# Fire-resistance test on fire collars protecting a concrete slab penetrated by services

## Test Report

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**Report number:** FSP 2177
**Date:** 30 March 2021

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

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## Report Status and Revision History:

| VERSION | STATUS | DATE | DISTRIBUTION | ISSUE NUMBER |
|---|---|---|---|---|
| Revision A | Draft for review | 10/02/2021 | CSIRO and The Client | FSP 2177 |
| Revision B | Draft for review | 17/02/2021 | CSIRO and The Client | FSP 2177 |
| Revision C | Final for issue | 30/03/2021 | CSIRO and The Client | FSP 2177 |

## Report Authorisation:

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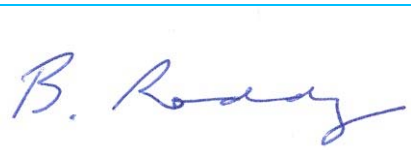
|  |  |  |
| 30 March 2021 | 30 March 2021 | 30 March 2021 |

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# Contents

# Fire-resistance test on fire collars protecting a concrete slab penetrated by services

# Sponsored Investigation No. FSP 2177

## 1 Introduction

### 1.1 Identification of specimen

The sponsor identified the specimen as five SNAP fire collars protecting a 120-mm thick concrete floor slab penetrated by five services.

### 1.2 Sponsor

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

### 1.3 Manufacturers

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

### 1.4 Test standard

Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2014, Fire-resistance tests for 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 5052/4602

## 1.7 Test date

The fire-resistance test was conducted on 19 January 2021.

# 2 Description of specimen

## 2.1 General

The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab. The slab was penetrated by multiple services protected by five (5) cast-in fire collars.

The 120-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures.

The pipes used in the test are stated to be manufactured in accordance with:

- AS/NZS 5065:2005 'Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications';
- AS/NZS 7671:2010 Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings— Polypropylene (PP)
- AS/NZS 1260 PVC-U pipes and fittings for drain, waste and vent application

For the purpose of the test, the penetrations were referenced as Specimen 1, 2, 3, 4, and 5. Only four specimens are the subject of this report (Specimens 2, 3, 4 and 5). Documents containing a complete description of each specimen were supplied by the sponsor and are retained on file.

Specimen 2 – A SNAP UL100FWS Ultra Low Top-Floor Waste Shower cast-in fire collar protecting a nominal 110-mm Valsir Triplus floor waste incorporating a Triplus 4-way riser fitted below the collar.

The SNAP UL100FWS Ultra Low Top-Floor Waste Shower cast-in fire collar comprised a moulded plastic casting with a 110-mm inner diameter and a 194-mm x 194-mm base flange. The 67-mm high collar casing incorporated a 4-mm thick x 60-mm wide x 426-mm long Intumesh intumescent strip. The closing mechanism comprised four 4-mm diameter (SPR-SS400-60-Z) stainless steel springs, a nylon fuse link and a 455-mm x 58-mm stainless steel mesh as shown in drawing numbered UL100FWS dated 25 May 2020, by SNAP Fire Systems.

The penetrating service comprised a nominal 110-mm Valsir Triplus waste system. The floor waste pipe had a 110-mm outside diameter Valsir Triplus polypropylene pipe with a wall thickness of 3.55-mm fitted through the collar's sleeve. The floor waste was fitted with a chrome plated brass grate and a plastic puddle flange. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 4-way riser was connected below the fire collar to the penetrating pipe and supported by a 4-way riser bracket with a galvanized steel plate and fixed to the concrete slab using a two M10 threaded rod and steel drop-in anchors.

The 4-way riser arms were plugged with ceramic fibre. The floor waste gully was charged with water to the level shown in drawing titled "Specimen #2, 110 Triplus Floorwaste & UL100FWS", dated 14 December 2020, provided by Snap Fire Systems Pty Ltd.

Specimen 3 – A SNAP H50S-RR High-Top Stack cast-in fire collar protecting a nominal 40-mm Iplex polyvinyl chloride (PVC-U) stack pipe incorporating a coupling inside the collar.

The SNAP H50S-RR High-Top Stack cast-in fire collar comprised a 1.6-mm thick polypropylene casing with a 67-mm inner diameter and a 150-mm diameter base flange. The 250-mm high collar casing incorporated a 230-mm x 55-mm x 5-mm thick Intumesh intumescent material and a rubber ring seal. The closing mechanism comprised three galvanised steel springs bound with nylon fuse links and a 268-mm x 53-mm 316 stainless steel mesh as shown in drawing titled 'SNAP 50 High-Top Stack' dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 43-mm outside diameter PVC pipe with a wall thickness of 2.2-mm and a PVC coupling with a total wall thickness of 4.4-mm fitted through the collar's sleeve penetrating concrete slab as shown in drawing titled 'Specimen #3, 40 PVC Stack + Fitting & H50S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd. The pipe projected vertically 2000-mm above the unexposed face of the concrete floor and 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and fitted with a PVC end cap on the exposed end.

Specimen 4 – A SNAP H100S-RR High-Top Stack cast-in fire collar protecting a nominal 80-mm polyvinyl chloride (PVC-U) stack pipe.

The SNAP H100S-RR High-Top Stack cast-in fire collar comprised a 1.6-mm thick polypropylene casing with a 126.5 mm inner diameter and a 213-mm diameter base flange. The 250-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh intumescent material and a rubber ring seal. The closing mechanism comprised three equally spaced 3.15-mm diameter galvanised steel springs bound with nylon fuse links acting against a 460-mm x 83-mm 316 stainless steel mesh as shown in drawing titled "SNAP 100 High-Top Stack", dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised an 82-mm outside diameter Vinidex polyvinyl chloride pipe with a wall thickness of 3.28-mm fitted through the collar's sleeve. The annular gap between the pipe and the inside collar incorporated a PE backing rod, back filled with Fuller's Firesound sealant to a depth of 10 mm and finished flush with the slab as shown in drawing titled 'Specimen #4, 80 PVC Stack & H100S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd.

The pipe projected vertically, 2000-mm above the unexposed face of the concrete floor and 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and fitted with a PVC end cap on the exposed end.

Specimen 5 – A SNAP H100S-RR High-Top Stack cast-in fire collar protecting a nominal 100-mm polyvinyl chloride sandwich construction (PVC-SC) stack pipe incorporating a coupling inside the collar.

The SNAP H100S-RR High-Top Stack cast-in fire collar comprised a 1.6-mm thick polypropylene casing with a 126.5 mm inner diameter and a 213-mm diameter base flange. The 250-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh intumescent material and a rubber ring seal. The closing mechanism comprised three equally spaced 3.15-mm diameter galvanised steel springs bound with nylon fuse links acting against a 460-mm x 83-mm 316 stainless steel mesh as shown in drawing titled "SNAP 100 High-Top Stack", dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 110-mm outside diameter Iplex PVC(SC) pipe with a wall thickness of 3.26-mm and a PVC coupling with a total wall thickness of 5.76-mm fitted through the collar's sleeve on the exposed face as shown in drawing titled 'Specimen #5, 100 PVC(SC) Stack + Fitting & H100S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd.

The pipe projected vertically, 2000-mm above the unexposed face of the concrete floor and 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and fitted with a PVC end cap on the exposed end.

## 2.2 Dimensions

The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab to suit the opening in the specimen containing frame.

## 2.3 Orientation

The reinforced concrete slab was placed horizontally on top of the furnace chamber and subjected to fire exposure from the underside.

## 2.4 Conditioning

The concrete slab was left to cure for a period longer than 30 days. The specimen was delivered on 6 January 2021 and stored under standard laboratory atmospheric conditions until the test date.

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

The supporting floor 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 'Test Slab S-20-N Layout', dated 14 December 2020 by, Snap Fire Systems Pty Ltd.

Drawing titled 'Specimen #1 110 HDPE Floorwaste with P-Trap & UL100FWS', dated 14 December 2020, by Snap Fire Systems Pty Ltd.

Drawing titled 'Specimen #2 110 Triplus Floorwaste & UL100FWS', dated 14 December 2020, by Snap Fire Systems Pty Ltd.

Drawing titled 'Specimen #3 40 PVC Stack + Fitting & H50S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd.

Drawing titled 'Specimen #4 80 PVC Stack & H100S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd.

Drawing titled 'Specimen #5 100 PVC(SC) Stack + Fitting & H100S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd.

Drawing titled "SNAP 100 Ultra Low-Top Floor Waste Shower" with Drawing No. UL100FWS, dated 25 May 2020, by Snap Fire Systems Pty Ltd.

Drawing titled 'SNAP 50 High-Top Stack' dated 29 September 2017, by Snap Fire Systems Pty Ltd.

Drawing titled "SNAP 100 High-Top Stack", dated 29 September 2017, by Snap Fire Systems Pty Ltd.

No confidential information about the test specimen has been submitted to CSIRO Infrastructure Technologies.

# 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 22°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 241 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 |
|---|---|
| 90 seconds - | Smoke has begun fluing from the end of the pipe of Specimen 4. |
| 2 minutes - | Smoke has begun fluing from the end of the pipe of Specimen 3. |
| 2 ½ minutes - | Smoke has ceased fluing from the end of the pipes of Specimens 3 and 4. |
| 3 minutes - | Smoke has begun fluing from the metal grate Specimen 2 floor waste.<br>Cotton pad test applied above the grate of Specimen 2 – no ignition noted at this time. |
| 4 ½ minutes - | Cotton pad test applied above the grate of Specimen 2 – no ignition noted at this time. Smoke has begun fluing from the end of the pipe of Specimen 5.<br>The level of smoke fluing from the base of Specimen 3 has reduced. |
| 8 minutes - | The level of smoke fluing from the pipe of Specimen 5 has reduced.<br>Smoke has ceased fluing at the base of Specimen 3. |
| 10 minutes - | The base of the pipe of Specimen 5 has deformed. Smoke is being emitted between the inside collar casing and the pipe at the base adjacent to the slab. (Photograph 3). |
| 16 minutes - | The level of smoke fluing at the base of Specimen 5 has increased. The base of the pipe has been pushed up approximately 20-mm above the slab. (Photograph 4). |

24 minutes - Smoke has ceased fluing from the end of the pipe of Specimen 5, however fluing from the base between the pipe and collar casing continues.

26 minutes - Water has begun pooling on the slab at the base of Specimen 3.

32 minutes - Water has begun pooling on the slab at the base of Specimen 5.

50 minutes - The water pooling on the slab at the base of specimens 3 and 5 has begun to evaporate.

76 minutes - A crack in the sealant at the base of Specimen 4 has developed.

88 minutes - Venting of smoke from the grate of the Specimen 2 has ceased.
The water pooling on the slab has almost completely evaporated with light steam being emitted from the unexposed face of the slab.

104 minutes - The collar casing inside the slab of Specimen 5 has begun to melt. (Photograph 9).

150 minutes - The collar casing of Specimen 5 continues to melt.

208 minutes - Smoke has resumed fluing from the grate of Specimen 2 floor waste (Photograph 13).

218 minutes - The collar casing inside the slab of Specimen 5 continues to melt.

228 minutes - Smoke has resumed fluing from the end of the pipe of Specimen 5.

239 minutes - Insulation failure of Specimen 4 - maximum temperature rise of 180K is exceeded on the floor slab 25-mm from the sealant.

241 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 2.

Figure 4 shows the curve of temperature versus time associated with Specimen 3.

Figure 5 shows the curve of temperature versus time associated with Specimen 4.

Figure 6 shows the curve of temperature versus time associated with Specimen 5.

## 8.5 Performance

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

Specimen 2 – A SNAP UL100FWS Ultra Low Top-Floor Waste Shower cast-in fire collar protecting a nominal 110-mm Valsir Triplus floor waste incorporating a Triplus 4-way riser fitted below the collar

| | | |
|---|---|---|
| Structural adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | no failure at 241 minutes |

Specimen 3 – A SNAP H50S-RR High-Top Stack cast-in fire collar protecting a nominal 40-mm Iplex polyvinyl chloride (PVC-U) stack pipe incorporating a coupling inside the collar

| | | |
|---|---|---|
| Structural adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | no failure at 241 minutes |

Specimen 4 – A SNAP H100S-RR High-Top Stack cast-in fire collar protecting a nominal 80-mm polyvinyl chloride (PVC-U) stack pipe

| | | |
|---|---|---|
| Structural adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | 239 minutes |

Specimen 5 – A SNAP H100S-RR High-Top Stack cast-in fire collar protecting a nominal 100-mm polyvinyl chloride sandwich construction (PVC-SC) stack pipe incorporating a coupling inside the collar

| | | |
|---|---|---|
| Structural adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | no failure at 241 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 AS 1530.4. Any significant variation with respect to size, construction details, loads, stresses, edge of 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 the measurement of fire resistance, it is not possible to provide a stated degree for accuracy of the result.

# 9 Fire-resistance level (FRL)

For the purpose of building regulations in Australia, the FRL's of the test specimens were as follows:

| | | |
|---|---|---|
| Specimen 2 | - | -/240/120* |
| Specimen 3 | - | -/240/120* |
| Specimen 4 | - | -/240/120* |
| Specimen 5 | - | -/240/120* |

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested.

* All test specimens were tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018 - Concrete structures. The maximum FRL of any test specimen cannot exceed the FRL achieved by the concrete slab in which it was installed.

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 10.12 of AS 1530.4-2014, have been made provided no individual component is removed or reduced.

# 11 Tested by

Peter Gordon
Testing Officer

# Appendices

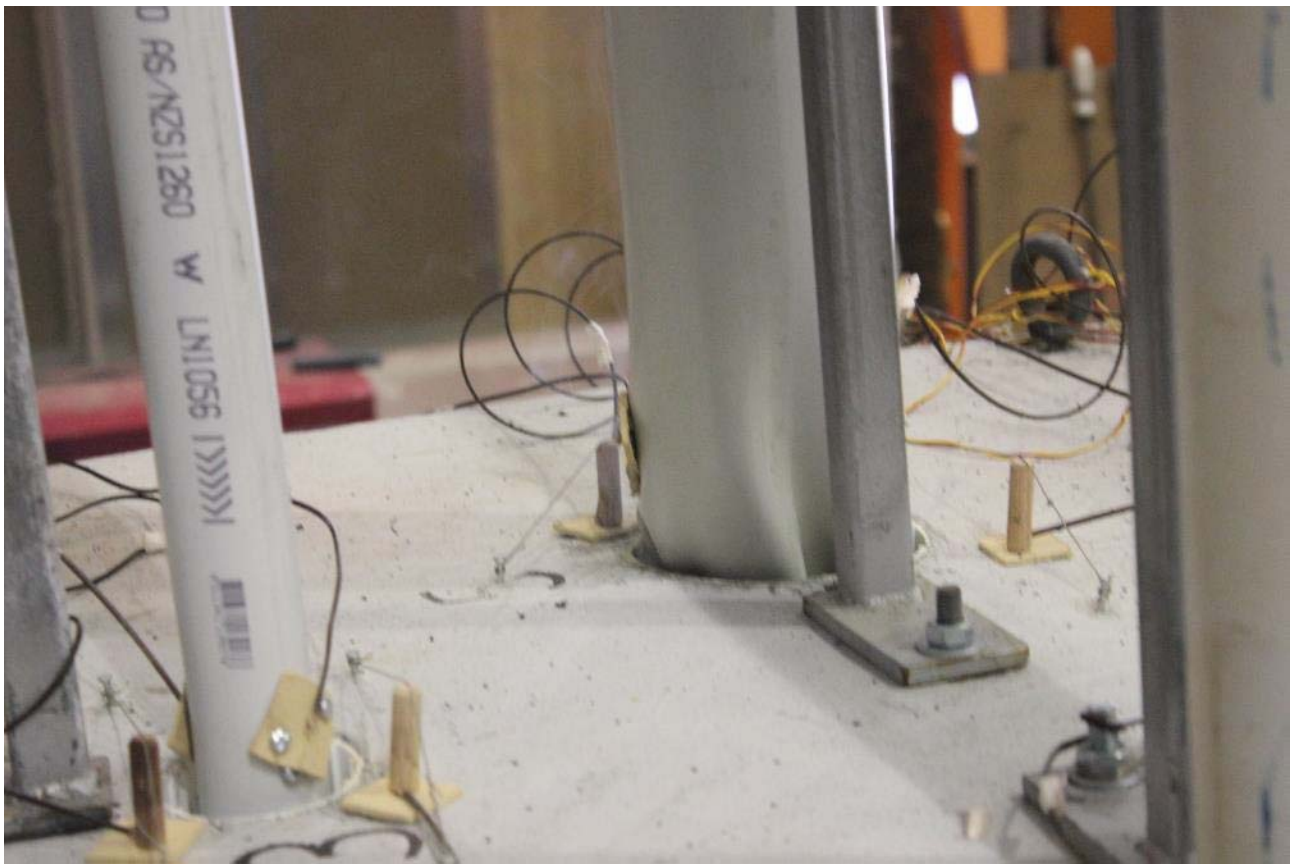
## Appendix A – Measurement location

| Specimen | T/C Position | T/C designation |
|---|---|---|
| Specimen 2 – A SNAP 100 Ultra Low-Top Floor Waste Shower cast-in fire collar protecting a nominal 110-mm Valsir Triplus floor waste incorporating a Triplus 4-way riser fitted below the collar | On top of the slab, 25-mm from screed (North) | S4 |
| | On top of the slab, 25-mm from screed (South) | S5 |
| | On screed, 25-mm from grate (North) | S6 |
| | On screed, 25-mm from grate (South) | S7 |
| | On centre of the grate | S8 |
| Specimen 3 – A SNAP 50 High-Top Stack cast-in fire collar protecting a nominal 40-mm Iplex polyvinyl chloride (PVC-U) stack pipe incorporating a coupling inside the collar | On slab 25-mm from PVC pipe (N/W) | S9 |
| | On slab 25-mm from PVC pipe (SW) | S10 |
| | On PVC pipe 25-mm from slab (N/E) | S11 |
| | On PVC pipe 25-mm from slab (S/W) | S12 |
| Specimen 4 – A SNAP 100 High-Top Stack cast-in fire collar protecting a nominal 80-mm polyvinyl chloride (PVC-U) stack pipe | On slab 25-mm from sealant (N/W) | S13 |
| | On slab 25-mm from sealant (S/E) | S14 |
| | On sealant 25-mm from slab (North) | S15 |
| | On sealant 25-mm from slab (South) | S16 |
| | On pipe 25-mm above sealant (N/W) | S17 |
| | On pipe 25-mm above sealant (S/E) | S18 |
| Specimen 5 – A SNAP 100 High-Top Stack cast-in fire collar protecting a nominal 100-mm polyvinyl chloride sandwich construction (PVC-SC) stack pipe incorporating a coupling inside the collar | On slab 25-mm from PVC pipe (North) | S19 |
| | On slab 25-mm from PVC pipe (South) | S20 |
| | On PVC pipe 25-mm from slab (North) | S21 |
| | On PVC pipe 25-mm from slab (South) | S22 |
| Rover | Rover | S23 |
| Ambient | Ambient | S24 |

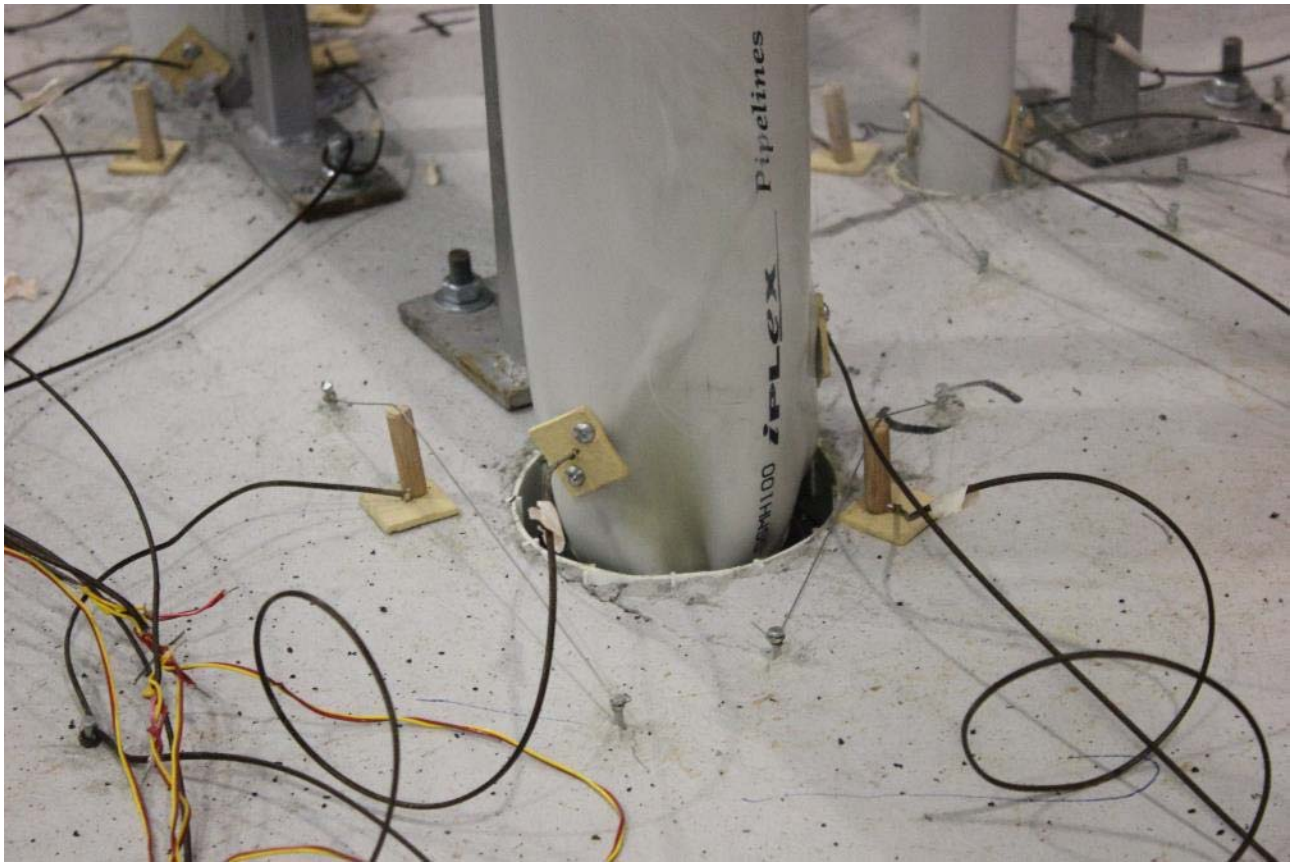
# Appendix B – Photographs

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

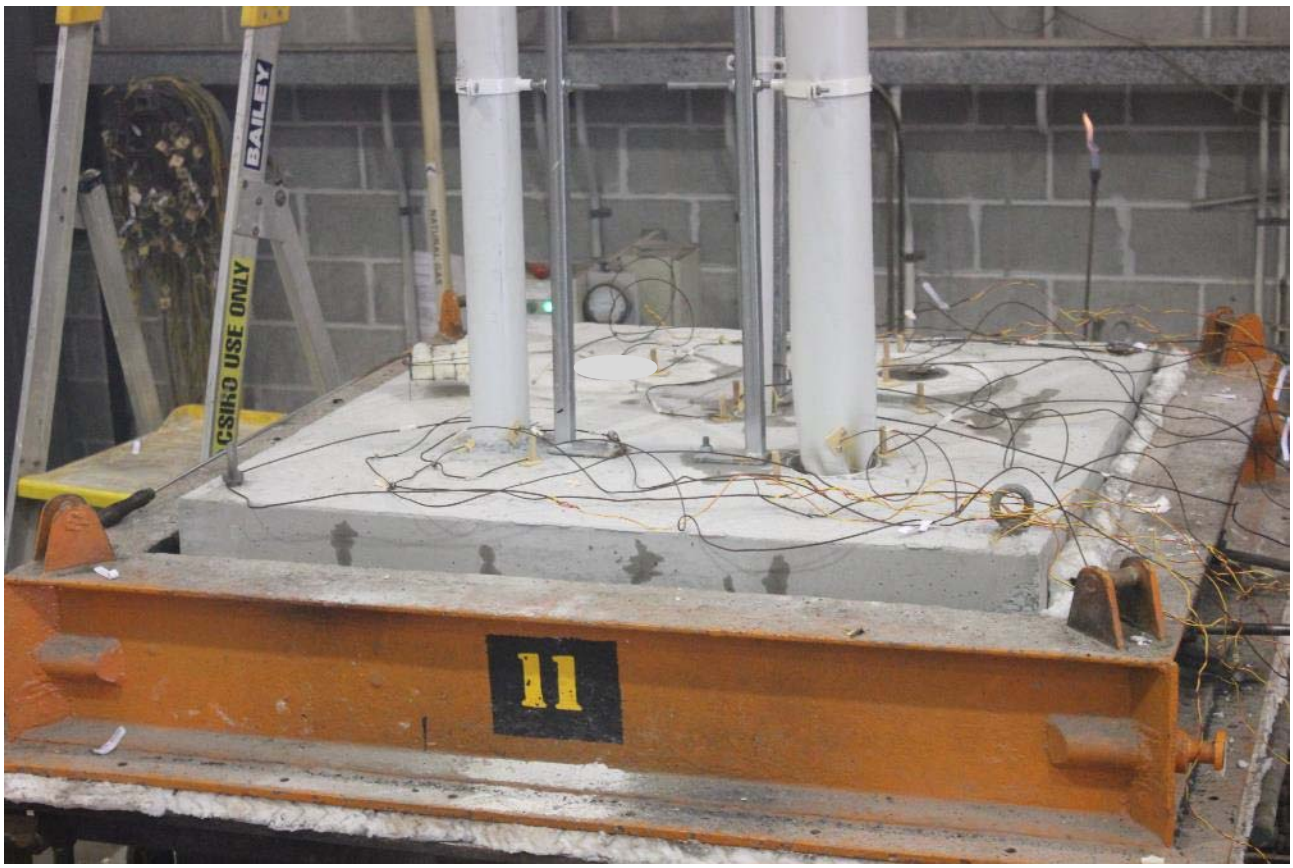

**PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMEN PRIOR TO TESTING**



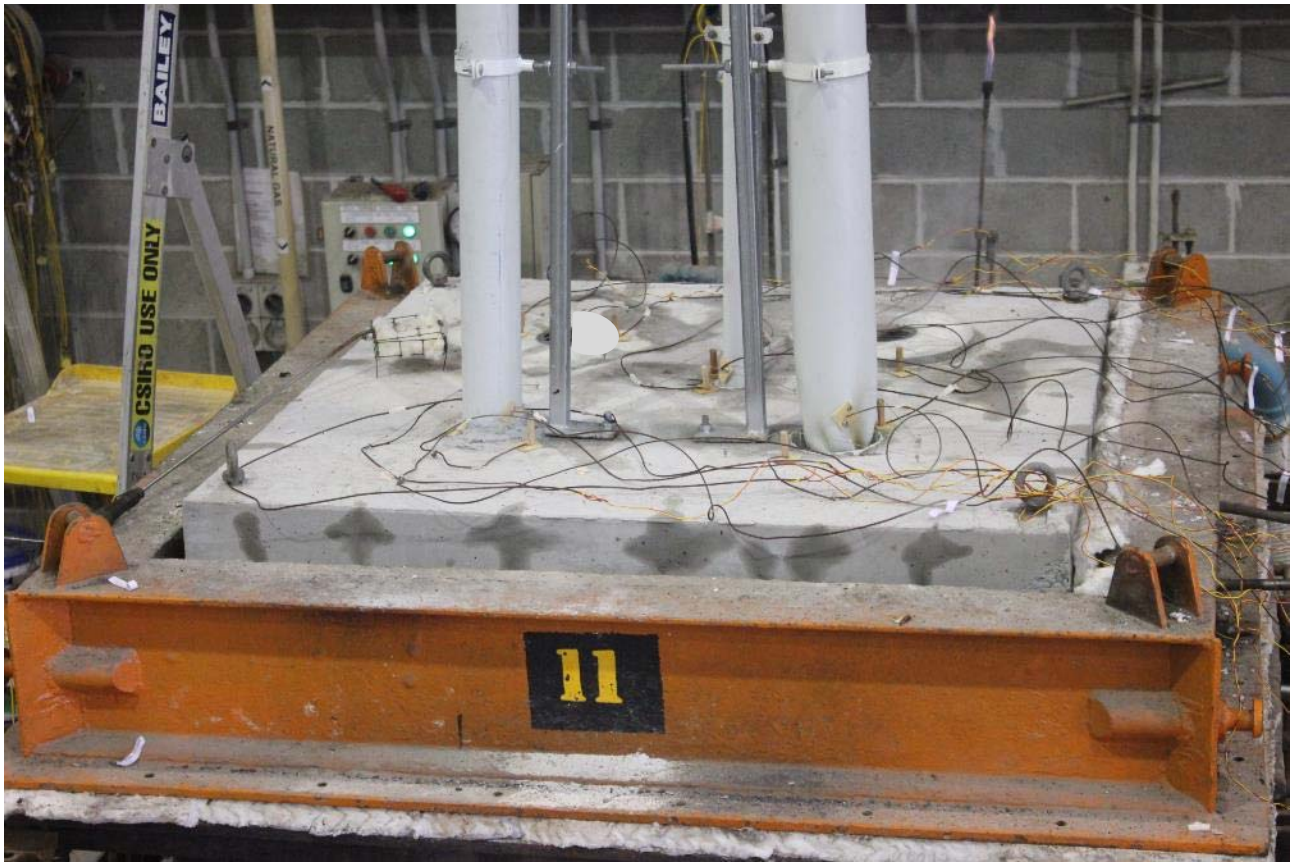

**PHOTOGRAPH 3 – SPECIMEN 5 AT 10 MINUTES INTO THE TEST**



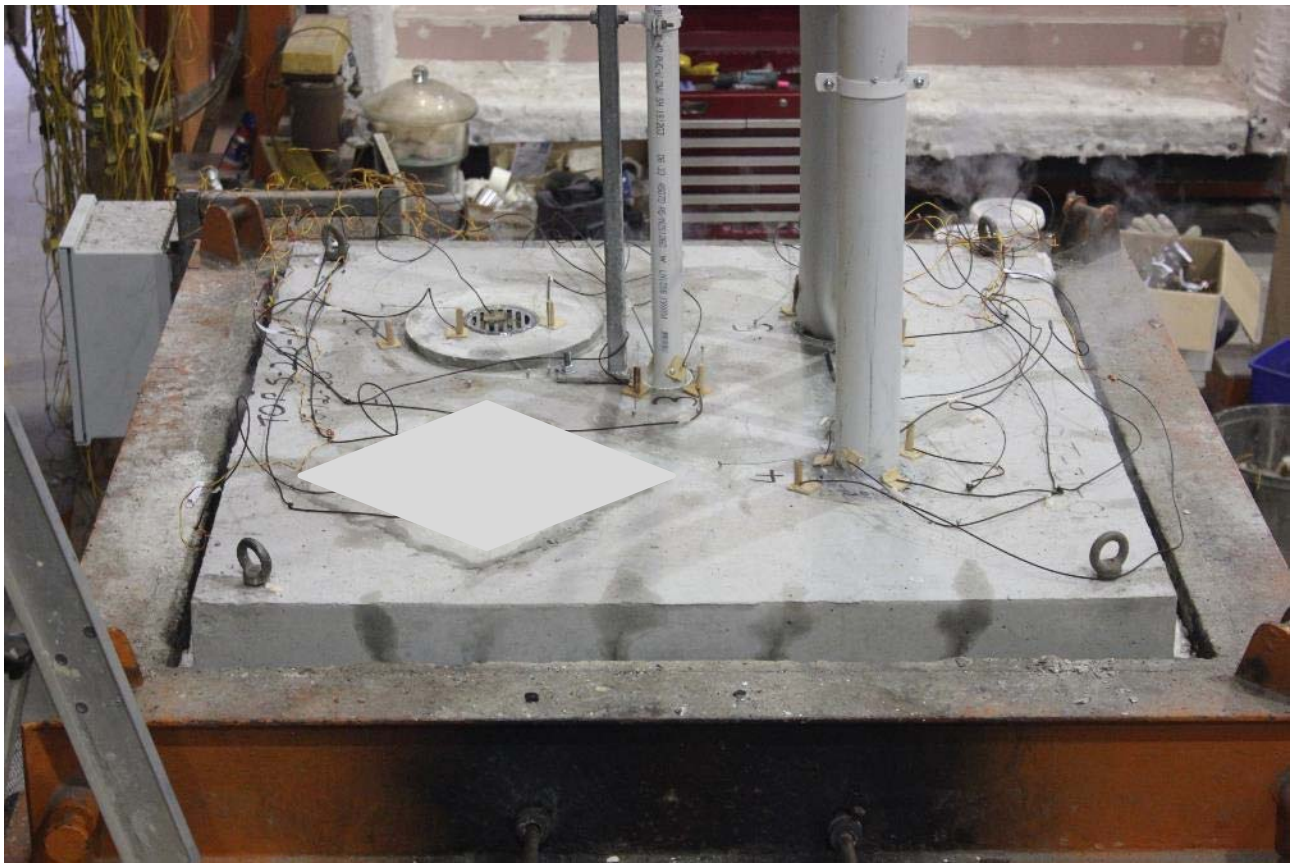

**PHOTOGRAPH 4 – SPECIMEN 5 AT 16 MINUTES INTO THE TEST**




**PHOTOGRAPH 5 – SPECIMENS AT 30 MINUTES INTO THE TEST**




**PHOTOGRAPH 6 – SPECIMENS AT 60 MINUTES INTO THE TEST**

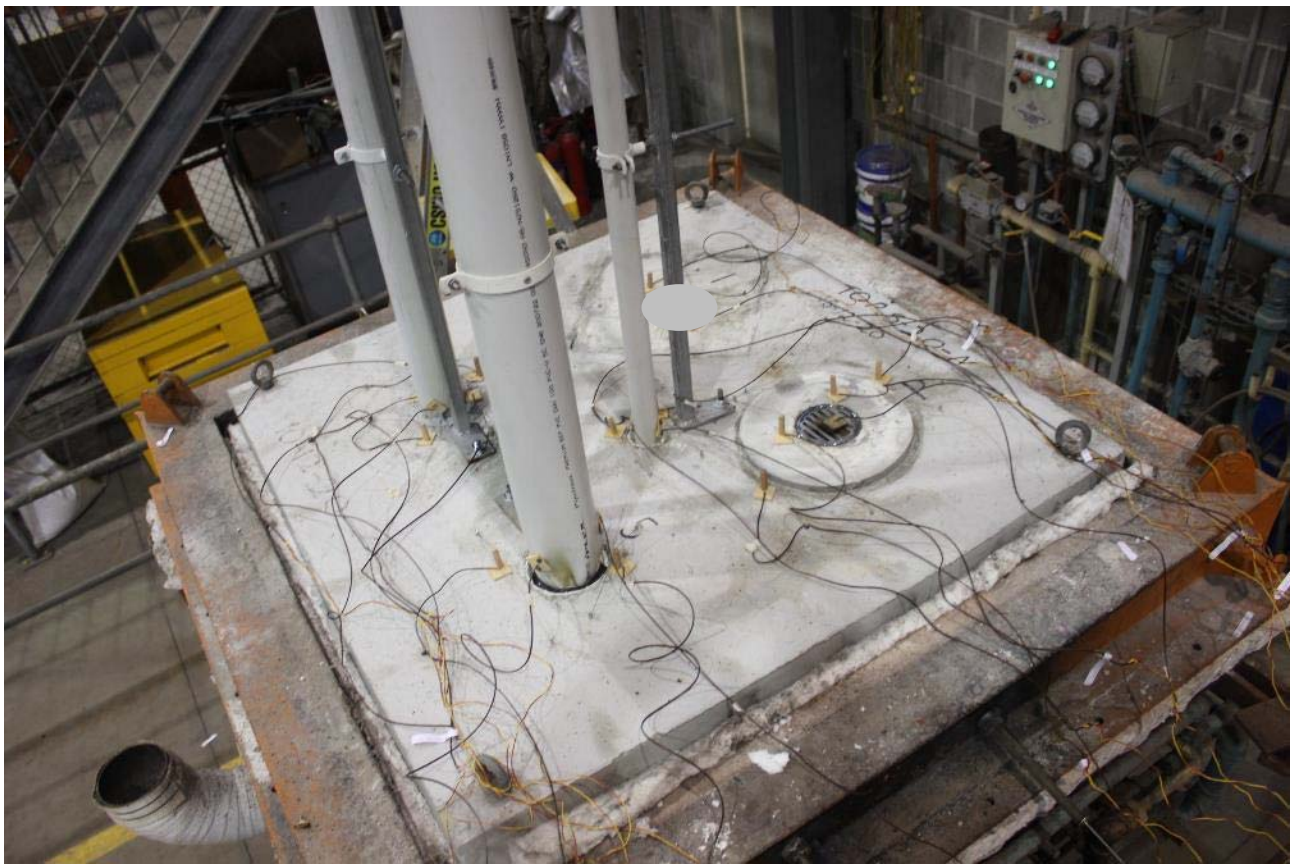


**PHOTOGRAPH 7 – SPECIMENS AT 90 MINUTES INTO THE TEST**

**PHOTOGRAPH 8 – SPECIMEN 5 AT 104 MINUTES INTO THE TEST**

**PHOTOGRAPH 9 – SPECIMEN 4 AT 106 MINUTES INTO THE TEST**

**PHOTOGRAPH 10 – SPECIMENS AT 120 MINUTES INTO THE TEST**

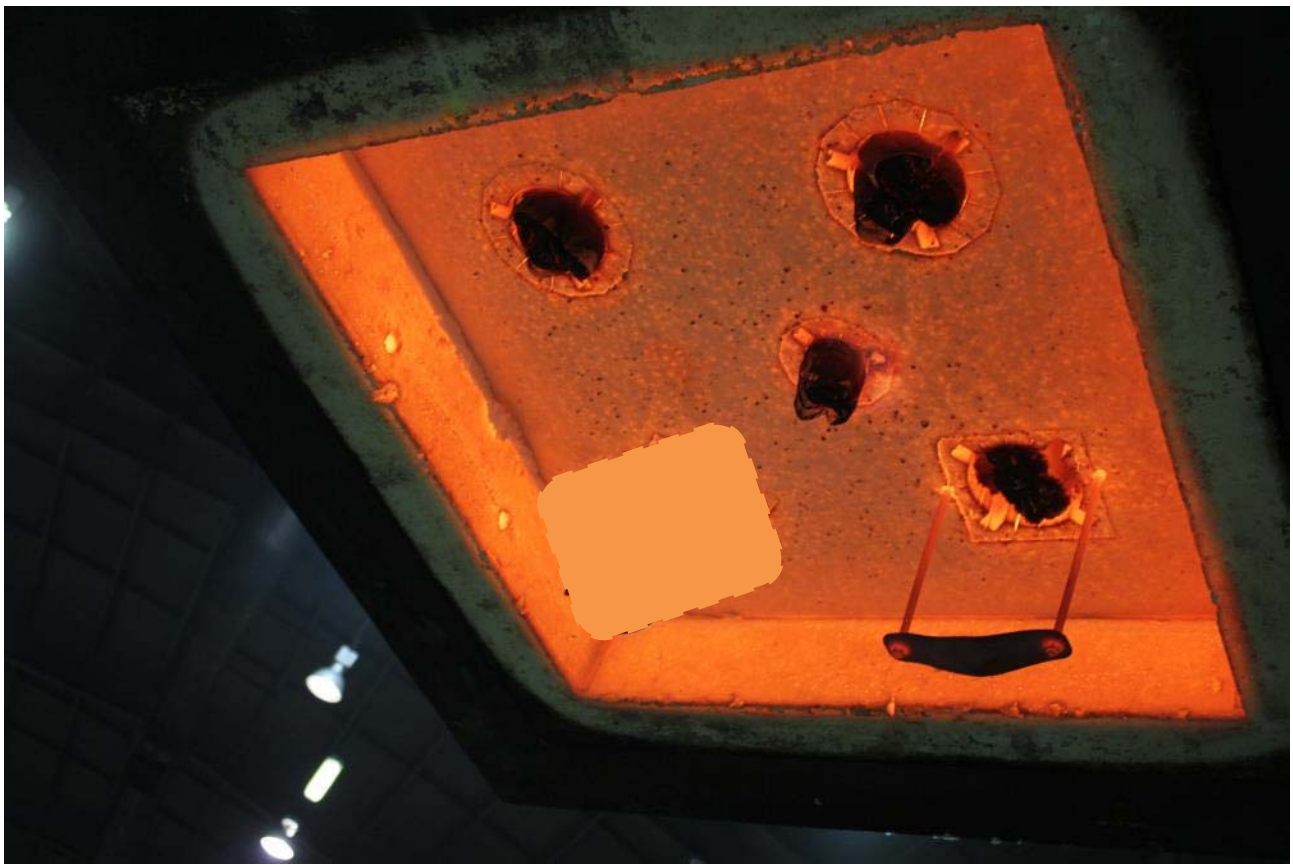


**PHOTOGRAPH 11 – SPECIMENS AT 150 MINUTES INTO THE TEST**

**PHOTOGRAPH 12 – SPECIMENS AT 180 MINUTES INTO THE TEST**


**PHOTOGRAPH 13 – SPECIMENS 2 AND 3 AT 208 MINUTES INTO THE TEST**

**PHOTOGRAPH 14 – SPECIMENS AT THE CONCLUSION OF TESTING**



**PHOTOGRAPH 15 – EXPOSED FACE OF SPECIMENS AT THE CONCLUSION OF TESTING**

# Appendix C – Test Data charts

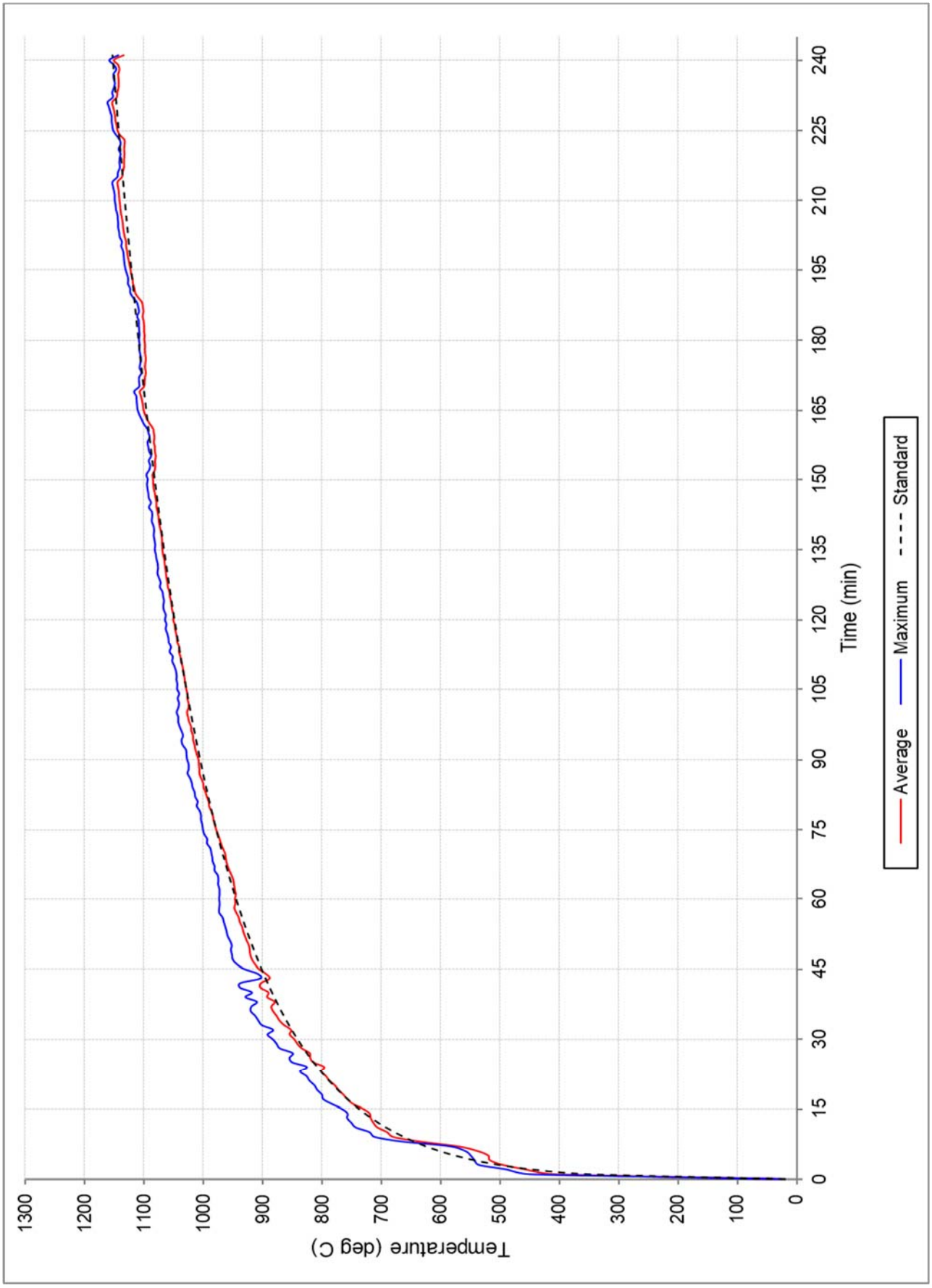



**FIGURE 1 – FURNACE TEMPERATURE**

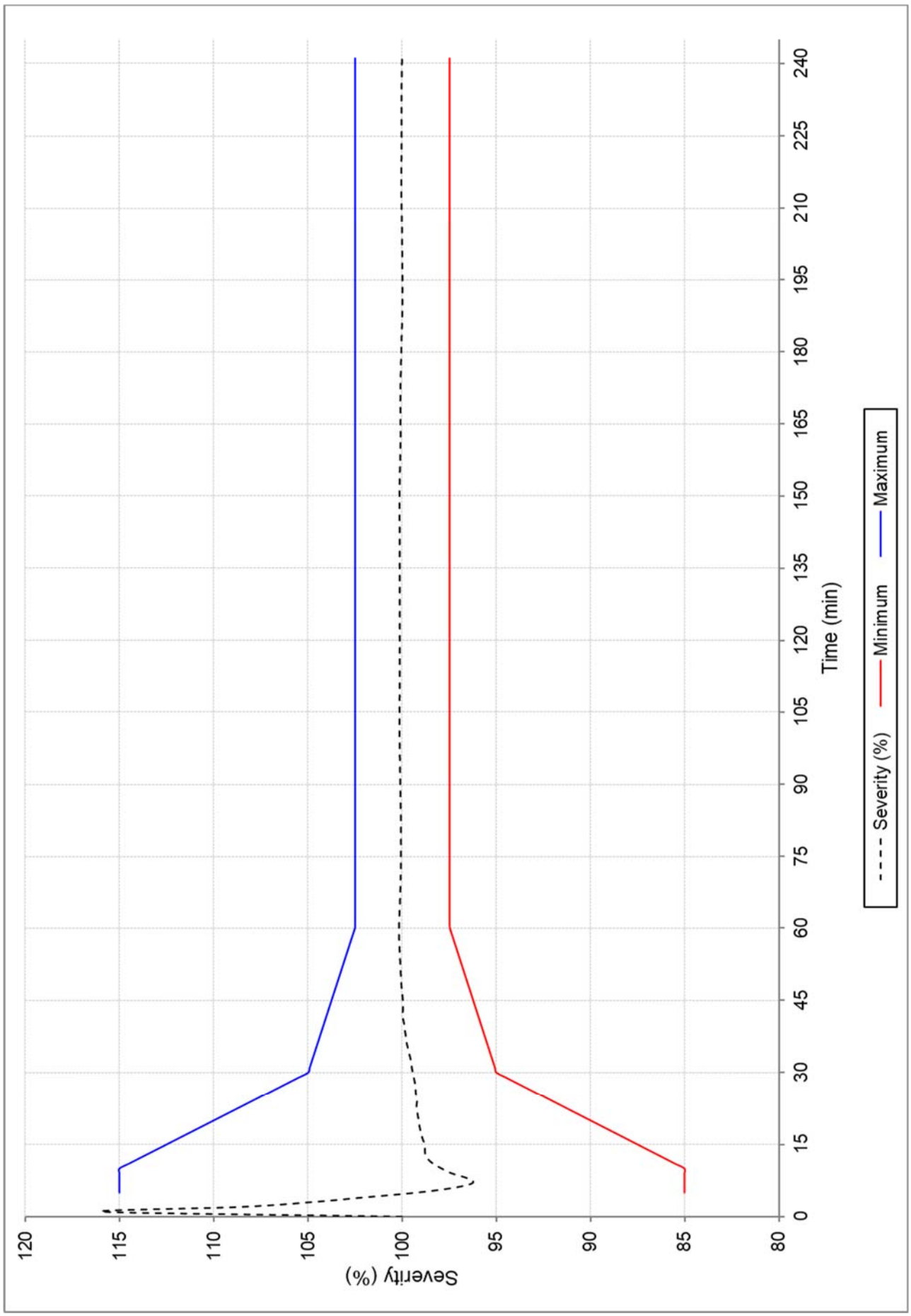



**FIGURE 2 – FURNACE SEVERITY**

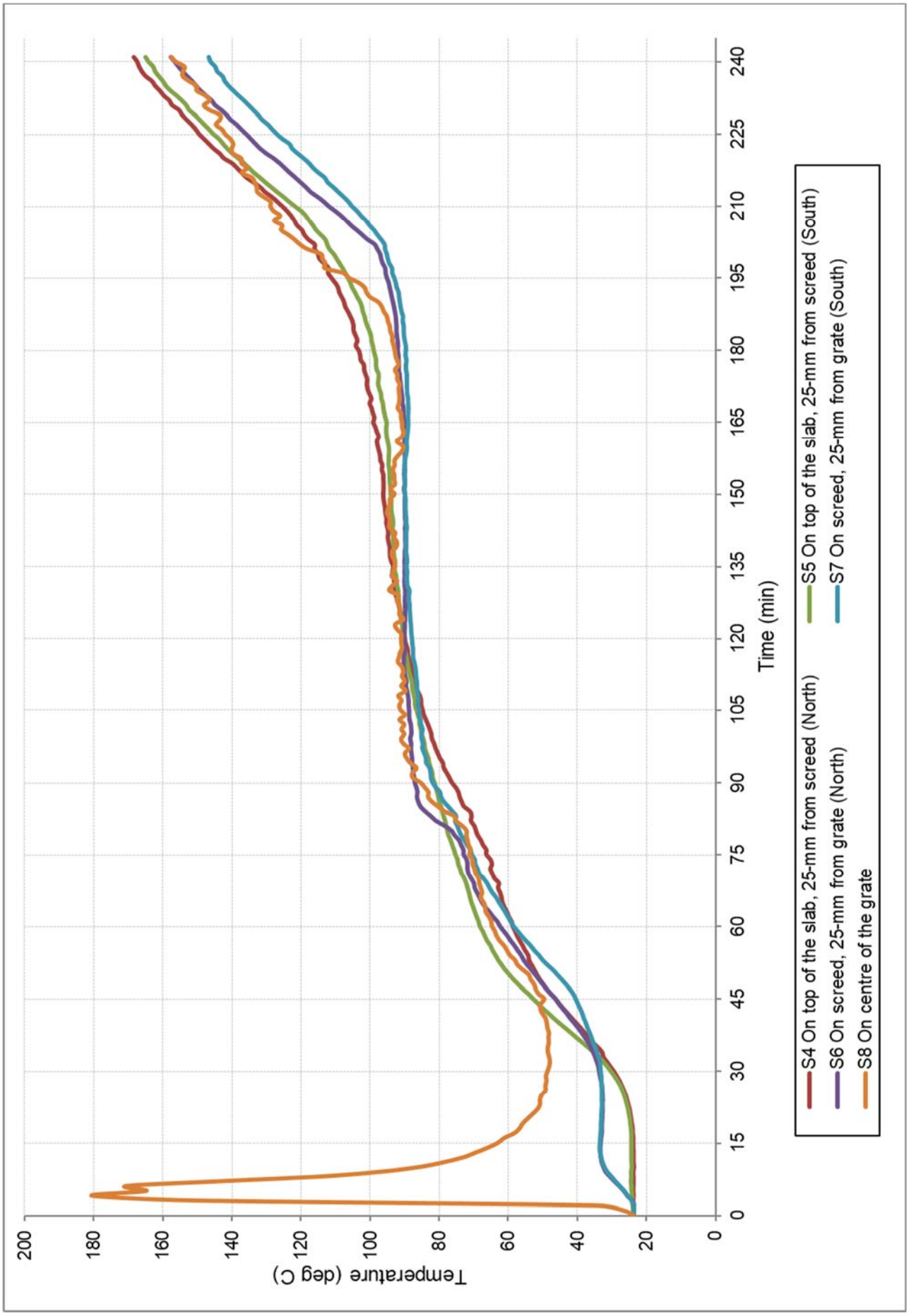



**FIGURE 3 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 2**

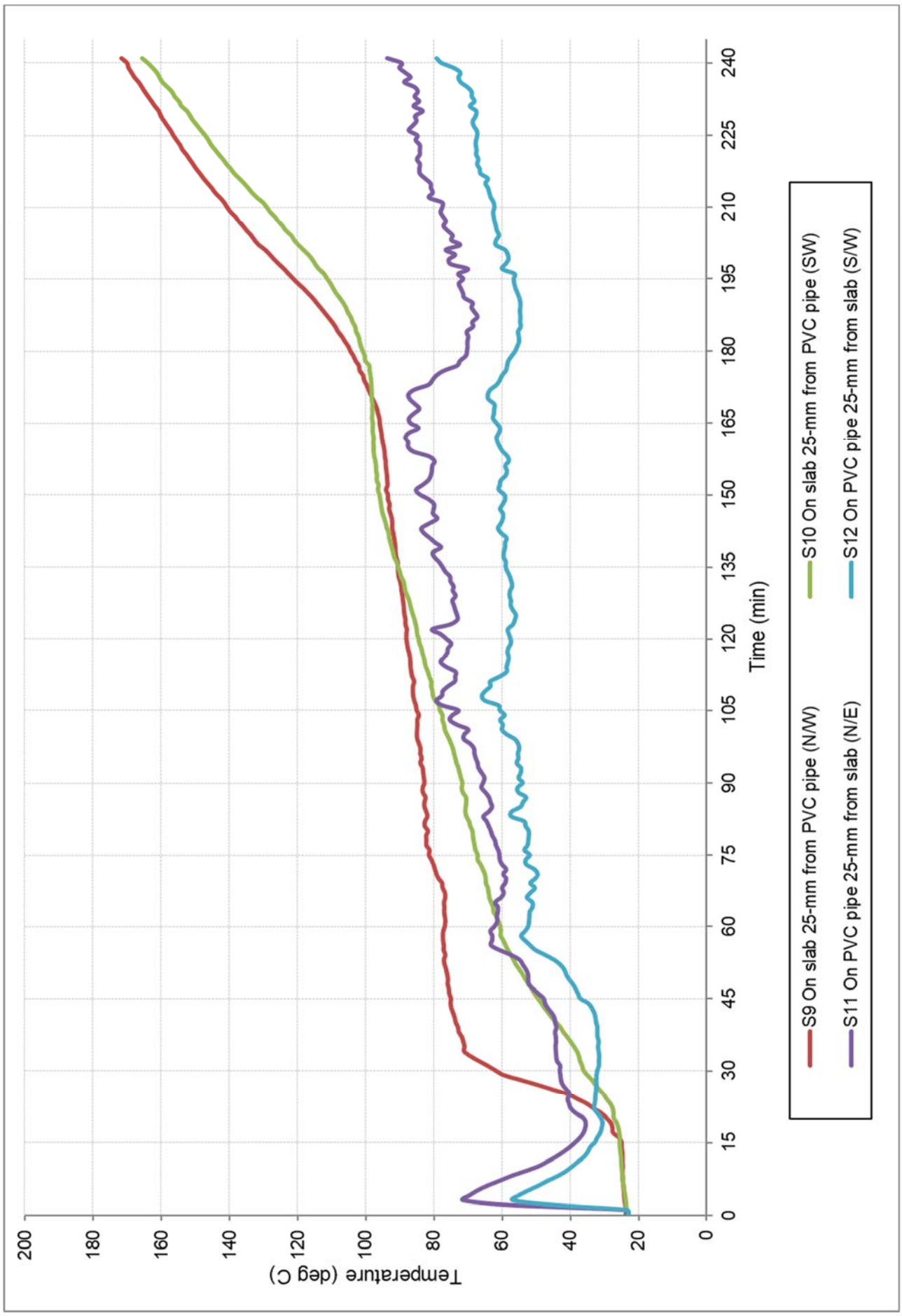



**FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 3**

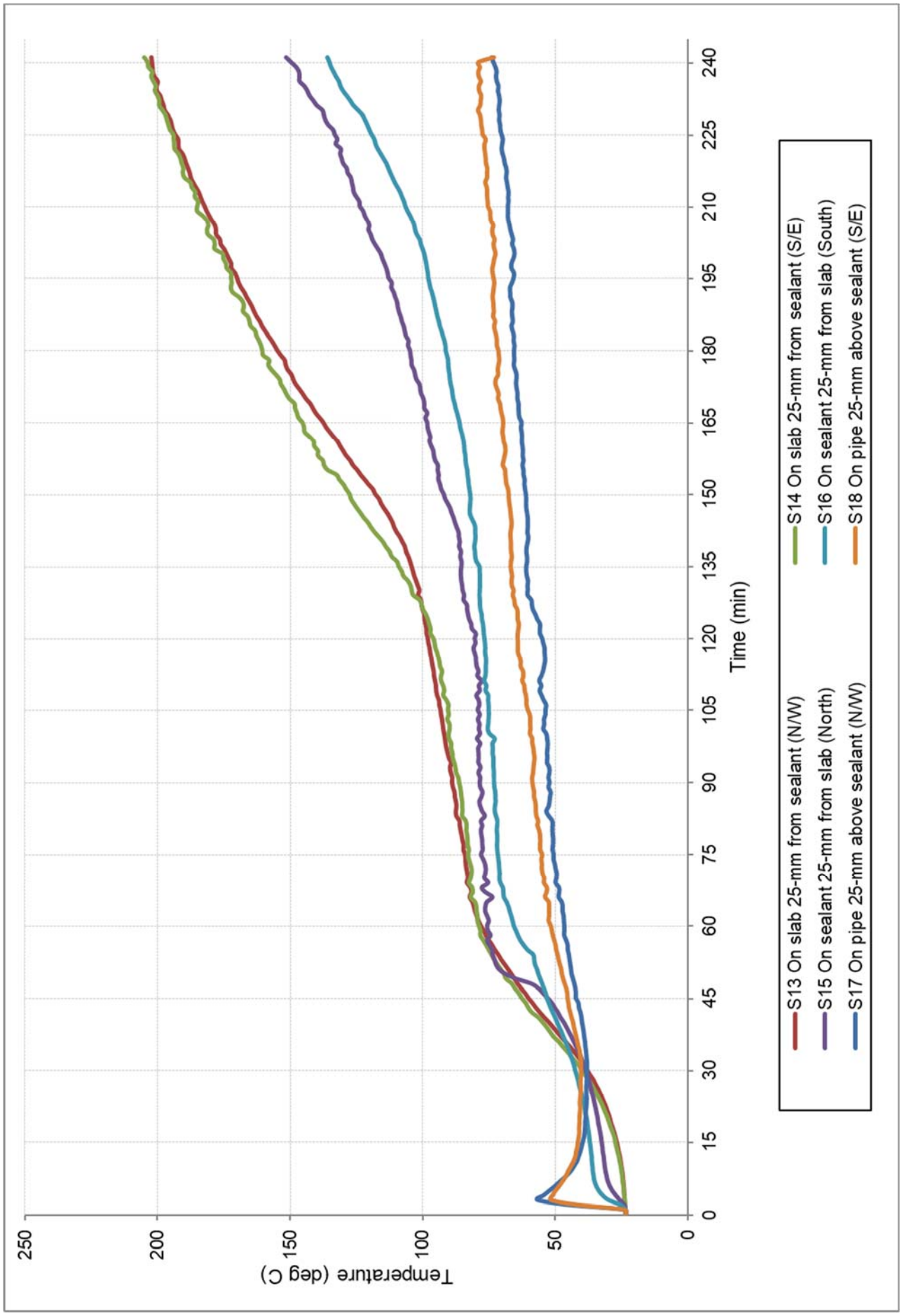



**FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 4**

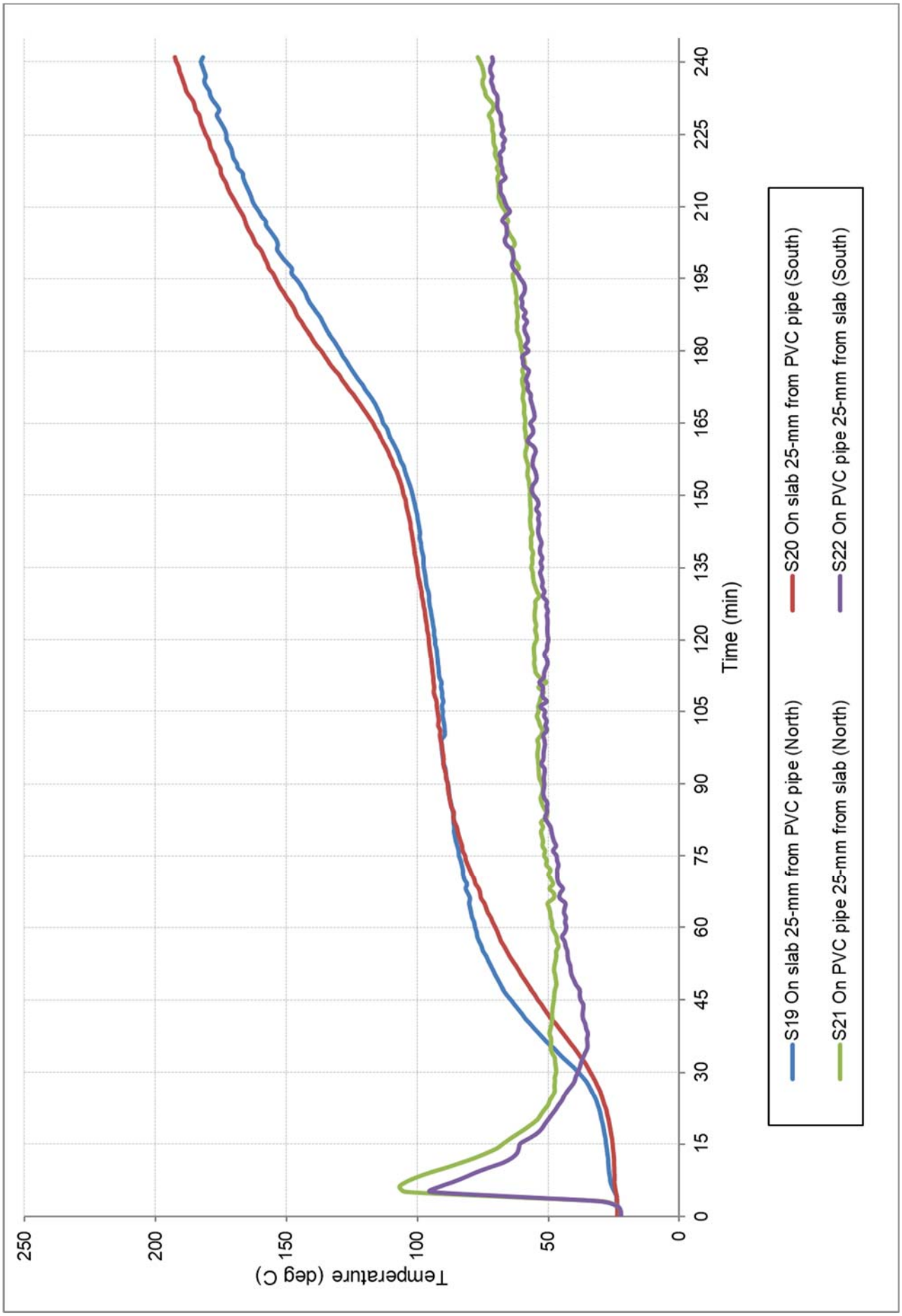


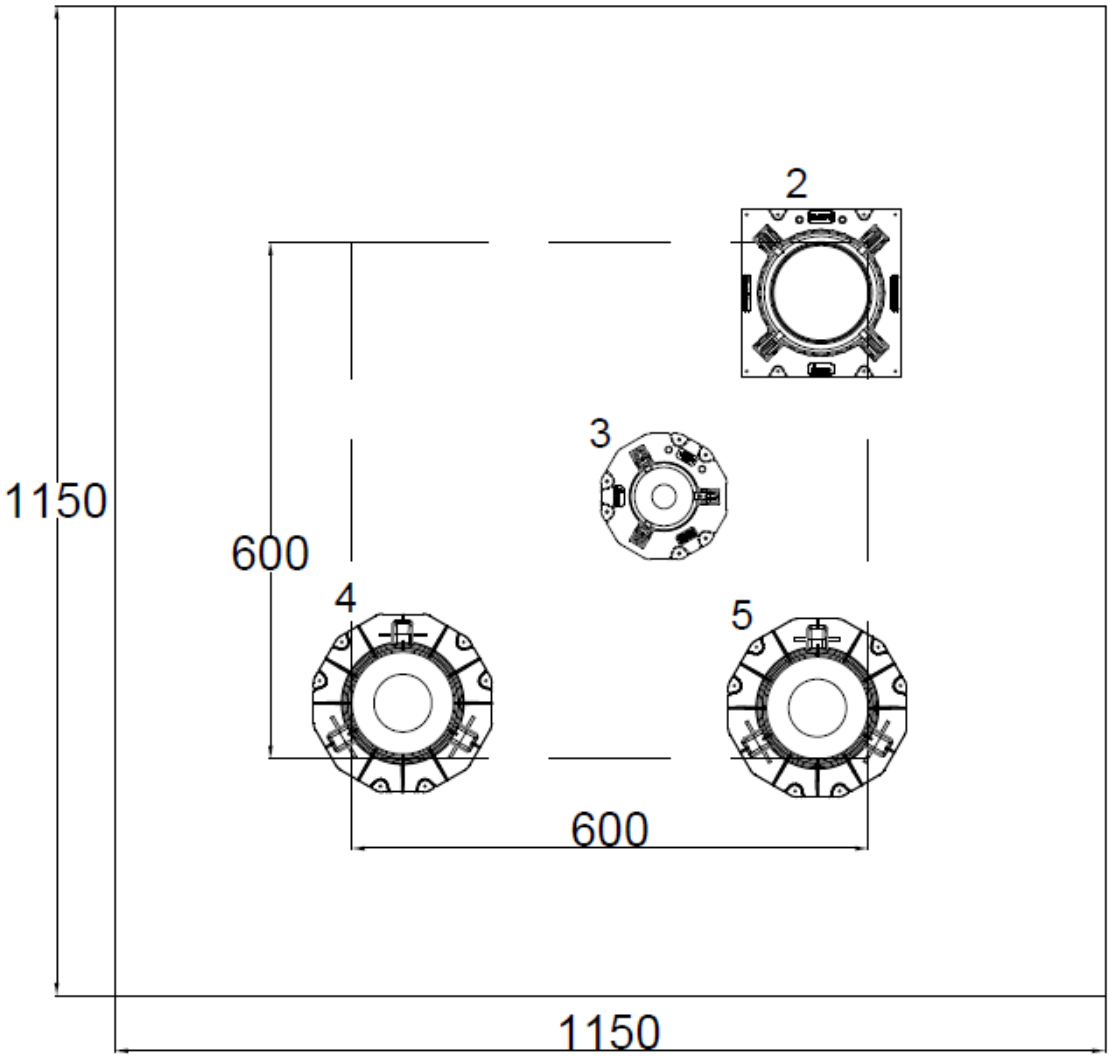

**FIGURE 6 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 5**

## Appendix D – Installation drawings

# Snap Fire Systems Pty Ltd

Test Slab S-20-N Layout

Date: 14 DEC 2020




| Penetration | Collar Code | Pipe Type | Pipe Diameter |
|---|---|---|---|
| 2 | UL100FWS | Triplus | 110 |
| 3 | H50S-RR | PVC+Fitting | 40 |
| 4 | H100S-RR | PVC | 80 |
| 5 | H100S-RR | PVC(SC)+Fitting | 100 |

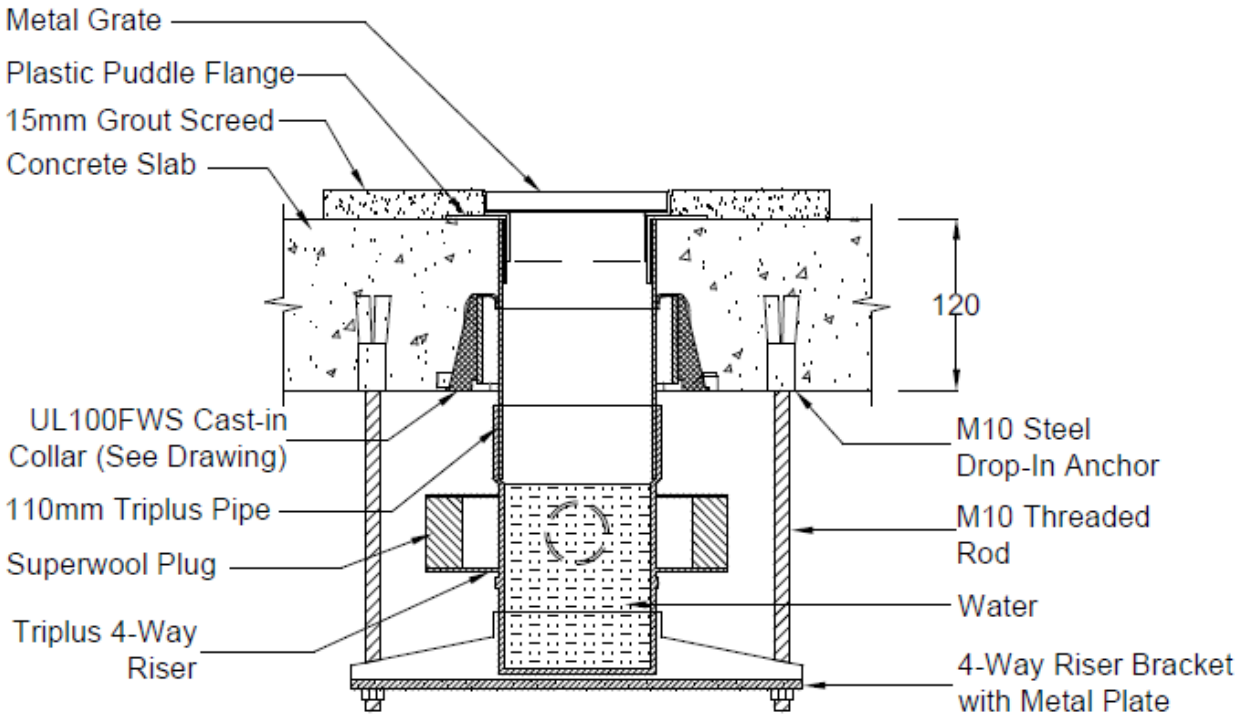
**DRAWING TITLED 'TEST SLAB S-20-O LAYOUT', DATED 14 DECEMBER 2020, BY SNAP FIRE SYSTEMS PTY LTD**

# Snap Fire Systems Pty Ltd

Specimen #2

110 Triplus Floorwaste & UL100FWS

Date: 14 DEC 2020



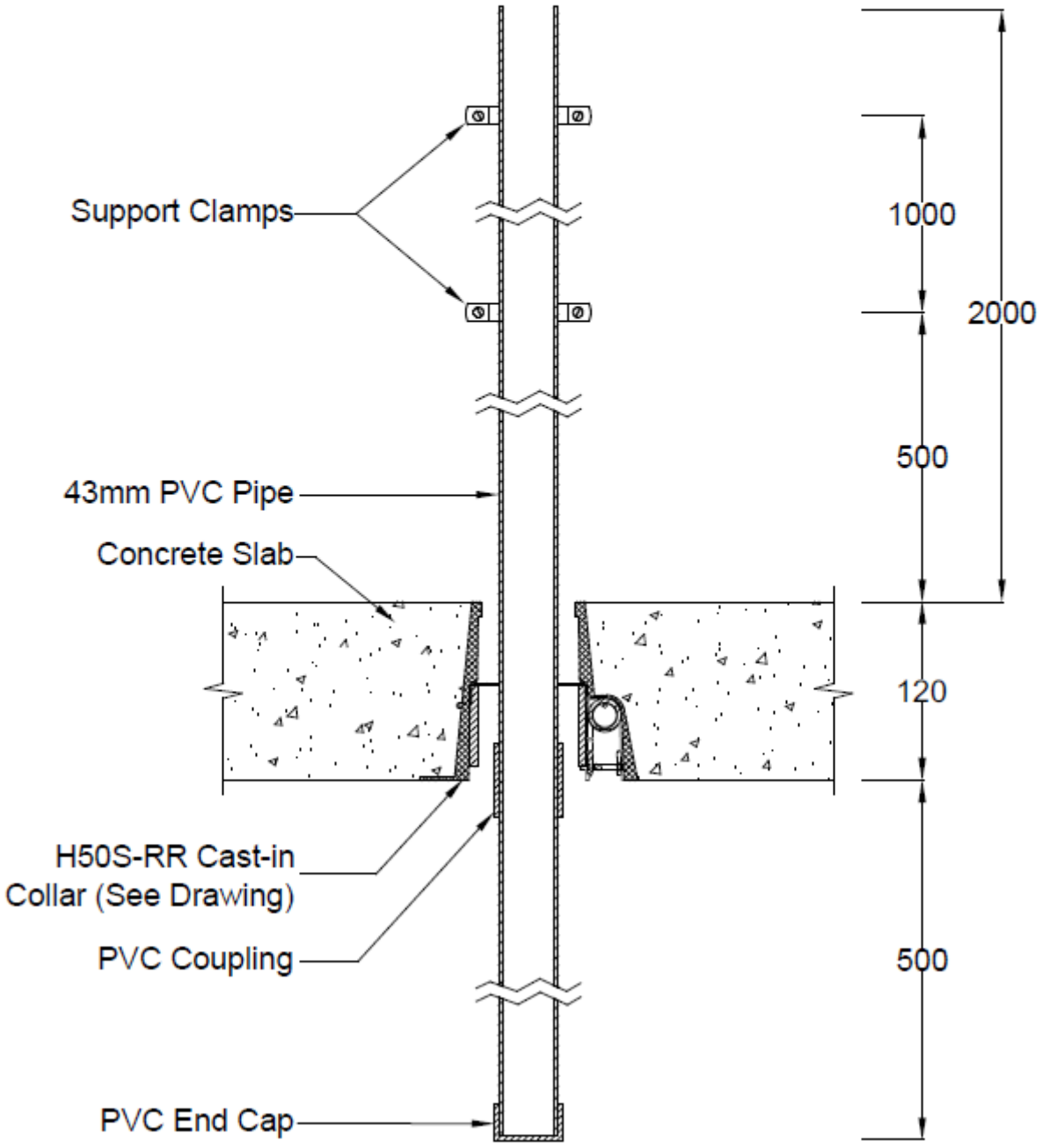

**DRAWING TITLED 'SPECIMEN #2 110 TRIPLUS FLOORWASTE & UL100FWS', DATED 14 DECEMBER 2020, BY SNAP FIRE SYSTEMS PTY LTD**

# Snap Fire Systems Pty Ltd

## Specimen #3

## 40 PVC Stack + Fitting & H50S-RR

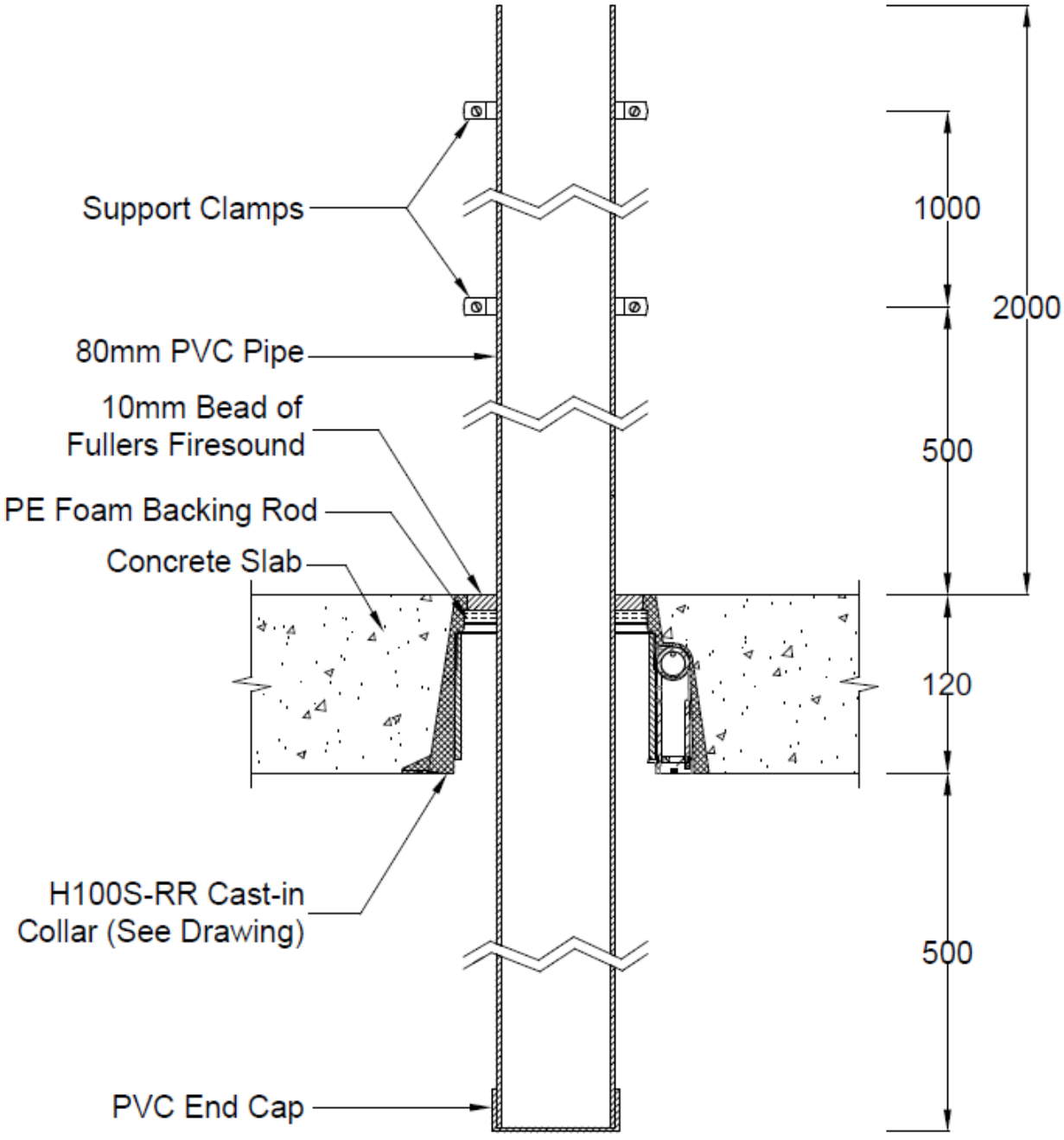
## Date: 14 DEC 2020




**DRAWING TITLED 'SPECIMEN #3 40 PVC STACK + FITTING & H50S-RR', DATED 14 DECEMBER 2020, BY SNAP FIRE SYSTEMS PTY LTD**

# Snap Fire Systems Pty Ltd

## Specimen #4
## 80 PVC Stack & H100S-RR
## Date: 14 DEC 2020



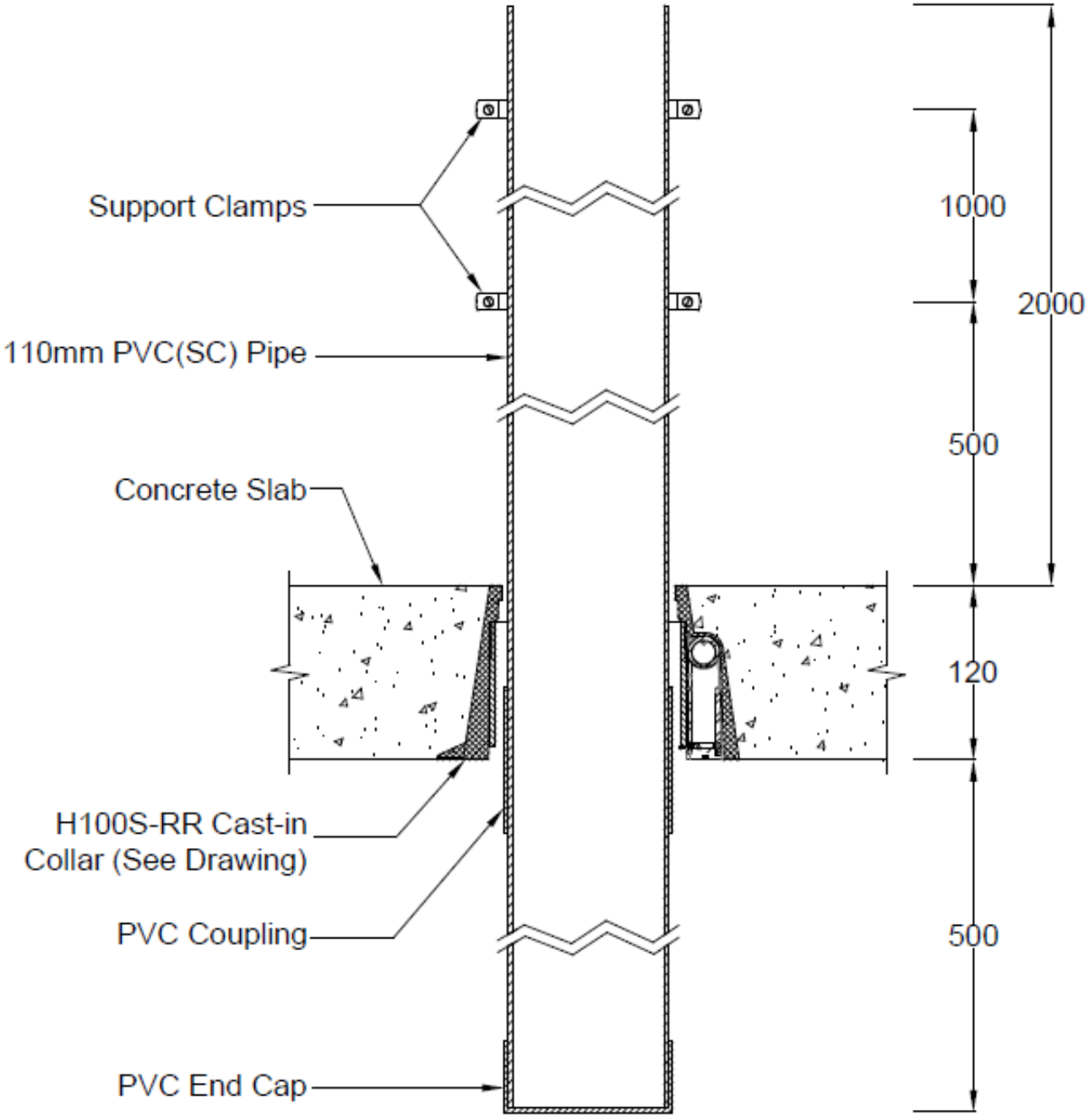

**DRAWING TITLED 'SPECIMEN #4 80 PVC STACK & H100S-RR', DATED 14 DECEMBER 2020, BY SNAP FIRE SYSTEMS PTY LTD**

# Snap Fire Systems Pty Ltd

## Specimen #5

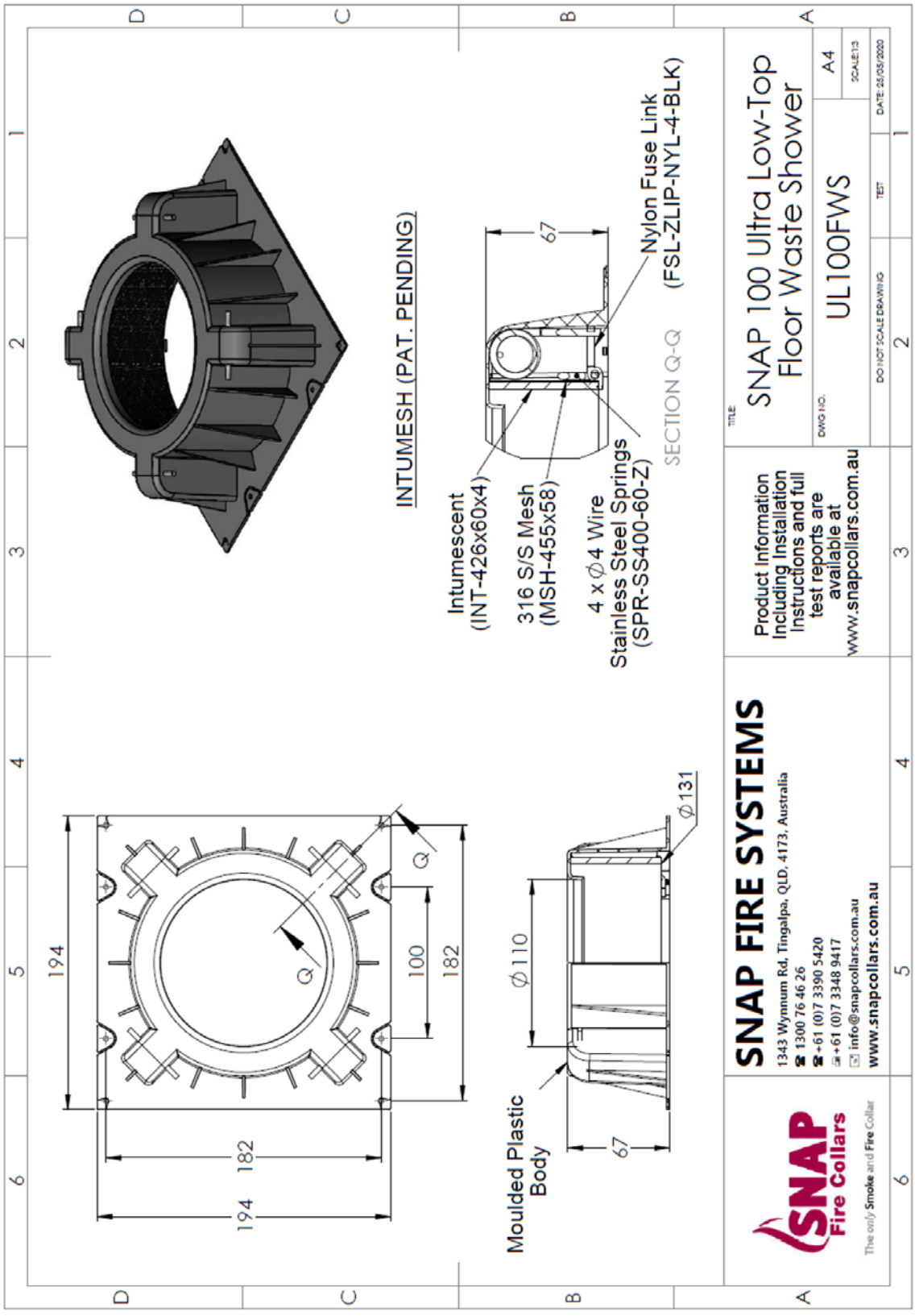
## 100 PVC(SC) Stack + Fitting & H100S-RR

## Date: 14 DEC 2020

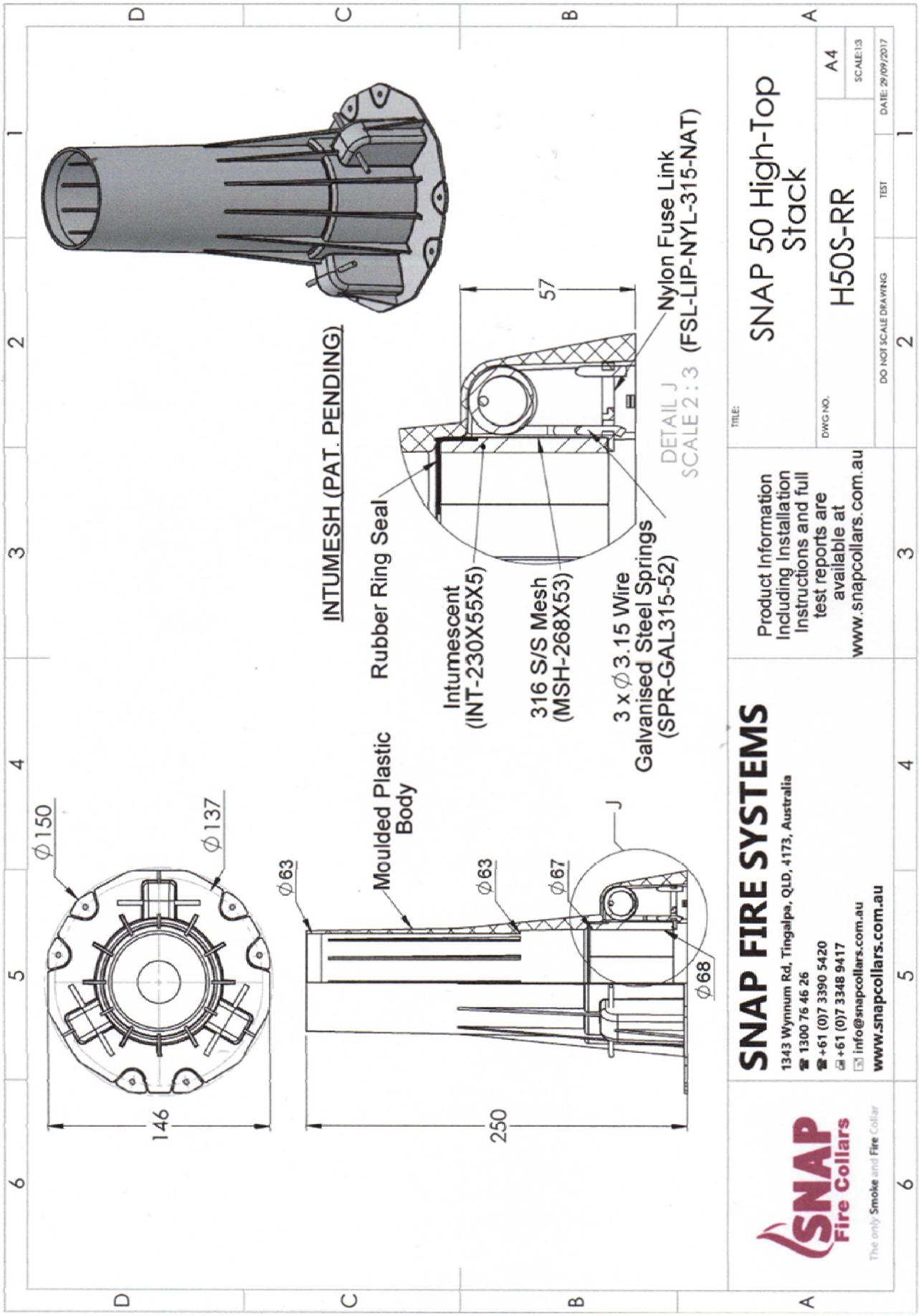



**DRAWING TITLED 'SPECIMEN #5 100 PVC(SC) STACK + FITTING & H100S-RR', DATED 14 DECEMBER 2020, BY SNAP FIRE SYSTEMS PTY LTD**

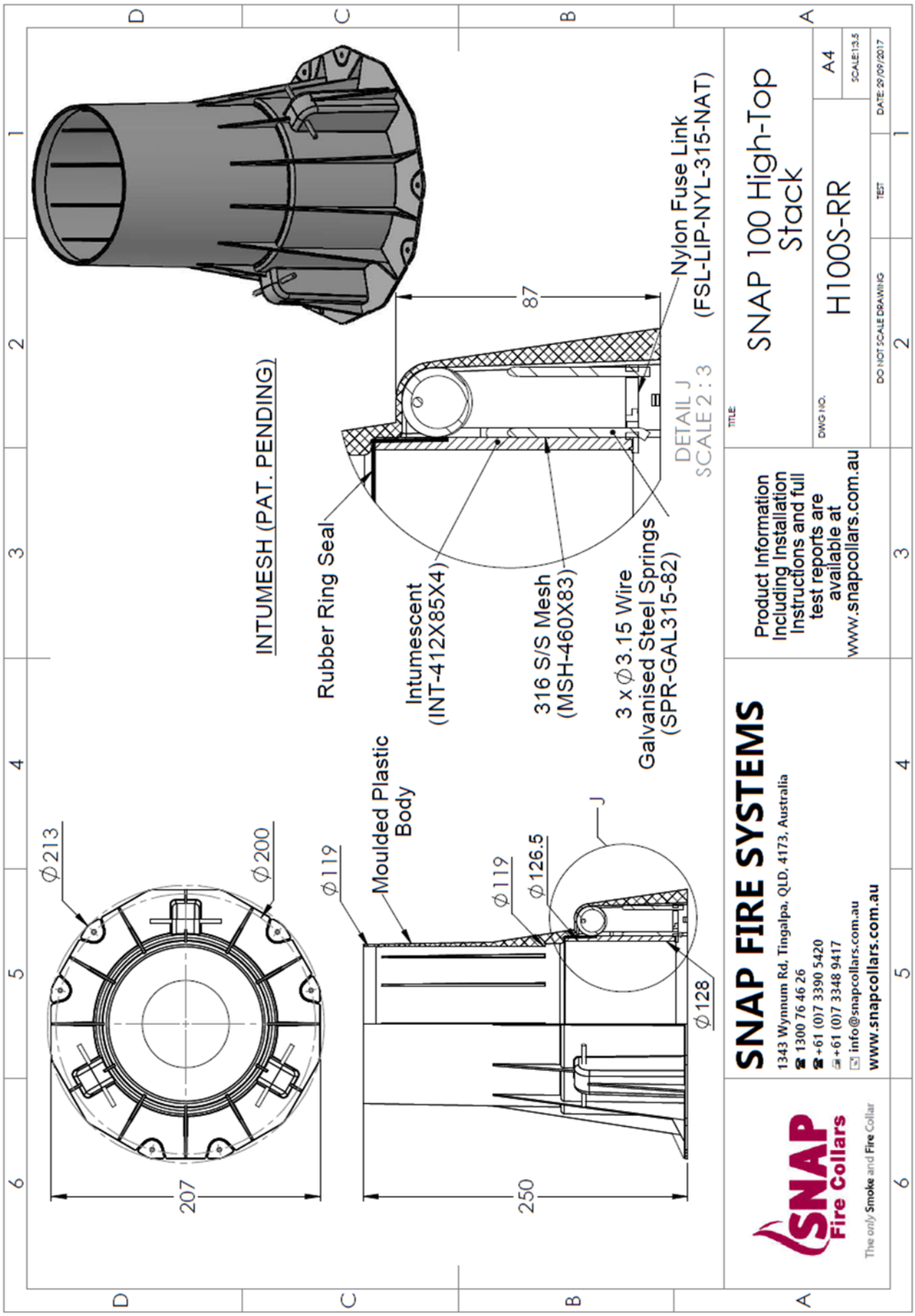
# Appendix E – Specimen Drawings




**DRAWING TITLED 'SNAP 100 ULTRA LOW-TOP FLOOR WASTE SHOWER', DATED 25 MAY 2020, BY SNAP FIRE SYSTEMS PTY LTD**




**DRAWING TITLED 'SNAP 50 HIGH-TOP STACK', DATED 29 JANUARY 2017, BY SNAP FIRE SYSTEMS PTY LTD**




**DRAWING TITLED "SNAP 100 HIGH-TOP STACK, DATED 29 SEPTEMBER 2017, BY SNAP FIRE SYSTEMS PTY LTD**

# Appendix F – Certificate(s) of Test

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PO Box 52, North Ryde NSW 1670, Australia
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## Certificate of Test

No. 3561

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 2177.

Product Name: SNAP UL100FWS Ultra Low Top-Floor Waste Shower cast-in fire collar protecting a nominal 110-mm Valsir Triplus floor waste incorporating a Triplus 4-way riser fitted below the collar (Specimen 2)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab. The slab was penetrated by nominal 110-mm Valsir Triplus floor waste incorporating a Triplus 4-way riser protected by a SNAP UL100FWS Ultra Low Top-Floor Waste Shower cast-in fire collar. The 120-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. The SNAP UL100FWS Ultra Low Top-Floor Waste Shower cast-in fire collar comprised a moulded plastic casting with a 110-mm inner diameter and a 194-mm x 194-mm base flange. The 67-mm high collar casing incorporated a 4-mm thick x 60-mm wide x 426-mm long Intumesh intumescent strip. The closing mechanism comprised four 4-mm diameter (SPR-SS400-60-Z) stainless steel springs, a nylon fuse link and a 455-mm x 58-mm stainless steel mesh as shown in drawing numbered UL100FWS dated 25 May 2020, by SNAP Fire Systems. The penetrating service comprised a nominal 110-mm Valsir Triplus waste system. The floor waste pipe had a 110-mm outside diameter Valsir Triplus polypropylene pipe with a wall thickness of 3.55 mm fitted through the collar's sleeve. The floor waste was fitted with a chrome plated brass grate and a plastic puddle flange. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 4-way riser was connected below the fire collar to the penetrating pipe and supported by a 4-way riser bracket with a galvanized steel plate and fixed to the concrete slab using a two M10 threaded rod and steel drop-in anchors. The 4-way riser arms were plugged with ceramic fibre. The floor waste gully was charged with water to the level shown in drawing titled "Specimen #2, 110 Triplus Floorwaste & UL100FWS", dated 14 December 2020, provided by Snap Fire Systems Pty Ltd.

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

| | | |
|---|---|---|
| Structural Adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | no failure at 241 minutes |

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/120.

The fire-resistance level (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The test specimen was tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018 - Concrete structures. The maximum FRL of any test specimen cannot exceed the FRL achieved by the concrete slab in which it was installed. 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: 19 January 2021

Issued on the 30th day of March 2021 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments



This document is issued in accordance with NATA's accreditation requirements.
Accreditation No. 165 – Corporate Site No. 3625
Accredited for compliance with ISO/IEC 17025 - Testing

**COPY OF CERTIFICATE OF TEST – NO. 3561**

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**T** (02) 9490 5444 • **ABN** 41 687 119 230

# Certificate of Test

No. 3562

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 2177.

Product Name: SNAP H50S-RR High-Top Stack cast-in fire collar protecting a nominal 40-mm Iplex polyvinyl chloride (PVC-U) stack pipe incorporating a coupling inside the collar (Specimen 3)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab. The slab was penetrated by nominal 40-mm Iplex polyvinyl chloride (PVC-U) stack pipe incorporating a coupling protected by a SNAP H50S-RR High-Top Stack cast-in fire collar. The 120-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. The SNAP H50S-RR High-Top Stack cast-in fire collar comprised a 1.6-mm thick polypropylene casing with a 67-mm inner diameter and a 150-mm diameter base flange. The 250-mm high collar casing incorporated a 230-mm x 55-mm x 5-mm thick Intumesh intumescent material and a rubber ring seal. The closing mechanism comprised three galvanised steel springs bound with nylon fuse links and a 268-mm x 53-mm 316 stainless steel mesh as shown in drawing titled 'SNAP 50 High-Top Stack' dated 29 September 2017, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 43-mm outside diameter PVC pipe with a wall thickness of 2.2 mm and a PVC coupling with a total wall thickness of 4.4 mm fitted through the collar's sleeve penetrating concrete slab as shown in drawing titled 'Specimen #3, 40 PVC Stack + Fitting & H50S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd. The pipe projected vertically 2000-mm above the unexposed face of the concrete floor and 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and fitted with a PVC end cap on the exposed end.

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

| | | |
|---|---|---|
| Structural Adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | no failure at 241 minutes |

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/120.

The fire-resistance level (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The test specimen was tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018 - Concrete structures. The maximum FRL of any test specimen cannot exceed the FRL achieved by the concrete slab in which it was installed. 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: 19 January 2021

Issued on the 30th day of March 2021 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments



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# Certificate of Test

No. 3563

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 2177.

Product Name: SNAP H100S-RR High-Top Stack cast-in fire collar protecting a nominal 80-mm polyvinyl chloride (PVC-U) stack pipe (Specimen 4)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab. The slab was penetrated by nominal 80-mm polyvinyl chloride (PVC-U) stack pipe protected by a SNAP H100S-RR High-Top Stack cast-in fire collar. The 120-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. The SNAP H100S-RR High-Top Stack cast-in fire collar comprised a 1.6-mm thick polypropylene casing with a 126.5 mm inner diameter and a 213-mm diameter base flange. The 250-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh intumescent material and a rubber ring seal. The closing mechanism comprised three equally spaced 3.15-mm diameter galvanised steel springs bound with nylon fuse links acting against a 460-mm x 83-mm 316 stainless steel mesh as shown in drawing titled "SNAP 100 High-Top Stack", dated 29 September 2017, by Snap Fire Systems Pty Ltd. The penetrating service comprised an 82-mm outside diameter Vinidex polyvinyl chloride pipe with a wall thickness of 3.28-mm fitted through the collar's sleeve. The annular gap between the pipe and the inside collar incorporated a PE backing rod, back filled with Fuller's Firesound sealant to a depth of 10 mm and finished flush with the slab as shown in drawing titled 'Specimen #4, 80 PVC Stack & H100S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd. The pipe projected vertically, 2000-mm above the unexposed face of the concrete floor and 500 mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and fitted with a PVC end cap on the exposed end.

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

| | | |
|---|---|---|
| Structural Adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | 239 minutes |

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/120.

The fire-resistance level (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The test specimen was tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018 - Concrete structures. The maximum FRL of any test specimen cannot exceed the FRL achieved by the concrete slab in which it was installed. 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: 19 January 2021

Issued on the 30th day of March 2021 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments



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# Certificate of Test

No. 3564

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 2177.

Product Name: SNAP H100S-RR High-Top Stack cast-in fire collar protecting a nominal 100-mm polyvinyl chloride sandwich construction (PVC-SC) stack pipe incorporating a coupling inside the collar (Specimen 5)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab. The slab was penetrated by nominal 100-mm polyvinyl chloride sandwich construction (PVC-SC) stack pipe incorporating a coupling protected by a SNAP H100S-RR High-Top Stack cast-in fire collar. The 120-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. The SNAP H100S-RR High-Top Stack cast-in fire collar comprised a 1.6-mm thick polypropylene casing with a 126.5 mm inner diameter and a 213-mm diameter base flange. The 250-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh intumescent material and a rubber ring seal. The closing mechanism comprised three equally spaced 3.15-mm diameter galvanised steel springs bound with nylon fuse links acting against a 460-mm x 83-mm 316 stainless steel mesh as shown in drawing titled "SNAP 100 High-Top Stack", dated 29 September 2017, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 110-mm outside diameter Iplex PVC(SC) pipe with a wall thickness of 3.26-mm and a PVC coupling with a total wall thickness of 5.76-mm fitted through the collar's sleeve on the exposed face as shown in drawing titled 'Specimen #5, 100 PVC(SC) Stack + Fitting & H100S-RR', dated 14 December 2020, by Snap Fire Systems Pty Ltd. The pipe projected vertically, 2000-mm above the unexposed face of the concrete floor and 500 mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and fitted with a PVC end cap on the exposed end.

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

| | | |
|---|---|---|
| Structural Adequacy | - | not applicable |
| Integrity | - | no failure at 241 minutes |
| Insulation | - | no failure at 241 minutes |

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/120.

The fire-resistance level (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The test specimen was tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018 - Concrete structures. The maximum FRL of any test specimen cannot exceed the FRL achieved by the concrete slab in which it was installed. 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: 19 January 2021

Issued on the 30th day of March 2021 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments



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**COPY OF CERTIFICATE OF TEST – NO. 3564**

# 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 for 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. |
| AS 3600-2018 | Concrete structures. |

CONTACT US

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FOR FURTHER INFORMATION

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