Fire Testing Laboratory

TEST REPORT

PF25097

Fire resistance test for penetrations passing through a horizontal separating element

Client:	Firestop Centre Ltd
Test method:	AS1530.4-2014
Report Date:	13/11/2025
Test number:	PF25097

Passive Fire Inspection and Test Services Limited
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Table of Contents

1.1 Document revision schedule

Revision #	Date	Description
1	07/11/2025	Initial issue for Client review
2	13/11/2025	Updated as per Client comments

1.2 Signatories

Report	Name	Signature	Date
Prepared by:	Mandy Smith		13/11/2025
Reviewed by:	Alexey Kokorin		13/11/2025
Authorised by:	Andrew Bain (Authorized signatory)		13/11/2025

ACCREDITED
TESTING LABORATORY

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

2. Report Summary

Service penetrations were tested passing through a 1600mm (width) x 1600mm (length) x 126mm (depth) cross laminated timber (CLT) panel. The apertures for the services were coated with 1mm (nominal) Protecta FR Coating. Both penetrations were protected with Protecta® EX mortar and Firestop Wool. Exposed SHS was wrapped with ceramic wool, leaving 10mm gap between the ceramic wool wrap and steel plate.

SP #	Service	Installation Angle	Actual Integrity (min)	Actual Insulation (min)	FRL*
1	SHS 150	90°	91 NF	83	-/60/60
2	SHS 150	60°	91 NF	91	-/60/60

NF – No Failure

* - FRL is limited to the stated performance of the separating element.

3. General Information

3.1 Testing Scope

Applicable Standards:

AS 1530.4-2014 Section 10: Service penetrations and control joints

AS 4072.1-2005 (r. 2016) Components for the protection of openings in fire-resistant separating elements. Part 1: Service penetrations and control joints

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) The temperature at any location on the unexposed face of the test specimen exceeds the initial temperature by more than 180℃

b) Integrity failure shall be deemed to have occurred upon ignition of the cotton pad when glowing or flaming occurs 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.

Documentation:

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

3.2 Contact Details

Accredited Testing Laboratory

FTSL - 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:

Firestop Centre Ltd

657 Great South Rd, Penrose, Auckland, 1061

New Zealand

Contact e-mail: info@firestopcentre.co.nz

Supplier/Manufacturer of firestopping:

Firestop Centre Ltd

657 Great South Rd, Penrose, Auckland, 1061

New Zealand

Manufacturer of CLT panel:

Reg Stag Investment Limited

3.3 Specimen Preparation, Conditioning and Timeline

Specimens conditioning and delivery to Laboratory:

Separating element was supplied by the Client. Installation of fire stopping system was performed the Client. The Laboratory was not involved in sampling of the materials. The Laboratory checked materials during construction of the specimen. Services were capped on the fire side.

Testing date:

31/10/2025

Installation completion date:

23/10/2025

Termination of The Test:

The test was discontinued at 91 minutes.

3.4 Use of the 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.

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	Cross Laminated Timber (CLT) Panel	
	Dimensions	Width: 1600mm	Length: 1600mm
		Thickness: 126mm	
	Lamella	Layers: 3	Thickness: 42mm

4.2 Specimens

Materials			
2.1	Item	Square Hollow Section (SHS) 150	
	Dimensions	Width: 150.2mm	Depth: 151.1mm
		Length: 1128mm	Steel Thickness: 5.7mm
	Steel Plate	Width: 300mm	Length: 300mm
		Thickness: 6.0mm	
	Specimen #	1	
2.2	Item	Square Hollow Section (SHS) 150	
	Dimensions	Width: 150.8mm	Depth: 150.6mm
		Length: 1400mm	Steel Thickness: 6.13mm
	Steel Plate	Width: 300mm	Length: 390mm
		Thickness: 6.0mm	
	Specimen #	2	

4.3 Fire Stopping

Material			
3.1	Item	Protecta EX Mortar	
	Description	Dry, white powder composed of inorganic materials and perlite	
	Dimensions	Size: 20L	Packaging: Bag
	Mixing Ratio	Mortar: 2 parts	Water: 1 part
	Specimen #	1, 2	

3.2	Item	Firestop Wool	
	Description	High-temperature, fibre blanket	
	Dimensions	Width: 100mm	Length: 7,320mm
		Thickness: 13mm	Density: 128kg/m³
	Specimen #	1, 2	
3.3	Item	Protecta FR Coating	
	Description	Spray grade ablative sealant coating	
	Dimensions	Size: 8L	Packaging: Pail
	Specimen #	1, 2	
3.4	Item	Ceramic Fiber Blanket	
	Description	Ceramic fibre	
	Dimensions	Width: 610mm	Length: 7200mm
		Thickness: 25mm	Density: 128kg/m³
	Specimen #	1, 2	
3.5	Item	Weld Pins	
	Dimensions	Head OD: 30mm	Length: 38mm
	Specimen #	1, 2	
3.6	Item	Stainless Steel Strap	
	Dimensions	Width: 12.0mm	Length: 1800mm
		Thickness: 0.25mm	
	Specimen #	1, 2	

5. Test Conditions

5.1 Equipment

Furnace:

1200X1200mm Indicative 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:

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.

5.2 Furnace Data

Furnace Temperature:

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

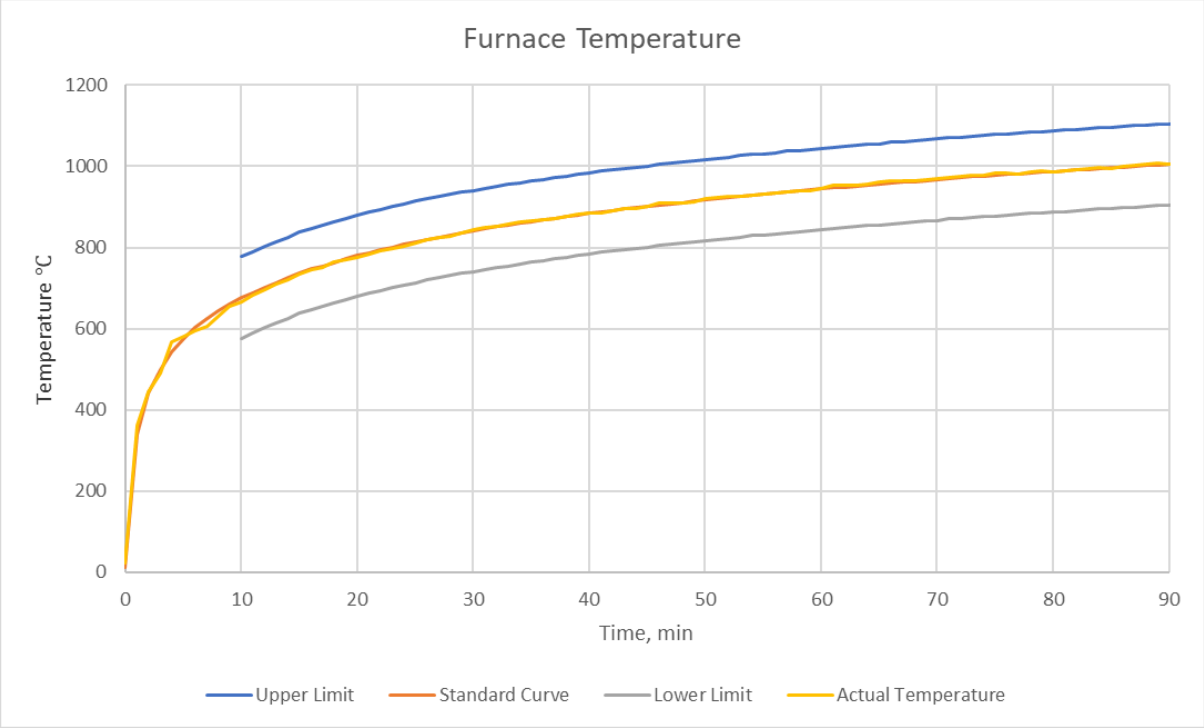

Figure 1 - Furnace Temperature during the test

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:

After the first 5 minutes of the test, the furnace pressure was maintained at 20±3 Pa with respect to atmosphere. The probe was located 100mm below the specimen.

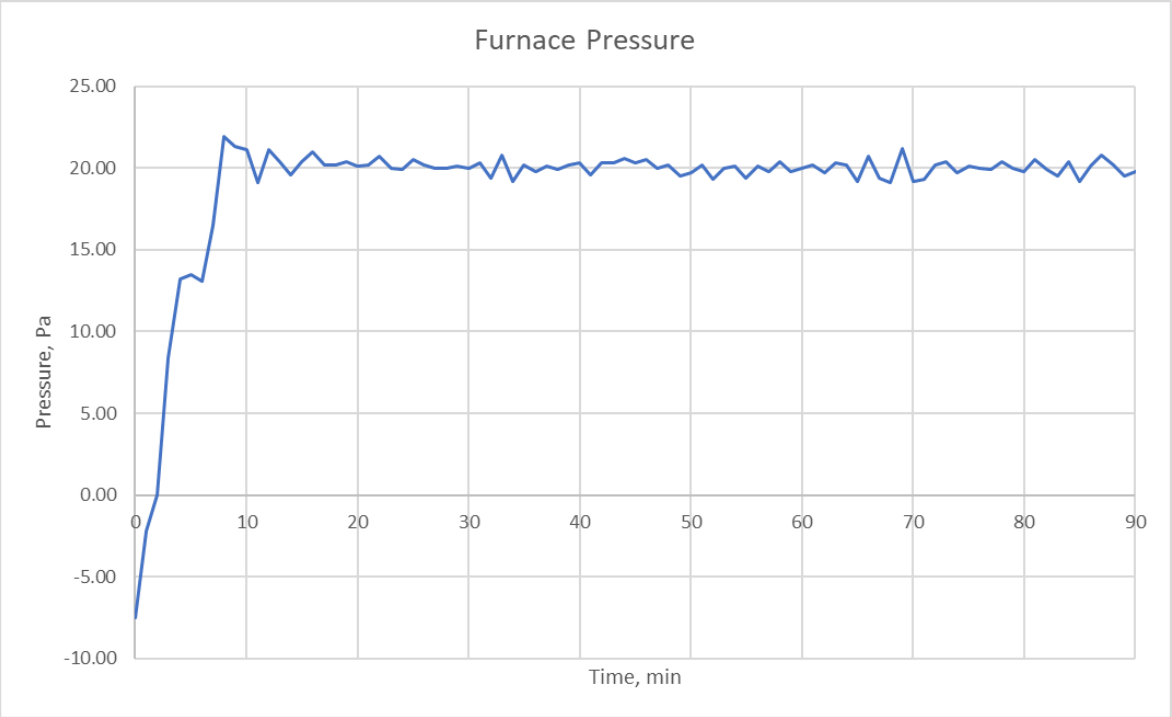

Figure 2 - Furnace Pressure during the test

5.3 Thermocouple locations

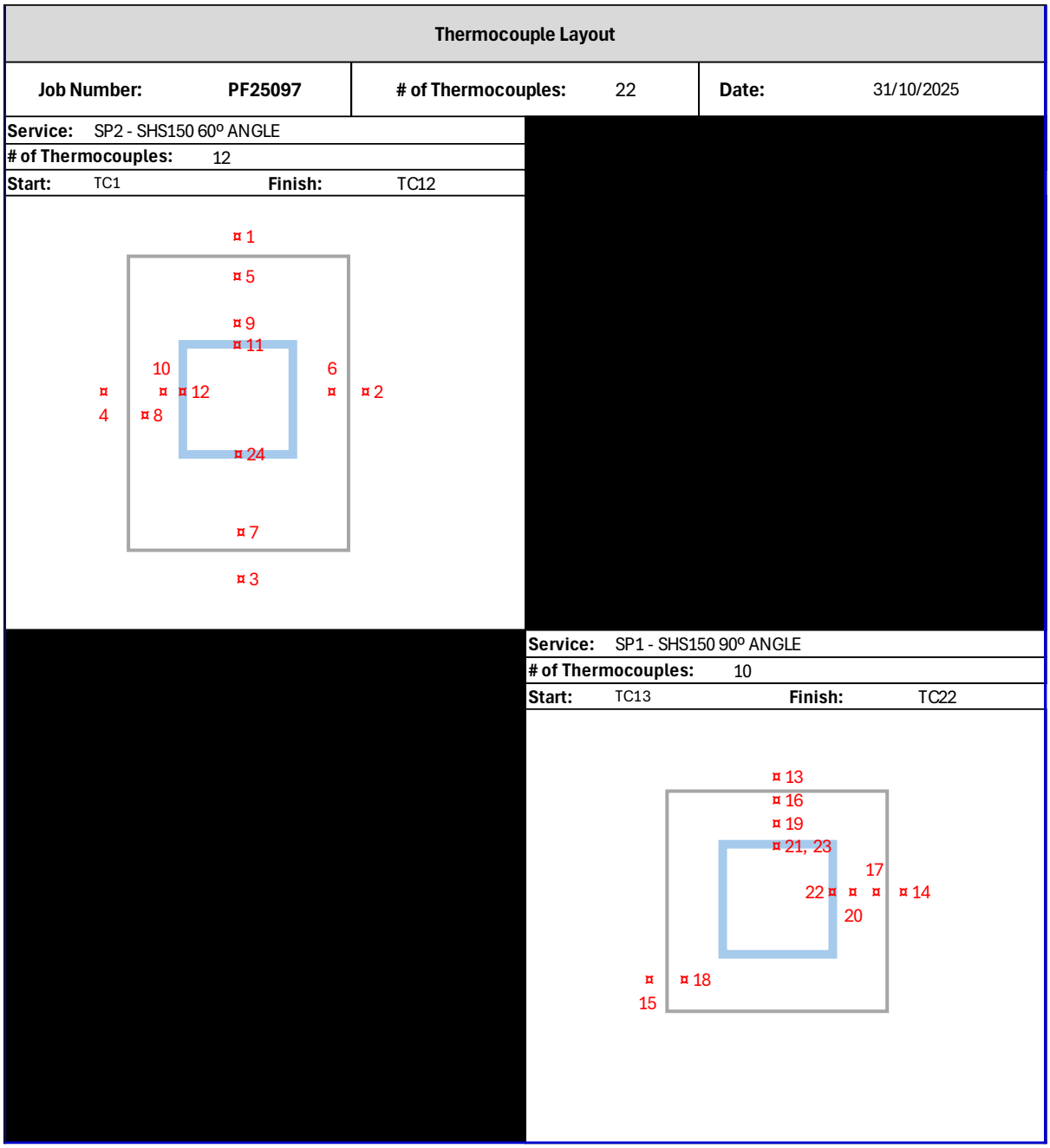

Figure 3 - Thermocouple locations

TC #	SP #	Location
1	2	CLT Slab, 25mm above specimen, mid width of aperture
2	2	CLT Slab, 25mm right of specimen, mid width of steel
3	2	CLT Slab, 25mm below specimen, mid width of aperture
4	2	CLT Slab, 25mm left of specimen, mid width of steel

5	2	Mortar, 25mm from top of aperture, mid width of aperture
6	2	Mortar, 25mm from right side of aperture, mid width of steel
7	2	Mortar, 25mm from bottom of aperture, mid width of aperture
8	2	Mortar, 25mm from left side of aperture, mid width of steel
9	2	Mortar, 25mm from top of steel, mid width of aperture
10	2	Mortar, 25mm from left side of steel, mid width of steel
11	2	Steel, 25mm from mortar, mid width of top of steel
12	2	Steel, 25mm from mortar, mid width of left side of steel
13	1	CLT Slab, 25mm above specimen, mid width of aperture
14	1	CLT Slab, 25mm right of specimen, mid height of aperture
15	1	CLT Slab, 25mm left of specimen, 50mm from bottom of aperture
16	1	Mortar, 25mm from top of aperture, mid width of aperture
17	1	Mortar, 25mm from right side of aperture, mid height of aperture
18	1	Mortar, 25mm from left side of aperture, 50mm from bottom edge of aperture
19	1	Mortar, 25mm from top of steel, mid width of steel
20	1	Mortar, 25mm from right side of steel, mid width of steel
21	1	Steel, 25mm from mortar, mid width of top of steel
22	1	Steel, 25mm from mortar, mid width of right side of steel
23	1	Steel, 300mm from mortar, mid width of top of steel (added at 20 minutes as per request from Client for information purpose)
24	2	Steel, 300mm from mortar, mid width of top of steel (added at 20 minutes as per request from Client for information purpose)

6. Test Results

6.1 Observations during the test

Time min	Test face	SP#	OBSERVATIONS/REMARKS
15	U	1, 2	No major changes observed
30	U	1, 2	No major changes observed
38	U	2	Moisture visible on mortar
60	U	1, 2	No major changes observed
75	U	1, 2	No major changes observed
80	U	2	Crack developed in CLT next to the specimen
88	U	SE	Smoke coming through knot in CLT
91			**TEST DISCONTINUED**

NOTE: E – Exposed Face (inside furnace)

U – Unexposed Face (outside furnace)

SE – Separating element

6.2 Specimen 1

Service penetration details	
Service	SHS 150 installed at a 90° angle to the separating element
Service Support	Unexposed side: 180mm and 430mm
Aperture Size	300mm (width) x 310mm (length)
Annular Spacing	Exposed side: between the steel plate and the opening - Min: -2.0mm (overlapped with CLT panel), Max: 5.4mm

Local Fire-stopping system	
Application	Asymmetrical
Products	Protecta FR Coating, Protecta EX Mortar, Firestop Wool, Ceramic Blanket, Weld Pins – 38, Stainless Steel Strap
Procedure	Unexposed side: 1. A 1mm (nominal) thick layer of Protecta FR Coating was applied to the sides of the aperture. 2. Firestop Wool was cut to size and one layer was installed at the base of the aperture, covering the steel plate and gaps between the steel plate and the sides of the opening. 3. A 20mm (nominal) deep layer of Protecta EX Mortar, mixed at a 2:1 ratio, was poured over the Firestop Wool. 4. Protecta EX Mortar, mixed at a 2:1 ratio, was then applied to fill the aperture and finished flush with the unexposed surface of the separating element. Exposed side: 1. Ceramic blanket with a 50mm overlap was wrapped around the steel, starting10mm down from the plate. 2. The ceramic blanket was fastened to the steel using weld pins on the vertical joins, spaced 200mm apart. 3. Four stainless steel straps were wrapped around the ceramic blanket, 50mm from each end and spaced 150mm apart.

Test results	
Structural adequacy	Not applicable
Integrity	No failure at 91 minutes
Insulation	83 minutes

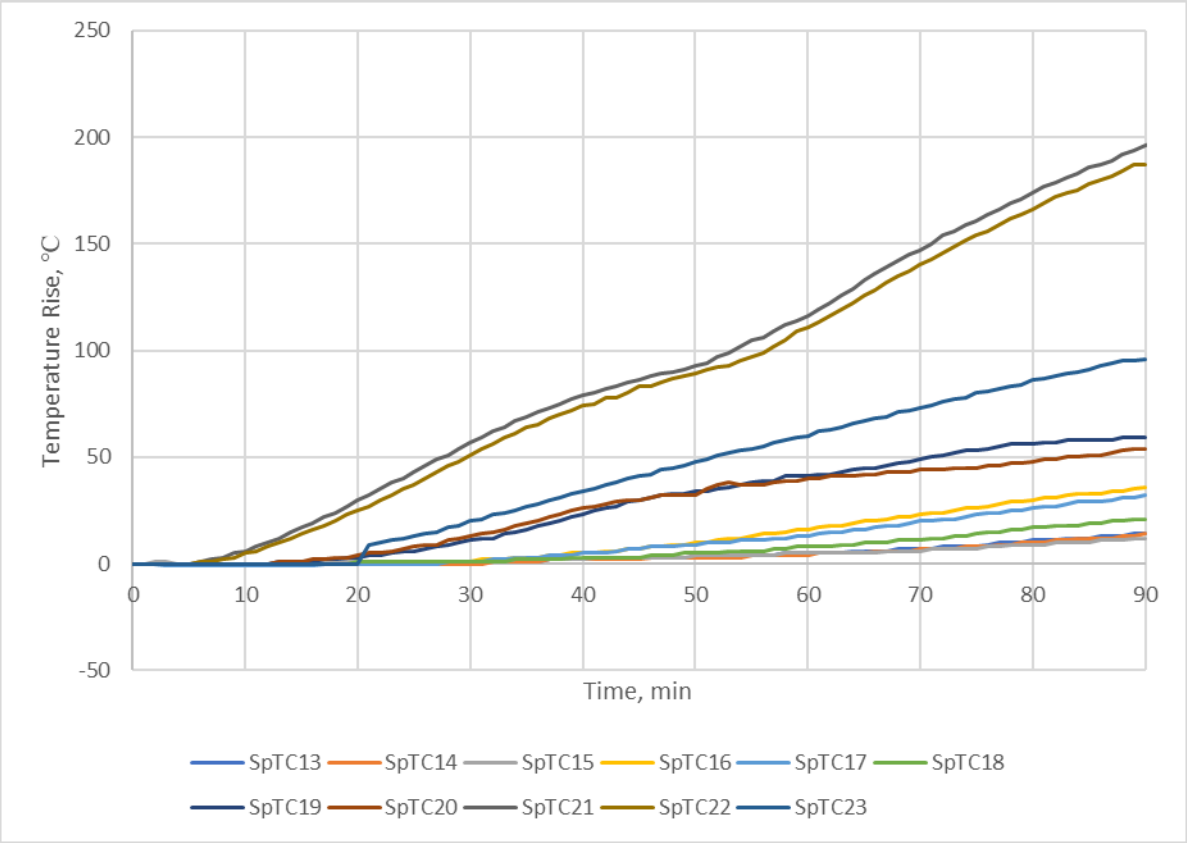

Figure 4 - Specimen 1 thermocouple temperature rise readings

6.3 Specimen 2

Service penetration details	
Service	SHS 150 installed at a 60° angle from the separating element
Service Support	Unexposed side: 180mm and 430mm
Aperture Size	300mm (width) x 400mm (length)
Annular Spacing	Exposed side: between the steel plate and the opening - Min: -8.6mm (overlapped onto CLT panel), Max: 8.6mm

Local Fire-stopping system	
Application	Asymmetrical – applied from the unexposed side only
Products	Protecta FR Coating, Protecta EX Mortar, Firestop Wool, Ceramic Blanket, Firestop Weld Pins – 38, Stainless Steel Strap
Procedure	Unexposed side: 1. A 1mm (nominal) thick layer of Protecta FR Coating was applied to the sides of the aperture. 2. Firestop Wool was cut to size and one layer was installed at the base of the aperture, covering the steel plate and gaps between the steel plate and the sides of the opening. 3. A 20mm (nominal) deep layer of Protecta EX Mortar, mixed at a 2:1 ratio, was poured over the Firestop Wool. 4. Protecta EX Mortar, mixed at a 2:1 ratio, was then applied to fill the aperture and finished flush with the unexposed surface of the separating element. Exposed side: 1. Ceramic blanket with a 50mm overlap was wrapped around the steel, starting10mm down from the plate. 2. The ceramic blanket was fastened to the steel using weld pins on the vertical joins, spaced 200mm apart. 3. Four stainless steel straps were wrapped around the ceramic blanket, 50mm from each end and spaced 150mm apart.

Test results	
Structural adequacy	Not applicable
Integrity	No failure at 91 minutes
Insulation	91 minutes

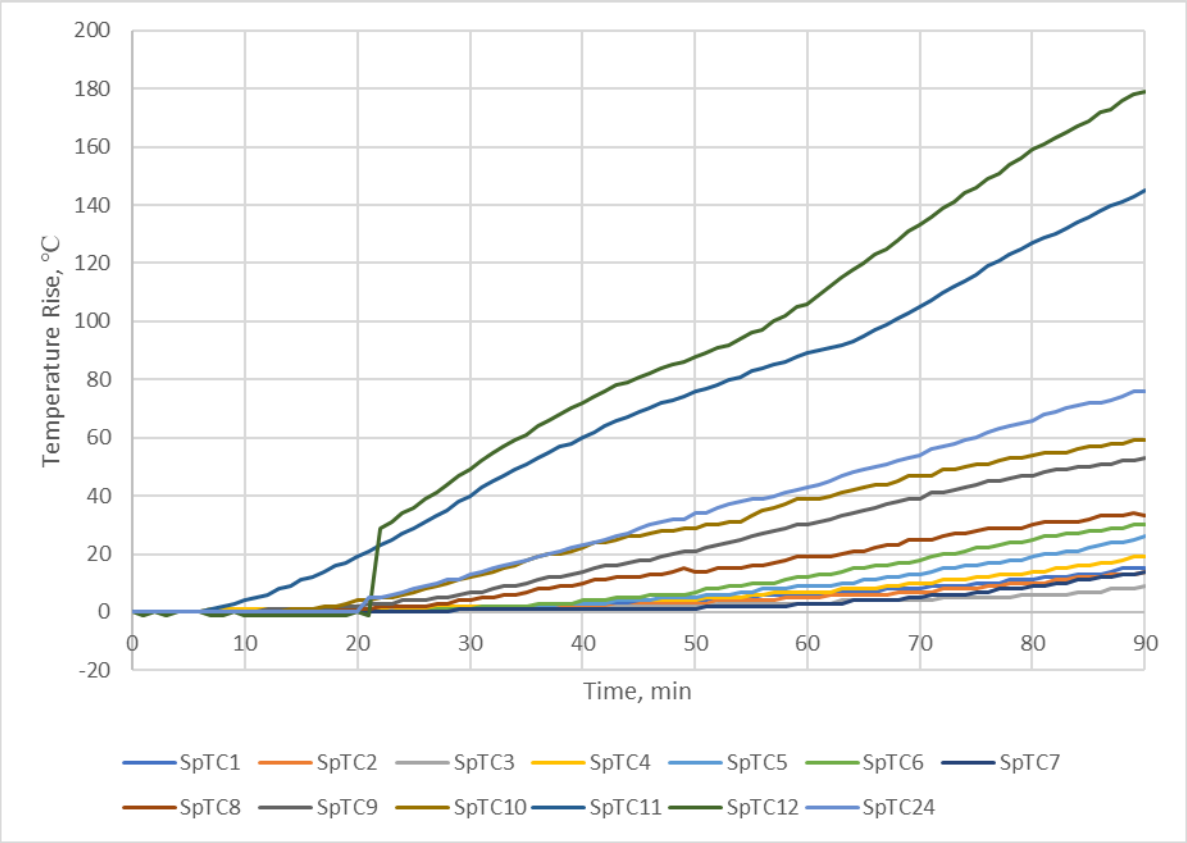

Figure 5 - Specimen 2 thermocouple temperature rise readings

7. Photos

7.1 Photos before the test

Figure 6 - Unexposed face prior to test commencement

Figure 7 - Exposed face prior to test commencement

7.2 During and after the test

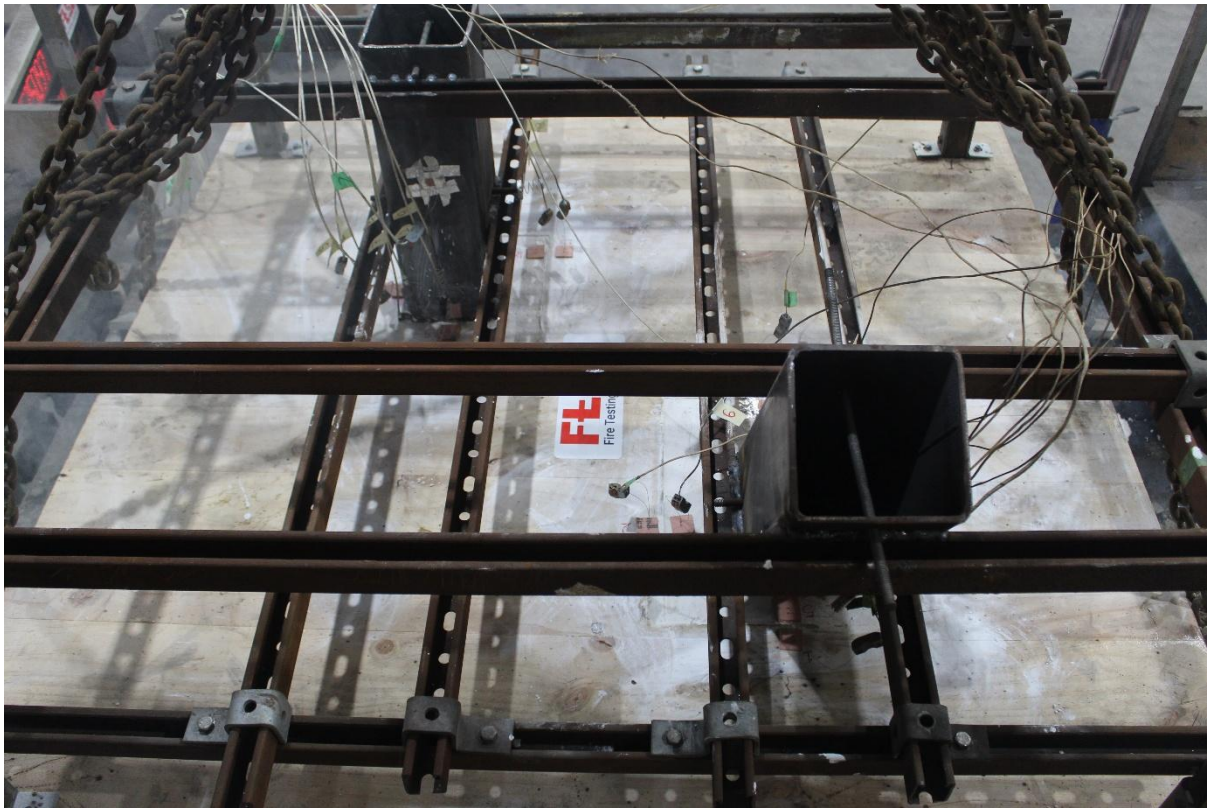

Figure 8 - Unexposed face at 15 minutes

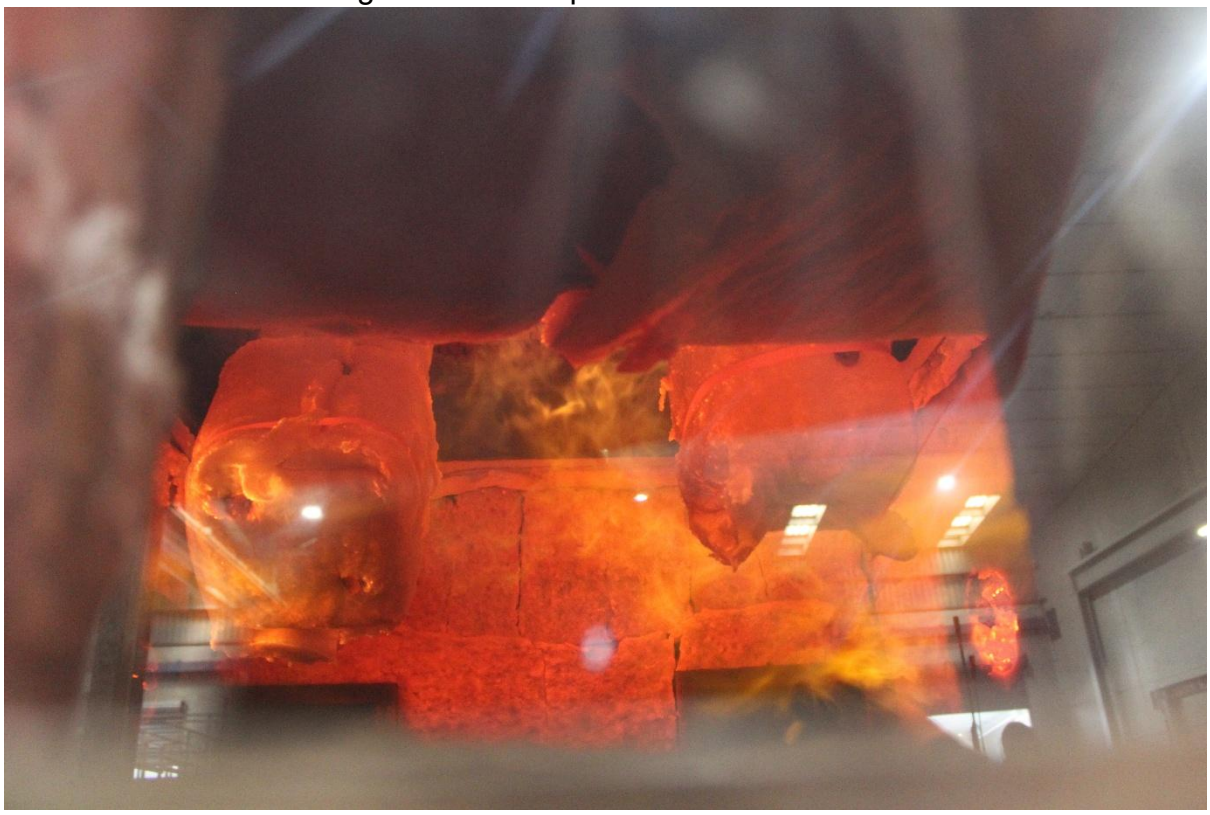

Figure 9 - Exposed face at 15 minutes

Figure 10 - Unexposed face at 30 minutes

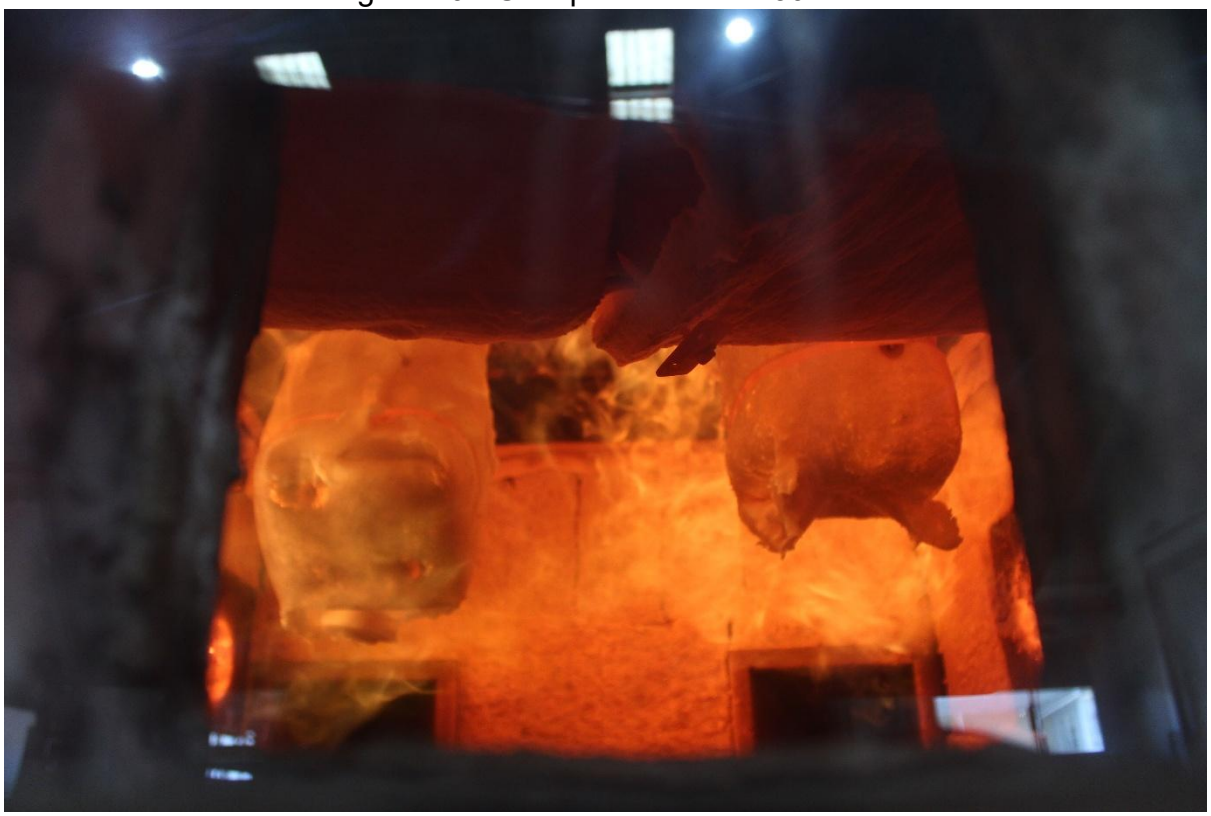

Figure 11 - Exposed face at 30 minutes

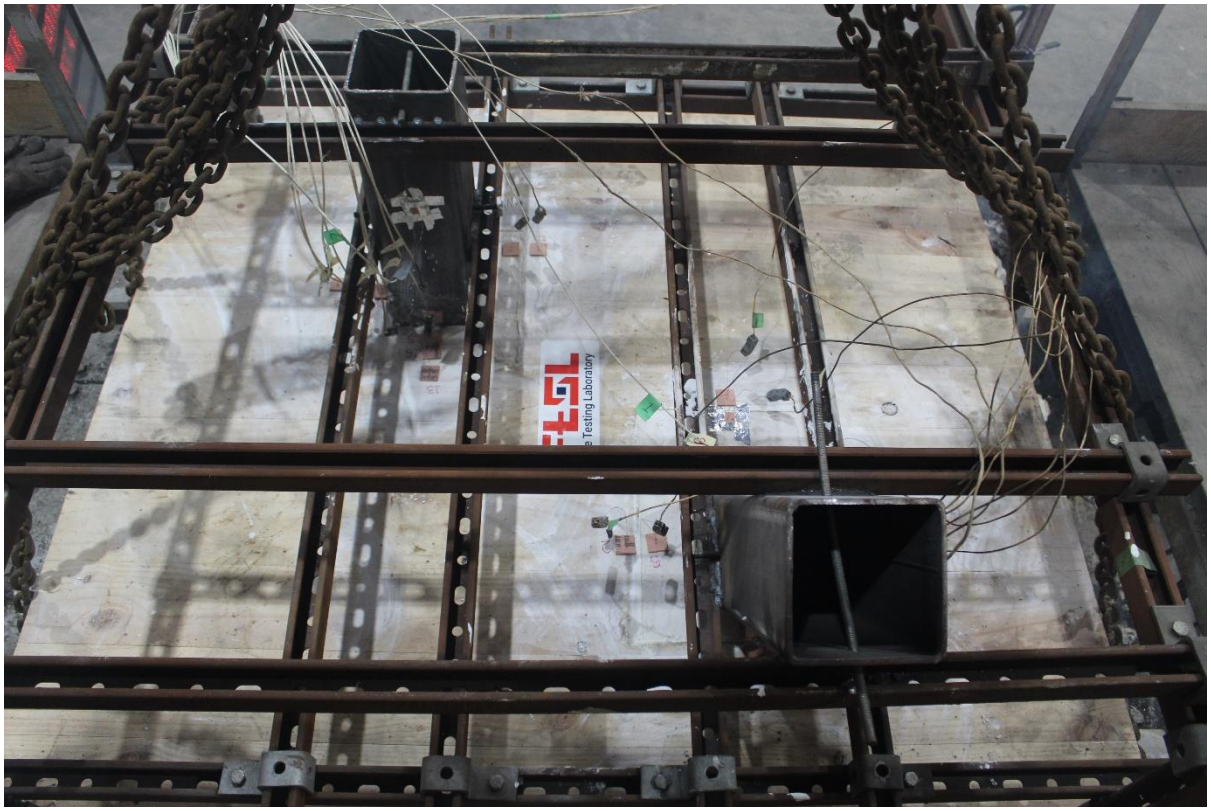

Figure 12 - Unexposed face at 45 minutes

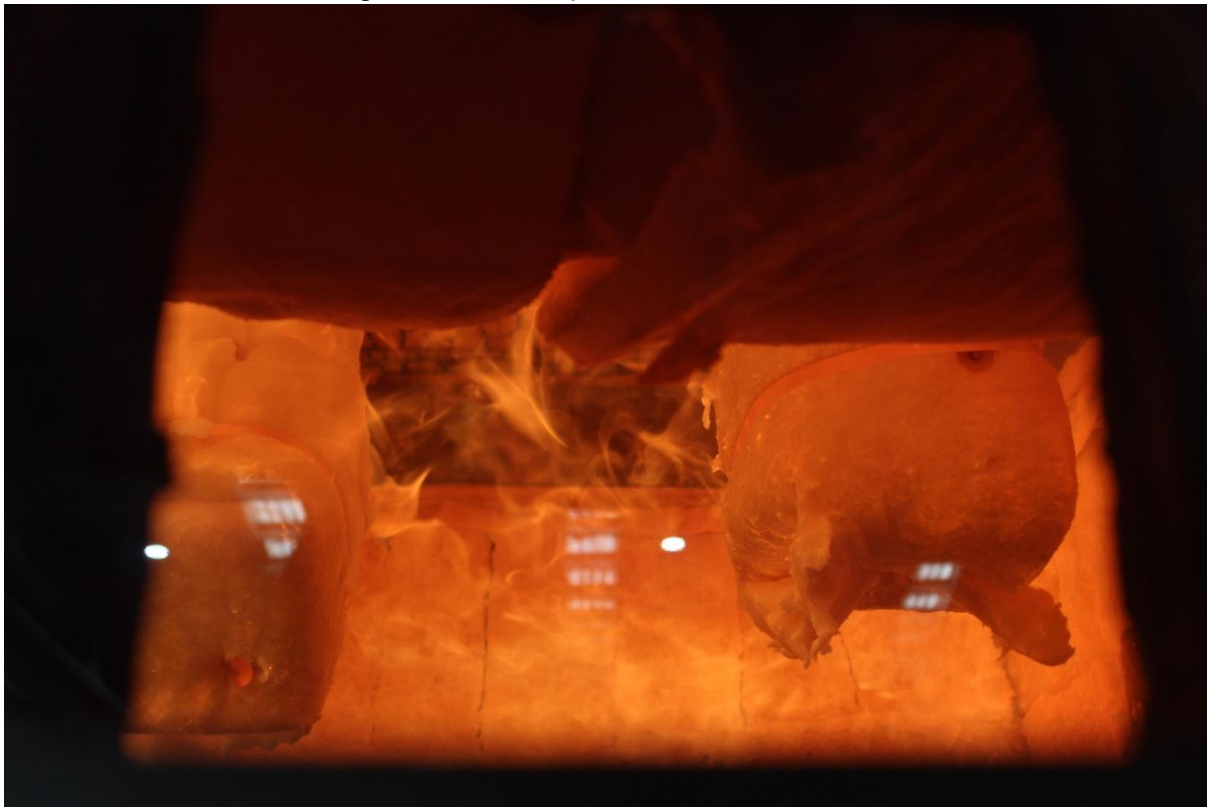

Figure 13 - Exposed face at 45 minutes

Figure 14 - Unexposed face at 60 minutes

Figure 15 - Exposed face at 60 minutes

Figure 16 - Unexposed face at 90 minutes

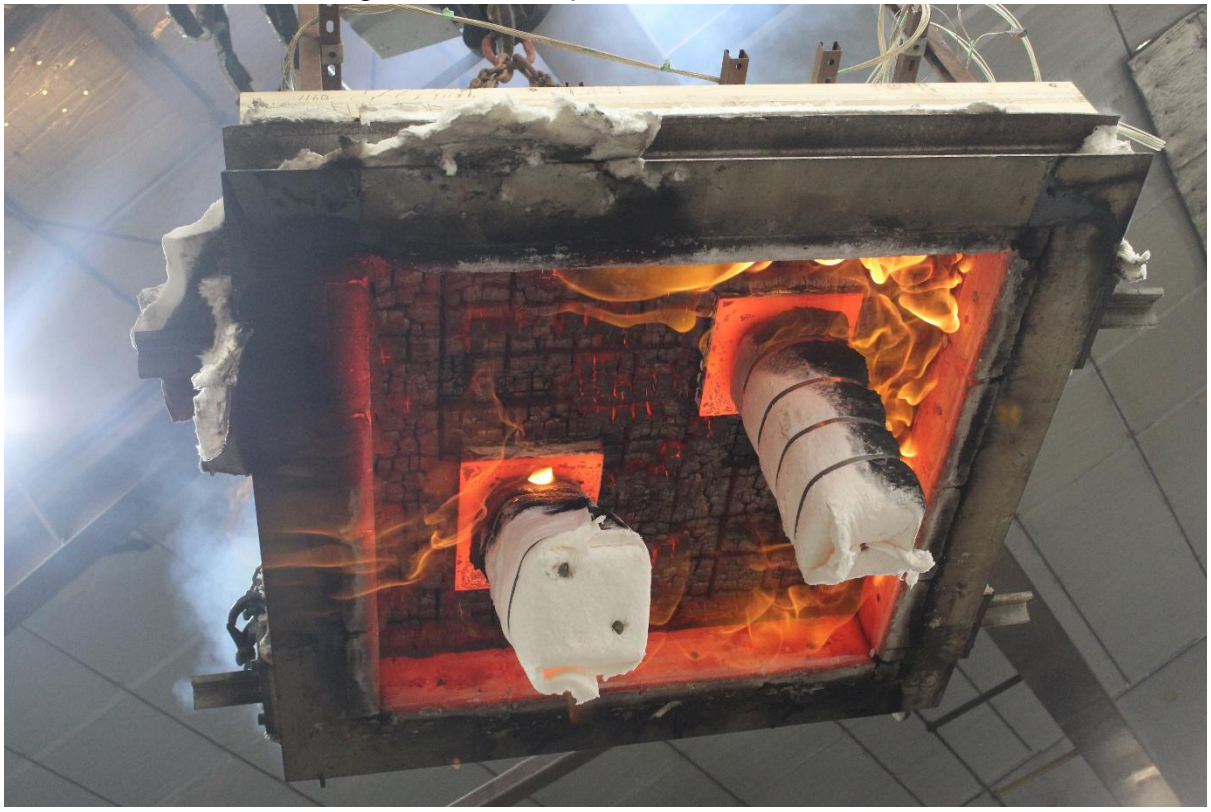

Figure 17 - Exposed face after the test