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IGNIS LABORATORY ASSESSMENT

APOLLO HOME IMPROVEMENTS – TRIMLINK AND CORRO INSUALTED SHEETING BUSHFIRE COMPLIANCE ASSESSMENT

IGNE-25116-01R I01R00

1 Introduction

Ignis Labs has been engaged by Apollo Home Improvements to undertake a review of the Trimlink and Corro steel faced insulated sheeting products for their suitability in patio roof applications in bushfire prone areas up to BAL 40. Their compliance with AS 3959:2018 and the National Construction Code 2022 Volume One Clauses G5P1, G5D1, G5D2 and G5D3 and Volume Two H7D4 has been considered.

Apollo Home Improvement's Trimlink and Corro panels are a steel faced with an EPS core. Clause 8.6.1 AS 3959:2018 states that within BAL 40 applications, roof sheets shall be non-combustible. The pre-finished metal sheeting of the Trimlink and Corro panels have been reviewed by BRANZ in their assessment report FC17997-01-1 dated 15 December 2023, determining the steel facing as being able to be used wherever non-combustible materials are required and meeting the criteria of Clause 8.6.1 AS 3959:2018.

While AS 3959:2018 does not place conditions on the insulation, it is recognised that as the EPS insulation is bonded to the steel facing, there is a risk for the combustible EPS insulation to pose a risk in bushfire applications. The Trimlink and Corro roof systems have been tested at a pilot scale to AS 1530.8.1 for BAL 40 exposure for the purpose of understanding how the panels perform when exposed to incident radiation under test conditions.

For use in bushfire applications, the panels are to have capping and flashing installed, and be sealed in the same manner as the tested systems.

2 BAL 40 Compliance Requirements

In accordance with the National Construction Code Volume One and Two, buildings located in bushfire prone areas are to comply with the requirements of AS 3959:2018.

Section 8 of AS 3959:2018 details the construction requirements for BAL 40 Clause 8.1 of AS 3959:2018 states that 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 contained in Clauses 8.2 to 8.8 This includes Clause 8.6, which details the requirements of roof systems.

BCA Compliance

Compliance for wall and roof structures in accordance with AS 3959 is achieved through a Deemed-to-Satisfy process. The National Construction Code establishes this

through the deemed to satisfy provisions G5D3 and H7D4 of Volumes 1 and 2 respectively for construction in bushfire prone areas.

AS 3959 Compliance

A Bushfire Attack Level (BAL) is a means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact. AS 3959:2018 details the construction requirements for building elements in bushfire-prone areas with different BAL ratings. The BAL rating is measured in increments of radiant heat (expressed in kilowatts/m^2).

FIGURE 1:

BAL RATING ZONES VISUALIZED

Source: Bushfire Prone Planning Australia

In accordance with AS 3959 Clause 3.4, the construction requirements specified for a particular BAL shall be acceptable for a lower level.

This assessment considers compliance with the Deemed-to-Satisfy provisions of the National Construction Code through satisfying the requirements of AS 3959 with the exceptions as listed in NSW H7D4 (2)(a)(i) and (ii) for NSW.

The requirements for roofs within BAL 40 applications are detailed within Clause 8.6 of AS 3959

BAL 12.5 to BAL 40 | AS 3959 allows roof sheets for BAL 12.5 to BAL 40 applications to be composed of non-combustible material.

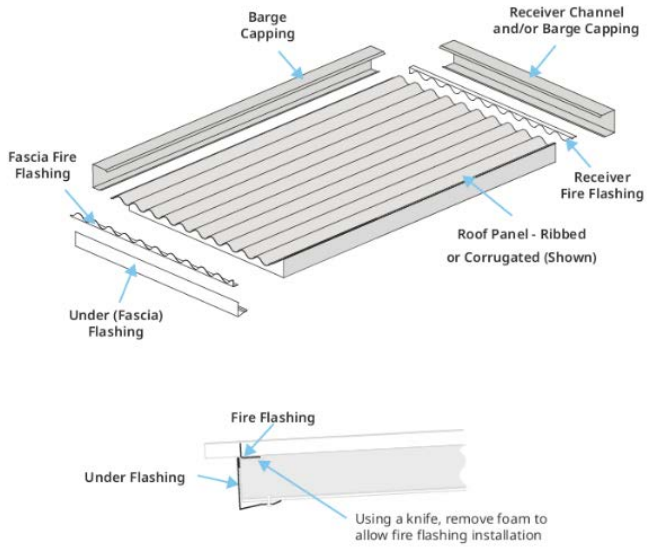
Gaps | Any gaps sealed at the facia or wall line hips and ridges by:

- A mesh or perforated sheet composed of corrosion-resistant steel or bronze having a maximum aperture of 2 mm.
- Mineral wool.
- Other non-combustible material.
- A combination of any of the above.

The steel faced Trimlink and Corro panels meet the requirements of Clause 8.6, having a non-combustible pre-finished steel lining as determined by BRANZ in their assessment report FC17997-01-1 dated 15 December 2023. As the combustible EPS core is bonded to the steel facing, additional pilot scale testing has been undertaken by Ignis Labs to AS 1530.8.1 to verify the performance of the panels when exposed to 40 kW/m^2 of radiation.

FIGURE 2:

APOLLO ROOF PANEL WITH CAPPING AND FLASHING FOR BAL 40 APPLICATIONS



Source: Apollo Patios

3 AS 1530.8.1 Testing

Clause 8.1 of AS 3959:2018 states that 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 of Clauses 8.2 to 8.8. As such, testing of the Trimlink and Corro roof systems to AS 1530.8.1 with a maximum incident radiation of 40 kW/m^2 demonstrates compliance with AS 3959 and the BCA for use within BAL 40 applications.

The Trimlink and Corro patio roof systems have been tested at a pilot scale to AS 1530.8.1 to investigate the reaction of the combustible EPS core when exposed to BAL 40 conditions. The radiant panel measured 1 m by 1 m in lieu of 3 m by 3m and the test specimens measured 700 mm wide in lieu of the minimum width of 2,000 mm as specified in Clause 17.2 of AS 1530.8.1. Being a patio roof system, the underside was not enclosed.

The specimens were exposed to the 'Severe' radiation schedule prescribed by Table 14.3.1 of AS 1530.8.1 as shown below in Figure 3.

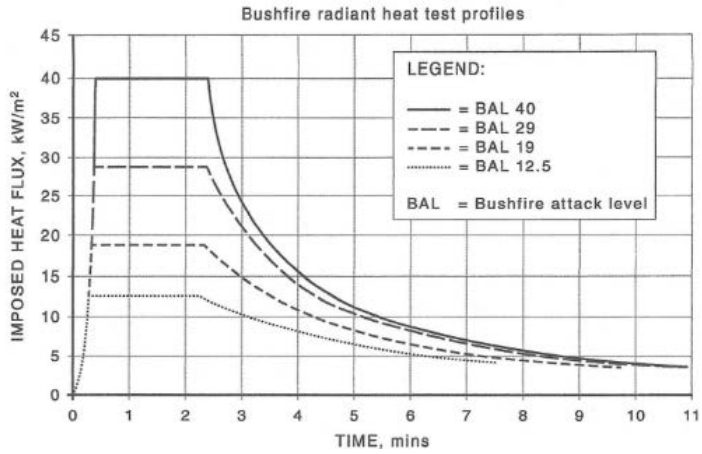
FIGURE 3:

RADIANT HEAT PROFILES

TABLE 14.3.1

BUSHFIRE RADIANT HEAT TEST PROFILES—TIME FROM START OF TEST

Bushfire attack level (BAL)	Incident radiation kW/m²	Time from start of test(s)								
		20–140	140–180	180–240	240–300	300–360	360–420	420–480	480–540	540–600
Severe [1]	40	Min 40	24	16	12	8.5	7	5	4	3
Very high	29	Min 29	21	14	11	8	6.5	5	3.5	3
High	19	Min 19	15	11	8	7	5	4	3	3
Medium	12.5	Min 12.5	10	8	6	5	4	3	3	3



Trimlink Patio Roof System

The Trimlink patio roof system comprising of the Trimlink steel faced EPS panel, barge capping, steel flashing and a box gutter was tested to AS 1530.8.1 at an angle of 18° with a maximum incident radiation of 40 kW/m² and Class A cribs located in the box gutter and adjacent to the capping joint. The gaps were sealed with a fire rated sealant.

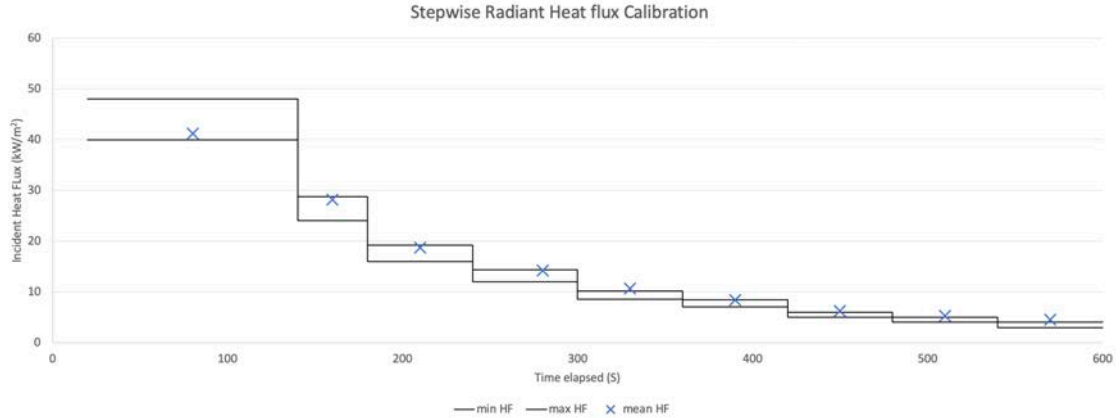
FIGURE 4:

TRIMLINK PATIO ROOF SYSTEM TEST SPECIMEN FRONT AND SIDE VIEW

The specimen was exposed to the 'Severe' radiation schedule for BAL 40, with the incident radiation calibration shown below in Figure 5.

FIGURE 5:

INCIDENT RADIANT HEAT FLUX



The specimen was tested for 60 minutes, with 10 minutes of radiation exposure. Minor flaming was observed on the fire exposed side during the first 10 minutes from the sealant, and from the joint in the panel adjacent to the box gutter. The flaming self-extinguished.

FIGURE 6:

2 MINUTES INTO THE TEST

3 MINUTES INTO THE TEST

FIGURE 7:

5 MINUTES INTO THE TEST

6 MINUTES INTO THE TEST

FIGURE 8:

8 MINUTES INTO THE TEST

10 MINUTES INTO THE TEST

FIGURE 9:
END OF THE TEST

The Trimlink patio roof system achieved the following results in accordance with Clause 14.4 of AS 1530.8.1.

Performance Criteria	Time to failure (min)	Position of failure
Formation of through-gaps greater than 3 mm	No failure	-
Sustained flaming for 10 s on the non-fire side	No failure	-
Flaming on the fire-exposed side at the end of the 60 min test period	No failure	-
Radiant heat flux 365 mm from the non-fire side exceeding 15 kW/m^2	Not applicable	NA
Mean and maximum temperature rises greater than 140 K and 180 K	Not applicable	NA
Radiant heat flux 250 mm from the specimen, greater than 3 kW/m^2 between 20 min and 60 min	Not applicable	NA
Mean and maximum temperature of internal faces exceeding 250 °C and 300 °C respectively between 20 min and 60 min after commencement of test	Not applicable	NA
Crib class: A	Peak heat flux:	40 kW/m^2

It was deemed that the Trimlink patio roof system maintained the applicable performance criteria of AS 1530.8.1 when exposed to a peak heat flux of 40 kW/m^2 and as such is suitable for BAL 40 applications.

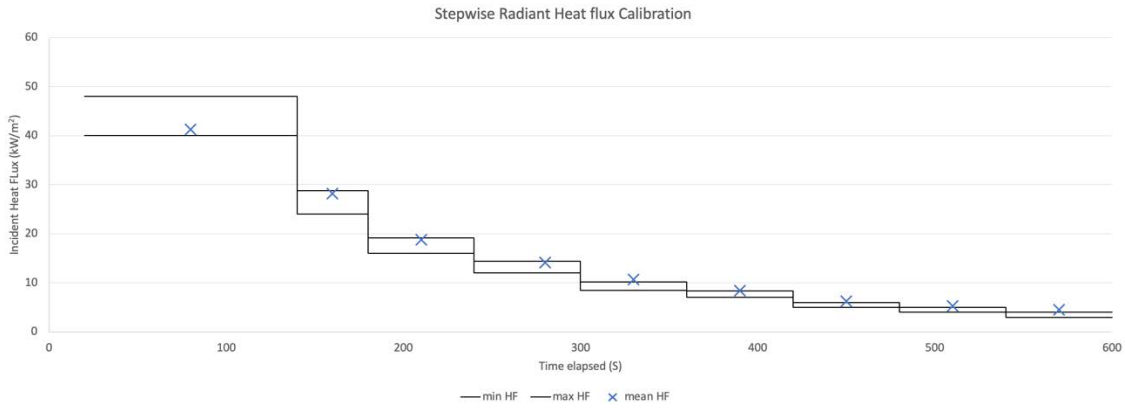
Corro Patio Roof System

The Corro patio roof system comprising of the Corro steel faced EPS panel, barge capping, steel flashing and a box gutter was tested to AS 1530.8.1 at an angle of 18° with a maximum incident radiation of 40 kW/m² and Class A cribs located in the box gutter and adjacent to the capping joint. The gaps were sealed with a fire rated sealant.

FIGURE 10:
CORRO PATIO ROOF SYSTEM TEST SPECIMEN FRONT AND SIDE VIEW

The specimen was exposed to the 'Severe' radiation schedule for BAL 40, with the incident radiation calibration shown below in Figure 5.

FIGURE 11:
INCIDENT RADIANT HEAT FLUX



The specimen was tested for 60 minutes, with 10 minutes of radiation exposure. Equivalent performance to the Trimlink system was observed, with minor flaming was observed on the fire exposed side during the first 10 minutes from the sealant, and from the joint in the panel adjacent to the box gutter. The flaming self-extinguished.

FIGURE 12:

START OF THE TEST

3 MINUTES INTO THE TEST

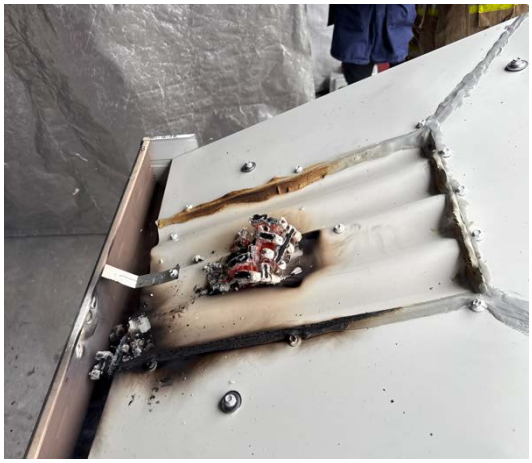
FIGURE 13:

4 MINUTES INTO THE TEST

5 MINUTES INTO THE TEST

FIGURE 14:

7 MINUTES INTO THE TEST



10 MINUTES INTO THE TEST

FIGURE 15:
END OF THE TEST

The Corro patio roof system achieved the following results in accordance with Clause 14.4 of AS 1530.8.1.

Performance Criteria	Time to failure (min)	Position of failure
Formation of through-gaps greater than 3 mm	No failure	-
Sustained flaming for 10 s on the non-fire side	No failure	-
Flaming on the fire-exposed side at the end of the 60 min test period	No failure	-
Radiant heat flux 365 mm from the non-fire side exceeding 15 kW/m^2	Not applicable	NA
Mean and maximum temperature rises greater than 140 K and 180 K	Not applicable	NA
Radiant heat flux 250 mm from the specimen, greater than 3 kW/m^2 between 20 min and 60 min	Not applicable	NA
Mean and maximum temperature of internal faces exceeding 250 °C and 300 °C respectively between 20 min and 60 min after commencement of test	Not applicable	NA
Crib class: A	Peak heat flux:	40 kW/m^2

It was deemed that the Corro patio roof system maintained the applicable performance criteria of AS 1530.8.1 when exposed to a peak heat flux of 40 kW/m^2 and as such is suitable for BAL 40 applications.

4 CONCLUSION

Apollo Home Improvement's Trimlink and Corro patio roof systems have been assessed for their compliance with AS 3959 on the basis of them having a non-combustible roof lining by BRANZ in their assessment report FC17997-01-1 dated 15 December 2023. While AS 3959:2018 does not place conditions on the insulation, it is recognised that as the EPS insulation is bonded to the steel facing, there is a risk for the combustible EPS insulation to pose a risk in bushfire applications and as such the systems were additionally tested to AS 1530.8.1 at a pilot scale.

The testing to AS 1530.8.1 demonstrated that the whole system, having met the performance criteria, is suitable for use within BAL 40 applications. For use in bushfire applications, the panels are to have capping and flashing installed, and be sealed in the same manner as the tested systems.

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