warringtonfire
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A simulated bushfire test report

An external construction tested in accordance with AS 1530.8.1:2007

Test sponsor: Brite Decking (Pty) Pty Ltd

Products: Brite Decking WPC Traditional Solid Deck Boards

Bushfire attack level (BAL) exposure: 29kW/m^2 Crib class: A

Job number: FRT200102

Test date: 19 November 2018 Revision: R1.0

Quality management

Version	Date	Information about the report			
R1.0	6 May 2020	Description	Initial issue		
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General conditions of use

Executive summary

This report documents the findings of a simulated bushfire attack – radiant heat and small flaming sources test on elements of construction for buildings undertaken on 19 November 2018 in accordance with clauses 14 and 21 of AS 1530.8.1:2007.

Warringtonfire Australia did the test at the request of Brite Decking (Pty) Pty Ltd.

Table 1 provides details of the test assembly, and Table 2 provides a summary of the test specimen. A summary of the results is provided in Table 3.

Table 1 Test assembly

Item	Detail	
Wall system size	Width (w): Height (h): Thickness (t):	3000 mm 3000 mm 106 mm
Nominal deck size	Width (w): Height (h): Depth (d):	1800 mm 450 mm 750 mm
Recess	The deck was set within 1800 mm wide × 750 mm deep recess of the wall system.	

Table 2 Test specimen

Item	Detail
Test specimen	• The deck consisted of the Brite Decking WPC Traditional Solid decking boards that were 137 mm wide × 23 mm thick and installed parallel to the wall system with a nominal 1.9 mm spacing between each board. • The boards were spaced using the Brite Decking WPC hidden fastener and screw system. • The boards were secured to joists using 6g × 35 mm long countersunk head needle point screws in conjunction with the Brite Decking WPC hidden fasteners. • The front fascia of the specimen consisted of an 1800mm long × 137 mm wide × 23 mm deep Brite Decking WPC Traditional Solid fascia board installed horizontally and secured to the ends of each joist using two 10g × 60 mm long Torx head T17 screws located 30mm from the upper and lower edges of the board. • A fire-resistant woven fibreglass fabric was installed below the deck in order to simulate an enclosed sub-floor. • The wall system incorporated 90 × 45 timber framing, clad with 13 mm thick Gyprock Fyrchek plasterboard and 6 mm thick square edge CSR Cemintel fibre-cement board to the exposed side. • The unexposed side of the wall system was lined with 10 mm thick regular plasterboard.

Table 3 Test results

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 minute test period		No failure	-
Radiant heat flux 365 mm from the non-fire side exceeding 15 kW/m^2		Not applicable	-
Mean and maximum temperature rises greater than 140 K and 180 K		Not applicable	-
Radiant heat flux 250 mm from the specimen, greater than 3 kW/m^2 between 20 min and 60 min		Not applicable	-
Mean and maximum temperature of internal faces exceeding 250 °C and 300 °C respectively between 20 min and 60 min after commencement of test		No failure	-
Crib class	Type A	**Peak heat flux**	29 kW/m^2
Test result		BAL— A29	

Contents

1. Introduction

This report documents the findings of a simulated bushfire attack – radiant heat and small flaming sources test on elements of construction for buildings undertaken on 19 November 2018 in accordance with clauses 14 and 21 of AS 1530.8.1:2007.

Warringtonfire Australia did the test at the request of test sponsors listed in Table 4.

Table 4 Test sponsor details

Test sponsor	Address
Brite Decking (Pty) Pty Ltd	33 Liverpool Road Ashfield NSW 2131 Australia

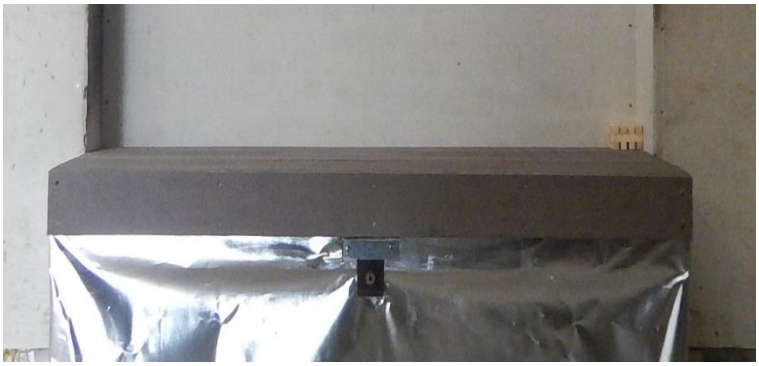
2. Test specimen

2.1 Schedule of components

Table 5 describes the test specimen and lists the schedule of components. These were provided by the test sponsor and surveyed by Warringtonfire Australia.

A full description of the test specimen is provided in the drawings included in Appendix A.

Table 5 Schedule of components

Item	Description	
Deck		
1	Name	Brite Decking WPC Traditional Solid decking boards
	Size	137 mm wide × 23 mm thick (measured)
	Linear Density	Nominal 4.3 kg/m (measured)
	Installation	Positioned on the top side of the joists parallel to the wall system. There was a gap of nominal 1.9 mm between the boards (spaced using Brite Dekcing WPC hidden fastener and screw system). The fascia consisted of a full width Brite Decking WPC fascia board.
	Fixing	The decking boards were secured using screws (item 2) at every joist (Item 5) and spaced using the Brite Decking WPC hidden fasteners (item 4). The fascia board was secured using 2-off screws (item 3) spaced at every joist, 30 mm from the upper and lower edges of the board. 
2	Name	Decking screws
	Description	6g × 35 mm long countersunk head needle point course thread screws
	Installation	1-off screw used in conjunction with the Brite Decking WPC hidden fastener (item 4) to secure the decking boards (Item 1) to each joist.
3	Name	Fascia board screws
	Description	10g × 60 mm long Torx head Type 17 screws
	Installation	2-off screws spaced at every joist, 30 mm from the upper and lower edges of the fascia board and secured to the joists.
4	Name	Brite Decking WPC Hidden Fastener
	Size	39 mm long × 25 mm wide × 11 mm high
	Material	304 Stainless Steel
	Installation	Inserted into the groove of the decking boards (item 1) and secured to the joists using screws (item 2).
Sub-floor		
5	Material	F17 Kiln Dried Hardwood
	Size	90 mm × 45 mm

Item	Description	
	Density	656 kg/m^3 (measured)
	Moisture Content	8% (measured)
	Fixings	75 mm × 3.06 mm smooth shank framing nails on each joist to the bearer
	Installation	5-off 730 mm long lengths to form the joists that were located perpendicular to the wall, at nominal 450 mm centres.
6	Item name	Fibreglass mesh
	Material	Woven fibreglass fabric
	Thickness	0.2 mm thick
Sub-floor	Installation	Five × 730 mm long lengths of the F17 hardwood (item 5) were used to form the joists of the subfloor. These were positioned perpendicular to the wall at spaced at nominal 450 mm centres. Two × 1797 mm lengths of the F17 hardwood (item 5) were used to form the bearers of the subfloor. These were positioned parallel to the wall. The bearers were located at the front and back edge of the specimen. The fibreglass mesh (item 6) was stapled to the bearer and front fascia to ensure there were no gaps greater than 3 mm in diameter to the subfloor area.
Wall system		
7	Item name	Exposed side cladding
	Product name	CSR Cemintel fibre-cement board
	Material	6 mm thick cement sheet
	Density	1468 kg/m^3 (measured)
8	Item name	Exposed side plasterboard
	Product name	13mm Gyprock Fyrchek plasterboard
	Size	1200 mm wide × 3000 mm long × 13 mm thick (cut to size)
	Density	847 kg/m^3 (measured)
9	Item name	Unexposed side plasterboard
	Product name	10 mm Gyprock plasterboard
	Size	1200 mm wide × 3000 mm long × 10 mm thick (cut to size)
	Density	566 kg/m^3 (measured)
10	Item name	Eaves sheet lining
	Material	4.5 mm thick cement sheet
	Density	1468 kg/m^3 (measured)
11	Item name	Wall framing
	Product name	90×45 MGP10 Radiata pine
	Density	489 kg/m^3 (measured)
Wall system	Installation	The wall framing (item 11) was assembled together using 3-inch gun nails. The exposed side cladding (item 7) was fixed to the exposed side of the wall on top of item 8 at nominal 200 mm centres with 6g × 40 mm long needle point screws. The exposed side plasterboard (item 8) was fixed to the exposed side of the wall – directly to the wall framing at nominal 300 mm centres with 6g × 32 mm long needle point screws. The unexposed side plasterboard (item 9) was fixed to the unexposed side of the wall – directly to the wall framing at nominal 300 mm centres with 6g × 32 mm long needle point screws.

Item	Description	
		A nominal 250 mm wide eaves sheet lining (item 10) was installed on the top of the recess formed in the wall system. It was approximately 1800 mm long and secured to the eaves framing with two screws at each support location.

2.2 Installation details

Table 6 lists the installation and orientation details for the test specimen.

Table 6 Installation and orientation details

Item	Detail
Start date for construction of separating element	16 November 2018
Deck assembled on	19 November 2018
Separating element constructed by	Representatives of Warringtonfire Melbourne
Deck assembled by	Representatives of Warringtonfire Melbourne.
Deck installed into the separating element by	Representatives of Warringtonfire Melbourne
Orientation	Asymmetrical due to the external face with the assembled deck system exposed to the radiant heat source. The front face of the deck was exposed to a radiant panel at an initial irradiance level of 29 kW/m^2. It was confirmed that the system was exposed to heat from the side that would normally face the outside of the building.

3. Test procedure

Table 7 details the test procedure for this a simulated bushfire test.

Table 7 Test procedure

Item	Detail	
Statement of compliance	The test was performed in accordance with the requirements of clauses 14 and 21 of AS 1530.8.1:2007 for an external construction.	
Variations	None	
Pre-test conditioning	The construction and installation of the test specimen was completed on 19 November 2018. The test specimen was subjected to normal laboratory temperatures and conditions between the completion of construction of the test specimen and the start of the test.	
Sampling / specimen selection	The laboratory was not involved in sampling or selecting the test specimen for a simulated bushfire test.	
Ambient laboratory temperature	Start of the test Minimum temperature Maximum temperature	32 °C 32 °C 35 °C
Test duration	The test was stopped after 60 minutes in accordance with the procedures in AS 1530.8.1:2007	
Instrumentation and equipment	The instrumentation was provided in accordance with AS 1530.8.1:2097 as follows: • The unexposed side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads. • The internal temperatures of the specimen were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads. • The thermocouple positions are shown in Table 10 and Figure 5 in Appendix D. • A Ø3 mm gap gauge was available during the test to assess the performance of the test specimen under the criteria of integrity. • A pilot ignition source was available to assess any areas of the specimen producing significant quantities of volatiles. • The crib was conditioned for at least 24 hours in a conditioning oven and removed 1 hour before the start of the test. • The crib was weighed to confirm that it was within the 0.25±0.05kg mass required by the standard. The crib was lit over a 3 minute period; 30 seconds per exposed side with an additional 30 seconds of overall coverage using an acetylene torch with a Type 551 Size 8 × 10 tip. • Radiant heat flux measurements to determine the irradiance received and transmitted from the exposed face of the specimen were taken using Medtherm heat flux gauges. • A second heat flux meter was placed in the centre of the wall to provide additional information. • The heat flux gauge positions are shown in Figure 4 in Appendix E.	

4. Test measurements and results

Table 8 summarises the results the specimen achieved against the performance criteria listed in clauses 14 and 21 of AS 1530.8.1:2007.

Appendix E includes details of the measurements taken during the test.

Table 9 in Appendix B includes observations of any significant behaviour of the specimen and details of the occurrence of the various performance criteria specified in AS 1530.8.1:2007.

Photographs of the specimen are included in Appendix F.

Table 8 Test results

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 minute test period		No failure	-
Radiant heat flux 365 mm from the non-fire side exceeding 15 kW/m^2		Not applicable	-
Mean and maximum temperature rises greater than 140 K and 180 K		Not applicable	-
Radiant heat flux 250 mm from the specimen, greater than 3 kW/m^2 between 20 min and 60 min		Not applicable	-
Mean and maximum temperature of internal faces exceeding 250 °C and 300 °C respectively between 20 min and 60 min after commencement of test		No failure	-
Crib class	Type A	**Peak heat flux**	29 kW/m^2
Test result		BAL— A29	

5. Application of test results

5.1 Test limitations

The results of these fire tests may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

These results only relate to the behaviour of the specimen of the element of construction under the particular conditions of the test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use, and they do not necessarily reflect the actual behaviour in fires.

5.2 Variations from the tested specimen

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described here was tested in accordance with test method in AS 1530.8.1:2007. Any significant variation with respect to size, construction details, loads, stresses, edge or end conditions, other than that allowed under the field of direct application in the relevant test method, is not covered by this report.

It is recommended that any proposed variation to the tested configuration – other than as permitted under the field of direct application specified in Appendix C – should be referred to the test sponsor. They should then obtain appropriate documentary evidence of compliance from Warringtonfire Australia Pty Ltd or another registered testing authority.

5.3 Uncertainty of measurements

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

Appendix A Drawings of test assembly

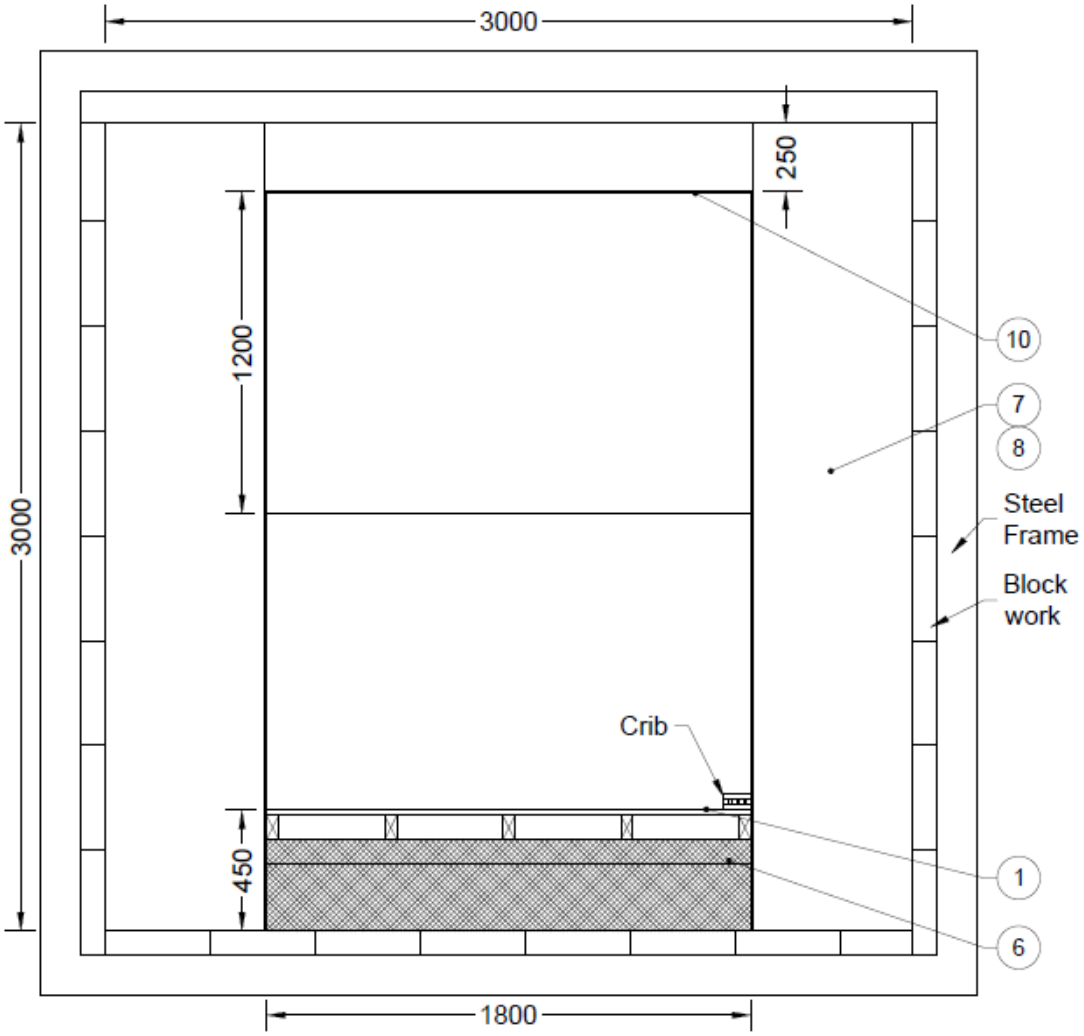


Figure 1 Exposed side elevation of test specimen

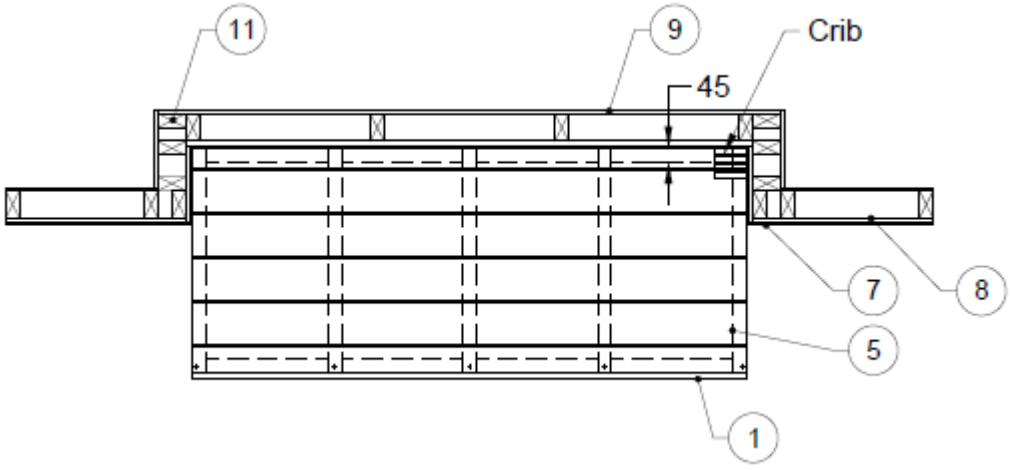


Figure 2 Horizontal section through test specimen

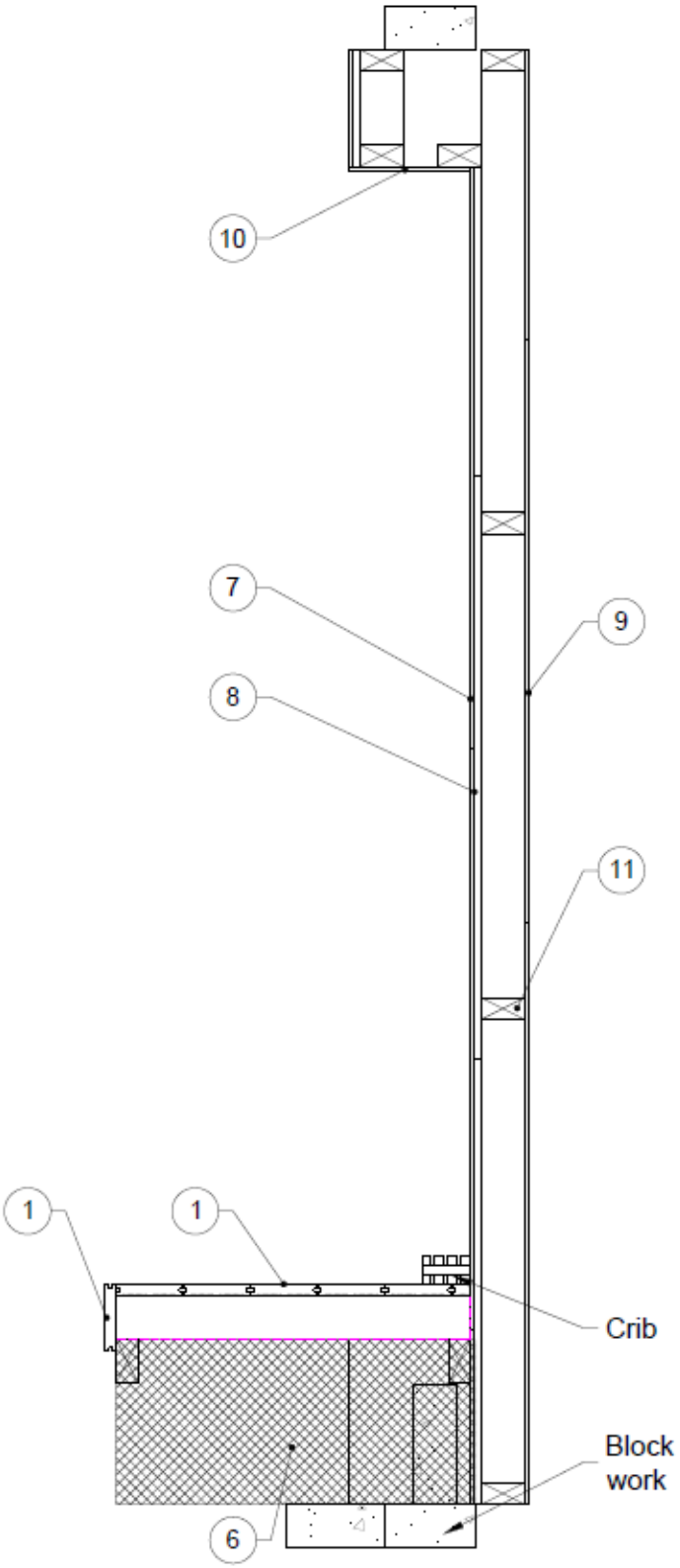


Figure 3 **Vertical cross section through test specimen**

Appendix B Test observations

Table 9 shows observations of any significant behaviour of the specimen during the test.

Table 9 Test observations

Time		Observation
Min	Sec	
00	00	Bushfire test commenced; a flaming crib (Class A) was placed against the specimen.
00	02	The screen was removed and the specimen was exposed to the radiant heat profile for BAL-29 as specified in AS1530.8.1-2007.
01	26	Smoke emission had become evident on the front of the deck
02	00	Smoke emission along the top deck boards.
10	00	Screen was positioned in front of the furnace and exposure to the radiant heat profile for BAL 29 ceased. Monitoring of the specimen to the criteria specified in AS1530.8.1- 2007 continued.
60	00	No further changes to the specimen. The test was terminated in accordance with the procedure of AS1530.8.1- 2007.

Appendix C Direct field of application

Note: The text, figures and tables in this appendix have been taken from AS 1530.8.1:2007.

The results of the fire test contained in this test report are directly applicable, without reference to the testing authority for a technical opinion, to similar constructions where one or more of the following changes have been made provided no individual component is removed or reduced:

- Increase in thickness of solid decking material.
- Increase in cross-section of bearers and joists.
- Increase in the size of the deck.

Appendix D Instrumentation positions

Figure 4 Indicative heat flux gauge locations (exposed side shown)

Note:

- Southern crib located at the south east corner of the deck
- Black dots indicate heat flux gauge location.
- Orange dots indicate crib location.

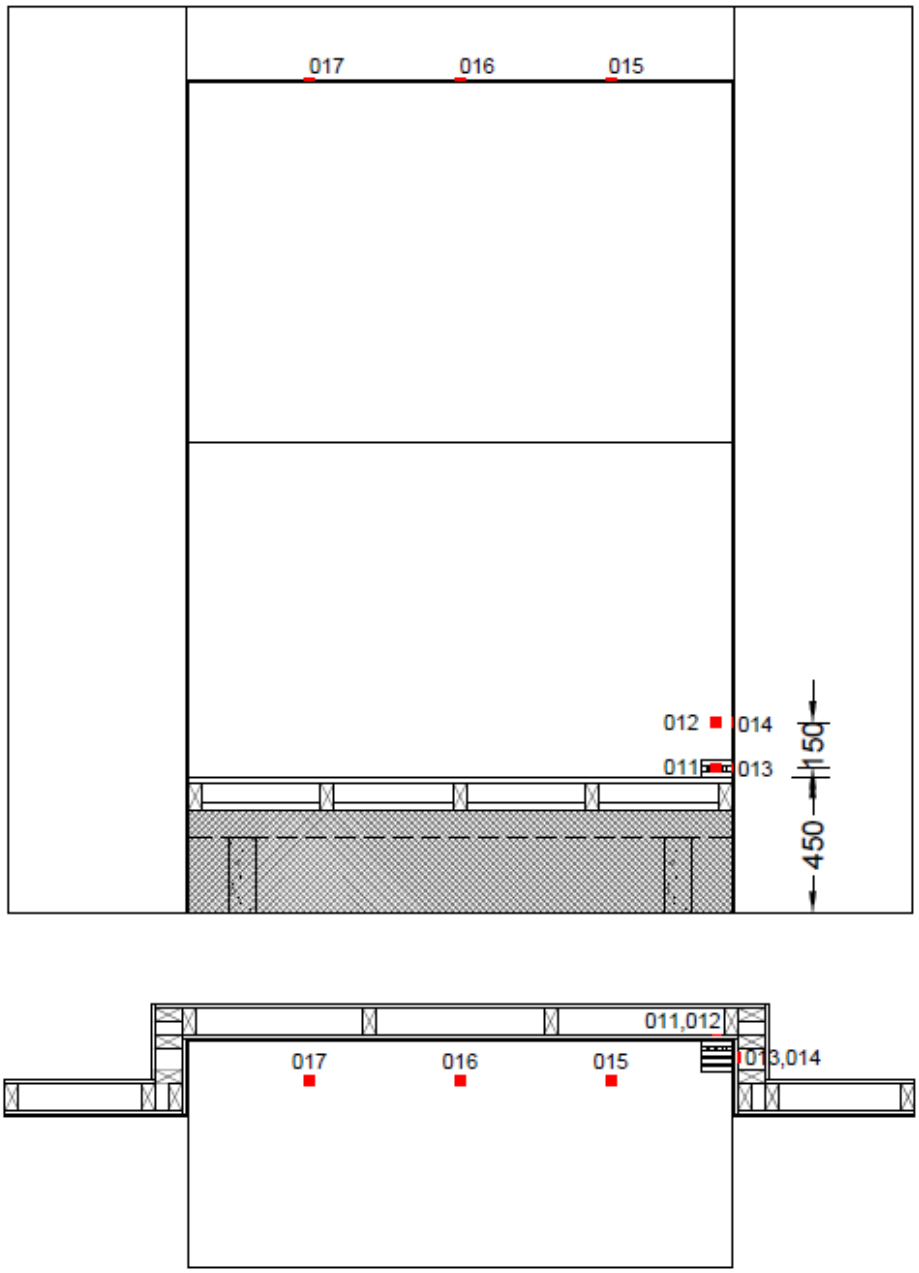


Figure 5 **Indicative thermocouple locations**

The instrumentation was positioned in accordance with the requirements of clauses 14 and 21 of AS 1530.8.1:2007 as summarised in Table 10 and Table 11.

Table 10 Thermocouple location

Location	T/C #	Description
External behind the crib	011	On the internal lining sheet behind the crib 30 mm at the south side
	012	On the internal lining sheet behind the crib 150 mm up from TC 011 at the south side
	013	On the internal lining sheet 30 mm on the south side crib
	014	On the internal lining sheet 150 mm up from TC 013 on the south side of the crib
Eave	015	On the eave at the south side
	016	On the eave at the centre
	017	On the eave at the north side

Table 11 Heat flux gauge location

Location	Ref	Description
Fascia	HFG1	Located centrally across the deck, a nominal 50 mm below the bottom of the deck.
Wall	HFG2	Located centrally to the wall, on the exposed face.

Appendix E Test data

E.1 Measure of heat flux received

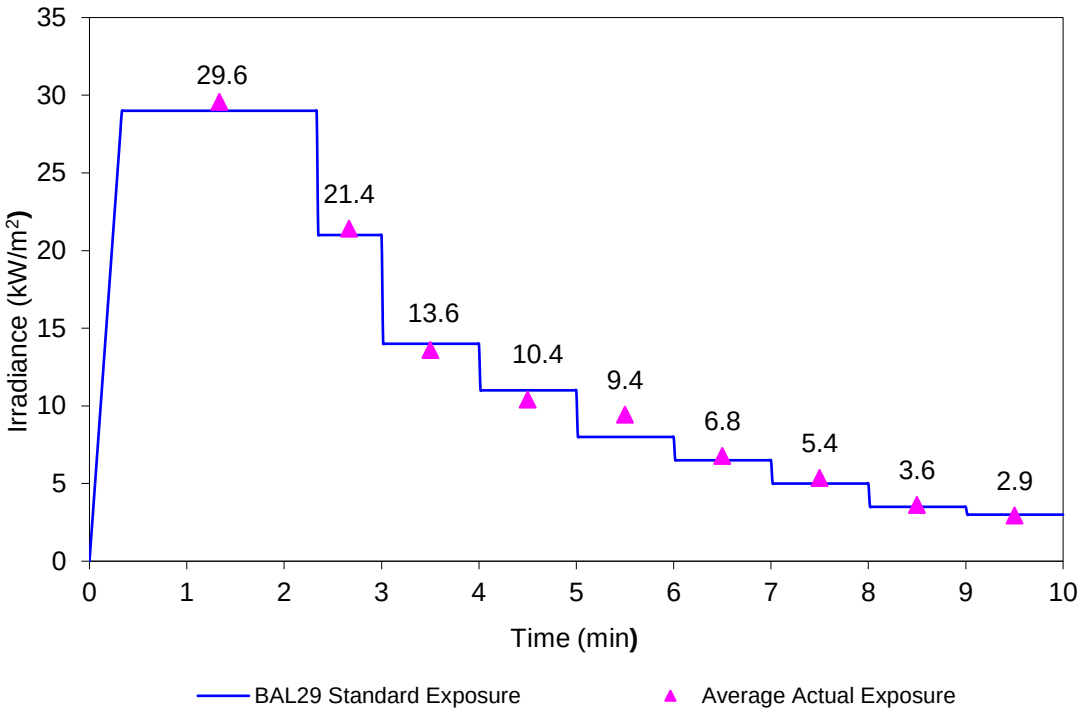


Figure 6 **Averaged irradiance levels received at the front of the decking system**

E.2 Specimen temperatures

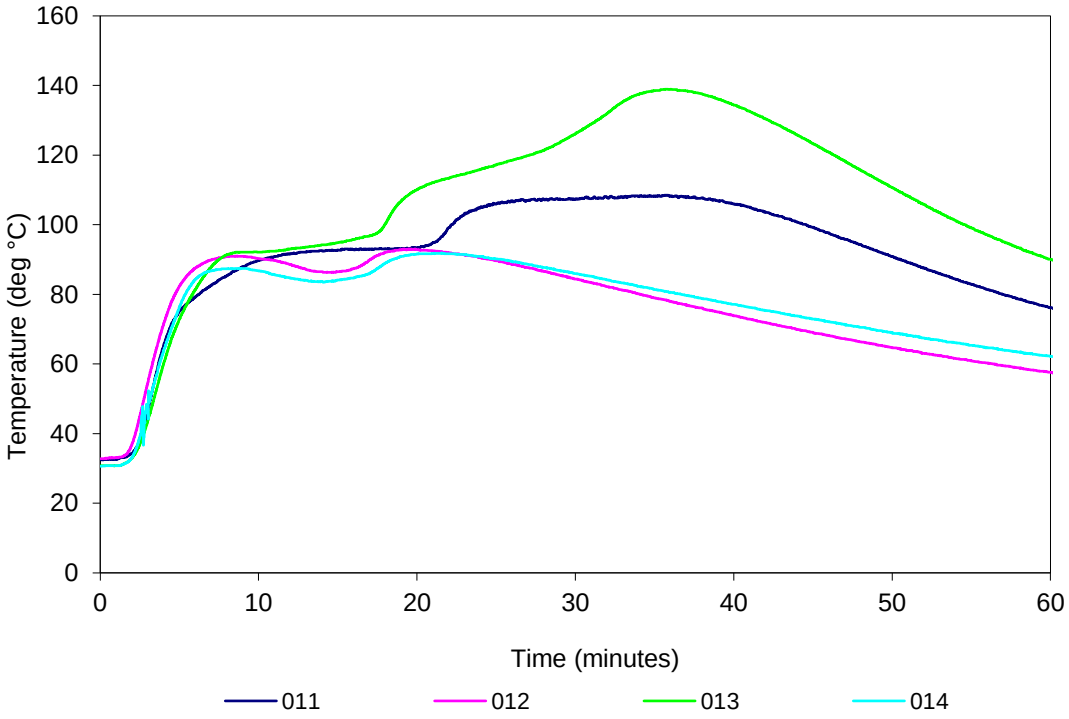


Figure 7 External surface (behind the crib) - temperature vs time

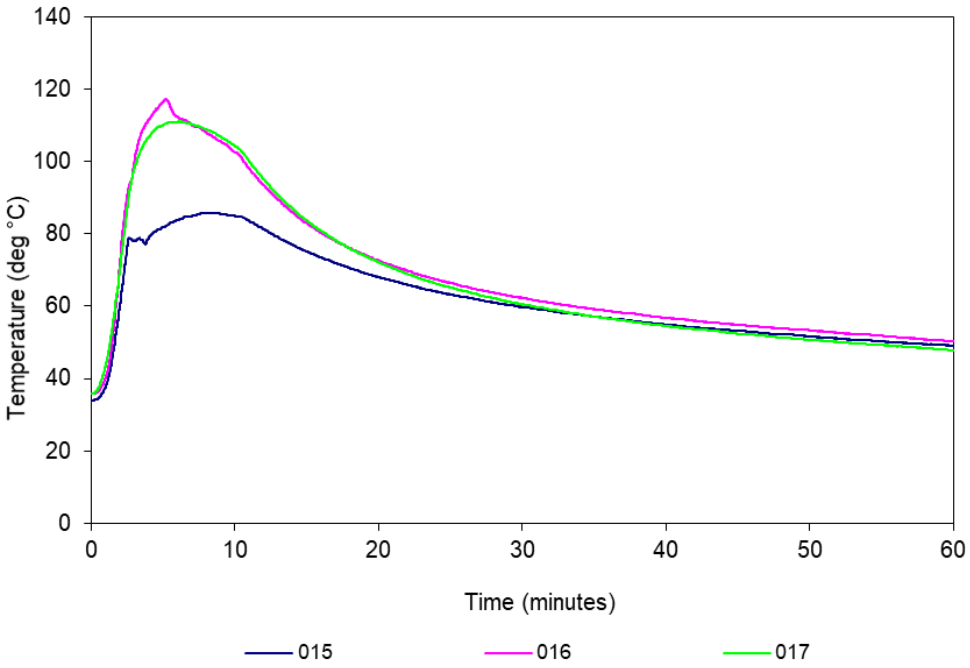


Figure 8 Eaves – temperature vs time

Table 12 Test specimen temperatures

Location	T/C #	Description[1]	Temp (°C) at t (minutes)					Limit[2,3] (minutes)
			t=0	t=15	t=30	t=45	t=60	
External behind the crib	011	On the internal lining sheet behind the crib 30 mm at the south side	33	93	107	99	76	-
	012	On the internal lining sheet behind the crib 150 mm up from TC 011 at the south side	33	87	84	69	58	-
	013	On the internal lining sheet 30 mm on the south side crib	31	95	126	123	90	-
	014	On the internal lining sheet 150 mm up from TC 013 on the south side of the crib	31	84	86	73	62	-
Eave	015	On the eave at the south side	34	75	60	53	49	-
	016	On the eave at the centre	36	83	62	55	50	-
	017	On the eave at the north side	36	84	60	52	48	-

Notes

1 Refer to Table 10 for locations of thermocouples as only a generic description is included in the table.

2 Limit time is the time to the nearest whole minute, rounded down to the nearest minute, at which the temperature recorded by any surface thermocouple does not rise by more than 180K above the initial temperature, or the average of the external quarter point thermocouple measured temperatures does not rise by more than 140 K above the initial temperature.

3 Limit time is the time to the nearest whole minute, rounded down to the nearest minute, at which the temperature recorded by any internal thermocouple does not reach 300 °C, or the average of the internal quarter point thermocouple measured temperatures does not reach 250 °C

Thermocouple malfunction.

'–' Under Limit column indicates the temperature limit was not exceeded during the test period or up until the time of integrity failure if a failure occurred.

Appendix F Photographs

North

South

Figure 9 **Exposed face of the specimen before the start of the bush fire test**

North

South

Figure 10 **Exposed face of the specimen at the end of the bush fire test**