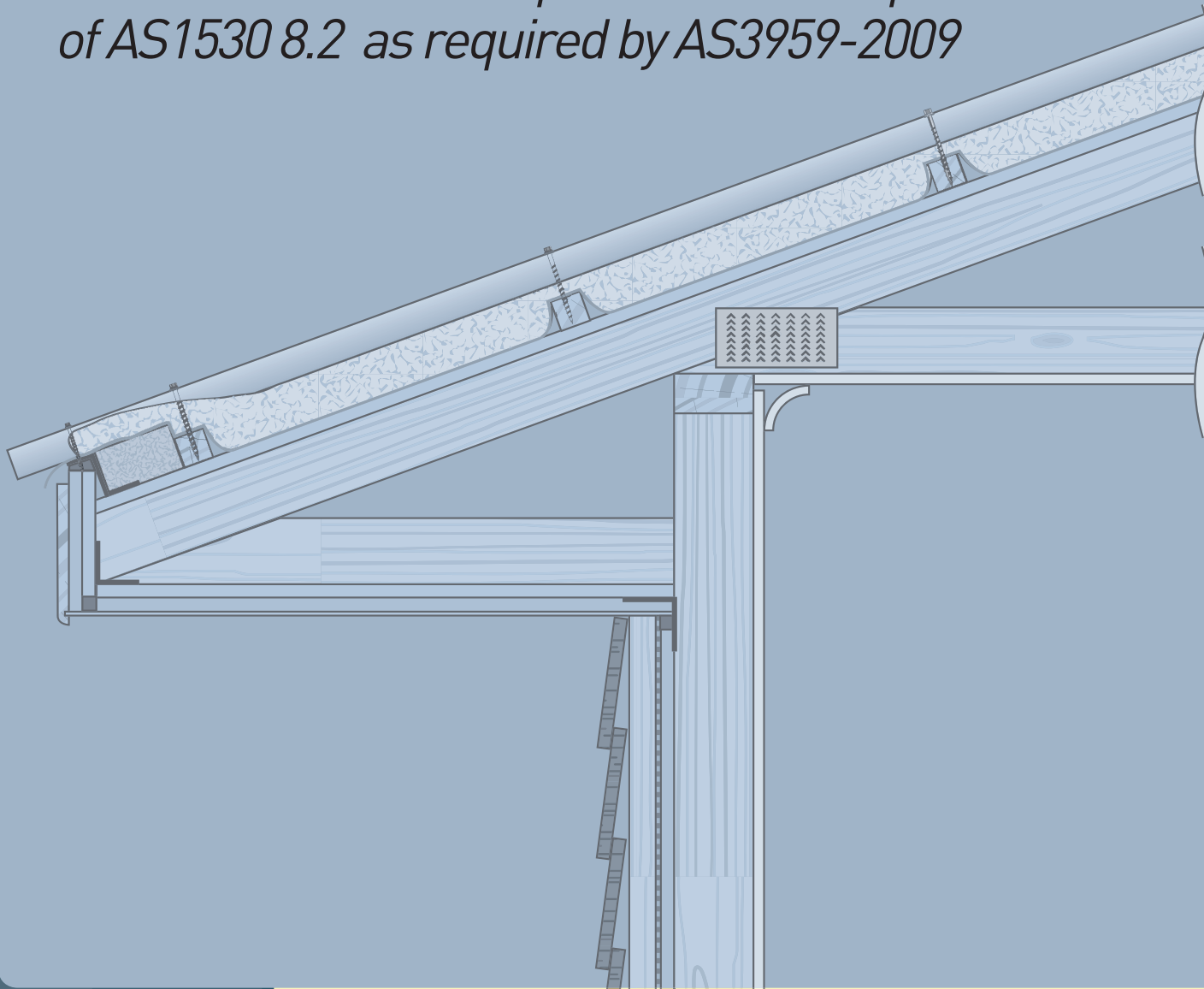


#04-1



Bushfire Flame Zone Resistant Sheet Metal Roofs

The plywood membrane solution - a roof system for BAL-FZ which complies with the requirements of AS1530 8.2 as required by AS3959-2009





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Introduction

The Australian Standard AS3959-2009 *Construction of buildings in bushfire-prone areas* (2009) now applies in Victoria, the ACT and Queensland. It is anticipated that other states will adopt this standard in May 2010.

Under the standard, sites that have been assessed at the highest Bushfire Attack Level, Flame Zone (BAL-FZ) must have roof and eaves systems that comply by meeting the requirements of AS1530 8.2 *Test on Elements of Construction for buildings exposed to simulated bushfire attack - large flame source*. This datasheet details the first system for sheet metal roofs to comply. This plywood membrane roof system can be used in combination with any wall cladding system that complies with AS3959-2009 to BAL-FZ, this includes systems utilising wall sheeting and weatherboard.

The roof system uses a membrane of 15mm plywood over the rafters/trusses with 75mm Anticon™ Roofing Blanket (glasswool). The eaves system combines 15mm plywood and 16mm fire grade moisture-resistant plasterboard.

As additional roof solutions are tested and certified for compliance with BAL-FZ, up-to-date information can be found on our website www.timber.org.au/bushfire as it becomes available.

The AS1530 8.2 test method is quite severe. The resultant building systems resemble the fire-rated requirements commonly used for wall or floor construction. Roofing installers must ensure the same level of care and supervision applies when building bushfire resisting roofs and eaves systems.

The prevention of embers, radiant heat and flames through the roof system is critical. The following details are important for the points that are known to be most vulnerable eg. the leading edge of roofing (at fascias, ridge, hips and valleys). Obviously, by simplifying the roof design you can reduce the opportunity for the fire to breach the roof system and gathering points for embers. You will also save on construction and material costs.

Plywood Membrane Roof System for BAL-FZ

Plywood sheathing between the roof cavity and insulation system provides a rigid base for the mineral wool and is a material that will smoulder rather than melt and collapse in extreme conditions.

To meet the test Standard:

- 15mm tongue and grooved (T&G) plywood is placed directly over the rafters/trusses, with the face veneer at right angles to the rafter direction.
- The end joints must be made over rafter edges.
- Where a free end is unavoidable, use a nogging (not less than 70mm x 35mm) running between the rafters and set flush to the top of the rafters.
- Each plywood panel must be continuous over more than one span.

Readily available plywood stress grades are F11 and F14.

Diagram 1 shows the AS3959-2009 BAL-FZ compliant roof system using a plywood membrane.

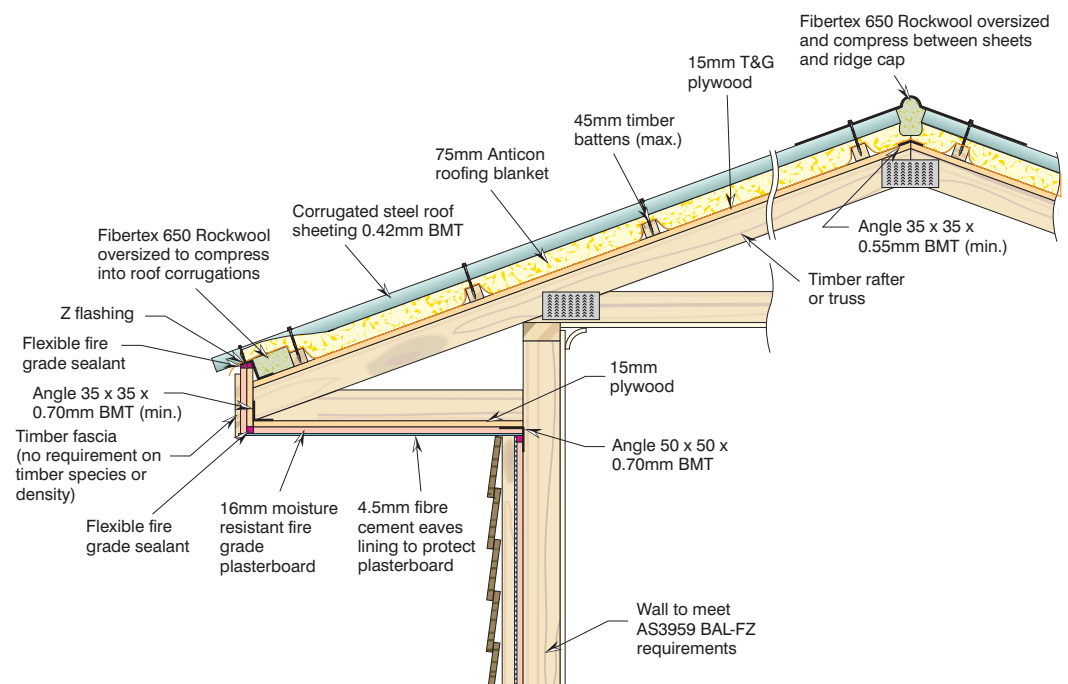


Diagram 1: Plywood roof system

Fixing Plywood

To fix the plywood to the rafters/trusses, use the same method as for fixing plywood flooring, (detailed in AS1684 *Residential timber-framed construction* standards).

Space nails and/or screws at 150mm centres at panel ends and at 300mm centres at intermediate rafters/trusses and noggings. Do not fix the plywood at less than 10mm from edges.

Hand driven nails	2.8mm minimum diameter, flathead or bullet head nail, minimum length of 40mm (this length is 2.5 times plywood thickness)
Gun driven nails	2.5mm minimum diameter gun nails, minimum length of 40mm (this length is 2.5 times the plywood thickness)
Screws to timber joists	No.8 x 30 self-drilled countersunk wood screws.

At the ridge and valley position, the plywood joint must be covered by a 35 x 35mm x 0.55BMT (BMT = base metal thickness) angle or flashing.

Battens

Use timber battens with a maximum size of 45mm x 90mm. Traditional timber battens are 35-38mm thick and therefore comply. They are also easy to handle and fix.

When fixing battens to rafters/trusses roofing installers need to comply with the specific tie-down as required for the site's location.

Insulation

Roof systems for BAL-FZ require additional steps and materials compared to traditional steel roofs. The steps described below detail how to provide protection to the points known to be most vulnerable eg. the leading edge of roofing (at fascias, ridge, hips and valleys). These steps are vital to ensure that the roofing system performs as tested, to limit the possibility of entry of embers, radiant heat and flames.

Roof area

To comply with the tested system, lay 75mm Anticon™ Roofing Blanket over the roof filling the void between the plywood deck and the underside of the metal sheet.

Interface with fascia

At the interface of the metal roof sheet and the fascia, use an oversized Fibretex 650 Rockwool strip to seal between the plywood and the roof sheet. The Rockwool strip is to be 75mm thick by 90mm high, fitted snugly between the Z flashing and the first lower roof batten and placed continuously along the roof's edge (see Diagram 2). The Anticon™ Roofing Blanket (foil facing down) is laid over the battens and the Rockwool strip and under the roof sheeting. Compress the blanket, along with the Rockwool, to assist in sealing off the leading edge of the roof sheeting.

Roof ridge and hips

At the ridge and hips, install a 90mm high by 75mm thick strip of Fibretex 650 Rockwool fitted between the ends of the roof sheets so that the Rockwool is compressed to 50 per cent of its thickness and placed above the Anticon™ Roofing Blanket.

Valleys

On both sides of the valley, install two layers of 15mm plywood 'strips' on top of the plywood membrane cut to neatly fit under the valley gutter.

At the interface of the metal roof sheet and the valley, use an oversized Fibretex 650 Rockwool strip to seal between the plywood and the roof sheet. The Rockwool strip is to be 75mm thick by 90mm high, fitted snugly between the Z flashing and the first lower roof batten and placed continuously along both valley edges - detail similar to Diagram 2. Between the Z flashing and the double plywood strips, apply fire grade sealant along each side of the valley.

The Anticon™ Roofing Blanket (foil facing down) will cover the Rockwool strip but needs to be trimmed back to the Z flashing to avoid moisture problems. Compress the blanket, along with the Rockwool, to assist in sealing off the leading edge of the roof sheeting.

Roof Sheeting

To reach AS1530 8.2 *Test on Elements of Construction for buildings exposed to simulated bushfire attack - large flame source*, use 0.42mm BMT corrugated roof sheets that comply with AS1445. Fix the roof sheets normally, except you need to apply double fixings along the leading edge of the roof into the Z flashing (see detail plan view, Diagram 3).

Eaves, Fascia And Barge Boards

Testing revealed that eaves and fascia construction does not benefit from the inclusion of insulation, so the system requires a different approach.

The BAL-FZ sheet metal roof system solution for fascia and eaves takes advantage of the strength of plywood in both the eaves soffit and fascia to achieve fire resistance. It combines 15mm plywood and 16mm fire-grade moisture-resistant plasterboard to effectively seal the building envelope at these points.

First fix the plywood sheet to the framing (using the same methods described for the roof).

Over the plywood, fix 16mm fire grade moisture-resistant plasterboard to the timber framing using 38mm x 6g needlepoint screws at 150mm centres - plasterboard oriented so that butt joints do not fall on joints in plywood.

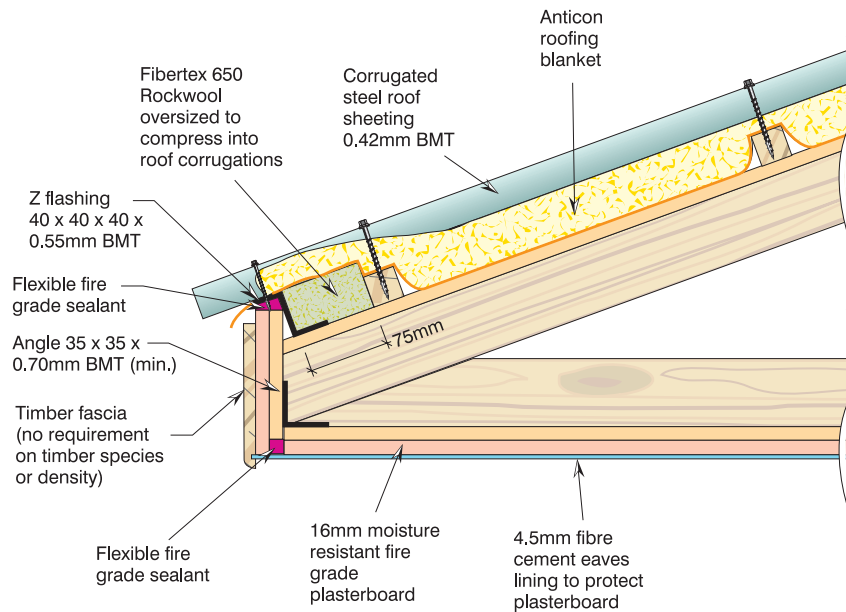


Diagram 2: Eaves, Fascia and Bargeboard details for compliant sheet metal roof systems.

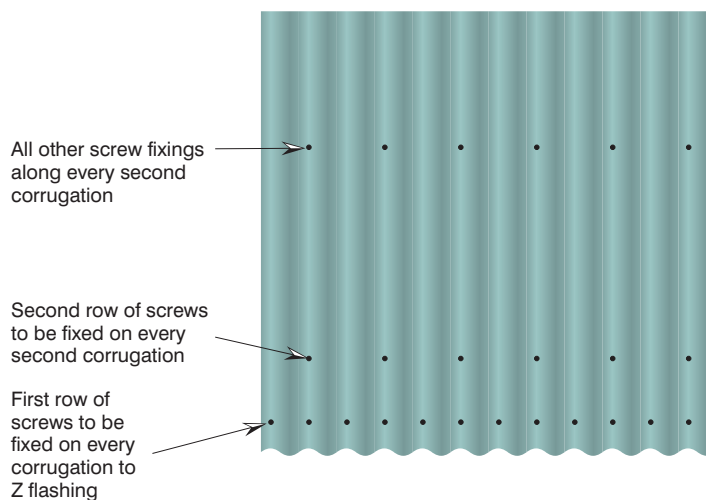


Diagram 3: Detail, Roof fixing requirements

Joints, corners and abutting sections

- Use flexible fire-grade mastic to seal joints in the 16mm fire-grade moisture-resistant plasterboard, corners or where the plasterboard abuts another element.

Support the plasterboard by using 35 x 35 x 0.70mm angles, timber noggings or follow the plasterboard manufacturer's requirements.

Weather protection

- Cover the 16mm fire-grade moisture-resistant plasterboard with a weather protector. For the:
 - Eaves soffit - 4.5mm (minimum) fibre cement eaves lining.
 - Fascias or bargeboards - standard 19mm timber fascia.

These elements are an integral part of the roof system.

Other issues

This data sheet details the roof system requirements to meet the fire resistance mandated by the test method.

This data sheet does not address other issues, such as durability, ventilation, structural adequacy, bracing, fixing (unless required by the fire test) or tie-down that may affect the roof. Designers and/or roofing installers should seek information on these matters from relevant technical sources.

Using materials of other thicknesses or densities

Information contained in this data sheet represents the minimum to meet the tested system. Products that are thicker or denser may be used, unless otherwise indicated herein.

Proprietary products

Products that are described by manufacturer's name (eg Anticon™) cannot be substituted for similar products.

Compliance information

This data sheet was developed to outline how to comply with BAL-FZ with a sheet metal roof. It meets the requirements of the AS3959-2009 *Construction of buildings in bushfire-prone areas* Standard. This is achieved by the system described above complying with AS1530.8.2 *Methods for fire tests on building materials, components and structures*. The report on which this is based is:

Exova Warringtonfire Report No: RIR 23626A-07 - An assessment of the bushfire attack level (BAL) performance of various sheet metal roof systems if tested in accordance with AS1530.8.2-2007 Section 16 (Flame Zone).

Wall cladding systems and other exterior construction elements

The roof system can be used in combination with any wall cladding system that complies with AS3959-2009 to the relevant bushfire attack level. A system combining traditional light-weight cladding materials (including weatherboard and fibre cement sheeting) and a fire-grade moisture resistant plasterboard can achieve a Fire Resistance Level (FRL) in excess of the Standard requirements at BAL-FZ (FRL 30/30/30). Find out more from your specialist plasterboard supplier.

Ensure that alternative exterior wall sections used in combination with, or to replace, brick veneer comply with the relevant requirements in the Standard.