9 Fire safety

Part 9.1 Scope and application of Section 9

9.1.1 Scope

[New for 2022]

(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).

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

9.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC Volume Two.

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

Explanatory Information

In NCC 2019, the content of Section 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 9.2 Fire separation of external walls

SA 9.2.1

9.2.1 External walls of Class 1 buildings

[2019: 3.7.2.2]

An *external wall* of a Class 1 building, and any openings in that wall, must comply with 9.2.3 if the wall is less than—

(a) 900 mm from an allotment boundary other than the boundary adjoining a road alignment or other public space; or

(b) 1.8 m from another building on the same allotment other than a Class 10 building associated with the Class 1 building or a detached part of the same Class 1 building.

9.2.2 Measurement of distances

[2019: 3.7.2.3]

(1) The distance from any point on an *external wall* of a building to an allotment boundary or another building is the distance to that point measured along a line at right angles from the allotment boundary or *external wall* of the other building which intersects that point without being obstructed by a wall complying with 9.2.3.

(2) Where a wall within a specified distance is *required* to comply with 9.2.3, only that part of the wall (including any openings) within the specified distance need be constructed in that manner (see Figure 9.2.2a, Figure 9.2.2b and Figure 9.2.2c).

(3) 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, excluding any eave overhang (see Figure 9.2.2d and Figure 9.2.2e).

SA 9.2.2(4)

Figure 9.2.2a: Walls at right angles to the boundary

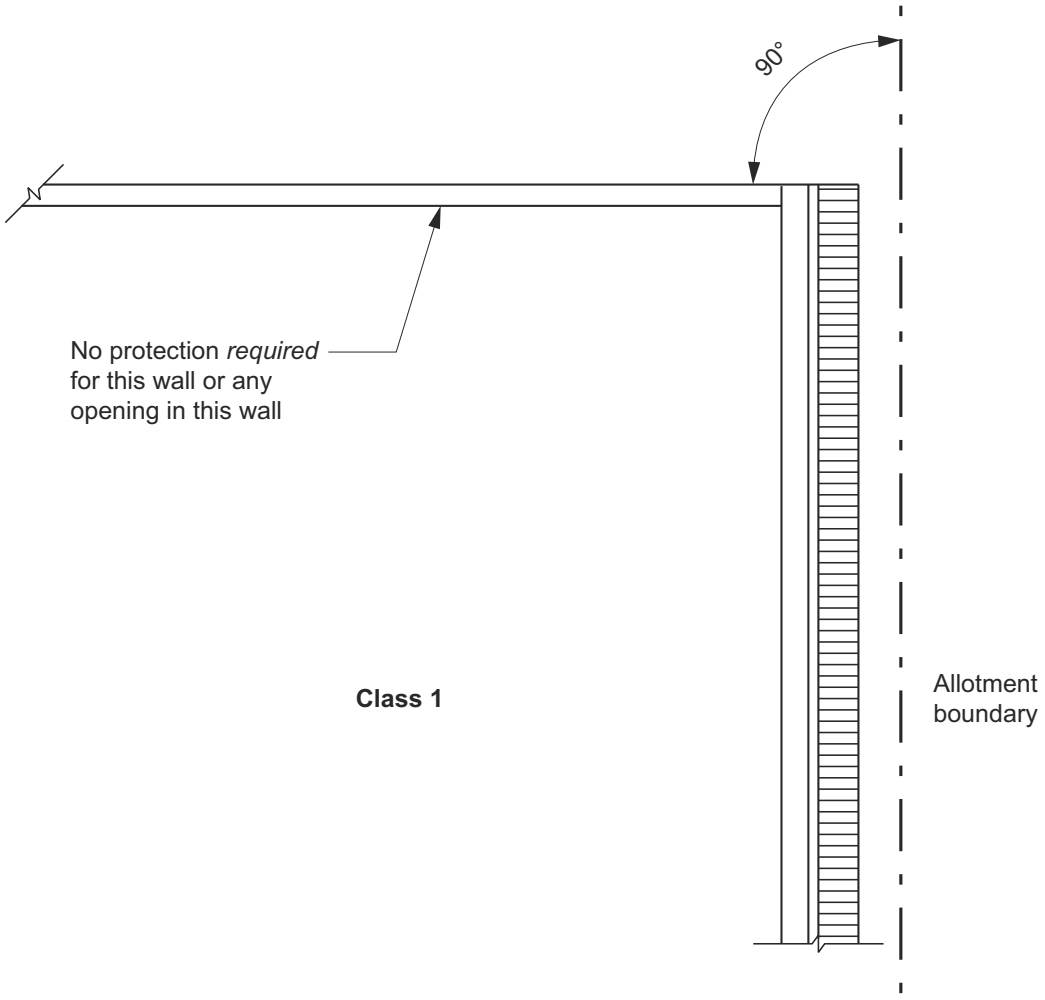


Figure Notes

(1) No protection *required* for the wall at right angles or more to the boundary.

(2) For protection of encroachments refer to 9.2.9.

Figure 9.2.2b: Measurement of distances — Full wall protection (Plan view)

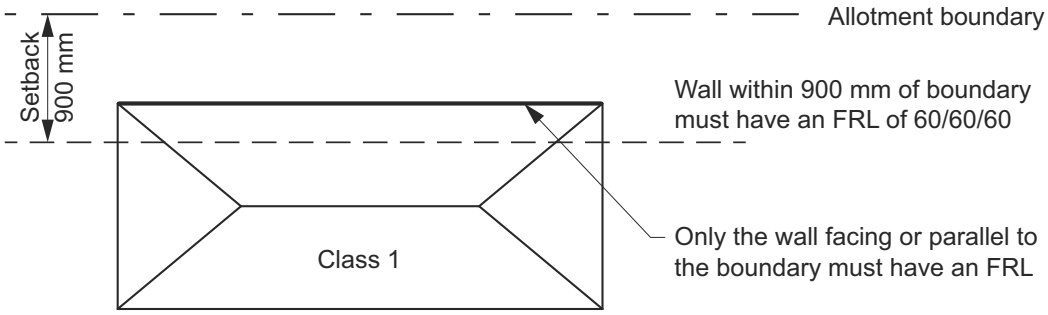


Figure Notes

Setback distance is measured at right angles to the boundary.

Figure 9.2.2c: Measurement of distances — Part walls protection (Plan view)

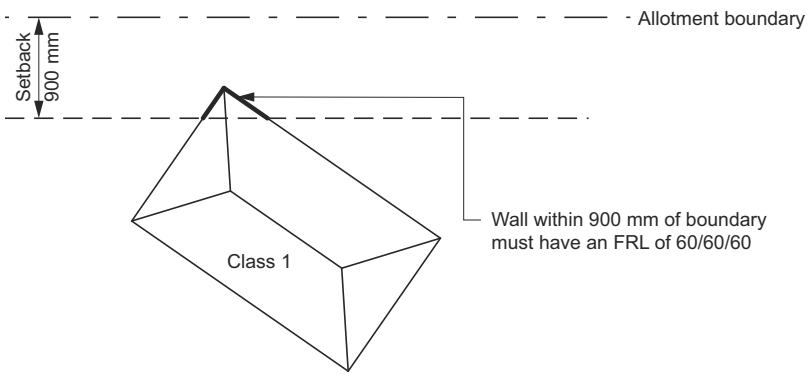


Figure Notes

Setback distance is measured at right angles to the boundary.

Figure 9.2.2d: Measurement of distance — Buildings of different heights — Class 1 buildings on same allotment

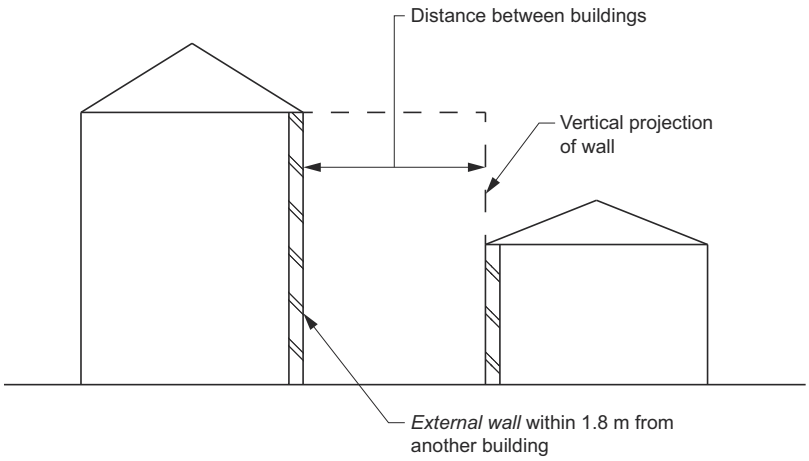
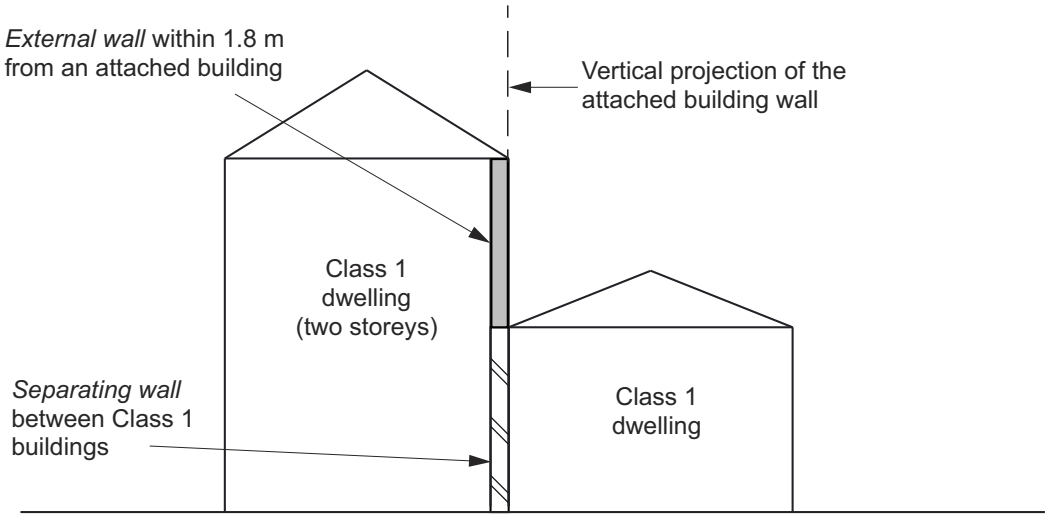


Figure 9.2.2e: Measurement of distance — Buildings of different heights — Attached Class 1 buildings on same allotment



9.2.3 Construction of external walls

[2019: 3.7.2.4]

(1) *An external wall* (including a gable) *required* to be *fire-resisting* (referred to in 9.2.1 or 9.2.4) must—

(a) commence at the footings or ground slab, except where the *external wall* commences above a *separating wall* complying with 9.3.1 (see Figure 9.2.2e); and

(b) extend to—

(i) the underside of a *non-combustible* roof covering, except that a wall may terminate not more than 200 mm from the underside of a *non-combustible* roof covering, where the area between the *external wall* and underside of the roof covering is sealed with a *non-combustible* fascia, gutter or *flashing*; or

(ii) the underside of a *non-combustible* eaves lining (See Figures 9.2.3a and b); and

(c) be constructed in accordance with (2).

(2) A wall *required* by (1) must—

(a) have an FRL of not less than 60/60/60 when tested from the outside; or

(b) be of masonry-veneer construction in which the external masonry veneer is not less than 90 mm thick; or

(c) be of masonry construction not less than 90 mm thick.

(3) Openings in *external walls required* to be *fire-resisting* (referred to in 9.2.1 or 9.2.4) must be protected by—

(a) non-openable fire *windows* or other construction with an FRL of not less than –/60/–; or

(b) *self-closing* solid core doors not less than 35 mm thick.

(4) The requirements of (3) do not apply to a *window* in a non-*habitable room* that is located adjacent to and not less than 600 mm from the boundary of an adjoining allotment or 1.2 m from another building on the same allotment provided that—

(a) in a bathroom, laundry or toilet, the opening has an area of not more than 1.2 m^2; or

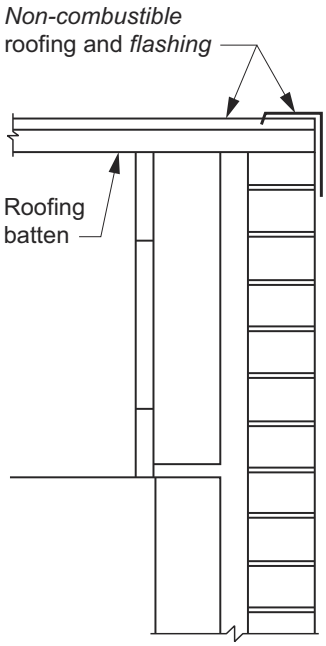
(b) in a room other than one referred to in (a), the opening has an area of not more than 0.54 m^2 and—

(i) the *window* is steel-framed, there are no opening sashes and it is glazed in wired glass; or

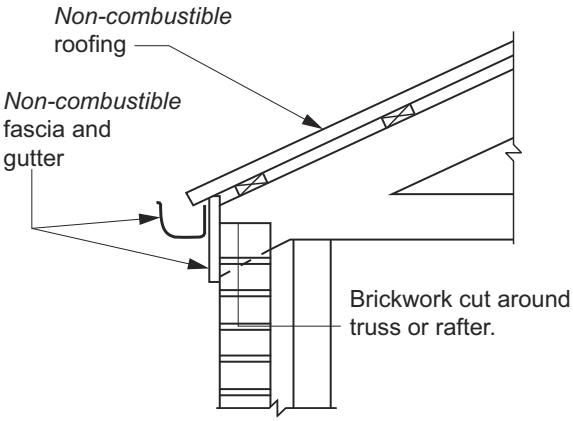
(ii) the opening is enclosed with translucent hollow glass blocks.

(5) Subfloor vents, roof vents, weepholes, control joints, construction joints and penetrations for pipes, conduits and the like need not comply with (3).

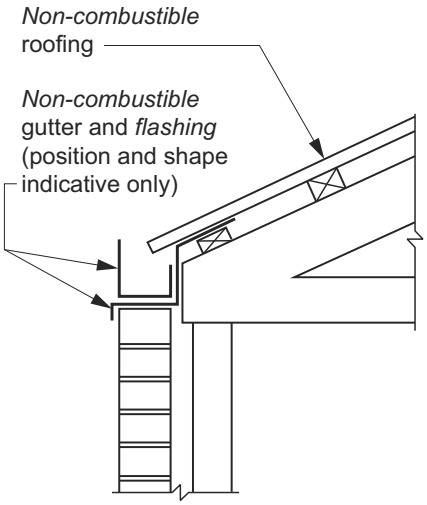
Figure 9.2.3a: Typical construction of external walls



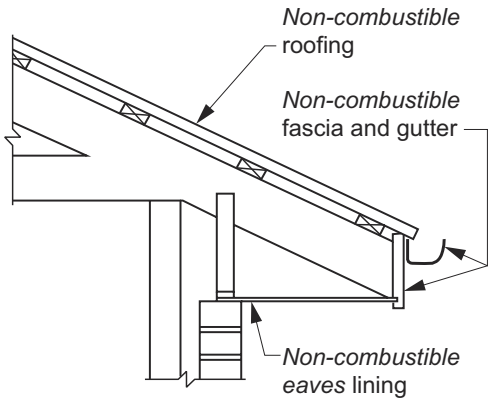
(a) Gable construction



(b) Gutter on face of wall



(c) Gutter on top of wall



(d) Eaves construction

Figure Notes

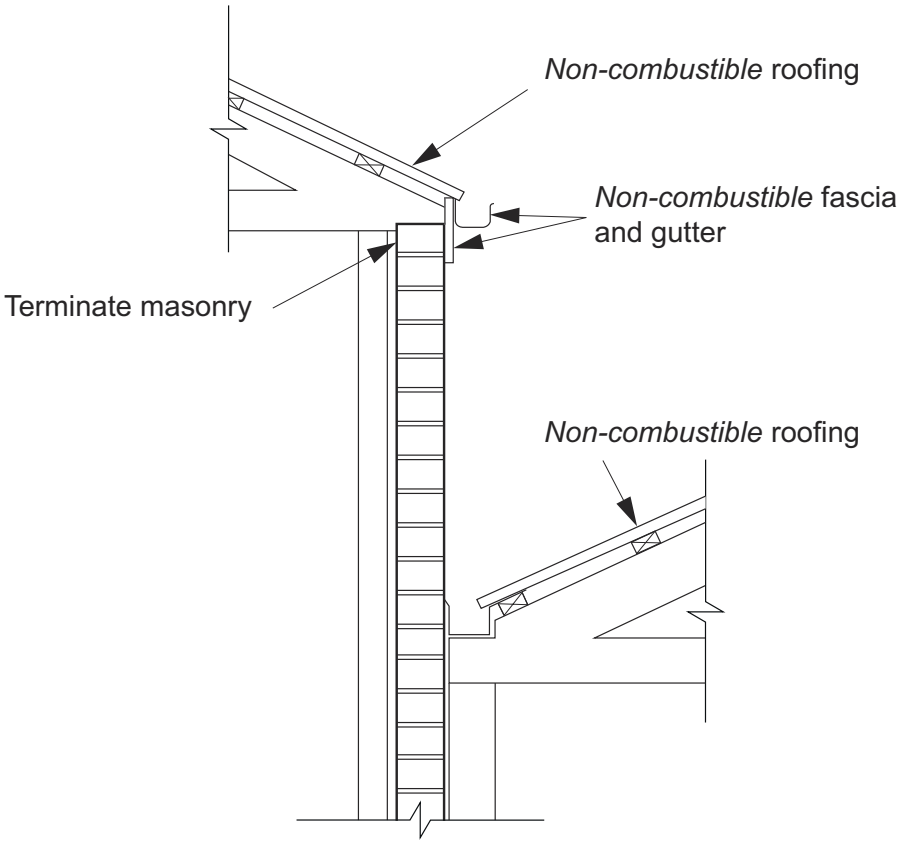
(1) The *external wall* is deemed to extend to the underside of *non-combustible* roof covering, or *non-combustible* eaves lining, when constructed as shown.

(2) Where sarking is installed it must be located so that ponding of water is avoided between the fascia and the first roofing batten.

(3) The location of *flashing* and framing is indicative only.

(4) Masonry shown in diagram (b) is to be terminated in accordance with 9.2.3(1)(b).

Figure 9.2.3b: Typical construction of external walls — attached Class 1 buildings on the same allotment



Attached Class 1 buildings on the same allotment

Figure Notes

(1) The *external wall* is deemed to extend to the underside of *non-combustible* roof covering, or *non-combustible* eaves lining, when constructed as shown.

(2) Where sarking is installed it must be located so that ponding of water is avoided between the fascia and the first roofing batten.

(3) The location of *flashing* and framing is indicative only.

(4) Masonry shown in diagram (b) is to be terminated in accordance with 9.2.3(1)(b).

Explanatory Information

- A *Performance Solution* must be used where an *external wall required* to be *fire-resisting* does not commence in accordance with 9.2.3(1)(a).
- The intent of the typical construction details shown in Figures 9.2.3a and b are to ensure that *combustible* materials (external or internal) are not directly exposed to fire at the junction of the wall and *non-combustible* roof, eaves lining, guttering and the like. Other forms of construction may also be acceptable provided that they achieve this intent.
- See Figure 9.2.2a and clause 10.7.3 for internal *separating wall* construction under one common roof.

9.2.4 Class 10a buildings

[2019: 3.7.2.5]

(1) A Class 1 building must be protected by a method in—

(a) 9.2.5 where a Class 10a building is located between or adjacent to a Class 1 building and a boundary alignment

that is not a boundary with a road alignment or other public space; or

(b) 9.2.6 where a Class 10a building is located between or adjacent to a Class 1 building it is associated with and another building on the same allotment; or

(c) 9.2.7 where two or more Class 10a buildings on the same allotment are located between and are associated with different Class 1 buildings.

(2) A Class 10a building must not significantly increase the risk of spread of fire between Class 2 to 9 buildings.

SA 9.2.4(3)

SA 9.2.4(4)

Explanatory Information

9.2.4(1)(a) ensures that when a Class 10 building is located between an allotment boundary and a Class 1 building or another building on the same allotment, either directly or indirectly, that the Class 1 building be protected by a wall with an FRL.

The intention is to prevent the spread of fire from an allotment boundary (*fire source feature*) to a Class 1 building via a Class 10a building. Where a Class 10a building is not sited directly and wholly between the allotment boundary and the Class 1 building (see 9.2.5), the potential of fire spreading from the allotment boundary to the Class 1 still exists. Therefore, fire separation would be *required*.

9.2.4 does not apply to a boundary that adjoins a road or public space such as parklands, lakes, rivers and the like where the construction of buildings is unlikely.

9.2.5 Protection of Class 1 buildings — Class 10a between Class 1 and the allotment boundary

[2019: Figure 3.7.2.4]

The following methods are acceptable for the protection of a Class 1 building where a Class 10a building is located between or adjacent to a Class 1 building and a boundary alignment that is not a boundary with a road alignment or other public space:

(a) The Class 10a building is not less than 900 mm from the allotment boundary, other than the boundary adjoining a road alignment or other public space, as shown in Figure 9.2.5a.

(b) An *external wall* of the Class 10a building which is less than 900 mm from an allotment boundary, other than the boundary adjoining a road alignment or other public space, complies with 9.2.3 as shown in Figure 9.2.5b.

(c) An *external wall* of the Class 10a building, which is less than 900 mm from the Class 1 building, complies with 9.2.3 as shown in Figure 9.2.5c.

(d) The Class 1 building is not less than 900 mm from the Class 10a building, as shown in Figure 9.2.5d.

(e) An *external wall* of the Class 1 building, which is less than 900 mm from the Class 10a building, complies with 9.2.3, as shown in Figure 9.2.5e.

(f) An *external wall* of the Class 10a building which is less than 900 mm from an allotment boundary other than the boundary adjoining a road alignment or other public space, complies with 9.2.3, as shown in Figure 9.2.5f.

(g) An *external wall* of the Class 10a building, which is less than 900 mm from the *external wall* of the Class 1 building, complies with 9.2.3, as shown in Figure 9.2.5g.

(h) An *external wall* of the Class 1 building, which is less than 900 mm from a Class 10a building that is situated less than 900 mm from an allotment boundary, complies with 9.2.3, as shown in Figure 9.2.5h.

(i) The *external wall* of the Class 1 and Class 10a building which are less than 900 mm from an allotment boundary, other than the boundary adjoining a road alignment or other public space, complies with 9.2.3 as shown in Figure 9.2.5i.

Figure 9.2.5a: Class 10a building 900 mm from allotment boundary

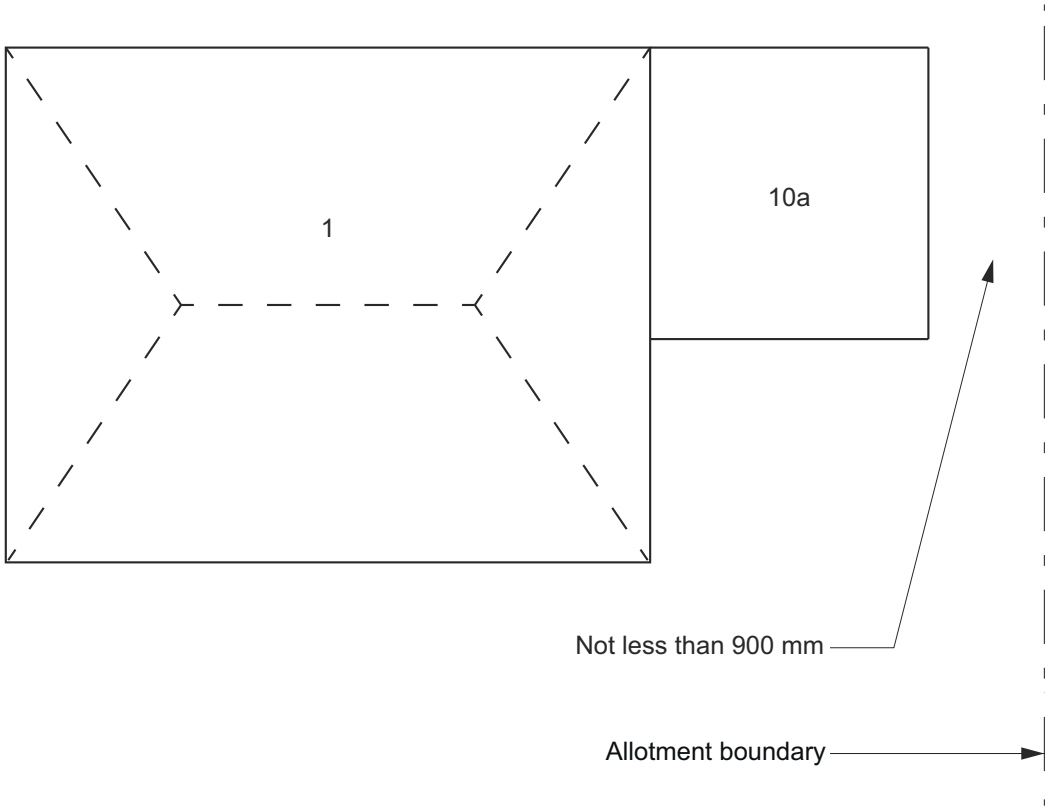


Figure 9.2.5b: External wall to Class 10a building with FRL (method 1)

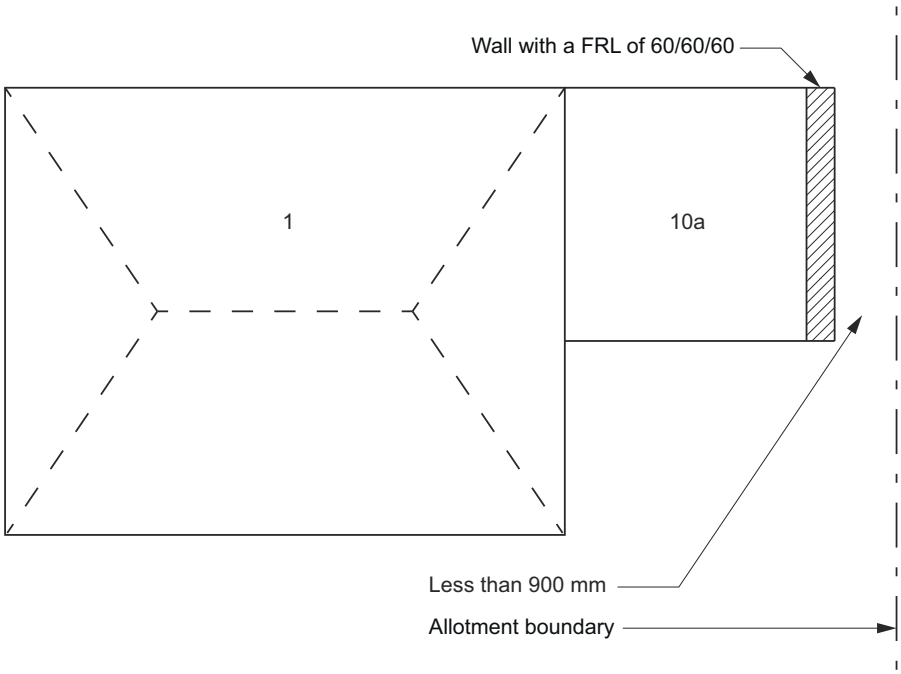


Figure 9.2.5c: External wall to Class 10a building with FRL (method 2)

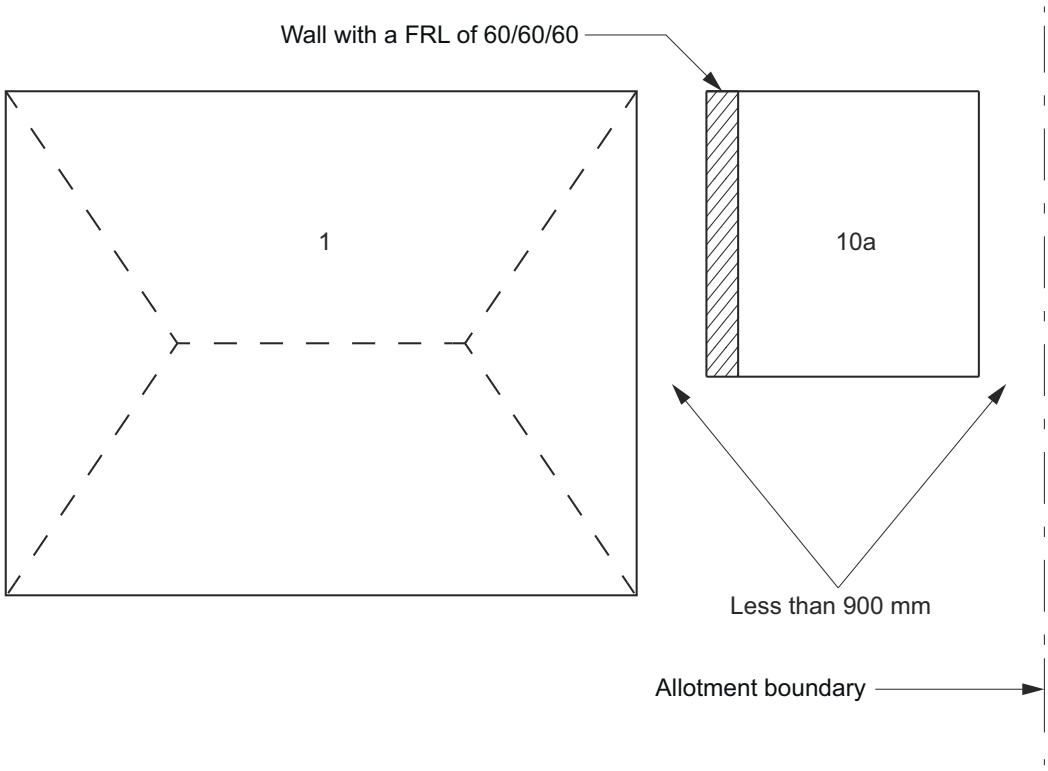


Figure 9.2.5d: 900 mm separation between buildings

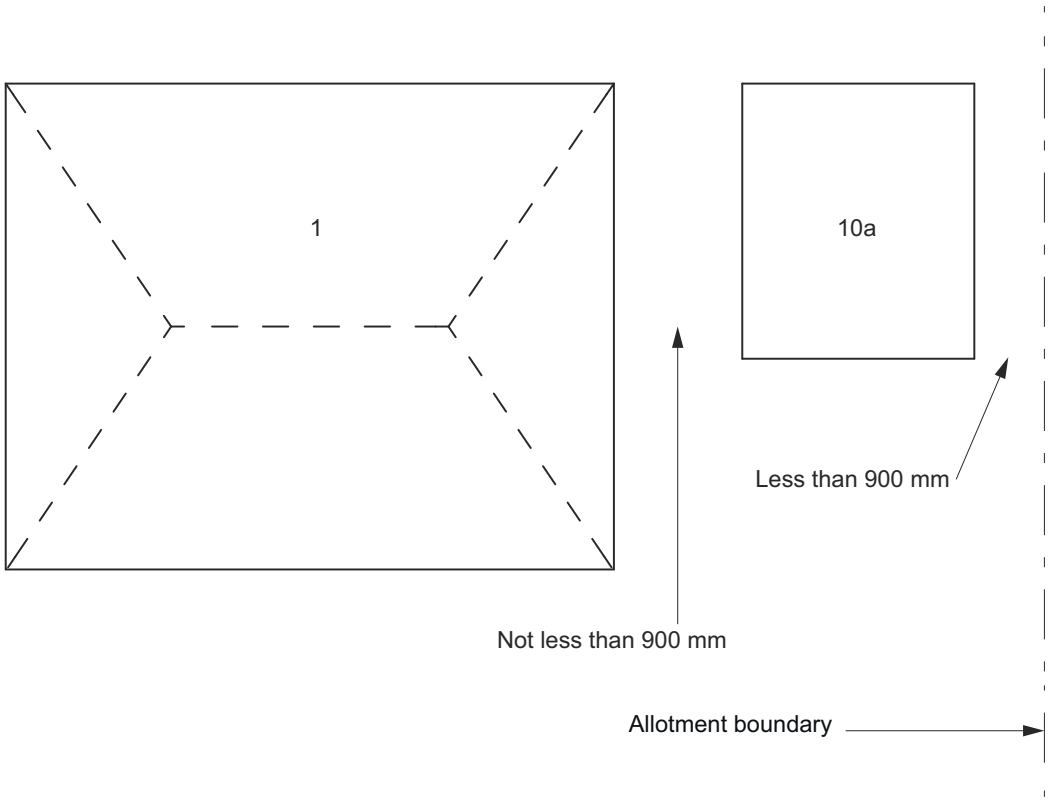


Figure 9.2.5e: Class 1 building with FRL to external wall

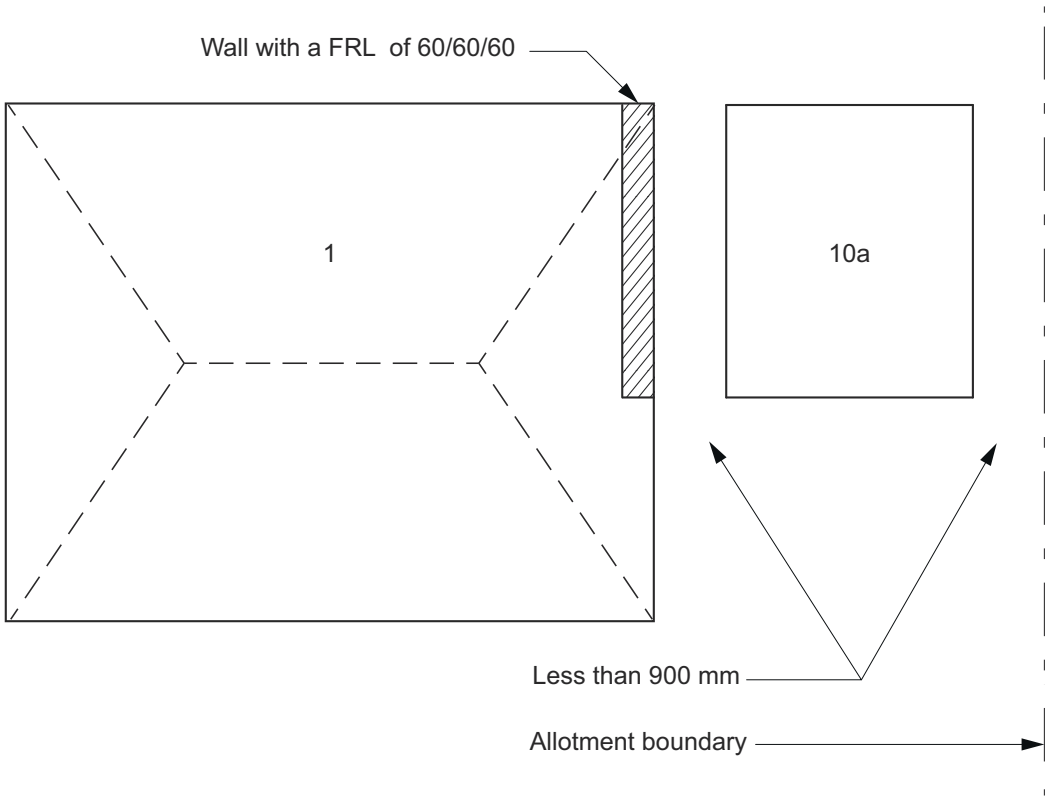


Figure 9.2.5f: External wall of adjacent Class 10a building with FRL (method 1)

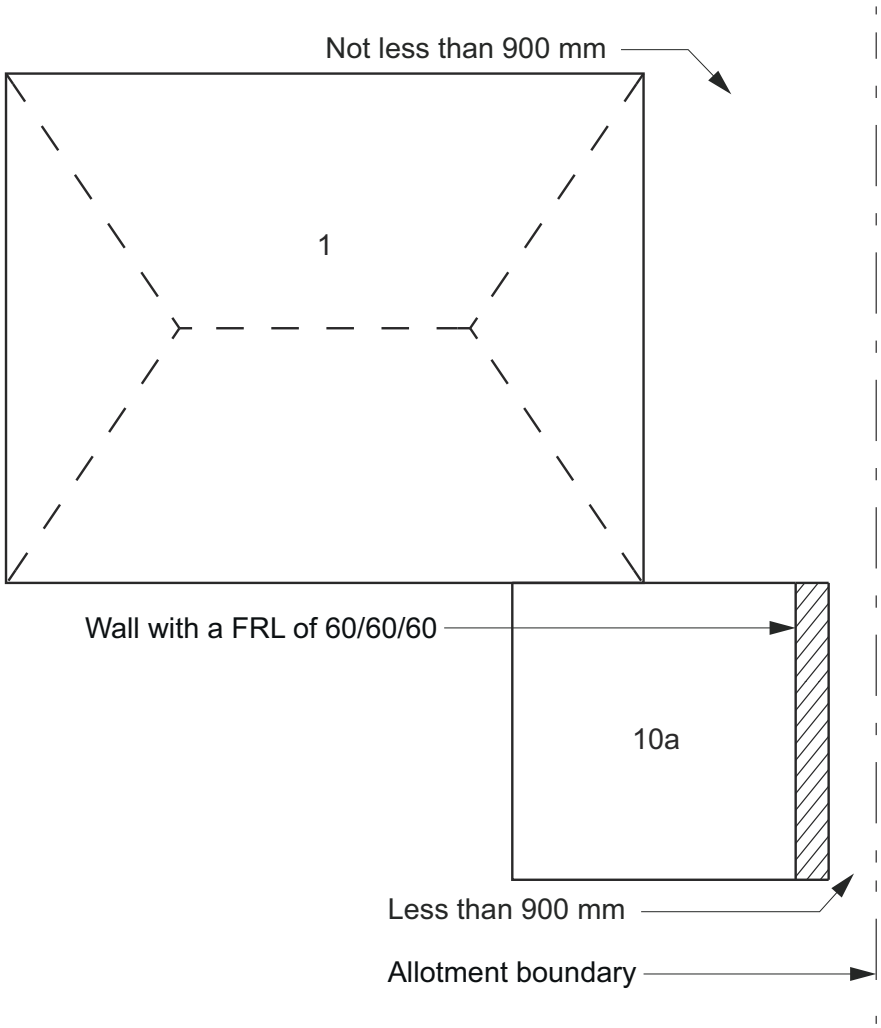


Figure 9.2.5g: External wall of adjacent Class 10a building with FRL (method 2)

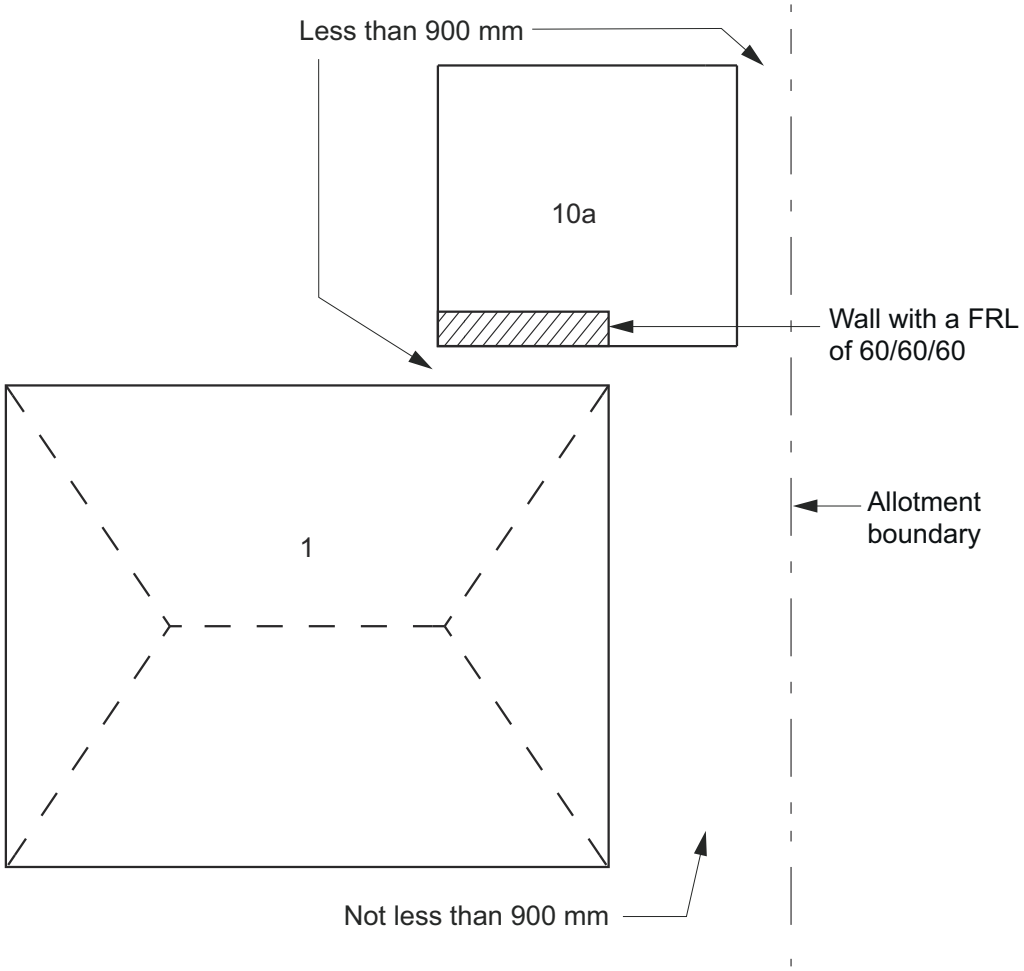


Figure 9.2.5h: Class 1 building with FRL to external wall

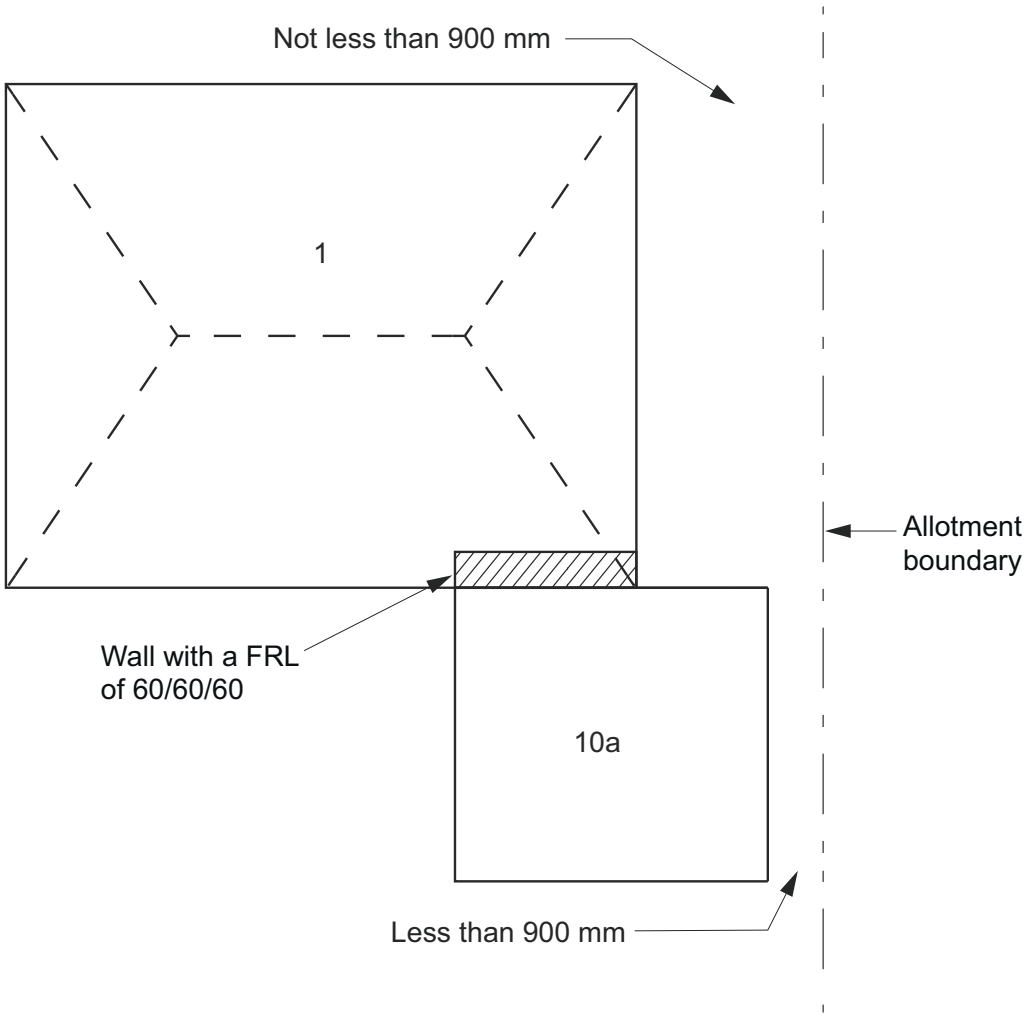
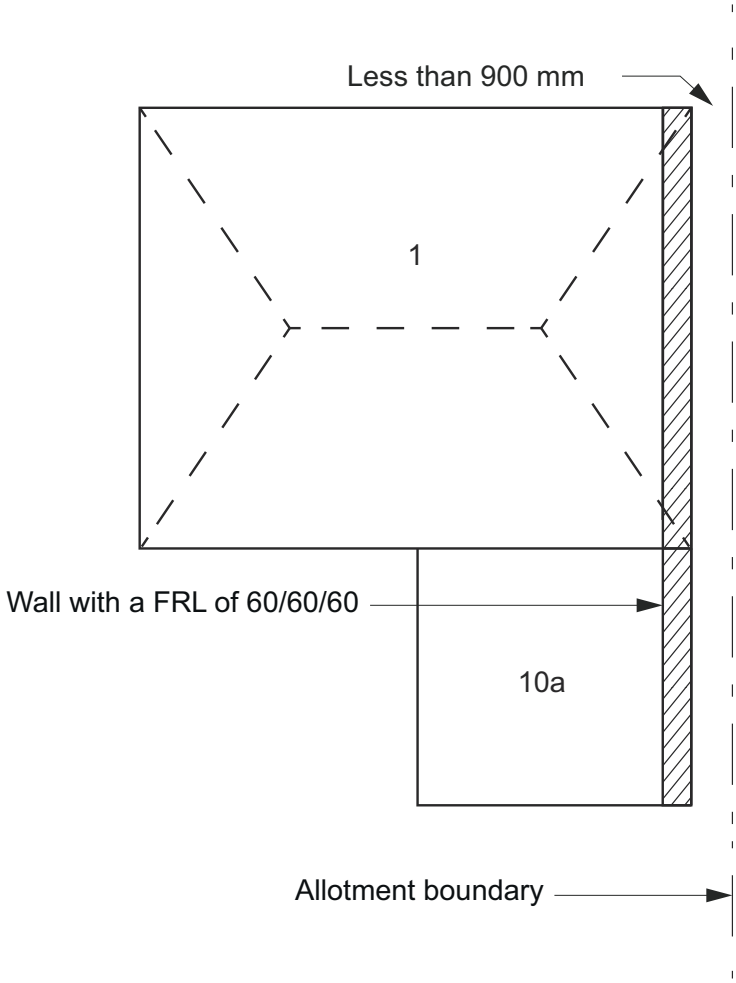


Figure 9.2.5i: External wall to Class 10 building with FRL



9.2.6 Protection of Class 1 buildings—Class 10a between Class 1 and other buildings on allotment

[2019: Figure 3.7.2.5]

The following methods are acceptable for the protection of a Class 1 building where a Class 10a building is located between or adjacent to a Class 1 building it is associated with and another building on the same allotment:

(a) The Class 10a building is not less than 1.8 m from the other building, as shown in Figure 9.2.6a.

(b) An *external wall* of the Class 10a building, which is less than 1.8 m from the other building, complies with 9.2.3, as shown in Figure 9.2.6b.

(c) An *external wall* of the Class 10a building, which is less than 1.8 m from the Class 1 building, complies with 9.2.3, as shown in Figure 9.2.6c.

(d) The Class 1 building is not less than 1.8 m from the Class 10a building, as shown in Figure 9.2.6d.

(e) An *external wall* of the Class 1 building, which is less than 1.8 m from the Class 10a building, complies with 9.2.3, as shown in Figure 9.2.6e.

(f) An *external wall* of the Class 10a building, which is less than 1.8 m from the *external wall* of the other building, complies with 9.2.3, as shown in Figure 9.2.6f.

(g) An *external wall* of the Class 10a building, which is less than 1.8 m from the *external wall* of the Class 1 building, complies with 9.2.3, as shown in Figure 9.2.6g.

(h) An *external wall* of the Class 1 and 10a building, which is less than 1.8 m from the *external wall* of the other building, complies with 9.2.3, as shown in Figure 9.2.6h.

Figure 9.2.6a: Class 10a building 1.8 m from other building on allotment

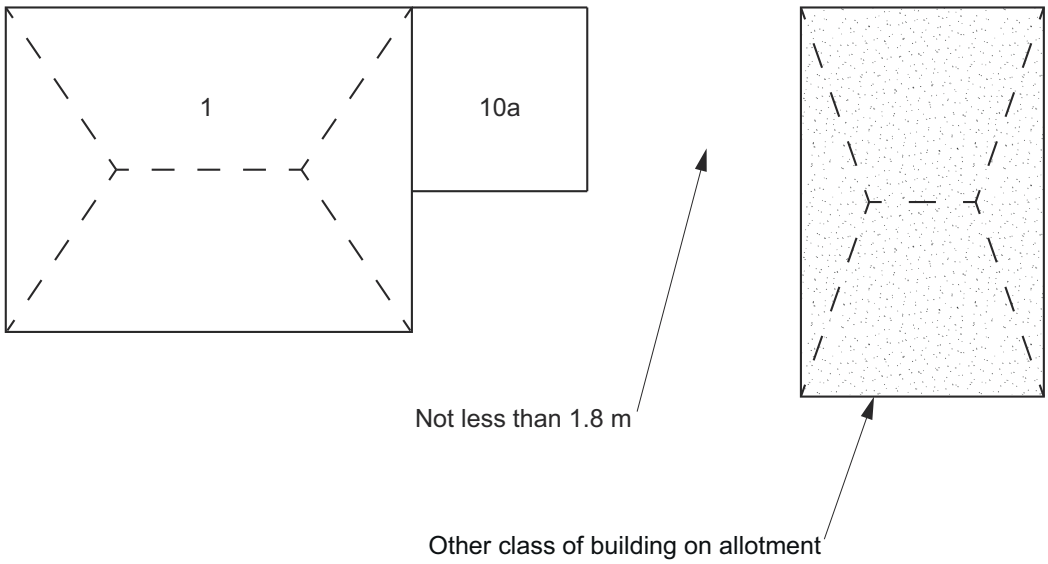


Figure 9.2.6b: External wall to Class 10a building with FRL (method 1)

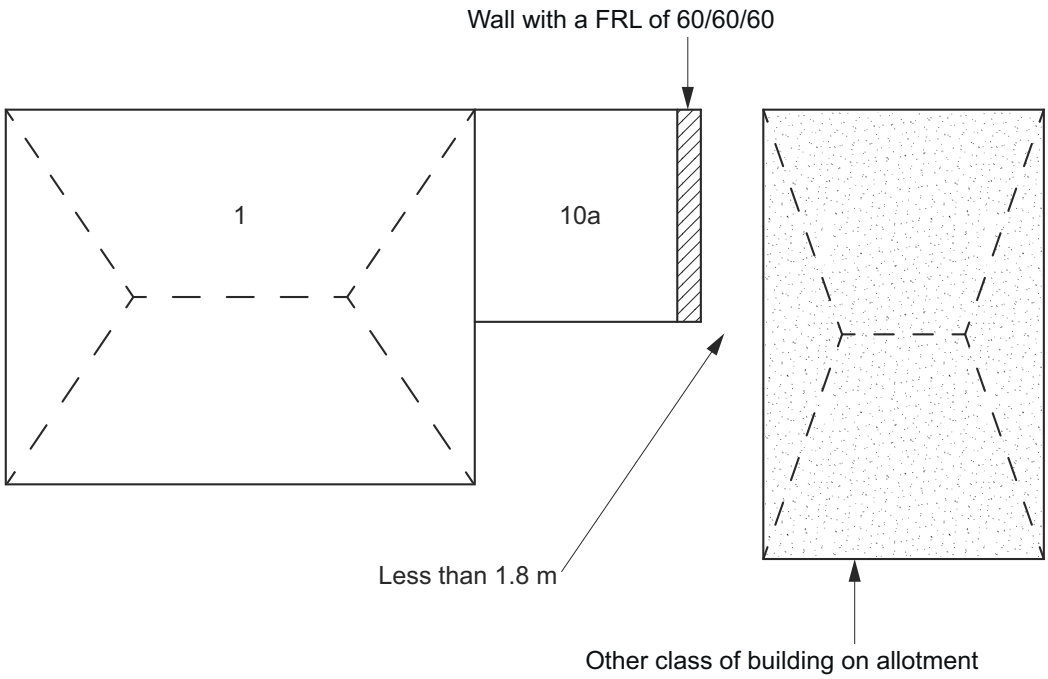


Figure 9.2.6c: External wall to Class 10a building with FRL (method 2)

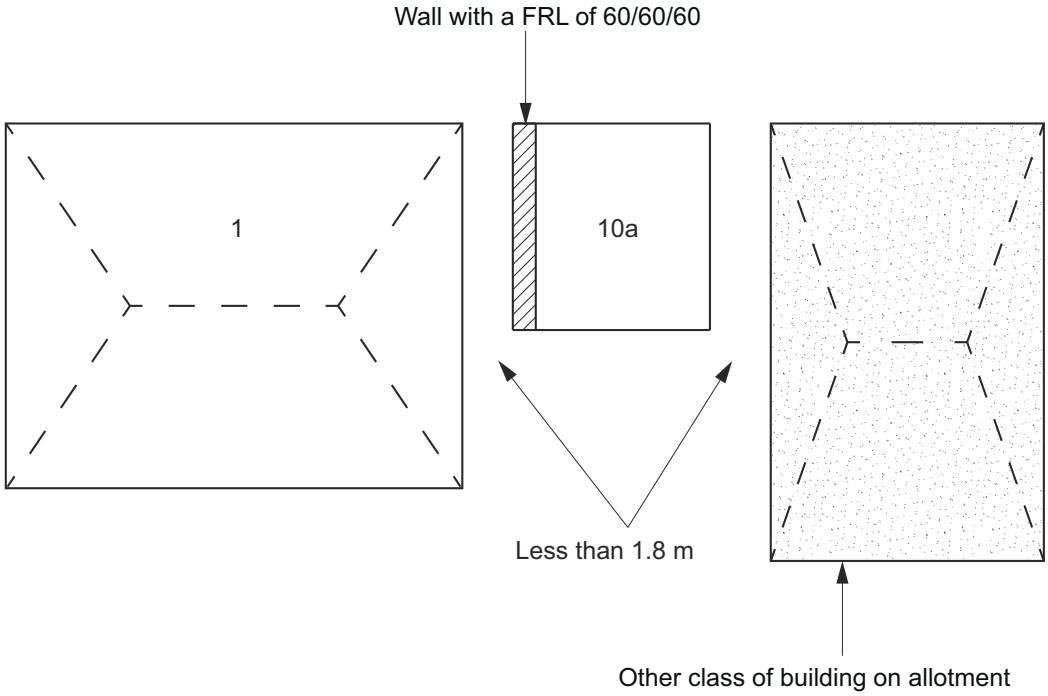


Figure 9.2.6d: 1.8 m separation between Class 1 and 10a

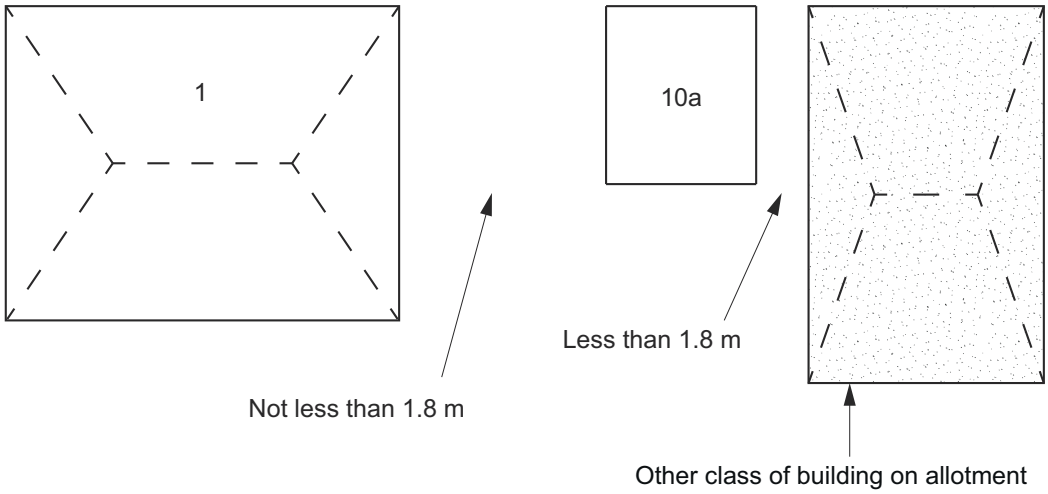


Figure 9.2.6e: Class 1 building with FRL to external wall

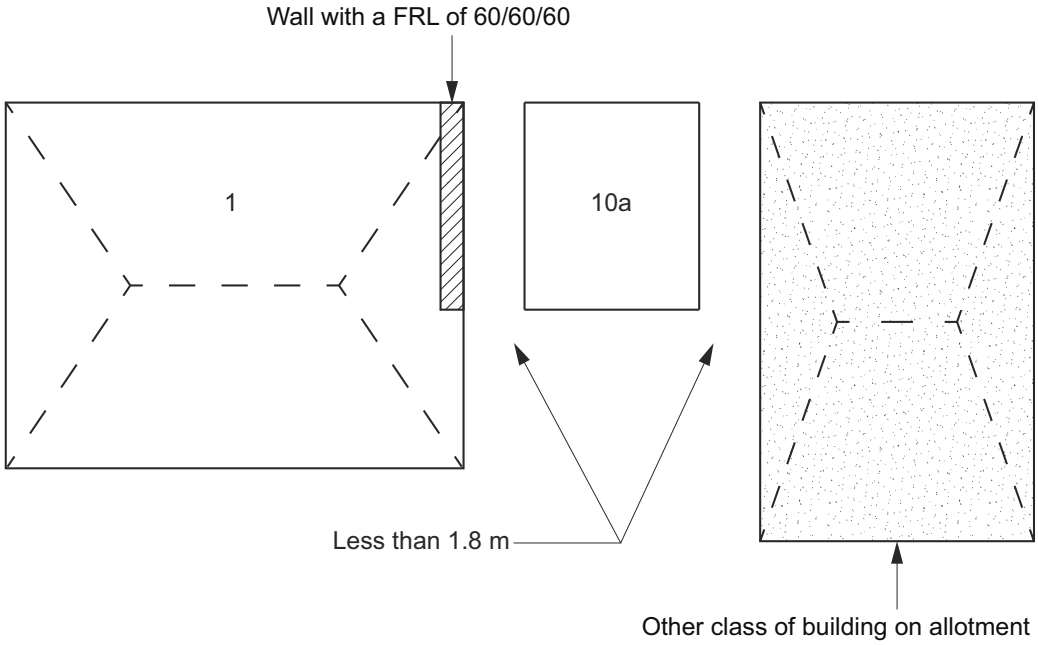


Figure 9.2.6f: External wall of adjacent Class 10a building with FRL (method 1)

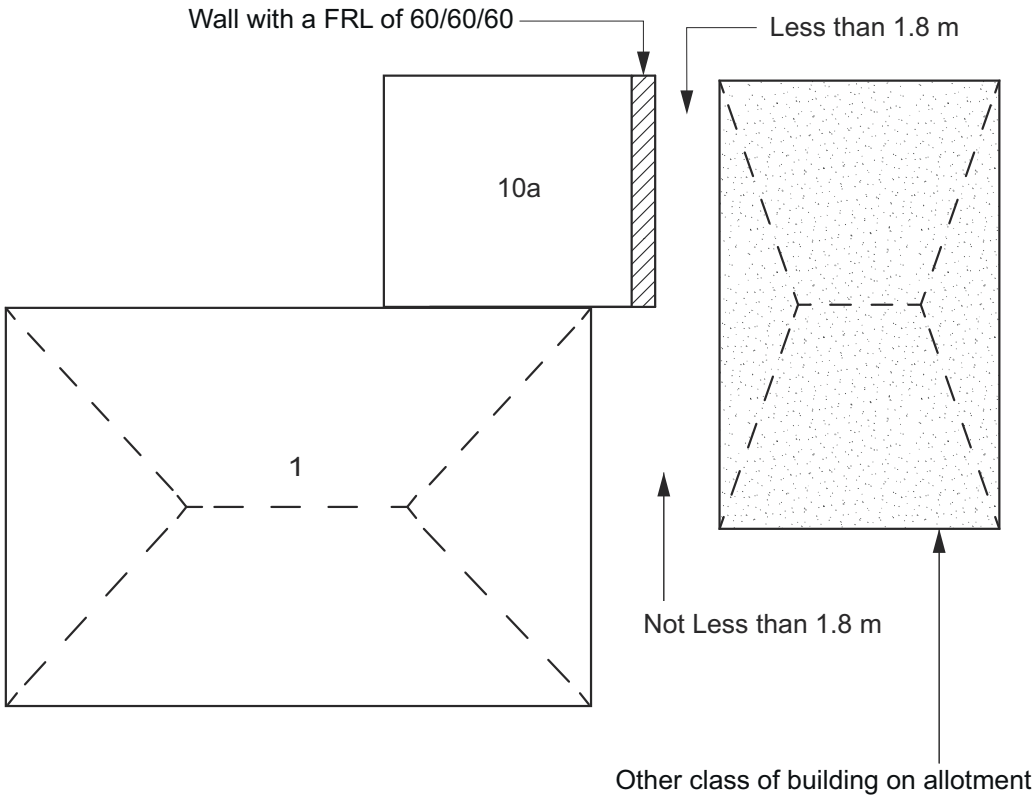


Figure 9.2.6g: External wall of adjacent Class 10a building with FRL (method 2)

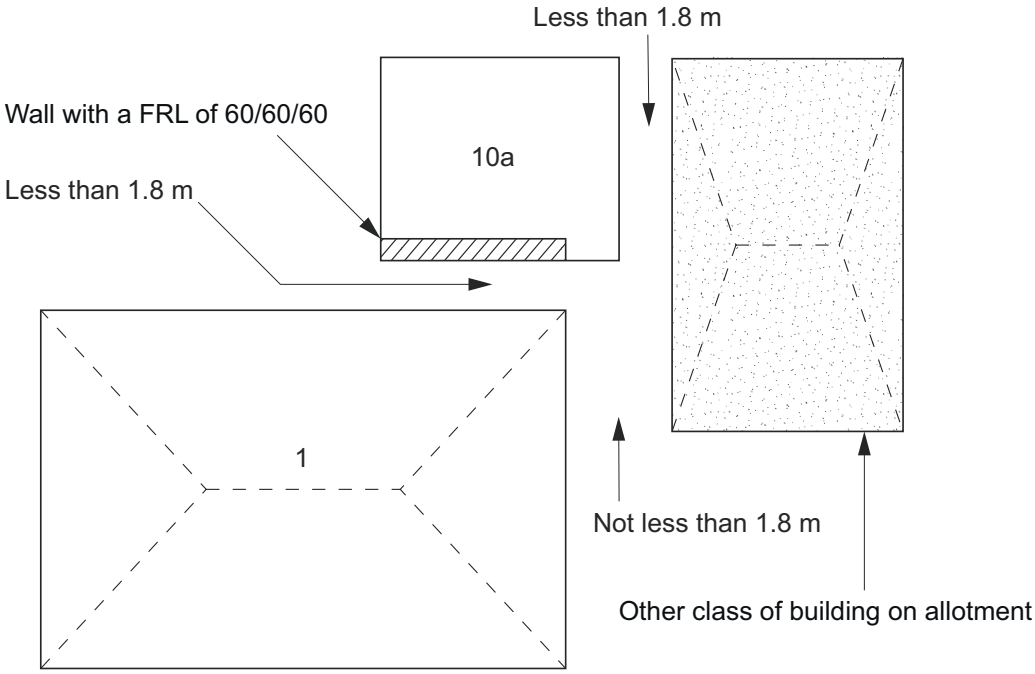
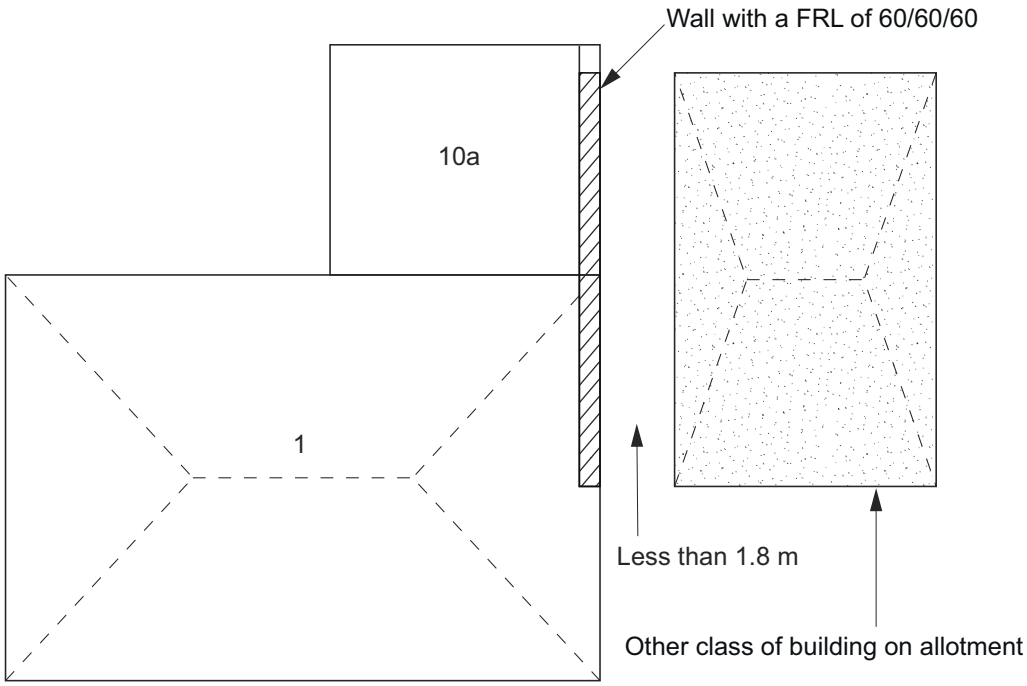


Figure 9.2.6h: Class 1 and 10 building with FRL to external wall



9.2.7 Protection of Class 1 buildings—separation of Class 10a buildings on an allotment

[2019: Figure 3.7.2.6]

The following methods are acceptable for the protection of a Class 1 building where two or more Class 10a buildings on the same allotment are located between and are associated with different Class 1 buildings:

(a) Each Class 10a building must be separated from each other by a distance of not less than 1.8 m, as shown in

Figure 9.2.7a.

(b) Each Class 10a building must be separated from each other by *external walls* complying with 9.2.3, as shown in Figure 9.2.7b.

(c) Each Class 10a building must be separated from each Class 1 building by a distance of not less than 900 mm, as shown in Figure 9.2.7c.

(d) Each Class 10a building must be separated from each Class 1 building by *external walls* complying with 9.2.3, as shown in Figure 9.2.7d.

(e) Each Class 10a building must be separated by a wall complying with 9.3.1, as shown in Figure 9.2.7e.

(f) Each Class 10a building must be separated from each other by *external walls* complying with 9.2.3, as shown in Figure 9.2.7f.

(g) Each Class 10a building must be separated from each Class 1 building by *external walls* complying with 9.2.3, as shown in Figure 9.2.7g.

(h) Each Class 10a building must be separated by a wall complying with 9.3.1, as shown in Figure 9.2.7h.

Figure 9.2.7a: 1.8m separation between Class 10a buildings

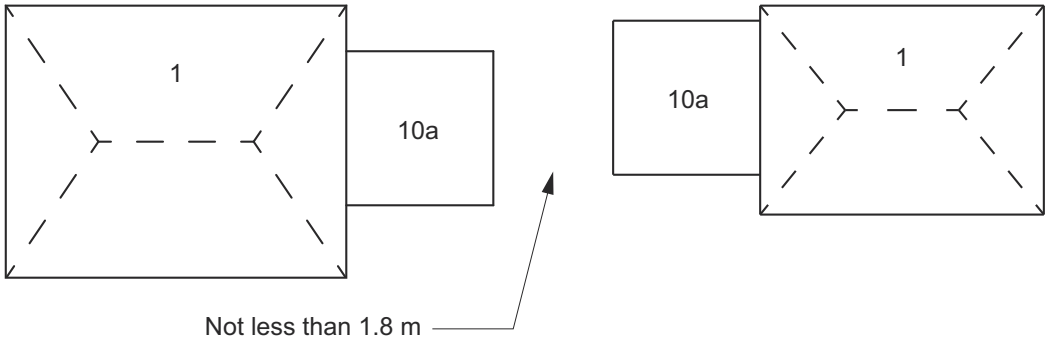


Figure 9.2.7b: External wall to Class 10a building with FRL (method 1)

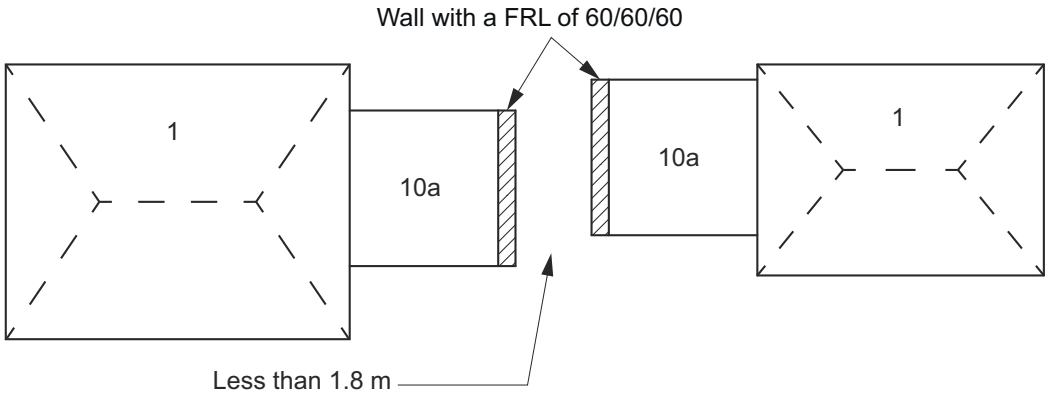


Figure 9.2.7c: 900 mm separation between Class 10a and Class 1 buildings

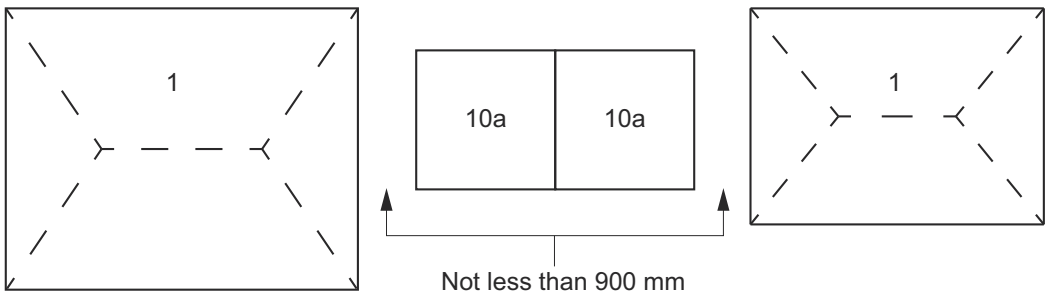


Figure 9.2.7d: External wall to a Class 10a buildings with FRL (method 2)

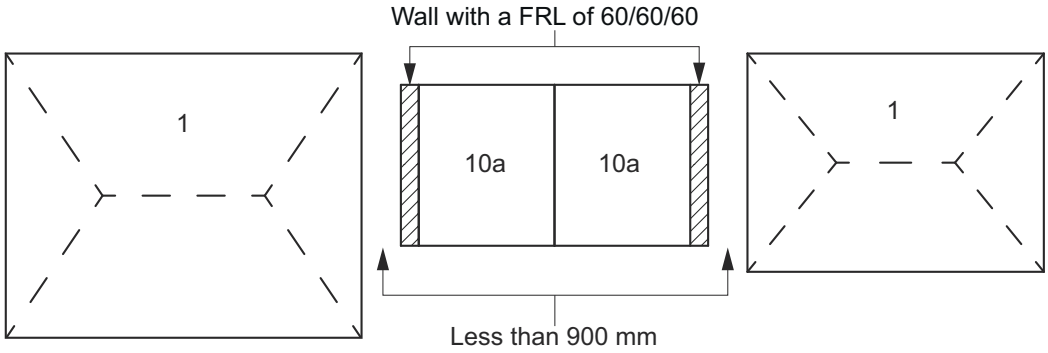


Figure 9.2.7e: Class 10a buildings with FRL to separating wall (method 1)

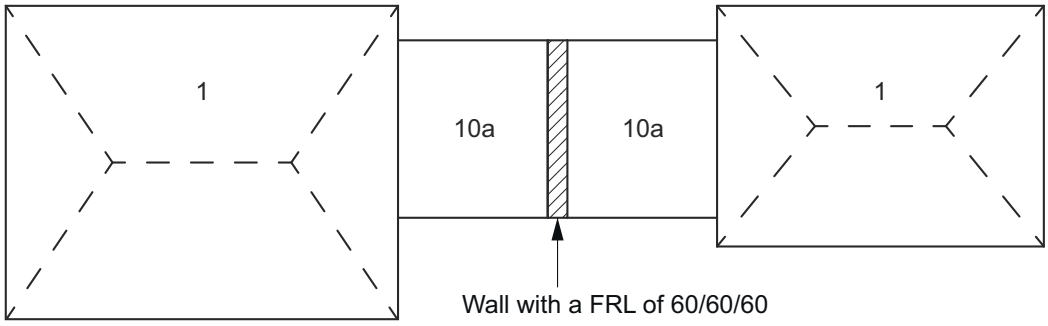


Figure 9.2.7f: External wall to adjacent Class 10a buildings with FRL (method 1)

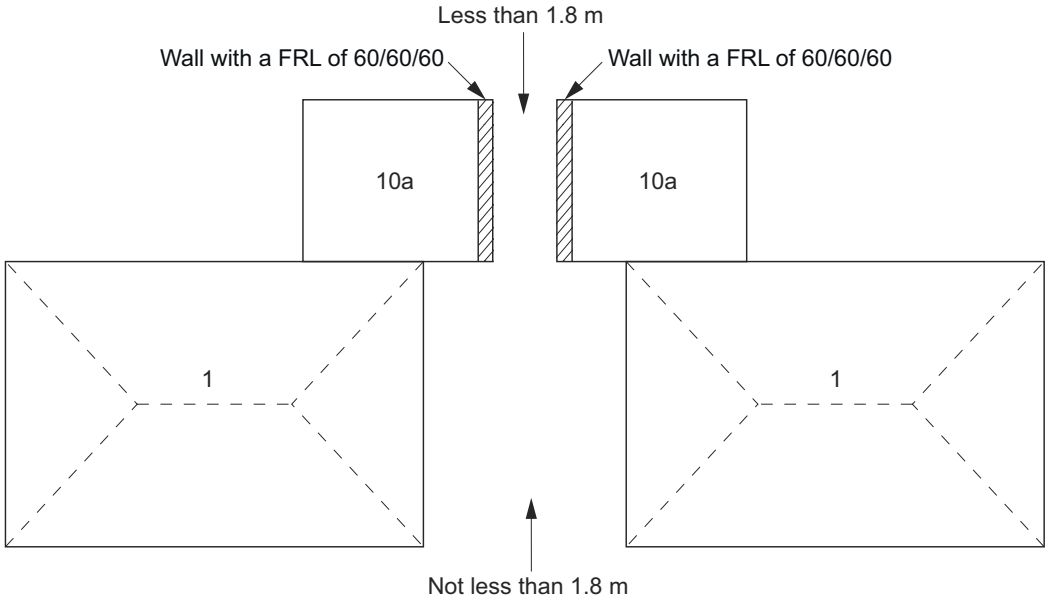


Figure 9.2.7g: External wall to adjacent Class 10a buildings with FRL (method 2)

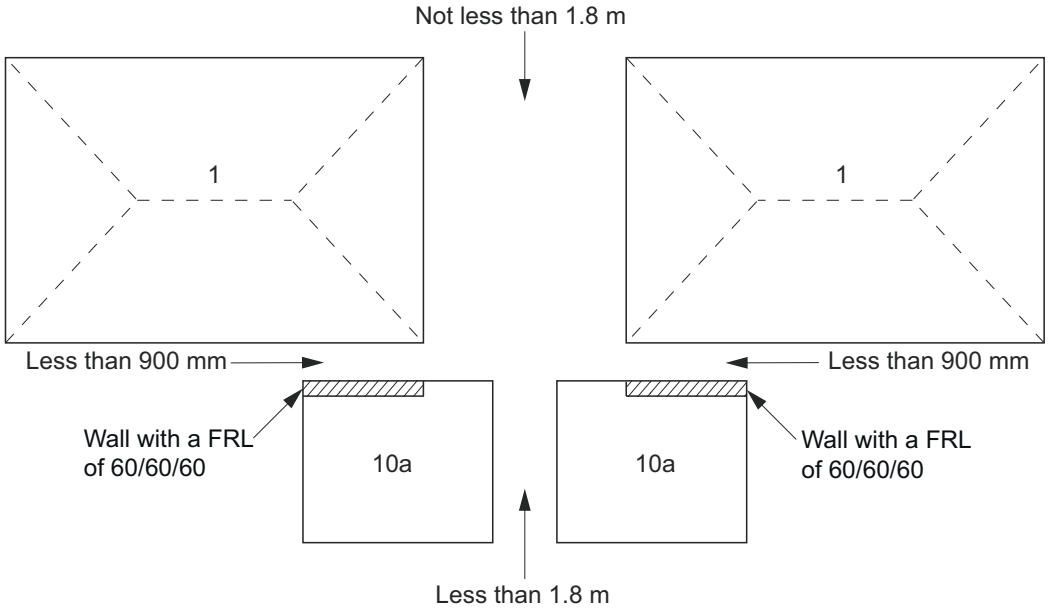
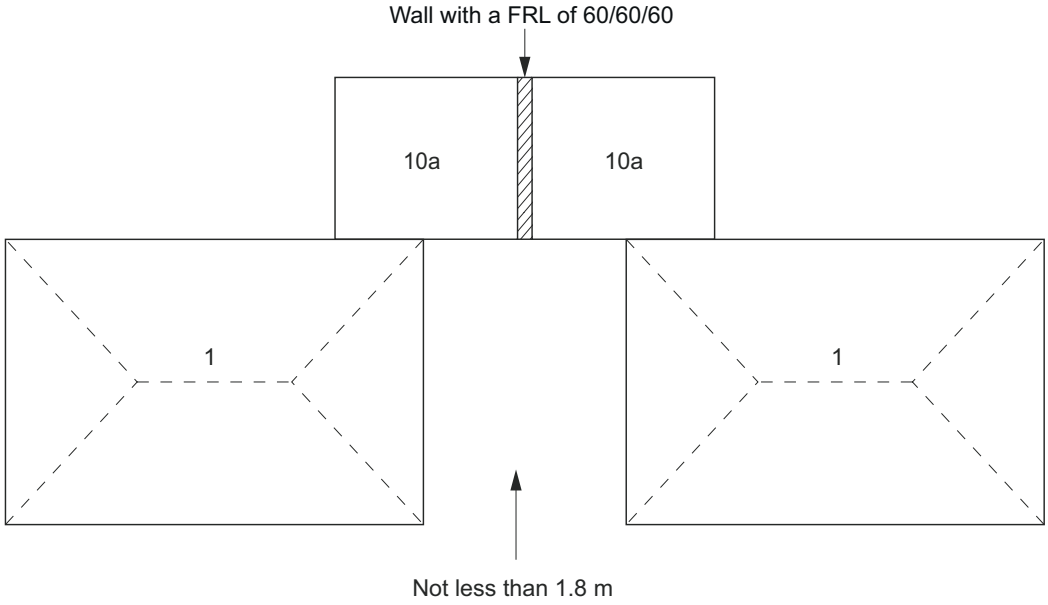


Figure 9.2.7h: Class 10a buildings with FRL to separating wall (method 2)



SA 9.2.8

9.2.8 Open carports

[2019: 3.7.2.6]

A Class 10a carport is exempt from complying with 9.2.4(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 the roof covering adjacent to that side is not less than 500 mm from another building or allotment boundary; and

(c) it has a polycarbonate or *non-combustible* roof covering; and

(d) any ceiling lining and wall cladding, including gables, is *non-combustible* (see Figure 9.2.8a); and

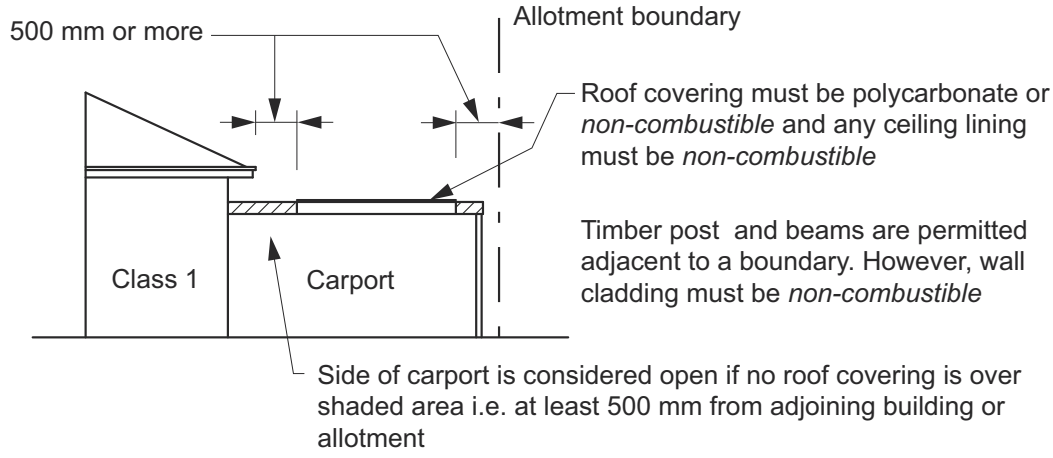
(e) it does not provide direct vertical support to any part of the Class 1 building; and

(f) in the case where it has a common roof structure with the Class 1 building and the carport does not have a ceiling (See Figure 9.2.8b), the opening between the top of the wall of the Class 1 building and the underside of the roof covering is infilled with—

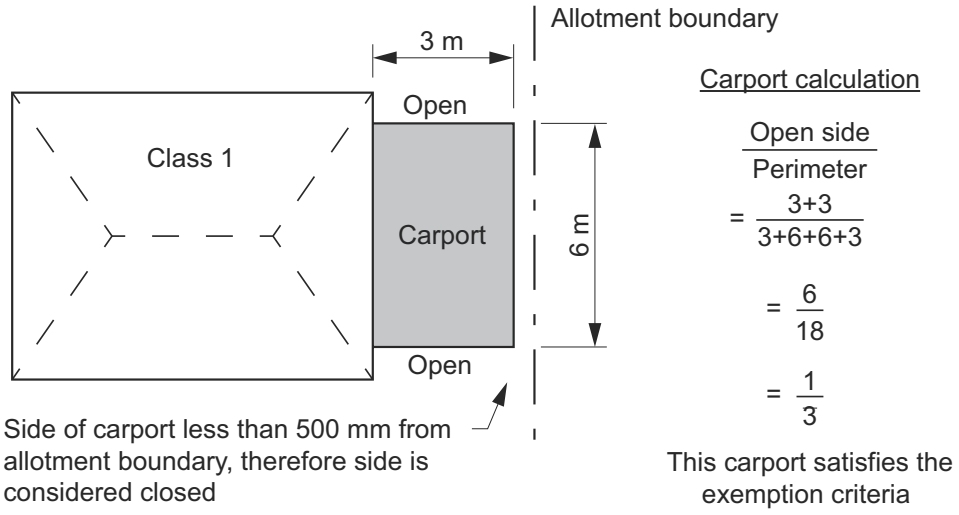
(i) a *non-combustible* material; or

(ii) construction clad with *non-combustible* material on the carport side.

Figure 9.2.8a: Identifying an open carport

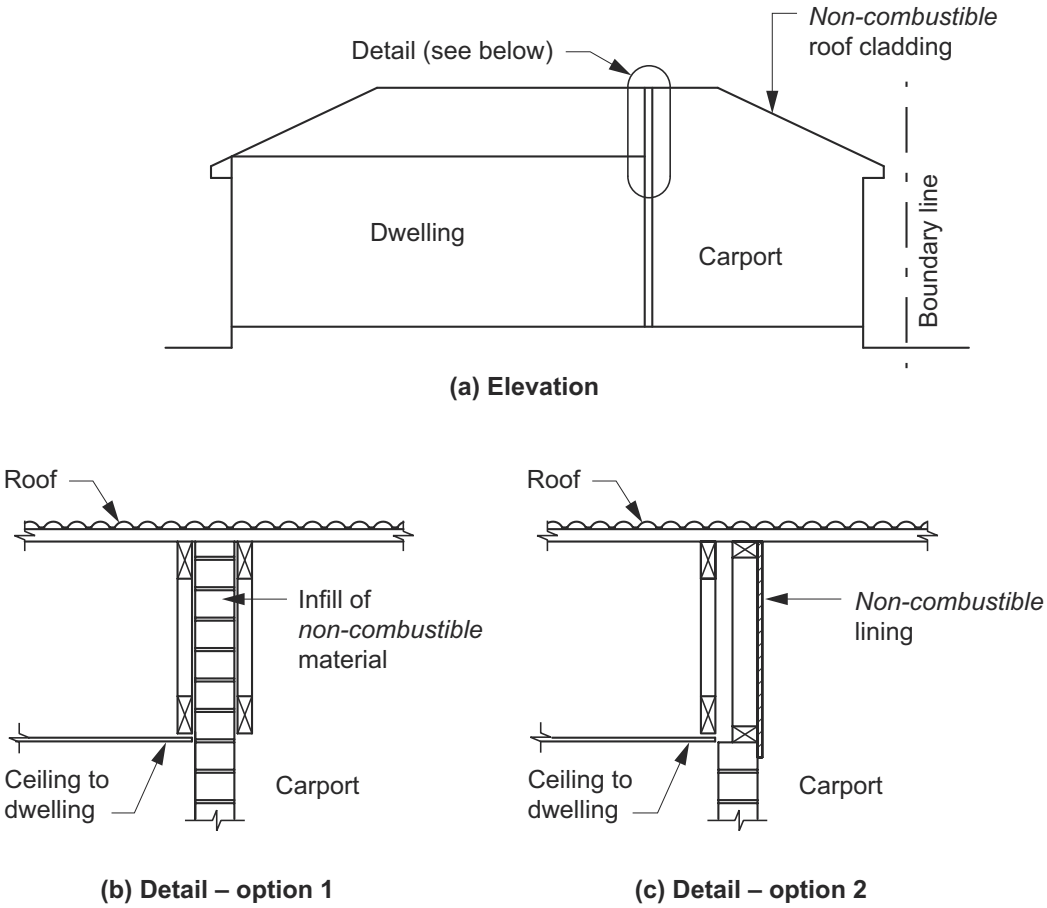


(a) Example A



(b) Example B

Figure 9.2.8b: Requirements for non-combustible infill panels to carport



(a) Elevation

(b) Detail – option 1

(c) Detail – option 2

Explanatory Information

A side of a carport enclosed by a vehicle access door is not considered to be an open side.

SA 9.2.9

9.2.9 Allowable encroachments

[2019: 3.7.2.7]

(1) An encroachment is any construction—

(a) between the *external wall* of the building and the allotment boundary other than a boundary adjoining a road or other public space; or

(b) between the *external walls* of two buildings on the same allotment; or

(c) between the *external wall* of the building and the vertical projection of the *external wall* of another building on the same allotment; or

(d) that extends beyond the vertical projection of another building on the same allotment other than a building it is associated with.

(2) For the purposes of (1), an encroachment relates to any *external wall* of—

(a) a Class 10a building *required* to comply with 9.2.4; or

(b) a Class 1 building.

(3) Encroachments allowed within 900 mm of an allotment boundary or within 1.8 m of another building, or its vertical projection, on the same allotment are—

(a) *non-combustible* fascias, gutters and downpipes; and

(b) light fittings, electricity or gas meters, aerials or antennas; and

(c) pergolas, sun blinds or water tanks (see Figure 9.2.9a); and

(d) unroofed terraces, landings, steps and ramps, not more than 1 m in height.

(4) Encroachments allowed up to but not closer than 450 mm from an allotment boundary or up to but not closer than 900 mm from another building, or its vertical projection, on the same allotment or associated encroachments of another building on the same allotment are—

(a) *combustible* fascias, gutters and downpipes (see Figure 9.2.9a, Figure 9.2.9b and Figure 9.2.9c); and

(b) eaves with *non-combustible* roof cladding and *non-combustible* lining; and

(c) flues, chimneys, pipes, domestic fuel tanks, cooling or heating appliances or other services.

(5) Encroachments allowed to project beyond the vertical projection of another building on the same allotment are *non-combustible* fascias, gutters and downpipes (see Figure 9.2.3b).

Figure 9.2.9a: Allowable encroachments for non-combustible construction — Combustible fascia up to but not closer than 450 mm to an allotment boundary

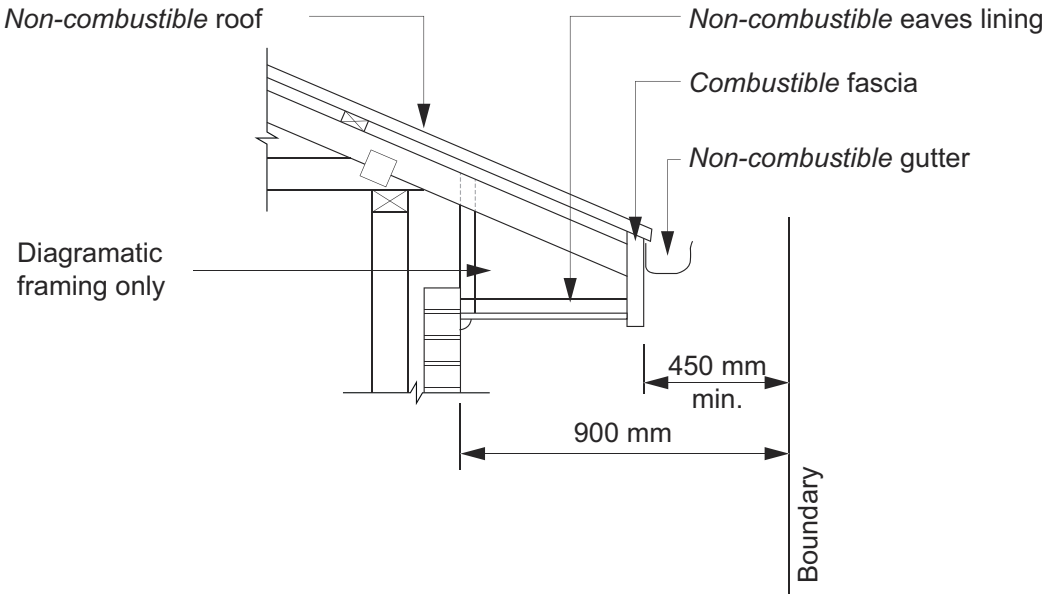


Figure 9.2.9b: Allowable encroachments for non-combustible construction — Non-combustible fascia and gutter within 900 mm of an allotment boundary

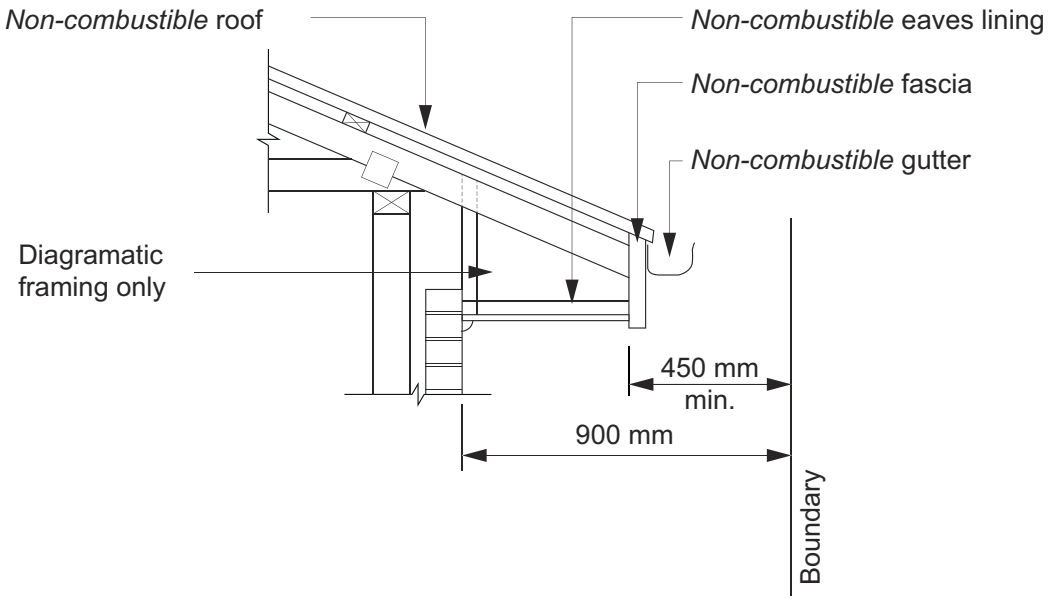
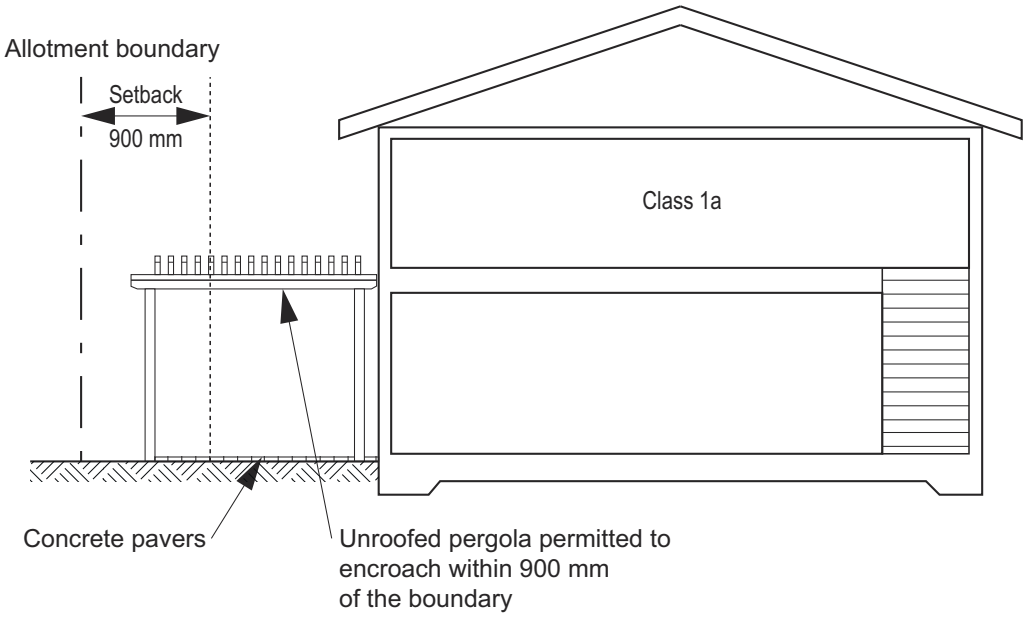


Figure 9.2.9c: Allowable encroachments for non-combustible construction — Unroofed pergola within 900 mm of an allotment boundary



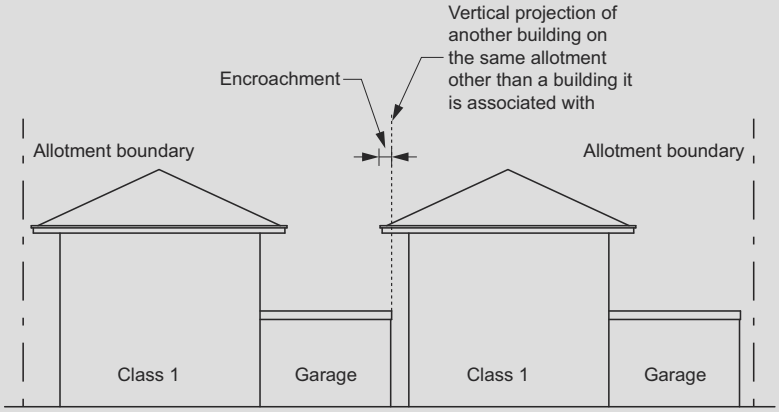
Explanatory Information

A deck is not considered an unroofed terrace and is therefore not permitted as an allowable encroachment under 9.2.9 whether *combustible* or not.

The term ‘pergola’ is a reference to an unroofed structure.

Explanatory Figure 9.2.9 depicts encroachment of a building on the same allotment, but which is not associated with the building onto which it encroaches.

Figure 9.2.9 (explanatory): Encroachment of a building that is not associated on the same allotment



9.2.10 Roof lights

[2019: 3.7.2.8]

Combustible roof lights, skylights or the like installed in a roof or part of a roof *required* to have a *non-combustible* covering must—

(a) have an aggregate area not more than 20% of the roof or part of the roof; and

(b) be not less than—

(i) 900 mm from the allotment boundary other than the boundary adjoining a road alignment or other public space; and

(ii) 1.8 m from any roof light or the like in another building on the allotment other than an associated building or a detached part of the same building (see Figure 9.2.10).

Figure 9.2.10: Location of combustible roof lights

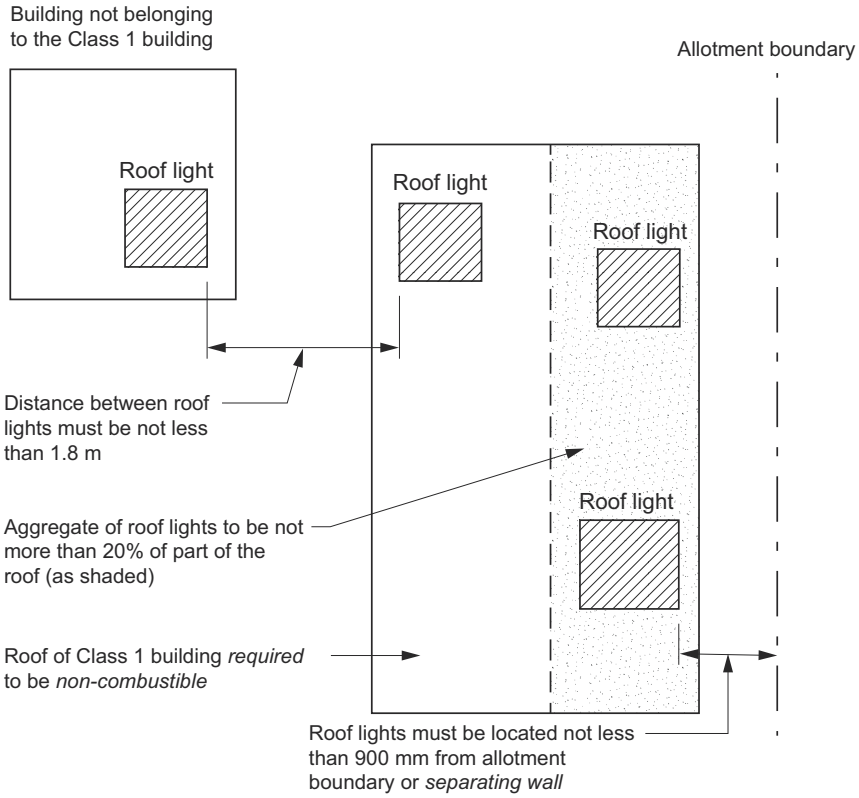


Figure Notes

Roof lights depicted in Figure 9.2.10 are *combustible*.

Part 9.3 Fire protection of separating walls and floors

9.3.1 Separating walls

[2019: 3.7.3.2]

(1) A *separating wall* between Class 1 buildings, or a wall that separates a Class 1 building from a Class 10a building which is not associated with the Class 1 building must—

(a) be constructed—

(i) having an FRL of not less than 60/60/60; or

(ii) of masonry not less than 90 mm thick; and

(b) commence at the footings or ground slab (see Figure 9.3.1a), except for horizontal projections to which 9.3.4 applies (see Figure 9.3.4); and

(c) extend—

(i) if the building has a *non-combustible* roof covering, to the underside of the roof covering (see Figure 9.3.1a and Figure 9.3.1b); or

(ii) if the building has a *combustible* roof covering, to not less than 450 mm above the roof covering (see Figure 9.3.1a); and

(d) comply with (2) to (5) and 9.3.2 as applicable.

(2) A *separating wall* of *lightweight construction* must be tested in accordance with Specification 6.

(3) A *separating wall* complying with (1)(c)(i)—

(a) must not be crossed by timber or other *combustible* building elements except for roof battens with dimensions of 75 x 50 mm or less, or roof sarking; and

(b) must have any gap between the top of the wall and the underside of the roof covering packed with mineral fibre or other suitable *fire-resisting* material.

(4) Where a building has a masonry veneer *external wall*, any gap between the *separating wall* and the external masonry veneer must be—

(a) not more than 50 mm; and

(b) packed with a mineral fibre or other suitable *fire-resisting* material with the packing arranged to maintain any weatherproofing requirements of H2D4.

(5) Eaves, verandahs and similar spaces that are open to the roof space and are common to more than one Class 1 dwelling must be separated by a *non-combustible* vertical lining (see Figure 9.3.1c).

Figure 9.3.1a: Separating wall construction

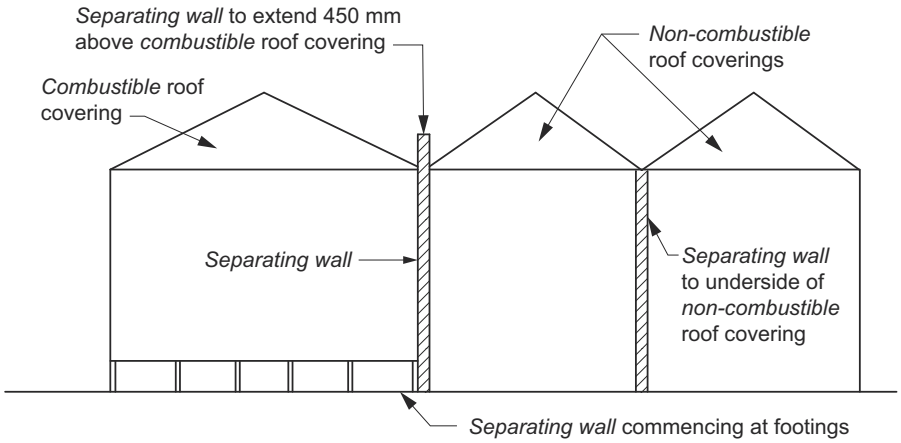
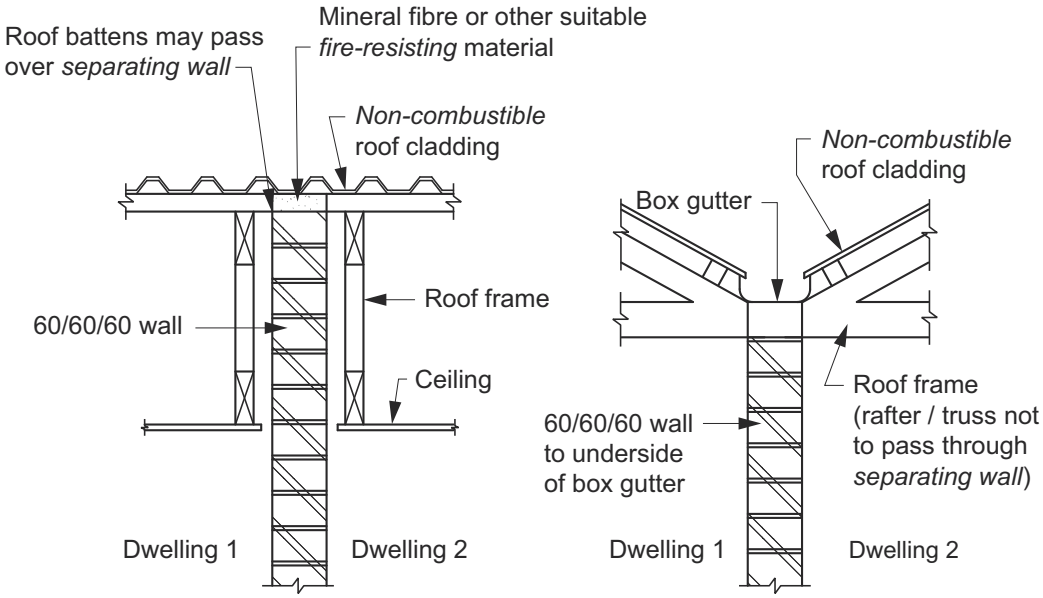


Figure 9.3.1b: Separating wall construction — Underside of non-combustible roof cladding (diagram 1)



(a) Wall parallel to roof frame **(b) Wall at right-angles to roof frame**

Figure 9.3.1c: Separating wall construction — Underside of non-combustible roof cladding (diagram 2)

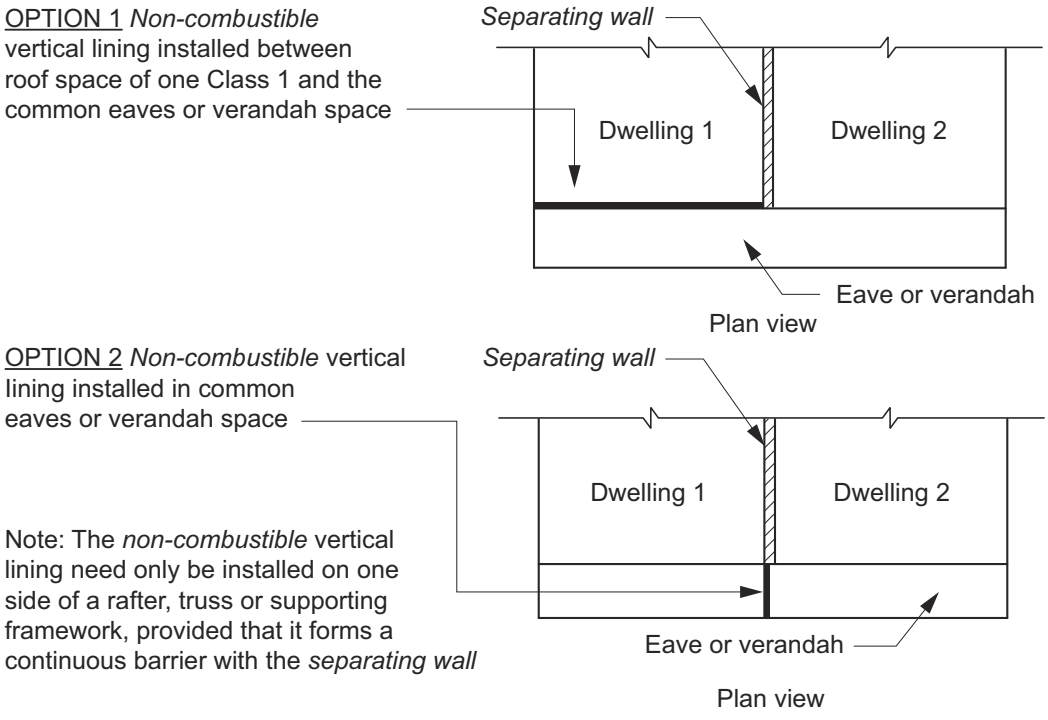


Figure Notes

Elements crossing the *non-combustible* vertical lining must comply with 9.3.1(3).

9.3.2 Services in separating walls

[2019: 3.7.3.3]

(1) Any service opening, other than those listed in (2), (3) and (4), in a *separating wall* must have construction with an

FRL of not less than -/60/60.

(2) If an electrical wire or cable penetrates a *separating wall*—

(a) the service and building element at the penetration must—

(i) be identical with a prototype assembly that has been tested in accordance with AS 4072.1 and AS 1530.4 and achieve an FRL of not less than -/60/60; or

(ii) differ from a prototype assembly of the service and building element in accordance with AS 4072.1; or

(b) the service must be installed so that—

(i) the opening is neatly formed, cut or drilled and no closer than 50 mm to any other service; and

(ii) the opening is no larger in cross-section than—

(A) 2000 mm^2 if only a single cable is accommodated and the gap between the cable and the wall is no wider than 15 mm; or

(B) 500 mm^2 in any other case; and

(iii) any gap between the service and the wall is packed with mineral fibre or other suitable *fire-resisting* material.

(3) If an electrical switch, outlet, socket or the like is accommodated in a *separating wall*—

(a) the service and building element at the penetration must—

(i) be identical with a prototype assembly which has been tested in accordance with AS 4072.1 and AS 1530.4 and achieve an FRL of not less than -/60/60; or

(ii) differ from a prototype assembly of the service and building element in accordance with AS 4072.1; or

(b) the service must be installed so that—

(i) the opening or recess—

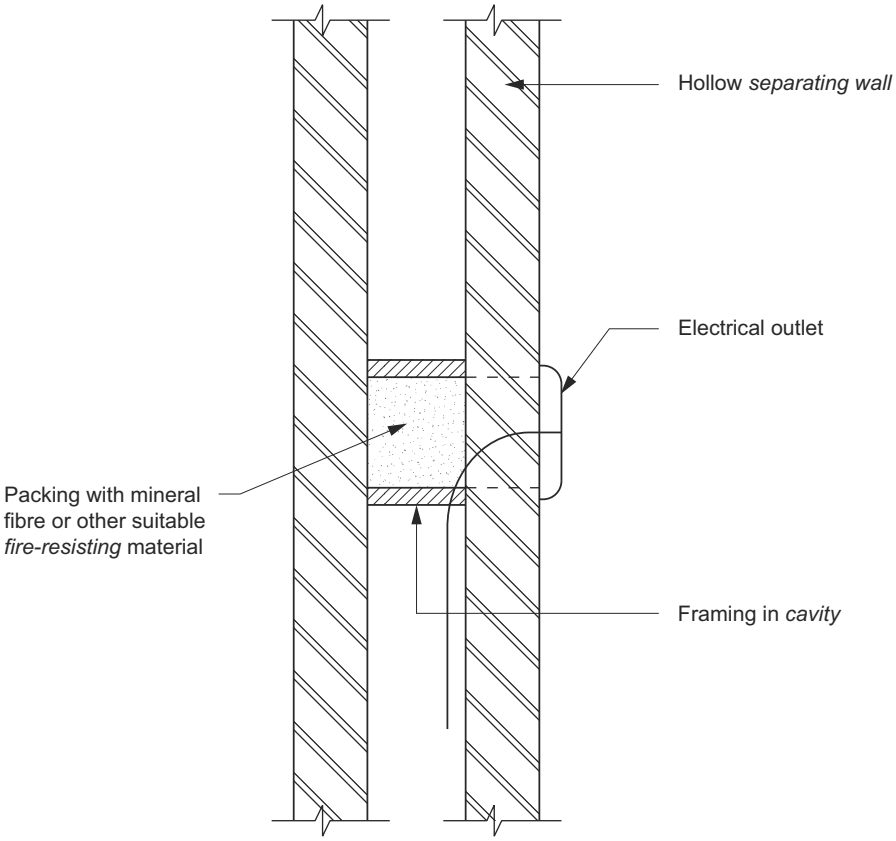
(A) is not located opposite any point within 300 mm horizontally or 600 mm vertically of any opening or recess on the opposite side of the wall; or

(B) does not extend beyond half the thickness of the wall; and

(ii) any gap between the service and the wall is packed with mineral fibre or other suitable *fire-resisting* material.

(4) Other than where a tested system is used in accordance with (3)(a), if an electrical switch, socket, outlet or the like is accommodated in a hollow *separating wall*, the *cavity* immediately behind the service must be framed and packed with mineral fibre or other suitable *fire-resisting* material (see Figure 9.3.2).

Figure 9.3.2: Separating wall construction — Services in cavity construction



Explanatory Information

For the purposes of 9.3.2 and 10.7.2, a reference to a *separating wall* includes a wall that separates a Class 1 building from a Class 10a building that is not associated with the Class 1 building.

It is important that any opening in a *separating wall* between Class 1 buildings does not allow the free passage of fire between buildings. Many designs would require the installation of openings for electrical cables and outlets in these walls. 9.3.2 therefore allows such openings provided they comply with the requirements of that provision.

A reference to a hollow *separating wall* in 9.3.2(4) may include a stud wall, masonry *cavity* wall or a wall of hollow blockwork.

Part 10.7 (sound insulation) also contains requirements relevant to *separating walls*, in addition to the provisions of this Part. This includes installation requirements for walls and services to achieve appropriate levels of sound insulation.

9.3.3 Roof lights

[2019: 3.7.3.4]

Combustible roof lights, skylights or the like installed in a roof or part of a roof *required* to have a *non-combustible* covering must—

(a) have an aggregate area not more than 20% of the roof or part of the roof; and

(b) be not less than 900 mm from the vertical projection of a *separating wall* extending to the underside of the roof covering.

9.3.4 Horizontal projections

[2019: 3.7.3.5]

(1) Where a horizontal projection forms part of a *separating wall* complying with 9.3.1, any horizontal projection within 1.8 m on each side of the *separating wall* (see Figure 9.3.4) must—

(a) be a floor/ceiling or floor/soffit system incorporating a ceiling or soffit which has a *resistance to the incipient spread of fire* to the space above itself of not less than 60 minutes; or

(b) have an FRL not less than 30/30/30 when tested from the underside; or

(c) have a *fire-protective covering* on the underside of the floor, including beams incorporated in it, if the floor is *combustible* or of metal.

(2) The part of the *separating wall* that projects outwards horizontally must—

(a) extend to the underside of the floor/ceiling or floor/soffit system complying with (1); and

(b) not be crossed by timber or other *combustible* building elements except for framing members with dimensions of 75 x 50 mm or less, or sarking; and

(c) have any gap between the bottom of the wall and the underside of the floor/ceiling or floor/soffit system packed with mineral fibre or other suitable *fire-resisting* material.

(3) Where a floor subject to (1)(b) depends on direct vertical or lateral support from another part to maintain its FRL, that supporting part must have an FRL of not less than 30/-/-.

(4) Where a service passes through a floor referred to in (1), the penetration must not reduce the fire performance of the floor or covering.

Figure 9.3.4: Horizontal projection forming part of a separating wall

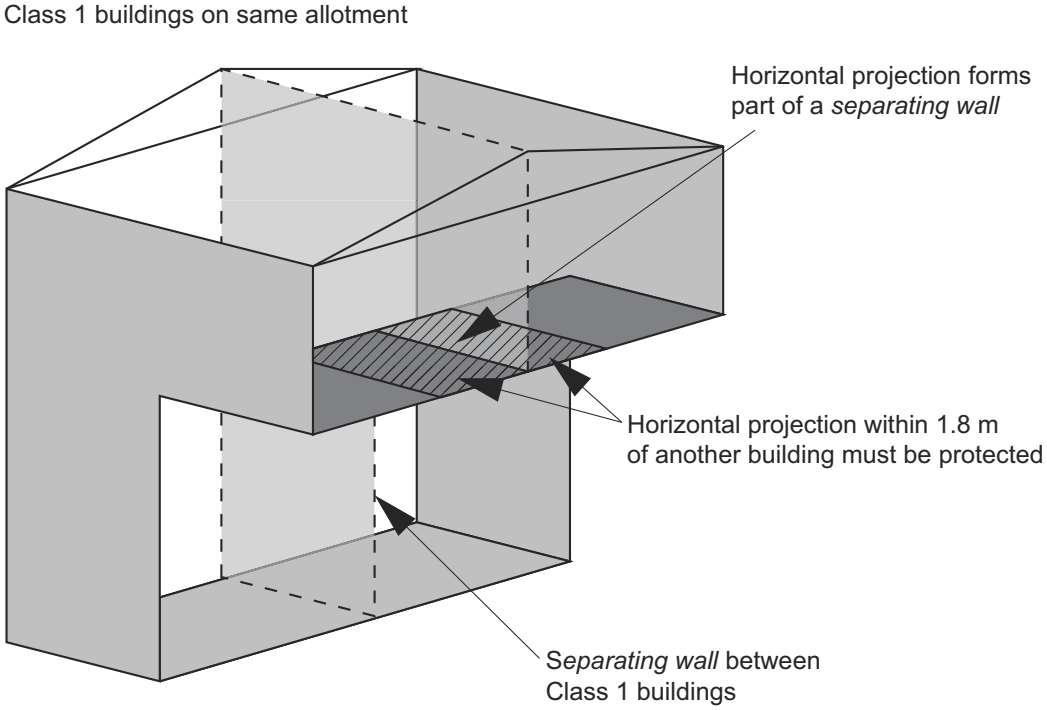


Figure Notes

Horizontal projections within 1.8 m of another building must be protected in accordance with 9.3.4(1).

Part 9.4 Fire protection of garage top dwellings

NSW Part 9.4

9.4.1 Walls requiring protection

[2019: 3.7.4.2]

(1) Where parts of a Class 1a dwelling are located above a Class 10a *private garage* that is not associated with the Class 1a dwelling—

(a) any wall separating parts of the Class 1a dwelling from the *private garage* not associated with the dwelling must comply with (2); and

(b) any *private garage* associated with and located below the Class 1a dwelling must be separated from the *private garage* not associated with the dwelling by a wall complying with (2).

(2) A wall *required* by (1) must—

(a) have either—

(i) an FRL of not less than 60/60/60 when tested from the *private garage* associated with another dwelling side; or

(ii) be of masonry construction not less than 90 mm thick; and

(b) commence at the footings or ground slab; and

(c) extend to the underside of a separating floor complying with 9.4.2; and

(d) comply with 9.3.1(2) to (5) and 9.3.2 as applicable.

9.4.2 Separating floors

[2019: 3.7.4.3]

(1) Where parts of a Class 1a dwelling are located above or below a Class 10a *private garage* that is not associated with the Class 1a dwelling, any floor separating the Class 1a dwelling from the Class 10a *private garage* not associated with the dwelling must—

(a) be a floor/ceiling or floor/soffit system incorporating a ceiling or soffit which has a *resistance to the incipient spread of fire* to the space above itself of not less than 60 minutes; or

(b) have an FRL not less than 30/30/30 when tested from the underside; or

(c) have a *fire-protective covering* on the underside of the floor, including beams incorporated in it, if the floor is *combustible* or of metal.

(2) Where a floor subject to (1)(b) depends on direct vertical or lateral support from another part to maintain its FRL, that supporting part must have an FRL of not less than 30/-/-.

(3) Where a service passes through a floor referred to in (1), the penetration must not reduce the fire performance of the floor or covering.

Notes

Figure 9.4.2 illustrates requirements of this provision.

Figure 9.4.2: Separating wall and floor construction

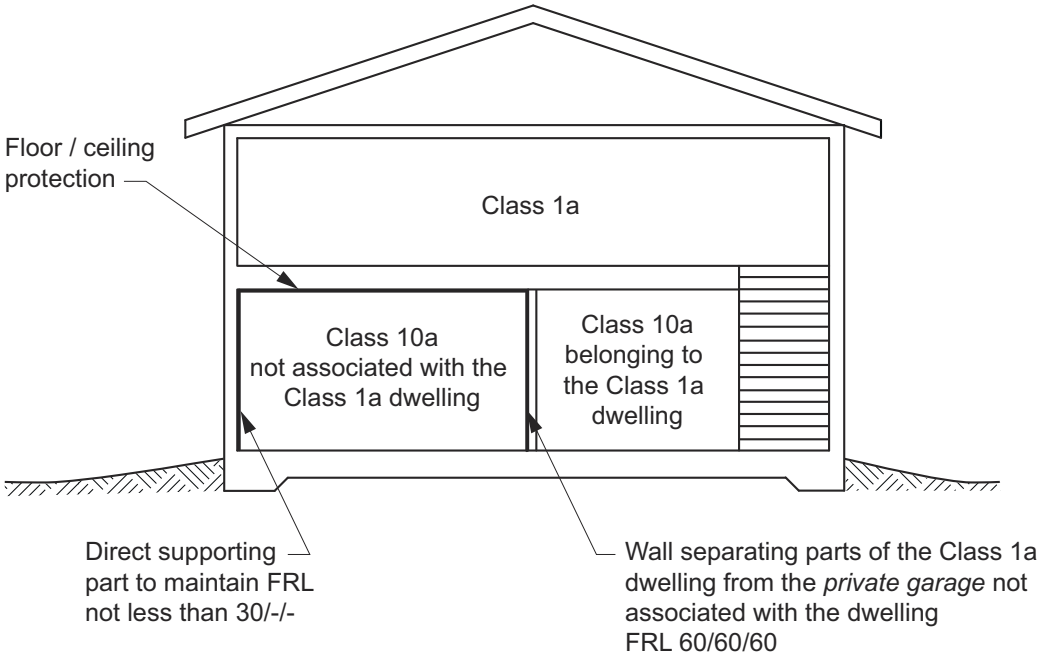


Figure Notes

(1) For floor/ceiling protection, see 9.4.1(2)(c) and 9.4.2.

(2) For FRL for direct supporting part, see 9.4.2(2).

(3) For FRL for wall separating parts of the Class 1a dwelling from the non-associated *private garage*, see 9.4.1(1).

Part 9.5 Smoke alarms and evacuation lighting

NSW 9.5.1

9.5.1 Smoke alarm requirements

[2019: 3.7.5.2]

Smoke alarms must—

(a) be located in—

(i) a Class 1a building in accordance with 9.5.2 and 9.5.4; and

(ii) a Class 1b building in accordance with 9.5.3 and 9.5.4; and

(b) comply with AS 3786, except that in a Class 10a *private garage* where the use of the area is likely to result in smoke alarms causing spurious signals, any other alarm deemed suitable in accordance with AS 1670.1 may be installed provided that smoke alarms complying with AS 3786 are installed elsewhere in the Class 1 building; and

(c) be powered from the consumer mains source where a consumer mains source is supplied to the building; and

(d) be interconnected where there is more than one alarm.

Explanatory Information

A smoke alarm can give spurious alarms if the atmosphere contains particles which obscure vision, such as could occur in a Class 10a *private garage* part of a building. 9.5.1(b) therefore allows the use of a more suitable alarm, such as a heat alarm, in these locations.

9.5.1(d) requires alarms to be interconnected where there is more than one alarm. This only applies within a single dwelling. Therefore, alarms in a Class 1a dwelling need not be interconnected with alarms in another dwelling or a *private garage* which does not belong to the Class 1a dwelling.

9.5.2 Location – Class 1a buildings

[2019: 3.7.5.3]

In a Class 1a building, smoke alarms must be located in—

(a) any storey containing bedrooms, every corridor or hallway associated with a bedroom, or if there is no corridor or hallway, in an area between the bedrooms and the remainder of the building; and

(b) each other storey not containing bedrooms.

Notes

Figure 9.5.2a and 9.5.2b illustrates requirements of this provision.

Figure 9.5.2a: Class 1a building where all bedrooms are grouped together and served by a hallway

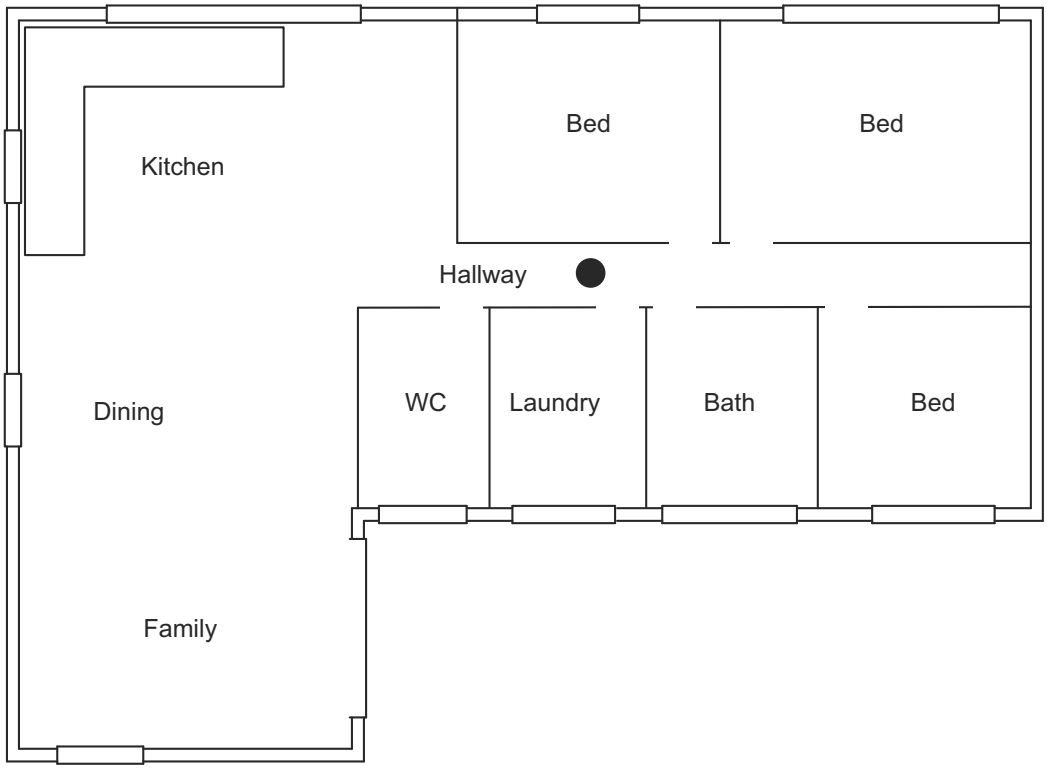


Figure Notes

In this diagram, the location of the smoke alarm is indicated by a black dot.

Figure 9.5.2b: Class 1a building where bedrooms are located in separate areas

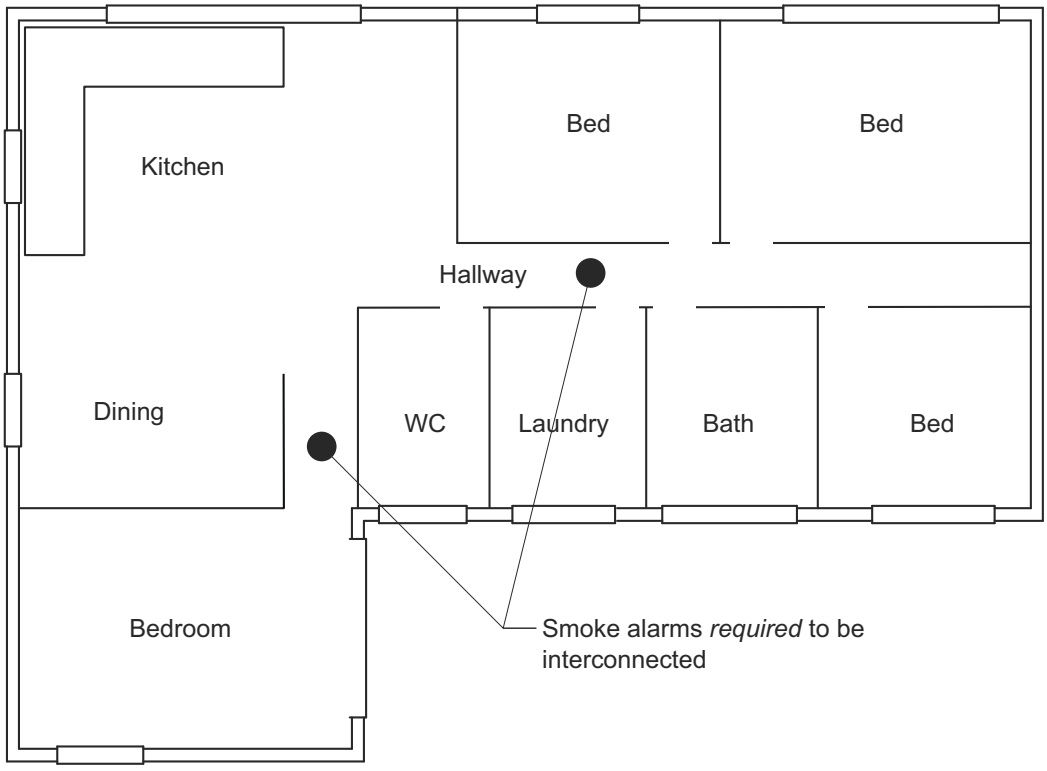


Figure Notes

(1) In this diagram, the location of each smoke alarm is indicated by a black dot.

(2) Smoke alarms are *required* to be interconnected by 9.5.1(d).

9.5.3 Location – Class 1b buildings

[2019: 3.7.5.4]

In a Class 1b building, smoke alarms must be located in—

(a) every bedroom; and

(b) every corridor or hallway associated with a bedroom, or if there is no corridor or hallway, in an area between the bedrooms and the remainder of the building; and

(c) each other storey.

Notes

Figure 9.5.3 illustrates requirements of this provision.

Figure 9.5.3: Class 1b building where multiple bedrooms are served by a hallway

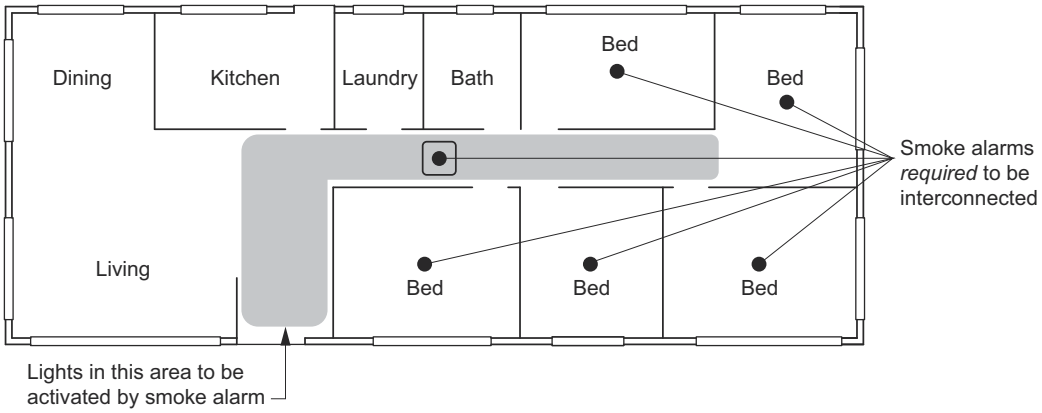


Figure Notes

(1) In this diagram—

(a) the location of each smoke alarm is indicated by a black dot; and

(b) the location of a smoke alarm with evacuation lighting is indicated by a black dot within a square; and

(c) the area served by evacuation lighting is indicated by grey shading.

(2) Smoke alarms are *required* to be interconnected by 9.4.1(d).

(3) Lighting in the grey shaded area is to be activated by a smoke alarm if using 9.5.5(b)(ii).

9.5.4 Installation of smoke alarms

[2019: 3.7.5.5]

Smoke alarms *required* by 9.5.2 and 9.5.3 must be installed on or near the ceiling, in accordance with the following:

(a) Where a smoke alarm is located on the ceiling it must be—

(i) a minimum of 300 mm away from the corner junction of the wall and ceiling; and

(ii) between 500 mm and 1500 mm away from the high point and apexes of the ceiling, if the room has a sloping ceiling.

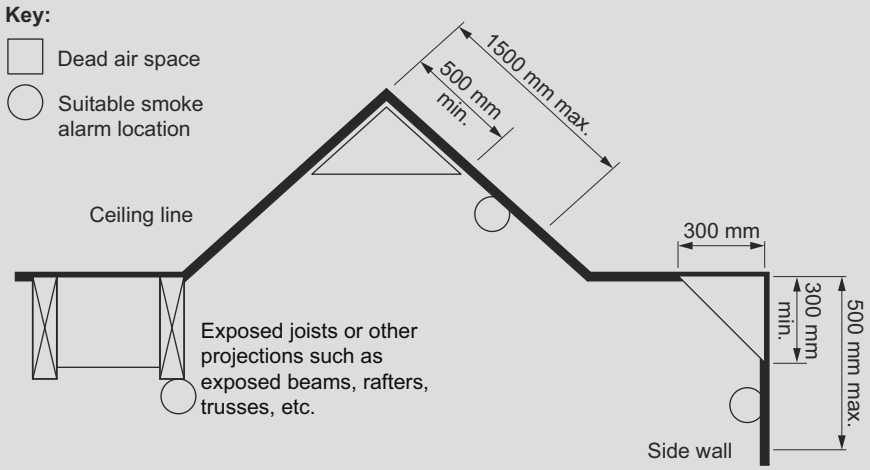
(b) Where (a) is not possible, the smoke alarm may be installed on the wall, and located a minimum of 300 mm and a maximum of 500 mm off the ceiling at the junction with the wall.

Explanatory Information

Smoke alarms need to be located on (or near) the ceiling for optimum detection of smoke in a fire situation with special care taken to avoid dead air spaces. A dead air space is an area in which trapped hot air will prevent smoke from reaching the alarm. This space generally occurs at the apex of cathedral ceilings, the corner junction of walls and ceilings and between exposed joists etc. (see Explanatory Figure 9.5.4).

Smoke alarms may be located on the wall in accordance with 9.5.4(b). Explanatory Figure 9.5.4 provides location criteria and the dimensional relationship to building elements and the associated dead air spaces.

Figure 9.5.4 (explanatory): Installation of smoke alarms to avoid dead air space



9.5.5 Lighting to assist evacuation – Class 1b buildings

[2019: 3.7.5.6]

In a Class 1b building, a system of lighting must be installed to assist evacuation of occupants in the event of a fire, and—

(a) be activated by the smoke alarm *required* by 9.5.3(b); and

(b) consist of—

(i) a light incorporated within the smoke alarm; or

(ii) the lighting located in the corridor, hallway or area served by the smoke alarm.

Explanatory Information

The lighting *required* by 9.5.5 may consist of artificial lighting which may already be installed in a corridor, hallway or area, provided that the lighting is activated by the smoke alarm. However consideration should be given to ensure that the lighting is not controlled by a dimmer or timer controlled switch which may dim the level of light to an ineffective level, or switch the light off before occupants have time to evacuate.

10 Health and amenity

Part 10.1 Scope and application of Section 10

10.1.1 Scope

[New for 2022]

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

(a) *wet areas* and external *waterproofing* (see Part 10.2); and

(b) room heights (see Part 10.3); and

(c) facilities (see Part 10.4); and

(d) light (see Part 10.5); and

(e) ventilation (see Part 10.6); and

(f) sound insulation (see Part 10.7); and

(g) *condensation* management (see Part 10.8).

10.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC Volume Two.

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

Explanatory Information

In NCC 2019, the content of Section 10 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Parts 3.8.1 to 3.8.7 of NCC 2019 Volume Two.

Part 10.2 Wet area waterproofing

SA 10.2.1

10.2.1 Wet areas

[2019: 3.8.1.2]

(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)

[2019: Table 3.8.1.1]

(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).

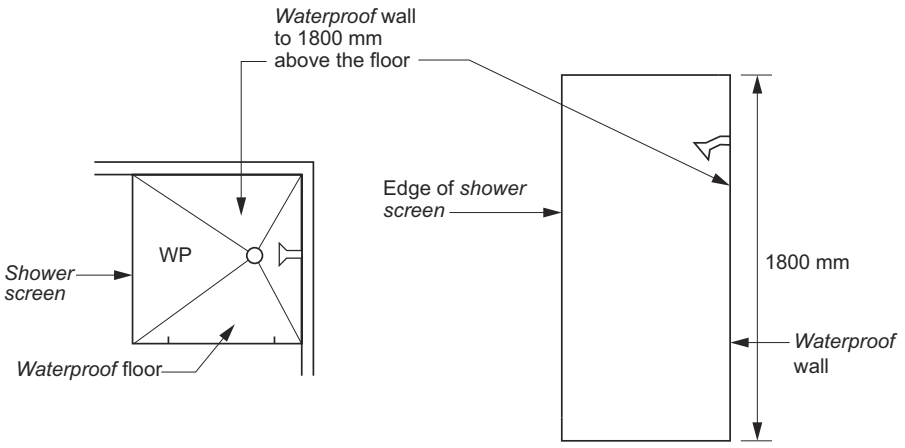
(c) Wall junctions and joints within the *shower area* must be *waterproof* not less than 40 mm either side of the junction (see Figure 10.2.2).

(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*.

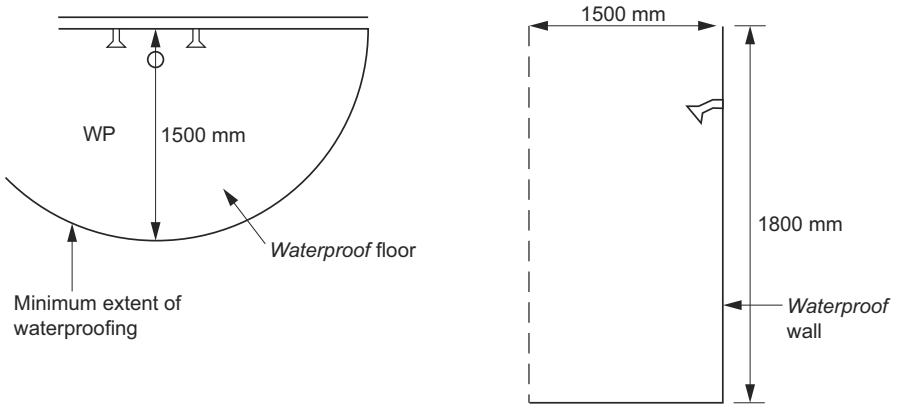
(2) A shower with a *preformed shower base* must also comply with the requirements of (1), except for (a) which is not applicable.

Figure 10.2.2: Extent of treatment for shower areas — concrete compressed fibre-cement and fibre-cement sheet floors



(i) Plan view (ii) Side view

(a) Enclosed shower



(i) Plan view (ii) Side view

(b) Unenclosed shower

Figure Notes

Wall/floor junction heights are to be as per 10.2.2 to 10.2.6 (as applicable).

Notes

Where a shower is above a bath or spa, use requirements for shower.

10.2.3 Area outside shower area

[2019: Table 3.8.1.1]

(1) For concrete, compressed fibre-cement and fibre-cement sheet flooring, the floor of the room must be *water resistant*.

(2) For timber floors including particleboard, plywood and other timber based flooring materials, the floor of the room must be *waterproof*.

(3) Wall/floor junctions must be—

(a) *waterproof*; and

(b) where a *flashing* is used, the horizontal leg must be not less than 40 mm.

10.2.4 Areas adjacent to baths and spas without showers

[2019: Table 3.8.1.1]

(1) For areas adjacent to all baths and spas, the following applies:

(a) For concrete, compressed fibre-cement and fibre-cement sheet flooring, the floor of the room must be *water resistant*.

(b) For timber floors including particleboard, plywood and other timber based flooring materials, the floor of the room must be *waterproof*.

(c) Tap and spout penetrations must be *waterproof* where they occur in horizontal surfaces.

(2) For areas adjacent to non-freestanding baths and spas, the following applies:

(a) Walls must be *water resistant* (see Figure 10.2.4a and Figure 10.2.4b)—

(i) to a height of not less than 150 mm above the *vessel*, for the extent of the *vessel*, where the *vessel* is within 75 mm of a wall; and

(ii) for all exposed surfaces below *vessel* lip.

(b) Wall junctions and joints must be *water resistant* within 150 mm above a *vessel* for the extent of the *vessel*.

(c) Wall/floor junctions must be *waterproof* for the extent of the *vessel* (see Figure 10.2.4a and Figure 10.2.4b).

(3) For inserted baths and spas, the following applies:

(a) For floors and horizontal surfaces:

(i) Any shelf area adjoining the bath or spa must be *waterproof* and include a *waterstop* under the *vessel* lip.

(ii) There are no requirements for the floor under a bath or spa.

(b) For walls:

(i) *Waterproof* to not less than 150 mm above the lip of a bath or spa.

(ii) There are no requirements for the floor under a bath or spa.

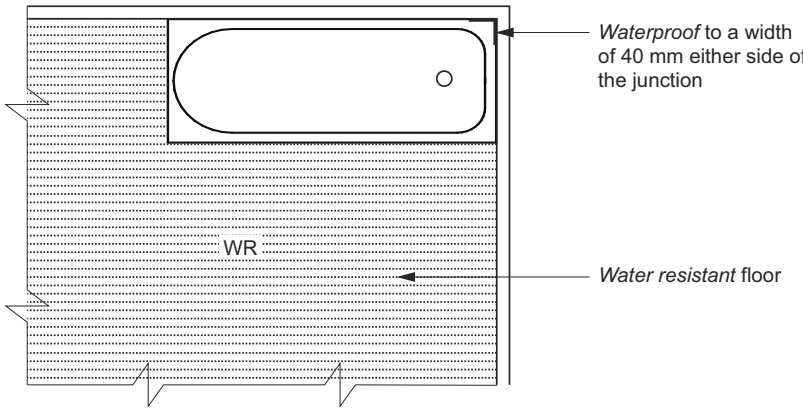
(c) For wall junctions and joints, the following applies:

(i) *Waterproof* junctions within 150 mm of a bath or spa.

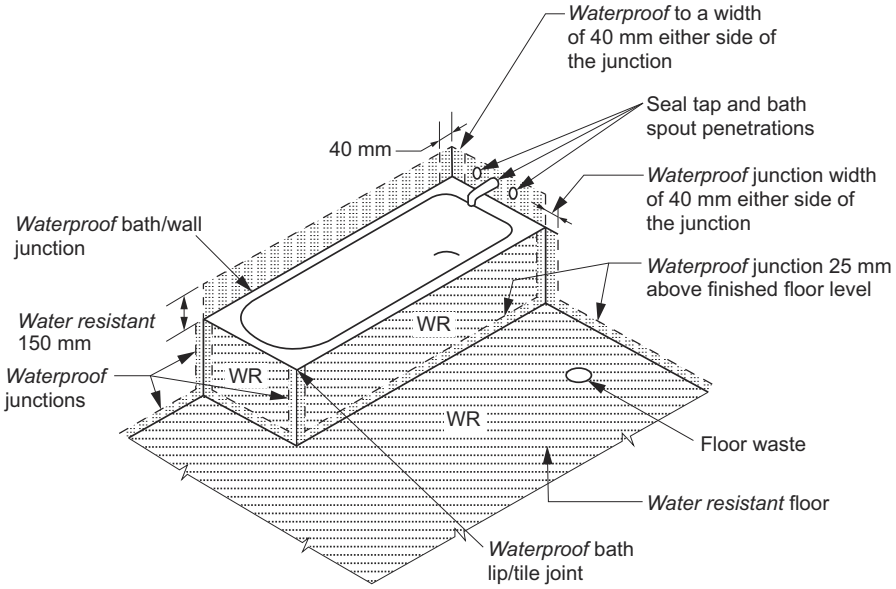
(ii) There are no requirements for junctions and joints in walls beneath the lip of a bath or spa.

(d) Tap and spout penetrations must be *waterproof* where they occur in horizontal surfaces.

Figure 10.2.4a: Areas adjacent to baths and spas without showers for concrete, compressed fibre-cement and fibre-cement sheet flooring

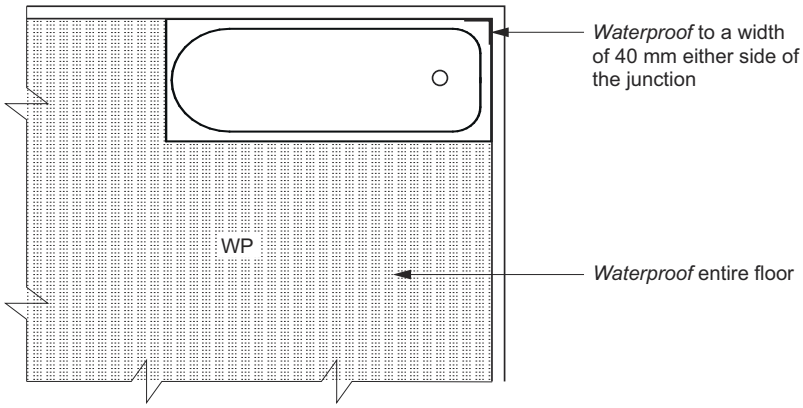


(a) Plan view

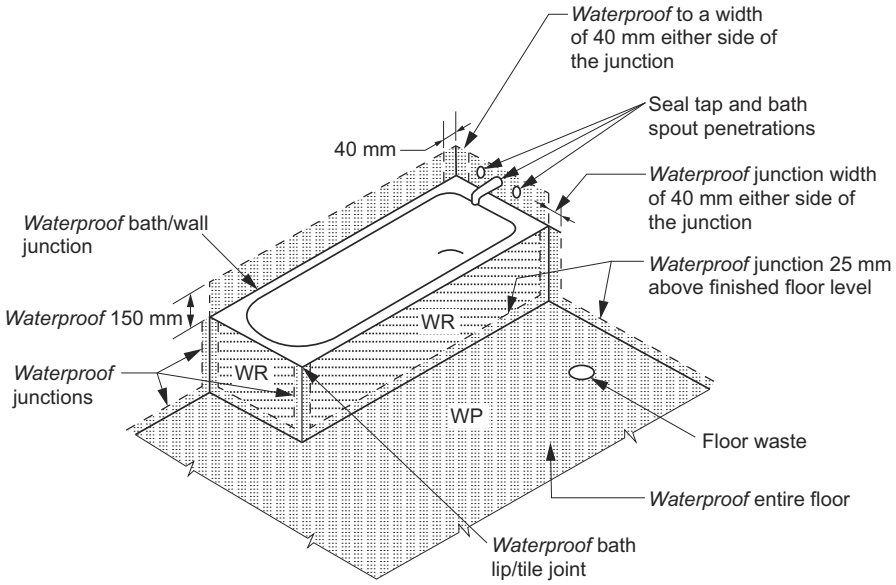


(b) Isometric view

Figure 10.2.4b: Areas adjacent to baths and spas without showers for timber floors including particle-board, plywood and other floor materials



(a) Plan view



(b) Isometric view

10.2.5 Other areas

[2019: Table 3.8.1.1]

(1) For walls adjoining other types of *vessels* (e.g. sink, basin or laundry tub), the following applies:

(a) Walls must be *water resistant* to a height of not less than 150 mm above the *vessel*, for the extent of the *vessel*, where the *vessel* is within 75 mm of a wall (see Figure 10.2.5).

(b) *Waterproof* wall junctions where a *vessel* is fixed to a wall.

(c) *Waterproof* tap and spout penetrations where they occur in surfaces required to be *waterproof* or *water resistant*.

(2) For laundries and WCs, the following applies:

(a) The floor of the room must be *water resistant*.

(b) Wall/floor junctions must be *water resistant*, and where a *flashing* is used, the horizontal leg must not be less

than 40 mm.

(3) For WCs with handheld bidet spray installations, the following applies:

(a) The floor of the room must be *waterproof*.

(b) Walls must be—

(i) *waterproof* in WC area within a 900 mm radius from the wall connection of the handheld bidet spray device to a height of not less than 150 mm above the floor substrate; and

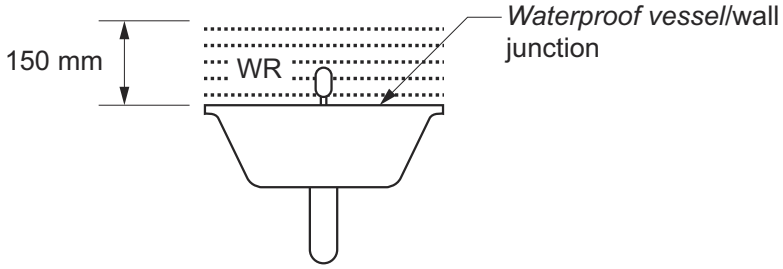
(ii) *water resistant* in WC area within a 900 mm radius from the wall connection of the handheld bidet device to not less than 1200 mm above the finished floor level of the WC.

(c) Wall junctions within the WC area within 900 mm radius from the wall connection of the handheld bidet spray device must be *waterproof*.

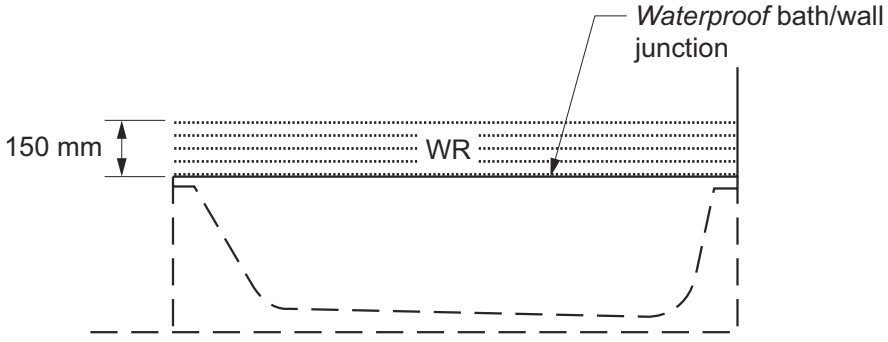
(d) Wall/floor junctions within the WC area within 1000 mm radius from the wall connection of the handheld bidet spray device must be *waterproof*.

(e) Penetrations in the WC area must be *waterproof*.

Figure 10.2.5: Bath and vessel abutting wall — areas to be protected



(a) Vessel abutting wall



(b) Wall/bath junction

10.2.6 Waterproofing systems

[New for 2022]

(1) For the purposes of this Part, a *waterproofing system* is deemed—

(a) *waterproof*, if it complies with (2); or

(b) *water resistant*, if it complies with (3).

(2) For a *waterproofing system* required to be *waterproof* in accordance with 10.2.2 to 10.2.5, the materials nominated in 10.2.8 must be used.

(3) For a *waterproofing system* required to be *water resistant* in accordance with 10.2.2 to 10.2.5, the materials nominated

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

10.2.7 Materials

[New for 2022]

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

[New for 2022]

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

[New for 2022]

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 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 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

[New for 2022]

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

[New for 2022]

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

[New for 2022]

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

[New for 2022]

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

10.2.14 Shower area requirements

[New for 2022]

Shower areas must be designed as either *enclosed* or *unenclosed*—

(a) to include a *floor waste* with falls complying with 10.2.12; and

(b) with a—

(i) stepdown complying with 10.2.15; or

(ii) *hob* complying with 10.2.16; or

(iii) level threshold complying with 10.2.17.

10.2.15 Stepdown showers

[New for 2022]

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 10.2.15a: Typical enclosed stepped down shower construction (membrane below tile bed)

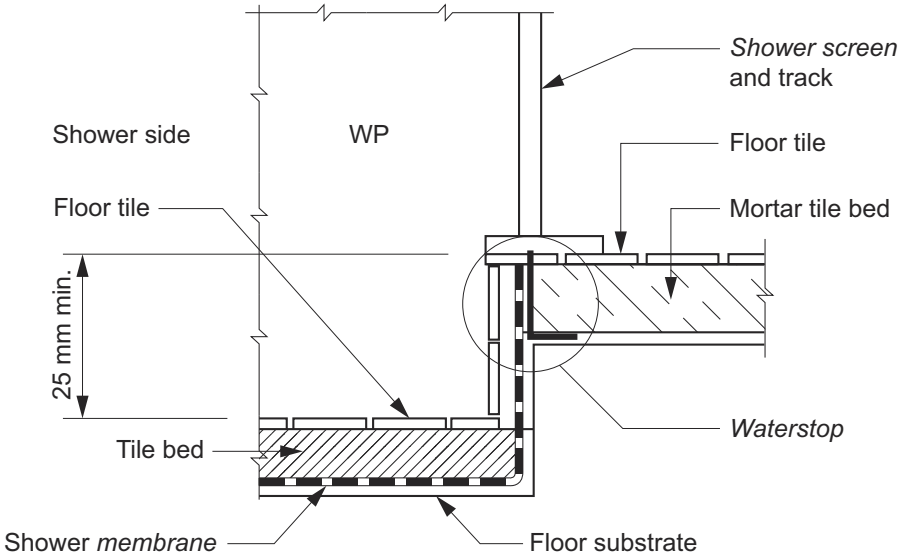


Figure 10.2.15b: Typical enclosed stepped down shower construction (membrane above tile bed)

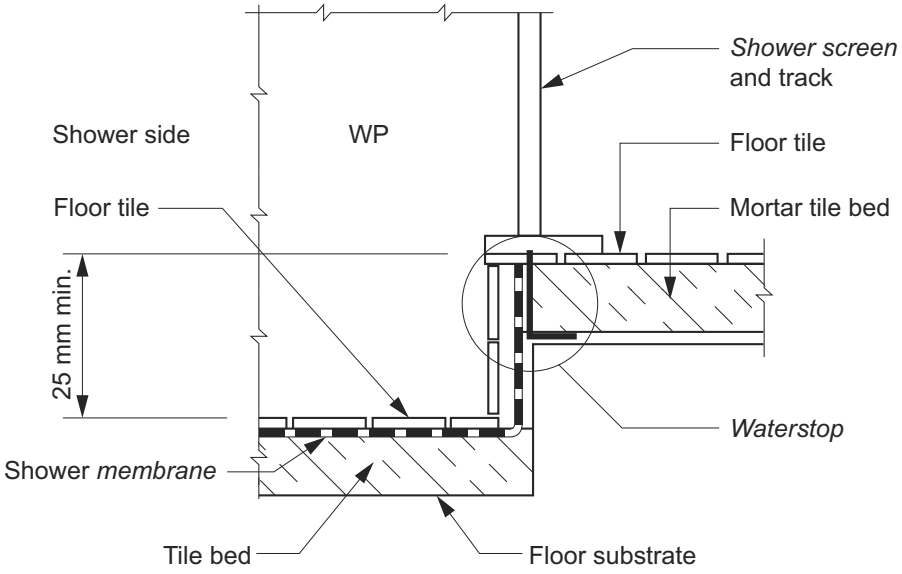


Figure 10.2.15c: Typical unenclosed stepped down shower construction (membrane below tile bed)

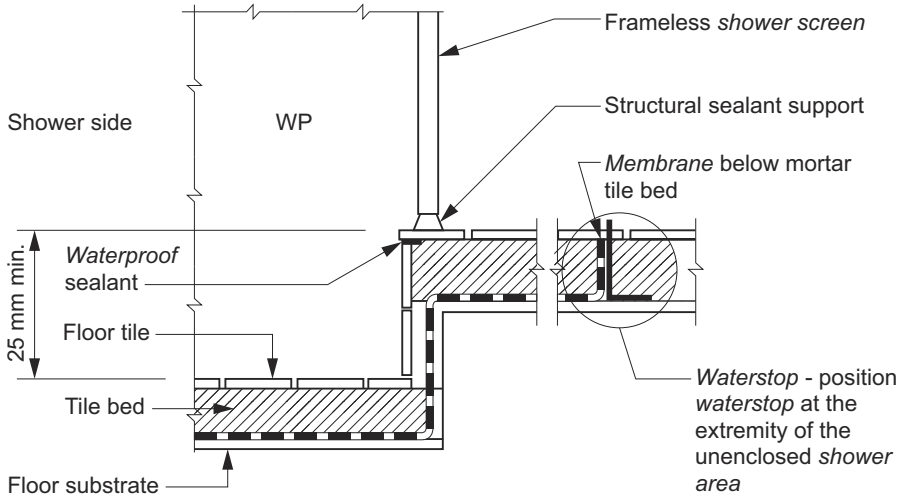
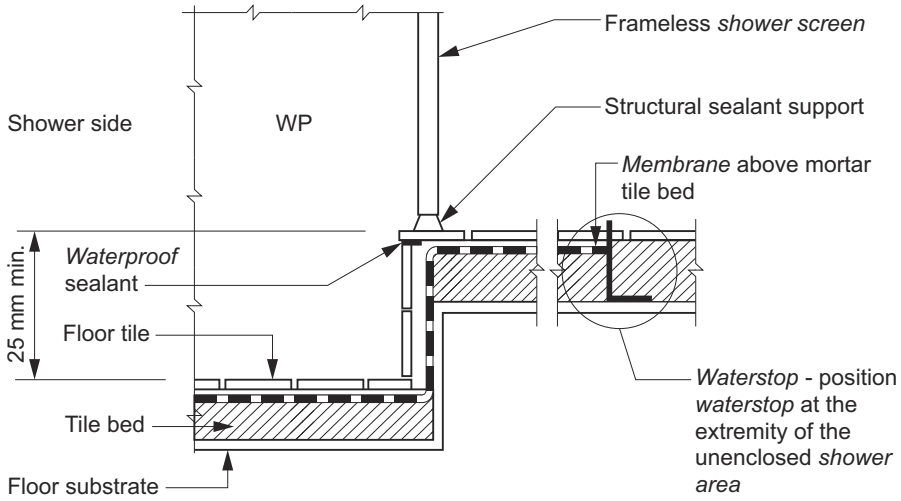


Figure 10.2.15d: Typical unenclosed stepped down shower construction (membrane above tile bed)



10.2.16 Hob construction

[New for 2022]

(1) *Hobs* must be constructed of—

(a) masonry; or

(b) concrete; or

(c) autoclaved aerated concrete; or

(d) extruded polyurethane foam,

in accordance with Figure 10.2.16.

(2) All gaps, joints and intersections of the *hob* substrate must be made flush before application of a *membrane*.

(3) *Hobs* must be adequately secured to the floor and sealed against the wall prior to applying a *membrane*.

(4) Timber must not be used for *hob* construction.

Figure 10.2.16: Typical hob construction — internal membrane

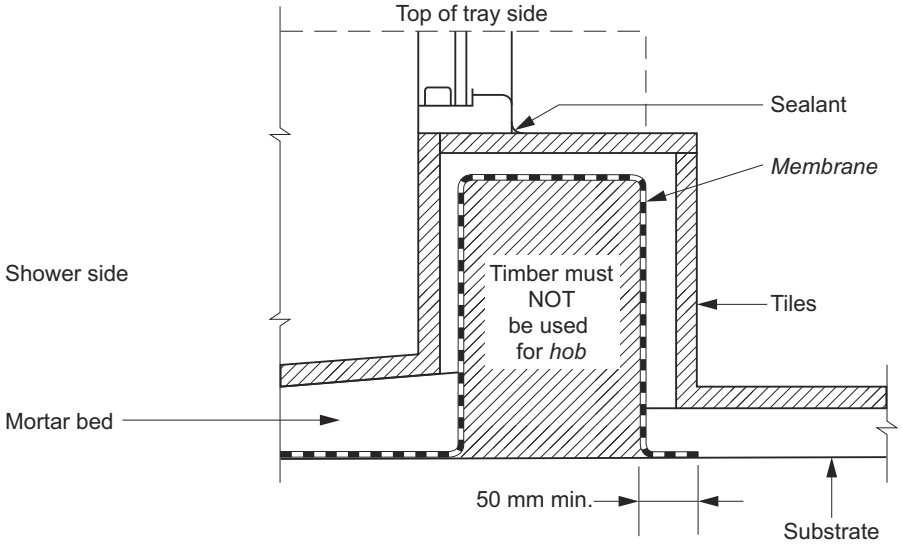


Figure Notes

For *shower screen* positioning, see 10.2.32.

10.2.17 Enclosed showers with level threshold (without hob or set down)

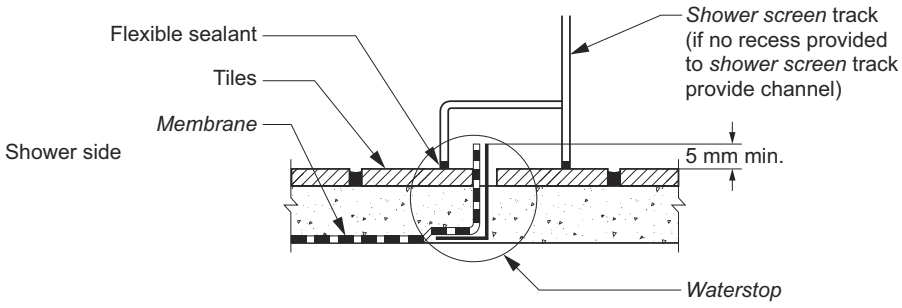
[New for 2022]

For enclosed showers without a stepdown or a *hob*, at the extremity of the *shower area*, a *waterstop* must be positioned so that its vertical leg finishes—

(a) where a *shower screen* is to be installed, not less than 5 mm above the finished floor level (see Figure 10.2.17); and

(b) where the *waterstop* intersects with a wall or has a joint, the junction must be waterproof.

Figure 10.2.17: Typical hobless construction



10.2.18 Unenclosed showers

[New for 2022]

(1) Unenclosed showers must be constructed as follows:

(a) A *waterstop* must be installed a minimum horizontal distance of 1500 mm from the shower rose.

(b) The vertical leg of the *waterstop* must finish—

(i) flush with the top surface of the floor (see Figure 10.2.18); and

(ii) where the *waterstop* intersects with a wall or is joined—

(A) the junction must be *waterproof*; or

(B) the whole *wet area* floor must be waterproofed and drained to a *floor waste* as for the *shower area*.

(2) In the case of (1)(b)(ii)(B), at doorways, where the height of the tiling angle needs to be adjusted for tiling purposes, the angle must be fixed with a sealant compatible with the waterproofing *membrane* without damaging the *waterproofing system*.

Figure 10.2.18: Typical termination of membrane at extent of shower area

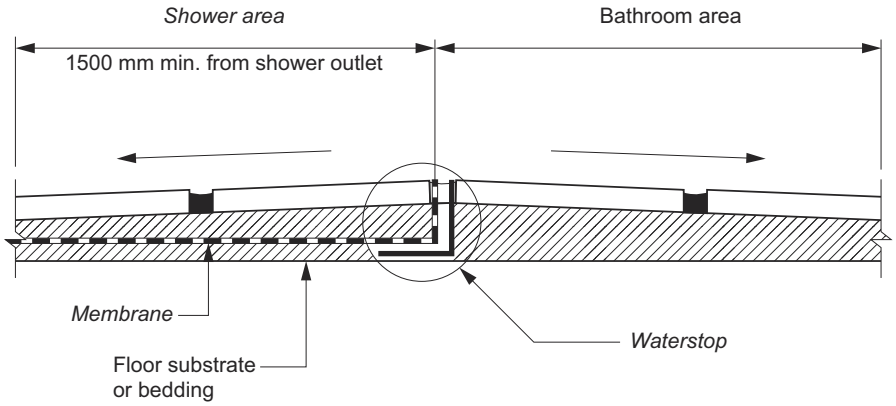


Figure Notes

Fall is to be provided in accordance with 10.2.12.

10.2.19 Preformed shower bases

[New for 2022]

Preformed shower bases must—

(a) have an upturn lip (see Figure 10.2.19a and Figure 10.2.19b); and

(b) be recessed into the wall to allow the *water resistant* surface materials and substrate materials to pass down inside the perimeter upturn lip of the shower base (see Figure 10.2.19a and Figure 10.2.19b); and

(c) be supported to prevent distortion or cracking.

Figure 10.2.19a: Typical preformed shower base wall/floor junction

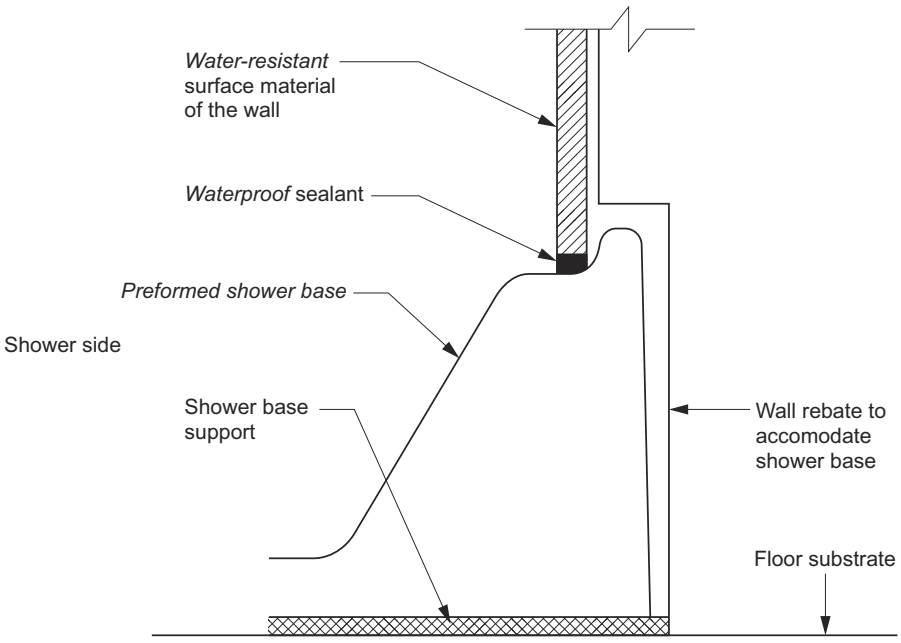
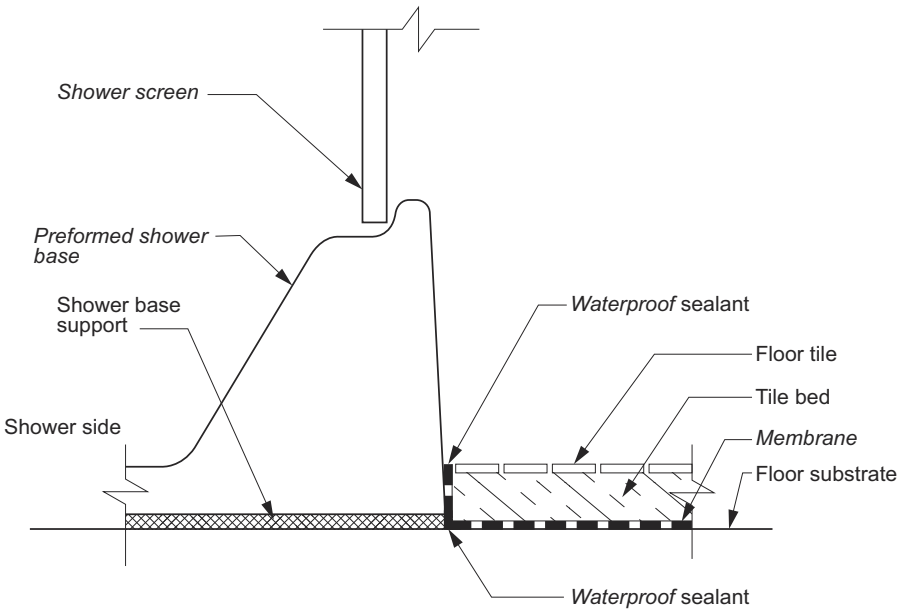


Figure Notes

(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 in the design in accordance with AS 3700.

Figure 10.2.19b: Typical preformed shower base/floor junction on timber floors, including particleboard, plywood and other timber materials



10.2.20 Baths and spas

[New for 2022]

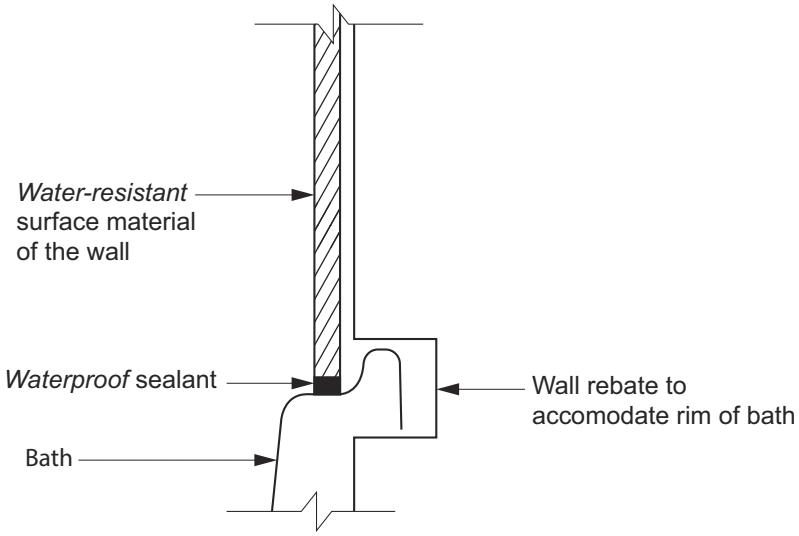
Baths and spas, except freestanding baths and spas, must—

(a) have an upturn lip; and

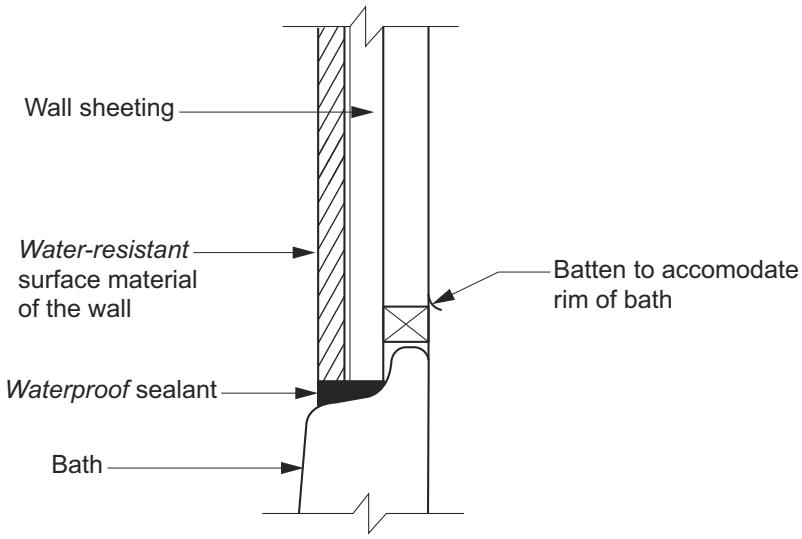
(b) be recessed into the wall (see Figure 10.2.20); and

(c) have the *water resistant* substrate materials of the wall pass down inside the upturn lip (see Figure 10.2.20).

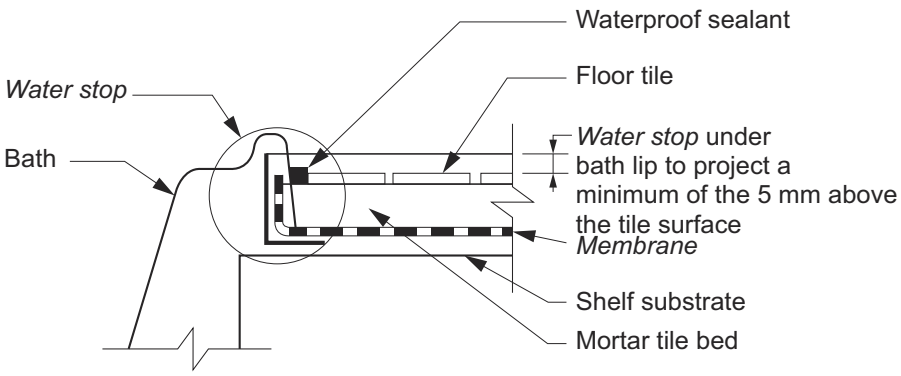
Figure 10.2.20: Typical bath junctions



(a) Bath/wall junction - recessed



(b) Bath/wall junction - battened



(c) Bath/shelf junction

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

[New for 2022]

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

[New for 2022]

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

[New for 2022]

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

[New for 2022]

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.

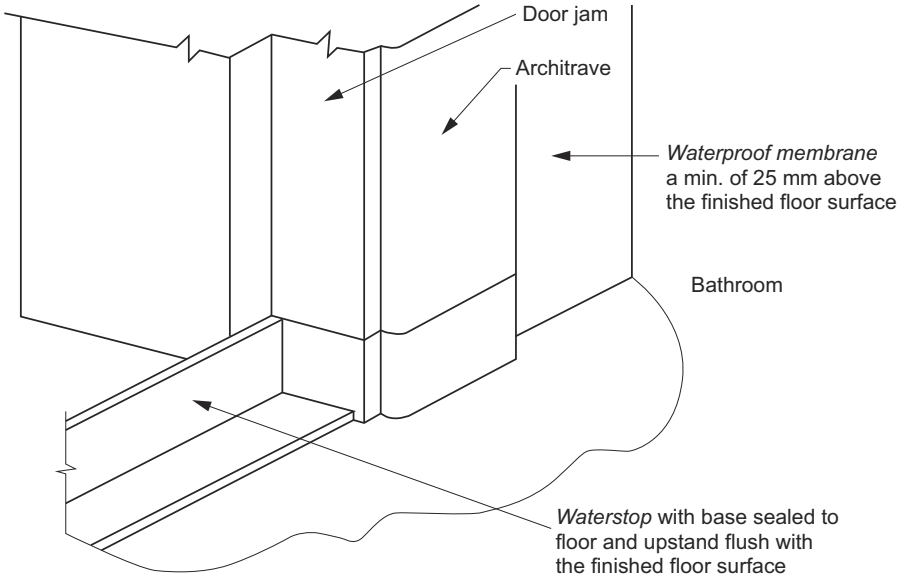
(c) Perimeter *flashings* at a floor level opening must comply with the following:

(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).

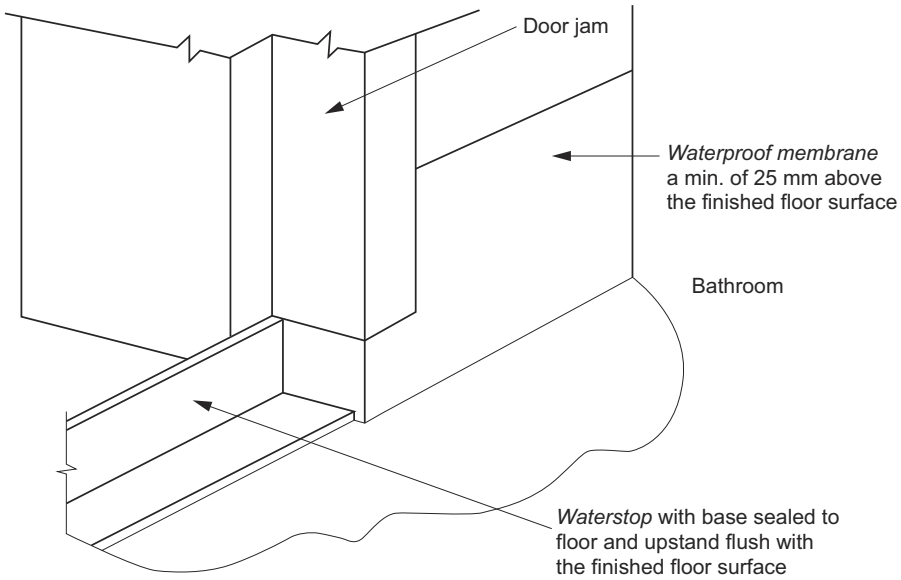
(ii) In any other case, at a floor level opening a *waterstop* must be installed that has a vertical leg finishing flush with the top of the finished floor level and waterproofed to the perimeter *flashing*.

(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

Explanatory Information

Vertical *flashing* may be used as follows:

(a) External vertical *flashing* may be used with external *membrane* systems and installed behind the wall sheeting or render. They must have legs of sufficient width to allow the wall sheeting or render to overlap by not less than 32 mm.

(b) Internal vertical *flashing* may be used with both external and internal *membrane* systems provided each leg has a minimum overlap of 40 mm to the wall sheeting or render and where used with—

(i) internal *membrane*, must extend vertically from the shower tray; and

(ii) external *membranes*, must overlap the top edge of the floor *waterproofing system* by not less than 20 mm; and

(iii) *preformed shower bases* or baths, must extend to the bottom edge of the wall sheeting or render.

10.2.25 Shower area floor membrane application

[New for 2022]

For hobless showers, or showers with hobs or stepdowns, the *membrane* must be applied over the floor and up the vertical face of the wall substrate to a minimum height of 1800 mm above the finished tile level of the floor.

10.2.26 Shower area membrane requirements for wall sheeting substrates

[New for 2022]

(1) Where wall sheeting is used with an external *membrane* system in a *shower area* it must be *waterproof* to prevent water movement by capillary action.

(2) Where *water resistant* plasterboard is used all cut edges that have the potential to be affected by water and moisture must be waterproofed, including the bottom edge over a *preformed shower base*.

10.2.27 Bond breaker installation for bonded membranes

[New for 2022]

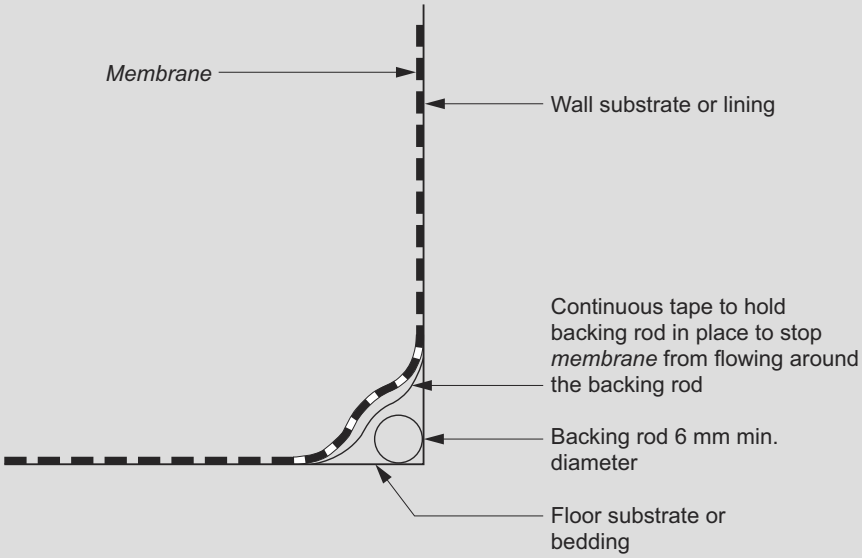
(1) *Bond breakers* must be installed at all wall/wall, wall/floor, *hob*/wall junctions and at movement joints where the *membrane* is bonded to the substrate.

(2) *Bond breakers* must be of the type compatible with the flexibility class of the *membrane* to be used.

Explanatory Information

Typical details for *bond breaker* types are given in Explanatory Figure 10.2.27.

Figure 10.2.27 (explanatory): Typical bond breaker details



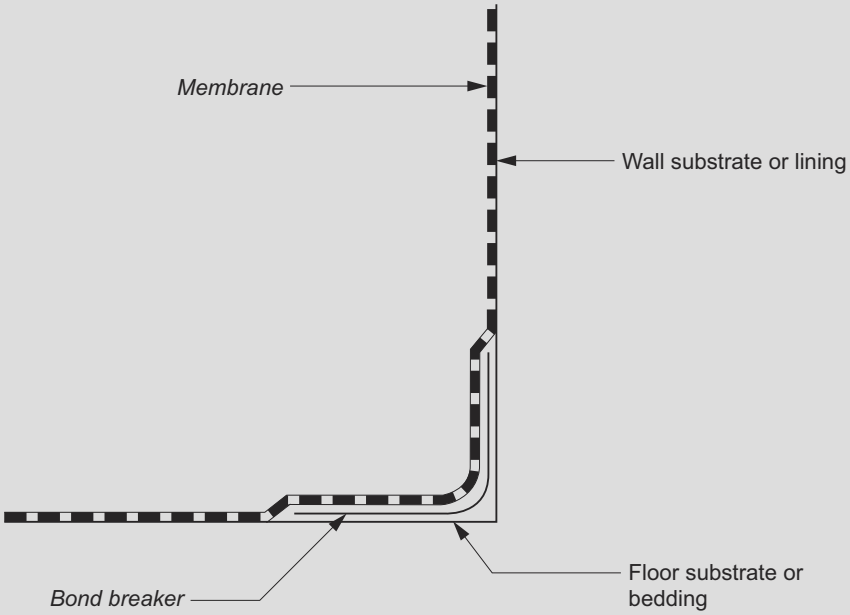


Figure Notes

(1) *Bond breakers* for Class I *membranes* (low extensibility) allow the *membrane* to flex rather than stretch.

(2) *Bond breakers* for Class II *membranes* (medium extensibility) allow the *membrane* to stretch. If a tape is used as a *bond breaker*, either the *membrane* must not bond to the tape or the tape must have elastic properties similar to the *membrane*.

(3) *Bond breakers* for Class III *membranes* (high extensibility) allow the *membrane* to have an even thickness.

10.2.28 Installation of internal membranes

[New for 2022]

(1) Where a shower has a *hob* the *membrane* must be brought over the top of the *hob*, down the outside face and

terminate not less than 50 mm onto the floor (see Figure 10.2.16).

(2) Where the shower has a *waterstop*, the *membrane* must be brought to the top of the finished floor, except where it is under a framed *shower screen* where it must terminate not less than 5 mm above the finished tile surface (see Figure 10.2.17 and Figure 10.2.18).

10.2.29 Membrane to drainage connection

[New for 2022]

(1) *Membrane* drainage connections in concrete floors must comply with one of the following:

(a) A *drainage flange* must be installed with the waterproofing *membrane* terminated at or in the *drainage flange* to provide a *waterproof* connection (see Figure 10.2.29).

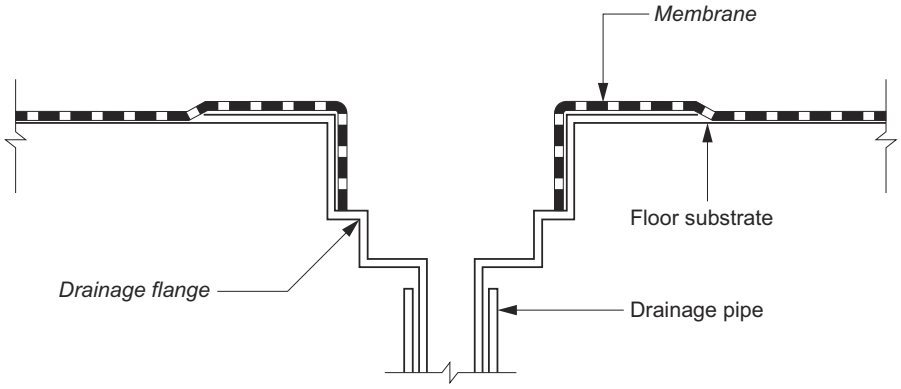
(b) Where a *preformed shower base* is used, provision must be made to drain the tile bed and provide a *waterproof* connection to the drain.

(2) For *membrane* drainage connections in other floors, a *drainage flange* must be installed with the waterproofing *membrane* terminated at or in the *drainage flange* to provide a *waterproof* connection (see Figure 10.2.29).

(3) Where a *preformed shower base* is used, provision must be made to drain the tile bed and provide a *waterproof* connection to the drain.

(4) *Floor wastes* must be of sufficient height to suit the thickness of the tile and tile bed at the outlet position.

Figure 10.2.29: Typical membrane termination at drainage outlet



Explanatory Information: Drainage flanges

- For *membrane* drainage connections in concrete floors: *drainage flange* may be either cast into the concrete slab or set into the top surface of the concrete slab or the tile bed.
- For *membrane* drainage connections in other floors: *drainage flange* may be either set into the floor substrate or the tile bed.

10.2.30 Drainage riser connection

[New for 2022]

(1) Where a *preformed shower base* is used, the *drainage riser* must be connected to the tray with a *waterproof* joint.

(2) Where an in situ shower tray is used, the *membrane* must be able to form a permanent *waterproof* seal to the *drainage riser* or *drainage flange* (see Figure 10.2.29).

10.2.31 Door jambs on tiled floors

[New for 2022]

Where the bottom of a door jamb does not finish above the floor tiling, the portion of the door frame below the floor tiling

must be waterproofed to provide a continuous seal between the perimeter *flashing* and the *waterstop*.

10.2.32 Shower screens

[New for 2022]

(1) For a shower with a *hob*, the *shower screen* must be installed flush with the *shower area* side of the *hob* or overhang into the *shower area*.

(2) For a shower with a stepdown, the *shower screen* must be installed flush with the finished vertical surface of the stepdown of the *shower area*.

(3) For a shower without a *hob* or stepdown, the *shower screen* must incorporate or be mounted on an inverted channel, positioned over the top of the *waterstop*, that defines the *shower area*.

(4) For bath end walls and dividing walls abutting a shower, the *shower screen* must be positioned so that the bottom edge within the *shower area* is either flush with the outside edge of the bath or overhanging into the *shower area*.

Explanatory Information

A self-draining sub-sill is considered to be part of the *shower screen*.

SA 10.2.33

Part 10.3 Room heights

10.3.1 Height of rooms and other spaces

[2019: 3.8.2.2]

(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, *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

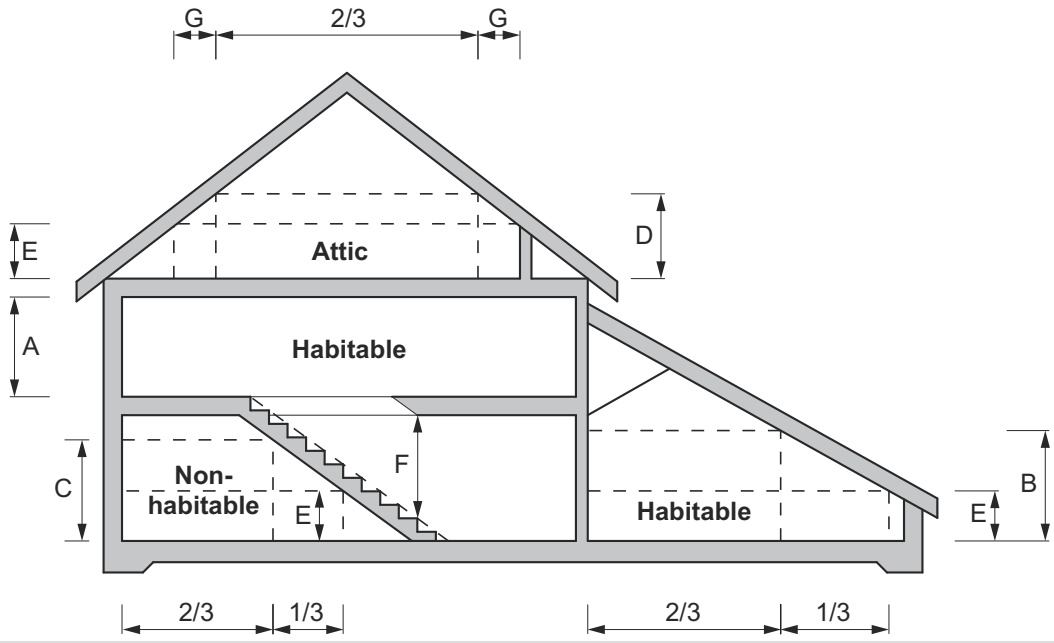


Figure Notes

The letters in the diagram represent the following minimum dimensions:

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

B = 2.4 m In a *habitable room* with a sloping ceiling for at least two-thirds of the *floor area* of the room or space.

C = 2.1 m In a non-*habitable room* with a sloping ceiling for at least two-thirds of the *floor area* of the room or space.

D = 2.2 m In an attic with a sloping ceiling for at least two-thirds of the *floor area* of the room or space.

E = 1.5 m For the purpose of calculating the *floor area* of a room or space, any ceiling height of less than 1.5 m is excluded.

F = 2.0 m In a stairway (measured vertically above the nosing line).

The combined dimensions of G must not exceed one-third of the *floor area* (see E above) of the room or space.

Explanatory Information

- Where a room or space has no ceiling lining, the measurement is taken from the floor to the underside of the floor or roof above.
- In areas unlikely to be occupied for long periods, such as non-*habitable rooms*, a reduced height of 2.1 m is permitted.
- 10.3.1(1)(f) permits a reduced height of 2.0 m above stairways, ramps and *landings*, as these are used for transient purposes and therefore a reduction from the *required* height in corridors and rooms (2.1 and 2.4 m generally) will not adversely affect occupant safety, health or *amenity*

Part 10.4 Facilities

10.4.1 Required facilities

[2019: 3.8.3.2]

(1) A Class 1 building must be provided with—

(a) a kitchen sink and facilities for the preparation and cooking of food; and

(b) a bath or shower; and

(c) clothes washing facilities, comprising at least one washtub and space in the same room for a washing machine; and

(d) a closet pan; and

(e) a washbasin.

(2) If any of the facilities in (1) are detached from the main building, they must be set aside for the exclusive use of the occupants of the building.

Explanatory Information

- A kitchen sink or washbasin must not be counted as a laundry washtub. A laundry washtub is considered to provide the necessary means to dispose of waste water as *required* by H4P3(2).
- Installation requirements for certain electrical or gas cooking appliances may influence the selection of surrounding materials or the clearance to those materials.

10.4.2 Construction of sanitary compartments

[2019: 3.8.3.3]

The door to a fully enclosed *sanitary compartment* must—

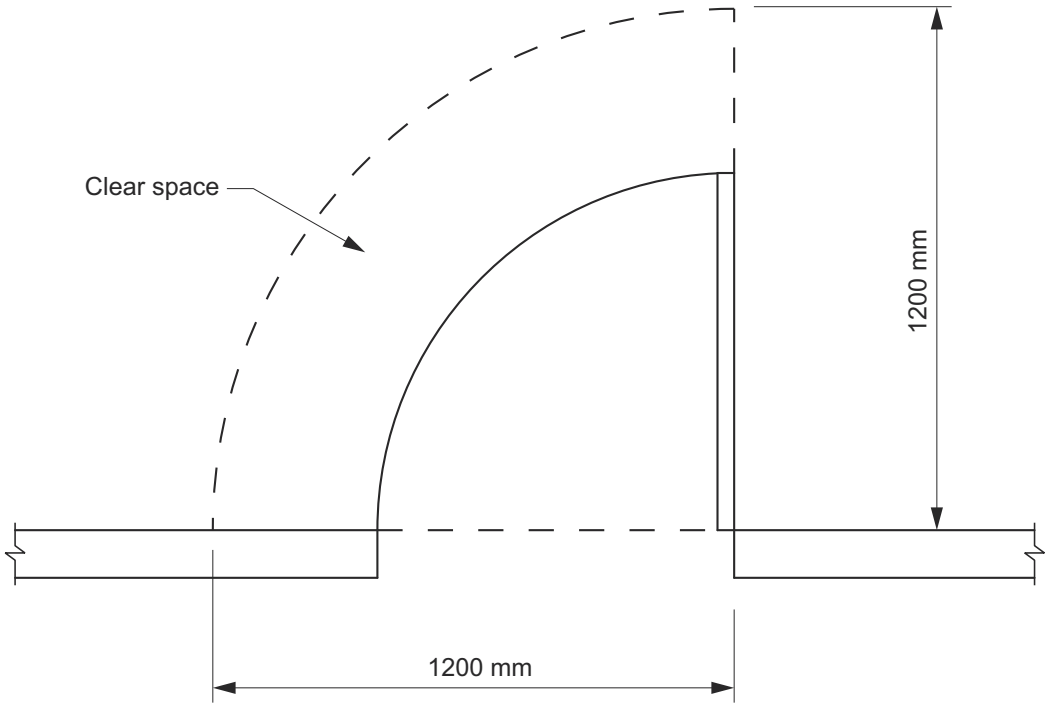
(a) open outwards; or

(b) slide; or

(c) be readily removable from the outside of the compartment,

unless there is a clear space of at least 1.2 m, measured in accordance with Figure 10.4.2, between the closet pan within the *sanitary compartment* and the doorway.

Figure 10.4.2: Construction of sanitary compartments



Explanatory Information

10.4.2 requires means of removing an unconscious occupant from a fully enclosed *sanitary compartment*. If the enclosure has gaps that are large enough to allow access for a person into the *sanitary compartment*, the compartment is not considered enclosed for the purpose of this clause.

TAS 10.4.3

Part 10.5 Light

10.5.1 Natural light

[2019: 3.8.4.2]

(1) Natural light must be provided to all *habitable rooms*, in accordance with the requirements of (2) to (5).

(2) Natural light must be provided by—

(a) *windows*, excluding *roof lights* that—

(i) have an aggregate light transmitting area measured exclusive of framing members, glazing bars or other obstructions of not less than 10% of the *floor area* of the room; and

(ii) are open to the sky or face a court or other space open to the sky or an open verandah, carport or the like; or

(b) *roof lights* that—

(i) have an aggregate light transmitting area measured exclusive of framing members, glazing bars or other obstructions of not less than 3% of the *floor area* of the room; and

(ii) are open to the sky; or

(c) a proportional combination of *windows* and *roof lights required* by (a) and (b).

(3) A *window required* to provide natural light that faces a boundary of an adjoining allotment must not be less than a horizontal distance of 900 mm from that boundary.

(4) Natural light to a room may come through one or more glazed panels or openings from an adjoining room (including an enclosed verandah) if—

(a) the glazed panels or openings have an aggregate light transmitting area of not less than 10% of the *floor area* of the room to which it provides light; and

(b) the adjoining room has—

(i) *windows*, excluding *roof lights* that—

(A) have an aggregate light transmitting area of not less than 10% of the combined *floor area* of both rooms; and

(B) are open to the sky or face a court or other space open to the sky or an open verandah, carport or the like; or

(ii) *roof lights* that—

(A) have an aggregate light transmitting area of not less than 3% of the combined *floor area* of both rooms; and

(B) are open to the sky; or

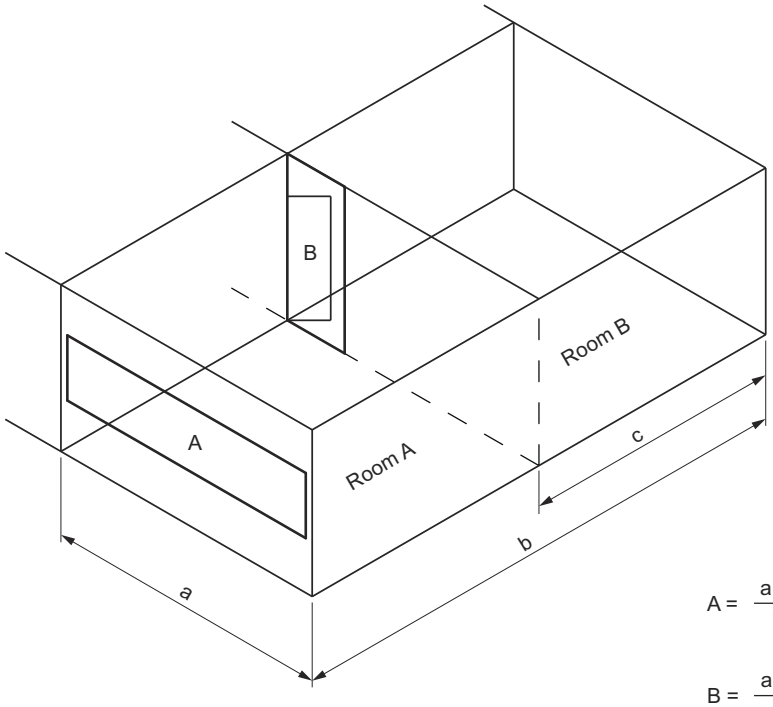
(iii) a proportional combination of *windows* and *roof lights required* by (i) and (ii).

(5) The areas specified in (4)(a) and (b) may be reduced as appropriate if direct natural light is provided from another source.

Notes

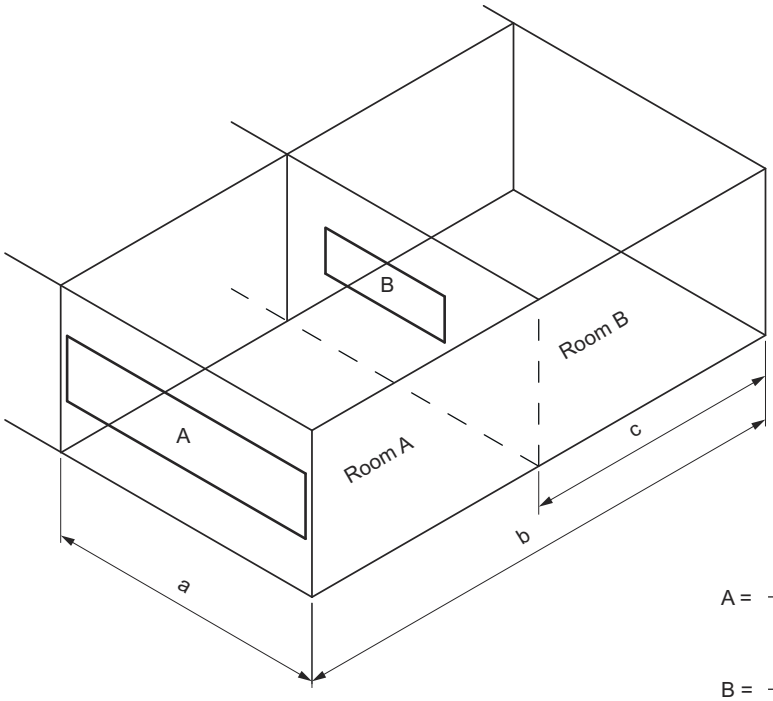
Figure 10.5.1 illustrates requirements of this provision.

Figure 10.5.1: Method of determining areas of openings for borrowed light



$$A = \frac{a \times b}{10} \ m^2$$

$$B = \frac{a \times c}{10} \ m^2$$



$$A = \frac{a \times b}{10} \ m^2$$

$$B = \frac{a \times c}{10} \ m^2$$

Explanatory Information: Explanatory Figure 10.5.1

A *roof light* generally receives greater exposure to sunlight than a *window* because of its orientation to the sky and consequently, the size of a *roof light* as a percentage of the *floor area* served is permitted to be smaller than for a

window serving the same *floor area*. This is explained in Explanatory Figure 10.5.1, below.

Figure 10.5.1 (explanatory): Method for determining proportional combination of windows and roof lights

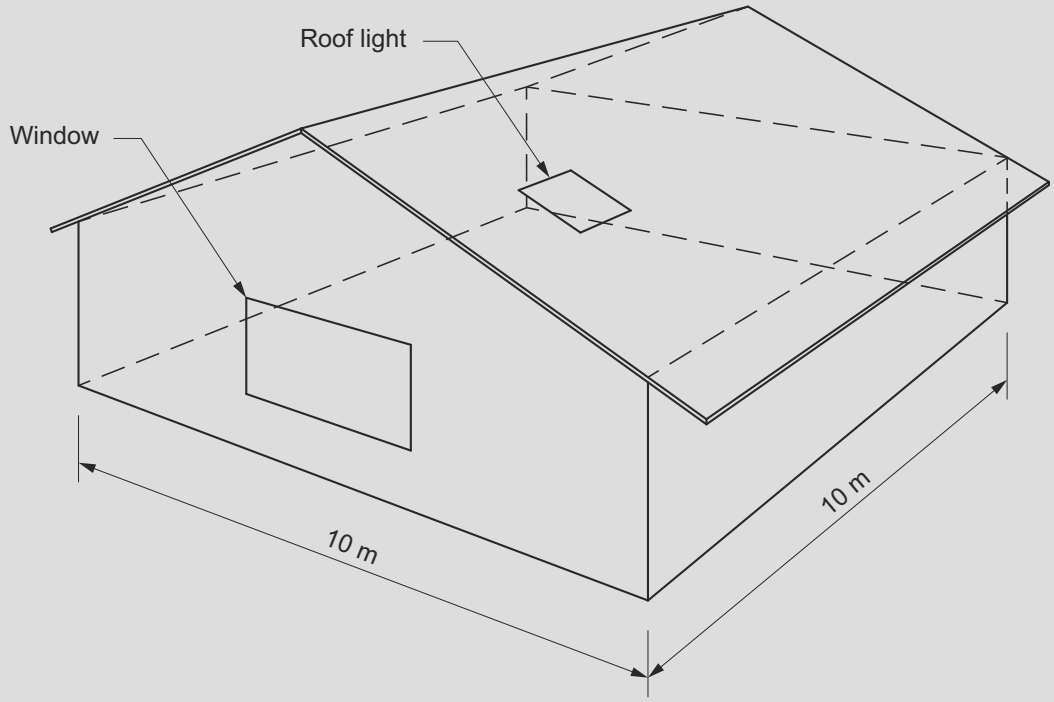


Figure Notes

(1) Area of the room which *requires* natural light is 100 m^2.

(2) No natural light is borrowed from adjoining rooms.

Explanatory Information: General requirements for Explanatory Figure 10.5.1

Required window(s) to provide natural light must have a light transmitting area of at least 10% of the *floor area*.

10% of 100 m^2 = 10 m^2

Or, *roof light(s)* to provide natural light must have a light transmitting area of at least 3% of the *floor area*.

3% of 100 m^2 = 3 m^2

In the formula shown in the next Explanatory Information box, 3% of the *floor area* is expressed as the fraction 0.03 and 10% of the *floor area* is expressed as the fraction 0.1.

Explanatory Information: Calculations for Explanatory Figure 10.5.1

Formula — for the area of *window(s) required* to compensate for *roof light(s)* short fall:

- Area of room covered by the *roof light(s)* = (Area of *roof light(s)*) / 0.03
- *Required window(s)* area = [(*floor area*) – (Area covered by the *roof light(s)*)] / 10

Area of *window(s) required* to compensate for *roof light(s)* short fall:

If the *roof light(s)* = 1 m^2

- Area of room covered by the *roof light(s)* = (1 m^2 / 0.03) = 33.33 m^2.
- *Required window(s)* area = (100 m^2 – 33.33 m^2) / 10 = 6.67 m^2.

Formula — for the area of *roof light(s) required* to compensate for *window(s)* short fall:

- Area of room covered by the *window(s)* = (Area of *window(s)*) / 0.1.
- *Required roof light(s)* area = [(*floor area*) – (Area covered by the *window(s)*)] / 33.33.

Area of *roof light(s) required* to compensate for *window(s)* short fall:

If the *window(s)* = 5 m².

- Area of room covered by the *window(s)* = (5 m^2 / 0.1) = 50 m^2.
- *Required roof light(s)* area = (100 m^2 – 50 m^2) / 33.33 m^2 = 1.5 m^2.

Notes:

(1) For the purposes of this example a *window* excludes a *roof light*.

(2) The same proportional calculation principle applies if—

(a) two or more *windows* are used; or

(b) two or more *roof lights* are used.

Explanatory Information: Natural light borrowed from another source

- Direct natural light provided from another source is intended to mean light from a *window* or *roof light* in the subject room. As the provision relates to natural light obtained from an adjoining room, 'another source' refers to direct natural light provided to the subject room which does not meet the *required* allowance of either 10% or 3% of the *floor area* of that room. By not meeting the *required* amount of natural light, the 'direct natural light from another source' can be used as a supplement to the natural light *required* from an adjoining room.
- To borrow natural light from another room, 10.5.1(4)(a) allows light to pass through a glazed panel(s) or opening(s) from an adjoining room, which under 10.5.1(4)(b), must have *windows*, *roof lights* or a combination of windows and *roof lights* of a minimum size in proportion to the combined floor areas of both rooms. The minimum size of the glazed panel(s) or opening(s), and the minimum size of the *window* to the adjoining room are illustrated in Figure 10.5.1.
- If a doorway is used as an opening to obtain natural light, it must do so when in the closed position (see Figure 10.5.1).

10.5.2 Artificial lighting

[2019: 3.8.4.3]

Sanitary compartments, bathrooms, shower rooms, airlocks and laundries must be provided with artificial lighting if natural light in accordance with the relevant provisions of 10.5.1 is not available—

(a) at a rate of not less than one light fitting per 16 m^2 of *floor area*; or

(b) in accordance with AS/NZS 1680.0.

Part 10.6 Ventilation

10.6.1 Application

[New for 2022]

(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

[2019: 3.8.5.2]

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

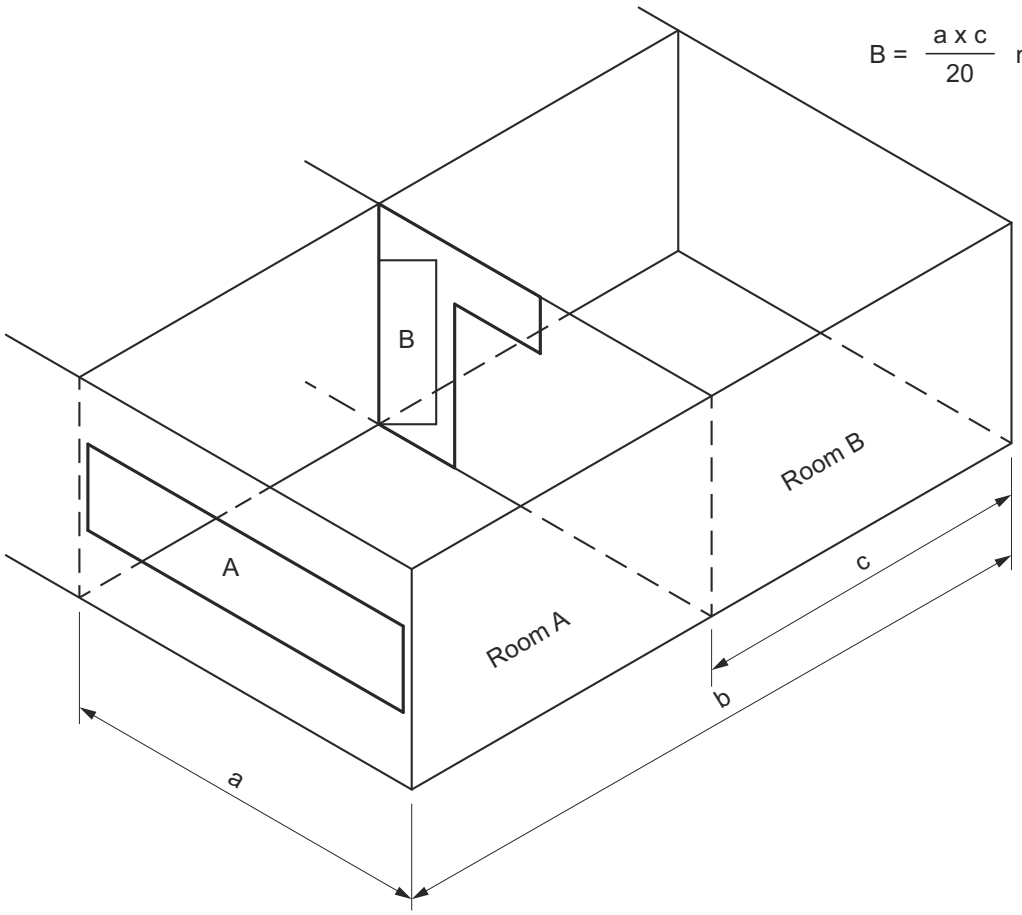
  (iv) the ventilating areas specified may be reduced as appropriate if direct natural ventilation is provided from another source (See Figure 10.6.2).

(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

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

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



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

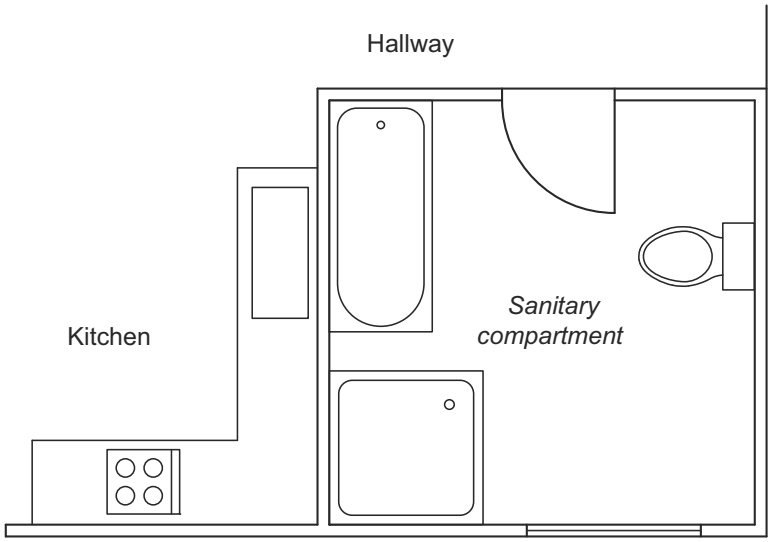
[2019: 3.8.5.3]

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

(b) the *sanitary compartment* is provided with an exhaust fan or other means of mechanical exhaust ventilation.

Figure 10.6.3: Acceptable location of non mechanically ventilated sanitary compartment



Part 10.7 Sound insulation

NT Part 10.7

10.7.1 Sound insulation requirements

[2019: 3.8.6.2]

(1) A *separating wall* between Class 1 buildings, or a wall that separates a Class 1 building from a Class 10a building which is not associated with the Class 1 building must—

(a) have an $R_w + C_{tr}$ (airborne) not less than 50; and

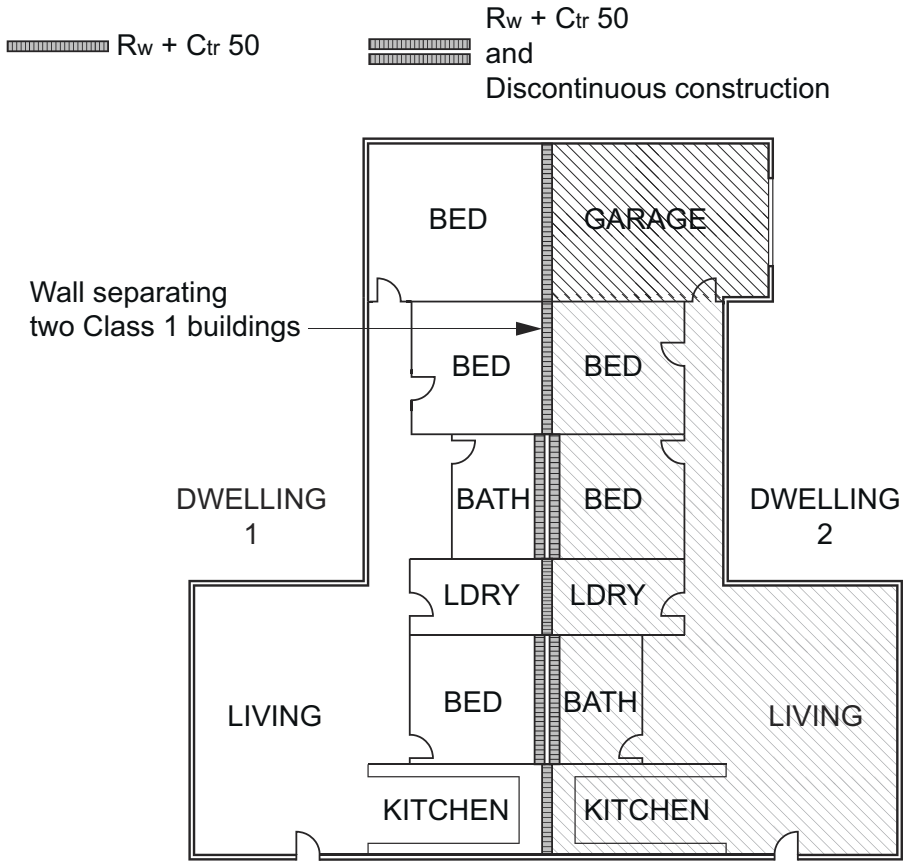
(b) be of *discontinuous construction* if it separates a bathroom, *sanitary compartment*, laundry or kitchen in one Class 1 building from a *habitable room* (other than a kitchen) in an adjoining Class 1 building (see Figure 10.7.1).

(2) A wall *required* to have sound insulation must continue to—

(a) the underside of the roof above; or

(b) a ceiling that provides the sound insulation *required* for the wall.

Figure 10.7.1: Required airborne and impact sound insulation — Plan view



Explanatory Information

Insulation to reduce both airborne and impact noise transmission is *required* for parts of a wall that are common to adjoining Class 1 buildings but not parts of a wall located in the subfloor.

10.7.2 Determination of airborne sound insulation ratings

[2019: 3.8.6.3]

The Rw + Ctr sound insulation rating *required* by 10.7.1(1)(a) must—

(a) be determined in accordance with AS/NZS ISO 717.1, using results from laboratory measurements; or

(b) comply with 10.7.5 to 10.7.8 and the relevant provisions of 10.7.3.

Explanatory Information

R_w is a measure of airborne sound insulation. C_{tr} is a spectrum adjustment factor that adjusts for low frequency sound levels. C_{tr} has been chosen in recognition of the problems caused by the high bass frequency outputs of modern home theatre systems and music reproduction equipment used by occupants of Class 1 buildings.

The wall configurations described in 10.7.5 to 10.7.8 are typical examples. Other proprietary methods are available via testing to AS/NZS ISO 717.1 for meeting the $R_w + C_{tr}$ requirements of 10.7.1.

10.7.3 Construction of sound insulated walls

[2019: 3.8.6.4]

To achieve the appropriate level of sound insulation, walls must be constructed as follows:

(a) Stud wall junction — junctions of sound insulated walls with any perimeter walls and roof cladding must be sealed in accordance with Figure 10.7.3a.

(b) Masonry — units must be laid with all joints filled solid, except for articulation joints complying with 5.6.8, including those between the masonry and any adjoining construction.

(c) Concrete panels — must have joints between panels and any adjoining construction filled solid.

(d) Plasterboard sheeting —

(i) If two layers are *required*, the second layer joints must not coincide with those of the first layer (see Figure 10.7.3b).

(ii) Joints between sheets including the outer layer or between sheets and any adjoining construction must be taped and filled solid.

(e) Steel framed construction — steel framing and perimeter members must be installed as follows:

(i) Steel framing members must be not less than 0.6 mm thick.

(ii) Studs must be not less than 63 mm in depth unless another depth is specified in 10.7.5 to 10.7.8.

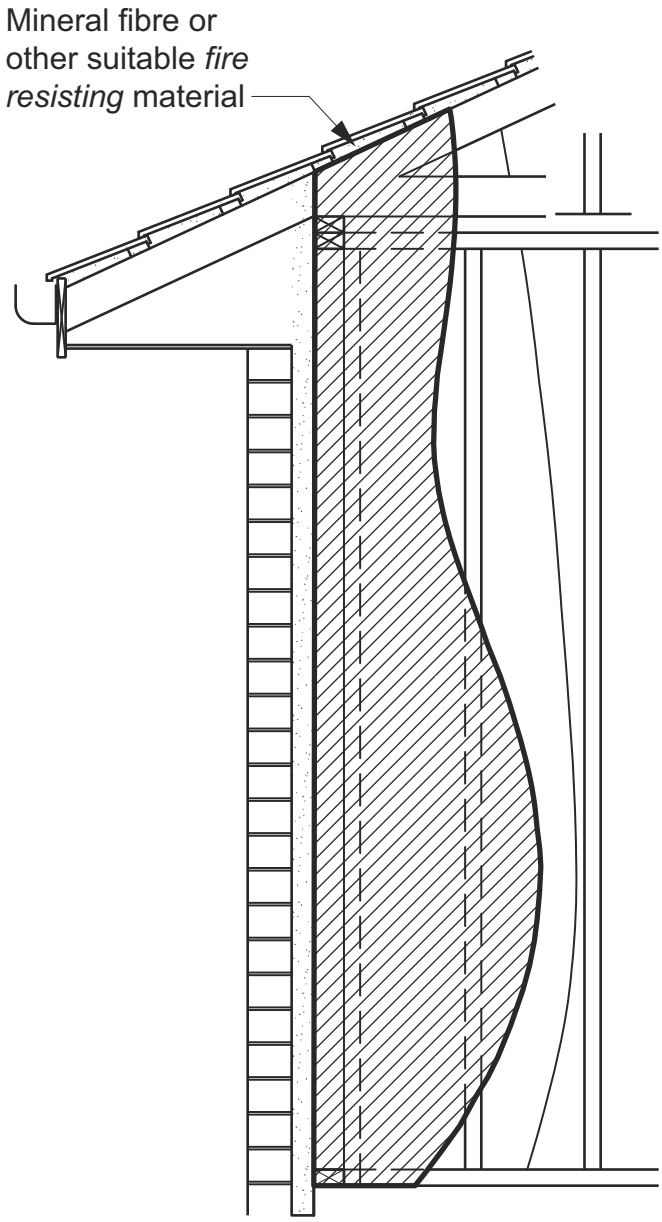
(iii) All steel members at the perimeter of the wall must be securely fixed to the adjoining structure and the joints must be caulked so that there are no voids between the steel members and the wall.

(f) Timber-framed construction — timber studs and perimeter members must be installed as follows:

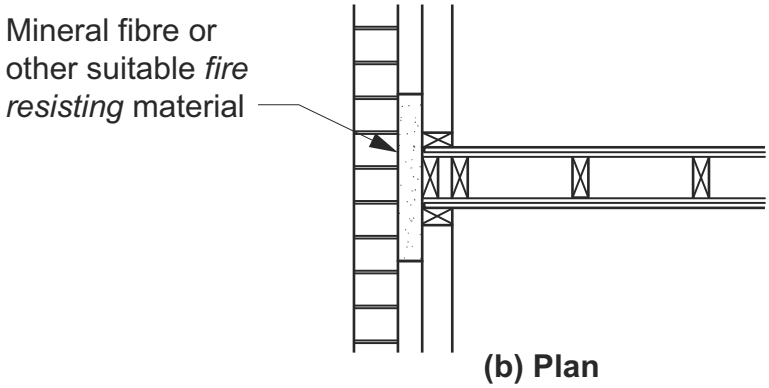
(i) Noggings and like members must not bridge between studs supporting different wall leaves.

(ii) All timber members at the perimeter of the wall must be securely fixed to the adjoining structure and the joints must be caulked so there are no voids between the timber members and the wall.

Figure 10.7.3a: Sound insulation between buildings — Stud wall junctions

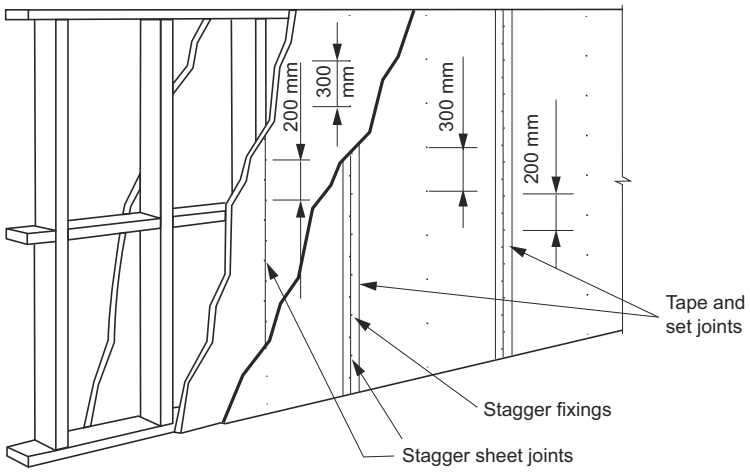


(a) Section

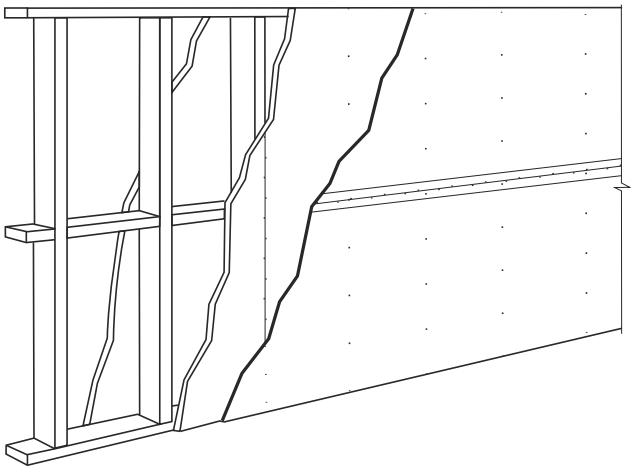


(b) Plan

Figure 10.7.3b: Typical installation of plaster sheets for sound insulation



(a) Second layer positioned vertically



(b) Second layer positioned horizontally

10.7.4 Services

[2019: 3.8.6.5]

(1) Services must not be chased into concrete or masonry *separating walls*.

(2) If a duct, soil, waste, water supply or stormwater pipe is located in a *separating wall*—

(a) a door or panel providing access to a duct or pipe *required* to be separated must—

(i) not open into any *habitable room*, other than a kitchen; and

(ii) in any other part must be firmly fixed so as to overlap the frame or rebate of the frame by not less than 10

mm and be constructed of—

(A) wood, plasterboard or blockboard not less than 33 mm thick; or

(B) compressed fibre reinforced cement sheeting not less than 9 mm thick; or

(C) other suitable material with a mass per unit area not less than 24.4 kg/m^2; and

(b) in the case of a water supply pipe, it must—

(i) only be installed in *discontinuous construction*; and

(ii) in the case of a water supply pipe that serves one dwelling, not be fixed to the wall leaf on the side of any other dwelling and have a clearance not less than 10 mm to the other wall leaf.

(3) Electrical outlets must be offset from each other—

(a) in masonry walling, not less than 100 mm; and

(b) in timber or steel-framed walling, not less than 300 mm.

10.7.5 Acceptable forms of construction for masonry walls

[2019: Table 3.8.6.1a]

(1) Acceptable forms of construction for masonry walls are set out in (2) to (6).

(2) Two leaves of 110 mm clay brick masonry with—

(a) a *cavity* not less than 50 mm between leaves; and

(b) 50 mm thick glass wool insulation with a density of 11 kg/m^3 or 50 mm thick polyester insulation with a density of 20 kg/m^3 in the *cavity*,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.5a.

(3) Two leaves of 110 mm clay brick masonry with—

(a) a *cavity* not less than 50 mm between leaves; and

(b) 13 mm cement render on each outside face,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.5b.

(4) A single leaf of 110 mm clay brick masonry with—

(a) a row of 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres, spaced 20 mm from the masonry wall; and

(b) 50 mm thick mineral insulation or glass wool insulation with a density of 11 kg/m^3 positioned between studs; and

(c) one layer of 13 mm plasterboard fixed to outside face of studs and outside face of masonry,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.5c.

(5) A single leaf of 90 mm clay brick masonry with—

(a) a row of 70 mm x 35 mm timber studs or 64 mm steels studs at 600 mm centres, spaced 20 mm from each face of the masonry wall; and

(b) 50 mm thick mineral insulation or glass wool insulation with a density of 11 kg/m^3 positioned between studs in each row; and

(c) one layer of 13 mm plasterboard fixed to studs on each outside face,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.5d.

(6) A single leaf of 220 mm brick masonry with 13 mm cement render on each face has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.5e.

Figure 10.7.5a: Two leaves of 110 mm clay brick masonry (method 1)

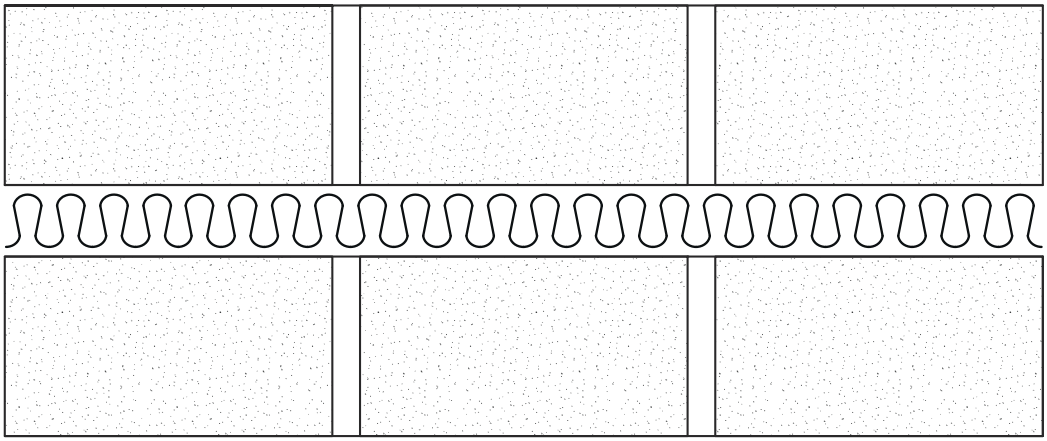


Figure 10.7.5b: Two leaves of 110 mm clay brick masonry (method 2)

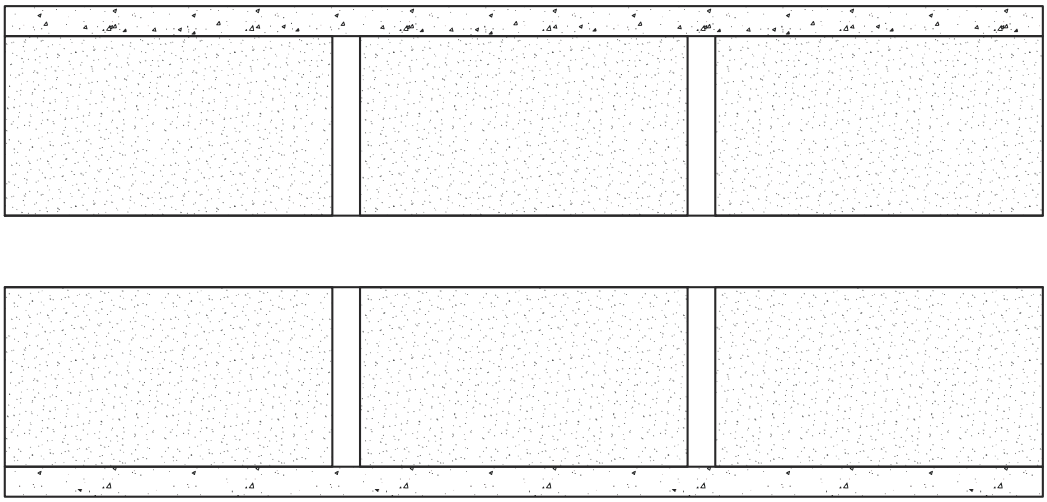


Figure 10.7.5c: Single leaf of 110 mm clay brick masonry

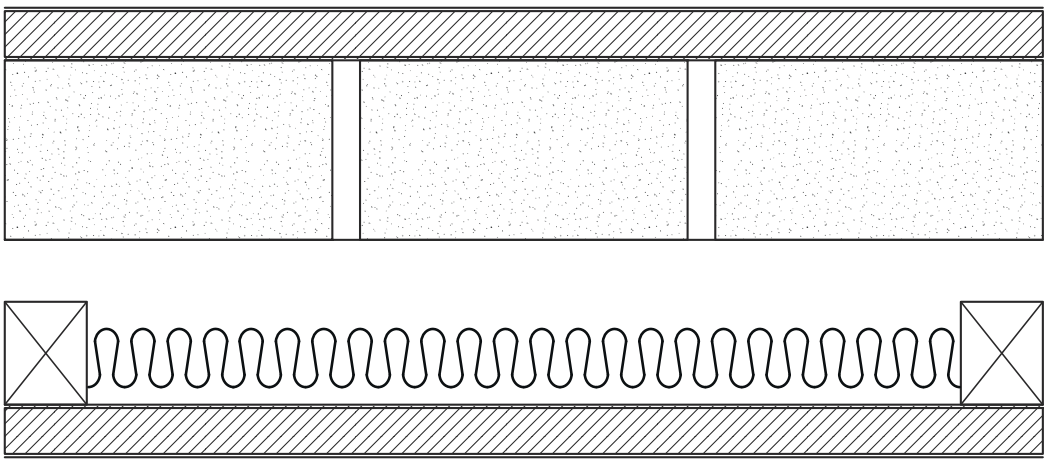


Figure 10.7.5d: Single leaf of 90 mm clay brick masonry

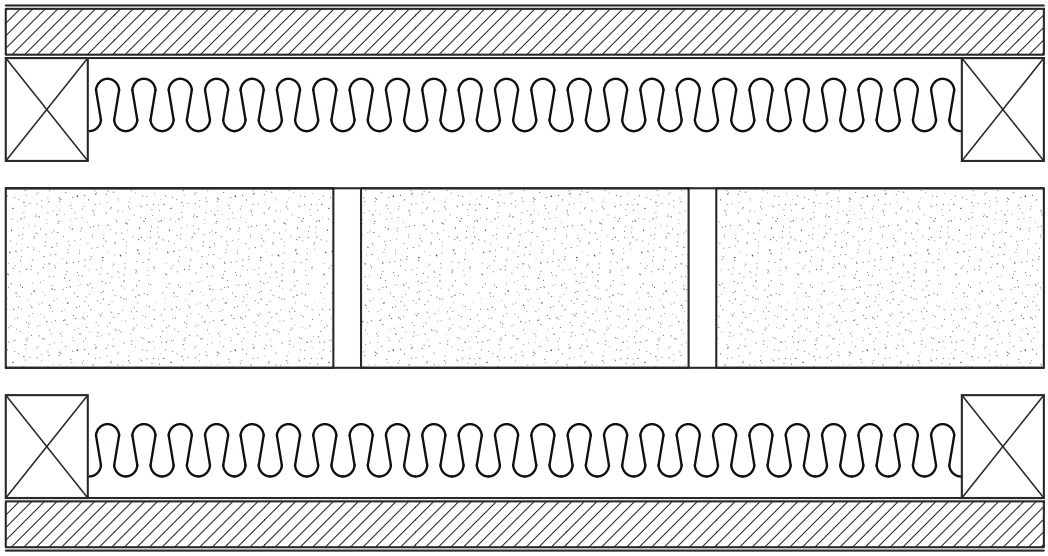
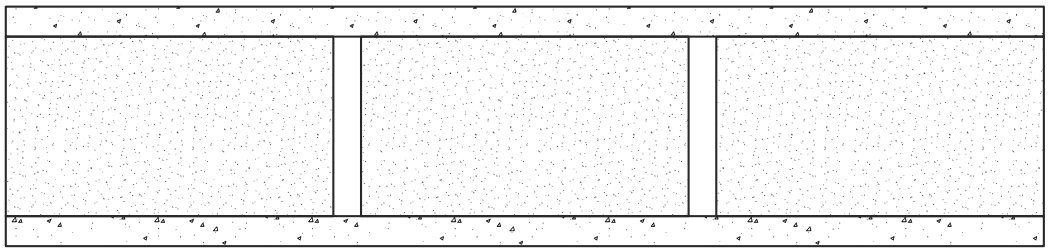


Figure 10.7.5e: Single leaf of 220 mm brick masonry with 13 mm cement render on each face



10.7.6 Acceptable forms of construction for concrete walls

[2019: Table 3.8.6.1b]

(1) Acceptable forms of construction for concrete walls are set out in (2) to (5).

(2) 150 mm thick plain off form concrete, has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.6a.

(3) 200 mm thick concrete panel with one layer of 13 mm plasterboard or 13 mm cement render on each face, has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.6b.

(4) A 100 mm thick concrete panel with—

(a) a row of 64 mm steel studs at 600 mm centres, spaced 25 mm from the concrete panel; and

(b) 80 mm thick polyester insulation or 50 mm thick glass wool insulation with a density of 11 kg/m^3, positioned between studs; and

(c) two layers of 13 mm plasterboard fixed to the outside face of studs and one layer of 13 mm plasterboard fixed to the outside face of the concrete panel,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.6c.

(5) A 125 mm thick concrete panel with—

(a) a row of 64 mm steel studs at 600 mm centres, spaced 20 mm from the concrete panel; and

(b) 70 mm polyester insulation with a density of 9 kg/m^3, positioned between studs; and

(c) one layer of 13 mm plasterboard fixed to the outside face of the studs,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.6d.

Figure 10.7.6a: 150 mm thick plain off form concrete

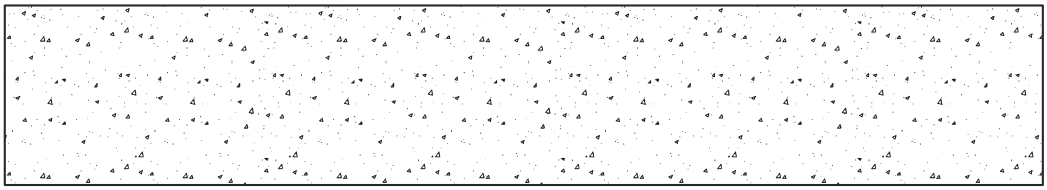


Figure 10.7.6b: 200 mm thick concrete panel

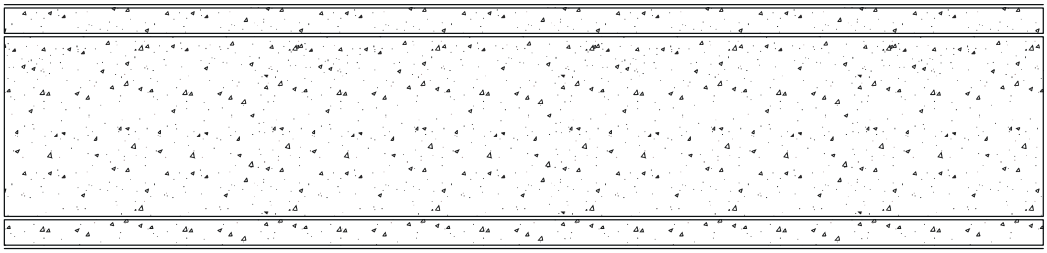


Figure 10.7.6c: 100 mm thick concrete panel

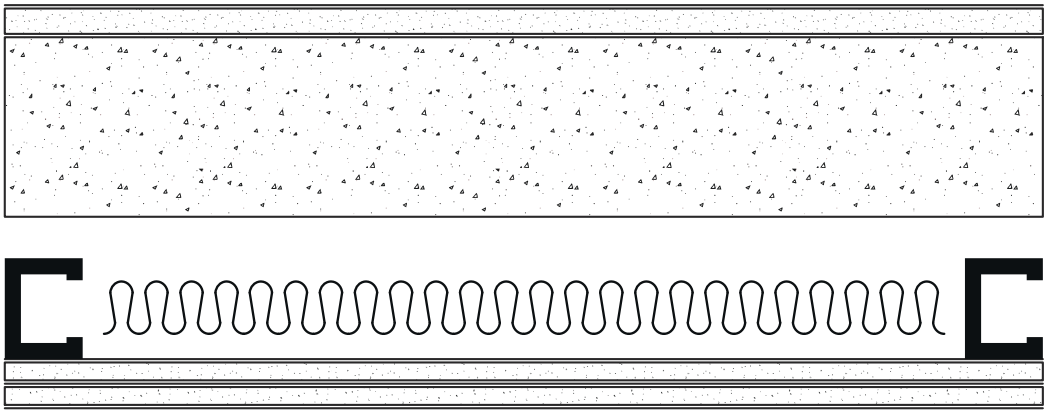
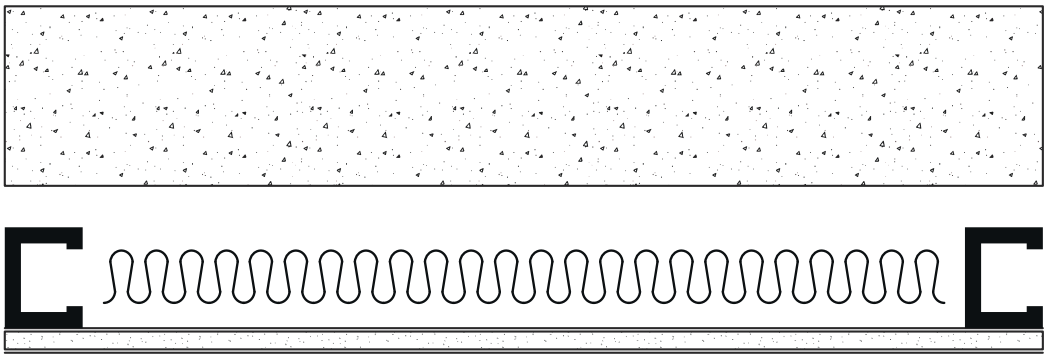


Figure 10.7.6d: 125 mm thick concrete panel



10.7.7 Acceptable forms of construction for autoclaved aerated concrete walls

[2019: Table 3.8.6.1c]

(1) Acceptable forms of construction for autoclaved aerated concrete walls are set out in (2) to (4).

(2) A 75 mm thick autoclaved aerated concrete wall panel with—

(a) a row of 64 mm steel studs at 600 mm centres, spaced 20 mm from the autoclaved aerated concrete wall panel;

and

(b) 75 mm thick glass wool insulation with a density of 11 kg/m^3 positioned between studs; and

(c) one layer of 10 mm moisture resistant plasterboard or 13 mm fire protective grade plasterboard fixed to outside face of studs and outside face of autoclaved aerated concrete wall panel,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.7a.

(3) A 75 mm thick autoclaved aerated concrete wall panel with—

(a) a row of 64 mm steel studs at 600 mm centres, spaced 35 mm from the autoclaved aerated concrete panel wall; and

(b) 28 mm metal furring channels fixed to the outside face of the autoclaved aerated concrete wall panel, with 50 mm thick polyester insulation with a density of 9 kg/m^3 positioned between furring channels and one layer of 13 mm fire protective grade plasterboard fixed to furring channels; and

(c) 105 mm thick glass wool insulation with a density of 7 kg/m^3 positioned between studs; and

(d) one layer of 13 mm fire protective grade plasterboard fixed to the outside face of the studs,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.7b.

(4) Two leaves of 75 mm autoclaved aerated concrete wall panel with—

(a) a *cavity* not less than 30 mm between panels containing 50 mm glass wool insulation with a density of 11 kg/m^3; and

(b) one layer of 10 mm plasterboard fixed to outside face of each panel,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.7c.

Figure 10.7.7a: 75 mm thick autoclaved aerated concrete wall panel (method 1)

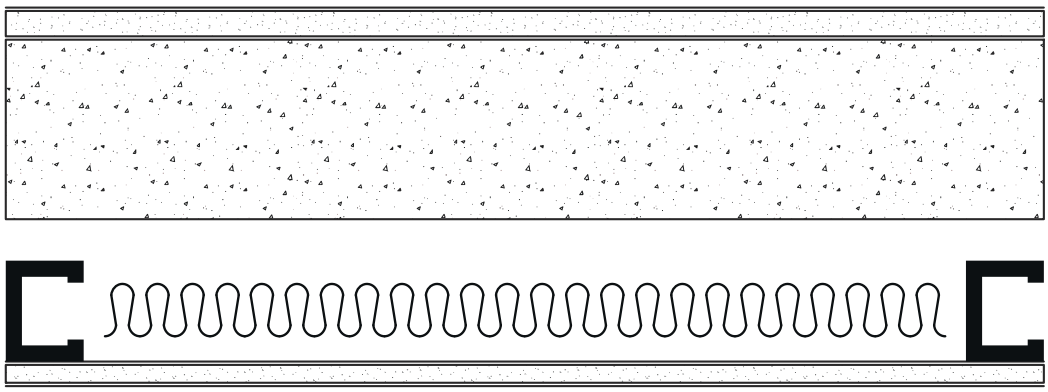


Figure 10.7.7b: 75 mm thick autoclaved aerated concrete wall panel (method 2)

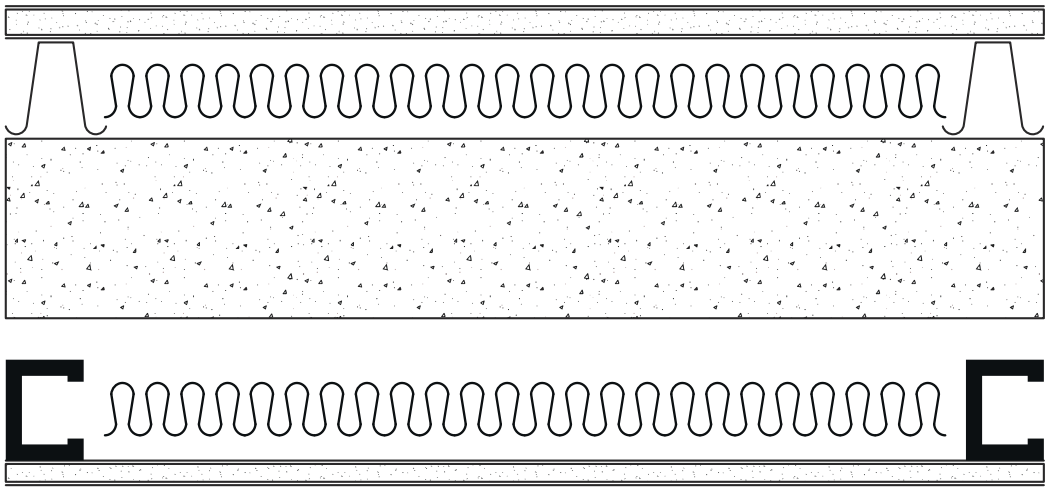
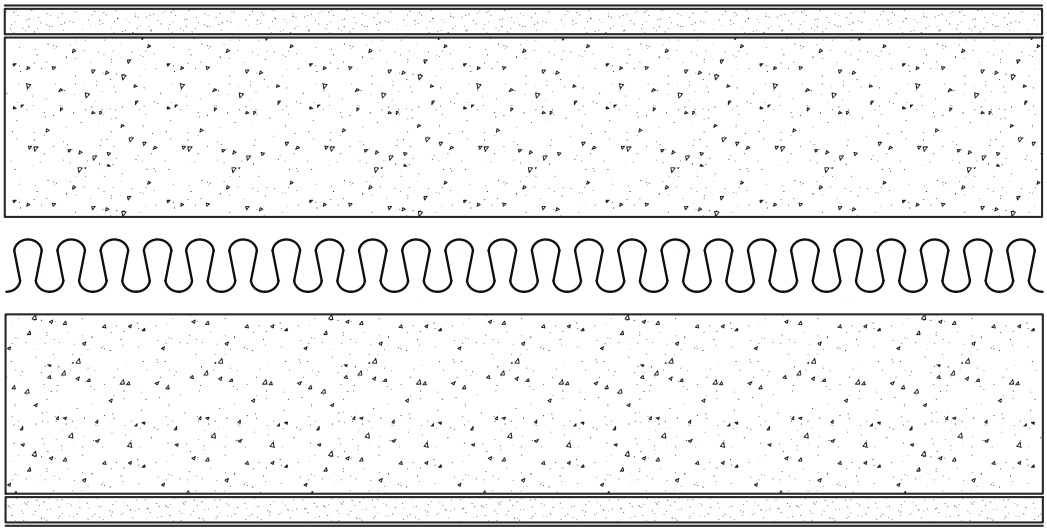


Figure 10.7.7c: Two leaves of 75 mm autoclaved aerated concrete wall panel



10.7.8 Acceptable forms of construction for timber and steel framed walls

[2019: Table 3.8.6.1d]

(1) Acceptable forms of construction for timber and steel framed walls are set out in (2) and (3).

(2) Two rows of 90 mm x 35 mm timber studs or two rows of 64 mm steels studs at 600 mm centres with—

(a) an air gap not less than 20 mm between the rows of studs; and

(b) 50 mm thick glass wool insulation or 60 mm thick polyester insulation with a density of 11 kg/m³, positioned between one row of studs, and

(c) two layers of 13 mm fire protective grade plasterboard or one layer of 6 mm fibre cement sheet and one layer of 13 mm fire protective grade plasterboard, fixed to outside face of studs,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.8a.

(3) Two rows of 64 mm steel studs at 600 mm centres with—

(a) an air gap not less than 80 mm between the rows of studs; and

(b) 200 mm thick polyester insulation with a density of 14 kg/m^3 positioned between studs; and

(c) one layer of 13 mm fire-protective grade plasterboard and one layer 13 mm plasterboard on one outside face and one layer of 13 mm fire-protective grade plasterboard on the other outside face,

has an $R_w + C_{tr}$ of not less than 50, if constructed in accordance with Figure 10.7.8b.

Figure 10.7.8a: **Two rows of 90 mm x 35 mm timber studs or two rows of 64 mm steels studs at 600 mm centres**

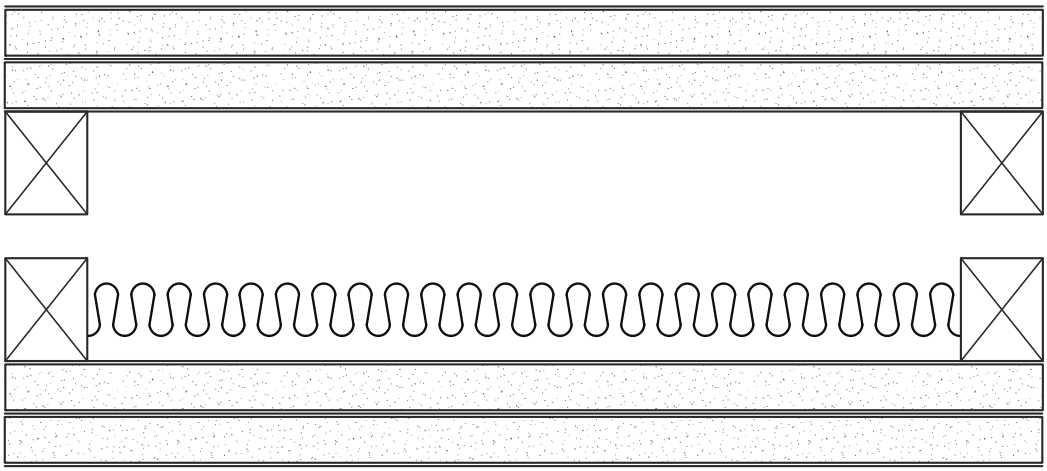
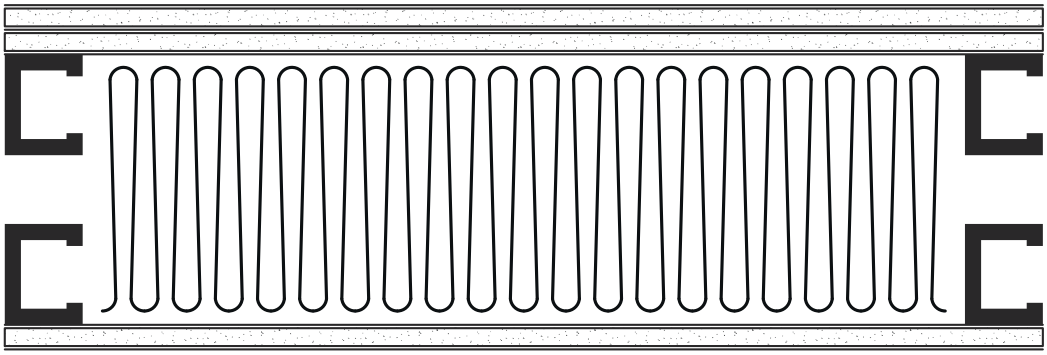


Figure 10.7.8b: **Two rows of 64 mm steel studs at 600 mm centres**



Part 10.8 Condensation management

10.8.1 External wall construction

[2019: 3.8.7.2]

(1) Where a *pliable building membrane* 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.

(2) 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.

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 Class 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)(b).

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*.

10.8.2 Exhaust systems

[2019: 3.8.7.3]

(1) An exhaust system installed in a kitchen, bathroom, *sanitary compartment* or laundry must have a minimum flow rate of—

(a) 25 L/s for a bathroom or *sanitary compartment*; and

(b) 40 L/s for a kitchen or laundry.

(2) Exhaust from a kitchen, kitchen range hood, bathroom, *sanitary compartment* or laundry must discharge directly or via a shaft or duct to *outdoor air*.

(3) Where a venting clothes dryer is installed, it must discharge directly or via a shaft or duct to *outdoor air*.

(4) An exhaust system that is not run continuously and is serving a bathroom or *sanitary compartment* that is not ventilated in accordance with 10.6.2(a) must—

(a) be interlocked with the room's light switch; and

(b) include a run-on timer so that the exhaust system continues to operate for 10 minutes after the light switch is turned off.

(5) Except for rooms that are ventilated in accordance with 10.6.2(a), a room with an exhaust system in accordance with (1) must be provided with make-up air—

(a) via openings to an adjacent room with a free area of 14,000 mm^2; or

(b) in accordance with AS 1668.2.

(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 roof spaces

[2019: 3.8.7.4]

(1) In *climate zones* 6, 7 and 8, a roof 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.

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

(a) concrete roof; or

(b) roof that is made of structural insulated 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 requirements

Roof pitch	Ventilation openings
< 10°	25,000 mm^2/m provided at each of two opposing ends
≥ 10° and < 15°	25,000 mm^2/m provided at the eaves and 5,000 mm^2/m at high level
≥ 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.

(2) For the purposes of this Table, 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.

Explanatory Information

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

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

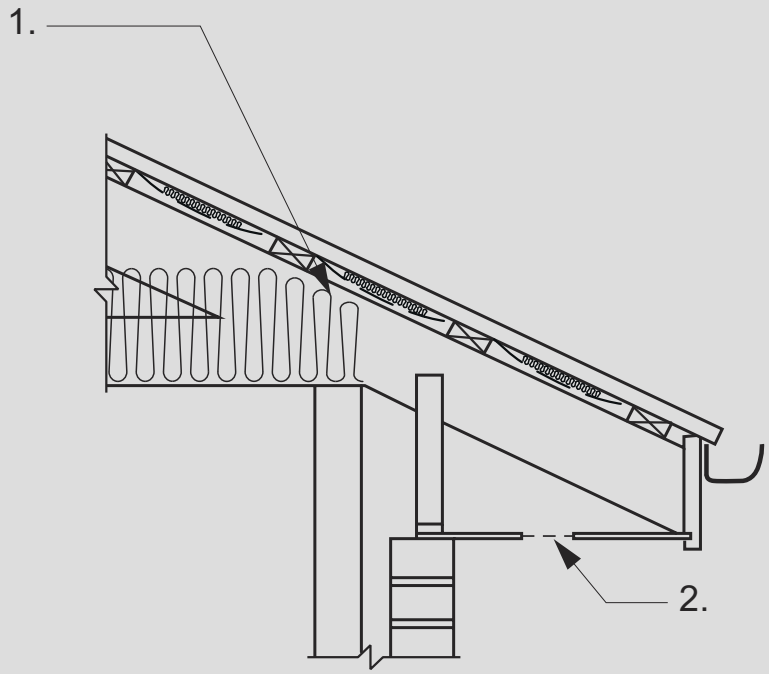


Figure Notes

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

(2) Eave ventilation opening in accordance with Table 10.8.3.

11 Safe movement and access

Part 11.1 Scope and application of Section 11

11.1.1 Scope

[New for 2022]

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

(a) stairway and ramp construction (see Part 11.2); and

(b) barriers and handrails (see Part 11.3).

11.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC Volume Two.

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

Explanatory Information

In NCC 2019, the content of Section 11 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Parts 3.9.1 and 3.9.2 of NCC 2019 Volume Two.

Part 11.2 Stairway and ramp construction

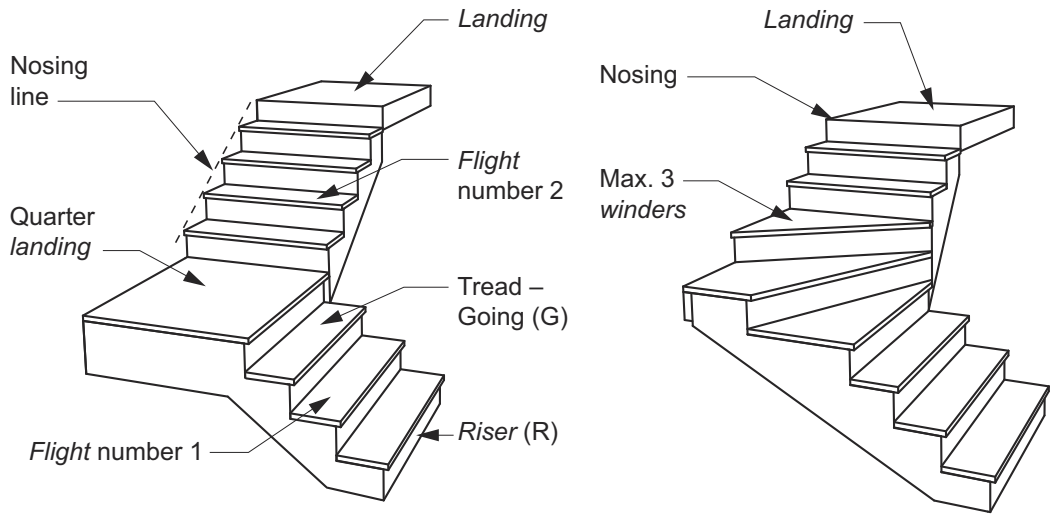
11.2.1 Explanation of terms

[2019: 3.9.1.0]

(1) Figure 11.2.1 depicts stairway members and associated terminology used to describe them in the ABCB Housing Provisions.

(2) Some items such as barriers and handrails have been omitted for clarity.

Figure 11.2.1: Stairway terms



(a) Quarter landing stairway – 2 flights

(b) Continuous stairway – 1 flight (90° change in direction)

Explanatory Information: Alpine areas

The requirements of this Part are to be read in conjunction with Part 12.2 where a building is located in an *alpine area* and contains an external stairway or ramp.

Explanatory Information: Room heights

Part 10.3 contains the *required* height for a ceiling above a stairway, ramp or *landing*, measured vertically above the nosing line of stairway treads or the floor surface of a ramp or *landing*.

11.2.2 Stairway construction

[2019: 3.9.1.2]

(1) A stairway must be designed to take loading forces in accordance with AS/NZS 1170.1 and must have—

(a) not more than 18 and not less than 2 *risers* in each *flight*; and

(b) *goings* (G), *risers* (R) and a slope relationship quantity (2R + G) in accordance with Table 11.2.2a, except as permitted by (2) and (3); and

(c) constant *goings* and *risers* throughout each *flight*, except as permitted by (3) and (4), and the dimensions of *goings* (G) and *risers* (R) in accordance with (1), (2) and (3) are considered constant if the variation between—

(i) adjacent *risers*, or between adjacent *goings*, is not more than 5 mm; and

(ii) the largest and smallest *riser* within a *flight*, or the largest and smallest *going* within a *flight*, is not more than 10 mm; and

(d) *risers* which do not have any openings that would allow a 125 mm sphere to pass through between the treads; and

(e) treads of solid construction (not mesh or other perforated material) if the stairway is more than 10 m high or connects more than 3 storeys.

(2) In the case of a stairway serving only non-*habitable rooms*, such as attics, storerooms and the like that are not used on a regular or daily basis—

(a) the *going* (G), *riser* (R) and slope relationship quantity (2R + G) in accordance with Table 11.2.2a may be substituted with those in Table 11.2.2b; and

(b) need not comply with (1)(d).

(3) In the case of a stairway with *winders*—

(a) a maximum of 3 consecutive *winders* in lieu of a quarter *landing* in a *flight* and a maximum of 6 consecutive *winders* in lieu of a half *landing* in a *flight*; and

(b) the *going* (G) of all *winders* in lieu of a quarter or half *landing* may vary from the *going* of the straight treads within the same *flight* provided that the *going* (G) of such *winders* is constant.

(4) The point of measurement of the *going* (G) in the slope relationship quantity (2R + G) for *tapered treads* and treads in *spiral stairways* as described in Table 11.2.2a (see Figure 11.2.2a, Figure 11.2.2b and Figure 11.2.2c) must be—

(a) for *tapered treads*, other than treads in a *spiral stairway*—

(i) not more than 1 m in width, the middle of the unobstructed width of the stairway (see Figure 11.2.2b); and

(ii) more than 1 m in width, 400 mm from the unobstructed width of each side of the stairway (see Figure 11.2.2c); and

(b) for treads in *spiral stairways*, the point seven tenths of the unobstructed width from the face of the centre pole or support towards the handrail side (see Figure 11.2.2d and Figure 11.2.2e).

(5) *Riser* and *going* dimensions must be measured in accordance with Figure 11.2.2f.

Table 11.2.2a: Riser and going dimensions (mm)

Stair type	*Riser* (R) (see Figure 11.2.2f)		*Going* (G) (see Figure 11.2.2f)		Slope relationship (2R+G)	
	Max	Min	Max	Min	Max	Min
Stairs (other than spiral)	190	115	355	240	700	550
Spiral	220	140	370	210	680	590

Table Notes

Riser and *going* dimensions must be measured in accordance with Figure 11.2.2f

Table 11.2.2b: Riser and going dimensions (mm) — stairways serving non-habitable rooms used infrequently

Riser (R)		*Going* (G)		Slope relationship (2R+G)	
Max	Min	Max	Min	Max	Min
225	130	355	215	700	540

Table Notes

The *going* (G) must be not more than the tread depth plus a maximum gap of 30 mm between the rear edge of one tread and the nosing of the tread above.

Figure 11.2.2a: Measurement of slope relationship — Plan view — Stair with 2 flights

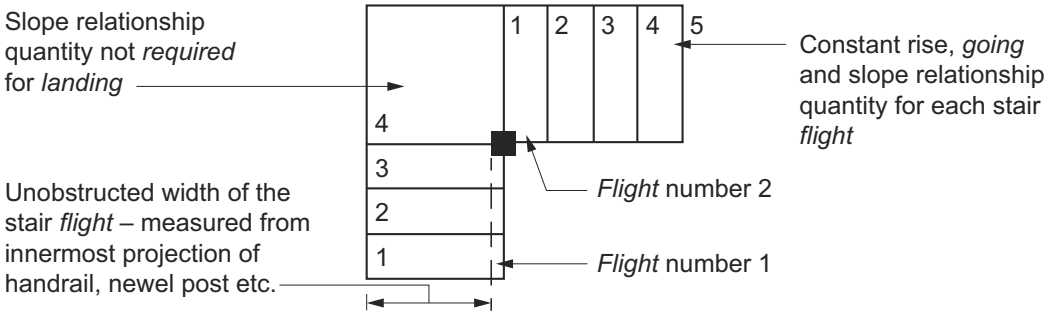


Figure 11.2.2b: Measurement of slope relationship — Plan view — Tapered treads not more than 1 m wide

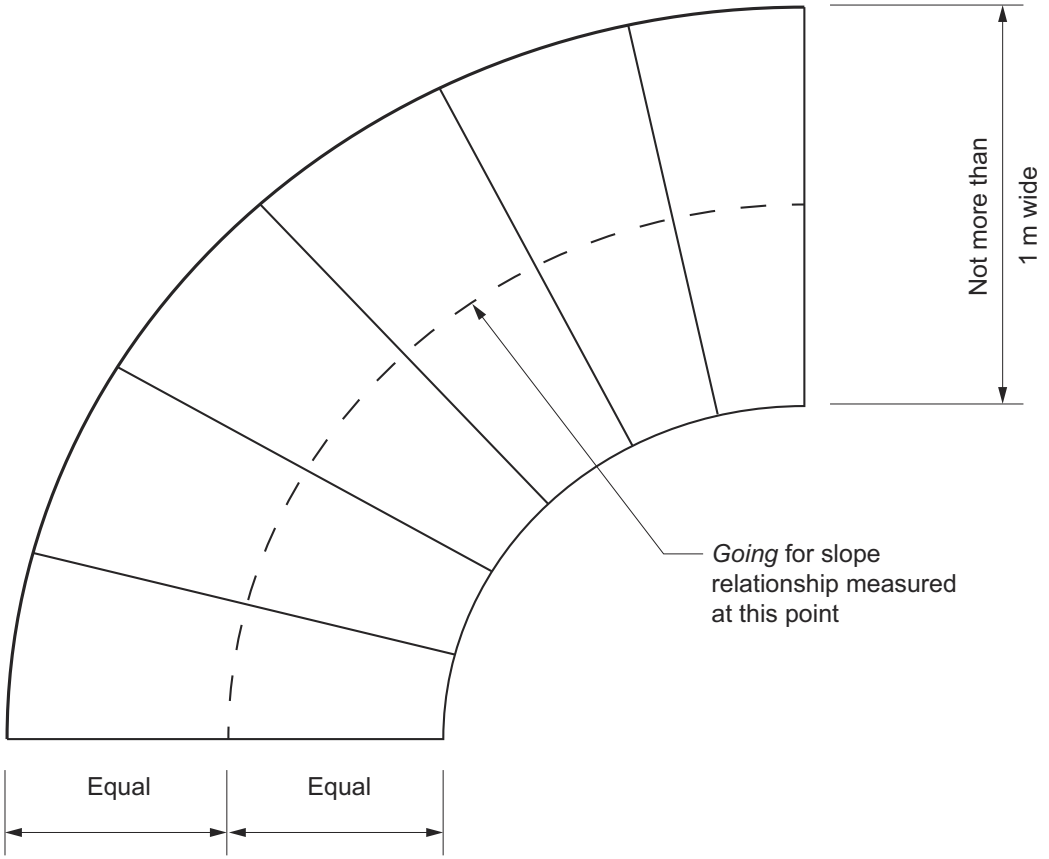


Figure 11.2.2c: Measurement of slope relationship — Plan view —Tapered treads more than 1 m wide

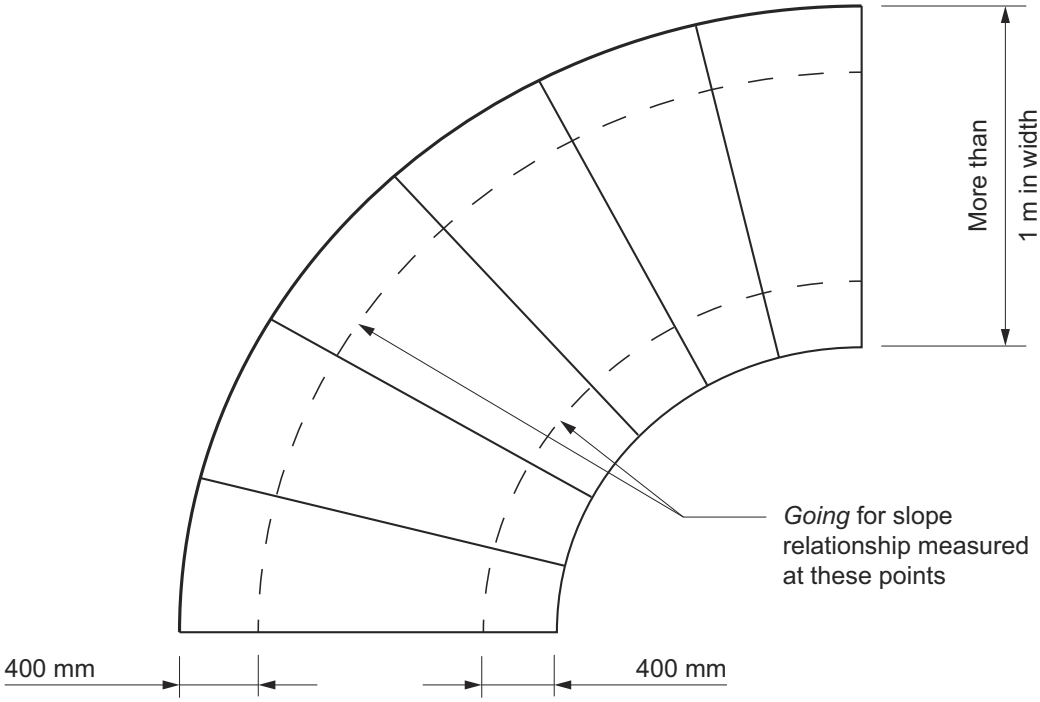


Figure 11.2.2d: Spiral stairs — Measurement for slope relationship

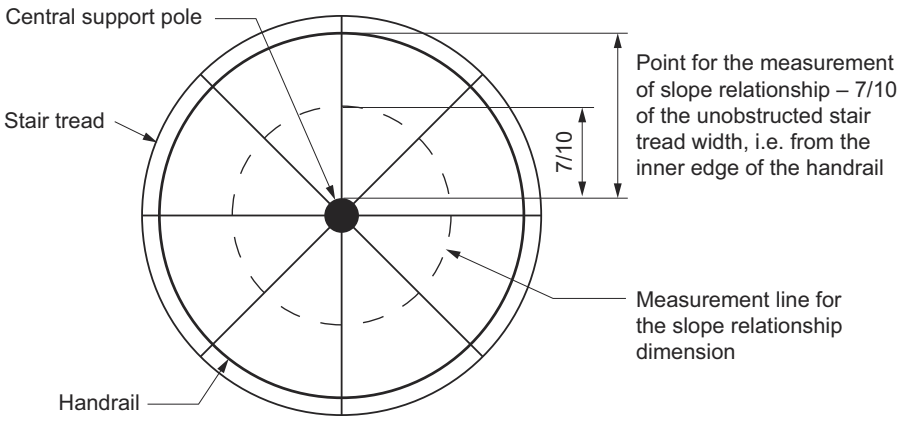


Figure 11.2.2e: Spiral stairs — Measurement of openings in stairs

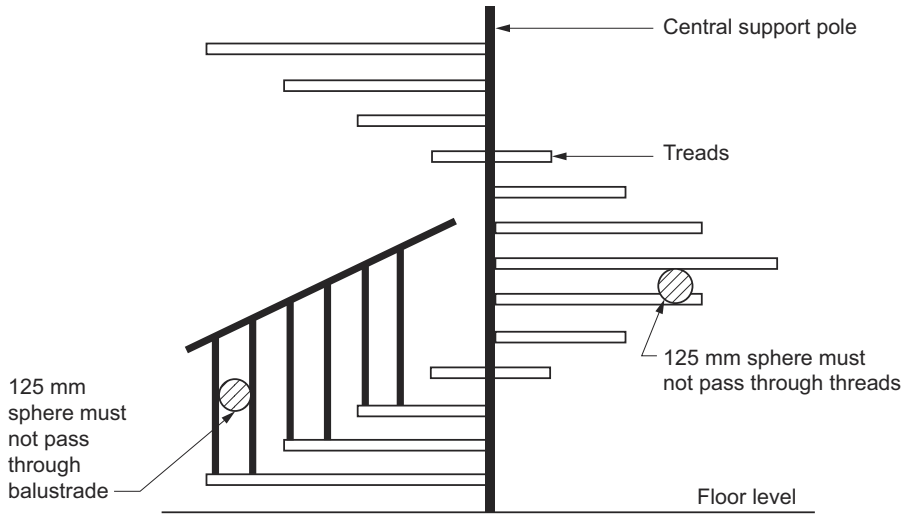
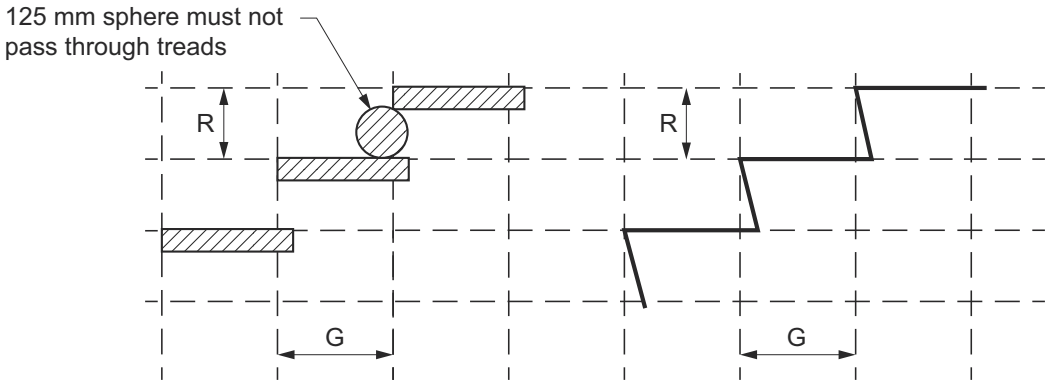


Figure 11.2.2f: Riser and going dimensions — Measurement



Explanatory Information: Not more than 18 and not less than 2 risers

11.2.2(1)(a) states that a stairway must have not more than 18 and not less than 2 *risers* in each *flight*. Where there are less than 2 *risers* in a *flight*, it does not comprise a stairway for the purpose of the NCC. 18 risers is considered to be the maximum reasonable number that an average person can negotiate before requiring a rest. Winders are counted as part of the maximum number of 18 *risers*. More than 1 *riser* is considered necessary for a person to observe and adjust to a change in level.

Explanatory Information: Going and riser dimensions

The purpose of 11.2.2 is to achieve constant *going* and *riser* dimensions deemed safe for people to walk up and down. This minimises the risk of people overstepping during descent on uneven stairs (due to short *goings*) and tripping on ascent (due to high *risers*). Table 11.2.2a and Table 11.2.2b express ratios between *going* and *riser* dimensions which are considered safe for use. 11.2.2(1)(c) accounts for conditions such as movement of materials due to atmospheric moisture changes or minor deviations related to variations in materials which affect finished stair dimensions.

Explanatory Figure 11.2.2a illustrates adjacent *risers* within a *flight* with minor deviations in the materials affecting the finished stair dimensions. The nominated *riser* height is exceeded by *riser* A. As a consequence *riser* height B is less than the nominated *riser* height. The difference between *riser* A and *riser* B cannot exceed 5 mm.

Explanatory Figure 11.2.2b illustrates an entire *flight* with minor deviations in the materials affecting the finished *riser* dimensions. In addition to the 5 mm difference permitted between adjacent *goings* or *risers*, the maximum difference between the smallest and largest *going* or *riser* within a *flight* must not exceed 10 mm. Despite the deviations shown in both diagrams, the stairs in the *flight* are deemed constant. Irrespective of any minor deviations permitted by 11.2.2(1)(c), finished *going* and *riser* dimensions must not exceed the limitations stipulated in Table 11.2.2a.

Figure 11.2.2a (explanatory): Minor deviations in a stairway — deviation in adjacent risers

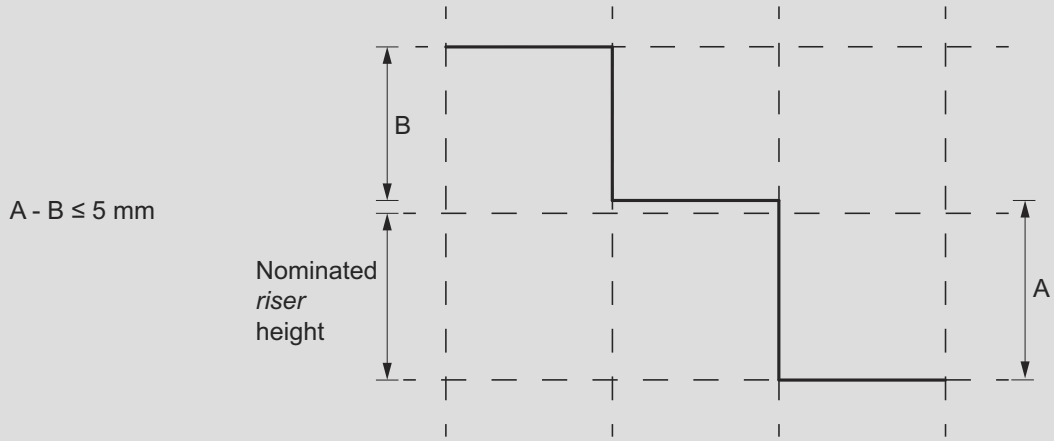


Figure Notes

(1) A = larger *riser* of two adjacent *risers*.

(2) B = smaller *riser* of two adjacent *risers*.

(3) This diagram only shows deviations in *risers*, however the same principle can apply for *goings*.

Figure 11.2.2b (explanatory): Minor deviations in a stairway – deviations over a flight

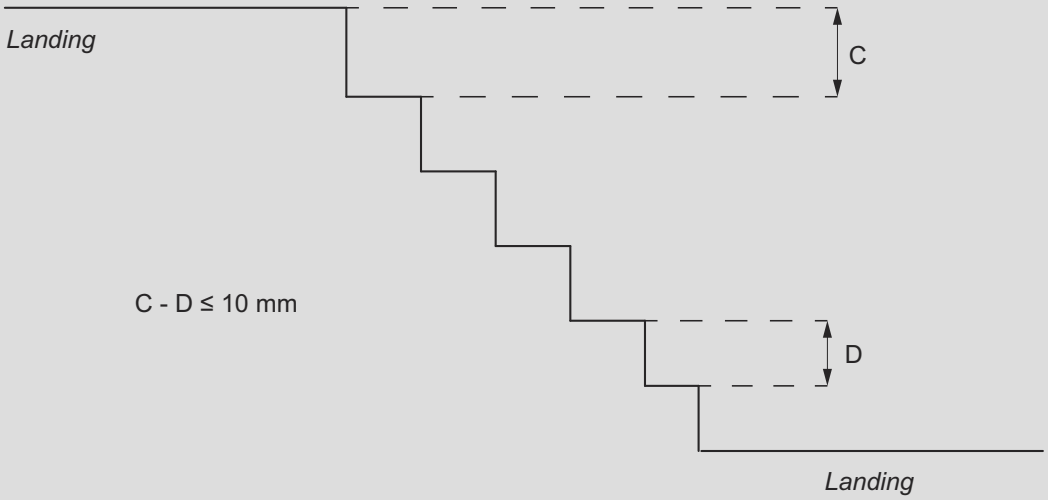


Figure Notes

(1) C = largest *riser* of the *flight*.

(2) D = smallest *riser* of the *flight*.

(3) This diagram only shows deviations in *risers*, however the same principle can apply for *goings*.

Explanatory Information: Openings in stair risers

11.2.2(1)(d) allows the use of open *riser* stairs. However, it limits the openings to 125 mm to minimise the risk of a person (especially a young child) falling through the opening created by the open *riser*.

Explanatory Information: Solid treads

11.2.2(1)(e) specifies a height where solid treads must be used so that people cannot see through them. This minimises the risk of people being affected by vertigo.

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

[2019: 3.9.1.3]

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) 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

[2019: 3.9.1.4]

(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 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

- To determine the appropriate surface of a tread or the floor surface of a ramp, it is necessary to determine the likely conditions the tread or ramp will be subject to over the life of the building. This can be either dry, wet or both. A dry surface is one that is not normally wet or likely to be made wet other than by an accidental spill. A wet surface is one that is normally wet or likely to be made wet, including areas exposed to the weather.
- Under 11.2.4(2) stair treads must have a surface or nosing strip which minimises the risk of people slipping and injuring themselves. In each case the surface or nosing must have a slip-resistance classification when tested in accordance with AS 4586. There are two tests (the Wet Pendulum Test or the Oil-Wet Inclining Platform Test) and two conditions (dry or wet) to be considered.
- Under 11.2.4(3) the floor surface of a ramp must be slip-resistant to minimise the risk of people slipping and injuring themselves. The surface must have a slip-resistance classification when tested in accordance with AS 4586.

11.2.5 Landings

[2019: 3.9.1.5]

(1) *Landings* must—

(a) be not less than 750 mm long and where this involves a change in direction, the length is measured 500 mm from the inside edge of the *landing* (see Figure 11.2.5a); and

(b) have a gradient not steeper than 1:50; and

(c) be provided where the sill of a threshold of a doorway opens onto a stairway or ramp that provides a change in floor level or floor to ground level greater than 3 risers or 570 mm (see Figure 11.2.5b); and

(d) extend across the full width of a doorway.

(2) In the case of a stairway serving only non-*habitable rooms*, such as attics, storerooms and the like that are not used on a regular or daily basis, the requirements of (1)(a) may be substituted with a minimum length of *landing* being not less than 600 mm long.

Figure 11.2.5a: Landings

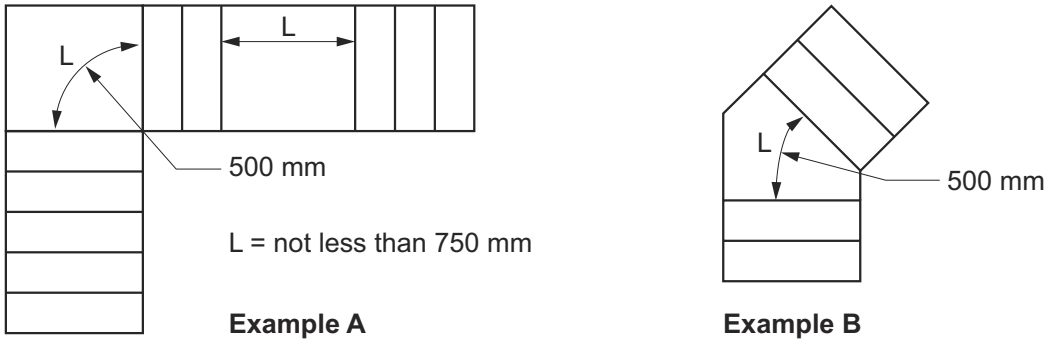
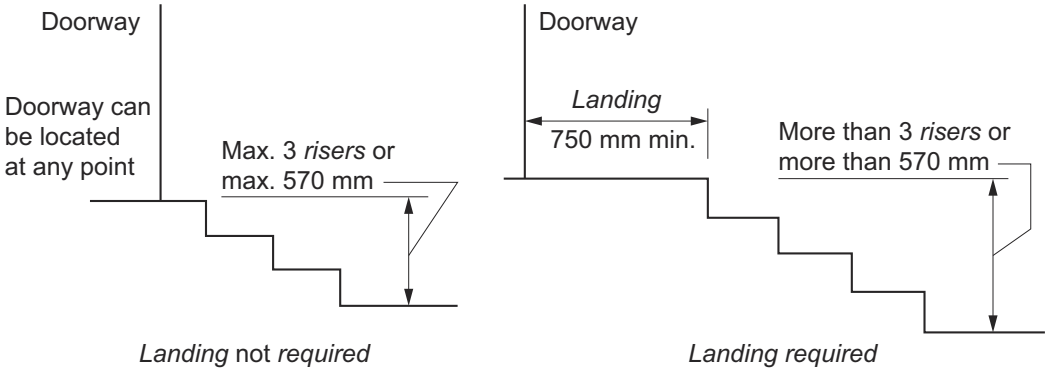


Figure 11.2.5b: Threshold landing



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

[2019: 3.9.1.6]

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.

Part 11.3 Barriers and handrails

11.3.1 Application

[2019: 3.9.2.1]

Compliance with this Part is achieved by complying with—

(a) 11.3.3, 11.3.4 and 11.3.6 for barriers to prevent falls; and

(b) 11.3.5 for handrails; and

(c) 11.3.7 and 11.3.8 for protection of openable windows.

Explanatory Information: External trafficable structures

For a *required* barrier to an external trafficable structure in an *alpine area*, the requirements of this Part need to be read in conjunction with the requirements of Part 12.2.

Explanatory Information: Swimming pools

Safety barrier requirements for *swimming pools* are contained in H7D2.

Explanatory Information: Additional requirements

In addition to the requirements of this Part, a barrier and handrail must comply with the structural requirements of Part 2.2. The structural requirements refer to the barrier and/or handrail being designed and constructed to withstand any combinations of loads and other actions to which it may reasonably be subjected and the structural resistance of the materials and forms of construction used for the barrier or handrail.

A window forming a part of a barrier must comply with the glazing assembly provisions of Section 8, and therefore is not *required* to comply with AS/NZS 1170.1 (structural design actions - referenced in Part 2.2) as it is exempted by Section 8. The Section 8 provisions consider the wind loading on the glazing and human impact requirements.

11.3.2 Explanation of terms

[2019: Figure 3.9.2.0]

(1) Figure 11.3.2 depicts typical stairway and barrier members and associated terminology.

(2) Some items have been omitted for clarity.

Figure 11.3.2: Typical stairway and barrier members

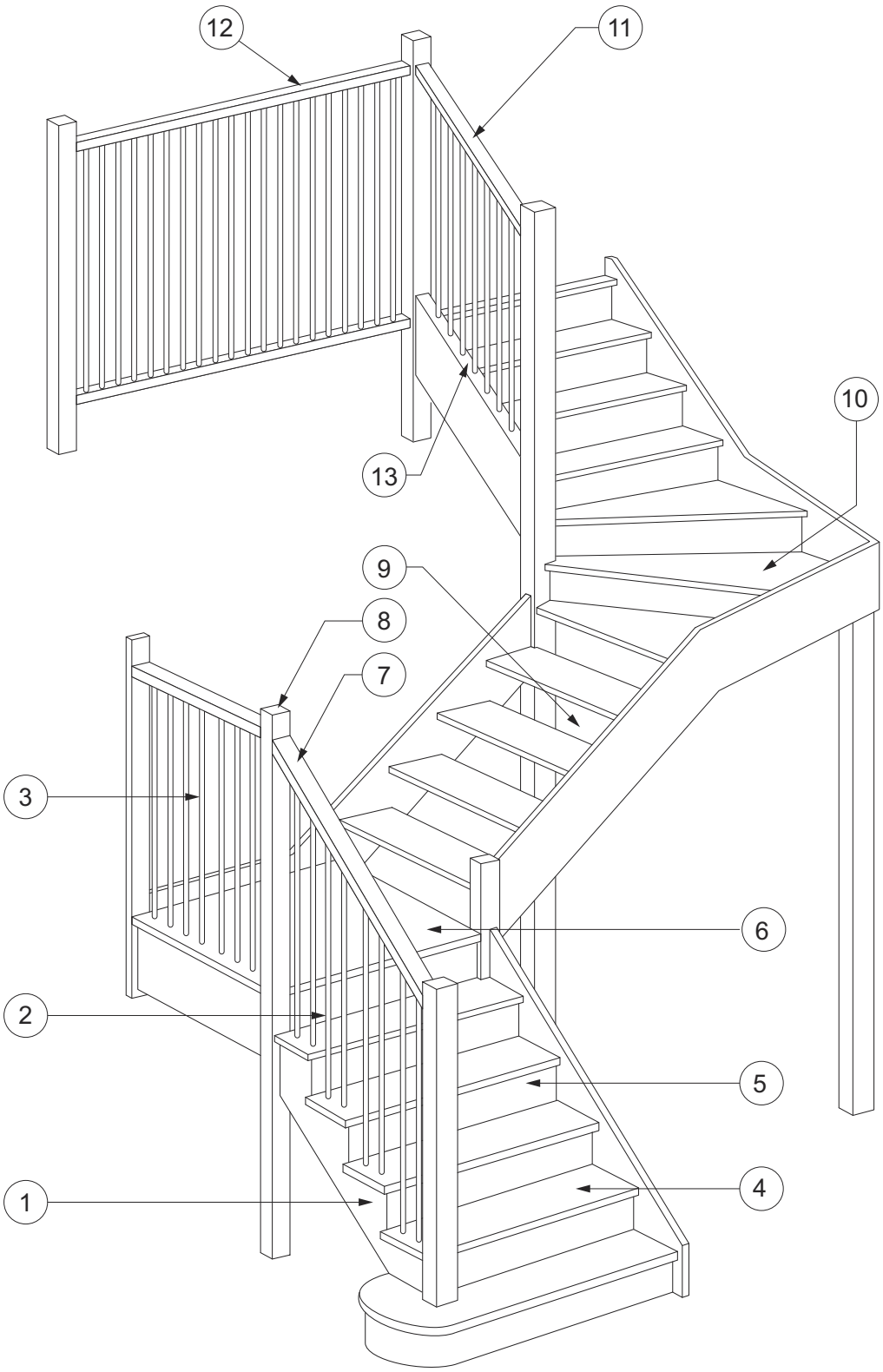


Figure Notes

Legend:

(1) Stringer

(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

[2019: 3.9.2.2]

(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,

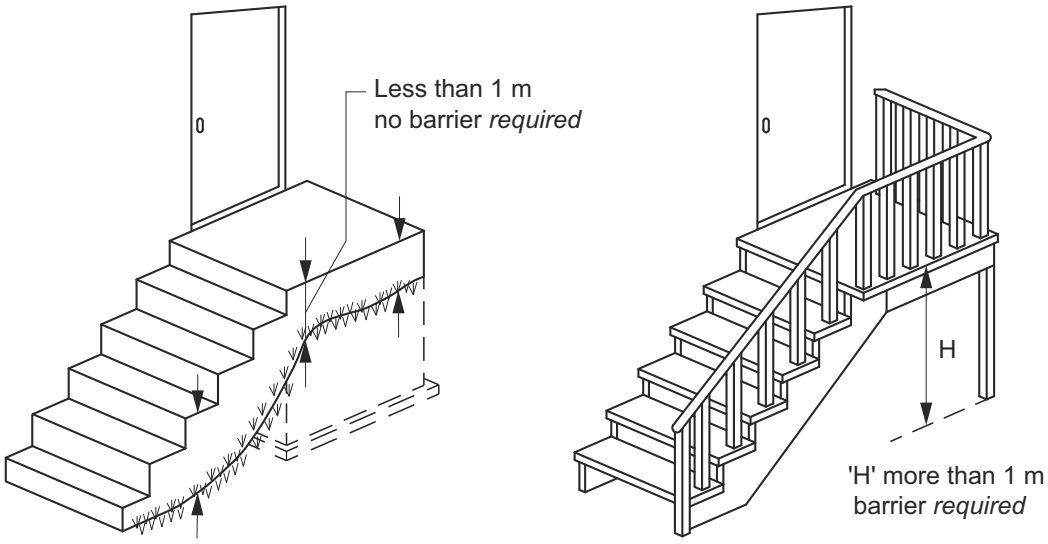
where it is possible to fall 1 m or more measured from the level of the trafficable surface to the surface beneath (see Figure 11.3.3a).

(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

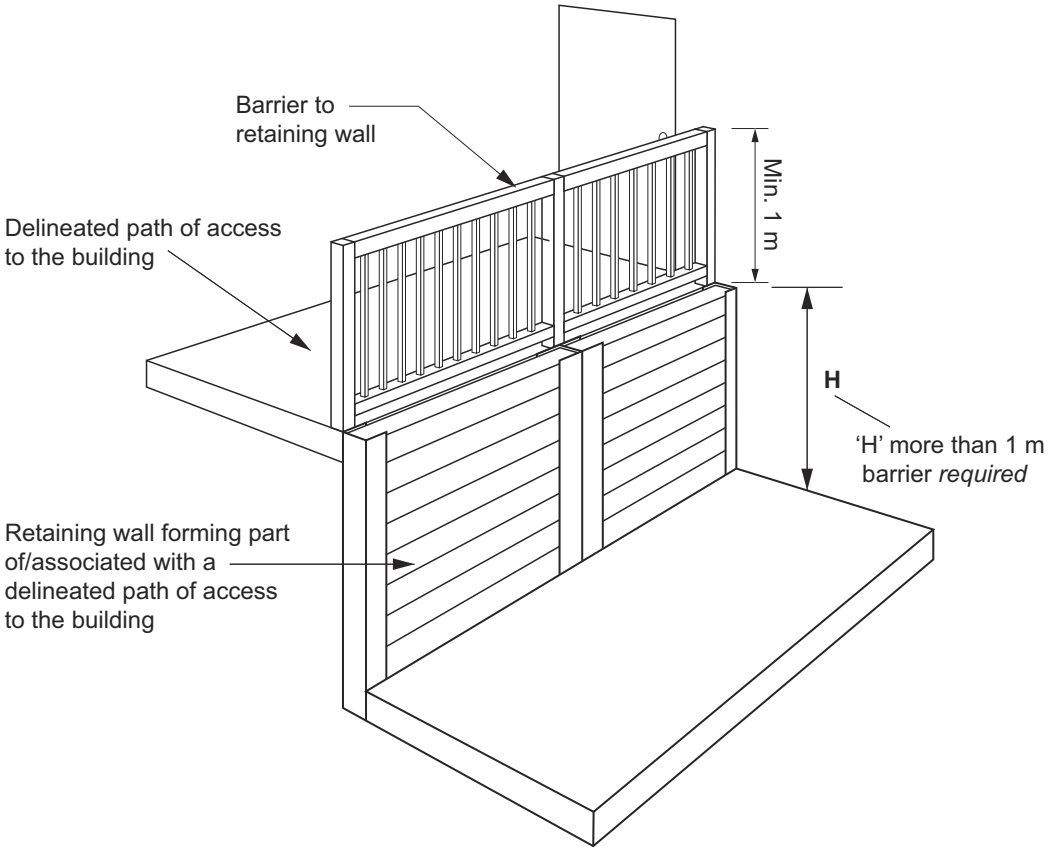
(b) a barrier provided to an openable window covered by 11.3.7 and 11.3.8.

Figure 11.3.3a: Barriers — when required



(a) Barrier not required **(b) Barrier required**

Figure 11.3.3b: Barriers — when required for retaining walls



Explanatory Information: Intent

The intent of the barrier requirements is to prescribe provisions to minimise the risk of a person falling from a stairway, raised floor level (such as a balcony) or the like. 11.3.3 sets out when barriers are *required* to be provided and 11.3.4 contains the requirements for the construction of barriers.

Explanatory Information: Barriers and children

Children are at particular risk of falling off, over or through ineffectively designed or constructed barriers. Accordingly the requirements of this Part aim to ensure that a barrier reduces the likelihood of children being able to climb over a barrier or fall through a barrier.

11.3.4 Construction of barriers to prevent falls

[2019: 3.9.2.3]

(1) A barrier *required* by 11.3.3 must comply with (2) to (11).

(2) The height of a barrier must be in accordance with the following:

(a) The height must not be less than 865 mm above the nosings of the stair treads, the floor of a ramp or the like (see Figure 11.3.4a).

(b) The height must not be less than—

(i) 1 m above the floor of any *landing*, corridor, hallway, balcony, deck, verandah, access path, *mezzanine*, access bridge, roof top space or the like to which general access is provided (see Figure 11.3.3b and Figure 11.3.4a); or

(ii) 865 mm above the floor of a *landing* to a stairway or ramp where the barrier is provided along the inside edge of the *landing* and does not exceed a length of 500 mm.

(3) A transition zone may be incorporated where the barrier height changes from 865 mm on the stairway *flight* or ramp to 1 m at the *landing* (see Figure 11.3.4b).

(4) Openings in barriers (including decorative balustrades) must be constructed so that they do not permit a 125 mm sphere to pass through it and for stairways, the opening is measured above the nosing line of the stair treads (see Figure 11.3.4a).

(5) Where a *required* barrier is fixed to the vertical face forming an edge of a *landing*, balcony, deck, stairway or the like, the opening formed between the barrier and the face must not exceed 40 mm.

(6) For the purposes of (5), the opening is measured horizontally from the edge of the trafficable surface to the nearest internal face of the barrier.

(7) A barrier to a stairway serving a non-*habitable room*, such as an attic, storeroom or the like that is not used on a regular or daily basis, need not comply with (4) if—

(a) openings are constructed so that they do not permit a 300 mm sphere to pass through; or

(b) where rails are used, the barrier consists of a top rail and an intermediate rail, with the openings between rails not more than 460 mm.

(8) Restriction on horizontal elements:

(a) Where it is possible to fall more than 4 m, any horizontal elements within the barrier between 150 mm and 760 mm above the floor must not facilitate climbing.

(b) For the purpose of (a), the 4 m is measured from the floor level of the trafficable surface to the surface beneath.

(9) A barrier constructed of wire is deemed to meet the requirements of (4) if it is constructed in accordance with 11.3.6.

(10) A glass barrier or *window* serving as a barrier must comply with H1D8 and the relevant provisions of this Part.

(11) A barrier, except a *window* serving as a barrier, must be designed to take loading forces in accordance with AS/NZS 1170.1.

Figure 11.3.4a: Barrier construction

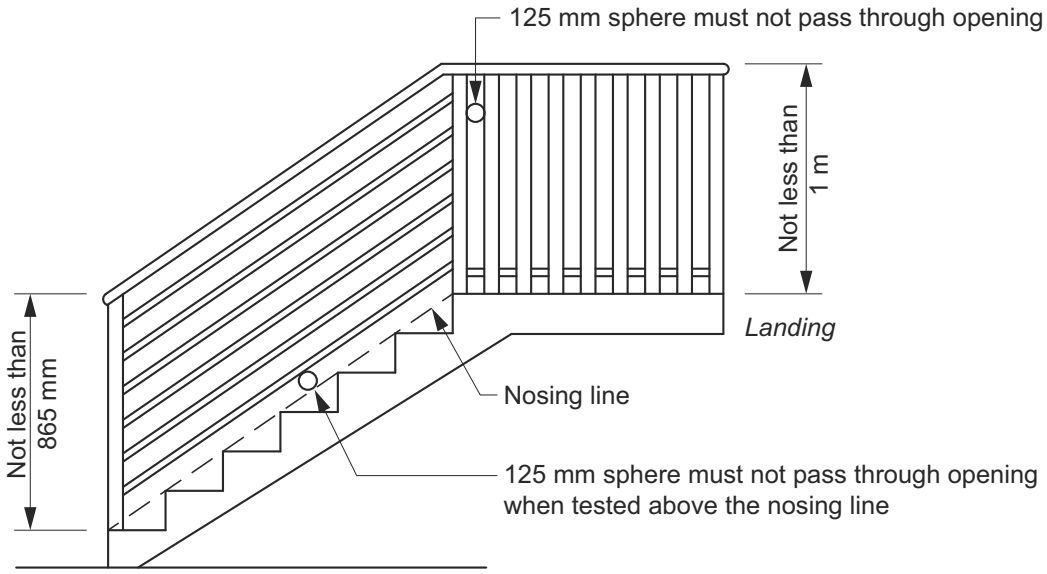
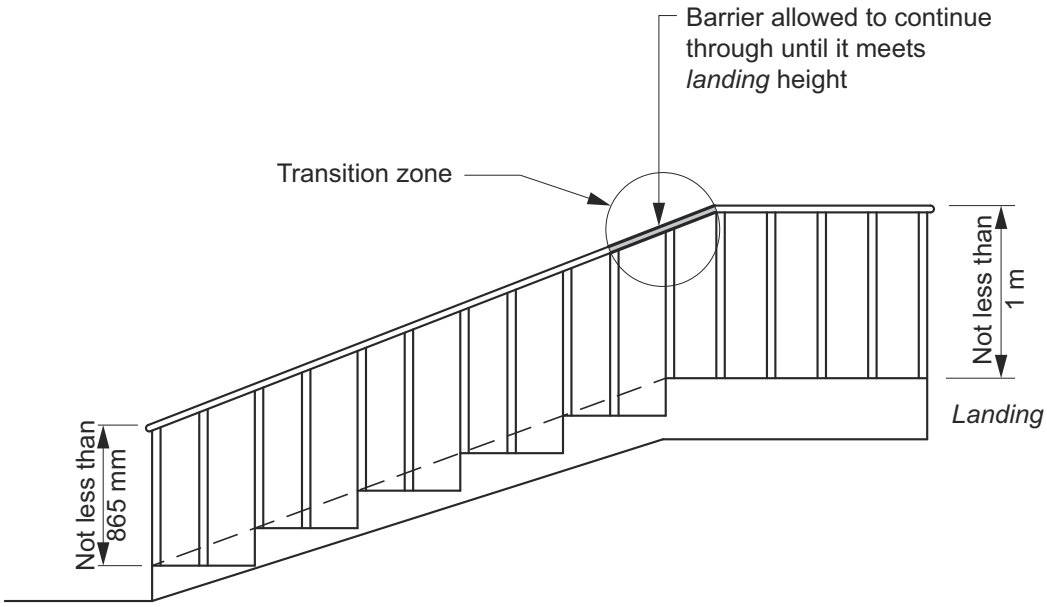


Figure 11.3.4b: Measuring heights for barriers and handrails and where transition zones are allowed



Explanatory Information

For a *window* forming part of a barrier, any horizontal elements such as a *window* sill, transom or rail between 150 mm and 760 mm above the floor is deemed to facilitate climbing.

Section 8 contains the glazing assembly provisions for glass barriers and *windows* forming part of the barrier, however, the barrier would still need to comply with the relevant requirements of this Part for *required* height, allowable openings, etc.

11.3.5 Handrails

[2019: 3.9.2.4]

(1) Handrails to a stairway or ramp must—

(a) be located along at least one side of the stairway *flight* or ramp; and

(b) be located along the full length of the stairway *flight* or ramp, except in the case where a handrail is associated with a barrier the handrail may terminate where the barrier terminates; and

(c) have the top surface of the handrail not less than 865 mm vertically above the nosings of the stair treads or the floor surface of the ramp (see Figure 11.3.4b); and

(d) be continuous and have no obstruction on or above them that will tend to break a handhold, except for newel posts, ball type stanchions, or the like.

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

(a) a stairway or ramp providing a change in elevation of less than 1 m; or

(b) a *landing*; or

(c) a *winder* where a newel post is installed to provide a handhold.

Explanatory Information

(1) 11.3.5 addresses requirements regarding location, height and extent of handrails. Where a barrier and handrail are installed together, 11.3.5 is to be read in conjunction with 11.3.3, 11.3.4 and 11.3.6.

(2) A handrail is *required* on at least one side of the stairway *flight* or ramp. The top rail of a barrier may be suitable as a handrail if it meets 11.3.5 and is able to be grasped by hand to provide support to the person using the stairway or ramp.

(3) 11.3.5(1)(b) requires a continuous handrail which must extend the full length of the stairway *flight* or ramp except where the handrail is associated with the barrier, in which case the handrail can terminate where the barrier is allowed to terminate. This allows for the barriers to geometric stairways such as elliptical, spiral, circular or curved stairways to finish a few treads from the bottom of the stairway.

(4) 11.3.5(1)(c) requires a minimum handrail height of 865 mm. This height provides comfort, stability, support and assistance for most users.

(5) 11.3.5(2) outlines where a handrail need not be provided, this includes—

(a) where a stairway or ramp is providing a change in elevation less than 1 m; or

(b) a *landing* for a stairway or ramp; or

(c) a *winder* in a stairway if a newel post is installed to provide a handhold.

11.3.6 Construction of wire barriers

[2019: 3.9.2.5]

(1) A wire barrier is deemed to meet the requirements of 11.3.4(4) if it is constructed in accordance with (2) to (4).

(2) For a horizontal or near horizontal wire system—

(a) when measured with a strain indicator, it must be in accordance with the tension values in Table 11.3.6a; or

(b) when measured for a maximum permissible deflection, it must not exceed the maximum deflections in Table 11.3.6b.

(3) For a non-continuous vertical wire system—

(a) when measured with a strain indicator, it must be in accordance with the tension values in Table 11.3.6a (see Note 4); or

(b) when measured for maximum permissible deflection, it must not exceed the maximum deflections in Table 11.3.6b.

(4) For a continuous vertical or continuous near vertical sloped wire system—

(a) it must have wires of not more than 2.5 mm diameter with a lay of 7 x 7 or 7 x 19 construction; and

(b) changes in direction at support rails must pass around a pulley block without causing permanent deformation to the wire; and

(c) supporting rails must be spaced of not more than 900 mm apart and be of a material that does not allow deflection that would decrease the tension of the wire under load; and

(d) when the wire tension is measured with a strain indicator, it must be in accordance with the tension values in Table 11.3.6c when measured in the furthermost span from the tensioning device.

Table 11.3.6a: Wire barrier construction – Minimum required tension (N) for stainless steel horizontal wire

Wire dia. (mm)	Lay	Wire spacing (mm)	Clear distance between posts (mm)								
			600	800	900	1000	1200	1500	1800	2000	2500
2.5	7x7	60	55	190	263	415	478	823	1080	1139	x
		80	382	630	730	824	1025	1288	x	x	x
		100	869	1218	1368	x	x	x	x	x	x
2.5	1x19	60	35	218	310	402	585	810	1125	1325	x
		80	420	630	735	840	1050	1400	1750	x	x
		100	1140	1565	x	x	x	x	x	x	x
3.0	7x7	60	15	178	270	314	506	660	965	1168	1491
		80	250	413	500	741	818	1083	1370	1565	x
		100	865	1278	1390	1639	x	x	x	x	x

Wire dia. (mm)	Lay	Wire spacing (mm)	Clear distance between posts (mm)								
			600	800	900	1000	1200	1500	1800	2000	2500
3.0	1x19	60	25	183	261	340	520	790	1025	1180	x
		80	325	555	670	785	1025	1330	1725	1980	x
		100	1090	1500	1705	1910	x	x	x	x	x
4.0	7x7	60	5	73	97	122	235	440	664	813	1178
		80	196	422	480	524	760	1100	1358	1530	2130
		100	835	1182	1360	1528	1837	2381	2811	3098	x
4.0	1x19	60	5	5	10	15	20	147	593	890	1280
		80	30	192	300	415	593	1105	1303	1435	1844
		100	853	1308	1487	1610	2048	2608	3094	3418	3849
4.0	7x19	60	155	290	358	425	599	860	1080	1285	1540
		80	394	654	785	915	1143	1485	1860	2105	2615
		100	1038	1412	1598	1785	2165	2735	x	x	x

Table Notes

(1) Lay = number of strands by the individual wires in each strand. For example a lay of 7 x 19 consists of 7 strands with 19 individual wires in each strand.

(2) Where a change of direction is made in a run of wire, the tensioning device is to be placed at the end of the longest span.

(3) If a 3.2 mm diameter wire is used, the tension figures for 3.0 mm wire are applied.

(4) This table may also be used for a set of non-continuous (single) vertical wires forming a barrier using the appropriate clear distance between posts as the vertical clear distance between the rails.

(5) X = not allowed because the *required* tension would exceed the safe load of the wire.

(6) Tension measured with a strain indicator.

Table 11.3.6b: Continuous wire barrier construction – Maximum permissible deflection of each wire in mm when a 2 kg mass is suspended at mid-span for stainless steel wires

Wire dia. (mm)	Wire spacing (mm)	Clear distance between posts (mm)					
		600	900	1200	1500	1800	2000
2.5	60	17	11	9	8	8	8
	80	7	5	5	5	x	x
3.0	60	19	13	8	7	7	7
	80	8	6	6	5	5	5
4.0	60	18	12	8	8	7	7
	80	8	6	4	4	4	4

Table Notes

(1) Where a change of direction is made in a run of wire, the 2 kg mass must be placed at the middle of the longest span.

(2) If a 3.2 mm diameter wire is used, the deflection figures for a 3.0 mm wire are applied.

(3) This table may also be used for a set of non-continuous (single) vertical wires forming a barrier using the appropriate clear distance between posts as the vertical clear distance between the rails.

(4) The deflection (offset) is measured by hooking a standard spring scale to the mid span of each wire and pulling it horizontally until a force of 19.6 N is applied.

(5) X = not allowed because the *required* tension would exceed the safe load of the wire.

(6) This table has been limited to 60 mm and 80 mm spaces for 2.5 mm, 3 mm and 4 mm diameter wires because the

required wire tensions at greater spacings would require the tension to be beyond the wire safe load limit, or the allowed deflection would be impractical to measure.

Table 11.3.6c: Continuous wire barrier construction—Minimum required tension (N) for vertical or near-vertical stainless steel wires where the maximum clear spacing between the rails is 900mm

Wire dia. (mm)	Lay	Wire spacing (mm)	Required tension in Newtons (N)
2.5	7 x 19	80	145
		100	310
		110	610
2.5	7 x 7	80	130
		100	280
		110	500

Table Notes

(1) Lay = number of strands by the number of individual wires in each strand. For example a lay of 7 x 19 consists of 7 strands with 19 individual wires in each strand.

(2) Vertical wires must have two pulley blocks to each 180 degree change of direction in the wire.

(3) Near vertical wires may only *require* one pulley block for each change of direction.

(4) Wire tension measured with a strain indicator.

(5) The table only includes 7 x 7 and 7 x 19 wires due to other wires not having sufficient flexibility to make the necessary turns.

Explanatory Information

- For the purpose of 11.3.6, a wire barrier consists of a series of tensioned wire rope connected to either vertical or horizontal supports serving as a guard to reduce the risk of a person falling from a roof, stairway, raised floor level or the like.
- To assist in the application of 11.3.6, the following terms are explained:
  - (i) Continuous - where the wire spans three or more supports.
  - (ii) Non-continuous - where the wire only spans between two supports.
  - (iii) Pulley block - a device consisting of a wheel in which a wire runs around to change its direction.
  - (iv) Permissible deflection - is the allowable bending of the wire.
  - (v) Support rails - are horizontal components of the barrier system that span across the top and bottom to provide structural support.
- Tables 11.3.6a and 11.3.6c contain tension requirements for wires in vertical and horizontal wire barrier systems with varying post spacings, wire spacings and wire types, whereas Table 11.3.6b contains deflection requirements for use in horizontal and vertical barrier systems. The figures contained in the tables were derived from testing the spacing combinations in order to prevent the passage of a 125 mm diameter solid cone penetrating between the wires at a predetermined force.
- It is important to read the notes to the tables as they provide additional information on their application to horizontal, vertical and near vertical wire barriers.
- Wire barriers deflect under loading conditions, even when tightly tensioned. This is particularly relevant over the service life of the barrier as the wire tends to lose its tension. Therefore, care needs to be taken to ensure that wire tension will be maintained during the life of the barrier. In some situations, it may be necessary to incorporate “lock-off” devices to prevent loosening of the wire. Likewise, if a threaded anchor bears against a soft wood post or rail, the anchor may indent the post or rail, thus loosening the wire.
- Temperature effects on the tension of the wire may be significant but there is little that can be done to allow for temperature variation in service. The shorter the wire span, the lesser the effect will be.
- Stainless steel wire with a lay of 1 x 19 has the greatest elastic modulus and will take up the same load with less

extension than equivalent wires with other lays.

- A wire barrier excludes wire mesh fences and the like.
- Sharp ends of wires at terminations and swages need to be removed for the safety of children and other people. No wire end should protrude more than half the diameter of the wire from the swage or termination fitting.
- It should be noted that 11.3.6 is only one form of compliance solution which can be used to demonstrate compliance with H5P2(2)(c) and (d). The following means of verification are available:
  - (i) H5V1.
  - (ii) The *Deemed-to-Satisfy Provisions* in 11.3.6.
  - (iii) A *Performance Solution* that uses one of the other NCC *Assessment Methods* which verifies that H5P2(2)(c) and (d) will be achieved.

11.3.7 Protection of openable windows – bedrooms

[2019: 3.9.2.6]

(1) A window opening in a bedroom must be provided with protection, where the floor below the window is 2 m or more above the surface beneath.

(2) Where the lowest level of the window opening covered by (1) is less than 1.7 m above the floor, the window opening must comply with the following:

  (a) The openable portion of the window must be protected with—

    (i) a device capable of restricting the window opening; or

    (ii) a screen with secure fittings.

  (b) A device or screen *required* by (a) must—

    (i) not permit a 125 mm sphere to pass through the window opening or screen; and

    (ii) resist an outward horizontal action of 250 N against the—

      (A) window restrained by a device; or

      (B) screen protecting the opening; and

    (iii) have a child resistant release mechanism if the screen or device is able to be removed, unlocked or overridden.

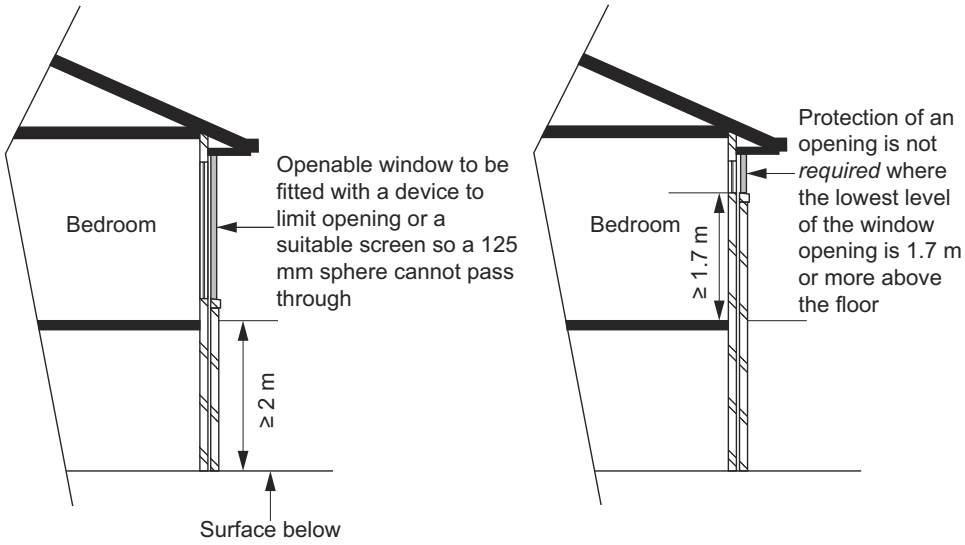
(3) Where a device or screen provided in accordance with (2)(a) is able to be removed, unlocked or overridden, a barrier with a height not less than 865 mm above the floor is *required* to an openable window in addition to window protection.

(4) A barrier covered by (3) must not—

  (a) permit a 125 mm sphere to pass through it; and

  (b) have any horizontal or near horizontal elements between 150 mm and 760 mm above the floor that facilitate climbing (see Figure 11.3.7).

Figure 11.3.7: Protection of openable windows — bedrooms



Explanatory Information: Intent

The intent of 11.3.7 is to reduce the risk of a person (especially a young child) falling through an openable window.

Explanatory Information: Protection of openable windows – bedrooms

Where the floor level below an openable window in a bedroom is less than 2 m there are no specific requirements. For an openable window 2 m or more above the surface beneath, openable windows are *required* to restrict passage of a 125 mm sphere using any one of the following design solutions:

- The window be designed such that any opening does not allow a 125 mm sphere to pass through (e.g. louvres) and be capable of resisting a 250 N force when directed against the window.
- The window be fitted with a fixed or dynamic device that is capable of restricting the window opening so it does not allow a 125 mm sphere to pass through and is difficult for a young child to operate. The restricting device must be capable of resisting a 250 N force when directed against the window such as a casement window or in attempting to push a sliding window open. An internal screen with similar parameters may be installed.
- The window be fitted with an internal or external screen that does not allow a 125 mm sphere to pass through and which must resist a horizontal outward force of 250 N.

If the openable part of the window is at least 1.7 m above the floor, no further protection is *required*.

Explanatory Information: Restricting devices

Where a device or screen is securely fixed in position (e.g. a screen pop riveted to the window frame) so it cannot be unlocked, overridden, or is very difficult to remove without for example a drill, the 865 mm barrier would not be *required* as the securing method is considered a fixture and not a child resistant release mechanism. 11.3.7(2)(b)(iii) relates to a screen or window restricting device protecting an openable window in a bedroom. The screen or opening restricting device may be installed in a manner that allows it to be removed, unlocked or overridden in the event of a fire or other emergency to allow safe egress. In these situations the unlocking device must be child resistant.

Child resistance could be achieved by the need to use a tool, key or two hands.

There are a number of hardware options available. Short chain winders and barrier screens will allow windows to comply with this requirement. Sliding window locks may lock a sash so a 125 mm sphere cannot pass through. Where provision is made to fully open the window beyond 125 mm then the child resistant release mechanism is required in addition to the device resisting a 250 N force as *required* by 11.3.7(2)(b)(ii).

11.3.7 in addition prescribes that an 865 mm barrier (sill) would be *required*. A wall beneath an openable window or fixed glazing under the openable part of a window which meets the height requirements (e.g. transom at least 865 mm above the floor) can be considered as the barrier if the criteria in 11.3.7 are met.

Explanatory Information: Use of the term 'window'

The term "window" is not italicised in 11.3.7 and as such, is not restricted to the definition of "window" in the NCC. The reason for this is to also capture windows that may let in air but not light, e.g. metal louvres. A metal louvre or openable panel would not fit in the NCC definition of window but is subject to the window barrier provisions.

11.3.8 Protection of openable windows – rooms other than bedrooms

[2019: 3.9.2.7]

(1) A window opening in a room other than a bedroom must be provided with protection where the floor below the window is 4 m or more above the surface beneath.

(2) The openable part of the window covered by (1) must be protected with a barrier with a height of not less than 865 mm above the floor.

(3) A barrier *required* by (2) must not—

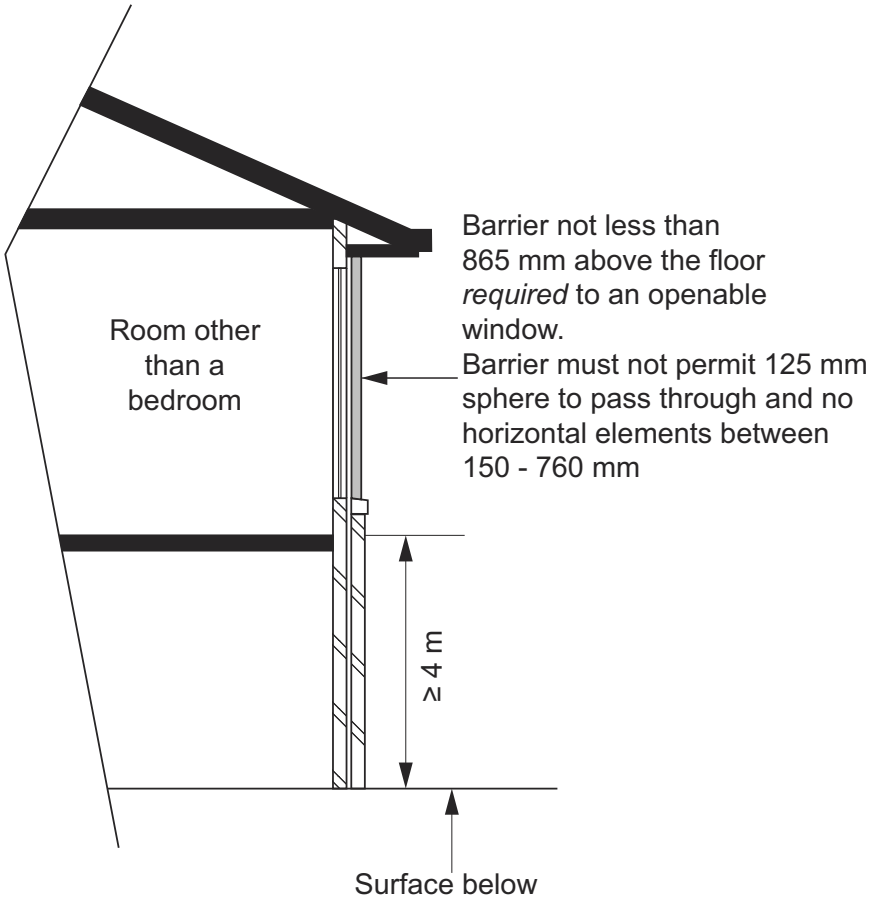
(a) permit a 125 mm sphere to pass through it; and

(b) have any horizontal or near horizontal elements between 150 mm and 760 mm above the floor that facilitate climbing.

Notes

Figure 11.3.8 illustrates requirements of this provision.

Figure 11.3.8: Protection of openable windows — rooms other than bedrooms



Explanatory Information: Intent

The intent of 11.3.8 is to reduce the risk of a person (especially a young child) falling through an openable window.

Explanatory Information: Protection of openable windows – rooms other than bedrooms

A wall beneath an openable window or fixed glazing under the openable part of a window which meets the height requirements (e.g. transom at least 865 mm above the floor) can be considered as the barrier, if the criteria in 11.3.8(2) are met.

Explanatory Information: Use of the term 'window'

The term "window" is not italicised in 11.3.8 and as such, is not restricted to the definition of "window" in the NCC. The reason for this is to also capture windows that may let in air but not light, e.g. metal louvres. A metal louvre or openable panel would not fit in the NCC definition of window but is subject to the window barrier provisions.

12 Ancillary provisions

Part 12.1 Scope and application of Section 12

12.1.1 Scope

[New for 2022]

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

(a) construction in *alpine areas* (see Part 12.2); and

(b) attachment of decks and balconies to external walls (see Part 12.3); and

(c) heating appliances, fire places, chimneys and flues (see Part 12.4).

(2) For other ancillary provisions and additional construction requirements not included in this Section of the ABCB Housing Provisions, refer to the following *Deemed-to-Satisfy Provisions* in NCC Volume Two:

(a) *swimming pools* (see H7D2).

(b) earthquake areas (see H1D9).

(c) *flood hazard areas* (see H1D10).

(d) construction in *designated bushfire prone areas* (see H7D4).

12.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

(a) The Governing Requirements of NCC Volume Two.

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

Explanatory Information

In NCC 2019, the content of Section 12 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Parts 3.10.4, 3.10.6 and 3.10.7 of NCC 2019 Volume Two.

In NCC 2019 Volume Two, Parts 3.10.1, 3.10.2, 3.10.3 and 3.10.5 did not include an acceptable construction practice.

Part 12.2 Construction in alpine areas

12.2.1 Application

[New for 2022]

Part 12.2 applies subject to the provisions at H7D3(2) and (3).

Explanatory Information

Buildings constructed in *alpine areas* need special consideration because of sub-zero temperatures which can create elements which restrict free movement to and from the building. The additional measures in this Part include—

- having external doorways open in a way that is not impeded by snow and ice outside; and
- for external trafficable structures forming part of the means of egress, being constructed so that they remain useable under snow conditions, and
- minimising the impact of snow build up between and around buildings.

Part 2.2 (structural provisions) and Section 13 (energy efficiency) also contain specific additional requirements for a building located in an *alpine area*.

12.2.2 External doors

[2019: 3.10.4.2]

External doors that may be subject to a build-up of snow must—

(a) open inwards or slide; and

(b) be constructed so that the threshold is not less than 900 mm above the adjoining surface; and

(c) in a Class 1b building, be marked “OPEN INWARDS” on the inside face of the door in letters not less than 75 mm high and in a colour contrasting with that of the background.

12.2.3 External trafficable structures

[2019: 3.10.4.3]

External stairways, ramps, access bridges or other trafficable structures serving the building must have—

(a) a floor surface that consists of expanded mesh if it is used as a means of egress; and

(b) any *required* barrier designed so that its sides are not less than 75% open; and

(c) for a stairway, *goings* (G), *risers* (R) and slope relationship quantity (2R + G) in accordance with—

(i) Table 11.2.2a; or

(ii) Table 12.2.3; and

(d) for a ramp serving an external doorway, a gradient not steeper than 1:12.

Table 12.2.3: Alternative stair riser and going dimensions

Maximum *risers* (R) (mm)	Minimum *risers* (R) (mm)	Maximum *going* (G) (mm)	Minimum *going* (G) (mm)	Maximum slope relationship (2R + G) (mm)	Minimum slope relationship (2R + G) (mm)
150	115	375	355	675	605

12.2.4 Clear spaces around buildings

[2019: 3.10.4.4]]

A building must be constructed so that—

(a) for any *external walls* more than 3.6 m above the natural ground level, the distance of that part of the building from the allotment boundary (other than a road alignment) must be not less than 2.5 m plus an additional 100 mm for each 300 mm or part by which that part of the *external wall* exceeds a height of 3.6 m (see Figure 12.2.4a); and

(b) if an external doorway discharges into a court between wings of a building and that area may be used for vehicle access to the building, the clear distance between wings must be not less than 4 m (see Figure 12.2.4b); and

(c) where an external doorway discharges opposite a feature that could trap snow or an embankment that is more than 900 mm above the threshold of that doorway, a minimum clear distance of not less than 4 m must be provided between the door and the feature (see Figure 12.2.4c and Figure 12.2.4d).

Figure 12.2.4a: Clear spaces around buildings — Set-back from allotment boundary where wall exceeds 3.6 m

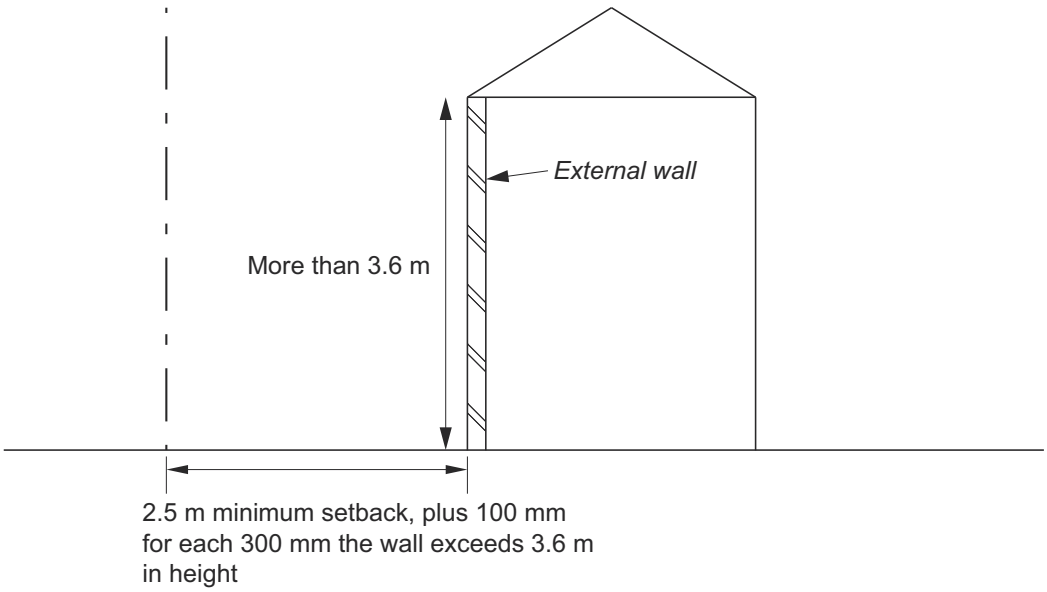


Figure 12.2.4b: Clear spaces around buildings — External doorway discharging into a court between wings of a building

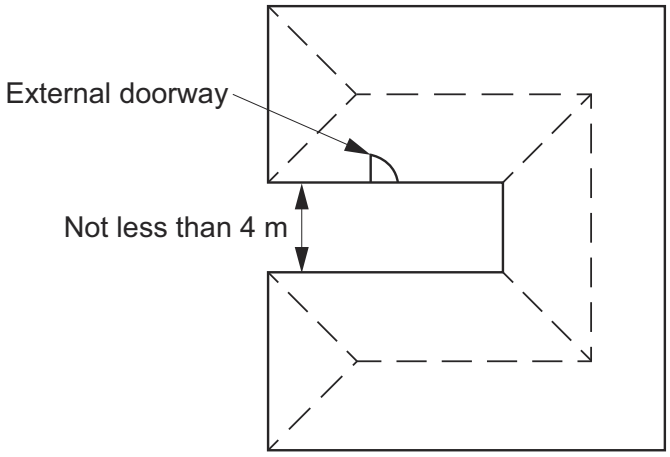


Figure 12.2.4c: Clear spaces around buildings — Embankments adjoining buildings

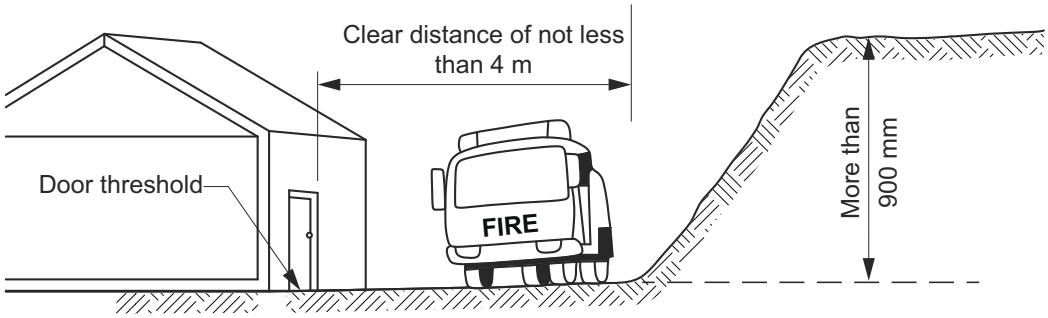
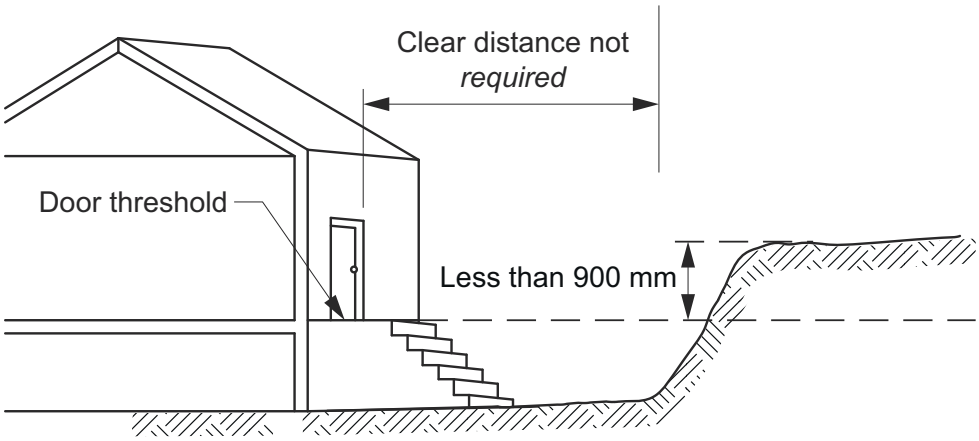


Figure 12.2.4d: Clear spaces around buildings — Use of a threshold where clear space is not available



Explanatory Information: Snow build-up around buildings

The design and construction of a building in an *alpine area* must not aid dangerous levels of snow build-up between and around buildings. This control—

- assists with egress in an emergency; and
- helps vehicle access around the buildings, both for snow clearing and emergency situations; and
- minimises the risk of snow or ice falling from the roof onto adjoining lots or egress routes.

Explanatory Information: Set-back distances

12.2.4(a) prescribes set-back requirements for *external walls* from the boundary of adjoining allotments. The aim is to ensure that a reasonable distance is created between buildings to reduce the amount of snow build-up between properties. 12.2.4(a) applies only to the area adjacent to that part of the wall that is more than 3.6 m in height.

Explanatory Information: Distance between wings of buildings

12.2.4(b) prescribes a minimum distance between wings of a building or attached buildings where external doorways may discharge into this area. This requirement only applies where the court or wings are able to be accessed by vehicles.

Explanatory Information: Embankments adjoining buildings

12.2.4(c) applies where features adjacent to an external doorway could trap snow and complicate access and egress to and from the building.

Part 12.3 Attachment of framed decks and balconies to external walls of buildings using a waling plate

12.3.1 Application

[New for 2022]

Part 12.3 applies subject to the limitations set out at H1D11.

12.3.2 Fixing decks and balconies to external walls

[2019: 3.10.6.2]

Where a deck or balcony relies on the *external wall* of a building or structure for support, the method of attachment, including any fixings, to the *external wall* must comply with the following:

(a) The deck or balcony's joist framing members must be supported at the wall by a waling plate.

(b) The joist span nearest the *external wall* must not be more than 3 m (single or continuous span).

(c) The size of a waling plate *required* by (a) must be not less than—

  (i) for a timber waling plate—

    (A) 140 x 35 mm with a minimum stress grade of F5 or MGP10 when fixed to concrete core-filled masonry using M12 chemical or expanding/mechanical anchors; or

    (B) 90 x 35 mm with a minimum stress grade of F5 or MGP10 when fixed to timber frames using No. 14 partial threaded self-drilling screws; or

  (ii) for a steel waling plate — C15015 (minimum Grade G550) with the web located against the *external wall*.

(d) A waling plate must be attached so that—

  (i) for core-filled reinforced concrete masonry *external walls*, fixings are staggered along the waling plate at not more than 300 mm centres measured along the waling plate; and

  (ii) for timber *external wall* frames, two No. 14 Type screws are provided—

    (A) into a solid joist or bearer framing member that is not less than 90 x 45 mm with a minimum stress grade of F5 or MGP10; and

    (B) for deck construction— at not more than 450 mm centres measured along the waling plate; and

    (C) for tiled balcony construction— at not more than 400 mm centres measured along the waling plate; and

  (iii) for steel framed *external walls*, two fixings are provided into a joist or bearer framing member not less than C20015 (Grade G550) at not more than 300 mm centres measured along the waling plate; and

  (iv) fixings are installed within 300 mm of each end of the waling plate, and in accordance with the following (as applicable):

    (A) For a timber waling plate — deck construction: two No. 14 partial threaded self-drilling screws at not more than 450 mm centres and not located within 65 mm from the ends or within 30 mm from the top and bottom edges.

    (B) For a timber waling plate — deck construction: M12 chemical or expanding/mechanical anchors at not more than 400 mm centres and not located within 120 mm from the ends or within 60 mm from the top and bottom edges.

    (C) For a timber waling plate — tiled balcony construction: two No. 14 partial threaded self-drilling screws at not more than 400 mm centres and not located within 65 mm from the ends or within 30 mm from the top and bottom edges.

    (D) For a timber waling plate — tiled balcony construction: M12 chemical or expanding/mechanical anchors at not more than 300 mm centres and not located within 120 mm from the ends or within 60 mm from the top and bottom edges.

    (E) For a steel waling plate — not located within 50 mm from the ends or within 30 mm from the top and

bottom edges.

(e) Fixings for attaching a waling plate to an *external wall* must be—

(i) for timber *external wall* frames with a minimum stress grade of F5 or MGP 10, No. 14 partial threaded self-drilling screws so that each screw is embedded not less than 44 mm into the joist or bearer member (see Figure 12.3.2a); and

(ii) for steel *external wall* frames, 8.8/S M12 bolts with not less than 3 mm thick 55 mm diameter washers; and

(iii) for a core-filled masonry *external wall*, 4.6/S M12 chemical or expanding/mechanical anchors with—

(A) a minimum 2 kN working load capacity in shear and 1.5 kN in tension; and

(B) not less than 3 mm thick 55 mm diameter washers placed on the waling plate under the anchor head (see Figure 12.3.2b).

(f) Fixings used for attaching waling plates to *external walls* must be—

(i) stainless steel where the building is located within 200 m of *breaking surf*; or

(ii) hot-dipped galvanised, stainless steel or monel metal for all other areas.

Figure 12.3.2a: Methods of attachment — No. 14 partial threaded self-drilling screws into a timber framed external wall

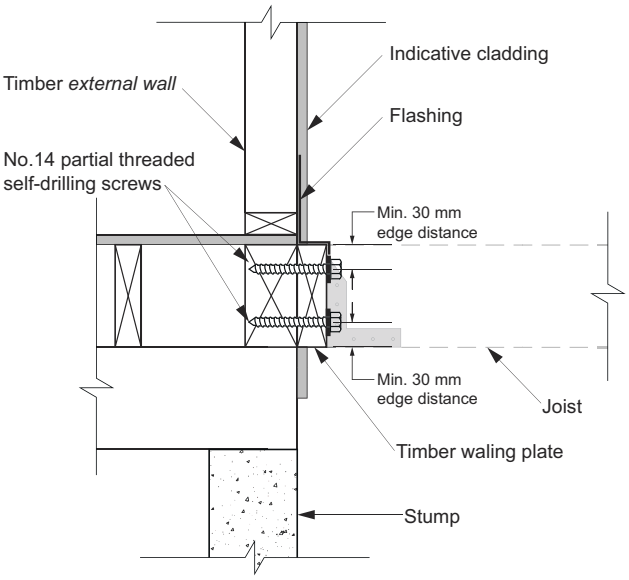
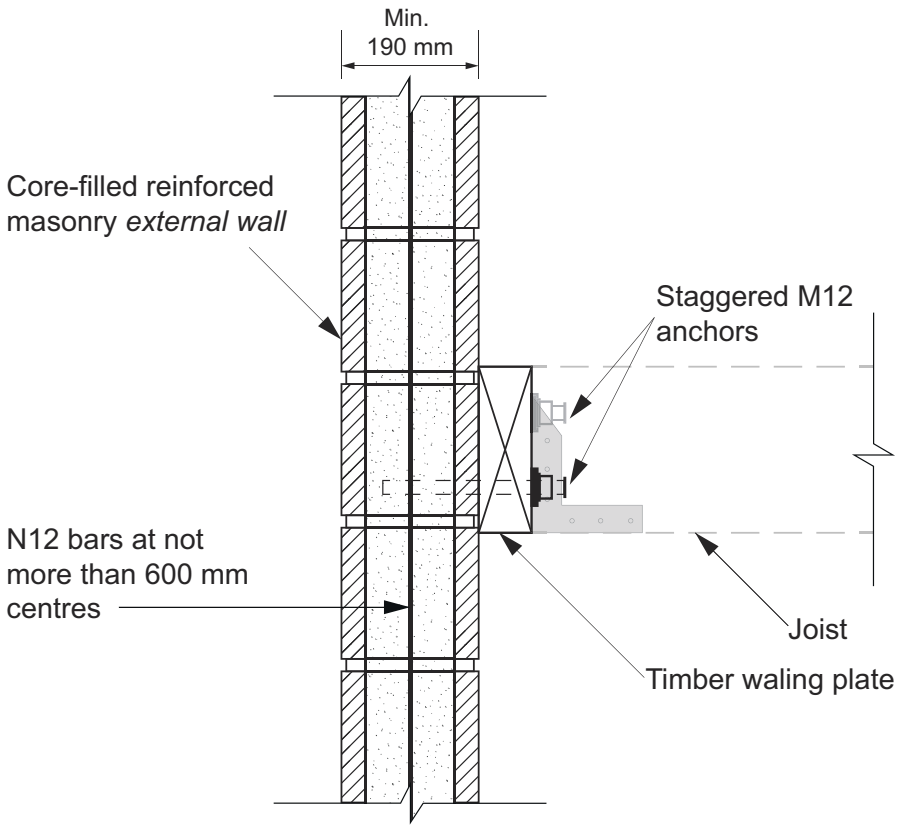


Figure 12.3.2b: Methods of attachment - 4.6/S M12 chemical or expanding/mechanical anchors into a core-filled reinforced masonry external wall



Explanatory Information

When using fixings specified in 12.3.2(d), care must be taken if chemical anchors are selected. The use of chemical anchors in horizontal applications is limited. Attention should be paid to selecting only chemical anchors that are specifically designed and manufactured for use in horizontal or overhead applications.

Consideration needs to be given to offsetting the waling plate fastener spacing to avoid interference with joist attachment. To ensure fasteners are positively anchored to the building or structure they need to be located so that they are not fixed into mortar beds between masonry units or fixed into blocking or the end grains of timbers.

An I-beam is not considered a solid joist or bearer framing member under 12.3.2(d)(ii) and is therefore not permitted as an appropriate method of support for attachment of a deck or balcony to an *external wall*.

The working load capacity of an anchor *required* by 12.3.2(e)(iii)(A) may be available in technical data provided by the manufacturer of the anchor.

The bolt category 4.6/S refers to a commercial bolt of a strength grade of 4.6 using a snug tight method of tensioning. AS 4100 contains information on tensioning techniques and the methods of determining the strength of an anchor.

Where the waling plate is fixed to the *external wall* through wall cladding, fixing length must be increased to compensate for the additional width of the cladding to ensure the connection to the *external wall* is structurally adequate.

All coach screwed joints should be pre-drilled with a pilot hole whose diameter is not greater than that of the threaded portion of the screw.

12.3.3 Flashings to the junction of the waling plate and external wall

[2019: 3.10.6.3]

Where the wall cladding is removed to attach a waling plate, openings in *external wall* cladding exposed to the weather must be flashed with materials complying with AS/NZS 2904 and in accordance with the following:

(a) *Flashings* must be provided to bottom, tops and the sides of the junction of the waling plate and the *external wall*, and must be installed so that the *flashing*—

(i) extends not less than 150 mm beyond each side of the waling plate where practicable; and

(ii) is attached to the waling plate and wall framing; and

(iii) at the top and bottom of the waling plate, drains to the outside face of the wall or cladding.

(b) Joins in the *flashing* must—

(i) overlap by not less than 75 mm in the direction of flow; and

(ii) be securely fastened at intervals of not more than 40 mm; and

(iii) have sealant installed between laps.

(c) The method of *flashing* must be suitable for the framing and cladding used.

(d) *Flashings* must be securely fixed at least 25 mm under the cladding at ends and edges of the framing of the opening.

Explanatory Information

Consideration needs to be given to the method of fixing the waling plate to the *external wall* so that deterioration of the *external wall* as a result of water entry will not occur. Such cases would include where the wall cladding is removed to attach a waling plate. This may be achieved by installing *flashing* between the *external wall* and the waling plate.

12.3.4 Bracing

[2019: 3.10.6.4]

Where a deck or balcony is more than 1 m off the ground when measured from the uppermost surface of the deck or balcony at any point to the top of any supporting footing, bracing must be installed as follows:

(a) Two diagonally opposed 30 x 0.8 mm galvanized steel straps must be installed across the top or underside of the joists and be attached using one fixing at—

(i) each joist or equivalent framing member; and

(ii) the waling plate.

(b) A secondary set of 30 x 0.8 mm steel straps must be installed using one fixing at each joist or equivalent framing member in accordance with Figure 12.3.4 where the deck or balcony extends more than 4 m from the *external wall*.

(c) The steel straps must—

(i) be continuous and extend diagonally at an angle between 30° to 60°; and

(ii) span not more than 4 m when measured along a line at a right angle from the *external wall*.

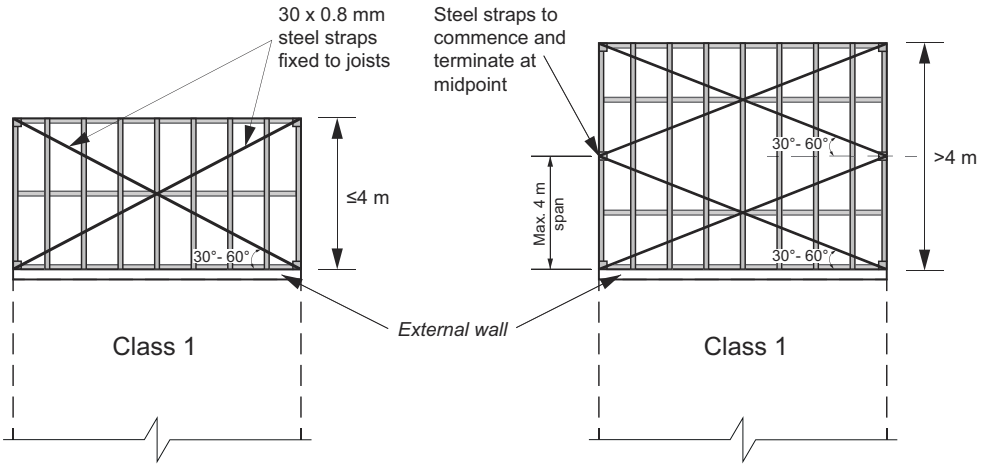
(d) Fixings for the steel straps must be—

(i) for timber framing, 50 x 3.15 hot-dipped galvanized flat head ring shank or flat head deformed nail; or

(ii) for steel framing, 8-18 self embedding head or wafer head screws.

(e) Where the deck or balcony is located within a severe corrosion environment, the bracing and fixings must comply with Table 6.3.9a, 6.3.9b and 6.3.9c.

Figure 12.3.4: Bracing of decks and balconies



a) Decks or balconies extending up to 4 m from the *external wall*

b) Decks or balconies extending more than 4 m from the *external wall*

Part 12.4 Heating appliances, fireplaces, chimneys and flues

12.4.1 Application

[New for 2022]]

For the installation of a domestic solid fuel burning appliance, Part 12.4 need not be complied with if H7D5(a) is complied with.

12.4.2 Open fireplace construction

[2019: 3.10.7.2]

An open fireplace, or solid-fuel burning appliance in which the fuel-burning compartment is not enclosed must have—

(a) all masonry constructed in accordance with H1D5; and

(b) a hearth constructed of stone, concrete, masonry or similar *non-combustible* material so that—

  (i) it extends not less than 300 mm beyond the front of the fireplace opening and not less than 150 mm beyond each side of that opening; and

  (ii) its upper surface does not slope away from the back hearth (see Figure 12.4.2); and

  (iii) *combustible* material, such as flooring or framing members below or around the external edge of the hearth, is situated not less than 150 mm from the upper surface of the hearth (see Figure 12.4.2); and

(c) walls forming the sides and back of the fireplace up to a height of 300 mm above the underside of the arch or lintel which—

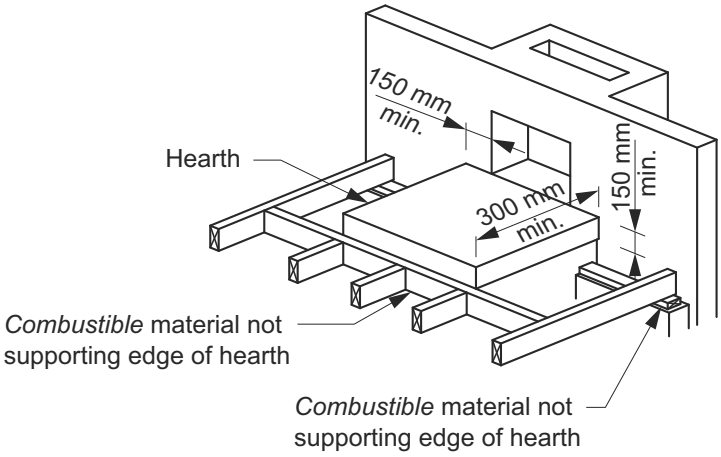
  (i) are constructed in 2 separate leaves of solid masonry with a total combined thickness not less than 180 mm, excluding any *cavity*; and

  (ii) do not consist of concrete block masonry in the construction of the inner leaf; and

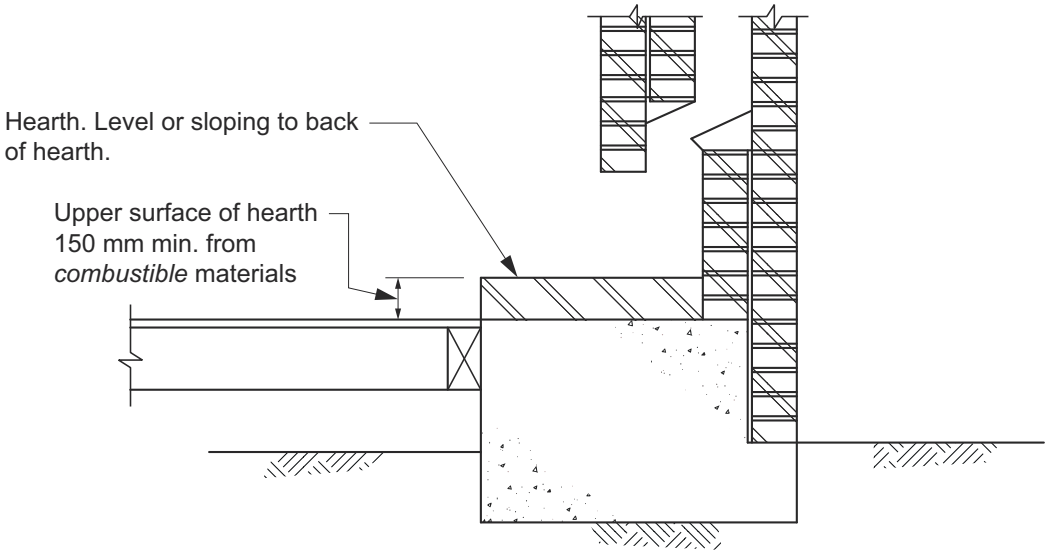
  (iii) are constructed of masonry units with a net volume, excluding cored and similar holes, not less than 75% of their gross volume, measured on the overall rectangular shape of the units, and with an actual thickness of not less than 100 mm; and

(d) the fireplace must be constructed on footings complying with 4.2.18.

Figure 12.4.2: Fireplace clearance from combustible materials



(a) View A



(b) View B

12.4.3 Chimney construction

[2019: 3.10.7.3]

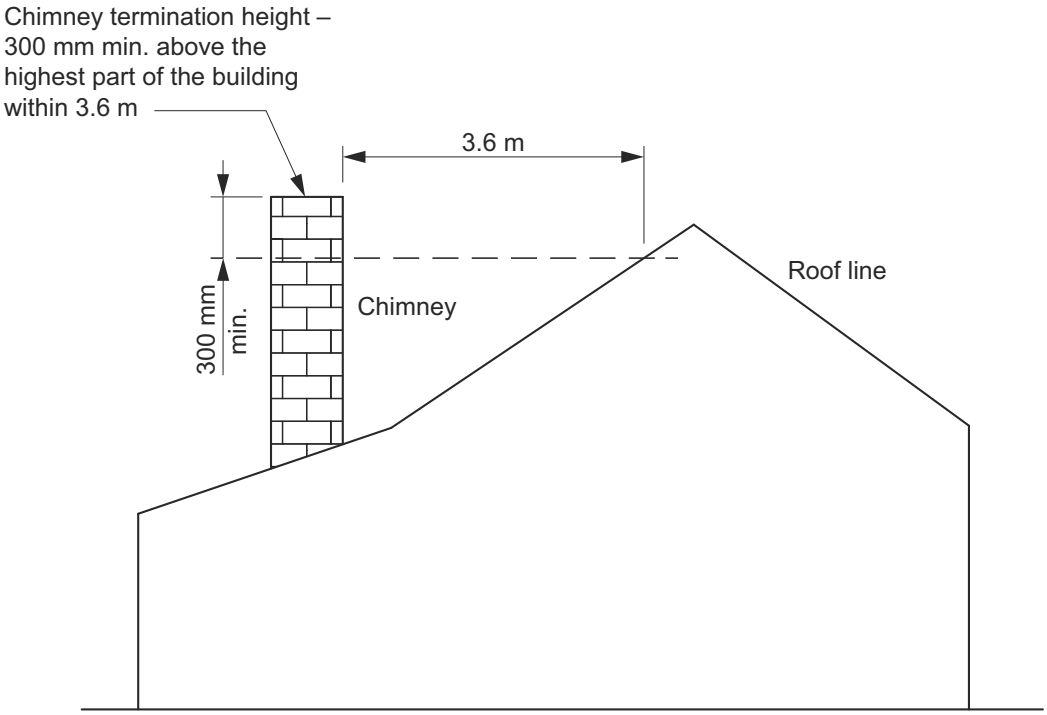
The construction of a chimney must comply with H1D5 and the following:

(a) The walls of the chimney above the level referred to in 12.4.2(c) must be lined internally to a thickness of not less than 10 mm with composition mortar parging.

(b) The composition mortar in (a) must comply with AS 3700 or AS 4773 except that the mortar must be mixed by volume in the proportions of 1 part cement : 1 part lime : 5 parts sand.

(c) The chimney or flue must terminate not less than 300 mm above the highest part of the building within a horizontal distance of 3.6 m of the chimney or flue (see Figure 12.4.3).

Figure 12.4.3: Section showing height and position of chimney



Explanatory Information

- The requirements of this Part are to be read in conjunction with the building sealing requirements in Part 13.4. However, it should be noted that Part 13.4 does not apply in all States and Territories.
- 12.4.3(a) requires the internal faces of masonry chimneys to be parged with a mortar to protect masonry elements and mortar beds from the corrosive by-products of combustion.

12.4.4 Installation of insert fireplaces and flues

[2019: 3.10.7.4]

An insert fireplace and flue must comply with the following:

(a) The insert fireplace and flue must be—

  (i) tested and passed the tests required by AS/NZS 2918; and

  (ii) fitted into a masonry fireplace (including chimney) constructed in accordance with H1D5 and Figure 12.4.4.

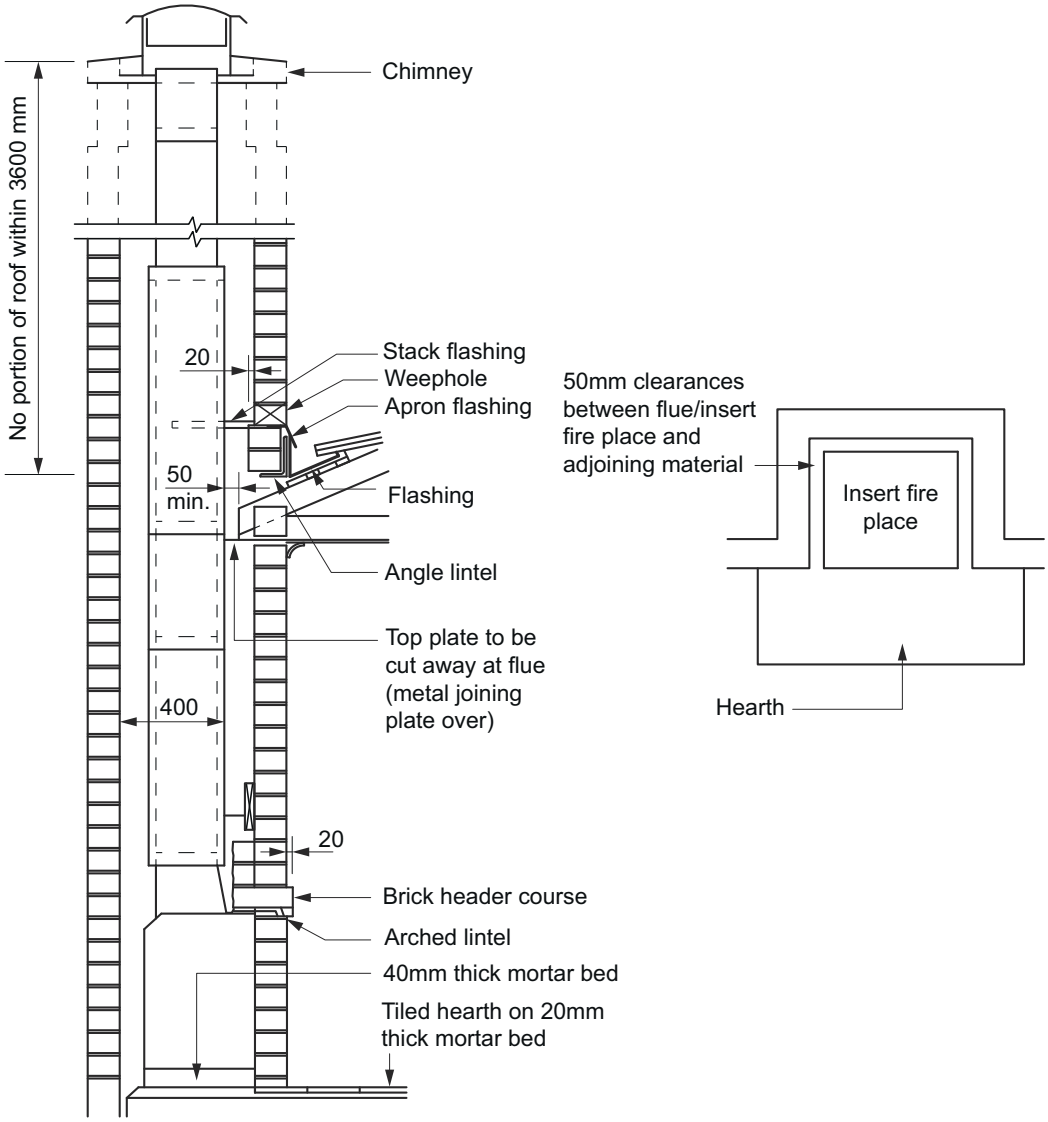
(b) The flue must be double skin and have been tested and pass the tests required by AS/NZS 2918.

(c) There must be a clearance of 50 mm between the outer flue and adjacent materials.

(d) The flue must terminate in accordance with Figure 12.4.3.

(e) The hearth must be constructed in accordance with 12.4.2(b) and (d).

Figure 12.4.4: Typical installation of fireplace flue inserts



12.4.5 Installation of free standing heating appliances

[2019: 3.10.7.5]

The installation of a free standing heating appliance must comply with the following:

(a) The appliance must—

(i) be installed with safety clearances determined by testing in accordance with AS/NZS 2918; or

(ii) be located not less than 1.2 m from adjoining walls (other than a masonry wall); or

(iii) have a heat shield between the adjoining wall (other than a masonry wall) and the heating appliance in accordance with Figure 12.4.5a and Figure 12.4.5b.

(b) Where a heat shield is used, it must be installed in accordance with Figure 12.4.5a and Figure 12.4.5b, and—

(i) have an FRL of not less than 60/60/60; or

(ii) be not less than 90 mm thick masonry constructed in accordance with H1D5.

(c) The heating appliance must be installed on a hearth—

(i) complying with 12.4.2(b), except that the hearth must extend 400 mm from the front and sides of the appliance in accordance with Figure 12.4.5a and Figure 12.4.5b; or

(ii) where a heat shield is installed, in accordance with Figure 12.4.5a and Figure 12.4.5b.

(d) The flue must—

(i) have been tested and passed the tests required by AS/NZS 2918; and

(ii) be installed in accordance with Figure 12.4.5c; and

(iii) terminate in accordance with Figure 12.4.3; and

(iv) be flashed in accordance with H1D7.

(e) Flue types or installation of flues in areas not specifically covered by Figure 12.4.5a and Figure 12.4.5b and Figure 12.4.5c must be installed in accordance with AS/NZS 2918.

Figure 12.4.5a: Acceptable location of free standing heating appliances — Elevation

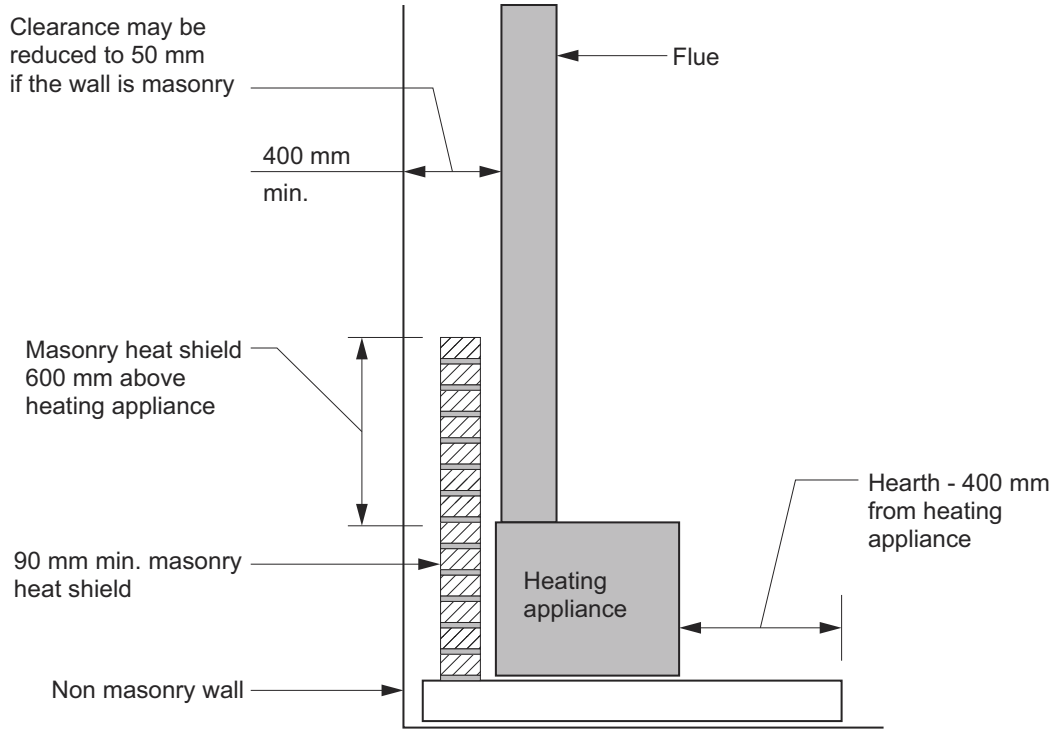


Figure 12.4.5b: Acceptable location of free standing heating appliances — Plan view

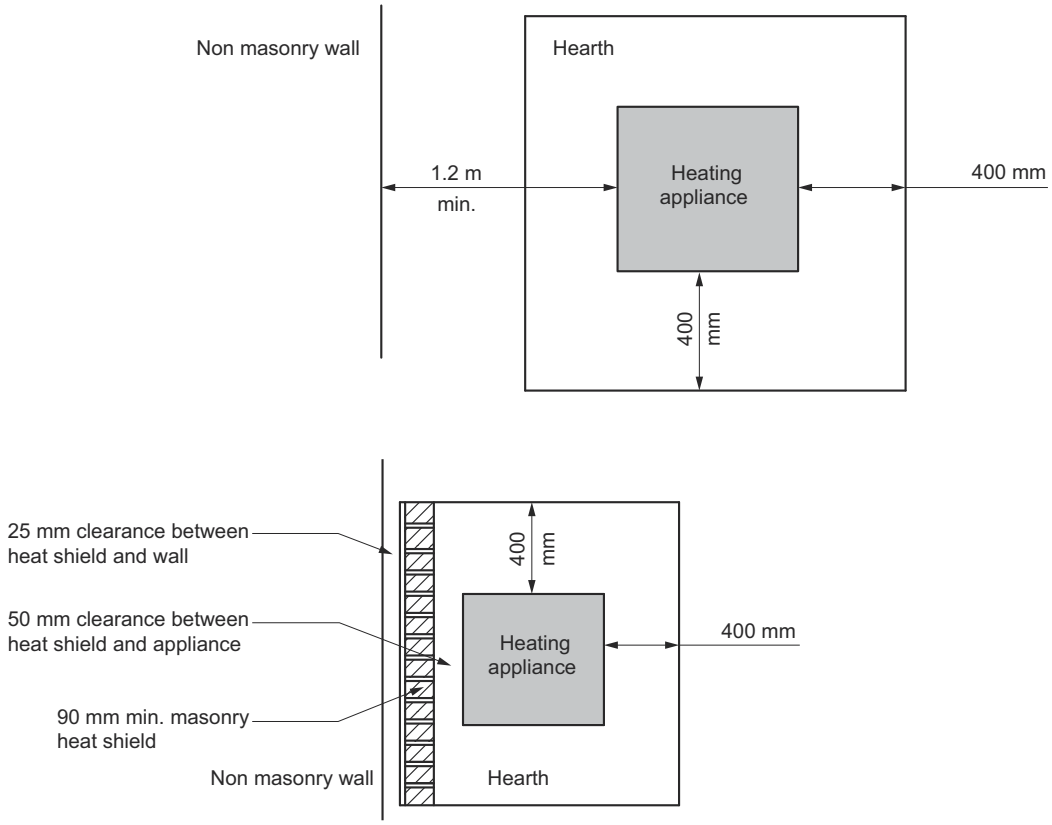


Figure 12.4.5c: Acceptable flue installation details

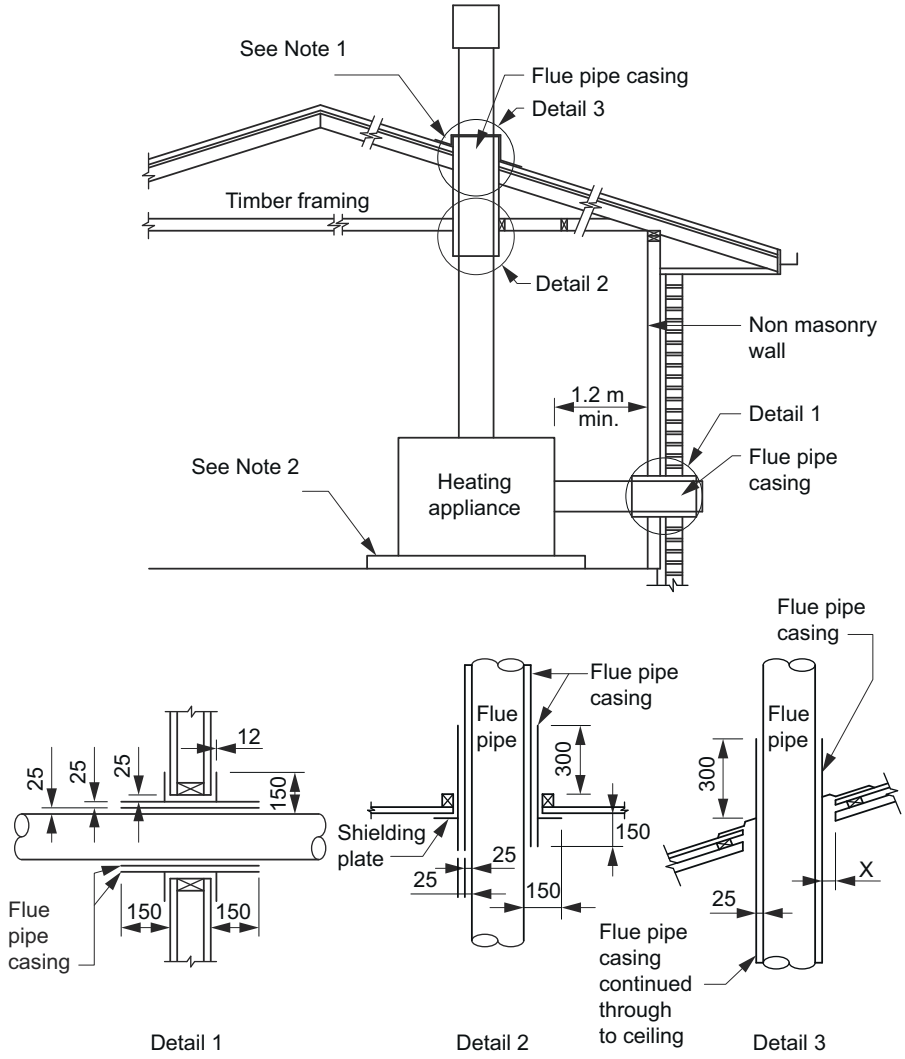


Figure Notes

(1) Roof flashing – see H1D7(2).

(2) Hearth – see 12.4.5.

(3) Flue pipe size — 150 mm maximum (for other sizes see AS/NZS 2918).

Explanatory Information

References to AS/NZS 2918 in 12.4.5(a)(i) and (d)(i) are only applicable in the context in which they are referred to in accordance with A4G1(2). 12.4.5(a) provides three options for the installation of free standing heating appliances. Where 12.4.5(a)(i) is chosen as a solution the free standing heating appliance must be installed with safety clearances determined by testing in accordance with AS/NZS 2918. 12.4.5(d)(i), in addition to (d)(ii) and (d)(iii), require the flue to be tested and have passed the tests required by AS/NZS 2918.

13 Energy efficiency

Part 13.1 Scope and application of Section 13

NSW Part 13.1
NT Part 13.1
TAS Part 13.1

13.1.1 Scope

[New for 2022]

This Section sets out the following *Deemed-to-Satisfy Provisions* for energy efficiency:

(a) Building fabric (see Part 13.2).
(b) External glazing (see Part 13.3).
(c) Building sealing (see Part 13.4).
(d) Ceiling fans (see Part 13.5).
(e) Whole-of-home energy usage (see Part 13.6).
(f) Services (see Part 13.7).

SA 13.1.2

13.1.2 Application

[New for 2022]

The application of this Section is subject to the following:

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

Explanatory Information

In NCC 2019, the content of Section 13 of the ABCB Housing Provisions (other than content added in NCC 2022 or later) was contained in the acceptable construction practices for Part 3.12 of NCC 2019 Volume Two.

Part 13.2 Building fabric

NT Part 13.2

TAS Part 13.2

NSW 13.2.1

13.2.1 Application of Part 13.2

[2019: 3.12.1]

(1) The provisions of 13.2.2 to 13.2.6 apply to—

(a) a Class 1 building; and

(b) a Class 10a building with a *conditioned space*.

(2) The provisions of 13.2.7 apply to a Class 1 building with an attached Class 10a building.

(3) Part 13.2 must be applied as directed in H6D2(1)(a) or (b).

13.2.2 Building fabric thermal insulation

[2019: 3.12.1.1]

(1) Where *required*, insulation must comply with AS/NZS 4859.1 and be installed so that it—

(a) abuts or overlaps adjoining insulation other than at supporting members such as columns, studs, noggings, joists, furring channels and the like where the insulation must butt against the member; and

(b) forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and

(c) does not affect the safe or effective operation of a *domestic service* or fitting.

(2) Where *required*, *reflective insulation* must be installed with—

(a) the necessary airspace, to achieve the required *R-Value* between a reflective side of the *reflective insulation* and a building lining or cladding; and

(b) the *reflective insulation* closely fitted against any penetration, door or *window* opening; and

(c) the *reflective insulation* adequately supported by framing members; and

(d) each adjoining sheet of roll membrane being—

(i) overlapped greater than or equal to 150 mm; or

(ii) taped together.

(3) Where *required*, bulk insulation must be installed so that—

(a) it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and

(b) in a ceiling, where there is no bulk insulation or *reflective insulation* in the *external wall* beneath, it overlaps the *external wall* by greater than or equal to 50 mm.

Explanatory Information: Example

- In a two storey house with the second storey set back, the insulation in the first storey wall, the second storey wall and the roof over the set-back must be continuous. Therefore if the roof over the set-back has insulation on a horizontal ceiling, then insulation is also needed on the vertical in any ceiling space in order to connect the ceiling insulation to the second storey wall.
- To form a continuous barrier, insulation should be placed in gaps between window and door jambs, heads and sills, and the adjoining wall framing unless a gap is otherwise *required*. This may need to be compressible to allow for movement between members.

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

[2019: 3.12.1.2]

(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 roof that—

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

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

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.

(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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

(6) X = not permitted.

Table 13.2.3b: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 1 – two (or more) 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	1.5	1.5	1.5	2.0
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	1.5
		≥ 1.5 to < 2.0	1.5	1.5	1.5	1.5	1.5
		≥ 2.0	1.5	1.5	1.5	2.0	2.0
	No	< 1.0	2.0	2.5	4.0	5.0	X
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	2.5
		≥ 1.5 to < 2.0	1.5	1.5	1.5	2.0	2.0
		≥ 2.0	1.5	1.5	1.5	1.5	1.5
Standard	Yes	< 1.0	1.5	1.5	2.0	3.0	4.0
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	2.5
		≥ 1.5 to < 2.0	1.5	1.5	1.5	1.5	2.0
		≥ 2.0	1.5	1.5	1.5	1.5	1.5
	No	< 1.0	2.5	4.0	6.0	X	X
		≥ 1.0 to < 1.5	1.5	1.5	1.5	1.5	4.0
		≥ 1.5 to < 2.0	1.5	1.5	2.0	2.0	2.5
		≥ 2.0	1.5	1.5	1.5	2.0	2.5

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

(6) X = not permitted.

Table 13.2.3c: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 2

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 ≤ 0.64
Vented	Yes	Any	2.5			
	No	< 0.5	2.5	3.0	3.0	3.5
		≥ 0.5	2.5			
Standard	Yes	Any	2.5			
	No	< 0.5	3.0	3.0	3.5	4.0
		≥ 0.5 to < 1.0	2.5	2.5	2.5	3.0
		≥ 1.0	2.5			

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under roof or ceiling insulation.

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

Table 13.2.3d: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 3

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	< 0.5	2.5				
		≥ 0.5 to < 1.0	2.0				
		≥ 1.0 to < 1.5	2.0	2.5	2.5	2.5	2.5
		≥ 1.5 to < 2.0	2.0	2.0	2.5	2.5	2.5
		≥ 2.0	2.5	2.5	3.0	3.0	3.0
	No	< 0.5	3.5	4.0	4.5	5.0	X
		≥ 0.5 to < 1.0	3.0	3.5	3.5	4.0	4.5
		≥ 1.0 to < 1.5	2.5	3.0	3.0	3.0	3.5
		≥ 1.5 to < 2.0	2.5	3.0	3.0	3.0	3.0
		≥ 2.0	2.5	2.5	3.0	3.0	3.0
Standard	Yes	< 0.5	2.0	2.0	2.5	2.5	2.5
		≥ 0.5 to < 1.0	2.0	2.0	2.5	2.5	2.5
		≥ 1.0 to < 1.5	2.0	2.0	2.0	2.0	2.5
		≥ 1.5 to < 2.0	2.0	2.5	2.5	2.5	3.0
		≥ 2.0	2.0	2.0	2.5	2.5	2.5
	No	< 0.5	3.5	4.0	5.0	X	X
		≥ 0.5 to < 1.0	3.0	3.0	3.5	4.0	5.0
		≥ 1.0 to < 1.5	2.5	2.5	3.0	3.0	3.5

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
		≥ 1.5 to < 2.0	2.0	2.0	2.5	2.5	2.5
		≥ 2.0	2.0	2.0	2.5	2.5	2.5

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

(6) X = not permitted.

Table 13.2.3e: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 4

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.23	0.23 < SA ≤ 0.64
Vented	Yes	< 0.5	3.0	3.5
		≥ 0.5	3.0	
	No	Any	3.5	
Standard	Yes	Any	3.0	
	No	≤ 0.5	3.5	
		> 0.5	3.0	

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3f: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 5

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.42	0.42 < SA ≤ 0.64
Vented	Yes	< 0.5	3.0	2.5
		≥ 0.5	2.5	
	No	< 2.0	3.0	
		≥ 2.0	2.5	

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	SA ≤ 0.42	0.42 < SA ≤ 0.64
Standard	Yes	Any	2.5	
	No	≤ 0.5	3.0	
		> 0.5 to < 2.0	2.5	
		≥ 2.0	3.0	

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

(c) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3g: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 6

Roof ventilation	*Reflective insulation* under-roof	Under-roof insulation *R-Value*	0.23 ≤ SA ≤ 0.64	0.64 < SA ≤ 0.96
Vented	Yes	< 1.0	4.0	3.5
		≥ 1.0	3.5	
	No	< 1.0	4.0	
		≥ 1.0	3.5	
Standard	Yes	< 1.0	3.5	
		≥ 1.0	3.0	
	No	< 1.0	4.0	
		≥ 1.0	3.5	

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

(c) is ventilated to *outdoor air* through evenly distributed openings with Table 10.8.3; or

(d) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) In *climate zones* 6, 7 and 8, roof ventilation must comply with 10.8.3.

(5) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3h: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 7

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	0.64 < SA ≤ 0.73	0.73 < SA ≤ 0.85	0.85 < SA ≤ 0.96
Vented	Yes	< 1.0	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0
		≥ 1.0	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
	No	< 1.0	5.0	4.5	4.5	4.5	4.0	4.0	3.5	3.5
		≥ 1.0 to < 1.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
		≥ 1.5	4.5	4.5	4.5	4.5	4.5	4.0	4.0	4.0
Standard	Yes	< 1.0	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0
		≥ 1.0	4.0							
	No	< 1.0	5.0	4.5	4.5	4.0	4.0	3.5	3.5	3.5
		≥ 1.0 to < 1.5	4.5	4.5	4.0	4.0	4.0	4.0	3.5	3.5
		≥ 1.5 to < 2.0	4.0							
		≥ 2.0	4.5	4.0	4.0	4.0	4.0	4.0	4.0	3.5

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

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

(d) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3i: Pitched roof with horizontal ceiling – minimum R-Value for ceiling insulation: climate zone 8

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	0.64 < SA ≤ 0.73	0.73 < SA ≤ 0.85	0.85 < SA ≤ 0.96
Vented	Yes	< 1.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0
		≥ 1.5 to < 2.0	4.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0
		≥ 2.0	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0
	No	< 1.0	4.5	4.5	4.5	4.0	4.0	3.5	3.5	3.0
		≥ 1.0 to < 1.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0	4.0
		≥1.5	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0

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	0.64 < SA ≤ 0.73	0.73 < SA ≤ 0.85	0.85 < SA ≤ 0.96
Standard	Yes	< 1.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5
		≥ 1.0 to < 1.5	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5
		≥ 1.5 to < 2.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5
		≥ 2.0	4.0							
	No	< 1.0	4.5	4.0	4.0	3.5	3.5	3.0	3.0	3.0
		≥ 1.0 to < 1.5	4.0	4.0	4.0	4.0	3.5	3.5	3.5	3.5
		≥ 1.5 to < 2.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5
		≥ 2.0	4.0	4.0	4.0	4.0	4.0	4.0	3.5	3.5

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

(b) has one powered roof ventilator per 200 m^2 of ceiling area, with gable, eave or ridge vents; or

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

(d) is a tiled roof without *sarking-type material* at roof level.

(3) If a roof is not 'vented', it is a 'standard' roof.

(4) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3j: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 1 – single storey dwelling

Reflective insulation under-roof	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤ 0.64
Yes	1.0	2.0	2.0	4.0	4.0
No	1.0	3.5	X	X	X

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on the top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

(5) X = not permitted.

Table 13.2.3k: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 1 – two (or more) storey dwelling

Reflective insulation under-roof	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤ 0.64
Yes	1.5	1.5	2.0	3.0	4.0
No	1.5	3.5	5.0	X	X

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

(5) X = not permitted.

Table 13.2.3l: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 2

Reflective insulation under-roof	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤ 0.64
Yes	2.5	2.5	2.5	2.5	2.5
No	3.0	3.0	3.5	4.0	4.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3m: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 3

Reflective insulation under-roof	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤ 0.64
Yes	2.0	2.0	2.5	2.5	2.5
No	3.5	4.0	5.0	X	X

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

(5) X = not permitted.

Table 13.2.3n: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 4

Reflective insulation under-roof	SA ≤ 0.64
Yes	3.0

Reflective insulation under-roof	SA ≤ 0.64
No	3.5

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3o: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 5

Reflective insulation under-roof	SA ≤ 0.64
Yes	2.5
No	3.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3p: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 6

Reflective insulation under-roof	0.23 ≤ SA < 0.64	SA = 0.64	0.64 < SA ≤ 0.96
Yes	4.0	3.5	4.0
No	4.0	4.0	4.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3q: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 7

Reflective insulation under-roof	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤ 0.64	0.64 < SA ≤ 0.73	0.73 < SA ≤ 0.85	0.85 < SA ≤ 0.96
Yes	4.5	4.5	4.5	4.0	4.0	4.0	4.0	4.0
No	5.0	4.5	4.5	4.0	4.0	3.5	3.5	3.5

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3r: Flat, skillion or cathedral roof – minimum R-Value for ceiling insulation: climate zone 8

Reflective insulation under-roof	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤ 0.64	0.64 < SA ≤ 0.73	0.73 < SA ≤ 0.85	0.85 < SA ≤ 0.96
Yes	4.0	4.0	4.0	4.0	4.0	3.5	3.5	3.5
No	4.5	4.0	4.0	3.5	3.5	3.0	3.0	3.0

Table Notes

(1) SA = solar absorptance.

(2) The *R-Value* can be achieved by installing insulation under the roof or on top of the ceiling or a combination of both.

(3) The *R-Value* of *reflective insulation* is not to be included in the *R-Value* of any under-roof or ceiling insulation.

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

Table 13.2.3s: Metal-framed pitched roof with horizontal ceiling – minimum Total R-Value of ceiling to account for thermal bridging

Minimum ceiling insulation *R-Value* from Tables 13.2.3a to 13.2.3i as applicable	Minimum ceiling *Total R-Value*
1.5	1.38
2.0	1.74
2.5	2.09
3.0	2.43
3.5	2.63
4.0	2.95
4.5	3.27
5.0	3.59
5.5	3.91
6.0	4.23

Table Notes

(1) The *Total R-Value* calculation only includes the ceiling frame, insulation and ceiling lining. It is not to include internal air films, roof space or roof lining.

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

Table 13.2.3t: Metal-framed flat, skillion or cathedral roof – minimum Total R-Value to account for thermal bridging

Minimum ceiling insulation *R-Value* from Tables 13.2.3j to 13.2.3r	Minimum *Total R-Value* to account for thermal bridging – heat flow down	Minimum *Total R-Value* to account for thermal bridging – heat flow up
1.0	1.40	1.32
1.5	1.86	1.78
2.0	2.29	2.21
2.5	2.71	2.63
3.0	3.11	3.02
3.5	3.31	3.22
4.0	3.66	3.57
4.5	3.98	3.90
5.0	4.32	4.22

Minimum ceiling insulation *R-Value* from Tables 13.2.3j to 13.2.3r	Minimum *Total R-Value* to account for thermal bridging – heat flow down	Minimum *Total R-Value* to account for thermal bridging – heat flow up
5.5	4.63	4.53
6.0	4.93	4.82

Table Notes

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

(2) Direction of heat flow must be determined in accordance with Table 13.2.3v.

Table 13.2.3u: Metal-framed flat, skillion or cathedral roof – thermal bridging mitigation

Minimum ceiling insulation *R-Value* from Tables 13.2.3j to 13.2.3r	Option 1 – increase insulation between roof frame members to specified minimum *R-Value*	Option 2 – add a layer of continuous insulation with specified minimum *R-Value* above or below the roof frame members
1.0	1.5	0.13
1.5	2.5	0.30
2.0	3.5	0.30
2.5	5.0	0.40
3.0	6.0	0.60
3.5	X	0.60
4.0	X	0.60
4.5	X	0.60
5.0	X	0.60
5.5	X	0.60
6.0	X	0.60

Table Notes

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

(2) X = not permitted.

Table 13.2.3v: Direction of heat flow

Climate zone	Direction of heat flow
1	Down
2 (altitude less than 300 m)	Down
2 (altitude 300 m or more)	Down and up
3	Down and up
4	Up
5	Up
6	Up
7	Up
8	Up

Table 13.2.3w: Adjusted minimum R-Value of ceiling insulation required to compensate for loss of ceiling insulation area

Percentage of ceiling area uninsulated	Minimum *R-Value* of ceiling insulation required to satisfy 13.2.3(1) and (3)									
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5
0.5 to less than 1.0%	1.0	1.6	2.2	2.8	3.4	4.0	4.7	5.4	6.2	6.9
1.0% to less than 1.5%	1.1	1.7	2.3	2.9	3.6	4.4	5.2	6.1	7.0	x
1.5% to less than 2.0%	1.1	1.7	2.4	3.1	3.9	4.8	5.8	6.8	x	x
2.0% to less than 2.5%	1.1	1.8	2.5	3.3	4.2	5.3	6.5	x	x	x
2.5% to less than 3.0%	1.2	1.9	2.6	3.6	4.6	5.9	x	x	x	x
3.0% to less than 4.0%	1.2	2.0	3.0	4.2	5.7	x	x	x	x	x
4.0% to less than 5.0%	1.3	2.2	3.4	5.0	x	x	x	x	x	x

Table Notes

(1) Interpolation is allowed for values between those shown.

(2) X = not permitted.

Table 13.2.3x: Total R-Value for roofs constructed with insulated sandwich panels

Climate zone	SA ≤ 0.23	0.23 < SA ≤ 0.32	0.32 < SA ≤ 0.42	0.42 < SA ≤ 0.53	0.53 < SA ≤ 0.64	0.64 < SA ≤ 0.73	0.73 < SA ≤ 0.85	0.85 < SA ≤ 0.96
1 (single storey dwelling)	1.40	3.31	X	X	X	X	X	X
1 (two or more storey dwelling)	1.86	3.31	4.32	X	X	X	X	X
2 (heat flow down)	3.11	3.11	3.31	3.66	3.66	X	X	X
2 (heat flow up)	3.02	3.02	3.22	3.57	3.57	X	X	X
3 (heat flow down)	3.31	3.66	4.32	X	X	X	X	X
3 (heat flow up)	3.22	3.57	4.22	X	X	X	X	X
4	3.22	3.22	3.22	3.22	3.22	X	X	X
5	3.02	3.02	3.02	3.02	3.02	X	X	X
6	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57
7	4.22	3.90	3.90	3.57	3.57	3.22	3.22	3.22
8	3.90	3.57	3.57	3.22	3.22	3.02	3.02	3.02

Table Notes

(1) SA = solar absorptance.

(2) Direction of heat flow must be determined in accordance with Table 13.2.3v.

(3) X = not permitted.

Explanatory Information: Table 13.2.3w

- When considering the reduction of insulation because of exhaust fans, flues or recessed downlights, 0.5% of the ceiling area for a 200 m^2 house would permit 2 bathroom heater-light assemblies, a laundry exhaust fan, a kitchen exhaust fan and either approximately 20 recessed down-lights with 50 mm clearance to insulation, 10 recessed downlights with 100 mm clearance to insulation or only 3 recessed downlights with 200 mm clearance to insulation.
- Note that 13.2.3(5) does not require an increase in ceiling insulation for *roof lights*.
- Placing some of the *required* insulation at the roof level may result in a more practical outcome. Insulation at the roof level is effective in warm climates and significantly moderates the roof space extremes and *condensation* risk in cold climates. Note that Part 10.8 contains specific provisions for *condensation*.

Explanatory Information: Thermal bridging calculation methods

The effect of thermal bridging through repeating framing elements such as ceiling joists and the bottom chord of ceiling trusses must be considered when calculating the *Total R-Value* of metal-framed roofs. Other types of thermal bridges may be calculated if considered significant.

NSW 13.2.4

13.2.4 Roof lights

[2019: 3.12.1.3]

Roof lights (including any associated shaft and diffuser) serving a *habitable room* or an interconnecting space such as a corridor, hallway, stairway or the like must have—

(a) a total area of not more than 5% of the *floor area* of the room or space served; and

(b) transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance of—

(i) for *Total System SHGC*, in accordance with Table 13.2.4; and

(ii) for *Total System U-Value*, not more than U3.9.

Table 13.2.4: Roof lights – Total System SHGC

Roof light shaft index Note 1	Total area of roof lights up to 3.5% of the *floor area* of the room or space	Total area of roof lights more than 3.5% and up to 5% of the *floor area* of the room or space
< 1.0	≤ 0.45	≤ 0.29
≥ 1.0 to < 2.5	≤ 0.51	≤ 0.33
≥ 2.5	≤ 0.76	≤ 0.49

Table Notes

(1) The *roof light* shaft index is determined by measuring the distance from the centre of the shaft at the roof to the centre of the shaft at the ceiling level and dividing it by the average internal dimension of the shaft opening at the ceiling level (or the diameter for a circular shaft) in the same units of measurement.

(2) The area of a *roof light* is the area of the roof opening that allows light to enter the building. The total area of *roof lights* is the combined area for all *roof lights* serving the room or space.

Explanatory Information

The *Total System SHGC* and *Total System U-Values* are expressed as Australian Fenestration Rating Council (AFRC) values.

NSW 13.2.5

13.2.5 External walls

[2019: 3.12.1.4]

(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 forms 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; and

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

(6) The requirements of (5) do not apply to walls constructed using insulated sandwich panels.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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 13.2.5r: Masonry veneer metal-framed walls: minimum Total R-Value to account for thermal bridging

Wall insulation from Tables 13.2.5c, 13.2.5g, 13.2.5i, 13.2.5k and 13.2.5m	Minimum *Total R-Value* to account for thermal bridging
1.5	1.79

Wall insulation from Tables 13.2.5c, 13.2.5g, 13.2.5i, 13.2.5k and 13.2.5m	Minimum *Total R-Value* to account for thermal bridging
2.0	2.08
2.5	2.34
2.7	2.44
≥3.0	2.57

Table Notes

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

Table 13.2.5s: Concrete block walls with internal lining fixed to a metal frame – thermal bridging mitigation

Wall insulation *R-Values* from Tables 13.2.5a to 13.2.5e	Option 1 – increase insulation between wall framing to specified minimum *R-Value*	Option 2 – add a layer of continuous insulation with specified minimum *R-Value* on the inside or outside of the wall framing
0 or reflective	Not required	Not required
0.5 or 1.0	1.5	0.13
1.5, 2.0 or 2.5	X	0.30

Table Notes

(1) X = not permitted.

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

Table 13.2.5t: Lightweight metal-framed walls – thermal bridging mitigation

Wall insulation *R-Value* from Tables 13.2.5a to 13.2.5o	Thermal bridging mitigation
0 or reflective	Not required
>0 to ≤1.5	Either install *reflective insulation* outside the frame to create a minimum 20 mm reflective airspace between frame and cladding, or increase insulation between frames by R0.5.
>1.5	Either install *reflective insulation* outside the frame to create a minimum 20 mm reflective airspace between frame and cladding, or add a layer of continuous insulation with an *R-Value* of at least R0.30 on the inside or the outside of the frame.

Table Notes

(1) Minimum *R-Value*s 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.

Table 13.2.5u: Masonry veneer metal-framed walls – thermal bridging mitigation

Wall insulation *R-Value* from Tables 13.2.5c, 13.2.5g, 13.2.5i, 13.2.5k and 13.2.5m	Thermal bridging mitigation options
> 0	Either install *reflective insulation* outside the frame to a minimum 20 mm reflective airspace between the frame and veneer, or add a layer of continuous insulation with an *R-Value* of at least R0.30 on the inside or the outside of the frame.

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

[2019: 3.12.1.5]

(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 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) Except for a waffle-pod slab—

(a) 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) 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

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

Table Notes

(1) Under-floor insulation is not permitted in *climate zone* 3.

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

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

Table 13.2.6d: Minimum R-Value of floor and subfloor wall insulation where the floor is over an enclosed subfloor space: climate zone 4

Subfloor wall height (mm)	*Reflective insulation* facing down over the subfloor space	Minimum subfloor wall insulation *R-Value*	Minimum suspended floor insulation *R-Value*
≤600	No	0.5	1.0
≤600	No	1.0	0.5
≤600	Yes	0.0	1.5
≤600	Yes	0.5	1.0
≤600	Yes	2.0	0.5
>600 to ≤900	No	0.0	1.5
>600 to ≤900	No	1.5	0.5
>600 to ≤900	Yes	0.0	1.5
>600 to ≤900	Yes	0.5	1.0
>900 to ≤1200	No	0.0	1.5
>900 to ≤1200	No	0.5	1.0
>900 to ≤1200	Yes	0.5	1.0
>900 to ≤1200	Yes	2.0	0.5
>1200 to ≤1500	No	0.0	1.5
>1200 to ≤1500	Yes	0.0	1.5
>1200 to ≤1500	Yes	0.5	1.0
>1500 to ≤1800	No	0.5	1.5
>1500 to ≤1800	No	1.0	1.0
>1500 to ≤1800	Yes	0.0	2.0

Table Notes

(1) A suspended floor includes a suspended timber-framed floor, suspended metal-framed floor and suspended concrete floor.

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

Table 13.2.6e: Minimum R-Value of floor and subfloor wall insulation where the floor is over an enclosed subfloor area: climate zone 5

Subfloor wall height (mm)	*Reflective insulation* facing down over the subfloor surface	Minimum subfloor wall insulation *R-Value*	Minimum suspended floor insulation *R-Value*
≤600	No	0.0	1.5

Subfloor wall height (mm)	*Reflective insulation* facing down over the subfloor surface	Minimum subfloor wall insulation *R-Value*	Minimum suspended floor insulation *R-Value*
≤600	Yes	0.0	2.0
>600 to ≤900	No	0.0	1.5
>600 to ≤900	Yes	0.0	2.0
>900 to ≤1200	No	0.0	2.0
>900 to ≤1200	Yes	0.0	2.0
>1200 to ≤1500	No	0.0	2.0
>1200 to ≤1500	Yes	0.0	2.0
>1500 to ≤1800	No	0.0	2.5
>1500 to ≤1800	No	0.5	2.0
>1500 to ≤1800	Yes	0.0	2.5
>1500 to ≤1800	Yes	0.5	2.0

Table Notes

(1) A suspended floor includes a suspended timber-framed floor, a suspended metal-framed floor and a suspended concrete floor.

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

Table 13.2.6f: Minimum R-Value of floor and subfloor wall insulation where the floor is over an enclosed subfloor space: climate zone 6

Subfloor wall height (mm)	*Reflective insulation* facing down over the subfloor area	Minimum subfloor wall insulation *R-Value*	Minimum suspended floor insulation *R-Value*
≤600	No	0.0	2.0
≤600	Yes	0.0	1.5
>600 to ≤900	No	0.0	2.0
>600 to ≤900	Yes	0.0	1.5
>900 to ≤1200	No	0.0	2.0
>900 to ≤1200	Yes	0.0	1.5
>1200 to ≤1500	No	0.0	2.5
>1200 to ≤1500	No	0.5	2.0
>1200 to ≤1500	Yes	0.0	1.5
>1500 to ≤1800	No	0.0	2.5
>1500 to ≤1800	Yes	0.0	2.0
>1500 to ≤1800	Yes	0.5	1.5

Table Notes

(1) A suspended floor includes a suspended timber-framed floor, suspended metal-framed floor and suspended concrete floor.

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

Table 13.2.6g: Minimum R-Value of floor and subfloor insulation where the floor is over an enclosed subfloor space: climate zone 7

Subfloor wall height (mm)	*Reflective insulation* facing down over the subfloor space	Minimum subfloor wall insulation *R-Value*	Minimum suspended floor insulation *R-Value*
≤600	No	0.0	2.5

Subfloor wall height (mm)	*Reflective insulation* facing down over the subfloor space	Minimum subfloor wall insulation *R-Value*	Minimum suspended floor insulation *R-Value*
≤600	Yes	0.0	1.5
>600 to ≤900	No	0.0	2.5
>600 to ≤900	Yes	0.0	1.5
>900 to ≤1200	No	0.0	3.0
>900 to ≤1200	Yes	0.0	1.5
>1200 to ≤1500	No	0.0	3.0
>1200 to ≤1500	Yes	0.0	1.5
>1500 to ≤1800	No	0.0	3.0
>1500 to ≤1800	Yes	1.0	1.5
>1500 to ≤1800	Yes	0.0	2.0

Table Notes

(1) A suspended floor includes a suspended timber-framed floor, suspended metal-framed floor and suspended concrete floor.

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

Table 13.2.6h: Minimum R-Value of floor and subfloor wall insulation where the floor is over an enclosed subfloor space: climate zone 8

Subfloor wall height (mm)	*Reflective insulation* facing down over the subfloor space	Minimum subfloor wall insulation *R-Value*	Minimum suspended floor insulation *R-Value*
≤600	No	0.0	2.5
≤600	Yes	0.0	1.5
>600 to ≤900	No	0.0	2.5
>600 to ≤900	Yes	0.0	1.5
>900 to ≤1200	No	0.0	3.0
>900 to ≤1200	Yes	0.0	1.5
>1200 to ≤1500	No	0.0	3.0
>1200 to ≤1500	Yes	0.0	1.5
>1500 to ≤1800	No	0.0	3.0
>1500 to ≤1800	Yes	1.0	1.5
>1500 to ≤1800	Yes	0.0	2.0

Table Notes

(1) A suspended floor includes a suspended timber-framed floor, suspended metal-framed floor and suspended concrete floor.

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

Table 13.2.6i: Metal-framed suspended floor — minimum Total R-Value for floor to account for thermal bridging

Floor insulation from Tables 13.2.6a and 13.2.6d to 13.2.6h as applicable	Floor covering	Minimum *Total R-Value* of floor
0.0	Carpet	0.36
0.0	Other	0.22
0.5	Carpet	0.86

Floor insulation from Tables 13.2.6a and 13.2.6d to 13.2.6h as applicable	Floor covering	Minimum *Total R-Value* of floor
0.5	Other	0.71
1.0	Carpet	1.30
1.0	Other	1.15
1.5	Carpet	1.65
1.5	Other	1.50
2.0	Carpet	1.97
2.0	Other	1.83
2.5	Carpet	2.27
2.5	Other	2.11
3.0	Carpet	2.52
3.0	Other	2.37
3.5	Carpet	2.59
3.5	Other	2.47
4.0	Carpet	2.79
4.0	Other	2.65

Table Notes

(1) The *Total R-Value* can be adjusted using area weightings where there is a combination of floor coverings. Invert the *Total R-Value* for each floor type before applying area weightings.

(2) The *Total R-Value* for the floor plane only includes the floor frame, insulation, flooring and floor coverings. It does not include the internal air film, subfloor airspace, subfloor walls or external air film.

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

(4) Direction of heat flow must be determined in accordance with Table 13.2.6k.

Table 13.2.6j: Metal-framed suspended floor — thermal bridging mitigation

Floor insulation from Tables 13.2.6a and 13.2.6d to 13.2.6h as applicable	Option 1 – increase insulation between floor framing to specified minimum *R-Value*	Option 2– add a layer of continuous insulation product above or below the floor framing with specified *R-Value*
0.5	1.0	0.13
1.0	1.5	0.30
1.5	2.5	0.40
2.0	3.0	0.40
2.5	4.0	0.40
≥ 3.0	X	0.60

Table Notes

(1) X = not permitted.

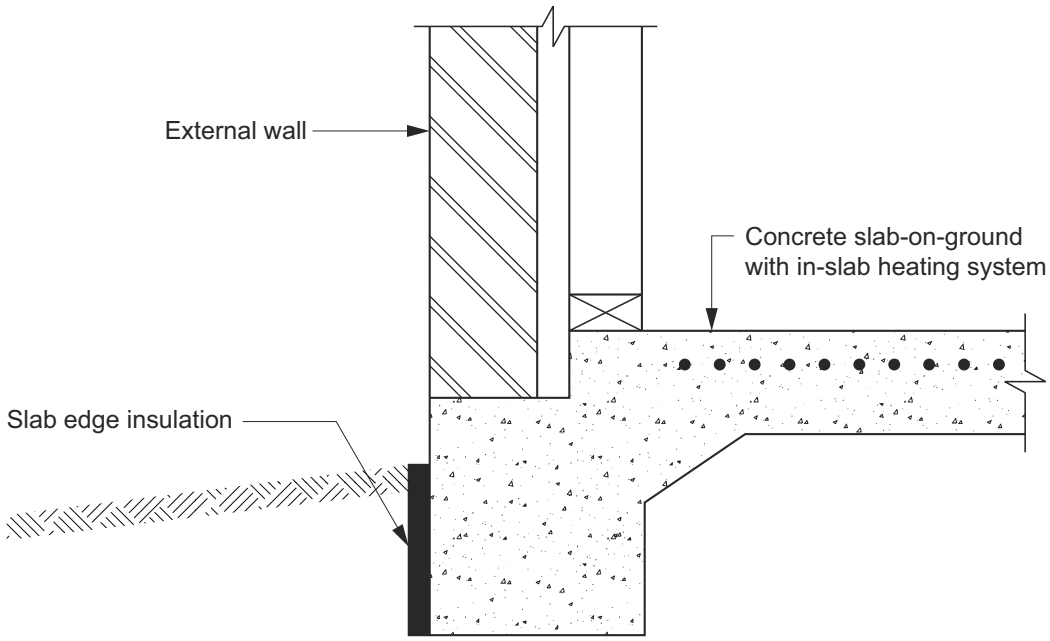
(2) Minimum *R-Values* are in-situ values. They account for compression of insulation.

Table 13.2.6k: Floor — direction of heat flow

Climate zone	Direction of heat flow
1	Up
2	Up
3	Up
4	Down

Climate zone	Direction of heat flow
5	Down
6	Down
7	Down
8	Down

Figure 13.2.6: Insulation of slab edge



Explanatory Information

- For 13.2.6(3) the effect of thermal bridging through repeating framing elements must be considered when calculating the *Total R-Value* of metal-framed floors. Other types of thermal bridges may be calculated if considered significant.
- 13.2.6(7) provides an exemption for an in-screed heating or cooling system used solely in bathrooms, amenity areas and the like, as these are typically small areas.
- Care should be taken to ensure that the type of termite management system selected is compatible with the slab edge insulation.

NSW 13.2.7

13.2.7 Attached Class 10a buildings

[2019: 3.12.1.6]

A Class 10a building attached to a Class 1 building must—

(a) have an external fabric that achieves the *required* level of thermal performance for a Class 1 building; or

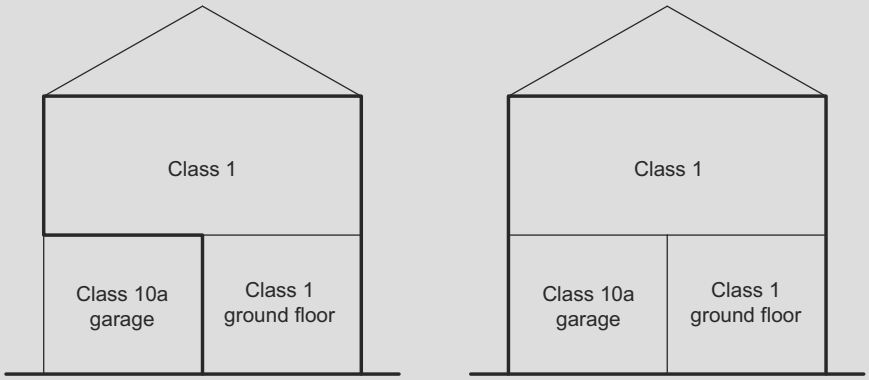
(b) be separated from the Class 1 building with construction having the *required* level of thermal performance for the Class 1 building.

Explanatory Information

The attachment of a Class 10a building, such as a garage, glasshouse, solarium, pool enclosure or the like should not compromise the thermal performance of the Class 1 building. In addition, the Class 10a building may be insulated and so assist the Class 1 building achieve the *required* thermal performance.

Explanatory Figure 13.2.7 below depicts examples of a Class 1 building with an attached Class 10a garage.

Figure 13.2.7 (explanatory): Attached Class 10a building examples



OPTION (a) – Elevation **OPTION (b) – Elevation**

Figure Notes

In (a), the thermal performance *required* for the Class 1 building may be achieved by including the walls and floor of the Class 1 building that adjoin the Class 10a garage.

In (b), the thermal performance *required* for the Class 1 building may be achieved by including the outside walls and floor of the Class 10a garage.

Part 13.3 External glazing

NSW Part 13.3
NT Part 13.3
TAS Part 13.3

13.3.1 Application of Part 13.3

[2019: 3.12.2]

(1) This Part applies to—

(a) a Class 1 building; and

(b) a Class 10a building with a *conditioned space*.

(2) Part 13.3 must be applied as directed in H6D2(1)(b).

13.3.2 External glazing — winter

[2019: 3.12.2.1]

(1) In *climate zones* 2 to 8, the ratio of the conductance (C_u) and solar heat gain (C_{SHGC}) of the *glazing* in each *storey*, including any *mezzanine*, must—

(a) not exceed the allowances obtained from Table 13.3.2a; and

(b) be calculated in accordance with the following formula:

$$\frac{[(A_1 \times U_1 \times BC_1 \times OC_1 \times R_{W1}) + (A_2 \times U_2 \times BC_2 \times OC_2 \times R_{W2}) + \ldots]}{[(A_1 \times SHGC_1 \times E_{W1} \times R_{W1} \times BS_{W1} \times L_{W1} \times F_{W1} \times H_{W1}) + (A_2 \times SHGC_2 \times E_{W_2} \times R_{W2} \times BS_{W2} \times L_{W2} \times F_{W2} \times H_{W2}) + \ldots]}$$

(2) In the formula at (1)(b)—

(a) $A_{1,2,etc}$ = the area of each *glazing* element; and

(b) $U_{1,2,etc}$ = the *Total System U-Value* of each *glazing* element; and

(c) $SHGC_{1,2,etc}$ = the *Total System SHGC* for each *glazing* element, not exceeding 0.7; and

(d) $E_{W1,W2,etc}$ = the winter exposure factor for each *glazing* element obtained from Table 13.3.2b, 13.3.2c, 13.3.2d, 13.3.2e, 13.3.2f, 13.3.2g, 13.3.2h, 13.3.2i, 13.3.2j, 13.3.2k, 13.3.2l, 13.3.2m, 13.3.2n, 13.3.2o, 13.3.2p or 13.3.2q; and

(e) $BC_{1,2,etc}$ = the bedroom conductance factor obtained from Table 13.3.2r; and

(f) $OC_{1,2,etc}$ = the orientation sector conductance factor obtained from Table 13.3.2s, 13.3.2t, 13.3.2u, 13.3.2v, 13.3.2w, 13.3.2x or 13.3.2y; and

(g) $R_{W1,W2,etc}$ = the room type factor in Table 13.3.2z, 13.3.2aa, 13.3.2ab, 13.3.2ac, 13.3.2ad, 13.3.2ae, 13.3.2af or 13.3.2ag; and

(h) $BS_{W1,W2,etc}$ = the bedroom solar heat gain factor in Table 13.3.2z, 13.3.2aa, 13.3.2ab, 13.3.2ac, 13.3.2ad, 13.3.2ae, 13.3.2af or 13.3.2ag; and

(i) $L_{W1,W2,etc}$ = the factor in Table 13.3.2z, 13.3.2aa, 13.3.2ab, 13.3.2ac, 13.3.2ad, 13.3.2ae, 13.3.2af or 13.3.2ag for each *glazing* element located on a floor level above the lowest floor level; and

(j) $F_{W1,W2,etc}$ = the frame factor in Table 13.3.2z, 13.3.2aa, 13.3.2ab, 13.3.2ac, 13.3.2ad, 13.3.2ae, 13.3.2af or 13.3.2ag for each *glazing* element; and

(k) $H_{W1,W2,etc}$ = the floor factor in Table 13.3.2z, 13.3.2aa, 13.3.2ab, 13.3.2ac, 13.3.2ad, 13.3.2ae, 13.3.2af or 13.3.2ag for each *glazing* element.

(3) For the purposes of this clause—

(a) orientation sectors must be determined in accordance with Figure 13.3.2a; and

(b) P/H must be determined in accordance with Figure 13.3.2b.

Table 13.3.2a: Maximum conductance to solar heat gain ratio (C_U/C_{SHGC})

Climate zone	Floor in direct contact with the ground	Suspended floor
2	9.60	9.37
3	19.10	14.75
4	10.25	8.04
5 (lightweight wall)	8.89	8.32
5 (concrete or masonry wall)	8.79	10.12
6	8.45	6.06
7	7.02	7.96
8	4.93	9.41

Table 13.3.2b: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 2

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.49	1.48	1.08	0.47	0.41	0.46	1.05	1.44
0.05	1.44	1.40	1.00	0.40	0.34	0.41	0.97	1.38
0.10	1.38	1.36	0.95	0.38	0.32	0.38	0.93	1.31
0.20	1.21	1.21	0.85	0.34	0.30	0.34	0.84	1.17
0.40	1.00	0.97	0.68	0.28	0.25	0.28	0.70	0.97
0.60	0.83	0.80	0.60	0.25	0.22	0.25	0.59	0.81
0.80	0.62	0.64	0.49	0.21	0.21	0.23	0.51	0.66
1.00	0.43	0.54	0.40	0.20	0.20	0.19	0.43	0.55
1.20	0.26	0.43	0.35	0.18	0.19	0.18	0.40	0.45
1.40	0.22	0.37	0.29	0.16	0.18	0.17	0.36	0.37
1.60	0.18	0.30	0.28	0.16	0.17	0.16	0.30	0.33
1.80	0.15	0.26	0.24	0.15	0.15	0.15	0.26	0.27
2.00	0.12	0.19	0.21	0.14	0.15	0.15	0.25	0.26

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2c: Orientation sector winter exposure factor (E_W) — suspended floor: climate zone 2

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.67	1.36	1.20	0.52	0.19	0.85	1.18	1.51
0.05	1.62	1.29	1.12	0.45	0.16	0.75	1.09	1.45
0.10	1.56	1.26	1.06	0.42	0.15	0.71	1.05	1.37
0.20	1.36	1.11	0.95	0.38	0.14	0.62	0.95	1.22
0.40	1.13	0.90	0.76	0.31	0.12	0.52	0.79	1.01
0.60	0.94	0.74	0.67	0.28	0.10	0.46	0.66	0.85

P/H	North	North east	East	South east	South	South west	West	North west
0.80	0.70	0.59	0.55	0.24	0.10	0.41	0.57	0.69
1.00	0.49	0.50	0.45	0.22	0.09	0.35	0.48	0.57
1.20	0.30	0.40	0.39	0.20	0.09	0.33	0.46	0.47
1.40	0.25	0.34	0.32	0.18	0.08	0.31	0.40	0.39
1.60	0.20	0.27	0.31	0.18	0.08	0.29	0.34	0.35
1.80	0.17	0.24	0.27	0.17	0.07	0.27	0.30	0.29
2.00	0.14	0.18	0.24	0.16	0.07	0.27	0.29	0.28

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2d: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 3

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.36	1.16	0.75	0.38	0.38	0.43	1.05	1.41
0.05	1.35	1.12	0.70	0.33	0.33	0.38	1.00	1.38
0.10	1.25	1.07	0.66	0.32	0.32	0.37	0.96	1.30
0.20	1.11	0.95	0.60	0.28	0.30	0.33	0.86	1.18
0.40	0.89	0.78	0.51	0.24	0.27	0.27	0.74	0.98
0.60	0.67	0.60	0.41	0.21	0.26	0.23	0.59	0.79
0.80	0.45	0.48	0.37	0.19	0.23	0.22	0.51	0.63
1.00	0.30	0.41	0.30	0.17	0.21	0.21	0.45	0.51
1.20	0.21	0.31	0.26	0.15	0.21	0.18	0.37	0.43
1.40	0.16	0.28	0.21	0.14	0.20	0.17	0.33	0.37
1.60	0.12	0.24	0.20	0.13	0.18	0.16	0.32	0.31
1.80	0.11	0.17	0.16	0.13	0.18	0.14	0.26	0.28
2.00	0.09	0.17	0.15	0.12	0.18	0.14	0.24	0.24

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2e: Orientation sector winter exposure factor (E_W) — suspended floor: climate zone 3

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.92	1.29	0.97	0.82	0.75	1.07	1.24	1.69
0.05	1.90	1.24	0.90	0.72	0.66	0.94	1.18	1.65
0.10	1.76	1.18	0.86	0.69	0.63	0.91	1.13	1.56
0.20	1.57	1.05	0.77	0.62	0.60	0.81	1.01	1.41
0.40	1.25	0.86	0.66	0.51	0.54	0.68	0.87	1.17
0.60	0.94	0.66	0.53	0.46	0.51	0.59	0.70	0.94
0.80	0.63	0.53	0.47	0.41	0.45	0.55	0.60	0.76
1.00	0.42	0.45	0.39	0.36	0.42	0.52	0.53	0.61
1.20	0.29	0.35	0.34	0.33	0.42	0.46	0.44	0.52
1.40	0.23	0.31	0.28	0.31	0.39	0.42	0.39	0.44
1.60	0.17	0.27	0.26	0.28	0.36	0.39	0.38	0.37
1.80	0.15	0.19	0.21	0.28	0.36	0.36	0.31	0.34

P/H	North	North east	East	South east	South	South west	West	North west
2.00	0.13	0.19	0.20	0.26	0.36	0.36	0.29	0.29

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2f: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 4

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.48	1.40	0.91	0.47	0.46	0.51	1.11	1.57
0.05	1.45	1.34	0.84	0.40	0.38	0.43	1.03	1.51
0.10	1.43	1.30	0.81	0.37	0.36	0.40	0.98	1.46
0.20	1.22	1.18	0.74	0.34	0.33	0.36	0.88	1.31
0.40	1.11	1.01	0.62	0.29	0.29	0.31	0.75	1.13
0.60	0.92	0.83	0.54	0.25	0.25	0.27	0.64	0.92
0.80	0.80	0.68	0.47	0.23	0.23	0.25	0.57	0.77
1.00	0.64	0.61	0.41	0.20	0.21	0.22	0.48	0.66
1.20	0.46	0.47	0.36	0.18	0.21	0.21	0.44	0.57
1.40	0.35	0,43	0.33	0.17	0.20	0.20	0.39	0.48
1.60	0.26	0.38	0.31	0.17	0.18	0.18	0.34	0.42
1.80	0.20	0.32	0.28	0.16	0.18	0.17	0.31	0.36
2.00	0.18	0.30	0.24	0.14	0.17	0.16	0.29	0.30

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2g: Orientation sector winter exposure factor (E_W) — suspended floor: climate zone 4

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.38	1.12	1.00	0.71	0.56	0.87	1.02	1.26
0.05	1.35	1.08	0.91	0.60	0.46	0.73	0.95	1.21
0.10	1.34	1.04	0.89	0.56	0.45	0.69	0.90	1.17
0.20	1.13	0.95	0.80	0.51	0.40	0.62	0.82	1.05
0.40	1.04	0.81	0.67	0.43	0.35	0.53	0.70	0.91
0.60	0.85	0.67	0.59	0.38	0.30	0.47	0.59	0.74
0.80	0.74	0.55	0.52	0.34	0.29	0.42	0.53	0.62
1.00	0.60	0.49	0.44	0.31	0.26	0.38	0.44	0.53
1.20	0.43	0.38	0.40	0.27	0.26	0.36	0.41	0.46
1.40	0.33	0.35	0.36	0.25	0.24	0.33	0.36	0.39
1.60	0.24	0.31	0.34	0.25	0.22	0.31	0.31	0.34
1.80	0.18	0.26	0.30	0.24	0.22	0.29	0.29	0.29
2.00	0.17	0.24	0.26	0.22	0.21	0.27	0.26	0.24

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2h: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 5 (lightweight wall)

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.61	1.55	1.00	0.49	0.44	0.47	1.02	1.58
0.05	1.56	1.49	0.91	0.41	0.37	0.40	0.94	1.51
0.10	1.56	1.43	0.86	0.39	0.36	0.38	0.90	1.47
0.20	1.30	1.27	0.77	0.35	0.32	0.34	0.80	1.32
0.40	1.19	1.05	0.64	0.30	0.28	0.29	0.66	1.10
0.60	0.97	0.87	0.52	0.26	0.25	0.25	0.56	0.90
0.80	0.78	0.71	0.46	0.24	0.23	0.23	0.50	0.73
1.00	0.64	0.55	0.36	0.21	0.22	0.20	0.43	0.63
1.20	0.43	0.48	0.33	0.20	0.20	0.19	0.35	0.50
1.40	0.32	0.36	0.27	0.19	0.19	0.18	0.34	0.43
1.60	0.22	0.32	0.25	0.18	0.17	0.16	0.28	0.36
1.80	0.18	0.26	0.21	0.16	0.17	0.16	0.24	0.32
2.00	0.14	0.20	0.20	0.15	0.17	0.14	0.23	0.24

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2i: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 5 (concrete or masonry wall)

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.61	1.55	1.00	0.43	0.33	0.43	1.11	1.66
0.05	1.56	1.49	0.91	0.36	0.28	0.36	1.01	1.59
0.10	1.56	1.43	0.86	0.34	0.27	0.35	0.98	1.54
0.20	1.30	1.27	0.77	0.31	0.24	0.31	0.87	1.39
0.40	1.19	1.05	0.64	0.26	0.21	0.26	0.72	1.16
0.60	0.97	0.87	0.52	0.23	0.19	0.23	0.61	0.95
0.80	0.78	0.71	0.46	0.21	0.17	0.21	0.55	0.77
1.00	0.64	0.55	0.36	0.19	0.16	0.19	0.47	0.66
1.20	0.43	0.48	0.33	0.18	0.15	0.18	0.38	0.53
1.40	0.32	0.36	0.27	0.17	0.14	0.17	0.36	0.45
1.60	0.22	0.32	0.25	0.15	0.13	0.14	0.30	0.38
1.80	0.18	0.26	0.21	0.14	0.13	0.14	0.26	0.34
2.00	0.14	0.20	0.20	0.13	0.13	0.13	0.25	0.25

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2j: Orientation sector winter exposure factor (E_W) — suspended floor: climate zone 5 (lightweight wall)

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.61	1.20	1.00	0.65	0.48	0.95	1.19	1.47
0.05	1.56	1.15	0.91	0.55	0.40	0.81	1.09	1.40
0.10	1.56	1.11	0.86	0.52	0.39	0.78	1.05	1.37

P/H	North	North east	East	South east	South	South west	West	North west
0.20	1.30	0.98	0.77	0.47	0.35	0.68	0.94	1.23
0.40	1.19	0.81	0.64	0.40	0.30	0.59	0.77	1.02
0.60	0.97	0.67	0.52	0.35	0.27	0.51	0.66	0.84
0.80	0.78	0.55	0.46	0.32	0.25	0.46	0.59	0.68
1.00	0.64	0.42	0.36	0.29	0.23	0.42	0.50	0.59
1.20	0.43	0.37	0.33	0.27	0.22	0.39	0.41	0.46
1.40	0.32	0.28	0.27	0.25	0.21	0.37	0.39	0.40
1.60	0.22	0.24	0.25	0.23	0.18	0.32	0.32	0.33
1.80	0.18	0.20	0.21	0.22	0.18	0.32	0.28	0.30
2.00	0.14	0.15	0.20	0.20	0.18	0.29	0.27	0.22

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2k: Orientation sector winter exposure factor (E_W) — suspended floor: climate zone 5 (concrete or masonry wall)

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.71	1.24	1.00	0.63	0.44	0.94	1.19	1.54
0.05	1.66	1.19	0.91	0.53	0.37	0.80	1.09	1.47
0.10	1.66	1.14	0.86	0.50	0.36	0.77	1.05	1.43
0.20	1.39	1.01	0.77	0.45	0.32	0.68	0.94	1.28
0.40	1.27	0.84	0.64	0.39	0.28	0.58	0.77	1.07
0.60	1.03	0.69	0.52	0.34	0.25	0.51	0.66	0.87
0.80	0.83	0.57	0.46	0.31	0.23	0.46	0.59	0.71
1.00	0.68	0.43	0.36	0.27	0.22	0.41	0.50	0.61
1.20	0.46	0.38	0.33	0.26	0.20	0.39	0.41	0.49
1.40	0.34	0.28	0.27	0.24	0.19	0.36	0.39	0.42
1.60	0.24	0.25	0.25	0.23	0.17	0.31	0.32	0.35
1.80	0.19	0.21	0.21	0.21	0.17	0.31	0.28	0.31
2.00	0.15	0.16	0.20	0.19	0.17	0.29	0.27	0.23

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2l: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 6

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.52	1.44	1.28	0.77	0.77	0.74	1.32	1.45
0.05	1.47	1.36	1.17	0.65	0.65	0.63	1.22	1.38
0.10	1.46	1.31	1.12	0.61	0.61	0.59	1.14	1.35
0.20	1.25	1.18	0.99	0.54	0.54	0.53	1.05	1.23
0.40	1.14	1.02	0.85	0.46	0.47	0.45	0.90	1.04
0.60	0.98	0.87	0.72	0.39	0.41	0.38	0.78	0.90
0.80	0.86	0.74	0.61	0.36	0.38	0.36	0.69	0.75
1.00	0.69	0.58	0.54	0.32	0.34	0.31	0.59	0.66

P/H	North	North east	East	South east	South	South west	West	North west
1.20	0.56	0.54	0.46	0.31	0.31	0.30	0.54	0.55
1.40	0.42	0.41	0.42	0.27	0.31	0.28	0.48	0.49
1.60	0.35	0.37	0.35	0.26	0.29	0.25	0.42	0.42
1.80	0.26	0.30	0.34	0.24	0.27	0.23	0.41	0.38
2.00	0.20	0.27	0.32	0.22	0.25	023	0.36	0.30

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2m: Orientation sector winter exposure factor (E_W) — suspended floor: climate zone 6

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.62	1.31	1.16	0.72	0.49	0.90	1.10	1.44
0.05	1.56	1.24	1.06	0.60	0.41	0.76	1.01	1.37
0.10	1.55	1.19	1.02	0.57	0.39	0.72	0.95	1.34
0.20	1.33	1.07	0.90	0.51	0.35	0.64	0.88	1.23
0.40	1.22	0.93	0.77	0.43	0.30	0.54	0.75	1.04
0.60	1.04	0.79	0.65	0.37	0.26	0.46	0.65	0.90
0.80	0.92	0.67	0.55	0.33	0.24	0.44	0.58	0.75
1.00	0.73	0.53	0.49	0.30	0.22	0.38	0.49	0.65
1.20	0.60	0.50	0.42	0.29	0.20	0.36	0.45	0.55
1.40	0.45	0.38	0.38	0.25	0.20	0.34	0.40	0.49
1.60	0.37	0.34	0.32	0.24	0.18	0.30	0.35	0.42
1.80	0.27	0.28	0.30	0.22	0.17	0.28	0.34	0.38
2.00	0.21	0.25	0.29	0.21	0.16	0.28	0.30	0.30

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2n: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 7

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.87	1.92	1.20	0.52	0.46	0.53	1.13	1.80
0.05	1.81	1.83	1.12	0.44	0.38	0.45	1.04	1.73
0.10	1.81	1.80	1.06	0.41	0.36	0.42	0.99	1.69
0.20	1.70	1.68	0.99	0.37	0.33	0.38	0.90	1.54
0.40	1.46	1.46	0.84	0.32	0.27	0.32	0.75	1.36
0.60	1.34	1.28	0.73	0.28	0.25	0.28	0.66	1.15
0.80	1.14	1.10	0.64	0.25	0.22	0.25	0.59	1.00
1.00	1.04	0.98	0.59	0.22	0.21	0.22	0.51	0.85
1.20	0.82	0.82	0.49	0.21	0.20	0.21	0.45	0.76
1.40	0.75	0.80	0.48	0.19	0.18	0.20	0.41	0.58
1.60	0.58	0.58	0.44	0.18	0.17	0.17	0.38	0.54
1.80	0.47	0.55	0.35	0.17	0.17	0.17	0.35	0.47
2.00	0.35	0.46	0.35	0.15	0.16	0.17	0.30	0.40

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2o: Orientation sector winter exposure factor (E_W) — suspended floor: climate zone 7

P/H	North	North east	East	South east	South	South west	West	North east
0.00	1.87	1.43	1.20	0.75	0.53	0.93	1.13	1.62
0.05	1.81	1.37	1.12	0.63	0.44	0.78	1.04	1.56
0.10	1.81	1.34	1.06	0.59	0.42	0.73	0.99	1.53
0.20	1.70	1.25	0.99	0.53	0.38	0.66	0.90	1.38
0.40	1.46	1.09	0.84	0.45	0.32	0.56	0.75	1.22
0.60	1.34	0.95	0.73	0.40	0.29	0.49	0.66	1.04
0.80	1.14	0.82	0.64	0.36	0.26	0.44	0.59	0.90
1.00	1.04	0.73	0.59	0.32	0.24	0.39	0.51	0.77
1.20	0.82	0.61	0.49	0.30	0.23	0.37	0.45	0.68
1.40	0.75	0.60	0.48	0.28	0.21	0.34	0.41	0.52
1.60	0.58	0.43	0.44	0.26	0.20	0.29	0.38	0.49
1.80	0.47	0.41	0.35	0.24	0.20	0.29	0.35	0.42
2.00	0.35	0.34	0.35	0.22	0.18	0.29	0.30	0.36

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2p: Orientation sector winter exposure factor (E_W) — floor in direct contact with the ground: climate zone 8

P/H	North	North east	East	South east	South	South west	West	North west
0.00	2.30	2.40	1.66	0.67	0.36	0.65	1.59	2.30
0.05	2.23	2.28	1.50	0.56	0.30	0.54	1.43	2.19
0.10	2.20	2.20	1.44	0.53	0.28	0.51	1.37	2.11
0.20	1.86	1.98	1.29	0.47	0.26	0.46	1.23	1.89
0.40	1.68	1.65	1.05	0.40	0.22	0.39	1.00	1.56
0.60	1.40	1.34	0.90	0.34	0.19	0.33	0.86	1.29
0.80	1.19	1.10	0.76	0.30	0.18	0.29	0.71	1.06
1.00	0.94	0.96	0.66	0.29	0.16	0.26	0.59	0.91
1.20	0.64	0.75	0.57	0.26	0.15	0.25	0.53	0.74
1.40	0.52	0.68	0.51	0.24	0.14	0.23	0.47	0.60
1.60	0.37	0.50	0.43	0.23	0.14	0.21	0.43	0.50
1.80	0.27	0.45	0.39	0.20	0.13	0.19	0.37	0.46
2.00	0.23	0.41	0.33	0.20	0.12	0.19	0.33	0.36

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2q: Orientation sector winter exposure factor (E_W) — suspended floor — climate zone 8

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.39	1.27	1.22	0.80	0.59	0.90	1.05	1.28
0.05	1.35	1.21	1.10	0.66	0.49	0.74	0.95	1.22

P/H	North	North east	East	South east	South	South west	West	North west
0.10	1.33	1.17	1.05	0.63	0.46	0.71	0.91	1.17
0.20	1.12	1.05	0.95	0.56	0.42	0.63	0.82	1.05
0.40	1.02	0.88	0.77	0.47	0.35	0.53	0.66	0.87
0.60	0.85	0.71	0.66	0.41	0.31	0.46	0.57	0.72
0.80	0.72	0.58	0.56	0.36	0.29	0.40	0.47	0.59
1.00	0.57	0.51	0.48	0.34	0.26	0.36	0.39	0.51
1.20	0.39	0.40	0.42	0.30	0.25	0.34	0.35	0.41
1.40	0.32	0.36	0.38	0.29	0.23	0.32	0.31	0.33
1.60	0.22	0.27	0.32	0.27	0.22	0.29	0.29	0.28
1.80	0.17	0.24	0.29	0.24	0.21	0.27	0.25	0.25
2.00	0.14	0.22	0.24	0.24	0.20	0.27	0.22	0.20

Table Notes

For P/H between those shown in this Table, either use the next highest P/H or interpolate.

Table 13.3.2r: Bedroom conductance factor (BC)

Climate zone	Floor in direct contact with the ground	Suspended floor
2	0.90	0.70
3	1.11	0.70
4	1.10	0.95
5 (lightweight or masonry veneer wall)	1.20	0.60
5 (concrete or masonry wall)	0.70	1.20
6	1.10	1.10
7	1.08	0.80
8	0.83	0.82

Table 13.3.2s: Orientation sector conductance factor (OC): climate zone 2

Floor type	North	North east	East	South east	South	South west	West	North east
Floor in direct contact with the ground	1.11	0.97	0.83	0.81	0.79	0.82	0.84	0.98
Suspended floor	1.20	0.98	0.75	0.75	0.75	0.78	0.80	1.00

Table 13.3.2t: Orientation sector conductance factor (OC): climate zone 3

Floor type	North	North east	East	South east	South	South west	West	North west
Floor in direct contact with the ground	1.25	1.08	0.91	0.86	0.80	1.00	1.20	1.23
Suspended floor	1.20	1.15	1.10	0.95	0.80	1.01	1.21	1.21

Table 13.3.2u: Orientation sector conductance factor (OC): climate zone 4

Floor type	North	North east	East	South east	South	South west	West	North west
Floor in direct contact with the ground	1.15	0.93	0.70	0.75	0.80	0.80	0.80	0.98
Suspended floor	1.20	1.05	0.90	0.90	0.90	0.90	0.90	1.05

Table 13.3.2v: Orientation sector conductance factor (OC): climate zone 5

Wall construction	Floor type	North	North east	East	South east	South	South west	West	North west
Lightweight or masonry veneer	Floor in direct contact with the ground	1.20	1.00	0.80	0.75	0.70	0.75	0.80	1.00
Lightweight or masonry veneer	Suspended floor	1.20	1.00	0.80	0.80	0.80	0.85	0.90	1.05
Concrete or masonry	Floor in direct contact with the ground	1.00	0.90	0.80	0.85	0.90	0.90	0.90	0.95
Concrete or masonry	Suspended floor	1.00	0.98	0.95	0.93	0.90	0.93	0.95	0.98

Table 13.3.2w: Orientation sector conductance factor (OC): climate zone 6

Floor type	North	North east	East	South east	South	South west	West	North west
Floor in direct contact with the ground	1.05	0.98	0.90	0.85	0.80	0.85	0.90	0.98
Suspended floor	1.00	0.90	0.80	0.80	0.80	0.80	0.80	0.90

Table 13.3.2x: Orientation sector conductance factor (OC): climate zone 7

Floor type	North	North east	East	South east	South	South west	West	North west
Floor in direct contact with the ground	1.30	1.05	0.80	0.80	0.80	0.80	0.80	1.05
Suspended floor	1.30	1.10	0.90	0.90	0.90	0.90	0.90	1.10

Table 13.3.2y: Orientation sector conductance factor (OC): climate zone 8

Floor type	North	North east	East	South east	South	South west	West	North west
Floor in direct contact with the ground	1.30	1.10	0.90	0.88	0.85	0.88	0.90	1.10
Suspended floor	1.20	1.00	0.80	0.75	0.70	0.75	0.80	1.00

Table 13.3.2z: Winter solar heat gain factors: climate zone 2

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom and a room which is not a *conditioned space*	0.40	1.00
Bedroom solar heat gain factor (BS_W)	1.80	1.02
Level factor (L_W) for all floor levels above the lowest floor	1.10	1.20
Frame factor (F_W) for frames with a solar absorptance of ≤ 0.40	0.98	0.97
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	0.99
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.03	1.03
Floor factor (for tiled or vinyl covered floor) (H_W)	1.14	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.2aa: Winter solar heat gain factor: climate zone 3

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom and a room which is not a *conditioned space*	0.26	1.00
Bedroom solar heat gain factor (BS_W)	0.79	0.50
Level factor (L_W) for all levels above the lowest floor	1.19	1.30
Frame factor (F_W) for frames with a solar absorptance of ≤ 0.40	0.97	0.97
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	1.00
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.04	1.04
Floor factor (for tiled or vinyl covered floor) (H_W)	1.15	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.2ab: Winter solar heat gain factors: climate zone 4

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom and a room which is not a *conditioned space*	0.60	1.00
Bedroom solar heat gain factor (BS_W)	0.70	0.71
Level factor (L_W) for all levels above the lowest floor	1.30	1.40
Frame factor (F_W) for frames with a solar absorptance of ≤ 0.40	0.98	0.98
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	1.00
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.04	1.04
Floor factor (for tiled or vinyl covered floor) (H_W)	1.03	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.2ac: Winter solar heat gain factors: climate zone 5 — lightweight or masonry veneer wall

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom and a room which is not a *conditioned space*	0.60	1.00
Bedroom solar heat gain factor (BS_W)	1.20	0.57
Level factor (L_W) for all floor levels above the lowest floor	1.30	1.20
Frame factor (F_W) for frames with a solar absorptance of ≤ 0.40	0.97	0.90
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	0.93
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.04	1.00
Floor factor (for tiled or vinyl covered floor) (H_W)	1.05	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.2ad: Winter solar heat gain factors: climate zone 5 — concrete or masonry wall

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom and a room which is not a *conditioned space*	0.40	0.30
Bedroom solar heat gain factor (BS_W)	1.00	0.60
Level factor (L_W) for all floor levels above the lowest floor	1.40	1.10
Frame factor (F_W) for frames with a solar absorptance of ≤ 0.40	0.97	0.90
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	1.00
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.04	1.00
Floor factor (for tiled or vinyl covered floor) (H_W)	1.10	Not applicable

Table Notes

(1) This Table only applies to dwellings with both high mass external and internal walls, for example masonry *cavity* walls and masonry internal walls.

(2) Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.2ae: Winter solar heat gain factors: climate zone 6

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom and a room which is not a *conditioned space*	0.60	1.00
Bedroom solar heat gain factor (BS_W)	0.70	1.35
Level factor (L_W) for all floor levels above the lowest floor	1.30	1.40
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	0.93	0.83
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	0.96	0.96
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.00	1.00
Floor factor (for tiled or vinyl covered floor) (H_W)	0.95	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.2af: Winter solar heat gain factors: climate zone 7

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom and a room which is not a *conditioned space*	0.60	1.00

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Bedroom solar heat gain factor (BS_W)	1.22	0.50
Level factor (L_W) for all floor levels above the lowest floor	1.30	1.10
Frame factor (F_W) for frames with a solar absorptance of ≤ 0.40	0.97	0.97
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	1.00
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.05	1.05
Floor factor (for tiled or vinyl covered floor) (H_W)	1.03	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.2ag: Winter solar heat gain factors: climate zone 8

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_W) for a bedroom or a which is not a *conditioned space*	0.50	1.00
Bedroom solar heat gain factor (BS_W)	1.52	0.32
Level factor (L_W) for all floor levels above the lowest floor	1.15	0.70
Frame factor (F_W) for frames with a solar absorptance of ≤ 0.40	0.96	0.96
Frame factor (F_W) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	1.00
Frame factor (F_W) for frames with a solar absorptance of ≥ 0.68	1.00	1.00
(H_W)	0.91	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Figure 13.3.2a: Orientation sectors

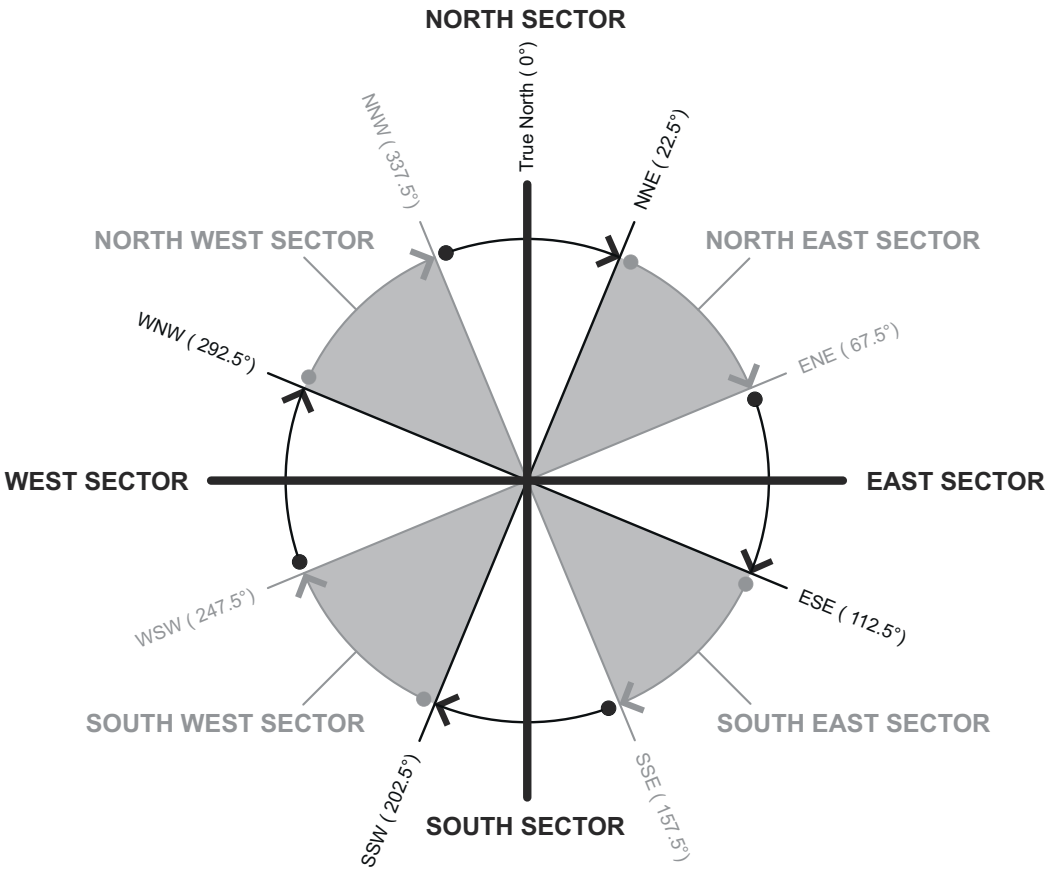


Figure Notes

(1) The orientation sector for a wall or *glazing* element is the sector that contains a line drawn perpendicular to the face of the wall or *glazing* element.

(2) This Figure is based on True North and all angles are measured clockwise from True North. Survey angles on site plans are usually marked in angles from True North. These angles can be used to establish True North for a particular site.

(3) Magnetic North, found by a magnetic compass, varies from True North over time and by different amounts in different locations. Magnetic North is not an acceptable approximation of True North.

(4) The eight orientation sectors shown in this Figure do not overlap at their boundaries. For example, north sector begins just clockwise after the NNW line and ends exactly on the NNE line. The start and end of other sectors are determined in a similar way, as indicated by the other curved arrows.

Figure 13.3.2b: Method of measuring P and H

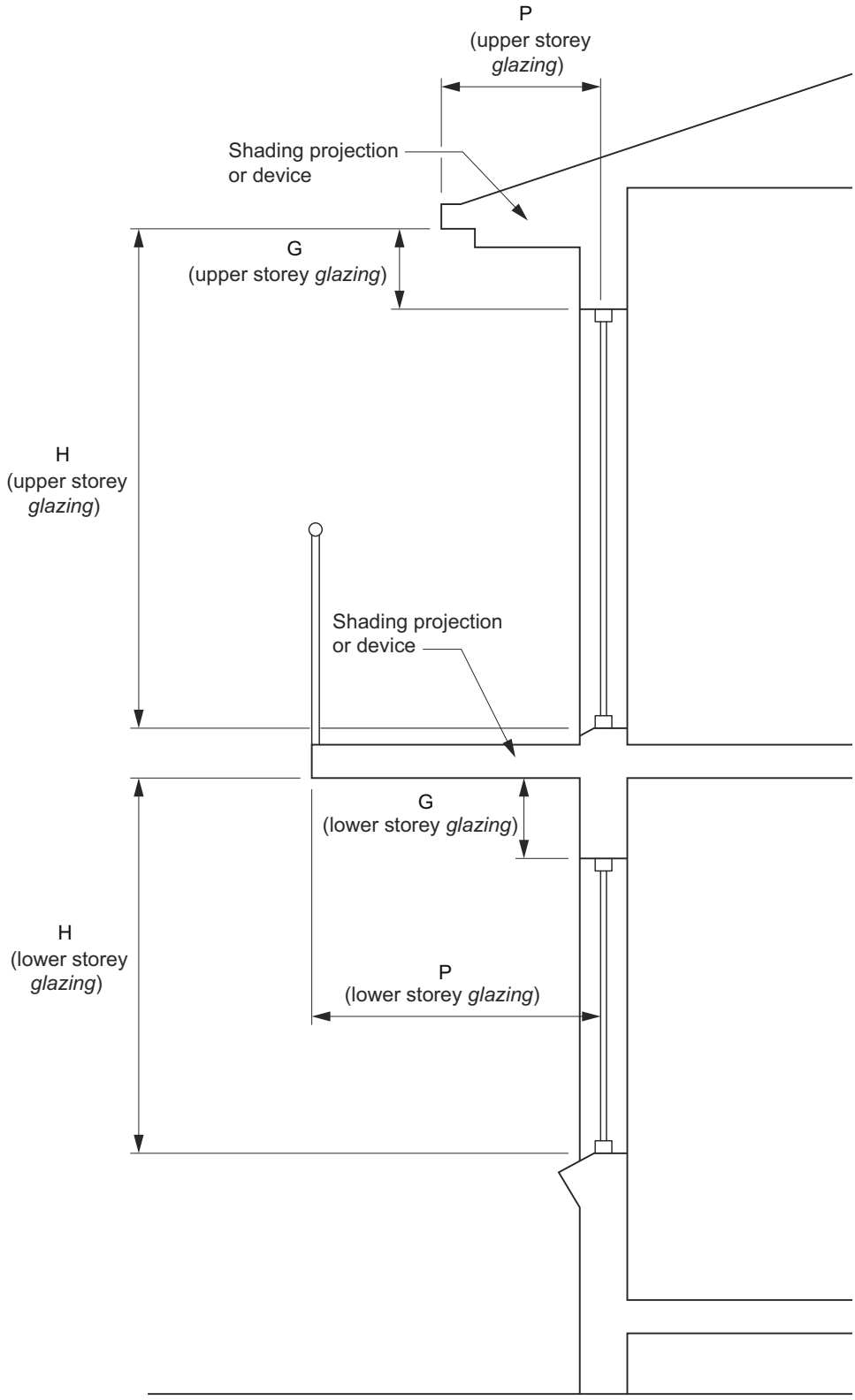


Figure Notes

(1) An external shading device that complies with 13.3.4(b) is considered to achieve a P/H value of 2.00.

(2) Where G exceeds 500 mm, the value of P must be halved.

Explanatory Information

- There is little or no need for heating at any time of the year in *climate zone* 1. Therefore, this clause does not apply in *climate zone* 1.
- For the bedroom conductance factor (BC), the conductance heat loss from *windows* in bedrooms and unconditioned areas has less impact on the heating loads of a dwelling than conductance heat loss from *windows* in a living area due to the different time of day that the rooms are occupied. Bedrooms are typically not occupied during the day when outdoor temperatures and solar heat gains are higher.
- For the orientation sector conductance factor (OC) in a room which has higher solar heat gain through the *glazing*, the average temperature in the room will be higher than an orientation which has lower solar heat gain through the *glazing*.

13.3.3 External glazing — summer

[New for 2022]

(1) In *climate zones* 1 to 7, the aggregate solar heat gain of the *glazing* in each *storey* of a building, including any *mezzanine*, must—

(a) not exceed the allowance resulting from multiplying the *floor area* of each *storey*, measured within the enclosing walls, by the constant C_{SHGC} obtained from Table 13.3.3a; and

(b) be calculated in accordance with the following formula:

$$(A_1 \times SHGC_1 \times E_{S1} \times R_{S1} \times L_{S1} \times F_{S1} \times H_{S1}) + (A_2 \times SHGC_2 \times E_{S2} \times R_{S2} \times L_{S2} \times F_{S2} \times H_{S2}) + \ldots$$

(2) In the formula at (1)(b)—

(a) $A_{1,2,etc}$ = the area of each *glazing* element; and

(b) $SHGC_{1,2,etc}$ = the *Total System SHGC* for each *glazing* element not exceeding 0.7; and

(c) $E_{S1,S2,etc}$ = the summer exposure factor for each *glazing* element obtained from Table 13.3.3b, 13.3.3c, 13.3.3d, 13.3.3e, 13.3.3f, 13.3.3g, 13.3.3h, 13.3.3i, 13.3.3j, 13.3.3k, 13.3.3l, 13.3.3m, 13.3.3n, 13.3.3o, 13.3.3p or 13.3.3q; and

(d) $R_{S1,S2,etc}$ = the factor in Table 13.3.3r, 13.3.3s, 13.3.3t, 13.3.3u, 13.3.3v, 13.3.3w, 13.3.3x or 13.3.3y for each *glazing* element located in a bedroom or room which is not a *conditioned space*; and

(e) $L_{S1,S2,etc}$ = the factor in Table 13.3.3r, 13.3.3s, 13.3.3t, 13.3.3u, 13.3.3v, 13.3.3w, 13.3.3x or 13.3.3y for each *glazing* element located on a floor level above the lowest floor; and

(f) $F_{S2,S2,etc}$ = the frame factor in Table 13.3.3r, 13.3.3s, 13.3.3t, 13.3.3u, 13.3.3v, 13.3.3w, 13.3.3x or 13.3.3y for each *glazing* element; and

(g) $H_{S1,S2,etc}$ = the floor factor in Table 13.3.3r, 13.3.3s, 13.3.3t, 13.3.3u, 13.3.3v, 13.3.3w, 13.3.3x or 13.3.3y for each *glazing* element.

(3) For the purposes of this clause—

(a) orientation sectors must be determined in accordance with Figure 13.3.2a; and

(b) P/H must be measured in accordance with Figure 13.3.2b.

Table 13.3.3a: Constant for solar heat gain coefficient (C_{SHGC}): climate zones 1 to 7

Floor type	*Ventilation opening* area	*Climate zone*							
		1	2	3	4	5 (lightweight wall)	5 (concrete or brick wall)	6	7
Floor in direct contact with the ground	5%	0.0672	0.0595	0.0945	0.0604	0.0484	0.0657	0.0786	0.0762
	10%	0.0718	0.0640	0.0985	0.0626	0.0538	0.0695	0.0817	0.0821
	15%	0.0770	0.0682	0.1001	0.0641	0.0569	0.0714	0.0832	0.0871
	20%	0.0827	0.0719	0.1007	0.0650	0.0587	0.0723	0.0840	0.0912
Suspended floor	5%	0.0431	0.0324	0.0768	0.0651	0.0334	0.0630	0.0963	0.0750
	10%	0.0497	0.0404	0.0783	0.0697	0.0426	0.0683	0.0989	0.0778
	15%	0.0541	0.0458	0.0792	0.0721	0.0477	0.0710	0.1001	0.0789
	20%	0.0570	0.0494	0.0796	0.0734	0.0505	0.0723	0.1007	0.0793

Table Notes

(1) The *ventilation opening* area is the total area of each *ventilation opening* divided by the *floor area* of the storey, including any *mezzanine*.

(2) No *window* may have a design *ventilation opening* greater than 90% because the window frame will always obstruct some of the area of the opening.

(3) Where the *ventilation opening* area is more than 20%, the C_{SHGC} value corresponding to 20% ventilation opening area is to be used.

(4) Where the floor construction of a storey, including any *mezzanine*, is partly in direct contact with the ground and partly suspended, the constant is to be—

(a) interpolated between the constants in proportion to the *floor area* of each floor type; or

(b) the constant for a suspended floor.

(5) If the *ventilation opening* area is between the values shown in this Table, the constant may be interpolated.

Table 13.3.3b: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 1

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.35	1.64	1.69	1.62	1.13	1.65	1.72	1.66
0.05	1.14	1.45	1.56	1.47	0.98	1.52	1.60	1.46
0.10	1.07	1.33	1.45	1.40	0.88	1.42	1.50	1.35
0.20	0.96	1.15	1.32	1.23	0.72	1.22	1.30	1.17
0.40	0.78	0.88	1.03	0.90	0.55	0.98	1.08	0.92
0.60	0.65	0.72	0.86	0.77	0.44	0.78	0.86	0.74
0.80	0.57	0.61	0.69	0.61	0.39	0.68	0.75	0.62
1.00	0.49	0.51	0.59	0.54	0.33	0.56	0.62	0.55
1.20	0.47	0.45	0.48	0.43	0.29	0.51	0.55	0.51
1.40	0.44	0.41	0.42	0.39	0.29	0.42	0.48	0.43
1.60	0.39	0.35	0.37	0.34	0.23	0.38	0.44	0.41
1.80	0.34	0.35	0.35	0.29	0.22	0.36	0.39	0.35
2.00	0.31	0.33	0.30	0.27	0.21	0.31	0.36	0.33

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3c: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 1

P/H	North	North east	East	South East	South	South west	West	North west
0.00	0.61	0.96	1.43	1.19	0.70	1.15	1.32	0.92
0.05	0.51	0.84	1.32	1.08	0.61	1.06	1.23	0.81
0.10	0.48	0.78	1.23	1.03	0.55	0.99	1.15	0.75
0.20	0.43	0.67	1.12	0.90	0.45	0.85	1.00	0.65
0.40	0.35	0.51	0.88	0.66	0.34	0.68	0.83	0.51
0.60	0.29	0.42	0.73	0.57	0.28	0.54	0.66	0.41
0.80	0.26	0.35	0.59	0.45	0.24	0.47	0.58	0.35
1.00	0.22	0.30	0.50	0.39	0.20	0.39	0.48	0.30
1.20	0.21	0.26	0.41	0.32	0.18	0.35	0.42	0.28
1.40	0.20	0.24	0.36	0.29	0.18	0.29	0.37	0.24
1.60	0.18	0.21	0.31	0.25	0.15	0.26	0.34	0.23
1.80	0.15	0.21	0.30	0.21	0.14	0.25	0.30	0.20
2.00	0.14	0.19	0.26	0.20	0.13	0.22	0.28	0.18

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3d: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 2

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.59	1.08	1.50	0.93	0.40	1.05	1.78	1.19
0.05	0.49	0.94	1.35	0.82	0.33	0.95	1.64	1.06
0.10	0.45	0.87	1.28	0.77	0.31	0.88	1.52	0.97
0.20	0.39	0.76	1.13	0.68	0.28	0.79	1.33	0.84

P/H	North	North east	East	South east	South	South west	West	North west
0.40	0.32	0.57	0.90	0.54	0.22	0.63	1.10	0.65
0.60	0.27	0.45	0.74	0.44	0.18	0.52	0.89	0.48
0.80	0.24	0.38	0.62	0.36	0.16	0.43	0.77	0.42
1.00	0.21	0.31	0.53	0.31	0.13	0.38	0.63	0.34
1.20	0.19	0.28	0.43	0.27	0.12	0.32	0.55	0.30
1.40	0.17	0.25	0.39	0.25	0.12	0.28	0.48	0.26
1.60	0.16	0.24	0.34	0.22	0.10	0.25	0.41	0.24
1.80	0.14	0.21	0.30	0.20	0.09	0.24	0.37	0.22
2.00	0.14	0.19	0.27	0.19	0.09	0.21	0.36	0.20

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3e: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 2

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.43	0.81	1.16	0.75	0.36	1.06	1.88	1.11
0.05	0.36	0.71	1.05	0.67	0.30	0.96	1.72	0.99
0.10	0.33	0.66	0.99	0.62	0.29	0.89	1.60	0.90
0.20	0.28	0.57	0.87	0.55	0.25	0.80	1.40	0.78
0.40	0.23	0.43	0.69	0.44	0.20	0.64	1.16	0.60
0.60	0.20	0.34	0.57	0.36	0.17	0.52	0.94	0.45
0.80	0.17	0.29	0.48	0.30	0.15	0.44	0.81	0.39
1.00	0.16	0.23	0.41	0.25	0.12	0.38	0.66	0.32
1.20	0.14	0.21	0.33	0.22	0.11	0.32	0.57	0.28
1.40	0.13	0.19	0.30	0.20	0.11	0.29	0.50	0.24
1.60	0.11	0.18	0.27	0.18	0.10	0.26	0.43	0.22
1.80	0.10	0.16	0.23	0.16	0.09	0.25	0.39	0.20
2.00	0.10	0.15	0.21	0.15	0.08	0.21	0.38	0.19

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3f: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 3

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.95	1.51	1.70	1.53	0.92	1.45	1.50	1.41
0.05	0.80	1.36	1.58	1.40	0.80	1.31	1.39	1.26
0.10	0.75	1.23	1.50	1.33	0.76	1.24	1.31	1.16
0.20	0.65	1.06	1.32	1.17	0.64	1.09	1.17	1.02
0.40	0.54	0.81	1.06	0.92	0.53	0.90	0.92	0.78
0.60	0.48	0.62	0.89	0.75	0.43	0.71	0.78	0.62
0.80	0.41	0.51	0.71	0.61	0.38	0.63	0.66	0.49
1.00	0.34	0.42	0.60	0.52	0.34	0.54	0.58	0.41
1.20	0.32	0.38	0.50	0.44	0.29	0.46	0.47	0.36
1.40	0.29	0.32	0.42	0.40	0.28	0.40	0.45	0.32

P/H	North	North east	East	South east	South	South west	West	North west
1.60	0.29	0.29	0.40	0.35	0.22	0.39	0.39	0.29
1.80	0.26	0.28	0.36	0.31	0.22	0.35	0.36	0.27
2.00	0.26	0.26	0.30	0.31	0.21	0.30	0.30	0.24

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3g: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 3

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.78	1.30	1.56	1.36	0.79	1.16	1.09	1.11
0.05	0.66	1.18	1.45	1.24	0.68	1.05	1.01	0.99
0.10	0.62	1.06	1.38	1.17	0.65	0.99	0.95	0.91
0.20	0.53	0.91	1.21	1.04	0.55	0.87	0.85	0.80
0.40	0.45	0.70	0.97	0.82	0.46	0.72	0.67	0.62
0.60	0.39	0.54	0.81	0.67	0.37	0.57	0.57	0.48
0.80	0.34	0.44	0.65	0.54	0.32	0.50	0.48	0.39
1.00	0.28	0.36	0.55	0.46	0.29	0.43	0.42	0.32
1.20	0.27	0.33	0.46	0.39	0.25	0.37	0.34	0.29
1.40	0.24	0.28	0.39	0.36	0.24	0.32	0.33	0.25
1.60	0.24	0.25	0.36	0.31	0.19	0.31	0.28	0.23
1.80	0.21	0.24	0.33	0.28	0.19	0.28	0.26	0.21
2.00	0.21	0.23	0.28	0.28	0.18	0.24	0.22	0.19

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3h: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 4

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.83	1.13	1.05	0.68	0.31	0.99	1.90	1.46
0.05	0.70	1.05	0.98	0.63	0.27	0.91	1.77	1.33
0.10	0.64	0.95	0.93	0.59	0.25	0.85	1.70	1.22
0.20	0.49	0.83	0.84	0.53	0.23	0.76	1.52	1.05
0.40	0.35	0.63	0.69	0.44	0.19	0.62	1.23	0.81
0.60	0.31	0.48	0.56	0.36	0.16	0.53	1.04	0.59
0.80	0.28	0.36	0.47	0.32	0.14	0.45	0.86	0.47
1.00	0.23	0.29	0.41	0.27	0.12	0.39	0.74	0.39
1.20	0.22	0.25	0.35	0.24	0.11	0.35	0.65	0.33
1.40	0.18	0.22	0.29	0.22	0.09	0.33	0.55	0.27
1.60	0.18	0.19	0.29	0.20	0.09	0.29	0.48	0.26
1.80	0.16	0.17	0.24	0.18	0.08	0.25	0.46	0.22
2.00	0.15	0.16	0.21	0.15	0.08	0.24	0.38	0.21

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3i: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 4

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.79	1.13	1.12	0.68	0.29	0.64	1.05	1.06
0.05	0.66	1.05	1.05	0.63	0.25	0.59	0.98	0.97
0.10	0.61	0.95	0.99	0.59	0.23	0.55	0.94	0.89
0.20	0.52	0.83	0.90	0.53	0.21	0.49	0.84	0.77
0.40	0.43	0.63	0.74	0.44	0.17	0.40	0.68	0.59
0.60	0.36	0.48	0.59	0.36	0.15	0.34	0.58	0.43
0.80	0.32	0.36	0.50	0.32	0.13	0.29	0.47	0.34
1.00	0.29	0.29	0.44	0.27	0.11	0.25	0.41	0.29
1.20	0.25	0.25	0.37	0.24	0.10	0.23	0.36	0.24
1.40	0.23	0.22	0.31	0.22	0.09	0.21	0.30	0.20
1.60	0.21	0.19	0.30	0.20	0.08	0.19	0.26	0.19
1.80	0.19	0.17	0.26	0.18	0.07	0.16	0.26	0.16
2.00	0.19	0.16	0.22	0.15	0.07	0.16	0.21	0.15

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3j: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 5 (lightweight or masonry veneer wall)

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.62	0.79	0.83	0.67	0.48	1.04	1.69	1.19
0.05	0.52	0.70	0.75	0.60	0.40	0.92	1.55	1.07
0.10	0.47	0.64	0.71	0.55	0.38	0.86	1.44	0.96
0.20	0.38	0.55	0.62	0.49	0.34	0.76	1.29	0.85
0.40	0.29	0.42	0.50	0.40	0.27	0.62	1.05	0.64
0.60	0.26	0.33	0.41	0.33	0.23	0.51	0.85	0.49
0.80	0.23	0.27	0.35	0.28	0.20	0.43	0.68	0.41
1.00	0.20	0.22	0.29	0.24	0.18	0.37	0.60	0.32
1.20	0.18	0.19	0.25	0.21	0.15	0.33	0.52	0.28
1.40	0.16	0.17	0.22	0.19	0.14	0.29	0.44	0.25
1.60	0.15	0.16	0.20	0.16	0.13	0.27	0.39	0.22
1.80	0.14	0.15	0.18	0.15	0.12	0.23	0.35	0.21
2.00	0.13	0.12	0.17	0.15	0.11	0.21	0.33	0.19

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3k: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 5 (concrete or masonry wall)

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.98	1.14	1.07	0.60	0.24	0.78	1.50	1.36
0.05	0.83	1.01	0.96	0.53	0.20	0.69	1.37	1.22
0.10	0.76	0.92	0.91	0.49	0.19	0.65	1.28	1.10
0.20	0.61	0.80	0.80	0.44	0.17	0.57	1.14	0.98

P/H	North	North east	East	South east	South	South west	West	North west
0.40	0.47	0.61	0.64	0.36	0.13	0.47	0.93	0.73
0.60	0.42	0.48	0.52	0.29	0.12	0.38	0.75	0.56
0.80	0.36	0.39	0.45	0.25	0.10	0.32	0.60	0.47
1.00	0.31	0.33	0.38	0.21	0.09	0.28	0.53	0.36
1.20	0.29	0.27	0.32	0.19	0.08	0.25	0.46	0.32
1.40	0.25	0.24	0.29	0.17	0.07	0.22	0.39	0.28
1.60	0.24	0.23	0.26	0.14	0.06	0.20	0.35	0.25
1.80	0.22	0.21	0.23	0.13	0.06	0.17	0.31	0.24
2.00	0.20	0.18	0.22	0.13	0.06	0.16	0.29	0.22

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3l: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 5 (lightweight or masonry veneer wall)

P/H	North	North east	East	South East	South	South west	West	North west
0.00	0.67	0.93	1.05	0.61	0.27	0.67	1.16	0.99
0.05	0.57	0.82	0.94	0.54	0.23	0.59	1.06	0.89
0.10	0.52	0.75	0.89	0.51	0.22	0.55	0.99	0.80
0.20	0.42	0.65	0.78	0.45	0.19	0.49	0.88	0.71
0.40	0.32	0.49	0.62	0.36	0.15	0.40	0.72	0.53
0.60	0.29	0.39	0.51	0.30	0.13	0.33	0.58	0.41
0.80	0.25	0.31	0.44	0.26	0.11	0.28	0.46	0.34
1.00	0.21	0.26	0.37	0.22	0.10	0.24	0.41	0.27
1.20	0.20	0.22	0.32	0.19	0.09	0.21	0.36	0.23
1.40	0.17	0.20	0.28	0.17	0.08	0.19	0.30	0.21
1.60	0.16	0.19	0.26	0.15	0.07	0.17	0.27	0.18
1.80	0.15	0.17	0.22	0.13	0.07	0.15	0.24	0.17
2.00	0.14	0.14	0.21	0.13	0.06	0.14	0.22	0.16

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3m: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 5 (concrete or masonry wall)

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.82	1.04	1.07	0.72	0.41	0.78	1.17	1.10
0.05	0.69	0.91	0.96	0.64	0.34	0.69	1.07	0.99
0.10	0.63	0.84	0.91	0.59	0.32	0.65	1.00	0.89
0.20	0.51	0.72	0.80	0.53	0.29	0.57	0.89	0.79
0.40	0.39	0.55	0.64	0.43	0.23	0.47	0.73	0.59
0.60	0.35	0.44	0.52	0.35	0.20	0.38	0.59	0.46
0.80	0.30	0.35	0.45	0.30	0.17	0.32	0.47	0.38
1.00	0.26	0.29	0.38	0.26	0.15	0.28	0.41	0.29
1.20	0.24	0.25	0.32	0.23	0.13	0.25	0.36	0.26

P/H	North	North east	East	South east	South	South west	West	North west
1.40	0.21	0.22	0.29	0.20	0.12	0.22	0.31	0.23
1.60	0.20	0.21	0.26	0.17	0.11	0.20	0.27	0.20
1.80	0.18	0.19	0.23	0.16	0.10	0.17	0.24	0.19
2.00	0.17	0.16	0.22	0.16	0.10	0.16	0.23	0.18

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3n: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 6

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.01	1.19	1.15	0.78	0.49	1.10	1.82	1.55
0.05	0.85	1.07	1.05	0.70	0.42	1.01	1.69	1.41
0.10	0.78	0.99	0.99	0.67	0.39	0.96	1.63	1.30
0.20	0.62	0.85	0.88	0.59	0.35	0.86	1.46	1.14
0.40	0.43	0.64	0.71	0.49	0.29	0.70	1.17	0.86
0.60	0.36	0.47	0.61	0.41	0.25	0.61	0.99	0.64
0.80	0.31	0.39	0.50	0.34	0.21	0.53	0.86	0.50
1.00	0.26	0.32	0.42	0.29	0.18	0.44	0.73	0.45
1.20	0.24	0.26	0.37	0.26	0.18	0.41	0.62	0.36
1.40	0.22	0.24	0.32	0.23	0.15	0.36	0.55	0.33
1.60	0.19	0.21	0.28	0.22	0.14	0.33	0.49	0.26
1.80	0.18	0.20	0.26	0.20	0.14	0.29	0.44	0.25
2.00	0.17	0.19	0.24	0.19	0.14	0.27	0.40	0.21

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3o: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 6

P/H	North	North east	East	South east	South	South west	West	North west
0.00	0.88	1.05	1.04	0.57	0.24	0.96	2.00	1.54
0.05	0.75	0.95	0.95	0.51	0.21	0.88	1.86	1.40
0.10	0.68	0.88	0.89	0.48	0.20	0.83	1.79	1.29
0.20	0.55	0.75	0.79	0.42	0.18	0.75	1.60	1.13
0.40	0.38	0.57	0.64	0.35	0.14	0.61	1.29	0.86
0.60	0.32	0.42	0.55	0.29	0.12	0.53	1.09	0.63
0.80	0.27	0.34	0.45	0.25	0.10	0.46	0.94	0.50
1.00	0.23	0.28	0.38	0.21	0.09	0.38	0.80	0.45
1.20	0.21	0.23	0.33	0.19	0.09	0.36	0.69	0.36
1.40	0.19	0.21	0.29	0.17	0.08	0.31	0.60	0.32
1.60	0.17	0.19	0.25	0.16	0.07	0.28	0.54	0.26
1.80	0.16	0.18	0.23	0.14	0.07	0.26	0.49	0.25
2.00	0.15	0.17	0.22	0.14	0.07	0.24	0.44	0.21

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3p: Orientation sector summer exposure factor (E_S) — floor in direct contact with the ground: climate zone 7

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.06	1.30	1.36	1.09	0.77	1.11	1.49	1.39
0.05	0.91	1.17	1.23	0.96	0.65	0.99	1.36	1.26
0.10	0.84	1.08	1.16	0.93	0.61	0.93	1.29	1.15
0.20	0.68	0.94	1.04	0.81	0.54	0.83	1.14	1.01
0.40	0.44	0.72	0.85	0.67	0.46	0.67	0.93	0.75
0.60	0.35	0.57	0.73	0.58	0.40	0.58	0.79	0.60
0.80	0.31	0.44	0.60	0.51	0.34	0.50	0.66	0.47
1.00	0.28	0.37	0.54	0.43	0.30	0.43	0.55	0.38
1.20	0.24	0.31	0.46	0.39	0.28	0.38	0.48	0.32
1.40	0.21	0.26	0.40	0.35	0.25	0.34	0.41	0.28
1.60	0.20	0.23	0.37	0.31	0.24	0.32	0.39	0.25
1.80	0.19	0.22	0.31	0.28	0.22	0.29	0.34	0.22
2.00	0.18	0.21	0.30	0.27	0.22	0.26	0.31	0.21

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3q: Orientation sector summer exposure factor (E_S) — suspended floor: climate zone 7

P/H	North	North east	East	South east	South	South west	West	North west
0.00	1.15	1.17	0.97	0.75	0.51	0.77	1.07	1.24
0.05	1.00	1.05	0.88	0.66	0.43	0.69	0.98	1.12
0.10	0.91	0.97	0.83	0.64	0.41	0.65	0.93	1.03
0.20	0.74	0.85	0.74	0.56	0.36	0.58	0.82	0.90
0.40	0.48	0.65	0.61	0.46	0.30	0.47	0.67	0.67
0.60	0.38	0.51	0.52	0.40	0.26	0.40	0.57	0.54
0.80	0.34	0.40	0.43	0.35	0.22	0.35	0.48	0.42
1.00	0.30	0.33	0.38	0.30	0.20	0.30	0.40	0.34
1.20	0.26	0.28	0.33	0.27	0.18	0.26	0.34	0.28
1.40	0.23	0.23	0.29	0.24	0.17	0.24	0.30	0.25
1.60	0.22	0.21	0.26	0.22	0.16	0.22	0.28	0.22
1.80	0.20	0.20	0.22	0.19	0.14	0.20	0.24	0.20
2.00	0.19	0.19	0.22	0.18	0.14	0.18	0.23	0.19

Table Notes

For P/H between those in this Table, either use the next lowest P/H or interpolate.

Table 13.3.3r: Summer solar heat gain factors: climate zone 1

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.60	0.57
Level factor (L_S) for all other floor levels	1.20	1.35

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.91	0.87
Frame factor (F_S) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	1.00
Frame factor (F_S) for frames with a solar absorptance of ≥ 0.68	1.15	1.21
Floor factor (for tiled or vinyl covered floor) (H_S)	0.75	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken 1.0.

Table 13.3.3s: Summer solar heat gain factors: climate zone 2

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.60	0.40
Level factor (L_S) for all other floor levels	1.20	1.10
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.91	0.68
Frame factor (F_S) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	0.90
Frame factor (F_S) for frames with a solar absorptance of ≥ 0.68	1.19	1.00
Floor factor (for tiled or vinyl covered floor) (H_S)	0.75	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.3t: Summer solar heat gain factors: climate zone 3

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.90	0.70
Level factor (L_S) for all other floor levels	1.70	1.90
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.88	0.88
Frame factor (F_S) for frames with a solar absorptance of < 0.40 to < 0.68	1.00	1.00
Frame factor (F_S) for frames with a solar absorptance of ≥ 0.68	1.21	1.21
Floor factor (for tiled or vinyl covered floor (H_S)	0.89	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.3u: Summer solar heat gain factors: climate zone 4

Type factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.35	0.80
Level factor (L_S) for all other floor levels	1.10	1.20
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.88	0.88
Frame factor (F_S) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	0.91
Frame factor (F_S) for frames with a solar absorptance of ≥ 0.68	1.19	1.00
Floor factor (for tiled or vinyl covered floor) (H_S)	0.91	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.3v: Summer solar heat gain factors: climate zone 5 (lightweight or masonry veneer wall)

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.45	0.52
Level factor (L_S) for all other floor levels	1.20	1.45
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.88	0.73
Frame factor (F_S) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	0.78
Frame factor (F_S) for frames with a solar absorptance of ≥ 0.68	1.20	1.00
Floor factor (for tiled or vinyl covered floor) (H_S)	0.65	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.3w: Summer solar heat gain factors: climate zone 5 (concrete or masonry wall)

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.50	0.35
Level factor (L_S) for all other floor levels	1.40	1.30

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.89	0.90
Frame factor (F_S) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	0.95
Frame factor (F_S) for frames with a solar absorptance of ≥ 68	1.18	1.00
Floor factor (for tiled or vinyl covered floor) (H_S)	0.60	Not applicable

Table Notes

(1) This Table only applies to dwellings with both high mass external and internal walls, for example masonry *cavity* external and internal walls.

(2) Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.3x: Summer solar heat gain factors: climate zone 6

Type of factor	Factor for a floor in direct contact with the ground	Factor for suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.60	0.80
Level factor (L_S) for all other floor levels	1.40	1.60
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.84	0.83
Frame factor (F_S) for frames with a solar absorptance of > 0.40 to < 0.68	0.90	0.96
Frame factor (F_S) for frames with a solar absorptance of ≥ 0.68	1.00	1.00
Floor factor (for tiled or vinyl covered floor) (H_S)	0.80	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Table 13.3.3y: Summer solar heat gain factors: climate zone 7

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Room factor (R_S) for a bedroom and a room which is not a *conditioned space*	0.40	0.40
Level factor (L_S) for all other floor levels	1.40	1.30
Frame factor (F_S) for frames with a solar absorptance of ≤ 0.40	0.91	0.85
Frame factor (F_S) for frames with a solar absorptance of > 0.40 to < 0.68	1.00	1.00
Frame factor (F_S) for frames with a solar absorptance of ≥ 0.68	1.00	1.00

Type of factor	Factor for a floor in direct contact with the ground	Factor for a suspended floor
Floor factor (for tiled or vinyl covered floor) (H_S)	0.85	Not applicable

Table Notes

Where a factor is listed as 'Not applicable', the value of the factor must be taken as 1.0.

Explanatory Information

- There is little or no need for cooling at any time of the year in *climate zone* 8. Therefore, this clause does not apply in *climate zone* 8.
- By referring to '*glazing* elements', 13.3.3 require *Total System U-Values* and *Total System SHGCs* to be assessed for the combined effect of glass and frames. The measurement of these *Total System U-Values* and *Total System SHGCs* is specified in the Technical Protocols and Procedures Manual for Energy Rating of Fenestration by the Australian Fenestration Rating Council (AFRC) for *glazing* elements of representative size and arrangements.
- Various assessors using AFRC procedures might refer to their published performance values by slightly different terms including 'U Factor' or 'Uw' for *Total System U-Value* or 'SHGC' for *Total System SHGC*. Such values can be used under 13.3.3 provided they measure the combined glass and frame performance according to AFRC requirements.
- For the room factor, the solar heat gains to bedrooms and unconditioned areas have less impact on the cooling loads of dwellings than solar heat gains to a living area due to the different time of day that the rooms are occupied. Bedrooms are typically not occupied during the day when outdoor temperatures and solar heat gains are higher.
- For the frame factor, the darker the window frame, the greater the solar heat gain through the frame. Radiation gains from *windows* are multiplied by this factor.
- For the floor factor, this is only applied for dwellings with a floor in contact with the ground. If a room has a tiled surface or is a polished slab, radiation gains in this room are multiplied by this factor.

13.3.4 Shading

[2019: 3.12.2.2]

Where shading is *required* to comply with 13.3.2 or 13.3.3, it must—

(a) be provided by an external permanent projection, such as a verandah, balcony, fixed canopy, eaves, shading hood or carport, which—

(i) extends horizontally on both sides of the *glazing* for a distance greater than or equal to the projection distance P in Figure 13.3.2b; or

(ii) provide the equivalent shading to (i) with a reveal or the like; or

(b) be provided by an external shading device, such as a shutter, blind, vertical or horizontal building screen with blades, battens or slats, which—

(i) is capable of restricting at least 80% of the summer solar radiation; and

(ii) if adjustable, is readily operated either manually, mechanically or electronically by the building occupants.

Explanatory Information

- Shading devices can include fixed louvres, shading screens and other types of perforated or fixed angle slatted shades. However, such devices need to be designed for the climate and latitude to ensure that summer sun penetration is restricted, while winter sun access is achieved. Winter access refers to the availability of winter solar gains to offset conducted heat losses.
- The impact of shading is assessed with respect to the solar heat gain of the *glazing*. The requirements of 13.3.2 and 13.3.3 consider solar heat gain to be either beneficial or detrimental to the energy efficiency of a building based on seasonal variation (winter/summer), *climate zone*, orientation and P/H. Higher P/H values are more beneficial in minimising summer solar heat gain where as lower P/H values are more beneficial in allowing winter access.
- Gutters can only be considered as providing shading if attached to a shading projection such as a verandah, fixed

canopy, eaves, shading hood, balcony or the like.

- Shading devices can be either attached or located adjacent to the building. For example, a free-standing lattice screen may be considered to provide shading to *glazing* if it complies with 13.3.4(b).
- An adjustable shading device in 13.3.4(b)(ii) should be readily operated from a safe location or platform that does not require ladders, rigging, harnessing, or the like.

Part 13.4 Building sealing

NT Part 13.4

TAS Part 13.4

NSW 13.4.1

13.4.1 Application of Part 13.4

[2019: 3.12.3]

(1) This Part applies to—

(a) a Class 1 building; and

(b) a Class 10a building with a *conditioned space*.

(2) The provisions of (1) do not apply to the following:

(a) A building in *climate zones* 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler.

(b) A permanent building *ventilation opening* that is necessary for the safe operation of a gas appliance.

(3) Part 13.4 must be applied as directed in H6D2(1)(a) or (b).

Explanatory Information

- An evaporatively cooled building in *climate zones* 4 and 6 must be sealed because of the likelihood of the building being heated during colder periods.
- Appropriate ventilation requirements for gas appliances can be obtained from relevant legislation, referenced standards and product installation manuals.

13.4.2 Chimneys and flues

[2019: 3.12.3.1]

The chimney or flue of an open solid-fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue.

Explanatory Information

- The requirements of this Part are to be read in conjunction with the fire safety requirements in Part 12.4 of the ABCB Housing Provisions.
- A solid-fuel burning appliance is a heater that burns materials such as timber, coal and the like. This clause does not apply to gas and liquid fuel burning appliances.

13.4.3 Roof lights

[2019: 3.12.3.2]

(1) A *roof light* must be sealed, or capable of being sealed, when serving—

(a) a *conditioned space*; or

(b) a *habitable room* in *climate zones* 4, 5, 6, 7 and 8.

(2) A *roof light required* by (1) to be sealed, or capable of being sealed, must be constructed with—

(a) an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or

(b) a weatherproof seal; or

(c) a shutter system readily operated either manually, mechanically or electronically by the occupant.

Explanatory Information

A *roof light* should be sealed regardless of which room it serves in *climate zones* 4, 5, 6, 7 and 8. For example, a *roof light* located in a hallway should be sealed to stop the transfer of cold air into adjoining *conditioned spaces*. This principle also applies to external doors and *windows*, exhaust fans, wall and floor junctions and evaporative coolers.

13.4.4 External windows and doors

[2019: 3.12.3.3]

(1) An external door, internal door between a Class 1 building and an unconditioned Class 10a building, openable *window* and other such opening must be sealed when serving—

(a) a *conditioned space*; or

(b) a *habitable room* in *climate zones* 4, 5, 6, 7 and 8.

(2) A seal to restrict air infiltration—

(a) for the bottom edge of a door, must be a draft protection device; and

(b) for the other edges of a door or the edges of an openable *window* or other such opening, may be a foam or rubber compressible strip, fibrous seal or the like.

(3) A *window* complying with the maximum air infiltration rates specified in AS 2047 need not comply with (2)(b).

13.4.5 Exhaust fans

[2019: 3.12.3.4]

An exhaust fan must be fitted with a sealing device such as a self-closing damper, filter or the like when serving—

(a) a *conditioned space*; or

(b) a *habitable room* in *climate zones* 4, 5, 6, 7 and 8.

Explanatory Information

An exhaust fan is considered to be adequately sealed if it is fitted with a filter such as the type commonly used in kitchen range hoods.

13.4.6 Construction of ceilings, walls and floors

[2019: 3.12.3.5]

(1) Ceilings, walls, floors and any opening such as a *window* frame, door frame, *roof light* frame or the like must be constructed to minimise air leakage in accordance with (2) when forming part of the external fabric of—

(a) a *conditioned space*; or

(b) a *habitable room* in *climate zones* 4, 5, 6, 7 and 8.

(2) Construction *required* by (1) must be—

(a) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or

(b) sealed at junctions and penetrations with—

(i) close-fitting architrave, skirting or cornice; or

(ii) expanding foam, rubber compressive strip, caulking or the like.

Explanatory Information

- A close fitting internal lining system is considered suitable to include an allowance for minimum lining movement