Test report # PF22076

Test Number 22076

Client: RLA Polymers Pty Ltd

Fire resistance tests for wall linear gaps

Test method: AS 1530.4:2014

Report Date 13/07/2023

1. Table of Contents

1.1 Document revision schedule

Revision #	Date	Description
1	23/03/2023	Initial Issue for Client review
2	30/03/2023	Issued to Client
3	13/07/2023	Specimen D typo corrected

1.2 Signatories

Report	Name	Signature	Date
Prepared by:	Alexey Kokorin (Technical Manager)		13/07/2023
Authorized by:	Andrew Bain (Authorized signatory)		13/07/2023

ACCREDITED
TESTING LABORATORY

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

2. Contact details

2.1 Registered Testing Laboratory

Fire TS Lab - 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 Client/Applicant

RLA Polymers Pty Ltd

215 Colchester Road, Kilsyth, Victoria, 3137

Australia

Contact e-mail: childebrand@rlapolymers.com.au

2.3 Manufacturer

RLA Polymers Pty Ltd

215 Colchester Road, Kilsyth, Victoria, 3137

Australia

3. Test Results

Specimen #	Joint	Actual Integrity (min)	Actual insulation (min)	FRL
A	**D2 cable configuration**	**123 NF**	**123 NF**	**-/120/120**
B	**D1 cable configuration**	**123 NF**	**123 NF**	**-/120/120**
C	**40mm blank seal**	**123 NF**	**123 NF**	**-/120/120**
D	**DN32 Copper pipe**	**123 NF**	**123 NF**	**-/120/120**
E	**20mm Vertical Linear Gap seal**	**123 NF**	**123 NF**	**-/120/120**

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:**
27/02/2023	22/01/2023

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 Laboratory in line with Client instructions. 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 123 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.

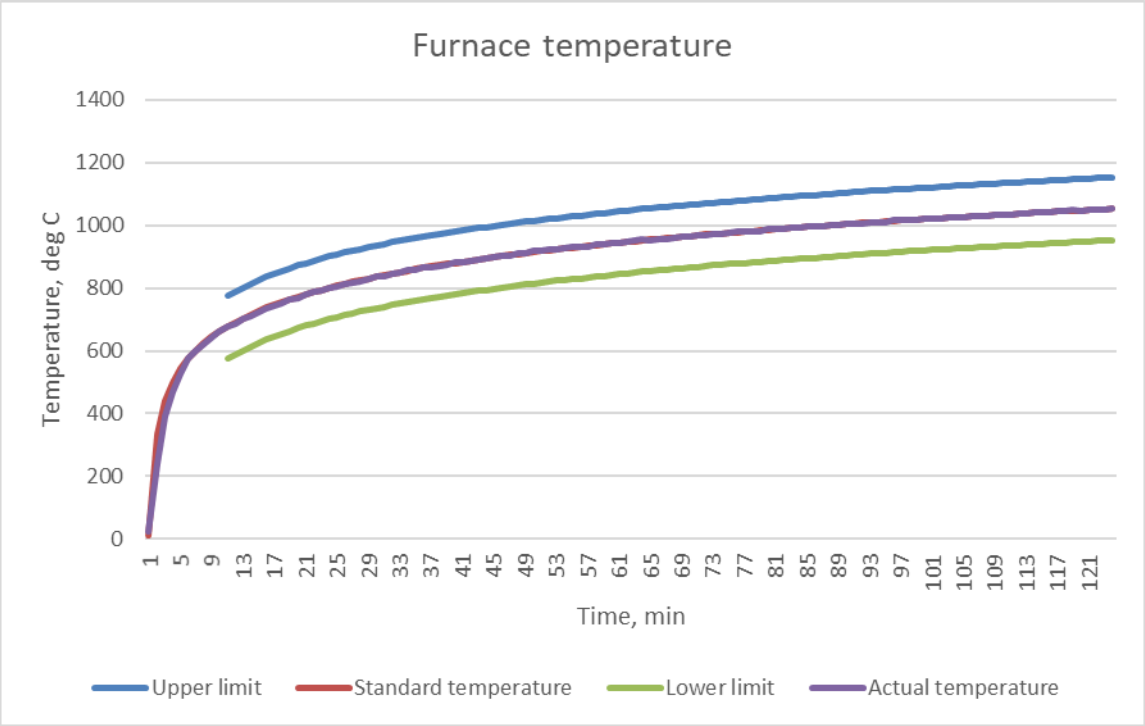
Specimen thermocouples:
Specimen thermocouples were installed to the unexposed face. Type K copper disk thermocouples fixed within the required locations referenced from AS1530.4-2014. Thermocouples are calibrated by ISO/IEC 17025 accredited laboratory - a signatory to the International Laboratory Accreditation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

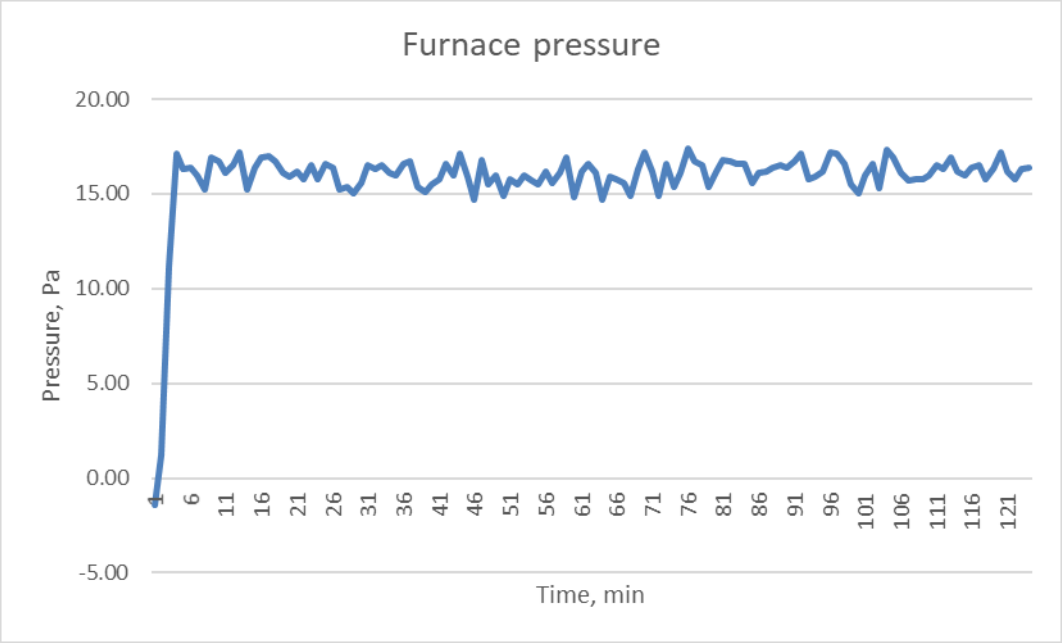


6.2 Ambient Temperature

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

Separating Element		
1.1	Item / Product Name	Steel Stud and Plasterboard Separating element
	Measurements	Width / Height (W/H): 1200mm x 1200mm
		Thickness (T): 116mm
1.2	Item / Product Name	Rondo Steel Stud
	Measurements	Width / Height (W/H): 64mm x 35.5mm
		Thickness (T): 0.50BMT
	Additional Info	Used to construct separating element
1.3	Item / Product Name	Rondo Steel Deflection Track
	Measurements	Width / Height (W/H): 64mm x 50mm
		Thickness (T): 0.75BMT
	Additional Info	Used to construct separating element
1.4	Item / Product Name	USG Boral Firestop Plasterboard
	Measurements	Width / Height (W/H): 1200mm x 3000mm
		Thickness (T): 13mm
	Additional Info	Used to construct separating element

Services		
2.1	Item / Product Name	Maser Communications Cable 50 Pair
	Measurements	Outer Diameter (OD): 16mm (nominal)
	Additional Info	Specimen A – 60 x cables installed in cable tray
2.2	Item / Product Name	Unbranded Steel Cable Tray
	Measurements	Width / Height (W/H): 170mm x 50mm
	Additional Info	Specimen A
2.3	Item / Product Name	Nexans XLPE/PVC 1 x 630mm^2 Copper Cable
	Measurements	Outer Diameter (OD): 42mm (nominal)

	Additional Info	Specimen B – 1 x cable installed in cable tray
2.4	Item / Product Name	Nexans XLPE/PVC 4 x 185mm^2 Aluminium Cable
	Measurements	Outer Diameter (OD): 49mm (nominal)
	Additional Info	Specimen B – 1 x cable installed in cable tray
2.5	Item / Product Name	Lapp Kabel PVC 3 x 6mm^2 + Earth Copper Cable (4G6)
	Measurements	Outer Diameter (OD): 16mm (nominal)
	Additional Info	Specimen B – 3 x cables installed in cable tray
2.6	Item / Product Name	Lapp Kabel PVC 3 x 16mm^2 + Earth Copper Cable (4G16)
	Measurements	Outer Diameter (OD): 16mm (nominal)
	Additional Info	Specimen B – 8 x cables installed in cable tray
2.7	Item / Product Name	Unbranded Steel Cable Tray
	Measurements	Width / Height (W/H): 325mm x 50mm
	Additional Info	Specimen B
2.8	Item / Product Name	DN32 Copper Pipe
	Measurements	Outer Diameter (OD): 32mm
		Inner Diameter (ID): 29.5mm
		Thickness (T): 1.25mm
	Additional Info	Specimen D

Sealants		
3.1	Item / Product Name	RLA FirePro FR Sealant
	Measurements	600mL Sausage
	Installation	Specimen A, B, C, D, E – Installed around penetrations. Used to fill blank seals.

Fixings		
4.1	Item / Product Name	GIB Grabber Self-Tapping Screws
	Measurements	32mm

	Installation	Used to fix plasterboard to steel stud
4.2	Item / Product Name	GIB Grabber Self-Tapping Screws
	Measurements	41mm
	Installation	Used to fix plasterboard to steel stud
4.3	Item / Product Name	Zenith Metal Screw – Button Head Philips drive
	Measurements	8g x 25mm
	Installation	Used to fix framing components
4.4	Item / Product Name	Unbranded Stainless-Steel Cable Ties
	Measurements	10mm x 1000mm
	Installation	Used to fix wrap around services

Wrap		
5.1	Item / Product Name	Shinagawa Refractories Ceramic Fibre Blanket
	Measurements	Width / Height (W/H): 610mm x 7200mm
		Thickness (T): 25mm
		Density (ρ): 128Kg/m^3
	Additional Info	Specimen A, B, C – Wrapped around service, extending 300mm from separating element

8. Test Specimens details

8.1 Thermocouple Positions Table

SPECIMEN	TC#	THERMOCOUPLE LOCATION DESCRIPTION
A	1	Separating element, 25mm above specimen A
A	2	Separating element, 25mm below specimen A
A	3	Ceramic wrap, top side of specimen, 25mm from separating element
A	4	Ceramic wrap, bottom side of specimen, 25mm from separating element
A	5	Ceramic wrap, top side of specimen, 25mm from end of wrap
A	6	Ceramic wrap, bottom side of specimen, 25mm from end of wrap
A	7	Cable bundle (2.1), top side of specimen, 25mm from end of wrap
A	8	Cable Tray (2.2), bottom side of specimen, 25mm from end of wrap
A	9	Separating element, 25mm above specimen B, left side of specimen
B	10	Separating element, 25mm above specimen B, right side of specimen
B	11	Separating element, 25mm below specimen B
B	12	Ceramic wrap, top side of specimen, 25mm from separating element
B	13	Ceramic wrap, top side of specimen, 25mm from separating element
B	14	Ceramic wrap, bottom side of specimen, 25mm from separating element
B	15	Ceramic wrap, bottom side of specimen, 25mm from separating element
B	16	Ceramic wrap, top side of specimen, 25mm from end of wrap
B	17	Ceramic wrap, top side of specimen, 25mm from end of wrap
B	18	Ceramic wrap, bottom side of specimen, 25mm from end of wrap
B	19	Ceramic wrap, bottom side of specimen, 25mm from end of wrap
B	20	Cable (2.3), top side of cable, 25mm from end of wrap
B	21	Cable (2.4), top side of cable, 25mm from end of wrap

B	22	Cable bundle (2.5), top side of cable, 25mm from end of wrap
B	23	Cable bundle (2.6), top side of cable, 25mm from end of wrap
B	24	Cable Tray (2.7), bottom side of specimen, 25mm from end of wrap
C	25	Separating element, 25mm above specimen C
C	201	Separating element, 25mm right of specimen C
C	202	Blank seal, centre of blank seal
D	203	Separating element, 25mm above specimen D
D	204	Separating element, 25mm right of specimen D
D	205	Ceramic wrap, top side of specimen, 25mm from separating element
D	206	Ceramic wrap, right side of specimen, 25mm from separating element
D	207	Ceramic wrap, top side of specimen, 25mm from end of wrap
D	208	Ceramic wrap, right side of specimen, 25mm from end of wrap
D	209	Copper pipe, top side of specimen, 25mm from end of wrap
D	210	Copper pipe, right side of specimen, 25mm from end of wrap
E	211	Separating element, 25mm left of specimen E, 200mm below top of refractory frame
E	212	Separating element, 25mm right of specimen E, 200mm below top of refractory frame
E	213	Separating element, 25mm left of specimen E, mid-height of separating element
E	214	Separating element, 25mm right of specimen E, mid-height of separating element
E	215	Separating element, 25mm left of specimen E, 200mm above bottom of refractory frame
E	216	Separating element, 25mm right of specimen E, 200mm above bottom of refractory frame
E	217	Blank seal, 200mm below top of refractory frame
E	218	Blank seal, mid-height of separating element
E	219	Blank seal, 200mm above bottom of refractory frame

8.2 Observations

Time Minutes	Test Face	SP#	Observations
1	U	A	Smoke from cables and wrap
2	U	B	Smoke from cables and wrap
5	U	A, B	Increase in amount of smoke from cables and wrap
15	E	C, E	Visible charring of sealant
20	U	B	Visible deforming of cable sheathing near TC20
20	E	A, B	Cable sheathing has combusted, and melting away from cable
20	E	A, B	Visible cracks between separating element and sealant
30	E/U	ALL	No notable changes
45	E/U	ALL	No notable changes
60	E/U	ALL	No notable changes
65	U	B	Reduced amount of smoke from specimen
65	U	A, B	Discolouring of wrap above cables
75	E/U	ALL	No notable changes
90	E/U	ALL	No notable changes
105	U	C, E	Visible expansion of sealant
120	E/U	ALL	No notable changes
123			TEST DISCONTINUED

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

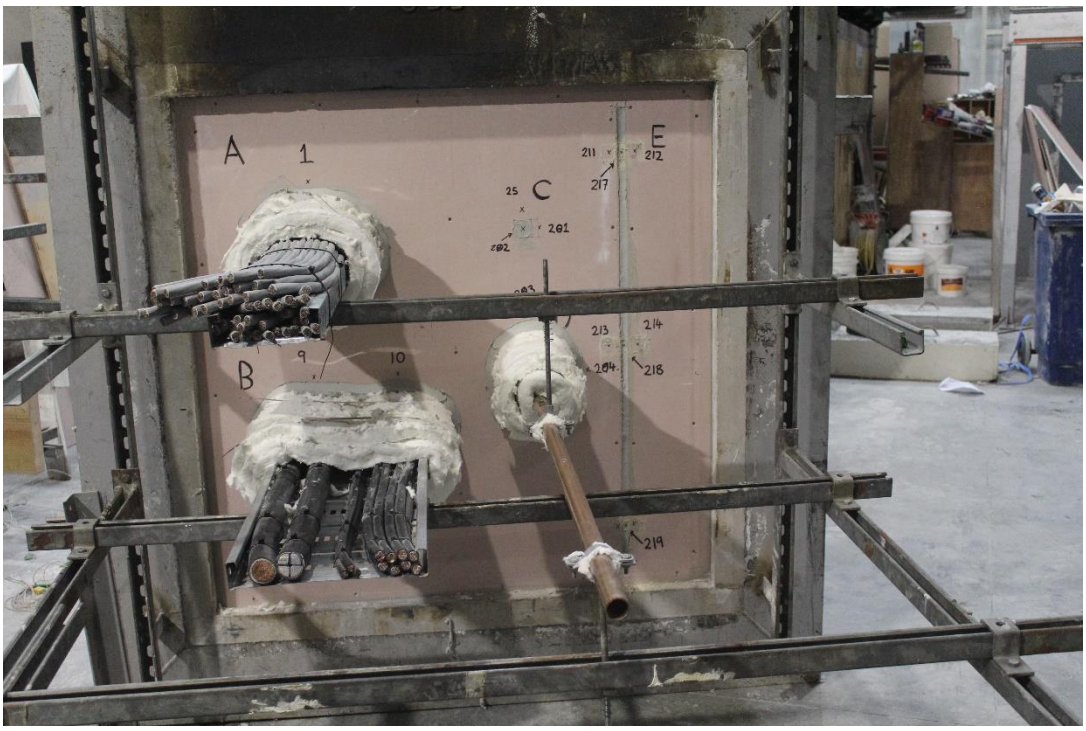
9. Separating element

The separating element was constructed by the laboratory following client-approved drawings. The Steel stud frame was constructed using five studs (1.2) and two tracks (1.3). The tracks were fixed to the top and bottom of the refractory frame, with the studs installed between the tracks. The studs were located at 25mm, 170mm, 220mm, 600mm and 1175mm from the right side of the refractory frame (unexposed view). The steel frame components were all fixed using screws (4.3).

Two layers of plasterboard (1.4) were fixed to each face of the separating elements. The first layers were fixed using screws (4.1) at 600mm centres. The second layers were fixed using screws (4.2) at 300mm centres. The penetration apertures were then cut from the separating element.

10. Specimens

Unexpoesd faced:



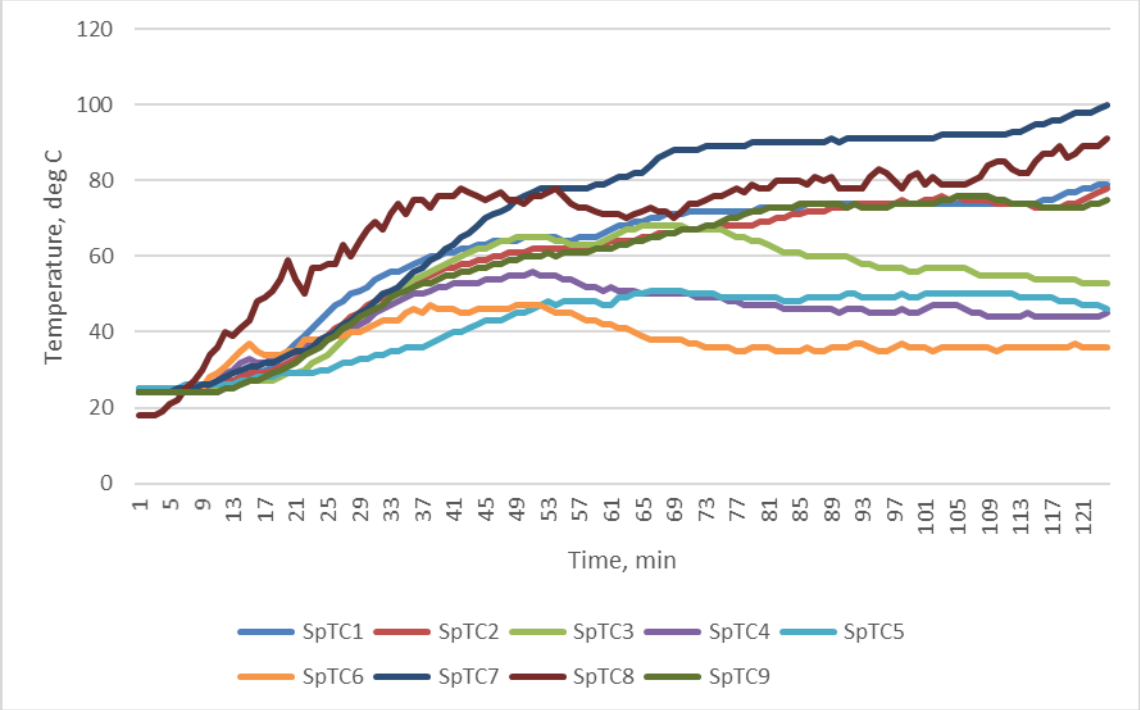
Exposed face:

10.1 Specimen A

Penetration System		
A	Service	D2 cable configuration
	Service Details	Cables (2.1), Cable Tray (2.2) Sealant (3.1), Ceramic Fibre Blanket (5.1), Cable Ties (4.4)
	Service Support	Unistrut structure at 500mm
	Aperture Size	179mm x 128mm
	Annular Spacing	Min: 5mm, Max: 20mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	Aperture was cut into the separating element. The 60 x D2 Cables (2.1) were bundled using cable ties and placed on the cable tray (2.2). The Cable tray was placed through the aperture, extending 500mm from the exposed face. Sealant (3.1) was installed between the cable tray and the separating element, flush with the plasterboard, resulting in a 26mm (nominal) seal. An additional 50mm x 70mm cone of sealant was applied between the cable tray and separating element. The cone extended 50mm from the cable bundle onto the separating element, and 70mm along the cables. Once the sealant had cured, the cable tray was wrapped with ceramic blanket (5.1). Two revolutions were applied around the cable tray, with 150mm (nominal) overlap. The wrap extended 300mm from the separating element, and was secured using two cable ties, spaced 100mm from each end of the wrap.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 123 min**
Insulation	**No failure at 123 min**

Specimen A Thermocouples Readings

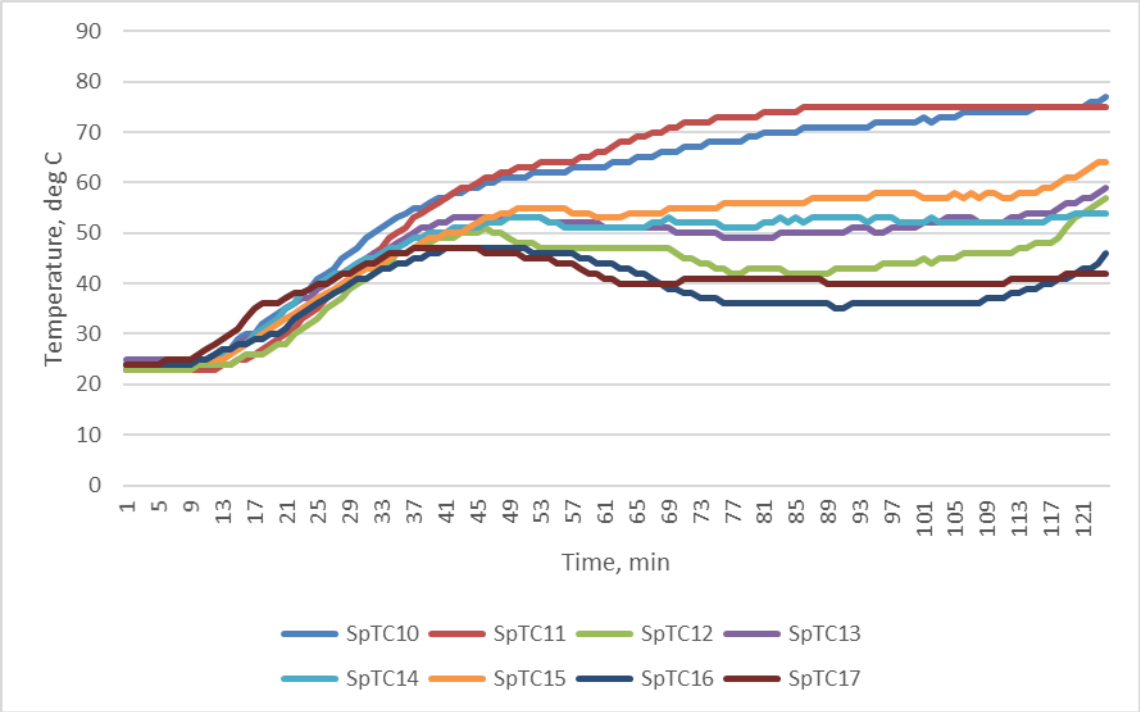


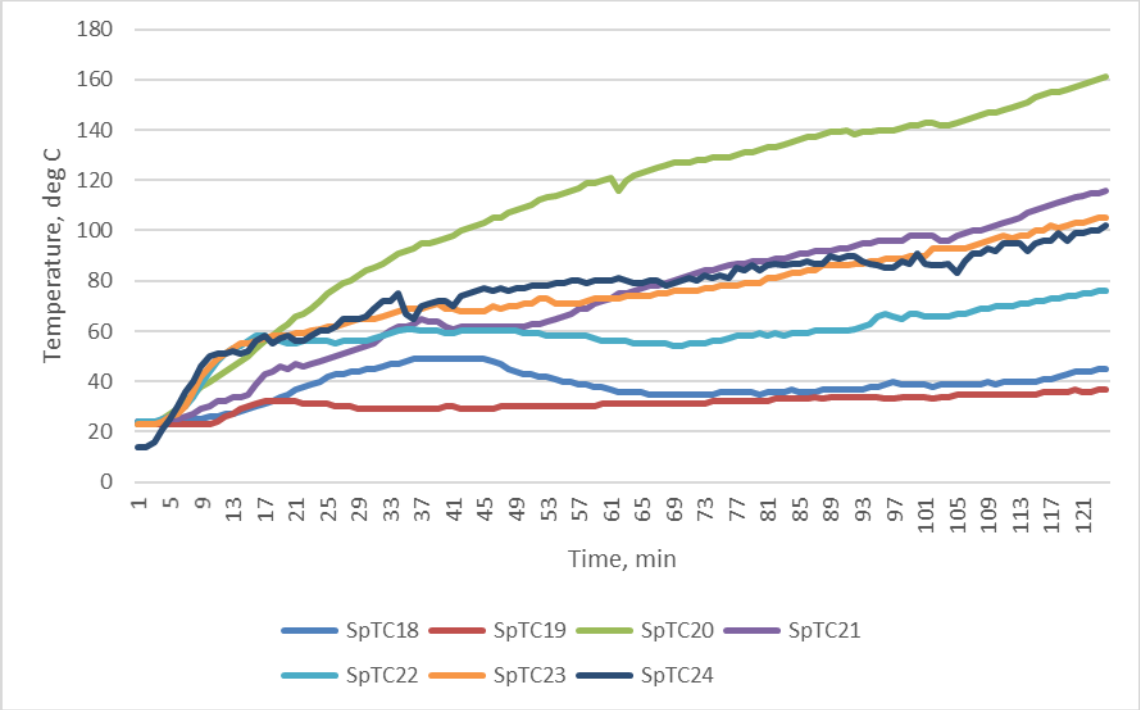
10.2 Specimen B

Penetration System		
B	Service	D1 cable configuration with the replacement of cable b)
	Service Details	Cables (2.3, 2.4, 2.5, 2.6), Cable Tray (2.7) Sealant (3.1), Ceramic Fibre Blanket (5.1), Cable Ties (4.4)
	Service Support	Unistrut structure at 500mm
	Aperture Size	331mm x 64mm
	Annular Spacing	Min: 1mm, Max: 63mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	Aperture was cut into the separating element. The 60 x D2 Cables (2.3, 2.4, 2.5, 2.6), were bundled into like groups using cable ties and evenly spaced on the cable tray (2.7). The Cable tray was placed through the aperture, extending 500mm from the exposed face. Sealant (3.1) was installed between the cable tray and the separating element, flush with the plasterboard, resulting in a 26mm (nominal) seal. An additional 50mm x 70mm cone of sealant was applied between the cable tray and separating element. The cone extended 50mm from the cable bundle onto the separating element, and 70mm along the cables. Once the sealant had cured, the cable tray was wrapped with ceramic blanket (5.1). Two revolutions were applied around the cable tray, with 150mm (nominal) overlap. The wrap extended 300mm from the separating element, and was secured using two cable ties, spaced 100mm from each end of the wrap.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 123 min**
Insulation	**No failure at 123 min**

Specimen B Thermocouples Readings



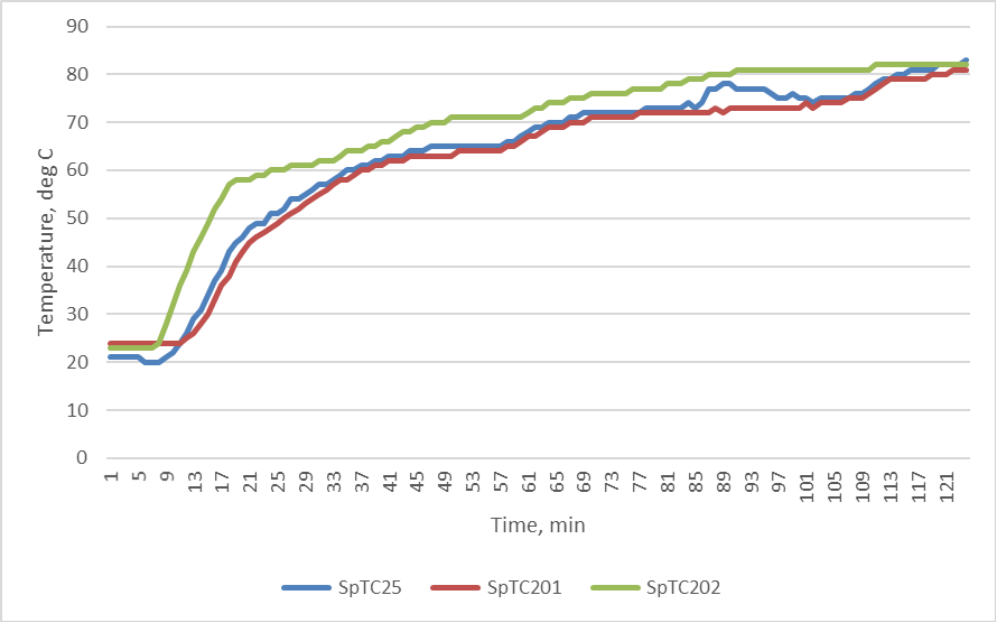


10.3 Specimen C

Penetration System		
C	Service	40mm blank seal
	Service Details	Sealant (3.1)
	Service Support	N/A
	Aperture Size	40mm
	Annular Spacing	N/A
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	Aperture was cut into the separating element. Sealant (3.1) was installed in the aperture, flush with the plasterboard, resulting in a 26mm (nominal) seal.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 123 min**
Insulation	**No failure at 123 min**

Specimen C Thermocouples Readings

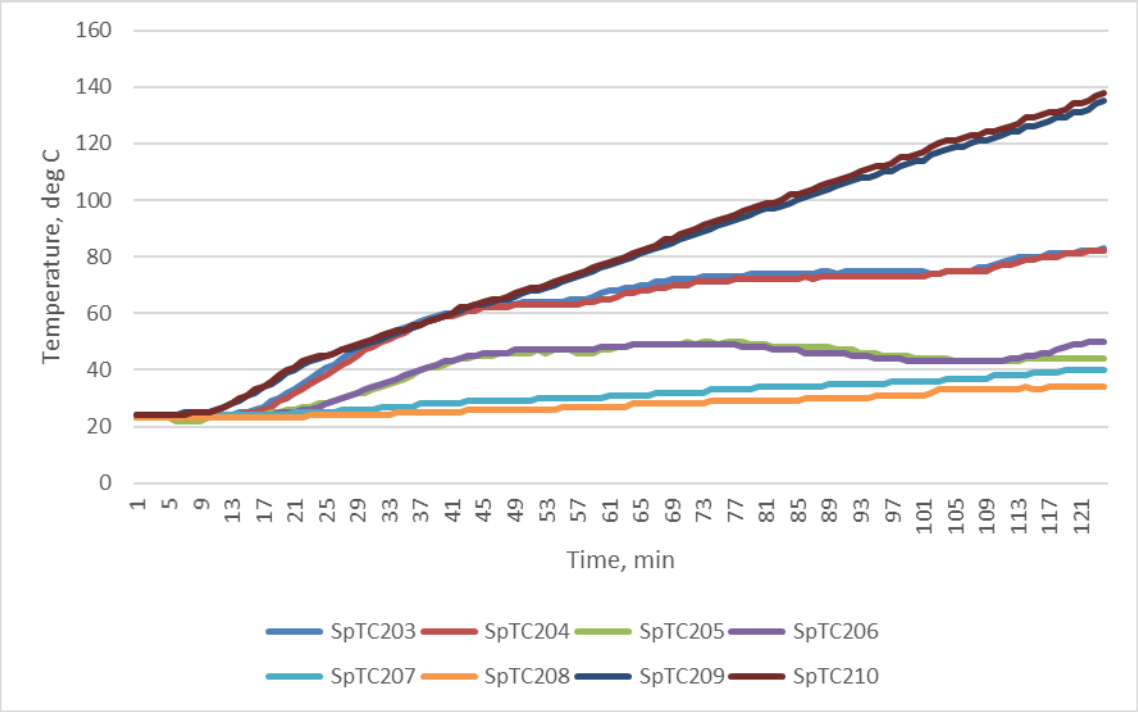


10.4 Specimen D

Penetration System		
D	Service	DN32 Copper pipe
	Service Details	Pipe (2.8), Sealant (3.1), Ceramic Fibre Blanket (5.1), Cable Ties (4.4)
	Service Support	Unistrut structure at 500mm
	Aperture Size	32mm
	Annular Spacing	Min: 0mm, Max: 1mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	Aperture was cut into the separating element. The pipe (2.8) was placed through the aperture, extending 500mm from the exposed face. A 50mm x 70mm cone of sealant was applied between the pipe and separating element. The cone extended 50mm from the pipe onto the separating element, and 70mm along the pipe. Once the sealant had cured, the cable tray was wrapped with ceramic blanket (5.1). Two revolutions were applied around the pipe, with 150mm (nominal) overlap. The wrap extended 300mm from the separating element, and was secured using two cable ties, spaced 100mm from each end of the wrap.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 123 min**
Insulation	**No failure at 123 min**

Specimen D Thermocouples Readings

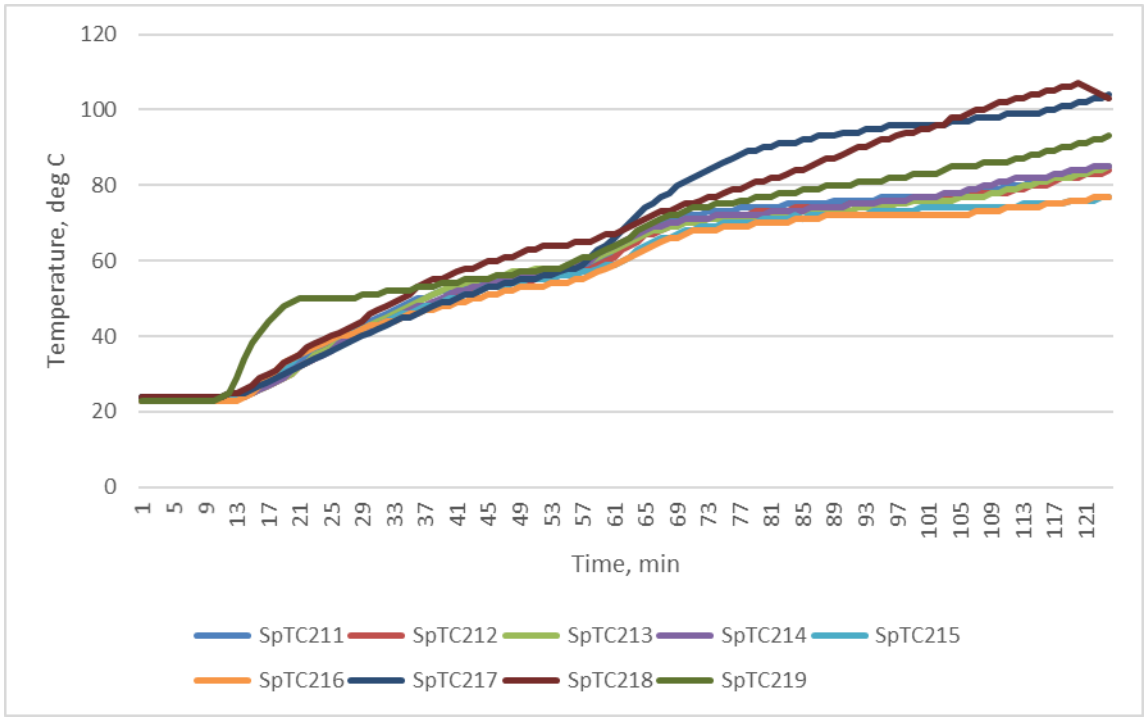


10.5 Specimen E

Penetration System		
E	Service	20mm Vertical Linear Gap seal
	Joint Details	Sealant (3.1)
	Aperture Size	20mm x 1000mm
	Local Fire-stopping Protection	
	Application	Symmetrical
	Protection Used	Aperture was cut into the separating element. Sealant (3.1) was installed in the aperture, flush with the plasterboard, resulting in a 26mm (nominal) seal.

Test results	
Structural adequacy	**Not applicable**
Integrity	**No failure at 123 min**
Insulation	**No failure at 123 min**

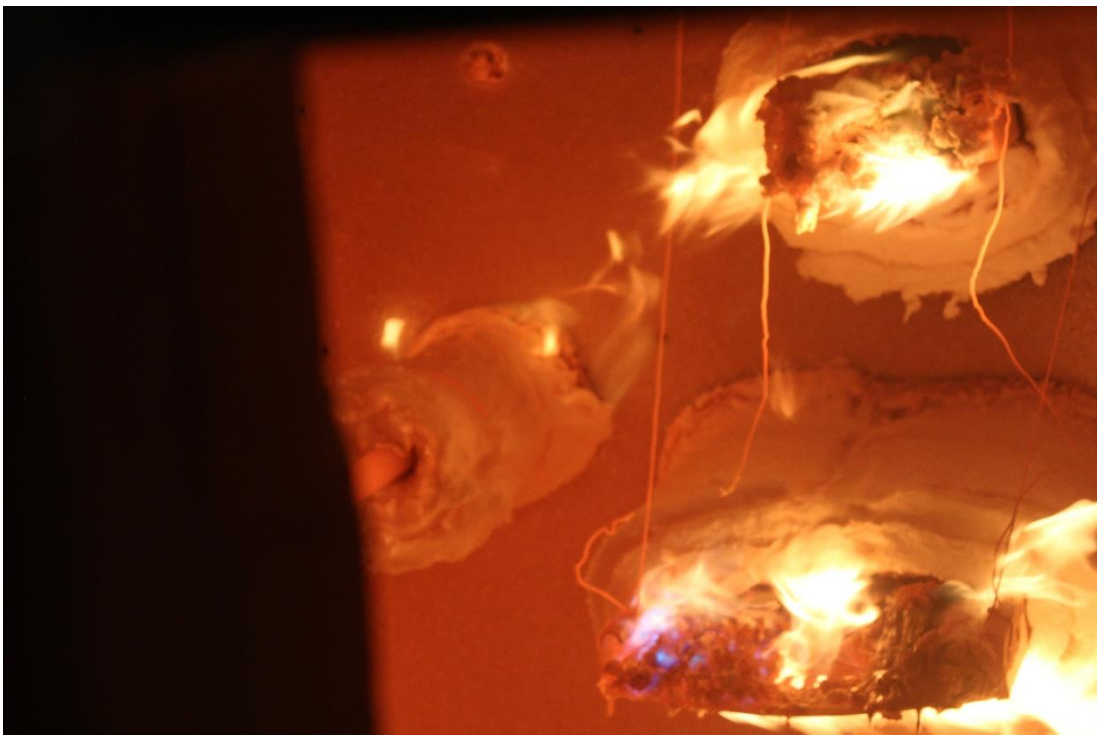
Specimen E Thermocouples Readings



11. Additional photographs

11.1 During and after the test

30 minutes:



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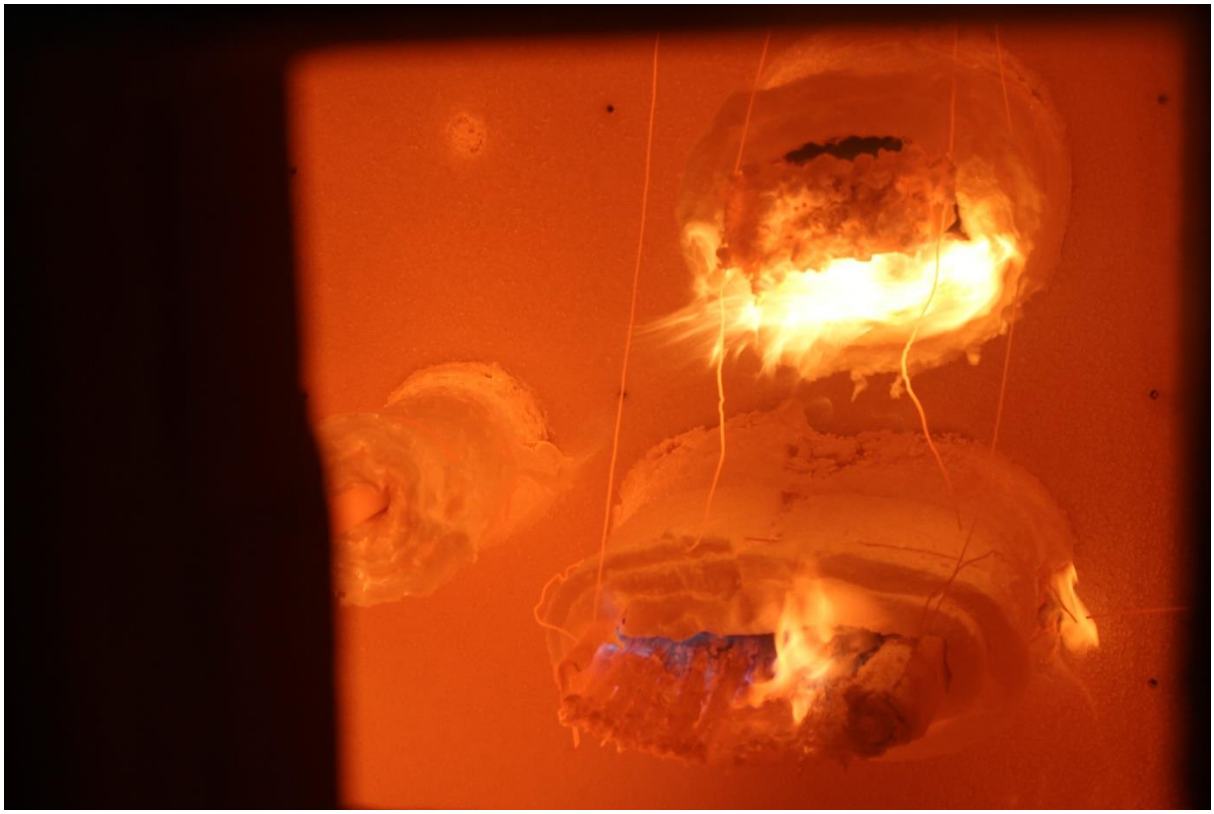

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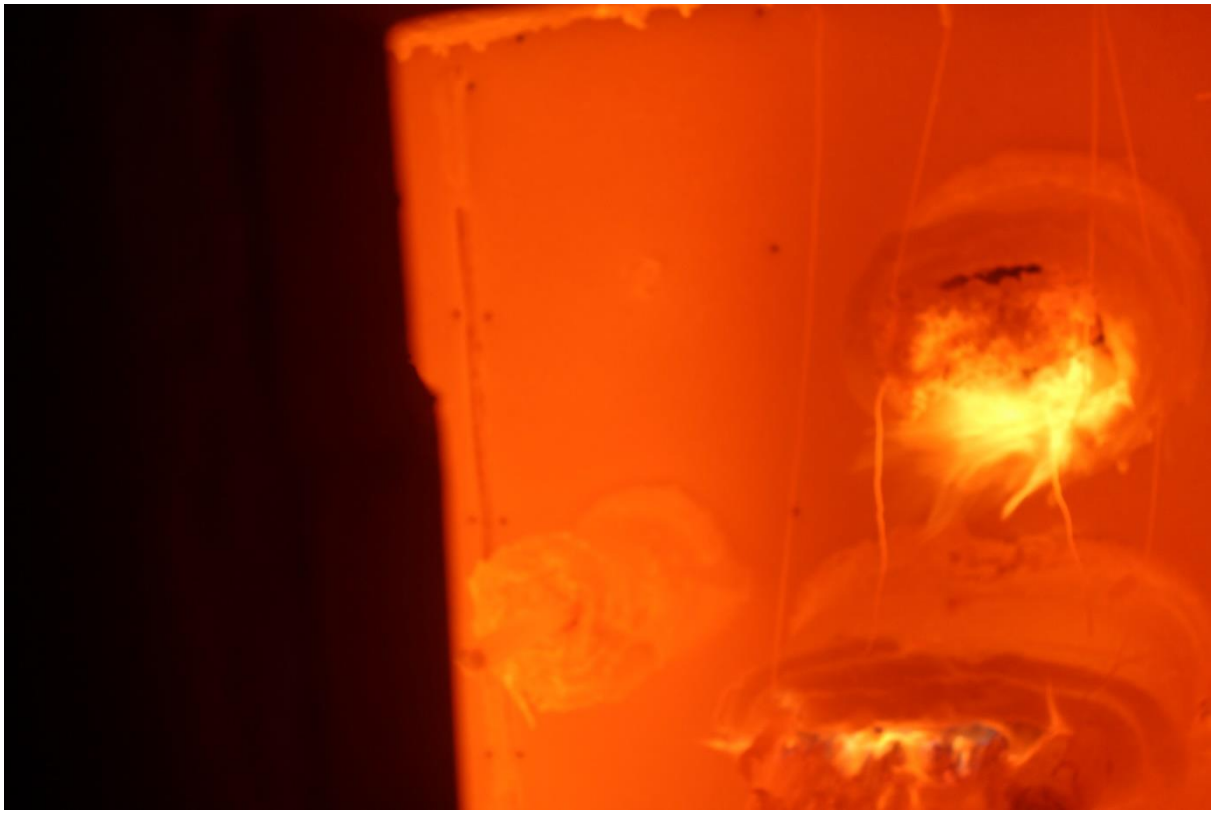
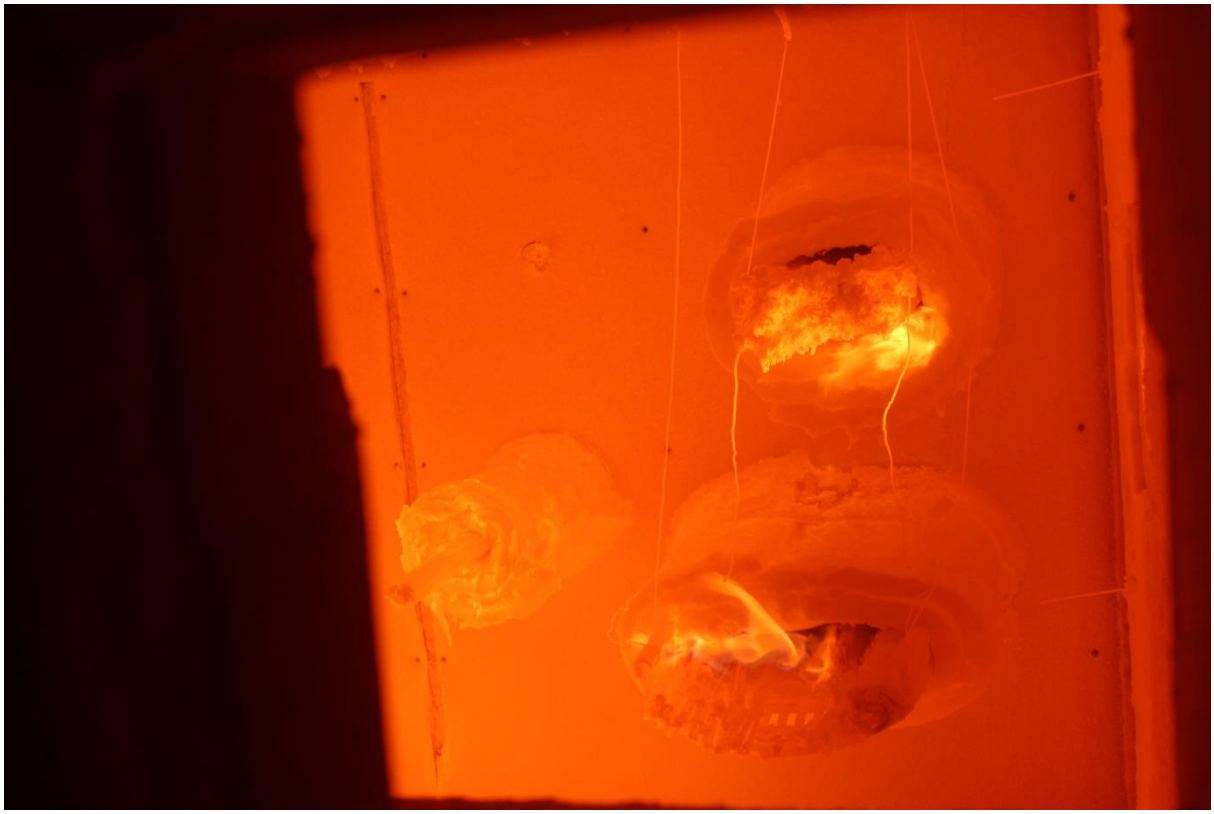


120 minutes:



After the test: