

TEST REPORT

PF23068

**Full scale loadbearing fire resistance test for
framed wall**

Client:	Health Based Building
Test method:	AS1530.4-2014
Report Date:	12/1/24
Test number:	PF23068



Table of Contents

1.1	Document revision schedule	3
1.2	Signatories	3
2.	Report Summary.....	4
3.	General Information	5
3.1	Testing Scope	5
3.2	Contact Details.....	6
3.3	Specimen Preparation, Conditioning and Timeline	6
3.4	Use of the Report.....	7
4.	Specimen Description.....	8
4.1	Supporting Construction.....	8
5.	Test Conditions.....	10
5.1	Equipment.....	10
5.2	Furnace Data	11
5.3	Thermocouple locations	13
5.4	Loading Conditions	13
6.	Test Results.....	14
6.1	Observations during the test	14
6.2	Specimen 1: Framed wall.....	15
7.	Photos	18
7.1	Photos before the test	18
7.2	During and after the test.....	19
	Appendix A – Client supplied drawings	22

1.1 Document revision schedule

Revision #	Date	Description
1	21/11/23	Initial issue for Client review
2	12/1/24	Issued to client

1.2 Signatories

Report	Name	Signature	Date
Prepared by:	Daniel De Jong		12/1/24
Reviewed by:	Alexey Kokorin		12/1/24
Authorised by:	Andrew Bain (Authorized signatory)		12/1/24



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

2. Report Summary

The tested specimen consisted of an 90x45mm LVL wall frame with one layer of Magnum Board with 16mm T&G shiplap cladding installed on fire side and 9mm Magnum board installed on non-fire side. The wall had a 50mm mineral wool insulation in the cavity and flexible air barrier between the cladding and the frame. The wall was asymmetrical construction, results apply if exposed to fire as tested.

Test results

Structural adequacy	102 minutes
Integrity	102 minutes
Insulation	102 minutes
Fire resistance level (FRL)	90/90/90

3. General Information

3.1 Testing Scope

Applicable Standards:

AS 1530.4-2014 Section 3 – Vertical Separating Elements

Loading:

4.5kN per stud

Departures from Testing Method:

No departures from the testing method

Performance Criteria:

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

- a) Temperature rise, If the mean unexposed face temperature increases by more than 140 °C above its initial specimen temperature value.
- b) the temperature at any location on the unexposed face of the test specimen exceeds the initial temperature by more than 180 °C.
- c) 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.
- d) Flaming to the unexposed face for 10 seconds or longer shall be deemed Integrity failure.
- e) Integrity failure shall be deemed to occur when a 6mm gap gauge can be passed through the specimen so that the gap gauge projects into the furnace and can be moved a distance of 150mm along the gap.
- f) Integrity failure shall be deemed to occur when a 25mm gap gauge can be passed through the specimen so that the gap gauge projects into the furnace.
- g) Failure in relation to structural adequacy shall be deemed to have occurred upon collapse, or when the axial contraction exceeds the limiting axial contraction, $C = \frac{h}{100} mm$, or the limiting rate of axial contraction, $\frac{dC}{dt} = \frac{3h}{1000} mm/min$, where h = initial height.

Documentation:

Testing products were checked and tested based on the Client description, refer to the Specimen description below. Documents provided by the Client:

- Framing drawing with notes for Firelab.pdf

3.2 Contact Details

IANZ registered Testing Authority

Fire TS Lab - Passive Fire Inspection and Test Services Ltd

Accreditation Number - 1335

1/113 Pavilion Drive, Mangere, Auckland, 2022

New Zealand

Contact e-mail: tests@firelab.co.nz

Client/Applicant:

Health Based Building Ltd

Level 4, 123 Victoria Street, Christchurch Central, Christchurch, 8013

New Zealand

Contact e-mail: robin@healthbasedbuilding.co.nz

Manufacturer:

Same as Client/Applicant

3.3 Specimen Preparation, Conditioning and Timeline

Specimens conditioning and delivery to Laboratory:

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

Testing date:

28/09/2023

Installation completion date:

22/09/2023

Termination of The Test:

The test was discontinued at 102 minutes.

3.4 Use of the Report

This report shall not be reproduced, except in full.

The wall was asymmetrical construction, results apply if exposed to fire as tested.

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.

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. Specimen Description

4.1 Supporting Construction

Separating element		
1.1	Item	90x45mm LVL wall frame with one layer of Magnum Board with 16mm T&G shiplap cladding installed on fire side and 9mm Magnum board installed on non-fire side. The wall had a 50mm mineral wool insulation in the cavity. The flexible Air Barrier was installed between the cladding and the frame. Studs and noggs were installed at 600mm centres
	Dimensions	Width / Height (W/H): nominal 3000mm x 3000mm
		Wall Thickness (T): 115mm
		Cavity: 90mm
		Insulation: 50mm thick

Materials		
1.2	Item	LVL Stud
	Dimensions	Width / Height (W/H): 90mmx45mm (nominal)
	Installation	Used to constructed wall frame. Studs at 600mm centres and noggs at 600mm centres.
1.3	Item	D-head Framing nails
	Dimensions	90mmx3mm
	Installation	Used to construct wall frame
1.4	Item	16mm Magnum Board with T&G shiplap cladding
	Dimensions	Width / Height (W/H): 210mmx3000mm (nominal)
		Thickness (T): 16mm (nominal)
Installation	Installed vertically to the exposed face of wall frame, over flexible air barrier	
1.5	Item	Magnum Board
	Dimensions	Width / Height (W/H): 1200mmx3000mm (nominal)
		Thickness (T): 9mm (nominal)
Installation	Installed vertically to the unexposed face of wall frame	

1.6	Item	Simpson Strong-Tie Stainless Steel Screw
	Dimensions	7g×75mm
	Installation	Used to fix magnum board to the exposed face of wall frame at 600mm centres along the vertical edges of each board
1.7	Item	Fortress Fasteners Fibre Cement Wall Lining Screw
	Dimensions	6g×30mm
	Installation	Used to fix magnum board to the unexposed face of wall frame at 300mm centres along perimeter edges and 600mm vertical mid lines of magnum boards
1.8	Item	MASONS UNI PLUS Flexible Air Barrier
	Dimensions	Width / Height (W/H): 3000mm × 3000mm (nominal)
	Installation	Installed to the exposed face of wall frame, behind magnum board
1.9	Item	Rockwool Thermalrock S60
	Dimensions	Width / Height (W/H): 600mm×1200mm
		Thickness (T): 50mm
		Density (ρ): 60kg/m ³
Installation	One layer used to fill the cavities in wall frame, between LVL studs	

5. Test Conditions

5.1 Equipment

Furnace:

3X3m Full scale vertical furnace designed to operate to AS1530.4:2014

Temperature:

Furnace Temperature measurements were controlled with 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:

Keypare 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.

5.2 Furnace Data

Furnace Temperature:

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

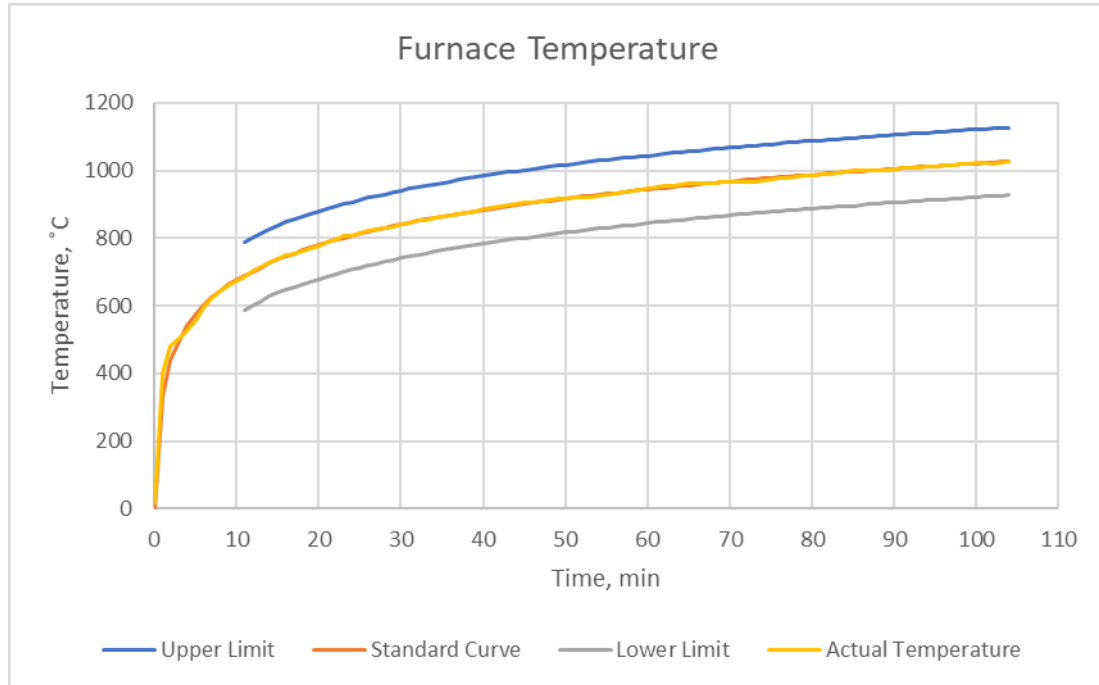


Figure 1 – Furnace Temperature during the test

Ambient Temperature:

The ambient temperature of the test area 15 minutes before the test and at the commencement of the test was 20°C.

Furnace Pressure:

Pressure probe was installed at 1500mm above the bottom of the test specimen and set to 8 Pa to control the furnace pressure. The pressure was set to 8 Pa at 1500mm to simulate a pressure of 0 Pa at 500mm.

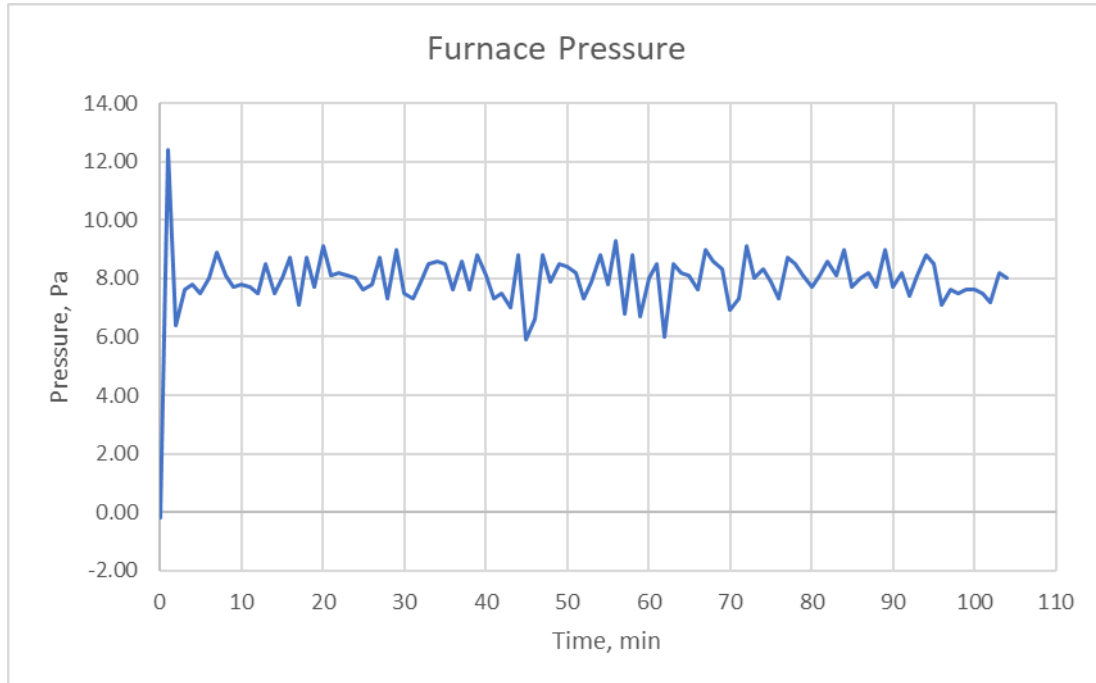


Figure 2 – Furnace Pressure during the test

5.3 Thermocouple locations

TC#	THERMOCOUPLE LOCATION DESCRIPTION
1	Magnum board, centre of upper left quarter
2	Magnum board, centre of upper right quarter
3	Magnum board, mid-width and mid-height of the wall
4	Magnum board, centre of lower left quarter
5	Magnum board, centre of lower right quarter
6	Magnum board, 15mm below top edge of board, 15mm right from left vertical joint
7	Magnum board, mid-width of framed wall, 15mm below top edge of board
8	Magnum board, approximately 1800mm right from left free edge, 30mm below top edge of board, in line with a stud
9	Magnum board, mid-height of wall, 100mm right from left free edge
10	Magnum board, mid-height of framed wall, 15mm right from left vertical edge

5.4 Loading Conditions

The tested specimen had a nominal size of 3000mm x 3000mm. Both vertical edges were free edges to allow for deflection.

The minimum loading requirements were specified by the client. The 4.5kN load per stud (27kN total) was applied by hydraulic rams from the top of the specimen.

6. Test Results

6.1 Observations during the test

Time min	Test face	OBSERVATIONS/REMARKS
6	U	Smoke from free edges, discolouration of framed wall around top corners
8	U	Liquid traveling down from the top right corner of separating element
16	U	Discolouration of magnum board, on the left side of left vertical joint, approximately 500mm-600mm below the top of the wall
28	U	Further discolouration around top right corner
45	U	Further discolouration of separating element, traveling down both edges
51	U	Visible deflection along left vertical joint, approximately 600mm below the top of the wall, discolouration of separating element on both sides of deflection
52	U	Further discolouration of separating element, traveling down both edges
54	E	Bottom of separating element swelled up
59	U	Cotton pad test applied over the opening along left vertical joint for 30 seconds – Pass
62	E	Visible gap between magnum boards
67	U	Discolouration of separating element at the top of right vertical joint
80	U	Discolouration of separating element at mid-height of left vertical joint, further discolouration along free edges
84	U	Discolouration along right vertical joint
89	U	Cotton pad test applied against the wall at the top of right vertical joint for 30 seconds – Pass
90	U	Discolouration along left vertical joint
95	U	Visible gap expanding along right vertical joint
102	U	Specimen collapsed, structural adequacy criteria failure
102	U	Test discontinued

NOTE: E – Exposed Face (inside furnace), U –Unexposed Face (outside furnace)

6.2 Specimen 1: Framed wall

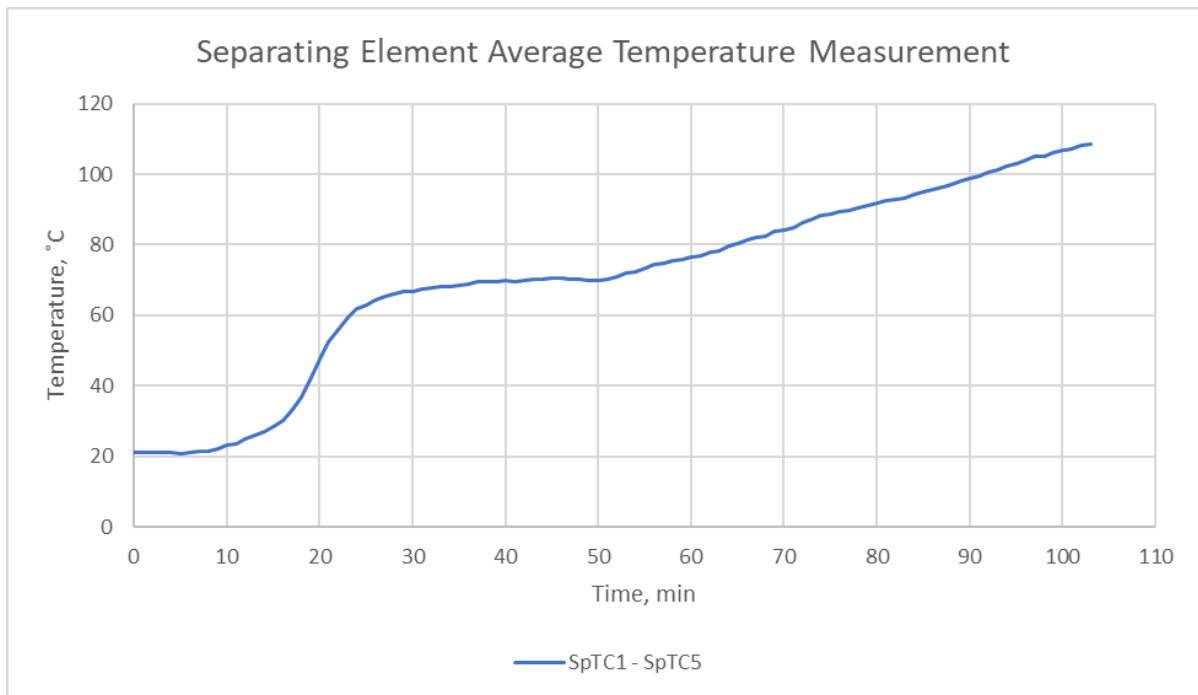


Figure 3 – Average Temperature Measurements of Separating Element

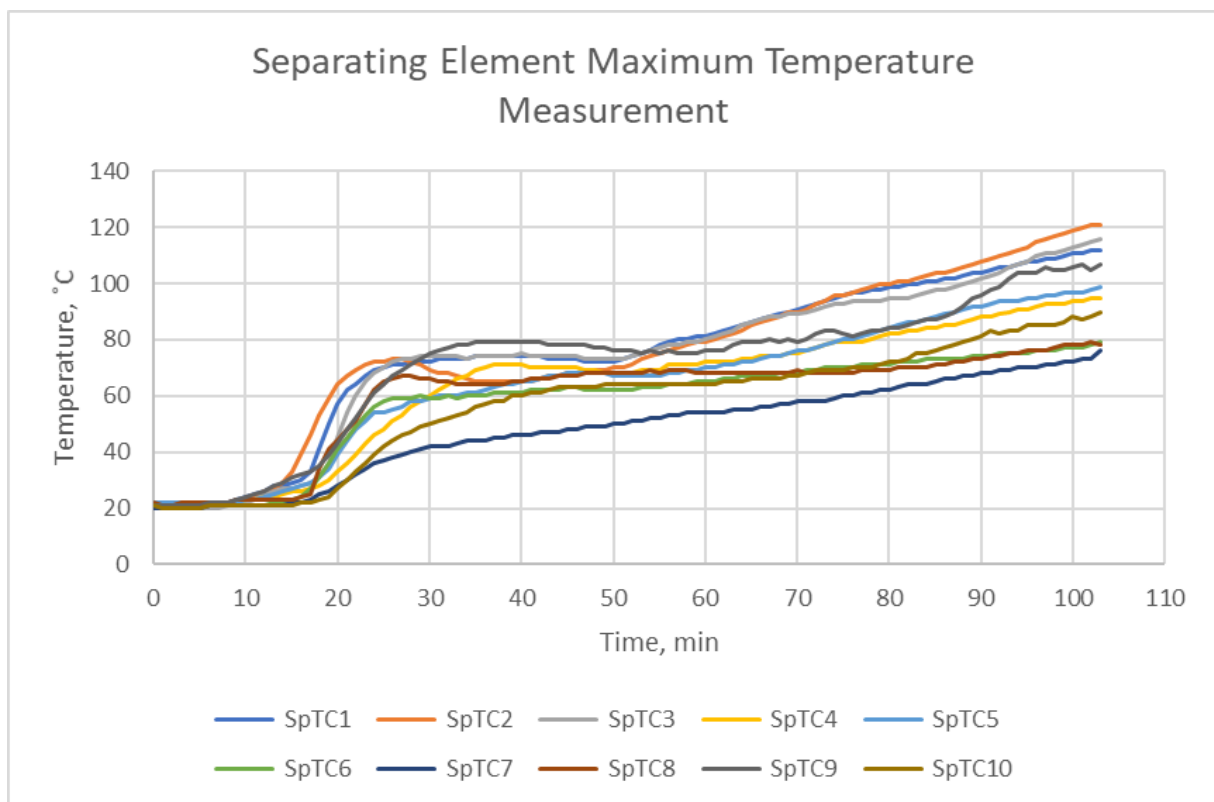


Figure 4 – Maximum Temperature Measurements of Separating Element

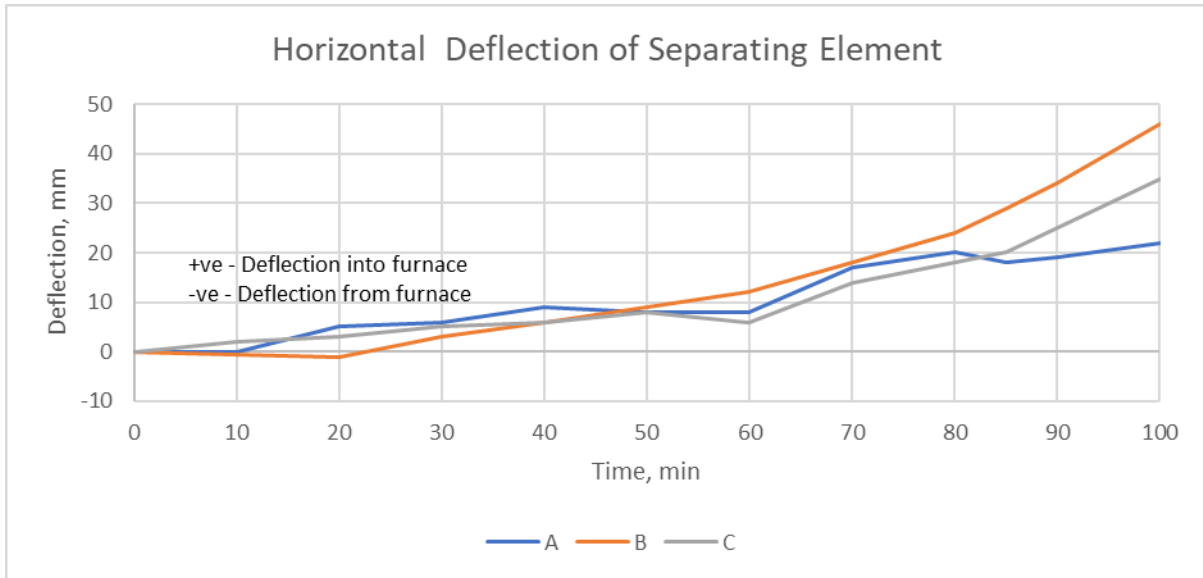


Figure 5 – Horizontal Deflection Measurements of Separating element

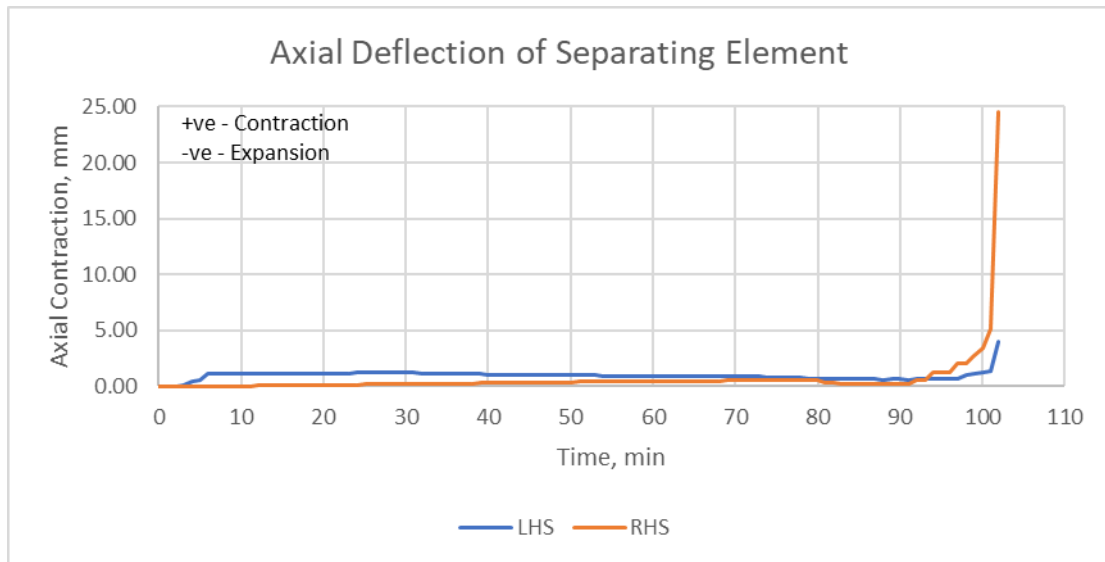


Figure 6 – Axial Deflection of Separating Element

*The limiting axial contraction was deemed to be 30mm, calculated using the limiting axial contraction failure criteria

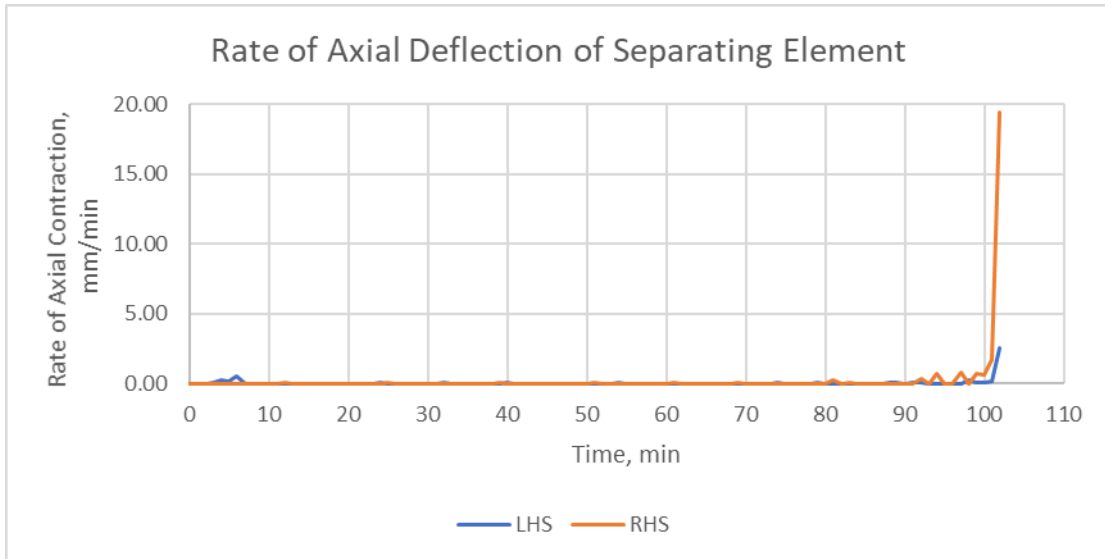


Figure 7 – Rate of Axial Deflection of Separating Element

* The limiting rate of axial contraction was deemed to be 9mm/min, calculated using the limiting rate of axial contraction failure criteria. Failure occurred at 102 minutes when the rate of axial contraction reached 19.4 mm/min.

7. Photos

7.1 Photos before the test



Figure 8 – Framing and insulation installed.



Figure 11 – Unexposed face prior to test commencement



Figure 12 – Exposed face prior to test commencement

7.2 During and after the test



Figure 13 – Unexposed face at 30 minutes



Figure 14 – Unexposed face at 60 minutes

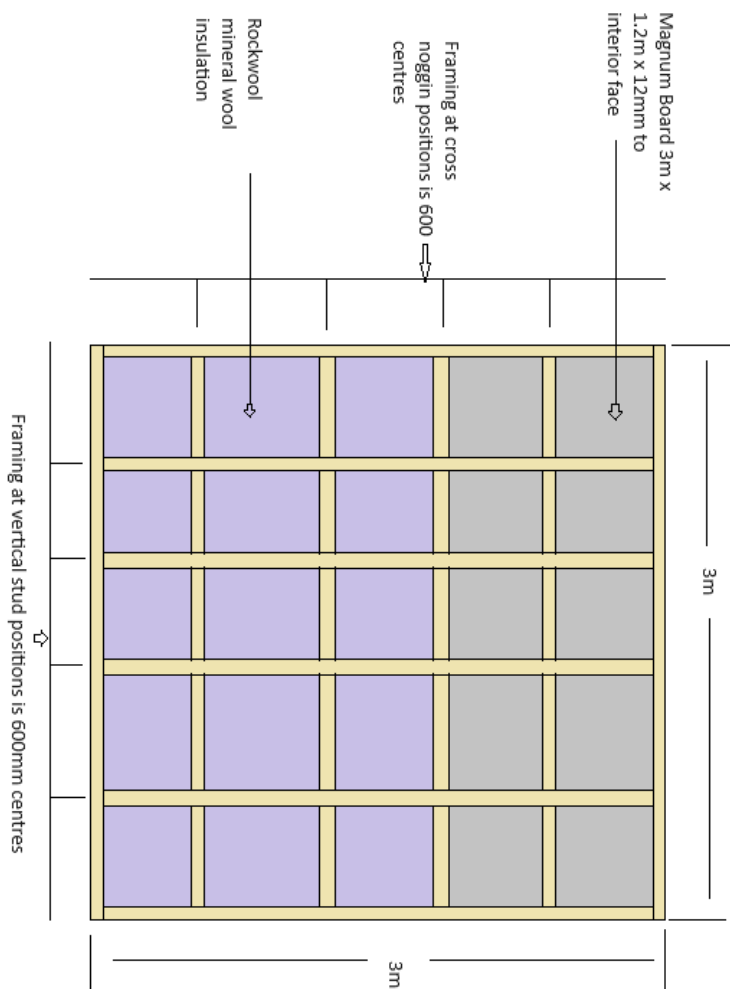


Figure 15 – Unexposed face at 90 minutes



Figure 16 – Exposed face after the test

Appendix A – Client supplied drawings



HBB has provided 90 x 45 LVL framing inclusive of 2 x 3m lengths and remaining lengths in volume sufficient to construct the wall frame.

Wall frame to be assembled using conventional 90mm x 3mm D-head steel nails and gas or compressor actuated nail gun.

Magnum Board 16mm T&G shiplap cladding to be installed vertically to the exterior face of the frame over fire resistance rated Flexible frame wrap to be supplied by Fire Lab

Magnum Board 3m x 1.2m x 12mm to be installed to the interior face of the frame.

Fire Lab to provide Rockwool 90mm mineral wool insulation to populate the frame