Part 2.2 Structural provisions

2.2.1 Application of Part 2.2

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

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

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 (wind regions B2 and C)	Cyclonic wind (wind region D)	Snow	Earthquake
1	1:100	1:200	1:250	1:100	1:250
2	1:500	1:500	1:1000	1:150	1:500

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

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 B2, 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

Part 3.2 Earthworks

3.2.1 Un-retained bulk earthworks – site cut and fill

(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~~2:3
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

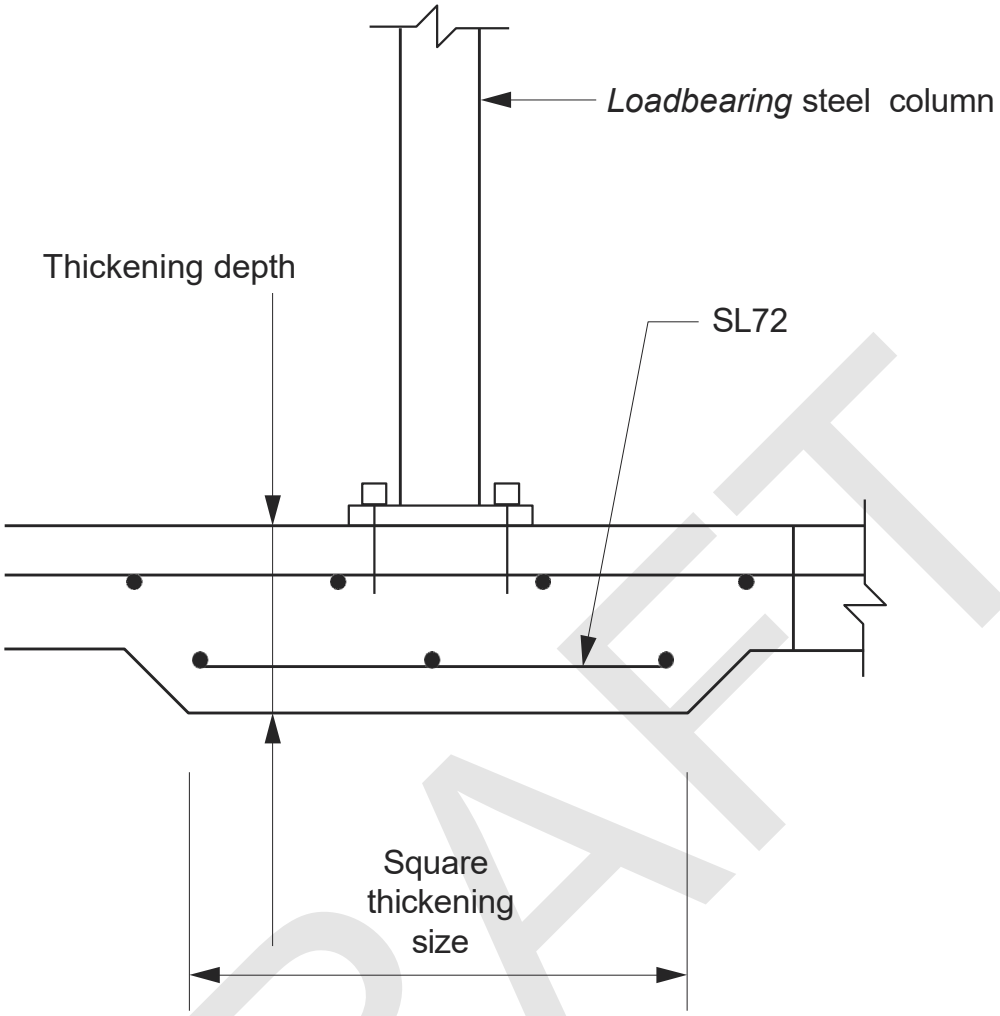
(1) See Figures 3.2.1a and 3.2.1b for some examples of un-retained embankment slopes.

(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 4.2.20: Localised thickening for concentrated loads



4.2.21 Minimum edge beam dimensions

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

(1) Where a recess in a slab is provided, a thickening must be provided not less than 400 mm measured from the inside face of the recess (L), reinforced in accordance ~~it must comply~~ with one of the following:

(a) For recess depths (d) 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~~

(i) be bent to accommodate the recess (see Figure 4.2.22a~~).~~); or

~~(a)~~(ii) be installed in accordance with (b)(i) and (ii).

(b) For recess depths (d) 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).

~~(2)~~(3) *Required* slab depth (D) must be provided below the recess.

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

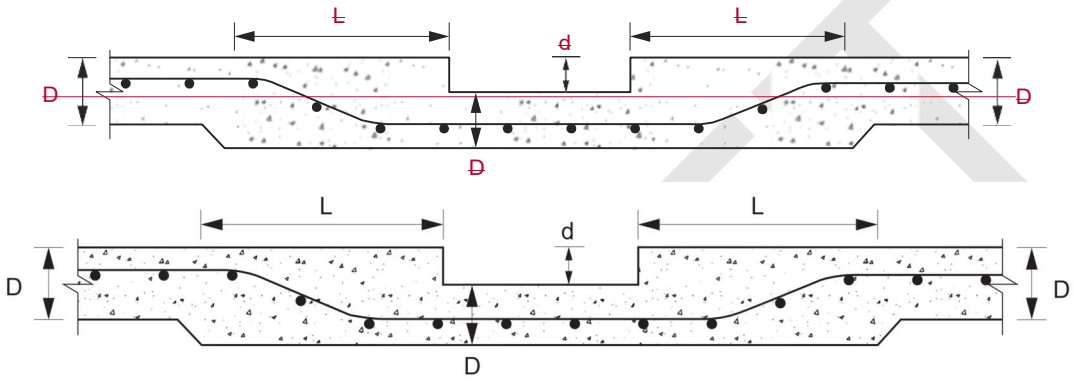


Figure Notes

L = Extent of thickening *required* by 4.2.22(1).
D = Slab depth.
d = Recess depth.

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

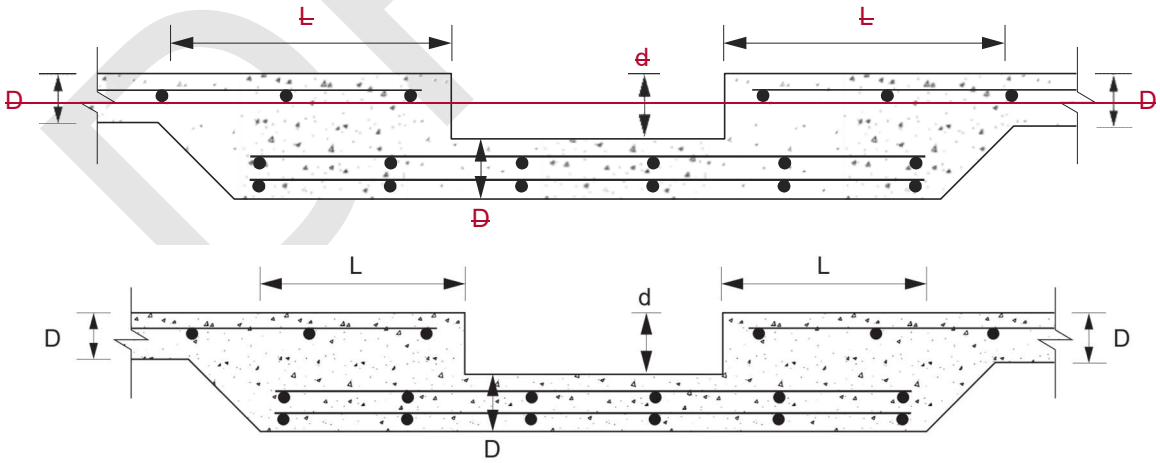
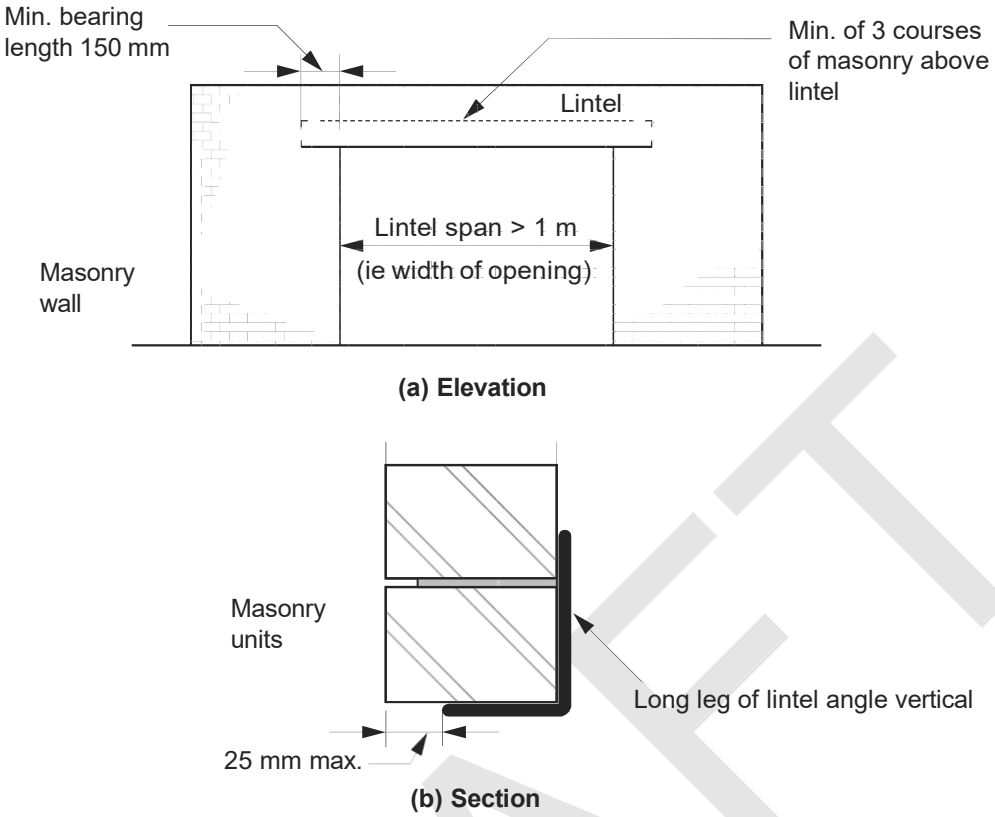


Figure Notes

L = Extent of thickening *required* by 4.2.22(1).
D = Slab depth.
d = Recess depth.

Figure 5.6.7: Lintel installation



5.6.8 Vertical articulation joints

(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 without openings or with openings ~~less than~~not more 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.

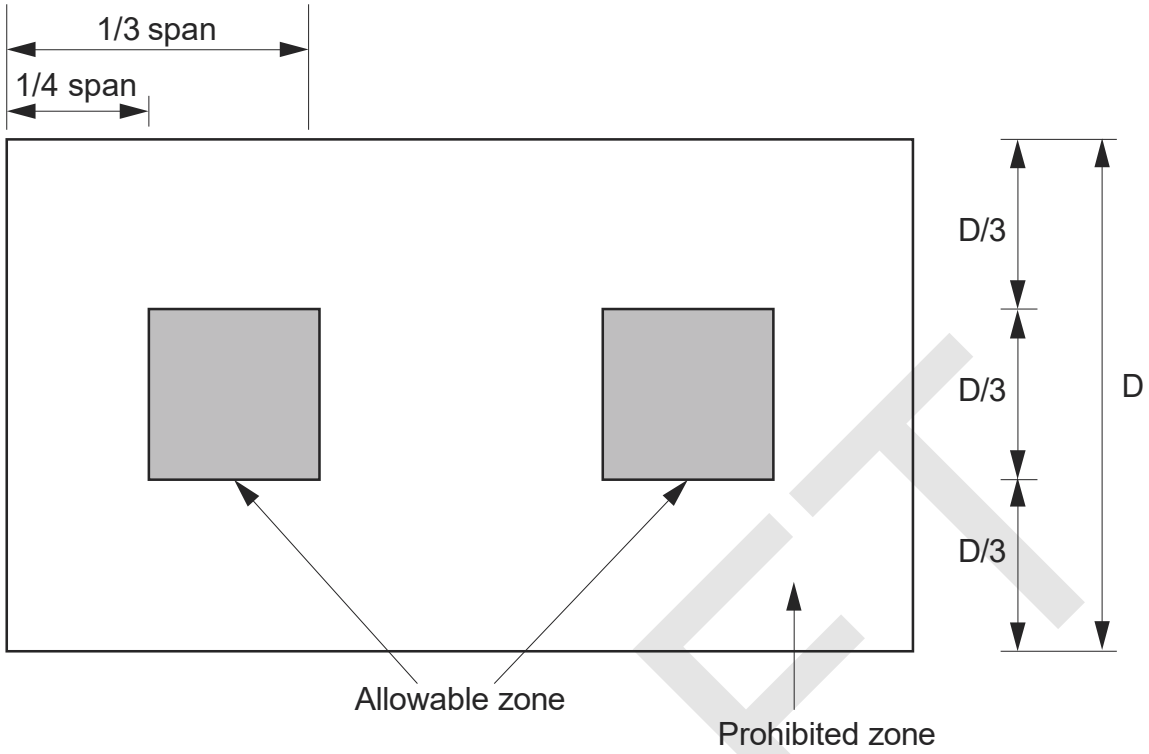
(3) Articulation joints must not be located adjacent to arched openings.

(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 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

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 October 2023.~~

(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

(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

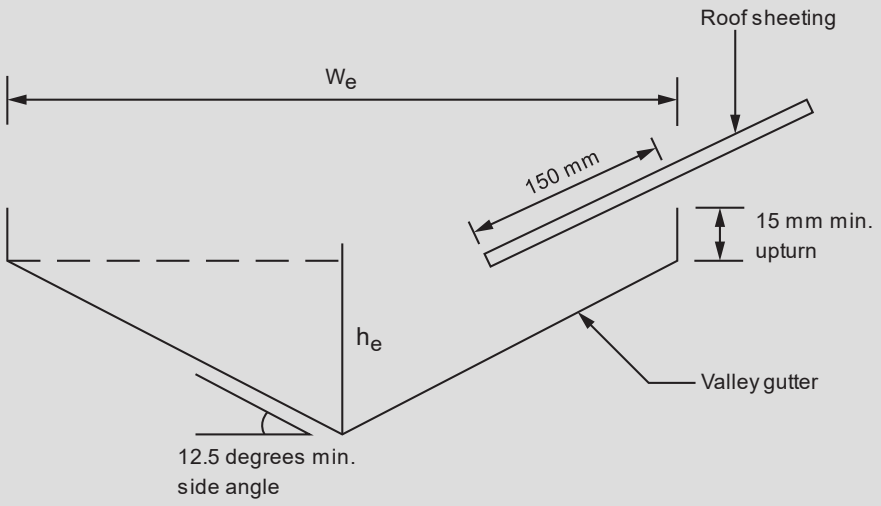
Table 7.4.4c: Valley gutters — Dimensions

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

- 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



Part 8.4 Glazing human impact

8.4.1 Application

(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)(a) 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

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

Part 9.1 Scope and application of Section 9

9.1.1 Scope

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

(a) fire separation of *external walls* (see Part 9.2); and

(b) fire protection of *separating walls* (see Part 9.3); and

(c) fire separation of garage top dwellings (see Part 9.4); and

(d) smoke alarms and evacuation lighting (see Part 9.5)~~.~~; and

~~(d)~~(e) fire separation of roofed outdoor areas (see Part 9.6).

(2) For other fire safety provisions not included in this Section, refer to NCC Volume Two H3D2(1) and (2): Fire hazard properties.

Limitations

Part 9.6 does not apply to verandahs and similar spaces subject to Part 9.3.

9.1.2 Application

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 9 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practice for Parts 3.7.2 to 3.7.5 of NCC 2019 Volume Two.

The content of Part 3.7.1 has been retained within Part H3 of NCC Volume Two as it contains requirements which affect how other provisions referenced in Part H3 are applied.

Part 9.6 Fire separation of roofed outdoor areas

9.6.1 Measurement of distances

(1) For roofed outdoor areas complying with 9.6.2(1) the distance is measured between the outermost structural projection of the roofed outdoor area and—

(a) the allotment boundary; or

(b) the *external wall* of another building; or

(c) the outermost structural projection of another roofed outdoor area (see Figure 9.6.1a).

(2) For roofed outdoor areas complying with 9.6.2(3) the distance is measured to the outermost projection of the roofed outdoor area and—

(a) the allotment boundary; or

(b) the *external wall* of another building including the outermost projection of any encroachment; or

(c) the outermost projection of another roofed outdoor area (see Figure 9.6.1b); or

(d) the *external wall* of the building including the outermost projection of any encroachment.

(3) The distance from any point on a roofed outdoor area to an allotment boundary, another building or another roofed outdoor area is the distance to that point measured in accordance with (1) and (2) along a line at right angles, without being obstructed by a wall complying with 9.2.3.

(4) Where the distance measured is between attached or detached buildings of different heights, the distance must be taken from the *external wall* with the highest elevation measured at right angles to a point that intersects the nearest part of a vertical projection above the adjacent building and—

(a) for roofed outdoor areas complying with 9.6.2(1) the measurement excludes eave overhang (see Figure 9.6.2c); and

(b) for roofed areas complying with 9.6.2(2) the measurement includes the outermost projection (see Figure 9.6.2d).

Figure 9.6.1a: Measurement of distance to outermost structural projection

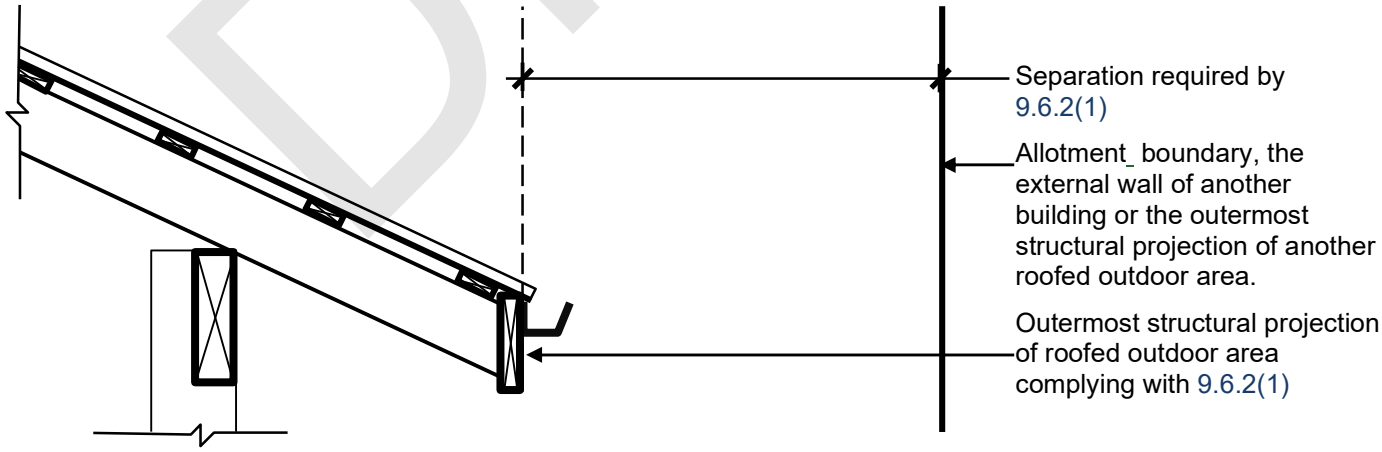


Figure Notes

The outermost structural projection will typically be the outside face of the fascia, or the roof structure where there is no fascia.

Figure 9.6.1b: Measurement of distance to outermost projection

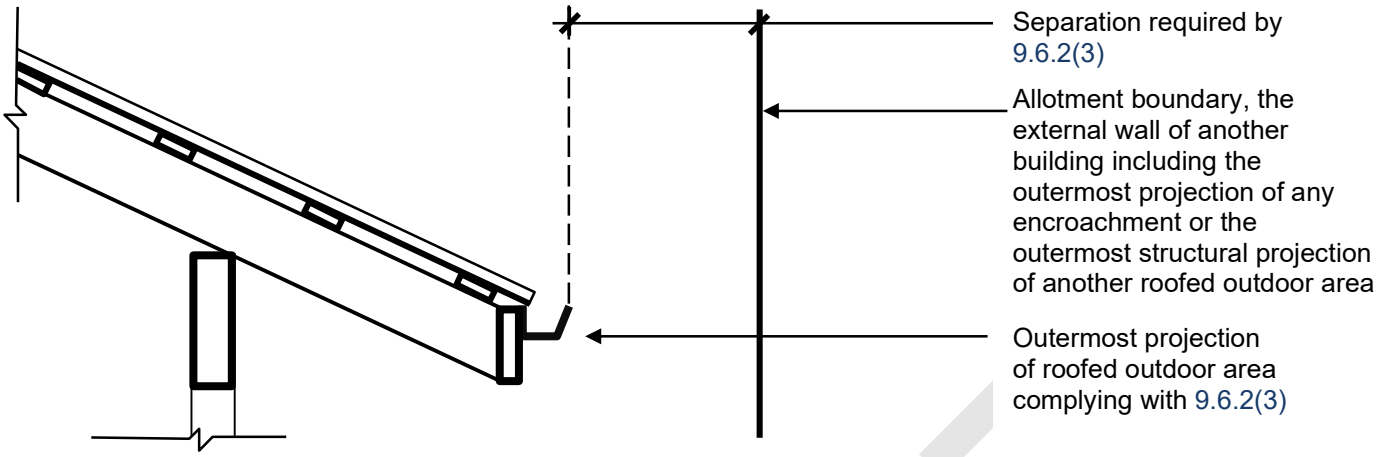


Figure Notes

The outermost projection will typically be the outside face or leading edge of the rainwater fittings, or the roof cover where there are no rainwater fittings.

Figure 9.6.1c: Measurement of distance — buildings of different heights on the same allotment — roofed outdoor area complying with 9.6.2(1)

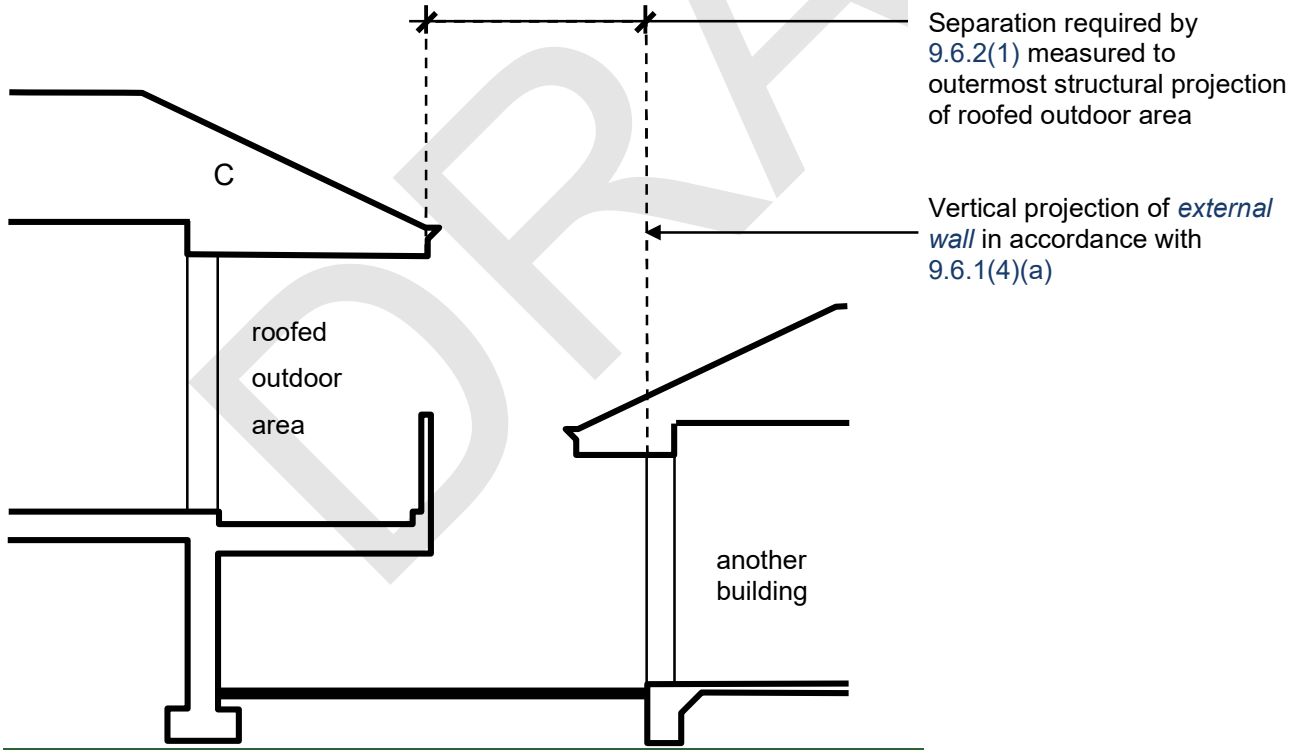
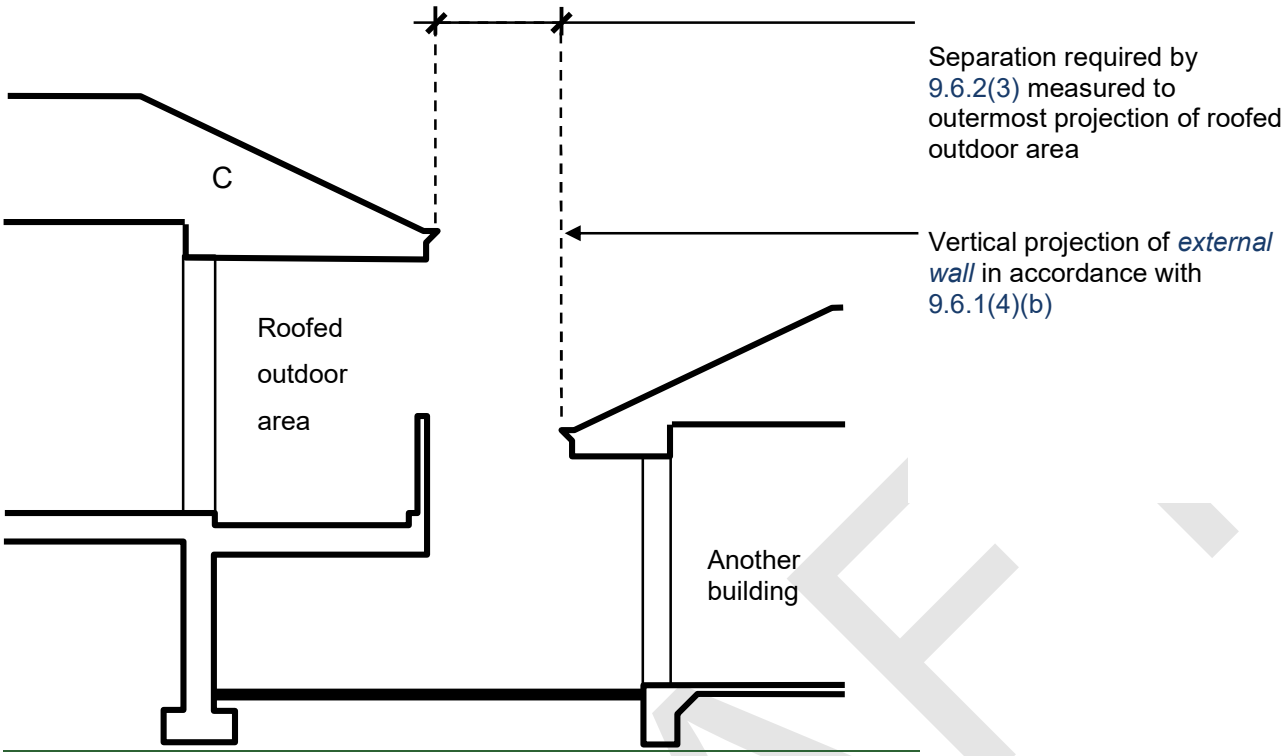


Figure 9.6.1d: Measurement of distance — buildings of different heights on the same allotment — roofed outdoor area complying with 9.6.2(3)



9.6.2 Roofed outdoor areas

(1) Unless provided with an *external wall* compliant with 9.2.3 the side of the roofed outdoor area must be not less than—

(a) 900 mm from an allotment boundary or a Class 10 building associated with the Class 1 building or a detached part of the same Class 1 building; or

(b) 1.8 m from another building or roofed outdoor area on the same allotment.

(2) The requirements of (1) do not apply to a boundary adjoining a road or other public space.

(3) Notwithstanding (1) a roofed outdoor area is allowed up to but not closer than 500 mm from an allotment boundary or up to but not closer than 1 m from another building, or its vertical projection, on the same allotment when measured in accordance with 9.6.1 if—

(a) it has two or more sides open and not less than one third of its perimeter open; and

(b) for the purposes of (a), a side is considered to be open if—

(i) it is without walls or openings capable of being closed for not less than two thirds of its length; and

(ii) the outermost projection adjacent to that side is not less than 1 m from another building or roofed outdoor area on the same allotment or, 500 mm from an allotment boundary or the *external wall* of the building (see Figure 9.6.2a, Figure 9.6.2d and Figure 9.6.2e); and

(c) the supported construction of the roofed outdoor area must be constructed from non-combustible materials, except that timber roof framing may be used where fully concealed by non-combustible ceiling and/or eaves lining, roof cover, gutters and fascias (see Figure 9.6.2b); and

(d) it does not provide direct vertical support to any part of the Class 1 building; and

(e) it has a polycarbonate or non-combustible roof covering (see Figure 9.6.2b); and

(f) any ceiling lining and wall cladding, including gables, is non-combustible (see Figure 9.6.2b); and

(g) the floor for the full extent of the roofed outdoor area, including any framing and supporting members is non-combustible (see Figure 9.6.2b); and

(h) in the case where the roofed outdoor area has a common roof structure with the Class 1 building and the roofed outdoor area does not have a ceiling (see Figure 9.6.2b and Figure 9.6.2c), the opening between the top of the wall of the Class 1 building and the underside of the roof covering is infilled with—

(i) a *non-combustible* material; or

(ii) construction clad with *non-combustible* material on the roofed outdoor area side; and

(i) the roofed outdoor area is separated from another building and/or an allotment boundary with fences or screens being—

(i) solid and constructed from a *non-combustible* material such as steel or fibre-reinforced cement sheeting, masonry or the like; and

(ii) not less than 1.5 m in height when measured from the finished surface floor level of the roofed outdoor area and having a clearance not greater than 100 mm between the bottom of the fence and the adjacent surface level boundary (see Figure 9.6.2d and Figure 9.6.2e); and

(iii) provided for the full length of the side(s) of the roofed outdoor area adjacent to another building and/or an allotment boundary (see Figure 9.6.2f).

Notes

For the purposes of Part 9.6 roofed outdoor areas are verandahs, alfresco dining areas and the like, and includes such uses when located below another part of the building, such as a ground floor alfresco dining area located below an upper floor balcony.

Figure 9.6.2a: Identifying a roofed outdoor area satisfying 9.6.2(3)(a) and (b)

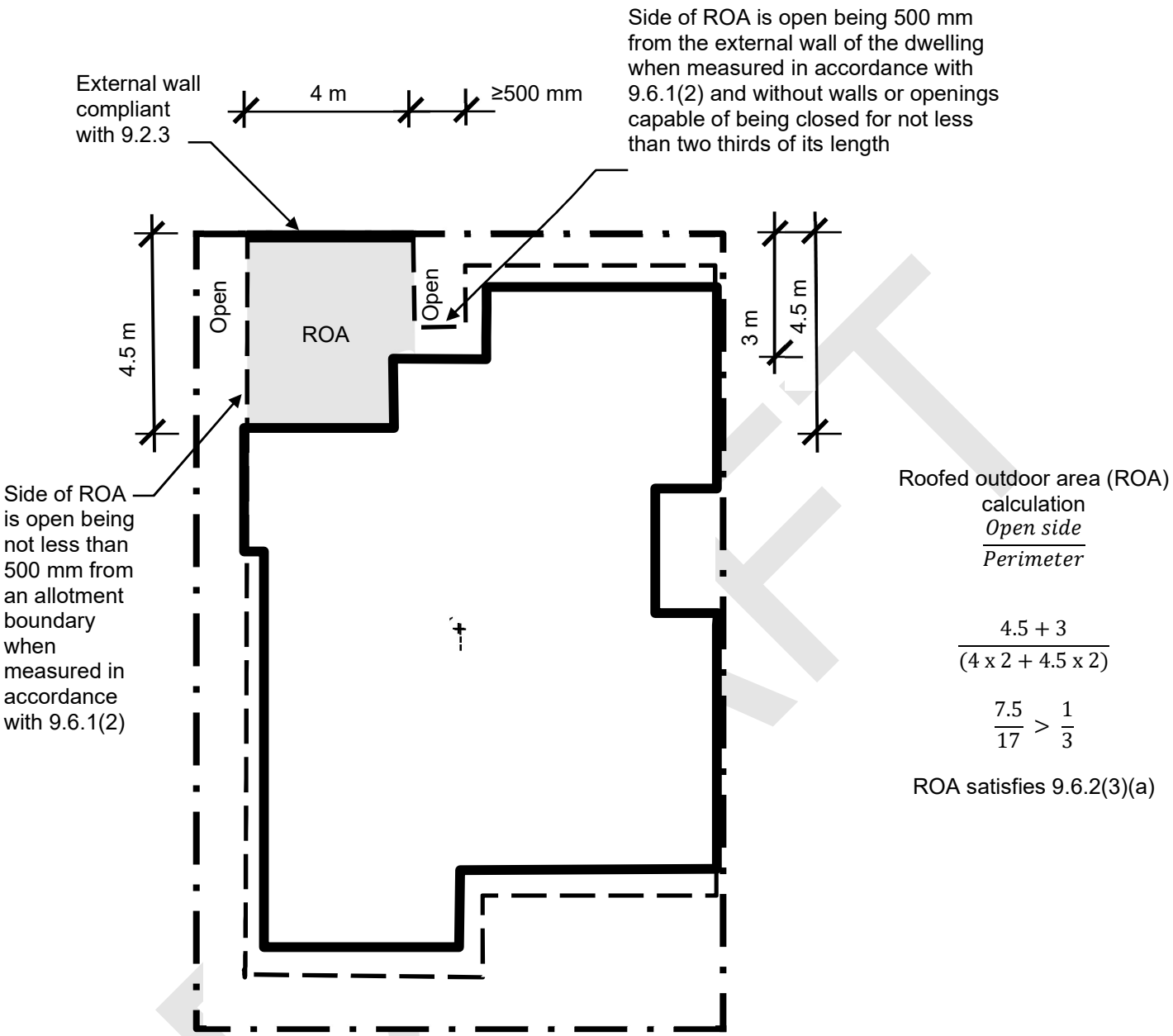


Figure Notes

Parts of roofed outdoor areas, being less than 500 mm from an allotment boundary or up to but not closer than 1 m from another building, or its vertical projection, on the same allotment or associated encroachments of another building on the same allotment must be provided with an external wall compliant with 9.2.3.

Figure 9.6.2b: Requirements for non-combustible construction

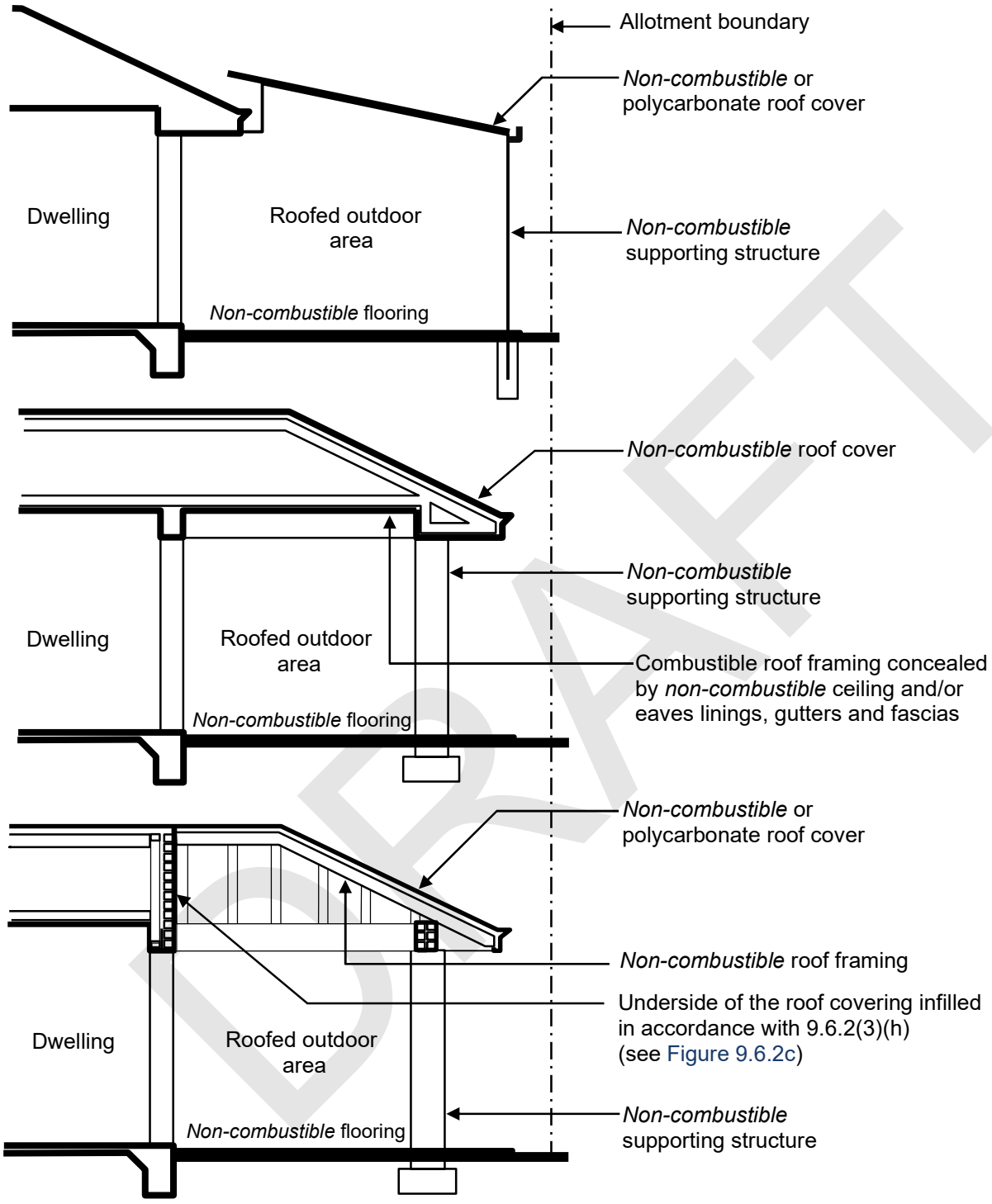


Figure Notes

The use of insulated panel products containing polystyrene is not permitted.

Figure 9.6.2c: Requirements for non-combustible infill panels

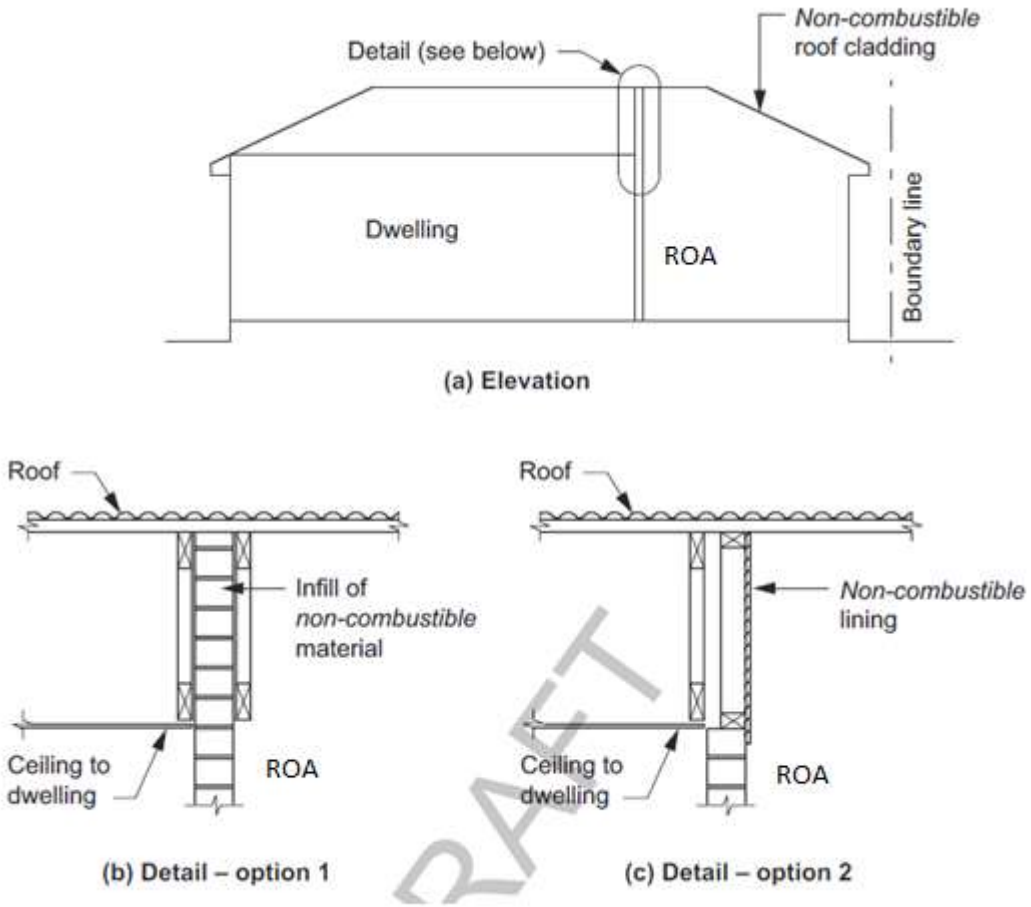


Figure Notes

The use of insulated panel products containing polystyrene is not permitted.

Figure 9.6.2d: Separation of roofed outdoor areas from an allotment boundary with a non-combustible fence or screen

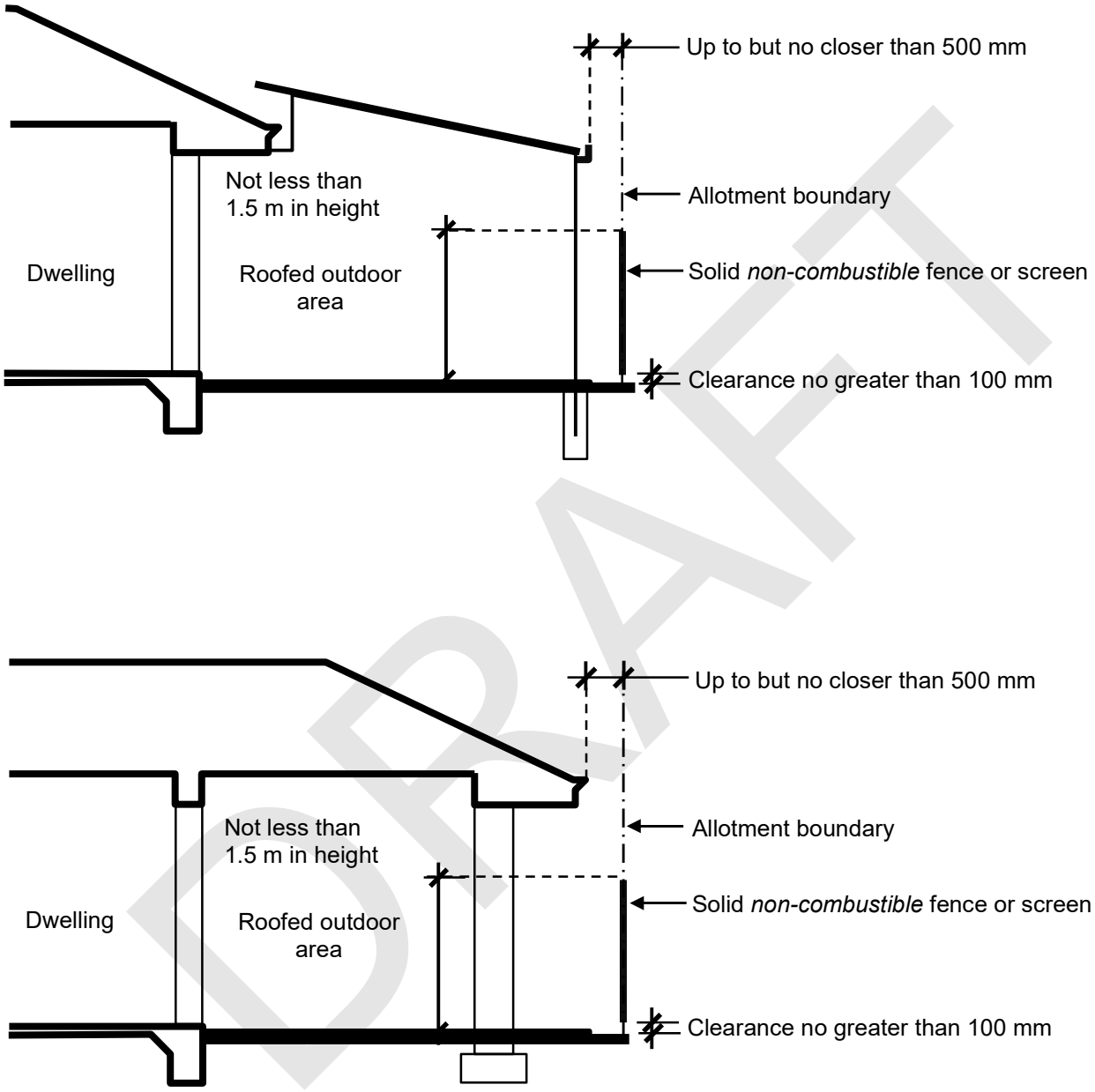


Figure 9.6.2e: Separation of roofed outdoor areas from another building on the same allotment with a non-combustible fence or screen

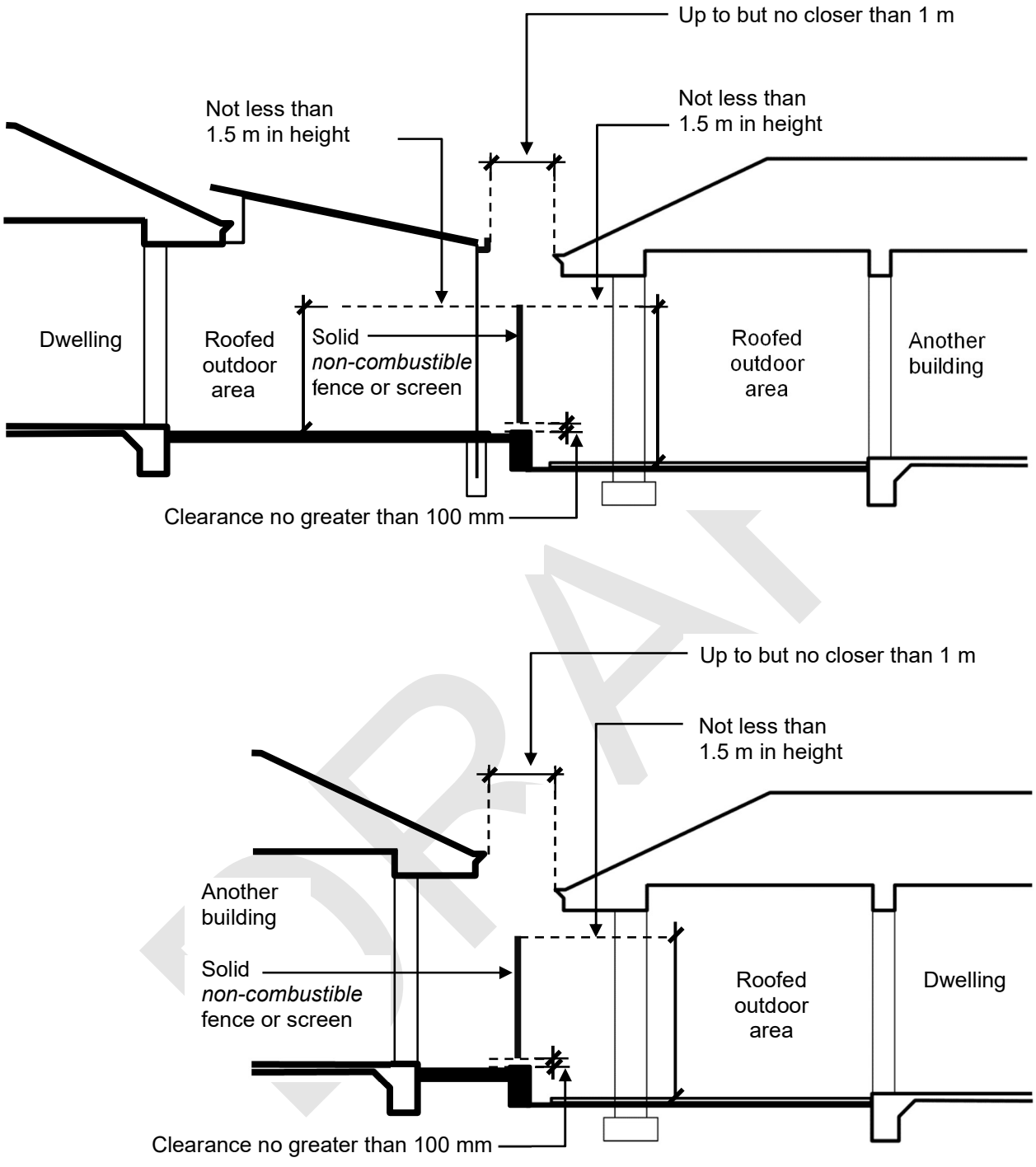


Figure 9.6.2f: Example locations of fences provided to separate roofed outdoor areas from another building and allotment boundaries

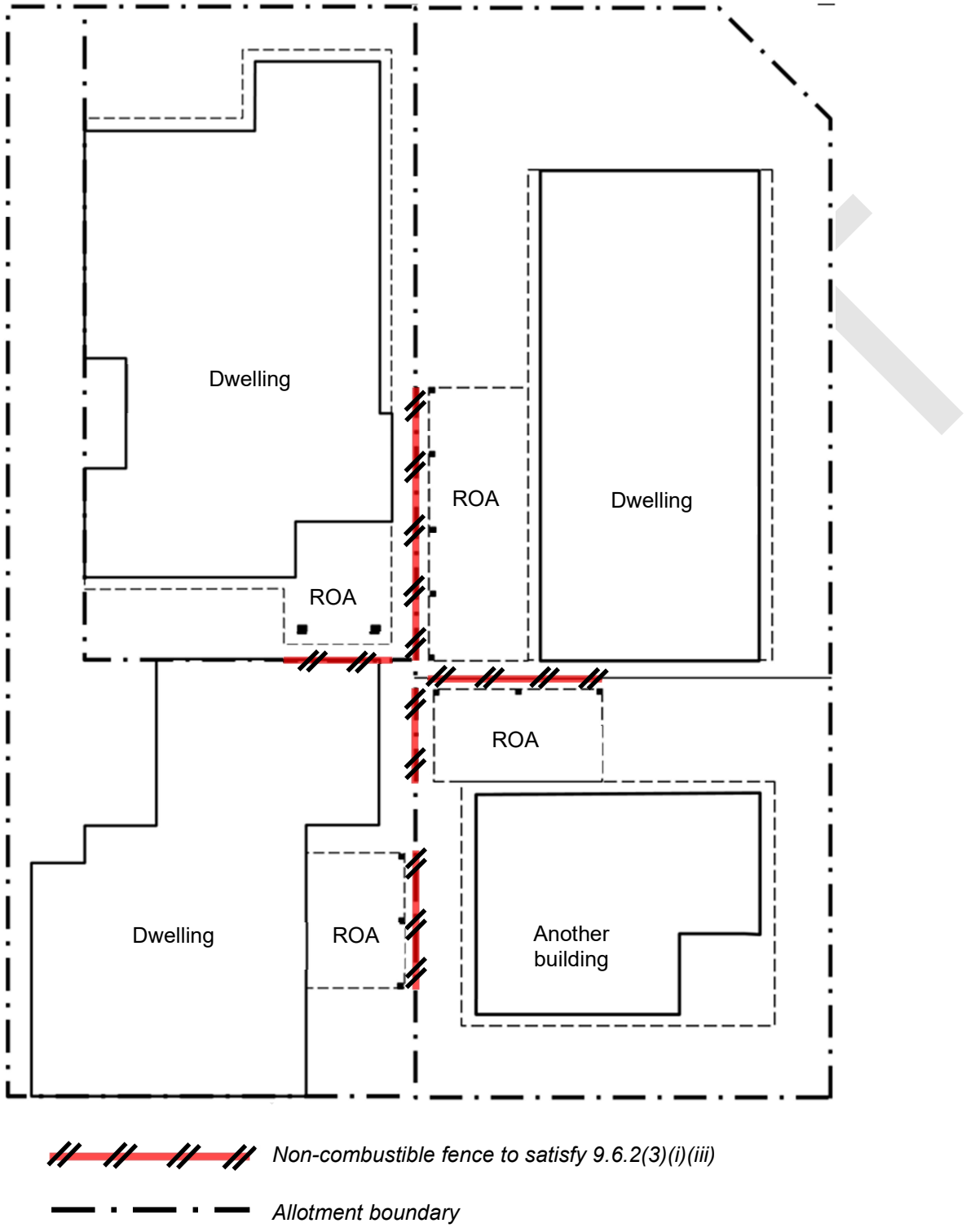


Figure Notes

Fences and screens providing separation to a roofed outdoor area are to comply with 9.6.2(i).

The examples in this figure show separation achieved by boundary fencing. An alternative is to provide a screen for the same extent in approximately the same location on the roofed outdoor area side of the boundary.

Part 10.2 Wet area waterproofing

SA 10.2.1

10.2.1 Wet areas

(1) Building elements in *wet areas* within a building must be protected with a *waterproofing system*.

(2) The *waterproofing system* in (1) must be either *waterproof* or *water resistant* in accordance with 10.2.2 to 10.2.6.

10.2.2 Shower area (enclosed and unenclosed)

(1) For a *shower area* with a hob, step-down or level threshold, the following applies:

(a) The floor of the *shower area* must be *waterproof*, including any hob or step-down (see Figure 10.2.2); and

(b) The walls of the *shower area* must be *waterproof* not less than 1800 mm above the floor substrate (see Figure 10.2.2).

(c) Wall junctions and joints within the *shower area* must be *waterproof* ~~not less than 40 mm either side of the junction~~ (see Figure 10.2.2).

(d) Wall/floor junctions within the *shower area* must be *waterproof* (see Figure 10.2.2).

(e) Penetrations within the *shower area* must be *waterproof*.

(2) A shower with a *preformed shower base* must also comply with the requirements of (1), except for (a) which is not applicable.

in 10.2.9 must be used in conjunction with the materials in 10.2.10.

10.2.7 Materials

Where *required* to be installed in accordance with 10.2.2 to 10.2.6, materials used in *wet areas* forming a *waterproofing system* must be either *waterproof* or *water resistant* in accordance with 10.2.8 and 10.2.9.

10.2.8 Materials — waterproof

The following materials used in *waterproofing systems* are deemed to be *waterproof*:

(a) Stainless steel.

(b) Flexible *waterproof* sheet flooring material with *waterproof* joints.

(c) *Membranes* complying with AS/NZS 4858.

(d) *Waterproof* sealant.

10.2.9 Materials — water resistant substrates

The following materials are deemed to be *water resistant*:

(a) For walls:

(i) Concrete complying with AS 3600, treated to resist moisture movement.

(ii) Cement render, treated to resist moisture movement.

(iii) ~~Compressed f~~Fibre-cement sheeting manufactured in accordance with AS/NZS 2908.2.

(iv) *Water resistant* plasterboard sheeting.

(v) Masonry in accordance with AS 3700, treated to resist moisture movement.

(b) For floors:

(i) Concrete complying with AS 3600.

(ii) Concrete slabs complying with AS 2870.

(iii) ~~Compressed f~~Fibre-cement sheeting manufactured in accordance with AS/NZS 2908.2~~ and supported on a structural floor~~.

10.2.10 Materials — water resistant surface materials

The following surface materials are deemed to be *water resistant*:

(a) For walls:

(i) Thermosetting laminate.

(ii) Pre-decorated compressed fibre-cement sheeting manufactured in accordance with AS/NZS 2908.2.

(iii) Tiles when used in conjunction with a substrate listed in 10.2.9.

(iv) *Water resistant* flexible sheet wall material with sealed joints when used in conjunction with a substrate listed in 10.2.9.

(v) Sanitary grade acrylic linings.

(b) For floors, when used in conjunction with a substrate listed in 10.2.9:

(i) Tiles.

(ii) *Water resistant* flexible sheet flooring material with sealed joints.

(c) Concrete treated to resist moisture movement.

Explanatory Information

Sheet vinyl or linoleum would satisfy the requirements of this clause.

10.2.11 Construction of wet areas — wall and floor substrate materials

For the purposes of this Part, materials used in wall and floor substrates must comply with 10.2.9.

10.2.12 Construction of wet area floors — falls

Where a *floor waste* is installed—

(a) the minimum continuous fall of a floor plane to the waste must be 1:80; and

(b) the maximum continuous fall of a floor plane to the waste must be 1:50.

10.2.13 Construction of wet areas — wall and floor surface materials

For the purposes of this Part, wall and floor surface materials must comply with 10.2.10.

10.2.14 Shower area requirements

~~(4)~~(1) Shower areas must be designed as either enclosed or unenclosed.~~—~~

~~(a)~~(2) *Shower areas* must incorporate~~to include~~ a *floor waste* with falls complying with 10.2.12.~~; and~~

~~(b)~~(3) *Enclosed shower areas* must incorporate ~~with~~ a—

~~(i)~~(a) stepdown complying with 10.2.15; or

~~(ii)~~(b) *hob* complying with 10.2.16; or

(c) level threshold complying with 10.2.17; or

(d) *preformed shower base* complying with 10.2.19.~~-~~

~~(iii)~~(4) *Unenclosed shower areas* must be constructed in accordance with 10.2.18.

10.2.15 Stepdown showers

For stepdown showers, the highest finished floor level of the *shower area* must be stepped down a minimum of 25 mm lower than the finished floor level outside the shower (see Figures 10.2.15a, 10.2.15b, 10.2.15c and 10.2.15d).

Figure Notes

(1) Rebating of timber and steel framed walls must be in accordance with AS 1684 or NASH Standard Part 2 as appropriate.

(2) Where rebating of masonry walls is required, it must be accommodated for in the design in accordance with AS 3700.

(3) For diagram (c), where a *waterstop* cannot be provided, a Type 1 or Type 2 junction can be used with AS 3740.

10.2.21 Membrane installation for screed

Where a *screed* is used in conjunction with a *waterproof* membrane, the *waterproof* membrane can be installed either above or below the tile bed or *screed*.

10.2.22 Substrate surface preparation for application of membrane

The substrate surface area where a membrane is to be applied must—

(a) be clean and dust free; and

(b) free of indentations and imperfections.

10.2.23 Penetrations

Penetrations within *shower areas* must comply with the following:

(a) Penetrations for taps, shower nozzles and the like must be waterproofed by sealing with—

(i) sealants; or

(ii) proprietary flange systems; or

(iii) a combination of (i) and (ii).

(b) The spindle housing of the tap body must be able to be removed to enable replacement of the washer without damaging the seal.

(c) The following must be waterproofed:

(i) All penetrations due to mechanical fixings or fastenings of substrate materials.

(ii) Any penetration of the surface materials due to mechanical fixings or fastenings.

(iii) Recessed soap holders (niches) and the like.

(d) Tap and spout penetrations on horizontal surfaces surrounding baths and spas must be waterproofed by—

(i) sealing the tap body to the substrate with sealants; or

(ii) proprietary flange systems.

10.2.24 Flashings/junctions

Flashings must be installed in accordance with 10.2.2 to 10.2.5 and the following:

(a) Perimeter *flashing* to wall/floor junctions must have a—

(i) vertical leg that extends a minimum of 25 mm above the finished floor level, except across doorways; and

(ii) horizontal leg that has a minimum width of not less than 50 mm.

(b) Where a *water resistant* substrate is used in conjunction with a *water resistant* surface material, a *waterproof* sealant must be installed at the substrate junction at the wall/floor junction.

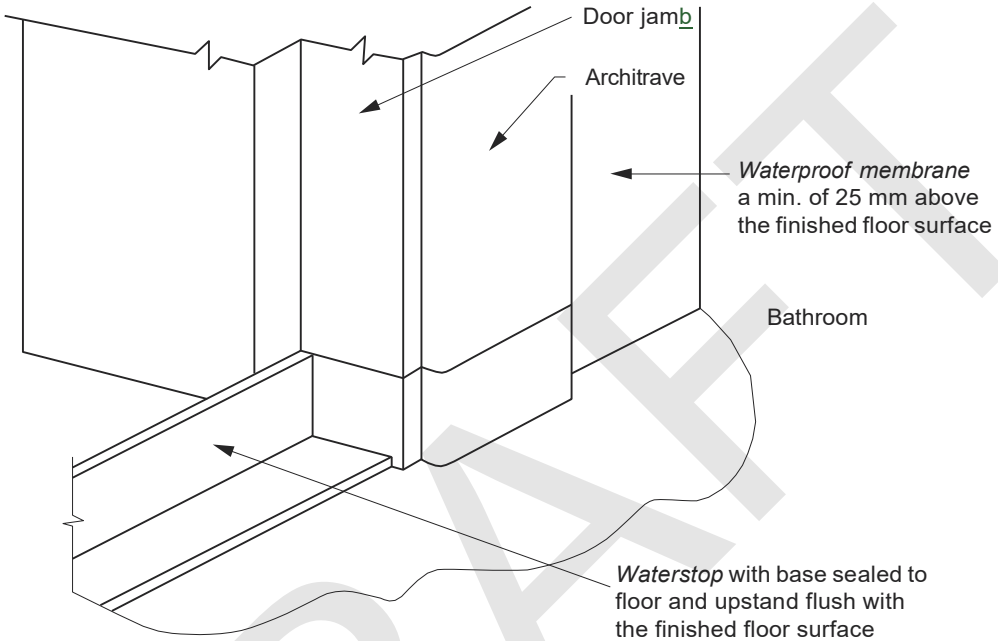
(c) Perimeter *flashings* at a floor level opening must comply with the following:

(i) Where the whole *wet area* floor is *waterproof*, at floor level openings, a *waterstop* must be installed that has a vertical leg finishing flush with the top of the finished floor level with the floor *membrane* being terminated to create a *waterproof* seal to the *waterstop* and to the perimeter *flashing* (see Figure 10.2.24).

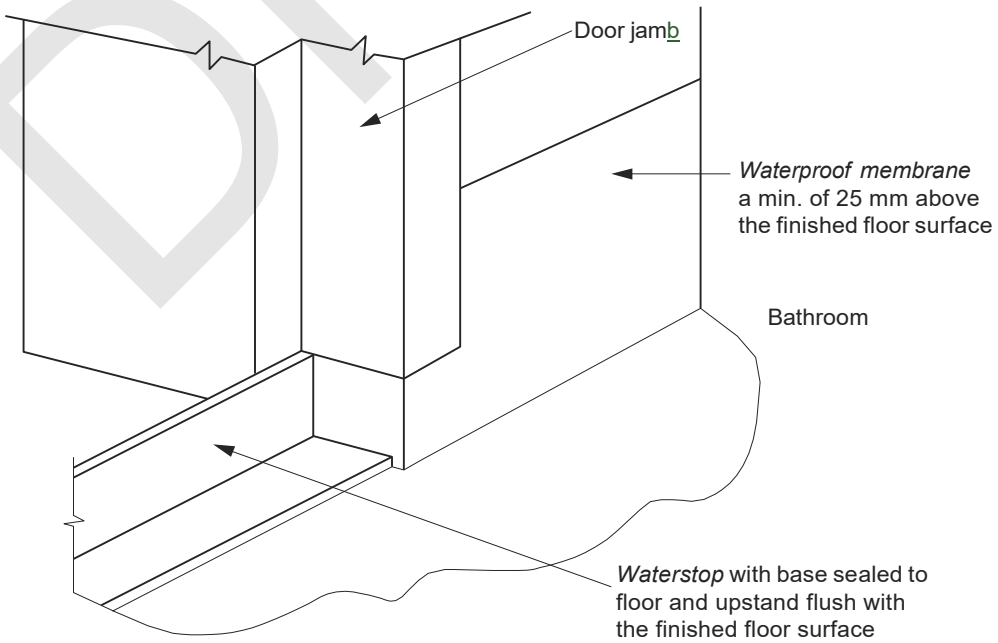
(ii) In any other case, at a floor level opening a *waterstop* must be installed that has a vertical leg finishing flush with the top of the finished floor level and waterproofed to the perimeter *flashing*.

(d) A vertical *flashing*, either external to the *wet area* or internal, must extend a minimum of 1800 mm above the finished floor level.

Figure 10.2.24: Typical bathroom door details for whole bathroom waterproofing



(a) After installation of architrave



(b) Prior to installation of architrave

Part 10.3 Room heights

10.3.1 Height of rooms and other spaces

(1) Heights of rooms and other spaces (see Figure 10.3.1) must be not less than—

(a) in a *habitable room* excluding a kitchen — 2.4 m; and

(b) in a kitchen — 2.1 m; and

(c) in a corridor, passageway or the like — 2.1 m; and

(d) in a bathroom, shower room, laundry, *sanitary compartment*, airlock, pantry, storeroom, garage, car parking area or the like — 2.1 m; and

(e) in a room or space with a sloping ceiling or projections below the ceiling line within—

(i) a *habitable room*—

(A) in an attic — a height of not less than 2.2 m for at least two-thirds of the *floor area* of the room or space; and

(B) in other rooms — a height of not less than 2.4 m over two-thirds of the *floor area* of the room or space; and

(ii) a non-*habitable room* — a height of not less than 2.1 m for at least two-thirds of the *floor area* of the room or space; and

(f) in a stairway, ramp (other than a *threshold ramp*), *landing*, or the like — 2.0 m measured vertically above the nosing line of stairway treads or the floor surface of a ramp, *landing* or the like.

(2) For the purposes of (1)(e), when calculating the *floor area* of a room or space, any part that has a ceiling height of less than 1.5 m is not included.

Figure 10.3.1: Measurement of heights of rooms and other spaces

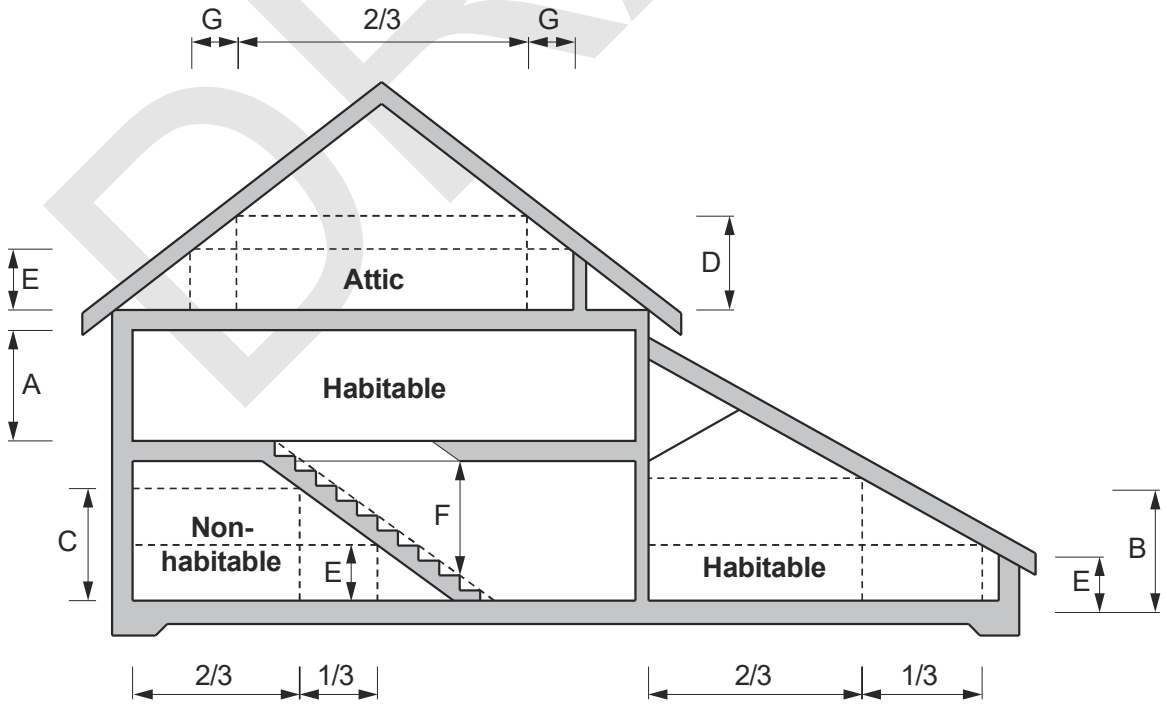


Figure Notes

The letters in the diagram represent the following minimum dimensions:

A = 2.4 m In a *habitable room* (excluding a kitchen).

Part 10.6 Ventilation

10.6.1 Application

(1) Part 10.6 applies subject to the limitations set out at H4D7.

(2) Part 10.6 need not be complied with if H4D7(1) is complied with.

Explanatory Information

The requirements of this Part are to be read in conjunction with the condensation management requirements in Part 10.8 and the ceiling fan requirements in Part 13.5. However, it should be noted that Part 13.5 does not apply in all States and Territories.

10.6.2 Ventilation requirements

Ventilation must be provided to a *habitable room*, *sanitary compartment*, bathroom, shower room, laundry and any other room occupied by a person for any purpose by any of the following means:

(a) Openings, *windows*, doors or other devices which can be opened—

  (i) with a ventilating area not less than 5% of the *floor area* of the room *required* to be ventilated; and

  (ii) open to—

    (A) a suitably sized court, or space open to the sky; or

    (B) an open verandah, carport, or the like; or

    (C) an adjoining room in accordance with (b).

(b) Natural ventilation to a room may come through a *window*, opening, door or other device from an adjoining room (including an enclosed verandah) if—

  (i) the room to be ventilated or the adjoining room is not a *sanitary compartment*; and

  (ii) the *window*, opening, door or other device has a ventilating area of not less than 5% of the *floor area* of the room to be ventilated; and

  (iii) the adjoining room has a *window*, opening, door or other device with a ventilating area of not less than 5% of the combined *floor areas* of both rooms; and

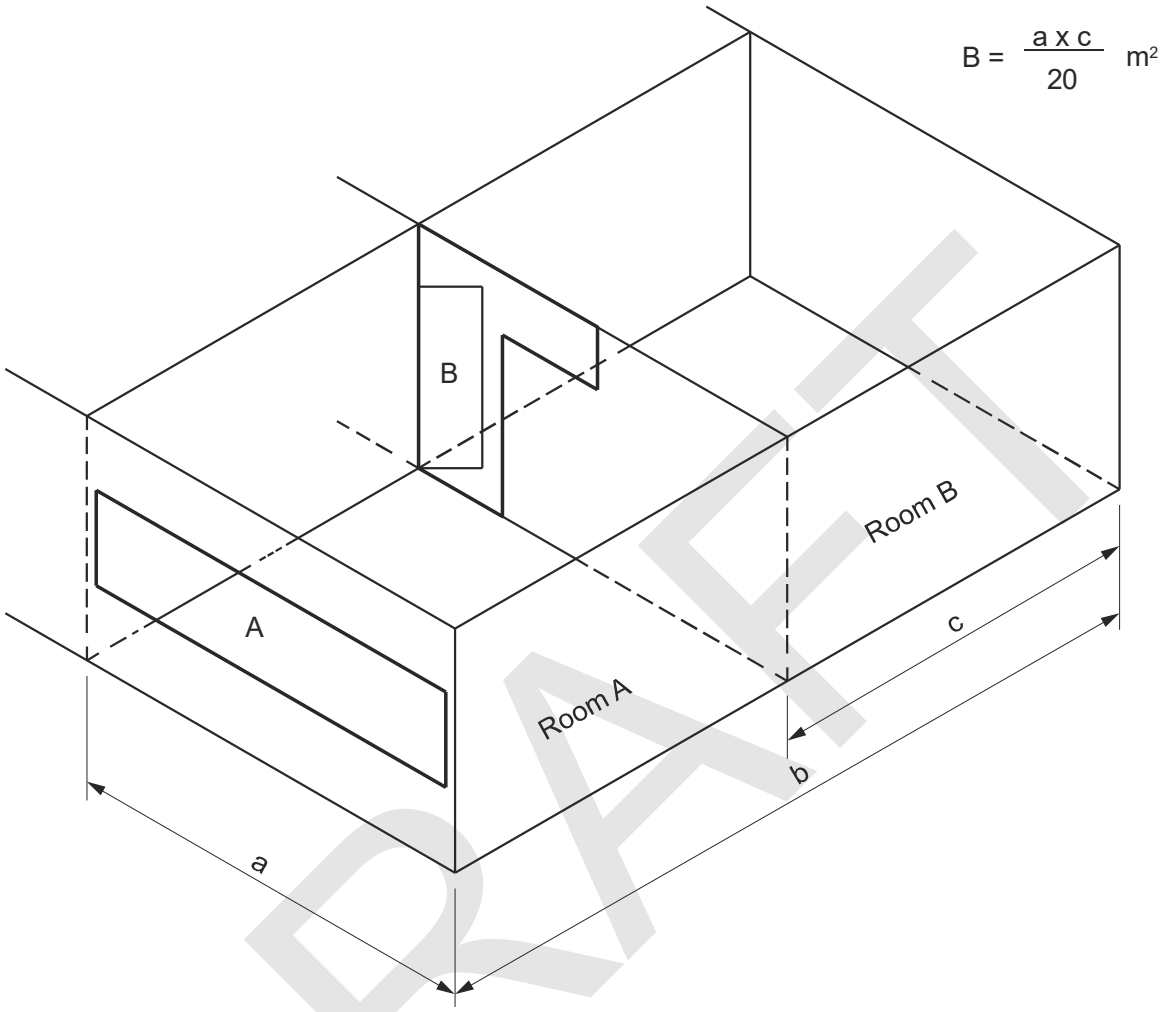
  (iv) the ventilating areas specified may be reduced as appropriate if direct natural ventilation is provided from another source (See Figure 10.6.2).

(c) An exhaust fan or other means of mechanical ventilation may be used to ventilate a *sanitary compartment*, laundry, kitchen or bathroom, or where mechanical ventilation is provided in accordance with 10.6.3(b), provided contaminated air exhausts comply with 10.8.2.

Figure 10.6.2: Method of determining areas of openings for borrowed ventilation

$$A = \frac{a \times b}{20} \ m^2$$

$$B = \frac{a \times c}{20} \ m^2$$



Exemptions

10.6.2 does not apply to rooms or spaces of a specialised nature occupied neither frequently nor for extended periods.

Explanatory Information

The ventilating area of a *window* is measured as the size of the openable sash of the *window*. This is the case regardless of the type of *window*, i.e. whether it is an awning, casement or sliding *window* and irrespective of the restrictions on the openable sash.

10.6.2(b) permits a room's *required* ventilation to be 'borrowed' from an adjoining room, i.e. an adjoining room's ventilation can be used to help make up the total amount of ventilation *required*.

The use of borrowed ventilation is acceptable if the provisions of 10.6.2(b) are applied to the subject room and to the total area of each relevant room.

10.6.3 Location of sanitary compartments

A *sanitary compartment* must not open directly into a kitchen or pantry unless—

(a) access is by an airlock, hallway or other room, (see Figure 10.6.3); or

Part 10.8 Condensation management

10.8.1 External wall construction

(1) Where a *pliable building membrane* or a sarking-type material is installed ~~in an external wall~~, it must—

(a) comply with AS 4200.1; and

(b) be installed in accordance with AS 4200.2; and

(c) be located on the exterior side of the *primary insulation layer* of wall assemblies that form ~~the external envelope of a building~~part of the building *envelope*.

(2) Subject to (5), any control layer, sheathing or water barrier incorporated between the cladding and the exterior side of the *primary insulation layer* in an *external wall* must achieve the *vapour permeance* specified in Table 10.8.1. ~~Where a *pliable building membrane*, *sarking-type material* or insulation layer is installed on the exterior side of the*primary insulation layer* of an *external wall* it must have a *vapour permeance* of not less than—~~

~~(a) in *climate zones* 4 and 5, 0.143 µg/N.s; and~~

~~(b) in *climate zones* 6, 7 and 8, 1.14 µg/N.s.~~

(3) ~~Except for single skin masonry or single skin concrete, where a *pliable building membrane* is not installed in an *external wall*, the primary *water control layer* must be separated from *water sensitive materials* by a drained cavity~~Subject to (4) and (5), an *external wall* without a control layer, sheathing or a water barrier must incorporate a drained and vented cavity..

(4) Subject to (5), for the purposes of (2) and (3), a drained and vented cavity must -

(a) be located between the cladding and the external side of the *primary insulation layer*, continuous control layer, water barrier or sheathing, whichever is outermost; and

(b) be at least 18 mm wide; and

(c) be drained to the exterior at the base of the cavity, including where cavities are vertically compartmentalised in a multi-*storey* building; and

(d) have openings with a free area of no less than 1,000 mm^2/m of wall provided at the base and top of the cavity at each *storey* or level; or

(e) for masonry walls, consist of open perpend joints in accordance with Part 5.7, provided the top of the cavity has openings not less than 1,000 mm2/m length.

(5) The requirements of (2), (3) and (4) do not apply to a —

(a) Single skin masonry wall in *climate zones* 1, 2 and 3; or

(b) Single skin concrete wall in *climate zones* 1, 2 and 3; or

(c) A wall constructed from insulated sandwich panels; or

(d) A wall that does not form part of the building *envelope*.

Table 10.8.1: *Vapour permeance* requirements

Climate zone	Wall construction	*Vapour permeance* (µg/N.s)
1	No cavity	≥ 0.0022 to < 1.1403
	Drained and vented cavity	≥ 0 to < 1.1403
2, 3	No cavity	≥ 0.1429
	Drained and vented cavity	≥ 0.0022
4, 5	No cavity	≥ 1.1403
	Drained and vented cavity	≥ 0.1429
6, 7, 8	No cavity	X
	Drained and vented cavity	≥ 1.1403

Table Notes

X = not permitted.

Explanatory Information

~~10.8.1(2) requires some wall materials on the external side of the *primary insulation layer* to have a minimum level of *vapour permeance*. *Vapour permeance* is measured in µg/N.s (micrograms per newton-second).~~

~~Class 3 and 4 vapour control membranes (as defined by clause 5.3.4 of AS 4200.1) meet the *vapour permeance* requirements of 10.8.1(2)(a), while Class 4 vapour control membranes meet the *vapour permeance* requirements of 10.8.1(2)(a).~~

A control layer is a continuous layer that is intended for air, vapour or thermal control (insulation). A *pliable building membrane* is subject to 10.8.3(2) on account of being a water barrier whilst a *sarking-type material* is subject to 10.8.3(2) on account of being a thermal control layer or a water barrier.

In cooler climates, a continuous air or vapour control layer or a water barrier with higher *vapour permeance* is desirable to allow outward drying of internal moisture. In tropical climates, materials with a relatively lower *vapour permeance* are desirable to limit outdoor moisture being driven inward.

Open-cell insulation, such as mineral wool or fibreglass, typically has a high *vapour permeance*, while closed-cell insulation such as polystyrene typically has a low *vapour permeance*. Many foil-faced insulation products have a low *vapour permeance*.

Deemed-to-Satisfy Provisions require *external walls* that form part of the building *envelope* of *sole-occupancy units* in *climate zones* 6, 7 and 8 to incorporate a drained and vented cavity, unless the wall is constructed from insulated sandwich panels.

Components or devices which restrict vermin entry may be used if they facilitate drainage and ventilation as *required* by this Part.

The *vapour permeance* range listed in Table 10.8.1 corresponds to the classes (as defined in AS 4200.1) listed in Explanatory Table 10.8.1, when tested in accordance with ASTM-E96 Procedure B – Water Method at 23°C and 50% relative humidity.

Table 10.8.1 (explanatory): *Vapor permeance* classes

Climate zone	Wall construction	*Vapour permeance* class as defined in AS 4200.1
1	No cavity	2 or 3
	Drained and vented cavity	1, 2 or 3
2, 3	No cavity	3 or 4
	Drained and vented cavity	2, 3 or 4
4, 5	No cavity	4
	Drained and vented cavity	3 or 4
6, 7, 8	No cavity	X
	Drained and vented cavity	4

Table Notes

X = not permitted.

(6) Except for rooms that are ventilated in accordance with 10.6.2(a), a room with an exhaust system in accordance with (3) must be provided with make-up air in accordance with AS 1668.2.

Explanatory Information

A range hood installed in a kitchen must comply with 10.8.2(2).

10.8.2(3) requires venting clothes dryers to be provided with exhaust ducting directly from the clothes dryer to *outdoor air*. This requirement only applies to venting clothes dryers and not other types of clothes dryers, such as condensing clothes dryers.

10.8.2(5) and 10.8.2(6) requires some rooms that have exhaust systems and are not naturally ventilated (e.g. rooms without openable windows) to be provided with make-up air. The make-up air openings *required* by 10.8.2(5)(a) are based on the minimum flow rates of 10.8.2(1). An opening with a free area of 14,000 mm^2 can by achieved by a 20 mm undercut to a 700 mm wide door. If the exhaust flowrates exceed the minimum flowrates of 10.8.2(1), additional make-up air openings may be required for the correct operation of the exhaust system.

10.8.3 Ventilation of a roof space~~s~~ with a ceiling not parallel to the roof plane

(1) In *climate zones* 4, 5, 6, 7 and 8, a roof with a ceiling not parallel to the roof plane, onto which the insulation is laid, must have a roof space that—

~~(a) is located—~~

~~(i) immediately above the *primary insulation layer*; or~~

~~(ii) immediately above sarking with a *vapour permeance* of not less than 1.14 µg/N.s, which is immediately above the *primary insulation layer*; or~~

~~(iii) immediately above ceiling insulation that meets the requirements of 13.2.3(3) and 13.2.3(4); and~~

~~(b) has a height of not less than 20 mm; and~~

~~(c) is either—~~

~~(i) ventilated to *outdoor air* through evenly distributed openings in accordance with Table 10.8.3; or~~

~~(ii) located immediately underneath the roof tiles of an unsarked tiled roof.~~

(a) has a height of not less than 18 mm at any point; and

(b) is located immediately above the ceiling insulation; and

(c) is ventilated to *outdoor air* in accordance with Table 10.8.3.

(2) The requirements of (1) do not apply to a—

(a) concrete roof; or

(b) roof that is made of ~~structural~~ insulated sandwich panels; or

(c) roof that is subject to Bushfire Attack Level FZ requirements in accordance with AS 3959.

Table 10.8.3: Roof space ventilation requirement

Roof pitch	Ventilation openings
<10°	~~25,000~~20,000 mm^2/m ~~provided at each of two opposing ends~~provided at roof perimeter, or at each of two opposing ends for gable roofs or at each of the low and high sides of a skillion roof
≥10° and <~~15~~75°	~~25,000~~7,000 mm^2/m ~~provided at the eaves and 5,000 mm^2/m at high level~~provided at the eaves or low level and 5,000 mm^2/m provided at high level or ridge
~~≥ 15° and < 75°~~	~~7,000 mm^2/m provided at the eaves and 5,000 mm^2/m at high level, plus an additional 18,000 mm^2/m at the eaves if the roof has a cathedral ceiling~~

Table Notes

(1) ~~Ventilation openings are specified as a minimum free open area per metre length of the longest horizontal dimension of the roof~~Total low level ventilation openings are calculated based on twice the longest total plan dimension of the roof, except for mono pitch roofs that are calculated based on the longest total plan dimension of the roof. Total high-level ventilation is calculated based on the longest total plan dimension of the roof.

(2) ~~For the purposes of this Table, h~~High level openings are openings provided at the ridge or not more than 900 mm below the ridge or highest point of the roof space, measured vertically or 1/3 of the height of the roof below highest point of the roof, whichever is least.

Explanatory Information

Ventilation openings are to be evenly distributed to avoid creating pockets of stagnant air.

Openings created by roof cladding profile can help meet ventilation opening requirements. Examples include openings underneath a metal cladding profile or inherent openings in a profiled tile roof, provided these openings are directly connected to the roof void to be ventilated.

For roof pitches greater than 10 degrees, total low level ventilation openings must be greater than total high level ventilation openings to minimise drawing air from occupied spaces and ensure intake of outdoor air.

Components such as spacers, battens and the like greater than 18 mm height are acceptable provided they do not create excessive resistance to airflow.

Explanatory Figure 10.8.3a is an example of a roof space with low level ventilation.

Explanatory Figure 10.8.3b is an example on calculating high and low-level ventilation openings.

Figure 10.8.3a (explanatory): Example of roof space with low level ventilation

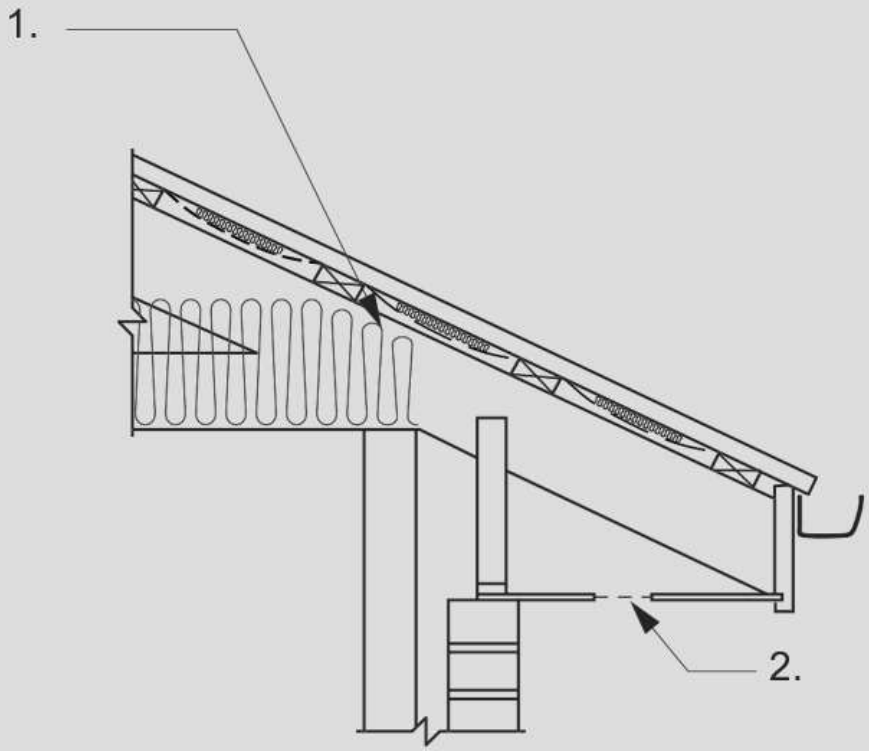


Figure Notes

(1) Minimum ~~20~~18 mm gap maintained between insulation and sarking.

(2) Eave or low-level ventilation opening in accordance with Table 10.8.3.

Figure 10.8.3b (explanatory): Example ventilation openings calculation

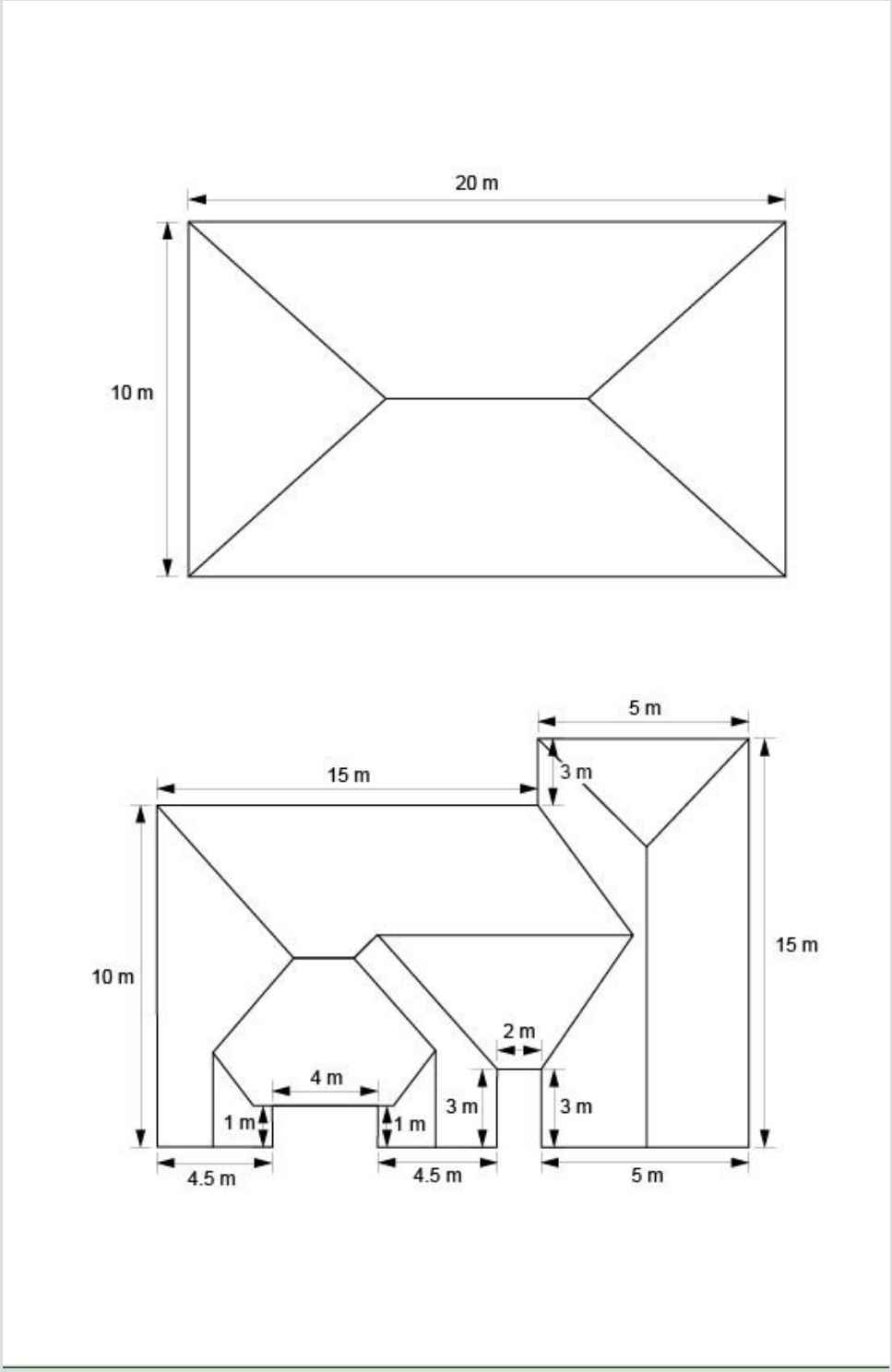


Figure Notes:

(1) For a pitch ≥10° and <75°: Both have a clear longest total plan dimension of 20 m

(2) Total low-level ventilation = 40 × 7,000 mm^2/m

(3) Total high-level ventilation = 20 × 5000 mm^2/m

10.8.4 Ventilation of a roof space with a ceiling parallel to the roof plane

(1) In *climate zones* 4, 5, 6, 7 and 8, a roof system with a ceiling installed parallel to the roof plane must have a ventilated cavity that —

(a) is located immediately above —

(i) the *primary insulation layer*; or

(ii) any control layer or water barrier installed in accordance with (2); and

(b) is not obstructed by insulation; and

(c) is not less than 18 mm as measured perpendicular to the plane of the roof; and

(d) is ventilated to outdoor air through openings not less than —

(i) 20,000 mm^2/m provided at the eaves or low level; and

(ii) 5,000 mm^2/m at the high level or ridge.

(2) Where a control layer, or water barrier is installed in *climate zones* 4, 5, 6, 7 and 8, it must —

(a) have a *vapour permeance* of not less than 1.14 µg/N.s; and

(b) be located immediately above the *primary insulation layer*.

(3) The requirements of (1) do not apply to a—

(a) concrete roof; or

(b) roof that is made of insulated sandwich panels; or

(c) roof that is subject to Bushfire Attack Level FZ requirements in accordance with AS 3959; or

(d) tiled roof without a control layer or water barrier located above the *primary insulation layer*.

Explanatory Information: Stairways with winders

- 11.2.2(3) allows the use of *winders* in stairways. However, 11.2.2(3) places a restriction on the number of allowable *winders* in a stairway *flight*, this restriction would apply equally to not permit a stairway incorporating a consecutive series of *winders* in a *flight*.
- This also means the maximum number of consecutive *winders* in any stairway *flight* is 6.

11.2.3 Ramps

An external ramp serving an external doorway or a ramp within a building must—

(a) be designed to take loading forces in accordance with AS/NZS 1170.1; and

(b) have a gradient not steeper than 1:8; and

(c) except for *threshold ramps*, *step ramps* and *kerb ramps*, be provided with *landings* complying with 11.2.5 at the top and bottom of the ramp and at intervals not greater than 15 m.

Notes: Livable housing design

Where an external ramp is provided for the purposes of compliance with the ABCB Standard for Livable Housing Design, the requirements of that Standard apply.

Explanatory Information

In relation to external ramps, 11.2.3 applies to a ramp serving an external door. For the purpose of 11.2.3 a driveway is not considered to be a ramp.

11.2.4 Slip resistance

(1) The requirements for slip-resistance treatment to stair treads, ramps and *landings* are as set out in (2), (3) and (4).

(2) Treads must have—

(a) a surface with a slip-resistance classification not less than that listed in Table 11.2.4 when tested in accordance with AS 4586; or

(b) a nosing strip with a slip-resistance classification not less than that listed in Table 11.2.4 when tested in accordance with AS 4586.

(3) The floor surface of a ramp, other than a *threshold ramp*, must have a slip-resistance classification not less than that listed in Table 11.2.4 when tested in accordance with AS 4586.

(4) *Landings*, where the edge leads to the *flight* below, must have—

(a) a surface with a slip-resistance classification not less than that listed in Table 11.2.4 when tested in accordance with AS 4586, for not less than 190 mm from the stair nosing; or

(b) a nosing strip with a slip-resistance classification not less than that listed in Table 11.2.4 when tested in accordance with AS 4586.

Table 11.2.4: Slip-resistance classification

Application	Dry surface conditions	Wet surface conditions
Ramp not steeper than 1:8	P4 or R10	P5 or R12
Tread surface	P3 or R10	P4 or R11
Nosing or landing edge strip	P3	P4

Explanatory Information: Purpose of a landing

The purpose of a *landing* is to provide a rest area for people using the stairway or ramp, and to allow the stairway or ramp to change direction if needed.

Explanatory Information: Minimum landing length

The minimum length of a *landing* allows people using a stairway or ramp to rest, and reduces the risk of people falling more than one *flight* of stairs.

Explanatory Information: Maximum grade of 1:50

The maximum grade of 1 in 50 *required* under 11.2.5(1)(b) makes sure that the *landing* is as level as possible, but still allows a slight slope for drainage if necessary.

11.2.6 Thresholds

Where the threshold of a doorway is more than 230 mm above the adjoining surface it must incorporate steps having *riser* (R) and *going* (G) dimensions in accordance with 11.2.2.

11.2.7 Fixed platforms, walkways, stairways and ladders for Class 10b structures

A fixed platform, walkway, stairway or ladder and associated landings serving a Class 10b structure must comply with—

(a) AS 1657; or

(b) for—

(i) stairways — 11.2.2 and 11.2.4; and

(ii) landings — 11.2.4 and 11.2.5.

(2) Baluster
(3) Barrier
(4) Tread
(5) *Riser*
(6) *Landing*
(7) Handrail
(8) Newel post
(9) Open *riser*
(10) *Winders* (tapered treads)
(11) Handrail
(12) *Landing* barrier
(13) Barrier

11.3.3 Barriers to prevent falls

(1) A continuous barrier must be provided along the side of a trafficable surface, such as—

(a) a stairway, ramp or the like; and

(b) a floor, corridor, hallway, balcony, deck, verandah, *mezzanine*, access bridge or the like; and

(c) a roof top space or the like to which general access is provided; and

(d) any delineated path of access to a building,

where it is possible to fall 1 m or more measured from the level of the trafficable surface to the surface beneath (see Figure 11.3.3a).

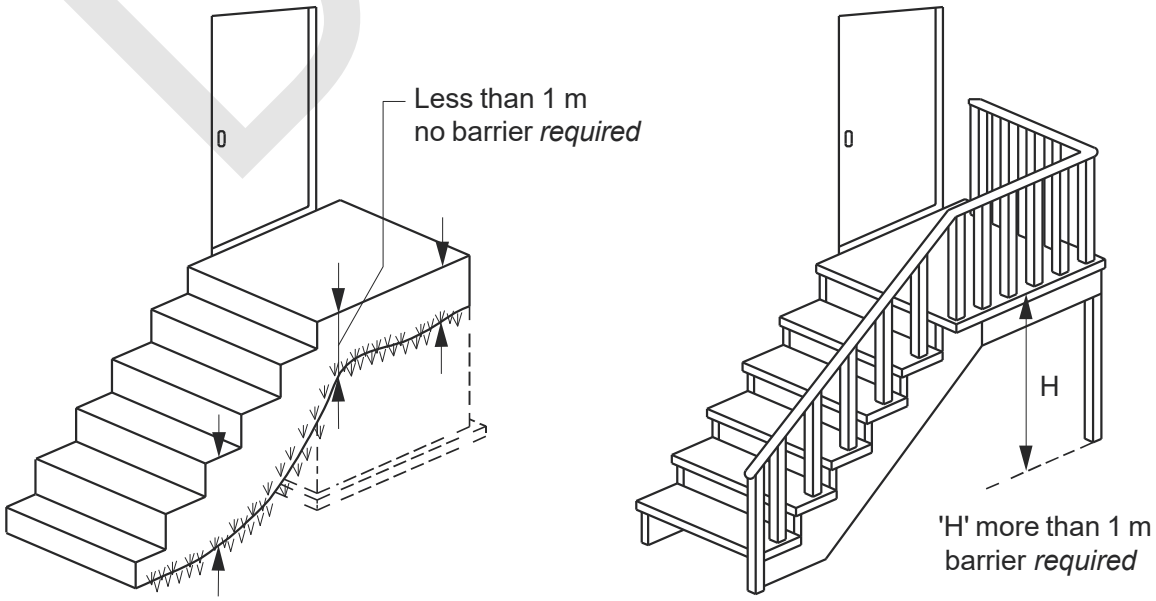
(2) The requirements of (1) do not apply to—

(a) a retaining wall unless the retaining wall forms part of, or is directly associated with, a delineated path of access to a building from the road, or a delineated path of access between buildings (see Figure 11.3.3b); or

(b) a barrier provided to an openable window covered by 11.3.7 and 11.3.8~~.~~; or

~~(b)~~(c) a barrier complying with AS 1657 serving a fixed platform, walkway, stairway or ladder provided in accordance with 11.2.7(a).

Figure 11.3.3a: Barriers — when required



Explanatory Information: Safety of domestic services

Care should be taken when installing insulation to ensure that it does not interfere with the safety or performance of *domestic services* and fittings such as heating flues, recessed light fittings, light transformers, gas appliances and general plumbing and electrical components. This includes providing appropriate clearance as detailed in relevant legislation and referenced standards such as for electrical, gas and fuel oil installations.

Explanatory Information: Compression of insulation

The *R-Value* of insulation, including insulation used to mitigate thermal bridging, is reduced if it is compressed. The allocated space for insulation must therefore allow the insulation to be installed so that it maintains its correct thickness to achieve the product's stated *R-Value*. Otherwise the *R-Value* needs to be reduced to account for any compression. This is particularly relevant to wall and cathedral ceiling framing whose members can only accommodate a limited thickness of insulation. In some instances, larger framing members or thinner insulation material, such as rigid boards, may be necessary to ensure that the insulation achieves its *required R-Value*.

Explanatory Information: Installation of reflective insulation

For *reflective insulation* and the adjoining airspace to achieve its tested *R-Value*, the airspace needs to be a certain width. This width varies depending on the particular type of *reflective insulation*. The *R-Value* also depends on the orientation of the insulation.

Where *reflective insulation* also acts as a vapour barrier or sarking, both a minimum overlap and taping may be necessary.

NSW 13.2.3

13.2.3 Roofs and ceilings

(1) Roof and ceiling insulation must achieve the minimum *R-Value*—

- (a) in *climate zone* 1, in accordance with Tables 13.2.3a, 13.2.3b, 13.2.3j and 13.2.3k as applicable; and
- (b) in *climate zone* 2, in accordance with Tables 13.2.3c and 13.2.3l as applicable; and
- (c) in *climate zone* 3, in accordance with Tables 13.2.3d and 13.2.3m as applicable; and
- (d) in *climate zone* 4, in accordance with Tables 13.2.3e and 13.2.3n as applicable; and
- (e) in *climate zone* 5, in accordance with Tables 13.2.3f and 13.2.3o as applicable; and
- (f) in *climate zone* 6, in accordance with Tables 13.2.3g and 13.2.3p as applicable; and
- (g) in *climate zone* 7, in accordance with Tables 13.2.3h and 13.2.3q as applicable; and
- (h) in *climate zone* 8, in accordance with Tables 13.2.3i and 13.2.3r as applicable.

(2) *Reflective insulation* installed to comply with (1) must—

- (a) have a surface emittance of not more than 0.05; and
- (b) be adjacent to a roof space of not less than 20 mm; and
- (c) in *climate zones* 3 to 8, be downward facing.

(3) The thermal bridging in a metal-framed roof must be addressed as follows—

- (a) for a pitched roof with a horizontal ceiling—
  - (i) achieving the *Total R-Value* in Table 13.2.3s, calculated using a method that accounts for the effects of thermal bridging; or
  - (ii) increasing the *R-Value* of the insulation between the ceiling frames by R0.5 more than the *R-Value* derived from (1); or
  - (iii) adding a continuous ceiling insulation layer with a minimum *R-Value* of R0.13 above or below the ceiling joists or the bottom chords of the trusses; or
  - (iv) achieving the *required* ceiling *R-Value* derived from (1) by stacking two layers of insulation immediately on

top of each other, such that the top layer is orientated to cover the ceiling joists or bottom chords of the trusses and has an *R-Value* of at least R0.5; or

(b) for a flat, skillion or cathedral roof—

(i) achieving the *Total R-Value* in Table 13.2.3t, calculated using a method that accounts for the effects of thermal bridging; or

(ii) complying with Table 13.2.3u.

(4) Where 10.8.3(1) of the ABCB Housing Provisions applies, continuous insulation placed above the *primary insulation layer* to mitigate thermal bridging must have a *vapour permeance* of not less than that of the *primary insulation layer*.

(5) Where, for operational or safety reasons, the area of ceiling insulation *required* is reduced, the loss of insulation must be compensated for in accordance with Table 13.2.3w.

(6) Where the ceiling insulation *required* by (1) to (5) has an *R-Value*—

(a) greater than R3.0 and less than or equal to R4.5, it may be reduced to R3.0 within 450 mm of an *external wall*; or

(b) greater than R4.5, it may be reduced to R3.0 within 450 mm of an *external wall*, provided all other *required* ceiling insulation is increased by R0.5.

(7) A metal roof that—

(a) has metal sheet roofing directly fixed to metal purlins, metal rafters, ~~or~~ metal battens, or the like; and

(b) does not have a ceiling lining or has a ceiling lining fixed directly to ~~those~~the metal purlins, metal rafters, ~~or~~ metal battens, or the like,

must have a thermal break, consisting of a material with an *R-Value* of greater than or equal to 0.2, installed between the metal sheet roofing and its supporting metal purlins, metal rafters, ~~or~~ metal battens~~.~~, or the like.

(8) The requirements of (1) to (7) do not apply to roofs constructed using insulated sandwich panels.

(9) Roofs constructed using insulated sandwich panels must achieve the minimum *Total R-Value* in Table 13.2.3x.

(10) In *climate zones* 1 to 5, the solar absorptance of the upper surface of a roof must not be more than 0.64.

Table 13.2.3a: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 1 – single storey dwelling

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤0 .64
Vented	Yes	< 1.0	1.5	2.0	2.5	3.0	3.5
		≥ 1.0 to < 1.5	1.5	1.5	2.0	2.5	3.0
		≥ 1.5	1.5	2.0	2.0	2.0	2.0
	No	< 1.0	2.5	4.5	X	X	X
		≥ 1.0 to < 1.5	2.0	3.0	4.0	5.0	X
		≥ 1.5	2.0	2.5	3.0	4.0	5.0
Standard	Yes	< 1.0	1.5	2.0	2.5	4.0	X
		≥ 1.0 to < 1.5	1.5	1.5	2.0	3.0	4.0
		≥ 1.5	1.5	1.5	2.0	2.5	3.0
	No	< 1.0	3.5	X	X	X	X
		≥ 1.0 to < 1.5	2.0	3.5	5.5	X	X
		≥ 1.5	2.0	2.0	3.5	4.0	6.0

Table Notes

(1) SA = solar absorptance.

(2) A roof is considered 'vented' if it—

(a) has one wind-driven roof ventilator per 50 m^2 of ceiling area, with gable, eave or ridge vents; or

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13.2.5 External walls

(1) Except for the *external wall* of a sub-floor space below a suspended floor and lightweight wall construction, wall insulation must have a minimum *R-Value*—

(a) in *climate zone* 1, in accordance with Table 13.2.5a; and

(b) in *climate zone* 2, in accordance with Tables 13.2.5c and 13.2.5d as applicable; and

(c) in *climate zone* 3, in accordance with Table 13.2.5e; and

(d) in *climate zone* 4, in accordance with Tables 13.2.5g and 13.2.5h as applicable; and

(e) in *climate zone* 5, in accordance with Tables 13.2.5i and 13.2.5j as applicable; and

(f) in *climate zone* 6, in accordance with Tables 13.2.5k and 13.2.5l as applicable; and

(g) In *climate zone* 7, in accordance with Tables 13.2.5m and 13.2.5n as applicable.

(2) For lightweight wall construction, wall insulation must have a minimum *R-Value*—

(a) in *climate zone* 1, in accordance with Table 13.2.5b; and

(b) in *climate zone* 2, in accordance with Table 13.2.5c, with R0.3 added; and

(c) in *climate zone* 3, in accordance with Table 13.2.5f; and

(d) in *climate zone* 4, in accordance with Table 13.2.5g, with R0.3 added; and

(e) in *climate zone* 5, in accordance with Table 13.2.5i, with R0.3 added; and

(f) in *climate zone* 6, in accordance with Table 13.2.5k, with R0.3 added; and

(g) in *climate zone* 7, in accordance with Table 13.2.5m, with R0.3 added; and

(h) in *climate zone* 8, in accordance with Table 13.2.5o.

(3) In *climate zones* 1 to 5, the solar absorptance of the outer surface of a wall used in (1) or (2) must be not more than 0.7.

(4) The thermal bridging in a metal-framed wall must be addressed by—

(a) achieving the *Total R-Value* in Tables 13.2.5p, 13.2.5q and 13.2.5r, calculated in accordance with AS/NZS 4859.2; or

(b) complying with one of the options in Tables 13.2.5s, 13.2.5t and 13.2.5u.

(5) A metal-framed wall ~~that~~ forming~~s~~ part of the building *envelope* must have a thermal break, consisting of a material with an *R-Value* of not less than R0.2, installed at all points of contact between the external cladding and the metal frame if the wall—

(a) does not have a wall lining, or has a wall lining that is fixed directly to the metal ~~frame~~studs, metal battens, or the like; and

(b) ~~is clad with weatherboards, fibre-cement or the like, or metal sheeting~~has cladding directly fixed to the metal frame.

(6) ~~The requirements of (5) do not apply to walls constructed using insulated sandwich panels.~~The thermal bridging in a wall constructed using insulated sandwich panels must be addressed by achieving the *Total R-Value* in Table 13.2.5q, calculated in accordance with AS/NZS 4859.2.

Table 13.2.5a: Concrete block walls – minimum insulation R-Value: climate zone 1

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.3	0	X	X	X	X
	> 0 to ≤ 300	Reflective	X	X	X
	> 300 to ≤ 450	0.0	Reflective	1.5	X
	> 450 to ≤ 600	0.0	Reflective	1.0	X
	> 600 to ≤ 900	0.0	0.0	Reflective	2.0

	> 900 to ≤ 1200	0.0	0.0	Reflective	1.0
	> 1200 to ≤ 1500	0.0	0.0	0.0	Reflective

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
	> 1500 to ≤ 1800	0.0	0.0	0.0	Reflective
	> 1800 ~~to ≤ 2400~~	0.0	0.0	0.0	Reflective
> 0.3 to ≤ 0.4	0	X	X	X	X
	> 0 to ≤ 300	1.0	X	X	X
	> 300 to ≤ 450	1.0	1.0	X	X
	> 450 to ≤ 600	Reflective	Reflective	2.0	X
	> 600 to ≤ 900	0.0	Reflective	Reflective	X
	> 900 to ≤ 1200	0.0	0.0	Reflective	1.5
	> 1200 to ≤ 1500	0.0	0.0	Reflective	Reflective
	> 1500 to ≤ 1800	0.0	0.0	0.0	Reflective
	> 1800 ~~to ≤ 2400~~	0.0	0.0	0.0	Reflective
> 0.4 to ≤ 0.5	0	X	X	X	X
	> 0 ≤ 300	1.0	X	X	X
	> 300 to ≤ 450	1.0	1.5	X	X
	> 450 to ≤ 600	Reflective	1.0	X	X
	> 600 to ≤ 900	0.0	Reflective	1.0	X
	> 900 to ≤ 1200	0.0	Reflective	Reflective	2.0
	> 1200 to ≤ 1500	0.0	0.0	Reflective	1.0
	> 1500 to ≤ 1800	0.0	0.0	Reflective	Reflective
	> 1800 ~~to ≤ 2400~~	0.0	0.0	0.0	Reflective
> 0.5 to ≤ 0.6	0	X	X	X	X
	> 0 to ≤ 300	1.5	X	X	X
	> 300 to ≤ 450	1.0	X	X	X
	> 450 to ≤ 600	Reflective	1.5	X	X
	> 600 to ≤ 900	Reflective	Reflective	1.5	X
	> 900 to ≤ 1200	0.0	Reflective	Reflective	X
	> 1200 to ≤ 1500	0.0	Reflective	Reflective	1.5
	> 1500 to ≤ 1800	0.0	0.0	Reflective	1.0
	> 1800 ~~to ≤ 2400~~	0.0	0.0	Reflective	Reflective
> 0.6 to ≤ 0.7	0	X	X	X	X
	> 0 to ≤ 300	X	X	X	X
	> 300 to ≤ 450	X	X	X	X
	> 450 to ≤ 600	Reflective	2.0	X	X
	> 600 to ≤ 900	Reflective	1.0	2.0	X
	> 900 to ≤ 1200	Reflective	Reflective	1.0	X
	> 1200 to ≤ 1500	0.0	Reflective	Reflective	2.0
	> 1500 to ≤ 1800	0.0	Reflective	Reflective	1.0
	> 1800 ~~to ≤ 2400~~	0.0	0.0	Reflective	Reflective

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) Reflective = *reflective insulation* with an airspace with a minimum width of at least 20 mm. The surface emittance of the reflective surface facing the airspace must be a maximum of 0.1, where the airspace is exposed to the sun during construction to reduce glare (an outward facing surface), or 0.05 if not exposed to the sun (an inward facing surface).

(5) This table shows wall heights for single storey dwellings. For two storey (or more) dwellings with a wall height up to 2.4 m, add R0.5 to the *R-Values* given in this Table. For two storey (or more) dwellings with a wall height greater than 2.4 m, add R1.0.

Table 13.2.5b: Lightweight walls – minimum insulation R-Value: climate zone 1

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.3	0	X	X	X	X
	> 0 to ≤ 300	2.5	X	X	X
	> 300 to ≤ 450	1.0	X	X	X
	> 450 to ≤ 600	Reflective	2.0	X	X
	> 600 to ≤ 900	Reflective	1.0	2.0	X
	> 900 to ≤ 1200	Reflective	Reflective	1.0	X
	> 1200 to ≤ 1500	Reflective	Reflective	Reflective	2.5
	> 1500 to ≤ 1800	0.0	Reflective	Reflective	1.5
	> 1800 ~~to ≤ 2400~~	0.0	0.0	Reflective	1.0
> 0.3 to ≤ 0.4	0	X	X	X	X
	> 0 to ≤ 300	X	X	X	X
	> 300 to ≤ 450	1.0	X	X	X
	> 450 to ≤ 600	Reflective	2.0	X	X
	> 600 to ≤ 900	Reflective	1.0	2.0	X
	> 900 to ≤ 1200	Reflective	Reflective	1.0	X
	>1200 to ≤ 1500	Reflective	Reflective	Reflective	2.5
	> 1500 to ≤ 1800	0.0	Reflective	Reflective	1.5
	> 1800 ~~to ≤ 2400~~	0.0	0.0	Reflective	1.0
> 0.4 to ≤ 0.5	0	X	X	X	X
	> 0 to ≤ 300	X	X	X	X
	> 300 to ≤ 450	1.0	X	X	X
	> 450 to ≤ 600	Reflective	2.0	X	X
	> 600 to ≤ 900	Reflective	1.0	2.0	X
	> 900 to ≤ 1200	Reflective	Reflective	1.0	X
	> 1200 to ≤ 1500	Reflective	Reflective	Reflective	2.5
	> 1500 to ≤ 1800	0.0	Reflective	Reflective	1.5
	> 1800 ~~to ≤ 2400~~	0.0	0.0	Reflective	1.0
> 0.5 to ≤ 0.6	0	X	X	X	X
	> 0 to ≤ 300	X	X	X	X
	> 300 to ≤ 450	1.0	X	X	X
	> 450 to ≤ 600	Reflective	2.0	X	X
	> 600 to ≤ 900	Reflective	1.0	2.0	X
	> 900 to ≤ 1200	Reflective	Reflective	1.0	X
	> 1200 to ≤ 1500	Reflective	Reflective	Reflective	2.5
	> 1500 to ≤ 1800	0.0	Reflective	Reflective	1.5

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
	> 1800 ~~to ≤ 2400~~	0.0	0.0	Reflective	1.0
> 0.6 to ≤ 0.7	0	X	X	X	X
	> 0 to ≤ 300	X	X	X	X
	> 300 to ≤ 450	1.0	X	X	X
	> 450 to ≤ 600	Reflective	2.0	X	X
	> 600 to ≤ 900	Reflective	1.0	2.0	X
	> 900 to ≤ 1200	Reflective	Reflective	1.0	X
	> 1200 to ≤ 1500	Reflective	Reflective	Reflective	2.5
	> 1500 to ≤ 1800	0.0	Reflective	Reflective	1.5
	> 1800 ~~to ≤ 2400~~	0.0	0.0	Reflective	1.0

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) Reflective = *reflective insulation* with an airspace with a minimum width of at least 20 mm. The surface emittance of the reflective surface facing the airspace must be a maximum of 0.1 where the airspace is exposed to the sun during construction to reduce glare (an outward facing surface), or 0.05 of not exposed to the sun (an inward facing surface).

(5) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings with a wall height up to 2.4 m, add R0.5 to *R-Values* from this Table. For two storey (or more) dwellings with a wall height greater than 2.4 m, add R1.0.

Table 13.2.5c: Masonry veneer wall – minimum insulation R-Value: climate zone 2

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	X	X	X	X
	> 0 to ≤ 300	2.0	X	X	X
	> 300 to ≤ 450	1.5	X	X	X
	> 450 to ≤ 600	1.5	2.0	X	X
	> 600 to ≤ 900	1.5	1.5	2.5	X
	> 900 to ≤ 1200	1.5	1.5	1.5	X
	> 1200 to ≤ 1500	1.5	1.5	1.5	2.5
	> 1500 ~~to ≤ 1800~~	1.5	1.5	1.5	2.0
> 0.35 to ≤ 0.5	0	X	X	X	X
	> 0 to ≤ 300	2.0	X	X	X
	> 300 to ≤ 450	1.5	X	X	X
	> 450 to ≤ 600	1.5	2.5	X	X
	> 600 to ≤ 900	1.5	1.5	2.5	X
	> 900 to ≤ 1200	1.5	1.5	1.5	X
	> 1200 to ≤ 1500	1.5	1.5	1.5	2.5
	> 1500 ~~to ≤ 1800~~	1.5	1.5	1.5	2.0

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
> 0.5 to ≤ 0.7	0	X	X	X	X
	> 0 to ≤ 300	2.0	X	X	X
	> 300 to ≤ 450	1.5	X	X	X
	> 450 to ≤ 600	1.5	2.0	X	X
	> 600 to ≤ 900	1.5	1.5	2.5	X
	> 900 to ≤ 1200	1.5	1.5	1.5	X
	> 1200 to ≤ 1500	1.5	1.5	1.5	X
	> 1500 ~~to ≤ 1800~~	1.5	1.5	1.5	2.0

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings with a wall height of up to 2.4 m add R0.4 to the *R-Values* from this Table. For two storey (or more) dwellings with a wall height greater than 2.4 m, add R0.8.

Table 13.2.5d: Masonry cavity wall – minimum insulation R-Value: climate zone 2

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	0.25	0.25	0.25	0.51
	> 0 to ≤ 300	0.0	0.25	0.25	0.51
	> 300 to ≤ 450	0.0	0.0	0.25	0.51
	> 450 to ≤ 600	0.0	0.0	0.25	0.51
	> 600 to ≤ 900	0.0	0.0	0.25	0.25
	> 900 to ≤ 1200	0.0	0.25	0.25	0.25
	> 1200 to ≤ 1500	0.0	0.25	0.25	0.25
	> 1500 ~~to ≤ 1800~~	0.0	0.25	0.25	0.25
> 0.35 to ≤ 0.5	0	0.25	0.25	0.25	0.51
	> 0 to ≤ 300	0.0	0.25	0.25	0.51
	> 300 to ≤ 450	0.0	0.0	0.25	0.51
	> 450 to ≤ 600	0.0	0.0	0.25	0.51
	> 600 to ≤ 900	0.0	0.0	0.25	0.25
	> 900 to ≤ 1200	0.0	0.0	0.0	0.25
	> 1200 to ≤ 1500	0.25	0.0	0.25	0.25
	> 1500 ~~to ≤ 1800~~	0.25	0.25	0.25	0.25
> 0.5 to ≤ 0.7	0	0.25	0.25	0.51	0.51
	> 0 to ≤ 300	0.0	0.25	0.25	0.51
	> 300 to ≤ 450	0.0	0.0	0.25	0.51
	> 450 to ≤ 600	0.0	0.0	0.25	0.51
	> 600 to ≤ 900	0.0	0.0	0.25	0.25
	> 900 to ≤ 1200	0.0	0.0	0.0	0.25
	> 1200 to ≤ 1500	0.0	0.0	0.0	0.25

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
	> 1500 ~~to ≤ 1800~~	0.0	0.0	0.25	0.25

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) This Table shows wall heights for single storey dwellings. For two-storey (or more) dwellings, add R0.25 to the *R-Values* given in this Table.

Table 13.2.5e: Concrete block wall – minimum insulation R-Value: climate zone 3

SA	*R-Value*
≤ 0.7	1.5

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

Table 13.2.5f: Lightweight wall – minimum insulation R-Value: climate zone 3

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.3	0	X	X	X	X
	> 0 to ≤ 300	2.5	X	X	X
	> 300 to ≤ 450	1.5	X	X	X
	> 450 to ≤ 600	1.5	2.5	X	X
	> 600 to ≤ 900	1.5	1.5	2.5	X
	> 900 to ≤ 1200	1.5	1.5	1.5	X
	> 1200 to ≤ 1500	Reflective	1.5	1.5	2.5
	> 1500 to ≤ 1800	Reflective	1.5	1.5	2.0
	> 1800 ~~to ≤ 2400~~	Reflective	Reflective	1.5	1.5
> 0.3 to ≤ 0.4	0	X	X	X	X
	> 0 to ≤ 300	2.5	X	X	X
	> 300 to ≤ 450	2.0	X	X	X
	> 450 to ≤ 600	1.5	2.5	X	X
	> 600 to ≤ 900	1.5	1.5	2.5	X
	> 900 to ≤ 1200	1.5	1.5	2.0	X
	> 1200 to ≤ 1500	Reflective	1.5	1.5	2.7
	> 1500 to ≤ 1800	Reflective	1.5	1.5	2.0
	> 1800 ~~to ≤ 2400~~	Reflective	Reflective	1.5	1.5
> 0.4 to ≤ 0.5	0	X	X	X	X
	> 0 to ≤ 300	X	X	X	X
	> 300 to ≤ 450	2.0	X	X	X
	> 450 to ≤ 600	1.5	X	X	X
	> 600 to ≤ 900	1.5	2.0	2.7	X
	> 900 to ≤ 1200	1.5	1.5	2.0	X
	> 1200 to ≤ 1500	1.5	1.5	1.5	X

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
	> 1500 to ≤ 1800	Reflective	1.5	1.5	2.5
	> 1800 ~~to ≤ 2400~~	Reflective	Reflective	1.5	1.5
> 0.5 to ≤ 0.6	0	X	X	X	X
	> to ≤ 300	X	X	X	x
	> 300 to ≤ 450	2.0	X	X	X
	> 450 to ≤ 600	1.5	X	X	X
	> 600 to ≤ 900	1.5	2.0	X	X
	> 900 to ≤ 1200	1.5	1.5	2.0	X
	> 1200 to ≤ 1500	1.5	1.5	1.5	X
	> 1500 to ≤ 1800	1.5	1.5	1.5	2.5
	> 1800 ~~to ≤ 2400~~	Reflective	1.5	1.5	2.0
> 0.6 to ≤ 0.7	0	X	X	X	X
	> 0 to ≤ 300	X	X	X	X
	> 300 to ≤ 450	2.5	X	X	X
	> 450 to ≤ 600	2.0	X	X	X
	> 600 to ≤ 900	1.5	2.0	X	X
	> 900 to ≤ 1200	1.5	1.5	2.5	X
	> 1200 to ≤ 1500	1.5	1.5	2.0	X
	> 1500 to ≤ 1800	Reflective	1.5	1.5	2.7
	> 1800 ~~to ≤ 2400~~	Reflective	1.5	1.5	2.0

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* for insulation.

(3) X = not permitted.

(4) Reflective = *reflective insulation* with an airspace with a minimum width of at least 20 mm. The surface emittance of the reflective surface facing the airspace must be a maximum 0.1, where the airspace is exposed to the sun during construction to reduce glare (an outward facing surface), or 0.05 if not exposed to the sun (an inward facing surface).

(5) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings with a wall height up to 2.4 m, add R1.0 to the *R-Values* given in this Table. For two storey (or more) dwellings with a wall height greater than 2.4 m, add R1.5.

Table 13.2.5g: Masonry veneer wall – minimum insulation R-Value: climate zone 4

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	2.0	2.5	2.5	X
	> 0 to ≤ 300	2.0	2.0	2.5	X
	> 300 to ≤ 450	2.0	2.0	2.5	3.0
	> 450 to ≤ 600	2.0	2.5	2.5	3.0
	> 600 to ≤ 900	2.5	2.5	2.5	3.0
	> 900 to ≤ 1200	X	3.0	3.0	3.0
	> 1200 to ≤ 1500	X	X	3.0	X

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
> 0.35 to ≤ 0.5	0	2.0	2.5	2.5	X
	> 0 to ≤ 300	2.0	2.0	2.5	X
	> 300 to ≤ 450	2.0	2.0	2.5	3.0
	> 450 to ≤ 600	2.0	2.0	2.5	3.0
	> 600 to ≤ 900	2.5	2.5	2.5	3.0
	> 900 to ≤ 1200	X	2.5	2.5	3.0
	> 1200 to ≤ 1500	X	X	3.0	3.0
> 0.5 to ≤ 0.7	0	2.0	2.5	2.5	X
	> 0 to ≤ 300	2.0	2.0	2.5	X
	> 300 to ≤ 450	2.0	2.0	2.5	3.0
	> 450 to ≤ 600	2.0	2.0	2.5	3.0
	> 600 to ≤ 900	2.0	2.0	2.5	3.0
	> 900 to ≤ 1200	3.0	2.5	2.5	3.0
	> 1200 to ≤ 1500	X	3.0	2.5	3.0

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings, add R0.5 to the *R-Values* given in this Table.

~~(4)~~(5) An overhang greater than 1500 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5h: Masonry cavity wall – minimum insulation R-Value: climate zone 4

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	0.25	0.25	0.51	0.75
	> 0 to ≤ 300	0.51	0.51	0.51	0.75
	> 300 to ≤ 450	0.51	0.51	0,51	0.75
	> 450 to ≤ 600	0.51	0.51	0.51	0.75
	> 600 to ≤ 900	1.08	0.75	0.75	1.08
	> 900 to ≤ 1200	1.44	1.08	1.08	1.08
	> 1200 to ≤ 1500	X	1.44	1.44	1.08
	> 1500 to ≤ 1800	X	X	X	1.44
> 0.35 to ≤ 0.5	0	0.25	0.25	0.51	0.62
	> 0 to ≤ 300	0.25	0.25	0.51	0.62
	> 300 to ≤ 450	0.51	0.51	0.51	0.62
	> 450 to ≤ 600	0.51	0.51	0.51	0.75
	> 600 to ≤ 900	0.75	0.62	0.62	0.75
	> 900 to ≤ 1200	1.08	1.08	0.75	1.08

	> 1200 to ≤ 1500	X	1.44	1.08	1.08
	> 1500 to ≤ 1800	X	X	1.44	1.44

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
> 0.5 to ≤ 0.7	0	0.0	0.25	0.25	0.51
	> 0 to ≤ 300	0.25	0.25	0.25	0.51
	> 300 to ≤ 450	0.25	0.25	0.51	0.51
	> 450 to ≤ 600	0.25	0.25	0.51	0.51
	> 600 to ≤ 900	0.25	0.51	0.51	0.62
	> 900 to ≤ 1200	0.51	0.62	0.62	0.75
	> 1200 to ≤ 1500	1.08	1.08	1.08	1.08
	> 1500 to ≤ 1800	1.44	1.44	1.08	1.08

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings, add R0.25 to the *R-Values* given in this Table.

~~(4)~~(5) An overhang greater than 1800 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5i: Masonry veneer wall – minimum insulation R-Value: climate zone 5

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	1.5	2.0	2.0	2.5
	> 0 to ≤ 300	1.5	2.0	2.0	2.5
	> 300 to ≤ 450	1.5	1.5	2.0	2.5
	> 450 to ≤ 600	1.5	2.0	2.0	2.5
	> 600 to ≤ 900	2.0	2.0	2.0	2.5
	> 900 to ≤ 1200	3.0	2.0	2.0	2.5
	> 1200 to ≤ 1500	X	3.0	2.5	2.5
> 0.35 to ≤ 0.5	0	1.5	2.0	2.0	2.5
	> 0 to ≤ 300	1.5	1.5	2.0	2.5
	> 300 to ≤ 450	1.5	1.5	2.0	2.5
	> 450 to ≤ 600	1.5	1.5	2.0	2.5
	> 600 to ≤ 900	2.0	2.0	2.0	2.5
	> 900 to ≤ 1200	2.5	2.0	2.0	2.5
	> 1200 to ≤ 1500	3.0	2.5	2.5	2.5
> 0.5 to ≤ 0.7	0	1.5	2.0	2.0	3.0
	> 0 to ≤ 300	1.5	2.0	2.0	3.0
	> 300 to ≤ 450	1.5	1.5	2.0	2.5
	> 450 to ≤ 600	1.5	2.0	2.0	2.5

> 600 to ≤ 900	2.0	2.0	2.0	2.5
> 900 to ≤ 1200	2.5	2.0	2.0	2.5
> 1200 to ≤ 1500	X	3.0	2.5	2.5

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings, add R0.5 to the *R-Values* given in this Table.

~~(4)~~(5) An overhang greater than 1500 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5j: Masonry cavity wall – minimum insulation R-Value: climate zone 5

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	0.0	0.0	0.25	0.25
	> 0 to ≤ 300	0.0	0.25	0.25	0.25
	> 300 to ≤ 450	0.25	0.25	0.25	0.25
	> 450 to ≤ 600	0.25	0.25	0.25	0.25
	> 600 to ≤ 900	0.25	0.25	0.25	0.51
	> 900 to ≤ 1200	0.51	0.51	0.51	0.51
	> 1200 to ≤ 1500	0.62	0.51	0.51	0.51
> 0.35 to ≤ 0.5	0	0.0	0.0	0.25	0.25
	> 0 to ≤ 300	0.0	0.0	0.25	0.25
	> 300 to ≤ 450	0.0	0.25	0.25	0.25
	> 450 to ≤ 600	0.25	0.25	0.25	0.25
	> 600 to ≤ 900	0.25	0.25	0.25	0.25
	> 900 to ≤ 1200	0.51	0.25	0.25	0.51
	> 1200 to ≤ 1500	0.62	0.51	0.51	0.51
> 0.5 to ≤ 0.7	0	0.0	0.0	0.0	0.25
	> 0 to ≤ 300	0.0	0.0	0.25	0.25
	> 300 to ≤ 450	0.0	0.0	0.25	0.25
	> 450 to ≤ 600	0.25	0.25	0.25	0.25
	> 600 to ≤ 900	0.25	0.25	0.25	0.25
	> 900 to ≤ 1200	0.51	0.25	0.25	0.25
	> 1200 to ≤ 1500	0.51	0.51	0.51	0.51

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) This Table shows wall heights for single storey dwellings. For two (or more) storey dwellings, add R0.25 to the *R-Values* shown in this Table.

~~(3)~~(4) An overhang greater than 1500 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5k: Masonry veneer wall – minimum insulation R-Value: climate zone 6

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	2.0	2.4	X	X
	> 0 to ≤ 300	2.4	2.4	X	X
	> 300 to ≤ 450	2.5	X	X	X
	> 450 to ≤ 600	X	X	X	X
	> 600 to ≤ 900	X	X	X	X
> 0.35 to ≤ 0.5	0	2.0	2.4	2.5	X
	> 0 to ≤ 300	2.4	2.5	X	X
	> 300 to ≤ 450	2.4	X	X	X

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
	> 450 to ≤ 600	X	X	X	X
	> 600 to ≤ 900	X	X	X	X
> 0.5 to ≤ 0.7	0	2.0	2.0	2.4	X
	> 0 to ≤ 300	2.0	2.4	2.5	X
	> 300 to ≤ 450	2.4	2.4	2.5	X
	> 450 to ≤ 600	2.5	2.5	X	X
	> 600 to ≤ 900	X	X	X	X
> 0.7 to ≤ 0.85	0	1.5	2.0	2.4	X
	> 0 to ≤ 300	2.0	2.0	2.4	X
	> 300 to ≤ 450	2.4	2.4	2.4	X
	> 450 to ≤ 600	2.4	2.4	2.4	X
	> 600 to ≤ 900	X	X	X	X

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings, add R0.5 to the *R-Values* given in this Table.

~~(4)~~(5) An overhang greater than 900 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5l: Masonry cavity wall – minimum insulation R-Value: climate zone 6

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	0.51	0.62	1.08	1.44
	> 0 to ≤ 300	1.08	1.08	1.08	1.44
	> 300 to ≤ 450	1.44	1.08	1.08	1.44
	> 450 to ≤ 600	1.44	1.44	1.08	1.44
	> 600 to ≤ 900	X	X	1.44	X
	> 900 to ≤ 1200	X	X	X	X
> 0.35 to ≤ 0.5	0	0.51	0.62	0.75	1.08
	> 0 to ≤ 300	0.75	0.75	1.08	1.44
	> 300 to ≤ 450	1.08	1.08	1.08	1.44
	> 450 to ≤ 600	1.44	1.08	1.08	1.44
	> 600 to ≤ 900	X	X	1.44	1.44
	> 900 to ≤ 1200	X	X	X	X
> 0.5 to ≤ 0.7	0	0.25	0.51	0.62	1.08
	> 0 to ≤ 300	0.62	0.62	0.75	1.08
	> 300 to ≤ 450	1.08	0.75	1.08	1.08
	> 450 to ≤ 600	1.44	1.08	1.08	1.08
	> 600 to ≤ 900	X	1.44	1.44	1.44
	> 900 to ≤ 1200	X	X	X	1.44
> 0.7 to ≤ 0.85	0	0.25	0.51	0.51	1.08

	> 0 to ≤ 300	0.62	0.51	0.75	1.08

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
	> 300 to ≤ 450	1.08	0.62	0.75	1.08
	> 450 to ≤ 600	1.08	1.08	1.08	1.08
	> 600 to ≤ 900	X	1.44	1.08	1.44
	> 900 to ≤ 1200	X	X	1.44	1.44

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings, add R0.25 to the *R-Values* given in this Table, to a maximum *R-Value* of R1.44.

~~(4)~~(5) An overhang greater than 1200 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5m: Masonry veneer wall – minimum insulation R-Value: climate zone 7

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	1.5	1.5	1.5	2.4
	> 0 to ≤ 300	2.0	1.5	2.0	2.4
	> 300 to ≤ 450	2.4	2.0	2.0	2.4
	> 450 to ≤ 600	X	2.4	2.0	2.4
	> 600 to ≤ 900	X	X	X	X
	> 900 to ≤ 1200	X	X	X	X
> 0.35 to ≤ 0.5	0	1.5	1.5	1.5	2.0
	> 0 to ≤ 300	1.5	1.5	2.0	2.4
	> 300 to ≤ 450	2.4	2.0	2.0	2.4
	> 450 to ≤ 600	X	2.0	2.0	2.4
	> 600 to ≤ 900	X	X	2.5	2.4
	> 900 to ≤ 1200	X	X	X	X
> 0.5 to ≤ 0.7	0	1.5	1.5	1.5	2.0
	> 0 to ≤ 300	1.5	1.5	1.5	2.0
	> 300 to ≤ 450	2.0	1.5	1.5	2.0
	> 450 to ≤ 600	2.5	2.0	2.0	2.0
	> 600 to ≤ 900	X	X	2.4	2.4
	> 900 to ≤ 1200	X	X	X	X
> 0.7 to ≤ 0.85	0	1.5	1.5	1.5	1.5
	> 0 to ≤ 300	1.5	1.5	1.5	2.0
	> 300 to ≤ 450	2.0	1.5	1.5	2.0
	> 450 to ≤ 600	2.4	2.0	2.0	2.0
	> 600 to ≤ 900	X	X	2.4	2.0
	> 900 to ≤ 1200	X	X	X	2.4

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings, add R0.5 to the *R-Values* given in this Table.

(5) An overhang greater than 1200 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5n: Masonry cavity wall – minimum insulation R-Value: climate zone 7

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	1.08	1.44	X	X
> 0.35 to ≤ 0.5	0	1.08	1.44	X	X
> 0.5 to ≤ 0.7	0	0.75	1.44	1.44	X
	> 0 to ≤ 300	1.44	X	X	X
> 0.7 to ≤ 0.85	0	0.75	1.08	1.44	X
	> 0 to ≤ 300	1.44	1.44	X	X

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings, add R0.25 to the *R-Values* given in this Table.

~~(4)~~(5) An overhang greater than 300 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5o: Lightweight wall – minimum insulation R-Value: climate zone 8

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
≤ 0.35	0	1.5	2.0	2.0	X
	> 0 to ≤ 300	2.0	2.0	2.4	X
	> 300 to ≤ 450	X	2.4	2.4	X
	> 450 to ≤ 600	X	X	2.5	X
	> 600 to ≤ 900	X	X	X	X
	> 900 to ≤ 1200	X	X	X	X
> 0.35 to ≤ 0.5	0	1.5	1.5	2.0	2.4
	> 0 to ≤ 300	2.0	2.0	2.0	2.5
	> 300 to ≤ 450	2.5	2.0	2.4	2.5
	> 450 to ≤ 600	X	2.5	2.4	X
	> 600 to ≤ 900	X	X	X	X
	> 900 to ≤ 1200	X	X	X	X
> 0.5 to ≤ 0.7	0	1.5	1.5	2.0	2.7
	> 0 to ≤ 300	2.0	2.0	2.0	2.7
	> 300 to ≤ 450	2.7	2.0	2.0	2.7
	> 450 to ≤ 600	X	2.7	2.5	2.5
	> 600 to ≤ 900	X	X	X	X
	> 900 to ≤ 1200	X	X	X	X
> 0.7 to ≤ 0.85	0	1.5	1.5	1.5	2.0
	> 0 to ≤ 300	2.0	1.5	2.0	2.4
	> 300 to ≤ 450	2.4	2.0	2.0	2.4
	> 450 to ≤ 600	X	2.4	2.0	2.4
	> 600 to ≤ 900	X	X	X	X

SA	Overhang (mm)	Wall height (m)			
		≤ 2.4	> 2.4 to ≤ 2.7	> 2.7 to ≤ 3.0	> 3.0 to ≤ 3.6
	> 900 to ≤ 1200	X	X	X	X

Table Notes

(1) SA = solar absorptance.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) X = not permitted.

(4) This Table shows wall heights for single storey dwellings. For two storey (or more) dwellings with a wall height up to 2.4 m, add R0.5 to the *R-Values* given in this Table. For two storey (or more) dwellings with a wall height greater than 2.4 m, add R1.0. In both cases, the maximum insulation level must be not more than R2.7, or R3.1 if there is a reflective airspace.

~~(4)~~(5) An overhang greater than 1200 mm is allowable where ≤ 15% of the total opaque wall area (excluding windows/doors) is covered by an overhang.

Table 13.2.5p: Concrete block walls with internal lining fixed to a metal frame: minimum Total R-Value to account for thermal bridging

Wall insulation *R-Value* from Tables 13.2.5a and 13.2.5e	Minimum *Total R-Value* to account for thermal bridging
0.5	0.94
1.0	1.15
1.5	1.66
2.0	2.04
2.5	2.24
2.8	2.38
3.0	2.48

Table Notes

Minimum *Total R-Values* are in-situ values. They account for compression of insulation.

Table 13.2.5q: Lightweight metal-framed walls: minimum Total R-Value to account for thermal bridging

Wall insulation *R-Value required* in accordance with 13.2.5(2)	Minimum *Total R-Value* to account for thermal bridging
1.0	1.32
1.5	1.64
2.0	1.89
2.5	2.06
2.7	2.15
≥3.0	2.27

Table Notes

(1) Where the wall insulation *R-Value* from Tables 13.2.5b, 13.2.5c, 13.2.5d, 13.2.5e, 13.2.5f, 13.2.5g, 13.2.5h, 13.2.5i, 13.2.5j, 13.2.5k, 13.2.5l, 13.2.5m, 13.2.5n and 13.2.5o falls between the values shown in this Table, the *required Total R-Value* may be interpolated.

(2) Minimum *Total R-Values* are in-situ values. They account for compression of insulation.

Table Notes

(1) Minimum *R-Values* are in-situ values. They account for compression of insulation.

(2) The surface emittance of a reflective surface facing an airspace must be a maximum of 0.1.

Explanatory Information

- A lightweight wall has no high thermal mass cladding on the outside or lining on the inside. Typically, this would represent a framed wall, clad externally with timber weatherboards, fibre-cement sheet, metal or autoclaved aerated concrete.
- Because of the high thermal conductance of metal, a thermal break is needed when a metal framing member directly connects the external cladding to the internal lining or the internal environment. For the purposes of 13.2.5(5)(b), expanded polystyrene strips greater than or equal to 12 mm thickness and timber greater than or equal to 20 mm thickness are deemed to achieve an *R-Value* greater than or equal to 0.2.
- Continuous insulation placed outside the *primary insulation layer*, including *reflective insulation*, may also be subject to *vapour permeance* requirements of 10.8.1(2). Many continuous insulation products and foils have a low vapour permeance. Some *reflective insulation* products have perforations to increase their *vapour permeance*. Many perforated *reflective insulation* products are not classified as a water barrier by AS 4200.1. Accordingly, these products are not suitable for use as a *water control layer*.
- Many *reflective insulation* products that use perforations to increase their *vapour permeance* are not suitable for use behind vertical or diagonally orientated timber cladding boards, where *required* by clause 7.5.2 of the ABCB Housing Provisions, or behind open jointed or unsealed cladding systems.

NSW 13.2.6

13.2.6 Floors and subfloor walls

(1) Floor insulation, where the floor is over an unenclosed space, must achieve the minimum *R-Value* in accordance with Table 13.2.6a.

(2) Floor and subfloor insulation, where the floor is over an enclosed subfloor space, must—

(a) in *climate zone* 1, be subfloor wall insulation with an *R-Value* of R1.5; and

(b) in *climate zone* 2, be subfloor wall insulation in accordance with Table 13.2.6b; and

(c) in *climate zone* 3, be subfloor wall insulation in accordance with Table 13.2.6c; and

(d) in *climate zone* 4, be in accordance with Table 13.2.6d; and

(e) in *climate zone* 5, be in accordance with Table 13.2.6e; and

(f) in *climate zone* 6, be in accordance with Table 13.2.6f; and

(g) in *climate zone* 7, be in accordance with Table 13.2.6g; and

(h) in *climate zone* 8, be in accordance with Table 13.2.6h.

(3) The thermal bridging in a metal-framed floor must be addressed by—

(a) achieving the *Total R-Value* in Table 13.2.6i, calculated by—

(i) using a method that accounts for the effect of thermal bridging in a suspended floor above an enclosed subfloor space; or

(ii) using AS/NZS 4859.2 for all other floors; or

(b) complying with one of the options in Table 13.2.6j.

(4) A concrete slab-on-ground, waffle pod slab or the like, with an in-slab or in-screed heating or cooling system, must have insulation with an *R- Value* greater than or equal to 1.0, installed around the vertical edge of its perimeter.

(5) A concrete slab-on-ground or the like, other than~~Except for~~ a waffle~~-~~ pod slab, must be insulated in accordance with the following:~~—~~

(a) ~~i~~In *climate zones* 6 and 7—

(i) insulation with *R-Value* greater than or equal to 0.64 must be installed around the vertical edge of its

perimeter; and

(ii) insulation with an *R-Value* greater than or equal to 0.64 must be installed underneath the slab.~~; and~~

(b) ~~i~~In *climate zone* 8—

(i) insulation with an *R-Value* greater than or equal to 1.0 must be installed around the vertical edge of its perimeter; and

(ii) insulation with an *R-Value* greater than or equal to 2.0 must be installed underneath the slab.

(6) Insulation required by (4), (5)(a)(i) and (5)(b)(i) must—

(a) be *water resistant*; and

(b) be continuous from the adjacent finished ground level—

(i) to a depth of greater than or equal to 300 mm; or

(ii) for at least the full depth of the vertical edge of the concrete slab-on-ground (see Figure 13.2.6).

(7) The requirements of (4) do not apply to an in-screed heating or cooling system used solely in a bathroom, amenity area or the like.

Table 13.2.6a: Minimum R-Value of floor insulation where the floor is over an unenclosed space

Climate zone	*R-Value*
1	2.0
2	2.0
3	1.5
4	X
5	X
6	4.0, or 3.5 if used in conjunction with a reflective airspace
7	
8	

Table Notes

(1) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(2) X = not permitted.

Table 13.2.6b: Minimum R-Value of subfloor wall insulation where the floor is over an enclosed subfloor space: climate zone 2

Subfloor wall height (mm)	Minimum subfloor wall insulation *R-Value*
≤600	0.5
>600 to ≤900	1.0
>900 to ≤1200	1.5
>1200 to ≤1500	1.5
>1500 to ≤1800	1.5

Table Notes

(1) Under-floor insulation is not permitted in *climate zone* 2.

(2) *R-Values* listed are for the labelled, declared *R-Value* of insulation.

(3) Subfloor wall insulation must not obstruct ventilation openings in the subfloor walls.

Table 13.2.6c: Minimum R-Value of subfloor wall insulation where the floor is over an enclosed subfloor space: climate zone 3

Subfloor wall height (mm)	Minimum subfloor wall insulation *R-Value*
≤600	0.5

- Control device factors in (2) are only applied to the *illumination power density*, not the overall *illumination power density*.
- To comply with (1), the overall *lamp power density* or overall *illumination power density* must be less than or equal to the allowance.
- Trading of allowances between (1)(a), (b) and (c) is not permitted.
- (1)(b) includes outdoor living spaces such as verandahs, balconies, patios, alfresco spaces or the like that are attached to a Class 1 building.
- The artificial lighting requirements in 13.7.6 are to be read in conjunction with the artificial lighting requirements in 10.5.2.
- The artificial lighting around the perimeter of a building does not need to comply to a maximum power density as neither the lighting required or the area of the space can be easily defined. Instead, external lights are required to be controlled by daylight sensors or to be efficient.
- In (4), separate switching is required for halogen lamps to facilitate less frequent usage. This is because they are significantly less energy efficient that fluorescent lamps.

NSW 13.7.7

13.7.7 Water heater in a heated water supply system

~~A water heater in a heated water supply system must be designed and installed in accordance with Part B2 of NCC Volume Three — Plumbing Code of Australia.~~

(1) In a new Class 1 or Class 10 building, a water heater in a heated water supply system must be—

(a) a solar water heater complying with (2); or

(b) a heat pump water heater complying with (2); or

(c) a gas water heater complying with (3); or

(d) an electric resistance water heater only in the circumstances described in (4); or

(e) a wood fired thermosiphon water heater or direct fired water heater each complying with AS/NZS 3500.4.

(2) In a new Class 1 or Class 10 building a solar water heater and a heat pump water heater must comply with either—

(f) Table 13.7.7a, for the minimum small-scale technology certificates for the installation zone; or

(g) Table 13.7.7b, for the minimum energy savings calculated in accordance with AS/NZS 4234.

(3) In a new Class 1 or Class 10 building, a gas water heater must be rated not less than 5 Stars in accordance with AS 4552.

(4) In a new Class 1 or Class 10 building, an electric resistance water heater with no storage or a heated water delivery of not more than 50 litres in accordance with AS 1056.1 may be installed when—

(a) the building has—

(i) not more than 1 bedroom; and

(ii) not more than 1 electric resistance water heater installed; or

(b) the building has—

(iii) a water heater that complies with (2) or (3); and

(iv) not more than 1 electric resistance water heater installed; or

(v) the greenhouse gas emission intensity of the public electricity supply is low.

Table 13.7.7a: Minimum small-scale technology certificates

Number of bedrooms in the building	2022	2023	2024	2025
1 or 2	12	11	9	8
3 or 4	19	17	15	13
4 or more	25	22	19	16

Table 13.7.7b: Minimum energy savings

Number of bedrooms	Minimum energy saving
1 or 2	40% for a 'small load' system
2 or 3	60% for a 'medium load' system
4 or more	60% for a 'large load' system

NSW 13.7.8

13.7.8 Swimming pool heating and pumping

(1) Heating for a *swimming pool* must be by—

(a) a solar heater not boosted by electric resistance heating; or

(b) a heater using reclaimed energy; or

(c) a gas heater; or

(d) a heat pump; or

(e) a combination of (a) to (d).

(2) Where some or all of the heating *required* by (1) is by a gas heater or a heat pump, the *swimming pool* must have—

(f) a cover with a minimum *R-Value* of 0.05, unless located in a *conditioned space*; and

(g) a time switch to control the operation of the heater.

(3) A time switch must be provided to control the operation of a circulation pump for a *swimming pool*.

(4) For the purposes of 13.7.8, a *swimming pool* does not include a spa pool.

NSW 13.7.9

13.7.9 Spa pool heating and pumping

(1) Heating for a spa pool that shares a water recirculation system with a *swimming pool* must be by—

(a) a solar heater; or

(b) a heater using reclaimed energy; or

(c) a gas heater; or

(d) a heat pump; or

(e) a combination of (a) to (d).

(2) Where some or all of the heating *required* by (1) is by a gas heater or a heat pump, the spa pool must have—

(a) a cover; and

(b) a push button and a time switch to control the operation of the heater.

(3) A time switch must be provided to control the operation of a circulation pump for a spa pool having a capacity of 680 L or more.

13.7.10 Switchboard capacity

(1) Subject to (2), where gas is used for any *domestic services*, a minimum of 8 empty single-phase circuit breaker slots must be provided in a switchboard.

(2) Where electricity is used for the *domestic service* of space heating, hot water or cooking, the number of empty single-phase circuit breaker slots *required* by (1) may be reduced by the number of single-phase circuit breaker slots used by the *domestic service*, so long as a minimum of 4 empty single-phase circuit breaker slots are provided.

(3) Where the empty single-phase circuit breaker slots *required* by (1) are located in a switchboard other than the main switchboard, supply to that switchboard from the main switchboard shall be sized to permit at least 32 A single-phase maximum demand.

Notes

For the purposes of (1), where an electrical system is installed to replace an existing gas system, the number of spare single-phase circuit breaker slots may be reduced by the number of single-phase circuit breaker slots used by that electrical system.

13.7.11 Provision for electric vehicle charging

Where a building is provided with one or more car parking spaces, the main switchboard must be provided with at least one single-phase circuit sized to support a load of 32 A, with active conductors of at least 6 mm^2 cross sectional area, that terminates at one of the car parking spaces with—

(a) a general purpose outlet of at least 15 A labelled to indicate that its purpose is for electric vehicle charging; or

(b) electric vehicle charging equipment.