



ماتيريال لاج

Material Lab

Test Report

**Fire Resistance Test
on
ASMACO Fire Stop Silicone Sealant**

**Test Sponsor:
Anchor Allied Factory L.L.C.**



Test Report

on

Fire Resistance of ASMACO Fire Stop Silicone Sealant

Testing Laboratory : Material Lab
Lab Report No. : CR-170406/16738 SN 1/2
Lab Project No. : P-3833
Test Reference No. : 170406473
Test Standard : BS 476: Part 22: 1987: Amd 2014.

Sample Description : ASMACO Fire Stop Silicone Sealant of varying joint configuration when applied in gaps between concrete blocks
Test Sponsor : Anchor Allied Factory L.L.C.
Manufacturer : Anchor Allied Factory L.L.C.
Test Sponsor Address : P.O. Box: 21152, Industrial Area No. 15, Sharjah, U.A.E
Test Sponsor Tel. No. : +971 6 534 2091
Test Sponsor Fax No. : +971 6 534 2107
Test Sponsor Website : www.anchorallied.com

Date Samples Received : 16/03/2017
Date of test : 06/04/2017
Required Duration of test : 240 Minutes
Report Date : 04/06/2017
No. of Pages : 26





MATERIAL LAB is **ACCREDITED** by the **DUBAI ACCREDITATION CENTER (DAC)**, accreditation certificate no: LB-008-TEST, to conduct Fire Resistance Tests in accordance with the following standards:

| | | | |
|----------------|---|------|--|
| BS EN 1364 – 1 | : | 1999 | Fire resistance tests for non-loadbearing elements – Part 1: Walls |
| BS EN 1364 – 3 | : | 2014 | Fire resistance tests for non-loadbearing elements – Part 3: Curtain walling – Full configuration (complete assembly) |
| BS EN 1364 – 4 | : | 2014 | Fire resistance tests for non-loadbearing elements – Part 4: Curtain walling – Part configuration |
| BS EN 1634 – 1 | : | 2014 | Fire resistance and smoke control tests for doors and shutter assemblies, openable windows and elements of building hardware – Part 1: Fire resistance test for door and shutter assemblies and openable windows |
| BS 476 part 20 | : | 1987 | Fire tests on building materials and structures- Part 20: Methods for determination of the fire resistance of elements of construction (general principles) |
| BS 476 part 22 | : | 1987 | Fire tests on building materials and structures- Part 22: Methods for determination of the fire resistance of non-loadbearing elements of construction |
| ISO 834 – 1 | : | 2012 | Fire-resistance tests – Elements of building construction – Part 1: General requirements |
| ISO 834 – 8 | : | 2002 | Fire-resistance tests – Elements of building construction – Part 8: Specific requirements for non-loadbearing vertical separating elements |
| ISO 3008 | : | 2007 | Fire-resistance tests – Doors and shutter assemblies |
| ISO 3009 | : | 2003 | Fire resistance tests – Elements of building construction – Glazed elements |





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CIVIL DEFENCE APPROVED

INTERNATIONAL TESTING AND CERTIFICATION BODIES

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ACCREDITATION CERTIFICATE

LB-008-TEST

Dubai Accreditation Department

has accredited

Material Lab

Al Quoz Industrial Area 4

Dubai- United Arab Emirates

In accordance with the requirements of ISO/ IEC 17025: 2005 to undertake the tests
in the fields of:

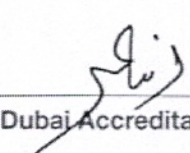
**Construction Materials Testing
Geotechnical Investigation
Environmental Testing**

Listed in the attached Scope of Accreditation

This Accreditation is invalid without the attached scope of accreditation and shall remain in
force within the validity period printed below, subject to continuing compliance with the
requirements of the accreditation program.

Validity of Certificate: from 07- 03- 2016 to 06- 03- 2019

Initial Accreditation Date: 05- 02- 2004


Director, Dubai Accreditation Department



SCOPE OF ACCREDITATION
Construction Materials Testing

Material Lab

Al Quoz Industrial Area 4

Dubai- United Arab Emirates

Scope Issue No: 10

Scope Validity Period: 07-03-2016 to 06-03-2019

Accreditation Certificate No: LB-008-TEST

Issued by (Head of Section):

| Type of Task | Materials/Products | Task Name | Standard method |
|-----------------|---|---|-----------------|
| Fire Resistance | Non load bearing Concrete blocks, Wall | Fire resistance tests for non-load bearing elements. Part 1. Walls <u>Performance criteria</u> Integrity ,Insulation and Radiation | BS EN 1364-1 |
| | Non load bearing elements-Curtain wall- full configuration (complete assembly) | Fire resistance tests for non-load bearing elements. Curtain walling. Full configuration (complete assembly) <u>Performance criteria</u> Integrity ,Insulation and Radiation | BS EN 1364-3 |
| | Non load bearing elements-Curtain wall- (Part configuration) | Fire resistance tests for non-load bearing elements. Curtain walling. Part configuration <u>Performance criteria</u> Integrity ,Insulation and Radiation | BS EN 1364-4 |

Note: For history details of accredited conformity assessment activities, please refer to Dubai Accreditation Department, Dubai Municipality.



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Construction Materials Testing

Material Lab

Al Quoz Industrial Area 4

Dubai- United Arab Emirates

Scope Issue No: 10

Accreditation Certificate No: LB-008-TEST

Scope Validity Period: 07-03-2016 to 06-03-2019

Issued by (Head of Section):

| Type of Task | Materials/Products | Task Name | Standard method |
|-----------------|---------------------------------------|--|-----------------|
| Fire Resistance | Doors, Shutters and open able windows | Fire resistance and smoke control tests for door and shutter assemblies, open able windows and elements of building hardware. Fire resistance test for door and shutter assemblies and open able windows <u>Performance criteria</u> Integrity ,Insulation and Radiation | BS EN 1634-1 |
| | Building materials and structures | Fire tests on building materials and structures- method for determination of the fire resistance of elements of construction (general principles) (non load bearing only) <u>Performance criteria</u> Integrity ,Insulation and Radiation | BS 476.20 |

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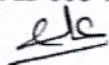
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Scope Validity Period: 07-03-2016 to 06-03-2019

Issued by (Head of Section): 

| Type of Task | Materials/Products | Task Name | Standard method |
|-----------------|-----------------------------------|---|-----------------|
| Fire Resistance | Building materials and structures | Fire tests on building materials and structures- method for determination of the fire resistance of non-load bearing elements of construction <u>Performance criteria</u> Integrity ,Insulation and Radiation | BS 476.22 |
| | | Fire-resistance tests - Elements of building construction - Part 1: General requirements (non load bearing only) <u>Performance criteria</u> Integrity ,Insulation and Radiation | ISO 834-1 |
| | | Fire-resistance tests -- Elements of building construction -- Part 8: Specific requirements for non-load bearing vertical separating elements <u>Performance criteria</u> Integrity ,Insulation and Radiation | ISO 834-8 |

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Accreditation Certificate No: LB-008-TEST

Scope Validity Period: 07-03-2016 to 06-03-2019

Issued by (Head of Section): *elc*

| Type of Task | Materials/Products | Task Name | Standard method |
|-------------------------|---|--|---|
| Fire Resistance | Doors and shutters | Fire resistance tests- Door and shutter assemblies. <u>Performance criteria</u> Integrity ,Insulation and Radiation | ISO 3008 |
| | Building construction – glazed elements | Fire-resistance tests - Elements of building construction - Glazed elements <u>Performance criteria</u> Integrity ,Insulation and Radiation | ISO 3009 |
| Mechanical/ Physical | Water proofing membrane | Standard Test Method for Water Absorption of Plastics | ASTM D570 |
| | | Special Directive for the Assessment of Reinforced Water proof Covering of Atactic Polypropylene (APP) polymer Bitumen and Styrene Butadiene-styrene(SBS) Elastomeric Bitumen- Heat Resistance | European Union of Agreement, UEA tc M.O.AT 30 & 31 Para E |
| | | Flexible sheets for waterproofing. Determination of tensile properties. Bitumen sheets for roof waterproofing | EN 12311-1 |

Note: For history details of accredited conformity assessment activities, please refer to Dubai Accreditation Department, Dubai Municipality.



1: Introduction

Material Lab is accredited to perform fire resistance tests in accordance with British, European and International Standards by the Dubai Accreditation Centre (DAC), accreditation certificate no: LB-008-TEST. Material Lab is approved from the United Arab Emirates Ministry of Interior Civil Defence GHQ.

The Fire Testing Division of Material Lab, located in Al Quoz industrial area of Dubai, was commissioned by Anchor Allied Factory L.L.C. to perform a fire resistance test on ASMACO Fire stop Silicone Sealant and ASMACO Gold Fire Retardant Multi-foam B2. The test was witnessed by representatives of the test sponsor and from C.C.S. (Conformity Certification Services).

The aim of this test report is to provide a comprehensive description of the procedure exercised to obtain the fire resistance properties of ASMACO Fire Stop Silicone Sealant and ASMACO Gold Fire Retardant Multi-foam B2 of varying joint configuration when applied in gaps in between concrete blocks. The sealants, manufactured by Anchor Allied Factory L.L.C., were tested in accordance with British Standard 476 part 22:1987/Amd: 2014 on 6th of April 2017 at Material Lab's main facility for a period of 240 minutes.

Although both the ASMACO Fire Stop silicone sealant and ASMACO Gold Fire Retardant Multi-foam B2 were tested simultaneously in the same frame, two separate reports for sealants have been generated upon the request of the client. This report contains details of components and results obtained for the ASMACO Fire Stop Silicone Sealant only. Report containing component details and results of the ASMACO Gold Fire Retardant Multi-foam B2 can be found in test report with Lab Report No. CR-170406/16738 SN 2/2.

2: Instrumentation

A fully computerized and automated 3.03m by 3.03m vertical fire resistance testing furnace employing the latest technology in PLC system by Siemens was used for this test. The furnace relies on its 10 powerful burners, which utilize a fixed proportion of liquefied petroleum gas and air, to raise temperature inside the furnace to around 1200 °C. All instruments vital for obtaining conclusive fire resistance data during the test have been identified in table 1.

| Equipment ID | Equipment Description |
|--------------|--|
| FTF-1 | Vertical Large Fire testing furnace, complete with LPG supply system |
| PLCS-1 | PLC system for data acquisition by Siemens |
| WINCC-1 | Visual and calculating software by Siemens |
| PS-1 to 2 | Calibrated Pressure Transducers |
| IFTC-1 to 9 | Calibrated Furnace Internal Thermocouple (K Type) |
| FSF-2 | Steel Frame for sample assembly. |
| FTIR-1 to 5 | Calibrated IR sensors for deflection measurements. |
| FGG6-1 | Gap Gauge ϕ 6 mm |
| FGG25-1 | Gap Gauge ϕ 25 mm |
| FCP-1 | Cotton pad |
| FCPF-1 | Cotton pad supporting frame |
| EFTC-1 to10 | Calibrated Unexposed Surface Thermocouple (K Type) |
| FVRT-1 | Calibrated Roving Thermometer |
| FATS-2 | Calibrated Ambient temperature sensor |
| RPF-1 | Ambient temperature sensor assembly |

Table 1: Detail of equipment used to perform the test

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3: Specimen Conditioning

Before erection of the supporting construction wall in the frame, it was ensured that the blocks used for the supporting construction had cured and achieved its specified compressive strength. It is essential that moisture content of the supporting construction blocks achieved equilibrium before testing as mentioned in clause 4.6 of BS 476-20. Hence prior to testing, the moisture content of the supporting construction constituents was determined using the dry oven technique i.e. the sample was weighed and then dried in oven at 105° C and two successive weighing at 24 hour intervals were taken. The difference between the successive weighing did not exceed 0.1%. Moisture content of the blocks was found to be complying with 1% to 3% moisture content requirement of BS 476-22.

After completion of the supporting construction on 10th of March 2017, the ASMACO Fire stop silicone sealant and ASMACO Gold Fire Retardant Multi-Foam B2 were applied on the 16th of March 2017 and allowed to cure for a period of 21 days as requested by the client. The test was then conducted on 6th of April 2017 after ensuring that the applied sealants had been fully cured and had achieved their Shore 'A' hardness value.

4: Specimen Preparation

A rigid steel frame with fire resistive concrete blocks fixed on its internal perimeter having an opening of 3.03 x 3.03 meter was used to prepare the specimen for testing. Supporting construction comprising of only 8" solid blocks was prepared in the test frame by the laboratory's skilled workers.

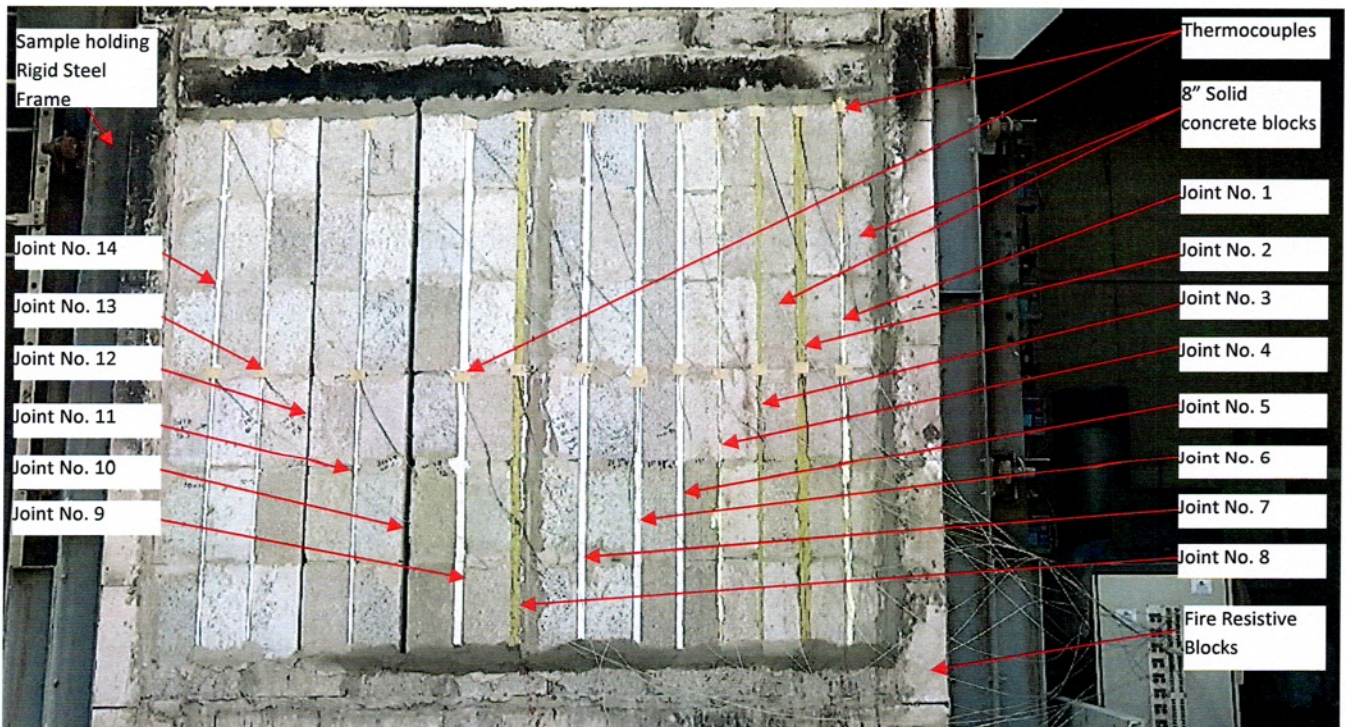


Figure 1: Test specimen mounted in frame for testing

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During construction vertical block columns were erected with vertical gaps left in between adjacent columns for application of the ASMACO Fire stop silicone sealant and ASMACO Gold Fire Retardant Multi-foam B2. In this manner a total of 14 vertical gaps having a height of 2.5m each starting from 100mm above the test frame bottom were left in the supporting construction wall, as shown in figure 1. The vertical gaps were then filled using various combinations of sealant by the sponsors' skilled workers. These combinations included:

1. Application of Fire stop silicone sealant to fire side with ceramic fiber backup on non-fire side.
2. Application of Fire stop silicone sealant to fire side followed by ceramic fiber backup and then again application of Fire stop silicone sealant on non-fire side.
3. Application of Fire stop silicone sealant to fire side with Mineral wool backup on non-fire side
4. Application of Fire stop silicone sealant to fire side followed by Mineral wool backup and then again application of Fire stop silicone sealant on non-fire side.
5. Application of Fire stop silicone sealant to fire side followed by Polyethylene backup and then again application of Fire stop silicone sealant on non-fire side.
6. Application of Multi-Foam B2 in gap completely.
7. Application of Multi-Foam B2 to fire side with Mineral wool backup on non-fire side.

Configuration of width and depth (thickness) of gap and type of sealant applied to the particular gap, from right to left, is provided in table 1.1.

| Joint No. | Width(mm) | Depth(mm) | Backup Type | Joint Type | Product |
|-----------|-----------|-----------|--------------------------|----------------|------------------------------|
| 1. | 15 | 200 | None | Full | Fire Retardant Multi-Foam B2 |
| 2. | 40 | 180 | (20 x 40)mm Mineral Wool | Only Fire Side | Fire Retardant Multi-Foam B2 |
| 3. | 15 | 180 | (20 x 15)mm Mineral Wool | Only Fire Side | Fire Retardant Multi-Foam B2 |
| 4. | 10 | 200 | None | Full | Fire Retardant Multi-Foam B2 |
| 5. | 25 | 15 | 30mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |
| 6. | 25 | 20 | (25 x20)mm Mineral wool | Both Sides | Fire stop Silicone Sealant |
| 7. | 25 | 25 | 30mm dia Polyethylene | Both Sides | Fire stop Silicone Sealant |
| 8. | 30 | 180 | (20 x 30)mm Mineral Wool | Only Fire Side | Fire Retardant Multi-Foam B2 |
| 9. | 25 | 20 | 30mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |
| 10. | 25 | 20 | 30mm dia Ceramic Fiber | Only Fire Side | Fire stop Silicone Sealant |
| 11. | 10 | 10 | 12mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |
| 12. | 10 | 10 | 12mm dia Ceramic Fiber | Only Fire Side | Fire stop Silicone Sealant |
| 13. | 6 | 10 | 8mm dia Polyethylene | Both Sides | Fire stop Silicone Sealant |
| 14. | 6 | 10 | 8mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |

Table 1: Details of sealant configuration used to fill in vertical gaps

5: Application of Instruments

Nine internal unshielded K type thermocouples were installed for measurement of internal temperature of the furnace. A positioning diagram, figure 12, for the internal thermocouples has been provided in appendix 3.

In order to ensure the insulation properties of the sealants, 24K type thermocouples were installed on unexposed surface of the specimen as per the requirements of BS 476: Part 22. 1987: Amd 2014.

For measurement of insulation criteria only maximum rise in temperature on the unexposed surface of the sealants was determined. In addition, the thermocouples were only fixed to every ASMACO Fire stop silicone sealant joint where the sealant was applied on both sides and on every joint containing the ASMACO Gold Multi-

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Foam B2. Two thermocouples were applied per joint, one located at the head of the joint and the second at mid height of the joint. A positioning diagram, figure 13, for these thermocouples has been provided in appendix 3.

Graph used for determining the maximum temperature rise on the unexposed side, for evaluation against insulation criteria, can be examined in appendix 2, figures 5 to 11.

Two pressure sensing heads, located at 1 m and approximately 2.5 m above the furnace floor, were installed to monitor furnace pressure as per the requirements of clause 3 of BS 476: Part 20. 1987: Amd 2014.

Configuration of thermocouples applied to joints is provided in table 2 below:

| Joint No. | Width (mm) | Depth (mm) | TC No. @ Head | TC No. @ Mid-Height | Product |
|-----------|------------|------------|---------------|---------------------|------------------------------|
| 1. | 15 | 200 | 2 | 1 | Fire Retardant Multi-Foam B2 |
| 2. | 40 | 180 | 4 | 3 | Fire Retardant Multi-Foam B2 |
| 3. | 15 | 180 | 6 | 5 | Fire Retardant Multi-Foam B2 |
| 4. | 10 | 200 | 8 | 7 | Fire Retardant Multi-Foam B2 |
| 5. | 25 | 15 | 10 | 9 | Fire stop Silicone Sealant |
| 6. | 25 | 20 | 12 | 11 | Fire stop Silicone Sealant |
| 7. | 25 | 25 | 14 | 13 | Fire stop Silicone Sealant |
| 8. | 30 | 180 | 16 | 15 | Fire Retardant Multi-Foam B2 |
| 9. | 25 | 20 | 18 | 17 | Fire stop Silicone Sealant |
| 11. | 10 | 10 | 20 | 19 | Fire stop Silicone Sealant |
| 13. | 6 | 10 | 22 | 21 | Fire stop Silicone Sealant |
| 14. | 6 | 10 | 24 | 23 | Fire stop Silicone Sealant |

Table 2: Details of thermocouples configuration used to measure unexposed surface temperature of vertical gaps

6: Test Procedure

The preparation and fixation of the thermocouples were followed by mounting of the test frame in front of the furnace. Prior to test commencement, proper functionality of all sensors and thermocouples were ensured for accurate display and data acquisition.

Ambient air temperature surrounding the laboratory was noted. Values characterizing ambient environment directly before and after the test are given in table 3.

| Ambient temperature @ 11:04 a.m. before start of test (°C) | Ambient temperature @ 3:04 p.m. at end of test (°C) | Difference between ambient temperature at start and end of test (°C) |
|--|---|--|
| 28.3 | 31.3 | 3.0 |

Table 3: Ambient air temperature surrounding the laboratory

The furnace was then initiated to commence the actual test and a trained fire testing engineer was instructed to take specimen observations throughout the test duration. These observations have been tabulated in Test Results section. A video camera was set up to record the full duration of the test. A DVD containing a PDF copy of the test report, pictures from the test and complete video recording of the test has been provided along with this report.

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Furnace conditions during the test, such as temperature and pressure, were kept in accordance with clause 3 of BS 476: Part 20: 1987: Amd 2014. During the test a neutral pressure plane was set up 1m above the furnace floor and the pressure at the top of the furnace was not allowed to exceed 20 Pa.

The temperature inside the furnace did not deviate and remained within the tolerance limits set in BS 476: Part 20. The graph representing regulation of internal temperature of the furnace in accordance with BS 476-22 has been provided in figure 3 of appendix 2.

7: Test Results

OBSERVATIONS:

Observations shown in table 4 is an integral part of this report.

| Time [min] | Observation on unexposed side of the sealants (Joint No. 1 to Joint No. 14) |
|------------|---|
| 0 | Commencement of Test. |
| 19 | Light smoke observed escaping from top edge of joint no. 10 and 12. |
| 30 | Light smoke observed escaping from mid height of joint no. 8. |
| 40 | Light smoke observed escaping from mid height of joint no. 7. |
| 52 | Formation of moisture patches all over surface of supporting construction. |
| 56 | Light smoke observed escaping from top edge and at mid height of joint no. 2 and 8. |
| 129 | Mineral Wool at joint no. 2 and 8 turning reddish brown at top edge. |
| 142 | Mineral Wool at joint no. 8 turning reddish brown at mid height. |
| 156 | Mineral Wool at joint no. 8 turning dark reddish brown at mid height. |
| 176 | Mineral Wool at joint no. 2 turning blackish brown at mid height. |
| 183 | Light smoke observed escaping from mid height of joint no. 1. |
| 215 | Light smoke observed escaping from top edge and mid height of joint no. 4. |
| 240 | Light smoke observed escaping from top edge and mid height of joint no. 1 and 4. |
| 240 | All joints stable after 240 minutes of testing. Termination of test upon request of client. |

Table 4: Observations of specimen behavior during the test

After being exposed for a total duration of 4 hours, the various combinations of ASMACO Fire stop Silicone Sealant were evaluated against the integrity and insulation criteria set in clause 5.6 of BS 476: Part 22: 1987: Amd 2014. The sealant configurations were found to achieve the following fire resistance properties illustrated in table 5.1. to 5.5.



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Fire Resistance of ASMACO Fire stop Silicone Sealant Configurations after testing:

| ASMACO Fire stop Silicone Sealant (Width x Depth : 25mm x 15mm) with Both Side Application and Ceramic Fiber Backup, Ref.: Joint No. 5 | | |
|--|---------|---|
| Test Parameters | Results | Remarks |
| Insulation: 240 Minutes | | |
| 1. Maximum Temperature | - | No failure. Maximum temperature recorded after 240 minutes of testing was 68°C on TC-10 which did not exceed standard limits. |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.1: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (25mm x 15mm) According to BS 476: Part 22: 1987: Amd 2014

| ASMACO Fire stop Silicone Sealant (Width x Depth : 25mm x 20mm) with Both Side Application and Mineral wool Backup, Ref.: Joint No. 6 | | |
|---|---------|---|
| Test Parameters | Results | Remarks |
| Insulation: 240 Minutes | | |
| 1. Maximum Temperature | - | No failure. Maximum temperature recorded after 240 minutes of testing was 73°C on TC-12 which did not exceed standard limits. |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.2: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (25mm x 20mm) According to BS 476: Part 22: 1987: Amd 2014

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| ASMACO Fire stop Silicone Sealant (Width x Depth : 25mm x 25mm) with Both Side Application and Polyethylene Backup, Ref.: Joint No. 7 | | |
|---|---------|---|
| Test Parameters | Results | Remarks |
| Insulation: 240 Minutes | | |
| 1. Maximum Temperature | - | No failure. Maximum temperature recorded after 240 minutes of testing was 71°C on TC-14 which did not exceed standard limits. |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.3: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (25mm x 25mm) According to BS 476: Part 22: 1987: Amd 2014

| ASMACO Fire stop Silicone Sealant (Width x Depth : 25mm x 20mm) with Both Side Application and Ceramic Fiber Backup, Ref.: Joint No. 9 | | |
|--|---------|---|
| Test Parameters | Results | Remarks |
| Insulation: 240 Minutes | | |
| 1. Maximum Temperature | - | No failure. Maximum temperature recorded after 240 minutes of testing was 71°C on TC-18 which did not exceed standard limits. |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.4: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (25mm x 20mm) According to BS 476: Part 22: 1987: Amd 2014

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| ASMACO Fire stop Silicone Sealant (Width x Depth : 25mm x 20mm) with only Fire Side Application and Ceramic Fiber Backup, Ref.: Joint No. 10 | | |
|--|---------|--|
| Test Parameters | Results | Remarks |
| Insulation: - | | |
| 1. Maximum Temperature | - | Insulation value was not determined |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.5: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (25mm x 20mm) According to BS 476: Part 22: 1987: Amd 2014

| ASMACO Fire stop Silicone Sealant (Width x Depth : 10mm x 10mm) with Both Side Application and Ceramic Fiber Backup, Ref.: Joint No. 11 | | |
|---|---------|---|
| Test Parameters | Results | Remarks |
| Insulation: 240 Minutes | | |
| 1. Maximum Temperature | - | No failure. Maximum temperature recorded after 240 minutes of testing was 82°C on TC-20 which did not exceed standard limits. |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.6: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (10mm x 10mm) According to BS 476: Part 22: 1987: Amd 2014



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| ASMACO Fire stop Silicone Sealant (Width x Depth : 10mm x 10mm) with only Fire Side Application and Ceramic Fiber Backup, Ref.: Joint No. 12 | | |
|--|---------|--|
| Test Parameters | Results | Remarks |
| Insulation: - | | |
| 1. Maximum Temperature | - | Insulation value was not determined |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.7: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (10mm x 10mm) According to BS 476: Part 22: 1987: Amd 2014

| ASMACO Fire stop Silicone Sealant (Width x Depth : 6mm x 10mm) with Both Side Application and Polyethylene Backup, Ref.: Joint No. 13 | | |
|---|---------|---|
| Test Parameters | Results | Remarks |
| Insulation: 240 Minutes | | |
| 1. Maximum Temperature | - | No failure. Maximum temperature recorded after 240 minutes of testing was 89°C on TC-22 which did not exceed standard limits. |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.8: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (6mm x 10mm) According to BS 476: Part 22: 1987: Amd 2014

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| ASMACO Fire stop Silicone Sealant (Width x Depth : 6mm x 10mm) with Both Sides Application and Ceramic Fiber Backup, Ref.: Joint No. 14 | | |
|---|---------|---|
| Test Parameters | Results | Remarks |
| Insulation: 240 Minutes | | |
| 1. Maximum Temperature | - | No failure. Maximum temperature recorded after 240 minutes of testing was 99°C on TC-24 which did not exceed standard limits. |
| Integrity: 240 Minutes | | |
| 1. Sustained Flaming | - | No failure. No Sustained flaming for 10 seconds observed throughout 240 minutes duration of test. |
| 2. Cotton Pad | - | No failure. No ignition or glowing of cotton pad observed throughout 240 minutes duration of test. |
| 3. 6mm Gap Gauge | - | 6mm gap gauge did not penetrate any gap. |
| 4. 25mm Gap Gauge | - | 25mm gap gauge did not penetrate any gap. |

Table 5.9: Integrity & Insulation Evaluation of Fire stop Silicone Sealant (6mm x 10mm) According to BS 476: Part 22: 1987: Amd 2014

8: Limitations

This report details the method of construction, specimen and test preparations, test conditions and the results which were obtained strictly following only the procedures outlined in BS 476: Part 22: 1987: Amd. 2014 and BS 476: Part 20:1987 (General Requirements).


The results only relate to the behavior of the specimen of the elements of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the elements in use nor do they reflect the actual behavior in fires.

The test results refer only to the items tested and does not apply to compounds with different dimensions or different components. Any interpretations or opinions expressed in this report are outside the scope of DAC accreditation. The test was carried out under standard conditions using testing equipment that is property of the Material Lab, Dubai. This report shall not be reproduced except in full, without the written approval of the laboratory.

Material Lab is an accredited independent laboratory. It is not associated / affiliated with any certification agency, manufacturer or producer in or out side of United Arab Emirates. Material Lab was not involved in any selection of the sampling procedure. The specimens were supplied by representatives of the client and certification agency.

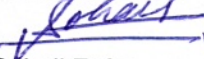
Although both the ASMACO Fire stop silicone sealant and ASMACO Gold Fire Retardant Multi-foam B2 were tested simultaneously in the same frame, two separate reports for sealants have been generated upon the request of the client. This report contains details of components and results obtained for the ASMACO Fire stop Silicone Sealant only. Report containing component details and results of the ASMACO Gold Fire Retardant Multi-foam B2 can be found in test report with Lab Report No. CR-170406/16738 SN 2/2.

Tested and Prepared by


Muhammad Zuhaib Saleem
Fire Testing Engineer

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Issue No. 1

Verified by

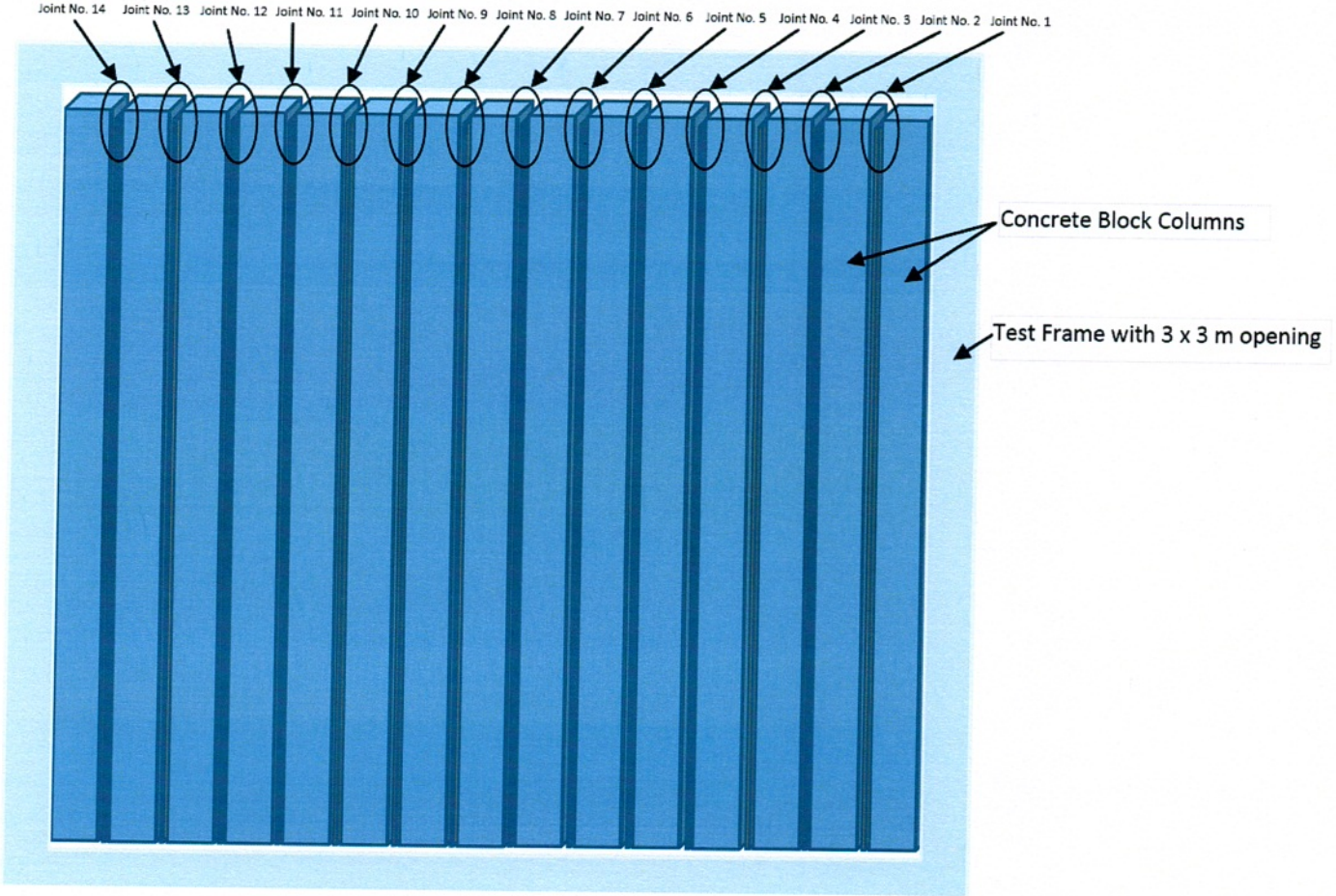

Sohail Zafar
Laboratory Manager

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Appendix 1:

Wall Construction Arrangements with Vertical Sealant Strips between Blocks:



| Joint No. | Width (mm) | Depth (mm) | Backup Type | Joint Type | Product |
|-----------|------------|------------|--------------------------|----------------|------------------------------|
| 1. | 15 | 200 | None | Full | Fire Retardant Multi-Foam B2 |
| 2. | 40 | 180 | (20 x 40)mm Mineral Wool | Only Fire Side | Fire Retardant Multi-Foam B2 |
| 3. | 15 | 180 | (20 x 15)mm Mineral Wool | Only Fire Side | Fire Retardant Multi-Foam B2 |
| 4. | 10 | 200 | None | Full | Fire Retardant Multi-Foam B2 |
| 5. | 25 | 15 | 30mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |
| 6. | 25 | 20 | (25 x 20)mm Mineral wool | Both Sides | Fire stop Silicone Sealant |
| 7. | 25 | 25 | 30mm dia Polyethylene | Both Sides | Fire stop Silicone Sealant |
| 8. | 30 | 180 | (20 x 30)mm Mineral Wool | Only Fire Side | Fire Retardant Multi-Foam B2 |
| 9. | 25 | 20 | 30mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |
| 10. | 25 | 20 | 30mm dia Ceramic Fiber | Only Fire Side | Fire stop Silicone Sealant |
| 11. | 10 | 10 | 12mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |
| 12. | 10 | 10 | 12mm dia Ceramic Fiber | Only Fire Side | Fire stop Silicone Sealant |
| 13. | 6 | 10 | 8mm dia Polyethylene | Both Sides | Fire stop Silicone Sealant |
| 14. | 6 | 10 | 8mm dia Ceramic Fiber | Both Sides | Fire stop Silicone Sealant |

Figure 2.1: Supporting construction arrangement, non – fire side view

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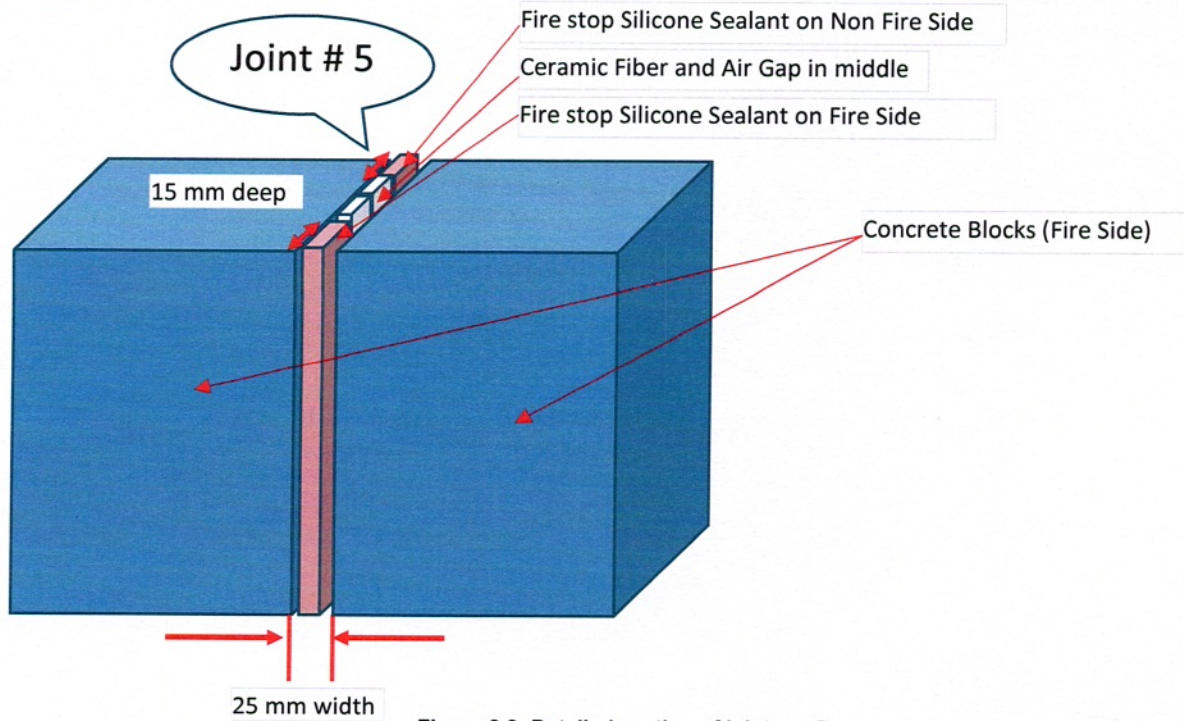


Figure 2.2: Detailed section of joint no. 5

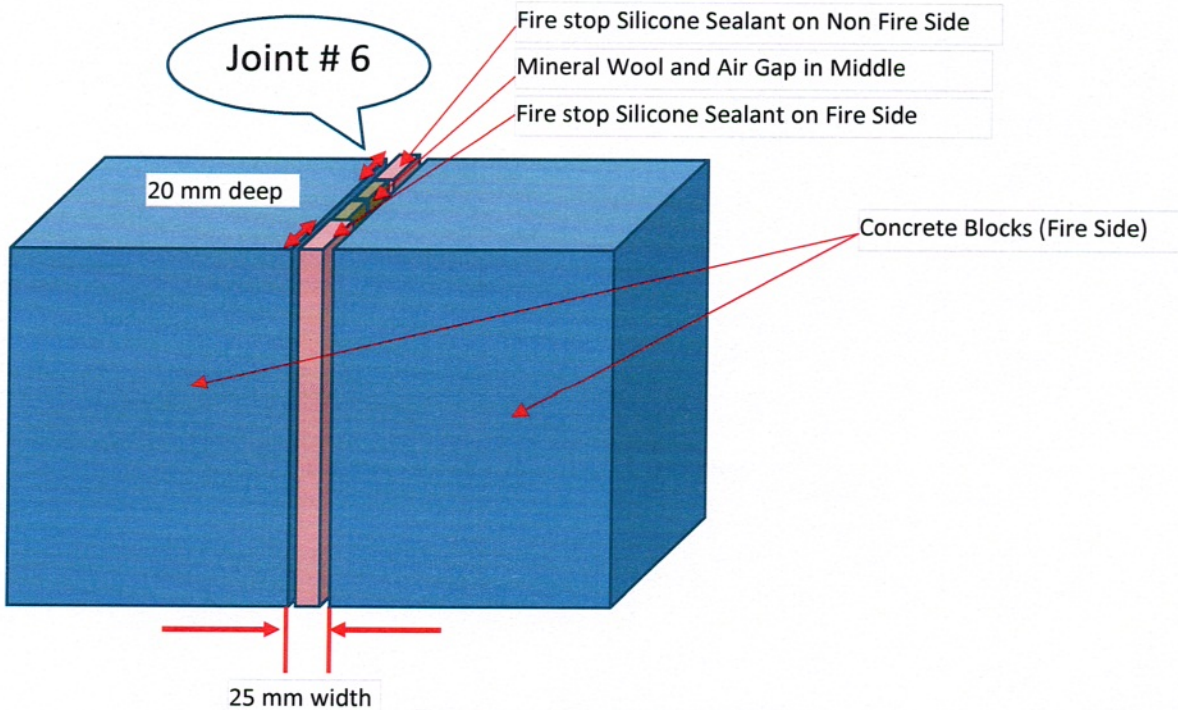


Figure 2.3: Detailed section of joint no. 6

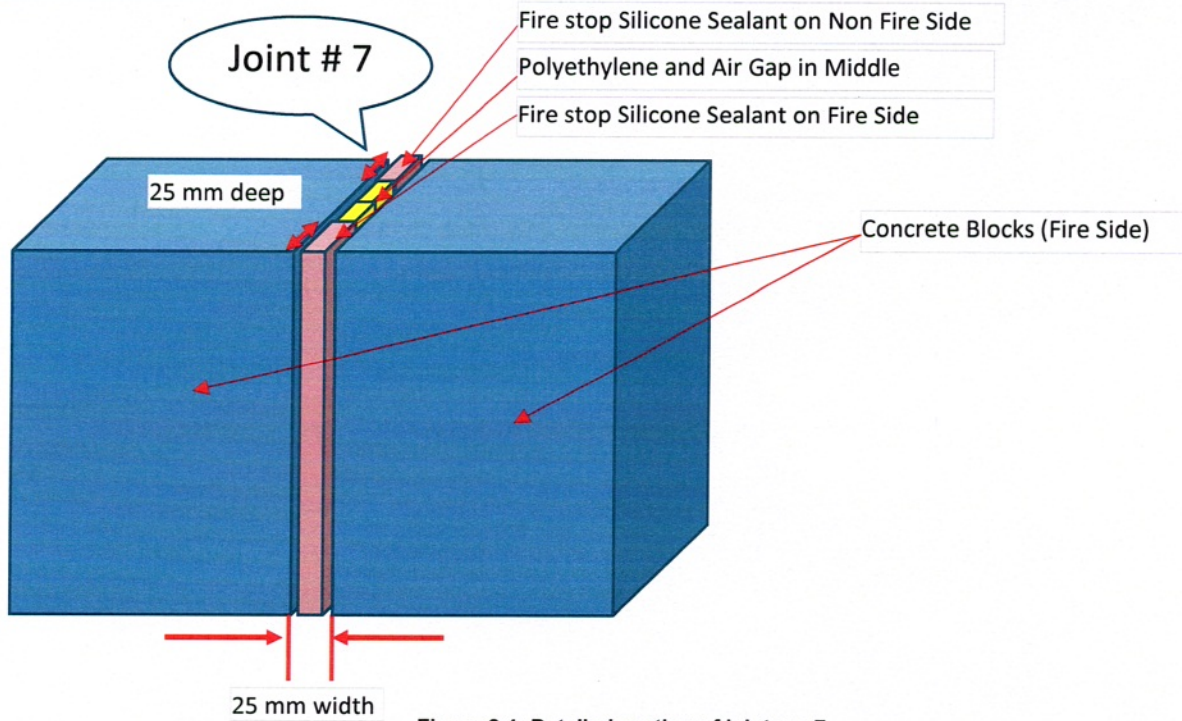


Figure 2.4: Detailed section of joint no. 7

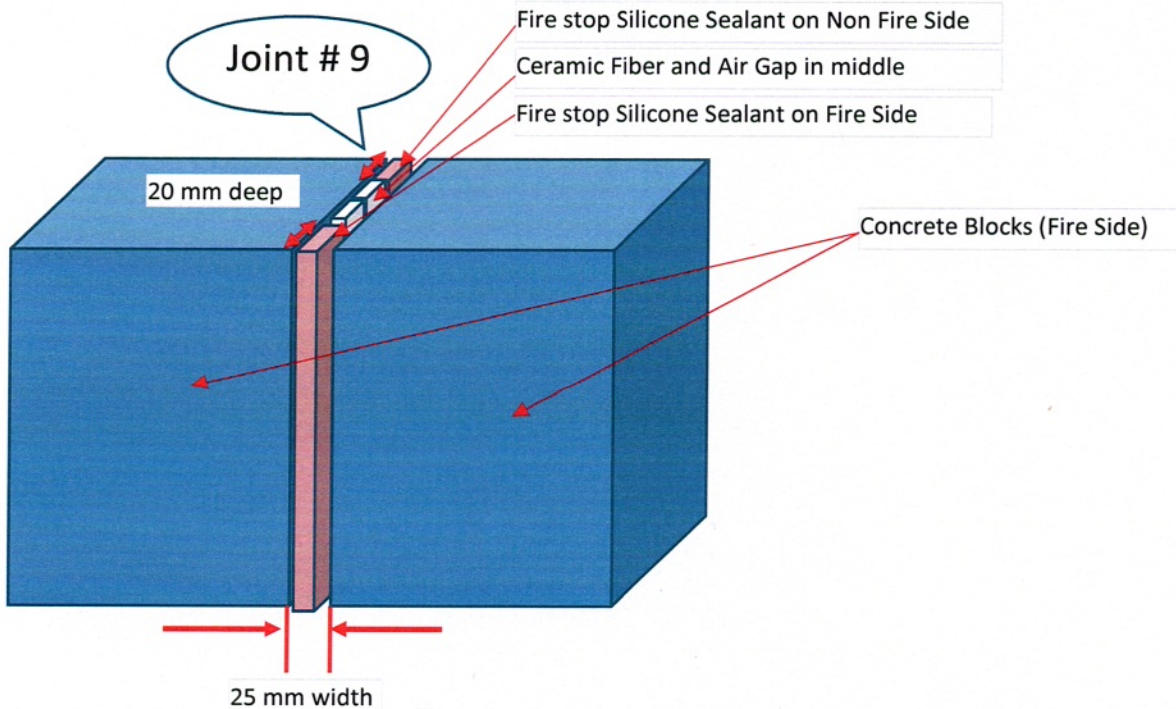


Figure 2.5: Detailed section of joint no. 9

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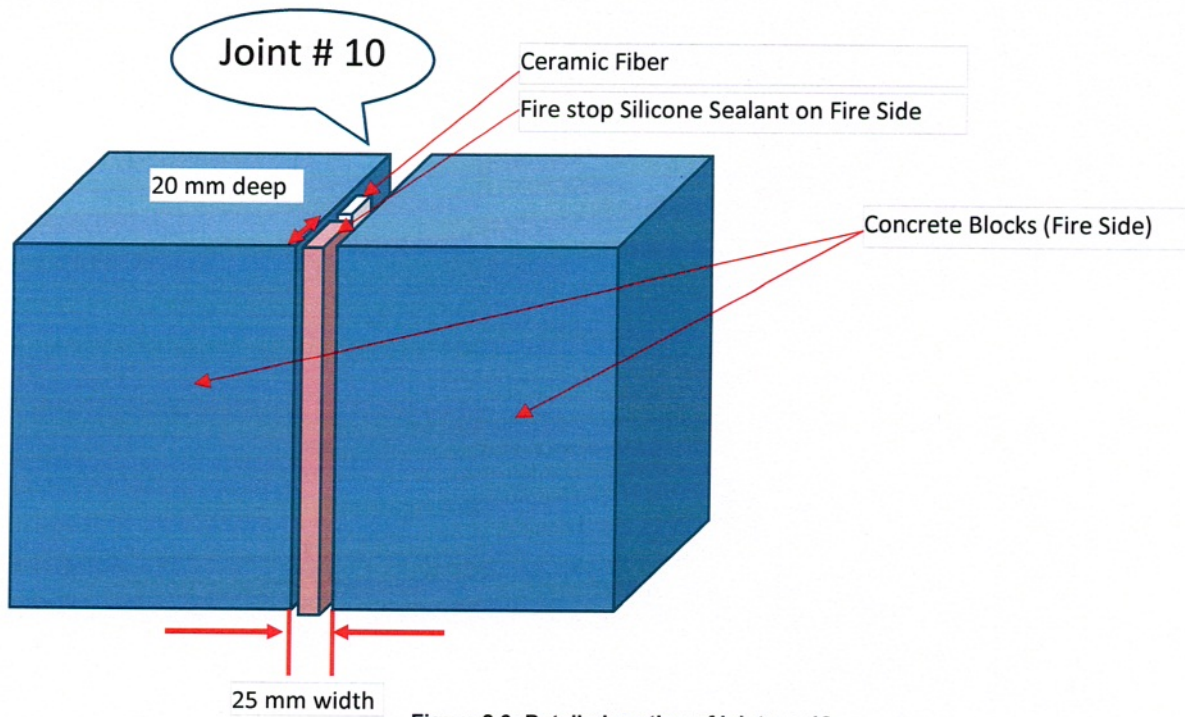


Figure 2.6: Detailed section of joint no. 10

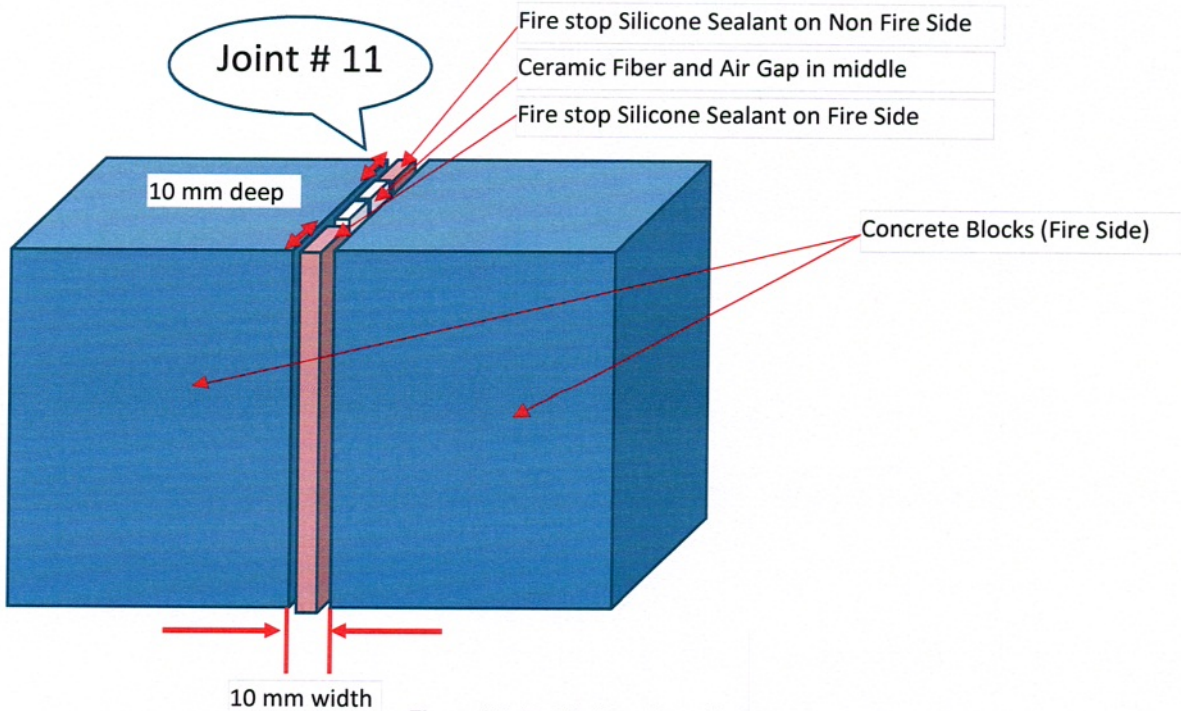


Figure 2.7: Detailed section of joint no. 11

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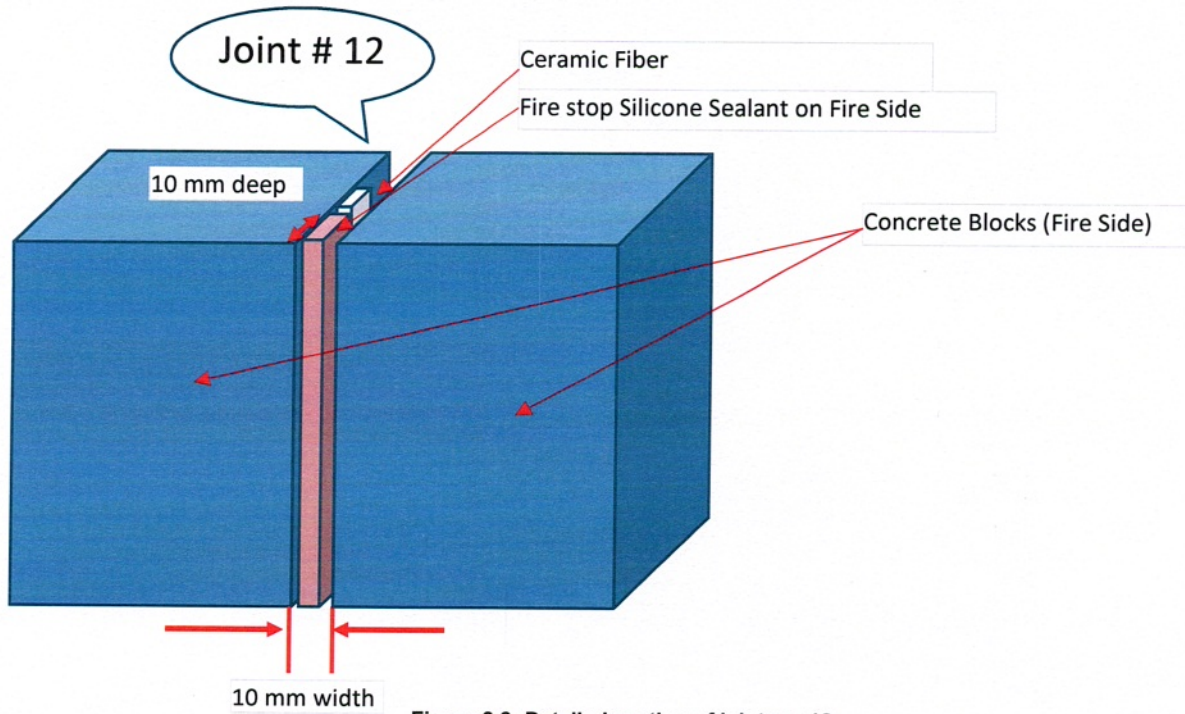


Figure 2.8: Detailed section of joint no. 12

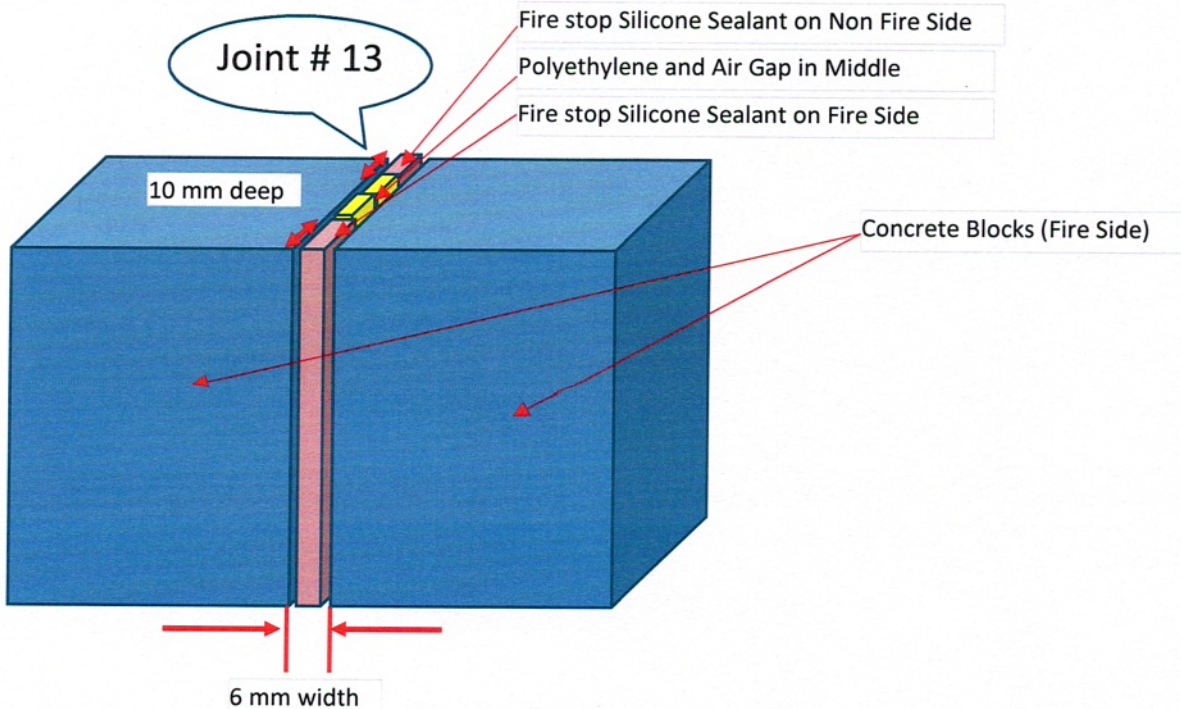


Figure 2.9: Detailed section of joint no. 13

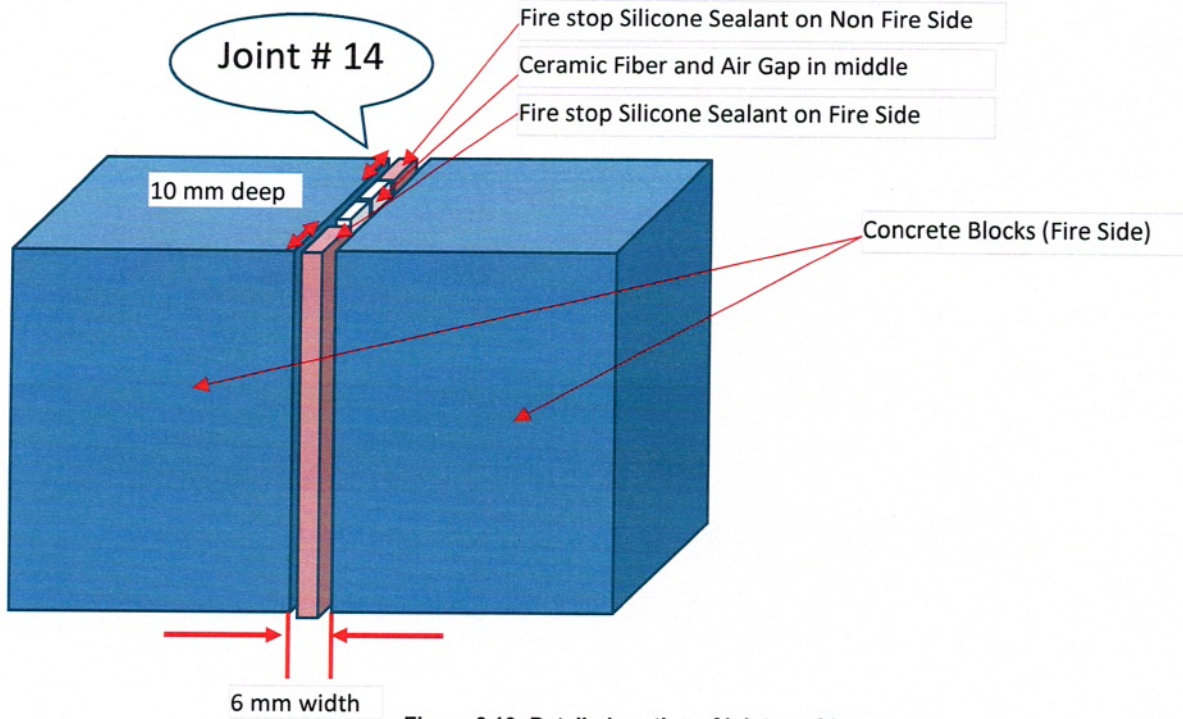


Figure 2.10: Detailed section of joint no. 14

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Appendix 2:

Data Results & Graphical Illustrations:

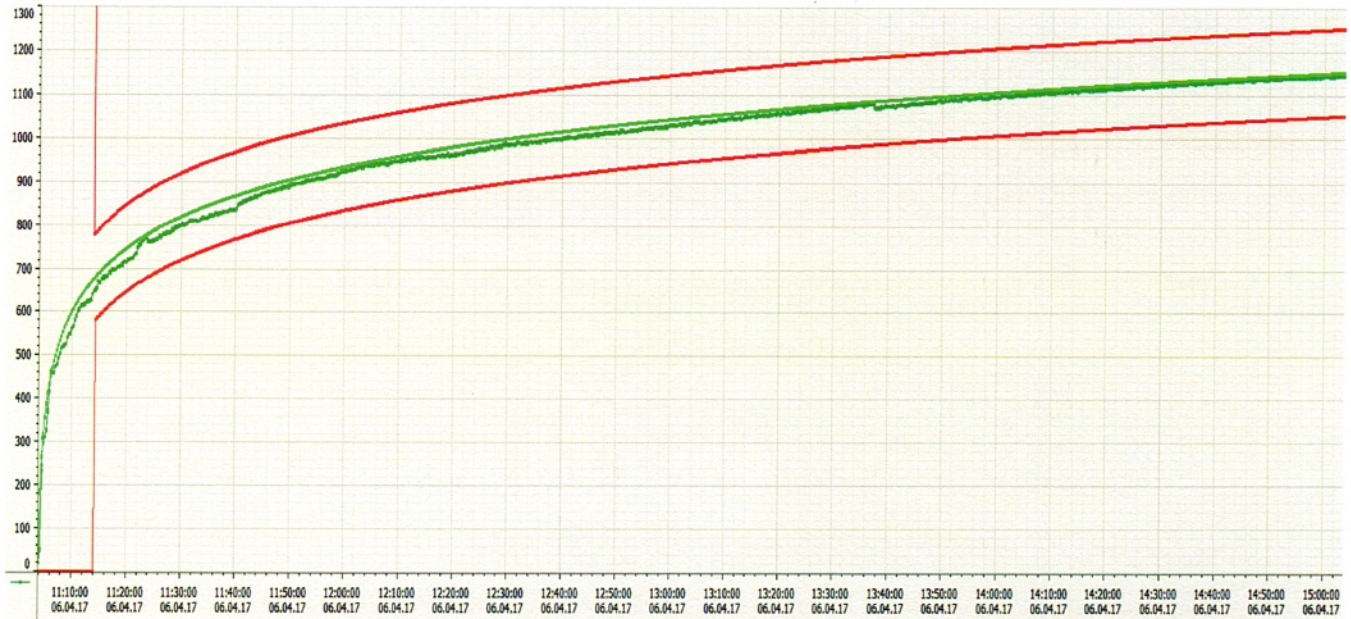


Figure 3: Furnace internal temperature graph for complete duration of test

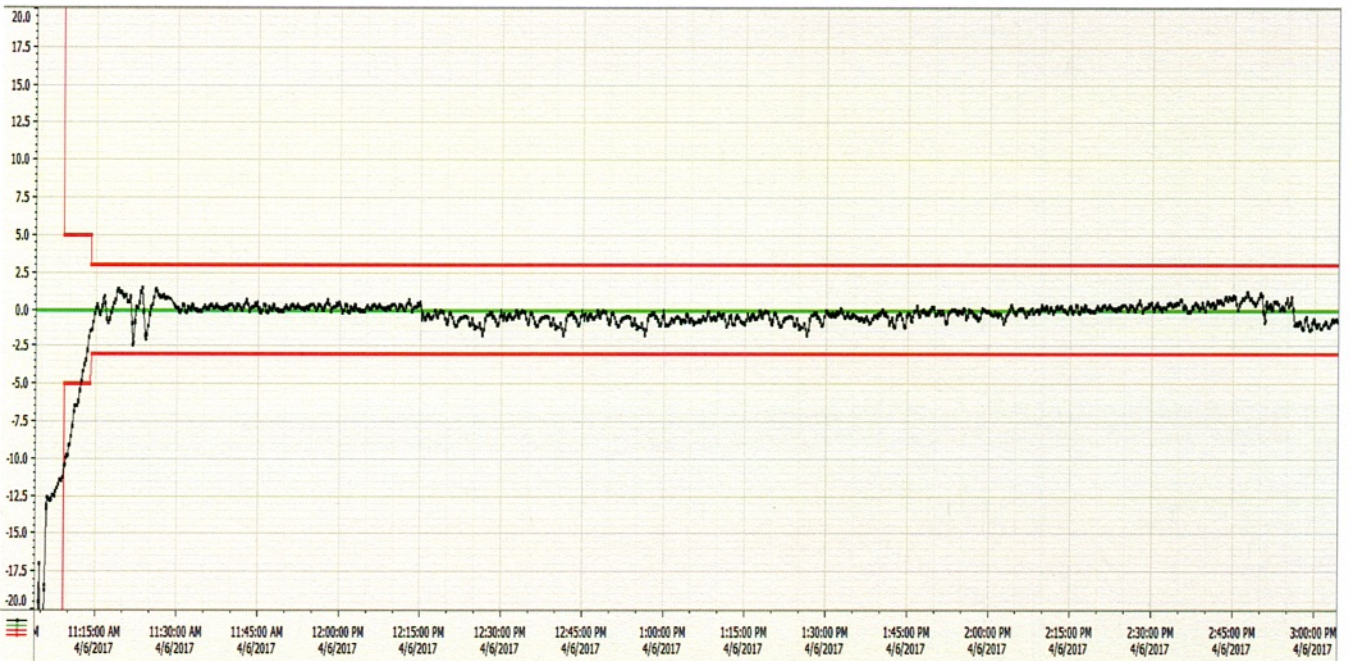


Figure 4: Furnace internal pressure graph for complete duration of test

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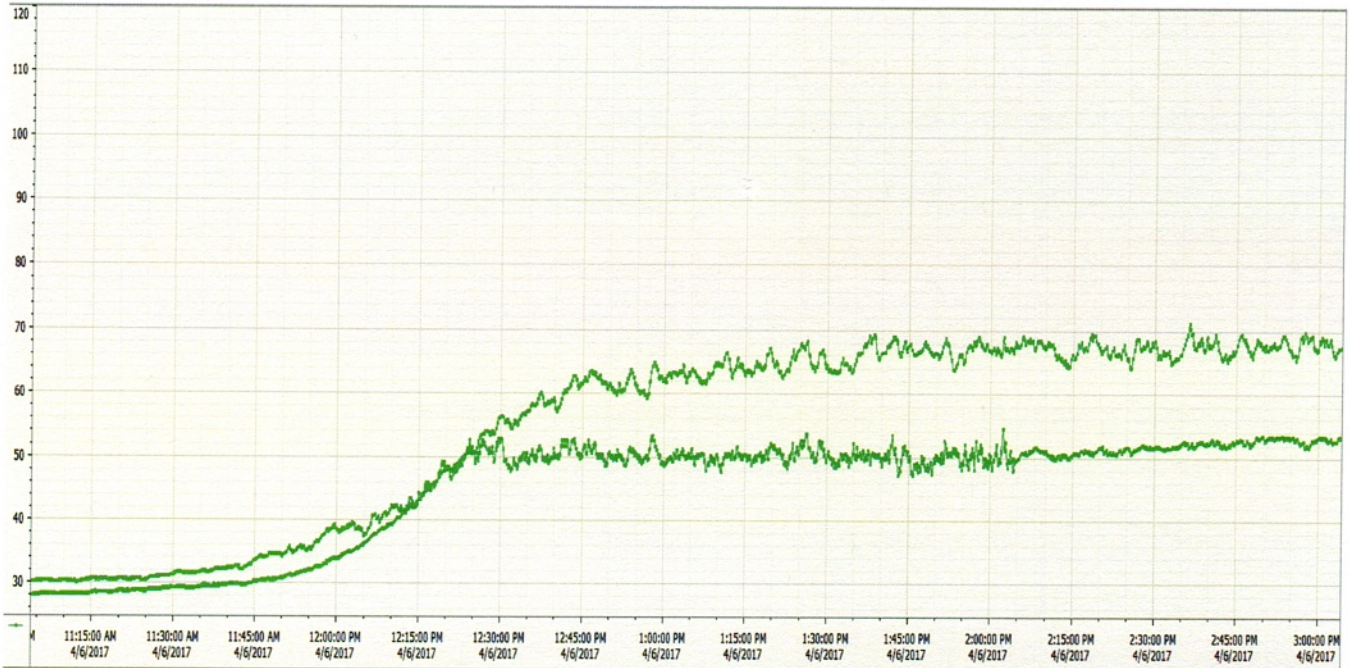


Figure 5: Thermocouples TC-9 & TC-10 representing unexposed surface temperature on joint no. 5 up till end of testing

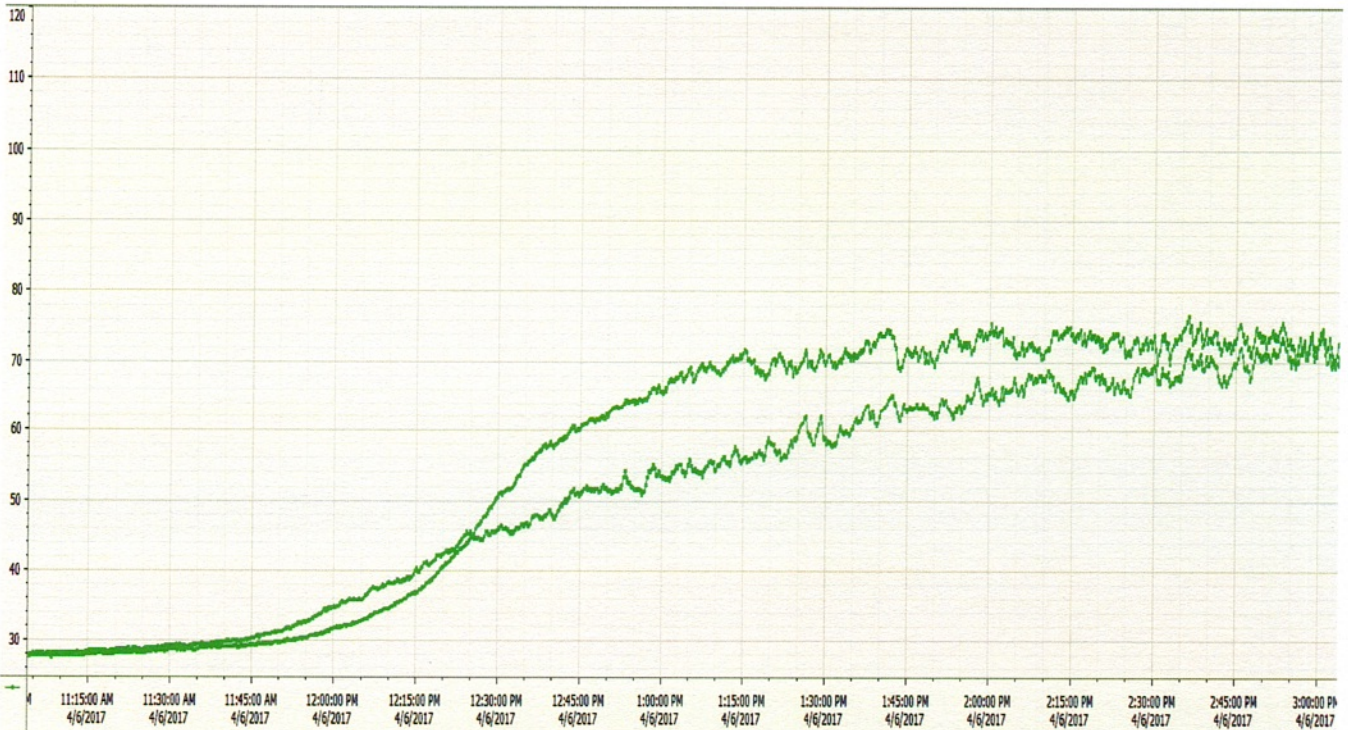


Figure 6: Thermocouples TC-11 & TC-12 representing unexposed surface temperature on joint no. 6 up till end of testing

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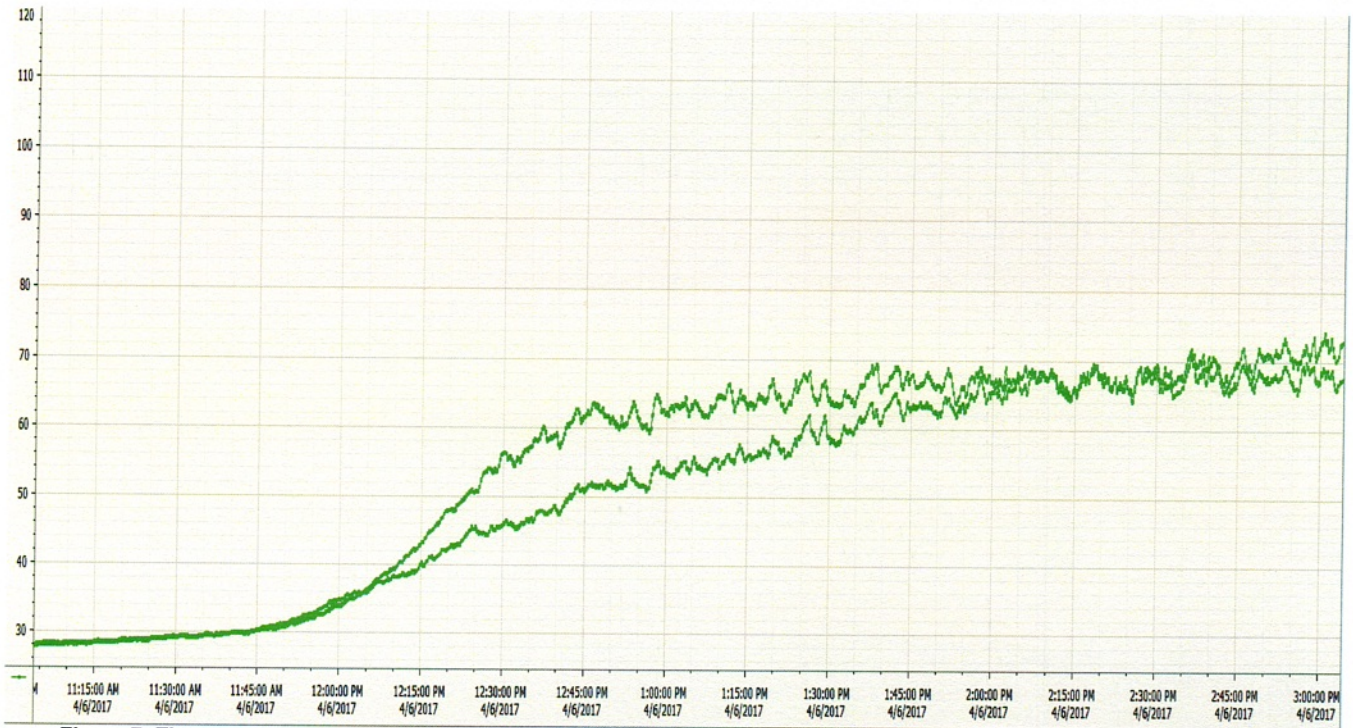


Figure 7: Thermocouples TC-13 & TC-14 representing unexposed surface temperature on joint no. 7 up till end of testing

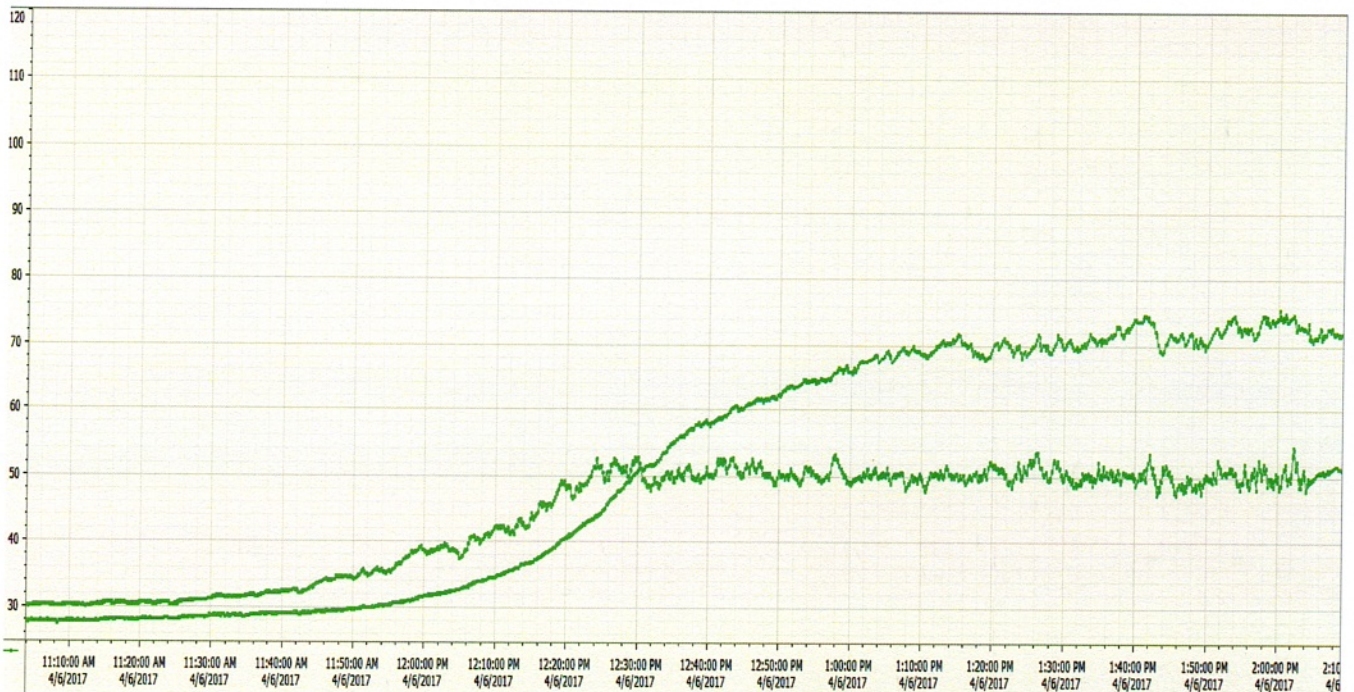


Figure 8: Thermocouples TC-17 & TC-18 representing unexposed surface temperature on joint no. 9 up till end of testing

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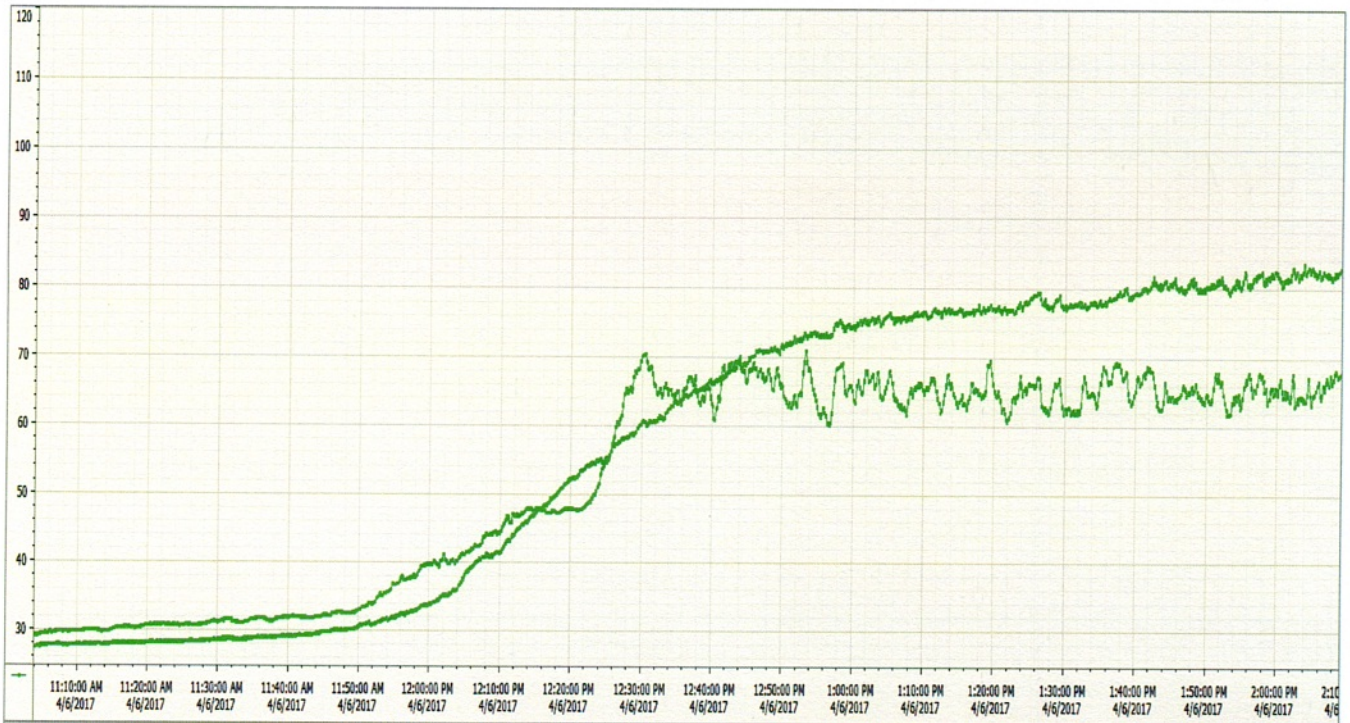


Figure 9: Thermocouples TC-19 & TC-20 representing unexposed surface temperature on joint no. 11 up till end of testing

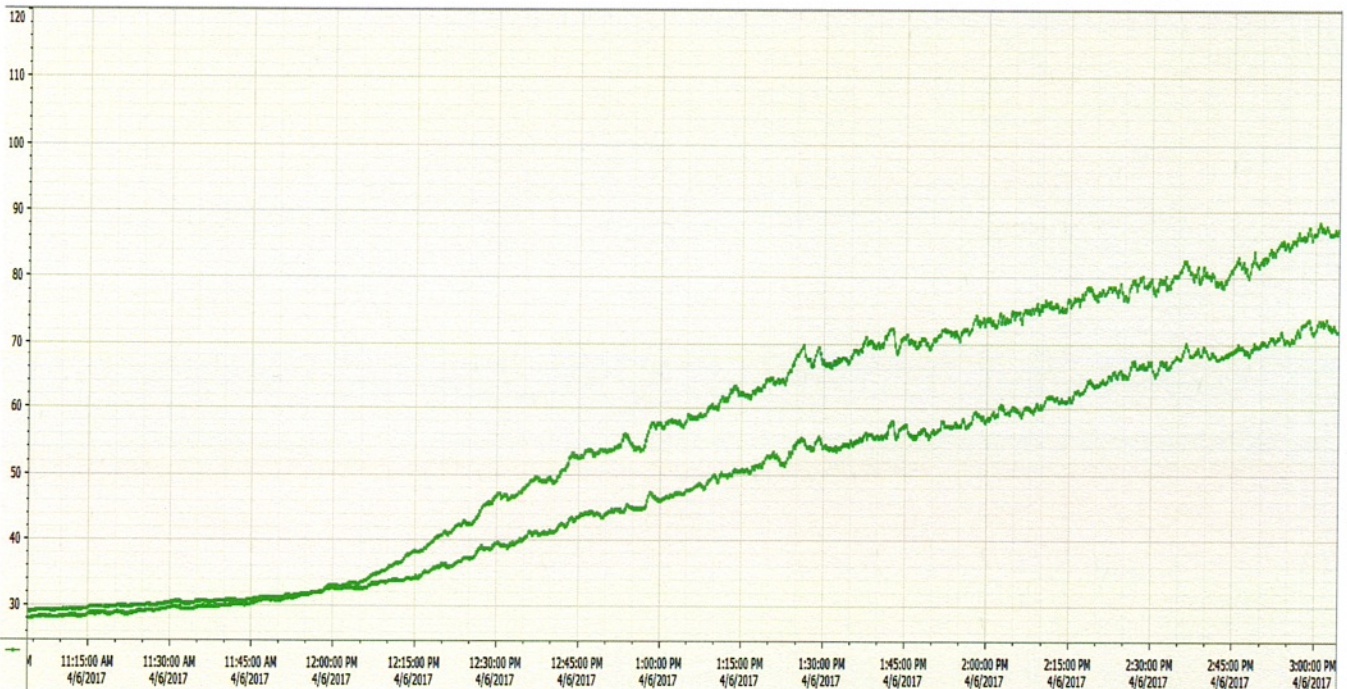


Figure 10: Thermocouples TC-21 & TC-22 representing unexposed surface temperature on joint no. 13 up till end of testing

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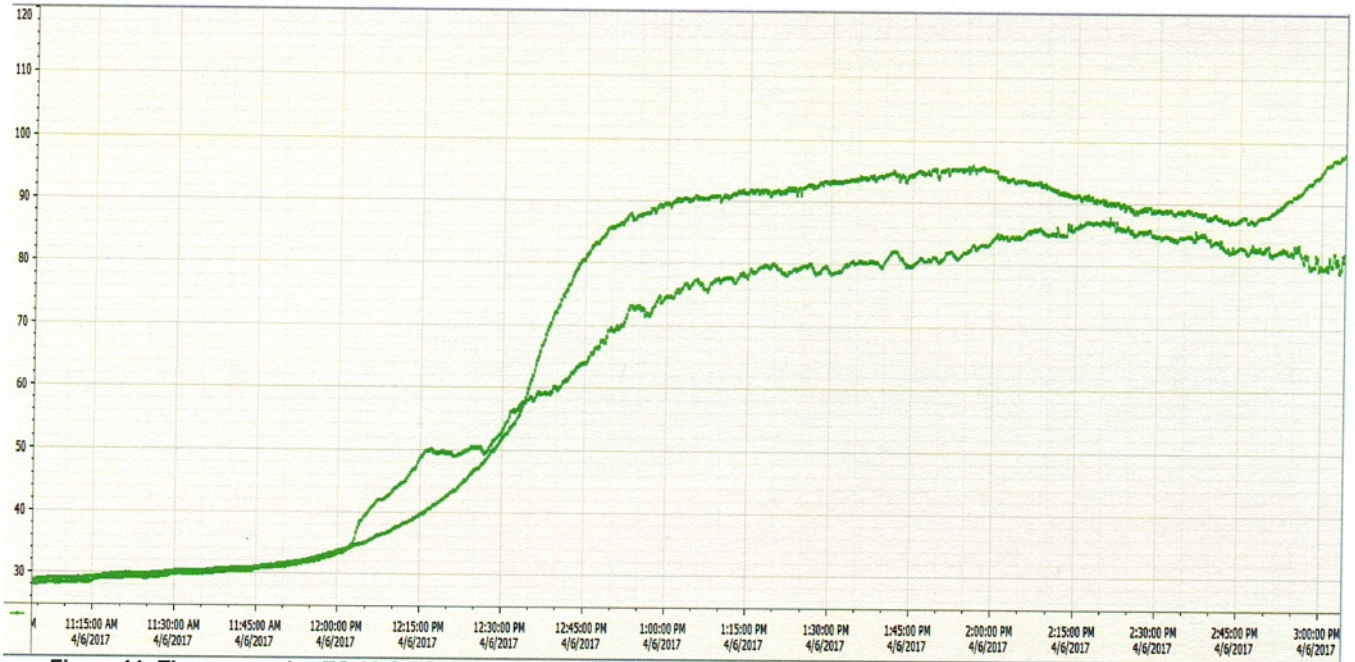


Figure 11: Thermocouples TC-23 & TC-24 representing unexposed surface temperature on joint no. 14 up till end of testing



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Appendix 3:

Instrumentation Positioning (All dimensions are in 'mm'):

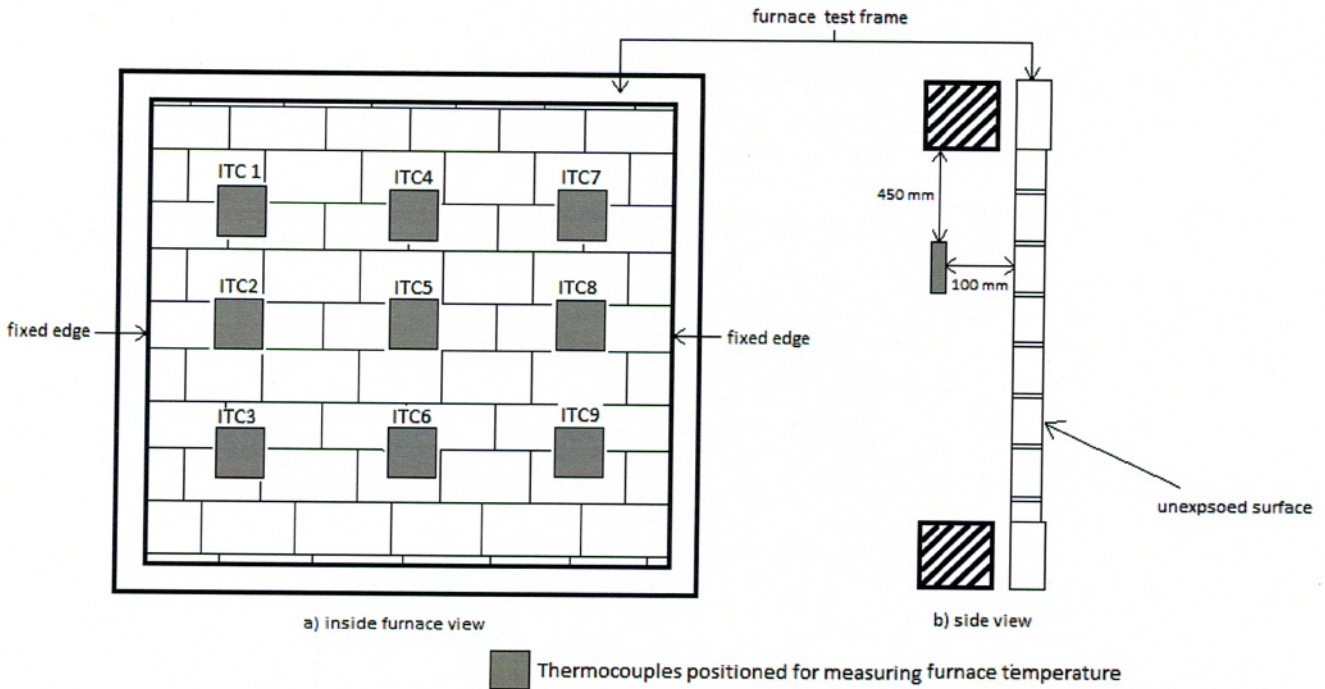
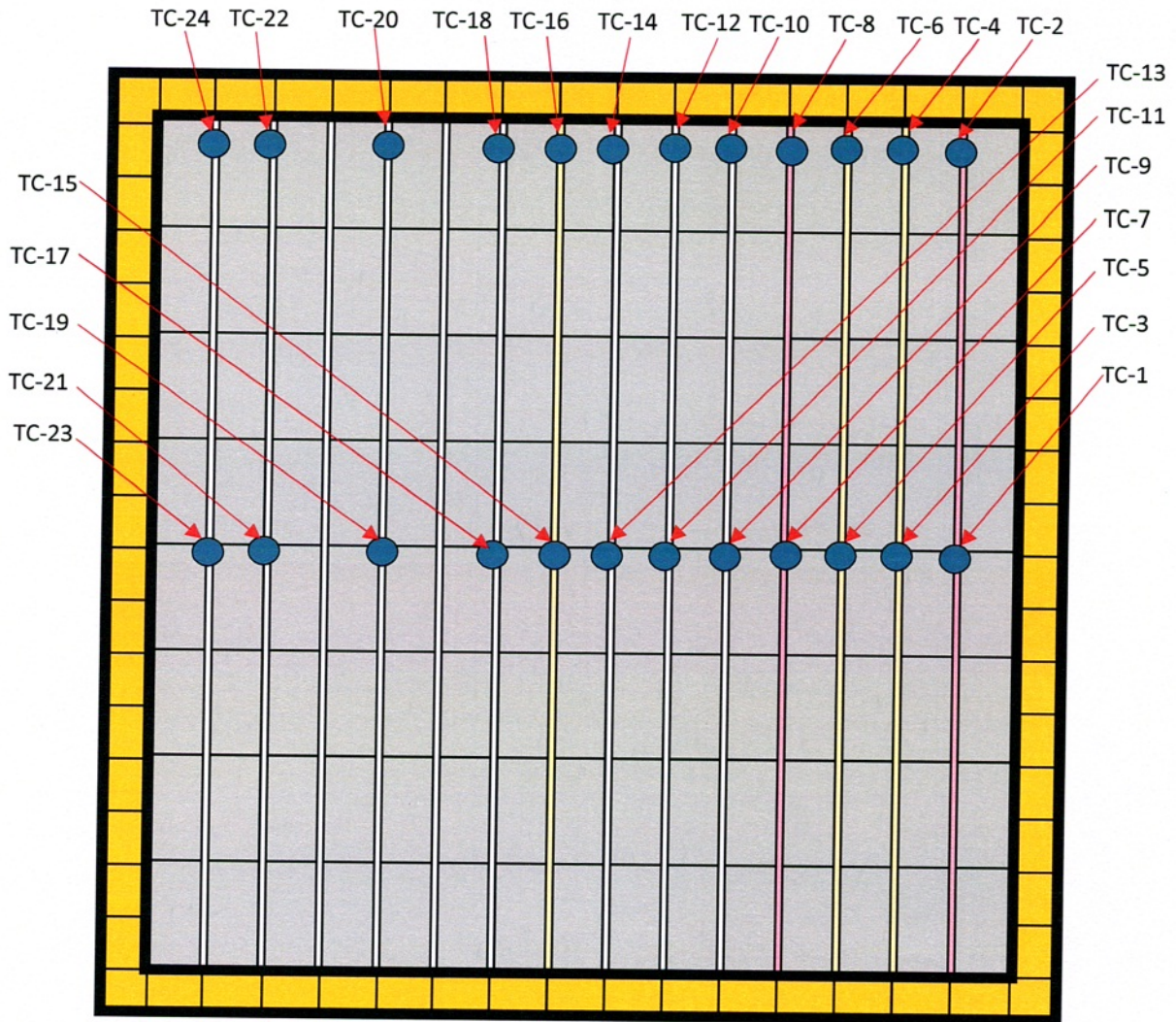


Figure 12: Front view of furnace showing positions of furnace internal thermocouple





| Joint No. | Width (mm) | Depth (mm) | TC No. @ Head | TC No. @ Mid-Height | Product |
|-----------|------------|------------|---------------|---------------------|------------------------------|
| 1. | 15 | 200 | 2 | 1 | Fire Retardant Multi-Foam B2 |
| 2. | 40 | 180 | 4 | 3 | Fire Retardant Multi-Foam B2 |
| 3. | 15 | 180 | 6 | 5 | Fire Retardant Multi-Foam B2 |
| 4. | 10 | 200 | 8 | 7 | Fire Retardant Multi-Foam B2 |
| 5. | 25 | 15 | 10 | 9 | Fire stop Silicone Sealant |
| 6. | 25 | 20 | 12 | 11 | Fire stop Silicone Sealant |
| 7. | 25 | 25 | 14 | 13 | Fire stop Silicone Sealant |
| 8. | 30 | 180 | 16 | 15 | Fire Retardant Multi-Foam B2 |
| 9. | 25 | 20 | 18 | 17 | Fire stop Silicone Sealant |
| 11. | 10 | 10 | 20 | 19 | Fire stop Silicone Sealant |
| 13. | 6 | 10 | 22 | 21 | Fire stop Silicone Sealant |
| 14. | 6 | 10 | 24 | 23 | Fire stop Silicone Sealant |

Figure13: Front view of specimen wall showing positions of thermocouples used to determine maximum temperature of unexposed surface of specimen wall

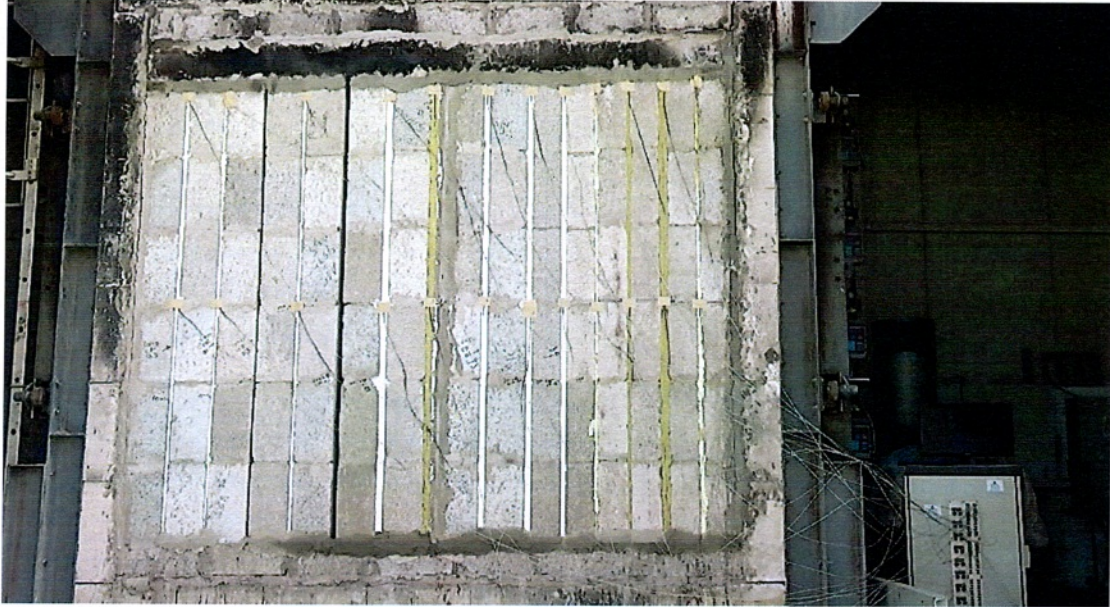
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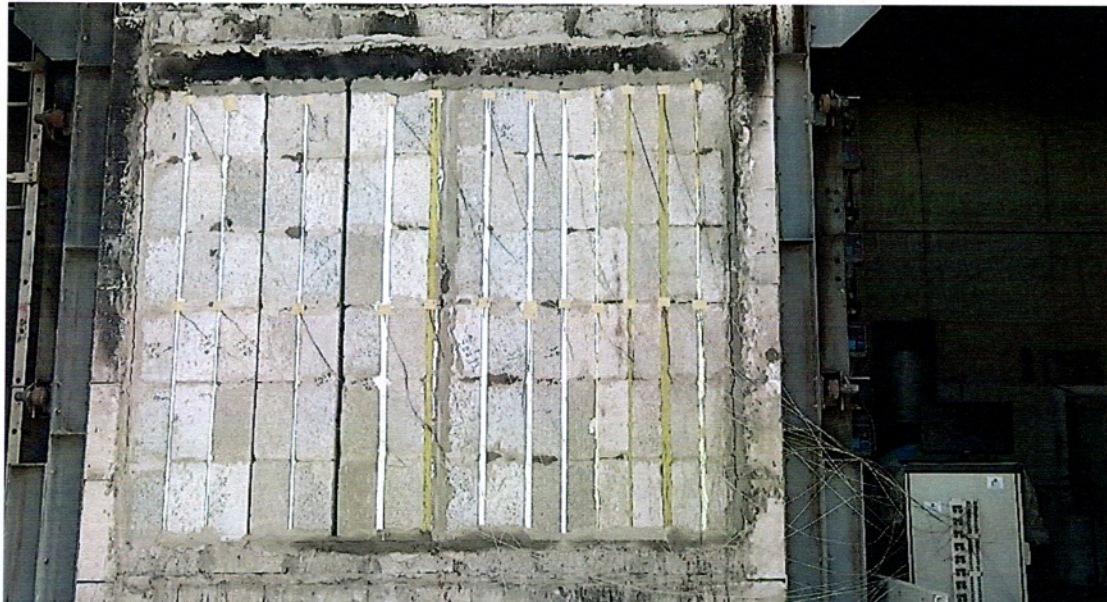
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Appendix 4:

Photographs



Specimen after 30mins of testing



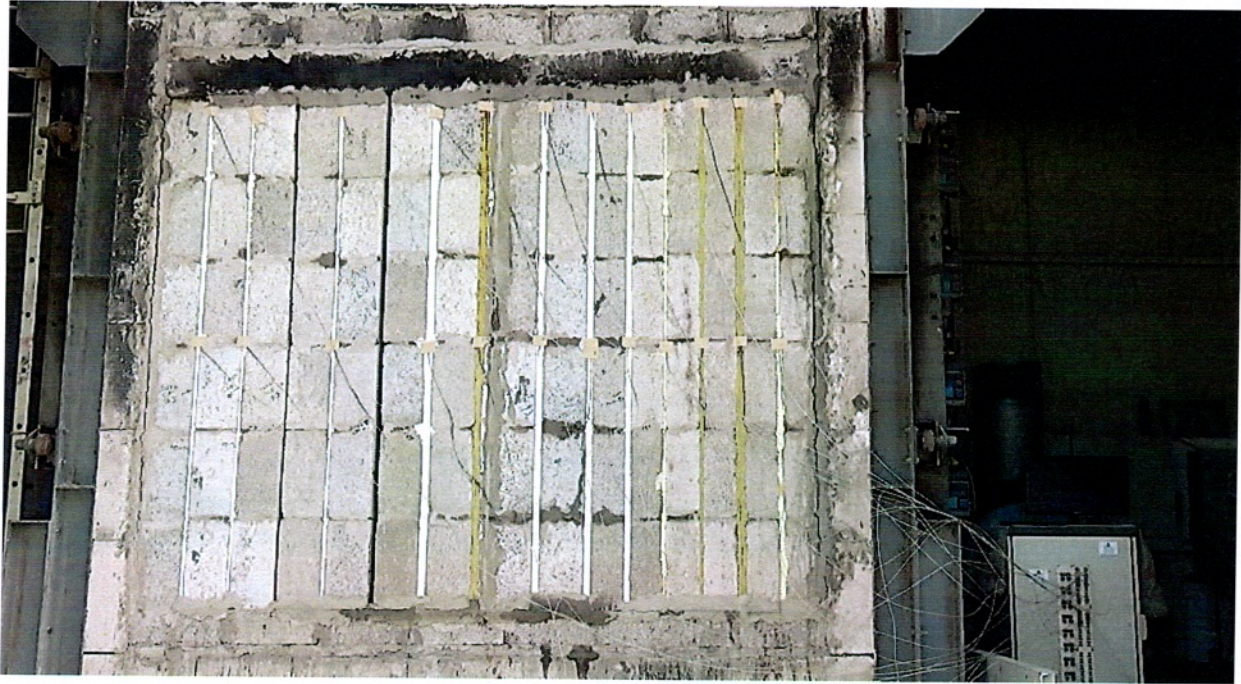
Specimens after 60mins of testing

Figure 14.1: Unexposed side of specimen during exposure to fire

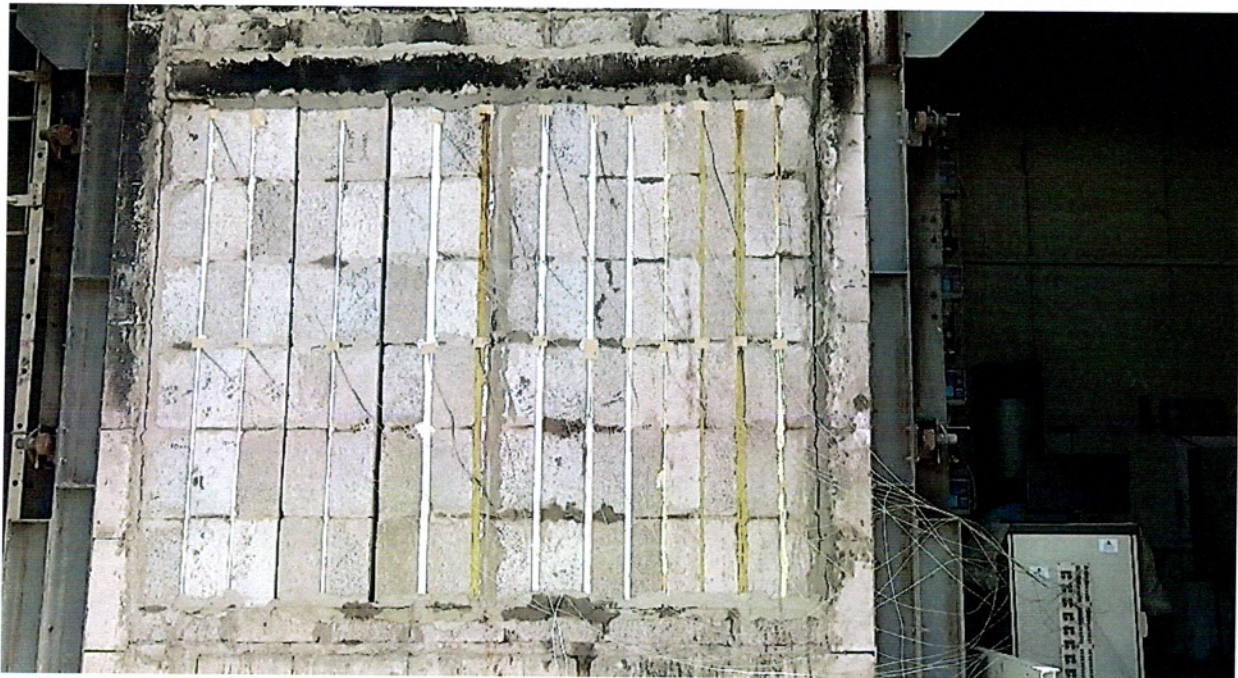
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Specimen after 90mins of testing



Specimen after 120mins of testing

Figure 14.2: Unexposed side of specimen during exposure to fire

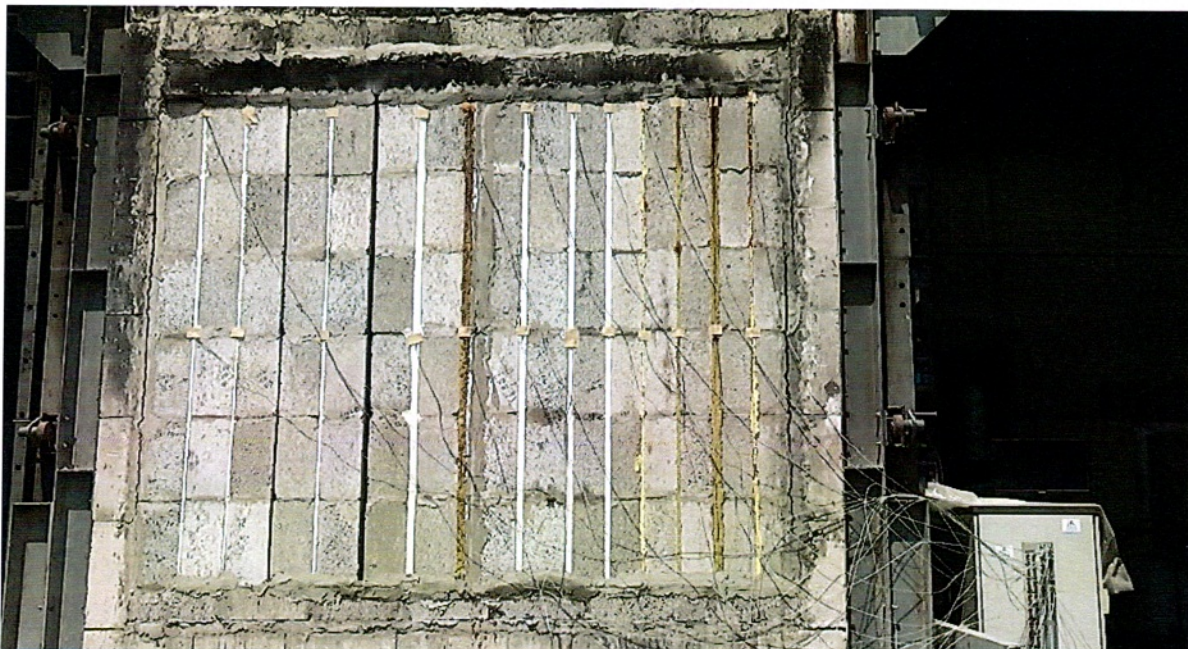
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Specimen after 180mins of testing



Specimen after 240mins of testing

Figure 14.3: Unexposed side of specimen during exposure to fire

--- END OF TEST REPORT ---

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