



Masonry in small buildings

Part 2: Construction



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 - Concrete Masonry Association of Australia
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Australian Standard®

Masonry in small buildings

Part 2: Construction

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PREFACE

A1 | This Standard was prepared by the Standards Australia Committee BD-004, Masonry Structures, to supersede AS 4773.2—2010.

This Standard incorporates Amendment No. 1 (September 2020). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this Standard is to provide minimum requirements for use by builders for the construction of masonry in small buildings, such as houses and garages.

This Standard is intended as a companion document to AS 4773.1, *Masonry in small buildings*, Part 1: *Design*.

The objective of this revision is to provide clarifications and minor corrections.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

The term ‘informative’ has been used in this Standard to define the application of the appendix to which it applies. An ‘informative’ appendix is only for information and guidance.

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STANDARDS AUSTRALIA

Australian Standard

Masonry in small buildings

Part 2: Construction

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for construction practices for masonry in buildings of Class 1 and Class 10a, as defined in the National Construction Code (NCC), designed in accordance with AS 4773.1 and to be constructed from clay, concrete, or calcium silicate masonry units and as follows:

- (a) Leaf thicknesses are 90 mm or greater.
- (b) The tops of all walls are laterally supported by a roof or floor structure acting as a diaphragm with the exception of parapets, chimneys and cantilevers in accordance with Clause 14.9 of AS 4773.1:2015 and fin walls in accordance with Table 9.1 of AS 4773.1:2015.
- (c) Walls are supported on concrete slabs, footings or suspended slab complying with NCC.
- (d) The geometric limitations specified in Clause 1.2.2.

The scope of this Standard does not cover the following:

- (i) Acoustics and energy efficiency.
- (ii) Construction or detailing of attachments such as basketball hoops, satellite dishes, shade structures and similar structures.
- (iii) Masonry constructed from autoclaved aerated concrete (AAC) units.
- (iv) Structures required to be designed for earthquake actions in accordance with AS 1170.4.
- (v) External walls constructed from horizontally cored units.

NOTES:

- 1 For acoustic and energy efficiency requirements, see the NCC.
- 2 For applications outside the scope of this Standard, the masonry should be constructed in accordance with AS 3700.
- 3 Guidance on the cleaning of masonry is given in Appendix A.

1.2 GENERAL LIMITATIONS

1.2.1 Loading

Wind category and loads derived from AS 4055 are required for the use of some of the Tables in this Standard.

NOTES:

- 1 For wind loads on structures outside the scope of Clause 1.2.2, AS/NZS 1170.2 should be used in conjunction with AS 3700.
- 2 The loads specified in AS 4055 include the appropriate combinations of permanent and wind actions.

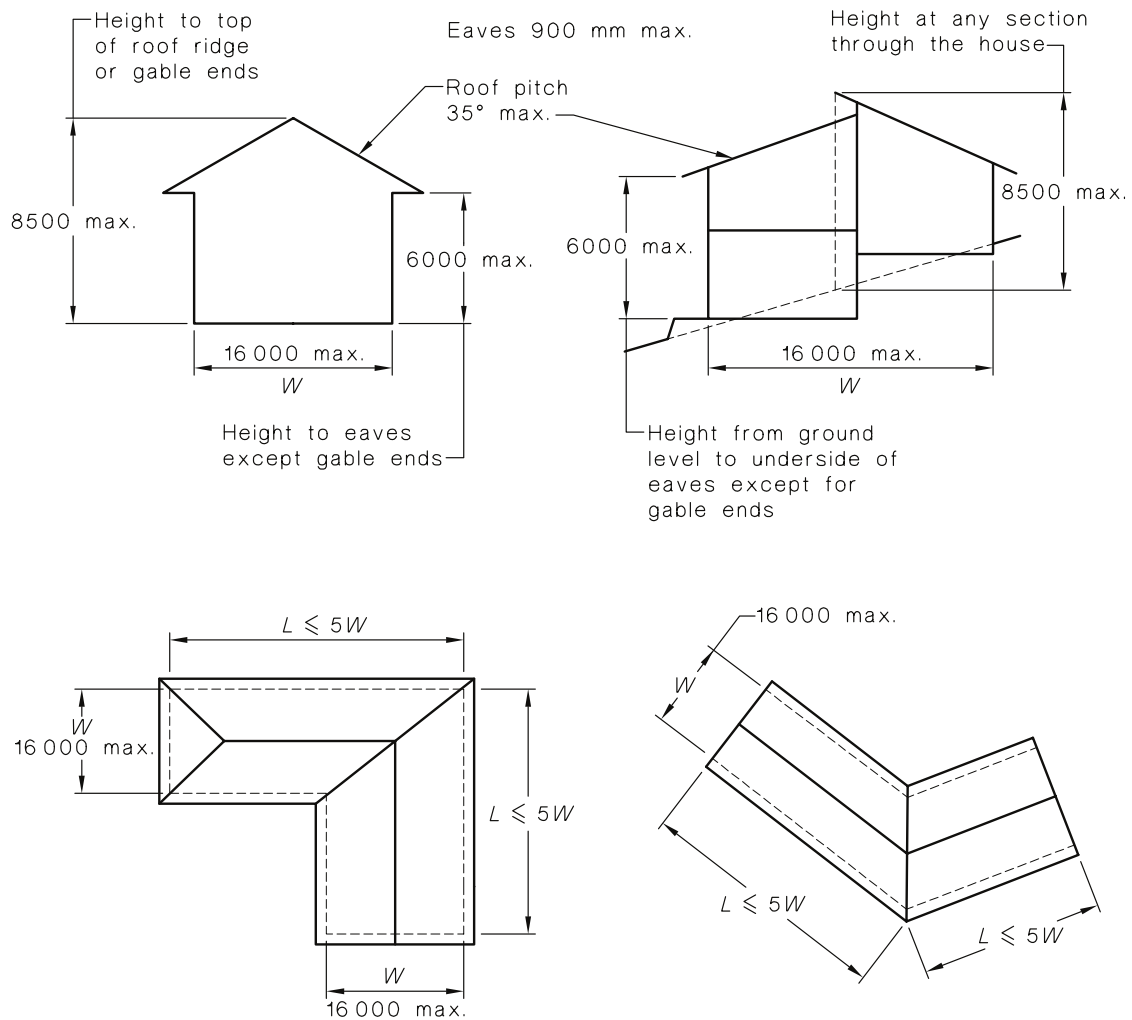
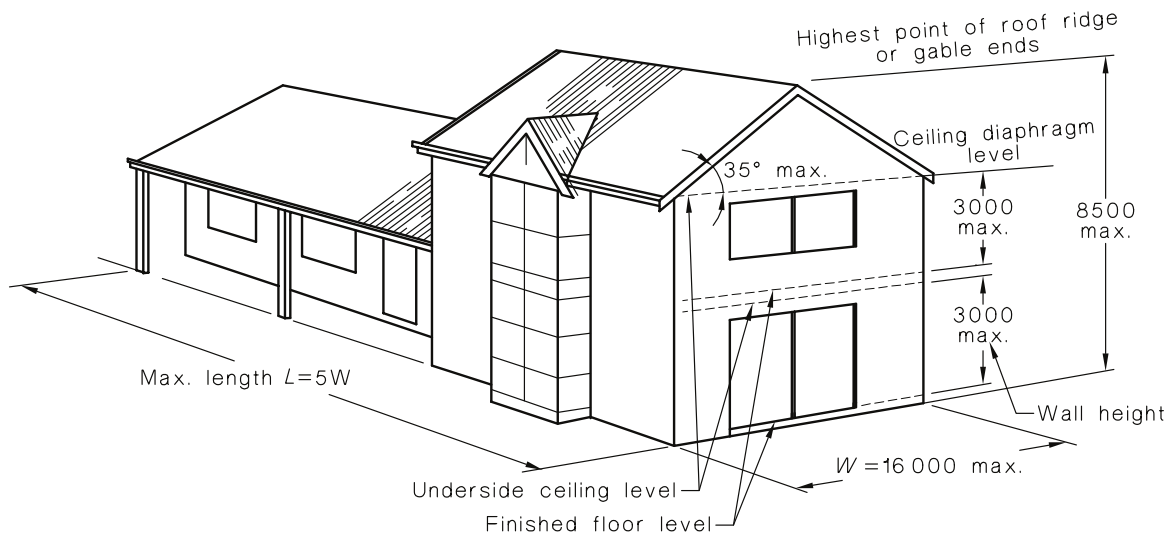
1.2.2 Limitations for building geometry

For the purpose of this Standard, the following conditions apply (see Figure 1.1):

- (a) The distance from ground level to the underside of eaves shall not exceed 6.0 m. The distance from ground level to the highest point of the roof, neglecting chimneys, shall not exceed 8.5 m, and the height of each storey, measured as floor to ceiling at external walls, shall not exceed 3.0 m.
- (b) The width (W), including roofed verandas but excluding eaves, shall not exceed 16.0 m, and the length (L) shall not exceed five times the width.
- (c) The roof pitch shall not exceed 35° .
- (d) Eaves width shall not exceed 900 mm.
- (e) The building shall include a continuous ceiling that acts as a diaphragm.

NOTES:

- 1 Atria exceeding these dimensions are outside the scope of this Standard.
- 2 Where the geometry lies outside the limitations of this Section, the design may be carried out in accordance with AS 3700.



DIMENSIONS IN MILLIMETRES

FIGURE 1.1 BUILDING GEOMETRY

1.3 NORMATIVE REFERENCES

The following are the normative documents referenced in this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

1141	Methods for sampling and testing aggregates (series)
1316	Masonry cement
1478	Chemical admixtures for concrete, mortar and grout
1478.2	Part 2: Methods of sampling and testing admixtures for concrete, mortar and grout
1672	Limes and limestones
1672.1	Part 1: Limes for building
1684	Residential timber-framed construction (series)
1720	Timber structures (series)
2870	Residential slabs and footings
3600	Concrete structures
3660	Termite management
3660.1	Part 1: New building work
3700	Masonry structures
3972	General purpose and blended cements
4055	Wind loads for housing
4100	Steel structures
4773	Masonry in small buildings
4773.1	Part 1: Design

AS/NZS

2699	Built-in-components for masonry construction
2699.1	Part 1: Wall ties
2699.3	Part 3: Lintels and shelf angles (durability requirements)
2904	Damp-proof courses and flashings
4455	Masonry units, pavers, flags and segmental retaining wall units
4455.1	Part 1: Masonry units
4600	Cold-formed steel structures
4671	Steel reinforcing materials

EN

12878	Pigments for the colouring of building materials based on cement and/or lime. Specifications and methods of test
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NASH

National Association of Steel Frame Housing
Standard for Residential and Low-rise Steel Framing
Part 1: Design criteria

NCC

National Construction Code

1.4 DEFINITIONS

For the purposes of this Standard, the definitions below apply.

1.4.1 Aggressive soils

Soils where walls are expected to be attacked by salts in the groundwater.

1.4.2 Air-entraining agent

An admixture used to form discrete, non-coalescing, small air bubbles, up to 1 mm in diameter. In mortar, it is used to improve workability and thus allow a reduction in fine aggregate and/or water.

NOTE: An air-entraining agent is not the same as 'methylcellulose-based' water thickener.

1.4.3 Connectors

Any components, other than wall ties, lintels and shelf angles, used in masonry construction to aid the structural integrity of the building or to provide support or stability to building finishes.

1.4.4 Control joints

Joints or gaps constructed in masonry to control and absorb movements in the masonry. Control joints include the following:

- (a) Contraction joints (or opening control joints), which open as the masonry contracts or shrinks.
- (b) Expansion joints (or closing control joints), which close as the masonry expands and/or associated concrete shrinks.
- (c) Articulation joints, which move to compensate for movements in the supporting structure.

1.4.5 Exposure environments

1.4.5.1 Severe marine

Areas up to 100 m from a non-surf coast and up to 1 km from a surf coast. The distances specified are from the mean high-water mark.

1.4.5.2 Marine

Areas from 100 m to 1 km from a non-surf coast and 1 km to 10 km from a surf coast. The distances are from the mean high-water mark.

NOTE: Sheltered bays such as Port Phillip Bay and Sydney Harbour are considered to be non-surf coasts.

1.4.5.3 Industrial

Environment within 1 km of industrial areas producing significant acidic pollution.

NOTE: The only areas within this category are around major industrial complexes. There are only a few such regions in Australia, for example, around Port Pirie.

1.4.5.4 Moderate

Area with light industrial pollution or very light marine influence, or both.

NOTE: Typical areas are suburbs of cities on sheltered bays such as Melbourne, Adelaide and Hobart (except those areas near the coast) and most inland cities.

1.4.5.5 Mild

Environment that is remote from the coast, industrial activity and the tropics.

NOTE: Sparsely settled regions such as outback Australia are typical examples, but the category also includes rural communities other than those on the coast.

1.4.6 Site class

Site classes assigned to the foundation material, determined in accordance with AS 2870, for the expected level of ground movement.

1.4.7 Small building

A building that is constrained by the building geometry as described in Clause 1.2.

1.4.8 Water thickener

Methylcellulose-based water retention mortar additive intended to retain moisture within a mortar during laying and the cement hydration process.

1.4.9 Wind class

Wind load class determined in accordance with AS 4055.

SECTION 2 MASONRY UNITS

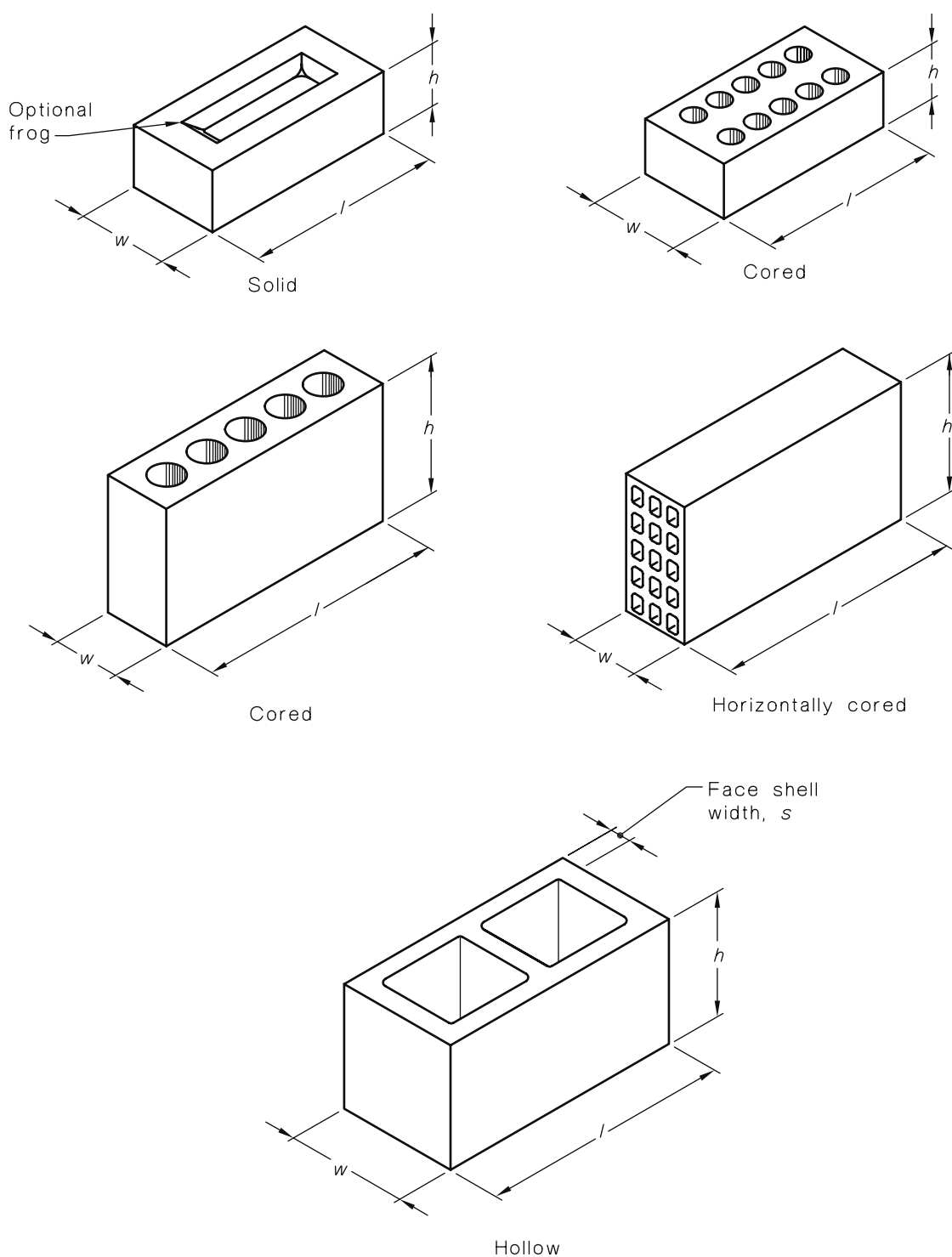
2.1 MATERIALS

All masonry units shall be fired clay, concrete or calcium silicate and shall be manufactured to comply with AS/NZS 4455.1. Masonry units shall be solid, cored, horizontally cored or hollow units.

NOTE: Typical units are shown in Figure 2.1.

2.2 SIZES

The work sizes, length (l), width (w), height (h) and face shell widths (s), of masonry units shall be nominated by the manufacturer (see Figure 2.1).



NOTE: These diagrams show only the basic shapes of the principal units. There are many commercially available 'fittings' and 'special' units used for particular applications.

FIGURE 2.1 TYPICAL MASONRY UNITS

2.3 COMPRESSIVE STRENGTH

Masonry units shall have the following minimum characteristic unconfined compressive strengths:

- (a) Solid or cored units in non-loadbearing masonry.....3 MPa.
- (b) Horizontally cored units in non-loadbearing masonry 2.5 MPa.
- (c) Solid or cored units in loadbearing masonry.....5 MPa.
- (d) Hollow units in unreinforced masonry 10 MPa.
- (e) Units in reinforced masonry 15 MPa.

2.4 DURABILITY

Masonry units shall have a salt attack resistance grade as specified in the documents but shall be not less than that set out in Table 2.1 for the exposure environments defined in Clause 1.4.5.

TABLE 2.1
SALT ATTACK RESISTANCE OF MASONRY UNITS

Exposure environment	Location		Masonry units salt attack resistance grade (see Note 1)
All	Interior	Normal	Protected
		Subject to non-saline wetting and drying	General purpose
		Subject to saline wetting and drying	Exposure
	Exterior coated in accordance with Clause 11.7, above a DPC and protected by roof, eave or coping, with properly flashed junctions		Protected
	Below a DPC or in contact with the ground	Protected from water ingress by an impermeable membrane	Protected
		Non-aggressive soils	General purpose
		Aggressive soils	Exposure
Mild	Exterior		Protected
Moderate	Exterior		Protected
Industrial	Exterior		Exposure
Marine (see Note 2)	Exterior		General purpose
Severe marine (see Note 3)	Exterior		Exposure
Special (see Note 4)	Exterior		(See Note 4)

NOTES:

- Means of determining salt attack resistance grades for masonry units are given in AS/NZS 4455.1.
- All external elements in contact with freshwater or subject to non-saline wetting and drying shall be treated as for a marine environment. For example, this applies to gardens against a house.
- All external elements in contact with saline or contaminated water or subject to saline wetting and drying shall be treated as for a severe marine environment.
- Requirements for especially aggressive environments depend on the nature of the corrosive agents and cannot be defined. Units shown by test or known by experience to be resistant to the particular corrosive agent shall be used.

2.5 EXPANSION OR CONTRACTION

The coefficients of expansion or drying contraction of masonry units shall be as specified in the documents, but shall be not more than the values given in Table 2.2.

NOTE: A local supplier may not be aware of the coefficients of expansion or drying contraction of masonry units; however, the brick or block manufacturer can provide this information.

TABLE 2.2
MAXIMUM EXPANSION OR CONTRACTION

Type of unit	Coefficient of expansion (see Note 1)	Coefficient of drying contraction (see Note 2)
	mm/m	mm/m
Clay units	1.8	—
Concrete or calcium silicate units	—	0.6

NOTES:

- 1 Coefficient of expansion derived from AS/NZS 4456.11.
- 2 Coefficient of drying contraction derived from AS/NZS 4456.12.

S E C T I O N 3 M O R T A R

3.1 MORTAR TYPES

Mortar types shall be as specified in the documents but their durability shall be not less than the requirements given in Table 3.1 and Table 3.2. The mix proportions shall comply with the following:

- (a) Mortar mixes shall be designated by the materials and proportions of their ingredients. They shall be set out in the order of parts of cement : lime : sand.

NOTE: These proportions are sometimes preceded by the letter that abbreviates the material. For example, C1 : L0.5 : S4.5 is one part cement : half a part lime : four and a half parts sand.

- (b) The water thickener referred to in Table 3.2 is methylcellulose based. The particular methylcellulose-based product used shall be specifically suited for this application.

NOTES:

- 1 The methylcellulose-based product should be used in accordance with the manufacturer's or supplier's instructions.
- 2 Air-entraining agent is not the same as methylcellulose-based water thickener.
- 3 Volumes in Table 3.2 refer to those materials in the dense-packed condition.

- (c) Type SR cement shall be used in masonry below the damp-proof course in areas with sulphate-rich ground water.

TABLE 3.1
MORTAR DURABILITY REQUIREMENTS

Exposure environment	Location		Mortar class	
All	Interior	Normal	Clay units	M2
			Concrete or calcium silicate units	M3
		Subject to non-saline wetting and drying	M3	
		Subject to saline wetting and drying	M4	
	Exterior-coated in accordance with Clause 11.7, above a DPC and protected by roof, eave or coping, with properly flashed junctions		Clay units	M2
			Concrete or calcium silicate units	M3
	Below a DPC or in contact with the ground	Protected from water ingress by an impermeable membrane	Clay units	M2
			Concrete or calcium silicate units	M3
		Non-aggressive soils	M3	
		Aggressive soils	M4	
Mild	Exterior		Clay units	M2
			Concrete or calcium silicate units	M3
Moderate	Exterior		Clay units	M2
			Concrete or calcium silicate units	M3
Industrial	Exterior		M4	
Marine (see Note 1)	Exterior		M3	
Severe marine (see Note 2)	Exterior		M4	
Special (see Note 3)	Exterior		(See Note 3)	

NOTES:

- 1 All external elements in contact with freshwater or subject to non-saline wetting and drying shall be treated as for a marine environment. For example, this applies to gardens against a house.
- 2 All external elements in contact with saline or contaminated water, or subject to saline wetting and drying, shall be treated as for a severe marine environment.
- 3 Requirements for especially aggressive environments depend on the nature of the corrosive agents and cannot be defined. Units, mortars, covers or coatings, shown by test or know by experience to be resistant to the particular corrosive agent, shall be used.
- 4 M2 mortar is not permitted for concrete and calcium silicate masonry. There are also limitations on the constituents of M3 and M4 mortars for calcium silicate masonry (see Table 3.2.).

TABLE 3.2
MORTAR MIXES

Mortar class	Mix proportions by volume					Mortar suitability		
	Cement (GB/GP)	Masonry cement	Building lime	Sand	Water thickener	Fired clay	Concrete	Calcium silicate
M2	1	0	2	9	No	✓	×	×
M3	1	0	1	6	Optional	✓	✓	×
	1	0	0	5	Yes	✓	✓	✓
	0	1	0	4	Yes	✓	✓	×
M4	1	0	0.5	4.5	Optional	✓	✓	×
	1	0	0	4	Yes	✓	✓	✓
	1	0	0-0.25	3	Optional	✓	✓	×
	0	1	0	3	Yes	✓	✓	×

LEGEND:

✓ = satisfactory

× = unsatisfactory

Type GP = general purpose portland cement.

Type GB = general purpose blended cement.

3.2 MORTAR COMPONENTS

3.2.1 Cement

Cements shall comply with AS 3972 for Type GP or GB or AS 1316 for masonry cement.

3.2.2 Lime

Dry hydrated lime shall comply with AS 1672.1.

3.2.3 Sand

Sand shall be free from material harmful to the mortar, grout, masonry units, reinforcement or any embedded items.

Sand shall be well graded and, when tested in accordance with the appropriate method of the AS 1141 series, shall contain not more than 10% of material passing the 75 micron sieve.

3.2.4 Water thickener

Water thickener shall be methylcellulose-based water thickener specifically designed and packaged for use in masonry.

3.2.5 Water

Water shall be free from any matter harmful to the mortar, grout, masonry units, reinforcement or any embedded items.

NOTE: Potable (drinkable) water is satisfactory.

3.2.6 Additives

The following additives are acceptable for use in mortar:

- (a) Plasticizers or workability agents specifically designed for use in masonry and air-entraining agents complying with AS 1478.2.

NOTE: Overdosing mortar with workability agents reduces the durability and bond strength.

- (b) Colouring pigments complying with EN 12878.

Fire clay shall not be used unless the sand is sharp and requires more workability. If fire clay is added to mortar, the proposed mix shall be tested in accordance with the requirements of AS 3700 for flexural strength and shall achieve a flexural strength not less than 0.2 MPa.

Detergent, sugar, beer, sweetened beverage and plaster of Paris are harmful to bond strength and shall not be used in mortar.

S E C T I O N 4 G R O U T

4.1 PURPOSE

Where required, grout shall be used to —

- (a) give a protective cover to reinforcement;
- (b) connect the reinforcement structurally to the masonry; or
- (c) fill the cores of hollow masonry units.

4.2 COMPOSITION

Grout shall be as specified in the documents but not less than the requirements of this Section.

Grout shall consist of a mixture of cement, sand and coarse aggregate (screened gravel or crushed rock).

Grout shall be mixed to a pouring consistency to give free flow without segregation. A mortar mix to which water has been added (slurry) shall not be used as a substitute for grout.

A1 | Aggregate shall not exceed 12 mm.

In addition, for reinforced masonry the following applies:

- (a) Premixed grout shall be of N 20 Grade and have a compressive strength of at least 20 MPa, with at least 300 kg of cement per cubic metre.
- (b) Site-mixed grout shall consist of the following volumetric proportion:
1 part cement : 2 parts sand : 4 parts aggregate.

4.3 PLACEMENT

The grout shall be placed by hand or by pumping. It shall be compacted by rodding or mechanically vibrating during the placing process to complete the filling of the cores.

NOTE: Grout will usually settle in the cores a short time after placing. Cores should be topped up while the grout is still plastic and the additional grout rodded into the earlier material.

S E C T I O N 5 B U I L T - I N C O M P O N E N T S

5.1 GENERAL

This Section sets out requirements for built-in components of masonry, as follows:

- (a) Wall ties.
- (b) Connectors.
- (c) Lintels and arch bars.
- (d) Reinforcement.
- (e) Flashing.
- (f) Damp-proof courses.

The type and location of built-in components shall be as specified in the documents but shall be not less than the requirements of this Section.

5.2 DURABILITY

Unless more stringent requirements are specified in the documents, wall ties, connectors and steel lintels shall have a durability rating as shown in Table 5.1.

TABLE 5.1
DURABILITY OF BUILT-IN COMPONENTS

Exposure environment	Location		Built-in components durability class (see Note 1)	Colour coding	Stamping
All	Interior	Normal	R1	Green	1
		Subject to non-saline wetting and drying	R3	Red	3
		Subject to saline wetting and drying	R4	White/Blue	4
	Exterior-coated in accordance with Clause 11.7, above a DPC and protected by roof, eave or coping, with properly flashed junctions		R1	Green	1
	Below a DPC or in contact with the ground	Protected from water ingress by an impermeable membrane	R2	Yellow	2
		Non-aggressive soils	R3	Red	3
		Aggressive soils	R4	White/Blue	4
Mild	Exterior		R1	Green	1
Moderate	Exterior		R1	Green	1
Industrial	Exterior		R4	White/Blue	4
Marine (see Note 2)	Exterior		R3	Red	3
Severe marine (see Notes 3 and 6)	Exterior		R4	White/Blue	4
Special (see Notes 4 and 6)	Exterior		R5	(See Note 4)	(See Note 4)

NOTES:

- 1 Durability classes for built-in components are defined in AS 2699.1 and AS 2699.3.
- 2 All external elements in contact with freshwater or subject to non-saline wetting and drying shall be treated as for a marine environment. For example, this applies to gardens against a house.
- 3 All external elements in contact with saline or contaminated water or subject to saline wetting and drying shall be treated as for a severe marine environment.
- 4 Requirements for especially aggressive environments depend on the nature of the corrosive agents and cannot be defined. Materials or coatings shown by test, or known by experience, to be resistant to the particular corrosive agent shall be used.
- 5 This table does not exclude the use of materials that otherwise comply with the requirements of AS/NZS 2699, Parts 1-3.
- 6 The design solution for R5 components (Special) will depend on the environment to which the components are exposed and therefore further technical advice on developing a solution should be sought.

A1

5.3 WALL TIES

Wall ties shall be used to connect the outer leaf of a masonry wall to its supporting inner leaf or frame. Wall ties shall be of Type A complying with AS/NZS 2699.1, and shall be selected and spaced in accordance with Clauses 9.7 and 10.6.

NOTE: Type A ties are not suitable for high earthquake applications. Type B ties are commonly used in New Zealand and are generally not available in Australia.

5.4 LINTELS

Lintels shall be steel, reinforced concrete, prestressed concrete, prestressed clay or other proprietary systems. Steel lintels shall comply with the durability requirements of AS/NZS 2699.3.

Lintel selection shall be in accordance with Section 8.

5.5 REINFORCEMENT

A1 | Steel reinforcement shall comply with AS/NZS 4671 and be detailed in accordance with the relevant requirements of AS 3700.

5.6 FLASHINGS AND DAMP-PROOF COURSES

Flashings and damp-proof courses shall comply with Table 5.2.

When flashings are expected to hold a particular shape, a rigid flashing material shall be used.

To avoid galvanic corrosion, metal flashings shall be compatible with other metals with which they are in contact or spill water onto, or from which they receive water. Lead flashings shall not be used on any roof that is part of a potable water catchment roof.

The combination of lead with zinc aluminium alloy shall not be used.

Membrane damp-proof course shall consist of—

- (a) a material that complies with AS/NZS 2904; or
- (b) sheet metal termite shields in accordance with AS 3660.1 (with any penetrations sealed) continuous through the wall or pier.

NOTE: Flashings that extend through the masonry may also serve the purpose of DPCs.

TABLE 5.2
SUITABLE FLASHINGS AND DPC MATERIALS

Location	Suitable flashing material
Non-exposed (within the structure and not exposed directly to the weather)	(a) Embossed/quilted polyethylene sheet of high impact resistance and low slip, with an average thickness prior to embossing of not less than 0.5 mm and not less than 0.75 mm after embossing (b) Polyethylene-coated aluminium with 0.3 mm min. base thickness (aluminium core thickness of not less than 0.1 mm coated with bitumen adhesive on both sides, enclosed in polyethylene film with a minimum thickness of 0.1 mm on both faces) and overall min. thickness of 0.5 mm prior to coating (c) Bitumen-coated aluminium with 0.3 mm min. base thickness and overall min. thickness of 0.56 mm after coating (d) Bitumen-coated copper with 0.15 mm min. base thickness and overall min. thickness of 0.41 mm after coating (e) Uncovered copper having a mass of not less than 2.8 kg/m² and having a thickness of 0.5 mm (f) Galvanized zinc-coated steel with a thickness of not less than 0.6 mm (g) Uncovered annealed lead having a mass of not less than 10 kg/m² in lengths not exceeding 1.5 m or 1.5 m² in area
Exposed (continuously open to the weather)	(a) Bitumen-coated aluminium with 0.55 mm min. base thickness and overall min. thickness of 0.81 mm after coating (b) Bitumen-coated copper with 0.15 mm min. base thickness and overall min. thickness of 0.41 mm after coating (c) Uncovered copper having a mass of not less than 2.8 kg/m² and having a thickness of 0.5 mm (d) Galvanized zinc-coated steel with a thickness of not less than 0.6 mm (e) Uncovered annealed lead having a mass of not less than 20 kg/m² in lengths not exceeding 1.5 m or 1.5 m² in area
Areas with saline ground salt	(a) Embossed/quilted polyethylene sheet of high impact resistance and low slip, with an average thickness prior to embossing of not less than 0.5 mm and not less than 0.75 mm after embossing (b) Polyethylene-coated aluminium with 0.3 mm min. base thickness (aluminium core thickness of not less than 0.1 mm coated with bitumen adhesive on both sides, enclosed in polyethylene film with a minimum thickness of 0.1 mm on both faces) and overall min. thickness of 0.5 mm prior to coating (c) Bitumen-coated aluminium with 0.55 mm min. base thickness and overall min. thickness of 0.81 mm after coating
Class A or S sites with sandy or limestone free draining soils	(a) Proprietary polymer emulsion DPC parged to the slab

NOTE: A and S classes are defined in AS 2870 (see Clause 1.5).

SECTION 6 SUBFLOOR CONSTRUCTION

6.1 GENERAL

The subfloor space between a suspended floor of a building and the ground shall be in accordance with the documents and shall—

- (a) be cleared of all building debris and vegetation;
- (b) be cross-ventilated by means of evenly spaced openings (see Clause 6.2); and
- (c) contain no dead air spaces.

NOTE: Typical subfloor ventilation layout and details are shown in Figure 6.1.

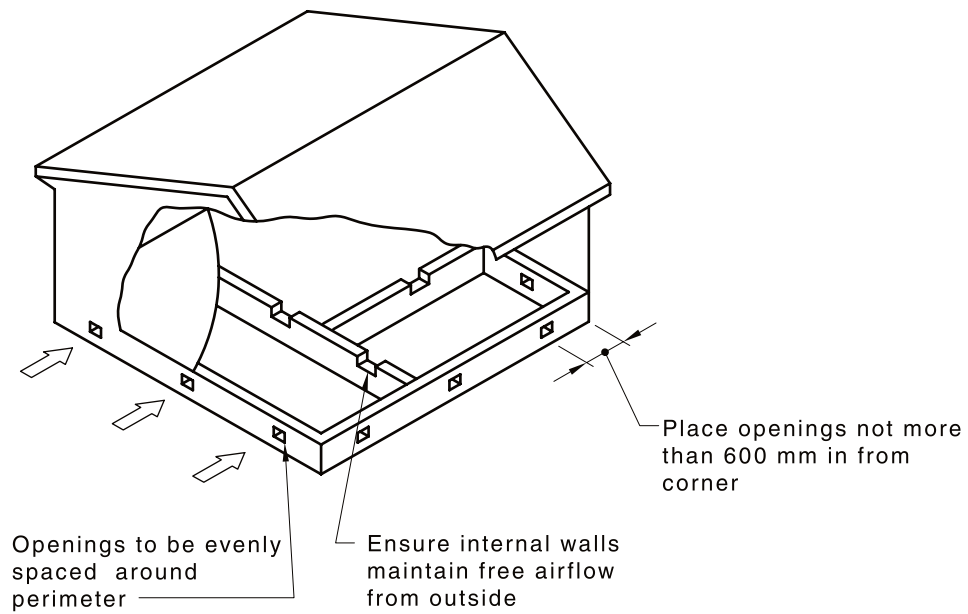
6.2 VENTILATION

The subfloor ventilation between the suspended floor of a building and the ground shall be in accordance with the documents but shall be not less than the following:

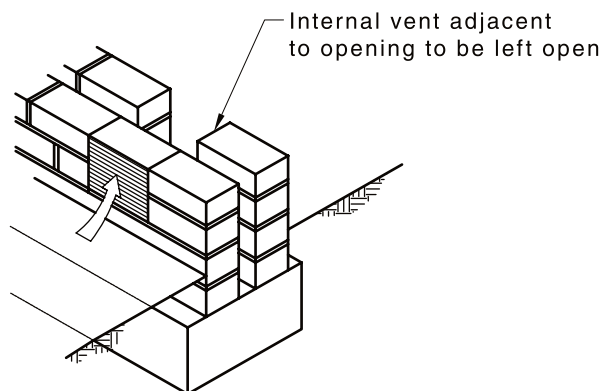
- (a) The subfloor ventilation openings in internal and external walls shall be in accordance with Table 6.1 for the climatic zones given in Figure 6.2.
- (b) The clearance between the ground surface and the underside of the lowest floor timber (generally the bearer underside) shall be in accordance with Table 6.1;

NOTE: For sloping sites, where termite inspections are required, the 400 mm clearance may be reduced to 150 mm within 2 m of external walls (see Figure 6.3).

- (c) In double-leaf masonry walls, the cross-ventilation openings shall be provided in both leaves of the masonry, with inner-leaf openings being aligned with outer leaf openings to allow an unobstructed flow of air.
- (d) Internal walls constructed in subfloor spaces shall be provided with openings—
 - (i) having an unobstructed area equivalent to that required for the adjacent external openings; and
 - (ii) which are evenly distributed throughout such internal walls.
- (e) Where ventilation is obstructed by patios, paving or similar structure, additional ventilation shall be provided to ensure that the overall level of ventilation is maintained.
- (f) Where the ground or subfloor space is excessively damp or subject to frequent flooding, in addition to the requirements of Items (a) to (e)—
 - (i) the area of subfloor ventilation required in Table 6.1 shall be increased by 50%; or
 - (ii) a sealed impervious membrane shall be provided over the ground; or
 - (iii) durability Class 1 or 2 timbers or H3 preservative-treated timbers in accordance with AS 1684 series shall be used.



(a) Typical subfloor ventilation layout



(b) Typical subfloor ventilation detail

FIGURE 6.1 TYPICAL SUBFLOOR VENTILATION

TABLE 6.1
SUBFLOOR VENTILATION AND CLEARANCE

Climate zone (see Figure 6.2)	Minimum subfloor ventilation mm ² /m of wall		Minimum height from ground surface mm	
	No membrane	Ground sealed with impervious membrane	Termite inspection not required	Termite inspection required
A	2000	1000	150	400
B	4000	2000	150	400
C	6000	3000	150	400

NOTES:

- 1 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 shows three broad climatic zones based on the prevailing relative humidity and includes a description of the relative humidity conditions that define each zone. If reliable weather data is available, these descriptions may be useful in determining within which zone a particular site is located.
- 2 The zones shown in Figure 6.2 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.

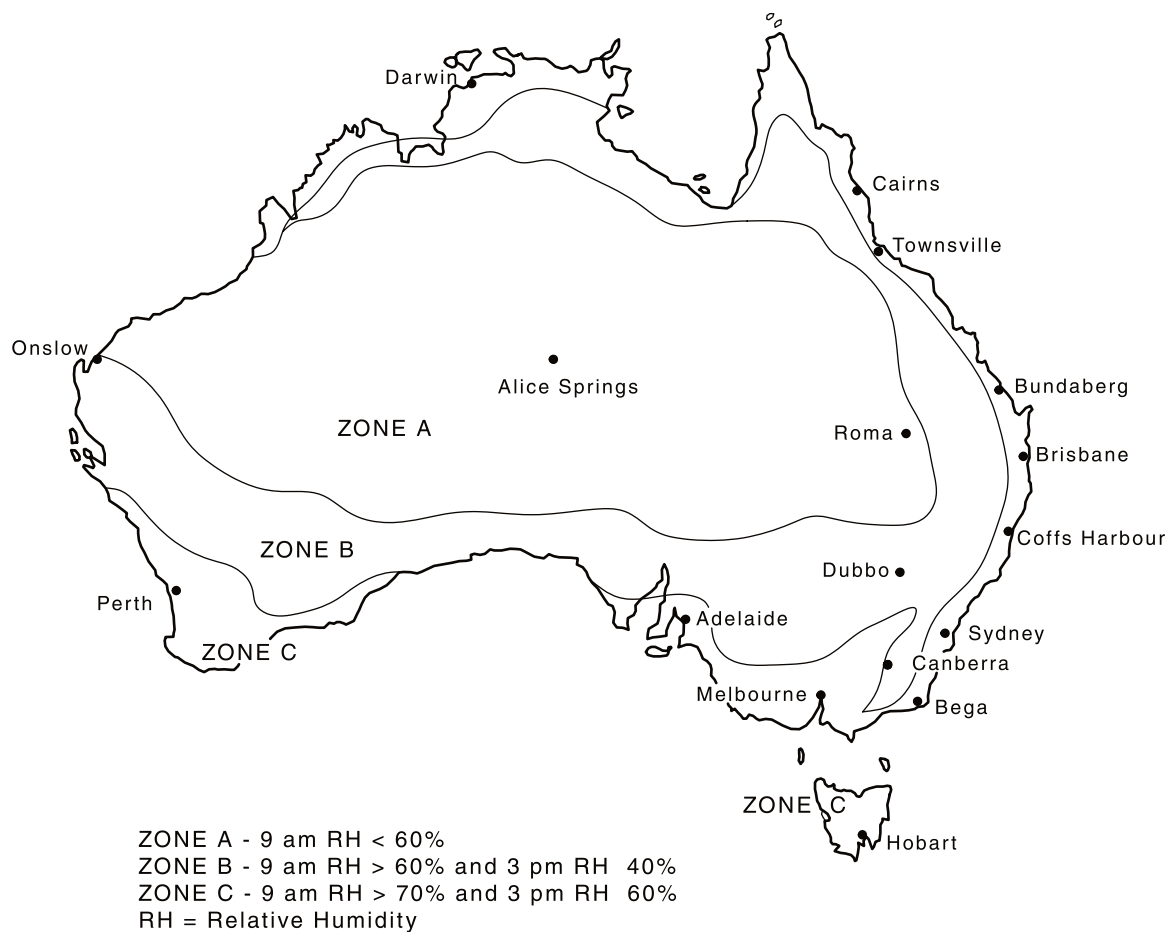


FIGURE 6.2 CLIMATIC ZONES BASED ON RELATIVE HUMIDITY

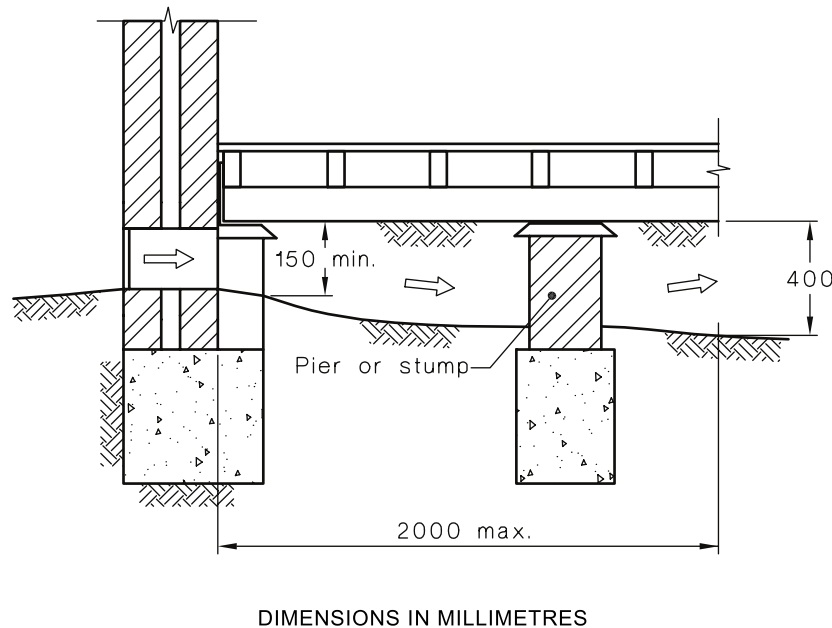


FIGURE 6.3 REDUCED CLEARANCE CONCESSION FOR SLOPING SITES
WHERE TERMITE INSPECTION IS REQUIRED

6.3 SUBFLOOR BRACING

Subfloor structures shall be as specified in the documents or in accordance with AS 4773.1, and shall provide resistance to racking loads from wind and earthquake, as appropriate, and shall transfer all loads to the footings and foundation.

6.4 SUBFLOOR PIERS

6.4.1 Pier spacing

The location of subfloor piers, whether isolated or engaged, shall be as specified in the documents or in accordance with AS 4773.1, and shall be spaced appropriate for the floor framing and, where applicable, the wall framing. All piers shall be fully supported on concrete footings.

6.4.2 Engaged piers

Where used, the spacing of engaged piers shall be as specified in the documents and, when constructed, shall not vary from these spacings by more than 20%. The thickness of engaged piers shall be not less than the greater of—

- (a) 100 mm (including 10 mm of mortar); and
- (b) the width of the supported timber floor member +25 mm as shown in Figure 6.4.

All engaged piers shall be fully bonded or tied to the masonry wall. Where ties are used, they shall be medium duty wall ties at not greater than 400 mm vertical centres (max.) with the top ties placed within 200 mm of the top of the pier.

- A1 | Engaged piers over 305 mm wide, measured along the length of the wall, shall incorporate 2 ties spaced horizontally at each required location. All engaged piers constructed of hollow units shall be filled with grout.