



# Fire-resistance test on fire collars protecting a plasterboard wall penetrated by a single service

## Test Report

**Author:** Peter Gordon  
**Report number:** FSP 2040  
**Date:** 23 September 2019

**Client:** IG6 Pty Ltd as trustee for the IG6 IP Trust

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AUTHOR	REVIEWED BY	AUTHORISED BY
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23 September 2019	23 September 2019	23 September 2019

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# Fire-resistance test on fire collars protecting a plasterboard wall penetrated by a single service

## Sponsored Investigation No. FSP 2040

### 1 Introduction

#### 1.1 Identification of specimen

The sponsor identified the specimen as a retrofit fire collar protecting a steel framed plasterboard wall system penetrated by a single service.

#### 1.2 Sponsor

IG6 Pty Ltd as trustee for the IG6 IP Trust  
3 Skirmish Court  
Victoria Point Qld 4165

#### 1.3 Manufacturer

Snap Fire Systems Pty Ltd  
Building A, 1343 Wynnum Road  
Tingalpa QLD 4173

#### 1.4 Test standard

Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2014, Fire-resistance tests of elements of construction.

Section 10: Service penetrations and control joints

#### 1.5 Reference standard

Australian Standard 4072, Components for the protection of openings in fire-resistant separating elements, Part 1 - 2005, Service penetrations and control joints.

#### 1.6 Test number

CSIRO Reference test number: FS 4910/4434

## 1.7 Test date

The fire-resistance test was conducted on 20 August 2019.

# 2 Description of specimen

## 2.1 General

The wall system was described as a 116-mm thick plasterboard lined steel framed wall comprising two layers of 13-mm thick Firestop plasterboard on each side of 64-mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120.

The wall was penetrated by a single service.

The pipe used in the test was stated to be manufactured in accordance with:

- AS/NZS 5065 'Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications'

For the purpose of the test, the specimen was referenced as Specimen 1. Documents containing a complete description of the specimen were supplied by the sponsor and are retained on file.

### Specimen 1 – HP250R-B Retrofit fire collar protecting a 250-mm HDPE pipe.

The SNAP retrofit HP250R-B collar comprised a 0.95-mm steel casing with a 279-mm inner diameter and a 453-mm diameter base flange. The 184-mm high collar casing incorporated two strips of Intumesh intumescent material, 910-mm x 179-mm x 12-mm thick and 958-mm x 179-mm x 2.5-mm thick. The closing mechanism comprised five stainless steel springs, with a nylon fuse link, and a 949-mm x 174-mm 316 stainless steel mesh located in between the intumescent strips, as shown in drawing numbered HP 250R-B-T, dated 15 August 2017, by Snap Fire Systems Pty Ltd. The Snap collar was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 5 mounting brackets using 8-mm threaded rod and 12 x M8 nuts.

The annular gap between the pipe and plasterboard on both sides of the wall was protected with a bead of HB Fullers Firesound sealant.

The penetrating service comprised a 250-mm OD PE100 pipe, with a wall thickness of 7.85-mm fitted through the collar's sleeve. The pipe penetrated the wall through a 260-mm diameter opening and projected horizontally 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm, and 1500-mm from the unexposed face of the plasterboard wall, as shown in drawing titled "Specimen #1, 250 HDPE Pipe & HP250R-B", dated 19 August 2019, provided by Snap Fire Systems Pty Ltd. The pipe was left open at the unexposed end and sealed with a Superwool plug on the exposed end.

## 2.2 Dimensions

The wall specimen was nominally 1150-mm wide x 1150-mm high x 116-mm thick. All dimensions are nominal.

## 2.3 Orientation

The plasterboard wall was placed vertically against the furnace chamber and subjected to fire exposure from one side only.

## 2.4 Conditioning

The specimen wall was delivered on 19<sup>th</sup> August 2019 and stored under laboratory atmospheric conditions until the test date.

## 2.5 Selection, construction and installation of the specimen and the supporting construction

The supporting wall construction and specimen installation was organised by the sponsor. CSIRO was not involved in the selection of the materials.

# 3 Documentation

The following documents were supplied or referenced by the sponsor as a complete description of the specimen and should be read in conjunction with this report:

- Drawing titled “Specimen #1, 250 HDPE Pipe & HP250R-B” dated 19 August 2019”, provided by Snap Fire Systems Pty Ltd.
- Drawing numbered HP 250R-B-T dated 15 August 2017, by Snap Fire Systems Pty Ltd.

# 4 Equipment

## 4.1 Furnace

The furnace had a nominal opening of 1000-mm x 1000-mm for attachment of vertical or horizontal specimens.

The furnace was lined with refractory bricks and materials with the thermal properties as specified in AS 1530.4-2014 and was heated by combustion of a mixture of natural gas and air.

## 4.2 Temperature

The temperature in the furnace chamber was measured by four type K, 3-mm diameter, and 310 stainless steel Mineral Insulated Metal Sheathed (MIMS) thermocouples. Each thermocouple was housed in high-nickel steel tubes opened at the exposed end.

The temperatures of the specimen were measured by glass-fibre insulated and sheathed K-type thermocouples with a wire diameter of 0.5-mm.

Location of the thermocouples on the unexposed face of the specimen are described in Appendix A.

## 4.3 Measurement system

The primary measurement system comprised a multiple-channel data logger, scanning at one minute intervals during the test.

## 5 Ambient temperature

The temperature of the test area was 18°C at the commencement of the test.

## 6 Departure from standard

There were no departures from the requirements of AS 1530.4-2014.

## 7 Termination of test

The test was terminated at 121 minutes by the agreement with the sponsor.

## 8 Test results

### 8.1 Critical observations

The following observations were made during the fire-resistance test:

Time	Observation
1 minute -	Smoke is being emitted at the base of specimen near the plasterboard wall between the collar and pipe on the unexposed side.
2 minutes -	Smoke has begun to flue from the end of the pipe of Specimen 1.
3 minutes -	Condensation is visible on the top of the pipe of Specimen 1, near the collar.
4 minutes -	The smoke emitted between the collar and pipe of Specimen 1 has increased. The fluing of smoke from the end of the pipe has increased.
6 minutes -	An orange glow of the furnace can be seen through the centre of the pipe.
7 minutes -	The end of the pipe has begun to close off.
9 minutes -	The red glow through the pipe of Specimen 1 can no longer be seen, however smoke continues to flue through the end of the pipe.
10 minutes -	The smoke emitted between the collar and the pipe of Specimen 1 has reduced.
13 minutes -	The smoke fluing from the end of the pipe of Specimen 1 briefly ceased then resumed fluing with increased intensity.
14 minutes -	The level of smoke emitted between the collar and the pipe has increased
16 minutes -	A large gap has begun to form between the top of pipe and the inside of the collar where the pipe has deformed and begun to collapse. The pipe has moved inwards towards the furnace approximately 7-mm. Cotton pad applied over the gap. No ignition noted at this time.
17 minutes -	Smoke has ceased fluing from the end of the pipe of Specimen 1.
20 minutes -	Cotton pad applied over the gap. No ignition noted at that time.
23 minutes -	Intumescent material has filled the large gap inside the collar where the pipe had collapsed.



- 35 minutes - Light smoke is being emitted between the collar and the pipe of Specimen 1.
- 40 minutes - Intumescent material continues to fill the large gap inside the collar.
- 60 minutes - No further visible change to specimen.
- 121 minutes - Test terminated.

## 8.2 Furnace temperature

Figure 1 shows the standard curves of temperature versus time for heating the furnace chamber and the actual curves of average and maximum temperature versus time recorded during the heating period.

## 8.3 Furnace severity

Figure 2 shows the curve of furnace severity versus time during the heating period.

## 8.4 Specimen temperature

Figure 3 shows the curve of temperature versus time associated with Specimen 1.

## 8.5 Performance

Performance observed in respect of the following AS 1530.4-2014 criteria:

Specimen 1 – HP250R-B Retrofit fire collar protecting a 250-mm HDPE pipe.

Structural adequacy	-	not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	no failure at 121 minutes

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in this standard. Any significant variation with respect to size, constructional details, loads, stresses, and edge or end conditions other than those 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.

# 9 Fire-resistance level (FRL)

For the purpose of building regulations in Australia, the FRL of the test specimen was: -

Specimen 1 - -/120/120

The fire-resistance level is applicable when the system is exposed to fire from either direction.

The fire-resistance level (FRL) is limited to that of the separating element.

For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be noted that a single test method will not provide a full assessment of fire hazard under all fire conditions.

## 10 Field of direct application of test results

The results of the fire test contained in this test report are directly applicable, without reference to the testing authority, to similar constructions where one or more changes listed in Clause 10.11 of AS 1530.4-2014, have been made provided no individual component is removed or reduced.

## 11 Tested by

A handwritten signature in blue ink, appearing to read 'Peter Gordon', is positioned above the printed name.

Peter Gordon  
Testing Officer

# Appendices

## Appendix A – Measurement location

Specimen	T/C Position	T/C designation
Specimen 1 Mueller Pipelines HDPE 250-mm OD x 7.85-mm wall thickness, pipe protected with HP250R-B fire collar and Firesound Mastic.	On Plasterboard wall, 25-mm above Collar	S1
	On Plasterboard wall, 25-mm right of Collar	S2
	On top of Collar 25-mm from Plasterboard wall	S3
	On right side of Collar 25-mm from Plasterboard wall	S4
	On top of Pipe 25-mm from Collar	S5
	On right side of Pipe 25-mm from Collar	S6
Rover	Rover	S7
Ambient	Ambient	S8

Appendix B – Photographs



**PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMEN 1 PRIOR TO TESTING**



**PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMEN 1 PRIOR TO TESTING**



**PHOTOGRAPH 3 – SPECIMEN 1 AFTER 3 MINUTES OF TESTING**



**PHOTOGRAPH 4 – SPECIMEN 1 AFTER 7 MINUTES OF TESTING**



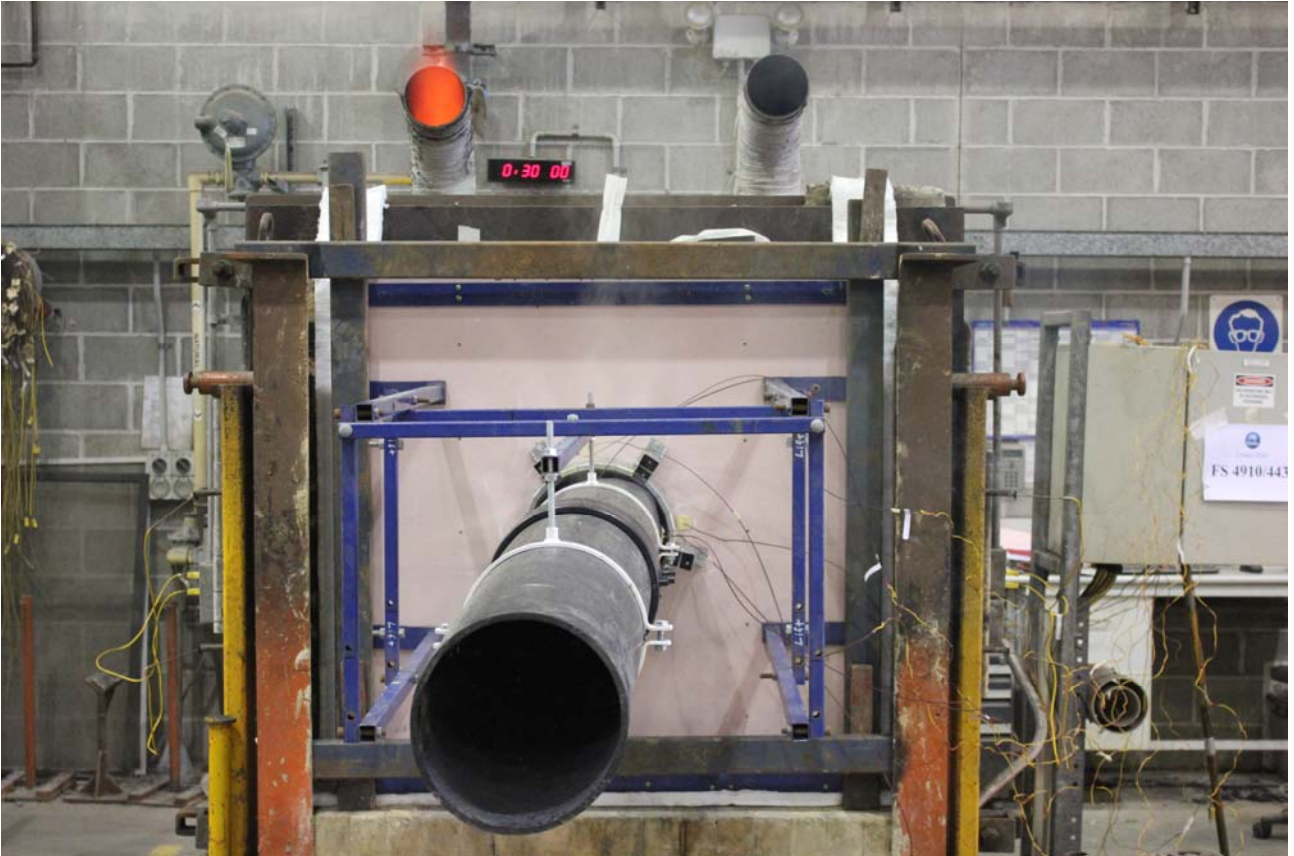
**PHOTOGRAPH 5 – SPECIMEN 1 AFTER 9 MINUTES OF TESTING**



**PHOTOGRAPH 6 – SPECIMEN 1 AFTER 16 MINUTES OF TESTING**



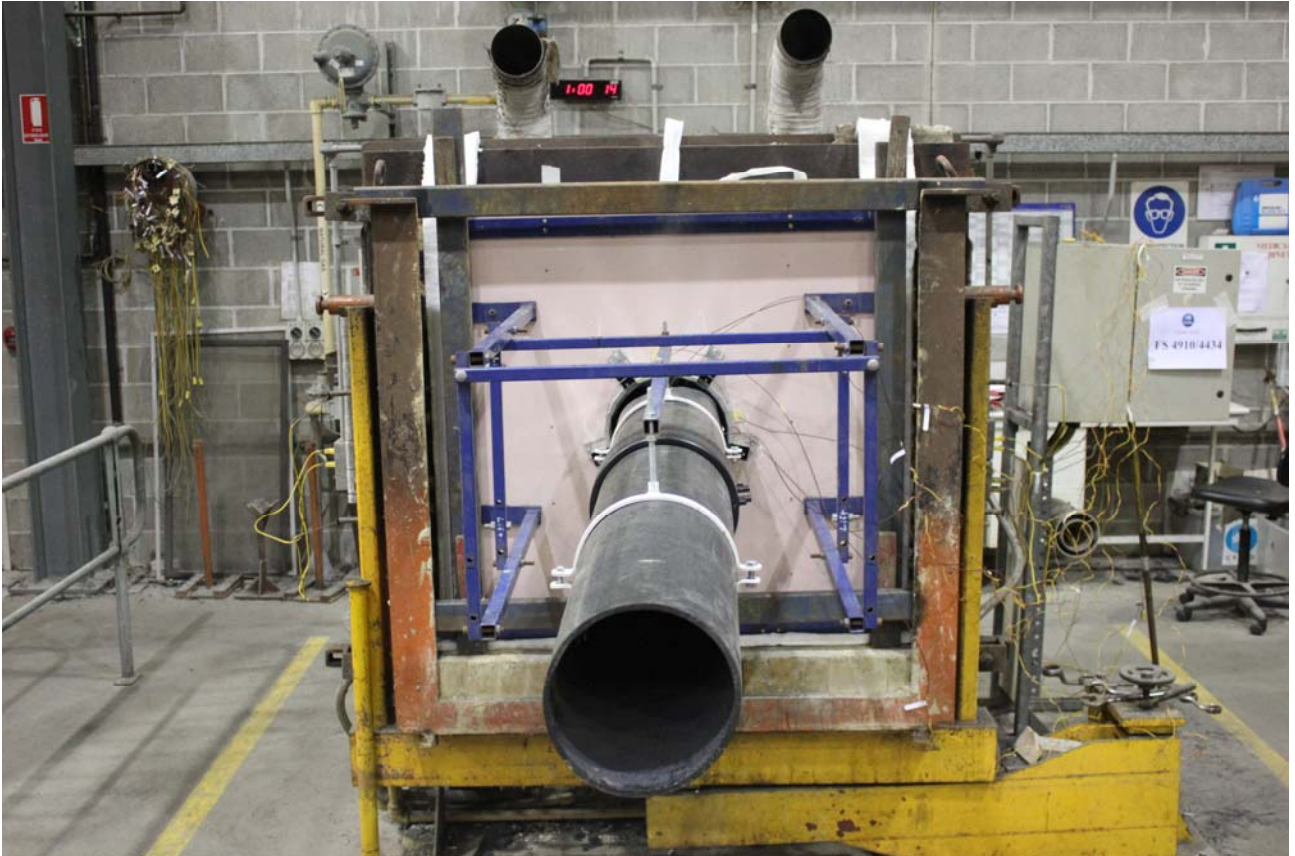
**PHOTOGRAPH 7 – SPECIMEN 1 AFTER 20 MINUTES OF TESTING**



**PHOTOGRAPH 8 – SPECIMEN 1 AFTER 30 MINUTES OF TESTING**



**PHOTOGRAPH 9 – SPECIMEN 1 AFTER 40 MINUTES OF TESTING**

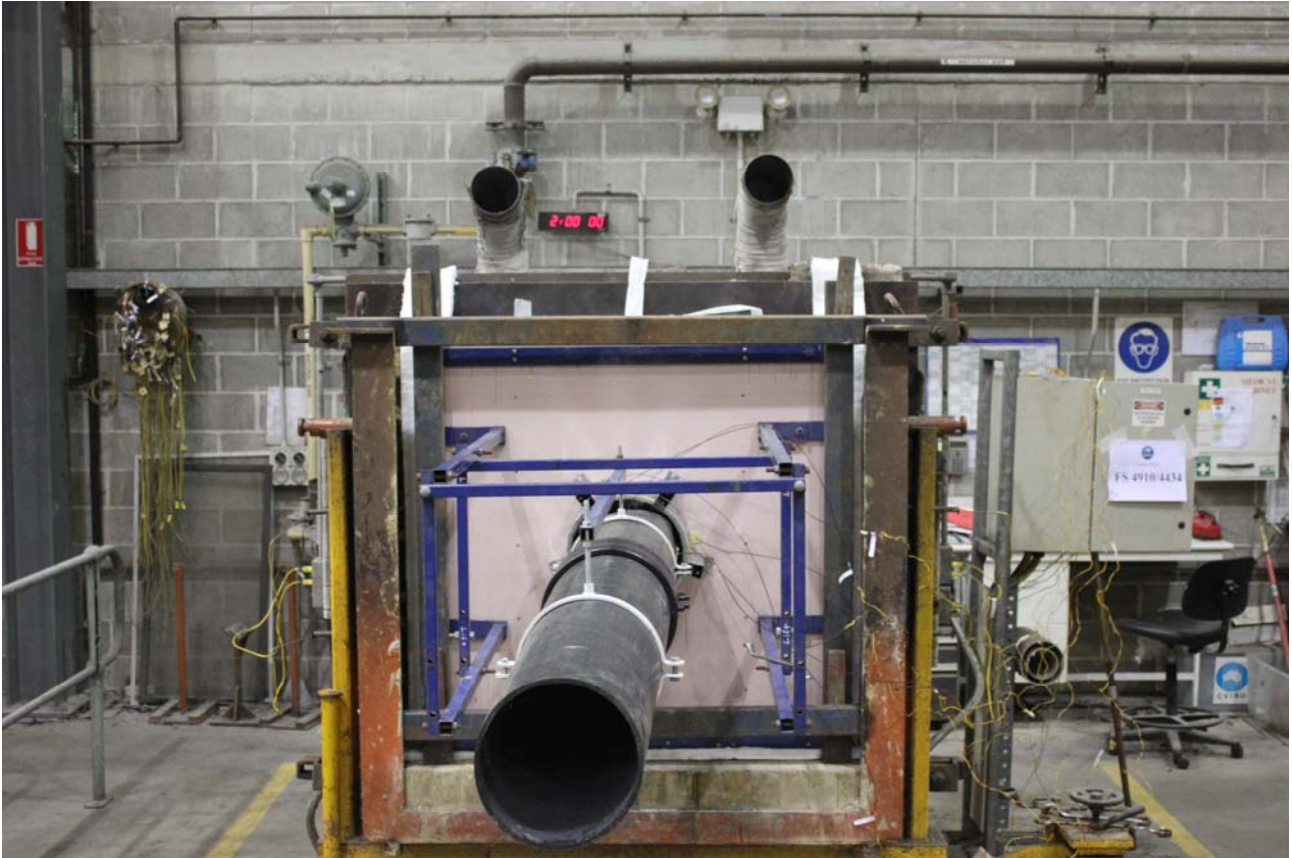


**PHOTOGRAPH 10 – SPECIMEN 1 AFTER 60 MINUTES OF TESTING**





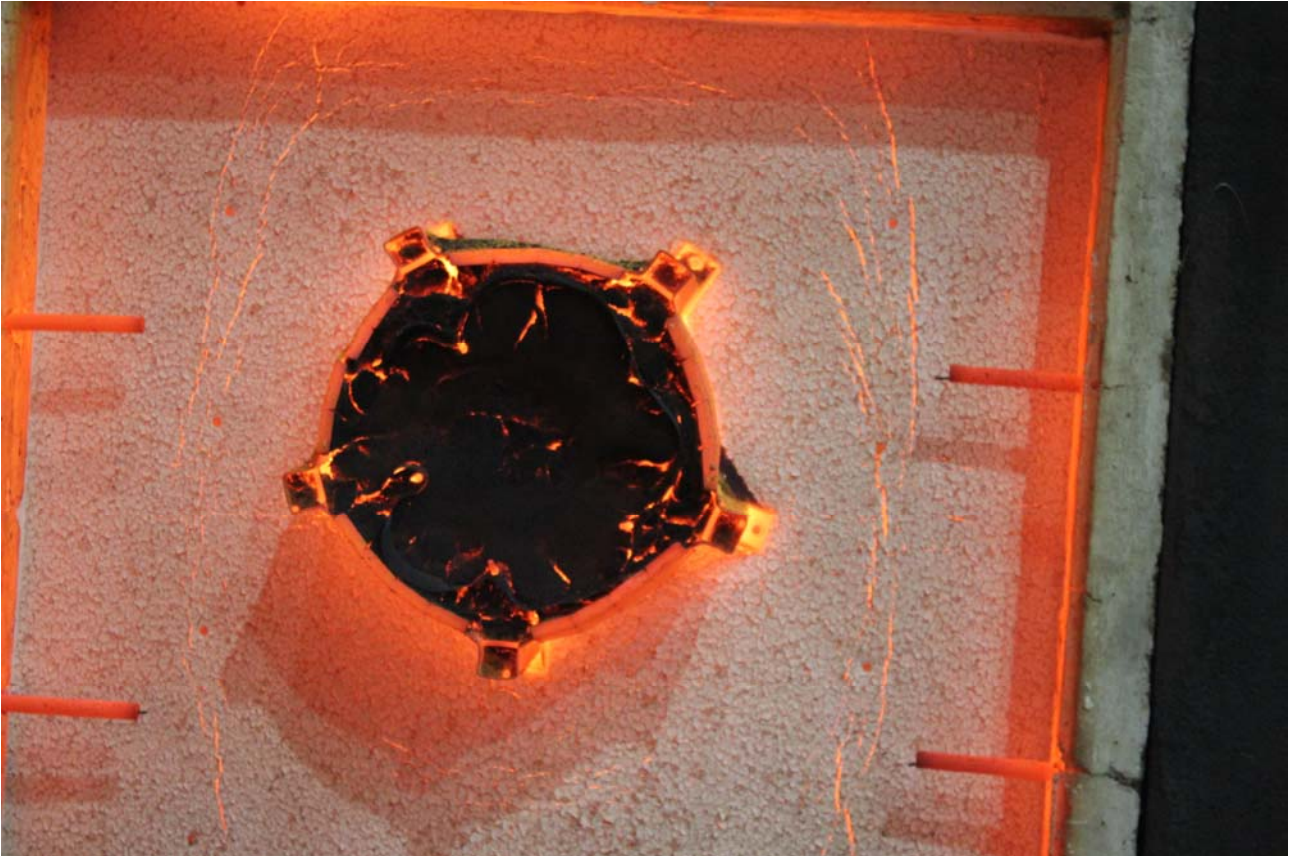
**PHOTOGRAPH 11 – SPECIMEN 1 AFTER 90 MINUTES OF TESTING**



**PHOTOGRAPH 12 – SPECIMEN 1 AFTER 120 MINUTES OF TESTING**



**PHOTOGRAPH 13 – SPECIMEN 1 AFTER 120 MINUTES OF TESTING**



**PHOTOGRAPH 14 – EXPOSED FACE OF SPECIMEN 1 AT CONCLUSION OF TESTING**

## Appendix C – Furnace Temperature

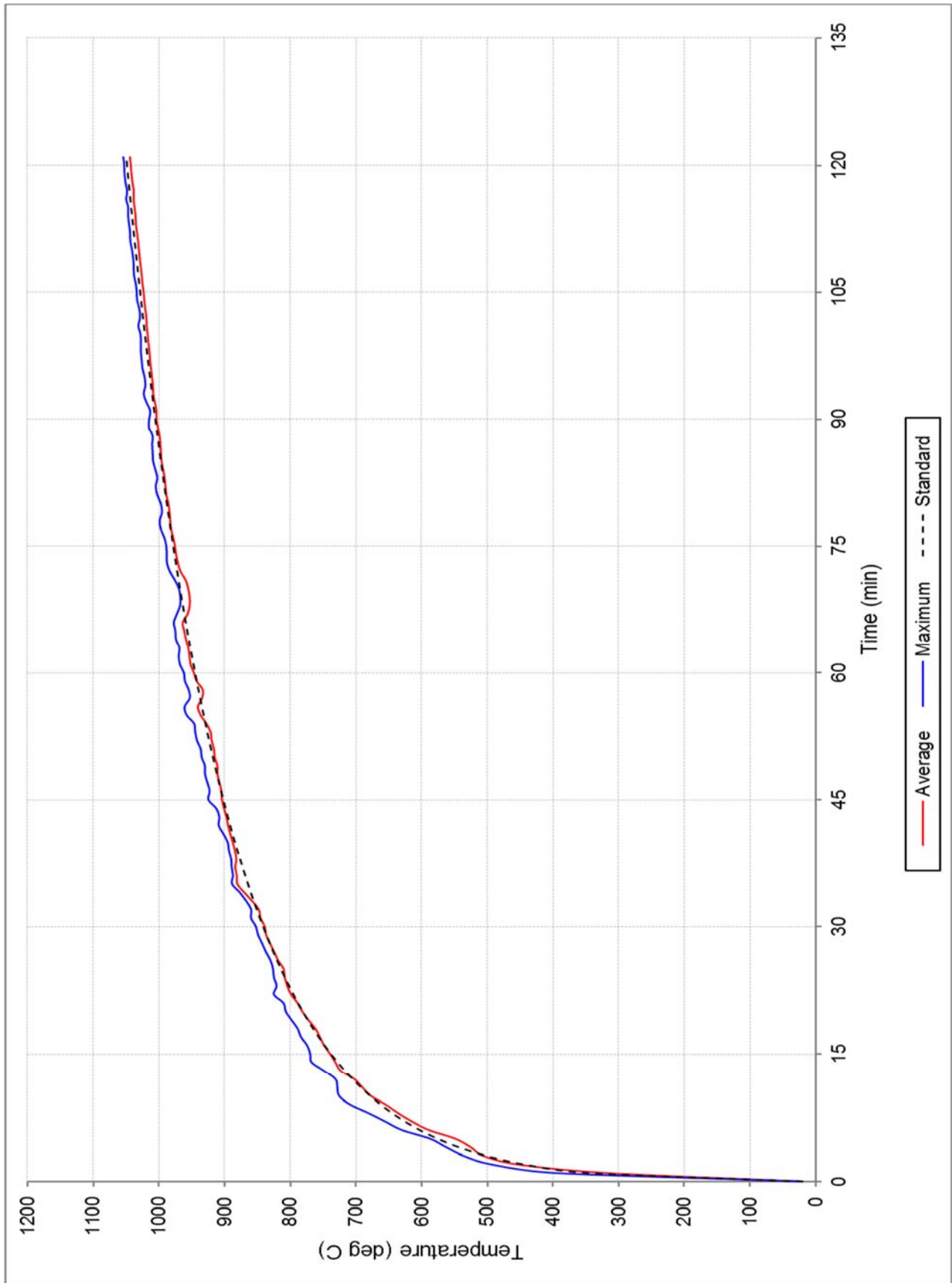


FIGURE 1 – FURNACE TEMPERATURE

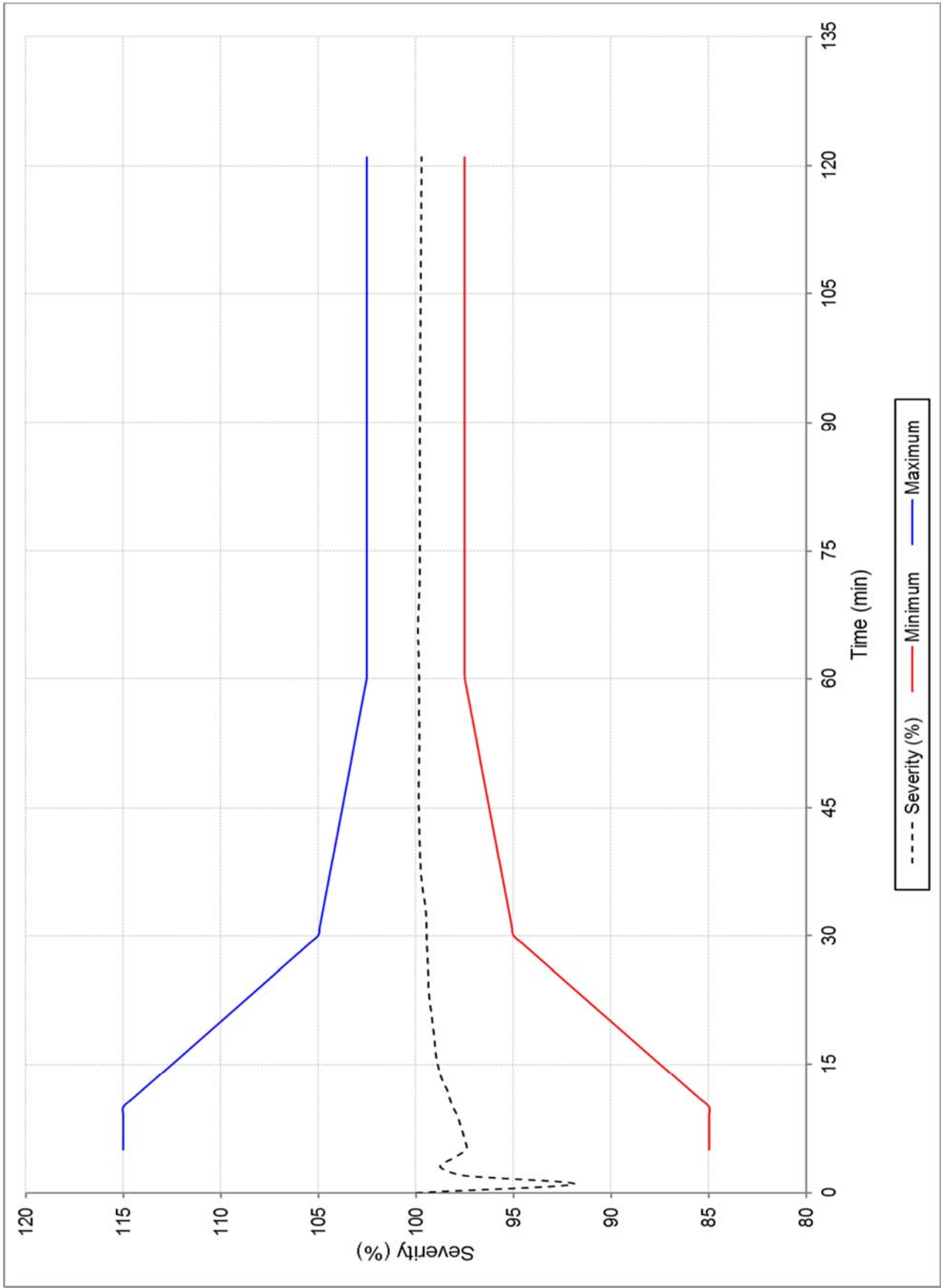


FIGURE 2 – FURNACE SEVERITY

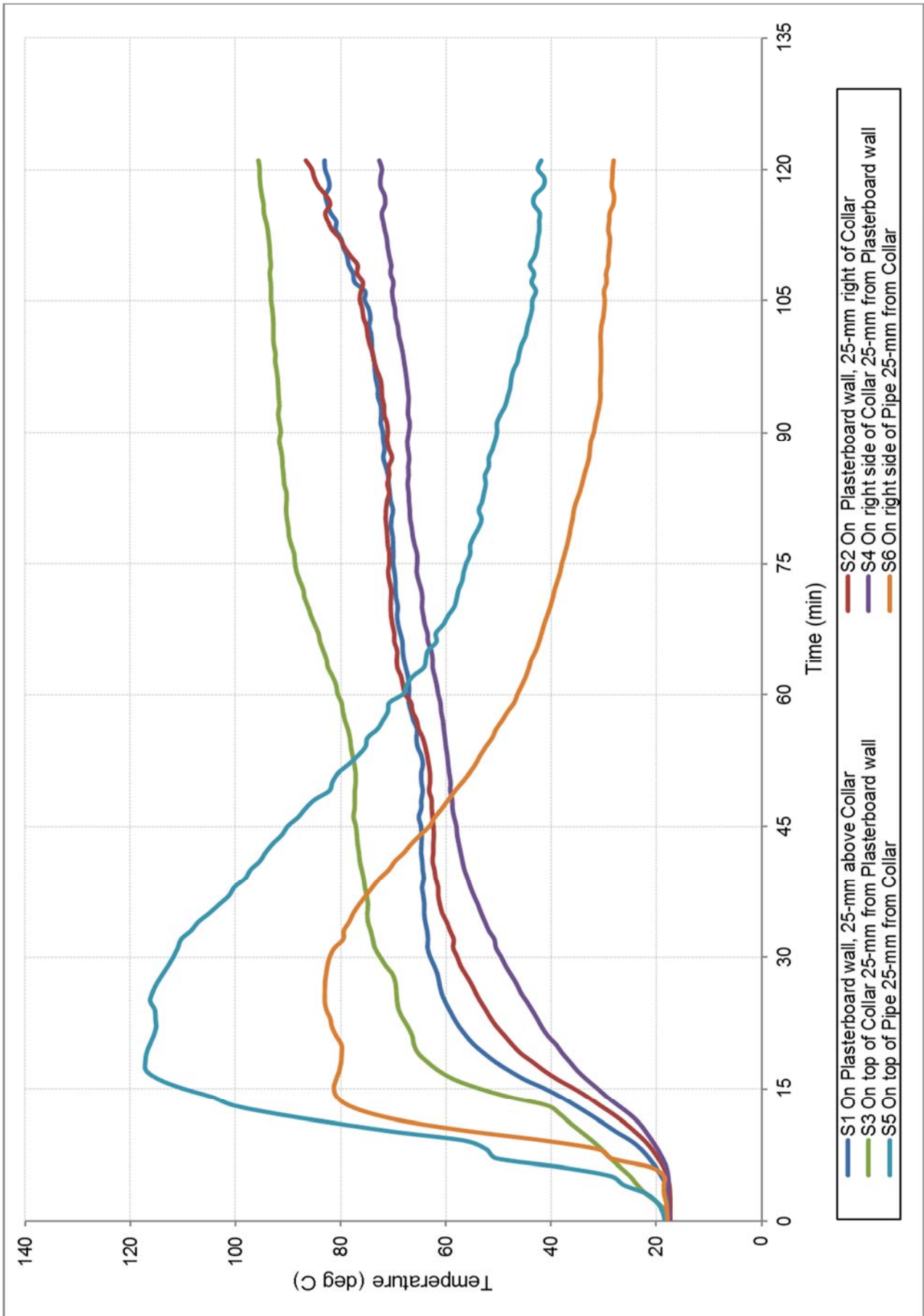
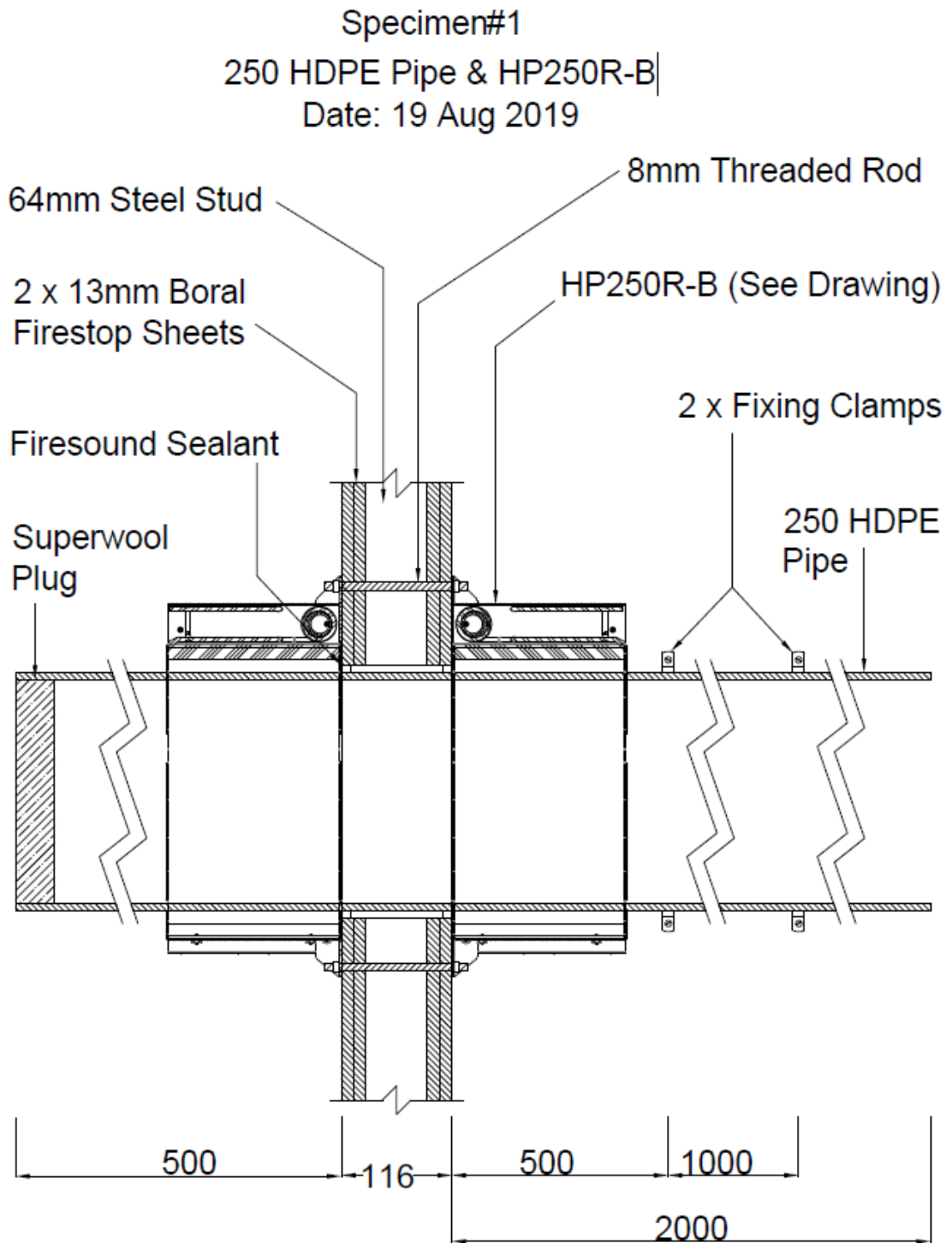


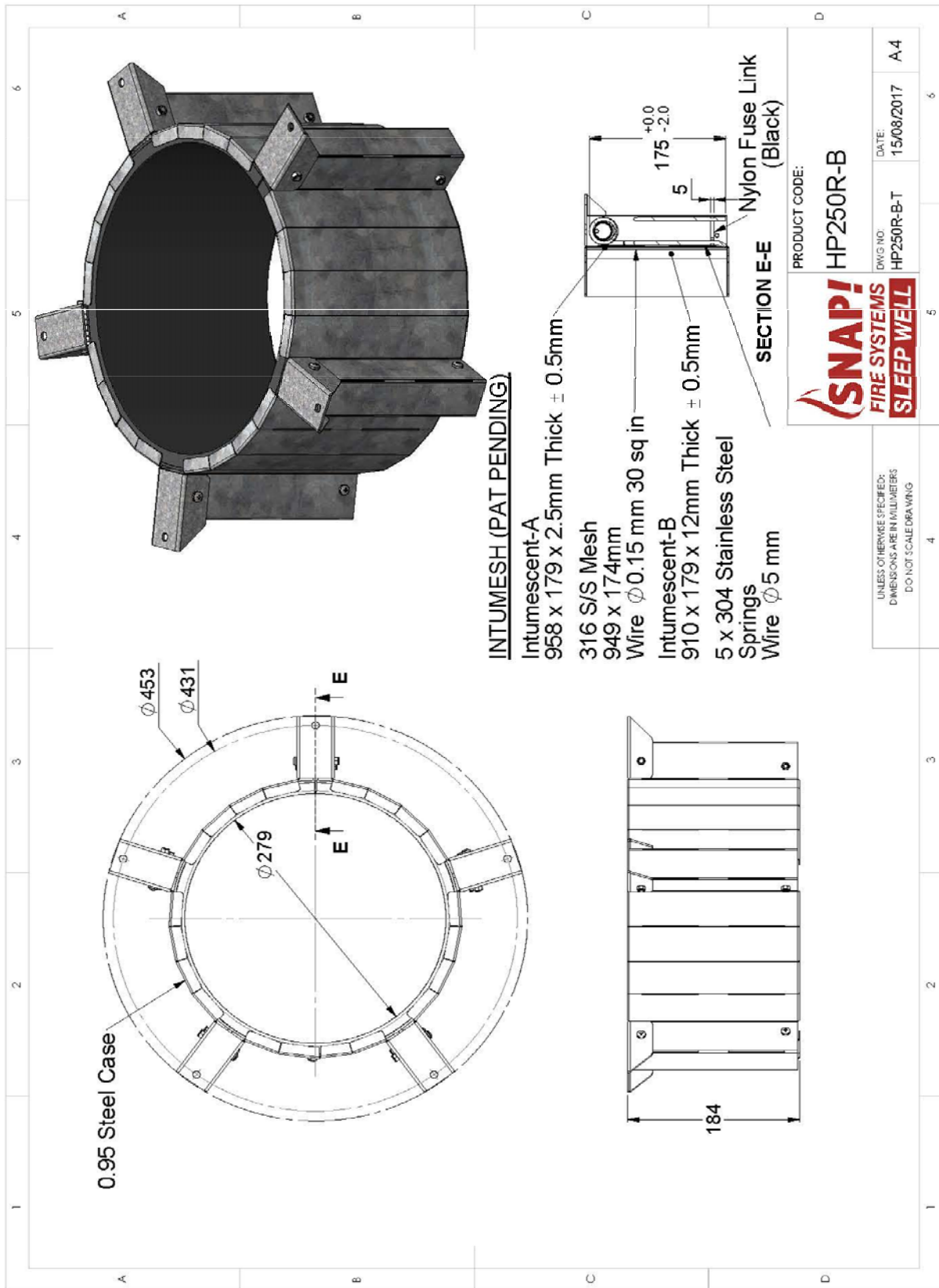
FIGURE 3 - SPECIMEN 1 TEMPERATURE

Appendix D – Specimen installation drawing



**DRAWING TITLED "SPECIMEN #1 250 HDPE PIPE & HP250R-B" DATED 19 AUGUST 2019, BY SNAP FIRE SYSTEMS PTY LTD.**

# Appendix E – Specimen Drawings



DRAWING NUMBERED HP250R-B-T DATED 15 AUGUST 2017, BY SNAP FIRE SYSTEMS PTY LTD.

# Appendix F – Copy of Certificate(s) of Test

<b>INFRASTRUCTURE TECHNOLOGIES</b> <a href="http://www.csiro.au">www.csiro.au</a>		
14 Julius Avenue, North Ryde NSW 2113 PO Box 52, North Ryde NSW 1670, Australia T (02) 9490 5444 • ABN 41 687 119 230		
<h2>Certificate of Test</h2>		No. 3328
This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014, Section 10: Service penetrations and control joints, on behalf of:		
IG6 Pty Ltd as trustee for the IG6 IP Trust 3 Skirmish Court Victoria Point Qld 4165		
A full description of the test specimen and the complete test results are detailed in the Division's report numbered FSP 2040.		
Product Name: HP250R-B Retrofit fire collar protecting a 250-mm HDPE pipe (Specimen 1)		
Description: The sponsor identified the specimen as a retrofit fire collar protecting a steel framed plasterboard wall system penetrated by a single service. The wall system was described as a 116 mm thick plasterboard lined steel framed wall comprising two layers of 13 mm thick Firestop plasterboard on each side of 64 mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. The SNAP retrofit HP250R-B collar comprised a 0.95-mm steel casing with a 279 mm inner diameter and a 453-mm diameter base flange. The 184-mm high collar casing incorporated two strips of Intumesh intumescent material, 910 mm x 179 mm x 12-mm thick and 958 mm x 179 mm x 2.5-mm thick. The closing mechanism comprised five stainless steel springs, with a nylon fuse link, and a 949 mm x 174-mm 316 stainless steel mesh located in between the intumescent strips. The Snap collar was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 5 mounting brackets using 8-mm threaded rod and 12 x M8 nuts. The annular gap between the pipe and plasterboard on both sides of the wall was protected with a bead of HB Fullers Firesound sealant. The penetrating service comprised a 250-mm OD PE100 pipe, with a wall thickness of 7.85 mm fitted through the collar's sleeve. The pipe penetrated the wall through a 260 mm diameter opening and projected horizontally 2000-mm away from the unexposed face of the wall and approximately 500 mm into the furnace chamber. The pipe was supported at nominally 500 mm, and 1500-mm from the unexposed face of the plasterboard wall. The pipe was left open at the unexposed end and sealed with a Superwool plug on the exposed end.		
Performance observed in respect of the following AS 1530.4-2014 criteria		
Structural Adequacy	-	not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	no failure at 121 minutes
and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/120.		
The FRL is applicable when the system is exposed to fire from either direction. The FRL is limited to that of the separating element. For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be noted that a single test method will not provide a full assessment of fire hazard under all fire conditions. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.		
Testing Officer:	Peter Gordon	Date of Test: 20 August 2019
Issued on the 23 <sup>rd</sup> day of September 2019 without alterations or additions.		
 Brett Roddy   Manager, Fire Testing and Assessments		
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**COPY OF CERTIFICATE OF TEST – NO. 3328**



# References

The following informative documents are referred to in this Report:

- |                |   |
|----------------|---|
| AS 1530.4-2014 | Methods for fire tests on building materials, components and structures Part 4: Fire-resistance tests of elements of building construction. |
| AS 4072.1-2005 | Components for the protection of openings in fire-resistant separating elements. Part 1: Service penetrations and control joints.           |

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