Test report # PF21007-A

Test Number 21007

Issued to: Intex International

Fire resistance tests for wall penetrations

Test method: AS 1530.4:2014

Report Date 12/07/2021

1. Table of Contents

1.1 Document revision schedule

Revision #	Date	Description
1	28/04/2021	Initial Issue for Client review
2	10/06/2021	Issued with Client comments
3	12/07/2021	Issued to Intex International

1.2 Signatories

Report	Name	Signature	Date
Prepared by:	Alexey Kokorin (Technical Manager)		12/07/2021
Authorized by:	Andrew Bain (Authorized signatory)		12/07/2021

ACCREDITED
TESTING LABORATORY

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

2. Contact details

2.1 IANZ registered Testing Authority

Passive Fire Inspection and Test Services Ltd

Accreditation N$^{o:}$ 1335

1/113 Pavilion Drive, Mangere, Auckland, 2022

New Zealand

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

2.2 Issued to

Intex International

115 McKellar Way Epping, Victoria, Australia, 3076

Contact e-mail: sales@intexinternational.com

3. Test Results

Specimen #	Joint	Actual Integrity (min)	Actual insulation (min)	FRL
A	10mm Butt-joined Vertical Control Joint	**125 NF**	**108**	**-/120/90**
B	20mm Butt-joined Vertical Control Joint	**125 NF**	**94**	**-/120/90**
C	30mm Butt-joined Vertical Control Joint	**125 NF**	**125NF**	**-/120/120**
D*	20mm Butt-joined Horizontal Control Head Joint	**125 NF**	**122**	**-/120/120**

*** - asymmetrical one-way system, the rating applied if exposed to fire as tested.**

NF – No failure during the test

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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

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 °C

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.

Testing scope:
AS 1530-2014 Part 4 Section 10 Service penetrations and control joints

AS 4072.1-2005 Part 1 Appendix A - Typical examples of fire-stopping systems for movement joints.

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

Testing date:	**Installation completion date:**
12/04/2021	01/04/2021

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. The Client confirmed in writing that BlazeBlocker® Fire Rated Sealant is based on the same formulation as FirePro FR Acrylic Sealant and has identical chemical composition, manufacturing process and properties.

Termination of The Test:
The test was discontinued at 125 minutes.

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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

Furnace:
1200X1200 Indicative 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.

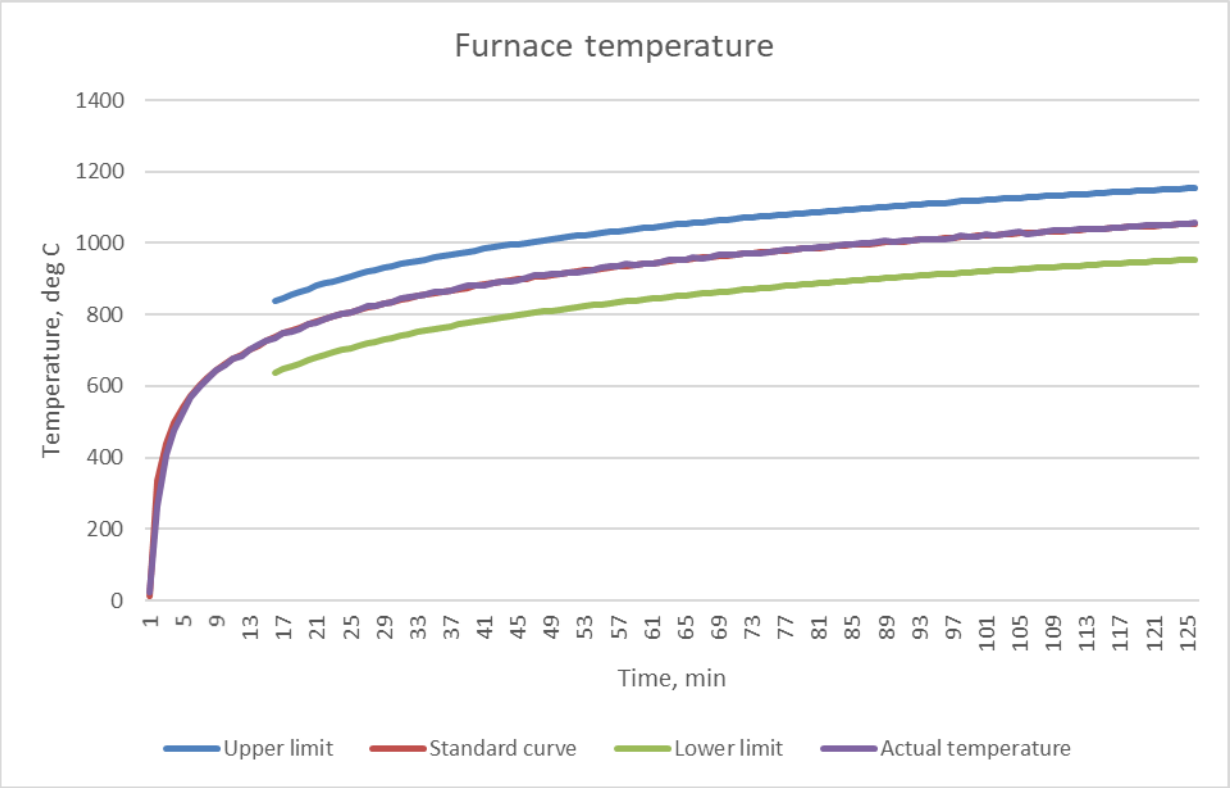
Specimen thermocouples:
Specimen thermocouples were installed to the unexposed face. Type K copper disk thermocouples fixed within the required locations referenced from AS1530.4-2014. Thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation 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.

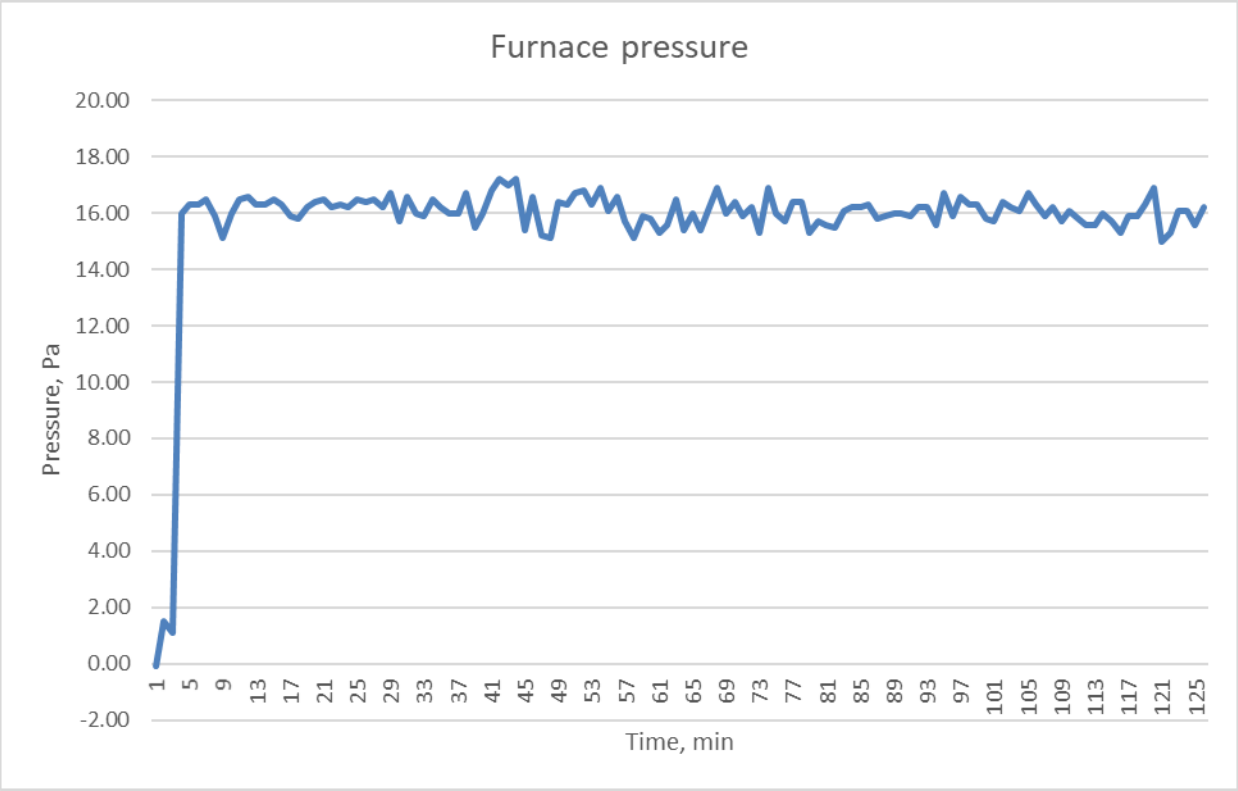


6.2 Ambient Temperature

The ambient temperature of the test area 15 minutes before the test and at the commencement of the test was 23 °C.

6.3 Pressure Readings

After the first 5 minutes of the test, the furnace pressure was maintained at 16 ± 3 Pa with respect to atmosphere. The probe was located 500mm above the furnace floor.



7. Schedule of materials

All firestopping products were supplied by Client.

Separating Element		
1.1	Item / Product Name	Concrete Slab and Hebel Panel Separating element
	Measurements	1200mm x 1200mm
	Thickness	75mm (nominal)
SE	Specification	Concrete Slab (1.3) was fixed to the top of the refractory frame, then steel angle (1.4) was fixed to the concrete slab and bottom of the refractory frame. Hebel panels (1.2) were cut to a width of 285mm, 275mm, 260mm and 270mm. Hebel panels were placed in the refractory frame and fixed to the steel angle using screw anchors (4.1). The spacing between Hebel panels was measured to be 10mm, 20mm and 30mm. The spacing between Hebel panels and the concrete slab was 20mm.
1.2	Item / Product Name	Hebel Panel
	Measurements	Width / Height (W/H): 600mm x 1050mm
		Thickness (T): 75mm (nominal)
	Additional Info	Used to construct separating element.
1.3	Item / Product Name	Concrete Slab
	Measurements	Width / Height (W/H): 1200mm x 140mm
		Thickness (T): 280mm
	Additional Info	Casted December 2020. Used to construct separating element.
1.4	Item / Product Name	Galvanised steel angle
	Measurements	Width / Height (W/H): 50mm x 50mm
		Thickness (T): 1mm
	Additional Info	Used to fix Hebel panels to refractory frame and concrete slab

Sealants		
3.1	Item / Product Name	BlazeBlocker® Fire Rated Sealant
	Measurements	600mL tube
	Installation	Inserted into separating element gaps

Fixings/Miscellaneous Items		
4.1	Item / Product Name	Unbranded Hex Head Screw Anchor
	Measurements	75mm
	Installation	Used to fix Hebel Panels to steel angle
4.2	Item / Product Name	Sika PEF Backing Rod
	Measurements	12mm
	Installation	Placed in separating element gaps to ensure correct sealant depth
4.3	Item / Product Name	Sika PEF Backing Rod
	Measurements	30mm
	Installation	Placed in separating element gaps to ensure correct sealant depth
4.4	Item / Product Name	Sika PEF Backing Rod
	Measurements	25mm
	Installation	Placed in separating element gaps to ensure correct sealant depth

8. Test Specimens details

8.1 Thermocouple Positions Table

SPECIMEN	TC#	THERMOCOUPLE LOCATION DESCRIPTION
A	1	Separating element, 25mm left of Specimen A, 100mm below top edge of Hebel Panel
A	2	Separating element, 25mm right of Specimen A, 100mm below top edge of Hebel Panel
A	3	Separating element, 25mm left of Specimen A, vertical centre of Hebel Panel
A	4	Separating element, 25mm right of Specimen A, vertical centre of Hebel Panel
A	5	Separating element, 25mm left of Specimen A, 100mm above bottom edge of Hebel Panel
A	6	Separating element, 25mm right of Specimen A, 100mm above bottom edge of Hebel Panel
D	7	Separating element, 25mm left of Specimen A, 25mm below top edge of Hebel Panel
A	8	On sealant, centre of 10mm sealed aperture, 75mm below top edge of Hebel Panel
A	9	On sealant, centre of 10mm sealed aperture, 25mm above vertical centre of Hebel Panel
A	10	On sealant, centre of 10mm sealed aperture, 75mm above bottom edge of Hebel Panel
B	11	Separating element, 25mm left of Specimen B, 100mm below top edge of Hebel Panel
B	12	Separating element, 25mm right of Specimen B, 100mm below top edge of Hebel Panel
B	13	Separating element, 25mm left of Specimen B, vertical centre of Hebel Panel
B	14	Separating element, 25mm right of Specimen B, vertical centre of Hebel Panel

B	15	Separating element, 25mm left of Specimen B, 100mm above bottom edge of Hebel Panel
B	16	Separating element, 25mm right of Specimen B, 100mm above bottom edge of Hebel Panel
D	17	Separating element, 25mm left of Specimen B, 25mm below top edge of Hebel Panel
B	18	On sealant, centre of 20mm sealed aperture, 75mm below top edge of Hebel Panel
B	19	On sealant, centre of 20mm sealed aperture, 25mm above vertical centre of Hebel Panel
B	20	On sealant, centre of 20mm sealed aperture, 75mm above bottom edge of Hebel Panel
C	21	Separating element, 25mm left of Specimen C, 100mm below top edge of Hebel Panel
C	22	Separating element, 25mm right of Specimen C, 100mm below top edge of Hebel Panel
C	23	Separating element, 25mm left of Specimen C, vertical centre of Hebel Panel
C	24	Separating element, 25mm right of Specimen C, vertical centre of Hebel Panel
C	25	Separating element, 25mm left of Specimen C, 100mm above bottom edge of Hebel Panel
C	26	Separating element, 25mm right of Specimen C, 100mm above bottom edge of Hebel Panel
D	27	Separating element, 25mm left of Specimen C, 25mm below top edge of Hebel Panel
C	28	On sealant, centre of 30mm sealed aperture, 75mm below top edge of Hebel Panel
C	29	On sealant, centre of 30mm sealed aperture, 25mm above vertical centre of Hebel Panel
C	30	On sealant, centre of 30mm sealed aperture, 75mm above bottom edge of Hebel Panel

D	31	Separating element, on bottom face of concrete slab, in line with Specimen A, 25mm from Hebel panel face
D	32	Separating element, on bottom face of concrete slab, in line with Specimen B, 25mm from Hebel panel face
D	33	Separating element, on bottom face of concrete slab, in line with Specimen C, 25mm from Hebel panel face

8.2 Observations

Time Minutes	Test Face	SP#	Observations
5	E	B, C	Visible expansion of sealant, visible flakes falling from combusted areas.
10	E	A	Visible expansion of sealant with white discolouring
10	E	B, C	Visible combustion along entire specimen with flaking
15	E	B, C, D	Visible black discolouring/charring of sealant
15	E/U	ALL	No notable changes
20	U	D	Small amount of smoke coming from head junction near thermocouples TC31, TC32 and TC33
20	E	D	Visible gaps in head joint sealant
20	E	A, B	No notable changes
20	E	C	White discolouring of specimen
30	E	ALL	All visible sealant has white discolouring
30	U	B, C, D	Visible expansion of sealant within head joint above specimen B and C
45	U	D	Visible expansion of sealant within head joint above specimen A
45	E	C, D	Visible gaps in expanded sealant
60	E/U	ALL	No notable changes
72	U	SE	Visible cracks through right side (unexposed view) of separating element, with visible expansion of unexposed sealant
72	E	SE	Visible cracks through the two centre Hebel panels, originating near the vertical centre of the panels
80	U	SE	Roving thermocouple test at crack above TC 23 - 104°C
84	U	D	Heavy smoke in head joint above specimen C
84	E	SE	Further increase in size of cracks
87	U	SE	Roving thermocouple test at crack above TC 23 - 147°C
87	U	SE	Dark discolouring of separating element near crack

90	U	SE	Visible crack across lower half of separating element between specimen A & B, B & C
90	U	SE	Cotton pad test for 30 seconds, applied to crack above TC23 – PASS
95	U	SE	Visible deflection, warping of Hebel panels
96	U	SE	Roving thermocouple test at crack above TC 23 - 163℃
100	U	SE	Cracks at bottom half of separating element have dark discolouring near edges of the panels
100	E	SE	Cracks through centre of the separating element have visibly increased in width
110	U	SE	Roving thermocouple test at crack above TC 23 - 164℃
125			TEST DISCONTINUED

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

9. Separating element and main fire-stopping system

Concrete Slab (1.3) was fixed to the top of the refractory frame, then steel angle (1.4) was fixed to the concrete slab and bottom of the refractory frame. Hebel panels (1.2) were cut to a width of 285mm, 275mm, 260mm and 270mm. Hebel panels were placed in the refractory frame and fixed to the steel angle using screw anchors (4.1). The spacing between Hebel panels was measured to be 10mm, 20mm and 30mm. The spacing between Hebel panels and the concrete slab was 20mm.

Performance of the separating element – Maximum temperature of the separating element measured during the test 130mm from any joint was 143 degC at 125 minutes.

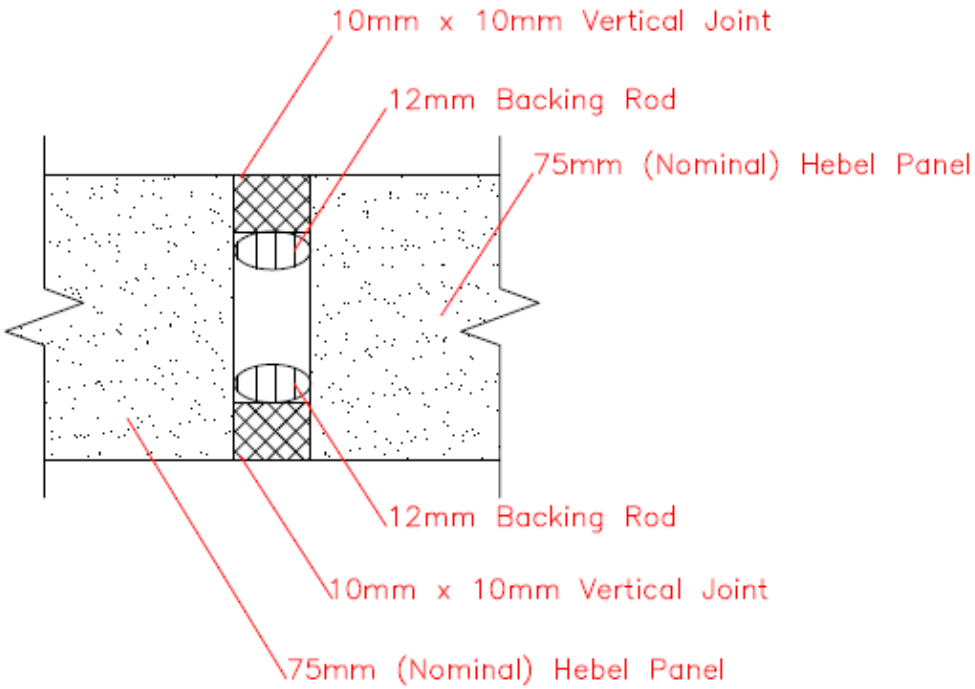
Separating element (exposed face)

10. Specimens

Unexpoesd faced:

Exposed face:

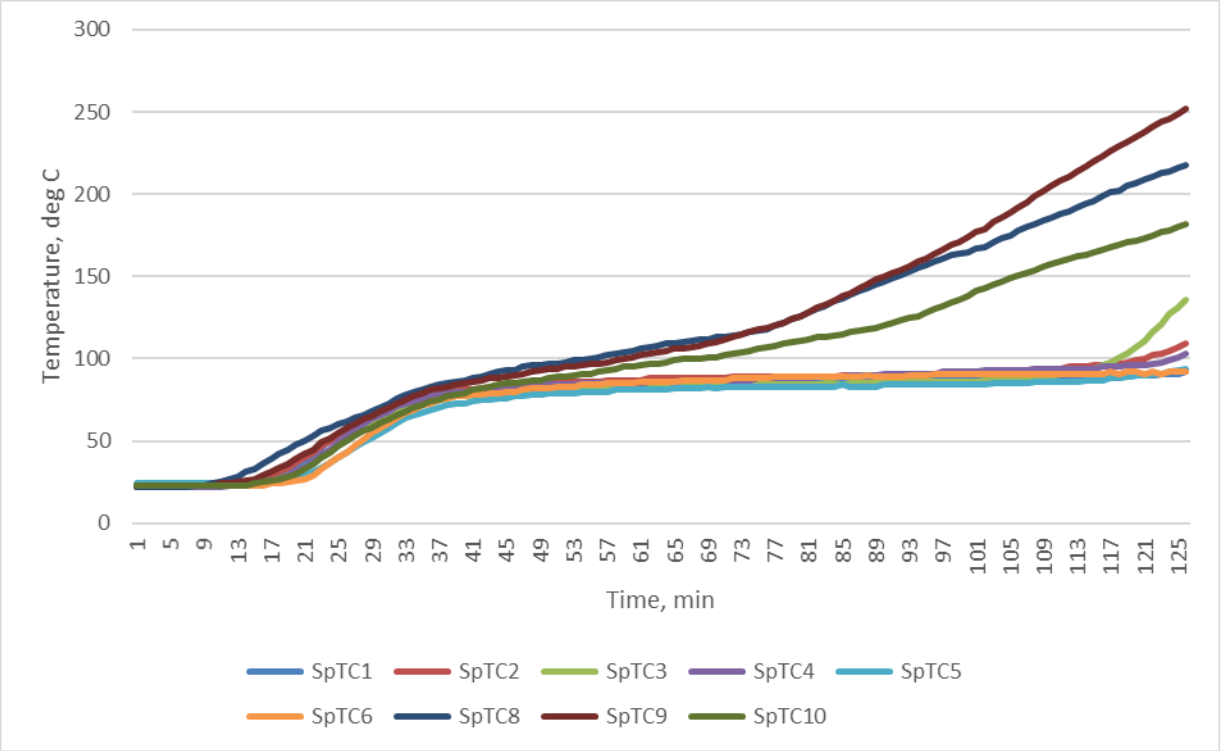
10.1 Specimen A



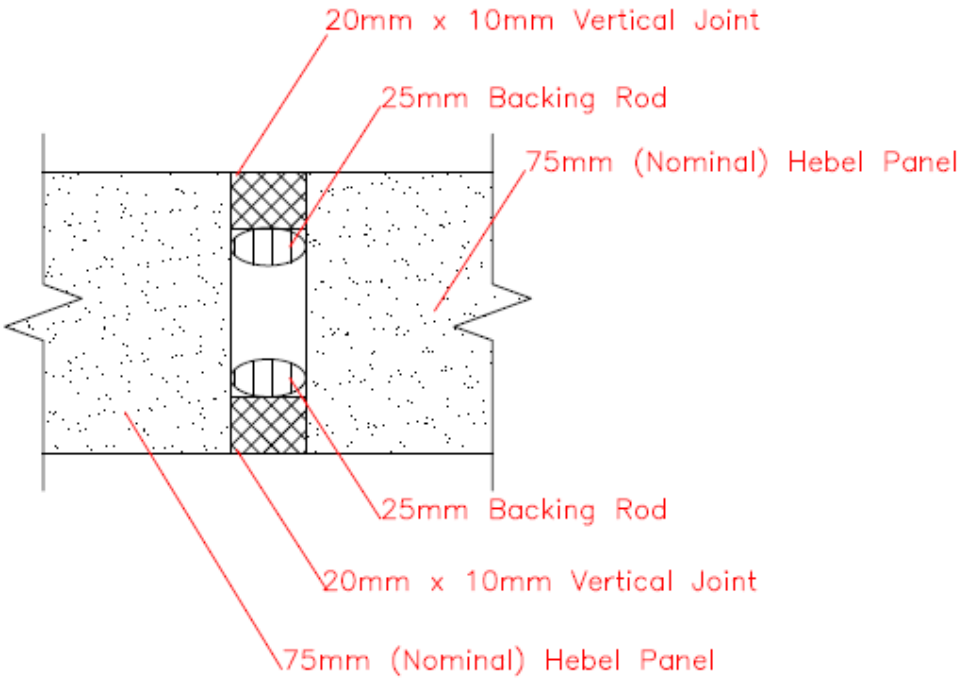
Penetration System		
A	Service	10mm Butt-joined Vertical Control Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 10mm x 1050mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	PEF Backing rod (4.2) was pressed into the Hebel Panel (1.2) separating element gap on both faces, and inside the top edge within the separating element. PEF rod was recessed 10mm from the surfaces. Sealant (3.1) was applied on top of the PEF rod, flush with the separating element faces, resulting in a 10mm (nominal) depth of sealant around the perimeter of the aperture.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 125 min**
Insulation	**108 min**

Specimen A Thermocouples Readings



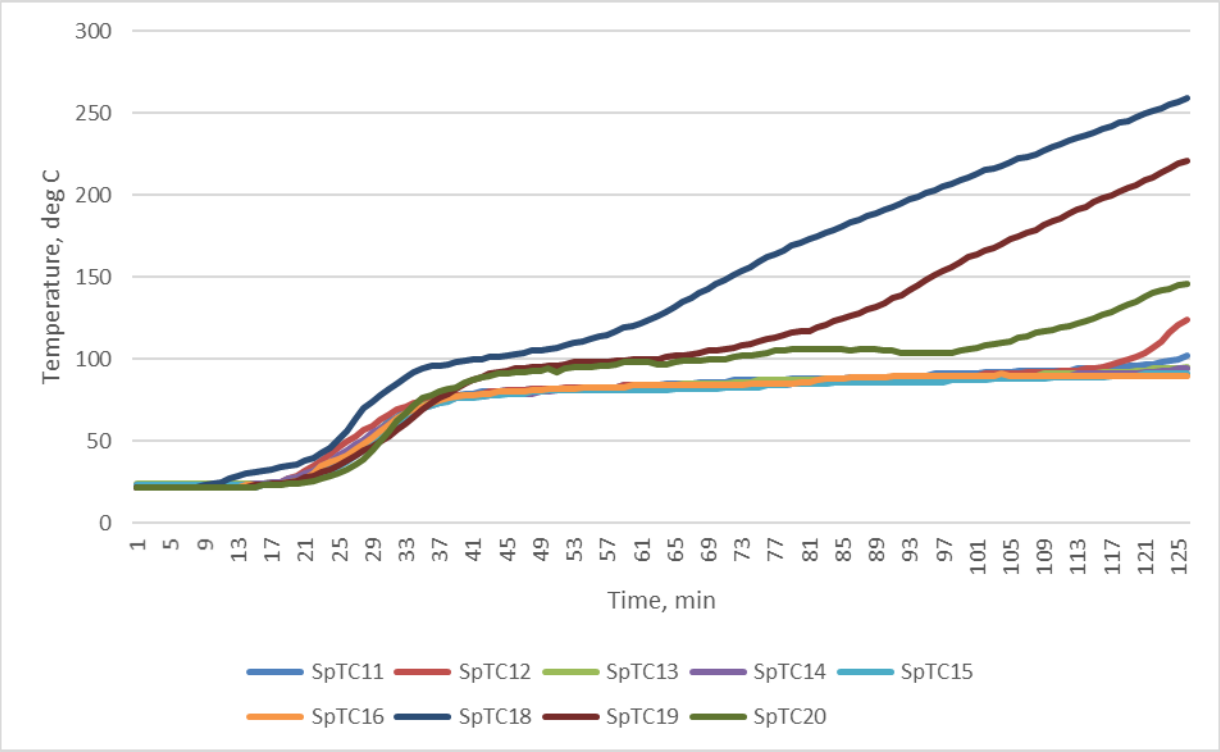
10.2 Specimen B



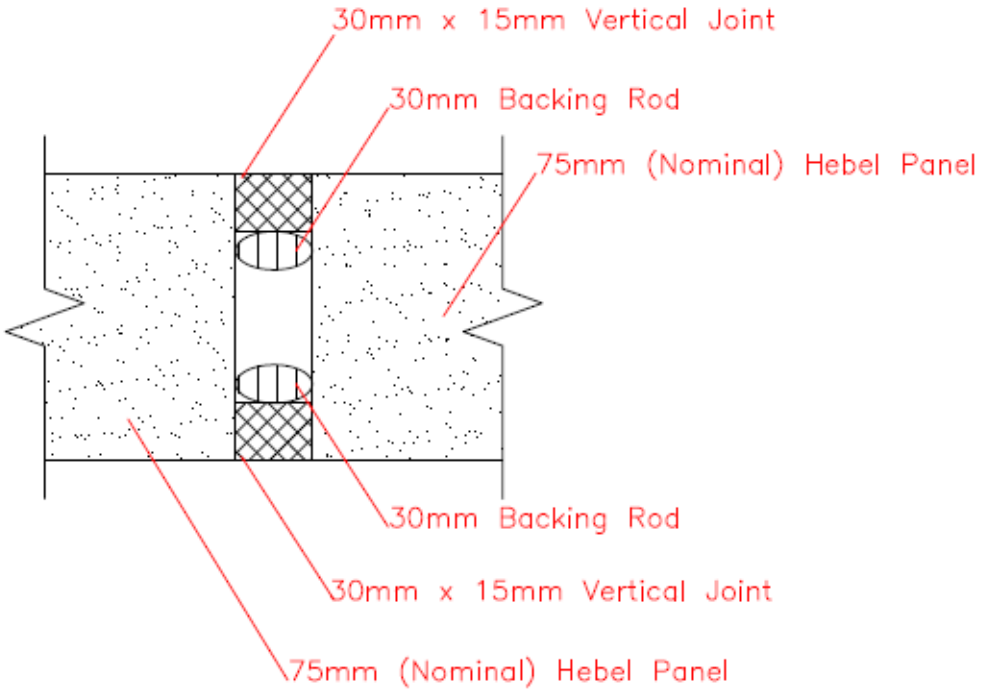
Penetration System		
B	Service	20mm Butt-joined Vertical Control Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 20mm x 1050mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	PEF Backing rod (4.4) was pressed into the Hebel Panel (1.2) separating element gap on both faces, and inside the top edge within the separating element. PEF rod was recessed 10mm from the surfaces. Sealant (3.1) was applied on top of the PEF rod, flush with the separating element faces, resulting in a 10mm (nominal) depth of sealant around the perimeter of the aperture.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 125 min**
Insulation	**94 min**

Specimen B Thermocouples Readings



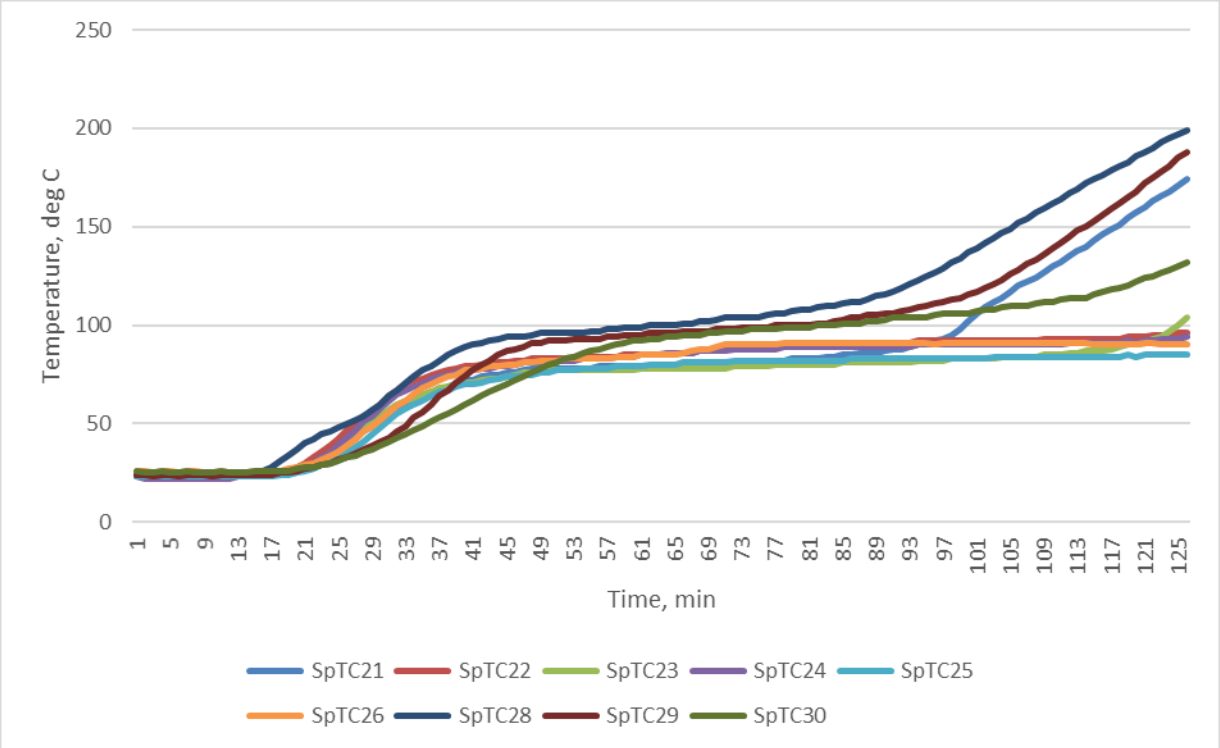
10.3 Specimen C



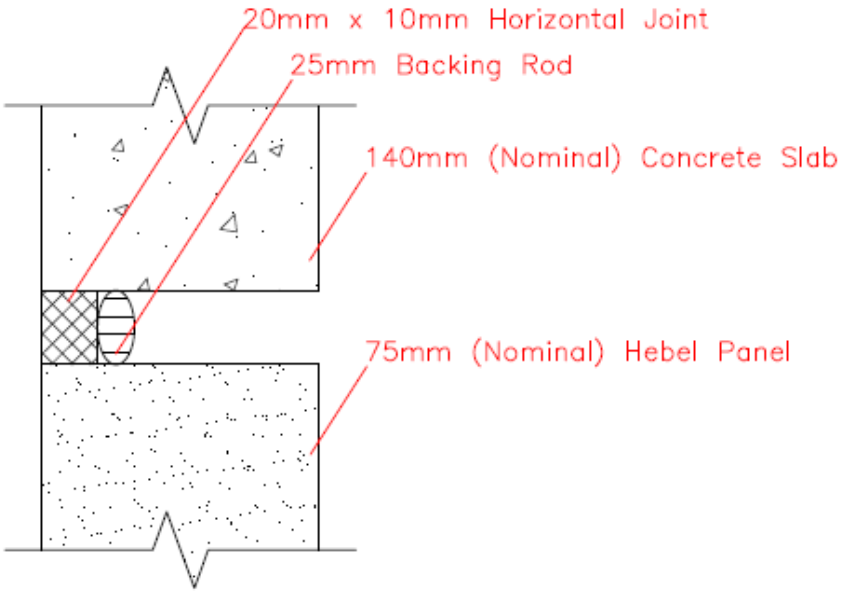
Penetration System		
C	Service	30mm Butt-joined Vertical Control Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 30mm x 1050mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	PEF Backing rod (4.3) was pressed into the Hebel Panel (1.2) separating element gap on both faces, and inside the top edge within the separating element. PEF rod was recessed 15mm from the surfaces. Sealant (3.1) was applied on top of the PEF rod, flush with the separating element faces, resulting in a 15mm (nominal) depth of sealant around the perimeter of the aperture.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 125 min**
Insulation	**No failure at 125 min**

Specimen C Thermocouples Readings



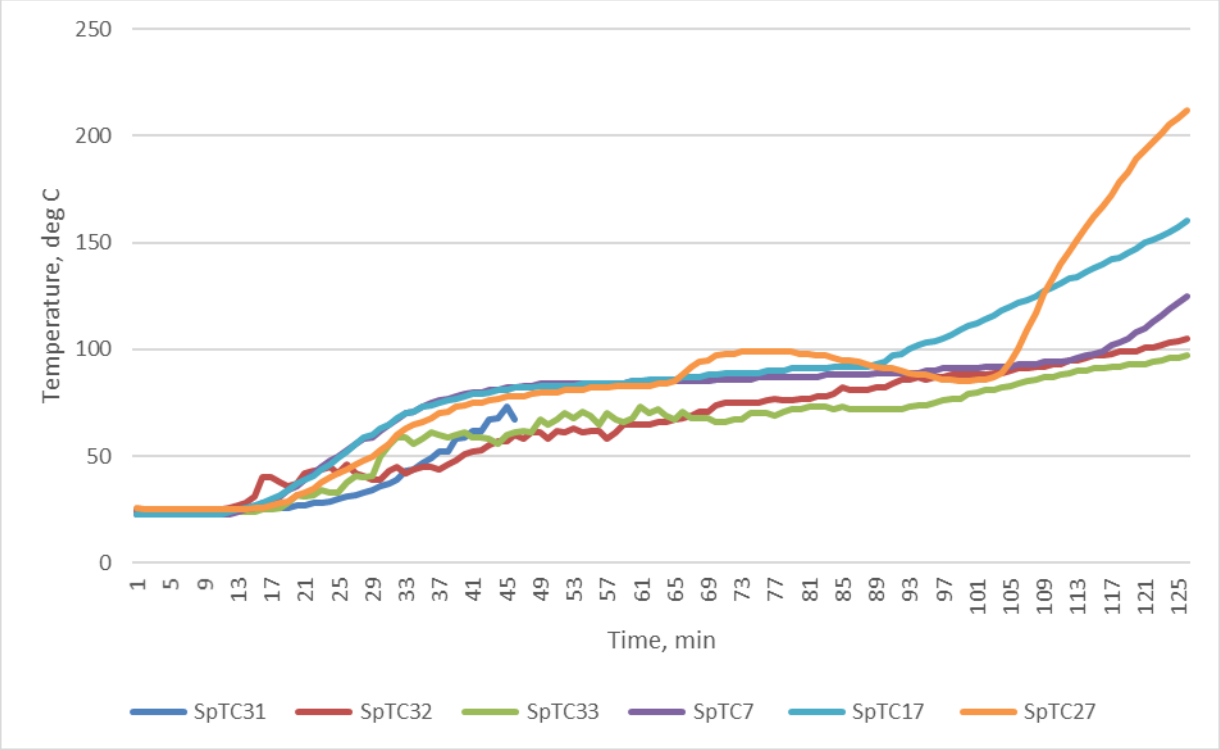
10.4 Specimen D



Penetration System		
D	Service	20mm Butt-joined Horizontal Control Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 1200mm x 20mm
	Local Fire-stopping Protection	
	Application	Asymmetrical
	Protection Used	PEF Backing rod (4.4) was pressed into the Hebel Panel (1.2) separating element gap from the exposed face. PEF rod was recessed 10mm from the surfaces. Sealant (3.1) was applied on top of the PEF rod, flush with the separating element faces, resulting in a 10mm (nominal) depth of sealant around the perimeter of the aperture.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 125 min**
Insulation	**122 min**

Specimen D Thermocouples Readings

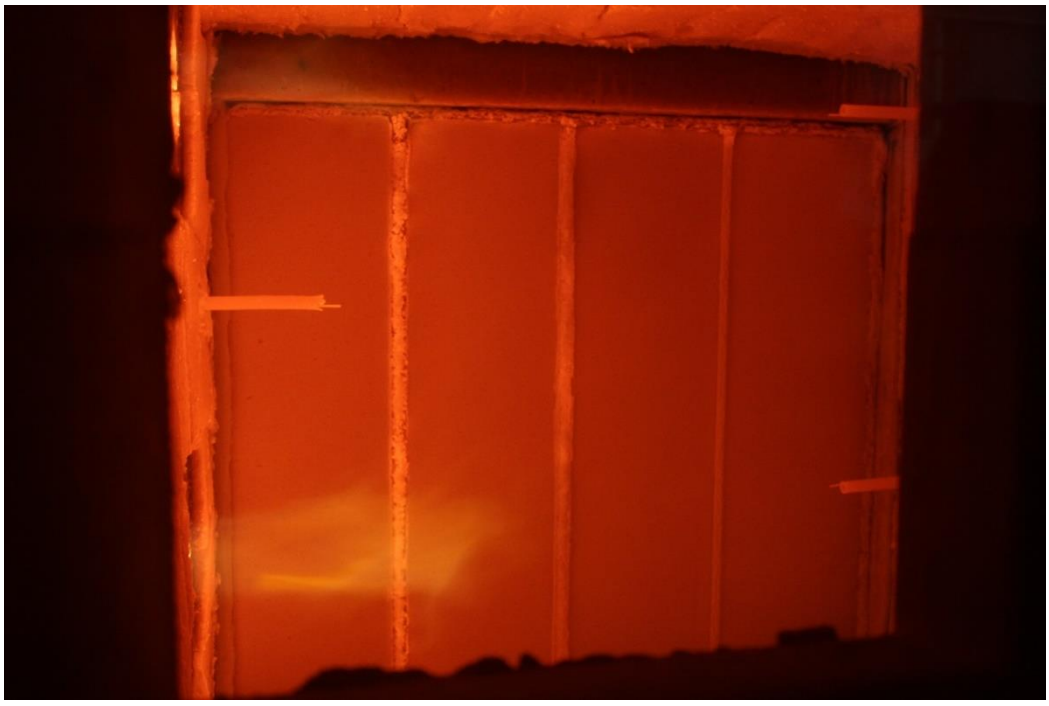


11. Additional photographs

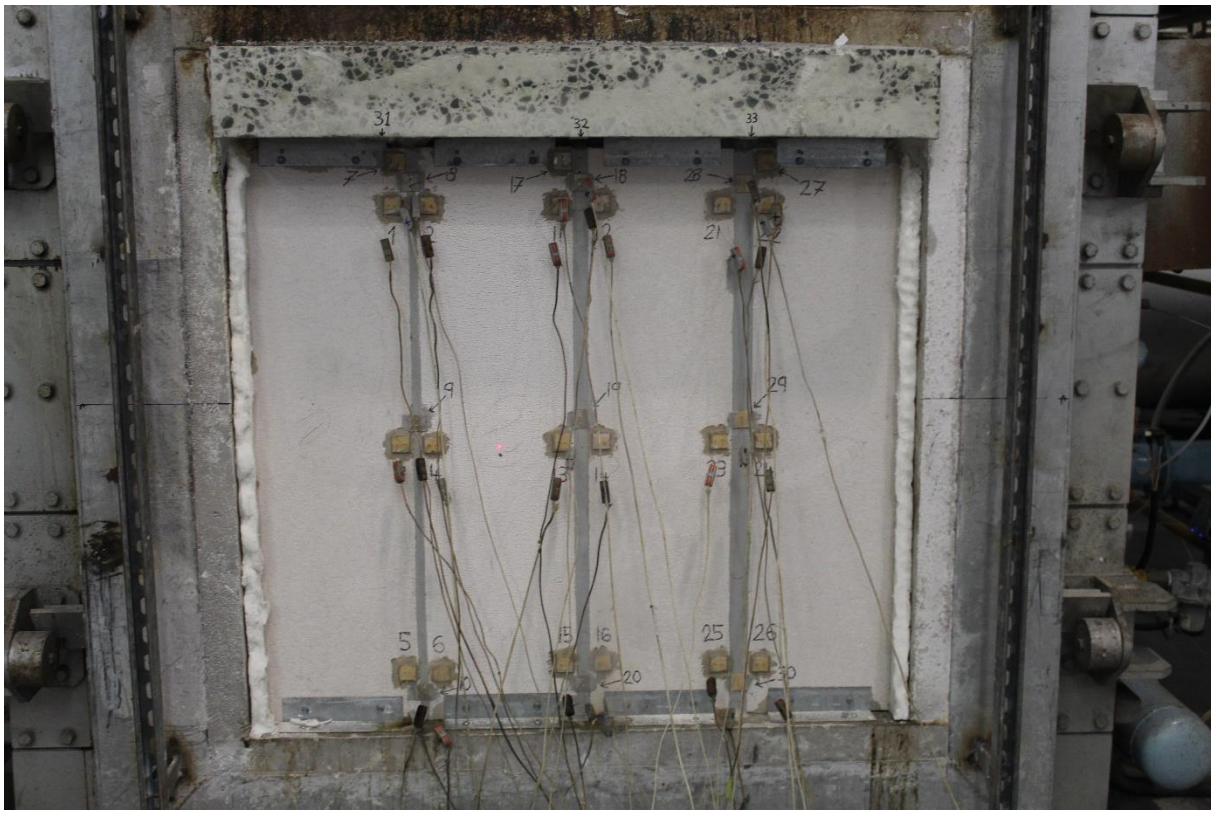
11.1 During and after the test

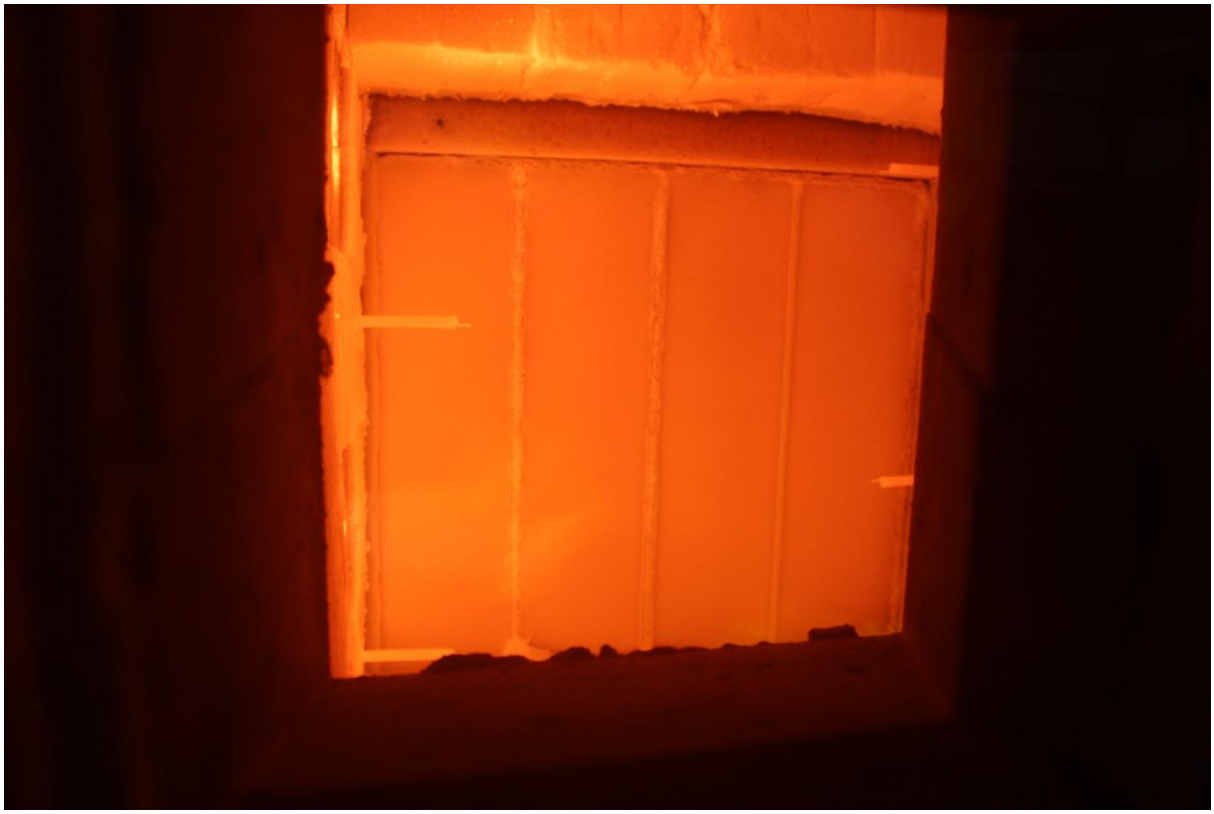
10 minutes:

30 minutes:

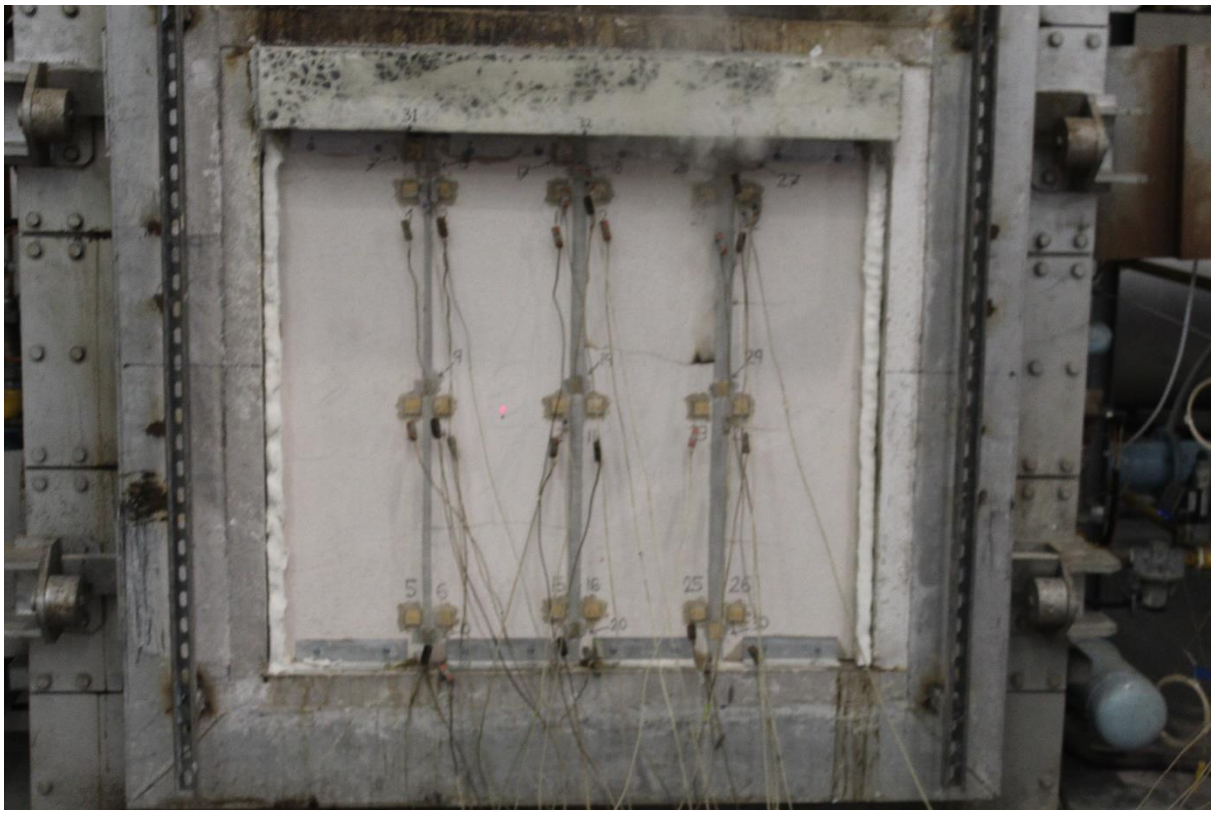


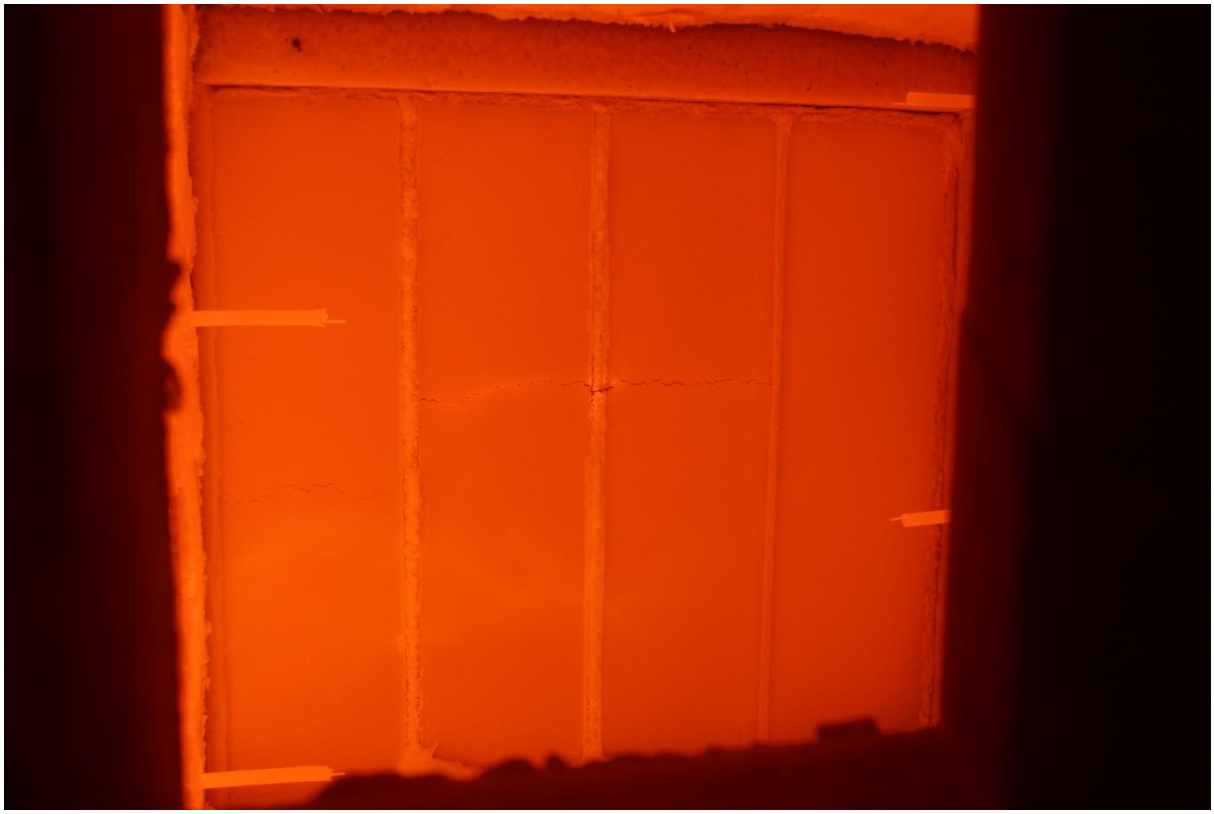
60 minutes:



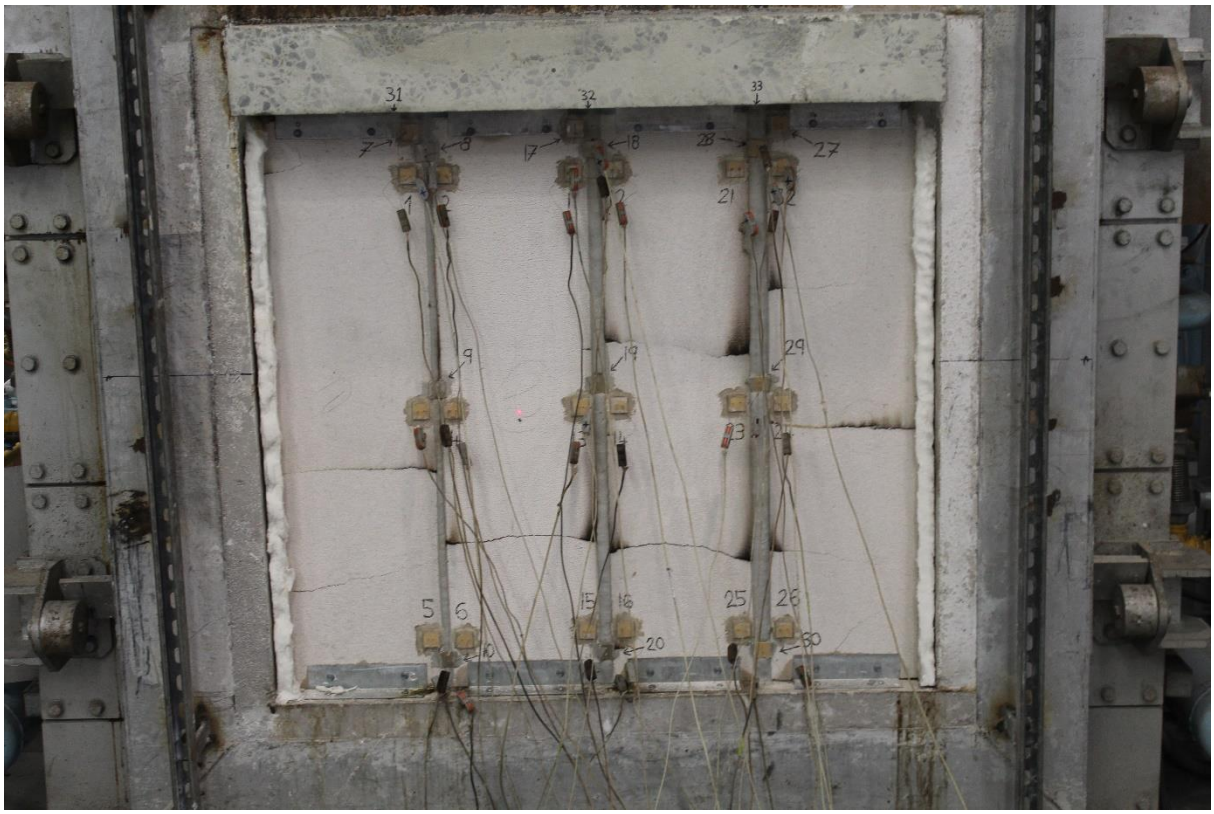


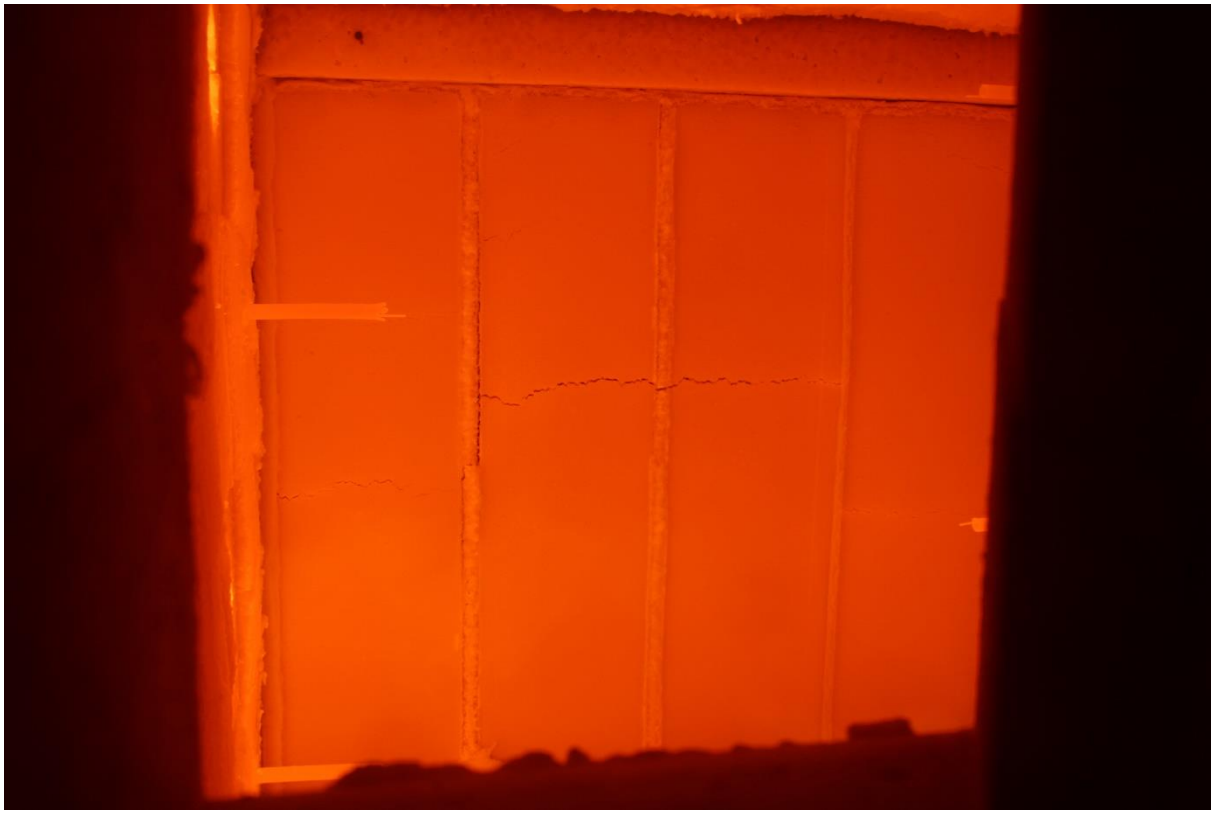
90 minutes:





120 minutes:





After the test: