



Reaction to fire test report

Test standard: Ad hoc ISO 13785-1:2002 Part 1 – Intermediate-scale

Test sponsor: Cladding Safety Victoria (CSV)

System: Cassetted aluminium composite panel (ACP) - with a 30% PE core – wall system

Job number: RTF240031

Test date: 20 June 2024 Revision: RR1.0

Quality management

Revision	Date	Information about the report			
RR1.0	2 December 2025	Description	Initial issue		
		Name	Prepared by	Reviewed by	Authorised by
			Signature		

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1. Introduction

This report documents the findings of an ad-hoc reaction to fire test for a Cassetted aluminium composite panel (ACP) - with a 30% PE core – wall system performed on 20 June 2024. The test was based off some general requirements of ISO 13785-1:2002 with an additional wind component.

Warringtonfire performed the test at the request of the test sponsor listed in Table 1.

Table 1 Test sponsor details

Test sponsor	Address
Cladding Safety Victoria (CSV)	717 Bourke Street Docklands VIC 3808 Australia

2. Test specimen

2.1 Schedule of components

Table 2 describes the test specimen and lists the schedule of components. These were provided by the representatives of the test sponsor and surveyed by Warringtonfire. All measurements were done by Warringtonfire – unless indicated otherwise.

Table 2 Schedule of components

Item	Description				
Cladding					
1.	Item name	FR aluminium composite panel (ACP)			
	Product name	██████████			
	Manufacturer/Supplier	██████████			
	Material	The panels – which were commercially sourced - consisted of two layers of aluminium sheets sandwiching a layer of polyethylene (PE) with fire-retardant core. The core was grey in colour. Chemical analysis was conducted on both the site samples and the commercially available samples and the results were: Analysis conducted by the analytical centre of UNSW showed that the core consisted of 73.4 % aluminium trihydrate, 0.6 % inert filler and 26 % PE.			
	Size	Total panel thickness – 4.0 mm Core thickness –3.0 mm Skin thickness – 0.5 mm (both) Refer to Appendix A for individual panel sizing details.			
	Areal density	Full panel – 7.6 kg/m ² as nominated			
	Colour	<table border="0"> <tr> <td>Skins</td> <td>Front skin – Tan Back skin – Light grey</td> </tr> <tr> <td>Core</td> <td>Dark grey</td> </tr> </table>	Skins	Front skin – Tan Back skin – Light grey	Core
Skins	Front skin – Tan Back skin – Light grey				
Core	Dark grey				
2.	Item name	FR Plasterboard			
	Product name	██████████			
	Batch no.	14/05/2024			
	Size	1200 mm wide × 3600 mm long × 16 mm thickness			
Framing					
3.	Item name	Test rig frame - 90 × 90 SHS and 200 × 90 PFC frame			

Item	Description	
	Material	Steel
	Manufacturer	██████████
	Size	90 mm × 90 mm × 5 mm thick and 200 mm × 90 mm × 10 mm thick – refer to Figure 4.
4.	Item name	Top track/base track
	Material	Steel
	Size	92 mm × 3600 mm × 40 mm, 1.15 mm B.M.T.
5.	Item name	Steel stud
	Size	92 mm × 3600 mm × 40 mm, 1.15 mm B.M.T.
	Installation	Studs at every 600 mm
6.	Item name	Steel nogging
	Size	92 mm × 580 mm × 40 mm, 1.15 mm B.M.T.
	Installation	Running horizontally at about 1800 mm height
7.	Item name	Aluminium cassette angles
	Size	20 mm × 20 mm × 3600 mm, 1.6 mm thick
	Installation	Used to secure the plasterboard within the ACPs. The angle was screw fixed to both ACPs and the plasterboard using screws (item 10 and 11).
8.	Item name	Curtain wall bracket
	Size	140 mm deep (13 mm thick) × 137 tall (13 mm thick) × 76 mm wide, 100 mm deep (9 mm thick) × 100 tall (9 mm thick) × 200 mm wide
	Installation	Used to secure the studs to the test rig using tek screws (item 11).
Sealant/Adhesive		
9.	Item name	Weathering sealant – silicone sealant
	Product name	██████████
	Manufacturer/Supplier	████████████████████
	Usage	Placed at ACP edges
Fixings		
10.	Item name	Wafer head screws
	Size	10g × 30 mm long
	Manufacturer	██████████
	Installation	Used to fix FR aluminium composite panel to the aluminium cassette angles
11.	Item name	Tek screws
	Size	10-16g × 50 mm long
	Manufacturer	██████████
	Installation	Used to fix plasterboard to the studs and aluminium cassette angles
12.	Item name	Aluminium rivets
	Size	Ø4 mm
	Usage	To fix the studs to the noggings.
Installation method		

Item	Description
Test rig	The test rig frame was the main support for the test specimen. The test specimen, interconnected through studs and noggings, was fixed to the test ring using curtain wall brackets (item 8) and fixings (item 10) – see Figure 1, 2 and 4.
Cassette wall	The cassetted wall was composed of plasterboard (item 2), top/base tracks (item 4), studs (item 5), noggings (item 6) and the diagonal supports, which were screw fix together using aluminium rivets (item 12). The FR plasterboard (item 2) were fixed to the studs using tek screws (item 11). The aluminium cassette angles (item 7) were fixed to the FR plasterboard (item 2) using tek screws (item 11).
Cladding	The exposed face of the specimen was clad with cassetted ACPs (item 1) that were fixed to aluminium cassette angles (item 7) using wafer head screws (item 10) at about 325 mm centres.

3. Test procedure

Table 3 details the test procedure for this reaction to fire test.

Table 3 Test procedure

Detail	
Statement of compliance	The ad-hoc test which was based off ISO 13785-1:2002 – was performed to determine the reaction to fire performance of an external wall cladding when exposed to heat from a simulated external fire with flames impinging directly upon the facade with an added wind component. The test utilises a burner used in ISO 13785-1:2002.
Sampling / specimen selection	The laboratory was not involved in sampling or selecting the test specimen for the reaction to fire test. The results obtained during the test only apply to the test samples as received and tested by Warringtonfire.
Test duration	60 minutes
Instrumentation and equipment	<ul style="list-style-type: none"> • 21 mineral insulated metal sheathed (MIMS) Type K thermocouples with an overall diameter of 1.5 mm with the measuring junction insulated from the sheath were positioned 60 mm in front of the face of the test specimen. Refer to Figure 1 and Figure 2 for details on positioning. • Temperatures above and below the cladding were measured by seven 100 mm × 100 mm × 0.7 mm plate thermocouples with mineral insulated metal sheathed (MIMS) Type K thermocouples with an overall diameter of 1 mm with the measuring junction electrically insulated from the sheath. The thermocouple hot junction was fixed to the geometric centre of the plate by a small steel strip made from the same material as the plate. The plate thermocouples included 97 mm × 97 mm × 10 mm inorganic insulation pads. Before the first use of the plate thermocouples, they were aged by being exposed to heat in a fire-resistance test furnace for 90 min under the standard temperature / time curve. Refer to Figure 1 and Figure 2 for details of the positioning. • The fire source was a propane (95% purity) gas burner 1.2 m long × 0.1 m deep × 0.15 m tall. The burner was placed on the floor next to the specimen. • Airflow across the front of the specimen was provided by a square array of 4-off pedestal fans. 3 blades with a fan diameter of 750 mm. The centre of the fans was located at the approximate heights of 1.5 m and 2.3 m from the floor and 0.5 m and 1.3 m from the guide wall. The fans were at the settings that provided the airflow listed in Table 4. • A guide wall – 2.8 m tall × 3.0 m wide was butted up to the specimen and cassetted wall was placed at a 45° angle in relation to the specimen. • The horizontal wind speed was measured using a hot wire anemometer. • Temperature data was collected at 5 s intervals.
Test procedure	<ul style="list-style-type: none"> • At least two minutes of baseline data was collected prior to burner ignition. Temperature data was collected at 5 s intervals. • The burner was ignited and the heat output from the burner was held at 300 kW. • 20 minutes after the burner ignition, the artificial wind source was turned on. • The burner was turned off 40 minutes after burner ignition. • 45 minutes after burner ignition, the artificial wind source was turned off. • Data was collected for the duration of the test – i.e. 60 minutes after burner ignition.

4. Test measurement and results

The results from the tests are summarized below. Photographs of the specimen are included in Appendix B.

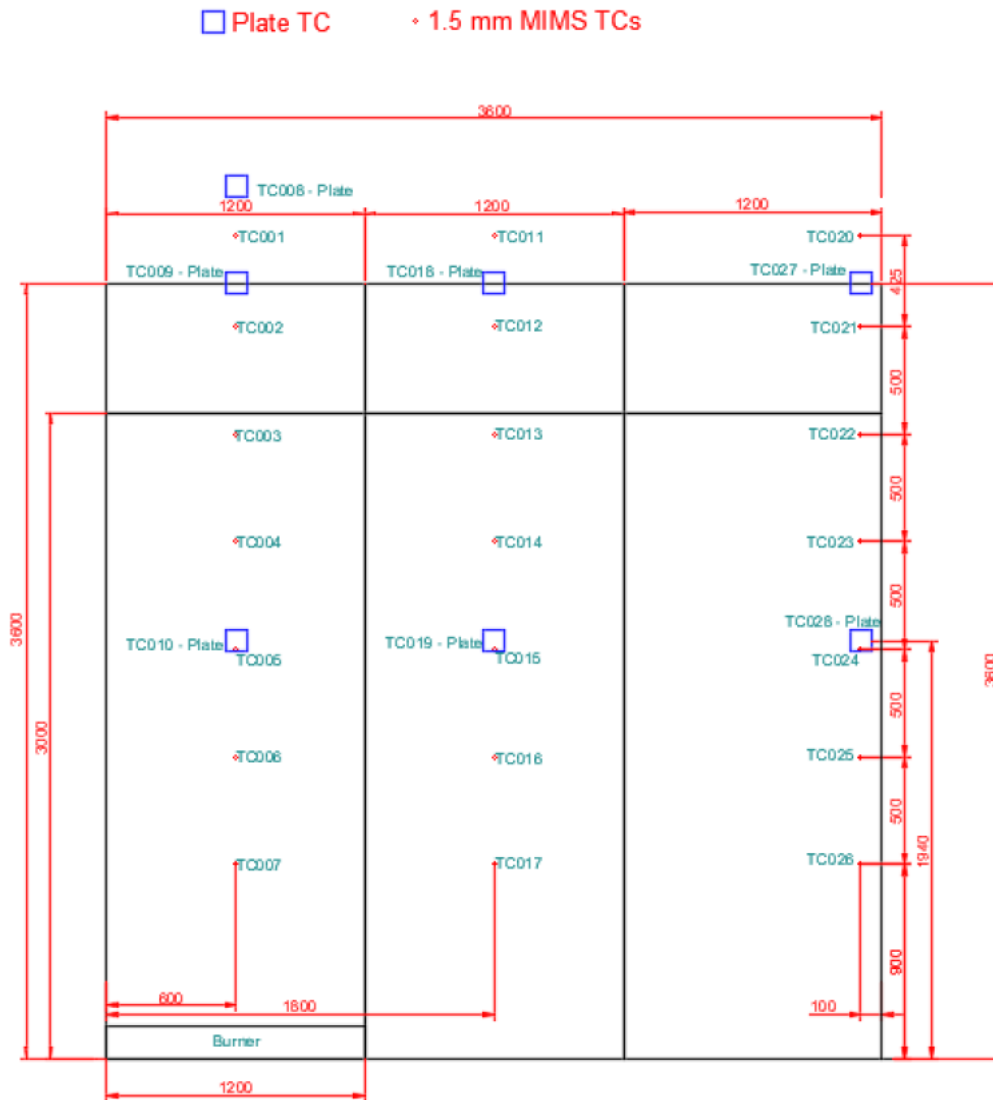


Figure 1 Instrumentation locations – front elevation

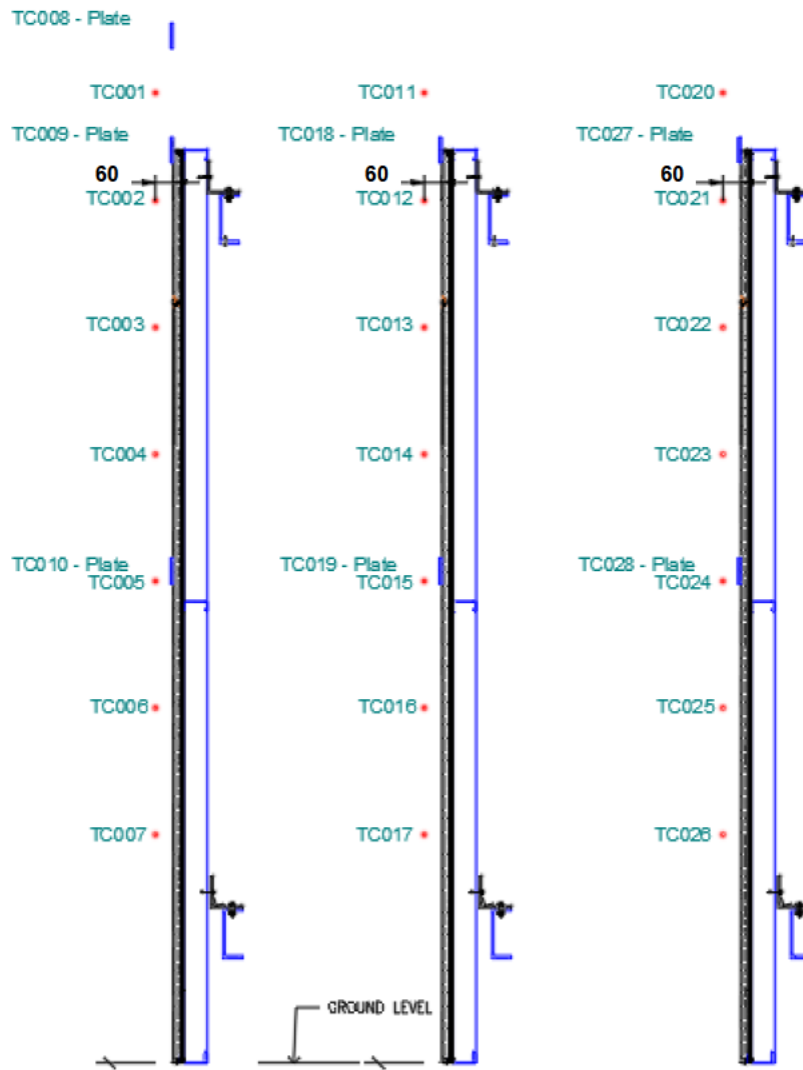


Figure 2 Instrumentation locations - sections

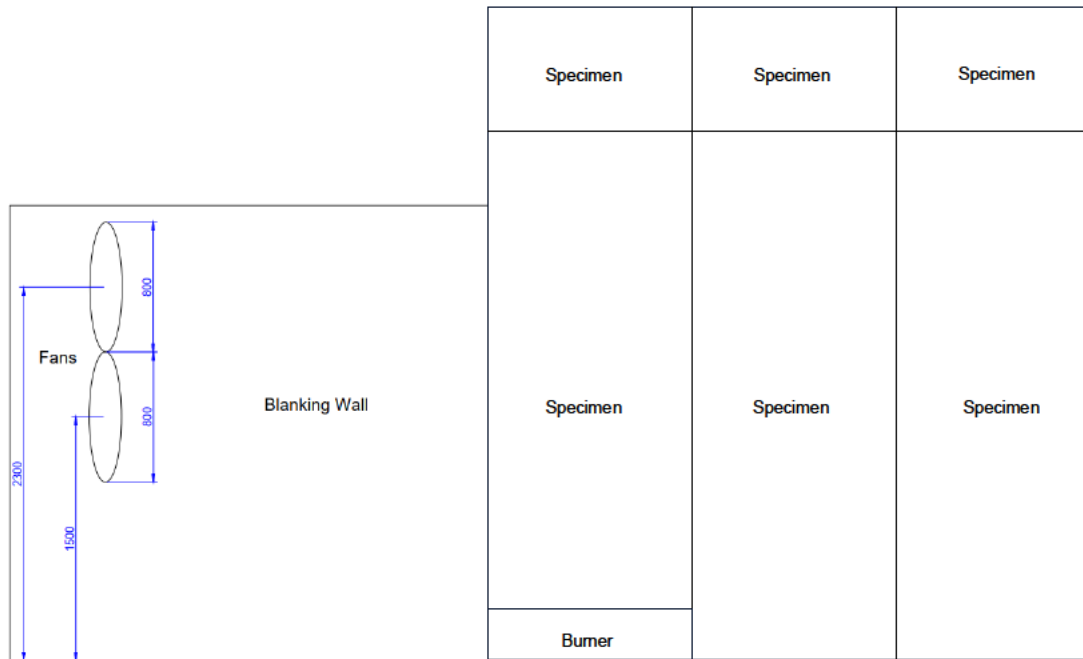


Figure 3 Instrumentation locations - Elevation

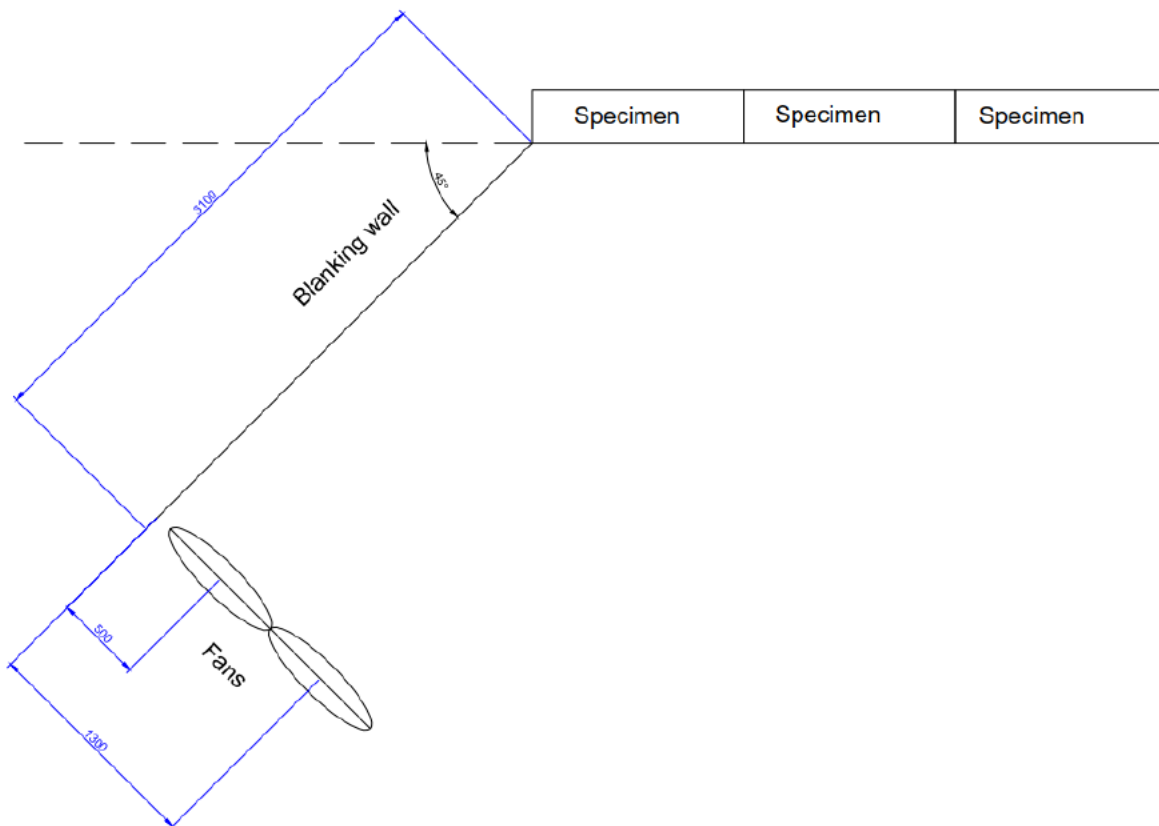


Figure 4 Instrumentation locations – Plan view

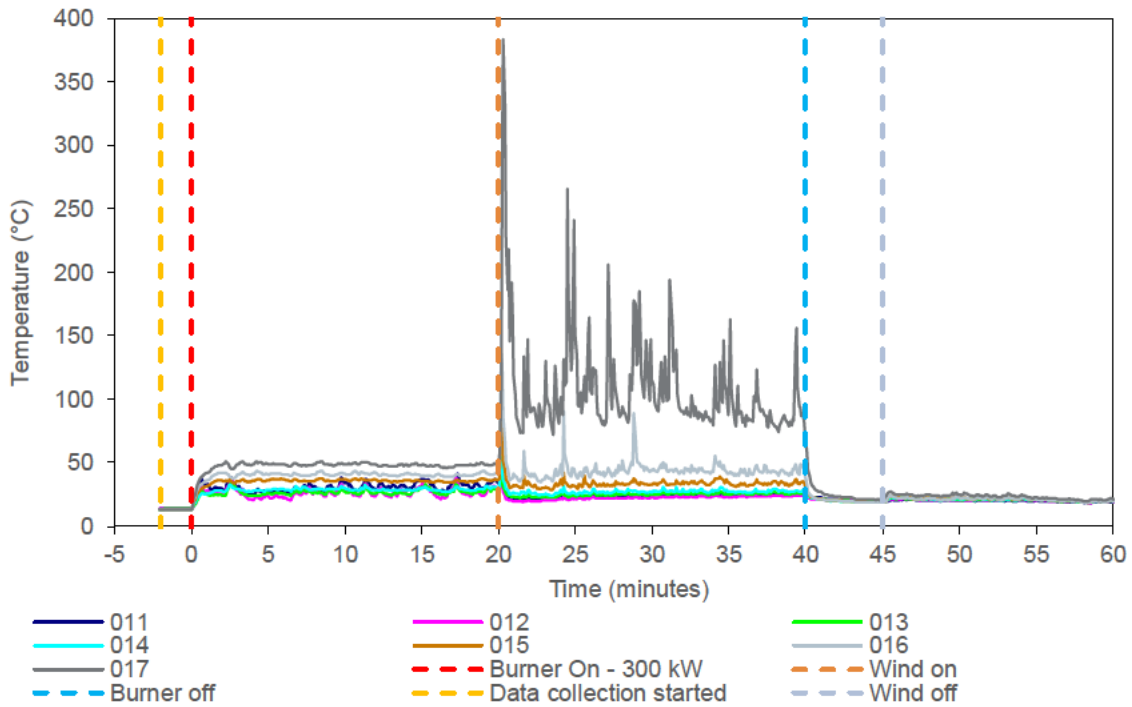


Figure 7 External temperature data collected by thermocouples placed 60 mm from the front face of the specimen – central module

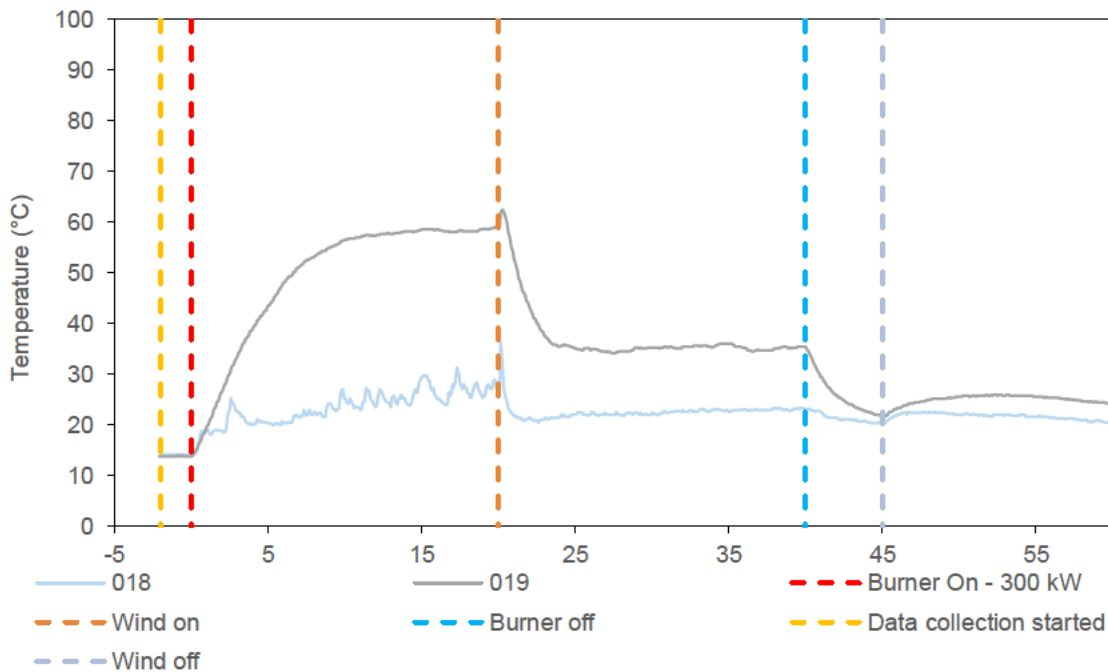


Figure 8 External temperature data collected by plate thermocouples in-line with ACP – central module

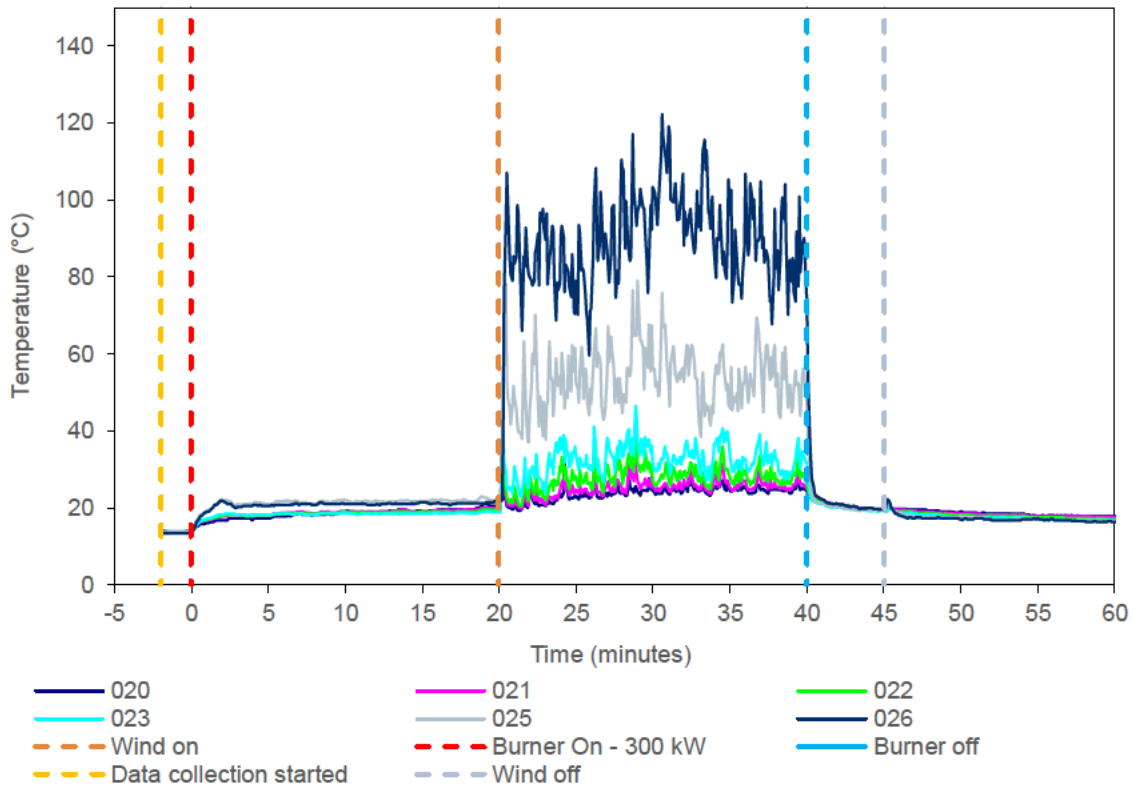


Figure 9 External temperature data collected by thermocouples placed 60 mm from the front face of the specimen – away from the burner

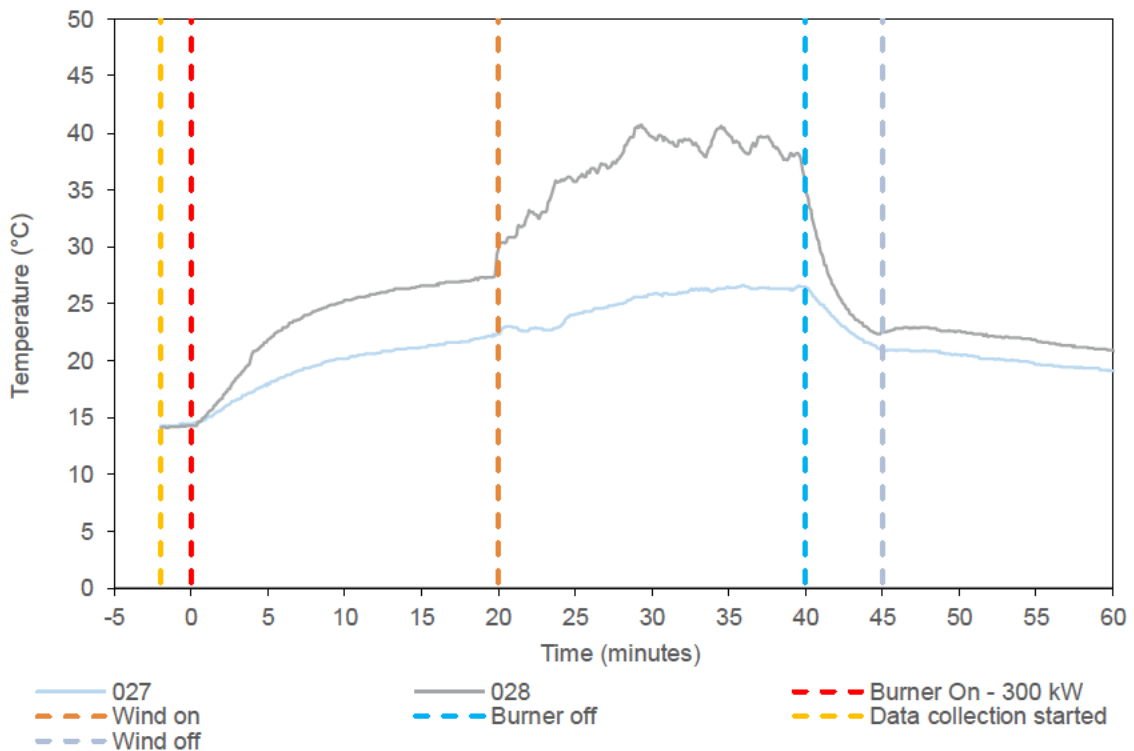


Figure 10 External temperature data collected by plate thermocouples in-line with ACP – away from the burner



Figure 11 Designation of section for the test observation

Table 4 shows the observations of any significant behaviour of the specimen during the test. Figure 11 shows the panel designations sighted in the observations.

Video recordings were also taken of the test. A copy of the video recording is available upon request by contacting Cladding Safety Victoria. The video of the test should be viewed in conjunction with the contents of this report.

Table 4 Test observations

Time		Des.	Observation
Min	Sec		
Pre-test			Within an hour period prior to the test period and data collection the wind was turned on and wind measurements and steady state conditions were recorded.
		A1	The wind speed just below TC005 was 0.6 – 2.2 m/s.
		A2	The wind speed just below TC015 was 0.7 – 2.1 m/s.
		A3	The wind speed just below TC024 was 2.2 – 2.3 m/s.
-2	00	All	Data logger started. Fan is turned off.
0	00	All	Burner on 300 kW
1	11	A1	The paint had burned off on the lower part.
4	15	A1	The lower part panel appeared to deform
9	14	A1/A2	Smoke emission from the joint between A1 and A2.

Time		Des.	Observation
Min	Sec		
9	58	A1/A2	The lower middle part appeared to deform
17	46	All	Smoke observed from the top left edge of the frame.
19	17	A1	Panel appeared to open up.
19	51	A1/A2	Flaming observed at the lower joint between A1 and A2.
20	00	All	Fans turned on.
20	44	A1	Opened up can be clearly seen at the location between TC7 and TC8.
21	35	All	Smoke emission observed from the back.
22	19	A2	The skin was burnt off on the lower part of the panel.
25	47	A3	The area around the lower left edge slightly deforms.
28	39	A2	The lower part of the panel appeared to open up below TC17.
30	51	A2/A3	Flaming at the lower joint between A2 and A3. Charring at the lower left edge of A3.
40	00	All	Burner turned off.
40	23	A1/A2	Flaming observed at the lower part of A2 and the right corner of A1
42	38	All	No flaming observed.
45	00	All	Fans turned off.
60	00	All	Test was ended.

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 following the procedure outlined in Table 3. 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 should be referred to the test sponsor. They should then obtain appropriate documentary evidence of compliance from Warringtonfire for another accredited testing authority.

5.3 Uncertainty of measurements

Because of the nature of reaction to fire testing and the consequent difficulty in quantifying the uncertainty of measurements obtained from a reaction to fire test, it is not possible to provide a stated degree of accuracy for the result.

Appendix A Drawings of test assembly

The drawings of the test assembly in Figure 12 to Figure 15 were provided by the representatives of Warringtonfire. Dimensions, unless specified, are in mm. The Figure 14 was modified by Warringtonfire, where the locations of the Fixing Bracket and FR plasterboard were modified.

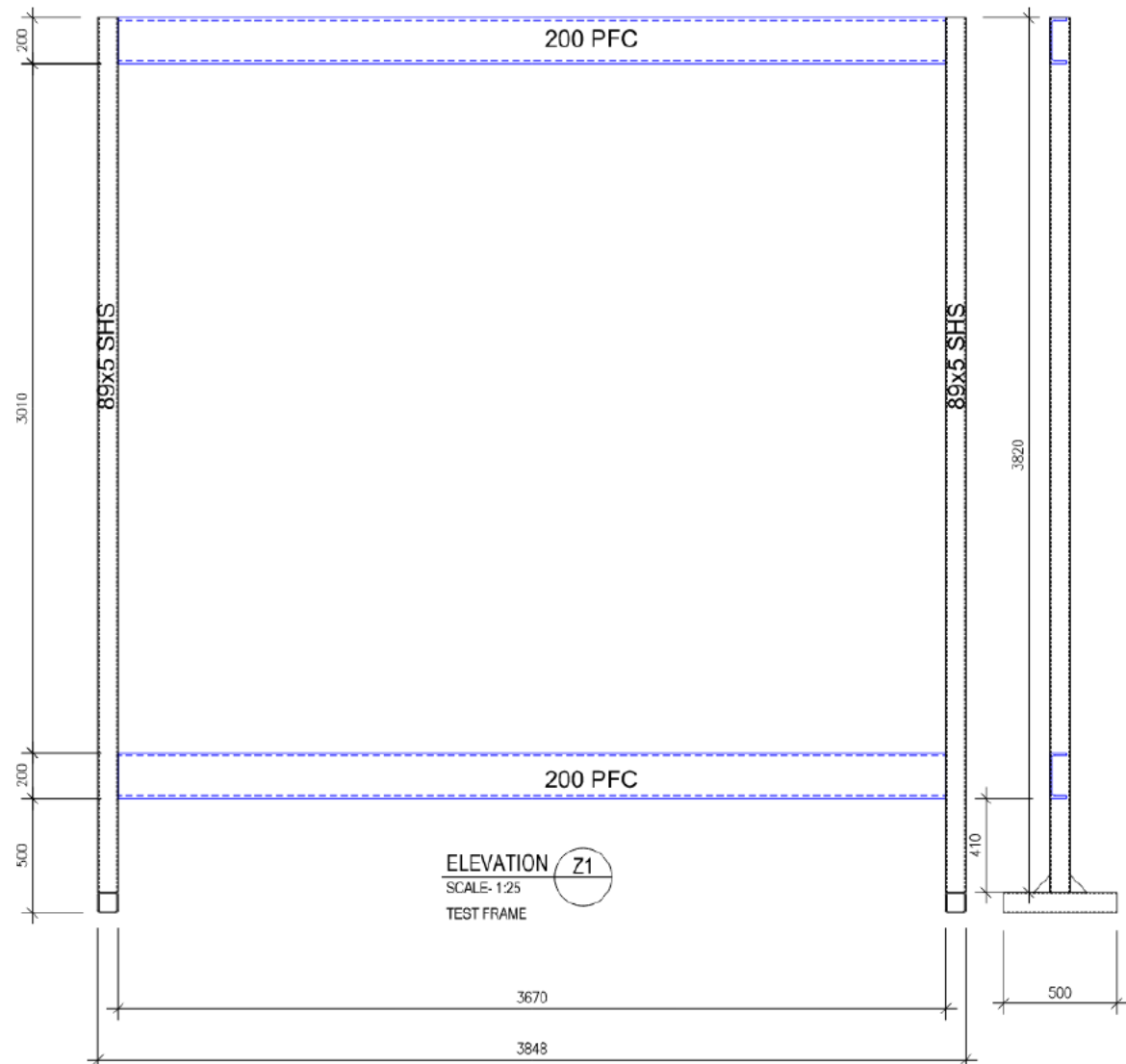
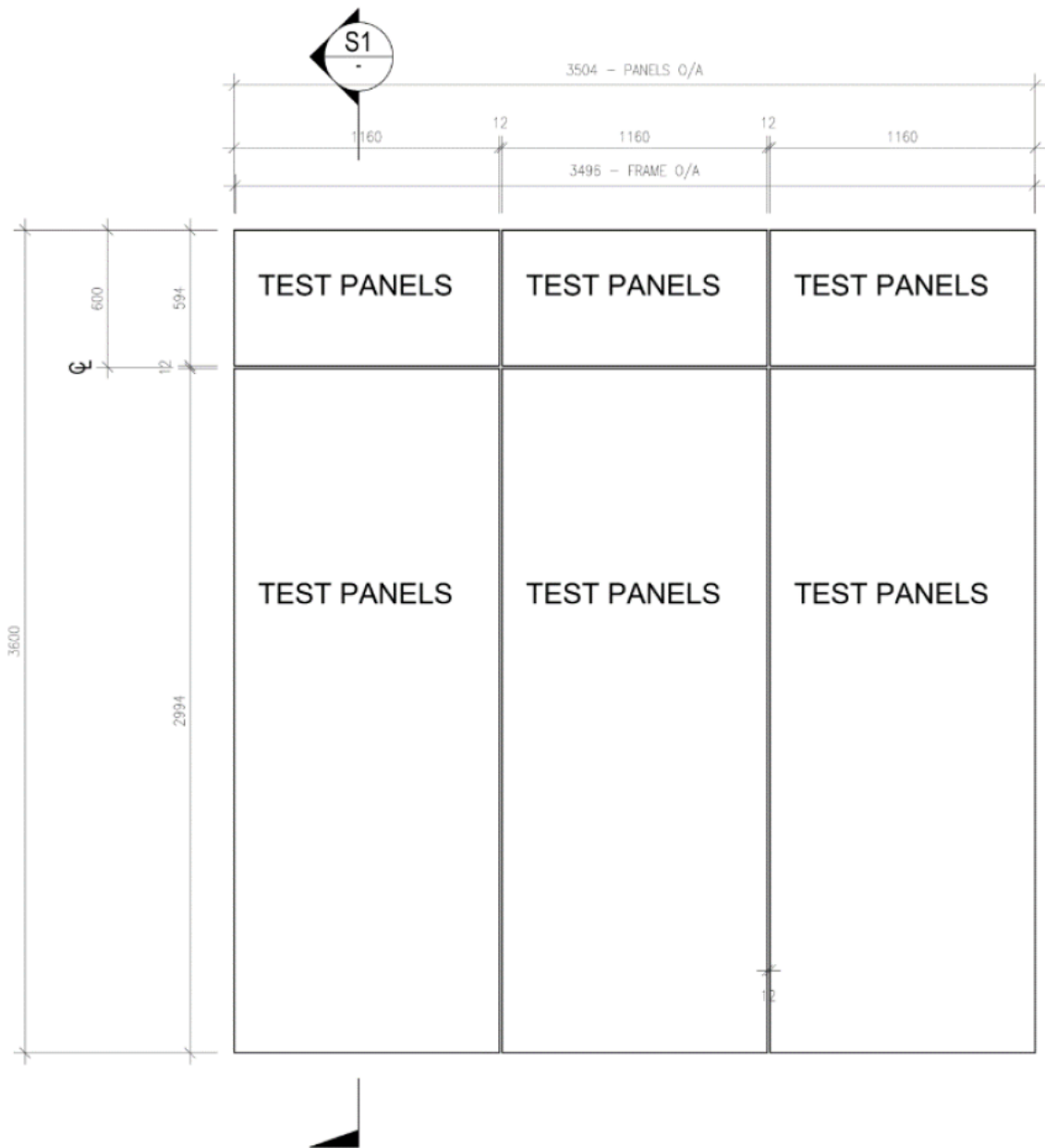


Figure 12 Elevation of rig support



ELEVATION X1
 SCALE- 1:25
 BLANK WALL PANELS TESTING

Figure 13 System assembly – Front view

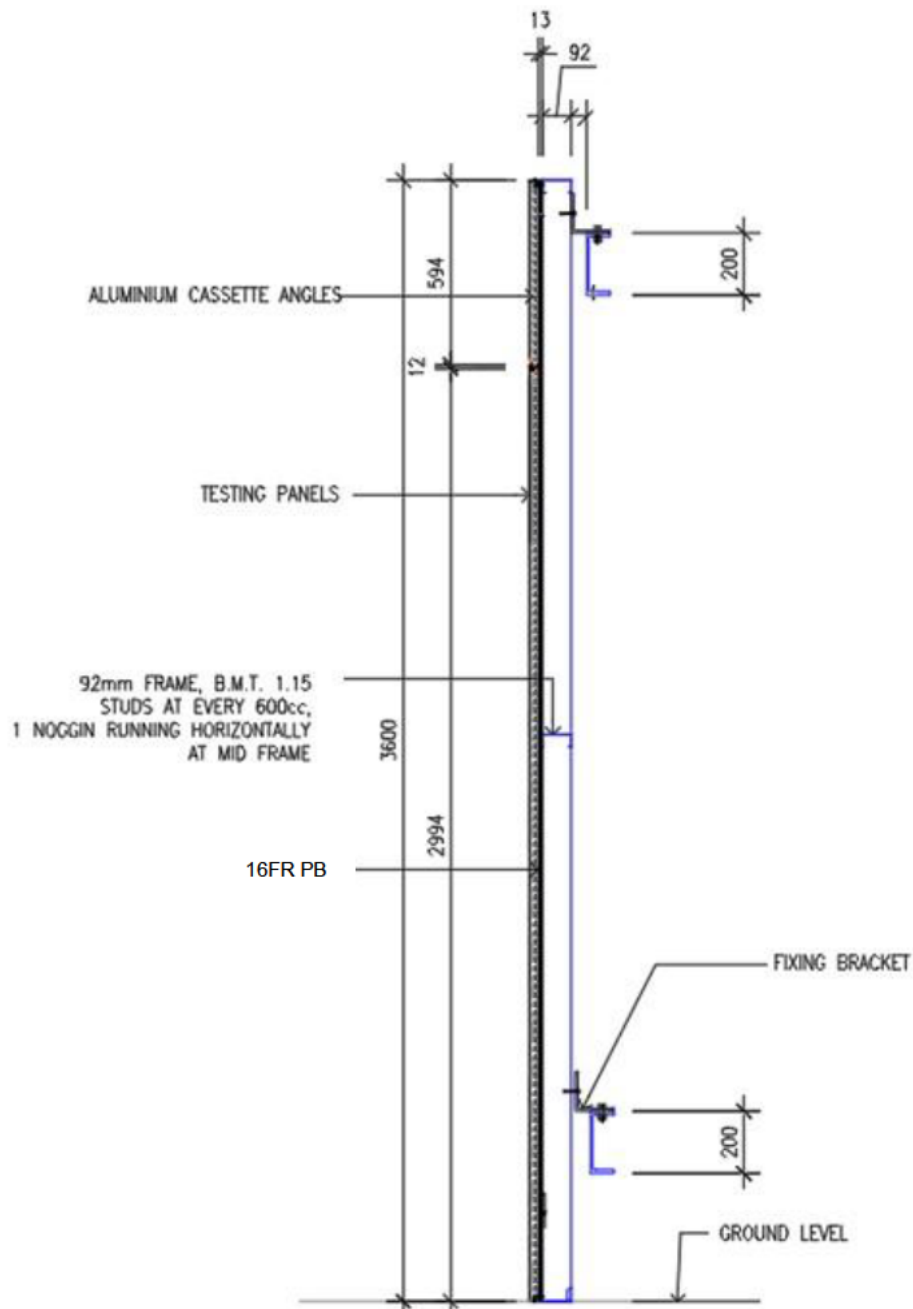
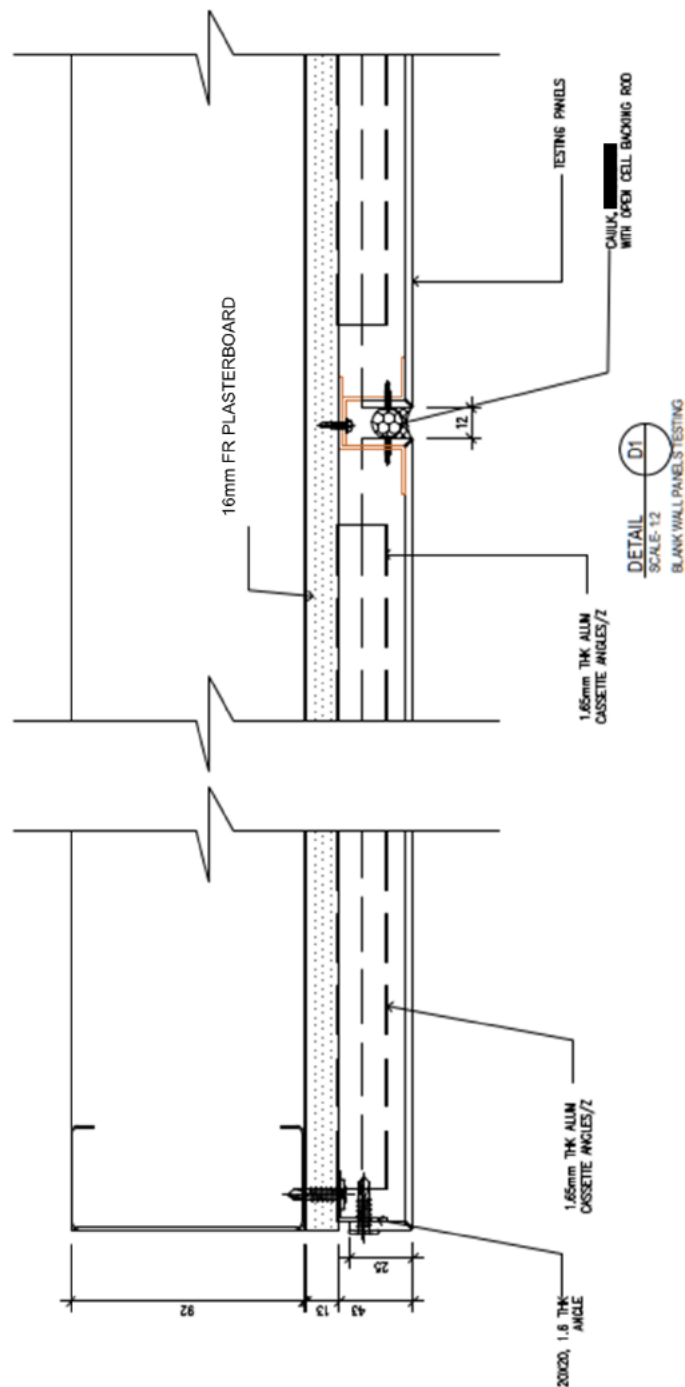


Figure 14 System assembly – vertical cross-sectional view



[MK1]

Figure 15 System assembly – vertical cross-sectional view

Appendix B Photographs



Figure 16 The specimen and test setup (angled – exposed side) before the reaction to fire test



Figure 17 The specimen before the reaction to fire test - unexposed side



Figure 18 The specimen 2 minutes 55 seconds into the test (burner output at 300 kW)



Figure 19 The specimen 5 minutes 10 seconds into the test (burner output at 300 kW)



Figure 20 The specimen 9 minutes 15 seconds into the test (burner output at 300 kW)



Figure 21 The specimen 16 minutes 55 seconds into the test (burner output at 300 kW)



Figure 22 The specimen 20 minutes into the test (burner output at 300 kW)



Figure 23 The specimen 28 minutes 50 seconds into the test (burner output at 300 kW)



Figure 24 The specimen 30 minutes into the test (burner output at 300 kW)



Figure 25 The specimen 39 minutes 55 seconds into the test (burner output at 300 kW)



Figure 26 The specimen 40 minutes 5 seconds into the test (5 seconds after burner off)



Figure 27 The specimen 59 minutes 34 seconds into the test (19 minutes 34 seconds after burner off)



Figure 28 The specimen 60 minutes into the test (20 minutes after burner off)

Appendix C **Chemical analysis results**^[MK2]



Report prepared by

MARK WAINWRIGHT ANALYTICAL CENTRE

**ANALYSIS OF ALUMINIUM
CLADDING CORE
REF: ALPOLIC SAMPLE**

by



for

Company:
Contact:

Warrington Fire



15th July 2022

Project No 22155

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ANALYSIS OF ALUMINIUM CLADDING CORE
REF: ALPOLIC SAMPLE

1.0 SAMPLES

One plastic sachet containing one cladding core sample was received for analysis. The sample was identified as follows:

Sample 1 ALPOLIC

I have been asked to identify the polymer and the filler (s) in the samples by FT/IR, quantitate and identify the mineral filler in the samples and classify them in accordance with the ICA cladding scheme.

2.0 METHODOLOGY AND RESULTS

The aluminium metal was removed from the cladding polymer and the flat surface of the polymer sample was abraded to remove any surface adhesive.

The sample was analysed directly by ATR/FTIR.

The core sample was then ashed to determine its percentage mineral content.

Where sufficient (>0.5 g) the ash was analysed for elemental composition by X ray fluorescence spectroscopy.

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ANALYSIS OF ALUMINIUM CLADDING CORE

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The core sample was then ashed to determine its percentage mineral content.

Where sufficient (>0.5 g) the ash was analysed for elemental composition by X ray fluorescence spectroscopy.

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3.0 COMPOSITION OF FILLER

The composition of the ash from the sample was as follows:

	#1
<i>Mineral content</i>	46.7%
<i>Alumina</i>	98.6%
<i>Sodium oxide</i>	0.46%
<i>Iron oxide</i>	<0.01%
<i>Titanium dioxide</i>	<0.01%
<i>Calcium oxide</i>	0.02%
<i>Nickel oxide</i>	<0.01%
<i>Magnesium oxide</i>	0.20%
<i>Silica</i>	<0.01%
<i>Sulphur trioxide</i>	<0.01%
<i>Phosphorus pentoxide</i>	<0.01%
<i>Potassium oxide</i>	<0.01%
<i>Zinc oxide</i>	<0.01%
<i>Barium oxide</i>	<0.01%
<i>Manganese oxide</i>	<0.01%
<i>Copper oxide</i>	<0.01%
<i>Chromium oxide</i>	<0.01%
<i>Lead oxide</i>	<0.01%
<i>Loss on ignition (1050°C)</i>	n.d

nd = not determined due to insufficient mass of ash

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4.0 CONCLUSIONS

The cladding sample #1 consisted of 73.4% aluminium trihydrate, 0.6% other inert material and approximately 26% polyethylene polymer.

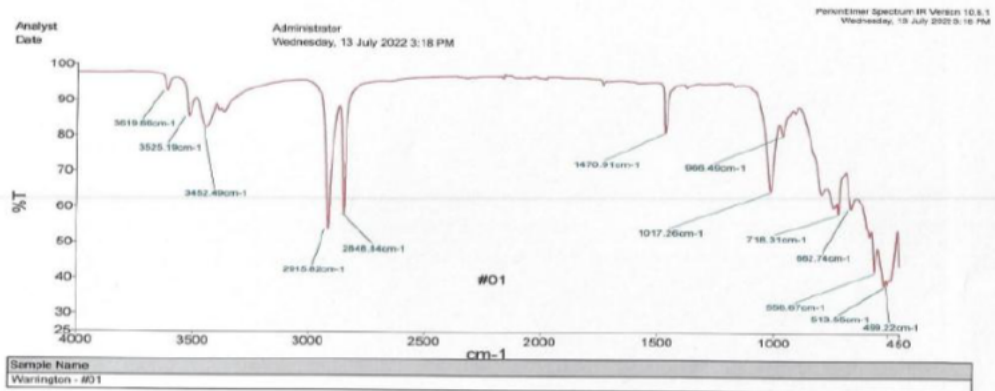
The cladding sample #1 is classified as ICA category B.

Note: The calculation for aluminium trihydrate content assumes that all aluminium found is present as the trihydrate.

The ICA Classification assigned is correct as per the September 2020 revision of the ICA Guidelines.


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15 July 2022

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