the most direct route with the least number of changes in direction.

Downpipe connections

Termination: Select from the following:

- Termination over pit: Stop downpipe 100 mm above the ground level and discharged into grated pit. Do not connect directly into stormwater pipes.
- Direct connection: Bring downpipes out from the building at a suitable angle and level so the downpipe enters the underground drain at the finished level of the surrounding area. Turn up branch pipelines with bends to meet the downpipe, finishing horizontally 50 mm (nominal) above finished ground or pavement level. Seal joints between downpipes and drains.

Laying

General: Lay in straight lines between changes in direction or grade with sockets pointing up hill. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous, cap open ends to prevent entry of foreign matter.

Identification

General: Lay a detectable strip or plastic tape in the trench after pipe laying, testing and initial backfilling.

Pipe underlay (bedding)

General: Bed piping on a continuous underlay of bedding material, minimum 75 mm and maximum 150 mm thick after compaction. Grade the underlay evenly to the gradient of the pipeline.

Chases: If required, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Pipe surrounds

General: Place the material in the pipe surround in layers, maximum 200 mm loose thickness, and compact without damaging or displacing the piping.

Anchor blocks

General: If required to restrain lateral and axial movement of the stormwater pipes, provide reinforced concrete anchor blocks at junctions and changes of grade or direction conforming to AS/NZS 3500.3 clause 7.9.

Encasement

General: As documented in the **Stormwater pipeline schedule**.

Location: Encase the pipeline in concrete at least 150 mm above and below the pipe, and 150 mm each side or the width of the trench, whichever is the greater.

Concrete: Grade N15 to AS 1379.

Thermal movement

General: Arrange piping to accommodate thermal expansion. Provide proprietary expansion joints in copper and plastic pipes where pipe flexibility does not allow movement. Make sure movement does not strain branch connections.

Downpipes

Downpipe termination: Stop downpipe 100 mm above the ground level and discharged into grated pit. Do not connect directly into stormwater pipes.

3.5 COMMISSIONING**Siphonic systems**

Commissioning: To the recommendations of AS/NZS 3500.3 Appendix N.

3.6 COMPLETION**Cleaning**

General: Clean and flush the whole installation.

4 SELECTIONS

4.1 STORMWATER

0822 WASTEWATER**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide sanitary plumbing and drainage, as documented.

1.2 STANDARDS**Sanitary plumbing and sanitary drainage**

General: To AS/NZS 3500.2.

1.3 SUBMISSIONS**Products and materials**

General: Submit evidence that proposed tapware is listed in the WaterMark Product Database.

Air admittance valves and positive air pressure attenuators: Submit the manufacturer's statement of compliance as evidence the installation conforms to the manufacturer's requirements.

1.4 INSPECTION**Notice**

Inspection: Give sufficient notice so that inspection may be made at the following:

- Excavated surfaces.
- Concealed or underground services.

2 PRODUCTS**2.1 GENERAL****Material selection**

Environmental conditions: Provide materials capable of withstanding the operational environmental conditions. Select and install to manufacturers' recommendations.

Dissimilar materials: Connect dissimilar materials using adapters to Network Utility Operator requirements and manufacturer's recommendations.

Rubber banded sleeves: Do not provide.

2.2 SEWAGE TREATMENT**Septic tanks**

General: As documented in the **Septic tank schedule**.

Standard: To AS/NZS 1546.1.

Certification: Required.

Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).

On-site wastewater management

Standard: To AS/NZS 1547.

Agricultural pipes: Perforated plastic pipe to AS 2439.2 Type 3, stiffness class SN2, DN 100.

2.3 TRAPS AND GULLIES**General**

Traps: As documented in the **Traps schedule**.

Location: If possible, conceal traps and wastes in the fabric of the building.

Gullies: As documented in the **Gullies schedule**.

Inspection chambers and sumps

General: As documented in the **Inspection chamber and sumps schedule**.

2.4 FLOOR WASTES

General

Requirement: Provide each floor waste with a trap constructed of the material specified for the sanitary plumbing system. Fit off each riser with a chromium plated brass grating finished flush with the surrounding floor finish. If the floor surfaces are vinyl, provide gratings and outlets designed to permit the vinyl to be turned down into the outlet and the grating clamped down onto the surface.

Waterproofing: Make sure all penetrations through floors and finishes up to the edge of grates are fully waterproof.

Priming: Provide priming of floor wastes. If floor wastes cannot be primed via fixture, provide priming valves to maintain the water seal to AS/NZS 3500.2.

2.5 PITS

General

Ladders: Provide pits deeper than 1.2 m with hot-dip galvanized rung type or individual rung ladders to AS/NZS 1567.

Covers: Provide sealed gas-tight covers with lifting holes to AS 3996. Provide removable plastic plugs in lifting holes.

Covers – tiled areas: Provide infill cover and frame or brass edge strip to accommodate tiling within the cover.

2.6 SEWER MAINTENANCE SHAFTS

General

Standard: To WSA 137 and AS/NZS 3500.2 unless otherwise required by the Network Utility Operator.

Requirement: Provide sewer maintenance shafts at all major intersections and changes of direction as documented. Provide sewer maintenance shafts with a 225 mm riser and finished with a screwed cap below the cover as documented.

2.7 AIR ADMITTANCE VALVES AND POSITIVE AIR PRESSURE ATTENUATORS

General

Requirement: Provide proprietary air admittance valves and positive air pressure attenuators incorporating carbon filters and conforming to AS/NZS 3500.2.

Certification: Obtain a statement of compliance from the manufacturer certifying that the installation has been completed to manufacturer's requirements.

2.8 TUNDISH

General

Requirement: Provide cone shaped tundish sized to suit the application.

Construction: Fabricate from 0.8 mm thick copper sheet.

Finish: Chrome-plated where exposed to view.

3 EXECUTION ---

3.1 GENERAL

Service trenching

Requirement: To 0223 *Service trenching*.

3.2 SANITARY PLUMBING

Location

General: Verify location and invert level of piping before commencing installation.

Layout: Arrange piping to conform to the documented layouts as follows:

- Avoid interference with other services and building elements not yet installed or built.
- Follow the most direct route with the least number of changes of direction.

Ducts: If installed in ducts, locate and fix stacks, wastes and pipes independently of other services. Arrange so they are easily accessible and removable throughout their entire length.

Piping: As documented.

Order of work

Requirement: Start drain laying at the downstream end of the drainage system (at the connection point to site infrastructure), not the upstream end. Confirm invert levels with building elements before starting to lay drains.

Discharge from air handling systems

Trays, sumps and plumbing: To AS/NZS 3666.1.

Expansion joints

Location: Provide expansion joints where pipes cross seismic or movement joints in the building, and from the building to below ground outside the building.

Inspection openings

Location: Provide inspection openings at each upstream end of branch and main drains, change of direction, entry to stacks and to AS/NZS 3500.2. Provide inspection openings complete with access riser brought up to finished floor levels. If access risers are located in tiled floor areas or surfaces with similar finishes, provide anti-slip inspection covers with neoprene gas tight sealing rings.

Size: Provide inspection openings that allow full access to the waste pipe.

Vertical stacks: Provide a removable access gate opening of size equal to the diameter of the pipe approximately 600 mm above finished floor level. If the stack is concealed behind a wall or duct, provide a hinged access panel in the wall or duct with finish to match the surface in which it is installed.

Protection from sunlight

Protection: Protect plastic pipes and fittings exposed to sunlight to AS/NZS 3500.1.

Thermal movement

General: Arrange piping to accommodate thermal expansion. Provide proprietary expansion joints in copper and plastic pipes where pipe flexibility does not allow for movement. Make sure that movement does not strain branch connections.

Tundishes

Location: Provide suitably sized, trapped tundishes to collect condensate wastes from mechanical equipment, as documented. Connect tundishes to nearest waste or floor drain. Connect tundish waste to floor wastes, wastes or drains and provide traps and vents where necessary.

Charging: If tundishes are not provided with a constant discharge from equipment and are connected directly to the sanitary plumbing system or drainage system, provide a trap seal primer valve to ensure that the trap of the tundish is charged at all times.

Vacuum drainage system

Standard: To AS/NZS 3500.2 Section 16.

Vent pipes

Requirement: Provide upstream and downstream vents to AS/NZS 3500.2.

Location: Locate vents at least 6 m from any air intake or grille and at least 3 m from exhaust discharges.

Staying to roof: If fixings for stays penetrate the roof covering, seal the penetrations and make watertight.

Terminations: Provide vent cowls of the same material as the vent pipe.

Wet area floors

General: Where drainage connections pass through wet area floors, terminate 4 mm below the substrate surface.

3.3 SANITARY DRAINAGE**Laying**

General: Lay in straight lines between changes in direction or grade with sockets pointing up hill. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous, cap open ends to prevent entry of foreign matter.

Piping: As documented in the **Sanitary drainage piping schedule**.

Pipeline identification

General: Lay detectable plastic warning tape, 300 mm above buried piping, for the full length of the piping.

3.4 PIPING

Finishes

Exposed piping: Finish exposed piping, including fittings and supports, as follows:

- In internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 service condition 2, bright.
- Externally and steel piping and iron fittings internally: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for identification marking. Prime steel piping and iron fittings.

Valves: Finish valves to match connected piping.

Supports

General: As documented.

Adverse soil conditions under structures: If soil under structures is unable to support piping without movement, suspend piping from the structure above on Type 316 stainless steel hangers, fasteners and saddles at 600 mm maximum centres. Backfill with non-compacted lightweight material and size supports to carry the load of the piping and backfill and conform to the **Pipeline tolerances table**. Cover metal components with petroleum based mastic then wrap with petroleum-based tape to provide a continuous barrier to prevent ingress of water. Provide 50% minimum overlap of tape.

Differential movement: If the geotechnical site investigation report predicts differential movements between buildings and the ground, conform to **SERVICES INSTALLATION, Differential movement in 0171 General requirements**.

Pipeline tolerances table

	Permissible angular deviation from alignment	Permissible displacement from alignment
Horizontal	1:300	15 mm
Vertical	1:500	5 mm

Trade waste

Piping: As documented in the **Trade waste piping schedule**.

Disposal: Provide sumps or interceptors.

Laboratory waste traps and connection

General: If there are chemically corrosive effluent wastes, provide compatible traps and waste connections, and drain to a treatment pit.

Trap material: As documented in the **Traps schedule**.

3.5 PITS

Installation

General: Prepare foundation, install pit and connect pipes, to manufacturer's recommendations.

Location: At junctions, changes of gradient and changes of direction of stormwater drains, as documented.

Metal access covers and grates

Standard: To AS 3996.

Cover levels: Top of cover or grate, including frame:

- In paved areas: Flush with the paving surface.
- In landscaped areas: 25 mm above finished surface.
- Gratings taking surface water runoff: Locate to receive runoff without ponding.

3.6 ACOUSTIC TREATMENT OF PIPING

Acoustic lagging

Location: Provide acoustic treatment where documented.

Material: Proprietary acoustic lagging consisting of an inner layer of 25 mm thick acoustic foam and an outer layer of impregnated rubber, vinyl or foil with a minimum surface weight of 4.5 kg/m².

Installation: To manufacturer's recommendations.

Pipe isolation

Location: Provide pipe isolation where documented as follows:

- Main pipe runs: Support from floor slab, not walls.
- Branch and main riser pipes: Supported on rubber lined clips or vibration-isolated hangers.
- Connections to vibrating plant: Provide flexible connections.
- Pipes in dividing walls: Locate pipes in dividing walls only if walls are of discontinuous construction. Support pipes in dividing walls on resilient clamps. Mount to the wall leaf adjacent to the room served by the pipe, or the wall leaf adjacent to the least noise sensitive space in the case of common pipework.
- Pipe penetrations through floors, walls, ceilings: Acoustically isolate so there is no direct contact between pipes and the surrounding structure or lining materials. Provide a flexible non-setting sealed joint between penetrating pipes (including insulation) and the penetrated building element.

3.7 TESTING**Pre-completion tests**

Requirement: Test to AS/NZS 3500.2 Section 15, before backfilling or concealing.

Leaks: If leaks are found, rectify and re-test.

3.8 COMPLETION**Cleaning**

General: On completion clean and flush the whole installation.

0823 COLD AND HEATED WATER**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Provide cold water and heated water systems, as documented.

1.2 STANDARDS**General**

Water supply: To AS/NZS 3500.1.

Heated water supply: To AS/NZS 3500.4.

Backflow prevention: To AS/NZS 2845.1 and AS 2845.2.

Copper pipe: To AS 1432 and AS 4809.

Microbial control: To AS/NZS 3666.1 and AS/NZS 3666.2 and the recommendations of SA/SNZ HB 32.

Installation of glass wool and rock wool insulation

General: Conform to the

ICANZ Industry code of practice for the safe use of glass wool and rock wool insulation.

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection the following definitions apply:

- Heated water: Water that has been intentionally heated. It includes hot water, warm water and boiling water.

1.4 SUBMISSIONS**Certification**

WaterMark certification: Submit evidence that proposed components are listed in the WaterMark Product Database.

Fire performance

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Products and materials

Thermal insulation performance: Submit evidence of conformity to AS/NZS 4859.1 and AS/NZS 4859.2.

Samples

General: Submit samples of accessories identified by proprietary item, including the following:

- Valves.
- Instruments, including gauges and thermostats.

1.5 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Excavated surfaces.
- Concealed or underground services.

2 PRODUCTS**2.1 GENERAL****Labelling**

Insulation: Deliver mineral wool products to site in packaging with third party mark of conformity indicating product is bio-soluble and not listed as a hazardous material in the Safe Work Australia Hazardous Chemical Information System (HCIS).

2.2 COMPONENTS

Pressure control valves

General: Provide reduction valves, pressure limiting valves, or ratio valves, which produce the necessary reduction in pressure.

Pressure reducing valve assembly: Provide the following:

- Pressure reducing valve.
- Inline strainer on the upstream side.
- Isolating valves upstream and downstream of the valve and strainer assembly.
- Pressure gauge with gauge cock on each side of the pressure reducing valve.

Performance: Maintain the set outlet pressure under no flow conditions.

Outlet pressure: 350 kPa or as documented.

Pressure reducing stations

Arrangement: Provide pressure reduction stations consisting of:

- A manifolded installation of three pressure reduction valves in a parallel equal flow arrangement.
- A pressure gauge with gauge cock permanently installed on each inlet and outlet manifold.
- Two DN50 adjustable pressure reducing valves each complete with inbuilt strainers and gauge ports. Set to deliver water at 430 kPa.
- One DN25 adjustable pressure reducing valve complete with inbuilt strainer and gauge ports. Set to deliver water at 500 kPa.
- Isolation valves upstream of each pressure reduction valve.

Maximum velocity: To AS/NZS 3500.4.

Calibrated balancing valves

Type: Continuously adjustable graduated with a limit stop for precise setting of the maximum valve opening, a numeric indication of valve opening position and pressure tapings across the variable orifice.

Accuracy and repeatability errors: $\pm 5\%$ or better over the normal measuring range of the valve.

Handwheel scale resolution: $< 2.5\%$ of full scale.

Construction:

- Body:
 - . \leq DN 50: Dezincification resistant copper alloy of Brinell hardness > 130 .
 - . $>$ DN 50: Cast iron.
- Seat: PTFE.

Automatic hot water balancing valves

Location: Provide automatic hot water balancing valves to individual hot water return pipework loops. Install in a readily accessible location behind an access panel.

Type: Automatic control of water temperature with stepless temperature setting and integral shut-off function without loss of temperature setting.

Thermometer: Provide an integral dial thermometer with each valve and integral self-sealing temperature-pressure test point.

Body: Dezincification resistant copper alloy.

Wash down reel

Requirement: Provide wash down hose reels, as documented.

Construction: Provide each hose reel with the following:

- 20 mm diameter hose tap below the reel.
- 25 mm diameter inlet water connection with isolation/gate valve with interlock for nozzle.
- Hose guide.

Finish: Powder coated in blue with signage in a contrast colour with the word WASH.

Fixing: Fix to wall with Type 316 stainless steel mounting plate and stainless steel fasteners.

Automatic air vents

Type: Float operated.

Construction:

- Body: Copper alloy.

- Float: Non-metallic or stainless steel.
- Seat: Stainless steel.

Backflow prevention devices

Standard: To AS/NZS 2845.1 and AS 2845.2.

Pressure drop: Select for lowest pressure drop compatible with the required functions.

Line strainers

Type: Low resistance, Y-form bronze bodied type, with screen of dezincification resistant brass, corrosion-resistant stainless steel, or monel.

Screen perforations: 0.8 mm maximum.

Pressure gauges

General: Provide gauges with fullscale reading in kPa, a minimum nominal diameter of 63 mm or as documented and with a fullscale value between 130% and 200% of the working pressure.

Bourdon tube gauges: To AS 1349.

Accuracy grade to AS 1349: Industrial.

Installation: To the recommendations of AS 1349 Appendix B. Provide a gauge cock and protect against pump pulsations.

Thermostatic mixing valves

Standard: To AS 4032.1.

Requirement: Provide thermostatic mixing valves that automatically control the temperature at the mixed outlet to a preselected temperature and suitable for the number of outlets served by the individual valve.

Controls: Include the following:

- A temperature sensitive automatic control that maintains temperature at the preselected setting and rapidly shuts down the flow if either the supply system fails, or if the normal discharge water temperature is exceeded.
- Hot water flush facility.

Wall box: If documented, house the thermostatic mixing valve in a stainless steel recessed wall box with a hinged door and keyed lock.

Water tanks

Requirement: To 0816 Tanks.

Water meters

Standard: To AS 3565.4.

Installation: To the requirements of the Network Utility Operator.

Sub water meters: Provide sub water meters as documented.

2.3 FIRE PERFORMANCE

Fire hazard properties

Insulation materials: Tested to AS/NZS 1530.3. Fire hazard indices as follows:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if the Spread-of-Flame Index is more than 5.

Facing materials: Tested to AS 1530.2: Flammability Index ≤ 5 .

Materials with reflective foil facing: Test to AS/NZS 1530.3 and the recommendations of Appendix A6.

2.4 INSULATION MATERIALS

General

Standard: To AS/NZS 4859.1.

Minimum insulation R-Value: \geq Total R-Value in AS/NZS 3500.4 for the type and location of the pipe.

Polyolefin foam

Type: Closed cell cross-linked polyolefin foam produced using a hydrocarbon blowing agent.

Insulation surface facing: Heat-bonded aluminium foil laminate.

Glass wool and rock wool and polyester

Description: Select from the following:

- Glass wool or rock wool resin-bonded to form tubular sections.
- Polyester in moulded tubular sections.

Elastomeric foam insulation

Type: Chemically blown closed cell nitrile rubber in tubular sections with smooth natural finish for pipe insulation, in sheets for insulating pipe fittings, and in sheets or rolls for large pipes, tanks, vessels and heat exchangers.

Physical properties:

- Free of ozone depleting gases in manufacture and composition.
- Moisture absorption: Non-hygroscopic.
- Water vapour diffusion resistance μ : ≥ 5000 to EN 13469.

Aluminium foil laminate sheet

Standard: To AS/NZS 4200.1.

Material: Glass fibre reinforced, aluminium foil-paper laminate.

Duty classification to AS/NZS 4200.1: Heavy duty.

Adhesives and sealants

Requirement: Provide adhesives and sealants to manufacturer's recommendations.

Aluminium foil laminate tape

Mechanical properties:

- Maximum tape thickness: 0.14 mm.
- Minimum breaking strength: 35 N/25 mm.
- Minimum adhesive strength: 5.5 N/25 mm.
- Maximum low speed unwind force: 17 N/25 mm.

Adhesive: Non-toxic, high tack synthetic pressure sensitive type.

Liner: Silicone coated paper.

Backing: Aluminium foil laminate.

Minimum width: 50 mm.

3 EXECUTION**3.1 PIPING****Mains connection**

Requirement: Connect the cold water supply system to the Network Utility Operator's main through a stop valve and meter, as documented.

Cold water system: Provide the cold water supply system, installed from the meter to the draw-off points or connections to other services as documented.

Heated water system: Provide the heated water system, installed from the cold water connection points to the draw-off points or connections to other services as documented.

Finishes

Exposed piping: Finish exposed piping, including fittings and supports, as follows:

- In internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 service condition 2, bright.
- Externally and steel piping and iron fittings internally: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for identification marking. Prime steel piping and iron fittings.

Valves: Finish valves to match connected piping.

Fittings and accessories

General: Provide the fittings required for the proper functioning of the water supply system, including taps, valves, backflow prevention devices, pressure and temperature control devices, strainers, gauges and automatic controls and alarms.

Provision for dismantling: Arrange piping by the provision of unions or similar so that valves, taps and other maintainable components can be removed for maintenance without disturbing or cutting adjacent piping.

Press-fit fittings

Type: Permanent and inseparable after pressing.

Fitting material: Copper, stainless steel or gunmetal.

Leak path: Incorporate a positive leak path in the form of a channel in the metallic body of the fitting that indicates leakage when dry pressure tested is over the range 2.2 kPa to 300 kPa or wet pressure tested is over the range 100 kPa to 650 kPa.

Seals: EPDM suitable for solar applications and incorporating a cylindrical pipe guide in the front of the seal.

Material identification marks

General: Pipes with grade or class identification markings: Install so that the markings are visible for inspection.

Pipes under pressure embedded in concrete

Prohibition: Do not embed or cast water service pipes into concrete structures.

Sleeves

Requirement: Provide sleeves at penetrations to 0171 *General requirements*.

Provision for expansion

Requirement: Provide for thermal expansion of piping to AS/NZS 3500.4 clause 4.13.3 using either:

- Inherent flexibility of the piping.
- Proprietary expansion compensators consisting of a corrugated stainless flexible hose inside a reinforced metallic braid and fitted with stainless steel flanges. Install in bending mode and provide guides and anchors to manufacturer's recommendations.

Expansion loops: If expansion loops are used, install isolation valves either side of the expansion loops within ceiling spaces and riser ducts.

Pressure gauges

Location: Provide pressure gauges complete with gauge cocks in the following locations:

- Suction and delivery side of each cold water pump.
- Suction and delivery side of each primary and secondary circulating pump.
- Inlet and outlet of each pressure reduction station.
- Inlet and outlet of each water filter.
- Supply inlet to hot water plant.
- Outlet manifold from the hot water and warm water heaters.
- Cold water supply to the hot water plant.
- Hot water return to the hot water plant.
- Downstream of main control valve to buildings.
- Adjacent highest fixture in the building.

Thrust blocks

Requirement: If water services with elastomeric (rubber) ring joints are laid below ground provide thrust blocks to AS/NZS 3500.1 clause 5.9.

Location and construction: To AS/NZS 3500.1 clause 5.9. Provide a minimum of 0.75 m³ of concrete at each thrust block location and arranged to transmit thrusts to undisturbed soil.

Valve spindles

General: If practicable, install valve spindles in a vertical position.

Venting

Location: Provide 15 mm minimum size air release vents at the following locations:

- High points of the system.
- Sections of the piping in which air may collect.
- Upstream from each item of heat exchange equipment.

Risers: Provide a 150 mm high riser set vertically from the pipe and fabricated from the same diameter and material as the pipe. Provide an automatic air vent at the top of the riser.

Protection from sunlight

Protection: Protect plastic pipes and fittings exposed to sunlight to AS/NZS 3500.1.

Bushfire-prone areas

Site with Bushfire Attack Level (BAL) 12.5, 19, 29, 40 or FZ to AS 3959: If external and above ground, provide metal pipes and fittings to AS 3959.

3.2 BACKFLOW PREVENTION

Location

Requirement: Provide backflow prevention devices in the following locations:

- On main incoming domestic cold water supplies, downstream of meters.
- On all mechanical plant, upstream of the plant.
- On all irrigation systems.

In other locations required by the PCA, Network Utility Operator, AS/NZS 3500.1 and as documented.

Installation

External valve locations: Protect from damage and vandalism.

Arrangement: Provide each backflow prevention device with the following:

- Provide unions if \leq DN50, flanges for larger sizes.
- Isolating valves upstream and downstream of each backflow prevention devices.
- Dual check valves to AS/NZS 3500.1.
- Line strainer upstream of the each backflow prevention device.
- Tundish and drain with connection to waste drain to AS/NZS 3500.1.

Registration: Register valves to Network Utility Operator requirements.

In-wall mounted backflow prevention valves

Arrangement: Provide pre-plumbed proprietary high hazard valve assemblies as follows:

- Dual hot and cold valve trains.
- Flush mount, lockable, recessed Type 304 stainless steel cabinet.
- Slide-in front panel.
- DN50 waste connection.

Vacuum breaker valves

Requirement: Provide vacuum breaker valves where required to prevent cross-connection of the cold water service.

3.3 PIPING INSULATION

General

Requirement: Insulate the following:

- Non-chrome plated heated water piping, fittings and valves.
- Non-chrome plated cold water piping in spaces subject to condensation.
- Cold water piping subject to freezing.

Minimum insulation R-Value: \geq Total R-Value in AS/NZS 3500.4 for the type and location of the pipe.

Application: Fit insulation tightly to piping surfaces without gaps. Close butt ends of insulation sections. Minimise number of joints. If the insulation is in half-sections, make only half-circumferential joints at any one place. Seal longitudinal seams in foil laminate and fix insulation at maximum 500 mm centres with polypropylene, zinc-coated steel or aluminium straps.

Unions and other items requiring service: Install the insulation so that it is readily removable.

Fittings: Provide insulation with insulation R-Value at least equal to that of the adjacent piping insulation.

Insulation material

General: Provide insulation material as documented.

Elastomeric foam insulation

Adhesives: Adhesive fix all longitudinal and butt joints. Adhere to the pipe at end joints, for a distance of 25 mm, to compartmentalise each section. Use only solvent-based adhesive supplied by insulation manufacturer and designed specifically for the material being used.

Sheathing

General: Provide metal sheathing to all piping insulation:

- In plant rooms.
- Where exposed to weather.
- Where exposed to view.
- Where subject to mechanical damage.

- On valves, pipeline components and pumps in sheathed piping.

Metal sheathing: Cover piping with 0.5 mm thick metallic-coated steel sheet sheathing sprung over the insulation in one piece with laps at least 30 mm wide, and fastened with self-tapping screws or snap head rivets at 150 mm maximum centres. Form the sheathing to match the shape of the insulated pipe and fittings. Position laps to avoid water penetration. In external locations weatherproof the joints and fixings using non-setting mastic.

Alternative protection for elastomeric foam: Where exposed to sunlight but not exposed to mechanical damage, provide 2 coats of tintable, water-based, rubberised, UV resistant, flexible paint finish to outdoor installations.

Surface preparation

General: Clean the surfaces to remove scale, rust, grease and dirt and prepare surfaces to suit the insulation. Restore surface coatings, which have been damaged or affected by welding.

Insulation at pipe supports

General: Provide supports formed to fit around the insulation.

Pipes under DN 25: Either:

- Fit supports directly to pipe and form insulation around the support.
- Support as for pipes DN 25 or over.

Pipes DN 25 or over: Either:

- Protect the insulation at the support point with metal sheathing extending sufficient distance both sides of the support so the insulation thickness is reduced by less than 10%.
- Replace the insulation at the support point with a shaped timber or cork spacer block. Butt the insulation up to the spacer block and seal with silicone compound. Clad the block and insulation in 0.5 mm metallic-coated steel sheet extending 100 mm both sides of the support.

Insulation of buried pipes

Insulation material: Elastomeric foam certified by the manufacturer as suitable for use direct buried in-ground.

Sealing: Seal all but joints and longitudinal joints and seams with the insulation manufacturer's recommended adhesive. Seal the insulation to the pipe at both ends and each termination.

Valves and fittings: Insulate and seal as for pipe. Install valves in pits.

Protection: Protect the pipe from water penetration. Select from:

- Use of insulation material with integral polymeric coating to protect from mechanical damage, water penetration and the growth of bacteria, mould and mildew.
- Application of high density rubber sheathing supplied by the insulation manufacturer and certified for use underground.

Sleeving: Install the insulated pipe in a PVC-U soil pipe. If the water table may be above the sleeve pipe, seal all joints watertight. If the water table is permanently below the sleeve pipe, provide 10 mm drain holes at 600 mm centres along the bottom centre of the sleeve pipe.

Insulation of piping to solar water heating systems

Standard: AS/NZS 2712.

Insulation material: Insulate flow and return piping between solar collectors and storage vessels as follows:

- Material temperature rating: Minimum 150°C.
- Protection: Protected against ultraviolet light mechanical damage, water penetration and the growth of bacteria, mould and mildew.

Sealing: Seal all but joints and longitudinal joints and seams with the insulation manufacturer's recommended adhesive. Seal the insulation to the pipe at both ends and each termination.

3.4 ACOUSTIC TREATMENT OF PIPING

Acoustic lagging

Location: Provide acoustic treatment where documented.

Material: Proprietary acoustic lagging consisting of an inner layer of 25 mm thick acoustic foam and an outer layer of impregnated rubber, vinyl or foil with a minimum surface weight of 4.5 kg/m².

Installation: To manufacturer's recommendations.

Pipe isolation

Location: Provide pipe isolation where documented as follows:

- Main pipe runs: Support from floor slab, not walls.
- Branch and main riser pipes: Supported on rubber lined clips or vibration-isolated hangers.
- Connections to vibrating plant: Provide flexible connections.
- Pipes in dividing walls: Locate pipes in dividing walls only if walls are of discontinuous construction. Support pipes in dividing walls on resilient clamps. Mount to the wall leaf adjacent to the room served by the pipe, or the wall leaf adjacent to the least noise sensitive space in the case of common pipework.
- Pipe penetrations through floors, walls, ceilings: Acoustically isolate so there is no direct contact between pipes and the surrounding structure or lining materials. Provide a flexible non-setting sealed joint between penetrating pipes (including insulation) and the penetrated building element.

3.5 PITS

General

Requirement: Install below-ground water meters, stop valves and control valves in concrete access pits with removable pit covers.

Construction

Internal dimensions: To give 300 mm clear space all around the fittings in the pit.

Concrete: Grade N20 to AS 1379, 100 mm thick, reinforced with F82 fabric.

Pit covers: To AS 3996.

Installation

General: Grade floor to a point on one side and drain to the stormwater drainage system. Carry the pit walls up to 50 mm above finished ground level. Cast in the pit cover frame flush with the top. Trowel the top smooth.

3.6 MARKING

Notice plate

General: Provide a notice plate containing condensed emergency instructions, legibly printed or engraved on durable material resistant to defacement, at least 3 mm thick or mounted on board at least 3 mm thick, permanently fixed in a convenient position at the control valves.

Buried services

Requirement: Provide a detectable marker tape with trace wire to identify the route of buried piping.

Marker tape: Provide a minimum 100 mm durable plastic in colour to AS 1345 continuously printed with the words DANGER – BURIED DRINKING WATER SERVICE BELOW.

Location: Lay in backfill 150 mm above the pipe.

Trace wire: Terminate with 1000 mm coil in a readily accessible location. Tag to match the record drawings.

3.7 VALVE BOXES

General

Requirement: Provide cast iron valve boxes with removable covers for access to underground valves. Provide cast iron sluice valve covers for access to sluice valves.

Installation

General: Set beneath each box a shaft formed of PVC-U pipe to give clear access to the valve wheel or spindle. Set top flush with pavement surface, or 15 mm above unpaved surfaces, and encase in formed concrete box 150 mm thick, with top surface trowelled smooth.

3.8 WARM WATER SYSTEM

General

Standard: AS/NZS 3500.4.

System: Provide a warm water tempering, disinfection and circulation system including the following:

- A factory assembled copper-silver ionisation disinfection system pre-plumbed, wired and lagged. Mount on a galvanized steel frame.
- Hot water disinfection bypass.
- Packaged warm water ring-main circulation pump set with timed pump alternation and automatic change over on fault. Provide fault alarm outputs.
- Packaged hot water ring main circulation pump set with timed pump alternation and automatic change over on fault. Provide fault alarm outputs.

- Thermostatic mixing valve manifold on frame.
- Magnetic anti-scale device to prevent scale formation in the thermostatic mixing valves.
- Temperature sensors mounted on the flow and return for the hot and warm water flow and return.
- Terminals for connection to the BMS.

3.9 TESTING

Pre-completion tests

Pressure tests: Before insulation is applied to joints, pressure test piping to AS/NZS 3500.1 and AS/NZS 3500.4 as appropriate.

Equipment: Before testing, disconnect any equipment not rated for the test pressure.

Leaks: If found, rectify and re-test.

Cross connections: Isolate systems individually and check for cross connections.

Backflow prevention: To AS/NZS 3500.1.

Tapware: Check for leaks.

Completion test

General: Provide a full operational test to verify conformance.

3.10 COMMISSIONING

General

Strainers: Remove, clean and replace strainer baskets.

Cleaning and disinfection: To AS/NZS 3500.1 Appendix G.

Cold water systems: Test and commission to AS/NZS 3500.1 Section 17.

Heated water systems: Test and commission to AS/NZS 3500.4 Section 9 and AS/NZS 3666.1 Section 3.

Non-drinking water services: AS/NZS 3500.1 Section 9.

Testable backflow prevention devices: Test and commission to AS/NZS 2845.3 by a licensed plumber with backflow device accreditation. Tag and certify to the requirements of the Network Utility Operator.

Thermostatic mixing valves: To AS 4032.1.

3.11 COMPLETION

Charging

Completion: On completion of installation, commissioning, testing and disinfection, fill the system with water, turn on control and isolating valves and the energy supply and leave the water supply system in full operational condition.

Thermostatic mixing valves

Field testing and maintenance: To AS 4032.3.

Maintenance manuals

Standard: To AS/NZS 3666.2.

4 SELECTIONS

4.1 COLD AND HEATED WATER

Piping system schedule (based on equivalent diameters)

	Type or location		
	25mm and less (Internal)	32mm and above (Internal)	Below Ground
Cold water generally			
Material	Rehau	Copper	PE100 PN16
Cold water visible within occupied space			
Material	Chrome Plated	N/A	N/A
Cold water inside plantrooms			
Material	Copper	Copper	N/A
Warm water			

	Type or location		
	25mm and less (Internal)	32mm and above (Internal)	Below Ground
Material	Rehau	Copper	N/A
Hot water			
Material	Rehau	Copper	N/A

Piping insulation schedule

Properties	R-value of Insulation m ² K/W		
	20mm and less (Internal)	20mm and less (External)	25mm and above (Internal)
Hot Water	0.3 (13mm)	0.6 (25mm)	0.6 (25mm)
Warm Water	0.3 (13mm)	0.6 (25mm)	0.6 (25mm)

0891 HYDRAULIC MAINTENANCE**1 GENERAL****1.1 RESPONSIBILITIES****General**

Requirement: Maintain the hydraulic systems for the documented maintenance period so that the performance, reliability, service life, energy efficiency and safety of the system is equal to or better than that at the beginning of the maintenance period, in parallel with and including:

- Periodic and statutory maintenance, cleaning and replacement of consumables.
- Emergency repairs.
- Condition reporting.

Maintenance period: As documented.

1.2 INTERPRETATION**Definitions**

General: For the purpose of this worksection the following definitions apply:

- Consumable: Materials or components intended to be replaced within the service life of the associated plant or equipment.
- Periodic maintenance: Planned routine maintenance of plant and equipment (proactive), including fire safety measures and statutory requirements.
- Repairs: Unplanned/corrective maintenance (reactive).
- Replace/replacement: Replacement of components on a regular cycle on a like for like basis, e.g. repainting, replacement of plant.

1.3 SUBMISSIONS**Certification**

Annual certification: Inspect and submit certification for all items required to be inspected annually under statutory requirements including, but not limited to boilers and pressure vessels.

Records

Maintenance records: Conform to *0171 General requirements*.

Periodic maintenance and performance report: At the frequency documented, submit reports summarising the maintenance performed and the performance of the hydraulic installation in the preceding period. Set out the report in a form that permits comparison with previous reports. Include the following as minimum requirements:

- Dates and number of site labour hours for periodic maintenance. Exclude travelling time.
- Dates, number of site labour hours and nature of work for emergency repairs. Exclude travelling time.
- Dates and number of site labour hours for defects liability rectification if within the defects liability period. Exclude travelling time.
- List of any motors for which the motor current varied by more than 10% from the current measured during commissioning.
- For each separately metered item, the water or gas use for each month of the reporting period.

1.4 INSPECTION**Notice**

Requirement: Give notice so that an inspection may be held simultaneously with the final programmed maintenance visit.

2 PRODUCTS

2.1 GENERAL

Product selection

Proprietary items: Select products, as consumables or replacement items, of the same make, model and type as those being replaced.

Substitutions: Where the existing product is no longer available, provide products with at least the same performance and construction characteristics.

3 EXECUTION

3.1 EMERGENCY REPAIRS

General

Requirement: Respond to call outs for breakdowns or other faults requiring emergency repairs. Rectify faults and replace faulty materials and equipment.

Remedial work: Carry out any remedial work, including temporary work, necessary to restore each system to safe and satisfactory operation. Verify each system is operating correctly before leaving the site. Do not leave the plant in an unsafe condition.

Temporary work: Promptly replace temporary work with permanent rectification.

Contact details

Emergency contract: Provide contact details including after hours and emergency mobile and/or pager details, to permit notification of emergency conditions.

Response time

Period: Attend site for emergency service within the documented response time.

Response period: Starts at the time of notification to the contactor's nominated contact point.

3.2 PERIODIC MAINTENANCE

General

Microbial control maintenance: To AS/NZS 3666.2.

Routine visits: Make routine service visits at the frequency documented. Service items of equipment in conformance with the maintenance schedules in the operation and maintenance manuals.

Notification of defects: When defects in the installation are identified, give notice.

Requirement: Provide maintenance work including, but not limited to, the following:

- Carry out the manufacturers' recommended maintenance.
- Attend to reported defects and complaints.
- Check for and repair corrosion.
- Check for and rectify any unsafe conditions.
- Replace faulty or damaged parts and consumable components.
- Check anti-vibration supports, brackets and clamps, holding down bolts and flexible connections, for deterioration and for freedom of movement of assembly.
- Identification of pipes, conduits and ducts maintenance: To AS 1345.
- Safety signs maintenance: To AS 1319.

Cleaning

Requirement: At the end of the maintenance period:

- Remove waste and clean all parts of the installation.
- Remove temporary protective coatings, packaging and labels.
- Clean screens and strainer baskets.

Piped systems

Tasks: Perform the following:

- Check equipment items and record values for operation, calibration, performance compliance, temperature and energy consumption.
- Rectify all leaks regardless of size. Clean and repair any damage from leak.
- Check condition of insulation and repair as required.

- Provide service tags recording inspections and tests.

Cold and heated water

Maintenance of tanks and piping for drinking water: To AS/NZS 3500.1 and AS/NZS 3500.4.

Ball float valves: Check and adjust for no overflow.

Heated water systems:

- Conform to the recommendations of AS/NZS 3500.4 Appendix M.
- Inspection and maintenance: To AS/NZS 3666.2.
- Provide service tags recording inspections and tests.

Leaks: Inspect cold and heated water systems at least annually for the following:

- Leaks, including leaks from cisterns.
- Other defects.
- Safe condition.
- Conformance to the PCA and Network Utility Operator requirements.

Leaks and defects: Report if found and rectify.

Strainers: Inspect and clean at least annually.

Tapware

Requirement: Inspect for leaks and damage. If leaks are found, service O-rings, replace washers and reseal to rectify.

Hydraulic pumps

Pumps and pump seals: Check and rectify if defective.

Safety and other controls: Check for correct operation and adjust if necessary.

Sewage pumps and pits: Perform the following at least six monthly:

- Inspect including seals on lids.
- Clean and test level controls.

Backflow prevention

General: Maintain to AS/NZS 2845.3 and AS/NZS 3500.1.

Service tags: Record inspections and tests.

Thermostatic mixing valves

Field testing and maintenance: To AS 4032.3.

Service tags: Record inspections and tests.

Drinking water dispensers

Service: Maintain to manufacturer's recommendations. Provide all consumables including, but not limited to, replacement filter cartridges.

Service tags: Record inspections and tests.

Water filter cartridges and media

Requirement: Replace at the manufacturer's recommended frequency or sooner if flow is reduced or pressure drop is excessive.

Fuel gas

Requirement: Maintain fuel gas services so that they are:

- Free from leaks and other defects.
- Efficient and safe.
- In conformance with AS/NZS 5601.1 and Network Utility Operator requirements.

Maintenance: Perform the following annually:

- Inspect all gas reticulation including fixings, isolating valves, regulators and safety enclosures.
- Pressure test the whole installation for leaks.
- Provide service tags recording inspections and tests.

Gas appliances

Service: Conform to AS 3814, including the recommendations of Appendix G. Inspect each appliance for correct operation including flame fail safe valve, thermocouple, thermostat and burners.

Sanitary plumbing

Requirement: Maintain as follows:

- At least annually: Inspect for leaks, repair and report.

- At other times: Attend and clear blockages within 24 hours of notification. Submit a report on the cause of the blockage.

System performance: Conform to the PCA and Network Utility Operator requirements.

Trade waste

Requirement: Annually inspect and clean odour vent filters.

Stormwater

Requirement: Regularly clean and inspection as follows:

- Annually at the end of autumn: Inspect guttering and other rainwater goods. Remove leaves and other potential blockages. Clean leaf screens.
- At other times: Attend and clear blockages within 24 hours of notification.

System performance: Conform to the PCA and Network Utility Operator requirements.

Electrical systems

Requirement: Perform the following:

- Check for hot joints, burnt insulation, burn contacts and repair.
- Check electrical connections for tightness. Tighten loose connections.
- Check operation of all electrical components. Rectify defects.
- Check indicating lights and replace defective lamps.
- Check and record motor currents.
- Check overload settings. Adjust if necessary.
- Check and report any changes to controls and wiring.
- Provide service tags recording inspections and tests.

Standards:

- Electrical equipment generally: To AS/NZS 3760.
- Switchboards: To AS 2467.

3.3 END OF MAINTENANCE PERIOD SERVICE

General

Requirement: Within a month of the end of the maintenance period, undertake all work scheduled to be carried out on an annual basis.

3.4 COMPLETION

Maintenance records

Service records: Record maintenance undertaken in the schedules in the operation and maintenance manuals.

Maintenance reports: Prepare maintenance reports, as documented.

Restitution after maintenance tasks

Requirement: Restore removed, damaged, contaminated or soiled services and building elements when the maintenance task is complete.

Standard: Equal to the condition of the original installation.

4 SELECTIONS

4.1 MAINTENANCE

Maintenance requirements schedule

Provision	Requirement
Maintenance period	12 months
Call out response time not to exceed	6 hours
Maximum time between programmed service visits	4 months
Frequency of periodic maintenance and performance reports	3 months

STRUCTURAL ENGINEERING DRAWINGS
SOUTH-EAST TRAINING FACILITY
DUBS & CO DRIVE, SORELL, TASMANIA 7172

I.01	INDEX	0	27/05/24
EN.01	ENGINEERING NOTES	0	27/05/24
EN.02	WORKPLACE HEALTH & SAFETY NOTES	0	27/05/24
S01	FOOTINGS AND SLABS PLAN	0	27/05/24
S02	WALLS PLAN	0	27/05/24
S03	STEEL FRAMING PLAN	0	27/05/24
S04	ROOF FRAMING PLAN	0	27/05/24
S05	CLERESTORY PLAN	0	27/05/24
S06	BRACING AND LINTELS PLAN	0	27/05/24
S07	FOOTINGS AND SLAB DETAILS	0	27/05/24
S08	BRACING, WALLS TO TRUSSES CONNECTIONS AND TIE-DOWNS DETAILS	0	27/05/24
S09	STEEL FRAMING DETAILS - 1	0	27/05/24
S10	STEEL FRAMING DETAILS - 2	0	27/05/24

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							CLIENT: SORELL COUNCIL	SCALE: N.T.S.	TOTAL SHEETS:	SIZE: A1
0	BUILDING APPROVAL	27/05/2024						PROJECT No: 24-C-592	SHEET: I.01	REV: 0
REV	ISSUE	DATE								

ENGINEERING NOTES - STRUCTURE

GENERAL

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS OR SKETCHES AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE SUPERINTENDENT BEFORE PROCEEDING WITH WORK.
2. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE SPECIFICATION, CURRENT SAA CODES, BUILDING REGULATIONS AND THE REQUIREMENTS OF ANY OTHER RELEVANT STATUTORY AUTHORITIES.
3. THESE DRAWINGS MUST NOT BE SCALED. ALL DIMENSIONS ARE IN mm U.N.O. ALL SET OUT DIMENSIONS AND LEVELS, INCLUDING THOSE SHOWN ON THESE DRAWINGS SHALL BE IN ACCORDANCE WITH THE ARCHITECT'S DRAWINGS AND MUST BE VERIFIED ON SITE.
4. THE CONSULTING ENGINEER HAS DESIGNED THE PERMANENT STRUCTURE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, IMPLEMENTATION AND CERTIFICATION OF ALL TEMPORARY WORKS, PROPPING, NEEDLING, FALSE WORK, BRACING, BACK-PROPPING, AND ANY OTHER STRUCTURE, NECESSARY TO COMPLETE THE WORK.
5. DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERTRESSED. THE CONTRACTOR SHALL ALLOW TO ENGAGE A SUITABLY QUALIFIED ENGINEER TO DESIGN, INSPECT THE TEMPORARY WORKS AND VERIFY THE TEMPORARY STABILITY OF THE STRUCTURE.

CONSTRUCTION SEQUENCE

1. THE FOLLOWING CONSTRUCTION SEQUENCE IS PROPOSED. ANY DEVIATION PROPOSED BY THE MANAGING CONTRACTOR SHOULD BE DISCUSSED WITH THE DESIGN ENGINEER PRIOR TO CONSTRUCTION:
- SITE ESTABLISHMENT
 - FOOTING EXCAVATION
 - POUR FOOTINGS
 - CONSTRUCT BLOCKWORK WALLS
 - POUR CONCRETE SLABS WITH CAST IN PLATES
 - INSTALL PRECAST WALLS IN ACCORDANCE WITH TEMPORARY WORKS DESIGNER METHODOLOGY AND TEMPORARY BRACING
 - INSTALL BAYS OF STEEL COLUMNS/RAFTERS/ROOF TRUS/SPURLINS/GIRTS/LINTELS (PROVIDE TEMPORARY/PERMANENT BRACING AS NECESSARY)
 - CONSTRUCT TIMBER FRAMING
 - INSTALL ROOF/WALL CLADDING
 - INSTALL FLOOR SHEETING

INSPECTION / HOLD POINTS

1. THE MANAGING CONTRACTOR SHALL ALLOW TO ENGAGE A SUITABLY QUALIFIED ENGINEER TO UNDERTAKE INSPECTION OF THE FOLLOWING ELEMENTS:
- FOUNDATION (PRIOR TO PLACING CONTROLLED FILL, VAPOUR BARRIER OR REINFORCEMENT)
 - FOOTING REINFORCEMENT
 - BLOCKWORK REINFORCEMENT
 - SLAB REINFORCEMENT
 - WALL REINFORCEMENT
 - STEEL AND TIMBER FRAMING
 - PRECAST PANELS (AT COMPLETION OF ERECTION)
 - PRECAST PANELS (AT COMPLETION OF STRUCTURE PRIOR TO REMOVAL OF TEMPORARY PROPS)

LOADING

1. STRUCTURAL ELEMENTS ARE DESIGNED TO WITHSTAND LOADING AS REQUIRED UNDER AS1170 AND THE BUILDING CODE OF AUSTRALIA (BCA).
2. FLOOR LIVE IMPOSED AND DEAD LOAD LIMITS ARE INDICATED ON THE RESPECTIVE FLOOR PLANS WITHIN THE DRAWING SET.
3. DO NOT PLACE OR STORE BUILDING MATERIALS ON STRUCTURAL MEMBERS WITHOUT APPROVAL OF THE DESIGN ENGINEER.
4. WIND DESIGN CRITERIA TO AS1170.2:
- | | |
|--------------------------------------|----------|
| • DESIGN LIFE: | 50 YEARS |
| • REGION: | A3 |
| • IMPORTANCE LEVEL: | 2 |
| • TERRAIN CATEGORY: | 2.5 |
| • REGIONAL WIND SPEED - ULTIMATE Vu: | 45 m/s |
| • REGIONAL WIND SPEED - SERVICE Vs: | 37 m/s |

FOUNDATIONS

1. REFER SITE INVESTIGATION REPORT GEOTECHNICAL SITE INVESTIGATION BY GES DATED OCTOBER 2021
2. REMOVE AND DISCARD ALL TREES, STUMPS, ROOTS AND OTHER VEGETATION TO A MINIMUM DEPTH OF 150mm BELOW NATURAL SURFACE AND TO APPROVAL OF THE ENGINEER.
3. EXCAVATED SITES SHALL BE INSPECTED AND APPROVED IN WRITING BY THE ENGINEER PRIOR TO PLACEMENT OF ANY FILL MATERIAL.
4. IMPORTED MATERIAL INTENDED FOR USE AS STRUCTURAL FILL SHALL BE APPROVED IN WRITING BY THE ENGINEER PRIOR TO USE.
5. BASES OF ALL FOOTINGS SHALL BE DEWATERED AND CLEANED OF ALL LOOSE MATERIAL PRIOR TO POURING OF CONCRETE.
6. AREAS OF SOFT FOUNDATION (LESS THAN 100 kPa ALLOWABLE BEARING) SHOULD BE REMOVED AND REPLACED WITH 15 MPa CONCRETE TO APPROVAL OF THE ENGINEER.
7. EXCAVATIONS FOR NEW FOOTINGS OR TRENCHES PARALLEL TO THE EDGE OF ANY EXISTING FOOTING, BATTERED BANK OR SERVICE TRENCH SHALL NOT EXTEND BELOW A LINE DRAWN AT 30° (FROM HORIZONTAL) FROM THE BOTTOM EDGE OF THE EXISTING FOOTING, BATTERED BANK OR SERVICE TRENCH.
8. WHERE BORED CONCRETE PIERS ARE INSTALLED THE MANAGING CONTRACTOR SHALL PROVIDE TO THE ENGINEER BORE LOGS FOR EACH PILE WHICH INCLUDES DETAIL OF DEPTH AND BASE OBTAINED. BORED PILES SHALL BE DEWATERED AND FREE OF ALL LOOSE MATERIAL.

REINFORCEMENT

1. REINFORCEMENT IS SHOWN DIAGRAMMATICALLY AND IS NOT NECESSARILY IN TRUE PROJECTION. SPLICES TO REINFORCEMENT SHALL BE MADE ONLY AT THE LOCATION SHOWN OR AS OTHERWISE APPROVED BY THE ENGINEER.
2. WELDING OF REINFORCEMENT MUST BE APPROVED BY ENGINEER AND SHALL BE CARRIED OUT BY A QUALIFIED WELDER IN ACCORDANCE WITH AS/NZS1554 AND THE REINFORCEMENT SUPPLIER'S RECOMMENDATIONS. THE INTERPASS TEMPERATURE SHALL BE LESS THAN 200 DEGREES IN ACCORDANCE WITH AS/NZS1554 PART 3.
3. THE REINFORCEMENT SYMBOLS ARE:
- N NORMAL DUCTILITY CLASS HOT ROLLED 500N DEFORMED BARS WITH f_{yk} = 500MPa.
 - R NORMAL DUCTILITY CLASS 250N PLAIN ROUND BARS WITH f_{yk} = 250MPa.
 - L LOW DUCTILITY CLASS HARD DRAWN 500L WIRE REINFORCING MESH WITH f_{yk} = 500MPa.
4. DO NOT USE LOW DUCTILITY CLASS L REINFORCEMENT UNLESS SHOWN ON THE DRAWINGS. THE NUMBER FOLLOWING THE REINFORCEMENT SYMBOL IS THE NOMINAL BAR DIAMETER IN MILLIMETRES. ALL REINFORCEMENT SHALL COMPLY WITH AS/NZS4671.
5. HOOKS AND COGS SHALL COMPLY WITH AS3600 UNLESS NOTED OTHERWISE. ALL PULL OUT BARS SHALL BE TEMPORCE BARS OR APPROVED EQUIVALENT. BENDING AND REBENDING OF BARS SHALL BE CARRIED OUT IN ACCORDANCE WITH AS3600. AS/NZS4671. THE SPECIFICATIONS AND THE REINFORCEMENT SUPPLIER RECOMMENDATIONS. BARS SHALL NOT BE HEATED ABOVE 400 DEGREES WITHOUT THE ENGINEER'S WRITTEN APPROVAL. THERMAL CRAYONS SHALL BE USED TO ENSURE COMPLIANCE WITH THIS TEMPERATURE LIMIT.

CONCRETE

1. NO HOLES, CHASES OR EMBEDMENTS OTHER THAN THOSE SHOWN ON THE DRAWINGS SHALL BE MADE IN CONCRETE ELEMENTS WITHOUT ENGINEER'S APPROVAL.
2. CONCRETE SLABS/BEAMS SHALL BE KEPT FREE OF SUPPORTING MASONRY WITH TWO LAYERS OF SUITABLE MEMBRANE (MALTHOID OR EQUAL). VERTICAL FACES SHALL BE SEPARATED BY 12mm BITUMINOUS CANEITE. ALL NON - LOAD BEARING WALLS SHALL BE KEPT 20mm CLEAR OF THE UNDERSIDE OF SLABS AND BEAMS UNLESS NOTED OTHERWISE.
3. CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND LOCATED TO THE SATISFACTION OF THE ENGINEER. THE MANAGING CONTRACTOR SHALL ALLOW FOR ALL NECESSARY CONSTRUCTION JOINTS.
4. WHERE THE CONCRETE SOFFITS ARE INDICATED TO BE CAMBERED, THE UPPER SURFACE SHALL BE SIMILARLY CAMBERED. DEPTH GAUGES SHALL BE USED TO VERIFY THE SLAB THICKNESS.
5. ALL CONCRETE SHALL BE MECHANICALLY VIBRATED.
6. COVER TO REINFORCEMENT AND CONCRETE GRADE SHALL BE AS FOLLOWS UNLESS NOTED OTHERWISE IN PLAN:

ELEMENT	CONCRETE GRADE	FORMED FINISH	CAST AGAINST GROUND
• FOOTINGS	N25	-	50
• WEATHER EXPOSED WALLS	N40	40	
• SLAB ON GRADE OVER MEMBRANE	N32	-	30

1. FOR EXPOSURE CLASSIFICATION B2 ADD 5mm TO THE COVER SHOWN UNDER (a)AND THE CONCRETE GRADE SHALL BE N40 MINIMUM.
2. FOR PRESTRESSING TENDONS THE MINIMUM COVER SHALL BE 25mm TO THE DUCT.
3. COVER IS THE CLEAR DISTANCE BETWEEN ANY REINFORCING (INCLUDING FITMENTS) AND THE FACE OF THE STRUCTURAL ELEMENT.
4. FOR ALL EXTERNAL SURFACES, PROVIDE FULLY PLASTIC BAR CHAIRS. THE WIRE SHALL NOT BE NAILED TO THE FORMS, REINFORCING BARS SHALL NOT BE USED TO KEEP FORMS APART AND A THROUGH TIE SYSTEM SHALL BE USED TO TIE FORMS.
5. PROVIDE AN APPROVED VAPOUR BARRIER FOR SLABS, BEAMS AND THICKENINGS CAST AGAINST THE GROUND.
6. THE COVERS SHALL BE MAINTAINED USING APPROVED BAR CHAIRS. BAR CHAIRS SUPPORTING MESH SHALL BE AT 800 x 800mm MAXIMUM CENTRES. BAR CHAIRS SUPPORTING BARS SHALL BE AT 40 BAR DIAMETERS OR 1500mm MAXIMUM CENTRES WHICHEVER IS THE LESSER. BAR CHAIRS SHALL BE PROVIDED ALONG THE EDGES OF ALL CONSTRUCTION JOINTS. STOP ENDS SHALL NOT BE USED TO MAINTAIN THE COVERS.
- a. EXTERNAL ELEMENTS ARE THOSE EXPOSED TO WEATHER, RAIN AND WATER PENETRATION AND ARE CLASSIFIED B1 UNLESS NOTED OTHERWISE.
7. EXTERNAL CONCRETE ELEMENTS SHALL MEET THE FOLLOWING REQUIREMENTS: MINIMUM PORTLAND CEMENT CONTENT 330kg/m³, MAXIMUM WATER/CEMENT RATIO 0.5, AND THE CHLORIDE CONTENT RESTRICTED AS PER CLAUSE 4.9 OF AS3600.
8. THE MIX DESIGN WITH THE 7 AND 28 DAYS TARGET STRENGTHS AND THE BASIC SHRINKAGE STRAIN AT 56 DAYS SHALL BE SUBMITTED FOR REVIEW PRIOR TO POURING ANY CONCRETE. ALL CONCRETE IN CONTACT WITH AGGRESSIVE SOIL SHALL HAVE SULPHATE RESISTING CEMENT. THE C3A CONTENT OF THE CEMENT SHALL BE LESS THAN 5%.
9. CONDUITS AND PIPES WHEN CAST IN SLABS OR WALLS ARE TO BE PLACED BETWEEN THE TWO REINFORCEMENT LAYERS. WHERE THERE IS ONLY ONE LAYER OF REINFORCEMENT, PROVIDE 50mm COVER TO CONDUIT. THE CONDUIT LOCATIONS ARE TO BE APPROVED BY THE ENGINEER.
10. FORMWORK SHALL BE DESIGNED, CONSTRUCTED AND SUPPLIED IN ACCORDANCE WITH AS3610.
11. CURING OF THE CONCRETE ELEMENTS SHALL BE STARTED AS SOON AS THE CONCRETE HAS HARDENED AND SHALL COMPLY WITH THE SPECIFICATIONS.

CONCRETE SLAB - ON GRADE

1. MINIMUM CONCRETE GRADE FOR DURABILITY:
- COVERED FLOOR: N32
 - POLISHED CONCRETE FLOOR: N32
 - TRAFFICABLE FLOOR (RUBBER TYRES): N32
 - TRAFFICABLE FLOOR (STEEL WHEELS): N40
2. ALL VEGETATION SHALL BE STRIPPED TO A MINIMUM DEPTH OF 150mm. ANY SOFT SPOTS OR DELETERIOUS MATERIAL SHALL BE REMOVED AND REPLACED WITH APPROVED GRANULAR FILLING COMPACTED TO 98% AUSTRALIAN STANDARD COMPACTION. MINOR FILLING (800 MAXIMUM) SHALL BE PROVIDED WHERE REQUIRED TO BRING SUB GRADE TO REQUIRED LEVEL IN ACCORDANCE WITH LIMITS STATED IN AS3798 AND BCA. FILLING SHALL BE APPROVED GRANULAR MATERIAL PLACED IN 150mm AND COMPACTED TO 98% AUSTRALIAN STANDARD COMPACTION.
3. A 0.2mm VAPOUR BARRIER SHALL BE USED, LAPPED A MINIMUM OF 200mm AT JOINTS AND TAPED AROUND SERVICES FITTINGS WITH ADHESIVE TAPE. THE VAPOUR BARRIER SHALL BE PLACED ON A 30mm MINIMUM COMPACTED SAND BED OR SIMILAR APPROVED MATERIAL TO PREVENT PUNCTURE.
4. FOR RAFT SLABS: TRENCH MESH IN BEAMS SHALL BE OVERLAPPED BY THE WIDTH OF FABRIC AT 'T' AND 'L' INTERSECTIONS AND SPLICED WITH A LAP OF 500mm AT ENDS OF SHEETS. THE OUTER BAR AT 'L' INTERSECTION MUST BE BENT AND LAPPED 500mm AROUND THE CORNER OR AN EQUIVALENT N12 BAR PROVIDED.
5. SLAB FABRIC TO BE LAPPED SUCH THAT THE TWO OUTERMOST TRANSVERSE WIRE OF ONE SHEET OF MESH OVERLAP THE TWO OUTERMOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED. MESH SHALL BE SUPPORTED ON BAR CHAIRS AT 800mm MAXIMUM CENTRES.
6. TOP OF SLAB SHALL BE 150mm MINIMUM ABOVE THE FINAL GROUND LEVEL U.N.O. CONTROL JOINTS IN BRICKWORK MUST CO-INSIDE WITH KEY JOINTS IN SLAB.
7. THE FINISHED GROUND SURFACE AT THE SLAB PERIMETER SHALL BE GRADED TO FALL AWAY FROM THE SLAB AT 5% OVER A MINIMUM OF 1m. DRAINAGE SHALL BE PROVIDED AS NECESSARY TO PREVENT WATER PONDING ADJACENT TO THE SLAB EDGE. TREATMENT OF AREAS SURROUNDING THE SLAB SHALL ALSO BE IN ACCORDANCE RECOMMENDATIONS BY THE CSIRO - REFER CSIRO INFORMATION SHEET No. 10-19.

STEEL

1. UNLESS NOTED OTHERWISE, ALL MATERIAL TO BE:
- GRADE 250 HOT ROLLED PLATES, FLATS, ANGLES, 100 x 100 ANGLE OR 125 x 75 ANGLE AND SMALLER
 - GRADE 300PLUS UB, UC, PFC AND LARGER ANGLES
 - GRADE 300 WB, WC
 - GRADE 350 RHS, CHS
2. THE FABRICATOR SHALL BE RESPONSIBLE FOR SUBMITTING SHOP DRAWINGS, WHICH SHALL COMPLY WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS. FOR REVIEW BEFORE FABRICATION IS STARTED. REVIEW DOES NOT INCLUDE CHECKING OF DIMENSIONS, NOR TAKE RESPONSIBILITY FOR CONTRACTORS OBLIGATIONS.
3. ALL DETAILS, GAUGE LINES, ETC. WHERE NOT SPECIFICALLY SHOWN SHALL BE IN ACCORDANCE WITH AISC DESIGN CAPACITY TABLES FOR STRUCTURAL STEEL AND AISC STANDARDISED STRUCTURAL CONNECTIONS.
4. FABRICATOR SHALL PROVIDE ALL FIXINGS FOR ARCHITECTURAL ELEMENTS ETC. WITHOUT WEAKENING STRUCTURAL MEMBERS IN ANY WAY.
5. ALL STEELWORK BELOW GROUND SHALL BE ENCASED BY CONCRETE WITH MIN. COVER OF 75mm. CONCRETE ENCASED STRUCTURAL STEEL TO BE WRAPPED WITH RF41 PLACED 25mm CLEAR OF STEEL. PROVIDE 50mm MINIMUM ENCASING.
6. THE BOLTING PROCEDURE IS DESIGNATED AS FOLLOWS:
- 4.4/S REFERS TO COMMERCIAL BOLTS OF STRENGTH GRADE 4.6 TO AS/NZS1111 TIGHTENED USING A STANDARD WRENCH TO A SNUG-TIGHT CONDITION. ENGINEER MUST BE CONSULTED IF CLASS 4.6 BOLTS REQUIRE WELDING
 - 8.8/S REFERS TO HIGH STRENGTH BOLTS OF STRENGTH GRADE 8.8 TO AS/NZS1252 TIGHTENED USING A STANDARD WRENCH TO A SNUG-TIGHT CONDITION.
 - 8.8/TB REFERS TO HIGH STRENGTH BOLTS OF STRENGTH GRADE 8.8 TO AS/NZS1252 FULLY TENSIONED TO AS1511, DESIGNED AS A FRICTION TYPE JOINT.
 - 8.8/TB REFERS TO HIGH STRENGTH BOLTS OF STRENGTH GRADE 8.8 TO AS/NZS1252 FULLY TENSIONED TO AS1511, DESIGNED AS A BEARING TYPE JOINT. WELDING OF ANY CLASS 8.8 BOLTS IS PROHIBITED.
7. LOAD INDICATING WASHERS SHALL BE USED TO VERIFY TIGHTENING OF BOLTS IN TF AND TB CONNECTIONS. A HARDENED WASHER SHALL BE USED UNDER THE BOLT HEAD OR NUT, WHICHEVER IS ROTATED. FULLY TENSIONED BOLTS SHALL NOT BE RE-USED.
8. ALL BOLTS SHALL BE OF SUCH LENGTH THAT AT LEAST ONE FULL THREAD IS EXPOSED BEYOND THE NUT AFTER THE NUT HAS BEEN TIGHTENED. MINIMUM ONE WASHER SHALL BE USED UNDER THE NUT IN ALL SITUATIONS. IF TIGHTENING IS CARRIED OUT AT THE HEAD, AN ADDITIONAL WASHER SHALL BE USED
9. ALL EXTERNAL STEEL MEMBERS EXPOSURE CATEGORY C3 TO BE HOT DIP GALVANISED IN ACCORDANCE WITH AS 2312.2 2014. ALL INTERNAL STEEL MEMBERS EXPOSURE CLASSIFICATION C2 TO BE PRIMED IN ACCORDANCE WITH AS2313.1 2014.
10. WELDING TO BE CARRIED OUT IN ACCORDANCE WITH AS/NZS1554.1. MINIMUM TENSILE STRENGTH OF WELDING CONSUMABLES TO BE 430MPa U.N.O. ALL WELD TO BE 6mm CFW SP CATEGORY U.N.O. INSPECTION TO BE CARRIED OUT TO AS/NZS1554.1.
11. ALL GP/SP WELDS TO BE 100% VISUALLY SCANNED.
12. THE ENDS OF TUBULAR MEMBERS SHALL BE SEALED WITH NOMINAL THICKNESS PLATES AND CONTINUOUS FILLET WELDED UNLESS NOTED OTHERWISE.
13. WHERE MEMBERS SHOWN ON THE STRUCTURAL OR ARCHITECTURAL DRAWINGS ARE REQUIRED TO BE CURVED, BENT OR ROLLED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE METHODS REQUIRED TO ACHIEVE THE REQUIRED SHAPES WITHOUT LOCALIZED DISTORTION OF THE MEMBERS.
14. THE CONTRACTOR SHALL PROVIDE AND LEAVE IN PLACE, UNTIL PERMANENT BRACING ELEMENTS ARE CONSTRUCTED, SUCH TEMPORARY BRACING AS IS NECESSARY TO STABILIZE THE STRUCTURE DURING ERECTION. REFER TO NOTES GENERAL 4 AND GENERAL 5.
15. SUBMIT DETAILS OF THE MANUFACTURER, MATERIAL AND SECTION PROPERTIES OF THE PURLINS AND GIRTS TO BE USED FOR APPROVAL. PURLIN AND GIRT BOLTS AND BRIDGING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS UNLESS SHOWN OTHERWISE.
16. TRIMMING MEMBERS FOR MECHANICAL/HYDRAULIC PENETRATIONS, DRAINAGE GUTTERS, SUMPS ETC., ARE NOT NECESSARILY SHOWN. SUPPORT OF HEAVY PIPES AND DUCTS IS TO BE APPROVED BY THE ENGINEER. SERVICES SHALL BE HUNG FROM THE WEB OF PURLINS NOT FLANGES.
17. THE DESIGN, SUPPLY AND INSTALLATION OF SECONDARY STEELWORK REQUIRED TO SUPPORT/CONNECT THE FACADE TO BASE STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR. CERTIFICATION OF ARCHITECTURAL FIXINGS/BRACING OF CEILINGS AND NON-STRUCTURAL WALLS TO THE BASE STRUCTURE IS THE RESPONSIBILITY OF THE CONTRACTOR. FORWARD TO THE ENGINEER A CERTIFICATE OF SUFFICIENCY BY THE SUPPLIER FOR THE ARCHITECTURAL FIXTURES/PANELS/DORY-WALL TO RESIST THE PRESSURES DESIGNATED IN THE DESIGN DOCUMENTS.

TIMBER FRAMING

1. ALL FRAMING TO CONFORM TO AS1684.2 AND NCC REQUIREMENTS U.N.O.
2. THE DOWN CONNECTIONS AND BRACING SHALL BE PROVIDED IN ACCORDANCE WITH AS1684.2 ENGINEERING NOTES MAY BE USED AS A GUIDE.
3. BRACING SHALL BE PROVIDED IN ACCORDANCE WITH AS1684.2 TABLE 8.18 AS ILLUSTRATED BY DETAILS 9, 10 AND 11.
4. PROPRIETARY TIMBER BEAMS AND JOISTS U.N.O. SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS. ALTERNATIVE OPTIONS TO BE APPROVED BY ENGINEER OR CERTIFIED BY SUPPLIER.
5. SHEET METAL TIMBER CONNECTIONS SHALL BE GANGNAIL, TECO, PRYDA BRAND STANDARD ITEMS FIXED IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES.
6. SPLICES IN SPEED BRACES SHALL BE MADE OVER TIMBER MEMBERS WITH A MINIMUM OF 3 NAILS THROUGH THE 2 SPEED- BRACES INTO THE TIMBER.
7. SHEET STEEL CONNECTORS SHALL BE GALVANIZED.
8. NAILS USED EXTERNALLY SHALL BE ZINC PLATED.
9. BOLTS SHALL BE ZINC PLATED.
10. LINTELS SHALL BE CHECKED BY TRUSS MANUFACTURER FOR ABILITY TO SUPPORT CONCENTRATED LOADS IMPARTED BY GIRDER TRUSSES.
11. WHERE THE NAIL LENGTH IS NOT SPECIFIED THE MINIMUM DEPTH OF PENETRATION INTO THE RECEIVING MEMBER SHALL BE A MINIMUM OF 10 TIMES THE NAIL DIAMETER INTO SIDE GRAIN AND 15 TIMES THE NAIL DIAMETER INTO END GRAIN.
12. UNLESS SPECIFIED OTHERWISE THE MINIMUM DIAMETER OF GUN DRIVEN NAILS SHALL BE 3.05mm FOR HARDWOOD AND 3.33mm FOR SOFTWOOD. WHERE PLAIN SHANK HAND DRIVEN NAILS ARE USED IN LIEU OF GUN DRIVEN NAILS THEY SHALL BE A MINIMUM DIAMETER OF 3.15mm FOR HARDWOOD AND 3.75mm FOR SOFTWOOD.

TABLE 5 - TIE DOWN FOR N3 (V_u = 50m/s) SITES

TABLE 5 - TIE DOWN FOR N3 (V _u = 50m/s) SITES	
SINGLE OR UPPER STOREY SHEET ROOF	
JOINT	MINIMUM FIXING REQUIREMENT
CEILING JOIST TO TOP PLATE	SKENED MINIMUM NAIL FIXING
CEILING JOIST TO RAFTER	MINIMUM NAIL FIXING
TOP PLATE TO RAFTER/TRUSS:	
- COUPLED ROOF	SKENED MINIMUM NAIL FIXING - 30 x 0.8 GL STRAP LOADED OVER EACH RAFTER AND WRAPPED UNDER THE TOP PLATE WITH MIN. 4 GALLY CLOUTS EACH END. 2.8 Ø x 25 FOR HARDWOOD, 2.8 Ø x 30 FOR PINE PLUS 3.75mm SKEW NAILS THROUGH RAFTER INTO TOP PLATE
- NON COUPLED ROOF	AS PER COUPLED ROOF
- TRUSS ROOF	AS PER TRUSS MANUFACTURER'S TIE DOWN SPECIFICATION. IN THE ABSENCE OF MANUFACTURERS TIE DOWN SPECIFICATION ADOPT AS A MINIMUM 50 x 6 GL STRAP LOADED OVER TRUSS AND WRAPPED UNDER THE PLATE WITH 4 GALLY CLOUTS EACH. 2.8 Ø x 25 FOR HARDWOOD, 2.8 Ø x 30 FOR PINE PLUS 3.75mm SKEW NAILS THROUGH RAFTER INTO TOP PLATE
COLLAR TIES TO RAFTERS	1 M10 BOLT FOR TIES OVER 4.2m OR 3.75mm NAILS FOR TIES UP TO 4.2m
STEEL BEAM TO RAFTER / TRUSS	WELD TO A STEEL CLEATS OF SUITABLE LENGTH TO STEEL BEAM AT RAFTER / TRUSS LOCATIONS. PROVIDE 2 / M10 OR 1 M10 BOLT AND WASHERS THROUGH RAFTER / TRUSS AND CLEAT
PURLIN TO RAFTER	PROVIDE 1 M10 100mm LONG TYPE 17 BUGLE SCREW AT EVERY PURLIN TO RAFTER / TRUSS JUNCTION (MAX. 900 G) FOR PINE RAFTERS / TRUSSES. PROVIDE 1.75mm TYPE 17 BUGLE SCREW AT EVERY PURLIN TO RAFTER / TRUSS JUNCTION (MAX. 900 G) FOR HARDWOOD RAFTERS / TRUSSES

- NOTES
1. A MINIMUM NAIL FIXING SHALL BE 2 / 75 x 3.15 HARDWOOD OR 2 / 75 x 3.33 (SOFTWOOD) GLUE COATED GUN DRIVEN NAILS.
2. ADDITIONAL ANCHORS MAY BE REQUIRED AT ENDS OF BRACING UNITS TO COMPLY WITH AS1684.2 REFER TO BRACING DETAILS
3. TO DETERMINE UPLOAD WIDTH REFER AS1684.2 FIGURE 9.5

0	BUILDING APPROVAL	27/05/2024			
REV	ISSUE	DATE			



mail@primaengineering.com.au

SOUTH-EAST TRAINING FACILITY

ADDRESS: 47 COLE STREET
SORELL

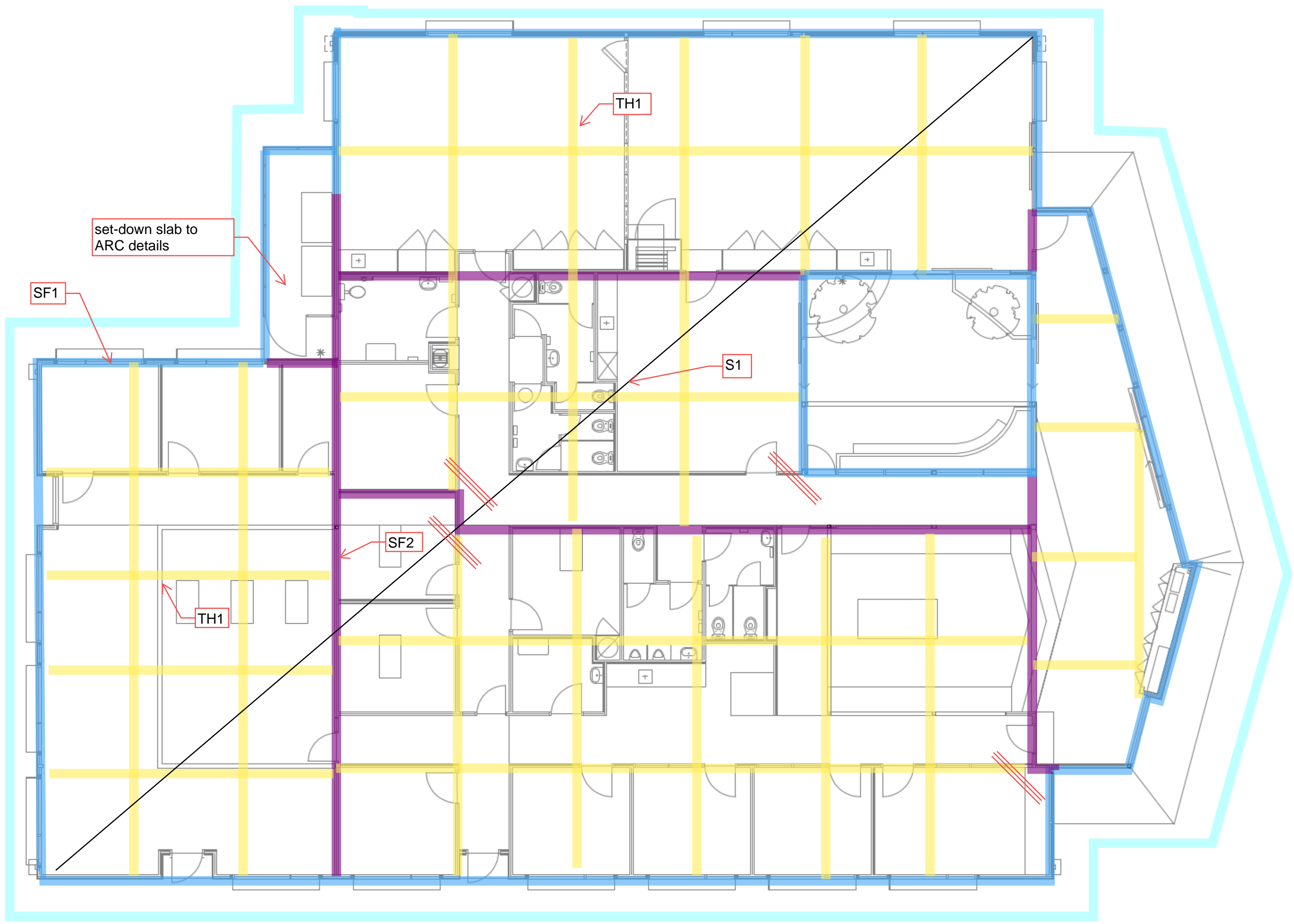
CLIENT: SORELL COUNCIL

ENGINEERING NOTES

SCALE:	N.T.S.	TOTAL SHEETS:	SIZE: A1
PROJECT No:	24-C-592	SHEET: EN.01	REV: 0

ARTICULATE MASONRY (IF ANY) TO NCC PART 3.3.1.8.

set-down slab to
ARC details



3N12 TOP trimmer bars
min 2000 long to all re-entrant corners. Locate first bar 25mm away from corner, rest @ 50

S1 -
125mm THICK CONCRETE SLAB ON
GRADE.
SL92(T) 40 COVER.
0.2mm POLYTHENE MEMBRANE
20mm THICK BEDDING SAND
MIN. 100mm THICK LAYER COMPACTED
20mm FCR
STRENGTH: N32 CONCRETE
SLUMP: 100mm MAX

FOOTINGS AND SLABS PLAN

[illegible]

Walls Framing to be as following:

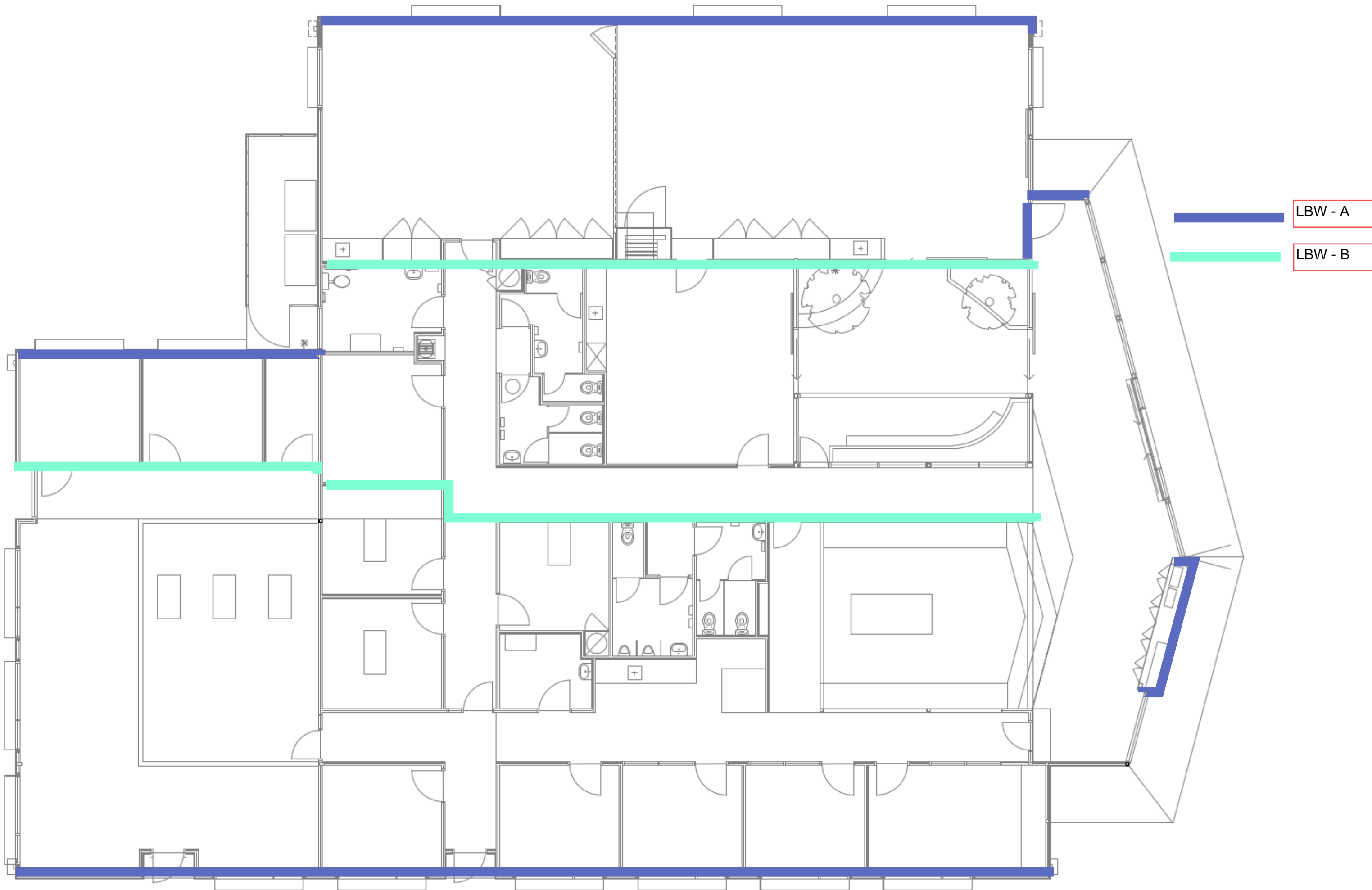
LBW - A:
Top plate: 2/35x90 MGP10
Bottom plate: 35x90 MGP12
Common Studs: 90x45 MGP12 @ max 450crs
Noggings: 45x90 MGP10 @ max 1350crs

LBW - B:
Top plate: 2/45x90 F17 or LVL equivalent
Bottom plate: 45x90 MGP12
Common Studs: 90x45 MGP12 @ max 450crs
Noggings: 45x90 MGP10 @ max 1350crs

All other walls (incl. clerestory):
Top plate: 2/35x90 MGP10
Bottom plate: 35x90 MGP10
Common Studs: 90x45 MGP10 @ max 450crs
Noggings: 45x90 MGP10 @ max 1350crs

Notes:

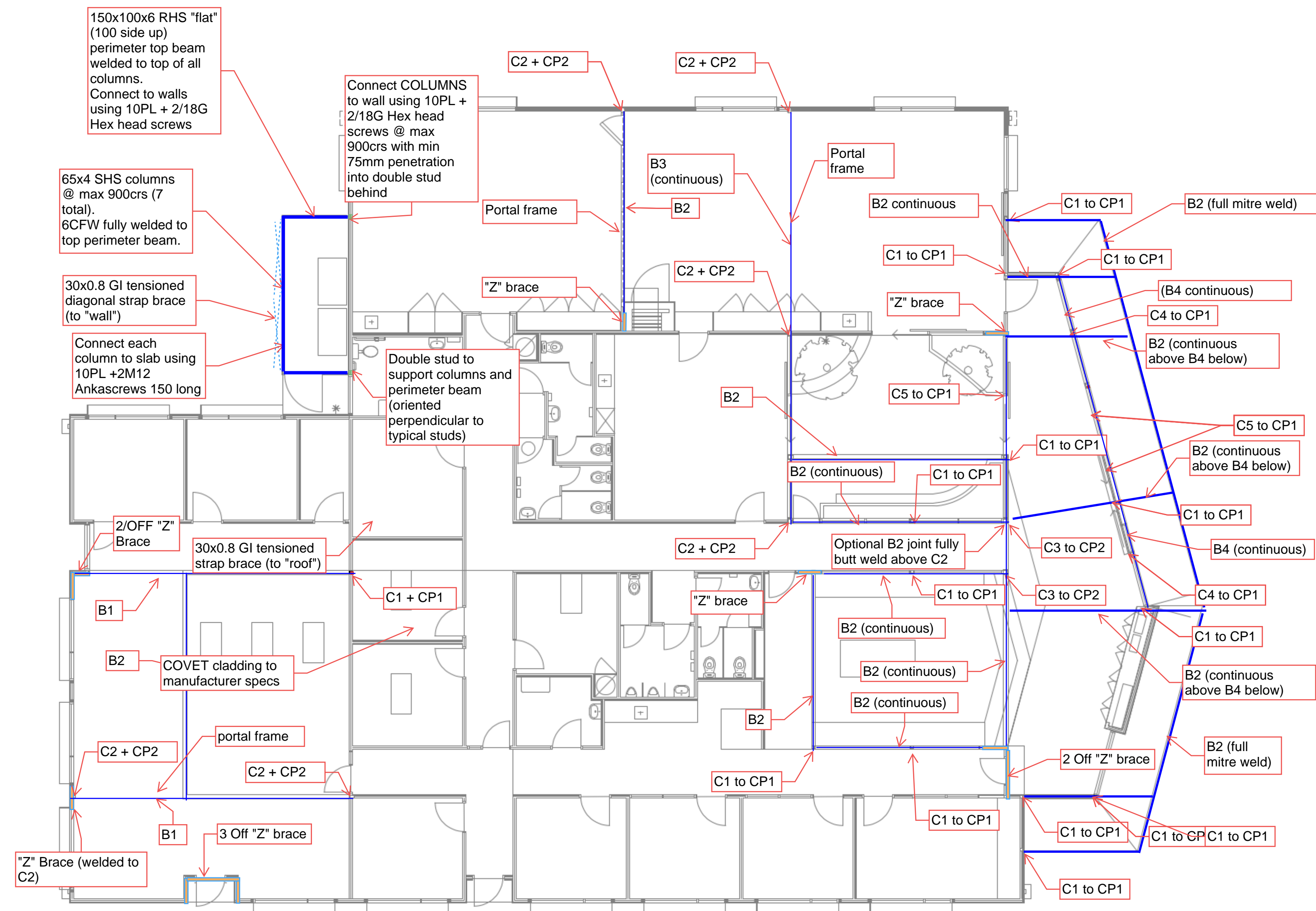
- The following design is based on a trusses layout by Ecotruss. Final design to be confirmed with engineer prior to construction.
- Girder trusses will require M12 tie-down rod to slab either side.
- Tie-down spacing for all LBW must not exceed 900crs
- Tie-down spacing for all non-LBW must not exceed 1200 crs



WALLS PLAN
NTS

Notes:

- All connections to be fully welded (6CFW).
- Unless note otherwise, provide 8PL stiffener to all open sections above columns.
- Services court screening design is based on COVET cladding and to be confirmed with engineer prior to construction.



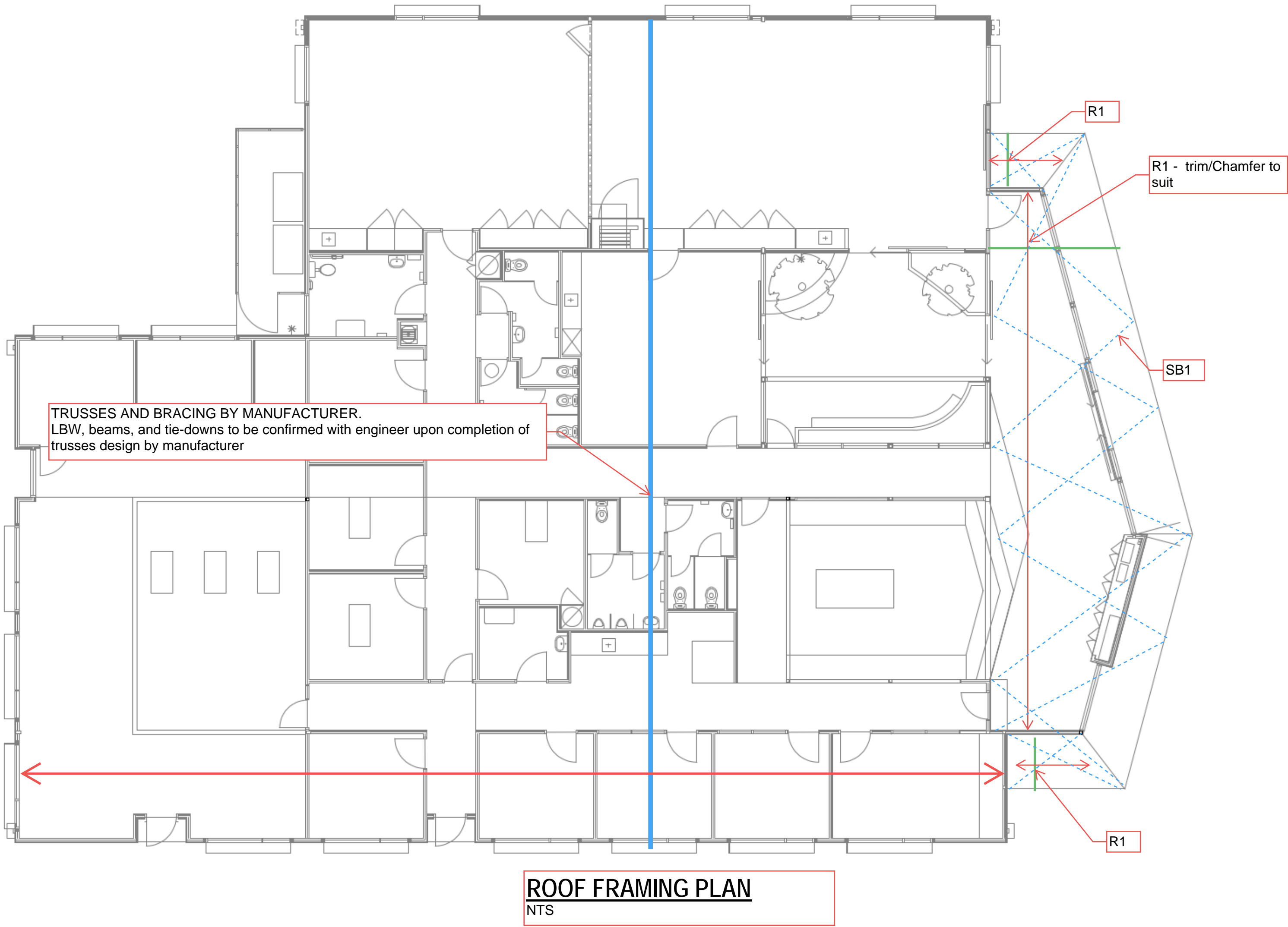
STEEL FRAMING PLAN

NTS

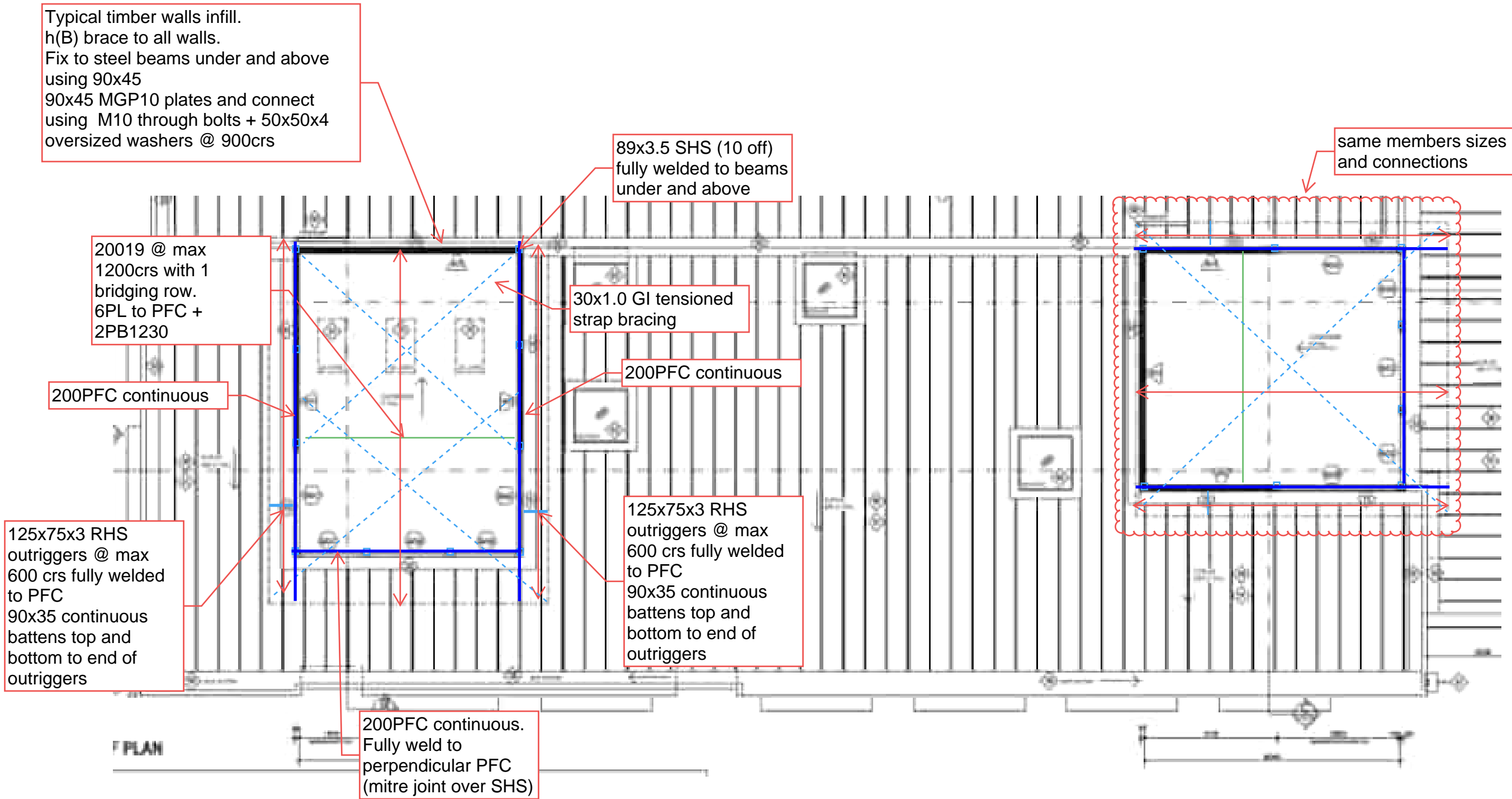
					 <p>PRIMA ENGINEERING EXCELLENCE SUSTAINABILITY INNOVATION</p> <p>mail@primaengineering.com.au</p>	SOUTH-EAST TRAINING FACILITY	ADDRESS: 47 COLE STREET SORELL	STEEL FRAMING PLAN		
0	BUILDING APPROVAL	27/05/2024					CLIENT: SORELL COUNCIL	SCALE: N.T.S.	TOTAL SHEETS:	SIZE: A1
REV	ISSUE	DATE						PROJECT No: 24-C-592	SHEET: S.03	REV: 0

R1 - 290x45 rafters @ max 600crs. MAX 100 notch to allow for gutter.
SB1 - 30x1.0 GI tensioned strap or Speedbrace

- Notes:
- Rafters and purlins to be F17 or LVL eq. (UNO).
 - Provide blocking to all rafters at mid-span and above support (UNO).
 - Provide continuous blocking at end of cantilevers
 - Rafters and purlins to be connected to walls using Pryda Cyclone straps or eq.



					<div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div>PRIMA ENGINEERING</div><div>EXCELLENCE SUSTAINABILITY INNOVATION</div></div> <div>mail@primaengineering.com.au</div>	SOUTH-EAST TRAINING FACILITY	ADDRESS: 47 COLE STREET SORELL	ROOF FRAMING PLAN		
							CLIENT: SORELL COUNCIL	SCALE: N.T.S.	TOTAL SHEETS:	SIZE: A1
0	BUILDING APPROVAL	27/05/2024						PROJECT No: 24-C-592	SHEET: S.04	REV: 0
REV	ISSUE	DATE								

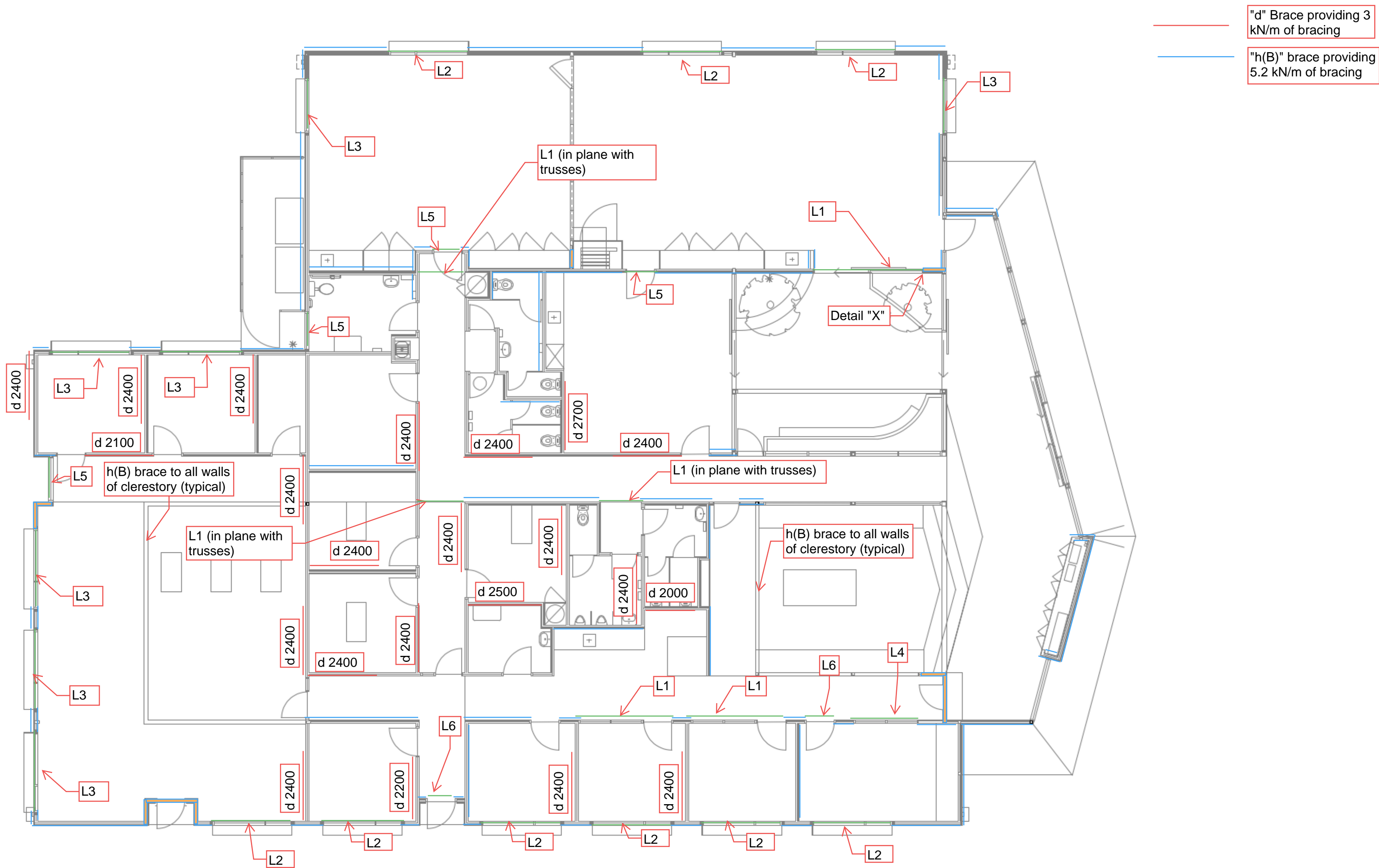


CLERESTORY PLAN
NTS

- L1 - 290x45 F17 or LVL eq. + 1M12 tie-down rod either side (UNO)
- L2 - 240x45 F17 or LVL eq. + 1M12 tie-down rod either side (UNO)
- L3 - 190x45 F17 or LVL eq.
- L4 - 170x45 F17 or LVL eq.
- L5 - 140x45 F17 or LVL eq.
- L6 - 120x45 F17 or LVL eq.

Notes:

- Lintels to be F17 or LVL eq.
- All lintels spanning over 1200 require min double stud either end, UNO.
- All lintels spanning over 1800 require min triple stud either end, UNO
- All lintels spanning over 3000 require 1M12 tie-down rod to slab.
- HOUSE LINTEL AND CARRY THROUGH TO NEXT STUD WHERE POSSIBLE
- All windowsill trimmers to be 2/45x90 F17 UNO



BRACING AND LINTELS PLAN
NTS

					<div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div>PRIMA ENGINEERING</div><div>EXCELLENCE SUSTAINABILITY INNOVATION</div><div>mail@primaengineering.com.au</div></div>	SOUTH-EAST TRAINING FACILITY		ADDRESS: 47 COLE STREET SORELL		BRACING AND LINTELS PLAN		
								CLIENT: SORELL COUNCIL		SCALE: N.T.S.	TOTAL SHEETS:	SIZE: A1
0	BUILDING APPROVAL	27/05/2024						PROJECT No: 24-C-592		SHEET: S.06	REV: 0	
REV	ISSUE	DATE										



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Hobart
HOBART 7000
Ph: 0408 383 235

Date	05/04/2024
Account No.	110
Order No.	SE TRAINING FACILITY & JOBS
Job No./Name	SE TRAINING FACILITY & JOBS
Sales Person	VICKI CURE #15
Supply Branch	Plumbing Mornington (TAS) #7005
Supply Branch Phone	(03) 6245 5010

Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	***** THIS IS A QUOTATION ONLY AND IS NOT A SALE DOCUMENT ***** SOUTH-EAST TRAINING FACILITY AND JOBS HUB FITTINGS & FIXTURES SCHEDULE Contact: Jonathan Blood					
	* Dda Wc 01 *					
	1811016 (EA) Life Assist Care Rimless T/Suite BL (4*) **installed With Wolfen Back Rest Additional	1.00	1642.83	1642.83	164.28	1807.11
	9507171 (EA) Wolfen Back Rest With Fixed Arms Wh/Ss	1.00	423.64	423.64	42.36	466.00
	9501878 (EA) Mobi 1000 X 600 L/H Cnr Grab Rail Sss	1.00	269.09	269.09		269.09
	9501865 (EA) Mobi 32 X 300 Grab Rail Satin S/Steel	1.00	81.45	81.45		81.45
	.					

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Supply Branch Phone	(03) 6245 5010

Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	9512156 (EA) Wolfen Wall Basin 400x365 Nof 1th	1.00	213.64	213.64	21.36	235.00
	2263197 (EA) Mizu Drift Uni 40mm Pop UP P&W Chrome	1.00	39.09	39.09	3.91	43.00
	9511862 (EA) Mizu Drift Sensor Basin Mixer Chr M (6*)	1.00	745.45	745.45	74.55	820.00
	2262546 (EA) Mizu Drift Bottle Trap 40mm Chrome	1.00	160.00	160.00	16.00	176.00
	.					
	2037912 (EA) Mirror Disabled Sss 460mmx990mm W/Vinyl Brushed Satin Finish	1.00	430.72	430.72	43.07	473.79






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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2265876 (EA) Wolfen Single Toilet Roll Holder Bss	1.00	35.45	35.45	3.55	39.00
	2265877 (EA) Wolfen Double Toilet Roll Hldr Brush SS	1.00	72.73	72.73	7.27	80.00
	2265875 (EA) Wolfen Robe Hook Brushed SS	1.00	31.82	31.82	3.18	35.00
	9510049 (EA) Wolfen W/Mount Sensor Soap Dispenser SS	1.00	150.00	150.00	15.00	165.00
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00

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Supply Branch	Plumbing Mornington (TAS) #7005
Supply Branch Phone	(03) 6245 5010

Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2039655 (EA) Wolfen Slimline Hand Dryer S/Less Steel	1.00	650.91	650.91	65.09	716.00
	.					
	* Male Wc 02 *					
	9509511 (KIT) Posh Solus Sqr CC TS S/T Scqrs WH (4*)	2.00	290.00	580.00	58.00	638.00
	.					
	9512157 (EA) Wolfen Wall Basin 500x420 Nof 1th	1.00	273.64	273.64	27.36	301.00
	9508807 (EA) Posh Solus Mk3 Basin Mixer Chrome (4*)	1.00	140.91	140.91	14.09	155.00
	2262546 (EA) Mizu Drift Bottle Trap 40mm Chrome	1.00	160.00	160.00	16.00	176.00

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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2263197 (EA) MIZU DRIFT UNI 40MM POP UP P&W CHROME	1.00	39.09	39.09	3.91	43.00
	.					
	9510049 (EA) Wolfen W/Mount Sensor Soap Dispenser SS	1.00	150.00	150.00	15.00	165.00
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	2039655 (EA) Wolfen Slimline Hand Dryer S/Less Steel	1.00	650.91	650.91	65.09	716.00
	2265139 (EA) Mizu Drift Reversible T/Roll Holder CP	2.00	48.18	96.36	9.64	106.00
	.					
	* Female Toilet 02 *					

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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	9509511 (KIT) Posh Solus Sqr CC TS S/T Scqrs WH (4*)	2.00	290.00	580.00	58.00	638.00
	.					
	9512157 (EA) Wolfen Wall Basin 500x420 Nof 1th	1.00	273.64	273.64	27.36	301.00
	2263197 (EA) MIZU DRIFT UNI 40MM POP UP P&W CHROME	1.00	39.09	39.09	3.91	43.00
	2262546 (EA) Mizu Drift Bottle Trap 40mm Chrome	1.00	160.00	160.00	16.00	176.00
	9508807 (EA) Posh Solus Mk3 Basin Mixer Chrome (4*)	1.00	140.91	140.91	14.09	155.00
	.					

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Supply Branch Phone	(03) 6245 5010

Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	9510049 (EA) Wolfen W/Mount Sensor Soap Dispenser SS	1.00	150.00	150.00	15.00	165.00
	2039655 (EA) Wolfen Slimline Hand Dryer S/Less Steel	1.00	650.91	650.91	65.09	716.00
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	2265139 (EA) Mizu Drift Reversible T/Roll Holder CP	2.00	48.18	96.36	9.64	106.00
	.					
	* Parenting Room *					
	9512157 (EA) Wolfen Wall Basin 500x420 Nof 1th	1.00	273.64	273.64	27.36	301.00

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Supply Branch Phone	(03) 6245 5010

Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2216379 (KIT) Mizu Drift Mk2 Bas MIX W/Ext Lvr CP (5*)	1.00	201.82	201.82	20.18	222.00
	9510049 (EA) Wolfen W/Mount Sensor Soap Dispenser SS	1.00	150.00	150.00	15.00	165.00
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	2039655 (EA) Wolfen Slimline Hand Dryer S/Less Steel	1.00	650.91	650.91	65.09	716.00
	.					
	1850488 (EA) Baby Change Station Rec SS	1.00	2214.30	2214.30	221.43	2435.73

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Job No./Name	SE TRAINING FACILITY & JOBS
Sales Person	VICKI CURE #15
Supply Branch	Plumbing Mornington (TAS) #7005
Supply Branch Phone	(03) 6245 5010

Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2265875 (EA) Wolfen Robe Hook Brushed SS	1.00	31.82	31.82	3.18	35.00
.
.	* Store *
	9506688 (EA) Wolfen #316 Cleaners Sink With Grate SS	1.00	456.36	456.36	45.64	502.00
	9506689 (PR) Wolfen #316 Clnr Sink Wall Bracket S/S	1.00	119.09	119.09	11.91	131.00
	9502278 (KIT) Posh Bristol Wall Sink Set Chrome (4*)	1.00	87.27	87.27	8.73	96.00
.
.	* Male Wc 01 *
	9509511 (KIT) Posh Solus Sqr CC TS S/T Scqrs WH (4*)	1.00	290.00	290.00	29.00	319.00
.

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Order No.	SE TRAINING FACILITY & JOBS
Job No./Name	SE TRAINING FACILITY & JOBS
Sales Person	VICKI CURE #15
Supply Branch	Plumbing Mornington (TAS) #7005
Supply Branch Phone	(03) 6245 5010

Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	9512157 (EA) Wolfen Wall Basin 500x420 Nof 1th	1.00	273.64	273.64	27.36	301.00
	9508807 (EA) Posh Solus Mk3 Basin Mixer Chrome (4*)	1.00	140.91	140.91	14.09	155.00
	2262546 (EA) Mizu Drift Bottle Trap 40mm Chrome	1.00	160.00	160.00	16.00	176.00
	2263197 (EA) Mizu Drift Uni 40mm Pop UP P&W Chrome	1.00	39.09	39.09	3.91	43.00
	.					
	9510049 (EA) Wolfen W/Mount Sensor Soap Dispenser SS	1.00	150.00	150.00	15.00	165.00

Continued Overleaf...

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Quote No. 430505624

LOCI ARCHITECTURE + PLANNING
Hobart
HOBART 7000
Ph: 0408 383 235

Date	05/04/2024
Account No.	110
Order No.	SE TRAINING FACILITY & JOBS
Job No./Name	SE TRAINING FACILITY & JOBS
Sales Person	VICKI CURE #15
Supply Branch	Plumbing Mornington (TAS) #7005
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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	2039655 (EA) Wolfen Slimline Hand Dryer S/Less Steel	1.00	650.91	650.91	65.09	716.00
	2265139 (EA) Mizu Drift Reversible T/Roll Holder CP	1.00	48.18	48.18	4.82	53.00
	9504316 (EA) H/Way Active Sens Urinal 240v 0.8ltr (6*	2.00	1651.82	3303.64	330.36	3634.00
	.					
	* Female Wc 01 *					
	9509511 (KIT) Posh Solus Sqr CC TS S/T Scqrs WH (4*	2.00	290.00	580.00	58.00	638.00
	.					






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	9512157 (EA) Wolfen Wall Basin 500x420 Nof 1th	1.00	273.64	273.64	27.36	301.00
	2263197 (EA) Mizu Drift Uni 40mm Pop UP P&W Chrome	1.00	39.09	39.09	3.91	43.00
	2262546 (EA) Mizu Drift Bottle Trap 40mm Chrome	1.00	160.00	160.00	16.00	176.00
	9508807 (EA) Posh Solus Mk3 Basin Mixer Chrome (4*)	1.00	140.91	140.91	14.09	155.00
	.					
	9510049 (EA) Wolfen W/Mount Sensor Soap Dispenser SS	1.00	150.00	150.00	15.00	165.00






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	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	2039655 (EA) Wolfen Slimline Hand Dryer S/Less Steel	1.00	650.91	650.91	65.09	716.00
	2265139 (EA) Mizu Drift Reversible T/Roll Holder CP	2.00	48.18	96.36	9.64	106.00
	.					
	* Dda Wc 02 *					
	1811016 (EA) Life Assist Care Rimless T/Suite BL (4*) **installed With Wolfen Back Rest Additional	1.00	1642.83	1642.83	164.28	1807.11
	9507171 (EA) Wolfen Back Rest With Fixed Arms Wh/Ss	1.00	423.64	423.64	42.36	466.00






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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	9501878 (EA) Mobi 1000 X 600 L/H Cnr Grab Rail Sss	1.00	269.09	269.09		269.09
	9501865 (EA) Mobi 32 X 300 Grab Rail Satin S/Steel	1.00	81.45	81.45		81.45
	.					
	9512156 (EA) Wolfen Wall Basin 400x365 Nof 1th	1.00	213.64	213.64	21.36	235.00
	- Or -					
	9507794 (KIT) A/Std Studio Wall Basin W/Fix 1th 500 WH	1.00	209.09	209.09	20.91	230.00
	2263197 (EA) Mizu Drift Uni 40mm Pop UP P&W Chrome	1.00	39.09	39.09	3.91	43.00






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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	9511862 (EA) Mizu Drift Sensor Basin Mixer Chr M (6*)	1.00	745.45	745.45	74.55	820.00
	2037912 (EA) Mirror Disabled Sss 460mmx990mm W/Vinyl	1.00	430.72	430.72	43.07	473.79
	.					
	9510049 (EA) Wolfen W/Mount Sensor Soap Dispenser SS	1.00	150.00	150.00	15.00	165.00
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	2039655 (EA) Wolfen Slimline Hand Dryer S/Less Steel	1.00	650.91	650.91	65.09	716.00






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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2265876 (EA) Wolfen Single Toilet Roll Holder Bss	1.00	35.45	35.45	3.55	39.00
	2265877 (EA) Wolfen Double Toilet Roll Hldr Brush SS	1.00	72.73	72.73	7.27	80.00
	2265875 (EA) Wolfen Robe Hook Brushed SS	1.00	31.82	31.82	3.18	35.00
	.					
	* Tea Room *					
	2402704 (EA) Memo Hugo Single Bowl Sink Nth SS	1.00	360.00	360.00	36.00	396.00
	9508811 (EA) Posh Solus Mk3 Std Sink MIX CP (4*)	1.00	150.00	150.00	15.00	165.00

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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	.					
	* Rumpus *					
	2402704 (EA) Memo Hugo Single Bowl Sink Nth SS	1.00	360.00	360.00	36.00	396.00
	9508811 (EA) Posh Solus Mk3 Std Sink MIX CP (4*)	1.00	150.00	150.00	15.00	165.00
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	1.00	147.27	147.27	14.73	162.00
	.					
	* Training Rooms 1 + 2 *					
	2402704 (EA) Memo Hugo Single Bowl Sink Nth SS	2.00	360.00	720.00	72.00	792.00

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Product Image	Product Code and Description	Qty Supplied	Price before GST	Net Price before GST	GST Amount	Total price inc GST
	9508811 (EA) Posh Solus Mk3 Std Sink MIX CP (4*)	2.00	150.00	300.00	30.00	330.00
	2263886 (EA) Wolfen Paper Towel Dispenser S/S	2.00	147.27	294.54	29.45	323.99
	Quote Expiry Date: 30/06/2024					
Delivery instructions, comments, ID.			Net total	29,117.01	2,841.59	31,958.60
			Delivery Fee			
			Refer Above			

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Sales Person	VICKI CURE #15
Supply Branch	Plumbing Mornington (TAS) #7005
Supply Branch Phone	(03) 6245 5010

Document Total	29,117.01	2,841.59	31,958.60
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Conditions of Quotation and Sale

Quote expiry date: 30/06/2024

Deposits and payments

- 50% deposit required at time of order. Full payment required for custom made or custom cut items, Specially Acquired Products (items with product code 101) and orders under \$100.
- Preferred methods of payment are cash, EFTPOS, Mastercard, Visa or Amex.
- Goods are subject to supplier availability.

Delivery

- Goods are to be collected or delivered within 30 days of notification that goods are available to you, unless arranged prior with management.
- Goods not collected within 30 days will require 100% payment.
- Delivery fees apply to all deliveries. In the event you require multiple deliveries, multiple fees will be charged.
- Standard delivery includes one delivery person to ground floor only. Clear access is required. If you have additional requirements, please speak with your Reece representative.

Changes

- Once an order for an item has been placed, a minimum handling fee of 20% applies for changes.

Returns and refunds -- Change of Mind

- Goods must be returned **within 30 days** in their original, unused and undamaged condition, this includes packaging.
- Goods returned are subject to a minimum 20% manufacturers handling fee.
- Goods that are custom made, custom-cut, or are a specially acquired product are non-returnable and non-refundable.

Full Terms and Conditions

- For full terms and conditions please refer to the Reece website <https://www.reece.com.au/terms-and-conditions/>

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Cover Letter | Door Hardware Schedule

30/04/2024 10:47 AM

Project Name: SORELL JOBS HUB BUILDING
Project ID: 91659 (29-04-2024)
Revision Note:
Project Address: 3 Dubs And Co Drive SORELL TAS 7172 AUSTRALIA
Keying System: Lockwood GEN6TX - Serviced Level (New)
Architect Company: LOCI ARCHITECTURE & PLANNING
Architect Project ID:
Consultant: Heath Scott

This schedule is based on the following documentation.

Project Comments: PROJECT FILE : 24NATAG024_91659
FLOOR PLANS : (To be updated)
DOOR SCHEDULE : (To be updated)

All aspects of this Door hardware schedule to be checked against final floor plans and specification prior to the ordering of hardware by hardware supplier / builder.

This door hardware schedule should be considered PRELIMINARY until; Door Numbering, Door and Frame Constructions, Door Swings and Hardware/Locking requirements are confirmed by Architect/Client/Builder.

Environmental Product Declaration - 3772 Mortice Lock
3772SS Mortice Lock Product specified in this project has been independently tested and Environmental Product Declaration (EPD) as per ISO 14025 and EN 15804 is available.

Environmental Product Declaration - 1905/70 Furniture
1905/70SC Door Furniture Product specified in this project has been independently tested and Environmental Product Declaration (EPD) as per ISO 14025 and EN 15804 is available.

Environmental Product Declaration - 2615 Door Closer
2615 Door Closer Product specified in this project has been independently tested and Environmental Product Declaration (EPD) as per ISO 14025 and EN 15804 is available.

Keying System, Generation 6 CK - MK New
A new Lockwood Generation-6 Restricted Construction and Master Keying system has been allowed for in this door hardware schedule. Master keying is included within the Construction Keyed cylinders. Final master key requirements are to be provided by the client prior to ordering cylinders.

Door Closer Surface Install, Non Public View
Where door closers have been scheduled they should generally be mounted to the less visible side of the door.

Door Closer Surface Install, Top Rail Measurement
Where door closers have been scheduled to the push side of an aluminium or timber framed glazed door, a larger top rail (125mm) should be specified to allow proper mounting of the door closer without the need for a drop plate.

Door Grilles, Not Scheduled
Door Grilles have not been allowed for in this door hardware schedule.

Door Seals, Aluminium Frames

Door Hardware Schedule

Project Name: SORELL JOBS HUB BUILDING
Schedule No: 91659

All aluminium frames that have door seal specified will need to have the clip in frame stop removed and a flat pocket filler added.

Door Seals, Frame Preparation

The seals specified to the fire and smoke doors are to be recessed into the frame. The frame manufacturer is to ensure that the doors are prepared for the specified seal.

Door Seals, Leaf Preparation

The seals specified to the fire and smoke doors are to be recessed into the door. The door manufacturer is to ensure that the doors are prepared for the specified seal.

Door Seals, Scheduled

Door seals have been specified as a guide to their location and function only. The Hardware Distributor should confirm seal compatibility (with specified meeting stile, aluminium doors, etc.) and the lengths required.

Hinge Confirmation, Stainless Steel

All Lockwood stainless steel hinges specified in this schedule are manufactured from 304 Grade stainless steel.

Kickplates, Acrovyn, Not Scheduled

Acrovyn kickplates have not been included in this door hardware schedule.

Mortice Lock Install, Aluminium Lock Stile

60mm backset mortice locks have been specified to aluminium glazed doors. The lock stile on these doors should be at least 110mm Minimum Internal Depth Of Stile (Approximately 125mm Overall) when using Aluminium Fabricator mounting kit.

Nib Wall Recommendation

Minimum 65mm nib wall to accommodate size 2-6 strength closer body.

Minimum 45mm head room to accommodate slide rail.

Door stop not to be placed 50% past door width to hinge side.

Signage, Not Scheduled

Signage has not been allowed for in this door hardware schedule.

Track Hardware, Scheduled

Sliding door tracks have been included in this specification. The hardware distributor is to determine the suitability of the track specified prior to ordering.

W.C Breakout, Not Scheduled

Breakout Function By Removal For Amenities Door Has Not Been Allowed For.

Please Confirm Door Swing To Pan Complies With BCA / NCC F2.5 For Acceptable Clearance of 1200mm (Measured in accordance with Figure F2.5) between the closet pan within the sanitary compartment and the doorway.

W.C Partition, Not Scheduled

Toilet partition hardware is to be provided by the toilet partition contractor. Builder to confirm supply.

Spence Doors Door Leaf And Door Frames

For Information on the spence doors and frames specified in this door hardware schedule, Please Contact Spence Doors;

Graham Hynson

(P) +61 2 9771 4511

(E) graham.hynson@assaabloy.com

(W) www.spencedoors.com.au

Door Hardware Schedule

ASSA ABLOY

Opening Solutions

Experience a safer
and more open world

Project Name: SORELL JOBS HUB BUILDING
Schedule No: 91659

Spence Doors, an ASSA ABLOY group company, can provide a full compliant solution for rated and non-rated door and frame requirements excluding aluminium solutions.

ASSA ABLOY Hardware specified within this project is compatible with applicable Spence door applications (at time of production of this documentation).

For questions concerning details of the Spence doors and frames, their specifications, and their utilisation, please contact Spence Doors projectenquiry.spencedoors@assaabloy.com. Alternatively visit www.spencedoors.com.au.

Door Hardware Schedule

ASSA ABLOY

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Project Name: SORELL JOBS HUB BUILDING
Schedule No: 91659

Item	Qty	Description	Brand	Finish
Mark:	D01	To/From Room:	FOYER	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:		
STA-SERIES BI-PART	1	AUTOMATIC SLIDING DOOR OPERATOR	Record Doors	NONE
Mark:	D02	To/From Room:	OPEN OFFICE 02	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2616DASIL	1	2616 SERIES CAM ACTION CLOSER WITH DELAYED ACTION	LOCKWOOD	SIL
2616-104SIL	1	2616 SERIES ANGLED MOUNTING PLATE	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
2616-180SIL	1	2616 SERIES MOUNTING PLATE	LOCKWOOD	SIL
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	
Mark:	D03	To/From Room:	CORRIDOR 04	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2616DASIL	1	2616 SERIES CAM ACTION CLOSER WITH DELAYED ACTION	LOCKWOOD	SIL
2616-104SIL	1	2616 SERIES ANGLED MOUNTING PLATE	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
2616-180SIL	1	2616 SERIES MOUNTING PLATE	LOCKWOOD	SIL
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	

Door Hardware Schedule

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Project Name: SORELL JOBS HUB BUILDING
Schedule No: 91659

Item	Qty	Description	Brand	Finish
Mark: D04	To/From Room:	CORRIDOR 04		
Door Type: GATE		Frame Type: OTHER		
3772X-SS	1	3772 - KEY ENTRY ESCAPE LOCK	LOCKWOOD	
570G6TXX7OEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH X7 CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
GATE HARDWARE	1	HINGES AND LOCKBOX TO BE SUPPLIED BY GATE MANUFACTURER	OTHER	
Mark: D05	To/From Room:	FOYER		
Door Type: ALUMINIUM FRAMED GLAZED		Frame Type:		
SDT	1	REFER ARCHITECTS SPEC	OTHER	NONE
3573AFWTSCLS	1	SLIDING DOOR CYLINDER AND TURN DEADLOCK WITH LATCHING STRIKE - ALUMINIUM FIXING	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
570G6WOEMSC	1	LOCKWOOD GEN6T / GENERATION SIX 570 AUSTRALIAN OVAL CYLINDER WITH W CAM MK	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
146X450SSS	1	146 ENTRANCE HANDLES WITH 450MM CENTRES	LOCKWOOD	SSS
1229/INSC	1	SYMPHONY 1220 SERIES DISABLE TURN ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
ALUM SEALS	1	ALUMINIUM DOOR SEALS TO BE SUPPLIED AND INSTALLED BY OTHERS	OTHER	
Mark: D06	To/From Room:	CORRIDOR 01		
Door Type: ALUMINIUM FRAMED GLAZED		Frame Type: ALUMINIUM		
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2616DASIL	1	2616 SERIES CAM ACTION CLOSER WITH DELAYED ACTION	LOCKWOOD	SIL
2616-104SIL	1	2616 SERIES ANGLED MOUNTING PLATE	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
2616-180SIL	1	2616 SERIES MOUNTING PLATE	LOCKWOOD	SIL
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	

Door Hardware Schedule

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Project Name: SORELL JOBS HUB BUILDING
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Item	Qty	Description	Brand	Finish
Mark:	D07	To/From Room:	RUMPUS	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:		
SDT	1	REFER ARCHITECTS SPEC	OTHER	NONE
3573AFWTSCLS	1	SLIDING DOOR CYLINDER AND TURN DEADLOCK WITH LATCHING STRIKE - ALUMINIUM FIXING	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
570G6WOEMSC	1	LOCKWOOD GEN6T / GENERATION SIX 570 AUSTRALIAN OVAL CYLINDER WITH W CAM MK	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
146X450SSS	1	146 ENTRANCE HANDLES WITH 450MM CENTRES	LOCKWOOD	SSS
1229/INSC	1	SYMPHONY 1220 SERIES DISABLE TURN ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
ALUM SEALS	1	ALUMINIUM DOOR SEALS TO BE SUPPLIED AND INSTALLED BY OTHERS	OTHER	
Mark:	D08	To/From Room:	TRAINING 01	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:		
SDT	1	REFER ARCHITECTS SPEC	OTHER	NONE
3573AFYYLSCNCYLLS	1	DOUBLE CYLINDER SLIDING DOOR DEADLOCK LH NO CYLINDER WITH LATCHING STRIKE - ALUMINIUM FIXING	LOCKWOOD	SC
CUTKEYS-G6	2	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
570G6YOEMSC	2	LOCKWOOD GEN6T / GENERATION SIX 570 AUSTRALIAN OVAL CYLINDER WITH Y CAM MK	LOCKWOOD	SC
1226/ISC	2	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
146X450SSS	1	146 ENTRANCE HANDLES WITH 450MM CENTRES	LOCKWOOD	SSS
ALUM SEALS	1	ALUMINIUM DOOR SEALS TO BE SUPPLIED AND INSTALLED BY OTHERS	OTHER	
Mark:	D09	To/From Room:	FOYER	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	4	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
2616-180SIL	1	2616 SERIES MOUNTING PLATE	LOCKWOOD	SIL
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/0920/S	1	DROP SEAL MORTICE 0920 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	

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Item	Qty	Description	Brand	Finish
Mark:	D10	To/From Room:	FOYER	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
2616-104SIL	1	2616 SERIES ANGLED MOUNTING PLATE	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
2615-180SIL	1	2615 SERIES MOUNTING PLATE	LOCKWOOD	SIL
LAS8001/1220/S	1	DROP SEAL MORTICE 1220 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	
Mark:	D11	To/From Room:	TRAINING 01	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	4	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3774VVSS	1	3774 - ANTI-VANDAL LOCK WITH INTERNAL LOCKING CYLINDER	LOCKWOOD	
570G6TXVOEMSC	2	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	2	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	2	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
2616-104SIL	1	2616 SERIES ANGLED MOUNTING PLATE	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
Mark:	D12	To/From Room:	TRAINING 02	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	4	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
2616-104SIL	1	2616 SERIES ANGLED MOUNTING PLATE	LOCKWOOD	SIL
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL

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Item	Qty	Description	Brand	Finish
Mark:	D13	To/From Room:	DDA TOILET 01	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	4	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3772-TASS	1	3772 - ANTI-LOCKOUT ESCAPE LOCK WITH TURN	LOCKWOOD	
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1228/9PSC	1	SYMPHONY 1220 SERIES PRIV IND EMER TURN AND PRIV IND DTURN ESCUTCH KIT	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
*300MM KICK PLATE	2	300MM X DOOR WIDTH KICKPLATE TO BE SUPPLIED BY OTHERS	OTHER	
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
Mark:	D14	To/From Room:	MALE TOILETS 02	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	3	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
21407NNSS	1	214 EXTERIOR PLATE	LOCKWOOD	SS
21524NN/P2SS	1	215 INTERIOR PLATE & P2 PULL HANDLE	LOCKWOOD	SS
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
*300MM KICK PLATE	1	300MM X DOOR WIDTH KICKPLATE TO BE SUPPLIED BY OTHERS	OTHER	
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
Mark:	D15	To/From Room:	FEMALE TOILETS 02	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	3	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
21407NNSS	1	214 EXTERIOR PLATE	LOCKWOOD	SS
21524NN/P2SS	1	215 INTERIOR PLATE & P2 PULL HANDLE	LOCKWOOD	SS
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
*300MM KICK PLATE	1	300MM X DOOR WIDTH KICKPLATE TO BE SUPPLIED BY OTHERS	OTHER	
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
Mark:	D16	To/From Room:	COMPUTER HUB 01	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	4	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3772X-SS	1	3772 - KEY ENTRY ESCAPE LOCK	LOCKWOOD	
ES2100	1	ES2100 E/STRIKE 12-30VDC M/FUNCTION DOOR MONITORED ⚡	LOCKWOOD	
570G6TXX7OEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH X7 CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
CARD READER	1	T15 CARD READER BY OTHERS	OTHER	

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Item	Qty	Description	Brand	Finish
Mark:	D17	To/From Room:	COMPUTER HUB 02	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	4	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3774XXSS	1	3774 - KEY ENTRY DOUBLE CYLINDER LOCK	LOCKWOOD	
ES2100	1	ES2100 E/STRIKE 12-30VDC M/FUNCTION DOOR MONITORED ⚡	LOCKWOOD	
570G6TX7OEMSC	2	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH X7 CAM MK	LOCKWOOD	SC
CUTKEYS-G6	2	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	2	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
CARD READER	1	T15 CARD READER BY OTHERS	OTHER	
Mark:	D18	To/From Room:	MALE TOILETS 01	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	3	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
21407NNSS	1	214 EXTERIOR PLATE	LOCKWOOD	SS
21524NN/P2SS	1	215 INTERIOR PLATE & P2 PULL HANDLE	LOCKWOOD	SS
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
*300MM KICK PLATE	1	300MM X DOOR WIDTH KICKPLATE TO BE SUPPLIED BY OTHERS	OTHER	
Mark:	D19	To/From Room:	FEMALE TOILETS 01	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	3	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
21407NNSS	1	214 EXTERIOR PLATE	LOCKWOOD	SS
21524NN/P2SS	1	215 INTERIOR PLATE & P2 PULL HANDLE	LOCKWOOD	SS
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
*300MM KICK PLATE	1	300MM X DOOR WIDTH KICKPLATE TO BE SUPPLIED BY OTHERS	OTHER	
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
Mark:	D20	To/From Room:	RUMPUS	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
2615-180SIL	1	2615 SERIES MOUNTING PLATE	LOCKWOOD	SIL
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	

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Item	Qty	Description	Brand	Finish
Mark:	D21	To/From Room:	OPEN OFFICE 01	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	3	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/0920/S	1	DROP SEAL MORTICE 0920 SIL SQUARE END PLATE	LORIENT	SIL
Mark:	D22	To/From Room:	OFFICE 01	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	
Mark:	D23	To/From Room:	OFFICE 02	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	

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Item	Qty	Description	Brand	Finish
Mark:	D24	To/From Room:	OFFICE 03	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	
Mark:	D25	To/From Room:	OFFICE 04	
Door Type:	ALUMINIUM FRAMED GLAZED	Frame Type:	ALUMINIUM	
AH130CAN	5	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	LOCKWOOD	CAN
3772AFKIT01NOCYL	1	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	LOCKWOOD	SC
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
ALUM PERIMETER SEAL	1	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	OTHER	
Mark:	D26	To/From Room:	DDA TOILET 02	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	4	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3772-TASS	1	3772 - ANTI-LOCKOUT ESCAPE LOCK WITH TURN	LOCKWOOD	
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1228/9PSC	1	SYMPHONY 1220 SERIES PRIV IND EMER TURN AND PRIV IND DTURN ESCUTCH KIT	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
2616-153	1	2616 SERIES OPENING DAMPER	LOCKWOOD	
*300MM KICK PLATE	2	300MM X DOOR WIDTH KICKPLATE TO BE SUPPLIED BY OTHERS	OTHER	

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Item	Qty	Description	Brand	Finish
Mark:	D27	To/From Room:	OFFICE 05	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075FPSSS	3	HINGES 100X75X2.5 FIXED PIN SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
Mark:	D28	To/From Room:	MENTORING 01	
Door Type:	SPENCE SOLID CORE WITH VIEWING PANEL	Frame Type:	TIMBER	
LW10075FPSSS	3	HINGES 100X75X2.5 FIXED PIN SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
Mark:	D29	To/From Room:	MENTORING 02	
Door Type:	SPENCE SOLID CORE WITH VIEWING PANEL	Frame Type:	TIMBER	
LW10075FPSSS	3	HINGES 100X75X2.5 FIXED PIN SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL

Door Hardware Schedule

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Item	Qty	Description	Brand	Finish
Mark:	D30	To/From Room:	MENTORING 03	
Door Type:	SPENCE SOLID CORE WITH VIEWING PANEL	Frame Type:	TIMBER	
LW10075FPSSS	3	HINGES 100X75X2.5 FIXED PIN SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
Mark:	D31	To/From Room:	COMPUTER HUB 03	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075BBSSS	4	HINGES 100X75X2.5 BALL BEARING SSS PK=30	LOCKWOOD	SSS
3772X-SS	1	3772 - KEY ENTRY ESCAPE LOCK	LOCKWOOD	
ES2100	1	ES2100 E/STRIKE 12-30VDC M/FUNCTION DOOR MONITORED ⚡	LOCKWOOD	
570G6TXX7OEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH X7 CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
2615DASIL	1	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	LOCKWOOD	SIL
A350SC	1	A350 WALL MOUNTED DOOR STOP TP	LOCKWOOD	SC
CARD READER	1	T15 CARD READER BY OTHERS	OTHER	
Mark:	D32	To/From Room:	OFFICE 06	
Door Type:	SPENCE SOLID CORE	Frame Type:	TIMBER	
LW10075FPSSS	3	HINGES 100X75X2.5 FIXED PIN SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL

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Item	Qty	Description	Brand	Finish
Mark: D33	To/From Room:	OFFICE 07		
Door Type: SPENCE SOLID CORE		Frame Type: TIMBER		
LW10075FPSSS	3	HINGES 100X75X2.5 FIXED PIN SSS PK=30	LOCKWOOD	SSS
3772V-SS	1	3772 - ANTI-VANDAL ESCAPE LOCK	LOCKWOOD	
570G6TXVOEMSC	1	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	LOCKWOOD	SC
CUTKEYS-G6	1	CUT KEYS - GENERATION SIX / GEN6TX	LOCKWOOD	NONE
1220/1221/70SC	1	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	LOCKWOOD	SC
1226/ISC	1	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	LOCKWOOD	SC
A250SC	1	A250 FLOOR MOUNTED DOOR STOP TP	LOCKWOOD	SC
LAS8001/1070/S	1	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	LORIENT	SIL
Mark: D37	To/From Room:	MALE TOILETS 02 (AMBULANT CUBICLE)		
Door Type: LAMINATED TOI PARTITION DOOR		Frame Type: T. PARTITION FRAME		
TOILET PARTITION	1	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	OTHER	
Mark: D38	To/From Room:	MALE TOILETS 02 (STANDARD CUBICLE)		
Door Type: LAMINATED TOI PARTITION DOOR		Frame Type: T. PARTITION FRAME		
TOILET PARTITION	1	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	OTHER	
Mark: D39	To/From Room:	FEMALE TOILETS 02 (STANDARD CUBICLE)		
Door Type: LAMINATED TOI PARTITION DOOR		Frame Type: T. PARTITION FRAME		
TOILET PARTITION	1	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	OTHER	
Mark: D40	To/From Room:	FEMALE TOILETS 02 (AMBULANT CUBICLE)		
Door Type: LAMINATED TOI PARTITION DOOR		Frame Type: T. PARTITION FRAME		
TOILET PARTITION	1	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	OTHER	
Mark: D41	To/From Room:	MALE TOILETS 01 (AMBULANT CUBICLE)		
Door Type: LAMINATED TOI PARTITION DOOR		Frame Type: T. PARTITION FRAME		
TOILET PARTITION	1	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	OTHER	
Mark: D42	To/From Room:	FEMALE TOILETS 01 (STANDARD CUBICLE)		
Door Type: LAMINATED TOI PARTITION DOOR		Frame Type: T. PARTITION FRAME		
TOILET PARTITION	1	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	OTHER	
Mark: D43	To/From Room:	FEMALE TOILETS 01 (AMBULANT CUBICLE)		
Door Type: LAMINATED TOI PARTITION DOOR		Frame Type: T. PARTITION FRAME		
TOILET PARTITION	1	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	OTHER	
Mark: D44	To/From Room:	TRAINING ROOM 01		
Door Type: BI-FOLDING PARTITION		Frame Type: ALUMINIUM		
BI-FOLD DOORS	1	ALL BI-FOLD DOOR HARDWARE TO BE SUPPLIED BY OTHERS	OTHER	

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Brand	Item	Description	Qty	Finish	
LOCKWOOD	AH130CAN	FAST FIX COMMERCIAL ALUMINIUM HINGE CAN	49	CAN	
LOCKWOOD	LW10075BBSSS	HINGES 100X75X2.5 BALL BEARING SSS PK=30	43	SSS	
LOCKWOOD	LW10075FPSSS	HINGES 100X75X2.5 FIXED PIN SSS PK=30	18	SSS	
OTHER	SDT	REFER ARCHITECTS SPEC	3	NONE	
LOCKWOOD	3772AFKIT01NOCYL	SELECTOR LOCK FURNITURE & CYLINDER KIT CYL LEVER/CYL LEVER AL FIXING NO CYLINDER	10	SC	
LOCKWOOD	3772V-SS	3772 - ANTI-VANDAL ESCAPE LOCK	18		
LOCKWOOD	3774XXSS	3774 - KEY ENTRY DOUBLE CYLINDER LOCK	1		
LOCKWOOD	3772X-SS	3772 - KEY ENTRY ESCAPE LOCK	3		
LOCKWOOD	3573AFWTSCLS	SLIDING DOOR CYLINDER AND TURN DEADLOCK WITH LATCHING STRIKE - ALUMINIUM FIXING	2	SC	

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Brand	Item	Description	Qty	Finish	
LOCKWOOD	3774VVSS	3774 - ANTI-VANDAL LOCK WITH INTERNAL LOCKING CYLINDER	1		
LOCKWOOD	3573AFYYLSCNCYLLS	DOUBLE CYLINDER SLIDING DOOR DEADLOCK LH NO CYLINDER WITH LATCHING STRIKE - ALUMINIUM FIXING	1	SC	
LOCKWOOD	3772-TASS	3772 - ANTI-LOCKOUT ESCAPE LOCK WITH TURN	2		
LOCKWOOD	ES2100	ES2100 E/STRIKE 12-30VDC M/FUNCTION DOOR MONITORED	3		
LOCKWOOD	570G6TXVOEMSC	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH V CAM MK	20	SC	
LOCKWOOD	570G6TXX7OEMSC	LOCKWOOD GEN6TX 570 AUSTRALIAN OVAL CYLINDER WITH X7 CAM MK	5	SC	
LOCKWOOD	CUTKEYS-G6	CUT KEYS - GENERATION SIX / GEN6TX	29	NONE	
LOCKWOOD	570G6WOEMSC	LOCKWOOD GEN6T / GENERATION SIX 570 AUSTRALIAN OVAL CYLINDER WITH W CAM MK	2	SC	
LOCKWOOD	570G6YOEMSC	LOCKWOOD GEN6T / GENERATION SIX 570 AUSTRALIAN OVAL CYLINDER WITH Y CAM MK	2	SC	







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Brand	Item	Description	Qty	Finish	
LOCKWOOD	1220/1221/70SC	LOCKWOOD SYMPHONY 70LOCKWOOD SYMPHONY 70 LEVER ON ROUND ROSE FULL SET	24	SC	
LOCKWOOD	1228/9PSC	SYMPHONY 1220 SERIES PRIV IND EMER TURN AND PRIV IND DTURN ESCUTCH KIT	2	SC	
LOCKWOOD	1226/ISC	SYMPHONY 1220 SERIES OVAL CYLINDER ESCUTCHEON - SURFACE FIX	29	SC	
LOCKWOOD	146X450SSS	146 ENTRANCE HANDLES WITH 450MM CENTRES	3	SSS	
LOCKWOOD	1229/INSC	SYMPHONY 1220 SERIES DISABLE TURN ESCUTCHEON - SURFACE FIX	2	SC	
LOCKWOOD	21407NNSS	214 EXTERIOR PLATE	4	SS	




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Brand	Item	Description	Qty	Finish	
LOCKWOOD	21524NN/P2SS	215 INTERIOR PLATE & P2 PULL HANDLE	4	SS	
LOCKWOOD	2615DASIL	2615 SERIES CAM ACTION DOOR CLOSER SIZE 1-5 DELAYED	15	SIL	
LOCKWOOD	2616DASIL	2616 SERIES CAM ACTION CLOSER WITH DELAYED ACTION	3	SIL	
LOCKWOOD	2616-104SIL	2616 SERIES ANGLED MOUNTING PLATE	6	SIL	
LOCKWOOD	2616-153	2616 SERIES OPENING DAMPER	8		
LOCKWOOD	2616-180SIL	2616 SERIES MOUNTING PLATE	4	SIL	

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Brand	Item	Description	Qty	Finish
LOCKWOOD	2615-180SIL	2615 SERIES MOUNTING PLATE	2	SIL
				
OTHER	*300MM KICK PLATE	300MM X DOOR WIDTH KICKPLATE TO BE SUPPLIED BY OTHERS	8	
LOCKWOOD	A250SC	A250 FLOOR MOUNTED DOOR STOP TP	9	SC
				
LOCKWOOD	A350SC	A350 WALL MOUNTED DOOR STOP TP	10	SC
				
Record Doors	STA-SERIES BI-PART	AUTOMATIC SLIDING DOOR OPERATOR	1	NONE
LORIENT	LAS8001/1070/S	DROP SEAL MORTICE 1070 SIL SQUARE END PLATE	16	SIL
LORIENT	LAS8001/0920/S	DROP SEAL MORTICE 0920 SIL SQUARE END PLATE	2	SIL
LORIENT	LAS8001/1220/S	DROP SEAL MORTICE 1220 SIL SQUARE END PLATE	1	SIL
OTHER	CARD READER	T15 CARD READER BY OTHERS	3	
OTHER	ALUM PERIMETER SEAL	ALUMINIUM FRAME PERIMETER SEAL SUPPLIED AND INSTALLED BY FABRICATOR	10	
OTHER	ALUM SEALS	ALUMINIUM DOOR SEALS TO BE SUPPLIED AND INSTALLED BY OTHERS	3	
OTHER	BI-FOLD DOORS	ALL BI-FOLD DOOR HARDWARE TO BE SUPPLIED BY OTHERS	1	
OTHER	GATE HARDWARE	HINGES AND LOCKBOX TO BE SUPPLIED BY GATE MANUFACTURER	1	
OTHER	TOILET PARTITION	HARDWARE TO BE SUPPLIED BY TOILET PARTITIONER	7	

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ENVIRONMENTAL PRODUCT DECLARATION as per ISO 14025 and EN 15804

Owner of the Declaration	ASSA ABLOY Australia Pty Ltd	
Programme holder	Institute Bauen und Umwelt e.V. (IBU)	
Publisher	Institute Bauen und Umwelt e.V. (IBU)	
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ASSA ABLOY Australia Pty Ltd

Single-point locks - Lockwood 3772SS Commercial Mortice Lock

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ENVIRONMENTAL PRODUCT DECLARATION as per ISO 14025 and EN 15804

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Programme holder	Institute Bauen und Umwelt e.V. (IBU)	
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ASSA ABLOY Australia Pty Ltd

Lockwood DC 2615

For more information please visit www.lockweb.com.au



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ENGINEERING
SOLUTIONS
TASMANIA

SORELL JOBS HUB - 23369
ELECTRICAL SPECIFICATION – REV T1

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SORELL JOBS HUB**0901 ELECTRICAL SYSTEMS**

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide the electrical services as documented.

The Works shall comprise the design, supply, installation, testing, commissioning, maintenance, and servicing of the electrical services installation as depicted and specified herein. Works shall include the provision of all minor and incidental work, materials or fittings which are obviously necessary for the satisfactory and efficient functioning of the installation, or which are generally provided in accordance with accepted trade practices, regardless of such material or work may not being explicitly depicted, scheduled or mentioned in this Specification.

This specification and drawings **MUST** be read in conjunction associated documents including but not limited to...

- **ARCHITECTURAL LAYOUTS AND ELEVATIONS.**
- **ELECTRICAL SERVICES LAYOUTS, SCHEDULES & SCHEMATICS**

Where conflict arises between these specification and drawings advice **MUST** be sought and approved from the building superintendent prior to works being carried out.

The drawings and this specification identify the overall and general system design concepts, design considerations, standards of performance, and quality required. These do not necessarily identify related problem areas or their solutions, which shall be the responsibility of the Contractor.

The Scope of works shall include but not be limited to the following:

1.2 DEMOLITION

The contractor shall perform the following...

- Testing, isolation and making safe electrical services in support of the building program.
- Minor works made necessary by building works or demolition, including making good and reconnection of retained electrical systems or making good minor damage.
- Provision of temporary support structures and mechanical protection for temporary cabling systems where affixed to building features during construction.
- The removal of redundant wiring, components, and accessories from site if any.

The electrical contractor shall liaise with the principal and client during all demolition works to ascertain which electrical systems or accessories are to be retained.

1.3 TEMPORARY CONSTRUCTION POWER & LIGHTING

Contractor to provide construction power and lighting during all stages of the construction project. All construction site electrical installations shall comply with AS/NZS 3012:2019.

- Where directed, provide temporary construction lighting to facilitate the works programme and enable safe movement within the site.
- Where directed, provide temporary construction exit & emergency lighting as per AS2293.1 and AS/NZS 3012:2019.
- Where directed, provide temporary distribution boards including socket outlets for charging battery tools and the connection of extension cords.
 - Boards shall provide a minimum of 12x 10-amp socket outlets and 2x 15-amp socket outlets.
 - Boards shall be located throughout the site at need. Ensure that power can be made available to all areas of work without joining extension cords or running extension cords between areas.
- Provide and maintain electrical services to trade amenities such as toilets, lunchrooms AND a site office.
- Provide testing and verification of all temporary construction electrical services and equipment. Maintain records of such testing on site and make them available on request.

1.4 SITE POWER SUPPLY.

- Site power supply, including the MSB shall be released as a separate tender package.

1.5 SWITCHBOARDS

General

The contractor shall...

- Liaise with the superintendent and associated trades to develop final locations ensuring access, compliance, and usability.
- Provide full shop drawings, surge protection, cascading and discrimination and arc flash assessment report for approval prior to placing orders. Include critical information such as form, IP ratings and projected fault levels.
- Submit component data for proprietary distribution boards, enclosures, equipment, or accessories for approval prior to placing orders.
- Confirm the final location of all new switchboards in consultation with the principal contractor and architect. Submit details of all cable routes, cable supports, penetrations and fire stopping for approval prior to roughing out.
- Provide cable access, support, covers and flashings for new or revised cable pathways serving all new or modified distribution boards.
- Provide an integrated exit and emergency test facility integral to any new distribution board that supplies exit and emergency lighting. Ensure that all exit and emergency lighting is subject to testing facilities in accordance with AS2293.

- Provide an integrated external lighting control facility to any new distribution board that supplies external lighting where other control methods, equipment or schema are not otherwise depicted. Allow to connect external lighting via this facility and programme / configure to client and site requirements.
- Provide an integrated internal lighting control facility to any new distribution board that supplies internal lighting where an access control or security system signals occupancy for the purpose of energy efficiency or building services control. Allow to connect internal lighting via this facility and programme / configure to client and site requirements.
- Provide an integrated Exit & Emergency Lighting Facility to any new distribution board that supplies exit or emergency lighting.
- Where required by Australian Standards, ensure that new distribution boards, or their surrounding cupboard feature smoke seals.
- On completion, provide new laminated circuit schedules and an A3 laminated site drawing depicting distribution details such as sub main sizes and interconnections, ratings, installation method. Handwritten schedules are not acceptable.
- Provide Laminated A3 AUTOCAD drawing showing all outlets and circuit numbers. Locate a copy of this drawing within each switchboard cupboard. Provide updated single line drawings, laminated and attached to all new DB's.

Distribution Boards DB-1 – DB-4

Provide wall mounted, check metered distribution boards as depicted.

- Laise with the superintendent to confirm finishes, clearances, access and final location.
- All distribution boards shall feature submains of the following size.
 - 4x 1C Tricab XL series 50mm SDI Flex (AL) & 1x 10mm Earth (CU)
 - Install on perforated tray, spacing to 1D.

1.6 COMMUNICATIONS

Data Distribution Services.

- Provide a new 72 core, optical fibre link between the Sorell Council Main data rack and the proposed CC-1 Data rack.
- Provide underground services including NBN lead in, fibre distribution and pits.
- Laise with the client's nominated IT representative and confirm rack allocations, cable and termination types and access arrangements prior to start.
 - The contractor shall ensure full compatibility of the installation with the council's existing / retained systems.
- Provide all fibre terminations, cable support systems, cabling, patch leads and accessories required for a fully functional communications link.

Structured Cabling Systems.

The contractor shall provide a complete communications CAT 6A cabling system and backbone as depicted.

- Provision of all data outlets, cabling, patching and installation works required to install and commission functional communications system as depicted.

- Route data outlets and WAP cabling to the relevant tenancy cabinet. Confirm allocations on site.
- Provide all cable trays, supports, pathways, mechanical protection and accessories required to complete the installation.
- Provide data outlets for designated Wireless Access Point locations.
 - Each outlet shall comprise 2 off Cat 6A data outlets flush mounted on a common 2 Gang plate, flush to the ceiling.
 - The final locations to be confirmed on site.
 - Install client supplied Wireless Access Points to a provided WAP outlet where directed.
- Supply of all Patch and Fly leads as outlined in the Communications section of this specification.
- Submit component data and warranty information for approval prior to placing orders.

Data Rack CC-1

Racks shall all be a 42RU freestanding data rack.

- The contactor shall liaise with clients nominated I.T. manager for delivery, rack population, layout and final location / orientation.
- Active components, including a UPS, shall be supplied by the client. (This excludes security, access control, PA and CCTV systems).
- Rack CC-1 shall feature reserved patch panel/s for building services. All outlets associated with CCTV, security, access control, and electrical services shall be installed on a separate , common patch panel within the rack to those used for general data and feature distinct patch lead colouring. Label the patch panel "Building Services".
- To each rack, install 2 off 10-way power distributor rails, one mounted rear left and the other rear right.
 - Rail 1 shall be supplied from the depicted 15A captive socket outlet mounted adjacent the rack.
 - Rail 2 shall be supplied from Rail 1, via a rack mounted UPS in the rack lower portion.
- Provide Cat 6A patch panels as required to meet the requirements of the project.
 - Subject to compatibility with the provided rack, utilise 24 port fully loaded Cat 6A patch panels.
- Provide 1 horizontal cable management module per 2 installed patch panels or reserved locations for switches.
- Allow to install client supplied accessories within the racks as directed by the client's IT representative.
- Provide additional mounting hardware, shelving or accessories where required.
- Provide a new Protective Earth with CET to all racks.
- Provide all cable supports, trays, cable management and hardware to complete the installation. Provide shop drawings and component data for approval prior to placing orders or proceeding.
- Provide patch leads and outlet leads for...
 - All building service outlets utilised at the time of handover. Include security, access control, CCTV and building control.
 - All data outlets at a ratio of 1 patch lead and 1 field lead for every 2 outlets installed.

- Colours and sizes for the various services are to be by client approval.

1.7 LIGHTING

- Provide site internal and external lighting as depicted.
- Provide all new luminaires, switches, motion sensing and control systems required to complete the installation.
- All external lighting is to be controlled via PE cell and time clock. Note Curfew and Non Curfew circuits.
- Install a new PE cell in a location to be confirmed. Connect to the DB-1 Distribution Board External Lighting Control Facility.
- Where not controlled by motion sensors, internal lighting shall be subject to a master off facility, controlled by building/area occupancy. An armed status signal from the security system shall be utilised. All designated internal lighting within the building shall turn OFF 2 minutes after all areas are armed and allow only the all lights to be turned ON instantly on any area disarm.
- Note that emergency lighting and internal security lighting is exempt from this requirement.
- Nominated areas shall feature dimming as depicted. Where dimming is specified, ensure correct dimming and switching types are utilised.
 - Combined Push Twist or Momentary push button actions are preferred.
 - All dimmers shall recall the last setting on turn on.
- Contractor is to refer to electrical and architectural reflected ceiling plans to ensure the exact required mountings, hardware and accessories are supplied and installed to suit each luminaire type.
- ALL locations and co-ordination of the lighting is to be confirmed onsite with architectural reflected ceiling plans.
- All final locations shall be approved prior to works by the architect.
 - All suspension heights are to be finalised with the architect onsite.
 - Any lighting relocation costs from failure to comply with this direction shall be borne by the contractor.

1.8 FIRE DETECTION AND ALARM SYSTEM

Provide a new, brigade connected, AS1670 compliant fire alarm system.

- Include all new smoke and thermal detection, sounders, strobes and accessories.
- Interface the fire alarm to the proposed access control system.
 - Coordinate with associated trades (door hardware and security installer) to provide fail safe release of nominated Emergency Release Latches (ERLSs) and automatic doors only where required.
- Ensure all concealed detection (ceiling) is accessible for ongoing testing and maintenance.
 - Provide FAMCO brackets where other ceiling access is impractical and coordinate with the principal contractor on site.
- Include 15 additional smoke or thermal detectors and 5 sounders / sounder bases within the tender.
- Contractor to supply Shop drawings for approval and as installed drawings upon completion.

- Liaise with Tas Fire Service throughout the duration of the works for any zone isolations, false alarms and inspections, and cover all costs. Contractor to ensure full compliance with AS1670 and Tas Fire Service installation guidelines.
- Contractor to submit all component data and layouts for approval prior to placing orders or proceeding.

1.9 EMERGENCY LIGHTING

- Supply, Install and Commission a complete Exit and Emergency Lighting system as depicted.
- Ensure all Exit and Emergency lights are subject to testing facilities in accordance with AS2293.
- Provide a new Exit and Emergency Lighting Maintenance Logbook.
- Provide a schematic layout and number referencing guide that incorporates all emergency fittings on site. Undertake commissioning tests and record the results as the first series in the new logbook.
- Make commissioning test results available in as installed documentation and on request.

1.10 SECURITY, ACCESS CONTROL SYSTEMS & CCTV

Note that Security, CCTV and Access Control systems specified within this project will form part of an organisational security solution. All works shall be compatible with planned upgrades to council facilities. Consultation with the specifying engineer and clients preferred Security & Access Control supplier shall be undertaken to ensure that technical and other client requirements are met.

Provide a new Access Control System as depicted.

Engage the client's nominated provider to supply, fit off, programme, commission and hand over the new Access Control System.

- Provide all Cat 6A data outlets for Controllers.
- Provide 240v dual socket outlets adjacent Controllers.
- Provide all fixed wiring serving Door Controllers, and hard-wired access-controlled doors. Note that access controlled automatic doors require an option card facility, supplied by others. Coordinate with the client's nominated Security & Access Control provider prior to start.
- All door hardware, including mortice locks, are supplied by the builder. Allow transfer spring or hinges as needed.
- Provide 50 pre programmed access cards for immediate issue.

Provide a new site Security System as depicted.

- Coordinate with client's nominated Access Control and Security provider to ensure integration between Access Control & Security Systems where required.
- Provide all Cat 6A data outlets for Controllers.
- Provide 240v dual socket outlets adjacent Controllers.
- Supply, install and commission all required hardware, wiring and accessories to complete the installation.
- Program the system to meet client and site requirements.
- Provide low level interfaces to lighting control as depicted, including cables and isolation relays where required. (Internal lighting master off)
- Provide low level interfaces to mechanical services including cables and isolation relays where required. (Mech Services Master Off, Exhaust Systems Master Off).
- Provide all programming based on client requirements and commissioning.
- Provide client training at handover of works.

Provide alterations and additions to the site CCTV system.

- For each camera location depicted, provide a single CAT6A data outlet from data cabinet CC-1. Cameras will connect to the organisations existing CCTV server via the new CAT6A structured cabling installation.
- Allow to mount and connect client supplied cameras to each wired location.
- Provide all assistance to the client in connecting, adjusting, commissioning each camera.
- NVR's, licences, POE switches and accessories shall be by the client.

1.11 MECHANICAL SERVICES

- Electrical Contractor is to liaise with mechanical services contractor and builder to co-ordinate access and scheduling for the duration of the works.
- The contractor shall provide power supply circuits only, up to and including final sub circuit isolation devices. Mechanical Services contractors are responsible for all work beyond the output terminals of such devices.
- Provide protective devices within Db-s only (ie Power Supplies) only for internal AC units, fans and the like.
- Confirm all ratings and types on site and in conjunction with associated trades.

1.12 HYDRAULIC SERVICES

- The Electrical Contractor shall liaise with the hydraulic services contractor and builder to co-ordinate access and scheduling for the duration of the works.
- Electrical contractor is to provide electrical supplies and connections for all hydraulic services, including supplies, final sub circuits, local isolators and final connections. Refer to the hydraulic drawings.
- Confirm all ratings and types on site and in conjunction with associated trades.

Such services include but are not limited to...

- Hot Water Cylinders.

1.13 EARTHQUAKE LOADS – SEISMIC RESTRAINT

The Contractor is to ensure all equipment is seismically restrained and design in accordance with AS1170.4.

- | | |
|-------------------------------|------------------------------------|
| - Importance Level: | 3 (Education facility >250 people) |
| - Probability factor: | TBA |
| - Sub Soil Class: | TBA |
| - Hazard Design Factor (kpZ): | TBA |
| - Earthquake Design Category: | TBA |

1.14 GENERAL

It is the contractor's responsibility to meet the design intent and the requirements of AS/NZS 3000. All works to comply with AS3000:2018 and TasNetworks Services Installation Guide.

The contractor shall:

- Allow time and suitably qualified personal to liaise with and confirm any instructions from the client and the superintendent, including any additional requirements for health and safety, prior to commencing any works.
- The location and height of all outlets shall be confirmed on site prior to installation. The contractor shall allow to install all outlets within 1 meter of the location shown on the electrical drawings and refer to Architectural elevations.
- Fully test and document the entire installation, including retained portions of existing electrical installation.
- Where power and communications shutdowns may affect or disrupt the works program or Pharmacy, the contractor **MUST** provide a minimum of **10 working days'** notice to the principal contractor and the Superintendent in writing prior to any works can be carried out.
- Provide new site infrastructure cabling including electrical pits, conduits, cables etc. for a complete operational system as depicted. Installation of all cable trays, catenary wires, cable supports, floor ducting, cable ways and accessories to complete the installation and maintain segregation between electrical, fire, data cabling and between other wiring systems.
- All new sub mains and final sub circuits, controls or incidentals.
- All communications cabling is to be run on new cable trays or catenaries.
- The Contractor shall note.
 - Cable tray routes are subject to change.
 - Develop locations and routes on site and in conjunction with associated trades and with the superintendent's approval.
- Supply and install new socket-outlets, electrical accessories, luminaires, wiring, support systems, final sub circuits, sub mains and miscellaneous accessories to complete the installation.
- Liaison with mechanical, hydraulic and building trades for the duration of works. Ensure co-ordination of the electrical services installation with the project schedule. Any failure to comply, which results in an increase in the project cost to rectify aborted work, shall be considered the responsibility of the electrical contractor who then shall pay such additional costs.
- All labelling (Power, Data/comm's, racks, security etc.) is to be *Engraved 'Treffolyte' labels ONLY* to match the items that are being labelled – i.e. white outlet surround to be Black on white background or Stainless steel door pushbuttons to be Black on silver background, Fire to be White on red background etc.

Stick on printed labelling such as Dyno labelling is not acceptable and will be considered a defect to the project and replaced at contractor expense.

- All Cabling and Conduits to be fully concealed under no circumstance shall conduits be exposed unless specifically identified on the electrical drawings.
- Provide approved fire stopping between all fire rated walls and floors where cables penetrate.
- Refer to Architectural drawings, schedules, and sections.
- Provision of component data and shop drawings prior to undertaking site works. These drawings are to include, but not be limited to.
 - Switchboard shop drawings including external dimensions, coordinated entries and door swing detail referenced to architectural drawings.

- All cable tray / ladder, flashings or covers including finish and dimensions.
- Data Systems Component Data.
- Provision of as installed manuals, component data, testing results, maintenance procedures and contact details in pdf format. The manuals shall be provided to the building superintendent for approval prior to handover of the total project. Electronic copy of Services drawings in AutoCAD 2020 Format is available from Engineering Solutions Tasmania for the purpose of as installed drawings.
- *The above scope is a guide only and certain items may have been omitted. It shall be the responsibility of the electrical contractor to meet the intent of the specification and drawings. Any discrepancies, or apparent omissions, in the documentation shall be raised for clarification during the tender period and formally qualified in the tender submission.*

Performance

Requirement: 400 V, 3-phase, 4-wire, 50 Hz multiple earth neutral (MEN) system.

Performance criteria: Meet the performance criteria, as documented.

Fault level protection: To withstand the prospective fault level of the incoming supply at the equipment location.

Site electricity supply

Responsibilities: Provide site electricity supplies as documented. Connect project electrical facilities to the network distributor's external site electricity supply.

High voltage supplies

Network distributor's protection devices: Determine the protection equipment type and protection curves for overload, short-circuit and earth fault currents.

Prospective fault current: Determine the high voltage prospective fault current.

High voltage network: To AS/NZS 3000 (2018), the network distributor's requirements and the supply authority Service and Installation rules.

High voltage protection: Provide high voltage short-circuit and overload protection for incoming main switches, ring main feeders, spur feeders and incoming supplies to transformers.

High voltage protection devices: Either switch fuse or circuit breaker type devices. Include full discrimination and cascade protection and grade with the network distributor's incoming supply protection system and the downstream site protection devices.

Protection report: Prepare a fault and protection report detailing the location and size of transformers, location and type of protection equipment, cable sizes and type, over-current and earth-fault current curves coordinated with upstream protection devices including the network distributor protection equipment curves and cable I²t curves.

Low voltage supplies

Low voltage transformer output supply: To AS/NZS 3000 (2018) and the network distributor's requirements.

Low voltage protection: Provide low voltage short-circuit and overload protection at the transformer secondary supply using fault current limiting circuit breakers with adjustable overload and short-circuit current setting features. Alternatively, if approved by the network distributor, where no secondary output protection is provided, provide appropriate sized high voltage protection on the incoming supply to transformers.

Low voltage circuit breakers: Include full discrimination and cascade protection and grade with the incoming transformer supply protection system and the downstream site protection devices.

Switchboards

Responsibilities: Provide main switchboard(s) and local distribution boards as documented and to the requirements of the following worksections:

- 0941 Switchboards - proprietary.
- 0942 Switchboards - custom-built.

Electrical protection equipment: Include all necessary electrical protection equipment, electrical components and the local network distributor's tariff metering equipment to the requirements of 0943 Switchboard components.

Large switchboards: Manufacture switchboards of module sizes to allow access and manoeuvrability through the project site and into switchrooms.

Overload and fault protection on all submains: Provide circuit breaker protection equipment coordinated to allow cascade and discrimination protection between upstream and downstream cable protection devices to AS/NZS 3000 (2018).

Electricity distributor's low voltage service protective device: To AS/NZS 3000 (2018), the network distributor's requirements and the supply authority Service and Installation rules.

Service protective devices > 100 A: Provide fault current limiting circuit breakers with adjustable overload and short-circuit current facilities and full discrimination and cascade protection between the incoming supply protection systems and the downstream protection systems, if required.

Electrical cable systems

Responsibilities: Provide the following cabling systems:

- Power cables: Provide cable systems as documented and to the requirements of *0921 Low voltage power systems*.
- Communications cables: Provide cable systems as documented and to the requirements of Australian Communications and Media Authority (ACMA) and *0961 Information and communications technology (ICT) systems*.

Communications and sound systems: Provide separate cable systems. Do not use any part of the power system cable support systems.

Lighting

Responsibilities: Provide lighting systems as documented and to the requirements of the following worksections:

- *0951 Lighting*.
- *0971 Emergency evacuation lighting*.

Proprietary equipment: If proprietary equipment is selected by the contractor, the requirements of this specification override the specifications inherent in the selection of a particular make and model of accessory.

Communications systems

Responsibilities: Provide communication systems as documented and to the requirements of *0961 Information and communications technology (ICT) systems*.

Security systems

Responsibilities: Provide security systems as documented and to the requirements of *0981 Electronic security*.

1.15 DESIGN

General

Requirement: To DESIGN in *0171 General requirements*.

Design for durability and maintainability

Design for durability: Develop the design so the systems achieve the documented performance, reliability, service life, energy efficiency and safety requirements, and are easily maintainable.

Access for maintenance: Develop the design so the systems conform to **ACCESS FOR MAINTENANCE** in *0171 General requirements*.

Operating environment

Requirement: Provide equipment suitable for the environment in which it operates and as documented.

Energy efficiency

Requirement: To BCA (2022) J7 and BCA (2022) J9.

Seismic restraint

Requirement: To **SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS** in *0171 General requirements*.

1.16 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0201 Demolition*.

- 0921 Low voltage power systems.
- 0941 Switchboards - proprietary.
- 0942 Switchboards - custom-built.
- 0951 Lighting.
- 0961 Information and communications technology (ICT) systems
- 0971 Emergency evacuation lighting.
- 0981 Electronic security.
- 0991 Electrical maintenance.

1.17 REFERENCED DOCUMENTS

General

Requirement: Conform to 0171 General requirements.

1.18 STANDARDS

Electrical services

Requirement: To AS/NZS 3000 (2018).

Electrical installations

Electrical design: To AS/NZS 3000 (2018).

Selection of cables: To AS/NZS 3008.1.1 (2017).

Degrees of protection (IP code): To AS 60529 (2004).

Electromagnetic compatibility (EMC): To the AS/NZS 61000 series.

Machinery noise and vibration: Vibration severity in Zone A to ISO 20816-1 (2016) and ISO 20816-3 (2022).

Communications systems: To AS/CA S008 (2020), AS/CA S009 (2020), AS 11801.1 (2019) and AS/NZS 14763.2 (2020).

1.19 CONTRACT DOCUMENTS

General

Requirement: Conform to 0171 General requirements.

1.20 SUBMISSIONS

General

Requirement: Conform to 0171 General requirements.

Baseline data

Requirement: Submit baseline data to **BASELINE DATA** in 0171 General requirements.

Calculations

Requirement: Submit calculations, as documented.

Certification

Plant and equipment - proposed: Submit certification that the plant and equipment proposed meet the requirements and capacities documented. If proposed plant and equipment departs from performance or other requirements documented, submit details to **SUBSTITUTIONS** in 0171 General requirements.

Plant and equipment - installed: Submit certification that each plant and equipment installation is operating correctly.

Existing systems

Shutdowns: Submit detailed proposed shutdowns schedule, including the date and time of shutdowns, details of proposed work and affected systems and locations, to **WORK ON EXISTING SYSTEMS**.

Existing condition: Submit proposals to rectify deficiencies if the existing condition does not conform to the documented requirements.

Operation and maintenance manuals

Requirement: Conform to **OPERATION AND MAINTENANCE MANUALS** in 0171 General requirements.

Products and materials

Data: Submit technical data for all items of plant and equipment, including the following:

- Assumptions.

- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.
- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of conformance to the applicable code or standard.
- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.
- Type test reports.
- Single line diagram(s), including fault levels at switchboards, cable size and type.
- Switchboard layouts.

Shop drawings

Requirement: To **SHOP DRAWINGS** in *0171 General requirements*. Submit detail drawings at minimum 1:100 scale, showing the following as applicable:

- Switchboard layout, equipment details and labelling.
- Mechanical motor control board layout, equipment details and labelling.
- Layouts of control panels including control functions logic diagram, wiring diagram, proposed terminology and labelling.
- Control system schematics with wire/ terminal identification.
- Control sensor and control device layouts.
- Control cable routes, cable sizes and types of cable, cable identification labelling.
- Wiring diagrams.
- Cable ladder and tray routes.
- Concealed conduit locations with interconnections.
- Cable riser layouts, take-offs and sections.
- Plant room layouts detailing electrical equipment.
- Connections to other services.
- Penetrations and associated building work. If penetrations are through external walls, detail flashing and weatherproofing at 1:10 scale.
- Reflected ceiling plan layouts showing lighting, emergency lighting, emergency warning system equipment, fire detection equipment and HVAC outlets.
- Power and communication system layout.
- Fire detection system layout.
- Security system layout.
- External services layouts including underground cable routes and pit locations, underground communications cable routes and pit locations.
- Lightning protection system layout.
- Submission drawings required by authorities.

1.21 INSPECTION

General

Requirement: Conform to *0171 General requirements*.

Notice

Inspection: Give notice so that inspection may be made of the following:

- Cabling rough in and building fabric close out.
- Site Electrical Testing.
- Hand Over.

2 PRODUCTS

2.1 ELECTRICAL ACCESSORIES

General

Requirement: Provide accessories, as documented.

Proprietary equipment: If proprietary equipment is selected by the contractor, the requirements of this specification override the specifications inherent in the selection of a particular make and model of accessory.

Uniformity: Provide all accessories and outlets located in close proximity of the same manufacture, size, finish and material.

Default finish: Select from the manufacturers' standard range.

3 EXECUTION

3.1 WORK ON EXISTING SYSTEMS

Equipment removal

General: Decommission, isolate, demolish and remove from the site all existing redundant equipment including minor associated components that become redundant as a result of the demolition.

Breaking down: Disassemble or cut up equipment if necessary to allow removal.

Recovered items

Requirement: To *0201 Demolition*.

Recovered materials: Recover all components associated with the items documented for recovery.

Minimise damage during removal and deliver to the locations documented.

Existing electrical systems

Condition of existing systems:

- If the existing condition does not conform to the documented requirements in the contract documents, provide proposals to rectify the deficiencies with related costing, time and other impacts.
- Subject to the rectification works on existing systems, achieve the performance in the contract documents.

Work on live electrical installations: Conform to WHS regulations.

Shutdowns

Requirement: Carry out shutdowns at scheduled times. Keep shutdown times to a minimum. In no case exceed documented or scheduled times.

Completion of shutdowns: Return systems to normal operation at the end of shutdowns.

Services in existing buildings

Existing ceilings: If the existing ceilings are to be retained, take care when installing new services.

Existing building: Survey the available space and ascertain the optimum services runs based on the existing floor joist layout and services layouts. Provide all bends, droppers and other items necessary to complete the installation, as documented.

3.2 INSTALLATION

Switchboards

Wall mounted switchboards: Fix direct to masonry or concrete walls, or to the wall framing of framed wall construction, using suitable fasteners.

Floor/wall mounted switchboards: Fix to floor plinths and direct to masonry or concrete walls, or to the wall framing of framed wall constructions, using suitable fasteners.

Floor mounted island switchboards: Fix to floor plinths, using suitable fasteners able to withstand seismic events nominated in the project documentation.

Wall and floor/wall mounted switchboards in seismic sensitive projects: Fix only to building structural elements or to steel framing fixed to structural elements, using suitable fasteners. Do not fix to masonry infill panels.

3.3 SUPPORT OF PLANT AND EQUIPMENT

General

Requirement: To **SUPPORT OF PLANT AND EQUIPMENT** in *0171 General requirements*.

3.4 COMMISSIONING

General

Requirement: Provide commissioning as documented. Conform to *0171 General requirements* and SA TS 5342 (2021).

3.5 MAINTENANCE

General

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0911 CABLE SUPPORT AND DUCT SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide cable support, trunking and duct systems, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0223 Service trenching*.
- *0901 Electrical systems*.
- *0991 Electrical maintenance*.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Cable support: Cable tray, cable ladders and cable mesh cable support systems.

1.4 SUBMISSIONS

Certification

General: Submit structural engineer's certification for the following:

- Fabricated columns.
- Flange assemblies at the base of columns.
- Footings for columns.
- Rag bolt assemblies for column support.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Cable support and duct systems: Submit technical data for the following:

- Ducted wiring enclosure systems.
- Cable support systems.
- Proprietary pits.
- Proprietary columns.
- Load calculations for aerial cable supports.

Type tests: Submit test results for cable support systems.

Shop drawings

Cable support and duct systems: Submit shop drawings showing the following:

- Cable tray and trunking routes.
- Layout of cable supports and enclosures on the current architectural background coordinated with the structure and other services.
- Layout of underground conduits, pits and drainage trenches.
- Invert levels for underground conduits.
- Depth of burial for cables and conduits.
- In situ pits.
- Provision for expansion and ground movement.
- Fabricated columns.
- Footing for columns.

2 PRODUCTS**2.1 GENERAL****Product identification**

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 CONDUITS**General**

Standards: To AS/NZS 2053.3 (1995), AS 61386.1 (2015), AS/NZS 61386.21 (2015), AS/NZS 61386.22 (2022) and AS/NZS 61386.23 (2015).

Communications cabling: To AS/NZS 14763.2 (2020).

Type

General: Rigid.

Sizes

Requirement: Conform to the following:

- Underground: ≥ 25 mm.
- Telecommunications: ≥ 25 mm.
- Other locations: ≥ 20 mm.

Fasteners

Surface mounted: Double-sided fixed.

Colour

Conduits generally: Light orange.

Telecommunications systems conduits: White.

Galvanized water pipe

Medium or heavy: To AS 1074 (1989).

2.3 METALLIC CONDUITS AND FITTINGS**General**

Standards: To AS/NZS 61386.21 (2015) and AS/NZS 61386.23 (2015).

Type

General: Screwed steel conduit with medium protection outside and inside to AS/NZS 61386.21 (2015).

Exposed to dampness or moisture: Steel conduit with high protection outside and inside to AS/NZS 61386.21 (2015).

Laid underground: Steel water pipe with protection outside and inside to AS/NZS 61386.21 (2015).

Joining

Steel conduit: Screwed joints and ends.

Fasteners

Saddles: Conform to the following:

- Internal: Zinc-plated.
- External: Hot-dipped galvanized.

Corrosion protection

Steel conduits: Paint ends and joint threads with zinc rich organic primer to AS/NZS 3750.9 (2009).

2.4 NON-METALLIC CONDUITS AND FITTINGS

General

Standards: To AS/NZS 2053.3 (1995), AS/NZS 61386.21 (2015), AS/NZS 61386.22 (2022) or AS/NZS 61386.23 (2015).

Solar radiation protection: Required for conduits and fittings exposed to sunlight.

Flexible conduit

Requirement: Provide flexible conduit to connect with equipment and plant subjected to vibration. If required, provide for adjustment or ease of maintenance. Use the minimum possible length.

Associated fittings

Type and material: Same as the conduit.

Wall boxes on PVC-U conduits: For special size wall boxes not available in PVC-U, provide prefabricated earthed metal boxes.

Inspection-type fittings

Requirement: Use only in accessible locations and where exposed to view.

Joints

Type: Cemented or snap-on joints.

2.5 CABLE DUCT/TRUNKING

General

Standards: To AS/NZS 4296 (1995).

Communications cabling: To AS/NZS 14763.2 (2020).

Cable duct

Material: Metal.

Material finish: Metallic- coated to AS 1397 (2021) Grade G2, Coating Class Z275.

Construction: Solid.

Covers for accessible locations: Screw- fixed or clip- on type removable only with the use of tools.

Accessories: Purpose- made to match the duct system.

Cable support: Except for horizontal runs where the covers are on top, support wiring with retaining clips at intervals of not more than 1000 mm.

Proprietary trunking systems

General: Provide proprietary skirting duct, wall duct, floor duct and service column systems, incorporating segregation, if used for multiple services. Provide rigid supports. Round off sharp edges and provide bushed or proprietary cable entries into metallic trunking.

Accessories and outlets: Proprietary fasteners and mountings facilities.

Covers: Screw-fixed or clip-on type, removable only with the use of tools.

2.6 CABLE TRAY/LADDER SYSTEMS

General

Standard: To NEMA VE-1 (2017).

Type tests: To NEMA VE-1 (2017).

Material: Mild steel.

Finish exterior or wet exposure: Hot-dipped galvanized after fabrication.

Finish interior dry exposure: Zinc or electro-zinc-coated steel.

Cable tray type: Slotted similar to "Admiralty" pattern with folded or rolled edges.

Manufacture: Provide proprietary cable support, fittings and accessories from a single manufacturer for the same support system.

Selection: Select cable supports in conjunction with support system installation to achieve the loading and deflection requirements.

Spare capacity: Minimum 50%.

Tray/ladder support

Power cables: Conform to the following:

- Overhead suspension: Trapeze or centre rail structure.
- Wall supported: Wall bracket with full access from one side of the cable support.

Communications cables: Conform to the following:

- Overhead suspension: Single-sided.
- Wall supported: Wall bracket with full access from one side of the cable support.

Dimensions: To the preferred dimensions nominated in NEMA VE-1 (2017).

Support material finish: Metallic-coated to AS 1397 (2021), Grade G2, Coating Class Z275.

Covers: Ventilated flat covers to cable support systems installed in accessible locations.

2.7 CATENARY SYSTEMS

General

Catenary systems: May be used within suspended ceiling spaces instead of cable tray and ladder systems.

Wire: Stainless steel or coated galvanized cable and couplings.

2.8 CABLE PITS

General

Cable draw-in pits: Provide cable draw-in pits, as documented. Sizes given are internal dimensions.

Proprietary cable pits

Pits not more than 1200 x 1200 mm: Proprietary concrete or polymer moulded pits.

In situ construction

Pits more than 1200 x 1200 mm: Provide either of the following:

- Proprietary cable pits.
- Construct walls and bottoms from rendered brickwork or 75 mm thick reinforced concrete. Incorporate a waterproofing agent in the render or concrete.

Pit covers

General: Provide pit covers to suit external loads. Fit flush with the top of the pit.

Standard: To AS 3996 (2019).

Weight: < 40 kg for any section of the cover.

Lifting handles: Provide a lifting handle for each size of cover section.

Drainage

General: Provide drainage from the bottom of cable pits, either to absorption trenches filled with rubble or to the stormwater drainage system.

Absorption trenches: Minimum size 300 x 300 x 2000 mm.

2.9 COLUMNS

General

Requirement: Provide tapered hot-dipped galvanized steel, aluminium or concrete columns, designed, manufactured and tested by a specialist manufacturer.

Columns: Conform to the following for fabricated columns more than 2400 mm high that are designed to support accessories outdoors.

Standards

Public lighting poles: To AS 1798 (2014).

Concrete structures: To AS 3600 (2018).

Steel structures: To AS 4100 (2020).

Hot-dipped galvanized (zinc) coatings on ferrous articles: To AS/NZS 4680 (2006).

Bases and footings

Mounting: Conform to the following:

- Steel and aluminium columns: Base plate mounting, suitable for mounting on rag bolt assemblies.
- Concrete columns: Direct mounting in the ground.

Footings: Provide footings and rag bolt assemblies detail designed by a professional engineer and independently certified.

Site specifics: Design for the site wind category and the soil conditions.

Dimensions: To AS 1798 (2014).

Rag bolt assemblies: Galvanized threaded steel of cross-sectional area designed to support each column taking into account the wind loads expected to act on the column and the luminaires mounted on the column. Set the rag bolt assemblies in the concrete footings. Cut holding bolts within 3 threads above top of base plate top lock nuts.

Base sealing: Seal space under pole base plate with grout.

Drainage: Provide adequate drainage at the column base.

Electrical connections: For hollow metal or concrete poles provide a recess fitted with a lockable or screw fixed flush-mounted cover at the base of the column for access to cable connections and equipment.

3 EXECUTION

3.1 GENERAL

Fire isolation

Requirement: Provide fire-stop sealing where electrical services pass through fire-resisting walls, floors or ceilings.

Wall boxes in fire-resisting walls: Provide fire-resisting barriers behind wall boxes in fire-resisting walls if the integrity of the fire-resistance level has been altered.

3.2 UNSHEATHED CABLES – INSTALLATION

General

Requirement: Provide permanently fixed enclosure systems, assembled before installing wiring.

Draw wires: Provide draw wires to pull in conductor groups from outlet to outlet, or provide ducts with removable covers.

3.3 CONDUIT SYSTEMS – INSTALLATION

Inspection fittings

Location: Locate in accessible positions.

Draw cords

General: Provide 5 mm² polypropylene draw cords in conduits not in use.

Draw-in boxes

General: For conduits in accessible locations provide draw-in boxes as follows:

- In straight runs at > 30 m: Spacing ≤ 30 m.
- At changes of level or direction.

Underground draw-in boxes: Provide gasketed covers and seal against moisture. Install in accessible pits.

Expansion

General: Allow for thermal expansion/contraction of conduits and fittings due to changes in ambient temperature conditions. Provide expansion couplings as required.

Rigid conduits

General: Install in straight long runs, smooth and free from rags, burrs and sharp edges. Set conduits to minimise the number of fittings.

Routes

Set-out: If exposed to view, install conduits in parallel runs with right angle changes of direction.

Bends: Install conduits with no more than 2 right angled bends per cable draw-in run.

Concealed conduits: Run conduits concealed in wall chases, embedded in floor slabs or installed in inaccessible locations directly between points of termination, minimising the number of sets. Do not provide inspection fittings. Use large radius bends or elbows.

Overhead conduits in mechanical plant rooms: If overhead conduits service mechanical equipment installed on plinths in plant rooms, provide support and protection. Alternatively, use cable support system.

Painting

Conduits exposed to view: Paint to match surrounds as documented.

Conduits in roof spaces

Location: Locate below roof insulation and sarking. In accessible roof spaces, provide mechanical protection for light-duty conduits.

Conduits in concrete slabs

Route: Do not run in concrete toppings. Do not run within pretensioning cable zones. Cross pretensioning cable zones at right angles. Route to avoid crossovers and minimise the number of conduits in any location.

Parallel conduit spacing: ≥ 50 mm apart.

Conduits in mechanical plant room slabs: Avoid installation of conduits in plant room slabs (boiler rooms, mechanical plant rooms and tank rooms) if conduits and cables are likely to experience high temperatures, be subject to core hole drilling, drilling of large anchor bolt points or where exact plant locations are unknown at time slab is poured.

Minimum cover: Not less than the diameter of the conduit plus 20 mm.

Construction joints: Provide sleeving over conduit to allow movement of the conduit across the joint due to any slab movement.

Fixing: Fix directly to the top of the bottom layer of reinforcing.

Conduits in hollow-block floors

Location: Locate conduits in the core-filled sections of precast hollow-block type floors.

Conduits in columns

Number and size of conduits in columns: As determined by the structural engineer.

Bends: Enter columns with radius sweep bends greater than or equal to 150 mm. Do not use elbows.

Chasing: Do not chase columns.

3.4 CABLE SUPPORT SYSTEMS – INSTALLATION**General**

Standard: To NEMA BI-50016 (2024).

Design: Support cable support systems as follows:

- Horizontal runs:
 - . Concealed cable support system: At spacings less than the length of cable support section.
 - . Visible cable support: Loaded deflection \leq span/200.
- Vertical runs: To manufacturer's recommendation, taking into account the weight of cables installed.

Fixing to building structure

General: Fix supports to the building structure or fabric with threaded rod hangers greater than or equal to 8 mm attached to hot-dip galvanized U-brackets, or by means of proprietary brackets.

Cable fixing

General: Provide strapping or saddles suitable for fixing cable ties.

Inside bend radius

Requirement: At least 12 times the outside diameter of the largest diameter cable carried.

Cable protection

General: Provide rounded support surfaces under cables where they leave trays or ladders.

Clearances

Access requirement: At least 150 mm free space above and at least 600 mm free space on at least one side of cable tray and ladders.

From hot water pipes: > 200 mm.

From boilers or furnaces: > 500 mm.

Electromagnetic interference (EMI): Locate support systems for electrical power cabling and communication cabling to minimise electromagnetic interference.

3.5 CATENARY SYSTEMS – INSTALLATION**General**

Anchoring: Anchor catenary systems to the structure. Do not fix to any part of a suspended ceiling system.

Design loads: Design catenary systems to support the proposed load of the cables with a spare capacity of 50% loading.

Fixing: Fix cables to the catenary system so that no cable is under stress due to tension or compression. Use proprietary fasteners that allow cables to be added or removed without destroying the integrity of the system.

3.6 CABLES IN TRENCHES – INSTALLATION**Sand bed and surround**

General: Conform to *0223 Service trenching*.

Sand bed and surrounds: Provide at least 150 mm clean sharp sand around cables and conduits installed underground.

Sealing ducts and conduits

General: Seal buried entries to ducts and conduits with waterproof seals as follows:

- Spare ducts and conduits: Immediately after installation.
- Other ducts and conduits: After cable installation.

3.7 COMPLETION**Operation and maintenance manuals**

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed.

3.8 MAINTENANCE**General**

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0921 LOW VOLTAGE POWER SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES**General**

Requirement: Provide low voltage power systems, as documented.

1.2 DESIGN**Electrical system design**

Fault protection: Automatic disconnection to AS/NZS 3000 (2018) clause 2.4.

Fire-resisting protection: Provide for switchboards and associated electrical conductors to BCA (2022) C3D14.

Maximum demand: Calculation method to AS/NZS 3000 (2018) Appendix C.

1.3 PERFORMANCE

Network supply

General: Separate Tender Package

1.4 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0773 Building management systems.
- 0901 Electrical systems.
- 0911 Cable support and duct systems.
- 0991 Electrical maintenance.

1.5 STANDARDS

General

Requirement: To AS/NZS 3000 (2018) Part 2, unless documented otherwise.

Electrical design: To AS/NZS 3000 (2018).

Electrical equipment: To AS/NZS 3100 (2022).

Fire and mechanical performance classification: To AS/NZS 3013 (2005).

Selection of cables: To AS/NZS 3008.1.1 (2017).

Distribution cables: To AS/NZS 4961 (2003).

Degrees of protection (IP code): To AS 60529 (2004).

Electromagnetic compatibility (EMC): To the AS/NZS 61000 series.

Communications systems: To AS/CA S008 (2020), AS/CA S009 (2020), AS 11801.1 (2019) and AS/NZS 14763.2 (2020).

Testing

Standard: To AS/NZS 3017 (2022).

1.6 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- RCD: Residual current device.
- SPD: Surge protection device.

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Embedded generator: Electricity generator connected to the local electrical distribution network.
- Extra-low voltage: Not exceeding 50 V a.c. or 120 V ripple-free d.c.
- High voltage: Exceeding low voltage.

1.7 SUBMISSIONS

Certification

Requirement: Submit certification of conformity to AS/NZS 3000 (2018), for electrical services.

Design documentation

Low voltage power systems: Submit the following information for each main, submain and final subcircuit for which calculation is the responsibility of the contractor:

- Single line diagram.
- Fault levels at switchboards.
- Maximum demand calculations.
- Cable and conductor cross-sectional area and insulation type.
- Cable operating temperature at design load conditions.
- Voltage drop calculations at design load conditions.
- Protective device characteristics.

- Discrimination and grading of protective devices, including grading charts.
- Prospective short-circuit current automatic disconnection times.
- Earth fault loop impedance calculations for testing and verification.
- Stringing calculations for private aerial cables.

Final subcircuits: May be treated as typical for common route lengths, loads and cable sizes.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals**.

Samples

Requirement: Submit samples to PRODUCTS, **GENERAL, Samples**.

Shop drawings

General: Submit shop drawings of the following:

- Cable routes and cable pits.
- Busduct systems including routes, dimensions and connection details.

Tests

Requirement: Submit results of the following:

- Verification testing of the installation to **TESTING, Site tests**.
- Connections to electricity networks to **TESTING, Site tests**.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples of visible accessories and equipment, including switched socket-outlets and light switch panels.

2.2 SITE ELECTRICITY SUPPLY

General

Responsibilities: Provide site electricity supplies, as documented. Connect project electrical facilities to the network distributor's external site electricity supply.

LV supplies from dedicated substations

LV transformer output supply: To AS/NZS 3000 (2018) and the Service and Installation Rules.

Requirement: Provide short-circuit and overload protection at the transformer secondary supply using fault current limiting circuit breakers with adjustable overload and short-circuit current setting features, if secondary output supply protection is required.

Circuit breakers: Include full discrimination and cascade protection and grade with the electricity distributor's incoming supply protection system and the downstream site protection devices.

Consumers mains

Requirement: Provide consumers mains, associated services and all necessary fault and overload current protection equipment to AS/NZS 3000 (2018) Section 3, the electricity distributor's standards and the Service and Installation Rules.

Protected consumers mains: Provide short-circuit and overload protection, where required by the electricity distributor.

Alternative power supplies

General: Provide alternative power supplies, as documented.

Metering

Retail: To the requirements of the electricity retailer and the electricity distributor.

Private: Provide energy measurement to BCA (2022) J9D3 and as documented.

Photovoltaic metering: Provide energy measurement to BCA (2022) J9D3 and as documented.

2.3 REMOTE MONITORING

General

Common alarm: Provide for common alarm to be connected into a remote monitoring system.

BMS interface: Provide an interface to allow a building management system to monitor system output, monitor system alarms.

2.4 WIRING SYSTEMS

General

Wiring and site cable reticulation systems: Appropriate to the installation conditions and the function of the load. Include the following:

- Underground services.
- Above-ground services.
- In-building services.

Type: Re-wireable system.

Neutral conductors: Same size as the corresponding active conductors. Rate the neutral conductor size for the maximum harmonic currents.

Cable support system: To *0911 Cable support and duct systems*.

2.5 POWER CABLES

Standards

Polymeric insulated cables: To AS/NZS 5000.1 (2005).

Aerial cables:

- Copper conductors: To AS 1746 (1991).
- Aluminium conductors: To AS 3607 (1989) or AS 1531 (1991).

Cable

Requirement: Select multi-stranded copper cables.

Default insulation: V-75.

Default sheathing: 4V-75.

Minimum size: Conform to the following:

- Lighting subcircuits: 1.5 mm².
- Power subcircuits: 2.5 mm².
- Submains: 6 mm².

Voltage drop: Select final subcircuit cables within the voltage drop parameters dictated by the route length and load.

Fault loop impedance: Provide final subcircuit cables to satisfy the requirements for automatic disconnection under short-circuit and earth fault/touch voltage conditions.

Underground residential distribution (URD) systems: Cables to AS/NZS 4026 (2008).

Distribution cables: To AS/NZS 4961 (2003).

Colours

Conductor colours: For fixed wiring cables, provide coloured conductor insulation or at least 150 mm of close-fitting coloured sleeving at the termination points of each conductor.

Active conductors in single phase circuits: Red.

Active conductors in polyphase circuits:

- A phase: Red.
- B phase: White.
- C phase: Blue.

Neutral conductors: Black.

Earthing conductors: Green-yellow.

Sheath: White.

Aluminium mains and submains

Requirement: Use aluminium mains and submains only where documented.

Nominal cable size: ≥ 95 mm².

2.6 ELECTRICAL PROTECTION SYSTEMS

General

Requirement: Provide the following protection systems, as documented:

- Fault protection to AS/NZS 3000 (2018) clause 2.4.
- Overcurrent to AS/NZS 3000 (2018) clause 2.5.
- Residual current to AS/NZS 3000 (2018) clause 2.6.
- Overvoltage to AS/NZS 3000 (2018) clause 2.7.
- Undervoltage to AS/NZS 3000 (2018) clause 2.8.
- Arc fault detection to AS/NZS 3000 (2018) clause 2.9.

2.7 ELECTRICAL ACCESSORIES

General

Requirement: Provide accessories of the same style and from the same manufacturer, as documented.

Socket-outlets - generally

Standards:

- General: To AS/NZS 3112 (2017).
- Industrial: To AS/NZS 3123 (2005).

Socket-outlet properties: Provide sockets conforming to the following:

- Type: Integral switched socket-outlet.
- Material: High impact plastic.
- Size: Standard single gang.
- Current rating: 10 A.
- Pin arrangement: Mount outlets with the earth pins at the 6 o'clock position.

Plastic switched socket-outlets

Colour: White electrical.

Mounting configuration: Horizontal.

Ironclad socket-outlets

Type: Integral switched socket-outlet.

Material: Diecast metal or cast iron.

Colour: Grey.

Weatherproof socket-outlets

Colour: Grey.

Combined RCD switched socket-outlets

Type: Integral RCD unit with double switched socket-outlet.

Colour: White electrical.

RCD trip current: Conform to the following:

- General light and power: 30 mA Type II to AS/NZS 3190 (2016).
- Patient treatment areas: 10 mA Type I to AS/NZS 3190 (2016), as documented.

Multi-switch socket-outlets on grid mounted panels

Type: Separate switch and socket-outlets grid mounted on propriety or custom designed panels.

Material: As documented.

Colour: As documented.

Panel finishes: As documented.

Plugs – 230 volt

Requirement: Insulated type to AS/NZS 3112 (2017) with integral pins.

230 volt combination switch and permanently connected cord outlet

Type: Three terminal flush mounted switch and flex-lock insert assembly.

Colour: White electrical.

Neon indicator: Provide neon indicator.

Flex-lock assembly: Match and securely grip the size and type of flexible cable used.

Mounting configuration: Horizontal.

Installation couplers

Standard: To AS/NZS 61535 (2011).

Permanently connected equipment

General: Provide final subcircuit to permanently connected equipment, as documented.

Isolating switch: Locate adjacent to equipment.

Mounting:

- Internal installations: Flush mount.
- External installations: Weatherproof surface mounted.

Coordination: Coordinate with equipment supplier.

Wall/ceiling mounted equipment: Conceal final cable connection to equipment.

Isolating switches

Standard: To AS 3133 (2020).

Emergency stop switches

Standard: To AS/NZS IEC 60947.5.5 (2015).

Type: Mushroom head with latch and twist releaser.

3-phase outlets

Standard: To AS/NZS 3123 (2005).

Type: Surface mounted Integral switched socket-outlet with flap lid on the outlet.

Material: High impact plastic.

IP rating: IP56.

Size: To suit current rating and pin configuration nominated in the project documents.

Colour: Grey.

Current rating: 5 pin, 20 A, 400 V a.c.

Switch mechanism: Rotating type.

Pin arrangement: Five round pins mounted with earth pins at the 6 o'clock position, neutral pins in the centre and the red, white and blue phases in a clockwise sequence when viewed from the front of the outlet.

Plug: Provide a matching plug top for each outlet.

Appliances

Connection: Shorten lead to minimum length for plug connections.

Isolating switches: To AS/NZS 3000 (2018).

Ceiling sweep fans

Standard: To AS/NZS 60335.2.80 (2016).

Horizontal clearance: ≥ 1200 mm from blade tip to wall cupboards or shelves that require access by ladder or steps.

Size: 1200 mm diameter unless otherwise documented.

Mounting height: Use the longest proprietary suspension rod so that the height from the blades to the finished floor level is more than 2200 mm.

Mounting location: To avoid stroboscopic effect, do not mount fans below luminaires.

Speed regulators, capacitive and electronic: Flush mounted with OFF position.

3 EXECUTION

3.1 SITE ELECTRICITY SUPPLY

General

Electrical systems: Connect to the electricity distributor's supply, as documented and provide the equipment necessary to meet the electricity distributor's requirements. Note that site power supply and revised distribution are a separate tender package.

3.2 EARTHING

Earthing systems

Protective earthing system with a multiple earth neutral (MEN) connection: To AS/NZS 3000 (2018) Section 5 and as documented.

Earth electrodes

General: Provide electrodes to AS/NZS 3000 (2018) clause 5.3.6.

Bonding

General: Provide equipotential bonding to AS/NZS 3000 (2018) clause 5.6.

Earth and bonding clamps

General: Provide proprietary earthing and bonding clamps to AS 1882 (2002).

3.3 POWER CABLES

Cable installation

Classifications: To AS/NZS 3013 (2005).

Handling cables: Report damage to cable insulation, serving or sheathing.

Stress: Do not use installation methods that exceed the cable's pulling tension. Use cable rollers for cable installed on tray/ladders or in underground enclosures.

Straight-through joints: Unless unavoidable due to length or difficult installation conditions, run cables without intermediate straight-through joints.

Cable joints: Locate in accessible positions in junction boxes and/or in pits.

Individual wiring of extra-low voltage circuits: Tie together at regular intervals.

Tagging

General: Identify multicore cables and trefoil groups at each end with stamped non-ferrous tags clipped around each cable or trefoil group.

Marking

General: Identify the origin of all wiring by legible indelible marking.

Submains and final subcircuits

Installation: Provide the following:

- Cables with diameter less than 13 mm: Run in conduit, cable ducts or support on cable trays or ladders.
- Single core cables of 3-phase circuits: Install unenclosed single core cables of diameter greater than 13 mm laid on cable tray in trefoil (RWB) or quadrofoil (RWBN) groups.
- Cables for lighting systems: Run in conduit, cable ducts, suspend on catenary systems or support on cable trays or ladders.
- Accessible concealed spaces: Install thermoplastic insulated and sheathed cables.
- Inaccessible concealed spaces: Install cable in PVC-U conduit.
- Roof spaces: Install cable below heat insulation and sarking. If not protected from high ambient roof space temperatures by thermal insulation, derate the cables, to AS/NZS 3008.1.1 (2017) Table 27, for an assumed ambient temperature of 55°C.
- Accessible ceiling voids: Support and enclose cables on ceiling surfaces or ceiling suspension systems.
- Plastered or rendered masonry: Install cable in PVC-U conduit.
- Double-sided face brick partition: Install cable in PVC-U conduit installed within the brick wall by slotting bricks or using any continuous pathways provided in the brick.
- Stud framed walls with bulk insulation: Install cables in PVC-U conduit.
- Stud framed walls without bulk insulation: Install thermoplastic insulated and sheathed cables allowing rewirability. Bush all knock-outs in steel framing to prevent cable damage. Earth metal stud frames to the electrical earthing system.
- Horizontal cable trays or ladders: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 2000 mm intervals.
- Vertical cable risers: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 1000 mm intervals.
- Plant rooms: Install cable in heavy duty PVC-U conduit or on cable tray, cable ladder or in duct.

3.4 COPPER CONDUCTOR TERMINATIONS

General

Requirement: Other than for small accessory and luminaire terminals, terminate copper conductors to equipment, with compression-type lugs of the correct size for the conductor. Compress using the correct tool or solder.

Within assemblies and equipment

General: Loom and tie together conductors from within the same cable or conduit from the terminal block to the point of cable sheath or conduit termination. Neatly bend each conductor to enter directly into the terminal tunnel or terminal stud section, allowing sufficient slack for easy disconnection and reconnection.

Alternative: Run cables in PVC-U cable duct with fitted cover.

Identification: Provide durable numbered ferrules fitted to each core, and permanently marked with numbers, letters or both to suit the connection diagrams.

Spare cores: Identify spare cores and terminate into spare terminals, if available. Otherwise, neatly insulate and bind the spare cores to the terminated cores.

3.5 ALUMINIUM CONDUCTOR TERMINATIONS

General

Conductor surface preparation: Remove oxide as follows:

- Wire brush surfaces to be connected.
- Immediately apply oxidation inhibiting abrasive grease containing zinc or similar particles. Thoroughly cover the surfaces and work the grease between the strands of stranded conductors.

Fittings: Unless joint contact surfaces are factory tinned or factory pre-filled with oxidation inhibiting abrasive grease, prepare as for conductors.

Aluminium-to-aluminium jointing

Compression method: Conform to the following:

- Provide aluminium or aluminium alloy crimp lugs or ferrules to suit the size and shape of the conductors.
- Use compression dies selected to suit lugs or ferrules, with hexagonal dies for stranded conductors and indent dies for solid conductors.
- Fill lugs or ferrules with oxidation inhibiting abrasive grease.
- Insert conductors into lugs or ferrules, driving out excess grease.
- Apply dies to provide at least 2 indentations at each joint or termination.

Termination of electro-tinned aluminium lug: Bolt the palm of the lug to terminals using a stainless steel bolt and nut with a large diameter stainless steel flat washer and two Belleville spring cup washers.

Bolted joints: Tighten to the Belleville spring cup manufacturer's recommended tension requirements. Do not over tension or destroy the ability of the cup washers to maintain the correct tension of the joint. Allow for thermal expansion of the joint.

Fusion weld method: Make joints by fusion welding with aluminium lugs. Protect cable insulation from heat by fixing substantial heat sinks to the cable near the joint. After completion of the weld, wire brush the joint and file sharp projections smooth.

Aluminium-to-copper jointing

Compression method: Conform to **Aluminium-to-aluminium jointing**.

Connector types: Select from the following:

- Bi-metal: Lug or pin type with cast copper palm or pin, friction welded to an aluminium barrel section, subsequently factory filled with oxidation inhibiting abrasive grease.
- Termination of electro-tinned aluminium lug: Bolt the palm of the lug to the copper busbar or terminal by means of a stainless steel bolt and nut with a large diameter stainless steel flat washer and two Belleville spring cup washers.

Bolted joints: Tighten to the Belleville spring cup manufacturer's recommended tension requirements. Do not over tension or destroy the ability of the cup washers to maintain the correct tension of the joint. Allow for thermal expansion of the joint.

3.6 ACCESSORIES

Installation

General: Install accessories and conceal cabling in walls in conformance with the following:

- Rendered masonry partition: Flush wall box, with conduit chased into wall.
- Double-sided face brick partition: Vertically mounted flush wall box, with conduit concealed in cut bricks.
- Face brick external cavity wall: Flush wall box, with thermoplastic insulated cables in conduit run in cavity and tied against inner brick surface, or thermoplastic sheathed cables run in cavity.
- Stud partition: Flush plate secured to proprietary support bracket or wall box.
- Fire walls: Flush wall box, with conduit built into wall. Provide additional fire protection around wall boxes, where necessary to maintain fire-resistance rating.

Location: Confirm final location of all outlets and equipment on site, before installation.

Spacing from adjacent horizontal surface: ≥ 75 mm to the centre of accessory socket.

Default mounting heights to centre of accessory plate:

- Outlets: 300 mm.
- Switches and controls: 1100 mm.

Accessories: Flush mounted, except in plant rooms.

Common faceplates: Mount adjacent flush mounted accessories under a common faceplate.

Restricted location: Do not install wall boxes across junctions of wall finishes.

Surface mounting: Proprietary mounting blocks.

Installation of ceiling mounted accessories

Connections for appliances: Flush mounted outlets on the ceiling next to support brackets.

Mounting: Mount appliances independent of ceiling tiles and suspended ceiling suspension system.

Fix directly to concrete slab or to roof structure above ceiling.

Connections for fixed equipment: Provide concealed permanent connections.

Fixing: For equipment and appliances heavier than 30 kg, provide support through the suspended ceiling to the building structure. Brace appliances that have excessive bending moments, are heavy or vibrate, to prevent horizontal movement.

Installation couplers

Standard: To AS/NZS 3000 (2018) and AS/NZS 61535 (2011).

Location: Accessible.

3.7 TESTING

Site tests

Inspection: Before testing, visually inspect the installation to AS/NZS 3000 (2018). Record on a checklist.

Verification: Test and verify the installation to AS/NZS 3000 (2018) Section 8 using the methods outlined in AS/NZS 3017 (2022). Record the results of all tests in the same sequence as undertaken.

Electricity networks: Test and verify the connections to electricity networks to AS 4741 (2010). Record the results of all tests.

Dummy loads: If electrical tests are required and the actual load is not available, provide a dummy load equal to at least 75% of the design load.

3.8 SPARE PARTS

General

Spare parts: As documented.

3.9 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed.

3.10 MAINTENANCE

General

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0941 SWITCHBOARDS - PROPRIETARY
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1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide proprietary switchboards, as documented.

Performance

Supply system: Switchboards to suit 400 V, 3-phase, 4-wire, 50 Hz, multiple earth neutral (MEN) supply system.

1.2 DESIGN

Switchboards for electric vehicle charging equipment

Requirement: Conform to BCA (2022) J9D4.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0901 Electrical systems*.
- *0921 Low voltage power systems*.
- *0991 Electrical maintenance*.

1.4 STANDARDS

General

General: To AS/NZS 3000 (2018).

Main switchboards and distribution switchboards: To AS/NZS 61439.1 (2016), AS/NZS 61439.2 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

Distribution switchboards intended for use by unskilled/ordinary persons: To AS/NZS 61439.2 (2016), AS/NZS 61439.3 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Fault current limiters: Circuit opening devices designed or selected to limit the instantaneous fault current.
- Proprietary assemblies: Low voltage switchgear and controlgear assemblies available as a catalogue item, consisting of the manufacturer's standard layout and equipment. Minor modifications are permissible to accommodate equipment and accessories, whilst retaining standard format.
- Rated currents: Continuous uninterrupted current ratings within the assembly environment under in-service operating conditions.
- Rated short-circuit currents: Maximum prospective symmetrical root mean square (r.m.s.) current values at rated operational voltage, at each assembly incoming supply terminal.

1.6 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Data for proprietary assemblies: Submit the following:

- Makes, types and model numbers of items of equipment.
- Overall dimensions.
- Fault level.
- IP rating.
- Rated current of components.
- Number of poles and spare capacity.
- Mounting details.
- Door swings.
- Paint colours and finishes.
- Access details.
- Schedule of labels.

Type tests: Submit results as evidence of a successful type test, as follows:

- Electrical and mechanical routine function: To PRODUCTS, **GENERAL, Tests**.
- Dielectric properties: To PRODUCTS, **GENERAL, Tests**.

Verification tests to the AS/NZS 61439 series: Submit verification test certificates for components, functional units and assemblies, including internal arcing-fault tests and factory test data, with evidence that the tests were carried out at not less than the designated fault currents at rated operational voltage. Assembly type testing to the AS/NZS 3439 series with test results that fulfil the requirements of the relevant parts of the AS/NZS 61439 series are acceptable as verification of the requirements of the AS/NZS 61439 series.

Alterations to tested assemblies: Submit records of alterations made to assemblies since the tests.

1.7 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Factory assembly completed, with busbars exposed and functional units in place.
- Assembly ready for routine testing.
- Assembly installed before connection.
- Assembly installed and connected.

2 PRODUCTS**2.1 GENERAL****Switchboard connection**

Type: Front connected.

Enclosure

Default material: Metallic-coated sheet steel.

Separation

Default: Form 1 to AS/NZS 61439.2 (2016).

Metering

Requirement: To *0921 Low voltage power systems*.

Main switchboard main switches

Spare capacity: Provide at least 25% spare capacity in the ratings main switch/isolators.

Busbars

General: Incorporate proprietary insulated busbar systems for the interconnection of isolators, circuit breakers and other circuit protective devices.

Busbar fault rating: Rated to meet the prospective fault current for 1 second or a minimum rating of ≥ 18 kA/second, whichever is the greater.

Spare capacity

Default spare poles: $\geq 20\%$.

Main switchboard incoming busbar: $\geq 25\%$.

Surge protection

General: Provide surge protection, as documented.

Earthing

General: Make provision for the connection of the communications earth terminal (CET) at switchboard earth bar to AS/CA S009 (2020).

Doors

General: Provide lockable doors with a circuit card holder unless enclosed in cupboards or in an area that is not readily accessible to the public.

Keying: Key alike for multiple doors, 2 keys per assembly.

IP rating

Default rating: IP42 minimum.

Weatherproof: IP56 minimum.

Equipment layout

General: Position equipment to provide safe and easy access for operation and maintenance. Group devices by function.

Compartments: Separate shipping sections, subsections, cable and busbar zones, functional unit modules and low voltage equipment compartments using vertical and horizontal steel partitions that suit the layout and form of separation.

Equipment on doors: Set out in functional unit groups and to allow access without the use of tools or keys.

Form 1 enclosures: Separate into compartments with partitions at 1.8 m maximum centres.

Segregation

General: Segregate NCC emergency equipment from non-emergency equipment with metal partitions designed to prevent the spread of a fault from non-emergency equipment to emergency equipment.

BMS equipment: Accommodate extra-low voltage BMS equipment in a separate compartment.

Finishes

External and interior: Orange X15 or the manufacturer's standard colour.

- Installed in cupboards, switchrooms and plant rooms: Orange X15 or the manufacturer's standard powder coated finish.
- Installed elsewhere: Orange X15, the manufacturer's standard powder coated finish or to the documented non-standard powder coated colour.

Supporting structure

Assemblies:

- Wall mounted: $\leq 2 \text{ m}^2$.
- Floor mounted: $> 2 \text{ m}^2$.

Ventilation

General: Required to maintain design operating temperatures at full load.

Tests

Standard: To AS/NZS 61439.1 (2016).

Electrical and mechanical routine function tests: Test assemblies at the factory using externally connected simulated circuits and equipment.

Dielectric properties: To AS/NZS 61439.1 (2016) clause 10.9.

Dielectric test voltage: To AS/NZS 61439.1 (2016) clause 10.9.2.1.

3 EXECUTION

3.1 GENERAL

Fixing

Requirement: Before making inter-panel connections, fix assemblies and metering equipment enclosures into position, level and plumb.

Cable entries

General: Neatly adapt one or more cable entry plates, if fitted, to accept incoming cable enclosure. Provide the minimum number of entry plates to leave spare capacity for future cable entries. Do not run cables into the top of weatherproof assemblies.

Single core cables rated > 300 A: Pass separately through non-ferrous gland plates. Do not provide ferrous metal saddles. Minimise eddy currents.

Cable enclosures

Requirement: Continue cable enclosures to or into assemblies and fit cable entry plates so that the IP rating of the assembly and the fire-resistance level of the cable are maintained.

Cable supports

Requirement: Support or tie mains and submains cables within 200 mm of terminations. Provide cable supports suitable for stresses resulting from short-circuit conditions.

3.2 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed.

3.3 MAINTENANCE

General

Requirements: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0942 SWITCHBOARDS - CUSTOM-BUILT

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide custom-built switchboards and distribution pillars, as documented.

1.2 DESIGN

Switchboards for electric vehicle charging equipment

No Requirement.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0901 Electrical systems.
- 0921 Low voltage power systems.
- 0991 Electrical maintenance.

1.4 STANDARDS

General

General: To AS/NZS 3000 (2018).

Main switchboards and distribution switchboards: To AS/NZS 61439.1 (2016), AS/NZS 61439.2 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

Distribution switchboards intended for use by unskilled/ordinary persons: To AS/NZS 61439.2 (2016), AS/NZS 61439.3 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Custom-built assemblies: Low voltage switchgear and controlgear assemblies manufactured to order and incorporating either purpose built or proprietary components or either purpose built or proprietary busbar assemblies.
- Fault current limiters: Circuit opening devices designed or selected to limit the instantaneous fault current.
- Incoming busbars: Busbars connecting incoming terminals to line side terminals of main switches.
- Main circuit supply busbars: Busbars connecting incoming functional unit terminals, or incoming busbars where no main switches are included, to outgoing functional unit terminals or outgoing functional unit tee-offs.
- Proprietary assemblies: Low voltage switchgear and controlgear assemblies available as a catalogue item, consisting of the manufacturer's standard layout and equipment. Minor modifications are permissible to accommodate equipment and accessories, whilst retaining standard format.
- Rated currents: Continuous uninterrupted current ratings within the assembly environment under in-service operating conditions.
- Rated short-circuit currents: Maximum prospective symmetrical root mean square (r.m.s.) current values at rated operational voltage, at each assembly incoming supply terminal.
- Tee-off busbars: Busbars connecting main busbars to incoming terminals of outgoing functional units.

1.6 SUBMISSIONS

Design documentation

Calculations: Submit the following:

- Detailed certified calculations verifying design characteristics.
- Design calculations of non-type-tested and non-proprietary busbar assemblies.

Standard: To AS 60890 (2009).

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

Type tests: Submit results as evidence of a successful type test, as follows:

- Electrical and mechanical routine function: To PRODUCTS, **GENERAL, Tests.**
- Dielectric properties: To PRODUCTS, **GENERAL, Tests.**

Verification tests to the AS/NZS 61439 series: Submit verification test certificates for components, functional units and assemblies with evidence that the tests, including any internal arcing-fault tests required, were carried out at not less than the designated fault currents at rated operational voltage. Assembly type testing to the AS/NZS 3439 series with test results that fulfil the requirements of the relevant parts of the AS/NZS 61439 series are acceptable as verification of the requirements of the AS/NZS 61439 series.

Alterations to assemblies tested to the AS/NZS 61439 series: Submit records of alterations made to assemblies since the tests.

Shop drawings

General: Submit shop drawings showing:

- Types, model numbers and ratings of assemblies.
- Design calculations of non-type tested and non-proprietary busbar assemblies.
- Overall dimensions.
- Rated current of components.
- Number of poles and spare capacity.
- Mounting details.
- Paint colours and finishes.
- Access details.
- Schedule of labels.
- Component details, functional units and transient protection.
- Detailed dimensions.
- Shipping sections, general arrangement, plan view, front elevations and cross-section of each compartment.
- Projections from the assembly that may affect clearances or inadvertent operation, such as handles, knobs, arcing-fault venting flaps and withdrawable components.
- Fault level and rated short-circuit capacity characteristics.
- IP rating.
- Fixing details for floor or wall mounting.
- Front and back equipment connections and top and bottom cable entries.
- Door swings.
- External and internal paint colours and paint systems.
- Quantity, brand name, type and rating of control and protection equipment.
- Construction and plinth details, ventilation openings, internal arcing-fault venting and gland plate details.
- Terminal block layouts and control circuit identification.
- Single line power and circuit diagrams for all new and modified switchboards.
- Details of mains and submain routes within assemblies.
- Busbar arrangements, links and supports, spacing between busbar phases and spacing between assemblies, the enclosure and other equipment and clearances to earthed metals.

- Dimensions of busbars and interconnecting cables in sufficient detail for calculations to be performed.
- Form of separation and details of shrouding of terminals.
- Labels and engraving schedules.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Fabrication and painting completed.
- Factory assembly completed, with busbars exposed and functional units in place.
- Assembly ready for routine testing.
- Assembly installed before connection.
- Assembly installed and connected.

2 PRODUCTS

2.1 GENERAL

Tests

Standard: To AS/NZS 61439.1 (2016).

Electrical and mechanical routine function tests: Test assemblies at the factory using externally connected simulated circuits and equipment.

Dielectric properties: To AS/NZS 61439.1 (2016) clause 10.9.

Dielectric test voltage: To AS/NZS 61439.1 (2016) clause 10.9.2.1.

2.2 CUSTOM-BUILT SWITCHBOARD CONSTRUCTION

Switchboard manufacturer

General: Use only switchboard manufacturers employing experienced switchboard personnel with more than 5 years' experience in the design of switchboards.

Switchboard connection

Type: Front connected.

Enclosure

Default material: Metallic-coated sheet steel.

Separation

Default: Form 1 to AS/NZS 61439.2 (2016).

Metering

Requirement: To *0921 Low voltage power systems*.

Main switchboard main switches

Spare capacity: Provide at least 25% spare capacity in the ratings main switch/isolators.

Busbars

General: Incorporate proprietary insulated busbar systems for the interconnection of isolators, circuit breakers and other circuit protective devices.

Busbar fault rating: Rated to meet the prospective fault current for 1 second or a minimum rating of ≥ 18 kA/second, whichever is the greater.

Spare capacity

Default spare poles: $\geq 20\%$.

Main switchboard incoming busbar: $\geq 25\%$.

Surge protection

General: Provide surge protection, as documented.

Earthing

General: Make provision for the connection of the communications earth terminal (CET) at switchboard earth bar to AS/CA S009 (2020).

IP rating

Default rating: IP42 minimum.

Weatherproof: IP56 minimum.

Equipment layout

General: Position equipment to provide safe and easy access for operation and maintenance. Group devices by function.

Connection: Front connected.

Compartments: Separate shipping sections, subsections, cable and busbar zones, functional unit modules and low voltage equipment compartments using vertical and horizontal steel partitions that suit the layout and form of separation.

Equipment on doors: Set out in functional unit groups and to allow access without the use of tools or keys.

Form 1 enclosures: Separate into compartments with partitions at 1.8 m maximum centres.

Segregation

General: Segregate NCC emergency equipment from non-emergency equipment with metal partitions designed to prevent the spread of a fault from non-emergency equipment to emergency equipment.

BMS equipment: Accommodate extra low voltage BMS equipment in a separate compartment.

Supporting structure

Assemblies:

- Wall mounted: Maximum 2 m².
- Floor mounted: Greater than 2 m².

Ventilation

General: Required to maintain design operating temperatures at full load.

Arc fault containment: Provide ventilation ducts and covers to allow the escape of hot gases generated under fault conditions.

Enclosure materials

General: Fabricate from sheet metal of rigid folded and welded construction. Obtain approval for non-welded forms of construction.

Material: Metallic-coated sheet steel to AS 1397 (2021).

Material thickness:

- Diagonal dimension:
 - . < 900 mm: Minimum 1.6 mm.
 - . ≥ 900 mm: Minimum 2.0 mm.

Coating class:

- Indoor assemblies: Z200.
- Outdoor assemblies: Z450.

Insect proofing

General: Cover ventilation openings with non- combustible and corrosion- resistant 1 mm mesh.

Equipment mounting panels

General: To support the weight of mounted equipment.

Metallic panels: Construct from metal greater than or equal to 3 mm thick with heavy metal angle supports or plates bolted or welded to enclosure sides.

Non-metallic panels: Provide non-metallic to support the weight of the mounted equipment and design the mounting structure for stability and stiffness.

Non-metallic boards: To IEC 60893-1 (2004).

Equipment fixing

Spacing: Provide 50 mm minimum clearance between busbars for the following:

- Lifts, fire services and building emergency services.
- General installation services busbars.
- Equipment.

Mounting: Bolts, set screws fitted into tapped holes in metal mounting panels, studs or proprietary attachment clips. Provide accessible equipment fixings that allow equipment changes after assembly commissioning.

Installation: For lightweight equipment, provide combination rails and proprietary clips.

Earth continuity

General: Strip painted surfaces and coat with corrosion-resistant material immediately before bolting to the earth bar. Provide serrated washers under bolt heads and nuts at painted, structural metal-to-metal joints.

Construction

Lifting provisions: For assemblies with shipping dimensions exceeding 1800 mm high x 600 mm wide, provide fixings in the supporting structure and removable attachments for lifting.

Supporting structure: Provide concealed fixings or brackets to allow mounting and fixing of assemblies in position without removing equipment.

Floor-mounting: Provide mild steel channel plinth, galvanized to class Z600, with toe-out profile, nominal 75 mm high x 40 mm wide x 6 mm thick, for mounting complete assemblies on site. Drill M12 clearance holes in assembly and channel and bolt assemblies to channel. Prime drilled holes with zinc rich organic primer to AS/NZS 3750.9 (2009).

2.3 CABLE ENTRIES

General

Requirement: Provide cable entry facilities within assembly cable zones for incoming and outgoing power and control cabling. Provide sufficient clear space within each enclosure next to cable entries to allow incoming and outgoing cables and wiring to be neatly run and terminated, without unnecessary bunching or sharp bends.

Cover and gland plates

Cover plates: Provide 150 mm maximum width cover plates butted together and covering the continuous cable entry slot.

Gland plates: Provide removable gland plates fitted with gaskets to maintain the degree of protection.

Materials: Conform to the following:

- Generally: 1.5 mm thick steel, 5 mm thick composite material or laminated phenolic.
- For MIMS cables and cable glands: 6 mm thick brass.

2.4 BUS TRUNKING SYSTEM ENTRY

General

Requirement: Provide entry plates with close tolerance cut-out to accommodate busbars, fitted with a flange bolted and sealed to assembly enclosure to maintain assembly IP rating. Earth the busway enclosure to the assembly protective earth conductor. Fit busway flanges at assembly manufacturer's premises and retain for transportation.

2.5 DOORS AND COVERS

General

Requirement: Provide lockable doors with a circuit card holder unless enclosed in cupboards.

Door layout

Maximum width: 900 mm.

Minimum swing: At least 90°.

Door stays: Provide stays to outdoor assembly doors.

Adjacent doors: Space adjacent doors to allow both to open to 90° at the same time.

Door construction

Protection: Provide single right angle return on all sides and fit suitable resilient sealing rubber to provide the documented IP rating and prevent damage to paintwork.

Hinges: Provide the following:

- Generally: Corrosion-resistant pintle hinges or integrally constructed hinges to support doors.
- For removable doors: Staggered pin lengths to achieve progressive engagement as doors are fitted.
- For doors higher than 1000 mm: 3 hinges.
- For non lift-off doors: Restraining devices and opposed hinges.

Door hardware: Provide the following:

- Corrosion-resistant lever-type handles, operating a latching system with latching bar and guides strong enough to withstand explosive force resulting from fault conditions within the assembly.
- Dual, edge mounted, corrosion-resistant T handles with provision for key locking cylinder.
- Captive, corrosion-resistant knurled thumb screws as an alternative to handles.

Locking: Incorporate cylinder locks in the latching system. Key alike, 2 keys per assembly.

Door mounted equipment: Protect or shroud door mounted equipment and terminals to prevent inadvertent contact with live terminals, wiring, or both.

Earthing: Maintain earth continuity to door mounted indicating or control equipment with multi-stranded, flexible earth wire, or braid of equal cross-sectional area, bonded to the door.

Covers

Maximum dimensions: 900 mm wide and 1.2 m² surface area.

Fixing: Fix to frames with at least 4 fixings, using corrosion-resistant acorn nuts with serrated washers.

Rest cover edges on the cubicle body or on mullions. Do not provide interlocked covers.

Handles: Provide corrosion-resistant D type handles.

Escutcheons

General: For doors enclosing circuit breakers, provide escutcheon plates as barriers between operating mechanisms and live parts.

Escutcheon plates

General: Provide plates or removable covers with neat circuit breaker toggle cut-outs allowing interchangeability of 1, 2 and 3 pole circuit breakers. Provide corrosion-resistant lifting handles or knobs. Provide unused circuit breaker toggle cut-outs with blanking infill pole covers.

Maximum dimensions: 900 mm wide and 1.2 m² surface area.

2.6 FACTORY FINISHES

General

Standard: To AS 2700 (2011).

Extent: Apply protective coatings to internal and external metal surfaces of assembly cabinets including covers, except to stainless steel, galvanized, electroplated, or anodised surfaces and to ventilation mesh covers.

Finish coats: Thermoset powder coating to AS 4506 (2005) or two-pack liquid coating of AS/NZS 3750.13 (1997) primer and proprietary or epoxy acrylic full gloss spray finish.

Factory finish colours

Mounting structure (brackets): To match enclosure.

Enclosure - indoor:

- Indoor assemblies: Orange X15.
- Assembly interior: Orange X15.

Enclosure - outdoor:

- Outdoor assemblies: Avocado green G34.
- Assembly interior: White.

Escutcheons - removable equipment panels:

- Internal assemblies: Orange X15.
- External assemblies: Off white Y35.

Doors: To match enclosure.

Plinths: Black.

2.7 BUSBARS

General

Requirement: Provide main circuit supply busbars within assemblies, extending from incoming supply terminals to the line side of protective equipment for outgoing functional units and for future functional units.

Standards: To AS 60890 (2009).

Custom-built busbar construction

Material: Hard-drawn high-conductivity electrolytic tough pitched copper alloy bars, designation 110.

Temperature rise limits - active and neutral conductors:

- Maximum rated current temperature rise limits: $65 \pm 1.5^{\circ}\text{C}$ by type test or calculation to AS 60890 (2009).
- Maximum short-circuit withstand current temperature rise limits: 160°C .

Cross-section: Rectangular. Remove sharp edges of rectangular busbar by filing the edge or use radiused edges.

Supports: Sufficient to withstand thermal and magnetic stresses due to maximum prospective fault currents.

Support material: Non-hygroscopic insulation capable of holding busbars at 105°C .

Proprietary busbars

Type: Multi-pole proprietary insulated busbar assemblies or busbar systems, verified for short-circuit capacity and temperature rise-limits by type tests.

Phase sequence

General: For main busbars and connections to switching devices, set-out phase sequence for phases A, B and C, from left-to-right, top-to-bottom and front-to-back when viewed from the front of the assembly.

Colour coding

General: Provide 25 mm minimum width colour bands permanently applied to busbars at 500 mm maximum intervals with at least one colour band for each busbar section within each compartment.

Active busbars: Red, white and blue respectively for the A, B and C phases.

Neutral busbar: Black.

MEN link: Green-yellow and black.

Protective earth busbar: Green-yellow.

Restrictions: Do not provide adhesive type colour bands.

Current carrying capacity

Active conductors: Take into account thermal stresses due to short-circuit current, assuming magnetic material enclosures located indoors in well-ventilated rooms and 90°C final temperature.

Neutral conductors: Size to match incoming neutral conductor current carrying capacity.

Protective earth conductors: Size for at least 50% of the rated short-circuit withstand current for 100% of the time duration.

Tee-off busbars current rating

For individual outgoing functional units: Equal to maximum frame size rating of the functional unit.

For multiple functional units: Equal to the diversity factors of AS/NZS 61439.1 (2016), based on frame size rating.

MEN links

MEN links $> 10 \text{ mm}^2$ in cross-section: Bolted removable busbar links stamped MEN LINK, located in the incoming compartment, between neutral and earth busbars.

Fault current limiters

General: Rate busbars connected to fault current limiters to 100% of the indicated fault current limiter circuit breaker frame size or fuse base rating.

Busbar links

General: For current transformers, provide removable busbar links less than or equal to 450 mm long.

Cable connection flags

General: Provide and support busbar flags for equipment with main terminals too small for cable lugs. Provide flags sized to suit cable lug termination, with current rating of at least the maximum equipment frame size.

Phase isolation: Provide phase isolation or barriers between flags where the minimum clearance distances phase-to-phase and phase-to-earth are below the component terminal spacing.

Future extensions

General: Pre-drill the main circuit supply busbar for future extensions and extend busbar droppers into future functional unit locations.

Jointing

General: Use multiple bolted joints on all overlapping busbars with a minimum of two bolts per joint.

Type: High tensile steel bolts, washers and nuts, with lock nuts or spring washers. Do not use tapped holes and studs or the like for jointing current carrying sections.

Custom-built busbar insulation

Active and neutral busbars and joints: Select from the following:

- Polyethylene: At least 0.4 µm thick with dielectric strength of 2.5 kV r.m.s for 1 minute, applied by a fluidised bed process in which the material is phase coloured and directly cured onto the bars.
- Close fitting busbar insulation mouldings at least 1 mm thick.
- Heat shrink material: Only on rounded edge busbars.

Taped joints: Apply non-adhesive stop-off type tape, coloured to match adjacent insulation and half lapped to achieve a thickness at least that of the solid insulation.

Damaged insulation: Repair damaged insulation before energising.

2.8 NEUTRAL LINKS AND EARTH BARS

Terminals

General: Provide terminals for future circuits.

Links

Assembly capacity > 36 poles: Provide neutral links and earth bars at the top and bottom of the circuit breaker section.

Assembly capacity ≤ 36 poles: Provide links and bars at the point of entry of incoming supply cables.

Mounting: Mount neutral links on an insulated base.

Control circuits: Provide separate neutral links and earth bars.

Labels: Provide labels for neutral and earth terminals.

Cables > 10 mm²: Provide bolts or studs.

Communications earth: Make provision for connection of communications systems earth at switchboard earth bar to AS/CA S009 (2020).

2.9 INTERNAL WIRING

Wiring

Cable type: 0.6/1 kV copper cables. Provide V-90HT insulation where directly connected to active and neutral busbars.

Cable interconnections

General: For the main circuit supply, provide cable interconnections as follows:

- ≥ 1.5 mm² internal cables, with minimum V75 insulation rating with stranded copper conductors rated to AS/NZS 3008.1.1 (2017). Provide cables with current ratings suitable for the internal assembly ambient air temperature and for temperature rise limits of equipment within the assembly.
- Run cables clear of busbars and metal edges.
- Provide cables capable of withstanding maximum thermal and magnetic stresses associated with relevant fault level and duration.
- Run cables neatly. Provide slotted trunking sized for future cables or tie at 150 mm maximum intervals with ties strong enough to withstand magnetic stresses created at the specified fault current. Do not provide adhesive supports.
- Provide for installation of wiring for future equipment without removal of existing equipment.
- Identify power and control cables at both ends with neat fitting ring type ferrules agreeing with record circuit diagrams.
- Terminate control cables and motor control circuits in tunnel terminals or, if necessary, provide suitable palm type lugs and correct crimp tool.
- For equipment mounted on hinged doors run cables on the hinge side to avoid restricting the door opening. Bundle cables with spiral wrap PVC and secure to door.
- If recommended by device manufacturers, provide shielded wiring.

Adjacent circuit breakers: If suitable proprietary multi-pole busbar assemblies are available to link adjacent circuit breakers, do not provide cable interconnections.

Cables > 6 mm²

Terminations:

- Tunnel terminals: Single cables.
- Other connection points or terminals: ≤ 2 cables.

Doors: Do not run cables to hinged doors or removable panels.

Supports:

- Spacing at enclosure: ≤ 200 mm from a termination.
- Spacing generally: ≤ 400 mm.
- Strength: Capable of withstanding forces exerted during fault conditions.

Single core cables rated ≥ 300 A: Do not provide ferrous type metal cable saddles.

Terminals marked: Terminate marked cables for connection to external controls in correspondingly marked terminals within the assembly.

Control and indication circuits

General: Provide conductors sized to suit the current carrying capacity of the particular circuit.

Minimum size: 1 mm² with 32/0.2 stranding.

Cable colours

General: Colour code wiring as follows:

- A phase: Red.
- B phase: White.
- C phase: Blue.
- Neutral: Black.
- Earthing: Green-yellow.

2.10 TERMINATIONS

Submains, light and power circuits

General: Connect direct to the control equipment terminals.

Shipping breaks: Provide terminal blocks for interconnecting wiring on each side of shipping breaks.

3 EXECUTION

3.1 ASSEMBLY INSTALLATION

Fixing

General: Before making inter-panel connections, fix assemblies and metering equipment enclosures into position, level and plumb.

3.2 ASSEMBLY ENTRIES

Cable entries

General: Neatly adapt one or more cable entry plates, if fitted, to accept incoming cable enclosure. Provide the minimum number of entry plates to leave spare capacity for future cable entries. Do not run cables into the top of weatherproof assemblies.

Single core cables rated > 300 A: Pass separately through integral non-ferrous gland plates. Do not use ferrous metal saddles. Minimise eddy currents.

Cable enclosures

General: Continue cable enclosures to or into assemblies and fit cable entry plates so that the IP rating of the assembly and the fire rating of the cable are maintained.

Cable supports

General: Support or tie mains and submains cables within 200 mm of terminations. Provide cable supports suitable for stresses resulting from short-circuit conditions.

Bus trunking system entry

General: Provide entry plates with close tolerance cut-out to accommodate busbars, fitted with a flange bolted and sealed to assembly enclosure to maintain assembly IP rating. Earth the busway enclosure to the assembly protective earth conductor. Fit busway flanges at assembly manufacturer's premises and retain for transportation.

3.3 MARKING AND LABELLING

General

Switchboard assembly: Label in conformance with AS/NZS 61439.1 (2016) including the following:

- Size and type of all incoming and outgoing mains and submains.
- Emergency operating procedures.

3.4 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed.

3.5 MAINTENANCE

General

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0943 SWITCHBOARD COMPONENTS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide switchboard components, as documented.

1.2 DESIGN

Statutory authority's equipment

General: Liaise with the electricity distributor about the installation and coordinate with their protective and control equipment.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0901 Electrical systems*.
- *0991 Electrical maintenance*.

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- ATS: Auto-transfer switch.
- MSB: Main switchboard.
- SPD: Surge protection device.

1.5 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Requirement: Submit manufacturer's technical data for all components.

2 PRODUCTS

2.1 REQUIREMENTS

General

Selection: To AS/NZS 3000 (2018) clause 1.7 and Section 2.

Rated duty: Uninterrupted.

Rated making capacity (peak): $\geq 2.1 \times$ fault level (r.m.s.) at assembly incoming terminals.

Utilization category: To AS/NZS 60947.1 (2021) clause 5.4 and the recommendations of Annex A.

- Circuits consisting of motors or other highly inductive loads: At least AC-23.
- Other circuits: At least AC-22.

Coordination: Select and adjust protective devices to discriminate under overload, fault current, and earth fault conditions.

Enclosure: IP4X minimum.

2.2 SWITCH-ISOLATOR

General

Standard: To AS/NZS 60947.1 (2021) and AS 60947.3 (2023).

Poles: 3.

Operation: Independent manual operation including positive ON/OFF indicator.

Shrouding: Effective over range of switch positions.

Fault make/fault break switch-isolators

Rated breaking capacity: To AS 60947.3 (2023) Table 4.

Rated short-time withstand current: As defined in AS/NZS 60947.1 (2021) clause 5.3.6.1 and the manufacturer's recommendation for the prospective fault current conditions.

Rated short-circuit making capacity: As defined in AS/NZS 60947.1 (2021) clause 5.3.6.2, to conform to the manufacturer's recommendation for the prospective fault current conditions.

Rated short-circuit breaking capacity: To AS/NZS 60947.1 (2021) clause 5.3.6.3 and the manufacturer's recommendation for the prospective fault current conditions.

Load make/load break switch-isolators

Rated making and breaking capacity: As defined in AS/NZS 60947.1 (2021) clause 5.3.5 to conform to AS 60947.3 (2023) Table 4 and the manufacturer's recommendations for the prospective fault current conditions.

2.3 OVERLOAD AND FAULT PROTECTION GENERALLY

General

Requirement: Provide overload and fault protection devices, including full discrimination and cascade protection, and grade with the electricity distributor's incoming supply protection system and the downstream site protection devices.

2.4 ARC FAULT DETECTION

General

Requirement: Provide arc fault detection devices on all final subcircuits, as documented, in conformance with AS/NZS 3000 (2018) clause 2.9.

Standard: To AS/NZS 62606 (2022).

2.5 FUSE SWITCH UNITS

General

Standard: To AS/NZS 60947.1 (2021) and AS 60947.3 (2023).

Operation: Provide an extendable operating handle.

Fuse links

Requirement: Isolate when switch contacts are open. Provide 3-phase sets of high rupturing capacity (HRC) fuse links.

2.6 AUTO-TRANSFER SWITCHES

General

Standard: To AS/NZS 60947.1 (2021) and AS/NZS IEC 60947.6.1 (2015).

Type: 3 pole automatic type with supervisory circuits that initiate and restore the changeover transfer operation.

Load side connections: Segregate from incoming side.

Classification: To AS/NZS IEC 60947.6.1 (2015):

- Contactors: PC.
- Circuits: CB.

Utilization category: To AS/NZS IEC 60947.6.1 (2015) clause 5.4.

Interlocks: Provide electrical and mechanical interlocks. If circuit breaker is used, provide for isolation of each circuit breaker.

2.7 MOULDED CASE AND MINIATURE CIRCUIT BREAKERS

General

Moulded case breakers: To AS/NZS 60947.1 (2021) and AS/NZS IEC 60947.2 (2015).

Miniature circuit breakers: Interrupting capacity classification to AS/NZS 60898.1 (2004) or AS/NZS 3111 (2009).

- For general building services: Type C.
- For motor protection: Type D.

Operation: Independent manual operation including positive ON/OFF indicator.

Trip type: Conform to the following:

- Moulded case breakers: Adjustable thermal, fixed magnetic.
- Miniature circuit breakers: Fixed thermal and fixed magnetic.

Isolation facility: Required.

Current limiting: Moulded case breakers required.

Mounting: Mount circuit breakers so that the ON/OFF and current rating indications are clearly visible with covers or escutcheons in position. Align operating toggles of each circuit breaker in the same plane.

Clip tray chassis: For miniature overcurrent circuit breakers, provide clip tray assemblies capable of accepting single, double or triple circuit breakers and related busbars. Provide moulded clip-on pole fillers for unused portions.

Utilization category: Moulded case breakers:

- Final subcircuits category: Category A.
- Mains and submains: Category B.

Trip settings: Set as documented, seal, and label.

Interchangeable trip units: Connect trip units so that trip units are not live when circuit breaker contacts are open.

Fault current limiting circuit breakers: Select breaker frame sizes from one manufacturer's tested range of breakers to give cascade and discrimination protection within the switchboard and downstream switchboards as required.

2.8 ELECTRICITY DISTRIBUTOR'S SERVICE PROTECTIVE DEVICES

General

Low voltage service protective devices: To AS/NZS 3000 (2018), the electricity distributor's requirements and the Service and Installation Rules.

Service protective devices > 100 A: Provide fault current limiting circuit breakers with adjustable overload and short-circuit current facilities with full discrimination and cascade protection between the incoming supply protection systems and the downstream protection systems.

2.9 RESIDUAL CURRENT OPERATED CIRCUIT BREAKERS (RCBO)

General

Standard: To AS/NZS 3190 (2016).

Integral non-overload protection type: To AS/NZS 61008.1 (2015).

Integral overload protection type: To AS/NZS 61009.1 (2015).

Modular type: To AS/NZS IEC 60947.2 (2015).

- Type I for patient treatment areas.
 - . Default tripping current: 10 mA.
 - . Switched neutral: Required.

- Type II.
- . Default tripping current: 30 mA.

2.10 AIR CIRCUIT BREAKERS

General

Standard: To AS/NZS 60947.1 (2021) and AS/NZS IEC 60947.2 (2015).

Type: Open construction, withdrawable 3 pole, front connected.

Utilization category: Category B.

Closing operation: Provide independent manual operation with trip free closing mechanisms and positive mechanically operated ON and OFF indication.

Opening operation: Provide independent manually operated release for opening.

Auxiliary switch contacts: Provide contacts with minimum rated operational current of 6 A at 230 V, 50 Hz. Provide at least one spare normally-open and one spare normally-closed contacts. Provide shunt trip release coil circuits with an early-make/late-break series connected auxiliary contact.

Protection system: Provide a fully adjustable solid state protection system integral to the circuit breaker and incorporating a solid state protection relay.

Locking: Provide for locking of circuit breakers in either the open or closed position.

Operating mechanism charging: Manual.

Electrical interlock: Control circuitry of functional units with normally-opened and normally-closed auxiliary contacts.

Mechanical Interlock: Provide cable or bar interlocks.

Interlock keys: Provide captive type coded key with squared face and alphabetical or numerical coded operating face to operate the electrical and mechanical interlocks as required.

Door interlock: Except for compartment doors that serve only as covers, provide interlocks to prevent compartment doors being open if the circuit breakers are closed.

Abnormal operations: Provide circuit breakers that preclude the following operations:

- Slow closing or opening of contacts.
- Manual independent hand closure, if springs fail.
- Release of charged springs while contacts are closed.

Maintenance: Provide for slow closing of the circuit breaker mechanism during disconnected maintenance.

Withdrawable type

Mounting: Mount circuit breaker on a withdrawable carriage for racking in or withdrawing, and for positively fixing the unit into any of the 3 following positions:

- Connected.
- Test/isolated.
- Disconnected.

Auxiliary contacts: Provide contacts that are disconnected in the isolated position and connected in the test position.

Interlocking: Provide interlocking that prevents the circuit breaker being racked in or withdrawn unless it is in a tripped condition and prevents the circuit breaker being closed unless located in either the connected or test/isolated position. Provide stored energy devices that are automatically discharged by any racking operation.

Shutters: Provide automatic shutters, which can be locked, covering busbar and incoming/outgoing circuit connections and labelled BUSBARS and CIRCUIT respectively.

Earthing: Provide earthing connection between withdrawable carriage and assembly earth busbar that makes before, and breaks after, other contacts on the circuit breaker carriage.

2.11 FUSES WITH ENCLOSED FUSE LINKS

General

Standards: To IEC 60269-1 (2006) and IEC 60269-2 (2013).

Fuses with fuse links for the protection of semiconductor devices: To IEC 60269-4 (2009).

Fuses with fuse links used as fault current limiters: Coordinate fuse type and rating with the protection switchgear manufacturer's recommendation if used downstream of the fault current limiters. Provide labels adjacent to the fuse holder stating FAULT CURRENT LIMITER and fuse size.

Fuse links: Enclosed, high rupturing capacity type mounted in a fuse carrier.

Breaking range and utilization category:

- Distribution/general purpose: gG.
- Motors: gM.

Fuse holders: Mount fuse holders so that fuse carriers may be withdrawn directly towards the operator and away from live parts. Provide fixed insulation that shrouds live metal when the fuse carrier is withdrawn.

Barriers: Provide barriers on both sides of each fuse link, preventing inadvertent electrical contact between phases by the insertion of screwdriver.

Spare fuse links: Provide 3 spare fuse links for each rating of fuse link on each assembly. Mount spares on clips within the spares cabinet.

Spare fuse holder carriers: Provide 3 spare fuse holder carriers for each size of fuse holder carrier on each assembly. Mount spares on clips within the spares cabinet.

Busbar mounted fuse holders: Provide fuse carriers with retaining clips, minimum fuse holder 32 A.

2.12 CURRENT TRANSFORMERS (PROTECTION)

General

Standard: To AS 61869.1 (2021) and AS 61869.2 (2021).

Type: Cast resin encapsulated window type with busbar clamping devices.

Rated short time current: At least the short time current equivalent to the assembly fault level.

Rated short time: At least the maximum time setting of the related protective relay. Minimum 1 s.

Rated primary current: Equal to assigned current rating of the associated functional unit.

Rated secondary current: 5 A. Connect star point to earth.

Interposing transformers: Provide to the protective relay manufacturer's recommendations.

Characteristics: Conform to the protective relay manufacturer's recommendations.

Test links: Provide test terminals and current transformer secondary shorting links in accessible positions within instrument panels. Provide a set of DIN rail mounted test links, consisting of screw clamped slide links and earth links, for each current transformer group.

Installation: Install transformers to permit easy removal.

Removable links: Provide removable links of minimum lengths for transformers fitted on busbar systems.

Markings: Mount transformers in the assembly enclosure, so that polarity markings and nameplate details are readily viewed right side up without removing the transformers.

2.13 SURGE PROTECTION DEVICES (SPD)

Standards

General: To AS 1768 (2021).

Ratings: To AS 1768 (2021) Section 4.

Installation: To AS 1768 (2021) Appendix F and AS/NZS 3000 (2018) Appendix F.

Primary protection

General: Provide shunt connected metal oxide varistor based SPDs between each phase and neutral at assembly incoming supply terminals, on the load side of incoming functional units.

Type I SPD

Surge rating (I_{max}) per phase to neutral: ≥ 100 kA.

Surge rating (I_{max}) neutral to earth if remote from the MEN earthing system: ≥ 100 kA.

Residual voltage: < 800 V at 3 kA.

Visual indicator: Provide visual indication of SPD status and life visible from the switchboard front panel.

Alarm contacts: Provide one set of normally closed dry contacts indicating active status.

Enclosure and installation: House SPD in a metal enclosure and protect with a suitably rated circuit breaker, HRC fuse or dedicated surge circuit breaker.

Type II SPD

Surge rating (I_{\max}) per phase to neutral: ≥ 40 kA.

Surge rating (I_{\max}) neutral to earth if remote from the MEN earthing system: ≥ 100 kA.

Nominal discharge current: 20 kA (8/20 μ s).

Residual voltage: < 800 V at 3 kA.

Visual indicator: Provide visual indication of SPD status and life visible from the switchboard front panel.

Alarm contacts: Provide one set of normally closed dry contacts indicating active status.

Enclosure and installation: House SPD in a metal enclosure and protect with a suitably rated circuit breaker, HRC fuse or dedicated surge circuit breaker.

Secondary protection

General: Provide shunt connected metal oxide varistor based SPDs between each phase and neutral and a gas discharge tube between neutral and earth at assembly incoming supply terminals, on the load side of incoming functional units and upstream of RCD devices.

Type III SPD

Surge rating (I_{\max}) per phase to neutral: ≥ 10 kA.

Surge rating (I_{\max}) neutral to earth: ≥ 5 kA.

Residual voltage: < 800 V at 3 kA.

Visual indicator: Provide visual indication of SPD status and life.

Alarm contacts: Provide one set of normally closed dry contacts indicating active status.

Enclosure and installation: House SPD in a metal enclosure and protect with a suitably rated circuit breaker, HRC fuse or dedicated surge circuit breaker. Make sure connecting lead lengths do not exceed 300 mm.

Combined primary and secondary surge reduction filter protection

General: Provide series connected surge reduction filter comprising metal oxide varistor based primary SPDs, a low pass LC filter and secondary metal oxide varistor based SPDs.

Surge rating (I_{\max}) per phase to neutral primary protection: ≥ 100 kA.

Surge rating (I_{\max}) neutral to earth if remote from the MEN earthing system: ≥ 100 kA.

Residual voltage: < 600 V at 3 kA.

Visual indicator: Provide visual indication of SPD status and life.

Alarm contacts: Provide one set of normally closed dry contacts indicating active status.

Enclosure and installation: House SPD in a metal enclosure and protected with a suitably rated circuit breaker or HRC fuse equal to or less than the load current rating of the SPD.

Protection of final subcircuits

General: Provide series connected surge filter comprising metal oxide varistor based primary SPDs, a low pass LC filter and secondary metal oxide varistor based SPDs.

Operating voltage (U_o): 230 V at 50 Hz.

Maximum discharge current (I_{\max}): 40 kA (8/20 μ s) phase to neutral and 100 kA neutral to earth.

Voltage protection level (U_p): < 600 V at 3 kA.

Visual indicator: Provide visual indication of SPD status.

Maximum continuous operating voltage (U_c): 275 V a.c.

Enclosure and installation: House SPD in electrical switchboard or panel and protect with a suitably rated circuit breaker or HRC fuse equal to or less than the load current rating of the SPD.

Enclosure mounting: DIN rail mounted.

2.14 CURRENT TRANSFORMERS (METERING)

Standard

Measurement current transformers: To AS 61869.1 (2021) and AS 61869.2 (2021).

Test links

General: Provide test links for connection of calibration instruments and meters and for shorting of current transformer secondaries.

Energy meters, maximum demand meters, ammeters and protection relays: Provide with rail-mounted links consisting of screw-clamped slide links and an earth link.

Test studs

General: For energy and demand meters provide rail-mounted potential test studs or plug connections next to associated current transformer links. Provide at least one set of test studs for each compartment.

Accuracy classification

Energy measurements: Class 0.5.

Indicating instruments: Class 3.

Ratings

Rated short time current: At least the short time withstand current equivalent of the circuit in which the transformer is installed.

Rated primary current: At least equal to the current rating of the functional unit.

Secondary windings: Rated at 5 A, burden of 0.4 Ω (10 VA) with star point earthed.

Type

General: If practicable, cast resin encapsulated window-type with busbar clamping devices. Otherwise wound-primary type with mounting feet.

Installation

General: Install transformers to permit easy removal.

Removable links: Provide removable links of minimum length for transformers fitted on busbar systems.

2.15 INSTRUMENTS AND METERS**Electricity meters (watthour meters)**

Standards:

- Socket mounting system: To AS 1284.4 (2006).
- Electronic: To AS 62053.21 (2023).

Electricity meters: Class 0.5.

3-phase metering: Polyphase meters suitable for balanced 3-phase, 4 wire loads.

1 or 2-phase metering: Single phase meters.

Current rating: To suit load and overload conditions. Provide direct connect meters suitable for current range of 15 to 100 A and meters with current transformers suitable to 5 A secondary.

Register: Provide a direct reading register of the large figure type. Mark on the scale the metering transformer ratios and the multiplying factor applied to the meter constant.

Covers: Seal main covers.

2.16 ELECTRICAL INDICATING MEASURING METERS**General**

Standard: To the IEC 60051 series.

Accuracy: Conform to the following:

- Indicating Instruments and accessories: \leq Class 1.5.
- Thermal maximum demand indicators: Class 3.
- Power factor meters, phase angle meters and synchroscopes: 2 electrical degrees maximum error.
- Transducers: Class 0.5.

Mounting: Flush mount.

Meter size:

- Minimum: 96 mm square bezel type.
- If located on Form 3 and Form 4 motor starter enclosures: 76 mm square bezel type.

Labels: If associated exclusively with one phase, label meters RED, WHITE, or BLUE as applicable.

Meter potential protection devices: Group together behind associated meter cover or hinged door, preferably next to current transformer test links.

Accessories: Mount next to associated instruments, inside cabinets.

Transducers: If necessary for transducer operation, provide auxiliary supply. Connect outputs to dedicated rail-mounted isolating type terminals.

Ammeters and voltmeters

Standard: To IEC 60051-2 (2018).

Ammeters: Conform to the following:

- Type: Moving iron type oil dampened for motor starter circuits, 90°.
- Overscale: For ammeters subject to motor starting currents, overscale to at least 5 x full load current.
- Selector switches: 4-position type with positions designated R/W/B/OFF. Mount under or beside relevant ammeters.

Voltmeters: Conform to the following:

- Type: Moving iron, 90°.
- Selector switches: 7-position voltage transfer type for measurement of phase-to-phase and phase-to-neutral voltages with off. Mount under or next to relevant voltmeters.

Maximum demand indicators

General: Provide a meter in each phase with 15 minute response time. Provide for sealing the reset mechanism. Provide a combination 3-point indicator consisting of an instantaneous red ammeter pointer, a red maximum demand slave pointer with external reset facility, and a white maximum demand pointer.

Instantaneous type: Combined type with bi-metal maximum demand ammeter element and moving iron instantaneous ammeter element.

Thermal type: Combined type with bi-metal maximum demand ammeter element.

Wattmeters and varmeters

Standard: To IEC 60051-3 (2018).

General: Suitable for balanced 3-phase, 4 wire loads. Connect to measurement transducers.

Frequency meters

Standard: To IEC 60051-4 (2018).

Type: Either an analog type, or vibrating reed type with 7 reeds.

Analog type: Graduated in 0.1 Hz increments.

Scales:

- Analog: Graduated 45/65 Hz.
- Vibrating reed: Horizontal reed bar graduated 47/53 Hz.

Synchrosopes

Standard: To IEC 60051-5 (2017).

General: Continuously rated, rotating vane type movement, with spring-loaded bearings and silicone fluid dampening, positive and negative arrows, black pointer and 12 o'clock marking.

Scales: 360.

Phase angle meters

Standard: To IEC 60051-5 (2017).

General: Provide for 3-phase, 4-wire balanced loads.

Scales: 0.5 leading to 0.5 lagging.

Hours-run meters

General: 6 figure (minimum), horizontal linear digits dial with last digit read-out in 0.1 hour increments.

2.17 CONTACTORS

General

Standard: To AS/NZS IEC 60947.4.1 (2015).

Type: Enclosed, block type, air break, electromagnetic.

Poles: 3.

Rated operational current: The greater of:

- Full load current of the load controlled.
- ≥ 16 A.

Mechanical durability: 10 million cycles to AS/NZS IEC 60947.4.1 (2015).

Electric durability: ≥ 1 million operations at AC-22 to AS/NZS IEC 60947.4.1 (2015).

Mounting: Mount with sufficient clearance to allow full access for maintenance, removal and replacement of coils and contacts, without the need to disconnect wiring or remove other equipment.

Auxiliary contacts: Provide auxiliary contacts with at least one normally-open and one normally-closed separate contacts with rating of 6 A at 230 V a.c., utilization category AC-1.

Slave relay: If the number of auxiliary contacts exceeds the number that can be accommodated, provide separate slave relays.

2.18 CONTROL DEVICES AND SWITCHING ELEMENTS

Standards

General: To AS/NZS 60947.1 (2021) and AS/NZS IEC 60947.5.1 (2015).

Switching elements:

- Electrical emergency stop device with mechanical latching function: To AS/NZS IEC 60947.5.4 (2015).
- Electromechanical control circuit devices: To AS/NZS IEC 60947.5.1 (2015).
- Proximity switches: To AS/NZS IEC 60947.5.2 (2015).

Rotary switches

General: Cam operated type with switch positions arranged with displacement of 60° .

Off position: Locate at the 12 o'clock position. Test positions must spring return to off position.

Rated operational current: At least 6 A at 230 V a.c.

Escutcheon plates: Provide rectangular plates securely fixed to the assembly panel. Identify switch position and function.

Time switches

Type: 7 day fully programmable with holiday override function.

Daylight saving switch: Required.

Mains failure operation: 100 hour minimum operating capacity.

Contact rating: ≥ 16 A at 230 V a.c. resistive load.

Construction: Provide readily accessible means of adjustment. Provide operational settings that are clearly visible when switch cover is fitted.

Dial: Digital with hour and minute display.

Override switch (manual): Required.

Control relays

Standard: To AS/NZS IEC 60947.5.1 (2015).

Requirement: Provide heavy duty fixed mounted type 3 relays.

Operation: Suitable for continuous operation.

Construction: Plug-in types. Receptacle bases with captive clips that can be operated without using tools.

Type: Modular block.

Contact elements: Electrically separate, double break with silver alloy, non-welding contacts.

Configuration: For standard relays, provide assemblies with ≥ 2 sets of contacts and expandable to 8 sets of contacts in the same assembly. Provide at least one normally-open and one normally-closed contact.

Plug-in types: If required provide the following:

- Receptacle bases with captive clips that can be operated without using tools.
- Changeover type contacts to allow either normally-open or one normally-closed configuration.

Control relay selection table

Relay type	Minimum mechanical life (million operations)	Base	Minimum contact rating	Inter-changeable	Minimum number of contact elements
1	5	Plug-in	1.25L	Yes	2
2	10	Plug-in	5 A at 240 V	Yes	2
3	10	Fixed mounting	5 A at 240 V	Yes	4

Time delay relays

Adjustable range: Adjustable over the full timing range with timing repeatability within $\pm 12.5\%$ of nominal setting.

Electronic relays: Incorporate light-emitting diodes indicating energisation states of relays.

Synchronous relays

General: Provide synchronous motor drive type relay fitted with anti-stalling device that protects gearing during normal operation.

Phase failure relays

General: Provide separate solid-state phase failure relays conforming to the following:

- Detect less than 85% of normal voltage.
- Detect single phase failure.
- Detect reverse phase sequence after an appropriate time delay.
- Automatic reset on detection of normal power supply.

Sensing circuit: To reject induced voltage spikes and disturbances with frequencies other than 50 Hz.

Back-up protection: Provide high rupturing capacity fuses to each phase.

Push- buttons

Type: Oil- tight, minimum 22 mm diameter, or 22 x 22 mm.

Rated operational current: At least 4 A at 230 V a.c.

Emergency stop devices with mechanical latching: To AS/NZS IEC 60947.5.5 (2015).

Marking: Identify functions of each push- button. For latched STOP or EMERGENCY STOP push- buttons, provide label with instructions for releasing latches.

2.19 SEMICONDUCTOR CONTROLLERS AND CONTACTORS**General**

Requirement: Provide semiconductor controllers and contactors rated for the characteristics of the controlled load.

Standard: To AS/NZS IEC 60947.4.3 (2015).

2.20 PROGRAMMABLE LOGIC CONTROLLERS (PLC)**General**

Requirement: Provide complete programmable logic controllers including central processing unit, input/output modules and mounting hardware, as follows:

- Modular in construction and of the same manufacture, with interchangeable peripherals and software.
- Provided with an integral power supply of sufficient capacity to satisfy the requirements of the central processing unit and input/output module combinations that can be located within the mounting hardware.
- Designed and constructed to operate in electrically noisy environments.
- Located in the low voltage control section of the associated functional unit.

Central processing units

General: Provide the following:

- Separate run, monitor and program functions.
- Operating system: Stored in non-volatile memory.

- Programmed software: Stored so that loss of power to the unit for a period up to 1 year will not cause corruption of data and will allow automatic restarting and correct operation immediately on power restoration.

Inputs and outputs (minimum):

- External inputs: 24.
- External outputs: 16.
- Internal relays: 128.

Input/output modules

Status: Clearly identified and indicated by a light-emitting diode.

Diodes: Not obscured by assembly wiring.

Analog input: 4 to 20 mA or 0 to 10 V d.c., opto-isolated.

Analog output: 4 to 20 mA or 0 to 10 V d.c., into a burden of $\geq 600 \Omega$.

Digital input: 24 V d.c., opto-isolated.

Digital output: Volt-free relay contacts or opto-isolated solid state switches for switching an output load of at least 2 A at 24 V a.c. or d.c.

Programmer

Operation: Using ladder logic, allowing for editing without the need to re-enter the whole program. Include test and monitoring functions that facilitate testing, running and debugging of software and provide for input/output number check.

Hand-held programmers: Provide moulded connectors and 2 m connection cable.

2.21 BUILDING MANAGEMENT SYSTEM INTERFACE

Standard

Building automation system protocol: To ANSI/ASHRAE 135 (2020).

Interface

General: Provide suitable BACnet interface equipment for connection to the BMS to achieve the documented performance and functionality.

Analog measuring equipment: Provide signal transducers to convert sensed signal to the required system signal standard for input to the BMS. Provide transducers with integral, accessible zero and span adjustments, open and short-circuit protection and reverse polarity protection.

AC current transducer input: Provide current sensing input devices, i.e. current transformers or Hall Effect Sensors, to input the current into the transducer.

Analog BMS transducer output: Provide both 0 to 10 V d.c. and 4 to 20 mA output signals for input to the BMS system.

BMS points: Provide the alarm and monitoring points to interface with the BMS, as documented.

BMS connection: Provide voltage-free contacts wired to a dedicated terminal strip in the respective switchboard.

Independent operation: Arrange the interface so that failure or fault in the BMS does not render the installation inoperative in any way.

2.22 CONTROL AND PROTECTIVE SWITCHING DEVICES OR EQUIPMENT

General

Standard: To AS/NZS IEC 60947.6.2 (2015).

Utilization category: To AS/NZS IEC 60947.6.2 (2015) Table 1.

2.23 INDICATOR LIGHTS

Standard

General: To AS/NZS IEC 60947.5.1 (2015).

LED indicators

Requirement for light units: Integrated LEDs.

Voltage range: 12 V a.c. and 12 V d.c. to 30 V d.c.

Body type: Plastic.

Rating: IP66.

Lens type: Plastic.

Terminals: Screw fixing.

2.24 INDICATING COUNTERS

General

Requirement: Provide the following:

- At least 6 digits.
- Digits at least 3.5 mm high.
- Continuous duty rated.
- Non-reset type.
- 500 V surge diverters.

2.25 ALARM ANNUNCIATORS

General

Requirement: Provide the following:

- Labelled annunciator illuminated windows, to indicate status and alarm conditions.
- Lamp test acknowledge-mute and reset individual push-buttons.
- Audible alarm and associated logic circuitry.

Mode of operation

General: Provide the following functions:

- Fault conditions: To initiate flashing of appropriate annunciator lamps and sounding of audible alarms.
- Operation of acknowledge and mute buttons: To silence audible alarms and change annunciator lamps to the steady state on condition.
- Window: To extinguish only when fault condition has been cleared and alarm reset push-button has been activated.
- Subsequent alarms on other inputs: To reactivate the audible alarm and flash the appropriate annunciator lamp.
- Resetting: After correction of the fault condition, provide on-site choice of either automatic resetting or manual resetting at the annunciator panel.

Type

General: Extra-low voltage, solid state, flush mounted, window type.

Lamps

General: Provide annunciators with 2 extra-low voltage lamps per window.

Rated voltage of lamps: 105% of the annunciator system voltage.

Replacing: Changeable from front of panel without affecting condition of annunciator.

Vibration: Provide lamps that do not disconnect due to vibration.

Extra-low voltage power supply

General: Provide an extra-low voltage power supply for the alarm annunciator.

Windows

Nominal size: 15 x 35 mm.

Engraving: Filled in black.

- Background colours: White for status monitoring, red for alarms and shutdown functions.

2.26 AUDIBLE ALARM DEVICES

Sound level

General: Not less than the greater of the following:

- 65 dB(A) at 1 m.
- 15 dB(A) above ambient sound levels at any location in designated areas.

2.27 EXTRA-LOW VOLTAGE TRANSFORMERS

General

Requirement: Provide the following:

- Centre tap on secondary winding.
- Primary and secondary windings wired out on opposite sides of transformer case.
- Primary and secondary windings separated by means of an earthed screen wired out to an insulated terminal.
- Transformer rating greater than or equal to 125% of maximum output load, taking account of degree of ventilation and ambient temperature within assembly, and supplied load.

2.28 BATTERIES AND CHARGERS

General

Requirement: Provide a battery and charger system for circuit breaker tripping, closing and automatic changeover switch operation. Locate within the switchroom or switchboard assembly.

Standards

General: To AS/NZS IEC 60947.5.1 (2015).

Valve regulated sealed lead-acid batteries: To AS 60896.21 (2023) and AS 60896.22 (2023).

Vented nickel-cadmium batteries: To AS IEC 60623 (2022).

Chargers: To AS 4044 (1992) Type 2.

Circuit breaker operation

General: Provide a d.c. supply for circuit breaker operation from battery system and charger.

Performance

General: Capable of 10 consecutive air-circuit breaker or moulded case circuit breaker operations for the designated quantity of circuit breakers. Each operation consists of open-close of main contacts for 0.5 s duration, with 1 s intervals between operations, and minimum discharge current of 4 A, with batteries in 50% discharge condition. Maintain a minimum terminal voltage of 80% of rated voltage at the completion of the 10 operations.

System voltage: 110 V d.c.

Battery chargers

Type: Free standing, floor mounted, ventilated cabinet type with separate charger and battery subsections.

Degree of protection: IP42.

Tapping: Provide tapplings on the transformer to permit adjustment over a range of 95% to 105% of secondary winding voltage on open circuit.

Circuitry: Solid state, micro-processor type, constant voltage, fully automatic, incorporating a smoothing network to give an output wave form at least as smooth as that of a 3-phase bridge system, and automatic boost and float charge functions for maximum battery life and rated performance. Provide facilities for manual boost and test.

Maximum design transient: 70% of the component manufacturer's peak inverse ratings.

Instruments, controls and indicators: Group for ease of operation. Provide analog or digital instruments for the following:

- Charger output current.
- System voltage.
- Load current.

a.c. input protection: Miniature circuit breakers. Protect outgoing tripping supply with a 2 pole d.c. miniature circuit breaker.

Alarm indication: Provide alarm indication to monitor the following:

- a.c. supply.
- Boost charge on.
- Charge fail.
- Low battery voltage.
- High battery voltage.
- Low electrolyte for vented cells.
- Earth fault, secondary side.

Safety signs and labels

Standard: To AS 2676.1 (2020).

Safety signs: Provide cautionary, regulatory and emergency safety signs to charger enclosure and switchroom.

2.29 ANTI-CONDENSATION HEATERS**General**

Rating: Provide heaters rated at not less than 20 W/m² of total external area including top of weatherproof enclosure.

Type: Black heat type with surface temperature less than or equal to 50°C, mechanically protected and thermostatically controlled.

2.30 SPARES CABINET**General**

Requirement: Provide a spares cabinet with main name plate, labelled shelves and non-lockable door. Size for storing racking handles, special tools, spare lamps, spare fuse links and other equipment necessary for satisfactory assembly operation.

Location: Either of the following:

- Incorporated into assembly enclosure.
- Wall mounted in main switchroom.

Finish: To match switchboard assembly.

3 EXECUTION

3.1 MARKING AND LABELLING**General**

Requirement: Provide labels including control and circuit equipment ratings, functional units, notices for operational and maintenance personnel, incoming and outgoing circuit rating, sizes and origin of supply and kW ratings of motor starters.

Labels on assembly exteriors

Manufacturer's name: Required.

Assemblies: Label with essential markings.

Designation labels: For other than main assemblies, provide designation label stating source of electrical supply. Identify separate sections of enclosures.

Assembly controls: Label controls and fault current limiters, including the following:

- Circuit designation for main switches, main controls and submains controls.
- Details of consumers mains and submains.
- Use different colours on labels to distinguish operational requirements such as normal operation, operation under fire or emergency conditions.
- Incoming busbar or cable rating to first tee-off.
- Fuse link size.

Labels on assembly interiors

General: Provide labels for equipment within assemblies. Locate so that it is clear which equipment is referred to, and so that lettering is not obscured by equipment or wiring.

Moulded case circuit breakers: If circuit breaker manufacturer's markings are obscured by operating handle mechanisms or motor operators, provide additional markings open to view on, or next to, the circuit breaker.

Arrestors: Label each group of primary arrestors, stating their purpose and the necessary characteristics.

Danger, warning and caution notices

Busbars: If polymer membrane coating is used without further insulation, provide warning notices on the front cover near the main switch or local main switch and on rear covers, indicating that busbars are not insulated.

Fault current limiters: In assembly sections containing fault current limiter fuses provide caution notices fixed next to the fault current limiters, stating that replacement fuse links are to match the installed fuse link ratings, make and characteristics. Provide separate label stating make and fault current limiting fuse ratings.

Externally controlled equipment: To prevent accidental contact with live parts, provide warning notices for equipment on assemblies not isolated by main switch or local main switch.

Stand-by power: Provide warning notices stating that assemblies may be energised from the stand-by supply at any time.

Anti-condensation heaters: To prevent accidental switching off, provide caution notices for anti-condensation heaters.

Insulation and shrouding: For insulation or shrouding requiring removal during normal assembly maintenance, provide danger notices with appropriate wording for replacement of insulation shrouding before re-energising assemblies.

Positioning: Locate notices so that they can be readily seen, next to or, if impracticable, on busbar chamber covers of functional units and behind the front cover of functional units. Provide circuit identification labels in the cabling chamber of each functional unit, located next to external terminations.

Schedule cards

General: For general light and power distribution assemblies, provide schedule cards of minimum size 200 x 150 mm, with printed text showing the following as-installed information:

- Submain designation, rating and short-circuit protective device.
- Light and power circuit numbers and current ratings, cable sizes and type and areas supplied.
- Mounting: Mount schedule cards in a holder fixed to the inside of the assembly or cupboard door, next to the distribution circuit switches. Protect with hard plastic transparent covers.

Single-line diagrams

Main switchboards and distribution switchboard assemblies: Provide single-line diagrams.

Format: Non-fading print, at least A3 size, showing the system as installed.

Mounting: Enclose in a non-reflective frame and wall mount close to assembly.

Marking cables

General: Identify the origin and cable size of wiring with legible indelible marking.

Identification labels: Provide durable labels fitted to each core and sheath, permanently marked with numbers, letters or both to suit the connection diagrams.

Multicore cables and trefoil groups: Identify multicore cables and trefoil groups at each end with durable non-ferrous tags clipped around each cable or trefoil group.

3.2 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed.

3.3 MAINTENANCE

General

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0951 LIGHTING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide lighting and control systems, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0901 *Electrical systems.*
- 0921 *Low voltage power systems.*
- 0991 *Electrical maintenance.*

1.3 STANDARDS

General

Air-handling luminaires: To AS/NZS 60598.2.19 (2001).

DALI systems: To the AS/NZS 62386 series.

Electronic switches: To AS 60669.2.1 (2020).

EMC compliance: To AS CISPR 15 (2017).

Energy efficiency for ballasts and lamps: To AS/NZS 4783.2 (2002).

Fixed general purpose luminaires: To AS/NZS 60598.2.1 (2014).

Floodlights: To AS/NZS 60598.2.5 (2018).

Harmonic limits: To AS/NZS IEC 61000.3.2 (2023).

Luminaires, general requirements and tests: To AS/NZS 60598.1 (2017).

Luminaires for swimming pools: To AS 60598.2.18 (2019).

Luminaires for use in clinical areas of hospitals and health care buildings: To AS/NZS 1680.2.5 (2018) and AS/NZS 60598.2.25 (2001).

Portable general purpose luminaires: To AS 60598.2.4 (2019).

Recessed luminaires: To AS/NZS 60598.2.2 (2016).

Road lighting luminaires: To SA/SNZ TS 1158.6 (2015).

Radio interference limits: To AS CISPR 15 (2017).

Minimum energy performance standards (MEPS)

General: To AS 4782.2 (2019), AS/NZS 4783.2 (2002) and AS 4934.2 (2021).

Self-ballasted lamps: To AS 4847.2 (2019).

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- CCT: Correlated colour temperature.
- CFL: Compact fluorescent lamps.
- CRI: Colour rendering index.
- DALI: Digital addressable lighting interface.
- EEI: Energy efficiency index.
- ELV: Extra low voltage.
- EMC: Electromagnetic compatibility.
- HID: High intensity discharge.
- ILCOS: International lamp coding system.

- LED: Light-emitting diode.
- PIR: Passive infra-red.
- PLC: Programmable logic controllers.
- RCD: Residual current device.
- UPS: Uninterruptable power supply.

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Control system (lighting): A lighting control system comprising a combination of some or all of the following:
 - . Automatic sensing and control components.
 - . Timers.
 - . Manual overrides.
 - . Programming using a computer interface.
- Incandescent lamp: Lamps covered in AS 4934.2 (2021) including tungsten filament, tungsten halogen and carbon filament types.
- Proprietary luminaires: Luminaires available as a catalogue item.

1.5 SUBMISSIONS**Operation and maintenance manuals**

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

Lighting: Submit technical data on the following:

- Luminaires.
- Lamps.
- Ballasts.
- Power factor correction equipment.
- Lighting control systems.
- All accessories.

Type test: Submit photometric test results as evidence of luminous efficacy for the applicable CCT for the following:

- Light-emitting diode luminaires.
- Light-emitting diode lamp replacement modules.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples.**

Shop drawings

Lighting: Submit shop drawings for the following:

- Lighting columns.
- Lighting column mounting bases.
- Non-proprietary luminaires.
- Non-standard fixing brackets.

2 PRODUCTS**2.1 GENERAL****Samples**

Requirement: Provide samples of luminaires and accessories complete with lamp, control gear and three core flex and plug.

2.2 PROPRIETARY LUMINAIRES**General**

Requirement: Provide proprietary luminaires complete with lamps, luminaire control equipment, lighting control equipment, and accessories as documented.

Self-ballasted lamps: To AS/NZS 60968 (2001).

Proprietary equipment

General: The requirements of this worksection for lamps, ballasts and luminaire control equipment override the specifications inherent in the selection of a particular make and model of luminaire.

2.3 FLUORESCENT LAMPS

Standards

Fluorescent lamps: To AS/NZS 4782.1 (2020) and AS 4782.2 (2019).

Compact fluorescent lamps: To AS/NZS 4847.1 (2010) and AS 4847.2 (2019).

Properties

CCT: 4000 K.

Colour rendering: Group 1B to AS/NZS 1680.1 (2006).

Linear and circular lamp type: T8 (26 mm diameter) or T5 (16 mm diameter), triphosphor, TL84, as documented.

Compact fluorescent lamp types: Four-pin, non-integrated type.

2.4 FLUORESCENT LAMP BALLASTS

Linear and circular lamp types

General: Provide electronic fluorescent lamp ballasts for fluorescent lamp lighting systems selected for compatibility with the lamp and control method.

Electronic fluorescent lamp ballasts: Conform to the following:

- To AS/NZS 61347.2.3 (2016) and AS/NZS 60929 (2020).
- Current total harmonic distortion: < 15%.
- Soft start.
- Number of ballasts: Provide separate ballasts for each lamp or integral dual ballasts as an alternative for dual lamp fittings.

Ballast performance measurement – fluorescent lamps: To AS/NZS 4783.1 (2001).

CFL lamp types

General: Provide electronic fluorescent lamp ballasts for CFL lighting systems selected for compatibility with the lamp and control method.

Electronic fluorescent lamp ballasts: Conform to the following:

- To AS/NZS 61347.2.3 (2016) and AS/NZS 60929 (2020).
- Current total harmonic distortion: < 15%.
- Number of ballasts: Provide separate ballasts for each lamp or integral dual ballasts as an alternative for dual lamp fittings.

Ballast performance measurement – fluorescent lamps: To AS/NZS 4783.1 (2001).

Fluorescent lamp power factor correction

General: Provide power factor correction on all luminaires to a minimum power factor of 0.9 lagging.

2.5 DISCHARGE LAMPS (HID)

Lamp standards

High pressure mercury vapour: To IEC 60188 (2001).

High pressure sodium vapour: To IEC 60662 (2011).

Low pressure sodium vapour: To IEC 60192 (2001).

Metal halide lamps: To IEC 61167 (2018).

Lamp controlgear for HID lamps: To the AS/NZS 61347 series and AS/NZS 60923 (1998).

Discharge lamp ballasts

General: Provide ballasts for lighting systems selected for compatibility with the lamp and control method.

High-pressure mercury vapour, low-pressure sodium vapour, high-pressure sodium vapour and metal halide type: Conform to the AS/NZS 61347 series and AS/NZS 60923 (1998).

Metal halide type:

- ≤ 150 W: Reactors or electronic controlgear.

- > 150 W indoor: To the lamp manufacturer's recommendation.
- > 150 W outdoor: To the lamp manufacturer's recommendation.

Igniters: If documented, provide igniters that cut out when lamp ignites and after pre-determined time period if lamp fails to ignite.

Instant restrike igniters: If required, provide instant restrike igniters for instant restart of suitable HID lamps to the manufacturer's requirements.

HID power factor correction

General: Provide power factor correction on all luminaires to a minimum power factor of 0.9 lagging.

Capacitors

Standard: To AS 61048 (2019) and AS/NZS 61049 (2002).

Integral fuses

General: Provide integral fuses for reactive high intensity discharge (HID) lamp ballasts.

2.6 LIGHT-EMITTING DIODE (LED) LUMINAIRES

General

Requirement: Provide light-emitting diode (LED) luminaires, as documented.

Light-emitting diode luminaires

General: Light-emitting diode luminaires including integral LEDs, reflectors, lenses, heatsinks and drivers.

Performance: Provide LED luminous efficacy of the LED luminaire at normal operating temperature in its normal position and enclosure of > 60 lumens per watt.

Life of the LED in the complete luminaire: L70 to IES LM-80 (2021), unless documented.

Colour: CRI > 80.

CCT: 3000 K.

Light-emitting diode lamp replacement modules

Performance: Conform to the following:

- Reflector lamps: Provide luminous efficacy of the LED replacement modules at operating temperature in normal position and enclosure of > 40 lumens per watt where the quoted beam angle is the angle between the points of 50% of maximum luminous intensity.
- Linear fluorescent lamps: Provide luminous efficacy of replacement modules of > 80 lumens per watt.

2.7 CONTROL GEAR ENCLOSURE

General

Requirement: Provide controlgear support enclosure within the body of the luminaire, except where remotely mounted controlgear is documented or required by the manufacturer.

Enclosures and controlgear mounting assemblies: Provide heat dissipation facilities to dissipate heat from the luminaire.

Controlgear enclosure: Form a barrier against direct contact with live parts of the controlgear and the area of the luminaire containing the lamp and lamp support holders.

Separate controlgear enclosures: If separate controlgear enclosures external to the luminaire are required, conform to the above requirements.

Fixing: Screw fixed.

2.8 WIRING

External flexible cords

Recessed luminaires: Provide flexible cords in conformance with the following:

- Length: ≥ 1.5 m.
- Cross-sectional area: 0.75 mm^2 .
- Type: 3-core V75 (minimum) PVC/PVC, connected to a 10 A 3-pin moulded plug to AS/NZS 3112 (2017) or multi-pin plug, as documented.

Other fittings: Provide external flexible cords in conformance with the following:

- Cross-sectional area: $\geq 1 \text{ mm}^2$.

2.9 LIGHTING CONTROL

General

Requirement: Provide the following, as documented:

- Lighting switches.
- Electronic lighting switches.
- Dimmers.
- Automatic control systems.

Manual controls

General: Provide manual control of luminaires into groups, zones and to individual devices, as documented.

Digital control system

General: Provide a microprocessor-based system to control lighting under automatic and user interface control, as documented.

Control wiring: To control system manufacturers' recommendation, with distinctive sheath colour.

Controllers and contactors: Provide controllers and contactors rated for the characteristics of the controlled load and to AS/NZS IEC 60947.4.3 (2015).

Dimmer control: Provide electronic dimmer controls compatible with the lighting control system and as documented.

Direct current interface for proximity sensors and amplifiers: To AS/NZS IEC 60947.5.6 (2015).

Controller interfaces: Provide interfaces between lighting control systems and other control systems as documented.

Remote monitoring

Common alarm: Provide for common alarm to be connected into a remote monitoring system.

BMS interface: Provide an interface to allow a building management system to monitor system output, monitor system alarms.

2.10 ACCESSORIES

General

Manufacturer: If of a similar finish, provide electrical accessories from the same manufacturer throughout the project and for interchangeability of subcomponents such as switch modules in wall plates.

Lighting outlets

Pin arrangement: Conform to the following:

- Standard: 3 flat pin with looping terminal.
- Luminaires with integral emergency light or special switching: If required, a 4 or 5 pin plug or a second lighting outlet plug of alternative pin configuration to differential the functions or supply.

Lighting switches

General: Provide light switches, as documented.

Standard: To AS 3133 (2020).

Type: Unbreakable polycarbonate rocker.

Colour: White.

Minimum: 10 A, 230 V a.c.

Fluorescent lamp circuit switches: 10 A or 15 A, 230V a.c. to suit circuit load.

Plantroom switches: Industrial type, rated IP56.

Key switches

General: Provide key switches as documented.

Run-on timer switches

General: Provide run-on timer switches as documented.

Delay: Adjustable to 20 minutes.

Dimmer switches

General: Provide integral dimmer/switch units as documented.

Proximity switches

General: Provide proximity switches as documented.

Standard: To AS/NZS IEC 60947.5.2 (2015).

Daylight switches

General: Provide integral photo electric switch units as documented.

Performance: Adjustable between 50 and 1000 lux in internal applications and 2 to 100 lux in external applications

Time delay: > 2 minutes.

Illumination differential: > 50 lux.

Motion detector switches

General: Provide motion detection sensors that cover designated areas as documented.

Timer: Incorporate ON timers adjustable between 1 and 5 minutes minimum and 30 minutes and 2 hours maximum.

Control function: Provide manual/OFF/automatic control switch. If manual switches are used in association with motion sensors, wire the switch so that it can turn the lights OFF but not override the motion switch to turn the lights ON.

Standard: To AS 2201.3 (1991).

Type: Passive infra-red (PIR).

Manual time delay switches

General: Provide manual time delay relay switches as documented.

Type: Electronic.

Duration: Adjustable between 5 minutes and 15 minutes.

Indicator light: Required. Activated when artificial illumination is OFF.

3 EXECUTION

3.1 RE-USE OF LUMINAIRES**Modifications and refurbishing**

General: Modify and refurbish existing luminaires to manufacturer's current recommendations. Test for conformance with current Australian Standards before returning to service. Provide test results.

Component replacement: Starter and lamp.

Diffuser: Clean.

3.2 SUPPORTS**General**

Requirement: Install luminaires on proprietary supports, including battens, trim, noggings, roses and packing material.

Suspended luminaires

Rods: Steel pipe suspension rods fitted with gimbal joints.

Chains: Electroplated welded link chain.

Levelling wire: Stainless steel.

Levelling: Adjust the suspension system length so that the lighting system is level and even.

Horizontal tolerance: ± 3 mm between luminaires within the same area.

Surface mounted luminaires

General: Fit packing pieces to level luminaires and prevent distortion of luminaire bodies. Provide packing strips to align end to end luminaires.

Fixing: Conform to the following:

- Generally: Provide 2 fixings at each end of fluorescent luminaires.
- Luminaires less than 150 mm: A single fixing at each end in conjunction with 1.6 mm backing plates may be used.
- Provide battens and support for the fitting.
- Do not direct fix into plasterboard.

Recessed luminaires

General: Install recessed luminaires in trimmed openings in the suspended ceiling.

3.3 WIRING CONNECTION**Recessed luminaires**

General: Connect recessed luminaires to a plug socket-outlet.

Lighting tracks

General: For low voltage transformers located remotely from the track, size the cable between the transformer and the track to give a voltage drop of less than 5% between the transformer and the track at the rated current of the transformer.

3.4 ACCESSORIES**Installation**

General: Install accessories and conceal cabling to *0921 Low voltage power systems*.

3.5 COMPLETION**Operation and maintenance manuals**

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed.

3.6 COMMISSIONING**General**

Requirement: Before the date for practical completion carry out the following:

- Verify the operation of all luminaires.
- Adjust aiming and controls for all luminaires under night time conditions.
- Replace lamps that have been in service for a period greater than 50% of the lamp life as published by the lamp manufacturer.

Digital control system: Commission to the manufacturer's recommendations and to the documented control requirements.

BMS interface: Commission as part of commissioning process for the BMS.

3.7 MAINTENANCE**General**

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0961 INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES**General**

Passive systems: Provide a passive telecommunications cabling network including all cabling components, as documented.

Remote powering category: Category RP1 to AS/NZS 14763.2 (2020) Table 1 for a remote powering cable installation, also known as Power over Ethernet (PoE).

Active systems: Provide all IT components, active computer hardware and systems, as documented.

System performance - commercial buildings, small offices and home offices

Application class: To AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz).

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clauses 6.3, 7.2 and 9.3, AS 11801.2 (2019) and AS 11801.4 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 (data/voice) Category 6_A, AS 11801.2 (2019) and AS 11801.4 (2019).

Optical fibre cabling system: To AS 11801.1 (2019) clauses 6.5, 7.4, 8.3 and 9.5, AS 11801.2 (2019) and AS 11801.4 (2019).

System warranty: 15 years minimum.

System performance – distributed building services

Application class: To AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz).

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.6 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.6 (2019).

Optical fibre cabling system: To AS 11801.1 (2019) clauses 8.3 and 9.5, and AS 11801.6 (2019).

System warranty: 15 years minimum.

System performance – data centres

Application class: Main distribution, intermediate distribution and zone distribution cabling systems to AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz), and AS 11801.5 (2019) clause 6.3.2.

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.5 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.5 (2019) clauses 8.2, 9.2, 10 and 11.

Optical fibre cabling system: To AS 11801.5 (2019) clauses 6.3.3, 9.5, 10 and 11.3.

System warranty: 15 years minimum.

System performance – industrial premises

Application class: Main distribution, intermediate distribution and zone distribution cabling systems to AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz), and AS 11801.3 (2019) clause 6.3.2.

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.3 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.3 (2019) clauses 8.2, 9.2, 10 and 11.

Optical fibre cabling system: To AS 11801.3 (2019) clauses 6.3.3, 8.3, 9.3, 10 and 11.3.

System warranty: 15 years minimum.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements*.
- 0901 *Electrical systems*.
- 0991 *Electrical maintenance*.

1.3 STANDARDS

General

Authorities: To the requirements of the Australian Communications and Media Authority (ACMA).

Cabling products: To AS/CA S008 (2020) and the AS 11801 series.

Communications cable systems: To AS/CA S009 (2020), the AS 11801 series, AS/NZS 3084 (2017) and AS/NZS 14763.2 (2020).

Communications cable systems for small office/home office: To AS/CA S009 (2020), the AS 11801 series and AS/NZS 14763.2 (2020).

Cable management and documentation: To AS/NZS 14763.2 (2020) and AS 3085.1 (2022).

1.4 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- CES: Communication earth systems.
- EMI: Electromagnetic interference.
- EMR: Electromagnetic radiation.

- FD: Floor Distributor.
- F/UTP: Foil screen/unshielded twisted pairs.
- IDC: Insulation displacement connection.
- LAN: Local area network.
- OSI: Open systems interconnection.
- PoE: Power over Ethernet.
- RP: Remote powering.
- RU: Rack unit.
- U/FTP: Unscreened/foil screen twisted pairs.
- WAN: Wide area network.
- WAP: Wireless access point.

1.5 SUBMISSIONS

Certification

Requirement: Submit certification for product and installation.

Copper cable termination distributors: Submit vendor certification, including the warranty period, for the integrated voice/data copper cabling systems.

Optical fibre termination panels: Submit vendor certification, including the warranty period, for the optical fibre cabling systems.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Telecommunications cabling: Submit technical data including the following:

- System design parameters: Performance.
- Voice and/or data transfer rate.
- Cable type, cross-sectional area and characteristics.
- Segregation requirements for EMI/EMR.
- Maximum length of cables.
- Cross-connect type and characteristics.
- Cross-connect block.
- Patch cords.
- Fibre optic terminations.
- Patch panel module.
- Cable management for racks.
- Rack.
- Fly leads.

Communications components: Submit technical data including the following:

- Hardware and software manufacturer's technical literature.

Quality plan

Requirement: Submit a quality plan prior to the commencement of the installation to AS/NZS 14763.2 (2020) Section 6. Within the quality plan, include installation methodology, engineering calculations of pathway and remote powering, maximum cable lengths and the records management system.

Records

Cable management: To AS/NZS 14763.2 (2020) Section 9. Before the date for practical completion, submit logbooks for each distribution frame with details of cable terminations and provisions for recording cable, line and jumper information.

Samples

Requirement: Submit samples to **PRODUCTS**, **GENERAL**, **Samples**.

Shop drawings

Telecommunications cabling: Submit shop drawings for the following:

- Layouts of equipment racks.
- Cross-connect layout.
- Cabling diagram for complete system.
- Cable management system.

Tests

Production tests: Submit test results of the following to PRODUCTS, **TESTS, General**:

- Free and fixed connections.
- Other connecting hardware.

Site tests: Submit test results to EXECUTION, **TESTING**.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples of the telecommunications outlets.

2.2 NETWORK CONNECTION

External network

Requirement: Liaise with each external communications carrier and determine the services and site access requirements for each network carrier's connection.

2.3 BUILDING ENTRANCE FACILITIES

Campus distributor (CD)

Standard: To AS/NZS 3084 (2017), AS 11801.1 (2019), AS 11801.2 (2019) and AS/NZS 14763.2 (2020).

Network termination device

Requirement: Provide network termination device for the termination of external carrier cables and facilities. Provide separate frames as required for each external communications' carrier and for copper and optical fibre cables.

Degree of protection for external BD/CDs: To AS 60529 (2004).

2.4 DISTRIBUTORS

General

Requirement: Provide the Building Distributors (BD) and Floor Distributors (FD) for voice and data to AS 11801.1 (2019) and AS/NZS 14763.2 (2020) and as documented for the termination of campus and building backbone cable systems and the horizontal cable distribution systems.

Equipment requirements: Provide cable termination racks, patch panels, equipment mounting racks for servers and routers complete with power outlets as documented.

Copper cable termination distributors

General: Provide termination frames for the termination of copper horizontal cable services to the manufacturer's recommendations.

Certification: Provide vendor certification (including the warranty period) for the integrated voice/data copper cabling systems.

Equipment racks

Dimension and type: Conform to the following:

- Equipment racks: 19 inch wide industrial type, or 600 mm or 800 mm wide RUs:
 - . ≤ 18 RU: Wall mounted, 600 mm depth.
 - . > 18 RU: Floor mounted, 800 mm or 1000 mm depth.
- Patch panels – Copper CAT 6A cables: 800 mm wide and 800 mm deep.
- Patch panels – Optical fibre cables: 800 mm wide and 800 mm deep.
- Server racks: 600 mm wide and 1000 mm deep.

Access location: Front, sides or rear.

Cable tray: Locate within outer cabinet void. Document any required alternative in the quality plan.

Doors: Provide lockable doors with infill material suitable to provide airflow capability to suit environmental and security considerations.

Power provision: Minimum 1 socket-outlet for every 3 rack units on vertical rail. Make sure socket numbers suit the required power rating. Fit socket-outlets with captive rings to retain captive plugs.

Cable management: Provide as follows:

- 1 module for every 2 patch panels.
- 1 module for each fibre termination panel.
- Locate vertically, on both sides of the panel.

Provisions for active equipment: 25% minimum, 1 fixed shelf for every 4 RU of active equipment space.

Ventilation: Fan assisted.

Earthing: CES earth bar required.

Fixing: Conform to the following:

- Floor mounted: Firmly fix to floor, bolt together multiple racks using standard kit accessories.
- Floor/Wall mounted: Firmly fix to floor and wall.

Cross connect patch panels (copper cables)

General: Provide the following:

- Copper cross connect patch panels as documented.
- Separate patch panels for voice and data services and clearly label the service.

Size: Provide the following:

- 24 jack modular standard patch panel racks of sufficient quantity to accommodate the horizontal cabling requirements for voice and data equipment circuits.
- 20% spare capacity.

Jacks: Provide 8 position, 8 conductor, RJ45, non-keyed modular jacks with centre locking latch to AS 11801.1 (2019).

Patch cable support: Provide an integral patch cable support system with each patch panel.

Terminations: Terminate directly to the modular connector.

Fixed terminations:

- Rear terminals: To manufacturer's recommendations.
- Front terminals: Connect to RJ45 modular connector.

Patch cords: Terminate cord ends with appropriate registered jacks.

Optical fibre termination panels

Requirement: Provide rack mounted termination frames for the termination of optical fibre backbone and horizontal cable services.

Certification: Provide vendor certification, including the warranty period, for the optical fibre cabling systems.

Break out trays: Provide fibre optic cable break out trays at each group of fibre optic cable terminations.

Loom cables: Neatly loom cables and lay stripped cables into the break out tray.

Secure cables: Make sure that cables are secured by the sheath and that there is no stress on the fibre optic cores.

Cross connect patch panels (optical fibre cables)

Requirement: Provide optical fibre cross connect patch panels as documented for both single and multicore optical fibre cables.

Cable management

Record book: To AS/NZS 14763.2 (2020) Section 9.

Location: Document in the quality plan.

Identification, labelling, and record documentation: To AS/NZS 14763.2 (2020) Section 9 and AS 3085.1 (2022).

2.5 CABLES

Copper

Standard: To AS/CA S008 (2020), AS/CA S009 (2020), the AS 11801 series and AS/NZS 14763.2 (2020).

Campus and building voice backbone cables: Cable as documented or to suit the voice outlet density at each building or floor distributor, with 30% spare capacity allowance.

Horizontal cabling voice and data: CAT 6A F/UTP cabling to each floor outlet.

Balanced system cables: Unshielded or shielded twisted pairs, as documented.

Cable end length: Sufficient cable slack to move within the rack.

Optical fibre

Standard: To AS 11801.1 (2019).

Campus and building backbone cables:

- Default multimode type: 6 core multi-mode OM4 50/125 μm .
- Default single mode type: Single core OS1 internal and OS2 external and underground.

Length: Provide not less than 1000 mm spare at each end.

Component type: LC.

Safe practices: To AS/NZS 2967 (2014).

External and underground

Standard: Water penetration resistance and UV stabilisation to AS/CA S008 (2020).

2.6 SURGE PROTECTION DEVICES (SPD)

General

Requirement: Provide all mode metal oxide varistor based series connected SPD to protect equipment in racks and cabinets, as documented.

Standard: To AS 4262.1 (1995), AS 4262.2 (1999), AS 1768 (2021) and AS/NZS 62368.1 (2022).

Operating voltage (U_o): 230 V at 50 Hz.

Surge rating (I_{max}): 40 kA (8/20 μs) phase to neutral and 100 kA neutral to earth.

Voltage protection level (U_p): < 600 V at 3 kA.

Visual indicator: Provide visual indication of SPD status.

Maximum continuous operating voltage (U_c): 275 V a.c.

Enclosure and installation: House SPD in an electrical switchboard or panel and protect with a suitably rated circuit breaker or HRC fuse equal to or less than the load current rating of the SPD.

Enclosure mounting: DIN rail mounted.

2.7 TELECOMMUNICATIONS OUTLETS

General

Outlets: Provide RJ45 8-way modular jacks, flush mounted on faceplate. Provide for up to three modular voice or data outlets on each faceplate. Make sure unused socket positions are filled with blank inserts. Arrange the modular sockets with the locking latch in the bottom position, i.e. pins at the top.

Colour: Electric white.

Standard: To AS/CA S008 (2020).

Horizontal cabling termination: Terminate cabling to the rear of the outlet modular jack to manufacturer's recommendations. Arrange cable pairs at each jack conforming to AS 11801.1 (2019) Figure 9.

Pinouts: T568A to AS 11801.1 (2019) and AS 11801.2 (2019).

Modular socket-outlets: Provide an 8-position conductor, no keyed RJ45 compatible modular jack with centre locking latch in conformance with AS 11801.1 (2019).

2.8 FLY LEADS

General

Type: Flexible. Minimum 26 AWG.

Length: 1500 mm.

Quantity: Provide fly leads to 50% of outlets installed.

2.9 PATCH CORDS

General

Type: Flexible. CAT 6_A U/FTP. Minimum 26 AWG.

Length: 1000 mm.

Quantity: 100% of outlets installed with 10% additional spare patch cords.

Termination: Registered jacks.

2.10 WIRELESS ACCESS POINT (WAP)

General

Requirement: Provide WAPs documented, cabled to patch panels in the nearest FD.

Compatibility: ISO/IEC/IEEE 8802-11 (2022), IEEE 802.3 (2022) and IEEE 802.11 (2020).

LAN port: Minimum 2.5 GB.

Modes: Wireless access point, point-to-point bridge, point-to-multi-point wireless bridge, wireless client and wireless repeater.

Power over ethernet: Required.

Location: Install in ceiling voids distributed around the site buildings. Determine the number and location by a site survey using the wireless network to confirm full site coverage.

2.11 ENGINEERING SERVICES

General

Requirement: Provide cabling systems, as documented.

2.12 TESTS

General

Production tests: Complete as follows:

- Free connections: To AS/NZS 14763.4 (2022).
- Fixed connections: To AS 11801.6 (2019).
- Other connecting hardware: To AS/NZS 14763.4 (2022).

Cable separation

Separation for safety: To AS/CA S009 (2020).

Separation for performance: To AS/NZS 14763.2 (2020).

Fluorescent luminaires: Maintain a clearance of more than 300 mm.

External cabling

Requirement: To CA C524 (2013).

2.13 TELECOMMUNICATIONS OUTLET INSTALLATION

Installation

Horizontal cabling termination: Terminate cabling to the rear of the outlet modular jack to manufacturer's recommendations. Arrange cable pairs at each jack conforming to AS 11801.1 (2019) Figure 9.

2.14 EARTHING SYSTEM

General

Standard: To AS/CA S009 (2020) Section 20.

Communication earth system (CES)

Requirement: Provide a communications earth terminal (CET) adjacent to each communications room electrical switchboard. Connect the CET to the local protective earth (PE) system at the local switchboard.

Distributor: Provide an earth bar within each distributor or rack and connect to the local CET.

Interconnections: Verify that there are no interconnections between the lightning protective earthing system and the telecommunications earthing system.

2.15 LABELS

General

Telecommunications facilities: To AS/NZS 14763.2 (2020).

Cross connects and outlets: To AS 11801.1 (2019).

Cables: Label with the origin and destination of the cable.

Outlets: Label with the origin of the cross-connect, the workstation or outlet number and the port designation.

Label type table

Component	Label scheme	Type
Cables	Origin and destination	Self-adhesive, wrap on
Cross-connects	Port number	Proprietary
Patch cords	Type of service	Colour code

2.16 TESTING

General

Requirement: Carry out 100% permanent link tests to AS/NZS 14763.2 (2020).

Cable testing

Telecommunications cabling installation copper cables: To IEC 61935-1 (2019), IEC 61935-2 (2022) and AS/NZS 14763.2 (2020).

Telecommunications cabling installation fibre optic cables: To AS/NZS 14763.3 (2017).

Balanced cabling

Standard: To AS/NZS 14763.2 (2020) clause 6.3.1 and Table 2. Include the following for permanent link testing:

- Basic verification:
 - . Wire map.
 - . Length.
 - . Continuity.
- Internal transmission:
 - . Return loss.
 - . Insertion loss.
 - . Pair to pair NEXT.
 - . PS NEXT.
 - . Pair to pair ACR-N.
 - . PS ACR-N.
 - . Pair to pair ACR-F.
 - . PS ACR-F.
 - . DC loop resistance.
 - . DC resistance unbalance within a pair.
 - . DC resistance unbalance between pairs.
 - . Propagation delay.
 - . Delay skew.

Optical fibre cabling

Standard: To AS/NZS 14763.2 (2020) clause 6.3.2 and Table 4. Include the following for permanent link testing:

- Basic verification:
 - . Polarity.
- Basic test group:
 - . Attenuation.
 - . Propagation delay.

. Length.

2.17 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed, as documented in the quality plan.

Warranties

Requirement: Cover materials and in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As documented.

2.18 COMMISSIONING

Software

Requirement: Commission to the manufacturer's recommendations.

Completion: Verify the functional and operational performance of the software before the date for practical completion.

Disaster recovery: Verify that the software recovers from disaster events without loss of data and without loss of reliability.

Reliability: Verify that the software system provides reliable reporting and results through alternative measurement methods.

2.19 MAINTENANCE

General

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0971 EMERGENCY EVACUATION LIGHTING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide single point monitored emergency lighting and exit signs, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0901 Electrical systems.
- 0991 Electrical maintenance.

1.3 STANDARDS

General

System design, installation and operation: To AS/NZS 2293.1 (2018).

Inspection and maintenance: To AS/NZS 2293.2 (2019).

Emergency escape luminaires and exit signs: To AS/NZS 2293.3 (2018).

1.4 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

Emergency evacuation lighting: Submit technical data for each type of luminaire and exit sign including the following:

- Maximum luminaire spacing for a given mounting height.
- Luminaire classification to AS/NZS 2293.3 (2018).
- Central battery and charger performance test reports, including discharge and charging characteristics.

Type tests: Submit test results for emergency evacuation lighting equipment to AS/NZS 2293.3 (2018).

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples.**

Shop drawings

General: For each custom-built luminaire and exit sign, submit the following:

- Construction details.
- Overall dimensions.
- Wiring arrangement.

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples of luminaires and exit signs.

2.2 SINGLE POINT SYSTEM LUMINAIRES

General

Requirement: Provide single point luminaires complete with lamps, luminaire control equipment, lighting control equipment, batteries and accessories as documented. Provide lamps of the same type from the same brand and country of manufacture.

Visual indicator lights: Provide a red indicator, readily visible when the luminaire is in its operating location, which indicates that the battery is being charged.

Inverter system: Provide protection of the inverter system against damage in the event of failure, removal or replacement of the lamp, while in normal operation.

Local test switches: Provide a momentary action test switch, accessible from below the ceiling, on each luminaire to temporarily disconnect the mains supply and connect the battery to the lamp.

Common test switches: Provide a common test switch on the local distribution board that disconnects main supply to the luminaires and tests for discharge performance and automatically reverts to normal operating mode after testing.

Batteries

Type: Lithium-ion, lead-acid or nickel-cadmium batteries capable of operating each lamp at its rated output continuously for at least 2 hours during commissioning tests and 1.5 hours during subsequent tests.

Battery life: At least 5 years when operating under normal conditions at an ambient temperature of between 10°C and 40°C and subject to charging and discharging at 6 monthly intervals.

Marking: Indelibly mark each battery with its date of manufacture.

3 EXECUTION

3.1 SINGLE POINT SYSTEM

Power supply

General: Provide an unswitched active supply to each luminaire and exit sign, originating from the test switch control panel.

Data monitoring

General: If a monitoring system is documented, provide a data cable system from each single point luminaire and connect to the monitoring computer.

Test switch

General: Provide a timed test switch at each distribution board.

Function: To energise emergency lights and exit signs and then to automatically reset controls after a maximum of 2 hours.

3.2 MARKING AND LABELLING

Labelling

General: Label each luminaire with a unique identifying number. Provide a label that is permanently fixed, indelible and readable at a distance of 1 m.

Emergency evacuation lighting schedule: Record the number and luminaire location in an emergency evacuation lighting schedule included in the operation and maintenance manual.

3.3 COMPLETION

Operation and maintenance manuals

Standard: To the recommendations of AS/NZS 2293.1 (2018) Appendix G.

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed. Include baseline data to AS/NZS 2293.1 (2018) and **BASELINE DATA** in 0171 General requirements.

3.4 PRE-COMMISSIONING

Mains supply

General: Before commissioning, make sure mains supply has been continuously connected for at least 24 hours.

3.5 COMMISSIONING

General

Standard: To AS/NZS 2293.1 (2018).

Requirement: Carry out tests, including out-of-hours tests, to demonstrate the emergency and evacuation system's performance, to the manufacturer's recommendations and as follows:

- Test components for correct function and operation.
- Demonstrate illumination performance on site, to at least the level stated in the manufacturer's recommendations for performance for that device.
- Test operation of battery discharge test and control test switch functions, including discharge and restoration.
- Demonstrate system functions under mains fail condition.
- Demonstrate operation of the battery and charger including a full discharge/recharge over the designated time.

3.6 MAINTENANCE

General

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0981 ELECTRONIC SECURITY

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide electronic security systems, as documented.

System components

Requirement: Provide the following components:

- Access control system.
- Intruder detection system.
- Closed circuit television system.
- Centralised control.
- Intercom system.
- Integrated system: Combine the required electronic security system components from the same manufacturer to form an integrated system using common entry panels.
- Remote monitoring system.

Security classification: As documented.

System communications: As documented.

System provider

Electronic security system provider: A licensed security organisation only.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0901 Electrical systems*.
- *0991 Electrical maintenance*.

1.3 STANDARDS

Communication between network clients and devices

Procedures: To AS/NZS IEC 60839.11.31 (2020).

Intruder alarm systems

General: To AS/NZS 2201.1 (2007).

Alarm transmission system: To AS/NZS 2201.5 (2008).

Internal detection devices: To AS 2201.3 (1991).

Wireless systems: To AS 2201.4 (1990).

Wiring and enclosures

General: To AS/NZS 3000 (2018), AS/NZS 3013 (2005) and AS 60529 (2004).

CCTV systems

General: To AS/NZS 62676.4 (2020).

Remote monitored systems: To AS/NZS 62676.1.2 (2020).

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- CCTV: Closed circuit television.
- LAN: Local area network.
- LCD: Liquid crystal display.
- LED: Light-emitting diode.
- PIR: Passive infra-red sensor.
- PC: Personal computer.
- PIN: Personal identification number.
- SPD: Surge protection device.
- TFT: Thin-film-transistor display.

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Metal oxide varistors: Semiconductors that protect electronic components and systems from transient voltage.

1.5 SUBMISSIONS**Operation and maintenance manuals**

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

General: Submit data showing dimensions and space requirements for the following:

- Door contacts and reed switches.
- Detection devices.
- Activation devices.
- Electric door strikes and door release devices.
- LCD monitors, cameras and associated equipment.
- Intercom stations.
- Vehicle control systems.
- Duress alarm switches.

Records

General: Submit records to AS/NZS 2201.1 (2007).

Licence: Submit copy.

Samples

Requirement: Submit samples to **PRODUCTS, GENERAL, Samples.**

Shop drawings

General: Before commencing work, submit shop drawings showing the following:

- Schematic diagram of all systems.
- Panel layouts and dimensions.
- Power supply requirements.
- Wiring access necessary for door frames.
- Cut-out dimensions.
- Fixing provisions for cameras and monitors.

Tests

Requirement: Submit test results to **TESTING, Completion tests.**

2 PRODUCTS

2.1 GENERAL

Samples

Requirement: Provide samples of the following:

- Door contacts and reed switches.
- Key or card readers.
- Internal intercom monitor.
- External door station.
- CCTV camera.
- Electric door strikes and door release devices.
- Duress alarm switches.

2.2 SECURITY SYSTEMS

General

Requirement: Provide security systems, as documented.

2.3 SURGE PROTECTION DEVICES (SPD)

General

Requirement: Provide all mode metal oxide varistor based series connected SPD to protect final equipment in racks and cabinets, as documented.

Standard: To AS 4262.1 (1995), AS 4262.2 (1999) and AS 1768 (2021).

Operating voltage (U_o): 230 V at 50 Hz.

Surge rating (I_{max}): 40 kA (8/20 μ s) phase to neutral and 100 kA neutral to earth.

Voltage protection level (U_p): < 600 V at 3 kA.

Visual indicator: Provide visual indication of SPD status.

Maximum continuous operating voltage (U_c): 275 V a.c.

Enclosure and installation: House SPD in an electrical switchboard or panel and protect with a suitably rated circuit breaker or HRC fuse equal to or less than the load current rating of the SPD.

2.4 INTRUDER ALARM SYSTEM

General

Requirement: Provide an intruder alarm system, as documented.

Intruder alarm system panels

Requirement: Provide intruder alarm panels for each individual intruder alarm security system required. Provide alarm panels with the processors and power supplies required to operate the system as documented.

Power supply

Mains power: Provide a mains power sourced electrical supply to operate the security system under normal operation conditions.

Batteries and chargers

Sealed battery: Provide a 12 V 7 Ah sealed battery and charger system contained within each control panel to provide uninterruptible power in the event of mains power loss.

Uninterruptible power supply

General: Provide a dedicated uninterruptible power supply and connect to the security systems, where documented.

Capacity: At least 15 minutes, for the complete system in normal operation.

Anti-tamper devices

Requirement: Provide anti-tamper devices to control panels, external equipment, control and activating devices, and access control devices.

Function: To register an instantaneous alarm if covers are removed or vital wiring is disconnected.

Alarm circuit supervision

Requirement: At each detection device, provide alarm circuit supervision by an end-of-line device connected via a separate circuit within the cable.

Function: To register an instantaneous alarm if cable characteristics change, such as when cut or short-circuited.

Sector control

Requirement: Provide sector control for each nominated internal zone, and for normally-closed and normally-open perimeter zones, where documented for each security system.

Area time delay: Provide adjustable entry/exit time delay for each area, with adjustment range 0 to 30 s.

Intruder alarm system processor

General: Provide intruder alarm system processor including:

- Wireless and wired operational capability.
- Two way wireless devices (if applicable).
- Area or zone control.
- Optional modules for TCP/IP network address features.
- Telephone calling and call back.
- Large user capability (up to 100 users).
- Ability to arm/disarm/isolate different zones within the system.
- Ability to log alarms and send remote alarm information.
- Duress/emergency alarm features.
- Software: Provide all software required.

Activation devices

General: Provide activation devices, as documented.

Keypads

Requirement: Provide keypads, as documented.

Wireless pendants

Requirement: Provide programmable wireless remote pendants, as documented.

Network communicator

Requirement: Provide a network communication module, as documented, when the intruder alarm system is required to communicate to a smart phone application for self-monitoring.

Alarm devices

Outdoor alarm siren and strobe light: Provide externally mounted hard wired siren unit complete with Xenon strobe light and anti-tamper devices.

Internal screamer: Provide internal hard wired screamer device.

PIR detection devices

General: Provide PIR detectors, as documented.

Selection: To provide detection within the space occupied by the detector. Provide additional detectors to achieve coverage, as necessary.

Installation: To AS/NZS 2201.1 (2007).

PIR detectors: Mirror optic type with ≥ 7 curtains.

Dual PIR and microwave detectors: Mirror optic type PIR with 4 curtains, microwave motion sensors.

Door and window contacts

Reed switches: Provide concealed magnetic reed switches, where documented, which operate when:

- A monitored door or window is opened more than 20 mm at the lock/latch edge.
- The fixed leaf of a double door is opened more than 20 mm at the lock/latch edge.

Door lock sensors: Provide micro switches or magnetic contacts in lock keepers or door locks, where documented, which incorporate a bolt movement sensing device.

Function: To detect bolt movements more than 10 mm.

Event logging

Output: Provide for event logging from the alarm and access control panel at a local security monitoring system, as documented.

Function: To generate a report showing, as a minimum, the date, time and category of alarm initiations and access control entries.

Remote monitoring

Duration: Provide remote monitoring for the duration of the defects liability period.

Monitoring system: Provide a monitoring system in the alarm panel or processor for transmission of alarms and monitoring of the system by parties responsible for attending to alarms.

2.5 ACCESS CONTROL SYSTEM - GENERAL**General**

Requirement: Provide an access control system, as documented. Where the access control system includes audio, video or intercom systems, combine the access control, audio, video and intercom systems together to form an integrated system, utilising common entry panels.

Capacity: Provide separate entry/exit control modules for each designated access point.

Users: Program the system to match the number of authorised users with unique access codes.

Time zones: At least 2 per day, with provision for weekends and public holidays.

Headend equipment installation

Requirement: Mount headend equipment in adjacent communications cupboard/room or dedicated control panels meeting the requirements for alarm system panels set out in **INTRUDER ALARM SYSTEM, Intruder alarm system panels** and as documented.

2.6 ACCESS CONTROL SYSTEM - CENTRALISED**Central control unit**

Type: Each central control unit to include the following features:

- Large number of users.
- Multiple access points.
- Ability to interconnect central control units.
- Ability to connect a number of information control devices.
- Online access testing.
- Register of the last 2000 (nominal) incidents (entries, exits, access denied, alerts, etc.) within the memory without the need to download it to the PC.
- Option to connect readers with or without an integrated controller (via the door controller).

Interconnection between Central control units, door controllers and readers: Use core 14/0.20 security cable for the connection of 12 V power supply between units and shielded twisted pair cable for control data between units.

PC programming module: Where no permanent PC is installed in the system, provide any required software and hardware.

System programming: Provide system programming facilities, as documented. Entry readers to be programmed from the central control units.

PC programming connection: Where a permanent computer is utilised for programming changes, provide an USB to RS 232 serial port converter and any necessary programming module.

Remote management: Where an internet connected PC is used, allow for the installation of remote access software. If an onsite PC does not exist, the system is to have capability to be managed remotely via an interface module connected onto the internet.

On-site computer management software: Provide any management software preinstalled on the computer.

Power supply: Provide a 230 V/12 V power supply unit and connect to controller with a socket-outlet. Where available connect the power supply to a socket-outlet supported by the site emergency power supply. Where the socket-outlet is located in an unsecured location, utilise a permanent connection.

Backup power supply

Requirement: Provide a 12 V battery backup power supply complete with 12 V battery, as documented.

Batteries and chargers

Sealed battery: Provide a 12 V 7 Ah sealed battery and charger contained within each control panel to supply uninterruptible power in the event of mains power loss.

Access controller/processors

Requirement: Provide access controller processors, as documented.

Keypad controller

Requirement: Provide keypad controller, as documented, with the following features:

- Ability to be integrated on the audio/video door entry system panels.
- Backlit keypad.
- Integrated keypad and controller.
- Programmable from the central unit.
- Capacity up to 1000 user codes via central unit.
- User codes from 4 to 6 digits.
- Acoustic confirmation tones on pressing buttons.
- Adjustable lock release activation times up to 90 seconds.
- IP54.

Controller accessories: Capability to accept the following controls:

- Exit button to operate doors from inside the building.
- Free access button to allow doors to be opened for unrestricted access to the building.
- Operation of door release devices, i.e. locks.
- Relay with output contacts for auxiliary devices.

Keypad panels

Requirement: Provide keypad panels, as documented.

Proximity reader controllers

Requirement: Provide proximity reader controllers, as documented, with the following features:

- Ability to be integrated on the audio/video door entry system panels.
- Proximity reader operation by swiping proximity card.
- Integrated reader and controller.
- Capacity up to 400 user cards or keyrings.
- Acoustic and LED visual indication of swipe card acceptance/rejection.
- Adjustable lock release activation times.
- IP54.

Controller accessories: Capability to accept the following controls:

- Exit button to operate doors from inside the building.
- Free access button to allow doors to be opened for unrestricted access to the building.
- Operation of door release devices, i.e. locks.
- Relay with output contacts for auxiliary devices.

Proximity reader panels

Requirement: Provide keypad panels, as documented.

Proximity cards and pendants

Requirement: Provide proximity cards and pendants, as documented.

Radio controlled entry access systems

Requirement: Provide radio controlled entry access systems complete with radio transmitters, as documented.

Door entry controllers: Provide a door controller at each door access complete with:

- Radio receiver/reader inputs to activate door release.
- Exit button to operate doors from inside the building.
- Free access button to allow doors to be opened for unrestricted access to the building.
- Operation of door release devices, i.e. locks.
- Relay with output contacts for auxiliary devices.

Radio receiver: Provide an RF receiver at each door access, mounted adjacent to the door entry controller and to include the following:

- 433 MHz operational frequency.
- Code capability controller from central control unit.
- IP54 rating (IP65 for external application).
- Connect radio receivers to the 12V door entry controller power supply.

Radio transmitters: Provide RF transmitters to work with door entry RF controller. Where the addition of a proximity reader is incorporated in the access entry panel provide RF transmitters. Each transmitter to include the following:

- 433 MHz operational frequency.
- 4 button code transmission capability.
- The transmitter to include swipe proximity magnetic components.

Bluetooth access controllers

Requirement: Provide Bluetooth controllers, as documented, with the following features:

- Ability to be integrated on the audio/video door entry system panels.
- Access control reader to operate using mobile telephone Bluetooth technologies acting as user identifiers.
- Activated when an authorised mobile phone is programmed for use with the controller. Three modes telephone use are to be permitted, being:
 - . Automatic Mode (Without PIN).
 - . Request Confirmation.
 - . Request PIN.
- Capacity up to 1000 mobile telephones.
- Integrated reader and controller.
- Configurable reading range up to 20 m.
- Configurable reception time.
- Acoustic and visual status data.
- Adjustable lock release activation times programmable from central unit.
- IP54.

Accessories: Capability to accept the following controls:

- Exit button to operate doors from inside the building.
- Free access button to allow doors to be opened for unrestricted access to the building.
- Operation of door release devices, i.e. locks.
- Relay with output contacts for auxiliary devices.

Bluetooth access panels

Requirement: Provide keypad panels, as documented.

Biometric identification access controller

Requirement: Provide Biometric fingerprint reader controllers, as documented, with the following features:

- Access control reader to operate on fingerprint recognition.
- Programmable from central control unit.
- Ability to be integrated on audio/video door entry system panels.
- Capability to use with other access control functions, i.e. keypad, proximity card.
- Proximity reader operation by swiping proximity card.
- Integrated reader and controller.
- Capacity up to 1000 user cards or keyrings.
- Acoustic and LED visual indication of fingerprint acceptance/rejection.
- Adjustable lock release activation times.
- IP43.

Controller accessories: Capability to accept the following controls:

- Exit button to operate doors from inside the building.
- Free access button to allow doors to be opened for unrestricted access to the building.
- Operation of door release devices, i.e. locks.
- Relay with output contacts for auxiliary devices.

Access panels

Requirement: Provide access panels, as documented.

Dual function access controllers

Requirement: Provide dual function reader access controllers, as documented.

PC monitoring station

Requirement: Provide PC monitoring stations, as documented.

PC to central control unit: Provide USB to RS 232 serial port converter.

Interconnecting cable systems

Requirements: Provide multicore, power, twisted pair, coaxial and Cat 6 interconnecting cables as recommended by the supplier and as documented.

Signal repeaters

Requirement: Provide repeaters to regenerate digital BUS signals on twisted paired cables between panels, generally when distances exceed 1000 m and as documented.

Fibre optical converters

Requirement: Provide fibre optical converts, as documented.

2.7 DOOR ENTRY SYSTEMS

General

Requirement: Provide audio, video and intercom door entry systems, as documented. Where the audio, video or intercom systems includes access control systems combine the access control, audio, video and intercom systems together to form an integrated system, utilising common entry panels.

Equipment configuration

General: The equipment necessary for a combined audio/video/intercom and access control system includes the following:

- Headend equipment.
- Door entry audio/video/intercom annunciator equipment and where required access entry readers.
- Access entry control devices.
- Receiver station audio/video/intercom and access control in individual dwellings or management control areas.
- Data distribution system throughout the building complex.
- Garage or external facilities access, i.e. swimming pools or tennis courts.

Headend equipment

Requirement: Provide headend equipment, as documented.

Central control unit: Provide central control unit, as documented.

Power supply: Provide a 230 V/12 V power supply unit. The power supply to the controller is via socket-outlet. Where available connect the power supply to a socket-outlet supported by the site emergency power supply. Where the socket-outlet is located in an unsecured location, utilise a permanent connection.

Backup power supply: Provide a 12 V battery backup power supply complete with 12 V battery, as documented.

Switcher unit: Provide switcher units for every two audio/video/intercom entry panels. Connect the first unit central unit and serial connect remaining units using a multi-wired BUS to conform to the manufacturer's documentation for audio, video and power requirements.

Two way video distributor: Provide video distributors at each control unit, where multiple control units are used on large building complexes, where indicated by the equipment supplier. The distribution unit is to control video signals sent between control units.

Door entry panels

Requirement: Provide entry panels, as documented.

- Door entry panels for single or small dwellings: Utilise push button modules mounted in entry panels, one button for each dwelling or management control areas to allow contact between the entry facility and dwelling or management control areas.
- The button on activation to allow audio, and if included, video contact to the dwelling.

Door entry panels for large dwelling complexes: Two types of entry modules are generally available, being:

- A keypad module, where a list of occupants is available listing the code required to contact the dwelling or management control areas.
- A LCD display module containing the dwelling directory and dwelling codes, integrated with a keypad module for entry of the dwelling or management control areas code.

Audio module

Requirement: Provide audio modules and mount in door entry panels, as documented.

Audio module: The audio module to incorporating the electronic circuits needed for:

- Audio system operation.
- Volume control to allow installer to set the desired volume levels.
- Voice synthesiser allowing messages such as, on operating the lock release it issues a message: "door open, close after entry".
- Door opening circuitry.
- Operation initiated by push button control on the module.
- Ability to service up to three telephone units in each dwelling or management control areas.

Video module

Requirement: Provide video modules and mount in door entry panels, as documented.

Video module: The video module to incorporating the electronic circuits needed for:

- Audio system operation (audio volume control to allow installer to set the desired volume levels).
- Voice synthesiser allowing messages such as, on operating the lock release it issues a message: "door open, close after entry".
- Door opening circuitry.
- Colour camera.
- Video camera operation with adjustments for the installer to set the optimal level with built-in lighting and pan and tilt regulation system to adjust the camera lens.
- Operation initiated by push button control on the module.
- Ability to service up to three telephone units in each dwelling. or management control areas.

Access control modules: Where access control is required, i.e. keypads, proximity devices, incorporate access control modules in the entry panel, integrated with the communications modules.

Entry door release panel: Provide entry door release panel, complete with processor, power supply and exit release push button at each entry door to control the door release mechanism.

Entry area CCTV camera

Requirement: Provide wide angle entry area CCTV camera to provide additional CCTV surveillance of the entry area, where documented. Connect camera video outputs into the control unit system for distribution to building telephone receivers via the video distributors.

Entry panel types

Requirement: Provide standard or marine entry panels, as documented.

Telephone and video monitor systems

Requirement: Provide telephone and video monitor systems, as documented.

Telephone receiver

Audio only telephone unit: Provide telephone units with door release button and wall mount in premises, as documented.

Video monitor

Telephone handset type monitor requirement: Provide colour monitor, where documented, with the following features:

- Activates/deactivates communication with the outdoor panel.
- 3.5" colour monitor with TFT screen.

- Wall mounted.
- 18 Vdc operation.
- Door release at access entry and guard unit call button.
- Auto-on button for main and secondary camera activation.
- Call volume control.
- Colour, brightness and contrast control.
- On/off control.
- Two spare push buttons for allocation to additional features.
- Doorbell connectability.

Hands-free type monitor requirements: Provide colour monitor, where documented, with the following features:

- Activates/deactivates communication with the outdoor panel.
- 3.5" colour monitor with TFT screen.
- Wall mounted.
- 18 Vdc operation.
- Door release at access entry and guard unit call button.
- Auto-on button for main and secondary camera activation.
- Call volume control.
- Colour, brightness and contrast control.
- On/off control.
- Two spare push buttons for allocation to additional features.
- Doorbell connectability.
- Available in flush and surface mounted types.

Lift control

Requirement: Provide the following general lift control functions:

- Lift control from residents' video monitor: Activation of the lift button on the controller is to send the lift to the user's floor and the lift will remain accessible for a predetermined time. Access to floors once inside the lift is dependent upon programmed designations and would generally allow egress at building egress floors, garages and common activities levels, i.e. gymnasiums, swimming pools.
- Lift control from street panels by visitors: Once access is allowed into the building, lift access is only to be provided to the designated floor where the tenant has instigated and access to the lift is only available for a predetermined time.
- Lift control from access control readers: Lift control to be provided once a tenant's access control programs have been activated giving access to floors predetermined for the building for the tenant. Lifts will go to the floor where access control has been instigated and lifts to be available for a predetermined time.
- Lift control from a lift floor call panel: Activation of a lift call button is to send the lift to the floor of the call and only allow egress from the lift at building entrance or garage level.
- Lift control software: Lift control functions to be programmed into the access control system using proprietor's software setting up tenant and visitor protocols.
- Electronic relays: Utilise electronic relays connected to the access control system and the lift controls to provide lift access control.

Management door entry units

Requirement: Provide management door entry unit, as documented.

Management door entry unit facilities: Management door entry units to include the following features:

- 4 inch graphics display that informs of all events and actions within the installation, such as:
 - . Origin of call.
 - . Type of call.
 - . Call.
 - . Call waiting.
 - . Latest communication.

- Three operational modes being day, night and mixed.
- May act as an emergency or panic centre.

Data distribution system

Requirement: Provide audio decoders and video distributors, as documented.

Power supply to decoders and distributors

Requirement: Provide 12 V d.c. and 18 V d.c. power supplies to decoders and distributors as required by the equipment supplier.

Equipment connection: Connect telephone receivers to the decoders and distributors.

Interconnecting cable systems

Requirements: Provide multicore, power, twisted pair, coaxial and Cat 6 interconnecting cables as recommended by the supplier and as documented.

2.8 DOOR CONTROL DEVICES

General

Requirement: Provide electric strikes, electric locks, drop bolts, or similar devices, as documented, to suit door construction and hardware.

Lock release mechanisms: Include the following:

- Electric lock release mechanisms.
- Electrical shields or case as required.
- Power supply.
- Micro-switch to allow monitoring of door status.

Monitoring: Provide lock status and door position monitoring of door control devices, where documented.

Fail-safe: Connect door control devices in a fail-safe mode to permit egress in the event of power failure.

Glass doors: Provide tumbler, drop bolts or magnetic holders.

Double leaf doors (solid frame): Provide an electric strike or lock on the fixed leaf, connected to the door frame by concealed flexible wiring.

Vehicle control

Vehicle access control: Provide vehicle access control system combining connection to vehicular doors and boom gates, and interconnection to the main access control system.

Exit loop detection: Provide a buried loop detection system adjacent to the exit point to activate boom gates or vehicular doors on approach by a vehicle. Connect so that doors or gates close after a pre-set time.

Interlock: Provide a photoelectric beam safety interlock.

Interlock function: To prevent door or gate from closing until the vehicle has cleared the exit point.

Entry access equipment: Provide direct wall-mounted push-buttons or readers, or provide a robust mounting bollard and extension arm.

- Mounting height: 1000 mm from floor level.

Reed switches: Provide heavy duty reed switches on both sides of vehicle doors to generate a door closed indication at the control panel, where documented.

2.9 DURESS ALARM

General

Duress alarm switches: Provide duress alarm switches, as documented.

Desk or furniture mounting: Provide plug socket connections for duress alarm switches fixed to items of furniture. Conceal wiring and secure to avoid accidental disconnection.

Wall mounting: Recessed at 900 mm above finished floor level.

Disconnection alarm: Connect so that removal of plugs from sockets will automatically register as a duress alarm.

Alarm signal: Wire duress alarm switches for connection into the security system. Activation of a duress alarm is to register an alarm at a supervisory station.

2.10 CENTRAL CONTROL/SUPERVISORY STATIONS

General

Requirement: Provide central control/supervisory stations, as documented.

LCD monitor

General: Provide LCD colour monitors compatible with the security system. Provide fixing brackets and hardware for cabinet, wall-mounted and ceiling-mounted monitors.

Video recording system

General: Provide video recording hardware and software systems that store data from each camera in an industry standard compressed digital format.

Functionality: Provide the following:

- Index according to events.
- Fast search.
- Frame by frame search.
- Frame printing.
- Zoom and pan within a recorded frame.
- Back up daily to off-site storage.

CCTV video switching system

General: Provide switching software that allow cameras to be directed to specific monitors or for cameras to be scanned sequentially at predetermined intervals to a specific monitor and which, on receipt of an alarm signal, interrupts the scanning sequence and switches to the relevant security zones.

3 EXECUTION

3.1 EQUIPMENT POWER SUPPLY

Mains supplies

Permanent power supply: Provide permanent power supply to the following:

- Intruder alarm panels and access control panels including sub panels.
- Electric door strike local panels or control equipment.
- Intercom stations.
- CCTV monitors and cameras.

Marking: Label the switchboard circuit breaker from which power for the security systems is obtained as follows:

- SECURITY SYSTEM - Do not switch off.

Equipment installation

Requirement: Mount security equipment in adjacent communications cupboard/room or dedicated control panels meeting the requirements for alarm system.

CCTV cameras

Positioning and adjustment: Position and aim cameras to provide optimum coverage and to minimise the effect of shadows or direct light sources.

Interconnection to other services

General: Provide functions and equipment to allow the interconnection to other systems. Provide and connect wiring to the designated services.

Lifts: Arrange for installation and connection of lift readers and associated equipment.

3.2 TESTING

Completion tests

General: Carry out tests, including out-of-hours tests, to demonstrate the security system's performance. Include the following:

- Test components for correct function and operation.
- Demonstrate that devices perform on site, to at least the level stated in the manufacturer's performance specification for that device.

- Test the operation of alarm sectors and panel functions, including open and short-circuit tests.
- Demonstrate that the system functions under mains fail condition.
- Demonstrate operation of the battery and charger including a full discharge/recharge over the designated time.

3.3 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes details necessary to operate and maintain the equipment and systems installed.

3.4 COMMISSIONING

General

Requirement: Commission to AS/NZS 2201.1 (2007) and the manufacturer's recommendations.

3.5 MAINTENANCE

General

Requirement: Provide maintenance as documented. Conform to *0991 Electrical maintenance*.

0991 ELECTRICAL MAINTENANCE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Maintain the electrical systems for the documented maintenance period so that the performance, reliability, service life, energy efficiency and safety of the system is equal to or better than that at the beginning of the maintenance period, in parallel with and including:

- Periodic and statutory maintenance, cleaning and replacement of consumables.
- Emergency repairs.
- Condition reporting.

Maintenance period: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements*.
- 0901 *Electrical systems*.

1.3 STANDARD

General

Electrical services: To AS/NZS 3000 (2018).

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Emergency repairs: Repairs to restore the normal operating state or safety of the plant or systems.
- Periodic maintenance: Planned routine maintenance of plant and equipment (proactive), including fire safety measures and statutory requirements.
- Repairs: Unplanned/corrective maintenance (reactive).
- Replace/replacement: Replacement of components on a regular cycle on a like for like basis, e.g. repainting, replacement of plant.

1.5 SUBMISSIONS

Certification

Annual certification: Inspect and submit certification for all items required to be inspected annually under statutory requirements including, but not limited to, emergency evacuation lighting.

Records

Maintenance records: Conform to 0171 *General requirements*.

Periodic maintenance and performance report: At the frequency documented, submit reports summarising the maintenance performed and the performance of the electrical services in the preceding period. Set out the report in a form that permits comparison with previous reports. Include the following as minimum requirements:

- Dates and number of site labour hours for periodic maintenance. Exclude travelling time.
- Dates, number of site labour hours and nature of work for emergency repairs. Exclude travelling time.
- Dates and number of site labour hours for defects liability rectification if within the defects liability period. Exclude travelling time.
- Peak load and load profile for electrical power consumed, if metering equipment allows. If no appropriate metering equipment exists, provide copies of electricity accounts from the electricity service provider.
- Results of recommissioning if scheduled for the period.

1.6 INSPECTION

Notice

Inspection: Give notice so that an inspection may be held simultaneously with the final programmed maintenance visit.

2 PRODUCTS

2.1 GENERAL

Product selection

Proprietary items: Select products, as consumables or replacement items, of the same make, model and type as those being replaced.

Substitutions: Where the existing product is no longer available, provide products with at least the same performance, energy profile and construction characteristics.

Light fittings and ballasts: If fluorescent tubes or ballasts change due to obsolescence, provide changes so that the performance of the system is equal to or better than the existing, e.g. equal or lower energy consumption or changing to electronic ballasts that improves lamp life.

3 EXECUTION

3.1 MAINTENANCE REQUIREMENTS

Maintenance required

Minimum level: To the operation and maintenance manual and the manufacturer's recommendations.

3.2 EMERGENCY REPAIRS

General

Requirement: Respond to call outs for breakdowns or other faults requiring emergency repairs. Rectify faults and replace faulty materials and equipment.

Remedial work: Carry out any remedial work, including temporary work, necessary to restore each system to safe and satisfactory operation. Verify each system is operating correctly before leaving the site. Do not leave the plant in an unsafe condition.

Temporary work: Promptly replace temporary work with permanent rectification.

Contact details

General: Provide contact details including mobile phone numbers for normal working hours and emergency call outs.

Response time

Emergency repair: Attend site for emergency service within the documented response time.

Response period: Starts at the time of notification to the contractor's nominated contact point.

3.3 PERIODIC MAINTENANCE

General

Requirement: Provide maintenance work including, but not limited to, the following:

- Attend to reported defects and complaints.
- Check for and repair corrosion.
- Check for and rectify any unsafe conditions.
- Replace faulty or damaged parts and consumable components.
- Check anti-vibration supports, brackets and clamps, holding down bolts and flexible connections, for deterioration and for freedom of movement of assembly.
- Safety signs maintenance: To AS 1319 (1994).

Routine visits: Make routine service visits at the frequency documented. Service items of equipment in conformance with the maintenance schedules in the operation and maintenance manuals.

Notification of defects: When defects in the installation are identified, give notice.

Cleaning

Requirement: At the end of the maintenance period:

- Remove waste and clean all parts of the installation.
- Remove temporary protective coatings, packaging and labels.
- Clean interior of switchboards, switchgear, contactors and other electrical contacts to remove dust and foreign matter.

Lighting fittings: Clean the interior of luminaires, including diffusers and louvres, annually for non-air conditioned buildings and every three years for air conditioned buildings. For large air conditioned buildings, schedule areas of the building where a third of the fittings are cleaned each year.

Electrical systems

Standard:

- Electrical equipment generally: To AS/NZS 3760 (2022).

Requirement: Perform the following:

- Check for hot joints, burnt insulation and burnt contacts.
- Check electrical connections for tightness.
- Check operation of all electrical components and systems.
- Check indicating lights and replace defective lamps.
- Check overload settings.
- Check and report any changes to controls and wiring.
- Provide maintenance in conformance with manufacturer's recommended maintenance program.

Power generator - engine driven

Requirement: Maintain to the recommendations of AS/NZS 4509.1 (2009) Appendix A and the manufacturer's recommendations.

Power generator - photovoltaic

Stand-alone power systems: Maintain the system to AS/NZS 4509.1 (2009) during the defects liability period.

Grid connected systems: Maintain the system to AS/NZS 5033 (2021) Appendix D during the defects liability period.

Switchboards and switchboard components

Standard: To AS 2467 (2008).

Requirement: Carry out the following:

- Check for hot joints and burnt insulation. Carry out a thermal scan of joints and cable terminations by use of an infra-red temperature detector or cameras and repair any joints showing high temperatures.
- Rectify faults, make adjustments and replace consumable and faulty materials and equipment within 24 hours of notification.
- Monthly inspections and maintenance work to maintain the assembly, including battery systems.

Power factor correction

Standard: To AS 2467 (2008).

Emergency evacuation lighting

Requirement: To AS/NZS 2293.2 (2019) and the recommendations of AS/NZS 2293.1 (2018).

Interval: Carry out the 6-monthly procedures before practical completion and again before the end of the maintenance period.

Lightning protection

Standard: To AS 1768 (2021) Section 5.

Electronic security

Standard: To AS/NZS 2201.1 (2007).

Frequency of routine visits: ≤ 3 monthly.

Maintenance period performance monitoring:

- Monitor: Access control system.
- Investigate: Causes of alarms.
- Alarm report: < 2 days after alarm.

False alarms:

- Notification of false alarms: On the first working day after a false alarm, give notification of the circumstances surrounding the false alarm and action necessary to prevent similar occurrences.
- Alterations due to false alarms: Carry out alterations necessary to eliminate false alarms due to the following:
 - . Technical faults, selection, siting or aiming of devices.
 - . Environmental conditions evident at the time of installation.

3.4 END OF MAINTENANCE PERIOD SERVICE

General

Requirement: Within one month before the end of the maintenance period, undertake all work scheduled to be carried out on an annual basis.

3.5 COMPLETION

Maintenance records

Service records: Record maintenance undertaken in the schedules in the operation and maintenance manuals.

Maintenance reports: Prepare maintenance reports, as documented.

Restitution after maintenance tasks

Requirement: Restore removed, damaged, contaminated or soiled services and building elements when the maintenance task is complete.

Standard: Equal to the condition of the original installation.

1082 FIRE SERVICES ELECTRICAL - MINOR
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1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide fire services electrical installations, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements*.
- 1001 *Fire services systems*.
- 1091 *Fire services maintenance*.

1.3 STANDARDS

Electrical installations

Electrical design: To AS/NZS 3000 (2018).

Selection of cables: To AS/NZS 3008.1.1 (2017).

Wiring fire and mechanical performance classification: To AS/NZS 3013 (2005).

Degrees of protection (IP code): To AS 60529 (2004).

Electromagnetic compatibility (EMC): To the AS/NZS 61000 series.

Communications systems: To AS/CA S008 (2020), AS/CA S009 (2020), AS 11801.1 (2019) and AS/NZS 14763.2 (2020).

2 CABLE SUPPORT AND DUCT SYSTEMS

2.1 CONDUITS

General

Standards: To AS/NZS 2053.3 (1995), AS 61386.1 (2015), AS/NZS 61386.21 (2015), AS/NZS 61386.22 (2022) and AS/NZS 61386.23 (2015).

Communications cabling: To AS/NZS 14763.2 (2020).

2.2 NON-METALLIC CONDUITS AND FITTINGS

General

Standards: To AS/NZS 2053.3 (1995), AS/NZS 61386.21 (2015), AS/NZS 61386.22 (2022) or AS/NZS 61386.23 (2015).

Solar radiation protection: Required for conduits and fittings exposed to sunlight.

Flexible conduit

Requirement: Provide flexible conduit to connect with equipment and plant subjected to vibration. If required, provide for adjustment or ease of maintenance. Use the minimum possible length.

2.3 CABLE DUCT/TRUNKING

General

Standards: To AS/NZS 4296 (1995).

Communications cabling: To AS/NZS 14763.2 (2020).

Cable duct

Accessories: Provide purpose-made accessories and covers to match the duct system.

Covers for accessible locations: Screw-fixed or clip-on type removable only with the use of tools.

Cable support: Except for horizontal runs where the covers are on top, support wiring with retaining clips at intervals of not more than 1000 mm.

Ducting: Provide purpose-made ducts. Provide rigid supports. Round off sharp edges and provide bushed or proprietary cable entries into metallic ducting.

2.4 UNSHEATHED CABLES – INSTALLATION

General

Requirement: Provide permanently fixed enclosure systems, assembled before installing wiring.

Draw wires: Provide draw wires to pull in conductor groups from outlet to outlet, or provide ducts with removable covers.

2.5 CONDUIT SYSTEMS – INSTALLATION

Expansion

General: Allow for thermal expansion/contraction of conduits and fittings due to changes in ambient temperature conditions. Provide expansion couplings as required.

Routes

Set-out: If exposed to view, install conduits in parallel runs with right angle changes of direction.

Bends: Install conduits with no more than 2 right angled bends per cable draw-in run.

Concealed conduits: Run conduits concealed in wall chases, embedded in floor slabs or installed in inaccessible locations directly between points of termination, minimising the number of sets. Do not provide inspection fittings. Use large radius bends or elbows.

Overhead conduits in mechanical plant rooms: If overhead conduits service mechanical equipment installed on plinths in plant rooms, provide support and protection. Alternatively, use cable support system.

Conduits in roof spaces

Location: Locate below roof insulation and sarking. In accessible roof spaces, provide mechanical protection for light-duty conduits.

3 LOW VOLTAGE POWER SYSTEMS

3.1 WIRING SYSTEMS

General

Wiring and site cable reticulation systems: Appropriate to the installation conditions as follows:

- Fire pumps and control systems: To AS/NZS 3000 (2018) Part 2 clauses 7.2.5.2.1 and 7.2.5.2.2.
- Other fire and smoke equipment: To AS/NZS 3000 (2018) Part 2 clauses 7.2.6, 7.2.7 and 7.2.8.

Include the following:

- Underground services.
- Above-ground services.
- In-building services.

Type: Re-wireable system.

Neutral conductors: Same size as the corresponding active conductors. Rate the neutral conductor size for the maximum harmonic currents.

Cable support system: Provide cable support systems, as documented.

3.2 POWER CABLES

Standards

Polymeric insulated cables:

- Generally: To AS/NZS 5000.1 (2005).
- For WS52W classification: To AS/NZS IEC 60331.1 (2021) and AS/NZS IEC 60331.2 (2021).

Aerial cables: Copper conductors to AS 1746 (1991).

Cable

Requirement: Select multi-stranded copper cable.

Default insulation: V.75.

Default sheathing: 4V.75.

Minimum size: Conform to the following:

- Lighting subcircuits: 1.5 mm²
- Power subcircuits: 2.5 mm².
- Submains: 6 mm².

Voltage drop: Select final subcircuit cables within the voltage drop parameters dictated by the route length and load.

Fault loop impedance: Provide final subcircuit cables to satisfy the requirements for automatic disconnection under short-circuit and earth fault/touch voltage conditions.

Colours

Conductor colours: For fixed wiring cables, provide coloured conductor insulation or at least 150 mm of close-fitting coloured sleeving at the termination points of each conductor.

Active conductors in single phase circuits: Red.

Active conductors in polyphase circuits:

- A phase: Red.
- B phase: White.
- C phase: Blue.

Neutral conductors: Black.

Earthing conductors: Green-yellow.

Sheath:

- General cable system: White.
- For fire alarm cables: Red.

Cable installation

Classifications: To AS/NZS 3013 (2005).

Straight-through joints: Unless unavoidable due to length or difficult installation conditions, run cables without intermediate straight-through joints.

Cable joints: Locate in accessible positions in junction boxes and/or in pits.

Individual wiring of extra-low voltage circuits: Tie together at regular intervals.

Tagging

General: Identify multicore cables and trefoil groups at each end with stamped non-ferrous tags clipped around each cable or trefoil group.

Marking

General: Identify the origin of all wiring by legible indelible marking.

Submains and final subcircuits

Installation: Provide the following:

- Cables with diameter less than 13 mm: Run in conduit, cable ducts or support on cable trays or ladders.
- Single core cables of 3-phase circuits: Install unenclosed single core cables of diameter greater than 13 mm laid on cable tray in trefoil (RWB) or quadrofoil (RWBN) groups.
- Cables for lighting systems: Run in conduit, cable ducts, suspend on catenary systems or support on cable trays or ladders.
- Accessible concealed spaces: Install thermoplastic insulated and sheathed cables.
- Inaccessible concealed spaces: Install cable in PVC-U conduit.
- Roof spaces: Install cable below heat insulation and sarking. If not protected from high ambient roof space temperatures by thermal insulation, derate the cables, to AS/NZS 3008.1.1 (2017) Table 27, for an assumed ambient temperature of 55°C.
- Accessible ceiling voids: Support and enclose cables on ceiling surfaces or ceiling suspension systems.
- Plastered or rendered masonry: Install cable in PVC-U conduit.
- Double-sided face brick partition: Install cable in PVC-U conduit installed within the brick wall by slotting bricks or using any continuous pathways provided in the brick.
- Stud framed walls with bulk insulation: Install cables in PVC-U conduit.
- Stud framed walls without bulk insulation: Install thermoplastic insulated and sheathed cables allowing rewirability. Bush all knock-outs in steel framing to prevent cable damage. Earth metal stud frames to the electrical earthing system.
- Horizontal cable trays or ladders: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 2000 mm intervals.
- Vertical cable risers: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 1000 mm intervals.
- Plant rooms: Install cable in heavy duty PVC-U conduit or on cable tray, cable ladder or in duct.

3.3 ELECTRICAL ACCESSORIES

General

Requirement: Provide accessories, as documented.

Proprietary equipment: If proprietary equipment is selected by the contractor, the requirements of this specification override the specifications inherent in the selection of a particular make and model of accessory.

Uniformity: Provide all accessories and outlets located in close proximity of the same manufacture, size, finish and material.

Default finish: Select from the manufacturers' standard range.



ENGINEERING
SOLUTIONS
TASMANIA

23369 – Sorell Jobs Hub

MECHANICAL SPECIFICATION – Tender

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0701 MECHANICAL SYSTEMS**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide the mechanical services summarised as follows:

Airconditioning Systems

- 3 off Mitsubishi Electric VRF systems.
- 1 off split system heatpump for the IT Room
- Provide condensate drainage as required to approved locations.
- Coordination of the roof framing building works associated with the mechanical installation.

Ventilation Systems

- Heat Recovery ventilation to the fresh air systems.
- Tea room exhaust systems

General

- Associated controls including a Mitsubishi Electric AE-200E central controller located in the IT room.
- All associated electrical works including supplies from the existing distribution boards unless explicitly noted as documented elsewhere.
- Operating and maintenance manuals
- Provision of shop drawings and 'as-installed' drawings in Autocad format. Electronic copy of Services drawings in AutoCad Format is available from Engineering Solutions Tasmania for the purpose of shop and 'as-installed' drawings.
- 12 months comprehensive maintenance and defects liability.

The above scope is a guide only and certain items may have been omitted. It shall be the responsibility of the mechanical contractor to meet the intent of the specification and drawings. Any discrepancies, or apparent omissions, in the documentation shall be raised for clarification during the tender period and formally qualified in the tender submission

Design: Provide design work necessary to enable completion of the works as documented.

Uniformity

General: All products of the same type to be of the same manufacture.

Selections: As documented.

1.2 STANDARDS**General**

Mechanical ventilation and air conditioning: To AS/NZS 1668.1 and AS 1668.2, as required by the Building Code of Australia.

Microbial control: To AS/NZS 3666.1, AS/NZS 3666.2 and the recommendations of SAA/SNZ HB 32.

Refrigeration systems: To AS/NZS 1677.2 and the recommendations of SAA HB 40.1 and SAA HB 40.2.

Plumbing, drainage and water supply: To AS/NZS 3500.0, AS/NZS 3500.1, AS/NZS 3500.2, AS/NZS 3500.3 and AS/NZS 3500.4 and the PCA.

1.3 SUPPORT OF PLANT AND EQUIPMENT

The Contractor is to ensure all equipment is seismically restrained and installed in accordance with AS1170.4 Section 8. The building has an Importance level of IL2 rating.

1.4 WORK DOCUMENTED ELSEWHERE

Builder's

The following work is specified under the builder's documentation:

- Concrete plinths for airconditioning outdoor units

Electrical

The following work is specified under the electrical services documentation:

- Circuit breakers as follows:
 - DB-1 (House)
 - 16A, 1ph (OU4)
 - 16A, 1ph (HRV-3)
 - DB-2
 - 32A, 3ph (OU1)
 - 16A, 1ph (Indoor units)
 - 10A, 1ph (HRV-1)
 - 10A, 1ph (HRV-2)
 - DB-3
 - 25A, 3ph (OU2)
 - 16A, 1ph (Indoor units)
 - DB-4
 - 25A, 3ph (OU3)
 - 16A, 1ph (Indoor units)
- A fire alarm signal from the fire indicator panel run to the roof level plantdeck
- An Armed/Disarmed signal from the security system run to the roof level plantdeck.

Hydraulics

The following work is specified under the hydraulic services documentation:

- In-wall drain tundishes where shown on the hydraulics drawings.

1.5 INSPECTION

Notice

Inspection: Give notice so inspection may be made of the following:

- Pipework prior to covering in.
- Ductwork prior to covering in.
- Air balance commissioning shall be witnessed by the consulting engineer.

1.6 SUBMISSIONS

General

Requirement: Conform to the *General requirements* worksection.

Mechanical services shop drawings

Requirement: Submit the following detail drawings at minimum 1:100 scale or larger, showing:

- Fire and smoke dampers including dimensional tolerances.
- Floor wastes.
- Ductwork, pipework and equipment layouts and sections. Show the location of fire rated building elements.
- Diffuser and grille reference numbers corresponding to commissioning test results.
- Riser layouts and sections.
- Plant room layouts and sections.
- Locations of automatic control sensors, motors and valves.
- Acoustic details.
- Conditioner construction details.
- Seismic restraint details.
- Piping and other schematic drawings including numbering of each valve to correspond to the valve tag notation. For refrigerant piping include slope of horizontal runs, oil traps, double risers and valving.
- Submission drawings required by authorities.
- Switchboard details.
- Wiring diagrams.

Electrical loading information for mechanical services

General: Submit electrical loading information for all equipment before completion of the main switchboard shop drawings.

Loading and connection: Submit the information for items not supplied from the services switchboards.

Starting characteristics: Submit details for motors with reduced current starting. Ensure starting characteristics are within the characteristics of the respective submain protection devices.

Switchboards: Submit the following information for each building services switchboard:

- Board location and designation.
- For each submain connected to the board, submit the following for each item connected to it:
- Submain designation.
- Item designation and name.
- Power rating in kW.
- Number of phases.
- Full load amps per phase.
- Power factor.
- Total amps on each phase for respective submain.

Technical data

General: Documented fan pressures and pump heads are based on provisional equipment selections and estimated pressure drops.

Equipment: Before ordering equipment, calculate the respective system pressure losses based on the equipment offered and layouts shown on the shop drawings and submit the proposed selections.

Submissions: Submit technical data for all items of plant and equipment.

Data to be submitted: Include at least the following information in technical submissions:

- Assumptions.
- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.

- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of compliance with the applicable code or standard.
- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.
- Type-test reports.

2 PRODUCTS

2.1 GENERAL

General

Requirement: Conform to the *General requirements* worksection.

3 EXECUTION

3.1 GENERAL

General

Requirement: Conform to the *General requirements* worksection.

Rotating and reciprocating machinery noise and vibration: Vibration severity in Zone A to AS 2625.1 and AS 2625.4.

3.2 INSTALLATION

General

Fixing: If non-structural building elements are not suitable for fixing equipment and services to, fix directly to structure and trim around holes or penetrations in non-structural elements.

Installation: Install equipment and services plumb, fix securely and organise reticulated services neatly. Allow for movement in both structure and services.

Concealment: Conceal all cables, ducts, trays, pipes etc. unless installed in plant spaces ceilings, riser cupboards, etc. unless otherwise documented. If possible, do not locate on external walls.

Where it is not possible to conceal services, they shall be run within:

- Sheetmetal close fitting covers where exposed externally and painted to nominated colour.
- Proprietary plastic duct where exposed to view internally.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting as recommended by the manufacturer.

Suspended ground floors: Keep all parts of services under suspended ground floors > 150 mm clear of the ground surface. Make sure services do not impede access.

Arrangement: Arrange services so that services running together are parallel with each other and with adjacent building elements.

3.3 BUILDING PENETRATIONS

Embedded pipes

General: Do not embed pipes that operate under pressure in concrete or surfacing material.

Penetrations

Fire and smoke rated building elements: Seal penetrations with a system conforming to AS 4072.1.

Non-fire rated building elements: Seal penetrations around conduits and sleeves. Seal around cables within sleeves. If the building element is acoustically rated, maintain the rating.

Sleeves

General: If piping or conduit penetrates building elements, provide metal or PVC sleeves formed from pipe sections as follows:

- Movement: Arrange to permit normal pipe conduit movement.
- Diameter (for non fire-rated building elements): Sufficient to provide an annular space around the pipe or pipe insulation of at least 12 mm.
- Prime paint ferrous surfaces.
- Terminations:
 - . If cover plates are fitted: Flush with the finished building surface.
 - . In fire-rated and acoustic-rated building elements: 50 mm beyond finished building surface.
 - . In floors draining to floor wastes: 50 mm above finished floor.
 - . Elsewhere: 5 mm beyond finished building surface.
- Termite management: To AS 3660.1.
- Thickness:
 - . Metal: ≥ 1 mm.
 - . PVC: ≥ 3 mm.

3.4 CONCRETE PLINTHS**Construction**

General: Provide plinths where shown on the drawings.

- Concrete: Grade N20.
- Finish: Steel float flush with the surround.
- Reinforcement: Single layer of F62 fabric.
- Surround: Provide galvanized steel surround at least 75 mm high and 1.6 mm thick. Fix to the floor with masonry anchors. Fill with concrete.

3.5 PLANT AND EQUIPMENT ACCESS**General**

Services and equipment: Locate and arrange all services and equipment so that:

- Failure of plant and equipment (including leaks) does not create a hazard for the building occupants.
- Failure of plant and equipment (including leaks) cause a minimum or no damage to the building, its finishes and contents.
- Inspection and maintenance operations can be arranged to minimise inconvenience and disruption to building occupants or damage to the building structure or finishes.
- Services and equipment are readily accessible for inspection and maintenance and arranged so that inspection and maintenance can be carried out in a safe and efficient manner. Include the following:
 - . Conform to the relevant requirements of AS 1470, AS 1657, AS/NZS 1892.1, AS/NZS 2865 and AS/NZS 3666.1.
 - . If parts of the plant (including high level tanks) require regular inspection and maintenance either locate plant so it is safely accessible from floor level or provide permanent access platforms and ladders.
 - . In false ceilings locate items of equipment that require inspection and maintenance above tiled parts where possible. If this is not possible (for example if above set plaster or other inaccessible ceilings) provide access panels. Arrange services and plant locations to reduce the number of access panels. Coordinate with other trades to use common access panels where feasible.

- Modify manufacturer's standard equipment when necessary to provide the plant access in the contract documents.

3.6 VIBRATION SUPPRESSION

General

General: Minimise the transmission of vibration from rotating or reciprocating equipment to other building elements.

Connections

General: Provide flexible connections to rotating machinery and assemblies containing rotating machinery.

- Isolate ducts by flexible connections.
- Isolate pipes by incorporating sufficient flexibility into the pipework or by use of proprietary flexible pipe connections installed so that no stress is placed on pipes due to end reaction.

Speeds

General: If no maximum speed is prescribed do not exceed 1500 r/min for direct driven equipment.

3.7 SUPPORT OF PLANT AND EQUIPMENT

Support of roof mounted plant and equipment

Platforms: If a horizontal platform is required, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable platform.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

- Roof level support: If any of the following apply to roof level support, obtain the advice of a professional engineer:
 - The total load from any unit of plant or equipment exceeds 500 kg.
 - The load from a unit of plant or equipment to any single support point exceeds 100 kg.
 - The average loading of plant and equipment over the area extending 1 m on all sides beyond the plant and equipment exceeds 25 kg/m².

Sloping roofs:

- Roof slope $\geq 10^\circ$: Adopt the roof material manufacturer's documented installation procedures, or seek the advice of a professional engineer.
- Roof slope $< 10^\circ$: Provide appropriate continuous supporting members, compatible with the roof material, laid parallel to the span of the roof sheeting. Extend the continuous support members in both directions to the first purlin or joist that is > 1 m from the face of the plant or equipment it supports.

Support of ground level plant and equipment

Ground level:

- If the ground slope is $\geq 15^\circ$, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable slab or platform.
- In all other cases, provide proprietary plastic or concrete supports installed with falls that achieve a raised, impervious and water shedding bearing surface.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

3.8 PAINTING AND FINISHES

General

General: If exposed to view (excluding in plant rooms) paint new services and equipment.

Surfaces painted or finished off-site: Conform to *Metals and prefinishes*.

Exceptions: Do not paint chromium or nickel plating, anodised aluminium, GRP, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Surfaces with finishes applied

off-site need not be re-painted on-site provided the corrosion resistance of the finish is not less than that of the respective finish in this clause.

Standard

General: Conform to the recommendations of AS/NZS 2311 Sections 3, 6 and 7 or AS/NZS 2312 Sections 5, 8 and 10, as applicable.

Low VOC emitting paints

Provide the following low odour/low environmental impact paint types with the following VOC limits:

- Primers and undercoats: < 5 g/litre.
- Low gloss white or light coloured latex paints for broadwall areas: < 5 g/litre.
- Coloured low gloss latex paints: < 85 g/litre.
- Gloss latex paints: < 90 g/litre.

Painting systems

New unpainted interior surfaces: To AS/NZS 2311 Table 5.1.

New unpainted exterior surfaces: To AS/NZS 2311 Table 5.2.

3.9 MARKING AND LABELLING

General

General: Mark services and equipment to provide a ready means of identification.

- Locations exposed to weather: Provide durable materials.
- Pipes, conduits and ducts: Identify and label to AS 1345.
- Cables: Label to indicate the origin and destination of the cable.

Consistency: Label and mark equipment using a consistent scheme across all services elements of the project.

Operating and maintenance manuals: Provide marking and labelling text identical to the text and terminology used in operating and maintenance manuals.

Labels and notices

General: Select from the following materials:

- Cast metal.
- For indoor applications only, engraved two-colour laminated plastic.
- Proprietary pre-printed self-adhesive flexible plastic labels.
- Stainless steel or brass ≥ 1 mm thick with black filled engraved lettering.

Colours: Generally in conformance with AS 1345 as appropriate, otherwise black lettering on white background except as follows.

- Danger, warning labels: White lettering on red background.
- Main switch and caution labels: Red lettering on white background.

Edges: If labels exceed 1.5 mm thickness, radius or bevel the edges.

Fixing: Fix labels securely using screws, rivets, proprietary self-adhesive labels or double-sided adhesive tape.

- If labels are mounted in extruded aluminium sections, use rivets or countersunk screws to fix the extrusions.
- Use aluminium or monel rivets for aluminium labels.

Label locations: Locate labels so that they are easily seen and are either attached to, below or next to the item being marked.

Label text: To correspond to terminology and identifying number of the respective item as shown on the record drawings and documents.

Lettering heights:

- Danger, warning and caution notices: ≥ 10 mm for main heading, ≥ 5 mm for remainder.
- Equipment labels within cabinets: ≥ 3.5 mm.

- Equipment nameplates: ≥ 40 mm.
- Identifying labels on outside of cabinets: ≥ 5 mm.
- Isolating switches: ≥ 5 mm.
- Switchboards, main assembly designation: ≥ 25 mm.
- Switchboards, outgoing functional units: ≥ 8 mm.
- Switchboards, sub assembly designations: ≥ 15 mm.
- Valves: ≥ 20 mm.
- Other locations: ≥ 3 mm.

Operable devices: Mark to provide a ready means of identification. Include the following:

- Controls.
- Indicators, gauges, meters and the like.
- Isolating switches.

Vapour barriers: Do not penetrate vapour barriers.

Points lists

Automatic control points: Provide plasticised, fade-free points lists for each automatic control panel. Store in a pocket on the door of the panel. Lists to include terminal numbers, point addresses, short and long descriptors.

3.10 TRAINING

Maintenance

General: Explain and demonstrate to the principal's staff the purpose, function and maintenance of the installations.

Operation

General: Explain and demonstrate to the principal's staff the purpose, function and operation of the installations.

4 SELECTIONS

4.1 GENERAL

General

Requirement: Conform to the *General requirements* worksection.

4.2 MECHANICAL DESIGN CONDITIONS

Outdoor design conditions schedule

Properties	Type or location		
	Conditioned	B	C
Cooling			
Dry bulb	30 °C		
Wet bulb	21 °C		
Heating			
Dry bulb	1 °C		

Indoor design conditions schedule

Properties	Type or location		
	Airconditioned Space	B	C
Dry bulb	19 – 24°C		
Relative humidity	40 - 60%		

Noise level schedule

	Type or location		
		Offices	Ammenities
Upper limit of noise caused by services		NR 40	NR 45

0721 PACKAGED AIR CONDITIONING**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide packaged air conditioning plant.

Split systems: Supply indoor and outdoor units of split systems designed and rated by the manufacturer to operate together.

Selections: As documented.

1.2 STANDARDS**General**

Refrigeration systems: To AS/NZS 1677.2 and the recommendations of SAA HB 40.1 and SAA HB 40.2.

Microbial control: To AS/NZS 3666.1 and the recommendations of SAA/SNZ HB 32.

Ductwork and insulation: To AS 4254.

Air filter performance and construction: To AS 1324.1.

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection the following definitions apply:

- Direct expansion one-piece package or split systems with total cooling capacity when tested to AS/NZS 3823.1.1 or AS/NZS 3823.1.2, Standard test condition T1:
 - . Room air conditioner: < 7.5 kW.
 - . Packaged air conditioner: ≥ 7.5 kW.

1.4 PRE-COMPLETION TESTS**Standards**

General: Provide air conditioning equipment that has been subjected to physical test in conformance to the following:

- Non-ducted air conditioners: To AS/NZS 3823.1.1, Standard test condition T1.
- Ducted air conditioners: To AS/NZS 3823.1.2, Standard test condition T1.

Labelling

Required: To AS/NZS 3823.2.

Refrigerant: Show the type of refrigerant at the charging point and on indicator panels.

2 PRODUCTS**2.1 GENERAL****Operating conditions**

General: Provide equipment that operates within an ambient temperature range of 0°C to 45°C, without excessive head pressure, unstable operation or icing.

Split systems

Outdoor units: Provide packaged condensing units consisting of refrigerant condensers, compressors and associated piping and electrical connections, mounted within the condenser enclosure.

Indoor units: Provide units consisting of coils, piping, supply air fan, accessories and electrical connections, mounted within an insulated enclosure.

One-piece packages

General: Provide packaged units consisting of refrigerant condensers, compressors, supply air fan, cooling coil and associated piping and electrical connections, mounted within the same enclosure.

Filters

Filters: Type 1 to AS 1324.1 with Class and Performance rating as documented but not less than:

- Test Dust No. 1 to AS 1324.2: $\geq 20\%$ efficiency.
- Test Dust No. 4 to AS 1324.2: $\geq 85\%$ arrestance.

2.2 EQUIPMENT ENCLOSURES**General**

General: Provide enclosures, materials and finishes that are weatherproof and corrosion-resistant, assembled and reinforced to prevent flexing and drumming.

Material and finishes

Materials: Conform to the following:

- Metallic-coated steel: Base and legs ≥ 1.6 mm with ≥ 1.0 mm panels.
- Aluminium: Base and legs ≥ 2.0 mm with ≥ 1.6 mm panels.

Outdoor equipment finishes: Powder coat all metallic-coated steel interior and exterior surfaces to AS 3715 or AS 4506 as appropriate.

Indoor equipment finish: Manufacturer's standard finish.

Moisture retention: All parts free draining with no pockets in which condensation and/or rainwater may be retained.

Access

General: Provide access to the interior of the unit for routine inspection and maintenance and for removal of major components. Provide doors and panels with handles and captive fasteners and, where they are for access to the conditioned air stream, provide soft gaskets ensuring an airtight seal. Provide weatherproof doors and panels on outdoor enclosures. Do not use self tapping screws on removable panels.

Access: As a minimum, provide access to the following:

- Condensate tray (underside of access panel to be within 300 mm of tray).
- Supply fan motor and drive.
- Compressor section.
- Condenser section.
- Filter section.

Access panel fasteners:

- Units < 1000 L/s: Metal thread screws or camlock fasteners.
- Units ≥ 1000 L/s: Camlock fasteners.

Handles: Provide handles to permit easy and safe removal and replacement of panels.

- < 450 mm diagonal panel dimension: 1 handle.
- ≥ 450 mm diagonal panel dimension: 2 handles.

Insulation

General: Insulate enclosures to prevent external surface condensation under all operating conditions. Fix insulation to panels with waterproof adhesive applied to at least 50% of the panel area.

Material properties: Conform to the following:

- Thermal conductivity: ≤ 0.035 W/m.K.
- Thickness: ≥ 25 mm.
- Facing: Reinforced aluminium foil.
- Moisture absorption: Non-hygroscopic.
- Fire hazard properties: To AS 4254 clause 2.7.1.
- CFC or HCFC not used as blowing agents in the manufacturing process.

Condensate trays

General: Provide a tray under each cooling coil extending downstream to collect water carry over and under any other components on which condensation may occur. Grade trays and sumps to the outlet to prevent water retention. Provide radiused corners and arrange to facilitate cleaning.

Material: Fabricate wetted parts from aluminium to AS/NZS 1734 or stainless steel sheet grade 304L.

Protection

General: Provide metallic coated steel mesh protection to outdoor fans and exposed faces of outdoor coils.

2.3 SUPPLY FAN**Performance**

Performance: Select fans and fan motors so the air flow can be increased $\geq 5\%$ above the documented design air flow rate, against the corresponding increased system resistance by fan speed change alone and without unstable operation.

Fans with multi-speed motors: Select for required duty at second highest speed.

Construction

Forward curved impellers: Metallic-coated steel blades and wheel.

Backward inclined impellers: Backward inclined, steel or extruded aluminium, aerofoil or single thickness blades, and non-overloading power characteristic.

Casing: Metallic-coated steel sheet, riveted or spot-welded with joints sealed. Provide 1.2 mm minimum thickness scroll and 2 mm minimum thickness side plates.

Bases: Formed from pressed metallic-coated steel sheets, bolted to casings. Provide at least 4 brackets for mounting.

Inlet bells: Shaped for aerodynamically efficient air entry and small clearance from impeller.

Shaft: Steel treated with solvent removable petroleum based protective coating.

Bearings: Self-aligning sealed for life ball or roller type.

Finish: Brush and prime spot welds with zinc-rich organic primer to AS/NZS 3750.9.

Drive

Type: Direct or belt drive as documented.

Direct drive: Multi speed or electronic variable speed.

Belt drive: To suit a minimum 125% of motor power and capable of transmitting the full starting torque without slip. Provide adjustable motor pulley. Provide pulleys with shaft keys or taper lock bushes.

2.4 CONDENSER FANS**Type**

Propeller fan: Direct drive with single thickness fixed pitch aluminium or UV protected polypropylene blades.

Aerofoil axial flow fan: Direct drive with adjustable pitch aerofoil section blades of UV protected GRP or polypropylene, or aluminium.

Centrifugal fan: Conform to the following:

- Drive: Direct or belt driven as documented.
- Impeller: Forward curved or backward inclined as documented.
- Construction: Conform to the **Supply fan** clause.
- Belt drive: If belt drive is documented conform to the **Supply fan** clause.

Multiple fans: If multiple fans operate in sequence for capacity control, provide baffles in the condenser to prevent air short circuiting through idle fans.

Guards: Provide easily removable powder coat finished metallic coated steel guards over condenser fans.

Power consumption: ≤ 0.015 kW/kW total heat rejected by the condenser when tested to AHRI 460.

2.5 FAN MOTORS

General

Power rating of supply fans: At least the power required by the fan when the air flow is increased by 10% above the design air flow rate stated in the schedules, against the corresponding increased system resistance as installed.

Single phase motors: ≤ 0.37 kW only.

Speed: < 25 rev/s.

Bearings: Sealed for life ball bearings.

Minimum degree of protection:

- Supply fans: IP54.
- Condenser fans: IP55.

Insulation to AS 60034.1:

- Single phase motors: Minimum Class B.
- Three phase motors: Minimum Class F.

2.6 COMPRESSORS

General

Enclosure: Welded or accessible hermetic steel enclosure with ≥ 3 mounting feet. Provide the following:

- Mounting: Vibration isolating mountings.
- Service valves: Packed and capped, backseating refrigerant suction valve.
- Charging connections: Schraeder type connections for evacuation and refrigerant charging.

Crankcase heaters: Provide integral positive temperature coefficient type crankcase heaters if required for safe compressor operation.

Scroll compressors: Provide reverse rotation protection.

2.7 COILS

Design

Coil face velocity: ≤ 2.5 m/s.

Fin pitch: ≤ 550 fins/m.

Cooling coil air pressure drop: ≤ 150 Pa when wet.

Construction

Tubes: Copper to AS/NZS 1571 or AS 1572 designation C12200.

Fins: Aluminium alloy plate fins ≥ 0.12 mm thick to AS 2848.1, designation 3003 or 8011.

Coil frames:

- Aluminium alloy to AS 2848.1, designation 5005.
- Metallic-coated steel sheet coating class Z275.

Condenser coil: To provide at least 5 K subcooling.

Access

General: Arrange coils and casing so that both sides of coils are easily accessible for inspection and cleaning.

Additional coil treatment

General: If the atmospheric corrosivity category documented in the *General requirements* worksection is C or D, provide proprietary coil corrosion protection coating as follows:

- Type: Factory applied coating resistant to dilute acids, dilute alkalis, solvents, inorganic salts and salt laden air.
- Application: Apply after coil fabrication.
- Performance: When tested to ASTM B117, show no sign of attack after 3000 hours in salt spray.

2.8 REFRIGERATION SYSTEM

Components

Refrigerant: R407C or R410A.

Copper pipe: To AS/NZS 1571.

Pipe insulation within unit: Insulate pipes that operate below ambient temperature with elastomeric foam ≥ 10 mm thick.

Multiple compressor units: Provide separate refrigeration circuit for each compressor.

Refrigerant expansion device:

- < 20 kW total capacity: Eliminator or similar, non-capillary expansion device, thermostatic expansion valve or electronic expansion valve.
- ≥ 20 kW total capacity: Thermostatic expansion valve or electronic expansion valve.

Refrigeration circuits: Provide each refrigeration circuit with a sight glass-moisture indicator, filter dryer and manual reset high pressure and auto reset low pressure cutouts. Provide a suction accumulator if compressor is liable to damage by liquid slugs.

Reverse cycle units: Provide refrigerant reversing valve and an effective outdoor coil defrost facility that prevents room temperature dropping more than 2 K during defrost.

2.9 CONTROLS AND ELECTRICAL

Components

General: Provide factory wired control panel for each unit containing the following:

- Plug-in relays.
- Terminal strips numbered to correspond to wiring diagram.
- Starter and overload protection for each motor.
- Short circuit protection: Provide each compressor and each 3-phase motor with short circuit protection by either:
 - . High rupture coefficient (HRC) fuses or
 - . Circuit breaker with interrupting capacity selected to suit the anticipated short circuit current.
 - . Starter contactor with manual reset thermal or magnetic overload.
- Provide automatic lead/lag changeover for units with multiple compressors.
- Short cycle timer function: To limit compressor starts.
- Separate control and electrical circuit for each compressor.
- HRC fuse or circuit breaker short circuit protection for each crankcase heater (if fitted) and control circuit.
- Phase failure protection on motors ≥ 5.5 kW.
- Terminals for remote indication of run and fault conditions.
- Permanent, weatherproof, wiring diagram fixed on or next to the control panel.

Safety controls: Arrange so that operation of one item does not shut down other items that are not directly dependent on its operation.

Isolating switch: Provide system isolator for each system located adjacent to the outdoor unit.

Condenser head pressure control: If documented, provide electronic condenser fan speed control to maintain minimum condenser head pressure at all operating ambient conditions.

Pump-down control: If documented, provide solenoid valve and automatic pump-down control.

3 EXECUTION

3.1 REFRIGERATION PIPING

General

General: Conform to equipment manufacturer's recommendations for the refrigerant used. Provide refrigeration piping designed and installed so that the complete system meets the documented performance under the documented operating conditions.

Design

Suction lines: Size for pressure drop < 1.0 K saturated suction temperature at documented supply air flow, documented cooling coil entering conditions, documented condenser air entering condition and unit manufacturer's rated total capacity, saturated condensing temperature and saturated suction temperature under the above conditions.

Oil return: Size for oil return to compressor. Where velocity for oil return would result in the suction line pressure drop exceeding pressure drop limit, provide double suction risers. Prevent oil draining back on the off cycle.

Liquid lines: Size for pressure drop < 1.0 K saturated liquid temperature when handling the manufacturer's unit capacity under the operating temperatures stated in the schedules.

Layout

General: Install pipework in straight lines and uniform grades without sags. Grade horizontal hot gas lines and suction lines at not less than 1 in 200 in the direction of gas flow.

Location: When possible, run suction and liquid lines inside common insulation.

Pipe support

General: Provide hangers, brackets, saddles, clips, and support system components, incorporating provisions for adjustment of spacing, alignment, grading and load distribution. Support pipework from associated equipment or building structure. Support valves, strainers and major line fittings so that no load is placed on adjacent tubes or transmitted to them during operation and maintenance.

Support type: Proprietary metallic-coated steel channel section with clamps and hangers sized match external diameter of pipe being supported.

Vertical pipes: Provide anchors and guides to maintain long pipes in position, and supports to balance the mass of the pipe and its contents.

Saddles: Do not provide saddle type supports for pipes \geq DN 25.

Uninsulated pipes: Clamp piping supports directly to pipes.

Insulated pipe support:

- Spacers: Provide spacers at least as thick as the insulation between piping supports and pipes. Extend either side of the support by at least 20 mm.
- Spacer material: Rigid insulation material of sufficient strength to support the piping and suitable for the temperature application.
- Vapour barriers: For cold pipes apply aluminium foil tape over the circumference of the spacer to form a vapour barrier.
- Metal sheathing: Provide a 0.55 mm thick metallic-coated steel band between the aluminium foil tape and the support, for the full width of the spacer.

Pipe support spacing table

Nominal pipe size, DN	Maximum spacing (m)	
	Horizontal	Vertical
10	1	2
$\geq 15, \leq 20$	1.5	2.5
25	2	3
32	2.5	3
40	2.5	4
50	3	4
65	3	4

Pipes

Piping: Provide copper tubes as follows:

- \leq DN 20: To AS/NZS 1571, 0 temper.
- $>$ DN 20: To AS/NZS 1571 1/2H temper. Use annealed (0 temper) copper only for pulled bends.

Pipe wall thickness:

- Pipes \leq DN 50: To AS 1432 Type B.

- Pipes > DN 50: ≥ 1.6 mm.

Deemed to comply for split systems under 7.5 kW cooling capacity: Split system manufacturer's standard pre-charged piping kit.

Bends

Pulled bends: Form bends without flattening or wrinkling with an inside radius ≥ 3 pipe diameters using the correct tool size for the pipe diameter.

Pipe fittings

Copper alloy fittings: To AS 3688, dezincification resistant, welded, brazed or compression type only.

Preformed fittings: Preformed refrigerant capillary line tees, bushes, couplings and elbows. Wherever possible, make reductions at elbows, tees, line devices or equipment connections with reducing fittings, otherwise provide reducing bushes or reducing couplings.

Compression fittings: Flareless twin ferrule, torque free, mechanical grip fittings which can be gauged using a precision ground and hardened metal gap inspection gauge.

Screwed joints: Use only if equipment items are not available with flare, flanged or brazed capillary connections.

Brazed joints

General: Provide preformed capillary fittings or form capillary unions by expanding one pipe end. Prevent flux and brazing alloy from entering pipes. Use dry nitrogen to purge air from pipes before brazing. During brazing, maintain a flow of dry nitrogen through pipes to prevent oxidation.

Brazing alloy: To AS/NZS 1167.1 Table 2 alloy B4 $\geq 15\%$ silver content.

Brazing alloy for jointing dissimilar metals: To AS/NZS 1167.1 Table 1 alloy A18 or an alloy with an equivalent silver content ($\geq 34\%$) and impurity levels.

Sleeves

General: Provide pipe sleeves where pipes pass through building elements.

Valves

General: Provide valves of the type and in the location recommended by SAA HB 40.1. Make provision for charging and withdrawal of refrigerant. If a gauge is not permanently connected (for example commissioning connections), seal the outlet of the isolating valve with a flared seal cap nut.

Valve types

Service valves: Backseating type with gasketed cap.

Solenoid line valves: Solenoid coil and valve parts replaceable without disturbing valve body or refrigerant piping.

3.2 CONDENSATE DRAINS

General

Condensate drains: Provide trapped drain lines with uniform and continuous fall to connect condensate trays to the nearest building drain point. Provide drains from the following:

- Each indoor coil.
- Each outdoor coil unless casing freely drains to a roof or other location where condensate and/or rain water will not cause damage or pond.
- Each safety tray.
- Other moisture and rainwater collecting areas.

Material: As documented.

- Copper: To AS 1432 Type B.
- PVC-u: To AS/NZS 1477, installed to AS/NZS 2032.

Size: The greater of unit drain connection size and DN 20.

Pipe support spacing: To AS/NZS 3500.1 Table 5.2.

Sealing: Seal drain pipes where they penetrate casing.

Termination: Terminate drains to enable visual inspection of condensate flow.

Traps: To withstand > 2 times fan static pressure and constructed from either:

- Transparent, kink resistant hose.

- PVC-u trap with removable caps and a visible air break.

Falls and drains: Check that the condensate tray falls comply with AS/NZS 3666.1 and in particular that trays and sumps are graded to the outlet to prevent moisture retention. Test drains by pouring a measured quantity of water into upstream end.

3.3 SAFETY TRAY

Location

General: Provide a safety tray under packaged unit and indoor unit of split systems if leaks or condensation from these could cause nuisance or damage to the building or its contents.

Reverse cycle units: If reverse cycle outdoor units do not have drain connections, locate safety tray below unit and pipe drain to waste.

Construction

General: Galvanized steel sheet, 1.2 mm thick folded and stiffened, edges turned over and with all joints sealed. Sides ≥ 50 mm high.

Size: Extend tray ≥ 150 mm beyond unit casing and any components that may leak or drip condensation.

Drainage: Provide fall in tray and provide drain at lowest point. Run drain to visible waste.

3.4 REFRIGERATION PIPE INSULATION

Material

General: Insulate all refrigerant piping that may sweat. Apply insulation un-slit where possible. If slit, refix slit faces with adhesive applied to full area.

Material R-value: To BCA Spec J5.4.

Type: Chemically blown closed cell nitrile rubber or polyethylene in tubular form.

Physical properties:

- Maximum thermal conductivity: 0.04 W/mK at 0°C.
- Moisture absorption: Non-hygroscopic.
- Water vapour permeability: ≤ 0.065 ng/Pa.m.s.
- Fire hazard properties:
 - . Spread of flame index: 0.
 - . Smoke developed index: ≤ 3 .

Joining: Use only an adhesive or jointing system supplied by the insulation manufacturer.

Timing: Leak test piping before insulating joints, fittings and valves.

3.5 UNIT INSTALLATION

General

General: Supply all necessary components, including but not limited to the following:

- Means of attachment to the structure.
- Anti-vibration mounting.
- Appropriate flexible connections.
- Trim and sealing around openings.
- Electrical connections.
- Drainage connections.
- Field connection of refrigerant lines in split systems.

Alignment: Install units level, plumb and to manufacturer's recommendations.

Fixings: Bolt units in place with minimum 4 anchors or suspension rods.

Outdoor equipment

Arrangement: Provide clearance around units for condenser air flow and maintenance access. Make sure discharge air does not short-circuit to condenser intake.

Plinths: If located on grassed or similar permeable surfaces provide concrete plinths under outdoor equipment.

Duct connections

Supply duct: Provide internal or external flexible duct connection. Comply with **Flexible connections** in the *Ductwork* worksection.

Return, outside air and condenser duct connections: Provide external flexible duct connection.

Vibration isolation

General: Provide to each assembly at least four mountings, located to give uniform deflection under the applied load.

Isolation efficiency: $\geq 90\%$.

Suspended units:

- Suspended from lightweight structures: Metal spring or rubber-in-shear isolation mountings with ≥ 25 mm static deflection. Provide each mounting with a levelling screw and locknut.
- Suspended from heavyweight structure: Double deflection neoprene or rubber in shear mountings, with static deflection ≥ 15 mm.

Floor mounted units: Neoprene waffle pads.

3.6 COMMISSIONING**General**

Packaged equipment: Conform to the manufacturer's recommendations and record results.

Refrigeration systems: Conform to the recommendations of SAA HB 40.1.

Evacuation: If using the deep vacuum method to SAA HB 40.1 pull a vacuum to the lowest pressure achievable with the available equipment but ≤ 130 Pa absolute (1000 microns of mercury).

4 SELECTIONS**4.1 PACKAGED AIR CONDITIONING EQUIPMENT**

Refer to the drawings.

0732 AIR FILTERS**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide air filters.

Selections: As documented.

1.2 STANDARD**Air filters**

Performance and construction: To AS 1324.1.

Microbial control: To AS/NZS 3666.1 and the recommendations of SAA/SNZ HB 32.

1.3 INTERPRETATIONS**Definitions**

General: For the purposes of this worksection the definitions given below apply:

Class: Filter class to AS 1324.1

Type: Filter type to AS 1324.1

1.4 INSPECTION**Notice**

Inspection: Give sufficient notice so inspection may be made of the following:

- HEPA filters: Site filter tests.

1.5 SUBMISSIONS**Filter type tests**

Particulate filters: For each type of filter, submit evidence of filter type tests conducted by a Registered testing authority within the past 5 years.

Standards:

- HEPA and MEPA filters: To AS 4260.
- Other particulate filters: To AS 1324.2.

Filter size for test: 610 x 610 mm face dimension.

2 PRODUCTS**2.1 MATERIALS****General**

Sealant performance: Resistant to air, entrained water and oil, and microbial growth.

Adhesive performance:

- Characteristics under environmental conditions: Odourless and non toxic. Non-migrating, non-evaporating and non-hardening, and resistant to microbial growth.
- Environmental conditions: Normal temperature, sustained temperatures up to 60°C, and operating air velocities.

2.2 COMPONENTS**Component sizes**

General: Standardised throughout the installation as far as practicable.

Filters

Consistency: For filters of the same type provide filters from only one manufacturer.

Filter performance

Minimum performance: To AS 1668.2.

Metal components

Material: Stainless steel or metallic-coated steel with powder coat finish.

Cell frames

Design: Capable of withstanding distortion arising from the final pressure drop across the filter.

Air by-pass: Frames must stop air by-passing the filter media.

Holding frames

General: True and square. Provide gaskets and clamping systems which maintain an airtight seal between the frame and the filter.

Material: Stainless steel or metallic-coated steel with powder coat finish.

2.3 DRY MEDIA FILTERS (TYPE 1) AND VISCOUS IMPINGEMENT FILTERS (TYPE 2)**Filter performance rating**

If filters are documented by performance rating to AS 1324.1 clause 2.1.1 conform to the following:

- $\geq 20\%$ average efficiency when tested with AS 1324.2 Test Dust No. 1.
- $\geq 85\%$ average arrestance when tested with AS 1324.2 Test Dust No. 4.

Filter media

General: Provide filter media:

- That does not support microbial growth and is resistant to fungal and vermin attack.
- That does not shed fibres in service.

Class A filters

Construction: Provide cells in which the medium is permanently enclosed in a disposable frame.

Mounting: Mount the disposable cell in a fixed metal holding frame to the manufacturer's recommendations. Hold each cell in place with spring-loaded clips or clamps. Seal between the cell and mounting frame so no air bypasses the cell.

Class B and C filters

Construction: Provide a rigid metal frame into which the medium is installed.

Mounting: Support the medium on the mounting frame to provide even air flow. Shape pre-formed media to fit the frame. Hold the medium in place with clips, tabs or similar devices so it does not move in service.

Class D filters

Media advance mechanism: Automatic.

Differential pressure setting for the system: Adjustable.

Override controls: Provide a means of stopping the media advance mechanism.

2.4 MARKING**Filter**

General: Permanently and legibly mark, on a suitable section of the filter, the following:

- Filter type and class.
- Direction of airflow.
- Proprietary type, model and serial number.
- Filter performance rating to AS 1324.1.

Replaceable element

General: On the clean air side, fix the name of the supplier, proprietary type, filter type to AS 1324.1 and filter performance rating to AS 1324.1.

Plant room

General: Provide a permanent notice fixed to the wall identifying each filter and giving their design filter performance rating.

Ongoing purchasing requirements should require that replacement filters are labelled with the same performance ratings as the originals.

3 EXECUTION

3.1 INSTALLATION GENERALLY

Attachment

General: Rigidly attach filter frames to the air handling plant casing (such as duct, or return air plenum) with a system of bolting or blind pop riveting. Locate bolts or rivets clear of the filter element. Do not fix to the casing insulation. Ensure that the installation of the filter does not reduce its rated performance.

Access: Ensure that individual filter inspection and maintenance can be readily carried out without disturbing the filter bank.

Sealing: Ensure that there are no leaks between the filter holding frame and the casing. Seal individual filter units to each other. Seal filter connections to adjoining equipment, panelling or supporting framing. Do not use adhesive tapes for sealing.

Slide-in filter units: Do not use.

Plinth: Where possible, provide a 50 mm high plinth below the filter bank.

Cell frames

Access: Install filters so that they are accessible for maintenance and do not accumulate moisture.

Sealing: Seal filter frames to the plenum or duct in which they are installed.

Blanking plates

General: Close gaps where the dimensions of the filter plenum do not match those of the framing. Seal air tight to ensure no air bypasses the filters.

Plates material: ≥ 0.8 mm metallic-coated steel or grade 304 stainless steel sheet.

Additional bracing

General: Provide stiffeners between or behind the joint of every second column along the narrowest dimension of the plenum.

Stiffeners: Fabricate from ≥ 1.6 mm metallic-coated steel or grade 304 stainless steel.

Maximum deflection of filter bank under operating conditions (ratio of deflection: height or width): 1:500 under maximum system final resistance.

Manometers

General: Provide a manometer on each filter bank with more than one cell or handling more than 600 L/s.

Type: Minimum 75 mm diameter non-liquid, diaphragm type marked to show differential pressure across each filter bank.

Differential pressure gauge unit: Include pipework, termination and fittings necessary for correct operation and maintenance.

Indicator scale: Mark in 10 Pa divisions with full scale deflection no more than twice the maximum dirty filter condition.

Location: Outside unit casing in a readily readable location.

Marking: Mark clean and maximum dirty pressure drops on manometer scale.

Temporary pre-filters

Provide sheets of filter media to protect filter banks at installation.

Filter banks

General: Provide holding frames.

Filter access platforms

General: Ensure that platforms and ladders do not obstruct filter access.

Standard: To AS 1657.

3.2 CLEANING

Cleaning

General: Before start-up, ensure that the installation is free from debris and dirt, and check the integrity of the filter bank and plenum installation.

Temporary pre-filters

Remove at completion of commissioning.

4 SELECTIONS

4.1 AIR FILTERS

Refer to drawings.

0741 DUCTWORK**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide ductwork as documented.

Selections: As documented.

1.2 DESIGN**Standards**

Design and installation: Conform to the recommendations of:

- AIRAH DA09.
- ASHRAE Fundamentals Handbook.
- ASHRAE Handbook Systems and Equipment Handbook.

Method of calculation: Manual or software that employs the data and methods in the above standards.

Rigid sheet metal ductwork

Duct design: Size ductwork as follows:

- Velocity: ≤ 6 m/s.
- Pressure loss: ≤ 1.2 Pa/m.

Flexible duct

Requirement: Conform to the following:

- Velocity: ≤ 4.0 m/s.
- Length: ≥ 6 m total flexible duct length in the air path between the fan and furthest outlet or grille served. Provide rigid sheet metal duct for the remainder of the air path between the fan and furthest outlet or grille served.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *General requirements.*
- *Ductwork insulation.*

1.4 STANDARDS**General**

Ductwork: To AS 4254.

Proprietary and non-standard systems

Standard: Conform to functional criteria in AS 4254.

Microbial control

Standard: To AS/NZS 3666.1 and the recommendations of SAA/SNZ HB 32.

1.5 INTERPRETATIONS**Abbreviations**

General: For the purposes of this worksection the following abbreviations apply:

FRL: Fire-resistance level.

1.6 SAMPLES**Flexible duct**

General: Submit sample 2 metre length of 300 mm diameter flexible duct with sheet metal spigot attached.

1.7 SUBMISSIONS

Fire hazard properties

General: Submit evidence of conformance with the following:

- Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:
 - . Spread of flame index: 0.
 - . Smoke developed index: ≤ 3 .
- Facing materials when tested to AS/NZS 1530.2: Flammability index: ≤ 5 .
- Assembled duct systems: Pass the UL 181 burning test.
- Fire protection of duct systems: Achieves the required FRL to AS 1530.4.

Fire and smoke dampers

Certification: Submit test certificates showing compliance as follows:

- Fire and smoke dampers: To AS 1682.1 for air leakage.
- Fire dampers: To AS 1530.4 for FRL.

Mechanical fire dampers: For positions where dampers cannot be installed to close in the direction of the air flow, submit proposed installation details.

Access panels

General: Submit proposed alternative sizes, if any.

Rigid ductwork

General: Submit test data establishing conformance of the assembled duct system with AS 4254 clause 2.1.2 with respect to AS/NZS 1530.3 and UL 181 burning test.

Sealants and tapes

General: Submit type-test certificates showing conformance with the following standards:

- Sealants: To AS/NZS 1530.3.
- Tapes: To AS 4254 clause 2.2.1.

2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

Corrosion resistance

General: Conform to the **Corrosion resistance table** for the atmospheric corrosivity category documented in *General requirements*. Alternatively, provide proprietary products with metallic and/or organic coatings of equivalent or higher corrosion resistance.

Corrosion resistance table

Atmospheric corrosivity category to AS/NZS 2312	Situation	Fire, smoke and motorised dampers	Ductwork
A and B	Internal	Metallic-coated sheet Z275/AZ150	Metallic-coated sheet Z275/AZ150
	External	Metallic-coated sheet Z275/AZ150	Metallic-coated sheet Z275/AZ150
C	Internal	Metallic-coated sheet Z275/AZ150	Metallic-coated sheet Z275/AZ150
	External	Stainless 316	Metallic-coated sheet Z275/AZ150
D	Internal	Stainless 316	Metallic-coated sheet Z275/AZ150
	External	Stainless 316	Stainless 316

Situation:

- External situation includes:

- . Ductwork outside the building.
- . Fire, smoke and motorised dampers in ductwork outside the building.
- . Fire, smoke and motorised dampers located in the discharge air path within 3 m of the point of discharge from the building.
- . Fire, smoke and motorised dampers located in the outside air or mixed air/recycle air path up to the filters.
- Internal situation includes:
 - . Ductwork inside the building not included in external situation.

Adhesive duct tapes

Standard: To AS 4254 clause 2.2.1.

Marking: Label 'Compliant with AS 4254' at least every 200 mm.

Adhesive: Non toxic, high tack, synthetic pressure-sensitive type.

Liner: Silicone coated paper.

Backing: Aluminium foil laminate.

2.2 SHEET METAL DUCTWORK**Material**

General: Galvanized steel duct and mild steel components < 3 mm thick: Prime quality lockforming galvanized steel, to AS 1397 Grade G2 or G3 with Z275 coating.

Thickness: To AS 2338.

Components for stainless steel and aluminium ductwork: Use materials with corrosion resistance not less than that of the duct wall material.

Fasteners

Rivets: Expanding solid end type, aluminium base alloy for galvanized duct, stainless steel for stainless steel duct, minimum size as follows:

- For sheet metal to sheet metal: 3 mm.
- For sheet metal to supports, brackets and rolled steel angles: 4.8 mm.

Self tapping screws: Zinc-plated for galvanized duct, stainless steel for stainless steel duct.

Self drilling and tapping screws: Zinc-plated for galvanized duct, stainless steel for stainless steel duct. Provide only if base material into which they screw is thicker than 1.5 mm and they are unlikely to be removed or replaced.

Bolts, nuts, washers and drop rods: Zinc-plated steel, service condition number 2 for galvanized duct, stainless steel for stainless steel duct. Parts on stainless steel duct not in contact with air stream or corrosive conditions may be zinc-plated as for galvanized duct. Provide washers under nuts and bolt heads.

Duct sealing

General: Seal all openings in the surface, joints and seams of ducts in accordance with AS 4254 clause 2.2.1 and the **Duct seal class table**.

Duct seal class: Not lower than Class C to AS 4254 Table 2.2.1 regardless of duct pressure or location.

Sealant materials: Use only sealants that:

- Do not foster microbial growth.
- Have a smoke developed index ≤ 3 and a spread of flame index ≤ 0 when tested to AS/NZS 1530.3.
- Will maintain their sealing performance for the life of the duct system.
- Bond to the surface of application without primers.
- Are resistant to oils, refrigerants and water after curing.
- Are non-toxic.
- Have high elastomeric properties over the range of operating temperatures after curing.
- Are suitable for application by gun or hand tools.

Adhesive duct tapes: Do not use duct tape as the primary duct sealing agent. Use only as a secondary sealant on joints sealed by other means such as mastic, liquids or gaskets. Do not use duct tapes for non-sealant purposes.

Machine rolled flanges: Use mastic at corners.

Duct seal class table

Duct location	Seal class to AS 4254 Table 2.2.1			
	Supply ducts		Exhaust ducts	Return ducts
	(Static pressure classification Pa)			
	≤ 500	> 500		
Outdoors	A	A	A	A
Unconditioned spaces	B	A	B	B
Conditioned spaces (concealed ductwork)	C	B	B	B
Conditioned spaces (exposed ductwork)	A	A	B	B
Office-type spaces				
Factory-type spaces	C	B	B	B

2.3 FLEXIBLE DUCT

Materials

Uninsulated flexible duct: Aluminised fabric clamped on a formed metal helix. Do not use adhesives. If a metal helix is provided, it must not be in contact with the air stream.

Insulated flexible duct: As for uninsulated flexible duct with flexible blanket insulation wrapped around duct and covered with an outer vapour barrier.

Material R-value: To BCA Spec J5.2.

Insulation material: Conform to the *Ductwork insulation* worksection.

2.4 FLEXIBLE CONNECTIONS

General

General: Isolate fans and conditioner casings from ductwork, by means of airtight flexible connections.

Materials: Heavy duty, waterproof.

Length: Provide sufficient slack to ensure free movement and vibration isolation under operating and static conditions.

Alignment: Align openings of connected equipment.

Fixing: Fix to attachments with metallic-coated steel strip. Seal joints. Do not paint flexible material.

Fire protection: To achieve the FRL of the attached duct when tested to AS 1530.4.

Maintenance: Arrange to permit easy removal and replacement without disturbing ductwork or plant.

Restriction: Do not protrude connections or frames into the airstream where this would be detrimental to the air flow.

2.5 DAMPERS – GENERAL

Location

Provide balancing dampers at each branch duct or tee:

- Splitter type: Use only for supply branches up to 600 mm wide and with velocity in main < 10 m/s. Do not use on return or exhaust ducts.
- Opposed blade dampers: Use for any size supply and for all return and exhaust ducts. Locate in each branch.

2.6 VOLUME CONTROL DAMPERS

General

General: Provide dampers which are free of rattles, fluttering or slack movement and capable of adjustment over the necessary range without excessive self-generated noise or the need for special tools.

Face dimensions: Duct size.

Connections: Mating angle flanged cross joints.

Frames: 1.6 mm minimum thickness metallic-coated steel or 2 mm minimum thickness aluminium folded to form channel sections at least 150 mm wide and welded at corners.

Dampers required to provide tight shut-off: Comply with the **Motorised dampers** clause.

Dampers in smoke-spill systems: Metallic-coated steel or stainless steel blades and frames.

Blades

Material: Metallic-coated steel, aluminium or stainless steel.

Form: No sharp edges. Sufficiently rigid to eliminate movement when locked.

Minimum thickness:

- Metallic-coated sheet steel and stainless steel:
 - . Single thickness blades: 1.6 mm.
 - . Double thickness blades: 1.2 mm.
- Aluminium:
 - . Single thickness blades: 2.4 mm.
 - . Double thickness blades: 1.8 mm.

Maximum length: 1200 mm. If necessary provide intermediate mullions.

Single blade dampers:

- For single thickness blades: 600 mm maximum length, 600 mm maximum width or 600 mm maximum diameter.
- For single thickness blades with 6 mm minimum edge breaks: 1200 mm maximum length x 175 mm minimum width.
- For double thickness blades: 1200 mm maximum length x 300 mm minimum width.

Multi-blade dampers:

- For single thickness blades with 6 mm minimum edge breaks: 1200 mm maximum length 175 mm minimum width.

Bearings

Type: Oil impregnated sintered bronze bearings, sealed-for-life ball bearings or engineering plastic sleeve bearings. If the operating temperature is > 50°C, do not provide nylon.

Lubrication: Provide access for lubrication.

Housings: Rivet to damper frames.

Spindles

Material: Stainless steel in stainless steel dampers, zinc-plated steel or stainless steel otherwise.

Construction: Securely fix to damper blades.

Minimum diameter:

- Blade lengths ≤ 600 mm: 10 mm.
- Blade lengths > 600, ≤ 1200 mm: 12 mm.

Linkages

Fix securely to blades so that the blades rotate equally and close tightly without slip.

Damper adjustment

Provide for adjusting the damper and locking it in position. Locate in an accessible position. Label the open and closed positions clearly and permanently.

2.7 SPLITTER DAMPERS

Construction

Standard: Fabricate to AS 4254 Figure 2.3 (H) with a minimum length 1.5 times the width of the larger branch.

Limitation: Use only on supply ducts and only if duct velocity is less than 10 m/s. Provide volume control dampers otherwise.

Push rods: 5 mm diameter on 600 mm centres with screw locking bushes to fix position.

2.8 MOTORISED DAMPERS

Construction

Requirement: Comply with **Volume control dampers** and the following:

- Side seals: Aluminium or stainless steel.
- Blade tip seals: Neoprene or silicone rubber.
- Leakage: $\leq 25 \text{ L/s.m}^2$ at 1.5 kPa pressure differential.
- Bearings: Sealed-for-life ball bearings only.
- Drive shafts: Keyed, square or hexagonal.

Control characteristics

Flow characteristics: Linear flow relative to damper motor drive shaft rotation.

Type:

- Outdoor air/return air mixing dampers: Parallel blade type with air streams directed towards each other.
- Face and bypass dampers: Parallel blade type with air streams directed towards each other.
- Other modulating dampers: Opposed blade type.
- Two position shutoff dampers: Parallel or opposed blade type.

2.9 NON-RETURN DAMPERS

Construction

Requirement: Comply with **Volume control dampers**. Counterweight the assembly so that it:

- Offers minimum resistance to air flow.
- Closes by gravity.

2.10 ACCESS OPENINGS – LOCATION

Access doors

Location: Provide an access door in each section of air handling units where access is required for maintenance, inspection or removal of components. Removable panels may be used instead of doors where access is required only for removal of coils.

Access panels

Location: Provide access panels in the following locations:

- Next to each component located inside the duct requiring regular inspection and maintenance including, but not limited to:
 - . Fire and smoke dampers.
 - . Smoke detectors.
 - . Motorised dampers.
 - . Filters.
 - . On the air entering side of electric duct heaters.
 - . On the air entering side of duct mounted heating coils.
- In air handling units where unit size is insufficient to fit an access door.
- Where specified in **Kitchen exhaust**.
- In the vicinity of moisture producing equipment, to AS/NZS 3666.1 clause 2.11.3.
- In other locations documented.

2.11 ACCESS PANELS

Sizes

Access panels: Minimum clear opening:

- Personnel access: 450 x 600 mm.
- Hand access: 200 x 300 mm.

Construction

Type: Double panel, deep formed, zinc-coated steel construction, insulated to match the duct, or filled with at least 25 mm glass wool or rock wool insulation.

Cold bridging: Arrange to prevent condensation on cold surfaces.

Frames: Provide rigid matching galvanized steel frames securely attached to the duct. Do not protrude any part of the panel or frame into the airstream.

Seals: Silicone rubber or soft neoprene gaskets mechanically fixed to either the panel or the frame to ensure an airtight seal against the operating pressure when latched in the closed position. For fire rated seals, provide woven ceramic fibre material.

Latches: Wedge type sash latches.

Number of latches:

- For personnel access: 4.
- For hand access: 2.

Handles: Provide a 'D' handle on access panels for personnel access.

2.12 ACCESS DOORS

Construction

General: Provide rigid, reinforced access doors.

Thickness: 50 mm.

Construction: Provide either:

- Sandwich panel: As specified for wall and ceiling panels. Form door edging with a heavy gauge aluminium extrusion with double web seal to both skins. Mitre corner and firmly secure to panel with countersunk head screws.
- Folded: Two-piece press formed or machine folded from ≥ 1.6 mm zinc coated steel.

Minimum clear opening: 1.35 m high x 600 mm or larger to permit safe removal of equipment inside the section.

Door swing: Against air pressure as follows:

- Doors on the inlet side of the fan: To open outwards
- Doors on the discharge side of the fan: To open inwards.

Cold bridging: Arrange to prevent condensation on cold surfaces.

Jamb, stiles and head: Rigid matching ≥ 2.5 mm zinc coated steel, or ≥ 3.0 mm PVC or fibreglass securely mounted.

Door hardware:

- Catches: Provide ≥ 2 heavy duty proprietary clamping-type latches with permanently attached handles that can be operated from both the inside and the outside of the door. Provide satin chrome plated finish to exterior components.
- Hinges: Hang doors on edge-mounted, rising butt type self-closing hinges capable of holding the door fully open. Construct from chrome plated brass or heavy duty aluminium alloy. Provide stainless steel hinge shaft and nylon bearing surfaces.
- Installation: Securely bolt hardware to the door and frame by a method which minimises cold bridging and prevents the forming of condensation on the outside of the conditioner.

Seals: Silicone rubber or soft neoprene gaskets mechanically fixed to the door to ensure an airtight seal when latched closed. Fix to the door using a method that permits easy replacement. For fire rated seals, provide woven ceramic fibre material.

Insulation: 50 mm thick. Construction and insulation properties to match the insulation of the duct, plenum or casing in which the door is located.

3 EXECUTION

3.1 DUCTWORK INSTALLATION

Arrangement

Ductwork: Arrange ductwork neatly. Provide access to ductwork components which require inspection, entry, maintenance and repairs. Where possible, arrange duct runs adjacent and parallel to each other and to building elements.

Spacing

Provide minimum clear spacing, additional to duct insulation, as follows:

- 25 mm between adjacent ducts.
- 25 mm between duct flanges or upper surfaces of ducts and undersides of beams and slabs.
- 50 mm between ducts and electric cables.
- 150 mm between ducts and ground, below suspended floors.

Flexible duct

General: Install flexible duct as straight as possible with minimum number of bends. Maximise bend radius but not less than AS 4254 clause 2.8.5 (h).

Joints: Securely fix flexible duct to rigid spigots and sleeves using sealant and draw band encased with at least two wraps of duct sealing tape.

Joints between flexible ducts: Join lengths of flexible duct only for the purpose of providing an air tight or acoustic sleeve at a partition.

Support: To AS 4254. Limit sag to < 40 mm/m.

Maximum length of flexible duct sections: 6 metres including any rigid duct or sleeves used to join lengths of flexible duct.

Substitution: If rigid duct is shown on the drawings do not substitute flexible duct.

Flexible ducts used for air containing free moisture: Locate supporting helix outside airstream.

Motorised dampers

Maintenance access: Locate dampers and damper motors in accessible positions, for blade and motor maintenance and blade seal replacement.

Mounting: Sufficiently rigid to prevent flexing or distortion of the frame or ductwork during operation.

Operation: If 2 sets of dampers are connected to a single motor, provide linkages which allow either damper to be adjusted without affecting the other.

Cleaning

During installation progressively remove construction debris and foreign material from inside ducts.

Drainage

Provide drainage to AS/NZS 3666.1 at locations in ductwork where moisture may accumulate including at outside air intakes.

4 SELECTIONS

4.1 DUCTWORK

Ductwork schedule

Ductwork type	Material	Pressure class to AS 4254
Supply, Return, Relief, Exhaust	Zinc Coated Steel	250

0744 DUCTWORK INSULATION**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide insulation of ductwork and related items.

Selections: As documented.

Alternative insulation methods and materials

General: Do not submit alternatives for materials or methods that have lesser quality or characteristics in terms of the following:

- Performance.
- R-Value.
- Durability during and after installation.
- Corrosion resistance.
- Cold bridging.

1.2 STANDARDS**General**

Ductwork insulation: To AS 4254.

Installation of glass wool and rock wool insulation

General: Comply with the ICANZ Industry Code of Practice for the Safe Use of Glass Wool and Rock Wool Insulation.

Marking: Deliver mineral glass wool and rock wool products to site in packaging labelled FBS-1 BIO-SOLUBLE INSULATION.

1.3 INTERPRETATIONS**Definitions**

General: For the purposes of this worksection the following definitions apply:

- Fire hazard properties: Means the Average Specific Extinction Area, Critical Radiant Flux, Flammability Index, Smoke-Developed Index, Smoke Growth Rate Index, Smoke Development Rate or Spread-of-Flame Index of a material or assembly that indicate how they behave under specific fire test conditions.
- FBS-1 Glass Wool: Spun fibres of molten glass, utilizing up to 80% recycled waste glass, thermally bonded to form batts, blankets and sheets for thermal and acoustic insulation.
- FBS-1 Rock Wool: Spun fibres of molten rock thermally bonded to form batts and blankets for thermal and acoustic insulation.
- Polyester: Insulation manufactured from thermally bonded polyester fibres.
- Material R-Value: The thermal resistance ($\text{m}^2\cdot\text{K}/\text{W}$) of a component calculated by dividing its thickness by its thermal conductivity. Material R-Value does not include air space or surface resistances.

1.4 SUBMISSIONS**Fire hazard properties**

General: Submit evidence of conformance with the **Fire hazard properties** in **INSULATION MATERIALS**, including assembled duct systems.

Thermal insulation performance

General: Submit evidence of conformance to AS/NZS 4859.1.

Samples

Samples: Submit samples of the following:

- Each type of insulation, applied to a sample 1.5 m long section of ductwork, including a site applied insulated transverse joint.

Cutaway sections: For each sample, provide cutaway sections to permit inspection of application details including insulation materials, adhesives, mastics, fixings and sheathing.

Alternative insulation methods and materials

General: If offering alternatives for materials or methods, submit evidence that they are equal or superior quality and characteristics than that documented. Include comparison of the following:

- Thermal and other performance.
- Suitability for the operating temperature range.
- Durability during and after installation.
- Corrosion resistance.
- Cold bridging.

2 PRODUCTS

2.1 INSULATION PERFORMANCE

General

Insulation material R-Value: To BCA Spec J5.2 and as documented.

Thermal conductivity: $\leq 0.045 \text{ W/(m.K)}$.

2.2 INSULATION MATERIALS

Insulation material type

General: Choose from the following:

- Glass wool.
- Rock wool.
- Polyester.
- Polyolefin foam.

Fire hazard properties

General: Fire hazard indices for all materials when tested in conformance with AS/NZS 1530.3:

- Spread of flame index: 0.
- Smoke developed index: ≤ 3 .

Facing materials:

- Flammability index when tested in conformance with AS/NZS 1530.2: ≤ 5 .

Assembled duct systems: Pass the UL 181 burning test.

Materials with reflective facing: Test to AS/NZS 1530.3 clause A6.

Insulation materials

Standard: To AS/NZS 4859.1.

Type: In batt, board or blanket form.

Polyester: Thermally bonded polyester fibres.

Polyolefin: Closed cell cross-linked polyolefin foam produced using non-CFC blowing agent.

Vapour barrier

Standard: If vapour barrier performance is documented, provide a system with a vapour barrier classification of High to AS/NZS 4200.1 (permeance $\leq 0.002 \text{ } \mu\text{g/N.s}$).

Semi-rigid insulation

General: Physical properties:

- Alkalinity: pH 7 – 9.
- Moisture absorption: Non-hygroscopic.

Type: Batt or board form with a maximum mean deflection of 6 mm for 50 mm thick material and 20 mm for 25 mm thick material, tested as follows:

- Freely support a 900 x 1500 mm test piece on its longer sides.
- Allow the test piece to stand for 10 minutes and measure the vertical deflection.
- Turn the test piece over and repeat the test.
- Average the results.

Minimum absorption coefficients table

Insulation	Absorption coefficients (nominal) to AS ISO 354 at					
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Perforated foil faced: R 0.9 to AS 4508	0.12	0.48	0.84	0.96	0.97	0.94
R 1.5 to AS 4508	0.23	0.62	1.00	1.07	1.12	0.78

Adhesives

Type: Suitable for bonding facing to the insulation. Apply in an even coat.

Fire hazard properties:

- Smoke developed index: 0.

Aluminium foil laminate sheet

Standard: To AS/NZS 4200.1 as follows:

- Internal insulation: Heavy duty before perforation.
- External insulation: Heavy duty unperforated.

Test criteria: To UL 181 with performance to AS 4254 Table 2.8.2.

Aluminium foil laminate tape

Standard: To AS 4254 clause 2.2.1.

Marking: Label 'Compliant with AS 4254' at least every 200 mm.

Adhesive: Non toxic, high tack, synthetic pressure-sensitive type.

Liner: Silicone coated paper.

Backing: Aluminium foil laminate.

Elastomeric foam insulation

Material: Chemically blown closed cell nitrile rubber in sheets or rolls. Provide with a smooth natural finish and vapour barrier properties.

Standard: To ASTM C534.

Physical properties:

- Thermal performance: As for the attached duct.
- Moisture absorption: Non-hygroscopic.
- Water vapour permeability: ≤ 0.065 ng/Pa.m.s.

Adhesives: Adhesive fix and seal exterior joints. Provide only solvent-based adhesive supplied by insulation manufacturer and designed specifically for the material being used.

Protection: Metal sheath insulation where:

- Exposed to sunlight.
- Subject to mechanical damage.

Alternative protection: Where exposed to sunlight but not exposed to mechanical damage, provide 2 coats of tintable, water-based, rubberised, UV resistant, flexible paint finish to outdoor installations.

3 EXECUTION**3.1 GENERAL****Fixing devices**

Standard: To AS 4254 clause 2.7.

Pins: Stud welded fully annealed metallic-coated steel.

Speed clips: Bevel edged metallic-coated steel with an area not less than that of a 25 mm circle. Secure speed clips flush to the face of the insulation.

Protection: Cut off excess length of pins after insulation and speed clips have been applied or bend parallel with the insulation surface. Cover fixing pins and speed nuts on external insulation with aluminium foil laminate tape.

Insulation overlap

General: Provide an overlap of at least 300 mm where insulation changes from the inside of the duct to the outside.

Joints

Joints: Install insulation with the least number of joints practicable.

Use of multiple layers: If insulation is applied in more than one layer, stagger longitudinal and end joints.

Insulation near moisture producing equipment

General: If the likelihood exists of moisture accumulation inside ducts, in the vicinity of moisture producing equipment use only external insulation.

Metal sheath insulation: In plant rooms and where nominated in the **Ductwork insulation schedule**.

Vapour barriers

Type: Free from perforations and leaks, continuous, and sealed continuously at penetrations.

Location: Place vapour barriers on the side of the insulation that will be warm during cooling mode operation.

Application of tapes

Tape width: ≥ 72 mm.

Make sure surfaces are dry and free of dust and grease before applying tapes.

Completion of fabrication

General: After each length of duct or each fitting has been insulated inspect and remove any off cuts, drill swarf or other loose material.

Storage: Store under cover and protected from weather and the entry of foreign matter.

3.2 INTERNAL INSULATION – LAMINATE FACED**System description**

Insulation type: Semi-rigid board or batt.

Surface facing: Factory applied perforated aluminium foil laminate.

Application

General: Cover parts of ducts designated to be insulated, with individual pieces of insulation for each side of the duct. Where this is not possible, butt join edges of adjacent pieces. Where multi-layers are used (round or oval ducts) stagger all joints.

Joins in insulation

General: Cover joins with 100 mm wide strip of facing material or tape located centrally over the join.

Longitudinal joins: Locate behind corner angles or cover strips.

Fixing method

Method: Select from the following:

- Corner angle and end nosing method.
- Free edge method.

Fixing pins: Provide to AS 4254 clause 2.7.1 (g).

Corner angle and end nosing method

Corners: Overlap insulation on adjacent sides at corners. Hold insulation in position with metallic-coated steel corner angles. Fix corner angles under the turn back of the end nosing. For corner angles longer than 1600 mm provide additional fixing at 1600 mm maximum centres.

Corner angles:

- Ducts with faces < 300 mm: 25 x 25 x 0.55 mm, minimum.
- Other ducts: 40 x 40 x 0.55 mm, minimum.

End nosings: At ends of ducts, hold insulation in position with U-shaped metallic-coated steel end nosings, with edges crimped towards the surface. Rivet end nosings to ducts.

Size: 0.55 mm thick with a minimum 50 mm turn back over the insulation.

Butt joints: Square cut and butt tightly together edges of adjacent pieces of insulation. Cover with 50 x 0.55 mm metallic-coated steel strip. Rivet cover strips under corner angles or under turn-back of end nosings. For cover strips longer than 1600 mm, provide additional fixing at 1600 mm maximum centres.

Fixing pins: For ducts with faces ≥ 300 mm, fix the insulation at 300 mm maximum centres with at least one row per duct face.

Free edge method

General: Use only where larger duct side is ≤ 300 mm.

Edges: Extend insulation proud of ductwork at each end, to provide cushion joints that fully seal during assembly.

3.3 INTERNAL INSULATION – METAL FACED

Location

General: Apply metal facing to internal insulation in the following locations:

- 300 mm each side of fire, smoke and volume control dampers.
- Air handling plant casings and plenums.
- All other locations where insulation may be subject to mechanical damage.
- Other locations as documented.

System description

Insulation type:

- Rectangular ductwork: Semi-rigid batts.
- Circular and oval ductwork: Flexible batts.

Surface facing: Perforated metal.

Application

General: Cover parts of ducts designated to be insulated with individual pieces of insulation for each side of the duct. Where this is not possible, butt join edges of adjacent pieces. Overlap adjacent sides at corners.

Rectangular ductwork

Metal facing: Support insulation against duct surfaces with metal facing, cut and folded to the inside dimension of the duct to form overlapping joints at corners. Rivet the overlap at 300 mm maximum centres.

Facing material: 0.55 mm metallic-coated steel uniformly perforated with 2.5 mm diameter holes providing 10% open area.

End nosings: At ends of ducts hold insulation and metal facing in position with U-shaped metallic-coated steel end nosings, with edges crimped towards the surface. Rivet end nosings to ducts and rivet the overlap with the metal facing at 300 mm maximum centres, with at least one rivet per duct face.

Nosing size: 0.55 mm thick with a minimum 25 mm turn-back over the metal facing.

Fixing: Z section 0.55 mm metallic-coated steel fastened to ductwork and to facing with blind rivets. Provide adhesive cloth tape between the Z section and the duct. For duct sides over 600 mm, hold in position at 600 mm maximum centres with at least one row of rivets per duct face. Arrange to prevent condensation on cold surfaces.

Circular ductwork

Metal facing material: Metallic-coated steel uniformly perforated with 2.5 mm diameter holes providing 10% open area.

Method: Fabricate the facing in the same manner as the circular duct, with helical lock seams for longitudinal joints. Lap transverse joints in the facing in the direction of air flow with a minimum overlap of 75 mm. Wrap insulation around the facing so that the surface designed to be exposed

faces the air stream, and fix with polypropylene straps. Slide the insulated cylinder into the circular ductwork sections. Where the insulation is terminated, and at joints, provide end caps or channels.

Metal facing table

External duct diameter (mm)	Metal facing thickness (mm)
≤ 650	0.6
> 650, ≤ 950	0.8
> 950, ≤ 1250	1

3.4 EXTERNAL INSULATION – LAMINATE FACED

System description

Insulation type: Flexible batts or blanket.

Surface facing: Factory applied aluminium foil laminate.

Application

General: Wrap insulation around the outside of ducts, covering the parts designated to be insulated. Minimise the number of joints.

Joints: Square cut and butt together the edges of adjacent pieces of insulation.

Insulation of bends: Apply a single piece of insulation to each face of a bend or transition. Insulate bends and transitions on round and flat oval ducts with individually mitred gores cut to fit the fitting.

Vapour sealing: Seal the vapour barrier at joints with 100 mm wide aluminium foil laminate tape, applied centrally over the joint. Where the insulation is impaled over pins, seal the vapour barrier by covering pins with water-based mastic vapour barrier or reinforced aluminium foil faced tape at least 100 x 100 mm.

Flanges, stiffeners and joints: Maintain insulation thickness over flanges, joints, stiffeners and other items that protrude from the face of the duct. Use one of the following methods:

- Carry the insulation material over the protruding item without cutting or joins.
- Insulate with 150 mm wide strip of the same material as used for the duct. Fix with a row of pins and speed nuts on each side of the protruding item. Provide a continuous vapour barrier.

Polyolefin foam insulation: Apply proprietary 120 mm wide polyolefin foam flange strips over flanges, joints and stiffeners.

Fixing method

Materials other than polyolefin foam: Select from the following:

- Pin method: Provide pins to each face of the duct as follows:
 - . Horizontal ducts < 380 mm wide: Pins not required.
 - . Horizontal ducts > 380, < 760 mm wide: One row of pins along centreline to side and bottom duct faces at 380 mm maximum centres.
 - . Horizontal ducts ≥ 760 mm wide: Pins spaced at 380 mm maximum centres.
 - . Vertical ducts < 610 mm wide: Pins not required.
 - . Vertical ducts ≥ 610 mm wide: Pins spaced at 380 mm maximum centres.
- Strap and pin method: Provide 12 mm wide polypropylene strapping at maximum 600 mm intervals.
 - . Horizontal ducts ≥ 600 mm wide: Hold insulation in position on the underside with fixing pins spaced at 400 mm maximum centres with at least one row per duct face.
 - . Vertical ducts ≥ 600 mm wide: Provide pins to all faces at 400 mm maximum centres.
- Corner angle and strap method: Provide metallic-coated sheet steel corner angles on all four sides of the duct. Retain with 12 mm wide polypropylene strapping at maximum 750 mm intervals. Provide angles as follows:
 - . 25 mm nominal thickness insulation: 38 x 38 mm.
 - . 50 mm nominal thickness insulation: 63 x 63 mm.

Polyolefin foam: Provide pins spaced 50 mm from all edges and spaced 200 to 300 mm apart in all directions.

3.5 EXTERNAL INSULATION – LAMINATE FACED AND METAL SHEATHED

System description

Insulation type: Semi-rigid batts.

Surface facing: Factory applied aluminium foil laminate.

External protection: Metal sheathing.

Application

General: Comply with **External insulation – laminate faced**.

Support: Support insulation against the duct surfaces with 0.55 mm metallic-coated steel cut and folded to the outside dimensions of the insulated duct.

Joints in sheathing: Lap joints in sheathing at least 30 mm and rivet at 100 mm centres. Factory made joints may be of the grooved seam or spot welded type. Where necessary, provide for sheathing removal for maintenance or access, by providing self tapping screws that do not penetrate the vapour barrier.

Sealing: If exposed to weather, seal joints with silicone mastic sealant.

3.6 INSULATION OF DUCTWORK ACCESSORIES

Plenum boxes on air outlets

Insulation type: Internal insulation, with perforated aluminium foil laminate, black finish.

Material R-Value: Same as the connected duct.

Insulation fixing: Turn facing back over raw edges of insulation for at least 75 mm and bond the turn back to the insulation before installation. Provide fixing pins at 250 mm maximum centres with at least one pin per face. Fully bond insulation around neck with adhesive.

Dampers

Internal: Leave clearance between insulation and edges of the splitter or manually operated damper blades.

External: For manual and motorised dampers, provide removable insulated sheet metal top hat sections to encase dampers.

Access doors

General: Provide insulation to access doors and openings. Arrange to prevent condensation on cold surfaces.

3.7 INSULATION OF DUCT FLEXIBLE CONNECTIONS

General

General: Insulate duct flexible connections if the temperature of the air inside the duct may cause condensation on the outside of the flexible connection.

Material R-Value: Same as the connected duct.

Method

General: If the insulation of the connecting ductwork is:

- External laminate faced on one or both sides of the flexible connection: Insulate duct flexible connection as required in the **External insulation - laminate faced** clause.
- Any other insulation system: Insulate duct flexible connection with elastomeric foam as required in the **Elastomeric foam insulation** clause.

4 SELECTIONS

4.1 DUCTWORK INSULATION

Ductwork insulation schedule

Refer to drawings.

0746 AIR GRILLES**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide air grilles.

Selections: As documented.

1.2 DESIGN**General**

Requirement: Provide air distribution equipment to achieve the documented system performance.

Supply air

Requirement: Provide supply grilles, diffusers or unducted room air conditioners to:

- Evenly distribute supply air within the space free from draughts and to achieve the documented permissible temperature variation.
- Achieve the documented noise levels within the space.
- With at least one grille, diffuser or unducted room air conditioner in each room or space served.

Return air

Requirement: Provide return air grilles to:

- Return air to the air conditioning plant in a energy efficient manner.
- Achieve the documented noise levels within the space.

Door grilles

Requirement: Provide door grilles to:

- Return air to the plant if the return air path is through the door opening.
- Provide make-up air to exhaust ventilated spaces.
- In other locations necessary to prevent excessive space air pressures and achieve energy efficient plant operation.

Exhaust grilles

Requirement: Provide exhaust grilles to meet statutory ventilation requirements.

Outside air grilles and louvres

Requirement: Provide grilles and louvres on the face of the building to:

- Supply fresh air to air conditioning and ventilation plant.
- Provide relief of exhaust and return air.
- Prevent the entry of rain and vermin.

1.3 STANDARDS**General**

General: AS 4254.

1.4 INTERPRETATIONS**Abbreviations**

General: For the purposes of this worksection the following abbreviations apply:

Definitions

General: For the purposes of this worksection the definitions given below apply.

- Air grille: A general term referring to a grille of metal or other material fitted to the inlet or outlet end of an air duct or within walls, floors ceilings or doors.
- Diffuser: A supply air grille mounted in a ceiling or on the underside of a duct through which air is supplied and distributed within a room or interior space of a building.

- Register: A supply air grille mounted in a wall or on the side of duct.
- Grille: A grille fixed over the aperture from which air is removed from an enclosed space.
- Plenum box: A lower velocity (larger volume) duct element behind an air grille intended to allow equalisation of air flow over the air grille.
- Cushion head box: A plenum box fitted above a diffuser.

1.5 SUBMISSIONS

Samples

General: Submit a sample of each type of air grille and diffuser. Include plenum box and blanking plates as documented.

Product data

General: Submit type test data as follows:

- Air diffusion equipment: Acoustic performance to ISO 5135, ANSI/ASHRAE 70 or AHRI 890.

2 PRODUCTS

2.1 GENERAL

Manufacture

General: Provide proprietary grilles:

- Free from distortion, bends, surface defects, irregular joints, exposed fastenings and operation vibration.
- Mounted with secure and concealed fixings.
- With flange corners neatly mitred, butted and buffed, with no joint gaps.

Material: Steel or aluminium.

Finish:

- Exposed surfaces: Powder coated to nominated colour.
- Visible internal elements: Matt black enamel.

Fixings: Provide concealed fixings which allow removal without damage to surrounds or grilles.

Variable volume systems

General: Provide grilles tested for variable volume applications.

2.2 VOLUME CONTROL DAMPERS

Dampers controlling a single diffuser and grille attached to flexible duct

General: Provide a damper as follows:

- If the duct spigot is located above a tiled or otherwise accessible ceiling: Provide a butterfly damper in the rigid duct spigot.
- If the duct spigot is not located above a tiled or otherwise accessible ceiling: Provide an opposed blade damper behind the face of the diffuser or grille.

Butterfly dampers

Type: Single-blade round dampers with external locking quadrant indicating butterfly damper position.

Location: To **Dampers controlling a single diffuser and grille attached to flexible duct.**

Stream splitter dampers

Type: Duct mounted ganged, multi-blade, stream splitter type.

Location:

- At rigid duct take-offs to outlets.
- Location: To **Dampers controlling a single diffuser and grille attached to flexible duct.**
- Behind duct mounted registers.

Opposed blade dampers

Type: Multi-blade type with blades linked for ganged operation. If located at the air grille provide adjustment accessible through the grille face. If visible through grille paint the damper matt black.

Location:

- At the at end of duct spigot take-offs.
- Location: To **Dampers controlling a single diffuser and grille attached to flexible duct.**
- Behind supply diffusers and grilles attached to flexible duct if the spigot at the rigid duct is not accessible through the ceiling.
- Behind return and exhaust air grilles connected to ducts.

2.3 AIR GRILLE TYPES

Air grilles in suspended ceilings

Physical compatibility: To AS 2946.

Louvre ceiling diffusers

General: Provide either:

- Multi-bladed, removable core 4-way blow configuration, fitted with a blanking plate for 1-, 2-, or 3-way blow, as appropriate; or
- Multi-bladed, removable core 1-, 2-, 3- or 4-way blow configuration.

Reducer necks: If the outlet neck is smaller than the outlet necessary to suit the louvre face size, provide a reducer neck.

Frame: Provide a frame style to suit the type of ceiling, and ceiling grid mounting requirements.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **Volume control dampers.**

Swirl diffusers

General: Provide swirl diffusers as scheduled.

Reducer necks: If the outlet neck is smaller than the outlet necessary to suit the louvre face size, Slot diffusers

Type: Linear slot type ceiling diffusers with one or multiple slots, nominally 20 mm wide and integral air pattern control.

Construction: Extruded aluminium with parallel, inverted T members supported and spaced to form continuous discharge slots.

Plenum: Supply air to the active lengths of each diffuser via plenum ducts on the back of the diffuser with circular or oval spigots for flexible duct connections. Design the plenum ducts to ensure even distribution of air flow along the active length of the diffuser.

Frame: Flanged with outside edge returned and coordinated with the ceiling system.

Finished appearance: Continuous and unbroken irrespective of the purpose of the slot. Blank off all slots not used for supply or return air. For long lengths, provide mechanical aligning devices to produce a rigid assembly that minimises the visibility of joints.

Air pattern control: Provide an adjusting device which can be operated from the face of the diffuser through the slot to allow 180° deflection of air pattern from vertical to horizontal in either direction.

Air volume control: Conform to **Volume control dampers.**

Weatherproof louvre grilles

Construction: Extruded aluminium with fixed horizontal blades set into a fixed frame.

Louvre blades: Set at nominal 45° angle and incorporating at least one hooked edge to prevent ingress of water under all operating conditions. Brace and stiffen to prevent rattling or movement.

Frame: Flanged or channel to suit the installation profile.

Pressure drop: ≤ 15 Pa at the documented air flow.

Screens: Provide metallic-coated steel wire or PVC-U mesh screens behind louvres to prevent the entry of vermin, birds, rodents and wind blown extraneous material such as leaves and papers.

Return or exhaust grilles – indoor

Construction: Extruded aluminium with fixed horizontal blades set into a fixed support frame with mitred corners. Fit blades tightly into the frame to prevent rattling or movement. Brace and stiffen to produce a rigid assembly.

Pressure drop: ≤ 10 Pa at the documented air flow.

Blades:

- Half chevron type: Blades at nominal 45° angle on a nominal 25 mm pitch.
- Inverted V chevron type: Blades at nominal 25 mm pitch. Provide a telescopic frame with clip-on pattern surround frames on both sides.
- Light proof grilles: Inverted V chevron type but with double inverted V chevron blades and blade pitch selected to stop light penetration.

Air volume control: If the grille is connected to a duct, provide an opposed blade damper behind the grille core, key operated without removing the grille core.

Mesh grilles

Light duty type: Fabricate from 1.5 mm thick galvanized steel or bronze wire at 12 mm centres fixed into a folded metallic-coated steel or aluminium frame.

Heavy duty type: Fabricate from 3 mm thick galvanized steel or bronze wire at 20 mm centres, welded into a 3 mm thick galvanized steel frame.

Bronze mesh: If bronze mesh is provided on external grilles, provide a bronze frame.

Egg crate return or exhaust grilles

Construction: Nominal 12 x 12 mm square, 12 mm deep egg crate type aluminium core fixed in an extruded aluminium frame with mitred corners. Fit core tightly into the frame to prevent rattling or movement.

Free Area: $\geq 90\%$ of nominal face area.

Air volume control: If the grille is connected to a duct, provide an opposed blade damper behind the grille core, key operated without removing the grille core.

Semi light proof egg crate return or exhaust grilles

General: As for **Egg crate return or exhaust grilles** but with a 9.5 x 12.5 x 12.5 mm core set at 35°.

3 EXECUTION

3.1 INSTALLATION OF AIR GRILLES

Protection

Wrapping: Leave protective wrappings in place until final mounting.

Mounting

General: Provide a matching escutcheon to close gaps between the grille and its surrounds. Provide grilles with flanges to cover penetrations and irregularities in surrounds.

Tiled ceilings: Locate grilles and diffusers to minimise cut tiles. Otherwise, locate grille symmetrically in the tile.

Appearance: Install square.

Fixing

Visibility: Provide concealed fixings.

Accessibility: Provide fixings which allow removal without damage to surrounds or outlets.

Gaskets: Provide foam type gaskets under outlet flanges or flanged supports.

Plenum and cushion head boxes

General: Provide side entry plenum or cushion head boxes to diffusers and grilles connected to flexible ductwork.

Design: To achieve even air flow across the face of the diffuser or grille.

Material: Prime quality lockforming galvanized steel, to AS 1397 Grade G2 or G3 with Z275 coating.

Insulation: Conform to the **Insulation of ductwork accessories** clause in the *Ductwork insulation* worksection.

Painting: Paint interior of plenum box matt black if visible through grilles.

Flexible duct connections: Provide round or oval spigots on plenum boxes.

Support of plenum boxes: For louvre ceiling and slot diffusers support the plenum either:

- From above and independently of the ceiling.

- From the ceiling main Tees provided the load is less than the ceiling system manufacturer's maximum.

0772 AUTOMATIC CONTROLS – MINOR**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide automatic control systems to perform the control functions.

Performance: Within the documented limitations of the plant capacities, maintain the documented conditions. Supply and commission control systems that are safe and stable in operation under all anticipated operating conditions including start up, shut down and fault condition.

Selections: As documented.

1.2 INTERPRETATIONS**Abbreviations**

General: For the purposes of this worksection the following abbreviations apply:

- LED: Light emitting diode.
- RTD: Resistance temperature device.

2 PRODUCTS**2.1 GENERAL****Control components**

Provide sensors and control components that are:

- Of corrosion resistant construction.
- Suitable for the respective operating environment.
- Not affected by the accumulation of dust or moisture, extraneous influences or variation of $\pm 30\%$ in supply voltage.
- Protected against the entry of vermin.
- Selected for a response time appropriate to the application.
- Provided with proprietary connections suitable for the size and type of cable used.

2.2 CONTROLLERS**General**

Type: Modular and expandable electronic controllers, either application-specific or universal type, programmed for the required functions.

Hardware and facilities

Memory: Provide memory to hold operating system, software, database, programming and set points. Hold BIOS and application programming in non-volatile memory or battery backed up for ≥ 72 hours in the event of power loss.

Connections: Provide connections and software for:

- Each external input or output point via terminal strip or termination card.
- Connection of a Microsoft Windows based laptop computer to the controller for programming, setting up and troubleshooting. Provide for upload and download of programs and logged data.

Operator interface

Display: Provide backlit alphanumeric liquid crystal display (LCD) for sensed values and faults.

Operator interface: In addition to the laptop computer connection, provide the controller with keyboard or push buttons operating through a menu system to permit access limited by password to change set points, time schedules and manually override control functions. Provide diagnostic LEDs for power, communication and processor.

Controller software

General: Locate all application software in system controllers. Provide each controller with the following:

- Clock: Provide each controller with a real-time clock and daylight saving adjustment. Automatically synchronise time with the other parts of the system at least weekly.
- Diagnostics: Provide software in the controller to continually check its processor and memory circuit status and to generate an alarm on abnormal operation. In the event of abnormal operation provide continuous operation using the last reliable data.
- Scheduling: Provide calendar function and facilities for daily, weekly and day-omit (holiday) scheduling.
- Security: Provide multi-level password controlled access.

Input-output facilities

General: Hard wire input and output points to controllers.

Number: Provide sufficient input-output modules to perform the required functions. Provide spare space for future expansion.

Protection: Protect against damage caused by shorting an input or output to itself, to another point or to earth and reverse polarity. Protect from input or output point contact with $\leq 24\text{v}$ for any duration.

2.3 INPUT DEVICES – GENERAL**General**

General: Provide input devices with the following characteristics:

- With range, accuracy and response time appropriate to the required control function including the effects of transducer accuracy and signal transmission errors.
- Maintain documented performance over time.
- Protected by location or otherwise from extraneous influences including sunlight, heat sources and nonrepresentative locations.

2.4 INPUT DEVICES - TEMPERATURE**General**

Approval and testing of thermostats and temperature controls: To AS/NZS 3161.

Temperature sensors – room

General: Provide tamperproof sensors in an ABS or polycarbonate case ventilated to the room air and thermally insulated from the wall.

Sensing element: Resistance temperature device (RTD) or thermistor.

Accuracy: Within $\pm 0.3^\circ\text{C}$ over the temperature range required for the project application.

Repeatability: $\pm 0.1^\circ\text{C}$.

2.5 ACTUATORS**General**

Type: Electronic, incorporating a disengagement mechanism that permits manual operation in the event of power failure without disconnecting the actuator. Provide a position indicator on the actuator.

Mounting: Provide actuators and mounting selected to provide sufficient torque to allow changes of position with the fans or pumps operating.

Protection: Minimum IP54 enclosure. If the actuator is located outdoors provide additional weather protection.

Overload and stall: Protect actuators against overload. Provide electronic or magnetic clutch type stall protection effective throughout the entire actuator stroke. Do not rely on end switches that require field adjustment.

Fail safe operation: If fail-safe operation is required, provide integral spring return via clutch only.

Noise: Provide actuators that are inaudible in occupied areas.

3 EXECUTION

3.1 GENERAL

General

Marking: Mark each control components.

3.2 INSTALLATION – INPUT DEVICES

Sensors in occupied areas

Installation: Securely attach to walls, ceilings or columns. Mount on concealed junction boxes and seal cable entries to prevent air from the cavity entering the junction box. Conceal all wiring from view inside wall, column or ceiling space.

Wall or column mounted sensors: Locate 1500 mm above floor level.

Sensors – outdoor air

Installation: Either locate in the outdoor air stream of an air handling unit that operates at all times outside air temperature is required or locate in an accessible external location on a south facing wall and protected from rain and sun.

4 SELECTIONS

4.1 FUNCTIONAL DESCRIPTIONS

General

Functions: Provide automatic control systems, functions and components as documented.

The Mitsubishi Electric VRF systems shall be provided with a central controller to manage:

- Timescheduling and afterhours manual over-ride.
- Interlock with the security system and fire indicator panel.
- Operation of the heat recovery ventilator

Unit setpoints shall be adjustable at the local controllers albeit limited to a range between 18 and 25°C.

Provide an interlock with the security system such that the airconditioning systems cannot operate when the security system is armed.

The Heat Recovery Ventilator HRV-3 shall operate whenever the security system is disarmed.

The Heat Recovery Ventilators HRV-1 & 2 shall each be speed controlled (supply and exhaust) in response to a CO₂ sensor to maintain CO₂ levels below 850 ppm.

Provide an interlock with the fire indicator panel such that the airconditioning systems shut down in fire mode.

0781 MECHANICAL ELECTRICAL**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide mechanical electrical installations.

Selections: As documented.

1.2 ELECTRICAL ACCESSORIES**General**

Responsibilities: Provide accessories are documented.

Proprietary equipment: If proprietary equipment is selected by the contractor, the requirements of this specification over-ride the specifications inherent in the selection of a particular make and model of accessory.

Uniformity: Provide all accessories and outlets located in close proximity of the same manufacture, size, finish and material.

Default finish: Select from the manufacturers standard range.

2 LOW VOLTAGE POWER SYSTEMS**2.1 GENERAL****System description**

Supply: Conform to the following.

Nominal supply voltage	230/400 V
Number of phases	3
Frequency	50 Hz
Number of wires – system	4
Neutral connection	MEN

Standards

General: To AS/NZS 3000 Part 2 unless otherwise documented.

Electrical systems: To AS/NZS 3008.1.1 and SAA HB 301.

Degrees of protection (IP code): To AS 60529.

EMC: To AS/NZS 61000.

Telecommunications systems: To AS/ACIF S008, AS/ACIF S009, AS/NZS 3080, SAA HB 243 and SAA HB 29.

Interpretations

Definitions: For the purposes of this worksection the following definitions apply:

- Extra-low voltage: Not exceeding 50 V a.c. or 120 V ripple-free d.c.
- Low-voltage: Exceeding extra-low voltage, but not exceeding 1000 V a.c. or 1500 V d.c.

Samples

Samples: Submit samples of all visible accessories and equipment.

Submissions

Technical data: Submit the following information for each main, submain and final subcircuit for which calculation is the responsibility of the contractor.

- Single line diagram.
- Fault Levels at switchboards.
- Maximum demand calculations.
- Cable and conductor cross sectional area and insulation type.
- Cable operating temperature at design load conditions.
- Voltage drop calculations at design load conditions.
- Touch potential calculations.
- Protective device characteristics, e.g. curves, I^2t .
- Discrimination and grading of protective devices.
- Prospective short circuit current automatic disconnection times.
- Final subcircuits may be treated as typical for common route lengths, loads and cable sizes.
- Touch potential automatic disconnection times.
- Earth fault loop impedance for testing and verification.
- Certify compliance with AS/NZS 3000, for electrical services.

2.2 PRODUCTS**Wiring systems**

Selection: Provide wiring systems appropriate to the installation conditions and the function of the load.

Earthing systems

Earthing systems: Provide an earthing system complying with AS/NZS 3000 Section 5.

Power cables

Standard: Polymeric cables to AS/NZS 5000.1.

Cable: Use multi-stranded copper cable generally.

Default insulation: V-75.

Default sheathing: 4V-75.

Minimum size:

- Power sub-circuits: 2.5 mm².
- Sub-mains: 6 mm².

Voltage drop: Install final subcircuit cables within the voltage drop parameters dictated by the route length and load.

Fault loop impedance: Provide final subcircuit cables selected to satisfy the requirements for automatic disconnection under short circuit and earth fault/touch voltage conditions.

Distribution cables: To AS/NZS 4961.

Conductor colours: For fixed wiring, provide coloured conductor insulation. If this is not practicable, slide at least 150 mm of close fitting coloured sleeving on to each conductor at the termination points.

Active conductors in single phase circuits: Red.

Active conductors in polyphase circuits:

- A phase: Red.
- B phase: White.
- C phase: Blue.

Accessories

General: Provide accessories as documented.

Conformity: All accessories and outlets located in close proximity are to be the same manufacture, size and material if available.

Emergency stop switches:

- Standard: To IEC 60947.5

2.3 EXECUTION

Power cables

Standard: Classifications to AS/NZS 3013.

Handling cables: Report damage to cable insulation, serving or sheathing.

Stress: Ensure that installation methods do not exceed the cable's pulling tension. Use cable rollers for cable installed on tray/ladders or in underground enclosures.

Straight-through joints: Unless unavoidable due to length or difficult installation conditions, run cables without intermediate straight-through joints.

Cable joints: Locate in accessible positions in junction boxes.

Individual wiring of extra-low voltage circuits: Tie together at regular intervals.

Tagging: Identify multicore cables and trefoil groups at each end with stamped non-ferrous tags clipped around each cable or trefoil group.

Marking: Identify the origin of all wiring by means of legible indelible marking.

Cable systems: Provide the following:

- Accessible concealed spaces: Thermoplastic insulated and sheathed cables.
- Inaccessible concealed spaces: Cable in UPVC conduit.
- Plant rooms: Cable in heavy duty UPVC conduit, or on tray or in duct.
- Plastered or rendered surfaces: Cable in UPVC conduit.
- Stud walls without bulk insulation: Thermoplastic insulated and sheathed cables.
- Walls filled with bulk thermal insulation: Cables in PVC conduit.

Fire-rated cables

Protection: If exposed to mechanical damage, provide protection to AS/NZS 3013.

Copper conductor terminations

General: Other than for small accessory and luminaire terminals, terminate copper conductors to equipment, with compression-type lugs of the correct size for the conductor. Compress using the correct tool or solder.

Within assemblies and equipment: Loom and tie together conductors from within the same cable or conduit from the terminal block to the point of cable sheath or conduit termination. Neatly bend each conductor to enter directly into the terminal tunnel or terminal stud section, allowing sufficient slack for easy disconnection and reconnection.

Alternative: Run cables in UPVC cable duct with fitted cover.

Identification: Provide durable numbered ferrules fitted to each core, and permanently marked with numbers, letters or both to suit the connection diagrams.

Spare cores: Identify spare cores and terminate into spare terminals, if available. Otherwise, neatly insulate and neatly bind the spare cores to the terminated cores.

Completion tests

Site tests:

- Inspection: Visually inspect the installation to before testing. Record on a checklist.
- Test and verify the installation to AS/NZS 3000 Section 8, using the methods outlined in AS/NZS 3017 Record the results of all tests.

Spare parts

Spare parts: As documented.

3 CABLE SUPPORT AND DUCT SYSTEMS

3.1 GENERAL

Standards

Cable trunking systems: To AS/NZS 4296 and to the **Wiring enclosures and cable support systems schedule**.

Conduits and fittings for electrical installations: To AS/NZS 2053.1, AS/NZS 2053.2, AS/NZS 2053.3, AS/NZS 2053.4, AS/NZS 2053.5, AS/NZS 2053.6, AS/NZS 2053.7 and AS/NZS 2053.8.

Submissions

Shop drawings: Submit shop drawings showing the following:

- Cable tray and trunking routes.
- Layout of cable supports and enclosures on the current architectural background coordinated with the structure and other services.

Technical data: Submit technical data for the following:

- Ducted wiring enclosure systems.
- Cable support systems.

3.2 PRODUCTS

Conduits

Standards:

To AS/NZS 2053.1, AS/NZS 2053.2, AS/NZS 2053.3, AS/NZS 2053.4, AS/NZS 2053.5, AS/NZS 2053.6, AS/NZS 2053.7 and AS/NZS 2053.8.

Sizes:

- Conduits: ≥ 20 mm.
- Underground: ≥ 25 mm.

Galvanized water pipe:

- Medium or heavy: To AS 1074.

Fixing saddles: Double sided fixed.

Delete clause if UPVC conduit is permissible.

Metallic conduits and fittings

Standards: To AS/NZS 2053.7 or AS/NZS 2053.8.

Type: Screwed steel.

Fixing saddles:

- Internal: Zinc plated.
- External: Hot dipped galvanized.

Corrosion protection:

- Steel conduits: Paint ends and joint threads with zinc rich organic primer to AS/NZS 3750.9.

Non-metallic conduits and fittings

Standards: To AS/NZS 2053.2, AS/NZS 2053.3, AS/NZS 2053.4, AS/NZS 2053.5, and AS/NZS 2053.6.

Solar radiation protection: Required for exposed conduits and fittings.

Flexible conduit: Provide flexible conduit to connect with equipment and plant subjected to vibration. If necessary, provide for adjustment or ease of maintenance. Provide the minimum possible length.

Associated fittings:

- Type: The same type and material as the conduit.
- Wall boxes on UPVC conduits: For special size wall boxes not available in UPVC, provide prefabricated earthed metal boxes.

Inspection fittings: Provide inspection-type fittings only in accessible locations and where exposed to view.

Joints: Cemented or snap-on joints.

Ducted wiring enclosures

Standards:

- Cable duct/trunking systems: To AS/NZS 4296.

Cable duct

Material: Metal.

Construction: Solid.

Covers:

- Accessible locations: Screw-fixed or clip-on type removable only with the use of tools.

Accessories: Purpose-made to match the duct system.

Cable support: Except for horizontal runs where the covers are on top, support wiring with retaining clips at intervals of not more than 1000 mm.

Cable tray/ladder support systems

System: Provide a complete cable support system consisting of trays or ladders and including brackets, fixings.

Selection: Run cables < 13 mm diameter on cable trays or in ducts.-

Standard: NEMA VE-1.

Type tests: To NEMA VE-1.

Manufacture: Provide proprietary trays, ladders, fittings and accessories from a single manufacturer for the same support system.

Selection: Select cable tray/ladder in conjunction with support system installation to achieve the documented loading and deflection requirements.

Spare capacity: ≥ 50%.

3.3 EXECUTION**Unsheathed cables – installation**

General: Provide permanently fixed enclosure systems, assembled before installing wiring. Provide draw wires to pull in conductor groups from outlet to outlet, or provide ducts with removable covers.

Conduit systems – installation

Set out: If exposed to view, install conduits in parallel runs with right angle changes of direction.

Conduits in roof spaces: Locate below roof insulation and sarking. In accessible roof spaces, provide mechanical protection for light-duty conduits.

Inspection fittings: Locate in accessible positions.

Draw cords: Provide 5 mm² polypropylene draw cords in conduits not in use.

Draw-in boxes: Provide draw-in boxes as follows:

- In straight runs at > 30 m: Spacing ≤ 30 m.
- At changes of level or direction.

Underground draw-in boxes: Provide casketed covers and seal against moisture.

Expansion: Allow for thermal expansion/contraction of conduits and fittings due to changes in ambient temperature conditions. Provide expansion couplings as required.

Rigid conduits: Provide straight long runs, smooth and free from rags, burrs and sharp edges. Set conduits to minimise the number of fittings.

Routes: Run conduits concealed in wall chases, embedded in floor slabs or installed in inaccessible locations directly between points of termination, minimising the number of sets. Do not provide inspection fittings.

Conduits in concrete slabs: Conform to the following:

- Route: Do not run in concrete toppings. Do not run within pretensioning cable zones. Cross pretensioning cable zones at right angles. Route to avoid crossovers and minimise the number of conduits in any location. Space parallel conduits ≥ 50 mm apart.
- Minimum cover: The greater of the conduit diameter and 20 mm.

- Fixing: Fix directly to top of the bottom layer of reinforcing.

Hollow-block floors: Locate conduits in the core-filled sections of precast hollow-block type floors.

Columns: Conduits in columns:

- ≤ 4 per column.
- ≤ 25 mm diameter.
- Locate conduits centrally in each column.

Bends: Enter columns via ≥ 150 mm radius sweep bends. Do not use elbows.

Chasing: Do not chase columns.

Cable tray/ladder support systems – installation

Cable trays: Galvanized steel.

Fixing to building structure: Fix supports to the building structure or fabric by means of direct fixing hangers or brackets.

Cable fixing: Provide strapping or saddles suitable for fixing cable ties.

MIMS cables: Provide non-magnetic straps.

Bend radius: Provide bends with an inside radius ≥ 12 times the outside diameter of the largest diameter cable carried.

Cable protection: Provide rounded support surfaces under cables where they leave trays or ladders.

Access: Locate trays and ladders to provide ≥ 150 mm free space above and ≥ 600 mm free space on at least one side.

Clearances:

- From hot water pipes: > 200 mm.
- From boilers or furnaces: > 500 mm.
- EMI: Locate support systems for electrical power cabling and communication cabling to minimise electromagnetic interference.

0791 MECHANICAL COMMISSIONING**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide commissioning of all mechanical systems.

Selections: As documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *General requirements.*
- *Mechanical piping.*
- *Mechanical piping insulation.*

1.3 STANDARDS**General**

Measurement of fan and duct air quantities > 1000 L/s: To ISO 5802.

Testing, balancing and commissioning except fan and duct air quantity measurement:

To ASHRAE STD 111 or CIBSE CCA, CIBSE CCB, CIBSE CCC, CIBSE CCR and CIBSE CCW.

Statistical analysis: To ASHRAE Guideline 2 (RA 96) – Engineering Analysis of Experimental Data.

Fire operation of air handling systems: To AS/NZS 1668.1.

Orifice plates and venturi meters: To BS 1042.

Microbial control: To AS/NZS 3666.1.

Pressure equipment: To AS/NZS 3788.

1.4 INTERPRETATIONS**Definitions**

General: For the purposes of this worksection the definitions given below apply.

- **Accuracy:** The closeness of the agreement between the result of a measurement and the true value of the particular quantity being measured.
- **Error:** The measured value minus the true value of the particular quantity being measured.
- **Resolution:** The smallest difference between indications of a displaying device that can be meaningfully distinguished.

1.5 COMPLETION PROGRAM**General**

Submissions: Provide a program consistent with, and forming part of, the construction program. Set out the proposed program for completion, commissioning, testing and instruction. Identify related works and timing of the works pre-requisite to successful and timely completion of the works.

Fire safety: Complete testing and certification of all fire safety measures before occupation of the building.

Revisions: Revise the program as the project proceeds.

Running in period: Include time in the program for the running period before the date for practical completion.

1.6 RELATED TESTS**Retesting**

Failure to meet documented performance: Identify and correct the cause of failure and repeat the test.

Statutory authorities

General: Provide demonstrations and tests for witnessing by the statutory authorities. Complete testing of systems before witness testing by the statutory authorities.

Other trades

General: Provide assistance to other trades for testing related non-mechanical systems.

2 EXECUTION**2.1 COMMISSIONING****General**

General: When the installation is complete, commission the installation. Make the adjustments necessary to achieve the designated performance under continuous operating service conditions, including balancing, setting the controls, checking the operation of overload and safety devices, and correcting malfunctions.

Reports

General: Submit reports indicating observations and results of tests and compliance or non-compliance with requirements.

Notice

General: Give sufficient notice for inspection to be made of the commissioning of the installation.

Starting up

General: Coordinate schedules for starting up of various systems and equipment. Give 5 working days notice before starting up each item.

Checks: Before starting, verify that each piece of equipment has been checked for proper lubrication, drive rotation, belt tension, control sequence, circuit protection or for other conditions which may cause damage.

Tests: Verify that tests, meter readings, and documented electrical characteristics agree with those required by the manufacturer.

Wiring: Verify wiring and support components for equipment are complete and tested.

Manufacturers' representatives: If individual technical worksections require the attendance of a manufacturer's representative, have the manufacturers' representatives present on site to inspect and check and/or system installation before starting up, and to supervise placing equipment and operation.

Starting up: Execute starting up under supervision of manufacturers' representative (if nominated in the respective technical worksection) and appropriate contractors' personnel, in accordance with manufacturers' instructions.

Report: Submit a report demonstrating that equipment has been properly installed and is functioning correctly.

2.2 INSTRUMENTATION**Calibration and certification**

General: Use only instruments that have been calibrated by a Registered testing authority. Provide copies of certification if requested.

Maximum period since last calibration: As recommended by manufacturer but ≤ 12 months, except as noted below.

Air quantity at diffusers, outlets and grilles

Hood adjustment factors: Determine adjustment factor for each hood and associated anemometer by one of the following methods:

- Certified by a Registered testing authority for the type of diffuser or grille and direction of air flow being measured.
- Determined by duct pitot traverse for the particular type of diffuser or grille and direction of air flow being used on the project.

Instruments:

- Accuracy: Better than $\pm 5\%$ of measured value.
- Resolution: Better than 1% of measured value.
- Range: Minimum measured velocity for instrument not more than 50% of measured velocity.

Total system air flow

General: For systems handling over 1000 L/s measure total system air quantity to ISO 5802.

Air pressures and differential pressures

Instrument specifications:

- Pressures ≤ 50 Pa: Electronic meter or inclined manometer with 50 Pa full scale, accuracy better than 5% full scale.
- Pressures > 50 Pa: Electronic meter, mechanical meter or inclined manometer with full scale not more than 400% measured value, accuracy better than 2.5% full scale.

Temperature

Air temperature instruments specifications:

- Accuracy: ± 0.2 K or better at measured value.

Chilled water and condenser water temperature instrument specification:

- Accuracy: ± 0.2 K or better at measured value.

Instrument specifications for other temperature applications:

- Accuracy: ± 0.5 K or better at measured value.
- Scale divisions (mercury-in-glass): 1.0 K or better.

Humidity

Instruments specifications: Sling psychrometer, aspirated psychrometer or electronic humidity meter.

- Accuracy:
 - $\pm 3\%$ from 10 to 90% relative humidity where measured value tolerance is $\geq \pm 5\%$ relative humidity.
 - \pm half measured value tolerance from 10 to 90% relative humidity where measured value tolerance is $< \pm 5\%$ relative humidity.

2.3 SOUND PRESSURE LEVEL MEASUREMENTS**General**

Sound pressure level measurements: Provide sound pressure measurements as documented.

Provide the following:

Sound pressure level measurements

Internal: To AS/NZS 2107.

External: To AS 1055.1.

Sound pressure levels: Measure the A-weighted sound pressure levels and the A-weighted background sound pressure levels at the designated positions.

Sound pressure level analysis: Measure the sound pressure level and the background sound pressure level over the full range of octave band centre frequencies from 31.5 Hz to 8 kHz at the designated positions.

Correction for background noise: To AS/NZS 2107 Table B1.

Measurement positions: If a test position is designated only by reference to a room or space, do not take measurements less than 1 m from the floor, ground or walls.

2.4 AIR BALANCING**General**

General: Balance each air handling system.

Completion: Balancing is complete when all the following conditions are met:

- All air quantities are within the tolerances in **Air quantity tolerance table**.
- Each air quantity measured deviates by less than the instrument accuracy from of the previous reading on the same component with the same instrument.

- Resistance across the cooling coil bank (if present) is equal to the wetted coil resistance.
- Resistance of the filter bank (if present) is equal to that of the filter when fully loaded with dirt.
- For fans with variable speed drives, the frequency to the motor is ≤ 50 Hz.
- At least one outlet on each branch has its damper at the minimum pressure drop position.
- At least one sub-branch damper is at the minimum pressure drop position.
- At least one branch damper is at the minimum pressure drop position.
- The fan speed or pitch angle is at the lowest value consistent with the above.

Air quantity tolerances

General: Balance air handling systems to the designated air quantities within the tolerances in the **Air quantity tolerance table**. For the purposes of the **Air quantity tolerance table** the following definitions apply:

- Terminal: A supply, return or exhaust diffuser, grille or equivalent device discharging air into, or drawing air from, a space.
- Sub-branch: A duct connected to one or more terminals.
- Branch: A duct with no terminals connected to it.
- Total air quantity: The sum of air flows to the connected terminals, branches or sub-branches under the conditions of measurement.

Air quantity tolerance table

System type	Terminal air quantity tolerance	Branch air quantity tolerance	Total air quantity tolerance
Low velocity supply, return or exhaust system where all terminals on any one sub-branch serve the same space	+20% -0%	+10% -0%	+10% -0%
Low velocity supply, return or exhaust system where the terminals on any one sub-branch serve more than one space	+15% -0%	+10% -0%	+10% -0%
Supply systems for induction units	+5% -0%	+5% -0%	+10% -0%

Diversity

General: For variable air volume (VAV) and other systems where the sum of the design terminal air quantities is greater than the design fan air quantity, adjust the system as follows:

- The flow rate at the terminals is within tolerance for all possible load situations.
- The fan flow is within the tolerance limits for total air quantity in the **Air quantity tolerance table**.

Measurement methods

Total and branch air quantities > 1000 L/s: Measure to ISO 5802.

Other air quantities: Use balancing and measurement methods recommended by ASHRAE or CIBSE.

Do not use the following methods for air quantity measurement:

- Coil, damper or filter traverse using any kind of instrument.
- Measurement using an instrument operating with air flow in the reverse direction to that for which it has been certified.
- Air quantity measurement derived from fan curves or fan performance tables.

Preparation for air balancing

General: Before starting air balancing make sure that:

- All building work that may affect the air balance is complete. Make sure that:
 - . All ceiling tiles are in place.
 - . All doors are hung and door grilles (if applicable) are installed.
 - . All doors and windows are open or shut consistent with their normal state.
 - . The building is airtight.

- . The builder's work ducts, shafts and ceiling plenums are sealed airtight.
- All ductwork complete and clean.
- There are no air leaks that can be felt. Check for leaks through doors, access panels, penetrations and joints in air handling units.
- Flexible duct is installed as documented and has not been damaged.
- All fire and balancing dampers are open.
- All interrelated air handling systems are complete and operating concurrently.
- Fans, coils filters and other mechanical components are complete and operating correctly.
- All electrical components including overloads and safety devices are complete and operating correctly.
- All other related work is complete and operating correctly.

Additional adjustment of air quantities

General: Notwithstanding that air quantities may have been measured and are within tolerance. If so directed, adjust space air quantities to:

- Minimise drafts.
- Achieve temperatures in individual rooms or parts of rooms that are within the stated design conditions.

Resubmit reports: If air quantities are altered after submission of air balance reports, resubmit reports showing new values.

On completion of air balancing

General: When air balancing is complete:

- Mark final position of dampers.
- Seal test holes in ductwork.
 - . Duct pressure class ≤ 500 : Rubber or plastic plugs.
 - . Duct pressure class > 500 : Cover plates of same material as the duct.
- Set system into normal operation.
- Submit air balance reports.

2.5 FIRE MODE OPERATION**General**

General: Test all systems required to operate in fire mode.

Standards: To AS/NZS 1668.1 and AS 1668.3.

Related systems: Test air handling systems for correct operation in conjunction with fire protection and other related systems.

Reset: Verify that all systems return to normal operating mode after fire mode operation.

Fire and smoke dampers: Commission to AS 1682.2. Test that fire and/or smoke dampers close fully with fans operating.

Timing: Complete testing before practical completion.

2.6 AIR BALANCE REPORTS**General**

General: Include the following on the air balance reports:

- Date, time and place of test.
- Instrumentation used and its date of calibration.
- Name, position and signature of person responsible for test.
- Ambient temperature and/or other relevant factors.
- For each terminal grille and diffuser:
 - . Grille or diffuser reference number as shown on the shop drawings. List outlets on a branch by branch basis.

- . Design air quantity.
- . Measured value (e.g. L/s, m/s).
- . Hood or instrument factor.
- . Grille or diffuser manufacturers area factor if applicable.
- . Site measured air quantity in L/s calculated from the above.
- . Measured air quantity as a percentage of design air quantity.
- . Sum of measured branch and system air quantities and percentage of design.
- For each fan:
 - . Fan designation and location.
 - . Total air quantity measurement method.
 - . Location of measurement point.
 - . Simulated wet cooling coil pressure drop and dirty filter pressure drop.
 - . Design air quantity.
 - . Pitot readings (if used) or other measured values used to independently determine total fan air quantity.
 - . Site measured air quantity in L/s calculated from the above.
 - . Measured air quantity as a percentage of design air quantity.
 - . Measured air quantity as a percentage of the sum of the individual diffuser and grille air quantities.
 - . Blade pitch and/or fan speed as applicable.
 - . Variable speed drive frequency (if VSD is installed).
 - . Measured motor current and name plate full load current.
 - . Show the final operating point on the fan characteristic curve.
- Static pressure differentials across:
 - . Each filter bank when clean.
 - . Each cooling and heating coil.
 - . Each fan.
- Duct static pressure at:
 - . Entry to filters.
 - . Entry to each fan.
 - . At duct discharge from air handling unit.
 - . At each riser connection for supply and return systems serving multiple floors.

2.7 AUTOMATIC CONTROLS

General

General: Test all controls hardware and software for correct operation.

Sensor calibration

General: Calibrate all sensors to within the documented accuracy of the sensor.

2.8 SAFETY CONTROLS

Testing

General: Test each safety control and facility by simulating the unsafe condition that the control is intended to protect against.

Monitoring: Make sure that monitoring and safety measures are in place for the test to protect personnel from injury and the building and equipment from damage.

2.9 PLANT OPERATION PERIOD

General

General: Provide a plant operation period after the installation has passed completion tests and before the date for practical completion.

Plant operation period: ≥ 5 days.

Plant operation: Operate the mechanical systems continuously during the plant operation period. Provide one or more experienced operators in constant attendance in working hours and on call at other times to monitor the plant operation and make necessary adjustments to keep it operating properly.

2.10 COMPLETION TESTS

General

General: Carry out completion tests.

Heating and air conditioning performance tests

General: In addition to balancing and commissioning, test performance of air conditioning systems during the maintenance period.

Instrumentation: Electronic data logger with temperature and humidity sensors or thermohydrograph. Conform to **Instrumentation**.

Automatic control system: If the automatic control system has been documented to have facilities for logging sensed values, provide trend logs of sensor values over the same periods.

Performance: Record dry-bulb and relative humidity at each location continuously for 2 separate periods of at least 24 hours.

Reports: Provide graphical printout of values recorded by instrument together with control system log graphs where this facility is provided.

Motors

Motor-driven equipment performance tests: Test for performance. Adjust thermal overloads for actual current and record measured current and overload settings.

2.11 CERTIFICATION

General

Contract documents: Provide certification that the installation complies in all respects with the contract documents.

Statutory requirements: Provide certification of compliance with the relevant statutory requirements.

0792 MECHANICAL MAINTENANCE**1 GENERAL****1.1 RESPONSIBILITIES****General**

General: Provide maintenance of the mechanical systems.

Selections: As documented.

Maintenance period: As documented.

1.2 STANDARDS**General**

Air handling system maintenance: Maintain to AS 1851.

Microbial control: Maintain to AS/NZS 3666.2 and AS/NZS 3666.3.

Pressure equipment:

- Maintain to AS 3873.
- Inspect to AS/NZS 3788.

Respiratory protective devices: Maintain to AS/NZS 1715.

1.3 INSPECTION**Notice**

Inspection: Give notice so that an inspection may be held simultaneously with the end of maintenance period service.

1.4 OPERATION AND MAINTENANCE MANUALS**Mechanical systems and equipment**

General: Provide operation and maintenance manuals for the whole of the mechanical work.

Contents: Include the following in addition to that specified in the *General requirements* worksection:

- Installation description: General description of the installation.
- Systems descriptions: Technical description of the systems installed, written to ensure that the principal's staff fully understand the scope and facilities provided. Identify function, normal operating characteristics, and limiting conditions.
- Systems performance: Technical description of the mode of operation of the systems installed.
- Equipment descriptions:
 - . Manufacturers' technical literature for equipment installed, assembled specifically for the project, excluding irrelevant matter. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.
 - . Supplements to product data to illustrate relations of component parts. Include typed text as necessary.
- Operation procedures:
 - . Safe starting up, running-in, operating and shutting down procedures for systems installed. Include logical step-by-step sequence of instructions for each procedure.
 - . Control sequences and flow diagrams for systems installed.
 - . Legend for colour-coded services.
 - . Schedules of fixed and variable equipment settings established during commissioning and maintenance.
 - . Procedures for seasonal changeovers.
 - . If the installation includes cooling towers, a water efficiency management plan.
- Maintenance procedures:

- . Schedule of normal consumable items, local sources of supply, and expected replacement intervals up to a running time of 40 000 hours. Include lubricant and lubrication schedules for equipment.
- . Schedule of maintenance work including frequency and manufacturers' recommended tests.
- . Instructions for use of tools and testing equipment.
- . Emergency procedures, including telephone numbers for emergency services, and procedures for fault finding.
- . Material safety data sheets (MSDS).
- Certificates:
 - . Copies of test certificates for the mechanical installation and equipment used in the installation.
 - . Test and balancing reports.
 - . All control system testing and commissioning results.
- 7 day record of all trends at commissioning.
- Drawings:
 - . Switchgear and control gear assembly circuit schedules including electrical service characteristics, controls and communications.
 - . Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- Recommissioning instructions.
- Prototype periodic maintenance and performance report.
- Documentation to AS 1851 clause 18.2.4 including the schedule of essential functionality and performance requirements.
- Prototype periodic maintenance records for compliance with AS 1851 prepared to include project specific details.
- Schedules to be used for recording recommissioning data so that changes in the system over time can be identified.
- Instructions and schedules for complying with AS 1851, AS/NZS 3666.2 and AS/NZS 3666.3.

1.5 PERIODIC MAINTENANCE AND PERFORMANCE REPORT

General

General: At the frequency documented, provide a report summarising the maintenance performed and the performance of the mechanical plant in the preceding period. Set out the report in a form that permits comparison with previous reports. Include the following as minimum requirements:

- Dates and number of site labour hours for programmed maintenance. Exclude travelling time.
- Dates, number of site labour hours and nature of work for corrective maintenance. Exclude travelling time.
- Dates and number of site labour hours for defects liability rectification if within the defects liability period. Exclude travelling time.
- Quantity and type of refrigerant used.
- Peak load and load profile for chillers.
- Peak load and load profile for electrical power consumed by mechanical plant.
- Mechanical plant gas consumption and load profile.
- List of any motors for which the motor current varied by more than 10% from the current measured during commissioning.
- Results of recommissioning if scheduled for the period.

2 EXECUTION

2.1 MAINTENANCE REQUIREMENTS

General

General: Provide all labour and material necessary to maintain the mechanical installation including, but not limited, to filter media, belts, refrigerants, lubricants and all items commonly referred to as consumable.

Site control

General: Report to the principal's designated representative on arriving at and before leaving the site.

2.2 MAINTENANCE DURING CONSTRUCTION

General

General: During the construction period and until all maintenance and operation manuals have been completed and submitted and all operator instruction is complete, provide all maintenance including but not limited to:

- Daily operation including starting and stopping of the plant.
- All routine service tasks.
- Emergency visits.

2.3 CLEANING

General

General: Progressively clean the interior of pipework, ductwork and air handling components as they are installed. Inspect the interior of dampers and valves on installation and remove obstructions.

Immediately before the date for practical completion:

- Clean all parts of the installation.
- Clean interior of switchboards, switchgear, contactors and other electrical contacts.
- Clean interior or air handling plant.
- Clean strainer baskets.

2.4 CORRECTIVE MAINTENANCE

General

General: Respond to call outs for breakdowns or other faults requiring corrective maintenance. Rectify faults and replace faulty materials and equipment.

Remedial work: Carry out any remedial work, including temporary work, necessary to restore the systems to safe and satisfactory operation. Do not leave site until correct operation has been proved. Do not leave the plant in an unsafe condition.

Temporary work: Promptly replace temporary work with permanent rectification.

Contact details

General: Provide contact details including after hours and emergency mobile and/or pager details to permit notification of emergency conditions.

Response time

General: Attend site for emergency service within the time period documented.

Calculation of response period: Response period starts at the time of notification to the contractors nominated contact point.

Failure to respond

General: Should the contractor fail to respond to site within the period stated in the schedules, the principal may, without incurring any liability or obligation and without limiting any other redress, engage persons other than the contractor to undertake emergency work on the systems. Fully reimburse the principal for any costs incurred.

2.5 REGULAR MAINTENANCE

General

General: Make routine service visits at the frequency documented. Service items of equipment in accordance with the maintenance schedules in the operation and maintenance manuals.

Frequency of visits

General: Provide maintenance visits at the following maximum intervals, or comply with the frequency documented if more frequent:

- Analysis of refrigerant in hermetic compressors: 3 months.
- Air filters: Comply with AS 1324.1 Section 3.
- Air handling systems within the scope of AS/NZS 1668.1 and AS 1668.3: Comply with AS 1851.

Notification of defects

General: When defects in the installation are identified notify the principal in writing.

All systems

General: Provide maintenance work including but not limited to the following:

- Attend to reported defects and complaints.
- Check for and repair corrosion.
- Remove rubbish and clean equipment.
- Check for and rectify any unsafe conditions.
- Replace faulty or damaged parts and consumable components.
- Check anti-vibration supports, brackets and clamps, holding down bolts and flexible connections, for deterioration and for freedom of movement of assembly.
- Identification of pipes, conduits and ducts: Maintain to AS 1345.
- Safety signs: Maintain to AS 1319.

Air handling systems

General: Perform the following tasks on each air handling system and ventilation system:

- Maintain air handling and water systems.
- Carry out Level 1, 2, 3 and 4 maintenance routines to AS 1851 on air handling systems that are within the scope of AS/NZS 1668.1.
- Carry out maintenance required by AS/NZS 3666.2 including inspecting and, if necessary cleaning, both sides of cooling coils and condensate pans.
- Check coils for fin damage and repair.
- Check and clean fan impellers and blades.
- Check fan balance. Rebalance out of balance fans.
- Rectify air leaks including leaks in air handling units.
- Check motorised damper operation and lubricate linkages. Rectify defective operation.
- Check that motorised dampers seal tight when closed. Repair or replace defective seals.
- Check air handling and water systems for temperature, pressure, flow and leakage. Adjust if necessary. Repair all leaks.
- Check penetrations and outside air intakes and exhaust outlets for foreign matter water entry and leaks. Clean where necessary.
- Check condition of insulation and vapour barriers for damage and repair.
- Air filters:
- Check that electric duct heaters are not tripped.
- Inspect the interior of ductwork in the vicinity of moisture producing equipment in accordance with AS/NZS 3666.2.

Drives

General: Perform the following tasks:

- Check drives and couplings. Rectify faults.

- Check belt drives for belt wear and tension. Replace worn or broken belts.
- Check pulley alignment and re-align if out of alignment.
- Check motors and machinery for excessive operating temperature, bearing noise and excessive vibration. Rectify defects.
- Lubricate equipment.

Automatic controls

General: Perform the following tasks:

- Check operation and safety controls for variable speed drives. Check and record output frequency. Adjust if incorrect. Rectify defects.
- Record readings of thermometers, gauges, meters, current draw of motors and heaters, sample readings, control set points and controlled space conditions.
- Check sensor calibration. Recalibrate if incorrect.
- Check electrical and control systems, including safety limits for temperature, pressure and humidity. Adjust if incorrect. Rectify defects.

Electrical

General: Perform the following tasks:

- Check for hot joints, burnt insulation, burn contacts and repair.
- Check electrical connections for tightness. Tighten loose connections.
- Check operation of all electrical components. Rectify defects.
- Check indicating lights and replace defective lamps.
- Check and record motor currents.
- Check overload settings. Adjust if necessary.
- Check and report any changes to controls and wiring.

Standards:

- Electrical equipment generally: To AS/NZS 3760.
- Switchboards: To AS 2467.
- Repair and overhaul of rotating electrical equipment: To AS 4307.1.

2.6 END OF MAINTENANCE PERIOD SERVICE**General**

General: Within one month before the end of the maintenance period, carry out the following service tasks:

- Undertake all work scheduled to be carried out on an annual basis.
- Replace air filters if the resistance exceeds 80% of the 'dirty' resistance of the filter bank.
- Provide infra-red scan of switchboards.

2.7 RECOMMISSIONING**General**

General: Conform to **RECOMMISSIONING** in the *Mechanical commissioning* worksection.

Frequency: Recommission systems at the frequency documented. Submit the results.

2.8 STATUTORY CERTIFICATION**General**

Annual certification: Inspect and certify all items required to be inspected annually under statutory requirements including but not limited to air handling systems required for fire operation, boilers and pressure vessels. Submit certification to the principal.

2.9 MAINTENANCE RECORDS**Maintenance records**

General: Record maintenance undertaken. If available, record in the schedules provided as part of the maintenance manuals.

Records: As a minimum, record the following:

- Date, time and name of person undertaking the task.
- Activities completed including operational and maintenance procedures.
- Materials used.
- Test results.
- Comments for future maintenance actions and notes covering the condition of the installation.

Mandatory maintenance records: Include mandatory maintenance record forms with project specific information completed.

Certificates: Include test and approval certificates.

Service visits: Record comments on the functioning of the systems, work carried out, items requiring corrective action, adjustments made and name of service operator. Obtain the signature of the principal's designated representative.

Referenced documents: If referenced documents or technical worksections require that log books or records be submitted, include this material in the maintenance records.

Certification: On satisfactory completion of the installation, submit certificates stating that each installation is operating correctly.

3 SELECTIONS

3.1 MAINTENANCE

Maintenance requirements schedule

Provision	Requirement
Mechanical maintenance period	Conform to <i>General requirements</i>
Call out response time not to exceed	24 hours
Maximum time between programmed service visits	4 months
Frequency of periodic maintenance and performance reports	3 months
Recommissioning frequency	6 months

	SOUTH-EAST TRAINING FACILITY & JOBS HUB - BOQ		
	DETAILED TRADE BREAKDOWN		
1	Site Set-up/ Establishment	Perimeter Fence, Site Shed, Power Supply, Toilet	
2	Earthworks	Trim Topsoil/ Level adjustments	
		Excavate/ bore to required depth for structural	
3	Concrete Works	Footings	
		Slab	
4	Carpentry		
5	Structural Steel	Columns	
		Beams	
6	Roof	Framing	
		Sheeting	
		Skylights	
		Insulation/ Sislotion/ Mesh	
		Flashings/ Cappings	
		Box Gutters/ Downpipes	
		Safety System	
7	Ceilings & Soffits	Ceiling Type CL1	
		Ceiling Type CL2 - Villaboard Soffit	
		Ceiling type CL3 - Suspended	
		Ceiling Type CL4 - Timber Batten	
8	Aluminum Frames and Glazing	External Doors	
		External Windows	
		Internal Windows	
9	Automatic Door		
10	Internal Doors		
11	Toilet Partitions & Doors		
12	Operable walls		
13	External Walls	WT1(a) - External Nail Strip/ R2.5/ PB (below ceiling level)	
		WT1(b) - External Nail Strip (above ceiling level)	
		WT2 - External Cementel/ R2.5/ PB	
		WT3 - External Timber Batten/ R2.5/ PB	
		WT5 - External Cement Sheet/ R2.5/ PB	
14	Internal Walls	WT4 - Internal full-height	
		WT8 - Internal 1420mm	
15	Screening	Framing	
		Covet system battening	
16	Metalwork		
17	Floor Finishes	FL2 - Vinyl Polyflor Verona	
		FL3 - Carpet	
		FL4 - Vinyl Polyflor Palletone SD	
18	Concrete Finishing		
19	Painting/ Staining	External Timber	
		Internal Plaster Walls	
		Internal Ceilings	
		Other	
20	Waterproofing		
21	Tiling		
22	Fittings & Fixtures		
23	Door Hardware		
24	Window Hardware		
25	Sealing & Leveling		
26	Special Equipment		
27	Hydraulics		
28	Electrical, Security, Comms, & Dry Fire	Electrical Cabling	
		IT Cabling	
		Light Fittings, Sensors & Switches	
		Fire Alarm, Smoke Detectors	
		Equipment & Plant	
29	Mechanical	Ducting	
		Equipment & Plant	
30	Fire Protection		
31	Masonry		
32	Joinery Allowance	Cabinets to Training Rooms, Rumpus and Tea Room	Allow Approx. 12m2 at 900mm high - laminate bench top and faces, white top. Two benches with sinks

		Reception/ Open Office 01	Allow for 750mmH work benches and 1125mmH Counter
		Services Cupboard/ Fire Cabinet	Allow for x8No. full height doors
		Cupboards in Training Rooms	Allow for full height doors to length of joinery.
33	Miscellaneous		
	PRELIMINARIES		
	LUMP SUM PRICE - A		
	ADDITIONAL COSTS		
	TOTAL EXTRAS - B		
	COST SAVINGS		
	Alternative WT6 Screen System		
	Alternative Fittings & Fixtures		
	Alternative Light Fittings		
	Alternative External Cladding		
	Alternative Sundry Hardware		
	Alternative Operable Wall		
	Alternative Door and Windows (to equal or better performance)		
	TOTAL SAVINGS - C		
	TOTAL ADJUSTED PRICE (A + B + C)		

South-East Training Facility & Jobs Hub

Dubs & Co. Drive, Sorell, TAS 7172

Specification

29.05.2024

Revision	Date	Approved by

loci architecture + planning

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0121 TENDERING

1 CONDITIONS OF TENDERING

1.1 RESPONSIBILITIES

General

Requirement: Provide a complete genuine tender based on the included drawings, documents & specifications.

1.2 GENERAL

Status

General: These conditions of tendering do not form part of the contract. Conditions of the Sorell Council Contract C-23-B-002 take precedence where conflicts and inconsistencies occur.

Interpretation

General: In these conditions of tendering, the word principal has the same meaning as owner and proprietor.

1.3 PROJECT INFORMATION

Outline description of the works

South-East Training Facility & Jobs Hub building as per the documents.

Description of the site

Location: Dubs & Co Drive, Sorell, TAS, 7172.

Investigations carried out: Rock Solid Geotechnics Pty Ltd Geotechnical Assessment.

Tender documents

The tender documents comprise the following:

- Conditions of tendering.
- Schedule of rates.
- Schedule of provisional sums TBC.
- Schedule of prime-cost sums TBC.
- Bills of quantities.
- General conditions of contract.
- Special conditions of contract.
- Schedule or annexure to general conditions of contract, partly pre-completed.
- Specifications.
- Drawings.
- Nominated subcontracts.
- Deeds of novation for nominated or selected subcontracts.
- Subcontract interfacing information, including services and facilities.
- Geotechnical site investigation reports, as follows: Rock Solid Geotechnics Pty Ltd Geotechnical Assessment.
- WHS Safety Report.
- Other documents issued by the principal for the purpose of tendering, as follows: Door Hardware Schedule; Fitting & Fixtures Schedule.

Security: Do not disclose to third parties tender documents marked with a classification such as Restricted, Confidential or Secret, except with prior written approval of the principal and subject to the conditions imposed.

1.4 FURTHER INFORMATION

Contact person

Refer inquiries to the following:

- Name: Jonathan Blood
- Telephone: 0408 383 235
- Email: Loci.hobart@gmail.com

Examination

General: A full set of documents is available for examination, which may be arranged through the contact person.

Site inspections

General: Information on dates and times at which the site will be available for inspection can be obtained from the contact person.

Conferences

General: Information on dates and times of tender conferences can be obtained from the contact person.

Addenda

General: Written addenda issued by the principal are the only recognised explanations of, or amendments to, the tender documents.

Enquiries and clarifications

Requirement: Clarifications and information provided in response to enquiries by one tenderer are to be shared with all other tenderers.

1.5 PREPARATION OF TENDERS

Tender form

Form: Submit the tender on the *Tender form* provided. The form may be edited or retyped by tenderers to include additional information as required.

Addenda: Confirm on the *Tender form* that allowance has been made of each addendum and any extensions of the tender period.

Name and address of tenderer: State the following:

- If an individual, the name in full and address of the individual.
- If an unincorporated body, the registered business name and address of the body and the name in full and address of each member of the body.
- If a company, the registered business name, ABN and registered office address of the company.

Address for service of notices: Include on the *Tender form* an address for service of notices for the purpose of this tender and any subsequent contract arising out of this tender.

Execution: Sign the *Tender form* or, if a company, comply with the relevant provisions of the Corporations Law and regulations.

Scope

Scope: Tender for the whole of the work described in the tender documents unless the tender documents provide otherwise.

Exclusions: If unable to tender on parts of the works, inform the contact person in writing as soon as possible, defining the relevant parts and giving reasons.

Completion

General: Complete in full the *Tender form* and other required documents.

Alterations: Do not alter or add to tender documents except as may be required by these conditions of tendering.

Selected subcontracts

General: Submit with the tender the identity of subcontractors proposed for selected subcontract work.

Alternatives

General: Alternative proposals may be submitted with the tender for consideration, but the following must also be submitted:

- A conforming tender that complies with the tender documents.

- A detailed description of the alternative stating clearly how it differs from the requirements of the tender documents whilst complying with the principal's commercial and technical objectives.

Alternative time for practical completion: Consideration will be given to alternative tenders that offer different times for practical completion. The prescribed liquidated damages will apply to those different times.

Alternative working hours and working days: If the tender includes an allowance for work at times other than the working hours or working days prescribed in the tender documents, submit the working hours and days proposed.

Prequalified subcontractors

Nominated works: Select a subcontractor from the **Prequalified subcontractor schedule**.

Prequalified subcontractor schedule

Works	Subcontractor

Preferred suppliers

Nominated works: Select a subcontractor from the **Preferred suppliers schedule**.

Preferred suppliers schedule

Works	Suppliers

Evidence of contractor's registration or licensing

General: If it is a statutory requirement of the state or territory in which the works are located that a contractor (as defined by the statutory requirement) be registered or licensed to carry out the work described in the tender documents, submit with the tender evidence of registration or licence.

Prototypes

Produce and submit the following prototypes: FL1 Concrete sample.

Cost: The cost of this work will not be reimbursed.

Time for submission: with tender.

Program

General: Submit a construction program in the form of a preliminary bar chart and network diagram, showing the following:

- Sequence of work.
- Periods within which various stages or parts of the work are to be executed.
- Critical paths of activities related to the work.
- Allowance for holidays.
- Restraints imposed by the contract documents.
- Significant milestones including separable parts, if any.
- Activity inter-relationships, including those activities to be undertaken by subcontractors and suppliers, both on and off site.
- External dependencies including provision of access, document approvals and work by others.
- The estimated value of work completed for each month.
- Site set-up.
- Access.

Time for submission: with tender

Conflict of interest

General: Declare any conflicts of interest.

Quality system

Tenderer's submission: Submit a statement of quality control resources.

Time for submission: With tender

1.6 SUBMISSION OF TENDERS**Lodgement**

Procedure: Enclose tenders in a sealed envelope marked with the name of the project and tender item (if any) and lodge in the tender box at, or send by prepaid post to, the nominated place, by the date and time for closing of tenders.

Electronic transmission: Electronic tenders received by the date and time for closing of tenders may be considered provided that a conforming tender, in the form required, is submitted by the due date & time.

Oral tenders: Oral tenders will not be considered.

Franking: Impressions of franking machines are not acceptable evidence of timely posting or dispatch.

Supporting information: Enclose in a separate sealed envelope marked with 'Supporting information for South-East Training Facility & Jobs Hub' and the identity of the tenderer.

Late tenders

Consideration: Late tenders may be considered if the principal is satisfied that under normal circumstances they would have been received by the date and time for closing of tenders.

Hand delivery: Late tenders delivered by hand may be considered if the principal is satisfied that under normal circumstances they would have been received by the date and time for closing of tenders and that the delay was beyond the control of the tenderer.

Other: Late tenders sent by other forms of delivery or transmission will not be considered.

Closing of tenders

Date: 26.06.2024

Time: 2pm

Place for lodgement

Tender box location: Sorell Council Building

Address for postal tenders: 47 Cole Street, Sorell, TAS 7172

Tender validity period

General: Unless withdrawn, tenders must remain valid from the date and time for closing of tenders, for the following period: Refer Sorell Council's Conditions of Tender.

1.7 PROCEDURES AFTER TENDER PERIOD**Public opening of tenders**

Date: 26.06.2024

Time: 2:30pm

Evaluation of tenders

General: In evaluating the tenders, the principal may take into consideration the following:

- Conformity with tender documents.
- Construction period.
- Proposed use of local subcontractors and suppliers.
- Proposed alternatives. (Must include specified method and alternative)
- Alternative working times proposed by the tenderer, and the cost to the principal of providing contract administration for the work under the contract at those times.
- Maintenance and running costs. (Manuals).
- Quality of prototypes.
- Construction program.
- Proposed methods.
- Quality assurance.
- Conflicts of interest.
- Life of proposed equipment.

- Standardisation of proposed equipment.
- Value for money.
- Tenderer's resources.
- Tenderer's current commitments.
- Tenderer's previous performance.
- Industrial relations and safety records.

Qualifications: Tenders containing unauthorised alterations, additions or qualifications may be rejected.

Unpriced items: Costs relating to items not priced will be assumed to have been included elsewhere in the tender.

Correction of errors in tenders

Procedure: Notify Contact Person

Additional information

General: If required, submit additional information, by the stipulated date and time, to allow further consideration of the tender before any tender is accepted. Failure to meet this requirement may result in the tender being rejected.

Confidentiality

General: Treat as confidential any information provided after the tender period.

Acceptance of tender

Non-acceptance: The principal is not bound to accept the lowest or any tender, or to give reasons.

Acceptance: A tender is not accepted until notice in writing of acceptance is delivered by one of the following methods:

- Handed to the tenderer.
- Sent by prepaid post to, or left at, the address for service of notices stated in the Tender form.
- Transmitted by facsimile to the tenderer's facsimile number.

Formal instrument of agreement: Required.

Period between acceptance of tender and possession of site

Anticipated maximum period: TBC – approximately 4 weeks.

2 TENDER FORM

Name of principal: Sorell Council
Name of project: South-East Training Facility & Jobs Hub
Tender – lump sum I/We tender to perform the work for the above project as described in, and in conformance with, the tender documents referenced in the <i>Conditions of tendering</i> and in conformance with the attached <i>Schedule of rates/Contract sum analysis/priced Bills of quantities</i> and for the lump sum (which includes specified provisional sums) of
..... including GST (sum in words and figures)
The contract duration will be weeks from the date of site possession. Tender validity period: This tender remains open for consideration for weeks from the date and time of closing of the tender period. I/We acknowledge the receipt of addenda numbered during the tender period.
Name of tenderer
ABN/ACN
Telephone
Facsimile
Email
Tenderer's address or registered business office address
Address for service of notices
Tenderer's bank and branch address

Execution if tenderer is an individual or unincorporated body
Tenderer's signature
Witness' signature
Execution if tenderer is a company
The common seal of the tenderer was affixed in conformance with the Articles of Association
Director's signature
Secretary's signature
OR
Authorised officer's signature
Witness' signature
Date of tender

0131 PRELIMINARIES

1 GENERAL

1.1 GENERAL

General conditions

Contract: C-23-B-002

Interpretation

General: The words owner and architect have the same meaning, respectively, as principal and contract administrator, unless the context requires otherwise.

Cross reference: **INTERPRETATION** in 0171 *General requirements* also applies.

1.2 THE SITE

General

Public viewing area: Refer drawing CD02 and/or contact Contact Person

Site restrictions

Site limitations: Comply with the following restrictions on the use of the site: TBC

Access area restrictions: Access onto and within the site, and use of the site for temporary works and constructional plant, including working and storage areas, location of offices, workshops, sheds, roads and parking, is restricted to the following areas: TBC

Secure areas

Designated secure areas: N/A

Conditions of entry: N/A

Entry permits: Make available, to persons entering designated secure areas, valid entry permits. Make sure these persons comply with conditions of entry.

Personnel: Submit the full name, address, and date and place of birth of persons required to enter designated secure areas.

- Purpose of submission: For review.
- Timing of submission: At least 10 working days before entry is required.

Occupied premises

General: For the parts of the site documented in the **Occupied premises schedule**:

- Allow occupants to continue in secure possession and occupancy of the premises for the required period.
- Maintain safe access for occupants.
- Arrange work to minimise nuisance to occupants and for their safety.
- Protect occupants against weather, dust, dirt, water or other nuisance.

Proposals: Submit details of proposed methods.

- Purpose of submission: For information.
- Timing of submission: Before commencement of work.

Occupied premises schedule

Occupants	Occupied premises	Period of occupancy
N/A	N/A	N/A

Reinstatement

Accessways and services: Do not obstruct or damage roadways and footpaths, drains and watercourses and other existing services in use on or adjacent to the site. Determine the location of

such services. Rectify immediately any obstruction or damage to such services and provide temporary services whilst repairs are carried out.

Trees and properties: Do not interfere with or damage trees and properties that are to remain on or adjacent to the site, including adjoining property encroaching onto the site. Rectify immediately any interference or damage to such trees and properties.

Existing services

Service to be continued: Repair, divert or relocate service, as documented.

Trenches: If the existing service crosses the line of a required trench or will lose support when the trench is excavated, provide permanent support for the existing service.

Redundant services: Remove redundant parts and make safe.

Interruptions to services: Minimise the number and duration of interruptions.

Changes to existing services: Submit proposals.

- Purpose of submission: For review.
- Timing of submission: Before starting work to existing services.

Adjoining properties

Notice: At least 10 working days before commencing work, give written notice to owners and occupants of adjoining properties of intention to commence work and an outline description of the type and extent of work.

Conditions for work on adjoining properties: Contact Contact Person prior to commencing.

Revealed encroachments: If the works reveal unknown encroachments of adjoining properties onto the site or of existing site structures onto adjoining properties, immediately notify the architect and seek instruction.

Records: For each property documented in the **Adjoining properties to be recorded schedule**:

- Inspect the property with the architect and owner and occupant of the property, before commencement of work.
- Make detailed records of conditions existing within the property, especially structural defects and other damage or defacement.
- Arrange for at least 2 copies of each record, including drawings, written descriptions and photographs, to be endorsed by the owner and occupant of the property, or their representatives, as evidence of conditions existing before commencement of work.

Endorsed copies: Submit one endorsed copy of each record. Keep the other endorsed copy on site.

- Purpose of submission: For information.
- Timing of submission: Before commencement of work.

Adjoining properties to be recorded schedule

Title	Owner	Description

1.3 CONSTRUCTION PLANT

General

Temporary works: Provide and maintain required hoardings, barricades, guards, fencing, shoring, temporary roadways, footpaths, signs, lighting and traffic management.

Access roads

Temporary roads: TBC

Owner's existing roads: Use only designated roads.

Location: TBC

Parking

Owner's existing parking areas: Use only designated parking areas.

Number of spaces: TBC

Location: TBC

Protective clothing

Requirement: Make available protective clothing for the use of visitors, as follows:

- Safety helmets: Type 1 to AS/NZS 1801 (1997).
- High visibility safety vests: To AS 4602.1 (2011).

Certification: Required.

- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JASANZ).

Number of helmets: As required for construction work and visitors TBC as per standards

Number of high visibility safety vests: As required for construction work and visitors TBC as per standards

Temporary fence

Requirement: To Occupational Health and Safety Act 2004 and AS 4687.4.2022

Temporary services

Requirement: Portable toilets to NCC2022, Occupational Health and Safety Act 2004, and relevant codes.

Use of existing services

General: Existing services may be used as temporary services for the performance of the contract subject to conditions of use, as documented in the **Existing services schedule**.

Existing services schedule

Service	Conditions of use

Project signboards

General: Provide project specific signboards and as follows:

- Locate where directed.
- Maintain in good condition for duration of the work.
- Obtain permission for removal.
- Remove on completion.

Other signboards: Obtain approval before display of advertisements or provision of other signboards.

Project signboards schedule

Location: TBC

Size: TBC

Text and graphics: TBC

Other details: TBC

1.4 BUILDING THE WORKS**Surveys**

Setting out: Arranged by Contractor at Contractor's cost.

Survey marks

Definition: A survey peg, benchmark, reference mark, signal, alignment, level mark or any other mark used or intended to be used for the purpose of setting out, checking or measuring the work.

Care of survey marks: Preserve and maintain the owner's survey marks in their true positions.

Rectification: If survey marks are disturbed or obliterated, immediately rectify at Contractor's cost.

Safety

Accidents: Promptly notify the architect of the occurrence of the following:

- Accidents involving death or personal injury.
- Accidents involving loss of time.
- Incidents with accident potential such as equipment failure, slides and cave-ins.

Accident reports: Submit reports of accidents.

- Purpose of submission: For information.
- Comply with Sorell Council requirements and Contract C-23-B002.

Contractor's representative

General: Must be accessible, and fluent in English and technical terminology.

Contacts: Submit names and telephone numbers of responsible persons who may be contacted after hours during the course of the contract.

- Purpose of submission: For information.
- Timing of submission: At the first site meeting.

Subcontracting

General: Submit a complete list of proposed subcontractors and suppliers.

- Purpose of submission: For information.
- Timing of submission: with tender.

Order of work schedule

Portion of work	Order of work	Time of work

Program of work

Construction program: Submit a construction program showing the following:

- Sequence of work.
- Critical paths of activities related to the work.
- Allowance for holidays.
- Activity inter-relationships.
- External dependencies including provision of access, document approvals and work by others.
- Periods within which various stages or parts of the work are to be executed.

Time scale: Working days.

Updated program: Identify changes since the previous issue, and show the estimated percentage of completion for each item of work.

Purpose of submission: For information.

Program chart: Display in the contractor's site office an up-to-date bar chart and network diagram based on the construction program.

Site meetings

General: Hold and attend site meetings throughout the contract and arrange for the attendance of appropriate subcontractors, architect and appropriate consultants.

Minutes: Make a record of site meetings. Distribute a copy of the minutes to each party.

- Purpose of submission: For review.
- Timing of submission: Within 5 working days after each meeting.

Progress photographs

General: Take colour progress photographs within 5 working days, before each site meeting. Submit 2 sets of prints and the digital files. Identify the project, date, time, location and orientation.

- Purpose of submission: For information.
- Timing of submission: At each site meeting.

Format: digital

Items supplied by owner

General: Materials and other items supplied free of charge to the contractor for installation in the execution of the works. Unload and take delivery, inspect for defects and take care of the items. If defects are found, advise. Return unused items to the owner.

Items supplied by owner schedule

Location	Item	Quantity	Date
----------	------	----------	------

Location	Item	Quantity	Date
TBC			

Changes to existing items

General: At least 10 working days before changing existing items, obtain approval from Contact Person and Building Surveyor.

Existing items requiring notification and approval: any deviation from the approved documents.

Control of runoff stormwater

Requirement: To conditions of Planning Permit 5.2023.34.1 Conditions 7 & 8

Environmental Management Plan

Requirement: To conditions of Planning Permit 5.2023.34.1 Condition 4

Persons other than contractor

Facilities: Refer to person other than contractor documentation.

Contractor/person other than contractor interfaces: Refer to person other than contractor documentation.

1.5 COMPLETION OF THE WORKS

Final cleaning

General: Before the date for practical completion, clean throughout, including interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces. Clean debris from the site, roofs, gutters, downpipes and drainage systems. Remove waste and surplus materials.

Samples: Remove non-incorporated samples, prototypes and sample panels.

Reinstatement

General: Before the date for practical completion, clean and repair damage caused by installation or use of temporary work and restore existing facilities used during construction to original condition.

Adjoining properties

Evaluation: At practical completion, for each property documented in the **Error! Reference source not found.**, inspect the property with the architect and owner and occupant of the property, recording any damage that has occurred since the pre-commencement inspection.

Pest eradication

General: Employ suitably qualified pest exterminators. At practical completion, verify that completed works are free of pest types documented in the **Pest eradication treatment schedule**.

Pest eradication treatment schedule

Pest type to be treated	Eradication method

Removal of plant

General: Within 10 working days after practical completion, remove temporary works and construction plant no longer required. Remove the balance before the end of the defects liability period.

1.6 PAYMENT FOR THE WORKS

Progress claims

Anticipated progress claims: Submit a schedule of anticipated progress claims for the contract period.

- Purpose of submission: For information.
- Timing of submission: At commencement of the works.

Progress claim breakdown: Submit a statement of amounts claimed in respect of each worksection or trade heading designated in the specification. Claim Schedule must conform with the Purchase Order

- Purpose of submission: For review.
- Timing of submission: With each progress claim.

Import costs

Definition: Import costs include costs attributable to exchange rates, customs and import duty of imported content of items purchased for incorporation in the works.

Adjustment: If there are changes in rates applying to import costs of items documented in the **Import costs adjustment schedule**, add or deduct the amount of the difference to or from the contract sum, as applicable.

Import costs adjustment schedule

Item	Country of origin	Import cost
TBC		

Method of measurement

General: In conformance with the principles of the Australian and New Zealand standard method of measurement of building works (ANZSMM) (2022).

1.7 MISCELLANEOUS**Contractor and owner to observe confidentiality**

Publicity: Do not issue information concerning the project for publication in the media without prior written approval of the owner. Refer enquiries from the media concerning the project to the owner.

Compliance with the law

Requirements of authorities: The owner, before entering into the contract, has given the notices, paid the fees, and obtained the permits, approvals and other authorisations, as documented in the **Prior applications and approvals schedule**.

Prior applications and approvals schedule

Prior notices given and applications made	Fees paid	Permits, approvals and authorisations received
Training Levee	Refer Sorell Council's Conditions of Tender.	

Authority conditions schedule

Authority	Document	Condition
Sorell Council	Planning Permit 5.2023.34.1	All
Building Permit		
Plumbing Permit		

0171 GENERAL REQUIREMENTS

1 GENERAL

1.1 PRECEDENCE

General

Order of precedence: If there is conflict or inconsistency between the worksections of this specification, the requirements of worksections take the following order of precedence:

- All worksections other than those listed below.
- *0701 Mechanical systems, 0801 Hydraulic systems, 0901 Electrical systems and 1001 Fire services systems.*
- 018 Common requirements worksections.
- *0171 General requirements.*

1.2 CROSS REFERENCES

Common requirements

Requirement: Conform to the following worksections:

- *0181 Adhesives, sealants and fasteners.*
- *0182 Fire-stopping.*
- *0183 Metals and prefinishes.*
- *0184 Termite management.*
- *0185 Timber products, finishes and treatment.*

Cross referencing styles

General: Within the text, titles are cross referenced using the following styles:

- Worksection titles are indicated by *Italicised* text.
- Subsection titles are indicated by CAPITAL text.
- Clause titles are indicated by **BOLD CAPITAL** text.
- Subclause titles are indicated by **Bold Sentence case** text.

1.3 REFERENCED DOCUMENTS

General

Precedence: The requirements of worksections override conflicting requirements of their referenced documents. The requirements of the referenced documents are minimum requirements.

Contractual relationships: Responsibilities and duties of the principal, contractor and contract administrator are not altered by requirements in the documents referenced in this specification.

Current editions: All referenced documents are the editions, with amendments, current on 31st May 2024.

Exception to current editions: If statutory requirements reference other editions or standards, conform to those other editions or standards. Where the NCC (2022) references editions other than the current edition, the same editions cited in the NCC (2022) are referenced in each worksection.

Maintenance and repair works: If statutory requirements applicable to the maintenance or repair works reference other editions or standards, conform to those other editions or standards.

1.4 CONTRACT DOCUMENTS

Services diagrammatic layouts

General: Layouts of service lines, plant and equipment shown on the drawings are diagrammatic only, except where figured dimensions are provided or calculable.

Before commencing work:

- Obtain measurements and other necessary information.
- Coordinate the design and installation in conjunction with all trades.

Levels

General: Spot levels take precedence over contour lines and ground profile lines.

Drawings and manuals for existing services

Warranty: No warranty is given as to the completeness or accuracy of drawings and/or manuals of existing services.

1.5 INTERPRETATION**Abbreviations**

General: For the purposes of this specification the following abbreviations apply:

- AS: Australian Standard.
- BCA: National Construction Code Series Volume One: Building Code of Australia Class 2 to 9 Buildings and Volume Two: Building Code of Australia Class 1 and Class 10 Buildings.
- EN: European Norm (European Standard).
- GRP: Glass Reinforced Plastic.
- IP: Ingress protection.
- NATA: National Association of Testing Authorities.
- NCC: National Construction Code.
- NZS: New Zealand Standard.
- PCA: National Construction Code Series Volume 3: Plumbing Code of Australia.
- PVC: Polyvinyl Chloride.
- PVC-U: Unplasticised Polyvinyl Chloride. Also known as UPVC.
- SDS: Safety data sheets.
- VOC: Volatile Organic Compound.
- WHS: Work Health and Safety.

Definitions

General: For the purposes of this specification, the following definitions apply:

- Access for maintenance: Includes access for maintenance, inspection, measurement, operation, adjustment, repair, replacement and other maintenance related tasks.
- Accessible, readily: Readily accessible, easily accessible, easy access and similar terms mean capable of being reached quickly and without the use of a tool, without hazard, climbing over or removing obstructions, using a movable ladder, and in any case not more than 2.0 m above the ground, floor or platform.
- Accredited Testing Laboratory:
 - . An organisation accredited by the National Association of Testing Authorities (NATA) to undertake the relevant tests; or
 - . An organisation outside Australia accredited to undertake the relevant tests by an authority recognised by NATA through a mutual recognition agreement; or
 - . An organisation recognised as being an Accredited Testing Laboratory under legislation at the time the test was undertaken.
 - . An organisation accredited for compliance with ISO/IEC 17025 (2017) to undertake the relevant tests.
- Appropriately qualified person: To NCC (2022) Schedule 1.
- Attendance: Attendance, provide attendance and similar expressions mean give assistance for examination and testing.
- Baseline data: Data derived from the final design, installation and commissioning, which serve as a basis for verification of results of routine servicing.
- Commissioning: Advancement of an installation from static completion to full working order, including verification that the systems, subsystems, and their components meet the project requirements. This includes all work described as commissioning in referenced documents, even if carried out before static completion.
- Contract administrator: Has the same meaning as architect, superintendent or principal's authorised person and is the person appointed by the owner or principal under the contract.

- Contractor: Has the same meaning as builder and is the person or organisation bound to carry out and complete the work under the contract.
- Default: Specified value, product or installation method that is to be provided unless otherwise documented.
- Design life: The period of time for which it is assumed, in the design, that an asset will be able to perform its intended purpose with only anticipated maintenance but no major repair or replacement being necessary.
- Design parameters: Information used as the basis for design. It includes design requirements, performance criteria, performance parameters and similar terms.
- Documented: Documented, as documented and similar terms mean contained in the contract documents.
- Economic life: The period of time from the acquisition of an asset to the time when the asset, while still physically capable of fulfilling its function and with only anticipated maintenance, ceases to be the lowest cost alternative for satisfying that function.
- Electricity distributor: Any person or organisation that provides electricity from an electricity distribution system to one or more electrical installations. Includes distributor, supply authority, network operator, local network service provider, electricity retailer or electricity entity, as may be appropriate in the relevant jurisdiction.
- Errors and omissions: For the design prepared by the contractor, errors and omissions have the same meaning as defects.
- Fire hazard properties: To NCC (2022) Schedule 1.
- Gas Network Operator: Has the same meaning as network operator in AS/NZS 5601.1 (2022).
- Geotechnical site investigation: The process of evaluating the geotechnical characteristics of the site in the context of existing or proposed construction.
- Give notice: Give notice, submit, advise, inform and similar expressions mean give notice (submit, advise, inform) in writing to the contract administrator.
- High level interface: Systems transfer information in a digital format using an open system interface.
- Hot-dip galvanized: Zinc coated to AS/NZS 4680 (2006) after fabrication with coating thickness and mass to AS/NZS 4680 (2006) Table 1.
- Ingress protection: IP, IP code, IP rating and similar expression have the same meaning as IP Code in AS 60529 (2004).
- Joints:
 - . Construction joint: A joint with continuous reinforcement provided to suit construction sequence.
 - . Contraction joint: An opening control joint with a bond breaking coating separating the joint surfaces to allow independent and controlled contraction of different parts or components, induced by shrinkage, temperature changes or other causes. It may include unbound dowels to assist vertical deflection control.
 - . Control joint: An unreinforced joint between or within discrete elements of construction that allows for relative movement of the elements.
 - . Expansion joint: A closing control joint with the joint surfaces separated by a compressible filler to allow axial movement due to thermal expansion or contraction with changes in temperature or creep. It may include unbound dowels to assist vertical deflection control.
 - . Sealant joint: A joint filled with a flexible synthetic compound that adheres to surfaces within the joint to prevent the passage of dust, moisture and gases.
 - . Structural control joint: A control joint (contraction, expansion and isolation) in structural elements when used with applied material and finishes.
 - . Substrate joint: A joint in the substrate, which includes construction joints and joints between different materials.
 - . Weakened plane joint: A contraction joint created by forming a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.
- Local authority (local council): A body established for the purposes of local government by or under a law applying in a state or territory.
- Low level interface: Systems transfer information via terminals and voltage free contacts.

- Manufacturer's recommendations: Recommendations, instructions, requirements, specifications (and similar expressions) provided in written or other form by the manufacturer and/or supplier relating to the suitability, use, installation, storage and/or handling of a product.
- Metallic-coated: Steel coated with zinc or aluminium-zinc alloy as follows:
 - . Metallic-coated steel sheet: To AS 1397 (2021). Metal thicknesses specified are base metal thicknesses.
 - . Ferrous open sections zinc coated by an in-line process: To AS/NZS 4791 (2006).
 - . Ferrous hollow sections zinc coated by a continuous or specialised process: To AS/NZS 4792 (2006).
- Network Utility Operator: To NCC (2022) Schedule 1. A person who undertakes the piped distribution of drinking water or non-drinking water for supply; or is the operator of a sewerage system or a stormwater drainage system.
- Obtain: Obtain, seek and similar expressions mean obtain (seek) in writing from the contract administrator.
- Pipe: Includes pipe and tube.
- Practical completion or defects free completion: The requirements for these stages of completion are defined in the relevant building contract for the project.
- Pre-commissioning: Verifying that the installation of a system is complete and ready for commissioning.
- Principal: Principal has the same meaning as owner, client and proprietor and is the party to whom the contractor is legally bound to construct the works.
- Professional engineer: To NCC (2022) Schedule 1.
- Proprietary: Identifiable by naming the manufacturer, supplier, installer, trade name, brand name, catalogue or reference number.
- Prototype: A full size mock-up of components, systems or elements to demonstrate or test construction methods, junctions and finishes, and to define the level of quality.
- Provide: Provide and similar expressions mean supply and install and include development of the design beyond that documented.
- Record drawings: Record drawings has the same meaning as as-installed drawings, as-built drawings and work-as-executed drawings.
- Recovered/reclaimed materials: Material previously used in a building or project that is then re-used in another project. The material may be altered, re-sized, refinished, or adapted, but is not reprocessed in any way, and remains in its original form.
- Referenced documents: Standards and other documents whose requirements are included in this specification by reference.
- Required: Required by the contract documents, the local or statutory authorities.
 - . If required: A conditional specification term for work that may be shown in the documents or is a legislative requirement.
- Sample: A physical example that illustrates workmanship, materials or equipment, and establishes standards by which the work will be judged. It includes samples and sample panels.
- Statutory authority: A public sector entity created by legislation, that is, a specific law of the Commonwealth, State or Territory.
- Static completion: The state of a system when installation works are complete but have not been commissioned.
- Supply: Supply, furnish and similar expressions mean supply only.
- Tests - integrated system: Tests conducted on the project as a complete, integrated system to verify successful integration, interaction, and operation of all interrelated systems to the project requirements.
- Tests - production: Tests carried out on an item, before delivery to the site.
- Tests - site: Tests carried out on site.
- Tests - type: Tests carried out on an item identical with a production item, including with respect to materials, material suppliers, manufacturing processes, dimensions and marking.

- Tolerance: The permitted difference between the upper limit and the lower limit of dimension, value or quantity.
- Utility service provider: Includes Electricity distributor, Network Utility Operator, Gas Network Operator and organisations providing other reticulated utilities including data and telecommunications services.
- Verification: Provision of evidence or proof that a performance requirement has been met or a default exists.

2 SUBMISSIONS AND INSPECTIONS

2.1 SUBMISSIONS

General

Requirement: Make submissions, as documented.

Submit to: Relevant Consultant, Principal, Architect, and Building Surveyor

Contractor review: Before submitting, review each submission item, and check for coordination with other work of the contract and conformance to contract documents.

Submission times

Default timing: Submit information or other material for information, comment or approval at least 5 working days before ordering products or starting installation of the respective portion of the works.

Submission response times: Allow in the construction program for at least the following times:

- Shop drawings: Refer Gantt
- Samples and prototypes: As requested
- Manufacturers' or suppliers' recommendations: As requested
- Product data: As requested
- Product/design substitution or modification: As requested

Proposed products schedules: Submit a schedule of proposed products that have not been specified as proprietary items within 3 weeks of starting work on site.

Identification

Requirement: Identify the project, contractor, subcontractor or supplier, manufacturer, applicable product, model number and options, as appropriate and include relevant contract document references. If the submission covers more than one item, identify the item in the contract documents the submitted items relate to.

Non-conformance: Identify proposals that do not conform with project requirements, and characteristics that may be detrimental to successful performance of the completed work.

Errors

Requirement: If a submission contains errors, make a new or amended submission as appropriate, indicating changes made since the previous submission during assessment period.

Electronic submissions

Electronic copies file format: PDF

CAD file format: AutoCAD LT 2023

Quantity: As requested.

Hard copy submissions

Hard copy quantity: xNo. 1

Standard contract drawing size: A1

Project requirements

General: Submit the following, as documented:

- Authority approvals: Notes of meetings with regulatory authorities and utility service providers whose requirements apply to the work and evidence that notices, fees and permits have been sought and paid, that utility service provider connections are complete and that statutory approvals by the authorities whose requirements apply to the work have been received.
- Baseline data: To **BASELINE DATA**.
- Building penetrations: Details of the methods to maintain the required structural, fire and other properties to **BUILDING PENETRATIONS**.

- Certification: Certificates of conformance to documented requirements.
- Commissioning plan: For the whole of the work to **COMMISSIONING**.
- Commissioning program: For the whole of the work to **COMMISSIONING**.
- Design documentation: Drawings, calculations and specifications as documented.
- Electronic facility and asset management information: For the whole of the work to **ELECTRONIC FACILITY AND ASSET MANAGEMENT INFORMATION**.
- Execution details: Execution programs, schedules and details of proposed methods and equipment. For building services include the following:
 - . Embedded services: Proposed method for embedding services in concrete walls or floors or chasing into concrete or masonry walls.
 - . Fixing of services: Typical details of locations, types and methods of fixing services to the building structure.
 - . Inaccessible services: If services will be enclosed and not accessible after completion, submit proposals for location of service runs and fittings.
- Fire performance: Evidence of conformity to requirement for combustibility, fire hazard properties and fire-resistance of building elements.
- Marking and labelling: Samples and schedules of proposed marking and labels to **MARKING AND LABELLING**.
- Operation and maintenance manuals: For the whole of the work to **OPERATION AND MAINTENANCE MANUALS**.
- Products and materials: Products and materials data, including manufacturer's technical specifications and drawings, product data sheets, type tests results, evidence of conformity to documented requirements, product certification, performance and rating tables, service connection requirements and installation and maintenance recommendations.
- Prototypes: Prototypes of components, systems or elements.
- Records: As-built documents, photographs, system diagrams, schedules and logbooks to **RECORD DRAWINGS**.
- Safe Work Method Statement: For high risk construction works.
- Safety in design report: For the proposed work to **DESIGN DEVELOPMENT, Safety in design**.
- Samples: Representative of proposed products and materials and including proposals to incorporate samples into the works, if any to **SAMPLES AND PROTOTYPES**.
- Shop drawings: To **SHOP DRAWINGS**.
- Substitutions: To **SUBSTITUTIONS**.
- Tests:
 - . Test reports for testing performed under the contract.
- Warranties: To **WARRANTIES**.

2.2 INSPECTION

Notice

Concealment: If notice of inspection is required for parts of the works that are to be concealed, give notice when the inspection can be made before concealment – 24 hours notice.

Notification times

Minimum notice: As documented.

Light levels

Lighting levels for inspection: To AS/NZS 1680.2.4 (2017).

Attendance

General: Provide attendance for documented inspections and tests.

3 PERFORMANCE

3.1 BUSHFIRE-PRONE AREAS

General

Bushfire Attack Level (BAL) to AS 3959 (2018): Nil

3.2 CORROSION RESISTANCE

Atmospheric corrosivity category

General: Atmospheric corrosivity category as defined in AS 4312 (2019): Refer Rock Solid Geotechnics Pty Ltd – Peter Hofto.

Galvanizing

Severe conditions: Galvanize mild steel components (including fasteners) to AS/NZS 1214 (2016) or AS/NZS 4680 (2006) as appropriate, if:

- Exposed to weather.
- Embedded in masonry.
- Exposed to or in air spaces behind the external leaf of masonry walls.
- In contact with chemically treated timber, other than copper chrome arsenate (CCA).

3.3 NOISE LEVELS

General

Requirement: Install systems to operate within the noise level limits, as documented for the contract design and documented equipment performance.

3.4 STRUCTURE

General

Requirement: If required, provide structures, installations and components as follows:

- Fixed accessways: To AS 1657 (2018).
- Structural design actions: To the AS/NZS 1170 series.

4 DESIGN

4.1 DESIGN DEVELOPMENT

General

Requirement: Complete the design of the work, including development of the design beyond that documented.

Conflict with the documents: If it is believed that a conflict exists between statutory requirements and the documents, notify the contract administrator immediately and provide a recommendation to resolve the conflict.

Certification of the design

Requirement: Submit certification verifying conformance of the design to the documented and statutory requirements.

Certifier: To **DESIGNER**.

Safety in design

Requirement: Provide a design that allows for safe construction, operation and maintenance, and demolition in conformance with statutory requirements.

4.2 DESIGNER

General

Design by contractor: If the contractor provides design, use only appropriately qualified and registered persons.

5 PRODUCTS AND MATERIALS

5.1 GENERAL

Consistency

General: For each material or product use the same source or manufacturer and provide consistent type, size, quality and appearance.

Low VOC emitting paints

Paint types: To the recommendations of AS/NZS 2311 (2017) Table 4.2.

Prohibited materials

General: Do not provide the following:

- Materials, exceeding the limits of those listed, in the Safe Work Australia *Hazardous Chemical Information System* (HCIS) Workplace exposure standards.
- Blowing agents:
 - . Materials that use chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) in the manufacturing process.
 - . A blowing agent with a global warming potential (GWP) ≥ 700 .

5.2 PROPRIETARY ITEMS**Manufacturer's or supplier's recommendations**

General: Provide manufactured items to the manufacturer's or supplier's recommendations.

Proprietary items/systems/assemblies: Assemble, install or fix to substrate to the manufacturer's or supplier's recommendations.

Project modifications: Advise of activities that supplement, or are contrary to the manufacturer's or supplier's recommendations.

Identification of proprietary items

Sealed containers: If items are supplied by the manufacturer in closed or sealed containers or packages, bring them to point of use in the original containers or packages.

Other items: Marked to show the following, as applicable:

- Manufacturer's identification.
- Brand name.
- Product type.
- Quantity.
- Reference code and batch number.
- Date of manufacture.

5.3 SUBSTITUTIONS**General**

Identified proprietary items: Identification of a proprietary item does not necessarily imply exclusive preference for the identified item, but indicates the necessary properties of the item.

Alternatives: If alternatives to the documented products, methods or systems are proposed, submit sufficient information to permit evaluation of the proposed alternatives, including the following:

- Product, method or system identification.
- Manufacturer's contact details.
- Detailed comparison between the properties of the documented product and proposed substitution.
- Details of manufacturer and/or installer warranty.
- Statement of NCC compliance, if applicable.
- Evidence of conformity to a cited standard.
- Evidence that the performance is at least equal to that specified.
- Samples.
- Essential technical information, in English.
- Reasons for the proposed substitutions.
- Statement of the extent of revisions to the contract documents.
- Statement of the extent of revisions to the construction program.
- Statement of cost implications including costs outside the contract.
- Statement of consequent alterations to other parts of the works.

Availability: If the documented products or systems are unavailable within the time constraints of the construction program, submit evidence.

Criteria: If the substitution is for any reason other than unavailability, submit evidence that the substitution:

- Is of net enhanced value to the principal.

- Is consistent with the contract documents and is as effective as the identified item, detail or method.

5.4 SAMPLES AND PROTOTYPES

General

Incorporation of samples: Only incorporate samples that have been endorsed for inclusion in the works. Do not incorporate other samples.

Retention of samples: Keep endorsed samples in good condition on site, until the date for practical completion.

Unincorporated samples: Remove on completion.

5.5 SHOP DRAWINGS

General

Standard: To AS 1100.101 (1992), AS 1100.201 (1992), AS 1100.301 (2008), AS 1100.401 (1984) and AS/NZS 1100.501 (2002) as applicable.

Documentation: Include dimensioned drawings showing details of the fabrication and installation of structural elements, building components, services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

Diagrammatic layouts: Coordinate work shown diagrammatically in the contract documents, and prepare dimensioned set-out drawings.

Services coordination: Coordinate with other building and service elements. Show adjusted positions on the shop drawings.

Space requirements: Check space and access for maintenance requirements of equipment and services indicated diagrammatically in the contract documents.

Commissioning requirements: Show provisions for testing and commissioning on the drawings.

Access for maintenance: Show space and provisions for access for maintenance.

Building work drawings for building services: On dimensioned drawings show the following:

- Access doors and panels.
- Conduits to be cast in slabs.
- Holding down bolts and other anchorage and/or fixings required complete with loads to be imposed on the structure during installation and operation.
- Openings, penetrations and block-outs.
- Sleeves.
- Plinths, kerbs and bases.
- Required external openings.

Submission medium: Electronic PDF & CAD and hard copy

Drawing size: <10MB

CAD base drawings: AutoCAD LT 2023

Record drawings: Amend all documented shop drawings to include changes made during the progress of the work and up to the end of the defects liability period.

6 ANCILLARY BUILDING WORK

6.1 WALL CHASING

Holes and chases

General: If holes and chases are required in masonry walls, make sure structural integrity of the wall is maintained. Do not chase walls with a fire-resistance level or an acoustic rating.

Parallel chases or recesses on opposite faces of a wall: Not closer than 600 mm to each other.

Chasing blockwork: Only chase core-filled hollow blocks or solid blocks that are not documented as structural.

Concrete blockwork chasing table

Block thickness (mm)	Maximum depth of chase (mm)
190	35

Block thickness (mm)	Maximum depth of chase (mm)
140	25
90	20

6.2 FIXING

General

Suitability: If equipment is not suitable for fixing to non-structural building elements, fix directly to structure and trim around penetrations in non-structural elements.

Fasteners

General: Use proprietary fasteners capable of transmitting the loads imposed, and sufficient for the rigidity of the assembly.

6.3 BUILDING PENETRATIONS

Penetrations

Requirement: Maintain the required structural integrity, fire performance, waterproofing performance and other properties when penetrating or fixing to the following:

- Structural building elements including external walls, fire walls, fire doors and access panels, other tested and rated assemblies or elements, floor slabs and beams.
- Membrane elements including damp-proof courses, waterproofing membranes and roof coverings. If penetrating membranes, provide a waterproof seal between the membrane and the penetrating component.

Sealing

Fire-resisting building elements: Seal penetrations with a system conforming to AS 4072.1 (2005).

Non fire-resisting building elements: Seal penetrations around conduits and sleeves. Seal around cables within sleeves. If the building element is acoustically rated, maintain the rating.

Sleeves

General: If piping, cables or conduits penetrate building elements, provide metal or PVC-U sleeves formed from pipe sections as follows:

- Movement: Arrange to permit normal pipe or conduit movement.
- Diameter (for non fire-resisting building elements): Sufficient to provide a ring shaped space around the pipe or pipe insulation of at least 12 mm.
- Ferrous surfaces: Prime paint.
- Sealing: Seal between pipes or conduits and sleeves to prevent the entry of vermin.
- Terminations:
 - . Cover plates fitted: Flush with the finished building surface.
 - . Fire-resisting and acoustic rated building elements: 50 mm beyond finished building surface.
 - . Floors draining to floor wastes: 50 mm above finished floor.
 - . Other locations: 5 mm beyond finished building surface.
 - . Termite management: To AS 3660.1 (2014).
- Thickness:
 - . Metal: 1 mm or greater.
 - . PVC-U: 3 mm or greater.

6.4 SUPPORT OF PLANT AND EQUIPMENT

Concrete plinths

General: Provide concrete plinths as documented and under all equipment located on concrete floor slabs as follows:

- Surround: Zinc (hot-dipped) coated steel, at least 75 mm high and 1.6 mm thick. Fix to the floor with masonry anchors. Fill with concrete.
- Height: 75 mm or greater, as documented.
- Reinforcement: Single layer of F62 fabric.
- Concrete: Grade N20.

- Finish: Steel float, flush with top edge of the surround.

Support of ground level plant and equipment

Ground level: Conform to the following:

- If the ground slope is 15° or more, or the area of the plant and equipment is extensive, obtain the advice of a professional engineer for the documentation of a suitable slab or platform.
- In all other cases, provide proprietary plastic or concrete supports installed with falls that achieve a raised, impervious and water shedding bearing surface.

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Support of plant and equipment mounted on roofs or elevated platforms

Platforms: If a platform is required, or the area of the plant and equipment mounted on roofs or elevated platforms is extensive, obtain the advice of a professional engineer for the documentation of a suitable platform. Preference: Contact Alex Taoum at Prime Engineering on 0431 401 625

Balustrades: If balustrades or screening are required, obtain the advice of a registered architect.

Roof level support: If any of the following apply to roof level support, obtain the advice of a professional engineer:

- The total load from any unit of plant or equipment exceeds 500 kg.
- The load from a unit of plant or equipment to any single support point exceeds 100 kg.
- The average loading of plant and equipment over the area extending 1 m on all sides beyond the plant and equipment exceeds 25 kg/m².

6.5 SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS

General

Seismic restraint to AS 1170.4 (2007)

7 BUILDING SERVICES

7.1 SERVICES CONNECTIONS

Connections

General: Connect to utility service provider services or service points. Excavate to locate and expose connection points. Reinstall the surfaces and facilities that have been disturbed to preexisting condition.

Utility service provider requirements

General: If the utility service provider elects to perform or supply part of the works, make the necessary arrangements. Install equipment supplied, but not installed, by the utility service provider.

7.2 SERVICES INSTALLATION

General

Installation: Install equipment and services as follows:

- Plumb and securely fixed.
- Allow for movement in both structure and services.
- Arrange services running together, parallel to each other and adjacent building elements.

Concealment: Conceal all cables, ducts, trays and pipes except where installed in plant spaces, ceiling spaces and riser cupboards or documented to be exposed. If alternative routes are available, do not locate on external walls.

Lifting: Provide heavy items of equipment with permanent fixtures for lifting to the manufacturer's recommendations and Work Health and Safety Act 2012.

Dissimilar metals

Joining: Join dissimilar metals with fittings of electrolytically compatible material.

Temporary capping

Pipe ends: During construction, protect open ends of pipe with metal or plastic covers or caps.

Piping

General: Install piping in straight lines at uniform grades without sags. Arrange to prevent air locks. Provide sufficient unions, flanges and isolating valves to allow removal of piping and fittings for maintenance or replacement of plant.

Spacing: Provide at least 25 mm clear between pipes and between pipes and building elements, additional to insulation.

Changes of direction: Provide as follows:

- If practicable, long radius elbows or bends and sets, and swept branch connections.
- If pipes are led up or along walls and then through to fixtures, provide elbows or short radius bends.
- Do not provide mitred fittings.

Vibration: Arrange and support piping to prevent vibration whilst permitting necessary movement. Minimise the number of joints.

Embedded pipes: Do not embed pipes that operate under pressure in concrete or surfacing material.

Valve groupings: If possible, locate valves in groups.

Pressure testing precautions: Isolate items not rated for the test pressure. Restrain pipes and equipment to prevent movement during pressure testing.

Support and structure

Requirement: Provide incidental supports and structures to suit the services.

Pipe support systems

Standard: To AS 4041 (2006) clause 3.28.

General: Provide hangers, brackets, saddles, clips, and support system components to resist live and dead loads and to control pipe movement caused by thermal and water pressure effects. Incorporate provisions for adjustment of spacing, alignment, grading and load distribution. Support pipework from associated equipment or building structure. Support valves, strainers and major line fittings so that no load is placed on connected piping or transmitted to it during operation and maintenance.

Fixings: Provide fixings to the associated equipment or building structure designed to withstand the loads imposed by the pipe supports.

Channel section supports: Proprietary channel section with clamps and hangers sized to match external diameter of pipe being supported. Provide all components from the same manufacturer.

Channel and fixing material: Metallic-coated steel or as documented.

Vertical pipes: Provide anchors and guides to maintain long pipes in position, and supports designed for the mass of the pipe and its contents.

Saddles: Do not use saddle type supports for pipes larger than DN 20.

Dissimilar metals: If pipe and support materials are dissimilar, provide industrial grade electrically non-conductive material securely bonded to the pipe to separate them. Provide fasteners of electrolytically compatible material.

Fixing to masonry and concrete: Provide metallic-coated steel or non-ferrous metal bolts or screws into chemical or expanding metal masonry anchors.

Uninsulated pipes: Clamp piping supports directly to pipes. Provide electrical isolation of dissimilar metals.

Insulated pipes:

- Spacers: Provide spacers at least as thick as the insulation between piping supports and pipes. Extend either side of the support by at least 20 mm.
- Spacer material: Rigid insulation material of sufficient strength to support the piping and suitable for the temperature application.
- Vapour barriers: For cold pipes, apply aluminium foil tape over the circumference of the spacer to form a vapour barrier. Fit to spacer before installation of the bracket on the pipe.
- Metal sheathing: If metal sheathing is documented, provide a band of the documented sheathing materials between the aluminium foil tape and the support for the full width of the spacer.

Hanger sizes: Conform to the following:

- Gas installations: To AS/NZS 5601.1 (2022) Table 5.8.3.
- Other pipes: Provide hangers sized to the manufacturer's recommendations to suit operating conditions and regulatory requirements including the loads due to valves and other attached components, pipe material, pipe contents and temperature and seismic loads.

Support spacing: Provide supports at no greater spacing than the following:

- Cold and heated water: To AS/NZS 3500.1 (2021) Table 5.7.4.
- Sanitary plumbing: To AS/NZS 3500.2 (2021) Table 10.2.1.

- Stormwater: To AS/NZS 3500.2 (2021) clause 4.9.
- Fuel gas: To AS/NZS 5601.1 (2022) Table 5.8.2.
- Fire sprinklers and combined wet suppression systems: To AS 2118.9 (1995) Table 2.6.1.
- Fire hydrants:
 - . Metal piping: To AS 2419.1 (2021) clause 10.6.
 - . Plastic piping: To AS/NZS 3500.1 (2021).
- Gaseous fire suppression systems:
 - . General gaseous fire suppression systems: To AS 4214 (2018) clause 6.3.4.
 - . Carbon dioxide fire suppression systems: To AS 6183 (2011) clause 6.3.4.
- Medical gases: To AS 2896 (2021) Table 4.1.
- Refrigerant: To AS/NZS 5149.2 (2016) Tables 5 and 6.
- Other ferrous pipes under pressure: To AS 4041 (2006) Table 3.28.2.
- Other copper pipes: To AS 4809 (2017) Table 6.2.
- ABS pipes: To AS/NZS 3690 (2009) Table 6.2.
- PVC pipes: To AS/NZS 2032 (2006) Table 6.3.
- PE pipes: To AS/NZS 2033 (2008) Table 6.1.
- Other non-ferrous pipe carrying liquids: To AS/NZS 3500.1 (2021) Table 5.7.4.
- Other pipes carrying air or gases: To AS/NZS 5601.1 (2022) Table 5.8.2.
- Proprietary grooved piping systems: To the manufacturer's recommendations.

Additional supports: Provide additional supports as follows:

- Proprietary grooved piping systems: To the manufacturer's recommendations.
- Valves and other heavy pipe mounted components: Adjacent to the valve or component.
- Adjacent pipe mounted components requiring regular maintenance.
- At changes of direction and adjacent to wall or floor penetrations.
- Where required to anchor piping or control thermal or other movement.

Differential movement

General: If the geotechnical site investigation report predicts differential movements between buildings and the ground in which pipes or conduits are buried, provide control joints in the pipes or conduits, as follows:

- Arrangement: Arrange pipes and conduits to minimise the number of control joints.
- Magnitude: Accommodate the predicted movements.

7.3 PLANT AND EQUIPMENT

General

Location: Locate so failure of plant and equipment (including leaks) does not create a hazard for the building occupants and causes a minimum or no damage to the building, its finishes and contents including water sensitive equipment or finishes.

Safe tray and an overflow pipe: Provide to each tank, hot water heater and storage vessel.

Refer Engineering Solutions Tasmania drawings and specifications.

7.4 ACCESS FOR MAINTENANCE

General

Requirement: Provide access for maintenance of all items requiring inspection, measurement, operation, adjustment, repair, replacement and other maintenance-related tasks.

Standards: Conform to the relevant requirements of AS 1657 (2018), AS 1892.1 (2018), AS 2865 (2009) and AS/NZS 3666.1 (2011).

Work Health and Safety: Conform to the requirements of the applicable Work Health and Safety regulations.

Refrigerated or cooling plant: If the space is a refrigerated or cooling chamber inside a duct, air handling plant or similar, provided with an access door or personnel access panel and of sufficient size for a person to enter, provide the following to BCA (2022) G1D3:

- An access door.

- Internal lighting with external indicator lamp.
- An alarm.

Protection from injury: Protect personnel from injury caused by contact with objects including those that are sharp, hot or protrude at low level.

Plant room flooring surfaces: R10 Slip resistance classification to AS 4586 (2013).

Trip hazards: Do not run small services including drains and conduits across floors where they may be a trip hazard.

Manufacturer's standard equipment: If necessary, modify manufacturer's standard equipment to provide the plant access documented.

Clearances

Minimum clearances for access: Conform to the following:

- Vertical clearance: ≥ 2100 mm, vertically above horizontal floors, ground and platforms.
- Horizontal clearance: Preferably ≥ 750 mm clear, but in no case less than 600 mm between equipment or between equipment and building features including walls.
- If tools are required to operate, adjust or remove equipment, provide sufficient space so the tools can be used in their normal manner and without requiring the user to employ undue or awkward force.
- Hinged or removable components: To the manufacturer's recommendations.
- Within plant items: Conform to the preceding requirements, and not less than the clearances recommended in BS 8313 (1997).

Elevated services other than in occupied areas

Access classifications:

- Access class A: Readily accessible. Provide clear and immediate access to and around plant items. If plant or equipment is located more than 2.0 m above the ground, floor or platform, provide a platform with handrails accessible by a stair, all to AS 1657 (2018).
- Access class B: If the plant item requiring access is located more than 2.0 m above the ground, floor or platform, provide a platform with handrails accessible by a non-vertical ladder, all to AS 1657 (2018).
- Access class C: Locate plant so temporary means of access conforming to Work Health and Safety regulations can be provided.

Temporary means of access: Make sure there is adequate provision in place, which is safe and effective.

Areas in which access is restricted to authorised maintenance personnel: Provide access as follows:

- Instruments, gauges and indicators (including warning and indicating lights) requiring inspection at any frequency: Readily accessible.
- Access required monthly or more frequently: Access class A.
- Access required between monthly and six monthly: Access class A or B.
- Access required less frequently than six monthly: Access class A, B or C.

Other areas: Provide access as follows:

- Locate to minimise inconvenience and disruption to building occupants or damage to the building structure or finishes.
- In suspended ceilings, locate items of equipment that require inspection and/or maintenance above tiled parts. If not possible, provide access panels where located above set plaster or other inaccessible ceilings. Arrange services and plant locations to reduce the number of access panels. Coordinate with other trades to use common access panels where feasible.
- Do not locate equipment requiring access above partitions.
- Instruments, gauges and other items requiring inspection at any frequency: Readily accessible.
- Labelling: If equipment is concealed in ceilings, provide marking to **MARKING AND LABELLING, Equipment concealed in ceilings.**

Facilities for equipment removal and replacement

Requirement: Provide facilities to permit removal from the building and replacement of plant and equipment, including space large enough to accommodate it and any required lifting and/or

transportation equipment. Arrange plant so large and/or heavy items can be moved with the minimum changes of direction.

Removal of components: Allow sufficient space for removal and replacement of equipment components including air filters, tubes of shell and tube heat exchangers, removable heat exchanger bundles, coils and fan shafts. Provide access panels or doors large enough to permit the safe removal and replacement of components within air handling units.

Facilities for access

Equipment behind hinged doors: Provide doors opening at least 150°.

Equipment behind removable panels: Provide panels with quick release fasteners or captive metal thread screws.

Removable panels: Provide handles to permit easy and safe removal and replacement.

Insulated plant and services: If insulation must be removed to access plant and services for maintenance, arrange it to allow for removal and replacement without damage.

Piping

Requirement: Conform to the following:

- Provide access and clearance at fittings that require maintenance, inspection or servicing, including control valves and joints intended to permit pipe removal.
- Arrange piping so it does not interfere with the removal or servicing of associated equipment or valves or block access or ventilation openings.
- Preferably run piping, conduits, cable trays and ducts at high level and drop vertically to equipment.

Electrical equipment and controls

Electrical equipment: Provide clearances and access space to AS/NZS 3000 (2018).

Switchboards and electrical control equipment: Locate near the main entrance to plant space and with switchboards visible from the plant being operated. Refer Engineering Solutions Tasmania drawings and specifications.

Control panels: Locate near and visible from the plant being controlled. Refer Engineering Solutions Tasmania drawings and specifications.

7.5 VIBRATION SUPPRESSION

General

Requirement: Minimise the transmission of vibration from rotating or reciprocating equipment to other building elements.

Standard

Machinery noise and vibration: Vibration severity in Zone A to ISO 20816-1 (2016) and ISO 20816-3 (2022).

Speeds

General: If no maximum speed is prescribed, do not exceed 1500 r/min for direct driven equipment.

Connections

General: Provide flexible connections to rotating machinery and assemblies containing rotating machinery. Isolate pipes by incorporating sufficient flexibility into the pipework or by use of proprietary flexible pipe connections installed to prevent placing stress on pipes due to end reaction.

Inertia bases

General: If necessary to achieve the required level of vibration isolation, provide inertia bases having appropriate mass and to the following:

- Construction: Steel or steel-framed reinforced concrete with reinforcing bars welded between base sections. Position foundation bolts for equipment before pouring concrete.
- Supports: Support on vibration isolation mountings using height saving support brackets.

Vibration isolation mountings

General: Except for external equipment that is not connected to the structure of any building, support rotating or reciprocating equipment on mountings as follows:

- For static deflections < 15 mm: Single or double deflection neoprene in-shear mountings incorporating steel top and base plates and a tapped hole for bolting to equipment.
- For static deflections ≥ 15 mm: Spring mountings.

Selection: Provide mountings selected to achieve 95% isolation efficiency at the normal operating speeds of the equipment.

Installation: Set and adjust vibration isolation mounting supports to give clearance for free movement of the supports.

Spring mountings: Provide freestanding laterally stable springs as follows:

- Clearances: ≥ 12 mm between springs and other members such as bolts and housing.
- High frequency isolation: 5 mm neoprene acoustic isolation pads between base plate and support.
- Levelling: Provide bolts and lock nuts.
- Minimum travel to solid: $\geq 150\%$ of the designated minimum static deflection.
- Ratio of mean coil diameter to compressed length at the designated minimum static deflection: $\geq 0.8:1$.
- Snubbing: Snub the springs to prevent bounce at start-up.
- Vertical resilient limit stops: To prevent spring extension when unloaded, to serve as blocking during erection and which remain out of contact during normal operation.

7.6 FINISHES TO BUILDING SERVICES

General

Requirement: If exposed to view (including in plant rooms), paint building services and equipment.

Surfaces painted or finished off-site: Conform to *0183 Metals and prefinishes*.

Exceptions: Do not paint chromium or nickel plating, anodised aluminium, GRP, stainless steel, non-metallic flexible materials and normally lubricated machined surfaces. Surfaces with finishes applied off-site need not be re-painted on-site provided the corrosion resistance of the finish is not less than that of the respective finish documented.

Standard: Conform to the recommendations of AS/NZS 2311 (2017) Sections 3, 6 and 7 or AS 2312.1 (2014) Sections 6, 7 and 8, as applicable.

Inaccessible surfaces: If surfaces are inaccessible after installation, complete finish before installation.

Painting systems

New unpainted interior surfaces: To AS/NZS 2311 (2017) Table 5.1.

New unpainted exterior surfaces: To AS/NZS 2311 (2017) Table 5.2.

Paint application

Coats: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Make sure each coat of paint or clear finish is uniform in colour, gloss, thickness and texture and free of runs, sags, blisters or other discontinuities.

Combinations: Do not combine paints from different manufacturers in a paint system.

Protection: Remove fixtures before starting to paint and refix in position undamaged when painting is complete.

Underground metal piping

Requirement: Provide corrosion protection for the following:

- Underground ferrous piping.
- Underground non-ferrous metal piping in chemically aggressive soils and environments.

Corrosion protection: Select from the following:

- Cathodic protection: Sacrificial anodes or impressed current. Incorporate a facility for periodic testing. Conform to the recommendations of AS 2832.1 (2015).
- Continuous wrapping using proprietary petroleum taping material.
- Impermeable flexible plastic coating.
- Sealed polyethylene sleeve.

Aggressive soils: If metallic piping or components are installed in chemically aggressive soil, provide additional protection as follows:

- **Material:** Continuous polyethylene sleeve to ASTM D1248 (2016) with a minimum thickness of 0.25 mm.
- **Installation:** Wrap or sleeve pipes and components. Tape joints between sections of polyethylene and between polyethylene and piping.

Repairs to finishes

Requirement: Repair damaged finishes to restore their corrosion protection, appearance and service life.

Painting of pipe threads: After pipe installation and before other finishes or insulation are applied, paint exposed threads in metallic-coated steel pipe with zinc rich paint.

7.7 MARKING AND LABELLING**General**

Requirement: Mark and label services and equipment for identification purposes as follows:

- Locations exposed to weather: Provide durable materials.
- Pipes, conduits and ducts: To AS 1345 (1995) throughout its length, including in concealed spaces.
- Cables: Label to indicate the origin and destination of the cable.

Consistency: Label and mark equipment using a consistent scheme across all services elements of the project.

Label samples and schedules

Requirement: For each item or type of item, prepare a schedule of marking and labelling, including the following:

- A description of the item or type of item for identification.
- The proposed text for marking or labelling.
- The proposed location of the marking and labelling.

Submission timing: Before marking or labelling.

Electrical accessories

Circuit identification: Label isolating switches and outlets to identify circuit origin.

Operable devices

Requirement: Mark to identify the following:

- Controls.
- Indicators, gauges, meters.
- Isolating switches.

Equipment concealed in ceilings

Location: Provide a label on the ceiling, to indicate the location of each concealed item requiring access for routine inspection, maintenance and/or operation and as follows:

- Tiled ceilings, locate the label on the ceiling grid closest to the concealed item access point.
- Flush lined ceilings, locate adjacent to closest access panel.

Concealed equipment: Items to be labelled include the following:

- Fan coil units and terminal equipment (e.g. VAV terminals).
- Fire and smoke dampers.
- Isolating valves not directly connected to items otherwise labelled.
- Motorised dampers.

Wall mounted equipment in occupied areas

Location: Provide labels on wall mounted items in occupied areas including the following:

- Services control switches.
- Temperature and humidity sensors.

Points lists

Automatic control points: Provide plasticised, fade-free points lists for each automatic control panel and include terminal numbers, point addresses, short and long descriptors in the lists. Store in a pocket on the door of the panel.

Pressure vessels

General: Mount manufacturer's certificates in glazed frames on a wall next to the vessel.

Valves and pumps

General: Label to associate pumps with their starters and valves. Screw fix labels to body or attach label to valve handwheels with a key ring.

Underground services

Survey: Accurately record the routes of underground cables and pipes before backfilling. Include on the record drawings.

Records: Provide digital photographic records of underground cable and pipe routes before backfilling. Include in operation and maintenance manual.

Location marking: Accurately mark the location of underground cables and pipes with route markers consisting of a marker plate set flush in a concrete base, engraved to show the direction of the line and the name of the service.

Markers: Place markers at ground level at each joint, route junction, change of direction, termination and building entry point and in straight runs at intervals of not more than 100 m.

Marker bases: 200 mm diameter x 200 mm deep, minimum concrete.

Direction marking: Show the direction of the cable and pipe run by means of direction arrows on the marker plate. Indicate distance to the next marker.

Plates: Brass, aluminium or stainless steel with black filled engraved lettering, minimum size 75 x 75 x 1 mm thick.

Plate fixing: Waterproof adhesive and 4 brass or stainless steel countersunk screws.

Marker height: Set the marker plate flush with paved surfaces, and 25 mm above other surfaces.

Marker tape: Where electric bricks or covers are not provided over underground wiring, provide a 150 mm wide yellow or orange marker tape bearing the words WARNING – electric cable buried below, laid in the trench 150 mm below ground level.

Plastic pipe: Provide a detectable marker tape with trace wire to identify the route of buried piping. Terminate with 1000 mm coil in a readily accessible location. Tag to match the record drawings.

Labels and notices

Materials: Select from the following:

- Cast metal.
- For indoor applications only, engraved two-colour laminated plastic.
- Proprietary pre-printed self-adhesive flexible plastic labels with machine printed black lettering.
- Stainless steel or brass minimum 1 mm thick with black filled engraved lettering.

Emergency functions: To AS 1319 (1994).

Colours: Generally to AS 1345 (1995) as appropriate, otherwise black lettering on white background except as follows:

- Danger, warning labels: White lettering on red background.
- Main switch and caution labels: Red lettering on white background.

Edges: If labels exceed 1.5 mm thickness, radius or bevel the edges.

Labelling text and marking: To correspond to terminology and identifying number of the respective item as shown on the record drawings and documents and in operating and maintenance manuals.

Lettering heights:

- Danger, warning and caution notices: Minimum 10 mm for main heading, minimum 5 mm for remainder.
- Equipment labels within cabinets: Minimum 5 mm.
- Equipment nameplates: Minimum 40 mm.
- Identifying labels on outside of cabinets: Minimum 5 mm.
- Isolating switches: Minimum 5 mm.
- Switchboards, main assembly designation: Minimum 25 mm.
- Switchboards, outgoing functional units: Minimum 10 mm.
- Switchboards, sub assembly designations: Minimum 15 mm.
- Valves:
 - . \geq DN 65: Minimum 25 mm.
 - . $<$ DN 65: Minimum 10 mm.
- Self-adhesive flexible plastic labels:
 - . Labels less than 2000 mm above floor: 5 mm.

- . Labels minimum 2000 mm above floor: 10 mm.
- . Other locations: Minimum 5 mm.

Label locations: Locate labels so they are easily seen and are either attached to, below or next to the item being marked.

Fixing: Fix labels securely using screws, rivets, proprietary self-adhesive labels or double-sided adhesive tape and as follows:

- If labels are mounted in extruded aluminium sections, use rivets or countersunk screws to fix the extrusions.
- Use aluminium or monel rivets for aluminium labels.

Vapour barriers: Do not penetrate vapour barriers.

8 COMPLETION

8.1 TOOLS AND SPARE PARTS

Spare parts

General: Provide spare parts listed as documented.

Replacement: Replace spare parts used during the maintenance period.

Refer Engineering Solutions Tasmania drawings and specifications.

Tools and spare parts schedule

Submission timing: At least 8 weeks before the date for practical completion.

Requirement: Prepare a schedule of tools, portable instruments and spare parts necessary for maintenance of the installation. For each item state the recommended quantity and the manufacturer's current price. Include the following in the prices:

- Checking receipt, marking and numbering in conformance with the spare parts schedule.
- Packaging and delivery to site.
- Painting, greasing and packing to prevent deterioration during storage.
- Referencing equipment schedules in the operation and maintenance manuals.
- Suitable means of identifying, storing and securing the tools and instruments. Include instructions for use.

8.2 TRAINING

General

Standard: To SA TS 5342 (2021).

Duration: Instruction to be available for the whole of the commissioning and running-in periods.

Format: Conduct training at agreed times, at system or equipment location. Also provide seminar instruction to cover all major components.

Operation and maintenance manuals: Use items and procedures listed in the final draft operation and maintenance manuals as the basis for instruction. Review contents in detail with the principal's staff.

Certification: Provide written certification of attendance and participation in training for each attendee. Provide register of certificates issued.

Demonstrators

General: Use only qualified manufacturer's representatives who are knowledgeable about the installations.

Operation

General: Explain and demonstrate to the principal's staff the purpose, function and operation of the installations.

Maintenance

General: Explain and demonstrate to the principal's staff the purpose, function and maintenance of the installations.

Seasonal operation

General: For equipment requiring seasonal operation, demonstrate during the appropriate season.

8.3 CLEANING

Final cleaning

General: Before the date for practical completion, clean throughout, including all exterior and interior surfaces except those totally and permanently concealed from view.

Labels: Remove all visible labels not required for maintenance.

Removal of material

General: Dispose of building waste material off site to the requirements of the relevant authorities.

8.4 WARRANTIES

General

Requirement: If a warranty is documented, name the principal as warrantee. Register with manufacturers as necessary. Retain copies delivered with components and equipment.

Approval of installer: If installation is not by manufacturer, and product warranty is conditional on the manufacturer's approval of the installer, submit the manufacturer's written approval of the installing firm.

Principal's responsibilities: Submit details of responsibilities of the principal required to keep warranties in force.

9 TESTING AND COMMISSIONING

9.1 TESTING - GENERALLY

Inspection and testing plan

Requirement: Provide inspection and testing plan consistent with the construction program including details of test stages and procedures.

Notice

Site tests: Give notice of the time and place of documented tests.

Inspection: Give sufficient notice for inspection to be made of the commissioning, testing and verification tests on completion of commissioning.

Attendance

General: Provide attendance at tests. Refer Engineering Solutions Tasmania and Building Surveyor.

Suppliers: If necessary to carry out documented tests, arrange equipment suppliers to assist.

Testing authorities

Requirement: Have tests carried out by an Accredited Testing Laboratory, accredited for the documented test method, except for site tests or test methods that do not have an accredited testing laboratory.

Test equipment

Accuracy: Use testing equipment designed to test and/or measure system performance within the documented tolerances.

Calibration: Use only instruments that have current calibration certificates issued by an Accredited Testing Laboratory. Tag or label instruments with calibration date and calibration authority name. Provide copies of certification if requested.

Maximum period since last calibration: As recommended by the manufacturer but less than 12 months, except as documented.

Recalibration: If dropped or damaged, recalibrate instruments.

Testing equipment: Provide test equipment and tools to perform documented tests as follows:

- Special testing equipment: If documented, provide special equipment, tools and instruments required for testing or calibration.
- Other testing equipment: Provide standard testing equipment.

Testing procedures

Verification: Verify test procedures by:

- Manual testing.
- Monitoring performance and analysing results using the control system trend logs.
- A combination of the above methods.

Sampling: Sampling may be used subject to the following:

- Use a sampling strategy only for multiple identical pieces of non-life-safety or otherwise non-critical equipment.
- If at any point, more than one identical item has failed, stop testing, determine the cause, rectify and document changes made to remaining units, before continuing with functional testing of the remaining units.

Type tests

Type test reports: Required, as evidence of conformance of proprietary equipment.

Sound pressure level measurements

Requirement: Conform to the following:

- Correction for background noise: To AS/NZS 2107 (2016) Table B1.
- External: To AS 1055 (2018).
- Internal: To AS/NZS 2107 (2016).
- Measurement positions: If a test position is designated only by reference to a room or space, do not take measurements less than 1 m from the floor, ground or walls. For large equipment items including chillers, measure at 2 m and 7 m from the equipment item.
- Sound pressure level analysis: Measure the sound pressure level and the background sound pressure level over the full range of octave band centre frequencies from 31.5 Hz to 8 kHz at the designated positions.
- Sound pressure levels: Measure the A-weighted sound pressure levels and the A-weighted background sound pressure levels at the designated positions.

Test outcome

Requirement: Test as documented and achieve the following:

- Pass the documented Pass/Fail test, and/or
- Values that meet documented requirements, and/or
- Verification of manufacturer's claimed performance.

Failure of multiple items

Requirement: If 10% or 3, whichever is greater, of identical pieces (size does not constitute a difference) of equipment fail to perform as documented for any reason, treat all identical units as having failed. Submit notice of failure and conform to the following:

- Within one week of notification, examine all other identical units and record the results. Submit a report of the findings within two weeks of the original failure notice.
- Within two weeks of the original failure notification, submit a signed and dated explanation of the problem, including the cause of failure, the proposed solution, full equipment details and any other information. Do not exceed the documented requirements of the original installation with the proposed solution.

Rectification of failure under test

Requirement: If an item fails a documented test, rectify the cause of failure and repeat the test.

Submissions: If submission of test results is documented, submit results of both successful and unsuccessful tests.

Test reports

Requirement: Include the following:

- Documented performance criteria including, if documented, tolerances.
- Observations and results of tests and conformance or non-conformance with documented requirements.

Test validity period

Requirement: As documented or, if no validity period is documented, no older than 5 years.

Controls

General: Calibrate, set and adjust control instruments, control systems and safety controls.

Circuit protection

General: Confirm that circuit protective devices are sized and adjusted to protect installed circuits.

Certification

General: On satisfactory completion of the installation, testing and commissioning and before the date for practical completion, certify that each installation is operating correctly. Comply with requirements of Engineering Solutions Tasmania and Building Surveyor.

Integrated system tests

Requirement: Conduct integrated system tests as documented.

Tests: Provide the following:

- Test the integrated operation of the systems listed in each mode documented.
- Restoration of the systems to their pre-test condition on completion of the tests above.

Failure: If any of the systems fails to perform as documented, including return to normal operation, rectify the cause and repeat the integrated system test.

Deferred and seasonal tests

Deferred tests: If documented testing cannot be completed at the scheduled or documented time, the Superintendent may direct that they be deferred to a later time but as soon as possible after the scheduled or documented time.

Seasonal tests: If documented tests are dependent on specific weather conditions, they may be deferred to a time when weather conditions are close to the documented test conditions. Complete seasonal testing as soon as possible but no later than one month before the end of the defects liability period.

Functional tests

Function: Carry out functional and operational tests on each energised equipment item and circuit.

9.2 COMMISSIONING**Standard**

Requirement: Conform to SA TS 5342 (2021).

Static completion

Requirement: Systems, components and building elements are statically complete when:

- Their construction and installation is complete and as documented, including completion of all systems, components and building elements on which they are dependent for commissioning.
- All pre-commissioning tests have been successfully completed.
- They are safe and ready for commissioning.
- All cleaning that may adversely affect commissioning is complete.
- They have been inspected and all outstanding remedial work that may adversely affect commissioning is complete.
- All spaces required for access for commissioning are safe to use and cleared of obstructions that may adversely affect commissioning.

Commissioning plan

Requirement: Provide a commissioning plan to SA TS 5342 (2021) including the following:

- A summary of the work covered by the commissioning plan.
- The parties responsible for this work and any commissioning interrelationships.
- The basis of the design.
- General sequence of commissioning.
- Project specific commissioning methodologies for each system and building element to be commissioned.
- Pre-commissioning requirements.
- Project specific commissioning procedures for each commissioning activity including integrated system tests, deferred and seasonal tests.
- A project specific building tuning plan for all commissioned systems. Include building tuning procedures and tuning team members.
- Requirements for witnessing of tests and documented demonstrations of completion of commissioning.
- Commissioning program to **COMMISSIONING, Commissioning program**.

Commissioning program

Submissions: Submit a program consistent with, and forming part of, the construction program as follows:

- Set out the proposed program for completion, commissioning, testing and instruction.
- Identify related works and timing of the works prerequisite to successful and timely completion of the works.

Revisions: Submit revisions of the program as the project proceeds.

Plant operating period: Include time in the program for the documented plant operating period before the date for practical completion.

Commissioning activities

Requirement: Provide the following to SA TS 5342 (2021):

- Manage the commissioning process.
- Establish and manage the completion process.
- Review design documents for commissionability. Submit a report including any recommended changes.
- Review documented commissioning requirements. Submit a report including any recommended changes.
- Review construction documents for commissionability. Submit a report including any recommended changes.
- Develop, review and update the commissioning plan and commissioning program.
- Develop, review and update commissioning methodologies.
- Develop, review and update commissioning procedures.
- Report on interdependencies between trades that may affect commissioning.
- Develop, review and update procedures for initial start-up of systems.
- Develop, review and update integrated system test procedures.
- Carry out pre-commissioning activities. Record results and submit pre-commissioning records.
- Conduct commissioning activities to the commissioning methodologies and procedures. Record and submit commissioning records.
- Facilitate and conduct integrated system tests and demonstrations. Record and submit integrated system test records.
- Conduct documented demonstrations of completion of commissioning.
- Report on the progress of commissioning work.
- Report on conformance to the commissioning plan and program.
- Report on commissioning defects and issues and progress on their resolution.
- Develop, review and update commissioning report.
- Develop, review and update training materials, conduct training sessions to **TRAINING**.
- Develop, review and update operation and maintenance manuals to **OPERATION AND MAINTENANCE MANUALS**.
- Manage and report deferred and seasonal testing activities to **TESTING - GENERALLY**.
- Management and reporting of building tuning process.
- Periodically review performance data.

Verification of commissioning

Requirement: On completion of commissioning of the equipment or system, provide additional tests to verify that it is fully commissioned and operating to documented requirements.

9.3 BUILDING TUNING**General**

Standard: To SA TS 5342 (2021).

Frequency: Three monthly or more frequently.

Duration: Until the end of the maintenance period. Provide last building tuning in the month before the end of the maintenance period.

Requirement: Provide the following:

- Review data from all recording systems against documented requirements.
- Review of building occupant feedback.
- If discrepancies are identified from the above, take corrective action to rectify them.
- Report on the findings of the reviews, corrective action and effect of corrective action.
- Recommend other action to improve the effectiveness, reliability and efficiency of systems.

10 PROJECT RECORDS

10.1 TACTICAL FIRE DRAWINGS

General

Requirement: Provide sets of colour coded tactical fire drawings, showing all items and systems relevant in a fire to BCA (2022) Spec 19.

Scale: 1:200 or larger if required to be easily read under emergency conditions.

Coordination: Agree the format, colour coding and contents of the tactical fire plans with the Local Fire Authority before beginning documentation.

Location: Provide one set of the laminated drawings fixed to the wall or supplied in a vertical plan hanger in the fire control room.

Loose set: Provide a second set of identical drawings.

Operation and maintenance manuals: Provide a set of colour coded tactical fire drawings in each copy of the operating and maintenance manual.

Inclusions

Requirement: Include the following on the tactical fire drawings:

- Legend sheet at front of set.
- Colour coding key.
- Building: As follows:
 - . Floor plans.
 - . Pressurised and non-pressurised fire isolated stairs and passages.
 - . Smoke and fire compartments.
 - . Special risk areas.
- Fire services: As follows:
 - . Automatic fire detection systems.
 - . Automatic suppression systems including gas flooding systems.
 - . Communications including warden intercommunication points.
 - . Fire control room.
 - . Fire equipment including booster connections.
 - . Fire hydrants, hose reels, portable fire extinguishers.
 - . Fire detection control and indicating equipment (FDCIE).
 - . Fire service lifts.
 - . Fire telephone and control panel.
 - . Hydrant and sprinkler pumps.
 - . Hydrant/hose reels.
 - . Sprinkler and hydrant, suction and booster connections.
 - . Sprinkler control valves.
- Electrical services: As follows:
 - . Emergency power supplies.
 - . Essential services switchboards.
 - . Evacuation warning panel.
 - . Standby power plant.
 - . Substations/transformers.
 - . Switchboards, main switchroom.

- Mechanical ventilation and air handling equipment: As follows:
 - . Air intakes, fans, ducts, shafts.
 - . Conditioners and mixing boxes.
 - . Fire dampers.
 - . General exhaust air fans, ducts, shafts, discharges.
 - . Smoke dampers.
 - . Smoke fans including exhaust fans, zone and stair pressurisation fans.
 - . Stair pressurisation systems.
 - . Supply air system.
- Mechanical ventilation and air handling equipment operation: As follows:
 - . Statement of normal condition.
 - . Condition upon fire alarm.
 - . Manual controls available.
- Hydraulic services: As follows:
 - . Gas meters.
 - . Gas supply control.
 - . Incoming water supplies and valves for the sprinkler, hydrant and fire hose reel systems.
 - . Water tank.

10.2 RECORD DRAWINGS

General

Requirement: Prepare record drawings showing the following:

- Installed locations of building elements, services, plant and equipment.
- Off-the-grid dimensions and depth if applicable.
- Any provisions for the future.

Recording, format and submission

Requirement: Record changes made during the progress of the works on a set of drawings kept on site for that specific purpose.

Drawing layout: Use the same borders and title block as the contract drawings.

Quantity and format: Conform to **SUBMISSIONS**.

Endorsement: Sign and date all record drawings.

Accuracy: If errors in, or omissions from, the record drawings are found, amend the drawings and re-issue in the quantity and format documented for **SUBMISSIONS**.

Date for submission: Not later than 2 weeks after the date for practical completion.

Services record drawings

General: To **RECORD DRAWINGS**, **General** and **Recording, format and submission** and the following:

- Extensions and/or changes to existing: If a drawing shows extensions and/or alterations to existing installations, include sufficient of the existing installation to make the drawing comprehensible without reference to drawings of the original installation.
- Detention: If on-site detention tanks or pondage are provided, include the volume required on the drawing and the permitted flow rate to the connected system.
- Domestic cold water or fire mains: Show the pressure available at the initial connection point and the pressure available at the most disadvantaged location on each major section of the works.
- Stormwater: If storm water pipes are shown, include the pipe size and pipe grade together with the maximum acceptable flow and the actual design flow.

Diagrams: Provide diagrammatic drawings of each system including the following:

- Controls.
- Piping including all valves and valve identification tags.
- Principal items of equipment.
- Single line wiring diagrams.

- Acoustic and thermal insulation.
- Access provisions and space allowances.
- Fasteners.
- Fixtures.
- Switchgear and control gear assembly circuit schedules including electrical service characteristics, controls and communications.
- Charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

CAD base drawings: AutoCAD dwg.

Subsurface services: Record information on underground or submerged services to the documented quality level, conforming to AS 5488.1 (2022).

Subsurface services recording quality level: Accurate to 10mm

10.3 BASELINE DATA

General

Requirement: Provide baseline data to permit routine service of fire protection systems and equipment to AS 1668.1 (2015), AS 1670.1 (2018), AS 1851 (2012) and AS/NZS 2293.1 (2018). Include baseline data for the following:

- Active fire and smoke systems including automatic fire sprinkler systems, fire pumpsets, fire hydrant systems and water storage tanks for fire protection systems.
- Fire detection and alarm systems.
- EWIS, exit signs and emergency lighting.
- Standby generator sets and batteries.
- Lay flat fire hose, fire hose reels, portable and wheeled fire extinguishers and fire blankets.
- Passive fire and smoke systems including vertical and horizontal fire and smoke elements such as:
 - . Walls.
 - . Floors.
 - . Ceilings.
 - . Access panels and hatches
 - . Structural fire-resistant elements - beams, columns, girders, trusses.
 - . Fire-resisting doorsets - hinged, pivoted and horizontal sliding.
 - . Smoke doors - hinged and pivoted
 - . Fire shutters.
 - . Fire-resisting glazing.
 - . Ducts.
 - . Dampers.
- Fire and smoke control features of mechanical services.
- Emergency planning in facilities.

Format: Provide baseline data in a format that facilitates the carrying out and recording of routine service tasks including drawings showing the extent and location of items to be serviced, schedules of items and unique identification of each item.

10.4 OPERATION AND MAINTENANCE MANUALS

General

Standard: To SA TS 5342 (2021).

Authors and compilers: Personnel experienced in the maintenance and operation of equipment and systems installed, and with editorial ability.

Referenced documents: If referenced documents or worksections require submissions of manuals, include corresponding material in the operation and maintenance manuals.

Subdivision: By installation or system, depending on project size.

Revisions: Amend operation and maintenance manuals to include changes made to the installation during the construction and maintenance.

Contents of manual

Table of contents: Include a table of contents in each volume. Title to match cover.

Table of amendments: Include a table of amendments.

Directory: Include names, addresses, email addresses and telephone and facsimile numbers of principal consultant, subconsultants, contractor, subcontractors and names of responsible parties.

Record drawings: Include complete set of record drawings, full size.

Drawings and technical data: Include as necessary for the efficient operation and maintenance of the installation.

Installation description: Include a general description of the installation.

Systems descriptions and performance: Include a technical description of the systems installed including the basis of design, the interrelation with other systems and the building and mode of operation, presented in a clear and concise format readily understandable by the principal's staff. Identify function, normal operating characteristics, safety features and limiting conditions.

Baseline data: Include the baseline data to **BASELINE DATA**.

Commissioning records: Include commissioning records to SA TS 5342 (2021). Link commissioning records to item codes on the record drawings.

Training material: Include materials used to provide training, to **TRAINING**, in a form that can be used to train others.

Fire systems and equipment: Include documentation to AS 1851 (2012), including the schedule of essential functionality and performance requirements.

Digital photographic records: Include records to **MARKING AND LABELLING, Underground services**.

Equipment: Include schedules with the following details for installed equipment:

- Item code for use on record and diagrammatic drawings, and spare parts schedule.
- Equipment name plate data including serial number, if any.
- Name and contact details of the manufacturer and supplier.
- Catalogue list number(s).
- Location.
- Function.
- Performance figures and capacity data.
- Date of manufacture.
- Manufacturer's product data sheets including only relevant matter for the project. Mark each product data sheet to clearly identify specific products and component parts used in the installation, and data applicable to the installation.
- Additional information and commentary to illustrate relations of component parts.

Certificates:

- Certificates from authorities.
- Product certification.
- Test certificates for each service installation and all equipment.
- Warranties.

Trends: 7 day record of all trends at commissioning.

Operation procedures: Include for systems installed:

- Manufacturer's technical literature as appropriate.
- Safe starting up, running-in, operating and shutting down procedures. Include logical step-by-step instructions for each procedure.
- Control sequences and flow diagrams.
- Legend for colour-codes services.
- Schedules of fixed and variable equipment settings established during commissioning and maintenance.
- A list of special safety devices and their set points.
- Procedures for seasonal changeovers.

- Warnings to operators.
- Procedures for identifying and rectifying common faults.
- Recommendations for efficient plant operation.
- If the installation includes cooling towers, recommendations for water efficiency.
- Building tuning plan and procedure to **COMMISSIONING, Commissioning plan.**

Building occupants' guide: Include a concise guide written and illustrated for building occupants with no technical background. Include the following:

- Security provisions.
- Safety and access.
- Environmental features, including energy and water efficiency and waste management.
- Occupant relevant information on design and operation.
- Information for occupants on environmental systems that rely partially or wholly on local controls for heating, lighting, cooling, and ventilation.
- Contact details for faults, maintenance and emergencies.

Maintenance procedures:

- Detailed recommendations for periodic maintenance and procedures, including schedule of maintenance work with frequency and manufacturers' recommended tests.
- Manufacturer's technical literature as appropriate. Register with manufacturer as necessary. Retain copies delivered with equipment.
- Safe trouble-shooting, disassembly, repair and reassembly, cleaning, alignment and adjustment, balancing and checking procedures. Provide logical step-by-step instructions for each procedure.
- Schedule of spares, recommended to be held on site, for those items subject to wear or deterioration and that may involve the principal in extended deliveries when replacements are required. Include complete nomenclature and model numbers, and local sources of supply.
- Schedule of normal consumable items, local sources of supply, and expected replacement intervals up to a running time of 40 000 hours. Include lubrication schedules for equipment.
- Instructions for use of tools and testing equipment.
- Troubleshooting procedures.
- Emergency procedures, including telephone numbers for emergency services, and procedures for fault finding.
- Safety data sheets (SDS).
- Instructions and schedules conforming to AS 1851 (2012), AS/NZS 3666.2 (2011), AS/NZS 3666.3 (2011) and AS/NZS 3666.4 (2011).

Maintenance records:

- Prototype routine service records conforming to AS 1851 (2012) prepared to include project specific details.
- Prototype periodic maintenance records and report to AS/NZS 3666.2 (2011), AS/NZS 3666.3 (2011) and AS/NZS 3666.4 (2011) as appropriate, prepared to include project specific details.
- Hard copies: Binders to match the manuals, containing loose leaf logbook pages designed for recording completion activities including operational and maintenance procedures, materials used, test results, comments for future maintenance actions and notes covering the condition of the installation. Include completed logbook pages recording the operational and maintenance activities performed up to the date for practical completion.
- Number of pages: The greater of 100 pages or enough pages for the maintenance period and a further 12 months.

Emergency information: For each type of emergency, including fire, flood, gas leak, water leak, power failure, water failure, system or subsystem failure, chemical release or spill, include the following:

- Emergency instructions.
- Emergency procedures including:
 - . Instructions for stopping or isolating.
 - . Shutdown procedures and sequences.

- . Instructions for actions outside the property.
- . Special operating instructions relevant to the emergency.
- . Contact details relevant to the emergency.

Emergency information manual

Form of emergency information: Provide one of the following:

- An index and coloured tabs identifying emergency information for each type of emergency within the Operation and maintenance manual.
- A separate Emergency manual containing copies of emergency information from the main Operation and maintenance manual.

Format – electronic copies

Scope: Provide the same material as documented for hardcopy in electronic format.

Delivery method: Email and/or DropBox folder

Quantity and format: Conform to **SUBMISSIONS, Electronic submissions**.

Printing: Except for drawings required in **RECORD DRAWINGS** provide material that can be legibly printed on A4 size paper.

Format – hard copies

General: A4 size loose leaf, in commercial quality, 4 ring binders with hard covers, each indexed, divided and titled. Include the following features:

- Cover: Identify each binder with typed or printed title *OPERATION AND MAINTENANCE MANUAL*, to spine. Identify title of project, volume number, volume subject matter, and date of issue.
- Dividers: Durable divider for each separate element, with typed description of system and major equipment components. Clearly print short titles under laminated plastic tabs.
- Drawings: Fold drawings to A4 size with title visible, insert in plastic sleeves (one per drawing) and accommodate them in the binders.
- Pagination: Number pages.
- Ring size: 50 mm maximum, with compressor bars.
- Text: Manufacturers' printed data, including associated diagrams, or typewritten, single-sided on bond paper, in clear concise English.

Number of copies: 3.

Date for submission

Draft submission: The earlier of the following:

- 4 weeks before the date for practical completion.
- Commencement of training.

Final submission: Within 2 weeks after practical completion.

10.5 ELECTRONIC FACILITY AND ASSET MANAGEMENT INFORMATION**Data**

Facility and asset data: Comprehensive

Data exchange schema: Comprehensive

File format: AutoCAD Lt dwg.

Timing: Prior to Completion

11 MAINTENANCE

11.1 PERIODIC MAINTENANCE**General**

Requirement: Provide documented maintenance so that the condition and performance of the maintained work throughout and at the end of the maintenance period is equal to or better than that at the beginning of the maintenance period including with respect to the following:

- Performance, service delivery.
- Service life and reliability.
- Compliance with statutory requirements.

- Compliance with building rating requirements.
- Energy and water efficiency.
- Environmental impact.
- Health and safety.
- Risk management.

Inclusions: Include the following:

- Periodic and statutory maintenance, cleaning and replacement of consumables.
- Emergency repairs.
- Condition reporting.

Duration: From the time systems and equipment are put into service to the end of the maintenance period.

Maintenance period: The greater of the defects liability period and the period documented.

Faults: Rectify promptly.

Emergencies: Attend emergency calls promptly.

Annual maintenance: Carry out recommended annual maintenance procedures within the four weeks before the end of the maintenance period.

Maintenance program

General: Submit details of maintenance procedures and program, relating to installed plant and equipment, 6 weeks before the date for practical completion. Indicate dates of service visits. State contact telephone numbers of service operators and describe arrangements for emergency calls.

Maintenance records

General: Record in binders provided with the operation and maintenance manuals.

Referenced documents: If referenced documents or technical worksections require that logbooks or records be submitted, include this material in the maintenance records.

Certificates: Include test and approval certificates.

Service visits: Record comments on the functioning of the systems, work carried out, items requiring corrective action, adjustments made and name of service operator. On completion of the visit, obtain the signature of the principal's designated representative on the record of the work undertaken.

Site control

General: Report to the principal's designated representative on arriving at and before leaving the site.

11.2 STATUTORY INSPECTIONS AND MAINTENANCE

General

Duration: From the time systems and equipment are put into service to the end of the maintenance period.

Requirement: Provide inspections and maintenance of safety measures required by the following:

- AS 1851 (2012).
- Other statutory requirements applicable to the work.

Records: Provide mandatory records.

Certification: Certify that mandatory inspections and maintenance have been carried out and that the respective items conform to statutory requirements.

Annual inspection: Perform an annual inspection and maintenance immediately before the end of the maintenance period.

12 SELECTIONS

12.1 PERFORMANCE

Noise level schedule

	A	B	C
Upper limit of noise caused by services			

	A	B	C

12.2 SUBMISSIONS AND INSPECTIONS

Notices schedule

Item	Minimum notice
Disabled access to AS 1428.1	At setting out prior to commencing.
To comply with Certificate of Compliance and Permits	Prior to proceeding past hold points

12.3 TESTS

Tests schedule

Test	Requirements
Plumbing	Comprehensive to ensure full optimal operation
Mechanical	Comprehensive to ensure full optimal operation
Electrical	Comprehensive to ensure full optimal operation
Sealants & fasteners	Comprehensive to ensure full optimal operation

12.4 COMPLETION

Warranty schedule

Warranty	Form	Period

12.5 MAINTENANCE

Maintenance requirements schedule

Provision	Maintenance period (months)	Requirement

0181 ADHESIVES, SEALANTS AND FASTENERS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide adhesives, sealants and fasteners, as documented.

Performance

Requirements: Conform to the following:

- Fitness for purpose: Suitable for particular use, capable of transmitting imposed loads, sufficient to maintain the rigidity of the assembly, or integrity of the joint.
- Finished surface: That will not cause discolouration.
- Compatibility: Compatible with the products to which they are applied.
- Sealant replacement: Capable of safe removal without compromising the application of the replacement sealant for future refurbishment.
- Movement: If an adhered or sealed joint is subject to movement, select a system certified to accommodate the projected movement under the conditions of service.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*

1.3 SUBMISSIONS

Products and materials

Adhesives and sealants: Submit product data sheets.

Type tests: Submit adhesion and compatibility testing data demonstrating that adhesive, sealant or fastener is compatible with materials to be fixed and is suitable for the project conditions.

Samples

Visible joint sealants: Submit colour samples.

Tests

Site tests: Submit results as follows:

- Installed sealant tests;
- Installed fastener tests.

Warranties

Manufacturer's warranty: Submit the manufacturer's published product warranties.

2 PRODUCTS

2.1 ADHESIVES

Standards

Gypsum plaster adhesive: To AS 2753 (2018).

High strength adhesive tape

General description: A foam of cross linked polyethylene or closed cell acrylic coated both sides with a high performance acrylic adhesive system, encased in release liners of paper or polyester.

Product classification: Select tape to suit substrate as follows:

- Firm high strength foam tapes: For high energy surfaces including most bare metals such as stainless steel and aluminium.
- Conformable high strength foam: For the following:
 - . Medium energy surfaces including many plastics, paints and bare metals.

- . Lower energy surfaces including many plastics, most paints and powder coatings, and bare metals.

Thickness: Select the tape to make sure a mismatch between surfaces does not exceed half the tape thickness under the applied lamination pressure.

Total VOC limits

Requirement: Conform to the following maximum limits:

- General purpose adhesives: 50 g/L.
- Structural glazing adhesive, timber flooring and laminate adhesives: 100 g/L.

2.2 SEALANTS**Standards**

General: To ISO 11600 (2002).

External masonry joints

General: Provide sealant and bond breaking materials that are non-staining to masonry. Do not use bituminous materials with absorbent masonry units.

Bond breaking backing:

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed cell or impregnated, not water-absorbing.

Lightweight building element joints

Joints subject to rapid changes of movement: Provide sealants that accommodate the movement of the contact materials.

Floor control joints

General: Provide trafficable sealants.

Bond breaking backing:

- Bond breaking materials: Non-adhesive to sealant, or faced with a non-adhering material.
- Foamed materials: Closed cell or impregnated, not water-absorbing.

Total VOC limits

Requirement: Conform to the following maximum limits:

- General purpose sealants: 50 g/L.
- Acoustic sealants, architectural sealants, waterproofing sealants: 250 g/L.
- Wood flooring and laminate sealant: 100 g/L.

2.3 FASTENERS**General**

Masonry anchors: Proprietary expansion or bonded type anchors, as documented.

Plain washers: To AS 1237.1 (2002).

- Provide washers to the heads and nuts of bolts, and the nuts of coach bolts.

Plugs: Proprietary purpose-made plastic.

Stainless steel fasteners: To ASTM A276/A276M (2023).

Steel nails: To AS 2334 (1980).

- Length: At least 2.5 times the thickness of the member being secured, and at least 4 times the thickness if the member is plywood or building board less than 10 mm thick.

Unified hexagon bolts, screws and nuts: To AS/NZS 2465 (1999).

Fasteners in CCA treated timber: Epoxy coated or stainless steel.

Bolts

Coach bolts: To AS/NZS 1390 (1997).

Hexagon bolts Grades A and B: To AS 1110.1 (2015).

Hexagon bolts Grade C: To AS 1111.1 (2015).

Nuts

Hexagon chamfered thin nuts Grades A and B: To AS 1112.4 (2015).

Hexagon nuts Grade C: To AS 1112.3 (2015).

Hexagon nuts Style 1 Grades A and B: To AS 1112.1 (2015).

Hexagon nuts Style 2 Grades A and B: To AS 1112.2 (2015).

Screws

Coach screws: To AS/NZS 1393 (1996).

Hexagon screws Grades A and B: To AS 1110.2 (2015).

Hexagon screws Grade C: To AS 1111.2 (2015).

Hexagon socket screws: To AS 1420 (2008).

Self-drilling screws: To AS 3566.1 (2002).

Self-tapping screws:

- Cross-recessed countersunk (flat – common head style): To AS/NZS 4407 (2015).
- Cross-recessed pan: To AS/NZS 4406 (2015).
- Cross-recessed raised countersunk (oval): To AS/NZS 4408 (2015).
- Hexagon: To AS/NZS 4402 (2015).
- Hexagon flange: To AS/NZS 4410 (2015).
- Hexagon washer: To AS/NZS 4409 (2015).
- Slotted countersunk (flat – common head style): To AS/NZS 4404 (2015).
- Slotted pan: To AS/NZS 4403 (2015).
- Slotted raised countersunk (oval – common head style): To AS/NZS 4405 (2015).

Blind rivets

Description: Expanding end type with snap mandrel.

Type: Closed end for external application, open end for internal application.

End material:

- Aluminium base alloy for metallic-coated or prepainted steel.
- Stainless steel for stainless steel sheet.
- Copper for copper sheet.

Size:

- For sheet metal to sheet metal: 3 mm.
- For sheet metal to supports, brackets and rolled steel angles: 4.8 mm.

Corrosion resistance

Atmospheric corrosivity category: To 0171 *General requirements*.

Steel products: Conform to the **Corrosion resistance table** or provide proprietary products with metallic and/or organic coatings of equivalent corrosion-resistance.

Corrosion resistance table

Atmospheric corrosivity category to AS 4312 (2019)	Threaded fasteners and anchors		Powder actuated fasteners
	Material	Minimum local metallic coating thickness (µm)	Material
C1 and C2	Electroplated zinc or Hot-dip galvanized	30	Stainless steel Type 316
C3	Hot-dip galvanized	45	Stainless steel Type 316
C4	Stainless steel Type 316	-	Stainless steel Type 316

Note: For categories C5, CX and T to the AS/NZS 2312 series, seek specialist advice.

Finishes

Electroplating:

- Metric thread: To AS 1897 (2016).
- Imperial thread: To AS 4397 (2007).

Galvanizing:

- Threaded fasteners: To AS/NZS 1214 (2016).
- Other fasteners: To AS/NZS 4680 (2006).

Mild steel fasteners: Galvanize if:

- Embedded in masonry.
- In external timbers.
- Exposed to or in air spaces behind the external leaf of masonry walls.
- In contact with chemically treated timber other than CCA treated timber.

Epoxy coated: CCA treated timber.

3 EXECUTION

3.1 ADHESIVES

General

Requirement: Install to the manufacturer's recommendations.

Preparation

Substrates: Conform to the following:

- Remove any deposit or finish that may impair adhesion.
- If framed or discontinuous, provide support members in full lengths without splicing.
- If solid or continuous, remove excessive projections.
- If previously painted, remove cracked or flaking paint and lightly sand the surface.

Contact adhesive

Precautions: Do not use contact adhesive if:

- A substrate is polystyrene foam.
- A PVC substrate may allow plasticiser migration.
- The adhesive solvent can discolour the finished surface.
- Dispersal of the adhesive solvent is impaired.

Two-way method: Immediately after application, press firmly to transfer adhesive and then pull both surfaces apart. Allow to tack off and then reposition and press firmly together. Tap areas in contact with a hammer and padded block.

One-way method: Immediately after application, bring substrates together and maintain maximum surface contact for 24 hours by clamps, nails or screws as appropriate. If highly stressed, employ permanent mechanical fasteners.

High strength adhesive tape

Preparation:

- Non-porous surfaces: Clean with surface cleaning solvents such as isopropyl alcohol/water, wash down and allow to dry.
- Porous surfaces: Prime the surface with a contact adhesive compatible with the tape adhesive system.

Application to copper, brass, plasticised vinyl and hydrophilic surfaces such as glass and ceramics in a high humidity environment: Conform to manufacturer's recommendations.

Applied lamination pressure: Make sure the tape experiences 100 kPa.

Application temperature: Generally above 10°C and to the manufacturer's recommendations.

Completion: Do not apply loads to the assembly for 72 hours at 21°C.

3.2 JOINT SEALING

General

Requirement: Install to the manufacturer's recommendations.

Joint preparation

Cleaning: Cut flush joint surface protrusions and rectify if required. Mechanically clean joint surfaces free of any deposit or finish that may impair adhesion of the sealant. Immediately before sealant application, remove loose particles from the joint, using oil-free compressed air.

Bond breaking: Install bond breaking backing material.

Taping: Protect the surface on each side of the joint using 50 mm wide masking tape or equivalent means. On completion of sealant application, remove the tape and remove any stains or marks from adjacent surfaces.

Primer: Apply the recommended primer to the surfaces in contact with sealant materials.

Sealant joint proportions

General weatherproofing joints (width:depth):

- 1:1 for joint widths less than 12 mm.
- 2:1 for joint widths greater than 12 mm.

Sealant application

General: Apply the sealant to dry joint surfaces using a pneumatic applicator gun. Make sure the sealant completely fills the joint to the required depth, provides good contact with the full depth of the sides of the joint and traps no air in the joint. Do not apply the sealant outside the recommended working time for the material or the primer.

Weather conditions

Two pack polyurethanes: Do not apply the sealant if ambient conditions are outside the following:

- Temperature: Less than 5°C or greater than 40°C.
- Humidity: To the manufacturer's recommendations.

Joint finish

General: Force the sealant into the joint and finish with a smooth, slightly concave surface using a tool designed for the purpose.

Excess sealant: Remove from adjoining surfaces using cleaning material nominated by the sealant manufacturer.

Protection

General: Protect the joint from inclement weather during the setting or curing period of the material.

Rectification

General: Cut out and remove damaged portion of joint sealant and reinstall so repaired area is indistinguishable from undamaged portion.

3.3 FASTENERS

General

Requirement: Install to the manufacturer's recommendations.

Fastening to wood and steel

Timber substrates: To AS 1720.1 (2010) Section 4.

Self-drilling screws: To AS 3566.1 (2002) for timber and steel substrates.

Masonry anchors

Installation: To the manufacturer's recommendations.

4 SELECTIONS

4.1 ADHESIVES

Application schedule

Application	Product	Relevant worksections
Adhesive fixed timber strip flooring and parquetry systems	N/A	0655 Timber flooring
Colourback glass faced wall panels or splashbacks	To approval	0551 Joinery, 0641 Applied wall finishes
Drywall lining/wall panels	To approval	0463 Glass blockwork, 0511 Lining, 0522 Partitions – framed and lined
Multilayered board floors	N/A	0654 Multilayered board flooring
Joinery doors	To approval	0453 Doors and access panels

Application	Product	Relevant worksections
Mirrors	N/A	0467 Glass components
Stainless steel faced wall panels or splashbacks	To approval	0551 Joinery, 0553 Stainless steel benching
Timber joinery fitments	To approval	0551 Joinery
Trim, mouldings, skirtings and architraves	To approval	0511 Lining

4.2 ANCHORS

Bonded anchor schedule

	A	B	C
Adhesive	Refer Structural Engineer		
Base material			
Anchor rod: Diameter (mm)			
Anchor rod: Length (mm)			
Anchor rod: Finish/coating			
Anchor rod: Strength grade			
Anchor rod: Depth of embedment (mm)			
Anchor rod: Part number			
Drill hole: Diameter (mm)			
Drill hole: Depth (mm)			
Tightening torque (Nm)			
Seismic approval			

Expansion anchor schedule

	A	B	C
Anchor name	Refer Structural Engineer		
Part number			
Size			
Base material			
Finish/coating			
Drill hole: Diameter (mm)			
Drill hole: Depth (mm)			
Socket size (mm)			
Tightening torque (Nm)			
Seismic approval			

4.3 SEALING, POINTING AND BEDDING

Application schedule

Application	Product	Relevant worksections
Metal flashings and rainwater goods	Colorbond	0421 Roofing – combined, 0423 Roofing – profiled sheet metal, 0424 Roofing – seamed sheet metal, 0425 Roofing – shingles and shakes, 0426 Roofing – slate, 0427 Roofing – tiles
Metal flashings and sealing non-	Colorbond	0431 Cladding – combined, 0432

Application	Product	Relevant worksections
porous substrates		<i>Curtain walls, 0434 Cladding – flat sheets and panels, 0435 Cladding – planks and weatherboards, 0436 Cladding – profiled and seamed sheet metal</i>
Window and external doors	To approval	<i>0432 Curtain walls, 0451 Windows and glazed doors, 0453 Doors and access panels, 0463 Glass blockwork</i>
Hydraulic services	To approval	<i>0811 Sanitary fixtures, 0812 Tapware, 0813 Water heaters, 0815 Drinking water dispensers</i>

Adhesives, sealants and fasteners combined function schedule

Application	Product	Relevant worksections
Fixing and sealing acoustic ceiling tiles	Documented in relevant worksections	<i>0531 Suspended ceilings – combined</i>
Control joints, tile adhesives and wet area sealants	To approval	<i>0631 Ceramic tiling, 0632 Stone and terrazzo tiling</i>
Timber floor control joints, adhesives and fixings	To approval	<i>0655 Timber flooring, 0654 Multilayered board flooring</i>
Wet area sealants and lightweight detail items	To approval	<i>0525 Cubicle systems, 0551 Joinery, 0811 Sanitary fixtures</i>

4.4 SEALING STRUCTURALLY DESIGNED CONTROL JOINTS

Application schedule

Application	Sealant type	Bond breaking	Sealant colour	Relevant worksection
Masonry control joints	To approval	To approval	To approval	<i>0321 Precast concrete, 0322 Tilt-up concrete, 0331 Brick and block construction, 0332 Stone masonry</i>
Trafficable masonry control joints	To approval	To approval	To approval	<i>0274 Concrete pavement, 0275 Paving – mortar and adhesive bed</i>

0182 FIRE-STOPPING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide fire-stopping, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Service penetration fire-stopping systems: To AS 4072.1 (2005) and BCA (2022) C4D15.

Control/construction joint fire-stopping systems: To AS 4072.1 (2005) and BCA (2022) C4D16.

1.4 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the definitions given in AS 4072.1 (2005) apply.

1.5 SUBMISSIONS**Certification**

General: Submit evidence of conformity with the recommendations of AS 4072.1 (2005) Appendix B.

Certification: Submit a completed statement of compliance and schedule of installed fire-stopped penetrations and control/construction joints.

- Schedule: To AS 4072.1 (2005) Figure B1.
- Statement of compliance: To AS 4072.1 (2005) Figure B2.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

General: Submit the following:

- Evidence that systems conform to documented requirements.
- Copies of relevant manufacturers' instructions.
- Product data sheets (PDS).
- Safety data sheets (SDS), where applicable.

Type tests: Submit type test reports from an Accredited Testing Laboratory as evidence of conformance for each combination of fire-stopping system, application, type of service, substrate, penetration orientation and drawings of tested details. Include for the following:

- Service penetration fire-stopping systems: Fire-resistance tested to AS 1530.4 (2014).
- Fire-stop mortars: Resistance to explosive spalling to AS 1774.36 (2019).
- Control joint fire-stopping systems: Fire-resistance tested to AS 1530.4 (2014).

Samples

Sample panels: Supply a sample panel of each fire-stopping assembly, on representative substrates. If built into the works, identify by marking it as a control sample.

Size: 500 mm run for junction seals and 500 x 500 mm area for penetration seals.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Service penetrations completed and ready for fire-stopping.
- Control/construction joints completed and ready for fire-stopping.
- Finished fire-stopping, before being concealed.
- Authority inspections: in compliance with Certificate of Likely Compliance, Building Permit, and Plumbing Permit.

2 PRODUCTS ---

2.1 MATERIALS

Storage and handling

General: Deliver, unload and store products and accessories in unbroken manufacturer's packaging in a dry, well-ventilated and secure storage area, unaffected by weather.

Shelf life: Use materials that have not exceeded their shelf life.

Control joints

General: To AS 4072.1 (2005) clauses 2.3 and 4.7 and Appendix C.

Toxicity

Toxic materials: Free of asbestos and lead, and free of, nor requiring the use of, toxic solvents.

Toxicity in fire: Non-toxic.

Toxicity before curing: Select products with very limited, or no health hazards, where applicable.

Total VOC limits

Requirement: Conform to the following maximum limits:

- Fire stopping sealants: 250 g/L.

Product certification

Conformance: Address the following:

- Statutory and performance requirements.
- Adequacy of application/installation.

Appointment: In the joint names of the contractor and the principal.

2.2 FIRE-STOPPING PRODUCTS

Fire-stop mortars

Type: Re-enterable cement-based compound, mixed with water. Non-shrinking, moisture resistant. Insoluble in water, after setting.

Formulated compound of incombustible fibres

Material: Formulated compound mixed with mineral fibres, non-shrinking, moisture resistant. Insoluble in water after setting.

Non-combustible mineral fibre stuffing

Material: Mineral fibre stuffing insulation, dry and free of other contaminants.

Standard: To AS/NZS 4859.1 (2018) Section 7.

Intumescent fire pillows

Material: Self-contained self-locking intumescent fire pillows for medium to large openings, where no additional support is required.

Fire-stop composite sheets

Material: Composite system comprised of a number of components, including a fire-resistive elastomeric sheet, bonded on either side with layers of sheet steel and/or steel-wire mesh covered with aluminium foil.

Fire-stop sealants

Material: Elastomeric sealant. Soft, permanently flexible, non-sag, non-shrinking, moisture resistant. Capable of providing a smoke-tight, gas-tight and waterproof seal when properly installed. Insoluble in water after setting.

Fire-stop foams

Material: Single component compound of reactive foam ingredients, non-shrinking, moisture resistant. Insoluble in water after setting.

Fire-stop putty

Material: Single component, mouldable, permanently flexible, non-shrinking, moisture resistant, intumescent compound that conforms to the following:

- Expands on exposure to surface heat gain to form a high-volume thermally insulating char that closes gaps and voids.
- Resists the turbulence of a severe fire.
- Can be placed by hand to form an immediate fire seal.
- Insoluble in water after setting.

Cavity barriers

Cavity barrier: Formed compressible fire-stopping strip.

Intumescent cavity barrier: Formed fire-stopping strip with high expansion intumescent seal.

2.3 COMPONENTS**Fire-stop collars**

Material: Mechanical device with incombustible intumescent fillers covered with sheet steel jacket. Airtight and watertight.

Fire-stop pillows

Material: Formed self-contained compressible flexible mineral fibre in cloth bags, rated to permit frequent changes in service.

Multi-service cable transit box

Material: Mechanical device consisting of a sheet steel sleeve containing heat reactive intumescent polymer, including intumescent seals and smoke rated brushes. The insulation rating can be increased by the incorporation of other fire-stopping products.

Control joint insert – elastomeric foam strip

Material: Elastomeric foam strip laminated with a graphite based intumescent compound on both sides, which is a water resistant seal that expands when exposed to heat.

Accessories

Primer: To approval

Permanent dam material: Non-combustible.

Permanent dam material type: To approval

Metal lath: To approval

Stickers and labels: To **COMPLETION, Labelling**.

Installation accessories: Provide clips, collars, fasteners, stainless steel cable ties, temporary stops and dams, backing rods and other devices required to position, support and contain fire-stopping and accessories.

3 EXECUTION**3.1 PREPARATION****Substrates**

General: Give notice, if substrates or penetrants or both are not suitable for fire-stopping.

Cleaning: Clean substrates of dirt, dust, grease, oil, loose material, and other matter that may affect the bond of fire-stopping products.

Primer: Dry substrates for primers and sealants.

Restraint: Install backing and/or damming materials to arrest liquid material leakage. Remove temporary dams after material has cured.

3.2 INSTALLATION

General

Extent: Fire-stop and smoke-stop interruptions to fire-resistance rated assemblies, materials and components, including penetrations through fire-resisting elements, breaks within fire-resisting elements such as expansion joints, and junctions between fire-resisting elements.

Sequence: Fire-stop after services have been installed through penetrations and properly spaced and supported, after sleeving where appropriate, and after removal of temporary lines, but before restricting access to the penetrations, including before dry lining.

Fire-resistance level (FRL): Install products to the manufacturer's recommendations. Install to achieve the documented FRL in accordance with the manufacturer's tested system.

Ventilation: Supply ventilation for non-aqueous solvent-cured materials.

Density: Apply fire-stopping material to a uniform density.

Fire-stopping exposed to view: Finish surfaces to a uniform and level condition.

Cable separation: Maintain cable separation.

Protection: Protect adjacent surfaces from damage arising through installation of fire-stopping. Protect completed fire-stopping from damage arising from other work.

Loose or damaged fire-stopping material: Remove and replace.

Penetrations by pipes and ducts: Allow for thermal movement of the pipes and ducts.

Preventing displacement: Reinforce or support fire-stopping materials with non-combustible materials when:

- The unsupported span of the fire-stopping materials is greater than 100 mm.
- The fire-stopping materials are non-rigid (unless shown to be satisfactory by test).

Environmental management: To the manufacturer's Safety Data Sheets for WHS and environmental management of the materials.

Penetrations: Provide structural support around the opening.

3.3 FIRE-STOPPING SYSTEMS

Control joint insert – elastomeric foam strip

Site conditions: Make sure that the application area is free from dust, oil, solvents or any other foreign substances.

Installation: To the manufacturer's recommendations to completely close and seal the joint.

Fire-stop mortars

Ambient conditions: Do not install below 5°C.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Formulated compound of incombustible fibres

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Non-combustible mineral fibre stuffing

Installation: Install in accordance with a type tested installation to achieve the required FRL.

Completely close and seal the opening.

Fire-stop composite sheets

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Fire-stop sealants

Ambient conditions: Do not store above 32°C. Do not install outside the temperature range recommended by the sealant manufacturer. Do not install when humidity exceeds that recommended by the sealant manufacturer for safe installation.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Fire-stop foams

Ambient conditions: Do not store above 32°C. Do not install below 15°C or above 32°C. Do not apply when temperature of substrate and air is below 15°C. Maintain this minimum temperature before, during and for 3 days after installation.

Installation: Test substrates for adhesion and prime if necessary. Place in layers for homogenous density, filling cavities and spaces to the manufacturer's recommendations. Place sealant to completely seal junctions with adjacent dissimilar materials.

Fire-stop putty

Ambient conditions: Do not install below 5°C. Do not allow the material to freeze.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Fire-stop collars

Installation: To the manufacturer's recommendations.

Fire-stop pillows

Ambient conditions: Do not install in conditions outside the manufacturer's recommendations.

Installation: To the manufacturer's recommendations to completely close and seal the opening.

Cavity barriers

Installation: To the manufacturer's recommendations.

Multi-service cable transit box

Installation: To the manufacturer's recommendations.

3.4 COMPLETION**Cleaning**

Requirement: Clean the finished surfaces and remove spilled and excess fire-stopping materials without damaging other work.

Labelling

Requirement: To the recommendations of AS 4072.1 (2005) Appendix B.

Additional marking: Include the following text in addition to the above: CAUTION – FIRE BARRIER MUST REMAIN SEALED.

Location: Attach labels to cables, conduits, pipes and ducts on both sides of and close to, the control joint or penetration. On large items, provide multiple labels.

Operation and maintenance manuals

General: Include schedules showing type of system installed, fire rating, location, date of installation and inspection requirements.

For fire-stopping systems that are intended to be modified in service, include the manufacturers' data as follows:

- Recommendations for changes in service and reinstallation.
- Recommendations for service use, care and maintenance.
- List of manufacturers and suppliers for replacement parts.

Warranties

Proprietary fire-stopping products and systems: Submit the manufacturer's published product warranties.

4 SELECTIONS**4.1 FIRE-STOPPING PRODUCTS****Fire-stopping materials schedule**

	FS1	FS2	FS3
Proprietary item	To approval		
Material or component			
Elongation/shrinkage (%)			
Potential expansion: minimum (%)			
Adhesion and bond to substrate (kPa)			
Compressive strength (kPa)			
Density (kg/m ³)			
Vapour permeability (ng/Pa/s/m ²)			
Air permeability (L/s/m ²)			
Durability in service (years)			
Surface durability			

	FS1	FS2	FS3
Recycled content (%)			
VOC content (gram/L)			
Colour			

4.2 FIRE-STOPPING SYSTEMS

Fire-stopping systems schedule

	A	B	C
System	To approval		
Substrate			
Penetrants			
Fire-stopping material or component			
FRL (--/--/--)			
Resistance to the incipient spread of fire			

0185 TIMBER PRODUCTS, FINISHES AND TREATMENT

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide timber products with finishes and treatments, as documented.

Performance

Requirements:

- Appropriate for durability and fire-resistance.
- Appropriate surface finish.
- Appropriate certification for the finishing applications.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 *General requirements*.
- 0671 *Painting*.

1.3 STANDARDS**General**

Sawn and milled products:

- Hardwood: To AS 2796.1 (1999).
- Softwood: To AS 4785.1 (2002).

Reconstituted wood based panels:

- Particleboard: To AS 1859.1 (2017).
- Particleboard flooring: To AS/NZS 1860.1 (2017).
- Dry process fibreboard: To AS/NZS 1859.2 (2017).
- Decorative overlaid wood panels: To AS/NZS 1859.3 (2017).
- Wet process fibreboard: To AS/NZS 1859.4 (2018).

Plywood:

- Structural: To AS/NZS 2269.0 (2012).
- Interior: To AS/NZS 2270 (2006).
- Exterior: To AS/NZS 2271 (2004).
- Marine: To AS/NZS 2272 (2006).

Glued laminated timber: To AS/NZS 1328.1 (1998).

Laminated veneer lumber: To AS/NZS 4357.0 (2022).

Timber grading methods:

- Stress graded: To the AS/NZS 1748 series.
- Visually graded F-grade: To AS 2082 (2007) or AS 2858 (2008).

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- LVL: Laminated Veneer Lumber.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 4491 (1997) and the following apply:

- Dry process fibreboard: Panel material with a nominal thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and

pressure, the bond of which is derived from a synthetic adhesive added to the fibres and the panels are manufactured with a forming moisture content less than 20%.

- Particleboard: Panel material manufactured under pressure and heat from particles of wood (wood flakes, strands, chips, shavings, sawdust and similar) and/or lignocellulosic material in particle form (flax shives, hemp hurds, bagasse fragments, rice hulls, wheat straw and similar) with the addition of an adhesive.
- Wet process fibreboard: Panel material with a nominated thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from the felting of the fibres and the panels are manufactured with a forming moisture content greater than 20%.

1.5 SUBMISSIONS

Products and materials

Chain of custody of forest products: Submit the following as evidence of conformity to

CERTIFICATION, Timber source certification:

- Third party certification of supplier's chain of custody management system.
- Formal claim of chain of custody by supplier.

Preservative treatment of timber: Submit a certificate from an independent testing authority to AS/NZS 1604.1 (2021) clause 1.5.3.6. Include details of treatment and a copy of the charge sheet.

Tests: Submit moisture content test results.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Deliver timber products to site in unbroken wrapping or containers and store so that the moisture content is not adversely affected.

Product identification

Preservative treated timber: Marking to AS/NZS 1604.1 (2021) clause 1.5.3 and including the following:

- A unique identifier for the treatment plant.
- A unique identifier for the preservative.
- Hazard class.

2.2 CERTIFICATION

Timber source certification

Requirement: Use timber products originating from sustainably managed forests.

Engineered timber product certification and identification

Branding: Brand timber products under the authority of a certification scheme applicable to the product. Locate the brand on faces or edges that will be concealed in the works.

2.3 FIRE-RESISTANCE

General

Structural timber: To AS/NZS 1720.4 (2019) or alternative conforming to NCC (2022) A5G3.

Bushfire-prone areas

Standard: To AS 3959 (2018).

2.4 DURABILITY

General

Requirement: Provide timbers with natural durability appropriate to the conditions of use, or preservative-treated timber of equivalent durability.

Natural durability class: To AS 5604 (2022).

Naturally termite-resistant timbers: To AS 3660.1 (2014) Appendix C.

Timber quality: Free of core wood (material within 50 mm of the tree's centre) and free of splits, checks, loose knots and cavities. Free of sapwood (lighter coloured wood found on the outer layer of the tree).

Lyctid susceptible timbers: To AS 5604 (2022). Do not provide untreated timbers containing lyctid susceptible sapwood.

Untreated sapwood: Do not use in applications requiring treated timber or natural durability.

Preservative treatment

Wood-based products: To AS/NZS 1604.1 (2021) or preservative treated products conforming to NCC (2022) A5G3.

Verification requirements: To AS/NZS 1604.2 (2021).

Test methods: To AS/NZS 1604.3 (2021).

Moisture content

Test: Methods as follows:

- Timber and glued laminated timber products: To AS/NZS 1080.1 (2012).
- Plywood and LVL: To AS/NZS 2098.1 (2006).
- Reconstituted wood-based products: To AS/NZS 4266.1 (2017).

Protection: Protect timber and timber products stored on site from moisture and weather. For milled, prefinished, prefabricated and similar elements that are to be protected in the final structure, provide temporary weather protection until the permanent covering is in place.

2.5 FINISHING

Production finish

Glued laminated timber: To AS/NZS 1328.1 (1998).

Hardwood: To AS 2796.1 (1999) Table B1.

Plywood: To AS/NZS 2269.0 (2012), AS/NZS 2270 (2006), AS/NZS 2271 (2004) and AS/NZS 2272 (2006).

Softwood: To AS 4785.1 (2002) Table B1.

Surface finish: To approval

Edge detail: To approval

Surface coating

Painting and staining: To *0671 Painting*.

Water-repellent treatment: To approval

Application: To the manufacturer's specification.

2.6 RECYCLED TIMBER

General

Grit blasted or re-machined: Remove all nails and screws.

Classification: Visually graded.

3 EXECUTION

3.1 JOINTS

General

Joints and connections: Use hot-dipped galvanized or stainless steel fasteners, composite bolts, nails or nailed metal connectors.

Timber-to-timber interfaces: To the manufacturer's recommendations and the following:

- Provide a seal coating of preservative treatment.
- Make sure the inside of bolt holes and the end grains of the timber are coated.

Water retention: Avoid details that may trap water including housing or birdsmouth joints.

Fasteners: To prevent chemical treatments reacting with fasteners, install to manufacturer's recommendations.

3.2 SHRINKAGE RESTRAINT

General

Requirement: If possible, use seasoned timber, particularly where timber elements are integrated with steel and/or concrete.

Moisture content: Maintain a timber moisture content near the anticipated in-service equilibrium moisture content.

Fasteners: Where possible, align fasteners along member axis.

Connections: Use connections that allow for movement without adversely affecting the performance of the connection.

Unseasoned timber: Provide as follows:

- Drill bolt holes 2 mm or 10% larger than the bolt diameter.
- Use species with similar shrinkage values to reduce movement and shrinkage.
- Provide adequate clearance between unseasoned timber framing, and interfacing structures and materials to allow for movement.

3.3 FINISHING

Ploughing

General: Back plough boards liable to warp (e.g. if exposed externally on one face). Make the width, depth and distribution of ploughs appropriate to the dimensions of the board and degree of exposure.

Painting

Edges: Chamfer edges of work to receive paint or similar coatings.

Priming: For woodwork to be painted, prime hidden surfaces before assembly.

4 SELECTIONS

4.1 PRODUCT SCHEDULES

Preservative treatment schedule

	A	B	C
Timber product application	To approval		
Hazard class to AS/NZS 1604.1 (2021)			
Species	Refer to Structural Engineer		
Natural durability class to AS 5604 (2022)			
Preservative treatment	To approval		

0191 SUNDRY ITEMS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide sundry items, as documented.

Performance

Requirements: Installation as follows:

- Undamaged and free of surface defects or distortions.
- Correctly located and aligned, plumb, level and straight.
- Fixed firmly in position.
- Connected to the nominated service(s).

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 SUBMISSIONS

Certification

Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants with items and substrates.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Samples

Samples required: [complete/delete]

Labelling: Label each sample, giving the brand and product name, manufacturer's code reference, date of manufacture and intended building location.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, showing the following:

- Details of fabrication and components.
- Details of fabrication involving other trades or components.
- Information necessary for site assembly.
- Proposals for the break-up of large items as required for delivery to the site.
- Proposed method of joining the modules of large items.
- Fixing locations and types.

Requirement: Submit shop drawings for the following:

- Item A: [complete/delete]

Tests

Requirement: Submit completion test results.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Set-out of item locations before fixing.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Deliver, unload and store components and accessories in unbroken manufacturer's packaging.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Prepare the substrate to receive the item.

Protection

General: Protect existing work from damage during the installation and rectify any damage. Provide temporary coverings if required.

3.2 INSTALLATION

Accessories and trim

Requirement: Provide accessories and trim necessary to complete the installation.

3.3 TESTING

Completion tests

Item A: [complete/delete]

3.4 COMMISSIONING

General

Requirement: Provide commissioning to *0171 General requirements* for the following:

- Item A: [complete/delete]

3.5 COMPLETION

Cleaning

Requirement: Remove packaging. Clean the completed assembly and surrounds. Wipe down appliances and fittings with a damp, soft, clean cloth.

Operation and maintenance manuals

Requirement: Prepare a maintenance manual and, if required, an operation manual with the technical specification and manufacturer's recommendations for the item to be installed.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and the installer.

Item: [complete/delete]

Warranty terms: [complete/delete]

4 SELECTIONS

4.1 ITEMS NOT CONNECTED TO SERVICES

Item A

Proprietary item: [complete/delete]

Standard: [complete/delete]

Location: [complete/delete]

Item identification code: [complete/delete]

Procurement arrangement: [complete/delete]

Material: [complete/delete]

Finish: [complete/delete]
Colour: [complete/delete]
Mounting height: [complete/delete]
Fixing: [complete/delete]
Accessories: [complete/delete]

4.2 ITEMS CONNECTED TO HYDRAULIC SERVICES

Item A

Proprietary item: [complete/delete]
Standard: [complete/delete]
Location: [complete/delete]
Item identification code: [complete/delete]
Procurement arrangement: [complete/delete]
Material: [complete/delete]
Finish: [complete/delete]
Colour: [complete/delete]
Mounting height: [complete/delete]
Fixing: [complete/delete]
Accessories: [complete/delete]
Services connections: [complete/delete]

4.3 ITEMS CONNECTED TO ELECTRICAL SERVICES

Item A

Proprietary item: [complete/delete]
Standard: [complete/delete]
Location: [complete/delete]
Item identification code: [complete/delete]
Procurement arrangement: [complete/delete]
Material: [complete/delete]
Finish: [complete/delete]
Colour: [complete/delete]
Mounting height: [complete/delete]
Fixing: [complete/delete]
Accessories: [complete/delete]
Services connections: [complete/delete]

0193 BUILDING ACCESS SAFETY SYSTEMS
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1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide building access safety systems, as documented.

Performance

Roofing and cladding: Maintain waterproofing integrity without damage or distortion. Maintain the structural integrity of the supporting elements.

1.2 DESIGN**General**

Designer: TBC

Requirements

General: To DESIGN in *0171 General requirements*.

Responsibility: Contractor

Performance requirements: To NCC2022 and Australian Standards

Authority requirements: To approval of Holdfast Building Surveyors and Sorell Council.

Access: Provide a system for three workers at any one time, to access the following:

- Full extent of gutters.
- Roof mounted plant and equipment.
- Roof areas within 2.5 m of fall hazards not otherwise protected by parapets or guard rails.
- External facade areas including glazing.
- External lighting.
- Aerials and telecommunications equipment.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *0171 General requirements*.

1.4 STANDARDS**General**

Personal equipment for working at height: To AS/NZS 1891.1 (2020), AS/NZS 1891.2 (2001), AS 1891.3 (2020), AS/NZS 1891.4 (2009) and AS 1891.5 (2020).

Rope access system: To AS/NZS 4488.1 (1997), AS/NZS ISO 22846.1 (2020) and AS/NZS ISO 22846.2 (2020).

1.5 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviation applies:

- PPE: Personal protective equipment.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 1891.1 (2020), AS/NZS 5532 (2013) and AS/NZS ISO 22846.1 (2020) apply.

1.6 SUBMISSIONS**Certification**

General: Submit certification of installed system.

Design documentation

General: To *0171 General requirements* and the following:

- Calculations: Submit calculations by a professional engineer experienced in building access safety systems.
- Certification: Submit certification by a professional engineer experienced in building access safety systems design as evidence of conformance to documented requirements.
- Drawings: Submit the following drawings:
 - . Layout of anchors and system components in plan and elevation.
 - . Proposed methods of fixing to each substrate type in the building.
- Safe work method statement (SWMS) for the designed system.

Marking and labelling

Requirement: Samples and schedules of proposed marking and labels for each system component.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit manufacturer's data including the following:

- Product data sheets.
- Installation and maintenance recommendations.

Type tests: Submit results, as follows:

- Personal equipment for working at height.
- Rope access systems.
- Fixed ladders.
- Single point anchors.

Samples

Samples required: prior to installation.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers as recommended by the manufacturer.

Tests

Site tests: Submit results of proof load tests of drilled-in anchors.

Warranties

Requirement: For each type of building access safety system, submit warranties to **COMPLETION**, **Warranties**.

1.7 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Shop fabricated or assembled items ready for delivery to the site.
- Commencement of shop or site welding.
- All equipment attachments with concealed fixings, before they are covered.
- Site erected assemblies on completion of erection, before applying finishes.
- Steel surfaces prepared for, and immediately before, site applied finishes.

Installation inspector: Registered height safety inspector or engineer.

2 PRODUCTS**2.1 GENERAL****Product identification**

General: Marked to show the following:

- Manufacturer's identification.
- Installer's contact details.
- Intended location.
- Load rating and direction.

- Current inspection/service date.
- Batch number or serial number of the components.

2.2 FALL PROTECTION SYSTEMS

Access safety system

System: To approval.

Anchors

Single point anchors: To AS/NZS 5532 (2013).

Vertical lifeline and ladder systems

Product: Vertical rail systems including cables, fixed ladders, guides and fall arrestor trolleys.

Fixed ladders: To AS 1657 (2018).

Personal protective equipment (PPE)

Harness: Supply two full body harnesses to AS/NZS 1891.1 (2020) with shock absorbing lanyards to AS 1891.5 (2020).

Storage: PPE storage holdall supplied by the manufacturer.

Tests

Personal equipment for working at height: Tested as follows:

- Harnesses: To AS/NZS 1891.1 (2020) Section 4.
- Horizontal lifeline and rail systems: To AS/NZS 1891.2 (2001).
- Lanyard assemblies and pole straps: To AS 1891.5 (2020) clause 3.4.

Rope access systems:

- Rope grabs and descenders: Static load test to AS/NZS 4488.1 (1997) Appendix A.
- Back-up type rope grabs and descenders: Dynamic load and performance test to AS/NZS 4488.1 (1997) Appendix B.

3 EXECUTION

3.1 INSTALLATION

Standards

Personal equipment for working at height: To the AS/NZS 1891 series.

Rope access systems: to AS/NZS 4488.1 (1997).

Subcontractor

Installer: Registered installer, approved by the manufacturer.

Labels and signage

General: To AS/NZS 1891.4 (2009) clause 2.2.9.

3.2 TESTING

Proof load test for anchors

Drilled-in anchors: Load test drilled-in anchors used in shear and not in axial tension (direct pull-out) before use.

3.3 TRAINING

General

Responsibilities: Coordinate the training of owner's facilities management personnel in conformance with *0171 General requirements*.

Training records: Video record all training sessions. Catalogue and include recordings with the operation and maintenance manuals.

Additional training: [\[complete/delete\]](#)

3.4 COMPLETION

Reinstatement

Extent: Repair or replace damage to the roofing and rainwater system. If the work cannot be repaired satisfactorily, replace the whole area affected.

Touch up: If it is necessary to touch up minor damage to prepainted metal roofing, do not overspray onto undamaged surfaces.

Cleaning

Roofing and rainwater drainage system: Remove debris, metal swarf, solder, sealants and unused materials.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the following:

- Limitations of the system.
- Operation procedures and methods.
- PPE user manuals.
- Care and maintenance requirements.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and the installer.

3.5 MAINTENANCE**General**

Preventative and mandatory system maintenance: By an Accredited Height Safety Inspector/Certifier, in conformance with AS/NZS 1891.4 (2009) Section 9 and manufacturer's maintenance/recertification recommendations.

Checklist for all inspections: To AS/NZS 1891.2 Supp 1 (2001) Table 8, and AS/NZS 1891.4 (2009) Section 9 and Appendices C and D.

The installer/competent person: To AS/NZS 1891.4 (2009) clause 1.4.2.

Regular scheduled periodic inspections

Standard: To AS/NZS 1891.4 (2009) Section 9.

Completion certificate:

- Provide inspection, testing and certification by an Accredited Installer and/or Accredited Height Safety Inspector:
 - . Upon completion of the installation at the date for practical completion.
 - . Upon the expiry of the defects liability period or 12 months after completion of the installation, whichever is the lesser, and valid for a further 12 months period.
- Record the date of the next system inspection and period of validity and display the certificate at the access points of the work area or on the individual system components where provision is made.

Inspection after a fall or other event

Standard: To AS/NZS 1891.4 (2009) clause 9.5.

Ongoing maintenance

Certificate: Submit the completion certificates and notify the proprietor of the requirement for continued interval testing.

4 SELECTIONS

4.1 FALL PROTECTION SYSTEMS**General**

Type: to approval, NCC2022, and relevant Australian Standards.

Harness gear and ancillary equipment

Harness type: to approval, NCC2022, and relevant Australian Standards.

Accessories: to approval, NCC2022, and relevant Australian Standards.

Horizontal lifelines and rail systems

Product: to approval, NCC2022, and relevant Australian Standards.

Accessories: to approval, NCC2022, and relevant Australian Standards.

Overhead rail systems

Product: to approval, NCC2022, and relevant Australian Standards.

Accessories: to approval, NCC2022, and relevant Australian Standards.

Inertia reels

Product: to approval, NCC2022, and relevant Australian Standards.

Accessories: to approval, NCC2022, and relevant Australian Standards.

Anchorage device

Product: to approval, NCC2022, and relevant Australian Standards.

Roof anchorage system: to approval, NCC2022, and relevant Australian Standards.

Roof anchor fixing: to approval, NCC2022, and relevant Australian Standards.

Roof anchor flashing: to approval, NCC2022, and relevant Australian Standards.

Vertical lifeline and ladder system

Proprietary access ladder: to approval, NCC2022, and relevant Australian Standards.

- Vertical safety system: to approval, NCC2022, and relevant Australian Standards.
- Cage: to approval, NCC2022, and relevant Australian Standards.
- Rest platform: to approval, NCC2022, and relevant Australian Standards.

Permanent ladder eaves bracket: to approval, NCC2022, and relevant Australian Standards.

Anchor mounting system: to approval, NCC2022, and relevant Australian Standards.

Intermediate wire guide spacing: to approval, NCC2022, and relevant Australian Standards.

0194P RAVEN DOOR SEALS AND WINDOW SEALS
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1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide RAVEN door seals and window seals, as documented.

Performance

Handling: Before supply, verify on site, the correct handling of hardware items.

Operation: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

1.2 PERFORMANCE**Bushfire-prone areas**

Bushfire Attack Level (BAL): To AS 3959 (2018).

1.3 COMPANY CONTACTS**RAVEN technical contacts**

Website: www.raven.com.au.

1.4 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.5 STANDARDS**Seals general**

Quality management for manufacture: To ISO 9001 (2015).

Acoustic applications: Tested to AS 1191 (2002) or EN ISO 10140-2 (2021) and rated to AS/NZS ISO 717.1 (2004).

Fire door assemblies: To AS 1530.4 (2014) and AS 1905.1 (2015).

Smoke door assemblies: To BCA (2022) Spec 12, tested to AS 1530.7 (2007) and rated to AS 6905 (2007), and tested to EN 1634-3 (2004).

Combined fire and smoke door assemblies: To BCA (2022) Spec 12, AS 1530.4 (2014), AS 1905.1 (2015), AS 1530.7 (2007) and AS 3959 (2018) for weather seals providing BAL-FZ.

Buildings in bushfire-prone areas: To AS 3959 (2018):

- BAL-40: Flame retardant silicon, PVC and TPE weather seals with a Flammability Index not more than 5 when tested to AS 1530.2 (1993).
- BAL-FZ: Approved door seals for use with fire doorsets tested to AS 1530.4 (2014).

Weather and energy saving seals for proprietary windows and door assemblies: To AS 4420.1 (2016) clause 5 and clause 6, and AS 2047 (2014).

Door bottom and perimeter seals for glazed external doors: To AS 2047 (2014).

Threshold plates: To the NCC cited AS 1428.1 (2009).

1.6 MANUFACTURER'S DOCUMENTS**Technical manuals**

Website: www.raven.com.au.

1.7 INTERPRETATION**Abbreviations and definitions**

General: For the purposes of this worksection the following abbreviations and definitions apply:

Ordering abbreviations:

- Al: Aluminium.

- C/A: Clear anodised (15 µm for door bottom seals and perimeter seals, 25 µm for threshold plates).
- B/A: Bronze anodised (15 µm for door bottom seals and perimeter seals, 25 µm for threshold plates).
- B/K: Black anodised (15 µm for door bottom seals and perimeter seals, 25 µm for threshold plates).
- EPDM: Ethylene Propylene Diene Monomer.
- PE: Painted Polyester Enamel finish (special order and extra cost).
- PVC: Polyvinyl Chloride.
- Si: Silicone Rubber.
- TPE: Thermoplastic Elastomer.

1.8 SUBMISSIONS

Samples

Particular samples required: prior to installation.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 MATERIALS

Aluminium

Material: Commercial grade alloy 6060, 6061 or 6063 with T5 or T6 temper.

Finish to visible extrusions:

- Satin clear, bright gold, bronze or black anodised, or as documented.
- Anodising thickness:
 - . Perimeter seal extrusions: Minimum 15 µm.
 - . Threshold plates and threshold plate seals: Minimum 25 µm.

PVC

RAVEN proprietary grade PVC extrusions:

- Highest quality available.
- Added UV inhibitors where exposed to sunlight.
- Self-extinguishing grade.
- Antimicrobial additive.
- Service temperature -5°C to +70°C.

Si

RAVEN proprietary grade silicon rubber extrusions:

- Are unique and where designated (SE) are self-extinguishing.
- Added UV inhibitors.
- Antimicrobial additive.
- Service temperature of -60°C to +230°C.

TPE

RAVEN proprietary grade TPE extrusions:

- Highest quality available.
- Added UV inhibitors.
- Flammability Index less than 5 to AS 1530.2 (1993) where indicated for bushfire-prone areas.
- Service temperature -40°C to +100°C.

EPDM

RAVEN proprietary grade closed cell EPDM rubber extrusions:

- Highest quality available as developed by the automotive industry.
- Added UV inhibitors.
- Classified SE/B self-extinguishing burn rate to SAE J 369 (2019), and ISO 3795 (1989).
- Service temperature -40°C to +70°C.

3 EXECUTION

3.1 INSTALLATION

Handing

Requirement: Match door seals to the handing of doors.

Supply

Factory fit and retrofit: Deliver door seals for door perimeter seals and door bottom seals in complete sets for each door, ready for installation.

Identification: Mark packaging with relevant floor level and door location number.

Packaging: For rigid length seals, provide recyclable cartons and recyclable polyethylene with fixings and fitting instructions.

Off-site installation to proprietary window and door assemblies: Supply RAVEN TPE and silicon rubber weather stripping on bulk reels.

Door assemblies

Modification: Rebate and groove door assemblies to suit the dimensions recommended by RAVEN.

Fitting instructions: Conform to RAVEN's fitting instructions, supplied with each product.

Fixing

Fasteners:

- Unexposed applications: Zinc-plated self-tapping fasteners supplied by RAVEN with each product.
- External coastal exposure applications: Substitute the standard fasteners supplied with equivalent stainless steel fasteners.

Backset: Allow backset clearances as required for hinging, latching and automatic closers.

Proprietary aluminium door/window frames: Select the fixing options to suit the documented RAVEN perimeter/frame seals.

3.2 COMPLETION

Warranties

Requirement: manufacturer and installation.

4 SELECTIONS

4.1 SELECTING A SEALING SYSTEM DUTY LEVEL

Sealing System Duty Level guide

SYSTEM DUTY LEVEL	Building/Room type	Suggested sealing systems	
		Single door	Double doors
LIGHT DUTY (Residential)	Apartments Bedrooms/sleeping areas	RP120 + RP60	RP120 + RP123 + RP510
Generally used in residential and light traffic areas, such as Class 1 to 4 buildings.	Guest house rooms Living areas	RP113 + RP3	RP520 + RP4 +

SYSTEM DUTY LEVEL	Building/Room type	Suggested sealing systems	
		Single door	Double doors
			RP150
MEDIUM DUTY (Commercial / Light industrial) Generally used in commercial and medium traffic areas, such as Class 3 to 6 buildings.	Art studios Auditoriums Bars and lounges Board rooms Boarding house rooms Cafés Car parks Cinemas/home theatres Classrooms Computer rooms Consulting rooms Control rooms Convention centres Corridors / lobbies Drama studios Executive offices Film or television studios Gyms Hotel rooms/motel rooms Laboratories Libraries Meeting rooms Music practice/studio rooms Offices Places of worship University tutorial rooms/lecture theatres	RP78Si + RP8Si RP94Si + RP127Si RP10Si + RP38Si	RP78Si + RP8Si + RP71Si RP94Si + RP127Si + RP16Si RP10Si + RP126Si + RP16Si
HEAVY DUTY (Heavy Commercial / Public / Industrial) Generally used in heavy pedestrian and wheeled traffic areas, such as Class 5 to 10 buildings.	Airports Court rooms Delivery suites Factories Food courts Government and defence rooms/buildings High security rooms Intensive care wards Music recording studios Prisons Recovery rooms Utility rooms Shopping malls/supermarkets Sound stages	RP10Si + RP38Si RP87Si + RP70Si RP24Si + RP70Si	RP10Si + RP38Si + RP16Si RP87Si + RP70Si + RP16Si RP24Si + RP70Si + RP37

4.2 NOISE – ACOUSTIC

R_w 30 to R_w 33 acoustic sealing system schedule

R _w	Raven acoustic sealing systems	Refer to the categories in the Raven Acoustic Sealing System Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
30	RP78Si + RP8Si	R _w 30 to R _w 33 Acoustic Sealing Systems	Butt	Single	35	M	
	RP78Si + RP35Si		Butt	Single	35	M	
	RP10 / RP10Si + RP99Si		Butt	Single	35	H	
	RP10Si + RP8Si		Butt	Single	40	M	
	RP94Si + RP8Si		Butt	Single	44	M	
	RP94Si + RP99Si		Butt	Single	44	M	
	RP10Si + RP126Si + RP16Si		Butt	Double	45	H	
	RP10Si + RP128Si + RP71Si		Butt	Double	45	H	
	RP24 + RP38 + RP71		Butt	Double	45	H	
	RP24Si + RP38Si + RP16Si		Butt	Double	45	H	
	RP44Si + RP127Si + RP71Si		Butt	Double	45	M	
	RP84Si + RP126Si + RP16Si		Butt	Double	45	H	
	RP84Si + RP128Si + RP71Si		Butt	Double	45	H	
	RP84Si + RP8Si + RP71		Butt	Double	45	M	
	RP87HSi + RP126Si + RP16Si		Butt	Double	45	H	
31	RP120 + RP8Si		Butt	Single	44	M	
	RP84Si + RP127Si + RP71Si		Butt	Double	45	H	

R _w	Raven acoustic sealing systems	Refer to the categories in the Raven Acoustic Sealing System Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
32	RP10 / RP10Si + RP99Si		Butt	Single	44	H	
	RP10 / RP10Si + RP99Si		Butt	Single	44	H	
	RP10 / RP10Si + RP99Si + RP16Si		Butt	Double	44	H	
	RP10 / RP10Si + RP99Si + RP71Si		Butt	Double	44	H	
	RP10 / RP10Si + RP99Si + RP85		Butt	Double	44	H	
	RP24 + RP38		Butt	Single	44	H	
	RP24 + RP70		Butt	Single	44	H	
	RP47Si + RP38		Butt	Single	44	H	
	RP47Si + RP70		Butt	Single	44	H	
	RP93Si + RP99Si		Butt	Single	44	M	
	RP120 + RP38		Butt	Single	44	M	
	RP10Si + RP127Si		Butt	Single	48	H	
33*	RP78Si + RP8Si		Butt	Single	40	M	

Note: (*) Door Assembly R_w ratings above R_w32 require acoustically constructed door leaves.

R_w 34 to R_w 40 acoustic sealing system schedule

R _w	Raven acoustic sealing systems	Refer to the categories in the Raven Acoustic Sealing System Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
34*	RP78Si + RP530 +	R _w 34 to R _w 40 Acoustic	Butt	Single	50	M	

R _w	Raven acoustic sealing systems	Refer to the categories in the Raven Acoustic Sealing System Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
	RP70	Sealing System					
36*	RP78Si + RP124 + RP8Si		Butt	Single	35	M	
	RP120 + RP520 + RP8Si + RP99Si		Butt	Single	44	M	
	RP10Si + RP127Si		Butt	Single	68	H	
37*	RP78Si + RP8Si		Butt	Single	35	M	
	RP10Si + RP128Si		Butt	Single	35	H	
	RP24Si + RP38Si		Butt	Single	35	H	
	RP120 + RP520 + RP38 + RP99Si		Butt	Single	44	M	
	RP24Si + RP127Si + RP126Si		Butt	Single	48	H	
38*	RP120 + RP127Si		Butt	Single	48	M	
	RP78Si + RP530 + RP70 + RP117Si		Butt	Single	53	M	
39*	RP78Si + RP120 + RP70		Butt	Single	53	M	
40*	RP124 + RP127Si		Butt	Single	48	M	
Note: (*) Door Assembly R _w ratings above R _w 32 require acoustically constructed door leaves.							

R_w 41 to R_w 50 acoustic sealing system schedule

R _w	Raven acoustic sealing systems	Refer to the categories in the Raven Acoustic Sealing System Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
41*	RP78Si +	R _w 41 to R _w	Butt	Double	54	M	

R _w	Raven acoustic sealing systems	Refer to the categories in the Raven Acoustic Sealing System Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
	RP530 + RP38 + RP16Si	50 Acoustic Sealing Systems					
42*	RP10Si + RP124 + RP8Si + RP128Si		Butt	Single	35	H	
	RP24Si + RP124 + RP8Si + RP38Si		Butt	Single	35	H	
	RP87Si + RP124 + RP8Si + RP128Si		Butt	Single	35	H	
	RP10Si + RP124 + RP127Si		Butt	Single	68	H	
	RP24Si + RP127Si + RP126Si		Butt	Single	68	H	
43*	RP78Si + RP124 + RP8Si + RP128Si		Butt	Single	35	M	
	RP10Si + RP124 + RP8Si + RP128Si		Butt	Single	35	H	
	RP10Si + RP124 + RP127Si		Butt	Single	48	H	
45*	RP10Si + RP124 + RP127Si + RP126Si		Butt	Single	48	H	
	RP78Si + RP120 + RP70 + RP120 + RP71 + RP393Si		Butt	Double	54	M	
	RP24Si + RP124 + RP127Si +		Butt	Single	68	H	

R_w	Raven acoustic sealing systems	Refer to the categories in the Raven Acoustic Sealing System Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
	RP126Si						
46*	RP78Si + RP120 + RP2004F + RP8Si		Butt	Double	60	M	
	RP85 + RP124 + RP127Si + RP126Si		Butt	Single	68	H	
47*	RP78Si + RP120 + RP70 + RP71 + RP393Si		Butt	Single	54	M	
49*	RP78Si + RP120 + RP2004F + RP8Si + RP71 + RP393Si		Butt	Double	60	M	

Note: (*) Door Assembly R_w ratings above R_w32 require acoustically constructed door leaves.

Other acoustic sealing system schedule

R_w	Raven acoustic sealing systems	Refer to the categories in the Raven Architectural Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
30	RP47Si + RP47Si	Noise-Acoustic-Sealing System (Bulkhead, Interconnecting, Sliding, Pivot)	Broad butt	Single	35	H	
	RP118Si + RP71Si + RP117Si		Broad butt	Double	45	M	
31	RP84Si + RP51F + RP52F		Sliding	Single	35	M	
	RP93Si + RP71Si + RP97Si		Broad butt	Double	45	M	
	RP118Si + RP8Si + RP16Si		Broad butt	Double	45	M	
32	RP47Si + RP47Si		Broad butt	Single	44	H	
34*	RP10Si +		Sliding	Single	35	M	

R _w	Raven acoustic sealing systems	Refer to the categories in the Raven Architectural Catalogue	Door			System Duty level	Door No.
			Hinge	Configuration	Thickness (mm)		
	RP51F + RP52F						
35*	RP71Si + RP71Si + RP96		Pivot	Single	50	M	
38*	RP94Si + RP8Si		Broad butt	Interconnecting	40	M	
44*	RP530 + RP70		Broad butt	Interconnecting	50	M	
52*	RP78Si + RP120 + RP70 + RP71 + RP393Si		Broad butt	Interconnecting	54	M	

Note: (*) Door Assembly R_w ratings above R_w32 require acoustically constructed door leaves.

4.3 SMOKE DOORS

Smoke sealing system schedule

RAVEN smoke sealing system	Refer to the categories in the Raven Architectural Catalogue	Door			System Duty level	Door No.
		Hinge	Configuration	Thickness (mm)		
RP120 + RP8Si + RP120	Smoke Door Sealing Systems (Tested & Certified on Solid Core Doors)	Butt	Single	35+	M	
RP78Si + RP8Si		Butt	Single	35+	M	
RP78Si + RP38Si		Butt	Single	35+	M	
RP78Si + RP35Si		Butt	Single	35+	M	
RP78Si + RP128Si		Butt	Single	35+	M	
RP124 + RP128Si		Butt	Single	35+	M	
RP124 + RP126Si		Butt	Single	35+	M	
RP124 + RP127Si		Butt	Single	40+	M	
RP23 + RP8Si		Butt	Single	35+	M	
RP24Si + RP38Si		Butt	Single	40+	H	
RP87Si + RP126Si		Butt	Single	40+	H	
RP78Si + RP38Si + RP16Si		Butt	Double	40+	M	

RAVEN smoke sealing system	Refer to the categories in the Raven Architectural Catalogue	Door			System Duty level	Door No.
		Hinge	Configuration	Thickness (mm)		
RP120 + RP8Si + RP120		Butt	Double	40+	M	
RP150 + RP8Si + RP150		Butt	Double	40+	M	
RP124 + RP35Si + RP71Si		Butt	Double	40+	M	
RP130Si + RP129F + RP130Si + RP115 threshold plate		Pivot double acting	Double	40+	H	

Smoke sealing system schedule - fire engineered alternative solution tested to AS 1530.7 (2007)

RAVEN smoke sealing system	Refer to the categories in the Raven Architectural Catalogue	Door			System Duty level	Door No.
		Hinge	Configuration	Thickness (mm)		
RP120 + RP8Si	Smoke Door Sealing Systems (Fire Engineered – Performance Solutions)	Butt	Single	35+	M	
RP670 + RP8Si		Butt	Single	35+	M	
RP124 + RP35Si		Butt	Single	35+	M	
RP76Si + RP8Si		Butt	Single	35+	M	
RP78Si + RP38Si + RP16Si		Butt	Double	46+	M	
RP124 + RP8Si + RP16Si		Butt	Double	40+	M	
RP150 + RP126Si + RP150		Butt	Double	40+	M	
RP130Si + RP129F + RP130Si + RP115 threshold plate		Pivot double acting	Double	40+	H	

4.4 FIRE DOORS

Combined smoke and acoustic sealing system schedule

RAVEN	Refer to the	Door	System Duty	Door
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smoke sealing system	categories in the Raven Architectural Catalogue	FRL (Fire Rating)	Configuration	Thickness (mm)	level	No.
RP120 + RP8Si	Smoke Sealing Systems (Fire Rated 'Labelled' Doors)	-/120/30 -/180/30	Single/Double	38 47	M	
RP10Si + RP8Si		-/120/30 -/240/30	Single/Double	38 47	M	
RP24Si + RP38Si		-/120/30	Single/Double	47	H	
RP78Si + RP8Si		-/120/30 -/240/30	Single/Double	38 47	M	
RP78Si + RP35Si		-/120/30 -/240/30	Single/Double	38 47	M	
RP78Si + RP38Si		-/120/30 -/240/30	Single/Double	38 47	M	
RP78Si + RP127Si		-/60/30	Single/Double	47	M	
RP93Si + RP99Si		Up to - /240/30	Single/Double	47	M	
RP87Si + RP128Si		-/120/30 -/120/30	Single/Double	38 47	H	
RP94Si + RP126Si		-/120/30	Single/Double	38	M	

Threshold at doorways schedule

RAVEN threshold (plates/ ramps and plate seals)	NCC cited AS 1428.1 (2009) (Design for access and mobility)	Durability ANSI/BHMA A156.21 (2019) designation	Fire door		System Duty level	Door No.
			FRL (fire resistance level)	Configuration		
RP4b	-	J33100	Up to - /240/30	Single/Double	M	
RP13	Yes	J30300	Up to - /240/30	Single/Double	H	
RP19	-	-	Up to - /240/30	Single/Double	H	
RP27	-	J33100	Up to - /240/30	Single/Double	H	
RP28	-	J32130	Up to - /240/30	Single/Double	H	
RP29	-	J32130	Up to - /240/30	Single/Double	H	
RP66	Yes	J32140	Up to - /240/30	Single/Double	H	
RP77	Yes	J38130	Up to - /240/30	Single/Double	H	
RP82	Yes	J32300	Up to - /240/30	Single/Double	H	
RP91	-	J30300	Up to - /240/30	Single/Double	H	
RP95	Yes	J32300	Up to -	Single/Double	H	

RAVEN threshold (plates/ ramps and plate seals)	NCC cited AS 1428.1 (2009) (Design for access and mobility)	Durability ANSI/BHMA A156.21 (2019) designation	Fire door		System Duty level	Door No.
			FRL (fire resistance level)	Configuration		
			/240/30			
RP96	Yes	J32300	Up to - /240/30	Single/Double	H	
RP97Si	Yes	J38130	Up to - /240/30	Single/Double	H	
RP98	Yes	J38130	Up to - /240/30	Single/Double	H	
RP109Si	-	J36100	Up to - /240/30	Single/Double	H	
RP110Si	-	J36100	Up to - /240/30	Single/Double	H	
RP111Si	-	J36100	Up to - /240/30	Single/Double	H	
RP112	Yes	J38130	Up to - /240/30	Single/Double	M	
RP115	Yes	J32130	Up to - /240/30	Single/Double	H	
RP116	Yes	J32130	Up to - /240/30	Single/Double	H	
RP117Si	-	J36100	Up to - /240/30	Single/Double	H	
RP137	Yes	J32130	Up to - /240/30	Single/Double	H	
RP138	Yes	J38130	Up to - /240/30	Single/Double	H	
RP151	Yes	J32130	Up to - /240/30	Single/Double	H	

4.5 BUSHFIRE-PRONE AREAS

Door sealing system schedule

RAVEN bushfire sealing system	Refer to the categories in the Raven Architectural Catalogue	Door configuration Doorsets to AS 3959 (2018) BAL requirements	BAL	Door No.
RP78Si + RP4FZ	Bushfire Sealing Systems (Bushfire Prone Areas)	Butt hinged single	BAL - FX	
RP78Si + RP51Si + RP16Si + RP82		Butt hinged single and double	BAL - 40	
RP600 series - Weather Stripping		Folding doors and windows to AS 3959 (2018)	BAL - 40	
RP600 + RP51Si		Folding doors and windows to AS 3959 (2018)	BAL - 40	
RP41 + RP75 + RP114 + RP91		Panel lift garage door	BAL - 40	
RP75 + RP75		Sliding garage doors	BAL - 40	

Garage door sealing system schedule

Bushfire Attack Level (BAL) to AS 3959 (2018)	Side hung (ember attack) - Perimeter and door bottom seals	Garage doors (ember attack) - roller and sectional overhead doors	Door No.
BAL – LOW Note: There is no further requirement from AS 3959 (2018).	RAVEN weather and energy draught seals	RAVEN Nylon Brush Strip seal with a flammability rating no greater than 5. Includes: RP2a, RP2b, RP41, RP49, RP50, RP51F, RP57, RP58, RP74, RP74F, RP75 at door head and sides where required. Door bottom seal RP4T or RP51Si (if bottom seal not supplied with door). Option: Threshold plate RP91	
BAL 12.5 - BAL 29	RAVEN weather and energy draught seals	RAVEN Nylon Brush Strip seal with a flammability rating no greater than 5. Includes: RP2a, RP2b, RP41, RP49, RP50, RP51F, RP57, RP58, RP74, RP74F, RP75 at door head and sides where required. Door bottom seal RP114 or RP51Si (if bottom seal not supplied with door). Option: Threshold plate RP91	
BAL - 40	RAVEN seals with a flammability index ≤ 5 tested to AS 1530.2 (1993)	RAVEN Nylon Brush Strip seal with a flammability rating no greater than 5. Includes: RP2a, RP2b, RP41, RP49, RP50, RP51F, RP74, RP74F, RP75 at door head and sides where required. Door bottom seal RP4T or RP51Si (if bottom seal not supplied with door). Option: Threshold plate RP91	
BAL - FZ	RAVEN seals tested to AS 1530.4 (2014)	RAVEN Nylon Brush Strip seal includes:	

Bushfire Attack Level (BAL) to AS 3959 (2018)	Side hung (ember attack) - Perimeter and door bottom seals	Garage doors (ember attack) - roller and sectional overhead doors	Door No.
	used with fire-resisting doorsets to AS 1905.1 (2015) and BCA (2022) Spec 12	RP2a, RP2b, RP41, RP49, RP50, RP51F, RP74, RP74F, RP75 at door head and sides where required. Door bottom seal RP4T or RP51Si (if bottom seal not supplied with door). Option: Threshold plate RP91	

4.6 WEATHER AND ENERGY

Weather sealing system schedule

RAVEN weather sealing systems	Refer to the categories in the Raven Architectural Catalogue	Door		System Duty level	Door No
		Hinge	Configuration		
RP78Si + RP4 + RP16Si	Weather and Energy Sealing System (Butt Hinged Doors)	Butt	Timber single and double	M	
RP10 + RP8Si + RP98		Butt	Aluminium - single	H	
RP84Si + RP89 + RP77		Butt	Aluminium - single	M	
RP74F + RP74F + RP52F + RP82		Pivot	Timber single and double	H	
RP130Si + RP129Si + RP130Si + RP115		Pivot	Timber single and double	H	
RP89 + RP89 + RP116		Pivot	Aluminium - single and double	M	
RP74F + RP74F + RP19		Pivot	Aluminium - single and double	H	
RP51F + RP2a		Sliding	Timber	H	
RP51F + RP74F		Sliding	Timber	H	
RP73 + RP17b		Sliding	Timber	L	
RP41 +		Panel lift garage	Metal	H	

RAVEN weather sealing systems	Refer to the categories in the Raven Architectural Catalogue	Door		System Duty level	Door No
		Hinge	Configuration		
RP4T + RP91		door			
RP57 + RP4T + RP91		Roll-up garage door	Metal	H	
RP500 Series Weather Stripping		Folding doors and windows	Timber	H	
RP500 + RP550 + RP73		Folding doors and windows	Timber	H	
RP600 Series Weather Stripping		Folding doors and windows	Timber	H	

4.7 ACCESS AND MOBILITY

Application - thresholds at doorways

RAVEN threshold plates: to AS 1428.1

4.8 HEALTH AND AGED CARE

Acoustic and smoke sealing system schedule

RAVEN sealing system	Refer to the categories in the Raven Architectural Catalogue	Door		System Duty level	Door No.
		Hinge	Configuration		
RP24Si + RP38Si	Health and Aged Care - Sealing System (Butt Hinged Doors)	Butt	Timber single	H	
RP78HSi + RP8Si		Butt	Timber single	M	
RP87HSi + RP126Si		Butt	Timber Single	H	
RP87HSi + RP128Si		Butt	Single	H	
RP84Si + RP126Si + RP71Si		Butt	Timber single and double	M	
RP124 + RP127Si + RP71Si		Butt	Timber single and double	M	
RP71Si + RP71Si + RP71Si + RP96		Pivot	Timber single and double	M	
RP130Si + RP52F + RP130Si		Pivot	Timber single and double	H	

RAVEN sealing system	Refer to the categories in the Raven Architectural Catalogue	Door		System Duty level	Door No.
		Hinge	Configuration		
RP130Si + RP129F + RP130Si		Pivot	Timber single and double	H	
RP130Si + RP129Si + RP130Si + RP96		Pivot	Timber single and double	H	

4.9 CHILDCARE

Anti-finger Jam Seals schedule

RAVEN seals	BS 8613 (2017) Class 1 compliant	Comments	Door		System Duty level	Door No.
			Hinge	Configuration		
RP62	Yes	-	Butt	Timber/Aluminium	H	
RP62 BW	Yes	-	Butt	Timber/Aluminium	H	
RP62 LGBK	Yes	-	Butt	Timber/Aluminium	H	
RP62s	Yes	Used in conjunction with larger RP62 series (as above)	Butt	Timber/Aluminium	H	

0195P DTAC TACTILE INDICATORS AND STAIR EDGINGS
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1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide DTAC tactile indicators, stair nosing and edging, threshold transition strips, urban edge protectors and handrail tactile indicators, as documented.

1.2 COMPANY CONTACTS**DTAC technical contacts**

Website: www.dtac.com.au/contact.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS**General**

Tactile indicators: To AS/NZS 1428.4.1 (2009).

Stair edging: To the NCC cited AS 1428.1 (2009).

Slip resistance

Classification: To AS 4586 (2013).

1.5 MANUFACTURER'S DOCUMENTS**Technical manuals**

DTAC Tactile ground surface indicators (TGSI):

- Warning tactiles: dtac.com.au/product-category/warning-tactiles.
- Directional tactiles: dtac.com.au/product-category/directional-tactiles.
- Integrated tactiles: dtac.com.au/product-category/integrated-tactiles.
- Carpet tactile systems: dtac.com.au/product-category/carpet-tactile-systems.

DTAC PEMKO® Stair treads nosing and edging, threshold transitions and edging strips:

- Stair nosing and edging: dtac.com.au/product-category/stair-nosing-edging.
- Thresholds and transition strips: dtac.com.au/product-category/thresholds-transition-strips.

DTAC Urban edge protectors: www.dtac.com.au/product-category/urban-edge-protectors.

DTAC Handrail tactile indicators (HRTI): www.dtac.com.au/product-category/handrail-tactile-indicators.

1.6 SUBMISSIONS**Products and materials**

Type tests: Submit results, as follows:

- Slip resistance of tactile indicators and edgings to AS 4586 (2013).
- Luminance reflectance of tactile indicators and edgings to AS/NZS 1428.4.1 (2009) Appendix E and the NCC cited AS 1428.1 (2009) Appendix B.

Prototypes

General: Provide a prototype of the DTAC product installed in the finished substrate.

Location and extent: As documented

Tests

Completion tests: Submit results of the following:

- Slip resistance.
- Luminance contrast.

Warranties

Tactile indicators, stair nosing and edging, threshold transition strips, urban edge protectors and handrail tactile indicators: Submit DTAC product and installation warranties.

1.7 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the completed substrate ready for tactile indicators, and nosing and edging installation.

2 PRODUCTS

2.1 GENERAL**Product substitution**

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

2.2 DTAC TACTILE INDICATORS, STAIR NOSING AND EDGING, THRESHOLD AND TRANSITION STRIPS, URBAN EDGE PROTECTORS AND HANDRAIL TACTILE INDICATORS**Warning tactile products**

Classic: Tactile indicators with a concentric circle design machined or injection moulded on the horizontal face and a smooth outer edge.

Terraced: Tactile indicators with a concentric circle design machined or injection moulded on the horizontal face and a terraced slip-resistant outer edge.

Ecotac® Classic: Tactile indicators with a cupped underside, a concentric circle design machined on the horizontal face and a smooth outer edge.

Ecotac® Terraced: Tactile indicators with a cupped underside, a concentric circle design machined on the horizontal face and a terraced slip-resistant outer edge.

Directional tactile products

Ecotac® Classic: Tactile indicator with a cupped underside, a grooved design machined on the horizontal face and a smooth outer edge.

Ecotac® Terraced: Tactile indicator with a cupped underside, a grooved design machined on the horizontal face and a terraced slip-resistant outer edge.

Classic: UV stabilised thermoplastic urethane (TPU) injection moulded tactile with an undulating groove design on the horizontal face and a smooth outer edge.

Integrated tactile products

Classic: An integrated Type 316 stainless steel plate with Classic tactile indicators on the horizontal face.

Classic Black Top: An integrated Type 316 stainless steel plate with Classic Black tactile indicators on the horizontal face.

Ultimat® Tactile: An integrated UV stabilised thermoplastic urethane (TPU) injection moulded tactile with Classic tactile indicators on the horizontal face.

Ultimat Duo® Tactile: An integrated UV stabilised thermoplastic urethane (TPU) injection moulded tactile with contrasting coloured Classic tactile indicators on the horizontal face.

Carpet tactile systems

Classic (Low/High Pile): Tactile indicators with a concentric circle design machined on the horizontal face, a smooth outer edge and a female thread stud to affix to the carpet plate.

Terraced (Low/High Pile): Tactile indicators with a concentric circle design machined on the horizontal face, a terraced slip-resistant outer edge and a female thread stud to affix to the carpet plate.

Ecotac® Classic (High Pile): Tactile indicators with a cupped underside, a concentric circle design machined on the horizontal face, a smooth outer edge and an extended shaft. This product does not require steel carpet plates.

Stair nosing and edging products

PEMKO® Corduroy edging: Extruded aluminium sections with a continuous corduroy pattern.

PEMKO® Pinstripe edging: Extruded smooth, blunt edged aluminium sections with an intermittent high and low profile.

PEMKO® Pleat edging: Extruded smooth, aluminium sections with an intermittent continuous corduroy pattern.

PEMKO® Stitch edging: Extruded aluminium sections with a continuous stitch pattern.

PEMKO® Suede edging: Extruded anodised aluminium sections with a continuous band of silicon carbide.

PEMKO® Urban edging: Continuous band of silicon carbide inserted into anodised aluminium extrusions.

PEMKO® Urban edging - Mill finished aluminium: Intermittent striations of silicon carbide inserted into aluminium extrusions.

PEMKO® Rugged edging: Continuous band of fibre glass reinforced plastic extrusion.

Thresholds and transition strips

PEMKO® Threshold plates: Extruded aluminium sections, many featuring a ribbed profile and integrated gasket sills.

Urban edge protectors

Round button: 35 mm diameter urban edge protector featuring round edge.

Bevelled button: 35 mm diameter urban edge protector featuring bevelled edge.

Thin bar: 5 mm thick Type 316 stainless steel bar.

Thick bar: 10 mm thick Type 316 stainless steel bar.

Handrail tactile indicators

Handrail button: Machined domed Type 316 stainless steel button.

3 EXECUTION

3.1 GENERAL

Substrate preparation and installation of DTAC products

Requirement: To DTAC's recommendations and fitting instructions.

Location: As documented.

Classic and Terraced tactile and directional indicators:

- Stone, masonry, timber or vinyl substrates: Drill and pressure fit.
- Vitrified porcelain, ceramics, glass or metal substrates: To manufacturer's instructions.
- Carpet or carpet tile substrates: Drill and screw.

Handrail tactile indicators: Drill and glue to substrate.

Ultimat® and Ultimat Duo® Tactile: Direct stick to substrate (excluding asphalt/bitumen) with DTAC tactile adhesive.

Urban edge protectors:

- Stone, masonry, timber or vinyl substrates: Drill and glue.
- Vitrified porcelain, ceramics, glass or metal substrates: Diamond core drill and glue.

Fixing DTAC PEMKO® stair nosing and edging, threshold and transition products

PEMKO® Corduroy, Pinstripe, Pleat, Stitch, Suede, Threshold plates:

- Stone, masonry, timber or vinyl substrates: Adhesive fix.
- Vitrified porcelain, ceramics, glass or metal substrates: Adhesive fix.
- Carpet or carpet tile substrates: Screw-fix or adhesive fix.

Urban edges protectors and Rugged stair nosing and edging: Screw-fix with optional adhesive.

3.2 TESTING

Completion tests

Slip resistance of completed installation: To AS 4663 (2013).

Luminance contrast testing of completed installation: Submit evidence of conformity to AS/NZS 1428.4.1 (2009) Appendix E and the NCC cited AS 1428.1 (2009) Appendix B.

3.3 COMPLETION

Warranties

Conditions: Installation by DTAC or DTAC approved installer.

Warranty period: 2 years.

4 SELECTIONS

4.1 DTAC PRODUCTS

Tactile indicator and edge protector schedule

	TI1	TI2	TI3
Type	to approval, NCC2022, and relevant Australian Standards.		
Product code			
Design			
Material/Colour			
Slip-resistance classification			
Substrate			

Stair edging schedule

	SE1	SE2	SE3
Product code	to approval, NCC2022, and relevant Australian Standards.		
Application			
Design			
Colour			
Slip resistance classification			
Substrate			

0221 SITE PREPARATION

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide site preparation, as documented.

Performance

Areas for protection: N/A

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0172 Environmental management.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Authority: Any organisation with statutory authority relating to the project, including clearances.
- Clearances: A formal certificate, approval or condition issued by a statutory authority allowing work in a particular area.
- Plant establishment period: The period between the date of practical completion and the end of the defects liability period.

1.4 SUBMISSIONS

Certification

Vermis: Submit pest exterminator's certification as evidence that the completed site works are free from vermin.

Execution details

Requirement: Submit details of methods and equipment proposed for the following:

- Clearing and grubbing.
- Tree removal and transplanting.
- Protecting ground within and adjacent to tree driplines from compaction by proposed earthworks machinery.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Enclosures around trees requiring protection.
- Trees requiring removal.
- Trees for transplanting to determine final orientation.

2 EXECUTION

2.1 COMMUNITY LIAISON

Notification

General: Notify residents about construction activities that will affect access to, or disrupt the use of, their properties.

Notice: Minimum 5 working days, unless the work is of an urgent nature with safety implications.

Notification content:

- Description of the work.

- The reason for the work.
- The expected duration.
- Changes to traffic arrangements and property access.
- The 24-hour contact number of the representative responsible.

2.2 EXISTING SERVICES

General

Requirement: Before starting earthworks, locate and mark existing underground services in the areas affected by the earthworks operations including clearing, excavating and trenching.

Utility services: Contact BEFORE YOU DIG AUSTRALIA to identify location of underground utility services pipes and cables.

Excavation: Do not machine excavate within 1000 mm of existing services.

Existing service lines: If required, divert services detected during excavation, clear of the building, and reconnect to the utility service provider requirements.

2.3 SITE CLEARING

Extent

Requirement: Clear only areas occupied by works such as structures, paving, excavation, regrading and landscaping or other areas documented for clearing.

Contractor's site areas: If not included within the areas documented above, clear only to the extent necessary for the performance of the works.

Clearing and grubbing

Clearing: Remove everything on or above the site surface, including rubbish, scrap, grass, vegetable matter and organic debris, scrub, trees, timber, stumps, boulders and rubble.

Grubbing: Grub out stumps and roots over 75 mm diameter to a minimum depth as follows:

- Below subgrade under buildings, embankments or paving: 500 mm.
- Below finished surface in unpaved areas: 300 mm.

Backfilling: Fill holes remaining after grubbing with sand material to prevent ponding of water.

Compact the material to the relative density of the existing adjacent ground material.

Redundant/decommissioned works: Remove works no longer required, including slabs, foundations, paving, drain, and access chambers and covers within the works zone.

Fire hazard reduction

Requirement: N/A

Batters

Temporary protection: If the change in level between crest and toe is more than 1500 mm, protect from erosion with geofabric, hessian and tar or heavy duty black polyethylene sheet cover. Securely fix down at crest and toe.

Surplus material

Topsoil and excavated material: Remove unwanted stripped soil and other material from the site as the work proceeds, including any material dropped on footpaths or roadways.

2.4 STORMWATER AND SEDIMENT CONTROL

General

Erosion and sediment control measures: To 0172 *Environmental management*.

Waterways and drains

Waterways: If required, temporarily divert ditches, field drains and other waterways affected by excavation and reinstate on completion.

Stormwater drains: Divert drains detected during excavation, clear of the building, and reconnect as documented or obtain approval.

2.5 EXISTING WORKS TO REMAIN

Marking

Requirement: Identify existing works to remain with 1000 mm high, 50 x 50 mm timber stakes connected by yellow plastic tape to prevent accidental damage.

2.6 TREE REMOVAL

Designation

Marking: Identify trees and shrubs for removal by tagging 1000 mm above ground level.

Extent: N/A

Tags: N/A

2.7 TREE PROTECTION

General

Warning signs: In a prominent position at each entrance to the site, display warnings that trees and plantings require protection during the contract. Remove on completion.

Lettering: Road sign type sans serif letters, 100 mm high to AS 4970 (2009) Appendix C.

Protection measures: Provide before starting the earthworks.

Trees to remain

Extent: Trees not marked for removal.

Tree protection

Tree protection zone (TPZ): To AS 4970 (2009) Section 3.

Tree protective measures: To AS 4970 (2009) Section 4.

Monitoring and certification: To AS 4970 (2009) Section 5.

Work near trees

Materials placement: Conform to the following:

- Keep the area within the dripline of trees free of sheds and paths, construction material and debris.
- Do not place bulk materials and harmful materials within the dripline of trees.
- Do not place spoil from excavations against tree trunks.
- Prevent wind-blown materials such as cement from harming trees and plants.

Damage: Prevent damage to tree bark. Do not attach stays, guys and similar material to trees.

Work under trees: Do not remove topsoil from, or add topsoil to, the area within the dripline of the trees.

Excavation: If excavation is required near trees, give notice. Minimise period and extent of excavation within the dripline.

Hand methods: Use hand methods to locate, expose and cleanly remove the roots on the line of excavation. If excavation is required within the dripline, use hand methods so that root systems remain intact and undamaged.

Roots: Do not cut tree roots exceeding 50 mm diameter. If required to cut tree roots, use cutting methods that do not excessively disturb the remaining root system. Immediately after cutting, water the tree and apply a liquid rooting hormone to stimulate the growth of new roots.

Backfilling: Backfill excavations around tree roots. Place the backfill in layers of 300 mm maximum depth and compact to a dry density similar to that of the original or surrounding soil. Do not backfill around tree trunks to a height greater than 200 mm above the original ground surface. Immediately after backfilling, thoroughly water the root zone surrounding the tree.

Backfill material:

- Mix proportions (topsoil: well-rotted composts) by volume: 3:1.
- Neutral pH value.
- Free from weed growth and harmful materials.

Compacted ground: Do not compact the ground or use skid-steer vehicles under the tree dripline. If compaction occurs, give notice.

Compaction protection: Protect ground adjacent to the tree dripline.

Watering: Water trees as necessary, including where roots are exposed at ambient temperature more than 35°C.

Mulching: Spread 100 mm thick organic mulch to the whole of the area within the dripline of all existing trees to remain.

2.8 TEMPORARY LANDSCAPE FENCING

Fence dimensions

Height: 1200 mm.

Maximum post spacing: 5000 mm.

Component sizes

Corner and gate posts: Hardwood or preservative-treated softwood, 250 mm diameter.

Intermediate posts: Star picket.

Gate: Provide a suitable hinged gate with a gate latch.

Wire: Top, intermediate and bottom rows of 3.2 mm plain galvanized steel wire. Thread the top wire through pieces of plastic tube and through corner posts.

Removal

Completion: Remove the fence at the end of the planting establishment period.

2.9 TREE TRANSPLANTING

General

N/A

Conditions: Select a time for transplanting based on the following criteria:

- Seasonal conditions.
- Length of operation.
- Rootball diameter and depth.
- Lifting methods.
- Weather conditions.

Preparation

Watering: Establish a temporary drip irrigation system, or manually water the identified trees for two weeks before ball excavation work.

Fertilising: Apply one application of liquid fertiliser mix, appropriate to the species, to the foliage and roots. Apply sufficient fertiliser to allow the spray to drip from foliage and soak into the rootball. Do not apply fertiliser on excessively hot, dry or windy days.

Rootball

General: Minimise the cutting of roots. Use only sharp tools, water blasting or water cutting.

Initial cut: Conform to the following:

- Cut manually or using chain trenching machine. Do not excavate using a backhoe or an excavator.
- Cut 250 mm beyond the required finished rootball dimension to allow trimming of damaged roots to final dimensions before sealing.

Hand trimming: To 100 mm less than the required finished rootball dimension. Cut back all roots greater than 25 mm diameter.

Rootball cutting: Conform to the following:

- Symmetrical about the trunk and in proportion to the overall size of the tree except where the limitations of individual tree planter openings require specific tailoring of the rootball dimension.
- Cut the rootball to a size that maximises the rootball for each specimen.

Trench: Backfill and lightly compact with clean sand, free of any foreign matter, pathogens or any substances that may be harmful to future root growth. Apply root inducing formulation to the manufacturer's recommended concentration, to saturate the backfill in the trench.

Maintenance of on-site plant material

Watering: Maintain a temporary drip irrigation system around each tree, located within the trenched rootball perimeter. Program the system to supply water at an optimum rate to encourage growth and avoid drying out through excessive transpiration following the cutting of the roots. Monitor the system continuously until the tree is lifted and transplanted.

Pruning: If pruning of branches is required to balance root loss, obtain approval. Prune only as directed and as documented in **TREE MAINTENANCE**.

Fertilising: Apply fertiliser at regular intervals during this period to maintain healthy growth.

Responsibility: Safeguard the health and well-being of all on-site plant material as required, before lifting and transplanting.

Execution

Lifting: Two days before transplanting each specimen, thoroughly irrigate to the full depth of the rootball. Do not disturb the soil around the root system. Maintain rootball in firm condition during transplanting by wrapping in hessian or other appropriate open weave material, securely tied.

Storage: Transport trees to a designated nursery site. Store and maintain until ready for planting.

Planting: Avoid disturbing the rootball during moving and planting. After placement, remove the rootball wrapping and ties by cutting.

Watering: After transplanting, water the rootball thoroughly and continue to water until established.

Transplanting schedule

Species	Method	Pruning
N/A		

2.10 SITE NURSERY

Temporary works

Location: As documented

Perimeter: Provide a bund wall of compacted fill as follows:

- Height: 400 mm.
- Batter grade (horizontal:vertical): 2:1.

2.11 TREE MAINTENANCE

General

Notice: Give notice before starting tree maintenance.

Pruning: To AS 4373 (2007) using a fully qualified and experienced arborist. Carry out all required works in a safe manner.

Execution

Requirement: Rectify any damage to existing trees to remain.

Operations: Remove dead and decayed wood or damaged limbs. Make all cuts at branch collars. If trees show signs of deterioration after the work is completed, ameliorate the soil by soil aeration, irrigation or incorporation of organic material. Continue this program until the end of the plant establishment period.

Root pruning: Do not excessively disturb the remaining root system. Cut off damaged roots cleanly inside the exposed or damaged area. Cover exposed root area with soil immediately after pruning, do not leave roots exposed.

Wetting and new root stimulation: Form a water collecting basin and apply a rooting hormone and wetting agent to the rootball.

Precautions: Avoid damage to trees being treated and to nearby trees and surroundings. Do not use trees as anchors for winching operations or bracing. Provide bracing as necessary before cutting to prevent uncontrolled breakages and damage to surroundings.

Failure: If repair work is impracticable, or is attempted and is rejected, remove the tree and root system and make restitution.

Tree maintenance schedule

Tree species	Description of work
N/A	

2.12 COMPLETION

Temporary works

Remove at completion

Site restoration

Requirement: Reinstate undeveloped ground surfaces to the condition existing at the commencement of the contract.

Clean up

Progressive cleaning: Keep the works clean and tidy, and regularly remove from the site, waste and surplus material arising from execution of the work.

Waste disposal: To *0172 Environmental management*.

Vermin management

Requirement: Employ a suitably qualified pest exterminator to remove vermin found during site preparation.

0222 EARTHWORK

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide earthworks to the dimensions and tolerances, as documented.

1.2 DESIGN

General

Geotechnical and environmental reports provided: Rock Solid Geotechnics Pty Ltd

Requirements

General: To DESIGN in *0171 General requirements*.

Design of footing or pier depths: Refer Structural Engineers Drawings and Specification.

Contract depths: The footing or pier depths shown on the drawings are provisional.

Authority requirements: To Building Permit and Certificate of Likely Compliance.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0172 Environmental management*.

1.4 STANDARDS

General

Earthworks: Conform to the recommendations of those parts of AS 3798 (2007) that are referenced in this worksection.

Description and classification of soils: To AS 1726 (2017).

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- GITA: Geotechnical inspection and testing authority.
- GTA: Geotechnical testing authority.

Definitions

General: For the purposes of this worksection, the definitions given in AS 3798 (2007) and the following apply:

- Bad ground: Ground unsuitable for the works, including fill liable to subsidence, ground containing cavities, faults or fissures, ground contaminated by harmful substances and ground that is, or becomes, soft, wet or unstable.
- Rock: Monolithic material with volume greater than 0.3 m³ that cannot be removed until broken up by rippers or percussion tools.
- Site topsoil: Natural soil, excavated from the site, that contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 (2018) and is free from the following:
 - . Stones more than 25 mm diameter.
 - . Clay lumps more than 50 mm diameter.
 - . Weeds and tree roots.
 - . Sticks and rubbish.
 - . Material toxic to plants.
- Subgrade: The trimmed or prepared earth material on which the pavement, footing or slab is constructed. Generally taken to relate to the upper line of the earth material.

- Zone of influence: A foundation zone bounded by planes extending downward and outward from the bottom edge of a footing, slab or pavement and defining the extent of foundation material having influence on the stability or support of the footings, slab or pavement.

1.6 TOLERANCES

General

Finish: Finish the surface to the required level, grade and shape within the following tolerances:

- Under building slabs and load bearing elements: +0, -25 mm.
- Pavement subgrades: +0, -40 mm.
- Batters: No steeper than the slope shown on the drawings. Make sure flatter slopes do not impact on boundaries or required clearances to buildings, pavements or landscaping.
- Other ground surfaces: ± 50 mm, provided the area remains free draining and matches adjacent construction where required. Provide smoothness as normally produced by a scraper blade.

1.7 SUBMISSIONS

Design documentation

Calculations: Submit calculations by a professional engineer showing the stability and safety of proposed excavations and temporary supports, including supports required for adjacent structures.

Execution details

Report: Submit a time-based schedule detailing the methods and equipment proposed for the earthworks, including the following:

- Dewatering and groundwater control and disposal of surface water.
- Excavation methods, stages, clearances, batters and temporary supports.
- Stockpiles and borrow pits.
- Placing and compaction methods and stages.

Geotechnical site investigations: Provide a geotechnical report supporting the methods proposed for excavation.

Disposal location: Submit details of the locations and evidence of compliance with the appropriate authority requirements for the disposal of material requiring removal from site.

Temporary shoring: Submit a proposal for any temporary shoring required, including the progressive removal.

Proof rolling: Submit details of proposed method and equipment for proof rolling.

Records of measurement: Submit a certified copy of the agreed records of measurement.

Site records: Submit the following to AS 3798 (2007) clause 3.4 and Appendix B:

- Geotechnical site visit record.
- Earthworks summary report or daily geotechnical reports.

Products and materials

Imported fill: Submit certification or test results by a GTA registered laboratory of the imported fill as evidence of conformity with the contract, including the source.

Tests

Compaction: Submit certification and/or test results in conformance with the documented level of inspection and testing to AS 3798 (2007).

1.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Items to be measured as listed in **RECORDS OF MEASUREMENT**.
- Areas to be cleared and/or stripped of topsoil.
- Areas stripped of topsoil.
- Excavation completed to contract levels or founding material.
- Proof rolled subgrade before placing fill.
- Filling completed to contract levels.
- Stockpiled topsoil before spreading.

2 PRODUCTS

2.1 FILL MATERIALS

General

Suitable material: To AS 3798 (2007) clause 4.4 including inorganic, non-perishable material suitably graded and capable of compaction to the documented density.

Unsuitable materials: Do not use fill defined as unsuitable by AS 3798 (2007) clause 4.3.

Sulfur content: Do not provide material with sulfur content exceeding 0.5% within 500 mm of cement bound elements (for example concrete structures or masonry) unless the elements are protected by impermeable membranes or equivalent means.

Re-use of excavated material: Only re-use suitable material to AS 3798 (2007) clause 4.4.

Stockpiles

General: Segregate the earth and rock material and stockpile for re-use in backfilling operations.

Location: Do not stockpile excavated material against tree trunks, buildings, fences or obstruct the free flow of water along drainage channels.

2.2 BORROW OR IMPORTED FILL

General

Borrow or imported material: Use only when suitable excavated material from site is not available.

- Suitable material: To AS 3798 (2007) clause 4.4.

Borrow pits:

- Locate more than 3000 mm from any fence line, boundary, edge of excavation or embankment.
- Strip and stockpile topsoil.
- Provide erosion protection during winning operations of material and make sure drainage is maintained.
- On completion of winning operations grade abrupt changes of slope, respread topsoil, and apply and maintain hydroseeded grassing.

2.3 GEOTEXTILE

General

Material: UV stabilised, permeable, polymeric, woven or non-woven textile material used in contact with soil/rock material.

Identification and marking: To AS 3705 (2012).

Product: to approval of Holdfast Building Surveyors and Sorell Council

3 EXECUTION

3.1 SITE PREPARATION

Erosion and sedimentation control

Requirement: To 0172 *Environmental management*.

3.2 GEOTECHNICAL

As found site conditions

General: If the following are encountered, give notice and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Discrepancy in expected conditions.
- Rock.
- Springs, seepages.
- Topsoil more than 100 mm deep.

Inspection and testing

Level of inspection and testing: to approval, NCC2022, and relevant Australian Standards.

Frequency of testing: To AS 3798 (2007) Table 8.1.

3.3 RECORDS OF MEASUREMENT

Excavation and backfilling

Agreed quantities: If a schedule of rates applies, provisional quantities are documented, or there are variations to the contract levels or dimensions of excavations, do not backfill or place permanent works in the excavation until the following have been agreed and recorded:

- Depths of excavations related to the datum.
- Final plan dimensions of excavations.
- Quantities of excavations in rock.

Method of measurement: By registered surveyor.

Rock

Level and class: If rock is measured for payment purposes, either as extra over excavation of material other than rock or for adjustment of provisional measurements, do not remove the rock until the commencing levels and the classes of rock have been determined.

3.4 REMOVAL OF TOPSOIL

General

Extent: Areas of cut or fill and areas occupied by structures, pavements and embankments.

Maximum depth: 200 mm.

Disposal: Remove topsoil unsuitable for re-use from the site to AS 3798 (2007) clause 6.1.8.

Topsoil stockpiles

General: Stockpile site topsoil intended for re-use.

Stockpile maximum height: 1.5 m.

Identification: Mark and label stockpiles of different soil types.

Vegetation: Do not burn off or remove plant growth that occurs during storage.

Protection: Conform to the following:

- Provide drainage and erosion protection.
- Do not allow traffic on stockpiles.
- If a stockpile is to remain for more than four weeks, sow with temporary grass.
- Protect the topsoil stockpiles from contamination by other excavated material, weeds and building debris.

3.5 EXCAVATION

Extent

Site surface: Excavate the site to the levels and profiles required for the documented structures, pavements, filling and landscaping. Make allowance for compaction, settlement or heaving.

Footings, pits, wells and shafts: Excavate to the required sizes and depths. Confirm that the foundation conditions meet the design bearing capacity.

Bearing surfaces

Requirement: Provide even plane bearing surfaces for loadbearing elements including footings. Step to accommodate level changes. If supporting masonry, make the steps appropriate to the courses.

Rock

General: Do not use explosives.

Existing footings

Requirement: If excavation is required within the zone of influence of an existing footing, provide supports to the footing sufficient to prevent damage arising from the works. Use methods including temporary shoring or underpinning.

Existing services

Location: Before starting earthworks, locate and mark existing underground services in the areas that will be affected by the earthworks operations including clearing, excavating and trenching.

Utility services: Contact BEFORE YOU DIG AUSTRALIA to identify location of underground utility services pipes and cables.

Excavation: Do not excavate by machine within 1000 mm of existing services.

Proof rolling

Extent: Proof roll excavations for pavements, filling and non-spanning slabs on ground to determine the presence of bad ground.

Proof rolling method and equipment: To AS 3798 (2007) clause 5.5.

Requirement: If excessive settlement, rebound or heaving is encountered, provide test pits or trenching to determine the extent of bad ground.

Disposal of excess excavated material

General: Remove excess excavated material from site not required or unsuitable for fill.

Standard: To AS 3798 (2007) clause 6.1.8.

3.6 REINSTATEMENT**Deterioration of bearing surfaces**

Requirement: If the bearing surface deteriorates because of water or other cause, excavate to a sound surface before placing the loadbearing element.

Subgrades affected by moisture

Requirement: If, due to high moisture content, the subgrade cannot support construction equipment or the overlying pavement cannot be compacted, perform one or more of the following:

- Allow the subgrade to dry until it provides support for equipment and allows compaction.
- Scarify the subgrade to a depth of 150 mm, work as necessary to accelerate drying, and recompact when the moisture content is satisfactory.
- Excavate the wet material and remove to spoil, and backfill excavated areas.

Over excavation

Requirement: If excavation exceeds the required depths, reinstate to the correct depths, levels and bearing capacity.

Zone of influence: Within the zone of influence of footings, beams, or other structural elements, use concrete of strength equal to the structural element, minimum 15 MPa. Make sure that remedial concrete does not create differential bearing conditions.

Below slabs or pavements: Rectify the over excavation as follows:

- Generally: Provide selected fill compacted to the documented density.
- Less than 100 mm: Do not backfill. Increase the thickness of the layer above.

Rock depressions and subsoil drains: Backfill rock depressions and over excavation of subsoil drains using coarse subsoil filter.

3.7 SUPPORTING EXCAVATIONS**Removal of supports**

General: Remove temporary supports progressively as backfilling proceeds.

Voids

General: If voids occur outside sheeting or sheet piling, fill and compact voids to a dry density similar to that of the surrounding material.

3.8 ADJACENT STRUCTURES**Temporary supports**

General: If required, provide supports to adjacent structures, sufficient to prevent damage arising from the works.

Lateral supports: Provide lateral support with shoring.

Vertical supports: If required, provide vertical support with piling or underpinning or both.

Permanent supports

General: If permanent supports for adjacent structures are required and are not documented, give notice and obtain instructions.

Encroachments

General: If encroachments from adjacent structures are encountered and are not documented give notice and obtain instructions.

Zone of influence

Angle from horizontal: to approval of Holdfast Building Surveyors and Sorell Council

3.9 ROCK BOLTING

General

Requirement: For temporary or permanent support of rock faces, provide proprietary high strength steel bars or tubes anchored into holes drilled in the rock and tensioned against plates bearing on the rock face. Schedule the installation to conform to systematic bolting or calculated relief, as documented.

Standard: To AS 4678 (2002).

Protection

General: Protect permanent rock bolts by grouting the drilled hole with cement grout after tensioning the rock bolt. Protect the bearing plate and the exposed portion of rock bolt and anchorage with a protective coating or by embedment in concrete.

3.10 GEOTEXTILE

General

Preparation: Trim the ground to a smooth surface free from cavities and projecting rocks.

Installation: Lay the fabric flat, not stretched tight, and secure with anchor pins. Overlap joints 300 mm minimum.

3.11 PREPARATION FOR FILLING

Preparation

Stripping: Prepare the ground surface before placing fill (including topsoil fill), ground slabs or load bearing elements to AS 3798 (2007) clause 6.1.5. Remove material that inhibits or prevents satisfactory placement of fill layers, loose material, debris and organic matter.

Foundation preparation: To AS 3798 (2007) clause 6.1.7.

Compaction: Compact the ground exposed after stripping or excavation, to a minimum depth of 150 mm, to the minimum relative compaction in AS 3798 (2007) Table 5.1.

Ground treatment or improvement methods:

- Scarify method: Loosen exposed excavation by scarifying to a minimum of 150 mm, moisture-condition and compact to AS 3798 (2007) Section 5.
- Impact roller and impact compaction: Use an approved method.

Slope preparation: If fill is placed on a surface steeper than 4:1 (horizontal:vertical), bench the surface to form a key for the fill. As each layer of fill is placed, cut the existing ground surface progressively to form a series of horizontal steps more than 1 m in width and more than 100 mm deep. Recompact the excavated material as part of the filling. Shape to provide free drainage.

Under earth mounds

General: Cultivate the ground to a depth of 200 mm before mound formation.

Under slabs, paving and embankments

General: If required, loosen the ground to a depth of more than 200 mm and adjust the moisture content before compaction to a density consistent with subsequent filling.

Rock ledges

General: Remove overhanging rock ledges.

3.12 PLACING FILL

General

Extent: Place fill to the documented dimensions, levels, grades, and cross-sections so that the surface is always self-draining.

Layers: Place fill in near-horizontal layers of uniform thickness no greater than 150 mm after compaction, deposited systematically across the fill area.

Edges: At junctions of fill and existing surfaces, do not feather the edges.

Mix: Place fill in a uniform mixture.

Previous fill: Before placing subsequent fill layers, make sure that previously accepted layers still conform to requirements, including moisture content.

Protection: Protect the works from damage due to compaction operations. If required, limit the size of compaction equipment or compact by hand.

Protective covering to membranes: Do not disturb or damage during backfilling.

Placing at structures

Fill adjacent structures and trenches: To AS 3798 (2007) clause 6.2.6.

Requirement: Place and compact fill in layers simultaneously on both sides of structures, culverts and pipelines to avoid differential loading. Commence compacting each layer at the structure and proceed away from structure.

Over the top of structures: Carefully place first layers of fill.

Retaining walls: Do not place fill against concrete retaining walls until the concrete has been in place for 28 days unless the structure is supported by struts.

Compaction

General: Compact the subgrade and each layer of fill to the required depth and density, as a systematic construction operation. Shape surface to provide drainage and prevent ponding.

Maximum rock and lump size in layer after compaction: To AS 3798 (2007) clause 6.2.2.

Fill batter faces: Either compact separately, or overfill and cut back. Form roughened surfaces to the faces.

Minimum relative compaction: To AS 3798 (2007) Table 5.1.

3.13 PLACING TOPSOIL

Stockpiled topsoil

Cultivation: Rip subgrade to a depth of 100 mm or to the depth of rippable subgrade if less. Cultivate around services and tree roots by hand. Trim to allow for the required topsoil depth.

Herbicide: Apply before placing topsoil.

Placing: Spread and grade evenly.

Compaction: Lightly compact topsoil so that the finished surface is smooth, free from lumps of soil, at the required level, ready for cultivation and planting.

Edges: Finish topsoil flush with abutting kerbs, mowing strips and paved surfaces. Feather edges into adjoining undisturbed ground.

Disposal of excess topsoil

On-site: Dispose of surplus topsoil remaining on site by spreading evenly over the areas already placed.

Off-site: Remove excess topsoil from the site and dispose of legally.

3.14 FILL MOISTURE CONTROL

General

Moisture content: Adjust the moisture content of fill during compaction within the range of 85% to 115% of the optimum moisture content determined by AS 1289.5.1.1 (2017) or AS 1289.5.2.1 (2017), as appropriate, to achieve the required density.

3.15 TESTING

Site tests

Compaction control tests: To AS 1289.5.4.1 (2007) or AS 1289.5.7.1 (2006).

Test frequency: To AS 3798 (2007) Table 8.1.

3.16 COMPLETION

Geotechnical report

Inspection and testing report: by Rock Solid Geotechnics Pty Ltd

Grading

External areas: Grade to give falls away from buildings, minimum 1:100.

Subfloor areas: Grade the ground surface under suspended floors to drain ground or surface water away from buildings without ponding.

Site restoration

Requirement: If variation of existing ground surfaces is not required as part of the works, restore surfaces to the condition existing at the commencement of the contract.

0223 SERVICE TRENCHING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide trenching for underground services, as documented.

1.2 DESIGN**Requirements**

General: To DESIGN in *0171 General requirements*.

Responsibility: Design and coordinate all trenching required for proposed inground services, as documented.

Existing services: Where possible, design to avoid all existing services. Locate existing services to EXECUTION, **EXISTING SERVICES**.

Authority requirements: To Plumbing Permit, Building Permit and Certificate of Likely Compliance.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *0171 General requirements*.

1.4 STANDARDS**Trenching**

Earthworks: To AS 3798 (2007).

Electrical services: To AS/NZS 3000 (2018).

Hydraulic services: To the AS/NZS 3500 series.

Communication services: To AS/CA S009 (2020).

1.5 TOLERANCES**Surface levels**

Earthworks: Finish the surface to the required level, grade and shape within the following tolerances:

- Under building slabs and load bearing elements: +0, -25 mm.
- Pavement subgrades: +0, -40 mm.
- Batters: No steeper than the slope shown on the drawings. Make sure flatter slopes do not impact on boundaries or required clearances to buildings, pavements or landscaping.
- Other ground surfaces: ± 50 mm, provided the area remains free draining and matches adjacent construction where required. Provide smoothness as normally produced by a scraper blade.

Pavement base and subbase: Finish the surface to the required level, grade and shape within the following tolerances:

- Subbase: +10 mm, -25 mm.
- Base: +10 mm, -5 mm.

Finished pavement or paving surface: Conform to the documented level within the following tolerances:

- Asphalt: ± 10 mm.
- Concrete: +10 mm, -0 mm.
- Paving:
 - . Finished level: ± 8 mm.
 - . Height deviation between adjacent units (lippage): ± 2 mm.
- Granular surfaces: ± 10 mm.
- Lippage between restored surface and adjacent existing surface: ± 5 mm.

1.6 SUBMISSIONS

Execution details

Excavation method: Submit details of proposed equipment and method of excavation, including the following:

- Service location and type: A plan of the trench works showing the location and type of service.
- Open excavation: Proposed duration.
- Shuttering and/or bracing of trench sides: If required for safety and stability, provide proposals.
- Geotechnical data: Geotechnical report supporting the procedures proposed for trenching and/or boring.
- Boring: Proposals for the following:
 - . Limits on length.
 - . Existence of other services and method of protection.
 - . Pressure grouting to voids.
 - . The effect of pressure grouting on other services, ground heave and proposals for minimising such effects.
 - . Access to properties outside the site.
 - . Council permits.
 - . Service interruptions including a plan for minimising unintended interruptions.
- Hazards: Identify WHS hazards that may be encountered with deep trenches including toxic gases and liquids.

Off-site disposal location: Submit details of the proposed disposal locations and evidence of conformance with the relevant authorities for the disposal of material required to be removed from the site.

Records

As-built location: Upon completion, submit to the relevant authority as-built documentation showing the location of the installed services.

Tests

Trench backfill: Submit results of the following:

- Compaction tests.
- Density tests.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Items to be measured as listed in **GROUND CONDITIONS, Records of measurement**.
- Service trenches excavated before laying the service.
- Services laid in trenches and ready for backfilling.
- Completed surface restoration.

2 PRODUCTS

2.1 FILL MATERIALS

General

Suitable material: To AS 3798 (2007) clause 4.4 including inorganic, non-perishable material suitably graded and capable of compaction to the documented density.

Unsuitable materials: Do not use unsuitable material for fill in conformance with AS 3798 (2007) clause 4.3.

Sulfur content: Do not provide filling with sulfur content exceeding 0.5% within 500 mm of cement bound elements (for example concrete structures or masonry) unless such elements are protected by impermeable membranes or equivalent means.

Re-use of excavated material: Only re-use suitable material in conformance with AS 3798 (2007) clause 4.4.

Material in reactive clay areas: In sites classified M, M-D, H1, H1-D, H2, H2-D, E or E-D to AS 2870 (2011), re-use excavated site material at a moisture content within $\pm 1\%$ of that of the adjoining in situ clay.

2.2 SURFACE RESTORATION MATERIALS

General

Re-use: If possible re-use the existing surface materials that were removed during trench excavation, whilst conforming to the documented material requirements.

Subbase and base

Requirement: Provide crushed rock material configured in layers and depths to match existing and adjacent work, as follows:

- Base: 20 mm nominal size.
- Subbase: 40 mm nominal size.

Pathways and paved surfaces generally

Requirement: Provide materials consistent with those of the existing surface before service trenching works commenced.

Concrete surfaces

Material requirements: Normal-class to AS 1379 (2007).

Concrete strength grade: N25.

Slump: Maximum 100 mm.

Asphalt surfaces

Aggregate: To AS 2758.5 (2020) or to AS 2758.2 (2021) for sprayed bituminous surfaces.

Asphalt: To AS 2150 (2020).

Medium cut back bitumen: To AS 2157 (1997).

Bitumen emulsion: To AS 1160 (1996).

Bitumen binder: Class 170.

Pavers

Concrete and clay pavers: To AS/NZS 4455.2 (2010).

Bedding and joint filling sand: Well-graded sand, free of deleterious material, such as soluble salts, that may cause efflorescence.

Stone pavers and setts: Provide sound stone pavers and setts of uniform quality. Reject any with defects liable to affect strength and durability.

Bedding mortar mix (cement:sand): Select from the range 1:3 to 1:4 to obtain satisfactory adhesion. Provide minimum water.

3 EXECUTION

3.1 EXISTING SERVICES

Location

Requirement: Before commencing service trenching, locate and mark existing underground services in the areas that will be affected by the service trenching operations.

Utility services: Contact BEFORE YOU DIG AUSTRALIA to identify location of underground utility services pipes and cables.

Excavation

General: Do not excavate by machine within 1 m of existing underground services.

3.2 EXISTING SURFACES

Concrete and asphalt pavements

Method: Sawcut trench set out lines for the full depths of the bound pavement layers except where the set out line is located along expansion joints.

Removal of concrete and asphalt: Break out concrete or asphalt pavement material between the trench set out lines, remove and dispose of off-site.

Paving

Removal: Take up paving units both full and cut by hand, between the trench set out lines, and neatly stack on wooden pallets.

Concrete edging: Break out, remove and dispose of off-site.

Concrete subbase: If present, sawcut along the trench set-out lines.

Grass

Removal method: Neatly cut grass turf between trench set-out lines into 300 mm squares.

Grass suitable for re-use: Take up and store the turf and water during the storage period.

Unsuitable grass: Remove and dispose of off-site.

Small plants, shrubs and trees

Remove for re-planting: Take up and store. Wrap the rootball in a hessian or plastic bag with drain holes and water during the storage period.

Unsuitable vegetation: Remove and dispose of off-site.

3.3 GROUND CONDITIONS**As found site conditions**

Unexpected conditions: If the following are encountered, give notice immediately and obtain instructions before carrying out any further work in the affected area:

- Bad ground.
- Discrepancies to expected ground conditions.
- Rock.
- Springs, seepages.
- Topsoil > 100 mm deep.

Records of measurement

Excavation and backfilling: If a schedule of rates applies, provisional quantities are specified, or there are variations to the contract levels or dimensions of excavations, do not commence backfilling or place permanent works in the excavation until the following have been agreed and recorded:

- Depths of excavations related to the datum.
- Final plan dimensions of excavations.
- Quantities of excavations in rock.

3.4 EXCAVATION**General**

Requirement: Excavate for underground services in conformance with the following:

- To required lines and levels, with uniform grades.
- Straight between access chambers, inspection points and junctions.
- With stable sides.
- Width tolerance: ± 50 mm, unless constrained by adjacent structures.
- Tree protection: To AS 4970 (2009).

Adjacent structures

Existing footings: If excavation is required within the zone of influence of an existing footing, use methods including (temporary) shoring or underpinning that maintain the support of the footing and make sure that the structure and finishes supported by the footing are not damaged.

Temporary supports: Provide supports to adjacent structures where necessary, sufficient to prevent damage arising from the works, as follows:

- Lateral supports: Provide lateral support using shoring.
- Vertical supports: Provide vertical support where necessary using piling or underpinning or both.

Permanent supports: If permanent supports for adjacent structures are necessary and are not described, give notice and obtain instructions.

Encroachments: If encroachments from adjacent structures are encountered and are not shown on the drawings, give notice and obtain instructions.

Trench widths

General: Keep trench widths to the minimum, consistent with the laying and bedding of the relevant service and construction of access chambers and pits.

Trench depths

General: As required by the relevant service and its bedding method.

Obstructions

General: Clear trenches of sharp projections. Cut back roots encountered in trenches to at least 600 mm clear of services. Remove other obstructions including stumps and boulders that may interfere with services or bedding.

Dewatering

General: Keep trenches free of water. Place bedding material, services and backfilling on firm ground, free of surface water.

Pumping: Provide pump-out from adjacent sumps or install well points.

Adjacent subsidence: Provide recharge points to isolate the dewatering zone.

Excess excavation

General: If trench excavation exceeds the correct depth, reinstate to the correct depth and bearing value using compacted bedding material or sand stabilised with 1 part of cement to 20 parts of sand by volume.

Stockpiles

Topsoil removal: Stockpile topsoil intended for re-use to a maximum height of 1500 mm.

Excavated material for backfill: If required, segregate the earth and rock material and stockpile, for re-use in backfilling operations.

Locations: Do not stockpile excavated material against tree trunks, buildings, fences or obstruct the free flow of water along gutters where stockpiling is permitted along the line of the trench excavation.

Disposal: If stockpiling is not permitted, dispose of excavated material off-site.

Unsuitable material

Disposal: Remove unsuitable material from the bottom of the trench or at foundation level and dispose of off-site. Replace with trench backfill material.

Boring

Subcontractor: If boring is required instead of trenches, engage a suitably qualified subcontractor to do the work.

3.5 TRENCH BACKFILL**General**

Place fill: To AS 3798 (2007) clauses 6.2.2 and 6.2.6.

Timing: Backfill service trenches as soon as possible after laying and bedding the service, if possible on the same working day.

Removal of supports: Remove temporary supports progressively as backfilling proceeds.

Marking services

Marking tape: Provide marking tape above service, with appropriate labelling, to AS/NZS 2648.1 (1995) and as follows:

- Non-metallic services: Provide tape capable of being detected by inground scanning devices.
- Location: Locate tape approximately half the depth of the service being marked, to a maximum depth of 200 mm below the finished ground level.

Boring: If boring techniques are used to install the service, provide permanent on site labelling at the start and end of the service run and record on the as-built documentation.

Bedding, haunch, side and overlay zones

Installation and material: To the particular utility authority or utility service requirements. Secure pipes against floatation.

Bedding of services: Surround pipes or conduits on all sides with a minimum of 75 mm compacted bedding sand, or as documented.

Overlay zone thickness: Maximum 300 mm immediately over the utility service.

Trees

Backfill at trees: Backfill minimum 300 mm thick, around tree roots with a topsoil mixture. Place and compact in layers of 150 mm minimum depth to a dry density equal to that of the surrounding soil.

Original surface level: Do not place backfill above the original ground surface around tree trunks or over the root zone.

Watering: Thoroughly water immediately after backfilling the tree root zone.

Compaction

Control moisture within backfill: To AS 3798 (2007) clause 6.2.3.

Layers: Compact all material in layers not exceeding 150 mm compacted thickness. Compact each layer to the required relative compaction before starting the next layer.

Compaction: To AS 3798 (2007) Section 5.

Frequency of testing: To AS 3798 (2007) clause 8.7.

Precautions: Use compaction methods that do not cause damage or misalignment to utility services.

Density tests

Testing authority: Carry out density tests of pipe bedding and backfilling by an Accredited Testing Laboratory.

Test methods: Conform to the following:

- Compaction control tests: To AS 1289.5.4.1 (2007) or AS 1289.5.7.1 (2006).
- Field dry density: To AS 1289.5.3.2 (2004) or AS 1289.5.3.5 (1997).
- Standard maximum dry density: To AS 1289.5.1.1 (2017).
- Dry density ratio: To AS 1289.5.4.1 (2007).
- Density index: To AS 1289.5.6.1 (1998).

3.6 SURFACE RESTORATION**Subbase and base**

Compaction: Uniformly compact each layer of the subbase and base courses over the full area and depth within the trench to a relative compaction of 100% when tested in conformance with AS 1289.5.4.1 (2007).

Compacted layer thickness:

- Maximum: 200 mm.
- Minimum: 100 mm.

Compaction test frequency: Minimum 1/every second layer/50 m² of restoration surface area.

Concrete surfaces

Construction: Conform to the following:

- Prime coat the cut edges of the existing surfaces with cement slurry. Lay and compact concrete so that the edges are flush and the centre is cambered 5 mm above the adjoining existing surfaces.
- Surface finish and pattern: Match existing adjoining work.
- Minimum thickness: 75 mm or the adjacent pavement thickness, whichever is thicker.
- Reinforcement and dowels: If required, provide steel reinforcement with dowels into the adjacent concrete.
- Expansion joints: 15 mm thick preformed jointing material of bituminous fibreboard placed in line with joints in existing concrete.
- Control joints:
 - . Form control joints strictly in line with the control joints in existing concrete.
 - . Around service poles: Terminate the concrete paving 200 mm from the pole and fill the resulting space with cold mix asphalt.

Weather: Do not place concrete in ambient temperatures above 30°C or below 10°C, without adequate precautions. Protect surface from rain damage, if required.

Compaction: Compact as follows:

- Thickness 100 mm or less: Compact by placing, screeding and finishing processes. If required use a hand-held vibrating screed at the surface. Do not use immersion vibrators.
- Thickness more than 100 mm and downturns: Use an immersion vibrator.

Curing: Cure by keeping continuously wet for 7 days.

Asphalt surfaces

Placement: To AS 2150 (2020).

Operations: Spread the asphalt mix in layers covering the full width of the trench.

Thickness: Match the adjoining asphalt surface.

Finish: Compact to a smooth even surface.

Sprayed bituminous surfaces: To AS 3727.1 (2016) Section 8.

Pavers

Bedding: Replicate the bedding used for the original paved surface. Use bedding methods and materials that are appropriate to the paver, the substrate, the conditions of service, and which leave the paver firmly and solidly bedded in the bedding material.

Laying: Re-lay to match the pattern and surface levels of the existing paving.

Damaged pavers unsuitable for relaying: Replace with new pavers of the same material, type, size and colour as the existing.

Landscaped areas

In topsoil areas: Complete the backfilling with topsoil for at least the top 100 mm.

Grass: Re-lay stockpiled turf. If existing turf is no longer viable, re-sow grass over the trench and other disturbed areas.

Planted areas: Overfill to allow for settlement.

3.7 COMPLETION

General

As-built documentation: Upon completion, record the location of all installed services on the as-built documentation.

0241 LANDSCAPE – WALLING AND EDGING
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1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscape walling and edging, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 SUBMISSIONS

Samples

Submit samples

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.4 INSPECTION

Notice

Inspection: Give notice so inspection may be made of the following:

- Set-out before starting construction.
- Geotextiles and subsurface drainage in place before backfilling.

2 PRODUCTS

2.1 TIMBER

Durability

Natural durability class to AS 5604 (2022): Class 1.

Preservative treatment

Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed, provide details.

Hardwood

General: To AS 2796.1 (1999) Section 2.

Softwood

General: To AS 4785.1 (2002) Section 2.

2.2 STEEL

Steel posts

Hot-rolled steel bars and sections: To AS/NZS 3679.1 (2016).

Coating: Hot-dip galvanized to AS/NZS 4680 (2006).

2.3 CONCRETE

General

Standard: To AS 1379 (2007).

Exposure classification: To AS 3600 (2018) Table 4.3.

Grade, if there are cast-in metal items: To AS 3600 (2018) Table 4.4.

2.4 DRY STONE WALLS

Walling stone

Requirement : As documented.

Natural stone: Stone of uniform quality, sound and free from defects liable to affect its strength, appearance or durability.

Field stone: Local weathered uncut random sized natural stones.

Quarried stone: Cut or uncut random or regular size stone.

2.5 SLEEPER WALLS

Sleepers

Requirement: As documented.

Hardwood: Sound durability class or preservative treated hardwood sleepers to AS 3818.2 (2010).

Softwood: Sound preservative treated softwood sleepers.

Concrete: Proprietary system of concrete sleepers and concrete or galvanized steel posts.

2.6 CRIB WALLS

General

Requirement : As documented.

Type: Proprietary system of interlocking precast concrete or preservative treated timber cribs with selected backfill placed and compacted progressively with the crib to form a retaining wall.

2.7 MASONRY SEGMENTAL WALLS

General

Requirement : As documented.

Type: Proprietary system of interlocking masonry segmental units with selected backfill placed and compacted progressively to form a retaining wall.

Masonry segmental retaining wall units: To AS/NZS 4455.3 (2008).

2.8 GABIONS

General

Requirement : As documented.

Standard: To ASTM A974 (1997) or ASTM A975 (2021).

Type: Proprietary system of rock filled wire baskets.

2.9 REINFORCED EARTH WALLS

General

Requirement : As documented.

Type: Proprietary system of galvanized steel strips, steel mesh strips or polymeric mesh reinforcement placed in layers with compacted selected fill and connected to precast concrete facing panels to form vertical retaining walls. Provide the necessary accessories including levelling pad, bearing pads, and joint fillers or covers to keep the selected fill material out of the panel joints.

2.10 GEOTEXTILES

General

Requirement : As documented.

Type: Polymeric fabric formed from a plastic yarn composed of at least 85% by weight of propylene, ethylene, amide or vinylidene chloride and containing stabilisers or inhibitors to make the filaments resistant to deterioration due to ultraviolet light.

Identification and marking: To AS 3705 (2012).

2.11 EDGING

Log

Requirement : As documented.

Timber type: Provide only timbers with preservative treatment appropriate to the Hazard class.

CCA treated timber: If proposed, provide details.

Sawn timber

Requirement : As documented.

Hardwood: To AS 2796.1 (1999) Section 2.

Softwood: To AS 4785.1 (2002) Section 2.

Sleeper

Requirement: New or recycled timber, as documented.

Concrete

Requirement : As documented.

Standard: To AS 1379 (2007) – Grade N20.

Steel

Requirement : As documented.

Finish: Hot-dip galvanized.

Aluminium

Requirement: As documented.

Brick

Requirement: Provide masonry units, as documented.

Plastic

Requirement: Provide plastic units, as documented.

3 EXECUTION

3.1 GENERAL

Set-out

General: Set out the position of walls and edging and mark the position of furniture.

Clearing

Extent: Except for trees or shrubs to be retained, clear vegetation within 1 m of the landscape walls. Grub out stumps and roots of removed trees or shrubs and trim the grass to ground level, but do not remove the topsoil.

Excavation

Extent: Excavate for foundations and footings.

Geotextiles

Storage and handling: Store clear of the ground and out of direct sunlight. During installation do not expose the filter fabric to sunlight for more than 14 days.

3.2 DRY STONE WALLS

Construction

Generally: Select the stones for their locations and lay in the wall with minimum stonecutting as follows:

- Each stone is stable, non-rocking, and firmly interlocked with adjacent stones without mortar.
- The wall face shows reasonably regular, flat and vertical stone faces.
- Vertical joints or perpend between stones are spanned by the next stone above.
- Stones are laid generally as through stones whenever possible.
- At least 50% of footings, 30% of wall stones, and all coping stones are laid as through stones.

Footings: Select the largest, flattest and most regular stones for footings, and set them one third of their depth into the ground.

Copings: Select stones of reasonably uniform size and finish the top of the wall to a level line.

Retaining walls

Construction: If dry stone walls act as retaining walls, construct the stonework to be free draining through the wall. Secure the top course of the wall with cement mortar bedding. Backfill progressively, with a layer at least 300 mm thick of porous material, such as coarse aggregate or crushed rock in the size range 20 to 40 mm.

Minimum thickness: 300 mm.

Wall face batter: Batter back the wall face 50 to 70 mm for every 300 mm in height.

Rip-rap retaining walls

Construction: Construct as dry stone retaining walls with large random sized boulders recovered from excavations, to form gravity walls retaining, and supported by, embankments. Place boulders with large face down and stepped back from boulders below.

3.3 SLEEPER WALLS**Construction**

Timber sleeper wall: Erect sleeper posts at 2 m centres, buried one third. Brace wall at half height above ground with sleepers returned into embankment, spiked to posts. Lay sleepers in stretcher bond behind the verticals and securely spike together at joints and at 2 m centres. Back with geotextile and place a 100 mm draining layer of coarse sand or fine gravel between the fabric and backfill.

Concrete sleeper wall: To manufacturer's recommendations.

Backing: Backfill to ground level with compacted fine crushed rock or gravels.

3.4 CRIB WALLS**Construction**

Requirement: Construct walls to the manufacturer's recommendations.

3.5 GABIONS**Assembly**

Requirement: Assemble the baskets and join together by wiring along the horizontal and vertical edges before placing the rock fill. Fix the top of the basket by wiring to the sides and the diaphragms.

Filling

Requirement: Place rocks, by hand, at the front and other exposed faces to form a neat face free of bulges, depressions and voids.

3.6 REINFORCED EARTH WALLS**Construction**

Requirement: Construct walls to the manufacturer's written recommendations.

3.7 EDGING**Log edges**

Installation: Excavate to lay logs at least half diameter into the ground. Spike through logs with two 13 mm diameter galvanized mild steel rods per log, penetrating a minimum of 500 mm into the subgrade. Drive the rods flush with the upper surface of the log. Butt the logs together to a close neat fit. Select adjacent logs with similar diameter.

Sawn timber

Installation: Set edgings flush with adjoining surfaces. Drive pegs into the ground at 1200 mm centres on the planting side of the edging and on both sides of joints between boards, with peg tops 15 mm below top of edging. Fix the pegs with galvanized nails, two per fixing.

Curving: Space the pegs to hold edging to a uniform curve. Reduce edging thickness to 15 mm if required for bending.

Sleeper

Installation: Spike through sleepers with two 13 mm diameter galvanized mild steel rods per sleeper, penetrating a minimum of 500 mm into the subgrade. Drive the rods flush with the upper surface of the sleeper. Arris the upper exposed sleeper edges to produce a 15 mm wide face at 45 degrees to the edges.

Concrete

Edging strip: Place in a shallow trench between timber forms. Wood float finish flush with the adjacent finished level. Provide control joints, filled with resilient bituminous material, at 3 m maximum centres.

Concrete kerb: Fixed form, extrusion or slip forms.

Steel

Fixing:

- Angle section: Fixed in place by the mass of surrounding soil works.

- Flats: Fix in place with 250 mm long x 10 mm galvanized steel spikes driven through 50 x 50 mm fixing plates. Weld holed plates at right angles to the face of the flat at 1000 mm centres on alternate sides set parallel and 25 mm below the top of the edging.

Aluminium

Flats: Place in a shallow trench. Fix in place with steel pegs at 2000 mm centres.

Spade edge

Edges: Define mass planting beds by cutting through soil with garden spade at approximately 70° to vertical. Remove sods from garden beds and spread throughout grassed areas.

Finish: Free from kinks in alignment with one curve grading evenly into the next, and free of straight sections.

Brick

Setting: On a 1:1:6 (cement:lime:sand) mortar haunch.

Laying: Lay edging bricks to the documented bond or coursing pattern.

Joints: 3 mm struck flush.

Alignment: Even and free from dips, humps and bends.

Cleaning: Wash off mortar progressively.

Plastic

Flats: Place in a shallow trench. Fix in place with plastic pegs at 500 to 2000 mm centres.

3.8 COMPLETION**Warranties**

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS**4.1 WALLING SCHEDULES****Dry stone walling schedule**

	A	B	C
Material	N/A		
Source of supply			
Minimum unit size			
Pattern or bond			
Face finish			

Sleeper walling schedule

	A	B	C
Post type	N/A		
Post grade			
Post size			
Post treatment			
Sleeper type			
Sleeper grade			
Sleeper size			
Sleeper treatment			
Source of supply			
Finish			
Colour			

Crib walling schedule

	A	B	C
Manufacturer	N/A		
Product			
Type			
Hazard class			
Finish			
Colour			

Masonry segmental walling schedule

	A	B	C
Manufacturer	N/A		
Product			
Type			

Gabion walling schedule

	A	B	C
Manufacturer	N/A		
Product			
Cage size (w x l x h mm)			
Mesh grid size (X x Y mm)			
Mesh wire diameter (mm)			
Mesh coating			
Rock type			
Rock size (mm)			

Reinforced earth walling schedule

	A	B	C
Manufacturer	N/A		
Product			
Reinforcing material			

Geotextiles schedule

	A	B	C
Manufacturer	To approval		
Product			

4.2 EDGING SCHEDULES**Log edging schedule**

	A	B	C
Timber	N/A		
Hazard class			
Size			
Finish			
Colour			

Sawn timber edging schedule

	A	B	C
--	---	---	---

	A	B	C
Timber	N/A		
Hazard class			
Size			
Pegs			

Sleeper edging schedule

	A	B	C
Timber	N/A		
Hazard class			
Size			
Finish			
Colour			

Concrete edging schedule

	A	B	C
Edge strip profile	To approval of Holdfast Building Surveyors and Sorell Council.		
Kerb profile			

Steel edging schedule

	A	B	C
Product	To approval of Holdfast Building Surveyors and Sorell Council.		
Material			
Size			
Finish			
Colour			

Aluminium edging schedule

	A	B	C
Product	To approval of Holdfast Building Surveyors and Sorell Council.		
Size			
Finish			
Colour			

Brick edging schedule

	A	B	C
Product	To approval of Holdfast Building Surveyors and Sorell Council.		
Type			

	A	B	C
Laying pattern			

Plastic edging schedule

	A	B	C
Product	To approval of Holdfast Building Surveyors and Sorell Council.		
Size			

0242B LANDSCAPE – FENCES AND BARRIERS
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1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide fences and barrier systems, as documented.

Performance

Requirements:

- Complete for their function.
- Conforming to the detail and location drawings.
- Firmly fixed in position.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 SUBMISSIONS

Samples

Requirement: Submit samples as follows: prior to commencing work on fences and barriers

Shop drawings

Custom-built items: Submit shop drawings to a scale that best describes the details, showing methods of construction, assembly and installation, with dimensions and tolerances.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.4 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Boundary survey location.
- Set-out before construction.
- Foundation conditions after excavation.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Deliver, unload and store components and accessories in unbroken manufacturer's packaging.

2.2 TIMBER

Durability

Durability class to AS 5604 (2022) Section 6

Hazard class to AS/NZS 1604.1 (2021)

Posts and rails

Hardwood: To AS 2082 (2007).

Softwood: To AS 2858 (2008).

Stress grade: To approval of Holdfast Building Surveyors and Sorell Council.

Pickets and palings

Hardwood: To AS 2796.1 (1999) Section 8.

- Grade to AS 2796.2 (2006): Select.

Softwood: To AS 4785.1 (2002) Section 7.

Softwood grade: To AS 4785.2 (2002): To approval of Holdfast Building Surveyors and Sorell Council.

Seasoned cypress pine: To AS 1810 (1995) Section 5.

Seasoned cypress pine grade: To approval of Holdfast Building Surveyors and Sorell Council.

Preservative treatment

Timber type: Provide only timbers with preservative treatment to the documented Hazard class.

Cut surfaces: Provide supplementary preservative treatment to all cut and damaged surfaces.

CCA treated timber: If proposed to be used, provide details.

2.3 STEEL

Steel tubes

Posts, rails, stays and pickets: To AS/NZS 1163 (2016).

- Grade: C350L0.

Post and rail finish: Hot-dip galvanized.

Fencing wire

Chain link, cable wire, tie wire and barbed wire: To AS 2423 (2002).

2.4 CONCRETE

General

Standard: To AS 1379 (2007).

Exposure classification: To AS 3600 (2018) Table 4.3.

2.5 COMPONENTS

Steel panel fencing

Steel framing: Zinc-coated or aluminium/zinc alloy coated steel to AS 1397 (2021).

Steel sheeting: Prepainted to AS/NZS 2728 (2013).

Timber fencing

General: Conform to the timber members in the **Timber fencing sizes table**.

Timber fencing sizes table

Member	Preservative treated soft wood picket (mm)	Preservative treated soft wood paling/lap and cap (mm)	Hardwood or cypress pine paling/lap and cap (mm)
Maximum height	1200	1800	1800
End/corner gate posts	90 x 90	100 x 100	125 x 125 or 100 x 100
Intermediate posts	90 x 90	140 x 45 or 100 x 75	125 x 50 or 100 x 75
Maximum post spacing	2400	2400/2700 ^a	2700 ^a
Rails	70 x 40	75 x 50 or 100x 38	75 x 50 or 100x 38
Picket/paling size	70 x 19	75, 100 or 150 ^a x 15	100 or 150 ^a x 13
Capping	-	125 x 35	100 x 50
Concrete footing size (diameter x depth)	300 x 600	300 x 600	300 x 600
Earth footing size (diameter x depth)	200 x 600	250 x 600	250 x 600
a. Three rail fences only			

Gates

General: As documented.

Barriers for swimming pools

Design, construction and performance: To AS 1926.1 (2012).

Location of barriers for private swimming pools: To AS 1926.2 (2007).

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Set-out

General: Set out the fence line and mark the positions of posts, gates and bracing panels.

Property boundaries: Confirm by survey.

Clearing

Fence line: Except for trees or shrubs to be retained, clear vegetation within 1 m of the fence alignment. Grub out the stumps and roots of removed trees and shrubs, and trim the grass to ground level. Do not remove the topsoil.

Excavation

Posts: Excavate post holes so that they have vertical sides and a firm base. Spread surplus material on the principal's side of the fence.

Earth footings

Base: Place 100 mm of gravel in the footing base under posts.

Compaction: Backfill with earth around posts, compacting firmly by hand or machine in 150 mm deep layers.

Concrete footings

In ground: Place mass concrete around posts to protect posts from waterlogged conditions and finish with a weathered top falling 25 mm from the post to ground level.

On slabs: Provide welded and drilled post base flanges for fixing with masonry anchors to the concrete.

Erection

Line and level: Erect posts vertically. Set heights to follow the contours of natural ground, unless documented otherwise.

3.2 GATES

Hardware

General: Provide the following:

- Drop bolt and ferrule to each leaf of double gates.
- Latch to one leaf of double gates.
- Provision for locking by padlock.
- Hinges with smooth operation and adjustment for future sagging.

Hand access

Requirement: Where required, provide hand holes to give access from outside to reach locking provision.

3.3 TIMBER FENCING

Radiata pine picket fencing

General: As documented.

Radiata pine paling fencing

General: As documented.

Hardwood paling fencing

General: As documented.

Installation

General: Mortice posts, taper splice rails and nail twice in mortices. Set pickets and palings clear of the ground.

Picket fence: Nail twice to each rail.

Plain paling fence: Provide 2 rails for fences up to 1800 mm high, and locate 200 mm from the tops and bottoms of the palings. Close butt palings and nail twice to each rail.

Lap and cap paling fence: Provide 2 rails for fences up to 1800 mm high, and locate 200 mm from the bottoms of the palings and abutting the tops of palings. Close-butt larger palings and nail twice to each rail. Fix smaller palings over joints and nail twice to each rail. Nail capping to the top rail.

Timber gates

Ledges and braces: Match fence rails.

3.4 STEEL FENCING**Steel picket fencing**

Requirement: As documented.

Steel picket fencing installation

General: Fit tightly fittings caps to steel posts. Attach panels to posts with fixing clips and galvanized M8 x 75 mm hexagon head bolts before concreting footing.

Steel panel fencing

Requirement: As documented.

Protection: Make sure bottom rails have drain holes or clearance to posts and are at least 50 mm clear of the ground.

3.5 CHAIN LINK FABRIC FENCING**Tennis court fencing – private/residential**

Requirement: As documented.

Standard: To AS 1725.3 (2010).

Gate frames: To AS 1725.3 (2010) Appendix D.

Bracing stays and backstays: To AS 1725.3 (2010) Appendix E.

Base plates: To AS 1725.1 (2010) Appendix F.

3.6 WELDED MESH FENCING**Welded mesh fencing**

Requirement: As documented.

Footing type: Concrete.

Installation

General: Fit tightly fittings caps to steel posts. Attach panels to posts with fixing clips and galvanized M8 x 75 mm hexagon head bolts before concreting footing.

3.7 SWIMMING POOL BARRIERS**Pool barriers**

Requirement: As documented.

Installation

Construction and performance: To AS 1926.1 (2012) and AS 1926.2 (2007).

Installation: Provide complete with accessories.

3.8 TEMPORARY LANDSCAPE FENCING**Fence dimensions**

Height: 1200 mm.

Maximum post spacing: 5000 mm.

Component sizes

Corner and gate posts: Hardwood or preservative-treated softwood, 250 mm diameter.

Intermediate posts: Star picket.

Gate: Provide a suitable hinged gate with a gate latch.

Wire: Top, intermediate and bottom rows of 3.2 mm plain galvanized steel wire. Thread the top wire through pieces of plastic tube and through corner posts.

Removal

Completion: Remove the fence at the end of the planting establishment period.

3.9 COMPLETION

Cleaning

Requirement: Remove excess debris, metal swarf and unused materials. Clean all visible metal surfaces with soft clean cloth or brush and clean water or approved cleanser, finishing with a clean cloth. Do not use abrasive or alkaline materials.

Powder coated aluminium architectural applications: Clean completed assembly to AS 3715 (2002) Appendix C.

Powder coated metal, other than aluminium, architectural applications: Clean completed assembly to AS 4506 (2005) Appendix D.

Protection: Remove protective coatings using methods required by the manufacturer after completion.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 TIMBER FENCING

Radiata pine picket fencing schedule

	A	B	C
Height (mm)	N/A		
Footing type			
Footing size (diameter x depth mm)			
Posts: Size (mm)			
Posts: Spacing (mm)			
Rails (mm)			
Pickets: Size (mm)			
Pickets: Spacing (mm)			
Pickets: Pattern			
Gate: Type			
Gate: Size (h x w mm)			
Gate: Finish			
Gate: Hardware			
Finish			
Colour			

Radiata pine paling fencing schedule

	A	B	C
Height (mm)	N/A		
Footing type			
Footing size (diameter x depth mm)			
Posts: Intermediate (mm)			
Posts: End, corner and gate (mm)			
Posts: Spacing (mm)			
Rails (mm)			
Palings: General (mm)			
Palings: Lap and cap (mm)			
Capping (mm)			

	A	B	C
Gate: Type			
Gate: Size (h x w mm)			
Gate: Finish			
Gate: Hardware			
Finish			
Colour			

Hardwood paling fencing schedule

	A	B	C
Height (mm)	N/A		
Footing type			
Footing size (diameter x depth mm)			
Posts: Intermediate (mm)			
Posts: End, corner and gate (mm)			
Posts: Spacing (mm)			
Rails (mm)			
Palings: General (mm)			
Palings: Lap and cap (mm)			
Capping (mm)			
Gate: Type			
Gate: Size (h x w mm)			
Gate: Finish			
Gate: Hardware			
Finish			
Colour			

4.2 STEEL FENCING**Steel tube picket fencing schedule**

	A	B	C
Product			
Height (mm)			
Footing type			
Footing size (diameter x depth mm)			
Posts: Size (mm)			
Posts: Spacing (mm)			
Rails (mm)			
Pickets: Size (mm)			
Pickets: Spacing (mm)			
Pickets: Pattern			
Gate: Type			
Gate: Size (h x w mm)			
Gate: Finish			
Gate: Hardware			
Finish			
Colour			

Steel panel fencing schedule

	A	B	C
Product	N/A		
Height (mm)			
Footing type			
Footing size (diameter x depth mm)			
Posts: Size (mm)			
Posts: Spacing (mm)			
Rails (mm)			
Panel: Profile			
Panel: Base metal thickness (BMT) (mm)			
Gate: Type			
Gate: Size (h x w mm)			
Gate: Finish			
Gate: Hardware			
Finish			
Colour			

4.3 CHAIN LINK FABRIC FENCING**Tennis court fencing – private/residential schedule**

	A	B	C
Fabric height (mm)	N/A		
Wire coating and colour			
Service duty			
Pipe grades and tables			
Design options			
Gates			
Hinges			
Catches			
Drop bolts/Shoot bolts			
Finish: Components			

4.4 WELDED MESH FENCING**Welded mesh fencing schedule**

	A	B	C
Product			
Height (mm)			
Footing size (diameter x depth mm)			
Posts: Size - Ends, corners and intermediate (mm)			
Posts: Spacing (mm)			
Gate posts: Personnel (mm)			
Gate posts: Vehicles (mm)			
Panel wire: Horizontal (mm)			
Panel wire: Vertical (mm)			
Gate: Type			

	A	B	C
Gate: Size (h x w mm)			
Gate: Finish			
Gate: Hardware			
Finish			
Colour			

4.5 SWIMMING POOL BARRIER

Swimming pool barrier schedule

	A	B	C
Type			
Product			
Height (mm)			
Posts: Size (mm)			
Posts: Spacing (mm)			
Rails (mm)			
Pickets: Size (mm)			
Pickets: Spacing (mm)			
Pickets: Pattern			
Glass: Barrier			
Glass: Type			
Gate: Type			
Gate: Size (h x w mm)			
Gate: Finish			
Gate: Hardware			
Finish			
Colour			

0250B LANDSCAPE – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide landscaping, as documented.

Performance

Plants: Grown to a standard that allows rapid establishment and growth to maturity.

Maintenance: Encourage and maintain healthy growth for the duration of the contract.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Imported topsoil: Similar to local natural soil, suitable for the establishment and ongoing viability of the selected vegetation, free of weed propagules and of contaminants, and classified by texture to AS 4419 (2018) Appendix K Table K1, as follows:
 - . Fine: Clay loam, fine sandy clay loam, sandy clay loam, silty loam, loam.
 - . Medium: Sandy loam, fine sandy loam.
 - . Coarse: Sand, loamy sand.
- Investigative inspection: Any method of root inspection that involves the washing away of all or portions of the soil from the rootball to expose a section or all the roots.
- Plant establishment period: The period between the date of practical completion and the end of the defects liability period.
- Site rock: Rocks selected for salvage.
- Site topsoil: Natural soil, excavated from the site, that contains organic matter, supports plant life, conforms generally to the fine-to-medium texture classification to AS 4419 (2018) and is free from the following:
 - . Stones more than 25 mm diameter.
 - . Clay lumps more than 50 mm diameter.
 - . Weeds and tree roots.
 - . Sticks and rubbish.
 - . Material toxic to plants.
- Soil blend: A landscape soil derived from the blending of two or more of sand, natural soil material or organic materials, and with a bulk density and organic matter content to meet site specific requirements.
- Top dressing: A soil that is suitable for surface application to turf and lawns.
- Topsoil: Includes landscape soil, low density soils and soils for turf and lawns.

1.4 SUBMISSIONS

Products and materials

Supplier's data: Submit supplier's data including the following:

- Material source of supply.

Samples

General: Submit representative samples of each material, packed to prevent contamination and labelled to indicate source and content.

Bulk materials: At least 5 working days before bulk deliveries, submit a 1 kg sample of each type documented with required test results.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

2 PRODUCTS

2.1 TOPSOIL

Standard

Site and imported topsoil: To AS 4419 (2018).

Composts, soil conditioners and mulches: To AS 4454 (2012).

Source

General: If the topsoil of documented quality cannot be provided from material recovered from site, provide imported topsoil.

Imported topsoil

Requirement: Imported topsoil to AS 4419 (2018) Tables 1, 2 and 3, and as documented.

Imported topsoil particle size table (% passing by mass)

Sieve size (mm)	Soil textures		
	Fine	Medium	Coarse
2.36	100	100	100
1.18	90 – 100	90 – 100	90 – 100
0.60	75 – 100	75 – 100	70 – 90
0.30	57 – 90	55 – 85	30 – 46
0.15	45 – 70	38 – 55	10 – 22
0.075	35 – 55	25 – 35	5 – 10
0.002		2 – 15	2 – 8

Imported topsoil nutrient level table

Nutrient	Unit	Sufficiency range
Nitrate-N (NO ₃)	mg/kg	> 25
Phosphate-P (PO ₄) – P tolerant	mg/kg	43 - 63
Phosphate-P (PO ₄) – P sensitive	mg/kg	< 28
Phosphate-P (PO ₄) – P very sensitive	mg/kg	< 6
Potassium (K)	mg/kg	178 - 388
Sulfate-S (SO ₄)	mg/kg	39 - 68
Calcium (Ca)	mg/kg	1200 - 2400
Magnesium (Mg)	mg/kg	134 - 289
Iron (Fe)	mg/kg	279 - 552
Manganese (Mn)	mg/kg	18 - 44
Zinc (Zn)	mg/kg	2.6 - 5.1
Copper (Cu)	mg/kg	4.5 - 6.3
Boron (B)	mg/kg	1.4 - 2.7

Method References

pH in H₂O (1:5), pH in CaCl₂ (1:5) and Electrical Conductivity (EC) by Rayment & Higginson (1992) method 4A2, 4B2, 3A1.

Soluble Nitrate-N by APHA 4500.

Soluble Chloride by Rayment and Lyons 2011 modified method 5A2.

Extractable P by Mehlich 3 – ICP.

Exchangeable cations – Ca, Mg, K, Na by Mehlich 3 – ICP.

Extractable S by Mehlich 3 – ICP.

Extractable trace elements (Fe, Mn, Zn, Cu, B) by Mehlich 3 - ICP.

Site topsoil

Requirement: Site topsoil, as documented.

Soil blend: If required, stripped natural soil with sand and/or organic matter and recommended ameliorants.

2.2 GRASS**Turf**

Description: Cultivated turf of even thickness, free from weeds and other foreign matter, as documented.

Supplier: A specialist grower of cultivated turf.

2.3 FERTILISER**General**

Description: Proprietary fertilisers, delivered to the site in the manufacturer's labelled and unopened bags or containers, as documented.

Application rate: Vary the application rate to allow for the plant-available immediate fertiliser equivalence value of the soil conditioning compost.

Labelling

General: To the applicable statutory requirements, including manufacturer or supplier, weight, fertiliser type, N:P:K ratio, recommended uses and application rates.

Label type: To withstand transit without erasure or misplacement.

2.4 PLANTS**General**

Requirement: Supply plants with the following properties:

- Stress: Free from stress resulting from inadequate watering, excessive shade or excessive sunlight experienced at any time during their development.
- Site environment: Grown and hardened off to suit anticipated site conditions at the time of delivery and prevent dieback.
- Pests and disease: Free from attack by pests or disease.
- Native species with a history of attack by native pests: Restrict plant supply to those with evidence of previous attack to less than 15% of the foliage and make sure actively feeding insects are absent.

Labelling

General: To the recommendations of the *National Plant Labelling Guidelines (2023)*.

Label type: To withstand transit without erasure or misplacement.

Label frequency: One for each plant.

Root system

Requirement: Supply plant material with a root system as follows:

- Well-proportioned in relation to the size of the plant material.
- Conducive to successful transplantation.
- Free of any indication of having been restricted or damaged.

Root inspection: If investigative inspection is required, sample as follows:

- For more than 100 samples: Inspect 1%.
- For less than 100 samples: Inspect 1 sample.

Sample plants: Replace plants used in investigative inspection.

Defective samples: [complete/delete]

Rejection: Do not provide root bound stock.

2.5 IRRIGATION**General**

Requirement: Provide automatically controlled, fixed irrigation systems, as documented.

Backflow prevention: To meet statutory requirements.

Irrigation controllers

Type: Automatic controllers that are easily programmed and include the following:

- Manual cycle and individual control valve operation.
- Manual on/off operation of irrigation without loss of program.
- ≥ 4 on/off cycles per day.
- Day omit.
- 240 V input and 24 V output capable of operating 2 control valves simultaneously.
- Not less than 24 hour battery program backup.
- Power surge protection.
- Mounted in a lockable cabinet of minimum IP54 to AS 60529 (2004) in external locations.

Micro-irrigation systems

Tubing: Polyethylene micro-irrigation pipe.

Drip irrigation systems

Integrated drip line systems: Tubing with integral drippers inserted into the tube during manufacture.

Discrete drip emitter systems:

- Tubing: Polyethylene micro-irrigation pipe.
- Drippers: Turbulent flow types, easily dismantled for cleaning.

Fittings

Type: Barbed fittings rated for the pressure class of the pipe, fastened with ratchet type clamps.

Valve boxes

Requirement: Provide the following in each valve box:

- Automatic control valve.
- Isolating valve.
- Filter:
 - . Micro-irrigation systems: 200 μm .
 - . Drip irrigation systems: 100 μm .
- Pressure-reducing valve with 170 kPa outlet pressure.

Construction: UV-resistant high impact plastic with high impact snap lock plastic cover and adequately sized for clear access.

3 EXECUTION

3.1 PREPARATION**Weed eradication**

Requirement: As documented.

Herbicide: Eradicate weeds using environmentally acceptable methods, such as a non-residual glyphosate herbicide in any registered formulae, at the recommended maximum application rate.

Manual weeding: Regularly remove weed growth by hand throughout grassed, planted and mulched areas. Remove weed growth from an area of 750 mm diameter around the base of the trees in grassed areas. Continue weeding throughout the course of the works and during the planting establishment period.

Vegetative spoil

Disposal: Remove vegetative spoil from site. Do not burn.

3.2 ROCK WORK**New rock work**

Requirement: As documented.

Erosion control: Bury rock two-thirds by volume or as appropriate for effective erosion control, with weathered faces exposed. Protect the weathered faces from damage.

Site rock: Stockpile for future placement and accessibility for lifting. Dispose of other rock off site.

Imported rock: Provide rock that has been selected before delivery.

Placing rock: Place while ground formation work is being carried out, as documented.

3.3 EARTH MOUNDS

Construction

Placing: Place clean fill in layers approximately 150 mm thick compacted to 85% of the dry density ratio of the surrounding soil tested to AS 1289.5.4.1 (2007). Minimise slumping and further compacting.

Edges: Construct changes in grade over a minimum width of 500 mm to smooth, gradual and rounded profiles with no distinct joint.

Existing trees: Maintain the natural ground level under the canopy.

Pipes, culverts and associated structures: Construct mounding to avoid unbalanced loading.

Drainage: Construct mounds to allow free drainage of surface water and to eliminate ponding.

3.4 SUBSOIL

Ripping

General: Rip parallel to the final contours. Do not rip when the subsoil is wet or plastic. Do not rip within the dripline of trees and shrubs to be retained.

Subsoil: Rip the subsoil to the following typical depths:

- Compacted subsoil: 300 mm.
- Heavily compacted clay subsoil: 450 mm.

Ripline planting areas: Rip planting areas to the following typical depths:

- [complete/delete]

Planting beds

Excavated: Excavate to reduce the subsoil level to at least 300 mm below finished design levels. Shape the subsoil to fall to subsoil drains, if required. Break up the subsoil to a further depth of 100 mm.

Unexcavated: Remove weeds, roots, rubbish and other debris. Reduce the planting bed level to 75 mm below finished design levels.

Cultivation

Requirement: As documented.

Minimum depth: 100 mm.

Services and roots: Do not disturb services or tree roots. If required, cultivate these areas by hand.

Cultivation: Cultivate manually within 300 mm of paths or structures. Remove stones exceeding 25 mm, clods of earth exceeding 50 mm, and weeds, rubbish or other deleterious material brought to the surface during cultivation. Trim the surface to design levels after cultivation.

Additives

General: Apply additives after ripping or cultivation and incorporate into the upper 100 mm layer of the subsoil as documented.

Herbicides

General: Before spreading topsoil apply a herbicide treatment as follows:

- Product: [complete/delete]
- Location: [complete/delete]

3.5 TOPSOIL

Placing topsoil

Spreading: Spread the topsoil on the prepared subsoil and grade evenly, making allowances, if appropriate, for the following:

- Required finished levels and contours after light compaction.
- Grassed areas finished flush with adjacent hard surfaces such as kerbs, paths and mowing strips.

Steep batters: If using a chain drag for spreading, make sure there is no danger of batter disturbance.

Finishing: Feather edges into adjoining undisturbed ground.

Consolidation

General: Compact lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface that has the following characteristics:

- Finished to design levels.
- Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting.

Topsoil depths

General: Spread topsoil to the following typical depths:

- Excavated planting areas:
 - . For organic mulch: 225 mm.
 - . For gravel mulch: 250 mm.
- Irrigated grassed areas generally: 150 mm.
- Irrigated grassed areas, heavy use (e.g. playing fields, playgrounds and public parks): 200 mm.
- Non-irrigated grass areas: 100 mm.
- Earth mounds:
 - . Mass planted surfaces: 300 mm.
 - . Grassed surfaces: 100 mm.
- Top dressing: 10 mm.

Surplus topsoil

General: Spread surplus topsoil on designated areas on-site or dispose off-site.

3.6 TURFING**Supply**

Elapsed time: Deliver the turf within 24 hours of cutting, and lay within 36 hours of cutting. Prevent turf from drying out between cutting and laying. If not laid within 36 hours of cutting, roll turf out on a flat surface with the grass up, and water as required to maintain a healthy condition.

Application

Method: Lay the turf as follows:

- Stretcher bond pattern with the joints staggered and close butted.
- Parallel with the long sides of level areas, and with contours on slopes.
- Finish flush, after tamping, with adjacent finished surfaces of ground, paving edging, or grass seeded areas.

Laying: Close butt the end joints and space the turf strips 300 mm apart. Lay top dressing between the turf strips. Finish with an even surface.

Tamping: Lightly tamp to an even surface immediately after laying. Do not use a roller.

Stabilising on steep slopes: Peg the turf to prevent downslope movement. Remove the pegs when the turf is established.

Watering

General: Water immediately after laying until the topsoil is moistened to its full depth. Maintain moisture to this depth.

Initial establishment

General: Maintain turfed areas until there is a dense continuous sward of healthy grass over the whole turfed area, evenly green and of a consistent height.

Failed turf: Lift failed turf and replace with new turf.

Levels: If levels have deviated from the design levels after placing and watering, lift turf and regrade topsoil to achieve design levels.

Top dressing: Mow the established turf and remove cuttings. Lightly top dress to a depth of 10 mm. Rub the dressing into the joints and correct any unevenness in the turf surface.

3.7 PLANTING

General

Plant location and spacing: If necessary to vary plant locations and spacings to avoid service lines, or to cover the area uniformly, or for other reasons, give notice.

Planting conditions

Weather: Do not plant in unsuitable weather conditions, including extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

Watering

Timing: Thoroughly water the plants before planting, immediately after planting, and as required to maintain growth rates free of stress.

Preparation

Individual plantings in grassed areas: Prepare for planting as follows:

- Excavate a hole twice the diameter of the rootball and at least 100 mm deeper than the rootball.
- Break up the base of the hole to a further depth of 100 mm.
- Loosen compacted sides of the hole to prevent confinement of root growth.

Ripline planting: Prepare for planting as follows:

- Rip the row and excavate a plant hole for each plant large enough to accept the rootball plus 0.1 m³ of backfilling with topsoil.
- Clear weeds and other vegetative material within 300 mm radius of the plants.
- If planting holes are excavated by mechanical means, increase the hole size by 100 mm and loosen compacted sides to prevent confinement of root growth.

Placing

General: Place plants as follows:

- Remove the plant from the container with minimum disturbance to the rootball. Make sure that the rootball is moist.
- If required, root prune to make sure all circling roots have been either severed or aligned radially into the surrounding soil.
- Place the plant in its final position, in the centre of the hole and plumb, and with the topsoil level of the plant rootball level with the finished surface of the surrounding soil.

Fertilising

Pellets: In planting beds and individual plantings, place fertiliser pellets around the plants at the time of planting.

Backfilling

General: Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Make sure that topsoil is not placed over the top of the rootball, so the plant stem remains the same height above ground as it was in the container. Avoid mixing mulch with topsoil.

Watering basins for plants in grassed areas

Location: To each individual plant not located in irrigated grassed areas or naturally moist areas.

Watering basin: Construct around the base of each individual plant, consisting of a raised ring of soil capable of holding at least 10 L.

3.8 IRRIGATION

General

Requirement: As documented.

Micro-irrigation systems

General: Connect micro-tube laterals with proprietary push in or screw in fittings.

Drippers: Connect directly into piping or provide appropriately sized micro-tubes.

Microsprays: Mount microsprays 300 mm above ground on stakes and connect to the piping with appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

Air release valves: Provide at the highest point in each section to drain the system when flow stops.

Drip irrigation systems

Discrete drippers: Connect directly into piping or provide appropriately sized micro-tubes.

Piping: Lay polyethylene micro-irrigation pipe on finished ground surface under planting bed mulch and anchor at 1500 mm maximum intervals with U-shaped stakes.

Air release valves: Provide at the highest point in each section to drain the system when flow stops.

Valve box installation

Requirement: Install with top of box flush with the surface.

Clearance: Allow 100 mm minimum clearance from filters and 50 mm min clearance from valves.

Base: Concrete plinth or crushed rock.

3.9 MULCHING**General**

Requirement: As documented.

Placing mulch

General: Place mulch to the required depth and clear of plant stems, so that after settling it conforms to the following:

- Smooth and evenly graded between design surface levels.
- Flush with the surrounding finished levels.
- Sloped towards the base of plant stems in plantation bed.
- For gravel mulches: Not closer to the stem than 50 mm.

Extent: Provide mulch to 750 mm diameter to surrounds of plants planted in riplines and grassed areas.

Depths:

- Organic mulch: 75 mm.
- Gravel mulch: 50 mm.

Stabilisation:

- Leaf litter, pine flake and pine bark: Provide stabilisation on slopes greater than 1:3
- River pebbles and gravels: Do not use on slopes greater than 1:6.

Installation:

- In ripline and grassed areas: Place mulch to 750 mm diameter around plants.
- In mass planted areas: Place after the preparation of the planting bed but before planting and other work.
- In smaller areas (e.g. planter boxes): Place after the preparation of the planting bed, planting and other work.

3.10 TREATMENT**General**

Pest attack or disease: If evidence of pest attack or disease of plant material is discovered, immediately give notice.

Physical removal

General: Remove pest infestation and diseased plant material by hand if appropriate.

Pesticide

Product: Spray with insecticide, fungicide or both, as required.

3.11 STAKES AND TIES**Stakes**

Material: Hardwood, straight, free from knots or twists, pointed at one end.

Installation: Drive stakes into the ground at least one-third of their length, avoiding damage to the root system.

Stake sizes and quantities:

- For plants \geq 2500 mm high: Three 50 x 50 x 2400 mm stakes per plant.
- For plants 1000 to 2500 mm high: Two 50 x 50 x 1800 mm stakes per plant.

- For plants < 1000 mm high: One 38 x 38 x 1200 mm stake per plant.

Ties

General: Provide ties fixed securely to the stakes, one tie at half the height of the main stem, others as necessary to stabilise the plant. Attach ties loosely so as not to restrict plant growth.

Tie types:

- For plants ≥ 2500 mm high: Two strands of 2.5 mm galvanized wire neatly twisted together, passed through reinforced rubber or plastic hose, and installed around stake and stem in a figure eight pattern.
- For plants < 2500 mm high: 50 mm hessian webbing stapled to the stake.

Trunk protection

Collar guards: Provide proprietary collar guards or 200 mm length of 100 mm diameter agricultural pipe split lengthways.

3.12 ESTABLISHMENT

Planting

Requirement: Make sure the general appearance and presentation of the landscape and the quality of plant material at the date of practical completion is maintained for the planting establishment period.

Plant replacement: Replace failed, dead and/or damaged plants at maximum 3 weekly intervals as necessary throughout the plant establishment period.

Pruning: To AS 4373 (2007) and as documented.

Application of fertiliser: Apply either an all-purpose fertiliser or a 12 month slow release fertiliser, in two rows and cultivated into soil to a depth of 100 mm.

- Program: September and March according to seasonal growth requirement.

Weeding: Remove unwanted broad-leaf plants and grasses considered invasive to the locality.

Remulching: Maintain the original ground levels around the base of plants.

Watering: Minimum 3 complete waterings, soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall.

Grass surfaces

Preparation: Remove litter and fallen branches before mowing.

Mowing:

- Grass height: Consistent with the growth habit of the grass variety and maintained at 25 to 40 mm throughout the year. Do not remove more than one-third of the grass height at any one time.
- Program: Weekly during the mowing season, November to March, and at fortnightly intervals from April to October. Do not mow during wet conditions. Carry out last mowing not more than 7 days before end of plant establishment period.
- Clippings: Remove grass clippings from the site after each mowing.
- Raking: Once every month before mowing during the mowing season, rake the grass with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Weeding: Remove unwanted broad-leaf plants and grasses considered invasive to the locality.

- Program: Quarterly, and as required to maintain the general lawn condition.

Edge trimming: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Do not damage trees and shrubs.

Top dressing for established lawns: Weed-free imported sandy topsoil to a depth of 5 mm.

- Program: The spring following initial establishment.

Application of fertiliser: Apply lawn fertiliser at the completion of the first and last mowings of the plant establishment period, and at other times as required to maintain healthy grass cover.

3.13 COMPLETION

Irrigation

Requirement: On completion of the irrigation system, carry out the following:

- Flush system thoroughly. Check heads, sprays and drippers and clean if blocked.
- Clean strainers.
- Adjust for even distribution with no dry areas.

Cleaning

Stakes and ties: Remove those no longer required at the end of the planting establishment period.

Temporary fences: Remove temporary protective fences at the end of the planting establishment period.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS**4.1 WEED ERADICATION****Weed eradication schedule**

	A	B	C
Weed type	N/A		
Acceptable eradication method or treatment			
Unacceptable eradication method or treatment			

4.2 ROCK WORK**New rock work schedule**

Source	A	B	C
Source	N/A		
Rock type			
Description			
Size (mm)			

4.3 SUBSOIL**Subsoil cultivation depths schedule**

	A	B	C
Cultivation depth (mm) (grassed areas)	N/A		
Cultivation depth (mm) (hydroseeded or hydromulched areas)			
Cultivation depth (mm) (planting areas)			

Subsoil additives schedule

	A	B	C
Additive type	N/A		
Additive rate			

4.4 TOPSOIL**Imported topsoil schedule**

	A	B	C
Type	N/A		
Bulk density (kg/L)			
Texture			

	A	B	C
Soil pH			
Organic content by mass			
Plant sensitivity to phosphorus			
Fertiliser (N:P:K)			
Fertiliser application rate			
Product			
Source			

Site topsoil schedule

	A	B	C
Type	N/A		
Bulk density (kg/L)			
Texture			
Soil pH			
Organic content			
Fertiliser (N:P:K)			
Fertiliser application rate			
Plant sensitivity to phosphorus			

4.5 GRASSING**Turfing schedule**

	A	B	C
Species or variety	N/A		
Minimum thickness (mm)			
Roll size (mm)			
Mowing height (mm)			

4.6 FERTILISER**Fertiliser schedule**

	A	B	C
Product	N/A		
N:P:K ratio			
Application rate (kg/ha)			

4.7 IRRIGATION**Irrigation schedule**

	A	B	C
System type	N/A		
Micro irrigation emitter type			
Emitter spacing			
Coverage (mm)			
Watering period			
Control			

4.8 MULCHING**Mulching schedule**

	A	B	C
Mulch type and depth (mm)	N/A		
Stabilisation method			

4.9 PLANT MATERIAL**Plant material supply schedule**

Project stage	Botanical name	Common name	Size (mm or L)	Quantity (+10%)
N/A				

0256b Landscape – establishment

5 GENERAL

5.1 RESPONSIBILITIES

General

Requirement: Provide soft and hard landscape establishment and maintenance, as documented.

5.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

5.3 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Plant establishment period: The period between the date of practical completion and the end of the defects liability period.

5.4 SUBMISSIONS

Certification

Replacement plants species: Submit the supplier's certification as evidence that plants are true to the required species and type, and free from diseases, pests and weeds at the time of delivery.

Execution details

General: Give at least two days' notice of the following operations:

- Application of herbicide.
- Application of fertiliser.
- Watering.
- Each site maintenance visit.

Reporting: Submit monthly reports by the last Friday of each month.

Records

Requirement: To **COMPLETION, Records**.

Tests

Requirement: Submit soil property test results to **PLANTING WORKS, Fertilising** for the following:

- Landscape soils.
- Low density soils.
- Soils for turf and lawns.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

5.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made at the following intervals:

- Date of practical completion.
- Three monthly intervals during the plant establishment period.
- End of defects liability period.

6 EXECUTION

6.1 GENERAL

Rubbish removal

Rubbish: Remove loose rubbish such as bottles, papers, and cigarette butts from the site. Execute this work regularly so that all areas are free from rubbish when observed at fortnightly intervals.

Leaf litter: Remove from all path and lawn areas.

6.2 PLANTING WORKS

Planting

Requirement: Make sure the general appearance and presentation of the landscape and the quality of plant material at the date of practical completion is maintained for the planting establishment period.

Existing plant material: Maintain existing planting and grass within the landscape contract area as documented for the matching classifications of new grassland or planting.

Plant replacement: Replace failed, dead and/or damaged plants at maximum 3 weekly intervals as necessary throughout the plant establishment period.

Fertilising

Soil tests: Take samples from both planting beds and lawn areas and conduct tests, as follows:

- Landscape soils: To AS 4419 (2018) Table 1.
- Low density soils: To AS 4419 (2018) Table 2.
- Soils for turf and lawns: To AS 4419 (2018) Table 3.

Fertilising program: Base the program on soil testing results.

Application of fertiliser: Apply either an all-purpose fertiliser or a 12 month slow release fertiliser, in two rows and cultivated into soil to a depth of 100 mm.

- Program: September and March according to seasonal growth requirement.

Sensitive native species: Apply appropriate dosage.

Insect and disease control

Period for treatment: Until the problem has been eliminated.

Chemical spray: Apply outside of normal working hours.

Stakes and ties

Generally: If plants are not self-supporting or if stakes are damaged, stake or re-stake the plants as follows:

- Drive three hardwood stakes placed diagonally with the first stake on the opposite side to the prevailing winds.
- Do not single stake large plants.

Removal: If plants are robust with well-developed systems and no longer require support, remove stakes and ties.

6.3 GRASS SURFACES

Mowing and trimming

Preparation: Remove litter and fallen branches before mowing.

Grass height: Consistent with the growth habit of the grass variety and maintained at 25 to 40 mm throughout the year. Do not remove more than one-third of the grass height at any one time.

Program: Weekly during the mowing season, November to March, and at fortnightly intervals from April to October. Do not mow during wet conditions. Carry out last mowing not more than 7 days before end of plant establishment period.

Raking: Once every month before mowing from November to March, rake the grass with a flexible rake. On alternate mowings, adopt a north-south and east-west pattern.

Edge trimming: At the same time as mowing, trim lawn edges to plant beds, pathways, base of trees and other obstacles. Do not damage trees and shrubs.

Top dressing

Top dressing for established lawns: Weed-free imported sandy topsoil to a depth of 5 mm.

- Program: The spring following initial establishment.

Top dressing for remediation of depressions or irregularities: Apply coarse or medium texture soil to AS 4419 (2018), suitable for application to turf or grass seeded areas.

Fertilising

Application of fertiliser: Apply lawn fertiliser at the completion of the first and last mowings of the plant establishment period, and at other times as required to maintain healthy grass cover.

6.4 WEEDING

General

Requirement: Remove unwanted broad-leaf plants and grasses considered invasive to the locality.

Program:

- Lawns: Quarterly, and as required to maintain the general lawn condition.
- Trees and shrubs: As required for planted, paved and mulched areas to be weed free when observed at fortnightly intervals.

Vigorous ground covers: Keep 200 mm clear from the base of any shrub or tree. Remove as follows:

- Small areas: By hand.
- Large areas: Proprietary herbicides.

Herbicide application: Apply as follows:

- To the manufacturer's recommendations.

6.5 MULCHED SURFACES

General

Inspection: Fortnightly to determine mulch requirements.

Requirement: Maintain minimum depth as follows:

- 75 mm for organic mulch.
- 50 mm for gravel mulch.

Remulching: Maintain the original ground levels around the base of plants.

6.6 WATERING

Establishment

Water quality:

- pH between 5.5 and 7.5.
- Total soluble salts less than 1000 mg/litre.
- No substances toxic to plant growth.

Watering program: Minimum 3 complete waterings, soaking to a depth of 150 mm at fortnightly intervals for the first 6 weeks of plant establishment irrespective of natural rainfall. Confirm soaked depth and record in the log book.

Water restrictions: Coordinate the water supply and conform to legislation and restrictions applying at the time.

Hand watering

Requirement: Manually water all lawn and planting areas in absence of an irrigation system or until the proposed irrigation system is fully operational. Avoid frequent dampening of the surface. Allow the surface of the soil to partially dry out between waterings.

Irrigation

Irrigation system program: Adjust to suit the following:

- The precipitation requirements of the individual zones/stations with regard to types of plants.
- The infiltration rate of the soil/medium and associated physical factors, seasons, evaporation, exposure, topography and local authority restrictions.
- Adjustment or shut down during and after periods of prolonged heavy rain.
- Water supply and watering regime of legislation and restrictions applying at the time.

Equipment maintenance:

- Check all components for proper operation.
- Repair or replace damaged components with parts from the same manufacturer.
- Flush any dirt or foreign matter from the system and clear all blockages.

6.7 PAVING AND STRUCTURES

Paving

Furniture, signage and barriers

Maintenance guidelines:

- Furniture and pots: Keep in a good condition and move as required to carry out maintenance works.
- Directional and building signs: Keep in a good condition and maintain visibility.
- Boundary and car park barriers: Keep in a good condition and maintain visibility.

Drains

Maintenance: Inspect and clean all drainage structures and pit covers and maintain in working order. Remove all organic debris.

Frequency: As required, so that all overflow drains are clear when observed at fortnightly intervals.

6.8 COMPLIANCE

Criteria

Generally: Plant establishment is complete, subject to the following:

- Repairs to plant material are complete.
- Ground surfaces are covered with the documented treatment to the documented depths.
- Pests, disease, or nutrient deficiencies or toxicities are not evident.
- Organic and gravel mulched surfaces are in a weed free and tidy condition and to the documented depth.
- Vegetation is established and well formed.
- Vegetation cover to cell, seeded and/or hydromulched areas is established.
- Plants have healthy root systems that have penetrated into the surrounding, undisturbed ground and are not able to be lifted out of the planting holes.
- Vegetation is not restricting essential sight lines and signage.
- Only frangible species are growing within road side clear zones.
- Specified vegetation setbacks from services and road furniture are evident.
- All hard landscape works are installed and operating as documented.
- Litter collection and removal is complete.
- Mulch is removed from drainage and access areas.
- All non-conformance reports and defects notifications are complete.

Plant establishment compliance table

Plant material	Acceptable failure per area	Acceptable concentration of failure
Tube stock	< 10%	< 15% in any given location
140 mm	< 5%	< 15% in any given location
300 mm or larger	Nil	Nil
Turf	< 5%	Nil
Cells	< 5%	< 15% in any given location
Direct seeded native species and cover crop – including hydromulch, drilled and broadcasted areas	Not less than 3 documented species per 1 m ² grid (determined on a testing frequency of 20 grid areas per 500 m ²)	Nil grids with < three (3) documented plant species
Direct seeded grass species and cover crop	< 15% (determined by a 1 m ² grid on a testing frequency of 1 grid area per 500 m ²)	< 10%
Cover crop	< 5%	Nil

6.9 COMPLETION

Records

Logbook: Keep on site and make available for inspection a logbook, recording the following on a weekly basis:

- Description, time and method of application of toxic material.
- Maintenance work details.
- Inclement weather to verify inability to carry out work within the specified time frame.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

0271B PAVEMENT BASE AND SUBBASE
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1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide base and subbase courses as documented.

Performance

Surface level: Provide a finished surface level that is free draining and evenly graded between level points.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0222 Earthwork.

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the following definitions apply:

- Base: One or more layers of material, forming the uppermost structural element of a pavement and on which the surfacing may be placed.
- Subbase: Material laid on the subgrade below the base either for the purpose of making up additional pavement thickness required, to prevent intrusion of the subgrade into the base, or to provide a working platform. Usually designated as Dense graded base (DGS), NGS 40mm gravel, CRS, CCS or RCMS.

1.4 TOLERANCES**Surface level**

Subbase: +10 mm, -25 mm.

Base: +10 mm, -5 mm.

Base abutting gutters: ± 5 mm from the level of the lip of the gutter, minus the design thickness of the wearing course.

Surface deviation

Base: ≤ 5 mm from a 3 m straightedge laid on the surface.

1.5 SUBMISSIONS**Products and materials**

Source of material: Submit the supplier name, material type (crushed rock, natural gravel, recycled concrete aggregate) and source quarry or recycling site.

Tests

Compaction tests: Submit results of compaction testing to **TESTING, Site tests**.

1.6 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Prepared subgrade.
- Proof rolling of subbase before spreading of base.
- Proof rolling of base before sealing.

2 PRODUCTS

2.1 BASE AND SUBBASE MATERIAL

Granular material

Requirement: Provide unbound granular materials, including blends of two or more different materials, which when compacted develop structural stability and are uniform in grading and physical characteristics.

Crushed rock

Requirement: Provide crushed rock as follows:

- Base: 20 mm nominal.
- Subbase: 40 mm nominal.

Recycled materials

Requirement: Provide recycled materials as follows:

- Base and subbase: Conform to the **Limits on use of recycled and manufactured materials as constituent materials table** and the **Undesirable material properties table**.

Natural gravel

Requirement: Provide unbound natural gravel materials as follows:

- Base: 20 mm nominal.
- Subbase: 40 mm nominal.

Subbase material properties and test methods table

Property and test method	Differentiating criteria	Material requirements	
		Crushed rock	Natural gravel
Particle size distribution or grading (% passing through sieve) to AS 1289.3.6.1 (2009)	Sieve size (mm)	—	—
	53.0	100	100
	37.5	90 - 100	95 - 100
	26.5	74 - 96	80 - 97
	19.0	62 - 86	—
	13.2	—	—
	9.5	42 - 66	48 - 85
	4.75	28 - 50	35 - 73
	2.36	20 - 39	25 - 58
	0.425	8 - 21	10 - 33
	0.075	3 - 11	3 - 21
Maximum dry compressive strength on fraction passing 19 mm sieve (only applies if plasticity index is less than 1) to AS 1141.52 (2019)	—	min 1.0 MPa	min 1.0 MPa
4 day soaked CBR (98% modified compaction) to AS 1289.6.1.1 (2014)	—	min 30%	min 30%

Limits on use of recycled and manufactured materials as constituent materials table

Recycled material	Unbound or modified base and subbase	Bound base and subbase
Iron and steel slag	100%	100%
Crushed concrete ^a	100%	100%
Brick	20%	10%
RAP	40%	40%
Fly ash ^b	10%	10%
Furnace bottom ash	10%	10%
Crushed glass fines	10%	10%
Notes:		

Recycled material	Unbound or modified base and subbase	Bound base and subbase
<p>a. For pavements using high percentages of crushed concrete, take into account the amount of available cement that will rehydrate when subjected to moisture to create rigid or semi-rigid pavement and result in subsequent shrinkage cracking.</p> <p>b. For pavements using fly ash, take into account the possibility of hydration and binding when subject to moisture to create rigid or semi-rigid pavement and result in subsequent shrinkage cracking.</p>		

Undesirable material properties table

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	Recycled material	Natural gravel
Undesirable constituent materials (% retained on a 4.75 mm sieve) to RMS T276 (2012)	Material type	—	—	—
	Type I - Metal, glass, stone, ceramics and slag	—	max 2.0 %	—
	Type II - Plaster, clay lumps and other friable material	—	max 0.5%	—
	Type III - Rubber, plastic, paper, cloth, paint, wood and other vegetable matter	—	max 0.1%	—

Base material properties and test methods table

Property and test method	Differentiating criteria	Material requirements		
		Crushed rock	Recycled material	Natural gravel
Particle size distribution or grading (% passing through sieve) AS 1289.3.6.1 (2009)	Sieve size (mm)	—	—	—
	26.5	100	100	100
	19.0	95 - 100	95 - 100	93 - 100
	13.2	77 - 93	78 - 92	—
	9.5	63 - 83	63 - 83	71 - 87
	4.75	44 - 64	44 - 64	47 - 70
	2.36	29 - 49	30 - 48	35 - 56
	0.425	13 - 23	13 - 21	14 - 32
	0.075	5 - 11	5 - 9	6 - 20
CBR (98% modified compaction) to AS 1289.6.1.1 (2014)	—	min 80%	min 80%	min 80%
Unconfined compressive strength to AS 5101.4 (2008)	—	max 1.0 MPa	max 1.0 MPa	—

3 EXECUTION

3.1 SUBGRADE PREPARATION

General

Requirement: Prepare the subgrade to 0222 *Earthwork*.

3.2 PLACING BASE AND SUBBASE

General

Weak surfaces: Do not place material on a surface that is weakened by moisture and is unable to support, without damage, the construction plant required to perform the works.

Spreading: Spread material in uniform layers without segregation.

Moisture content: Maintain wet mixed materials at the required moisture content before and during spreading. Add water to dry mixed materials through fine sprays to the entire surface of the layer after spreading, to bring the material to the required moisture content.

Compacted layer thickness: 200 mm maximum and 100 mm minimum. Provide layers of equal thickness in multilayer courses.

Joints

General: Plan spreading and delivery to minimise the number of joints. Offset joints in successive layers by a minimum of 300 mm.

Start of shift: Remix last 2 m of previous days' work for continuity of compaction.

Final trimming

General: Trim and grade the base course to produce a tight even surface with no loose stones or slurry of fines.

3.3 BASE AND SUBBASE COMPACTION

General

Construction operation: Compact each layer of fill to the required depth and density, as a systematic construction operation.

Unstable areas: If unstable areas develop during rolling or are identified by proof rolling, open up, dry back and recompact, to the requirements of this worksection. If dry back is not possible, remove for the full depth of layer, dispose of and replace with fresh material.

Minimum relative compaction table

Item description	Minimum dry density ratio (modified compaction) to AS 1289.5.2.1 (2017)
Subbase	95%
Base	98%

Compaction requirements

General: Apply uniform compactive effort over the whole area to be compacted, until the required density is achieved or until failure is acknowledged. If failure is acknowledged, conform to

Rectification.

Equipment: Use rollers appropriate to the materials and compaction requirements documented.

Moisture content

General: During spreading and compaction, maintain material moisture content within the range of -2% to +1% from the optimum moisture content (modified compaction).

Spraying: Use water spraying equipment to distribute water uniformly, in controlled quantities, over uniform lane widths.

Dry back: Allow materials to dry to 60 to 80% of the optimum moisture content before applying the seal or wearing course.

Rectification

General: If a section of the pavement material fails to meet the required density or moisture content after compaction, remove the non-conforming material, dispose of off-site or rectify for re-use, replace with fresh material, re-compact and test.

Level corrections

General: Rectify incorrect levels as follows:

- High areas: If the area can be rectified by further trimming to produce a uniform, hard surface by cutting without filling, trim so that the rectified area conforms to **TOLERANCES**.
- Low areas and high areas not rectifiable by further trimming: Remove layers to a minimum depth of 75 mm and replace with new material and re-compact.

3.4 TESTING

Site tests

Compaction control tests: To AS 1289.5.4.1 (2007) and AS 1289.5.4.2 (2007).

Frequency of compaction control tests: Not less than the following (whichever requires the most tests):

- 1 test per layer per 100 lineal metres for two-lane roads.
- 1 test per layer per 2000 m² for car parks.
- 3 tests per layer.
- 3 tests per visit.

0274B CONCRETE PAVEMENT

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide concrete pavement, as documented.

Performance

Requirement:

- Free draining and evenly graded between level points.
- Even and smooth riding surfaces.

Conformance: Conform to the local authority requirements for levels, grades and minimum thickness, reinforcement and concrete strength for pavements within the kerb-and-gutter property boundaries.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0222 *Earthwork.*

1.3 STANDARDS**Concrete**

Specification and supply: To AS 1379 (2007).

Materials and construction: To AS 3600 (2018).

Residential pavements: To AS 3727.1 (2016).

Slip resistance

Classification: To AS 4586 (2013).

1.4 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the following definitions apply:

- Ambient temperature: The air temperature at the time of mixing and placing of concrete.
- Concrete class – normal: Concrete that is specified primarily by a standard compressive strength grade up to 50 MPa and otherwise in conformance with AS 1379 (2007) clause 1.5.3.
- Concrete class – special: Concrete that is specified to have certain properties or characteristics different from, or additional to, those of normal-class concrete and otherwise in conformance with AS 1379 (2007) clause 1.5.4.
- Weather – cold: Ambient shade temperature less than 10°C.
- Weather – hot: Ambient shade temperature greater than 30°C.

1.5 TOLERANCES**General**

Surface abutting gutters: ± 5 mm from the level of the gutter edge.

Rigid pavement surface:

- From design level: +10 mm, -0 mm.
- From a 3 m straightedge placed anywhere on surface: 5 mm.

Horizontal position of outer concrete edge: ± 20 mm from documented position.

Joint locations in plan: 10 mm from documented position.

1.6 SUBMISSIONS**Products and materials**

Aggregates: Nominate the source for all aggregates.

Reinforcement: Submit the manufacturer's certificate of compliance with AS/NZS 4671 (2019), or submit test certificates from an Accredited Testing Laboratory.

Pre-mixed supply delivery dockets: For each batch, submit a docket listing the information required by AS 1379 (2007), and the following:

- For special-class performance concrete: Documented performance and type of cement binder.
- For special-class prescription concrete: Details of mix, additives, and type of cement binder.
- Method of placement and climate conditions during pour.
- Name of concrete delivery supervisor.
- Project assessment carried out each day.
- The concrete element or part of the works for which the concrete was ordered, and where it was placed.

Liquid curing compounds: Submit certified test results, including the application rate and the efficiency index to AS 3799 (1998) Appendix B.

Curing by covering: Submit details of the proposed covering material.

Repair materials: Submit proposals for epoxy resin/grout and elastomeric sealant.

Trial mix design report: Six weeks before commencing production, submit a report for each mix design containing the information required in AS 1012.2 (2014), the individual and combined aggregate particle size distribution, and the records and reports for the tests.

Tests

Requirement: Submit test results of the following:

- Concrete:
 - . Compressive strength.
 - . Drying shrinkage.
 - . Flexural strength.
 - . Slump.
- Luminance contrast of completed tactile ground surface indicator installations.
- Slip resistance test of completed installations.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Base or subgrade before covering.
- Membrane or film underlay installed on the base or subgrade.
- Concrete formwork, reinforcement and dowels in position.
- Commencement of concrete placement and compaction.
- Finishing and curing of concrete.
- Evaluation of surface finish.

2 PRODUCTS

2.1 REINFORCEMENT

Steel reinforcement

Standard: To AS/NZS 4671 (2019).

Surface condition: Provide surfaces conforming to the following:

- Free of loose or flaking mill scale and rust
- Clean from oil, grease, mud or other material that may reduce the bond between the reinforcement and concrete.

Storage: Store reinforcement above the surface of the ground and protect from damage and from deterioration by exposure.

Dowels

General: Provide each dowel in one piece, straight, cut accurately to size with ends square and free from burrs.

Standard: To AS/NZS 3679.1 (2016).

Finish: Hot-dipped galvanized.

Refer to Structural Engineer's Drawings and Specification.

Tie bars

Type: Deformed bar, 12 mm diameter, grade 500N, 1 m long.

Tie wire

General: Annealed steel 1.25 mm diameter (minimum).

External and corrosive applications: Galvanized.

Supports

Standard: To AS/NZS 2425 (2015).

2.2 CONCRETE MIX

Standard

Concrete mix and supply: To AS 3600 (2018) clause 17.1 and AS 1379 (2007).

Properties

Refer to Structural Engineer's Drawings and Specification.

Slump: Maximum 100 mm.

Drying shrinkage: Maximum 450 µε after 21 days of air drying.

Special class concrete additional properties

Colour: TBC

Aggregates: TBC

Cement colour: TBC

2.3 AGGREGATE

Characteristics

Standard: To AS 2758.1 (2014).

Durability: Tested to AS 1141.22 (2019):

- Wet strength not less than 80 kN.
- 10% Fines Wet/Dry variation not to exceed 35%.

Recycled concrete aggregate (RCA): If blending coarse RCA with natural aggregates, make sure substitution rates are below 30%.

2.4 CEMENT

General

Standard: To AS 3972 (2010).

Age: Less than 6 months old.

Moisture: Protect from moisture until used. Do not use caked or lumpy cement.

Storage: Store cement bags in a dry, under cover and above ground environment.

Supplementary cementitious materials

Fly ash: To AS/NZS 3582.1 (2016).

Slag: To AS 3582.2 (2016).

Amorphous silica: To AS/NZS 3582.3 (2016).

Manufactured pozzolans: To AS 3582.4 (2022).

2.5 WATER

General

Mixing water: To AS 1379 (2007) clause 2.4.

Requirement: Clean potable water, free from any material that may be harmful to the concrete or reinforcement including oil, acid, alkali, organic or vegetable matter.

Limits of impurities in mixing water: To AS 1379 (2007) Table 2.2 and the following:

- Chloride ion: Maximum 300 parts per million to AS 1478.1 (2000) Appendix C.
- Sulfate ion: Maximum 400 parts per million to AS 1289.4.2.1 (2020).

2.6 ADMIXTURES

General

Standard: Chemical admixtures to AS 1478.1 (2000), used to the manufacturer's recommendations.

Quality: Free from calcium chloride, calcium formate, triethanolamine or any other accelerator. Do not use admixtures or combinations of admixtures without prior written approval.

Dosage: Vary the dosage of chemical admixture to account for factors such as air temperature, setting time and cement content to the manufacturer's recommendations.

2.7 CURING COMPOUNDS

General

Curing compounds: To AS 1160 (1996) and AS 3799 (1998), Type 2.

Sheet material covering: To ASTM C171 (2020), white opaque or clear polyethylene film, or white burlap-polyethylene sheet, or equivalent material.

2.8 OTHER MATERIALS

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1 (2009).

3 EXECUTION

3.1 GENERAL

Traffic control

Traffic restriction: Do not allow traffic or construction plant other than that associated with testing, sawcutting, cleaning or joint sealing on pavement for minimum 10 days after placing, or when the concrete has reached a compressive strength of at least 20 MPa, and joints have been completely sealed.

3.2 SUBGRADE

Preparation

Conformance: Prepare subgrade to 0222 *Earthwork*.

Extent: Prepare a uniform subgrade for the full pavement formation, extending at least to the back of kerbs or at least 300 mm beyond each side of the carriageway if kerbs are not proposed.

Reinstatement: Make sure of uniformity for backfilling of any utility trenches.

3.3 SUBBASE

Thickness

Refer to Structural Engineer's Drawings and Specification.

Width

Subbase width: Extend the subbase at its full depth to at least the back of kerbs or other edge stops before their installation.

No integral kerbs: Extend granular unbound subbase at least 300 mm beyond each side of the carriageway.

Tolerance

Subbase finished surface level: +0 mm, -10 mm.

3.4 INSTALLATION

Junctions with existing pavements

Trimming: If new pavement is to be joined to an existing pavement, trim the edge of the existing pavement to create a neat vertical edge for its full depth before placing new pavement material.

Fixed formwork

Type:

- Steel forms.
- Seasoned, dressed timber planks, free of warps, bends or kinks.

Depth: Equal to the edge thickness of the slab and in one piece.

Tolerances on position:

- Level of top of form: -0 mm, +10 mm from pavement surface design level.
- Horizontal tolerance: 10 mm (maximum departure from a plane surface).
- Verticality: 3 mm departure from vertical.

Staking: Stake forms in position using at least 3 steel stakes per form, not more than 1.5 m apart. Lock joints between form sections to prevent movement.

Release agent: Before placing reinforcement, apply a release agent compatible with the contact surfaces, to the interior of the formwork, except where the concrete is to receive an applied finish for which there is no compatible release agent.

Re-use: Clean and recoat the forms each time before placing concrete.

Keyways: Form the keyways of keyed construction joints using steel or timber form strips accurately located at the mid-depth of the slab and securely fastened flush against the formwork face.

Reinforcement

Tolerances in fabrication and fixing: To AS 3600 (2018).

Locate reinforcement: Place reinforcement in the top half of the pavement.

Minimum cover to reinforcement: 30 mm.

Splicing mesh: Overlap a minimum of 2 crosswires.

Supports: Provide reinforcement supports as follows:

- Able to withstand construction and traffic loads and maintain the concrete cover, as documented.
- With a protective coating if they are ferrous metal extending to the surface of the concrete.
- Use plastic or concrete supports with galvanized or zinc-coated reinforcement.
- Spacing:
 - . Bars: ≤ 60 diameters.
 - . Mesh: ≤ 600 mm.
- Supports over membranes: Prevent damage to waterproofing membranes or vapour barriers. If appropriate, place a metal or plastic plate under each support.

Projecting reinforcement: If starter or other bars extend beyond reinforcement mats or cages, through formwork or from cast concrete, provide a plastic protective cap to each bar until it is cast into later work.

Tying: Secure the reinforcement against displacement at intersections with either wire ties, or clips. Bend the ends of wire ties away from nearby faces of formwork or unformed faces to prevent the ties projecting into the concrete cover.

Mats: For bar reinforcement in the form of a mat, secure each bar at alternate intersections.

Cores, fixings and embedded items

Position: Fix cores and embedded items to prevent movement during concrete placing. In locating cores, fixings and embedded items, displace but do not cut reinforcement, and maintain cover to reinforcement.

Isolation: Isolate embedded items to prevent water tracking to concrete providing minimum cover to reinforcement.

3.5 CONCRETE SUPPLY

Elapsed delivery time

General: Make sure that the elapsed time between the wetting of the mix and the discharge of the mix at the site is in conformance with the **Elapsed delivery time table**. Do not discharge at ambient temperature below 10°C or above 30°C unless approved heating or cooling measures are taken to deliver concrete within the range 5°C to 35°C.

Elapsed delivery time table

Concrete temperature at time of discharge (°C)	Maximum elapsed time (minutes)
5 – 24	120
24 – 27	90
27 – 30	60
30 – 35	45

Pre-mixed supply

Transport method: Select to prevent segregation, loss of material and contamination of the environment, and not to adversely affect placing or compaction.

Site mixed supply

Emergencies: If mixing by hand, provide details.

Plant: Mix concrete in a plant located on the construction site.

3.6 TESTING**General**

Test authority: Concrete supplier or an Accredited Testing Laboratory.

Reports and records of test results: To the relevant parts of the AS 1012 series. Keep results on site.

Standards

Sampling, identification, testing and recording: To the AS 1012 series.

Type and frequency: To AS 1379 (2007).

Concrete testing methods

Specimens: Sample the concrete on-site, at the point of discharge from the agitator.

Slump: To AS 1012.3.1 (2014).

Compressive strength: To AS 1012.8.1 (2014) and AS 1012.9 (2014).

Drying shrinkage: To AS 1012.8.4 (2015) and AS 1012.13 (2015).

Flexural strength: To AS 1012.8.2 (2014) and AS 1012.11 (2000).

Acceptance criterion for strength: The average strength of any set of 3 consecutive project samples must be equal to or greater than the specified minimum value.

Sampling frequency: Provide a minimum of one sample from each 50 m³ of concrete.

Slip resistance tests

Slip resistance of completed installation: To AS 4663 (2013).

Tactile ground surface indicators

Luminance contrast of completed installation: To AS/NZS 1428.4.1 (2009) Appendix E.

3.7 CONCRETE PLACING AND COMPACTION**Placing**

General: Place concrete uniformly over the width of the slab or lane and so that the face is generally vertical and normal to the direction of placement. Hand spread concrete using shovels, not rakes.

Fibre-reinforced concrete: For pumped concrete, use a 100 to 150 mm mesh screen on the pump hopper to catch fibre balls.

Ponding: Remove any water ponding on the base or subbase before starting placement.

Placing sequence: Commence from one corner (usually the lowest point) and proceed continuously out from that point.

Weather: Do not place concrete in ambient temperatures above 30°C or below 10°C, without adequate precautions.

Compaction

Thickness 100 mm or less: Compact by placing, screeding and finishing processes. If required use a hand-held vibrating screed at the surface. Do not use immersion vibrators.

Thickness more than 100 mm and downturns: Use an immersion vibrator.

Placing records

Logbook: Keep on site and make available for inspection a logbook recording each placement of concrete, including the following:

- Date.
- Specified grade and source of concrete.
- Slump measurements.
- The portion of work.
- Volume placed.

Rain

Protection: During placement and before setting, protect surface from damage.

Placing in cold weather

Cement: Do not use high alumina cement.

Temperature limits: Maintain the following:

- Freshly mixed concrete: $\geq 5^{\circ}\text{C}$.
- Formwork and reinforcement before and during placing: $\geq 5^{\circ}\text{C}$.
- Water: Maximum 60°C when placed in the mixer.

High early strength cement: If deteriorating weather conditions are predicted, use high early strength cement.

Temperature control: Heat the concrete materials, other than cement, to the minimum temperature necessary so that the temperature of the placed concrete is $\geq 5^{\circ}\text{C}$.

Admixtures: Do not use calcium chloride, salts, chemicals or other material in the mix to lower the freezing point of the concrete.

Frozen materials: Do not allow frozen materials or materials containing ice to enter the mixer, and keep formwork, materials, and equipment coming in contact with the concrete free of frost and ice.

Freezing: Prevent concrete from freezing.

Placing in hot weather

Requirement: Prevent premature stiffening of the fresh mix and reduce water absorption and evaporation losses.

Severe weather: If ambient shade temperature more than 38°C , do not mix concrete.

Temperature control: Select one or more of the following methods to make sure the temperature of the concrete mix does not exceed 35°C :

- Cool the concrete using liquid nitrogen injection before placing.
- Cover horizontal transport containers.
- Forms and reinforcement before and during placing: $\leq 35^{\circ}\text{C}$.
- Spray the coarse aggregate using cold water before mixing.
- Use chilled mixing water.

Evaporation control barriers: Erect barriers to protect freshly placed concrete from drying winds.

Evaporation rate limit: $\leq 0.50 \text{ kg/m}^2/\text{h}$.

3.8 CONCRETE FINISH**General**

Commencement: Immediately after placement, spreading and compaction of the concrete, start initial finishing procedures to achieve the documented finish.

Final finishing: Do not commence final finishing until all bleed water has evaporated from the surface after initial finishing procedures.

Unformed surfaces

General: Strike off, screed and level slab surfaces to finished levels, to the tolerance class and finish documented.

Formed surfaces

Damage: Do not strip formwork prematurely if damage to the concrete may be caused.

Curing: If formwork is stripped before the minimum curing period for the concrete has elapsed, continue curing the exposed faces as soon as the stripping is completed, and within an hour of exposure.

Finishing methods - primary finish

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Wood float finish: After machine floating, use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

Scored or scratched finish: After screeding, use a stiff brush or rake drawn across the surface before final set to produce a coarse scored texture.

Finishing methods - supplementary finish

Abrasive blast: After steel trowelling, abrasive blast the cured surface to provide texture or to form patterns without exposing the coarse aggregate, using hard, sharp graded abrasive particles.

Coloured applied finish: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer's recommendations and trowel to achieve the required appearance.

Stamped and coloured pattern finish: Provide finishing system.

Surface repairs

Method: If surface repairs are required, detail proposals.

3.9 CURING

General

Requirements: Taking into account the average ambient temperature at site over the relevant period affecting the curing, adopt procedures to make sure of the following:

- Curing: Cure continuously from completion of finishing, when the concrete has set sufficiently not to be damaged by the curing process, until the minimum total cumulative number of days or fractions of days, during which the air temperature in contact with the concrete is above 10°C, conforms to AS 3600 (2018) clause 17.1.5. Cure for at least 7 days.
- End of curing period: Prevent rapid drying out at the end of the curing period.
- Protection: Maintain at a reasonably constant temperature with minimum moisture loss, during the curing period.

Curing method: Refer to Structural Engineer's Drawings and Specification.

Curing compounds

Liquid membrane-forming compounds: Provide a uniform continuous flexible coating without visible breaks or pinholes, which remains unbroken for at least the required curing period after application. Respray defective areas within 30 minutes. Respray within 3 hours after heavy rain.

Visually important surfaces: Apply curing compounds to produce uniform colour on adjacent surfaces.

Water curing

Method: Select a method of ponding or continuous sprinkling that does not damage the concrete surface during the required curing period.

Wet hessian curing

Method: Place wet hessian sheets/bags over concrete surface. Keep hessian wet during the required curing period by regularly sprinkling with water. Protect from wind and traffic.

Impermeable sheet curing

Method: Place impermeable sheets, to ASTM C171 (2020), over concrete surface. Anchor down and tape joints in material to retain concrete moisture. Keep the concrete surface covered for the required curing period.

Cold weather curing

Temperature: Maintain concrete surface temperatures above 5°C for the duration of the curing period.

Hot weather curing

Requirement: If the concrete temperature exceeds 25°C, or the ambient shade temperature exceeds 30°C, protect from drying winds and sun by using an evaporative retarder until curing has commenced.

3.10 JOINTS

General

Requirement: Construct expansion, contraction and construction joints straight and plumb. Make transverse joints normal to longitudinal joints. Extend transverse expansion and contraction joints continuously from edge to edge of the pavement through interconnected slabs.

Joint layout: Install joints as documented.

Joint spacings: Refer to Structural Engineer's Drawings and Specification.

Joint widths: Refer to Structural Engineer's Drawings and Specification.

Non-dowelled contraction joints

Installation: Construct transverse and longitudinal contraction joints by early power sawing at an appropriate time, tooling or by placing an insert in the fresh concrete.

Construction joints

Installation: Place header board on the subbase or subgrade at right angles to the pavement centreline.

Planned location: Terminate each day's placing operation at a transverse construction joint located to coincide with a planned contraction or expansion joint.

Unplanned joints: If placement is interrupted for 30 minutes or longer, form a tied transverse construction joint within the middle third of the distance between planned joints but no closer than 1.5 m to the nearest planned joint. If necessary remove placed concrete back to the required location.

Expansion joints

Joint filling: Fill with jointing materials as documented. Finish visible jointing material neatly flush with adjoining surfaces.

Jointing materials: Provide jointing materials compatible with each other, and non-staining to concrete in visible locations.

Foamed materials (in compressible fillers): Closed cell or impregnated, not water absorbing.

Sawn joints

Weakened plane joint: Saw the hardened concrete to depth at least 0.25 to 0.33 of the pavement thickness and to a uniform width in the range of 3 to 5 mm as follows:

- Timing: Commence sawing, regardless of time or weather conditions, as soon as the concrete has hardened sufficiently to permit cutting with only minor ravelling of the edges of the saw cut. Complete sawing no later than 24 hours after concrete placement.
- Sequence: If possible, saw every third transverse joint initially, then saw the intermediate joints. Start where concrete placement commenced.
- Cracking: If the concrete has already cracked near the location chosen for a joint, do not saw a joint in that location. If a crack develops ahead of the saw cut, discontinue sawing and submit proposals for extra sawn joints.
- Stand-by machines: Provide one stand-by sawing machine for each machine planned to be used.
- Cleaning and protection: Immediately after each joint is sawn, flush the saw cut and adjacent concrete surface using water, until the waste from sawing is removed from the joint.

Rebated groove joints: Saw straight, parallel sided grooves for joint seals on top of and centred on the sawn weakened plane joints.

- Timing: Commence sawing after the curing period has ended, immediately before joint sealing. Saw during daylight hours.

Preparing joints

Stripping time: At least 12 hours.

Clean: Immediately before installation of the sealer, make sure the joint space is dry, clean and free from loose material. Remove laitance, curing compound and protrusions of hardened concrete from the sides and upper edges of the joint.

Joint sealing

Sealant type: Provide silicone sealant in conformance with the manufacturer's recommendations.

Backing rod: Compressible closed cell polyethylene foam with a bond breaking surface.

3.11 SURFACE SEALERS

General

Sealer: TBC

Application: Apply surface sealer after the curing period and when concrete has dried to allow the sealer to penetrate into the concrete surface.

Curing sealer compound: If using the sealer as a curing compound, apply directly after finishing.

3.12 TACTILE GROUND SURFACE INDICATORS

Preparation

Requirement: Conform to the manufacturer's requirements and make sure surfaces are clean and free of dust and contaminants.

Installation

General: Install on a dry and flat surface. Conform to the manufacturer's recommendations.

3.13 COMPLETION

Material removal

Excavated material: Remove from site.

4 SELECTIONS

4.1 SCHEDULES

Unformed surface finishes schedule

	A	B	C
Location	TBC		
Primary finish			
Supplementary finish			
Slip resistance classification			
Surface modifier			

Tactile ground surface indicators schedule

	A	B	C
Product	TBC		
Type			
Edge protector			
Material			
Colour			

0277 PAVEMENT ANCILLARIES

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide pavement ancillaries, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the following definitions apply:

- Absolute level tolerance: Maximum deviation from design levels.
- Relative level tolerance: Maximum deviation from a 3 m straightedge laid on the surface.

1.4 TOLERANCES**Channels and kerbs**

Absolute level tolerance: ± 10 mm at any point on the finished surface.

Relative level tolerance: 5 mm to the top or face of kerbs, and to the surface of channels.

Plan position deviation: 25 mm.

Exception: Kerb laybacks, grade changes or curves, or at gully pits requiring channel depression.

Linemarking

Longitudinal line lengths: ± 20 mm from the lengths documented in AS 1742.2 (2022).

Longitudinal line widths: ± 10 mm from the widths documented in AS 1742.2 (2022).

Transverse line lengths and widths: ± 10 mm from the lengths and widths documented in AS 1742.2 (2022).

Other markings: ± 50 mm from the dimensions documented or in AS 1742.2 (2022) for arrows, chevrons, painted medians, painted left turn islands and speed markings. Place arrows and speed markings square with the centreline of the traffic lane.

Raised pavement markers

Plan position deviation: 20 mm.

Directional displacement: $\pm 4^\circ$.

Vehicle barriers

Plan position deviation: 50 mm.

Length: ± 20 mm.

Bollard plumb: H/100.

1.5 SUBMISSIONS**Products and materials**

Linemarking material properties: Submit Accredited Testing Laboratory test reports to the AS 4049 series, at least seven days before work is scheduled to start, including paint and glass beads.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.6 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Set-out of pavement ancillaries.
- Trial sections:
 - . Channels and kerbs.
 - . Linemarking.

2 PRODUCTS

2.1 KERB AND CHANNEL (GUTTER)

Concrete

Requirement: As documented.

Precast: Proprietary precast units as documented.

In situ: To AS 1379 (2007).

Stone

Requirement: As documented.

Kerb: To EN 1343 (2012).

Natural stone: Stone of uniform quality, sound and free from defects liable to affect its strength, appearance or durability.

2.2 LINEMARKING

General

Requirement: As documented.

Pavement marking paint

Requirement: Conform to the following:

- Solvent-borne paint: To AS 4049.1 (2005).
- Waterborne paint: To AS 4049.3 (2005).
- High performance: To AS 4049.4 (2006).

Glass beads

Standard: To AS/NZS 2009 (2006).

Bead type: B.

2.3 RAISED PAVEMENT MARKERS

General

Requirement: As documented.

Standard: To AS/NZS 1906.3 (2017).

2.4 VEHICLE BARRIERS

Timber log barriers and timber bollards

Hardwood: To AS 2082 (2007).

Softwood: To AS 2858 (2008) and AS 1720.2 (2006).

Timber preservative for softwood: Minimum hazard class H4 to AS/NZS 1604.1 (2021).

Precast concrete wheel stops

Material: Precast concrete units with pre-drilled holes located 300 mm from each end for fixing to ground surface.

Plastic/rubber wheel stops

Material: Proprietary plastic or rubber wheel stops with black and yellow chevron markings.

Steel tube bollards

Type: Bollards fabricated from heavy steel tube, to AS 1074 (1989).

Minimum nominal size: DN 100.

2.5 OTHER MATERIALS

Mortar materials

Cement: To AS 3972 (2010).

Sand: Fine aggregate free from deleterious matter.

Water: Clean and free from any deleterious matter.

Tactile ground surface indicators

Requirement: As documented.

Standard: To AS/NZS 1428.4.1 (2009).

3 EXECUTION

3.1 KERB AND CHANNEL (GUTTER)

General

Precast concrete: Install to manufacturer's recommendations.

In situ concrete: Construct kerbs and/or channels in fixed forms, by extrusion or by slip forming.

Stone: Lay butt jointed.

Preparation

Subgrade or subbase material: Compact to form a firm base extending at least 150 mm beyond the proposed alignment of the back of the kerb. Match the adjoining pavement subgrade/subbase compaction or compact to 95% standard maximum dry density to AS 1289.5.1.1 (2017), as appropriate.

Concrete base: Provide a concrete base and mortar bed for stone and kerb channels above the compacted subgrade or subbase, as documented.

Setting out

General: Set out the work so that all channels and kerbs are placed with tolerances, as documented.

Joints

Joint type and location: As documented.

Contraction joint: Provide as follows:

- Extruded kerb: Cut a minimum of 50% of the cross-sectional area. Do not distort the kerb or adjacent surfaces. Tool the top of the joint to create a groove minimum 20 mm deep and 5 mm wide.
- Formed kerb: Form joint at the documented locations.

Construction joint in concrete kerb and channel: Roughen the surface of the set concrete at the location of the joint. Remove loose or soft material, foreign matter and laitance. Dampen the surface just before placing the fresh concrete and coat with a neat cement slurry.

Expansion joint: Form joint, as documented.

Concrete pavement: If channels and/or kerbs are cast adjacent to a concrete pavement, continue the same joint type, as documented for the concrete pavement, across the channels and/or kerbs.

Backfill

Timing: Not earlier than three days after placing channels and/or kerbs, backfill and reinstate the spaces on both sides of the channels and/or kerbs.

Material: Granular, free of organic material, clay and rock in excess of 50 mm diameter.

Compaction: Compact backfill in maximum 150 mm thick layers, to a relative compaction of 95% tested to AS 1289.5.4.1 (2007), for standard compactive effort.

Pavement: Backfill pavement material adjacent to new channels and/or kerbs to the documented requirements of the pavement material.

3.2 LINEMARKING

Preparation

Surface: Clean, dry and free of any deposit that may impair adhesion of the linemarking.

Wet weather: Do not apply linemarking during wet weather or if rain is likely to fall during application or paint drying time.

Provision for traffic: Allow for traffic during application and protect linemarkings until the material has dried sufficiently to carry traffic without being damaged.

Mixing of paint: Before use, mix all paint in its original container to produce a smooth uniform product consistent with the freshly manufactured product.

Removal of existing pavement markings

General: Remove existing linemarking, as documented, from the wearing surface of pavements without causing significant damage to the surface.

Setting out

General: Set out the work so that all linemarkings are placed within tolerances, as documented.

Application of linemarking

Longitudinal lines: Spray all longitudinal lines with a self-propelled machine. For a one-way or two-way barrier line pattern, concurrently spray the two sets of lines.

Hand spraying: Hand spray transverse lines, symbols, letters, arrows and chevrons using templates.

Paint thickness: Uniform wet film thickness: 0.35 to 0.40 mm.

Linemarking alignment: Straight or with smooth, even curves as documented.

Edges: Form clean, sharp edges. Remove any paint applied beyond the defined edge of the linemarking and leave a neat and smooth marking on the wearing surface of the pavement.

Glass bead application

Glass beads: Apply glass beads immediately after the application of the paint, at the following minimum rates:

- Longitudinal lines: 0.5 kg/m².
- Other markings: 0.3 kg/m².

3.3 RAISED PAVEMENT MARKERS**Preparation**

Surface: For concrete wearing surfaces, scabble the full area below each marker to remove the fine mortar material.

Adhesive preparation: Freshly heat and mix the adhesive to the manufacturer's recommendations. Do not allow the adhesive to cool and do not reheat before use.

Setting out

General: Set out the work so that all raised pavement markers are placed within tolerances, as documented.

Installation to regular surfaces

Application of adhesive: Spread the adhesive uniformly over the underside of the raised pavement marker to a depth of approximately 10 mm.

Adhesion of marker to pavement: Conform to the following:

- Press the raised pavement marker onto the pavement surface in its correct position and rotate slightly until the adhesive is squeezed out around all edges of the marker.
- Do not disturb the raised pavement marker until the adhesive has set.

Installation to rough surfaces

Adhesion of marker: Conform to the following:

- Apply an initial pad of adhesive of diameter 20 mm larger than the diameter of the base of the raised pavement marker.
- Apply the adhesive to fill the irregularities in the pavement surface to produce a flat, smooth surface flush with the upper level.
- Allow the adhesive pad to set.
- Apply adhesive to the raised pavement marker and adhere to the adhesive pad on the pavement surface, in conformance with **Installation to regular surfaces**.

3.4 VEHICLE BARRIERS**General**

Requirement: As documented.

Timber log barriers

Installation: Check out the posts to receive the rails. Set each post 600 mm below the finished surface level and surround with compacted fine crushed rock, gravel or cement stabilised rammed earth. Bolt rails to posts with M12 diameter galvanized bolts and washers, with bolt heads and nuts recessed.

Precast concrete wheel stops

Installation: Drive 12 mm diameter galvanized steel rods a minimum of 600 mm below finished surface level and stop the top of the rod 25 mm below the top of the wheel stop.

Concrete pavement/slab: Bolt the wheel stop to the pavement using galvanized steel masonry anchors, installed to manufacturer's recommendations. Top of bolt to stop 25 mm below the top of the wheel stop.

Completion: Grout fill the holes flush to match the concrete finish.

Steel tube bollards

Installation: Encase buried end of bollard in concrete footing, minimum 600 mm deep x 250 mm diameter. Finish top of footing minimum 100 mm below finished surface level.

On concrete slabs: Weld on a 10 mm thick base plate drilled for 4 bolts, and bolt to concrete slab using galvanized steel masonry anchors installed to manufacturer's recommendations.

Filling: Fill the tube with 15 MPa concrete.

Open ends: Seal with matching fabricated end caps, spot welded and ground smooth.

Timber bollards

Installation: Encase buried end of bollard in concrete footing, minimum 600 mm deep x 300 mm diameter. Finish top of footing minimum 100 mm below finished surface level.

3.5 TACTILE GROUND SURFACE INDICATORS**Preparation**

Requirement: Conform to the manufacturer's recommendations and make sure surfaces are clean and free of dust and contaminants.

Installation

General: Install on a dry and flat surface. Conform to the manufacturer's recommendations.

3.6 COMPLETION**Cleaning**

Completion: Clean progressively and leave adjoining surfaces, pavements and ancillaries clean on completion.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS**4.1 SCHEDULES****Concrete properties schedule**

	A	B	C
Strength grade/characteristic compressive strength f'_c (MPa)	TBC		
Air entrainment – air volume (%)			
Slump (mm)			
Maximum aggregate size (mm)			

Concrete kerb and channel (gutter) schedule

	A	B	C
Unit size	TBC		
Face finish			
Edge profile			

Concrete kerb and channel (gutter) joints schedule

	A	B	C
Type	TBC		
Location			
Joint width (mm)			

Stone kerb and channel (gutter) schedule

	A	B	C
Material	TBC		
Source of supply			
Unit size			
Face finish			
Edge profile			

Linemarking schedule

	A	B	C
Pavement marking paint	TBC		
Pavement marking paint colour			
Glass beads			

Raised pavement markers schedule

	A	B	C
Marker category	TBC		
Retroreflective marker class			
Retroreflective marker type			
Adhesive			

Vehicle barriers schedule

	A	B	C
Vehicle barrier type	TBC		
Size and profile			
Height			
Material			
Finish			

Tactile ground surface indicators schedule

	A	B	C
Product	TBC		
Type			
Edge protector			
Material			
Colour			

0315 CONCRETE FINISHES

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide finishes to formed and unformed concrete surfaces, as documented.

Performance

Requirement: Compatible with documented applied finishes.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Formed surfaces: To AS 3610.1 (2018).

Slip resistance

Classification: To AS 4586 (2013).

1.4 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the following definitions apply:

- Green concrete: Concrete that has recently set but has not achieved any design strength.

1.5 TOLERANCES**Formed surfaces**

Form face deflections: To AS 3610.1 (2018) Table 3.3.4.1.

Straight elements: To AS 3610.1 (2018) Table 3.3.5.1.

Unformed surfaces

Flatness: To the **Flatness tolerance class table**, using a straightedge placed anywhere on the surface in any direction, for the documented class of finish.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	2 m straightedge	4
B	3 m straightedge	6
C	600 mm straightedge	6

1.6 SUBMISSIONS**Execution details**

Surface repairs: If surface repairs are required, submit proposed methods.

Prototypes

Test panels: Provide test panels to AS 3610.1 (2018) clause 3.7 and as documented.

Manufacture: Cast the panels using the form, concrete, compaction equipment, form release agents, curing and formwork removal methods that are to be used in the final work.

Storage: Once accepted, maintain the panels on site undamaged and protected from the weather, as reference prototypes for evaluation of completed work.

Surface treatment: Do not proceed with the related work until the acceptable range of surface treatments have been determined.

Tests

Site tests: Submit test results of the following:

- Slip resistance test of completed installations.

1.7 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Completed formwork with all dust and debris removed from forms.
- Evaluation of the off-form finishes.
- Evaluation of surface finish.

2 PRODUCTS

2.1 MATERIALS**Surface modifiers**

Hardeners, sealants and protectors: If documented, proprietary products conforming to the manufacturer's recommendations.

Slip resistance treatment: If documented, proprietary products conforming to the manufacturer's recommendations.

3 EXECUTION

3.1 SURFACE MODIFIERS**General**

Application: Apply to clean surfaces, to the manufacturer's recommendations.

3.2 FORMED SURFACES**General**

Surface finish: To AS 3610.1 (2018) Table 3.3.3.1 and as documented.

Damage: Do not strip formwork prematurely if damage to the concrete may be caused.

Curing

Requirement: If formwork is stripped before the minimum curing period for the concrete has elapsed, continue curing the exposed faces as soon as the stripping is completed, and within an hour of exposure.

Evaluation of formed surfaces

General: If evaluation of a formed surface is required, complete the evaluation before surface treatment.

Finishing methods

Requirement: If soffits of horizontal concrete elements or faces of vertical concrete elements are to have a finish other than an off-form finish, provide finishes as documented.

Form removal: If vertical face formwork needs to be removed for finishing methods while the concrete is green, make sure the concrete has sufficiently set to prevent slump.

Blasted finishes:

- Abrasive: Blast the cured surface using hard, sharp graded abrasive particles until the coarse aggregate is in uniform relief.
- Light abrasive: Blast the cured surface using hard, sharp graded abrasive particles to provide a uniform matt finish without exposing the coarse aggregate.

Bush hammered finish: Remove the minimum matrix using bush hammering to expose the coarse aggregate, recessing the matrix no deeper than half the aggregate size, to give a uniform texture.

Exposed aggregate finish: While the concrete is green, wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Do not use acid etching. Rinse the surface with water.

Floated finishes:

- Sand floated finish: While the concrete is green, wet the surface and rub using a wood float. Rub fine sand into the surface until a uniform colour and texture is produced.
- Grout floated finish: While the concrete is green, dampen the surface and spread a slurry, using hessian pads or sponge rubber floats. Remove surplus slurry and work until a uniform colour and texture is produced.

Smooth rubbed finish: While the concrete is green, wet the surface and rub using a carborundum or similar abrasive brick until a uniform colour and texture is produced.

3.3 UNFORMED SURFACES

General

Surface finish: As documented.

Finished levels: Strike off, screed and level slab surfaces to finished levels and to the flatness tolerance class documented.

Finishing methods – primary finish

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Steel trowel finish: After machine floating, finish as follows:

- Use power or hand steel trowels to produce a smooth surface relatively free from defects.
- When the surface has hardened sufficiently, re-trowel to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy finish, uniform in texture and appearance, and free of trowel marks and defects.

Wood float finish: After machine floating, use wood or plastic hand floats to produce the final consolidated finish free of float marks and uniform in texture and appearance.

Broom finish: After machine floating and steel trowelling use a broom or hessian belt drawn across the surface to produce a coarse even-textured transverse-scored surface.

Scored or scratched finish: After screeding, use a stiff brush or rake drawn across the surface before final set to produce a coarse scored texture.

Sponge finish: After machine floating and steel trowelling, use a damp sponge to wipe the surface to produce an even textured sand finish.

Exposed aggregate finish: After floating and when concrete has stiffened, wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Rinse the surface with water.

Finishing methods – supplementary finish

Abrasive blast: After steel trowelling, abrasive blast the cured surface to provide texture or to form patterns without exposing the coarse aggregate, using hard, sharp graded abrasive particles.

Coloured applied finish: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer's recommendations and trowel to achieve the required appearance.

Stamped and coloured pattern finish: Provide a proprietary finishing system.

Polished finish: After steel trowelling, grind the cured surface of the concrete.

3.4 TESTING

Slip resistance tests

Slip resistance of completed installation: To AS 4663 (2013).

4 SELECTIONS

4.1 SCHEDULES

Test panels schedule

Application	Incorporated features	Panel size

Application	Incorporated features	Panel size

Formed surface finishes schedule

	A	B	C
Surface finish class to AS 3610.1 (2018)	TBC		
Formwork lining type			
Bolt hole filling			
Evaluation			
Surface finishing method			
Abrasive particle type			

Surface finish class schedule

	Class 1	Class 2	Class 3
Colour control	TBC		
Critical faces of elements			
Distance between face steps (mm)			
Form face span and direction of span			
Repairs	Not permitted		
Liner details, pattern and accuracy			
Surface pattern details and accuracy			
Surface treatment pattern			
Tie rod pattern			

Unformed surface finishes schedule

	A	B	C
Flatness tolerance class	TBC		
Primary finish			
Supplementary finish			
Slip resistance treatment			
Slip resistance classification			
Surface modifier			

0342 LIGHT STEEL FRAMING

5 GENERAL**5.1 RESPONSIBILITIES****General**

Requirement: Provide light steel floor, wall, roof and truss framing, as documented.

Performance

Requirements:

- Suitable for having flooring, linings, cladding and roofing fixed to it.
- Conforming to the documented performance criteria.
- Conforming to the requirements of NASH-1 (2005) or NASH-2 (2014).

5.2 DESIGN**General**

Designer: Refer to Structural Engineer's Drawings and Specification.

Requirements

General: To DESIGN in *0171 General requirements*.

5.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *0171 General requirements*.

5.4 STANDARDS**General**

Design, materials and protection: To AS/NZS 4600 (2018).

Residential and Low-rise steel framing: To NASH-1 (2005) (National Association of Steel Housing) and NASH-2 (2014).

5.5 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the definitions given in the NASH-1 (2005) and NASH-2 (2014) apply.

5.6 TOLERANCES**General**

Manufacturing, assembly and installation tolerances: To NASH-1 (2005) Appendix D and NASH-2 (2014) Appendix A.

5.7 SUBMISSIONS**Certification**

Erected frame: Submit certification that the erected frame conforms to the documented project requirements.

Design documentation

General: If the structural documentation defines performance criteria, submit as follows:

- Design to AS/NZS 4600 (2018) or NASH-1 (2005): Independent design, documentation and certification from a professional engineer.
- To NASH-2 (2014): Certification of conformance to the requirements of NASH-2 (2014) from a professional engineer.

Reactions: Submit the location and magnitude of reactions that are to be accommodated by the support structure.

Floor and wall frame member sizes: Submit a schedule of proposed member sizes, certified as meeting stated project, and AS/NZS 4600 (2018) or NASH-2 (2014) requirements for span, spacings and loadings.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, requirements for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

- Plan: Truss layout.
- Elevations: Arrangement of members, allowing for the accommodation of in-roof services, and the size and section type of each member.
- Method of assembly and connection details.
- Holding down and bracing: Details demonstrating capability to resist lateral and uplift forces.

Prefabricated wall frames: Include the following:

- Plan: Wall layout.
- Elevation: Arrangement of members, and size and section type of each member.
- Method of assembly, connection, holding down and bracing.

Prefabricated floor frames/cassettes: Include the following:

- Plan: Level of installation, arrangement of members, and size and section type of each member, including prefabricated floor joists.
- Method of assembly, connection, holding down and bracing.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

5.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Damp-proof course installed before installation of steel framing.
- Steel framing erected on site before lining or cladding.

6 PRODUCTS

6.1 GENERAL

Storage and handling

Requirement: Transport all components to site and store, if required, so that components and their coating are not damaged or distorted.

Frames and trusses: If required, store on a flat even surface and do not load with other items.

Exposure: Minimise exposure of components to the weather, both during storage, handling and after erection.

6.2 COMPONENTS

Damp-proof course

Membrane: To the membrane requirements of AS 2870 (2011) or AS/NZS 2904 (1995).

Cold-formed steel framing

General: Cold-formed sections from steel, metallic-coated to AS 1397 (2021).

Corrosion protection: To NASH-2 (2014) Section 8.

Framing members

Cold-formed steel framing for proprietary systems: To NASH-1 (2005) or NASH-2 (2014).

Fascias and barge boards

Product: TBC

Profile: TBC

Finish: Colorbond

Colour: Monument

7 EXECUTION

7.1 GENERAL

Frame fabrication

Length: Cut members accurately to length so that they fit firmly against abutting members.

Service holes: If not pre-punched, form holes by drilling or punching, without compromising the structural integrity of the frame, located centrally within the centre third span of the element, conforming to the requirements of NASH-2 (2014).

Swarf: Immediately remove swarf and other debris from cold-formed steel framing.

Fastening

Prefabricated framing: Fasten framing elements using fasteners, as documented, to the fabricator's requirements.

Framing built in situ: Use fasteners, as documented, from the following types:

- Bolting.
- Self-drilling, self-tapping screws.
- Blind rivets.
- Proprietary clinching system.
- Structural adhesives.
- Welding. On-site welded connections are not permitted.

Compatibility: Compatible with steel frame to prevent galvanic corrosion of dissimilar metals.

Welding

Burning: Avoid procedures that result in greater than localised burning of the sheets or framing members.

Prefabricated frames

General: Protect frames from damage or distortion during erection.

Unseasoned or CCA treated timber

General: Do not fix in contact with framing without fully painting the timber and/or the steel.

Earthing

Requirement: To AS/NZS 3000 (2018). Provide temporary earthing during erection until the permanent earthing is installed.

Protection

General: Restore coatings that have been damaged by welding or other causes. Thoroughly clean affected areas back to base metal and coat with a zinc rich organic primer.

Metal separation: Install lagging to separate non-ferrous service pipes and accessories from the framing.

Grommets: Provide grommets to isolate piping and wiring from cold-formed steel framing.

Site cut holes: Provide plastic bushes or grommets to site cut holes.

7.2 FLOOR FRAMING

General

Protection: If floor framing is for ground floor construction, make sure that it is protected from moisture.

Construction loads: If construction loading exceeds design loading, provide additional support so as to avoid overstressing of members.

7.3 WALL FRAMING

Wall studs

General: Provide studs in single lengths without splices. Place a stud and a stiffened top plate under each structural load point from the roof or ceiling (except at openings). Provide multiple studs at points of concentrated load.

Maximum stud spacing: 600 mm.

Heads to openings

Requirement: Provide lintels appropriate to load and span.

Additional support

General: Provide additional support in the form of noggings, trimmers and studs for support and fixing of lining, cladding, hardware, accessories, fixtures and fittings.

Vermin barriers

Brick veneer barrier: Close nail steel wire mesh, with a maximum aperture of 10 mm, to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Damp-proof course

Requirement: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as documented or as follows if not documented otherwise:

- External walls (not masonry veneer): Turn up a minimum of 75 mm on the inside and tack to studs. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up a minimum of 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity of damp-proofing at junctions of damp-proof courses, sarking and waterproof membranes.

Flashings

Location: Provide flashings to external openings sufficient to prevent the entry of moisture. Form trays at the ends of sill flashings.

Masonry veneer construction: Extend across cavities and build into brickwork.

7.4 ROOF AND CEILING FRAMING**Beam framing**

General: Construct framing for flat or pitched roofs where the ceiling follows the roof line, consisting of prefabricated roof beams, rafters or purlins supporting both ceiling and roof covering.

Additional support

Requirement: Provide additional frame members at the following locations:

- Hanging light fittings.
- Ceiling fans.
- Access panels.
- Any other hanging services or fixtures and fittings.

Water tank or heater in roof space: Provide a support platform to AS/NZS 3500.4 (2021) clause 5.5.1.

Battens

Requirement: Supply and fix battens suitable for span, spacing and proposed roofing material.

Anti-ponding boards

Standard: To AS 4200.2 (2017).

7.5 TRUSSES**Fabrication**

Assembly: Factory assemble trusses.

Supports for in roof services

General: If walkways, mechanical plant or other services are to be supported within the roof space, provide support and make sure trusses have been designed to carry the loads.

Water tank and heater: If a water tank or heater is located in the roof space, provide a support platform to AS/NZS 3500.4 (2021) clause 5.5.1 and make sure trusses have been designed to carry the loads.

Marking

General: Permanently mark each truss to show:

- Project identification.
- Manufacturer.
- Tag or number.
- Location.

- Support points.

Installation

Support: Support and fix trusses to the truss fabricator's recommendations.

Vertical movement: Over internal walls not providing support to trusses, provide at least 10 mm vertical clearance and use wall bracing methods that allow for vertical movements, to the truss fabricator's recommendations.

7.6 ROOF TRIM

Fascia, valley and barge boards

Requirement: Fix fascia, valley gutter boards and barge boards in conformance with the manufacturer's recommendations.

7.7 COMPLETION

Cleaning

General: On completion of framing remove debris from any gaps between members and make sure void between bottom chord of roof trusses and top of any non-supporting internal wall is clear.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and the installer.

0344B STEEL – HOT-DIP GALVANIZED COATINGS
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1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide hot-dip galvanized coatings, as documented.

Performance

Requirement: Control atmospheric corrosion to structural steelwork and steel products until the first scheduled maintenance.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

General

Coating: To AS/NZS 4680 (2006).

Coating on fasteners: To AS/NZS 1214 (2016).

Durability: To AS/NZS 2312.2 (2014).

Metal finishing

Coating mass/thickness minimum: To AS/NZS 4680 (2006).

Threaded fasteners coating mass/thickness minimum: To AS/NZS 1214 (2016).

1.4 SUBMISSIONS

Execution details

Holes and lifting lugs: If holes and lifting lugs are required to facilitate handling, filling, venting and draining during galvanizing, submit details on size and location.

Detailing features: If design and fabrication features of the items to be galvanized may lead to dimensional change, distortion or difficulties during galvanizing, identify these and submit details for improvement.

2 EXECUTION

2.1 GENERAL

Care

Embrittlement: Take due care to avoid embrittlement of susceptible steels.

Mechanical properties: Avoid mechanical damage. Make sure that mechanical properties of the base metal do not change.

Surface preparation

Surface contaminants and coatings generally: Chemical clean, then acid pickle.

Chemical cleaning: To AS 1627.1 (2003).

Acid pickling: To AS 1627.5 (2003).

- Inhibitor: Required.

Abrasive blast cleaning: To AS 1627.4 (2005) and the following:

- Class: TBC
- Abrasive: TBC
- Type: TBC

Coating process

General: To AS/NZS 4680 (2006) Section 6.

Double dipping to AS/NZS 5131 (2016) clause 9.10.5

Threaded fasteners: To AS/NZS 1214 (2016) Section 5.

Post treatment

General: Passivate.

Drilling after completion of hot-dip galvanizing

Repair: Prime drill hole surfaces to AS/NZS 4680 (2006) Section 8 before the surfaces begin to corrode.

Surface finish

Standard: To AS/NZS 4680 (2006) Section 7.

Coating quality: Continuous and as smooth and evenly distributed as possible. Free of blisters, roughness, sharp points, flux residues and any defects that may affect the end use of the article.

Silicon killed steels: Dull grey is acceptable provided a sound and continuous coating is achieved.

Surplus zinc on fastener threads: Remove.

Friction-type bolted connections: Treat coated contact surfaces to achieve the required design slip factor, without removing excessive coating thickness as follows:

- Contact surface preparation: To
GAA Best practice guide for hot dip galvanized bolts and bolted joints (2020).
- Slip factor test: To AS 4100 (2020) Appendix J.

Coating repair

Rejection: If uncoated surfaces or areas damaged by handling at the galvanizing plant exceed the limits specified for repair in AS/NZS 4680 (2006) Section 8, reject the galvanizing.

Extent and methods: To AS/NZS 4680 (2006) Section 8.

Preparation of galvanized surfaces for paint finishes

Coarse preparation: Remove spikes, and make sure edges are free from lumps and runs.

Light sweep blasting before painting: Required.

- Maximum zinc removal: 10 microns.
- Abrasive grade (range): 150 to 180 microns.
- Abrasive type: Clean ilmenite or garnet.
- Blasting angle to surface: 45° maximum.
- Blast pressure (maximum): 275 kPa.
- Distance of nozzle from surface (range): 350 to 400 mm.
- Nozzle type: 10 to 13 mm orifice diameter venturi type.

2.2 SITE WORK

Site welding

Grinding of edges: Permitted.

Weld areas: Reinstate coating to AS/NZS 4680 (2006) Section 8.

Site coating reinstatement

Rejection: If any item has damaged areas exceeding the limits specified for repair in AS/NZS 4680 (2006) clause 8.1, reject the item.

Extent: Areas damaged by transport, site welding, site flame cutting, site handling, or erection.

Method: To AS/NZS 4680 (2006) Section 8.

3 SELECTIONS

3.1 STRUCTURAL STEEL

Hot-dip galvanized steel schedule

	A	B	C
Atmospheric corrosivity category to AS/NZS 2312.2 (2014)	TBC		
Chemical composition			
Mechanical properties			

	A	B	C
Mechanical work (drilling)	TBC		
Special requirements for frequency of testing			
Test for uniformity or adherence			
Location of significant surface			
Additional requirements			
Special coating thickness			
Renovation of damaged or uncoated areas			

0345 STEEL – PROTECTIVE PAINT COATINGS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide protective paint coatings for the protection of steel products and structural steelwork against interior and exterior atmospheric corrosion, as documented.

Performance

Requirement: Control atmospheric corrosion to structural steelwork and steel products until the first scheduled maintenance.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Surface preparation and coating: To AS/NZS 5131 (2016) Section 9 and the recommendations of AS 2312.1 (2014).

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- DFT: Dry Film Thickness.
- ITP: Inspection and Test Plan.
- MIO: Micaceous Iron Oxide.
- PDS: Product Data Sheet.
- SDS: Safety Data Sheet.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 2310 (2002) and the following apply:

- Coating contractor: The protective coatings application contractor conducting the on- or off-site coating application works.
- Coating manufacturer: The supplier and/or manufacturer of the protective coating materials used.
- Inspection and test plans (ITP): A series of formal inspection and test plans, prepared by the coating contractor to reflect the specific inspection and testing that will be carried out on the surface preparation, coating application and the record keeping tasks to be undertaken.

1.5 SUBMISSIONS**Execution details**

Detailing features: If design and fabrication features of the items to be coated may lead to difficulties, identify these and submit details for improvement.

Repair of damaged coating: If the protective coating is damaged, submit a coating repair proposal, based on the coating manufacturer's recommendations for reinstating the corrosion protection function of the system.

Reinstatement: If final coat varies from the submitted sample, submit proposals for reinstatement of the visible final coating system.

Maintenance painting

Existing steelwork: Identify, itemise and submit details of areas of corrosion, damage and other degradation.

Recoating systems: Submit details of coating systems for maintenance painting of previously coated items and structural elements, including surface preparation.

Products and materials

Multi-component coatings: If partial mixing of packs is proposed, submit details.

Quality

ITPs: Submit for each proposed coating system.

Quality supervisor: Submit the name and record of experience of the person responsible for the implementation of the ITPs.

Records

General: Prepare and maintain records of all surface preparation and coating application works, as follows:

- Standards: To AS 3894.10 (2002), AS 3894.11 (2002), AS 3894.12 (2002), AS 3894.13 (2002) and AS 3894.14 (2002).
- Reference the relevant parts of the ITP and record conformance.

Samples

Painting and coating colour: Submit a 400 x 400 mm sample of the finished product for each coating system.

Retention: Retain samples for comparison during application.

Subcontractors

General: Submit names and contact details of proposed suppliers and applicators.

Requirement: Submit proof of currency of the applicator's environmental operating licence.

Substrate acceptance: Submit evidence of applicator's acceptance of the coating substrate before starting installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Items after fabrication, before commencing surface cleaning and preparation.
- Surfaces after preparation, before application of first coating.
- Coating stages:
 - . After application of primer or seal coats.
 - . After application of each subsequent coat.
- Repair of coating damage: Exposure of corrosion pitting or significant metal loss by blasting process.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.

Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.

Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.

Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).

Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material

Requirement: To AS/NZS 5131 (2016) clause 9.9.3.

Proprietary products

Requirement: Provide all products from the one manufacturer's supply.

Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.

Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.

Recording: To AS/NZS 5131 (2016) clause 9.9.5.

3 EXECUTION

3.1 GENERAL

Product warnings

Requirement: Conform to the SDS.

Surroundings

Protection: Prevent the release of abrasives, overspray or paint waste debris into the air, ground or to any watercourse. Prevent damage to other assets, services or equipment.

Reinstatement: Repair and/or clean affected surrounding areas.

Working area

General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.

Period: Continue protection where any of these conditions exist until the coating is no longer affected.

3.2 SURFACE PREPARATION

General

Requirement: Conform to AS/NZS 5131 (2016) clauses 9.3, 9.4 and 9.5.

Treatment grade to AS/NZS 5131 (2016)

Galvanized, aluminium and zinc primed surfaces

Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1 (2003). Allow to dry and immediately proceed with priming.

Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Zinc primed surfaces: If present, remove zinc salts from zinc primers.

Treatment of welds

Requirement: Clean welds to remove roughness, using power tools to AS 1627.2 (2002). Remove filings by vacuuming or compressed air.

Temporary welds: Grind flush any temporary welds.

Porous, skip or stitch welds: Not permitted.

Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 (2016) clause 9.12.2.

Shop priming

Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating

General: High pressure wash down all surfaces with clean water. Lightly sand down primer/intermediate coats, which have been shop applied, before site application of next coat.

3.3 PREPARATION ASSESSMENT

General

Conformance: Assess all surfaces of each steel member for conformance with the documented preparation requirements.

Abrasive blast cleaning

Assessment: To AS 1627.4 (2005) and AS 1627.9 (2002).

Mechanical cleaning

Assessment: To AS 1627.9 (2002).

Surface profile

General: To AS 3894.5 (2002) Method A.

Surface dust from abrasion

General: To AS 3894.6 (2002) Method C.

Chloride level testing

Test: To AS 3894.6 (2002) Method A.

Maximum allowable chloride levels: 50 mg/m² for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.

Conformance: If the maximum allowable chloride level is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.

Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.4 MIXING**General**

Requirement: To AS/NZS 5131 (2016) clause 9.9.6.

Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.

Multi-component coatings: Combine as whole pack units before application.

Thinners: If addition of thinners is proposed, conform to the coating manufacturer's recommendations for the documented product.

Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 COATING APPLICATION**General**

Requirement: Conform to AS/NZS 5131 (2016) clause 9.9 and the PDS.

Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application

Limits: Do not apply coating if any of the environmental/climatic/substrate conditions listed in AS/NZS 5131 (2016) clause 9.9.10 exist or if the following conditions are present:

- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- The specified surface cleanliness will deteriorate before the full prime coat application can be completed.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceeded 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, provided the final surface preparation and all coating applications are undertaken under the limit conditions.

Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, boltholes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolts, washers and nuts before installation.

Procedure: Conform to the coating order requirements for each coating designation, as documented.

Subsequent coats: Before applying any subsequent coating layers, make sure the surface condition of preceding coats are clean, free from defects and conform to the requirements documented.

Wet film thickness (WFT)

Method of measurement: To AS 3894.3 (2002) Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT)

Method of measurement: To AS 3894.3 (2002) Section 10.

Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.

Number of measurements: To AS 3894.3 (2002) Section 7.

Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.

Single readings: Conform to the following:

- The average of 5 point readings for each 10 m² area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m² to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.
- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

Rectification and defects

Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.

Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.6 PROTECTION

Contamination

Surfaces: Prevent contamination of coated surfaces, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care

General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.

Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.

Water ponding: Stack coated items to prevent water ponding.

3.7 COATING REPAIR

Repair of coating damage

Preparation: Feather back by hand or machine sand all leading edges of intact coating adjacent to the repair, to remove any sharp edge.

Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.

Sequence: Apply the repair coating in the same sequence and manner as the original coating.

Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged exposing the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Recoat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.

Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.

Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.

Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.8 COMPLETION

General

Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and the applicator.

4 SELECTIONS**4.1 PROTECTIVE PAINT COATING SYSTEMS****Protective paint coating schedule - AS 2312.1 (2014) designated systems**

	PC1	PC2	PC3
Location			
Atmospheric corrosivity category to AS 2312.1 (2014)			
System designation			
Description			
Colour (To AS 2700 (2011))			
Chloride level testing			

Protective paint coating schedule - Non AS 2312.1 (2014) designated systems

	PC1	PC2	PC3
Location			
Atmospheric corrosivity category to AS 2312.1 (2014)			
Durability - Years to first maintenance			
Description			
Primer (DFT)			
Second coat (DFT)			
Third coat (DFT)			
Colour (To AS 2700 (2011))			
Chloride level testing			

0345B STEEL – PROTECTIVE PAINT COATINGS
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1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide protective paint coatings for the protection of steel products and structural steelwork against interior and exterior atmospheric corrosion, as documented.

Performance

Requirement: Control atmospheric corrosion to structural steelwork and steel products until the first scheduled maintenance.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Surface preparation and coating: To AS/NZS 5131 (2016) Section 9 and the recommendations of AS 2312.1 (2014).

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- DFT: Dry Film Thickness.
- ITP: Inspection and Test Plan.
- MIO: Micaceous Iron Oxide.
- PDS: Product Data Sheet.
- SDS: Safety Data Sheet.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 2310 (2002) and the following apply:

- Coating contractor: The protective coatings application contractor conducting the on- or off-site coating application works.
- Coating manufacturer: The supplier and/or manufacturer of the protective coating materials used.
- Inspection and test plans (ITP): A series of formal inspection and test plans, prepared by the coating contractor to reflect the specific inspection and testing that will be carried out on the surface preparation, coating application and the record keeping tasks to be undertaken.

1.5 SUBMISSIONS**Execution details**

Detailing features: If design and fabrication features of the items to be coated may lead to difficulties, identify these and submit details for improvement.

Repair of damaged coating: If the protective coating is damaged, submit a coating repair proposal, based on the coating manufacturer's recommendations for reinstating the corrosion protection function of the system.

Reinstatement: If final coat varies from the submitted sample, submit proposals for reinstatement of the visible final coating system.

Samples

Painting and coating colour: Submit a 400 x 400 mm sample of the finished product for each coating system.

Retention: Retain samples for comparison during application.

Subcontractors

General: Submit names and contact details of proposed suppliers and applicators.

Requirement: Submit proof of currency of the applicator's environmental operating licence.

Substrate acceptance: Submit evidence of applicator's acceptance of the coating substrate before starting installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Items after fabrication, before commencing surface cleaning and preparation.
- Surfaces after preparation, before application of first coating.
- Coating stages:
 - . After application of primer or seal coats.
 - . After application of each subsequent coat.
- Repair of coating damage: Exposure of corrosion pitting or significant metal loss by blasting process.

2 PRODUCTS**2.1 GENERAL****Storage and handling**

Requirement: Handle, store, mix and apply all protective coatings in conformance with the manufacturer's recommendations.

Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.

Ambient temperature range for storage: 3°C to 30°C, or to manufacturer's recommendations.

Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).

Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material

Requirement: To AS/NZS 5131 (2016) clause 9.9.3.

Proprietary products

Requirement: Provide all products from the one manufacturer's supply.

Product data sheets (PDS): Keep on site copies of all relevant manufacturer's PDS.

Safety data sheets (SDS): Keep on site copies of all relevant manufacturer's SDS.

Recording: To AS/NZS 5131 (2016) clause 9.9.5.

3 EXECUTION**3.1 GENERAL****Product warnings**

Requirement: Conform to the SDS.

Surroundings

Protection: Prevent the release of abrasives, overspray or paint waste debris into the air, ground or to any watercourse. Prevent damage to other assets, services or equipment.

Reinstatement: Repair and/or clean affected surrounding areas.

Working area

General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.

Period: Continue protection where any of these conditions exist until the coating is no longer affected.

3.2 SURFACE PREPARATION

General

Requirement: Conform to AS/NZS 5131 (2016) clauses 9.3, 9.4 and 9.5.

Treatment grade to AS/NZS 5131 (2016)

Galvanized, aluminium and zinc primed surfaces

Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1 (2003). Allow to dry and immediately proceed with priming.

Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Zinc primed surfaces: If present, remove zinc salts from zinc primers.

Treatment of welds

Requirement: Clean welds to remove roughness, using power tools to AS 1627.2 (2002). Remove filings by vacuuming or compressed air.

Temporary welds: Grind flush any temporary welds.

Porous, skip or stitch welds: Not permitted.

Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 (2016) clause 9.12.2.

Shop priming

Requirement: Dust off and apply a coat of primer in conformance with the manufacturer's recommendations.

Site coating

General: High pressure wash down all surfaces with clean water. Lightly sand down primer/intermediate coats, which have been shop applied, before site application of next coat.

3.3 PREPARATION ASSESSMENT

General

Conformance: Assess all surfaces of each steel member for conformance with the documented preparation requirements.

Abrasive blast cleaning

Assessment: To AS 1627.4 (2005) and AS 1627.9 (2002).

Mechanical cleaning

Assessment: To AS 1627.9 (2002).

Surface profile

General: To AS 3894.5 (2002) Method A.

Surface dust from abrasion

General: To AS 3894.6 (2002) Method C.

3.4 COATING APPLICATION

General

Requirement: Conform to AS/NZS 5131 (2016) clause 9.9 and the PDS.

Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application

Limits: Do not apply coating if any of the environmental/climatic/substrate conditions listed in AS/NZS 5131 (2016) clause 9.9.10 exist or if the following conditions are present:

- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- The specified surface cleanliness will deteriorate before the full prime coat application can be completed.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceeded 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, provided the final surface preparation and all coating applications are undertaken under the limit conditions.

Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, boltholes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolts, washers and nuts before installation.

Procedure: Conform to the coating order requirements for each coating designation, as documented.

Subsequent coats: Before applying any subsequent coating layers, make sure the surface condition of preceding coats are clean, free from defects and conform to the requirements documented.

3.5 PROTECTION

Contamination

Surfaces: Prevent contamination of coated surfaces, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care

General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.

Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.

Water ponding: Stack coated items to prevent water ponding.

3.6 COATING REPAIR

Repair of coating damage

Preparation: Feather back by hand or machine sand all leading edges of intact coating adjacent to the repair, to remove any sharp edge.

Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.

Sequence: Apply the repair coating in the same sequence and manner as the original coating.

Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged exposing the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Recoat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.

Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.

Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.

Timing: Apply the protective coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

3.7 COMPLETION

General

Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and the applicator.

4 SELECTIONS

4.1 PROTECTIVE PAINT COATING SYSTEMS

Protective paint coating schedule - AS 2312.1 (2014) designated systems

	PC1	PC2	PC3
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	PC1	PC2	PC3
Location			
Atmospheric corrosivity category to AS 2312.1 (2014)			
System designation			
Description			
Colour (To AS 2700 (2011))			
Chloride level testing			

Protective paint coating schedule - Non AS 2312.1 (2014) designated systems

	PC1	PC2	PC3
Location			
Atmospheric corrosivity category to AS 2312.1 (2014)			
Durability - Years to first maintenance			
Description			
Primer (DFT)			
Second coat (DFT)			
Third coat (DFT)			
Colour (To AS 2700 (2011))			
Chloride level testing			

0345P DULUX STEEL PROTECTIVE PAINT COATINGS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide Dulux protective paint coatings for the protection of steel products and structural steelwork against interior and exterior atmospheric corrosion, as documented.

Performance

Requirement: Control atmospheric corrosion to structural steelwork and steel products until the first scheduled maintenance.

1.2 COMPANY CONTACTS**DuluxGroup/Dulux technical contacts**

Architects and Specifiers' Hotline: 13 23 77.

Website: www.duluxprotectivecoatings.com.au/contact-us/.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS**General**

Surface preparation and coating: To AS/NZS 5131 (2016) Section 9 and the recommendations of AS 2312.1 (2014).

Site testing of protective coatings

Test methods: To AS 3894.

1.5 MANUFACTURER'S DOCUMENTS**Technical manuals**

Duspec PDS, SDS, paint system selection: www.duspec.com.au.

1.6 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- ACA: Australasian Corrosion Association.
- DFT: Dry Film Thickness.
- ITP: Inspection and Test Plan.
- MIO: Micaceous Iron Oxide.
- NACE: National Association of Corrosion Engineers (USA).
- PDS: Product Data Sheet.
- SDS: Safety Data Sheet.
- SSPC: The Society for Protective Coatings (USA).
- μm : Micron (10⁻⁶m).

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 2310 (2002) and the following apply:

- Coating contractor: The protective coatings application contractor conducting the on- or off-site coating application works.
- Coating manufacturer: Dulux Protective Coatings.

- Inspection and test plans (ITP): A series of formal inspection and test plans, prepared by the coating contractor to reflect the specific inspection and testing that will be carried out on the surface preparation, coating application and the record keeping tasks to be undertaken.
- Safety data sheet (SDS): Prepared in conformance with Safe Work Australia's requirements and distributed by the coating manufacturer to provide information on the safe handling, storage, personal protective equipment requirements, use and disposal of a coating product. Previously called a material safety data sheet (MSDS).

1.7 QUALITY ASSURANCE

General

Standard: Applicator Quality Assurance system to AS/NZS ISO 9001 (2016).

Applicator's quality assurance officer: Nominate a qualified NACE Certified Coating Inspector or a ACA Certified Coatings Technician under direction of a NACE inspector.

Records: Maintain records:

- Access: Have records available for inspection.

Verification: Nominate an independent NACE Certified Coating Inspector to carry out quality audits.

Defects: Provide written inspector reports.

1.8 SUBMISSIONS

Execution details

Detailing features: If design and fabrication features of the items to be coated may lead to difficulties, identify these and submit details for improvement.

Repair of damaged coating: If the protective coating is damaged, submit a coating repair proposal, based on the coating manufacturer's recommendations for reinstating the corrosion protection function of the system.

Reinstatement: If final coat varies from the submitted sample, submit proposals for reinstatement of the visible final coating system.

Maintenance painting

Existing steelwork: Identify, itemise and submit details of areas of corrosion, damage and other degradation.

Recoating systems: Submit details of coating systems for maintenance painting of previously coated items and structural elements, including surface preparation.

Products and materials

Multi-component coatings: If partial mixing of packs is proposed, submit details.

Quality

ITPs: Submit for each proposed coating system.

Quality supervisor: Submit the name and record of experience of the person responsible for the implementation of the ITPs.

Records

General: Prepare and maintain records of all surface preparation and coating application works, as follows:

- Standards: To AS 3894.10 (2002), AS 3894.11 (2002), AS 3894.12 (2002), AS 3894.13 (2002) and AS 3894.14 (2002).
- Reference the relevant parts of the ITP and record conformance.

Samples

Painting and coating colour: Submit a 400 x 400 mm sample of the finished product for each coating system.

Retention: Retain half of each sample for comparison during coating application.

Subcontractors

General: Submit names and contact details of proposed suppliers and applicators.

Requirement: Submit proof of currency of the applicator's environmental operating licence.

Substrate acceptance: Submit evidence of applicator's acceptance of the coating substrate before starting installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.9 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Items after fabrication, before commencing surface cleaning and preparation.
- Surfaces after preparation, before application of first coating.
- Coating stages:
 - . After application of primer or seal coats.
 - . After application of each subsequent coat.

2 PRODUCTS**2.1 GENERAL****Product substitution**

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Storage and handling

General: Store in a cool shady place.

Care: Handle, store, mix and apply all protective coatings in conformance with Dulux recommendations.

Original containers: Deliver coating products to site in manufacturer's labelled and sealed containers.

Ambient temperature range for storage: 15°C to 25°C.

Sunlight: Protect coating materials from direct sunlight before mixing or adding the converter (catalyst).

Use-by-date: Use products with limited shelf life before their use-by-date, unless written authorisation from the coating manufacturer's technical services section is provided.

Paint material

Requirement: To AS/NZS 5131 (2016) clause 9.9.3.

Proprietary products

Substitution: Dulux paint products and specified coatings systems have been selected for this project and unauthorised product substitution will jeopardise or void the Warranties.

Product data sheets (PDS): Keep on site copies of all relevant Dulux technical data sheets.

Safety data sheets (SDS): Keep on site copies of all relevant Dulux SDSs.

Recording: To AS/NZS 5131 (2016) clause 9.9.5.

3 EXECUTION**3.1 GENERAL****Product warnings**

Requirement: Conform to the requirements and recommendations of the relevant Dulux SDS.

Qualifications

Requirement: All work is to be completed by suitably qualified professionals holding TAFE or other recognised qualifications.

Surroundings

Protection: Prevent the release of abrasives, overspray or paint waste debris into the air, ground or to any watercourse. Prevent damage to other assets, services or equipment.

Reinstatement: Repair and/or clean affected surrounding areas.

Working area

General: Perform all painting under cover and/or protected from rain, condensation, dew, excessive wind, overspray or wind-blown dust.

Period: Continue protection where any of these conditions exist until the coating is no longer affected.

3.2 SURFACE PREPARATION

General

Requirement: Conform to AS/NZS 5131 (2016) clauses 9.3, 9.4 and 9.5.

Treatment grade to AS/NZS 5131 (2016)

Surface cleansing: Wash and degrease all surfaces to be coated, to AS 1627.1 (2003), with a free-rinsing, alkaline detergent, such as Gibson F310B or Gamlen CA No. 1 used in conformance with the manufacturer's written instructions and all safety warnings.

Bolts: Provide washers at heads and nuts at replacement bolts.

Galvanized, aluminium and zinc primed surfaces

Requirement: Remove grease, oil and other solvent-soluble contaminants to AS 1627.1 (2003). Allow to dry and immediately proceed with priming.

Galvanized and aluminium surfaces: Abrade surfaces to a medium coarse type finish to provide an adhesion key.

Zinc primed surfaces: If present, remove zinc salts from zinc primers.

Treatment of welds

Requirement: Clean welds to remove roughness, using power tools to AS 1627.2 (2002). Remove filings by vacuuming or compressed air.

Temporary welds: Grind flush any temporary welds.

Porous, skip or stitch welds: Not permitted.

Site welding: If possible, avoid site welding. If on site welding is required, prepare and treat the weld to AS/NZS 5131 (2016) clause 9.12.2.

Shop priming

Requirement: Dust off and apply a coat of primer, according to the technical specification.

Site coating

General: High pressure wash down all surfaces with clean water. Lightly sand down primer/intermediate coats, which have been shop applied, before site application of next coat.

3.3 PREPARATION ASSESSMENT

General

Conformance: Assess all surfaces of each steel member for conformance with the documented preparation requirements.

Abrasive blast cleaning

Assessment: To AS 1627.4 (2005) and AS 1627.9 (2002).

Minimum acceptance class: Sa 2.5.

Mechanical cleaning

Assessment: To AS 1627.9 (2002) and ISO 8501-2 (1994).

Minimum acceptance class: St 2.

Surface profile

General: To AS 3894.5 (2002) Method A.

Acceptable profile range: 40 to 75 µm.

Surface dust from abrasion

General: To AS 3894.6 (2002) Method C.

Chloride level testing

Test: To AS 3894.6 (2002) Method A.

Maximum allowable chloride levels: 50 mg/m² for critical applications (heavy condensation, fresh water ponding or immersion) or to manufacturer's recommendations.

Conformance: If the maximum allowable chloride level is exceeded, rewash the affected surface area until the chloride level is within the acceptable limits using clean water or chloride neutralising solutions. Jet-washing or steam cleaning is also acceptable before re-testing and re-abrasive blasting.

Timing of testing: Early in the blasting work so that removal procedures can be started before the blasting is completed.

3.4 MIXING

General

Requirement: To AS/NZS 5131 (2016) clause 9.9.6.

Powered agitators: Mix package sizes larger than 4 litres using powered agitators driven by air motors.

Multi-component coatings: Combine as whole pack units before application.

Thinners: If addition of thinners is proposed, conform to the Dulux PDS for the documented product.

Colour consistency: If colour consistency is required, pre-mix tinted products, before the addition of the curing agent or converter and before coating application.

3.5 COATING APPLICATION

General

Requirement: Conform to the Dulux PDS, the Dulux specification and AS/NZS 5131 (2016) clause 9.9.

Painting and coating colour: Verify all project finish colours with the retained samples.

Final surface preparation or coating application

Limits: Do not apply coating if any of the environmental/climatic/substrate conditions listed in AS/NZS 5131 (2016) clause 9.9.10 exist or if the following conditions are present:

- Ambient air temperature below 5°C or above 40°C.
- Substrate temperature below 5°C or above 35°C.
- The specified surface cleanliness will deteriorate before the full prime coat application can be completed.
- Surface preparation standard has not been achieved.
- Time between final surface preparation and the commencement of coating has exceeded 4 hours.
- Visual tarnishing or black spots develop on the surface of the steel.

Exception: Preliminary blast or other surface preparations may be performed in conditions that are outside the limits, provided the final surface preparation and all coating applications are undertaken under the limit conditions.

Pre-coating: Before the spray application of each coating, stripe coat by brush method all edges, welds, seams, rivets, bolts, boltholes (including slots) and difficult to spray areas. Prime the underlying surfaces of replacement bolts, washers and nuts before installation.

Procedure: Conform to the coating order of each protective paint coating system, as documented.

Subsequent coats: Make sure that before any subsequent coating layer is applied, the surface condition of the preceding coat is complete and correct in all respects, including its DFT achievement, cleanliness and freedom from defects. These are detailed on the Dulux Protective Coating specification. Depending on the applicators chosen method additional coats may be required to achieve the nominated minimum DFT.

Conformance: To AS 2312.1 (2014) for the specified film thickness of individual coats.

Correction: Correct any defect in a coating layer before the subsequent coating layer is applied.

Wet film thickness (WFT)

Method of measurement: To AS 3894.3 (2002) Appendix C using an approved wet film gauge continuously during application.

Dry film thickness (DFT)

Method of measurement: To AS 3894.3 (2002) Section 10.

Extent: Measure all surfaces at the completion of each prime, intermediate and finish coats, including areas of the element difficult to paint, masked by structure, or where double or light coating is likely.

Number of measurements: To AS 3894.3 (2002) Section 7.

Coatings with DFT 150 µm or less: If testing, deduct the effect of the measured surface profile from all DFT readings.

Single readings: Conform to the following:

- The average of 5 point readings for each 10 m² area of coating surface to be within the documented coating thickness range.
- No single point reading in any 10 m² to be less than 80% of the specified minimum coating thickness. If the average of three readings is used to produce a point reading, an individual reading may be less than 80% of the minimum coating thickness.

- Check any single reading that is greater than 150% of the documented maximum DFT with three additional readings within 50 mm of the original reading. If the average of these three readings is not greater than 150% of the specified DFT, take the average reading as the point reading. If greater than 150%, reject the DFT for that area. If no maximum limit for DFT is documented, consult manufacturer.

Rectification and defects

Rectification: Re-work areas rejected, using the same surface preparation, coatings and sequence as for the original work.

Defects (including under-thickness and over-thickness): Mark with dustless chalk, adhesive inspection labels or masking tape. Do not use crayon, paint or spirit based ink pens.

3.6 PROTECTION

Contamination

Surfaces: Prevent contamination of coated surfaces, which are not yet dry, from blasting dust, abrasive or surface preparation debris and any other foreign matter.

Post application care

General: Protect the coating against physical, chemical, or atmospheric damage until all components are fully cured.

Care: Stack and handle all coated items using fabric slings or padded chains. Use soft packaging, carpet strips or other deformable materials between all coated items.

Water ponding: Stack coated items to prevent water ponding.

3.7 COATING REPAIR

Repair of coating damage

Preparation: Feather back by hand or machine sand all leading edges of intact coating adjacent to the repair, to remove any sharp edge.

Surface contamination: Remove by dusting or blowing down before applying the first coat of paint.

Sequence: Apply the repair coating in the same sequence and manner as the original coating.

Areas damaged without exposing the primer: Wash with a proprietary detergent solution, rinse with clean water and abrade so that edges of sound paint are feathered. Coat the area with the appropriate intermediate and finishing coat materials.

Areas damaged exposing the primer or steel surface: Blast clean to the original standard. Prepare at least 50 mm into the sound coating and to a further feathering zone of approximately 50 mm. Recoat with the documented system to restore the film thickness and integrity over the whole prepared surface including the feathered zone.

Aesthetic reinstatement: If required, repaint to a physical or discernible boundary line.

Defects: If corrosion pitting or areas of significant metal loss and defects are exposed by the blasting process, advise for inspection and have areas passed as being fit for service before proceeding with the coating system.

Timing: Apply the Dulux Protective Coating system within 4 hours of blast cleaning or in any case before visual tarnishing of the steel occurs.

Cleaning: Provide, at no additional cost, surface treatment as follows:

- Surfaces left longer than 4 hours: Re-blast cleaning before coating.
- Surfaces that develop visual tarnishing (red rust or black spots) at any time before coating: Wash down with clean water then blast clean before coating. There are commercially available chloride reducing solutions that may assist.

3.8 COMPLETION

General

Joints: On completion, seal all joints and mating surfaces with a compatible polyurethane sealant.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and the applicator.

4 SELECTIONS

4.1 PROTECTIVE PAINT COATING SYSTEMS

There are decorative finish options for architectural and structural steel. The most common coating types are:

Gloss polyurethane

Inland AS 2312.1 (2014) Categories C1 and C2: Polyurethane

Location	Primer	Second Coat	Third Coat	Duspec No.
Interior non-decorative	75 µm DULUX Durepon EZP	Nil	Nil	PC00016
Interior decorative	75 µm DULUX Durepon EZP	75 µm DULUX Weathermax HBR	Nil	DU04004
Exterior non-decorative	125 µm DULUX Duremax GPE ZP	75 µm DULUX Weathermax HBR	Nil	DU03795
Exterior decorative	125 µm DULUX Duremax GPE ZP	75 µm DULUX Weathermax HBR	Nil	DU03795

Coastal AS 2312.1 (2014) Categories C3, C4 and C5: Polyurethane

Location	Primer	Second Coat	Third Coat	Duspec No.
Interior non-decorative	75 µm DULUX Zincanode 402	Nil	Nil	PC00385
Interior decorative equivalent to AS 2312.1 (2014) PUR2a	75 µm DULUX Zincanode 402	75 µm DULUX Weathermax HBR	Nil	DU04006
Exterior non-decorative equivalent to AS 2312.1 (2014) EHB4	75 µm DULUX Zincanode 402	200 µm DULUX Duremax GFX	Nil	PC00385 PC00348
Exterior decorative	75 µm DULUX Zincanode 402	200 µm DULUX Duremax GPE	75 µm DULUX Weathermax HBR	DU04005

Micaceous Iron Oxide (MIO)

Inland AS 2312.1 (2014) Categories C1 and C2: Micaceous iron oxide

Location	Primer	Second Coat	Third Coat	Duspec No.
Interior non-decorative	75 µm DULUX Luxaprim ZP	Nil	Nil	PC612
Interior decorative	75 µm DULUX Durepon EZP	Dulux Weathermax HBR Two Pack MIO Gloss	Nil	DU04004
Exterior non-decorative	75 µm DULUX Zincanode 402	Dulux Weathermax HBR Two Pack MIO Gloss	Nil	DU4006
Exterior decorative	75 µm DULUX Zincanode 402	Dulux Weathermax HBR Two Pack MIO Gloss	Dulux Weathermax HBR Two Pack MIO Gloss	DU4006

Coastal AS 2312.1 (2014) Categories C3, C4 and C5: Micaceous iron oxide

Location	Primer	Second Coat	Third Coat	Duspec No.
Interior non-decorative	75 µm DULUX Zincanode 402	Nil	Nil	PC00385
Interior decorative	75 µm DULUX Zincanode 402	100 µm DULUX Ferreko 3	100 µm DULUX Ferreko 3	DU05364

Location	Primer	Second Coat	Third Coat	Duspec No.
Exterior non-decorative equivalent to AS 2312.1 (2014) EHB6	75 µm DULUX Zincanode 402	125 µm DULUX Ferreko 3	125 µm DULUX Ferreko 3	DU03703
Exterior decorative	75 µm DULUX Zincanode 402	200 µm DULUX Duremax GPE	100 µm DULUX Ferreko 3	DU04130

4.2 SCHEDULES

Protective paint coating schedule

	PC1	PC2	PC3
Atmospheric corrosivity category to AS 2312.1 (2014)	TBC		
Level/grids/reference			
Protective paint coating system			
Location			
Chloride level testing			
Colour (To AS 2700 (2011))			

0382 LIGHT TIMBER FRAMING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide light timber floor, wall and roof framing, as documented.

Refer to Structural Engineer's Drawings and Specification.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0181 Adhesives, sealants and fasteners.
- 0185 Timber products, finishes and treatment.

1.3 STANDARDS**General**

Framing: To AS 1684.2 (2021), AS 1684.3 (2021) or AS 1684.4 (2010), as appropriate.

Design: To AS 1720.1 (2010).

1.4 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the definitions given in the AS 1684 series apply.

1.5 TOLERANCES**Floors**

Maximum deviation from a 3 m straightedge laid in any direction on the floor framing: 5 mm.

Wall tolerances table

Property	Permitted deviation
Generally: Verticality in 2 m	1:500
Generally: Flatness ^a in 2 m	3 mm
Features ^b : Verticality in 2 m	1:1000
Features ^b : Horizontality in 2 m	1:1000
a. Flatness: Measured under a straightedge laid in any direction on a surface.	
b. Features: Conspicuous horizontal or vertical lines including external corners, parapets, reveals, heads, sills.	

1.6 SUBMISSIONS**Certification**

Requirement: Submit certification by an appropriately qualified person of the design, documentation and erected work to the AS 1684 series and/or by a professional engineer to AS 1720.1 (2010).

Include the following:

- Reactions: Provide location and magnitude of reactions to be accommodated by the support structure. If part of the structure is manufactured by a prefabricator (e.g. roof trusses), provide location and magnitude of reactions and tie down forces.
- Floor, wall and roof frame member sizes: A schedule of proposed member sizes, certified as meeting stated project requirements for spans, spacings, loadings and deflections.
- Species and stress grade.

Products and materials

Supply: Submit supplier's evidence of conformity, which may be included on an invoice or delivery docket, verifying that the timber conforms to the documented requirements.

Inspection: Submit the inspection authority's evidence of conformity verifying that the erected timber frame conforms to the documented requirements.

Moisture content: Submit records of moisture content to AS/NZS 1080.1 (2012).

CCA treated timber: If proposed to be used, submit details.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, certified by a professional engineer stating that the design has been carried out to the requirements of the AS 1684 series and AS 1720.1 (2010), for the documented configurations and loadings.

Prefabricated roof trusses: Include the following:

- Marking plans.
- Truss plan layout.
- Elevations, with the arrangement of members allowing for the accommodation of in-roof services and the size and section type of each member.
- Camber of all elements.
- The method of assembly, connection and lifting.
- Location and details of tie down and bracing.

Prefabricated wall frames: Include the following:

- Wall plan, showing all wall layouts.
- Elevations showing the arrangement of members, and the size and section type of each member.
- The method of assembly, connection and lifting.
- Location and details of tie down and bracing.

Subcontractors

Prefabricated items: Submit the name and contact details of proposed manufacturers, suppliers and installers.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Prefabricated units before installation.
- Fabricated items before priming or water-repellent treatment.
- Bolts after final tightening.
- Timber work after erection but before it is covered.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Handling: Do not distort or damage timber or timber products. Do not mark or stain the surface of architecturally expressed structural elements. Use identified loading and lifting points.

Storage: To manufacturer's specifications and the following:

- Maintain integrity of structural timber and treatments.
- Store architecturally expressed structural elements and elements for internal use under cover.

Moisture content of seasoned timber: Provide protection throughout handling and storage to maintain a moisture content within the targets for seasoned timber (15% maximum) and ideally near the equilibrium moisture content anticipated in service.

Marking

Branding: Brand structural timber, under the authority of a recognised product certification scheme to *0185 Timber products, finishes and treatment* as applicable to the product. Locate the brand mark on faces or edges that will be concealed in the works. Include the following data for timbers not covered by branding provisions in Australian Standards or regulations for which branding is required:

- Stress grade.
- Method of grading.

- If seasoned, the word, SEASONED or DRY, or an abbreviation of seasoned, such as SEAS or S.
- The certification mark of the product certification scheme.
- The applicable standard.

Trusses: Permanently label each truss to show:

- Manufacturer.
- Tag or number with reference to location.
- Support and tie down points.
- Labelling in coordination with installation documentation.

Preservative treatment

Requirement: To *0185 Timber products, finishes and treatment*, including for termite treatments.

2.2 TIMBER

Certification

Requirement: Certification, chain of custody and product labelling to *0185 Timber products, finishes and treatment*.

Fascias and barge boards

Hardwood: To AS 2796.1 (1999).

Seasoned cypress pine: To AS 1810 (1995).

Softwood: To AS 4785.1 (2002).

Refer to Structural Engineer's Drawings and Specification.

Trusses

Design: To AS 1720.1 (2010).

Nailplated roof trusses: To AS 1720.5 (2015).

Overhangs: Free from spring or splits.

Refer to Structural Engineer's Drawings and Specification.

2.3 LAMINATED VENEER LUMBER AND GLUED LAMINATED TIMBER

Laminated veneer lumber

Standard: To AS/NZS 4357.0 (2022).

Formaldehyde emission class to AS/NZS 4357.0 (2022)

Refer to Structural Engineer's Drawings and Specification.

Glued laminated timber

Standard: To AS/NZS 1328.1 (1998).

2.4 STRUCTURAL PLYWOOD

General

Standard: To AS/NZS 2269.0 (2012).

Bond: Type A to AS/NZS 2754.1 (2016).

Formaldehyde emission class to AS/NZS 2269.0 (2012)

Refer to Structural Engineer's Drawings and Specification.

Bracing

Refer to Structural Engineer's Drawings and Specification.

Veneer

Veneer quality to visible surfaces: CD (minimum) to AS/NZS 2269.0 (2012).

Refer to Structural Engineer's Drawings and Specification.

2.5 COMPONENTS

Nailplated joined beams

Type: Engineered beam made from stress-graded timber pieces joined together with nailplates.

Refer to Structural Engineer's Drawings and Specification.

Mild steel post bases

Embedment: Embed base a minimum of 150 mm into the concrete support and to the manufacturer's recommendations.

Location: To timber posts supported off concrete slabs or footings.

Finish: Galvanized.

Refer to Structural Engineer's Drawings and Specification.

Fasteners

Requirement: Conform to *0181 Adhesives, sealants and fasteners*.

CCA treated timber: If in contact with CCA treated timber, provide hot-dip galvanized bolts with plastic sheaths, or bituminous or epoxy coatings to manufacturer's recommendations.

Damp-proof course

Material: To AS/NZS 2904 (1995) or suitable alternative material conforming to NCC (2022) A5G3.

Flashings

Material: To AS/NZS 2904 (1995) or suitable alternative material conforming to NCC (2022) A5G3.

Type: Colour to match adjacent wall and/or roof to approval.

2.6 FINGER JOINTED STRUCTURAL TIMBER**General**

Performance: To AS/NZS 8008 (2022).

Adhesive bond performance: To AS/NZS 8008 (2022).

Production: To AS 5068 (2006).

Material requirements: As documented.

2.7 RECONSTITUTED WOOD PRODUCTS**Wet process fibreboard (including hardboard)**

Standard: To AS/NZS 1859.4 (2018).

Bending strength: To AS/NZS 1859.4 (2018) Section 7.

Material requirements: As documented.

3 EXECUTION

3.1 GENERAL**Installation**

Framing: To the AS 1684 series.

Fastener installation: To *0181 Adhesives, sealants and fasteners*. Do not split or otherwise damage the timber.

3.2 FLOOR FRAMING**Bearers and joists**

Levelling: Level bearers and joists by checking or by packing for the full width of the member with dense corrosion-resistant material that is secured in place.

Maximum thickness of packing: 3 mm.

Spring: Lay bearers and joists to allow for straightening under loading.

Refer to Structural Engineer's Drawings and Specification.

Joints

Requirement: Locate joints only over supports:

- Minimum bearing of bearers: 50 mm.
- Minimum bearing of joists: 30 mm.

Fixing and restraint

Fixing: Secure bearers and joists to supports to provide restraint against lateral movement.

Deep joists: To AS 1684.2 (2021) clause 4.2.2.3 or AS 1684.3 (2021) clause 4.2.2.3 as appropriate.

Trimmers or blocking dimensions:

- Depth: Joist depth less 25 mm.
- Minimum thickness: 25 mm.

Engineered timber joists: Provide lateral restraint to the manufacturer's recommendations.

3.3 WALL FRAMING

Bracing

Refer to Structural Engineer's Drawings and Specification.

Additional support

Requirement: Provide additional support in the form of noggings, trimmers and studs for fixing lining, cladding, hardware, accessories, fixtures and fittings, as required.

Spacing of noggings: Maximum 1350 mm centres.

Refer to Structural Engineer's Drawings and Specification.

Vermin barriers

Requirement: Provide vermin barriers as follows:

- Brick veneer barrier: Close nail 10 mm galvanized steel wire mesh to the underside of the bottom plate of external stud walls, extending across the cavity for building into brickwork.

Damp-proof course

Requirement: Provide damp-proof courses under the bottom plate of stud walls built off slabs or masonry dwarf walls, as documented and as follows:

- External walls (not masonry veneer): Turn up at least 75 mm on the inside and tack. Project 10 mm beyond the external slab edge or dwarf wall and turn down at 45°.
- Walls of bathrooms, shower rooms and laundries: Turn up at least 150 mm on the wet side and tack to studs.

Installation: Lay in long lengths. Lap full width at angles and intersections and at least 150 mm at joints.

Junctions: Preserve continuity at junctions of damp-proof courses, sarkings and waterproof membranes.

Flashings

Location: Provide flashings to external openings to prevent the entry of moisture. Form trays at the ends of sill flashings.

Masonry veneer construction: Extend flashing across cavities and build into brickwork.

3.4 ROOF AND CEILING FRAMING

Wall plates

Fixing: Fix timber wall plates to masonry, with straps, bolts or both.

Refer to Structural Engineer's Drawings and Specification.

Fixing plates

Requirement: Provide timber fixing plates to transfer the design loads where timber joists, rafters or purlins bear on or into steel members, as documented. Bolt to the steel member at maximum 500 mm centres and at a maximum of 100 mm from the end of the fixing plate.

Refer to Structural Engineer's Drawings and Specification.

Beam framing

Ridge straps: Butt ends of rafters together at ridge, and strap each pair together with 900 mm long steel strap passing over the ridge, triple nail to each rafter.

Refer to Structural Engineer's Drawings and Specification.

Additional support

Requirement: Provide additional frame members at the following locations:

- Hanging light fittings.
- Ceiling fans.
- Access panels.
- Any other hanging services or fixtures and fittings.

Water tank or heater in roof space: Provide a support platform to AS/NZS 3500.4 (2021) clause 5.5.1.

Anti-ponding boards

Standard: To AS 4200.2 (2017).

Trusses

Nailplated prefabricated roof trusses: To AS 4440 (2004).

Support: Support trusses on bottom chord at two points only, unless designed for additional support.

Plumb: The lesser of $H/50$ or 50 mm, where H is the height of the truss at point where plumb is being measured.

Vertical movement: Provide minimum vertical clearance of 10 mm plus ceiling batten depth over internal non-load bearing walls. Use bracing methods that allow for the design vertical movements.

Refer to Structural Engineer's Drawings and Specification.

3.5 ROOF TRIM**Fascia, valley and barge boards**

Requirement: Fix fascia, valley gutter boards and barge boards.

3.6 COMPLETION**Protection**

Protection from weather: Provide temporary protection for members until permanent covering is in place.

Tightening

Requirement: Retighten bolts, screws and other fixings so that all joints and anchorages are secure at the date of practical completion.

Cleaning

General: On completion of framing remove debris from any gaps between members and make sure void between bottom chord of roof trusses and top of any non-supporting internal wall is clear.

4 SELECTIONS**4.1 SCHEDULES****Finger jointed structural timber schedule**

	A	B	C
Cross-section (mm)	TBC		
Length (mm)			
Stress grade			
Service class			

Reconstituted wood products schedule

	A	B	C
Classification	TBC		
Thickness (mm)			
Dimensions (mm)			
Finish quality			
Surface finish			
Bracing unit type			

0411B WATERPROOFING – EXTERNAL AND TANKING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide external waterproofing and tanking systems to substrates, as documented.

Performance

Requirements:

- Graded to falls to dispose of stormwater without ponding above the depth of lapped seams.
- Able to accommodate anticipated building movements.
- Able to accommodate its own shrinkage over the warranty life of the roofing system.
- Able to resist water under hydrostatic pressure.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**Below ground waterproofing**

Membrane design and installation: To BS 8102 (2022).

External waterproofing

Membrane materials: To AS 4654.1 (2012).

Membrane design and installation: To AS 4654.2 (2012).

Stormwater drainage

Standard: To AS/NZS 3500.3 (2021).

Slip resistance

Classification: To AS 4586 (2013).

1.4 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- APP: Atactic polypropylene.
- SBS: Styrene butadiene styrene.

Definitions

General: For the purposes of this worksection, the definitions given in AS 4654.1 (2012) and AS 4654.2 (2012) and the following apply:

- Bitumen: A viscous material from the distillation of crude oil comprising complex hydrocarbons, which is soluble in carbon disulfide, softens when it is heated, is waterproof and has good powers of adhesion. It is produced as a refined by-product of oil.
 - . APP bitumen: Bitumen modified with atactic (meaning non-crystalline or amorphous) polypropylene wax to form a plastomeric sheet. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
 - . SBS bitumen: Bitumen modified with styrene-butadiene-styrene, a thermoplastic rubber that undergoes a phase inversion at elevated temperature and converts to an elastomeric material. The membrane is reinforced with fibreglass or non-woven polyester (NWP).
- Bond breaker: A system preventing a membrane bonding to the substrate, bedding or lining.
- Double detail joint: A joint formed by turning up and bonding the horizontal membrane to a vertical substrate and adding an overflashing of membrane material bonded to the vertical substrate and folded over and bonded to the horizontal membrane. In certain situations the double detail can be

achieved by bonding an angle profile of membrane material to the junction prior to laying the membrane.

- Liquid applied: A water-based formulation that cures to form an elastomeric membrane.
- Polyurethane: Water or solvent-based formulations that moisture cure to form an elastic rubber membrane.
- PVC membrane: Flexible plastic sheet membrane (vinyl).
- Slip sheet: A sheet used to isolate the membrane system from the supporting substrate or from the topping or mortar bedding. The most common material is polyethylene.
- Substrate: The surface to which a material or product is applied.
- Waterproofing system: Combinations of membranes, flashings, drainage and accessories that form waterproof barriers and that may be:
 - . Loose-laid.
 - . Bonded to substrates.

1.5 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Records

General: Submit photographic records to **EXECUTION, GENERAL, Reporting.**

Flood tests: Submit photographic records to **TESTING, Flood tests.**

Subcontractors

General: Submit names and contact details of proposed suppliers and installers as recommended by the manufacturer.

Substrate acceptance: Submit evidence of installer's acceptance of the flooring substrate before starting installation.

Tests

Site tests: Submit test results of the following:

- Substrate moisture content to **TESTING, Substrate moisture tests.**
- Flood test, including results of retesting after rectification, to **TESTING, Flood tests.**
- Slip resistance of completed installation to **TESTING, Slip resistance tests.**

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrates prepared and ready for installation of the waterproofing and tanking systems.
- Secondary layers prepared and ready for subsequent layers.
- Membranes after installation and before concealment.
- Underflashings after installation and before installation of overflashings.
- After flood testing, if applicable.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Store and handle to the manufacturer's recommendations and as follows:

- Protect materials from damage.

2.2 MEMBRANES

Membrane system

Requirement: Proprietary membrane system suitable for the intended external waterproofing.

Tanking system

Requirement: Proprietary membrane system suitable for the intended below ground tanking.

2.3 ACCESSORIES

Internal roof outlets

General: Proprietary funnel shaped sump cast into the roof slab, set flush with membrane, with a removable grating and provision for sealing the membrane into the base of the outlet.

Bond breakers

Requirement: Compatible with the extensibility class of the membrane to be used.

Material: Purpose-made bond breaker tapes and closed cell foam backing rods or fillets of sealant.

Flashings

Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

Liquid membrane reinforcement

Requirement: Flexible fabric compatible with the waterproof membrane system.

Sealants

Requirement: Waterproof, flexible, mould-resistant and compatible with the waterproofing system.

Adhesives

Requirement: Waterproof and compatible with the waterproofing system.

Control joint covers

Corners, crossovers, tees and bends: Factory mitred, welded and provided with 50 mm legs.

End closures: Factory folded and sealed to match joint cover profile.

Fixing hobs: Concrete or timber.

2.4 THERMAL INSULATION

Insulation boards

2.5 PROTECTION

Protection board

2.6 SLIP SHEETS

Sheet material

2.7 DRAINAGE CELL PANELS

Walls N/A

Planter bases N/A

3 EXECUTION

3.1 GENERAL

Reporting

General: Make progressive photographic records of the waterproofing installation. Label photographs with the date, location and weather.

Timing: Record at the following stages:

- After substrate preparation.
- After primer application.
- After membrane installation.
- After protection from traffic provided.

Liquid applied membranes:

- Record wet film thickness once every 10 m² and compare to the manufacturer's requirements.
- On completion of every 100 m² of each coat, compare the amount of membrane used with the manufacturer's application rate and record the result.

3.2 PREPARATION

Substrates

General: Prepare substrates as follows:

- Clean and remove any deposit or finish that may impair adhesion of membranes.
- Remove excessive projections.
- Fill voids and hollows in concrete substrates with a concrete mix not stronger than the substrate.
- Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.
- Remove all traces of a concrete curing compound if used.

Concrete substrates: Cure for more than 28 days.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to **TESTING, Substrate moisture tests**.

Falls

Requirement: Verify that falls in substrates are greater than 1:100.

Joints and fillets

Internal corners:

- Liquid applied membranes: Provide 15 x 15 mm 45° fillets.
- Sheet membranes: Provide 40 x 40 mm 45° fillets.

Fillet material: Cement or plastic.

External corners: Round or arris edges.

Control joints: Prepare all substrate joints to suit the membrane system.

Priming

Compatibility: If required, prime the substrates with compatible primers for adhesion of the membrane system.

3.3 INSTALLATION

Ambient conditions

Requirement: Do not install in conditions outside the manufacturer's recommendations.

Protection

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage.

Drains

General: Prevent moisture from tracking under the membranes at drainage locations.

Drains and cages: Provide removable grates or cages to prevent blockage from debris. If the finished surface is above the level of the membrane, provide a slotted extension piece to bring the grate up to the level of the finished surface.

Overflows: Apply a bond breaker to the perimeter of the overflow outlet at its junction with the surface to which the membrane will be fixed. Turn the membranes into the overflow to prevent moisture from tracking behind the membrane.

Sheet membrane joints

Orientation of laps: Lap sheets on the upslope side of the roof fall over sheets on the downslope side.

End laps generally: Stagger end lap joints.

Bituminous sheet membranes:

- Side laps: ≥ 75 mm.
- End laps: ≥ 150 mm.
- Method: Heat welded.

Synthetic rubber membranes:

- Factory-vulcanized laps: ≥ 40 mm.
- Field side laps: ≥ 50 mm.
- Field end laps: ≥ 100 mm.

PVC membranes:

- Factory-welded laps: ≥ 40 mm.
- Field-welded laps:
 - . If used over insulation boards: ≥ 100 mm.
 - . Other instances: ≥ 75 mm.

Movement and control joints

General: Install membranes to accommodate control joints in the substructure.

Bond breakers: Size to allow the membrane to accommodate movement.

Joint backing gutter: Fix a formed metal gutter to one side of the soffit directly below the joint and fall to a suitable disposal or drainage point.

Control joint covers: Install after fixing hobs and membranes.

Membrane terminations

Membrane upturns: Provide upturns above the maximum water level expected from the exposure conditions of rainfall intensity and wind, as follows:

- Height: To AS 4654.2 (2012) Table A1.
- Anchoring: Secure sheet membranes along the top edge.
- Edge protection: Protect edges of the membrane.

Waterproofing above vertical upward terminations: Waterproof the structure above the termination to prevent moisture entry behind the membrane using cavity flashings, capping, waterproof membranes or waterproof coatings.

Vertical upward terminations:

- Liquid applied membranes: Terminate under an overflashing, or provide an overflashing of liquid applied membrane.
- Sheet membranes: Terminate under an overflashing, or provide a pressure seal overflashing or an overflashing fixed into a cast-in reglet.

Membrane downturns: Provide downturns for sheet membrane systems as follows:

- Roofs or similar structures: Extend minimum 100 mm from the junction of the structure.
- Balconies with a fully bonded membrane: Terminate at the drip groove.

Vertical downward terminations:

- Liquid applied membranes: Extend membrane to the underside of a horizontal return.
- Sheet membranes: Provide a pressure seal overflashing.

Horizontal terminations: Do not provide. Use vertical terminations.

Membrane penetrations

Vertical penetrations: Provide overflashing fixed to the substrate for vertical penetrations including pipes, ducts and vents.

Horizontal penetrations: Provide SBS bitumen flange to seal the membrane to rigid PVC-U conduits and pipes without burning the PVC-U. Do not use high density polyethylene (HDPE), polypropylene (PP) pipes or flexible PVC conduit.

Membrane at balcony doors and windows

Requirement: Install membrane before fixing door or window frames.

Upturn height above external finished floor level: To AS 4654.2 (2012) Table A1.

Hobless and flush thresholds: Install membrane before fixing door or window frames. Provide a continuous grated drain abutting the external face of the door or window sill.

Membrane around skylights and hatches

Requirement: Install membranes to upstands before the installation of the skylight or hatch.

Upturn height above roof surface: To AS 4654.2 (2012) Table A1.

Membrane at parapets

Requirement: Terminate membrane upturns under parapet flashing or capping with at least 75 mm overlap. Do not top fix parapet cappings. Seal heads of fasteners against capping.

Membrane at gutters

Requirement: Terminate membrane over a corrosion-resistant metal angle fixed to the gutter support substrate with the vertical leg of the angle turned down into the gutter at least 35 mm.

Membrane at post supports

Post supports fixed before membrane:

- Fix post support to substrate with countersunk fasteners and seal the perimeter of the base plate to the substrate.
- Lay out membrane sheets to minimise cuts around the post support vertical member.
- Dress the membrane closely around the post support and seal the edge of the penetration to the vertical member.
- Fix an overflashing so that any joint is staggered as much as possible relative to joints in the base membrane, and overlap at least 150 mm beyond the perimeter of the base plate.

Post supports fixed after membrane:

- Fix post support to substrate with countersunk fasteners over a waterproof resilient gasket cut to match the shape of the base plate, and seal the perimeter of the base plate to the membrane.
- Dress the overflashing closely around the post support and seal the edge of the penetration to the vertical member.
- Fix an overflashing and overlap at least 150 mm beyond the perimeter of the base plate.

Membrane to planter boxes

Membrane: Extend root-resistant membrane at least 100 mm vertically above the soil or fill level and secure.

Drainage: Grade the base of the planter to adequately sized drainage outlets and terminate the membrane in the outlets.

Drainage riser: Install a riser with drainage slots that extend from the membrane level to the top of the drainage cell. Extend the riser above the soil fill level and finish with a screw cap to provide access for drain clearing.

Protection board: Provide protection board to the full extent of the membrane including areas between soil level and the underside of flashings and cappings.

Drainage cell: Provide geo-filter fabric wrapped drainage cell to the base of the planter and turn geo-filter fabric up drainage riser at least 100 mm above drainage slots.

Cappings and flashings: Provide capping to the tops of planter walls to protect the membrane. Extend the capping to overlap the top of the protection board on the inside face of the planter wall. Where planter walls abut other walls, provide a flashing over the top of the membrane.

Membrane to below ground structures

Membrane: Externally apply membrane to all walls and return to horizontal surfaces to prevent water tracking around structure at joints and corners.

Reinforcement: Provide reinforcement to the membrane at junctions, corners and over joints to the manufacturer's recommendations.

Protection board: Provide protection board to the full extent of the membrane.

Drainage cell: Provide geo-filter fabric wrapped drainage cell to vertical surfaces of the structure.

Curing of liquid membrane systems

General: To the manufacturer's recommendations.

Overlaying finishes on membranes

Compatibility: If a membrane is to be overlaid with another system such as tiles, pavers, ballast, insulation or soil, provide an overlaying system that is compatible with and will not cause damage to the membrane.

Bonded or partially bonded membranes: If the topping or bedding mortar is to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

Slip sheet: If the topping or bedding mortar is structurally sufficient to not require bonding to the substrate, lay a double slip sheet over the membrane to separate it from the topping or bedding mortar.

Paint coatings: If maintenance pathways are indicated by a paving paint, use a paving paint that is compatible with the membrane.

3.4 TESTING

Substrate moisture tests

Moisture content of concrete substrate: Test substrate in-slab relative humidity to ASTM F2170 (2019). Perform three tests for the first 100 m² of subfloor area and an additional test for each additional 100 m².

Moisture content of timber, plywood and particleboard substrate: Test substrate to AS/NZS 2098.1 (2006) for plywood substrates or to AS/NZS 1080.1 (2012) for timber and particleboard substrates.

Flood tests

Requirement: Perform a flood test before the installation of surface finishes.

Moisture content measurement method: To **Substrate moisture tests**.

Set-up:

- Measure the wall/floor junction of adjacent spaces and of the slab soffit below for dryness.
- Record the result for each area.
- Dam the access openings and seal drainage outlets.
- Provide temporary overflows of the same capacity as the outlets.
- Fill space with clean water as follows:
 - . Minimum water level: 25 mm.
 - . Maximum water level: 100 mm.
 - . Minimum dimension below perimeter flashings: 25 mm.
- Test duration: Minimum 24 hours and maximum 72 hours.

Records:

- Make photographic records of the flooded areas and adjacent areas.
- Label photographs with the date and location.

Evaluation:

- Visual test: Drain the water. After 2 hours, visually inspect the wall/floor junction of adjacent spaces and of the slab soffit below for water or moisture.
- Moisture meter test: If there is no visual evidence of water, test the same areas for dryness using a moisture meter, and compare the results to the measurements taken before flooding.

Conformance:

- Evidence of water from the visual test: Failure.
- Test results indicating an increase in moisture after flooding: Failure.
- Failure: If required, remedy defects and retest.

Slip resistance tests

Slip resistance of completed installation: To AS 4663 (2013).

3.5 COMPLETION

Reinstatement

Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's maintenance recommendations, including the following:

- Preventative maintenance procedures.
- Instructions and procedures for the repair of the membrane.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the supplier and the applicator.

4 SELECTIONS

4.1 EXTERNAL WATERPROOFING

Requirements schedule

	A	B	C
Abrasion resistance	TBC		
Traffic			
Slip resistance classification			
Overlaying finish			
Root resistance and bioresistance			
Reflectivity (%)			

Single layer sheet membrane system schedule

	A	B	C
Proprietary system	TBC		
System type			
Sheet type			
Sheet thickness (mm)			
Base weight (kg/m ²)			
Tensile strength (MPa)			
Tensile strain (elongation at break) (%)			
Modulus at 300% elongation (MPa)			
Permeability (g.m ² /d)			
Method of application			
Primer			
Surface finish			

Multi-layer sheet membrane system schedule

	A	B	C
Proprietary system	TBC		
Number of layers			
Method of laying			
Primer			
Vent sheet			
Base layer			
Intermediate layer			
Top layer			
Bonding agent			
Thermal insulation			
Surface finish			

Liquid membrane system schedule

	A	B	C
Proprietary system	TBC		
Material type			
Elasticity (%): At maximum stress			
Elasticity (%): At break			

	A	B	C
Maximum stress (kPa)	TBC		
Permeability (g.m ² /d)			
Method of application			
Number of coats			
Application rate (L/m ²)			
Dry film thickness (total) (mm)			
Underlay			
Reinforcement			
Primer			
Surface finish			

0423P COLORBOND® STEEL AND ZINCALUME® STEEL IN ROOFING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide and install roof cladding made from COLORBOND® steel and ZINCALUME® steel and associated work, as documented.

Ambient climatic conditions

Design rainfall intensity (mm/h) to AS/NZS 3500.3 (2021): Refer to Engineering Solutions Tasmania Drawings and Specifications.

Corrosion resistance

Material: To the manufacturer's recommendations for distance from marine influence.

Roof access

Type: TBC

1.2 COMPANY CONTACTS

BlueScope technical contacts

Website: www.steel.com.au/support

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

General

Standard: To AS 1562.1 (2018).

1.5 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 1562.1 (2018) apply.

1.6 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.steel.com.au/library.

1.7 TOLERANCES

Sheet metal roofing

Supporting members: To AS 1562.1 (2018) clause 4.2.3.

1.8 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Type tests: As appropriate for the project, submit evidence of conformity to the following:

- Metal roofing generally: Roof sheeting and fastenings to AS 1562.1 (2018) clause 5.4 for resistance to concentrated loads and to AS 1562.1 (2018) clause 5.5 for resistance to wind pressures.
- Metal roofing in AS/NZS 1170.2 (2021) cyclonic regions: Roof sheeting and fastenings to AS 1562.1 (2018) clause 5.6.
- Plastic sheet roofing: Roofing and fastenings to AS 1562.3 (2006) Section 5 for resistance to wind forces and resistance to impact.

Samples

Requirement: Submit samples of the following, showing the range of variation available:

- Trim and accessories with a colour finish.
- Custom profiled flashings and cappings.
- Sheet metal finishes.
- Sealants.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail.

Tests

Internal downpipes: Submit test results to **TESTING, Internal downpipe tests.**

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.9 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Roof supports before covering up or concealing.
- Glazing products before they are installed.
- The parts of the roofing, sarking, vapour barrier, insulation and roof plumbing installation before covering up or concealing.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Storage and handling

Storage: To the manufacturer's recommendations and as follows:

- Keep clean, dry and unexposed to weather.
- Store away from uncured concrete and masonry, on a level base and not in contact with other materials that cause staining, denting or other surface damage.
- Stack flat and off the ground on at least 3 evenly placed bearers.

Handling: Handle metal roofing materials as follows:

- Use gloves when handling precoated metal roofing material.
- Use soft soled shoes when fixing or working on roofs.
- Protect edges and surfaces from damage. Do not drag sheets across each other or over other materials.

Storage area conditions: Allocate a safe and trade free area.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Welded safety mesh

Standard: To AS/NZS 4389 (2015).

2.2 PROFILED SHEET METAL ROOFING

Standards

Design and materials: To AS 1562.1 (2018).

Fasteners

Requirement: Starter clips, fixing clips and fastenings to the roofing system supplier's recommendations.

Prefinished exposed fasteners: Finish with an oven baked polymer coating to match the roofing material.

Fastenings to timber battens: Fastenings long enough to penetrate the thickness of the batten without piercing the underside.

Profiled fillers

Type: Purpose-made closed cell polyethylene foam profiled to match the roofing profile.

Location: Provide profiled fillers under flashings to the following:

- Ridges.
- Eaves.
- Lapped joints in roof sheeting.

Insulation spacers

Description: Proprietary spacer system to prevent excessive compression of insulation between roof sheeting and framing.

Components

Sealant: 100% neutral cure non-acid based silicone rubber to match roofing.

2.3 ROOF PLUMBING

General

Description: Flashings, cappings, gutters, rainheads, outlets, downpipes and accessories necessary to complete the roofing system.

Flashing and capping: Notched to match profile of roofing.

Matching fascia/barge capping: If the selected eaves gutter is a proprietary high front pattern forming part of a combined system of gutter, fascia and barge, provide matching proprietary fascias and barge cappings to roof verges and edges.

Standards

Roof drainage: To AS/NZS 3500.3 (2021).

Metal rainwater goods: To AS/NZS 2179.1 (2014).

Flashings and cappings: To AS/NZS 2904 (1995).

2.4 SKYLIGHTS

General

Standard: To AS 4285 (2019).

Description: A proprietary skylight system for installation in roofs pitched less than 15°, including framing, fixing, trim, seals, accessories and flashings.

2.5 ROOF HATCHES

General

Description: A proprietary roof hatch system, including framing, fixing, trim, seals, accessories and flashings.

2.6 ROOF WINDOWS

General

Standard: To AS 4285 (2019).

Description: A proprietary window system designed for non-vertical installation in roofs pitched greater than 15° and less than 90°, consisting of the following:

- Timber frame and sash, shop clear primed or prefinished.
- External anodised aluminium protective profiles.
- Sealed double glazing.
- Horizontally pivoted sash, 180° reversible, on patent friction hinges.
- Opening and locking by patent control bar.
- Ventilation flap.

2.7 ROOF VENTILATORS

General

Description: A proprietary roof ventilator system including framing, fixing, trim, seals, accessories and flashings.

2.8 ROOF ACCESS

Walkways

Description: A proprietary roof walkway system including fixings.

3 EXECUTION

3.1 GENERAL

Preparation

Substrates or framing: Before fixing roofing, check the alignment of substrates or framing and adjust if required.

Flexible underlay: Check that the underlay or insulation is restrained.

Roofing: Make sure the roofing is clean and free of dust and loose particles.

3.2 INSTALLATION

Protection

General: Keep the roofing and rainwater system free of debris and loose material during construction.

Protection: Protect surfaces and finishes, including the retention of protective coatings during installation.

Thermal movement

Requirement: Allow for thermal movement in the roof installation and the structure, including movement in joints and fastenings.

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by one of the following methods:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

3.3 COLORBOND® STEEL AND ZINCALUME® STEEL SHEET METAL ROOFING

Roof sheet installation

Standard: To AS 1562.1 (2018).

Fastener type, size, corrosion resistance class, and spacing: To the sheet metal roofing manufacturer's recommendations.

Swarf: Remove swarf and other debris as soon as it is deposited.

Accessories: Provide accessories with the same finish as roofing sheets to complete the roofing installation.

Pan type sheets

Removal: Install sheets so that individual sheets can be removed without damage.

Curved corrugated sheet

General: Form by rolling from material recommended for curving or bullnosing. Minimise crimping or creasing across the face of the sheet. Trim off crimped or creased edges and ends.

Ridges and eaves

Sheet ends: Treat as follows, if appropriate:

- Project sheets 50 mm into gutters.
- Close off ribs at bottom of sheets using mechanical means or with purpose-made fillers or end caps.
- Turn pans of sheets up at tops and down into gutters by mechanical means.
- Pre-cut notched eaves flashing and birdproofing if required.
- Close off ridges with purpose-made ridge fillers of closed cell polyethylene foam.

Ridge and barge

Capping: Finish off along ridge and verge lines with purpose-made ridge capping or barge rolls.

End laps

General: If end laps are unavoidable, and the sheet profile is not suitable for interlocking or contact end laps, construct a stepped type lap.

3.4 ROOF PLUMBING

Jointing sheet metal rainwater goods

Butt joints: Make joints over a backing strip of the same material.

Soldered joints: Do not solder aluminium or aluminium/zinc-coated steel.

Sealing: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Flashings

Installation: Flash roof junctions, upstands, abutments and projections through the roof. Preform to required shapes if possible. Notch, scribe, flute or dress down as necessary to follow the profile of adjacent surfaces. Mitre angles and lap joints 150 mm in running lengths. Provide matching expansion joints for every two lengths of flashing, at a maximum of 12 m centres.

Upstands: Flash projections above or through the roof with two part flashings, consisting of a base flashing and a cover flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection.

Large penetrations in low pitch roofs: Extend the base flashing over the roofing ribs to the ridge to prevent ponding behind the penetrating element.

Wall abutments: Where a roof abuts a wall, provide overflashing as follows:

- In masonry walls, planked cladding or concrete: Step in courses to the roof slope. Interleave with damp-proof course, if any.
- Raking in masonry: Build into the full width of the outer leaf. Turn up and across the cavity and fix to or build into the inner leaf at least 75 mm above the roofing line.
- Raking in concrete: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material and point up.

Fixing to pipes: Solder or seal with neutral cure silicone rubber and secure with either of the following:

- Clamping ring.
- Proprietary flexible clamping shoe with attached metal surround flashing.

Gutters

Gutter and sump support: Provide framing and lining to support valley gutters, box gutters and sumps. Line the whole area under the gutters and sumps.

Box gutter: Prefabricate box gutters to the required section and shape as follows:

- Form stop ends, downpipe nozzles, bends and returns.
- Dress downpipe nozzles into outlets.
- Hail guards: Install grating over the whole of the box gutter, over all box gutter sumps and over the edges of roofing sheeting entering box gutters.
- Overflows: Provide overflows to prevent back-flooding. Size to pass 100% of the design rainfall. Discharge overflows in visible locations and so water does not enter the building or cause damage to the building.
- Sumps: Minimum 150 mm deep and the full width of the box gutter.

Valley gutters: Profile to suit the valley boarding. Turn back both edges 180 x 6 mm radius. Nail or screw to the valley boarding at the top end to prevent the gutter creeping downwards.

Expansion joints in guttering longer than 30 m: Provide as follows:

Type: Refer to Engineering Solutions Tasmania Drawings and Specifications.

Gratings: Install removable gratings over rainheads and sumps.

Leaf guard location: All gutter outlets.

External downpipes

General: Prefabricate downpipes to the required section and shape where possible. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains.

Access cover: Provide a removable watertight access cover at the foot of each downpipe stack.

- Size: Not less than the diameter of the downpipe.

Downpipe support: Provide supports and fixings for downpipes.

Internal downpipes

Joining method: Refer to Engineering Solutions Tasmania Drawings and Specifications.

Access: Provide access openings as follows:

- At each junction and bend.
- At the foot of each stack.
- At every second floor level.

Acoustic insulation: Mineral fibre pipe insulation 50 mm thick, spirally bound on with 1.5 mm wire at 150 mm pitch.

Building in: If pipes are built into masonry or concrete, spiral wrap the pipe (and insulation, if any) with building paper.

Rainwater disposal

System: Refer to Engineering Solutions Tasmania Drawings and Specifications.

3.5 SKYLIGHTS

Installation

Standard: To AS 4285 (2019).

3.6 ROOF HATCHES

Installation

Fixing: To approval

3.7 ROOF WINDOWS

Installation

Standard: To AS 4285 (2019).

3.8 ROOF VENTILATORS

Installation

Fixing: Refer to Engineering Solutions Tasmania Drawings and Specifications.

3.9 ROOF ACCESS

Walkway

Installation: TBC

3.10 TESTING

Internal downpipe tests

Standard: To AS/NZS 3500.3 (2021) clause 9.3.1.

Internal downpipes: Test each stack hydrostatically in stages, each test to run over two storeys high for two hours. Remedy defects and retest if necessary.

3.11 COMPLETION

Reinstatement

Extent: Repair or replace damage to the roofing and rainwater system. If the work cannot be repaired satisfactorily, replace the whole area affected.

Damage to prepainted finish: Replace panels with scratches in the prepainted finish greater than 2 mm in width visible from the ground.

Fasteners: Make sure weathertight and external panel facings are not distorted.

Cleaning

Roofing and rainwater drainage system: Remove debris, metal swarf, solder, sealants and unused materials.

Exposed metal surfaces: Clean surfaces of substances that interfere with uniform weathering or oxidation.

Roof plumbing: Clean out spoutings, gutters and rainwater pipes after completion of roof installation.

Protection: After completion, remove protective coatings using methods to the manufacturer's recommendations.

Operation and maintenance manuals

Requirement: Prepare a manual that includes recommendations from the roofing manufacturer or supplier for the maintenance of the roofing system including frequency of inspection and recommended methods of access, inspection, cleaning, repair and replacement.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 PERFORMANCE

Roofing performance schedule

	A	B	C
Solar absorptance	0.93		
Light Reflectance Value (LRV)	8		

4.2 PRODUCT

Profiled sheet metal roofing schedule

	A	B	C
Product	Refer to drawings CD09 & CD10		
Profile	Refer to drawings CD09 & CD10		
Material	Colorbond		
Base metal thickness (BMT) (mm)	0.48mm		
Finish	Colorbond		
Colour	Monument		
Fasteners	To Manufacturer's instructions. Monument		
Insulation spacer type	Cavibat		

4.3 ROOF PLUMBING

Flashing and capping schedule

	A	B	C
Type	Refer drawings CD09 & CD10		
Product	TBC		
Material	Colorbond		
Thickness and grade	TBC		
Colour	Monument		

Roof plumbing schedule

Item	Type	Product	Material	Thickness/Grade	Colour/Shape/Size
Eaves gutter					Monument

Item	Type	Product	Material	Thickness/Grade	Colour/Shape/Size
Valley gutter	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Box gutter	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Rainhead	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Sump	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Downpipe	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Vent	Refer to Engineering Solutions Tasmania Drawings and Specifications.				
Hail guard					
Grate					
Leaf guard					

4.4 ROOF ACCESSORIES

Skylight schedule

	A	B	C
Product	Refer Drawings		
Type			
Size (mm)			
Light shaft			
Ceiling diffuser			
Total system solar heat gain coefficient (SHGC)			
Total system U-Value (W/m ² .K)			
WERS for Skylights energy rating % heating			
WERS for Skylights energy rating % cooling			
Hail guard			

Roof hatch schedule

	A	B	C
Product	N/A		
Size (mm)			

Roof window schedule

	A	B	C
Product	N/A		
Type			
Size (mm)			
Total system solar heat gain coefficient (SHGC)			
Total system U-Value (W/m ² .K)			
WERS for Skylights energy rating % heating			
WERS for Skylights energy rating % cooling			
Hail guard			

Roof ventilator schedule

	A	B	C
Product	Refer to Engineering Solutions Tasmania Drawings and Specifications.		
Size (mm)			
Throat diameter (mm)			
Material			
Finish	Monument		
Capacity			
Options			

Roof access schedule

	A	B	C
Product	TBC		
Size (mm)			
Material			

0423P LYSAGHT ROOFING – PROFILED SHEET METAL

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide a LYSAGHT profiled sheet metal roofing system and associated work, as documented.

Ambient climatic conditions

Design rainfall intensity (mm/h) to AS/NZS 3500.3 (2021): Refer to Engineering Solutions Tasmania Drawings and Specifications.

Corrosion resistance

Material: To the manufacturer's recommendations for distance from marine influence.

Roof access

Type: To approval

1.2 COMPANY CONTACTS**LYSAGHT technical contacts**

Website: www.lysaght.com/content/contact-us

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS**General**

Standard: To AS 1562.1 (2018).

1.5 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the definitions given in AS 1562.1 (2018) apply.

1.6 MANUFACTURER'S DOCUMENTS**Technical manuals**

Website: professionals.lysaght.com/resources/manuals

1.7 TOLERANCES**Sheet metal roofing**

Supporting members: To AS 1562.1 (2018) clause 4.2.3.

1.8 SUBMISSIONS**Operation and maintenance manuals**

Requirement: Submit manual to **COMPLETION**, Operation and maintenance manuals.

Products and materials

Type tests: As appropriate for the project, submit evidence of conformity to the following:

- Metal roofing generally: Roof sheeting and fastenings to AS 1562.1 (2018) clause 5.4 for resistance to concentrated loads and to AS 1562.1 (2018) clause 5.5 for resistance to wind pressures.
- Metal roofing in AS/NZS 1170.2 (2021) cyclonic regions: Roof sheeting and fastenings to AS 1562.1 (2018) clause 5.6.
- Plastic sheet roofing: Roofing and fastenings to AS 1562.3 (2006) Section 5 for resistance to wind forces and resistance to impact.

Samples

Requirement: Submit samples of the following, showing the range of variation available:

- Trim and accessories with a colour finish.
- Custom profiled flashings and cappings.
- Sheet metal finishes.
- Sealants.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail.

Tests

Internal downpipes: Submit test results to **TESTING, Internal downpipe tests**.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.9 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Roof supports before covering up or concealing.
- Glazing products before they are installed.
- The parts of the roofing, sarking, vapour barrier, insulation and roof plumbing installation before covering up or concealing.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Storage and handling

Storage: To the manufacturer's recommendations and as follows:

- Keep clean, dry and unexposed to weather.
- Store away from uncured concrete and masonry, on a level base and not in contact with other materials that cause staining, denting or other surface damage.
- Stack flat and off the ground on at least 3 evenly placed bearers.

Handling: Handle metal roofing materials as follows:

- Use gloves when handling precoated metal roofing material.
- Use soft soled shoes when fixing or working on roofs.
- Protect edges and surfaces from damage. Do not drag sheets across each other or over other materials.

Storage area conditions: Allocate a safe and trade free area.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Welded safety mesh

Standard: To AS/NZS 4389 (2015).

2.2 PROFILED SHEET METAL ROOFING

Standards

Design and materials: To AS 1562.1 (2018).

Product

Proprietary steel roofing: LYSAGHT steel roofing.

Proprietary aluminium roofing: Permalite aluminium roofing.

Fasteners

Prefinished exposed fasteners: Finish with an oven baked polymer coating to match the roofing material.

Fastenings to timber battens: Fastenings long enough to penetrate the thickness of the batten without piercing the underside.

LYSAGHT steel roofing fasteners:

- Type, size, corrosion resistance class and spacing: To LYSAGHT recommendations.

Permalite aluminium roofing fasteners:

- Type, size, corrosion resistance class and spacing: To Permalite recommendations.

Profiled fillers

Type: Purpose-made closed cell polyethylene foam profiled to match the roofing profile.

Location: Provide profiled fillers under flashings to the following:

- Ridges.
- Eaves.
- Lapped joints in roof sheeting.

Insulation spacers

Description: Proprietary spacer system to prevent excessive compression of insulation between roof sheeting and framing.

Components

Sealant: 100% neutral cure non-acid based silicone rubber to match roofing.

2.3 ROOF PLUMBING

General

Description: Flashings, cappings, gutters, rainheads, outlets, downpipes and accessories necessary to complete the roofing system.

Flashing and capping: Notched to match profile of roofing.

Matching fascia/barge capping: If the selected eaves gutter is a proprietary high front pattern forming part of a combined system of gutter, fascia and barge, provide matching proprietary fascias and barge cappings to roof verges and edges.

Standards

Roof drainage: To AS/NZS 3500.3 (2021).

Metal rainwater goods: To AS/NZS 2179.1 (2014).

Flashings and cappings: To AS/NZS 2904 (1995).

2.4 SKYLIGHTS

General

Standard: To AS 4285 (2019).

Description: A proprietary skylight system for installation in roofs pitched less than 15°, including framing, fixing, trim, seals, accessories and flashings.

2.5 ROOF HATCHES

General

Description: A proprietary roof hatch system, including framing, fixing, trim, seals, accessories and flashings.

2.6 ROOF WINDOWS

General

Standard: To AS 4285 (2019).

Description: A proprietary window system designed for non-vertical installation in roofs pitched greater than 15° and less than 90°, consisting of the following:

- Timber frame and sash, shop clear primed or prefinished.
- External anodised aluminium protective profiles.
- Sealed double glazing.

- Horizontally pivoted sash, 180° reversible, on patent friction hinges.
- Opening and locking by patent control bar.
- Ventilation flap.

2.7 ROOF VENTILATORS

General

Description: A proprietary roof ventilator system including framing, fixing, trim, seals, accessories and flashings.

2.8 ROOF ACCESS

Walkways

Description: A proprietary roof walkway system including fixings.

3 EXECUTION

3.1 GENERAL

Preparation

Substrates or framing: Before fixing roofing, check the alignment of substrates or framing and adjust if required.

Flexible underlay: Check that the underlay or insulation is restrained.

Roofing: Make sure the roofing is clean and free of dust and loose particles.

3.2 INSTALLATION

Protection

General: Keep the roofing and rainwater system free of debris and loose material during construction.

Protection: Protect surfaces and finishes, including the retention of protective coatings during installation.

Thermal movement

Requirement: Allow for thermal movement in the roof installation and the structure, including movement in joints and fastenings.

Pan type sheets

Removal: Install sheets so that individual sheets can be removed without damage.

Curved corrugated sheet

General: Form by rolling from material recommended for curving or bullnosing. Minimise crimping or creasing across the face of the sheet. Trim off crimped or creased edges and ends.

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by one of the following methods:

- Applying an anti-corrosion, low moisture transmission coating to contact surfaces.
- Inserting a separation layer.

3.3 PROFILED SHEET METAL ROOFING

Roof sheet installation

Standard: To AS 1562.1 (2018).

LYSAGHT steel roofing: To the manufacturer's recommendations.

Permalite aluminium roofing: To the manufacturer's recommendations.

Fastener type, size, corrosion resistance class, and spacing: To LYSAGHT's recommendations.

Swarf: Remove swarf and other debris as soon as it is deposited.

Accessories: Provide accessories with the same finish as roofing sheets to complete the roofing installation.

Ridges and eaves

Sheet ends: Treat as follows:

- Project sheets 50 mm into gutters.
- Close off ribs at bottom of sheets using mechanical means or with purpose-made fillers or end caps.

- Turn pans of sheets up at tops and down into gutters by mechanical means.
- Pre-cut notched eaves flashing and birdproofing if required.
- Close off ridges with purpose-made ridge fillers of closed cell polyethylene foam.

Ridge and barge

Capping: Finish off along ridge and verge lines with purpose-made ridge capping or barge rolls.

Sprung curved ridge

General: Lay the roofing sheets in single lengths from eaves to eaves by naturally curving the sheets over the ridge.

Ridge: Seal side laps at the ridge and extend the sealant to the point where the roof pitch equals the recommended pitch of the roofing profile.

End laps

General: If end laps are unavoidable, and the sheet profile is not suitable for interlocking or contact end laps, construct a stepped type lap.

3.4 ROOF PLUMBING

Jointing sheet metal rainwater goods

Butt joints: Make joints over a backing strip of the same material.

Soldered joints: Do not solder aluminium or aluminium/zinc-coated steel.

Sealing: Seal fasteners and mechanically fastened joints. Fill the holes of blind rivets with silicone sealant.

Flashings

Installation: Flash roof junctions, upstands, abutments and projections through the roof. Preform to required shapes if possible. Notch, scribe, flute or dress down as necessary to follow the profile of adjacent surfaces. Mitre angles and lap joints 150 mm in running lengths. Provide matching expansion joints for every two lengths of flashing, at a maximum of 12 m centres.

Upstands: Flash projections above or through the roof with two part flashings, consisting of a base flashing and a cover flashing, with at least 100 mm vertical overlap. Provide for independent movement between the roof and the projection.

Large penetrations in low pitch roofs: Extend the base flashing over the roofing ribs to the ridge to prevent ponding behind the penetrating element.

Wall abutments: Where a roof abuts a wall, provide overflashing as follows:

- In masonry walls, planked cladding or concrete: Step in courses to the roof slope. Interleave with damp-proof course, if any.
- Raking in masonry: Build into the full width of the outer leaf. Turn up and across the cavity and fix to or build into the inner leaf at least 75 mm above the roofing line.
- Raking in concrete: Turn 25 mm into joints or grooves, wedge at 200 mm centres with compatible material and point up.

Fixing to pipes: Solder or seal with neutral cure silicone rubber and secure with either of the following:

- Clamping ring.
- Proprietary flexible clamping shoe with attached metal surround flashing.

Gutters

Gutter and sump support: Provide framing and lining to support valley gutters, box gutters and sumps. Line the whole area under the gutters and sumps.

Box gutter: Prefabricate box gutters to the required section and shape as follows:

- Form stop ends, downpipe nozzles, bends and returns.
- Dress downpipe nozzles into outlets.
- Hail guards: Install grating over the whole of the box gutter, over all box gutter sumps and over the edges of roofing sheeting entering box gutters.
- Overflows: Provide overflows to prevent back-flooding. Size to pass 100% of the design rainfall. Discharge overflows in visible locations and so water does not enter the building or cause damage to the building.
- Sumps: Minimum 150 mm deep and the full width of the box gutter.

Valley gutters: Profile to suit the valley boarding. Turn back both edges 180 x 6 mm radius. Nail or screw to the valley boarding at the top end to prevent the gutter creeping downwards.

Gratings: Install removable gratings over rainheads and sumps.

Leaf guard location: All gutter outlets.

External downpipes

General: Prefabricate downpipes to the required section and shape where possible. Connect heads to gutter outlets and, if applicable, connect feet to rainwater drains.

Access cover: Provide a removable watertight access cover at the foot of each downpipe stack.

- Size: Not less than the diameter of the downpipe.

Downpipe support: Provide supports and fixings for downpipes.

Internal downpipes

Joining method: Refer to Engineering Solutions Tasmania Drawings and Specifications.

Access: Provide access openings as follows:

- At each junction and bend.
- At the foot of each stack.
- At every second floor level.

Type of access opening: Refer to Engineering Solutions Tasmania Drawings and Specifications.

Acoustic insulation: Mineral fibre pipe insulation 50 mm thick, spirally bound on with 1.5 mm wire at 150 mm pitch.

Building in: If pipes are built into masonry or concrete, spiral wrap the pipe (and insulation, if any) with building paper.

Rainwater disposal

System: Refer to Engineering Solutions Tasmania Drawings and Specifications.

3.5 SKYLIGHTS

Installation

Standard: To AS 4285 (2019).

3.6 ROOF HATCHES

Installation

Fixing: N/A

3.7 ROOF WINDOWS

Installation

Standard: To AS 4285 (2019).

3.8 ROOF VENTILATORS

Installation

Fixing: Refer to Engineering Solutions Tasmania Drawings and Specifications.

3.9 ROOF ACCESS

Walkway

Installation: TBC

3.10 TESTING

Internal downpipe tests

Standard: To AS/NZS 3500.3 (2021) clause 9.3.1.

Internal downpipes: Test each stack hydrostatically in stages, each test to run over two storeys high for two hours. Remedy defects and retest if necessary.

3.11 COMPLETION

Reinstatement

Extent: Repair or replace damage to the roofing and rainwater system. If the work cannot be repaired satisfactorily, replace the whole area affected.

Damage to prepainted finish: Replace panels with scratches in the prepainted finish greater than 2 mm in width visible from the ground.

Fasteners: Make sure weathertight and external panel facings are not distorted.

Cleaning

Roofing and rainwater drainage system: Remove debris, metal swarf, solder, sealants and unused materials.

Exposed metal surfaces: Clean surfaces of substances that interfere with uniform weathering or oxidation.

Roof plumbing: Clean out spoutings, gutters and rainwater pipes after completion of roof installation.

Protection: After completion, remove protective coatings using methods to the manufacturer's recommendations.

Operation and maintenance manuals

Requirement: Prepare a manual that includes recommendations from the roofing manufacturer or supplier for the maintenance of the roofing system including frequency of inspection and recommended methods of access, inspection, cleaning, repair and replacement.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 PERFORMANCE

Roofing performance schedule

	A	B	C
Solar absorptance	0,93		
Light Reflectance Value (LRV)	8		

4.2 PRODUCT

LYSAGHT profiled sheet steel roofing schedule

	A	B	C
Profile	Refer drawings CD09 & CD10		
Material	Colorbond		
Base metal thickness (BMT) (mm)	0.48		
Colour	Monument		
Fasteners	To approval		
Insulation spacer type	Cavibat		

Permalite profiled sheet aluminium roofing schedule

	A	B	C
Profile	N/A		
Base metal thickness (BMT) (mm)			
Finish			
Colour			
Fasteners			
Insulation spacer type			

4.3 ROOF PLUMBING

Flashing and capping schedule

	A	B	C
Type	Refer drawings		
Product	TBC		
Material	Colorbond		
Thickness and grade	TBC		
Colour	Monument		

Roof plumbing schedule

Item	Type	Product	Material	Thickness/ Grade	Colour/Shape/Size
Eaves gutter	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Valley gutter	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Box gutter	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Rainhead	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Sump	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Downpipe	Refer to Engineering Solutions Tasmania Drawings and Specifications.		Colorbond		Monument
Vent	Refer to Engineering Solutions Tasmania Drawings and Specifications.				

Item	Type	Product	Material	Thickness/ Grade	Colour/Shape/Size
Hail guard					
Grate					
Leaf screen					

4.4 ROOF ACCESSORIES

Skylight schedule

	A	B	C
Product	Refer drawings		
Type			
Size (mm)			
Light shaft			
Ceiling diffuser			
Total system solar heat gain coefficient (SHGC)			
Total system U-Value (W/m ² .K)			
WERS for Skylights energy rating % heating			
WERS for Skylights energy rating % cooling			
Hail guard			

Roof hatch schedule

	A	B	C
Product	N/A		
Size (mm)			

Roof window schedule

	A	B	C
Product	N/A		
Type			
Size (mm)			
Total system solar heat gain coefficient (SHGC)			
Total system U-Value (W/m ² .K)			
WERS for Skylights energy rating % heating			
WERS for Skylights energy rating % cooling			
Hail guard			

Roof ventilator schedule

	A	B	C
Product	Refer to Engineering Solutions Tasmania Drawings and Specifications.		

	A	B	C
Size (mm)			
Throat diameter (mm)			
Material			
Finish			
Capacity			
Options			

Roof access schedule

	A	B	C
Product	TBC		
Size (mm)			
Material			

0431 CLADDING – COMBINED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide external wall cladding and associated work, as documented.

Corrosion resistance

Material: To the manufacturer's recommendations for distance from marine influence.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- AAC: Autoclaved aerated concrete.
- ACP: Aluminium composite panel.
- CCA: Copper chrome arsenate.
- CFC: Compressed fibre cement.
- EIFS: Exterior insulation and finish system.
- EPS: Expanded polystyrene.
- EPS-FR: Expanded polystyrene-fire retardant.
- FC: Fibre cement.
- GRP: Glass fibre reinforced polyester.
- LOSP: Light organic solvent preservative.
- MRF: Mineral fibre.
- PF: Phenolic foam.
- PIR: Rigid polyisocyanurate foam.
- PUR: Rigid polyurethane foam.
- XPS: Extruded polystyrene.

1.4 TOLERANCES

Permitted deviations

Flat sheet and panel cladding: To the manufacturer's recommendations.

Insulated panel systems: To the manufacturer's recommendations.

Plank and weatherboard cladding: 5 mm from a 1.8 m straightedge or to manufacturer's recommendations.

Profiled metal sheet cladding: To AS 1562.1 (2018) clause 4.2.3.

Structural steelwork for wall cladding: ± 5 mm between bearing planes of adjacent supports.

1.5 SUBMISSIONS

Fire performance

Combustibility: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE, Error! Reference source not found.**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE, Error! Reference source not found.**

Fire-resistance level: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE, Error! Reference source not found.**

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Thermal insulation performance: Submit evidence of performance to AS/NZS 4859.1 (2018) and AS/NZS 4859.2 (2018).

Type tests: As appropriate for the project, submit results of facade testing as follows:

- Water penetration to AS/NZS 4284 (2008).
- Structural testing to AS/NZS 4284 (2008).
- Resistance to wind pressure:
 - . For non-cyclone regions to AS 4040.2 (1992).
 - . For cyclone regions to AS 4040.3 (2018).
- Resistance to impact to AS/NZS 4040.5 (1996).

Prototypes

General: Erect a prototype of each panel type, including at least one example of each component in the system to verify selections submitted as samples, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to verify performance, including wind loading.

Inclusions:

- Typical components, attachments to building structure and methods of installation.
- Window opening with cladding panel, trim and returns.
- Sealant filled joint.

Samples

Finish: Submit samples of the cladding material showing the range of variation available.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail, showing the following:

- Dimensioned elevations of all elements.
- Details of construction, connections and all support systems.
- Dimensions of all typical elements and of any special sizes and shapes.
- Provision for the exclusion and/or drainage of moisture.
- Jointing details and method of fixing between individual elements and between this installation and adjacent work, including adjustment.
- Sealant types and full size sections of all sealant-filled joints and backing rods.
- Provision for thermal movement.
- Provision for movement under seismic and wind loads.
- Sequence of installation.
- Coordination requirements with other work.
- Schedule of materials, finishes, componentry, hardware and fittings.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Seamed sheet metal cladding: Submit evidence of experience with non-ferrous cladding installation.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.6 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Workshop assemblies before delivery to the site.
- Framing, pliable membranes and insulation before covering up or concealing.
- Completion of a prototype.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Store and handle materials to the manufacturer's recommendations and the following:

- Protect materials including edges and surfaces from damage.
- Keep dry and unexposed to weather.
- Do not drag sheets or panels across each other or over other materials.
- AAC panels: Stack on edge, support off the ground and level to avoid sagging and damage to ends, edges and surfaces.
- Composite panels: Store unpacked panels by size in racks and protect from scratching, warping or bending.
- Sheeting: Stack flat and off the ground on at least 3 evenly placed bearers.
- Store metal materials away from uncured concrete and masonry on a level base.
- Do not store metal materials in contact with other materials that may cause staining, denting or other surface damage.
- Use gloves when handling precoated metal cladding material.

Components

Cladding support: Provide components, as documented.

Fasteners and ties: Type, size, corrosion resistance class and spacing to the cladding manufacturer's recommendations.

Flashings: To AS/NZS 2904 (1995).

2.2 FIRE PERFORMANCE

Combustibility

Cladding: Tested to AS 1530.1 (1994).

Fire hazard properties

Group number: To AS 5637.1 (2015).

Bonded laminated materials: Tested to AS/NZS 1530.3 (1999). Fire hazard indices, as follows:

- Spread-of-Flame Index: 0.
- Smoke-Developed Index: ≤ 3 .

Insulation materials: Tested to AS/NZS 1530.3 (1999). Fire hazard indices as follows:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

Fire-stops

Requirement: Where fire-stops and smoke flashings are placed between inner faces of the cladding and building elements (such as beam, slab or column faces), install and seal to meet fire test requirements.

2.3 AUTOCLAVED AERATED CONCRETE (AAC) PANELS

General

Requirement: Proprietary AAC panels.

Standard: To AS 5146.1 (2015).

Joint adhesive: Proprietary adhesive to the manufacturer's recommendations.

Sealant: Flexible sealant to the manufacturer's recommendations.

2.4 ALUMINIUM WEATHERBOARDS

General

Requirement: Proprietary prefinished aluminium weatherboards.

Standard: To AS/NZS 1734 (1997).

Finishes

Anodising: To AS 1231 (2000).

- Thickness: ≥ 15 microns to 20 microns.

2.5 COMPOSITE PANELS**General**

Requirement: Proprietary panels comprising prefinished skins continuously laminated over a panel core, as documented.

Panel joints and control joints: Integral.

Flexible sealant: Non-staining to the manufacturer's recommendations.

Aluminium composite panels (ACPs)

Product identification: Permanent labelling to SA TS 5344 (2019).

2.6 COMPRESSED FIBRE CEMENT (CFC) SHEETS**General**

Requirement: Proprietary compressed fibre cement sheets.

Standard: To AS/NZS 2908.2 (2000) and the following:

- Type A Category 5.

Finish: Smooth and even with factory sealed edges, free of imperfections such as chips.

Edge profile: Square.

Sealant and bond breaking tape: To the manufacturer's recommendations.

2.7 EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)**General**

Requirement: Proprietary system comprising rigid insulation panels, fixed to a subframe and finished on one or both sides with a cementitious base coat and finish coat.

Insulation

Standard: To AS/NZS 4859.1 (2018):

- Rigid cellular foam insulation (EPS and XPS): To AS/NZS 4859.1 (2018) Section 8.

Insulation blowing agents

Restricted agents: Conform to PRODUCTS AND MATERIALS, **GENERAL**, **Prohibited materials** in 0171 *General requirements*.

2.8 FIBRE CEMENT (FC) PLANKS**General**

Requirement: Proprietary single faced fibre cement building planks.

Standard: To AS/NZS 2908.2 (2000) and the following:

- Type A Category 3.

Corners: Preformed metal joining pieces.

2.9 FIBRE CEMENT (FC) SHEETS**General**

Requirement: Proprietary single faced fibre cement sheets.

Standard: To AS/NZS 2908.2 (2000) and the following:

- Type A Category 3.

Finish: Smooth and even, free of imperfections such as chips.

Sealant and bond breaking tape: To the manufacturer's recommendations.

2.10 HARDBOARD PLANKS**General**

Requirement: Proprietary wet process fibreboard planks.

Standard: To AS/NZS 1859.4 (2018).

Classification: Exterior.

Plank thickness: 9.5 mm.

External corners: Preformed metal joining pieces.

Internal corners: Scribed.

2.11 INSULATED PANEL SYSTEMS

General

Description: Proprietary panels comprising prefinished metal skin factory-bonded to both faces of an insulating core, as documented.

Panel joints and control joints: Integral.

Insulation core

Standard: To AS/NZS 4859.1 (2018):

- Rigid cellular foam insulation (EPS, PF, PIR, PUR and XPS): To AS/NZS 4859.1 (2018) Section 8.

Insulation blowing agents

Restricted agents: Conform to PRODUCTS AND MATERIALS, **GENERAL**, **Prohibited materials** in *0171 General requirements*.

Internal and external skins

Factory pre-coating: Polyester to a dry film thickness of 25 microns.

Profile: Internal and external panel profiles as documented.

System accessories

Requirement: Proprietary insulated cladding system accessories colour matched to panels, as documented.

Sealants

Materials: Non-staining and to the manufacturer's recommendations.

2.12 PLASTIC SHEETS

General

Requirement: Proprietary plastic sheets.

Unplasticised polyvinyl chloride (PVC-U) sheet: To AS 4256.4 (2006).

Glass fibre reinforced polyester (GRP) sheet: To AS 4256.3 (2006).

Polycarbonate: To AS 4256.5 (2006).

2.13 PLYWOOD SHEETS

General

Requirement: Proprietary plywood sheets.

Standard: To AS/NZS 2271 (2004).

Bond: Type A.

Presealed plywood: Sides and edges presealed with a machine applied sealer.

Visible surfaces with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Hidden surfaces: Veneer quality C or D.

Identification: Sheets labelled under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*.

Fasteners

LOSP treated timber and non-corrosive timber cladding: Hot-dip galvanized steel.

CCA treated timber and corrosive timber cladding (including western red cedar or redwood): Stainless steel Type 316 or silicon bronze.

2.14 PROFILED SHEET METAL

General

Requirement: Proprietary profiled sheet metal cladding.

Design and installation: To AS 1562.1 (2018).

2.15 SEAMED SHEET METAL

General

Description: Sheet metal roll formed into pan profiles, laid with seamed joints on a breathable waterproof membrane on flush finished, continuous plywood sheeting or to manufacturer's recommendations.

Plywood sheeting

Standard: To AS/NZS 2269.0 (2012):

- Surface grade: D.
- Bond: Type A.
- Formaldehyde emission class: E₁.

Thickness: 15 mm.

Identification: Sheets labelled under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*.

Underlayer

Requirement: Breathable waterproof membrane to internal face of cavity when cladding including a plywood or FC substrate, is installed as a vented cavity or rainscreen system. Minimum 40 mm ventilation gap between substrate and framing.

Separation layer

Requirement: Breathable waterproof membrane between cladding material and substrate.

Accessories

Solder (tin/lead): 40/60 soft solder.

Flux: Z-04-S.

Sealant: 100% neutral cure non-acid based silicone rubber to match cladding.

Fasteners: Provide starter clips, fixing clips and fastenings as recommended by the cladding system supplier.

2.16 TERRACOTTA PANELS AND TILES

General

Requirement: Proprietary cladding system comprising prefinished, fired, extruded clay panels and mechanical fixing system.

Finish: Smooth or profiled factory finish, free of imperfections such as chips.

Edge profile:

- Vertical: square.
- Horizontal: tongue and groove.

Suspension rails: Proprietary aluminium, galvanized steel or stainless steel extrusions.

Accessories: Proprietary powder coated aluminium profiles to the manufacturer's recommendations.

2.17 TIMBER WEATHERBOARDS

General

Hardwood: To AS 2796.1 (1999).

- Grade: To AS 2796.2 (2006).

Seasoned cypress pine: To AS 1810 (1995).

Softwood: To AS 4785.1 (2002).

- Grade: To AS 4785.2 (2002).

Fasteners

LOSP treated timber and non-corrosive timber cladding: Hot-dip galvanized steel.

CCA treated timber and corrosive timber cladding (including western red cedar or redwood): Stainless steel Type 316 or silicon bronze.

Hardwood cladding: Bullet head and plain shank nails, if the cladding is painted and nails are punched and stopped.

Softwood cladding: Flat head and plain shank nails, if cladding is painted.

CCA treated softwood cladding: Deformed shank (ring or annular) flat head nails.

Unpainted cladding/framing joints: Do not use machine driven T head nails.

3 EXECUTION

3.1 GENERAL

Preparation

Substrates or framing: Before fixing cladding, check the alignment of substrates or framing and adjust if required.

Flexible underlay: Check that the underlay or insulation is restrained.

Cladding: Make sure the cladding is clean and free of dust and loose particles.

Installation

Requirement: Install cladding as follows:

- Fix sheeting firmly against framing to the manufacturer's recommendations.
- Plumb, level, straight and to documented tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading recommendations.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Cladding layout: Cut/fabricate and install cladding to suit the layout as documented.

Protection: Protect surfaces and finishes, including the retention of protective coatings during installation.

Proprietary systems or products

Requirement: Use panels and components from a single proprietary system and install to the manufacturer's recommendations.

Accessories and trim

Requirement: Provide accessories and trim required to complete the installation, or as documented.

Corner flashing for profiled and seamed metal sheets: Finish off at corners with purpose-made folded flashing strips.

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either of the following methods:

- Apply an anti-corrosion, low moisture transmission coating to contact surfaces.
- Insert a separation layer.

Incompatible metal fixings: Do not use.

Horizontal cladding

Horizontal cladding surface:

- Minimum slope: 1:15.
- Staining: Slope away from visible vertical facade areas to prevent staining.

Defective and damaged parts

Defective components: Do not install component parts that are defective, including warped, bowed, dented, chipped, scratched, abraded or broken members.

Damaged parts: Remove and replace damaged parts during installation.

3.2 AAC PANEL CLADDING

Installation

Standard: To AS 5146.3 (2018).

Joint adhesive: Apply to vertical and horizontal joints. Remove excess adhesive from the face after panels are butted together.

Sealant: Caulk control joints, gaps between panels and infill or penetration framing with flexible sealant.

Vertical joints: Finish flush.

Cracking: For render finishes, minimise cracking at joints to the manufacturer's recommendations.

3.3 COMPOSITE PANEL CLADDING

General

Fabrication: Factory fabricate panels and elements wherever possible.

Installation: To the manufacturer's recommendations.

Joints

Requirement: Rigidly secure joints other than movement joints. Fabricate joints to the manufacturer's recommendations or as documented.

Arrangement: Set out in even panels with joints coinciding with framing or as documented.

Control joints: To coincide with structural movement joints and as documented.

Fixing

Requirement: Mechanically fix panels to supporting frame and to the manufacturer's recommendations.

3.4 CFC SHEET CLADDING

Joints

Control joint:

- Locate between the panel and fixing system and the supporting structure, as documented.
- Sheet edges: Square cut.
- Sealant: Do not apply finish coating over joint sealants.

Prefinished metal backing/jointing strip: Fix proprietary backing strip to the rear face of the panel with proprietary closed cell self-adhering foam and horizontal gasket.

- Seal the joint with a 3 mm epoxy fillet.

Vertical joints: Vertical gasket or prefinished jointing strip to framing member.

Arrangement: Set out in even panels with joints coinciding with framing or as documented.

Fixing

General: Screw fix to proprietary framing supports at centres to the manufacturer's recommendations.

Concealed fixings:

- Predrill oversized holes.
- Countersink so that the top of the screw is 2 to 3 mm below the surface.
- Finish: Stop screw heads with epoxy filler. Smooth and level upon application and sand flush after curing.

3.5 EIFS CLADDING

Joints

Requirement: Close butt. Make sure joints are supported and finished level.

Control joint: To coincide with structural movement joints and as documented.

- Sealant: Do not apply finish coating over joint sealants.

Installation

Trim: Install PVC-U around windows, along bottom of walls and at external corners.

Junctions: Make sure junctions are effectively sealed when installing PVC-U or other rigid window flashings.

Saddle and back flashings: Install before fixing the panels.

Parapet and cap flashings: Complete as soon as practicable after finishing the system.

Finishing

Preparation: Remove any oxidation from polystyrene before plastering.

Base coat reinforcement: Embed alkali resistant fibreglass reinforcing mesh into the wet base coat.

Render and texture finish: Apply render and texture finish coats to the manufacturer's recommendations.

3.6 FC SHEET CLADDING

Joints

Control joints:

- Locate between the panel and fixing system and the supporting structure, as documented.
- Sheet edges: Square cut.
- Sealant: Do not apply finish coating over joint sealants.

Arrangement: Set out in even panels with joints coinciding with framing or as documented.

Fixing

General: Corrosion-resistant nails or screws to the manufacturer's recommendations.

Eaves and soffit lining: Fix at 150 mm centres to soffit bearers at a maximum of 450 mm centres.

3.7 INSULATED PANEL SYSTEMS

Site cut panels

Site cut panels:

- Provide accurate, true lines with no distortion.
- Cut with a suitable metal cutting circular type saw and treat exposed edges with a proprietary edge protection lacquer.
- Cut openings to the minimum size necessary.

Penetrations larger than 300 x 300 mm: Provide additional structural support.

Swarf: Remove swarf and any foreign matter immediately from the external surface of panels.

Joints

Control joints: To coincide with structural movement joints and as documented.

Fixing

Requirement: Mechanically fix panels to supporting frame and to the manufacturer's recommendations.

3.8 PLASTIC SHEET CLADDING

Installation

Standard: To AS 1562.3 (2006).

3.9 PLYWOOD SHEET CLADDING

Preparation

Requirement: Cut sheets to suit the layout, as documented.

Cut edges: Seal before fixing and install facing upwards.

Bottom edges: Prime or pre-coat before fixing.

Installation

Layout for sheets with shiplap joints: Start at a corner and install shiplap joints facing away from the prevailing weather.

Labels: Install panels so that any certification scheme labels are concealed.

Joints

Movement allowances:

- Between sheets: 2 mm minimum gap. Apply elastomeric sealant.
- Between the bottom of sheets and flashings: 5 mm gap.

Control joints: To coincide with structural movement joints and as documented.

Fixing

Timber frames: 12 mm thick sheets:

- Nails: 40 x 2.5 mm.
- Screws: No. 8 x 40 mm.

Steel frames: 12 mm thick sheets:

- 1.5 mm steel: 10 gauge to 16 thread pitch x 45 mm screws.
- 2.8 mm steel: 10 gauge to 16 thread pitch x 45 mm screws.

Nail fixing centres:

- Edges: At 150 mm centres and not less than 9 mm from sheet edge.
- Intermediate framing: At 300 mm centres.
- Sheet corners: Not less than 50 mm from corner on vertical edges.

Finish: Flush with surface. Do not punch.

Shiplap joint top lap: Do not nail.

3.10 PROFILED SHEET METAL CLADDING

General

Installation: To AS 1562.1 (2018).

Ground clearance: Maintain documented clearance.

Cutting sheets: Wherever possible, factory cut to length. Do not use an abrasion disc.

Accessories: Provide material with the same finish as cladding sheets.

Swarf: Remove swarf and other debris as soon as it is deposited.

Fixing

Concealed

Joints

Expansion joints: to manufacturer's instructions and Australian Standards.

3.11 SEAMED SHEET METAL CLADDING

Plywood sheeting

Installation: Lay the length of the sheets at right angles to the supports.

End joints: Stagger the end joints and locate centrally over framing members.

Edge support: If panels are not tongue and grooved, provide noggings or trimmer joists to support the edges.

Fixing: 300 mm centres to each support:

- Timber: Adhesive and nail.
- Steel: Metallic-coated self-drilling/tapping screws with the heads finishing below the surface.

Control joints: 12 mm gap at abutting building elements.

Fabrication

Requirement: Factory fabricate pans.

Installation: To AS 1562.1 (2018).

Ground clearance: Maintain documented clearance.

Cutting sheets: Wherever possible, factory cut to length. Do not use an abrasion disc.

Accessories: Provide material with the same finish as cladding sheets.

Minimum bending radius: 1.75 mm.

Swarf: Remove swarf and other debris as soon as it is deposited.

Fixing

Requirement: Fix pans to the sheeting with concealed clips at 250 mm maximum centres or to manufacturer's recommendations.

Seams

Walls: Single angle standing seams.

3.12 TERRACOTTA PANELS AND TILES

Installation

Set-out: Confirm set-out before starting the installation. Minimise cut panels and tiles.

Substrate: Install proprietary suspension rails to manufacturer's details over pliable membrane. Use fasteners conforming to wind load requirements.

Panels and tiles: Install to manufacturer's recommendations.

Trim: Install proprietary trim and flashings.

3.13 TIMBER WEATHERBOARD CLADDING

Preparation

Preservative treatment: For cladding with a natural or stained finish, prefinish the boards by dipping or brushing with water repellent preservative.

Compatibility: Make sure preservative is compatible with the documented pigmented stain finish.

Cut surfaces: Treat freshly cut surfaces with water repellent preservative before fixing.

Installation

Single lengths: If installed vertically, use single lengths. If installed horizontally, use single lengths whenever possible.

Edge finish to lowest board: Cut the bottom edge of the lowest board to slope inwards and upwards at an angle of 15°.

Fixing

Fixings at supports:

- Seasoned milled weatherboards: 2.
- Unseasoned hardwood, sawn weatherboards, or secret nailed profiles: 1.
- Do not fix through the overlap of adjacent weatherboards.

Nailheads: Treat visible nailheads as follows:

- Stained or clear finishes: Drive flush with weatherboard surface.
- Opaque finishes: Punch below the weatherboard surface and fill flush with putty after the surface has been primed.

Joints

Overlapping joints: Lap boards at least 30 mm.

End grain joints: Install boards so that butt joints are in compression. Fix all board ends to support framing. Stagger joints vertically or as documented.

Internal and external corners: Butt against a stop bead that projects at least the thickness of the cladding.

Timber boards abutting masonry: Leave a gap between boards and masonry to prevent moisture uptake.

3.14 COMPLETION**Fasteners**

Requirement: Adjust for weathertightness without distortion of external panel face.

Reinstatement

Extent: Repair or replace damage to the cladding. If the work cannot be repaired satisfactorily, replace the whole area affected.

Damage to prepainted finish: Replace panels with scratches in the prepainted finish.

Cleaning

Requirement: Remove excess debris, metal swarf, solder, sealants and unused materials.

Exposed metal surfaces: Clean surfaces of substances that interfere with uniform weathering or oxidation.

Protection: Remove protective coatings using methods required by the manufacturer after completion.

Panels: Clean surfaces with soft, clean cloths and clean water to the manufacturer's recommendations.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published use, care and maintenance requirements.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS**4.1 PERFORMANCE****Cladding performance schedule**

	A	B	C
Combustibility	TBC		

	A	B	C
Fire hazard property: Group number			
Fire hazard property: Spread-of-Flame Index			
Fire hazard property: Smoke-Developed Index			
Fire-resistance level (FRL)			
R-Value (m ² .K/W)	Refer Energy Assessment		
Acoustic characteristic			
Solar absorptance	0.93		
Light Reflectance Value (LRV)	8		

4.2 PRODUCT

Cladding support schedule

	A	B	C
Product	Refer drawings		
Material			
Vertical members			
Horizontal members			
Spacing: Vertical members			
Spacing: Horizontal members			

AAC panel cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Thickness (mm)			
Length (mm)			
Width (mm)			
Edge profile			
Coating system			
Panel orientation			
Trim			
Control joint width (mm)			
Flashings and cappings			
Fasteners			

Aluminium weatherboard cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Mounting			
Profile			

	A	B	C
Profile depth (mm)			
Length (mm)			
Finish			
Colour			
Trim			
Flashings and cappings			
Fasteners			

Composite panel cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Thickness (mm)			
Length (mm)			
Width (mm)			
Skin material			
Skin thickness (mm)			
Core material			
Surface finish			
Colour			
Panel edge treatment			
Panel joint			
Trim			
Control joint width (mm)			
Flashings and cappings			
Fasteners			

CFC sheet cladding schedule

	A	B	C
Product	Cemintel Barestone	Hardie Matrix Cladding	
Fixing system	Concealed	Concealed	
Thickness (mm)	9mm	8mm	
Length (mm)	3000	1190	
Width (mm)	1200	1190	
Finish	x2No. Ceminseal	x3No. Dulux paint	
Colour	Clear	Monument	
Joints	Expressed	Expressed	
Panel edge treatment	Square edge	Square edge	
Corners			
Soffit lining perforations			
Trim			
Control joint width (mm)	10	10	
Flashings and cappings	TBC	Colorbond - Monument	
Fasteners	Concealed	Concealed	

EIFS cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Thickness (mm)			
Length (mm)			
Width (mm)			
Core material			
Base coat			
Finish coat			
Colour			
Trim			
Control joint width (mm)			
Flashings and cappings			
Fasteners			

FC plank cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Thickness (mm)			
Texture			
Width (mm)			
Length (mm)			
Joints			
Finish			
Trim			
Flashings and cappings			
Fasteners			

FC sheet cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Thickness (mm)			
Length (mm)			
Width (mm)			
Finish			
Colour			
Joints			
Edge profile			
Panel edge treatment			
Corners			
Soffit lining perforations			
Trim			
Control joint width (mm)			
Flashings and cappings			

	A	B	C
Fasteners			

Hardboard plank cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Bending strength			
Texture			
Width (mm)			
Length (mm)			
Joints			
Finish			
Trim			
Flashings and cappings			
Fasteners			

Insulated panel system schedule

	A	B	C
Product	N/A		
Panel core			
Panel thickness (mm)			
Panel skin material: External			
Panel skin material: Internal			
Panel skin thickness (mm): External			
Panel skin thickness (mm): Internal			
Panel skin profile			
Panel finish and colour: External			
Panel finish and colour: Internal			
Control joint width (mm)			
Trim			
Fasteners			
Flashings and cappings			

Plastic sheet cladding schedule

	A	B	C
Product	N/A		
Material			
Thickness (mm)			
Length (mm)			
Width (mm)			
Class or grade			
Type			

	A	B	C
Translucency			
Colour			
Impact resistance			
Ignitability			
Trim			
Flashings and cappings			
Fasteners			

Plywood sheet cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Thickness (mm)			
Length (mm)			
Width (mm)			
Veneer species			
Finish			
Coating			
Colour			
Joints			
Corners			
Fixing start location			
Trim			
Control joint width			
Flashings and cappings			
Fasteners			

Profiled sheet metal cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Profile			
Material type			
Thickness (mm)			
Colour			
Trim			
Flashings and cappings			
Fasteners			

Seamed sheet metal cladding schedule

	A	B	C
Product	Nailstrip 25mm rib		
Fixing system	Concealed		
Material	Colorbond Matt		
Minimum thickness (mm)	0.55		
Seam spacing	280		

	A	B	C
Colour	Monument		
Finish	Colorbond Matt		
Trim	Colorbond Matt		
Flashings and cappings	Colorbond Matt		
Fasteners	Concealed		

Terracotta cladding schedule

	A	B	C
Product	N/A		
Fixing system			
Thickness (mm)			
Length (mm)			
Width (mm)			
Edge profile			
Finish			
Panel orientation layout			
Trim			
Joint width			
Flashings and cappings			
Suspension rails			
Fasteners			

Timber cladding schedule

	A	B	C
Product	Mortlock Timber ProPlank Timber Batten Lining System		
Timber species	Tas oak		
Fixing system	Batten clips to 9mm cement sheet backing		
Profile	Block profile		
Width (mm)	40		
Depth (mm)	20		
Finish	x2 No. coats Cutek CD50 clear oil		
Preservative	Manufacturers		
Trim	Colorbond Matt Monument		
Flashings and cappings	Colorbond Matt Monument		
Fasteners	Manufacturer's system to Manufacturer's instructions and specifications.		

0436P COLORBOND® STEEL AND ZINCALUME® STEEL IN CLADDING
--

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide COLORBOND® steel and ZINCALUME® steel cladding and associated work, as documented.

Corrosion resistance

Material: To the manufacturer's recommendations for distance from marine influence.

1.2 COMPANY CONTACTS

BlueScope technical contacts

Website: www.steel.com.au/support.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.steel.com.au/library.

1.5 TOLERANCES

Permitted deviations

Profiled metal sheet cladding: To AS 1562.1 (2018) clause 4.2.3.

Structural steelwork for wall cladding: ± 5 mm between bearing planes of adjacent supports.

Length: ± 7 mm.

Width: ± 4 mm.

1.6 SUBMISSIONS

Products and materials

Type tests: As appropriate for the project, submit results of facade testing as follows:

- Resistance to wind pressure:
 - . For non-cyclone regions to AS 4040.2 (1992).
 - . For cyclone regions to AS 4040.3 (2018).

Samples

Finish: Submit samples of the cladding materials.

Subcontractors

Seamed sheet metal: Submit evidence of experience with non-ferrous cladding installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.7 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Framing, pliable membranes and insulation before covering up or concealing.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Storage and handling

Requirement: Store and handle materials to the manufacturer's recommendations and the following:

- Protect materials including edges and surfaces from damage.
- Do not drag sheets or panels across each other or over other materials.
- Store metal materials away from uncured concrete and masonry on a level base.
- Do not store metal materials in contact with other materials that may cause staining, denting or other surface damage.
- Use gloves when handling precoated metal cladding material.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 COLORBOND® STEEL AND ZINCALUME® STEEL COMPONENTS

General

Flashing: To AS/NZS 2904 (1995).

Material and colour: To match the cladding material.

Rib notching: To match the cladding material.

Fasteners

General: Type, size, corrosion resistance class and spacing to the cladding manufacturer's recommendations.

Finish for exposed fasteners on coloured cladding: Prefinish exposed fasteners with an oven baked polymer coating to match the cladding material.

Fasteners to timber battens: Provide fasteners long enough to penetrate the thickness of the batten without piercing the underside.

2.3 COLORBOND® STEEL AND ZINCALUME® STEEL

General

Requirement: COLORBOND® steel or ZINCALUME® steel profiled sheet metal cladding.

Design and installation: To AS 1562.1 (2018).

2.4 SEAMED SHEET METAL SYSTEM

General

Requirement: Sheet metal roll formed into pan profiles, laid with seamed joints on a separation layer on flush finished, continuous plywood sheeting or to manufacturer's recommendations.

Plywood sheeting

Standard: To AS/NZS 2269.0 (2012):

- Surface grade: D.
- Bond: Type A.
- Formaldehyde emission class: E₁.

Thickness: 15 mm.

Identification: Sheets labelled under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*.

Underlayer

Requirement: Breathable waterproof membrane to internal face of cavity when cladding including a plywood or FC substrate, is installed as a vented cavity or rainscreen system. Minimum 40 mm ventilation gap between substrate and framing.

Separation layer

Requirement: Breathable waterproof membrane between cladding material and substrate.

Accessories

Solder (tin/lead): 40/60 soft solder.

Flux: Z-04-S.

Sealant: 100% neutral cure non-acid based silicone rubber to match cladding.

Fasteners: Provide starter clips, fixing clips and fastenings as recommended by the cladding system supplier.

3 EXECUTION

3.1 GENERAL

Preparation

Substrates or framing: Before fixing cladding, check the alignment of substrates or framing and adjust if required.

Flexible underlay: Check that the underlay or insulation is restrained.

Cladding: Make sure the cladding is clean and free of dust and loose particles.

Installation

Standard: To AS 1562.1 (2018).

Requirement: Install cladding as follows:

- Fix sheeting firmly against framing to the manufacturer's recommendations.
- Plumb, level, straight and to documented tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading recommendations.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Cladding layout: Cut/fabricate and install cladding to suit the layout as documented.

Protection: Protect surfaces and finishes, including the retention of protective coatings during installation.

Accessories and trim

Requirement: Provide accessories and trim required to complete the installation, or as documented.

Corner flashing for profiled and seamed metal sheets: Finish off at corners with purpose-made folded flashing strips.

Metal separation

Requirement: Prevent direct contact between incompatible metals, and between green hardwood or chemically treated timber and aluminium or coated steel, by either of the following methods:

- Apply an anti-corrosion, low moisture transmission coating to contact surfaces.
- Insert a separation layer.

Incompatible metal fixings: Do not use.

Louvre sunscreens

Installation: Fix sunscreen systems to the current written recommendations and instructions of the manufacturer or supplier.

Horizontal cladding

Horizontal cladding surface:

- Minimum slope: 1:15.
- Staining: Slope away from visible vertical facade areas to prevent staining.

Defective and damaged parts

Defective components: Do not install component parts that are defective, including warped, bowed, dented, chipped, scratched, abraded or broken members.

Damaged parts: Remove and replace damaged parts during installation.

3.2 COLORBOND® STEEL AND ZINCALUME® STEEL CLADDING

General

Installation: To AS 1562.1 (2018).

Ground clearance: Maintain documented clearance.

Cutting sheets: Wherever possible, factory cut to length. Do not use an abrasion disc.

Accessories: Provide material with the same finish as cladding sheets.

Swarf: Remove swarf and other debris as soon as it is deposited.

Fixing

Concealed: To manufacturer's instructions.

Joints

Expansion joints to manufacturer's instructions and Australian Standards.

3.3 SEAMED SHEET METAL CLADDING

Plywood sheeting

Installation: Lay the length of the sheets at right angles to the supports.

End joints: Stagger the end joints and locate centrally over framing members.

Edge support: If panels are not tongue and grooved, provide noggings or trimmer joists to support the edges.

Fixing: 300 mm centres to each support:

- Timber: Adhesive and nail.
- Steel: Metallic-coated self-drilling/tapping screws with the heads finishing below the surface.

Control joints: 12 mm gap at abutting building elements.

Fabrication

Requirement: Factory fabricate pans.

Installation: To AS 1562.1 (2018).

Ground clearance: Maintain documented clearance.

Cutting sheets: Wherever possible, factory cut to length. Do not use an abrasion disc.

Accessories: Provide material with the same finish as cladding sheets.

Minimum bending radius: 1.75 mm.

Swarf: Remove swarf and other debris as soon as it is deposited.

Fixing

Requirement: Fix pans to the sheeting with concealed clips at 250 mm maximum centres or to manufacturer's recommendations.

Seams

Walls: Single angle standing seams.

3.4 COMPLETION

Fasteners

Requirement: Adjust for weathertightness without distortion of external panel face.

Reinstatement

Extent: Repair or replace damage to the cladding. If the work cannot be repaired satisfactorily, replace the whole area affected.

Damage to prepainted finish: Replace panels with scratches in the prepainted finish.

Cleaning

Requirement: Remove excess debris, metal swarf, solder, sealants and unused materials.

Exposed metal surfaces: Clean surfaces of substances that interfere with uniform weathering or oxidation.

Protection: Remove protective coatings using methods required by the manufacturer after completion.

Panels: Clean surfaces with soft, clean cloths and clean water to the manufacturer's recommendations.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 PERFORMANCE

Cladding performance schedule

	A	B	C
Combustibility			
Fire hazard property: Group number			
Fire hazard property: Spread-of-Flame Index			
Fire hazard property: Smoke-Developed Index			
Fire-resistance level (FRL)			
R-Value (m ² .K/W)	Refer Energy Assessment Report		
Acoustic characteristic			
Solar absorptance	0.93		
Light Reflectance Value (LRV)	8		

4.2 PRODUCT SCHEDULES

COLORBOND® steel and ZINCALUME® steel profiled sheet metal cladding schedule

	A	B	C
Profile	Nailstrip – 25mm rib		
Fixing system	Concealed		
Material type	Colorbond Matt		
Thickness (mm)	0.55		
Colour	Monument		
Trim	Colorbond Matt Monument		
Flashing and cappings	Colorbond Matt Monument		
Fasteners	Concealed		

Seamed sheet metal cladding schedule

	A	B	C
Product	Nailstrip – 25mm rib		
Fixing system	Concealed		
Material	Colorbond Matt		
Minimum thickness (mm)	0.55		
Width between seams	280		

	A	B	C
Colour	Monument		
Finish	Colorbond Matt		
Trim	Colorbond Matt - Monument		
Control joints	To manufacturer's instructions and Australian Standards		
Flashing and capping type	Colorbond Matt - Monument		
Fasteners	Concealed		

0451B WINDOWS AND GLAZED DOORS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide windows and glazed doors, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Selection and installation: To AS 2047 (2014).

Glazing

Glass type and thickness: To AS 1288 (2021), if no glass type or thickness is nominated.

Materials and installation: To AS 1288 (2021).

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667 (2000).

Ensure glazing shown in Window and Door Schedules CD12 – CD16 complies with glazing stipulated in the Energy Assessment Report.

1.4 SUBMISSIONS**Certification**

Windows and glazed doors: Submit evidence of conformity to AS 2047 (2014).

Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

Toughened glass: For each batch of glass, submit certification from the manufacturer of heat soaking.

Fire performance

Fire-resistance level: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire-resistance of building elements**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Safety glazing materials: Submit evidence of conformity to AS/NZS 2208 (1996) Appendix A.

Type tests: Submit results, as follows:

- Acoustic performance of windows and doors.
- Protection of openable windows.

Samples

General: Submit samples labelled with the series code reference and date of manufacture.

Window and door framing: Submit samples of the following:

- Prefinished production materials showing the limits of the range of variation in the documented colour.
- Joints made by proposed techniques.
- Sections for frames, sashes and slats.

Glazing: Submit samples of glazing materials, each at least 200 x 200 mm, showing the visual properties and range of variation, if any, for each of the following:

- Tinted or coloured glass or plastics glazing.
- Surface modified or surface coated glass.
- Patterned or obscured glass or plastics glazing.

- Wired glass.
- Mirror glass.

Hardware and accessories: Submit samples of the following:

- Window manufacturer's standard hardware and accessories including locks, latches, handles, catches, sash operators, anchor brackets and attachments, masonry anchors and weatherseals (pile or extruded).
- Generic hardware: Submit samples of generic hardware not documented as proprietary items.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, showing the following:

- Full size sections of members.
- Hardware, fittings and accessories including fixing details.
- Junctions and trim to adjoining surfaces.
- Layout (sectional plan and elevation) of the window assembly.
- Methods of assembly.
- Methods of installation, including fixing, caulking and flashing.
- Provision for vertical and horizontal expansion.
- Method of glazing, including the following:
 - . Rebate depth.
 - . Edge restraint.
 - . Clearances and tolerances.
 - . Glazing gaskets and sealant beads.

Subcontractors

General: Submit names and contact details of proposed manufacturers and installers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Openings prepared to receive windows.
- Fabricated window assemblies at the factory ready for delivery to the site.
- Fabricated window assemblies delivered to the site, before installation.
- Commencement of window installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Storage: Store in a clean, dry area unaffected by weather, to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding splatter.

Handling: Handle frames to the manufacturer's recommendations and as follows:

- Stack upright, off the ground and against a flat, vertical surface.
- Carry in the vertical position with sashes locked.
- Do not rack frames out of square.
- Do not remove any bands and corner bracing until after installation.

Acoustic performance

Windows and doors: Rating to AS/NZS ISO 717.1 (2004), as documented.

Protection of openable windows

Fall prevention: To BCA (2022) D3D29 and BCA (2022) H5D3.

Marking

Window assemblies: To AS 2047 (2014) Section 8.

2.2 FIRE PERFORMANCE**Fire-resistance of building elements**

Fire-resistance level: Tested to AS 1530.4 (2014).

2.3 FRAMES**Aluminium frames**

Standard: To AS 2047 (2014) clause 3.1.

Construction: Assembled from aluminium sections, including accessories such as pile strips, fixing ties or brackets and cavity flashings, with provision for fixing documented hardware and seals.

Subsill: If the frame includes a subsill, provide a self-draining section.

Steel frames

Standard: To AS 2047 (2014) clause 3.4.

Construction: Continuously welded from metallic-coated steel sheet sections, including accessories such as buffers, fixing ties or brackets, and cavity flashing. Provision for fixing documented hardware, seals and electronic security assemblies, and prefinished with a protective coating.

Metallic coating class to AS 1397 (2021) interior: ZF100.

Finish: Grind the welds smooth, cold galvanize the welded joints and shop prime.

Timber frames

Standard: To AS 2047 (2014) clause 3.2.

Hardwood: To AS 2796.1 (1999):

- Grade: Select.

Softwood: To AS 4785.1 (2002):

- Grade: Select.

Construction: Assembled from timber sections, with provision for fixing documented hardware including rebates for seals, where documented.

PVC-U frames

Standard: To AS 2047 (2014) clause 3.3.

2.4 GLAZING**Performance**

Glass: Free from defects that detract from appearance or interfere with performance under normal conditions of use.

Plastics glazing: Free from surface abrasions and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Heat soaking

Requirement: Heat soak glass to AS 1288 (2021) clause 3.8.

Standard: To EN 14179-1 (2016).

Marking: To EN 14179-1 (2016) or certified by the manufacturer to AS 1288 (2021) clause 3.8.2.

Safety glazing materials

Standard: To AS/NZS 2208 (1996).

Type: Grade A to AS 1288 (2021).

Certification: Required.

- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JASANZ).

Marking: To AS/NZS 2208 (1996) clause 1.7.

Heat-strengthened glass

Requirement: Heat-strengthened annealed glass that requires extra strength and thermal resistance.

Standard: To ASTM C1048 (2018).

Insulating glass units (IGUs)

Requirement: Provide insulating glass units, as documented.

Manufacture, testing and installation: To AS 4666 (2012).

2.5 GLAZING MATERIALS

General

Requirement: Putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges appropriate for the conditions of application and required performance.

Jointing materials

Requirement: Jointing and pointing materials that are compatible with each other and the contact surfaces, and non-staining to finished surfaces to manufacturer's recommendations. Do not provide bituminous materials on absorbent surfaces.

Elastomeric sealants

Sealing compounds (polyurethane, polysulfide, acrylic): To ASTM C920 (2018) or ISO 11600 (2002).

Sealing compounds (silicone): To ASTM C920 (2018) or ISO 11600 (2002).

Sealing compounds (butyl): To ASTM C1311 (2022).

Elastomeric sealants schedule

Sealant type	Material	Location or function
To approval		

Primer

Compatibility: Apply the manufacturer's recommended primer to the surfaces in contact with sealant materials.

Control joints

Depth of elastomeric sealant: One half the joint width or 6 mm, whichever is the greater.

Foamed materials (in compressible fillers and backing rods): Closed cell or impregnated types that do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, that do not adhere to the sealant.

2.6 SCREENS

General

Requirement: Provide screens, as documented.

Fixed screens

General: Fixed screens fitted to the window frames with a clipping device that allows for removal for cleaning.

Hinged screens

General: Screens hinged at the top to give access to opening sash.

Retractable screens

General: Proprietary retractable screens, comprising aluminium frames and fibreglass mesh, fitted between the guide channels incorporated in the frames, and a retraction system including tension spring, bearings, positive self-locking device and elastomeric sealing strip at sill.

Sliding screens

General: Screens that are not part of the window frame, with matching aluminium head guide, sill runner, and frame stile sections.

Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

Aluminium framed screens

General: Aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners. If necessary to adapt to window opening gear, provide an extended frame section.

Mesh: Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and free of distortion.

2.7 SECURITY WINDOW GRILLES

General

Requirement: Proprietary metal security grilles, or operable screen and frames, fixed to the building structure with tamper resistant fastenings.

Standard: To AS 5039 (2008).

2.8 ALUMINIUM FRAME FINISHES

Powder coatings

Service condition category to AS 3715 (2002)

Anodised

Standard: To AS 1231 (2000).

Thickness:

- Internal: 15 microns.
- External: 20 microns.

2.9 OTHER MATERIAL FRAME FINISHES

Finish

Standard: To AS 2047 (2014) clause 3.4.1.4.

2.10 ANCILLARY COMPONENTS AND FITTINGS

Trim

General: Provide trim, shadow angles and architraves, as documented.

Extruded gaskets and seals

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

Flashings

General: Corrosion-resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.

Standard: To AS/NZS 2904 (1995).

Nylon brush seals

General: Dense nylon bristles locked into holding strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door or frame to the manufacturer's recommendations.

Pile weatherstrips

General: Provide weatherstrips, as documented.

Standard: To AAMA 701/702 (2023).

Material: Pile and backing or equivalent polypropylene, low friction silicone treated, ultraviolet stabilised, fixed to the frame to the manufacturer's recommendations.

Finned type: A pile weatherseal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

Weather bars

General: Provide corrosion-resistant weather bars or threshold plates for hinged external doors, located under the centres of closed doors or to manufacturer's recommendations.

2.11 HARDWARE

Hardware documented generically

General: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined.

Window locks and latches

Standard: To AS 4145.2 (2008).

Window catches: Provide 2 catches per sash to manually latched awning or hopper sashes over 1000 mm wide.

Sash balances

Requirement: Match the spring strength of the balances to the sash weight they support.

Sash operators

Requirement: Provide sash operators, as documented.

3 EXECUTION

3.1 GLAZING PROCESSING**General**

Processing: Perform required processes on glazing, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arised.

3.2 INSTALLATION**General**

Requirement: Install windows and glazed doors as follows:

- Plumb, level, straight and true within building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Glazing

Requirement: Install the glass as follows:

- Permanently fix in place each piece of glass to withstand the normal loadings and ambient conditions at its location without distortion or damage to glazing materials.
- No transfer of building movements to the glazing.
- Watertight and airtight for external glazing.

Temporary marking: Use a method that does not damage the glazing. Remove marking only after certification and acceptance of the installation.

Toughened glass: Do not cut, drill, edgework or permanently mark after toughening. Use installation methods that prevent the glass making direct contact with metals or other non-resilient materials.

Frameless installations: Join the vertical edges of adjacent glass panels with silicone jointing compound.

Heat-absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Site glazing

External timber framed glazing: Glaze with putty.

Weatherproofing

Flashing and weatherings: Install flashings, weather bars, threshold plates, drips, storm moulds, joint sealant and pointing to prevent water penetrating the building between the window frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

Fixing

Packing: Pack behind fixing points with durable full width packing.

Fasteners: Conceal fasteners.

Fasteners and fastener spacing: Conform to the recommendations of the manufacturer.

Prepared masonry openings: If fixing of timber windows to prepared anchorages needs fastening from the frame face, sink the fastener heads below the surface and fill the sinking flush with a material compatible with the surface finish.

Joints

General: Make accurately fitted tight joints so that fasteners or fixing devices such as pins, screws, adhesives and pressure indentations are not visible on exposed surfaces.

Sealants:

- If priming is recommended, prime surfaces in contact with jointing materials.
- If frames are powder coated, apply a neutral cure sealant.

Operation

General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and are lubricated.

Protection

Removal: Remove temporary protection measures from the following:

- Contact mating surfaces before joining up.
- Exposed surfaces before completion of the works.

Seals

General: Provide the fixings, rebates, grooves, and clearances required for installation and operation of the seals. Allow seals unwound from coils to settle before use. Install proprietary seals to manufacturer's recommendations and adjust correctly.

Trim

General: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the window frames. Install to make neat and clean junctions between frames and the adjoining building surfaces.

3.3 SECURITY WINDOW GRILLES**General**

Installation: To AS 5040 (2003).

3.4 HARDWARE**Fasteners**

Materials: Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function.

- Concealed fasteners: Provide a corrosion-resistant finish.
- Exposed fasteners: Match exposed fasteners to the material being fixed.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fasteners.

- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self-tapping screws or pop rivets.

Proprietary window systems

Requirement: Provide the standard hardware and internal fixing points for personnel safety harness attachment, if required by and conforming to the governing regulations.

Operation

General: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Opening force performance: To the NCC cited AS 1428.1 (2009).

Supply

Delivery: Deliver window hardware items, ready for installation, in individual complete sets for each window set, as follows:

- Clearly labelled with the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

3.5 COMPLETION**Hardware**

Adjustment: Leave the hardware with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Repair of finish

Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products, otherwise replace damaged material.

Cleaning

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive, acidic or alkaline materials.

Extent: All frames and glass surfaces internally and externally.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the following:

- Window and glazed door manufacturer's published recommendations for operation, care and maintenance.
- Hardware manufacturer's published recommendations for use, care and maintenance.

Warranties

Window and door assemblies: Provide the manufacturer's published product warranties.

Hardware: Provide the manufacturer's published product warranties.

4 SELECTIONS**4.1 PERFORMANCE****Window and glazed door performance schedule**

	A	B	C
Total system U-Value (W/m ² .K)	Ensure glazing shown in Window and Door Schedules CD12 – CD16 complies with glazing stipulated in the Energy Assessment Report.		
Total system SHGC			
Airborne sound insulation			
Visible transmittance (T _{vis})			
Reflectance (%)			
WERS Energy rating%: Heating			
WERS Energy rating%: Cooling			
AGWA Glass Compliance Certificate			
AGWA Window Compliance Certificate			
Water penetration resistance (Pa)			
Fire-resistance level (FRL)			
Ultimate limit state (ULS) wind pressure (Pa)			
Serviceability limit state (SLS) wind pressure (Pa)			
Openable (free) area (m ²)			

Window locks and latches performance schedule

	A	B	C
Durability (D)	To approval		
Key security (K)			

	A	B	C
Cylinder security (S _c)			
Physical security of locks (S)			
Physical security of locksets (S _L)			
Corrosion classification (C)			
Classification to AS 4145.1 (2008)			

4.2 WINDOWS AND GLAZED DOORS

Window and glazed door schedule

	A	B	C
Product name	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		
Proprietary suite			
Suite description			
Generic description			
Frame: Material			
Frame: Finish			
Frame: Colour			
Frame: Gloss level			
Thermal break			
Screen: Frame material			
Screen: Frame finish			
Screen: Mesh type			
Glazing			
Permanent ventilation			
Safety markings			
Hardware			

4.3 SCREENS

Screen schedule

	A	B	C
Product	Refer drawings		
Type			
Frame: Material			
Frame: Finish			
Frame: Colour			
Frame: Gloss level			
Mesh type			

4.4 SECURITY WINDOW GRILLES

Security window grille schedule

	A	B	C
Product	N/A		
Type to AS 5039 (2008)			
Material			
Finish			
Colour			
Gloss level			
Hinges: Material			
Hinge: Fixing			
Hardware			

4.5 GLAZING

Glass schedule

	A	B	C
Glass type	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		
Glass thickness (mm)			
Body tint colour			
Interlayer colour			
Surface coating: Description			
Surface coating: Colour			
Reflective coating: Colour			
Reflective coating: % reflectance			
Surface pattern			
Surface processing: Method			
Surface processing: Pattern			
Surface processing: Colour			
Edge processing			
Number of edges processed			
Fire-resistance level (FRL)			
Safety markings			

Special glasses schedule

	A	B	C
Mirrored	Refer Fitting and Fixture Schedule.		
Patterned			
Acid etched			
Sandblasted			

Plastics glazing schedule

	A	B	C
Polycarbonate sheet: Type	N/A		
Polycarbonate sheet: Abrasion resistance			
Polycarbonate sheet: Fire hazard properties			
Acrylic sheet			
Reinforced polyester sheet: Type			
Reinforced polyester sheet: Surface treatment			
Reinforced polyester sheet: Mass/unit area			

Insulating glass units (IGUs) schedule

	A	B	C
Product	N/A		
Outer pane: Glass type			
Outer pane: Thickness (mm)			
Outer pane: Colour/coating type			
Inner pane: Glass type			
Inner pane: Thickness (mm)			
Inner pane: Colour/coating type			
Spacer width (mm)			
Gas filling: Type			

4.6 ANCILLARY COMPONENTS AND FITTINGS**Trim schedule**

	A	B	C
Product	Refer drawings		
Trim			
Door architrave			
Window architrave			

Window and glazed door seal schedule

	A	B	C
Product	Refer to Window and Door Schedules CD12 – CD16 and Door Hardware Schedule.		
Function			
Carrier material and finish			
Seal insert type and material			
Complementary seal			

Pile weatherstrips schedule

	A	B	C
Product	Refer to Window and		

	A	B	C
	Door Schedules CD12 – CD16 and Door Hardware Schedule.		
Material			

Weather bars schedule

	A	B	C
Product	N/A		
Material			

4.7 WINDOW HARDWARE**Window hardware schedule**

	A	B	C
Hinges	To approval		
Sash balances	To approval		
Stays	To approval		
Sash lift and pulls	To approval		
Sash operator	Refer to Window and Door Schedules CD12 – CD16		
Sash operator remote controller	N/A		
Locks, catches and bolts	To approval		

0451P CAPRAL ALUMINIUM WINDOWS AND DOORS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide CAPRAL ALUMINIUM windows and glazed doors, as documented.

1.2 COMPANY CONTACTS

Capral Aluminium technical contacts

Website: www.capral.com.au/architectural-building-solutions/caprals-specification-team/

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

General

Selection and installation: To AS 2047 (2014).

Glazing

Glass type and thickness: To AS 1288 (2021), if no glass type or thickness is nominated.

Materials and installation: To AS 1288 (2021).

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667 (2000).

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.capral.com.au/resources-downloads/technical-docs-drawings/

1.6 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- AGWA: Australian Glass and Window Association.
- WERS: Window Energy Rating Scheme.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 4668 (2000) and the following apply:

- Hardware: To AS 4145.1 (2008) Section 2.
- Total system SHGC: Solar heat gain coefficient as defined by the NCC and tested in conformance with NFRC 200 (2023).
- Total system U-Value: Thermal transmittance as defined by the NCC and tested in conformance with NFRC 100 (2023).
- Weathering: Inclined upper external surface, such as of a coping, sill, or top of a buttress or chimney, designed to shed rainwater quickly and throw it clear of the facing material below.

1.7 SUBMISSIONS

Certification

Windows and glazed doors: Submit evidence of conformity to AS 2047 (2014).

Sealant compatibility: Submit statements from all parties to the installation certifying the compatibility of sealants and glazing systems to all substrates.

Opacified glass: Submit a report, from the manufacturer, certifying that the proposed method of opacifying the glass will not be detrimental to the glass or affect the glass product warranty.

Toughened glass: For each batch of glass, submit certification from the manufacturer of heat soaking.

Fire performance

Bushfire-resistance: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Bushfire resistance**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Safety glazing materials: Submit evidence of conformity to AS/NZS 2208 (1996) Appendix A.

Type tests: Submit results, as follows:

- Acoustic performance of windows and doors.
- Protection of openable windows.

Prototypes

Sample installations: Install the designated typical window and door assemblies in their final position incorporating at least one example of each component in the system, including attachments to the structure, flashing, caulking, sealing, glazing, operating hardware, locks and keys.

Samples in prototypes: Install required samples in prototypes.

Samples

General: Submit samples labelled with the series code reference and date of manufacture.

Window and door framing: Submit samples of the following:

- Prefinished production materials showing the limits of the range of variation in the documented colour.
- Joints made by proposed techniques.
- Sections for frames, sashes, louvres and slats.

Glazing: Submit samples of glazing materials, each at least 200 x 200 mm, showing the visual properties and range of variation, if any, for each of the following:

- Tinted or coloured glass or plastics glazing.
- Surface modified or surface coated glass.
- Patterned or obscured glass or plastics glazing.
- Ceramic-coated glass.
- Wired glass.
- Mirror glass.

Hardware and accessories: Submit samples of the following:

- Window manufacturer's standard hardware and accessories including locks, latches, handles, catches, sash operators, anchor brackets and attachments, masonry anchors and weatherseals (pile or extruded).
- Generic hardware: Submit samples of generic hardware not documented as proprietary items.

Shop drawings

General: Submit shop drawings, to a scale that best describes the detail, showing the following:

- Full size sections of members.
- Hardware, fittings and accessories including fixing details.
- Junctions and trim to adjoining surfaces.
- Layout (sectional plan and elevation) of the window assembly.
- Methods of assembly.
- Methods of installation, including fixing, caulking and flashing.
- Provision for vertical and horizontal expansion.
- Method of glazing, including the following:
 - . Rebate depth.
 - . Edge restraint.
 - . Clearances and tolerances.
 - . Glazing gaskets and sealant beads.

Subcontractors

General: Submit names and contact details of proposed manufacturers and installers.

Warranties

Requirement: Submit CAPRAL ALUMINIUM warranty for finishing and hardware to **COMPLETION, Warranties.**

1.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Prototypes constructed and ready for inspection.
- Openings prepared to receive windows.
- Fabricated window assemblies at the factory ready for delivery to the site.
- Fabricated window assemblies delivered to the site, before installation.
- Commencement of window installation.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Storage and handling

Storage: Store in a clean, dry area unaffected by weather, to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding splatter.

Handling: Handle frames to the manufacturer's recommendations and as follows:

- Stack upright, off the ground and against a flat, vertical surface.
- Carry in the vertical position with sashes locked.
- Do not rack frames out of square.
- Do not remove any bands and corner bracing until after installation.

Acoustic performance

Windows and doors: Rating to AS/NZS ISO 717.1 (2004), as documented.

Protection of openable windows

Fall prevention: To BCA (2022) D3D29 and BCA (2022) H5D3.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Marking

Window assemblies: To AS 2047 (2014) Section 8.

2.2 FIRE PERFORMANCE

Bushfire resistance

Windows and doors: To AS 3959 (2018).

2.3 CAPRAL ALUMINIUM AGS COMMERCIAL FRAMING SYSTEMS

AGS 300 Narrowline

Description: Single glazed centre pocket framing system.

Framing section: 76 mm x 35 mm.

Maximum height: 3300 mm.

Maximum width: 2000 mm.

AGS 325 Narrowline Double Glazed

Description: Double glazed centre pocket framing system.

Framing section: 76 mm x 35 mm.

Maximum height: 3000 mm.

Maximum width: 2000 mm.

AGS 400 Narrowline

Description: Single glazed centre pocket framing system.

Framing section: 101.6 mm x 44 mm.

Maximum height: 4000 mm.

Maximum width: 2400 mm.

AGS 425 Narrowline Double Glazed

Description: Double glazed centre pocket framing system.

Framing section: 101.6 mm x 50 mm.

Maximum height: 4000 mm.

Maximum width: 2400 mm.

AGS 450 Narrowline Double Glazed

Description: Wide pocket double glazed centre pocket framing system.

Framing section: 101.6 mm x 55 mm frame.

Maximum height: 4000 mm.

Maximum width: 2400 mm.

AGS 600 Narrowline

Description: Single glazed centre pocket framing system.

Framing section: 150 mm x 50 mm.

Maximum height: 4000 mm.

Maximum width: 2200 mm.

AGS 625 Narrowline Double Glazed

Description: Double glazed centre pocket framing system.

Framing section: 150 mm x 50 mm.

Maximum height: 4000 mm.

Maximum width: 2200 mm.

AGS 601 Offset Narrowline

Description: Single glazed offset pocket framing system.

Framing section: 150 mm x 44 mm.

Maximum height: 5000 mm.

Maximum width: 2200 mm.

AGS 419 Flushline Single Glazed - 100 mm frame

Description: Single glazed forward positioned glazing pocket framing system for flush external finish.

Framing section: 100 mm x 50 mm.

Maximum height: 3800 mm.

Maximum width: 2400 mm.

AGS 619 Flushline Single Glazed - 150 mm frame

Description: Single glazed forward positioned glazing pocket framing system for flush external finish.

Framing section: 150 mm x 50 mm.

Maximum height: 5000 mm.

Maximum width: 2400 mm.

AGS 619 Flushline Acoustic

Description: Dual glazing pocket framing system that allows a 100 mm air space for noise reduction.

Framing section: 150 mm x 50 mm.

Maximum height: 4400 mm.

Maximum width: 2400 mm.

AGS 429 Flushline Double Glazed - 100 mm frame

Description: Double glazed forward positioned glazing pocket, framing system for flush external finish.

Framing section: 100 mm x 55 mm.

Maximum height: 3400 mm.

Maximum width: 2400 mm.

AGS 629 Flushline Double Glazed - 150 mm frame

Description: Double glazed forward positioned glazing pocket, framing system for flush external finish.

Framing section: 150 mm x 55 mm.

Maximum height: 5000 mm.

Maximum width: 2400 mm.

AGS 1029 Flushline Double Glazed - 250 mm frame

Description: Double glazed forward positioned glazing pocket, framing system for flush external finish.

Framing section: 250 mm x 55 mm.

Maximum height: 6000 mm.

Maximum width: 2400 mm.

AGS 659 Flushline Double Glazed - 150 mm frame with 50mm pocket

Description: Wide, double glazed forward positioned glazing pocket, framing system for flush external finish.

Framing section: 150 mm x 55 mm.

Maximum height: 5000 mm.

Maximum width: 2400 mm.

2.4 CAPRAL ALUMINIUM AGS COMMERCIAL WINDOWS

AGS 35 Series Awning and Casement Windows

Description: Single or double glazed awning and casement operable window system capable of incorporating fixed lights and operable awning or casement sashes.

Maximum panel size and weight:

- Awning window:
 - . Height: 1500 mm.
 - . Width: 1200 mm.
 - . Weight: 60 kg.
- Casement window:
 - . Height: 1500 mm.
 - . Width: 750 mm.
 - . Weight: 40 kg.
- Integral hinged awning window:
 - . Height: 1800 mm.
 - . Width: 1500 mm.
 - . Weight: 60 kg.

AGS 50 Series Awning and Casement Windows

Maximum panel size and weight:

- Awning window:
 - . Height: 1800 mm.
 - . Width: 1500 mm.
 - . Weight: 60 kg.
- Integral hinged awning window:
 - . Height: 1800 mm.
 - . Width: 1500 mm.
 - . Weight: 60 kg.

- Casement window:
 - . Height: 1500 mm.
 - . Width: 900 mm.
 - . Weight: 40 kg.
- Jockey sash:
 - . Height: 1500 mm.
 - . Width: 700 mm.
 - . Weight (on 3 jockey hinges): 15 kg.

AGS Euro Awning and Casement Windows

Description: Single or double glazed awning and casement windows that can be installed either in standard or high performance configurations using a subframe system.

Maximum panel size and weight:

- Awning window:
 - . Height: 1800 mm.
 - . Width: 1500 mm.
 - . Weight: 60 kg.
- Casement window:
 - . Height: 1800 mm.
 - . Width: 900 mm.
 - . Weight: 40 kg.
- Integral hinged awning window:
 - . Height: 2100 mm.
 - . Width: 1800 mm.
 - . Weight: 60 kg.
- Integral hinged casement window:
 - . Height: 2100 mm.
 - . Width: 1200 mm.
 - . Weight: 60 kg.

AGS Euro Tilt and Turn Window

Description: Single or double glazed tilt and turn windows installed into commercial framing for standard or high performance configurations using a subframe system.

Maximum panel size and weight:

- Tilt and turn window:
 - . Height: 2400 mm.
 - . Width: 1300 mm.
 - . Weight: 80 kg.

AGS 380/480 Sliding Window

Description: Single or double glazed sliding window.

Framing section:

- 380 sliding window: 76 mm x 35 mm.
- 480 sliding window: 101.6 mm x 44 mm.

Maximum panel size and weight:

- 380 Sliding Window:
 - . Height: 1500 mm.
 - . Width: 1200 mm.
 - . Weight per sash (standard rollers): 12 kg.
 - . Weight per sash (heavy duty rollers): 42 kg.
- 480 Sliding Window:
 - . Height: 1500 mm.

- . Width: 1200 mm.
- . Weight per sash (standard rollers): 12 kg.
- . Weight per sash (heavy duty rollers): 42 kg.

AGS 950 Sliding Window

Description: High performance single or double glazed sliding window.

Maximum panel size and weight:

- Height: 1800 mm.
- Width: 1200 mm.
- Weight per sash (standard rollers): 64 kg.

AGS 481 Double Hung Window

Description: Single glazed or double glazed double hung window for integration into the AGS 400 Narrowline framing system.

Framing section: 101.6 mm x 44 mm.

Maximum double hung size and sash weight:

- Height: 2400 mm.
- Width: 1200 mm.
- Weight: 18 kg.

2.5 CAPRAL ALUMINIUM AGS COMMERCIAL DOORS

AGS 900 Sliding Door

Description: Single or double glazed sliding door system with external and internal single, multi-stack, corner and cavity configurations.

Maximum panel size and weight:

- Height: 3000 mm.
- Width:
 - . Standard rails: 1750 mm.
 - . Heavy duty rails: 2500 mm.
- Weight:
 - . Standard roller: 160 kg.
 - . Heavy duty roller: 250 kg.

AGS 996 Artisan Folding Door

Description: Single or double glazed, top hung track system folding door with open in, open out and corner entry configurations.

Maximum panel size and weight:

- Height:
 - . On 3 hinges: 2500 mm.
 - . On 4 hinges: 2500 mm to 3000 mm.
- Width: 1000 mm.
- Weight: 100 kg.

AGS 215 36 mm Hinged Door

Description: Single glazed hinged door for integration with Capral Aluminium framing system.

Framing section:

- Stiles: 36 mm deep x 91 mm wide.
- Rails: 101 mm high.

Maximum panel size and weight:

- Height: 2700 mm.
- Width: 1200 mm.
- Weight (on 4 hinges): Up to 100 kg.

AGS 225 46 mm Commercial Door

Description: Single and double glazed hinged or sliding shopfront door for integration with Capral Aluminium framing system.

Framing section:

- Stiles: 46 mm deep x 83 mm and 131 mm wide.
- Rails: 87 mm and 110 mm high.

Maximum panel size and weight: Hinged and pivot:

- Height: 3000 mm.
- Width: 1200 mm.
- Weight: Up to 100 kg.

Maximum panel size and weight: Sliding:

- Height: 2700 mm.
- Width: 1800 mm.
- Weight: Up to 300 kg.

2.6 CAPRAL ALUMINIUM FUTURELINE THERMAL BREAK FRAMING SYSTEMS

Futureline 425TB Fixed Light Frame

Description: Thermally broken double glazed centre pocket framing system.

Framing section: 100 mm x 62 mm.

Maximum height: 4000 mm.

Maximum width: 2400 mm.

Futureline 429TB 100 mm Flush Fixed Light Frame

Description: Thermally broken double glazed forward positioned glazing pocket system for flush external finish.

Framing section: 100 mm x 62 mm.

Maximum height: 4800 mm.

Maximum width: 2400 mm.

Futureline 629TB 150 mm Flush Fixed Light Frame

Description: Thermally broken double glazed forward positioned glazing pocket system for flush external finish.

Framing section: 150 mm x 62 mm.

Maximum height: 5400 mm.

Maximum width: 2400 mm.

2.7 CAPRAL ALUMINIUM FUTURELINE THERMAL BREAK WINDOW

Futureline 992TB Awning/Casement Window

Description: Thermally broken double glazed awning and casement windows for integration with Capral Aluminium Futureline framing systems.

Maximum panel size and weight:

- Awning window:
 - . Height: 1800 mm.
 - . Width: 1500 mm.
 - . Weight: 60 kg.
- Casement window:
 - . Height: 1800 mm.
 - . Width: 900 mm.
 - . Weight: 40 kg.

Futureline 991TB Vertical and 990TB Horizontal Sliding Window

Description: Sashless sliding windows for integration with Capral Aluminium Futureline framing systems.

Maximum panel size and weight:

- Horizontal Slider:
 - . Height: min 250 mm.
 - . Width: 4500 mm.
 - . Weight: 60 kg.
- Vertical Slider:
 - . Height: 3000 mm.
 - . Width: 1200 mm.

2.8 CAPRAL ALUMINIUM FUTURELINE THERMAL BREAK DOOR

Futureline 997TB Hinged Door

Description: Thermally broken double glazed hinged door for integration with CAPRAL ALUMINIUM Futureline framing systems.

Framing section:

- Stiles: 46 mm deep x 85 mm wide.
- Rails: 89 mm and 120 mm high.

Maximum panel size and weight:

- Height: 2700 mm.
- Width: 1000 mm.
- Weight: 115 kg.

Futureline 994TB Sliding Door

Description: Thermally broken double glazed sliding door for integration with Capral Aluminium Futureline framing systems.

Framing section:

- Stiles: 45 mm deep x 102 mm wide.
- Rails: 102 mm high.

Maximum panel size and weight:

- Height: 3000 mm.
- Width: 2400 mm.
- Weight (sliding): 200 kg.
- Weight (lift & slide): 300 kg.

2.9 CAPRAL ALUMINIUM URBAN RESIDENTIAL WINDOWS

Urban 280 Sliding Window

Description: Single or double glazed sliding window for integration with CAPRAL ALUMINIUM Urban awning, casement and double hung windows.

Maximum panel size and weight:

- Height: 1500 mm.
- Width: 1200 mm.
- Weight per sash (standard rollers): 12 kg.
- Weight per sash (heavy duty rollers): 42 kg.

Urban 281 Double Hung Window

Description: Single glazed double hung window for integration with Capral Aluminium Urban sliding, casement and awning windows.

Maximum panel size and weight:

- Double hung:
 - . Height: 2400 mm.
 - . Width: 1200 mm.
 - . Sash weight: 18 kg.
- Fixed lights:
 - . Height: 2400 mm.
 - . Width: 1200 mm.

Urban 282 Awning and Casement Windows

Description: Single or double glazed awning and casement window with provision for side and top lights for integration with CAPRAL ALUMINIUM Urban sliding, casement and double hung windows.

Maximum panel size and weight:

- Awning window:
 - . Height: 1550 mm.
 - . Width: 1210 mm.
 - . Weight: 43 kg.
- Hinged head awning window:
 - . Height: 1800 mm.
 - . Width: 1800 mm.
 - . Weight: 60 kg.
- Casement window:
 - . Height: 1500 mm.
 - . Width: 750 mm.
 - . Weight: 40 kg.
- Fixed lights:
 - . Height: 2400 mm.
 - . Width: 1800 mm.

2.10 CAPRAL ALUMINIUM URBAN RESIDENTIAL DOORS

Urban 284 Sliding Door

Description: Single or double glazed sliding door with standard, multi-stack and inside and outside corner configurations with provisions for side lights.

Maximum panel size and weight:

- Height: 2700 mm.
- Width:
 - . Standard rail: 1200 mm.
 - . Heavy duty rail: 1500 mm.
- Weight:
 - . Standard roller: 50 kg.
 - . Heavy duty roller: 160 kg.

Maximum fixed light size:

- Height: 2700 mm.
- Width: 1200 mm.

Maximum frame width with highlight window: 3000 mm.

2.11 CAPRAL ALUMINIUM URBAN PLUS RESIDENTIAL WINDOWS

Urban Plus 390 Sliding Window

Description: Single or double glazed sliding window with XO, XX, OXXO, XOX, OXX and OXXXXO configurations and provisions for side, high and top lights.

Maximum panel size and weight:

- Sliding window:
 - . Height: 1800 mm.
 - . Width: 1200 mm.
 - . Weight: 60 kg.
- Framed fixed light:
 - . Height: 2400 mm.
 - . Width: 1450 mm.

Urban Plus 391 Double Hung Window

Description: Single or double glazed double hung window with DH and DH.DH configurations with provisions for side and top lights.

Frame depth: 76 mm.

Maximum sash size and weight:

- Height: 1200 mm.
- Width: 1200 mm.
- Weight: 20.4 kg.

Maximum framed fixed light size:

- Height: 2400 mm.
- Width: 1450 mm.

Urban Plus 392 Awning/Casement Window

Description: Single or double glazed high performance awning and casement window.

Frame depth: 76 mm.

Maximum panel size:

- Awning window:
 - . Tall awnings: 2100 x 900 mm.
 - . Wide awnings: 900 x 2100 mm.
 - . Maximum area: 1.89 m².
- Casement window:
 - . Height: 2400 mm.
 - . Width: 1150 mm.
 - . Weight: 44 kg.
- Framed fixed light:
 - . Height: 2400 mm.
 - . Width: 1450 mm.

Urban Plus 393 Louvre Window

Description: Single glazed framing system that incorporates operable louvres galleries.

Frame depth: 125 mm.

Maximum size louvre opening:

- Height: 2100 mm.
- Width: 900 mm.

Maximum framed fixed light size:

- Height: 2700 mm.
- Width: 1500 mm.

Louvres: Profiled extruded aluminium louvre blades.

Urban Plus 395 Folding Window

Description: Single or double glazed, bottom roller folding window with open in, open out options with provisions for low, side and high lights.

Frame depth: 76 mm.

Maximum panel size:

- Height: 2100 mm.
- Width: 900 mm.
- Weight: 40 kg.

2.12 CAPRAL ALUMINIUM URBAN PLUS RESIDENTIAL DOORS

Urban Plus 394 Sliding Door

Description: Single or double glazed sliding door with single, multi-stack and cavity configurations with provision for side and top lights.

Frame depth: 125 mm.

Maximum panel size and weight:

- Height: 2700 mm.
- Width: 1500 mm.
- Weight: 160 kg.

Maximum framed fixed light size:

- Height: 2400 mm.
- Width: 1500 mm.

Maximum frame width with highlight window: 3000 mm.

Urban Plus 396 Folding Door

Description: Single or double glazed, bottom roller folding door with open in, open out options with provisions for side and high lights.

Frame depth: 76 mm.

Maximum panel size

- Height: 2700 mm.
- Width: 900 mm.
- Weight: 40 kg.

Urban Plus 397 Hinged Door

Description: Single and double glazed hinged door for integration with Capral Aluminium Urban Plus framing system.

Frame depth: 125 mm.

Panel section:

- Stiles: 46 mm deep x 83 mm and 131 mm wide.
- Rails: 110 mm or 140 mm high.

Maximum panel size and weight: Hinged and pivot:

- Height: 3000 mm.
- Width: 1200 mm.
- Weight: Up to 100 kg.

2.13 SCHÜCO ALUMINIUM SLIDING SYSTEMS

ASS 39 PD.NI Panoramic Door

Description: Single or double glazed sliding door system with external and internal single, multi-stack, corner and cavity configurations.

Framing section: 107 mm and 159 mm x flush sill.

Maximum panel size and weight:

- Height: 3300 mm.
- Width: 2000 mm.
- Weight: 300 kg.

ASE 39 PD.NI HD Panoramic Door

Description: Single or double glazed sliding door system with external and internal single, multi-stack, corner and cavity configurations.

Framing section: 107 mm and 159 mm x flush sill.

Maximum panel size and weight:

- Height: 3300 mm.
- Width: 2200 mm.
- Weight: 300 kg.

ASS 50 Sliding Door

Description: Thermally broken double glazed sliding door for integration with Schüco framing systems.

Framing section: 120 mm and 185 mm x 38 mm sill.

Maximum panel size and weight:

- Height: 3000 mm.

- Width: 3000 mm.
- Weight: 400 kg.

ASS 70 FD Folding Door

Description: Thermally broken double glazed bottom roller folding door for integration with Schüco framing systems.

Framing section: 80 mm x 60 mm sill.

Maximum panel size and weight:

- Height: 3000 mm.
- Width: 1200 mm.
- Weight: 100 kg.

2.14 SCHÜCO ALUMINIUM DOOR SYSTEMS

ADS 65 HD Hinged Door

Description: Thermally broken double glazed hinged door for integration with Schüco framing systems.

Maximum panel size and weight:

- Height: 3000 mm.
- Width: 1400 mm.
- Weight: 200 kg.

ADS 75 HD.HI Hinged Door

Description: Thermally broken double glazed hinged door for integration with Schüco framing systems.

Framing section: 125 mm and 150 mm x 26 mm sill.

Maximum panel size and weight:

- Height: 3000 mm.
- Width: 1400 mm.
- Weight: 200 kg.

2.15 SCHÜCO ALUMINIUM WINDOW SYSTEMS

AWS 65 Framing suite

Description: Thermally broken double glazed forward positioned glazing pocket system for flush external finish.

Framing section:

- Maximum height: 4800 mm.
- Maximum width: 2400 mm.

Tilt and turn window:

- Height: 2500 mm.
- Width: 1700 mm.
- Weight: 160 kg.

AWS 75.SI+ Framing suite

Description: Super insulated thermally broken double glazed forward positioned glazing pocket system for flush external finish.

Framing section:

- Maximum height: 4800 mm.
- Maximum width: 2400 mm.

Tilt and turn window:

- Height: 2500 mm.
- Width: 1700 mm.
- Weight: 200 kg.

AWS 114 PAF Parallel opening window

Description: Thermally broken double glazed parallel opening window for integration with Schüco framing systems.

Panel size limitations:

- Maximum height: 3600 mm.
- Maximum width: 2200 mm.
- Weight: 250 kg.

2.16 GLAZING

Performance

Glass: Free from defects that detract from appearance or interfere with performance under normal conditions of use.

Plastic glazing: Free from surface abrasions and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Heat soaking

Requirement: Heat soak glass to AS 1288 (2021) clause 3.8.

Standard: To EN 14179-1 (2016).

Marking: To EN 14179-1 (2016) or certified by the manufacturer to AS 1288 (2021) clause 3.8.2.

Safety glazing materials

Standard: To AS/NZS 2208 (1996).

Type: Grade A to AS 1288 (2021).

Certification: Required.

- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JASANZ).

Marking: To AS/NZS 2208 (1996) clause 1.7.

Heat-strengthened glass

Requirement: Heat-strengthened annealed glass that requires extra strength and thermal resistance.

Standard: To ASTM C1048 (2018).

Ceramic-coated glass

Requirement: Heat-strengthened or toughened glass with a coloured ceramic coating fused to and made an integral part of the surface to ASTM C1048 (2018), Condition B.

Opacified glass

Requirement: Glass with an opacifier permanently bonded to the inner face.

Insulating glass units (IGUs)

Requirement: Provide insulating glass units, as documented.

Manufacture, testing and installation: To AS 4666 (2012).

2.17 GLAZING MATERIALS

General

Requirement: Putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks and compression wedges appropriate for the conditions of application and required performance.

Jointing materials

Requirement: Jointing and pointing materials that are compatible with each other and the contact surfaces, and non-staining to finished surfaces to manufacturer's recommendations. Do not provide bituminous materials on absorbent surfaces.

Elastomeric sealants

Sealing compounds (polyurethane, polysulfide, acrylic): To ASTM C920 (2018) or ISO 11600 (2002).

Sealing compounds (silicone): To ASTM C920 (2018) or ISO 11600 (2002).

Sealing compounds (butyl): To ASTM C1311 (2022).

Elastomeric sealants schedule

Sealant type	Material	Location or function
To approval		

Very high bond adhesive tape schedule

Tape type	Material	Location or function	Dimensions
To approval			

Primer

Compatibility: Apply the manufacturer's recommended primer to the surfaces in contact with sealant materials.

Control joints

Depth of elastomeric sealant: One half the joint width or 6 mm, whichever is the greater.

Foamed materials (in compressible fillers and backing rods): Closed cell or impregnated types that do not absorb water.

Bond breaking: Provide backing rods, and other back-up materials for sealants, that do not adhere to the sealant.

2.18 INTEGRAL BLINDS**General**

Requirement: Provide integral blinds, as documented.

2.19 SCREENS**General**

Requirement: Provide screens, as documented.

Fixed screens

General: Fixed screens fitted to the window frames with a clipping device that allows for removal for cleaning.

Hinged screens

General: Screens hinged at the top to give access to opening sash.

Retractable screens

General: Proprietary retractable screens, comprising aluminium frames and fibreglass mesh, fitted between the guide channels incorporated in the frames, and a retraction system including tension spring, bearings, positive self-locking device and elastomeric sealing strip at sill.

Sliding screens

General: Screens that are not part of the window frame, with matching aluminium head guide, sill runner, and frame stile sections.

Hardware: Nylon slide runners and finger pull handle. Provide pile strip closers against sash where necessary to close gaps.

Aluminium framed screens

General: Aluminium extruded or folded box frame sections with mesh fixing channel, mitred, staked and screwed at corners. If necessary to adapt to window opening gear, provide an extended frame section.

Mesh: Bead the mesh into the frame channel with a continuous resilient gasket, so that the mesh is taut and free of distortion.

2.20 SECURITY SCREEN DOORS AND SECURITY WINDOW GRILLES**General**

Requirement: Proprietary metal security grilles, or operable screen and frame, fixed to the building structure with tamper resistant fastenings.

Standard: To AS 5039 (2008).

2.21 AMPLIMESH SECURAMESH WINDOW AND DOOR**General**

Description: Provides visual deterrent and security screen door and window grille protection.

Material: Grade 6060 Aluminium, temper T5.

Thickness: 7 mm.

Nominal aperture size: 83 mm x 68 mm.

Maximum panel size:

- Length: 3500 mm.
- Width: 1200 mm.

2.22 AMPLIMESH SUPASCREEN® WINDOW AND DOOR

General

Material: Type 316 Marine grade stainless steel.

Wire thickness: 0.80 mm.

Nominal aperture size: 1.5 mm x 1.5 mm.

Amplimesh Folding Door

Maximum panel size and weight:

- Height: 2400 mm.
- Width: 850 mm.
- Weight: 20 kg.

Maximum frame width: 6500 mm.

Hinge requirements for the following door heights:

- ≤ 2100 mm: 3 hinges.
- ≥ 2100 mm: 4 hinges.

Amplimesh SupaScape Window

Maximum frame size:

- Hinged window:
 - . Height: 1500 mm.
 - . Width: 900 mm.
- Double slider window:
 - . Height: 1500 mm.
 - . Width: 1800 mm.

2.23 AMPLIMESH INTRUDAGUARD® SECURITY SCREENS

General

Material: 5052 Marine grade aluminium sheet.

Thickness: 1.20 mm.

Perforated hole size: 2 mm.

Maximum sheet size:

- Length: 3000 mm.
- Width: 1500 mm.

2.24 ALUMINIUM FRAME FINISHES

Powder coatings

Standard: To AS 3715 (2002).

Anodised

Standard: To AS 1231 (2000).

Thickness:

- Internal: 15 microns.
- External: 20 microns.

2.25 OTHER MATERIAL FRAME FINISHES

Finish

Standard: To AS 2047 (2014) clause 3.4.1.4.

2.26 ANCILLARY COMPONENTS AND FITTINGS

Glazing adaptors

Glazing adaptor glazing capacity:

- St Kilda plant-on adaptor: 6 mm to 36 mm.
- St Lucia plant-on adaptor: 4 mm to 28 mm.
- Frameless glazing channels:
 - . 24 mm: 4 mm to 12 mm.
 - . 33 mm: 6 mm to 12 mm.
- General adaptors:
 - . 31 mm: 6 mm to 11 mm.
 - . 35 mm: 4 mm to 26 mm.
 - . 50 mm: 6 mm to 41 mm.

Trim

General: Provide trim, shadow angles and architraves, as documented.

Extruded gaskets and seals

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

Flashings

General: Corrosion-resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.

Standard: To AS/NZS 2904 (1995).

Nylon brush seals

General: Dense nylon bristles locked into holding strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door or frame to the manufacturer's recommendations.

Pile weatherstrips

General: Provide weatherstrips, as documented.

Standard: To AAMA 701/702 (2023).

Material: Pile and backing or equivalent polypropylene, low friction silicone treated, ultraviolet stabilised, fixed to the frame to the manufacturer's recommendations.

Finned type: A pile weatherseal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

Weather bars

General: A weather bar for hinged external doors, located under the centres of closed doors.

2.27 HARDWARE

Hardware documented generically

General: Provide hardware of sufficient strength and quality to perform its function, appropriate to the intended conditions of use, compatible with associated hardware, and fabricated with fixed parts firmly joined.

Window locks and latches

Standard: To AS 4145.2 (2008).

Window catches: Provide 2 catches per sash to manually latched awning or hopper sashes over 1000 mm wide.

Sash balances

Requirement: Match the spring strength of the balances to the sash weight they support.

Sash operators

Requirement: Provide sash operators, as documented.

2.28 KEYING

Contractor's keys

Master key systems: Do not use any key under a master key system.

Refer to Door Hardware Schedule and Engineering Solutions Tasmania drawings and specifications.

Identification

Labelling: Supply each key with a purpose-made plastic or stamped metal label legibly marked to identify the key, attached to the key by a metal ring.

Key material

Pin tumbler locks: Nickel alloy, not brass.

Lever locks: Malleable cast iron or mild steel.

Keying system

Requirement: Keying system, as documented.

Coding of locks: If window locks are included in building key code groups, provide cylinder or pin tumbler locks coded to match.

Number of keys table

Code	Key type	Minimum number of keys
KD	Locks keyed to differ	2 for each lock
KA#	Locks keyed alike:	
	2 locks in code group	4
	3 to 10 locks in code group	6
	11 to 40 locks in code group	10
	41 and over locks in code group	1 for every 4 locks or part thereof

3 EXECUTION

3.1 GLAZING PROCESSING

General

Processing: Perform required processes on glazing, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arised.

3.2 INSTALLATION

General

Requirement: Install windows and glazed doors as follows:

- Plumb, level, straight and true within building tolerances.
- Fixed or anchored to the building structure in conformance with the wind action loading requirements.
- Isolated from any building loads, including loads caused by structural deflection or shortening.
- Allow for thermal movement.

Glazing

Requirement: Install the glass as follows:

- Permanently fix in place each piece of glass to withstand the normal loadings and ambient conditions at its location without distortion or damage to glazing materials.
- No transfer of building movements to the glazing.
- Watertight and airtight for external glazing.

Temporary marking: Use a method that does not damage the glazing. Remove marking only after certification and acceptance of the installation.

Toughened glass: Do not cut, drill, edgework or permanently mark after toughening. Use installation methods that prevent the glass making direct contact with metals or other non-resilient materials.

Frameless installations: Join the vertical edges of adjacent glass panels with silicone jointing compound.

Heat-absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Weatherproofing

Flashing and weatherings: Install flashings, weather bars, threshold plates, drips, storm moulds, joint sealant and pointing to prevent water penetrating the building between the window frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

Fixing

Packing: Pack behind fixing points with durable full width packing.

Fasteners: Conceal fasteners.

Fasteners and fastener spacing: Conform to the recommendations of the manufacturer.

Joints

General: Make accurately fitted tight joints so that fasteners or fixing devices such as pins, screws, adhesives and pressure indentations are not visible on exposed surfaces.

Sealants:

- If priming is recommended, prime surfaces in contact with jointing materials.
- If frames are powder coated, apply a neutral cure sealant.

Operation

General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and are lubricated.

Protection

Removal: Remove temporary protection measures from the following:

- Contact mating surfaces before joining up.
- Exposed surfaces before completion of the works.

Trim

General: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the window frames. Install to make neat and clean junctions between frames and the adjoining building surfaces.

3.3 SECURITY SCREEN DOORS AND SECURITY WINDOW GRILLES

General

Installation: To AS 5040 (2003).

3.4 HARDWARE

Fasteners

Materials: Use materials compatible with the item being fixed and of sufficient strength, size and quality to perform their function.

- Concealed fasteners: Provide a corrosion-resistant finish.
- Exposed fasteners: Match exposed fasteners to the material being fixed.

Support: Provide appropriate back support (for example lock stiles, blocking, wall noggings and backing plates) for hardware fasteners.

- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self-tapping screws or pop rivets.

Proprietary window systems

Requirement: Provide the standard hardware and internal fixing points for personnel safety harness attachment, if required by and conforming to the governing regulations.

Operation

General: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Supply

Delivery: Deliver window hardware items, ready for installation, in individual complete sets for each window set, as follows:

- Clearly labelled with the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, fixings and fixing instructions.

3.5 COMPLETION

Hardware

Adjustment: Leave the hardware with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Keys

Contractor's keys: Immediately before the date for practical completion, replace cylinders to which the contractor has had key access during construction with new cylinders that exclude the contractor's keys.

Keys: For locks keyed to differ and locks keyed alike, verify quantities against key records, and deliver to the contract administrator at practical completion.

Key codes: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Repair of finish

Polyester or fluoropolymer coatings: Contact supplier for approval to apply touch up products, otherwise replace damaged material.

Cleaning

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive, acidic or alkaline materials.

Extent: All frames and glass surfaces internally and externally.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for operation, care and maintenance.

Warranties

Window and door assemblies: Provide the manufacturer's published product warranties.

Hardware: Provide the manufacturer's published product warranties.

4 SELECTIONS

4.1 PERFORMANCE

Window and glazed door performance schedule

	A	B	C
Total system U-Value (W/m ² .K)	Refer to Energy Assessment Report.		
Total system SHGC			
Airborne sound insulation			
Visible transmittance (T _{vis})			
Reflectance (%)			
WERS Energy rating%: Heating			
WERS Energy rating%: Cooling			
AGWA Glass Compliance Certificate			
AGWA Window Compliance Certificate			
Water penetration resistance (Pa)			
Fire-resistance level (FRL)			
Ultimate limit state (ULS) wind pressure (Pa)			
Serviceability limit state (SLS) wind pressure (Pa)			
Openable (free) area (m ²)			

Window locks and latches performance schedule

	A	B	C
Durability (D)	TBC		
Key security (K)			
Cylinder security (S _c)			
Physical security of locks (S)			
Physical security of locksets (S _L)			
Corrosion classification (C)			
Classification to AS 4145.1 (2008)			

4.2 CAPRAL WINDOWS AND GLAZED DOORS**CAPRAL ALUMINIUM commercial framing schedule**

	A	B	C
Product	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		
Glazing	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		
Hardware	Refer to Door Hardware Schedule and Engineering Solutions Tasmania drawings and specifications.		
Frame: Finish	Aluminium		
Frame: Colour	Monument		

CAPRAL ALUMINIUM commercial window schedule

	A	B	C
Product	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		

	A	B	C
Glazing	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		
Hardware	Refer to Door Hardware Schedule and Engineering Solutions Tasmania drawings and specifications.		
Frame: Finish	Aluminium		
Frame: Colour	Monument		

CAPRAL ALUMINIUM commercial door schedule

	A	B	C
Product	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		
Glazing	Refer to Window and Door Schedules CD12 – CD16. Ensure compliance with the Energy Assessment Report		
Hardware	Refer to Door Hardware Schedule and Engineering Solutions Tasmania drawings and specifications.		
Frame: Finish	Aluminium		
Frame: Colour	Monument		

CAPRAL ALUMINIUM residential window schedule

	A	B	C
Product	N/A		
Glazing			
Hardware			
Frame: Finish			
Frame: Colour			

CAPRAL ALUMINIUM residential door schedule

	A	B	C
Product	N/A		
Glazing			
Hardware			
Frame: Finish			
Frame: Colour			

4.3 SCHÜCO WINDOWS AND DOORS**Schüco Aluminium sliding systems schedule**

	A	B	C
Product	N/A		
Glazing			
Hardware			
Frame: Finish			
Frame: Colour			

Schüco Aluminium door systems schedule

	A	B	C
Product	N/A		
Glazing			
Hardware			
Frame: Finish			
Frame: Colour			

Schüco Aluminium window systems schedule

	A	B	C
Product	N/A		
Glazing			
Hardware			
Frame: Finish			
Frame: Colour			

4.4 INTEGRAL BLINDS**Integral blind schedule**

	A	B	C
Product name	N/A		
Generic description			
Venetian blind: Slat width (mm)			
Venetian blind: Material			
Venetian blind: Finish			
Venetian blind: Colour			
Fabric blind: Material			
Fabric blind: Colour/pattern			
Operator			

4.5 SCREENS

Screen schedule

	A	B	C
Product	N/A		
Type			
Frame: Material			
Frame: Finish			
Frame: Colour			
Mesh type			

4.6 SECURITY SCREEN DOORS AND SECURITY WINDOW GRILLES

Security screen doors and security window grilles schedule

	A	B	C
Product	N/A		
Type to AS 5039 (2008)			
Material			
Grille			
Finish			
Frame colour			
SecuraMesh colour			
Hinges: Material			
Hinge: Fixing			
Hardware			

4.7 GLAZING

Glass schedule

	A	B	C
Glass type	Refer to Window and Door Schedules CD12 – CD16 and the Energy Assessment Report. Report any discrepancies between documents.		
Glass thickness (mm)			
Body tint colour			
Interlayer colour			
Surface coating: Description			
Surface coating: Colour			
Reflective coating: Colour			
Reflective coating: % reflectance			
Surface pattern			
Surface processing: Method			
Surface processing: Pattern			

	A	B	C
Surface processing: Colour			
Edge processing			
Number of edges processed			
Fire-resistance level (FRL)			
Bullet resistance classification			
Safety markings			

Special glasses schedule

	A	B	C
Mirrored	N/A		
Patterned			
Ceramic-coated glass: Base glass			
Ceramic-coated glass: Coating colour			
Ceramic-coated glass: Coating application method			
Acid etched			
Sandblasted			

Plastics glazing schedule

	A	B	C
Polycarbonate sheet: Type	N/A		
Polycarbonate sheet: Abrasion resistance			
Polycarbonate sheet: Fire hazard properties			
Acrylic sheet			
Reinforced polyester sheet: Type			
Reinforced polyester sheet: Surface treatment			
Reinforced polyester sheet: Mass/unit area			

Insulating glass units (IGUs) schedule

	A	B	C
Product	N/A		
Outer pane: Glass type			
Outer pane: Thickness (mm)			
Outer pane: Colour/coating type			
Inner pane: Glass type			
Inner pane: Thickness (mm)			
Inner pane: Colour/coating type			
Spacer width (mm)			
Gas filling: Type			

4.8 ANCILLARY COMPONENTS AND FITTINGS**Glazing adaptor schedule**

	A	B	C
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	A	B	C
Product	Capral		
Glazing thickness	TBC		

Trim schedule

	A	B	C
Product	To approval.		
Trim	Refer to Window and Door Schedules CD12 – CD16		
Door architrave	Refer to Window and Door Schedules CD12 – CD16		
Window architrave	Refer to Window and Door Schedules CD12 – CD16		

Window and glazed door seal schedule

	A	B	C
Product	Refer to Door Hardware Schedule		
Function			
Carrier material and finish			
Seal insert type and material			
Complementary seal			

Pile weatherstrips schedule

	A	B	C
Product	Refer to Door Hardware Schedule		
Material			

Weather bars schedule

	A	B	C
Product	Refer to Door Hardware Schedule		
Material			

4.9 WINDOW HARDWARE**Window hardware schedule**

	A	B	C
Hinges	To approval		
Sash balances	To approval		
Stays	To approval		
Sash lift and pulls	To approval		
Sash operator	Refer to Window and Door Schedules CD12 – CD16.		
Sash operator remote controller	N/A		

	A	B	C
Locks, catches and bolts	To approval		

4.10 KEYING

Key codes schedule

Window no.	KD	KA group code	Location		
			Building code and name	Floor level	Space code and name
Refer to Door Hardware Schedule and Engineering Solutions Tasmania drawings and specifications.					

0453B DOORS AND ACCESS PANELS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide doors, frames, doorsets, security screen doors, smoke doorsets and fire-resisting doorsets, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements.*
- 0185 *Timber products, finishes and treatment.*
- 0455 *Door hardware.*

1.3 STANDARDS

General

Timber and composite doors: To AS 2688 (2017).

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 2688 (2017) and the following apply:

- Fire-resisting doorset: A doorset that retains its integrity, provides insulation and limits, if required, the transmittance of radiation in a fire.
- Smoke doorset: A doorset that restricts the passage of smoke.

1.5 SUBMISSIONS

Products and materials

Type tests: Submit results, as follows:

- Fire-resisting and smoke doorsets.
- Acoustic performance of doorsets.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Door frames in place before building in to masonry.
- Door frames installed before fixing trim.

2 PRODUCTS

2.1 FRAMES

Aluminium frames

Construction: Assembled from aluminium sections, including accessories such as buffers, pile strips, strike plates, fixing ties or brackets and cavity flashings, with provision for fixing documented hardware and seals.

Threshold: If the frame includes a threshold member, provide a self-draining section with slip-resistant surface.

Steel frames

Construction: Continuously welded from metallic-coated steel sheet sections, including accessories such as buffers, strike plates, spreaders, mortar guards, switch boxes, fixing ties or brackets, and cavity flashing with provision for fixing documented hardware, seals and electronic security assemblies, and prefinished with a protective coating.

Base metal thickness (minimum):

- General: 1.1 mm.
- Fire-resisting doorsets: 1.5 mm.
- Security doorsets: 1.6 mm.

Metallic-coating class to AS 1397 (2021) interior: ZF100.

Finish: Grind the welds smooth, cold galvanize the welded joints and shop prime.

Hardware and accessories: Provide 4 mm backplates and lugs for fixing hardware including hinges and closers. Screw fix the hinges into tapped holes in the backplates.

Timber frames

Hardwood: To AS 2796.1 (1999):

- Grade: Select.

Softwood: To AS 4785.1 (2002):

- Grade: Select.

Joints:

- Morticed head and through tenons.
- Trenched head:
 - . Bare faced tenons on jambs.
 - . Full let-in jambs.

Construction: Assembled from timber sections, with provision for fixing documented hardware including rebates for door seals, where documented.

2.2 DOORS**General**

Doors: Proprietary products manufactured for interior or exterior applications and for the finish required.

Materials

Standards: Conform to the following:

- Decorative laminated sheets: To AS/NZS 2924.1 (1998).
- Wet process fibreboard (including hardboard): To AS/NZS 1859.4 (2018).
- Dry process fibreboard (including medium density fibreboard): To AS/NZS 1859.2 (2017).
- Particleboard: To AS 1859.1 (2017).
- Plywood and blockboard for interior use: To AS/NZS 2270 (2006).
- Plywood and blockboard for exterior use: To AS/NZS 2271 (2004).
- Seasoned cypress pine: To AS 1810 (1995).
- Timber – hardwood: To AS 2796.1 (1999).
- Timber – softwood: To AS 4785.1 (2002).

Identification

Panel doors: Provide panels branded under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the brand on faces or edges that will be concealed in the works.

Joinery doors

General: Provide joinery doors, as documented.

Flush panel doors

General: Provide flush panel doors of balanced construction, as documented.

Medium density fibreboard doors: Single thickness of moisture resistant general purpose medium density fibreboard with the same surface finish to both sides, for internal use.

Construction

General: To AS 2688 (2017).

Adhesives:

- Internal: To AS/NZS 2270 (2006).
- External: To AS/NZS 2271 (2004).

Door thickness:

- General: 35 mm.
- External doors and doors over 900 mm wide: 40 mm.

Cut-outs: If openings are required in flush panel doors (e.g. for louvres or glazing), do not make cut-outs closer than the width of the stiles at the edges of the doors.

Edge strips: Minimum thickness 10 mm. Increase overall thickness to greater than 15 mm to accommodate the full depth of the rebate in rebated doors. Apply to the external edges of door after the facings are bonded to the door framing/core and finish flush with outside surface of the facings.

Louvre grilles: Construct by inserting the louvre blades into a louvre frame, and fix the frame into the door.

Double doors

Square edged doors: Bevel as necessary to prevent binding between the leaves.

Rebated meeting stiles: If not double acting doors, provide rebated meeting stiles or fix equivalent metal T stop to one leaf where documented. Form rebates to suit standard rebated hardware.

2.3 DOORSETS**Marking and labelling**

Fire-resisting doorsets: To AS 1905.1 (2015) Section 6.

Doors and doorsets: To AS 2688 (2017) clause 2.5.

Acoustic performance

Doorsets: Rating to AS/NZS ISO 717.1 (2004), as documented.

Automatic door assemblies

Standard: To AS 5007 (2007).

Control systems: To *0455 Door hardware*.

Cavity sliding doors

General: Proprietary product comprising steel and timber frame construction with rigid steel top, base and rear supporting members and incorporating the overhead door track, ball race type wheel carriages, guides, stops, split jamb linings and removable pelmet.

Duct access panels

General: Proprietary products comprising metal-faced doors side-hung to steel door frames, including hardware and accessories such as hinges and lock and installation lugs.

Fire-resisting doorsets

Standard: To AS 1905.1 (2015) and BCA (2022) Spec 12.

Floor access panels

Frame: Weld from 50 x 50 x 6 mm angle, with two 40 mm coggled fixing lugs each side and shop prime.

Covers: 6.5 mm checker floorplate, on 40 x 40 x 6 mm angle welded frame with 32 x 6 mm diagonal stiffening flats. Cut, radius and grind off 100 x 25 mm lifting slots in each end of covers.

Security screen doorsets

Standard: To AS 5039 (2008).

Smoke doorsets

Construction: Solid core doors not less than 35 mm thick.

Standard: To AS 6905 (2007) and BCA (2022) Spec 12. Tested to AS 1530.7 (2007).

2.4 ANCILLARY MATERIALS**Trim**

General: Provide trim, shadow gaps and architraves, as documented.

Door seals

Acoustic applications: Tested to AS 1191 (2002) or EN ISO 10140-2 (2021) and rated to AS/NZS ISO 717.1 (2004).

Weather and energy saving seals: To AS 4420.1 (2016) Sections 5 and 6, and AS 2047 (2014).

Extruded gaskets and seals

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

Flashings

General: Corrosion-resistant, compatible with the other materials in the installation, and coated with a non-staining compound where necessary.

Standard: To AS/NZS 2904 (1995).

Jointing materials

General: Compatible with each other and with the contact surfaces and non-staining to finished surfaces. Do not provide bituminous materials on absorbent surfaces.

Nylon brush seals

General: Dense nylon bristles locked into holding strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door or frame to the manufacturer's recommendations.

Pile weatherstrips

General: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet stabilised, fixed to the door or frame to the manufacturer's recommendations.

Standard: To AAMA 701/702 (2023).

Weather bars

General: Provide corrosion-resistant weather bars or threshold plates under hinged external doors, located under the centres of closed doors or to manufacturer's recommendations.

3 EXECUTION

3.1 FRAMES**General**

Frames: Install the frames as follows:

- Plumb, level, straight and true.
- Fixed or anchored to the building structure.
- Isolated from any building loads, including loads caused by structural deflection or shortening.

Frame fixing

Brackets: Metallic-coated steel:

- Width: Minimum 25 mm.
- Thickness: Minimum 1.5 mm.

Depth of fixing for building into masonry:

- Brackets: Minimum 200 mm.
- Expansion anchors: Minimum 50 mm.
- Plugs: Minimum 50 mm.
- Rods: Minimum 60 mm.

Jamb fixing centres: Maximum 600 mm.

Joints

General: Make accurately fitted joints where fasteners, pins, screws, adhesives and pressure indentations are not visible on exposed surfaces.

Aluminium frames

Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Screw once to studs at each fixing.

Steel frames

Building into masonry: Attach galvanized steel rods to jambs, build in and grout up.

Fixing to masonry openings: Build in hairpin anchors and install locking bars, or use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Attach galvanized steel brackets to jambs and screw twice to studs at each fixing.

Timber frames

Building into masonry: Screw galvanized steel brackets twice to jambs and build in.

Fixing to masonry openings: Use proprietary expansion anchors and screw twice through jambs at each fixing.

Fixing to stud frame openings: Back screw twice to jambs at each fixing.

Fixing to thresholds: Dowel external door frames to thresholds other than timber with 10 mm diameter brass dowels, 100 mm long.

Heads of fasteners: Conceal if possible, otherwise sink the head below the surface and fill the depression flush with a material compatible with the surface finish.

Finishing

Trim: Provide mouldings, architraves, reveal linings, and other internal trim using materials and finishes matching the door frames to make neat and clean junctions between the frame and the adjoining building surfaces.

Seals

General: Provide the fixings, rebates, grooves, and clearances required for installation and operation of the seals. Allow seals unwound from coils to settle before use. Install proprietary seals to manufacturer's recommendations and adjust correctly.

Weatherproofing

Flashings and weatherings: Install flashings, weather bars, threshold plates, drips, storm moulds, caulking and pointing to prevent water from penetrating the building between the door frame and the building structure under the prevailing service conditions, including normal structural movement of the building.

3.2 DOORS

Priming

General: Prime timber door leaves on top and bottom edges before installation.

Tolerances

Installation: To AS 2688 (2017) Section 7.

3.3 DOORSETS

General

Installation: To AS 2688 (2017) Section 7.

Security screen doorsets

Standard: To AS 5040 (2003).

3.4 COMPLETION

Operation

General: Make sure moving parts operate freely and smoothly, without binding or sticking, at correct tensions or operating forces and that they are lubricated where appropriate.

Opening force performance: To the NCC cited AS 1428.1 (2009).

Protection

Temporary coating: On or before the date for practical completion, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty from the manufacturer.

- Form: Against failure of materials and execution under normal environment and use conditions.

- Period: As offered by the manufacturer.

4 SELECTIONS

4.1 DOOR TYPES SCHEDULE

Flush panel doors construction schedule

	A	B	C
Door type	Refer to Door Schedules CD14 & CD15.		
Door thickness (mm)			
Core material			
Facing material			
Face veneers: Matching arrangement			
Face veneers: Timber species or group			
Face veneers: Veneer quality			
Edge strip thickness (mm)			
Inset panels: Type			
Inset panels: Clear opening size (mm)			
Finish			
Floor clearance			

Joinery doors construction schedule

	A	B	C
Door type	TBC		
Door thickness (mm)			
Adhesive			
Timber species or group			
Timber grade			
Finished sizes (mm): Top rails and stiles			
Finished sizes (mm): Intermediate rails			
Finished sizes (mm): Bottom rails			
Finished sizes (mm): Muntins			
Panels: Material			
Panels: Thickness (mm)			
Finish			
Floor clearance			

Door seal schedule

	A	B	C
Product	Refer to Door Hardware Schedule.		
Function			
Carrier material and finish			
Seal insert type and material			
Complementary seal			

4.2 DOORSETS SCHEDULE

Doorsets performance schedule

	A	B	C
Fire-resistance level (FRL)	TBC		
Airborne sound insulation			

Fire-resisting doorsets construction schedule

	A	B	C
Automatic closure: Action	TBC		
Edge strip thickness (mm)			
Face veneers: Matching arrangement			
Face veneers: Timber species or group			
Face veneers: Veneer quality			
Fire-resistance level (FRL)			
Glazing			
Hardware: Item			
Hardware: Material			
Hardware: Finish			
Door seals			

Security screen doors construction schedule

	A	B	C
Type	N/A		
Material			
Finish			
Hinges: Material			
Hinges: Fixing			
Lock			

Automatic doorset schedule

	A	B	C
Pedestrian traffic	Refer to Door Schedules CD14 & CD15, Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.		
Door configuration			
Drive type			
Drive location			
Motion sensor control device			
Proprietary door suite			
Glazing			
Safety markings			
Aluminium frame finish			

	A	B	C
Powder coating: Service condition category			
Powder coating: Coating performance			
Powder coating: Coating type			
Powder coating: Polyester coating grade			
Powder coating: Product			
Powder coating: Gloss level			
Colour			
Ultimate limit state (ULS) wind pressure (Pa)			
Lock type			
Door seals			

0455 DOOR HARDWARE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide door hardware, as documented.

Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the abbreviations given in AS 4145.1 (2008) Appendix D apply.

Definitions

General: For the purposes of this worksection, the general definitions given in AS 4145.1 (2008) Section 2 and Appendix E apply.

1.4 SUBMISSIONS

Execution details

Door-by-door schedule: Submit a door-by-door hardware schedule.

- Information sources: This worksection and the contract drawings.

Re-use of recovered hardware: Submit a proposal describing the standard of cleaning, repair and testing of recovered items and the location where each is to be reused.

Key control system:

- New works: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster).
- Alterations and additions: Submit details to extend the existing key control security system for locks required to accept a group key.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Records

Door hardware schedule: Submit an amended schedule, prepared by the door hardware supplier, showing changes to the contract door hardware schedule resulting from the following:

- Approval of a hardware sample.
- Acceptance of an equivalent to a specified proprietary item.
- A contract variation to a door hardware requirement.

Key coding system: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Samples

Generic items: Submit samples of hardware items offered as meeting the description of items not specified as proprietary items.

Reconditioned items: Submit samples of hardware items offered as meeting the standard of cleaning, repair and testing of recovered items.

Subcontractors

Automatic door operators: Submit names and contact details of proposed manufacturer and installer.

Pressure floor mat: Submit names and contact details of proposed manufacturer and installer.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

2 PRODUCTS**2.1 GENERAL****Supply**

Delivery: Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:

- Clearly labelled to show the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, accessories fixings and fixing instructions.

Hardware specified generically: Hardware of the required strength and quality to perform its function, appropriate to the intended conditions of use, suitable for use with associated hardware, and fabricated with fixed parts firmly joined.

Storage and handling

General: Store and handle to protect materials from damage, to the manufacturer's recommendations.

Replacement items

Door hardware: Replacement items to match existing, or as documented.

Hinges: If required, upgrade hinges to conform to **Hinges for timber doors table** and **Hinges for aluminium doors table**.

2.2 LOCKS AND LATCHES**Standard**

General: To AS 4145.2 (2008).

Padlocks

Standard: To AS 4145.4 (2002).

Lock and latch classification

Rating systems: To AS 4145.1 (2008) Section 3.

Performance requirements: To AS 4145.2 (2008) Section 3.

2.3 HINGES**Butt hinge materials**

Doors fitted with closers: Provide low friction ball bearing hinges.

Fire-resisting doors: To AS 1905.1 (2015).

Power transfer hinges: Do not load and install with other compatible hinges.

Lift-off doors: If toilet cubicles require lift-off doors, provide lift-off hinges and allow for door panel with sufficient clearance at the head to allow door removal.

Timber solid core doors

Number of hinges: Determine the number of hinges required based on the nominated door leaf size and weight only. For other door leaf sizes or for doors with applied finishes, use the weight of the door to determine the number of hinges required. For a door leaf over 80 kg, use pivot hinges.

Size of hinges: Determine the size of the hinge based on the door leaf thickness:

- 35 to 43 mm thick door: 100 x 75 mm butt hinges with a minimum thickness of 2.5 mm.
- 44 to 55 mm thick door: 100 x 100 mm butt hinges with a minimum thickness of 2.5 mm.
- > 55 mm thick door: To the door by door hardware schedule.

Hinge pin: Supply fixed pins to hinges of doors opening out or designated as a security doors. For all other doors, provide loose pins.

Wide throw: If necessary, provide wide throw hinges to achieve the required door swings in the presence of obstacles such as nibs, deep reveals and architraves.

Hinges for timber doors table

Nominal door leaf size (L x W x T) (mm)	Door leaf weight (kg)	Number of hinges
2040 x 400 x 35	≤ 19	2

Nominal door leaf size (L x W x T) (mm)	Door leaf weight (kg)	Number of hinges
2040 x 600 x 35	≤ 29	2
2040 x 720 x 35	≤ 35	3
2040 x 820 x 35	≤ 39	3
2040 x 920 x 35	≤ 44	3
2040 x 1020 x 35	≤ 49	4
2040 x 720 x 40	≤ 37	3
2040 x 820 x 40	≤ 42	3
2040 x 920 x 40	≤ 48	3
2040 x 1020 x 40	≤ 52	4
2040 x 720 x 50	≤ 45	3
2040 x 820 x 50	≤ 50	3
2040 x 920 x 50	≤ 57	3
2040 x 1020 x 50	≤ 68	4
2400 x 720 x 40	≤ 50	4
2400 x 820 x 40	≤ 52	4
2400 x 920 x 40	≤ 55	4
2400 x 1020 x 40	≤ 60	4
2400 x 1220 x 50	≤ 72	5
2040 x 920 x 70	≤ 88	Pivot hinges

Aluminium doors

Application: Aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames of a weight of 40 kg or less.

Hinges for aluminium doors table

Nominal hinge size (L x W x T) (mm)	Door leaf weight (kg)	Knuckles (minimum)	Screws/hinge leaf (minimum)
100 x 70 x 3	≤ 30	3	3
100 x 80 x 3.5	≤ 50	5	4
130 x 50 x 3.4	≤ 75	Interfold	3

Length (L) is the dimension along the knuckles, not including hinge tips, if any, and width (W) is the dimension across both hinge leaves when opened flat.

2.4 SLIDING DOOR HARDWARE**General**

Requirement: Provide sliding door tracks and guides, as documented.

2.5 ANCILLARIES**Bolts**

General: Barrel bolts, flush bolts and tower bolts with keepers, including lock plates, staples, ferrules or floor sockets.

Door seals

Acoustic applications: Tested to AS 1191 (2002) or EN ISO 10140-2 (2021) and rated to AS/NZS ISO 717.1 (2004).

Weather and energy saving seals: To AS 4420.1 (2016) Sections 5 and 6, and AS 2047 (2014).

Extruded gaskets and seals

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

Mortar guards

General: For steel door frame installations, provide mortar guards designed to allow the full extension of the lock tongue or similar devices and the correct operation of the locking mechanism.

Nylon brush seals

General: Dense nylon bristles locked into holding strips and fixed in a groove in the edge of the door or in purpose-made anodised aluminium holders fixed to the door or frame to the manufacturer's recommendations.

Pile weatherstrips

General: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet stabilised, fixed to the door or frame to the manufacturer's recommendations.

Standard: To AAMA 701/702 (2023).

Rebated doors

General: For mortice locks or latches to rebated doors, provide purpose-made rebated pattern items.

Strike plates

General: Use strike plates supplied with the locks or latches. Do not provide universal strike plates.

Weather bars

General: Provide corrosion-resistant weather bars or threshold plates under hinged external doors, located under the centres of closed doors or to manufacturer's recommendations.

2.6 DOOR CONTROLLERS**Standard**

General: To AS 4145.5 (2011).

Performance

Requirement: Door controllers, pivots, floor or overhead door closers, and automatic door operators, suitable for the door type, size, weight, sliding action and swings required and the operating conditions, including wind and air conditioning pressure.

Automatic door operators

General: Complete automatic door operators for opening and closing doors, including door hanging (hinges, pivots or sliding gear) and electrical connection to distribution board.

Installation: Provide necessary recesses and core-holes, grout in components where required, and repair any damage. Provide cover plates for access to units in door heads, frames or transoms.

Automatic adjustable function: If the door opening angle or width is manually set below the maximum possible, under conditions of continuous traffic the doors must automatically creep to full opening, returning to reduced opening on the next cycle.

Radio remote door controllers: Provide a device, comprising a radio receiver and separate transmitter, for activating a motorised door operator so as to open and close the door by remote radio signal.

Key switch: If there is no separate access to the enclosure, provide a key switch mounted externally for opening and closing the door from outside the enclosure without the transmitter. Provide two keys.

Light: Provide an internal light that turns on for not less than 2 minutes before switching off automatically.

Receiver: House within a wall unit incorporating a push-button switch permanently illuminated. Mount within the enclosure and connect to power.

Transmitter: Portable battery-powered unit sending a coded signal effective up to not less than 12 m from the receiver.

Pressure floor mats: Automatic door activating system consisting of a mat that, when deflected by foot pressure, operates a switch that activates the door or doors.

Closers

Hinged and pivot doors:

- Fire-resisting doors: Closers tested and certified for use as components of fire-resisting door assemblies:
 - . Standard: To AS 1905.1 (2015).

2.7 ELECTRONIC CONTROL DEVICES

General

Requirement: Electric strikes, electric locks, drop bolts and/or similar devices to suit door construction and hardware.

Electromagnetic hold-open devices: To AS 1905.1 (2015) and AS 1670.1 (2018).

Glass doors: Tumbler, drop bolts or magnetic holders.

Double leaf doors (solid frame): Electric strike or lock on the inactive leaf, connected to the door frame by concealed flexible wiring.

Activation

Activation device: Keypads, card readers or other activation devices located next to entry points.

External: Weatherproof (IP56) hoods or housings for external units.

Mounting height: 900 to 1100 mm from floor level and not less than 500 mm from internal corners.

2.8 PANIC EXIT DEVICES

General

Standard: To EN 1125 (2008).

Requirements:

- Field sizable.
- Keyed dogging.

2.9 KEYING

Keying requirements

Standard: To AS 4145.1 (2008) for keying security.

Requirement: Provide door hardware and keys, as documented.

Temporary construction keys and cylinders

Requirement: Provide one of the following:

- Loan cylinder: Install for construction locks and replace at practical completion.
- Construction keyed master key cylinder: Keep up-to-date records of keys issued including recipient's name, company and contact details, date issued and date returned.

Delivery of keys

Great grandmaster, grandmaster and master keys: Arrange for delivery direct to the principal.

Locks keyed to differ and locks keyed alike: Check the quantity against key records, and deliver keys to the contract administrator at practical completion.

Group keying

Keying system: As documented.

Existing system extension: Obtain the details of existing group or master key systems of the system to be extended.

Future extensions: Provide master and grandmaster group keying systems capable of accommodating future extensions.

Proprietary keying control security system: Provide for cylinder or pin-tumbler locks that accept a group key (e.g. master key, maison key).

Stamping: Stamp keys and lock cylinders to show the key codes and/or door number as scheduled.

Identification

Labelling: Supply each key with a purpose-made plastic or stamped metal label legibly marked to identify the key, attached to the key by a metal ring.

Key material

Lever locks: Malleable cast iron or mild steel.

Pin tumbler locks: Nickel alloy, not brass.

Number of keys table

Key code	Key type	Minimum number of keys
GGMK	Great grandmaster keys	2
GMK	Grandmaster keys	2

Key code	Key type	Minimum number of keys
MK	Master keys	2 per code group
KD	Locks keyed to differ	2 per lock
KA	Locks keyed alike:	
	- 2 locks in code group	4
	- 3 to 10 locks in code group	6
	- 11 to 40 locks in code group	10
	- 41 and over locks in code group	1 per 4 locks or part thereof

3 EXECUTION

3.1 INSTALLATION

General

Handing: Before supply, verify on site, the correct handing of hardware items.

Operation: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Mounting height

Locks and latches: Centreline of the door knob or lever spindle above finished floor: Refer to Door Hardware Schedule.

Locks

Cylinders: Fix vertically and with consistent key alignment.

Door stops

Fixing: Fix on the floor, skirting or wall, as appropriate, to prevent the door or door furniture striking the wall or other surface.

Fasteners

Materials: Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function, and as follows:

- Concealed fasteners: Provide a corrosion-resistant finish to concealed fasteners.
- Exposed fasteners: Match exposed fasteners to the material being fixed.

Security: Locate exposed fasteners to lock furniture on the inside faces of external doors and on the inside faces of internal doors to lockable rooms.

Support:

- Hardware fasteners: Provide appropriate back support, such as lock stiles, blocking, wall noggings and backing plates.
- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self-tapping screws or pop rivets.

Floor springs

General: Form a recess in the floor slab for the floor spring box, securely fix and grout the box in place so that the cover plate is flush with the finished floor.

Hinges

Metal frames: Fix hinges using metal thread screws. Do not weld hinges to frames.

Timber doorsets: Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing), and fix with countersunk screws.

Seals

General: Provide the fixings, rebates, grooves, and clearances required for installation and operation of the seals. Allow seals unwound from coils to settle before use. Install proprietary seals to manufacturer's recommendations and adjust correctly.

3.2 COMPLETION

Adjustment

General: Leave the hardware properly adjusted with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Opening force performance: To the NCC cited AS 1428.1 (2009).

Automatic door operators: Maintain and adjust the system throughout the defects liability period.

Keys

Contractor's keys: Immediately before practical completion, replace or reset cylinders to which the contractor has had key access during construction to exclude the contractor's keys.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for use, care and maintenance of the hardware provided.

Automatic door operators: Include the installer's proposal for continuing maintenance after completion on an annual renewal basis.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 SCHEDULES

General door hardware requirements schedule

	D1	D2	D3
Manufacturer	Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.		
Finish			
Lever/rose furniture series			
Lever/plate furniture series: Standard width			
Lever/plate furniture series: Narrow stile			
Push plates and pull handles on plates series			
Entrance handles			
Door stop series			

Door hardware selection schedule

	Room group 1	Room group 2	Room group 3
Room type	Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.		
Interior or exterior door			
Door leaf/frame type			
Fire-resistance level (FRL)			
Hinges			
Sliding track			

	Room group 1	Room group 2	Room group 3
Automatic door operator type	Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.		
Closer type			
Closer classification			
Door seal type			
Electronic control device			
Lock furniture type			
Lock function			
Keying code			
Durability rating (D)			
Keying security (K)			
Cylinder security (S _c)			
Physical security of locks (S)			
Physical security of locksets (S _L)			
Corrosion classification (C)			
Classification to AS 4145.1 (2008)			
Notes			

4.2 DOOR-BY-DOOR

Common door hardware properties schedule

	D1	D2	D3
Manufacturer	Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.		
Door furniture series			
Door furniture type			
Backset			
Entrance handles			
Finish			

Door hardware schedule

	D1	D2	D3
Room name	Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.		
Door hand			
Lock or latch function			

	D1	D2	D3
Hinges			
Sliding track			
Door bolt			
Panic exit device			
Automatic door controller			
Door closer			
Door seal type			
Electronic control device			
Entrance handles			
Handles, plates, pulls			
Door stop			
Coat hook			
Door protection			

4.3 PADLOCKS

Padlock schedule

	Room or space group 1	Room or space group 2	Room or space group 3
Room or space type	N/A		
Security			
Keying security			
Durability			
Corrosion resistance			

4.4 KEYING

Key codes schedule

	D1	D2	D3
Door stamping	Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.		
Room name			
Level/Area			
Lock type			
Cylinder type			
Cam type			
Key code/No.: Qty			
Key code/No.: Qty			
Key code/No.: Qty			
Comments			

Key head colour schedule

Key code/No.	Key head colour
Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and	

Key code/No.	Key head colour
Specifications.	

0455P ASSA ABLOY DOOR HARDWARE

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide door hardware, as documented.

1.2 COMPANY CONTACTS**ASSA ABLOY technical contacts**

Website: www.assaabloy.com.au/en/local/au/contact/

Lorient door seals: www.lorient.com.au/contact

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *0171 General requirements.*
- ASSA ABLOY door hardware schedule.

1.4 MANUFACTURER'S DOCUMENTS**Technical manuals**

ASSA ABLOY materials and installation manuals: www.assaabloy.com/au/en

Lorient door seal data sheets, installation manuals and CAD downloads: www.lorient.com.au

1.5 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the abbreviations given in AS 4145.1 (2008) Appendix D apply.

Definitions

General: For the purposes of this worksection, the general definitions given in AS 4145.1 (2008) Section 2 and Appendix E apply.

1.6 SUBMISSIONS**Execution details**

Door hardware schedule: Submit a door hardware schedule, prepared by ASSA ABLOY Australia.

- Information sources: This worksection and the contract drawings.

Re-use of recovered hardware: Submit a proposal describing the standard of cleaning, repair and testing of recovered items and the location where each is to be reused.

Key control system:

- New works: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster).
- Alterations and additions: Submit details to extend the existing key control security system for locks required to accept a group key.

Re-use of recovered hardware: Submit a proposal describing the standard of cleaning, repair and testing of recovered items and the location where each is to be reused.

Key control system:

- New works: Submit details of the proprietary key control security system proposed by the lock manufacturer for locks required to accept a group key (master, grandmaster).
- Alterations and additions: Submit details to extend the existing key control security system for locks required to accept a group key.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Records

Door hardware schedule: Submit an amended schedule, prepared by ASSA ABLOY Australia or their designated door hardware supplier, showing changes to the contract door hardware schedule resulting from the following:

- Approval of a hardware sample.
- Acceptance of an ASSA ABLOY alternative to the specification.
- A contract variation to a door hardware requirement.

Key coding system: Submit the lock manufacturer's record of the key coding system showing each lock type, number and type of key supplied, key number for re-ordering, and name of supplier.

Samples

Generic items: Submit samples of nominated hardware items.

Reconditioned items: Submit samples of hardware items offered as meeting the standard of cleaning, repair and testing of recovered items.

Subcontractors

Automatic door operators: Submit names and contact details of proposed manufacturer and installer.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

2 PRODUCTS

2.1 GENERAL**Product substitution**

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Supply

Delivery: Deliver door hardware items, ready for installation, in individual complete sets for each door, as follows:

- Clearly labelled to show the intended location.
- In a separate dust and moisture proof package.
- Including the necessary templates, accessories fixings and fixing instructions.

Hardware specified generically: Hardware of the required strength and quality to perform its function, appropriate to the intended conditions of use, suitable for use with associated hardware, and fabricated with fixed parts firmly joined.

Storage and handling

General: Store and handle to protect materials from damage, to the manufacturer's recommendations.

Replacement items

Door hardware: Replacement items to match existing, or as documented.

Hinges: If required, upgrade hinges to conform to **Hinges for timber doors table** and **Hinges for aluminium doors table**.

2.2 LOCKS AND LATCHES**Standard**

General: To AS 4145.2 (2008).

Padlocks

Standard: To AS 4145.4 (2002).

Lock and latch classification

Rating systems: To AS 4145.1 (2008) Section 3.

Performance requirements: To AS 4145.2 (2008) Section 3.

Commercial Project requirements:

- Key Latch Retraction.
- Universal Functionality.
- Australian Made.

Multi-Residential Project requirements:

- Rating systems: To AS 4145.1 (2008) Section 3.

2.3 HINGES**Butt hinge materials**

- Product: Lockwood series.
- Product: Interfold stainless steel or high tensile aluminium with fixed stainless steel pins in nylon bushes, and with nylon washers to each knuckle joint.

Heavy Duty doors: Provide severe duty hinges with phosphorus bronze bushings.

Doors fitted with closers: Provide low friction ball bearing hinges.

Fire-resisting doors: To AS 1905.1 (2015).

Power transfer hinges: Do not load and install with other compatible hinges.

Lift-off doors: If toilet cubicles require lift-off doors, provide lift-off hinges and allow for door panel with sufficient clearance at the head to allow door removal.

Timber solid core doors

Number of hinges: Determine the number of hinges required based on the nominated door leaf size and weight only. For other door leaf sizes or for doors with applied finishes, use the weight of the door to determine the number of hinges required. For doors fitted with door closers with backcheck, add 20 kg to door weight.

Size of hinges: Determine the size of the hinge based on the door leaf thickness:

- 35 to 43 mm thick door: 100 x 75 mm butt hinges with a minimum thickness of 2.5 mm.
- 44 to 55 mm thick door: 100 x 100 mm butt hinges with a minimum thickness of 2.5 mm.
- > 55 mm thick door: To the door hardware schedule.
- For alternative hinge calculations, use ASSA ABLOY hinge calculator.

Hinge pin: Supply fixed pins to hinges of doors opening out or designated as a security doors. For all other doors, provide loose pins.

Wide throw: If necessary, provide wide throw hinges to achieve the required door swings in the presence of obstacles such as nibs, deep reveals and architraves.

Hinges for timber doors table

Nominal door leaf size (L x W x T) (mm)	Door leaf weight (kg)	Number of hinges
2040 x 400 x 35	≤ 19	2
2040 x 600 x 35	≤ 29	2
2040 x 720 x 35	≤ 35	3
2040 x 820 x 35	≤ 39	3
2040 x 920 x 35	≤ 44	3
2040 x 1020 x 35	≤ 49	4
2040 x 720 x 40	≤ 37	3
2040 x 820 x 40	≤ 42	3
2040 x 920 x 40	≤ 48	3
2040 x 1020 x 40	≤ 52	4
2040 x 720 x 50	≤ 45	3
2040 x 820 x 50	≤ 50	3
2040 x 920 x 50	≤ 57	3

Nominal door leaf size (L x W x T) (mm)	Door leaf weight (kg)	Number of hinges
2040 x 1020 x 50	≤ 68	4
2400 x 720 x 40	≤ 50	4
2400 x 820 x 40	≤ 52	4
2400 x 920 x 40	≤ 55	4
2400 x 1020 x 40	≤ 60	4
2400 x 1220 x 50	≤ 72	5
2040 x 920 x 70	≤ 88	Pivot hinges

Aluminium doors

Application: Aluminium hinges for aluminium doors, or for doors of other materials in aluminium frames of a weight of 40 kg or less.

Hinges for aluminium doors table

Nominal hinge size (L x W x T) (mm)	Door leaf weight (kg)	Knuckles (minimum)	Screws/hinge leaf (minimum)
100 x 70 x 3	≤ 30	3	3
100 x 80 x 3.5	≤ 50	5	4
130 x 50 x 3.4	≤ 75	Interfold	3

Length (L) is the dimension along the knuckles, not including hinge tips, if any, and width (W) is the dimension across both hinge leaves when opened flat.

2.4 DOOR HANGING SYSTEMS**General**

Requirement: Provide sliding door tracks and guides, as documented.

2.5 ANCILLARIES**Bolts**

General: Barrel bolts, flush bolts and tower bolts with keepers, including lock plates, staples, ferrules or floor sockets.

Extruded gaskets and seals

General: Provide seals, as documented.

Mortar guards

General: For steel door frame installations, provide mortar guards designed to allow the full extension of the lock tongue or similar devices and the correct operation of the locking mechanism.

Rebated doors

General: For mortice locks or latches to rebated doors, provide purpose-made rebated pattern items.

Strike plates

General: For steel door frame installations, provide strike plates designed to allow the full extension of the lock tongue or similar devices and the correct operation of the locking mechanism.

2.6 DOOR CONTROLLERS**Standard**

General: To AS 4145.5 (2011).

Performance

Requirement: Door controllers, pivots, floor or overhead door closers, and automatic door operators, suitable for the door type, size, weight, sliding action and swings required and the operating conditions, including wind and air conditioning pressure.

Automatic doors

Glazed sliding:

- Proprietary item: ASSA ABLOY Entrance Systems.
- Proprietary item: Record Automatic Doors.

Glazed revolving:

- Proprietary item: ASSA ABLOY Entrance Systems.

- Proprietary item: Record Automatic Doors.

Glazed swinging:

- Proprietary item: ASSA ABLOY Entrance Systems.
- Proprietary item: Record Automatic Doors.

Automatic door operators

General: Complete automatic door operators for opening and closing doors, including door hanging (hinges, pivots or sliding gear) and electrical connection to distribution board.

Installation: Provide necessary recesses and core-holes, grout in components where required, and repair any damage. Provide cover plates for access to units in door heads, frames or transoms.

Automatic adjustable function: If the door opening angle or width is manually set below the maximum possible, under conditions of continuous traffic the doors must automatically creep to full opening, returning to reduced opening on the next cycle.

Radio remote door controllers: Provide a device, comprising a radio receiver and separate transmitter, for activating a motorised door operator so as to open and close the door by remote radio signal.

Key switch: If there is no separate access to the enclosure, provide a key switch mounted externally for opening and closing the door from outside the enclosure without the transmitter. Provide two keys.

Light: Provide an internal light that turns on for not less than 2 minutes before switching off automatically.

Receiver: House within a wall unit incorporating a push-button switch permanently illuminated. Mount within the enclosure and connect to power.

Transmitter: Portable battery-powered unit sending a coded signal effective up to not less than 12 m from the receiver.

Pressure floor mats: Automatic door activating system consisting of a mat that, when deflected by foot pressure, operates a switch that activates the door or doors.

Closers

Hinged and pivot doors:

- Fire-resisting doors: Closers tested and certified for use as components of fire-resisting door assemblies:
 - . Standard: To AS 1905.1 (2015).

2.7 ELECTRONIC CONTROL DEVICES

General

Requirement: Electric strikes, electric locks, drop bolts and/or similar devices to suit door construction and hardware.

Electromagnetic hold-open devices: To AS 1905.1 (2015) and AS 1670.1 (2018).

Glass doors: Tumbler, drop bolts or magnetic holders.

Double leaf doors (solid frame): Electric strike or lock on the inactive leaf, connected to the door frame by concealed flexible wiring.

Activation

Activation device: Keypads, card readers or other activation devices located next to entry points.

External: Weatherproof (IP56) hoods or housings for external units.

Mounting height: 900 to 1100 mm from floor level and not less than 500 mm from internal corners.

2.8 PANIC EXIT DEVICES

General

Standard: To EN 1125 (2008).

Requirements:

- Field sizable.
- Keyed dogging.

2.9 KEYING

Keying requirements

Standard: To AS 4145.1 (2008) for keying security.

Requirement: Provide door hardware and keys, as documented.

Temporary construction keys and cylinders

Requirement: Provide one of the following:

- Loan cylinder, if specified: Install for construction locks and replace at practical completion.
- Construction keyed master key cylinder: Keep up-to-date records of keys issued including recipient's name, company and contact details, date issued and date returned.

Delivery of keys

Great grandmaster, grandmaster and master keys: Arrange for delivery direct to the principal.

Locks keyed to differ and locks keyed alike: Check the quantity against key records, and deliver keys to the contract administrator at practical completion.

Group keying

Existing system extension: Obtain the details of existing group or master key systems of the system to be extended.

Future extensions: Provide master and grandmaster group keying systems capable of accommodating future extensions.

Proprietary keying control security system: Provide for cylinder or pin-tumbler locks that accept a group key (e.g. master key, maison key).

Stamping: Stamp keys and lock cylinders to show the key codes and/or door number as scheduled.

Identification

Labelling: Supply each key with a purpose-made plastic or stamped metal label legibly marked to identify the key, attached to the key by a metal ring.

Key material

Lever locks: Malleable cast iron or mild steel.

Pin tumbler locks: Nickel alloy, not brass.

Number of keys table

Key code	Key type	Minimum number of keys
GGMK	Great grandmaster keys	2
GMK	Grandmaster keys	2
MK	Master keys	2 per code group
KD	Locks keyed to differ	2 per lock
KA	Locks keyed alike:	
	- 2 locks in code group	4
	- 3 to 10 locks in code group	6
	- 11 to 40 locks in code group	10
	- 41 and over locks in code group	1 per 4 locks or part thereof

2.10 DOOR SEALS

Standards

Quality management for manufacture: To ISO 9001 (2015).

Acoustic applications minimum standard: To BCA (2022) F7D6.

Acoustic applications: Tested to EN ISO 10140-2 (2021) and rated to AS/NZS ISO 717.1 (2004).

Fire door assemblies: To AS 1530.4 (2014) and in conformance with AS 1905.1 (2015).

Smoke door assemblies: To BCA (2022) Spec 12.

Smoke door assemblies: Performance based: Tested to AS 1530.7 (2007) and leakage in conformance with AS 6905 (2007).

Combined fire and smoke door assemblies: To BCA (2022) Spec 12, AS 1530.4 (2014), AS 1905.1 (2015) and AS 1530.7 (2007).

Doors for buildings in bushfire-prone areas: To AS 3959 (2018), AS 1530.4 (2014), AS 1530.8.1 (2018) and AS 1530.8.2 (2018).

Weather and energy sealing applications: To AS 4420.1 (2016) and AS 2047 (2014).

Access doors for people with disability: To the NCC cited AS 1428.1 (2009).

Aluminium extrusions

Material: Commercial grade alloy 6060 T5.

Finish to visible extrusions: Satin clear anodising, or as documented.

Thickness:

- Perimeter seal extrusions: Minimum 15 µm.
- Threshold plates and threshold plate seals: Minimum 20 µm.

PVC gaskets

Lorient proprietary grade PVC extrusions:

- Food grade with integral antimicrobial additive.
- Service temperature: -5° C to +70° C.

Silicone rubber gaskets

Lorient proprietary flame-retarded silicone rubber extrusions:

- Service temperature: -60° C to +230° C.

Fasteners

Unexposed applications: Zinc-plated self-drilling/self-tapping fasteners supplied with each product.

External coastal exposure applications: Substitute the standard fasteners supplied with equivalent stainless steel versions.

3 EXECUTION

3.1 INSTALLATION

General

Handling: Before supply, verify on site, the correct handling of hardware items.

Operation: Make sure working parts are accurately fitted to smooth close bearings, without binding or sticking, free from rattle or excessive play, lubricated where appropriate.

Mounting height

Locks and latches: Centreline of the door knob or lever spindle above finished floor: Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.

Locks

Cylinders: Fix vertically and with consistent key alignment.

Door stops

Fixing: Fix on the floor, skirting or wall, as appropriate, to prevent the door or door furniture striking the wall or other surface.

Fasteners

Materials: Provide materials compatible with the item being fixed, and of sufficient strength, size and quality to perform their function, and as follows:

- Concealed fasteners: Provide a corrosion-resistant finish to concealed fasteners.
- Exposed fasteners: Match exposed fasteners to the material being fixed.

Security: Locate exposed fasteners to lock furniture on the inside faces of external doors and on the inside faces of internal doors to lockable rooms.

Support:

- Hardware fasteners: Provide appropriate back support, such as lock stiles, blocking, wall noggings and backing plates.
- Hollow metal sections: Provide backing plates drilled and tapped for screw fixing, or provide rivet nuts with machine thread screws. Do not use self-tapping screws or pop rivets.

Floor springs

General: Form a recess in the floor slab for the floor spring box, securely fix and grout the box in place so that the cover plate is flush with the finished floor.

Hinges

Metal frames: Fix hinges using metal thread screws. Do not weld hinges to frames.

Timber doorsets: Install butt hinges in housings equal in depth to the thickness of the hinge leaf (except for hinges designed for mounting without housing), and fix with countersunk screws.

Door seals

Backset: Consider appropriate back set clearance requirements for hinging, latching furniture and automatic closers.

Installation: To the manufacturer's recommendations for each product.

Door assembly preparations: Mortise, semi-rebate or groove door assemblies to match the dimensions recommended in installation instructions.

Door seals for external doors in bushfire-prone areas table

BAL Level	Requirements
Low	None
12.5, 19, 29	Side hung doors: Install weather strips, draught excluders or draught seals at the base of doors.
40	Side hung doors: Install weather strips, draught excluders or draught seals at the base of doors. Seals to stiles, head and bottom to be silicone rubber. Sliding doors: Seals to stiles, head and sills or thresholds to be silicone rubber.
FZ	Side hung doors: Install weather strips, draught excluders or draught seals at the base of doors. Seals not to compromise the door fire resistance level. Side-hung external doors, including french doors, panel fold and bi-fold doors to have a fire resistance level of at least 30 minutes when tested in conformance with AS 1530.4 (2014).

Door seals for garage doors in bushfire-prone areas table

BAL Level	Requirements
Low	None
12.5, 19, 29, 40, FZ	Panel lift, tilt doors or side-hung doors: Fit with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a gap no greater than 3 mm. Roller doors: Guide tracks to have a gap no greater than 3 mm. Fit with a nylon brush that is in contact with the door.

3.2 COMPLETION

Adjustment

General: Leave the hardware properly adjusted with working parts in working order, and clean, undamaged, properly adjusted, and lubricated where appropriate.

Opening force performance: To the NCC cited AS 1428.1 (2009).

Automatic door operators: Maintain and adjust the system throughout the defects liability period.

Keys

Contractor's keys: Immediately before practical completion, replace or reset cylinders to which the contractor has had key access during construction to exclude the contractor's keys.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for use, care and maintenance of the hardware provided.

Automatic door operators: Include the installer's proposal for continuing maintenance after completion on an annual renewal basis.

Warranties

Automatic door operators: Provide interlocking warranties from the manufacturer and installer covering materials and workmanship.

Mechanical Products: 25 Years

- Exception, Yale Mechanical Products: 10 Years.

4 SELECTIONS

4.1 PRODUCT FINISHES

General

Requirement: All hardware finishes to be Satin Chrome, or like finish depending on the availability and base material of the specified items.

Satin Chrome finishes: Plated using trivalent process.

- Exceptions for approval: Lockwood Velocity Series.

Hardware locations

Door hardware schedule: The following schedules describe the selected hardware item but do not indicate the locations or quantities. A door hardware schedule is required.

4.2 LOCK AND LATCH CLASSIFICATION

Durability rating

Door type	Durability designation to AS 4145.1 (2008) Table 3.1
Refer to Door Hardware Schedule.	

Keying security

Door type	Keying security designation to AS 4145.1 (2008) Table 3.2
Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.	

Cylinder security

Door type	Cylinder security designation to AS 4145.1 (2008) Table 3.3
Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.	

Physical security of locks

Door type	Physical security designation of locks to AS 4145.1 (2008) Table 3.4
Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.	

Physical security of locksets

Door type	Physical security designation of locksets to AS 4145.1 (2008) Table 3.5
Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.	

Door type	Physical security designation of locksets to AS 4145.1 (2008) Table 3.5
Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.	

Corrosion classification

Door type	Corrosion category to AS 4145.1 (2008) Table 3.6
Refer to Door Hardware Schedule, and Engineering Solutions Tasmania Drawings and Specifications.	

4.3 ASSA ABLOY LOCKS AND LATCHES**Locks and latches schedule**

Door type	Brand / Product series	Comments
Generally		
Or		
Solid core	Lockwood Selector 3770 Series Selector Mortice Lock Lockwood Synergy 3570 Series Synergy Mortice Lock Lockwood Synergy 3579 Series Synergy Mortice Lock	
Fire rated	Lockwood Selector 3772 Selector Mortice Lock Lockwood Synergy 3572 Synergy Mortice Lock	
Aluminium framed glass	Lockwood Selector 3780 Series Selector Short Backset Mortice Lock Lockwood Selector 3770 Series Selector Mortice Lock Lockwood Synergy 3540 Series Synergy Mortice Lock Lockwood Synergy 3570 Series Synergy Mortice Lock	
Timber framed glass	Lockwood Selector 3780 Series Selector Short Backset Mortice Lock Lockwood Selector 3770 Series Selector Mortice Lock Lockwood Synergy 3570 Series Synergy Mortice Lock	
Other		

4.4 ASSA ABLOY FURNITURE**Furniture schedule**

Backplate Type	Brand/Product series	Comments
Rose	Lockwood Robert Watson Series Rose Door Furniture Lockwood Symphony 1220 Round Rose Door Furniture Lockwood Symphony 1420 Square Rose Door Furniture Lockwood 1360 Round Rose Brass Door Furniture Lockwood 1370 Round Rose Brass Door Furniture Lockwood 260 Round Rose Door Furniture Lockwood 260SQ Square Rose Door Furniture Lockwood Velocity Small Round Rose Door Furniture Lockwood Velocity Small Square Rose Door Furniture Yale Simplicity Round Rose Door Furniture	

Backplate Type	Brand/Product series	Comments
Plate	Lockwood 1800 Series Plate Brass Door Furniture Lockwood 2800 Series Plate Brass Door Furniture Lockwood 4800 Series Narrow Stile Plate Brass Door Furniture Lockwood 5800 Series Narrow Stile Plate Brass Door Furniture Lockwood Artefact 200 Series Plate Door Furniture Lockwood Artefact 202 Series Plate Door Furniture Lockwood Artefact 212 Series Plate Door Furniture Lockwood Artefact 224 Series Plate Door Furniture	
Detention	Lockwood Detention 220D Wide Plate Door Furniture Lockwood Detention 222D Narrow Plate Door Furniture	
Other		

Handles and plates schedule

Plate/Pull Type	Brand/Product series	Comments
Push/Pull Plate D-Handle	Lockwood Artefact 200 Series Plate Door Furniture Lockwood Artefact 202 Series Plate Door Furniture Lockwood Artefact 206 Series Plate Door Furniture Lockwood Artefact 208 Series Plate Door Furniture Lockwood Artefact 212 Series Plate Door Furniture Lockwood Artefact 214 Series Plate Door Furniture Lockwood Artefact 216 Series Plate Door Furniture Lockwood Artefact 218 Series Plate Door Furniture Lockwood Artefact 224 Series Plate Door Furniture	
Back to Back	Lockwood 231 Series Entrance Handles Lockwood 151 Series Entrance Handles Lockwood 192 Series Entrance Handles Lockwood 140 Series Entrance Handles	
D-Handle	Lockwood 184 Offset pull handle Lockwood 185 Offset pull handle Lockwood B Series Lockwood P Series	
Joinery		
Other		

4.5 ASSA ABLOY PANIC EXIT DEVICES**Panic exit device schedule**

Door Type	Brand/Product series	Comments
Solid core	Lockwood Fluid Series Panic Exit Devices	
Fire rated	Lockwood Fluid Series Panic Exit Devices	
Other		

4.6 ASSA ABLOY ACCESS CONTROL**Access control lock schedule**

Type	Brand/Product series	Comments
Electric strike	Lockwood Padde Series ES9000 Preload Electric Strike Lockwood Padde Series ES2100 Electric Strike Lockwood Padde Series ES2000 Electric Strike	
Drop bolt	Lockwood Padde Series TB25 Drop Bolt Lockwood Padde Series ES8000 V-Lock	
Electric mortice lock	Lockwood Synergy 3570EL Series Electric Mortice Lock Lockwood Synergy 3579EL Series Electric Mortice Lock Lockwood Synergy 3579HSEL Series Electric Mortice Lock Lockwood Synergy 3580EL Series Short Backset Electric Mortice Lock	

Type	Brand/Product series	Comments
	Lockwood Padde Series ES8200 Technilock	
Magnetic lock	Lockwood Padde Series Z4 Electromagnetic Locks Lockwood Padde Series Z8 Electromagnetic Locks	
Shear lock	Lockwood Padde Series ES6000 Hook Lock	
Panic exit device	Lockwood Fluid Electromechanical Panic Exit Devices	
Electronic escutcheon	ASSA ABLOY Aperio Wireless Access Control Lockwood Cortex Digital Door Lock	

4.7 ASSA ABLOY DOOR CONTROLLERS

Door closer schedule

Type	Brand / Product series	Comments
Generally		
Type A	Lockwood 2616 Cam Action Door Closer Lockwood 2615 Cam Action Door Closer Lockwood 8014 Concealed Door Closer Lockwood 8015 Concealed Door Closer Lockwood 7726 Door Closer Lockwood 7714 Door Closer	
Type B	Lockwood 726 Door Closer Lockwood 714 Door Closer Yale Y2600 Series Door Closer	
Type C	Lockwood 2000 Series Door Closer Yale Y2400 Series Door Closer	
Floor springs	Lockwood ST8011 Floor Spring Lockwood 8800 Series Floor Springs	
Transom closer	Lockwood 9800 Series Transom Closers	
Electro-magnetic	Lockwood 2616EMC Hold Open Door Closer System Lockwood 2616EMCD Hold Open Coordinating Door Closer System Lockwood 2616CO Coordinating Door System Lockwood FD480 Concealed Hold Open Door Closer System Lockwood FD484 Concealed Hold Open Coordinating Door Closer System Lockwood FD481 Coordinating Door System	
Door stays	Lockwood 8001 Door Stay	
Other		

Door closer type:

- A: High performance.
- B: Medium performance.
- C: Low performance.

Refer to Door Hardware Schedule.

Automatic door operators schedule

Brand	Item	Comments
ASSA ABLOY Entrance Systems	Refer to Door Hardware Schedule.	

4.8 MULTI-RESIDENTIAL HARDWARE KITS

Multi-residential hardware kits schedule

Door type	Brand/Product series	Kit contents
Apartment Entry Door (Fire Door)	Simplicity Lever Kit	Simplicity Mortice Lock Simplicity Door Closer Size 3 Simplicity Passage lever Simplicity Cylinder Escutcheon
Apartment Entry Door (Fire Door)	Simplicity Lever Kit with Turn	Simplicity Mortice Lock Simplicity Door Closer Size 3 Simplicity Passage lever Simplicity Cylinder Escutcheon Simplicity Turnknob Escutcheon
Stairwell (Fire Door)	Simplicity Stairwell Kit	Simplicity Mortice Lock Simplicity Door Closer Y2600 Simplicity Passage lever Simplicity Cylinder Escutcheon

4.9 ASSA ABLOY ANCILLARY HARDWARE

Bolts schedule

Type	Brand/ Product series	Size
Barrel	Refer to Door Hardware Schedule.	To suit door height
Flush timber		To suit door height
Flush aluminium		To suit door height
Skeleton		To suit door height
Auto		
Top latch		To suit door height

4.10 ASSA ABLOY DOOR HANGING SYSTEMS

Sliding track schedule

Door type	Brand	Product series	Description	Accessories
Refer to Door Hardware Schedule.	Henderson	Husky Sliding 50		
	Henderson	Husky Sliding 100		
	Henderson	Solitaire 120		
	Henderson	Solitaire 180		
	Henderson	Solitaire 250		

Door seal schedule

Function	Brand	Product series	Description	Finish
Refer to Door Hardware Schedule.				

Door stop schedule

Type	Brand	Product series	Description	Finish
Refer to Door Hardware Schedule.				

Type	Brand	Product series	Description	Finish

Coat hook schedule

Type	Brand	Product series	Description	Finish
TBC				

Door protection schedule

Type	Brand	Material	Finish	Size (mm x mm)
Refer to Door Hardware Schedule.				

4.11 PADLOCKS**Padlock schedule**

	Room or space group 1	Room or space group 2	Room or space group 3
Room or space type	N/A		
Security			
Keying security			
Durability			
Corrosion resistance			

4.12 DOOR SEALS**Acoustic door seal schedule**

Door type	Rating	Lorient product	Comments
Single leaf 35 mm solid core door	Rw30	LAS1212 Batwing + LAS8001si LAS7001si + LAS8001si	Concealed fixing: Fit LAS1212 Batwing to head and sides of door frame and fully mortise LAS8001si into door bottom. Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Optional LAS4000 aluminium threshold may be used as required.
Single leaf 40 mm solid core door	Rw32	LAS1212 Batwing + LAS8001si LAS7001si + LAS8001si	Concealed fixing: Fit LAS1212 Batwing to head and sides of door frame and fully mortise LAS8001si into door bottom. Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Optional LAS4000 aluminium threshold may be used as required.
Single leaf Fire rated door	Rw32	LAS1212 Batwing + LAS8001si LAS1812LSS +	Concealed fixing: Fit LAS1212 Batwing to head and sides of door frame and fully mortise LAS8001si into door bottom OR

Door type	Rating	Lorient product	Comments
		LAS8001si LAS7001si + LAS8001si	Fit LAS1812LSS combined fire/smoke/acoustic seal to head and jambs and fully mortise LAS8001si into door bottom. Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Optional LAS4000 aluminium threshold may be used as required.
Single leaf proprietary acoustic door	>Rw50	Check manufacturers reports	
Double leaf 35 mm solid core door	Rw30	LAS1212 Batwing + LAS8001si LAS7001si + LAS8001si + AAS7506 astragal	Concealed fixing: Fit LAS1212 Batwing to head and sides of door frame and fully mortise LAS8001si into door bottom. Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit AAS7506 to meeting stile. Optional LAS4000 aluminium threshold may be used as required.
Double leaf 40 mm solid core door	Rw32	LAS1212 Batwing + LAS8001si LAS7001si + LAS8001si + AAS7506 astragal	Concealed fixing: Fit LAS1212 Batwing to head and sides of door frame and fully mortise LAS8001si into door bottom. Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit AAS7506 to meeting stile. Optional LAS4000 aluminium threshold may be used as required.
Double leaf fire door	Rw32	LAS1212 Batwing + LAS8001si + FDMS T-Bar LAS7001si + LAS8001si + FDMS T-Bar	Concealed fixing: Fit LAS1212 Batwing to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit FDMS T-BAR set to meeting stiles. Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit FDMS T-BAR set to meeting stiles. Optional LAS4000 aluminium threshold may be used as required.
Double leaf proprietary acoustic door	>Rw50	Check manufacturers reports	

Smoke door seal schedule (DTS)

Door type	Lorient product	Comments
Single leaf single swing 35 mm solid core door DTS solution	LAS7004si + LAS8001si LAS1011 + LAS8001si LP1504DS + LAS8001si	Fit LAS7004si to top and sides of door leaf and fully mortise LAS8001si into door bottom. Fit LAS1011 to top and sides of door leaf and fully mortise LAS8001si into door bottom. Rebate LP1504DS combined fire/smoke/acoustic seal into top and sides of door leaf and fully mortise LAS8001si into door bottom. Optional LAS4000 aluminium threshold may be used as required.
Double leaf single swing 35 mm solid core door DTS solution	LAS7004si + LAS8001si + AAS7506 astragal LAS1011 + LAS8001si + AAS7506 astragal LP1504DS +	Fit LAS7004si to top and sides of door leaf and fully mortise LAS8001si into door bottom. Fit AAS7506 to meeting stile. Kerf-fit LAS1011 to top and sides of door leaf and fully mortise LAS8001si into door bottom. Fit AAS7506 to meeting stile.

Door type	Lorient product	Comments
	LAS8001si + AAS7506 astragal	Rebate LP1504DS combined fire/smoke/acoustic seal into top and sides of door leaf and fully mortise LAS8001si into door bottom. Fit AAS7506 to meeting stile. Optional LAS4000 aluminium threshold may be used as required.
Single leaf double swing 35 mm solid core door DTS solution	LAS7004si + LAS3009si + LAS4010 LAS1011 + LAS3009si +LAS4010	Fit LAS7004si to top and sides of door leaf and LAS3009si to door bottom. Fit LAS4000 aluminium plate to threshold. Kerf-fit LAS1011 to top and sides of door leaf and LAS3009si to door bottom. Fit LAS4000 aluminium plate to threshold.
Double leaf double swing 35 mm solid core door DTS solution	LAS7004si + LAS3009si + LAS4010 LAS1011 + LAS3009si + LAS4010	Fit LAS7004si to top and sides of door leaf and LAS3009si to door bottom. Fit LAS4000 aluminium plate to threshold. Kerf-fit LAS1011 to top and sides of door leaf and LAS3009si to door bottom. Fit LAS4000 aluminium plate to threshold.

Smoke door seal schedule

Door type	Leakage rating	Lorient product	Comments
Single leaf fire rated door	>10m ³ /hr	LAS1212 Batwing + LAS8001si LAS1812LSS + LAS8001si LAS1212 Batwing + LAS8002si LAS1812LSS + LAS8002si LAS1212 Batwing + LAS8003si LAS1812LSS + LAS8003si LAS1212 Batwing + LAS8006si LAS1812LSS + LAS8006si	Fit LAS1212 Batwing to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit LAS1812LSS combined fire/ smoke/ acoustic seal to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit LAS1212 Batwing to head and sides of door frame and surface mount LAS8002si on door bottom Fit LAS1812LSS combined fire/ smoke/ acoustic seal to head and sides of door frame and surface mount LAS8002si on door bottom. Fit LAS1212 Batwing to head and sides of door frame and surface mount LAS8003si on door bottom. Fit LAS1812LSS combined fire/ smoke/ acoustic seal to head and sides of door frame and surface mount LAS8003si on door bottom. Fit LAS1212 Batwing to head and sides of door frame and surface mount LAS 8006si on door bottom. Fit LAS1812LSS combined fire/ smoke/ acoustic seal to head and sides of door frame and surface mount LAS8006si on door bottom. Optional LAS4000 aluminium threshold may be used as required.

Fire door seal schedule

Door type	Rating	Lorient product	Comments
Perimeter seals	Up to - /240/30	LAS1812LSS combined fire/ smoke/ acoustic seal LAS1212 smoke/ acoustic seal LAS1515 smoke/ acoustic seal LAS7001si stop mounted acoustic compression seal LAS7005si stop mounted acoustic compression seal AAS7501si stop mounted acoustic compression seal	

Door type	Rating	Lorient product	Comments
		AAS7503 stop mounted acoustic compression seal	
Door bottom seals	Up to - /240/30	LAS8001si fully rebated (concealed) drop seal LAS8002si semi rebated or surface mounted drop seal LAS8003si semi rebated or surface mounted drop seal LAS8005si fully rebated (concealed) drop seal LAS8006si semi rebated or surface mounted drop seal LAS8007si fully rebated (concealed) drop seal LAS8008si surface mounted drop seal LAS8009si surface mounted drop seal	
Thresholds & ramps	Up to - /240/30	LAS4002 40 mm wide threshold plate LAS4010 75 mm wide x 6 mm high threshold plate LAS4011 100 mm wide x 6 mm high threshold plate LAS4012 125 mm wide x 6 mm high threshold plate LAS4013 150 mm wide x 6 mm high threshold plate AAS4551 100 mm wide threshold ramp 12.5 mm rise AAS4552 150 mm wide threshold ramp 12.5 mm rise AAS4553 150 mm wide threshold ramp 19 mm rise	
Meeting Stiles for double leaf fire doors – Single swing	Up to - /120/30	LDMS T-Bar fire door meeting stile set	
Meeting Stiles for double leaf fire doors – Double swing	Up to - /120/30	LDMS-BB bullnose meeting stiles	

Bushfire-prone area door seal schedule

BAL Level	Lorient product	Comments
Low	N/A, No sealing requirement	
12.5, 19, 29	LAS3004si surface mounted silicone rubber blade	Fit to door bottom.
40	LAS7001si silicone perimeter seal + LAS3004si silicone rubber blade	Fit LAS700si to head and sides of door and LAS3004si to door bottom
FZ	LAS7001si or LAS7005si silicone perimeter seal + LAS3004si silicone rubber blade.	Fit LAS7001si to head and sides of door and LAS3004si to door bottom.

Bushfire-prone area garage door seal schedule

BAL Level	Lorient product	Comments
Low	N/A, No sealing requirement	
12.5, 19, 29, 40, FZ	LAS5035 40 mm brush LAS5040 60 mm brush seal LAS5045 80 mm brush seal LAS5050 100 mm brush seal LAS5055 150 mm brush LAS5070H 45 mm 90° angled brush LAS5085 45 mm 45° angled brush AAS3530si silicone bulb	Fit LAS5035, LAS5040, LAS5045, LAS5050, LAS5055, LAS5070H or LAS5085 to head and/ or sides of garage door and AAS3530si to door bottom.

BAL Level	Lorient product	Comments
	LAS4000 series threshold plate may be used as required.	

Weather, draft, dust and insect door seal schedule

Door type	Lorient product	Comments
Single leaf door	LAS7001si + LAS8001si LAS1212 + LAS8001si LAS7005si + LAS8006si	Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Concealed fixing: Fit LAS1212 to head and sides of door frame and fully mortise LAS8001si into door bottom. Surface mounted: LAS7005si to head and sides of door frame and surface mount LAS8006si on door bottom
Double Leaf door	LAS7001si + LAS8001si + AAS7506 astragal LAS1212 + LAS8001si + AAS7506 astragal	Surface mounted: Fit LAS7001si to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit AAS7506 to meeting stiles. Concealed fixing: Fit LAS1212 to head and sides of door frame and fully mortise LAS8001si into door bottom. Fit AAS7506 to meeting stiles.

Door threshold plates and ramps schedule

Door type	Lorient product	Comments
Single leaf door	LAS4002 40 mm wide threshold plate LAS4010 75 mm wide x 6 mm high threshold plate LAS4011 100 mm wide x 6 mm high threshold plate LAS4012 125 mm wide x 6 mm high threshold plate LAS4013 150 mm wide x 6 mm high threshold plate AAS4551 100 mm wide threshold ramp with 12.5 mm rise AAS4552 150 mm wide threshold ramp with 12.5 mm rise AAS4553 150 mm wide threshold ramp with 19 mm rise	
Double Leaf door	LAS4002 40 mm wide threshold plate LAS4010 75 mm wide x 6 mm high threshold plate LAS4011 100 mm wide x 6 mm high threshold plate LAS4012 125 mm wide x 6 mm high threshold plate LAS4013 150 mm wide x 6 mm high threshold plate AAS4551 100 mm wide threshold ramp with 12.5 mm rise AAS4552 150 mm wide threshold ramp with 12.5 mm rise AAS4553 150 mm wide threshold ramp with 19 mm rise	

0461B GLAZING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide glazing, as documented.

Performance

Thermal qualities: U-Value and Solar heat gain coefficient (SHGC) as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**Glazing**

Glass type and thickness: To AS 1288 (2021), if no glass type or thickness is nominated.

Materials and installation: To AS 1288 (2021).

Quality requirements for cut-to-size and processed glass: To AS/NZS 4667 (2000).

Roof glazing: To AS 1288 (2021) Section 6.

1.4 SUBMISSIONS**Certification**

Design: Submit an engineer's certificate confirming conformance to AS 1288 (2021).

Opacified glass: Submit a report, from the manufacturer certifying that the proposed method of opacifying the glass will not be detrimental to the glass or affect the glass product warranty.

Toughened glass: For each batch of glass, submit certification from the manufacturer of heat soaking.

Installation: Submit certification from the fabricator that the method of glazing, the selection of sealant systems and conditions next to the glass conform to the following:

- Compatible with the edge seal of insulating glass units (IGUs) and self-cleaning glass.
- Will not be detrimental to the long-term structural performance, weathering capabilities and visual qualities of the glass.

Glazier's data: Submit the glazing subcontractor's statement certifying the following:

- A satisfactory thermal safety assessment.
- The assembled frame provides the required glazing clearances and tolerances, and maximum and minimum joint configurations, based on the bow, warp and kink characteristics of the required glass types, and is ready for glazing.

Execution details

Site glazing: If site glazing is intended, submit proposals.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Safety glazing materials: Submit evidence of conformity to AS/NZS 2208 (1996) Appendix A.

Samples

General: Submit samples of glazing materials, each at least 200 x 200 mm, showing the visual properties and range of variation, if any, for each of the following:

- Tinted or coloured glass or plastics glazing.
- Surface modified or surface coated glass.
- Patterned or obscured glass or plastics glazing.
- Ceramic-coated glass.

- Wired glass.
- Insulating glass units.
- Mirror glass.

Shop drawings

Requirement: Submit shop drawings showing the following:

- Method of glazing.
- Rebate depth.
- Edge restraint.
- Clearances and tolerances.
- Glazing gaskets and sealant beads.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

2 PRODUCTS

2.1 GENERAL**Storage and handling**

Storage: Store glass and glazing materials in a clean, dry area unaffected by weather, to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint and welding splatter.

Handling: Handle glass to the manufacturer's recommendations.

2.2 GLAZING**Performance**

Glass: Free from defects that detract from appearance or interfere with performance under normal conditions of use.

Plastics glazing: Free from surface abrasions and warranted by the manufacturer for 10 years against yellowing or other colour change, loss of strength and impact resistance, and general deterioration.

Heat soaking

Requirement: Heat soak glass to AS 1288 (2021) clause 3.8.

Standard: To EN 14179-1 (2016).

Marking: To EN 14179-1 (2016) or certified by the manufacturer to AS 1288 (2021) clause 3.8.2.

Safety glazing materials

Standard: To AS/NZS 2208 (1996).

Type: Grade A to AS 1288 (2021).

Certification: Required.

- Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JASANZ).

Marking: To AS/NZS 2208 (1996) clause 1.7.

Heat-strengthened glass

Requirement: Heat-strengthened annealed glass that requires extra strength and thermal resistance.

Standard: To ASTM C1048 (2018).

Insulating glass units (IGUs)

Requirement: Provide insulating glass units, as documented.

Manufacture, testing and installation: To AS 4666 (2012).

2.3 GLAZING MATERIALS**General**

Requirement: Putty, glazing compounds, sealants, gaskets, glazing tapes, spacing strips, spacing tapes, spacers, setting blocks, shims and compression wedges appropriate for the conditions of application and required performance.

Primer

Compatibility: Apply the manufacturer's recommended primer to the surfaces in contact with sealant materials.

2.4 ANCILLARY COMPONENTS AND FITTINGS**Extruded gaskets and seals**

General: Provide seals, as documented.

Materials: Non-cellular (solid) elastomeric seals as follows:

- Rubber products: Neoprene, ethylene propylene diene monomer (EPDM) or silicone rubber.
- Flexible polyvinyl chloride (PVC): E type compounds, colourfastness grade B.

Pile weatherstrips

Standard: To AAMA 701/702 (2023).

Material: Polypropylene or equivalent pile and backing, low friction silicone treated, ultraviolet stabilised.

Finned type: A pile weatherseal with a central polypropylene fin bonded into the centre of the backing rod and raised above the pile level.

3 EXECUTION**3.1 GLAZING PROCESSING****General**

Processing: Perform required processes on glazing, including cutting, obscuring, silvering and bending. Form necessary holes, including for fixings, equipment, access openings and speaking holes. Process exposed glass edges to a finish not inferior to ground arised.

3.2 INSTALLATION**Glazing**

Requirement: Install the glass as follows:

- Permanently fix in place each piece of glass to withstand the normal loadings and ambient conditions at its location without distortion or damage to glazing materials.
- No transfer of building movements to the glazing.
- Watertight and airtight for external glazing.

Temporary marking: Use a method that does not damage the glazing. Remove marking only after certification and acceptance of the installation.

Toughened glass: Do not cut, work, or permanently mark after toughening. Use installation methods that prevent the glass making direct contact with metals or other non-resilient materials.

Heat-absorbing glass: In locations exposed to direct sunlight, provide wheel cut edges free from damage or blemishes, with minimum feather.

Preglazing

Window assemblies and glazed doors: Supply inclusive of glazing, shop preglazed.

Curtain walls: Supply inclusive of glazing, shop preglazed.

Site glazing

Minimum dimensional requirements: Edge clearance, edge cover, front clearance and back clearance to AS 1288 (2021).

External timber framed glazing: Glaze with putty.

3.3 COMPLETION**Replacement**

Requirement: After replacing damaged glass, leave the work clean, polished, free from defects, and in good condition.

Cleaning

Method: Clean with soft clean cloths and clean water, finishing with a clean squeegee. Do not use abrasive, acidic or alkaline materials.

Extent: All frames and glass surfaces internally and externally.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturers' published recommendations for in-service use.

Warranties

Glazing subcontractor's warranty: Provide an undertaking conditional only on compliance with the manufacturers' recommendations for maintenance, to repair or replace glass and glazing materials that become defective or prove unsuitable for the nominated application; during the warranty period.

Glass manufacturer's warranty: Provide an undertaking, conditional only on compliance with the manufacturer's recommendation for installation and maintenance, to supply replacement glass units to the site for replacement of defective units defined as follows:

- IGU units: Units in which the hermetic seal has failed as evidenced by intrusion of foreign matter, or internal condensation at temperature above 2°C.
- Coated glass units (including coated super insulating glass units): Units in which the metallic coating shows evidence of manufacturing defects, including but not necessarily limited to cracking or peeling, as determined in conformance with ASTM C1048 (2018).

Toughened glass warranty: Provide a manufacturer's warranty that toughened glass supplied for use in curtain walls has been subjected to a heat soaking process that has converted at least 95% of the nickel sulfide content to the stable beta-phase.

4 SELECTIONS

4.1 PERFORMANCE

Glass performance schedule

	A	B	C
U-Value (thermal transmittance, W/m ² .K)	Refer to Window and Doors Schedules CD12 – CD15, and Energy Assessment Report. Confirm consistency between documents.		
Solar heat gain coefficient (SHGC)			
Airborne sound insulation			
Visible transmittance (T _{vis})			
Reflectance (%)			
AGWA Glass Compliance Certificate			

4.2 GLAZING

Glass schedule

	A	B	C
Glass type	Refer to Window and Doors Schedules CD12 – CD15, and Energy Assessment Report. Confirm consistency between documents.		
Glass thickness (mm)			
Body tint colour			
Interlayer colour			

	A	B	C
Surface coating: Description			
Surface coating: Colour			
Reflective coating: Colour			
Reflective coating: % reflectance			
Surface pattern			
Surface processing: Method			
Surface processing: Pattern			
Surface processing: Colour			
Edge processing			
Number of edges processed			
Fire-resistance level (FRL)			
Safety markings			
Digitally printed film			

Special glasses schedule

	A	B	C
Mirrored	Refer Fittings and Fixtures Schedule		
Patterned			
Ceramic base painted glass: Base glass			
Ceramic base painted glass: Ceramic coating colour			
Ceramic coated glass: Coating application method			
Acid etched			
Sandblasted			

Plastics glazing schedule

	A	B	C
Polycarbonate sheet: Type	N/A		
Polycarbonate sheet: Abrasion resistance			
Polycarbonate sheet: Fire hazard properties			
Acrylic sheet			
Reinforced polyester sheet: Type			
Reinforced polyester sheet: Surface treatment			
Reinforced polyester sheet: Mass/unit area			

Insulating glass units (IGUs) schedule

	A	B	C
Product	N/A		
Outer pane: Glass type			
Outer pane: Thickness (mm)			
Outer pane: Colour/coating type			
Inner pane: Glass type			

	A	B	C
Inner pane: Thickness (mm)			
Inner pane: Colour/coating type			
Spacer width (mm)			
Gas filling: Type			

0471 THERMAL INSULATION AND PLIABLE MEMBRANES
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1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide thermal insulation and pliable membrane systems, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the following definitions apply:

- Batts: Flexible insulation supplied as factory cut pieces and composed of mineral fibre (glass and rock fibre) or polyester fibre.
- Bio-soluble: A product that dissolves in bodily fluids and is quickly cleared from the lungs.
- Blankets: Flexible insulation supplied as factory cut rolls and composed of mineral fibre (glass and rock fibre) or polyester fibre, and may be combined with reflective facings.
- Fire hazard properties: To NCC (2022) Schedule 1.
- Pliable building membrane: To AS 4200.1 (2017) and equivalent to sarking-type materials as defined in the NCC.
- Thermal insulation terminology: To AS/NZS 4859.1 (2018).
- Vapour permeable (breathable) membrane: A flexible membrane material, normally used for secondary waterproofing that allows for the transmission of water vapour.

1.4 SUBMISSIONS**Fire performance**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Products and materials

Thermal insulation properties: Submit evidence of conformity to AS/NZS 4859.1 (2018) and AS/NZS 4859.2 (2018).

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.5 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Insulation or pliable membrane materials after installation and before concealment.

2 PRODUCTS**2.1 GENERAL****Storage and handling**

Labelling: Deliver mineral fibre products to site in packaging with third party mark of conformity indicating product is bio-soluble and not listed as hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

2.2 FIRE PERFORMANCE

Fire hazard properties

Insulation materials: Tested to AS/NZS 1530.3 (1999). Fire hazard indices as follows:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .

Materials with reflective facing: Tested to AS/NZS 1530.3 (1999) and the recommendations of Appendix A6.

Pliable membranes: Flammability Index ≤ 5 tested to AS 1530.2 (1993).

2.3 MATERIALS

Thermal insulation

Standard: To AS/NZS 4859.1 (2018).

Wet process fibreboard (softboard): To AS/NZS 1859.4 (2018).

Mineral fibre insulation: Bio-soluble and not listed as a hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

Pliable building membranes

Standard: To AS 4200.1 (2017).

Vapour control membranes:

- Vapour barrier:
 - . Vapour control classification: Class 1 or Class 2, as documented.
- Vapour permeable (breathable) membrane:
 - . Vapour control classification: Class 3 or Class 4, as documented.

Water control (sarking) membrane (other than walls and gables):

- Water control classification: Water barrier.

2.4 COMPONENTS

Fasteners and supports

General: Metallic-coated steel.

Mesh support to roof insulation

Welded safety mesh: To AS/NZS 4389 (2015).

Thermal break strips

Product: Proprietary item.

R-Value ($\text{m}^2\text{K/W}$): ≥ 0.2 .

3 EXECUTION

3.1 GENERAL

Thermal insulation

Requirement: To AS 3999 (2015) and BCA (2022) J4D3 or BCA (2022) H6D2(1)(b)(i), as appropriate.

Installation: Firmly butt together with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 (2018) clause 4.5.
- Electrical cables: To AS 3999 (2015) clause 2.6.

Pliable building membrane

Installation: To AS 4200.2 (2017) and BCA (2022) J4D3 or BCA (2022) H6D2(1)(b)(i), as appropriate.

3.2 FLOORS

Under suspended framed floors

Fibre batts: Fit tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Rigid cellular insulation boards:

- Installation: Fix to the underside of timber strip flooring. Butt tightly to joists.

- Fixing: Adhesive or mechanical fasteners.

Over suspended framed floors

Rigid cellular insulation boards:

- Installation: Over sheet flooring and between battens supporting a final flooring finish.

Below concrete slab on ground

Preparation: Sand blinding or working slab, as documented.

Rigid cellular insulation boards:

- Laying pattern: Stretcher bond, with edges tightly butted.
- Damp-proof membrane: Lay over insulation.

Over concrete slab on ground

Substrate preparation: Prepare substrate as follows:

- Clean and remove any deposit or finish that may impair adhesion or location of insulation.
- Remove excessive projections.
- Voids and hollows > 10 mm with abrupt edges: Fill with a cement: sand mix not stronger than the substrate or weaker than the bedding.

Rigid cellular insulation boards:

- Laying pattern: Stretcher bond, with edges tightly butted.
- Fixing: Adhesive fix directly to the concrete floor slab.

Under suspended concrete slab

Fibre batts:

- Fixing: Mechanical fasteners and support mesh or nylon twine.

Rigid cellular insulation boards:

- Fixing: Adhesive or mechanical fasteners.
- Joints: Apply reinforced foil tape to all joints.

3.3 WALLS

Framed walls

Fibre batts: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Thermal break strips: Provide to steel framing with lightweight external cladding:

- Screw fixing: Button head screws at 1 m centres.
- Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Masonry veneer cavity walls

Rigid cellular insulation boards:

- Installation: Fix boards horizontally with the tongue to the top edge, pushed over prefixed wall ties and held firmly against the wall frame. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Hex head screws at 450 mm centres.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation boards.

Full masonry cavity walls – external face of internal leaf

Rigid cellular insulation boards:

- Installation: Fix boards horizontally with the tongue to the top edge and firmly against the inner masonry skin. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Proprietary plastic clips on pre-installed wall ties.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation boards.

Full masonry cavity walls – internal face of internal leaf

Substrate preparation: Conform to the following:

- Clean and remove any deposit or finish that may impair adhesion or location of insulation.
- Remove excessive projections and fill voids and hollows with plaster.

- Maximum surface deviation from a 2400 mm straightedge: 6 mm.

Substrate correction: Skim plaster.

Rigid cellular insulation boards:

- Installation: Fix boards horizontally with staggered vertical joints, all close butted and without crushing.
- Fixing: Proprietary adhesive compatible with the insulation. Apply sufficient pressure to evenly distribute adhesive.

Vapour permeable (breathable) membrane

Requirement: Provide a vapour permeable membrane behind external facing material that does not provide permanent weatherproofing or that may be subject to condensation forming on the internal face, including the following:

- Boards or planks fixed vertically or diagonally.
- Boards or planks fixed in exposed locations where wind driven rain can penetrate the joints.
- Unpainted or unsealed cladding.
- Masonry veneer.

Installation: Run the vapour permeable membrane horizontally on the outer face of external wall framing, over the flashing, from the bottom plate up. Pull taut over the framing and fix to framing members. Seal across the wall cavity at the top.

Horizontal laps: At least 150 mm wide, lapped to make sure water is shed to the outer face of the membrane.

End or vertical overlaps laps: At least 150 mm wide made over framing.

Openings: Run the vapour permeable membrane over the openings and leave covered until windows and doors are installed. Cut the membrane on a 45° diagonal from each corner of the opening, fold the flaps inside and fix to the inside frame of the opening. If the membrane is used to provide a continuous airtight layer, seal all joints with pressure sensitive adhesive tape.

Fixing: Install as follows:

- Timber frames: Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads.
- Steel or aluminium frames: Hex head screws, with either 20 mm diameter washers or through hardboard strips.
- Plywood: Alternatives:
 - . Metallic-coated clouts, 20 mm long 6 to 8 mm staples or punched multi-point metallic-coated steel brads at minimum 300 mm centres.
 - . Water based contact adhesive with a 50% adhesive cover.

3.4 CEILINGS

Cathedral ceilings

Rigid cellular insulation boards:

- Installation: Lay boards with their long edges at right angles to the rafters and with the tongue pointing up the slope. Start laying at eaves and progress towards the ridge. Cut boards and tightly fit to abutments and penetrations.
- Fixing: Secure temporarily by occasional nailing to the rafters. Fix permanently by nailing counter battens to the rafters.
- Sealing: Seal gaps with polyurethane foam.

Framed ceilings

Fibre batts: Fit tightly between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

Suspended ceilings

Fibre batts and blankets: Lay batts/blankets over the ceiling system close butted to each other and to the suspension rods.

3.5 ROOFS

General

Requirement: Provide insulation to the whole of the roof area including skylight shaft walls, except the following:

- Eaves, overhangs, skylights, vents and openings.
- Roofs to outbuildings, garages, and semi-enclosed spaces such as verandahs, porches and carports.

Mesh support to roof insulation

Requirement: Provide support to the following:

- Water control (sarking), vapour barrier or reflective thermal insulation membranes laid over roof framing members that are spaced at more than 900 mm centres.
- Blanket type thermal insulation laid over roof framing members as sound insulation to metal roofing.

Installing welded safety mesh: To AS/NZS 4389 (2015).

Metal roofs

Fibre batts: Fit tightly between framing members.

Fibre blanket for sound insulation: Install over the roof framing, reflective thermal insulation (if any), and mesh support, so that the blanket is in continuous contact with the underside of the metal roofing sheets.

Combined fibre blanket and reflective insulation: Lay facing reflective insulation face downwards over safety mesh.

Thermal break strips: Provide to steel framing supporting metal sheet roofing.

- Screw fixing: Button head screws at 1 m centres.
- Adhesive fixing: Wallboard adhesive walnuts at 1 m centres.

Waterproof membrane roofs

Preparation: Make sure membrane is clean and free of loose material. Lay separation layer over membrane with edges lapped 300 mm and turned up at upstands and penetrations.

Rigid cellular insulation boards: Lay boards in brick pattern with shiplap edges pushed together firmly, cut neatly around penetrations and extend up upstands.

Pliable building membranes

Vapour barrier: Lay over the roof framing with sufficient sag to allow the bulk insulation to achieve its full thickness. Overlap all edges 150 mm and seal all joints with pressure sensitive adhesive tape.

Water control (sarking) membrane: Provide sarking under tile and shingle roofing.

3.6 COMPLETION

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 THERMAL INSULATION

Thermal insulation schedule

	A	B	C
Application	Refer drawings and the and Energy Assessment Report. Confirm consistency between documents.		
Type/Product			
R-Value (m ² .K/W)			

	A	B	C
Thickness (mm)			
Airborne sound insulation			
Compressive strength (kPa)			
Rigid cellular sheet class			

4.2 PLIABLE MEMBRANES

Pliable membranes schedule

	A	B	C
Application	Refer drawings and the and Energy Assessment Report. Confirm consistency between documents.		
Product			
Location			
Electrical conductivity classification			
Duty classification			
Surface emittance classification			
Membrane emittance category			
Vapour control membrane classification			
R-Value (m ² .K/W)			

0472 ACOUSTIC INSULATION

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide acoustic insulation, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the following definitions apply:

- Acoustic insulation: Materials or methods of construction to reduce the transmission of airborne and structure-borne sound through floors, walls and ceilings or other enclosing elements in buildings.
- Acoustic underlay: A resilient material laid between the subfloor and the flooring material to provide sound isolation.
- Airborne sound: Sound radiated directly from a source, such as a loudspeaker or machine, into the surrounding air.
- Batts: Flexible insulation supplied as factory cut pieces and composed of mineral fibre (glass and rock fibre) or polyester fibre.
- Bio-soluble: A product that dissolves in bodily fluids and is quickly cleared from the lungs.
- Blankets: Flexible insulation supplied as factory cut rolls and composed of mineral fibre (glass and rock fibre) or polyester fibre, and may be combined with reflective facings.
- Fire hazard properties: To NCC (2022) Schedule 1.
- Impact sound: Sound caused by impacts on building structure. Typical sources include footsteps, dropped objects on horizontal surfaces and the slamming of doors.
- Sound insulation (isolation): Reduction of sound energy passing through building elements.
- Structure-borne sound: Sound waves transmitted within the building structure and re-radiated into other spaces as airborne sound. Typical sources include direct impact from dropped objects and vibrating machinery.

1.4 SUBMISSIONS**Fire performance**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Products and materials

Acoustic insulation properties: Submit evidence of conformity to documented requirements for insulation.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.5 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Insulation after installation and before concealment.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Labelling: Deliver mineral fibre products to site in packaging with third party mark of conformity indicating product is bio-soluble and not listed as hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

2.2 FIRE PERFORMANCE

Fire hazard properties

Insulation materials: Tested to AS/NZS 1530.3 (1999). Fire hazard indices as follows:

- Spread-of-Flame Index: ≤ 9 .
- Smoke-Developed Index: ≤ 8 if Spread-of-Flame Index > 5 .

Facing materials: Tested to AS 1530.2 (1993): Flammability Index ≤ 5 .

2.3 MATERIALS

General

Mineral fibre insulation: Bio-soluble and not listed as a hazardous material in the Safe Work Australia *Hazardous Chemical Information System* (HCIS).

Bulk insulation

Mineral fibre blankets and batts: Glass wool or rock wool bonded with thermosetting resin.

Polyester blankets and batts: Thermally bonded polyester fibres.

Board insulation

Mineral fibre panels: High density glass wool or rock wool bonded with thermosetting resin.

Wet process fibreboard (including softboard): To AS/NZS 1859.4 (2018).

Composite plasterboard panels: Proprietary items.

Flexible sheet insulation

Impregnated vinyl: Mass loaded vinyl sheeting.

Recycled rubber/cork: Recycled rubber granules and/or cork bound with polymers.

2.4 COMPONENTS

Fasteners and supports

General: Metallic-coated steel.

Resilient mounts: Proprietary fixing clips with rubber or acrylic pads.

Adhesives

General: Compatible with the substrate and the insulation and conforming to the insulation manufacturer's recommendations.

Sealants

Acoustic sealant: Non-hardening sealant compatible with the substrate materials.

Fire-resisting sealant: Non-hardening sealant compatible with the substrate materials and having a fire-resistance rating equal to that of the building element it seals.

Sealant strips: Closed cell resilient foam.

3 EXECUTION

3.1 GENERAL

Bulk insulation

General: Firmly butt together with no gaps except as follows:

- Access openings and vents: Do not obstruct.
- Light fittings: To AS/NZS 3000 (2018) clause 4.5.
- Electrical cables: To AS 3999 (2015) clause 2.6.

3.2 FLOORS

Under suspended framed floors

Fibre batts: Fit tightly between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Mineral fibre panels:

- Installation: Fix to the underside of timber strip flooring. Butt tightly to joists.
- Fixing: Adhesive or mechanical fasteners.

Over concrete slab

Substrate preparation: Prepare substrate as follows:

- Clean and remove any deposit or finish that may impair adhesion or location of insulation.
- Remove excessive projections.
- Voids and hollows > 10 mm with abrupt edges: Fill with a cement: sand mix not stronger than the substrate or weaker than the bedding.

Mineral fibre panels:

- Laying pattern: Stretcher bond, with edges tightly butted.
- Fixing: Adhesive fix directly to the concrete floor slab.

Under suspended concrete slab

Fibre batts:

- Fixing: Mechanical fasteners and support mesh or nylon twine.

Mineral fibre panels:

- Fixing: Adhesive or mechanical fasteners.

Acoustic underlays

Handling: Store horizontally and keep dry.

Conditioning: Roll out underlay and leave in place for a minimum of 12 hours to acclimatise.

Installation: Adhesive fixed or loose laid, as documented.

3.3 WALLS

Framed walls and partitions

Fibre batts: Friction fit between framing members. If other support is not provided, staple nylon twine to the framing and stretch tight.

Mineral fibre panels: Fix to face of studs with adhesive and temporarily fasten with single screw until plasterboard installed.

Full masonry cavity walls – external face of internal leaf

Mineral fibre panels:

- Installation: Fix panels firmly against the inner masonry skin. Keep boards clean, dry and free from mortar and grout. Do not bridge the cavity.
- Fixing: Proprietary plastic clips on pre-installed wall ties.
- Sheet size: Select or cut to suit wall tie spacing.

Flashings: Install flashings before installing insulation. Prevent entry of water behind the insulation.

Full masonry cavity walls – internal face of internal leaf

Substrate preparation: Conform to the following:

- Clean and remove any deposit or finish fibre may impair adhesion or location of insulation.
- Remove excessive projections and fill voids and hollows with plaster.
- Maximum surface deviation from a 2400 mm straightedge: 6 mm.

Substrate correction: Skim plaster.

Mineral fibre panels:

- Installation: Fix boards horizontally with staggered vertical joints, all close butted and without crushing.
- Fixing: Proprietary adhesive compatible with the insulation. Apply sufficient pressure to evenly distribute adhesive.

3.4 CEILINGS

Framed ceilings

Fibre batts: Fit tightly between framing members. If support is not otherwise provided, staple nylon twine to the framing and stretch tight.

Suspended ceilings

Fibre batts and blankets: Lay batts/blankets over the ceiling system close butted to each other and to the suspension rods.

3.5 FLANKING SOUND INSULATION

Baffles

General: Install plenum baffles tightly butted to building structure, service ducts, pipes and conduits and to the top of the partition or to the top of the suspended ceiling structure directly above the line of the partition. Seal joints, penetrations and intersections and maintain the required performance.

Bulk insulation: Install individual layers to fill space between building structure and the top of the partition or the top of the suspended ceiling.

Flexible sheet insulation: Fix to soffit through a continuous furring channel, hang to meet the top of the partition and extend horizontally 900 mm over the suspended ceiling.

Abutments

Trim: Install over sealant. Allow for movement at abutting surfaces.

Cable management

Power outlets: Do not install general purpose socket outlets back to back. Separate adjoining socket outlets with a continuous layer of the documented wall insulating material.

Ducted skirtings: If a ducted skirting extends continuously across an abutment, pack the cavities firmly with bulk insulating material for 300 mm each side of the abutment, and scribe and seal the joint.

3.6 COMPLETION

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 SCHEDULES

Acoustic insulation schedule

	A	B	C
Application	Refer drawings and the and Energy Assessment Report. Confirm consistency between documents.		
Type/Product			
Thickness (mm)			
Airborne sound insulation			
Density (kg/m ³)			
Surface weight (kg/m ²)			

0511B LINING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide internal lining systems, as documented.

Performance

Requirement: Provide lining system with a surface that is:

- Resistant to impacts expected in use.
- Resistant to moisture encountered under expected environmental conditions.
- Free of irregularities.
- A suitable substrate for the nominated final finish.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviation applies:

- MDF: Medium density fibreboard.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 4491 (1997) and the following apply:

- Decorative overlaid wood panels: Particleboard or fibreboard with a bonded decorative finishing surface such as thermosetting resin (low pressure melamine), PVC film, paper foils or wood veneer.
- Dry process fibreboard: Panel material with a nominal thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and pressure, the bond of which is derived from a synthetic adhesive added to the fibres and the panels are manufactured with a forming moisture content less than 20%.
- Fibre cement sheet linings: Treated cellulose fibre in a matrix of cement and sand autoclaved sheet, sealed on one side.
- High pressure decorative laminates (HPDL):
 - . Panels consisting of core layers impregnated with phenolic and/or aminoplastic resins and a surface layer(s) impregnated with aminoplastic resins (mainly melamine resins).
 - . Sheets consisting of a decorative face and layers of fibrous sheet material (e.g. paper) impregnated with thermosetting resins and bonded together under heat and pressure of at least 5 MPa.
- Particleboard: Panel material manufactured under pressure and heat from particles of wood (wood flakes, strands, chips, shavings, sawdust and similar) and/or lignocellulosic material in particle form (flax shives, hemp hurds, bagasse fragments, rice hulls, wheat straw and similar) with the addition of an adhesive.
- Wet process fibreboard: Panel material with a nominated thickness of 1.5 mm or greater, manufactured from lignocellulosic fibres (derived from wood or other materials) with application of heat and/or pressure, the bond of which is derived from the felting of the fibres and the panels are manufactured with a forming moisture content greater than 20%.

1.4 TOLERANCES

Permitted deviations

Bearing surface of finished framing:

- Gypsum lining: To AS/NZS 2589 (2017) clause 4.2.2.

- Other lining: 4 mm from a 1.8 m straightedge.

1.5 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrate or framing before installation of linings.
- Finished surface of installation before applying:
 - . Sealer.
 - . Finish coatings or decorative papers.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Store lining stacked in pallets horizontally on a smooth, level surface. Prevent distortion or moisture ingress.

Timber or fibreboard panels: Store off the ground in a well-ventilated area.

Handling: Do not drag sheets across each other or across other materials. Protect edges, corners and surface from damage.

Certification

Timber based products: Label panels under the authority of a recognised certification scheme to *0185 Timber products, finishes and treatment*, as applicable to the product. Locate the label on faces or edges that will be concealed in the works.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1 (2015).

2.3 PLASTERBOARD

General

Standard: To AS/NZS 2588 (2018).

2.4 FIBRE CEMENT

General

Standard: To AS/NZS 2908.2 (2000).

Wall and ceiling linings: Type B category 2.

Minimum thickness: 4.5 mm.

2.5 TONGUE AND GROOVE BOARDS

Hardwood

Standard: To AS 2796.1 (1999).

Seasoned cypress pine

Standard: To AS 1810 (1995).

Softwood

Standard: To AS 4785.1 (2002).

2.6 PLYWOOD AND BLOCKBOARD

General

General interior use: To AS/NZS 2270 (2006).

Areas requiring moisture resistance: To AS/NZS 2271 (2004).

Visible surfaces with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Back/face veneer: Veneer quality C or D.

Presealed plywood: Plywood pre-sealed both sides and edges with a machine applied sealer.

2.7 PARTICLEBOARD

General

Standard: To AS 1859.1 (2017).

2.8 ADHESIVES, SEALANTS AND FASTENERS

Adhesives

For wallboards: Gunnable synthetic rubber/resin based mastic contact adhesive formulated for bonding flooring and wallboards to a variety of substrates.

Sealants

Fire-resisting sealant: Non-hardening sealant, compatible with the materials to be sealed and having a fire-resistance rating equal to that of the building element it seals.

Acoustic sealant: Non-hardening sealant compatible with the materials to be sealed.

Fasteners

Steel nails: Hot-dip galvanized.

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Conditions

Requirement: Do not start lining work until the building or installation area is enclosed and weathertight, and all wet trades have been completed.

Preparation

Requirement: Before fixing linings, check and adjust the alignment of substrates or framing, if necessary.

Substrate: Make sure substrates are plumb, level, in true alignment and to the lining manufacturer's recommendations.

Timber, steel framing and battened masonry: To AS/NZS 2589 (2017) clause 4.2.

Pre-conditioning

General: Acclimatise timber panels in the in-service conditions for 2 to 3 weeks before installing.

Battens

General: Fix at each crossing with structural framing members, to solid walls or ceiling support.

Provide wall plugs in solid substrates.

Ceiling linings

General: Do not install until the timber roof structure has been fully loaded for at least 14 days.

Accessories and trim

General: Provide accessories and trim as necessary to complete the installation.

Adhesives

General: Provide adhesive types appropriate for the purpose, and apply them so they transmit the loads imposed without causing discolouration of the finished surfaces.

Fire-resisting and acoustic rated installations

Sealing: Apply sealant to the manufacturer's recommendations and as follows:

- Around services pipes and penetrations.
- Electrical outlets and recessed lights: Line back and sides of fixture with plasterboard and seal around fixture junction with sealant.

- Around perimeter of lining panels: Provide continuous runs of sealant.

3.2 PLASTERBOARD

Installation

Gypsum plasterboard and fibre reinforced gypsum lining: To AS/NZS 2589 (2017).

Level of finish and jointing: To AS/NZS 2589 (2017) clause 3.1.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceed the recommended spacing.
- Where direct fixing of plasterboard is not possible, due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Multiple sheet layers

Application: Fire-resisting and acoustic rated walls.

Joints: Fill and flush up all joints and fasteners in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or provide back blocking.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide purpose-made metallic-coated control joint beads at not more than 12 m centres in walls and ceilings and to coincide with structural control joints.

Wet areas: Install additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Do not apply a topping coat after bedding perforated paper tape in bedding compound.

3.3 FIBRE CEMENT

Installation

Joints and layout: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Supports

General: Install timber battens or proprietary cold-formed galvanized steel furring channels as follows:

- Where framing member spacing exceed the recommended spacing.
- Where direct fixing of fibre cement is not possible, due to the arrangement or alignment of the framing or substrate.
- Where the lining is the substrate for tiled finishes.
- If required for penetrations for services, including mechanical grilles and lighting fixtures.
- If required to support fixtures.

Fixing

Timber framed construction: Nail only or combine with adhesive.

Steel framed construction: Screw only or combine with adhesive.

Wall framing: Conform to the following:

- Do not fix to top and bottom plates or noggings.
- In tiled areas: Provide an extra row of noggings immediately above wall-to-floor flashings. Fix sheet at 150 mm centres to each stud and around the perimeter of the sheet.

Masonry wall construction: Conform to the following:

- Direct fixing: Adhesive fix to the masonry except where lining forms a substrate for tiled finish.
- Furring channels: Fix using screw and/or adhesive.

Ceilings: Fix using screw and/or adhesive to ceiling furring members. Do not fix sheets directly to the bottom chords of trusses.

- Ceiling battens: Fix at 600 mm maximum centres.

Wet areas: Do not use adhesive fixing alone.

Multiple sheet layers

Application: Fire-resisting and acoustic rated walls.

Joints: Fill and flush up all joints and fasteners in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm.

Joints

Joint width:

- Butt joints: 1 to 2 mm.
- Expressed joints: 10 mm maximum.

Joint backing for expressed joints: Black self-adhesive polyurethane tape.

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over metallic-coated steel corner beads.

Dry joints: Provide square edged sheet and finish with a PVC-U joining section.

Control joints: Provide control joints to coincide with structural control joints and as follows:

- Walls: ≤ 7.2 m centres.
- Ceilings: To divide into bays not larger than 10.8×7.2 m.
- Soffit linings: To divide into bays not larger than 4.2×4.2 m or 5.6×3.6 m.
- Control joint beads: Purpose-made metallic-coated.
- Support: Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.

Wet areas: Provide additional supports, flashings, trim and sealants as required.

Joints in tiled areas: Bed perforated paper tape in bedding compound. Do not apply a topping coat.

- Control joints: Not more than 4.2 m centres and space to suit joints required in tiling.
- Internal corners: Reinforce with metallic-coated steel angles. In corners subject to continuous moisture, flash over the angle and under the sheeting with continuous bitumen coated aluminium flashing.

3.4 TONGUE AND GROOVE BOARDS

Installation

General: Conform to the following:

- Horizontal installation: Provide single lengths of boards if possible.
- Vertical installation: Provide single lengths only.

Stained or clear finished boards: Select board to give a random pattern. At corners, return the same board to give a continuous grain pattern.

Fixing: Nail twice to each crossing, except for secret nailed profiles.

Secret nail fixing: Fix nail diagonally through the tongue only. Punch nails to maintain correct alignment of the next board.

Nailheads: Treat visible nailheads as follows:

- In stained or clear finishes: Drive flush.
- In opaque finishes: Punch below surface and fill flush with putty after the surface has been primed.

Corners and junctions: Allow for movement at all corners and junctions.

Joints

Requirement: Select board lengths to give minimum number of joints.

End grain joints: Install boards so that butt joints are in compression.

Internal corners: Scribe.

External corners: Mitre.

3.5 TIMBER PANEL LINING

General

Installation: Set out in even panels with joints coinciding with framing members. Fit and fix panels and trim plumb, level and in true alignment of face and grain.

Fixing:

- Plywood and hardboard: Wallboard adhesive or pin fixed to timber frame, screw fixed to steel frame. Punch pin heads just below surface.
- Laminated plastic: Wallboard adhesive.

Plywood

Expansion joints: Provide a 2 to 3 mm gap at edges of linings and as follows:

- 2 to 3 mm gap at each panel joint, or
- 6 to 9 mm every 3.6 m, or
- 8 to 12 mm every 4.8 m.

Areas with an expected high level of internal moisture: Provide a gap of 4 to 6 mm every 1.2 m.

3.6 TRIM AND ACCESSORIES

General

Requirement: Provide trim such as beads, mouldings and stops to make neat junctions between lining components, finishes and adjacent surfaces.

Proprietary items: Provide complete with installation accessories.

Timber and MDF trim: Fix using full length so that trim is secure and without movement. Where nail or screw fixings are used, make sure fastener finishes sufficiently below face of trim so that stopping piece finishes flush with the face.

3.7 COMPLETION

General

Damaged or marked lining and components: Replace.

Exposed surfaces: Touch up shop applied finishes and restore damaged or marked areas.

Timber panels: If appearance is not uniform, replace panels.

Cleaning: Clean completed surfaces to remove irregularities and leave panels smooth and clean, to the manufacturer's recommendations. If required, sand with fine paper to remove irregularities and refinish panel surface.

- Debris and unused material: Remove from site.

Warranties

Requirement: Warrant against defective materials and installation.

4 SELECTIONS

4.1 SHEET LINING

Sheet lining schedule

	L1	L2	L3
Location	Refer drawings and the and Energy Assessment Report. Confirm consistency between documents.		
Material			
Thickness (mm)			
Configuration			
Edge type			
Joint type			

	L1	L2	L3
Fixing			
Level of finish			
Fire hazard properties: Group number			
Battens: Size (mm)			
Battens: Spacing			
Lining trim: Re-entrant corners			
Lining trim: Salient angles			
Lining trim: Edge trim			
Airborne sound insulation			
Impact sound insulation			

Tongue and groove boards schedule

	L1	L2	L3
Location	N/A		
Timber species			
Grade			
Profile			
Thickness (mm)			
Width (mm) coverage			
Orientation of boards			
Fire hazard properties: Group number			
Airborne sound insulation			
Impact sound insulation			

0525B CUBICLE SYSTEMS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide cubicles, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION

1.4 TOLERANCES

General

Deviation (from true grid lines and planes): 1:1000 to a maximum of 3 mm.

Misalignment (of adjoining surfaces at panel junctions): 1 mm.

Panel thickness: ± 0.5 mm.

Length and width: 0.1% of the dimension or 0.5 mm, whichever is the greater.

Flatness, twist, winding and bow: 1 mm deviation from a 2.4 m straightedge placed in any position.

Maximum deviation of edges from the intended true line: ± 1 mm.

1.5 SUBMISSIONS

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials and Prototypes

Samples

General: Submit samples of the following:

- Each selected panel and door finish, at least 300 x 300 mm, with associated selected edge strips and trim.
- All hardware and metal components in the selected finish.

Shop drawings and Subcontractors

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Set-out before installation.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Store in a clean, dry area, unaffected by weather and to the manufacturer's recommendations. Protect from building materials and loose debris such as wet plaster, mortar, paint, and welding spatter.

2.2 PRODUCT SYSTEMS

Acrylic polymer resin panels and Engineered stone panels

Sheet faced reconstituted wood-based panels and doors

Particleboard: Moisture resistant particleboard to AS 1859.1 (2017).

Dry process fibreboard (including medium density fibreboard): Moisture resistant or high performance medium density fibreboard to AS/NZS 1859.2 (2017).

Finishes: Conform to the following:

- Decorative overlay: To AS/NZS 1859.3 (2017).
- Edge strip: 2 mm ABS colour matched to decorative overlay.
- High pressure decorative laminates: Sheets made from thermosetting resins to AS/NZS 2924.1 (1998).
- Stainless steel: Type 316.
 - . Edge: Adhesive fixed stainless steel folded channel.

High pressure decorative laminate (HPDL) panels and doors

Material: Compact high pressure decorative laminate panels with an integral surface finish and edges sealed by the manufacturer.

Standard: To AS/NZS 2924.1 (1998).

- Classification: Compact general purpose standard (CGS).

Panel edge: Factory prefinished square cut, ground smooth and arrised. Cleaned and oiled by the manufacturer.

Compressed fibre cement panels

Material: Factory prefinished compressed cellulose cement sheets with square stone cut edges ground smooth and arrised.

Standard: To AS/NZS 2908.2 (2000).

Panel finish: Factory applied two-pack polyurethane.

2.3 COMPONENTS

Suspension beam

General: For suspended systems, provide a suspension beam consisting of a galvanized mild steel channel, located immediately above the ceiling framing along the line of the partition fronts.

Hardware

Fixing hardware: Bolts, dowels, brackets, standards, cappings and stabilising bars supplied to complete the cubicle assembly.

Door furniture: As documented.

3 EXECUTION

3.1 GENERAL

Pre-conditioning

General: Acclimatise wood-based system components in the in-service conditions for a minimum period of two weeks before assembly.

Control of movement

Assembly: Accommodate thermal expansion of panels.

3.2 PANELS

Manufactured cubicle system installation

Assembly: Attach divisions and nibs to walls and fronts with purpose-made proprietary fixings. Cut nibs and divisions that abut walls, as required, so that assembly is plumb. Seal edges as recommended by the manufacturer.

Floor mounted/overhead braced type: Fix fronts to the floor with proprietary fittings and at the top to a metal channel head rail, supplied as part of the system. Run head rail across the fronts and fix to the walls at each end. Form the channel into a box section over doorways by snapping in a mating channel insert.

Heads of openings: Fix stabilising head channels by screwing to the top of the partitions. Provide an infill strip to the channel across the opening.

Ceiling-hung type: Hang the fronts from a suspension beam with attachments incorporating a means of height adjustment, supplied as part of the system.

Freestanding type: Fix fronts to the floor with proprietary fittings.

Engineered stone panels: Avoid on-site cutting and mechanical processing of panels where possible.

3.3 COMPONENTS

Shower seats

Fixing: Fix to structural elements using one of the following methods:

- Anodised aluminium channel to exposed edge, secured to walls at each end.
- Product assembly detail.
- Proprietary wall bracket.

Suspension beam

Installation: Install suspension beam as follows:

- Build the ends into masonry structure or provide end fixings to the structure, as necessary, to transfer the load.
- Drill the bottom flange of the channel for the partition fixing bolts.

3.4 COMPLETION

Operation and maintenance manuals

Requirement: Prepare a manual that includes the following:

- Full product information for each system, including product designations, components list, colours and finishes, and accessories.
- Information on all doors and hardware supplied as part of the system including door type, size, finishes, and hardware details.
- Maintenance recommendations.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 SCHEDULES

Cubicle schedule

	CP1	CP2	CP3
Manufacturer	Polytec		
Product name	Polytec Overhead Braced Floor Mounted Partitioning System.		
Cubicle function	Toilets		
Type	Compact Laminate		
Front base fixing	Polytec floor mounting.		
Panel material and thickness: Division (mm)	To manufacturer's recommendations.		
Panel material and thickness: Front and nib (mm)	To manufacturer's recommendations.		
Panel finish: Type	Compact Laminate		
Panel finish: Colour	Cinder		

	CP1	CP2	CP3
Door material	Compact Laminate		
Door thickness (mm)	13mm		
Door finish: Type	Compact Laminate		
Door finish: Colour	Cinder		
Components finish	Black		
Hardware: Indicator bolts	Refer drawings		
Hardware: Hinges	To manufacturer's recommendations.		
Hardware: Coat hook/door stop	Proprietary - black		
Hardware: Additional hardware not standard to the cubicle product	-		
Hardware: Finish	Black		
Shower seat: Product	N/A		
Shower seat: Material	N/A		
Shower seat: Type	N/A		
Shower seat: Fixing	N/A		
Shower seat: Finish	N/A		

0527 ROOM DIVIDERS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide room dividers, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the definitions given in AS 2688 (2017) and the following apply:

- Flush door panels: Door panels with two plane faces that entirely cover and conceal its structure.
- Flush door panels with blockboard core: Door panels consisting of a core plate of timber strips laid edge to edge, and to which are bonded no less than two sheets of veneer on each face.
- Room dividers: Proprietary systems comprising overhead tracks and carriers supporting doors or panels that are linked, or can be linked, to provide complete partition-type enclosures within defined limits, and which may be opened by sliding and stacking to the sides of openings, inclusive of manufacturer's standard operating gear, hardware, and accessories necessary for satisfactory performance.
 - . Accordion doors: Double-walled dividers in which the walls comprise twin rows of paired folding door panels, or equivalent paired folding walls of flexible materials attached to pantograph frames, the pairs linked together at the centre and suspended from the points of linkage.
 - . Folding doors: Centre-hung door panels hinged together, stacking by sliding and pivoting.
 - . Operable walls: Partition panels independently suspended and stackable, with provision for linking together at the vertical edges and for preventing lateral movement at the bottom when closed.

1.4 TOLERANCES**General**

Deviation (from true grid lines and planes): 1:1000 to a maximum of 3 mm.

Misalignment (of adjoining surfaces at panel junctions): 1 mm.

Panel thickness: ± 0.5 mm.

Length and width: 0.1% of the dimension or 0.5 mm, whichever is the greater.

Flatness, twist, winding and bow: 1 mm deviation from a 2.4 m straightedge placed in any position.

Maximum deviation of edges from the intended true line: ± 1 mm.

Substrates

Jamb plumb tolerance: 10 mm.

Floor: Maximum 3 mm deviation from a 3 m straightedge. Maximum 6 mm over opening width.

1.5 SUBMISSIONS**Fire performance**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Error! Reference source not found.**

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit manufacturer's standard product literature for each system type.

Type tests: Submit results as follows:

- Weighted sound reduction index: To AS/NZS ISO 717.1 (2004).

Samples

General: Submit 2 samples of each of the following where applicable:

- Proposed frame sections.
- Proposed jointing methods.
- Finishes to prepared surfaces with associated selected edge strips and trim.
- Colour range samples of facings and prefinished production material.
- Manufacturer's standard door furniture items.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail, showing the following:

- General arrangement and stacking.
- Pass door(s).
- Details of each assembly, component and connection.
- Information relevant to fabrication, surface treatment and installation.
- Details of structural support of the head track.
- Details of how the integrity of the acoustic plenum baffle will be maintained at track supports.
- Thickness and fabrication details of toughened glass panels.
- Hardware.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Substrate acceptance: Submit evidence of the installer's acceptance of the wall, floor and ceiling substrate before starting installation.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Overhead tracks installed before dividers/door panels are hung and ceiling installed.
- Completion of assembly.

2 PRODUCTS

2.1 GENERAL

Proprietary systems

Requirement: Complete proprietary systems, as documented, fabricated by one manufacturer.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1 (2015).

3 EXECUTION

3.1 INSTALLATION

General

Requirement: Fabricate and install wall divider components to substrates undamaged, plumb, level, straight, free of distortion and to the documented tolerances.

Support: Make sure the brackets and fixings supporting the head track from the base building slab soffit are structurally adequate.

Pre-conditioning

General: Acclimatise wood-based system components in the in-service conditions for a minimum period of two weeks before assembly.

3.2 COMPLETION**General**

Adjusting: Fine tune and adjust the room divider to make sure it is operating smoothly and correctly and that all the seals are operating and sealing properly. Leave the work clean, free of defects and in good condition.

Cleaning

Temporary coating: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary coatings used as a means of protection.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for use, care and maintenance requirements.

Warranties

Requirement: Submit the manufacturer's published product warranties.

4 SELECTIONS**4.1 FOLDING DOORS****Folding doors schedule**

	FD1	FD2	FD3
Product	N/A		
Door arrangement			
Door panels: Size (mm)			
Door panels: Hanging weight (kN/m ²)			
Door panels: Material			
Door panels: Facing			
Door panels: Finish			
Hinges: Material			
Hinges: Colour			
Hinges: Finish			
Track: Material			
Track: Finish			
Track: Size (mm)			
Carrier: Wheels			
Carrier: Distribution			
Airborne sound insulation			
Acoustic seals: Vertical seals			
Acoustic seals: Horizontal seals			
Accessories and trim			
Hardware: Item			
Hardware: Material			
Hardware: Finish			
Fire hazard properties: Group number			

4.2 ACCORDION DOORS

Accordion doors schedule

	AD1	AD2	AD3
Product	N/A		
Door arrangement			
Timber doors: Hanging weight (kN/m ²)			
Timber doors: Material			
Timber doors: Facing			
Timber doors: Finish			
Vinyl doors: Pantograph			
Vinyl doors: Covers			
Vinyl doors: Facing			
Connector hinges: Material			
Connector hinges: Colour			
Track: Material			
Track: Finish			
Track: Size (mm)			
Carrier: Wheels			
Carrier: Distribution			
Airborne sound insulation			
Acoustic seals: Vertical seals			
Acoustic seals: Horizontal seals			
Accessories and trim			
Hardware: Item			
Hardware: Material			
Hardware: Finish			
Fire hazard properties: Group number			

4.3 OPERABLE WALLS

Operable walls schedule

	OW1	OW2	OW3
Product	Lotus Operable Wall		
Door arrangement	Refer Door Schedule 02 CD15		
Stacking arrangement	Refer Door Schedule 02 CD15		
Panel suspension	Refer manufacturer		
Panel type: Size (mm)	Refer Door Schedule 02 CD15		
Panel type: Construction	Lotus SeriesS/49/RD2		
Panel type: Sheeting	Refer manufacturer		

	OW1	OW2	OW3
Panel type: Facing	Fabric TBC		
Panel type: Finish	Fabric TBC		
Edge locking of panels	Refer manufacturer		
Lateral movement prevention	Refer manufacturer		
Track: Material	Lotus 100-4 standard mitred track		
Track: Finish	Powdercoated		
Track: Size (mm)	Refer manufacturer		
Carrier: Wheels	Refer manufacturer		
Carrier: Distribution	Refer manufacturer		
Power operation	Yes		
Airborne sound insulation	Refer manufacturer		
Acoustic seals: Vertical seals	Refer manufacturer		
Acoustic seals: Horizontal seals	Refer manufacturer		
Accessories and trim	Refer manufacturer		
Hardware: Item	Refer manufacturer		
Hardware: Material	Refer manufacturer		
Hardware: Finish	Refer manufacturer		
Fire hazard properties: Group number	Refer manufacturer		

0531P RONDO IN SUSPENDED CEILINGS – COMBINED

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide suspended ceilings using RONDO ceiling support system, as documented.

1.2 COMPANY CONTACTS**RONDO technical contacts**

Website: www.rondo.com.au/contact-us/

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.
- 0453p RONDO in doors and access panels.

1.4 STANDARDS**General**

Suspended ceilings: To AS/NZS 2785 (2020).

1.5 MANUFACTURER'S DOCUMENTS**Technical manuals**

Resources: www.rondo.com.au/resources

Product: www.rondo.com.au/products/ceilings/

Product manual: www.rondo.com.au/resources/installation/product-manuals/

1.6 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the definitions given in AS/NZS 2785 (2020) and the following apply:

- Ceiling unit: Tile, panel, plank, strip or open grid supported within or to a suspended ceiling system.

1.7 TOLERANCES**Suspension system**

Flatness, twist, winding and bow: 1.5 mm deviation from a 1.5 m straightedge placed in any position.

Deflection: To AS/NZS 2785 (2020) Table 2.4.5.

Setting out and levelling: To AS/NZS 2785 (2020) Appendix D.

Sheeted or flush ceiling suspension system

Suspension system bearing surface for flush lined ceiling: To AS/NZS 2589 (2017) Table 4.2.2.

Deflection: To AS/NZS 2589 (2017) Table 3.5.1.2.

1.8 SUBMISSIONS**Fire performance**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Fire-resistance level: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire-resistance of building elements**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Type tests: Submit results as follows:

- Weighted suspended ceiling normalised level difference: To AS/NZS ISO 717.1 (2004).
- Weighted sound absorption coefficient: To AS ISO 11654 (2002), as tested to AS ISO 354 (2006).
- Weighted sound reduction index: To AS/NZS ISO 717.1 (2004).

Prototypes

General: Provide a prototype of the ceiling system, including at least one example of each of the specified components, including services terminals.

Size: At least 10 m².

Samples

General: Submit samples as follows:

- Suspension system: Sections proposed for the suspension system, including suspension rods, clips and wall angles.
- Accessories including access panels and wall trim.
- Ceiling material: Lining or ceiling units, with insulation, showing the extremes and mean of variation in colour, pattern, or texture of the proposed finish.

Shop drawings

Set-out drawings: Submit proposed set-out, indicating the grid module, type and ceiling unit layout, before installation. Coordinate with plenum services layouts, building structure and other factors affecting the layout.

Subcontractors

Requirement: Use specialist installers recommended by the ceiling system manufacturer.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.9 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- The suspension system before the installation of ceiling units or lining.
- The ceiling assembly before the installation of fittings and site painting, if applicable.
- The completed ceiling.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in *0171 General requirements*.

Storage and handling

Requirement: Store suspended ceiling components in a dry and secure area, and to the manufacturer's recommendations.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1 (2015).

Fire-resistance of building elements

Fire-resistance level: Tested to AS 1530.4 (2014).

2.3 SUSPENSION SYSTEM

RONDO ceiling systems

General: As documented.

Ceiling systems:

- RONDO KEY-LOCK® Concealed ceiling system.
- RONDO DUO® Exposed grid ceiling system.
- RONDO Xpress® Drywall grid ceiling system.
- RONDO DONN® Exposed grid ceiling system.
- Accessories: To RONDO's recommendations.

Materials

Protective coatings for steel components: To AS/NZS 2785 (2020) Appendix F.

Protection against atmospheric corrosion: To AS 2312.1 (2014) and AS/NZS 2312.2 (2014).

2.4 CEILING UNITS

General

Ceiling units: As documented.

2.5 LININGS

Ceiling linings

General: As documented.

Plasterboard

Standard: To AS/NZS 2588 (2018).

Minimum thickness: 10 mm.

Fibre cement

Standard: To AS/NZS 2908.2 (2000).

Internal ceiling linings: Type B Category 2.

External ceiling linings: Type A Category 3.

Minimum thickness: 4.5 mm.

Sealants

Fire-resisting sealant: Non-hardening sealant compatible with the materials to be sealed and having a fire-resistance rating equal to that of the building element it seals.

Acoustic sealant: Non-hardening sealant compatible with the ceiling materials and rated to match the ceiling system's acoustic performance.

2.6 TRIM

General

Trim: Provide trim consistent with the materials and finishes of the ceiling system.

Accessories

General: Provide accessories as part of the proprietary ceiling system necessary to complete the installation.

3 EXECUTION

3.1 GENERAL

Working environment

General: Do not start work before the building is enclosed, wet work is complete and dry, and all work above the ceiling, including services, is complete.

Protection

General: Protect existing work from damage during the installation.

Partitions

General: If partitions are attached to the underside of the ceiling systems, include the partition mass in the seismic mass of the ceiling.

Bracing: Brace partitions attached to the ceiling at concentrated load points such as window and door openings and shelving.

Stability

General: Install the ceilings level, to the nominated plane and fix to prevent looseness or rattling of ceiling components under normal conditions.

Structure-borne sound

General: Provide a ceiling system that does not amplify structure-borne sound. Provide suitable proprietary products or systems for reducing contact vibrations between structure and ceiling.

Control of movement

Abutments: Install the ceiling to allow for differential movement at abutting surfaces.

Alignment: Align ceiling control joints with structural control joints. Do not bridge structural control joints.

Prefinishes

General: Repair damaged prefinishes by recoating.

Curtain recesses

General: Provide curtain recesses, including the following:

- Lining.
- Curtain track support.
- Accommodation for motors and cabling.

3.2 SUSPENSION SYSTEM

Installation of RONDO ceiling support systems

Requirement: To the RONDO Professional Design Manual.

Ceiling grid

Set-out: Align ceiling unit joints and centrelines of visible suspension members with documented set-out points. If not documented, set out with equal margins. Maintain a consistent and uniform grid set-out conforming to RONDO's span tables, or as documented.

Clearances: Allow for adequate clearance between ceiling grid and building facade elements.

Suspension system

Support members: Install support members as follows:

- Space as required by the loads on the system and the type of ceiling.
- Allow for the installation of services and accessories, including ductwork, light fittings and diffusers.
- Provide additional back support or suspension members for the fixing of access panels or air registers to prevent distortion, overloading or excessive vertical deflection.
- Allow for access for maintenance of services.

Alignment: Align suspension system with ceiling grid members.

- Vertical misalignment: < 5° (9H in 100V) in either direction.

Clearances: Provide minimum clearance between suspension system and services in the plenum space, to RONDO's recommendations.

Height adjustment: Provide height adjustment with a length adjustment device at each suspension point, permitting length variation of at least 50 mm.

Grid members: If required, notch grid members at the junction with the perimeter trim to make sure the ceiling units lay flat on the perimeter trim.

- Minimum bearing length: 7 mm.

Restriction: Do not attach the suspension system to the lip or flange of purlins.

Services

Support: Conform to the following:

- Do not fix suspension members to services.
- If services obstruct the ceiling supports, provide bridging and suspension on each side of the services.
- Do not support services terminals on ceiling units.

- Clearances: Maintain clearance between services and the suspension system to RONDO's recommendations.

RONDO DUO ceiling grids: If the weight of the service exceeds 7.5 kg, provide independent suspension to the service.

Bracing

General: If the ceiling grid is unable to transfer sufficient load at the perimeter junction, provide plenum bracing to RONDO's recommendations to prevent lateral movement of the ceiling grid and to resist the imposed horizontal seismic force.

Bulkheads

General: Integrate bulkheads with the ceiling structure and brace to prevent lateral movement. If the ceiling is terminated at a bulkhead, provide for the resulting seismic force within the bulkhead bracing.

External suspended soffits

RONDO KEY-LOCK® ceiling grid system: Provide rigid down-strutting members as documented, at each suspension point to prevent ceiling uplift.

Fasteners

General: Provide concealed fasteners to the manufacturer's recommendations. If material supporting hangers is less than 1.2 mm thick, do not use single screw fasteners in tension.

3.3 CEILING UNITS

Installation

Fitting: Fit ceiling units accurately and neatly, without distortion.

Tile hold down clips: If ceiling units are required to be restrained for security or to prevent dislodgement of the ceiling tile under seismic actions, insert tile hold down clips at the junction of carrier rails and units.

Pattern and texture: Set out patterned or heavily textured materials with a consistent direction of pattern or texture, or as documented.

Service penetrations

General: Provide openings for all services elements, including light fittings, ventilation outlets, detectors, sprinklers and loudspeakers. If services pass through ceiling grid members, provide additional grid members and support.

Cut ceiling unit edges

General: Conceal, or finish to match prefinished edges, including at openings for services elements.

3.4 PLASTERBOARD

Installation

Gypsum plasterboard and fibre-reinforced gypsum plaster: To AS/NZS 2589 (2017).

Level of finish and jointing: To AS/NZS 2589 (2017) clause 3.1.

Suspended flush ceilings: Fix using screws or screws and adhesive to ceiling members or support frame.

Multiple sheet layers

Application: Fire-resisting and acoustic rated ceilings.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm in both directions.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

Butt joints: Make joints over framing members or otherwise provide back blocking.

External corner joints: Make joints over RONDO P01 corner beads.

Control joints and movement joints: Align lining control joints with structural movement joints and as follows:

- Ceilings:
 - . Internal: At maximum 12 m centres.
 - . External: At maximum 6 m centres.
- Control joint beads: RONDO P35 expansion joint.
- Seismic joint: RONDO sliding joint.

- Location: Position joints to intersect light fixtures, vents or air diffusers, as required.

Wet areas: Install additional supports, trim and sealants, as required.

3.5 FIBRE CEMENT

Installation

General: Run sheets across the framing members. In flush jointed applications, stagger end joints in a brick pattern and locate them on framing members, away from the corners of large openings. Provide supports at edges and joints.

Suspended flush ceilings: Fix using screws or screws and adhesive to ceiling members or support frame.

External areas: Close up ceiling grid spacing to the manufacturer's recommendations for fibre cement, as appropriate.

Multiple sheet layers

Application: Fire-resisting and acoustic rated ceilings.

Joints: Fill and flush up all joints and fixings in each layer and caulk up perimeters and penetrations before installing following layers. Stagger all sheet joints by minimum 200 mm in both directions.

Joints

Flush joints: Provide recessed edge sheets and finish flush using perforated paper reinforcing tape.

External corner joints: Make joints over RONDO P01 corner beads.

Dry joints: Provide square edged sheet and join with a RONDO Extreme PDM joining section.

Control and movement joints: Align lining control joints with structural control joints and for flush jointing as follows:

- Control joint beads: RONDO P35 expansion joint.
- Seismic joint: RONDO sliding joint.
- Support: Provide framing parallel to the joint on each side. Do not fix the lining to abutting building surfaces.
- Location: Position joints to intersect light fixtures, vents or air diffusers, as required.

Wet areas: Install additional supports, trim and sealants, as required.

3.6 ACCESS PANELS

General

Requirement: Provide RONDO access panels to *0453p RONDO in doors and access panels*.

Finish

General: Match the access panels to the ceiling in appearance and performance.

Identification

General: Provide each access panel with an identification mark.

Non-demountable ceilings

General: Provide access panels supported and anchored to permit ready removal and refixing.

Reinforcement

Frames: Frame the ceiling opening on all sides to allow fixing of the access panel. Provide independent suspension to the framing, as required.

3.7 TRIM

General

Trim: Install trim at junctions with other building elements and surfaces, including walls, beams and penetrations, consistent with the materials and finishes of the ceiling system.

Accessories

General: Install accessories as part of the proprietary ceiling system necessary to complete the installation.

Plasterboard cornices

Fixing: Mitre at corners and adhesive fix with cornice cement. Pin in place at cornice edges until adhesive sets, remove pins and fill holes.

Vertical movement: If minor vertical movement of the ceiling is anticipated, use flexible mastic to joints to vertical surfaces.

Plaster cornices and roses

Fixing: Pin or prop in place and fix with wet gypsum plaster and scrim straps over framing members.

Fire-resisting walls

Requirement: Seal to soffit with sealant with an equivalent fire-resistance level before fixing decorative cornices, if any.

3.8 COMPLETION**General**

Exposed surfaces: Touch up shop applied finishes and restore damaged or marked areas.

Cleaning: Clean completed surfaces

Debris and unused material: Remove from site.

Spares

General: Provide spare matching ceiling components, as follows, and store the spare materials on site where directed:

- Supporting system: One spare supporting member (hanger or framework member) for every 100 members or part thereof of the same type installed in the ceiling.
- Ceiling units: One spare unit for every 50 units or part thereof installed in the ceiling.
- Accessories: One spare of each type for every 50 units or part thereof installed in the ceiling.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's recommendations for the care and maintenance of the ceiling, and operating instructions for demounting, if applicable.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and conditions of use.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS**4.1 GENERAL****Suspended ceiling performance schedule**

	A	B	C
Additional structural design actions	TBC		
Fire hazard properties: Group number			
Fire-resistance level (FRL)			
Weighted suspended ceiling normalised level difference ($D_{n,c,w}$)			
Weighted sound absorption coefficient (α_w)			
Weighted sound reduction index (R_w)			
Impact sound insulation			

4.2 SUSPENSION SYSTEM**RONDO ceiling support system schedule**

	A	B	C
Product	Rondo Key-Lock		
Application	Refer drawings		
Grid	To manufacturer's instructions and specifications.		

	A	B	C
Grid finish/colour	TBC		
Fixing type	To manufacturer's instructions and specifications.		
Wall trim	TBC		

4.3 CEILING UNITS

Ceiling units schedule

	A	B	C
Product	N/A		
Type			
Material			
Size (mm)			
Thickness (mm)			
Pattern			
Colour			
Edge type			
Finish			

4.4 LININGS

Sheet lining schedule

	A	B	C
Location	Refer drawings		
Material	Plasterboard		
Thickness (mm)	13mm		
Configuration	Refer drawings		
Plasterboard: Grade	Highest grade		
Plasterboard: Level of finish to AS/NZS 2589 (2017)	Level 5		
Plasterboard cornice	Square set		
Plaster cornice	Square set		
Plaster rose	N/A		
Control joint	To Australian Standards		
Access panels	600x600 flush, to approval.		

0551B JOINERY

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide joinery, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 TOLERANCES**General**

Requirement: Fabricate and install joinery items to substrates undamaged, plumb, level, straight and free of distortion.

Tolerances table

Property	Tolerance
Plumb and level	1:800
Offsets in flush adjoining surfaces	0.5 mm
Offsets in revealed adjoining surfaces	2 mm
Alignment of adjoining doors	0.5 mm
Difference in scribe thickness for joinery items centred between walls	2 mm
Doors centred in openings	0
Joints in finished surfaces	0

1.4 SUBMISSIONS**Operation and maintenance manuals**

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Manufacturer's data: Submit manufacturer's product data.

Proprietary items: Submit the manufacturer's standard drawings and details showing:

- Methods of construction.
- Assembly and fixing, with dimensions and tolerances.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail, showing the following:

- Overall dimensions.
- Materials, thicknesses and finishes of elements including doors, divisions, shelves and benches.
- Type of construction including mitre joints and junctions of members.
- Hardware type and location.
- Temporary bracing, if required.
- Procedures for shop and site assembly and fixing.
- Locations of benchtop joints.
- Stone benchtop layout including joint arrangement and penetrations.
- Locations of sanitary fixtures, stoves, ovens, sinks, and other items to be installed in the units.
- Relationship of fixture to adjacent building elements.
- Details of fabrication involving other trades or components.

- Proposals for the break-up of large items as required for delivery to the site.
- Proposed method of joining the modules of large items.

Timing: Before fabrication.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Shop fabricated or assembled items ready for delivery to the site.
- Openings prepared to receive assemblies.
- Site erected assemblies on completion of erection, before covering up by cladding and encasing.
- Surfaces prepared for, and immediately before, site applied finishes.
- Completion of installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Deliver joinery units to site in unbroken wrapping or containers and store so that its moisture content is not adversely affected. Do not store in areas of wet plaster. Store in an adequately ventilated space away from heat and direct sunlight. Keep storage time to a minimum by delivering items only when required for installation.

2.2 JOINERY MATERIALS AND COMPONENTS

Visible work

Clear finished timber and veneer: Make sure all visible surfaces are free of branding, crayon or chalk marks and of blemishes caused by handling.

Joinery timber

Hardwood for trim: To AS 2796.1 (1999).

Hardwood for furniture: To AS 2796.3 (1999).

Seasoned cypress pine: To AS 1810 (1995).

Softwood for trim: To AS 4785.1 (2002).

Softwood for furniture: To AS 4785.3 (2002).

Finished sizes of milled timbers: Not less than the documented dimensions unless qualified by a term such as nominal, out of or ex to which industry standards for finished sizes apply.

Plywood

Interior use generally: To AS/NZS 2270 (2006).

Interior use, exposed to moisture: To AS/NZS 2271 (2004).

Visible surface with a clear finish: Veneer quality A.

Other visible surfaces: Veneer quality B.

Non-structural glued laminated timber

Wet process fibreboard (including hardboard)

Standard: To AS/NZS 1859.4 (2018).

Particleboard

Standard: To AS 1859.1 (2017).

Melamine overlaid particleboard: Particleboard overlaid on both sides with low pressure melamine.

Dry process fibreboard (including medium density fibreboard)

Standard: To AS/NZS 1859.2 (2017).

Melamine overlaid medium density fibreboard: Medium density fibreboard (STD MDF) overlaid on both sides with low pressure melamine.

Decorative overlaid wood panels

Standard: To AS/NZS 1859.3 (2017).

High-pressure decorative laminate (HPDL) sheets

Standard: To AS/NZS 2924.1 (1998).

Minimum thickness: Conform to the following:

- For horizontal surfaces fixed to a continuous substrate: 1.2 mm.
- For vertical surfaces fixed to a continuous substrate: 0.8 mm.
- For post formed laminate fixed to a continuous substrate: 0.8 mm.
- For vertical surfaces fixed intermittently, including to studs: 3.0 mm.
- For edge strips: 0.4 mm.

Stone facings

General: Provide stone or engineered stone slabs within the visual range of the approved samples. Repair mud veins or lines of separation that are integral to the selected pattern with resin fillers and back lining.

Splashbacks

Glass: Toughened safety glass to AS/NZS 2208 (1996).

Stainless steel: Type 304, No. 4 finish.

2.3 VENEERS**Timber veneer**

Requirement: Provide veneers slip matched and flitch batched and falling within the visual range of the approved samples.

Veneer quality: To AS/NZS 2270 (2006).

Minimum grade:

- Select grade, veneer quality A, for visible surfaces to have clear finish or to have no coated finish.
- General purpose grade, veneer quality B, for other visible surfaces.

Vinyl veneer

Type: Proprietary unbacked vinyl fabric factory-bonded to the designated surface.

2.4 JOINERY ASSEMBLIES**General**

Standard: To AS 4386 (2018).

Product certification**Plinths**

Thickness: 16 mm.

Fabrication: Form up with front and back members and full height cross members at not more than 900 mm centres.

Fasteners: Conceal with finish.

Installation: Scribe to floor and secure to wall to provide level platform for carcasses.

Carcasses

Thickness: 16 mm.

Adjustable shelves: Support on proprietary pins in holes bored at equal centres vertically.

- Spacing: 32 mm.

Fasteners: Conceal with finish.

Installation: Secure to walls at not more than 600 mm centres.

Drawer fronts and doors

Thickness: 16 mm.

Door size: Not exceeding 1.5 m² on face, with 2400 mm maximum height or 900 mm maximum width.

Drawer fronts: Rout for drawer bottoms.

Drawer backs and sides

Material: PVC film wrapped particleboard.

Thickness: 12 mm.

Installation: Mitre corners leaving outer skin of foil intact, finish with butt joints, glue to form carcass and screw to drawer front. Rout for drawer bottoms.

Drawer bottoms

Material: PVC film laminated hardboard.

Thickness: 3 mm.

Drawer and door hardware

Hinge types: Concealed metal hinges with the following features:

- Nickel plated.
- Adjustable for height, side and depth location of door.
- Integrated soft and self-closing action.
- Hold open function.

Piano hinges: Chrome plated steel, extending full height of doors.

Slides: Metal runners and plastic rollers with the following features:

- 30 kg loading capacity.
- Integrated soft and self-closing action.
- Closure retention.
- White thermoset powder coating or nickel plated.

Full height doors**Flaps and pull-out shelves****2.5 WORKING SURFACES****Laminated benchtops**

Exposed edges: Extend laminate over shaped nosing, finishing more than 50 mm back on underside. Splay outside corners at 45°.

Balance underside: Extend laminate to the undersides of benchtops.

Installation: Scribe to walls. Fix to carcass at least twice per 600 mm length of benchtop.

Joint sealing: Fill joint with sealant matching finish and clamp with proprietary mechanical connectors.

Stone benchtops

Balance underside: Laminate undersides of benchtops.

2.6 OTHER MATERIALS**Tactile ground surface indicators**

Tactile ground surface indicators to stairs: To AS/NZS 1428.4.1 (2009).

3 EXECUTION**3.1 JOINERY****General**

Joints: Provide materials in single lengths where possible. If joints are necessary, make them over supports.

Framing: Frame and trim where necessary for openings, including those required by other trades.

Concealed surfaces: Prime surfaces concealed by substrates.

Deficiencies: Examine joinery units for completeness and remedy deficiencies.

Substrate: Damp clean and vacuum substrate surfaces that will be permanently concealed.

Acclimatisation

General: Acclimatise the joinery items by stacking in the in-service conditions with air circulation to all surfaces after the following are complete:

- Air conditioning operational.
- Lighting operational.
- Site drainage and stormwater works are complete.
- Space fully enclosed and secure.
- Wet work complete and dry.

Accessories and trim

General: Provide accessories and trim necessary to complete the installation.

Fasteners

Visibility: Do not provide visible fasteners except in the following locations:

- Inside cupboards and drawer units.
- Inside open units, in which case provide proprietary caps to conceal fixings.

Visible fasteners: Where fasteners are unavoidable on visible joinery faces, sink the heads below the surface and fill the sinking flush with a material compatible with the surface finish. In surfaces that are to have clear or tinted finish, provide matching wood plugs showing face (not end) grain. In surfaces that are to have melamine finish, provide proprietary screws and caps finished to match.

Fixing to substrate: Fix joinery units to substrates as follows:

- Floor mounted units: 600 mm centres maximum.
- Wall mounted units: To each nogging and/or stud stiffener.

Fasteners: Screws with washers into timber or steel framing, or masonry anchors.

Adhesives

General: Provide adhesives to transmit the loads imposed and for the rigidity of the assembly, without causing discolouration of finished surfaces.

Finishing

Junctions with structure: Scribe, plinths, benchtops, splashbacks, ends of cupboards, kickboards and returns to follow the line of structure.

Joints: Scribe internal and mitre external joints.

Edge strips: Finish exposed edges of sheets with edge strips that match sheet faces.

Matching: For surfaces that are to have clear or tinted finish, arrange adjacent pieces to match the grain and colour.

Hygiene requirements: To all food handling areas and voids at the backs of units in all areas, seal all carcass and junctions wall/floor, and cable and pipe entries with silicone beads for vermin proofing. Apply water resistant sealants around all plumbing fixtures and make sure sealants are fit for purpose.

Benchtops

Installation: Fix to carcass at least twice per 600 mm length of benchtop.

Joint sealing: Fill joints with sealant matching the finish colour and clamp with proprietary mechanical connectors.

Edge sealing: Seal to walls and carcasses with a sealant that matches the finish colour.

Engineered stone: Avoid on-site cutting and mechanical processing of engineered stone, where possible.

Glass splashbacks

Adhesive: Fix with non-acidic silicone adhesive. Apply at the rate recommended by the manufacturer.

Installation: Clean the back of the glass panel and apply walnuts of adhesive together with double sided adhesive tape for temporary support, and affix directly to the substrate.

Labelling

General: Permanently mark each unit of furniture with the manufacturer's name, on an interior surface.

3.2 TIMBER STAIRS**Set-out**

General: Set out stair rod to give uniform risers and uniform treads respectively in each flight.

Fabrication

Closed strings: Trench for treads and risers.

Cut strings: Profile for treads and risers. Mitre riser ends.

Treads: Arris nosings to a pencil round. Return nosings at cut strings. Groove for riser tongue in closed rise stair. Set rise 19 mm back from nosing.

Nosing strip: To BCA (2022) D3D14 and BCA (2022) D3D15.

Top tread: Flush with finished floor, otherwise to match stair treads. Provide similar tread section as nosing to floor edges around stairwell.

Risers: Tongue to tread. Mitre to string in cut string stairs.

Installation

General: Glue joints in internal work. In closed rise stairs, wedge treads and risers to strings. Plant 2 glue blocks behind each tread to riser junction. Trim floors to carry ends of stairs and around stair well.

Stair bolts (to open rise close string stairs): Provide 8 mm diameter mild steel stair bolts, one at each end and one at centre of flight, transversely between strings. Draw strings tight against ends of treads.

Fascia: Provide fascia of depth sufficient to overlap 19 mm below ceiling, fixed to floor joists hard up under nosing.

Trim: Provide beads and mouldings as necessary, including a scotia or similar planted under the tread nosing against the risers and cut strings, a bead between wall strings and wall, and a bead behind the fascia over the ceiling finish.

Soffit lining: Fix to 38 x 38 mm nailing battens notched and nailed to the underside of treads and risers of closed riser stairs at the centre of flights and at each side.

3.3 TIMBER BALUSTRADES

General

Requirement: Provide balustrading to stair and landing, consisting of newels, handrail, balusters, and associated mouldings.

Newels

General: Halve and bolt to strings. Turn tops to detail.

Handrails

Installation: Install handrails on edge, stubbing tenon to newels.

Bullnose arrises: 13 mm radius.

Balusters

Installation: Stub tenon to handrail at top and to tread or floor at bottom.

Spacing: At 100 mm centres.

3.4 TRIM

General

Requirement: Provide trim such as architraves, beads, mouldings, stops and skirtings to make neat junctions to openings and between lining components, finishes and adjacent surfaces.

Fixing

To masonry walls: Screw with wall plugs at 600 mm centres maximum.

To stud walls: Nail to plate or framing at 600 mm centres maximum.

3.5 COMPLETION

Protection

Timber treads: Provide full timber or plywood casing.

Cleaning

Requirement: Remove all dust, marks and rubbish from all surfaces and internal spaces. Clean and polish all self-finished surfaces such as anodised and powder coated metals, sanitary ware, glass, tiles and laminates.

Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of temporary protective coatings.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for service use.

4 SELECTIONS

4.1 TIMBER STAIRS

Timber stair component schedule

Member	Timber species or group	Finished sizes (mm)	Finish
Carriages	N/A		

Member	Timber species or group	Finished sizes (mm)	Finish
Closed string			
Cut string			
Beads			
Treads			
Risers			
Nosing			
Soffit lining			

Tactile ground surface indicators schedule

	A	B	C
Product	TBC		
Type			
Edge protector			
Material			
Colour			

4.2 TRIM

Trim schedule

	T1	T2	T3
Door architraves: Timber species or group	Refer Door Schedules CD14 & CD15		
Door architraves: Grade			
Door architraves: Size (h x t) (mm)			
Door architraves: Finish			
Window architraves: Timber species or group			
Window architraves: Grade			
Window architraves: Size (h x t) (mm)			
Window architraves: Finish			
Skirtings: Timber species or group			
Skirtings: Grade			
Skirtings: Size (h x t) (mm)			
Skirtings: Profile			
Skirtings: Finish			
Cornices: Timber species or group			
Cornices: Grade			
Cornices: Size (h x t) (mm)			
Cornices: Profile			
Cornices: Finish			
Picture rails: Timber species or group			
Picture rails: Grade			
Picture rails: Size (h x t) (mm)			
Picture rails: Profile			
Picture rails: Finish			
Dado rails: Timber species or group			

	T1	T2	T3
Dado rails: Grade			
Dado rails: Size (h x t) (mm)			
Dado rails: Profile			
Dado rails: Finish			
Pelmet: Timber species or group			
Pelmet: Grade			
Pelmet: Size (h x t) (mm)			
Pelmet: Profile			
Pelmet: Finish			

0552B METALWORK - FABRICATED

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide metal fixtures, as documented.

Performance

Requirements:

- Undamaged, plumb, level and straight or as documented.
- Free of surface defects or distortions or as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

General

Access for maintenance: To AS 1657 (2018).

Structural design actions: To AS/NZS 1170.1 (2002).

1.4 TOLERANCES

General

Requirement: ± 2 mm from design dimensions.

1.5 SUBMISSIONS

Design documentation

General: Engage a professional engineer and submit certification for the design and installation of:

- Window shade structures.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Proprietary items: Submit the manufacturer's standard drawings and details showing:

- Methods of construction.
- Assembly and fixing, with dimensions and tolerances.

Stainless steel: For each batch of stainless steel supplied to the works, submit a certificate of conformance or test certificate, as documented.

Stainless steel welding: Before fabrication commences, submit evidence of qualification of the welding procedure by testing to AS/NZS 1554.6 (2012) clause 4.7 or evidence of prequalification to AS/NZS 1554.6 (2012) clause 4.12.

Shop drawings

General: Submit shop drawings to a scale that best describes the detail, showing the following information:

- Overall and detail dimensions.
- Details of fabrication and components.
- Details of fabrication involving other trades or components.
- Information necessary for site assembly.
- Proposals for the break-up of large items as required for delivery to the site.
- Proposed method of joining the modules of large items.

Subcontractors

General: Submit names and contact details of proposed suppliers, fabricators and installers.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Arrival of materials on site or in workshop.
- Shop fabricated or assembled items ready for delivery to the site.
- Commencement of shop or site welding.
- Site erected assemblies on completion of erection, before covering up by cladding and encasing.
- Steel surfaces prepared for, and immediately before, site applied finishes.

2 PRODUCTS**2.1 GENERAL****Storage and handling**

Requirement: Store and handle fabricated metalwork, as follows:

- Deliver to site in unbroken wrapping or packing.
- Store on a level base, away from uncured concrete and masonry and areas of wet plaster.
- Do not store in contact with other materials that may cause staining, denting or other surface damage.
- Use gloves when handling precoated finishes.
- Keep storage time to minimum by delivering items only when required for installation.

Marking

General: Provide suitable and sufficient marks or other means for identifying each member of site-erected assemblies, and for their correct setting out, location, erection and connection. Mark bolted connections to show the bolting category. Do not mark stainless steel by notching.

2.2 MATERIALS**Metals and components**

Performance: Provide metals and components in quantity, lengths and cross-sections of strength and stiffness suited to their required function and as documented.

Stainless steel

Plate, sheet and strip: To ASTM A240/A240M (2023).

Bar: To ASTM A276/A276M (2023).

Tube: To ASTM A554 (2021).

Aluminium

Plate sheet and strip: To AS/NZS 1734 (1997).

Bar, rod and wire: To AS/NZS 1865 (1997).

Tube: To AS/NZS 1867 (1997).

Aluminium alloys, compositions and designations: To AS 2848.1 (1998).

Steel

Steel plate: To AS/NZS 3678 (2016).

Hot rolled bars and sections: AS/NZS 3679.1 (2016).

Welded sections: To AS/NZS 3679.2 (2016).

Fasteners

Performance: Provide fasteners to resist galvanic corrosion in materials of structural and mechanical strengths and corrosion resistance at least equal to that of the lowest resistant metal in the connection.

Materials: Provide fasteners as follows:

- To copper and copper alloys: Copper or copper-alloy fixing devices only.

- To aluminium and aluminium alloys: Aluminium alloy or non-magnetic stainless steel fixing devices only.
- To stainless steel: Appropriate stainless steel materials only.

2.3 OTHER MATERIALS

Tactile ground surface indicators

Tactile ground surface indicators to stairs: To AS/NZS 1428.4.1 (2009).

3 EXECUTION

3.1 CONSTRUCTION GENERALLY

Aluminium structures

Standard: To AS/NZS 1664.1 (1997) or AS/NZS 1664.2 (1997).

Metals

Incompatible metals: Separate using concealed layers of suitable materials in appropriate thicknesses.

Fabrication

Workshop: Fabricate and pre-assemble items in the workshop wherever practicable.

Edges and surfaces: Keep clean, neat and free from burrs and indentations. Remove sharp edges without excessive radiusing.

Tube bends: Form bends in tube without deforming the cross-section and the material thickness.

Colour finished work: Match colours of sheets, extrusions and heads of fasteners.

Thermal movement: Accommodate thermal movement in joints and fastenings.

Joints

General: Fit joints to an accuracy appropriate to the class of work. Finish visible joints made by cutting, drilling, welding, brazing or soldering using grinding, buffing or other methods appropriate to the class of work, before further treatment.

Self-finished metals: Free of surface colour variations, after jointing.

Joints: Fit accurately to a fine hairline or as documented.

Splicing

General: Provide structural members in single lengths.

3.2 WELDING AND BRAZING

Welding

Quality: Provide finished welds that are free of surface and internal cracks, welding slag, and porosity.

Corners and edges: Grind smooth sharp, marred, or roughened corners and edges.

Rough surfaces: Deburr and grind smooth.

Site welds: Avoid site welding wherever possible. If required, locate site welds in positions for down hand welding.

Butt weld quality level: Not inferior to the appropriate level recommended in AS/NZS 1554.1 (2014) Section 6, AS/NZS 1554.6 (2012) Section 6 or AS/NZS 1665 (2004) Section 6, as appropriate.

Brazing

General: Make sure brazed joints have sufficient lap to provide a mechanically sound joint.

Butt joints: Do not use butt joints for joints subject to load. If butt joints are used, do not rely on the filler material only.

3.3 STAINLESS STEEL FABRICATION

Welding stainless steel

Qualification of welders: To AS 1796 (2022).

Riveting

General: Use only to join stainless steel sheet or strip less than 1 mm thick. Drill (not punch) the rivet hole, and drive the rivet cold. On completion, clean and passivate the riveted assembly.

Soldering

General: Do not solder stainless steel.

3.4 CUSTOM-BUILT STEEL STAIRS

General

Materials, design and construction: To AS 1657 (2018).

Nosing strip: To BCA (2022) D3D14 and BCA (2022) D3D15.

Fabrication

Method: Welding.

Joints: Produce smooth unbroken surfaces at joints or as documented. Scribe the joints to all steel members. Make end-to-end joints over an internal sleeve.

Bends: Make changes of direction in rails by evenly curved pipe bends.

Free ends: Seal the free ends of pipes with fabricated or purpose-made end caps.

Fixing to structure

General: Provide fabricated predrilled or purpose-made brackets, anchors or post bases, and attach the steel member to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the steel member.

Galvanizing

General: If possible, complete fabrication before galvanizing; otherwise apply a zinc-rich primer to affected joint surfaces.

Other protective coatings

General: Apply other protective coatings as documented and to the manufacturer's recommendations.

3.5 PROPRIETARY STAIR SYSTEMS

General

Materials, design and construction: To AS 1657 (2018).

Nosing strip: To BCA (2022) D3D14 and BCA (2022) D3D15.

Straight flight stair assembly: A proprietary system, pre-assembled and fixed in place, comprising the following:

- Stair flights with treads and risers.
- Landings.
- Balustrade and handrail to stair flight and landings.
- Security gates.

Circular stairs: A proprietary system, mechanically assembled and fixed in place, comprising the following:

- A central steel tube column.
- Prefabricated metal treads sleeved over and cantilevered from the column.
- Landings.
- Balustrade and handrail to stair and landings.
- Spacers, fixings and accessories necessary to complete the system.

3.6 FIXED STEEL LADDERS

Assembly

Materials, design and construction: To AS 1657 (2018).

Fixing: Fix ladder stiles securely to the building structure at tops and bottoms of flights, and at intermediate points.

3.7 RETRACTABLE CEILING ACCESS STAIRS

General

Retractable access stair: A proprietary system, pre-assembled and fixed in place, comprising the following:

- Retractable ladder.
- Infill frame and ceiling panel.
- Handrails, if required.

3.8 STEEL PLATFORMS AND WALKWAYS

General

Steel platforms and walkways: Rooftop mesh platform system for mounting of equipment, comprising the following:

- Frame: Proprietary or structural engineer designed, in aluminium or galvanized structural steel.
- Deck: Slip-resistant, expanded galvanized steel or aluminium mesh.
- Roof connectors: Proprietary or to structural engineer's details.
- Associated access stairs, handrails and balustrades, including toe boards.

3.9 BALUSTRADES

Fabrication

Method: Welding.

Joints: Produce smooth unbroken surfaces at joints. Scribe the joints between posts and rails. Make end-to-end joints over an internal sleeve.

Bends: Make changes of direction in rails by evenly curved pipe bends.

Free ends: Seal the free ends of pipes with fabricated or purpose-made end caps.

Fixing to structure

General: Provide fabricated predrilled or purpose-made brackets or post bases, and attach the piping to the building structure with fixings, including bolts into masonry anchors, and coach screws or bolts into timber, of metal compatible with the piping.

Galvanizing

General: If possible, complete fabrication before galvanizing; otherwise apply a zinc-rich primer to affected joint surfaces.

Other protective coatings

General: Apply other protective coatings as documented and to the manufacturer's recommendations.

3.10 PROPRIETARY BALUSTRADES

General

Balustrades: A proprietary system, pre-assembled and fixed in place, comprising the following:

- Posts, rails and balusters.
- Infill frame and panels.
- Handrails, if required.

3.11 CORNER GUARDS

Guards

General: Where projecting corners of the structure require protection from mechanical damage, provide metal corner guards as follows:

- Consisting of rolled angle sections or sections fabricated from metal sheet bent to the radius or angle of the corner.
- Fitting close to adjoining surface finishes.
- Solidly grouted up at the back as necessary to eliminate voids.
- Securely fixed by a method that does not cause distortion in the guard surface, and consists of either concealed built in lugs, or flush countersunk head fixings into appropriate anchors.

3.12 COMPLETION

Cleaning

Temporary coatings: On or before completion of the works, or before joining up to other surfaces, remove all traces of coatings used as temporary protection.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published recommendations for service use.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty from the fabricator.

- Form: Against failure of materials and execution under normal environment and use conditions.

- Period: As offered by the fabricator.

4 SELECTIONS

4.1 CUSTOM-BUILT STEEL STAIRS

Custom-built steel stair components schedule

Member	Sizes (mm)
Strings	N/A
Treads/risers	
Landing frame	
Landing deck	
Toe board	
Handrail/top rail	
Mid rail	
Posts	
Finish	

4.2 PROPRIETARY STEEL STAIR SYSTEMS

Straight flight stair assembly schedule

	T1	T2	T3
Product	N/A		
Material			
Finish			

Circular stair assembly schedule

	T1	T2	T3
Product	N/A		
Diameter (mm)			
Height (mm)			
Finish			

4.3 FIXED STEEL LADDERS

Fixed steel ladder component schedule

Member	Sizes (mm)
Strings	N/A
Treads – step type	
Treads – rung type	
Landing frame	
Landing deck	
Handrail/top rail	
Posts	
Ladder cage	
Safety system	
Finish	

4.4 RETRACTABLE CEILING ACCESS STAIRS

Retractable ceiling access stair assembly schedule

	A1	A2	A3
Product	N/A		
Height (mm)			
Material			
Finish			
Ceiling access panel finish			

4.5 STEEL PLATFORMS AND WALKWAYS

Steel platform and walkway component schedule

Member	Sizes (mm)	Product	Finish
Structural frame	N/A		
Decking			
Toe board			
Handrail/top rail			
Mid rail			
Posts			

4.6 BALUSTRADES

Steel balustrade components schedule

Member	Sizes (mm)	Spacing	Material/Finish
Posts	N/A		
Handrail/top rail			
Bottom rail			
Balusters			
Infill panels: Frame			
Infill panels: Panel			

Steel pipe rail balustrade component schedule

Member	Sizes (mm)	Spacing	Material/Finish
Posts	N/A		
Handrail/top rail			
Mid rails			
Toe board			

Proprietary balustrade schedule

	A1	A2	A3
Product	N/A		
Material			
Infill panels: Frame			
Infill panels: Panel			
Finish			

4.7 PROPRIETARY STEEL GUARDRAILING**Maintenance access schedule**

	A1	A2	A3
Product	N/A		
Material			
Finish			

4.8 TACTILE GROUND SURFACE INDICATORS**Tactile ground surface indicators schedule**

	A	B	C
Product	TBC		
Type			
Edge protector			
Material			
Colour			

0573 FIRE EXTINGUISHERS AND BLANKETS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide portable fire extinguishers and fire blankets, as documented.

Refer Engineering Solutions Tasmania drawings and specifications.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.
- 0581 Signage.

1.3 SUBMISSIONS

Products and materials

Requirement: Submit evidence of suitability for use, to NCC (2022) A5G1, for all fire protection products.

Records

General: Submit any routine service records to AS 1851 (2012).

2 PRODUCTS

2.1 EXTINGUISHERS

Portable fire extinguishers

General: To AS/NZS 1841.1 (2007).

Type:

- Water: To AS/NZS 1841.2 (2007).
- Wet chemical: To AS/NZS 1841.3 (2007).
- Foam: To AS/NZS 1841.4 (2007).
- Powder: To AS/NZS 1841.5 (2007).
- Carbon dioxide: To AS/NZS 1841.6 (2007).
- Non-rechargeable: To AS/NZS 1841.8 (2007).

Selection, location and distribution: To AS 2444 (2001).

2.2 BLANKETS

Fire blankets

General: To AS/NZS 3504 (2006).

Selection and location: To AS 2444 (2001).

3 EXECUTION

3.1 INSTALLATION

Fire fighting equipment

Standard: Installation to AS 2444 (2001).

Signage: Provide signs to **STATUTORY SIGNS** in 0581 Signage.

3.2 COMPLETION

Routine service

Portable fire extinguishers: To AS 1851 (2012) Section 10.

Fire blankets: To AS 1851 (2012) Section 11.

Baseline data

Requirement: Provide baseline data to AS 1851 (2012).

4 SELECTIONS**4.1 EQUIPMENT****Portable fire extinguishers schedule**

	FE1	FE2	FE3
Location	Refer Engineering Solutions Tasmania drawings and specifications.		
Number			
Unit type			
Classification and rating			
Nozzle type			
Maximum force to operate lever (N)			
Maximum force to frangible seal (N)			
Cabinet: Type			
Cabinet: Security			
Waterproof cover			

Fire blankets schedule

Location	Number	Size
Refer Engineering Solutions Tasmania drawings and specifications.		

0581B SIGNAGE

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide signage systems, as documented.

Performance

Requirement: Provide signage as follows:

- Appropriately secured.
- Located within a clear line of vision.
- With characters and symbols contrasting with the background.
- With clean, well-defined edges or arrises, and free from blemishes.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*
- *0921 Low voltage power systems.*

1.3 STANDARDS

Signs

Safety signs - design and use: To AS 1319 (1994).

Signs and graphics for disability access: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

Tactile wayfinding signs: To AS 1428.4.2 (2018).

1.4 SUBMISSIONS

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

2 PRODUCTS

2.1 MATERIALS

Standards

Aluminium:

- Plate for engraving: Alloy and temper designation 6063-0 to AS 2848.1 (1998).
- For casting: To AS 1874 (2000).
- Finishes:
 - . Anodising: To AS 1231 (2000).
 - . Powder coating: To AS 3715 (2002) and AAMA 2604 (2022).

Stainless steel:

- External: Type 316. Mirror electropolish surface finish.
- Internal: Type 304. No. 4 brushed (general purpose polished) surface finish.

Plastics:

- PVC-U sheet: Semi-rigid sheet.
- Rigid cellular polystyrene: To AS 1366.3 (1992), class VH for cut-out shapes.

Brass and bronze: Plate, sheet and strip: To AS 1566 (1997).

- Finish: Patinated.

Glass type and thickness: To AS 1288 (2021).

Photoluminescent exit signs: To BCA (2022) E4D8(a)(ii).

Adhesive

General: Proprietary solvent based contact adhesive compatible with the substrate and signage material.

3 EXECUTION**3.1 WORKMANSHIP****Production**

General: Form signage and graphic items accurately with clean, well-defined edges or arises, free from blemishes.

Engraving to two-layer plastic laminate: Engrave lettering to expose the lower laminate.

Engraved and filled: Lettering precision cut and filled colouring material. Clean faces of all filling material.

Casting: Produce shapes free of pits, scale, blow holes or other defects, hand or machine-finished if necessary.

Laser cut lettering: Individual vinyl letters with self-adhesive backing.

Printed lettering: Lettering and graphic images screen/digitally printed on:

- Film with self-adhesive backing.
- Acrylic sheet.
- Aluminium plate.
- Stainless steel plate.

Large format digital printing: Lettering and graphic images screen printed film with self-adhesive backing.

Signwriting: Lettering and graphic images hand painted direct to the background by a tradesman with recognised qualifications and demonstrated skills.

Fabricated: Three dimensional, formed as follows:

- Laser cutting from solid material and hand finished as necessary.
- Moulding: Individual plastic hollow three dimensional characters and shapes formed by:
 - . Injection moulding.
 - . Vacuum forming.
- Built-up individual shapes by fabricating the faces and edges from separate pieces neatly and securely joined.

3.2 INSTALLATION**General**

Requirement: Install signage and graphic items level and plumb, securely mounted, with concealed corrosion and theft-resistant fixings.

Self-adhesive signs

Requirement: Fix free of bubbles and creases.

Aluminium and stainless steel signs

Pin fixing: Epoxy fix to substrate.

Illuminated signs

Electrical fittings: Provide a junction box for power connection, and the necessary lamps with proper mountings, protection, and accessories including wiring transformers and insulators. Install signs and conceal cabling to *0921 Low voltage power systems*.

3.3 COMPLETION**Cleaning**

General: Remove protective coverings, replace damaged signage and leave the work clean, polished, free from defects, and in good condition.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the manufacturer and the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the manufacturer and the installer.

4 SELECTIONS

4.1 GENERAL SIGNS

Signage schedule

Sign No.	Sign type	Location	Message	Notes
Refer door Schedule 02 CD15				

Fixed signs schedule

	FS1	FS2	FS3
Location	Refer door Schedule 02 CD15		
Message			
Material			
Finish/Colour			
Size (l x h x t) (mm)			
Mounting			
Fixing method			

Changeable letter systems schedule

	CL1	CL2	CL3
Location	N/A		
Message			
Display board: Material			
Display board: Finish/Colour			
Display board: Size (l x h x t) (mm)			
Display board: Fixing method			
Display board: Frame			
Display board: Enclosure			
Display board: Locking system			
Characters: Material			
Characters: Finish/Colour			
Characters: Letter height and thickness (mm)			
Characters: Typeface			
Characters: Quantity			
Characters: Fixing method			

Changeable plate systems schedule

	CP1	CP2	CP3
Location	N/A		
Message			
Sign plate holder: Material			
Sign plate holder: Finish/colour			
Sign plate holder: Size (l x h x t) (mm)			
Sign plate holder: Fixing method			
Sign plate: Material			
Sign plate: Finish/Colour			
Sign plate: Size (l x h x t) (mm)			
Sign plate: Fixing method			

External post and panel systems schedule

	EP1	EP2	EP3
Location	N/A		
Message			
Panels: Material			
Panels: Finish/Colour			
Panels: Size (l x h x t) (mm)			
Panels: Fixing method			
Supporting framework: Material			

Illuminated signs schedule

	IS1	IS2	IS3
Location	N/A		
Message			
Cabinet: Material			
Cabinet: Finish/Colour			
Cabinet: Size (l x h x t) (mm)			
Cabinet: Mounting			
Cabinet: Fixing method			
Face panel: Material			
Face panel: Form			
Illumination: Type			
Illumination: Lamps			

Tactile wayfinding signs schedule

	TW1	TW2	TW3
Location	TBC		

	TW1	TW2	TW3
Message			
Material			
Finish/Colour			
Size (l x h x t) (mm)			
Method of forming			
Finish			
Mounting			
Fixing method			

4.2 STATUTORY SIGNS

Termite protection

Location	In or near meter box or similar
Message	Details of termite management system Indicate: The method of protection The date of installation The life expectancy of a chemical barrier as listed on the appropriate authority's pesticides register label The installer's recommendation for inspections
Sign type	Laminated page(s)
Conformance	BCA (2022) H1D3(3), BCA (2022) B1D4(i)(ii) AS 3660.1 (2014) Appendix A

Required fire door and required smoke door

Location	On or adjacent to the door, on the side of the door that faces a person seeking egress, and if the door is in the held open position, on either the wall adjacent the doorway or both sides of the door.
Message if auto door with auto hold open device	FIRE SAFETY DOOR – DO NOT OBSTRUCT
Message if self-closing door	FIRE SAFETY DOOR DO NOT OBSTRUCT DO NOT KEEP OPEN
Message if door discharging from a fire isolated exit	FIRE SAFETY DOOR – DO NOT OBSTRUCT
Letter height (minimum)	20 mm
Sign type	
Conformance	BCA (2022) D3D28

Non-required stair, ramp or escalator

Location	Outside the shaft near all doors opening to the shaft
Message	DO NOT USE THIS STAIRWAY IF THERE IS A FIRE (or) Do not use this stairway if there is a fire
Letter height (minimum)	20 mm (upper case) 16 mm (lower case)
Sign type	
Conformance	BCA (2022) Spec 14

Exit signs, Class 2 or 3 buildings and Class 4 parts, in lieu of illuminated exit signs

Location	On, above, or adjacent every door described in BCA (2022) E4D5, BCA (2022) E4D6 and BCA (2022) E4D7.
Message	EXIT (with arrow in the direction of egress, if required)
Letter height (minimum)	25 mm
Sign type	
Conformance	BCA (2022) E4D5, BCA (2022) E4D6 and BCA (2022) E4D7

Braille and tactile exit signage

Location	To BCA (2022) Spec 15 for every door described in BCA (2022) E4D5
Message	Exit (and) Level (followed by the floor level number) (Braille and tactile signage)
Letter height (minimum)	BCA (2022) Spec 15
Mounting height	Braille and tactile signage between 1200 mm and 1600 mm above finished floor level
Sign type	
Conformance	BCA (2022) E4D5, BCA (2022) D4D7 and BCA (2022) Spec 15

Fire exit offence notice (NSW)

Location	In a conspicuous position adjacent to doors to fire-isolated stairs
Message	OFFENCE RELATING TO FIRE EXITS It is an offence under the <i>Environmental Planning and Assessment Act 1979 (NSW)</i> (a) to place anything in or near this fire exit that may obstruct persons moving to and from the exit, or (b) to interfere with or obstruct the operation of any fire doors, or (c) to remove, damage or otherwise interfere with this notice.
Letter height (minimum)	8 mm (title), 2.5 mm (remainder)
Sign type	
Conformance	<i>Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021 (NSW)</i> cl 108

Fire exit offence notice (ACT)

Location	In a conspicuous position adjacent to doors to fire-isolated stairs
Message	OFFENCES RELATING TO FIRE STAIRS Under the <i>Emergencies Act 2004 (ACT)</i> it is an offence to: 1. Place anything in this stairway or any associated passageway leading to the exterior of the building which may impede the free passage of persons; or 2. Interfere with or cause obstruction or impediment to the normal operation of fire doors providing access to this stairway; or 3. Remove, damage or otherwise interfere with this notice.
Letter height (minimum)	20 mm (title), 3 mm (remainder)
Sign type	Embossed or engraved and filled
Conformance	BCA (2022) Schedule 4 ACT

Fire hose reels and fire hydrants

Location	Cupboard door or adjacent the FHR
Message	FIRE HYDRANT (and/or) FIRE HOSE REEL
Letter height (minimum)	50 mm
Sign type	Adhesive backed vinyl
Conformance	AS 2441 (2005) clause 10.4.4 AS 2419.1 (2021) clause 11.3.5

Fire hose reel – Location sign

Location	Above or adjacent the FHR if located in a recess, cavity or obscure location
Message	To AS 2441 (2005) Figure 10.1
Letter height (minimum)	16 mm
Mounting height (minimum)	2000 mm above finished floor level or at a height visible to a person approaching the fire hose reel location
Sign type	Adhesive backed vinyl
Conformance	AS 2441 (2005) clause 4.1

Fire brigade booster assembly cabinet – Location sign

Location	Cabinet doors
Message if fire hydrant booster is installed	FIRE HYDRANT BOOSTER ASSEMBLY
Message if fire hydrant booster and sprinkler booster are installed	FIRE HYDRANT BOOSTER AND SPRINKLER BOOSTER ASSEMBLY
Message if combined fire hydrant and sprinkler booster is installed	COMBINED FIRE HYDRANT AND SPRINKLER BOOSTER ASSEMBLY
Message if a feed fire hydrant is enclosed in the cabinet	(Symbol FH within a 100 mm circle of thickness and colour to match lettering)
Letter height (minimum)	50 mm
Sign type	Adhesive backed vinyl
Conformance	AS 2419.1 (2021) clause 11.3.1 AS 2118.6 (2012) clause 2.2.3

Fire brigade booster assembly – Attack fire hydrant

Location	Behind or adjacent to attack fire hydrant
Message	ATTACK HYDRANT
Letter height (minimum)	25 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.1

Fire brigade booster assembly – Notice of pressure

Location	Within the cabinet or enclosure
Message	TEST PRESSURE: ◊ kPa BOOST PRESSURE: ◊ kPa
Letter height (minimum)	25 mm
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.4

Boosters in series with pumps

Location	Adjacent to the pressure gauge
Message	WARNING THIS BOOSTER IS CONNECTED IN SERIES (RELAY) WITH THE FIXED ON-SITE FIRE PUMPS WHICH MAY BE RUNNING. THIS GAUGE SHOWS THE DISCHARGE PRESSURE AT THE OUTLET OF THE FIXED ON-SITE PUMP
Letter height (minimum)	25 mm (title), 15 mm (remainder)
Sign type	
Conformance	AS 2419.1 (2021) clause 11.3.7.1

Block plan

Location	At booster assembly cabinet or enclosure, and in fire control room or pump room, if applicable.
Message	(Block plan to AS 2419.1 (2021) clause 11.5 or AS 2118.1 (2017) clause 8.3)
Letter height (minimum)	
Sign type	
Conformance	AS 2419.1 (2021) clause 11.5 AS 2118.1 (2017) clause 8.3

Portable fire extinguishers – Cabinet

Location	Cabinet
Message	FIRE EXTINGUISHER
Letter height (minimum)	32 mm
Sign type	Adhesive backed vinyl
Conformance	AS 2444 (2001) clause 3.6

Portable fire extinguishers – Location sign

Location	As nominated in AS 2444 (2001) clause 3.2 at every installed extinguisher nominated in BCA (2022) E1D14
Message	FIRE EXTINGUISHER (and prescribed graphic)
Letter height (minimum)	16 mm
Mounting height (minimum)	2000 mm above finished floor level
Sign type	Computer generated adhesive backed vinyl graphic
Conformance	AS 2444 (2001) clause 3.3

Fire blankets

Location	As nominated in AS 2444 (2001) clause 6.4 at every blanket location nominated in AS 2444 (2001) clause 6.3
Message	FIRE BLANKET (and prescribed graphic)
Letter height (minimum)	16 mm
Mounting height (minimum)	2000 mm above finished floor level
Sign type	Computer generated adhesive backed vinyl graphic
Conformance	AS 2444 (2001) clauses 6.3, 6.4 and Figure 6.1

Regulatory car park signs – Low clearance

Location	Entry to overhead obstruction where clearance is: 3 m or less – car and light van use only 4.6 m – all other cases
Message	LOW CLEARANCE (measured minimum clearance rounded down to the nearest 0.1 m)
Sign type	AS/NZS 2890.1 (2004) R6-11 or R6-16
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Stop and Give Way

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(b)
Sign type	AS/NZS 2890.1 (2004) R1-1 (Stop), R1-2 (Give Way)
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Speed limit

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(c)
Sign type	AS/NZS 2890.1 (2004) R4-1
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Hump warning

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(d)
Sign type	AS/NZS 2890.1 (2004) W5-10
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Steep grade warning

Location	As required for traffic control
Message	Graphic nominated in AS/NZS 2890.1 (2004) clause 4.3.4(e)
Sign type	AS/NZS 2890.1 (2004) W5-12 (Down), W5-13 (Up)
Conformance	AS/NZS 2890.1 (2004) clause 4.3.4

Regulatory car park signs – Accessible parking facilities

Location	Designated car space
Symbol	Graphic size and position nominated in the NCC cited AS/NZS 2890.6 (2009) clause 3.1, Figure 3.1. Space delineation and shared space markings to the NCC cited AS/NZS 2890.6 (2009) clause 3.2.
Sign type	Pavement marking paint.
Conformance	NCC cited AS/NZS 2890.6 (2009) clause 3.1

Unisex accessible sanitary facilities

Location	To BCA (2022) Spec 15
Message	Braille and tactile signage incorporating the international symbol of access. Indicate suitability for left or right handed use.
Symbol size	AS 1428.2 (1992) clause 16, Table 1.
Letter height (minimum)	Braille: BCA (2022) Spec 15 Raised characters: Sans serif type font 20 mm.
Sign type	

Conformance	NCC cited AS 1428.1 (2009) clause 8.1 BCA (2022) D4D7
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Ambulant sanitary facilities

Location	To BCA (2022) Spec 15
Message	Braille and tactile signage incorporating the male/ female ambulant symbol.
Symbol size	AS 1428.2 (1992) clause 16, Table 1.
Letter height (minimum)	Braille: BCA (2022) Spec 15 Raised characters: Sans serif type font 20 mm.
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1 BCA (2022) D4D7

Airlocks to sanitary facilities

Location	Entry doors to airlocks serving areas containing sanitary facilities
Message	Braille and tactile signage incorporating the symbols identifying each sanitary facility within
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Letter height (minimum)	Braille: BCA (2022) Spec 15 Raised characters: Sans serif type font 20 mm
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1

Non-accessible sanitary facilities

Location	At each bank of sanitary facilities that are not provided with an accessible unisex sanitary facility
Message	Braille and tactile signage incorporating the international symbol of access. Indicate location of the nearest accessible unisex sanitary facility with directional arrow.
Letter height	AS 1428.2 (1992) clause 17, Table 2
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1 BCA (2022) D4D7

Non-accessible pedestrian entrance

Location	At each non-accessible pedestrian building entrance
Message	Signage incorporating the international symbol of access to direct a person to the location of the nearest accessible pedestrian entrance
Letter height	AS 1428.2 (1992) clause 17, Table 2
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.1 BCA (2022) D4D7

Hearing augmentation

Location	Where hearing augmentation is installed to BCA (2022) D4D8
Message	Braille and tactile signage incorporating the international symbol of deafness in white on a blue background. Identify:

	Type of hearing augmentation. Area covered within the room. If receivers are being used and where the receivers can be obtained.
Letter height (minimum)	BCA (2022) Spec 15
Symbol size	AS 1428.2 (1992) clause 16, Table 1
Sign type	
Conformance	NCC cited AS 1428.1 (2009) clause 8.2.2 BCA (2022) D4D8 BCA (2022) Spec 15

Main switchboard – Main entry, excluding Class 1 dwellings

Location	Each entry that may be used by emergency services or at Fire detection control and indicating equipment (FDCIE)
Message	Indicate location of main switchboard. Incorporate the term Main Switchboard into notice
Letter height (minimum)	
Sign type	
Conformance	AS/NZS 3000 (2018) clause 2.10.2.4

Main switchboard – Room or enclosure, excluding Class 1 dwellings

Location	The room or enclosure containing the main switchboard
Message	MAIN SWITCHBOARD
Letter height (minimum)	
Sign type	
Conformance	AS/NZS 3000 (2018) clause 2.10.2.4

Fire orders – Alpine areas

Location	Near main entrance and on each storey.
Message	FIRE ORDERS followed by an explanation of the following: Method of operation of the alarm system and location of call points Location and method of operation of all the firefighting equipment Location of all exits Evacuation procedure
Letter height (minimum)	
Sign type	
Conformance	BCA (2022) G4D8

0611 RENDERING AND PLASTERING

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide render and plaster finishes, as documented.

Performance

Requirements:

- Resistant to impacts expected in use.
- Free of irregularities.
- Consistent in texture and finish.
- Firmly bonded to substrates for the expected life of the application.
- Without obvious shrinkage cracks.
- As a suitable substrate for the nominated final finish.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 *General requirements.*

1.3 INTERPRETATION**Abbreviations**

General: For the purposes of this worksection, the following abbreviations apply:

- CRF: Cement render – finish.
- CRM: Cement render – medium.
- CRS: Cement render – stronger.
- CRW: Cement render – weaker.
- GPF: Gypsum plaster – finish.

Definitions

General: For the purposes of this worksection, the definitions given in AS 1672.1 (1997) and the following apply:

- Base coat: A plaster coat applied before the application of the finish coat.
- Binder: Material binding aggregate particles together into a heterogeneous mass.
- Bonding treatment: A treatment of a substrate that improves adhesion of a rendering or plastering system.
- Finish coat: The final coat of a coating system.
- Finishing treatment: The treatment applied to a finish coat which may include processes and results.
- Laitance: Scum or whitish deposit that rises to the surface of newly placed, over-wet concrete or over-trowelled mortar.
- Lath: An applied substrate for render or plaster.
- Plaster: A mixture of binders, aggregate and water, which is typically applied to internal substrates, in a plastic state and dries and cures to a hard surface which may subsequently be decorated or remains self-finished:
 - . Cement plaster: Contains general purpose cement as the principal binder.
 - . Gypsum plaster: Contains hydrated or anhydrous calcium sulfate as the principal binder.
- Plastering: The process of applying plaster to a substrate with a float or trowel.
- Render: A mixture of binders, aggregate, water and with or without admixtures, which is typically applied to external substrates, in a plastic state and dries and cures to a hard surface, which may subsequently be decorated or remain self-finished.

- . Cement render: Contains general purpose cement as the principal binder.
- Rendering: The process of applying render to a substrate with a float or trowel.
- Rendering or plastering system: One or more coats of render or plaster and associated treatments comprising some or all of the following in sequence:
 - . Bonding treatment.
 - . Base coat(s).
 - . Finish coat.
 - . Finishing treatment.
- Substrate: The surface to which a material or product is applied.

1.4 TOLERANCES

Tolerances table

Description	Alignment	Tolerance
Walls and other vertical structures	Vertical	6 mm in 2400 mm
Reveals sides	Vertical	3 mm in 1800 mm
Reveals head up to 1800 mm	Horizontal	3 mm in 1800 mm
Reveals head over 1800 mm	Horizontal	5 mm max
Reveals, piers, beams, wall stop ends up to 300 mm	Square	3 mm max
Reveals, piers, beams, wall stop ends over 300 mm	Square	5 mm max
Radius of corners	Round	Should not vary by more than $\pm 10\%$ over the length of the arris.

1.5 SUBMISSIONS

Prototypes

Requirement: Prepare prototypes of each render and plaster system complete with beads and other embedded items:

- Size: 1200 x 2400 mm.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Prototypes ready for inspection.
- Substrates immediately before applying base coats.
- Finishing treatments before decoration.

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Store materials in a dry, well-ventilated and secure storage area, unaffected by weather.

2.2 MATERIALS AND COMPONENTS

Accessories

Beads: Proprietary PVC or metal proprietary sections manufactured for fixing to substrates and/or embedding in the render or plaster to form and protect edges and junctions.

Lath: Provide a proprietary product manufactured from PVC or raised expanded metal for use with render or plaster.

Metallic-coatings to AS 1397 (2021): For metal beads or lath in cement render or plaster, to the **Corrosion resistance and durability table**.

Admixtures

Plasticisers or workability agents: Do not use.

Aggregates

Sand: Fine, sharp, well-graded sand with a clay content between 1% and 5% tested to AS 1141.12 (2015), and free from efflorescing salts.

Sand grading for base coat plaster table

Sieve size (mm)	Percent passing	
	Minimum	Maximum
4.75	100	100
2.36	90	100
1.18	60	90
0.6	35	70
0.3	10	30
0.15	0	5
0.075	0	3

Render and plaster for autoclaved aerated concrete

General: Provide a proprietary product manufactured for use with the wall system.

Bonding agents

General: Proprietary products manufactured for bonding cement-based render or plaster to solid substrates.

Cement

Standard: To AS 3972 (2010).

Type: GP.

Colouring products

General: Provide proprietary products manufactured for colouring cement plaster.

Integral pigment proportion: 5% maximum weight of cement.

Cornice cement

General: Provide a proprietary product manufactured for use with the cornice.

Cornices

Cast plaster: Proprietary item.

Corrosion resistance and durability

Requirement: To the **Corrosion resistance and durability table** or provide proprietary products with metallic and/or organic coatings of equivalent corrosion resistance and as follows:

- Galvanizing: To AS/NZS 4680 (2006).

Corrosion resistance and durability table

Atmospheric corrosivity category to AS 4312 (2019)	Metal lath, beads and embedded items	Minimum cement content (mix type) above damp-proof course
C1 and C2	Galvanize after fabrication 300 g/m ²	CRW
	Stainless steel Type 316	
	Powder coated aluminium	CRM
C3	Stainless steel Type 316	CRM
	Powder coated aluminium	
C4	Stainless steel Type 316	CRS
	Powder coated aluminium	
Note: For categories C5 and CX seek specialist advice.		

Curing products

General: Provide proprietary products manufactured for use with the render or plaster system.

Gypsum plaster

General: Provide a proprietary product containing calcium sulfate hemihydrate with additives to modify setting.

Lime

Limes for building: To AS 1672.1 (1997).

Lime putty

General: Prepare lime putty as follows:

- Stand dry hydrated lime to AS 1672.1 (1997) and water for 24 hours or more without drying out.
- Stand quicklime and water for 14 days or more without drying out.

Mixes

General: Select a mix proportion to suit the conditions of application.

Measurement: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Mixing: Machine mix for 3 to 6 minutes.

Strength of successive coats: Make sure successive coats are no richer in binder than the coat to which they are applied.

Mix proportion table – Cement render, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume		
			Cement	Lime	Sand
Single or multi-coat systems with integral finishing treatments Base coats in multi-coat systems with cement or gypsum finishes	CRS	Dense and smooth concrete and masonry	1 1	0 0.5	3 4.5
	CRM	Regular clay or concrete masonry	1 1	0.5 1	4.5 6
	CRW	Lightweight concrete masonry and other weak substrates	1 1	1 2	6 9
Second coat - Internal	CRF	Cement render base coats	1 1	1 2	6 9
Second coat - External	CRF	Cement render base coats	1 1	1 2	5 6

Mix proportion table – Gypsum finish coat, by volume

Mix type		Substrate	Upper and lower limits of proportions by volume			
			Gypsum	Cement	Lime putty	Sand
Gypsum finish coats	GPF	Cement render base coats	1	-	1.5	-
			1	-	2	-

Mix proportion table – Gypsum finish coat, by weight

Gypsum plaster (kg)	Lime putty (kg)
17	25
34	50
51	75

Control joint products

General: Provide proprietary products manufactured for use with the plastering system and to accommodate the anticipated movement of the substrates and/or the plaster.

Water

General: Clean and free from any deleterious matter.

3 EXECUTION**3.1 PREPARATION****Substrates**

General: Prepare substrates as follows:

- Clean and free from any deposit or finish that may impair adhesion of render or plaster.
- If framed or discontinuous, support members in full lengths without splicing.
- If solid or continuous, remove excessive projections and fill voids and hollows with render or plaster stronger than the first coat and not weaker than the substrate.

Absorbent substrates: If suction is excessive, control it by dampening without over-wetting. Do not render or plaster substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen to remove 2 mm of the laitance and expose the aggregate before applying a bonding treatment.

Painted surfaces: Remove paint and hack the surface at close intervals.

Untrue substrates: If the substrate is not sufficiently true for conformity with the thickness limits for the render or plaster system, or has excessively uneven suction resulting from variations in the composition of the substrate, apply additional coats without exceeding the thickness limits for the substrate or system.

Beads

Location: Fix beads as follows:

- Angle beads: At all external corners.
- Drip beads: At all lower terminations of external render.
- Beads for control of movement: At all control joints.
- Stop beads: At all terminations of render or plaster and junctions with other materials and render or plaster systems.

Joints in beads: Provide dowels to maintain alignment.

Mechanical fixing to substrate: ≤ 300 mm centres.

Bonding treatment

General: If bonding treatment is required to the substrate, throw a wet mix onto the substrate. Mix proportions to the following:

- Cement render (cement:sand): 1:2.
- Gypsum plaster (gypsum:sand): 1:2.

Curing: Cure as follows:

- Keep continuously moist for 5 days or more and allow to dry before applying render or plaster coats.
- Protect cement render from direct sun and drying winds for at least 16 hours after application.

Thickness: ≥ 3 mm and < 6 mm.

Embedded items

General: To the **Corrosion resistance and durability table**. If there are water pipes and other embedded items, sheath them to allow for thermal movement.

Lath

Location: Provide lath as follows:

- Chases: If chases or recesses are 50 mm wide or greater, fix lath extending 75 mm or more beyond each side of the chase or recess.
- Masonry and concrete substrates: If mechanical key cannot be attained by scabbling and bonding, fix lath.
- Metal and other non-porous substrates: Fix lath to provide a key.

Installation: Fix lath as follows:

- General: Run the long way of the mesh across supports with strands sloping downwards and inwards from the intended face of the render or plaster.

- Fixing: Mechanically fix at 150 mm maximum centres.
- Laps: Tie with 1.25 mm galvanized wire at centres of 150 mm or less. Do not stop edges of sheets at corners but bend around.
- On solid substrates: Space the lath 5 mm or more clear of the substrate.
- Support spacing: ≤ 400 mm.

3.2 APPLICATION

Rendering and plastering

Base coats: Scratch-comb each base coat in two directions when it has stiffened.

Lath: Press the render or plaster through the apertures of lath and wings of beads.

Incidental work

General: Return render or plaster into reveals, beads, sills, recesses and niches. Render or plaster faces, ends and soffits of projections in the substrate, such as string courses, sills, pilasters and corbels. Run neatly finished throating on soffits of external projections. Trim around openings. Plaster exposed internal surfaces of built-in joinery.

Joining up

General: If joining up is required, make sure joints are imperceptible in the finished work after decoration.

Control joints

General: Provide joints in the finish to coincide with control joints in the substrate. Make sure the joint in the substrate is not bridged during rendering or plastering.

Size:

- Depth: Extend the joint right through the render or plaster and reinforcement to the substrate.
- Width: 3 mm, or the same width as the substrate joint, whichever is greater.

Damp-proof courses: Do not continue render or plaster across damp-proof courses.

Rendering or plastering on lath: Provide control joints to divide the rendering or plastering area into rectangular panels of 10 m² or less.

V-joints: Provide V-joints, cut right through the render or plaster to the substrate, at the following locations:

- Abutments with metal door frames.
- Abutments with other finishes.
- Junctions between different substrates.

Cornices

General: Accurately cut and mitre corners. Match and align ornament. Do not make butt joints in the length of a cornice.

Installation: Butter edges, mitres and joins for the full length of the cornice with adhesive.

Mechanical fixing: If cornice projects across a ceiling 400 mm or more, provide additional mechanical fixing as follows:

- Fixing centres: ≤ 600 mm.

Decorative joints

Render and plaster thickness table

Substrate	Render and plaster, total thickness of single or multi-coat work (mm)	Gypsum/lime plaster (mm)
Dense concrete walls	15 max	3 max
Dense concrete ceilings	9 max	3 max
Brickwork and blockwork	12 min	3 max
Lightweight concrete and blocks	12 min	3 max
Metal lath measured from the face of the lath.	18 min	3 max

Temperature

General: If the ambient temperature is less than 10°C or more than 30°C, make sure the temperature of mixes, substrates and reinforcement at the time of application is between 5°C and 35°C.

Unused mixes

General: Do not use render or plaster unused after 90 minutes from the time of mixing.

3.3 FINISHES**Finishing treatments**

Plain even surfaces: Work the hardening plaster as follows:

- Bag: Rub the finish coat when set firm with a hessian bag or similar.
- Carborundum stone: Rub the finish coat when set hard with a carborundum stone to achieve a finish free from sand.
- Foam float: Float the finish coat on application with a wood or plastic float to an even surface and finish with a foam float to achieve a fine sand textured finish.
- Steel trowel: Steel trowel the finish coat to a smooth dense surface which is not glass-like and is free from shrinkage cracks and crazing.
- Wood or plastic float: Float the finish coat on application with a wood or plastic float to an even surface.

Ornamental patterned surfaces: Work the hardening plaster with a trowel or other tool for the documented type.

Sprayed textured surfaces: Spray plaster onto a substrate using a purpose-designed machine.

Stippled textured surfaces: Work the hardening plaster with a stiff brush.

Rough cast surfaces: Throw plaster onto a substrate or pebbles onto a plastic plaster base for the documented type.

Specialist plaster finishes

Polymer modified render:

- Base coat render: Proprietary polymer modified cementitious render supplied as a complete plastering system.
- Finish coats: Proprietary coloured and textured polymer modified finish coats.

Polished plaster: In situ applied plaster system incorporating selected stone dust in a proprietary matrix producing a smooth polished surface with visual patterning.

Glass bead coatings: Glass beads bound in a proprietary matrix.

3.4 COMPLETION**Curing**

General: Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, keep the render or plaster moist as follows:

- Base coats and single coat systems: Keep continuously moist for 2 days and allow to dry for 5 days before applying further render or plaster coats.
- Finish coats: Keep continuously moist for 2 days.

Multiple coats: Cure and dry each successive coat in multiple coat systems.

4 SELECTIONS**4.1 SCHEDULES****Rendering or plastering construction schedule**

	A	B	C
Substrate	Refer drawings		
Bonding treatment			
Bond coat			
Base coat(s)			
Finish coat			

	A	B	C
Finishing treatment			

Specialist plastering systems schedule

	A	B	C
Substrate	N/A		
Plastering system			
Colour			
Texture			

Accessories schedule

	A	B	C
Product	TBC		
Beads			
Lath			

0612B CEMENTITIOUS TOPPINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide cementitious toppings, as documented.

Performance

Requirements:

- Consistent in level, finish, colour and texture.
- Free of discontinuities.
- Resistant to impacts and loads expected in use.
- Resistant to environmental degradation within the manufacturer's stated life span.
- Accommodating movement in the substrate between control joints.
- If unbonded, without edge curl.
- If bonded, compatible with the substrate and without drummy areas.
- Without obvious shrinkage cracks.

Self-levelling screeds: Provide if substrates for the various overlaid flooring types cannot meet the performance requirements.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

Slip resistance

Classification: To AS 4586 (2013).

1.4 TOLERANCES

Unformed surfaces

Thickness: Deviation from the documented thickness:

- Thickness < 15 mm: ±2 mm.
- Thickness ≥ 15 < 30 mm: ±5 mm.
- Thickness ≥ 30 mm: ±10 mm.

Flatness: To the **Flatness tolerance class table**, using a straightedge placed anywhere on the surface in any direction, for the documented class of finish.

Flatness tolerance class table

Class	Measurement	Maximum deviation (mm)
A	2 m straightedge	4
B	3 m straightedge	6
C	600 mm straightedge	6

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: Deliver, unload and store products and accessories in unbroken manufacturer's packaging and containers in a dry, well-ventilated and secure storage area, unaffected by weather.

2.2 MATERIALS

Aggregates

Standard: To AS 2758.1 (2014).

Coarse aggregate: Nominal single size not more than 1/3 topping thickness.

Fine aggregate: Fine, sharp, well-graded sand with a low clay content and free from efflorescing salts.

Nominal single size not more than 1/4 topping thickness for toppings less than 40 mm thick.

Bonding products

General: Proprietary products manufactured for bonding cement-based toppings to concrete substrates.

Separating layer

General: Provide a bond breaker to separate the topping from the substrate, as documented.

Cement

Standard: To AS 3972 (2010).

- Type: SL.

Colouring products

General: Provide proprietary products manufactured for colouring cement toppings.

Integral pigment proportion: 10% maximum by weight of cement.

Concrete

Standard: To AS 1379 (2007).

Unreinforced topping: Normal-class.

Reinforced topping table

Above ground exposure location	Compressive strength (MPa)	Cover to reinforcement (mm)
Internal residential External more than 50 km from coastline and non-industrial and arid	20	20
Internal non-residential External more than 50 km from coastline and non-industrial and temperate	25	30
External more than 50 km from coastline and non-industrial and tropical External more than 50 km from coastline and industrial in any climatic zone External between 1 to 50 km from coastline in any climate zone	32N40	40
External coastal less than 1 km from coastline	40	45

Reinforcement

Standard: To AS/NZS 4671 (2019).

Mesh: SL 62.

Maximum joint spacing: 6 m internal, 4 m external.

Curing products

General: Provide proprietary products manufactured for use with cement-based toppings and with the floor finish to be laid on the toppings.

Water

General: Clean and free from any deleterious matter.

Mixes

General: Select mix proportions to the **Mix proportion table**, or alternatively provide pre-mixed concrete for toppings as follows:

- Air entrainment: $\leq 3\%$.
- Nominal coarse aggregate size: $\leq 0.3 \times$ topping thickness.
- Slump: 80 mm.

- Standard strength grade: N25.

Water quantity: The minimum necessary to achieve full compaction and prevent excessive water being brought to the surface during compaction.

Mix proportion table

Mix type	Thickness (mm)	Upper and lower limits of proportions by weight		
		Cement	Fine aggregate	Coarse aggregate
Bonded – cement and sand	35	1	3	0
		1	4.5	0
Bonded – fine concrete	40	1	3	1
		1	3	2
Unbonded – fine concrete	100	1	3	1
		1	3	2
Granolithic	Floors: 25 Skirtings: 13	1	2	1
Separated – fine concrete	70	1	3	1
		1	3	2

Self-levelling screed

Type: Proprietary self-levelling liquid cement-based screed.

Slip resistance products

General: Provide proprietary products manufactured to improve the wet slip resistance of toppings.

- Silicon carbide granules:
 - . Granule size: Between 300 to 600 µm.
- Silicon carbide two-part resin:
 - . Granule size: ≥ 300 µm.

Surface treatment products

General: Provide proprietary products manufactured for use with cement-based toppings to change the characteristics of the surface of the finished topping.

Treatment: [complete/delete]

2.3 CONTROL JOINTS

Control joint materials

General: As documented.

Control joint strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Proprietary slide plate divider strip: An arrangement of interlocking metal plates grouted into pockets formed in the concrete joint edges.

Sealant: One-part self-levelling non-hardening mould-resistant, silicone or polyurethane sealant applied over a backing rod. Finish flush with the surface.

- Floors: Trafficable, Shore hardness greater than 35A.

Backing rod: Compressible closed cell polyethylene foam with a bond breaking surface.

3 EXECUTION

3.1 PREPARATION

Substrates

General: Prepare substrates as follows:

- Clean and remove any deposit that may impair adhesion of monolithic or bonded toppings.
- Remove excessive projections.
- Voids and hollows:

- . More than 10 mm with abrupt edges: Fill with a sand/cement mix not stronger than the substrate or weaker than the topping.
- . Less than 10 mm: Scabble edges to eliminate a featheredge and apply a latex modified cementitious product.

Substrates for bonded toppings

Hardened concrete: Roughen by scabbling to remove 2 mm of the surface and expose the aggregate.

3.2 APPLICATION

Installation

General: Spread the mix and compact. Strike off, consolidate and level surfaces to finished levels and to the documented flatness tolerance class.

Bonding product: Before laying topping wash the substrate with water and provide a bonding product, or treat as follows:

- Keep wet for 2 hours or more.
- Remove surplus water and brush on neat cement or a clean slurry of cement and water.
- Place the topping while the slurry is wet.

Monolithic toppings: Lay while concrete subfloor is plastic and the surface water is no longer visible.

Unbonded toppings: Lay separating layer.

Toppings 50 to 75 mm thick:

- Lay in two layers of equal thickness.
- Place a layer of reinforcement between the topping layers. Lap reinforcement 200 mm and tie. Do not create four way laps.

Temperature control

General: Make sure that the temperature of mixes, substrates and reinforcement are not less than 5°C or greater than 35°C at the time of application.

Severe temperature: If the ambient shade temperature is greater than 38°C, do not mix topping.

3.3 SURFACE FINISHES

Finishing methods – primary finish

Machine float finish:

- After levelling, consolidate the surface using a machine float.
- Cut and fill and refloat immediately to a uniform, smooth, granular texture.
- Hand float in locations inaccessible to the machine float.

Steel trowel finish: After machine floating, finish as follows:

- Produce a smooth surface free from defects using power tools.
- When the surface has hardened sufficiently, use steel hand trowels to produce the final consolidated finish free of trowel marks and uniform in texture and appearance.

Burnished finish: Continue steel trowelling until the concrete surface attains a polished or glossy finish, uniform in texture and appearance, and free from trowel marks and defects.

Wood float finish: After machine floating, produce the final consolidated finish free of float marks and uniform in texture and appearance using wood or plastic hand floats.

Broom finish: After machine floating, draw a broom or hessian belt across the surface to produce a coarse even-textured slip-resistant transverse-scored surface.

Scored or scratch finish: After screeding, produce a coarse scored surface texture using a stiff brush or rake drawn across the surface before final set.

Sponge finish: After machine floating, produce an even textured sand finish by wiping the surface using a damp sponge.

Exposed aggregate finish: After floating and when concrete has stiffened, wet the surface and scrub with stiff fibre or wire brushes, flushing continuously with clean water, until the aggregate is uniformly exposed. Rinse the surface with water.

Finishing methods – supplementary finish

Abrasive blast: After steel trowelling, abrasive blast the cured surface to provide texture or to form patterns without exposing the coarse aggregate using fine, hard, sharp, graded abrasive particles.

Coloured applied finish: After machine floating, apply a proprietary liquid or dry shake material to the manufacturer's recommendations, and trowel to achieve the required appearance.

Stamped and coloured pattern finish: Provide a proprietary finishing system.

Polished finish: After steel trowelling, grind the cured surface of the concrete.

Slip-resistant treatment

Surface treatment: Apply silicon carbide granules after floating and before the topping surface has set, and trowel into the surface so that the granules remain exposed.

Application rate: 1 kg/m² evenly distributed.

Slip-resistant treatment to stair treads, nosings, ramps and landings

Surface treatment: To BCA (2022) Table D3D15.

Stair and landing nosing

Surface treatment

General: Apply the surface treatment after floating and before the topping surface has set.

3.4 CONTROL OF MOVEMENT

General

Requirement: Provide control joints as documented and as follows:

- Location:
 - . Over structural control joints.
 - . To divide complex room plans into rectangles.
 - . Around the perimeter of the floor.
 - . At junctions between different substrates.
 - . To divide large topping-finished areas into bays.
 - . At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Control joints to divide topping into bays: Provide joints using one of the following methods:

- Form in situ using square edge steel forms and trowelling a 3 mm radius to edges.
- Form a groove, extending at least one quarter the depth of the section, either by using a grooving tool, by sawing, or by inserting a premoulded strip.
- Install a control joint proprietary product, to manufacturer's recommendations.

3.5 SELF-LEVELLING SCREED

Installation

Requirement: Pour on and spread in conformance with the manufacturer's recommendations. Finish without any bubbles and make sure screed is correctly installed into corners and re-entrant angles.

3.6 JOINT ACCESSORIES

Floor finish dividers

General: Provide a corrosion-resistant metal dividing strip suitably fixed to the substrate, at junctions with differing floor finishes, with top edge flush to the finished floor. If changes of floor finish occur at doorways, make the junction directly below the centre of the closed door.

Weather bars

General: Provide corrosion-resistant weather bars or threshold plates under hinged external doors, located under the centres of closed doors or to manufacturer's recommendations.

3.7 COMPLETION

Curing

General: Prevent premature or uneven drying out and protect from the sun and wind.

Keeping moist: If a proprietary curing agent is not used, as soon as toppings have set sufficiently, keep them moist by water spraying or covering with polyethylene film for 7 days.

Joint sealant

General: If required, seal joints as follows:

- Formed joints: ≤ 25 mm deep with filler and bond breaker.

- Sawn joints: Full depth of cut.

Protection

General: Protect finished work from damage during building operations.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's published use, care and maintenance instructions.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty from the installer.

- Form: Against failure of materials and execution under normal environment and use conditions.
- Period: As offered by the installer.

4 SELECTIONS

4.1 SCHEDULES

Cementitious toppings construction schedule

	A	B	C
Proprietary item	Refer drawings		
Substrate			
Separation layer: Location			
Separation layer: Type			
Thickness (mm)			
Topping function			
Topping method			
Primary finish			
Flatness tolerance class			
Supplementary finish			
Surface treatment			
Slip resistance classification			
Slip resistance product: Colour			
Crushing resistance/soundness			
Topping joints			

Control joints schedule

	A	B	C
Control joint strip: Joint side-plate material	Refer Structural Engineer's drawings and specifications		
Control joint strip: Neoprene colour			
Control joint strip: Width			
Control joint strip: Fixing			
Proprietary slide plate: Product			
Proprietary slide plate: Material			
Proprietary slide plate: Insert colour			
Sealant: Type			
Sealant: Colour			
Sealant: Width (mm)			

Joint accessories schedule

	A	B	C
Floor finish divider: Type			
Floor finish divider: Material			
Floor finish divider: Finish			
Floor finish divider: Size			
Weather bar: Type			
Weather bar: Material			
Weather bar: Finish			
Weather bar: Size			

0621 WATERPROOFING – WET AREAS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide wet area waterproofing systems, as documented.

Performance

Requirements:

- Graded to floor wastes, to dispose of water without ponding.
- Able to prevent moisture entering the substrate or adjacent areas.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *0171 General requirements.*

1.3 STANDARDS**Waterproofing wet areas**

Standard: To AS 3740 (2021).

1.4 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the definitions given in AS 3740 (2021) and the following apply:

- Membranes (waterproof): Impervious barriers to liquid water, which may be:
 - . Installed below floor finishes.
 - . Installed behind the wall sheeting or render.
 - . Installed to the face of the wall sheeting or render.
 - . Applied in liquid or gel form and air cured to form a seamless film.
 - . Applied in sheet form with joints lapped and sealed.
- Waterproofing system: Combinations of membranes, flashings, drainage and accessories that form waterproof barriers and that may be:
 - . Loose-laid.
 - . Bonded to substrates.
- Wet area: An area within a building supplied with a floor waste.

1.5 SUBMISSIONS**Products and materials**

Manufacturer's data: Submit product data sheets.

Type tests: Submit certificates verifying conformance to AS/NZS 4858 (2004) Table 8.1.

Prototypes

General: Apply waterproofing to 10 m² of substrate to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality. Install final surface finish to demonstrate aesthetic affects, physical properties, and quality of materials and execution as applicable.

Records

General: Submit photographic records to EXECUTION, **GENERAL**, **Reporting**.

Flood tests: Submit photographic records to **TESTING**, **Flood tests**.

Samples

Requirement: Submit 300 x 300 mm samples of each type of membrane.

Shop drawings

Requirement: Submit shop drawings showing the following:

- Junctions with vertical surfaces and upstands.
- Junctions at perimeters.
- Drainage details.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.
- Membrane layers.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers as recommended by the manufacturer.

Substrate acceptance: Submit evidence of installer's acceptance of the flooring substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Substrate moisture content test.
- Flood test.
- Electronic leak detection test.
- Seam probe test.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.6 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Substrates prepared and ready for installation of the wet area waterproofing systems.
- Secondary layers prepared and ready for subsequent layers.
- Membranes after installation and before concealment.
- After flood testing, if applicable.

2 PRODUCTS**2.1 GENERAL****Storage and handling**

General: Store and handle to the manufacturer's recommendations and as follows:

- Protect materials from damage.

2.2 MEMBRANES**Standards**

Standard: To AS/NZS 4858 (2004).

Membrane system

Requirement: Proprietary membrane system suitable for the intended internal wet area waterproofing.

Total VOC limits

Requirement: Conform to the following maximum TVOC content:

- Waterproof membrane: 250 g/L.

2.3 ACCESSORIES**Shower tray**

General: Purpose-made jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob on the inside of the tray upstands.

Waterstop angles

Material: Rigid, corrosion-resistant angles compatible with the waterproof membrane system.

Bond breakers

Requirement: Compatible with the extensibility class of the membrane to be used.

Material: Purpose-made bond breaker tapes or fillets of sealant.

Flashings

Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

Liquid membrane reinforcement

Requirement: Flexible fabric compatible with the waterproof membrane system.

Sealants

Requirement: Waterproof or water resistant, flexible, mould-resistant and compatible with the waterproofing system and to the manufacturer's recommendations.

Adhesives

Requirement: Waterproof and compatible with the waterproofing system.

3 EXECUTION

3.1 GENERAL**Reporting**

General: Make progressive photographic records of the waterproofing installation. Label photographs with the date and location.

Timing: Record at the following stages:

- After substrate preparation.
- After primer application.
- After membrane installation.
- After protection from traffic provided.

Liquid applied membranes:

- Record wet film thickness once every 10 m² and compare to the manufacturer's requirements.
- On completion of every 100 m² of each coat, compare the amount of membrane used with the manufacturer's application rate and record the result.

3.2 PREPARATION**Substrates**

General: Prepare substrates as follows:

- Clean and remove any deposit or finish that may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, make sure support members are in full lengths without splicing.
- If floors are solid or continuous:
 - . Remove excessive projections.
 - . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
 - . Fill depressions less than 10 mm with a latex modified cementitious product with feathering eliminated by scabbling the edges.
 - . Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.

Concrete substrates: Cure for more than 28 days.

External corners: Round or arris edges.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to the recommendations of AS 3740 (2021) Appendix F.

Falls

Membrane applied to substrate: Make sure the fall in the substrate conforms to the fall documented for the finish.

Sheet substrate fastening

Requirement: Provide fasteners compatible with the substrate. Mechanically fasten to the supporting structure.

Waterstop angles

Requirement: Provide waterstop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Sizing: Size the vertical leg of the waterstop angle to conform to the requirements of AS 3740 (2021).

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix waterstop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Priming

Compatibility: If required, prime the substrates with compatible primers for adhesion of the membrane system.

Bond breakers

Requirement: After the priming of surfaces, provide bond breakers at wall/floor junctions, hob/wall junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Width: Conform to AS 3740 (2021) Table 4.10.

3.3 INSTALLATION**Ambient conditions**

Requirement: Do not install in conditions outside the manufacturer's recommendations.

Protection

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage and an overlaying finish is installed.

Extent of waterproofing

Waterproof or water resistant surfaces: To the requirements of BCA (2022) F2D2 or BCA (2022) H4D2, as applicable.

Sheet membrane joints

Bituminous sheet membranes:

- Side laps: ≥ 75 mm.
- End laps: ≥ 150 mm.

Synthetic rubber membranes:

- Factory-vulcanized laps: ≥ 40 mm.
- Field side laps: ≥ 50 mm.
- Field end laps: ≥ 100 mm.

PVC membranes:

- Factory-welded laps: ≥ 40 mm.
- Field-welded laps: ≥ 75 mm.

Flashings

Junctions between waterproof surfaces: Provide a bond breaker at internal corners behind flashings.

Junctions between waterproof surfaces and other surfaces: Provide a bead of sealant at the following junctions:

- Waterproof and water resistant surfaces.
- Water resistant and water resistant surfaces.
- Water resistant and non-water resistant surfaces.

Perimeter flashings: Provide continuous flashings to the full perimeter of waterproof areas at wall/floor junctions and to waterstop angles.

Vertical flashings: Provide vertical corner flashings continuous across wall/wall junctions to at least 1800 mm above finished floor level of the shower or base of the bath or tray, or 50 mm above the shower rose, whichever is the higher.

Vertical liquid applied flashings:

- Return legs at least 40 mm on each wall.
- Overlap the vertical termination of the floor waterproofing membrane at least 20 mm.

Vertical sheet flashings:

- Return legs at least 50 mm on each wall.
- Overlap shower tray upstands at least 50 mm.
- Do not penetrate flashing with wall lining fasteners.

Reinforcement: At coves, corners and wall/floor junctions with gaps greater than 3 mm, reinforce liquid applied membranes with reinforcement fabric tape recommended by the membrane manufacturer.

Fold the tape in half lengthways and embed it in the first coat of membrane with one half of the tape on each side of the corner or joint. Apply a second coat of membrane to seal the fabric.

Drainage connections

Floor wastes: Provide floor wastes of sufficient height to accommodate the thickness of floor finishes and bedding at the outlet position. Position leak control flange to drain at membrane level. Turn membrane down 50 mm minimum into the floor waste leak control flanges, and adhere to form a waterproof connection.

Floor wastes in shower trays: Provide drainage of the tile bed and a waterproof connection between the tray and the drain.

Preformed drainage channels:

- With continuous leak control flanges: Provide a continuous waterproof connection between the membrane and the channel.
- Without leak control flanges: Provide continuous waterproofing under the channel and terminate the membrane at a floor waste with a recessed leak control flange.

Vertical membrane terminations

Upstands:

- Shower areas with hobs and step-downs: Minimum 150 mm above the highest finished tile level of the shower area or 25 mm above the maximum retained water level, whichever is the greater.
- Shower areas without hobs: Minimum 150 mm above the highest finished tile level of the floor within the shower area.
- Shower areas with ceiling mounted shower rose: To the full height of the wall.
- Bath without an integral upstand edge without showers over: Minimum 150 mm above the shower rose connection.
- Bath with an integral upstand edge, bath with a shower over or bath adjoining an unenclosed shower: Minimum 150 mm above the bath edge.

Anchoring: Secure sheet membranes along the top edge.

Edge protection: Protect edges of the membrane.

Showers with hobs

General: Provide masonry, concrete or corrosion-resistant metal hobs. Fix securely to the floor, seal against walls and make flush all gaps, joints and intersections before applying the membrane.

Masonry or concrete hob: Extend membrane over the hob and into the room at least 50 mm.

- Autoclaved aerated concrete hobs: Prime before applying the membrane.

Metal hob: Provide metal angle with height at least 15 mm above the finished floor level of the floor outside the shower. Terminate the membrane within 5 mm from the top of the angle. Seal the gap between the shower screen and the angle.

Showers with step-downs

Level of shower area: At least 15 mm below the finished floor level outside the shower.

Framed shower screens:

- Terminate the membrane directly below the floor tiles below the shower screen sill mounted on the upper level of the step-down.
- Support and adhere the membrane to a waterstop angle fixed securely to the substrate.

Frameless shower screens:

- Install a waterstop angle where the base of the shower screen will be installed and across the opening of the shower.
- Install membranes on both sides of the waterstop angle and turn the membranes up against the angle. Extend the membrane at least 50 mm into the adjacent area
- Finish membrane flush with the underside of tiles.
- Provide a sealant joint between the waterstop angle and tiles.
- Install the shower screen with the inside face flush with the step-down.

Showers without hobs or step-downs

Framed shower screens:

- Install a waterstop angle directly below where the base of the shower screen sill will be installed.
- Size the angle so that the vertical leg finishes at least 5 mm above the level of the tiles.
- Support and adhere the membrane over the waterstop angle and extend the membrane at least 50 mm into the adjacent area.

Frameless shower screens:

- Install a waterstop angle directly below where the base of the shower screen will be installed.
- Support and adhere the membrane over the waterstop angle and extend the membrane at least 50 mm in to the adjacent area.
- Install a capping angle over the membrane and vertical leg of the waterstop angle to protect the exposed membrane.
- Install the shower screen over the capping angle.

Framed or frameless shower screens with trench drain located below screen:

- Install a waterstop angle where the outer edge of the trench drain to the perimeter of the shower will be installed.
- Size the angle so that the vertical leg finishes at the underside of the tiles.
- Support and adhere the membrane over the waterstop angle and terminate the membrane at floor wastes as documented in **Drainage connections**.
- Install the trench drain with the shower screen located vertically above it.

Unenclosed showers

Requirement: Extend membrane at least 1500 mm into the room from the shower rose outlet, on the walls and floor.

Preformed shower bases

Preformed shower bases with integral perimeter upstands:

- Support shower bases to prevent distortion or cracking.
- Recess shower base into walls or batten off wall lining sufficiently to allow water resistant wall finishes to overlap the integral upstands along the top edge of the shower base.
- Maintain the structural integrity of walls that are rebated.

Baths and spas

Baths with integral upstands:

- Recess bath edges into walls or batten off wall lining sufficiently to allow water resistant wall finishes to overlap the integral upstands.
- Maintain the structural integrity of walls that are rebated.

Baths without integral upstands or with showers over:

- Form a rebate in the wall to receive the bath edge.
 - . Rendered masonry walls: Form or chase in the render.
 - . Framed and lined walls: Form in the wall lining with a corrosion-resistant lipped channel.
- Waterproof the wall above and below the rebate, including the rebate, and the floor area under the bath.

- Seal the edge of the bath into the rebate.

Plinth-mounted insert baths and spas:

- Line framed enclosures for insert baths.
- Form an upstand on the inside edge of the enclosure opening to receive the bath with an angle or compressible foam rod.
- Waterproof walls abutting the enclosure, the top of the plinth and the interior and exterior of the enclosure.
- After tiling the walls, top of the plinth and exterior of the enclosure, install the bath with its downturn edge lip outside the upstand formed on the edge of the opening and seal the lip to the tiles.
- Minimum dimension from wall or free edge of the plinth to insert bath: 100 mm.

Taps and spouts

Requirement: Waterproof penetrations for taps and spouts with preformed flange systems or a sealant.

Provision for servicing: Install taps so tap washers or ceramic discs can be serviced without damaging the waterproofing or seal.

Wall recesses

Requirement: Support all faces of the recess and line with the same sheet material as the adjacent wall. Fall base of recess towards the shower area. Flash all junctions and waterproof all surfaces.

Curing of liquid membrane systems

General: To the manufacturer's recommendations.

Curing: Allow membrane to fully cure before tiling.

Overlaying finishes on membranes

Requirement: Protect waterproof membranes with compatible water resistant surface materials that do not cause damage to the membrane.

Suitable materials: Conform to AS 3740 (2021).

Bonded or partially bonded membranes: If the topping or bedding mortar is to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

3.4 TESTING

Substrate tests

Moisture content: Test substrate for suitability for the installation of membranes to AS 3740 (2021) Appendix F.

- Maximum relative humidity of concrete or cementitious screeds: To AS 3740 (2021) Appendix F2.4.
- Moisture content of timber and plywood substrates: To AS 3740 (2021) Appendix F2.3.

Flood tests

Requirement: To AS 3740 (2021) Appendix C2.

Records:

- Make photographic records of the flooded areas and adjacent areas.
- Label photographs with the date and location.

Electronic leak detection test

Requirement: To AS 3740 (2021) Appendix C3.

Seam probe test

Requirement: To AS 3740 (2021) Appendix C4.

3.5 COMPLETION

Reinstatement

Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.

- Period: As offered by the supplier and the applicator.

4 SELECTIONS

4.1 SYSTEMS

Liquid membrane system schedule

	A	B	C
Proprietary system			
Material type			
Tensile stress at break (MPa)			
Tensile strain (elongation at break) (%)			
Method of application			
Number of coats			
Application rate (L/m ²)			
Dry film thickness (total) (mm)			
Reinforcement			
Primer			
Base layer			
Top layer			
Waterstop angles			
Bond breakers			

Single layer sheet membrane system schedule

	A	B	C
Proprietary system			
System type			
Sheet type			
Sheet thickness (mm)			
Base weight (kg/m ²)			
Tensile strength (MPa)			
Tensile strain (elongation at break) (%)			
Method of application			
Primer			
Bonding agent			
Waterstop angles			
Bond breakers			

Shower tray schedule

	A	B	C
Material			
Dimensions (mm)			
Surface protection/finish			

0621P DRIBOND CONSTRUCTION CHEMICALS WATERPROOFING – WET AREAS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide wet area waterproofing systems by Dribond Construction Chemicals, as documented.

Performance

Requirements:

- Graded to floor wastes, to dispose of water without ponding.
- Able to prevent moisture entering the substrate or adjacent areas.

1.2 COMPANY CONTACTS

Dribond Construction Chemicals technical contacts

Website: www.constructionchemicals.com.au/contact-us/.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*

1.4 STANDARDS

Waterproofing wet areas

Standard: To AS 3740 (2021).

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Website: www.constructionchemicals.com.au/tech-info/.

1.6 INTERPRETATION

Definitions

General: For the purposes of this worksection, the definitions given in AS 3740 (2021) and the following apply:

- Membranes (waterproof): Impervious barriers to liquid water, which may be:
 - . Installed below floor finishes.
 - . Installed behind the wall sheeting or render.
 - . Installed to the face of the wall sheeting or render.
 - . Applied in liquid or gel form and air cured to form a seamless film.
 - . Applied in sheet form with joints lapped and sealed.
- Waterproofing system: Combinations of membranes, flashings, drainage and accessories that form waterproof barriers and that may be:
 - . Loose-laid.
 - . Bonded to substrates.
- Wet area: An area within a building supplied with a floor waste.

1.7 SUBMISSIONS

Products and materials

Manufacturer's data: Submit product data sheets.

Type tests: Submit certificates verifying conformance to AS/NZS 4858 (2004) Table 8.1.

Prototypes

General: Apply waterproofing to 10 m² of substrate to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality. Install final surface finish to demonstrate aesthetic affects, physical properties, and quality of materials and execution as applicable.

Records

General: Submit photographic records to EXECUTION, **GENERAL, Reporting**.

Flood tests: Submit photographic records to **TESTING, Flood tests**.

Samples

Requirement: Submit 300 x 300 mm samples of each type of membrane.

Shop drawings

Requirement: Submit shop drawings showing the following:

- Junctions with vertical surfaces and upstands.
- Junctions at perimeters.
- Drainage details.
- Control joints.
- Flashings.
- Penetrations.
- Corners.
- Terminations and connections.
- Membrane layers.

Subcontractors

General: Submit names and contact details of proposed suppliers and installers as recommended by the manufacturer.

Substrate acceptance: Submit evidence of installer's acceptance of the flooring substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Substrate moisture content test.
- Flood test.
- Electronic leak detection test.
- Seam probe test.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties**.

1.8 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Substrates prepared and ready for installation of the wet area waterproofing systems.
- Following primer application.
- Membranes after installation and before concealment.
- After flood testing, if applicable.

2 PRODUCTS

2.1 GENERAL

Product substitution

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

Storage and handling

General: Store and handle to Dribond's recommendations and as follows:

- Protect materials from damage.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

2.2 MEMBRANES

Standards

Standard: To AS/NZS 4858 (2004).

Total VOC limits

Requirement: Conform to the following maximum TVOC content:

- Waterproof membrane: 250 g/L.

2.3 DRIBOND CONSTRUCTION CHEMICALS MEMBRANE SYSTEMS

Hydrathane

Description: One-part, water-based, polyurethane waterproofing membrane.

Liquid Flash 1

Description: Premixed, one-pack, water-based microfibre reinforced acrylic, flexible waterproofing membrane.

Liquid Flash 2

Description: Two-pack, microfibre reinforced, cement acrylic waterproofing membrane.

Flexible Sealer

Description: Pre-mixed, one-pack, water-based, brush/roller applied acrylic waterproofing membrane.

Primebond

Description: Acrylic based liquid primer.

Primax

Description: Two-pack, water resistant, bonding primer.

2.4 ACCESSORIES

Shower tray

General: Purpose-made jointless shower tray, with wall upstands at least 50 mm higher than the hob upstands. Set hob on the inside of the tray upstands.

Waterstop angles

Material: Rigid, corrosion-resistant angles compatible with the waterproof membrane system.

Bond breakers

Requirement: Compatible with the extensibility class of the membrane to be used.

Material: Purpose-made bond breaker tapes or fillets of sealant.

Flashings

Requirement: Flexible waterproof flashings compatible with the waterproof membrane system.

Liquid membrane reinforcement

Description: Flexible fabric compatible with the waterproof membrane system.

Product: Reomat tape - 140 mm wide.

Sealants

Requirement: Waterproof or water resistant, flexible, mould-resistant and compatible with the waterproofing system and to the manufacturer's recommendations.

Adhesives

Requirement: Waterproof and compatible with the waterproofing system.

3 EXECUTION

3.1 GENERAL

Reporting

General: Make progressive photographic records of the waterproofing installation. Label photographs with the date and location.

Timing: Record at the following stages:

- After substrate preparation.
- After primer application.
- After membrane installation.
- After protection from traffic provided.

Liquid applied membranes:

- Record wet film thickness once every 10 m² and compare to the manufacturer's requirements.
- On completion of every 100 m² of each coat, compare the amount of membrane used with the manufacturer's application rate and record the result.

3.2 PREPARATION

Substrates

General: Prepare substrates as follows:

- Clean and remove any deposit or finish that may impair adhesion of membranes.
- If walls are plastered, remove loose sand.
- If walls or floors are framed or discontinuous, make sure support members are in full lengths without splicing.
- If floors are solid or continuous:
 - . Remove excessive projections.
 - . Fill voids and hollows greater than 10 mm with abrupt edges with a cement:sand mix not stronger than the substrate nor weaker than the bedding.
 - . Fill depressions less than 10 mm with a latex modified cementitious product with feathering eliminated by scabbling the edges.
 - . Fill cracks in substrates wider than 1.5 mm with a filler compatible with the membrane system.

Concrete substrates: Cure for more than 28 days.

External corners: Round or arris edges.

Moisture content

Requirement: Verify that the moisture content of the substrate is compatible with the water vapour transmission rate of the membrane system by testing to the recommendations of AS 3740 (2021) Appendix F.

Falls

Membrane applied to substrate: Make sure the fall in the substrate conforms to the fall documented for the finish.

Sheet substrate fastening

Requirement: Provide fasteners compatible with the substrate. Mechanically fasten to the supporting structure.

Waterstop angles

Requirement: Provide waterstop angles at door thresholds and shower enclosures to support the waterproof membrane at junctions between waterproofed and non-waterproofed areas.

Sizing: Size the vertical leg of the waterstop angle to conform to the requirements of AS 3740 (2021).

Corners: Cut the horizontal leg and bend the vertical leg at corners instead of forming vertical joints between separate lengths of angle.

Fixing: Fix waterstop angles to the substrate with compatible sealant or adhesive and corrosion-resistant countersunk or wafer head screws.

Priming

General: Prime the substrates with a primer compatible with the membrane system, suited to the substrate surface and to Dribond's recommendations.

Bond breakers

Requirement: After the priming of surfaces, provide bond breakers at wall/floor junctions, hob/wall junctions and at control joints where the membrane is bonded to the substrate.

Sealant fillet bond breakers:

- Application: Form a triangular fillet or cove of sealant to internal corners within the period recommended by the membrane manufacturer after the application of the primer.
- Width: Conform to AS 3740 (2021) Table 4.10.

3.3 INSTALLATION

Ambient conditions

Requirement: Do not install in conditions outside the manufacturer's recommendations.

Protection

Damage: Protect membrane from damage during installation and for the period after installation until the membrane achieves its service characteristics that resist damage and an overlaying finish is installed.

Extent of waterproofing

Waterproof or water resistant surfaces: To the requirements of BCA (2022) F2D2 or BCA (2022) H4D2, as applicable.

Flashings

Junctions between waterproof surfaces: Provide a bond breaker at internal corners behind flashings.

Junctions between waterproof surfaces and other surfaces: Provide a bead of sealant at the following junctions:

- Waterproof and water resistant surfaces.
- Water resistant and water resistant surfaces.
- Water resistant and non-water resistant surfaces.

Perimeter flashings: Provide continuous flashings to the full perimeter of waterproof areas at wall/floor junctions and to waterstop angles.

Vertical flashings: Provide vertical corner flashings continuous across wall/wall junctions to at least 1800 mm above finished floor level of the shower or base of the bath or tray, or 50 mm above the shower rose, whichever is the higher.

Vertical liquid applied flashings:

- Return legs at least 40 mm on each wall.
- Overlap the vertical termination of the floor waterproofing membrane at least 20 mm.

Vertical sheet flashings:

- Return legs at least 50 mm on each wall.
- Overlap shower tray upstands at least 50 mm.
- Do not penetrate flashing with wall lining fasteners.

Reinforcement: At coves, corners and wall/floor junctions with gaps greater than 3 mm, reinforce liquid applied membranes with reinforcement fabric tape to provide critical movement reinforcement.

Drainage connections

Floor wastes: Provide floor wastes of sufficient height to accommodate the thickness of floor finishes and bedding at the outlet position. Position leak control flange to drain at membrane level. Turn membrane down 50 mm minimum into the floor waste leak control flanges, and adhere to form a waterproof connection.

Floor wastes in shower trays: Provide drainage of the tile bed and a waterproof connection between the tray and the drain.

Preformed drainage channels:

- With continuous leak control flanges: Provide a continuous waterproof connection between the membrane and the channel.

- Without leak control flanges: Provide continuous waterproofing under the channel and terminate the membrane at a floor waste with a recessed leak control flange.

Vertical membrane terminations

Upstands:

- Shower areas with hobs and step-downs: Minimum 150 mm above the highest finished tile level of the shower area or 25 mm above the maximum retained water level, whichever is the greater.
- Shower areas without hobs: Minimum 150 mm above the highest finished tile level of the floor within the shower area.
- Shower areas with ceiling mounted shower rose: To the full height of the wall.
- Bath without an integral upstand edge without showers over: Minimum 150 mm above the shower rose connection.
- Bath with an integral upstand edge, bath with a shower over or bath adjoining an unenclosed shower: Minimum 150 mm above the bath edge.

Edge protection: Protect edges of the membrane.

Showers with hobs

General: Provide masonry, concrete or corrosion-resistant metal hobs. Fix securely to the floor, seal against walls and make flush all gaps, joints and intersections before applying the membrane.

Masonry or concrete hob: Extend membrane over the hob and into the room at least 50 mm.

- Autoclaved aerated concrete hobs: Prime before applying the membrane.

Metal hob: Provide metal angle with height at least 15 mm above the finished floor level of the floor outside the shower. Terminate the membrane within 5 mm from the top of the angle. Seal the gap between the shower screen and the angle.

Showers with step-downs

Level of shower area: At least 15 mm below the finished floor level outside the shower.

Framed shower screens:

- Terminate the membrane directly below the floor tiles below the shower screen sill mounted on the upper level of the step-down.
- Support and adhere the membrane to a waterstop angle fixed securely to the substrate.

Frameless shower screens:

- Install a waterstop angle where the base of the shower screen will be installed and across the opening of the shower.
- Install membranes on both sides of the waterstop angle and turn the membranes up against the angle. Extend the membrane at least 50 mm into the adjacent area
- Finish membrane flush with the underside of tiles.
- Provide a sealant joint between the waterstop angle and tiles.
- Install the shower screen with the inside face flush with the step-down.

Showers without hobs or step-downs

Framed shower screens:

- Install a waterstop angle directly below where the base of the shower screen sill will be installed.
- Size the angle so that the vertical leg finishes at least 5 mm above the level of the tiles.
- Support and adhere the membrane over the waterstop angle and extend the membrane at least 50 mm into the adjacent area.

Frameless shower screens:

- Install a waterstop angle directly below where the base of the shower screen will be installed.
- Support and adhere the membrane over the waterstop angle and extend the membrane at least 50 mm in to the adjacent area.
- Install a capping angle over the membrane and vertical leg of the waterstop angle to protect the exposed membrane.
- Install the shower screen over the capping angle.

Framed or frameless shower screens with trench drain located below screen:

- Install a waterstop angle where the outer edge of the trench drain to the perimeter of the shower will be installed.

- Size the angle so that the vertical leg finishes at the underside of the tiles.
- Support and adhere the membrane over the waterstop angle and terminate the membrane at floor wastes as documented in **Drainage connections**.
- Install the trench drain with the shower screen located vertically above it.

Unenclosed showers

Requirement: Extend membrane at least 1500 mm into the room from the shower rose outlet, on the walls and floor.

Preformed shower bases

Preformed shower bases with integral perimeter upstands:

- Support shower bases to prevent distortion or cracking.
- Recess shower base into walls or batten off wall lining sufficiently to allow water resistant wall finishes to overlap the integral upstands along the top edge of the shower base.
- Maintain the structural integrity of walls that are rebated.

Baths and spas

Baths with integral upstands:

- Recess bath edges into walls or batten off wall lining sufficiently to allow water resistant wall finishes to overlap the integral upstands.
- Maintain the structural integrity of walls that are rebated.

Baths without integral upstands or with showers over:

- Form a rebate in the wall to receive the bath edge.
 - . Rendered masonry walls: Form or chase in the render.
 - . Framed and lined walls: Form in the wall lining with a corrosion-resistant lipped channel.
- Waterproof the wall above and below the rebate, including the rebate, and the floor area under the bath.
- Seal the edge of the bath into the rebate.

Plinth-mounted insert baths and spas:

- Line framed enclosures for insert baths.
- Form an upstand on the inside edge of the enclosure opening to receive the bath with an angle or compressible foam rod.
- Waterproof walls abutting the enclosure, the top of the plinth and the interior and exterior of the enclosure.
- After tiling the walls, top of the plinth and exterior of the enclosure, install the bath with its downturn edge lip outside the upstand formed on the edge of the opening and seal the lip to the tiles.
- Minimum dimension from wall or free edge of the plinth to insert bath: 100 mm.

Taps and spouts

Requirement: Waterproof penetrations for taps and spouts with preformed flange systems or a sealant.

Provision for servicing: Install taps so tap washers or ceramic discs can be serviced without damaging the waterproofing or seal.

Wall recesses

Requirement: Support all faces of the recess and line with the same sheet material as the adjacent wall. Fall base of recess towards the shower area. Flash all junctions and waterproof all surfaces.

Curing of liquid membrane systems

General: To the manufacturer's recommendations.

Curing: Allow membrane to fully cure before tiling.

Overlaying finishes on membranes

Requirement: Protect waterproof membranes with compatible water resistant surface materials that do not cause damage to the membrane.

Suitable materials: Conform to AS 3740 (2021).

Bonded or partially bonded membranes: If the topping or bedding mortar is to be bonded to the membrane, provide sufficient control joints in the topping or bedding mortar to reduce the movement over the membrane.

3.4 TESTING

Substrate tests

Moisture content: Test substrate for suitability for the installation of membranes to AS 3740 (2021) Appendix F.

- Maximum relative humidity of concrete or cementitious screeds: To AS 3740 (2021) Appendix F2.4.
- Moisture content of timber and plywood substrates: To AS 3740 (2021) Appendix F2.3.

Flood tests

Requirement: To AS 3740 (2021) Appendix C2.

Electronic leak detection test

Requirement: To AS 3740 (2021) Appendix C3.

Seam probe test

Requirement: To AS 3740 (2021) Appendix C4.

3.5 COMPLETION

Reinstatement

Extent: Repair or replace faulty or damaged work. If the work cannot be repaired satisfactorily, replace the whole area affected.

Warranties

Requirement: Cover materials and workmanship in the terms of the warranty in the form of interlocking warranties from the supplier and the applicator.

- Form: Against failure of materials and execution under normal environment and use conditions.

Materials:

- Warranty period: 10 years.
- Warranty terms: As offered by DRIBOND.

4 SELECTIONS

4.1 SYSTEMS

Dribond liquid applied membrane systems schedule

	1A	1B	1C	1D
Proprietary system	Dribond	Dribond	Dribond	Dribond
Membrane	Flexible Sealer	Hydrathane	Liquid Flash 1	Liquid Flash 2
Material type	Pre-mixed, one-pack, water-based, acrylic	One-part, water-based, polyurethane	Premixed, one-pack, water-based microfibre reinforced acrylic	Two-pack, microfibre reinforced, cement acrylic
Tensile strain (elongation at the break) (%)	450	468	420	201
Tensile stress at break (MPa)	1.3	2.2	1.5	1.9
Primer				
Number of coats (minimum)	2	2	2	2
Reinforcement	Reomat	Reomat	Reomat	Reomat
Membrane first coat	Flexible Sealer	Hydrathane	Liquid Flash 1	Liquid Flash 2
Membrane second coat	Flexible Sealer	Hydrathane	Liquid Flash 1	Liquid Flash 2
Method of application	Thick brush or roller	Thick brush or roller	Brush	Thick brush or roller
Application rate/coat (L/m ²)	1.0	Floors: 0.66 Walls: 1.0	1.0	0.5

	1A	1B	1C	1D
Dry film thickness (total) (mm)	1.5	Floors: 1.0 Walls: 0.6	1.5	1.5
Water stop angle				
Bond breakers	Reinforced membrane strip, 150 mm wide.	Reinforced membrane strip, 150 mm wide.	Reinforced membrane strip, 150 mm wide.	Reinforced membrane strip, 150 mm wide.

Shower tray schedule

	A	B	C
Material			
Dimensions (mm)			
Surface protection/finish			

0642 WALLCOVERINGS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide wallcovering, as documented.

Performance

Requirements: Install wallcovering conforming to the following:

- Consistent in colour, pattern and texture.
- Free of sags, blisters, wrinkles, gaps or other discontinuities.
- Fully adhered.
- Smooth.
- Resistant to expected impacts in use.
- Resistant to environmental degradation within the manufacturer's stated life span.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements.*

1.3 INTERPRETATION

Definitions

General: For the purposes of this worksection, the following definitions apply:

- Booking (book): The procedure of folding pasted surfaces together for easier handling, when applying paste onto wallcoverings.
- Component layers (of wallcoverings):
 - . Decorative (top) layer (wallpaper): Consisting of ink and a protective polymer coating applied to the top of the intermediate layer. The design and/or texture is printed using various methods such as gravure, flexography, surface printing and screen-printing.
 - . Intermediate layer (or the ground): Providing the surface upon which the decorative layer is printed and the background colour.
 - . Backing: Is the part of the wallcovering that adheres to the wall substrate. The backing material includes woven and non-woven fabrics and lightweight paper products.
- Fabric pests: Insects that have the ability to feed on keratin, a proteinaceous constituent of wool and other animal hair. This includes clothes moths, tapestry moths, carpet beetles and other insect species that can damage fabrics by chewing through.
- Grasscloth wallpapers: Handcrafted natural fibre wallpaper made by gluing grasses or vines to a paper backing.
- Lining paper (wall liner): A thick, plain wallcovering, available in a variety of weights, installed under the decorative wallpaper as a preparatory or foundation layer to smooth out rough, damaged or textured walls.
- Match (pattern match): The point where the design matches at the seams.
- Paste the wall (non-woven): Papers installed by applying paste to the wall rather than the paper. The paper can be removed in one piece.
- Primer: An oil alkyd or acrylic based coating used to improve bonding of wallcoverings to hard, glossy, slick, slippery or non-porous surfaces.
- Primer/sealer: An oil alkyd or acrylic based coating that combines the functions of a sealer and a primer.
- Sealer (wall coverings): An oil alkyd or acrylic based coating for sealing porous substrates so that adhesives are not absorbed into the wall and there are no bleed throughs to the wallcovering.

- Size (sizing): A liquid painted onto walls to prepare them for the wallpaper. It creates a slippery surface of uniform porosity so that wallpaper slides easily into place and adheres evenly.
- Wallcovering: A flexible sheet of paper, fabric, veneer or vinyl with a repeating pattern for adhering on walls as a decorative finish and protection.
- Wallpaper type - Unpasted: Papers with no paste applied to the backing. Paste is applied at the installation stage by brush or a pasting machine.
- Wallpaper type - Prepasted: Papers with a cured adhesive applied to the backing that can be activated with water.

1.4 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Requirement: For each type of finish, submit manufacturer's product data of the following:

- Product data sheets.

Pest resistant materials: Submit evidence that textile wallcoverings have been treated for resistance to fabric pests.

Samples

Requirement: For each type of wallcovering, submit a sample the width of the roll, and at least 2000 mm long or the length of one pattern repeat, whichever is the greater.

Warranties

Requirement: For each type of wallcovering, submit the manufacturer and installer's warranty for material and workmanship.

1.5 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Completion of substrate surface preparation.
- After hanging lining paper.
- Wallcovering set-out.
- After hanging subsequent wallcovering.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Delivery: Deliver wallcovering and adhesive in sealed, unopened wrapping or containers clearly marked with the supplier's identification label.

Storage: Store materials in sealed, unopened wrapping or containers in a secure, lockable, clean, dry, temperature controlled, well-ventilated area conforming to the manufacturer's recommendations. Store in a flat position to prevent damage to roll ends away from direct sunlight. Do not cross stack.

Storage area conditions: 15°C to 20°C and with relative humidity of 40% to 60%, as recommended by the manufacturer.

2.2 FIRE PERFORMANCE

Fire hazard properties

Group number: To AS 5637.1 (2015).

2.3 MATERIALS

General

Wallcovering: Provide rolls of wallcovering of one colour or design, from the same batch/production run.

Timber veneer wallcovering: Provide wallcovering from the same flitch.

Adhesives, size, fillers

Adhesives: Waterborne, low moisture content, non-staining, starch, cellulose or synthetic resin, containing mildew inhibitors and a fire retardant:

- Strippable adhesives: Adhesives that allow dry stripping of fabric backed vinyls from plasterboard and other lining or partitions without damaging the face of the substrate.
- Adhesives for sealed or non-absorbent surfaces: Quick drying, low moisture content adhesive with a blend of synthetic polymers that allow direct hanging of wide wallcoverings onto a non-absorbent substrate surface.

Primer/sealer and size: Proprietary products to the wallcovering manufacturer's recommendations and compatible with the adhesive.

Latex size: Provide for the following wallcovering installations:

- Paper-backed wallpaper, unpasted or prepasted.
- Fabric backed or heavyweight vinyl.
- Heavily embossed coverings or foil.
- If the paper is applied to a gloss or semi-gloss surface.

Granulated size: Provide under non-woven wallpapers and paste the wall type wallcoverings.

2.4 WALLPAPERS**Decorative papers generally**

Description: Mildew-resistant, printed and/or embossed wallpaper, as documented.

Lining papers

Description: Non-woven, synthetic underlay.

Grasscloth wallpapers

Description: Handcrafted, mildew-resistant, natural fibre applied to paper backing with a clear adhesive, as documented.

2.5 VINYL WALLCOVERINGS**General**

Description: Mildew-resistant, vinyl coated substrate or solid vinyl laminated to a substrate.

2.6 TEXTILE WALLCOVERINGS**General**

Description: Mildew-resistant, wallcovering of textile fibre laminated to a substrate.

Pest resistance: Provide textile wallcoverings containing animal fibres that have been treated for resistance to fabric pests and tested to AS 2001.6.1 (1980).

2.7 WOVEN GLASS FIBRE WALLCOVERINGS**General**

Description: Mildew-resistant, woven glass fibre wallcovering for a subsequent paint finish, as documented.

2.8 FLEXIBLE TIMBER VENEER WALLCOVERINGS**General**

Description: Mildew-resistant, flexible timber veneer applied to a backing with a clear water-based adhesive, as documented.

3 EXECUTION**3.1 GENERAL****Order of work**

Other trades: Before starting wallcovering installation, complete the work of other trades, as far as practicable, within the area affected by the installation, except for the installation of fittings and laying flooring materials.

Painting of adjoining surfaces: Complete and allow to dry out before hanging wallcovering.

Material inspection

Site delivery: Check materials are free from damage and there is sufficient material from the one batch before cutting and hanging. If matching to an existing wall, check colour match before proceeding.

Acclimatisation

Storage: Remove packaging and store wallcovering in the installation space not less than the following before installing:

- Generally: 36 hours.
- Timber wallcovering: 48 hours.
- Grasscloth wallpapers: 72 hours.

Ambient conditions

General: Carry out installation under the following conditions:

- Provide continuous ventilation to the work area during the hanging and drying periods.
- Hang wallcovering under conditions that will not adversely affect the finished work.
- Temperature range: 10°C to 30°C, and to the wallcovering manufacturer's recommendations.
- Work area lighting level: Minimum 325 lux and matching the finished space lighting condition.
- Away from direct sunlight and drafts.

Constant site conditions: Maintain site at a constant relative humidity of 65% maximum.

Protection

Other surfaces: Before preparing substrate, protect floors and other finished surfaces against soiling and marking.

Removable fixtures and furniture: Remove hardware and fittings, including door furniture, switch plates, light fittings before installing wallcovering.

- Labelling and storage: Attach labels or mark fixtures using a non-permanent method, identifying the location and refixing instructions. Store and protect against damage.

Difficult to remove fixtures: If removal is impractical or difficult, apply surface protection before substrate preparation.

Electrical safety

Metallic wallcoverings: Prevent contact with live wires or metal components of socket outlets or switches.

Seaming

Seams and edges: Tightly butt to each other and to adjoining features. Do not make horizontal joints within vertical drops.

Vinyl wallcoverings

Prohibition: Do not install over oil based timber stains.

3.2 SUBSTRATE PREPARATION**Substrate condition**

Substrate surface: Smooth, clean, dry, chemically neutral, structurally sound and free of mildew, mould, flaking materials, cracks, stains and defects.

Maximum surface variation: 3 mm in a 3000 mm straightedge.

Moisture content:

- Generally: To the wallcovering manufacturer's recommendations.
- Plasterboard, plastered substrates, concrete and masonry units: If the substrate moisture content exceeds 5%, measured with a moisture meter, do not hang.

Cleaning substrates: Remove substances that may impair wallcovering bonding as follows:

- Dirt, grease, polish, water soluble stains: Wash with a detergent solution to remove stain and rinse off with clean water. Allow surface to dry completely.
- Efflorescence: Brush down with a stiff brush to remove all powdery salt residues and leave for 48 hours. If required, repeat procedure until remedied.
- Mould growth and algae: Treat with a fungicidal wash to the manufacturer's recommendations. Make sure there is no immediate regrowth.
- Holes, cracks and irregularities: Fill with a filler and sand smooth with an 80 grit sandpaper. Remove dust with a soft brush.

- Painting adjacent surfaces: When painting adjoining surfaces, avoid painting areas to be finished with wallcovering. If this occurs, rub down paint to provide a good keying surface.

Wallcovering and substrate colour: Apply pigmented primer/sealer or install paper lining compatible with the wallcovering colour to minimise the underlying colour showing through. Provide a light coloured substrate for light coloured wallcovering and dark coloured substrate for dark wallcovering.

Absorbent substrate surfaces

Uncoated surfaces: For surfaces including rendered/plastered surfaces, plasterboard, hardboard and plywood, rub down the surface with glass paper, 120/150 grit sandpaper or similar, to remove loose, flaky and powdery materials. Apply a matt emulsion or pigmented primer/sealer or apply paper lining.

Rendered/plastered surfaces: Allow to dry out for minimum 4 weeks, longer in humid conditions.

Coated surfaces: For absorbent surfaces coated with paint, liners and old wallcovering, conform to the following:

- Flaking paint: Remove all traces of unstable coating and treat as for uncoated surfaces. If all traces cannot be removed, apply an oil based alkali-resisting primer. Allow 48 hours to dry, rub down with an abrasive paper to form a smooth surface and then treat as for uncoated surfaces.
- Painted surfaces: Test substrate soundness by holding a wet sponge or cloth to the surface for 15 seconds. Rub the surface vigorously with a cloth, and if little or no paint is removed, the surface is considered sound. Rub down to provide a keying surface, apply one coat of primer and allow to dry. If large amounts of paint come off, treat as for surfaces with flaking paint.
- Previously papered substrates: Remove the old wallcovering and wash the surface down to remove old adhesive and treat as for uncoated surfaces. If required, fill any holes and cracks and sand smooth with sandpaper before applying priming/sealing or lining.

Non-absorbent substrate surfaces

Requirement: For uncoated surfaces (including fibreglass, laminates, metal, ceramic tiles) and coated surfaces (including painted, primed and sealed surfaces), conform to the following:

- Wash down surface with a detergent solution.
- Rub down the surface to provide key. If required, use a scraper to remove imperfections.
- Rinse with clean water to remove any contaminants.
- Apply primer/sealer as recommended by the wallcovering manufacturer.

Metal surfaces: Prepare and prime to the primer manufacturer's recommendations.

Priming and sealing

Application: Prime/seal substrate surface using the following:

- Wall lining with latex or oil based paint: Acrylic primer.
- Wall lining with low gloss paint: Primer/sealer.
- Newly plastered surfaces: Size mixed with the adhesive to be used for hanging the final wallcovering.
- Older plastered surfaces with latex or oil based paint: Acrylic primer or primer/sealer.
- Any wall with defects or damage: Primer/sealer.
- Any wall with stains or mould: Stain killer primer.
- New or repaired wall lining: Primer/sealer.
- Wall surface with residual wallpaper paste: Primer/sealer.

Sealing: Apply one coat of pigmented sealer as recommended by the wallcovering manufacturer. Allow the paint to dry then lightly rub down.

Substrates for non-impervious wallpapers: Seal and apply one coat of cellulose based size, followed by lining paper.

Substrates for impervious metallic foils: Seal and prime substrate as follows:

- Remove minor imperfections, apply one coat of ready mixed latex size, and allow to dry.
- Apply prepasted lining paper, or unpasted lining paper using cellulose type adhesive. Rub down when dry.
- Apply a second lining to achieve a smooth surface, allow to dry and lightly rub down.
- After 48 hours minimum, when the surface is thoroughly dry, apply the metallic foil.

3.3 LININGS

Application

Requirement: Line the substrate with lining paper before hanging duplex, flock, metallic foils, hand-printed or heavyweight and grasscloth wallpapers.

Lining paper type and application: Install lining paper to substrate surfaces as follows:

- Badly cracked surfaces: Strong brown.
- Damp walls: Pitch coated.
- Surfaces liable to move: Cotton backed.
- Other surfaces: Common pulp quality, 165 to 365 kg/ream.

Hanging

Requirement: Install lining paper in a direction transverse to the final paper, without gaps or overlaps, to form a smooth wrinkle-free surface for the finished installation. Do not start hanging the final decorative paper until the lining paper has completely dried.

3.4 PREPARATION OF WALLCOVERINGS

General

Requirement: Keep adhesive/paste off wallcovering face. If adhesive/paste gets on to the face, wipe it off with a damp sponge after hanging each strip and trimming.

Adhesive/paste type: To the wallcovering manufacturer's recommendations.

Prepasted wallcoverings paste activation

Requirement: Soak prepasted wallcovering with lukewarm water or brush on paste activator as recommended by the manufacturer. Allow wallcoverings of the same type to soak for equal times, long enough to allow their fibres to expand as recommended by the manufacturer.

Booking: If recommended by the wallcovering manufacturer, fold the pasted sides together after activation, loosely roll the sheets and set aside to relax before hanging.

Hanging: Hang wallcovering after paste activation as follows:

- Lining paper, paper backed vinyls and thin papers: Immediately after pasting.
- Thicker papers: After soaking long enough for the paper to become limp.
- Plastic-faced wallcoverings with fabric backing: Allow for shrinkage after hanging.

Unpasted wallcoverings

Paste application: Mix the paste before applying or use a pre-mixed wallcovering adhesive. Place cut sheets on a flat surface, face side down, and apply an even coat of paste with a paint roller or stiff bristle brush to the backing. Apply paste to the edges. Do not paste more than one strip at a time.

Booking: If recommended by the manufacturer, book the wallcovering to prevent edges from drying out as for prepasted wallcoverings.

Hanging: Hang wallcovering after the paste becomes tacky.

Grasscloth wallpapers: If paste gets on the face surface, remove excess with a dry cloth, allow the remainder to dry, then flake it off with a brush. Do not use water as this can alter the colour of the natural fibres.

Paste the wall wallcoverings

Paste application: Apply a thin, even coat of paste directly on the substrate wall surface with a paint roller.

Work area: Do not apply paste to more than 3 to 4 drops wide of wall to prevent paste drying out.

Hanging: Hang wallcovering immediately after paste application.

Adhesive wallcoverings

Adhesive application: Apply a uniform layer of adhesive to the backing with a paint roller. Allow the adhesive to tack before affixing the wallcovering.

3.5 INSTALLING WALLCOVERINGS

General

Requirement: Install wallcovering vertically, clean and without tears, lift or curling edges and without visible shrinkage.

Matching and sequence

Matching: Match rolls for discrete areas or groups of surfaces before hanging. Irrespective of roll markings, check the colour, pattern and texture by eye in good light to AS/NZS 1680.1 (2006) Table 3.1, before cutting wallcovering, as follows:

- Patterned wallcovering: Accurately align the pattern in adjoining sheets.
- Grasscloth wallpaper: Check rolls for shading variation. Test shades on opposite walls to plan strip sequence. If required, reverse strips to allow for subtle shading variation.
- Batching: Make sure wallcovering for each wall is of the same lot or run.

Sequence: Cut wallcovering strips in roll number sequence. Change the roll numbers at partition breaks and corners. Install strips in the same order as cut from the roll.

- Solid colour, non-directional, even textured or random match wallcoverings: Reverse every strip.

Windows, doors and other openings: Fill in spaces above and below the opening in sequence from the roll and not at a later date when full length pieces have been installed.

Cut/part rolls: Hang in isolation including on columns, piers or pillars.

Ceilings: If both ceiling and walls are to be covered, apply wallcovering to the ceiling first.

Hanging

Setting out: After establishing the starting position, correctly position and lay the leading edge of the first strip of wallcovering to a plumb line.

Set-out inspection: After applying 3 strips of wallcovering, make arrangements for an inspection of texture, colour or pattern variation/arrangement.

Bonding: Fully bond wallcovering to the substrate. Remove air bubbles, wrinkles, blisters and other defects.

Excess adhesive/paste: Remove any adhesive/paste seepage immediately after hanging each strip. Except for grasscloth wallpapers, use clean, warm water and natural sponge or cloth.

Grasscloth wallpapers: To prevent wallcovering from curling up along the edges, brush adhesive/paste on the wall substrate along the top and bottom and letting it tack up before hanging. Make sure wallcovering makes contact with the wall by using a soft bristle brush or cloth. After installation, monitor for potential moisture or vapour infiltration.

Wall-hung fixtures: Install wallcovering to the full wall surface, extending behind wall-hung fixtures, including whiteboards and pinboards.

Trimming

Requirement: Cut without pulling or dragging fibre strands. Allow wallcovering minimum 15 minutes to settle after hanging before trimming.

Excess wallcovering: Trim the wallcovering at the ceiling, skirting and other edges with a sharp knife, using a straightedge as a guide.

Edges and seams: Trim edges and seams for colour uniformity, pattern matching and tight closure.

Wallcovering supplied untrimmed: Remove selvage with a straightedge cutting wheel attachment.

Seams

General: Butt seams together as tightly as possible without leaving gaps or overlapping except at corners. Control the amount of adhesive/paste used so that it does not squeeze out along the seam under normal brushing or rolling pressure during application. Do not use a seam roller, unless recommended by the wallcovering manufacturer, including on embossed or flock wallpapers and woven glass fibre wallcoverings.

Seams not factory trimmed: If the one or both seams to be butted together are not factory trimmed, overlap and double cut seams with a sharp knife using a straightedge as a guide.

Wallcovering face protection: If required, use low tack painter's tape to keep the face of the seams clean before applying the next strip.

Corners: Turn strip approximately 50 mm around the corner and overlap the next strip at the corner.

Seam location at corners: Locate seam minimum 150 mm from outside corners and 75 mm from inside corners.

Corners

General: Measure the distance to the corner at both ends of the drop, add an equal amount, approximately 50 mm to each measurement, and cut the sheet. The balance of the sheet, if of an appropriate width, may be used as the next sheet for hanging around the corner.

Vertical seams: Re-establish plumb after turning corners.

Inside corners: Hang in two pieces.

Grasscloth wallpapers: Lightly mist the face of the wallpaper with clean water before hanging, to soften the stiffer grasses and allow bending around corners.

Woven glass fibre wallcoverings:

- Outside corners: Using a damp (not wet) sponge, soften the wallcovering fibres at outside corners and similar to make the fibres more pliable and easier to mould or turn without breaking the yarns.
- Inside corners: Double cut at the corner to allow corrections at corners that are not plumb.

Finishing

Timber veneer wallcovering: If site finishing is required, apply minimum 2 to 3 coats of coating to the wallcovering manufacturer's recommendations.

3.6 COMPLETION

Spare material

Requirement: Set aside partially used rolls, and supply at completion.

Quantity: At least 5% (length) of the quantity installed by the full width for each type, colour, texture and finish.

Cleaning

General: On completion of paper hanging, leave surfaces clean and dust free. Remove all traces of adhesives, dust, dirt and other contaminants from the wallcovering. Remove excess adhesive at seams, perimeter edges and adjacent surfaces.

Cleaning methods: Use methods recommended by the wallcovering manufacturer.

Grasscloth wallpapers: Gently vacuum or use a soft brush to remove any dust. Do not use water.

Strips that cannot be cleaned: Replace.

Removable fittings: Reinstall hardware and fittings on completion.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the manufacturer's maintenance data for each type of wallcovering installed. Include details of the recommended cleaning materials, procedures and precautions.

4 SELECTIONS

4.1 WALL COVERING SCHEDULES

Wallpaper schedule

	A	B	C
Location	N/A		
Wallpaper type			
Colour/style and finish/pattern			
Thickness/weight (g/m ²)			
Width (mm)			
Coating			
Colourfastness (h)			
Care			
Removability			
Biocide treatment			

Grasscloth wallpaper schedule

	A	B	C
Location	N/A		
Wallpaper type			
Material			

	A	B	C
Fibre treatment			
Width (mm)			
Thickness/weight (g/m ²)			
Pattern match			
Removability			

Vinyl wallcovering schedule

	A	B	C
Location	Refer drawings		
Wallcovering type			
Protective coating			
Thickness/weight (g/m ²)			
Width (mm)			
Fabric backing			
Colour/style and finish/pattern			
Colourfastness (h)			
Care			
Biocide treatment			
Removability			

Textile wallcovering schedule

	A	B	C
Location	Refer drawings		
Wallcovering type			
Backing			
Fabric treatment			
Thickness/weight (g/m ²)			
Width (mm)			
Colour/style and finish/pattern			
Colourfastness (h)			
Care			
Biocide treatment			
Removability			

Woven glass fibre wallcovering schedule

	A	B	C
Location	N/A		
Weave/pattern			
Backing			
Thickness/weight (g/m ²)			
Width (mm)			
Abrasion resistance			
Pattern repeat			
Removability			

Timber veneer wallcovering schedule

	A	B	C
Location	Refer drawings		
Wallcovering type			
Backing			
Sheet size (mm)			
Thickness (mm)			
Number of ply			
Veneer timber species			
Veneer cut			
Veneer matching			
Sheet matching			
Finish			

4.2 INSTALLATION SCHEDULES**Wallcovering hanging schedule**

	A	B	C
Lining paper	TBC		
Cross seaming			
Adhesive			
Size			
Primer/sealer			
Match			
Seaming method			

0651B RESILIENT FINISHES

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide resilient floor finishes to substrates, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Installation: To AS 1884 (2021).

Slip resistance

Classification: To AS 4586 (2013).

1.4 SUBMISSIONS**Fire performance**

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE, Fire hazard properties.**

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION, Operation and maintenance manuals.**

Products and materials

Manufacturer's data: Submit the manufacturer's product data sheets for each type of finish, and the manufacturer's recommendations for its application including the following, as appropriate:

- Thickness and width of sheet, or size of tile or plank.
- Adhesive and jointing method.
- Resistance to wear, indentation, chemicals, light and fire.
- Flexibility and bending strength.

Type tests: Submit results, as follows:

- Slip resistance to AS 4586 (2013).

Subcontractors

General: Submit names and contact details of proposed suppliers and installers.

Substrate acceptance: Submit evidence of installer's acceptance of the flooring substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Moisture content test.
- Surface pH test.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

1.5 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Substrate immediately before fixing resilient finishes or underlay.
- Completed underlay, if any.
- Finished surface before applying sealers or polishes, if any.
- Completed installation.

2 PRODUCTS

2.1 GENERAL

Storage and handling

Requirement: Store and handle to the manufacturer's recommendations.

2.2 FIRE PERFORMANCE

Fire hazard properties

Critical radiant flux: Tested to AS ISO 9239.1 (2003).

2.3 UNDERLAYS

Cementitious

General: Polymer modified cementitious smoothing and self-levelling compound.

Thickness: 3 mm minimum.

Fibre cement underlay

Standard: To AS/NZS 2908.2 (2000), Type B, category 2 minimum.

Thickness: 5 mm minimum.

Wet process fibreboard (hardboard) underlay

Standard: To AS/NZS 1859.4 (2018).

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

2.4 ADHESIVES

General

Requirement: To the resilient finishes manufacturer's recommendations.

2.5 SHEETS, TILES AND PLANKS

Cork tiles

Standard: To EN 12104 (2023).

Linoleum

Standard: To EN ISO 24011 (2012).

Corklinoleum

Standard: To EN 688 (2011).

Rubber

Standard:

- Smooth rubber: To EN 1817 (2020).
- Textured/relief rubber: To EN 12199 (2020).

Polyvinyl chloride (PVC)

Resilient floor covering, homogeneous: To EN ISO 10581 (2020).

Resilient floor covering, heterogeneous: To EN ISO 10582 (2018).

Resilient floor covering, jute or polyester felt backing: To EN 650 (2012).

Resilient floor covering, with foam layer: To EN 651 (2011).

Resilient floor covering, with particle based enhanced slip resistance: To EN 13845 (2017).

Resilient floor covering, semi-flexible polyvinyl chloride tiles: To EN ISO 10595 (2012).

2.6 OTHER MATERIALS

Edge strips and threshold strips

General: Heavy duty metal moulding or extruded edge strip appropriate to the floor covering type, capable where necessary of accommodating different levels of adjacent floor finishes.

Type: As documented.

Location: At exposed edges of the floor covering, and at junctions with differing floor finishes or finishes of a different thickness. Where edge strips occur at doorways, locate the junctions directly below the closed door.

Stair and landing nosings

Standard: To BCA (2022) D3D14 and BCA (2022) D3D15.

Type: As documented.

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1 (2009).

3 EXECUTION**3.1 SUBCONTRACTORS****General**

Requirement: Use specialist installers recommended by the material manufacturers.

3.2 PREPARATION**Substrates**

General: To AS 1884 (2021) Section 3.

Substrate tolerance table

Property	Length of straightedge laid in any direction	Max. deviation under the straightedge
Planeness	2000 mm	4 mm
Abrupt deviation tolerance	150 mm	0.5 mm

Concrete substrates

Requirement: Do not start installation of the resilient finishes until the concrete substrate conforms to AS 1884 (2021) clause 3.1 and the adhesive and resilient finish manufacturers' recommendations.

Substrate rectification: Conform to the following:

- Surface treatments: Mechanically remove any incompatible surface treatments, including the following:
 - . Sealers and hardeners.
 - . Curing compounds.
 - . Waterproofing additives.
 - . Surface coatings and contamination.
- Surface quality: Remove projections and fill voids and hollows with a smoothing and self-levelling compound compatible with the adhesive. Allow filling or levelling compound to dry to manufacturer's recommendations.

Cleaning: Remove loose materials or dust.

Timber, plywood, particleboard and fibre cement sheet substrates

Requirement: Do not start installation of the resilient finishes until the timber, plywood, particleboard and fibre cement substrate conforms to AS 1884 (2021) clause 3.6.

Substrate rectification: Remove projections. If conformance to the **Substrate tolerance table** cannot be achieved, provide an underlay in brick pattern with joints avoiding substrate joints.

Cleaning: Remove oil, grease, traces of applied finishes and loose materials or dust.

Working environment

General: Do not start work before the building is enclosed, wet work is complete and dry, overhead work is complete and good lighting is available. Protect adjoining surfaces.

3.3 TESTING**Moisture content tests**

General: Test substrate for suitability for the installation of resilient floor coverings to AS 1884 (2021) Appendix A.

- Maximum relative humidity of concrete: To AS 1884 (2021) Appendix A3.2.
- Moisture content of timber, plywood and particleboard subfloors: To AS 1884 (2021) Appendix A3.3.

Surface pH tests

General: Test concrete subfloor for suitability for the installation of resilient floor coverings to AS 1884 (2021) Appendix C.

- Maximum pH: 10.

3.4 INSTALLATION**General**

Requirement: To AS 1884 (2021) Section 5 and the manufacturer's recommendations.

Sheet set-out

General: Set out sheets to give the minimum number of joints. Position joints away from areas of high stress. Run sheet joints parallel with the long sides of floor areas, vertically on non-horizontal surfaces.

Tile set-out

General: Set out tiles from centre of room. If possible, cut tiles at margins only to give a cut dimension of at least 100 mm x full tile width. Match edges and align patterns. Arrange the tiles so that any variation in appearance is minimised.

Plank set-out

General: Set out planks from centre of room. Align patterns, texture and grain in one direction.

Edges

General: Make sure edges are firm, unchipped and machine-cut accurately to size and square to the face, and that edges are square to each other before installation.

Joints

Non-welded: Butt edges together to form tight neat joints showing no visible open seams.

Doorways: Where changes of floor finish occur at doorways, locate the joint on the centreline of the door leaf in the closed position.

Expansion joints

General: To the manufacturer's recommendations for joint widths, and area and length limitations.

Junctions

General: Scribe neatly up to returns, edges, fixtures and fittings. Finish flush with adjoining surfaces.

Rolling

General: If rolling is required, roll the finish in multiple directions before the adhesive sets.

Change of finish

General: Maintain finished floor level across changes of floor finish including carpet.

Cleaning

General: Keep the surface clean as the work proceeds.

3.5 TILING**Vinyl tiles and planks**

Laying: Lay as follows:

- Loose lay: Interlock tongue and groove edges of rigid planks. Tap down with rubber mallet.
- Adhesive fix: Apply acrylic adhesive over whole subfloor surface.

Cork tiles

Laying: Provide a water-based latex adhesive. Do not use pins.

Finishing: Sand after laying.

Rubber tiles

General: Keep tiles flat during storage. Before laying, allow the tiles to relax and decompress, and make sure that the backs are free of loose material.

Laying: Lay tiles in stretcher bond. Match edges and align joints and studs. Make sure the whole surface of the tile or accessory is in contact with the substrate.

Stair finish: Provide as follows:

- Smallest tiles: Half tile.
- Nosing tiles: Purpose-made matching tread, nosing and riser tile. Accurately scribe, cut and fit to perimeters. Close butt seams.

3.6 SHEETING

Welded joints

Thermal welding: After fixing, groove the seams using a grooving tool and weld the joints with matching filler rod, using a hot air welding gun. When the weld rod has cooled, trim off flush.

Chemical welding: Apply seaming compound 100 mm wide to the substrate centrally under the seam. Roll the seam until the compound is forced up into the joint. Clean off flush with a damp cloth.

Epoxy jointing: Join seams with epoxy adhesive.

3.7 VINYL STAIR FINISH

General

Preformed: Provide purpose-made vinyl stair finish combining riser, nosing and tread in the one element. Lay each step consecutively with the joint at the bottom of each riser.

Formed in situ: Fit the sheet vinyl to each tread, and to the riser above, in one piece, coved in the angle. Accurately scribe, cut and fit to stair nosings and perimeters.

Stair and landing nosing

Installation: To the manufacturer's recommendations.

3.8 JOINTS AND ACCESSORIES

Accessories

General: Provide purpose-made matching moulded accessories for nosings, coves, skirtings, edge cover strips and finishes at junctions, margins, and angles, if available. Otherwise, form accessories from the sheet material. Provide solid backing for radiused coves and nosings.

Edge strips and threshold strips

Installation: To the NCC cited AS 1428.1 (2009) and the manufacturer's recommendations.

Control joints

Location: Provide control joints as follows:

- Over structural control joints.
- At junctions between different substrates.

Depth of joint: Right through to the substrate.

Sealant width: 6 to 25 mm.

Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Control joint materials – sheet flooring

Proprietary slide plate divider strip: Provide interlocking metal plates grouted into pockets formed in the concrete joint edges to finish flush with the flooring surface.

Vinyl skirting

Feather edge: Moulded PVC skirting section.

Flat skirting: Flat PVC skirting section.

Fixing: Scribe as necessary. Mitre corners. Fix to walls with contact adhesive.

Minimum height: 100 mm.

Rubber coved skirtings and margins

General: Form from smooth flat sheet matching the colour and total thickness of the rubber flooring. Scribe and mitre at internal corners.

External corners and stop ends: Provide purpose-made matching moulded pieces.

Coved skirtings

Site formed coving: Carry the flooring material up over a profiled coving section to form the skirting and mitre and weld all joints. Make sure the radius of the coving section conforms to the floor finish manufacturer's recommendations for sheeting material and thickness.

3.9 COMPLETION

Protection

Finished floor surface: Keep traffic off floors for a minimum of 24 hours after laying or until bonding has set, whichever period is the longer. Avoid contact with water for minimum 7 days after laying.

Cleaning

General: Clean the finished surface. Buff and polish. Before the date for practical completion, mop and leave the finished surface clean and undamaged on completion.

Spare materials

General: Supply spare matching resilient finishes and accessories of each type for future replacement purposes. Store the spare materials on site where directed.

Quantity: At least 1% of the quantity installed.

Operation and maintenance manuals

General: Prepare a manual that includes manufacturer's recommendations for care and maintenance for each type of finish.

Warranties

Requirement: For each type of resilient finish specified, submit the manufacturer and installer's warranty of the material, workmanship and application.

4 SELECTIONS**4.1 PRODUCTS****Sheet and tile schedule**

	A	B	C
Type	Polyflor Verona PUR	Polyflor Paletone SD	
Form	Sheet vinyl	Static dissipative vinyl	
Colour	Clacier 5225	Dove Tail 8607	
Pattern	To approval	To approval	
Tile laying pattern	N/A	N/A	
Sheet width (mm)	Refer manufacturer.	Refer manufacturer.	
Thickness (mm)	Refer manufacturer.	Refer manufacturer.	
Vinyl chip size (mm)	Refer manufacturer.	Refer manufacturer.	
Surface	Refer manufacturer.	Refer manufacturer.	
Slip resistance classification	R10	Refer manufacturer.	
Critical radiant flux	Refer manufacturer.	Refer manufacturer.	
Airborne sound insulation	Refer manufacturer.	Refer manufacturer.	
Impact sound insulation	Refer manufacturer.	Refer manufacturer.	
Tile dimensions (mm)	N/A	N/A	
Underlay	Refer manufacturer.	Refer manufacturer.	
Welded joints	Refer manufacturer.	Refer manufacturer.	
Finish	Refer manufacturer.	Refer manufacturer.	
Roll after laying	Refer manufacturer.	Refer manufacturer.	

Tactile ground surface indicators schedule

	A	B	C
Product	TBC		
Type			
Edge protector			
Material			
Colour			

Accessories schedule

	A	B	C
Skirting	150mm coved		

	A	B	C
Edge strip material			
PVC cover strip: Width (mm)			
PVC cover strip: Colour			

Control joints schedule – proprietary slide plate

	A	B	C
Location	Refer manufacturer and Australian Standards		
Product			
Material			
Insert colour			

0652B CARPETS

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide textile floor coverings and underlays to subfloors, as documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS

Slip resistance

Classification: To AS 4586 (2013).

1.4 TOLERANCES

General

Requirement: To AS/NZS 1385 (2007).

1.5 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to PRODUCTS, **FIRE PERFORMANCE**, **Fire hazard properties**.

Operation and maintenance manuals

Requirement: Submit manual to **COMPLETION**, **Operation and maintenance manuals**.

Products and materials

Manufacturer's documentation: Submit copies of the following data:

- Product data sheets.

Slip resistance classification: Submit evidence of conformity to documented requirements.

Samples

General: Submit labelled production run samples demonstrating the range of colour, pattern, texture and pile yarn available in each documented carpet type.

Sample size: Submit the following:

- Carpet: Manufacturer's standard swatch.
- Carpet tiles: 4 x tile size.
- Edge strip, trim, extrusions, and stair and landing nosings: Submit a 300 mm length of each type.
- Underlay: Submit one labelled sample at least 600 x 600 mm.
- Stitched seam: Submit one sample, minimum 1000 mm length.

Penetrations: Submit one production carpet sample with a penetration access cut as documented in **EXECUTION, INSTALLATION - CARPET**.

Subcontractors

General: Submit name and contact details of proposed suppliers and installers.

Substrate acceptance: Submit evidence of installer's acceptance of the substrate before starting installation.

Tests

Site tests: Submit results, as follows:

- Substrate moisture content test.
- Substrate alkalinity test.

Warranties

Requirement: Submit warranties to **COMPLETION**, **Warranties**.

1.6 INSPECTION

Notice

Inspection: Give notice so that inspection may be made of the following:

- Each batch of material upon delivery.
- Substrate immediately before fixing underlay.
- Fixings, edge strips, and underlay installed ready to lay carpet.
- Completed carpet after cleaning and before covering for protection.

2 PRODUCTS ---

2.1 GENERAL

Storage and handling

Requirement: Store on a flat, clean, dry, well ventilated and secure storage area, elevated above the subfloor and unaffected by weather.

2.2 FIRE PERFORMANCE

Fire hazard properties

Critical radiant flux: Tested to AS ISO 9239.1 (2003).

2.3 CARPET

Batching

Requirement: Carpet from one manufacturing batch and dye lot.

Antimicrobial treatment

Requirement: Non-metallic, colourless, odourless, positively charged polymer applied during manufacturing to form a molecularly bonded surface to resist bacteria and mould growth.

Insect resistance

Requirement: Carpets and underlays comprising materials either inherently resistant to insect attack or treated against insect attack by moth and carpet beetle, by application of insect resist agents (IRA) to the yarn during wet processing at the manufacturing stage.

Insect resist treatment of wool: Application Level 4 to the recommendations of Woolmark Specification CP-4 (2016).

Stain and soil resistance

Requirement: Carpet with one or more of the following:

- Fluoro-treatments: Fluorochemical soil and liquid repelling chemical treatment applied during manufacturing.
- Stain blockers: Colourless acid-based dye stainblocker applied to dyed fibres.

Total VOC

Total VOC emission tested to ISO 10580 (2010): < 0.5 mg/m²/h.

2.4 CARPET TILES

General

Type: Non-stick, non-curling carpet tiles capable of being taken up without damage and then re-laid in different positions.

Marking: On the back, showing manufacturer's instructions or directional arrow for laying.

Tolerances

Requirement: Conform to the following:

- Dimensional tolerance: 0.2%.
- Squareness: Maximum difference of 2 mm between lengths of diagonals.

Sustainable carpet tile backing

Re-usable backing: Proprietary vinyl backing to carpet tiles capable of separation and recycling in new carpet tiles.

2.5 MATS

General

Requirement: Provide mats made to fit each designated mat recess, as documented.

Linked metal mats

Type: Proprietary hinged extruded aluminium slatted mat with capability of accepting different types of insert.

Frames: If the mat is recessed, provide frames to match the mat material and finish.

2.6 UNDERLAYS

Application

Performance: To AS 2455.1 (2019) clause 1.5.2.

Cementitious

General: Polymer modified cementitious smoothing and self-levelling compound.

Thickness: 3 mm minimum.

Fibre cement hard underlay

Standard: To AS/NZS 2908.2 (2000).

Thickness: 5 mm minimum.

Dry process fibreboard (MDF) hard underlay

Standard: To AS/NZS 1859.2 (2017).

Classification: Moisture resistant Medium density fibreboard (MR MDF).

Thickness: 5.5 mm.

Wet process fibreboard (hardboard) underlay

Standard: To AS/NZS 1859.4 (2018).

Classification: General purpose medium board, manufactured specifically as flooring underlay.

Thickness: 5.5 mm.

Soft underlay

Standard: To AS 4288 (2003).

2.7 OTHER MATERIALS

Adhesives

General: Compatible with the floor covering material, and suitable for bonding it to the subfloor to AS 2455.1 (2019) clause 1.5.3.

Friction compound: Suitable for holding carpet tiles in position without permanent sticking.

Hot-melt adhesive tapes

General: Commercial grade glass fibre and cotton thermoplastic adhesive-coated tape 60 mm wide on a 90 mm wide metal foil base and backed with silicone-coated release paper.

Preformed carpet grippers

General: Architectural plywood carpet grippers with 3 rows of corrosion-resistant angled pins of length appropriate to the carpet type to AS 2455.1 (2019) clause 1.5.4.

Size (minimum): 33 mm wide x 7 mm thick.

Location: At edges, except where edge strips are used. Provide double grippers to edges where recommended by the manufacturer.

Edge strips and threshold strips

General: Heavy duty metal moulding or extruded edge strip appropriate to the floor covering type, capable where necessary of accommodating different levels of adjacent floor finishes.

Type: As documented.

Location: At exposed edges of the carpet, and at junctions with differing floor finishes or finishes of a different thickness. Where edge strips occur at doorways, locate the junctions directly below the closed door.

Stair and landing nosings

Standard: To BCA (2022) D3D14 and BCA (2022) D3D15.

Type: As documented.

Tactile ground surface indicators

Standard: To AS/NZS 1428.4.1 (2009).

Type: As documented.

3 EXECUTION**3.1 PREPARATION****General**

Pre-installation requirements: To AS 2455.1 (2019) Section 2.

- Carpet tiles: Pre-laying requirements including access panel floors to AS 2455.2 (2019) clause 4.

Working environment: Do not start work before the building is enclosed, wet work is complete and dry, overhead work is complete and good lighting is available.

Protection: Protect adjoining surfaces.

Substrate

General: Conform to the following:

- To AS 2455.1 (2019) or AS 2455.2 (2019), as appropriate.
- Clean and free of any deposit or finish that may impair adhesion or location and functioning of control joints.
- Free of any imperfections, including ridges, indentations and projections that may adversely affect the installed carpet.

Concrete substrate rectification: Remove projections, grind as necessary and fill voids and hollows with a levelling compound compatible with the adhesive to achieve the required tolerance.

Timber substrate rectification: Remove projections. If conformance with the **Substrate tolerance table** cannot be achieved, fix a hard underlay in brick pattern. Make sure joints do not coincide with substrate joints.

Moisture content and alkalinity of concrete substrate: Do not start installation until the moisture content and alkalinity of the concrete substrate has been tested to **TESTING, Substrate tests** and conforms to the values in AS 2455.1 (2019) Appendix B.

Moisture content of timber, plywood or particleboard substrate: Do not start installation until the moisture content of the substrate has been tested to **TESTING, Substrate tests** and conforms to the values as follow:

- Air conditioned buildings: 8 to 10%.
- Intermittently heated buildings: 10 to 12.5%.
- Unheated buildings: 12 to 15%.

Fixtures: Remove door stops and other fixtures, and refix in position undamaged on completion of the installation. Make sure fixings penetrate substrate and are stable.

Substrate tolerance table

Property	Length of straightedge laid in any direction	Max. deviation under the straightedge
Flatness Class B	3 m	6 mm
Smoothness	150 mm	1 mm
Planar	2000 mm	4 mm

Trial set-out

General: Prepare a trial set-out of each type of carpet with underlay, minimum 10 m², including accessories, and 3000 mm of typical seam.

3.2 TESTING**Substrate tests**

Moisture content and alkalinity of concrete substrate: Test substrate to AS 2455.1 (2019) Appendix B.

Moisture content of timber, plywood or particleboard substrate: Test substrate to AS/NZS 1080.1 (2012) for timber and particleboard or AS/NZS 2098.1 (2006).

3.3 INSTALLATION - CARPET

General

Requirement: To AS 2455.1 (2019) Section 3 and the manufacturer's recommendations.

Batching

Requirement: In a single area and for each documented type, quality, or colour, use carpet from one manufacturing batch and dye lot.

Setting out

Joints in underlay: Make sure joints in underlay do not coincide with carpet joints. Do not carry underlay over carpet grippers or edge strips.

Partition layout: Confirm that permanent partitions have been installed before starting carpet laying.

Seaming methods

Woven carpet: Machine or hand sew. Do not provide glued taped seams unless selvages are woven to suit and recommended by manufacturer.

Tufted carpet: Seam with hot-melt adhesive tape.

Seam sealing: Apply appropriate seam sealer to each cut edge.

Cutting laid carpet

Method: If penetrations through laid carpet are necessary for electrical, telephone or other outlets, cut the carpet either by cross cutting or by cutting rectangular or circular openings.

Cutting holes in concrete floors: Protect the carpet and remove concrete particles and dust on completion. Replace the cut carpet over the opening without any signs of fraying or other damage, and fix with a peel-up adhesive, or resew.

Edge strips and threshold strips

Installation: To the NCC cited AS 1428.1 (2009) and the manufacturer's recommendations.

3.4 INSTALLATION - CARPET TILES

General

Installation: To AS 2455.2 (2019) and the manufacturer's recommendations.

3.5 STAIRS AND LANDINGS

Installation

General: To AS 2455.1 (2019) clause 3.10.

Concrete stairs

Fixing: Adhesive method.

Laying method: Apply the floor covering continuously to the treads and risers.

Timber stairs

Closed risers:

- Fixing: Tackless method, with a gripper strip in each angle between treads and risers.
- Laying: Apply the floor covering continuously to the treads and risers.

Open risers:

- Fixing: Adhesive.
- Laying: Wrap the carpet around the tread and neatly butt join beneath the nosing if a separate nosing is required, or if not, in the centre of the underside of the tread.

Stair and landing nosing

Installation: To the manufacturer's recommendations.

3.6 COMPLETION

Cleaning

Requirement: Progressively clean the work. Remove waste, excess materials and adhesive.

Final cleaning: When the installation is complete, clean the carpet as necessary to remove extraneous matter, marks and soiling and to lift the pile where appropriate.

Protection

Requirement: Provide fabric drop sheets. Do not use plastic sheeting. If wheeled traffic is to follow carpet installation, protect with hardboard sheets butted and fixed with adhesive tape.

Operation and maintenance manuals

Requirement: Prepare a manual that includes the following:

- A technical specification of the carpet installation.
- The manufacturer's recommendations for use, care and maintenance of the carpet to AS/NZS 3733 (2018).
- The names and address of the supplier and manufacturer of each component.

Warranties

General: Submit the manufacturer's product warranties.

4 SELECTIONS**4.1 SCHEDULES****Carpet underlay schedule**

	A	B	C
Subfloor	TBC		
Hard underlay			
Soft underlay: Use classification			
Soft underlay: Type			
Airborne sound insulation			
Impact sound insulation			

Carpet and laying schedule by ACCS/ECS

	A	B	C
Carpet type	Carpet tiles		
Generic type			
Product	Milliken Ontera		
Slip resistance classification	Refer manufacturer		
Colour and pattern	Ontera		
Recycled material content			
Pile: Composition	Refer manufacturer		
Pile: Finish	Refer manufacturer		
Pile: Length	Refer manufacturer		
Pile: Thickness	Refer manufacturer		
Backing thickness	Refer manufacturer		
ACCS Grade	Refer manufacturer		
ECS	Refer manufacturer		
Suitable for Stairs Icon	N/A		
Treatments: For insect resistance	Refer manufacturer		
Treatments: Electrostatic protection	Refer manufacturer		
Critical radiant flux	Refer manufacturer		
Dimensions (mm)	Refer manufacturer		
Fixing method	Refer manufacturer's instructions and specifications.		
Seaming method	To approval.		

Tactile ground surface indicators schedule

	A	B	C
Product	TBC		
Type			
Edge protector			
Material			
Colour			

Carpet sundry fixtures schedule

	A	B	C
Product	To approval		
Type			
Finish			
Colour			

Mats schedule

Location	Mat type	Mat size (mm)	Recess trim
Foyer TBC			

0671P DULUX PAINTING

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide DuluxGroup/Dulux coating systems to substrates, as documented.

Performance

Requirement:

- Consistent in colour, gloss level, texture and dry film thickness.
- Free of runs, sags, blisters, or other discontinuities.
- Paint systems that are fully opaque or at the documented level of opacity.
- Clear finishes at the level of transparency consistent with the product.
- Fully adhered.
- Resistant to environmental degradation within the manufacturer's stated life span.

1.2 COMPANY CONTACTS

DuluxGroup/Dulux technical contacts

Architects and Specifiers' Hotline (Paint, Acratex, Protective Coatings): 13 23 77.

Powder Coatings Technical Advice Hotline: 13 24 99.

Website: www.dulux.com.au/contact-us

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 General requirements.

1.4 STANDARDS

Painting

General: To the recommendations of those parts of AS/NZS 2311 (2017) referenced in this worksection.

1.5 MANUFACTURER'S DOCUMENTS

Technical manuals

Product Guide: www.dulux.com.au/specifier/products

Duspec Product Data Sheets, SDS, paint system selection: www.duluxconstructionsolutions.com.au

1.6 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- ASU: Acrylic sealer undercoat multipurpose combo product.
- DFT: Dry film thickness.
- OFC: Off form concrete.
- PDS: Product data sheet.
- PRN: Paint reference number.
- PSU: Primer sealer undercoat multipurpose combo product.
- WFT: Wet film thickness.

Definitions

General: For the purposes of this worksection, the definitions given in AS/NZS 2310 (2002) and the following apply:

- Gloss: The optical property of a surface, characterised by its ability to reflect light specularly.
- Gloss unit: Numerical value for the amount of specular reflection relative to that of a standard surface under the same geometric conditions.
- Levels of gloss finish: When the specular direction is 60 degrees, surfaces with the following specular gloss reading is defined as follows:
 - . Full gloss: Over 85 gloss units.
 - . Gloss: Over 50 and up to 85 gloss units.
 - . Semi-gloss (satin): Over 20 and up to 50 gloss units.
 - . Low gloss (low sheen): Over 5 and up to 20 gloss units.
 - . Matt: Over 3 and up to 7 gloss units.
 - . Flat: Up to 5 gloss units.
- Opacity: The ability of a paint or textured and membrane coating to obliterate the colour difference of a substrate.
- Paint or coating system: A product in liquid form, which when applied to a surface, forms a dry film having protective, decorative or other specific technical properties.
- Primer, prime coat: The first coat of a painting system that helps bind subsequent coats to the substrate and which may inhibit its deterioration.
- Sealer: A product used to seal substrates to prevent the following:
 - . Materials from bleeding through to the surface.
 - . Reaction of the substrate with incompatible top coats.
 - . Undue absorption of the following coat into the substrate.
- Substrate: The surface to which a material or product is applied.
- Undercoat: An intermediate coat formulated to prepare a primed surface or other prepared surface for the finishing coat.

1.7 SUBMISSIONS

Products and materials

General: Dulux coatings systems have been selected for this project. Submit the following details at least 3 weeks before the paint is required:

- Paint brand name and product range quality statement.
- Safety data sheets (SDS) showing the health and safety precautions to be taken during application.
- The published recommendations for maintenance.

Samples

Clear finish coatings: Submit labelled samples of timber or timber veneer matching those to be used in the works as follows:

- Label for identification and prepare, putty, stain, seal and coat, as documented.
- Size: Minimum 500 x 500 mm.

Opaque coatings: Submit labelled samples of each coating system, on representative substrates, showing surface preparation, colour, gloss level, texture, and physical properties.

Coated samples schedule

Substrate	Paint system	Colour	Sample size/number
Plasterboard	P1	Dulux Vivid White	A4

Subcontractors

Specialist applicators: Submit name and contact details of proposed specialist applicators.

Wet samples

General: Submit two clearly labelled, 500 mL samples of each type of coating required to be tested.

Wet samples schedule

Coating type	Colour
TBC	

Warranties

Requirement: Before the application of the paint system, submit proposed warranties to PRODUCTS, **GENERAL, Warranties.**

1.8 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Opaque finishing stages:
 - . Completion of surface preparation.
 - . After application of final coat.
- Clear finishing stages:
 - . Before surface preparation of timber.
 - . Completion of surface preparation.
 - . After application of final coat.

2 PRODUCTS**2.1 GENERAL****Product substitution**

Other products: Conform to **SUBSTITUTIONS** in 0171 *General requirements*.

Storage and handling

General: Store materials not in use in tightly covered containers in well-ventilated areas with temperatures maintained at the manufacturer's recommendations.

Delivery: Deliver paints to the site in the manufacturer's labelled and unopened containers.

Product identification

General: Marked to show the following:

- Manufacturer's identification.
- Product brand name.
- Product type.
- Quantity.
- Product reference code and batch number.
- Date of manufacture.

Warranties

Manufacturer's material warranty: Include the following:

- Extent: Paintwork generally.
- Terms: Paint systems are suitable for their intended use.
- Period: As defined by the manufacturer.

Alternative material performance warranty: Include the following:

- Terms: Submit the performance criteria as defined by the manufacturer.
- Measure: As defined by the manufacturer.
- Period: As defined by the manufacturer.

2.2 PAINTING MATERIALS

Combinations

General: Do not combine paints from different manufacturers in a paint system. Dulux paint products and coating systems have been selected and specified for this project. Any unauthorised product substitution will void the warranties.

Clear timber finish systems: Provide only the combinations of putty, stain and sealer recommended by the manufacturer of the top coats.

Tinting

General: Provide only products that are colour tinted by the manufacturer or supplier.

Toxic ingredients

General: To the *Therapeutic Goods (Poisons standard) Instrument (2023)* Part 2 Division 9.

Standards

Paint types: Conform to the Australian Standard referenced in the **DuluxGroup/Dulux paint type reference table**.

DuluxGroup/Dulux paint type reference table legend

Key:

ASU = Acrylic Sealer/Undercoat.

NE = No Equivalent.

PSU = Primer/Sealer/Undercoat.

Low VOC products are noted in the Table and the **Low VOC compliance reference table**.

^ Use is discouraged in favour of water based paints because of environmental concerns.

These paints have either limited availability or low requirement in the Building Industry.

DuluxGroup/Dulux paint type reference table

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
Semi-gloss solvent-borne: interior	Dulux Super Enamel Semi-Gloss	DU00098	B3	AS 3730.5 (2006)
Semi-gloss water-borne, interior /exterior trim (alt B8b)	Dulux Aquanamel Semi Gloss (low VOC)	DU00075	B41	AS 3730.2 (2006)
Gloss solvent-borne: aerosols	Dulux Spray Pak	DU00016	B4#	NE
Full gloss solvent-borne: exterior	Dulux Metalshield Premium UV Resistant High Gloss	PC00281	B5a	AS 3730.6 (2006)
Full gloss solvent-borne: interior	Dulux Super Enamel Full Gloss	DU00090	B5b	AS 3730.6 (2006)
Full gloss waterborne interior/exterior trim (alt B9b)	Dulux Aquanamel Gloss (low VOC)	DU00176	B42	AS 3730.2 (2006)
Flat latex: interior ceilings	Dulux White Ceiling Paint (low VOC)	DU00125	B6a	AS 3730.1 (2006)
Flat latex: interior ceilings (tinted colours)	Dulux EnvirO ₂ Ceiling Flat (low VOC)	DU00164	B6a	AS 3730.1 (2006)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
Low gloss latex: exterior	Dulux Weathershield Low Sheen Acrylic	DU00073	B7b	AS 3730.8 (2006)
Low gloss latex: interior	Dulux Wash&Wear Low Sheen Acrylic (low VOC)	DU00110	B7a	AS 3730.3 (2006)
Low gloss latex: interior	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen (low VOC)	DU00114	B7a	AS 3730.3 (2006)
Low gloss latex: interior	Dulux Professional Steriguard Acrylic Low Sheen	PR00036	B7a	AS 3730.3 (2006)
Semi-gloss latex: exterior	Dulux Weathershield Semi Gloss Acrylic	DU00084	B8b	AS 3730.9 (2006)
Semi-gloss latex: interior	Dulux Wash&Wear Semi Gloss Acrylic (low VOC)	DU00111	B8a	AS 3730.2 (2006)
	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss (low VOC)	DU00115		
Semi-gloss waterborne latex: interior	Dulux Professional Steriguard Water Based Enamel Semi Gloss	PR00038	B42	AS 3730.2 (2006)
Gloss latex: exterior	Dulux Weathershield Gloss	DU00083	B9b	AS 3730.10 (2006)
Gloss latex: interior	Dulux Wash&Wear Gloss	DU00112	B9a	AS 3730.12 (2006)
Gloss waterborne interior/exterior trim (alt B9a/B9b)	Dulux Aquaname Gloss (low VOC)	DU00176	B42	AS 3730.1 (2006)
Gloss waterborne latex: interior	Dulux Professional Steriguard Water Based Enamel Gloss	PR00037	B42	AS 3730.1 (2006)
Wood primer, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DU00179	B10	AS 3730.13 (2006)
Wood primer, latex	Dulux 1 Step Acrylic Primer Sealer Undercoat	DU00148	B10a	AS 3730.17 (2006)
Metal primer for steel – solvent-borne	Dulux Metalshield All Surface Primer	DU03647	B11	AS 3730.21 (2006)
Metal primer, latex (domestic)	Dulux Precision All Metal Primer (water based, low VOC)	DU00123	B11a#	AS 3730.15 (2006)
Galvanised metal (Zincalume) undercoat (domestic)	Dulux Professional Galvanised Iron Primer (water based, low VOC)	PR00023	B12a	AS 3730.15 (2006)
Metal primer for non	Dulux Precision All Metal Primer (water based, low	DU00123	B13	AS 3730.17 (2006)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
ferrous metals (domestic)	VOC)			
Zinc-rich organic binder/primer for steel	Dulux Zinc Rich 1P Primer	PC00319	B14	AS 3730.9 (2006)
White Set Plaster and powdery surface sealer	Dulux Precision Sealer Binder	DU00124	B15	AS 3730.22 (2006)
Concrete and masonry sealer	Dulux Acratex Acraprime 501/2	AC00077	B15	AS 3730.22 (2006)
Concrete and masonry sealer	Berger Gold Label Acrylic Block Filler	BG00016	B15	AS 3730.22 (2006)
Clear low viscosity paint for concrete (domestic)	Dulux AquaTread Concrete Sealer (low VOC)	BE00035	B15a	NE
Clear low viscosity paint for concrete floors	Dulux Luxafloor WB Acrylic Dust Sealer Gloss	PC00021	B15a	NE
Moisture resistant plasterboard	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC)	DU00148	B15a	AS 3730.18 (2006)
Concrete and masonry, latex wallboard sealer, sealer/undercoat,	Dulux Acrylic Sealer Undercoat (low VOC) Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC)	DU175 DU00148	B16	AS 3730.18 (2006)
Undercoat, solvent-borne	Dulux 1 Step Oil Based Primer Sealer Undercoat	DU00179	B17	AS 3730.14 (2006)
Undercoat, latex: exterior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acratex Water Based 501/1	DU00148 AC00077	B17a	AS 3730.18 (2006)
Undercoat, latex: interior	Dulux 1 Step Acrylic Primer Sealer Undercoat (low VOC) Dulux Acrylic Sealer Undercoat (low VOC)	DU00148 DU175	B17a	AS 3730.18 (2006)
Wood Stain - spirit	Feast Watson Proofint	FW00069	B18	NE
Wood Stain - oil	Feast Watson Liming White Cabot's Interior Stain Oil Based	FW00103 CA00063	B18	
Wood Stain - latex	Intergrain UltraDeck® Timber Stain (interior/exterior) (low VOC) Cabot's Interior Stain Water	IN00039 CA00022	B18a	NE

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
	Based			
Interior clear varnish, solvent-based, one-pack	Feast Watson Floorclear – Gloss, Satin, Matt	FW00033 FW00028 FW00031	B19	AS 3730.25 (2006) or AS 3730.27 (2006) (for floors)
Interior clear latex varnish, water-based, one-pack	Cabot's Cabothane Clear Water Based Gloss, Satin or Matt (low VOC) Cabot's Stain & Varnish Water Based Gloss, Satin	CA00020 CA00021 CA00068 CA00007 CA00012	B19a	NE or AS 3730.27 (2006) (for floors)
Floor varnish, solvent based, clear (moisture cure)	Feast Watson Commercial Maxithane – Gloss, Satin	DW0701 DW0703	B20	AS 3730.27 (2006)
Floor Varnish, water-based, one-pack	Intergrain Enviropro Endure 1 Pack - Matt, Satin, Gloss (low VOC)	FW00081 FW00081 FW00065 FW00064	B20	AS 3730.27 (2006)
Floor varnish, clear or tinted, two-pack	Intergrain Enviropro Endure 2 Pack - Gloss, Satin, Matt	IE00028 IE00026 IE00017	B20	AS 3730.27 (2006)
Exterior latex stain, semi-transparent	Intergrain UltraDeck® Timber Stain (low VOC)	IN00039	B22	AS 3730.16 (2006)
Fence stain, latex paints, opaque	Dulux Weathershield Garden Shades – Low Sheen Cabot's Timbercolour Deck & Exterior Paint	DU00097 CA00073	B22b	AS 3730.16 (2006)
Exterior stain, solvent-borne, opaque	Feast Watson Timber & Deck Stain	FW00097	B23#	AS 3730.28 (2006)
Exterior stain, solvent-borne, semi-transparent	Feast Watson Exterior Stain & Varnish Gloss	FW00106	B23a	NE
Paving paint for concrete, solvent	Berger Jet Dry Paving Paint range	BE00034	B24	AS 3730.29 (2006)
Paving paint for concrete, latex	Berger Jet Dry Aqua Tread Satin	BE00035	B24a	NE
Roofing paint, latex (Solar reflectance)	Dulux AcraTex 962 COOLROOF with InfraCOOL Technology™	AC00084	B25	
Intumescent	Dulux Protective Coatings	Protective	B28#	NE

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2 017) (Table 4.2)	Standard
paints		Coatings link		
Epoxy paint, two-pack, solvent-borne topcoats, interior only	Dulux Durebild STE 2 Pack Epoxy (high build & surface tolerant) Dulux Duremax GPE	PC00237 PC00349	B29	AS/NZS 3750.1 (2 008)
Epoxy paint, two-pack, solvent-borne topcoats, exterior & pools		N/A	B29	AS/NZS 3750.1 (2 008)
Epoxy paint, two-pack, water based, interior only	Dulux Luxafloor ECO2 (low VOC) Dulux Enviropoxy WBE	PC00392 PC00283	B29a	NE
High Build Recoatable two-pack, solvent-borne gloss polyurethane	Dulux Weathermax HBR Luxathane HPX	PC00382 PC00367	B29c B29c	NE
Stain sealer, solvent-borne for water soluble stains	Dulux Precision High Opacity Stain Blocker	DU00108	B30	NE
Stain sealer, water based for oil stains	Dulux Precision Maximum Strength Adhesion Primer	DU00119	B30	
Chalk sealer, surface conditioner	Dulux Sealer Binder Dulux Acraprime Solvent Based Primer	DU00124 AC00078	B31	NE
Anti-mould (treatment or wash for timber)	Intergrain Ultraprep Mould Killer	IN00042	B32	NE
Water-repellent for masonry	Dulux AquaBan	DU00055	B33	NE
Creosote stain	No longer used	Poly	B35	NE
Paint remover, solvent-borne	Selleys Polystrippa Paint Stripper	Poly	B36a	NE
Paint remover, chemical	Selleys Polystrippa Renovators' Choice	Poly	B36b	NE
High build membrane or texture coatings for masonry and	Dulux Acratex Range	Acratex	B38b	AS/NZS 4548.1 (1 999) AS/NZS 4548.2 (1 999) AS/NZS 4548.3 (1

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2017) (Table 4.2)	Standard
concrete: exterior				999) AS/NZS 4548.4 (1999)
Texture finish latex coatings for masonry and plasterboard: interior only	Dulux Effects Range (interior)	Effects range link	B38a	NE
Clear or colourless coatings (waterborne) for timber, exterior	Intergrain UltraClear Exterior – Gloss, Satin Note: not suitable for decking.	IN00015 IN00006	B39	NE
Clear coatings (waterborne) for timber, interior	Cabot's Cabothane Clear Water Based Gloss, Satin & Matt (low VOC)	CA00020 CA00021 CA00068	B39	NE
Clear or colourless coatings (waterborne) for timber, interior floors	Intergrain Enviropro Endure 1 Pack - Matt, Satin, Gloss (low VOC) Intergrain Enviropro Endure 2 Pack - Matt, Satin, Gloss	IE00028 IE00026 IE00017 IE00025 IE00027 IE00018	B39	AS 3730.27 (2006)
Sanding sealer	Feast Watson Sanding Sealer	FW00021	B40	NE
Semi-gloss latex, interior trim (alt B8b)	Dulux Aquaname! Semi-Gloss (low VOC)	DU00075	B41	NE
Gloss or full gloss latex, interior trim	Dulux Aquaname! Gloss (low VOC)	DU00176	B42	NE
Penetrating tung oil type varnish or wax for timber floors: interior	Intergrain Enviropro Hard Wax Oil Feast Watson Tung Oil	IE00035 FW00058	B43	NE
Penetrating tung oil type varnish for timber decks: exterior	Intergrain Nature's Timber Oil Feast Watson Traditional Timber Oil	IN00012 FW00085	B43	NE
Gloss pigmented polyurethane	Dulux Luxathane R Dulux Luxathane HPX Dulux Weathermax HBR	PC00368 PC00367 PC00382	B44	AS/NZS 3750.6 (2009)
Powder coatings for non-ferrous metals	Dulux Powder Coat Range	duluxpowders.com.au	B45b	AS 3715 (2002)
Powder coatings for	Dulux Powder Coat Range	duluxpowders.com.au	B45b	AS 4506 (2005)

Paint type	DuluxGroup/Dulux material description	Dulux PDS No.	PRN AS/NZS 2311 (2 017) (Table 4.2)	Standard
ferrous metals				

Low VOC compliance reference table

Green Star Interiors	VOC Limits MAX g/litre	DULUX Products compared to the GBCA specification	VOC g/litre Untinted
COMPLIANCE CRITERIA – GBCA specifications (obtain latest figures).			
Walls and ceilings - interior semi-gloss	16	Dulux EnvirO ₂ Interior Semi-Gloss	1
Walls and ceilings - interior semi-gloss	16	Dulux Wash&Wear Semi-Gloss Dulux Wash&Wear +Plus Kitchen&Bathroom Semi-Gloss	16 16
Walls and ceilings - interior low sheen	16	Dulux EnvirO ₂ Interior Low Sheen	1
Walls and ceilings - interior low sheen	16	Dulux Wash&Wear Low Sheen Dulux Wash&Wear +Plus Kitchen& Bathroom Low Sheen	16 16
Walls and ceilings - interior flat-washable	16	Dulux EnvirO ₂ Interior Matt	1
Ceilings - interior flat	14	Dulux EnvirO ₂ Interior Tintable ceiling Flat	1
Ceilings - interior flat	14	Dulux White Ceiling Paint	14
Trim - interior gloss	75	Dulux Aquanamel Gloss Dulux Professional Steriguard Water Based Enamel Gloss	60 74
Trim - interior semi-gloss	75	Dulux Aquanamel Semi-Gloss Dulux Professional Steriguard Water Based Enamel Semi-Gloss	53 74
Trim - interior semi-gloss	75	Dulux EnvirO ₂ Water Based Enamel Semi-Gloss	1

Green Star Interiors	VOC Limits MAX g/litre	DULUX Products compared to the GBCA specification	VOC g/litre Untinted
Timber primer	30	Dulux Acrylic Sealer Undercoat	5
Latex primer for galvanized iron and zincalume NOT FOR HDG	60	Dulux Professional Total Prep	45
Latex primer for galvanized iron and zincalume NOT for HDG	60	Dulux Professional Galvanised Iron Primer	< 60
Interior latex undercoat	65	Dulux EnvirO ₂ Acrylic Sealer Undercoat (ASU)	1
Interior latex undercoat	65	Dulux Prepcoat Acrylic Sealer Undercoat	< 5
Exterior latex undercoat	65	Dulux 1 Step Acrylic Primer Sealer Undercoat (PSU) Dulux Professional Total Prep	<37 45
Interior sealer	65	Dulux EnvirO ₂ Acrylic Sealer Undercoat (ASU)	1
Interior concrete sealer	65	Dulux Luxafloor Eco2 (clear) + colours Dulux Luxafloor WB (Clear) + colours	10 10
One and two pack performance coatings for floors	140	Dulux Luxafloor Eco2 concrete Dulux Luxafloor WB concrete Intergrain Enviropro Timber Endure One Pack Intergrain Enviropro Timber Endure Two Pack	10 10 < 75 <140 (Part A & B)

3 EXECUTION

3.1 PREPARATION

Standard

General: To AS/NZS 2311 (2017) Section 3.

Order of work

Other trades: Before painting, complete the work of other trades as far as practicable within the area to be painted, except for the installation of fittings, floor sanding and laying flooring materials.

Clear finishes: Complete clear timber finishes before commencing opaque paint finishes in the same area.

Protection

General: Before painting, clean the area and protect it from dust contamination. Use drop sheets and masking agents to protect surfaces, including finished surfaces and adjacent finishes, during painting.

Fixtures and furniture: Remove door furniture, switch plates, light fittings and other fixtures before painting, and conform to the following:

- Labelling and storage: Attach labels or mark fixtures using a non-permanent method, identifying location and refixing instructions, if required. Store and protect against damage.

Difficult to remove fixtures: Where removal is impractical or difficult, apply surface protection before substrate preparation and painting.

Substrates

General: Prepare substrates to receive the documented paint system.

Cleaning: Clean down the substrate surface. Do not cause damage to the substrate or the surroundings.

Filling: Fill cracks and holes with fillers, sealants, putties or grouting cements as appropriate for the finishing system and substrate, and sand smooth:

- Clear finish: Provide filler tinted to match the substrate.

Clear timber finish systems: Prepare the surface so that its attributes will show through the clear finish without blemishes, using methods including the following:

- Removal of bruises.
- Removal of discolourations, including staining by oil, grease and nail heads.
- Bleaching where necessary to match the timber colour sample.
- Puttying.
- Fine sanding, with the last abrasive no coarser than 220 grit, so that there are no scratches across the grain.

Treated surfaces: If surfaces have been treated with preservatives or fire retardants, make sure the paint system is compatible with the treatment and does not adversely affect its performance.

Iron and steel: Remove weld spatter, slag, burrs, or any other objectionable surface irregularities and radius all edges to a minimum of 2 mm. Degrease by solvent or alkaline cleaning.

Iron and steel blast cleaning: To AS 1627.9 (2002) and to the class specified in the specified protective treatment. Provide a surface roughness or profile appropriate for the specified treatment. Where steelwork to be abrasive cleaned includes irregular shapes allow for special equipment to achieve required abrasive cleaning.

Structural steel: All exposed fixings including bolts, screws and the like, are to be painted to match adjacent steelwork paint system.

Concrete and masonry: Before application to very smooth concrete, brick or masonry, either acid etch, mechanically grind or abrasive track blast the surface as appropriate to provide a suitable key for the subsequently applied coating and to remove laitance. Remove loose friable matter before filling surface discontinuities.

Set plaster surfaces: Do not apply solvent borne paint or other impervious coatings if the moisture content at the surface, tested with a moisture meter, exceeds 12%.

Substrate moisture content

Requirement: Use a moisture meter to demonstrate that the moisture content of the substrate is at or below the recommended maximum level for the type of paint and the substrate material.

Unpainted surfaces

Standard: To AS/NZS 2311 (2017) Section 3.

Previously painted surfaces

Preparation of a substrate in good condition: To AS/NZS 2311 (2017) clause 7.4.

Preparation of a substrate in poor condition: To AS/NZS 2311 (2017) clause 7.5.

Preparation of steel substrates with protective coatings: To AS 2312.1 (2014) Section 8 and AS 1627.1 (2003).

PVC-U: Clean with methylated spirit and a nylon scouring pad.

Wallcovering: Remove wallcovering and residual paste with clean water. Patch and repair substrate to a uniform surface before painting.

Lime wash paints: Remove by brushing with warm water.

Reconditioned damaged surfaces in galvanized steel: To AS/NZS 4680 (2006) clause 8.

Cleaning external surfaces

Sound external surfaces other than timber: Remove dirt, grease, loose and foreign matter, efflorescence and mould by water blasting or steam cleaning without damaging the surface. Remove remaining loose material with hand tools. Use sanding blocks to preserve the arrises of masonry and stone details.

Efflorescence: Eliminate the source of salt and water before cleaning. Allow surface to dry for 15 to 30 days before repainting.

New masonry: Allow 30 days for the masonry to cure and pH level to stabilise before painting.

Particular preparation requirements schedule

Substrate	Preparation method	Applicable standard
N/A		

3.2 PAINTING SYSTEMS

Dulux paint systems

Requirement: Apply paint systems as documented in the **Interior painting schedules** and the **Exterior painting schedules**.

General: Apply the paint system nominated for each substrate to the referenced manufacturer's Product Data Sheets (PDS) and Spec Sheets and include:

- The number and order of coats.
- The paint type for each coat.

Additional coats: Apply if necessary to:

- prepare porous or reactive substrates with prime or seal coats consistent with the manufacturer's recommendations;
- achieve the total film thickness or texture specified; or
- achieve a satisfactory opacity, in the specified or required colour.

Painting systems

Standards: The scheduled DuluxGroup/Dulux paint systems override AS/NZS 2311 (2017) as follows:

- New unpainted interior surfaces: To AS/NZS 2311 (2017) Table 5.1.
- New unpainted exterior surfaces: To AS/NZS 2311 (2017) Table 5.2.
- Standard: To AS/NZS 2311 (2017) clause 5.2. Provide the following final coats:
 - . High build textured or membrane finishes for concrete and masonry: B38 using products conforming to the AS/NZS 4548 series.
 - . Two-pack gloss pigmented polyurethane: B44.
 - . Two-pack epoxy: B29.
 - . Two-pack water-based epoxy: B29A.

Paint Reference Number (PRN): The number in brackets against the individual product refers to the Paint Ref. No. (PRN) listed in the **DuluxGroup/Dulux paint type reference table** (See PRODUCTS) and AS/NZS 2311 (2017) Table 4.2.

3.3 APPLICATION

Standard

General: To AS/NZS 2311 (2017) Section 6.

Light levels

General: During preparation of surfaces, painting and inspection, maintain light levels such that the luminance (photometric brightness) of the surface is equal to the specified permanent artificial illumination conditions or 400 lux, whichever is the greater.

Paint application

General: Apply the first coat immediately after substrate preparation and before contamination of the substrate can occur. Apply subsequent coats after the manufacturer's recommended drying period has elapsed.

Painting conditions

General: Unless the paint is recommended for such conditions, do not paint under the following conditions:

- Dusty conditions.
- Relative humidity: > 85%.
- Surface temperature: < 10°C or > 35°C.

Priming timber before fixing

General: Apply one coat of wood primer, and 2 coats to end grain, to the back of the following before fixing in position:

- External fascia boards.
- Timber door and window frames.
- Bottoms of external doors.
- Associated trim and glazing beads.
- Timber board cladding.

Spraying

General: If the paint application is by spraying, use conventional or airless equipment that conforms to the following:

- Satisfactorily atomises paint being applied.
- Does not require paint to be thinned beyond the maximum amount recommended by the manufacturer.
- Does not introduce oil, water or other contaminants into the applied paint.

Coatings with known health hazards: Not permitted on site.

Sanding

Clear finishes: Sand the sealer using abrasives no coarser than 320 grit without cutting through the colour. Take special care with round surfaces and edges.

Repair

Requirement: Clean off marks, paint spots and stains progressively and restore damaged surfaces to their original condition.

Maintenance painting: To AS/NZS 2311 (2017) Section 8.

Repair of galvanizing

Cleaning: For galvanized surfaces that have been subsequently welded, power tool grind to remove all surface contaminants, including rust and weld splatter. Prime affected area immediately after cleaning.

Primer: Type 2 organic zinc-rich coating for the protection of steel to AS/NZS 3750.9 (2009).

Tinting

General: Tint each coat of an opaque coating system so that each has a noticeably different tint from the preceding coat where possible, except for top coats in systems with more than one top coat.

Windows

Operation: Make sure opening windows function correctly before and after painting.

Doors

Drying: Maintain door leaf in the open position during drying. Do not allow door hardware or accessories to damage the door finish during the drying process.

Wet paint warning

Notices: Place in a conspicuous location and do not remove until the paint is dry.

Exclusions

Exclude the following surfaces from paint systems (unless specifically requested):

- Flexible duct connections, rubber hoses and mountings and other non-metallic flexible fittings.
- Wire rope and machined surfaces.
- Metals plated or specially finished for appearance, bronze, brass, copper and stainless steel (except as specified in the *Pipe identification* clause of the *Services* worksections).
- Aluminium frames.
- Prefinished aluminium frames to windows and doors, and trim.
- Metal floor duct covers.
- Raised access floors.
- Floors.
- Fair faced brickwork, blockwork, stonework, artificial stone and exposed aggregates.
- Sprayed vermiculite.
- Floors, paving, roads unless otherwise specified.
- Timber roof structure.
- Concealed timber roof structure.
- Timber ceiling and eaves lining.
- Exterior timber sheeting.
- Exterior timber stairs and decking.
- Plastic finishes generally
- Inside of service ducts, heat exchangers, pipes and valves.
- Shower seats, store shelving, work benches.
- Those parts of timber fixtures, such as insides of cupboards, not visible when doors are closed, unless otherwise specified. Insides of bathroom cabinets are not excluded and shall be painted.
- Self-finished surface such as glass and plastic laminates.
- Door hardware, including hinges.

3.4 COMPLETION

General

Protection and masking: Remove masking and protection coverings before paint has dried.

Cleaning: On completion of painting, remove splatters by washing, scraping or other methods that do not scratch or damage the surface.

Reinstatement: Repair, replace or refinish any damage, including works of other trades. Touch up new damaged paintwork or misses only with the paint batch used in the original application.

Fixtures: Refix removed and undamaged fixtures in the original locations. Make sure they are properly fitted and in proper working order.

Disposal of paint and waste materials

Requirement: Conform to requirements of the local government authority.

Spares

Spare material: Supply clearly labelled sealed containers of each type, coat and colour of paint/coating from the same batch, for future repair purposes.

4 SELECTIONS

4.1 INTERIOR PAINTING SCHEDULES

Flat and matt latex - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00290
Plasterboard (Ultra low VOC system)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Dulux Enviro ₂ Interior Matt	Dulux Enviro ₂ Interior Matt	DU00160

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (ceilings) (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux White Ceiling Paint	Dulux White Ceiling Paint	DU02398
Plasterboard (ceilings) (Ultra low VOC system)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Dulux Enviro ₂ Interior Ceiling Flat	Dulux Enviro ₂ Interior Ceiling Flat	DU04471
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00338
Fibrous/set plaster (with glancing light issues)	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00338
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00290
Timber and veneers	Dulux Professional Total Prep	Dulux Aquanamel Low-Gloss	Dulux Aquanamel Low-Gloss	DU01538
Cement render (low VOC system)	Dulux Prepcoat Acrylic Sealer Undercoat	Dulux Wash&Wear Matt	Dulux Wash&Wear Matt	DU00361
Acoustic ceiling tiles, vents & grids Vermiculite	Dulux Professional Acousticoat Flat			PR00396

Low-gloss latex - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02391
Plasterboard (Ultra low VOC system)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Dulux Enviro ₂ Interior Low Sheen	Dulux Enviro ₂ Interior Low Sheen	DU02822
Plasterboard (Dark colours)	Dulux Enviro ₂ Interior Acrylic Sealer Undercoat	Porter's Aqua Enamel Satin	Porter's Aqua Enamel Satin	PP00319
Fibrous/set plaster	Dulux Precision Sealer Binder	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU04651
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02896
Timber and veneers	Dulux Professional Total Prep	Dulux Aquanamel Low Gloss	Dulux Aquanamel Low Gloss	DU01538
Timber and veneers (walls)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02618
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02966
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02560

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
MDF	Dulux Professional Total Prep	Dulux Aquanamel Low Gloss	Dulux Aquanamel Low Gloss	DU01538
MDF (walls)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02539
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02966
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU00488

Low-gloss latex (mould resistant) – Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03227
Plasterboard (MR grade) (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03227
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03340
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03242
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03350
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03350
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03010
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU03350
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	Dulux Wash&Wear +Plus Kitchen & Bathroom Low Sheen	DU02850

Low-gloss latex (mould and bacteria resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC)	Dulux Acrylic Sealer Undercoat	Dulux Professional Steriguard Acrylic	Dulux Professional Steriguard Acrylic	PR00236

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
system)		Low Sheen	Low Sheen	
Plasterboard (MR grade) (low VOC system)	Dulux Professional Total Prep	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00902
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00129
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00237
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00238
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00237
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00238
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Professional Steriguard Acrylic Low Sheen	Dulux Professional Steriguard Acrylic Low Sheen	PR00169

Semi-gloss latex - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU2392
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02488
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02508
Timber and veneers	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU03000
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02478
Cement render (low VOC system)	Dulux Total Prep	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02544
MDF (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU03000
Brick and masonry (low VOC)	Dulux Acrylic Primer Sealer Undercoat	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02478

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
system)				
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear Semi Gloss	Dulux Wash&Wear Semi Gloss	DU02860

Semi-gloss latex (mould resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03235
Plasterboard (MR grade) (low VOC system)	Dulux EnvirO ₂ Interior Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU02457
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03346
Fibre cement products (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03228
Concrete (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03349
Cement render (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03347
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03348
Brick and masonry (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU03349
Concrete blockwork (low VOC system)	Berger Gold Label Acrylic Block Filler	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	Dulux Wash&Wear +Plus Kitchen & Bathroom Semi Gloss	DU02989

Semi-gloss water based enamel - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU02831
Plasterboard (MR grade)	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU02831
Plasterboard (MR grade) (Ultra low VOC system)	Dulux EnvirO ₂ Interior Acrylic Sealer Undercoat	Dulux EnvirO ₂ Interior Enamel Semi Gloss	Dulux EnvirO ₂ Interior Enamel Semi Gloss	DU04533
Fibrous/set plaster	Dulux Sealer Binder	Dulux	Dulux	DU02922

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
	(solvent based)	Aquanamel Semi Gloss	Aquanamel Semi Gloss	
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03558
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04571
Timber and veneers (ultra low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux EnvirO ₂ Interior Enamel Semi Gloss	Dulux EnvirO ₂ Interior Enamel Semi Gloss	DU04339
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01004
Cement render	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00414
MDF (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04571
Brick and masonry	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03356
Concrete blockwork	Berger Gold Label Acrylic Block Filler	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03370
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal) (low VOC system)	Dulux Galvanised Iron Primer (water based)	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01005
Shop primed or red oxide primed (ROZP) ferrous metal	Dulux Metalshield All Surface Primer	Dulux Aquanamel Semi Gloss Acrylic	Dulux Aquanamel Semi Gloss Acrylic	DU05329
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00715
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU05239

Semi-gloss water based enamel (mould and bacteria resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00062
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00147

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00240
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00241
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00242
MDF (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00243
Concrete blockwork	Berger Gold Label Acrylic Block Filler	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00245
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Galvanised Iron Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00246
Shop primed or red oxide primed (ROZP) ferrous metal (low VOC system)	Dulux Metalshield All Surface Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00247
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00248
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	Dulux Professional SteriGuard Water Based Enamel Semi Gloss	PR00249

Semi-gloss, solvent-borne - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and primed hardboard veneers	Dulux 1 Step Oil Based Primer Sealer Undercoat (solvent based)	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02412
MDF	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02569
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-	Dulux Galvanised Iron Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU00599

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
primed steel)				
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Metalshield All Surface Primer (water based)	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU00544
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU03013
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02993
Plastics (solvent sensitive types e.g. polystyrene)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel Semi Gloss	Dulux Super Enamel Semi Gloss	DU02993

Full gloss water based enamel - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02514
Plasterboard (MR grade)	Dulux Precision Sealer Binder	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU05334
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03097
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03357
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02436
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03375
Cement render	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02747
MDF (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU02972
Brick and masonry	Dulux Acrylic Sealer Undercoat	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03375
Concrete blockwork	Berger Gold Label Acrylic Block Filler	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03375
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Galvanised Iron Primer (water based)	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU04438
Shop primed or red oxide primed (ROZP) ferrous metal	Dulux Metalshield All Surface Primer	Dulux Aquanamel	Dulux Aquanamel	DU05336

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
		Gloss	Gloss	
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU03014
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01011

Full gloss water based enamel (mould and bacteria resistant) - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Plasterboard	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00250
Fibrous/set plaster	Dulux Sealer Binder (solvent based)	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00154
Fibre cement products	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00251
Timber and veneers (low VOC system)	Dulux 1 Step Acrylic Primer Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00252
Concrete	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00253
MDF (low VOC system)	Dulux Acrylic Sealer Undercoat	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00254
Concrete blockwork	Berger Gold Label Acrylic Block Filler	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00255
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Galvanised Iron Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00256
Shop primed or red oxide primed (ROZP) ferrous metal (low VOC system)	Dulux Metalshield All Surface Primer (water based)	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00259
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Professional SteriGuard Water Based Enamel Gloss	Dulux Professional SteriGuard Water Based Enamel Gloss	PR00257
Plastics (solvent	Dulux Precision	Dulux Professional	Dulux Professional	PR00258

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
resistant types e.g. FRP, PVC-U) (low VOC system)	Maximum Strength Adhesion Primer	SteriGuard Water Based Enamel Gloss	SteriGuard Water Based Enamel Gloss	

Full gloss solvent-borne – Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and primed hardboard veneers	Dulux 1 Step Oil Based Primer Sealer Undercoat	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02410
MDF	Dulux 1 Step Acrylic Primer Undercoat	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02568
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Galvanised Iron Primer (water based)	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU00599
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Metalshield All Surface Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	PR05342
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU03012
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02428
Plastics (solvent sensitive types e.g. polystyrene)	Dulux Precision Maximum Strength Adhesion Primer	Use water based paints, not solvent based.	Use water based paints, not solvent based.	N/A

Full gloss, epoxy primed enamel - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Zinc-coated metals (zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Durebild STE to 100 microns DFT	Dulux Metalshield Prem UV Resistant Enamel Topcoat Gloss	Dulux Metalshield Prem UV Resistant Enamel Topcoat Gloss	DU00248

Full gloss, epoxy primed two-pack polyurethane - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Zinc-coated metals (incl. HD Galvanized steel, zincalume, Galvabond, zincanneal, zincseal, zinc-primed steel)	Dulux Duremax GPE Zinc Phosphate to 125 microns DFT	Dulux Duremax GPE to 100 microns DFT	Dulux Weathermax HBR to 75 microns DFT	DU03559

Clear over stain on timber or veneers - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and timber veneer (solvent based system)	Cabot's Cabothane (solvent based) Gloss or Satin	Cabot's Cabothane (solvent based) Gloss or Satin	Cabot's Cabothane (solvent based) Gloss or Satin	CA00114 CA00162
Timber and timber	Cabot's Cabothane	Cabot's Cabothane		CA00216

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
veneer (low VOC water based system)	Clear Water Based Gloss or Satin Apply 10.8 m ² /litre	Clear Water Based Gloss or Satin Apply 10.8 m ² /litre		CA00218

Gloss level required: Satin

Clear coat two-pack polyurethane - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (low VOC water based system)	Intergrain Enviropro Timberseal	Intergrain Enviropro Endure 2 Pack Matt	Intergrain Enviropro Endure 2 Pack Matt	IE00110
Timber (low VOC water based system)	Intergrain Enviropro Timberseal	Intergrain Enviropro Endure 2 Pack Satin	Intergrain Enviropro Endure 2 Pack Satin	IE00050
Timber (low VOC water based system)	Intergrain Enviropro Timberseal	Intergrain Enviropro Endure 2 Pack Gloss	Intergrain Enviropro Endure 2 Pack Gloss	IE00047

Clear coat single pack polyurethane - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and timber veneer (low VOC water based system)	Cabot's Cabothane Clear Water Based Gloss or Satin Apply 12 m ² /litre	Cabot's Cabothane Clear Water Based Gloss or Satin Apply 12 m ² /litre		CA00216 CA00218

Two pack gloss pigmented polyurethane - Interior joinery

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (Factory applied)	Dulux Luxepoxy 4 White Primer to 50 microns DFT.	Dulux Luxathane SPX Satin		PC00046

Clear finishing oils for timber - Interior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber	Feast Watson Scandinavian Oil Apply at 16 m ² /litre	Feast Watson Scandinavian Oil Apply at 16 m ² /litre		FW00181
Timber	Feast Watson Tung Oil Apply 12-14 m ² /litre	Feast Watson Tung Oil Apply 12-14 m ² /litre		FW00182

Tung oil (Semi-gloss finish) - Interior (timber floors)

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (soft wood)	Feast Watson Proofseal	Feast Watson Tung Oil (Commercial)	Feast Watson Tung Oil (Commercial)	FW00194
Timber (hardwood)	Feast Watson Proofseal	Feast Watson Tung Oil (Commercial)	Feast Watson Tung Oil (Commercial)	FW00194

Clear single pack polyurethane - Interior (timber floors)

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber (floors) (low VOC water based system)	Intergrain Enviropro Endure 1 Gloss, Satin or Matt	Intergrain Enviropro Endure 1 Gloss, Satin or Matt	Intergrain Enviropro Endure 1 Gloss, Satin or Matt	IE00104 IE00115 IE00106
Timber (floors)	Feast Watson Floorproof (solvent based) Gloss or Satin	Feast Watson Floorproof (solvent based) Gloss or Satin	Feast Watson Floorproof (solvent based) Gloss or Satin	FW00153 FW00154

Paving paint for concrete – Interior or exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete (solvent based system)	Berger Jet Dry Non-Slip Paving Paint	Berger Jet Dry Non-Slip Paving Paint	Berger Jet Dry Non-Slip Paving Paint	BE00100
Concrete (low VOC, water based system)	Berger Jet Dry Aqua Tread Satin	Berger Jet Dry Aqua Tread Satin		BE00155

Clear sealer for concrete – Interior or exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete (Domestic) (low VOC, water based system)	Berger Jet Dry Aqua Tread Satin	Berger Jet Dry Aqua Tread Satin	Berger Jet Dry Aqua Tread Satin	BE00155
Concrete (commercial) (low VOC, water based system)	Dulux Luxafloor WB	Dulux Luxafloor WB	Dulux Luxafloor WB	PC00214
Concrete (commercial) (water based system)	Dulux Protective Coatings Luxafloor WB Sealer Gloss	Dulux Protective Coatings Luxafloor WB Sealer Gloss	Dulux Protective Coatings Luxafloor WB Sealer Gloss	PC00214
Concrete (commercial) (solvent based system)	Dulux Luxafloor ACS	Dulux Luxafloor ACS		PC00130

Previously painted surfaces - Interior

Primer: [complete/delete]

Sealer: [complete/delete]

Undercoat: [complete/delete]

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
e.g. Painted Plasterboard	Dulux ASU	Dulux Wash&Wear Low Sheen	Dulux Wash&Wear Low Sheen	DU02391

4.2 EXTERIOR PAINTING SCHEDULES**Low-gloss latex – Exterior**

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Weatherboard - hardboard cladding (Weathertex) Restricted application	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05348

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Weatherboard -fibre cement board cladding (Hardiboard) Restricted application	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU02593
Fibre cement products (soffits)	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen		DU04504
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00611
Concrete (OFC, tilt slab or precast) Restricted application	Dulux Acratex Green Render Sealer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04491
Concrete (OFC, tilt slab or precast) (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC02778
Cement render (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC00860
Clay brick and masonry Restricted application	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00421
Concrete blockwork Restricted application	Berger Gold Label Acrylic Blockfiller	Dulux Weathershield Low Sheen Acrylic	Dulux Weathershield Low Sheen Acrylic	DU02631
Concrete blockwork (High-build performance coating system)	Dulux AcraTex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	DU04938
Zinc coated metals (incl. Zinalume, Galvabond, Zincaneal, zincseal, zinc-primed steel)	Dulux 1 Step Prep	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04608
HD Galvanized steel or zinc-primed steel (Domestic)	Dulux Durebuild STE Two Pack Epoxy	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05261
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00478
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04610

Semi-gloss latex – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Weatherboard -hardboard cladding Non rebated Jointed (Weathertex) Restricted application	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05348
Weatherboard -fibre cement	Dulux	Dulux	Dulux	DU02593

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
board cladding Non rebated Jointed (Hardiboard) Restricted application	Weathershield Low Sheen	Weathershield Low Sheen	Weathershield Low Sheen	
Fibre cement products Soffits	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen		DU04504
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00611
Concrete (OFC, tilt slab or precast) Restricted application	Dulux Acratex Green Render Sealer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04491
Concrete (OFC, tilt slab or precast) (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC02778
Cement render (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC00860
Clay brick and masonry Restricted application	Dulux Professional Acrylic Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00421
Concrete blockwork Restricted application	Berger Gold Label Acrylic Blockfiller	Dulux Weathershield Low Sheen Acrylic	Dulux Weathershield Low Sheen Acrylic	DU02631
Concrete blockwork (High-build performance coating system)	Dulux AcraTex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	DU04938
Zinc coated metals (incl. Zinalume, Galvabond, Zincoanneal, zincseal, zinc-primed steel)	Dulux 1 Step Prep	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04608
HD Galvanized steel or zinc-primed steel (Domestic)	Dulux Durebuild TE Two Pack Epoxy	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU05261
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU00478
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU04610

Gloss latex – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products Restricted application	Dulux Weathershield Gloss	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05350

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU00623
Concrete (OFC, tilt slab or precast) Restricted application	Dulux AcraPrime 501/1 Water Based Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU02639
Concrete (OFC, tilt slab or precast) (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC02778
Cement render (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	AC01415
Clay brick and masonry	Dulux Professional Acrylic Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05353
Concrete blockwork	Berger Gold Label Acrylic Blockfiller	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU03378
Concrete blockwork (High-build performance coating system)	Dulux Acratex Green Render Sealer	Dulux AcraTex AcraShield Roller Finish	Dulux AcraTex AcraShield Roller Finish	DU04938
Zinc coated metals (incl. Zinalume, Galvabond, Zincaneal, zincseal, zinc-primed steel)	Dulux Professional Galvanised Iron Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05354
HD galvanized steel or zinc-primed steel (Domestic)	Dulux Durebuild STE Two Pack Epoxy	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05355
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer (solvent based)	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU00480
Plastics (solvent resistant types e.g. FRP, PVC-U) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Weathershield Gloss	Dulux Weathershield Gloss	DU05299

Acrylic paint system for bagged masonry – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Brickwork and concrete Restricted application	Berger Gold Label Block Filler	Dulux Weathershield Low Sheen	Dulux Weathershield Low Sheen	DU02631
Brickwork and concrete – bagged slight texture finish	Dulux AcraPrime 501/1 Water Based Primer	Dulux Acratex Contempo Advance Coarse Bagged Look (2nd coat Optional)	Dulux Acratex Contempo Advance Coarse Bagged Look	AC01825
Brickwork and concrete – flush finish – medium	Dulux AcraTex Mediterranean Classique	Dulux AcraTex Mediterranean Classique	Dulux AcraTex AcraShield	AC02669

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
texture				

Textured acrylic paint system – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Concrete, blockwork and cement render	Dulux Acraprime 501/1 Water Based Primer	Dulux Acratex Contempo 959 Advance Base Coat	Dulux Acratex Contempo 959 Advance Finish Coat	AC01825
Concrete, blockwork and cement render	Dulux Acraprime 501/1 Water Based Primer (B15)	Dulux Acratex Roll On 00 Low Profile Texture	Dulux Acratex Acrashield Finish	AC01629
Concrete, masonry, blockwork and cement render	Dulux Acraprime 501/1 Water Based Primer	Dulux Acratex Acrashield 955 Low Gloss Rolana Finish	Dulux Acratex Acrashield 955 Low Gloss Rolana Finish	AC01958

Semi-gloss water based enamel – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00432
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04571
Concrete Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01004
Cement render Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00414
Brick and masonry Restricted application	Berger Gold Label Acrylic Block Filler	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03370
Concrete blockwork Restricted application	Berger Gold Label Acrylic Block Filler	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU03370
Zinc coated metals Zincalume, Galvabond, Zincaneal, zincseal, zinc-primed steel) (low VOC system)	Dulux Professional Galvanised Iron Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU01005
Shop primed or red oxide primed (ROZP) ferrous metal	Dulux Metalshield All Surface Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU04575
Non-ferrous metals (incl. aluminium, brass, copper, tin plate) (low VOC system)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Semi Gloss	Dulux Aquanamel Semi Gloss	DU00715
Plastics (solvent resistant types e.g. FRP,	Dulux Precision Maximum Strength	Dulux Aquanamel	Dulux Aquanamel	DU00413

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
PVC-U) (low VOC system)	Adhesion Primer	Semi Gloss	Semi Gloss	

Full gloss water based enamel – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Fibre cement products Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00431
Timber and veneers	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00548
Concrete Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01006
Cement render Restricted application	Dulux Professional Acrylic Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00415
Brick and masonry Restricted application	Berger Gold Label Acrylic Blockfiller	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01008
Concrete blockwork Restricted application	Berger Gold Label Acrylic Blockfiller	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01008
Zinc-coated metals (Zincalume, Galvabond, Zincaneal, zincseal, & zinc-primed steel)	Dulux Professional Galvanised Iron Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU04438
Shop primed or red oxide primed (ROZP) ferrous metal.	Dulux Luxaprime Zinc Phosphate Primer (solvent based)	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU00436
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01010
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Aquanamel Gloss	Dulux Aquanamel Gloss	DU01011

Full gloss, solvent borne – Exterior

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
Timber and primed hardboard veneers	Dulux 1 Step Oil Based PSU (solvent based)	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02410
Zinc-coated metals (zincalume, Galvabond, zincaneal, zincseal, zinc-primed steel)	Dulux Professional Galvanised Iron Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU05331
Shop primed or red oxide primed (ROZP)	Dulux Luxaprime Zinc Phosphate Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU00481

Substrate	1st coat	2nd coat	3rd coat	Manufacturer's Spec Sheet Ref
ferrous metal.	(solvent based)	Gloss	Gloss	
Non-ferrous metals (incl. aluminium, brass, copper, tin plate)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU03012
Plastics (solvent resistant types e.g. FRP, PVC-U)	Dulux Precision Maximum Strength Adhesion Primer	Dulux Super Enamel High Gloss	Dulux Super Enamel High Gloss	DU02428
Plastics (solvent sensitive types, e.g. polystyrene)	Dulux Precision Maximum Strength Adhesion Primer	Don't use Solvent Based, Use Water Based Paints	Don't use Solvent Based, Use Water Based Paints	N/A

Car parking line marking

Requirement:

- Apply nominally 70 mm wide line marking for car parking spaces nominated on drawings.
- Materials:
- Paint System: Dulux Roadmaster WB2, spray applied to manufacturers written recommendations.
- Colour shall be white and shall not be subject to discolouration by the bitumen from the road surface.

Application: Unless approved all paint shall be applied by a mechanical line marking sprayer. The road surface shall be clean and dry at the time of painting. Paint shall be applied at wet thickness in the range of 0.35 to 0.40 mm. Bitumen shall be at least 30 days old before coating.

Standard: To AS/NZS 2890.1 (2004).

Paint colours schedule

Substrate	Number of colours

4.3 PAINT PROPERTIES**Paint system schedule**

Paint code	Characteristic	Requirements

0673 POWDER COATINGS

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide powder coating systems to substrates, as documented.

1.2 CROSS REFERENCES**General**

Requirement: Conform to the following:

- 0171 General requirements.

1.3 STANDARDS**General**

Application to aluminium and aluminium alloy substrates for architectural applications: To AS 3715 (2002) and AAMA 2603 (2022), AAMA 2604 (2022) and AAMA 2605 (2022) as appropriate.

Application to metal substrates other than aluminium for architectural applications: To AS 4506 (2005).

1.4 INTERPRETATION**Definitions**

General: For the purposes of this worksection, the following definitions apply:

- Powder coating: The process of preparing, applying, fusing and curing a thermoset powder coating material to a substrate:
 - . Thermoset powder coating: A mixture of finely ground particles of pigment and resin sprayed on to a prepared substrate. Charged powder particles adhere to electrically grounded surfaces until heated and fused into a smooth coating in a curing oven.
 - . Polyester powder coating: Uses an enhanced polyester resin.
 - . Fluoropolymer powder coating: Uses PTFE (poly tetra fluoro ethylene) for aluminium substrates.
- Substrate: The surface to which a material or product is applied.

1.5 SUBMISSIONS**Products and materials**

Coating manufacturer: Submit the following details at least 3 weeks before fabrication:

- Recommended coating system for the nominated service condition.
- Brand name.
- Storage and handling recommendations.
- Product data sheets.
- Maintenance recommendations.

Samples

Powder coating samples: Submit labelled samples of each coating system on representative substrates, showing surface preparation, colour, gloss level, texture, and physical properties.

Coated samples schedule

Substrate	Coating system	Colour/texture	Sample size/Number
TBC			

Subcontractors

Specialist applicators: Submit name and contact details of proposed specialist applicators as registered by the coating manufacturer.

Warranties

Requirement: Submit warranties to **COMPLETION, Warranties.**

2 PRODUCTS

2.1 GENERAL

Storage and handling

General: To AS 3715 (2002) Appendix D for powder coated aluminium and AS 4506 (2005) Appendix F for all other powder coated materials.

2.2 MATERIALS

Performance requirements

Powder coating to aluminium and aluminium alloy: To AS 3715 (2002) Section 2.

Powder coating to metals, other than aluminium: To AS 4506 (2005) Section 2.

3 EXECUTION

3.1 PREPARATION

Substrate pre-treatment

Powder coating to aluminium: To AS 3715 (2002) Appendix G.

Powder coating to metals, other than aluminium: To AS 4506 (2005) Appendix I.

3.2 COMPLETION

Cleaning

Aluminium architectural applications: Clean completed assembly to AS 3715 (2002) Appendix C.

Metal, other than aluminium, architectural applications: Clean completed assembly to AS 4506 (2005) Appendix D.

Warranties

Requirement: Submit the coating manufacturer's warranties, as documented.

4 SELECTIONS

4.1 ALUMINIUM FOR ARCHITECTURAL APPLICATIONS

Powder coating properties schedule

	A	B	C
Proprietary item	TBC		
Application			
Location			
Substrate			
Service condition category to AS 3715 (2002)			
Powder coating performance			
Powder coating type			
Polyester coating grade			
Colour			
Gloss level			
Warranty: Film integrity			
Warranty: Colour integrity			

4.2 METAL OTHER THAN ALUMINIUM FOR ARCHITECTURAL APPLICATIONS

Powder coating properties - metal substrates other than aluminium schedule

	A	B	C
Proprietary item	TBC		
Application			

	A	B	C
Location			
Substrate			
Service condition to AS 4506 (2005)			
Powder coating type			
Polyester coating grade			
Colour			
Gloss level			
Warranty: Film integrity			
Warranty: Colour integrity			

4.3 MDF JOINERY APPLICATIONS

Powder coating properties for MDF schedule

	A	B	C
Proprietary item	TBC		
Application			
Location			
Substrate			
Colour			
Gloss level			
Warranty: Film integrity			
Warranty: Colour integrity			

0702 MECHANICAL DESIGN AND INSTALL

1 MECHANICAL SYSTEMS

1.1 RESPONSIBILITIES

General

Requirement: Design systems and provide mechanical services, as documented.

Refer Engineering Solutions Tasmania's drawings and specifications.

1.2 DESIGN

General

Requirement: To DESIGN in 0171 General requirements.

Designer qualifications

Designer qualification: Use only appropriately experienced and qualified persons to undertake design work. If requested, provide documents verifying the qualification and experience. Conform to

DESIGNER in 0171 General requirements.

Design for durability and maintainability

Design for durability: Develop the design so the systems achieve the documented performance, reliability, service life, energy efficiency and safety requirements, and are easily maintainable.

Access for maintenance: Develop the design so the systems conform to **ACCESS FOR MAINTENANCE** in 0171 General requirements.

Energy efficiency

Requirement: To BCA (2022) J6.

Seismic restraint

Requirement: To **SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS** in 0171 General requirements.

Design, application and calculations

Standards: Conform to the recommendations of one or more of the following:

- AIRAH Design Application Manuals.
- ASHRAE Handbooks.
- CIBSE Guides.

Methods of calculation: Manual or software that employs the data and methods in the applicable standard.

Air conditioning system design

Requirement: Provide engineering design that:

- Maximises the functionality, performance, safety, flexibility and reliability of the mechanical services.
- Is technically sound.
- Can be constructed using methods that are good practice and in common use.
- That provide the lowest combined owning and operating cost over the design life of the systems.

Outdoor design conditions

General: Use design conditions listed in AIRAH DA09 (2022) or ASHRAE Handbook - Fundamentals (2021) for:

- The design conditions location selected to the recommendations of AIRAH DA09 (2022) clause 3.4.2.
- Cooling design: Annual cooling, dehumidification and enthalpy design conditions, 1% DB (dry bulb) and MCWB (mean coincident wet bulb) for the selected location.
- Heating design: Annual heating and humidification design conditions, 99% Heating DB (dry bulb) for the selected location.

Indoor design conditions

General: Conform to the following:

- Summer: 24°C dry bulb, 50% relative humidity.

- Winter: 21°C dry bulb.

Cooling performance

Requirement: Maintain the air conditioned spaces, as measured at the points of control, within the documented cooling indoor design conditions at the highest cooling load due to the combination of the following:

- Cooling loads imposed by the outdoor design conditions.
- Other cooling loads when they are at their maximum.
- Full solar load.
- Loads due to system and other losses.

Heating performance

Requirement: Maintain the air conditioned spaces, as measured at the points of control, within the documented heating indoor design conditions at the highest heating load due to the combination of the following:

- Heating loads imposed by the outdoor design conditions.
- Other documented cooling loads are zero.
- Solar cooling load is zero.
- Loads due to system and other losses.

Temperature variation

Requirement: Limit the temperature difference in air conditioned spaces served by the same zone or system to 2°C as follows:

- Between any 2 points in the space from floor level to 1500 mm above floor level.
- > 2000 mm from cooking equipment and > 1000 mm from any other appliance.
- When the documented outdoor conditions are not exceeded.
- After the plant has been operating for one hour.
- With the temperatures measured in the same 5 minute period.

Zoning

Requirement: Divide the systems into temperature controlled zones to meet the stated permissible limits in temperature variation, and the system divisions stated in the equipment schedule.

Fresh air: Supply fresh air to spaces with air conditioning systems via the air handling system.

Building fabric loads

Requirement: Allow for loads from the construction documented.

Internal window shading: As documented.

Lighting loads

Requirement: Allow for heat loads from the lighting as documented but not less than 5 W/m².

Internal equipment loads

Requirement: Allow for loads from the equipment as documented but not less than 5 W/m².

People loads

Number of people in each space: To AS 1668.2 (2012) but no fewer than 1 person/10 m².

Heat gain from people: To AIRAH DA09 (2022).

Supply air

Minimum supply air to each air conditioned space: ≥ 4.5 L/s/m² at all times the plant is operational.

Outside air

Standard: To AS 1668.2 (2012) but not less than 10 L/s/person.

Means of supply: Provide outside air only through the air conditioning system or a mechanical ventilation system. Do not offer natural ventilation lieu of mechanical ventilation to AS 1668.2 (2012).

Design life

General: To 0171 *General requirements*.

Design life:

- Equipment to **PACKAGED AIR CONDITIONING**: 15 years.
- Equipment to **ROOM AIR CONDITIONERS**: 10 years.
- All other systems and components other than consumables: 20 years.

Noise levels

Ambient noise emitted: Lower than the level that can be heard within a habitable room in any neighbouring premises, regardless of whether any door or window to that room is open.

Noise levels in occupied spaces: To **NOISE LEVELS** in *0171 General requirements*.

Acoustic treatment of services: Provide acoustic treatment to achieve the documented space and ambient noise levels and acoustic separation.

Fire separation

Requirement: As documented.

Control

Requirement: To **PACKAGED AIR CONDITIONING, ROOM AIR CONDITIONERS, AUTOMATIC CONTROLS** and BCA (2022) J6D3.

Mechanical ventilation

Requirement: To AS 1668.2 (2012).

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *0171 General requirements*.

1.4 STANDARDS**General**

Mechanical ventilation and air conditioning: To AS 1668.1 (2015) and AS 1668.2 (2012).

Microbial control: To AS/NZS 3666.1 (2011), AS/NZS 3666.2 (2011) and the recommendations of SA/SNZ HB 32 (1995).

Plumbing, drainage and water supply: To AS/NZS 3500.0 (2021), AS/NZS 3500.1 (2021), AS/NZS 3500.2 (2021), AS/NZS 3500.3 (2021) and AS/NZS 3500.4 (2021) and the PCA (2022).

Refrigeration systems: To AS/NZS 5149.1 (2016), AS/NZS 5149.2 (2016), AS/NZS 5149.3 (2016) and AS/NZS 5149.4 (2016).

Residential heating and cooling systems: To AS/NZS 5141 (2018).

Electrical services

Requirement: To AS/NZS 3000 (2018), unless otherwise documented.

Electrical installations

Electrical design: To AS/NZS 3000 (2018).

Selection of cables: To AS/NZS 3008.1.1 (2017).

Degrees of protection (IP code): To AS 60529 (2004).

Electromagnetic compatibility (EMC): To the AS/NZS 61000 series.

Communications systems: To AS/CA S008 (2020), AS/CA S009 (2020), AS 11801.1 (2019) and AS/NZS 14763.2 (2020).

1.5 INTERPRETATION**Definitions**

General: For the purposes of this worksection the definitions given in *0171 General requirements* and the following apply:

- Sealants: Material in liquid (including aerosol) form or mastic form (including mastic embedded in fabric) designed to prevent air, water and vapour leakage. If mastic sealant is specified, do not use liquid sealant. If liquid sealant is specified, do not use mastic sealant.

1.6 SUBMISSIONS**General**

Requirement: Conform to *0171 General requirements*.

Submissions: Before starting work, submit the following:

- Outdoor design conditions, corresponding geographic location and source of data.
- Calculated total and sensible cooling capacities and heating capacity.
- Name of calculation method used.

- Makes and model numbers of proposed equipment.
- Total and sensible cooling capacities and heating capacity of the proposed equipment, adjusted for the documented outdoor and indoor conditions and any effects of the proposed plant configuration.
- Any assumptions on which the calculations are based.
- Details of any departures from this specification.
- Method of heating and % of total heating load in the case of electric heating.
- Mechanical contractor provision for attendance to breakdowns.
- Availability of service network of plant manufacturer.
- Licence numbers and type of licences held by persons responsible for the installation.

Authority approvals

Authority submissions: Submit evidence of approval from authorities relating to the works.

Baseline data

Requirement: Submit baseline data to **BASELINE DATA** in *0171 General requirements*.

Certification

Completion: Submit certificate as verification that the design and installation conforms to all contractual and statutory requirements.

Drawings

Requirement: Submit drawings at minimum 1:100 scale showing the following:

- Areas to be air conditioned.
- Areas to be mechanically ventilated including car parks, toilets and kitchens.
- Details demonstrating compliance with mechanical ventilation requirements of NCC.
- Details demonstrating compliance with energy requirements of NCC.
- Make, model and principal performance parameters of each item heating and cooling equipment.
- Make, model and principal performance parameters of ventilation fans.
- Make, model and principal performance parameters of air filtration equipment and details of compliance with statutory requirements.
- Air conditioning zones and sensor locations and methods of heating.
- Functional descriptions of automatic control systems.
- Duct, pipe, equipment layouts and plant locations. Show proposed zoning and methods of heating.
- Details of equipment supports, including seismic restraints to *0171 General requirements*.
- Mechanical services electrical diagrams and details.
- Provisions for maintenance access, balancing and commissioning.
- If necessary to convey the requirements of the design, provide additional schematic diagrams of air, control and refrigeration systems.
- Details of fire provisions demonstrating compliance with NCC.
- Other details and information to meet statutory requirements.

Operation and maintenance manuals

Requirement: Conform to **OPERATION AND MAINTENANCE MANUALS** in *0171 General requirements*.

Subcontractors

General: Submit names, contact details, licence numbers and type of licence of proposed suppliers and installers.

1.7 ADHESIVES AND SEALANTS**Requirements**

Requirement: Provide only materials that:

- Have a Smoke-Developed Index less than 3 and a Spread-of-Flame Index of 0 tested to AS/NZS 1530.3 (1999).
- Are suitable for application by gun, spray, brush, hand or other means recommended by the manufacturer.
- Are recommended by the adhesive or sealant manufacturer for the application and surfaces to which they are applied and which bond without the application of primers.

- After curing, have high elastomeric properties under the operating conditions to which it is exposed including temperatures, air velocities, contaminants in the air and vibration.
- If exposed to sunlight, are resistant to ultraviolet light and ozone.
- Remain flexible and maintain their sealing and adhesion performance for the design life of the component to which they are applied.
- Do not support mould or other microbial growth.
- Are resistant to oils, refrigerants and water.
- Are non-toxic.
- Do not emit volatile organic compounds.

1.8 INSTALLATION

Pipe support

Requirement: To **SERVICES INSTALLATION, Pipe support systems** in 0171 *General requirements*.

2 PACKAGED AIR CONDITIONING

2.1 EQUIPMENT

Operating conditions

Requirement: Provide equipment that operates within an ambient temperature range of 0°C to 45°C, without excessive head pressure, unstable operation or icing.

Split systems

General: Supply indoor and outdoor condensing units of split systems designed and rated by the manufacturer to operate together.

Outdoor units: Provide packaged outdoor condensing units consisting of refrigerant condensers, compressors and associated piping and electrical connections, mounted within the condenser enclosure.

Indoor units: Provide units consisting of coils, piping, supply air fan, accessories and electrical connections, mounted within an insulated enclosure.

One-piece packages

Requirement: Provide packaged units consisting of refrigerant condensers, compressors, supply air fan, cooling coil and associated piping and electrical connections, mounted within the same enclosure.

Construction

Insulation: Insulate and vapour seal to prevent external condensation under all operating conditions.

Supply fan: Centrifugal with multi-speed or variable speed motor.

Condenser fans: Low speed propeller or axial.

Coils: Copper tube, aluminium plate fin type with no moisture carry over.

Drains: Provide aluminium, stainless steel or plastic drain trays to collect all moisture generated inside unit. Provide trapped drain to waste.

2.2 EQUIPMENT ENCLOSURES

General

Requirement: Provide enclosures, materials and finishes that are corrosion-resistant, assembled and reinforced to prevent flexing and drumming.

External equipment enclosures: Weatherproof.

Insulation

Requirement: Insulate enclosures to prevent external surface condensation under all operating conditions. Fix insulation to panels with adhesive applied to at least 50% of the panel area.

2.3 FILTERS

General

Filter performance: Provide dry media filters with performance to one of the following:

- AS 1324.1 (2001): ≥ G4.
- ASHRAE 52.2 (2017): ≥ MERV 6.
- EN 779 (2012): ≥ G4.

- ISO 16890-1 (2016): \geq Coarse 90%.

2.4 REFRIGERATION PIPING

General

Requirement: Conform to equipment manufacturer's recommendations for the refrigerant used. Provide refrigeration piping designed and installed so that the complete system meets the documented performance under the documented operating conditions.

2.5 CONDENSATE DRAINS

General

Condensate drains: Provide trapped drain lines with uniform and continuous fall to connect condensate trays to the nearest building drain point. Provide drains from:

- Each indoor coil.
- Each outdoor coil, unless the casing freely drains to a roof or other location where condensate and/or rain water will not cause damage or ponding.
- Each safety tray.
- Other moisture or rainwater collecting areas.

2.6 SAFETY TRAY

Location

General: If leaks or condensation can damage or become a nuisance to the building or its contents, provide a safety tray under packaged unit and indoor unit of split systems.

Reverse cycle units: If reverse cycle outdoor units do not have drain connections, locate safety tray below unit and pipe drain to waste.

2.7 UNIT INSTALLATION

General

Requirement: Supply all necessary components, including but not limited to the following:

- Means of attachment to the structure.
- Anti-vibration mounting.
- Appropriate flexible connections.
- Trim and sealing around openings.
- Electrical connections.
- Drainage connections.
- Field connection of refrigerant lines in split systems.

Alignment: Install units level, plumb and to manufacturer's recommendations.

Fixing: Bolt units in place with minimum 4 anchors or suspension rods.

Outdoor equipment

Arrangement: Provide clearance around units for condenser air flow and maintenance access. Make sure discharge air does not short-circuit to condenser intake.

Plinths: If located on grassed or similar permeable surfaces, provide concrete plinths under outdoor equipment.

Wind and rain: Conform to AS/NZS 1170.2 (2021) for wind action. Design to prevent entry of rain to the supply air duct under all likely conditions.

Duct connections

Supply duct: Provide internal or external flexible duct connection.

Return, outside air and condenser duct connections: Provide external flexible duct connection.

3 ROOM AIR CONDITIONERS

3.1 GENERAL

Split systems

General: Supply indoor and outdoor units of split systems designed and rated by the manufacturer to operate together.

Standards

Safety: Conform to AS/NZS 60335.2.34 (2021) and AS/NZS 60335.2.40 (2023).

Construction

Insulation: Insulate and vapour seal to prevent external condensation under all operating conditions.

Supply fan: Centrifugal with multi-speed or variable speed motor.

Condenser fans: Low speed propeller or axial.

Coils: Copper tube, aluminium plate fin type with no moisture carry over.

Drains: Provide aluminium, stainless steel or plastic drain trays to collect all moisture generated inside unit. Provide trapped drain to waste.

Filters

Filters and media: Supply filters and media that are odourless, non-toxic, non-migrating, non-evaporating, non-hardening, resistant to microbial growth, resistant to vermin and which do not shed fibres in service.

Filter pressure drop: To BCA (2022) J6D5.

Filter performance: Provide dry media filters with performance to one of the following:

- AS 1324.1 (2001): \geq G4.
- ASHRAE 52.2 (2017): \geq MERV 6.
- EN 779 (2012): \geq G4.
- ISO 16890-1 (2016): \geq Coarse 90%.

3.2 CONDENSATE DRAINS**General**

Condensate drains: Provide trapped drain lines with uniform and continuous fall to connect condensate trays to the nearest building drain point. Provide drains from:

- Each indoor coil.
- Each outdoor coil, unless the casing freely drains to a roof or other location where condensate and/or rain water will not cause damage or ponding.
- Each safety tray.
- Other moisture or rainwater collecting areas.

4 FANS

4.1 DESIGN**Fan efficiency**

Requirement: Provide fans with efficiencies to BCA (2022) J6D5.

Centrifugal fans

Requirement: Select fans so the air flow can be increased at least 10% above the rate documented, as follows:

- Against the corresponding increased system resistance as installed.
- Without unstable operation.
- Without motor change.
- By speed change alone.

Axial flow fans

Requirement: Select fans so the air flow can be increased at least 10% above the rate documented, as follows:

- Against the corresponding increased system resistance as installed.
- Without unstable operation.
- Without motor change.
- By pitch angle change alone.

Fans with multi-speed motors

Requirement: Conform to the following:

- Two speed fans: Provide fans selected to perform duties documented.

- Fans with 3 or more speeds and single phase fans with adjustable speed control: Provide fans selected to achieve the duty documented at a speed not more than 80% of highest speed.

4.2 CENTRIFUGAL FANS – IN-LINE

General

Requirement: Non-overloading power characteristics.

Casings

Casing types: Rectangular or circular with spigot or flanges for duct mounting, with construction as follows:

- Steel: Metallic-coated steel sheet, spot welded. Brush and prime spot welds with zinc-rich organic primer to AS/NZS 3750.9 (2009).
- Non-metallic: Moulded glass reinforced plastic (GRP) or impact resistant plastic with integral support foot.

Access to impellers up to 350 mm diameter: Provide fan manufacturer's standard fast clamps both sides of the fan to permit removal of the impeller-motor assembly or fan as a whole.

Impellers

Requirement: Backward inclined or forward curved style.

Construction: Metallic-coated steel, extruded aluminium or polypropylene.

Balance: Balance impellers statically and dynamically.

Electrical

Motors: Direct mounted to impellers with minimum thermal class 155 (F) insulation to IEC 60085 (2007).

Bearings: Sealed for life bearings with a minimum rating fatigue life of 40 000 hours at 40°C ambient.

Overload protection: Provide manual reset current overload protection to AS/NZS 60335.2.80 (2016).

Electrical connection: Terminal box external to fan casing and wired to fan motor.

4.3 AXIAL FLOW FANS

General

Requirement: Non-overloading power characteristics.

Casing

Type: Tubular, flanged at each end, constructed from mild steel, fully welded, hot-dip galvanized after fabrication.

Impellers

Requirement: Aerofoil section blades constructed from cast aluminium alloy or glass reinforced plastic.

4.4 ROOF MOUNTED FANS

Types

General: Centrifugal, mixed flow, aerofoil axial or propeller.

Axial flow and propeller: Conform to **AXIAL FLOW FANS**.

Mixed flow fans:

- Impeller: Mixed flow with rotating parts vibration isolated from the unit casings by suitable resilient mountings.
- Arrangement: Position the motor above the impeller to allow servicing from above the roof.

Housing

Requirement: House fans in compact bases fitted with weathering skirts and a hinged or removable weatherproof cowl with bird screen.

Material: UV stabilised ABS, polypropylene, polyethylene, glass-fibre reinforced polyester or steel, hot-dip galvanized (HDG) after manufacture.

Vertical discharge

Requirement: Weatherproof metallic-coated steel, plastic or aluminium backdraft dampers where the weather may enter when units are stopped.

Backdraft damper closure: Counterweighted or electrically driven.

Motors

Bearings: Sealed for life or grease-packed, fitted with lubrication lines extending through roof cowls. Provide bearings with a minimum rating fatigue life of 40 000 hours. Provide access to grease relief ports.

Minimum degree of protection: IP55.

4.5 WINDOW/WALL FANS**General**

Run-on timer: Conform to BCA (2022) F8D4.

Impeller: Plastic or metallic-coated steel propeller type, adjustable pitch axial or centrifugal.

Housing: Provide the following:

- Isolating mountings.
- Discharge cowls with birdmesh guards.
- Backdraft shutters constructed from lightweight nylon or aluminium blades, arranged to gravity close when fans are not operating.

4.6 INSTALLATION**Duct connections**

Flexible connections: Provide flexible connections to prevent transmission of vibration to ductwork. If under negative pressure, make sure that flexible connection does not reduce fan inlet area by providing a spacer piece at least one fan diameter long between the flexible connection and the fan inlet.

5 DUCTWORK

5.1 DESIGN**Rigid sheet metal ductwork**

Duct design: Size ductwork as follows:

- Velocity: ≤ 6 m/s.
- Pressure loss: ≤ 1.2 Pa/m.

Flexible duct

Requirement: Conform to the following:

- Velocity: ≤ 4.0 m/s.
- Length: No more than 6 m total flexible duct length in the air path between the fan and furthest outlet or grille served. Provide rigid duct for the remainder of the air path between the fan and furthest outlet or grille served.

5.2 STANDARDS**General**

Flexible ductwork: To AS 4254.1 (2021).

Rigid ductwork: To AS 4254.2 (2012).

5.3 MATERIALS AND COMPONENTS**Fittings**

Requirement: Provide fittings, including fittings between flexible duct, fabricated from sheet metal.

5.4 SHEET METAL DUCTWORK**Material**

Galvanized steel duct and steel components less than 3 mm thick: Prime quality lockforming galvanized steel to AS 1397 (2021) Grade G2 or G3 with Z275 coating to AS 1397 (2021).

5.5 FLEXIBLE DUCT**Standard**

Requirement: To AS 4254.1 (2021).

Materials

Uninsulated flexible duct: Aluminised fabric clamped on a formed metal helix. Do not use adhesives. If a metal helix is provided, it must not be in contact with the air stream.

Insulated flexible duct: As for uninsulated flexible duct with flexible blanket insulation wrapped around duct and covered with an outer vapour barrier and the following:

- Insulation joints: Lap insulation at least 50 mm at longitudinal and transverse joints.
- Minimum insulation R-Value ($\text{m}^2\cdot\text{K}/\text{W}$): To BCA (2022) J6D6.

Adhesives and sealants: Conform to MECHANICAL SYSTEMS, **ADHESIVES AND SEALANTS**.

5.6 FLEXIBLE CONNECTIONS**General**

Requirement: Isolate fans and air handling unit casings from ductwork, by means of airtight flexible connections.

Materials:

- Generally: Heavy duty, waterproof.
- In kitchen exhaust ductwork: To AS 4254.2 (2012) clause 2.1.3.

5.7 DAMPERS – GENERAL**Construction**

Material: Galvanized steel or aluminium.

Location

Balancing dampers: Provide at each branch duct or tee, as follows:

- Splitter type: Use only for supply branches up to 300 mm maximum dimension and with velocity in main duct less than 10 m/s. Do not use on return or exhaust ducts.
- Opposed blade dampers: Use for any size supply and for all return and exhaust ducts. Locate in each branch.

5.8 ACCESS OPENINGS – LOCATION**Access panels**

Location: Conform to the following:

- Next to each component located inside the duct requiring regular inspection and maintenance including, but not limited to:
 - . Fire and smoke dampers.
 - . Smoke detectors.
 - . Motorised dampers.
 - . Filters.
 - . On the air entering side of electric duct heaters.
 - . On the air entering side of duct mounted heating coils.
- In air handling units where unit size is insufficient to fit an access door.
- In the vicinity of moisture producing equipment, to AS/NZS 3666.1 (2011) clause 2.11.3.

5.9 ELECTRIC DUCT HEATERS**General**

Standards: To AS/NZS 3102 (2002) and AS 1668.1 (2015).

Elements: Sheathed in steel or nickel alloy. Provide brazed spiral steel fins.

Connections: Connect the elements in each heater bank so that the load is balanced over the three phases. Earth cover plate and frame.

Frames: Assemble elements in a metal frame with terminal connections in an enclosed terminal box.

Heating section: Install to allow access to the terminal box and removal of the assembly without disturbing other components.

Fin rating: $< 20 \text{ W}/\text{m}^2$.

Heat distribution: Provide uniform heating across the duct cross-section.

Maximum temperature air rise across the heater: 7.5 K at the maximum supply air flow rate.

Airflow: Maintain uniform air velocity across the duct cross-section.

Velocity: Between 2 m/s and 5 m/s.

Electrical connection: Permanent electrical connection to the heater.

5.10 DUCTWORK INSTALLATION

Arrangement

Ductwork: Arrange ductwork neatly. Provide access to ductwork components that require inspection, entry, maintenance and repairs to **ACCESS FOR MAINTENANCE** in 0171 *General requirements*. Where possible, arrange duct runs adjacent and parallel to each other and to building elements.

Flexible duct

Layout: Install flexible duct as straight as possible with minimum number of bends. Maximise bend radius but not less than required by AS 4254.1 (2021).

Cutting to length: Make sure the inner core is fully extended before cutting. Cut to this length. Do not leave excess lengths of flexible duct for possible future relocation of air terminal devices.

Joints: Securely fix flexible duct to rigid spigots and sleeves using draw bands. Provide spigots with a bead.

Draw bands: Stainless steel or non-metallic with a tensile strength of ≥ 670 N.

Sealing: Seal the joint between the flexible duct and rigid duct using one of the following methods:

- Duct tape as detailed in AS 4254.1 (2021).
- Mastic sealant placed between the flexible duct core and rigid duct. Do not apply mastic sealant as a fillet.

Support: To AS 4254.1 (2021). Limit sag to less than 40 mm/m.

Maximum length of flexible duct sections: 6 m including the length of any rigid duct or sleeves used to join lengths of flexible duct.

Substitution: If rigid duct is shown on the drawings do not substitute flexible duct.

Constriction: If flexible duct is compressed or deformed by a building element or other component, conform to the following:

- Extent of constriction: Smallest dimension perpendicular to air flow not less than 80% of the original duct diameter.
- Length of constriction: Less than 300 mm.
- Number of constrictions: Not more than 2 in an individual run of flexible duct in not more than 20% of flexible duct runs in an air handling system.

6 DUCTWORK INSULATION

6.1 STANDARDS

General

Ductwork insulation: To AS 4254.1 (2021) and AS 4254.2 (2012).

Performance and technical provisions: To AS/NZS 4859.1 (2018).

6.2 SUBMISSIONS

Fire performance

Fire hazard properties: Submit evidence of conformity to **FIRE PERFORMANCE, Fire hazard properties**, including assembled duct systems.

6.3 INSULATION PERFORMANCE

General

Insulation R-Value ($\text{m}^2\cdot\text{K}/\text{W}$): To BCA (2022) J6D6.

Thermal conductivity: ≥ 0.030 W/m.K.

6.4 FIRE PERFORMANCE

Fire hazard properties

Insulation materials: Tested to AS/NZS 1530.3 (1999). Fire hazards indices as follows:

- Spread-of-Flame Index: 0.

- Smoke-Developed Index: ≤ 3 .

Facing materials: Tested to AS 1530.2 (1993): Flammability index ≤ 5 .

6.5 INSULATION MATERIALS

Insulation materials

Standard: To AS/NZS 4859.1 (2018).

Insulation blowing agents

Restricted agents: Conform to PRODUCTS AND MATERIALS, **GENERAL**, **Prohibited materials** in 0171 *General requirements*.

Bulk insulation

Form: Batt, board or blanket. Select from the following:

- Glass wool.
- Rock wool.
- Polyester: Thermally bonded polyester fibres.
- Polyolefin: Closed cell cross-linked polyolefin foam.

Aluminium foil laminate sheet

Standard: To AS 4200.1 (2017) as follows:

- Internal insulation: Heavy duty before perforation.
- External insulation: Heavy duty unperforated.

Test criteria: To UL 181 (2013) with performance to AS 4254.1 (2021).

6.6 INTERNAL INSULATION – LAMINATE FACED

System description

Insulation type: Semi-rigid board or batt.

Surface facing: Factory applied perforated aluminium foil laminate.

Fixing method

Method: Select from the following:

- Corner angle and end nosing method.
- Free edge method.

Fixing pins: Provide to AS 4254.2 (2012) clause 2.7.1.

Corner angle and end nosing method

Installation: Conform to the following:

- Overlap insulation on adjacent sides at corners.
- Hold insulation in position with metallic-coated steel corner angles.
- Fix corner angles under the turn back of the end nosing.
- For corner angles longer than 1600 mm, provide additional fixing at 1600 mm maximum centres.

Free edge method

General: Use only where larger duct side is no more than 300 mm.

Edges: Extend insulation proud of ductwork at each end, to provide cushion joints that fully seal during assembly.

6.7 EXTERNAL INSULATION – LAMINATE FACED

System description

Insulation type: Flexible batts or blanket.

Surface facing: Factory applied aluminium foil laminate.

Application

General: Wrap insulation around the outside of ducts, covering the parts designated to be insulated. Minimise the number of joints.

Fixing method

Materials other than polyolefin foam: Select from the following:

- Pin method: Provide pins to each face of the duct as follows:
 - . Horizontal ducts < 380 mm wide: Pins not required.

- . Horizontal ducts > 380, < 760 mm wide: One row of pins along centreline to side and bottom duct faces at 380 mm maximum centres.
- . Horizontal ducts ≥ 760 mm wide: Pins spaced at 380 mm maximum centres.
- . Vertical ducts < 610 mm wide: Pins not required.
- . Vertical ducts ≥ 610 mm wide: Pins spaced at 380 mm maximum centres.
- Strap and pin method: Provide 12 mm wide polypropylene strapping at maximum 600 mm intervals.
 - . Horizontal ducts ≥ 600 mm wide: Hold insulation in position on the underside with fixing pins spaced at 400 mm maximum centres with at least one row per duct face.
 - . Vertical ducts ≥ 600 mm wide: Provide pins to all faces at 400 mm maximum centres.
- Corner angle and strap method: Provide metallic-coated sheet steel corner angles on all four sides of the duct. Retain with 12 mm wide polypropylene strapping at maximum 750 mm intervals. Provide angles as follows:
 - . 25 mm nominal thickness insulation: 38 x 38 mm.
 - . 50 mm nominal thickness insulation: 63 x 63 mm.

Polyolefin foam: Tape all joints to manufacturer's recommendations. Fix as follows:

- Pin fixing: Provide pins spaced 50 mm from all edges and spaced 200 to 300 mm apart in all directions.

Self-adhesive sheet: Provide self-adhesive insulation with demonstrated ability to remain attached for the life of the duct system. Install to insulation manufacturer's recommendations including cleaning the whole duct surface before attaching insulation.

6.8 INSULATION OF DUCTWORK COMPONENTS AND FITTINGS

Insulation R-Value

Minimum: To BCA (2022) J6D6.

Plenum and cushion head boxes on air grilles

Insulation type: Internal insulation, with perforated aluminium foil laminate, black finish.

Insulation fixing: Turn facing back over raw edges of insulation for at least 75 mm and bond the turn back to the insulation before installation. Provide fixing pins at 250 mm maximum centres with at least one pin per face. Fully bond insulation around neck with adhesive.

6.9 INSULATION OF DUCT FLEXIBLE CONNECTIONS

General

Requirement: Insulate duct flexible connections if the temperature of the air inside the duct may cause condensation on the outside of the flexible connection.

Minimum insulation R-Value: Same as the connected duct.

7 AIR GRILLES

7.1 DESIGN

General

Requirement: Design air grilles and other air distribution equipment.

Supply air

Requirement: Provide supply air grilles, diffusers, registers or unducted room air conditioners as follows:

- Evenly distribute supply air within the space, free from draughts, and to achieve the documented permissible temperature variation.
- With at least one air grille, diffuser, register or unducted room air conditioner in each room or space served.

Return air

Requirement: Provide return air grilles as follows:

- Return air to the air conditioning plant in an energy efficient manner.

Door grilles

Requirement: Provide door grilles to:

- Return air to the plant if the return air path is through the door opening.
- Provide make-up air to exhaust ventilated spaces.
- In other locations, as required, to prevent excessive space air pressures and achieve energy efficient plant operation.

Exhaust air grilles

Requirement: Provide exhaust grilles to meet the statutory ventilation requirements.

Outside air grilles and louvres

Requirement: Provide air grilles and louvres on the face of the building as follows:

- Supply fresh air to air conditioning and ventilation plant.
- Provide relief of exhaust and return air.
- Prevent the entry of rain and vermin.

7.2 MANUFACTURE**General**

Proprietary air grilles: Conform to the following:

- Free from distortion, bends, surface defects, irregular joints, exposed fastenings and operation vibration.
- With flange corners neatly mitred, butted and buffed, with no joint gaps.

Material: Steel or aluminium.

Finish:

- Exposed surfaces: Powder coated to the nominated colour.

7.3 VOLUME CONTROL DAMPERS**Dampers controlling a single air grille attached to flexible duct**

General: Provide damper as follows:

- Duct spigot located above tiled or accessible ceiling: Provide a butterfly damper in the rigid duct spigot.
- Duct spigot not located above tiled or accessible ceiling: Provide an opposed blade damper behind the face of the air grille.

7.4 AIR GRILLE TYPES**Louvre ceiling diffusers**

Type: Select from:

- Multi-bladed, removable core 4-way blow configuration, fitted with a blanking plate for 1-, 2-, or 3-way blow, as appropriate; or
- Multi-bladed, removable core 1-, 2-, 3- or 4-way blow configuration.
- Four-way multi-directional with 4 separate one-way cores, each independently rotatable to 4 positions.

Reducer necks: If the outlet neck is smaller than the outlet necessary to suit the louvre face size, provide a reducer neck.

Frame: To suit the type of ceiling and ceiling grid mounting requirements.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: Conform to **VOLUME CONTROL DAMPERS**.

Side wall registers

Type: Double deflection type with horizontal front louvre blades and vertical rear blades at 19 mm nominal centres, capable of field adjustment of air throw over the range $\pm 45^\circ$.

Construction: Extruded aluminium with mitred corners and aerofoil section blades that rotate in non-metallic bearings in the support frame. Hold blades firmly so they do not rattle or flutter.

Core: Removable core (support frame and blades).

Blades > 600 mm long: Support at mid-point on a notched support bar.

Dampers: Stream splitter or opposed blade type damper behind each register, to provide even air flow across the register face.

Thermally powered VAV diffusers

Type: Proprietary VAV diffuser with integral actuator and dampers to adjust air volume in response to temperature sensed at the diffuser. Provide uniform air distribution pattern to maximise Coanda effect over the operating range from full open to the minimum air flow.

Construction: Appearance panel mounted within a pressed diffuser frame.

Material: Powder coated metallic-coated steel sheet.

Frame style: To suit the type of ceiling, and ceiling grid mounting requirements.

Operation: Integral hinged dampers to vary the outlet supply air volume under the control of a built-in room temperature sensing element.

Control: Provide one of the following:

- Self-powered type with expanding wax or similar temperature sensitive elements.
- Line powered with integral 24 volt transformer.

Heating operation: If the system operates in both heating and cooling modes, provide a factory preset supply duct temperature sensor that reverses the control action between heating and cooling. Operate in cooling mode when the air supply is below 20°C and in heating mode when supply air is above 27°C.

Room temperature set point: Adjustable from below the face of the diffuser over the range 21°C to 26°C.

Cushion head: If the diffuser is connected to a flexible duct, provide a cushion head box.

Air volume control: To **VOLUME CONTROL DAMPERS**.

Weatherproof louvre grilles

Type: Extruded aluminium with fixed horizontal blades set into a fixed frame.

Louvre blades: Set at nominal 45° angle and incorporating at least one hooked edge to prevent ingress of water under all operating conditions. Brace and stiffen to prevent rattling or movement.

Frame: Flanged or channel to suit the installation profile.

Return or exhaust air grilles – indoor

Type: Extruded aluminium with fixed horizontal blades set into a fixed support frame with mitred corners. Fit blades tightly into the frame to prevent rattling or movement. Brace and stiffen to produce a rigid assembly.

Pressure drop: ≤ 10 Pa at the documented air flow.

Blades:

- Half chevron type: Blades at nominal 45° angle on a nominal 25 mm pitch.
- Chevron type: Blades at nominal 25 mm pitch. Provide a telescopic frame with clip-on pattern surround frames on both sides.
- Light proof grilles: Chevron type but with double chevron blades, blade pitch and edge detail designed to stop light penetration.

Air volume control: If the air grille is connected to a duct, provide an opposed blade damper behind the grille core, key operated without removing the core.

Egg crate return or exhaust air grilles

Type: Nominal 12 x 12 mm square, 12 mm deep egg crate type aluminium core fixed in an extruded aluminium frame with mitred corners. Fit core tightly into the frame to prevent rattling or movement.

Free area: ≥ 90% of nominal face area.

Air volume control: If the air grille is connected to a duct, provide an opposed blade damper behind the grille core, key operated without removing the core.

7.5 INSTALLATION OF AIR GRILLES**Mounting**

General: Provide a matching escutcheon to close gaps between the air grille and its surrounds. Provide air grilles with flanges to cover penetrations and irregularities in surrounds.

Tiled ceilings: Locate air grilles to minimise cut tiles. Otherwise, locate the air grille symmetrically in the tile.

Appearance: Install square.

Fixing

Accessibility: Provide fasteners that allow removal of the air grille without damage to surrounds or air grille.

Gaskets: Provide foam type gaskets under air grille flanges or flanged supports.

Plenum and cushion head boxes

General: Provide side entry plenum or cushion head boxes to air grilles connected to flexible ductwork.

8 AUTOMATIC CONTROLS

8.1 DESIGN**General**

Requirement: Design automatic control systems.

Performance: Within the documented plant capacities, maintain the documented conditions. Provide control systems that are safe and stable in operation under all anticipated operating conditions including start up, shut down and fault condition.

Safety: Provide control devices and software to protect personnel from injury and equipment from damage by either normal or abnormal operation of the control system, including the removal and reapplication of power whether expected or unexpected.

Operating environment: Provide components that function correctly in their local environment.

8.2 CONTROL COMPONENTS**Performance**

Sensors and control components: Provide sensors and control components as follows:

- Of corrosion-resistant construction.
- Suitable for the respective operating environment.
- Not affected by the accumulation of dust or moisture, extraneous influences or variation of $\pm 30\%$ in supply voltage.
- Protected against the entry of vermin.
- Selected for a response time appropriate to the application.
- Provided with proprietary connections suitable for the size and type of cable used.

8.3 INPUT DEVICES – GENERAL**General**

Requirement: Provide input devices with the following characteristics:

- With range, accuracy and response time appropriate to the required control function including the effects of transducer accuracy and signal transmission errors.
- Maintain documented performance over time.
- Protected by location or otherwise from extraneous influences including sunlight, heat sources and non-representative locations.
- Requiring maintenance or re-calibration to maintain performance at not more often than 12 month intervals.
- Designed for the type of location and application in which they are installed.
- Readily accessible location for inspection, calibration, cleaning and maintenance.
- Tamperproof if located in occupied areas.
- Not affected by induced voltages or EMI.

8.4 INSTALLATION**Sensors in occupied areas**

Installation: Conform to the following:

- Securely attach to walls, ceilings or columns.
- Mount on concealed junction boxes and seal cable entries to prevent air from the cavity or conduit entering the junction box.

- Conceal all wiring from view inside wall, column or ceiling space.

Wall or column mounted sensors: Locate 1500 mm above floor level.

Sensors in unoccupied areas

Installation: Conform to **Sensors in occupied areas** except that sensors may be mounted on surface mounted junction boxes with wiring in exposed conduit.

9 MECHANICAL ELECTRICAL

9.1 LOW VOLTAGE POWER SYSTEMS

Electrical services

Requirement: To AS/NZS 3000 (2018), unless otherwise documented.

9.2 MOTORS

General

Requirement: Provide motors selected in conformance with AS 60034.1 (2009), the application load characteristics, motor manufacturers' recommendations and the following:

- Motors ≥ 0.75 kW: Three phase.

Rating

Standard: To AS 60034.1 (2009).

Maximum power rating: The greater of the documented minimum motor size and next preferred standard frame size above the maximum load of the driven equipment.

Duty: \geq S1.

Class of rating: Continuous running duty.

Speed: ≤ 1500 r/min.

9.3 STARTERS

Standards

General: To AS/NZS 60947.1 (2021) and AS 60034.12 (2009).

Electromechanical motor starters: To AS/NZS IEC 60947.4.1 (2015).

Selection

Motor starters: Provide with the following characteristics:

- Electricity distribution network limitations for starting currents and voltage flicker.
- Torque requirements for the motor load.
- Heating effects on the motor.
- Voltage drop during start due to starting currents.
- Time required to accelerate from rest to full speed.
- Number of starts per hour.

Motors with a limited number of starts per hour: Provide lockout timers in the motor control circuit to prevent motor restart within the designated non-restart time and which cannot be set by any manual resetting of the motor protection system.

9.4 MOTOR PROTECTION

General

Requirement: Provide over-current protection with manual reset giving overload protection in each phase of supply as part of the equipment assembly for each motor starter.

Standard: To AS 60034.11 (2009).

Single phase motor protection

Requirement: Overload units matching the motor heating curve characteristics.

3-phase motor protection - thermal overload protection

Requirement: Thermal overload protection relays for each motor.

Triple pole relays: Provide differential trip bar operation for single phase protection, and ambient temperature compensation.

Thermal overloads: Connect directly to contactor by means of proprietary links, except where operated separately by current transformers.

Star-delta starters: Provide triple pole thermal overload relay connected into motor phase winding circuits. Provide a name plate fixed to starter, stating full load current of motor phase winding.

Placement of sensors: If the configuration of the starter contactors is unsuitable for the placement of thermal overload sensors in each motor phase winding, fit to the line contactor.

10 MECHANICAL COMMISSIONING

10.1 COMMISSIONING

General

Requirement: Commission mechanical services when:

- The respective systems or parts of systems are at a stage of static completion.
- The building work on which commissioning depends is complete.

Adjustments: Make the adjustments necessary to achieve the documented performance under continuous operating service conditions, including balancing, setting the controls, checking the operation of overload and safety devices, and correcting malfunctions.

Failure to meet documented performance: Identify and correct the cause of failure and repeat the commissioning procedure.

Reports

General: Submit reports indicating observations and results of tests and compliance or non-compliance with requirements.

10.2 AIR BALANCING

General

Requirement: Balance each air handling system.

Completion: Balancing is complete when all the following conditions are met:

- Outdoor air quantities are within 100% and 110% of design.
- Other air quantities are within the tolerances in the **Air quantity tolerance table**.
- For the same component, each measured air quantity deviates by less than the instrument accuracy from the previous measured air quantity.
- Resistance across the cooling coil bank (if present) is equal to the wetted coil resistance. If necessary to achieve this, simulate wet coil resistance by blanking or other means.
- Resistance of the filter bank (if present) is equal to the average of its clean resistance and resistance of the filter when fully loaded with dirt. If necessary to achieve this, simulate filter resistance by blanking.
- For fans with variable speed drives, the frequency to the motor is between 45 and 50 Hz.
- At least one outlet on each branch has its damper at the minimum pressure drop position.
- At least one sub-branch damper is at the minimum pressure drop position.
- At least one branch damper is at the minimum pressure drop position.
- The fan speed or pitch angle is at the lowest value consistent with the above.

Air quantity tolerance table

System type	Terminal air quantity	Branch air quantity	Total air quantity
Supply, return or exhaust system where all terminals on any one sub-branch serve the same space	Within 100% and 120% of design	Within 100% and 110% of design	Within 100% and 110% of design
Supply, return or exhaust system where the terminals on any one sub-branch serve more than one space	Within 100% and 115% of design	Within 100% and 110% of design	Within 100% and 110% of design
Supply or return system in which temperature tolerance is closer than ± 1.0 K.	Within 100% and 110% of design	Within 100% and 105% of design	Within 100% and 105% of design

10.3 AUTOMATIC CONTROLS

General

Requirement: Test controls hardware and software for correct operation.

Sensors

Calibration: Calibrate sensors to within the documented accuracy of the sensor.

Set points: Adjust sensors to documented values.

10.4 SAFETY CONTROLS

Testing

General: Test each safety control and facility by simulating the unsafe condition that the control is intended to protect against.

Monitoring: Make sure that monitoring and safety measures are in place for the test to protect personnel from injury and the building and equipment from damage.

10.5 PLUMBING AND DRAINAGE

General

Requirement: Conform to AS/NZS 3500.1 (2021) Section 17.

11 MECHANICAL MAINTENANCE

11.1 GENERAL

Objectives

Requirement: Maintain the mechanical systems for the documented maintenance period so that the performance and service delivery including indoor conditions and indoor air quality, reliability, service life, compliance with statutory requirements, energy efficiency and safety of the system is equal to or better than that at the beginning of the maintenance period in parallel with and including:

- Periodic and statutory maintenance, cleaning and replacement of consumables.
- Emergency repairs.
- Condition reporting.

Maintenance period: To 0171 General requirements.

Maximum call out response time: 3 hours.

Maximum time between programmed service visits: To AS 1851 (2012) and AS/NZS 3666.1 (2011) but not less than three-monthly.

Frequency of periodic maintenance and performance reports: After each programmed service visit.

11.2 STANDARDS

General

Air handling system maintenance: To AS 1851 (2012).

Microbial control: To AS/NZS 3666.2 (2011).

Statutory certification

Annual and other certification: Inspect and submit certification for all items required to be inspected annually or more frequently under statutory requirements including but not limited to air handling systems required for fire and smoke control, boilers, pressure vessels, cooling towers and warm water systems.

11.3 MAINTENANCE REQUIREMENTS

General

Requirement: Provide all labour and material necessary to maintain the mechanical installation including, but not limited to, filter media, belts, refrigerants, lubricants and all items commonly referred to as consumable.

Maintenance required

Minimum level: To the operation and maintenance manual and the manufacturer's recommendations.

Frequency: Carry out the actions, at no lower frequency than the intervals recommended in AIRAH DA19 (2019) for Maintenance Level A.

11.4 EMERGENCY REPAIRS

General

Requirement: Respond to call outs for breakdowns or other faults requiring emergency repairs. Rectify faults and replace faulty materials and equipment.

11.5 PERIODIC MAINTENANCE

General

Routine visits: Make routine service visits at the frequency documented. Service items of equipment in conformance with the maintenance schedules in the operation and maintenance manuals and the manufacturer's recommendations.

Notification of defects: When defects in the mechanical services systems are identified, give notice.

11.6 COMPLETION

Maintenance records

Service records: Record maintenance undertaken in the schedules in the operation and maintenance manuals.

12 SELECTIONS

12.1 SYSTEMS

Air conditioning system schedule

	A	B	C
Spaces served	Refer Engineering Solutions Tasmania's drawings and specifications.		
One-piece unit or split system			
Ducted or non-ducted system			
Plant location			

Ventilation system schedule

	A	B	C
Spaces served	Refer Engineering Solutions Tasmania's drawings and specifications.		
Ventilation type			
Ducted or non-ducted			
Special requirements			

0802 HYDRAULIC DESIGN AND INSTALL

1 HYDRAULIC SYSTEMS

1.1 RESPONSIBILITIES

General

Requirement: Design systems and provide hydraulic services, as documented.

Refer Engineering Solutions Tasmania's drawings and specifications.

1.2 DESIGN

General

Requirement: To DESIGN in *0171 General requirements*.

Design criteria: Not less than the PCA (2022).

Designer qualifications

Designer qualification: Use only appropriately experienced and qualified persons to undertake design work. If requested, provide documents verifying the qualification and experience. Conform to

DESIGNER in *0171 General requirements*.

Design for durability and maintainability

Design for durability: Develop the design so the systems achieve the documented performance, reliability, service life, energy efficiency and safety requirements, and are easily maintainable.

Access for maintenance: Develop the design so the systems conform to **ACCESS FOR MAINTENANCE** in *0171 General requirements*.

Operating environment

Requirement: Provide equipment suitable for the environment in which it operates.

Hydraulic system design

Requirement: Provide engineering design that:

- Maximises the functionality, performance, safety, flexibility and reliability of the hydraulic services.
- Is technically sound.
- Can be constructed using methods that are good practice and in common use.
- That provide the lowest combined owning and operating cost over the design life of the systems.

Water heaters: Size water heaters to adequately and efficiently serve the functions documented.

Authority submissions: Make submissions, including notices, to authorities relating to the works.

Design life

General: To *0171 General requirements*.

Design life:

- Hot water heaters: 10 years.
- Rainwater tanks: 20 years:
- All other components and systems: 25 years.

Energy efficiency

Minimum: To the PCA (2022).

Water efficiency

Minimum: To the PCA (2022).

Noise levels

Ambient noise emitted: Lower than the level that can be heard within a habitable room in any neighbouring premises, regardless of whether any door or window to that room is open.

Noise levels in occupied spaces: To **NOISE LEVELS** in *0171 General requirements*.

Acoustic treatment of services: Provide acoustic treatment to achieve the documented space and ambient noise levels and acoustic separation.

Seismic restraint

Requirement: To **SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS** in *0171 General requirements*.

Fire separation

Requirement: As documented.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0171 *General requirements*.
- 0223 *Service trenching*.

1.4 STANDARDS

General

Plumbing and drainage: To AS/NZS 3500.0 (2021), AS/NZS 3500.1 (2021), AS/NZS 3500.2 (2021), AS/NZS 3500.3 (2021), AS/NZS 3500.4 (2021) and the PCA (2022).

Copper pipe and fittings-installation and commissioning: To AS 4809 (2017).

Gas: To AS/NZS 5601.1 (2022).

Microbial control: To AS/NZS 3666.1 (2011), AS/NZS 3666.2 (2011) and the recommendations of SA/SNZ HB 32 (1995).

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- LPG: Liquefied petroleum gas.

1.6 SUBMISSIONS

General

Requirement: Conform to 0171 *General requirements*.

Authority approvals

Authority submissions: Submit evidence of approval from authorities relating to the works.

Certification

Completion: Submit certificate as verification that the design and installation conforms to all contractual and statutory requirements.

Operation and maintenance manuals

Requirement: Conform to **OPERATION AND MAINTENANCE MANUALS** in 0171 *General requirements*.

Products and materials

Data: Submit technical data for all items of plant and equipment, including the following:

- Assumptions.
- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.
- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of conformance to the applicable code or standard.
- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.
- Type test reports.

Drawings

Requirement: Submit drawings showing the following:

- Pipework and equipment layout and sections showing the work to be installed on the level that the services are installed.
- Long sections of below ground drainage.

- Riser layouts and sections.
- Downpipes.
- Rainwater harvesting.
- Stormwater connection.
- Stormwater drainage stacks.
- Stormwater overflow path.
- Evidence of compliance with special planning conditions.
- If not obvious from other drawings, provide single line diagrams for rainwater and stormwater infrastructure mains plans and building servicing.
- Piping and other schematic drawings including numbering of each valve to correspond to valve tags notation.
- Access openings, cover plates, valve boxes and access pits.
- Details of control panels including control and power diagrams.
- Insulation of piping, fittings and tanks.
- Penetrations and associated building work. If penetrations are through external walls, detail flashing and weatherproofing at 1:10 scale.
- Location, capacity, type and other relevant details of water heaters, including supports and safe trays.
- Location, type, grade and finish of piping, fittings, valves, meters and pipe supports.
- On-site detention pondage areas.
- Provision of blue metal backfill to seepage drain system.
- Provision of erosion control measures.
- Provision of road barriers and lighting.
- Provision of temporary sanitary accommodation for construction workers.
- Provision of trafficable cover plates in the public domain.
- Relevant survey levels.
- Site and floor set out points.
- Tank stands and supporting structures.

Subcontractors

General: Submit names, contact details, licence numbers and type of licence of proposed suppliers and installers.

1.7 INSPECTION**Notice**

Inspection: Give notice so that inspection may be made of the following:

- Excavated surfaces.
- Concealed or underground services.

1.8 PRODUCTS**Authorised products**

Requirement: Listed in the WaterMark Product Database, unless otherwise required by the Network Utility Operator.

Water efficiency

Requirement: Provide products with documented water efficiency but not less than that in the PCA (2022).

Labelling

Water efficiency labelling: Provide products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

Bushfire-prone areas

Site with Bushfire Attack Level (BAL) 12.5, 19, 29, 40 or FZ to AS 3959 (2018): If external and above ground, provide metal pipes and fittings to AS 3959 (2018).

1.9 INSTALLATION

Connections to mains

General: Excavate to locate and expose the connection points and connect to the Network Utility Operator and gas Network Operator mains. On completion, backfill and compact the excavation and reinstate surfaces and elements that have been disturbed, such as roads, pavements, kerbs, footpaths and nature strips to *0223 Service trenching*.

Connections: Connect to Network Utility Operator mains.

Metering: Provide metering, valves and fittings to Network Utility Operator requirements.

Service trenching

Requirement: To *0223 Service trenching*.

Accessories

General: Provide the accessories and fittings necessary for the proper functioning of the systems, including taps, valves, outlets, pressure and temperature control devices, strainers, gauges and pumps.

Isolating valves: In addition to valves required to meet statutory requirements, provide valves to allow safe isolation of parts of the system, with minimum inconvenience to the building occupants, in event of leaks or maintenance.

Movement compensation

Compensation: Arrange piping crossing building expansion joints so that moment in the joint does not cause damage.

Pipe support

Requirement: To **SERVICES INSTALLATION, Pipe support systems** in *0171 General requirements*.

1.10 PIPING

Finishes

Exposed piping: Finish exposed piping, including fittings and supports, as follows:

- In internal locations such as toilet and kitchen areas: Chrome plate copper piping to AS 1192 (2004) service condition 2, bright.
- Externally and steel piping and iron fittings internally: Paint.
- In concealed but accessible spaces (including cupboards and non-habitable enclosed spaces): Leave copper and plastic unpainted except for identification marking. Prime steel piping and iron fittings.

Valves: Finish valves to match connected piping.

1.11 COMMISSIONING

General

Requirement: Provide commissioning as documented. Conform to *0171 General requirements* and SA TS 5342 (2021).

2 SANITARY FIXTURES

2.1 STANDARDS

General

Design for access and mobility: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

Installation: Install to manufacturer's recommendations.

3 TAPWARE

3.1 STANDARDS

General

Design for access and mobility: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

3.2 TAPS

General

Material: Brass or bronze.

Taps other than hose taps: Provide anti-splash aerator nozzles.

Construction: Provide the following:

- Ceramic disk valve.
- O-ring seals.
- Vandal resistant handle.
- Vandal resistant aerator nozzles.

Hose taps

Construction: Provide hose taps as follows:

- Type: DN 20 diameter brass finish hose tap.
- Riser: DN 20 diameter copper riser with a back plated elbow.
- Heads: Provide anti-vandal heads where documented.

Backflow prevention: Provide vacuum breaker backflow prevention device and isolation valve.

Installation: Conform to the following:

- Fix hose tap 450 mm above the floor.
- Install against a masonry or concrete wall. Fix the back plated elbow to the wall with 3, 20 mm brass screws, screwed into 20 x 6 mm expanding plastic plugs.

Taps and valve heads

Metal heads and handles: Provide brass fittings or a suitable bush to prevent electrolysis and growth.

Plastic heads and handles: Provide compact fittings designed to prevent fracture and exposure of jagged or rough edges.

Vandal-proof heads: Provide vandal-proof or anti-tampering devices for the designated types.

4 WATER HEATERS

4.1 ELECTRIC STORAGE WATER HEATERS

Description

General: Proprietary automatic electrically heated water heater including connections, controls and fittings.

Standards

General: To AS/NZS 4692.1 (2005).

Energy performance: To AS/NZS 4692.2 (2005).

Tariff

General: Install so that the heating system qualifies for the tariff concession or subsidy offered by the electricity distributor.

4.2 GAS STORAGE WATER HEATERS

Description

General: Proprietary automatic gas-fired water heater including connections, controls and fittings.

Standards

General: To AS/NZS 5601.1 (2022) and AS/NZS 5263.1.2 (2020).

Energy performance: To AS/NZS 4552.2 (2010).

4.3 SOLAR WATER HEATERS

Description

General: Proprietary automatic water heater comprising solar collector and storage container and including connections, controls and fittings.

Standards

General: To AS/NZS 2712 (2007).

4.4 HEAT PUMP WATER HEATERS

Description

General: Proprietary automatic water heater comprising self-contained reverse cycle heating system and storage container, including connections, controls and fittings.

Standards

General: To AS/NZS 2712 (2007).

Safety: To AS/NZS 60335.2.40 (2023).

Performance evaluation: To AS/NZS 5125.1 (2014).

4.5 INSTANTANEOUS WATER HEATERS

Gas instantaneous heaters

Standard: To AS/NZS 5601.1 (2022).

Energy rating: Minimum 6 stars.

Power supply: Provide gas and electrical supply with isolation at the heater.

Free air flow: Make sure air flow around and above the heater is not obstructed and discharge air does not short-circuit to the air intake.

Electric instantaneous heaters

Standard: To AS/NZS 60335.2.35 (2013).

4.6 INSTALLATION

General

Standard: Install to AS/NZS 3500.4 (2021).

Gas water heaters

Standard: Install to AS/NZS 5601.1 (2022).

Solar water heaters

Collectors: Install collectors:

- Facing $\pm 20^\circ$ of north.
- Inclined at the angle for the nearest location listed in AS/NZS 3500.4 (2021) Table G.1.
- In a location not subject to shading at any time of year especially in winter when the sun is low.

Adjustment: If installing at other angles and/or subject to shading, increase the size of the collectors to that required to give the performance of an unshaded collector oriented as specified above.

Heat pump water heaters

General: Make sure that free air flow around and above the heater is not obstructed and that discharge air does not short-circuit to the air intake.

Manifolds

General: If multiple heaters are installed in banks use the manufacturer's standard manifold arrangement to provide equal flow through each heater in the bank.

4.7 COMMISSIONING

General

Requirement: Commission to the manufacturer's recommendations.

5 TANKS

5.1 STANDARDS

General

Metal tanks and rainwater goods: To AS/NZS 2179.1 (2014).

Products in contact with drinking water: Tested to AS/NZS 4020 (2018).

5.2 SUBMISSIONS

Warranties

Manufacturer's warranty: Submit the tank manufacturer's warranty.

5.3 PRODUCTS

Accessibility

Interior: Arrange tanks so the interior is accessible for inspection and cleaning. Arrange internal features to permit effective cleaning.

Support

Requirement: Provide structural support to withstand the weight of the tank when full without deformation or excessive settling.

5.4 BLADDER TANKS

General

Type: Proprietary plastic bladder type.

Material: Reinforced polymer conforming to AS/NZS 4020 (2018), resistant to puncture and microbial attack.

Bedding: Provide adequate bedding to support the weight of the bladder when full.

5.5 METALLIC-COATED STEEL TANKS

Construction

Materials: Conform to the following:

- Top and sides: Metallic-coated steel with polymer film to AS/NZS 4020 (2018) on the inside and prepainted on the outside.
- Base: Metallic-coated steel with polymer film to AS/NZS 4020 (2018) on inside and prepainted on the outside.
- Plinth: Provide a plinth under the whole area of the tank designed to support the load of the tank when full.

5.6 ROTATIONALLY MOULDED TANKS

General

Standard: To AS/NZS 4766 (2020).

5.7 ABOVE GROUND TANK INSTALLATION

General

Restraint: Restrain the tank to prevent movement, when empty, caused by wind and other loads.

Base: Provide a level base with gaps not exceeding 10 mm, free of sharp projections and projecting beyond the edge of the tank at all points.

Foundations

Requirement: Provide foundations for the tanks that are flat, level with irregularities measured laterally or diagonally less than 2 mm in any 1 m but no more than 6 mm in any 3 m.

Intermittent supports: Continuous across the width of the tank and spaced to manufacturer's recommendations.

Rotationally moulded tanks

Support:

- Tanks \leq 1000 litres: Trim and compact the ground and place a level bed of sand at least 50 mm thick.
- Tanks $>$ 1000 litres: Designed by a professional engineer.

Coated steel tanks

Support: Fully support the tank on a self-draining timber or concrete base.

Corrosion protection:

- Prevent contact with dissimilar metals.
- Arrange so that no part of the tank is below ground level and so that adjacent ground surfaces fall away from the tank.
- Do not use sharp objects inside the tank. After drilling or cutting ferrous metal, remove swarf with a magnet.
- Recoat or seal new openings to restore original corrosion resistance.

Bladder tanks

Support: Locate on a level base free from sharp objects. Install with manufacturer's supporting frame.

Relief: Provide over-pressurising relief and air vent.

5.8 COMPLETION**Cleaning**

Cleaning: Wash and flush tanks to remove manufacturing and other contaminants.

6 STORMWATER – BUILDINGS

6.1 DESIGN**General**

Requirement: Design the roof drainage system, including sumps, rainwater outlets, overflow outlets and downpipes.

Roof drainage system design, application and calculations

Standards: Conform to the following:

- AS/NZS 3500.3 (2021).
- National Construction Code Series Volume 3: Plumbing Code of Australia (PCA (2022)).

Handbooks: Conform to the recommendations of SA HB 39 (2015).

Rainfall intensity for design:

- Eaves gutters: Annual exceedance probability of 5%.
- Box gutters: Annual exceedance probability of 1%.

Box gutter overflow

Overflow: Design for 100% overflow.

Methods of calculation

Requirement: Manual or software that employs the data and methods in the applicable standard.

Design documentation

Drawings: Show the following on the drawings:

- General layout of the system.
- Calculated capacities.
- Details of components including internal and external metal gutters, downpipes, sumps and rainheads.
- Spatial relationship to other services and building structure.
- Means of accommodating thermal and building movement.
- Details of penetrations.
- Coordination and interfaces with other trades.
- Connection points to site stormwater system.

6.2 STORMWATER DRAINS**Location**

General: Provide stormwater drains to connect downpipes, surface drains, subsoil drains and drainage pits to the outlet point or point of connection. Make sure location of piping will not interfere with other services and building elements not yet installed or built. Subject to the preceding and documented layouts, follow the most direct route with the least number of changes in direction.

Downpipe connections

Termination: Select from the following:

- Termination over pit: Stop downpipe 100 mm above the ground level and discharged into grated pit. Do not connect directly into stormwater pipes.
- Direct connection: Bring downpipes out from the building at a suitable angle and level so the downpipe enters the underground drain at the finished level of the surrounding area. Turn up branch pipelines with bends to meet the downpipe, finishing horizontally 50 mm (nominal) above finished ground or pavement level. Seal joints between downpipes and drains.

Laying

Installation: Lay in straight lines between changes in direction or grade with sockets pointing up hill. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous, cap open ends to prevent entry of foreign matter.

Pipe underlay

General: Bed piping on a continuous underlay of bedding material, minimum 75 mm and maximum 150 mm thick after compaction. Grade the underlay evenly to the gradient of the pipeline.

Chases: If required, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Pipe surrounds

General: Place the material in the pipe surround in layers, maximum 200 mm loose thickness, and compact without damaging or displacing the piping.

Anchor blocks

Restraint: If required to restrain lateral and axial movement of the stormwater pipes, provide reinforced concrete anchor blocks at junctions and changes of grade or direction conforming to AS/NZS 3500.3 (2021) clause 7.9.

Thermal movement

General: Arrange piping to accommodate thermal expansion. Provide proprietary expansion joints in copper and plastic pipes where pipe flexibility does not allow movement. Make sure movement does not strain branch connections.

6.3 SUBSOIL DRAINS**General**

Requirement: Provide subsoil drains to intercept groundwater seepage and prevent water build-up behind walls and under floors and pavements. Connect subsoil drains to surface drains or to the stormwater drainage system as applicable.

Trench width: Minimum 450 mm.

Trench floor: Grade the trench floor evenly to the gradient of the pipeline. If the trench floor is rock, correct any irregularities with compacted bedding material.

Pipe depth: Provide the following minimum clear depths, measured to the crown of the pipe, below the following elements:

- Formation level of the pavement, kerb or channel: 100 mm.
- Average gradient of the bottom of footings: 100 mm.
- Finished surface of unpaved ground: 450 mm.

Jointing

General: At junctions of subsoil pipes, provide tees, couplings or adaptors to AS 2439.1 (2007).

Pipe underlay

General: Bed piping on a continuous underlay of bedding material, minimum 75 mm and maximum 150 mm thick after compaction. Lay the pipe with one line of perforations at the bottom.

Chases: If required, form chases to prevent projections such as sockets and flanges from bearing on the trench bottom or underlay.

Pipe surrounds

General: Place the material in the pipe surround in layers, of a maximum 200 mm loose thickness, and compact without damaging or displacing the piping.

Depth of overlay:

- To the underside of the bases of overlying structures such as pavements, slabs and channels.
- To within 150 mm of the finished surface of unpaved or landscaped areas.

Geotextile

Requirement: Provide polymeric fabric formed from plastic yarn composed of at least 85% by weight propylene, ethylene amide or vinylidene chloride and containing stabilisers or inhibitors that provide resistance to deterioration due to ultraviolet light.

Marking: To AS 3705 (2012).

Protection: Provide heavy duty protective covering. Store clear of the ground and out of direct sunlight. During installation, do not expose the filter fabric to sunlight for more than 14 days.

Filter socks

General: Provide permeable polyester socks, capable of retaining particles 0.25 mm and greater. Securely fit or join the sock at each joint.

6.4 PITS**Finish to in situ exposed surfaces**

General: Provide a smooth, seamless finish, using steel trowelled render or concrete cast in steel forms.

Location: At junctions, changes of gradient and changes of direction of stormwater drains.

Metal access covers and grates

Standard: To AS 3996 (2019).

Cover levels: Top of cover or grate, including frame:

- In paved areas: Flush with the paving surface.
- In landscaped areas: 25 mm above finished surface.
- Gratings taking surface water runoff: Locate to receive runoff without ponding.

6.5 TESTING**Pre-completion tests**

General: Before backfilling or concealing, carry out the following tests to AS/NZS 3500.3 (2021) Section 9:

- Downpipes within buildings: Air or water pressure test.
- Site stormwater drains and main internal drains: Air or water pressure test.
- Rising mains from pumped discharge: Water pressure test.

Leaks: If leaks are found, rectify and re-test.

6.6 COMPLETION**Cleaning**

General: Clean and flush the whole installation.

7 WASTEWATER

7.1 PRODUCTS**Material selection**

Environmental conditions: Provide materials capable of withstanding the operational environmental conditions. Select and install to manufacturers' recommendations.

Dissimilar materials: Connect dissimilar materials using adapters to Network Utility Operator requirements and manufacturer's recommendations.

Rubber banded sleeves: Do not provide.

7.2 FLOOR WASTES**General**

Requirement: Provide each floor waste with a trap constructed of the material specified for the sanitary plumbing system. Fit off each riser with a chromium plated brass grating finished flush with the surrounding floor finish. If the floor surfaces are vinyl, provide gratings and outlets designed to permit the vinyl to be turned down into the outlet and the grating clamped down onto the surface.

Waterproofing: Make sure all penetrations through floors and finishes up to the edge of grates are fully waterproof.

Priming: Provide priming of floor wastes. If floor wastes cannot be primed via fixture, provide priming valves to maintain the water seal to AS/NZS 3500.2 (2021).

7.3 SANITARY PLUMBING**Location**

General: Verify location and invert level of piping before commencing installation.

Layout: Arrange piping in conformance with the following:

- Avoid interference with other services and building elements.

- Follow the most direct route with the least number of changes of direction.

Ducts: If installed in ducts, locate and fix stacks, wastes and pipes independently of other services. Arrange so they are accessible and removable throughout their entire length.

Order of work

Requirement: Start drain laying at the downstream end of the drainage system (at the connection point to site infrastructure), not the upstream end. Confirm invert levels with building elements before starting to lay drains.

Discharge from air handling systems

Trays, sumps and plumbing: To AS/NZS 3666.1 (2011).

Expansion joints

Location: Provide expansion joints where pipes cross seismic or movement joints in the building, and from the building to below ground outside the building.

Inspection openings

Location: Provide inspection openings at each upstream end of branch and main drains, change of direction, entry to stacks and to AS/NZS 3500.2 (2021). Provide inspection openings complete with access riser brought up to finished floor levels. If access risers are located in tiled floor areas or surfaces with similar finishes, provide slip-resistant inspection covers with neoprene gas tight sealing rings.

Size: Provide inspection openings that allow full access to the waste pipe.

Vertical stacks: Provide a removable access gate opening of size equal to the diameter of the pipe approximately 600 mm above finished floor level. If the stack is concealed behind a wall or duct, provide a hinged access panel in the wall or duct with finish to match the surface in which it is installed.

Thermal movement

General: Arrange piping to accommodate thermal expansion. Provide proprietary expansion joints in copper and plastic pipes where pipe flexibility does not allow for movement. Make sure that movement does not strain branch connections.

Tundishes

Location: Provide suitably sized, trapped tundishes to collect condensate wastes from mechanical equipment. Connect tundishes to nearest waste or floor drain. Connect tundish waste to floor wastes, wastes or drains and provide traps and vents where necessary.

Charging: If tundishes are not provided with a constant discharge from equipment and are connected directly to the sanitary plumbing system or drainage system, provide a trap seal primer valve to make sure that the trap of the tundish is charged at all times.

Vent pipes

Requirement: Provide upstream and downstream vents to AS/NZS 3500.2 (2021).

Location: Locate vents at least 6 m from any air intake or grille and at least 3 m from exhaust discharges.

Staying to roof: If fixings for stays penetrate the roof covering, seal the penetrations and make watertight.

Terminations: Provide vent cowls of the same material as the vent pipe.

Wet area floors

General: Where drainage connections pass through wet area floors, terminate 4 mm below the substrate surface.

7.4 SANITARY DRAINAGE

Laying

General: Lay in straight lines between changes in direction or grade with sockets pointing up hill. If other pipes are adjacent, set each pipe true to line and complete each joint before laying the next pipe. If work is not continuous, cap open ends to prevent entry of foreign matter.

7.5 PIPING

Supports

Adverse soil conditions under structures: If soil under structures is unable to support piping without movement, suspend piping from the structure above on type 316 stainless steel hangers, fasteners and saddles at 600 mm maximum centres. Backfill with non-compacted lightweight material and size

supports to carry the load of the piping and backfill and conform to the **Pipeline tolerances table**. Cover metal components with petroleum based mastic then wrap with petroleum based tape to provide a continuous barrier to prevent ingress of water. Provide 50% minimum overlap of tape.

Differential movement: If the geotechnical site investigation report predicts differential movements between buildings and the ground, conform to **SERVICES INSTALLATION, Differential movement** in 0171 *General requirements*.

Pipeline tolerances table

	Permissible angular deviation from alignment	Permissible displacement from alignment
Horizontal	1:300	15 mm
Vertical	1:500	5 mm

7.6 PITS

Installation

General: Prepare foundation, install pit and connect pipes, to manufacturer's recommendations.

Location: At junctions, changes of gradient and changes of direction of stormwater drains.

Metal access covers and grates

Standard: To AS 3996 (2019).

Cover levels: Top of cover or grate, including frame:

- In paved areas: Flush with the paving surface.
- In landscaped areas: 25 mm above finished surface.
- Gratings taking surface water runoff: Locate to receive runoff without ponding.

7.7 TESTING

Pre-completion tests

Requirement: Test to AS/NZS 3500.2 (2021) Section 15, before backfilling or concealing.

Leaks: If leaks are found, rectify and re-test.

7.8 COMPLETION

Cleaning

General: On completion clean and flush the whole installation.

8 COLD AND HEATED WATER

8.1 DESIGN

General

Requirement: Design the cold water and heated water systems.

Design parameters

Standards: Conform to the following:

- AS/NZS 3500.1 (2021).
- National Construction Code Series Volume 3: Plumbing Code of Australia (PCA).
- Pressure and velocity: Design drinking water and recycled water systems to achieve the following:
 - . Minimum outlet pressure at any point: 250 kPa.
 - . Maximum outlet pressure at any point: 500 kPa.
 - . Maximum velocity at any point: 1.6 m/s.

8.2 PRODUCTS

Backflow prevention devices

Standard: To AS/NZS 2845.1 (2022) and AS 2845.2 (2010).

Pressure drop: Select for lowest pressure drop compatible with the required functions.

Thermostatic mixing valves

Standard: To AS 4032.1 (2005).

Requirement: Provide thermostatic mixing valves that automatically control the temperature at the mixed outlet to a preselected temperature and suitable for the number of outlets served by the individual valve.

Controls: Include the following:

- A temperature sensitive automatic control that maintains temperature at the preselected setting and rapidly shuts down the flow if either the supply system fails, or if the normal discharge water temperature is exceeded.
- Hot water flush facility.

Wall box: If documented, house the thermostatic mixing valve in a stainless steel recessed wall box with a hinged door and keyed lock.

Water meters

Standard: To AS 3565.4 (2007).

Installation: To the requirements of the Network Utility Operator.

8.3 PIPING

Mains connection

Requirement: Connect the cold water supply system to the Network Utility Operator's main through a stop valve and meter.

Cold water system: Provide the cold water supply system, installed from the meter to the draw-off points or connections to other services.

Heated water system: Provide the heated water system, installed from the cold water connection points to the draw-off points or connections to other services.

Fittings and accessories

General: Provide the fittings required for the proper functioning of the water supply system, including taps, valves, backflow prevention devices, pressure and temperature control devices, strainers, gauges and automatic controls and alarms.

Provision for dismantling: Arrange piping by the provision of unions or similar so that valves, taps and other maintainable components can be removed for maintenance without disturbing or cutting adjacent piping.

Press-fit fittings

Type: Permanent and inseparable after pressing.

Fitting material: Copper, stainless steel or gunmetal.

Leak path: Incorporate a positive leak path in the form of a channel in the metallic body of the fitting that indicates leakage when dry pressure tested is over the range 2.2 kPa to 300 kPa or wet pressure tested is over the range 100 kPa to 650 kPa.

Seals: EPDM suitable for solar applications and incorporating a cylindrical pipe guide in the front of the seal.

Pipes under pressure embedded in concrete

Prohibition: Do not embed or cast water service pipes into concrete structures.

Sleeves

Requirement: Provide sleeves at penetrations to *0171 General requirements*.

Provision for expansion

Requirement: Provide for thermal expansion of piping to AS/NZS 3500.4 (2021) clause 4.13.3 using either:

- Inherent flexibility of the piping.
- Proprietary expansion compensators consisting of a corrugated stainless flexible hose inside a reinforced metallic braid and fitted with stainless steel flanges. Install in bending mode and provide guides and anchors to manufacturer's recommendations.

Expansion loops: If expansion loops are used, install isolation valves either side of the expansion loops within ceiling spaces and riser ducts.

Venting

Location: Provide 15 mm minimum size air release vents at the following locations:

- High points of the system.
- Sections of the piping in which air may collect.

- Upstream from each item of heat exchange equipment.

Risers: Provide a 150 mm high riser set vertically from the pipe and fabricated from the same diameter and material as the pipe. Provide an automatic air vent at the top of the riser.

8.4 BACKFLOW PREVENTION

Location

Requirement: Provide backflow prevention devices in the following locations:

- On main incoming domestic cold water supplies, downstream of meters.
- On all mechanical plant, upstream of the plant.
- On all irrigation systems.
- In other locations required by the Network Utility Operator and AS/NZS 3500.1 (2021).

Installation

Location: Arrange to be readily accessible and easily removed.

External valve locations: Protect from damage and vandalism.

Arrangement: Provide each backflow prevention device with the following:

- Provide unions if \leq DN 50, flanges for larger sizes.
- Isolating valves upstream and downstream of each backflow prevention devices.
- Dual check valves to AS/NZS 3500.1 (2021).
- Line strainer upstream of each backflow prevention device.
- Tundish and drain with connection to waste drain to AS/NZS 3500.1 (2021).

Registration: Register valves to Network Utility Operator requirements.

In-wall mounted backflow prevention valves

Arrangement: Provide pre-plumbed proprietary high hazard valve assemblies as follows:

- Dual hot and cold valve trains.
- Flush mount, lockable, recessed Type 304 stainless steel cabinet.
- Slide-in front panel.
- DN 50 waste connection.

Vacuum breaker valves

Requirement: Provide vacuum breaker valves where required to prevent cross-connection of the cold water service.

8.5 PIPING INSULATION

General

Requirement: Insulate the following:

- Non-chrome plated heated water piping, fittings and valves.
- Non-chrome plated cold water piping in spaces subject to condensation.
- Cold water piping subject to freezing.

Minimum insulation R-Value: \geq Total R-Value in AS/NZS 3500.4 (2021) for the type and location of the pipe.

Application: Fit insulation tightly to piping surfaces without gaps. Close butt ends of insulation sections. Minimise number of joints. If the insulation is in half-sections, make only half-circumferential joints at any one place. Seal longitudinal seams in foil laminate and fix insulation at maximum 500 mm centres with polypropylene, zinc-coated steel or aluminium straps.

Unions and other items requiring service: Install the insulation so that it is readily removable.

Fittings: Provide insulation with insulation R-Value at least equal to that of the adjacent piping insulation.

8.6 MARKING

Notice plate

General: Provide a notice plate containing condensed emergency instructions, legibly printed or engraved on durable material resistant to defacement, at least 3 mm thick or mounted on board at least 3 mm thick, permanently fixed in a convenient position at the control valves.

Buried services

Requirement: Provide a detectable marker tape with trace wire to identify the route of buried piping.

Marker tape: Provide a minimum 100 mm durable plastic in colour to AS 1345 (1995) continuously printed with the words DANGER – BURIED DRINKING WATER SERVICE BELOW.

Location: Lay in backfill 150 mm above the pipe.

Trace wire: Terminate with 1000 mm coil in a readily accessible location. Tag to match the record drawings.

8.7 PLANTER IRRIGATION**General**

Location: Where documented, provide a DN 20 hose tap within each planter area. Also provide a capped DN 20 diameter point for future connection of irrigation system adjacent to each hose tap.

Backflow prevention: Provide backflow prevention devices to the PCA and AS/NZS 3500.1 (2021).

8.8 TESTING**Pre-completion tests**

Pressure tests: Before insulation is applied to joints, pressure test piping to AS/NZS 3500.1 (2021) and AS/NZS 3500.4 (2021) as appropriate.

Equipment: Before testing, disconnect any equipment not rated for the test pressure.

Leaks: If found, rectify and re-test.

Cross connections: Isolate systems individually and check for cross connections.

Backflow prevention: To AS/NZS 3500.1 (2021).

Tapware: Check for leaks.

Completion test

General: Provide a full operational test to verify conformance.

8.9 COMMISSIONING**General**

Strainers: Remove, clean and replace strainer baskets.

Cold water systems: Test and commission to AS/NZS 3500.1 (2021) Section 17.

Heated water systems: Test and commission to AS/NZS 3500.4 (2021) Section 9 and AS/NZS 3666.1 (2011) Section 3.

Testable backflow prevention devices: Test and commission to AS/NZS 2845.3 (2020) by a licensed plumber with backflow device accreditation. Tag and certify to the requirements of the Network Utility Operator.

8.10 COMPLETION**Charging**

Completion: On completion of installation, commissioning, testing and disinfection, fill the system with water, turn on control and isolating valves and the energy supply and leave the water supply system in full operational condition.

Thermostatic mixing valves

Field testing and maintenance: To AS 4032.3 (2022).

9 FUEL GAS**9.1 STANDARDS****Reticulated gas systems**

General: To AS/NZS 5601.1 (2022).

Gas equipment

Standard: To AS 3645 (2017) and AS/NZS 5263.0 (2023).

Industrial and commercial gas-fired appliances

General: To AS 3814 (2018).

Steel mains and services

Maximum operating pressure not more than 1050 kPa: To AS/NZS 4645.2 (2018).

Flue cowls

General: To AS 4566 (2005).

9.2 PIPING

Concealment

General: If practicable, install piping so that it is concealed within service ducts or non-habitable enclosed spaces and does not appear on external walls. Otherwise, provide metal piping mounted on metal brackets and provide metal cover plates at penetrations.

Connection to gas Network Operator mains

Connection: Arrange for connection and connect to gas Network Operator mains. Conform to gas Network Operator requirements.

9.3 LPG STORAGE SYSTEMS

Tank LPG storage

Tank colour: White.

Certificate holders: Provide a galvanized steel pipe, one end fitted with a brass plug, one end threaded and fitted with a threaded brass cap. Weld to the tank support member.

Cylinder LPG storage

Fittings: Supply cylinders with regulators that have AGA approval.

Hoods

General: Provide a weatherproof protective steel cover to the valve and regulators of 450 L capacity cylinders, together with hinge pins, padlock and key.

Function: For storage of current storage system approval and test certificates.

Marking: Mark the threaded cap with the phrase LPG CERTIFICATES.

Notices and signs

General: Required.

9.4 MANUALS

Operation and maintenance manuals

Requirement: Prepare manuals to include recommendations for the operation, care and maintenance of gas appliances, storage tanks, valves, regulators and their associated fittings.

9.5 COMMISSIONING

General

Requirement: On completion of installation and testing, turn on isolating and control valves, and purge and charge the system.

Purging: Conform to the recommendations of AS/NZS 5601.1 (2022) Appendix D.

Appliances: Commission appliances. Conform to the recommendations of AS/NZS 5601.1 (2022) Appendix N.

9.6 COMPLETION

Charging

Requirement: Immediately before the date for practical completion, fully charge the system with gas.

LPG systems: Fill gas storage containers and replace gas used in testing.

10 RAINWATER STORAGE SYSTEMS

10.1 STANDARDS

General

Metal rainwater goods: To AS/NZS 2179.1 (2014).

Design, installation, maintenance and repairs: To the recommendations of SA HB 230 (2008).

10.2 RAINWATER TANKS

General

Requirement: Provide structurally sound and watertight tanks.

Standard: If the tank is to contain drinking water or water for laundry or toilet flushing, provide materials to AS/NZS 4020 (2018).

Tank capacity: To statutory requirements but not less than the recommendations of SA HB 230 (2008).

Accessories: Provide the accessories needed to complete the installation. Include the following:

- Inlet and outlet connections to meet the intended flows to the NCC (2022) and AS/NZS 3500.3 (2021).
- Floating outlet to draw water from the upper part of the tank.
- Tight fitting lids or screens with maximum 1 mm mesh at all openings.
- Flap valves at every opening to the tank.
- Calmed inlet to the tank to prevent stirring sediment.
- Overflow siphon to skim surface contaminants.

Accessory materials: Select from:

- Ultraviolet light resistant plastic.
- Corrosion-resistant metal. Do not use copper or copper alloys with metallic-coated steel tanks.
- The same material as the tank.

Access opening: Provide a vermin-proof, childproof access opening above the high water level and cover with either a strainer or a lid fixed securely to the tank.

10.3 FIRST FLUSH DIVERTER

General

Requirement: Provide dry systems with a first flush diverter. Arrange to drain completely.

Sizing: Select for minimum 20 L/100 m² rainwater catchment area.

Construction: Corrosion-resistant and compatible with the rainwater plumbing and tank.

Discharge: Discharge waste water from the first flush diverter either:

- If permitted by the local authority, onto grassed areas away from tank and building footings.
- To the stormwater installation.

10.4 RAINWATER FILTRATION

Tank inlet

General: Provide dry and charged (wet) systems with an easily cleanable filter to treat rainwater before the entry to the tank.

Mesh size: Maximum 1 mm.

Tank outlet

Water filters for drinking water: To AS 3497 (2021) and the requirements of the statutory authorities having jurisdiction.

10.5 PUMPS

General

Requirement: Provide pumps to fulfill the functions of the system.

Selection: To the recommendations of SA HB 230 (2008).

10.6 INSTALLATION

General

Connecting piping: Support independently of the tank. Provide a 300 mm long section of reinforced flexible hose to prevent piping exerting a load on the tank.

Overflow: Pipe to discharge away from the tank.

10.7 CLEANING

General

Requirement: Flush the rainwater system. Wash and flush tanks to remove manufacturing and other contaminants.

10.8 COMMISSIONING

General

Testing and commissioning: To AS/NZS 3500.1 (2021) Section 9.

11 HYDRAULIC MAINTENANCE

11.1 GENERAL

Objective

Requirement: Maintain the hydraulic systems for the documented maintenance period so that the performance, reliability, service life, energy efficiency and safety of the system is equal to or better than that at the beginning of the maintenance period, in parallel with and including:

- Periodic and statutory maintenance, cleaning and replacement of consumables.
- Emergency repairs.

Maintenance period: To 0171 *General requirements*.

11.2 MAINTENANCE

Cold and heated water

Maintenance of tanks and piping for drinking water: To AS/NZS 3500.1 (2021) and AS/NZS 3500.4 (2021).

Ball float valves: Check and adjust for no overflow.

Heated water systems:

- Conform to the recommendations of AS/NZS 3500.4 (2021) Appendix M.
- Inspection and maintenance: To AS/NZS 3666.2 (2011).
- Provide service tags recording inspections and tests.

Leaks: Inspect cold and heated water systems at least annually for the following:

- Leaks, including leaks from cisterns.
- Other defects.
- Safe condition.
- Conformance to the PCA (2022) and Network Utility Operator requirements.

Leaks and defects: Report if found and rectify.

Strainers: Inspect and clean at least annually.

Rainwater storage systems

Requirement: Provide annual maintenance to SA HB 230 (2008) Table 10.1 at the following times:

- Maintenance period shorter than 12 months: Within a month of the end of the defects liability period.
- Maintenance period 12 months or longer: Annually.

Service tags: Record inspections and tests.

12 SELECTIONS

12.1 SUBMISSIONS

Samples schedule

Sample required	Details and inclusions
Refer Engineering Solutions Tasmania's drawings and specifications.	

12.2 COMPONENTS

Appliance schedule

	A	B	C
Appliance	Refer Engineering Solutions Tasmania's drawings and specifications.		
Description			
Accessories			
Colour/finish			
WELS rating to AS/NZS 6400 (2016) (stars)			

Sanitary fixtures schedule

Fixture	Description	Accessories and tapware	Colour/finish
	Refer Engineering Solutions Tasmania's drawings and specifications.		

Water heater schedule

	A	B	C
Water heater type	Refer Engineering Solutions Tasmania's drawings and specifications.		
Energy source			
Function served			

LPG storage systems schedule

	A	B	C
Storage type	N/A		
Total capacity (L)			
Number of cylinders			

0811S SANITARY FIXTURES

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide sanitary fixtures, as documented.

Refer drawings, Fittings and Fixtures Schedule, and Engineering Solutions Tasmania's drawings and specifications.

1.2 STANDARDS**General**

Design for access and mobility: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

2 PRODUCTS**2.1 GENERAL****Authorised products**

Requirement: Listed in the WaterMark Product Database, unless otherwise required by the Network Utility Operator.

Labelling

Water efficiency labelling: Provide products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

3 EXECUTION**3.1 SANITARY FIXTURES****General**

Requirement: Install to manufacturer's recommendations.

4 SELECTIONS**4.1 SANITARY FIXTURES****Baths schedule**

	A	B	C
Brand	N/A		
Catalogue number or model			
Material			
Size (L x W) (mm)			
Type			
Wall thickness (mm)			
Waste outlet size			
Installation and support			
Overflow			

Basins schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			

	A	B	C
Material			
Colour			
Bowl size (nominal) (mm)			
Soap recesses			
Sides			
Supports			
Overflow			
Number of tap holes			
Trap			
Location			
Rim height from floor (mm)			

Bidettes and bidets schedule

	A	B	C
Brand	N/A		
Catalogue number or model			
Type			
Material			
Tap type			
Water supply			
Load test to AS 1172.3 (2019) Appendix B			

Cisterns schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Type			
Material			
Colour			
Nominal flush (litres)			
WELS rating to AS/NZS 6400 (2016) (stars)			

Cleaners sinks schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Trap material			

Flush valves schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Trap material			

	A	B	C
WELS rating to AS/NZS 6400 (2016) (stars)			

Laundry tub schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			

Shower cabinets schedule

	A	B	C
Brand	N/A		
Catalogue number or model			

Shower bases schedule

	A	B	C
Brand	N/A		
Catalogue number or model			

Stainless steel sinks schedule

	A	B	C
Type	Refer Fittings and Fixtures Schedule		
Stainless steel Type			
Thickness (mm)			
Bowls			
Number of tap holes			
Waste outlet			
Outlet plug			
Trap			
Appliance connections			
Drainer: Location			
Drainer: Surface			
Drainer: Overall length (sink and drainer)			
Drainer: Overall width			
Drainer: Splashback			
Drainer: Tiling flange			
Drainer: Fascia			
Drainer: Drainer backing			
Drainer: Backing to splashback and fascias			
Drainer: Sink support			
Drainer: Bench inset sink			
Fixing			
Sealing			

Urinal assemblies schedule

	A	B	C
Type	Refer Fittings and Fixtures Schedule		
Flushing system			
Outlet connector			
Foot grating			
Material			
Supports			
Cisterns			
Trap			
WELS rating to AS/NZS 6400 (2016) (stars)			
Fixings			

Vanity schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Material			
Top style			
Number of tap holes			
Cabinet finish			
Cabinet hardware			

WC pans schedule

	A	B	C
Type	Refer Fittings and Fixtures Schedule		
Brand			
Catalogue number or model			
Material			
Colour			
Seat form			
Trap			
WELS rating to AS/NZS 6400 (2016) (stars)			

Sanitary fixtures samples schedule

Item	Requirement
Refer Fittings and Fixtures Schedule	

0812S TAPWARE

1 GENERAL**1.1 RESPONSIBILITIES****General**

Requirement: Provide tapware, as documented.

Refer drawings, Fittings and Fixtures Schedule, and Engineering Solutions Tasmania's drawings and specifications.

1.2 STANDARDS**General**

Design for access and mobility: To the NCC cited AS 1428.1 (2009) and AS 1428.2 (1992).

2 PRODUCTS**2.1 GENERAL****Authorised products**

Requirement: Listed in the WaterMark Product Database, unless otherwise required by the Network Utility Operator.

Labelling

Water efficiency labelling: Provide products conforming to and labelled to the Water Efficiency Labelling Scheme (WELS).

3 EXECUTION**3.1 TAPWARE****General**

Requirement: Install to manufacturer's recommendations.

4 SELECTIONS**4.1 TAPWARE****Bath tapware schedule**

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Finish			
Outlet type			
Plug			
Spindle			
Vandal resistant construction			
WELS rating to AS/NZS 6400 (2016) (stars)			

Basin tapware schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			

	A	B	C
Finish			
Outlet type			
Plug			
Spindle			
Vandal resistant construction			
Miniature stop valves			
WELS rating to AS/NZS 6400 (2016) (stars)			

Laundry trough and tub tapware schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Laundry extension arm type			
Laundry extension arm extension			
Finish			
Mounting			
Spindle			
Vandal resistant construction			
Miniature stop valves			
WELS rating to AS/NZS 6400 (2016) (stars)			

Shower tapware schedule

	A	B	C
Brand	N/A		
Catalogue number or model			
Finish			
Hand shower			
Shower head			
Spindles			
Vandal resistant construction			
WELS rating to AS/NZS 6400 (2016) (stars)			

Sink tapware schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Finish			
Outlet reach			
Outlet type			
Plug			
Spindle			
Vandal resistant construction			

	A	B	C
Miniature stop valves			
WELS rating to AS/NZS 6400 (2016) (stars)			

Flush valves schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
WELS rating to AS/NZS 6400 (2016) (stars)			

Other tapware schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Finish			
Spindle			
Vandal resistant construction			
Miniature stop valves			
WELS rating to AS/NZS 6400 (2016) (stars)			

Proprietary fittings and fixtures schedule

	A	B	C
Brand	Refer Fittings and Fixtures Schedule		
Catalogue number or model			
Dimensions			
Material and finish			

Tapware samples schedule

Item	Requirement
Refer Fittings and Fixtures Schedule	

0902 ELECTRICAL DESIGN AND INSTALL

1 ELECTRICAL SYSTEMS

1.1 RESPONSIBILITIES

General

Requirement: Design systems and provide electrical services, as documented.

Refer Engineering Solutions Tasmania's drawings and specification.

1.2 DESIGN

General

Requirement: To DESIGN in *0171 General requirements*.

Designer qualifications

Designer qualifications: Use only appropriately experienced and qualified persons to undertake design work. If requested, provide documents verifying the qualification and experience. Conform to

DESIGNER in *0171 General requirements*.

Design for durability and maintainability

Design for durability: Develop the design so the systems achieve the documented performance, reliability, service life, energy efficiency and safety requirements, and are easily maintainable.

Access for maintenance: Develop the design so the systems conform to **ACCESS FOR MAINTENANCE** in *0171 General requirements*.

Operating environment

Requirement: Provide equipment suitable for the environment in which it operates.

Energy efficiency

Requirement: To BCA (2022) J7 and BCA (2022) J9.

Seismic restraint

Requirement: To **SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS** in *0171 General requirements*.

Electrical system design

Requirement: Provide engineering design that:

- Maximises the functionality, performance, safety, flexibility and reliability of the electrical services.
- Is technically sound.
- Can be constructed using currently accepted methods.
- That provide the lowest combined owning and operating cost over the design life of the systems.

Design parameters: Provide facilities to meet the functional requirements of the works.

Fault protection: Automatic disconnection to AS/NZS 3000 (2018) clause 2.4.

Fire-resisting protection: Provide for switchboards and associated electrical conductors to BCA (2022) C3D14.

Maximum demand: Calculation method to AS/NZS 3000 (2018) Appendix C.

Authority submissions: Make submissions, including notices, to authorities relating to the works.

Design life

General: To *0171 General requirements*.

Design life: All components and systems: 25 years.

Fire separation

Requirement: As documented.

1.3 CROSS REFERENCES

General

Requirement: Conform to the following:

- *0171 General requirements*.
- *0223 Service trenching*.

1.4 STANDARDS

Electrical services

Requirement: To AS/NZS 3000 (2018), unless otherwise documented.

Electrical installations

Electrical design: To AS/NZS 3000 (2018).

Selection of cables: To AS/NZS 3008.1.1 (2017).

Degrees of protection (IP code): To AS 60529 (2004).

Electromagnetic compatibility (EMC): To the AS/NZS 61000 series.

Communications systems: To AS/CA S008 (2020), AS/CA S009 (2020), AS 11801.1 (2019) and AS/NZS 14763.2 (2020).

1.5 INTERPRETATION

Abbreviations

General: For the purposes of this worksection, the following abbreviations apply:

- CCT: Correlated colour temperature.
- CFL: Compact fluorescent lamps.
- CRI: Colour rendering index.
- EEI: Energy efficiency index.
- EMI: Electromagnetic interference.
- EMR: Electromagnetic radiation.
- FD: Fluorescent lamp ballast code set out in AS/NZS 4783.2 (2002).
- LED: Light-emitting diode.
- RCD: Residual current device.
- SPD: Surge protection devices.

1.6 SUBMISSIONS

General

Requirement: Conform to *0171 General requirements*.

Authority approvals

Authority submissions: Submit evidence of approval from authorities relating to the works.

Baseline data

Requirement: Submit baseline data to **BASELINE DATA** in *0171 General requirements*.

Certification

General: Submit the following:

- Certification of conformance with AS/NZS 3000 (2018), for electrical services.
- Telecommunications cabling: Submit certification for the product and installation.

Completion: Submit certificate as verification that the design and installation conforms to all contractual and statutory requirements.

Operation and maintenance manuals

Requirement: Conform to **OPERATION AND MAINTENANCE MANUALS** in *0171 General requirements*.

Products and materials

Data: Submit technical data for all items of plant and equipment, including the following:

- Assumptions.
- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.
- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of compliance with the applicable code or standard.

- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.
- Type test reports.
- Single line diagram(s), including fault levels at switchboards, cable size and type.
- Switchboard layouts.

Lighting: Submit technical data on the following:

- Luminaires.
- Lamps.
- Ballasts.
- Power factor correction equipment.
- Lighting control systems.
- All accessories.

ICT cabling: Submit technical data including the following:

- System design parameters: Performance.
- Voice and/or data transfer rate.
- Cable type and characteristics.
- Segregation requirements for EMI/EMR.
- Maximum length of cables.
- Cross-connect type and characteristics.
- Cross-connect block.
- Patch cords.
- Fibre optic terminations.
- Patch panel module.
- Cable management for racks.
- Rack.
- Fly leads.

Emergency evacuation lighting: Submit technical data for each type of luminaire and exit sign including the following:

- Maximum luminaire spacing for a given mounting height.
- Luminaire classification to AS/NZS 2293.3 (2018).
- Central battery and charger performance test reports, including discharge and charging characteristics.

Type test: Submit test results for the following:

- Emergency evacuation lighting equipment: To AS/NZS 2293.3 (2018).
- Light-emitting diode luminaries: Photometric test results from an Accredited Testing Laboratory as evidence of luminous efficacy for the applicable CCT.
- Light-emitting diode lamp replacement modules: Photometric test results from an Accredited Testing Laboratory as evidence of luminous efficacy for the applicable CCT.

Quality plan

Information and communications technology (ICT) systems: Submit a quality plan prior to the commencement of the installation to AS/NZS 14763.2 (2020) Section 6. Within the quality plan, include installation methodology, engineering calculations of pathway and remote powering, maximum cable lengths and the records management system.

Records

Cable management: Before the date for practical completion, submit logbooks for each distribution frame with details of cable terminations and provisions for recording cable, line and jumper information.

Samples

Lighting: Submit samples of all luminaires and accessories complete with lamp, control gear and three core flex and plug.

Emergency evacuation lighting: Submit samples of all luminaires and exit signs.

Shop drawings

Requirement: Submit drawings showing the following:

- Cable ladder and tray routes.
- Cable riser layouts, take-offs and sections
- Concealed conduit locations with interconnections.
- Connections to other services.
- Control cable routes, cable sizes and types of cable, cable identification labelling.
- Control sensor and control device layouts.
- Control system schematics with wire/ terminal identification.
- External services layouts including underground cable routes and pit locations, underground communications cable routes and pit locations.
- Fire detection system layout.
- Layouts of control panels including control functions logic diagram, wiring diagram, proposed terminology and labelling.
- Lighting:
 - . Lighting columns.
 - . Lighting column mounting bases.
 - . Non-proprietary luminaires.
 - . Non-standard fixing brackets.
- Lightning protection system layout.
- Power and communication system layout.
- Reflected ceiling plan layouts showing lighting, emergency lighting, emergency warning system equipment, fire detection equipment and HVAC outlets.
- Security system layout.
- Switchboard layout, equipment details and labelling.
- Telecommunications cabling:
 - . Layouts of equipment racks.
 - . Cross-connect layout.
 - . Cabling diagram for complete system.
 - . Cable management system.
- Wiring diagrams.

Subcontractors

General: Submit names, contact details, licence numbers and type of licence of proposed suppliers and installers.

1.7 WORK ON EXISTING SYSTEMS**Demolition**

General: Decommission, isolate, demolish and remove from the site all existing redundant equipment including minor associated components that become redundant as a result of the demolition.

Breaking down: Disassemble or cut up equipment where necessary to allow removal.

Recovered materials: Recover all components associated with the listed items. Minimise damage during removal and deliver to the locations documented.

Existing electrical systems

Condition of existing systems:

- If the existing condition does not conform to the requirements in the contract documents, submit proposals to rectify the deficiencies with related costing, time and other impacts.
- Subject to the rectification works on existing systems, achieve the performance in the contract documents.

1.8 SERVICE TRENCHING

General

Requirement: To 0223 *Service trenching*.

1.9 COMMISSIONING

General

Requirement: Provide commissioning as documented. Conform to 0171 *General requirements* and SA TS 5342 (2021).

2 LOW VOLTAGE POWER SYSTEMS

2.1 GENERAL

Network supply

General: Liaise with the electricity distributor and provide network connection.

Program: Schedule the works and statutory inspections to suit the construction program.

Prospective fault current: Determine, from the electricity distributor, the prospective fault current and fault protection requirements.

Supply system: 400 V, 3-phase, 4-wire, 50 Hz, multiple earth neutral (MEN) system.

Distribution system

General: Provide power distribution system elements required for the works.

2.2 SURGE PROTECTION DEVICES (SPD)

General

Requirement: Provide all mode metal oxide varistor based series connected SPD to protect equipment in racks and cabinets, if required.

Standard: To AS 4262.1 (1995), AS 4262.2 (1999) and AS 1768 (2021).

Operating voltage (U_o): 230 V at 50 Hz.

Surge rating (I_{max}): 40 kA (8/20 μ s) phase to neutral and 100 kA neutral to earth.

Voltage protection level (U_p): < 600 V at 3 kA.

Visual indicator: Provide visual indication of SPD status.

Maximum continuous operating voltage (U_c): 275 V a.c.

Enclosure and installation: House SPD in an electrical switchboard or panel and protect with a suitably rated circuit breaker or HRC fuse equal to or less than the load current rating of the SPD.

Enclosure mounting: DIN rail mounted.

2.3 SITE ELECTRICITY SUPPLY

General

Responsibilities: Provide site electricity supplies required for the works. Connect project electrical facilities to the network distributors external site electricity supply.

Consumers mains

Requirement: Provide consumers mains, associated services and all necessary fault and overload current protection equipment to AS/NZS 3000 (2018) Section 3, the electricity distributor's standards and the Service and Installation Rules.

Protected consumers mains: Provide short-circuit and overload protection, where required by the electricity distributor.

Alternative power supplies

General: Provide alternative power supplies, if required.

Metering

Retail: To the requirements of the electricity retailer and the electricity distributor.

Private: Provide energy measurement to BCA (2022) J9D3, if required.

Photovoltaic metering: Provide energy measurement to BCA (2022) J9D3, if required.

2.4 WIRING SYSTEMS

General

Wiring and site cable reticulation systems: Appropriate to the installation conditions and the function of the load. Include the following:

- Underground services.
- Above-ground services.
- In-building services.

Type: Re-wireable system.

Neutral conductors: Same size as the corresponding active conductors. Rate the neutral conductor size for the maximum harmonic currents.

2.5 POWER CABLES

Standards

Polymeric insulated cables: To AS/NZS 5000.1 (2005).

Aerial cables:

- Copper conductors: To AS 1746 (1991).
- Aluminium conductors: To AS 3607 (1989) or AS 1531 (1991).

Cable

Requirement: Select multi-stranded copper cables.

Default insulation: V-75.

Default sheathing: 4V-75.

Minimum size: Conform to the following:

- Lighting subcircuits: 1.5 mm².
- Power subcircuits: 2.5 mm².
- Submains: 6 mm².

Voltage drop: Select final subcircuit cables within the voltage drop parameters dictated by the route length and load.

Fault loop impedance: Provide final subcircuit cables to satisfy the requirements for automatic disconnection under short-circuit and earth fault/touch voltage conditions.

Underground residential distribution (URD) systems: Cables to AS/NZS 4026 (2008).

Distribution cables: To AS/NZS 4961 (2003).

Colours

Conductor colours: For fixed wiring cables, provide coloured conductor insulation or at least 150 mm of close-fitting coloured sleeving at the termination points of each conductor.

Active conductors in single phase circuits: Red.

Active conductors in polyphase circuits:

- A phase: Red.
- B phase: White.
- C phase: Blue.

Neutral conductors: Black.

Earthing conductors: Green-yellow.

Sheath: White.

Cable installation

Classifications: To AS/NZS 3013 (2005).

Handling cables: Report damage to cable insulation, serving or sheathing.

Stress: Do not use installation methods that exceed the cable's pulling tension. Use cable rollers for cable installed on tray/ladders or in underground enclosures.

Straight-through joints: Unless unavoidable due to length or difficult installation conditions, run cables without intermediate straight-through joints.

Cable joints: Locate in accessible positions in junction boxes and/or in pits.

Individual wiring of extra-low voltage circuits: Tie together at regular intervals.

Tagging

General: Identify multicore cables and trefoil groups at each end with stamped non-ferrous tags clipped around each cable or trefoil group.

Marking

General: Identify the origin of all wiring by legible indelible marking.

Submains and final subcircuits

Installation: Provide the following:

- Cables with diameter less than 13 mm: Run in conduit, cable ducts or support on cable trays or ladders.
- Single core cables of 3-phase circuits: Install unenclosed single core cables of diameter greater than 13 mm laid on cable tray in trefoil (RWB) or quadrofoil (RWBN) groups.
- Cables for lighting systems: Run in conduit, cable ducts, suspend on catenary systems or support on cable trays or ladders.
- Accessible concealed spaces: Install thermoplastic insulated and sheathed cables.
- Inaccessible concealed spaces: Install cable in PVC-U conduit.
- Roof spaces: Install cable below heat insulation and sarking. If not protected from high ambient roof space temperatures by thermal insulation, derate the cables, to AS/NZS 3008.1.1 (2017) Table 27, for an assumed ambient temperature of 55°C.
- Accessible ceiling voids: Support and enclose cables on ceiling surfaces or ceiling suspension systems.
- Plastered or rendered masonry: Install cable in PVC-U conduit.
- Double sided face brick partition: Install cable in PVC-U conduit installed within the brick wall by slotting bricks or using any continuous pathways provided in the brick.
- Stud framed walls with bulk insulation: Install cables in PVC-U conduit.
- Stud framed walls without bulk insulation: Install thermoplastic insulated and sheathed cables allowing rewirability. Bush all knock-outs in steel framing to prevent cable damage. Earth metal stud frames to the electrical earthing system.
- Horizontal cable trays or ladders: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 2000 mm intervals.
- Vertical cable risers: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 1000 mm intervals.
- Plant rooms: Install cable in heavy duty PVC-U conduit or on cable tray, cable ladder or in duct.

2.6 EARTHING**Earthing systems**

Protective earthing system with a multiple earth neutral (MEN) connection: To AS/NZS 3000 (2018) Section 5.

Earth electrodes

General: Provide electrodes to AS/NZS 3000 (2018) clause 5.3.6.

Bonding

General: Provide equipotential bonding to AS/NZS 3000 (2018) clause 5.6.

Earth and bonding clamps

General: Provide proprietary earthing and bonding clamps to AS 1882 (2002).

2.7 ELECTRICAL ACCESSORIES**General**

Style: Provide accessories of the same style and from the same manufacturer.

Socket outlets - generally

Standards:

- General: To AS/NZS 3112 (2017).
- Industrial: To AS/NZS 3123 (2005).

Socket outlet properties: Provide sockets conforming to the following:

- Type: Integral switched socket outlet.

- Material: High impact plastic.
- Size: Standard single gang.
- Current rating: 10 A.
- Pin arrangement: Mount outlets with the earth pins at the 6 o'clock position.

Plastic switched socket outlets

Colour: White electrical.

Mounting configuration: Horizontal.

Ironclad socket outlets

Type: Integral switched socket outlet.

Material: Diecast metal or cast iron.

Colour: Grey.

Weatherproof socket outlets

Colour: Grey.

Combined RCD switched socket outlets

Type: Integral RCD unit with double switched socket outlet.

Colour: White electrical.

RCD trip current: Conform to the following:

- General light and power: 30 mA Type II to AS/NZS 3190 (2016).
- Patient treatment areas: 10 mA Type I to AS/NZS 3190 (2016).

Multi-switch socket outlets on grid mounted panels

Type: Separate switch and socket outlets grid mounted on propriety or custom designed panels.

Material: High impact plastic.

Colour: White electrical.

Panel finishes: To suit work requirements.

Plugs – 230 volt

Requirement: Insulated type to AS/NZS 3112 (2017) with integral pins.

230 volt combination switch and permanently connected cord outlet

Type: Three terminal flush mounted switch and flex-lock insert assembly.

Colour: White electrical.

Neon indicator: Provide neon indicator.

Flex-lock assembly: Match and securely grip the size and type of flexible cable used.

Mounting configuration: Horizontal.

Permanently connected equipment

General: Provide final subcircuit to permanently connected equipment.

Isolating switch: Locate adjacent to equipment.

Mounting:

- Internal installations: Flush mount.
- External installations: Weatherproof surface mounted.

Coordination: Coordinate with equipment supplier.

Wall/ceiling mounted equipment: Conceal final cable connection to equipment.

Isolating switches

Standard: To AS 3133 (2020).

Emergency stop switches

Standard: To AS/NZS IEC 60947.5.5 (2015).

Type: Mushroom head with latch and twist releaser.

3-phase outlets

Standard: To AS/NZS 3123 (2005).

Type: Surface mounted Integral switched socket outlet with flap lid on the outlet.

Material: High impact plastic.

IP rating: IP56.

Size: To suit current rating and pin configuration nominated in the project documents.

Colour: Grey.

Current rating: 5 pin, 20 A, 400 V a.c.

Switch mechanism: Rotating type.

Pin arrangement: Five round pins mounted with earth pins at the 6 o'clock position, neutral pins in the centre and the red, white and blue phases in a clockwise sequence when viewed from the front of the outlet.

Plug: Provide a matching plug top for each outlet.

Installation

General: Install accessories and conceal cabling in walls in conformance with the following:

- Rendered masonry partition: Flush wall box, with conduit chased into wall.
- Double sided face brick partition: Vertically mounted flush wall box, with conduit concealed in cut bricks.
- Face brick external cavity wall: Flush wall box, with thermoplastic insulated cables in conduit run in cavity and tied against inner brick surface, or thermoplastic sheathed cables run in cavity.
- Stud partition: Flush plate secured to proprietary support bracket or wall box.
- Fire walls: Flush wall box, with conduit built into wall. Provide additional fire protection around wall boxes, where necessary to maintain fire-resistance rating.

Location: Confirm final location of all outlets and equipment on site, before installation.

Spacing from adjacent horizontal surface: ≥ 75 mm to the centre of accessory socket.

Default mounting heights to centre of accessory plate:

- Outlets: 300 mm.
- Switches and controls: 1100 mm.

Accessories: Flush mounted, except in plant rooms.

Common faceplates: Mount adjacent flush mounted accessories under a common faceplate.

Restricted location: Do not install wall boxes across junctions of wall finishes.

Surface mounting: Proprietary mounting blocks.

Installation of ceiling mounted accessories

Connections for appliances: Flush mounted outlets on the ceiling next to support brackets.

Mounting: Mount appliances independent of ceiling tiles and suspended ceiling suspension system.

Fix directly to concrete slab or to roof structure above ceiling.

Connections for fixed equipment: Provide concealed permanent connections.

Fixing: For equipment and appliances heavier than 30 kg, provide support through the suspended ceiling to the building structure. Brace appliances that have excessive bending moments, are heavy or vibrate, to prevent horizontal movement.

3 POWER GENERATION – PHOTOVOLTAIC

3.1 GENERAL

System components

Requirement: Incorporate the following:

- Photovoltaic array.
- Regulator.
- Battery system.
- Inverter.
- Connection to low voltage power system.

3.2 STANDARDS

General

Requirement: For the purpose of this worksection, the following standards relating to stand-alone systems are also applicable to network connected systems:

- Stand-alone power systems: To AS/NZS 4509.1 (2009) and AS/NZS 4509.2 (2010).

- Grid connected systems: To AS/NZS 4777.1 (2016) and AS/NZS 4777.2 (2020).
- IEC TS 61836 (2016).

3.3 PHOTOVOLTAIC MODULE

General

Selection: To AS/NZS 4509.2 (2010) and AS/NZS 5033 (2021).

Array

Encapsulation: Required.

Toughened glass: Required.

Protection rating: \geq IPX6.

Integral bypass diode protection: Required.

Cells

Type: Crystalline.

Standard: To IEC 61215-1-1 (2021).

Efficiency: \geq 12%.

3.4 REGULATOR

General

Selection: To AS/NZS 4509.2 (2010).

Function: Charge cycle control including:

- Low battery voltage disconnect.
- Pulse width modulation.
- \geq 3 step series regulation.

Display: LCD display of:

- Battery voltage.
- Charge current.
- Ampere hours in and out.
- Load current.

Alarms: Visible and audible low and high battery voltage alarms.

Transient protection: Required.

3.5 BATTERY SYSTEM

General

Selection: To meet the documented performance.

Blocking diodes: Required.

Service life: \geq 10 years.

Standards

General: To AS 2676, AS 4086.1 (1993) and AS/NZS 5139 (2019).

3.6 INVERTER

General

Selection: To meet the documented performance.

Waveform: True Sine wave.

Waveform quality: To the AS/NZS 4777 series.

Voltage regulation: $\pm 8\%$.

Harmonic distortion of output current: $< 4\%$.

Frequency regulation: $\pm 1\%$.

Efficiency: $\geq 90\%$ at 10% load.

Protection: Overload, short-circuit and transient required.

Automatic no-load shutdown: Required.

Display:

- Output power.
- Grid stability.

Standards

General: To AS/NZS 4777.2 (2020).

Synchronisation

Requirement: Self-commutation modules that automatically synchronise the inverter supply frequency and phase angle to the low voltage network or other embedded generator system.

3.7 CONTROL SYSTEM**Control panel**

General: Provide photovoltaic system control panels, switchgear and controlgear assemblies.

3.8 PHOTOVOLTAIC METERING**General**

Requirement: Provide bi-directional metering equipment to meter the photovoltaic energy that is exported back to the grid to the requirements of the electricity distributor and the electricity retailer.

3.9 COMMISSIONING**General**

Requirement: Pre-commission, test and commission to AS/NZS 4509.1 (2009), and AS/NZS 5033 (2021) and the manufacturer's recommendations. Obtain test reports from manufacturers or suppliers verifying the performance of safety and control functions of each system.

4 SWITCHBOARDS – PROPRIETARY

4.1 GENERAL**Performance**

Supply system: Switchboards to suit 400 V, 3-phase, 4-wire, 50 Hz, multiple earth neutral (MEN) supply system.

4.2 DESIGN**Switchboards for electric vehicle charging equipment**

Requirement: Conform to BCA (2022) J9D4.

4.3 STANDARDS**General**

General: To AS/NZS 3000 (2018).

Main switchboards and distribution switchboards: To AS/NZS 61439.1 (2016), AS/NZS 61439.2 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

Distribution switchboards intended for use by unskilled/ordinary persons: To AS/NZS 61439.2 (2016), AS/NZS 61439.3 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

4.4 PRODUCTS**Switchboard connection**

Type: Front connected.

Enclosure

Default material: Metallic-coated sheet steel.

Separation

Default: Form 1 to AS/NZS 61439.2 (2016).

Metering

Retail: To the requirements of the electricity retailer and the electricity distributor.

Private: Provide energy measurement to BCA (2022) J9D3, if required.

Photovoltaic metering: Provide energy measurement to BCA (2022) J9D3, if required.

Main switchboard main switches

Spare capacity: Provide at least 25% spare capacity in the ratings main switch/isolators.

Busbars

General: Incorporate proprietary insulated busbar systems for the interconnection of isolators, circuit breakers and other circuit protective devices.

Busbar fault rating: Rated to meet the prospective fault current for 1 second or a minimum rating of ≥ 18 kA/second, whichever is the greater.

Spare capacity

Default spare poles: $\geq 20\%$.

Main switchboard incoming busbar: $\geq 25\%$.

Earthing

General: Make provision for the connection of the communications earth terminal (CET) at switchboard earth bar to AS/CA S009 (2020).

Doors

General: Provide lockable doors with a circuit card holder unless enclosed in cupboards or in an area that is not readily accessible to the public.

Keying: Key alike for multiple doors, 2 keys per assembly.

IP rating

Default rating: IP42 minimum.

Weatherproof: IP56 minimum.

Finishes

External and interior: Orange X15 or the manufacturer's standard colour.

- Installed in cupboards, switchrooms and plant rooms: Orange X15 or the manufacturer's standard powder coated finish.
- Installed elsewhere: Orange X15, the manufacturer's standard powder coated finish or to the documented non-standard powder coated colour.

Supporting structure

Assemblies:

- Wall mounted: ≤ 2 m².
- Floor mounted: > 2 m².

Ventilation

General: Required to maintain design operating temperatures at full load.

Cable entries

General: Neatly adapt one or more cable entry plates, if fitted, to accept incoming cable enclosure. Provide the minimum number of entry plates to leave spare capacity for future cable entries. Do not run cables into the top of weatherproof assemblies.

Single core cables rated > 300 A: Pass separately through non-ferrous gland plates. Do not provide ferrous metal saddles. Minimise eddy currents.

Cable enclosures

Requirement: Continue cable enclosures to or into assemblies and fit cable entry plates so that the IP rating of the assembly and the fire-resistance level of the cable are maintained.

Cable support

Requirement: Support or tie mains and submains cables within 200 mm of terminations. Provide cable support suitable for stresses resulting from short-circuit conditions.

5 SWITCHBOARD COMPONENTS

5.1 DESIGN**Statutory authority's equipment**

General: Liaise with the electricity distributor about the installation and coordinate with their protective and control equipment.

5.2 REQUIREMENTS**General**

Selection: To AS/NZS 3000 (2018) clause 1.7 and Section 2.

Rated duty: Uninterrupted.

Rated making capacity (peak): $\geq 2.1 \times$ fault level (r.m.s.) at assembly incoming terminals.

Utilization category: To AS/NZS 60947.1 (2021) clause 5.4 and the recommendations of Annex A.

- Circuits consisting of motors or other highly inductive loads: At least AC-23.
- Other circuits: At least AC-22.

Coordination: Select and adjust protective devices to discriminate under overload, fault current, and earth fault conditions.

Enclosure: IP4X minimum.

5.3 SWITCH-ISOLATOR

General

Standard: To AS/NZS 60947.1 (2021) and AS 60947.3 (2018).

Poles: 3.

Operation: Independent manual operation including positive ON/OFF indicator.

Shrouding: Effective over range of switch positions.

Fault make/fault break switch-isolators

Rated breaking capacity: To AS 60947.3 (2018) Table 3.

Rated short-time withstand current: As defined in AS/NZS 60947.1 (2021) clause 5.3.6.1 and the manufacturer's recommendation for the prospective fault current conditions.

Rated short-circuit making capacity: As defined in AS/NZS 60947.1 (2021) clause 5.3.6.2, to conform to the manufacturer's recommendation for the prospective fault current conditions.

Rated short-circuit breaking capacity: To AS/NZS 60947.1 (2021) clause 5.3.6.3 and the manufacturer's recommendation for the prospective fault current conditions.

Load make/load break switch-isolators

Rated making and breaking capacity: As defined in AS/NZS 60947.1 (2021) clause 5.3.5 to conform to AS 60947.3 (2018) Table 3 and the manufacturer's recommendations for the prospective fault current conditions.

5.4 OVERLOAD AND FAULT PROTECTION GENERALLY

General

Requirement: Provide overload and fault protection devices, including full discrimination and cascade protection, and grade with the electricity distributor's incoming supply protection system and the downstream site protection devices.

Cascade protection: Provided by either fault current limiting fuses or fault current limiting circuit breakers.

5.5 FUSE SWITCH UNITS

Fuse links

Requirement: Isolate when switch contacts are open. Provide 3-phase sets of high rupturing capacity (HRC) fuse links.

5.6 MOULDED CASE AND MINIATURE CIRCUIT BREAKERS

General

Moulded case breakers: To AS/NZS 60947.1 (2021) and AS/NZS IEC 60947.2 (2015).

Miniature circuit breakers: Interrupting capacity classification to AS/NZS 60898.1 (2004) or AS/NZS 3111 (2009).

- For general building services: Type C.
- For motor protection: Type D.

Operation: Independent manual operation including positive ON/OFF indicator.

Trip type: Conform to the following:

- Moulded case breakers: Adjustable thermal, fixed magnetic.
- Miniature circuit breakers: Fixed thermal and fixed magnetic.

Mounting: Mount circuit breakers so that the ON/OFF and current rating indications are clearly visible with covers or escutcheons in position. Align operating toggles of each circuit breaker in the same plane.

Clip tray chassis: For miniature overcurrent circuit breakers, provide clip tray assemblies capable of accepting single, double or triple circuit breakers and related busbars. Provide moulded clip-on pole fillers for unused portions.

Interchangeable trip units: Connect trip units so that trip units are not live when circuit breaker contacts are open.

Fault current limiting circuit breakers: Select breaker frame sizes from one manufacturer's tested range of breakers to give cascade and discrimination protection within the switchboard and downstream switchboards as required.

5.7 ELECTRICITY DISTRIBUTOR'S SERVICE PROTECTIVE DEVICES

General

Low voltage service protective devices: To AS/NZS 3000 (2018), the electricity distributor's requirements and the Service and Installation Rules.

Service protective devices > 100 A: Provide fault current limiting circuit breakers with adjustable overload and short-circuit current facilities with full discrimination and cascade protection between the incoming supply protection systems and the downstream protection systems.

5.8 RESIDUAL CURRENT OPERATED CIRCUIT BREAKERS (RCBO)

General

Standard: To AS/NZS 3190 (2016).

Integral non-overload protection type: To AS/NZS 61008.1 (2015).

Integral overload protection type: To AS/NZS 61009.1 (2015).

Modular type: To AS/NZS IEC 60947.2 (2015).

- Type I for patient treatment areas.
 - . Default tripping current: 10 mA.
 - . Switched neutral: Required.
- Type II.
 - . Default tripping current: 30 mA.

5.9 FUSES WITH ENCLOSED FUSE LINKS

General

Standards: To IEC 60269-1 (2006) and IEC 60269-2 (2013).

Fuses with fuse links for the protection of semiconductor devices: To IEC 60269-4 (2009).

Fuses with fuse links used as fault current limiters: Coordinate fuse type and rating with the protection switchgear manufacturer's recommendation if used downstream of the fault current limiters. Provide labels adjacent to the fuse holder stating FAULT CURRENT LIMITER and fuse size.

Fuse links: Enclosed, high rupturing capacity type mounted in a fuse carrier.

Breaking range and utilization category:

- Distribution/general purpose: gG.
- Motors: gM.

5.10 CONTACTORS

General

Standard: To AS/NZS IEC 60947.4.1 (2015).

Type: Enclosed, block type, air break, electromagnetic.

Poles: 3.

Rated operational current: The greater of:

- Full load current of the load controlled.
- ≥ 16 A.

Mechanical durability: 10 million cycles to AS/NZS IEC 60947.4.1 (2015).

Electric durability: ≥ 1 million operations at AC-22 to AS/NZS IEC 60947.4.1 (2015).

Mounting: Mount with sufficient clearance to allow full access for maintenance, removal and replacement of coils and contacts, without the need to disconnect wiring or remove other equipment.

Auxiliary contacts: Provide auxiliary contacts with at least one normally-open and one normally-closed separate contacts with rating of 6 A at 230 V a.c., utilization category AC-1.

6 LIGHTING

6.1 STANDARDS

General

Energy efficiency for ballasts and lamps: To AS/NZS 4783.2 (2002).

Minimum energy performance standards (MEPS)

General: To AS 4782.2 (2019), AS/NZS 4783.2 (2002) and AS 4934.2 (2021).

Self-ballasted lamps: To AS 4847.2 (2019).

6.2 PROPRIETARY LUMINAIRES

General

Requirement: Provide proprietary luminaires complete with lamps, luminaire control equipment, lighting control equipment, and accessories. Provide lamps of the same type from the same brand and country of manufacture.

Self-ballasted lamps: To AS/NZS 60968 (2001).

6.3 FLUORESCENT LAMPS

Standards

Fluorescent lamps: To AS/NZS 4782.1 (2020) and AS 4782.2 (2019).

Compact fluorescent lamps: To AS/NZS 4847.1 (2010) and AS 4847.2 (2019).

Properties

CCT: 4000 K.

Colour rendering: Group 1B to AS/NZS 1680.1 (2006).

Linear and circular lamp type: T8 (26 mm diameter) or T5 (16 mm diameter), triphosphor, TL84, as documented.

Compact fluorescent lamp types: Four-pin, non-integrated type.

6.4 FLUORESCENT LAMP BALLASTS

Linear and circular lamp types

General: Provide electronic fluorescent lamp ballasts for fluorescent lamp lighting systems selected for compatibility with the lamp and control method.

Electronic fluorescent lamp ballasts: Conform to the following:

- To AS/NZS 61347.2.3 (2016) and AS/NZS 60929 (2020).
- Current total harmonic distortion: $< 15\%$.
- Soft start.
- Number of ballasts: Provide separate ballasts for each lamp or integral dual ballasts as an alternative for dual lamp fittings.

Ballast performance measurement – fluorescent lamps: To AS/NZS 4783.1 (2001).

CFL lamp types

General: Provide electronic fluorescent lamp ballasts for CFL lighting systems selected for compatibility with the lamp and control method.

Electronic fluorescent lamp ballasts: Conform to the following:

- To AS/NZS 61347.2.3 (2016) and AS/NZS 60929 (2020).
- Current total harmonic distortion: $< 15\%$.
- Number of ballasts: Provide separate ballasts for each lamp or integral dual ballasts as an alternative for dual lamp fittings.

Ballast performance measurement – fluorescent lamps: To AS/NZS 4783.1 (2001).

Fluorescent lamp power factor correction

General: Provide power factor correction on all luminaires to a minimum power factor of 0.9 lagging.

6.5 LIGHT-EMITTING DIODE (LED) LUMINAIRES**General**

Requirement: Provide light-emitting diode (LED) luminaires.

Light-emitting diode luminaires

Colour: CRI > 80.

CCT: 3000 K.

6.6 CONTROL GEAR ENCLOSURE**General**

Requirement: Provide controlgear support enclosure within the body of the luminaire, except where remotely mounted controlgear is documented or required by the manufacturer.

Enclosures and controlgear mounting assemblies: Provide heat dissipation facilities to dissipate heat from the luminaire.

Controlgear enclosure: Form a barrier against direct contact with live parts of the controlgear and the area of the luminaire containing the lamp and lamp support holders.

Separate controlgear enclosures: If separate controlgear enclosures external to the luminaire are required, conform to the above requirements.

Fixing: Screw fixed.

6.7 WIRING**External flexible cords**

Recessed luminaires: Provide flexible cord in conformance with the following:

- Length: ≥ 1.5 m.
- Cross-sectional area: 0.75 mm^2 .
- Type: 3-core V75 (minimum) PVC/PVC, connected to a 10 A 3-pin moulded plug to AS/NZS 3112 (2017) or multi-pin plug.

6.8 LIGHTING CONTROL**General**

Requirement: Provide the following:

- Lighting switches.
- Electronic lighting switches.
- Dimmers.
- Automatic control systems.

Digital control system

General: Provide a microprocessor-based system to control lighting under automatic and user interface control, if required.

6.9 ACCESSORIES**Run-on timer switches**

General: Provide run-on timer switches, if required.

Delay: Adjustable to 20 minutes.

6.10 SUPPORTS**General**

Requirement: Install luminaires on proprietary supports, including battens, trim, noggings, roses and packing material.

Suspended luminaires

Rods: Steel pipe suspension rods fitted with gimbal joints.

Chains: Electroplated welded link chain.

Levelling wire: Stainless steel.

Levelling: Adjust the suspension system length so that the lighting system is level and even.

Horizontal tolerance: ± 3 mm between luminaires within the same area.

Surface mounted luminaires

General: Fit packing pieces to level luminaires and prevent distortion of luminaire bodies. Provide packing strips to align end to end luminaires.

Fixing: Conform to the following:

- Generally: Provide 2 fixings at each end of fluorescent luminaires.
- Luminaires less than 150 mm: A single fixing at each end in conjunction with 1.6 mm backing plates may be used.
- Provide battens and support for the fitting.
- Do not direct fix into plasterboard.

Recessed luminaires

General: Install recessed luminaires in trimmed openings in the suspended ceiling.

6.11 COMMISSIONING

General

Requirement: Before the date for practical completion carry out the following:

- Verify the operation of all luminaires.
- Adjust aiming and controls for all luminaires under night time conditions.
- Replace lamps that have been in service for a period greater than 50% of the lamp life as published by the lamp manufacturer.

Digital control system: Commission to the manufacturer's recommendations and to the documented control requirements.

7 INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SYSTEMS

7.1 GENERAL

System components

Requirement: Provide the following as appropriate:

- Network connection.
- Campus distributor.
- Campus cabling.
- Building distributor.
- Backbone cabling.
- Floor distributors.
- Consolidation points.
- Telecommunications outlets.
- Patching.
- IT components.
- Active computer hardware.

System performance – general

Remote powering category: Category RP1 to AS/NZS 14763.2 (2020) Table 1 for a remote powering cable installation, also known as Power over Ethernet (PoE).

System performance - commercial buildings, small offices and home offices

Application class: To AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz).

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clauses 6.3, 7.2 and 9.3, AS 11801.2 (2019) and AS 11801.4 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 (data/voice) Category 6_A AS 11801.2 (2019) and AS 11801.4 (2019).

Optical fibre cabling system: To AS 11801.1 (2019) clauses 6.5, 7.4, 8.3 and 9.5, AS 11801.2 (2019) and AS 11801.4 (2019).

System warranty: 15 years minimum.

System performance - distributed building services

Application class: To AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz).

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.6 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.6 (2019).

Optical fibre cabling system: To AS 11801.1 (2019) clauses 8.3 and 9.5, and AS 11801.6 (2019).

System warranty: 15 years minimum.

System performance – data centres

Application class: Main distribution, intermediate distribution and zone distribution cabling systems to AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz), and AS 11801.5 (2019) clause 6.3.2.

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.5 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.5 (2019) clauses 8.2, 9.2, 10 and 11.

Optical fibre cabling system: To AS 11801.5 (2019) clauses 6.3.3, 9.5, 10 and 11.3.

System warranty: 15 years minimum.

System performance – industrial premises

Application class: Main distribution, intermediate distribution and zone distribution cabling systems to AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz), and AS 11801.3 (2019) clause 6.3.2.

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.3 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.3 (2019) clauses 8.2, 9.2, 10 and 11.

Optical fibre cabling system: To AS 11801.3 (2019) clauses 6.3.3, 8.3, 9.3, 10 and 11.3.

System warranty: 15 years minimum.

Surge protection devices (SPD)

General: Provide surge protection devices to protect equipment in racks and cabinets to LOW VOLTAGE POWER SYSTEMS, **SURGE PROTECTION DEVICES (SPD)**.

7.2 STANDARDS**General**

Authorities: To the requirements of the Australian Communications and Media Authority (ACMA).

Cabling products: To AS/CA S008 (2020) and the AS 11801 series.

Communications cable systems: To AS/CA S009 (2020), the AS 11801 series, AS/NZS 3084 (2017) and AS/NZS 14763.2 (2020).

Communications cable systems for small office/home office: To AS/CA S009 (2020), the AS 11801 series and AS/NZS 14763.2 (2020).

Cable management and documentation: To AS/NZS 14763.2 (2020) and AS 3085.1 (2022).

7.3 NETWORK CONNECTION**External network**

Requirement: Liaise with each external communications carrier and determine the services and site access requirements for each network carrier's connection.

7.4 BUILDING ENTRANCE FACILITIES**Campus distributor (CD)**

Standard: To AS/NZS 3084 (2017), AS 11801.1 (2019), AS 11801.2 (2019) and AS/NZS 14763.2 (2020).

Network termination device

Requirement: Provide network termination device for the termination of external carrier cables and facilities. Provide separate frames as required for each external communications' carrier and for copper and optical fibre cables.

Degree of protection for external BD/CDs: To AS 60529 (2004).

7.5 DISTRIBUTORS

General

Requirement: Provide the Building Distributors (BD) and Floor Distributors (FD) for voice and data to AS 11801.1 (2019), AS/NZS 14763.2 (2020) and as documented for the termination of campus and building backbone cable systems and the horizontal cable distribution systems.

Equipment requirements: Provide cable termination racks, patch panels, equipment mounting racks for servers and routers complete with power outlets.

Copper cable termination distributors

General: Provide termination frames for the termination of copper horizontal cable services to the manufacturer's recommendations.

Certification: Provide vendor certification (including the warranty period) for the integrated voice/data copper cabling systems.

Equipment racks

Dimension and type: Conform to the following:

- Equipment racks: 19 inch wide industrial type, or 600 mm or 800 mm wide RUs:
 - . ≤ 18 RU: Wall mounted, 600 mm depth.
 - . > 18 RU: Floor mounted, 800 mm or 1000 mm depth.
- Patch panels – Copper CAT 6A cables: 800 mm wide and 800 mm deep.
- Patch panels – Optical fibre cables: 800 mm wide and 800 mm deep.
- Server racks: 600 mm wide and 1000 mm deep.

Access location: Front, sides or rear.

Cable tray: Locate within outer cabinet void. Document any required alternative in the quality plan.

Doors: Provide lockable doors with infill material suitable to provide airflow capability to suit environmental and security considerations.

Power provision: Minimum 1 socket outlet for every 3 rack units on vertical rail. Make sure socket numbers suit the required power rating. Fit socket outlets with captive rings to retain captive plugs.

Cable management: Provide as follows:

- 1 module for every 2 patch panels.
- 1 module for each fibre termination panel.
- Locate vertically, on both sides of the panel.

Provisions for active equipment: 25% minimum, 1 fixed shelf for every 4 RU of active equipment space.

Ventilation: Fan assisted.

Earthing: CES earth bar required.

Fixing: Conform to the following:

- Floor mounted: Firmly fix to floor, bolt together multiple racks using standard kit accessories.
- Floor/Wall mounted: Firmly fix to floor and wall.

Cross connect patch panels (copper cables)

General: Provide cross connect patch panels.

Terminations: Terminate directly to the modular connector.

Fixed terminations:

- Rear terminals: To manufacturer's recommendations.
- Front terminals: Connect to RJ45 modular connector.

Patch cords: Terminate cord ends with appropriate registered jacks.

Optical fibre termination panels

Requirement: Provide rack mounted termination frames for the termination of optical fibre backbone and horizontal cable services.

Certification: Provide vendor certification, including the warranty period, for the optical fibre cabling systems.

Break out trays: Provide fibre optic cable break out trays at each group of fibre optic cable terminations.

Loom cables: Neatly loom cables and lay stripped cables into the break out tray.

Secure cables: Make sure that cables are secured by the sheath and that there is no stress on the fibre optic cores.

Cross connect patch panels (optical fibre cables)

Requirement: Provide optical fibre cross connect patch panels for both single and multicore optical fibre cables.

Cable management

Record book: To AS/NZS 14763.2 (2020) Section 9.

Location: Document in the quality plan.

Identification, labelling, and record documentation: To AS/NZS 14763.2 (2020) Section 9 and AS 3085.1 (2022).

7.6 CABLES

Copper

Standard: To AS/CA S008 (2020), AS/CA S009 (2020), the AS 11801 series and AS/NZS 14763.2 (2020).

Campus and building voice backbone cables: Cable as documented or to suit the voice outlet density at each building or floor distributor, with 30% spare capacity allowance.

Horizontal cabling voice and data: CAT 6A F/UTP cabling to each floor outlet.

Balanced system cables: Unshielded or shielded twisted pairs, as documented.

Cable end length: Sufficient cable slack to move within the rack.

Optical fibre

Standard: To AS 11801.1 (2019).

Campus and building backbone cables:

- Default multimode type: 6 core multi-mode OM4 50/125 µm.
- Default single mode type: Single core OS1 internal and OS2 external and underground.

Length: Provide not less than 1000 mm spare at each end.

Component type: LC.

Safe practices: To AS/NZS 2967 (2014).

External and underground

Standard: Water penetration resistance and UV stabilisation to AS/CA S008 (2020).

7.7 TELECOMMUNICATIONS OUTLETS

General

Outlets: Provide RJ45 8 way modular jacks, mounted on faceplate. Provide for up to three modular voice or data outlets on the each faceplate. Make sure unused socket positions are filled with blank inserts. Arrange the modular sockets with the locking latch in the bottom position, i.e. pins at the top.

Colour: Electric white or as documented.

Standard: To AS/CA S008 (2020).

Horizontal cabling termination: Terminate cabling to the rear of the outlet modular jack to manufacturers' instructions. Arrange cable pairs at each jack conforming to AS 11801.1 (2019) Figure 9.

Pinouts: T568A to AS 11801.1 (2019) and AS 11801.2 (2019).

7.8 FLY LEADS

General

Type: Flexible. Minimum 26 AWG.

Length: 1500 mm.

Quantity: Provide fly leads to 50% of outlets installed.

7.9 PATCH CORDS

General

Type: Flexible. CAT 6A U/FTP. Minimum 26 AWG.

Length: 1000 mm.

Quantity: 100% of outlets installed.

Termination: Registered jacks.

7.10 WIRELESS ACCESS POINT (WAP)

General

Requirement: Provide WAPs as required, cabled to patch panels in the nearest FD.

Compatibility: ISO/IEC/IEEE 8802-11 (2022), IEEE 802.3 (2022) and IEEE 802.11 (2020).

LAN port: Minimum 2.5 GB.

Modes: Wireless access point, point-to-point bridge, point-to-multi-point wireless bridge, wireless client and wireless repeater.

Power over ethernet: Required.

Location: Install in ceiling voids distributed around the site buildings. Determine the number and location by a site survey using the wireless network to confirm full site coverage.

7.11 ENGINEERING SERVICES

General

Requirement: Provide cabling systems, as required.

7.12 ACTIVE COMPUTER HARDWARE

Computer hardware

General: Provide the computer hardware required for the operation and management of the building IT systems and as documented.

Network hub/switch

Type: Managed Gigabit ethernet Layer 2.

Interface: Web.

RS232 port: Required.

Quality of service: Implementation required to IEEE 802.1Q (2022).

Power over ethernet: Required.

VLAN: IEEE 802.19.1 (2018).

Security: IEEE 802.1X (2020) RADIUS protocol.

Mounting: Rack mounting.

Network router

Type: Gigabit ethernet.

Functions: Static IP, dynamic IP, integrated DHCP, PPPoE, and device name support.

Mounting: Rack mounting.

Backup/archive facilities

Type: Tape.

Mounting: Rack mounting.

Printers

General: As documented.

Voice telecommunication equipment

General: As documented.

Voice telecommunications equipment includes:

- Voice over Internet Protocol (VoIP) systems.
- Telephone handsets.

WAN interfaces

General: Provide WAN interface equipment for the operation and management of the WAN site and Building IT system interface as documented.

7.13 SOFTWARE

General

Requirement: Provide the software required for the operation and management of the building IT systems and equipment including the following:

- All passwords, access codes and other means used to limit or control access to, or modification (including extension) of, the software.
- All software and manuals necessary to modify or extend the software.
- Backup copies of software in electronic format.
- Installation of all software updates issued before the end of the defects liability period.

Compatibility: Provide software systems that are planned to have upgrades backward compatible, so that each upgrade does not require user input or changes to base data or to the site specific installation.

Licence: Provide fully licensed versions of all software and licenses for all users defined in the documents.

OSI model: Provide software that operates on the OSI model.

System software

General: Provide system software.

Application software

General: Provide the software required for the operation and management of building services systems and equipment including the following:

- Absolute right, and all necessary facilities, for the principal to modify extend or reduce any or all functions, hardware and software that form part of the system.
- Full listings of all software supplied that has been developed, modified or adapted to meet the requirements of this project.

Function: Provide software that delivers accurate and reliable results.

Modular construction: Provide software constructed in modules to assist maintenance and to reduce the delays in execution.

Pre-delivery tests

General: Verify that the software has been assembled and tested for operational performance before installation on site.

High level interface test: If a high level interface to other systems is required, test and verify software performance with the documented systems before installation on site.

7.14 INSTALLATION - GENERAL

Installation

Standard: To the AS 11801 series, AS/NZS 3084 (2017), AS/CA S008 (2020), AS/CA S009 (2020) and AS/NZS 14763.2 (2020).

Precedence: AS/NZS 14763.2 (2020) takes precedence over AS/NZS 3084 (2017).

Issues can include space requirements and remote powering demands for cable power loadings, bundle temperature rise and heat dissipation methods.

7.15 CABLE INSTALLATION

Installation

Requirement: To the manufacturers' recommendations.

Crossover: Install cables neatly.

Loom size: Loom cables into groups not exceeding 24 cables, as documented and to the quality plan. Hold looms in place using reusable cable ties at least 20 mm wide. Do not exert compressive force on the cables when installing cable straps.

Cable separation

Separation for safety: To AS/CA S009 (2020).

Separation for performance: To AS/NZS 14763.2 (2020).

Fluorescent luminaires: Maintain a clearance of more than 300 mm.

External cabling

Requirement: To CA C524 (2013).

7.16 TELECOMMUNICATIONS OUTLET INSTALLATION**Installation**

Horizontal cabling termination: Terminate cabling to the rear of the outlet modular jack to manufacturer's recommendations. Arrange cable pairs at each jack conforming to AS 11801.1 (2019) Figure 9.

7.17 EARTHING SYSTEM**General**

Standard: To AS/CA S009 (2020) Section 20.

Communication earth system (CES)

Requirement: Provide a communications earth terminal (CET) adjacent to each communications room electrical switchboard. Connect the CET to the local protective earth (PE) system at the local switchboard.

Distributor: Provide an earth bar within each distributor or rack and connect to the local CET.

Interconnections: Verify that there are no interconnections between the lightning protective earthing system and the telecommunications earthing system.

7.18 TESTING**General**

Requirement: Carry out 100% permanent link tests to AS/NZS 14763.2 (2020).

Cable testing

Telecommunications cabling installation copper cables: To IEC 61935-1 (2019), IEC 61935-2 (2022) and AS/NZS 14763.2 (2020).

Telecommunications cabling installation fibre optic cables: To AS/NZS 14763.3 (2017).

Balanced cabling

Standard: To AS/NZS 14763.2 (2020) clause 6.3.1 and Table 2. Include the following for permanent link testing:

- Basic verification:
 - . Wire map.
 - . Length.
 - . Continuity.
- Internal transmission:
 - . Return loss.
 - . Insertion loss.
 - . Pair to pair NEXT.
 - . PS NEXT.
 - . Pair to pair ACR-N.
 - . PS ACR-N.
 - . Pair to pair ACR-F.
 - . PS ACR-F.
 - . DC loop resistance.
 - . DC resistance unbalance within a pair.
 - . DC resistance unbalance between pairs.
 - . Propagation delay.
 - . Delay skew.

Optical fibre cabling

Standard: To AS/NZS 14763.2 (2020) clause 6.3.2 and Table 4. Include the following for permanent link testing:

- Basic verification:
 - . Polarity.

- Basic test group:
 - . Attenuation.
 - . Propagation delay.
 - . Length.

7.19 COMMISSIONING

Software

Requirement: Commission to the manufacturer's recommendations.

Completion: Verify the functional and operational performance of the software before the date for practical completion.

Disaster recovery: Verify that the software recovers from disaster events without loss of data and without loss of reliability.

Reliability: Verify that the software system provides reliable reporting and results through alternative measurement methods.

8 TELEVISION DISTRIBUTION SYSTEMS

8.1 GENERAL

System components

Requirement: Provide a system suitable for the reception and distribution of analog and digital television, video, radio and sound signals.

Network connection: Arrange with the network operator(s) for the connection of their network. Conform to the network operators' requirements.

Designer: Network operator's Approved Design Partner.

Survey: Confirm location and height of Free-to-air (FTA) antenna by on-site measurements.

8.2 STANDARDS

General

Electromagnetic compatibility: To AS/NZS 1367 (2016) Section 3.

8.3 SYSTEM DESCRIPTION

System type

Type: As documented.

Performance requirements

General: To AS/NZS 1367 (2016).

Capacity: Provide the distribution system with the installed capacity to accommodate 30% additional outlets.

Signal sources

Free-to-air (FTA) antennae system: Provide FTA antennae system terminating at the premises cabling interface.

Satellite (SAT) antennae system: Provide SAT antennae system terminating at the premises cabling interface.

Network operator: Provide for the connection of the network operator's system terminating at the premises cabling interface.

Local signal source: Provide television input sockets at the premises cabling headend for the distribution of in-house television channels on separate channels of the network.

Service entry

General: Provide service entry facilities to suit signal sources, headend equipment and distribution systems.

Headend equipment

General: Provide headend equipment to suit signal sources, distribution systems and documented performance.

Surge protection devices (SPD)

General: Provide surge protection devices to protect final equipment in racks and cabinets to LOW VOLTAGE POWER SYSTEMS, **SURGE PROTECTION DEVICES (SPD)**.

Distribution system

General: Provide a cabling distribution network from the headend equipment to each network distribution tap.

FTA distribution taps: Provide FTA distribution taps.

Satellite distribution taps: Where satellite system signals cannot connect to the FTA distribution system, provide individual distribution taps. Co-locate the taps with the FTA taps in groups to facilitate selected connection or changes to outlet feeders.

Network distribution taps: For systems designed for more than one network operator, provide individual distribution taps for each network operator. Co-locate the taps with FTA taps in groups to facilitate selected connection or changes to outlet feeders.

Location: Group all equipment as required.

Outlets

General: Provide outlets and feeders from distribution tap(s).

Quantity: Provide separate sockets for each source and service.

8.4 COMMISSIONING**General**

Standard: To AS/NZS 1367 (2016) Section 9.

Requirement: Commission to the manufacturer's recommendations. Record the results of all tests.

Extent: Test 100% of the system to demonstrate compliance with all documented requirements.

Setup: Use locally generated test signals to provide static conditions for level measurements.

Carrier-to-noise measurements: Required.

9 EMERGENCY EVACUATION LIGHTING

9.1 SINGLE POINT SYSTEM LUMINAIRES**General**

Requirement: Provide single point luminaires complete with lamps, luminaire control equipment, lighting control equipment, batteries and accessories. Provide lamps of the same type from the same brand and country of manufacture.

Visual indicator lights: Provide a red indicator, readily visible when the luminaire is in its operating location, which indicates that the battery is being charged.

Inverter system: Provide protection of the inverter system against damage in the event of failure, removal or replacement of the lamp, while in normal operation.

Local test switches: Provide a momentary action test switch, accessible from below the ceiling, on each luminaire to temporarily disconnect the mains supply and connect the battery to the lamp.

Common test switches: Provide a common test switch on the local distribution board that disconnects main supply to the luminaires and tests for discharge performance and automatically reverts to normal operating mode after testing.

Monitored system

Data connection: Provide internal monitoring facilities and provision for the connection of data cabling to a central monitoring computer.

Batteries

Type: Lead-acid or nickel-cadmium batteries capable of operating each lamp at its rated output continuously for at least 2 hours during commissioning tests and 1.5 hours during subsequent tests.

Battery life: At least 5 years when operating under normal conditions at an ambient temperature of between 10°C and 40°C and subject to charging and discharging at 6 monthly intervals.

Marking: Indelibly mark each battery with its date of manufacture.

9.2 SINGLE POINT SYSTEM

Power supply

General: Provide an unswitched active supply to each luminaire and exit sign, originating from the test switch control panel.

Data monitoring

General: If a monitoring system is documented, provide a data cable system from each single point luminaire and connect to the monitoring computer.

9.3 PRE-COMMISSIONING

Mains supply

General: Before commissioning, make sure mains supply has been continuously connected for at least 24 hours.

9.4 COMMISSIONING

General

Standard: To AS/NZS 2293.1 (2018).

Requirement: Carry out tests, including out-of-hours tests, to demonstrate the emergency and evacuation system's performance, to the manufacturer's recommendations and as follows:

- Test components for correct function and operation.
- Demonstrate illumination performance on site, to at least the level stated in the manufacturer's recommendations for performance for that device.
- Test operation of battery discharge test and control test switch functions, including discharge and restoration.
- Demonstrate system functions under mains fail condition.
- Demonstrate operation of the battery and charger including a full discharge/recharge over the designated time.

10 ELECTRONIC SECURITY AND ACCESS CONTROL

10.1 GENERAL

System components

Requirement: Provide the following components:

- Access control system.
- Intruder detection system.
- Closed circuit television system.
- Intercom system.
- Remote monitoring system.

Security classification: As documented.

System communications: As documented.

10.2 STANDARDS

Communication between network clients and devices

Procedures: To AS/NZS IEC 60839.11.31 (2020).

Intruder alarm systems

General: To AS/NZS 2201.1 (2007).

Alarm transmission system: To AS/NZS 2201.5 (2008).

Internal detection devices: To AS 2201.3 (1991).

Wireless systems: To AS 2201.4 (1990).

CCTV systems

General: To AS/NZS 62676.4 (2020).

Remote monitored systems: To AS/NZS 62676.1.2 (2020).

10.3 SECURITY SYSTEMS

Alarm system panels or processors

Capacity: Provide separate sectors for each nominated internal zone, and for normally-closed and normally-open perimeter zones.

Sector time delay: Provide adjustable entry/exit time delay for each sector, with adjustment range 0 to 30 s.

Batteries and chargers:

- Sealed battery: Provide a sealed battery and charger system contained within each control panel with capacity to meet the performance required.

Uninterruptible power supply

General: Provide a dedicated uninterruptible power supply and connect to the security systems.

Capacity: At least 15 minutes, for the complete system in normal operation.

Activation devices

Activation devices: Provide keypads, cards, card readers and other activation devices for access control and intruder alarm systems.

External: Provide weatherproof (IP56) hoods or housings for external units.

Default mounting height: 1100 mm from floor level.

External audible and visual alarms

General: Provide a corrosion-resistant weatherproof metal enclosures containing sirens and blue strobe lights. Fix in locations not readily accessible without a ladder.

Anti-tamper devices

Requirement: Provide anti-tamper devices to control panels, external equipment, control and activating devices, and access control devices.

Function: To register an instantaneous alarm if covers are removed or vital wiring is disconnected.

Remote monitoring

Monitoring system: Provide a monitoring system in the alarm panel or processor for transmission of alarms and monitoring of the system by parties responsible for attending to alarms.

10.4 ACCESS CONTROL

Access control processors or panels

Capacity: Provide separate entry/exit control modules for each designated access point.

Users: Program the system to match the number of authorised users with unique access codes.

Time zones: At least 4 per day, with provision for weekends and public holidays.

Vehicle control

Vehicle access control: Provide vehicle access control system combining connection to vehicular doors and boom gates, and interconnection to the main access control system.

Exit loop detection: Provide a buried loop detection system adjacent to the exit point to activate boom gates or vehicular doors on approach by a vehicle. Connect so that doors or gates close after a pre-set time.

Interlock: Provide a photoelectric beam safety interlock.

Interlock function: To prevent door or gate from closing until the vehicle has cleared the exit point.

Entry access equipment: Provide direct wall-mounted push-buttons or readers, or provide a robust mounting bollard and extension arm.

- Mounting height: 1000 mm from floor level.

Reed switches: Provide heavy duty reed switches on both sides of vehicle doors to generate a door closed indication at the control panel, where documented.

Intercom

Base station: Provide intercom base station, interconnected with the individual local stations. Include speakers and microphones.

Entry station construction: Wall mounted flush stainless steel panel.

Weatherproofing: IP56.

Dial: Digital push-button type.

Schedule: Provide a weatherproof (IP56) schedule holder and card identifying individual local stations. Locate next to the base station intercom panel.

Local station: Provide wall mounted intercom local stations, interconnected with the base stations and external entry points.

Internal station type: Surface mounted, removable handset type.

Operation: Provide an audible tone device to indicate that the individual station is being called, and a press-to-talk switch so that the entry station can communicate with the internal station only when the switch is held down.

Door control: Provide integral momentary action door release switches to operate the door release or opening mechanisms at each external entry point.

10.5 SITE VIDEO MONITORING

CCTV system

General: Provide a closed circuit television system monitoring and recording the areas/spaces as required.

CCTV cameras

Selection: Provide cameras that allow coverage of designated areas and to allow persons within the field of view to be readily distinguishable on monitors under all ambient night and day lighting conditions.

Motorised cameras: Provide camera drives that allow remote control of camera rotation and tilt, and of lens focal length.

External cameras: Provide corrosion-resistant weatherproof housings for cameras located externally that allow cameras to perform to manufacturer's recommendations.

Fixing: Provide mounting brackets and hardware that rigidly fix cameras, monitors and accessories to buildings or structures.

CCTV monitors

General: Provide LCD colour monitors compatible with the security system, and provide fixing brackets and hardware for wall-mounted and ceiling-mounted monitors.

CCTV recording system

General: Provide CCTV recording hardware and software systems that store data from each camera in an industry standard compressed digital format.

Functionality: Provide the following:

- Index according to events.
- Fast search.
- Frame by frame search.
- Frame printing.
- Zoom and pan within a recorded frame.
- Back up daily to off-site storage.

Minimum data storage (days): [complete/delete]

CCTV video switching system

General: Provide switching software that allow cameras to be directed to specific monitors or for cameras to be scanned sequentially at predetermined intervals to a specific monitor and which, on receipt of an alarm signal, interrupts the scanning sequence and switches to the relevant security zones.

10.6 EQUIPMENT POWER SUPPLY

Mains supplies

Permanent power supply: Provide permanent power supply to the following:

- Intruder alarm panels and access control panels including sub panels.
- Electric door strike local panels or control equipment.
- Intercom stations.
- CCTV monitors and cameras.

Marking: Label the switchboard circuit breaker from which power for the security systems is obtained as follows:

- SECURITY SYSTEM - Do not switch off.

Interconnection to other services

General: Provide functions and equipment to allow the interconnection to other systems. Provide and connect wiring to the designated services.

Lifts: Arrange for installation and connection of lift readers and associated equipment.

10.7 COMMISSIONING

General

Requirement: Commission to AS/NZS 2201.1 (2007) and the manufacturer's recommendations.

11 SELECTIONS

11.1 LOW VOLTAGE POWER SYSTEMS

Accessory schedule

	A	B	C
Manufacturer	Refer Engineering Solutions Tasmania's drawings and specification.		
Product series			

11.2 LIGHTING

Lighting types and illumination levels schedule

	A	B	C
Area description	Refer Engineering Solutions Tasmania's drawings and specification.		
Proposed usage			
Lighting type			

11.3 TELEVISION DISTRIBUTION SYSTEMS

System type schedule

	A	B	C
Services required	Refer Engineering Solutions Tasmania's drawings and specification.		
Systems			

11.4 ELECTRONIC SECURITY

System description schedule

	A	B	C
Security classification	Refer Engineering Solutions		

	A	B	C
	Tasmania's drawings and specification.		
System communications			

1002 FIRE SERVICES DESIGN AND INSTALL
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1 FIRE SERVICES SYSTEMS**1.1 RESPONSIBILITIES****General**

Requirement: Design systems and provide fire services, as documented.

Refer Engineering Solutions Tasmania's drawings and specification.

1.2 DESIGN**General**

Requirement: To **DESIGN** in *0171 General requirements*.

Design criteria: Not less than the PCA (2022).

Designer qualifications

Designer qualifications: Use only appropriately experienced and qualified persons to undertake design work. If requested, provide documents verifying the qualification and experience. Conform to **DESIGNER** in *0171 General requirements*.

Design for durability and maintainability

Design for durability: Develop the design so the systems achieve the documented performance, reliability, service life, energy efficiency and safety requirements, and are easily maintainable.

Access for maintenance: Develop the design so the systems conform to **ACCESS FOR MAINTENANCE** in *0171 General requirements*.

Operating environment

Requirement: Provide equipment suitable for the environment in which it operates.

Seismic restraint

Requirement: To **SEISMIC RESTRAINT OF NON-STRUCTURAL COMPONENTS** in *0171 General requirements*.

Fire services system design

Requirement: Provide engineering design that:

- Maximises the functionality, performance, safety, flexibility and reliability of the fire services.
- Is technically sound.
- Can be constructed using methods that are good practice and in common use.
- That provide the lowest combined owning and operating cost over the design life of the systems.

Fire extinguishers and blankets: To *0573 Fire extinguishers and blankets*.

Electrical systems:

- Electrical design: To AS/NZS 3000 (2018).
- Selection of cables: To AS/NZS 3008.1.1 (2017).
- Fire-resisting protection: Provide for switchboards and associated electrical conductors to BCA (2022) C3D14.

Authority submissions: Make submissions, including notices, to authorities relating to the works.

Design life

General: To *0171 General requirements*.

Design life: All components and systems: 25 years.

Fire separation

Requirement: As documented.

1.3 CROSS REFERENCES**General**

Requirement: Conform to the following:

- *0171 General requirements*.
- *0223 Service trenching*.

- 0573 Fire extinguishers and blankets.

1.4 STANDARDS

Hydraulic fire services

Plumbing and water supply: To AS/NZS 3500.1 (2021).

Sprinklers: To AS 2118.1 (2017).

Hydrants: To AS 2419.1 (2021).

Hose reels: To AS/NZS 1221 (1997) and AS 2441 (2005).

Combined wet fire suppression systems: To AS 2118.6 (2012).

Tanks for fire protection systems: To AS 2304 (2019).

Pumps for fire services: To AS 2941 (2013).

Electrical fire services

Requirement: To AS/NZS 3000 (2018), unless otherwise documented.

Fire detection and alarms: To AS 1670.1 (2018), AS 1670.5 (2016), AS 4428.16 (2020), AS 7240.2 (2018), AS 7240.4 (2018) and AS 7240.13 (2021).

Emergency warning and intercommunication: To AS 1428.5 (2021), AS 1670.4 (2018), AS 1670.5 (2016), AS 4428.4 (2016), AS 4428.16 (2020), AS ISO 7240.24 (2018) and AS 60849 (2004).

Wiring fire and mechanical performance classification: To AS/NZS 3013 (2005).

Degrees of protection (IP code): To AS 60529 (2004).

Electromagnetic compatibility (EMC): To the AS/NZS 61000 series.

Communications systems: To AS/CA S008 (2020), AS/CA S009 (2020), AS 11801.1 (2019) and AS/NZS 14763.2 (2020).

1.5 SUBMISSIONS

General

Requirement: Conform to 0171 General requirements.

Authority approvals

Authority submissions: Submit evidence of approval from authorities relating to the works.

Baseline data

Requirement: Submit baseline data to **BASELINE DATA** in 0171 General requirements.

Certification

Completion: Submit certificate as verification that the design and installation conforms to all contractual and statutory requirements.

Design documentation

Hydrants: Submit the following:

- Hydraulic calculations: Submit hydraulic calculations of the hydrant systems to AS 2419.1 (2021).
- Calculation method: Use commercially available software written and validated to conform to AS 2419.1 (2021).
- Drawings: Based on the calculations, submit drawings showing the most hydraulically advantaged and disadvantaged hydrants to AS 2419.1 (2021).

Sprinklers: Submit the following:

- Hydraulic calculations: Submit hydraulic calculations of the sprinkler systems to AS 2118.1 (2017) Section 14.
- Calculation method: Use commercially available software written and validated to conform to AS 2118.1 (2017).
- Drawings: Based on the calculations, submit drawings showing the most favourable and unfavourable areas to AS 2118.1 (2017).

Operation and maintenance manuals

Requirement: Conform to **OPERATION AND MAINTENANCE MANUALS** in 0171 General requirements.

Products and materials

Data: Submit technical data for all items of plant and equipment, including the following:

- Assumptions.
- Calculations.
- Model name, designation and number.
- Capacity of all system elements.
- Country of origin and manufacture.
- Materials used in the construction.
- Size, including required clearances for installation.
- Certification of compliance with the applicable code or standard.
- Technical data schedules corresponding to the equipment schedules in the contract documents. If there is a discrepancy between the two, substantiate the change.
- Manufacturers' technical literature.

Samples

General: Submit samples of accessories not documented as proprietary items, including the following:

- Sprinkler heads.
- Valves and flow switches.
- Fire brigade booster valve.
- Fire hydrant valve.
- Vandal resistant canister enclosures.
- Detectors.
- Manual call points.
- Alarm bells.
- Magnetic door holders.
- Visual alarm devices.
- Speakers.
- Warden intercommunication point handsets.
- Emergency call points.

Drawings

Requirement: Submit drawings at minimum 1:100 scale, showing the following:

- Pipework and equipment layout and sections showing the work to be installed on the level that the services are installed. Do not submit glass floor drawings.
- Riser layouts and sections.
- Piping and other schematic drawings including numbering of each valve to correspond to valve tags notation.
- Inclusions: Include the following on the drawings:
 - . Hydraulic fire systems: System block plans and system schematics showing water supplies, pumps, booster connections and other arrangements including provisions to meet statutory requirements.
 - . For combined systems: Hydrant and sprinkler pipework internal layout including fire hydrant, hose reel and sprinkler pipe risers, supply and return from intake valves or plant rooms to relevant floor take-offs, associated isolation valves for fire sprinklers, hydrants and hose reels.
 - . Sprinkler valve rooms layouts including risers, supply and return from intake valves or plant rooms to relevant floor take-offs and associated isolation valves for fire water, and fire sprinkler control valves, isolation valves and drain down points, including water capture and recycling.
 - . Fire pump details, layout and schematics.
 - . Detection and alarm systems: System block plans.
 - . Baseline data to **Baseline data**.
 - . Fire systems control matrix.
 - . EWIS layouts and details.
 - . Controls system single line diagrams.
 - . Details of control panels including indicating equipment, control and power diagrams.

- . Location, type, grade and finish of piping, fittings, valves and pipe supports. Include scaled sections and elevations.
- . Provision of a temporary fire hydrant service in the construction period.
- . Provision of site treatment and fire vehicle parking as required adjacent to the fire hydrant booster inlet valve.
- . Tank stands and supporting structures.
- . Penetrations and associated building work. If penetrations are through external walls, detail flashing and weatherproofing at 1:10 scale.
- . Fire hose reel and extinguisher layout including hose reel coverage.
- . Fire hydrant site plan for the entire site including hydrant coverage.
- . Fire fan control schematics and layouts.
- . Location of detector system components.
- . Circuit identification.
- . Labelling details.

Subcontractors

General: Submit names, contact details, licence numbers and type of licence of proposed suppliers and installers.

1.6 PRODUCTS

Bushfire-prone areas

Site with Bushfire Attack Level (BAL) 12.5, 19, 29, 40 or FZ to AS 3959 (2018): If external and above ground, provide metal pipes and fittings to AS 3959 (2018).

1.7 WORK ON EXISTING SYSTEMS

Demolition

General: Decommission, isolate, demolish and remove from the site all existing redundant equipment including minor associated components that become redundant as a result of the demolition.

Breaking down: Disassemble or cut up equipment where necessary to allow removal.

Recovered materials: Recover all components associated with the listed items. Minimise damage during removal and deliver to the locations documented.

Existing fire systems

Condition of existing systems:

- If the existing condition does not conform to the requirements in the contract documents, submit proposals to rectify the deficiencies with related costing, time and other impacts.
- Subject to the rectification works on existing systems, achieve the performance in the contract documents.

1.8 INSTALLATION

Pipe support

Requirement: To **SERVICES INSTALLATION, Pipe support systems** in *0171 General requirements*.

1.9 COMMISSIONING

General

Requirement: Provide commissioning as documented. Conform to *0171 General requirements* and SA TS 5342 (2021).

2 HYDRANTS

2.1 PIPING

General

Piping material: To AS 2419.1 (2021).

2.2 VALVES

General

Valves: To AS 2419.1 (2021).

Isolating valves

Below-ground metal seated isolating valves: To AS/NZS 2638.1 (2011).

Below-ground resilient seated isolating valves: To AS/NZS 2638.2 (2011).

Pressure reducing valve stations

Requirement: If required by AS 2419.1 (2021) to limit system pressure, provide pressure reducing valves to AS 4118.1.8 (1999). Provide isolating valves, pressure gauges and pressure tappings on each side of each pressure reducing valve.

2.3 FIRE HYDRANTS

General

Upstand assemblies: DN 100 hot-dip galvanized steel.

Internal hydrants: Single headed.

External hydrants: Double headed.

Fire hydrant valves

Standard: To AS 2419.2 (2009).

Requirement: Provide fire hydrant valves, as follows:

- To the requirements of the local fire brigade.
- Copper alloy construction.
- Matching non-ferrous dust cap and non-ferrous chain.

2.4 FIRE BRIGADE BOOSTER ASSEMBLY

General

Requirement: Provide a fire brigade booster assembly to AS 2419.1 (2021) Section 7 and AS 2419.3 (2012).

Type: Provide a proprietary booster fitting with a cast bronze body, DN 65 inlets suitable for quick connect couplings, back pressure valves, pressure gauge, drain valve and main stop valve.

Backflow prevention: Required.

Number of booster valves: ≥ 2 .

Storz fittings: To AS 2419.4 (2021).

Signage and block plan: To AS 2419.1 (2021).

Location: House the fire brigade booster assembly in a cabinet or cupboard located to AS 2419.1 (2021), as documented.

Cabinet

General: Form from machine-folded sheet metal with returns on free edges.

Material: Metallic-coated sheet steel minimum 1.6 mm thick.

Finish: Full gloss, solvent-borne, interior and exterior or an equivalent factory-applied coating system.

Doors: Provide doors with locks and signage to AS 2419.1 (2021) Sections 7 and 11.

External cabinets degree of protection: \geq IP44.

2.5 BLOCK PLAN

General

Requirement: Provide a block plan to AS 2419.1 (2021) clause 11.5.

Construction: Minimum A3 size, photo reproduced on 1.6 mm thick aluminium, with black line work and an aluminium frame.

2.6 WATER SUPPLY

General

Supply: Provide water supply, as documented.

Backflow prevention: Provide backflow prevention to AS/NZS 3500.1 (2021) Section 4.

Service trenches: To 0223 *Service trenching*.

2.7 INSTALLATION

General

System: To AS 2419.1 (2021).

Valves: Locate valves to permit satisfactory operation and maintenance.

Isolating valves: Provide isolating valves to AS 2419.1 (2021) clause 8.7.

Ring mains: To AS 2419.1 (2021) clause 8.6.

Pressure gauges: Provide pressure gauges at the hydraulically most disadvantaged fire hydrant in the installation and each pressure zone.

Proving test facilities

Requirement: Provide facilities to verify that the system flows and pressures meet AS 2419.1 (2021).

Flow sensor: Low loss pitot type averaging sensor, with 2 flared isolating valves for connection of pressure lines and stainless steel wetted parts.

Installation: Install to the manufacturer's recommendation for installation, connection and valving.

Provide manufacturers recommended straight lengths of pipe upstream and downstream of tapping point. Mount in the piping using an adaptor bushing and welding boss.

Performance:

- Accuracy: Within $\pm 1.5\%$ over the range of flow anticipated.
- Stability: Within $\pm 0.125\%$ over five years.
- Repeatability: $\pm 0.1\%$.

2.8 PRE-COMMISSIONING

General

Flush: Before testing, flush the piping system with clean water to AS 2419.1 (2021). Flush until the piping has been thoroughly cleaned out. Operate the system until all foreign matter has been removed.

Hydrostatic test: Test the piping system to AS 2419.1 (2021). Maintain the test pressure for the minimum time required to AS 2419.1 (2021) or longer if necessary to complete the inspection of the system under test.

2.9 COMMISSIONING

General

System: To AS 2419.1 (2021).

Manufacturer's recommendations: Commission to manufacturer's recommendations.

Baseline data

Requirement: Provide baseline data to AS 1851 (2012), AS 2419.1 (2021) and **BASELINE DATA** in 0171 *General requirements*.

3 HOSE REELS

3.1 FIRE HOSE REELS

General

Standard: To AS/NZS 1221 (1997).

Product certification: Required, to AS/NZS 1221 (1997) clause A3.

Certification provider: An organisation accredited by the Joint Accreditation System of Australia and New Zealand (JASANZ).

Type: Swivel hose guide.

Fire hose reel cabinets

Requirement: Provide fire hose reels in cabinets, as documented.

Construction: Form from machine-folded sheet metal with returns on free edges.

Material: Metallic-coated sheet steel minimum 1.6 mm thick.

Finish: Full gloss, solvent-borne, interior and exterior or an equivalent factory-applied coating system.

Doors: Provide doors with locks and signage to AS 2441 (2005).

External cabinets degree of protection: \geq IP44.

3.2 WATER SUPPLY

General

Supply: Provide water supply, as documented.

Backflow prevention: Provide backflow prevention to AS/NZS 3500.1 (2021) Section 4.

Service trenches: To 0223 *Service trenching*.

3.3 INSTALLATION

Fire hose reels

Standard: To AS 2441 (2005).

Protection from damage: To AS 2441 (2005).

Below-ground resilient seated isolating valve: To AS/NZS 2638.2 (2011).

3.4 PRE-COMMISSIONING

General

Flush: Before testing, flush the piping system with clean water. Flush until the piping has been thoroughly cleaned out. Operate the system until all foreign matter has been removed.

Hydrostatic test: Test the piping system. Maintain the test pressure for the time required to complete the inspection of the system under test.

3.5 COMMISSIONING

General

Standard: To AS 2441 (2005) clause 12.

Manufacturer's recommendations: Commission to manufacturer's recommendations.

Baseline data

Requirement: Provide baseline data to AS 1851 (2012) and **BASELINE DATA** in 0171 *General requirements*.

4 SPRINKLERS

4.1 STANDARDS

General

General requirements: To AS 2118.1 (2017).

Wall wetting sprinkler systems: To AS 2118.2 (2021).

Deluge system: To AS 2118.3 (2010).

Systems for Class 2 and 3 buildings with a rise in storeys of 4 or more and 25 m or less in effective height: To AS 2118.1 (2017) or AS 2118.4 (2012).

4.2 PIPING

Pipe

Wall thickness: Not less than AS 1074 (1989) Medium wall thickness.

Fittings

General: Wall thickness to match that of the pipe.

Screwed fittings: Heavy pattern, low carbon steel suitable for making screwed joints to AS ISO 7.1 (2008).

Welded pipe construction: Provide butt-weld flanges.

Pipe bends: To AS 4041 (2006).

Elbows:

- < DN 50: Screwed type.
- ≥ DN 50: Either welded or segmented roll-grooved type.

Tees:

- < DN 50: Screwed type.
- ≥ DN 50: Either welded or roll-grooved type.

Mechanical roll-grooved fittings: Provide only in accessible locations, in sprinkler-protected areas.

Flanges: To AS 2129 (2000).

Bolts for flanges: Carbon steel to AS 2129 (2000) Appendix C.

- Finish: Zinc-plated in non-corrosive environments; otherwise a protective finish with equivalent corrosion resistance to, and compatible with, the flange.

Thread sealing: Seal the threads of screwed connections with degreased PTFE tape or hemp with a thread sealing compound.

4.3 VALVES, ACCESSORIES AND ASSOCIATED ITEMS

General

Compatibility: Provide all valves, accessories and associated items of the same type to the same manufacturer and model. If extending an existing system, match the existing make and model, if available.

Valve sizes: To match the nominal size of the pipe in which they are installed.

Pressure rating: All components subject to hydrostatic test to be rated to a minimum of 2100 kPa.

Alarm valves

Type: Full way swing type.

Air bleed valves

General: Provide brass air bleed valves, suitable for connection to 12 mm hose fittings, at the high points of the sprinkler system.

Anti-freeze system

Requirement: If the space served operates below 4°C, provide an anti-freeze system using a non-toxic glycerine-based anti-freeze solution with a freezing point not less than 10°C below the lowest temperature within the area served.

Bell testing

General: Provide a proprietary bell testing system to simulate the flow of one sprinkler head using a pump or similar means.

Block plan

Requirement: Provide a block plan to AS 2118.1 (2017) clause 8.3 adjacent to each set or group of installation control assemblies. Include the following:

- Location of control valves and area of protection.
- Diagram of water supply system including the location of source of water supply and sizes of incoming main and isolating stop valves.
- A diagram of the control valve set up.
- Areas containing quick response sprinkler heads.
- Other details required by AS 2118.1 (2017).

Construction: Minimum A3 size, photo reproduced on 1.6 mm thick aluminium, with black line work and an aluminium frame.

Emergency instructions

Requirement: Provide emergency instructions to AS 2118.1 (2017) clause 8.5 at each control valve assembly. Include the name of the maintenance contractor and emergency contact details.

Location plate

Requirement: Provide a location plate on the outside of an external wall to AS 2118.1 (2017) clause 8.4.

Sprinkler control valve assembly - pre-action

Standard: To AS 4118.1.5 (1996).

Operation: Double interlocked to operate on a dual circuit smoke detector alarm from the protected area.

Inclusions: Provide all items required by AS 2118.1 (2017) and AS 4118.1.5 (1996).

Sprinkler control valve assembly - wet

Standard: To AS 4118.1.2 (1996).

Inclusions: Provide all items required by AS 2118.1 (2017) and AS 4118.1.2 (1996).

Sprinkler control valve enclosure

Requirements: Provide a control valve enclosure to AS 2118.1 (2017) Section 8 and BCA (2022) E1D4.

Test valves

Requirement: Provide local or remote valves, to AS 2118.1 (2017) clause 8.13.1, to test alarm devices.

4.4 FIRE BRIGADE BOOSTER ASSEMBLY

General

Requirement: Provide a fire brigade booster assembly to AS 2118.1 (2017) clause 4.14.

Type: Provide a proprietary booster fitting with a cast bronze body, DN 65 inlets suitable for quick connect couplings, back pressure valves, pressure gauge, drain valve and main stop valve.

Backflow prevention: Required.

Number of booster valves: ≥ 2 .

Storz fittings: To AS 2419.4 (2021).

Signage and block plan: To AS 2419.1 (2021).

Location: House the fire brigade booster assembly in a cabinet or cupboard located to AS 2419.1 (2021), as documented.

Cabinet

General: Form from machine-folded sheet metal with returns on free edges.

Material: Metallic-coated sheet steel minimum 1.6 mm thick.

Finish: Full gloss, solvent-borne, interior and exterior or an equivalent factory-applied coating system.

Doors: Provide doors with locks and signage to AS 2419.1 (2021) Sections 7 and 11.

External cabinets degree of protection: \geq IP44.

4.5 PUMPS

General

Requirement: To AS 2118.1 (2017).

4.6 SPRINKLER HEADS

General

Requirement: Provide sprinkler heads.

Type: Glass bulb type, quick response.

Ceiling mounted sprinkler heads: Semi-recessed.

Sprinkler heads in removable ceilings: Provide two-piece slip on or screwed on escutcheons.

Coordinate with architectural details and colours.

Protection: Provide a robust metallic-coated steel protective mesh cover to each sprinkler head in plantrooms, low height areas and other locations subject to potential damage.

Electrical and communications equipment: Provide deflector plates to sprinkler heads over switchgear, switchboards and communications equipment.

External and side wall quick response sprinklers: Provide, complete with heat collector constructed from corrosion-resistant material.

4.7 WALL WETTING SPRINKLER SYSTEM

General

Requirement: Provide wall wetting fire sprinkler systems to protect both internal and external areas of the building, as documented.

4.8 TANKS

General

Requirement: To AS 2118.1 (2017).

4.9 WATER SUPPLY

General

Standard: To AS/NZS 3500.1 (2021).

Supply: Provide water supply, as documented.

Town main: Extend water supply from the town main connection point to the backflow prevention and sprinkler booster arrangement. Continue to the sprinkler control valves, sprinkler pumps, water storage tanks and provide the necessary isolating valves and pipe connections.

Water meter: Provide a water meter, if required by the Network Utility Operator.

Backflow prevention: Provide backflow prevention to AS/NZS 3500.1 (2021) Section 4.

Service trenches: To 0223 *Service trenching*.

4.10 SPARES CABINET

General

Requirement: Provide a spares cabinet of size sufficient to contain the stock of spare sprinklers and spanners, with a lockable hinged door. Store each item separately on clips or in drawer compartments.

Required spares: For each type and temperature rating provide the following spare sprinkler heads:

- Light hazard system: ≥ 6 .
- Ordinary hazard system: ≥ 24 .
- High hazard system: ≥ 36 .

Construction

General: Form from machine-folded sheet metal with returns on free edges.

Material: Metallic-coated sheet steel minimum 1.6 mm thick.

Finish: Full gloss, solvent-borne, interior and exterior or an equivalent factory-applied coating system.

4.11 MARKING AND LABELLING

General

Requirement: Conform to **MARKING AND LABELLING** in 0171 *General requirements*.

Notice plate

General: Provide a notice plate containing condensed emergency instructions, legibly printed or engraved on durable material resistant to defacement, at least 3 mm thick or mounted on board at least 3 mm thick, permanently fixed in a convenient position at the control valves.

Orifice plates

General: Mark flanges next to an orifice plate to show the plate size and other details necessary for correct matching.

Valves

Requirement: Provide each valve with a name plate showing its use and TO OPEN and TO SHUT directions.

Flow measurement sensors

Marking: Provide a stamped tag showing normal, maximum and minimum flows, pipe size, serial number and related data.

Spares cabinet

General: Mark the spares cabinet with SPARE SPRINKLERS in letters at least 30 mm high.

Label

Requirement: Label all valves, pressure gauges, drain cocks, and other items requiring operation or inspection to 0171 *General requirements*.

4.12 PRE-COMMISSIONING

Site tests

Standard: To AS 2118.1 (2017).

Flush: Before testing, flush the piping systems with clean water to AS 2118.1 (2017) and AS 2419.1 (2021). Flush until the piping has been thoroughly cleaned out. Operate the systems until all foreign matter has been removed.

Hydrostatic test: Test the sprinkler system to AS 2118.1 (2017) and AS 2419.1 (2021). If necessary, to complete the inspection of the sprinkler system under test, maintain the test pressure beyond the designated period.

Air pressure test: Test dry pipe systems using compressed air, with pipe ends sealed and valves in the distribution system open. Maintain the test pressure for at least 30 min and make sure there are no leaks.

4.13 COMMISSIONING

General

Requirement: To AS 2118.1 (2017) including the recommendations of Appendix H, AS 2118.2 (2021), AS 2118.3 (2010) and AS 2118.4 (2012), as applicable.

Manufacturer's recommendations: Commission to manufacturer's recommendations.

Installer's completion certificates

General: Required before practical completion.

Water quality tests

Function: To demonstrate that the sprinkler system water is clean and free from foreign matter, including sand, sediments and other impurities.

Discharge test: Inspect water discharged from at least one of the flushing valves, for foreign matter.

Sprinkler head test: Remove at least 10% of the sprinkler heads, at designated locations, and inspect them for foreign matter lodged across the orifices of the heads.

Test failure: If foreign matter is observed in quantities likely to impair the functioning of the sprinkler system then:

- Drain the system.
- Open and clean the alarm valve and strainer.
- Recharge the system.

Water supply proving tests

General: Demonstrate that the water supply satisfies the pressure and flow requirements.

Pressure pumps

Requirement: Commission to the manufacturers' recommendations.

Minimum requirements: As a minimum, provide the following for each pump and pump set before the date for practical completion:

- Pump operation: Test for correct pump rotation and operation.
- Automatic changeover: Test changeover sequence under all operational combinations.
- Level controls: Operate pumps, measure levels and adjust if necessary.
- Safety controls: Simulate fault for each safety control.
- Alarms: Simulate alarm condition. Verify correct alarm raised.
- Motors: Measure motor current and adjust motor overloads to suit.
- Capacity: Demonstrate that pressure pumps have the designated capacity.
- Completion test: Provide a full operational test to verify compliance.
- Integrated system tests: Test pumps and pump sets as part of documented integrated system tests.

Test and recording equipment

Flow and pressure test and recording equipment: Conform to *0171 General requirements*.

Baseline data

Requirement: Provide baseline data to AS 1851 (2012), AS 2118.1 (2017) and **BASELINE DATA** in *0171 General requirements*.

5 FIRE DETECTION AND ALARMS

5.1 SYSTEM

General

System type: Addressable.

Interface: Emergency warning and intercommunications system.

5.2 CONTROL AND INDICATING EQUIPMENT

Standards

General: To AS ISO 7240.1 (2018) and AS 7240.2 (2018).

Alarm signalling equipment: To AS 4428.6 (2018).

Power supply units: To AS 7240.4 (2018).

Fire brigade panel: To AS 4428.3 (2020).

Wire-free alarm zone circuits: To AS ISO 7240.25 (2015).

Fire brigade panel

General: Provide metal cubicle-type enclosures at the Designated site entry point (DSEP), to AS 1670.1 (2018).

Fire detection control and indicating equipment (FDCIE) and mimic panels

General: Provide metal cubicle-type enclosures.

Isolation

Isolating facilities: Provide on FDCIE to allow testing without the transmission of alarm signals to the fire brigade.

Capacity

Spare zones: 50% minimum allowing for the addition of plug-in circuit cards.

5.3 DETECTORS

Type

Requirement: Provide detector type as follows:

- Areas generally: Optical beam smoke detectors mounted on plug-in bases.
- Hot areas: Fixed temperature integral heat detector/alarm unit type.

Standards

Smoke alarms: To BCA (2022) Spec 20.

Carbon monoxide (CO) fire detectors: To AS 7240.6 (2017).

Duct sampling units: To AS 1603.13 (2018) and AS 7240.22 (2018).

Heat detectors: To AS ISO 7240.5 (2018).

Point type smoke detectors: To AS 7240.7 (2018).

Integral heat detector/alarm units: To AS 1603.3 (2018).

Integral smoke detector/alarm units: To the NCC cited AS 3786 (2014).

Multi-sensor fire detectors: To AS 7240.15 (2018).

Multi-point aspirated smoke detectors: To AS 7240.20 (2012).

Optical beam smoke detectors: To AS 7240.12 (2018).

Visual warning devices: To AS 1603.11 (2018).

Warning equipment for people with hearing impairment: To AS 1603.17 (2020).

Self-indicating detectors

General: Provide a light-emitting diode mounted in a clearly visible position, which illuminates whenever detector operation causes an alarm condition to register on the FDCIE. Provide self-indicating devices that, if faulty, will not render the detector inoperative under fire conditions.

Mounting positions of light-emitting diodes: Conform to the following:

- Visible detectors: On the outside of the detector or its base.
- Detectors concealed above ceilings: On the underside of the ceiling immediately below the detector.
- Detectors in other concealed spaces: On a visible panel close to the entry to the concealed space housing the detector.

Installation

General: Install detectors so they can be easily inspected and tested in situ, and readily withdrawn from service.

Integral smoke detector/alarm units: To AS 1670.6 (2023).

5.4 MANUAL CALL POINTS

General

Standard: To AS ISO 7240.11 (2018).

Type: Flush mounted break glass type.

Mounting: Mounted 1350 mm above floor level.

5.5 EXTERNAL ALARM INDICATION

General

Requirement: Provide red flashing strobe visual warning device (VWD) to AS 1670.1 (2018) clause 3.8.

Standards

Bell circuits: To AS 7240.2 (2018).

Strobe lights: To AS 1603.11 (2018).

Power supply

To the strobe light and not more than 2 others: From the fire detection control and indicating equipment battery power supply.

To additional strobe lights: From the mains supply. Provide appropriate interface relays, operated by the fire detection control and indicating equipment.

5.6 MAGNETIC DOOR HOLDERS

General

Requirement: Provide electromagnetic door holders, if required.

Control facilities

Standard: To AS 1905.1 (2015) clause 2.1.4.3 and AS 1670.1 (2018) clause 3.19.

Signals: Ancillary control device circuits and connections for automatically controlling and releasing magnetic door holders to operate the relevant doors under fire alarm conditions.

5.7 AIR HANDLING SYSTEMS

Fire fan control panels (FFCP)

Standard: To AS 1668.1 (2015) and AS 1670.1 (2018).

Signals: Provide fire detection and alarm signals for the fire fan control panel (FFCP).

5.8 COMMISSIONING

General

Requirement: Conform to the recommendations of AS 1670.1 (2018) Appendix A.

6 EMERGENCY WARNING AND INTERCOMMUNICATION

6.1 SOUND SYSTEM

Loudspeakers

Standard: To AS ISO 7240.24 (2018).

Ceiling speakers: Requirements, as follows:

- 200 mm maximum diameter.
- 5 W minimum rated capacity.
- Minimum frequency response: 150 Hz to 10 kHz ± 3 dB.
- Minimum SPL: 89 dB at 1 m per watt at 1 kHz.
- Rated input voltage: 100 V.
- 1.25 W minimum tapping setting.
- To have grille, matching ceiling colour.

Horn speaker: Requirements, as follows:

- 200 mm maximum diameter at open end.
- 10 W minimum rated capacity.
- Minimum frequency response: 300 Hz to 10 kHz ± 3 dB.
- Minimum SPL: 100 dB at 1 m per watt at 1 kHz.
- Rated input voltage: 100 V.
- 5 W minimum tapping setting.

Mounting: Securely fix to building elements.

Flush mounting: Required in suspended ceilings.

Wall mounting: 150 mm below finished ceiling level to top of speaker enclosure.

6.2 INTERCOMMUNICATION SYSTEM

Warden intercommunication points (WIP)

Connection: Provide separate circuits for each WIP handset.

Conferencing switching facilities: Permit the initiation of conference calls, between up to 5 warden intercommunication points, from any emergency control panel.

Lift cars: Provide a terminal block outside the lift motor room. Cable from the terminal block to central control equipment. Provide a WIP handset in each emergency lift car.

6.3 COMMISSIONING

General

Standard: Conform the recommendations of AS 1670.4 (2018) Appendix A.

Manufacturer's recommendations: Commission to manufacturer's recommendations.

7 ELECTRICAL SYSTEMS

7.1 GENERAL

Supply system

Requirement: 400 V, 3-phase, 4-wire, 50 Hz, multiple earth neutral (MEN) system.

7.2 SURGE PROTECTION DEVICES (SPD)

General

Requirement: Provide all mode metal oxide varistor based series connected SPD to protect equipment in racks and cabinets, as required.

Standard: To AS 4262.1 (1995), AS 4262.2 (1999) and AS 1768 (2021).

Surge rating (I_{max}): 40 kA (8/20 μ s) phase to neutral and 100 kA neutral to earth.

Voltage protection level (U_p):

- < 600 V at 3 kA.
- 700 V at 500 A.

Visual indicator: Provide visual indication of SPD status.

Enclosure and installation: House SPD in an electrical switchboard or panel and protect with a suitable rated circuit breaker equal to or less than the load current rating of the SPD.

7.3 WIRING SYSTEMS

General

Requirement: Provide wiring and site cable reticulation systems appropriate to the installation conditions and the function of the load, as follows:

- Fire pumps and control systems: To AS/NZS 3000 (2018) Part 2 clauses 7.2.5.2.1 and 7.2.5.2.2.
- Other fire and smoke equipment: To AS/NZS 3000 (2018) Part 2 clauses 7.2.6, 7.2.7 and 7.2.8.

Include the following:

- Underground services.
- Above-ground services.
- In-building services.

Type: Re-wireable system.

Neutral conductors: Same size as the corresponding active conductors. Rate the neutral conductor size for the maximum harmonic currents.

7.4 POWER CABLES

Standards

Polymeric insulated cables:

- Generally: To AS/NZS 5000.1 (2005).
- For WS52W classification: To AS/NZS IEC 60331.1 (2021) and AS/NZS IEC 60331.2 (2021).

Aerial cables: Copper conductors to AS 1746 (1991).

Cable

Requirement: Select multi-stranded copper cables.

Default insulation: V-75.

Default sheathing: 4V-75.

Minimum size: Conform to the following:

- Lighting subcircuits: 1.5 mm².
- Power subcircuits: 2.5 mm².
- Submains: 6 mm².

Voltage drop: Select final subcircuit cables within the voltage drop parameters dictated by the route length and load.

Fault loop impedance: Provide final subcircuit cables to satisfy the requirements for automatic disconnection under short-circuit and earth fault/touch voltage conditions.

Colours

Conductor colours: For fixed wiring cables, provide coloured conductor insulation or at least 150 mm of close-fitting coloured sleeving at the termination points of each conductor.

Active conductors in single phase circuits: Red.

Active conductors in polyphase circuits:

- A phase: Red.
- B phase: White.
- C phase: Blue.

Neutral conductors: Black.

Earthing conductors: Green-yellow.

Sheath:

- General cable system: White.
- For fire alarm cables: Red.

Cable installation

Classifications: To AS/NZS 3013 (2005).

Straight-through joints: Unless unavoidable due to length or difficult installation conditions, run cables without intermediate straight-through joints.

Cable joints: Locate in accessible positions in junction boxes and/or in pits.

Individual wiring of extra-low voltage circuits: Tie together at regular intervals.

Tagging

General: Identify multicore cables and trefoil groups at each end with stamped non-ferrous tags clipped around each cable or trefoil group.

Marking

General: Identify the origin of all wiring by legible indelible marking.

Submains and subcircuits

Installation: Provide the following:

- Cables with diameter less than 13 mm: Run in conduit, cable ducts or support on cable trays or ladders.
- Single core cables of 3-phase circuits of diameter greater than 13 mm: Install unenclosed single core cables laid on cable tray or support systems in trefoil (RWB) groups.
- Cables for lighting systems: Run in conduit, cable ducts, suspend on catenary systems or support on cable trays or ladders.
- Accessible concealed spaces: Install thermoplastic insulated and sheathed cables.
- Inaccessible concealed spaces: Install cable in PVC-U conduit.
- Roof spaces: Install cable below heat insulation and sarking. If not protected from high ambient roof space temperatures by thermal insulation, derate the cables, to AS/NZS 3008.1.1 (2017) Table 27, for an assumed ambient temperature of 55°C.
- Accessible ceiling voids: Support and enclose cables on ceiling surfaces or ceiling suspension systems.

- Plastered or rendered masonry: Install cable in PVC-U conduit.
- Double sided face brick partition: Install cable in PVC-U conduit installed within the brick wall by slotting bricks or using any continuous pathways provided in the brick.
- Stud framed walls with bulk insulation: Install cables in PVC-U conduit.
- Stud framed walls without bulk insulation: Install thermoplastic insulated and sheathed cables allowing rewirability.
- Horizontal cable trays or ladders: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 2000 mm intervals.
- Vertical cable risers: Fix cables using proprietary nylon cable ties or straps, cable saddles or clips at 1000 mm intervals.
- Plant rooms: Install cable in heavy duty PVC-U conduit or on cable tray or in duct.

7.5 EARTHING

Earthing systems

Protective earthing system with a multiple earth neutral (MEN) connection: To AS/NZS 3000 (2018) Section 5.

7.6 ELECTRICAL ACCESSORIES

General

Style: Provide accessories of the same style and from the same manufacturer, as documented.

Socket outlets - generally

Standards:

- General: To AS/NZS 3112 (2017).
- Industrial: To AS/NZS 3123 (2005).

Socket outlet properties: Provide sockets conforming to the following:

- Type: Integral switched socket outlet.
- Material: High impact plastic.
- Size: Standard single gang.
- Current rating: 10 A.
- Pin arrangement: Mount outlets with the earth pins at the 6 o'clock position.

Plastic switched socket outlets

Colour: White electrical.

Mounting configuration: Horizontal.

Ironclad socket outlets

Type: Integral switched socket outlet.

Material: Diecast metal or cast iron.

Colour: Grey.

Weatherproof socket outlets

Colour: Grey.

Permanently connected equipment

General: Provide final subcircuit to permanently connected equipment.

Isolating switch: Locate adjacent to equipment.

Mounting:

- Internal installations: Flush mount.
- External installations: Weatherproof surface mounted.

Coordination: Coordinate with equipment supplier.

Wall/ceiling mounted equipment: Conceal final cable connection to equipment.

Isolating switches

Standard: To AS 3133 (2020).

8 SWITCHBOARDS – PROPRIETARY

8.1 STANDARDS

General

General: To AS/NZS 3000 (2018).

Main switchboards and distribution switchboards: To AS/NZS 61439.1 (2016), AS/NZS 61439.2 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

Distribution switchboards intended for use by unskilled/ordinary persons: To AS/NZS 61439.2 (2016), AS/NZS 61439.3 (2016), and the recommendations of SA/SNZ TR 61439.0 (2016).

8.2 PRODUCTS

Switchboard connection

Type: Front connected.

Enclosure

Default material: Metallic-coated sheet steel.

Separation

Default: Form 1 to AS/NZS 61439.2 (2016).

Communication equipment: Where provided, mount in a separate compartment.

Busbars

General: Incorporate proprietary insulated busbar systems for the interconnection of isolators, circuit breakers and other circuit protective devices.

Busbar fault rating: Rated to meet the prospective fault current for 1 second or a minimum rating of ≥ 18 kA/second, whichever is the greater.

Spare capacity

Default spare poles: $\geq 20\%$.

Main switchboard incoming busbar: $\geq 25\%$.

Earthing

General: Make provision for the connection of the communications earth terminal (CET) at switchboard earth bar to AS/CA S009 (2020).

Doors

General: Provide lockable doors with a circuit card holder unless enclosed in cupboards or in an area that is not readily accessible to the public.

Keying: Key alike for multiple doors, 2 keys per assembly.

IP rating

Default rating: IP42 minimum.

Weatherproof: IP56 minimum.

Finishes

External and interior: Orange X15 or the manufacturer's standard colour.

- Installed in cupboards, switchrooms and plant rooms: Orange X15 or the manufacturer's standard powder coated finish.
- Installed elsewhere: Orange X15, the manufacturer's standard powder coated finish or to the documented non-standard powder coated colour.

Supporting structure

Assemblies:

- Wall mounted: ≤ 2 m².
- Floor mounted: > 2 m².

Ventilation

General: Required to maintain design operating temperatures at full load.

Cable entries

General: Neatly adapt one or more cable entry plates, if fitted, to accept incoming cable enclosure. Provide the minimum number of entry plates to leave spare capacity for future cable entries. Do not run cables into the top of weatherproof assemblies.

Single core cables rated > 300 A: Pass separately through non-ferrous gland plates. Do not provide ferrous metal saddles. Minimise eddy currents.

Cable enclosures

Requirement: Continue cable enclosures to or into assemblies and fit cable entry plates so that the IP rating of the assembly and the fire-resistance level of the cable are maintained.

Cable supports

Requirement: Support or tie mains and submains cables within 200 mm of terminations. Provide cable supports suitable for stresses resulting from short-circuit conditions.

9 SWITCHBOARD COMPONENTS

9.1 REQUIREMENTS**General**

Selection: To AS/NZS 3000 (2018) clause 1.7 and Section 2.

Rated duty: Uninterrupted.

Rated making capacity (peak): $\geq 2.1 \times$ fault level (r.m.s.) at assembly incoming terminals.

Utilization category: To AS/NZS 60947.1 (2021) clause 5.4 and the recommendations of Annex A.

- Circuits consisting of motors or other highly inductive loads: At least AC-23.
- Other circuits: At least AC-22.

Coordination: Select and adjust protective devices to discriminate under overload, fault current, and earth fault conditions.

Enclosure: IP4X minimum.

9.2 SWITCH-ISOLATOR**General**

Standard: To AS/NZS 60947.1 (2021) and AS 60947.3 (2018).

Poles: 3.

Operation: Independent manual operation including positive ON/OFF indicator.

Shrouding: Effective over range of switch positions.

9.3 OVERLOAD AND FAULT PROTECTION GENERALLY**General**

Requirement: Provide overload and fault protection devices, including full discrimination and cascade protection, and grade with the electricity distributor's incoming supply protection system and the downstream site protection devices.

9.4 MOULDED CASE AND MINIATURE CIRCUIT BREAKERS**General**

Moulded case breakers: To AS/NZS 60947.1 (2021) and AS/NZS IEC 60947.2 (2015).

Miniature circuit breakers: Interrupting capacity classification to AS/NZS 60898.1 (2004) or AS/NZS 3111 (2009).

- For general building services: Type C.
- For motor protection: Type D.

Operation: Independent manual operation including positive ON/OFF indicator.

Trip type: Conform to the following:

- Moulded case breakers: Adjustable thermal, fixed magnetic.
- Miniature circuit breakers: Fixed thermal and fixed magnetic.

Mounting: Mount circuit breakers so that the ON/OFF and current rating indications are clearly visible with covers or escutcheons in position. Align operating toggles of each circuit breaker in the same plane.

Clip tray chassis: For miniature overcurrent circuit breakers, provide clip tray assemblies capable of accepting single, double or triple circuit breakers and related busbars. Provide moulded clip-on pole fillers for unused portions.

Interchangeable trip units: Connect trip units so that trip units are not live when circuit breaker contacts are open.

Fault current limiting circuit breakers: Select breaker frame sizes from one manufacturer's tested range of breakers to give cascade and discrimination protection within the switchboard and downstream switchboards as required.

9.5 RESIDUAL CURRENT OPERATED CIRCUIT BREAKERS (RCBO)

General

Standard: To AS/NZS 3190 (2016).

Integral non-overload protection type: To AS/NZS 61008.1 (2015).

Integral overload protection type: To AS/NZS 61009.1 (2015).

Modular type: To AS/NZS IEC 60947.2 (2015).

- Type II.
 - . Default tripping current: 30 mA.

9.6 CONTACTORS

General

Standard: To AS/NZS IEC 60947.4.1 (2015).

Type: Enclosed, block type, air break, electromagnetic.

Poles: 3.

Rated operational current: The greater of:

- Full load current of the load controlled.
- ≥ 16 A.

Mechanical durability: 10 million cycles to AS/NZS IEC 60947.4.1 (2015).

Electric durability: ≥ 1 million operations at AC-22 to AS/NZS IEC 60947.4.1 (2015).

Mounting: Mount with sufficient clearance to allow full access for maintenance, removal and replacement of coils and contacts, without the need to disconnect wiring or remove other equipment.

Auxiliary contacts: Provide auxiliary contacts with at least one normally-open and one normally-closed separate contacts with rating of 6 A at 230 V a.c., utilization category AC-1.

10 MOTORS AND STARTERS

10.1 MOTORS

General

Requirement: Provide motors utilised for fire hydrant and sprinkler services selected in conformance with AS 60034.1 (2009), the application load characteristics, motor manufacturers' recommendations and the following:

- Motors ≥ 0.75 kW: Three phase.

Rating

Standard: To AS 60034.1 (2009).

Maximum power rating: The greater of the documented minimum motor size and next preferred standard frame size above the maximum load of the driven equipment.

Duty: \geq S1.

Class of rating: Continuous running duty.

Speed: ≤ 1500 r/min.

10.2 STARTERS

Standards

Starters for hydrant and sprinkler pump motors: To AS/NZS 3000 (2018) Part 2 clause 7.2.5.6, AS/NZS 60947.1 (2021) and AS 60034.12 (2009).

Electromechanical motor starters: To AS/NZS IEC 60947.4.1 (2015).

Selection

Requirement: Provide motor starters, selected for the following:

- Electricity distribution network limitations for starting currents and voltage flicker.
- Torque requirements for the motor load.
- Heating effects on the motor.
- Voltage drop during start due to starting currents.
- Time required to accelerate from rest to full speed.
- Number of starts per hour.

Selected motor starter characteristics: Provide above details of selected motor starters.

10.3 MOTOR PROTECTION

General

Standard: To AS/NZS 3000 (2018) Part 2 clause 7.2.5.6, AS 60034.11 (2009) and AS 60034.12 (2009).

Over-current protection

Requirement: Provide over-current protection devices for each motor.

Standard: To AS/NZS 3000 (2018) Part 2 clause 7.2.5.6.2.

Over-temperature protection

Requirement: Provide over-temperature detection devices in each motor to warn of over-temperature conditions. Make sure the over-temperature detection devices do not control the operation of the fire pump motor

Standard: To AS/NZS 3000 (2018) Part 2 clause 7.2.5.6.3.

Single phase motor protection

Requirement: Overload units matching the motor heating curve characteristics, to indicate motor overload only.

3-phase motor protection - thermal overload protection

Requirement: Thermal overload protection relays for each motor.

Triple pole relays: Provide differential trip bar operation for single phase protection, and ambient temperature compensation.

Thermal overloads: Connect directly to contactor by means of proprietary links, except where operated separately by current transformers.

Star-delta starters: Provide triple pole thermal overload relay connected into motor phase winding circuits. Provide a name plate fixed to starter, stating full load current of motor phase winding.

11 INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) SYSTEMS

11.1 GENERAL

System performance - commercial buildings, small offices and home offices

Application class: To AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz).

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clauses 6.3, 7.2 and 9.3, AS 11801.2 (2019) and AS 11801.4 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 (data/voice) Category 6_A, AS 11801.2 (2019) and AS 11801.4 (2019).

Optical fibre cabling system: To AS 11801.1 (2019) clauses 6.5, 7.4, 8.3 and 9.5, AS 11801.2 (2019) and AS 11801.4 (2019).

System warranty: 15 years minimum.

System performance – distributed building services

Application class: To AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz).

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.6 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.6 (2019).

Optical fibre cabling system: To AS 11801.1 (2019) clauses 8.3 and 9.5, and AS 11801.6 (2019).

System warranty: 15 years minimum.

System performance – data centres

Application class: Main distribution, intermediate distribution and zone distribution cabling systems to AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz), and AS 11801.5 (2019) clause 6.3.2.

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.5 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.5 (2019) clauses 8.2, 9.2, 10 and 11.

Optical fibre cabling system: To AS 11801.5 (2019) clauses 6.3.3, 9.5, 10 and 11.3.

System warranty: 15 years minimum.

System performance – industrial premises

Application class: Main distribution, intermediate distribution and zone distribution cabling systems to AS 11801.1 (2019) clause 6.3.1 Class E_A (500 MHz), and AS 11801.3 (2019) clause 6.3.2.

Balanced cabling system: To AS 11801.1 (2019) clause 8.2 Category 6_A, clause 9.3 and AS 11801.3 (2019).

Balanced cabling system components: To AS 11801.1 (2019) clause 8.2.1 Category 6_A and AS 11801.3 (2019) clauses 8.2, 9.2, 10 and 11.

Optical fibre cabling system: To AS 11801.3 (2019) clauses 6.3.3, 8.3, 9.3, 10 and 11.3.

System warranty: 15 years minimum.

11.2 STANDARDS**General**

Authorities: To the requirements of the Australian Communications and Media Authority (ACMA).

Cabling products: To AS/CA S008 (2020) and the AS 11801 series.

Communications cable systems: To AS/CA S009 (2020), the AS 11801 series, AS/NZS 3084 (2017) and AS/NZS 14763.2 (2020).

11.3 CABLES**Copper**

Standard: To AS/CA S008 (2020), AS/CA S009 (2020), the AS 11801 series and AS/NZS 14763.2 (2020).

Horizontal cabling voice and data: CAT 6_A F/UTP cabling to each floor outlet.

Balanced system cables: Unshielded or shielded twisted pairs, as documented.

Cable end length: Sufficient cable slack to move within the rack.

Optical fibre

Standard: To AS 11801.1 (2019).

Length: Provide not less than 1000 mm spare at each end.

Component type: LC.

Safe practices: To AS/NZS 2967 (2014).

External and underground

Standard: Water penetration resistance and UV stabilisation to AS/CA S008 (2020).

11.4 CABLE INSTALLATION**Installation**

Requirement: To the manufacturers' recommendations.

Crossover: Install cables neatly.

Loom size: Loom cables into groups not exceeding 24 cables, as documented and to the quality plan. Hold looms in place using reusable cable ties at least 20 mm wide. Do not exert compressive force on the cables when installing cable straps.

Cable separation

Separation for safety: To AS/CA S009 (2020).

Separation for performance: To AS/NZS 14763.2 (2020).

External cabling

Requirement: To CA C524 (2013).

12 SELECTIONS

12.1 SYSTEMS

Fire services schedule

Fire service	Requirement
Hydrants	Refer Engineering Solutions Tasmania's drawings and specification.
Hose reels	
Sprinklers	
Fire detection and alarms	
Emergency warning and intercommunication	

12.2 SUBMISSIONS

Samples schedule

Sample required	Details and inclusions
Refer Engineering Solutions Tasmania's drawings and specification.	
