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How to use the Housing Provisions

This Section is for information only.

1.1 Introduction

The ABCB Housing Provisions contains *Deemed-to-Satisfy Provisions* that are considered to be acceptable forms of construction that meet the requirements for complying with Parts H1 to H8 of NCC Volume Two (i.e. they comply with the *Performance Requirements* listed in Parts H1 to H8 of NCC Volume Two).

There is no obligation to adopt any particular option contained in the ABCB Housing Provisions if it is preferred to meet the *Performance Requirements* some other way.

However, if one of the options described in the ABCB Housing Provisions or elsewhere in the *Deemed-to-Satisfy Provisions* of NCC Volume Two is not complied with, then the *appropriate authority* must be satisfied that the *Performance Requirements* have been met.

1.2 Application

This Housing Provisions must be applied in accordance with each of the following:

- Section A (Governing Requirements) of NCC Volume Two.
- Any conditions on the use of the ABCB Housing Provisions set out within the *Deemed-to-Satisfy Provisions* of NCC Volume Two where it is referenced.
- The Scope clause at the beginning of each Section of the ABCB Housing Provisions.

1.3 The scope of the ABCB Housing Provisions

In Section H of NCC Volume Two, some *Deemed-to-Satisfy Provisions* contain more than one compliance pathway. Usually, the first of these pathways will be by reference to a relevant Australian Standard (or similar) and the second will be by reference to a particular Section or Part of the ABCB Housing Provisions. In these cases, use of the ABCB Housing Provisions is one option for complying with the relevant *Deemed-to-Satisfy Provision*.

Other *Deemed-to-Satisfy Provisions* contain only one compliance pathway: either a reference to an Australian Standard (or similar), or a reference to a particular Section or Part of the ABCB Housing Provisions. In these cases, the ABCB Housing Provisions may only be used if it is referenced, and must be used if it is the only compliance option for the particular *Deemed-to-Satisfy Provision*.

If a *Deemed-to-Satisfy Provision* does not reference the ABCB Housing Provisions, then the ABCB Housing Provisions cannot be used as a compliance pathway for that particular *Deemed-to-Satisfy Provision*.

The ABCB Housing Provisions only contains content relevant to the *Deemed-to-Satisfy Provisions* in NCC Volume Two which call it up. Therefore, the ABCB Housing Provisions should not be interpreted as a comprehensive or complete manual for house building.

Section 2 of the ABCB Housing Provisions contains a number of structural design manuals which can be used to design building elements using engineering principles. There is no obligation for the provisions of Section 2 to be used apart from situations where a particular building, building element or component is required to comply with NCC Volume Two and is not within the scope of any other *Deemed-to-Satisfy Provisions*.

Section 12 contains additional construction requirements that are ancillary to the construction of a building or structure, such as the construction of *swimming pools*, heating appliances, fireplaces, methods of attaching decks and balconies to *external walls* or the like. Section 12 also contains special provisions for construction in *alpine areas*. Earthquake areas are addressed in Section 2 and *flood hazard areas* are addressed in the ABCB Standard for Construction of Buildings in Flood Hazard Areas, which is referenced directly by H1D10.

Situations where it is necessary for a mixed application of the ABCB Housing Provisions and other documents referenced in the *Deemed-to-Satisfy Provisions* of NCC Volume Two may be identified by reference to the differing components of the *Performance Requirements* (see A2G3).

1.4 Suitability of Performance Solutions

The options described in the *Deemed-to-Satisfy Provisions* are typical examples of national construction methods. They are not the only means available for complying with NCC Volume Two. The performance format of the NCC provides flexibility and allows the use of alternative construction methods to those described in the *Deemed-to-Satisfy Provisions*.

1.5 The use of maps

Maps have been used throughout NCC Volume Two, including in the ABCB Housing Provisions, to indicate areas where particular requirements apply. These maps are indicative and some variation in conditions will apply, especially on the border of marked areas.

It is recommended that the *appropriate authority* be consulted and in most cases they should be able to identify what conditions apply in such areas at the early stage of building design.

1.6 Consultation with appropriate authorities

When building in certain locations there may be local conditions or other site constraints that may limit the type of construction that can be used. This is particularly important with buildings that are constructed in areas subject to increased structural loading conditions that may occur due to geographical, topographical or climatic conditions and soil types.

Appropriate authorities have a wide range of experience and information on the geographical and topographical conditions found in their area of responsibility, and should be consulted during the initial design stage.

1.7 Layout of the ABCB Housing Provisions

Although they do not cover every aspect of housing construction, the ABCB Housing Provisions have nonetheless been organised in a manner that follows the logical construction sequence of a building. Table 1.7 outlines some of the more frequently used details and where they are located in the ABCB Housing Provisions or NCC Volume Two.

Table 1.7: Information guide

Stage	Relevant part	Reference(s)
Initial design considerations	Earthworks	3.2
	Fire Safety	9
	Facilities	10.4
	Room heights	10.3
	Light and ventilation	10.5, 10.6
	Stairway and ramp construction	11.2
	Energy efficiency	13
	Site preparation and drainage	3.1,3.3
	Footings and slabs	4
	Masonry	5
	Framing	6
	Roof cladding, gutters and downpipes and wall cladding	7
	Gutters and downpipes	7.4
	Glazing	8
	Barriers and handrails	11.3
	Livable housing design	H8 (NCC Volume Two)
Construction issues	Wet areas and external waterproofing	10.2
	Sound insulation	10.7
	Condensation management	10.8
	Swimming pools	H7D2 (NCC Volume Two)

Stage	Relevant part	Reference(s)
	Termite risk management	3.4
	Earth retaining structures	H1D3 (NCC Volume Two)
	Subfloor ventilation	6.2
	Smoke alarms and evacuation lighting	9.5
	Boilers, pressure vessels, heating appliances, fireplaces, chimneys and flues	12.4
Special requirements	Earthquake areas	2
	Flood hazard areas	H1D10 (NCC Volume Two)
	Construction in bushfire areas	H7D4 (NCC Volume Two)
	Construction in alpine areas	12.2
	Attachment of decks and balconies to external walls of buildings	12.3
	High wind areas	2
	Class 10 buildings and structures	Various

1.8 Interpretation

Throughout the ABCB Housing Provisions, diagrams, explanatory information and cross-volume considerations are included. A1G4 (interpretation) contains information on these elements in the NCC, which is also applicable when they appear in the ABCB Housing Provisions.

1.9 How to use the requirements of each Section/Part

Each Section of the ABCB Housing Provisions is comprised of a scope statement and one or more Parts which contain the technical provisions which must be followed as appropriate to achieve compliance with the relevant *Deemed-to-Satisfy Provisions*. Generally, a *Deemed-to-Satisfy Provision* will refer to a specific Part of the ABCB Housing Provisions in order to link the user directly to the relevant technical provisions.

Each Section contains a scope and application Part which sets out the conditions and limitation applicable to the subsequent Parts contained within that Section. Each Part must only be applied in a way that is consistent with its scope.

Sections are numbered with a single numeral (e.g. Section 2 - Structure).

Parts are numbered with two numbers separated by a decimal (e.g. Part 2.2 – Structural provisions).

Clauses within each Part are numbered with three numbers separated by a decimal point (e.g. Clause 2.2.4 – Determination of structural resistance of materials and forms of construction).

Sub-clauses and below are numbered using the system used throughout the NCC.

List of amendments - ABCB Housing Provisions

This list has been prepared by the Australian Building Codes Board to assist National Construction Code (NCC) users in identifying changes incorporated in the 2022 edition of the ABCB Housing Provisions.

The notes provide a description of major changes made from the previous edition of the Housing Provisions (NCC Volume Two).

While the Australian Building Codes Board has attempted to include all major changes made from the previous edition of the Housing Provisions, the Board does not give any warranty nor accept any liability in relation to the contents of this list of amendments.

Table 1: List of amendments - ABCB Housing Provisions

Reference	Changes and Commentary
General	
Throughout	A “Scope” and “Application” has been added to each Section of the ABCB Housing Provisions. This sets out the conditions and limitations applicable to the subsequent Parts within that Section.
Throughout	A number of provisions have been amended, restructured, deleted and relocated as part of the initiative to provide a consistent NCC structure and improve NCC usability.
Section 3—Site preparation	
3.3.3	Amended as a consequence of including new Livable housing design requirements in Part H8 of Volume Two.
Section 4—Footings and slabs	
Section 4	Amendments, including insertion of new provisions, tables, diagrams and grouping provisions, have been made to reflect current practice, improve readability and structure. The construction of footings and slabs has been reduced to a certain geometric size and the applicability to soil classifications is restricted to Class A, S and M sites.
4.2.11	The requirement for reinforcing re-entrant corners moved from 2019: 3.2.5.3 to this clause as part of steel reinforcement requirements. Explanatory information has also been provided.
4.2.20	A new provision has been added for localised thickening for footings or slabs supporting concentrated loads.
4.2.22	A new provision has been added for recesses in slabs.
Section 5—Masonry	
5.1	A new provision has been inserted as a consequence to new clauses 5.7.3 and 5.7.4.
5.2.4	A new provision has been inserted as a consequence to new clauses 5.7.3 and 5.7.4.
5.2.5	A new provision has been added as a consequence to new clause 5.6.8.
5.3	A new Part has been added and contains provisions related to cavity masonry.
5.4	A new Part has been added and contains provisions related to unreinforced single leaf masonry.
5.5	The Part has been re-named to ‘Isolated piers’ and contains content in Part 3.3.6 of Volume Two 2019 Amendment 1.
5.6	A new Part, ‘Masonry components and accessories’ has been added and incorporates some content from Part 3.3.5 of Volume Two 2019 Amendment 1. It includes amendments and new provisions to reflect current practice, improve readability and structure.
5.6.6	New explanatory information has been added to Figure 5.6.6c referenced in clause 5.6.6 to guide designs for roof tie-down over openings greater than 1200 mm wide in masonry construction.

Reference	Changes and Commentary
5.7	A new Part 'Weatherproofing for masonry' has been added and incorporates some content from Part 3.3.5 of Volume Two 2019 Amendment 1. It includes amendments and new provisions to reflect current practice, improve readability and structure.
5.7.6	A new provision has been added for waterproofing for single leaf masonry walls to compliment new Part 5.4.
Section 6—Framing	
6.3	Amendments for structural steel members, including insertion of new tables, diagrams and explanatory information, have been made to improve readability and structure.
6.3.3	A new provision has been added for steel bearers as part of the restructure of Section 6—Framing.
6.3.4	A new provision has been added for steel strutting beams as part of the restructure of Section 6—Framing.
6.3.5	A new provision has been added for steel lintels as part of the restructure of Section 6—Framing.
6.3.6	A new provision has been added for steel columns as part of the restructure of Section 6—Framing.
6.3.7	A new provision has been added providing details for fixings and bearing for structural steel members. This includes additional figures for various fixing details.
6.3.8	A new provision has been added providing details for cuts and penetrations through structural steel members.
6.3.9	Tables relating to protective coatings for steelwork have been changed to provide greater detail and additional options for corrosion protection.
Section 7—Roof and wall cladding	
7.2.8	Amended to require sheets overhang not less than 50 mm where an eaves gutter is provided.
7.4	Amendments, including insertion of new tables, diagrams and explanatory information, have been made to reflect current practice, improve readability and structure. The amendments also align annual exceedance probability figures with AS 3500.3-2021 replacing average recurrence interval figures.
Tables 7.5.2, 7.5.3a and 7.5.3b	Table note has been amended to refer base metal thickness of steel framing members to that required for a roof batten in NASH Standard.
Section 8—Glazing	
8.2	Part 8.2 has been re-named, groups provisions relevant to windows and external glazed doors and contains amendments, including insertion of new tables, diagrams and explanatory information, to improve readability and structure.
8.2.2	A new provision has been added for the installation of windows.
8.3.3	Amended to reflect new terminology 'monolithic' in lieu of 'ordinary' to reflect current practice.
8.4	A new Part has been added, re-named and groups provisions relevant to glazing human impact and contains amendments, including insertion of new tables, diagrams and explanatory information to improve readability and structure.
8.4.6	Amended to include provisions for mirrors and splashbacks.
8.4.8	A new provision has been added for the identification of safety glass.
Section 9—Fire safety	
9.2.9	Amendments have been made to clarify application of allowable encroachments.
Section 10—Health and amenity	
10.2	Amendments, including insertion of new Deemed-to-Satisfy Provisions, tables, diagrams and explanatory information, have been made to reflect current practice, improve readability and structure.

Reference	Changes and Commentary
10.2.2	Amended to require walls in shower areas to be waterproof to not less than 1800 mm above the floor substrate.
10.2.5	A new sub-clause has been added for WCs with handheld bidet spray installations.
10.2.6	A new provision has been added for waterproofing systems distinguishing how systems are deemed either waterproof or water resistant.
10.2.7	A new provision has been added stating materials used in wet areas must be either waterproof or water resistant.
10.2.8	A new provision has been added setting out what materials used in waterproofing systems are deemed to be waterproof.
10.2.9	A new provision has been added setting out materials deemed to be water resistant for wall and floor substrates.
10.2.10	A new provision has been added setting out materials deemed to be water resistant for wall and floor surface materials.
10.2.11	A new provision has been added setting out the relevant Part to be complied with for wall and floor substrates in wet areas.
10.2.12	A new provision has been added for falls to wet area floors.
10.2.13	A new provision has been added setting out the relevant Part to be complied with for wall and floor surface materials in wet areas.
10.2.14	A new provision has been added for shower area requirements.
10.2.15	A new provision has been added for step-down showers.
10.2.16	A new provision has been added for the hob construction of showers.
10.2.17	A new provision has been added for enclosed showers with level threshold.
10.2.18	A new provision has been added for unenclosed showers.
10.2.19	A new provision has been added for preformed shower bases.
10.2.20	A new provision has been added for baths and spas.
10.2.21	A new provision has been added relating to the membrane installation for screeds and location of tiles.
10.2.22	A new provision has been added for the substrate surface preparation where membranes are to be applied.
10.2.23	A new provision has been added for the treatment of penetrations within shower areas.
10.2.24	A new provision has been added relating to the installation of flashings and treatment of junctions including vertical and horizontal legs at perimeters.
10.2.25	A new provision has been added for the application of shower area floor membranes.
10.2.26	A new provision has been added relating to shower area membrane requirements for wall sheeting substrates.
10.2.27	A new provision has been added relating to the installation of bond breakers for bonded membranes.
10.2.28	A new provision has been added for the installation of internal membranes.
10.2.29	A new provision has been added detailing membrane to drainage connections.
10.2.30	A new provision has been added detailing drainage riser connections.
10.2.31	A new provision has been added relative to door jambs on tiled floors.
10.2.32	A new provision has been added for the installation and location of shower screens.
10.8.1	Amended to include vapour permeance requirements for several materials in climate zones 4 to 8.
10.8.2	Amended to include additional exhaust requirements, including ducting of exhausts to outdoor air, exhaust run-on timers in some rooms and provision of make-up air to some rooms.

Reference	Changes and Commentary
10.8.3	Amended to require a ventilated roof space in climate zones 6, 7 and 8, with exceptions for concrete roofs, roofs made from structural insulated panels and roofs subject to Bushfire Attack Level FZ.
Section 11—Safe movement and access	
11.2.3	A note has been inserted as a consequence of new Part H8 Livable housing design in Volume Two.
11.3.4	Amended and includes new sub-clause (5) and (6) to provide a maximum opening between barrier and vertical face of a landing, balcony, deck, stairway or the like.
Section 12—Ancillary provisions	
12.1.1	Scope has been amended to reflect the deletion of boilers and pressure vessels from Part 12.4 of the ABCB Housing Provisions.
12.3	Heading amended to improve clarity and application of part.
12.3.2	Timber waling plate sizes and fixings have been amended to reflect contemporary available materials and practices.
12.4	Amendments, including deletion of boilers and pressure vessels, have been made to reflect current practice, improve readability and structure.
12.4.3	An additional sub-clause 12.4.3(b) has been included relative to the composition of mortar.
12.4.4	Sub-clause 12.4.4(a) has two additional and further sub-clauses clarifying the testing and fitting of insert fireplaces and flues.
12.4.5	An explanatory note has been added to clause 12.4.5 to clarify the application of testing standards and Deemed-to-Satisfy Provisions.
12.4.5	Sub-clause 12.4.5(b) has been amended to clarify the masonry construction for heat shields. Sub-clause 12.4.5(b) has also been amended to add flashing requirements for flues.
Section 13—Energy efficiency	
13.2.3	Amended to improve the performance of roofs and ceilings in order to achieve the equivalent of a 7 stars NatHERS energy rating for thermal performance under Deemed-to-Satisfy elemental provisions. A requirement to address thermal bridging in metal-framed roofs has also been added.
13.2.4	Amended to align with roof light requirements in Volume One.
13.2.5	Amended to improve the performance of walls in order to achieve the equivalent of a 7 stars NatHERS energy rating for thermal performance under Deemed-to-Satisfy elemental provisions. A requirement to address thermal bridging in metal-framed walls has also been added.
13.2.6	Amended to improve the performance of floors and subfloor walls in order to achieve the equivalent of a 7 stars NatHERS energy rating for thermal performance under Deemed-to-Satisfy elemental provisions. A requirement to address thermal bridging in metal-framed floors has also been added.
13.3	Amended to improve the performance of external glazing in order to achieve the equivalent of a 7 stars NatHERS energy rating for thermal performance under Deemed-to-Satisfy elemental provisions.
13.5	Amended to include new ceiling fan requirements for climate zones 1,2,3 and 5 (Queensland and New South Wales only).
13.6	A new part has been added containing provisions related to whole-of-home energy usage.
13.7.8	Amended to include a minimum R-Value for swimming pool covers.
Schedule 1—Definitions	

Reference	Changes and Commentary
Schedule 1	Schedule 1 has been amended as part of the initiative to improve readability of the NCC. Schedule 1 – Definitions includes Abbreviations, Symbols and Glossary. States & Territory Appendices (formerly located in Schedule 1) have been incorporated into Schedule 3 to Schedule 11.
Abbreviations	Acrylic conformal coating (ACC) has been added.
Abbreviations	Acrylic latex (ACL) has been added.
Abbreviations	Australian Institute of Refrigeration, Air conditioning and Heating (AIRAH) has been added.
Abbreviations	American National Standards Institute (ANSI) has been added.
Abbreviations	American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) has been added.
Abbreviations	National Standard of Canada (CAN) has been added.
Abbreviations	Chartered Institution of Building Services Engineer (CIBSE) has been added.
Abbreviations	Flame zone (FZ) has been added.
Abbreviations	Greenhouse and Energy Minimum Standards (GEMS) has been added.
Abbreviations	Hot dip galvanising (HDG) has been added.
Abbreviations	Inorganic zinc silicate (IZS) has been added.
Abbreviations	NATA has been amended to include reference to Australia.
Abbreviations	National Sanitation Foundation (NSF) has been added.
Abbreviations	Polyurethane (PUR) has been added.
Symbols	µg/N.s has been added.
Symbols	f'c has been added.
Symbols	f'y has been added.
Symbols	G has been added.
Symbols	N/m has been added.
Symbols	Q has been added.
Symbols	ULS has been added.
Glossary	A defined term, 'Above ground rainwater tank', has been added.
Glossary	A defined term, 'Annual exceedance probability', has been added as a consequence of amendments to Part 7.4 Gutters and downpipes of the ABCB Housing Provisions.
Glossary	A defined term, 'Assumed cooling thermostat set point' has been added as a consequence of quantification in J1P2 and H6P1.
Glossary	A defined term, 'Average recurrence interval', has been deleted as a consequence of amendments to Part 7.4 Gutters and downpipes of the ABCB Housing Provisions.
Glossary	A defined term, 'Bond breaker', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, 'Building complexity criteria', has been added.
Glossary	A defined term, 'Buried rainwater tank', has been added as a consequence of amendments to Specification 41 of Volume Three.
Glossary	A defined term, 'Cooling degree hours' has been added as a consequence of quantification in J1P2 and H6P1.
Glossary	A defined term, 'Daily outdoor temperature range' has been added as a consequence of quantification in J1P2 and H6P1.
Glossary	A defined term, 'Dehumidification gram hours', has been added as a consequence of quantification in J1P2 and H6P1.
Glossary	A defined term, 'Design bushfire', has been added as a consequence of amendments to Part G5.

Reference	Changes and Commentary
Glossary	The defined term, 'Domestic services', has been amended to include on-site renewable energy equipment as a result of quantification in J1P3 and H6P2.
Glossary	A defined term, 'Drainage flange', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, 'Drainage riser', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, 'Efficacy', has been added as a consequence of including quantified Performance Requirement H3P2 for automatic warning for occupants.
Glossary	A defined term, 'Energy value', has been added as a consequence of quantification in J1P3 and H6P2.
Glossary	A defined term, 'Engaged pier', has been added as a consequence of amendments to Section 5 of the ABCB Housing Provisions.
Glossary	A defined term, 'Fire actions', has been added as a consequence of amendments to Part G5.
Glossary	The defined term, 'Flashing', has been amended to clarify perimeter and vertical flashings as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	The defined term, 'Floor area', for Volume One, has been amended on account of new defined term 'Volume'.
Glossary	A defined term, 'Floor waste', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	The defined term, 'Glazing', has been amended as a consequence of the updates to the energy efficiency Deemed-to-Satisfy provisions for Class 2 buildings.
Glossary	A defined term, 'Heating degree hours', has been added as a consequence of quantification in J1P2 and H6P1.
Glossary	A defined term, 'Hob', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term 'Irrigation system', has been added as a consequence of amendments to S41C2 in Volume Three.
Glossary	A defined term, 'Lateral support', has been added as a consequence of amendments to Part 5.3 of the ABCB Housing Provisions.
Glossary	A defined term, 'Main water heater' has been added as a consequence of including new whole-of-home energy efficiency requirements.
Glossary	A defined term, 'Main space conditioning' has been added as a consequence of including new whole-of-home energy efficiency requirements.
Glossary	A defined term, 'Maximum retained water level', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, 'Membrane', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	The defined term, 'NABERS Energy for Offices' has been amended to be 'NABERS Energy' to reflect its use for multiple building classifications.
Glossary	The defined term, 'Performance-based design brief' has been amended for clarity.
Glossary	The defined term, 'Point of connection', has been amended for clarity.
Glossary	A defined term, 'Preformed shower base', has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, 'Primary insulation layer', has been added as a consequence of amendments to condensation management provisions.
Glossary	The defined term, 'Rainwater harvesting system', has been amended to 'Rainwater service' and 'Rainwater storage' as a consequence of amendments to Part B6 of Volume Three.

Reference	Changes and Commentary
Glossary	The defined term ‘Reliability’ has been added as a consequence of including quantified Performance Requirements for automatic warning for occupants.
Glossary	The defined term ‘Reference building’ has been amended to remove reference to Thermal comfort levels and as a consequence of the introduction of J1V5.
Glossary	A defined term, ‘Screed’, has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	The defined term, ‘Shower area’, has been amended to clarify enclosed and unenclosed shower areas as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, ‘Shower screen’, has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, ‘Thermal energy load’, has been added as a consequence of quantification in J1P2 and H6P1.
Glossary	The defined term ‘Total R-Value’ in the ABCB Housing Provisions has been amended to align with Volume One.
Glossary	The defined term ‘Total System U-Value’ in the ABCB Housing Provisions has been amended to align with Volume One.
Glossary	A defined term ‘Unprotected water service’, has been added as a consequence of introducing new provision for unprotected water service – B5D5 of Volume Three.
Glossary	A defined term, ‘Vapour permeance’, has been added as a consequence of amendments to the condensation management provisions.
Glossary	A defined term, ‘Volume’, has been added to clarify the volume space with respect to a building, fire compartment and atrium.
Glossary	A defined term, ‘Waterproofing system’, has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, ‘Water stop’, has been added as a consequence of amendments to Part 10.2 of the ABCB Housing Provisions.
Glossary	A defined term, ‘Weighted average’, has been added as a consequence of amendments to A5G4.
Glossary	A defined term, ‘Wetted surface area’, has been added to provide clarification to the defined term ‘Weighted average’.
Schedule 2—Referenced documents	
AS/NZS 1170.2	The 2021 edition of AS/NZS 1170 Part 2 ‘Structural design actions — Wind actions’ has been referenced.
AS 1288	The 2021 edition of AS 1288 ‘Glass in buildings — Selection and installation’ has been referenced.
AS 1397	The 2021 edition of AS 1397 ‘Continuous hot-dip metallic coated steel sheet and strip — Coatings of zinc and zinc alloyed with aluminium and magnesium’ has been referenced. A note has been included to outline transitional arrangements.
AS 1530 Parts 1 to 4	The notes to AS 1530 Parts 1 to 4 have been deleted.
AS 1530.8.1	The 2018 edition of AS 1530 Part 8.1 ‘Methods for fire tests on building materials, components and structures — Tests on elements of construction for buildings exposed to simulated bushfire attack — Radiant heat and small flaming sources’ has been referenced.
AS/NZS 1546.1	The 2008 edition of AS/NZS 1546 Part 1 ‘On-site domestic wastewater treatment units — Septic tanks’ has been referenced.
AS/NZS 1546.2	The 2008 edition of AS/NZS 1546 Part 2 ‘On-site domestic wastewater treatment units — Waterless composting toilets’ has been referenced.
AS 1546.3	Amdt 1 of the 2017 edition of AS 1546 Part 3 ‘On-site domestic wastewater treatment units — Secondary treatment systems (incorporating amendment 1)’ has been referenced.

Reference	Changes and Commentary
AS 1546.4	The 2016 edition of AS 1546 Part 4 'On-site domestic wastewater treatment units — Domestic greywater treatment systems' has been referenced.
AS/NZS 1547	The 2012 edition of AS/NZS 1547 'On-site domestic wastewater management' has been referenced.
AS/NZS 1562.2	The 1999 edition of AS/NZS 1562 Part 2 'Design and installation of sheet roof and wall cladding — Corrugated fibre-reinforced cement' has been deleted.
AS 1562.3	The 2006 edition of AS 1562 Part 3 'Design and installation of sheet roof and wall cladding — Plastic' has been referenced.
AS 1670.1	Amdt 1 of the 2018 edition AS 1670 Part 1 'Fire detection, warning, control and intercom systems — System design, installation and commissioning — Fire (incorporating amendment 1)' has been referenced. Notes to AS 1670 have been amended to outline transitional arrangements.
AS 1670.3	Amdt 1 of the 2018 edition AS 1670 Part 3 'Fire detection, warning, control and intercom systems — System design, installation and commissioning — Fire alarm monitoring (incorporating amendment 1)' has been referenced. Notes to AS 1670 have been amended to outline transitional arrangements.
AS 1670.4	Amdt 1 of the 2018 edition AS 1670 Part 4 'Fire detection, warning, control and intercom systems — System design, installation and commissioning — Emergency warning and intercom systems (incorporating amendment 1)' has been referenced. Notes to AS 1670 have been amended to outline transitional arrangements.
AS 1684.2	The 2021 edition of AS 1684 Part 2 'Residential timber-framed construction — Non-cyclonic areas' has been referenced.
AS 1684.3	The 2021 edition of AS 1684 Part 3 'Residential timber-framed construction —Cyclonic areas' has been referenced.
AS/NZS 1720.4	The 2019 edition of AS/NZS 1720 Part 4 'Timber structures — Fire resistance of timber elements' has been referenced.
AS 1720.5	Amdt 1 of the 2015 edition of AS 1720 Part 5 'Timber structures —Nailplated timber roof trusses (incorporating amendment 1)' has been referenced.
AS/NZS 1859.4	The note to AS/NZS 1859 Part 4 has been deleted.
AS 2118.1	Amdt 2 of the 2017 edition of AS 2118 Part 1 'Automatic fire sprinkler systems — General systems (incorporating amendments 1 and 2)' has been referenced.
AS 2118.4	The 2012 edition of AS 2118 Part 4 'Automatic fire sprinkler systems — Sprinkler protection for accommodation buildings not exceeding four storeys in height'.
AS 2118.5	The 2008 edition of AS 2118 Part 5 'Automatic fire sprinkler systems — Home fire sprinkler systems' has been referenced.
AS 2118.6	The 2012 edition of AS 2118 Part 6 'Automatic fire sprinkler systems — Combined sprinkler and hydrant systems in multistorey buildings.'
AS/NZS 2293.1	Amdt 1 of the 2018 edition of AS/NZS 2293 Part 1 'Emergency lighting and exit signs for buildings — System design, installation and operation (incorporating amendment 1)' has been referenced.
AS 2312.1	The 2014 edition of AS 2312 Part 1 'Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings — Paint coatings' has been referenced.
AS/NZS 2312.2	The 2014 edition of AS 2312/NZS Part 2 'Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings — Hot dip galvanizing' has been referenced.
AS/NZS 2327	Amdt 1 of the 2017 edition of AS/NZS 2327 'Composite structures — composite steel-concrete construction in buildings (incorporating amendment 1)' has been referenced.
AS 2419.1	The 2021 edition of AS 2419 Part 1 'Fire hydrant installations — System design, installation and commissioning' has been referenced.

Reference	Changes and Commentary
AS 2699.1	The 2020 edition of AS 2699 Part 1 'Built-in components for masonry construction — Wall ties' has been referenced. A note has been included to outline transitional arrangements.
AS 2699.3	The 2020 edition of AS 2699 Part 3 'Built-in components for masonry construction — Lintels and shelf angles (durability requirements)' has been referenced. A note has been included to outline transitional arrangements.
AS/NZS 3500.0	The 2021 edition of AS 3500 Part 0 'Plumbing and drainage — Glossary of terms' has been referenced.
AS/NZS 3500.1	The 2021 edition of AS 3500 Part 1 'Plumbing and drainage — Water services' has been referenced.
AS/NZS 3500.2	Amdt 1 of the 2021 edition of AS 3500 Part 2 'Plumbing and drainage — Sanitary plumbing and drainage (incorporating amendment 1)' has been referenced.
AS/NZS 3500.3	The 2021 edition of AS 3500 Part 3 'Plumbing and drainage — Stormwater drainage' has been referenced. A note has been included to outline transitional arrangements.
AS/NZS 3500.4	The 2021 edition of AS 3500 Part 4 'Plumbing and drainage — Heated water services' has been referenced.
AS 3600	Amdt 2 of the 2018 edition of AS 3600 'Concrete structures (incorporating amendments 1 and 2)' has been referenced.
AS 3740	The 2021 edition of AS 3740 'Waterproofing of domestic wet areas' has been referenced.
AS 3959	Amdts 1 and 2 of the 2018 edition of AS 3959 'Construction of buildings in bushfire-prone areas (incorporating amendments 1 and 2)' has been referenced.
AS 4055	The 2021 edition of AS 4055 'Wind loads for housing' has been referenced.
AS 4072.1	The note to AS 4072 Part 1 has been deleted.
AS 4100	The 2020 edition of AS 4100 'Steel structures' has been referenced.
AS 4200.1	Amdt 1 of the 2017 edition of AS 4200 Part 1 'Pliable building membranes and underlays — Materials (incorporating amendment 1)' has been referenced.
AS 4200.2	Amdts 1 and 2 of the 2017 edition of AS 4200 Part 2 'Pliable building membranes and underlays — Installation (incorporating amendments 1 and 2)' has been referenced.
AS/NZS 4234	The 2021 edition of AS/NZS 4234 'Heated water systems — Calculation of energy consumption' has been referenced.
AS 4254.1	The 2021 edition of AS 4254 Part 1 'Ductwork for air-handling systems in buildings — Flexible duct' has been referenced.
AS/NZS 4256.1	The 1994 edition of AS/NZS 4256 Part 1 'Plastic roof and wall cladding materials — General requirements' has been deleted.
AS/NZS 4256.2	The 1994 edition of AS/NZS 4256 Part 2 'Plastic roof and wall cladding materials — Unplasticized polyvinyl chloride (uPVC) building sheets' has been deleted.
AS/NZS 4256.3	The 1994 edition of AS/NZS 4256 Part 3 'Plastic roof and wall cladding materials — Glass fibre reinforced polyester (GRP)' has been deleted.
AS/NZS 4256.5	The 1996 edition of AS/NZS 4256 Part 5 'Plastic roof and wall cladding materials — Polycarbonate' has been deleted.
AS 4773.2	Amdt 1 of the 2015 edition of AS 4773 Part 2 'Masonry in small buildings — Construction' has been referenced.
AS/NZS 4858	The 2004 edition of AS/NZS 4858 'Wet area membranes' has been referenced.
AS 5146.3	The 2018 edition of AS 5146 Part 3 'Reinforced Autoclaved Aerated Concrete — Construction' has been referenced.
AS 5216	The 2021 edition of AS 5216 'Design of post-installed and cast-in fastenings in concrete' has been referenced.
AS/NZS 5601.1	The 2013 edition of AS/NZS 5601 Part 1 'Gas installations — General installations' has been referenced.

Reference	Changes and Commentary
AIRAH-DA07	The 2021 edition of AIRAH-DA07 ‘Criteria for moisture control design analysis in buildings’ has been referenced.
ASTM E903	The 2012 edition of ASTM E903 ‘Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres’ has been deleted.
ASTM E96	The 2016 edition of ASTM E96 ‘Standard Test Methods for Water Vapor Transmission of Materials’ has been referenced.
ABCB	The 2022 version of the ABCB ‘Fire Safety Verification Method’ Standard has been referenced. As a consequence, the FSVM is deleted as a standalone schedule.
ABCB	The 2022 version of the ABCB ‘Housing Provisions’ Standard has been referenced.
ABCB	The 2022 version of the ABCB ‘Livable Housing Design’ Standard has been referenced.
ABCB	The 2022 version of the ABCB ‘Standard for NatHERS Heating and Cooling Load Limits’ has been referenced.
ABCB	The 2022 version of the ABCB ‘Standard for Whole-of-home Efficiency Factors’ has been referenced.
FPAA101D	The 2021 edition of FPAA101D ‘Automatic Fire Sprinkler System Design and Installation — Drinking Water Supply’ has been referenced.
FPAA101H	Amdt 1 of the 2018 edition of FPAA101H ‘Automatic Fire Sprinkler System Design and Installation — Hydrant Water Supply (incorporating amendment 1)’ has been referenced.
NASH Standard	The 2021 edition of NASH Standard ‘Steel Framed Construction in Bushfire Areas’ has been referenced.
NSF/ANSI/CAN 372	The 2020 edition of NSF/ANS/CAN 372 ‘Drinking Water System Components — Lead Content’ has been referenced.

2 Structure

Part 2.1 Scope and application of Section 2

2.1.1 Scope

[New for 2022]

(1) This Section sets out the *Deemed-to-Satisfy Provisions* for structural stability and resistance (see Part 2.2).

(2) For other structural provisions not included in this Section, refer to the following *Deemed-to-Satisfy Provisions* in NCC Volume Two:

- (a) Site preparation — see H1D3.
- (b) Footings and slabs — see H1D4.
- (c) Masonry — see H1D5.
- (d) Framing — see H1D6.
- (e) Roof and wall cladding — see H1D7.
- (f) Glazing — see H1D8.
- (g) Earthquake areas — see H1D9.
- (h) *Flood hazard areas* — see H1D10.
- (i) Attachment of decks and balconies to *external walls* of buildings — see H1D11.

2.1.2 Application

[New for 2022]

The application of Section 2 is subject to the following:

- (a) The Governing Requirements of NCC Volume Two.
- (b) The State and Territory variations, additions and deletions contained in the Schedules to the ABCB Housing Provisions and NCC Volume Two.

Explanatory Information

In NCC 2019, the content of Section 2 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in Part 3.0 of NCC Volume Two.

Part 2.2 Structural provisions

2.2.1 Application of Part 2.2

[New for 2022]

Part 2.2 need not be complied with if, for the purposes of H1D2(b) only, the *Deemed-to-Satisfy Provisions* of H1D3 to H1D11 relating to structural elements are complied with.

2.2.2 Resistance to actions

[2019: 3.0.2]

The resistance of a building or structure must be greater than the most critical action effect resulting from different combinations of actions, where—

(a) the most critical action effect on a building or structure must be determined in accordance with 2.2.3 and the general design procedures contained in AS/NZS 1170.0; and

(b) the resistance of a building or structure is determined in accordance with 2.2.4.

Explanatory Information

A building or structure must be designed to resist the most critical effect resulting from different combinations of actions, taking into consideration—

- the probability of simultaneous occurrence of two or more actions; and
- the levels of reliability of the structure when subject to combined actions; and
- the characteristics of the action.

Determining the levels of reliability of the structure when subject to combined actions should be consistent with the levels of reliability implicit in the design events for natural phenomenon. When designing for the maximum combined actions, a principle frequently adopted is that the maximum is likely to occur when at least one of the actions is at its maximum value.

WA 2.2.3

2.2.3 Determination of individual actions

[2019: 3.0.3]

The magnitude of individual actions must be determined in accordance with the following:

(a) Permanent actions:

(i) the design or known dimensions of the building or structure; and

(ii) the unit weight of the construction; and

(iii) AS/NZS 1170.1.

(b) Imposed actions:

(i) the known loads that will be imposed during the occupation or use of the building or structure; and

(ii) *construction activity actions*; and

(iii) AS/NZS 1170.1.

(c) Wind, snow and earthquake actions:

(i) the applicable annual probability of design event for safety, determined by—

(A) assigning the building or structure an Importance Level in accordance with Table 2.2.3a; and

(B) determining the corresponding annual probability of exceedance for safety in accordance with Table

2.2.3b; and

(ii) for wind actions, AS/NZS 1170.2 or AS 4055; and

(iii) for snow and ice actions, AS/NZS 1170.3; and

(iv) for earthquake actions, AS 1170.4.

(d) Actions not covered in (a), (b) and (c) above:

(i) the nature of the action; and

(ii) the nature of the building or structure; and

(iii) the Importance Level of the building or structure determined in accordance with Table 2.2.3a; and

(iv) AS/NZS 1170.1.

(e) For the purposes of (d) the actions include but are not limited to—

(i) liquid pressure action; and

(ii) ground water action; and

(iii) rainwater action (including ponding action); and

(iv) earth pressure action; and

(v) differential movement; and

(vi) time dependent effects (including creep and shrinkage); and

(vii) thermal effects; and

(viii) ground movement caused by—

(A) swelling, shrinkage or freezing of the subsoil; and

(B) landslip or subsidence; and

(C) siteworks associated with the building or structure; and

(ix) *construction activity actions*.

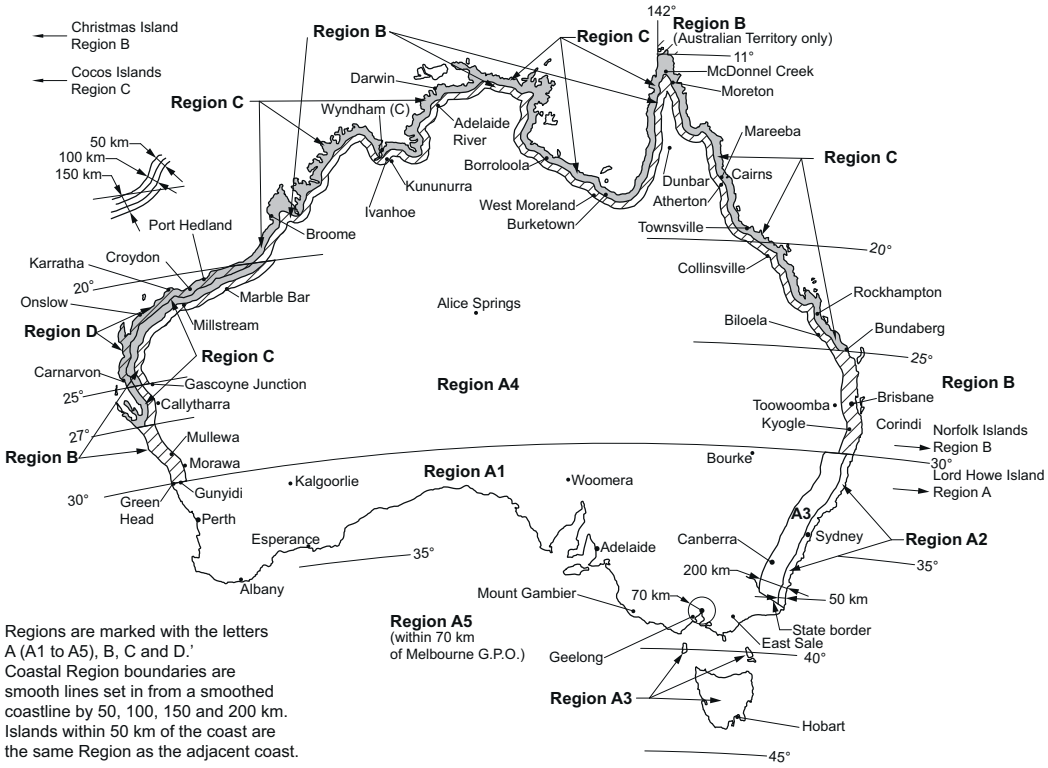
Table 2.2.3a: Importance Levels of buildings and structures

Importance Level	Building types
1	Buildings or structures presenting a low degree of hazard to life and *other property* in the case of failure.
2	Buildings or structures not included in Importance Level 1.

Table 2.2.3b: Design events for safety—annual probability of exceedance

Importance Level	Non-cyclonic wind	Cyclonic wind	Snow	Earthquake
1	1:100	1:200	1:100	1:250
2	1:500	1:500	1:150	1:500

Figure 2.2.3: Wind regions



Explanatory Information: Permanent and imposed actions

Permanent actions include the dead loads of the building or structure. These include the load imposed by the building's components inclusive of the forces imposed by the floors, walls, roofs, suspended ceilings, etc.

Imposed actions include live loads on the building or structure. These include the load arising from construction activity and the intended use or function of the building or structure.

Explanatory Information: Application of AS 1170.4

There are certain limitations on the application to domestic structures such as Class 1a and Class 1b buildings in Appendix A of AS 1170.4. These limitations include building height, roof slope, etc. For additional information refer to Appendix A of AS 1170.4.

Explanatory Information: Importance Levels (Table 2.2.3a)

Table 2.2.3a provides a generic description of building types to which Importance Levels have been assigned. The "Importance Level" concept is applicable to building structural safety only. More specific examples are provided in the following list. The examples are indicative and not exhaustive.

- Importance Level 1: Isolated minor Class 10a buildings and Class 10b structures.
- Importance Level 2: Class 1 buildings; Class 10a buildings and Class 10b structures associated with Class 1 buildings.

Importance Levels must be assigned on a case by case basis and relate to the hazards to human life and *other property* in the event of the structure's failure. For example—

(a) Importance Level 1 is for minor isolated structures that rarely contain people, are not required as part of normal infrastructure and present a low risk to life and *other property*.

(b) Importance Level 2 includes domestic housing and structures intended to contain reasonable numbers of people under normal operations.

Explanatory Information: Construction in cyclonic areas

The intent of building construction in cyclonic areas (see Figure 2.2.3) is to ensure the structure has sufficient strength to transfer wind forces to the ground with an adequate safety margin to prevent collapse of the building and the building being lifted, or slid off its foundations.

To resist these forces it is necessary to have—

- an anchorage system, where the roof is connected by the walls to the footings by a chain of connections; and
- a bracing system to prevent horizontal collapse due to wind forces; and
- continuity of the system where each structural element is interlocked to its adjoining structural element throughout the building.

Explanatory Information: Anchorage

Anchorage of the system is achieved by using a variety of connectors. Each connector must be capable of carrying the uplift force, because the ability of the building to resist the wind forces is directly related to its weakest link.

WA 2.2.4

2.2.4 Determination of structural resistance of materials and forms of construction

[2019: 3.0.4]

The following requirements, or any combination of them, must be used to determine the structural resistance of materials and forms of construction as appropriate:

(a) Earthworks: H1D3(1).

(b) Earth retaining structures: H1D3(2).

(c) Termite risk management: H1D3(3).

(d) Concrete construction (including slabs and footings, and reinforced and prestressed concrete structures): H1D4.

(e) Piled footings: H1D12.

(f) Post-installed and cast-in fastenings in concrete: AS 5216.

(g) Masonry (including masonry veneer, *unreinforced masonry* and *reinforced masonry*): H1D5.

(h) Steel construction (including steel framing and structural steel members): H1D6.

(i) Timber construction (including design of timber structures, timber framing and design of nail-plated timber roof trusses): H1D6.

(j) Composite steel and concrete: AS/NZS 2327.

(k) Aluminium construction:

  (i) AS/NZS 1664.1.

  (ii) AS/NZS 1664.2.

(l) Roof construction (including plastic sheeting, roofing tiles, metal roofing and terracotta, fibre-cement and timber slates and shingles): H1D7.

(m) Wall cladding: H1D7.

(n) Glazed assemblies: H1D8.

(o) Barriers and handrails (including stairway and ramp construction):

  (i) H5D3; and

  (ii) AS/NZS 1170.1 for the determination of loading forces on a barrier.

(p) Attachment of decks and balconies to *external walls* of buildings: H1D11.

(q) Garage doors and other large access doors in openings not more than 3 m in height in *external walls* of buildings determined as being located in wind region C or D in accordance with Figure 2.2.3: AS/NZS 4505.

(r) For *high wind areas*: requirements listed in (a) to (q) as appropriate or the Northern Territory Deemed to Comply

Standards Manual.

Explanatory Information

The weight of roof or ceiling insulation, particularly if additional ceiling insulation is used for compliance with the energy efficiency provisions, needs to be considered in the selection of plasterboard, plasterboard fixings and building framing.

2.2.5 Structural software

[2019: 3.0.5]

(1) Structural software used in computer aided design of a building or structure that uses design criteria based on the *Deemed-to-Satisfy Provisions* of NCC Volume Two and the ABCB Housing Provisions, including its referenced documents, for the design of steel or timber trussed roof and floor systems and framed building systems, must comply with the ABCB Protocol for Structural Software.

(2) The requirements of (1) only apply to structural software used to design steel or timber trussed roof and floor systems and framed building systems for buildings within the following geometrical limits:

- (a) The distance from ground level to the underside of eaves must not exceed 6 m.
- (b) The distance from ground level to the highest point of the roof, neglecting chimneys, must not exceed 8.5 m.
- (c) The building width including roofed verandahs, excluding eaves, must not exceed 16 m.
- (d) The building length must not exceed five times the building width.
- (e) The roof pitch must not exceed 35 degrees.

(3) The requirements of (1) do not apply to design software for individual frame members such as electronic tables similar to those provided in—

- (a) AS 1684 Parts 2, 3 and 4; or
- (b) NASH Standard Residential and Low-Rise Steel Framing, Part 2.

Explanatory Information

2.2.5 does not apply where a software package simply eliminates manual calculations and the process of the package requires identical methodology as that undertaken manually, e.g. AS 1684 span tables and bracing calculations.

3 Site preparation

Part 3.1 Scope and application of Section 3

3.1.1 Scope

[New for 2022]

(1) This Section sets out the *Deemed-to-Satisfy Provisions* for—

(a) earthworks — Part 3.2; and

(b) drainage — Part 3.3; and

(c) termite risk management — Part 3.4.

(2) For other site preparation provisions not included in this Section, refer to NCC Volume Two: H1D3(2) Earth retaining structures.

Explanatory Information

These provisions relate to general *site* preparation for footings, services, drainage and installation of termite management systems. It should be noted that other construction methods may be used to achieve the same results as specified in this Part provided they comply with the appropriate *Performance Requirement*.

The provisions in Part 3.2 will enable earthworks associated with the construction of a building to be carried out safely and to avoid potential damage to the subject building, adjoining structures and property through the soil collapsing or subsiding. Exceptional *site* conditions (including the effects of torrential rain) may need special consideration and additional advice from appropriately qualified people should be considered.

State and Territory legislation may also have requirements that apply to earthworks, especially in relation to adjoining property and notification of owners of that property. Advice should be obtained from the *appropriate authority* before commencement of works.

The requirements of this Part are to be read in conjunction with H1D3(2) of NCC Volume Two where an earth retaining structure is installed.

NSW 3.1.2

3.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC 2022 Volume Two.

(b) Any conditions set out within the following *Deemed-to-Satisfy Provisions* of NCC Volume Two:

(i) H1D3(1), for earthworks.

(ii) H2D2, for drainage.

(c) The State and Territory variations, additions and deletions contained in the Schedules to the ABCB Housing Provisions and NCC Volume Two.

Explanatory Information

In NCC 2019, the content of Section 3 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Parts 3.1.1, 3.1.3 and 3.1.4 of NCC 2019 Volume Two.

NCC 2019 Volume Two did not include an acceptable construction practice for Part 3.1.2.

Part 3.2 Earthworks

3.2.1 Un-retained bulk earthworks – site cut and fill

[2019: 3.1.1.1, 3.1.1.2]

(1) A *site* cut using an un-retained embankment must be—

(a) within the allotment; and

(b) not within the zone of influence of any existing structure on the property, or the allotment boundary as defined in Table 3.2.1 and Figure 3.2.1a; and

(c) not deeper than 2 m from the natural ground level at any point.

(2) Fill, using an un-retained embankment must—

(a) be placed within the allotment; and

(b) be placed at a gradient which complies with Table 3.2.1 and Figure 3.2.1b; and

(c) be placed and mechanically compacted in layers not more than 150 mm; and

(d) be not more than 2 m in height from the natural ground level at any point; and

(e) where used to support footings or slabs, be placed and compacted in accordance with Part 4.2; and

(f) have *surface water* diverted away from any existing structure on the property or adjoining allotment in accordance with 3.3.3.

Table 3.2.1: Un-retained embankment slope ratios

Soil class (see 4.2.2 for material description)	Site cut (excavation) (maximum embankment slope ratio, angle of site cut H:L Note 1)	Compacted fill (maximum embankment slope ratio, angle of batter H:L Note 1)
Stable rock (Class A)	8:1	3:3
Sand (Class A)	1:2	1:2
Firm clay (Class M-E)	1:1	1:2
Soft clay (Class M-E)	2:3	Not suitable

Table Notes

(1) See Figures 3.2.1a and 3.2.1b for some examples of un-retained embankment slopes.

(2) Retaining walls must be installed in accordance with H1D3(2) where—

(a) the embankment slope is steeper than described in this Table; or

(b) the soil type is not described in this Table.

Figure 3.2.1a: Site cut and fill using un-retained embankments — Site cut commencing at the allotment boundary or affecting an adjoining property

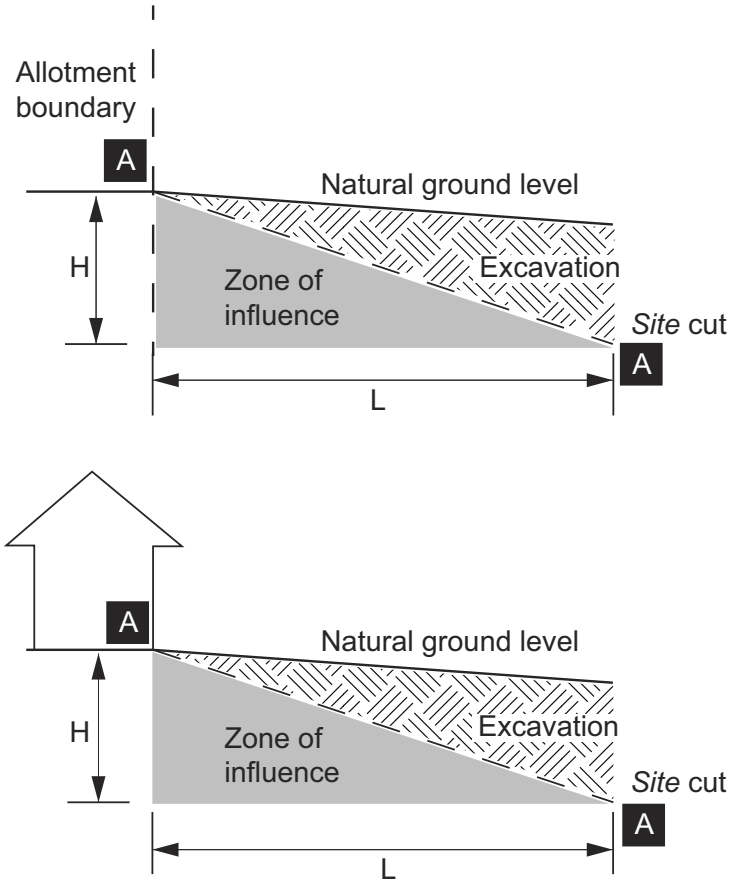


Figure Notes

(1) The angle for line A-A is defined as the maximum embankment slope ratio H:L in Table 3.2.1 and is taken from the bottom of the footing and identifies the area suitable for excavation.

(2) Consideration must be given for drainage of *surface water*, particularly where fill affects an adjoining property.

Figure 3.2.1b: **Site cut and fill using un-retained embankments — Fill commencing at the allotment boundary or affecting an adjoining property**

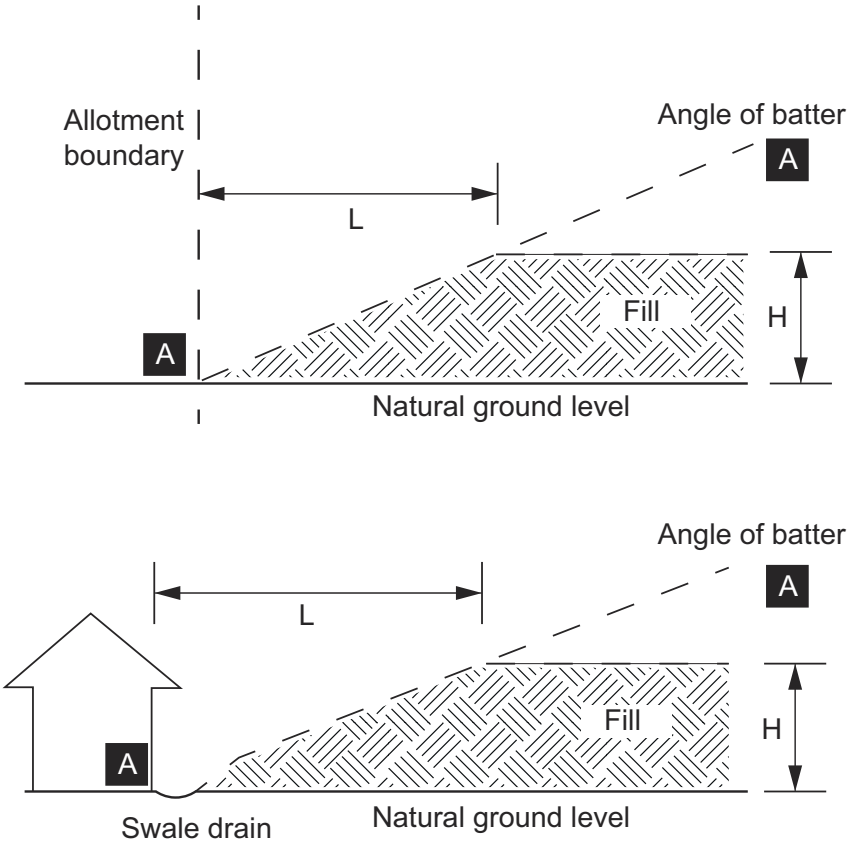


Figure Notes

(1) The angle for line A-A is defined as the maximum embankment slope ratio H:L in Table 3.2.1 and is taken from the bottom of the footing and identifies the area suitable for fill.

(2) Consideration must be given for drainage of *surface water*, particularly where fill affects an adjoining property.

Part 3.3 Drainage

3.3.1 Application

[New for 2022]

(1) Part 3.3 is subject to the limitations set out in H2D2(b).

(2) Part 3.3 need not be complied with if H2D2(a) is complied with.

3.3.2 Drainage requirements

[2019: 3.1.3.2]

Drainage systems must be installed as follows:

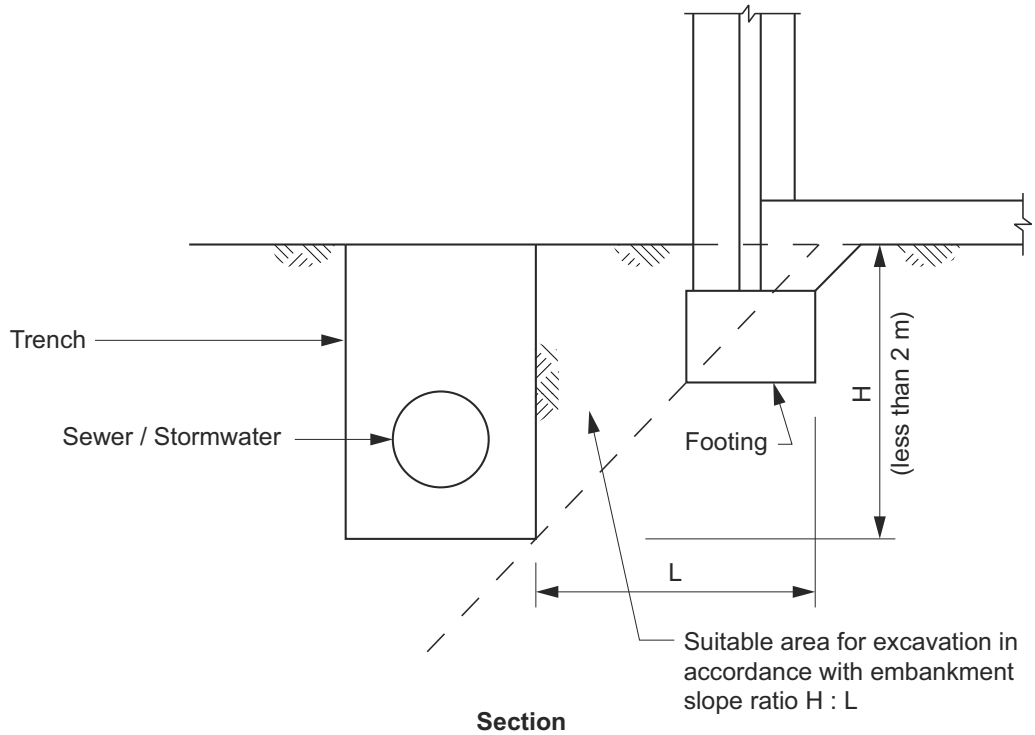
(a) Areas adjoining and under buildings — *surface water* drainage in accordance with 3.3.3; and

(b) Where *site* conditions exist that create a need for subsoil water to be diverted away from footings, basements, retaining walls etc — sub-soil drainage in accordance with 3.3.4; and

(c) Where underground drainage from roof areas is *required* or permitted — underground stormwater drainage in accordance with 3.3.5; and

(d) Excavation for drains adjacent to existing footings must be within the area described in Figure 3.3.2 as being safe for excavation.

Figure 3.3.2: Excavation for drains adjacent to footings



Section

Figure Notes

(1) Any excavation below the area defined as being safe for excavation will need additional protection measures to be determined by appropriately qualified persons.

(2) Slope ratio H:L is determined using Table 3.2.1.

3.3.3 Surface water drainage

[2019: 3.1.3.3]

Surface water must be diverted away from a Class 1 building as follows:

(a) Slab-on-ground — finished ground level adjacent to a building: the external finished surface surrounding the slab must be drained to move *surface water* away from the building and graded to give a slope of not less than (see Figure 3.3.3a) —

(i) 25 mm over the first 1 m from the building—

(A) in *low rainfall intensity areas* for surfaces that are reasonably impermeable (such as concrete or clay paving); or

(B) for any reasonably impermeable surface that forms part of an access path or ramp provided for the purposes of Clauses 1.1(2) or (4)(c) of the ABCB Standard for Livable Housing Design; or

(ii) 50 mm over the first 1 m from the building in any other case.

(b) Slab-on-ground — finished slab heights: the height of the slab-on-ground above external finished surfaces must be not less than (see Figure 3.3.3a) —

(i) 100 mm above the finished ground level in *low rainfall intensity areas* or sandy, well-drained areas; or

(ii) 50 mm above impermeable (paved or concrete) areas that slope away from the building in accordance with (a); or

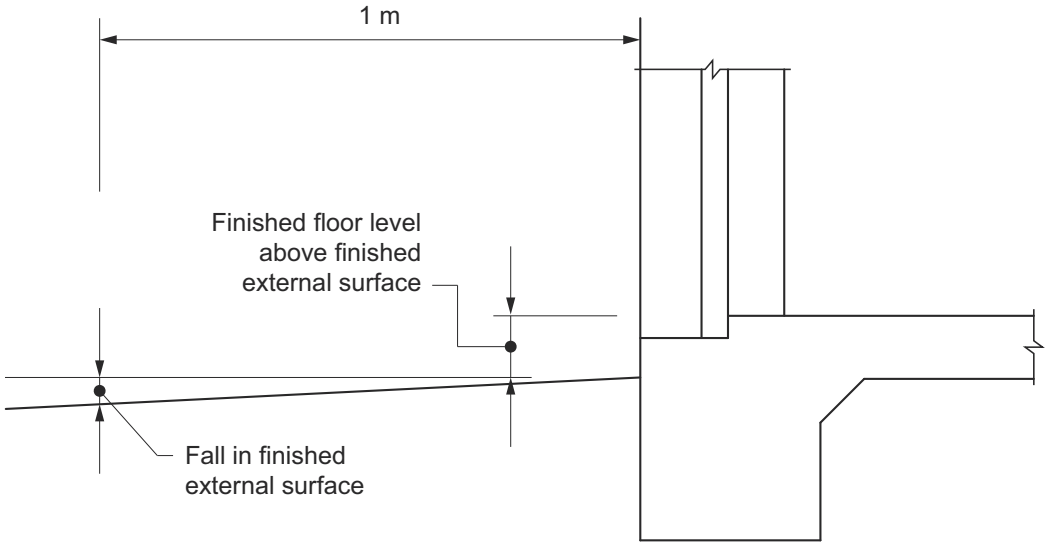
(iii) 150 mm in any other case.

(c) The ground beneath suspended floors must be graded so that the area beneath the building is above the adjacent external finished ground level and *surface water* is prevented from ponding under the building (see Figure 3.3.3b).

Limitations

3.3.3 does not apply to a landing area provided for the purposes of Clause 2.3 of the ABCB Standard for Livable Housing Design, except for a channel drain or drainage surface provided under Clause 2.4 of that standard.

Figure 3.3.3a: Site surface drainage



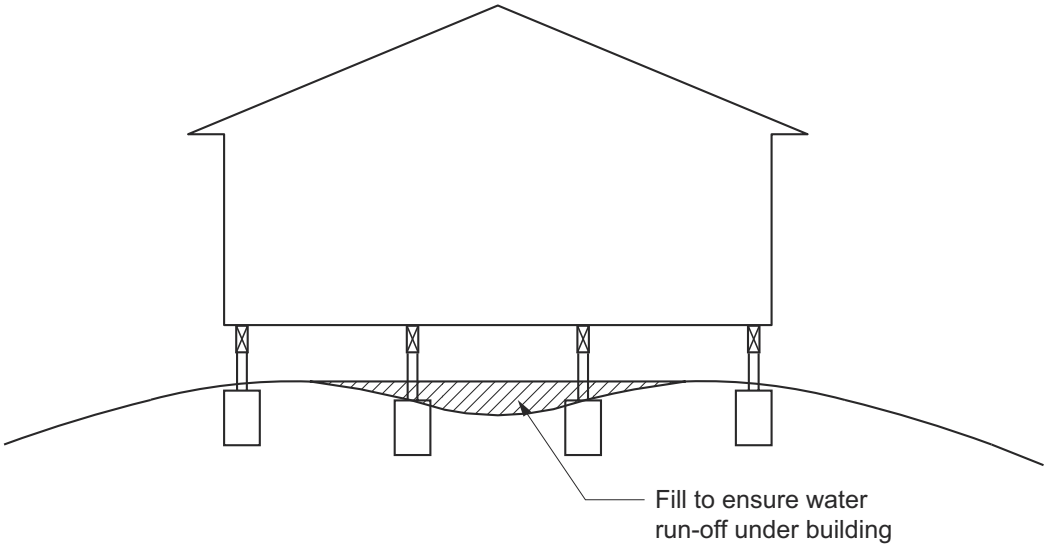
Elevation

Figure Notes

(1) For fall in finished external surface, see 3.3.3(a).

(2) For finished floor level above finished external surface, see 3.3.3(b).

Figure 3.3.3b: Grading of ground under suspended floors



Section

Explanatory Information

The appropriate slab height above finished ground level and the slope of the external finished surface surrounding the slab may vary depending on the following:

- The local plumbing requirements; in particular the height of the overflow relief gully relative to *drainage* fittings and ground level (to work effectively they must be a minimum of 150 mm below the lowest sanitary fixture).
- The run-off from storms, particularly in areas of high rainfall intensity, and the local topography.
- The effect of excavation on a cut and fill *site*.
- The possibility of flooding.
- Termite risk management provisions.

Clearances between wall cladding and the finished ground level are provided in 7.5.7.

3.3.4 Subsoil drainage

[2019: 3.1.3.4]

Where a subsoil drainage system is installed to divert subsurface water away from the area beneath a building, the subsoil drain must—

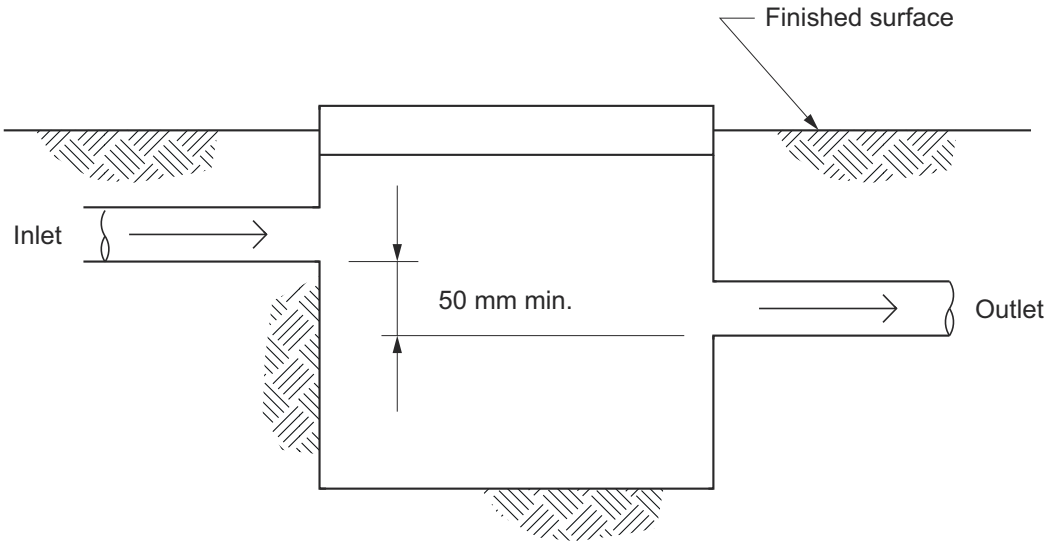
(a) be graded with a uniform fall of not less than 1:300; and

(b) discharge into an external silt pit or sump with—

(i) the level of discharge from the silt pit or sump into an impervious drainage line not less than 50 mm below the invert level of the inlet (see Figure 3.3.4); and

(ii) provision for cleaning and maintenance.

Figure 3.3.4: Construction of silt pits



Explanatory Information

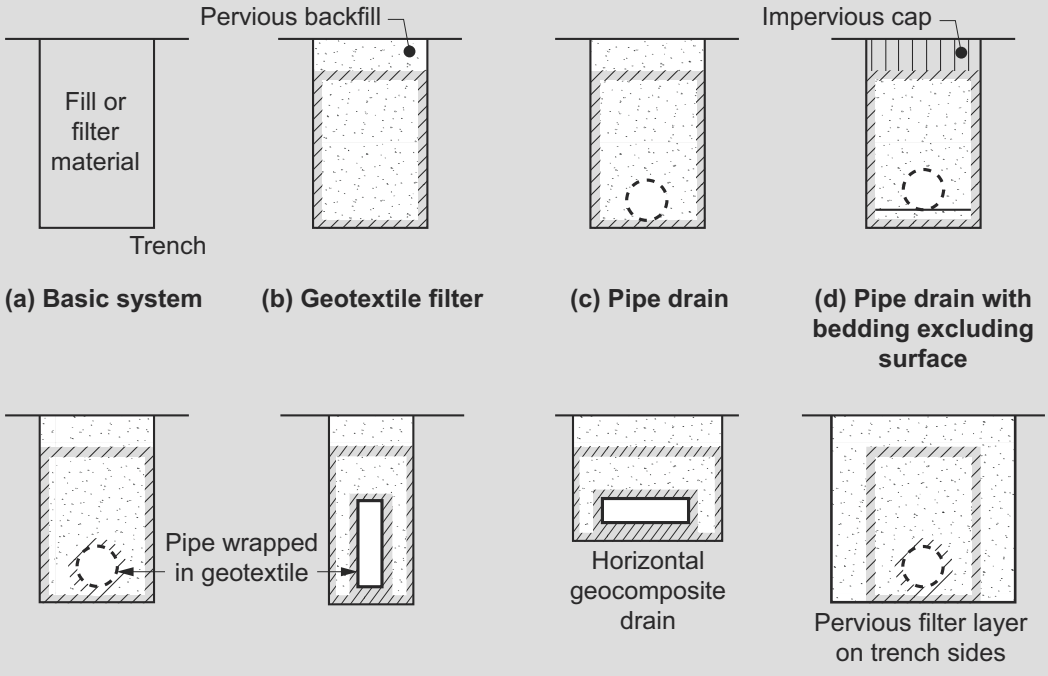
Subsoil drainage systems may need to be installed where subsurface water movement could damage buildings or cause loss of amenity through the build up of excessive moisture or lateral water pressure. Typical locations of subsoil drainage systems are on the uphill side of cut and fill sites, adjacent to deep footings, behind retaining walls and adjacent to basement walls.

The design and installation of subsoil drainage systems should take into account the nature of the soil and the anticipated water level, quantity and movement. In some cases, detailed investigations involving excavations, field observations and soil tests may be necessary to determine the appropriate solution. Typical subsoil drain configurations are shown in Figure 3.3.4 (explanatory).

In clay soil, subsoil drains can alter the long-term moisture content in the soil, adversely affecting the building *foundation* by removing or, in some cases, introducing water. In such conditions, subsoil drains should only be used where there are no other options for dealing with subsoil water.

Additional guidance on subsoil drainage systems can be found in AS/NZS 3500.3 and AS 2870.

Figure 3.3.4 (explanatory): Typical subsoil drain configurations



(a) Basic system **(b) Geotextile filter** **(c) Pipe drain** **(d) Pipe drain with bedding excluding surface**

(e) Geotextile around pipe **(f) Geocomposite drain in narrow trench** **(g) Geocomposite drain in shallow trench** **(h) Soil filter layer to avoid clogging of geotextile**

3.3.5 Stormwater drainage

[2019: 3.1.3.5]

Where a stormwater *drainage* system is installed, it must comply with the following:

(a) The position and manner of discharge of the stormwater *drainage* system must be to the satisfaction of the *appropriate authority*.

(b) The stormwater *drainage* system must be designed so that any overflow during heavy rain periods is prevented from flowing back into the building.

(c) Cover to stormwater drains: the cover to 90 mm Class 6 UPVC stormwater drains installed underground must be not less than—

(i) under soil — 100 mm; or

(ii) under paved or concrete areas — 50 mm; or

(iii) under areas subject to light vehicle traffic—

(A) reinforced concrete — 75 mm; or

(B) paved — 100 mm.

Explanatory Information: Discharge points

The manner of discharge of stormwater drainage systems includes consideration of discharge points. Some examples of discharge points which may be acceptable to the *appropriate authority* are—

- a legal discharge point at the allotment boundary; or
- on-site catchment systems, such as stormwater tanks; or
- on-site soil *drainage* systems, such as soaker wells.

Explanatory Information: Depth of cover

Different depths of soil cover (or no cover at all) can be achieved using other types of pipes. The cover specified is measured from the top of the pipe to either the finished ground level or, in the case of paved or concreted areas, to the underside of the paving or concrete.

Part 3.4 Termite risk management

3.4.1 Requirements for termite management systems

[2019: 3.1.4.2]

(1) The requirements of this Part apply where:

(a) a Class 1 or 10 building is constructed in an area where subterranean termites are known to present a potential risk of attack; and

(b) a *primary building element* of a Class 1 or 10 building is considered susceptible to termite attack.

NT 3.4.1(2)

(2) For the purposes of (1), a *primary building element* consisting entirely of, or a combination of, any of the following materials is considered not subject to termite attack:

(a) Steel, aluminium or other metals.

(b) Concrete.

(c) Masonry.

(d) Fibre-reinforced cement.

(e) Timber — naturally termite resistant in accordance with Appendix C of AS 3660.1.

(f) Timber — preservative treated in accordance with Appendix D of AS 3660.1.

QLD 3.4.1(3)

QLD 3.4.1(4)

QLD 3.4.1(5)

QLD 3.4.1(6)

Explanatory Information

- 3.4.1(1): Termites are not considered to be a risk in Tasmania and a lesser risk in parts of Victoria. The *appropriate authority* may have records of termite activity for each area and may be able to advise on whether termite risk management is needed.
- 3.4.1(2): Where individual *primary building elements* are susceptible to termite attack and the remainder of the *primary building elements* are constructed of termite resistant materials, only the susceptible elements need to be provided with a termite management system.
- 3.4.1(2)(c): states that masonry is not subject to termite attack, however termites may gain entry through mortar and other joints.
- Explanatory Figure 3.4.1 provides a flowchart for identifying if a termite management system is *required*.

Figure 3.4.1 (explanatory): Flow chart for identifying if a termite management system is required

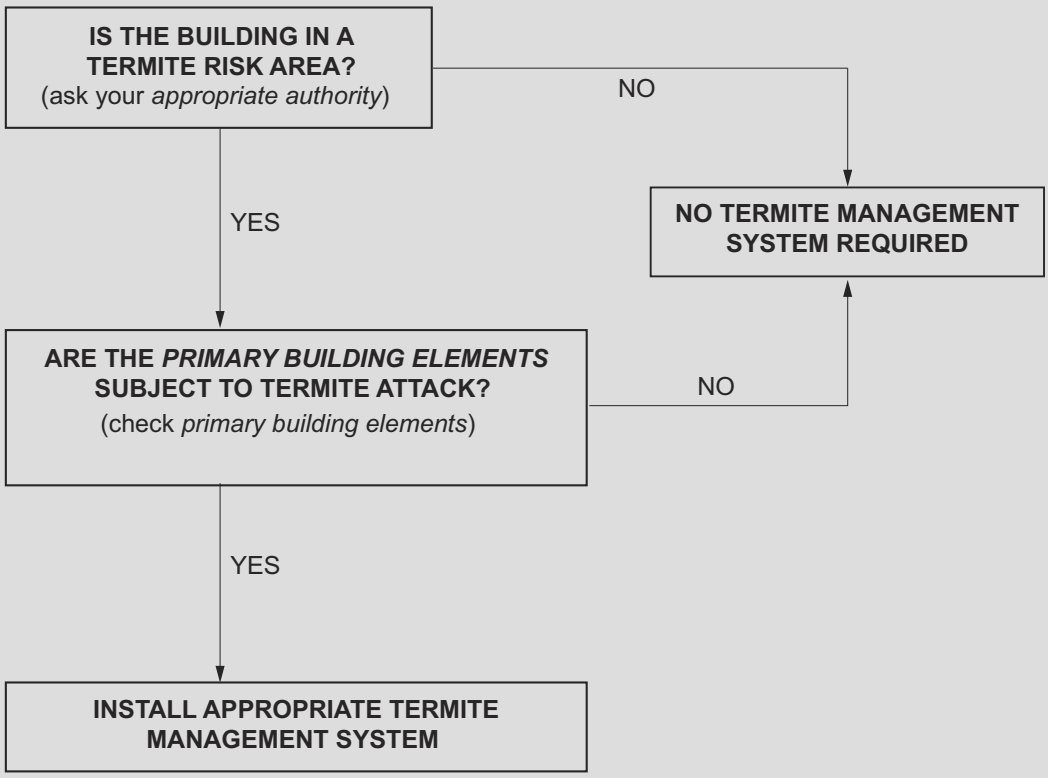


Figure Notes

To check *primary building elements*, see 3.4.1(2).

NT 3.4.2

QLD 3.4.2

3.4.2 Termite management systems

[2019: 3.1.4.3]

Where a termite management system is required it must—

(a) be selected appropriate to Table 3.4.2; and

(b) comply with—

(i) AS 3660.1; or

(ii) have been tested and passed the tests *required* by Section 5 of AS 3660.3; and

(c) have a durable notice installed in accordance with 3.4.3; and

(d) where a chemical termite management system is used, the chemical must be included on the *appropriate authority's* pesticides register.

Table 3.4.2: Acceptable termite management systems and components

Building element	Termite management system or component options
Concrete slab-on-ground: slab perimeter or *external wall* perimeter	Slab edge exposure
	Sheet material
	Granular material
	Chemical

Building element	Termite management system or component options
Concrete slab-on-ground: penetrations/control joints/area beneath the slab (see Note)	Sheet material
	Granular material
	Chemical
Suspended floors	Sheet material
	Granular material
	Chemical
Attachments to buildings	Termite management system to the attachment
	Inspection zone between attachment and building

Table Notes

The entire area beneath the slab must be treated when the slab-on-ground is not designed and constructed in accordance with AS 2870 or AS 3600.

Explanatory Information: Validity of test results

3.4.2(b)(ii) provides the option of having a chemical termite management system tested to AS 3660.3. In order for the test results to remain valid, the system would then have to be installed as tested.

Explanatory Information: Component

A component of a system as referred to in Table 3.4.2 is one that, when used in combination with other components, will form a 'full system'.

For example, if a concrete slab is used as a component of a system, it in itself will not provide a complete termite management system. Depending on the construction methods and the *site* conditions, additional requirements will be necessary for service penetrations through the concrete slab. Each of these are 'components', when integrated, will form a 'full system'.

Explanatory Information: Integrity of the termite management system

There are more than 350 species of termites in Australia, about 30 of which achieve economic importance by causing costly damage to building structures. Due to the nature of termites, it is extremely difficult to prevent them gaining access to a building.

In addition to correct installation of a termite management system, its effectiveness will rely on regular maintenance and competent inspection.

Explanatory Information: Attachments to buildings

Attachments referred to in Table 3.4.2 include downpipes, service pipes, steps, verandahs, porches, access ramps, carports, trellises, decks, *heated water* systems, air-conditioners and the like.

3.4.3 Durable notice

[2019: 3.1.4.4]

A durable notice must be permanently fixed to the building in a prominent location, such as in a meter box or the like, indicating—

(a) the termite management system used; and

(b) the date of installation of the system; and

(c) where a chemical is used, its life expectancy as listed on the *appropriate authority's* register label; and

(d) the installer's or manufacturer's recommendations for the scope and frequency of future inspections for termite activity.

Explanatory Information: Appropriate authority

For the purpose of the pesticides register, the *appropriate authority* is the government body responsible for the registration of pesticides. Currently, the Australian Pesticides and Veterinary Medicines Authority (APMVA) coordinates the registration scheme.

Explanatory Information: Durable notice

Where a durable notice is *required* by 3.4.3, it must be fixed to the building in a prominent location advising the building occupants that the system should be inspected and maintained.

The notice should be clearly written, on a material that will not deteriorate or fade over time and be located in or near the electrical meter box or similar location so that it can be easily seen and read by future owners of the building. Additional information may be included if desired by the person placing the notice.

4 Footings and slabs

Part 4.1 Scope and application of Section 4

4.1.1 Scope

[New for 2022]

This Section sets out the *Deemed-to-Satisfy Provisions* for footings and slabs.

Explanatory Information

This Section specifies the requirements for the excavation and filling for the footing or slab together with the construction of various alternative concrete slab and footing configurations. The slab and footing configurations detailed in this Section are only suitable for the specified soil classifications. The requirements contained in the remainder of this Section are more general and may be applied to all slab and footing construction.

The requirements of this Section are to be read in conjunction with Part 6.2. The Part 6.2 subfloor ventilation requirements apply to the subfloor space of all suspended floors of a building or deck, including but not limited to, timber and steel-framed subfloors and suspended concrete slabs.

4.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC 2022 Volume Two.

(b) Any conditions set out within the following *Deemed-to-Satisfy Provisions* of NCC Volume Two: H1D4(2), for footings and slabs.

(c) The State and Territory variations, additions and deletions contained in the Schedules to the ABCB Housing Provisions and NCC Volume Two.

Explanatory Information

In NCC 2019, the content of Section 4 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Part 3.2 of NCC 2019 Volume Two.

4.1.3 Explanation of terms

[New for 2022]

Figures 4.1.3a, 4.1.3b and 4.1.3c depict footing and slab members and associated terminology used to describe them in Part 4.2 of the ABCB Housing Provisions.

Figure 4.1.3a: Footing and slab members and associated terminology: diagram 1

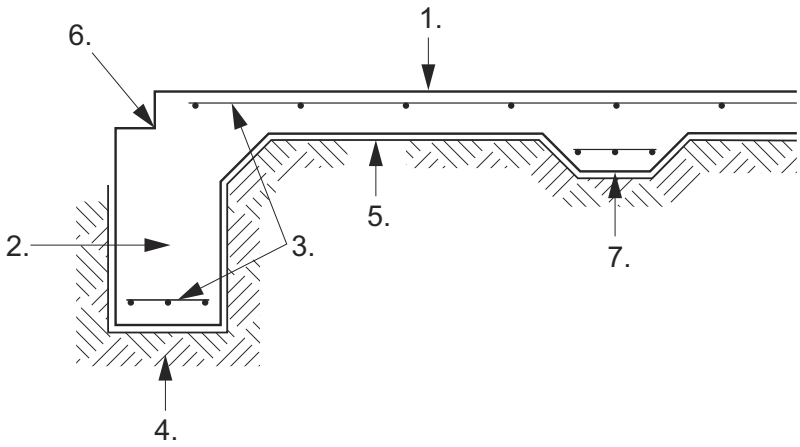


Figure Notes

(1) Slab (monolithic).

(2) Deepened edge beam.

(3) Reinforcement.

(4) *Foundation*.

(5) Vapour barrier/damp-proofing *membrane*.

(6) Edge rebate.

(7) Internal beam (thickening).

Figure 4.1.3b: Footing and slab members and associated terminology: diagram 2

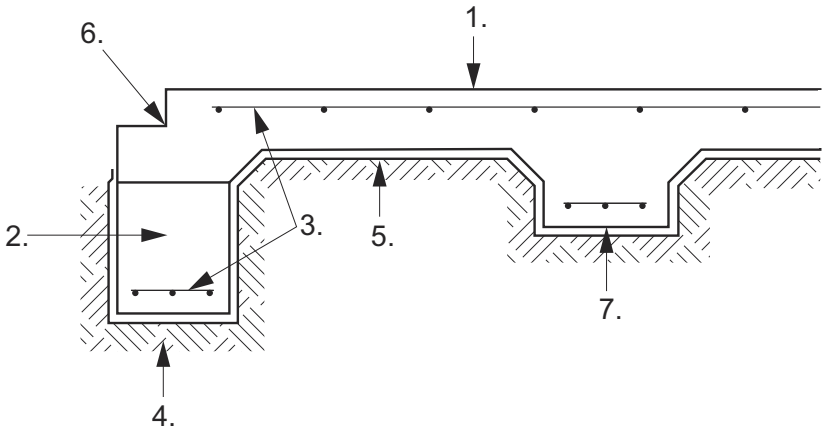


Figure Notes

(1) Slab.

(2) Deepened edge beam and slab.

(3) Reinforcement.

(4) *Foundation*.

(5) Vapour barrier/damp-proofing *membrane*.

(6) Edge rebate.

(7) Internal beam (thickening).

Figure 4.1.3c: Footing and slab members and associated terminology: diagram 3

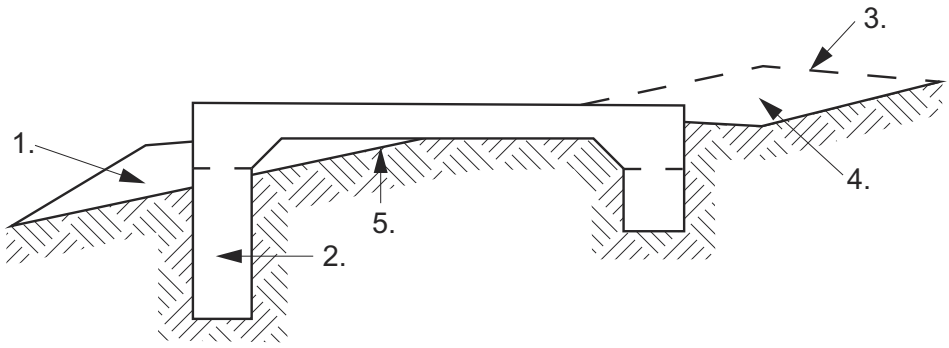


Figure Notes

(1) *Controlled fill*.

(2) Deepened edge beam and slab.

(3) Natural ground line above cut.

(4) Cut.

(5) *Foundation* (natural ground below fill).

Part 4.2 Footings, slabs and associated elements

4.2.1 Application

[New for 2022]

Part 4.2 is subject to the limitations set out in H1D4(2).

4.2.2 Site classification

[2019: 3.2.4.1]

The *foundations* where footings and slabs are to be located must be classified in accordance with AS 2870.

Explanatory Information

Explanatory Table 4.2.2 provides a general description of *foundation* soil types that will assist in the classification of a *site*. More detailed information, including differentiation between classifications, can be found in AS 2870 or alternatively contact the *appropriate authority*.

Due to the limitations of this Part, if a *site* is classified H, E or P then reference must be made to AS 2870 for design and construction information.

Table 4.2.2 (explanatory): General definition of site classes

Class	*Foundation*
A	Most sand and rock *sites* with little or no ground movement from moisture changes
S	Slightly reactive clay *sites* with only slight ground movement from moisture changes
M	Moderately reactive clay or silt *sites* which can experience moderate ground movement from moisture changes
H	Highly reactive clay *sites* which can experience high ground movement from moisture changes
E	Extremely reactive clay *sites* which can experience extreme ground movement from moisture changes
A to P	Filled *sites* — see AS 2870
P	*Sites* which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive *sites* subject to abnormal moisture conditions or *sites* which cannot be classified otherwise.

Table Notes

(1) For Class M, further division based on the depth of expected movement is *required*.

(2) For deep-seated movement, characteristic of dry climates and corresponding to a design depth of suction change H_S, equal to or greater than 3 m, the classification must be M-D.

(3) If classification M-D is established due to further division, design of footings and slabs is beyond the scope of the ABCB Housing Provisions and reference must be made to AS 2870 for design and construction information.

NSW 4.2.3

4.2.3 Excavation for footings

[2019: 3.2.2.1]

(1) Excavation for footings, including thickenings for slabs and pads must be clean cut with vertical sides, wherever possible.

(2) The base of the excavation must be—

(a) for flat *sites*, generally level but may slope not more than 1:40 to allow excavations to drain; and

(b) for sloping *sites* at an angle of not more than 1:10; and

(c) for stepped footings in accordance with 4.2.7.

(3) Footing excavations must be free of loose earth, tree roots, mud or debris.

(4) Topsoil containing grass roots must be removed from the *site* of the *foundation*.

(5) Excavation depths and soil cuts must comply with Part 3.2.

(6) On loose sand *sites* or *sites* subject to wind or water erosion, the depth below *finished ground level* to the bottom of footings must be not less than 300 mm.

(7) The height of a finished slab-on-ground must be in accordance with 3.3.3(b).

4.2.4 Filling under concrete slabs

[2019: 3.2.2.2]

Filling placed under a slab (except where the slab is suspended) must comply with the following:

(a) Filling must be either *controlled fill* or *rolled fill* as follows:

(i) Sand used in *controlled fill* or *rolled fill* must not contain any gravel size material and achieve a blow count of 7 or more per 300 mm using the test method described in AS 1289.6.3.3.

(ii) Clay used in *controlled fill* or *rolled fill* must be moist during compaction.

(iii) *Controlled fill*:

(A) Sand fill up to 800 mm deep — well compacted in layers not more than 300 mm deep by vibrating plate or vibrating roller.

(B) Clay fill up to 400 mm deep — well compacted in layers of not more than 150 mm by a mechanical roller.

(iv) *Rolled fill*:

(A) Sand fill up to 600 mm deep — compacted in layers of not more than 300 mm by repeated rolling by an excavator or other suitable mechanical equipment.

(B) Clay fill up to 300 mm deep — compacted in layers of not more than 150 mm by repeated rolling by an excavator or similar machine.

(b) A level layer of clean quarry sand must be placed on top of the fill, with a depth of not less than 20 mm.

(c) A graded stone termite management system complying with Part 3.4 may be substituted for the sand *required* in (b).

4.2.5 Foundations for footings and slabs

[2019: 3.2.2.3]

Footings and slabs, including internal and edge beams, must be founded on soil with an allowable bearing pressure as follows:

(a) Slab panels, load support panels and internal beams — natural soil with an allowable bearing pressure of not less than 50 kPa or *controlled fill* or *rolled fill* compacted in accordance with 4.2.4.

(b) Edge beams connected to the slab — natural soil with an allowable bearing pressure of not less than 50 kPa or *controlled fill* compacted in accordance with 4.2.4(a)(iii) and extending past the perimeter of the building 1 m

with a slope ratio not steeper than 2 horizontal to 1 vertical (see Figure 4.2.5).

(c) Pad footings, strip footings and edge beams not connected to the slab, must be—

(i) founded in natural soil with an allowable bearing pressure of not less than 100 kPa; or

(ii) for Class A and S sites they may be founded on controlled sand fill in accordance with 4.2.4(a).

Figure 4.2.5: Foundations for footings and slabs

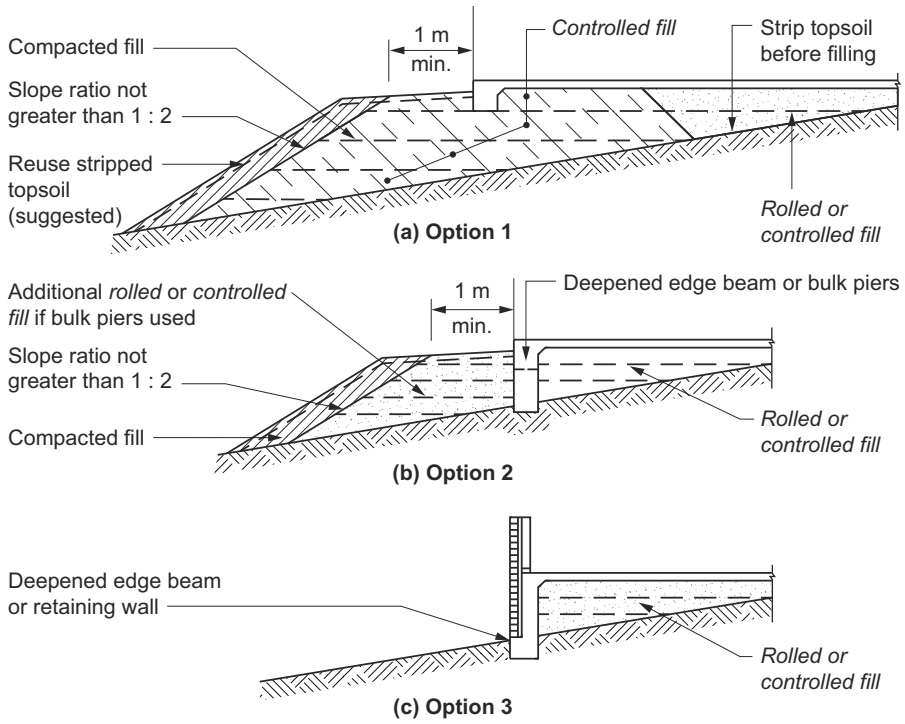


Figure Notes

Compacted fill must be in accordance with 4.2.4.

Explanatory Information

The *foundations* of a building are critical to its successful performance. As such, the soil must have the strength or bearing capacity to carry the building load with minimum movement.

The bearing capacity of a soil varies considerably and needs to be determined on a *site* by *site* basis. For this to occur, the appropriate people need to be consulted. These people may include a qualified engineer or experienced engineering geologist, or it may be determined by a person with appropriate local knowledge. The minimum bearing capacity (soil strength rating) may depend on the *site* conditions. The soil may be naturally undisturbed or be disturbed by building work or the like. Where soil is disturbed by building work and the like, the bearing capacity can be dramatically altered. This is typically the case for sloping *sites* where cut and fill procedures are used. In these situations the soil needs to be consolidated, generally via compaction, to achieve the *required* bearing capacity.

There are a number of alternatives for working on cut and filled *sites*. These are described in Figure 4.2.5.

Option 1 of Figure 4.2.5 refers to the *controlled fill* process which involves the compaction of fill in layers to achieve the bearing capacity described in 4.2.5. The depth of fill for each layer is specified to ensure effective compaction. Fill beyond these depths will need to be installed in accordance with H1D4(1).

Option 2 and 3 of Figure 4.2.5 refer to edge beams that extend through the fill into undisturbed soil which provides the 4.2.5 *required* bearing capacity. In this situation the fill is essentially only taking the internal slab loads.

4.2.6 Slab edge support on sloping sites

[2019: 3.2.2.4]

Footings and slabs installed on the low side of sloping *sites* must be as follows:

(a) Slab panels — in accordance with 4.2.5(a).

(b) Edge beams—

(i) supported by *controlled fill* in accordance with 4.2.5(b) (see Figure 4.2.5, Option 1); or

(ii) supported by deepened edge beams or bulk piers designed in accordance with AS 3600 (see Figure 4.2.5, Option 2); or

(iii) deepened (as per AS 2870) to extend into the natural soil level with a bearing capacity in accordance with 4.2.5(b) (see Figure 4.2.5, Option 3); or

(iv) stepped in accordance with AS 2870.

(c) Edge beams not connected to the slab, pad footings and strip footings — founded in accordance with 4.2.5(c).

(d) Where an excavation (cut) of the natural ground is used it must be in accordance with Part 3.2.

4.2.7 Stepped footings

[2019: 3.2.2.5]

Stepped strip footings must—

(a) have a base that is horizontal or be sloped at not more than 1:10; or

(b) be stepped in accordance with one of the methods shown in Figure 4.2.7.

Figure 4.2.7: Stepped strip footings

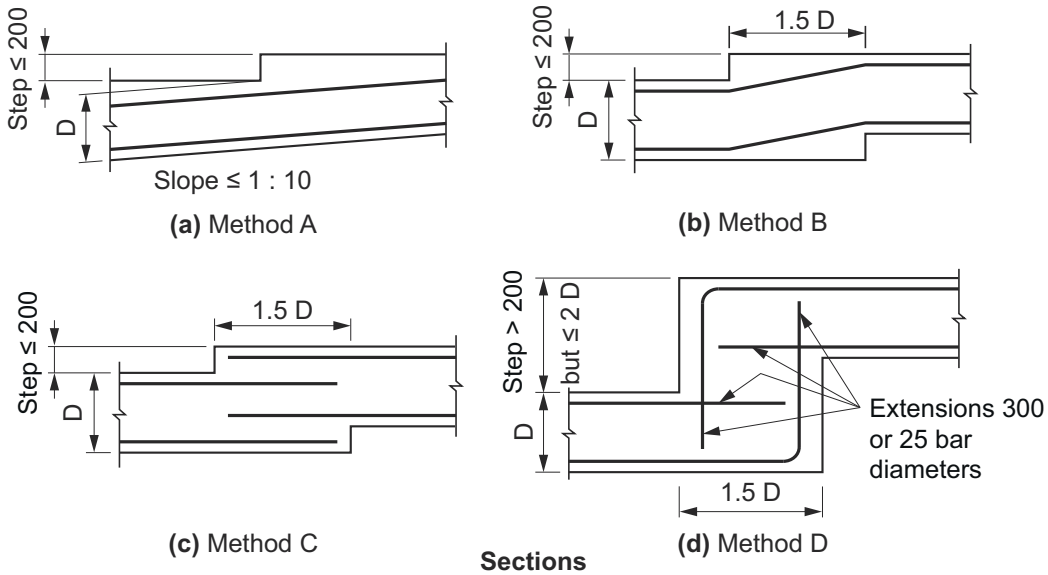


Figure Notes

All dimensions in millimetres.

NSW 4.2.8

SA 4.2.8

4.2.8 Vapour barriers

[2019: 3.2.2.6]

(1) A vapour barrier must be installed under slab-on-ground construction for a Class 1 building and for a Class 10 building where the slab is continuous with the slab of a Class 1 building in accordance with (2), (3), (4) and (5).

(2) Materials: A vapour barrier must be—

(a) 0.2 mm nominal thickness polyethylene film; and

(b) medium impact resistant,

determined in accordance with criteria specified in clause 5.3.3.3 of AS 2870.

(3) A vapour barrier must be branded continuously “AS 2870 Concrete underlay, 0.2 mm Medium impact resistance”.

(4) Installation: A vapour barrier must be installed as follows:

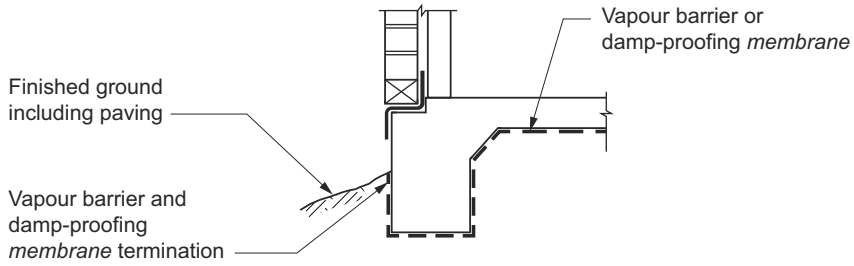
(a) Lap not less than 200 mm at all joints.

(b) Tape or seal with a close-fitting sleeve around all service penetrations.

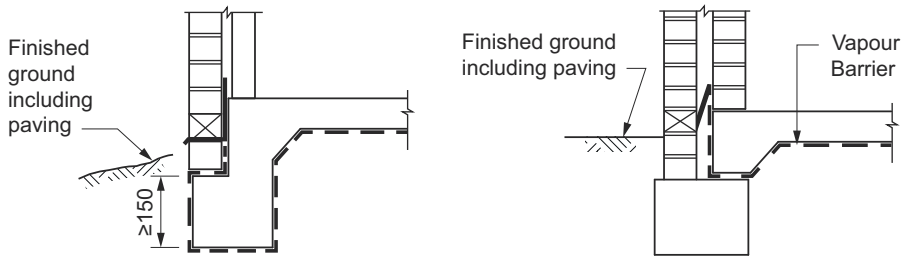
(c) Fully seal where punctured (unless for service penetrations) with additional polyethylene film and tape.

(5) The vapour barrier must be placed beneath the slab so that the bottom surface of the slab is entirely underlaid and must extend under internal and edge beams to finish at ground level in accordance with Figure 4.2.8.

Figure 4.2.8: Acceptable vapour barrier and damp-proofing membrane location



(a) Minimum rebate for cavity masonry or veneer wall



(b) Deep edge rebate alternative **(c) Masonry alternative**

Figure Notes

All dimensions in millimetres.

4.2.9 Edge rebates

[2019: 3.2.2.7]

Edge rebates for slab-on-ground and stiffened raft with masonry *cavity* or veneer construction must comply with the following:

(a) The rebate must not be less than 20 mm.

(b) The edge rebate must be flashed and drained in accordance with H2D4 and where it cannot be flashed, it must be filled with mortar.

Explanatory Information

See 4.2.21 for minimum edge beam details. For single skin or framed walls with external cladding, rebates are not required.

SA 4.2.10

4.2.10 Concrete

[2019: 3.2.3.1]

Concrete must comply with the following:

(a) Concrete must comply with AS 3600; and—

(i) have a strength at 28 days of not less than 20 MPa (denoted as N20 grade); and

(ii) have a 20 mm maximum nominal aggregate size; and

(iii) have a nominal 100 mm slump.

(b) Water must not be added to the mix to increase the slump to a value in excess of that specified.

(c) Concrete must be placed, compacted and cured in accordance with good building practice.

Explanatory Information

- Complete discharge of the concrete from the truck should be made within one and a half hours of initial mixing with water unless a suitable retarder has been specified.
- Compacting concrete by vibration removes air pockets and works the concrete thoroughly around reinforcement, service penetrations etc. and into corners of formwork to increase durability and resistance to termite infestation and salt damp attack. Care should be taken not to over-vibrate. The finishing and curing of slab edges provides an improved edge finish which is resistant to edge dampness.
- Care should be taken when using chemical curing methods, because some products may not be compatible with adhesives used to fix surface finishes to the slab.

4.2.11 Steel reinforcement

[2019: 3.2.3.2]

(1) Materials used for reinforcing steel must comply with AS 2870 and be—

(a) welded wire reinforcing fabric; or

(b) trench mesh; or

(c) steel reinforcing bars.

(2) Steel reinforcing bars may be substituted for trench mesh in accordance with Table 4.2.11a.

(3) Minimum laps for reinforcement as shown in Table 4.2.11b and Figure 4.2.11a must be provided where reinforcing is used.

(4) Any slab in H1D4 with a re-entrant corner must have—

(a) two strips of 3-L8TM; or

(b) one strip of 3-L11TM; or

(c) 3-N12 bars,

not less than 2 m in length and placed at an angle of 45° across the corner such that the centre of the 2 m length is at the location of the internal angle of the slab in accordance with Figure 4.2.11b.

(5) Footings and slabs-on-ground must have concrete cover between the outermost edge of the reinforcement (including ligatures, tie wire etc.) and the surface of the concrete of not less than—

(a) 40 mm to unprotected ground; and

(b) 30 mm to a membrane in contact with the ground; and

(c) 20 mm to an internal surface; and

(d) 40 mm to external exposure.

(6) Reinforcement must be free of loose rust, mud, paints and oils.

(7) Reinforcement must be placed as follows:

(a) All reinforcement must be firmly fixed in place to prevent it moving during concreting operations.

(b) Reinforcement must be supported off the ground or the forms by bar chairs made from wire, concrete or plastic.

(c) When using wire chairs, the minimum concrete cover (see (5)) to the uncoated portion of the chair must be obtained.

(d) Wire chairs on soft ground or plastic membrane must be placed on flat bases.

(e) Bar chairs must be spaced at not more than 800 mm centres for steel fabric.

Table 4.2.11a: Alternative mesh/reinforcing bar sizes

Trench mesh (TM)	Area — mm^2	Reinforcing bar alternative	Trench mesh alternative
2-L8TM	91	2-N10 or 1-N12	Not applicable
3-L8TM	136	2-N10 or 2-N12	Not applicable
4-L8TM	182	2-N12	2-L11TM
5-L8TM	227	2-N12	3-L11TM
2-L11TM	180	1-N16 or 2-N12	2x2-L8TM
3-L11TM	270	3-N12	2x3-L8TM
4-L11TM	360	2-N16	2x4-L8TM
2-L12TM	222	2-N12	3-L11TM
3-L12TM	333	3-N12	4-L11TM
4-L12TM	444	4-N12	5-L11TM

Table Notes

(1) Where necessary, 2 layers of mesh may be used.

(2) L11TM and L12TM may be replaced by RL1118 and RL1218 mesh respectively.

(3) L11TM may be replaced by two layers of L8TM.

Table 4.2.11b: Minimum lap for reinforcement

Reinforcement	Minimum splice	Minimum lap at “T” intersections	Minimum lap at “L” intersections
Steel reinforcing bars ≤12 mm diameter	500 mm	Full width across the junction	One outer bar must be bent and continue 500 mm (min) around corner
Steel reinforcing bars >12 mm to ≤16 mm diameter	700 mm	Full width across the junction	One outer bar must be bent and continue 500 mm (min) around corner
Trench mesh	500 mm	Full width across the junction	Full width across the junction
Square and rectangular mesh	The two outermost transverse wires of one sheet must overlap the two outermost transverse wires of the other	Not applicable	Not applicable

Figure 4.2.11a: Splice, L and T intersections

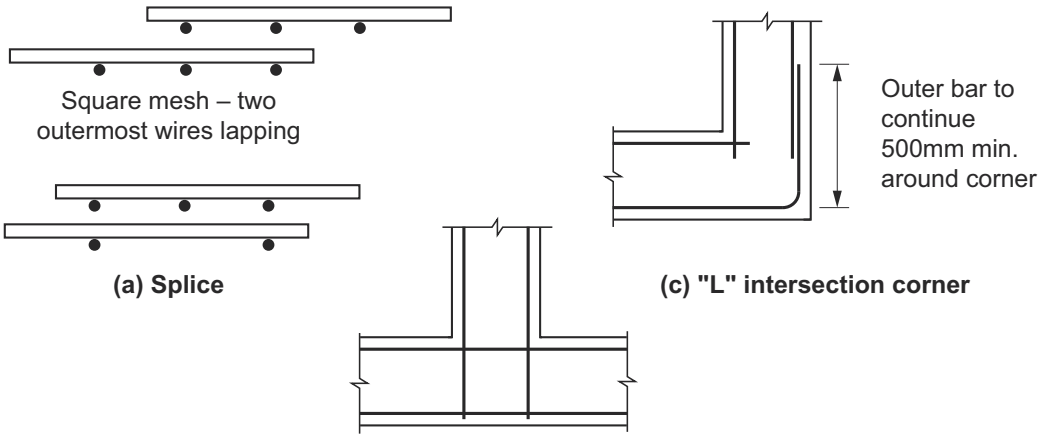
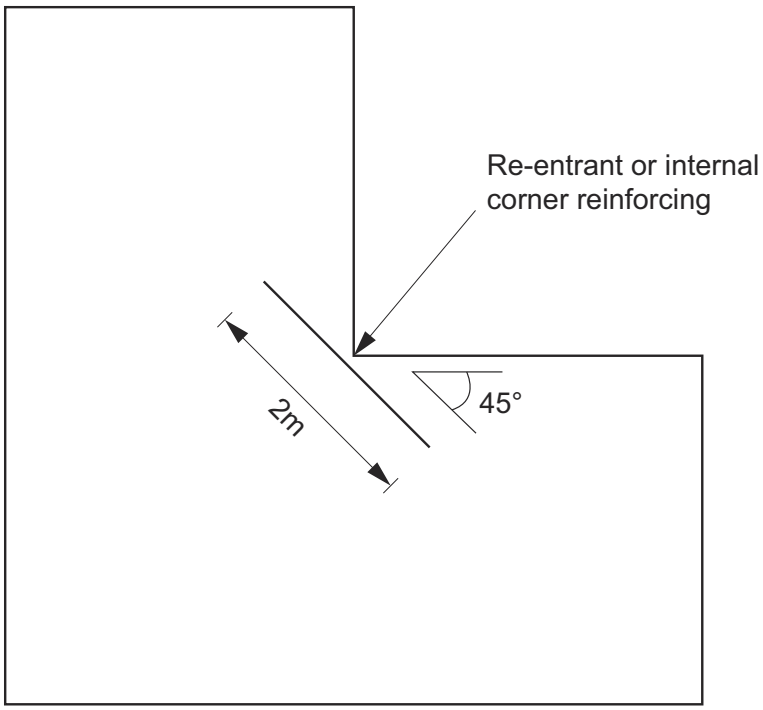


Figure 4.2.11b: Reinforcing for re-entrant corners



Explanatory Information: Reinforcement types

Reinforcement types referenced in this clause are described as follows:

- Square mesh is designated in terms of the diameter of each bar and the spacing of consecutive bars. For example, SL62 consists of 6 mm bar at 200 mm spacings.
- Trench mesh is designated in terms of the number of longitudinal bars and the diameter of each bar. For example, 3-L11TM consists of 3 longitudinal bars each of which are 11 mm in diameter.
- Reinforcing bars are designated in terms of the number of bars and the diameter of each bar. For example, 6-N12 consists of 6 bars each of which are 12 mm in diameter.

Explanatory Information: Cleaning and placement of reinforcing

In order to obtain a good bond between concrete and reinforcement, the reinforcement should be free of contamination by mud, paint, oils, etc. It is not necessary for the reinforcement to be completely free of rust. Some rusting is beneficial in promoting a good bond as it roughens the surface of the steel. Loose rust, however, must be removed from the reinforcement.

Reinforcement is designed to be in a particular place so as to add strength or to control cracking of the concrete. A displacement from its intended location could make a significant difference to the life or serviceability of the structure.

Supports for fabric reinforcement are provided to prevent the fabric distorting when workers walk on top of it to place the concrete and maintain the correct concrete cover to the fabric.

4.2.12 Footing and slab construction

[2019: 3.2.5.1]

Footing and slab construction, including size and placement of reinforcement, must be in accordance with the relevant provisions of—

(a) 4.2.13 for footings for stumps; and

(b) 4.2.14 for stiffened rafts on Class A, S and M *sites*; and

(c) 4.2.15 for strip footing systems on Class A, S and M *sites*; and

(d) 4.2.16 for footing slabs on Class A *sites*; and

(e) 4.2.17 for footings for *single leaf masonry*, *mixed construction* and earth retaining walls; and

(f) 4.2.18 for footings for fireplaces on Class A and S *sites*; and

(g) 4.2.19 for shrinkage control; and

(h) 4.2.20 for concentrated loads; and

(i) 4.2.21 for minimum edge beam dimensions; and

(j) 4.2.22 for recessed areas of slabs.

4.2.13 Stump footing details

[2019: 3.2.5.6]

(1) Footings for stumps must comply with—

(a) the provisions of Tables 4.2.13a, 4.2.13b or 4.2.13c for Class A and Class S *sites*; or

(b) the appropriate referenced document listed in—

(i) H1D6(3); or

(ii) H1D4.

(2) Concrete stumps must—

(a) be designed in accordance with—

(i) AS 3600; or

(ii) Tables 4.2.13d, 4.2.13e or 4.2.13f; and

(b) use a minimum 20 MPa concrete as defined in AS 3600.

(3) Steel stumps must be—

(a) designed in accordance with—

(i) AS 4100; or

(ii) Tables 4.2.13d, 4.2.13e or 4.2.13f; and

(b) fully enclosed and sealed with a welded top plate; and

(c) encased in concrete sloping away from the stump and finishing not less than 100 mm above *finished ground level*; and

(d) corrosion protected in accordance with Part 6.3.

(4) Timber stumps must be designed in accordance with—

(a) AS 1684.2, AS 1684.3, AS 1684.4 or AS 1720.1; or

(b) Tables 4.2.13d, 4.2.13e or 4.2.13f.

(5) Stumps must be braced—

(a) by a full perimeter masonry base; or

(b) for concrete stumps — in accordance with AS 3600; or

(c) for steel stumps — in accordance with AS 4100; or

(d) for timber stumps — in accordance with AS 1684.2, AS 1684.3, AS 1684.4 or AS 1720.1.

(6) Stumps must be embedded into the foundation material not less than 30% of their height above ground level or 450 mm, whichever is the greater.

(7) Pad footings for clad frame, Class A and Class S *sites*, must be in accordance with Table 4.2.13g and Figure 4.2.13.

Table 4.2.13a: Stumps supporting single storey timber floor and metal roof

Floor load area (m^2)	Dimension (mm)	Roof load area (m^2)		
		0	6	12
3	Square pad footing size	250 x 250	300 x 300	350 x 350
8	Square pad footing size	400 x 400	400 x 400	450 x 450
12	Square pad footing size	450 x 450	500 x 500	500 x 500
3	Circular pad footing diameter	300	400	400
8	Circular pad footing diameter	450	450	600
12	Circular pad footing diameter	600	600	600
3	Pad footing depth	250	250	250
8	Pad footing depth	250	250	250
12	Pad footing depth	250	250	250

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 0.92 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations for ULS included are 1.35G and 1.2G + 1.5Q for stumps and G + 0.5Q for pad footings.

(3) Minimum bearing pressure is 100 kPa for pad footings.

(4) For pad footings founded on rock, the width or diameter may be reduced by half but not less than 250 mm x 250 mm or 300 mm diameter.

(5) Stumps are assumed to be braced and simply-supported at both ends with an effective length factor of 1.

(6) A maximum load eccentricity of length/100 has been accounted for in the stumps.

(7) A roof load area of “0” must be used for stumps not supporting roof loads.

(8) The length of wall load allowed for is equal to the square root of the floor area.

Table 4.2.13b: Stumps supporting single storey tiled floor and tiled roof

Floor load area (m^2)	Dimension (mm)	Roof load area (m^2)		
		0	6	12
3	Square pad footing size	300 x 300	400 x 400	450 x 450
8	Square pad footing size	450 x 450	500 x 500	550 x 500
12	Square pad footing size	500 x 500	550 x 550	600 x 600
3	Circular pad footing diameter	400	450	600
8	Circular pad footing diameter	600	600	650
12	Circular pad footing diameter	650	650	700
3	Pad footing depth	250	250	250
8	Pad footing depth	250	250	250
12	Pad footing depth	250	300	300

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 0.92 kN/m permanent wall, 0.85 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations for ULS included are 1.35G and 1.2G + 1.5Q for stumps and G + 0.5Q for pad footings.

(3) Minimum bearing pressure is 100 kPa for pad footings.

(4) For pad footings founded on rock, the width or diameter may be reduced by half but not less than 250 mm x 250 mm or 300 mm diameter.

(5) Stumps are assumed to be braced and simply-supported at both ends with an effective length factor of 1.

(6) A maximum load eccentricity of length/100 has been accounted for in the stumps.

(7) A roof load area of “0” must be used for stumps not supporting roof loads.

(8) The length of wall load allowed for is equal to the square root of the floor area.

Table 4.2.13c: Stumps supporting double storey timber floor and metal roof

Floor load area (m^2)	Dimension (mm)	Roof load area (m^2)		
		0	6	12
3	Square pad footing size	350 x 350	400 x 400	450 x 450
8	Square pad footing size	550 x 550	550 x 550	600 x 600
12	Square pad footing size	650 x 650	650 x 650	700 x 700
3	Circular pad footing diameter	400	450	600
8	Circular pad footing diameter	650	650	700
12	Circular pad footing diameter	750	750	800
3	Pad footing depth	250	250	250
8	Pad footing depth	300	300	350

Floor load area (m^2)	Dimension (mm)	Roof load area (m^2)		
		0	6	12
12	Pad footing depth	350	350	350

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 0.92 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations for ULS included are 1.35G and 1.2G + 1.5Q for stumps and G + 0.5Q for pad footings.

(3) Minimum bearing pressure is 100 kPa for pad footings.

(4) For pad footings founded on rock, the width or diameter may be reduced by half but not less than 250 mm x 250 mm or 300 mm diameter.

(5) Stumps are assumed to be braced and simply-supported at both ends with an effective length factor of 1.

(6) A maximum load eccentricity of length/100 has been accounted for in the stumps.

(7) A roof load area of "0" must be used for stumps not supporting roof loads.

(8) The length of wall load allowed for is equal to the square root of the floor area.

Table 4.2.13d: Maximum stump height (mm): stump supporting single storey timber floor and metal roof

Stump material	Section size (mm)	Floor load area (m^2)	Roof load area (m^2)		
			0	6	12
Concrete f'_c= 20 MPa	100 x 100	3	2500	2000	1750
Concrete f'_c = 20 MPa	100 x 100	8	1500	1500	1500
Concrete f'_c = 20 MPa	100 x 100	12	1250	1250	1250
Steel f_y = 350 MPa	100 x 100 x 2.0	3	3000	3000	3000
Steel f_y = 350 MPa	100 x 100 x 2.0	8	3000	3000	3000
Steel f_y = 350 MPa	100 x 100 x 2.0	12	3000	3000	3000
Timber F17	100 x 100	3	3000	3000	3000
Timber F17	100 x 100	8	2500	2500	2250
Timber F17	100 x 100	12	2250	2000	2000
Timber F14	100 x 100	3	3000	3000	2500
Timber F14	100 x 100	8	2250	2000	1750
Timber F14	100 x 100	12	1750	1500	1500
Timber F11	100 x 100	3	3000	2500	2250
Timber F11	100 x 100	8	2000	1750	1750
Timber F11	100 x 100	12	1500	1500	1250
Timber F8	100 x 100	3	3000	2500	2000
Timber F8	100 x 100	8	1750	1500	1250
Timber F8	100 x 100	12	1250	1000	750
Timber F7	100 x 100	3	2500	2250	1750
Timber F7	100 x 100	8	1500	1250	750
Timber F7	100 x 100	12	750	–	–
Timber F5	100 x 100	3	2500	2000	1500

Stump material	Section size (mm)	Floor load area (m^2)	Roof load area (m^2)		
			0	6	12
Timber F5	100 x 100	8	1250	750	–
Timber F5	100 x 100	12	–	–	–

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 0.92 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations for ULS included are 1.35G and 1.2G + 1.5Q for stumps and G + 0.5Q for pad footings.

(3) Minimum bearing pressure is 100 kPa for pad footings.

(4) Stumps are assumed to be braced and simply-supported at both ends with an effective length factor of 1.

(5) A maximum load eccentricity of length/100 has been accounted for in the stumps.

(6) A roof load area of "0" must be used for stumps not supporting roof loads.

(7) The length of wall load allowed for is equal to the square root of the floor area.

Table 4.2.13e: Maximum stump height: stump supporting single storey tiled floor and tiled roof

Stump material	Section size (mm)	Floor load area (m^2)	Roof load area (m^2)		
			0	6	12
Concrete f'_c = 20 MPa	100 x 100	3	2250	1750	1500
Concrete f'_c = 20 MPa	100 x 100	8	1500	1250	1250
Concrete f'_c = 20 MPa	100 x 100	12	1250	1250	750
Steel f_y = 350 MPa	100 x 100 x 2.0	3	3000	3000	3000
Steel f_y = 350 MPa	100 x 100 x 2.0	8	3000	3000	3000
Steel f_y = 350 MPa	100 x 100 x 2.0	12	3000	3000	3000
Timber F17	100 x 100	3	3000	3000	2500
Timber F17	100 x 100	8	2500	2250	2000
Timber F17	100 x 100	12	2000	2000	1750
Timber F14	100 x 100	3	3000	2500	2000
Timber F14	100 x 100	8	2000	1750	1500
Timber F14	100 x 100	12	1500	1250	1000
Timber F11	100 x 100	3	3000	2250	2000
Timber F11	100 x 100	8	1750	1500	1250
Timber F11	100 x 100	12	1250	1000	750
Timber F8	100 x 100	3	2500	2000	1750
Timber F8	100 x 100	8	1500	1250	1000
Timber F8	100 x 100	12	1000	500	–
Timber F7	100 x 100	3	2500	1750	1250
Timber F7	100 x 100	8	1250	750	–
Timber F7	100 x 100	12	–	–	–
Timber F5	100 x 100	3	2250	1500	1000
Timber F5	100 x 100	8	750	–	–

Stump material	Section size (mm)	Floor load area (m^2)	Roof load area (m^2)		
			0	6	12
Timber F5	100 x 100	12	–	–	–

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 0.92 kN/m permanent wall, 0.85 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations for ULS included are 1.35G and 1.2G + 1.5Q for stumps and G + 0.5Q for pad footings.

(3) Minimum bearing pressure is 100 kPa for pad footings.

(4) Stumps are assumed to be braced and simply-supported at both ends with an effective length factor of 1.

(5) A maximum load eccentricity of length/100 has been accounted for in the stumps.

(6) A roof load area of "0" must be used for stumps not supporting roof loads.

(7) The length of wall load allowed for is equal to the square root of the floor area.

Table 4.2.13f: Maximum stump height: stump supporting double storey timber floor and metal roof

Stump material	Section size (mm)	Floor load area (m^2)	Roof load area (m^2)		
			0	6	12
Concrete f'_c = 20 MPa	100 x 100	3	1750	1500	1500
Concrete f'_c = 20 MPa	100 x 100	8	1250	1000	750
Concrete f'_c = 20 MPa	100 x 100	12	–	–	–
Steel f_y = 350 MPa	100 x 100 x 2.0	3	3000	3000	3000
Steel f_y = 350 MPa	100 x 100 x 2.0	8	3000	3000	3000
Steel f_y = 350 MPa	100 x 100 x 2.0	12	3000	2750	2500
Timber F17	100 x 100	3	3000	2500	2500
Timber F17	100 x 100	8	1750	1750	1500
Timber F17	100 x 100	12	1250	1250	1250
Timber F14	100 x 100	3	2500	2250	2000
Timber F14	100 x 100	8	1250	1250	1000
Timber F14	100 x 100	12	750	500	500
Timber F11	100 x 100	3	2250	2000	1750
Timber F11	100 x 100	8	1000	1000	750
Timber F11	100 x 100	12	–	–	–
Timber F8	100 x 100	3	2000	1750	1500
Timber F8	100 x 100	8	500	500	–
Timber F8	100 x 100	12	–	–	–
Timber F7	100 x 100	3	1750	1500	1250
Timber F7	100 x 100	8	–	–	–
Timber F7	100 x 100	12	–	–	–
Timber F5	100 x 100	3	1500	1000	750
Timber F5	100 x 100	8	–	–	–
Timber F5	100 x 100	12	–	–	–

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 0.92 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations for ULS included are 1.35G and 1.2G + 1.5Q for stumps and G + 0.5Q for pad footings.

(3) Minimum bearing pressure is 100 kPa for pad footings.

(4) Stumps are assumed to be braced and simply-supported at both ends with an effective length factor of 1.

(5) A maximum load eccentricity of length/100 has been accounted for in the stumps.

(6) A roof load area of "0" must be used for stumps not supporting roof loads.

(7) The length of wall load allowed for is equal to the square root of the floor area.

Table 4.2.13g: Minimum dimensions of circular and square pad footings for clad frame, Class A and S sites

Effective supported areas (m^2)	Width of square pad (mm)	Width of circular pad (mm)	Thickness (t) (mm)	Depth (mm)
10	400	500	200	400
20	500	600	200	400
30	600	750	250	400

Table Notes

(1) The effective area supported by a pad footing is the sum of—

(a) the supported floor area; and

(b) the supported roof area (if applicable); and

(c) half the supported wall area in elevation (if applicable).

(2) The width or diameter can be reduced to one half the above footings on rock.

(3) The pad footings must be constructed in concrete.

(4) Pad footing sizes must also apply to footings supporting roof and floor loads only.

(5) The *foundation* must provide an allowable bearing pressure of not less than 100 kPa.

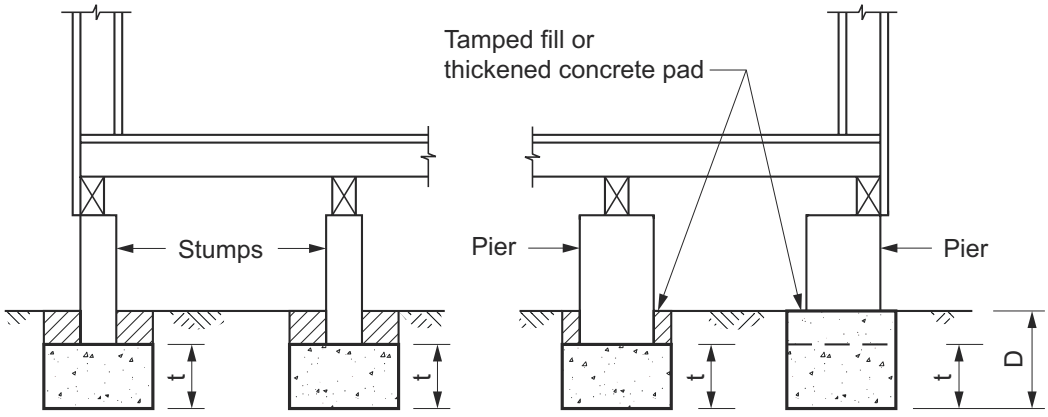
(6) The excavation must be backfilled with manually rodded tamped soil, or the footing thickness shall be increased by 50 mm.

(7) Where stump pad footings provide resistance to horizontal or uplift forces, the minimum size of the footing must comply with AS 2870.

(8) Braced stumps must comply with 4.2.13(5).

(9) For masonry piers, strip footings complying with 4.2.15 for masonry can be used in lieu of pad footings.

Figure 4.2.13: Pad footings for clad frame, Class A and S sites



(a) Stumps **(b) Piers**

Figure Notes

(1) For minimum pad footing dimensions t and D, see Table 4.2.13g.

(2) For tamped fill or thickened concrete pads, see Note 6 to Table 4.2.13g.

4.2.14 Stiffened rafts Class A, S and M sites

[New for 2022]

Footing and stiffened raft slabs must comply with—

(a) For Class A and S *sites* — Tables 4.2.14a, 4.2.14b and Figure 4.2.14a; and

(b) For Class M *sites* — Table 4.2.14c and Figure 4.2.14b.

Table 4.2.14a: Reinforcement for stiffened raft footings for Class A sites

Type of construction	Depth (D) (mm)	Bottom reinf.	Max. spacing c/l to c/l	Slab fabric
Clad frame	300	3-L8TM	N/A	SL72
Articulated masonry veneer	300	3-L8TM	N/A	SL72
Masonry veneer	300	3-L8TM	N/A	SL72
Articulated full masonry	400	3-L8TM	N/A	SL72
Full masonry	400	3-L8TM	N/A	SL72

Table Notes

(1) Internal and external edge beams must be arranged to form an integral structural grid (see clauses 5.3.8 and 5.3.9 of AS 2870).

(2) A 10% increase in spacings is permitted where the spacing in the other direction is 20% less than that specified.

(3) Where external beams are wider than 300 mm, an extra bottom bar or equivalent of the same bar size is *required* for each 100 mm additional width.

(4) Where a reinforced *single leaf masonry* wall is constructed directly above and structurally connected to a concrete edge beam, the beam may be reduced to 300 mm wide by 300 mm deep and reinforced with 3–L8TM reinforcement.

(5) Alternative reinforcement sizes must comply with AS 2870.

(6) Internal beam details and spacings must comply with Figure 4.2.14a or Figure 4.2.14b.

Table 4.2.14b: Reinforcement for stiffened raft footings for Class S sites

Type of construction	Depth (D) (mm)	Bottom reinf.	Max. spacing c/l to c/l	Slab fabric
Clad frame	300	3-L8TM	N/A	SL72
Articulated masonry veneer	300	3-L8TM	N/A	SL72
Masonry veneer	300	3-L11TM	N/A	SL72
Articulated full masonry	450	3-L11TM	N/A	SL72
Full masonry	450	3-N16	5.0 (m) Note 2	SL82

Table Notes

(1) Internal and external edge beams must be arranged to form an integral structural grid (see clauses 5.3.8 and 5.3.9 of AS 2870).

(2) A 10% increase in spacings is permitted where the spacing in the other direction is 20% less than that specified.

(3) Where external beams are wider than 300 mm, an extra bottom bar or equivalent of the same bar size is *required* for each 100 mm additional width.

(4) Where a reinforced *single leaf masonry* wall is constructed directly above and structurally connected to a concrete edge beam, the beam may be reduced to 300 mm wide by 300 mm deep and reinforced with 3–L8TM reinforcement.

(5) Alternative reinforcement sizes must comply with AS 2870.

(6) Internal beam details and spacings must comply with Figure 4.2.14a or Figure 4.2.14b.

Table 4.2.14c: Reinforcement for stiffened raft footings for Class M sites

Type of construction	Depth (D) (mm)	Bottom reinf.	Max. spacing c/l to c/l	Slab mesh
Clad frame	300	3-L11TM	6.0Note 2	SL72
Articulated masonry veneer	400	3-L11TM	6.0Note 2	SL72
Masonry veneer	400	3-L11TM	5.0Note 2	SL72
Articulated full masonry	500	3-L12TM	4.0	SL82
Full masonry	850	3-N16	4.0	SL92

Table Notes

(1) Internal and external edge beams must be arranged to form an integral structural grid (see clauses 5.3.8 and 5.3.9 of AS 2870).

(2) A 10% increase in spacings is permitted where the spacing in the other direction is 20% less than that specified.

(3) Where external beams are wider than 300 mm, an extra bottom bar or equivalent of the same bar size is *required* for each 100 mm additional width.

(4) Where a reinforced *single leaf masonry* wall is constructed directly above and structurally connected to a concrete edge beam, the beam may be reduced to 300 mm wide by 300 mm deep and reinforced with 3–L8TM reinforcement.

(5) Alternative reinforcement sizes must comply with AS 2870.

(6) Internal beam details and spacings must comply with Figure 4.2.14b.

Figure 4.2.14a: Footing slab and stiffened raft slab details for Class A and S sites

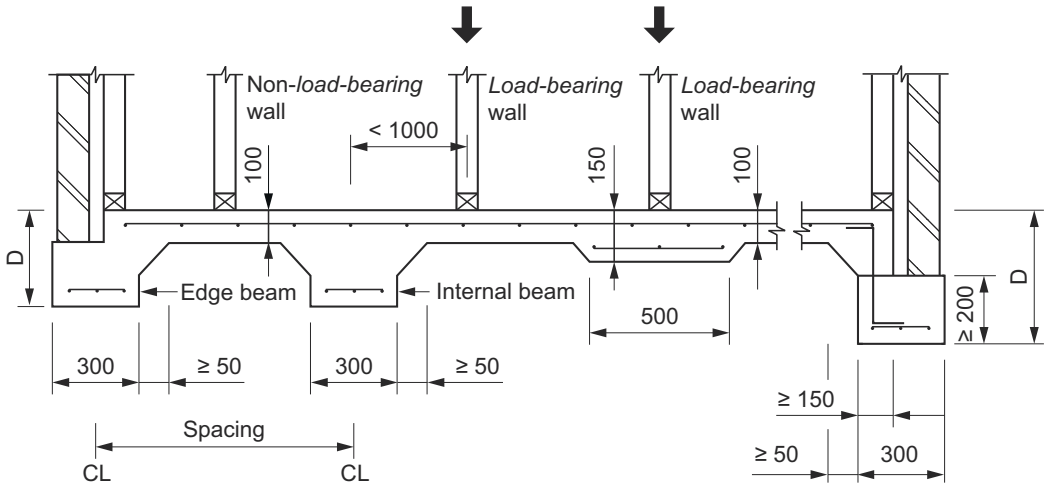
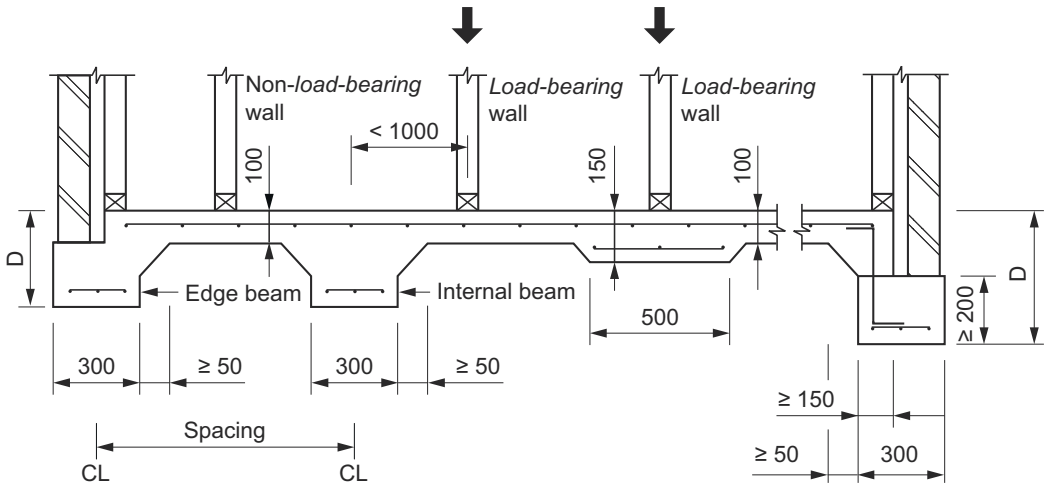


Figure 4.2.14b: Footing slab and stiffened raft slab details for Class M sites



4.2.15 Strip footings Class A, S and M sites

[New for 2022]

Strip footings for Class A, S and M *sites* must comply with—

(a) for Class A and S *sites* — Tables 4.2.15a, 4.2.15b and Figure 4.2.15a; and

(b) for Class M *sites* — Table 4.2.15c and Figure 4.2.15b.

Table 4.2.15a: Dimensions and reinforcement for strip footing systems for Class A sites

Type of construction	D (mm)	B (mm)	Reinforcement (top and bottom)
Clad frame	300	300	3–L8TM
Articulated masonry veneer	300	300	3–L8TM
Masonry veneer	300	300	3–L8TM
Articulated full masonry	300	400	4–L8TM
Full masonry	300	400	4–L8TM

Table Notes

(1) All masonry walls must be supported on strip footings.

(2) Internal strip footings must be of the same proportions as the external footings and run from external footing to external footing. 'Side slip joints' consisting of a double layer of polyethylene must be provided at the sides of the footing only.

(3) Infill floors may be concrete slabs, brick paving, stone flags or compacted and stabilised earth. For concrete slab infill panels, mesh may be required to control shrinkage in slab panels and around openings or restrained regions. Concrete infill slabs must use a minimum of SL62 mesh to control shrinkage (see also 4.2.19).

(4) Where footings are wider than the specified width, an extra bottom bar or equivalent of the same bar size is *required* for each 100 mm additional width. If strip footings deeper than those *required* are used, the reinforcement must be increased to match that specified for the deepened proportions.

(5) The measurement of D_f is greater or equal to D plus 75 mm.

(6) Alternative reinforcing sizes must comply with AS 2870.

Table 4.2.15b: Dimensions and reinforcement for strip footing systems for Class S sites

Type of construction	D (mm)	B (mm)	Reinforcement (top and bottom)
Clad frame	400	300	3–L8TM
Articulated masonry veneer	400	300	3–L8TM
Masonry veneer	400	300	3–L8TM
Articulated full masonry	400	400	4–L11TM
Full masonry	500	400	4–L11TM

Table Notes

(1) All masonry walls must be supported on strip footings.

(2) Internal strip footings must be of the same proportions as the external footings and run from external footing to external footing. 'Side slip joints' consisting of a double layer of polyethylene must be provided at the sides of the footing only.

(3) Infill floors may be concrete slabs, brick paving, stone flags or compacted and stabilised earth. For concrete slab infill panels, mesh may be *required* to control shrinkage in slab panels and around openings or restrained regions. Concrete infill slabs must use a minimum of SL62 mesh to control shrinkage (see also 4.2.19).

(4) Where footings are wider than the specified width, an extra bottom bar or equivalent of the same bar size is *required* for each 100 mm additional width. If strip footings deeper than those *required* are used, the reinforcement must be increased to match that specified for the deepened proportions.

(5) The measurement of D_f is greater or equal to D plus 75 mm.

(6) Alternative reinforcing sizes must comply with AS 2870.

Table 4.2.15c: Dimensions and reinforcement for strip footing systems for Class M sites

Type of construction	D (mm)	B (mm)	Reinforcement (top and bottom)
Clad frame	400	300	3-L11TM
Articulated masonry veneer	450	300	3-L11TM
Masonry veneer	500	300	3-L12TM
Articulated full masonry	600	400	4-L12TM
Full masonry	900 Note 2	400	4-L12TM

Table Notes

(1) All masonry walls must be supported on strip footings.

(2) For beams 700 mm or deeper, as specified in the table above, internal footings must be provided at no more than

6 m centres and at re-entrant corners to continue footings to the opposite external footing. Internal strip footings must be of the same proportions as the external footings and run from external footing to external footing. 'Side slip joints' consisting of a double layer of polyethylene must be provided at the sides of the footing only.

(3) Infill floors must only be used for Class A and S sites.

(4) Where footings are wider than the specified width, an extra bottom bar or equivalent of the same bar size is *required* for each 100 mm additional width. If strip footings deeper than those *required* are used, the reinforcement must be increased to match that specified for the deepened proportions.

(5) The measurement of D_f is greater or equal to D plus 75 mm.

(6) Alternative reinforcing sizes must comply with AS 2870.

(7) For Class M articulated full masonry and full masonry, internal strip footings must be of the same proportions as the external footing and run from external footing to external footing.

Figure 4.2.15a: Strip footing systems for Class A and S sites

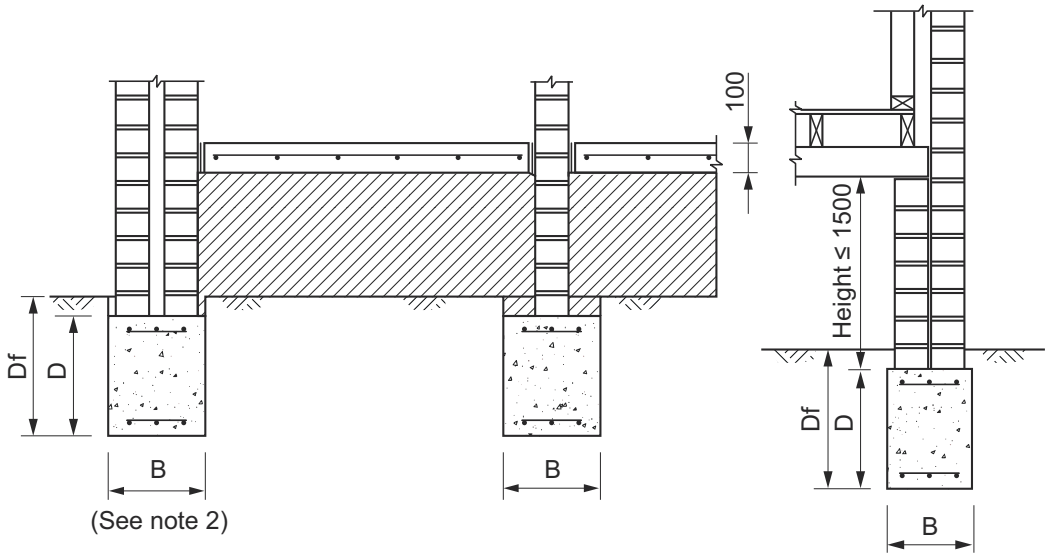


Figure Notes

See Notes to Tables 4.2.15a and 4.2.15b.

Figure 4.2.15b: Strip footing system for Class M sites

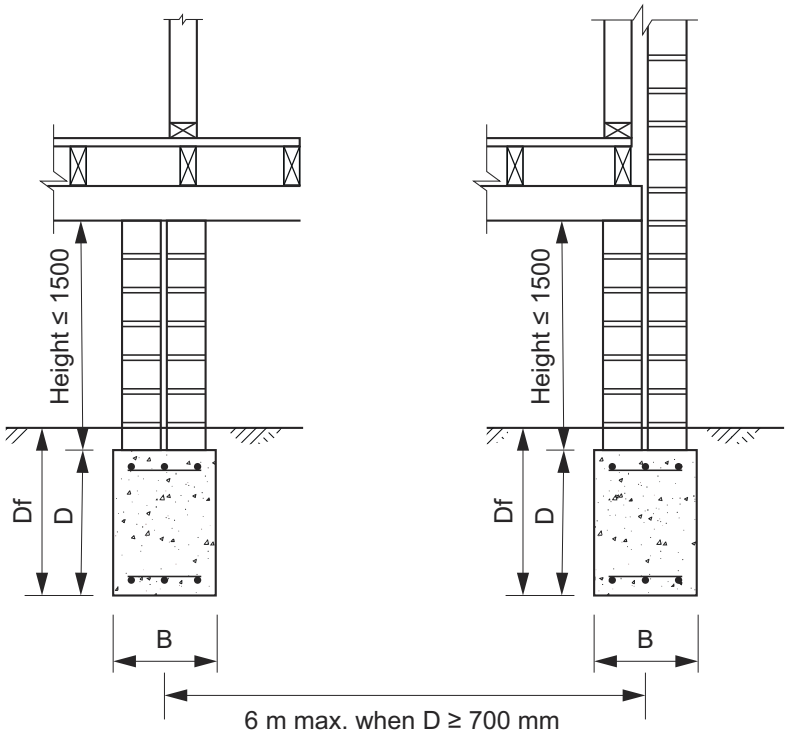


Figure Notes

See Notes Tables 4.2.15a, 4.2.15b and 4.2.15c.

4.2.16 Footing slabs for Class A sites

[New for 2022]

Footing slabs for Class A *sites* supporting the following *external wall* types must comply with Figure 4.2.16:

(a) *Clad frame*.

(b) *Articulated masonry*.

(c) Masonry veneer.

(d) Articulated full masonry.

(e) Full masonry.

Figure 4.2.16: Footing slabs for Class A sites suitable for clad frame, articulated masonry veneer, masonry veneer, articulated full masonry and full masonry

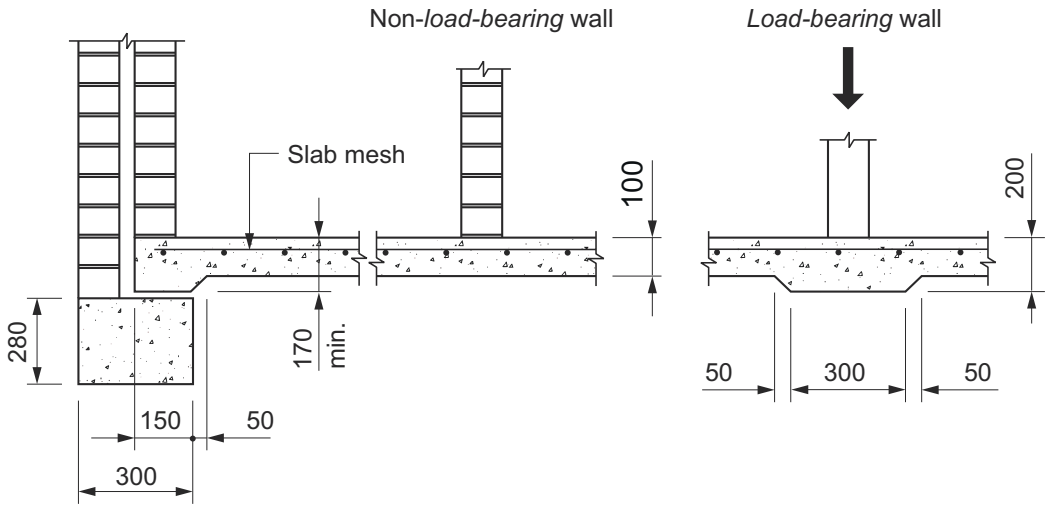


Figure Notes

(1) Use SL63 when slab length is less than 12 m.

(2) Use SL62 when slab length is less than 18 m.

(3) In parts of Western Australia (around Perth) and other locations where the *site* consists of extremely stable sands, and where specified by a *professional engineer*, the slab thickness may be reduced to 85 mm and reinforced as follows:

(a) Use SL53 when slab length is less than or equal to 12 m.

(4) Dune sands may require compaction.

4.2.17 Footings for single leaf masonry, mixed construction and earth wall construction

[2019: 3.2.5.2]

Footings supporting the following *external wall* types must comply with the equivalent wall construction set out in Tables 4.2.17a, 4.2.17b and 4.2.17c:

(a) *Single leaf masonry*.

(b) *Mixed construction*.

(c) Earth wall structures.

Table 4.2.17a: Equivalent wall construction: single leaf masonry

Actual construction: *external walls*	Actual construction: *internal walls*	Equivalent wall construction
Reinforced *single leaf masonry*	*Articulated masonry* on Class A and Class S *sites*, or framed	*Articulated masonry* veneer
Reinforced *single leaf masonry*	*Articulated masonry* or reinforced *single leaf masonry*	Masonry veneer
Articulated *single leaf masonry*	*Articulated masonry*	Articulated full masonry

Table 4.2.17b: Equivalent wall construction: mixed construction

Actual construction: *external walls*	Actual construction: *internal walls*	Equivalent wall construction
Full masonry	Framed	Articulated full masonry

Actual construction: *external walls*	Actual construction: *internal walls*	Equivalent wall construction
Articulated full masonry	Framed	Masonry veneer

Table 4.2.17c: Equivalent wall construction: earth wall construction

Actual construction: *external walls*	Actual construction: *internal walls*	Equivalent wall construction
Infill panels of earth wall construction	Framed earth wall construction	*Articulated masonry* veneer
Loadbearing earth wall construction	*Loadbearing* earth wall construction	Articulated full masonry

Explanatory Information

Tables 4.2.17a, 4.2.17b and 4.2.17c provide solutions for footings that are equivalent to those supporting a wall type that may be different to the actual type included in design documentation. The equivalent wall construction in the right-hand column of each of these tables recognises the types of footing systems suitable to support the actual *external wall* and *internal wall* types that may not have a specific solution for supporting footings.

4.2.18 Footings for fireplaces on Class A and S sites

[2019: 3.2.5.5]

(1) Fireplaces on Class A and S *sites* must be supported on a pad footing—

(a) 150 mm thick for single storey (one trafficable floor and a wall height not more than 4.2 m) construction; and

(b) 200 mm thick for 2 storey (two trafficable floors and a wall height not more than 8 m) construction; and

(c) reinforced top and bottom with SL72 mesh; and

(d) extending 300 mm past the edges of the masonry except for any edge flush with the outer wall.

(2) The pad footing must form an integral part of the slab.

4.2.19 Shrinkage control

[2019: 3.2.5.3]

Where brittle floor coverings, such as ceramic tiles, are to be used over an area greater than 16 m^2, one of the following additional measures must be taken to control the effect of shrinkage cracking—

(a) the amount of shrinkage reinforcement (steel reinforcement mesh in the slab panel) must be—

(i) increased to SL92 or equivalent throughout the affected slab area; or

(ii) reinforced top and bottom with sheets of slab mesh throughout the affected slab area; or

(b) the bedding system for brittle coverings must be selected on the basis of the expected slab movement and the characteristics of the floor covering (including the use of expansion joints etc.); or

(c) the placement of floor covering must be delayed for not less than 3 months after the concrete has been poured.

4.2.20 Concentrated loads

[New for 2022]

Where a footing or slab supports a concentrated load from a structural steel column, localised thickening must—

(a) be provided in accordance with—

(i) for tiled floor and tiled roof, Tables 4.2.20a, 4.2.20b or 4.2.20c; or

(ii) for timber floor and metal roof, Tables 4.2.20d, 4.2.20e or 4.2.20f; and

(b) be centred under the structural steel column; and

(c) have SL72 reinforcement with a minimum 50 mm of concrete cover (see Figure 4.2.20).

Table 4.2.20a: Localised thickening under concentrated load — tiled floor and tiled roof — roof load area = 0 m²

Localised thickening	Maximum floor load area (m²)		
	4	10	16
Square thickening size (mm)	450 x 450	650 x 650	850 x 850
Thickening depth (mm)	250	350	400

Table Notes

(1) Load accounted for includes 0.98 kPa permanent tiled floor, 0.85 kPa permanent tiled roof, 1.16 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are G + 0.5Q for ULS.

(3) Minimum bearing pressure is 100 kPa for pad footings.

(4) A roof load area of "0" must be used for footings not supporting roof loads.

(5) The length of wall allowed for is equal to the square root of the floor area.

Table 4.2.20b: Localised thickening under concentrated load — tiled floor and tiled roof — roof load area = maximum 9 m²

Localised thickening	Maximum floor load area (m²)		
	4	10	16
Square thickening size (mm)	650 x 650	800 x 800	950 x 950
Thickening depth (mm)	350	400	450

Table Notes

(1) Load accounted for includes 0.98 kPa permanent tiled floor, 0.85 kPa permanent tiled roof, 1.16 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are G + 0.5Q for ULS.

(3) Minimum bearing pressure is 1000 kPa for pad footings.

(4) The length of wall allowed for is equal to the square root of the floor area.

Table 4.2.20c: Localised thickening under concentrated load — tiled floor and tiled roof — roof load area = maximum 18 m²

Localised thickening	Maximum floor load area (m²)		
	4	10	16
Square thickening size (mm)	750 x 750	900 x 900	1000 x 1000
Thickening depth (mm)	400	450	500

Table Notes

(1) Load accounted for includes 0.98 kPa permanent tiled floor, 0.85 kPa permanent tiled roof, 1.16 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are G + 0.5Q for ULS.

(3) Minimum bearing pressure is 1000 kPa for pad footings.

(4) The length of wall allowed for is equal to the square root of the floor area.

Table 4.2.20d: Localised thickening under concentrated load — timber floor and metal roof — roof load area = 0 m²

Localised thickening	Maximum floor load area (m²)		
	4	10	16
Square thickening size (mm)	400 x 400	600 x 600	750 x 750
Thickening depth (mm)	250	300	350

Table Notes

(1) Load accounted for includes 0.53 kPa permanent timber floor, 0.4 kPa permanent metal roof, 1.16 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are G + 0.5Q for ULS.

(3) Minimum bearing pressure is 1000 kPa for pad footings.

(4) A roof load area of "0" must be used for footings not supporting roof loads.

(5) The length of wall allowed for is equal to the square root of the floor area.

Table 4.2.20e: Localised thickening under concentrated load — timber floor and metal roof — roof load area = maximum 9 m²

Localised thickening	Maximum floor load area (m²)		
	4	10	16
Square thickening size (mm)	500 x 500	700 x 700	800 x 800
Thickening depth (mm)	300	350	400

Table Notes

(1) Load accounted for includes 0.53 kPa permanent timber floor, 0.4 kPa permanent metal roof, 1.16 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are G + 0.5Q for ULS.

(3) Minimum bearing pressure is 1000 kPa for pad footings.

(4) The length of wall allowed for is equal to the square root of the floor area.

Table 4.2.20f: Localised thickening under concentrated load — timber floor and metal roof — roof load area = maximum 18 m²

Localised thickening	Maximum floor load area (m²)		
	4	10	16
Square thickening size (mm)	600 x 600	750 x 750	850 x 850
Thickening depth (mm)	300	400	450

Table Notes

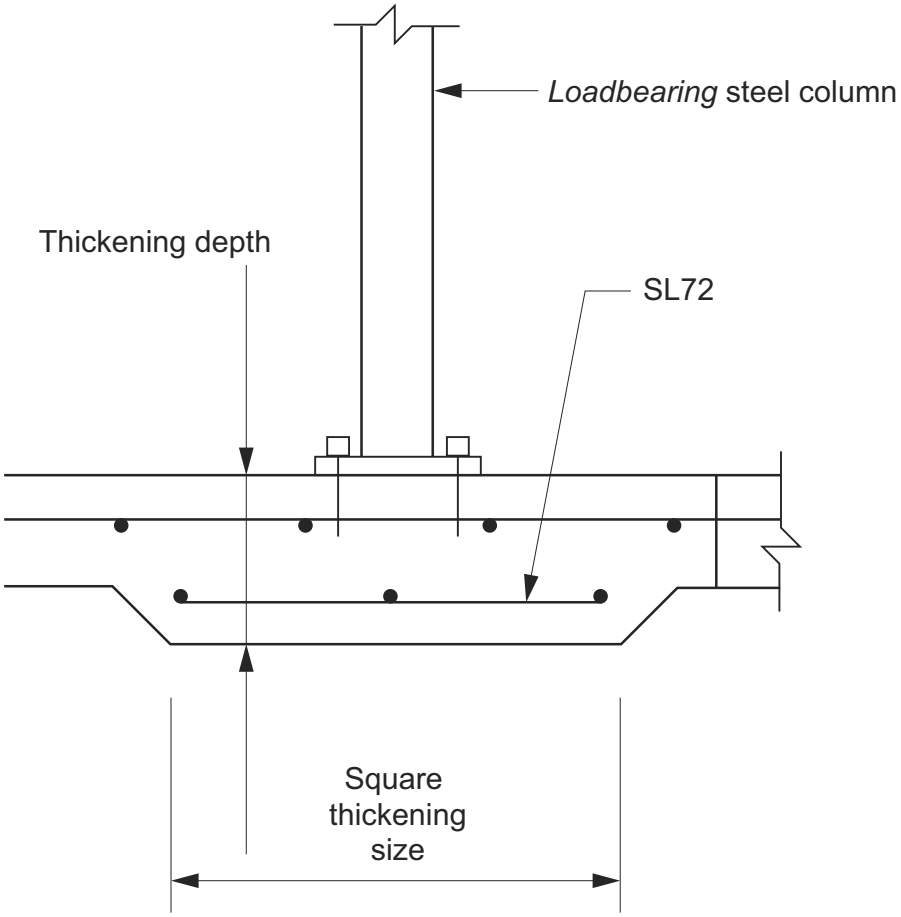
(1) Load accounted for includes 0.53 kPa permanent timber floor, 0.4 kPa permanent metal roof, 1.16 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are G + 0.5Q for ULS.

(3) Minimum bearing pressure is 1000 kPa for pad footings.

(4) The length of wall allowed for is equal to the square root of the floor area.

Figure 4.2.20: Localised thickening for concentrated loads



4.2.21 Minimum edge beam dimensions

[2019: 3.2.5.4]

For footing slabs, the width of the edge beam at the base of the rebate must not be less than 200 mm, except that if R10 or N10 ties at 900 mm spacing (or equivalent) are provided to resist vertical forces, the width of the edge beam at the base of the rebate can be reduced to 150 mm.

4.2.22 Recessed areas of slabs

[New for 2022]

(1) Where a recess in a slab is provided, it must comply with one of the following:

(a) For recess depths less than or equal to half the nominal slab thickness, the reinforcing mesh must have a minimum lap length of 400 mm measured from the inside face of the recess (see Figure 4.2.22a).

(b) For recess depths greater than half the nominal slab thickness (see Figure 4.2.22b)—

(i) top reinforcing mesh must overlap the bottom reinforcing mesh by not less than 400 mm; and

(ii) bottom reinforcing mesh must be two layers of SL72.

(2) Concrete cover to reinforcing in (1)(a) and (b) must comply with 4.2.11(5).

Figure 4.2.22a: Recess depths (d) less than or equal to nominal slab thickness

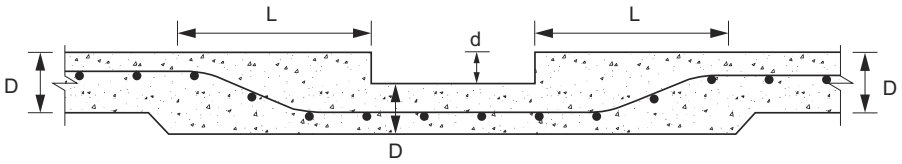
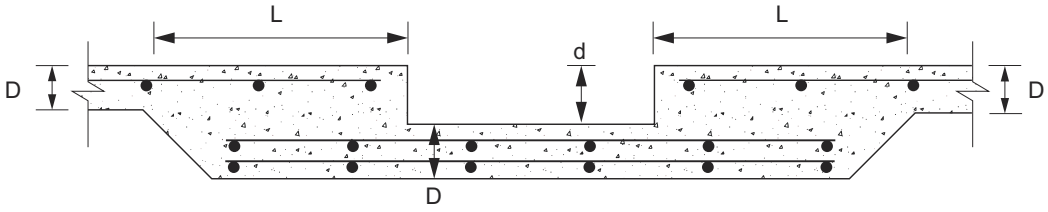


Figure 4.2.22b: Recess depths (d) greater than nominal slab thickness



5 Masonry

Part 5.7 Weatherproofing of masonry

Part 5.1 Scope and application of Section 5

5.1.1 Scope

[New for 2022]

(1) This Section sets out the *Deemed-to-Satisfy Provisions* for—

(a) masonry veneer — see Part 5.2; and

(b) *cavity* masonry — see Part 5.3; and

(c) single leaf *unreinforced masonry* — see Part 5.4; and

(d) isolated masonry piers — see Part 5.5; and

(e) masonry components and accessories — see Part 5.6; and

(f) weatherproofing of masonry — see Part 5.7.

(2) For other masonry provisions not included in this Section, refer to NCC Volume Two: H1D5(4) *Reinforced masonry*.

5.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC 2022 Volume Two.

(b) Any conditions set out within the following *Deemed-to-Satisfy Provisions* of NCC Volume Two:

(i) H1D5(1), for masonry veneer.

(ii) H1D5(2), for *cavity* masonry.

(iii) H1D5(3), for *unreinforced masonry*.

(iv) H1D5(5), for isolated masonry piers.

(v) H1D5(6), for masonry accessories.

(vi) H2D4(2)(c), for weatherproofing of masonry.

(c) The State and Territory variations, additions and deletions contained in the Schedules to the ABCB Housing Provisions and NCC Volume Two.

Explanatory Information

In NCC 2019, the content of Section 5 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Parts 3.3.5 and 3.3.6 of NCC 2019 Volume Two.

NCC 2019 Volume Two did not include an acceptable construction practice for Parts 3.3.1, 3.3.2, 3.3.3 or 3.3.4.

Part 5.2 Masonry veneer

5.2.1 Application

[New for 2022]

(1) Part 5.2 is subject to the limitations set out in H1D5(1)(c).

(2) Part 5.2 need not be complied with if H1D5(1)(a) or (b) are complied with.

5.2.2 Height of wall limitation

[2019: 3.3.5.2]

Masonry veneer walls must not be greater than 8.5 m in height when measured above the adjacent finished ground level.

5.2.3 Openings in masonry veneer

[2019: 3.3.5.11]

(1) Except where excluded by (2), openings in masonry veneer must be spanned by steel lintels.

(2) Openings in masonry veneer not more than 500 mm wide need not be provided with a steel lintel provided the opening is adequately supported.

5.2.4 Damp-proof courses and flashing materials

[New for 2022]

Damp-proof courses and *flashing* materials must be in accordance with 5.7.3 and 5.7.4.

5.2.5 Vertical articulation joints

[New for 2022]

Vertical articulation joints are to be installed in accordance with 5.6.8.

5.2.6 Engaged piers

[2019: 3.3.5.14]

Where *engaged piers* are installed to support subfloor framing, they must comply with the provisions of this Part and be constructed as follows:

(a) Footings for piers must comply with Section 4.

(b) *Engaged piers* must not support more than a single storey with a roof framing span of not more than 12 m.

(c) Piers must be spaced at not more than 3 m centres with floor framing complying with—

  (i) H1D6(3) for steel framing; and

  (ii) H1D6(4) for timber framing; and

  (iii) H1D6(5) for structural steel framing.

(d) Piers must be—

  (i) not more than 1.2 m high; and

  (ii) a minimum thickness of 100 mm inclusive of mortar; and

  (iii) a width greater than the depth of the timber or steel section which it is supporting (see Figure 5.2.6).

(e) Notwithstanding (c), *engaged piers* must be located beneath—

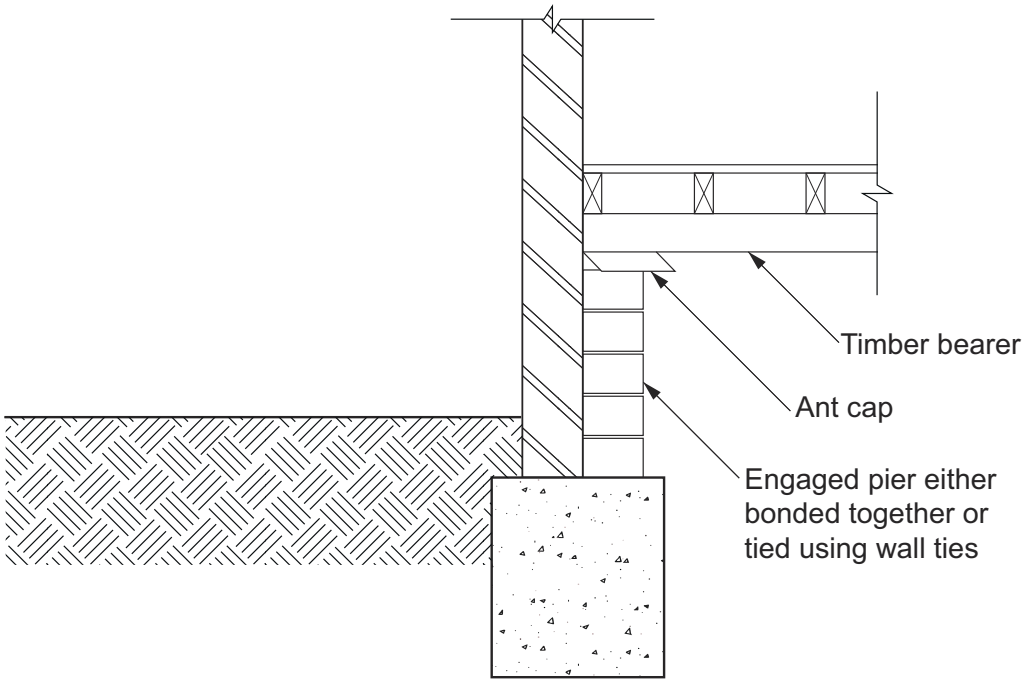
(i) each side of *window* and door openings; and

(ii) concentrated roof loads, inclusive of any roof beams and girder trusses.

(f) Piers must be tied or bonded to the external masonry wall, and where ties are used they must comply with 5.6.5.

(g) Piers formed from hollow-core masonry units must be filled with grout.

Figure 5.2.6: Engaged pier



Part 5.3 Cavity masonry

5.3.1 Application

[New for 2022]

(1) Part 5.3 applies subject to the limitations set out in H1D5(2)(c).

(2) Part 5.3 need not be complied with if H1D5(2)(a) or (b) are complied with.

5.3.2 Height of wall limitation

[New for 2022]

Cavity masonry walls must not be greater than 8.5 m in height when measured above the adjacent *finished ground level*.

5.3.3 External walls

[New for 2022]

(1) *Cavity* masonry walls must comply with the relevant provisions of this Part and Parts 5.6 and 5.7, and be constructed as follows:

- (a) The height of the wall between *lateral supports* (floor or ceiling or roof diaphragm) must be not more than 3 m.
- (b) *Cavity* masonry walls subject to wind loads must be supported by masonry cross walls or by steel mullions complying with (3).
- (c) Masonry cross walls must be—
  - (i) not less than 2 m in length; and
  - (ii) at not more than 5.1 m centres where the length of the *cavity* wall being supported does not contain any opening or control joint; and
  - (iii) not more than 2.5 m from the edge of a control joint in the length of the *cavity* wall being supported; and
  - (iv) not more than a distance from the edge of an opening in the length of the *cavity* wall being supported as stated in Table 5.3.3; and
  - (v) located at both edges of openings of width greater than 2.7 m; and
  - (vi) directly connected to the internal leaf of the *cavity* wall being supported using—
    - (A) properly bonded units with at least 90 mm engagement on each side of the interface with the selected bond pattern but not less than every fourth course of masonry; or
    - (B) medium duty Type A *cavity* wall ties in aligning mortar bed joints at a vertical spacing of not more than 300 mm; and
  - (vii) connected by a floor or ceiling diaphragm to the wall being supported where floor or ceiling connections are designed in accordance with AS/NZS 4600, AS 1720.1 or AS 3600, as appropriate.

(2) *Cavity* masonry walls must be constructed of two leaves, with each leaf not less than 90 mm wide.

(3) In *cavity* masonry construction, a *cavity* must be provided between the inner and outer masonry leaves as follows:

- (a) The *cavity* must be not less than 35 mm and not more than 75 mm in width, in accordance with 5.7.2.
- (b) Except for steel mullions, the minimum *cavity* width specified in (a) is to be maintained between the outer masonry leaf and any insulation or services located in the *cavity*.
- (c) Where steel mullions are located in a *cavity* as permitted by (b), a vertical *damp-proof course* must be placed between the outer masonry leaf and the mullion to prevent moisture penetration.

Table 5.3.3: Spacing of return walls for cavity walls with openings — distance from the edge of an opening (mm)

Wind class	Opening width (mm)			
	900	1500	2100	2700
N3	2100	1800	800	400
N2	3200	2900	2600	2300
N1	2500(Note)	2200(Note)	1900(Note)	800(Note)

Table Notes

The spacing in wind class N1 is smaller than for N2 because 5.6.5 states that for *cavity* walls in wind class N1, light duty *cavity* ties are to be used. This results in only relying on one leaf to resist the load instead of sharing it equally as per clause 7.7.3 of AS 3700.

Explanatory Information

Steel mullions complying with AS 4773.1 and 4773.2 used to support wind loads may be placed within a *cavity*. Flat ceiling capable of performing diaphragm action may act as *lateral support* to walls provided the structure has been specifically designed.

5.3.4 Internal walls

[New for 2022]

(1) Where internal masonry walls intersect with other internal or external walls they must comply with the relevant provisions of this Part and be—

(a) not less than 75 mm thick; and

(b) either—

(i) bonded at the junctions of the intersecting walls; or

(ii) provided with an articulation joint in accordance with 5.6.8.

(2) Where a vertical articulation joint is provided in an internal masonry wall it must be formed in accordance with 5.6.8.

5.3.5 Openings in cavity masonry

[New for 2022]

(1) Except where excluded by (2), openings in *cavity* masonry must be spanned by steel lintels in accordance with 5.6.7.

(2) Openings in *cavity* masonry not more than 500 mm wide need not be provided with a steel lintel provided the opening is adequately supported.

Explanatory Information

An opening of not more than 500 mm is considered to be adequately supported if the masonry bears directly on a timber window head or steel frame.

5.3.6 Damp-proof courses and flashing materials

[New for 2022]

Damp-proof courses and *flashing* must be provided in accordance with 5.7.3 and 5.7.4.

5.3.7 Vertical articulation joints

[New for 2022]

Vertical articulation joints are to be installed in accordance with 5.6.8.

Part 5.4 Unreinforced single leaf masonry

5.4.1 Application of Part 5.4

[New for 2022]

(1) Part 5.4 applies subject to the limitations set out in H1D5(3)(c).

(2) Part 5.4 need not be complied with if H1D5(3)(a) or (b) are complied with.

5.4.2 External walls

[New for 2022]

(1) Single leaf *unreinforced masonry* walls with *engaged piers* and return walls must comply with the relevant provisions of this Part and be constructed in accordance with the following:

(a) The roof frame must be connected continuously to the top of the wall (see Figure 5.4.2a).

(b) *Stack bonded piers* must have wall ties at every fourth course.

(c) Pier and return supports size limitations for—

(i) single leaf *unreinforced masonry* walls with *engaged piers*, must comply with Table 5.4.2a and Figure 5.4.2b; and

(ii) single leaf *unreinforced masonry* walls with return supports, must comply with Table 5.4.2b and Figure 5.4.2c.

(d) An *engaged pier* or return wall must be provided at both sides of an opening.

(e) The width of an opening must be not more than the spacing between the *engaged piers* unless the *engaged piers* either side of the opening are designed in accordance with AS 3700.

(f) Articulation joints must be located within 300 mm of vertical supports in accordance with 5.6.8.

(2) A Class 10a building containing not more than 1 storey may be enclosed with single leaf masonry *external walls* not less than 90 mm in thickness, provided that—

(a) the building measured in the direction of the span of the roof is not more than 9 m and the height is not more than 2.7m; and

(b) *engaged piers* are provided that are in accordance with Tables 5.4.2c and 5.4.2d; and

(c) the roof does not place any spreading thrust onto the *external walls*; and

(d) the Class 10a building is located in an area with a wind class of not more than N2.

Table 5.4.2a: Engaged piers in external single leaf masonry walls to AS 3700

Element	Symbol used in Figure 5.4.2b	Thickness of wall (T)	
		90	110
Pier size (minimum) (not more than N2)	A x B	290 x 190 (800 spacing)	350 x 230 (1150 spacing)
Pier size (minimum) (not more than N3)	A x B	290 x 290 (700 spacing)	350 x 350 (1050 spacing)
Spacing of returns (maximum)	S	700	1050
Height (maximum)	H	2400	2700

Table Notes

(1) Dimensions are in mm.

(2) Return supports are not *required* for 140 mm and 190 mm thick walls.

Table 5.4.2b: Return support limitations for external single leaf masonry walls to AS 3700

Element	Symbol used in Figure 5.4.2c	Thickness of wall (T)			
		90	110	140	190
Return length (minimum)	R	450	450	–	–
Spacing of returns (maximum) (N2)	S	1050	1300	–	–
Spacing of returns (maximum) (N3)	S	600	750	–	–
Height (maximum)	H	2400	2400	1700 (N2)	2300 (N2)

Table Notes

(1) Dimensions are in mm.

(2) Return supports are not *required* for 140 mm and 190 mm thick walls.

Table 5.4.2c: Engaged piers in external walls of Class 10a buildings — wall height: 2.4 m

Wall thickness (mm)	Pier thickness (mm)	Pier width (mm)	Spacing (mm) for wind class	
			N1	N2
90	190	290	1000	600
90	290	190	1700	1200
90	290	290	2600	1800
110	230	230	1320	840
110	230	350	2040	1320
110	350	230	3240	2160
110	350	350	4920	3360

Table 5.4.2d: Engaged piers in external walls of Class 10a building — wall height: 2.7 m

Wall thickness (mm)	Pier thickness (mm)	Pier width (mm)	Spacing (mm) for wind class	
			N1	N2
90	190	290	700	500
90	290	190	1300	900
90	290	290	2000	1400
110	230	230	960	600
110	230	350	1440	960
110	350	230	2520	1680
110	350	350	3840	2520

Figure 5.4.2a: Top lateral restraint detail for unreinforced single leaf masonry walls

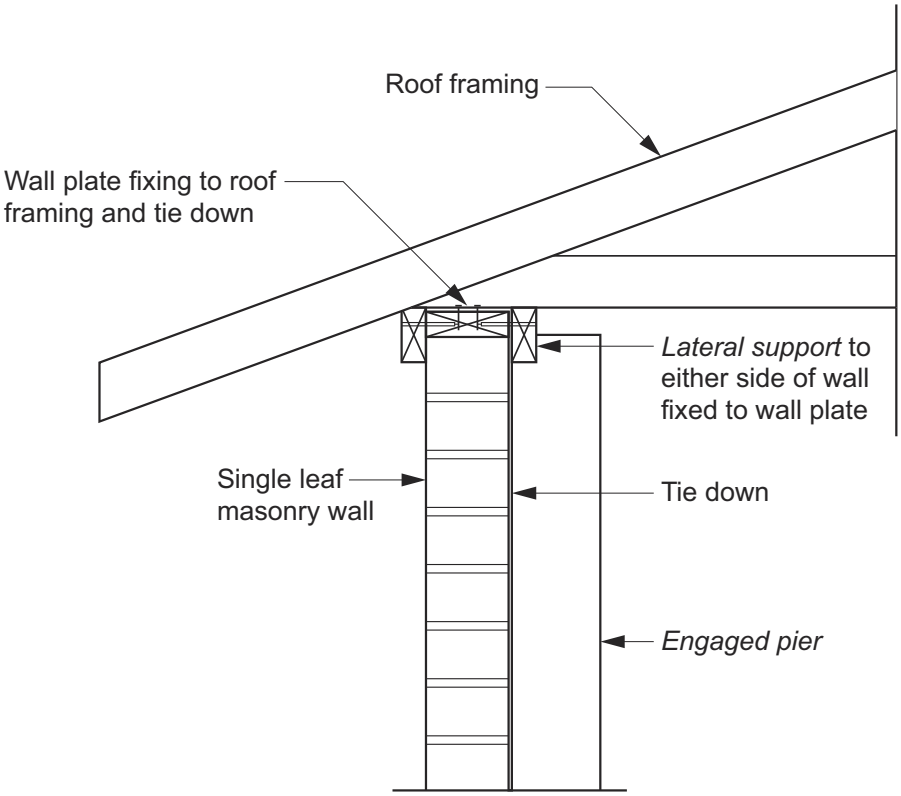


Figure Notes

Tie down of wall must comply with 5.6.6.

Figure 5.4.2b: Engaged piers in external single leaf masonry walls to AS 3700

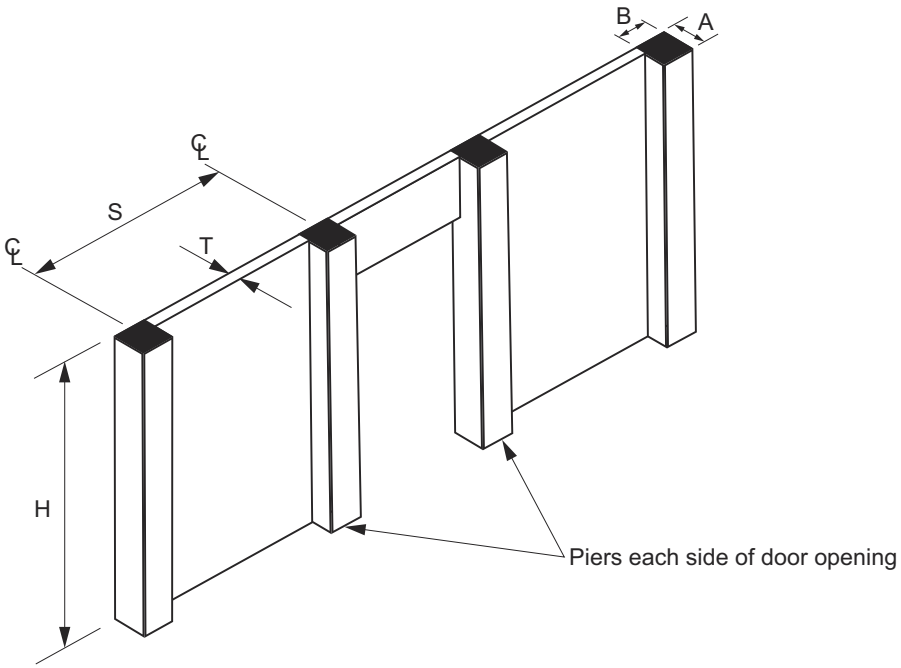
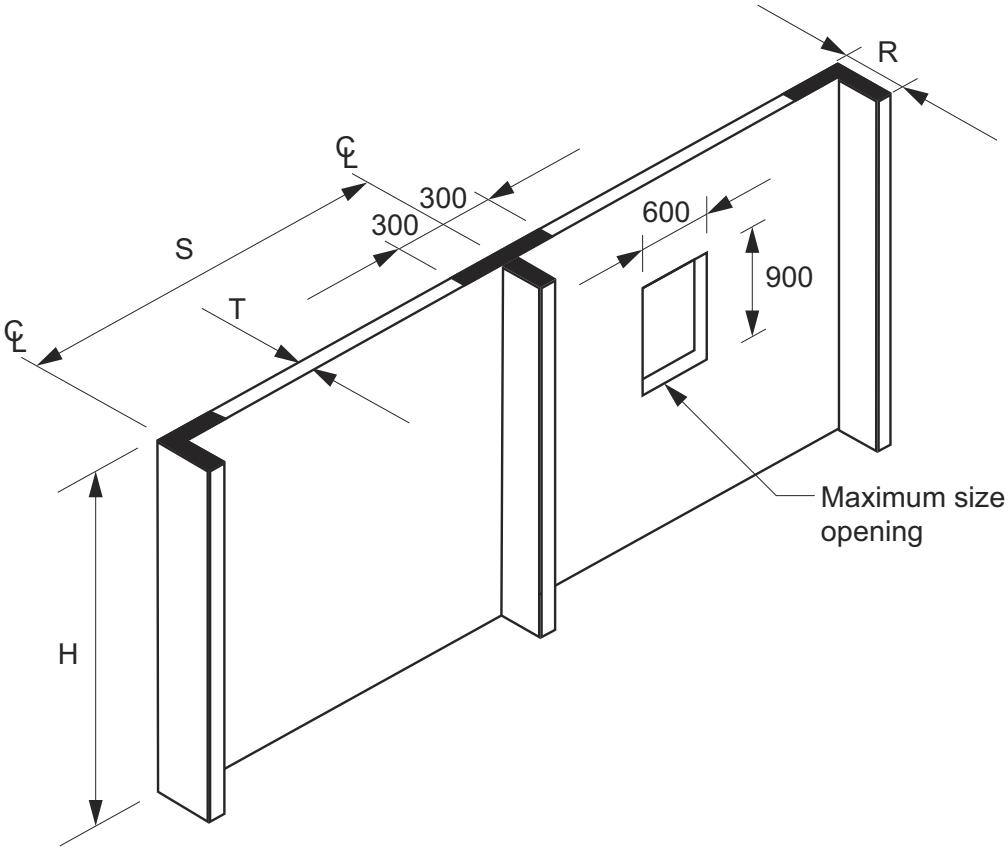


Figure 5.4.2c: Return support limitations for external single leaf masonry walls to AS 3700



5.4.3 Internal walls

[New for 2022]

Internal masonry walls must be engaged with other walls, must comply with the relevant provisions of this Part and must be—

(a) not less than 75 mm thick; and

(b) supported by either—

(i) the ceiling structure in accordance with Figure 5.4.3a; or

(ii) return walls in accordance with Figure 5.4.3b.

Figure 5.4.3a: Support for internal walls—supported by ceiling structure

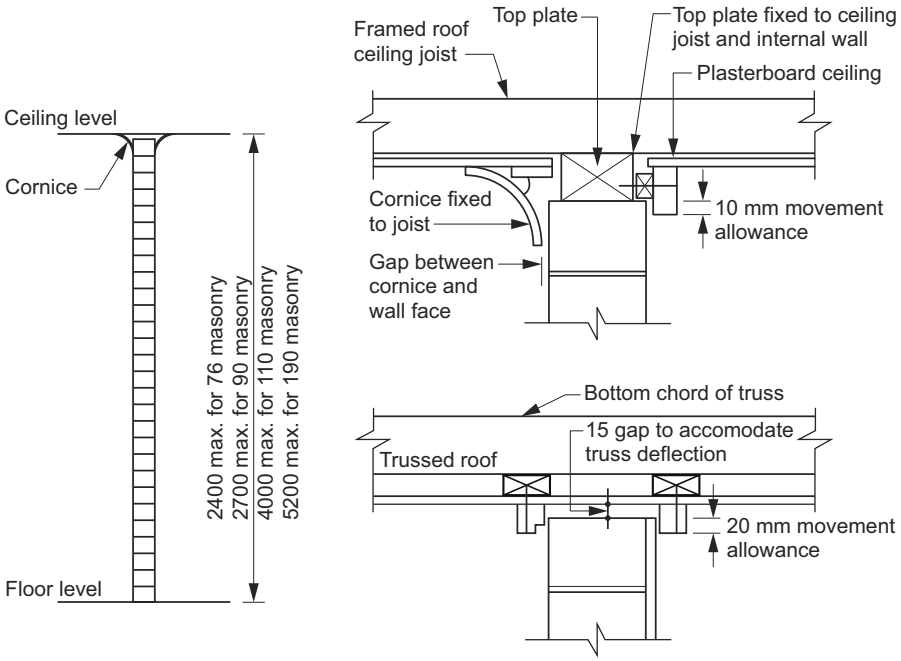


Figure Notes

(1) Timber joist must be fixed to top plate in accordance with H1D6(4).

(2) Fixing of top plate to masonry wall must be in accordance with 5.6.6.

Figure 5.4.3b: Support for internal walls—supported by return walls

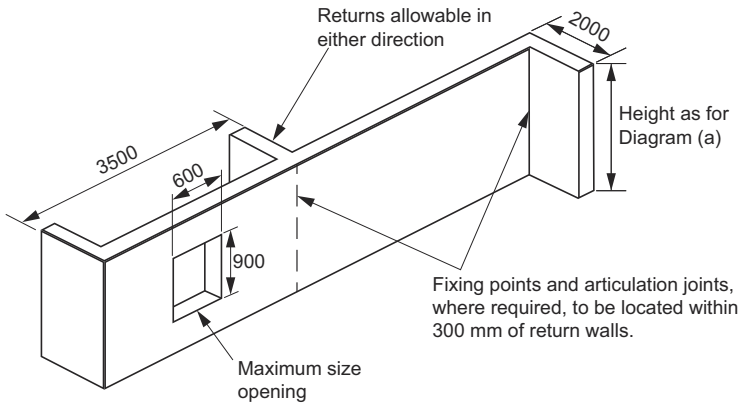


Figure Notes

(1) An opening of not more than 600 mm x 900 mm is allowed to internal walls without additional support.

(2) Openings larger than as described in Note 1 and door openings must be supported.

(3) The maximum allowable height for the wall is described in Figure 5.4.3a.

(4) Articulation joints must be in accordance with 5.6.8.

Explanatory Information

A full height door frame or stud fastened at the roof framing and tied to the wall at 300 mm centres can be considered equivalent to a return wall.

5.4.4 Vertical articulation joints

[New for 2022]

Vertical articulation joints must be provided in accordance with 5.6.8.

5.4.5 Damp-proof courses and flashing materials

[New for 2022]

Where required, *damp-proof courses* and *flashing* must be provided in accordance with 5.7.3 and 5.7.4.

Part 5.5 Isolated piers

5.5.1 Application

[New for 2022]

(1) Part 5.5 is subject to the limitations set out in H1D5(5)(c).

(2) Part 5.5 need not be complied with if H1D5(5)(a) or (b) are complied with.

5.5.2 Isolated piers supporting carports, verandahs, porches and similar roof structures

[2019: 3.3.6.2]

Isolated piers supporting carports, verandahs, porches and similar roof structures, or vehicle access door openings, which form part of the main roof, or are attached to a wall of a Class 1 building must—

(a) be not less than 290 x 290 mm in section; and

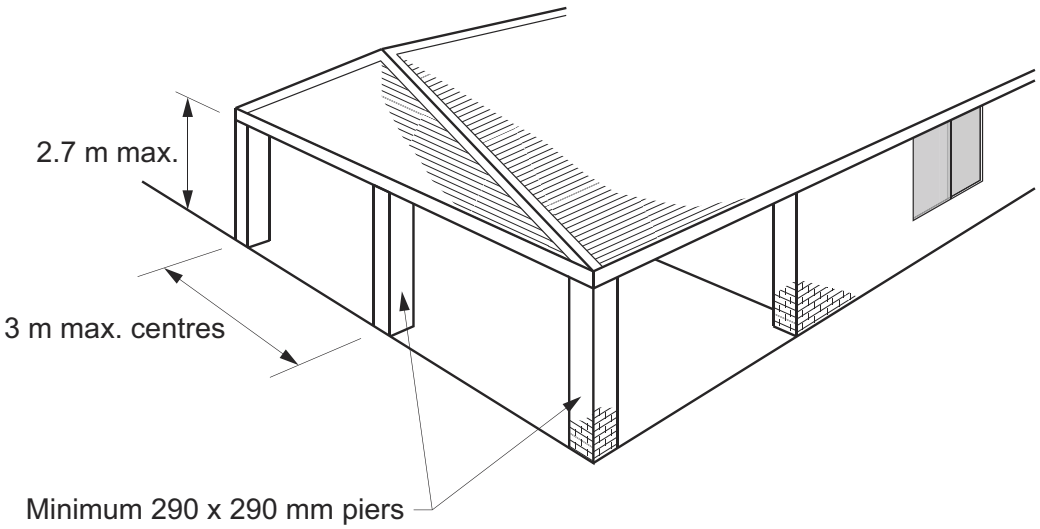
(b) be not more than 2.7 m high (see Figure 5.5.2); and

(c) be spaced at not more than 3 m centres (see Figure 5.5.2); and

(d) provide a bearing length of not less than 150 mm for any supported members; and

(e) comply with the relevant provisions of this Part.

Figure 5.5.2: Piers under main roof



5.5.3 Isolated piers supporting tiled roofs

[2019: 3.3.6.3]

Isolated piers supporting tiled roofs must have—

(a) a built-in 30 x 0.8 mm galvanised steel strap fixed to the roof structure that extends the full height of the pier; and

(b) a 4.6 grade M12 galvanised steel rod which is cast into the footing when poured and looped and fixed around the galvanised steel strap *required* by (a).

5.5.4 Isolated piers supporting sheet roofs

[2019: 3.3.6.4]

Isolated piers supporting sheet roofs must have—

(a) a built-in 30 x 0.8 mm galvanised steel strap fixed to the roof structure extending the full height of the pier which is looped and fixed around a 4.6 grade 16 mm diameter galvanised steel rod cast into the footing when poured; or

(b) a 4.6 grade M16 galvanised steel rod cast into the footing, threaded at the top and extending the full height of the pier to connect to the roof structure.

5.5.5 Isolated piers for freestanding carports

[2019: 3.3.6.5]

Piers for freestanding carports must—

(a) be not less than 290 x 290 mm in section with the central core filled with 20 MPa concrete, or an exposure class mortar (see Table 5.6.3) complying with 5.6.3; and

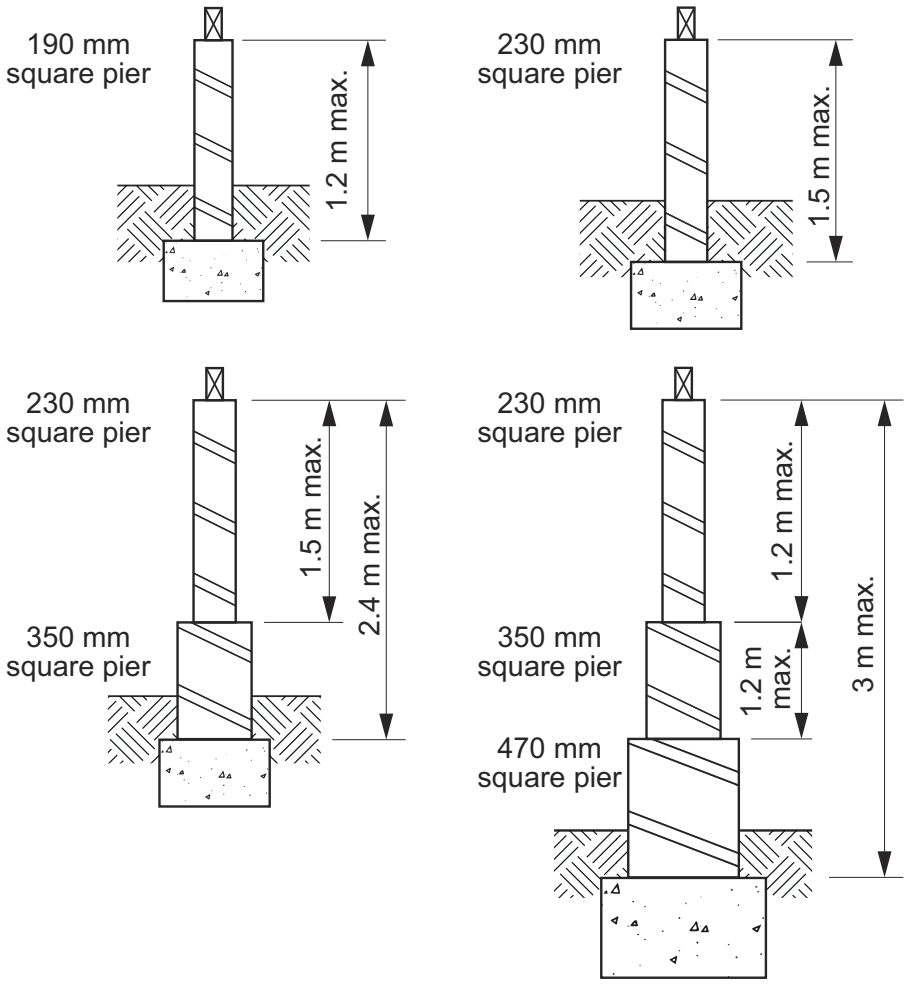
(b) have the core reinforced with one Y16 steel reinforcing rod cast into the footing and extending the full height of the pier to connect to the roof structure.

5.5.6 Subfloor isolated piers

[2019: 3.3.6.6]

Subfloor isolated piers must be not less than 190 x 190 mm in section and comply with Figure 5.5.6 for height requirements.

Figure 5.5.6: **Sub-floor isolated piers — maximum height and sectional details**



Part 5.6 Masonry components and accessories

5.6.1 Application

[New for 2022]

(1) Part 5.6 is subject to the limitations set out in H1D5(6)(c)(i), (ii) and (iii).

(2) Part 5.6 need not be complied with if H1D5(6)(a) or (b) are complied with.

5.6.2 Masonry units

[2019: 3.3.5.3]

(1) Masonry veneer masonry units must have a minimum compressive strength of—

  (a) 3 MPa for solid or cored units; or

  (b) 10 MPa for hollow units.

(2) *Cavity* masonry and single skin masonry units must have a minimum compressive strength of—

  (a) 5 MPa for solid or cored units; or

  (b) 10 MPa for hollow units.

(3) Masonry *cavity* walls must have a minimum leaf thickness of 90 mm.

(4) Subject to (5), masonry units must be—

  (a) either clay or calcium silicate brick or concrete brick or block; and

  (b) classified and used in the exposure conditions appropriate to their classification as described in (6).

(5) Mixing of panels consisting of clay masonry units with panels consisting of concrete or calcium silicate masonry units is not permitted unless—

  (a) at vertical junctions, a control joint is installed; and

  (b) at horizontal junctions between panels of different materials, a slip joint using a membrane similar to that used for *damp-proof courses* is installed.

(6) Masonry unit exposure classifications and corresponding masonry unit applications are as follows:

  (a) Protected (P) masonry units are suitable for use in locations such as—

    (i) internal walls; and

    (ii) *external walls* that are coated or rendered; and

    (iii) walls above *damp-proof courses* provided the wall is protected at the top by a roof, eaves, coping, topping or the like.

  (b) General Purpose (GP) masonry units are suitable for use in all locations except those where ‘Exposure class’ (Exp) is *required*.

  (c) Exposure class (Exp) masonry units are suitable for use in all locations including severe local conditions such as—

    (i) below the *damp-proof course* in areas where walls are expected to be attacked by salts in the ground water or masonry itself (salt attack or salt damp); and

    (ii) on sea fronts where walls are exposed to attack from salt spray; and

    (iii) in heavily polluted areas subject to deposition of atmospheric pollution; and

    (iv) under regular cyclic freeze and thaw conditions.

Explanatory Information

The exposure classification or durability of a masonry unit is a measure of its resistance to attack by soluble salts, either

in the ground or in the atmosphere. All masonry products manufactured are classified by their durability. The majority of uses will require either an Exposure class (Exp) product or a General Purpose (GP) product.

5.6.3 Mortar mixes

[2019: 3.3.5.4]

Mortar used for masonry construction must comply with AS 3700 or AS 4773 except that the mortar may be mixed by volume in the proportions stated in Table 5.6.3.

Table 5.6.3: Acceptable mortar mixes

Masonry unit exposure classification	Mortar mix by volume Note 1 Cement: lime: sand	
	General use	Suitable for concrete masonry Note 2
Protected	1:2:9	1:0:5
General purpose	1:1:6	1:0:5
Exposure class	1:0.5:4.5	1:0:4.2

Table Notes

(1) Additives may be used provided they comply with the appropriate specified rate.

(2) Mortar mixes for masonry require the use of methyl cellulose water thickener.

5.6.4 Mortar joints

[2019: 3.3.5.5]

(1) Unless otherwise specified, masonry bed and perpend joints must have a nominal thickness of 10 mm.

(2) Raked joints are not to be used in saline environments or areas subject to heavy industrial airborne pollution.

(3) Where raked joints are used the depth of raking must not be—

- (a) closer than 5 mm to any perforation in cored unit masonry or 20 mm in hollow unit masonry; or
- (b) more than 5 mm for masonry units at least 90 mm wide; or
- (c) more than 10 mm for masonry units at least 110 mm wide.

5.6.5 Wall ties

[2019: 3.3.5.10]

Masonry wall ties must—

- (a) comply with AS 2699.1 and—
  - (i) for masonry veneer walls be—
    - (A) a minimum of light duty veneer ties in areas where the *design wind speed* is not more than N2; and
    - (B) a minimum of medium duty veneer ties in areas where the *design wind speed* is more than N2; and
  - (ii) for *cavity* masonry walls be—
    - (A) a minimum of light duty *cavity* ties in areas where the *design wind speed* is N1; and
    - (B) a minimum of medium duty *cavity* ties in areas where the *design wind speed* is more than N1; and
  - (iii) where non-*engaged piers* are provided, piers must be tied to walls using medium duty ties; and
  - (iv) for monolithic or solid masonry construction be a minimum of medium duty ties; and
- (b) be spaced and fixed in accordance with Tables 5.6.5a, 5.6.5b and 5.6.5c (see also Figures 5.6.5a and 5.6.5b); and
- (c) be protected against corrosion in accordance with Table 5.6.5d.

Table 5.6.5a: Wall tie spacings in masonry veneer

Direction	Wall tie spacing	
	450 mm wall stud spacing	600 mm wall stud spacing
Horizontal	Maximum 450 mm	Maximum 600 mm
Vertical	Maximum 600 mm	Maximum 400 mm

Table Notes

Wall ties that are suitable for higher duties are also suitable for use in lower duty conditions.

Table 5.6.5b: Wall tie spacing in cavity and solid masonry

Direction	Wall tie spacing (maximum)	
	Cavity masonry	Solid or monolithic masonry
Horizontal	600 mm	400 mm
Vertical	600 mm	400 mm

Table Notes

Wall ties that are suitable for higher duties are also suitable for use in lower duty conditions.

Table 5.6.5c: Placement of wall ties

Location	Placement of wall ties
Unsupported panel sides and edges of openings	Within 300 mm of panel side or edge
Top of veneer panels and top of panels under openings	Within 300 mm or two courses (whichever is the lesser) of the top of veneer
Bottom of veneer panel in masonry rebate sealed with liquid applied *damp-proof course*	Within 300 mm or two courses (whichever is the lesser) from the bottom of the veneer
Bottom of veneer panel supported on steel lintel	
Bottom of veneer panel in masonry rebate with membrane *damp-proof course*	In each of the first two courses
Intersection of *internal walls* and *external walls*	350 mm vertically or 3-4 courses
Where articulation joints occur	At both sides of the articulation joint within 300 mm from the joint
Engaged piers	Within 200 mm of the top of the pier

Table Notes

(1) Ties to be embedded a minimum of 50 mm into each masonry leaf.

(2) Masonry wall ties must be installed in such a manner as to prevent moisture travelling along the tie to the inner leaf of masonry or the frame.

Table 5.6.5d: Corrosion protection for wall ties

Exposure condition	Tie specification (minimum corrosion protection)
Areas less than 1km from *breaking surf*; or less than 100 m from salt water not subject to *breaking surf*; or within heavy industrial areas.	Grade 316L stainless steel; or engineered polymer complying with the requirements of AS 2699.1.
Areas 1km or more but less than 10km from *breaking surf*; or 100m or more but less than 1km from salt water not subject to *breaking surf*.	Sheet steel and bar ties galvanised after manufacture - 470 g/m^2 on each side; or galvanised wire ties - 470 g/m^2 coating mass; or Grade 304L stainless steel.
All other areas	Galvanised sheet steel - 300 g/m^2 coating on each side; or sheet steel ties galvanised after manufacture - 300 g/m^2 on each side.

Figure 5.6.5a: Wall tie details (lowset)

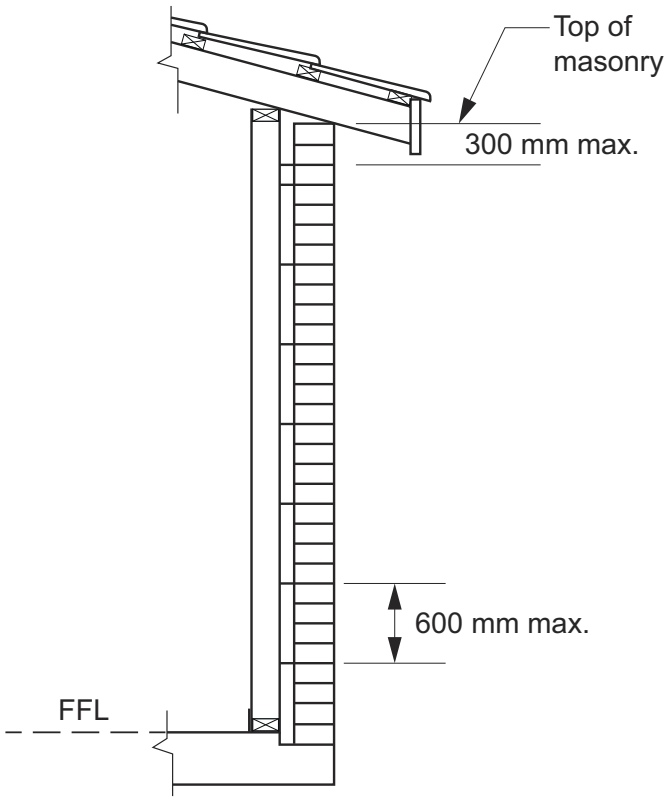


Figure 5.6.5b: Wall tie details (highset)

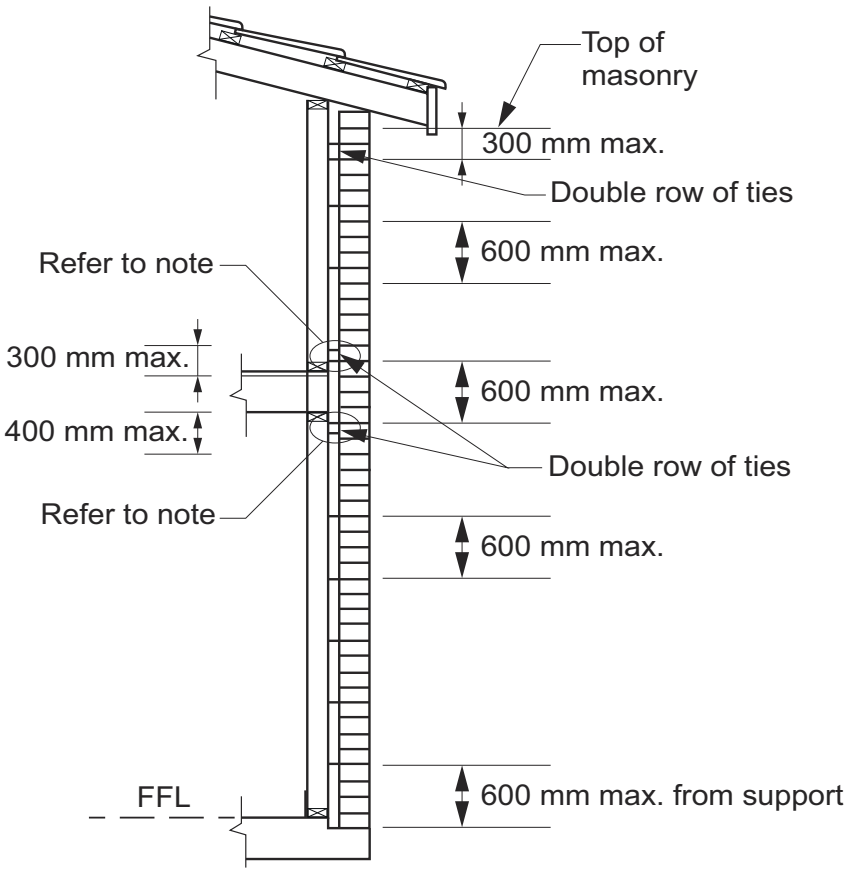


Figure Notes

Where wall ties are *required*, they must be placed in adjacent courses (as shown) or must be placed in the same course on each side of the stud.

Explanatory Information

Wall ties that are suitable for use in a more severe exposure condition are also suitable for use in less severe exposure conditions, i.e. stainless steel and engineered polymer ties are suitable for use in all conditions and 470g/m^2 galvanised ties can be used in all exposure conditions except the most severe.

5.6.6 Fixing straps and tie-down systems

[New for 2022]

(1) Timber door and *window* frames abutting *cavity* masonry must be fixed with 300 mm long 30 mm x 0.8 mm kinked galvanised steel straps—

(a) fixed to the back of frames; and

(b) set into courses not less than 150 mm at not more than 400 mm intervals.

(2) For areas with a wind class of N1 or N2 and a building width from outside wall to outside wall of not more than 10 m in the direction of the roof span (see Figure 5.6.6a), sheet metal and tiled roofs must be tied down using one of the following methods:

(a) 30 mm x 0.8 mm galvanised steel straps at not more than 1.2 m centres and corresponding with truss or rafter positions, looped around 10 mm diameter galvanised mild steel rods—

(i) built-in across the *cavity* at a course not less than 900 mm below the top of the wall; and

(ii) embedded not less than 50 mm into each leaf.

(b) 30 mm x 1 mm galvanised steel straps at not more than 1.2 m centres and corresponding with truss or rafter positions, built-in to masonry inner leaf not less than 50 mm and at a course not less than 900 mm below the top of the wall (see Figure 5.6.6b).

(3) Roof framing supporting tiled roofs on single leaf *unreinforced masonry* walls with *engaged piers* or return walls must have—

(a) a built-in 30 mm x 0.8 mm galvanised steel strap fixed to the roof structure that extends the full height of the *engaged pier* or return wall; and

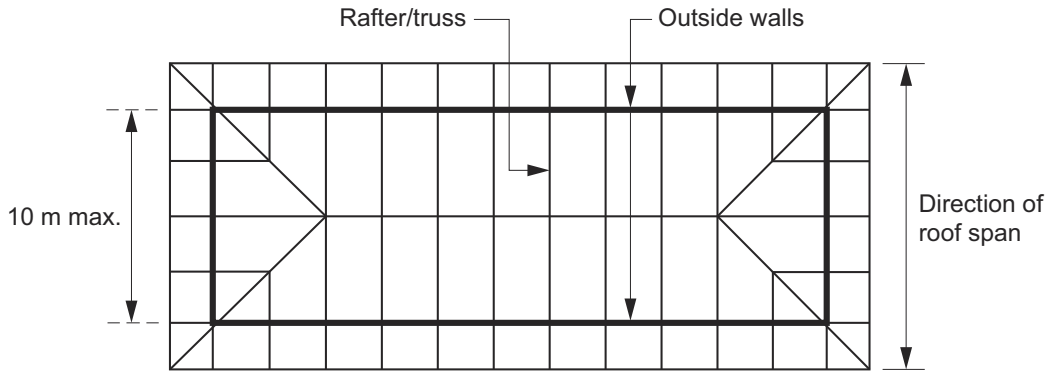
(b) a 4.6 grade M12 galvanised steel rod which is cast into the footing when poured and looped and fixed around the galvanised steel strap *required* by (a) (see Figure 5.6.6c).

(4) Roof framing supporting sheet roofs on single leaf *unreinforced masonry* with *engaged piers* or return walls must have—

(a) a built-in 30 mm x 0.8 mm galvanised steel strap fixed to the roof structure extending the full height of the *engaged pier* or return wall which is looped and fixed around a 4.6 grade 16 mm diameter galvanised steel rod cast into the footing when poured; or

(b) a 4.6 grade M16 galvanised steel rod cast into the footing, threaded at the top and extending the full height of the pier or return wall to connect to the roof structure.

Figure 5.6.6a: Building width



Plan view

Figure 5.6.6b: Suitable tie-down strap details for cavity masonry

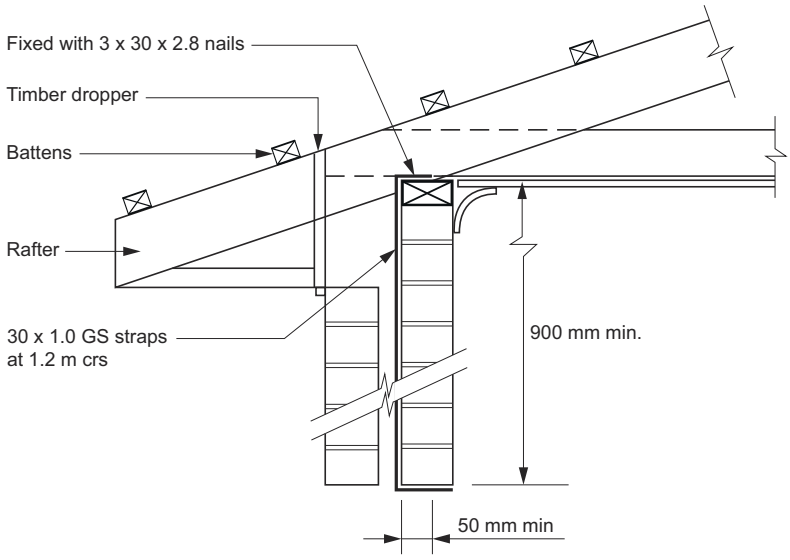
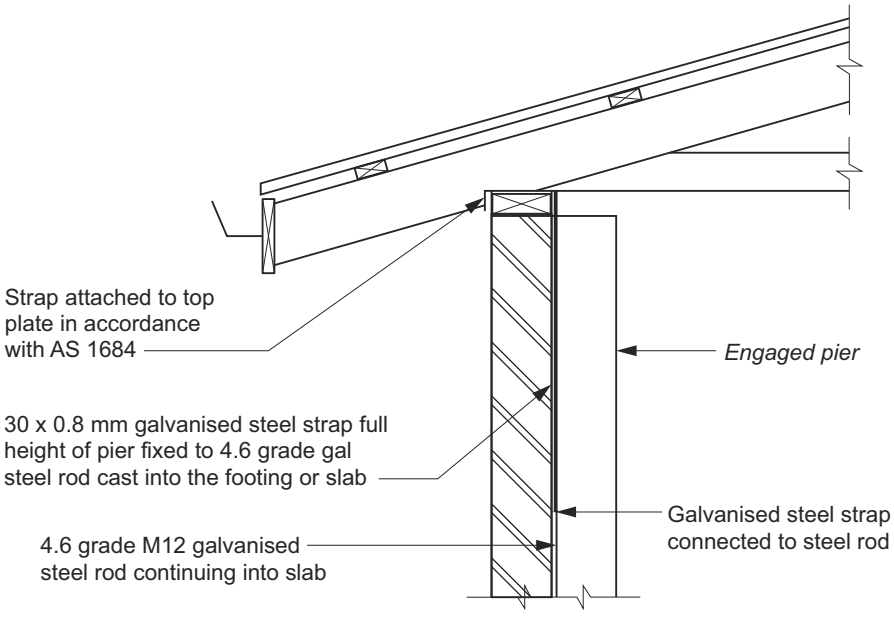


Figure 5.6.6c: Typical tie-down to single leaf unreinforced masonry



Explanatory Information

Roof tie-down over openings more than 1200 mm wide in masonry construction must be specifically designed in accordance with relevant material and structural design standards.

5.6.7 Lintels

[2019: 3.3.5.12]

Where a lintel is *required* it must comply with the following:

(a) Steel lintels must comply with this Part or H1D6(3).

(b) Steel lintels must—

(i) be sized in accordance with Table 5.6.7a; and

(ii) be installed with the long leg of lintel angle vertical; and

(iii) be wide enough so that the masonry does not overhang the horizontal leg of the lintel by more than 25 mm; and

(iv) not support masonry more than 3 m in height when measured above the opening; and

(v) have a minimum bearing length at each end of the lintel of—

(A) for clear spans not more than 1 m - 100 mm; or

(B) for clear spans more than 1 m - 150 mm (See Figure 5.6.7); and

(vi) have a minimum of three courses of masonry over openings; and

(vii) comply with the corrosion protection requirements of Table 5.6.7b.

Table 5.6.7a: Masonry lintel sizes

Lintel	Maximum clear span of lintel (mm): ≤ 600 mm of masonry over opening	Maximum clear span of lintel (mm): > 600 mm of masonry over opening
Flat 75 x 8	700	700
Flat 100 x 10	900	900
Angle 90 x 90 x 6EA	3000	2650
Angle 90 x 90 x 8EA	3200	2800
Angle 100 x 100 x 6EA	3350	2900
Angle 100 x 100 x 8EA	3600	3040
Angle 150 x 90 x 8UA	4200	3850

Table Notes

The lintels described in this Table must be not less than grade 300 MPa in accordance with AS 4100.

Table 5.6.7b: Corrosion protection – Lintels

Durability class of lintel in accordance with AS 2699.3 Note 1	Material or protective requirements in accordance with AS 2699.3 Note 1
R1, R2	Hot dip galvanised with a minimum average coating thickness of 300 g/m^2; or stainless steel 316L
R3	Hot dip galvanised with a minimum average coating thickness of 600 g/m^2; or stainless steel 316L
R4	Stainless steel 316L

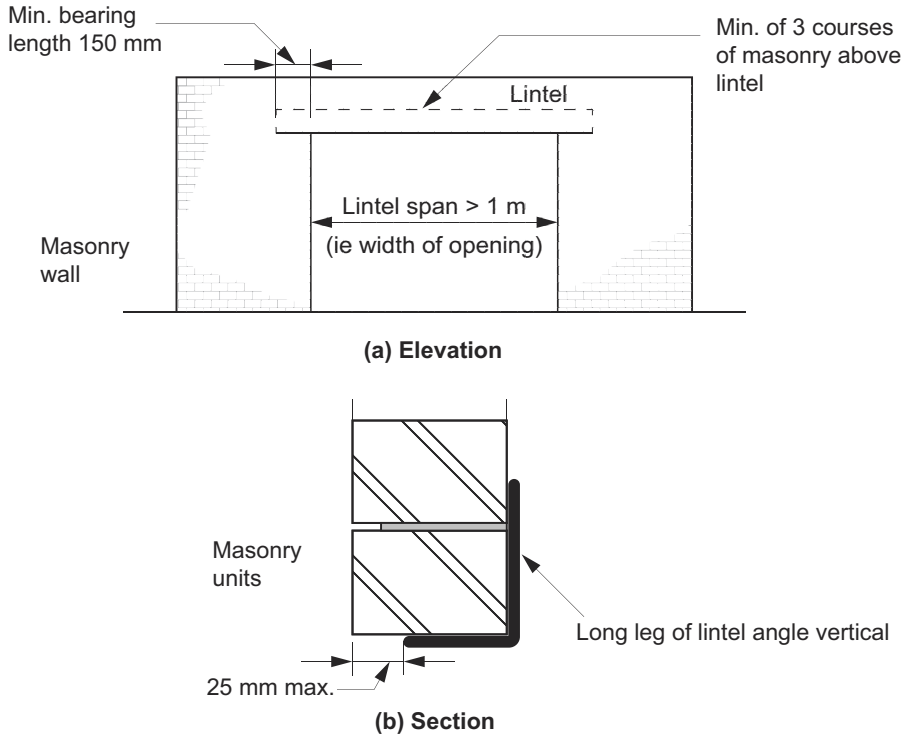
Table Notes

(1) AS 2699.3 contains information on the corrosivity category locations in Australia and provides a method for determining coating thickness for lintels.

(2) Additional decorative coatings can be applied, but must not be considered for the purpose of satisfying the requirements of this Table.

(3) Any lintel with a coating that is modified, i.e. by cutting, welding, or where damaged, must have the coating restored to provide an equivalent level of protection provided by the original coating.

Figure 5.6.7: Lintel installation



5.6.8 Vertical articulation joints

[2019: 3.3.5.13]

(1) Vertical articulation joints must be provided in masonry walls in accordance with (2), except in walls constructed on *sites* where the soil classification is A or S (see 4.2.2).

(2) Articulation joints between masonry elements must have a width of not less than 10 mm and be provided (see Figures 5.6.8a and 5.6.8b)—

- (a) in straight, continuous walls with openings less than 900 mm x 900 mm or walls without openings — at not more than 6 m centres and within 4.5 m, but not closer than 470 mm of all corners; and
- (b) in straight, continuous walls with openings more than 900 mm x 900 mm — at not more than 5 m centres and located so that they are not more than 1.2 m away from openings; and
- (c) where the height of the wall changes by more than 20% — at the position of change in height; and
- (d) where a wall changes in thickness; and
- (e) at control or construction joints in footings or slabs; and
- (f) at junctions of walls constructed of different masonry materials.

(3) Articulation joints must not be located adjacent to arched openings.

(4) Articulation joints must be filled with flexible sealant that is supported during installation by—

- (a) a compressible foam or polystyrene filler (see Figures 5.6.8d and 5.6.8e); or
- (b) a purpose made backer rod (see Figures 5.6.8c, 5.6.8d, 5.6.8e and 5.6.8f).

Figure 5.6.8a: Example of vertical articulation joint locations in plan view

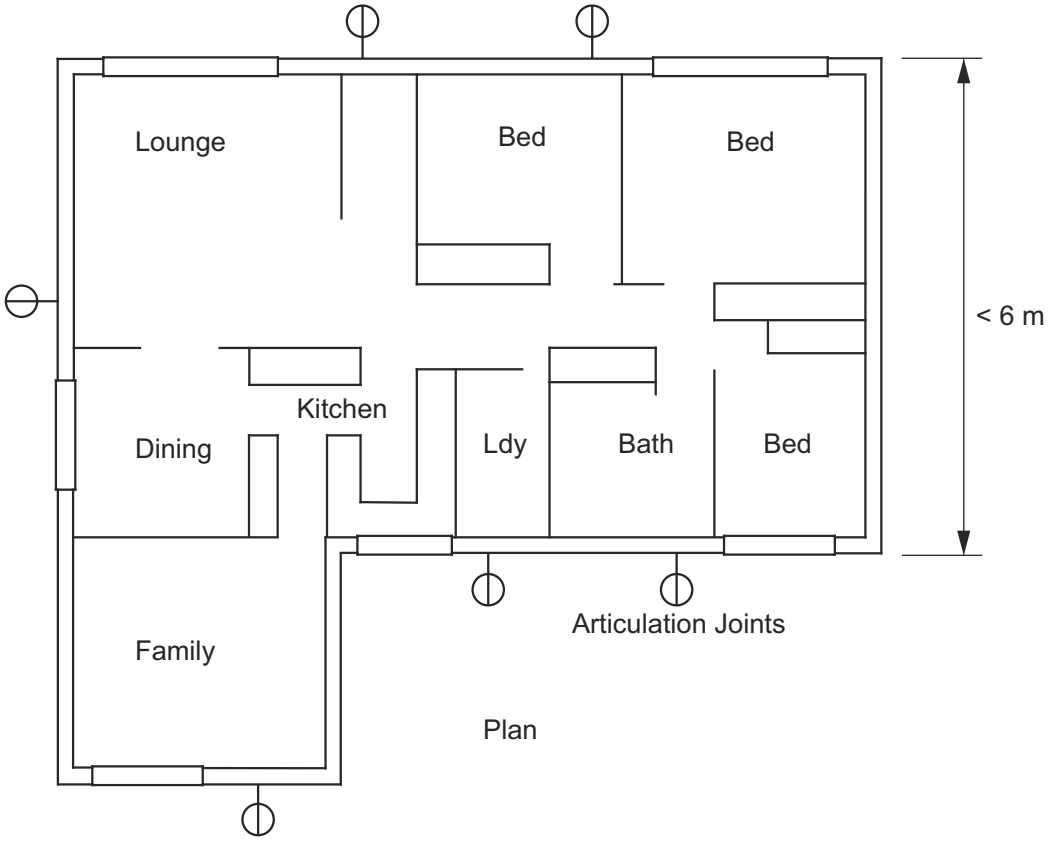


Figure 5.6.8b: Vertical articulation joints

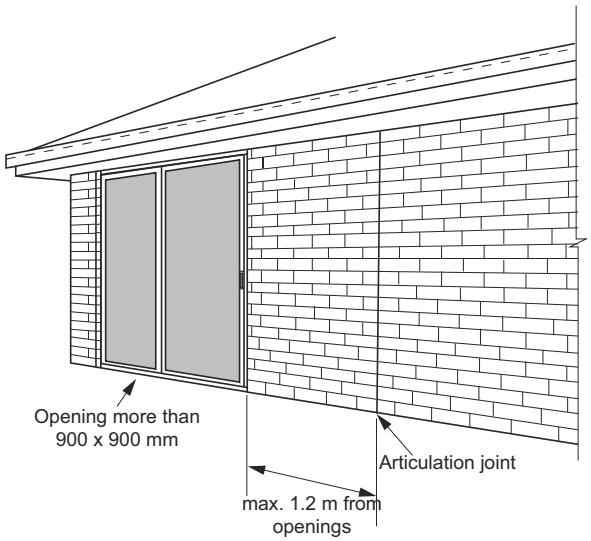


Figure 5.6.8c: Articulation joint with backer rod and sealant—single skin masonry and masonry veneer walls

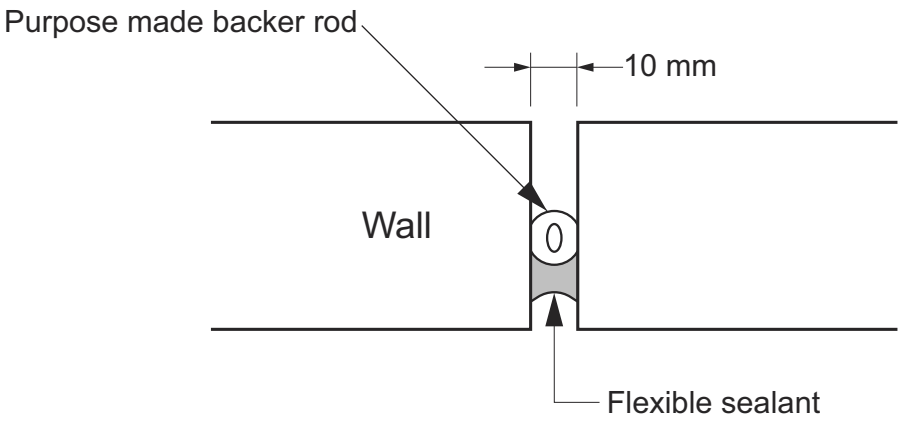


Figure 5.6.8d: Articulation joint in unreinforced single leaf masonry wall with compressed foam

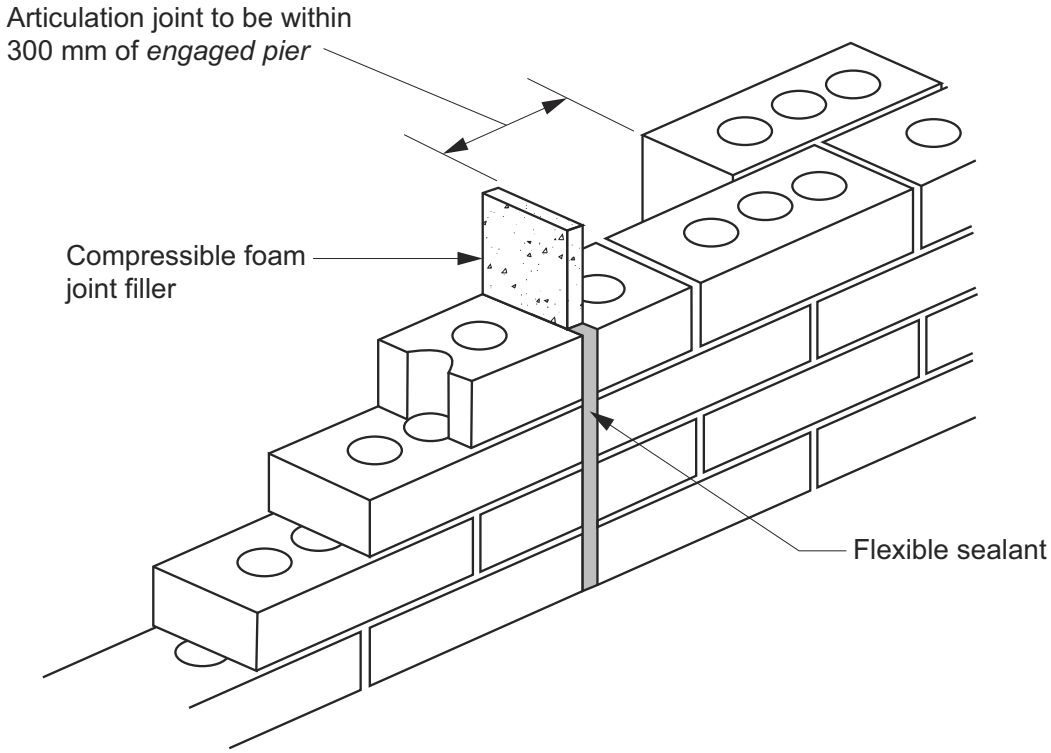


Figure 5.6.8e: Articulation joint in unreinforced masonry veneer wall with compressed foam

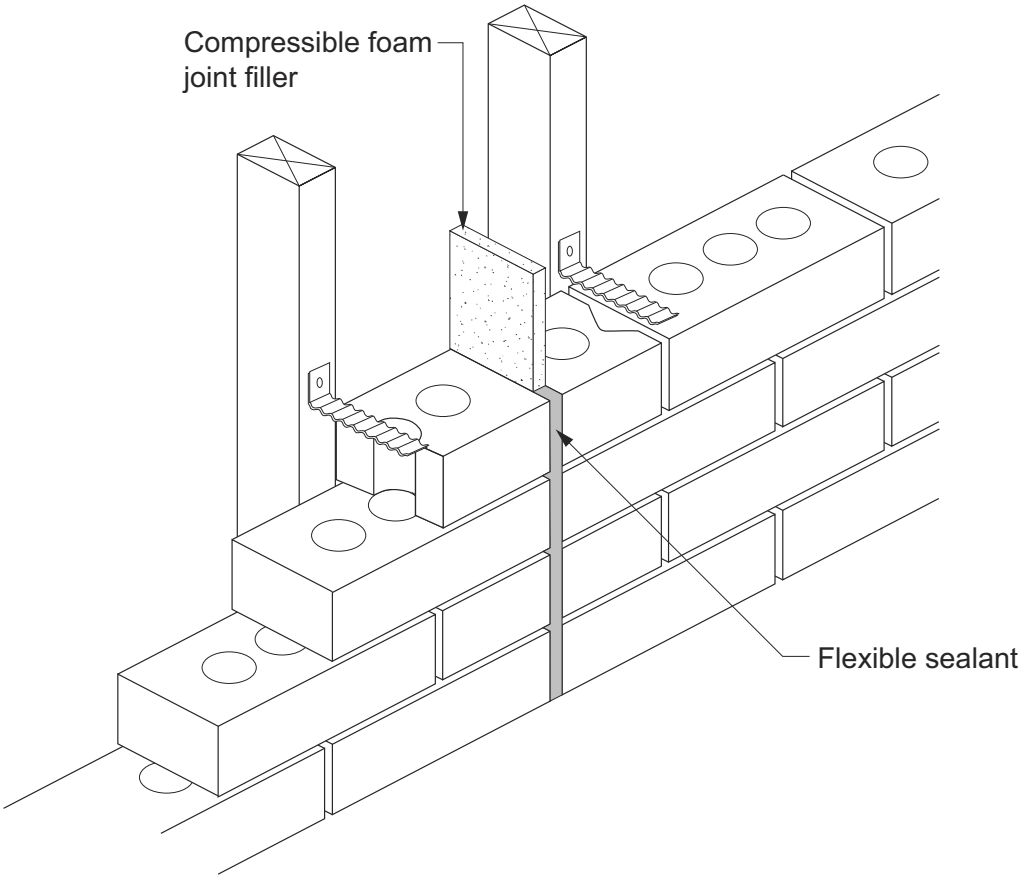
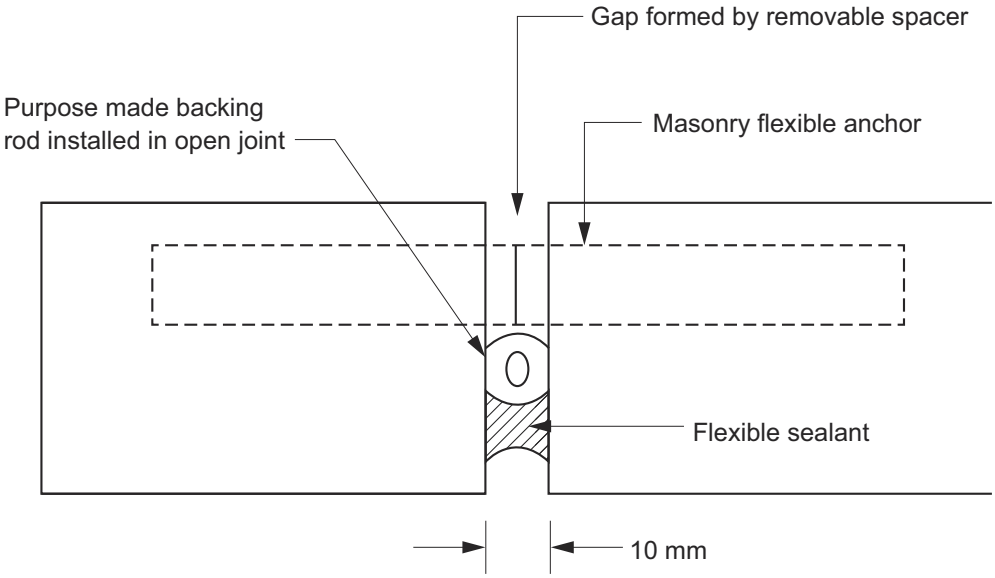
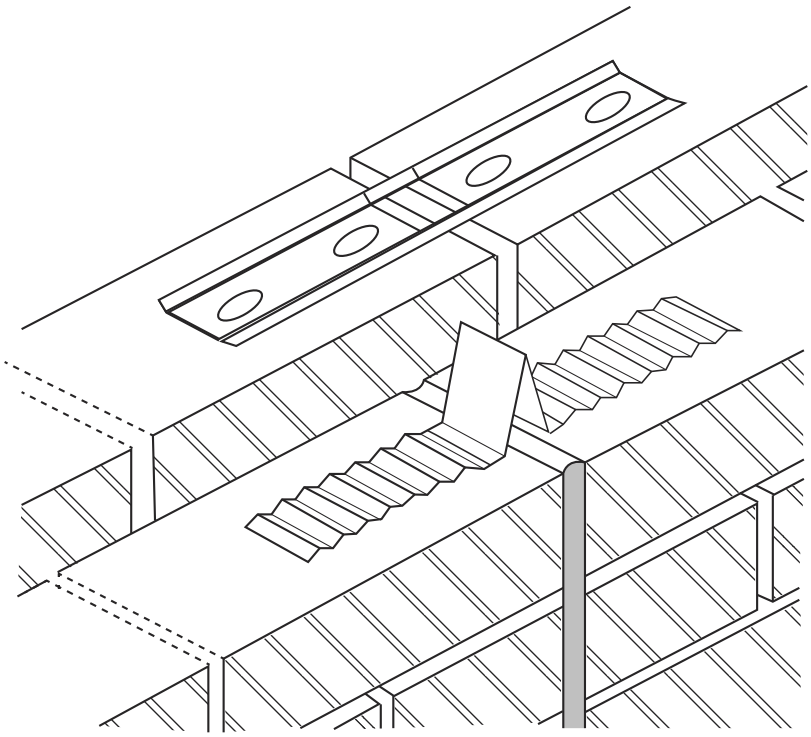


Figure 5.6.8f: Articulation joint in cavity masonry wall



(a) Backer rod joint detail



(b) Cavity wall extendable anchors

Explanatory Information

For the purposes of 5.6.8, the vertical articulation joint also performs the function of a contraction or expansion joint.

Part 5.7 Weatherproofing of masonry

5.7.1 Application

[New for 2022]

(1) Part 5.7 applies subject to the limitation set out in H2D4(2)(c).

(2) Part 5.7 need not be complied with if H2D4(2)(a) or (b) are complied with.

5.7.2 Cavities

[2019: 3.3.5.6]

(1) For masonry veneer, the clear width of a *cavity* between the masonry veneer and the exterior face of the supporting frame must not be—

(a) less than 25 mm wide; and

(b) more than 75 mm wide.

(2) For *cavity* masonry, the clear width of a *cavity* between the inner and outer masonry leaves must not be—

(a) less than 35 mm; and

(b) more than 75 mm.

(3) Where masonry veneer and *cavity* masonry in (1) and (2) are constructed on a slab-on-ground, the *cavity* must be drained to the outside in accordance with 5.7.5.

(4) The exterior masonry leaf must not overhang the edge of the slab by more than 15 mm.

Explanatory Information

The 25 mm clear width of the *cavity* needs to be maintained regardless of any wall *membranes*, sheet bracing or services installed to the supporting frame.

Where mullions are located within a *cavity*, a vertical *damp-proof course* must be placed between the outer masonry leaf and the mullion to prevent moisture penetration.

5.7.3 Damp-proof courses and flashings – material

[2019: 3.3.5.7]

Damp-proof courses and *flashings* must consist of—

(a) a material that complies with AS/NZS 2904; or

(b) embossed black polyethylene film of high impact resistance and low slip, with a nominal thickness of 0.5 mm prior to embossing, and comply with clause 7.6 of AS/NZS 2904; or

(c) polyethylene coated metal, that has an aluminium core of not less than 0.1 mm thick, is coated both sides with bitumen adhesive enclosed in polyethylene film of not less than 0.1 mm thick on each face, and has a nominal total thickness of not less than 0.5 mm prior to embossing; or

(d) bitumen impregnated materials of not less than 2.5 mm thick, that comply with clause 7.5 of AS/NZS 2904; or

(e) termite sheet materials complying with Part 3.4 (with no penetrations) serving the purpose of a *damp-proof course* and/or *flashing* that is continuous through the wall or pier.

5.7.4 Damp-proof courses and flashings – installation

[2019: 3.3.5.8]

(1) *Damp-proof courses* and *flashings* must be—

(a) located so as to form a continuous damp-proofing barrier—

(i) around the bottom perimeter of walls where constructed on a concrete slab; and

(ii) in walls and piers below suspended floors; and

(iii) where a masonry wall passes through a roof; and

(iv) where a roof abuts an external masonry wall; and

(v) to the bottom and tops of *windows* and doors and the like in accordance with (3), except a *damp-proof course* or a *flashing* need not be provided to the top of a *window* or door where the opening is protected by an eave of a width more than 3 times the height of the masonry veneer above the opening; and

(b) continuous through the wall or pier and be visible from the outside face of the wall.

(2) The location of a *damp-proof course*, or *flashing* serving as a *damp-proof course*, must be not less than—

(a) 150 mm above the adjacent ground level; or

(b) 75 mm above the finished surface level of adjacent paved, concreted or landscaped areas that slope away from the wall; or

(c) 50 mm above finished paved, concreted or landscaped areas complying with 3.3.3(b)(ii) and protected from the direct effects of the weather by a carport, verandah or the like; or

(d) in *low rainfall intensity areas*—

(i) 15 mm above finished paved, concreted or landscaped areas; or

(ii) 0 mm above finished paved, concreted or landscaped areas if the *damp-proof course* is protected from the direct effects of the weather by a carport, verandah or the like.

(3) Sill and head *flashings* serving openings must be—

(a) installed so that the *flashing* extends not less than 150 mm beyond the reveals on each side of the opening; and

(b) located not more than—

(i) one course below the sill brick course; and

(ii) 300 mm above the opening; and

(c) turned up in the *cavity* not less than 150 mm above the opening; and

(d) embedded not less than 30 mm into—

(i) for masonry veneer, the masonry leaf; and

(ii) for *cavity* masonry, the outer masonry leaf; and

(e) attached to the *window* or wall framing.

5.7.5 Weepholes

[2019: 3.3.5.9]

(1) Except where excluded by (2), open perpend joints (weepholes) must be created in the course immediately above any *flashing* (including above any *damp-proof course* acting as a *flashing*) and be—

(a) a minimum of 50 mm in height, by the width of the vertical mortar joint; and

(b) at not more than 1.2 m centres; and

(2) Weepholes are not *required* in the following locations:

(a) Where head openings are less than 1.2 m wide.

(b) Beneath *window* and door sills.

(c) Where the level of the external impervious surface is elevated for the purpose of providing step-free access *required* by H8P1.

5.7.6 Weatherproofing for single leaf masonry walls

[New for 2022]

(1) A *waterproof* coating material must be applied to all external single skin masonry walls in accordance with the following:

(a) The coating must extend from the uppermost exposed part of the wall—

(i) to a level adjacent to the internal finished floor level, if the external masonry wall leaf overhangs the edge of the slab by not less than 10 mm; or

(ii) 50 mm below the internal floor level if no edge overhang is provided.

(b) Acceptable external *waterproof* finishes are—

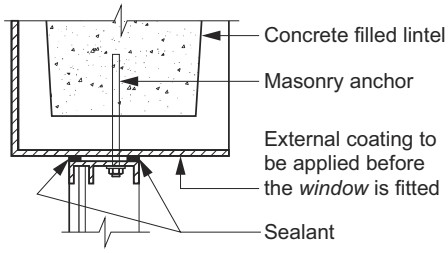
(i) three coats of 100% acrylic based exterior quality gloss paint; or

(ii) one complete coat of cement based paint and two coats of 100% acrylic based exterior quality gloss paint; or

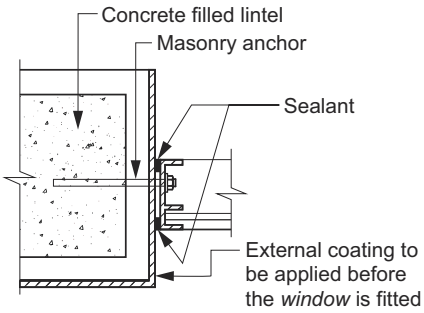
(iii) clear water repellent, provided the wall is protected by a roof overhang of not less than 1500 mm.

(2) *Windows* must be installed in accordance with Figure 5.7.6.

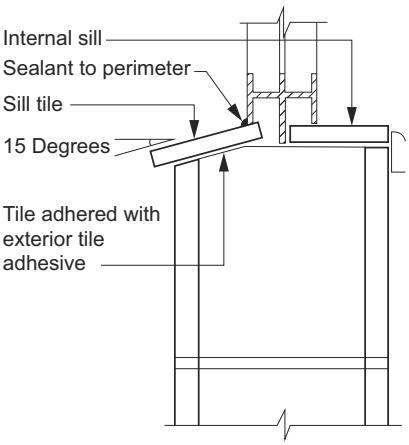
Figure 5.7.6: Typical window installation for unreinforced single skin masonry



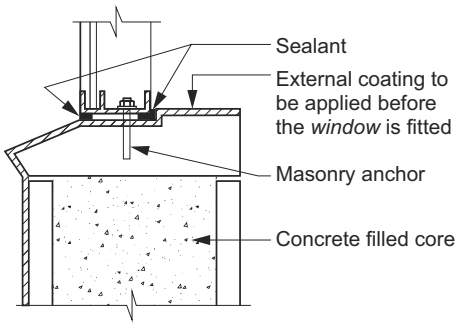
(a) Head fixing



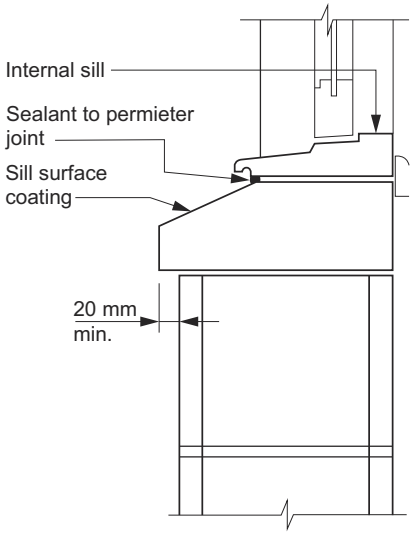
(b) Jamb fixing



(c) Sill fixing - 1



(d) Sill fixing - 2



(e) Sill fixing - 3

6 Framing

Part 6.1 Scope and application of Section 6

6.1.1 Scope

[New for 2022]

(1) This Section sets out the *Deemed-to-Satisfy Provisions* for—

(a) subfloor ventilation (see Part 6.2); and

(b) structural steel members (see Part 6.3).

(2) For other framing provisions not included in this Section, refer to the following *Deemed-to-Satisfy Provisions* in NCC Volume Two:

(a) Steel framing (see H1D6(3)).

(b) Timber framing (see H1D6(4)).

(c) Use of structural software (see H1D6(7)).

Explanatory Information

Part 6.2 applies to the subfloor space of all suspended floors of a building or deck, including but not limited to, timber and steel-framed subfloors and suspended concrete slabs.

6.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC Volume Two.

(b) The State and Territory variations, additions and deletions contained in the Schedules to the ABCB Housing Provisions and NCC Volume Two.

Explanatory Information

In NCC 2019, the content of Section 6 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Parts 3.4.1 and 3.4.4 of NCC 2019 Volume Two.

NCC 2019 Volume Two did not include an acceptable construction practice for Parts 3.4.2 or 3.4.3.

Part 6.2 Subfloor ventilation

6.2.1 Subfloor ventilation

[2019: 3.4.1.2]

(1) Subfloor spaces must—

(a) be provided with openings in *external walls* and internal subfloor walls in accordance with Table 6.2.1a for the climatic zones given in Figure 6.2.1a; and

(b) have clearance between the ground surface and the underside of the lowest horizontal member in the subfloor in accordance with Table 6.2.1b (see Figure 6.2.1b and Figure 6.2.1c).

(2) In addition to (1), a subfloor space must—

(a) be cleared of all building debris and vegetation; and

(b) have the ground beneath the suspended floor graded in accordance with 3.3.3; and

(c) contain no dead air spaces; and

(d) have openings evenly spaced as far as practicable (see Figure 6.2.1d); and

(e) have openings placed not more than 600 mm in from corners.

(3) In double leaf masonry walls, openings specified in (1) must be provided in both leaves of the masonry, with openings being aligned to allow an unobstructed flow of air (see Figure 6.2.1d).

(4) Openings in internal subfloor walls specified in (1) must have an unobstructed area equivalent to that *required* for the adjacent external openings (see Figure 6.2.1d).

(5) Where the ground or subfloor space is excessively damp or subject to frequent flooding, in addition to the requirements of (1) to (4)—

(a) the subfloor ventilation *required* in (1) must be increased by 50%; or

(b) the ground within the subfloor space must be sealed with an impervious *membrane*; or

(c) subfloor framing must be—

(i) where above ground — above ground durability Class 1 or 2 timbers or H3 preservative treated timbers in accordance with AS 1684.2, AS 1684.3 or AS 1684.4; or

(ii) where in-ground — in-ground durability Class 1 or 2 timbers or H5 preservative treated timbers in accordance with AS 1684.2, AS 1684.3 or AS 1684.4; or

(iii) steel in accordance with NASH Standard 'Residential and Low-Rise Steel Framing' Part 2.

Table 6.2.1a: Subfloor openings

Climatic zone (see Figure 6.2.1a)	Minimum aggregate subfloor ventilation openings with no *membrane* (mm^2/m of wall)	Minimum aggregate subfloor ventilation openings with ground sealed with impervious *membrane* (mm^2/m of wall)
A	2000	1000
B	4000	2000
C	6000	3000

Table Notes

In situations where openings in *external walls* and internal subfloor walls, including *separating walls*, are not able to be provided, additional measures must be provided to ensure that the overall level of ventilation of the subfloor space is maintained. This may include measures similar to those in 6.2.1(5) i.e. providing durability class timbers, or having the ground sealed in the subfloor space with an impervious *membrane*.

Table 6.2.1b: Ground clearance

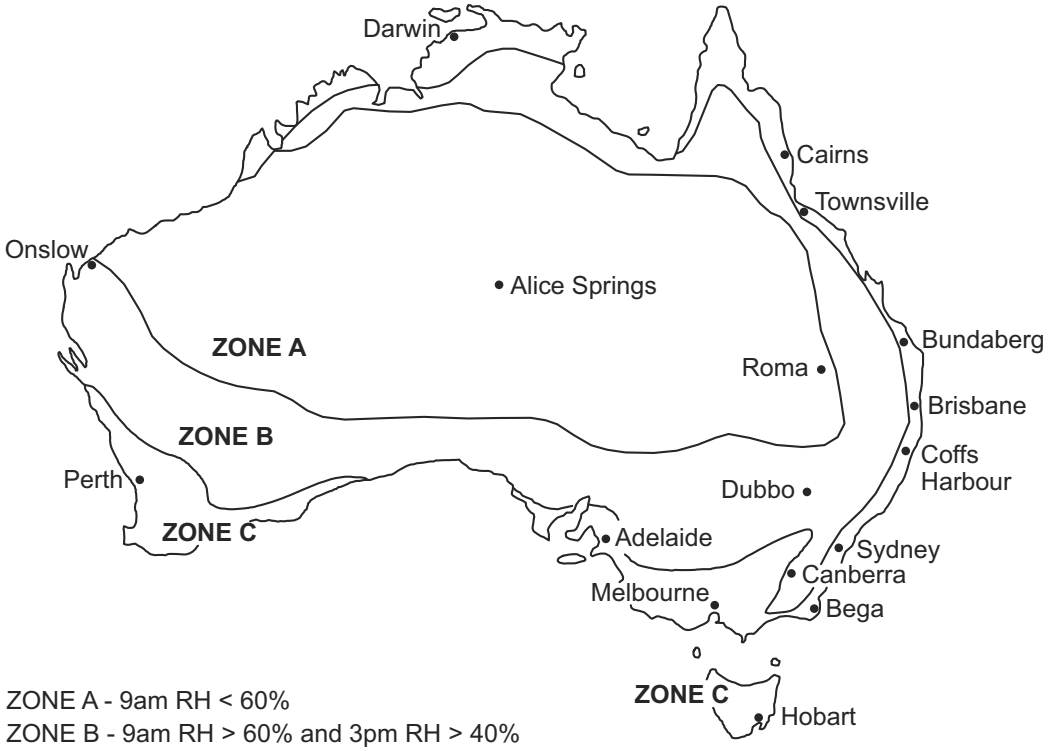
Climatic zone (see Figure 6.2.1a)	Minimum ground clearance height where termite inspection or management system is not *required* (mm)	Minimum ground clearance height where termite inspection is *required* (mm)
A, B and C	150	400

Table Notes

(1) 400 mm clearance *required* only where termite management systems are installed that need to be inspected (see Part 2.2.4).

(2) On sloping *sites* the 400 mm clearance *required* by (1) may be reduced to 150 mm within 2 m of *external walls* in accordance with Figure 6.2.1b.

Figure 6.2.1a: Climatic zones based on relative humidity



ZONE A - 9am RH < 60%
ZONE B - 9am RH > 60% and 3pm RH > 40%
ZONE C - 9am RH > 70% and 3pm RH > 60%
RH = Relative Humidity

Figure 6.2.1b: Subfloor clearance requirements

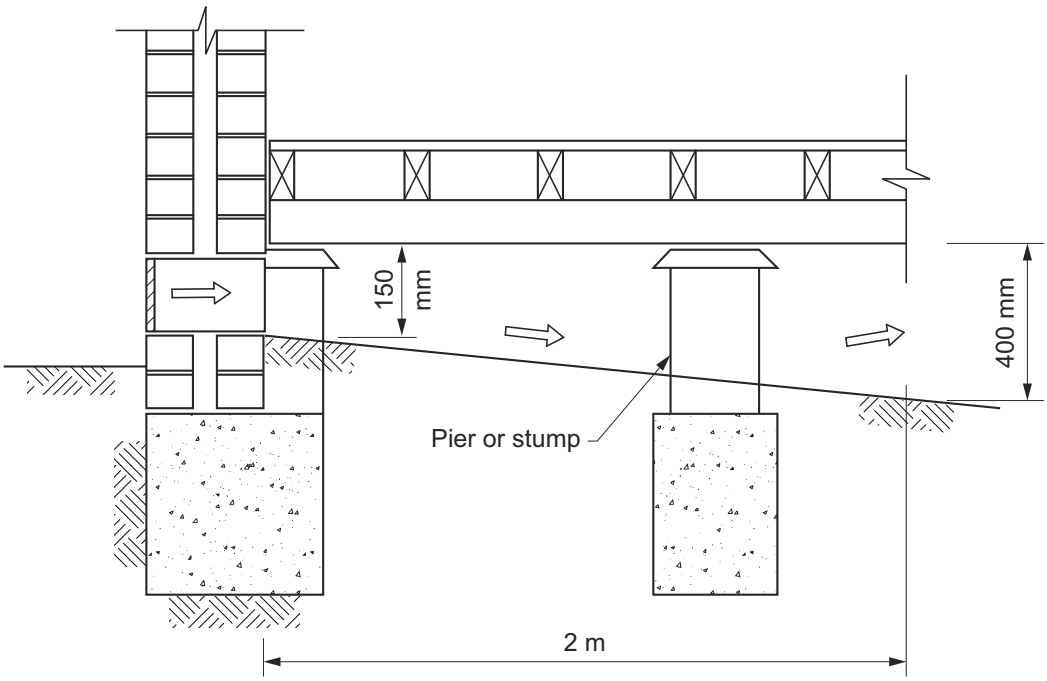


Figure Notes

See notes to Tables 6.2.1a and 6.2.1b.

Figure 6.2.1c: Subfloor clearance requirements – detail

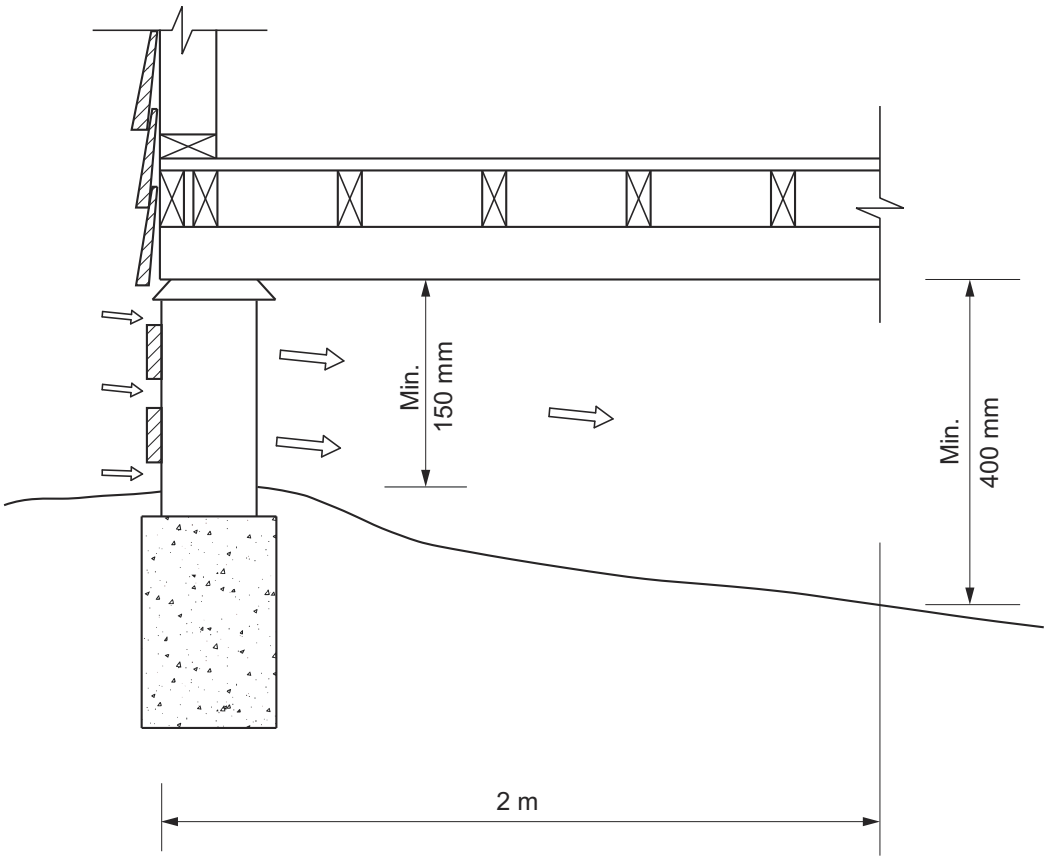
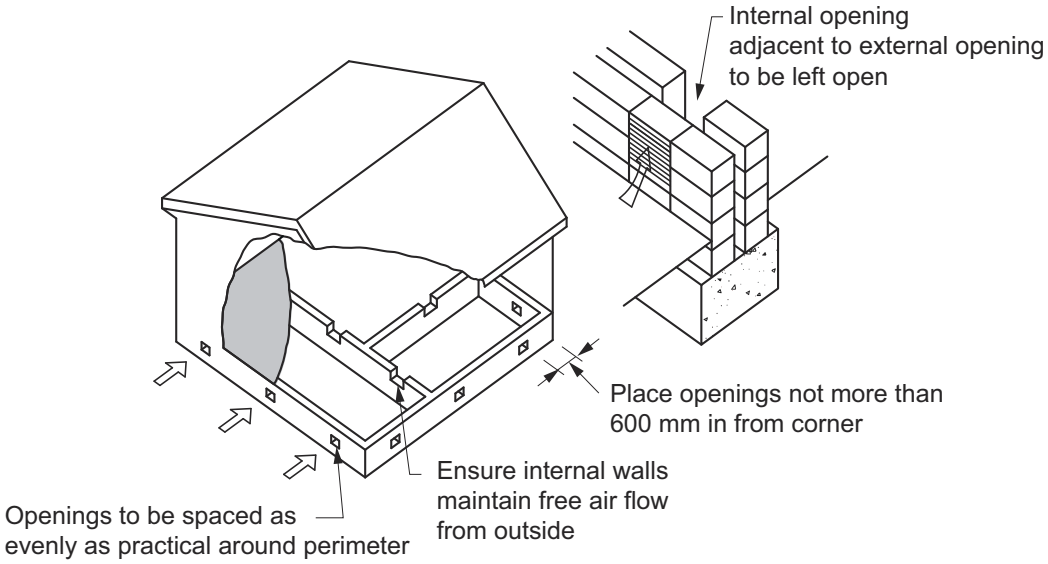


Figure Notes

See notes to Tables 6.2.1a and 6.2.1b.

Figure 6.2.1d: Typical subfloor ventilation details — typical cross ventilation of subfloor area



Explanatory Information

Subfloor ventilation is cross ventilation of the subfloor space between the underside of the subfloor and the ground surface under a building.

Ground moisture rising into or entering the subfloor space can create a damp environment which encourages timber rot, fungus growth and the potential for termite activity. Subfloor ventilation increases air flow, reducing any damaging water vapour in the subfloor space.

Factors that can affect achieving satisfactory levels of subfloor ventilation include height above ground, prevailing breezes (air transfer), differential temperature and humidity between the subfloor and the external environment and good building practice.

The amount of subfloor ventilation *required* for a building is related to the relative humidity likely to be encountered in that location. Figure 6.2.1a shows three broad climatic zones based on the prevailing relative humidity and includes a description of the relative humidity conditions which define each zone. If reliable weather data is available, these descriptions may be useful in determining which zone a particular location is in.

The zones shown in Figure 6.2.1a were determined by analysis of the average relative humidity at 9 am and 3 pm in January and July. The season with the highest relative humidity is used. Generally this will be July for southern Australia and January for northern Australia.

Table 6.2.1a and Table 6.2.1b specify the minimum amount of subfloor ventilation openings and height of subfloor framing members above ground level for the three climatic zones illustrated in Figure 6.2.1a. The table allows subfloor ventilation rates to be halved if the ground within the subfloor space is sealed by an impervious *membrane* because humidity levels in the space will not be affected by moisture from the soil.

Clause 6.2.1(5) specifies additional requirements for preventing deterioration of subfloor members where the ground or subfloor space is excessively damp, as would occur in areas with high water tables, poor drainage or in areas frequently affected by flooding or water inundation.

Part 6.3 Structural steel members

6.3.1 Application

[New for 2022]

(1) Part 6.3, other than clause 6.3.4, applies subject to the limitations set out in H1D6(6).

(2) Part 6.3 need not be complied with if H1D6(5)(a) or (b) are complied with.

6.3.2 Structural steel members

[2019: 3.4.4.2]

(1) Structural steel members may be used as follows:

(a) Bearers supporting a timber floor or non-*loadbearing* stud wall — in accordance with 6.3.3.

(b) Strutting beams supporting roof and ceiling loads — in accordance with 6.3.4.

(c) Lintels supporting roof, ceiling, frame and timber floor — in accordance with 6.3.5.

(d) Columns — in accordance with 6.3.6.

(2) Structural steel members in (1)(a), (b) and (c) must have a minimum nominal yield strength of 250 MPa.

(3) The yield strength of structural steel members in (1)(d) is nominated in 6.3.6.

(4) Structural steel members described in this Part must be protected against corrosion in accordance with 6.3.9.

6.3.3 Bearers

[New for 2022]

Structural steel bearers must comply with the following:

(a) Effective bearer spacing must be determined in accordance with—

(i) for single span joists — Table H1D6a and Figure H1D6d; and

(ii) for continuous span joists — Table H1D6b and Figure H1D6e.

(b) Maximum acceptable bearer spans must be determined in accordance with—

(i) for single spans — Tables 6.3.3a and 6.3.3c; and

(ii) for continuous spans — Tables 6.3.3b and 6.3.3d.

(c) All loads along the bearer must be evenly distributed.

(d) The difference in distance between supports for continuous span bearers must not be more than 10% of the span.

(e) Fixing of joists and columns to structural steel bearers must comply with 6.3.7.

(f) Bearers must be supported by structural steel columns that comply with 6.3.6 and are fixed in accordance with 6.3.7.

Table 6.3.3a: Maximum bearer span (m) — single span — bearer supporting timber floor and 3 m high non-loadbearing internal wall

Steel section	Effective load width (m)				
	1.8	2.4	3.0	3.6	4.2
125 TFB	4.2	4.0	3.9	3.8	3.6
180 UB 16.1	5.6	5.4	5.3	5.1	4.7
200 UB 18.2	6.4	6.2	6.0	5.8	5.4

Steel section	Effective load width (m)				
	1.8	2.4	3.0	3.6	4.2
250 UB 25.7	8.3	8.0	7.8	7.6	7.1
250 x 150 x 9 RHS	9.3	9.0	8.8	8.6	8.4
250 x 150 x 5 RHS	8.0	7.8	7.6	7.1	6.6
310 UB 32.0	10.0	9.7	9.4	9.2	8.6
125 x 75 x 2 RHS	2.9	2.6	2.3	2.2	2.0
125 x 75 x 3 RHS	3.5	3.3	3.2	2.9	2.7
150 x 50 x 2 RHS	3.3	2.9	2.6	2.4	2.3
150 x 50 x 3 RHS	3.7	3.6	3.4	3.1	2.9
100 TFB	2.9	2,8	2.7	2.5	2.4
150 PFC	5.2	5.0	4.9	4.7	4.6
180 PFC	6.1	5.9	5.8	5.6	5.4
200 PFC	6.8	6.6	6.4	6.2	5.9
250 PFC	8.9	8.6	8.4	8.2	8.0
300 PFC	10.4	10.1	9.8	9.5	9.3

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 0.92 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed.

(2) Load combinations included are 1.35G and 1.25G+1.5Q for ULS and G + 0.7Q for SLS with a maximum deflection of span/300.

(3) Bearers are assumed to have intermediate lateral restraints at joist locations and are considered fully laterally restrained.

Table 6.3.3b: Maximum bearer span (m) — continuous span — bearer supporting timber floor and 3 m high non-loadbearing internal wall

Steel section	Effective load width (m)				
	1.8	2.4	3.0	3.6	4.2
125 TFB	5.2	4.6	4.2	3.9	3.6
180 UB 16.1	6.8	6.0	5.5	5.1	4.7
200 UB 18.2	7.7	6.9	6.2	5.8	5.4
250 UB 25.7	10.2	9.1	8.3	7.6	7.1
250 x 150 x 9 RHS	12.4	11.5	10.5	9.8	9.1
250 x 150 x 5 RHS	9.5	8.4	7.7	7.1	6.6
310 UB 32.0	12.3	11.0	10.0	9.2	8.6
125 x 75 x 2 RHS	2.9	2.6	2.3	2.2	2.0
125 x 75 x 3 RHS	4.0	3.5	3.2	2.9	2.7
150 x 50 x 2 RHS	3.3	2.9	2.6	2.4	2.3
150 x 50 x 3 RHS	4.2	3.7	3.4	3.1	2.9
100 TFB	3.4	3.0	2.7	2.5	2.4
150 PFC	6.5	5.8	5.3	4.9	4.6
180 PFC	7.8	6.9	6.3	5.8	5.4
200 PFC	8.5	7.6	6.9	6.4	5.9
250 PFC	11.6	10.4	9.5	8.7	8.2
300 PFC	13.4	12.0	10.9	10.1	9.4

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 0.92 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed.

(2) Load combinations included are 1.35G and 1.25G+1.5Q for ULS and G + 0.7Q for SLS with a maximum deflection of span/300.

(3) Bearers are assumed to have intermediate lateral restraints at joist locations and are considered fully laterally restrained.

Table 6.3.3c: Maximum bearer span (m) — single span — bearer supporting tiled floor and 3 m high non-loadbearing internal wall

Steel section	Effective load width (m)				
	1.8	2.4	3.0	3.6	4.2
125 TFB	3.9	3.7	3.5	3.4	3.3
180 UB 16.1	5.2	5.0	4.8	4.6	4.4
200 UB 18.2	5.9	5.6	5.4	5.2	5.0
250 UB 25.7	7.7	7.3	7.1	6.8	6.6
250 x 150 x 9 RHS	8.7	8.3	8.0	7.7	7.5
250 x 150 x 5 RHS	7.5	7.1	6.9	6.6	6.1
310 UB 32.0	9.3	8.9	8.5	8.2	8.0
125 x 75 x 2 RHS	2.7	2.4	2.2	2.0	1.9
125 x 75 x 3 RHS	3.2	3.0	2.9	2.7	2.5
150 x 50 x 2 RHS	3.0	2.7	2.4	2.2	2.1
150 x 50 x 3 RHS	3.4	3.3	3.1	2.9	2.7
100 TFB	2.7	2.6	2.5	2.3	2.2
150 PFC	4.8	4.6	4.4	4.2	4.1
180 PFC	5.7	5.4	5.2	5.0	4.9
200 PFC	6.3	6.0	5.8	5.6	5.4
250 PFC	8.3	7.9	7.6	7.3	7.1
300 PFC	9.7	9.2	8.9	8.6	8.3

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 0.92 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed.

(2) Load combinations included are 1.35G and 1.25G+1.5Q for ULS and G + 0.7Q for SLS with a maximum deflection of span/300.

(3) Bearers are assumed to have intermediate lateral restraints at joist locations and are considered fully laterally restrained.

Table 6.3.3d: Maximum bearer span (m) — continuous span — bearer supporting tiled floor and 3 m high non-loadbearing internal wall

Steel section	Effective load width (m)				
	1.8	2.4	3.0	3.6	4.2
125 TFB	4.8	4.3	3.9	3.6	3.3
180 UB 16.1	6.3	5.6	5.1	4.7	4.4
200 UB 18.2	7.2	6.4	5.8	5.3	5.0
250 UB 25.7	9.5	8.5	7.7	7.1	6.6
250 x 150 x 9 RHS	11.6	10.8	9.8	9.1	8.5

Steel section	Effective load width (m)				
	1.8	2.4	3.0	3.6	4.2
250 x 150 x 5 RHS	8.8	7.8	7.1	6.6	6.1
310 UB 32.0	11.5	10.2	9.3	8.5	8.0
125 x 75 x 2 RHS	2.7	2.4	2.2	2.0	1.9
125 x 75 x 3 RHS	3.7	3.3	3.0	2.7	2.5
150 x 50 x 2 RHS	3.1	2.7	2.4	2.2	2.1
150 x 50 x 3 RHS	3.9	3.4	3.1	2.9	2.7
100 TFB	3.2	2.8	2.5	2.3	2.2
150 PFC	6.1	5.4	4.9	4.5	4.2
180 PFC	7.2	6.4	5.8	5.4	5.0
200 PFC	8.0	7.1	6.4	5.9	5.5
250 PFC	10.9	9.7	8.8	8.1	7.6
300 PFC	12.5	11.2	10.1	9.4	8.7

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 0.92 kN/m permanent wall, permanent member self-weight, 1.5 kPa or 1.1 kN imposed.

(2) Load combinations included are 1.35G and 1.25G+1.5Q for ULS and G + 0.7Q for SLS with a maximum deflection of span/300.

(3) Bearers are assumed to have intermediate lateral restraints at joist locations and are considered fully laterally restrained.

6.3.4 Strutting beams

[New for 2022]

Structural steel strutting beams must comply with the following:

(a) Acceptable strutting beam spacing must be determined in accordance with—
  (i) for single span rafters — Table H1D6a and Figure H1D6a; and
  (ii) for continuous span rafters — Table H1D6b and Figure H1D6b.

(b) Maximum acceptable strutting beam spans must be determined in accordance with—
  (i) for metal sheet roofs — Tables 6.3.4a, 6.3.4b, 6.3.4c, 6.3.4d, 6.3.4e or 6.3.4f; and
  (ii) for tiled roofs — Tables 6.3.4g, 6.3.4h, 6.3.4i, 6.3.4j, 6.3.4k or 6.3.4l.

(c) Any point load applied must be located within the middle third of the strutting beam.

(d) Strutting beams must be tied down in accordance with H1D6(3) where supporting metal roofs.

(e) Fixing and any cutting of strutting beams must comply with 6.3.7.

(f) Strutting beams must be supported by structural steel columns that comply with 6.3.6 and be fixed in accordance with 6.3.7.

Table 6.3.4a: Maximum combined strutting/hanging beam span — combined strutting/hanging beam supporting metal sheet roof and plasterboard ceiling — roof load area = 4 m^2

Section	Ceiling load width (m)		
	1.8	3.6	6.0
125 TFB	3.5	3.3	3.2
150 UB 14.0	3.6	3.4	3.3
200 UB 18.2	4.5	4.3	4.1

Section	Ceiling load width (m)		
	1.8	3.6	6.0
250 UB 31.4	6.8	6.5	6.2
310 UB 46.2	8.9	8.5	8.1
100 TFB	2.0	2.0	1.9
150 PFC	4.7	4.5	4.3
200 PFC	5.5	5.3	5.0
250 PFC	7.5	7.1	6.8
300 PFC	7.8	7.5	7.1

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

Table 6.3.4b: Maximum combined strutting/hanging beam span — combined strutting/hanging beam supporting metal sheet roof and plasterboard ceiling — roof load area = 8 m^2

Section	Ceiling load width (m)		
	1.8	3.6	6.0
125 TFB	2.6	2.6	2.5
150 UB 14.0	2.8	2.7	2.7
200 UB 18.2	3.6	3.5	3.4
250 UB 31.4	5.5	5.4	5.2
310 UB 46.2	7.3	7.1	6.9
100 TFB	1.4	1.4	1.4
150 PFC	3.7	3.6	3.5
200 PFC	4.4	4.3	4.1
250 PFC	6.0	5.8	5.7
300 PFC	6.3	6.2	6.0

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

Table 6.3.4c: Maximum combined strutting/hanging beam span — combined strutting/hanging beam supporting metal sheet roof and plasterboard ceiling — roof load area = 12 m²

Section	Ceiling load width (m)		
	1.8	3.6	6.0
125 TFB	2.2	2.2	2.2
150 UB 14.0	2.4	2.3	2.3
200 UB 18.2	3.1	3.0	3.0
250 UB 31.4	4.8	4.7	4.6
310 UB 46.2	6.4	6.3	6.1
100 TFC	1.1	1.1	1.1
150 PFC	3.1	3.1	3.0
200 PFC	3.7	3.7	3.6
250 PFC	5.2	5.1	5.0
300 PFC	5.5	5.4	5.3

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

Table 6.3.4d: Maximum counter-strutting beam span — counter-strutting beam supporting metal sheet roof and plasterboard ceiling — roof load area = 4 m²

Section	Ceiling load area (m²)		
	0	6	12
125 TFB	3.9	3.5	3.2
150 UB 14.0	4.0	3.7	3.4
200 UB 18.2	5.4	4.9	4.6
250 UB 31.4	8.9	8.2	7.7
310 UB 46.2	12.0	11.3	10.7
100 TFB	2.0	1.8	1.6
150 PFC	5.9	5.3	4.9
200 PFC	7.1	6.5	6.0
250 PFC	10.1	9.3	8.7
300 PFC	10.5	9.8	9.2

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G and 1.25G + 1.5Q, 1.25G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G+W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A ceiling load area of "0" must be used for strutting beams not supporting ceiling loads.

Table 6.3.4e: Maximum counter-strutting beam span — counter-strutting beam supporting metal sheet roof and plasterboard ceiling — roof load area = 8 m²

Section	Ceiling load area (m^2)		
	0	6	12
125 TFB	2.7	2.6	2.4
150 UB 14.0	2.9	2.8	2.6
200 UB 18.2	4.0	3.8	3.6
250 UB 31.4	6.8	6.5	6.2
310 UB 46.2	9.6	9.2	8.8
100 TFB	1.4	1.3	1.2
150 PFC	4.2	4.0	3.8
200 PFC	5.2	4.9	4.7
250 PFC	7.7	7.3	7.0
300 PFC	8.2	7.8	7.5

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G and 1.25G + 1.5Q, 1.25G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G+W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A ceiling load area of "0" must be used for strutting beams not supporting ceiling loads.

Table 6.3.4f: Maximum counter-strutting beam span — counter-strutting beam supporting metal sheet roof and plasterboard ceiling — roof load area = 12 m²

Section	Ceiling load area (m^2)		
	0	6	12
125 TFB	2.2	2.1	2.0
150 UB 14.0	2.4	2.3	2.2
200 UB 18.2	3.3	3.2	3.0
250 UB 31.4	5.7	5.5	5.3
310 UB 46.2	8.2	7.9	7.7
100 TFB	1.1	1.0	1.0
150 PFC	3.4	3.2	3.1
200 PFC	4.2	4.1	3.9
250 PFC	6.4	6.2	6.0
300 PFC	6.9	6.6	6.4

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G and 1.25G + 1.5Q, 1.25G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G+W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A ceiling load area of "0" must be used for strutting beams not supporting ceiling loads.

Table 6.3.4g: Maximum combined strutting/hanging beam span — combined strutting/hanging beam supporting tiled roof and plasterboard ceiling — roof load area = 4 m^2

Section	Ceiling load width (m)		
	1.8	3.6	6.0
125 TFB	2.7	2.6	2.6
150 UB 14.0	2.8	2.8	2.7
200 UB 18.2	3.6	3.5	3.4
250 UB 31.4	5.5	5.4	5.2
310 UB 46.2	7.2	7.1	6.9
100 TFB	1.6	1.5	1.5
150 PFC	3.7	3.7	3.6
200 PFC	4.4	4.3	4.2
250 PFC	6.0	5.8	5.7
300 PFC	6.3	6.1	6.0

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.84 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

Table 6.3.4h: Maximum combined strutting/hanging beam span — combined strutting/hanging beam supporting tiled roof and plasterboard ceiling — roof load area = 8 m^2

Section	Ceiling load width (m)		
	1.8	3.6	6.0
125 TFB	2.0	2.0	2.0
150 UB 14.0	2.2	2.1	2.1
200 UB 18.2	2.8	2.8	2.7
250 UB 31.4	4.4	4.3	4.3
310 UB 46.2	5.8	5.7	5.6
100 TFB	1.1	1.1	1.1
150 PFC	2.8	2.8	2.8
200 PFC	3.4	3.3	3.3
250 PFC	4.7	4.6	4.6
300 PFC	5.0	4.9	4.8

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.84 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

Table 6.3.4i: Maximum combined strutting/hanging beam span — combined strutting/hanging beam supporting tiled roof and plasterboard ceiling — roof load area = 12 m²

Section	Ceiling load width (m)		
	1.8	3.6	6.0
125 TFB	1.7	1.7	1.7
150 UB 14.0	1.8	1.8	1.8
200 UB 18.2	2.4	2.4	2.4
250 UB 31.4	3.8	3.8	3.7
310 UB 46.2	5.0	5.0	4.9
100 TFB	0.9	0.9	0.9
150 PFC	2.4	2.4	2.3
200 PFC	2.9	2.8	2.8
250 PFC	4.0	4.0	3.9
300 PFC	4.3	4.2	4.2

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.84 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

Table 6.3.4j: Maximum counter-strutting beam span — counter-strutting beam supporting tiled roof and plasterboard ceiling — roof load area = 4 m²

Section	Ceiling load area (m²)		
	0	6	12
125 TFB	3.4	3.1	2.9
150 UB 14.0	3.5	3.3	3.0
200 UB 18.2	4.7	4.4	4.1
250 UB 31.4	7.9	7.4	7.0
310 UB 46.2	10.9	10.4	9.9
100 TFB	1.7	1.6	1.4
150 PFC	5.1	4.6	3.6
200 PFC	6.2	5.7	5.4
250 PFC	9.0	8.4	8.0
300 PFC	9.5	8.9	8.5

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A ceiling load area of "0" must be used for strutting beams not supporting ceiling loads.

Table 6.3.4k: Maximum counter-strutting beam span — counter-strutting beam supporting tiled roof and plasterboard ceiling — roof load area = 8 m²

Section	Ceiling load area (m²)		
	0	6	12
125 TFB	2.3	2.2	2.1
150 UB 14.0	2.5	2.4	2.3
200 UB 18.2	3.4	3.3	3.2
250 UB 31.4	5.9	5.7	5.5
310 UB 46.2	8.5	8.2	7.9
100 TFB	1.2	1.1	1.0
150 PFC	3.6	3.4	3.3
200 PFC	4.4	4.2	4.1
250 PFC	6.7	6.4	6.2
300 PFC	7.2	6.9	6.7

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A ceiling load area of "0" must be used for strutting beams not supporting ceiling loads.

Table 6.3.4l: Maximum counter-strutting beam span — counter-strutting beam supporting tiled roof and plasterboard ceiling — roof load area = 12 m²

Section	Ceiling load area (m²)		
	0	6	12
125 TFB	1.8	1.8	1.7
150 UB 14.0	2.0	1.9	1.9
200 UB 18.2	2.8	2.7	2.7
250 UB 31.4	5.0	4.8	4.7
310 UB 46.2	7.1	7.0	6.8
100 TFB	0.9	0.9	0.8
150 PFC	2.8	2.7	2.7
200 PFC	3.6	3.5	3.4
250 PFC	5.5	5.4	5.2
300 PFC	5.9	5.8	5.6

Table Notes

(1) Load accounted for includes 0.2 kPa permanent ceiling, 0.4 kPa permanent roof, permanent member self-weight, 0.25 kPa imposed roof, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Strutting beams are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A ceiling load area of "0" must be used for strutting beams not supporting ceiling loads.

6.3.5 Lintels

[New for 2022]

Structural steel lintels must comply with the following:

(a) Spans for lintels supporting roofs, frames and timber floors must be determined in accordance with—

(i) for metal sheet roofs, Table 6.3.5a, 6.3.5b or 6.3.5c; and

(ii) for tiled roofs, Table 6.3.5d, 6.3.5e or 6.3.5f.

(b) Effective load widths for structural steel lintels must be determined in accordance with Figure 6.3.5 (a) or (b).

(c) All loads along the structural steel lintel must be evenly distributed.

(d) The top flange of the structural steel lintel must be laterally restrained at the loading points.

(e) Fixing of structural steel lintels must comply with 6.3.7.

(f) Structural steel lintels used in masonry must also comply with H1D5.

(g) Lintel beams must be supported by structural steel columns that comply with 6.3.6.

Table 6.3.5a: Maximum lintel span — lintel supporting metal sheet roof, timber floor and 3 m high exterior wall — roof load width = 1.5 m

Section	Floor load width (m)		
	0	1.8	3.6
150 UB 14.0	4.4	3.0	2.5
200 UB 25.4	6.8	4.7	4.0
250 UB 31.4	7.7	5.3	4.6
100 TFB	2.8	1.8	1.5
150 PFC	5.7	3.8	3.2
200 PFC	6.5	4.3	3.7
250 PFC	8.4	5.7	4.9
75 x 75 x 5 EA	2.0	1.0	–
90 x 90 x 6 EA	3.0	1.5	1.0
100 x 100 x 6 EA	3.0	1.8	1.0
125 x 75 x 6 UA	3.0	1.8	1.3
150 x 100 x 10 UA	4.0	3.0	2.5

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 1.16 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Lintels are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A floor load of "0" must be used for lintels not supporting floor loads.

Table 6.3.5b: Maximum lintel span — lintel supporting metal sheet roof, timber floor and 3 m high exterior wall — roof load width = 4.5 m

Section	Floor load width (m)		
	0	1.8	3.6
150 UB 14.0	3.1	2.7	2.4
200 UB 25.4	4.9	4.3	3.8
250 UB 31.4	5.6	4.9	4.3
100 TFB	1.9	1.7	1.5
150 PFC	4.0	3.4	3.0
200 PFC	4.5	3.9	3.4
250 PFC	6.0	5.2	4.6
75 x 75 x 5 EA	1.0	–	–
90 x 90 x 6 EA	1.8	1.3	–
100 x 100 x 6 EA	1.8	1.3	–
125 x 75 x 6 UA	1.8	1.3	1.0
150 x 100 x 10 UA	3.0	2.5	2.0

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 1.16 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Lintels are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A floor load of "0" must be used for lintels not supporting floor loads.

Table 6.3.5c: Maximum lintel span — lintel supporting metal sheet roof, timber floor and 3 m high exterior wall — roof load width = 7.5 m

Section	Floor load width (m)		
	0	1.8	3.6
150 UB 14.0	2.6	2.4	2.2
200 UB 25.4	4.1	3.8	3.6
250 UB 31.4	4.7	4.4	4.1
100 TFB	1.6	1.5	1.4
150 PFC	3.3	3.0	2.8
200 PFC	3.8	3.5	3.3
250 PFC	5.1	4.6	4.3
75 x 75 x 5 EA	–	–	–
90 x 90 x 6 EA	1.0	–	–
100 x 100 x 6 EA	1.0	–	–

Section	Floor load width (m)		
	0	1.8	3.6
125 x 75 x 6 UA	1.3	1.0	1.0
150 x 100 x 10 UA	2.5	2.0	2.0

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 1.16 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS and G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Lintels are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A floor load of “0” must be used for lintels not supporting floor loads.

Table 6.3.5d: Maximum lintel span — lintel supporting tiled roof, tiled floor and 3 m high exterior wall — roof load width = 1.5 m

Section	Floor load width (m)		
	0	1.8	3.6
150 UB 14.0	4.0	2.8	2.3
200 UB 25.4	6.2	4.4	3.7
250 UB 31.4	7.1	5.0	4.3
100 TFB	2.5	1.7	1.4
150 PFC	5.2	3.5	2.9
200 PFC	5.9	4.0	3.4
250 PFC	7.7	5.4	4.5
75 x 75 x 5 EA	2.0	–	–
90 x 90 x 6 EA	2.5	1.3	–
100 x 100 x 6 EA	3.0	1.3	–
125 x 75 x 6 UA	2.5	1.5	1.0
150 x 100 x 10 UA	4.0	2.5	2.0

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 1.16 kN/m permanent wall, 0.85 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS G + 0.7Q, G + W_S.

(3) 0.9G + WS_S for SLS with a maximum deflection of span/300.

(4) Lintels are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A floor load of “0” must be used for lintels not supporting floor loads.

Table 6.3.5e: Maximum lintel span — lintel supporting tiled roof, tiled floor and 3 m high exterior wall — roof load width = 4.5 m

Section	Floor load width (m)		
	0	1.8	3.6
150 UB 14.0	2.8	2.5	2.2
200 UB 25.4	4.4	3.9	3.5
250 UB 31.4	5.1	4.5	4.0
100 TFB	1.7	1.5	1.3
150 PFC	3.6	3.1	2.7
200 PFC	4.1	3.6	3.1
250 PFC	5.4	4.7	4.2
75 x 75 x 5 EA	–	–	–
90 x 90 x 6 EA	1.3	1.0	–
100 x 100 x 6 EA	1.5	1.0	–
125 x 75 x 6 UA	1.5	1.0	–
150 x 100 x 10 UA	2.5	2.0	1.8

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 1.16 kN/m permanent wall, 0.85 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor, positive roof wind pressure of 0.95 kPa and negative roof wind pressure of -1.49 kPa.

(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Lintels are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A floor load of “0” must be used for lintels not supporting floor loads.

Table 6.3.5f: Maximum lintel span — lintel supporting tiled roof, tiled floor and 3 m high exterior wall — roof load width = 7.5 m

Section	Floor load width (m)		
	0	1.8	3.6
150 UB 14.0	2.4	2.2	2.0
200 UB 25.4	3.8	3.4	3.2
250 UB 31.4	4.3	4.0	3.7
100 TFB	1.5	1.3	1.2
150 PFC	3.0	2.7	2.5
200 PFC	3.4	3.1	2.9
250 PFC	4.6	4.2	3.9
75 x 75 x 5 EA	–	–	–
90 x 90 x 6 EA	–	–	–
100 x 100 x 6 EA	–	–	–
125 x 75 x 6 UA	1.0	–	–
150 x 100 x 10 UA	2.0	1.8	1.5

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 1.16 kN/m permanent wall, 0.85 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor, positive roof wind pressure of 0.95 kPa and

negative roof wind pressure of -1.49 kPa.

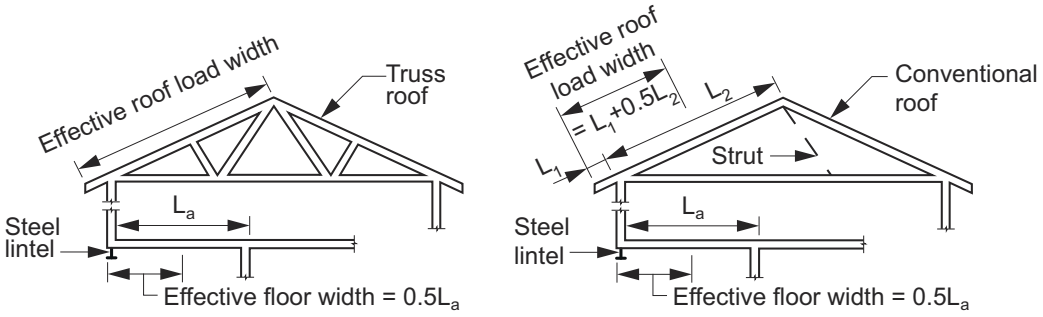
(2) Load combinations included are 1.35G, 1.2G + 1.5Q, 1.2G + W_U + 0.4Q, 0.9G + W_U for ULS G + 0.7Q, G + W_S.

(3) 0.9G + W_S for SLS with a maximum deflection of span/300.

(4) Lintels are assumed to be partially restrained at both ends with no rotational restraint and are designed as members without full lateral restraint.

(5) A floor load of "0" must be used for lintels not supporting floor loads.

Figure 6.3.5: Lintels supporting roof, frames and timber floors



(a) Floor and truss roof **(b) Floor and conventional roof**

6.3.6 Columns

[2019: 3.4.4.3]

Structural steel columns must comply with the following:

(a) Columns must support the maximum area provided for in—

(i) Tables 6.3.6a, 6.3.6b and 6.3.6c for columns supporting tiled floor and tiled roof load; and

(ii) Tables 6.3.6d, 6.3.6e and 6.3.6f for columns supporting timber floor and metal roof load.

(b) The floor area to be supported is to be determined in accordance with Table 6.3.6g and Figure 6.3.6a.

(c) The flooring system supported by structural steel columns must be fully braced to the footing level either by—

(i) subject to (d), adequately fixing the full height of the column to bracing walls of similar height in the two orthogonal directions of the building; or

(ii) a bracing system designed in accordance with AS 1684.2, AS 1684.3, AS/NZS 4600, NASH standard or AS 3700 as appropriate to the materials being used.

(d) For the purposes of (c)(i), the bracing walls must be capable of resisting racking forces in each direction not less than a proportion of the building's racking force equal to the proportion of floor area that the column is supporting compared to the total floor area of the building.

(e) Acceptable load eccentricity must not exceed 50% of the cross-sectional width plus 100 mm (see Figure 6.3.6b).

(f) Have a minimum nominal yield strength of 250 MPa.

Table 6.3.6a: Required column section — columns supporting tiled floor and tiled roof load — roof load area = 0 m²

Column section	Effective height (mm)	Floor load area (m²)		
		4	10	16
CHS 250	2400	60.3 x 4.5 CHS	88.9 x 5 CHS	114.3 x 4.5 CHS
CHS 250	2700	60.3 x 4.5 CHS	88.9 x 5 CHS	114.3 x 4.5 CHS
CHS 250	3000	60.3 x 4.5 CHS	88.9 x 5 CHS	114.3 x 4.5 CHS
CHS 250	3300	60.3 x 5.4 CHS	88.9 x 5 CHS	114.3 x 5.4 CHS

Column section	Effective height (mm)	Floor load area (m^2)		
		4	10	16
CHS 250	3600	60.3 x 5.4 CHS	88.9 x 5 CHS	114.3 x 5.4 CHS
CHS 350	2400	60.3 x 2.9 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	2700	60.3 x 2.9 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	3000	60.3 x 2.9 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	3300	76.1 x 2.3 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	3600	76.1 x 2.3 CHS	101.6 x 2.6 CHS	114.3 x 3.2 CHS
SHS 350	2400	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	2700	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	3000	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	3300	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	3600	65 x 65 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 450	2400	50 x 50 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	2700	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3000	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3300	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3600	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 1.16 kN/m permanent wall, 0.85 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q for ULS.

(3) Columns are assumed to be simply-supported at both ends with an effective length factor of 1.

(4) A maximum load eccentricity of 100 mm has been accounted for in the columns.

(5) A roof load area of "0" must be used for columns not supporting roof loads.

(6) The length of wall load allowed for is equal to the square root of the floor area.

Table 6.3.6b: Required column section — columns supporting tiled floor and tiled roof load — roof load area = 9 m^2

Column section	Effective height (mm)	Floor load area (m^2)		
		4	10	16
CHS 250	2400	76.1 x 4.5 CHS	101.6 x 5 CHS	114.3 x 5.4 CHS
CHS 250	2700	76.1 x 4.5 CHS	101.6 x 5 CHS	114.3 x 5.4 CHS
CHS 250	3000	76.1 x 5.9 CHS	101.6 x 5 CHS	139.7 x 5 CHS
CHS 250	3300	76.1 x 5.9 CHS	101.6 x 5 CHS	139.7 x 5 CHS
CHS 250	3600	76.1 x 5.9 CHS	101.6 x 5 CHS	139.7 x 5 CHS
CHS 350	2400	76.1 x 3.2 CHS	101.6 x 3.2 CHS	139.7 x 3 CHS
CHS 350	2700	76.1 x 3.2 CHS	101.6 x 3.2 CHS	139.7 x 3 CHS
CHS 350	3000	76.1 x 3.2 CHS	114.3 x 3.2 CHS	139.7 x 3 CHS
CHS 350	3300	88.9 x 2.6 CHS	114.3 x 3.2 CHS	139.7 x 3 CHS
CHS 350	3600	88.9 x 2.6 CHS	114.3 x 3.2 CHS	139.7 x 3 CHS
SHS 350	2400	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 350	2700	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 350	3000	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS

Column section	Effective height (mm)	Floor load area (m^2)		
		4	10	16
SHS 350	3300	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 350	3600	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 450	2400	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	2700	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3000	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 450	3300	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 450	3600	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 1.16 kN/m permanent wall, 0.85 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q for ULS.

(3) Columns are assumed to be simply-supported at both ends with an effective length factor of 1.

(4) A maximum load eccentricity of 100 mm has been accounted for in the columns.

(5) A roof load area of “0” must be used for columns not supporting roof loads.

(6) The length of wall load allowed for is equal to the square root of the floor area.

Table 6.3.6c: Required column section — columns supporting tiled floor and tiled roof load — roof load area = 18 m^2

Column section	Effective height (mm)	Floor load area (m^2)		
		4	10	16
CHS 250	2400	88.9 x 5 CHS	114.3 x 5.4 CHS	139.7 x 5 CHS
CHS 250	2700	88.9 x 5 CHS	114.3 x 5.4 CHS	139.7 x 5 CHS
CHS 250	3000	88.9 x 5 CHS	114.3 x 5.4 CHS	139.7 x 5 CHS
CHS 250	3300	88.9 x 5.9 CHS	114.3 x 5.4 CHS	139.7 x 5 CHS
CHS 250	3600	88.9 x 5.9 CHS	114.3 x 5.4 CHS	139.7 x 5 CHS
CHS 350	2400	101.6 x 2.6 CHS	114.3 x 3.6 CHS	139.7 x 3.5 CHS
CHS 350	2700	101.6 x 2.6 CHS	114.3 x 3.6 CHS	139.7 x 3.5 CHS
CHS 350	3000	101.6 x 3.2 CHS	114.3 x 3.6 CHS	139.7 x 3.5 CHS
CHS 350	3300	101.6 x 3.2 CHS	114.3 x 3.6 CHS	139.7 x 3.5 CHS
CHS 350	3600	101.6 x 3.2 CHS	114.3 x 3.6 CHS	139.7 x 3.5 CHS
SHS 350	2400	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS	100 x 100 x 4 SHS
SHS 350	2700	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS	100 x 100 x 4 SHS
SHS 350	3000	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS	100 x 100 x 5 SHS
SHS 350	3300	100 x 100 x 3 SHS	100 x 100 x 4 SHS	100 x 100 x 5 SHS
SHS 350	3600	100 x 100 x 3 SHS	100 x 100 x 4 SHS	100 x 100 x 5 SHS
SHS 450	2400	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 450	2700	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 450	3000	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 450	3300	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 450	3600	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS

Table Notes

(1) Load accounted for includes 0.98 kPa permanent floor, 1.16 kN/m permanent wall, 0.85 kPa permanent roof,

permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q for ULS.

(3) Columns are assumed to be simply-supported at both ends with an effective length factor of 1.

(4) A maximum load eccentricity of 100 mm has been accounted for in the columns.

(5) A roof load area of "0" must be used for columns not supporting roof loads.

(6) The length of wall load allowed for is equal to the square root of the floor area.

Table 6.3.6d: Required column section — columns supporting timber floor and metal roof load — roof load area = 0 m^2

Column section	Effective height (mm)	Floor load area (m^2)		
		4	10	16
CHS 250	2400	60.3 x 3.6 CHS	76.1 x 5.9 CHS	101.6 x 5 CHS
CHS 250	2700	60.3 x 3.6 CHS	76.1 x 5.9 CHS	101.6 x 5 CHS
CHS 250	3000	60.3 x 4.5 CHS	76.1 x 5.9 CHS	101.6 x 5 CHS
CHS 250	3300	60.3 x 4.5 CHS	76.1 x 5.9 CHS	101.6 x 5 CHS
CHS 250	3600	60.3 x 4.5 CHS	88.9 x 5 CHS	101.6 x 5 CHS
CHS 350	2400	60.3 x 2.3 CHS	88.9 x 2.6 CHS	101.6 x 3.2 CHS
CHS 350	2700	60.3 x 2.9 CHS	88.9 x 2.6 CHS	114.3 x 3.2 CHS
CHS 350	3000	60.3 x 2.9 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	3300	60.3 x 2.9 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	3600	60.3 x 2.9 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
SHS 350	2400	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 350	2700	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 350	3000	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 350	3300	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 350	3600	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	2400	50 x 50 x 2 SHS	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS
SHS 450	2700	50 x 50 x 2 SHS	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS
SHS 450	3000	50 x 50 x 2 SHS	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS
SHS 450	3300	50 x 50 x 2.5 SHS	89 x 89 x 3.5 SHS	89 x 89 x 3.5 SHS
SHS 450	3600	50 x 50 x 2.5 SHS	89 x 89 x 3.5 SHS	89 x 89 x 3.5 SHS

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 1.16 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q for ULS.

(3) Columns are assumed to be simply-supported at both ends with an effective length factor of 1.

(4) A maximum load eccentricity of 100 mm has been accounted for in the columns.

(5) A roof load area of "0" must be used for columns not supporting roof loads.

(6) The length of wall load allowed for is equal to the square root of the floor area.

Table 6.3.6e: Required column section — columns supporting timber floor and metal roof load — roof load area = 9 m²

Column section	Effective height (mm)	Floor load area (m²)		
		4	10	16
CHS 250	2400	60.3 x 5.4 CHS	88.9 x 5 CHS	114.3 x 4.5 CHS
CHS 250	2700	76.1 x 3.6 CHS	88.9 x 5 CHS	114.3 x 4.5 CHS
CHS 250	3000	76.1 x 3.6 CHS	88.9 x 5 CHS	114.3 x 4.5 CHS
CHS 250	3300	76.1 x 3.6 CHS	88.9 x 5 CHS	114.3 x 4.5 CHS
CHS 250	3600	76.1 x 4.5 CHS	88.9 x 5.9 CHS	114.3 x 5.4 CHS
CHS 350	2400	76.1 x 2.3 CHS	88.9 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	2700	76.1 x 2.3 CHS	101.6 x 2.6 CHS	114.3 x 3.2 CHS
CHS 350	3000	76.1 x 3.2 CHS	101.6 x 2.6 CHS	114.3 x 3.2 CHS
CHS 350	3300	76.1 x 3.2 CHS	101.6 x 3.2 CHS	114.3 x 3.2 CHS
CHS 350	3600	76.1 x 3.2 CHS	101.6 x 3.2 CHS	114.3 x 3.2 CHS
SHS 350	2400	65 x 65 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	2700	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	3000	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	3300	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 4 SHS
SHS 350	3600	75 x 75 x 2.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 450	2400	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	2700	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3000	65 x 65 x 2 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3300	65 x 65 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3600	65 x 65 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 1.16 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q for ULS.

(3) Columns are assumed to be simply-supported at both ends with an effective length factor of 1.

(4) A maximum load eccentricity of 100 mm has been accounted for in the columns.

(5) A roof load area of “0” must be used for columns not supporting roof loads.

(6) The length of wall load allowed for is equal to the square root of the floor area.

Table 6.3.6f: Required column section — columns supporting timber floor and metal roof load — roof load area = 18 m²

Column section	Effective height (mm)	Floor load area (m²)		
		4	10	16
CHS 250	2400	76.1 x 4.5 CHS	101.6 x 5 CHS	114.3 x 5.4 CHS
CHS 250	2700	76.1 x 5.9 CHS	101.6 x 5 CHS	114.3 x 5.4 CHS
CHS 250	3000	76.1 x 5.9 CHS	101.6 x 5 CHS	114.3 x 5.4 CHS
CHS 250	3300	76.1 x 5.9 CHS	101.6 x 5 CHS	114.3 x 5.4 CHS
CHS 250	3600	76.1 x 5.9 CHS	101.6 x 5 CHS	114.3 x 5.4 CHS
CHS 350	2400	76.1 x 3.2 CHS	101.6 x 3.2 CHS	114.3 x 3.6 CHS
CHS 350	2700	76.1 x 3.2 CHS	101.6 x 3.2 CHS	114.3 x 3.6 CHS

Column section	Effective height (mm)	Floor load area (m^2)		
		4	10	16
CHS 350	3000	88.9 x 2.6 CHS	101.6 x 3.2 CHS	114.3 x 3.6 CHS
CHS 350	3300	88.9 x 2.6 CHS	101.6 x 3.2 CHS	114.3 x 3.6 CHS
CHS 350	3600	88.9 x 2.6 CHS	101.6 x 3.2 CHS	114.3 x 3.6 CHS
SHS 350	2400	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 350	2700	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 350	3000	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 350	3300	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 350	3600	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS	100 x 100 x 4 SHS
SHS 450	2400	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	2700	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3000	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3300	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS
SHS 450	3600	75 x 75 x 2.5 SHS	89 x 89 x 3.5 SHS	100 x 100 x 3 SHS

Table Notes

(1) Load accounted for includes 0.53 kPa permanent floor, 1.16 kN/m permanent wall, 0.4 kPa permanent roof, permanent member self-weight, 1.5 kPa or 1.1 kN imposed floor and 0.25 kPa imposed roof.

(2) Load combinations included are 1.35G and 1.2G + 1.5Q for ULS.

(3) Columns are assumed to be simply-supported at both ends with an effective length factor of 1.

(4) A maximum load eccentricity of 100 mm has been accounted for in the columns.

(5) A roof load area of “0” must be used for columns not supporting roof loads.

(6) The length of wall load allowed for is equal to the square root of the floor area.

Table 6.3.6g: Area supported by columns

Column descriptor (as shown in Figure 6.3.6a)	Total area supported
C1	0.4L1 x 0.4LA
C2	0.7(L1 + L2) x 0.4LA
C3	0.4L1 x 0.7(LA + LB)
C4	0.7(L1 + L2) x 0.7(LA + LB)
C5	0.4L1 + 0.4LC
C6	0.7(L1 + L2) x 0.4LC

Table Notes

The total area supported equations marginally overestimate the total area to account for a difference between L1 and L2 by up to 30%.

Figure 6.3.6a: Determining floor area supported by columns

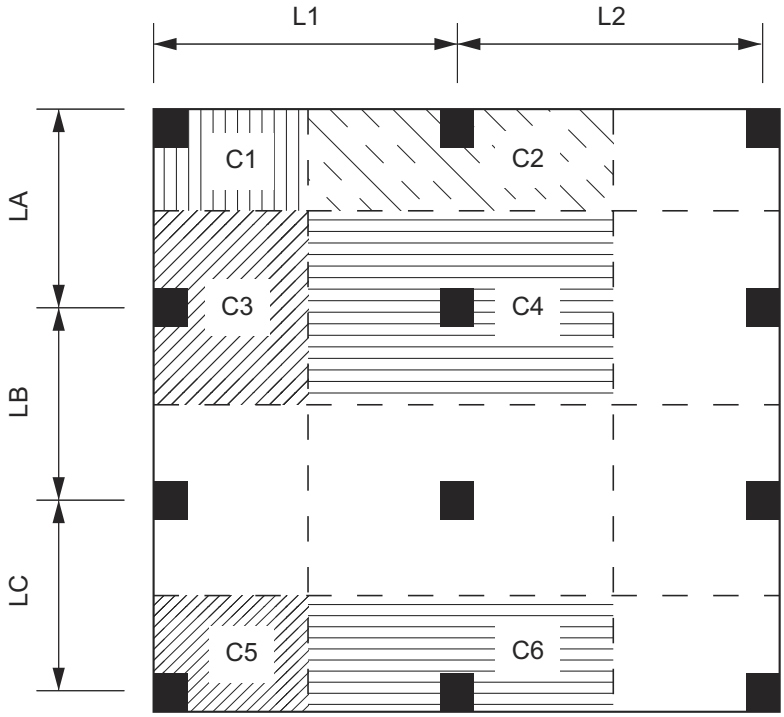
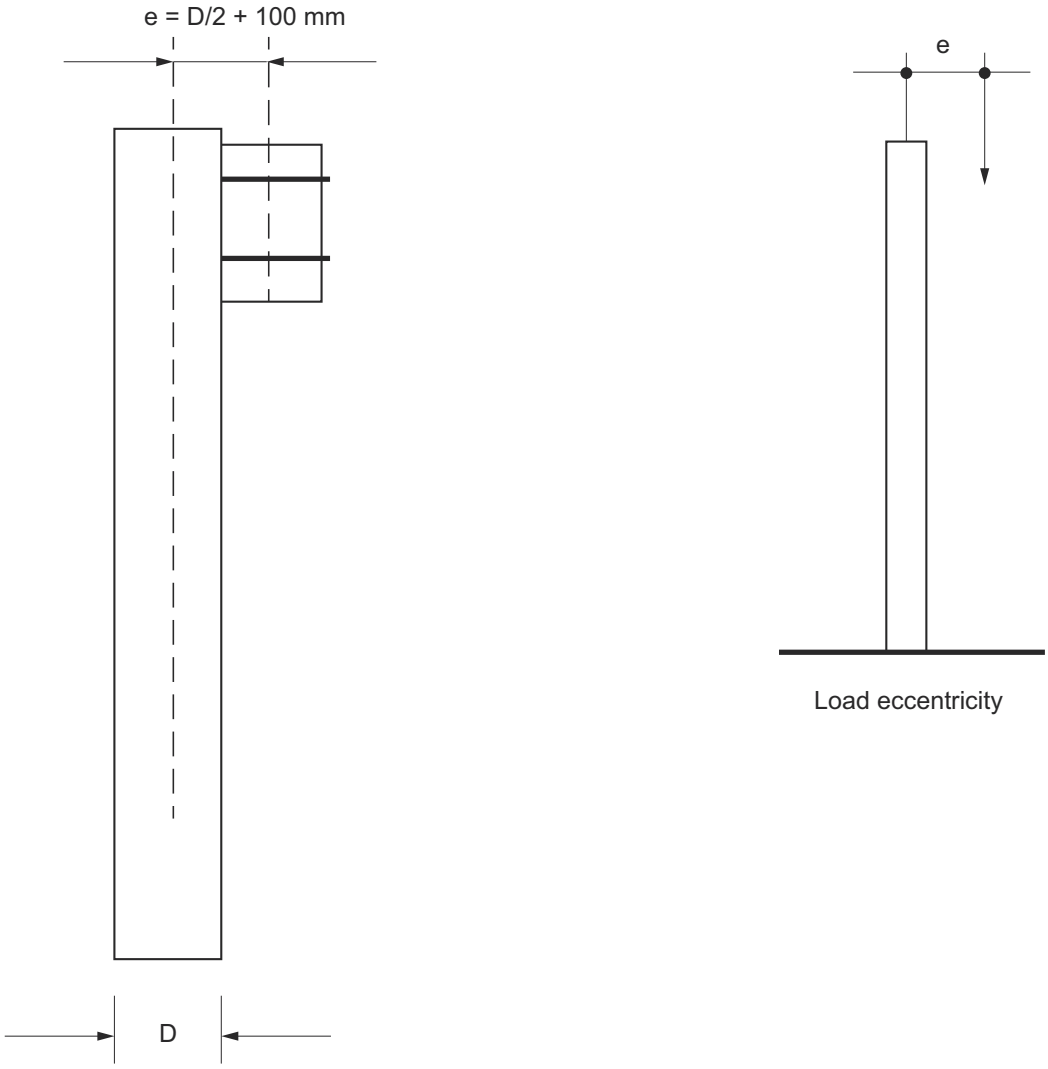


Figure 6.3.6b: Acceptable load eccentricity for columns



Explanatory Information: Cantilever columns

A cantilever column is not assisted by any lateral bracing element such as a column bracing set, timber or masonry wall.

Explanatory Information: Calculating column size

The following is an example of the steps required to calculate a suitable column to support typical floor loads in a residential building. It is proposed the column will—

- have an actual height of 1800 mm; and
- support a timber floor only; and
- be square in section; and
- be cast in to the footings; and
- be fully braced by column bracing sets.

Step 1 – Determining effective column height

The column height (H) is determined by multiplying the actual height by the relevant height factor (F1) in Tables 6.3.6d, 6.3.6e or 6.3.6f. In this case, the relevant value for F1 is 1.00 as the column is cast in to the footing and is fully braced.

Therefore:

- H = actual height x F1
- H = 1800 mm x F1
- H = 1800 mm (1.8 m)

Step 2 – Determine floor area to be supported

The column position selected is C4 as shown in Figure 6.3.6a and the dimensions of L1 and L2 are 2700 mm (2.7 m), LA is 1900 mm (1.9 m) and LB is 2100 mm (2.1 m).

The area supported by the column is determined by the formulae set out in Table 6.3.6g.

Therefore:

- Total area supported (A) is 0.625(L1 + L2) x 0.625(LA + LB)
- A = 0.625(2.7 m + 2.7 m) x 0.625 x (1.9 m + 2.1 m)
- A = (0.625 x 5.4 m) x (0.625 x 4.0 m)
- A = 3.38 m x 2.5 m
- A = 8.5 m^2

Step 3 – Select column size from Tables 6.3.6d, 6.3.6e or 6.3.6f

The column with an effective height of 1800 mm supporting a floor area of 8.5 m^2 is selected from the 10 m^2 column in Table 6.3.6d ("0" roof load area) giving a SHS 350 75 x 75 x 3 size.

It should be noted there is a choice of CHS 250 88.9 x 4 or CHS 350 101.6 x 2.6 should a different section be desired.

6.3.7 Fixings and bearing for structural steel members

[New for 2022]

(1) All bolts used in connections must be hot dip galvanised 300 g/m^2.

(2) Bearer connections must be fixed in accordance with Figure 6.3.7a.

(3) Joists, bearers and lintels must be restrained from lateral movement or twisting along their length by fixing rafters or joists to the top flange of the member so as to prevent the member from moving laterally.

(4) End supports for bearers and lintels must transfer loads to the footings and have a bearing distance as follows:

(a) For single spans, the bearing distance must be not less than the width of the member.

(b) For continuous spans, internal bearing must be not less than two times the width of the member.

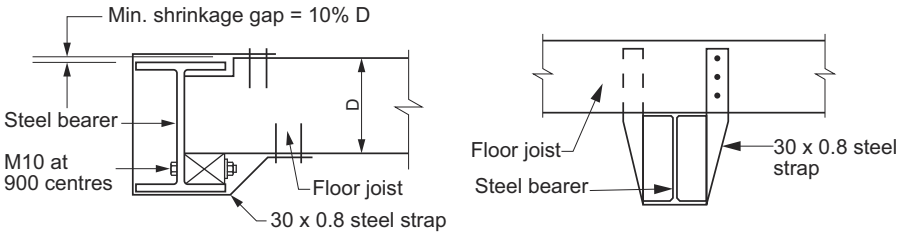
(5) Strutting beams must—

(a) be supported and fixed in accordance with Figure 6.3.7b; and

(b) where ends are cut to suit roof pitch, be cut in accordance with Figure 6.3.7c.

(6) Lintels must be fixed in accordance with Figures 6.3.7d, 6.3.7e, 6.3.7f, 6.3.7g and 6.3.7h.

Figure 6.3.7a: Bearer supporting a timber floor and non-loadbearing stud wall



(a) Example A **(b) Example B**

Figure 6.3.7b: Strutting beam supporting roof and ceiling

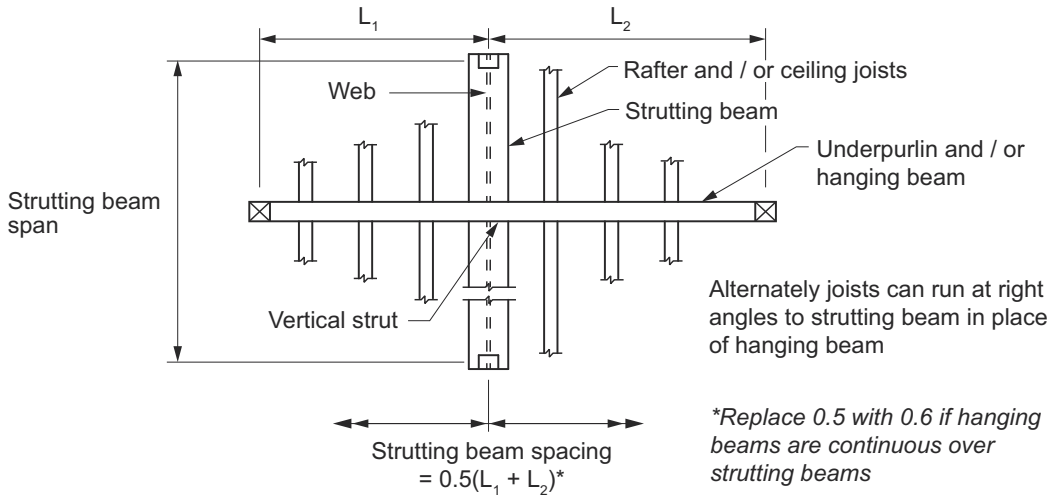


Figure 6.3.7c: End cuts to strutting beams

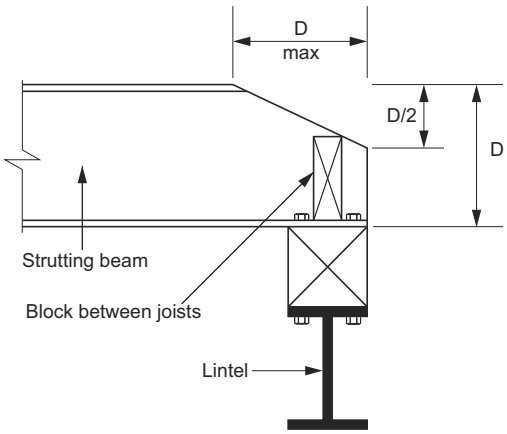
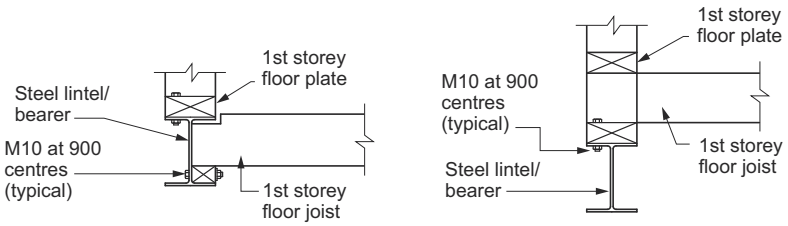


Figure Notes

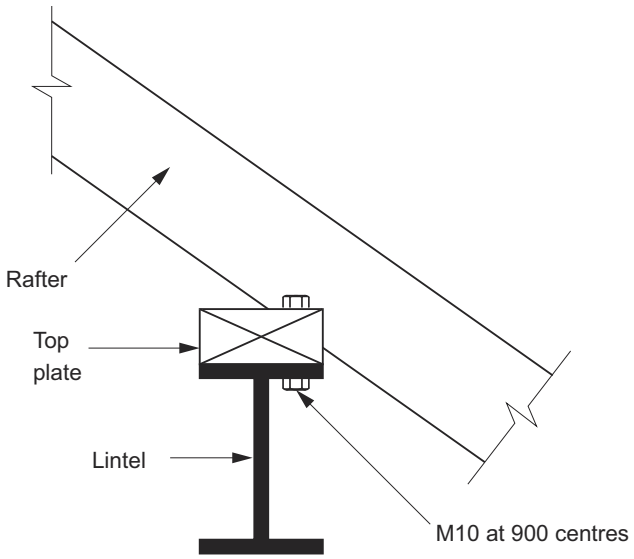
Strutting beam top plate to be tied down in accordance with 6.3.4.

Figure 6.3.7d: Lintels supporting roof, frames and timber floors



(a) Floor – example A **(b) Floor – example B**

Figure 6.3.7e: Lintels supporting roof, frames and timber floors — sections



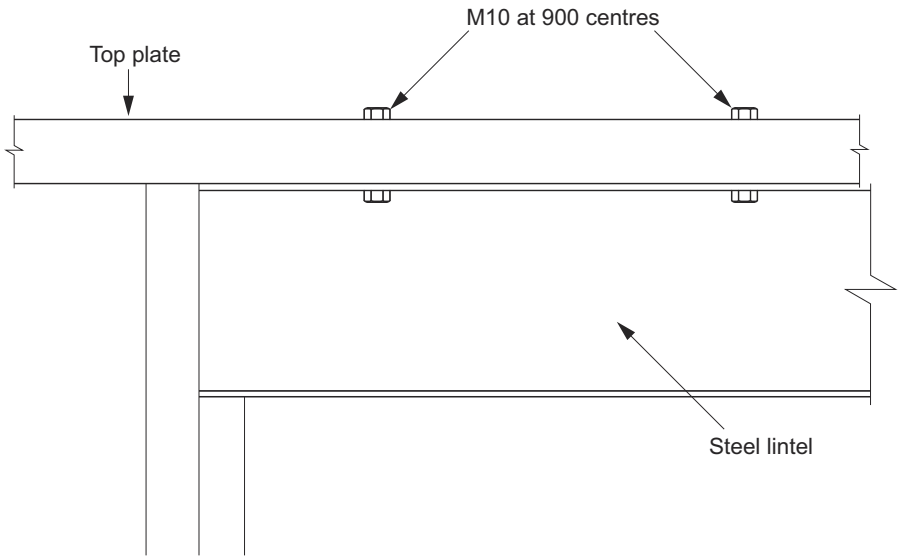


Figure 6.3.7f: Typical universal beam to column connection detail

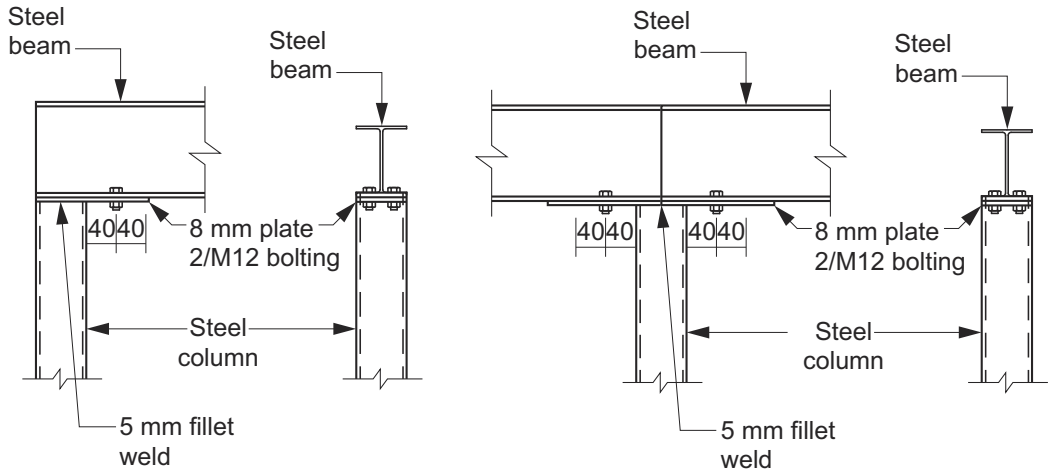


Figure Notes

(1) 8 mm steel plates to be welded to the top and bottom of the column using 5 mm fillet welds.

(2) Plate width must be the greater of the column width or the beam width.

(3) Plate length must be such that there is not less than 40 mm from the centreline of the bolts to the ends.

(4) All bolting between structural steel members must be not less than 2 M12 4.6/S.

Figure 6.3.7g: Typical PFC and RHS beam to column connection detail

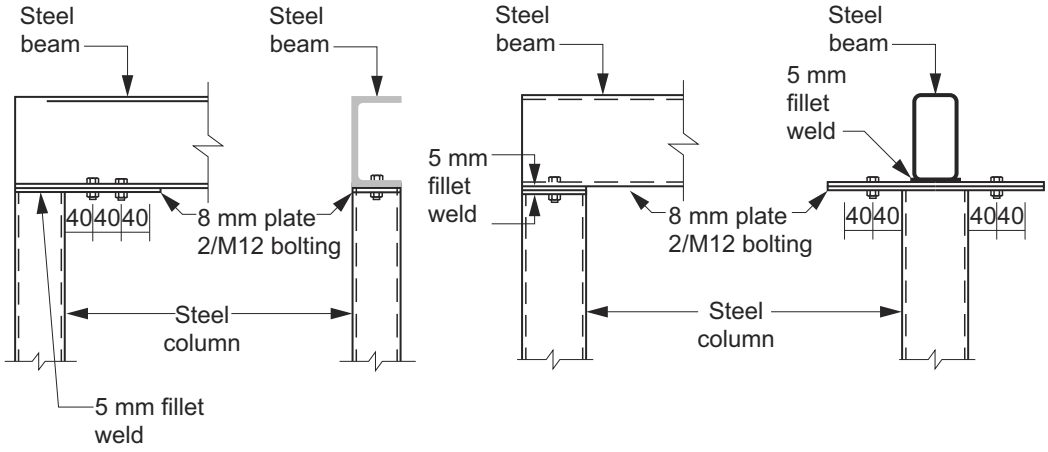


Figure 6.3.7h: Typical column base plate detail

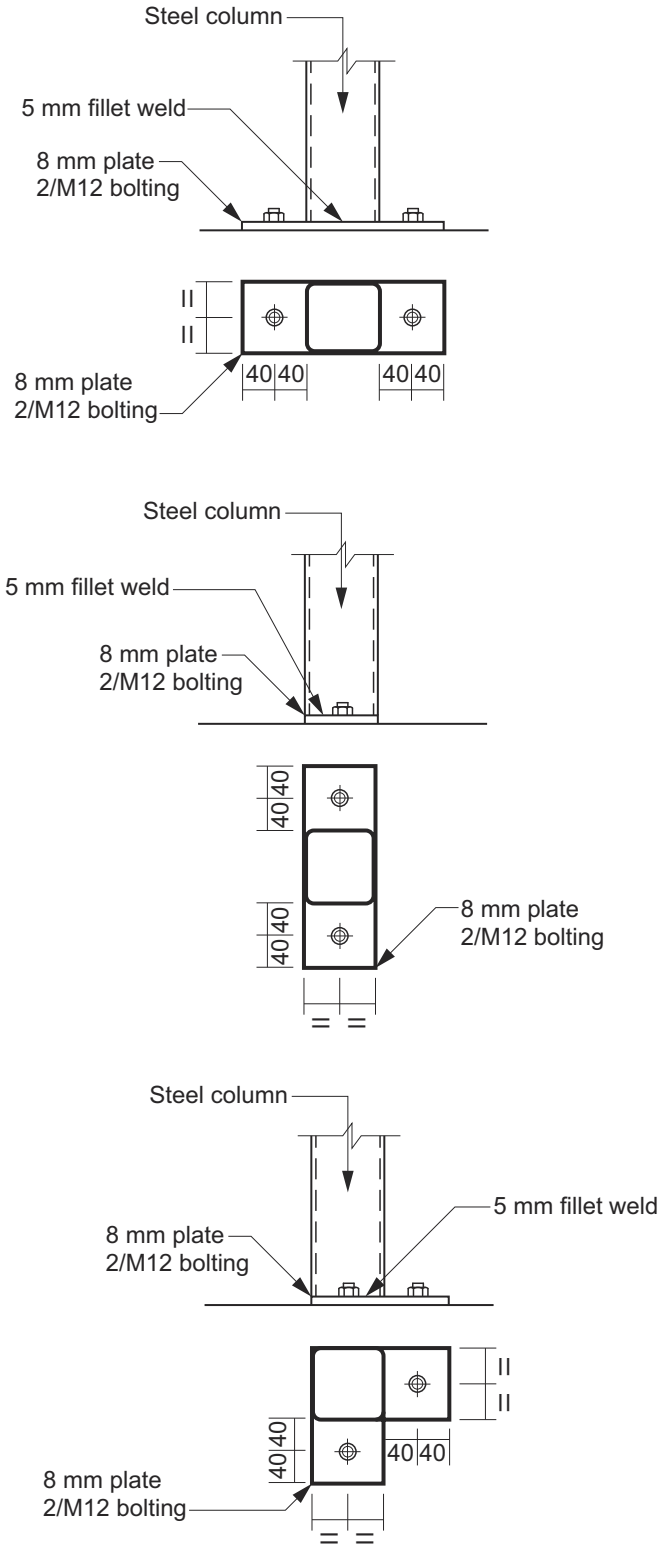


Figure Notes

Fixing of the column base plate to the slab must be not less than 2 M12 4.6/S post-installed mechanical anchors.

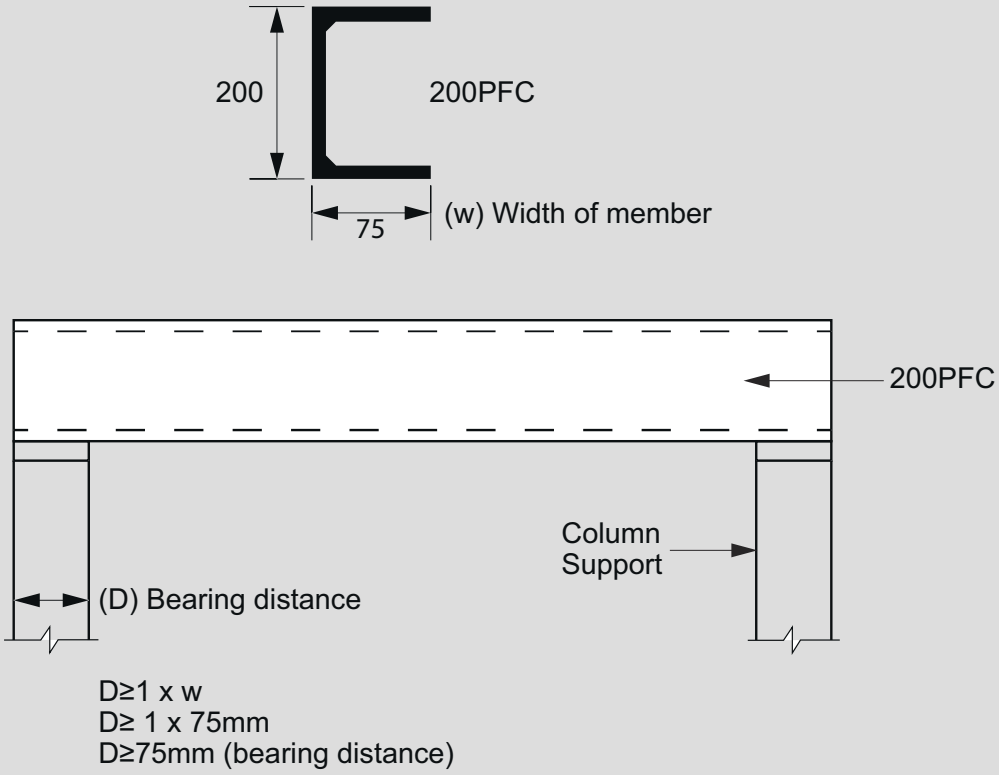
Explanatory Information

The ends of bearers and lintels must be sufficiently supported to ensure structural loads are transferred to the footing system. The amount of horizontal bearing (measured in millimetres) required on the vertical supports will depend on the type of span of the bearer or lintel. For single spans, the amount of horizontal bearing is to be equal to or greater than the width of the bearer or lintel. For continuous spans it is to be twice the width of the bearer or lintel.

For bearing distance, see 6.3.7(4)(a) and (b).

Explanatory Figure 6.3.7 depicts an example of a 200 PFC bearer or lintel supporting floor or roof loads over a single span.

Figure 6.3.7 (explanatory): Example of a 200 PFC bearer or lintel supporting floor or roof loads over a single span

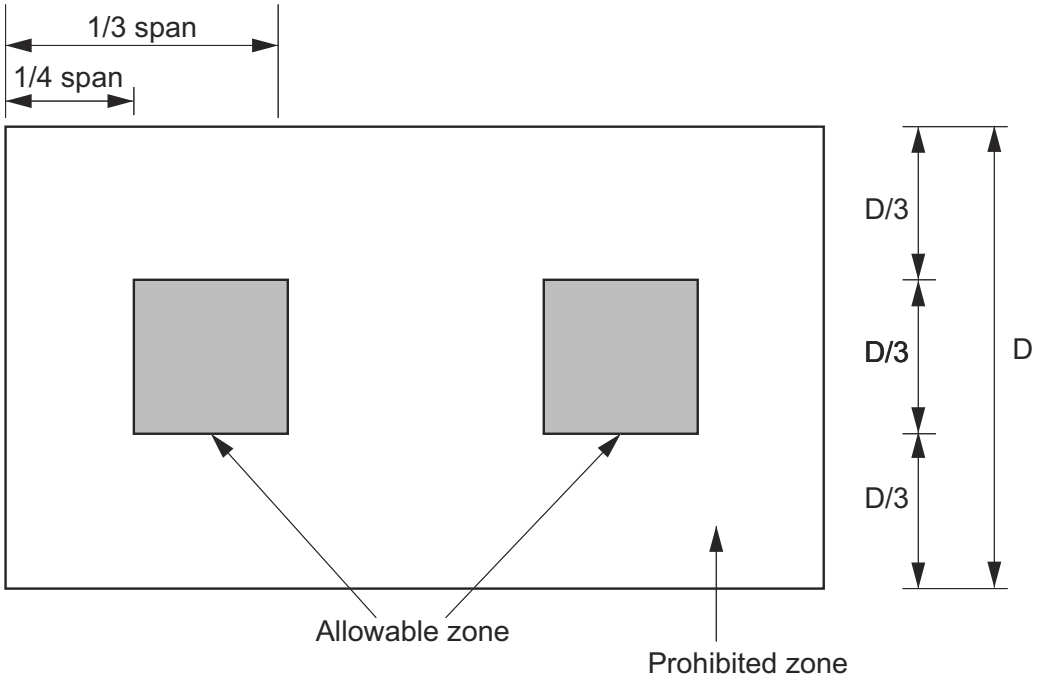


6.3.8 Penetrations through structural steel members

[New for 2022]

Penetrations through structural steel members must be within the allowable zones in Figure 6.3.8.

Figure 6.3.8: Allowable zones for penetrations through structural steel members



Explanatory Information

Cutting and penetrations in structural steel should be avoided where possible. Figure 6.3.8 provides permissible zones for penetrations through structural steel. However, it is recommended that a suitable qualified professional be consulted where penetrations or cuts are required to be made on site.

6.3.9 Corrosion protection

[2019: 3.4.4.4]

Structural steel members that are not built in to a masonry wall must—

(a) be protected against corrosion in accordance with Tables 6.3.9a, 6.3.9b and 6.3.9c; and

(b) where a paint finish is applied to the surface, be free from rust; and

(c) where zinc coatings are applied to the surface, be provided with a barrier coat to prevent domestic enamels from peeling; and

(d) when cut or welded on-site, have those areas and any other areas of damage to protective coatings comply with (a).

Table 6.3.9a: Minimum protective coatings for structural steel members

Environment	Location	Minimum protective coating		
		Option 1 (hot dip galvanising)	Option 2 (duplex system). See Table 6.3.9c	Option 3 (paint). See Table 6.3.9b
Low (mild steel corrosion rate 1.3 to 25 µm/year	Typically remote inland areas or more than 1 km from sheltered bays	HDG75	–	ACL2, ACC2, IZS1, PUR2A

Environment	Location	Minimum protective coating		
		Option 1 (hot dip galvanising)	Option 2 (duplex system). See Table 6.3.9c	Option 3 (paint). See Table 6.3.9b
Medium (mild steel corrosion rate 25 to 50 µm/year)	Typically more than 1 km from *breaking surf* or aggressive industrial areas or more than 50 m from sheltered bays	HDG225	–	ACL3, ACC4, ACC5, IZS1, PUR3, PUR4
High (mild steel corrosion rate 50 to 80 µm/year)	Typically more than 200 m from *breaking surf* or aggressive industrial areas or within 50 m from sheltered bays	HDG450	HDG150 (5 years) 4D (10-15 years) or HDG300 (10 years) 2D (5-10 years)	ACC6, IZS3, PUR5
Very High (mild steel corrosion rate 80 to 200 µm/year)	Typically extends from 100 m inland from *breaking surf* to 200 m inland from *breaking surf*, or within 200 m of aggressive industrial areas and within 100 m of *breaking surf*.	HDG900	HDG300 (5 years) 5D (10-15 years) or HDG600 (10 years) 4D (5-10 years)	ACC6 (C5-M only), PUR5

Table Notes

Hot dip galvanising and duplex systems must be in accordance with AS 2312.2. Paint systems must be in accordance with AS 2312.1.

Table 6.3.9b: Paint coating system specification

AS 2312.1 system	Surface preparation	1st coat		2nd coat		3rd coat		Total DFT
		Type of paint	DFT	Type of paint	DFT	Type of paint	DFT	
ACC2	Sa 2.5	Epoxy primer	75	Acrylic (2 pack)	50	–	–	125
ACC4	Sa 2.5	Epoxy primer	75	High build epoxy	125	Acrylic (2 pack)	50	250
ACC5	Sa 2.5	Zinc rich primer	75	High build epoxy	125	Acrylic (2 pack)	50	250
ACC6	Sa 2.5	Zinc rich primer	75	High build epoxy	200	Acrylic (2 pack)	50	325
ACL2	Sa 2.5	Zinc rich primer	75	Acrylic latex	40	Acrylic latex	40	155
ACL3	Sa 2.5	Zinc rich primer	75	High build epoxy	125	Acrylic latex	40	240
IZS1	Sa 2.5	Inorganic zinc silicate	75	–	–	–	–	75
IZS3	Sa 2.5	Inorganic zinc silicate	125	–	–	–	–	125
PUR2A	Sa 2.5	Zinc rich primer	75	High build polyurethane	75	–	–	150
PUR3	Sa 2.5	Epoxy primer	75	High build epoxy	125	Polyurethane gloss	50	250
PUR4	Sa 2.5	Zinc rich primer	75	High build epoxy	125	Polyurethane gloss	50	250
PUR5	Sa 2.5	Zinc rich primer	75	High build epoxy	200	Polyurethane gloss	50	325

Table Notes

DFT refers to dry film thickness, measured in µm.

Table 6.3.9c: Duplex coating system specification

AS 2312.2 duplex system	Surface preparation	1st coat		2nd coat		3rd coat		Total DFT
		Type of paint	DFT	Type of paint	DFT	Type of paint	DFT	
2D	Degrease, wash and dry, sweep blast clean	Epoxy primer (2 pack) inhibitive	75	Polyurethane or acrylic gloss (2 pack)	100	–	–	175
4D	Degrease, wash and dry, sweep blast clean	High-build epoxy (2 pack)	250	Polyurethane or acrylic gloss (2 pack)	100	–	–	350
5D	Degrease, wash and dry, sweep blast clean	Epoxy primer (2 pack) inhibitive	75	High-build epoxy (2 pack)	225	Polyurethane or acrylic gloss (2 pack)	100	400

Table Notes

DFT refers to dry film thickness, measured in µm.

Notes

Clause 3.4.4.4 and Table 3.4.4.7 from NCC Volume Two 2019 (Amendment 1) may be used in place of 6.3.9 and Tables 6.3.9a, 6.3.9b and 6.3.9c until 1 May 2024.

7 Roof and wall cladding

Part 7.1 Scope and application of Section 7

7.1.1 Scope

[New for 2022]

(1) This Section sets out the *Deemed-to-Satisfy Provisions* for—

- (a) metal sheet roofing (see Part 7.2); and
- (b) roof tiles (see Part 7.3); and
- (c) gutters and downpipes (see Part 7.4); and
- (d) timber and composite wall cladding (see Part 7.5).

(2) For other roof and wall cladding provisions not included in this Section, refer to NCC Volume Two H1D7(5) Metal wall cladding.

Explanatory Information

This Part contains requirements including weatherproofing and structural requirements, for wall and roof systems. Gutter and downpipe requirements are also contained in this Part.

It should be noted that other construction methods may be used to achieve the same results as specified in this Part provided they comply with the appropriate *Performance Requirements*.

7.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

- (a) The Governing Requirements of NCC Volume Two.
- (b) The State and Territory variations, additions and deletions contained in the Schedules to the ABCB Housing Provisions and NCC Volume Two.

Explanatory Information

In NCC 2019, the content of Section 7 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Parts 3.5.1 to 3.5.4 of NCC 2019 Volume Two.

NCC 2019 Volume Two did not include an acceptable construction practice for Part 3.5.5.

Part 7.2 Sheet roofing

7.2.1 Application of Part 7.2

[New for 2022]

(1) Part 7.2 applies subject to the limitations set out in H1D7(2)(c).

(2) Part 7.2 need not be complied with if H1D7(2)(a) or (b) are complied with.

Explanatory Information: Design wind speeds

Information on *design wind speeds* for particular areas may be available from the *appropriate authority*. Also see the table associated with the definition of '*design wind speed*' for wind classes. A map indicating wind regions of Australia is contained in Part 2.2.

Explanatory Information: Other relevant sheet roof requirements

In addition to the requirements of this Part, requirements for sheet roofing also exist in NCC Volume Two and other Parts of the ABCB Housing Provisions. They include the following:

(a) For the sizing and fixing of roof battens - NCC Volume Two H1D6(3) (steel battens) and H1D6(4) (timber battens)

(b) For sheet roofing over a *separating wall* - ABCB Housing Provisions Part 9.3.

(c) For gutters and downpipes - ABCB Housing Provisions Part 7.4.

7.2.2 Corrosion protection and compatibility requirements for roofing

[2019: 3.5.1.2]

(1) Metal sheet roofing must be protected from corrosion in accordance with Table 7.2.2a.

(2) Where different metals are used in a roofing system, including *flashings*, fasteners, guttering, downpipes, etc., they must be compatible with each other as described in Table 7.2.2b, Table 7.2.2c, Table 7.2.2d, to and Table 7.2.2e and—

(a) no lead materials can be used upstream from aluminium/zinc coated materials; and

(b) no lead materials can be used on roofs that form part of a *drinking water* catchment area; and

(c) no copper materials can be used upstream from galvanized coated materials.

Table 7.2.2a: Acceptable corrosion protection for metal sheet roofing

Environment	Location	Minimum metal coating in accordance with AS 1397: Metallic coated steel	Minimum metal coating in accordance with AS 1397: Metallic and organic coated steel
Low (mild steel corrosion rate 1.3 to 25 µm/y)	Typically remote inland areas or more than 1 km from sheltered bays.	Z450 galvanised or AZ150 aluminium/zinc or AM125 aluminium/zinc/magnesium	Z275 galvanised or AZ150 aluminium/zinc or AM100 aluminium/zinc/magnesium
Medium (mild steel corrosion rate 25 to 50 µm/y)	Typically more than 1 km from *breaking surf* or aggressive industrial areas or more than 50 m from sheltered bays.	Z450 galvanised or AZ150 aluminium/zinc or AM125 aluminium/zinc/magnesium	Z275 galvanised or AZ150 aluminium/zinc or AM100 aluminium/zinc/magnesium

Environment	Location	Minimum metal coating in accordance with AS 1397: Metallic coated steel	Minimum metal coating in accordance with AS 1397: Metallic and organic coated steel
High (mild steel corrosion rate 50 to 80 µm/y)	Typically more than 200 m from *breaking surf* or aggressive industrial areas or within 50 m from sheltered bays.	AZ150 aluminium/zinc or AM125 aluminium/zinc/magnesium	AZ150 aluminium/zinc or AM100 aluminium/zinc/magnesium
Very High (mild steel corrosion rate 80 to 200 µm/y)	Typically extends from 100 m inland from *breaking surf* to 200 m inland from *breaking surf*, or within 200 m of aggressive industrial areas.	Not suitable	AZ200 aluminium/zinc or AM150 aluminium/zinc/magnesium
Very High (mild steel corrosion rate 80 to 200 µm/y)	Typically within 100 m of *breaking surf*.	Not suitable	Not suitable

Table Notes

(1) Low — remote inland includes dry rural areas remote from the coast or sources of pollution. Many areas of Australia beyond at least 50 km from the sea are in this category, including most cities and towns such as Canberra, Ballarat, Toowoomba, Alice Springs and some suburbs of cities on sheltered bays such as Melbourne, Hobart, Brisbane and Adelaide that are more than 1 km from the sea. However each of these have many exceptions which are in more corrosive categories.

(2) Medium — urban inland, coastal or industrial typically coastal areas with low salinity around sheltered bays, such as Port Phillip Bay. This extends from about 50 m from the shoreline to a distance of about 1 km inland but seasonally or in semi-sheltered bays extends 3 to 6 km inland. Along ocean front areas with *breaking surf* and significant salt spray, it extends from 1 km inland to about 10 to 50 km depending on wind direction and topography. Much of the metropolitan areas of Wollongong, Sydney, Newcastle, Perth and the Gold Coast are in this category. This can extend to 30 to 70 km inland in South Australia while on some evidence, other southern Australian coastal zones are in this, or a more severe category. This also includes urban and industrial areas with low pollution and for several kilometres around large industries such as steel works and smelters.

(3) High typically occurs on the coast around sheltered bays. Category high extends up to 50 m inland from the shoreline. In areas of rough seas and surf it extends from several hundred metres to about 1 km inland. As with other categories the extent depends on wind, wave action and topography. The category will also be found inside industrial plants and can influence a distance of 1.5 km down wind of the plant.

(4) Very high is typical of offshore conditions and is found on the beachfront in regions of rough seas and surf beaches. It can extend inland for several hundred metres. It is also found in aggressive industrial areas with a pH of less than 5.

(5) All locations described in the table contain variations of greater corrosion severity. If significant, this must be addressed by designing for the most severe environment.

(6) In locations where metallic coatings are not a suitable form of corrosion protection, the roof sheeting must be of a type that has been designed and manufactured for such environments.

Table 7.2.2b: Acceptability of contact between different roofing materials – Stainless steel accessory or fastener

Cladding material	Atmosphere classification - Medium to very high as per Table 7.2.2a	Atmosphere classification - Low as per Table 7.2.2a
Copper and copper alloys	No	Yes
Stainless steel (300 series)	Yes	Yes
Zinc-coated steel and zinc	No	Yes
Zinc/aluminium coated steel	No	Yes

Cladding material	Atmosphere classification - Medium to very high as per Table 7.2.2a	Atmosphere classification - Low as per Table 7.2.2a
Aluminium/zinc (AZ) and aluminium/zinc/magnesium (AM) coated steel	No	Yes
Lead	Yes	Yes

Table Notes

(1) No — means the metal cannot be used in association with the other metal.

(2) Yes — means the metal can be used in association with the other metal.

Table 7.2.2c: Acceptability of contact between different roofing materials – Zinc-coated steel and zinc accessory or fastener

Cladding material	Atmosphere classification - Medium to very high as per Table 7.2.2a	Atmosphere classification - Low as per Table 7.2.2a
Copper and copper alloys	No	No
Stainless steel (300 series)	No	No
Zinc-coated steel and zinc	Yes	Yes
Zinc/aluminium coated steel	Yes	Yes
Aluminium/zinc (AZ) and aluminium/zinc/magnesium (AM) coated steel	Yes	Yes
Lead	No	Yes

Table Notes

(1) No — means the metal cannot be used in association with the other metal.

(2) Yes — means the metal can be used in association with the other metal.

Table 7.2.2d: Acceptability of contact between different roofing materials – Zinc/aluminium coated steel or aluminium/zinc (AZ) and aluminium/zinc/magnesium (AM) coated steel accessory or fastener

Cladding material	Atmosphere classification - Medium to very high as per Table 7.2.2a	Atmosphere classification - Low as per Table 7.2.2a
Copper and copper alloys	No	No
Stainless steel (300 series)	No	No
Zinc-coated steel and zinc	Yes	Yes
Zinc/aluminium coated steel	Yes	Yes
Aluminium/zinc (AZ) and aluminium/zinc/magnesium (AM) coated steel	Yes	Yes
Lead	No	No

Table Notes

(1) No — means the metal cannot be used in association with the other metal.

(2) Yes — means the metal can be used in association with the other metal.

Table 7.2.2e: Acceptability of contact between different roofing materials – Lead accessory or fastener

Cladding material	Atmosphere classification - Medium to very high as per Table 7.2.2a	Atmosphere classification - Low as per Table 7.2.2a
Copper and copper alloys	No	Yes
Stainless steel (300 series)	No	Yes
Zinc-coated steel and zinc	No	Yes
Zinc/aluminium coated steel	No	No
Aluminium/zinc (AZ) and aluminium/zinc/magnesium (AM) coated steel	No	No
Lead	Yes	Yes

Table Notes

(1) No — means the metal cannot be used in association with the other metal.

(2) Yes — means the metal can be used in association with the other metal.

Explanatory Information

To prevent corrosion due to adverse chemical reaction of materials used, 7.2.2(2) ensures that the metal roofing and other materials that come into contact with it, i.e. fasteners, *flashings* and cappings, etc. are compatible with each other.

7.2.3 Minimum pitches for metal sheet roofing profiles

[2019: 3.5.1.3]

Metal sheet roofing must comply with the minimum pitch requirements for the associated roof profile in accordance with Figure 7.2.3.

Figure 7.2.3: Minimum pitch requirements for metal roofing profiles

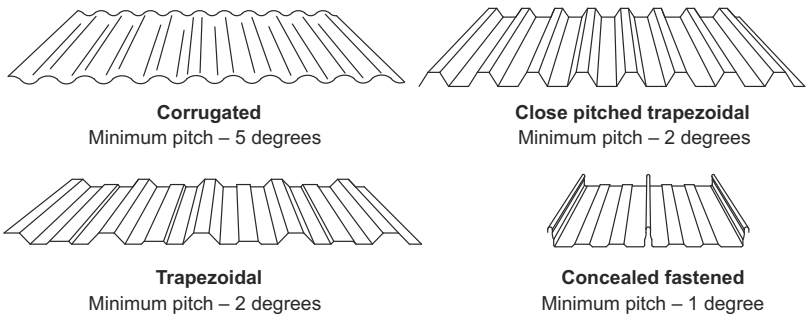


Figure Notes

(1) For minimum end lap requirements see 7.2.6(b)(ii).

(2) Consideration should be given to the drainage run off capacity of the roof sheeting when determining the minimum pitch and total length of the roof sheet.

7.2.4 Maximum spans

[2019: 3.5.1.4]

Metal sheet roofing must comply with the maximum span between roofing supports in accordance with Table 7.2.4 and

Figure 7.2.4.

Table 7.2.4: Maximum roofing spans between supports

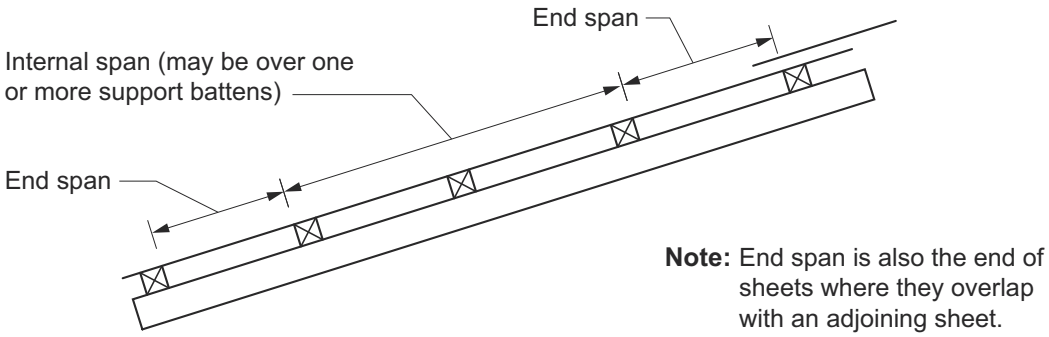
Sheet roofing profile	Sheet roofing base metal thickness (mm)	Max. end span (mm) Note 1	Max. internal span (mm) Note 1
Corrugated	0.42	900	1200
Close pitched trapezoidal	0.42	1800	2400
Trapezoidal	0.42	1300	1700
Concealed fasteners — narrow sheet	0.42	1750	2100
Concealed fasteners — wide sheet	0.48	1800	2100

Table Notes

(1) Refer to Figure 7.2.4 for determination of end span and internal spans.

(2) Thermal expansion - Maximum sheet run for pierced fixed metal roofing profiles must be not greater than 25 m when measured between the fasteners at the ends of the sheet.

Figure 7.2.4: Maximum spans for roofing between supports



7.2.5 Fixing of metal sheet roofing

[2019: 3.5.1.5]

Metal sheet roofing must—

(a) be either fixed through the roofing (crest fastening) or have concealed fasteners; and

(b) be fixed at spacings in accordance with Table 7.2.5; and

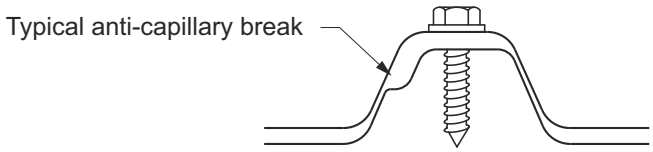
(c) use fixings of a compatible metal to the roof in accordance with Tables 7.2.2b, 7.2.2c, 7.2.2d and 7.2.2e; and

(d) when using both clipped and pierced fastening systems, employ an anti-capillary feature in the side lap of the sheet (see Figure 7.2.5).

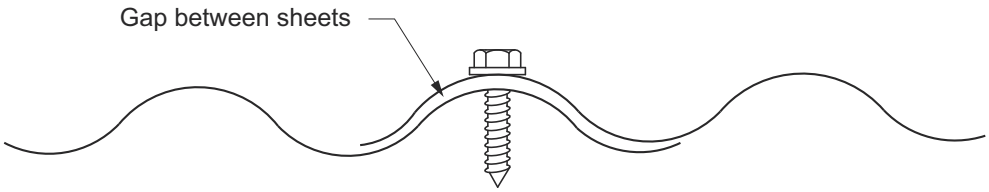
Table 7.2.5: Fixing requirements for sheet roofing

Sheet roofing profile	Fixing: End span	Fixing: Internal spans
Corrugated	Side lap and every second rib	Side lap and every third rib
Close pitched trapezoidal	Side lap and every second rib	Side lap and every third rib
Trapezoidal	Every rib	Every rib
Concealed fasteners	Every rib	Every rib

Figure 7.2.5: Side lap fastening detail



(a) Trapezoidal profile



(b) Corrugated profile

Explanatory Information

An anti-capillary feature in the side lap of the sheet is used to prevent capillary action drawing moisture into the lap and to allow the lap to drain. This can also be achieved by not over tightening the sheet fixing.

Wherever possible, consideration should be given to laying the metal sheet roofing so that the side lap is facing away from prevailing weather.

7.2.6 Installation of roofing sheets

[2019: 3.5.1.6]

Sheets must be—

(a) laid wherever possible using complete lengths from the fascia to ridge; or

(b) where a complete length cannot be laid—

  (i) each run must be laid from bottom to top before moving on to the next run (see Figure 7.2.6); and

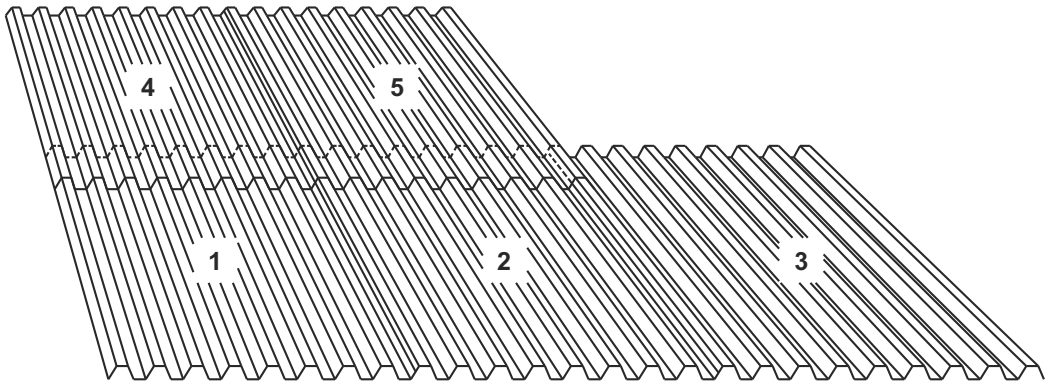
  (ii) the minimum end lap must be—

    (A) for roof slopes above 15 degrees (1:4) – 150 mm; and

    (B) for roof slopes between 5–15 degrees (1:12-1:4) – 200 mm; and

(c) stop ended (i.e. each valley turned up 60 degrees) at the ridge line of each length.

Figure 7.2.6: Sheet laying sequence



7.2.7 Flashings and cappings

[2019: 3.5.1.7]

(1) Sheet metal roof *flashings* and cappings must comply with the following:

(a) Roof *flashings* and cappings must be purpose made, machine-folded sheet metal sections of material compatible with all up and downstream metal roof covering materials in accordance with 7.2.2(2).

(b) The type of fasteners for *flashing* and cappings must comply with 7.2.5.

(c) The fastener and fixing frequency for *flashings* and cappings must comply with Table 7.2.7.

(d) Joints in *flashings* and cappings must be not less than 75 mm, lapped in the direction of the fall of the roof, and fastened at intervals not more than 40 mm.

(e) Wall and step *flashings* must be fastened into masonry walls with galvanized or zinc/aluminium sheet metal wedges at each end of each length and at intermediate intervals of not more than 500 mm and must overlap by not less than 75 mm in the direction of flow.

(f) Lead *flashings* must not be used with prepainted steel or zinc/aluminium steel or on any roof if the roof is part of a *drinking water* catchment area.

(g) Anti-capillary breaks must be installed in accordance with Figure 7.2.7a and be—

(i) for flat surfaces – 10 mm/30 degree fold; and

(ii) all other surfaces – 10 mm/90 degree or 135 degree fold.

(h) Acceptable *flashing* configurations are shown in Figure 7.2.7b and Figure 7.2.7c.

(2) *Flashing* of penetrations must comply with the following:

(a) Collar *flashings* must permit the total drainage of the area above the penetration.

(b) On completion of installation, the roof structure must be restored to its original strength by installing roof trimmers and soaker supports as necessary.

(c) The type of fasteners for *flashings* and cappings must comply with 7.2.5.

(d) Lead *flashings* must not be used with prepainted steel or zinc/aluminium steel or on any roof if the roof is part of a *drinking water* catchment area.

(e) Acceptable *flashings* for penetrations are shown in Figure 7.2.7d, Figure 7.2.7e and Figure 7.2.7f.

(f) Clearance for heating appliance roof support members must be in accordance with Part 12.4.

Table 7.2.7: Fastener frequency for flashings and cappings

Roof type	Fixing frequency	Fastener type
Concealed fastener roofs	Every rib	Rivets and self-drilling screws
Pierced fastener roofs	Every second rib	Self-drilling screws or rivets
Corrugated roofs	Every fourth rib	Self-drilling screws or rivets

Figure 7.2.7a: Anti-capillary breaks

(a) Roof capping **(b) Fascia flashing**

Figure 7.2.7b: Parapet flashing—Acceptable flashing details

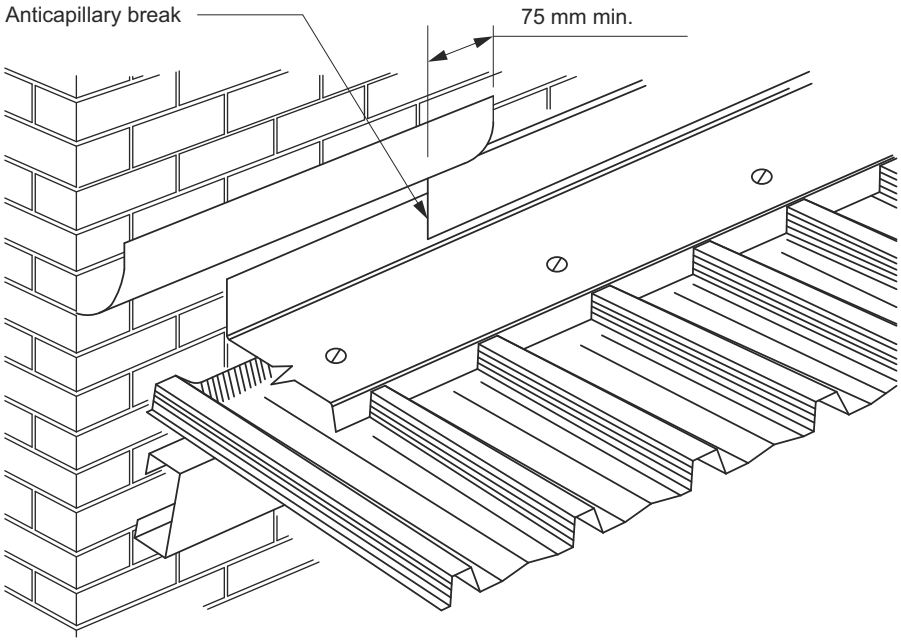


Figure 7.2.7c: Parapet and end wall flashing—Acceptable flashing details

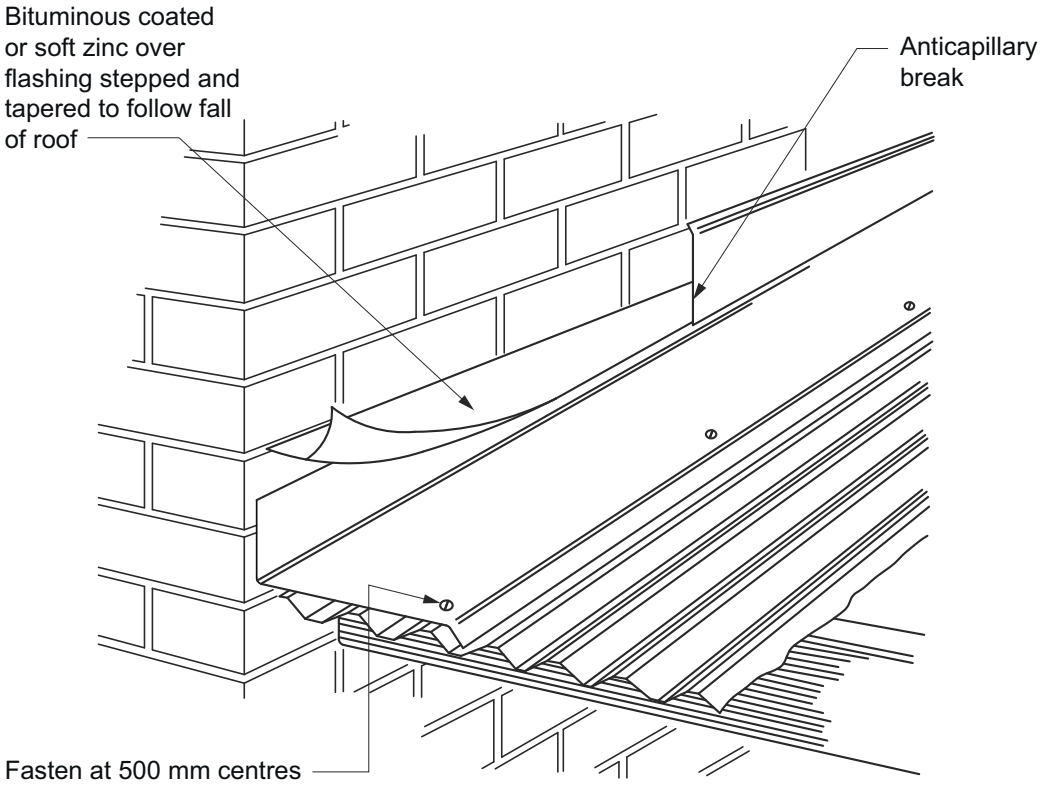


Figure 7.2.7d: PVC aprons—Typical roof penetration flashing details

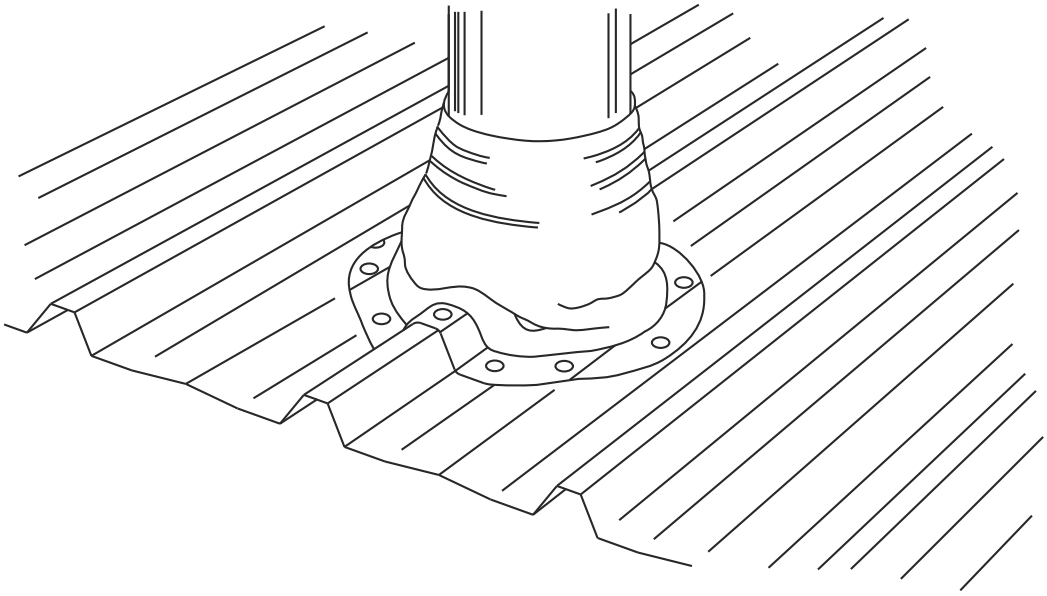


Figure 7.2.7e: Collar flashings—Typical roof penetration flashing details

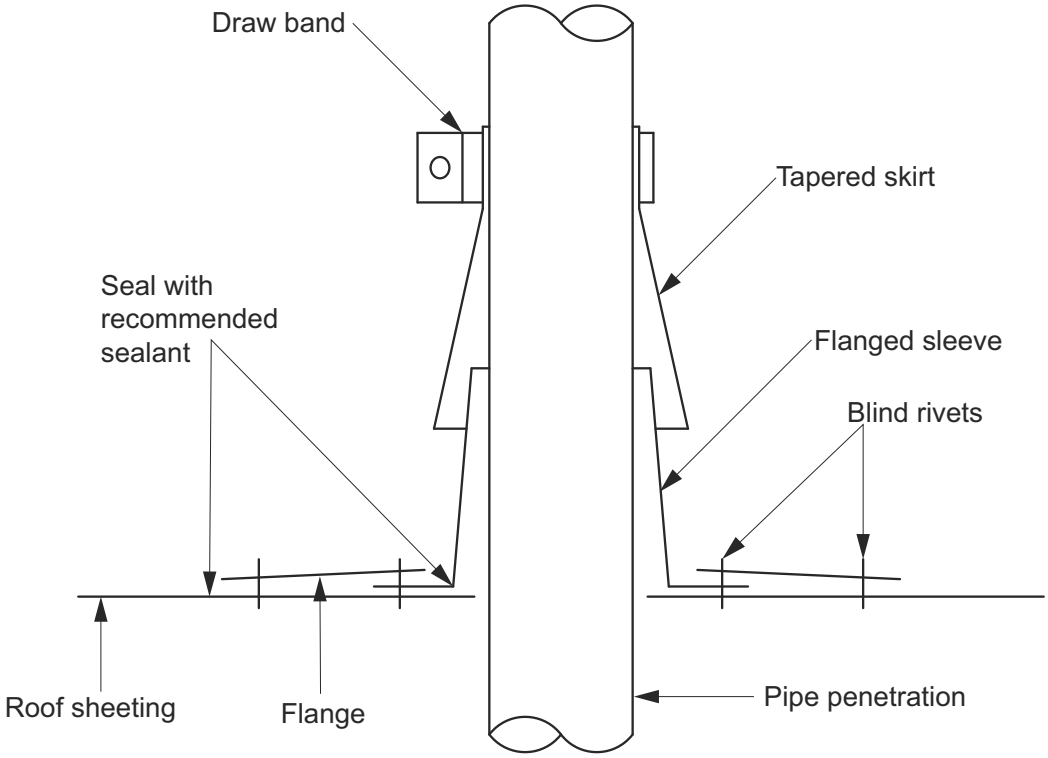
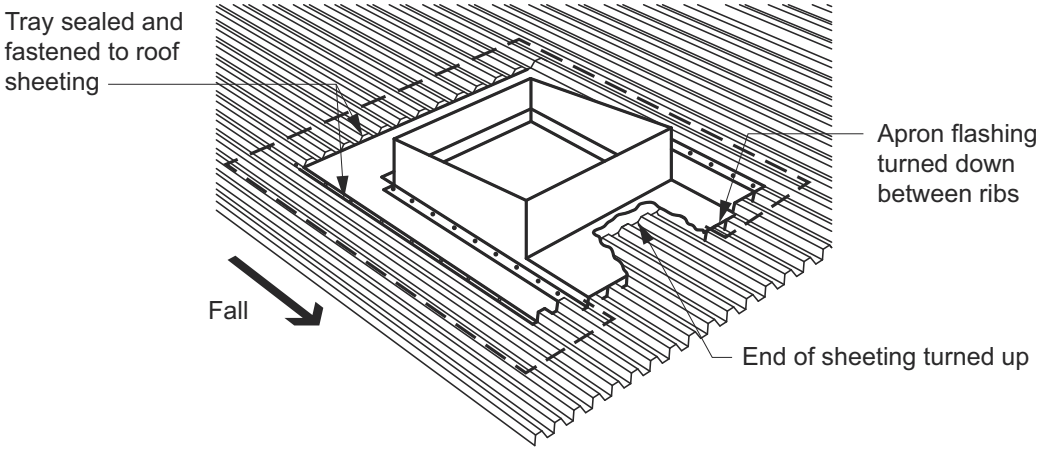


Figure 7.2.7f: Large penetrations using apron—typical roof penetration flashing details



7.2.8 Water discharge

[2019: 3.5.1.8]

Where an eaves gutter is provided in accordance with H2D6(1), sheets must overhang the fascia, or end batten where there is no fascia, by not less than 50 mm.

Part 7.3 Roof tiles and shingles

7.3.1 Application

[New for 2022]

(1) Part 7.3 applies subject to the limitations set out in H1D7.

(2) Part 7.3 need not be complied with if H1D7(3)(a) or (b) are complied with.

Explanatory Information: Design wind speeds

Information on *design wind speeds* for particular areas may be available from the *appropriate authority*. Also see the table associated with the definition of '*design wind speed*' for wind classes. A map indicating wind regions of Australia is contained in Part 2.2.

Explanatory Information: Other relevant roof tile requirements

In addition to the requirements of this Part, requirements for roof tiles also exist in NCC Volume Two and other Parts of the ABCB Housing Provisions. They include the following:

- For the sizing and fixing of roof battens - NCC Volume Two H1D6(3) (steel battens) and H1D6(4) (timber battens).
- For sheet roofing over a *separating wall* - ABCB Housing Provisions Part 9.3.
- For gutters and downpipes - ABCB Housing Provisions Part 7.4.

7.3.2 Fixing of roof tiles and ancillaries

[2019: 3.5.2.2]

(1) Roof tiles and hip, ridge, barge and capping tiles must be fixed in accordance with Table 7.3.2 and Figure 7.3.2a, Figure 7.3.2b, Figure 7.3.2c, Figure 7.3.2d and Figure 7.3.2e.

(2) Fixing *required* by Table 7.3.2 must consist of one or a combination of the following:

(a) Galvanized clout nails with a minimum diameter of 2.8 mm and of a length so that the nail will penetrate not less than 15 mm into the batten.

(b) Self embedding head screws of 8-18 gauge and of a length so that the screw will penetrate not less than 15 mm into the batten.

(c) Purpose made clips of non-ferrous metal, stainless steel or steel protected from corrosion in accordance with Tables 7.2.2b, 7.2.2c and 7.2.2d.

(d) Flexible pointing material complying with AS 2050.

Table 7.3.2: Minimum fixing requirements

Wind class	Tile fixing - edge of roof	Tile fixing - field of roof	Ridge, hip, barge and valley tiles including capping (see Figure 7.3.2d and 7.3.2e)
N1 and N2	Fix every full tile in second course in from the edge of roof.	In field of roof fix every second tile in every course, or every tile in each alternative course. (see Figure 7.3.2b)	Fix each tile
N3	Fix each full tile in every second course starting from the second course in (see Figure 7.3.2c)	Fix every second full tile in every course (see Figure 7.3.2c)	Fix each tile

Table Notes

Refer to Figure 7.3.2a for determination of 'edge of roof' and 'field of roof'.

Figure 7.3.2a: Fixing of tile requirements — Identification of field and edge of roof

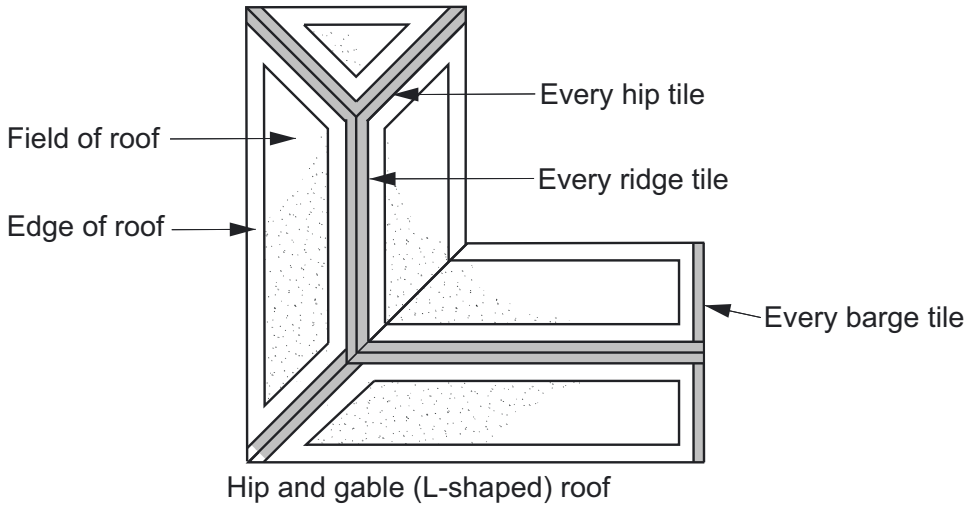


Figure 7.3.2b: Fixing of tile requirements — Minimum tile fixing requirements - Wind class N1/N2

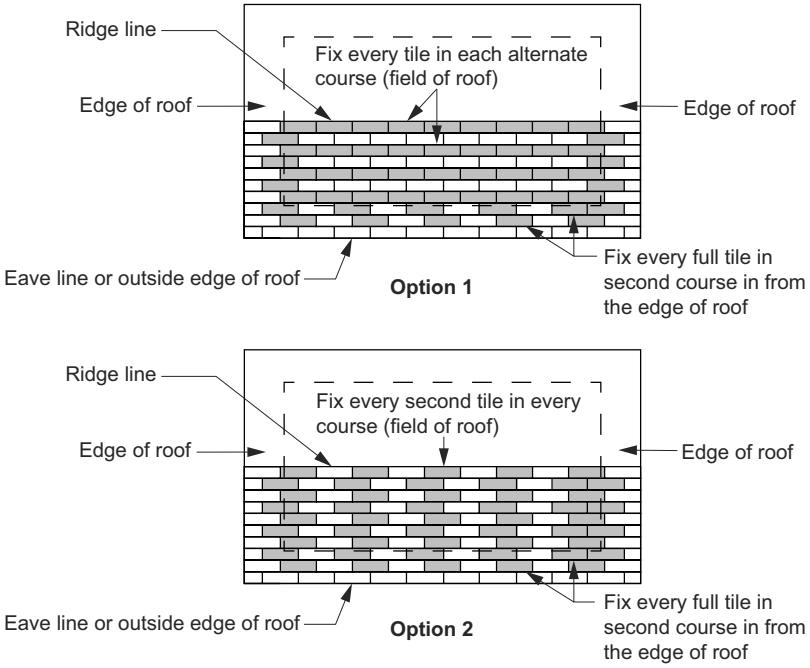


Figure 7.3.2c: Fixing of tile requirements — Minimum tile fixing requirements N3

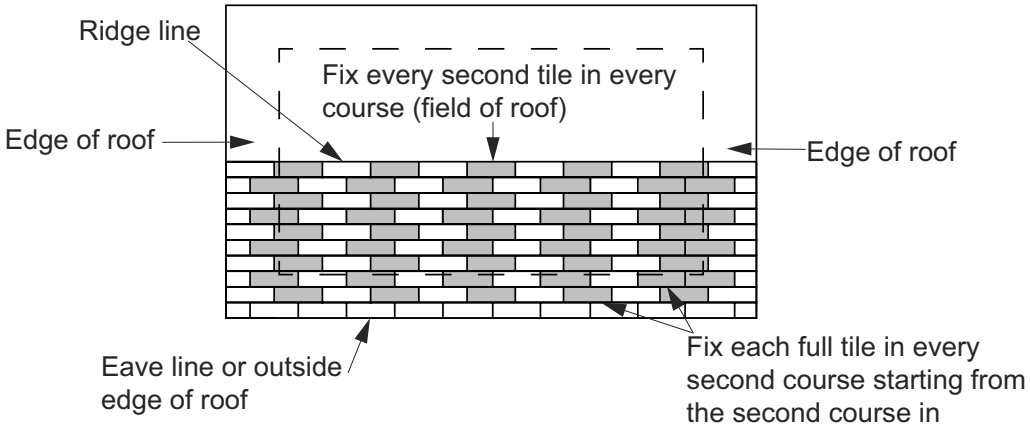


Figure 7.3.2d: Fixing of ridge capping — ridge clip fixing

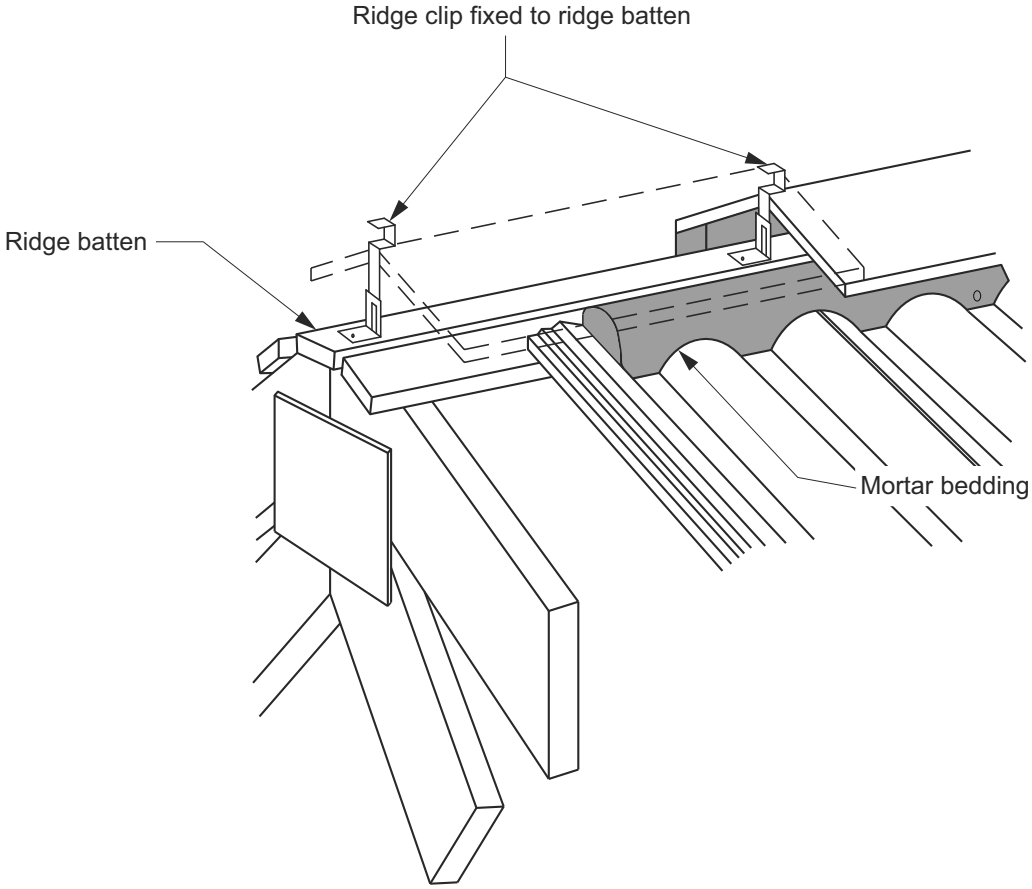
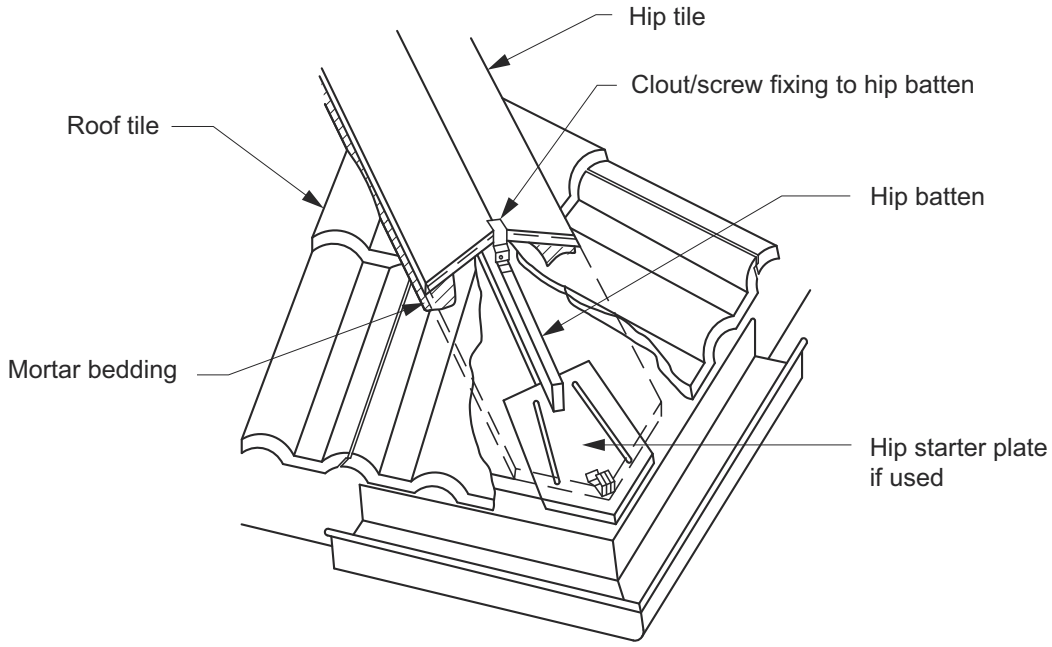


Figure 7.3.2e: Fixing of hip capping — clout or screw fixing



Explanatory Information

For the purposes of Figures 7.3.2a, 7.3.2b and 7.3.2c, 'edge of roof' is a 1.2 m wide band bounded by the eaves, hips and barge measured toward the 'ridge of roof'.

7.3.3 Flashing

[2019: 3.5.2.3]

(1) *Flashing* for roof tiles must comply with (2) to (7).

(2) Wall and step *flashings*:

- (a) For masonry or similar walls, *flashing* must—
  - (i) follow the roof line, allowing not less than 75 mm upturn to the wall and a minimum of 150 mm in width and moulded into the tiles; and
  - (ii) have a horizontal overflashing, stepped overflashing or raked overflashing built into the masonry leaf or veneer, except that one continuous *flashing* may be used as both an apron *flashing* or an overflashing; and
  - (iii) have joints overlap the one below by not less than 75 mm in the direction of flow.
- (b) For *flashing* where the upturn can be fixed to or behind the supporting frame or cladding, it must—
  - (i) follow the roof line, allowing not less than 75 mm upturn to the wall and a minimum of 150 mm in width and moulded into the tiles; and
  - (ii) be fastened into or behind the wall cladding at each end and at a maximum of 600 mm centres; and
  - (iii) have joints overlap the one below by not less than 75 mm in the direction of flow.

(3) *Flashing* of penetrations must—

- (a) be either collar, apron or other purpose made *flashings*; and
- (b) have a minimum upturn on the penetration of not less than 75 mm and a minimum of 150 mm in width surrounding the penetration and be moulded into the tiles; and
- (c) permit the total drainage of the area above the penetration.

(4) Joints in *flashing* must be not less than 75 mm and lapped in the direction of fall of the roof.

(5) Fixings for *flashings* must be compatible with the *flashing* material.

(6) Lead *flashings* must not be used on any roof that is part of a *drinking water* catchment area.

(7) Acceptable *flashing* configurations, including typical details for standard, and bedded and pointed valleys, are shown in Figures 7.3.3a, 7.3.3b, 7.3.3c, 7.3.3d, 7.3.3e, 7.3.3f and 7.3.3g.

Figure 7.3.3a: Flashing abutting a masonry wall

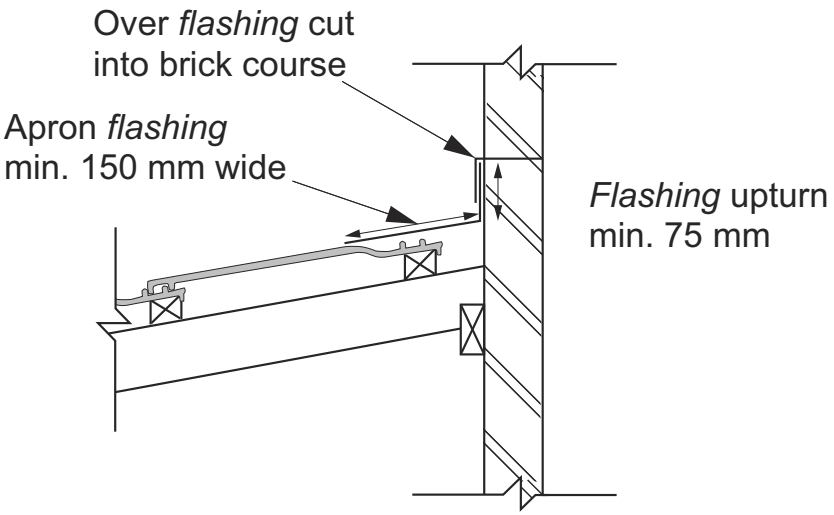


Figure 7.3.3b: Flashing abutting a weatherboard wall or similar cladding

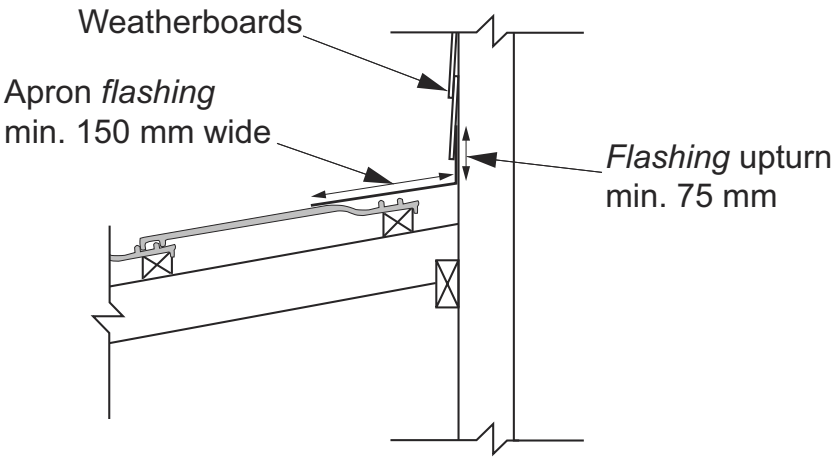


Figure 7.3.3c: Stepped flashing to a masonry wall

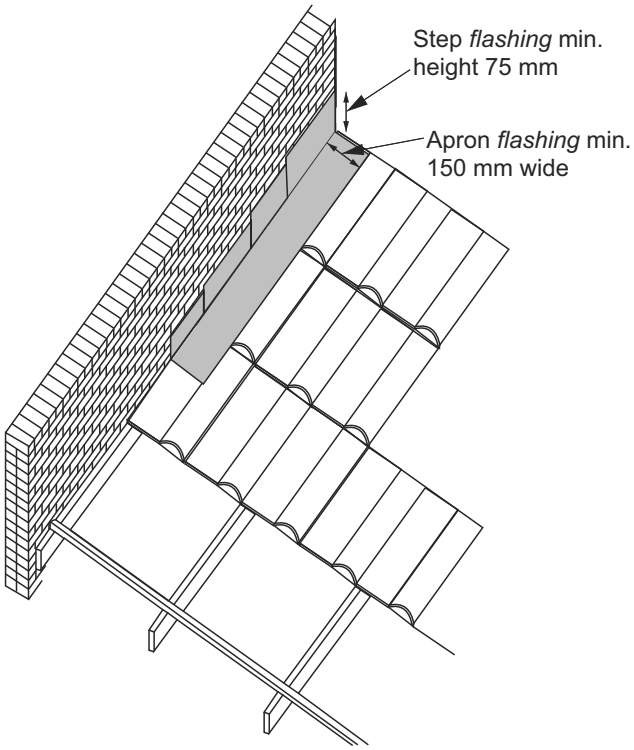


Figure 7.3.3d: Pipe penetration flashing

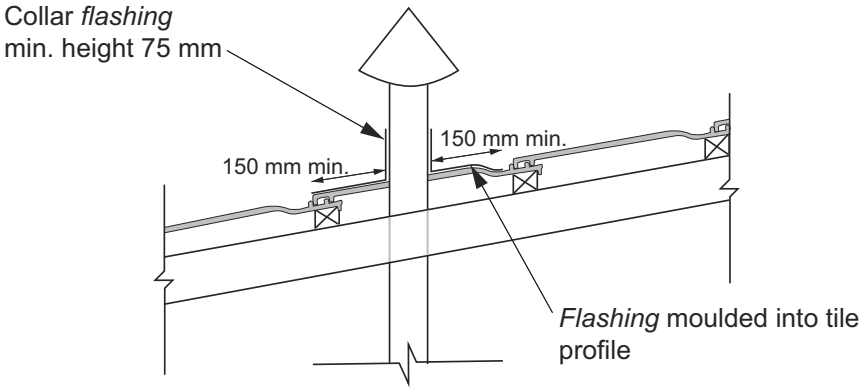


Figure 7.3.3e: Chimney flashing

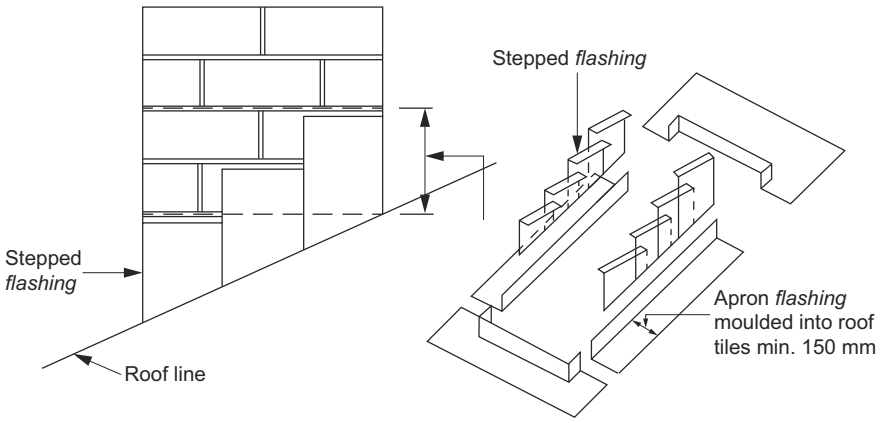


Figure 7.3.3f: Standard valley

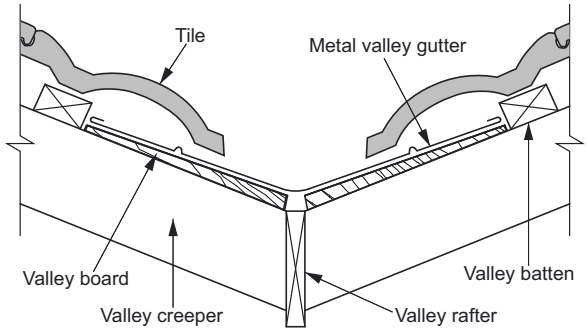
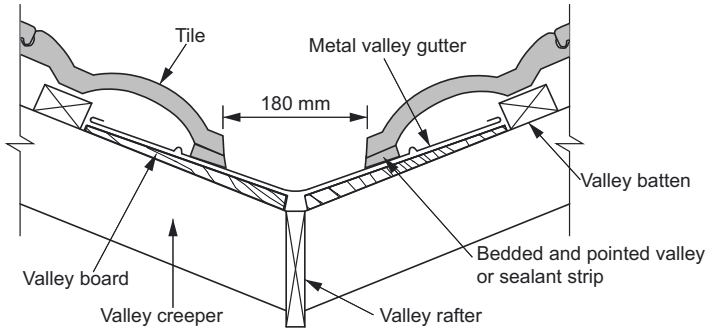


Figure 7.3.3g: Bedded and pointed valley for high rainfall areas (refer definition of low rainfall intensity area)



7.3.4 Sarking

[2019: 3.5.2.4]

Sarking must—

(a) be provided in accordance with Table 7.3.4; and

(b) comply with AS 4200.1 and be installed with—

(i) each adjoining sheet or roll being—

(A) overlapped not less than 150 mm; or

(B) taped together; and

(ii) sarking fixed to supporting members at not more than 300 mm centres; and

(iii) no sags more than 40 mm in the sarking.

Table 7.3.4: Sarking requirements for tiled roofs

Roof pitch	Maximum rafter/truss top chord length without sarking (mm) Note 1
<18°	N/A Note 2
≥18° <20°	4 500
≥20° <22°	5 500
≥22°	6 000

Table Notes

(1) The maximum rafter/truss top chord length is measured from the topmost point of the rafter/truss i.e. the apex downwards. Where the maximum length is exceeded, sarking must be installed over the remainder of the rafter/truss top chord length towards the eave line of the roof, or equivalent where the building has no eaves.

(2) All tiled roofs with a pitch less than 18 degrees must be provided with sarking, regardless of rafter/truss chord length.

Explanatory Information

Where sarking is also provided as *reflective insulation* for the purpose of energy efficiency, Section 13 of the ABCB Housing Provisions contains *required R-Values* and the necessary airspaces adjoining the *reflective insulation*.

7.3.5 Anti-ponding device/board

[2019: 3.5.2.5]

(1) An anti-ponding device/board must be provided where sarking is installed on—

(a) roofs with a pitch less than 20°; and

(b) roofs with no eaves overhang, regardless of the roof pitch.

(2) An anti-ponding device *required* by (1) must be *water resistant* and fixed along the eaves line from the top of the fascia back up the rafter with a clearance of approximately 50 mm below the first batten (See Figure 7.3.5).

Figure 7.3.5: Typical installation of anti-ponding device/board

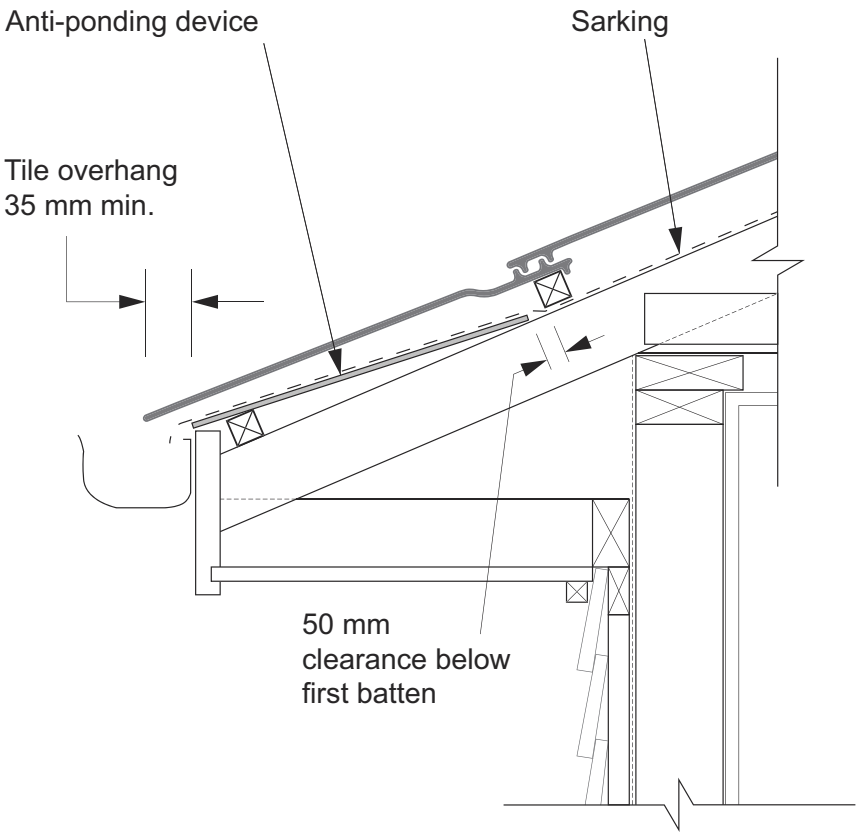


Figure Notes

(1) Sarking is *required* by 7.3.4.

(2) Anti-ponding device is *required* by 7.3.5.

7.3.6 Water discharge

[2019: 3.2.5.6]

Where an eaves gutter is provided in accordance with H2D6(1), tiles must overhang the fascia or tiling batten by not less than 35 mm (See Figure 7.3.5).

Part 7.4 Gutters and downpipes

7.4.1 Application

[New for 2022]

(1) Part 7.4 applies subject to H2D6(2) and the limitations set out in H2D6(3).

(2) Part 7.4 need not be complied with if H2D6(1)(a) is complied with.

Explanatory Information

- The requirement to install drainage systems from roofs and sub-soil drains should be confirmed with the *appropriate authority*. These provisions need only be applied when drainage systems are necessary.
- Information on drainage requirements outside the allotment can be obtained from the *appropriate authority*.
- Where box gutters are proposed to be installed, AS/NZS 3500.3 may be used to calculate minimum sizes, falls and overflow requirements.
- For Class 10 buildings, it may not be necessary to comply with the requirements for removing *surface water* where the Class 10 building is not connected to or does not impact a Class 1 building. For example, where a Class 10 garage is attached to a Class 1 dwelling, the run-off from the garage would most likely directly impact the dwelling and therefore be *required* to be removed. However, a garage that is separated by a reasonable distance from the dwelling so as to not have an impact would not necessarily have to comply with the requirements for removal of surface water.
- The following are a number of other Clauses and Parts of the ABCB Housing Provisions that contain requirements related to drainage and roofing in addition to the provisions of this Part:
  - 7.5.8 for parapet cappings.
  - 7.3.6 for water discharge.
  - 7.2.7 for *flashings* and cappings as they relate to penetrations through roofs.
  - Part 3.3 for *drainage*.

Explanatory Information: Design of stormwater drainage systems

Stormwater drainage systems specified in the NCC Volume Two and the ABCB Housing Provisions are not designed to remove all water to an appropriate outfall during exceptionally heavy rain, particularly in tropical areas. Specifically, eaves gutter systems are designed to remove water arising from rainfall events with an *annual exceedance probability* of 5% provided they are not blocked.

Accordingly, it is necessary to design and install the system to incorporate overflow measures so that when overflowing occurs, during a rainfall event with an *annual exceedance probability* of up to 1%, any water is directed away in a manner which ensures it does not pond against, enter or damage the building, even if the stormwater drainage system is blocked.

Insufficient and poorly located downpipes are a frequent cause of poor roof drainage system performance. The installation of downpipes, especially near valley gutters, is designed to ensure rainwater from areas on the roof that have concentrated water flows is adequately removed.

Particular consideration needs to be given to box gutters, valley gutters etc. located above the internal areas of a building. There are several options available to designers using the requirements of NCC Volume Two and the ABCB Housing Provisions. The designer will need to choose an overflow system that will cope with the rainfall intensity for the particular location. Consideration needs to be given to the total capacity of overflow measures on lower level roofs where overflow measures adopted for a higher roof catchment will result in overflow to a lower one. Overflow discharge onto lower roofs may also require consideration of sarking, flashing and other weatherproofing precautions to the lower roof area.

The acceptable overflow measures in Table 7.4.4a and Table 7.4.4b were calculated using the following formulas:

- For continuous slots or rainhead:

$$Q = C_d A\sqrt{2gh}$$

where—

A = Area (m^2)

C_d = Discharge coefficient = 0.61

g = Gravity = 9.81 m/s^2

h = Effective head (m)

Q = Flow rate (m^3/s)

- For front face weir, end stop weir, inverted nozzle, front bead or controlled gap:

$$Q = 0.67 C_d b\sqrt{2g}\, h^{1.5}$$

where—

b = Width (m)

C_d = Discharge coefficient = 0.63

g = Gravity = 9.81 m/s^2

h = Effective head (m)

Q = Flow rate (m^3/s)

7.4.2 Materials

[2019: 3.5.3.2]

Gutters, downpipes and *flashings* must—

(a) be manufactured in accordance with AS/NZS 2179.1 for metal components; and

(b) be manufactured in accordance with AS 1273 for UPVC components; and

(c) be compatible with all upstream roofing materials in accordance with 7.2.2(2); and

(d) not contain any lead if used on a roof forming part of a *drinking water* catchment area.

7.4.3 Selection of guttering

[2019: 3.5.3.3]

The size of guttering must—

(a) for eaves gutters, be in accordance with Table 7.4.3a, Table 7.4.3b and Table 7.4.3c; and

(b) be suitable to remove rainwater falling at the appropriate 5 minute duration rainfall intensity listed in Table 7.4.3d as follows—

(i) for eaves gutters — 5% *annual exceedance probability*; and

(ii) for eaves gutter overflow measures — 1% *annual exceedance probability*.

Table 7.4.3a: Size of gutter required to drain roof catchment area into one (1) downpipe for various rainfall intensities and roof catchment areas (A, B, C, D, E and F defined in Table 7.4.3b)

Design rainfall intensity (mm/h) (as per Table 7.4.3d)	Roof catchment area per downpipe — 30 m^2	Roof catchment area per downpipe — 40 m^2	Roof catchment area per downpipe — 50 m^2	Roof catchment area per downpipe — 60 m^2	Roof catchment area per downpipe — 70 m^2
90 mm/h	A or C	A or C	A or C	A or C	A or C

Design rainfall intensity (mm/h) (as per Table 7.4.3d)	Roof catchment area per downpipe — 30 m^2	Roof catchment area per downpipe — 40 m^2	Roof catchment area per downpipe — 50 m^2	Roof catchment area per downpipe — 60 m^2	Roof catchment area per downpipe — 70 m^2
120 mm/h	A or C	A or C	A or C	A or C	A or D
140 mm/h	A or C	A or C	A or C	A or D	B or E
160 mm/h	A or C	A or C	A or C	A or E	B or E
175 mm/h	A or C	A or C	A or D	B or E	E
200 mm/h	A or C	A or C	A or D	B or E	F
225 mm/h	A or C	A or C	A or B	E	F
255 mm/h	A or C	A or D	B or E	E	F
275 mm/h	A or C	A or D	B or E	F	F
325 mm/h	A or C	B or E	F	F	F
425 mm/h	A or C	E	F	F	F

Table 7.4.3b: Gutter sizes for various rainfall intensities

Gutter type	Gutter description	Minimum cross-sectional area (mm^2)
A	Medium rectangular gutter	6500
B	Large rectangular gutter	7900
C	115 mm D gutter	5200
D	125 mm D gutter	6300
E	150 mm D gutter	9000
F	Gutter must be designed in accordance with AS/NZS 3500.3	N/A

Table 7.4.3c: Downpipe selection for gutter types (A, B, C, D, E and F defined in Table 7.4.3b)

Downpipe section	Gutter type A	Gutter type B	Gutter type C	Gutter type D	Gutter type E
75 mm dia.	Yes	Yes	Yes	Yes	No
100 mm x 50 mm	Yes	Yes	Yes	Yes	Yes
90 mm dia.	Yes	Yes	Yes	Yes	Yes
100 mm x 75 mm	Yes	Yes	Yes	Yes	Yes

Table Notes

(1) Yes — downpipe is suitable for the eaves gutter selection.

(2) No — downpipe is not suitable for the eaves gutter selection.

Table 7.4.3d: 5 minute duration rainfall intensities

State	Locality	*Annual exceedance probability*, 5% (mm/h)	*Annual exceedance probability*, 1% (mm/h)
ACT	Canberra	143	192
ACT	Gungahlin	137	179
ACT	Tuggeranong	148	210
NSW	Albury	139	180
NSW	Broken Hill	142	217
NSW	Goulburn	120	154
NSW	Kiama	225	320

State	Locality	*Annual exceedance probability*, 5% (mm/h)	*Annual exceedance probability*, 1% (mm/h)
NSW	Newcastle	225	316
NSW	Orange	141	186
NSW	Sydney	201	262
NSW	Avalon, Sydney	210	287
NSW	Campbelltown, Sydney	166	223
NSW	Penrith, Sydney	178	240
NSW	Windsor, Sydney	175	234
NSW	Tweed Heads	252	332
NSW	Wollongong	218	311
NT	Alice Springs	165	239
NT	Darwin	233	274
NT	Katherine	216	250
QLD	Bamaga	252	298
QLD	Brisbane	236	306
QLD	Ipswich, Brisbane	211	278
QLD	Victoria Point, Brisbane	245	320
QLD	Bundaberg	266	339
QLD	Cairns	230	279
QLD	Cloncurry	219	278
QLD	Innisfail	248	302
QLD	Mackay	250	315
QLD	Mt Isa	201	262
QLD	Noosa Heads	258	332
QLD	Rockhampton	229	300
QLD	Toowoomba	203	268
QLD	Townsville	235	300
QLD	Weipa	238	281
SA	Adelaide	120	174
SA	Gawler, Adelaide	111	158
SA	Mt Gambier	103	144
SA	Murray Bridge	120	177
SA	Port Augusta	133	199
SA	Port Pirie	123	183
SA	Yorketown	155	166
TAS	Burnie	128	178
TAS	Flinders Island	124	167
TAS	Hobart	86	120
TAS	Launceston	91	123
TAS	Queenstown	94	120
TAS	St. Marys	150	207
VIC	Ballarat	134	192
VIC	Benalla	146	194
VIC	Geelong	103	143

State	Locality	*Annual exceedance probability*, 5% (mm/h)	*Annual exceedance probability*, 1% (mm/h)
VIC	Horsham	121	173
VIC	Lakes Entrance	145	199
VIC	Melbourne	132	187
VIC	Hastings, Melbourne	112	145
VIC	Sorrento, Melbourne	106	140
VIC	Mildura	142	219
VIC	Stawell	130	187
WA	Albany	127	179
WA	Broome	232	287
WA	Bunbury	147	198
WA	Derby	211	256
WA	Geraldton	138	194
WA	Kalgoorlie	136	204
WA	Perth	129	172
WA	Joondalup, Perth	133	180
WA	Midland, Perth	122	164
WA	Port Hedland	168	232
WA	Tom Price	138	182

Table Notes

Locations used in this table are based on the nearest Bureau of Meteorology grid cell latitude and longitude to the central Post Office of each city or town.

Explanatory Information

The cross sectional area referred to in Table 7.4.3b is measured up to the lowest part of the relevant overflow facility including the lower edge of a slot, gutter back, end-stop weir, inverted nozzle, front-face weir or overflow opening in a rainhead.

Explanatory Information: Worked example — determining appropriate overflow measures

The location of a proposed building is in Wollongong, NSW. Using Table 7.4.3d the 5 minute duration rainfall intensity for a 1% *annual exceedance probability* is 311 mm/h. The 5 minute duration rainfall intensities in Table 7.4.4a and Table 7.4.4b are provided in 25 mm/h increments, therefore for the purpose of the worked example 325 mm/h will be used.

Table 7.4.4a and Table 7.4.4b provide *required* overflow volumes in both litres per second for dedicated overflow measures and litres per second per metre for continuous overflow measures. Extrapolation of the values in these tables can be used to inform a *Performance Solution* complying with the Governing Requirements of the NCC. Where both dedicated and continuous measures are proposed, Table 7.4.4b can be used to determine the *required* overflow volume.

(1) Multiple overflow measures are proposed to be used with a roof catchment area of 60 m^2, incorporating a 10 m eaves gutter.

(2) Using Table 7.4.4b for a 325 mm/h 5 minute duration rainfall intensity, the overflow volume in litres per second (L/s) for a roof catchment area of 60 m^2 is 5.4 L/s.

(3) Select an acceptable dedicated overflow measure from 7.4.7.

  (a) The selected dedicated overflow measure is an end-stop weir which provides 0.5 L/s.

  (b) One end-stop weir does not achieve the *required* overflow volume of 5.4 L/s, and additional overflow measures are *required* to remove the overflow volume.

(4) To achieve the *required* overflow volume a continuous overflow measure is also selected from 7.4.6.

  (a) A front face slotted gutter is the selected overflow measure as it provides 0.5 L/s/m.

(b) Taking account of the eaves gutter length (10 m), the combined overflow measures (0.5 L/s for the end-stop weir and 0.5 L/s/m × 10 m) will remove up to 5.5 L/s.

(5) The 5.5 L/s capacity provided by the selected overflow measures exceeds the *required* 5.4 L/s overflow volume.

7.4.4 Installation of gutters

[2019: 3.5.3.4]

(1) Eaves gutters must be—

(a) installed with a fall of not less than 1:500; and

(b) supported by brackets securely fixed at stop ends, corners and at not more than 1.2 m centres; and

(c) fitted with overflow measures capable of removing the overflow volume specified in Table 7.4.4a and Table 7.4.4b.

(2) Overflow measures in accordance with 7.4.6 and 7.4.7 are deemed to be capable of removing the overflow volume specified in those provisions.

(3) Where the overflow volume values for ridge-to-gutter lengths in Table 7.4.4a and roof catchment areas in Table 7.4.4b are not stated, interpolation may be used to determine the applicable overflow values.

(4) Valley gutters must—

(a) be installed on a roof with a pitch more than 12.5 degrees; and

(b) have dimensions in accordance with Table 7.4.4c for the relevant rainfall intensity; and

(c) have minimum freeboard of not less than 15 mm; and

(d) have a side angle of not less than 12.5 degrees.

(5) The requirement of (1)(c) does not apply to eaves gutters fixed to a verandah or an eave that is greater than 450 mm in width, which—

(a) has no lining; or

(b) is a raked verandah or a raked eave with a lining sloping away from the building.

Table 7.4.4a: Overflow volume for continuous measure (L/s/m)

Design 5 minute duration rainfall intensity (mm/h) (from Table 7.4.3d)	Ridge to gutter length — 2 m	Ridge to gutter length — 4 m	Ridge to gutter length — 6 m	Ridge to gutter length — 8 m	Ridge to gutter length — 10 m	Ridge to gutter length — 12 m	Ridge to gutter length — 14 m	Ridge to gutter length — 16 m
150 mm/h	0.08 L/s/m	0.17 L/s/m	0.25 L/s/m	0.33 L/s/m	0.42 L/s/m	0.50 L/s/m	0.58 L/s/m	0.67 L/s/m
175 mm/h	0.10 L/s/m	0.19 L/s/m	0.29 L/s/m	0.39 L/s/m	0.49 L/s/m	0.58 L/s/m	0.68 L/s/m	0.78 L/s/m
200 mm/h	0.11 L/s/m	0.22 L/s/m	0.33 L/s/m	0.44 L/s/m	0.56 L/s/m	0.67 L/s/m	0.78 L/s/m	0.89 L/s/m
225 mm/h	0.13 L/s/m	0.25 L/s/m	0.38 L/s/m	0.50 L/s/m	0.63 L/s/m	0.75 L/s/m	0.88 L/s/m	1.0 L/s/m
250 mm/h	0.14 L/s/m	0.28 L/s/m	0.42 L/s/m	0.56 L/s/m	0.69 L/s/m	0.83 L/s/m	0.97 L/s/m	1.1 L/s/m
275 mm/h	0.15 L/s/m	0.31 L/s/m	0.46 L/s/m	0.61 L/s/m	0.76 L/s/m	0.92 L/s/m	1.1 L/s/m	1.2 L/s/m
300 mm/h	0.17 L/s/m	0.33 L/s/m	0.50 L/s/m	0.67 L/s/m	0.83 L/s/m	1.0 L/s/m	1.2 L/s/m	1.3 L/s/m
325 mm/h	0.18 L/s/m	0.36 L/s/m	0.54 L/s/m	0.72 L/s/m	0.90 L/s/m	1.1 L/s/m	1.3 L/s/m	1.4 L/s/m
350 mm/h	0.19 L/s/m	0.39 L/s/m	0.58 L/s/m	0.78 L/s/m	0.97 L/s/m	1.2 L/s/m	1.4 L/s/m	1.6 L/s/m
375 mm/h	0.21 L/s/m	0.42 L/s/m	0.63 L/s/m	0.83 L/s/m	1.0 L/s/m	1.3 L/s/m	1.5 L/s/m	1.7 L/s/m
400 mm/h	0.22 L/s/m	0.44 L/s/m	0.67 L/s/m	0.89 L/s/m	1.1 L/s/m	1.3 L/s/m	1.6 L/s/m	1.8 L/s/m

Table 7.4.4b: Overflow volume for dedicated measure (L/s)

Design 5 minute duration rainfall intensity (mm/h) (from Table 7.4.3d)	Roof catchment area — 30 m^2	Roof catchment area — 40 m^2	Roof catchment area — 50 m^2	Roof catchment area — 60 m^2	Roof catchment area — 70 m^2
150 mm/h	1.3 L/s	1.7 L/s	2.1 L/s	2.5 L/s	2.9 L/s
175 mm/h	1.5 L/s	1.9 L/s	2.4 L/s	2.9 L/s	3.4 L/s
200 mm/h	1.7 L/s	2.2 L/s	2.8 L/s	3.3 L/s	3.9 L/s
225 mm/h	1.9 L/s	2.5 L/s	3.1 L/s	3.8 L/s	4.4 L/s
250 mm/h	2.1 L/s	2.8 L/s	3.5 L/s	4.2 L/s	4.9 L/s
275 mm/h	2.3 L/s	3.1 L/s	3.8 L/s	4.6 L/s	5.3 L/s
300 mm/h	2.5 L/s	3.3 L/s	4.2 L/s	5.0 L/s	5.8 L/s
325 mm/h	2.7 L/s	3.6 L/s	4.5 L/s	5.4 L/s	6.3 L/s
350 mm/h	2.9 L/s	3.9 L/s	4.9 L/s	5.8 L/s	6.8 L/s
365 mm/h	3.1 L/s	4.2 L/s	5.2 L/s	6.3 L/s	7.3 L/s
400 mm/h	3.3 L/s	4.4 L/s	5.6 L/s	6.7 L/s	7.8 L/s

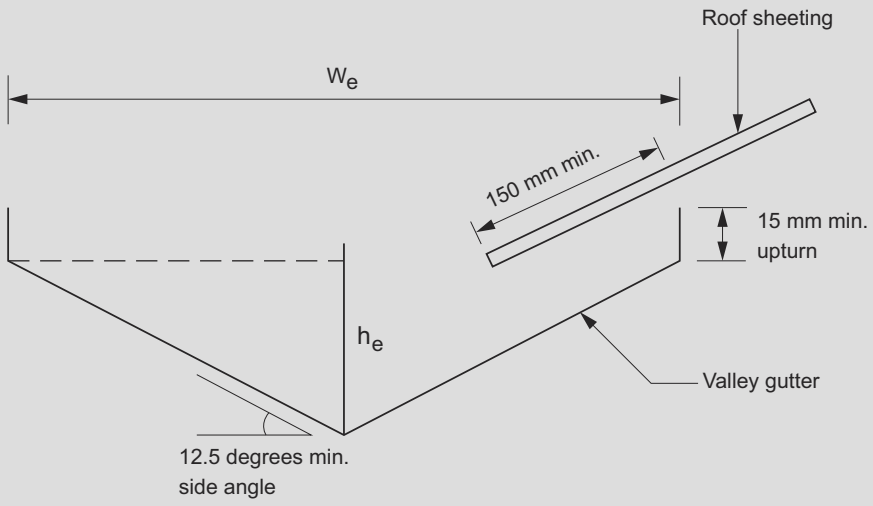
Table 7.4.4c: Valley gutters — Dimensions

Design rainfall intensity mm/h	Sheet width (minimum, mm)	Effective depth (h_e), (minimum, mm)	Effective width (w_e), (minimum, mm)
≤200	355	32	215
>200 to ≤ 250	375	35	234
>250 to ≤300	395	38	254
>300 to ≤350	415	40	273
>350 to ≤400	435	43	292

Explanatory Information: Valley gutters

- Where roofs have pitches less than 12.5 degrees valley gutters may be designed as box gutters in accordance with AS/NZS 3500.3 or as a *Performance Solution* by a professional engineer or other *appropriately qualified person*.
- An example of a valley gutter profile is shown in Explanatory Figure 7.4.4.

Figure 7.4.4 (explanatory): Valley gutter profile



7.4.5 Downpipes – size and installation

[2019: 3.5.3.5]

Downpipes must—

(a) not serve more than 12 m of gutter length for each downpipe; and

(b) be located as close as possible to valley gutters; and

(c) be selected in accordance with the appropriate eaves gutter section as shown in Table 7.4.3a, Table 7.4.3b and Table 7.4.3c.

Explanatory Information

A maximum 12 m gutter length served by each downpipe is to ensure effective fall and adequate capacity to discharge all water anticipated during a storm having an *annual exceedance probability* of 5%.

Where a rainhead overflow device is incorporated in the top of the downpipe, its overflow discharge should be directed away from the building.

7.4.6 Acceptable continuous overflow measure

[2019: Table 3.5.3.4a]

(1) For a front face slotted gutter with—

(a) a minimum slot opening area of 1200 mm^2 per metre of gutter; and

(b) the lower edge of the slots installed a minimum of 25 mm below the top of the fascia,

the acceptable overflow capacity must be 0.5 L/s/m, constructed in accordance with Figure 7.4.6a.

(2) For a controlled back gap with—

(a) a permanent minimum 10 mm spacer installed between the gutter back and the fascia; and

(b) one spacer per bracket, with the spacer not more than 50 mm wide; and

(c) the back of the gutter installed a minimum of 10 mm below the top of the fascia,

the acceptable overflow capacity must be 1.5 L/s/m, constructed in accordance with Figure 7.4.6b.

(3) For the controlled back gap option, the spacer can be a proprietary clip or bracket that provides the *required* offset of the gutter from the fascia.

(4) For controlled front bead height with the front bead of the gutter installed a minimum of 10 mm below the top of the fascia, the acceptable overflow capacity is 1.5 L/s/m constructed in accordance with Figure 7.4.6c.

Figure 7.4.6a: Construction of front face slotted gutter

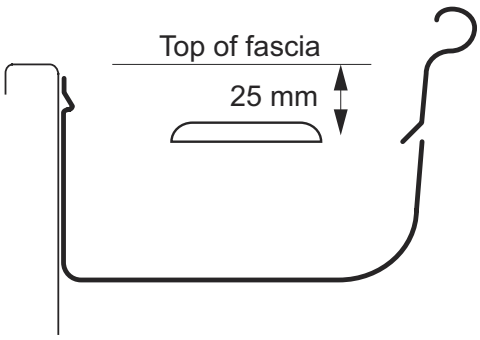


Figure 7.4.6b: Construction of controlled back gap

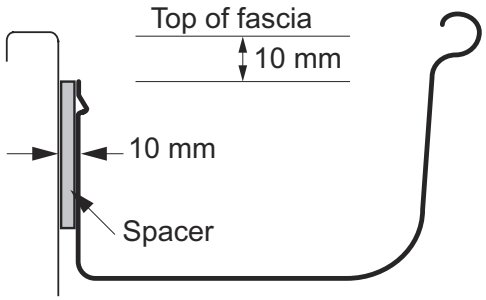


Figure 7.4.6c: Construction of controlled front bead height

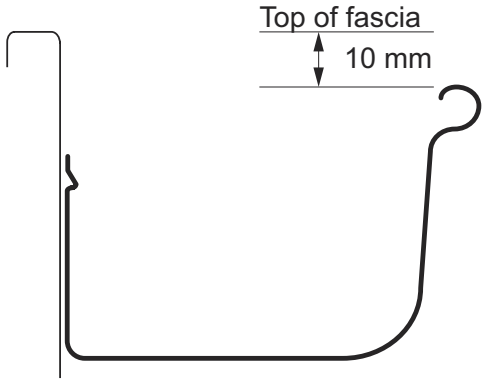


Figure Notes

Front bead of gutter to be a minimum of 10 mm below the top of the fascia.

7.4.7 Acceptable dedicated overflow measure per downpipe

[2019: Table 3.5.3.4b]

(1) For an end-stop weir with—

(a) a minimum clear width of 100 mm; and

(b) the weir edge installed a minimum 25 mm below the top of the fascia,

the acceptable overflow is 0.5 L/s constructed in accordance with Figure 7.4.7a.

(2) An end-stop weir is not suitable where the end-stop abuts a wall.

(3) For an inverted nozzle installed within 500 mm of a gutter high point with—

(a) a minimum nozzle size of 100 mm × 50 mm positioned lengthways in the gutter; and

(b) the top of the nozzle installed a minimum of 25 mm below the top of the fascia,

the acceptable overflow is 1.2 L/s constructed in accordance with Figure 7.4.7b.

(4) For a front face weir with—

(a) a minimum clear width of 200 mm; and

(b) a minimum clear height of 20 mm; and

(c) the weir edge installed a minimum of 25 mm below the top of the fascia,

the acceptable overflow capacity is 1.0 L/s constructed in accordance with Figure 7.4.7c.

(5) For a rainhead with—

(a) a 75 mm diameter hole in the outward face of the rainhead; and

(b) the centreline of the hole positioned 100 mm below the top of the fascia,

the acceptable overflow capacity is 3.5 L/s constructed in accordance with Figure 7.4.7d.

(6) The rainhead should be detailed to avoid nuisance discharge from the overflow at rainfall intensities below the normal design level.

Figure 7.4.7a: Construction of end-stop weir

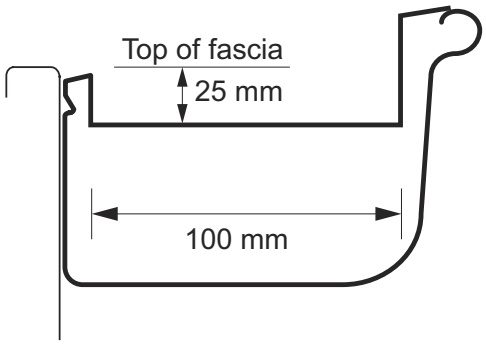


Figure 7.4.7b: Construction of inverted nozzle

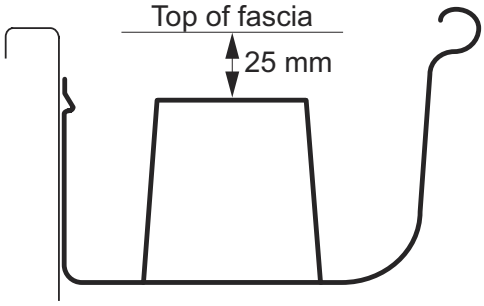


Figure 7.4.7c: Construction of front face weir

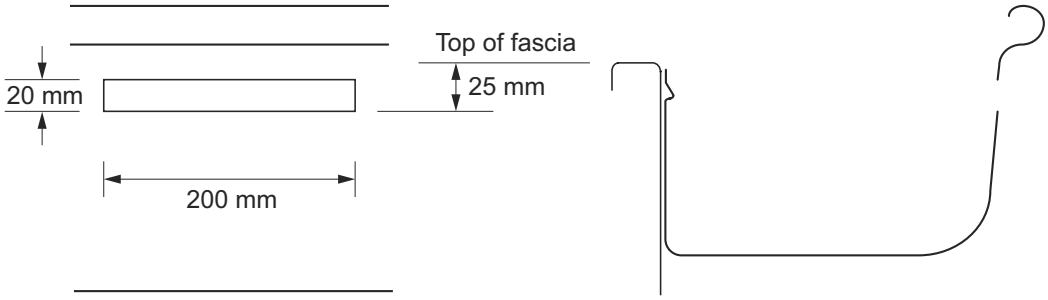
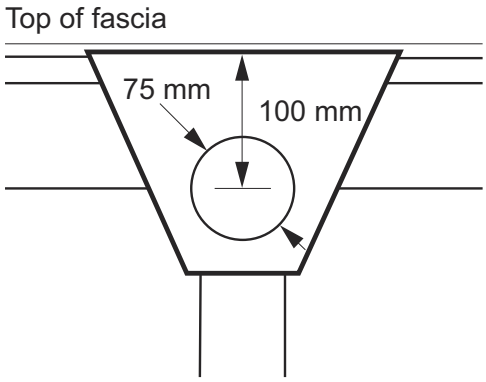


Figure 7.4.7d: Construction of rainhead



Part 7.5 Timber and composite wall cladding

7.5.1 Application

[2019: 3.5.4.1]

(1) Compliance with Part 7.5 for wall cladding is achieved if—

(a) it is installed in accordance with—

(i) 7.5.2 for timber cladding, including weatherboards and profiled boards; and

(ii) 7.5.3 for fibre-cement and hardboard wall cladding boards; and

(iii) 7.5.4 for fibre-cement, hardboard and plywood sheet wall cladding; and

(b) fibre-cement sheet eaves where provided, are installed in accordance with 7.5.5; and

(c) openings and penetrations in cladding are flashed in accordance with 7.5.6; and

(d) the bottom surface of the cladding terminates in accordance with 7.5.7; and

(e) parapets, where provided, are capped in accordance with 7.5.8.

(2) Part 7.5 need not be complied with if H1D7(5) is complied with.

Explanatory Information: Masonry wall cladding

Masonry wall cladding, including masonry veneer, is not covered by this Part but is covered by NCC Volume Two H1D5 and Section 5 of the ABCB Housing Provisions.

Explanatory Information: Alternative wall cladding materials and systems

The provisions of this Part and those of NCC Volume Two H1D5 and Section 5 (Masonry) of the ABCB Housing Provisions do not cover all of the wall cladding materials that may be used for a Class 1 or Class 10 building.

Wall cladding materials and systems not covered by the *Deemed-to-Satisfy Provisions* may be considered under a *Performance Solution* that complies with the relevant *Performance Requirements*.

One of the *Assessment Methods* that may be used to demonstrate compliance with the *Performance Requirements* is the use of documentary evidence in accordance with Part A5.

7.5.2 Timber wall cladding

[2019: 3.5.4.2]

(1) Timber wall cladding must be installed in accordance with (2), (3), (4) and (5).

(2) Splayed timber weatherboards must be fixed in accordance with Figure 7.5.2a and Figure 7.5.2b and with a lap not less than—

(a) 30 mm for hardwood, Cypress and treated pine; and

(b) 20 mm for Western Red Cedar; and

(c) 25 mm for Baltic Pine.

(3) Profiled timber boards must be—

(a) fixed in a horizontal, vertical or diagonal direction with the overlap and groove closely fitted, where provided; and

(b) with tongue and groove profile, fixed with tongue edge up, where they are fixed in a horizontal or diagonal direction; and

(c) where fixed in a vertical or diagonal direction, provided with a vapour permeable sarking complying with AS 4200.1 (see Figure 7.5.2c) installed behind boards with—

(i) each adjoining sheet or roll being—

(A) overlapped not less than 150 mm; or

(B) taped together; and

(i) sarking fixed to supporting members at not more than 300 mm centres.

(4) Splayed and profiled timber weatherboards must be fixed in accordance with Table 7.5.2, with—

(a) one fixing at each stud or equivalent framing member for splayed timber weatherboards; and

(b) one fixing provided at each stud or equivalent framing member for profiled timber boards not more than 130 mm wide; and

(c) two fixings provided at each stud or equivalent framing member for profiled timber board more than 130 mm wide; and

(d) fixings located so that the fixing does not penetrate the tip or thinner edge of the board beneath.

(5) Fixings used for timber cladding must comply with the following:

(a) Where fixings are punched or countersunk and filled prior to painting, fixings must be standard steel flat head nails or standard steel self embedding head screws.

(b) Uncoated copper or steel fixings must not be used for Western Red Cedar (silicon bronze, monel metal, stainless steel or hot-dipped galvanised are suitable).

(c) Where the building is located within 200 m of *breaking surf*, fixings must be—

(i) stainless steel when fixed into timber framing members; or

(ii) hot-dipped galvanized (min 600 g/m^2) when fixed into steel framing members.

(d) In all other cases, fixings must be hot-dipped galvanised (min. 600 g/m^2) flat head nails or hot dipped galvanised (min 600 g/m^2) self embedding head or wafer head screws.

Table 7.5.2: Fixing requirements—Splayed and profiled timber weatherboards

Wind class	Maximum stud spacing (mm)	Minimum nominal stud fixings
N1 - N3	600	Timber: 2.8 G or (8-18) S
		Steel: (8-18) S

Table Notes

(1) G = galvanised plain shank, threaded or equivalent nails.

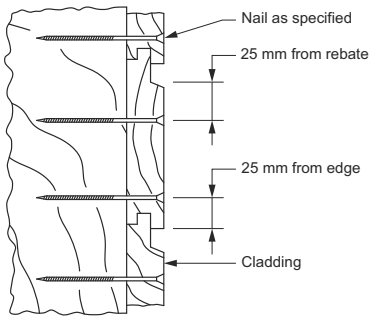
(2) S = self embedding head or wafer head screw.

(3) Fasteners must penetrate not less than 30 mm into timber frames and not less than two full screw threads through steel frames.

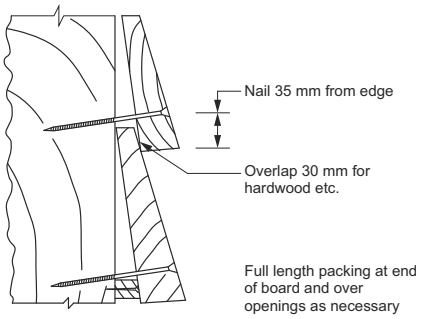
(4) Wall cladding may be fixed through timber or metal battens attached to the wall frame in accordance with AS 1684.2, AS 1684.3, AS 1684.4 or NASH standard as appropriate (see fixing requirements for roof battens) so long as the minimum penetration into the wall frame is achieved.

(5) Steel framing members must have a base metal thickness (BMT) not less than that *required* for a roof batten in NASH standard.

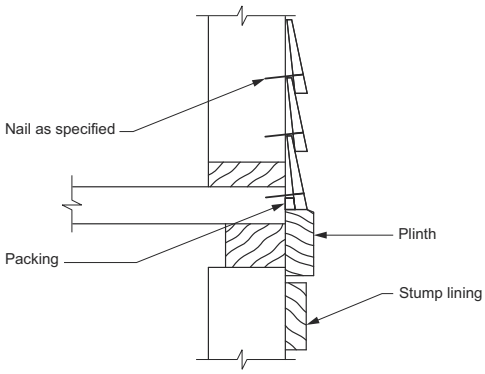
Figure 7.5.2a: Fixing of wall cladding — Timber cladding



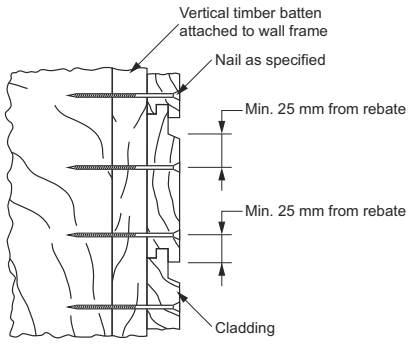
Shiplap weather board



Splayed weather board

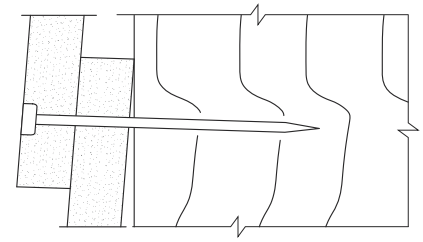


Section at lower part of weatherboard building

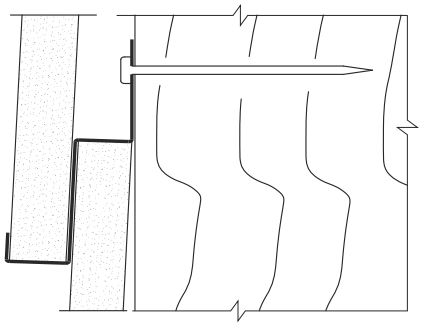


Shiplap weather board fixed through batten

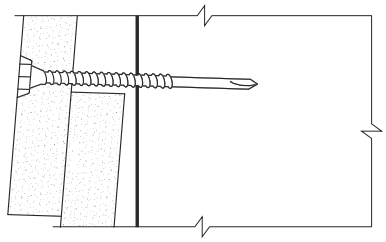
Figure 7.5.2b: Fixing of wall cladding — Wall cladding boards



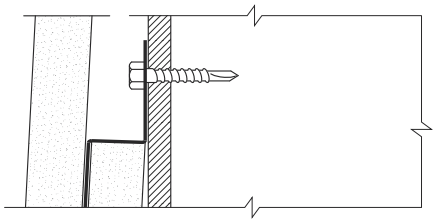
Timber stud nailing



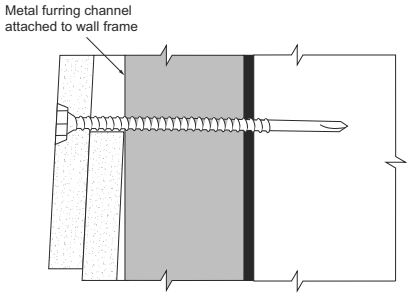
Timber stud clip



Steel stud screwing

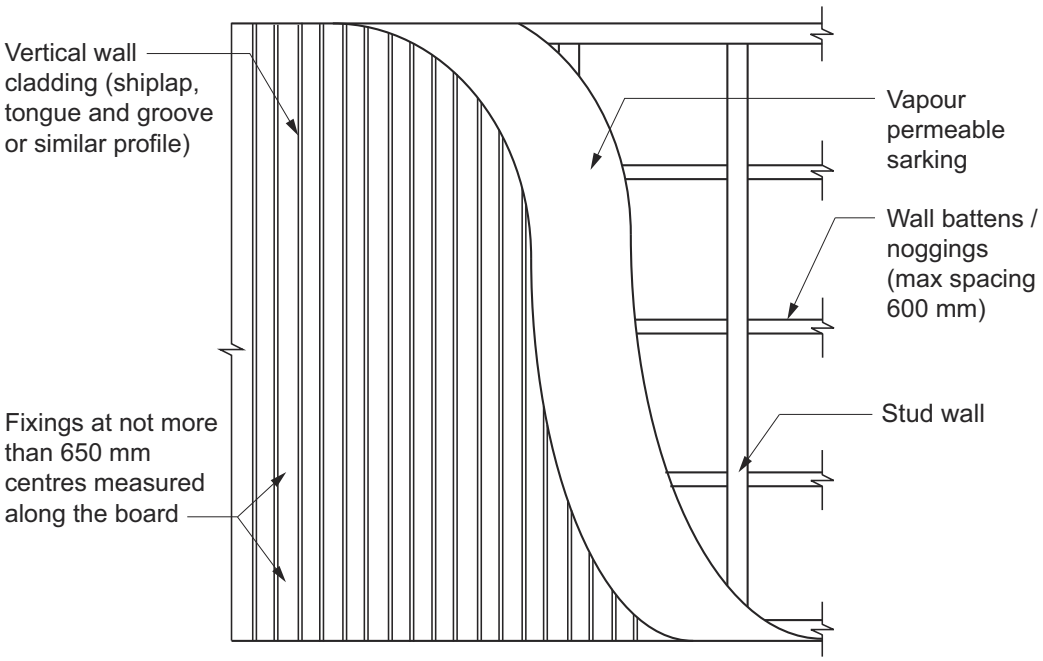


Steel stud clip



Steel stud screw through batten

Figure 7.5.2c: Fixing of vertical wall cladding



Explanatory Information: Fixing of wall cladding

7.5.2(4)(d) ensures the fixing of the wall cladding does not split the wall cladding board below. For example, for a 30 mm lap, fix 35 mm from the butt or 5 mm above the corresponding overlapping board (see Figure 7.5.2a).

Explanatory Information: Timber cladding profiles

7.5.2 covers the following types of timber cladding profiles:

- Horizontal bevel-back.
- Horizontal rebated bevel-back.
- Horizontal rusticated.
- Vertical and horizontal shiplap.
- Tongue and groove.

Explanatory Information: Machine and hand driven nails

Table 7.5.2 applies to both machine and hand driven nails.

7.5.3 Wall cladding boards

[2019: 3.5.4.3]

Wall cladding boards must—

(a) for 7.5 mm (minimum) thick fibre-cement — comply with AS/NZS 2908.2 or ISO 8336; and

(b) for 9.5 mm (minimum) thick hardboard — comply with AS/NZS 1859.4 for exterior grade; and

(c) be fixed in accordance with Table 7.5.3a and Table 7.5.3b with—

(i) one fixing provided at each stud or equivalent framing member for wall cladding boards not more than 130 mm wide; and

(ii) two fixings provided at each stud or equivalent framing member for wall cladding boards greater than 130 mm wide; and

(iii) fixings located along the studs at not more than 100 mm centres; and

(iv) fixings located so that they do not penetrate the tip or thinner edge of the board beneath; and

(d) have a lap not less than—

(i) for 7.5 mm (minimum) thick fibre-cement — 25mm; or

(ii) for 9.5 mm (minimum) thick hardboard — 20 mm.

Table 7.5.3a: Fixing requirements—Minimum 7.5 mm thick fibre-cement wall cladding boards

Wind class	Maximum stud spacing (mm)	Minimum nominal stud fixings
N1 - N3	600	Timber: 2.8 GC
		Steel: (8-18) S

Table Notes

(1) GC = galvanised fibre-cement nail.

(2) S = self embedding or wafer head screw.

(3) Fasteners must penetrate not less than 30 mm into timber frames and not less than two full screw threads through steel frames.

(4) Steel framing members must have a base metal thickness (BMT) not less than that *required* for a roof batten in NASH standard.

(5) Wall cladding may be fixed through timber or metal battens attached to the wall frame in accordance with AS 1684.2, AS 1684.3, AS 1684.4 or NASH standard as appropriate (see fixing requirements for roof battens) so long as the minimum penetration into the wall frame is achieved.

Table 7.5.3b: Fixing requirements—Minimum 9.5 mm thick hardboard wall cladding boards

Wind class	Maximum stud spacing (mm)	Minimum nominal stud fixings
N1 - N3	600	Timber: 2.8 GC
		Steel: (8-18) S

Table Notes

(1) GC = galvanised fibre-cement nail.

(2) S = self embedding or wafer head screw.

(3) Fasteners must penetrate not less than 30 mm into timber frames and not less than two full screw threads through steel frames.

(4) Steel framing members must have a base metal thickness (BMT) not less than that *required* for a roof batten in NASH standard.

(5) Wall cladding may be fixed through timber or metal battens attached to the wall frame in accordance with AS 1684.2, AS 1684.3, AS 1684.4 or NASH standard as appropriate (see fixing requirements for roof battens) so long as the minimum penetration into the wall frame is achieved.

Explanatory Information

Where the wall cladding boards contain a shiplap join as opposed to a lapped join, 7.5.3(d) does not apply, and the joins between the boards are *required* to have the overlap and groove closely fitted.

7.5.4 Sheet wall cladding

[2019: 3.5.4.4]

(1) Fibre-cement sheet wall cladding must—

(a) comply with AS/NZS 2908.2 or ISO 8336; and

(b) be fixed in accordance with Table 7.5.4a.

(2) Hardboard sheet wall cladding must—

(a) comply with AS/NZS 1859.4 for exterior grade; and

(b) be fixed in accordance with Table 7.5.4b.

(3) Structural plywood wall cladding must—

(a) comply with AS/NZS 2269.0; and

(b) be fixed in accordance with Table 7.5.4c.

Table 7.5.4a: Stud and fixing spacings for 6 mm fibre-cement sheet wall cladding

Wind class	Maximum stud spacing (mm)	Maximum nail spacing within 1.2 m of the external corners of the building (mm) Note 1	Maximum nail spacing elsewhere (mm) Note 1
N1	≤ 1.2 m of external building corners: 600 Elsewhere: 600	Body: 300, Edges: 200	Body: 300, Edges: 200
N2	≤ 1.2 m of external building corners: 600 Elsewhere: 600	Body: 200, Edges: 200	Body: 300, Edges: 200
N3	≤ 1.2 m of external building corners: 450 Elsewhere: 600	Body: 200, Edges: 200	Body: 200, Edges: 200

Table Notes

(1) Maximum nail spacing using 2.8 mm fibre-cement nails.

(2) Fixings must be located not less than 50 mm from the edge of all corners.

(3) Fasteners must penetrate not less than 30 mm into a timber frame.

(4) Wall cladding may be fixed through timber or metal battens attached to the wall frame in accordance with AS 1684.2, AS 1684.3, AS 1684.4 or NASH standard as appropriate (see fixing requirements for roof battens) so long as the minimum penetration into the wall frame is achieved.

Table 7.5.4b: Stud and fixing spacings for 9.5 mm thick hardboard sheet wall cladding

Wind class	Maximum stud spacing (mm)	Maximum nail spacing within 1.2 m of the external corners of the building (mm) Note 1	Maximum nail spacing elsewhere (mm) Note 1
N1	600	Body: 300, Edges: 150	Body: 300, Edges: 150
N2	600	Body: 300, Edges: 150	Body: 300, Edges: 150
N3	600	Body: 300, Edges: 150	Body: 300, Edges: 150

Table Notes

(1) Maximum nail spacing using 2.8 mm galvanised clouts or flat head nails.

(2) Fixings must be positioned a minimum of 12 mm from the edge of the sheet and not less than 50 mm from the edge of all corners.

(3) Fasteners must penetrate not less than 30 mm into the timber frame.

(4) Wall cladding may be fixed through timber or metal battens attached to the wall frame in accordance with AS 1684.2, AS 1684.3, AS 1684.4 or NASH standard as appropriate (see fixing requirements for roof battens) so long as the minimum penetration into the wall frame is achieved.

Table 7.5.4c: Stud and fixing spacings for plywood wall cladding equal to or greater than 6.5 mm thick

Wind class	Maximum stud spacing (mm)	Maximum nail spacing within 1.2 m of the external corners of the building (mm) Note 1	Maximum nail spacing elsewhere (mm) Note 1
N1	600	Body: 200, Edges: 100	Body: 200, Edges: 150
N2	600	Body: 200, Edges: 100	Body: 200, Edges: 150
N3	600	Body: 150, Edges: 100	Body: 200, Edges: 150

Table Notes

(1) Maximum nail spacing using 2.8 mm or 3.5 mm galvanised clouts or flat head nails.

(2) Fixings must be positioned a minimum of 12 mm from the edge of the sheet and not less than 50 mm from the edge of all corners.

(3) Fasteners must penetrate not less than 30 mm into the timber frame

(4) Wall cladding may be fixed through timber or metal battens attached to the wall frame in accordance with AS 1684.2, AS 1684.3, AS 1684.4 or NASH standard as appropriate (see fixing requirements for roof battens) so long as the minimum penetration into the wall frame is achieved.

Explanatory Information

Where sheet bracing is also acting as structural bracing, fixing requirements are listed in AS 1684 and NASH Standard – Residential and Low-Rise Steel Framing, Part 2.

7.5.5 Eaves and soffit linings

[2019: 3.5.4.5]

Where provided, external fibre-cement sheets and linings used as eaves and soffit linings must—

(a) comply with AS/NZS 2908.2 or ISO 8336; and

(b) be fixed in accordance with Table 7.5.5 and Figure 7.5.5 using—

(i) 2.8 × 30 mm fibre-cement nails; or

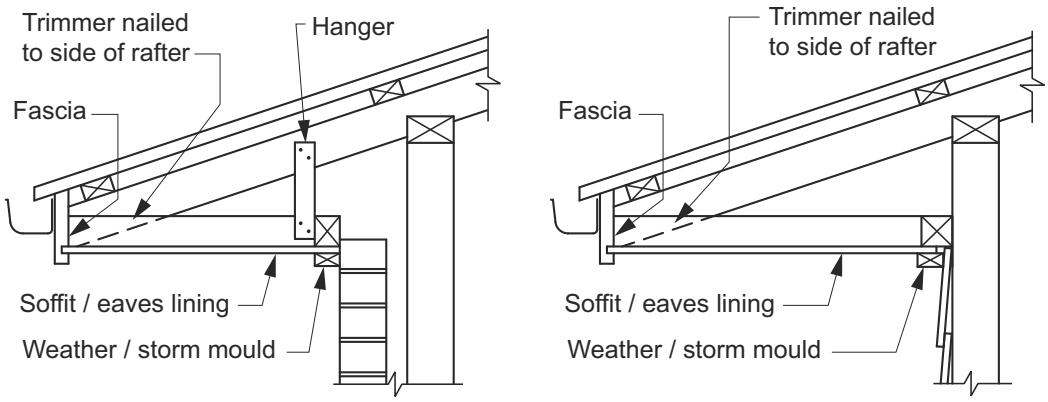
(ii) No. 8 wafer head screws (for 4.5 mm and 6 mm sheets only); or

(iii) No. 8 self embedding head screws (for 6 mm sheets only).

Table 7.5.5: Trimmer and fastener spacings for 4.5 mm and 6 mm fibre-cement eaves and soffit linings

Maximum eaves width	Wind class	Maximum trimmer spacings (mm)		Maximum fastener spacings (mm)	
		Within 1200 mm of the external corners of the building	Elsewhere	Within 1200 mm of the external corners of the building	Elsewhere
600	N1	600	900	200	300
	N2	600	800	200	300
	N3	500	700	200	300
1200	N1	600	750	200	300
	N2	600	700	200	300
	N3	500	650	200	300

Figure 7.5.5: Eaves trimmer detail



(a) Masonry-veneer construction **(b) Clad frame construction**

7.5.6 Flashings to wall openings

[2019: 3.5.4.6]

Openings in *external wall* cladding exposed to the weather must be flashed with materials complying with AS/NZS 2904 and in accordance with the following:

(a) *Flashings* must be provided to bottom, tops and sides of openings, except as permitted by (d), and must be installed so that the *flashing*—

  (i) extends not less than 110 mm beyond the reveals on each side of the opening where practicable; and

  (ii) is attached to the *window* and wall framing; and

  (iii) at the top and bottom of the opening, drains to the outside face of the wall or cladding.

(b) Joins in the *flashing* must—

  (i) overlap by not less than 75 mm in the direction of flow; and

  (ii) be securely fastened at intervals of not more than 40 mm; and

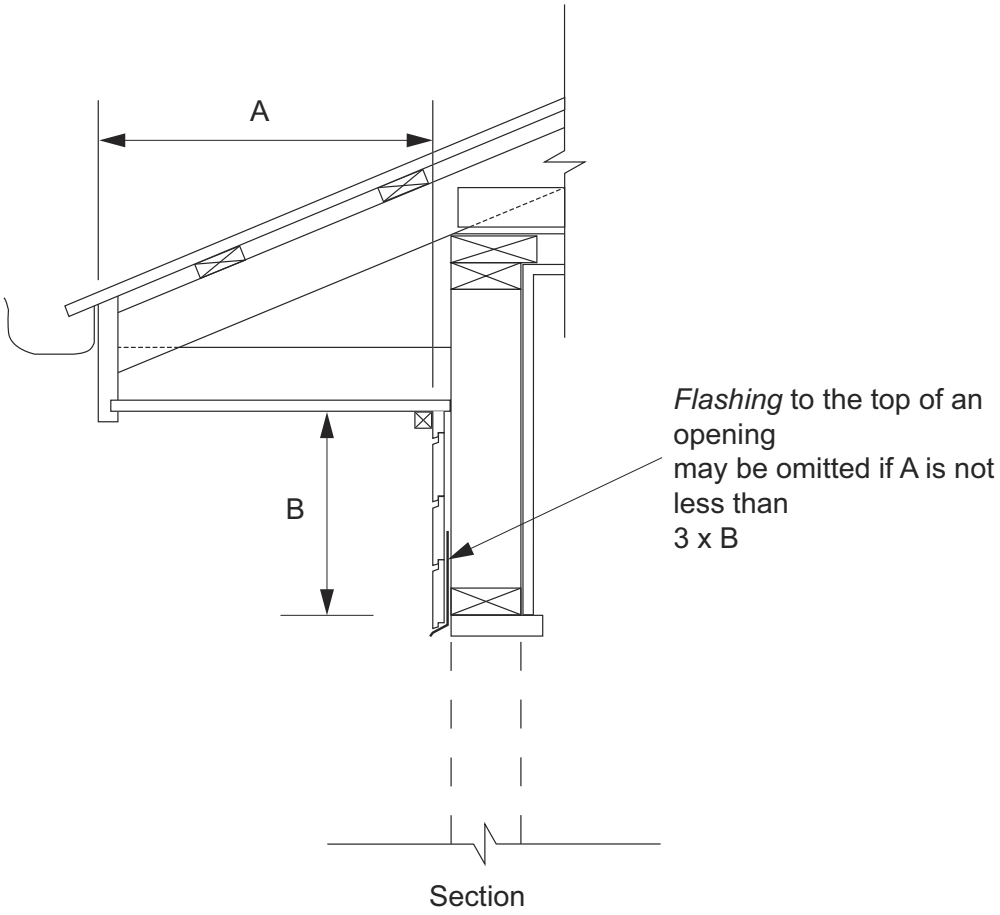
  (iii) have sealant installed between laps.

(c) The method of *flashing* must be suitable for the framing and cladding used and any reveal for the *window* or door system or any architrave or finishing trims that may be installed.

(d) The top of an opening need not be flashed where it is adequately protected by an eave of a width more than 3 times the height of the cladding above the opening (See Figure 7.5.6).

(e) *Flashings* must be securely fixed at least 25 mm under the cladding and extend over the ends and edges of the framing of the opening.

Figure 7.5.6: Weather protection of openings



Explanatory Information

7.5.6(a)(i) applies 'where practicable' because it is often impractical to extend the *flashing* 110 mm beyond the reveal; for example, where openings are positioned adjacent to a corner or where two *windows* are within 110 mm of each other. In such cases consideration should be given to ensure the *flashing* prevents the penetration of water into the *external wall*.

7.5.7 Clearance between cladding and ground

[2019: 3.5.4.7]

(1) The minimum clearance from the bottom of the wall cladding to the adjoining *finished ground level* must be—

(a) 100 mm in *low rainfall intensity areas* or sandy, well-drained areas; or

(b) 50 mm above impermeable (paved or concreted) areas that slope away from the building in accordance with 3.3.3(a); or

(c) 150 mm in any other case.

(2) Wall cladding must extend a minimum of 50 mm below the bearer or lowest horizontal part of the suspended floor framing.

Explanatory Information

The required clearances under 7.5.7 may also be subject to other requirements for drainage in Part 3.3, clearances for inspection zones for termite management in Part 3.4 and screening and sealing of gap requirements for construction in *designated bushfire prone areas* in H7D4, where appropriate.

7.5.8 Parapet cappings

[2019: 3.5.4.8]

Where a wall cladding is used to form a parapet wall, the cladding must be attached to a supporting frame and have a capping installed that complies with the following:

(a) Cappings must—

(i) be purpose made, machine-folded sheet metal or equivalent sections of a material compatible with all up and downstream metal roof covering materials in accordance with 7.2.2(2); and

(ii) extend not less than 50 mm down the sides of the parapet; and

(iii) be separated from the supporting framing by a vapour permeable sarking installed in accordance with (f); and

(iv) be fixed with either self drilling screws or rivets with rubber washers at intervals of not more than 500 mm that do not penetrate the top of cappings, except at joints and corners.

(b) The top of the capping must slope a minimum of 5 degrees.

(c) Joints in cappings must—

(i) overlap by not less than 50 mm in the direction of flow; and

(ii) be securely fastened at intervals of not more than 40 mm; and

(iii) have sealant installed between laps.

(d) Fixing for cappings must be compatible with the capping material in accordance with 7.2.2.

(e) Lead cappings must not be used with prepainted steel or zinc/aluminium steel or on any roof if the roof is part of a *drinking water* catchment area.

(f) Sarking must comply with AS 4200.1 and be installed behind all wall cladding where parapets are installed, with—

(i) each adjoining sheet or roll being—

(A) overlapped not less than 150 mm; or

(B) taped together; and

(i) sarking fixed to supporting members at not more than 300 mm centres.

Explanatory Information

For the purposes of 7.5.8(f), sarking is *required* to be installed to the whole *external wall* which contains the parapet and extend to the top and back of the parapet. A gap should be provided between the sarking and the parapet capping to help control *condensation*.

8 Glazing

Part 8.1 Scope and application of Section 8

8.1.1 Scope

[New for 2022]

This Section sets out the *Deemed-to-Satisfy Provisions* for—

(a) *windows* and external glazed doors (see Part 8.2); and

(b) glass (see Part 8.3); and

(c) glazing human impact (see Part 8.4).

Explanatory Information

These provisions relate to the design, manufacture and installation of *windows* in *external walls* and the use of glass in Class 1 and 10 buildings. The selection of glass in Part 8.3 applies to other assemblies that may not be in an *external wall* of a Class 1 or 10 building.

The terms *windows* and glazed assemblies are used throughout Section 8. The term *window* is defined in the NCC and relates to a device which is capable of transmitting natural light directly from outside a building or room when it is in the closed position. This is distinct from glazed assemblies which may also include elements located in internal parts of a building. These may be glazed panels, splash-backs, mirrors, shower screens or *window*-type assemblies that are not subject to wind loads and weatherproofing requirements.

A number of other parts of NCC Volume Two and the ABCB Housing Provisions also contain requirements relating to glazing in addition to this Part. They include:

- H1D5 of NCC Volume Two and Part 5.2 of the ABCB Housing Provisions for *flashing* material requirements.
- H7D2 of NCC Volume Two for glazed barriers for *swimming pool* enclosures.
- H7D4 for *windows* in buildings in *designated bushfire prone areas*.
- Part 13.3 of the ABCB Housing Provisions for glazing subject to energy efficiency requirements.

8.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC Volume Two.

(b) The State and Territory variations, additions and deletions contained in the Schedules to the ABCB Housing Provisions and NCC Volume Two.

Explanatory Information

In NCC 2019, the content of Section 8 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practice for Part 3.6 of NCC 2019 Volume Two.

Part 8.2 Windows and external glazed doors

8.2.1 Application

[New for 2022]

Part 8.2 applies subject to the limitations set out in H1D8(1) and (2).

Explanatory Information

This Part does not cover the installation of assemblies that are internal or revolving doors, fixed louvres, skylights, rooflights and *windows* not installed in the vertical plane, *windows* in greenhouses or horticultural buildings or frameless sliding doors.

The term 'one piece framing' in H1D8(1)(a)(iv) generally refers to glazing installed in the *external wall* of a building where the external fabric is forming the frame.

8.2.2 Installation of windows

[New for 2022]

Windows must be installed in accordance with the following:

(a) Structural building loads must not be transferred to the *window* assembly.

(b) A minimum 10 mm gap must be provided between the top of the *window* assembly and any *loadbearing* framing or masonry wall element.

(c) The requirements of (b) may be increased where necessary to allow for frame settlement over wide openings.

(d) Packing, if provided between each *window* assembly and the frame, must be—

(i) located along each side and bottom; and

(ii) fixed to ensure the sides and bottom of the *window* assembly remain straight; and

(iii) clear of any *flashing* material.

Explanatory Information

It is important for *windows* to be fixed correctly in the external frame or wall of a building to prevent buckling, diagonal distortion or twisting that may compromise weathertightness around the perimeter of the opening. Correct installation is also critical to ensure *windows* resist design wind pressures that the *external walls* of the building are subject to over its expected life and transfer the resultant forces only to the framing members beside the *window*. Consideration should be given to any additional details for systems designed specifically to meet acoustic or energy efficiency requirements.

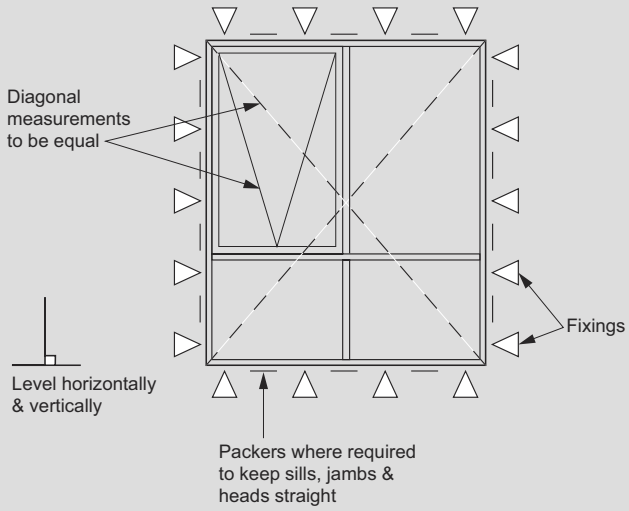
Window assemblies should be installed so they are as close as possible to being perpendicular with the vertical and horizontal planes and where all corners form right-angles, have equal distances when measured diagonally to ensure they are square.

A gap provided between the top of the assembly and the *external wall* frame will allow for settlement after construction and prevent the transfer of structural loads. Where packing is used between the openings in the *external wall* and the *window* assembly, it should be of a material that is compatible with both the frame and the *window* assembly. It should also be positioned and fixed to stay in place permanently and ensure the sides and sills remain straight.

Where aluminium sills of a *window* assembly may contact masonry, particularly mortar, an isolating material such as bituminous *membranes* or paints and caulking compounds containing zinc chromates should be used. Care must be taken to minimise any gaps between sills and external skins to prevent excessive ingress of water.

Explanatory Figure 8.2.2 provides guidance on the installation of *windows* and positioning of relevant fixing points.

Figure 8.2.2 (explanatory): Guidance for the installation of windows and positioning of relevant fixing points



Part 8.3 Glass

8.3.1 Application

[New for 2022]

Glazing must comply with the following:

(a) 8.3.2 for glass sizes and installation.

(b) 8.3.3 for fully framed glazing installed in the perimeter of buildings.

(c) Part 8.4 for glazed assemblies subject to human impact.

(d) Glass used must be of a type within the scope of AS 1288.

(e) Glass used in barriers, except a *window* serving as a barrier, must withstand loading forces in accordance with AS 1170.1.

(f) Safety glass must be—

(i) legibly marked in accordance with 8.4.7; and

(ii) made visible in accordance with 8.4.8.

Explanatory Information

- This Part applies to the selection of glass only and does not include the installation of *windows* or framed glazed doors. This is due to *window* systems relying on the design and testing of structural members to withstand wind loads (e.g. mullions, transoms, and meeting rails and stiles) and the perimeter frame design, sealants and gaskets to resist water penetration.
- This Part does not cover glazing in assemblies that are constructed on site and are architectural one-off *windows* which are not design tested in accordance with AS 2047 or other assemblies that are second-hand, reused, recycled or heritage.
- Information on *design wind speed* for particular areas may be available from the *appropriate authority*.
- For glazing in *high wind areas*, refer to Part 2.2.

8.3.2 Glazing sizes and installation

[2019: 3.6.2]

Glazing used in buildings must comply with the following:

(a) Glazing used in the *perimeter of buildings* and supported on all sides must comply with the appropriate provisions listed in 8.3.3.

(b) Glazing used in areas where the potential for human impact could occur must comply with the appropriate provisions listed in Part 8.4.

(c) For 3 mm monolithic annealed glass, the maximum area must not be more than 0.85 m^2.

Explanatory Information

The selection of glass thickness relies not just on limit state wind loads but on a number of geometric criteria that include the influence of aspect ratio and slenderness factors. These factors are taken into account in Tables 8.3.3a, 8.3.3b and 8.3.3c.

8.3.3 Fully framed glazing installed in perimeter of buildings

[2019: 3.6.3]

Fully framed (supported on all sides) monolithic annealed glass installed in the *perimeter of buildings* must comply with—

(a) if the building is located in an area with a wind class not exceeding N1 – Table 8.3.3a; or

(b) if the building is located in an area with a wind class not exceeding N2 – Table 8.3.3b; or

(c) if the building is located in an area with a wind class not exceeding N3 – Table 8.3.3c.

Table 8.3.3a: Glass thickness for wind class not exceeding N1: monolithic annealed glass (mm)

Edge (mm)	300	450	600	750	900	1050	1200	1350	1500	1650
300	3	3	3	3	3	3	3	3	3	3
450	3	3	3	3	3	3	3	3	3	3
600	3	3	3	3	3	3	3	3	4	4
750	3	3	3	3	3	3	4	4	4	4
900	3	3	3	3	3	4	4	4	4	4
1050	3	3	3	3	4	4	4	4	4	4
1200	3	3	3	4	4	4	4	4	4	4
1350	3	3	3	4	4	4	4	4	4	4
1500	3	3	4	4	4	4	4	4	4	4
1650	3	3	4	4	4	4	4	4	4	4
1800	3	3	4	4	4	4	4	4	4	4
1950	3	4	4	4	4	4	4	4	4	4
2100	3	4	4	4	4	4	4	4	4	4
2250	3	4	4	4	4	4	4	4	4	4
2400	3	4	4	4	4	4	5	5	4	5
2550	3	4	4	4	4	4	5	5	4	5
2700	3	4	4	4	4	4	5	5	6	5

Table 8.3.3b: Glass thickness for wind class not exceeding N2: monolithic annealed glass (mm)

Edge (mm)	300	450	600	750	900	1050	1200	1350	1500	1650
300	3	3	3	3	3	3	3	3	3	3
450	3	3	3	3	3	3	3	3	3	3
600	3	3	3	3	3	3	3	3	4	4
750	3	3	3	3	3	3	4	4	4	4
900	3	3	3	3	3	4	4	4	4	4
1050	3	3	3	3	4	4	4	4	4	4
1200	3	3	3	4	4	4	4	4	4	4
1350	3	3	3	4	4	4	4	4	4	4
1500	3	3	4	4	4	4	4	4	4	4
1650	3	3	4	4	4	4	4	4	4	4
1800	3	3	4	4	4	4	4	4	4	5
1950	3	4	4	4	4	4	4	4	5	5
2100	3	4	4	4	4	4	4	5	5	6

Edge (mm)	300	450	600	750	900	1050	1200	1350	1500	1650
2250	3	4	4	4	4	4	5	5	5	6
2400	3	4	4	4	4	4	5	5	5	6
2550	3	4	4	4	4	4	5	5	5	6
2700	3	4	4	4	5	5	5	5	6	6

Table 8.3.3c: Glass thickness for wind class not exceeding N3: monolithic annealed glass (mm)

Edge (mm)	300	450	600	750	900	1050	1200	1350	1500	1650
300	3	3	3	3	3	3	3	3	3	3
450	3	3	3	3	3	3	3	3	3	3
600	3	3	3	3	3	3	3	3	4	4
750	3	3	3	3	3	3	4	4	4	4
900	3	3	3	3	3	4	4	4	4	4
1050	3	3	3	3	4	4	4	4	5	5
1200	3	3	3	4	4	4	4	5	5	5
1350	3	3	3	4	4	4	5	5	5	5
1500	3	3	4	4	4	5	5	5	5	6
1650	3	3	4	4	4	5	5	6	6	6
1800	3	3	4	4	4	5	5	6	6	6
1950	3	4	4	4	5	5	5	6	6	6
2100	3	4	4	5	5	5	6	6	6	8
2250	3	4	4	5	5	5	6	6	8	8
2400	3	4	4	5	5	5	6	6	8	8
2550	3	4	4	5	5	5	6	6	8	8
2700	3	4	4	5	6	6	6	8	8	8

Explanatory Information

- For other types of perimeter glazing including toughened, wired, laminated, unframed glazing and insulated glass units, refer to AS 1288.
- For monolithic annealed patterned glass thickness measurement refer to AS 1288.
- The thickness of glass in Tables 8.3.3a, 8.3.3b and 8.3.3c is dependent on the wind classification of the *site*, Ultimate Limit State (ULS) wind pressure set out in AS 4055, and the dimensions of the glass panel. AS 4055 has higher ULS wind pressures for parts of *external walls* within 1200 mm of external corners. The thickness of glass in Tables 8.3.3a, 8.3.3b and 8.3.3c is based on these higher ULS wind pressures and can also be used for glass in the general length of walls.

Part 8.4 Glazing human impact

8.4.1 Application

[New for 2022]

(1) Part 8.4 applies subject to the limitations set out in H1D8(1).

(2) Part 8.4 need not be complied with if H1D8(3) is complied with.

(3) The thickness and type of glazing installed in areas of a building that have a high potential for human impact (an area of a building frequented by the occupants during everyday activities in which a person could fall into or against the glazed panel) must comply as follows:

(a) Doors — in accordance with 8.4.2.

(b) Door side panels — in accordance with 8.4.3.

(c) Full height glass panels — in accordance with 8.4.4.

(d) Glazed panels, other than doors or side panels, on the perimeter of rooms — in accordance with 8.4.5.

(e) Bathrooms, ensuite and spa room glazing — in accordance with 8.4.6.

(f) Visibility of glazing — in accordance with 8.4.7.

(g) Identification of safety glass — in accordance with 8.4.8.

8.4.2 Doors, side panels and other framed glazed panels

[2019: 3.6.4.1]

Glass in doors must be Grade A safety glazing material in accordance with Table 8.4.2 and Figure 8.4.2, except that—

(a) unframed doors, other than those incorporated in *shower screens* or bath enclosures, must be glazed with toughened safety glass with a minimum nominal thickness of 10 mm or laminated toughened safety glass with a minimum total thickness of 10 mm; and

(b) individual pieces of monolithic annealed glass incorporated in leadlights may be used, to a maximum area of 0.05 m^2 with a minimum nominal thickness of 3 mm; and

(c) for annealed and annealed decorated glass panels in doors—

(i) for 3 mm and 4 mm annealed glass, the maximum area must not be more than 0.1 m^2 with a maximum panel width of 125 mm; and

(ii) for 5 mm and 6 mm annealed glass, the maximum area must not be more than 0.26 m^2 with a maximum panel width of 300 mm; and

(d) for annealed glass in fully framed panels with a thickness of 10 mm or more, with or without bevelled edges, the maximum area must not be more than 0.5 m^2; and

(e) doors in bathrooms, ensuites and spa rooms must be glazed in accordance with 8.4.6.

Table 8.4.2: Maximum areas of glazing material for framed glass doors, framed glass side panels and other framed glazed panels

Type of glass	Minimum nominal thickness (mm)	Maximum area of pane (m^2)
Patterned or clear monolithic annealed glass	5	0.3
Patterned or clear monolithic annealed glass	6	0.9
Grade A toughened and toughened laminated safety glass	3	1

Type of glass	Minimum nominal thickness (mm)	Maximum area of pane (m^2)
Grade A toughened and toughened laminated safety glass	4	2
Grade A toughened and toughened laminated safety glass	5	3
Grade A toughened and toughened laminated safety glass	6	4
Grade A laminated safety glass	5.38	2.2
Grade A laminated safety glass	6.38	3
Grade A laminated safety glass	8.38	5

Figure 8.4.2: Identification of glazing requirements for doors and side panels

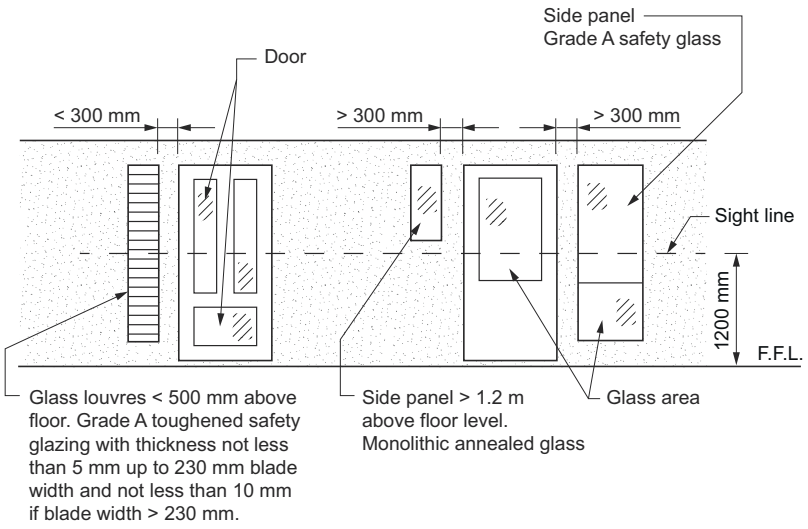


Figure Notes

For door and side panel glazing areas – see Table 8.4.2.

Explanatory Information

Larger areas of monolithic annealed glass in leadlights are not permitted regardless of glass thickness.

8.4.3 Door side panels

[2019: 3.6.4.2]

(1) All framed glass (except leadlight panels) in side panels with their nearest vertical sight line less than 300 mm from the nearest edge of the doorway opening must be Grade A safety glazing material in accordance with Table 8.4.2 and Figure 8.4.2, except that—

(a) where the lowest visible sight line is more than 1.2 m above the highest abutting finished floor level, monolithic annealed glass with a minimum thickness of 5 mm and an area of not more than 0.3 m^2 may be used; or

(b) where the lowest visible sight line is more than1.2 m above the highest abutting finished floor level, monolithic annealed glass with a minimum thickness of 10 mm with an area of not more than 0.5 m^2, may be used; or

(c) where the side panel consists of glass louvres with exposed edges or where the louvres are installed less than 500 mm above the highest abutting finished floor level—

(i) for blade widths not more than 230 mm with blade lengths not more than 1 m, Grade A toughened safety

glazing not less than 5 mm thick must be used; and

(ii) for blade widths more than 230 mm, Grade A toughened safety glazing not less than 10 mm thick must be used.

(2) Framed glass panels with the nearest vertical sight line not less than 300 mm from the nearest edge of the door opening are not considered to be side panels for the purposes of (1).

8.4.4 Full height framed glazed panels

[2019: 3.6.4.3]

(1) A glazed panel located in a building so that it is capable of being mistaken for an *unobstructed opening* must be glazed with Grade A safety glazing material in accordance with Table 8.4.2.

(2) Glazed panels are not considered an *unobstructed opening* where any of the following apply:

(a) The clear opening width is not more than 500 mm.

(b) The lowest sight line of the opening is not less than 500 mm above the highest abutting finished floor level.

(c) The glass is made apparent by means of transoms, colonial bars, other components of the glazing system, permanent motifs or other decorative treatment on or etched into the glass, of sufficient magnitude to be readily apparent, or the glass is opaquely coloured or patterned to indicate its presence.

(d) A chair rail or handrail not less than 40 mm thick, or the like, is provided at a height of not less than 700 mm above the adjoining ground level.

(e) The difference in floor level on either side of the panel is greater than 1000 mm.

8.4.5 Glazed panels, other than doors or side panels, on the perimeter of rooms

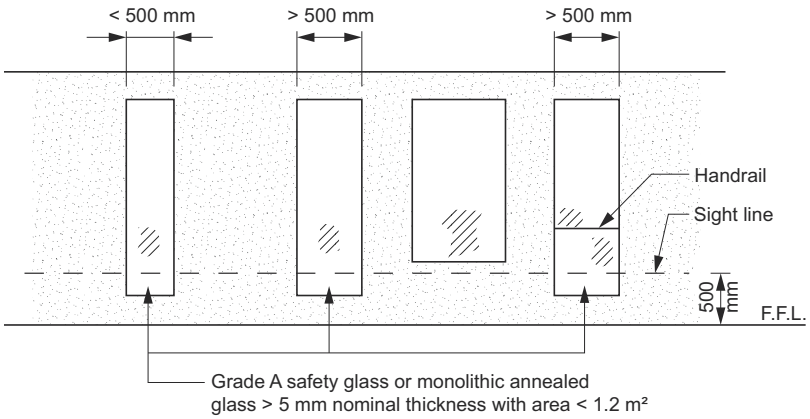
[2019: 3.6.4.4]

All framed glazing where the lowest sight line of the glazing panel is less than 500 mm from the highest abutting finished floor level (see Figure 8.4.5) must be—

(a) Grade A safety glazing material in accordance with Table 8.4.2; or

(b) monolithic annealed glass not less than 5 mm nominal thickness provided that the area of the glazing panel is not more than 1.2 m^2.

Figure 8.4.5: Identification of glazing requirements for glazed panels



8.4.6 Kitchen, bathroom, ensuite, spa room and splash-back glazing

[2019: 3.6.4.5]

(1) All glazing in kitchens, bathrooms, ensuites, spa rooms or the like, including shower doors, *shower screens*, bath enclosures, and associated *windows* and doors (including cabinet doors), where the lowest sight line is less than 2.0 m above the highest abutting finished level of the floor, bottom of the bath, or shower base, must—

(a) for framed panels, be glazed with Grade A safety glazing material in accordance with Table 8.4.2; or

(b) for panels or doors with any edge exposed, be toughened safety glass in accordance with Table 8.4.6 with a minimum nominal thickness of 6 mm.

(2) Monolithic annealed glass may be used for—

(a) mirrors, provided a fixed vanity or bench with a height of not less than 760 mm, depth of not less than 300 mm and extending the full width of the mirror is, located in front of the mirror; or

(b) splash-backs, provided it is fully backed by and continuously adhered to a solid wall material or a fixed cabinet or bench that is—

(i) a height not less than 760 mm; and

(ii) a depth not less than 300 mm; and

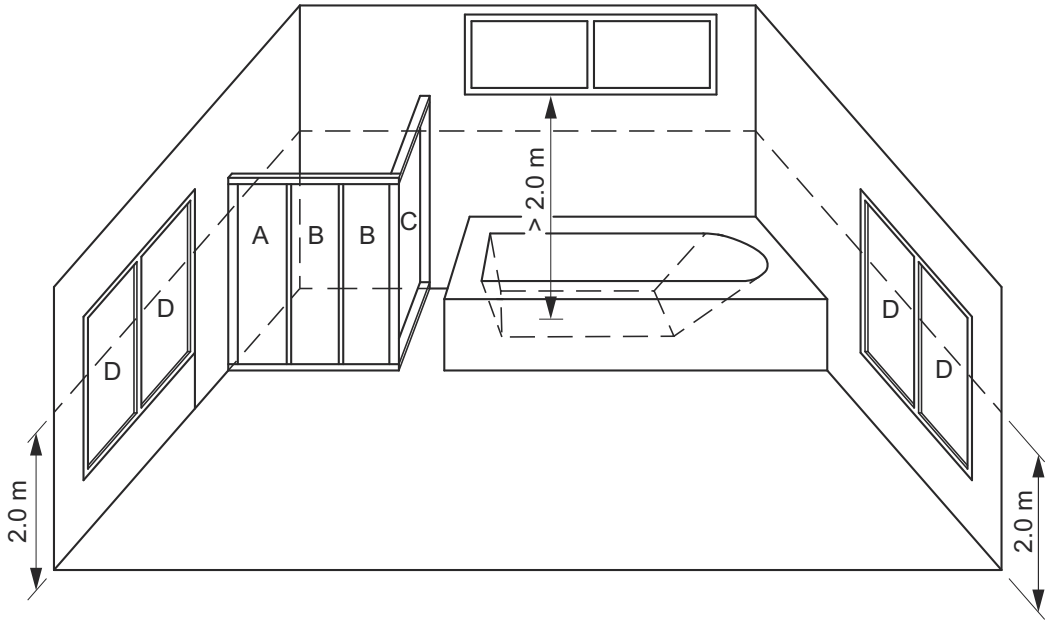
(iii) extending the full width of the splash-back; and

(iv) located in front of the splash back.

Table 8.4.6: Maximum areas of safety glazing materials for shower doors, shower screens and bath enclosures

Type of glass	Standard nominal thickness (mm)	Maximum area of pane (m^2)	Area (Figure 8.4.6)
Safety organic coated glass	3	1	A, B, C, D
Safety organic coated glass	4	1.5	A, B, C, D
Safety organic coated glass	5	2	A, B, C, D
Safety organic coated glass	≥ 6	3	A, B, C, D

Figure 8.4.6: Identification of glazing requirements for bathrooms, ensuites and spa rooms



Explanatory Information

Care should be taken when using showers fitted with safety organic-coated glass and laminated safety glass products that are liable to damage from thermal shock. Thermal shock occurs from hot water from the shower hitting the *shower screen* during cold weather.

The requirements for glass splashbacks used near gas appliances are covered in AS/NZS 5601.

8.4.7 Visibility of glazing

[2019: 3.6.4.6]

(1) If the presence of glazing in a door, side panel or panel capable of being mistaken for a doorway or opening is not made apparent in accordance with 8.4.4(2)(c), the glass must be marked to make it readily visible in accordance with (2).

(2) Marking must be in the form of an opaque band not less than 20 mm in height located so that—

  (a) the upper edge is not less than 700 mm above the floor; and

  (b) the lower edge is not more than 1.2 m above the floor.

(3) A band or marking is not *required* where any of the following applies:

  (a) The height of the glazing is not more than 1 m in any part.

  (b) The width of the glazing panel is not more than 500 mm in any part.

  (c) There is no glazing within 500 mm of the floor.

  (d) The glazing is provided with not less than one fixed glazing bar which must—

    (i) be firmly attached to the stiles to locate and protect each face of the glass; and

    (ii) be located with its upper edge not less than 500 mm and its bottom edge not more than 1 m above the floor; and

    (iii) have a face width not less than 40 mm.

Explanatory Information

- Making the glass visible by marking is not a substitute for the use of safety glazing in accordance with this Part.
- A broken line or patterns may be an acceptable form of marking provided it meets the criteria set out in 8.4.7(2).

8.4.8 Identification of safety glass

[New for 2022]

All safety glazing material in Tables 8.4.2 and Table 8.4.6 installed in accordance with this Part must comply with the following:

  (a) Safety glass must be marked in the form of either permanent etching or a label that cannot be reused once removed.

  (b) The permanent etching or label must state the following information:

    (i) The Standard to which the safety glass has been tested.

    (ii) Registered name of the manufacturer or supplier.

    (iii) Grade of the safety glass.

    (iv) Nominal thickness of the safety glass.

    (v) The type of safety glass.

Explanatory Information

The labelling of safety glass is not intended to remain after completion of construction. Labelling complying with 8.4.8 should remain in place on safety glass to allow relevant practitioners to confirm and certify that the correct type of safety

glass has been installed in a specific area of the building.

If a label is able to be removed from the glass, it must be comprised of a material that self-destructs upon removal so as to prevent it being reused on other glass panels.

The type of safety glass can be identified in a way that describes the type used such as “L” for laminated glass or “T” for toughened glass, etc.

9 Fire safety