Technical Supplement

Australia October 2022

Construction of buildings in bushfire prone areas to AS 3959:2018

Important Notes

This technical supplement must be read in conjuction with the current technical product literature. Hardie™ building products must be installed in accordance with the applicable technical product literature. All components and accessories must be installed in accordance with the respective manufacturer's specifications. For the product warranty, terms and conditions refer to the applicable Hardie™ technical product literature.

Scope

The National Construction Code (NCC) adopts the updated AS 3959:2018 that covers 'Construction of buildings in bushfire prone areas'. These bushfire requirements have been adopted by all states with variations in New South Wales and Tasmania.

Uses

This technical supplement is intended to be used as a guide in the design and construction of buildings in bushfire-prone areas in accordance to Australian Standard 3959:2018 'Construction of buildings in bushfire prone areas.'

This supplement promotes the successful use of non-combustible Hardie™ building materials. This technical supplement does not cover all areas of bushfire construction including but not limited to doors, windows, fascias, roofs, penetrations etc. Refer to the standard for other building components.

This supplement does not replace the standard but helps educate designers and builders on improving the performance of buildings when subjected to bushfire prone areas.

This supplement must be read in conjunction with the current Australian Standard and local building regulations.

Overview

AS AS 3959:2018 specifies requirements for the construction of buildings in bushfire prone areas in order to improve their resistance to bushfire attack from:

- Burning embers
- Flame contact
- Radiant heat
- Combinations of the three attack forms

There are six bushfire attack levels, AS 3959:2018 contains construction solutions for all BAL's. Construction requirements increase as BAL levels increase.

BAL levels:
BAL - LOW, BAL - 12.5, BAL - 19, BAL - 29, BAL - 40, BAL - FZ

NOTE
The number after the BAL is based on heat flux exposure thresholds in kW/m^2.

Where sarking is required, it shall have a flammability index of not more than 5 when tested to AS1530.2

The following table outlines Hardie™ external cladding product suitability and additional requirements to adhere to BAL construction requirements.

TABLE 1

	BAL Rating				
EXTERNAL CLADDING	**12.5**	**19**	**29**	**40**	**FZ**
Matrix™ Cladding	✓	✓	✓	✓*	✓*
Axon™ Cladding	✓	✓	✓	✓	✓*
Stria™ Cladding	✓	✓	✓	✓	✓*
Hardie™ Oblique™ Cladding	✓	✓	✓	✓	✓*
Linea™ Weatherboard	✓	✓	✓	✓	✓*
Hardie™ Flex Sheets 6mm	✓	✓	✓	✓*	✓*
PrimeLine™ Weatherboard	✓	✓	✓	✓	✓*
Hardie™ Plank Weatherboard	✓	✓	✓	✓*	✓*
EasyLap™ Panels	✓	✓	✓	✓	✓*
Hardie™ Fine Texture Cladding	✓	✓	✓	✓	✓*
ExoTec™ Facade Panel	✓	✓	✓	✓	✓*
DECKING	**12.5**	**19**	**29**	**40**	**FZ**
Hardie™ Deck System	✓	✓	✓	✓	✓

* Hardie™ Smart Boundary Wall System is required. Refer to figure 3 for more information or alternatively download Hardie™ Smart Boundary Wall Design Guide available at www.Jameshardie.com.au or www.myhardies.jameshardie.com.au

The following table outlines solutions to internal floor, decking and external walls using Hardie™ products. However, the following table must be read in conjunction with the current code.

BUILDING IN BUSHFIRE-PRONE AREAS IN ACCORDNACE WITH AS 3959:2018 – RELATED TO FIBRE CEMENT IN FLOOR AND EXTERNAL WALLS ONLY		
Building Element	**Australian Standard 3959:2018 Requirement**	**Recommendation by James Hardie**
CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL BAL's 12.5 AND 19		
FLOORS	**FLOORS** **Concrete slabs on ground** This Standard does not provide construction requirements for concrete slabs on the ground. **Enclosed subfloor space** This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with - **(a)** a wall that complies with Clause 5.4; or **(b)** a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or **(c)** a combination of Items (a) and (b) above. **Unenclosed subfloor space** Where the subfloor space is unenclosed, flooring material, including bearers, joists and flooring less than 400 mm above finished ground level, shall be: **(a)** Materials that conform with the following: **(i)** Bearers and joists shall be **(A)** non-combustible; or **(B)** of bushfire-resisting timber (see Appendix F); or **(C)** a combination of Items (A) and (B). **(ii)** Flooring shall be - **(A)** non-combustible; or (**B**) of bushfire-resisting timber (see Appendix F); or **(C)** timber (other than bushfire-resisting timber), particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; or **(D)** a combination of Items (A), (B) and (C). **(b)** a system complying with AS 1530.8.1; or This Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400 mm or more above finished ground level. **Decking - Floor** This Standard does not provide construction requirements for decking that is more than 300 mm from a glazed element. Decking less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck shall be made from: **(a)** non-combustible material; or **(b)** bushfire-resisting timber (see Appendix F); or **(c)** a timber species, as specified in Paragraph E1 Appendix E; **(d)** a combination of any of Items (a), (b) or (c) above.	All Hardie™ flooring products are deemed non-combustible in accordance with NCC section C1.9. Hardie™ flooring products include: ■ Secura™ Interior Flooring ■ Secura™ Exterior Flooring ■ Hardie™ Panel Compressed Sheets ■ Hardie™ Deck
EXTERNAL WALLS	**EXTERNAL WALLS** **Walls** That exposed components of an external wall surface that are 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 wall shall be of: **(a)** non-combustible material; or **(b)** timber logs - minimum density and thickness apply. **(c)** a minimum 6mm fibre-cement cladding that is fixed externally to a timber-framed or a steel-framed wall. (other types of cladding may apply) **(d)** a combination of any of Items (a), (b) or (c) above. This Standard does not provide construction requirements for external wall surfaces 400 mm or more from the ground or for external wall surfaces 400 mm or more 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 wall (see Figure D3, Appendix D). **Joints** All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed. **Vents and Weepholes** Vents and weepholes in external walls shall be screened with a mesh made of corrosion-resistant steel, bronze or aluminum. Exclusions may apply (clause 3.6).	All Hardie™ external cladding products 6mm or greater in thickness, are suitable for external walls. Please refer to table 1 for product suitability. They are deemed as a non combustible material in accordance with C1.9 and part 3.7.1.2 of the National Construction Code. They are also deemed a fibre cement external cladding material as they are manufactured in accordance with AS/NZS 2908.2.

BUILDING IN BUSHFIRE-PRONE AREAS IN ACCORDNACE WITH AS 3959:2018 – RELATED TO FIBRE CEMENT IN FLOOR AND EXTERNAL WALLS ONLY		
Building Element	**Australian Standard 3959:2018 Requirement**	**Recommendation by James Hardie**
CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL BAL 29		
FLOORS	**FLOORS** **Concrete slabs on ground** This Standard does not provide construction requirements for concrete slabs on ground. **Elevated floors** **Enclosed subfloor space** This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with: **(a)** a wall that complies with Clause 7.4; except that sarking is not required where specified in clause 7.4.1(c) **(b)** a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or **(c)** a combination of Items (a) and (b) above. **Unenclosed subfloor space** Where the subfloor space is unenclosed, flooring material, including bearers, joists and flooring less than 400 mm above finished ground level, shall be: **(a)** non-combustible (e.g., concrete, steel); or **(b)** of bushfire-resisting timber or **(c)** particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; or **(d)** a system complying with AS 1530.8.1; or **(e)** a combination of any of Items (a), (b), (c) or (d) above. This Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400 mm or more above finished ground level. **Decking - Floor** Decking shall be: **(a)** of non-combustible material; or **(b)** of bushfire-resisting timber (see Appendix F); or **(c)** a combination of Items (a) and (b) above.	All Hardie™ flooring products are deemed non-combustible in accordance with NCC section C1.9. Hardie™ flooring products include: ■ Secura™ Interior Flooring ■ Secura™ Exterior Flooring ■ Hardie™ Panel Compressed Sheets ■ Hardie™ Deck
EXTERNAL WALLS	**EXTERNAL WALLS** **Walls** Walls shall be one of the following: **(a)** Made of non-combustible material (e.g., full masonry, brick veneer, mud brick, concrete, aerated concrete). or **(b)** Timber logs, min. density and thickness apply. **(c)** Made of timber-framed or steel-framed walls that are sarked on the outside of the frame and clad with: **(i)** fibre-cement external cladding, a minimum of 6 mm in thickness; or **(ii)** steel sheet; or **(iii)** bushfire-resisting timber (see Appendix F); or **(iv)** a combination of any of Items (i), (ii) or (iii) above. or **(d)** A combination of Items (a), (b) and (c) above. **Joints** All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed. **Vents and weepholes** Vents and weepholes in external walls shall be screened with a mesh made of corrosion-resistant steel, bronze or aluminium, except where they are less than 3 mm (see Clause 3.6).	All Hardie™ external cladding products 6mm or greater in thickness, are suitable for external walls when installed with Hardie™ Weather Barrier. Please refer to table 1 for product suitability. They are deemed as a non combustible material in accordance with C1.9 and part 3.7.1.2 of the National Construction Code. They are also deemed a fibre cement external cladding material as they are manufactured in accordance with AS/NZS 2908.2.

BUILDING IN BUSHFIRE-PRONE AREAS IN ACCORDNACE WITH AS 3959:2018 – RELATED TO FIBRE CEMENT IN FLOOR AND EXTERNAL WALLS ONLY		
Building Element	**Australian Standard 3959:2018 Requirement**	**Recommendation by James Hardie**
CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL BAL 40		
FLOORS	**FLOORS** **Concrete slabs on ground** This Standard does not provide construction requirements for concrete slabs on ground. **Elevated floors** **Enclosed subfloor spaces** This 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 Clause 8.4, except that sarking is not required where specified in Clause 8.4.1(b) **Unenclosed subfloor spaces** Where the subfloor space is unenclosed, the flooring material, including bearers, joists and flooring, shall: **(a)** be non-combustible (e.g., concrete, steel); 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)** comply with AS 1530.8.1; or **(d)** be a combination of any of Items (a), (b) or (c) above. **Decking** Decking shall be: **(a)** of non-combustible material; or **(b)** a system complying with AS 1530.8.1, or **(c)** a combination of Items (a) and (b) above.	All Hardie™ flooring products are deemed non-combustible in accordance with NCC section C1.9. Hardie™ flooring products include: ■ Secura™ Interior Flooring ■ Secura™ Exterior Flooring ■ Hardie™ Panel Compressed Sheets ■ Hardie™ Deck **NOTE** 6mm Hardie™ Flex Sheets may be a suitable non-combustible material to have on the underside of a floor system for an unenclosed subfloor space.
EXTERNAL WALLS	**EXTERNAL WALLS** **Walls** Walls shall be one of the following: **(a)** Walls made from non-combustible material (e.g., full masonry, brick veneer, mud brick, concrete, aerated concrete). or **(b)** Timber-framed or steel-framed walls that are sarked on the outside of the frame and clad with: **(i)** fibre-cement external cladding, a minimum of 9 mm in thickness; or **(ii)** steel sheeting; or **(iii)** a combination of Items (i) and (ii) above. or **(c)** A system complying with AS 1530.8.1. or **(d)** A combination of any of Items (a), (b) or (c) above. **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. **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 or bronze except where they are less than 3 mm (see Clause 3.6). **NOTE** A system with an FRL of 30/30/30 or -/30/30 when tested from the outside also complies with BAL-40. See Hardie™ Smart wall systems, figures 3 & 4	For Hardie™ external cladding 6-8mm, a Hardie™ Smart Boundary wall system is required. Please refer to figure 3 in this guide. For Hardie™ external cladding 9mm and above including EasyLap™ and Hardie™ Fine Texture Cladding, no additional requirements are needed. Refer to the respective product install guide for installation.

BUILDING IN BUSHFIRE-PRONE AREAS IN ACCORDNACE WITH AS 3959:2018 – RELATED TO FIBRE CEMENT IN FLOOR AND EXTERNAL WALLS ONLY		
Building Element	**Australian Standard 3959:2018 Requirement**	**Recommendation by James Hardie**
CONSTRUCTION FOR BUSHFIRE ATTACK LEVEL BAL FZ		
FLOORS	**FLOORS** **Concrete slabs on ground** This Standard does not provide construction requirements for concrete slabs on ground. **Elevated floors** **Enclosed subfloor spaces** This 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 Clause 9.4. **Unenclosed subfloor spaces** Where the subfloor space is unenclosed, the floor system, including bearers, joist and flooring, shall: **(a)** have an FRL of at least 30/30/30 and the surface material shall be non-combustible (e.g., concrete, steel); or **(b)** have the underside of the combustible elements of the floor system protected with a 30 min resistance to incipient spread of fire system; or **(c)** comply with AS 1530.8.2 when tested from the underside; or **(d)** be a combination of any of Items (a), (b) or (c) above. **Decking** Decking shall have no gaps and be: **(a)** of non-combustible material; or **(b)** fibre-cement sheet; or **(c)** a system complying with AS 1530.8.2; or **(d)** a combination of Items (a), (b) or (c) above	All Hardie™ flooring products are deemed non-combustible in accordance with NCC section C1.9. Hardie™ flooring products include: ■ Secura™ Interior Flooring ■ Secura™ Exterior Flooring ■ Hardie™ Panel Compressed Sheets ■ Hardie™ Deck
EXTERNAL WALLS	**9.4 EXTERNAL WALLS** **9.4.1 Walls** Walls shall be one of the following: **(a)** Walls made of non-combustible material (e.g., masonry, brick veneer, mud brick, aerated concrete, concrete) with a minimum of 90 mm in thickness. or **(b)** A system complying with AS 1530.8.2 when tested from the outside. or **(c)** A system with an FRL of 30/30/30 or -/30/30 when tested from the outside. or **(d)** A combination of any of Items (a), (b) or (c) above. **9.4.2 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. **9.4.3 Vents and weepholes** Vents and weepholes in external walls shall be screened with a mesh made of corrosion-resistant steel or bronze, except where they are less than 3 mm (see Clause 3.6).	A 30/30/30 Wall FRL can be achieved with Hardie™ external cladding when using Hardie™ Smart Boundary Wall system or other available fire systems. See **Figures 3 and 4** for more information.

Typical Applications

Walls/Floors

Up to and including BAL 40

There are requirements in certain cases where the sub-floor space must be fully enclosed with non-combustible material (for which fibre cement is suitable). There are also cases where the floor must be sheeted underneath with a fire-retardant-treated (FRT) timber or a non-combustible material (for which fibre cement is suitable). In both cases the minimum required thickness of the fibre cement is 6mm.

For the following details please refer to Table 1 for product suitability and the current Hardie™ product literature for installation instructions.

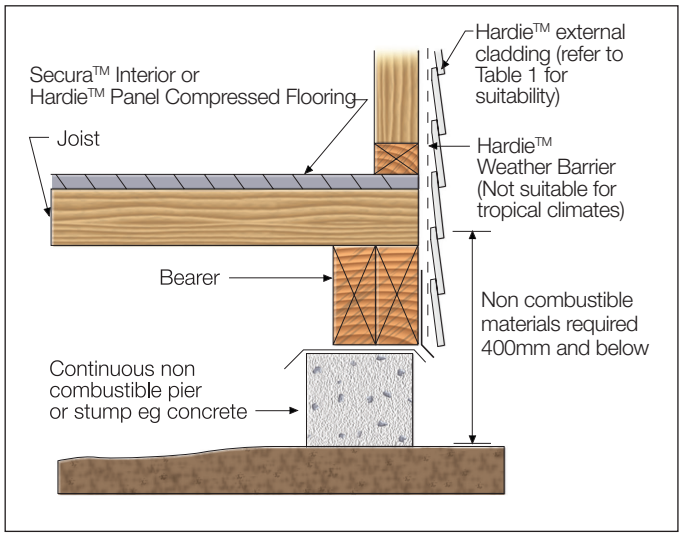

FIGURE 1: NON COMBUSTIBLE FLOOR DETAIL

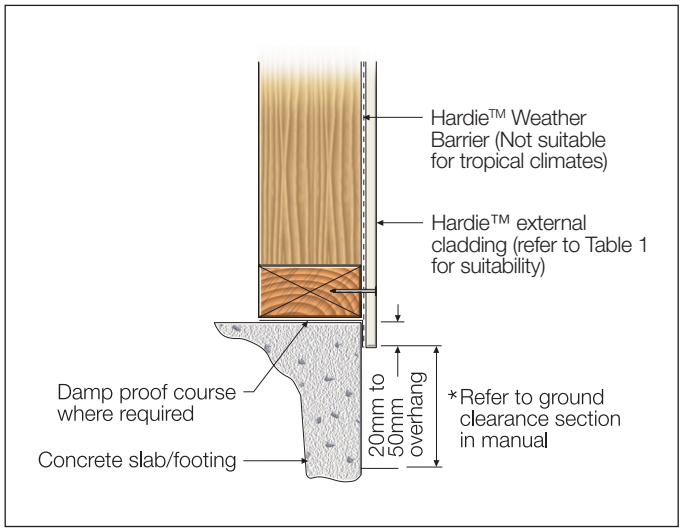

FIGURE 2: SLAB ON GROUND DETAIL-NON COMBUSTIBLE ONLY

FIRE RATED WALL - 30/30/30 for BAL-FZ (Hardie™ Smart Boundary Wall System)

For installation, construction and suitability please refer to Hardie™ Smart Boundary Wall System Design Guide available at www.jameshardie.com.au or www.myhardies.jameshardie.com.au

When a minimum 90x45mm wall frame is constructed at 600mm maximum stud centres using the below external and internal wall configuration, it will satisfy a 30/30/30 one way fire rating from the outside.

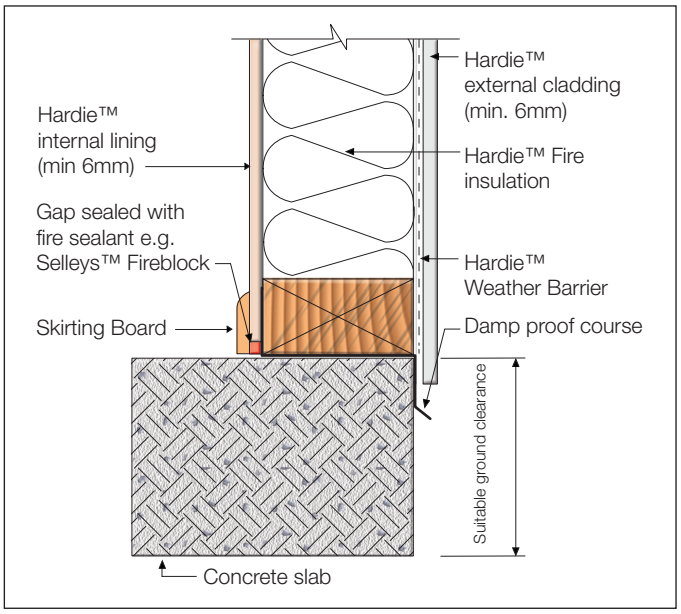

FIGURE 3: 30/30/30 ONE WAY FRL ALIGNED - HARDIE™ SMART WALL SYSTEM - OPTION 1

FIRE RATED WALL-30/30/30 For BAL-FZ

When a minimum 90x45mm wall frame is constructed at 600mm maximum stud centres using the below external and internal wall configuration, it will satisfy a 30/30/30 one way fire rating from the outside.

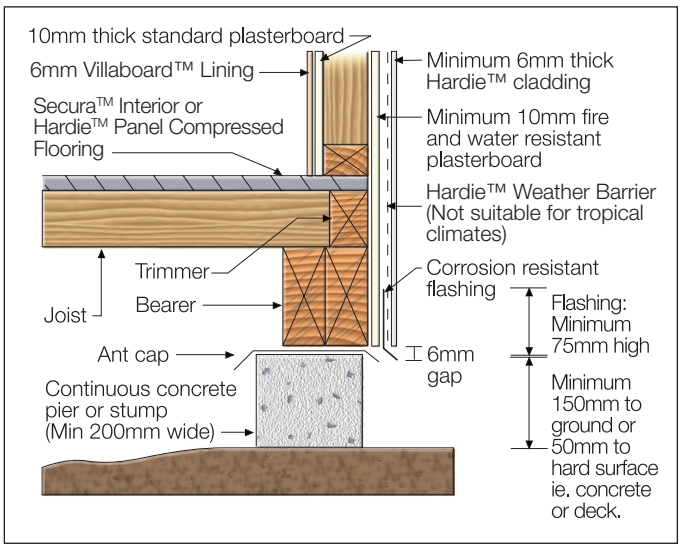

FIGURE 4A: 30/30/30 ONE WAY FRL OVERHANG FOOTING - OPTION 2

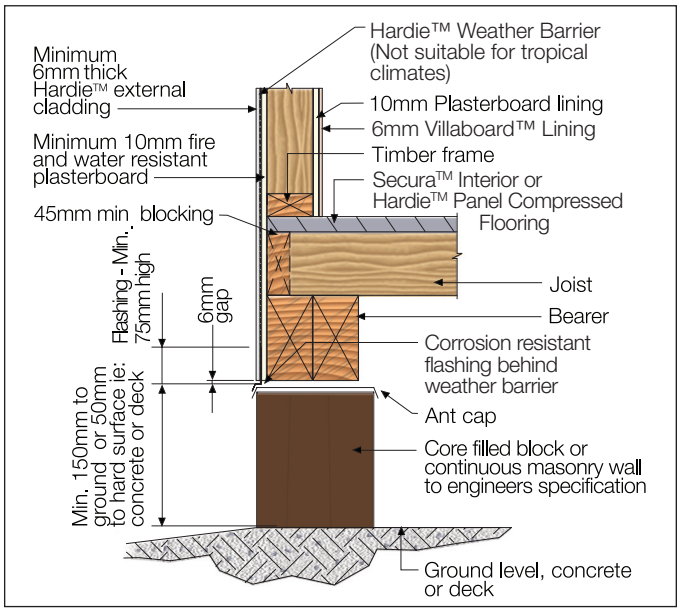

FIGURE 4B: 30/30/30 ONE WAY FRL ALIGNED - OPTION 3

Eaves

The roof/wall junction must be sealed by either the use of fascia or eaves linings or by sealing between the rafters at the line of the wall. All other types of roofing must be constructed to ensure that burning embers do not penetrate into the roof space.

BAL	Requirement
BAL LOW	No construction requirement but min. 4.5 mm fibre cement sheet is recommended
BAL 12.5	No construction requirement but min. 4.5 mm fibre cement sheet is recommended
BAL 19	No construction requirement but min. 4.5 mm fibre cement sheet is recommended
BAL 29	Minimum 4.5 mm fibre cement sheet
BAL 40	Minimum 6 mm fibre cement sheet
BAL FZ	A system with a FRL or -/30/30. See Figure 5.

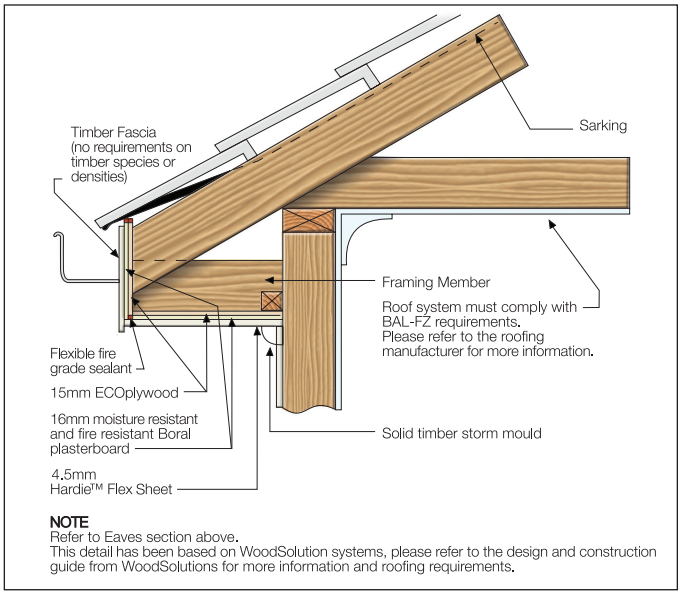

FIGURE 5: FIRE RATED EAVE DETAIL (FRL -/30/30)

* Framing to be at maximum 450mm centres.

15mm ECOplywood sheet Layer:

- All 15mm ECOplywood joints must fall on framing members or steel angles at fascia or at wall.
- 15mm ECOplywood sheets must be fixed to framing members at 200mm maximum centres with screws that are a minimum 50mm long.

16mm Boral Firestop plasterboard sheet layer:

- Boral Firestop plasterboard butt joints must not coincide with the 15mm ECOplywood joints.
- Boral Firestop plasterboard to be fixed to the framing at 150mm maximum centres around the perimeter, as well as at 200mm max centre spacing along framing.
- Plasterboard fastener to be plasterboard screws.

4.5mm Hardie™ Flex Sheet layer:

- 4.5mm Hardie™ Flex Sheets can be butt jointed or joined with PVC jointers on framing only.
- 4.5mm Hardie™ Flex Sheets cannot be joined off framing.
- The fastener recommended in the Hardie™ Flex Lining installation manual must be increased by 31mm minimum to allow for the additional layers behind the Hardie™ Flex Lining.
- 4.5mm Hardie™ Flex Sheets must be installed in accordance with the current Hardie™ Eave & Soffit Technical Specification.

For more information please refer to the relevant Hardie™ installation guides, www.jameshardie.com.au or contact the Technical Team on 131103

Deck: Sub floor enclosed

For BAL 40 on FZ only steel and concrete sub framing is allowed.

TABLE 1 BUSHFIRE PRONE AREAS REQUIREMENTS FOR DECKS

DESIGN CRITERIA (AS 4055: 2014)	BUSHFIRE ATTACK LEVEL (BAL)			
	12.5 & 19	29	40	Flame Zone (FZ)
Decking Boards	Hardie™ Deck suitable			
Framing and Supports	No additional requirements	Non-combustible (e.g. steel) or bushfire suitable resisting timber	Non-combustible (e.g. steel) or system compliant with AS 1530.8.1 (no bushfire timber allowed)	
Balustrade & Handrail	No additional requirements	Varies based on distance from glazed element or combustible material. <125mm, It must be non-combustible material or bushfire timber >125mm , no additional requirements		

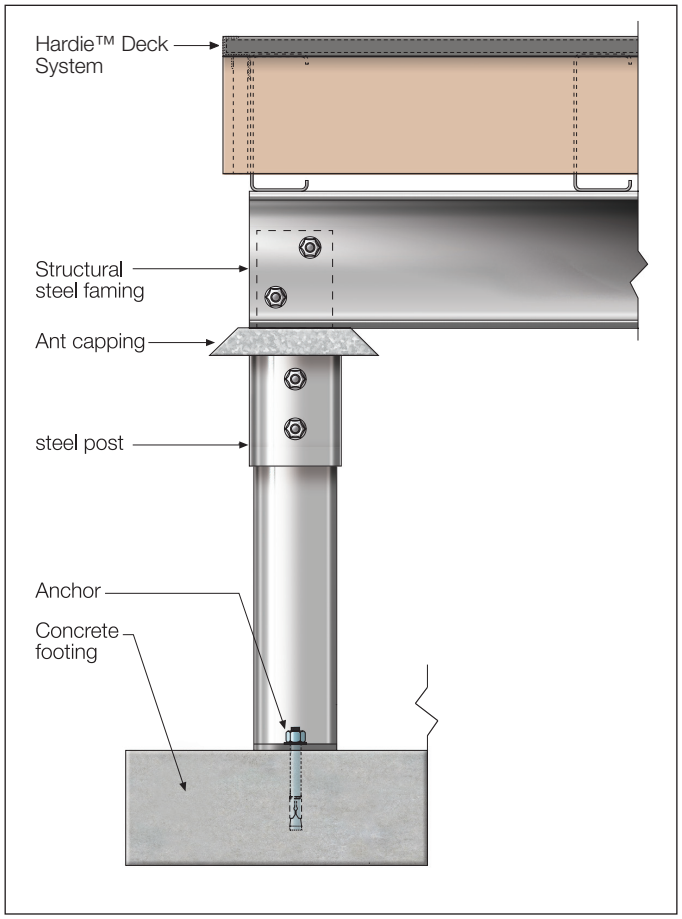

FIGURE 6: STEEL PIER AND STEEL SUB FRAMING - OPTION 1

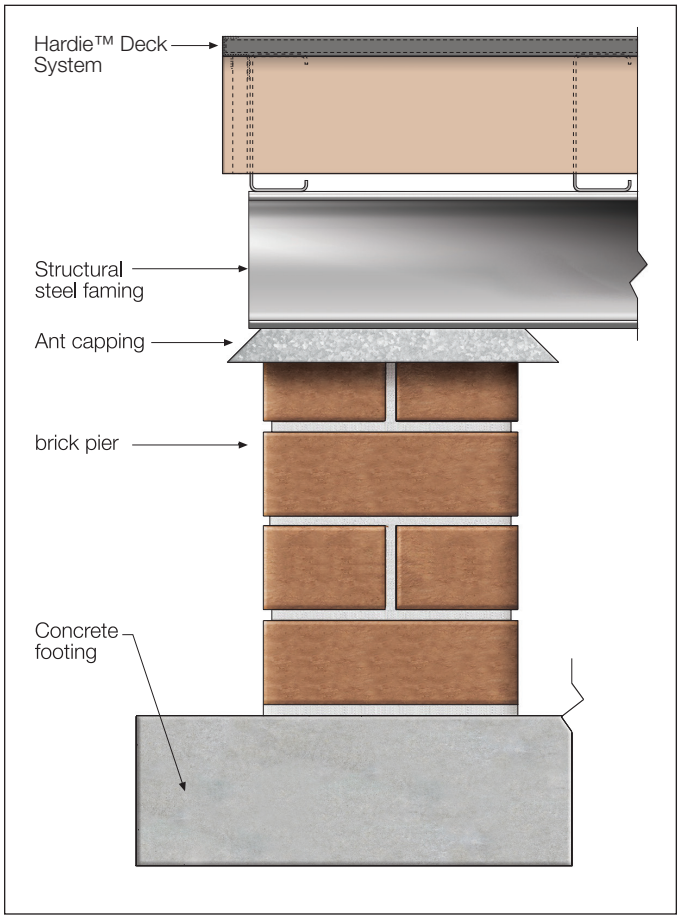

FIGURE 7: MASONRY PIER AND STEEL SUB FRAMING - OPTION 2

NOTES