

## Test report # PF21003

**Test Number 21003**

**Client: New Zealand Structural Insulated  
Panels (NZSIP) Limited**

**Fire resistance tests for loadbearing vertical  
separating element - wall**

**Test method: AS 1530.4:2014**

Report Date 09/04/2021

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## 1.1 Document revision schedule

Revision #	Date	Description
1	31/03/2021	Initial Issue for Client review
2	06/04/2021	Issued with Client comments
3	09/04/2021	Brand names correction as per Client request

## 1.2 Signatories

Report	Name	Signature	Date
Prepared by:	Alexey Kokorin (Technical Manager)		09/04/2021
Authorized by:	Andrew Bain (Authorized signatory)		09/04/2021



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

## 2. Contact details

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### 2.1 IANZ registered Testing Authority

Passive Fire Inspection and Test Services Ltd

Accreditation N<sup>o</sup>: 1335

1/113 Pavilion Drive, Mangere, Auckland, 2022

New Zealand

Contact e-mail: [tests@firelab.co.nz](mailto:tests@firelab.co.nz)

### 2.2 Client/Applicant

New Zealand Structural Insulated Panels (NZSIP) Limited

5 Wolter Crescent, Cromwell 9310

New Zealand

Contact e-mail: [james@nzsip.co.nz](mailto:james@nzsip.co.nz)

### 2.3 Manufacturer

Same as Applicant

## 3. Test Results

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<b>Test results – 115mm NZSIP Panel with lining both sides</b>	
<b>Structural adequacy</b>	<b>58 minutes</b>
<b>Integrity</b>	<b>57 minutes</b>
<b>Insulation</b>	<b>57 minutes</b>
<b>Fire resistance level (FRL)</b>	<b>30/30/30</b>

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The test results relate to the specimens of the product in the form in which they were tested. Differences in the composition or thickness of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product, which is supplied or used, is fully represented by the specimens, which were tested.

The specimens were supplied by the sponsor and the Laboratory was not involved in any of selection or sampling procedures.

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

## 4. Test Details

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### **Test Specification Fire Resistance:**

Failure shall be deemed to have occurred when one of the following occurs:

- a) the temperature at any location on the unexposed face of the test specimen exceeds the initial temperature by more than 180 K
- b) Integrity failure shall be deemed to have occurred upon ignition of the cotton pad when glowing or flaming occurs or for a period of 30 seconds.
- c) Flaming to the unexposed face for 10 seconds or longer shall be deemed to be an Integrity failure.
- d) Failure in relation to structural adequacy shall be deemed to have occurred upon collapse, or when the criteria of 2.13.1 is exceeded.
- e) the average temperature of the unexposed face of the test specimen, exceeds the initial temperature by more than 140 K

### **Testing scope:**

AS 1530-2014 Part 4 Section 3 Walls – vertical separating element

### **Documentation:**

Testing products were verified and tested based on Client description, refer to Specimens description below. No additional documentation was provided.

### **Testing date:**

24/03/2021

### **Installation completion date:**

22/03/2021

### **Specimens conditioning and delivery to Laboratory:**

Separating element was built by Laboratory in line with Client instructions. Installation of fire stopping system was performed by Client. The Laboratory was not involved in sampling of the materials. Laboratory verified materials during construction of the specimen.

### **Termination of The Test:**

The test was discontinued at 58 minutes. The test was discontinued due to specimen collapse.

## Use of Report:

This report shall not be reproduced, except in full.

This report details the methods of construction, test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in AS 1530.4. Any significant variation with respect to size, constructional 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.

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.

## 5. Equipment

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### **Furnace:**

3000X3000 Full Scale Furnace designed to operate to AS1530.4:2014

### **Temperature:**

Furnace Temperature measurements were controlled with four 3mm Type K MIMS thermocouples set within 50-100 mm from the face of the specimens in line with AS1530.4-2014. All thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

### **Pressure measurement:**

Kepware Siemens Data logging system including multi-channel recording data at 5 second intervals. Calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

### **Ambient Temperature:**

Ambient temperature was recorded 15 minutes before the test was commenced, at the start of the test and monitored during the test. All thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

### **Specimen thermocouples:**

Specimen thermocouples were installed to the unexposed face. Type K copper disk thermocouples fixed within the required locations referenced from AS1530.4-2014. Thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.

### **Dimensional measurements:**

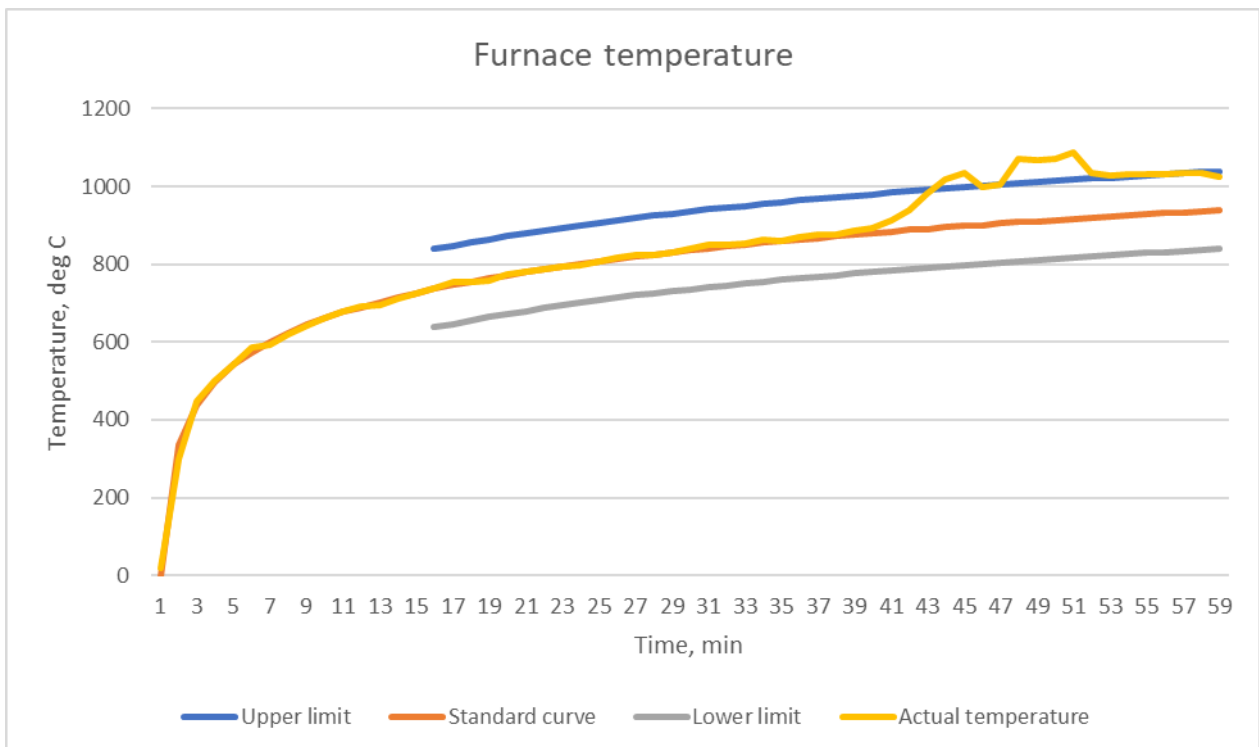
All linear measurements are made with equipment calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation Corporation (ILAC) through their Mutual Recognition Agreement (MRA) to the accuracy required by AS 1530.4-2014.



## 6. Test Conditions

### 6.1 Furnace Temperature

The furnace was controlled to follow the temperature/time relationship specified in AS 1530.4-2014 as closely as possible.



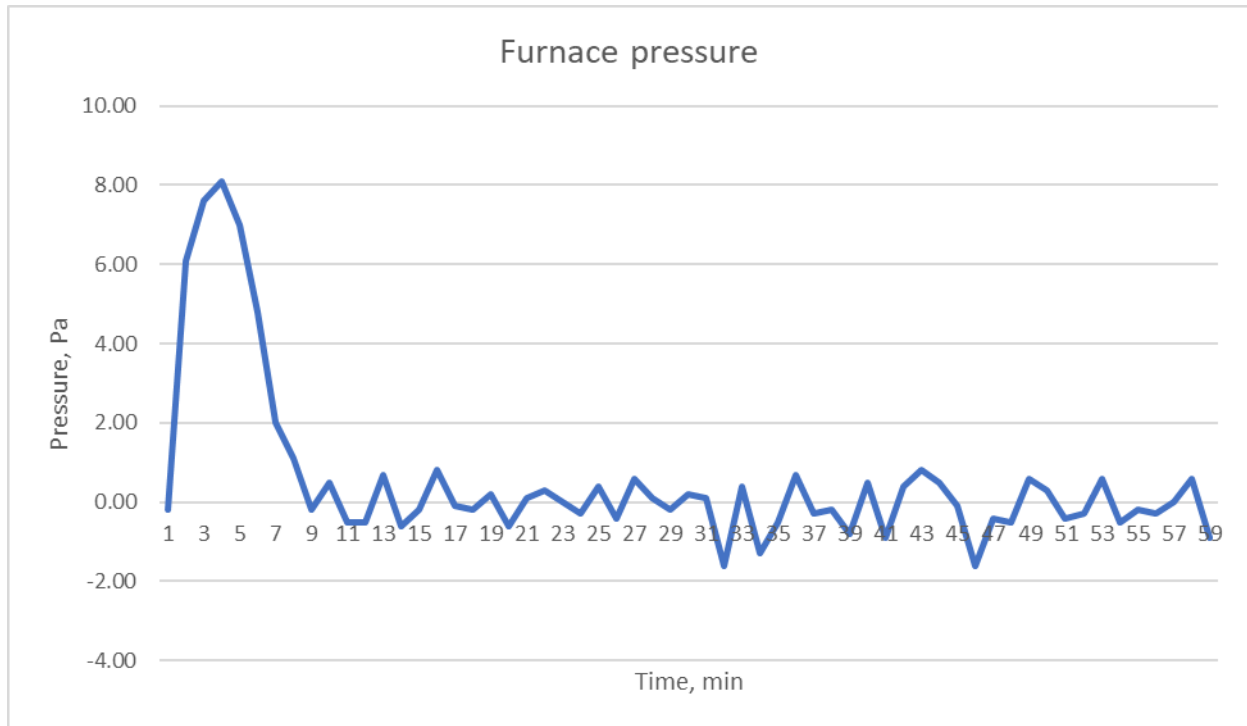
At 38 minutes sudden combustion of the polyurethane foam occurred. Due to the nature of the polyurethane foam burning—self-sustaining burning of the foam continued throughout the test till 58 minutes, when most of the foam burned out, the rest was extinguished with water.

### 6.2 Ambient Temperature

The ambient temperature of the test area 15 minutes before the test and at the commencement of the test was 24 °C.

## 6.3 Pressure Readings

The furnace pressure was maintained at  $0 \pm 3$  Pa with respect to atmosphere. The probe was located 500mm above the furnace floor.



## 7. Schedule of materials

Separating Element		
1.1	Item / Product Name	NZSIP Smart Panel
	Measurements	Width / Height (W/H): 2910mm x 3000mm
	Thickness	Thickness (T): 141mm
	SE Specification	Three NZSIP panels (1.2), (1.3) were joined together using their internal locking mechanism to create a 2910mm x 3000mm wall. Exposed face was lined with single layer of (1.4) plasterboard and unexposed face was lined with (1.5) plasterboard.
1.2	Item / Product Name	NZSIP Smart Panel
	Measurements	Width / Height (W/H): 1200mm x 3000mm
		Thickness (T): 115mm (nominal) – consist of one 12mm thick Stranboard each side and 90mm thick polyurethane foam filling
Additional Info	Used to construct separating element	
1.3	Item / Product Name	NZSIP Smart Panel
	Measurements	Width / Height (W/H): 600mm x 3000mm
		Thickness (T): 115mm (nominal) – consist of one 12mm thick Strandboard each side and 90mm thick polyurethane foam filling
Additional Info	Used to construct separating element	
1.4	Item / Product Name	USG Boral Securock Glass-Mat Sheathing
	Measurements	Width / Height (W/H): 1200mm x 3000mm
		Thickness (T): 13mm
Additional Info	Used to cover exposed face of separating element	
1.5	Item / Product Name	Firerated plasterboard
	Measurements	Width / Height (W/H): 1200mm x 3000mm
		Thickness (T): 13mm
Additional Info	Used to cover unexposed face of separating element	

1.6	Item / Product Name	Unbranded Steel Slotted Angle
	Measurements	Width / Height (W/H): 50mm x 50mm
	Additional Info	Used to secure separating element to refractory frame
1.7	Item / Product Name	Laser Frame SG8 Timber
	Measurements	Width / Height (W/H): 90mm x 45mm
	Additional Info	Used as bottom and top plates of separating element

Finishing Materials		
3.1	Item / Product Name	USG Boral Total Joint Finish
	Measurements	12kg
	Installation	Used for plasterboard stopping
3.2	Item / Product Name	Tescon Extora Weathertight sealing tape
	Measurements	Width (W): 100mm
	Installation	Used to seal junctions between Securock panels, cover screws on exposed face.

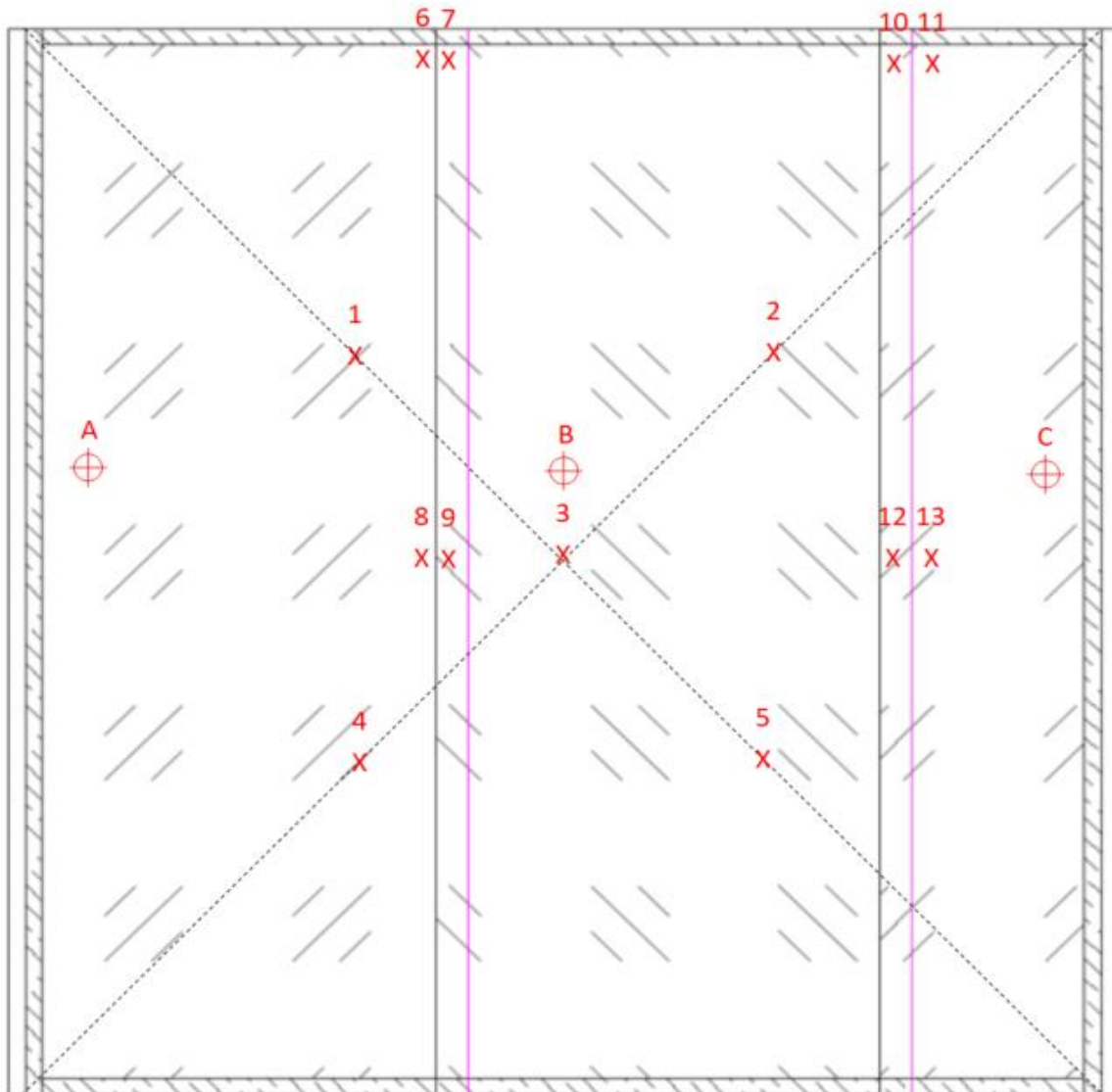
Fixings		
4.1	Item / Product Name	Paslode Framing Nails
	Measurements	90mm
	Installation	Used to fix separating element to top and bottom plates
4.2	Item / Product Name	Simpson Quik Drive Screws
	Measurements	8 x 1-3/4"
	Installation	Used to fix plasterboard and Glass-Mat Sheathing to separating element

## 8. Thermocouples positions and loading details

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### 8.1 Thermocouples and deflection Positions Table

TC#	THERMOCOUPLE LOCATION DESCRIPTION
1	Separating element, centre of top left quartile
2	Separating element, centre of top right quartile
3	Separating element, vertical and horizontal centre of specimen
4	Separating element, centre of bottom left quartile
5	Separating element, centre of bottom right quartile
6	Separating element, 25mm below head, 15mm left of leftmost NZSIP Panel junction
7	Separating element, 25mm below head, 15mm right of leftmost NZSIP Panel junction
8	Separating element, vertical centre of specimen, 15mm left of leftmost NZSIP Panel junction
9	Separating element, vertical centre of specimen, 15mm right of leftmost NZSIP Panel junction
10	Separating element, 25mm below head, 25mm left of rightmost plasterboard junction
11	Separating element, 25mm below head, 25mm left of rightmost plasterboard junction
12	Separating element, vertical centre of specimen, 25mm left of rightmost plasterboard junction
13	Separating element, vertical centre of specimen, 25mm left of rightmost plasterboard junction



A-C – deflection points

## 8.2 Loading details

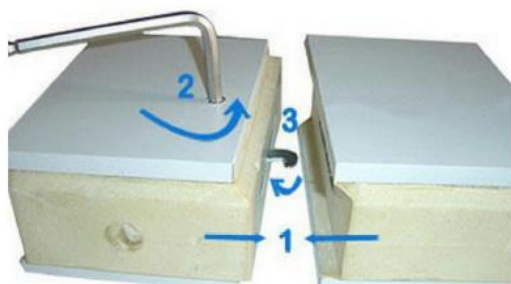
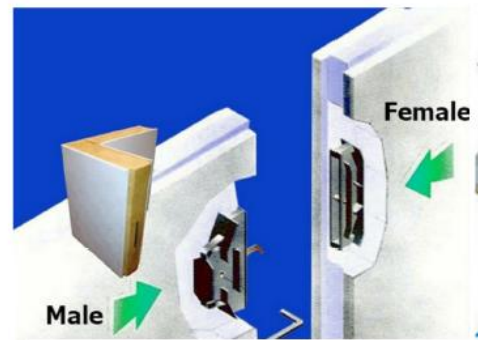
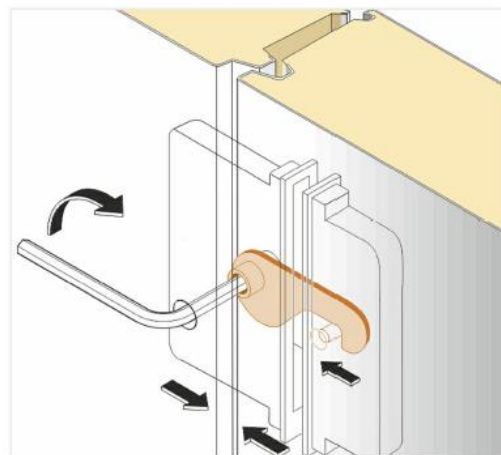
The total load of 30kN (10kN per linear meter uniformly distributed load) was applied to the specimen 2 hours prior to the test. The load was applied with 2 hydraulic rams through the full-length suspended beam from the top of the specimen. The loading was constant during the test the test and equals to 30kN +/-2%.

## 9. Specimen description

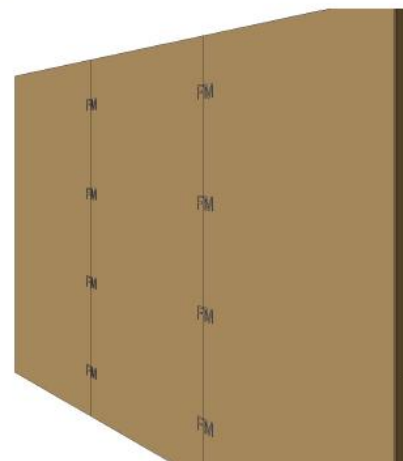
Three NZSIP panels (1.2), (1.3) were joined together using their internal locking mechanism to create a 2910mm x 3000mm wall. A timber top plate (1.7) and bottom plate were press fitted into the top and bottom cavities, between the Strandboard layers of the panels. Two studs were placed on left and right sides of the wall using the same method. The timber studs and plates were fixed using Paslode Framing nails (4.1) at 100mm centres. The wall was lifted into the refractory frame, and fixed to steel slotted angle (1.6) along the top and bottom edges.

1 layer of USG Boral Securock (1.4) was fixed to the exposed face of the separating element, with the junctions between sheets of Securock and the junctions between NZSIP panels offset by 600mm. 1 layer of 13mm fire-rated plasterboard (1.5) was fixed to the unexposed face of the separating element, with the junctions between sheets of plasterboard and the junctions between NZSIP panels offset by 88mm. Both the Securock and FR plasterboard were fixed using Steel Screws (4.2) at 300mm centres, screws along each sheet of a junction was offset by 150mm.

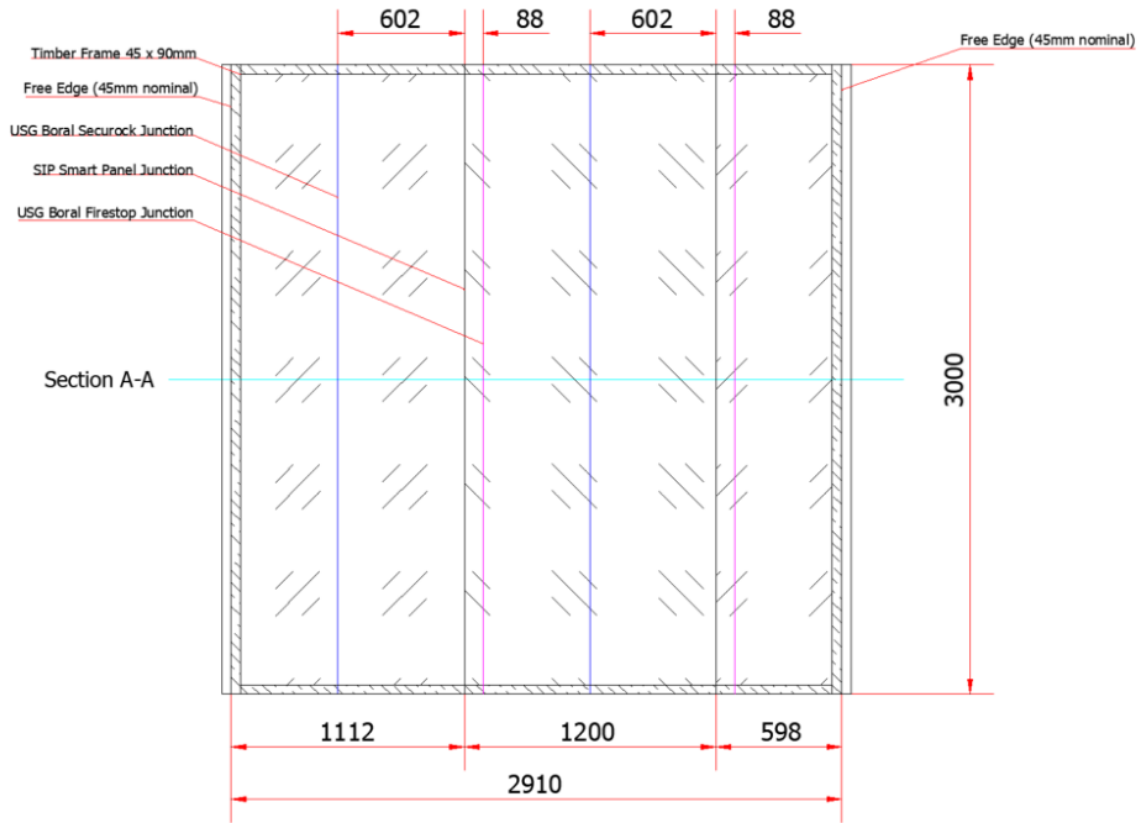
All screws and junctions on the exposed face were covered with Tescon Extora Weathertight sealing tape (3.2). All screws and junctions on the unexposed face were covered with USG Boral Total Joint Finish (3.1). Free edges were filled using white ceramic fibre, and a mastic smoke seal was applied to the top and bottom edges of the separating element.



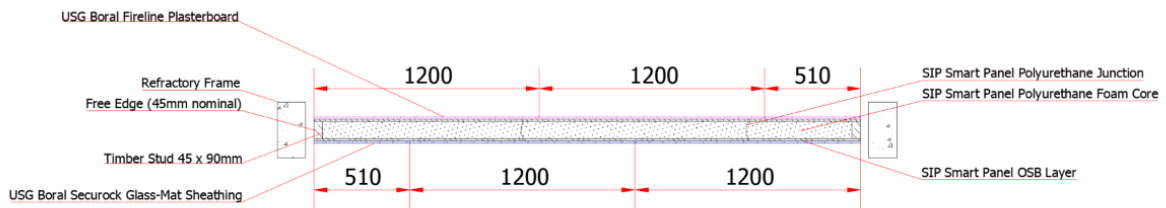
1) Fit together 2) Insert the screw 3) Remove the screw



## NZSIP Separating Element Construction Detail from Unexposed View



## NZSIP Separating Element Construction Section A-A

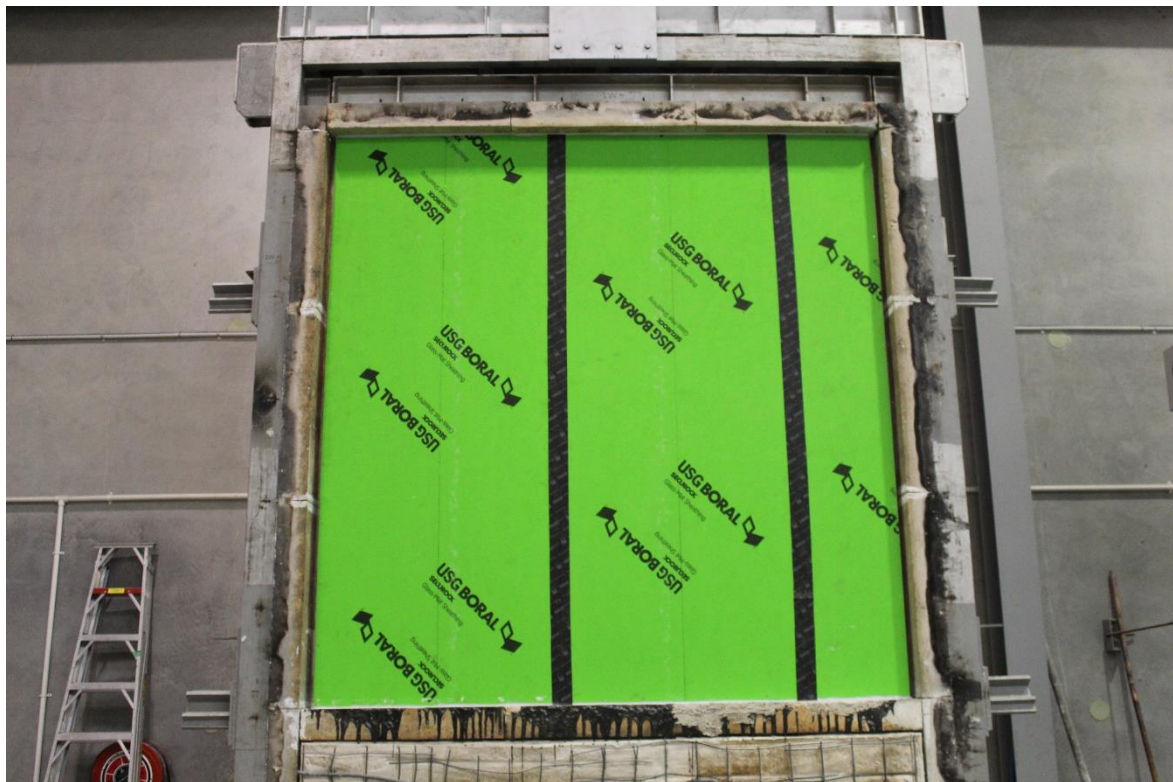




Exposed face before plasterboard lining:



Exposed face after plasterboard lining:

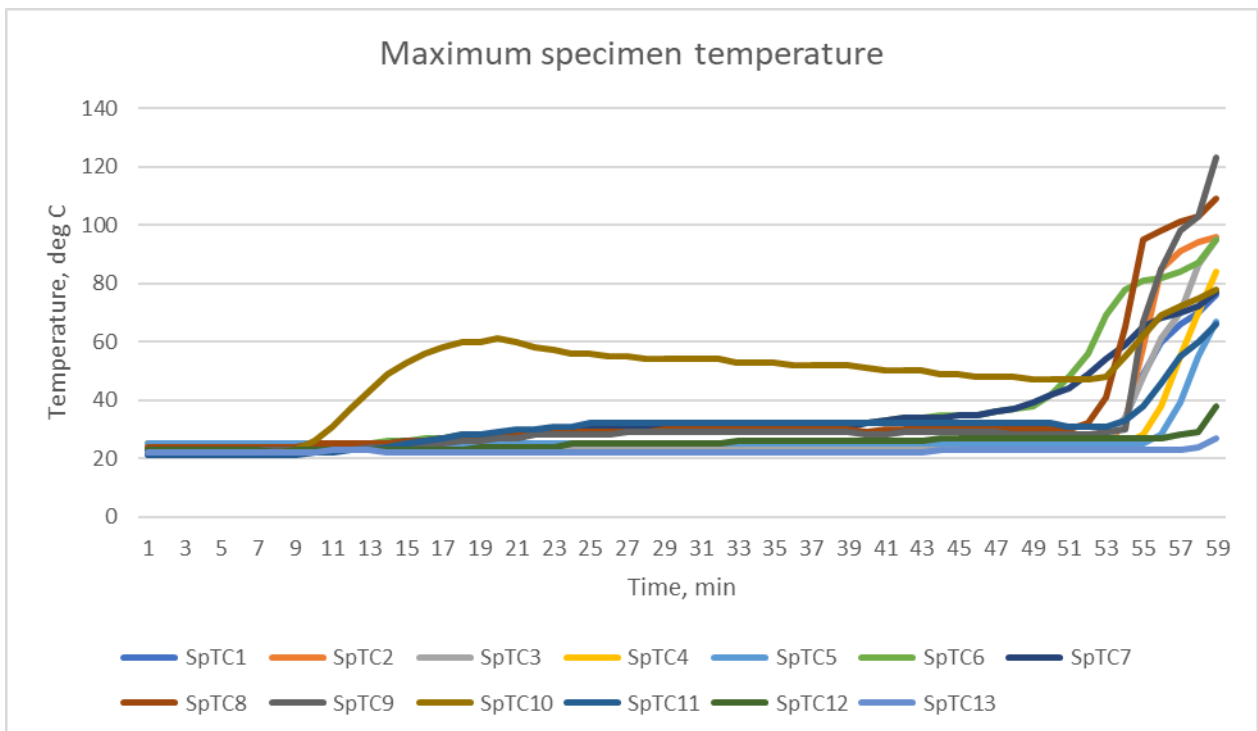
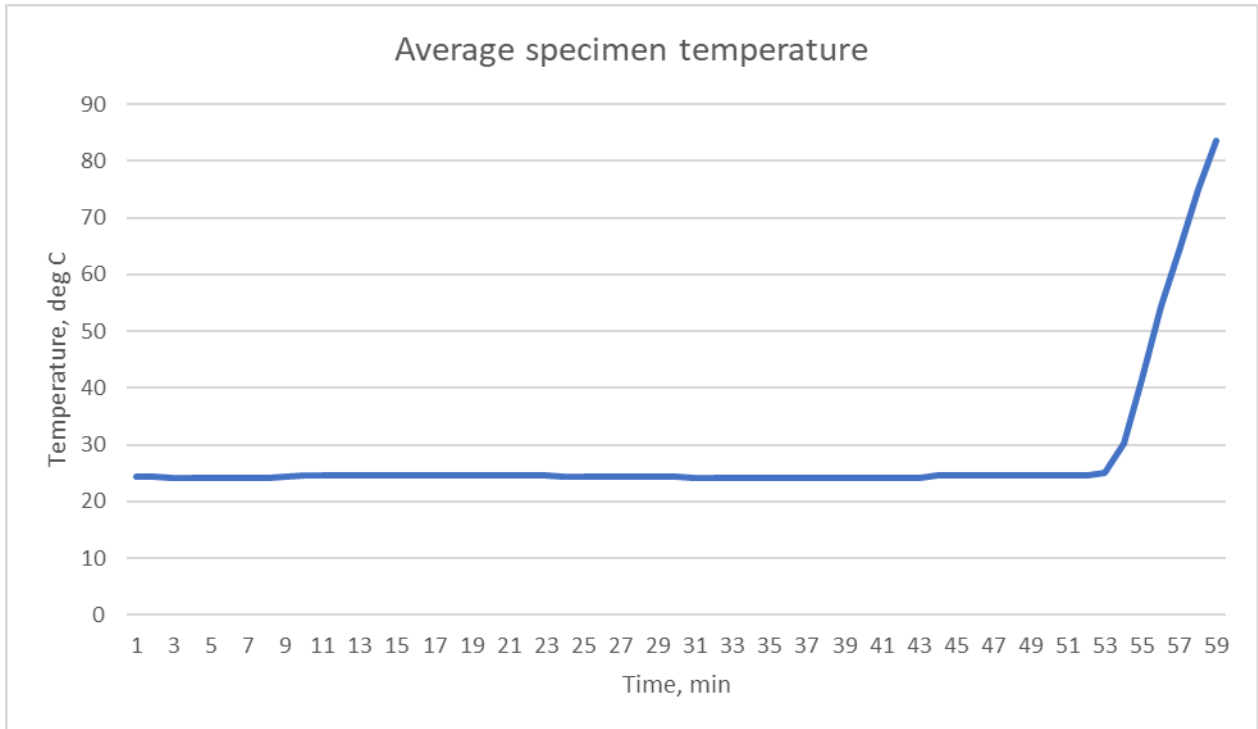


Unexposed face after plasterboard lining:

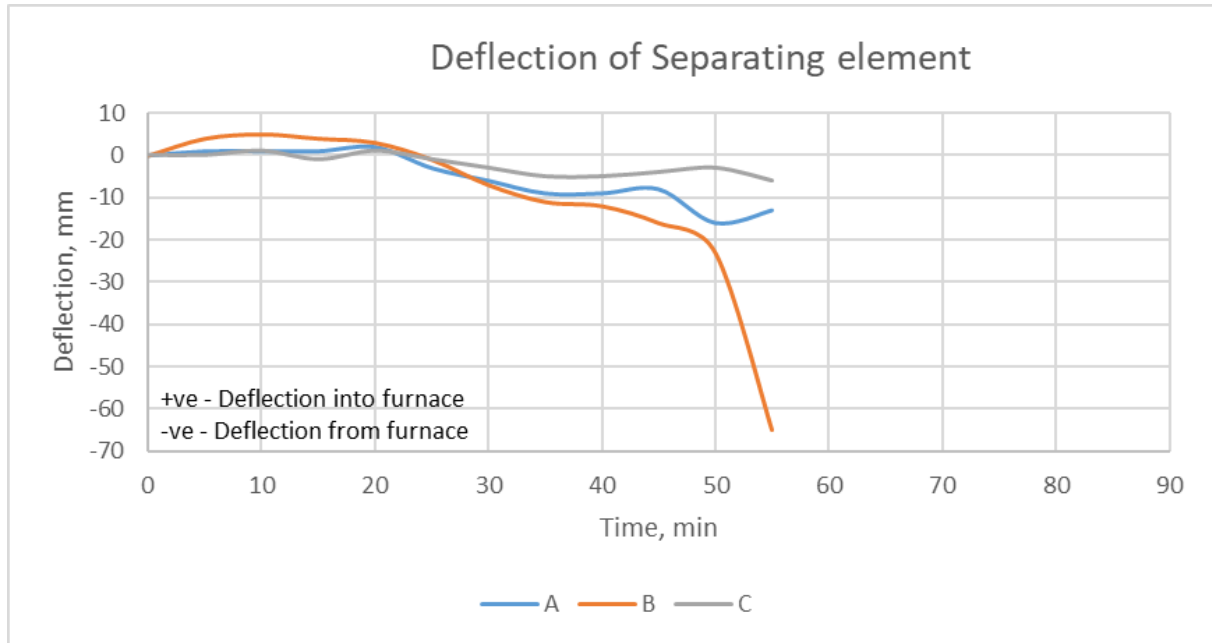


## 10. Test results

### 10.1 Temperature readings



## 10.2 Deflection measurements



Time, min	A, mm	B, mm	C, mm
0	0	0	0
5	1	4	0
10	1	5	1
15	1	4	-1
20	2	3	1
25	-3	-1	-1
30	-6	-7	-3
35	-9	-11	-5
40	-9	-12	-5
45	-8	-16	-4
50	-16	-23	-3
55	-13	-65	-6

## 10.3 Observations

Time Minutes	Test Face	Observations
10	E/U	No notable changes
12	E	Sealing tape used for junctions have combusted
20	E	Dark discolouring within screw locations
26	U	Minor visible smoke from frame and specimen junctions above TC10
32	E	Junctions between specimen have further discoloured, near the left side of each junction (exposed view)
40	E	Unable to see inside furnace due to exponential increase of flames
45	U	Dark Yellowish smoke from top junction near the centre
50	U	Very dark yellow smoke from above TC10
53	U	Large gap in plasterboard junction, heavy smoke
53	U	Cotton pad test for 30 seconds near gap - Pass
57	U	<b>Large flames coming from gap in plasterboard junction – Flaming to the unexposed face for 10 seconds or longer shall be deemed Integrity failure.</b>
58		<b>Test discontinued due to specimen collapse</b>

**Key: U = unexposed face. E = Exposed face.**



## 11. Additional photographs

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### 11.1 Materials used

#### NZSIP Panels:



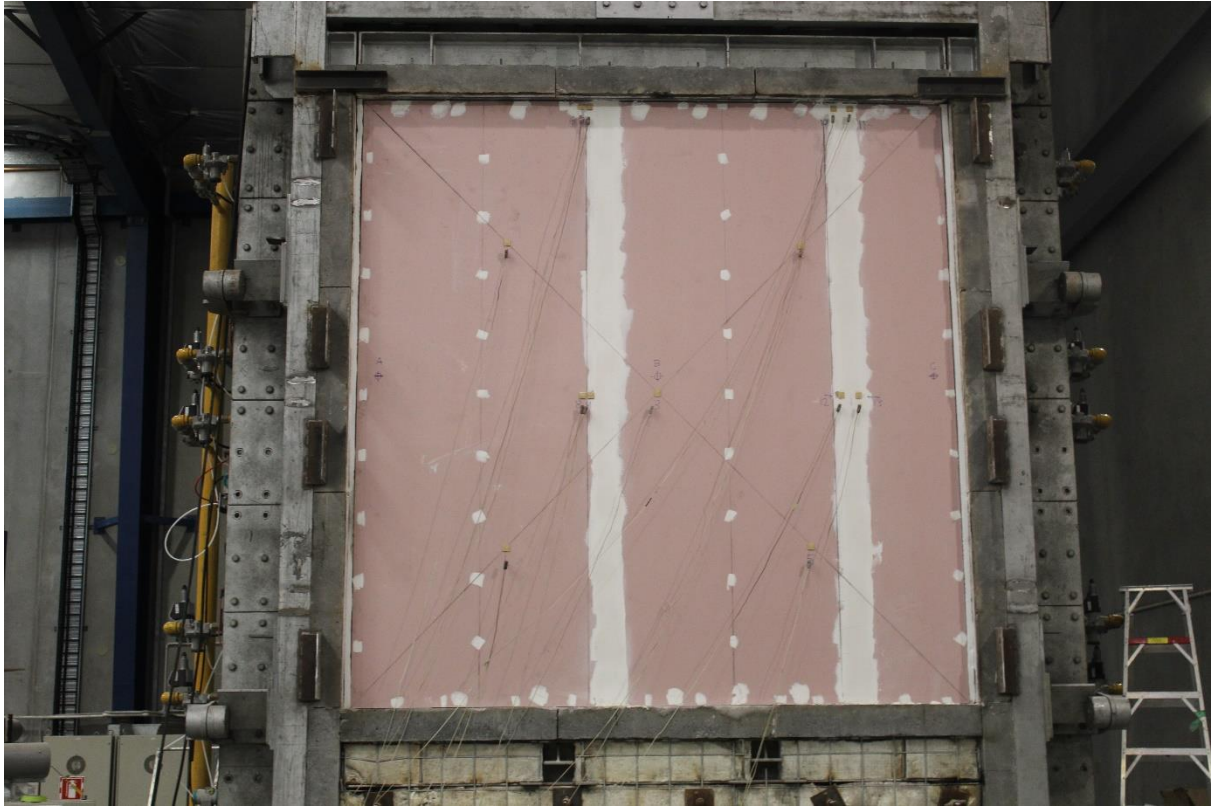
## 11.2 During and after the test

10 minutes:



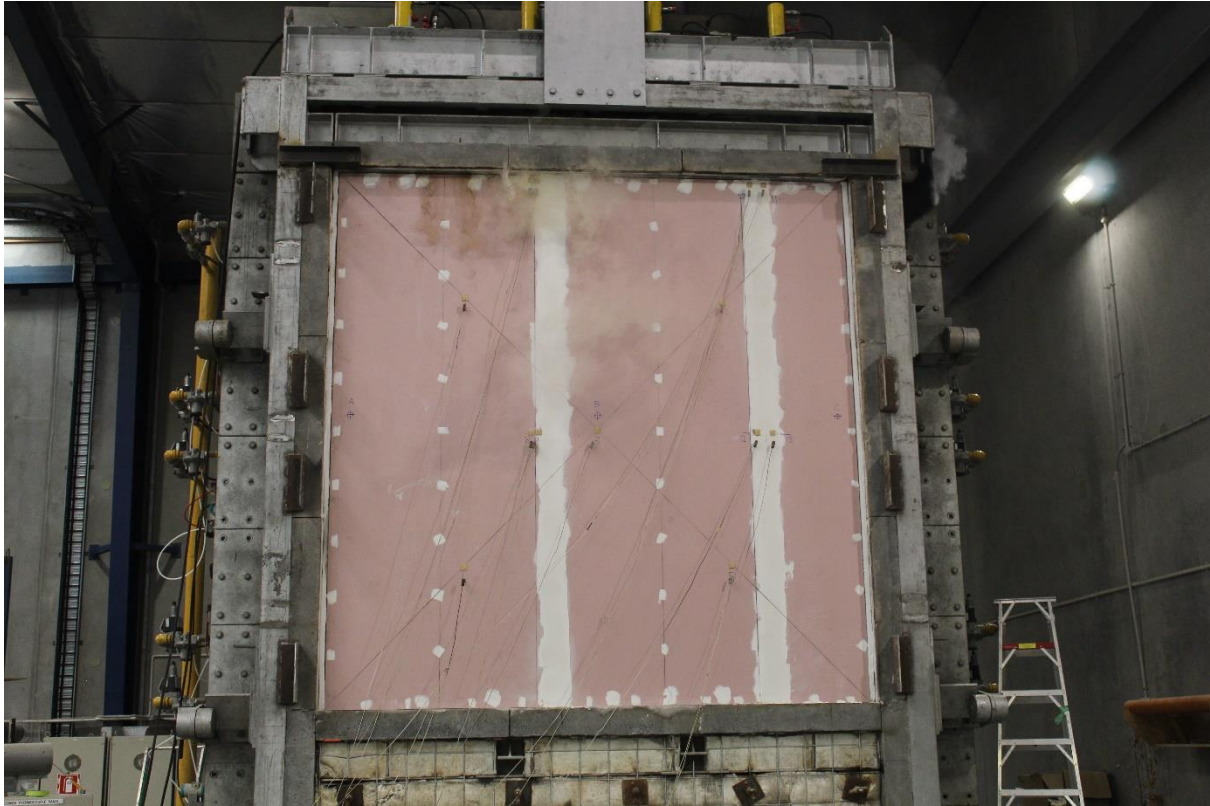


30 minutes:





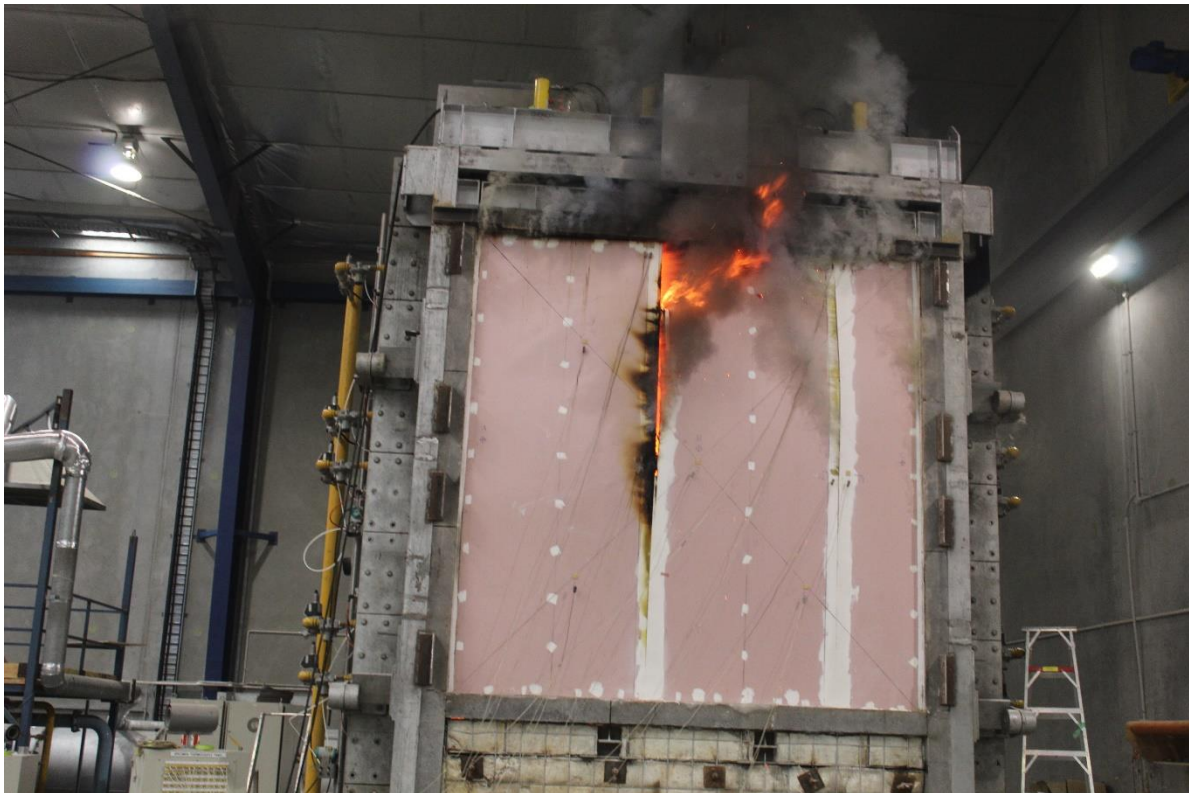
45 minutes:



53 minutes:



57 minutes:





After the test:

