Bradford™

NCC 2016 – AS3959: 2009

Bushfire Roofing Systems

Design Guide

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1.0 INTRODUCTION

Following the Victorian bushfire tragedy, a new residential building standard was introduced.

Every new home built or renovated must undergo a BAL (Bushfire Attack Level) assessment as part of the application for a building permit. The site BAL assessment determines the construction methods that must be used to better protect properties from the threat of bushfires. The BAL takes into consideration a number of factors including the Fire Danger Index, the slope of the land, types of surrounding vegetation and its proximity to any building.

A building surveyor will use AS3959 to check compliance with the construction requirements of the standard.

The following BAL 12.5-40 system details have been developed by CSR Bradford based on our interpretation of AS3959. Full compliance with AS3959 is confirmed by the relevant Fire Authority (CFA, RFS etc) of the applicable local council. For FZ tile roofs, the regulatory assessment report can be downloaded at www.rooftile.com.au/pdf/rir-23987-02.pdf. Details provided on pages 9 & 10 set out the construction requirements for tile roofs as tested by Exova Warrington Fire.

For FZ Steel roofs refer to www.bluescopesteel.com.au/.../bushfire-factsheet-version-1-april-2011, Exova Warrington fire Report No: 24286-02, An assessment of the bushfire attack level (BAL) performance of various sheet metal roof systems is tested in accordance with AS1530.8.2-2007 Section 16 (Flame Zone) (15 December 2010). Details provided on pages 11 & 12 set out the construction requirements for metal roof (FZ system variant 3). Further details are provided by Bluescope in the above mentioned factsheet.

For further information, contact your Bradford representative or call 1300 850 305. Further material such as sample specifications and installation information may be downloaded from our website:

www.bradfordinsulation.com.au

2.0 WHAT DO THESE BAL ZONES MEAN?

BUSHFIRE ATTACK LEVEL (BAL)	DESCRIPTION OF PREDICTED BUSHFIRE ATTACK AND LEVELS OF EXPOSURE
BAL – Low	There is not sufficient risk to warrant exposure
BAL – 12.5	Ember attack
BAL – 19	Increasing levels of ember attack and burning debris ignited by wind borne embers together with increasing heat flux between 12.5 and 19kW/m^2
BAL – 29	Increasing levels of ember attack and burning debris ignited by wind borne embers together with increasing heat flux between 19 and 29kW/m^2
BAL – 40	Increasing levels of ember attack and burning debris ignited by wind borne embers together with increasing heat flux with the increased likelihood of exposure to flames
BAL – FZ	Direct exposure to flames from fire front in addition to heat flux and ember attack

3.0 ROOFING SYSTEMS REQUIREMENTS

A rigorous process of independent research and testing has resulted in a range of compliant roofing systems designed to withstand the threats in each BAL. The following table outlines roofing requirements incorporated into the standard for each BAL zone.

BAL ZONE	ROOFING REQUIREMENTS
BAL – Low	No special requirements
BAL – 12.5	Non-combustible coverings roof/wall junction sealed. Openings fitted with non-combustible ember guards. Roof to be fully sarked
BAL – 19	Non-combustible coverings roof/wall junction sealed. Openings fitted with non-combustible ember guards. Roof to be fully sarked
BAL – 29	Non-combustible coverings roof/wall junction sealed. Openings fitted with non-combustible ember guards. Roof to be fully sarked
BAL – 40	Non-combustible coverings roof/wall junction sealed. Openings fitted with non-combustible ember guards. Roof to be fully sarked and no roof mounted evaporative coolers
BAL – FZ	Roof with FRL of 30/30/30 or tested bushfire resistance to AS1530.8.2. Roof/wall junction sealed. Openings fitted with non-combustible ember guards. No roof mounted evaporative coolers

4.0 ROOF SYSTEM SELECTION

To select the compliant roofing system for your project you need to first identify the BAL for your site and determine whether your roof will be tiled or metal clad. Please note that the following is a guide and CSR Bradford recommends that you work closely with your building surveyor/private certifier, fire engineering consultant and insurance provider early in the design phase of your building to ensure compliance where appropriate to your specific building type and project requirements.

4.1 **BAL-12.5 – BAL-40 Tiled Roof**

For compliance in BAL-12.5 to BAL-40 areas, 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

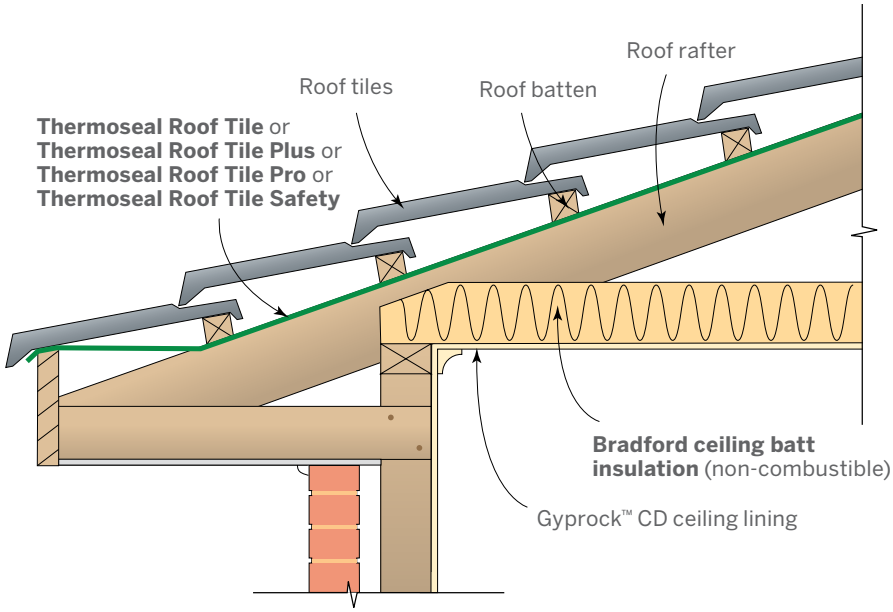
(b) Cover the entire roof area including ridges and hips; and

(c) Extend into gutters and valleys.

RAFTER SPACING	PRODUCT
Up to and including 600mm	Thermoseal™ Roof Tile, Thermoseal Roof Tile Plus or Thermoseal Roof Tile Pro
Over 600m	Thermoseal Roof Tile Safety

Figure 4.1. Tiled Roofs

- Install Thermoseal Roof Tile sarking on top of the roof framing and below the roof battens.
- For further fixing details contact CSR technical support.



4.2 **BAL-12.5 – BAL-40 Metal Roof**

For compliance in BAL-12.5 to BAL-40 areas, metal sheet roofs shall:

(a) Be fully sarked, except that foil-backed insulation blankets may be installed over the battens; (Use Thermoseal Resiwrap or Anticon™) and

(b) Have any gaps greater than 3mm (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 using Bradford Multitel™ BAL12.5 – 40.

APPLICATION	PRODUCT
Sarking	Thermoseal Resiwrap
Foil faced insulation blanket	Bradford Anticon
Gap seal	Bradford Multitel BAL 12.5 – 40 Blanket

Figure 4.2.1.a

Fascia Detail – Metal Roof (BAL12.5 – 40)

- Install Thermoseal Resiwrap to the entire roof area over the top of the battens.
- Immediately above the fascia install Multitel BAL12.5 – 40 Blanket extending up the roof and over the first batten. Compress with the roof sheeting.
- For further fixing details contact CSR technical support.

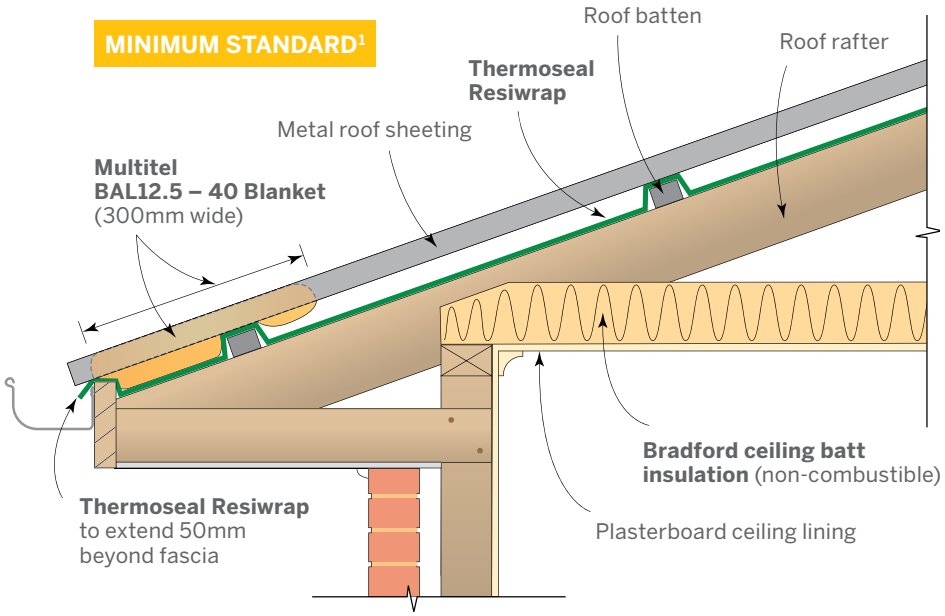
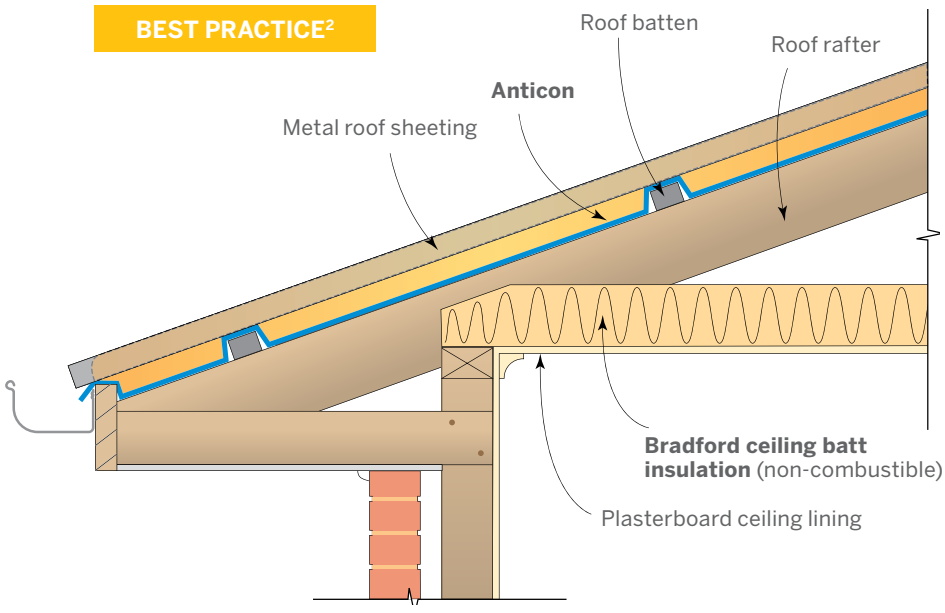


Figure 4.2.1.b

Fascia Detail – Metal Roof (BAL12.5 – 40)

- Install Anticon to the entire roof area over the top of the battens.
- Compress with the roof sheeting.
- For further fixing details contact CSR technical support.



1. Minimum standard: Suitable in warmer climates and where condensation is not considered a problem.
2. Best practice: Recommended for colder climates and where condensation can be a concern, especially BCA climate zones 7 & 8. (See notes on page 8 for further detail).

Figure 4.2.2.a

Valley Detail – Steel Roof (BAL-12.5 – BAL-40)

- Install Thermoseal Resiwrap to the entire roof area over the top of the battens.
- Multitel BAL12.5 – 40 Blanket to be laid over the top of the sarking extending into the outer edge of the valley gutter. Compress with roof sheeting.
- For further fixing details contact CSR technical support.

MINIMUM STANDARD[1]

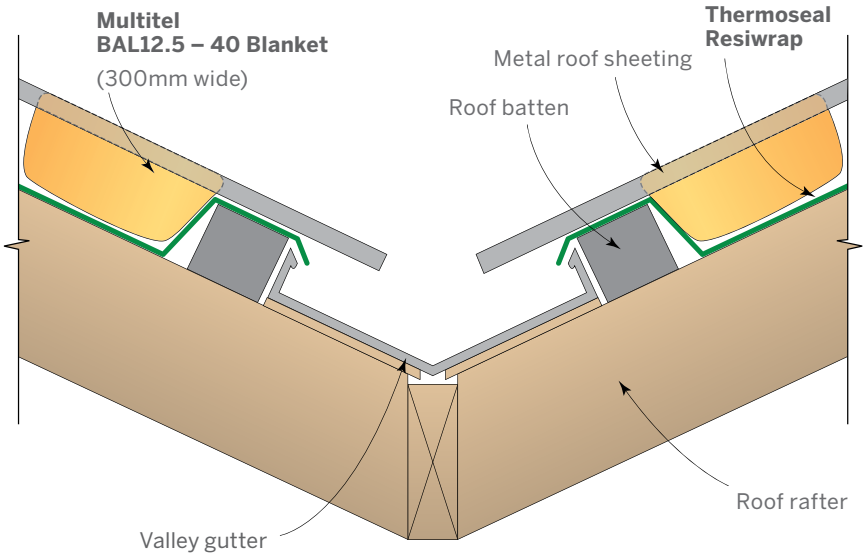


Figure 4.2.2.b

Valley Detail – Steel Roof (BAL-12.5 – BAL-40)

- Install Anticon to the entire roof area over the top of the battens.
- Compress with roof sheeting.
- For further fixing details contact CSR technical support.

BEST PRACTICE[2]

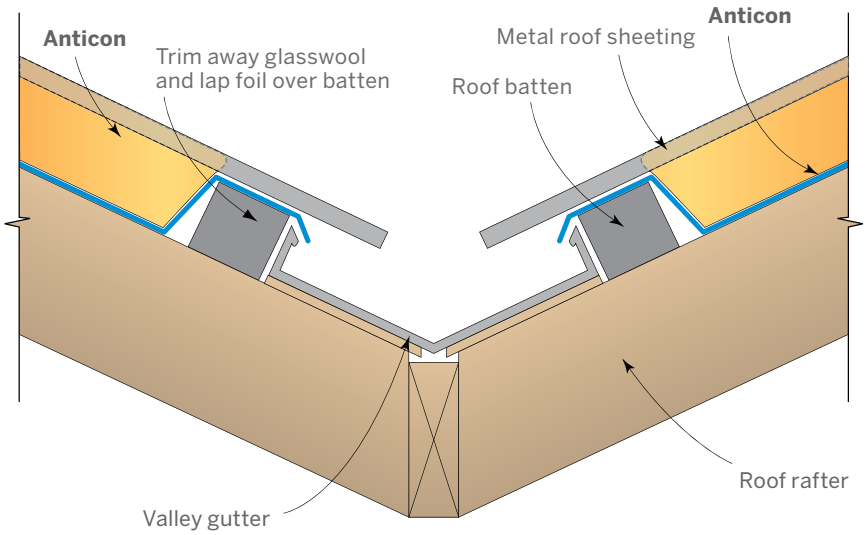
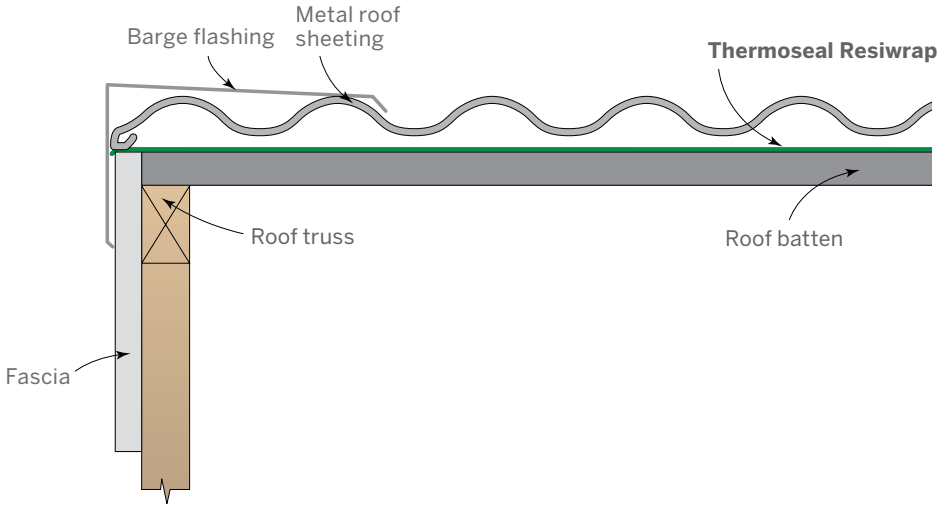


Figure 4.2.3.a

Barge Detail – Steel Roof (BAL-12.5 – BAL-40)

- Install Thermoseal Resiwrap to the entire roof area over the top of the battens.
- For further fixing details contact CSR technical support.

MINIMUM STANDARD[1]



1. Minimum standard: Suitable in warmer climates and where condensation is not considered a problem.
2. Best practice: Recommended for colder climates and where condensation can be a concern, especially BCA climate zones 7 & 8. (See notes on page 8 for further detail).

Figure 4.2.3.b

Barge Detail – Steel Roof (BAL-12.5 – BAL-40)

BEST PRACTICE[2]

- Install Anticon to the entire roof area over the top of the battens.
- Compress with roof sheeting.
- For further fixing details contact CSR technical support.

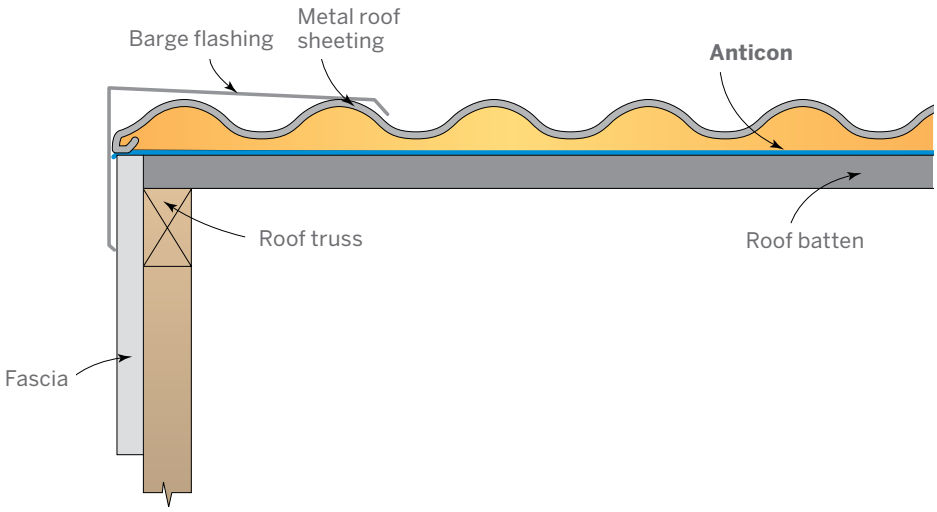


Figure 4.2.4.a

Hip/Ridge Detail – Steel Roof (BAL-12.5 – BAL-40)

MINIMUM STANDARD[1]

- Install Thermoseal Resiwrap to the entire roof area over the top of the battens.
- At the ridge/hip lay Multitel BAL12.5 – 40 Blanket between the batten and roof sheeting & compress. Install ridge capping over roof sheeting.
- For further fixing details contact CSR technical support.

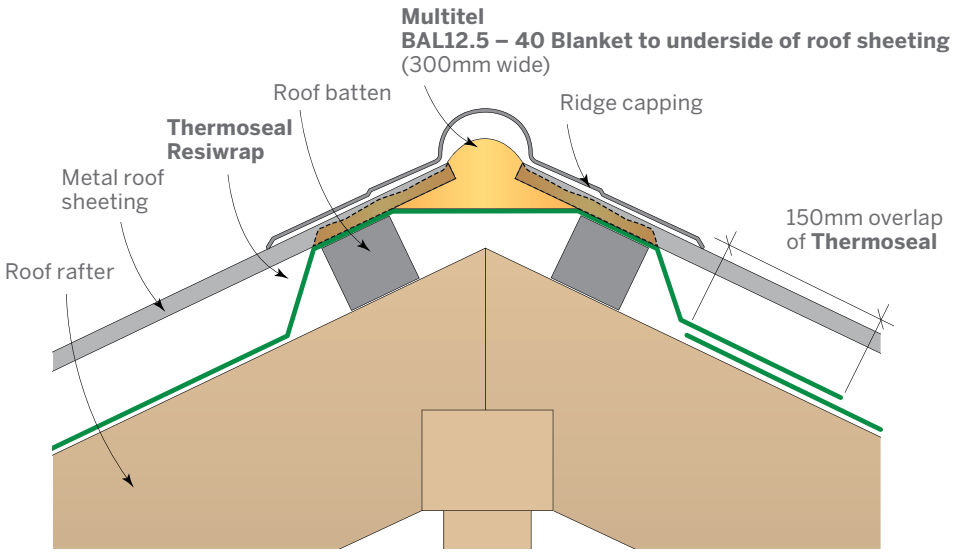
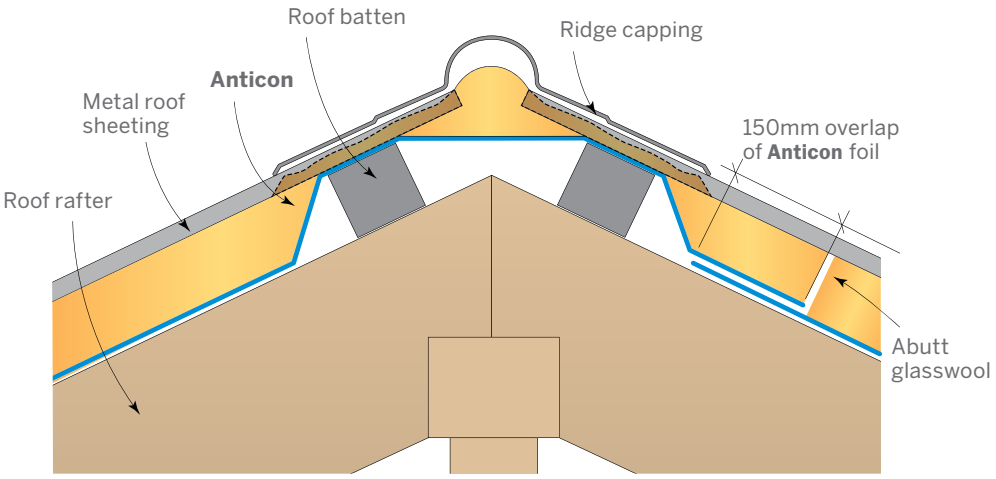


Figure 4.2.4.b

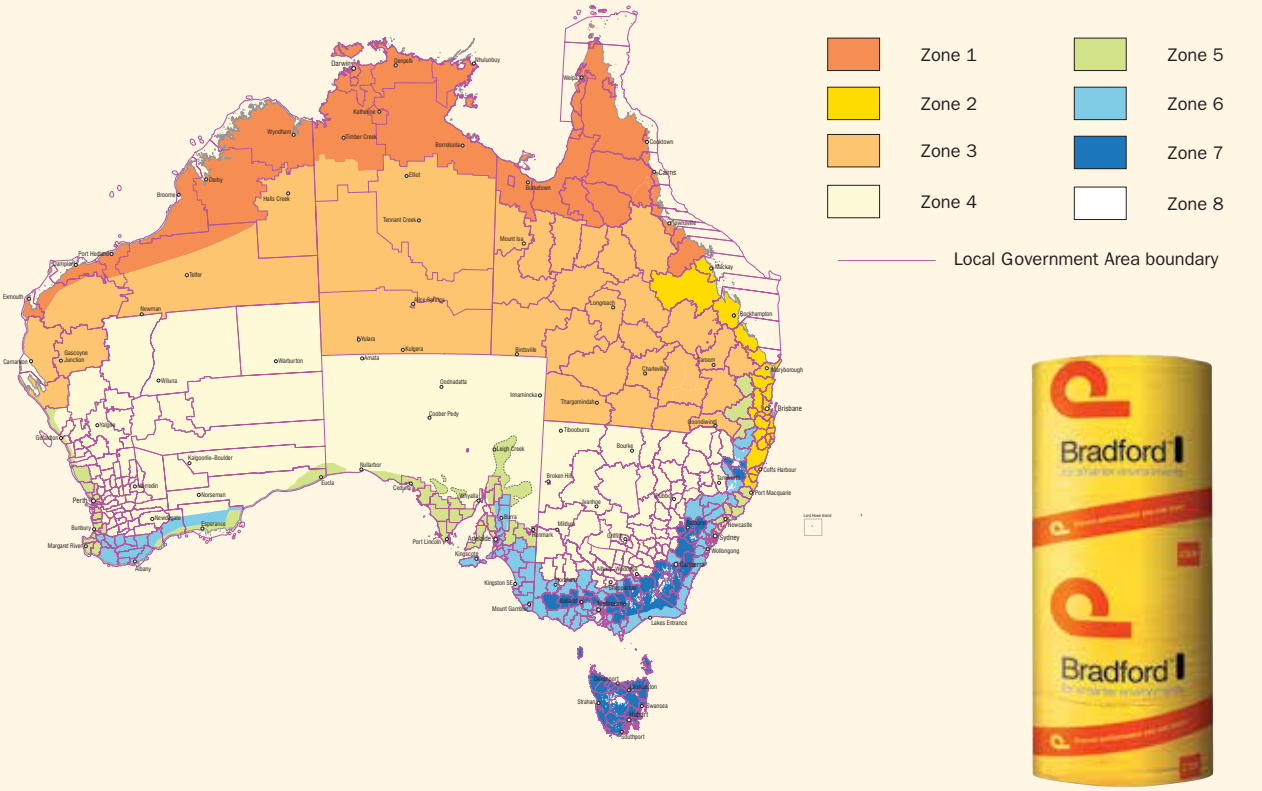
Hip/Ridge Detail – Steel Roof (BAL-12.5 – BAL-40)

BEST PRACTICE[2]

- Install Anticon to the entire roof area over the top of the battens.
- Install the ridge capping to the roof profile.
- For further fixing details contact CSR technical support.



1. Minimum standard: Suitable in warmer climates and where condensation is not considered a problem.
2. Best practice: Recommended for colder climates and where condensation can be a concern, especially BCA climate zones 7 & 8. (See notes on page 8 for further detail).



Note: Extra precautions may still need to be applied where condensation is deemed to be a concern. Condensation occurs when warm moist air hits a surface below the dew point. Any of the following can contribute to the incidence of condensation:
1) Where bathroom exhaust fans are vented into the attic (and not ducted to the outside)
2) Where kitchen range hoods are not ducted to the outside
3) Where high levels of ceiling insulation are installed (e.g. R5.0, R6.0 or R7.0)
4) Where the behaviours of occupants within the home generate excessive amounts of warm, moist air (such as exercise classes).
In these cases, we recommend the installation of Edmonds Sentinel along with eave vents to ensure any warm, moist air that enters the attic space can be expelled before it condenses. Sentinel features a motor that is hard wired so that air from the attic space can be expelled even when there is no breeze. Edmonds Sentinel is very economical to run and is the only BAL rated vent on the market.

4.3 **BAL FZ Tiled Roofs**

In the BAL–FZ case, much more stringent fire protection measures apply. In these areas the roofing system must comply with AS 1530.8.2 when tested from the outside. The roofing systems detailed in this section have been assessed by a registered testing authority as being likely to achieve bushfire attack level BAL–FZ if tested in accordance with AS1530.8.2-2007.

The following 2 pages set out the construction requirements for tile roofs in BAL-FZ as tested by Exova Warringtonfire. The Regulatory Information Assessment Report issued by Exova Warringtonfire can be downloaded at www.rooftile.com.au/pdf/rir-23987-02.pdf

Figure 4.3.1

Fascia Detail

- Pine 15mm pine plywood to be fixed above rafter.
- Cover plywood with 38mm Bradford Flexitel™ Blanket.
- Steel counter battens (not shown) to be fixed over the Flexitel blanket.
- Install Bradford Thermoseal Roof Tile sarking to entire roof area underneath the tile battens.
- Fill gap underneath ponding board and between Flexitel with Fireseal™ FZ Tile Roof batts.
- For further fixing details contact CSR technical support.

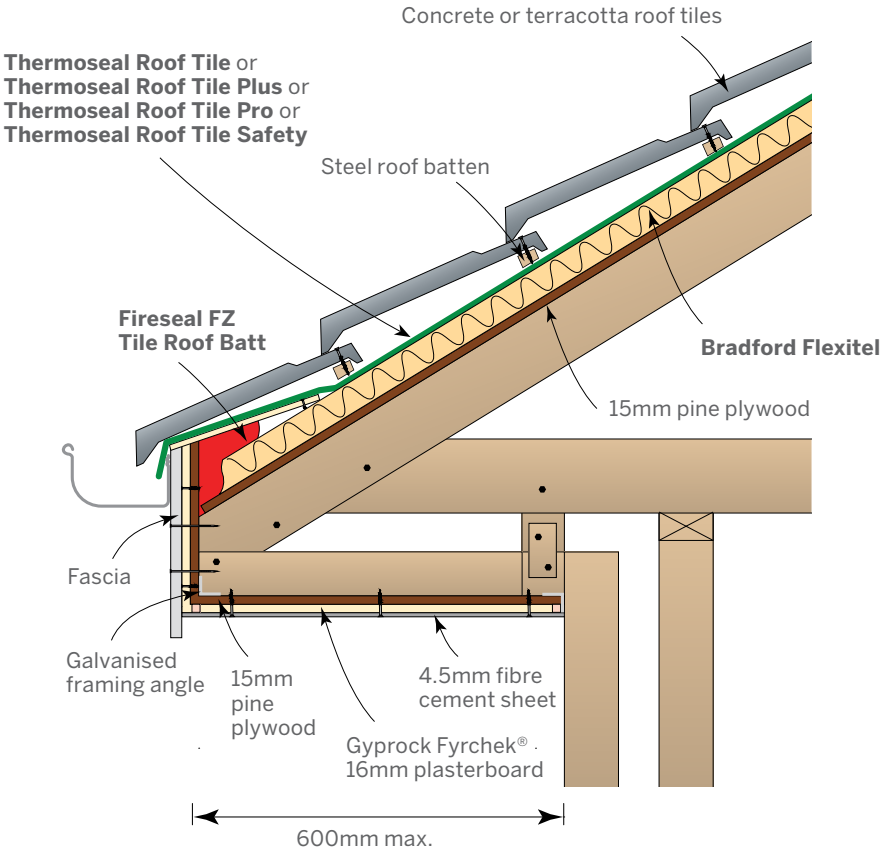


Figure 4.3.2

Valley Detail

- Pine 15mm pine plywood to be fixed above rafter.
- Cover plywood with 38mm Bradford Flexitel Blanket.
- Install Bradford Thermoseal Roof Tile sarking to entire roof area underneath the tile battens.
- The junction of the valley iron and fascia requires Fireseal FZ Tile Roof batts to be installed underneath the valley to eliminate the gap created by the change in pitch.
- For further fixing details contact CSR technical support.

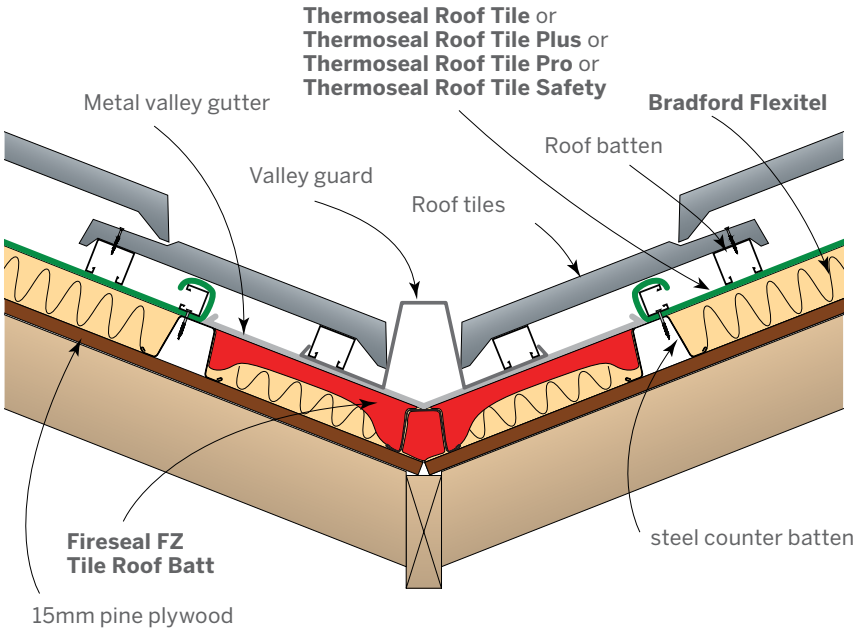


Figure 4.3.3

Hip/Ridge Detail

- Pine 15mm pine plywood to be fixed above rafter.
- Cover plywood with 38mm Bradford Flexitel Blanket.
- Steel counter batten (not shown).
- Install Bradford Thermoseal Roof Tile sarking to entire roof area underneath the tile battens.
- Ridge and hip tiles must be installed over Fireseal FZ Tile Roof batts to eliminate gaps.
- For further fixing details contact CSR technical support.

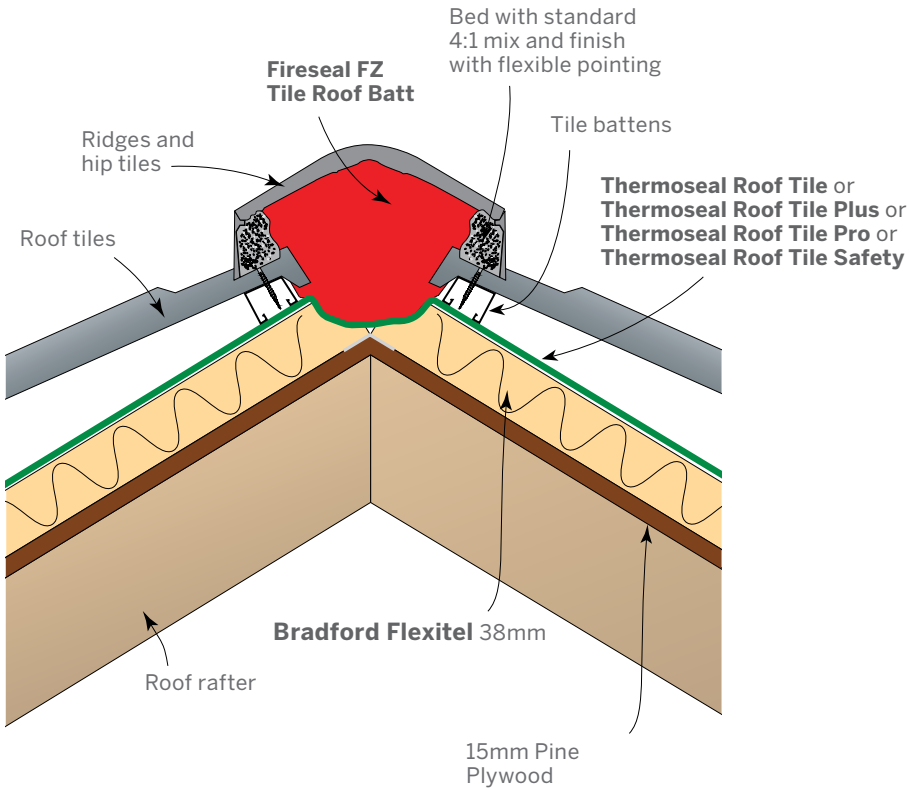
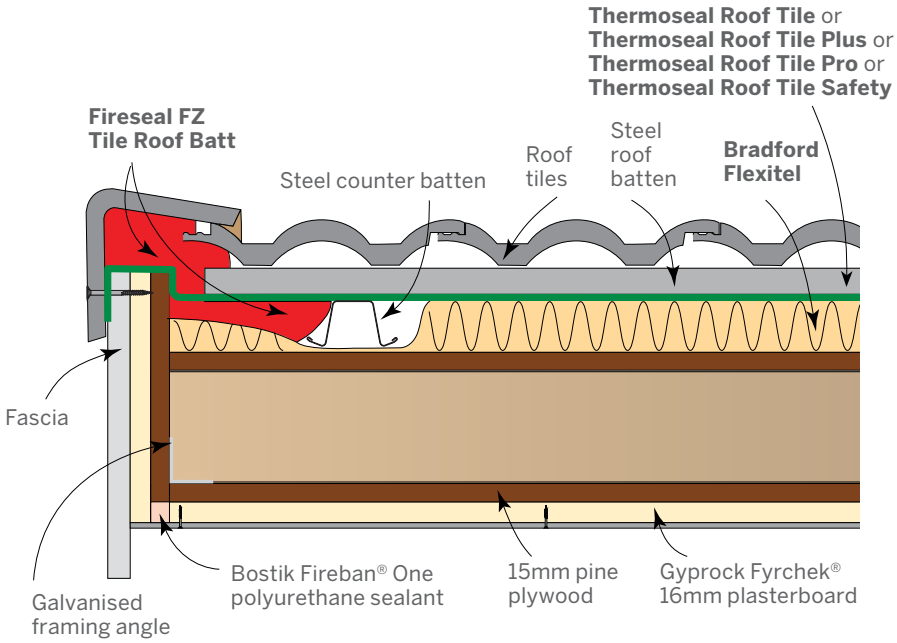


Figure 4.3.4

Barge Detail

- Pine 15mm pine plywood to be fixed above rafter.
- Cover plywood with 38mm Bradford Flexitel Blanket.
- Install Bradford Thermoseal Roof Tile sarking to entire roof area underneath the tile battens.
- Gaps under barge tile to be filled with Fireseal FZ Tile Roof batts.
- For further fixing details contact CSR technical support.



4.4 **BAL–FZ Metal Roof**

There are 3 system variants approved for FZ metal roof construction.

The following 2 pages set out the construction requirements for metal roofs in BAL FZ as tested by Exova Warrington. Further details can be downloaded at: www.bluescopesteel.com.au/.../bushfire-factsheet-version1-april-2011

The table below details the components and materials used in each of these 3 approved systems.

FZ SYSTEM VARIANT	ROOF COMPONENT	ROOF SYSTEM CONSTRUCTION MATERIALS
FZ System variant 1	Roof	Colorbond® or Zincalume®
	Battens	Steel
	Truss	Steel
	Barrier Material	Promatect with a damp course between batten
	Insulation & Sarking	Anticon 60 LD
	Fascia	Colorbond or Zincalume
FZ System variant 2	Roof	Colorbond or Zincalume
	Battens	Steel
	Truss	Timber
	Barrier Material	Promatect with a damp course between batten
	Insulation & Sarking	Anticon 60 LD
	Fascia	Colorbond or Zincalume
FZ System variant 3	Roof	Colorbond or Zincalume
	Battens	Steel
	Truss	Timber
	Barrier Material	Pine plywood
	Insulation & Sarking	Anticon 80 LD
	Fascia	Timber

Figure 4.4.1

FZ System variant 3 Fascia/eaves detail

- At eaves install 90mm wide Fireseal FZ Metal Roof batts positioned on the edge and compressed with Anticon 80 LD crushed to a thickness of 40mm by the roof sheeting.
- For further fixing details contact CSR technical support.

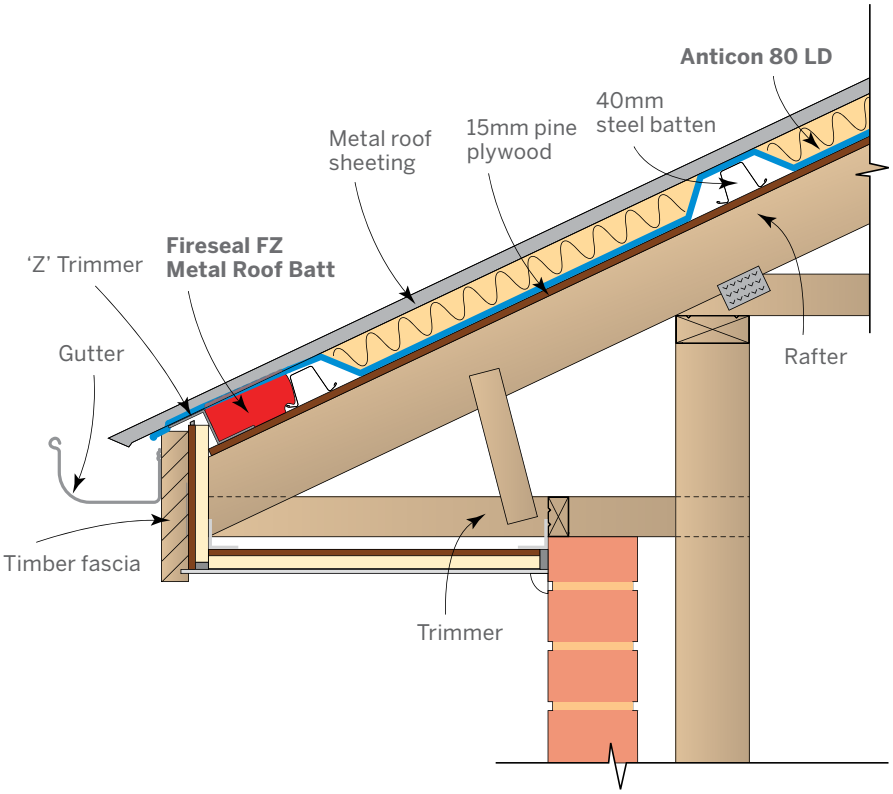


Figure 4.4.2

FZ System variant 3 Barge Detail

- Bradford Anticon 80 Light Duty installed with foil side down over roof battens and under roof sheeting.
- At barge Fireseal FZ Metal Roof batts are positioned on edge and compressed to a thickness of 40mm by the roof sheeting.
- For further fixing details contact CSR technical support.

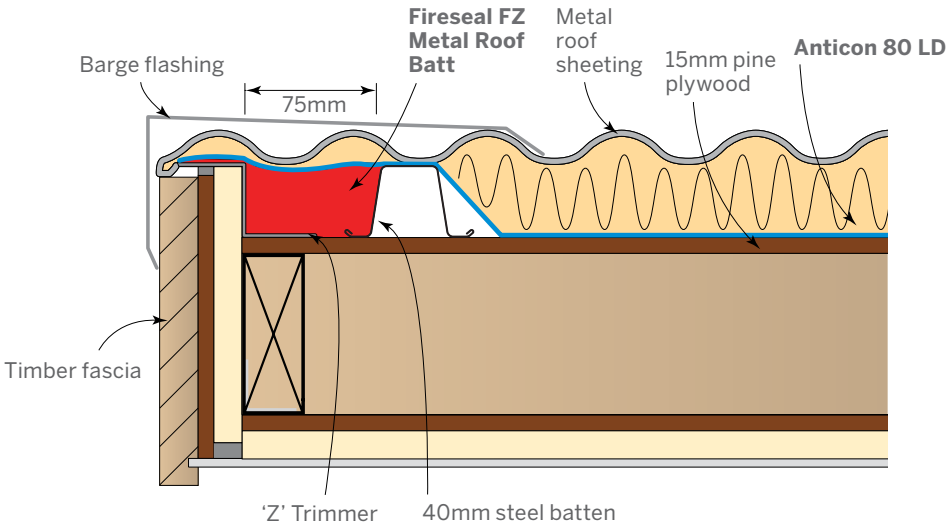


Figure 4.4.3

FZ System variant 3 Hip/ridge detail

- Bradford Anticon 80 Light Duty installed with foil side down over roof battens and under roof sheeting.
- At ridge install 90mm Fireseal FZ Metal Roof batts in gap between roof sheet edges so that batt is compressed by 50%.
- For further fixing details contact CSR technical support.

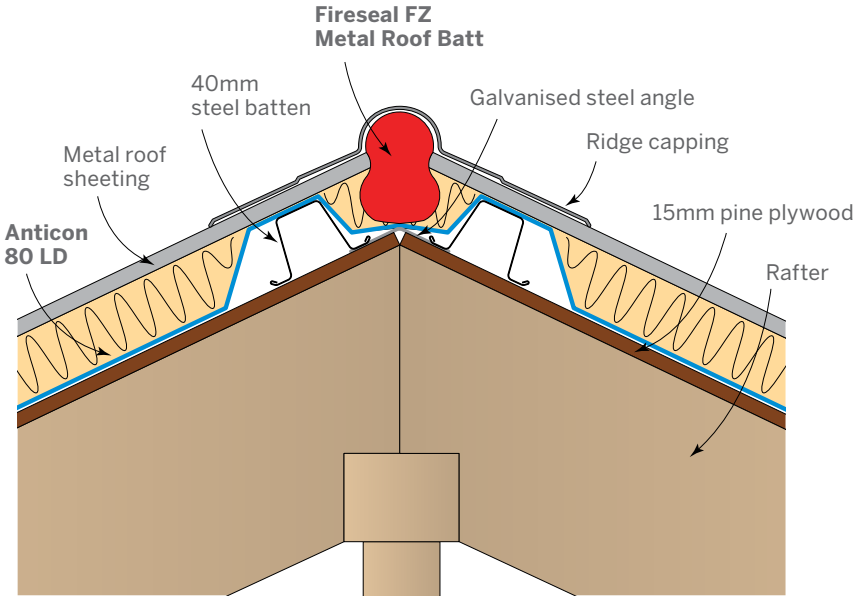
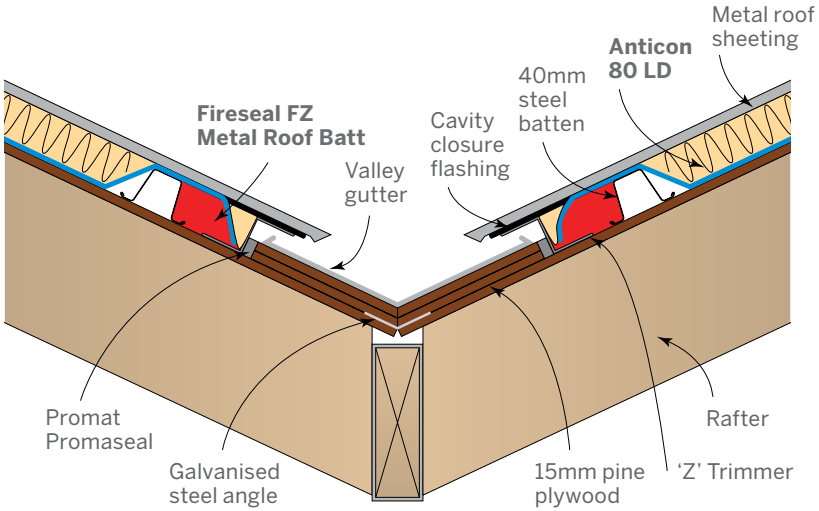


Figure 4.4.4

FZ System variant 3 Valley detail

- Bradford Anticon 80 Light Duty installed with foil side down over roof battens and under roof sheeting.
- At eaves and valleys install Fireseal FZ Metal Roof batts in edge compressed with Anticon 80 to a thickness of 40mm.
- For further fixing details contact CSR technical support.



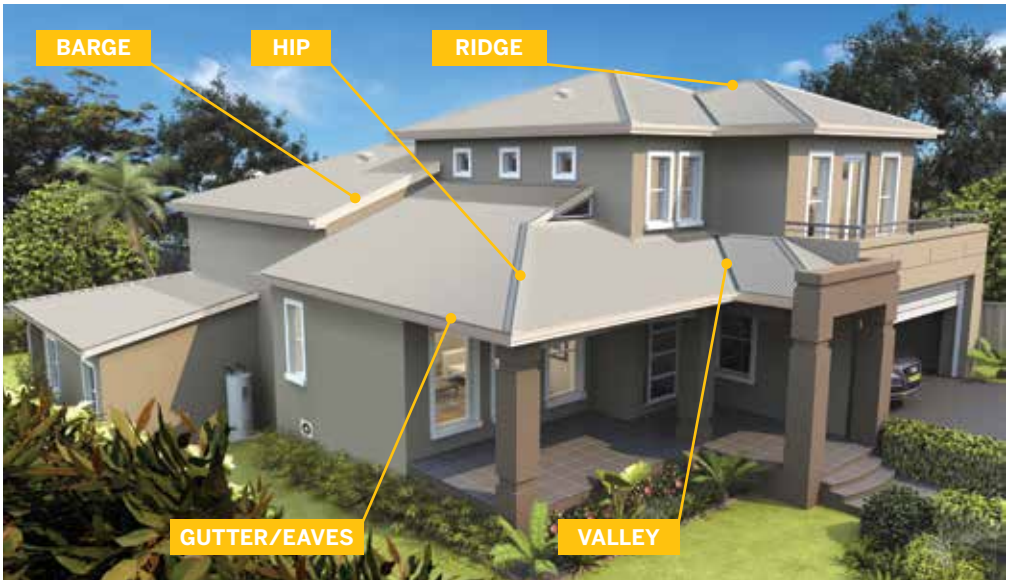
5.0 BRADFORD INSULATION PRODUCTS FOR BUSHFIRE ROOFING SYSTEMS

Multitel BAL 12.5 – 40 Blanket

A non-combustible glasswool roll used to seal off areas of metal roofs from potential ember ingress. The blanket is typically installed at gutter line, hip valley and ridge joint.

PRODUCT	THICKNESS (mm)	WIDTH (mm)	LENGTH (m)	PIECES PER PACK	PRODUCT CODE	LINEAL METRES PER PACK
Multitel BAL 12.5 – 40 Blanket	25	300	20	4	100061	80

Metal roof: Multitel BAL 12.5 – 40 and FZ Metal Roof Batt installation locations



Thermoseal Roof Tile Range

Bradford Thermoseal Roof Tile comprises a range of economical, heavy duty pliable reflective sarking membranes that are ideal for use under cement and terracotta roof tiles. Manufactured from aluminium foil faced woven polymeric fabric, they have high tensile strength and tear resistance. They are suitable for use for ember protection in bushfire prone areas.

PRODUCT	WIDTH (mm)	LENGTH (m)	PRODUCT CODE	AREA PER ROLL (m^2)	APPLICATIONS
Thermoseal Roof Tile	1500	30	15110	45	Suitable for rafter spacings of 600mm or less
Thermoseal Roof Tile Plus	1500	30	27308	45	Suitable for rafter spacings of 600mm or less
Thermoseal Roof Tile Pro	1500	30	123472	45	Suitable for rafter spacings of 600mm or less
Thermoseal Roof Tile Safety	1500	30	27060	45	Certified fall arrest membrane for use with rafter spacings up to 900mm*

*Allow for additional overlaps as required.

Thermoseal Resiwrap for Metal Roof

Bradford Resiwrap is an extra heavy duty, pliable, reflective foil membrane, specifically designed for use under metal roofs in dwellings. It helps reduce temperature variation in the roof space and protects against the ingress of embers in the event of a fire.

PRODUCT	WIDTH (mm)	LENGTH (m)	PRODUCT CODE	AREA PER ROLL (m^2)
Thermoseal Resiwrap	1350	30	108879	40.5*
Thermoseal Resiwrap	1350	60	108004	81*

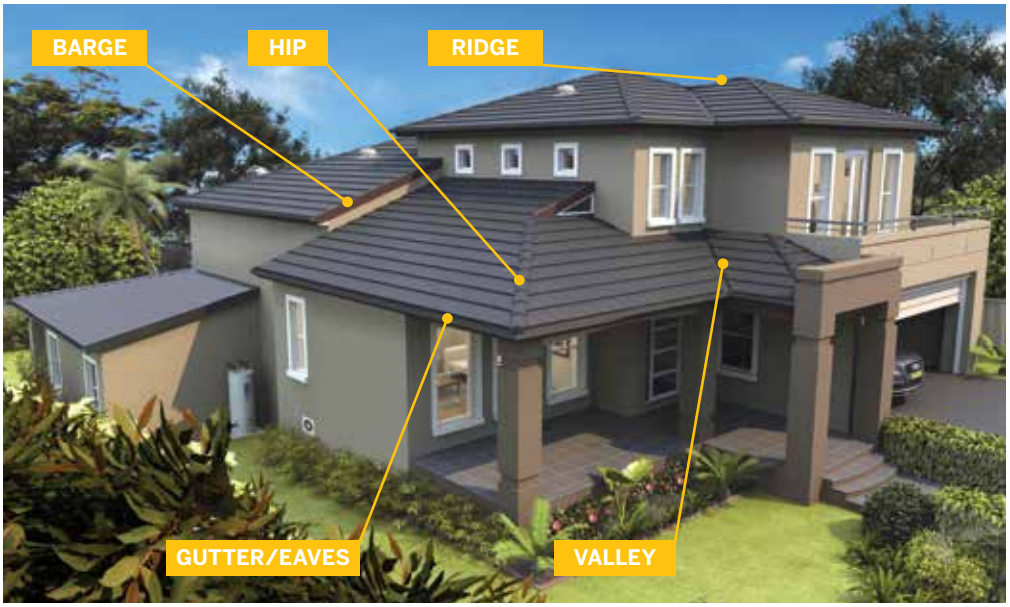
*Allow for additional overlaps as required.

Fireseal FZ

Bradford Fireseal FZ is a fire rated rockwool insulation suitable for continuous operation in extreme temperature. Rockwool is the most popular insulation for fire protection in buildings. Fireseal FZ batts have been specifically designed for use in tiled and metal roofs to help prevent the ingress of embers and flames into the roof space in the event of a fire.

PRODUCT	THICKNESS (mm)	WIDTH (mm)	LENGTH (m)	PIECES PER PACK	PRODUCT CODE	LINEAL METRES PER PACK
Fireseal FZ Tile Roof batts	100	115	1.2	8	125083	9.6
Fireseal FZ Metal Roof batts	75	90	1.2	15	125084	18

Tiled roof: FZ Tile Roof Batt installation locations



Bradford Flexitel

Bradford Flexitel is a lightweight insulation blanket with an R-Value of 1.1 and is easily handled. Its thermal qualities help to meet the BCA energy efficiency requirements and it is certified for use in BAL FZ applications.

PRODUCT	THICKNESS (mm)	WIDTH (mm)	LENGTH (m)	PRODUCT CODE	AREA PER ROLL (m^2)
Flexitel	38	1200	15	77365	18

Anticon foil faced metal roofing blanket

Anticon roofing blanket is a lightweight insulation with a light duty reflective Thermofoil facing. It is designed to provide efficient thermal insulation and condensation control. It also assists in reducing external noise transmission.

PRODUCT	R-VALUE	THICKNESS (mm)	WIDTH (mm)	LENGTH (m)	PRODUCT CODE	AREA PER ROLL (m^2)
Anticon 60 LD	R1.3	60	1200	15	15417	18
Anticon 80 LD	R1.8	80	1200	15	16072	18

6.0 EDMONDS SENTINEL – CSIRO ASSESSED AS COMPLIANT WITH AS 3959-2009

Sentinel is a roof vent manufactured specifically to meet the requirements of AS 3959 in ALL BAL AREAS up to and including BAL 40. Sentinel has been assessed by the CSIRO as compliant meaning it meets the requirement for well sealed roof spaces in bushfire prone regions.

BAL & Roofing Requirements

Why do you need a Bushfire rated ventilation system?

Roof ventilation is extremely important in bushfire prone areas. The standard for construction in bushfire zones requires that the roof space be well sealed, protecting against the risk of windblown embers entering and causing a fire that could threaten the home and occupants.

Edmonds Sentinel features a stainless steel ember guard with 1.9mm aperture and a high efficiency motor that effectively ventilates your roof space while protecting your home and your family in the event of a bushfire. Proper roof ventilation requires good airflow, allowing air to enter the roof space as well as exhaust from the same area. To do this in a BAL40 region, Edmonds recommends the installation of 2 Metal Eave Vents per Sentinel.

Sentinel power ventilator can be easily cleaned to maximise performance and long term durability.

Stainless steel ember guard won't rust or corrode.

The Sentinel motor is powered by 12V DC power pack. The 5-60°C adjustable thermostat allows the unit to run only when required.

It can be switched manually by wiring to a two-way switch.

Features & Benefits

Sentinel is available as a 12V DC (low voltage) model and includes a thermostat and 12V power pack. Extraction rates are equivalent to up to three wind powered ventilators with very low noise. Sentinel is available in 4 popular colours.

- Combines thermostat with energy efficient performance to eliminate hot air from the roof space
- Can be wired to operate continuously to minimise damaging condensation build-up in the roof space
- Low operating cost
- Quiet operation
- Can be installed in NEW and EXISTING homes
- Suitable for use on all types of METAL and TILE roofs
- Minimises the effects of mould on allergy and asthma sufferers

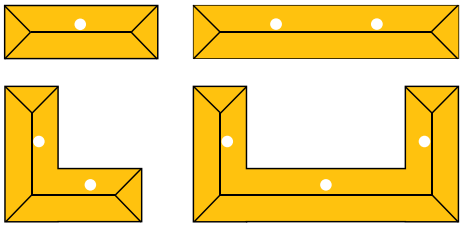
Code Requirements: Bathrooms & Laundries

Under the BCA/NCC requirements, bathroom and laundry ventilation cannot be exhausted directly into a sarked roof space without proper roof ventilation. With an unsarked roof not permitted within BAL zones, the only way around this costly and time consuming problem is to fit a Sentinel rated roof vent.

This simplifies compliance with the code and reduces the risk of moisture build-up and rot in roof spaces. Additionally, a qualified electrician can easily connect laundry and bathroom ventilation products directly to the Sentinel so that it switches on when it's most needed.

Suggested Placement & Recommended Ventilation Levels

- Install ventilators at same height to prevent higher unit pulling air in through lower unit.
- Do not install with other types of ventilators as air can be pulled in through less powerful units.



NO. OF SENTINEL	ROOF AREA (AS STATED BELOW) WILL ACHIEVE 8 AIR CHANGES PER HOUR	ROOF AREA (AS STATED BELOW) WILL ACHIEVE 2 AIR CHANGES PER HOUR
1	55m²	220m²
2	110m²	440m²

PRODUCT	PRODUCT CODE
Sentinel Surfmist	121161
Sentinel Night Sky	121140
Sentinel Headland	121139
Sentinel Woodland Grey	121162
Metal Eave Vent Pack of 2*	121274

Note: Colour range may alter without notice due to supplier and market circumstances.

***Designed for BAL rated areas, eave vents with ventilators are important to ensure good ventilation of the roof cavity. Specially developed from laser cut stainless steel to meet the bushfire requirements of AS3959-2009.**

7.0 PERFORMANCE YOU CAN TRUST

Bradford products are manufactured under ISO 9001 Quality systems and comply with AS4859.1 'Materials for the Thermal insulation of Buildings' as independently tested. This is your assurance it will provide the level of performance stated on the packaging.

Established over 80 years ago, CSR Bradford is Australia's most experienced insulation company. This experience, combined with our world class manufacturing technology, is your guarantee of quality and performance, all backed by CSR, Australia's leading building materials company.

For more information call **1300 850 305** or visit **bradfordinsulation.com.au**

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