Construction Standards to Comply with AS3959:2018 (Construction of building in bushfire-prone areas) for Bushfire Attack Level (BAL) - 40 (Very High)

This document has been prepared to assist in the preparation of plans and specifications in respect to BAL – 40, including the variations imposed by clause 7.5.2 of Planning for Bushfire Protection 2019 (NSW Variations under G5.2(a)(i) and 3.10.5.0(c)(i) of the NCC).

BAL—40 is primarily concerned with protection of your building from ember attack and burning debris ignited by wind borne embers and exposure to a high level of radiant heat radiant heat up to and including 40 kW/m2. There is some likelihood of direct exposure to flames from the fire front.

To comply with the Building Code of Australia, your construction or complying development certificate plans must include details of the building construction relevant to the level of bushfire.

Those parts of this document that relate to your development must be included on the construction certificate plans or in the construction specification.

The construction requirements for the next lower BAL may be used for an elevation of a dwelling that is not exposed to the source of a bushfire. However, this does not apply to the subfloor or roof.
An elevation is not exposed if the entire elevation is completely screened from the source of a bushfire by another part of the building.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements below (see Clause 3.8 of the Standard).

SARKING

Sarking, where used for bushfire protection shall be:

a. Non-combustible; or

b. Breather-type sarking complying with AS/NZS4200.1 and with a flammability index of not more than 5 and sarked on the outside of the frame; or

c. An insulation material conforming to the appropriate Australian Standard for that material.

SUBFLOOR SUPPORTS

This Standard does not provide construction requirements for subfloor supports where the subfloor space is enclosed with a wall that complies with the requirements for an external wall below except that sarking is not required to be installed where specified.

Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles shall be—

(1) of non-combustible material; or

(2) a system that has been tested and complies with AS 1530.8.1; or

(3) a combination of Items (i) and (ii) above.

NOTE: This requirement applies to the principal building only. See requirements below for verandas, decks, steps, ramps and landings.

FLOORS

1) Elevated floors

a) Enclosed subfloor space

The Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with a wall that complies with the standards for an external wall below except that sarking is not required to be installed where specified for a wall.

b) Unenclosed subfloor space

Where the subfloor space is unenclosed, the bearers, joists and flooring, shall—

(a) be non-combustible; or

(b) have the underside of the combustible elements of the floor system protected with a non-combustible material (e.g., fibre-cement sheet or metal sheet); or

(c) a system that has been tested and complies with AS 1530.8.1; or

(d) be a combination of any of Items (a), (b) or (c) above.

EXTERNAL WALLS

1) Walls

The exposed components of an external wall shall be:

(a) Non-combustible material such as cavity brick, masonry veneer walls with an outer leaf of clay, concrete, calcium silicate or natural stone, precast or in situ walls of concrete or aerated concrete or earth walling including mud brick; or

(b) Cladding that is fixed externally to a timber-framed or a steel-framed wall and is—

(i) Fibre-cement a minimum of 9 mm in thickness; or

(iii) Steel sheeting; or

(iv) A combination of any of Items (i) and (ii) above; or

(c) a system that has been tested and complies with AS 1530.8.1

(d) A combination of any of Items (a), (b) or (c) above.

2) Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed to prevent gaps greater than 3 mm.

3) Vents and weepholes

Vents and weepholes in external walls shall be screened with a mesh with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, except where the vents and weepholes have an aperture less than 3 mm.

EXTERNAL WINDOWS and DOORS

1) Windows

Window assemblies shall comply with one of the following:

(a) They shall be completely protected by a bushfire shutter that complies with Note 1 below; or

(b) They shall comply with the following:

(i) Window frames and hardware shall be metal.

(ii) Externally fitted hardware that supports the sash in its functions of opening and closing shall be metal.

(iii) Glazing shall be a minimum of 6 mm toughened glass.

NOTE: Where double-glazed units are used, the above requirements apply to the external face of the window assembly only.

(iv)Both the openable and fixed portions of windows shall be screened externally with screens complying with Note 2 below.

(v) Seals to stiles, head and sills or thresholds shall be manufactured from materials having a flammability index no greater than 5 or from silicone.

2) Doors—Side-hung external doors (including French doors, panel fold and bi-fold doors)

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall comply with one of the following:

(a) Doors and door frames shall be protected by bushfire shutters that comply with Note 1; or

(b) Doors and door frames shall comply with the following:

(i) Doors shall be—

(A) non-combustible; or

(B) a solid timber door, having a minimum thickness of 35 mm for the first 400 mm above the threshold and protected on the

outside by a metal framed screen door with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze; or

(C) a fully framed glazed door, where the framing is made from non-combustible materials.

(ii) Externally fitted hardware that supports the panel in its function of opening and closing shall be metal.

(ii) Where doors incorporate glazing, the glazing shall be toughened glass with a minimum thickness of 6mm.

(iii) Doors shall be tight-fitting to the door frame and to an abutting door, if applicable.

(iv) Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings, having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame, that portion shall be screened externally with a screen that complies with Note 2 below.

(v) Seals to stiles, head and sills or thresholds shall be manufactured from materials having a flammability index no greater than 5 or from silicone.

(vi) Door frames shall be metal.

(vii) Weather strips, draught excluders or draught seals shall be installed at the base of side-hung external doors.

3) Sliding doors

Sliding doors shall comply with one of the following:

(a) They shall be completely protected by a bushfire shutter that complies with Note 1; or

(b) They shall comply with the following:

(i) Any glazing incorporated in sliding doors shall be toughened glass with a minimum thickness of 6mm and both the fixed and openable portions of the door must be screened externally with screens complying with Note 2 below.

(ii) The door frame supporting the sliding door, the framing surrounding any glazing and any externally fitted hardware that supports the functioning of the door shall be metal.

(iii) Seals to stiles, head and sills or thresholds shall be manufactured from materials having a flammability index no greater than 5 or from silicone.

(iv) Doors shall be tight-fitting to the door frame and to an abutting door, if applicable.

4) Garage Doors

The following apply to vehicle access doors:

(a) All vehicular access doors shall be non-combustible.

(b) Panel lift, tilt doors or side-hung doors shall be fitted with suitable weather strips, draught excluders, draught seals or guide tracks, as appropriate to the door type, with a maximum gap no greater than 3 mm.

(c) Roller doors shall have guide tracks with a maximum gap no greater than
3 mm and shall be fitted with a nylon brush that is in contact with the door.

(d) Vehicle access doors shall not include ventilation slots.

Note 1: Where fitted, bushfire shutters shall be made from non-combustible material and:
(a) be fixed to the building and be non-removable;
(b) when in the closed position, have no gap greater than 3 mm between the shutter and the wall, the sill or the head;
(c) be readily manually operable from either inside or outside;
(d) protect the entire window assembly or door assembly;
(f) where perforated, have—
(i) uniformly distributed perforations with a maximum aperture of 3 mm when the shutter is providing radiant heat protection or 2 mm when the shutter is also providing ember protection (such as where the openable portion of the window is not screened in accordance with the requirements of the respective BAL); and
(ii) a perforated area no greater than 20% of the shutter. If bushfire shutters are fitted to all external doors then at least one of those shutters shall be operable from the inside to facilitate safe egress from the building.

Note 2: Where fitted, screens for windows and doors shall have a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze. Gaps between the perimeter of the screen assembly and the building element to which it is fitted shall not exceed 3 mm.

The frame supporting the mesh or perforated sheet shall be made from metal.

Note 3: Where double glazed units are used the above requirements apply to the external face of the window assembly only.

ROOFS (INCLUDING VERANDA AND ATTACHED CARPORT ROOFS, PENETRATIONS, EAVES, FASCIAS, GABLES, GUTTERS AND DOWNPIPES)

1. General

The following apply to all types of roofs and roofing systems:

(a) roof tiles, roof sheets and roof-covering accessories are to be non-combustible.

b) the roof/wall junction is to be sealed to prevent openings greater than 3 mm, either by the use of fascia and eaves linings or by sealing between the top of the wall and the underside of the roof and between the rafters at the line of the wall.

(c) roof ventilation openings, such as gable and roof vents, are to be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze.

(d) a pipe or conduit that penetrates the roof covering shall be non-combustible.

(e) Roof mounted evaporative coolers are not permitted in BAL-40.

2. Tiled roofs.

Tiled roofs shall be fully sarked. The sarking shall—

(a) be located on top of the roof framing, except that the roof battens may be fixed above the sarking;

(b) cover the entire roof area including ridges and hips; and

(c) extend into gutters and valleys.

3. Sheet roofs

Sheet roofs shall—

(a) be fully sarked, except that foil-backed insulation blankets may be installed over the battens; or

(b) have any gaps greater than 3 mm (such as under corrugations or ribs of sheet roofing and between roof components) sealed at the fascia or wall line and at valleys, hips and ridges by—

(i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze; or

(ii) mineral wool; or

(iii) other non-combustible material; or

(iv) a combination of any of Items (i), (ii) or (iii) above.

Note: Sarking is used as a secondary form of ember protection for the roof space to account for minor gaps that may develop in sheet roofing.

4. Verandah, carport and awning roofs

The following apply to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space shall meet all the requirements for the main roof.

(b) A veranda, carport or awning roof separated from the main roof space by a wall that complies with the specification above for an external wall shall have a non-combustible roof covering and the support structure shall be—

(i) of non-combustible material; or

(ii) timber rafters lined on the underside with fibre-cement sheeting a minimum of 6 mm in thickness, or with material complying with AS 1530.8.1; or

(iii) a system that has been tested and complies with AS 1530.8.1; or

(iv) a combination of any of Items (i), (ii) or (iii) above.

5. Roof penetrations

The following apply to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, aerials, vent pipes and supports for solar collectors, shall be adequately sealed at the roof to prevent gaps greater than 3 mm. The material used to seal the penetration shall be non-combustible.

(b) Glazed elements in roof lights and skylights are to have minimum fire resistance level (FRL) of -/30/-.

(c) External single plane glazed elements of roof lights and skylights, where the pitch of the glazed element is 18 degrees or less to the horizontal, shall be protected with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze.

6. Eaves linings, fascias and gables

The following apply to eaves linings, fascias and gables:

(a) Gables shall comply with the requirements for an external wall.

(b) Fascias and bargeboards shall be a system that has been tested and complies with AS 1530.8.1. At this time there have been a minimal number of tests on fascias and bargeboards. The Rural Fire Service (RFS) recommends that compliance with the requirements for External Walls is appropriate for fascias and bargeboards.

(c) Eaves linings shall be—

(i) fibre-cement sheet, a minimum 6 mm in thickness; or

(ii) calcium silicate sheet, a minimum 6 mm in thickness; or

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

(d) Eaves penetrations shall be protected the same as for roof penetrations.

(e) Eaves ventilation openings greater than 3 mm shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze.

(f) Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber moulds.

7. Gutters and downpipes

The Standard does not provide material requirements for downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Gutters shall be non-combustible.

Box gutters shall be flashed at the junction with the roof with non-combustible material.

VERANDAHS, DECKS, STEPS, RAMPS AND LANDINGS

1) General

Decking may not be spaced.

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

2) Enclosed subfloor spaces of verandas, decks, steps, ramps and landings

a) Materials to enclose a subfloor space

The subfloor spaces of verandas, decks, steps, ramps and landings are considered to be 'enclosed' when —

i) the material used to enclose the subfloor space complies with the standards for external walls above except that sarking is not required to be installed where specified; and

ii) all openings greater than 3 mm are screened with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel or bronze.

b) Supports

The Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

c) Framing

The Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e., bearers and joists).

d) Decking, stair treads and the trafficable surfaces of ramps and landings shall be—

i) of non-combustible material; or

ii) a system that has been tested and complies with AS 1530.8.1; or

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

3) Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings

a) Supports

Support posts, columns, stumps, stringers, piers and poles shall be—

i) of non-combustible material; or

ii) a system that has been tested and complies with AS 1530.8.1; or

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

b) Framing

Framing of verandas, decks, ramps or landings (i.e., bearers and joists) shall be—

i) of non-combustible material; or

ii) a system that has been tested and complies with AS 1530.8.1; or

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

c) Decking, stair treads and the trafficable surfaces of ramps and landings

Decking, stair treads and the trafficable surfaces of ramps and landings shall be—

i) of non-combustible material; or

ii) a system that has been tested and complies with AS 1530.8.1; or

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

4) Balustrades, handrails or other barriers

Those parts of the handrails and balustrades less than 125 mm from any glazing or any combustible wall shall be of non-combustible material.

Those parts of the handrails and balustrades that are 125 mm or more from the building have no requirements.

WATER AND GAS SUPPLY PIPES

Above-ground, exposed water and gas supply pipes are to be metal.