Test report # PF21006-A

Test Number 21006

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	21/04/2021	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**	**244**	**223**	**-/240/210**
B	**30mm Butt-joined Vertical Control Joint**	**244**	**226**	**-/240/210**
C	**50mm Butt-joined Vertical Control Joint**	**244**	**238**	**-/240/210**
D	**20mm Butt-joined Horizontal Control Head Joint**	**244**	**226**	**-/240/210**

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:**
16/04/2021	06/04/2021

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 244 minutes.

Use of Reports:

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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.

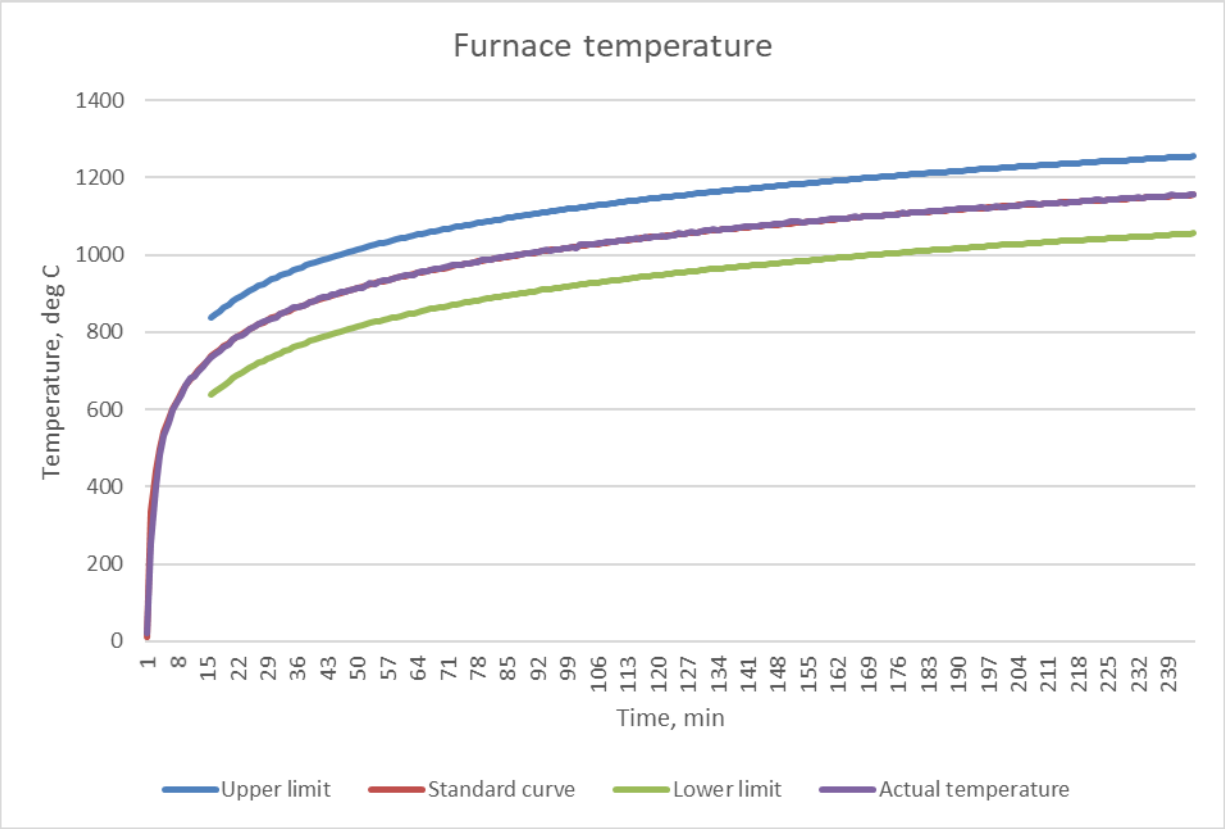
Specimen thermocouples:
Specimen thermocouples were installed to the unexposed face. Type K copper disk thermocouples fixed within the required locations referenced from AS1530.4-2014. Thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation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

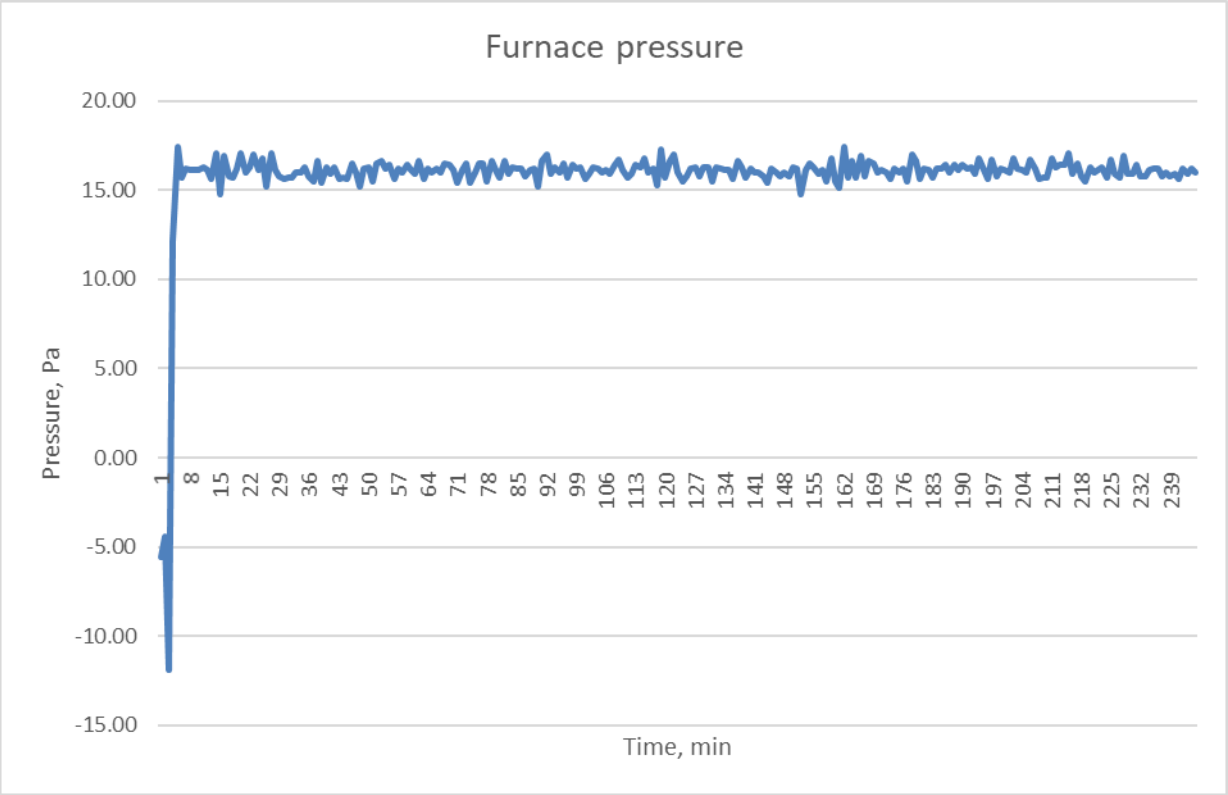


6.2 Ambient Temperature

The ambient temperature of the test area 15 minutes before the test and at the commencement of the test was 21 °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 Separating element
	Measurements	1200mm x 1200mm
	Thickness	140mm (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. Concrete Slab (1.2) was cut into 4 slabs with a width of 285mm, 270mm, 260mm and 260mm. The cut concrete slabs were placed in the refractory frame and fixed to the steel angle using screw anchors (4.1). The horizontal spacing between concrete slabs was measured to be 10mm, 30mm and 50mm. The vertical spacing between the concrete slabs (1.2 and 1.3) was 20mm.
1.2	Item / Product Name	Concrete Slab
	Measurements	Width / Height (W/H): 1100mm x 1040mm
		Thickness (T): 140mm (nominal)
	Additional Info	Casted December 2020. 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 concrete slabs to refractory frame

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 concrete slabs 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 top left of Specimen A
A	2	Separating element, 25mm top right of Specimen A
A	3	Separating element, 25mm left of Specimen A, vertical centre of Concrete slab
A	4	Separating element, 25mm right of Specimen A, vertical centre of Concrete slab
A	5	Separating element, 25mm left of Specimen A, 100mm above bottom edge of Concrete slab
A	6	Separating element, 25mm right of Specimen A, 100mm above bottom edge of Concrete slab
A	7	On sealant, centre of 10mm sealed aperture, 75mm below top edge of Concrete slab
A	8	On sealant, centre of 10mm sealed aperture, 25mm above vertical centre of Concrete slab
A	9	On sealant, centre of 10mm sealed aperture, 75mm above bottom edge of Concrete slab
B	10	Separating element, 25mm top left of Specimen B
B	11	Separating element, 25mm top right of Specimen B
B	12	Separating element, 25mm left of Specimen B, vertical centre of Concrete slab
B	13	Separating element, 25mm right of Specimen B, vertical centre of Concrete slab
B	14	Separating element, 25mm left of Specimen B, 100mm above bottom edge of Concrete slab
B	15	Separating element, 25mm right of Specimen B, 100mm above bottom edge of Concrete slab

B	16	On sealant, centre of 30mm sealed aperture, 100mm below top edge of Concrete slab
B	17	On sealant, centre of 30mm sealed aperture, vertical centre of Concrete slab
B	18	On sealant, centre of 30mm sealed aperture, 100mm above bottom edge of Concrete slab
C	19	Separating element, 25mm top left of Specimen C
C	20	Separating element, 25mm top right of Specimen C
C	21	Separating element, 25mm left of Specimen C, vertical centre of Concrete slab
C	22	Separating element, 25mm right of Specimen C, vertical centre of Concrete slab
C	23	Separating element, 25mm left of Specimen C, 100mm above bottom edge of Concrete slab
C	24	Separating element, 25mm right of Specimen C, 100mm above bottom edge of Concrete slab
C	25	On sealant, centre of 50mm sealed aperture, 100mm below top edge of Concrete slab
C	26	On sealant, centre of 50mm sealed aperture, vertical centre of Concrete slab
C	27	On sealant, centre of 50mm sealed aperture, 100mm above bottom edge of Concrete slab
D	28	Separating element, on bottom face of concrete slab, in line with Specimen A, 25mm from Concrete slab face
D	29	Separating element, on bottom face of concrete slab, in line with Specimen B, 25mm from Concrete slab face
D	30	Separating element, on bottom face of concrete slab, in line with Specimen C, 25mm from Concrete slab face
D	31	On sealant, centre of 20mm sealed aperture, left half centre
D	1	On Concrete slab, left half centre
D	2	On Concrete slab, left half centre
D	32	On sealant, centre of 20mm sealed aperture, centre

D	10	On Concrete slab, centre of joint
D	11	On Concrete slab, centre of joint
D	33	On sealant, centre of 20mm sealed aperture, righthand centre
D	19	On Concrete slab, right half centre
D	20	On Concrete slab, right half centre

8.2 Observations

Time Minutes	Test Face	SP#	Observations
3	E	ALL	Sealant is charred, discolouring to a black colour
5	E	ALL	Sealant has begun to combust, flakes of sealant protruding from specimen
7	E	ALL	Sealant is glowing red, flaking continued
10	E	ALL	Visible expansion of mastic from the separating element
13	E	B, C	Small sections of the sealant breaking off and falling away from specimen
15	U	ALL	No notable changes
15	E	ALL	Further expansion of sealant from the separating element
20	E/U	A, B, D	No notable changes
20	E	C	Further sections of the sealant breaking off and falling away from specimen
25	E	ALL	Flaking of sealant has visibly discontinued
25	E	ALL	Specimen has visibly discoloured to a white colour
30	E	A, B, D	Combustion of the specimen has discontinued
30	U	ALL	No notable changes
35	U	SE	Moisture protruding from bottom of separating element
45	E/U	ALL	No notable changes
55	U	D	Minor visible expansion of sealant
60	E	C	Single pinhole in sealant where combustion is present
60	U	ALL	No notable changes
65	E	C	Combustion of the specimen has discontinued
75	E/U	ALL	No notable changes
90	E	D	Sealant has begun to detach from head, small visible gap along length of the head
105	E/U	ALL	No notable changes

120	U	C, D	Minor expansion of sealant
120	E	ALL	No notable changes
131	U	B	Minor expansion of sealant
135	E	B	Small crack forming in sealant, at the centre of the specimen
135	U	C, D	Further expansion of sealant
150	U	A, B	Expansion of sealant with bubbles forming
151	E	B	Further minor cracks in sealant
165	E/U	ALL	No notable changes
180	U	ALL	Further expansion of sealant
195	U	A	Sealant is lifting and detaching from separating element in multiple locations
210	U	B, C	Increase in bubbles forming in sealant
210	U	SE	Crack forming in rightmost slab (unexposed view), approximately 400mm above the refractory frame
210	E	SE	White spots forming on separating element concrete slabs
225	E/U	ALL	No notable changes
240	E/U	ALL	No notable changes
243			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. Concrete Slab (1.2) was cut into 4 slabs with a width of 285mm, 270mm, 260mm and 260mm. The cut concrete slabs were placed in the refractory frame and fixed to the steel angle using screw anchors (4.1). The horizontal spacing between concrete slabs was measured to be 10mm, 30mm and 50mm. The vertical spacing between the concrete slabs (1.2 and 1.3) was 20mm.

Performance of the separating element – Maxumum temperature of the separating element measured during the test 130mm from any joint was 161 degC at 244 minutes.

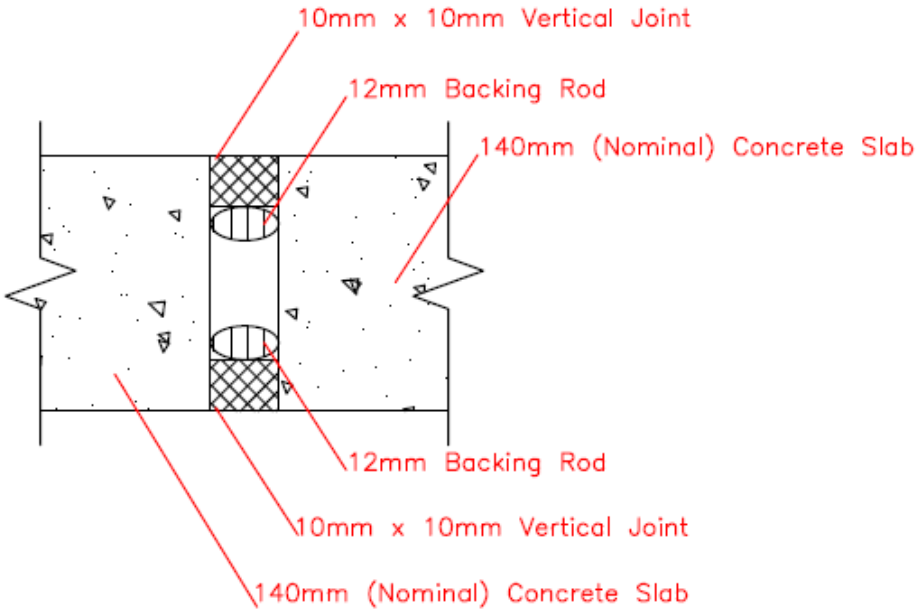
Separating element (exposed face)

10. Specimens

Unexpoesd faced:

Exposed face:

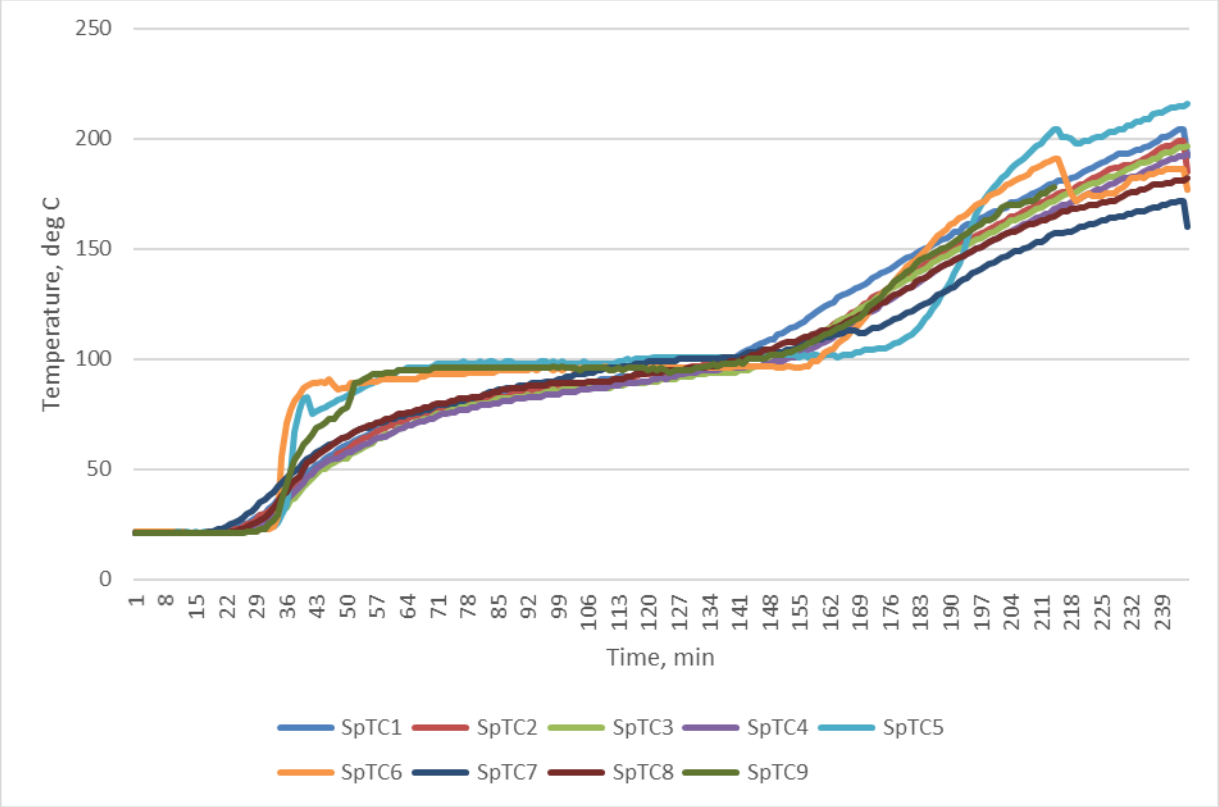
10.1 Specimen A



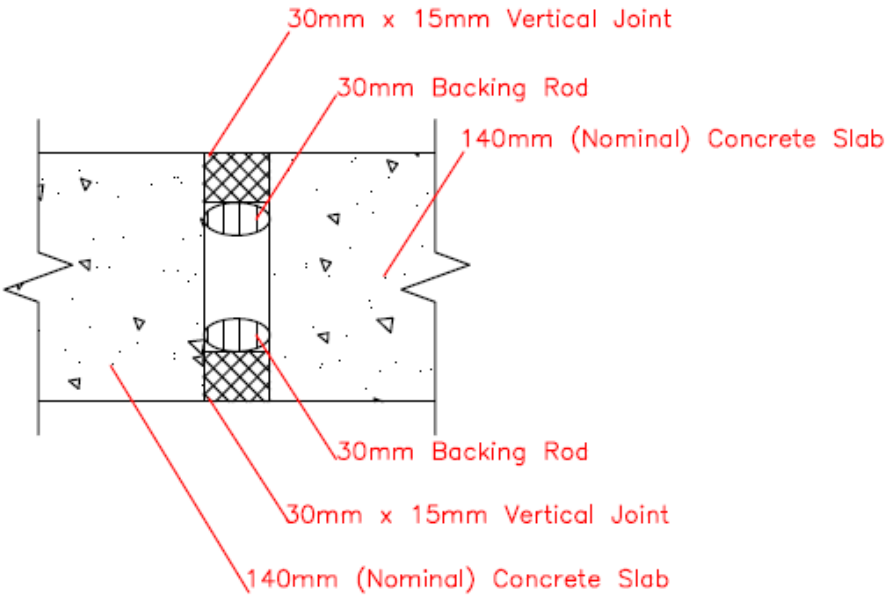
Penetration System		
A	Service	10mm Butt-joined Vertical Control Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 10mm x 1040mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	PEF Backing rod (4.2) was pressed into the Concrete Slab (1.2) separating element 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 244 min**
Insulation	**223 min**

Specimen A Thermocouples Readings



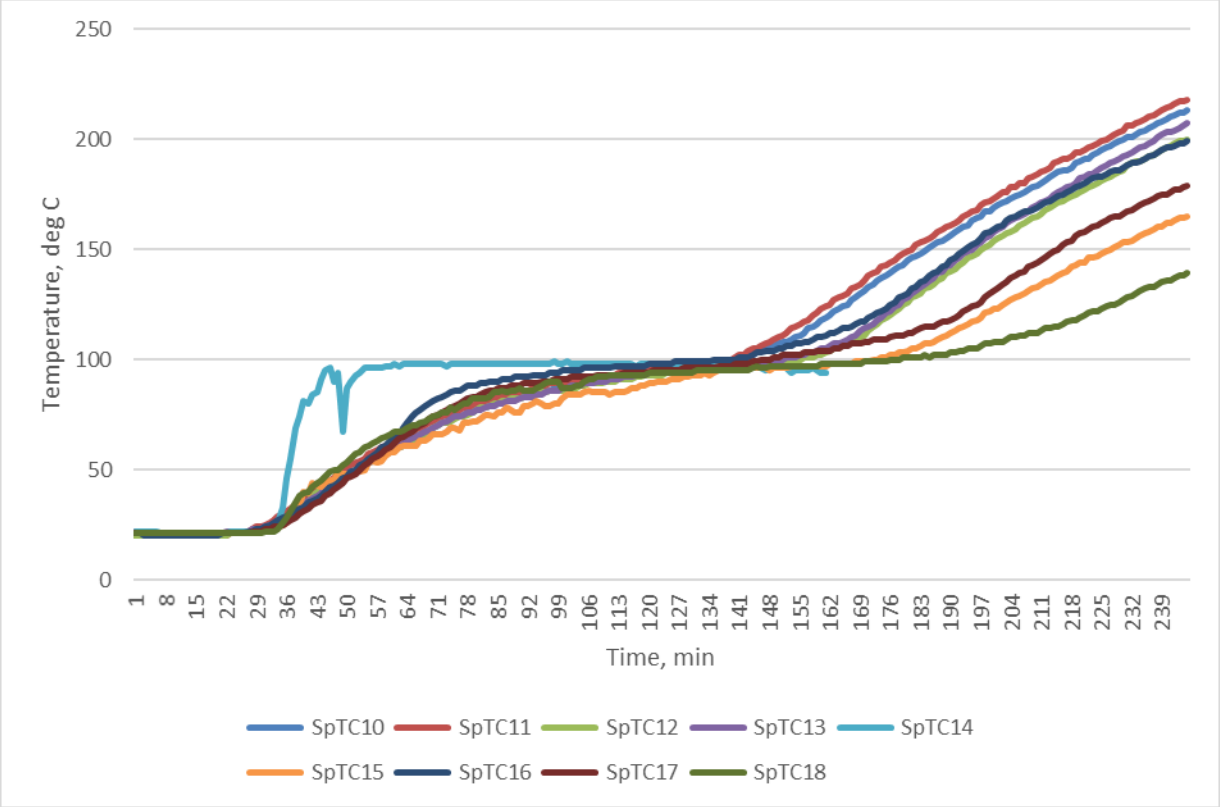
10.2 Specimen B



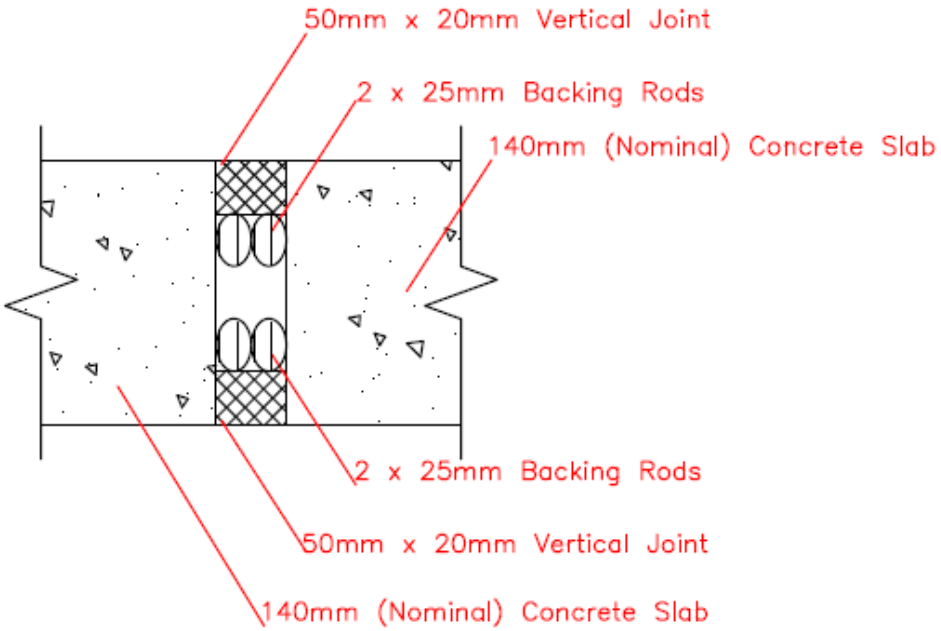
Penetration System		
B	Service	30mm Butt-joined Vertical Control Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 20mm x 1050mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	PEF Backing rod (4.3) was pressed into the Concrete Slab (1.2) separating element 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 244 min**
Insulation	**226 min**

Specimen B Thermocouples Readings



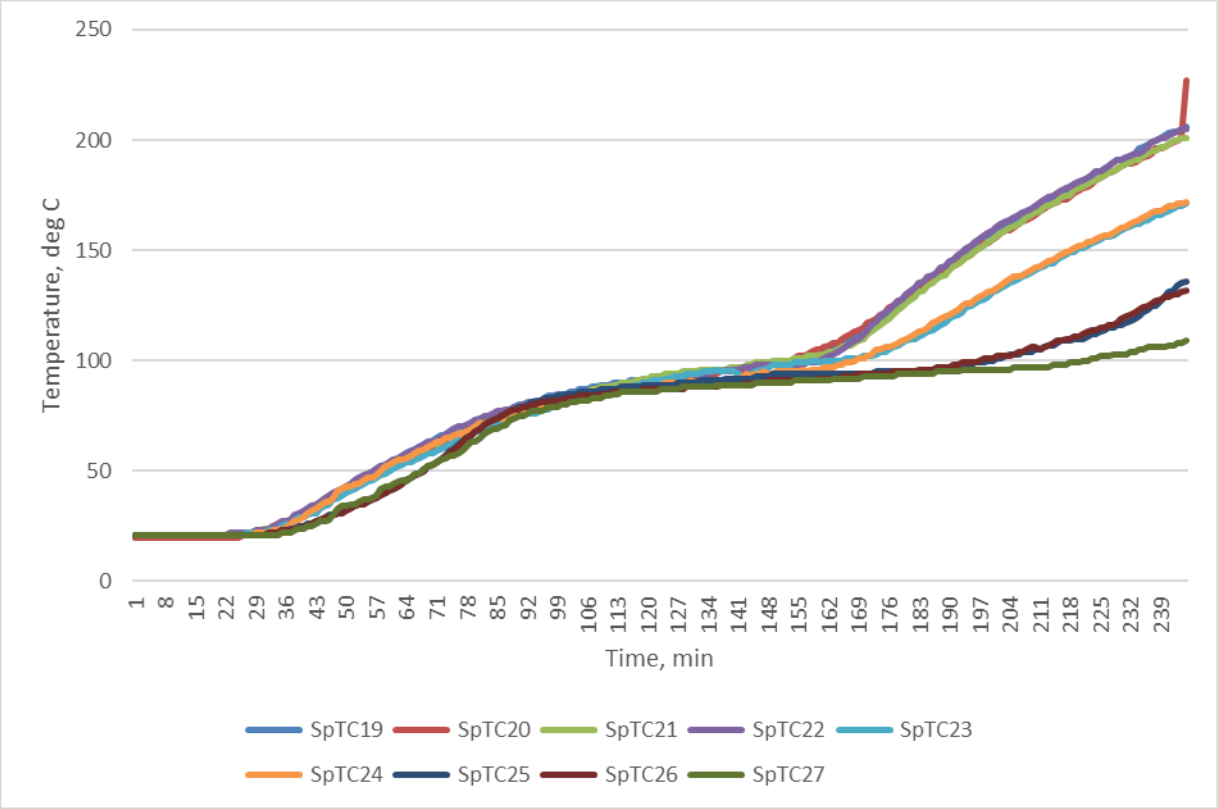
10.3 Specimen C



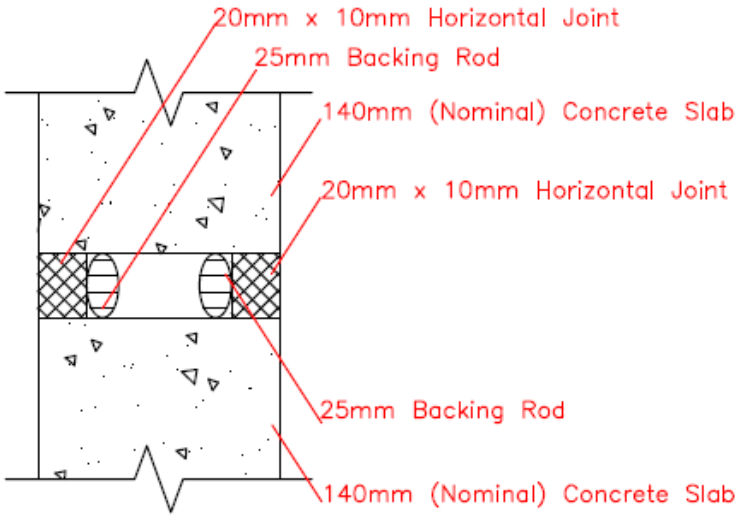
Penetration System		
C	Service	50mm Butt-joined Vertical Control Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 30mm x 1050mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	Two lengths of PEF Backing rod (4.4) were secured together, then pressed into the Concrete Slab (1.2) separating element gap on both faces, and inside the top edge within the separating element. PEF rod was recessed 20mm from the surfaces. Sealant (3.1) was applied on top of the PEF rod, flush with the separating element faces, resulting in a 20mm (nominal) depth of sealant around the perimeter of the aperture.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 244 min**
Insulation	**238 min**

Specimen C Thermocouples Readings



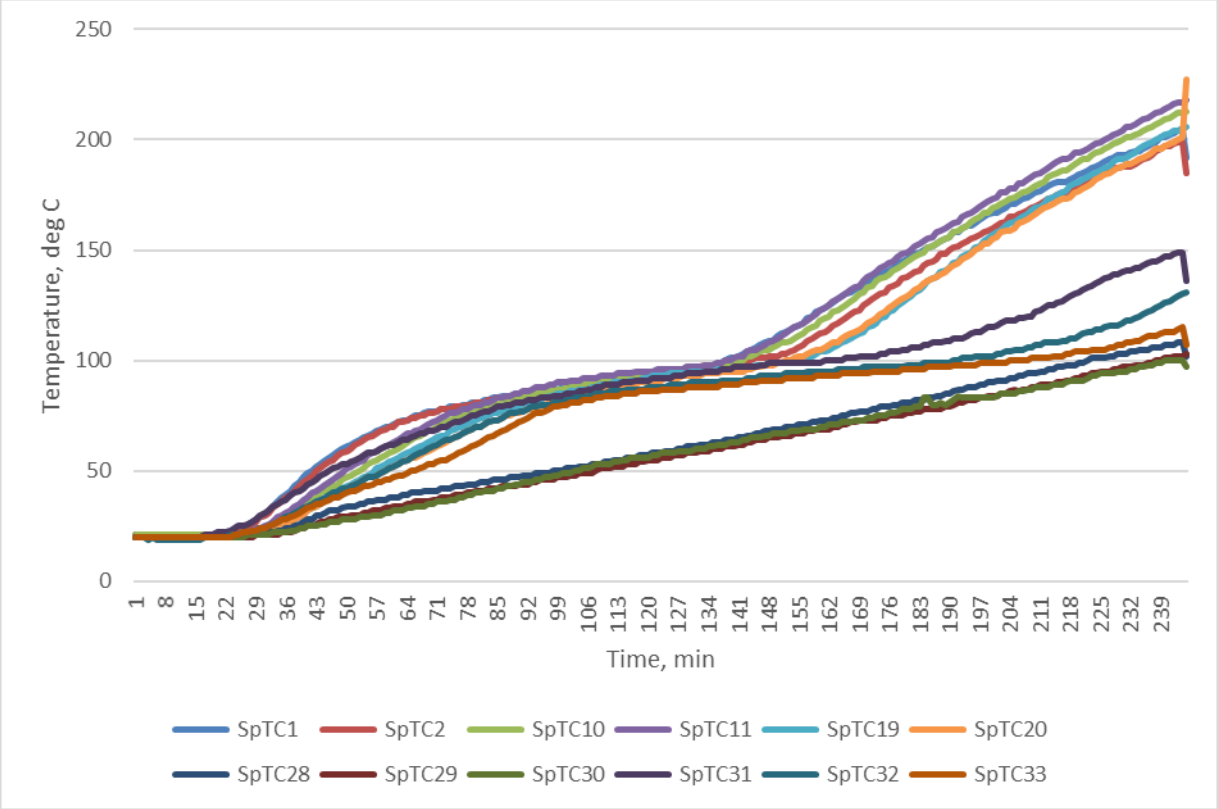
10.4 Specimen D



Penetration System		
D	Service	20mm Butt-joined Horizontal Control Head Joint
	Joint Details	Sealant (3.1)
	Aperture Size	Width/Height (W/H): 1200mm x 20mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	PEF Backing rod (4.4) was pressed into the Concrete Slab (1.2) separating element gap on both faces. 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 244 min**
Insulation	**226 min**

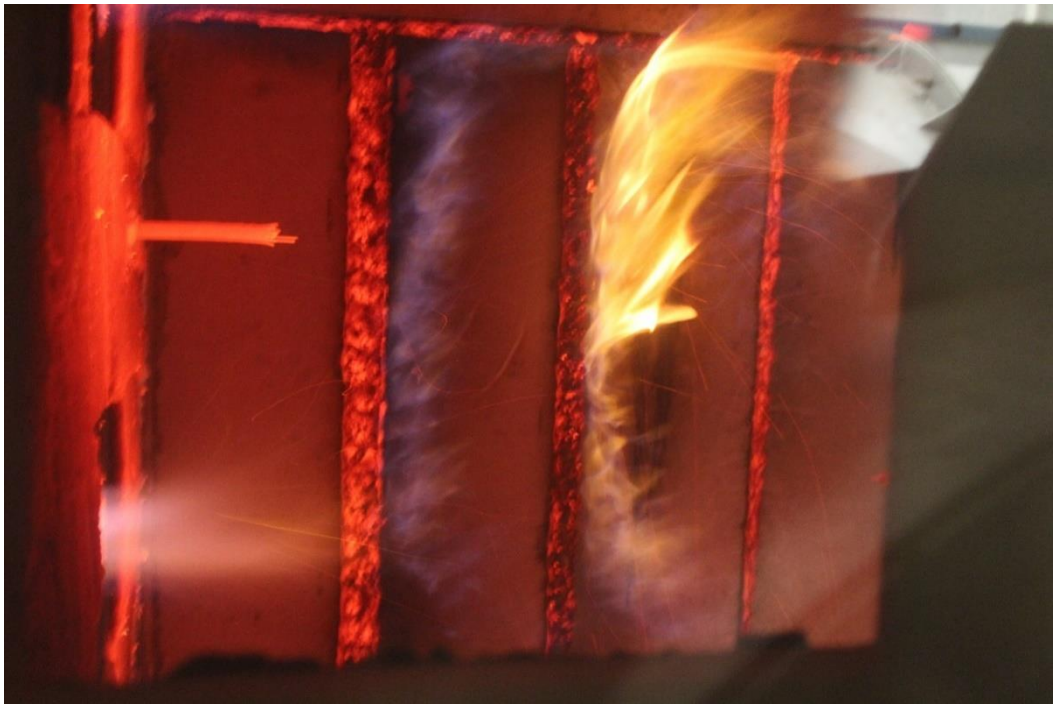
Specimen D Thermocouples Readings



11. Additional photographs

11.1 During and after the test

10 minutes:



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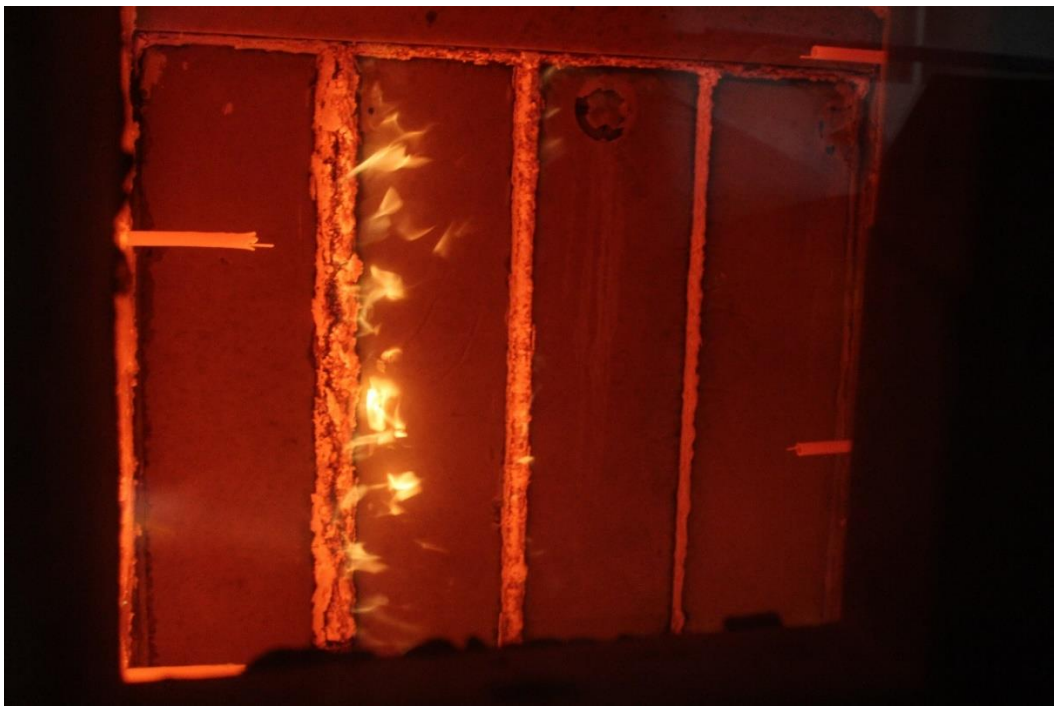
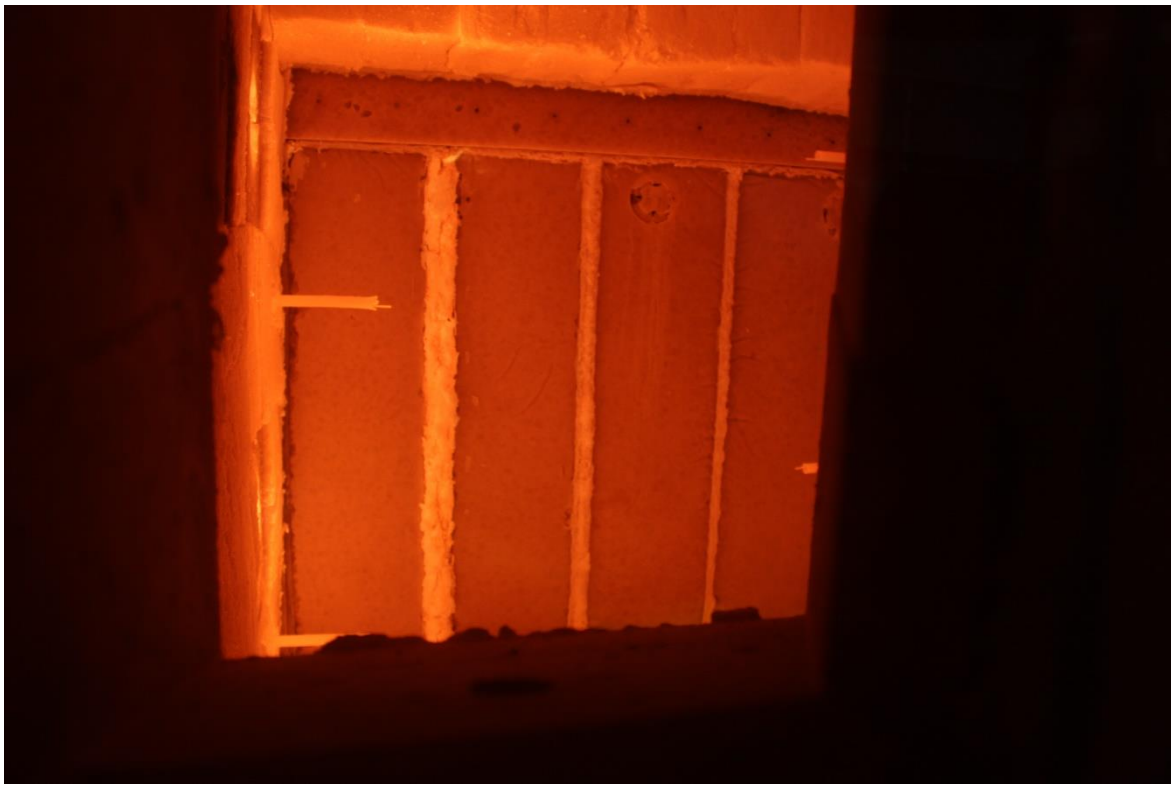
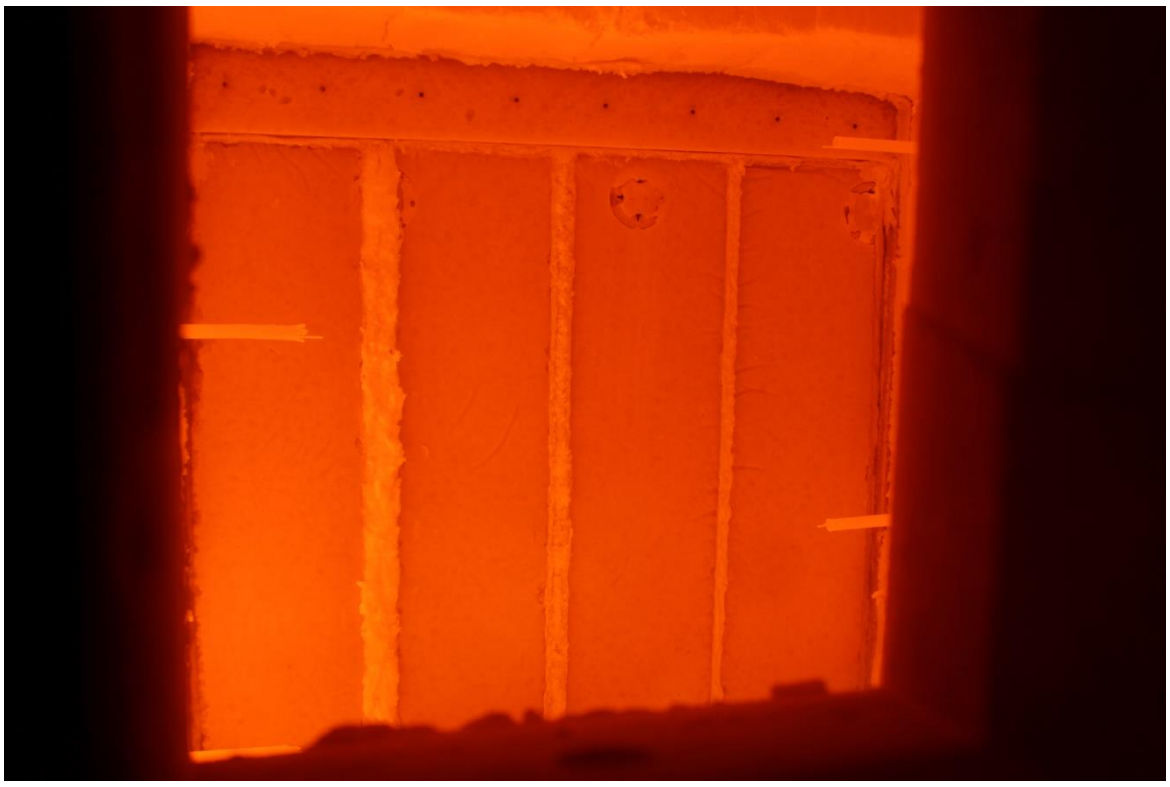


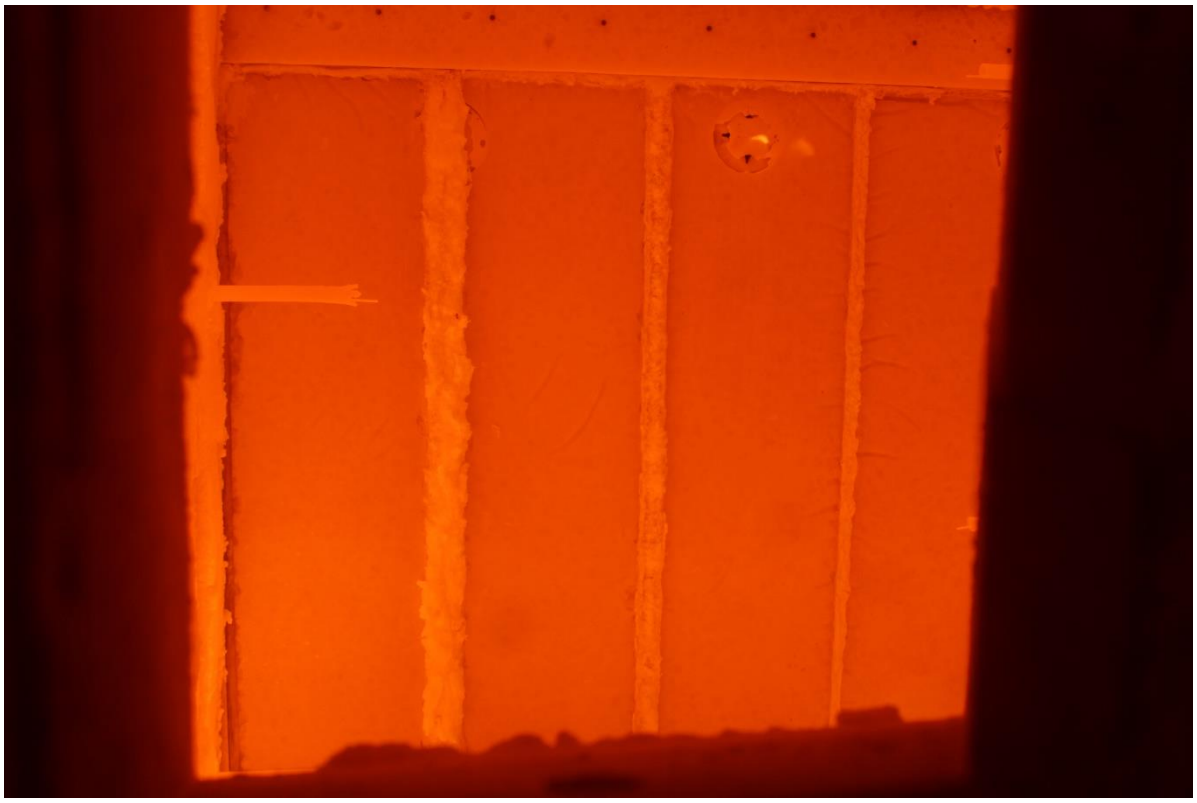
60 minutes:



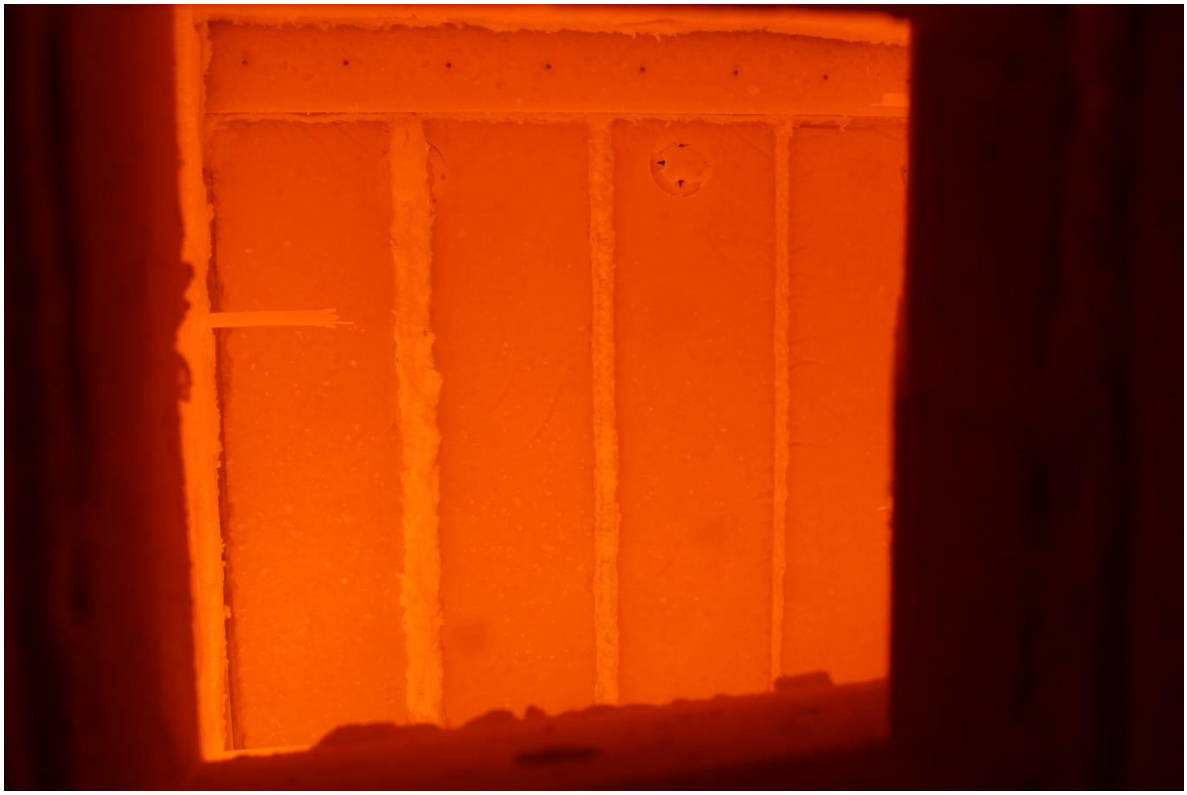
120 minutes:



180 minutes:



240 minutes:



After the test: