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

Test Report

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Client: IG6 Pty Ltd as The Trustee for the IG6 IP Trust

Commercial-in-confidence

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

Sponsored Investigation No. FSP 2315

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimens as SNAP retrofit fire collars protecting a 150-mm thick concrete floor slab penetrated by four services comprising a unplasticized polyvinyl chloride sandwich construction (PVC-SC) pipe, two unplasticized polyvinyl chloride (uPVC) pipes and a polypropylene pipe.

1.2 Sponsor

IG6 Pty Ltd as The Trustee for the IG6 IP Trust
3 Skirmish Court
Victoria Point QLD 4165

1.3 Manufacturers

Snap Fire Systems Pty Ltd
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 5209/4800

1.7 Test date

The fire-resistance test was conducted on 4 October 2022.

2 Description of specimen

2.1 General

The specimen comprised a 1150-mm x 1150-mm x 150-mm thick concrete slab which was penetrated by multiple services protected by three retrofit fire collars and once cast in fire collar.

The 150-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 180 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures.

For the purpose of the test, the penetrations were referenced as specimen 1, 2, 3 and 4. Documents containing a complete description of each specimen were supplied by the sponsor and are retained on file.

Specimen 1 - A SNAP 63R Retrofit fire collar protecting a DN50 PN12 uPVC stack pipe penetrating a 65-mm diameter core hole

The SNAP 63R Retrofit fire collar comprised a 0.75-mm steel casing with a 72-mm inner diameter and a 156-mm diameter base flange. The 47-mm high collar casing incorporated a closing mechanism which comprised two soft Intumesh intumescent wraps lined within the internal circumference of the collar. Intumescent A was 4-mm thick x 43-mm wide x 261-mm long, and Intumescent B was 4-mm thick x 43-mm wide x 235-mm long. Between the intumescent strips was a layer of 316 grade stainless steel mesh 243-mm long x 42-mm wide with a wire mesh diameter of 0.15-mm, as shown in drawing titled “SNAP 63 Retro”, dated 25 March 2019, by Snap Fire Systems Pty Ltd.

The SNAP 63R fire collar was centrally located over a 65-mm diameter core hole on the underside (exposed face) of the concrete slab and was fixed through 3 mounting brackets using 5-mm x 30-mm long concrete screw bolts.

The penetrating pipe comprised a Plastcorp PN12 uPVC pipe with a 60-mm outside diameter and a wall thickness of 3.47-mm. The pipe was fitted through the fire collar sleeve and penetrated the concrete slab through a 65-mm diameter core hole as shown in drawing titled ‘Specimen #1, 50 PN12 PVC Stack & 63R’, dated 10 September 2022 by Snap Fire Systems Pty Ltd. On the unexposed face concrete slab, the nominal 2.5-mm annular gap between the pipe and the core hole was left unprotected.

The pipe projected vertically 2000-mm above the unexposed face of the concrete slab and 500-mm below into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab, left open at the unexposed end and capped with a ceramic fibre (Superwool) plug on the exposed end.

Specimen 2 - A SNAP H150S-RR High-Top Stack cast-in fire collar protecting a DN110 Valsir Triplus polypropylene stack pipe

The SNAP H150S-RR High Top Stack fire collar comprised a white 2-mm thick polypropylene casing with a 180-mm inner diameter sleeve and a 292-mm diameter base flange. The 250-mm high collar casing incorporated a 600-mm long x 110-mm wide x 6-mm thick strip of intumescent material and a rubber ring seal. The closing mechanism comprised four x 4-mm diameter galvanised steel springs, four nylon fuse links and a 640 mm x 109-mm 316 stainless steel mesh as shown in drawing titled 'SNAP 150 High-Top Stack', dated 29 September 2017, by SNAP Fire Systems.

The SNAP H150S-RR High-Top Stack fire collar was cast into a 150-mm thick concrete slab with the collar casing cut down to 150-mm high finishing flush with the unexposed face of the concrete slab.

The penetrating pipe comprised a Valsir Triplus pipe with a 110.3-mm outside diameter and a wall thickness of 3.7-mm fitted through the collar sleeve. The pipe projected vertically 2000-mm above the unexposed face of the concrete slab and 500-mm below into the furnace chamber. The pipe was supported at 500-mm and 1500-mm from the unexposed face of the slab, left open at the unexposed end and capped with a ceramic fibre (Superwool) plug on the exposed end.

On the unexposed face of the slab the 35-mm wide annular gap between the pipe and the collar was backfilled with grout to a depth of 30-mm as shown in drawing titled 'Specimen #2, 110 Triplus Stack & H150S-RR', dated 10 September 2022 by Snap Fire Systems Pty Ltd.

Specimen 3 - A SNAP LP100R Low Profile Retrofit fire collar protecting a DN100 uPVC pipe incorporating a floor waste and P-trap penetrating a 120-mm diameter core hole

The SNAP LP100R Low Profile Retrofit fire collar comprised a 0.95-mm steel casing with a 118-mm inner diameter and a 257-mm diameter base flange. The 62-mm high fire collar casing incorporated a closing mechanism which comprised a 6-mm thick x 57-mm wide x 400-mm long Intumesh intumescent wrap lined within the internal circumference of the fire collar casing. The closing mechanism comprised three 3.15-mm diameter 304 stainless steel springs with black nylon fuse links and a 415-mm long x 120-mm wide stainless steel wire mesh with a diameter of 0.15-mm as shown in drawing number 'LP100R', dated 26 August 2016, by Snap Fire Systems Pty Ltd.

The LP100R Low Profile Retrofit fire collar was centrally located over a 120-mm core hole on the underside (exposed face) of the concrete slab and fixed in position through the 3 mounting brackets of the fire collar casing using 5-mm x 30-mm long concrete screw bolts.

The penetrating service comprised a Pipemakers uPVC (sandwich construction) 110.3-mm outside diameter pipe with a wall thickness of 3.18-mm fitted through the fire collar sleeve and penetrated the slab through a 120-mm core hole.

On the unexposed side of the slab, the top of the PVC (SC) pipe finished flush with the concrete slab and was fitted with a plastic puddle flange and a chrome plated brass floor waste grate. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor waste grate.

On the exposed side of the slab, a PVC P-Trap was connected to the penetrating pipe, supported by a M10 threaded rod, nut clip and a steel drop-in anchor. The P-Trap was capped using a PVC End Cap. The P-Trap was charged with 2 litres of water to the level shown in drawing titled 'Specimen #3 100 PVC(SC) Floor Waste & LP100R', dated 14 September 2022, by Snap Fire Systems Pty Ltd.

Specimen 4 – A SNAP 110R Retrofit fire collar protecting a DN100 PN12 uPVC stack pipe penetrating a 120-mm diameter core hole

The SNAP 110R Retrofit fire collar comprised a 0.75-mm steel casing with a 122-mm inner diameter and a 206-mm diameter base flange. The 62-mm high collar casing incorporated a closing mechanism which comprised three soft Intumesh intumescent wraps and wire mesh lined within the internal circumference of the collar.

Intumescent A was 2.5-mm thick x 58-mm wide x 424-mm long, intumescent B was 2.5-mm thick x 58-mm wide x 407-mm long and intumescent C was 2.5-mm thick x 58-mm wide x 389-mm long. Between intumescent strips A and B was a layer of 316 stainless steel mesh 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh, 398-mm long x 58-mm wide. Both wire mesh diameters measured 0.15-mm, as shown in drawing titled 'SNAP 110 Retro', dated 16 January 2019, by Snap Fire Systems Pty Ltd.

The SNAP 110R fire collar was centrally located over a 120-mm core hole on the underside (exposed face) of the concrete slab and fixed through 3 mounting brackets using 5-mm x 30-mm long concrete screw bolts.

The penetrating pipe comprised a Iplex PN12 uPVC pipe with a 114.5-mm outside diameter and a wall thickness of 6.25-mm. The pipe was fitted through the fire collar sleeve and penetrated the concrete slab through a 120-mm diameter core hole as shown in drawing titled 'Specimen #4, 110mm PN12 PVC Stack & 110R', dated 10 September 2022, by Snap Fire Systems Pty Ltd. On the unexposed face of concrete slab, the nominal 3-mm annular gap between the pipe and the core hole was left unprotected.

The pipe projected vertically 2000-mm above the unexposed face of the concrete slab and 500-mm below into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab, left open at the unexposed end and capped with a ceramic fibre (Superwool) plug on the exposed end.

2.2 Orientation

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

2.3 Conditioning

The concrete slab was left to cure for a period longer than 30 days. The specimen was delivered on 30 September 2022 and stored under standard laboratory atmospheric conditions until the test date.

2.4 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-22-M' Layout', dated 9 September 2022, by, Snap Fire Systems Pty Ltd.
- Drawing titled 'Specimen #1, 50 PN12 PVC Stack & 63R', dated 10 September 2022, by Snap Fire Systems Pty Ltd.
- Drawing titled 'Specimen #2, 110 Triplus Stack & H150S-RR', dated 10 September 2022, by Snap Fire Systems Pty Ltd.
- Drawing titled 'Specimen #3 100 PVC(SC) Floor Waste & LP100R', dated 14 September 2022, by Snap Fire Systems Pty Ltd.
- Drawing titled 'Specimen #4, 100 PN12 PVC Stack & 110R', dated 10 September 2022, by Snap Fire Systems Pty Ltd.
- Drawing titled 'SNAP 63 Retro', dated 25 March 2019, by Snap Fire Systems Pty Ltd.
- Drawing number 'LP100R-T', dated 26 August 2016, by Snap Fire Systems Pty Ltd.
- Drawing titled 'SNAP 110 Retro', dated 16 January 2019, by Snap Fire Systems Pty Ltd.
- Drawing titled 'SNAP 150 High-Top Stack', dated 29 September 2017, by Snap Fire Systems Pty Ltd.

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 Pressure

The furnace pressure was measured by a differential low-pressure transducer with a range of ± 50 Pa.

The pressure probe was located approximately 300-mm below the concrete slab supporting construction, where the pressure was set and controlled at 18 Pa.

4.4 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 20°C at the commencement of the test.

6 Departure from standard

The furnace pressure was in excess of the tolerances of the requirements of AS 1530.4-2014 for the short periods of time as shown in Figure 3. The test laboratory confirms that this minor departure in furnace pressure would not have significantly affected the results of this test.

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
1 minutes-	Smoke is being emitted at the base of specimens 1 and 4.
2 minutes -	Light smoke is being emitted from the floor waste grate of specimen 3.
2:30 minutes -	Light smoke has begun fluing from the end of the pipe of specimen 2 for 5 seconds then ceased.
3:40 minutes -	Cotton pad test was applied above the grate of Specimen 3 – no ignition noted at this time (photograph 4). Smoke has begun fluing from the ends of the pipes of specimens 1 and 2.
4 minutes -	Smoke has begun fluing from the end of the pipe of specimen 4. Smoke has ceased fluing from the end of the pipe of specimen 1 and the floor waste grate of specimen 2.
5 minutes -	Smoke has ceased fluing from the pipe end of specimen 2.
8 minutes -	Smoke has ceased fluing from the pipe end of specimen 4.
9 minutes -	Smoke has ceased emitting between the slab and the pipe at the base of specimen 1.
11 minutes -	Smoke staining on the pipe at the base of specimen 4 is now visible.
14 minutes -	Smoke has ceased emitting between the slab and pipe at the base of specimen 4.
17 minutes -	Moisture is visible on the screed of specimen 3.
27 minutes -	Moisture has begun pooling on the slab and the screed around the base of specimen 3 floor waste.
33 minutes -	Light smoke has resumed fluing from the ends of the pipes of specimens 1 and 4.
75 minutes -	Thermocouple #10 on the pipe of specimen 2 was replaced.
67 minutes -	Light smoke continues to flue from the end of the pipe of specimen 4.
116 minutes -	The moisture on the slab around the base of specimen 3 has dried up.
143 minutes -	The pipe at the base of specimens 1 and 4 continue to discolour.
229 minutes -	Cotton pad test applied above the grate of specimen 3 – no ignition noted at this time.
231 minutes -	The level of smoke venting at the base of specimen 4 has intensified. Cotton pad test at the base of specimen 4 – no ignition noted at this time.
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 Furnace pressure

Figure 3 shows the curve of average pressure versus time inside the furnace chamber recorded during the heating period.

8.5 Specimen temperature

Figure 4 shows the curve of temperature versus time associated with specimen 1.

Figure 5 shows the curve of temperature versus time associated with specimen 2.

Figure 6 shows the curve of temperature versus time associated with specimen 3.

Figure 7 shows the curve of temperature versus time associated with specimen 4.

8.6 Performance

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

Specimen 1 - A SNAP 63R Retrofit fire collar protecting a DN50 PN12 uPVC stack pipe penetrating a 65-mm diameter core hole

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

Specimen 2 - A SNAP H150S-RR High-Top cast-in fire collar protecting a DN110 Valsir Triplus stack pipe

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

Specimen 3 - A SNAP LP100R Low Profile Retrofit fire collar protecting a DN100 uPVC pipe incorporating a floor waste and P-trap penetrating a 120-mm diameter core hole

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

Specimen 4 - A SNAP 110R Retrofit fire collar protecting a DN100 PN12 uPVC stack pipe penetrating a 120-mm diameter core hole

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 1: -/240/180*

Specimen 2: -/240/180*

Specimen 3: -/240/180*

Specimen 4: -/240/180*

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

* Specimens were tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 180 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

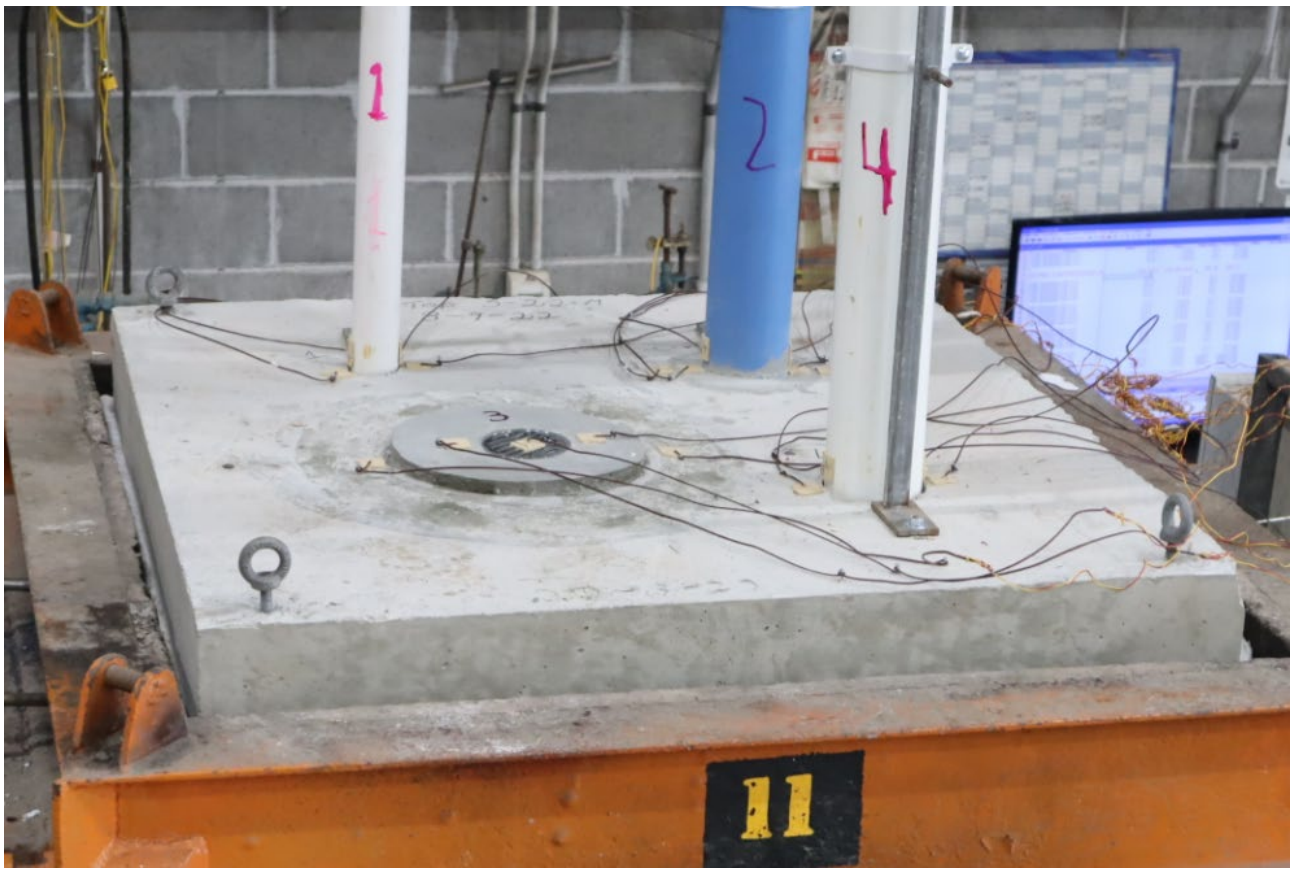
Appendix A – Measurement location

SPECIMEN	THERMCOUPLE POSTION	DESIGNATION
Specimen 1 - A SNAP 63R Retrofit fire collar protecting a DN50 PN12 uPVC stack pipe penetrating a 65-mm diameter core hole	On the slab, 25-mm from the core hole (West)	S1
	On the slab, 25-mm from core hole (East)	S2
	On the pipe, 25-mm above the slab (West)	S3
	On the pipe, 25-mm above the slab (East)	S4
Specimen 2 - A SNAP H150S-RR High-Top Stack cast-in fire collar protecting a DN110 Valsir Triplus polypropylene stack pipe	On the slab, 25-mm from the grout (West)	S5
	On the slab, 25-mm from grout (East)	S6
	On the grout (West)	S7
	On the grout (East)	S8
	On the pipe, 25-mm above the slab (West)	S9
	On the pipe, 25-mm above the slab (East)	S10
Specimen 3 - A SNAP LP100R Low Profile Retrofit fire collar protecting a DN100 uPVC pipe incorporating a floor waste and P-trap penetrating a 120-mm diameter core hole	On the centre of the grate	S11
	On the screed, 25-mm from the grate (West)	S12
	On the screed, 25-mm from the grate (East)	S13
	On the slab, 25-mm from the screed (West)	S14
	On the slab, 25-mm from the screed (East)	S15
Specimen 4 - A SNAP 110R Retrofit fire collar protecting a DN100 PN12 uPVC stack pipe penetrating a 120-mm diameter core hole	On the slab, 25-mm from the core hole (West)	S16
	On the slab, 25-mm from core hole (East)	S17
	On the pipe, 25-mm above the slab (West)	S18
	On the pipe, 25-mm above the slab (East)	S19
Rover		S20
Ambient		S21

Appendix B – Photographs

PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMENS PRIOR TO TESTING

PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMENS PRIOR TO TESTING



PHOTOGRAPH 3 – UNEXPOSED FACE OF SPECIMENS PRIOR TO TESTING

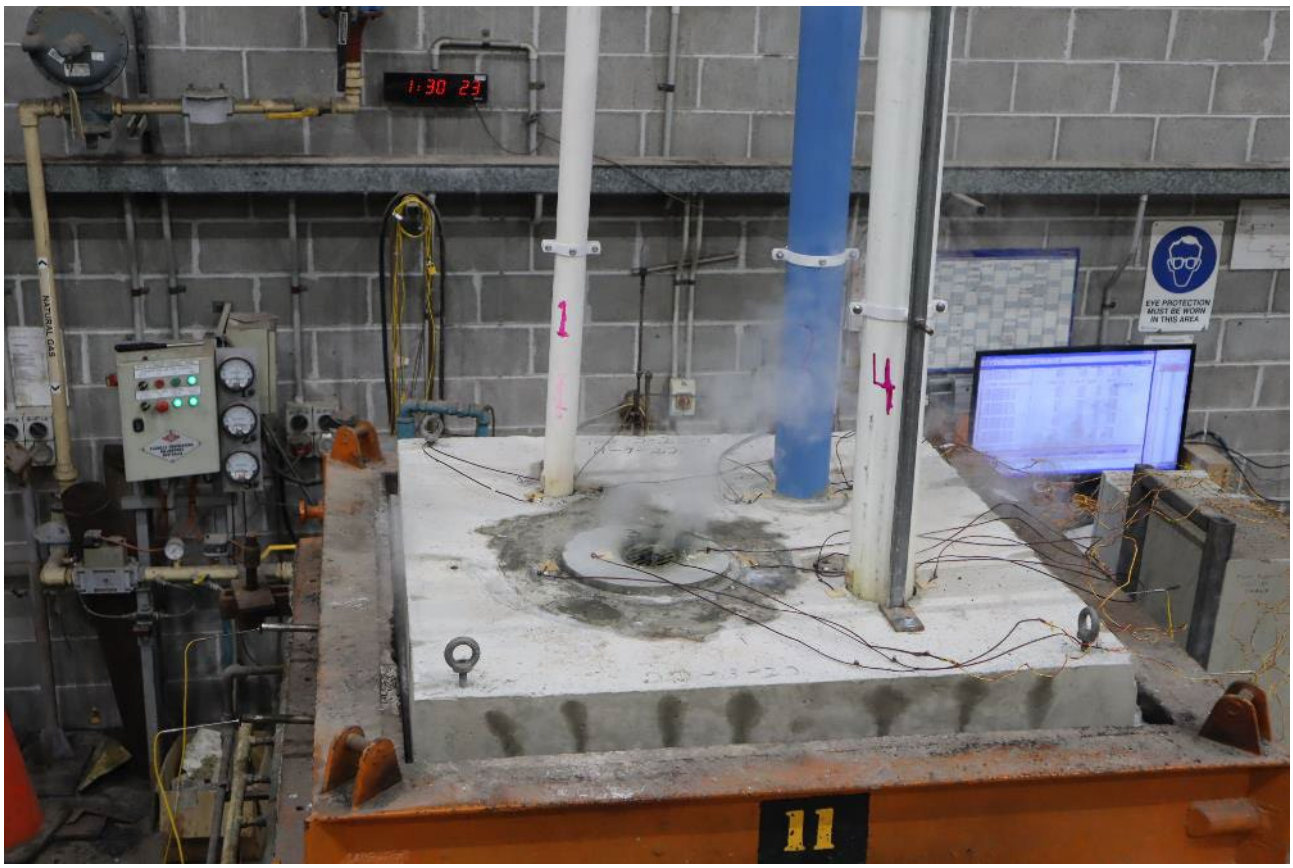
PHOTOGRAPH 4 – SPECIMENS AT 3 MINUTES INTO THE TEST

PHOTOGRAPH 5 – SPECIMEN 4 AT 11 MINUTES INTO THE TEST

PHOTOGRAPH 6 –SPECIMENS AT 27 MINUTES INTO THE TEST

PHOTOGRAPH 7 – SPECIMENS AT 30 MINUTES INTO THE TEST

PHOTOGRAPH 8 – SPECIMENS AT 60 MINUTES INTO THE TEST



PHOTOGRAPH 9 – SPECIMENS AT 90 MINUTES INTO THE TEST

PHOTOGRAPH 10 – TOP VIEW OF SPECIMENS AT 120 MINUTES INTO THE TEST

PHOTOGRAPH 11 –SPECIMENS AT 120 MINUTES INTO THE TEST

PHOTOGRAPH 12 – SPECIMENS AT 180 MINUTES INTO THE TEST

PHOTOGRAPH 13 –SPECIMENS AT 240 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

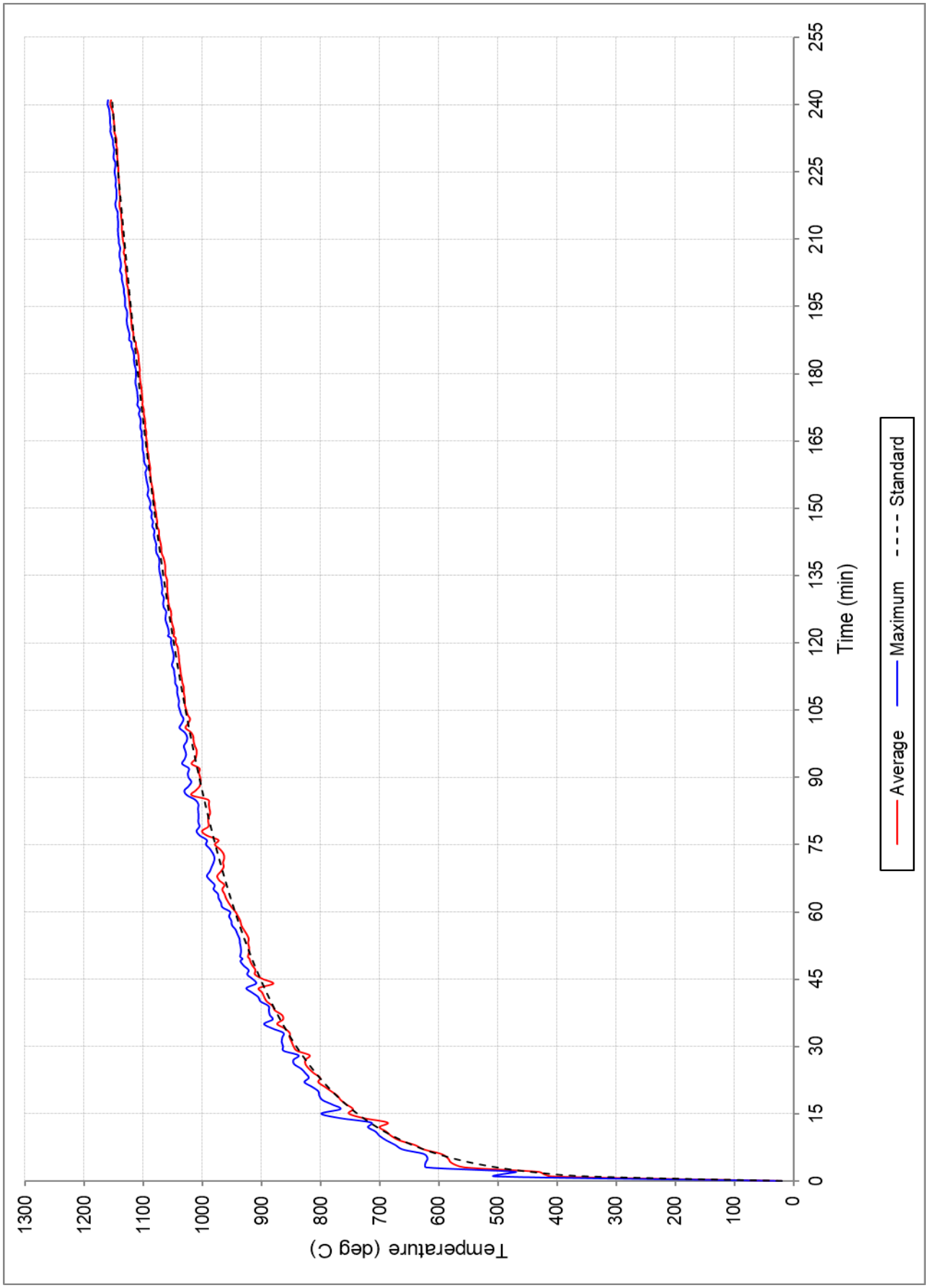


FIGURE 1 – FURNACE TEMPERATURE

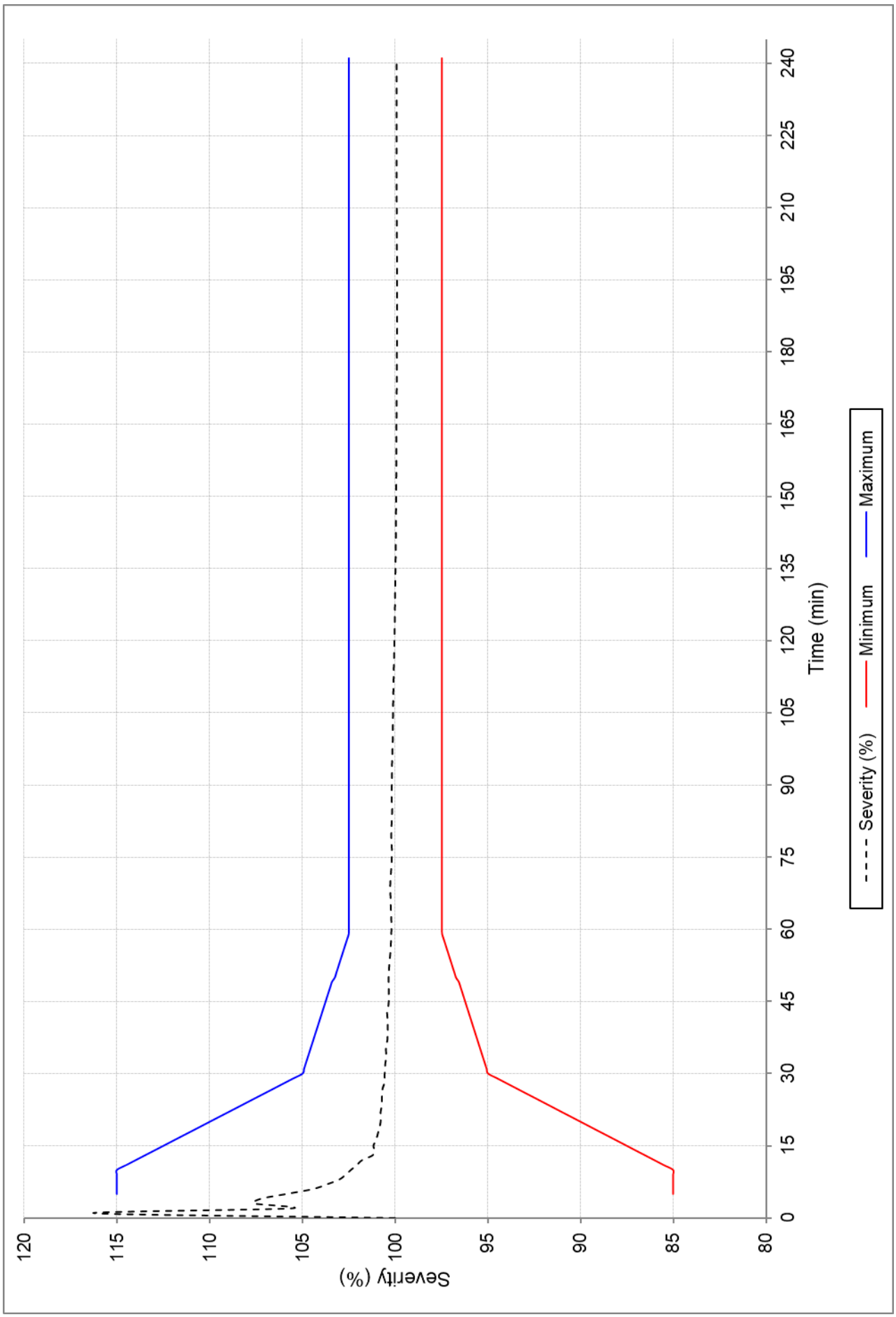


FIGURE 2 – FURNACE SEVERITY

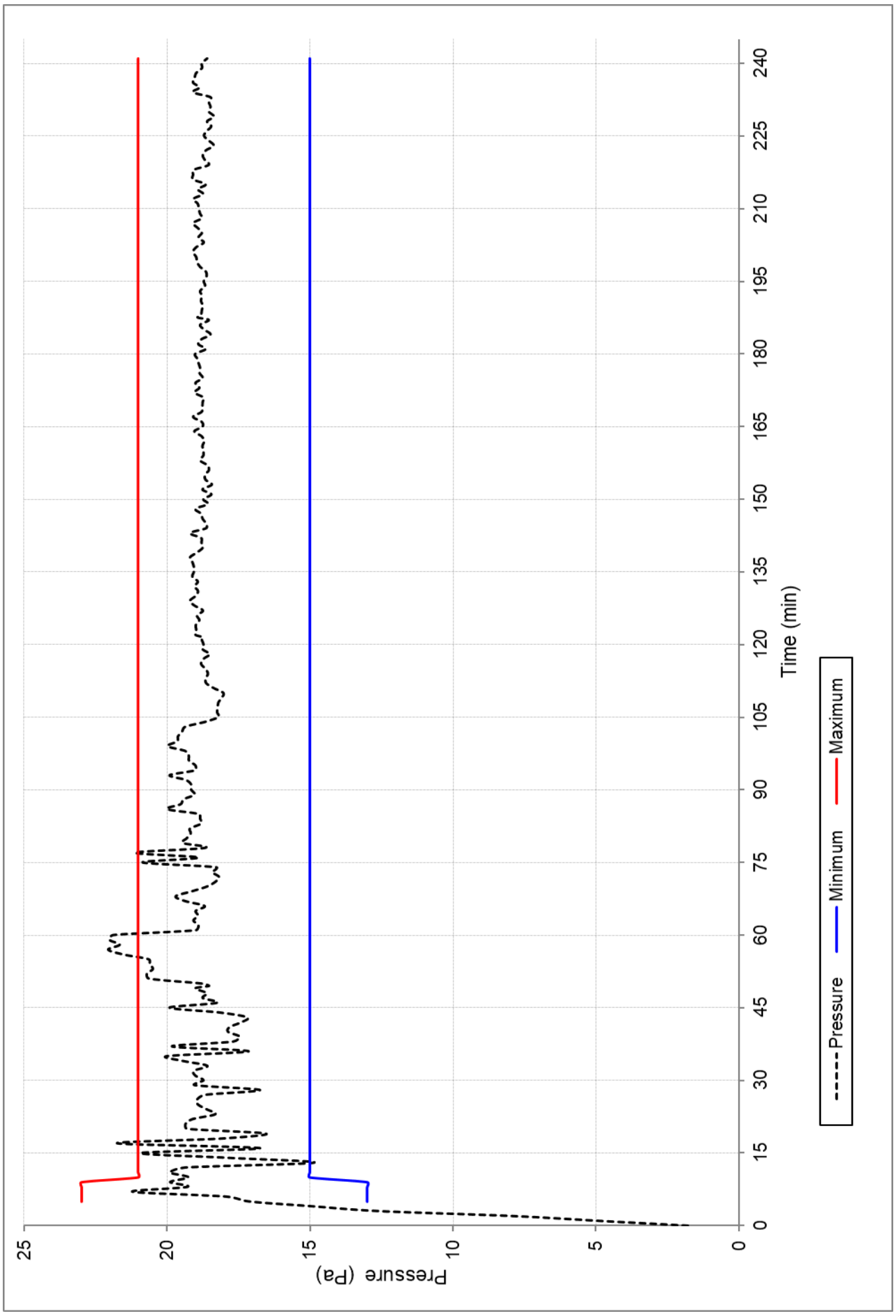


FIGURE 3 – FURNACE PRESSURE

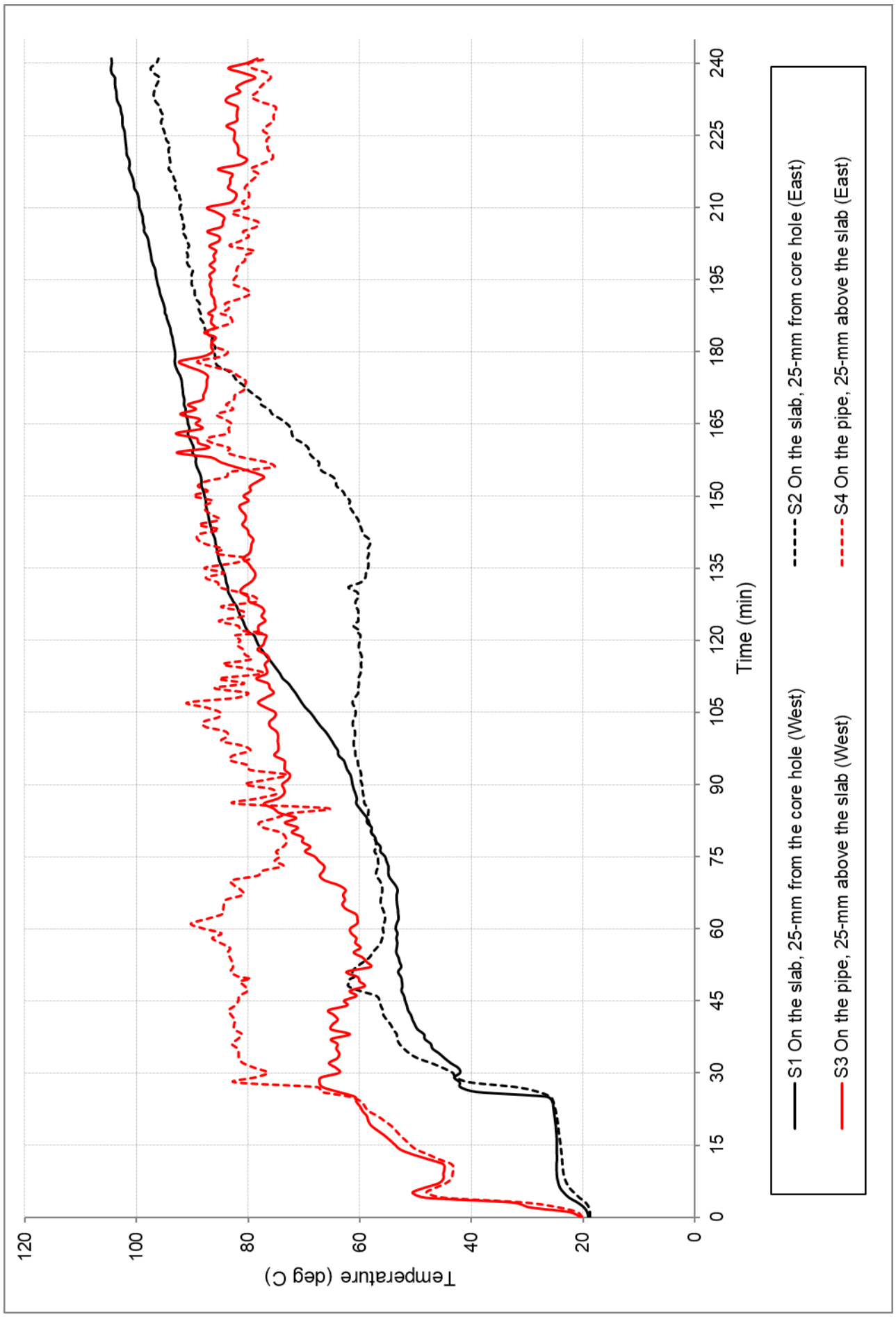


FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 1

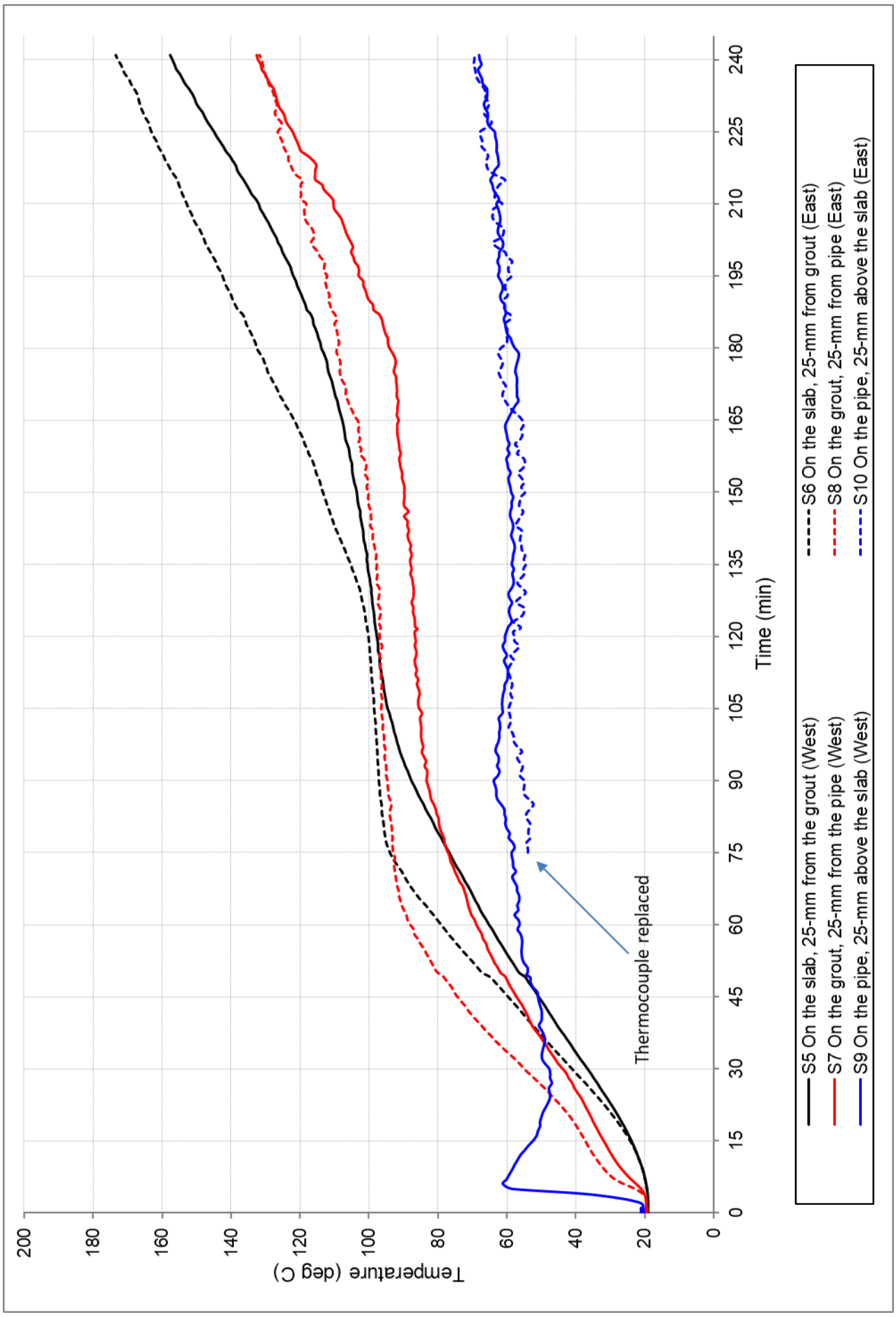


FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 2

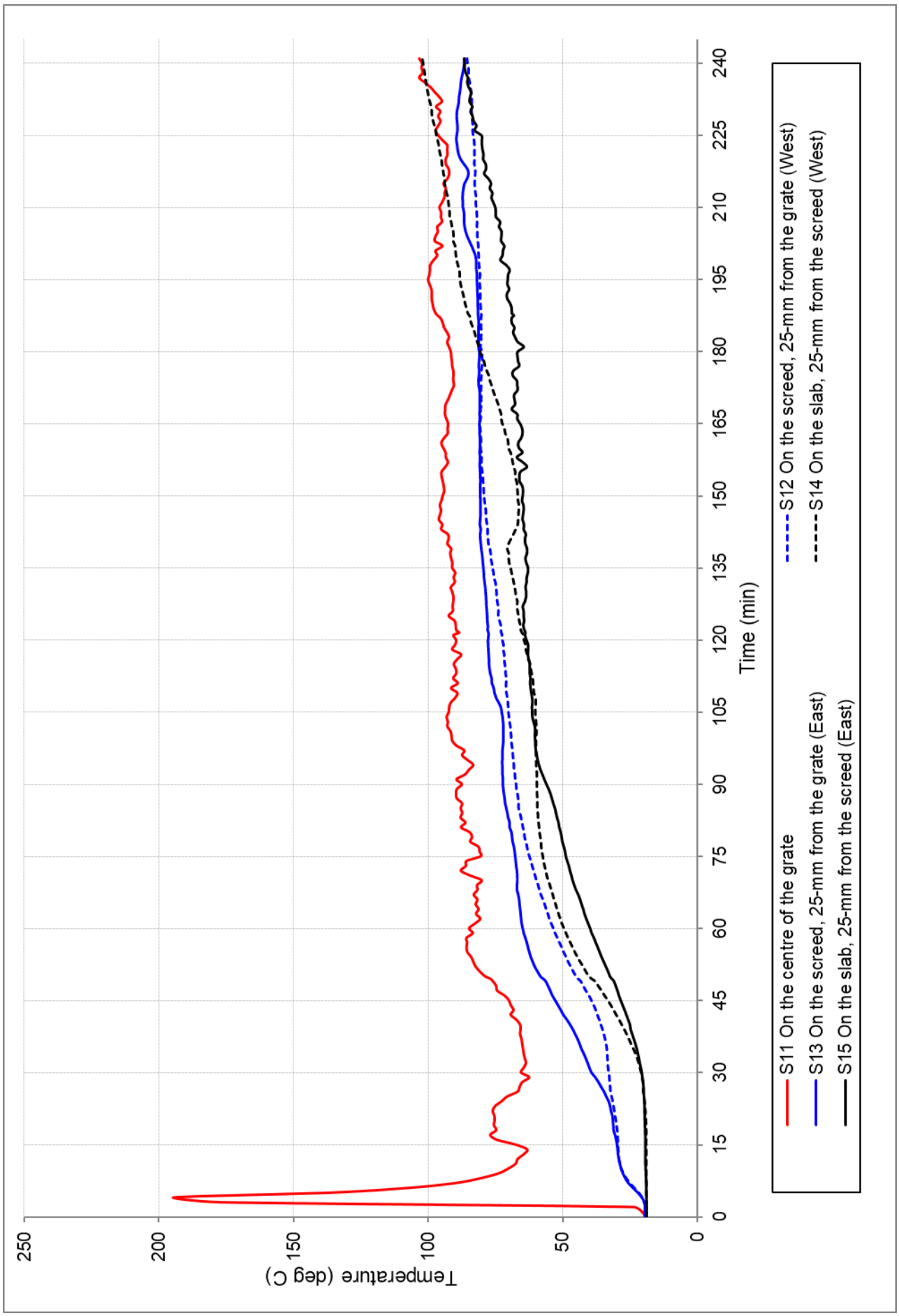


FIGURE 6 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 3

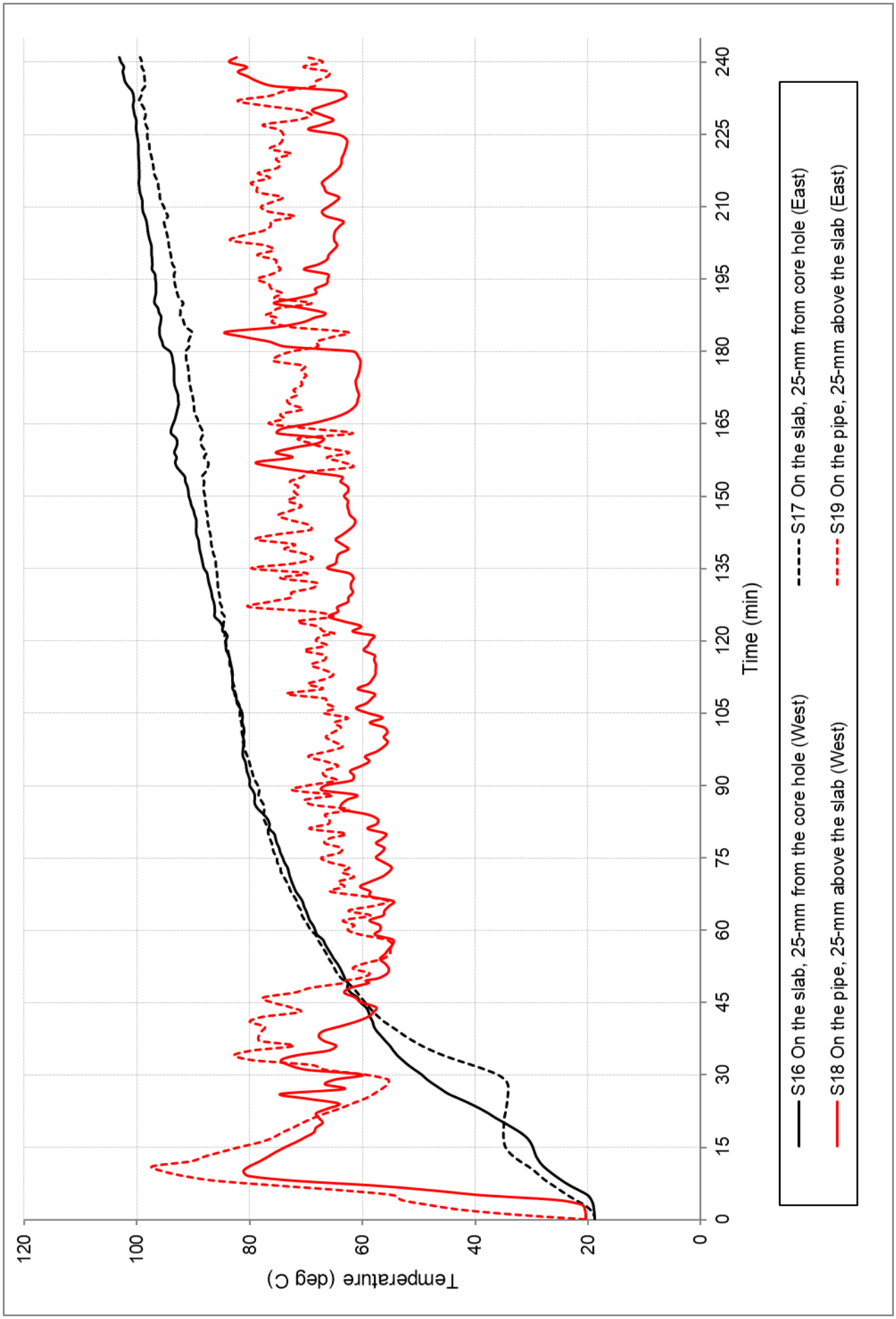


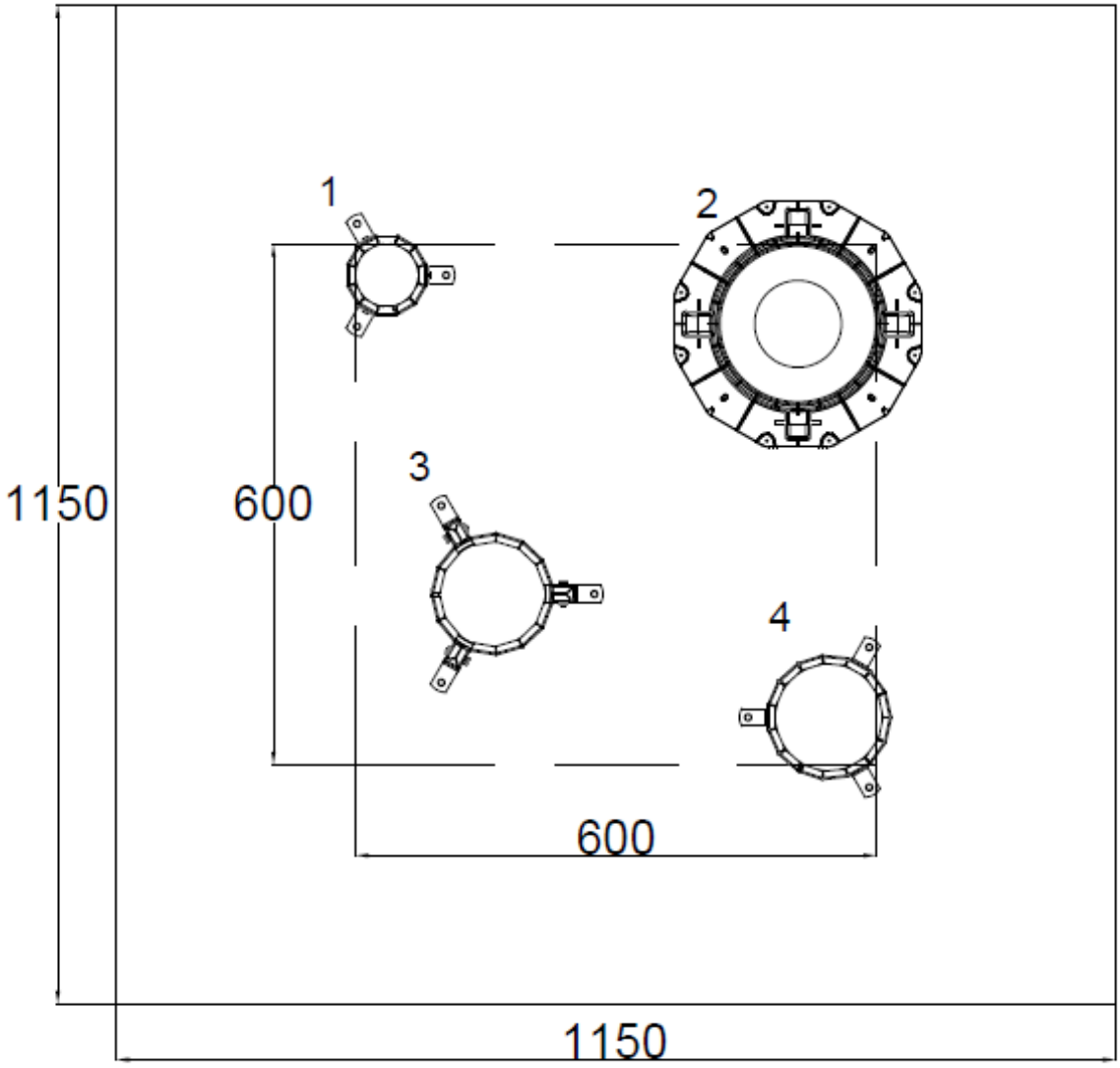
FIGURE 7 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 4

Appendix D – Installation drawings

Snap Fire Systems Pty Ltd

Test Slab S-22-M Layout

Date: 09 SEP 2022



Penetration	Collar Code	Pipe Type	Pipe Diameter
1	63R	PN12 PVC	50
2	H150S-RR	Triplus	110
3	LP100R	PVC(SC)	100
4	110R	PN12 PVC	110

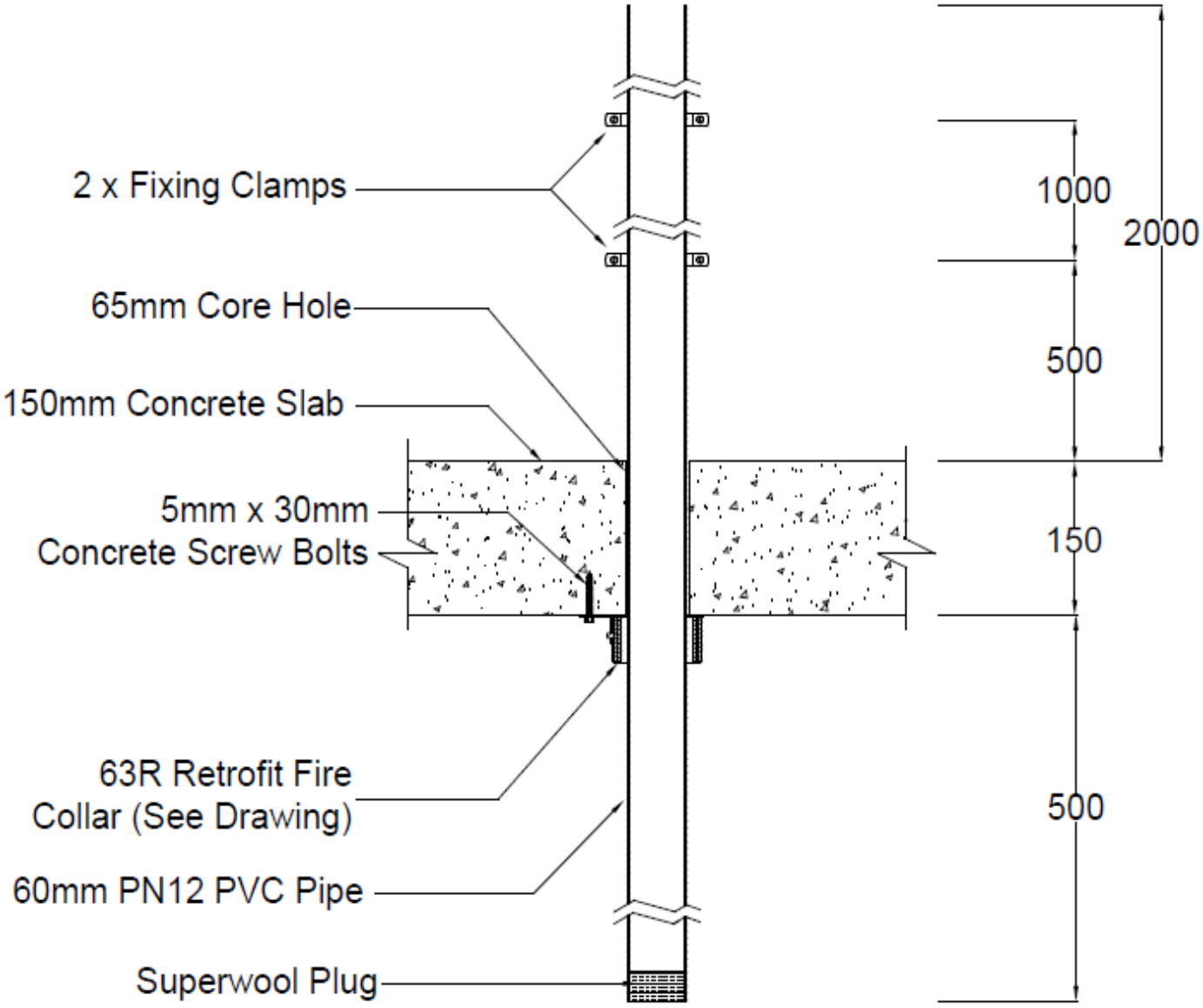
DRAWING TITLED 'TEST SLAB S-22-M LAYOUT', DATED 9 SEPTEMBER 2022, BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd

Specimen #1

50 PN12 PVC Stack & 63R

Date: 10 SEP 2022



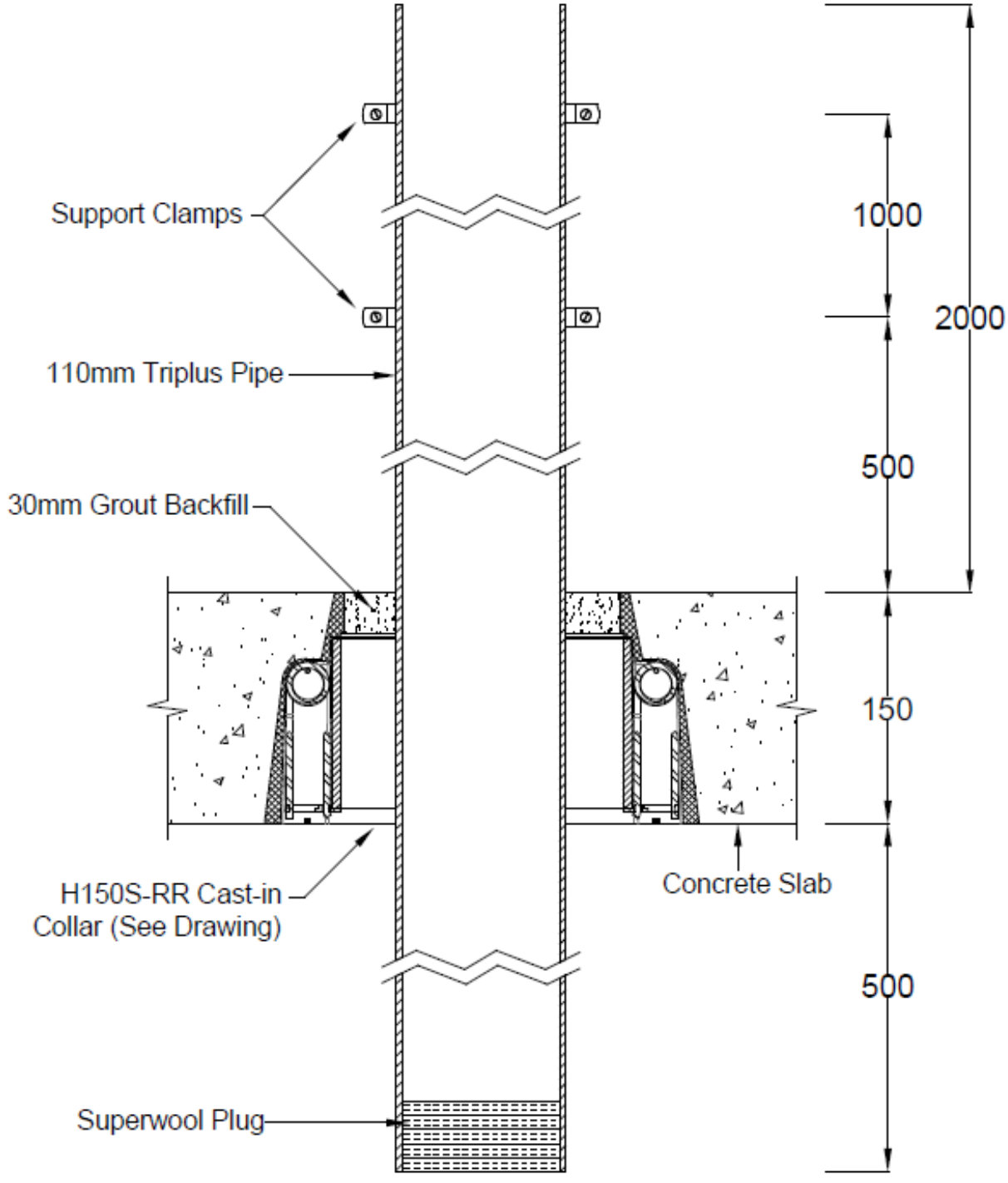
DRAWING TITLED 'SPECIMEN #1 '50 PN12 PVC STACK & 63R', DATED 10 SEPTEMBER 2022, BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd

Specimen #2

110 Triplus Stack & H150S-RR

10 SEP 2022



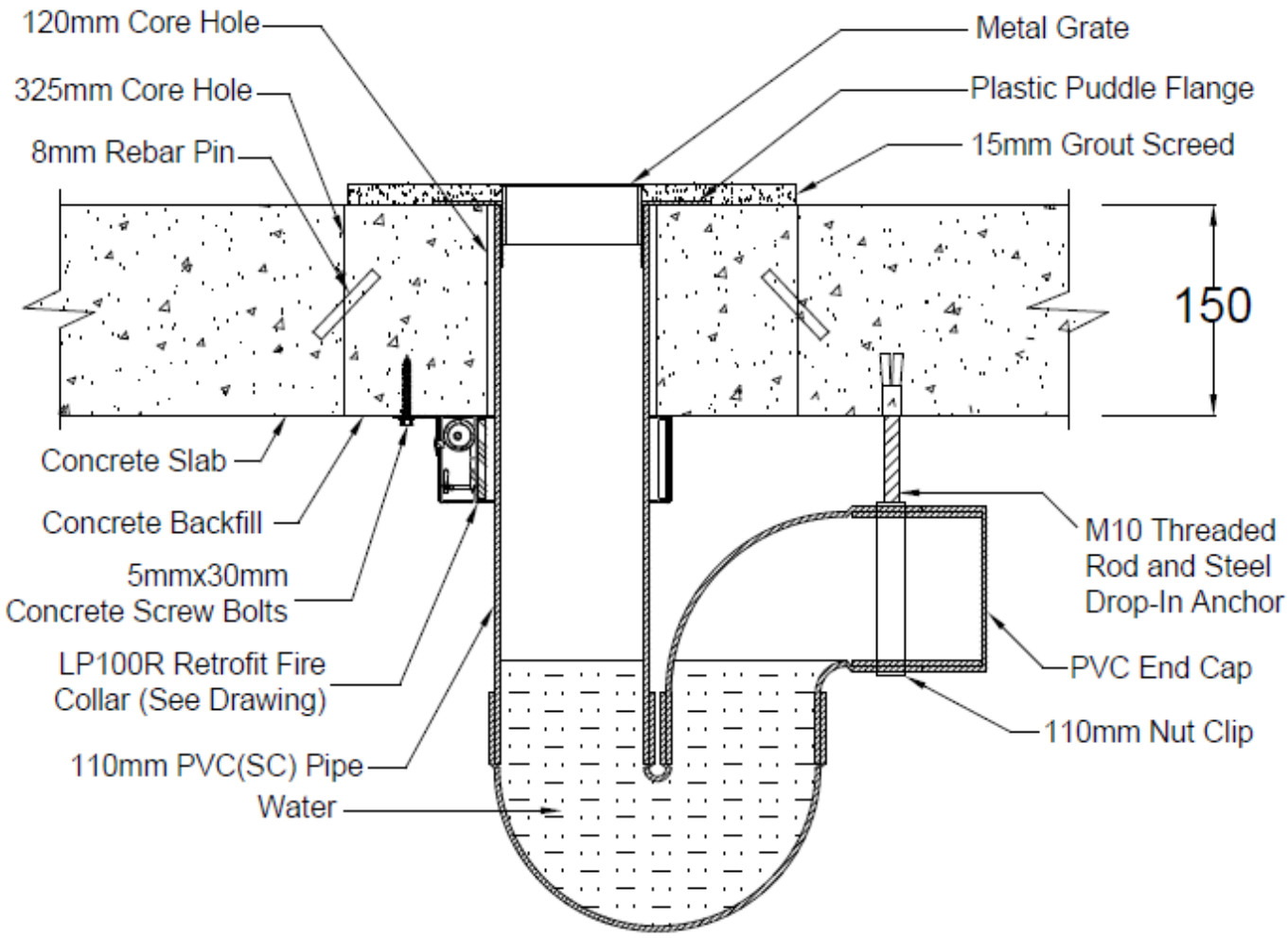
DRAWING TITLED 'SPECIMEN #2 '110 TRIPLUS STACK & H150S-RR', DATED 10 SEPTEMBER 2022, BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd

Specimen #3

100 PVC(SC) Floor Waste & LP100R

14 SEP 2022



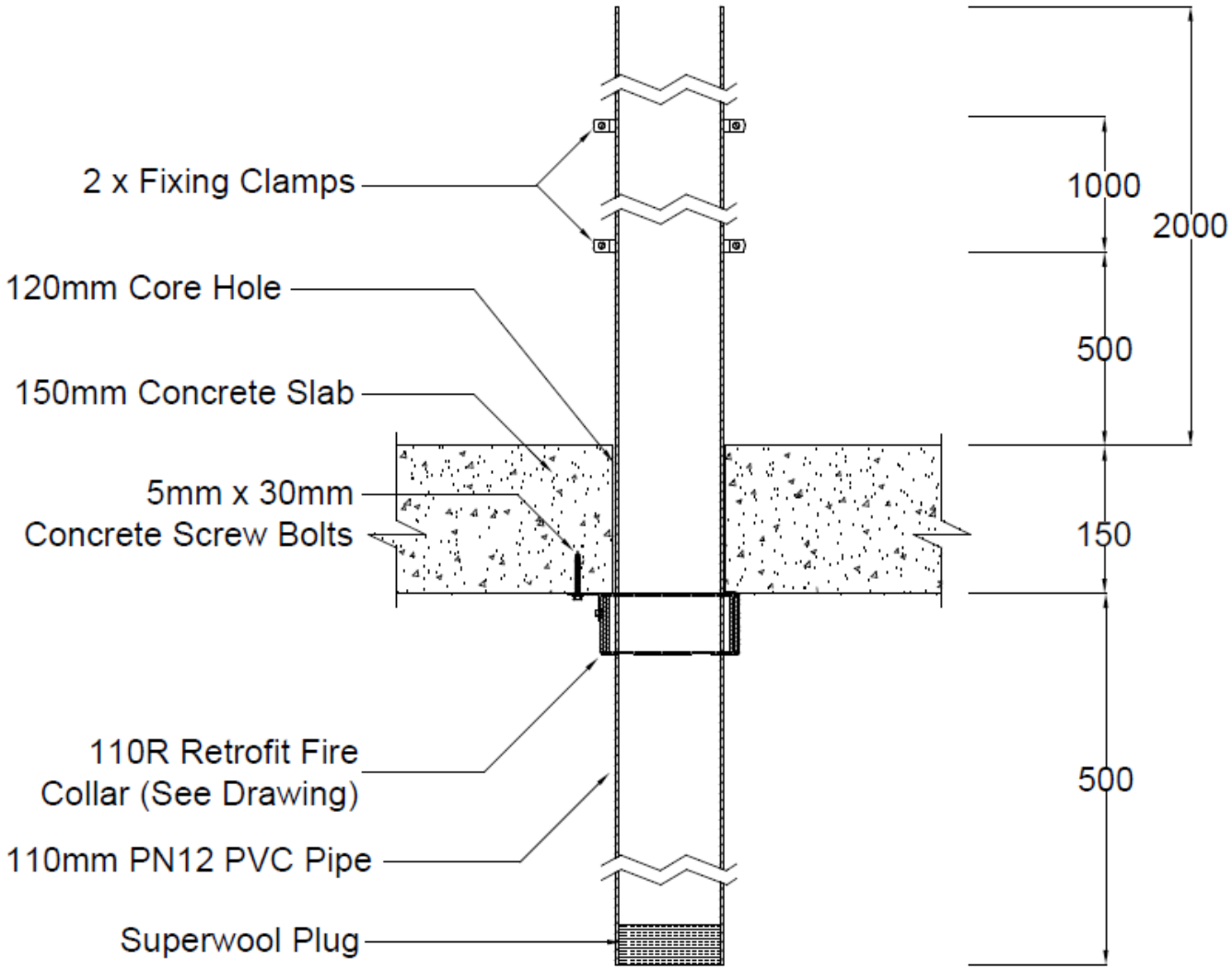
DRAWING TITLED 'SPECIMEN #3 100 PVC(SC) FLOOR WASTE & LP100R', DATED 14 SEPTEMBER 2022 BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd

Specimen #4

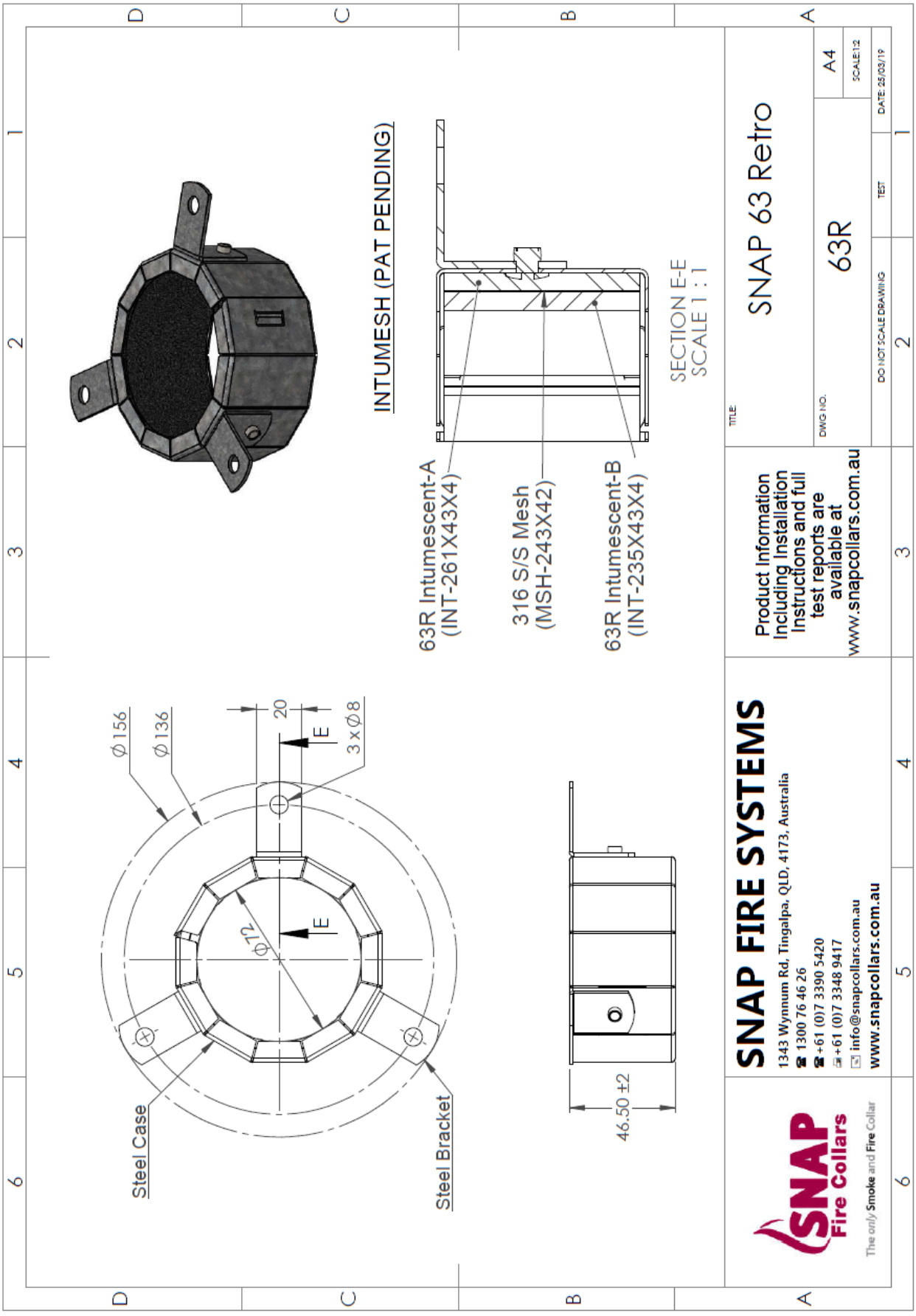
100 PN12 PVC Stack & 110R

Date: 10 SEP 2022

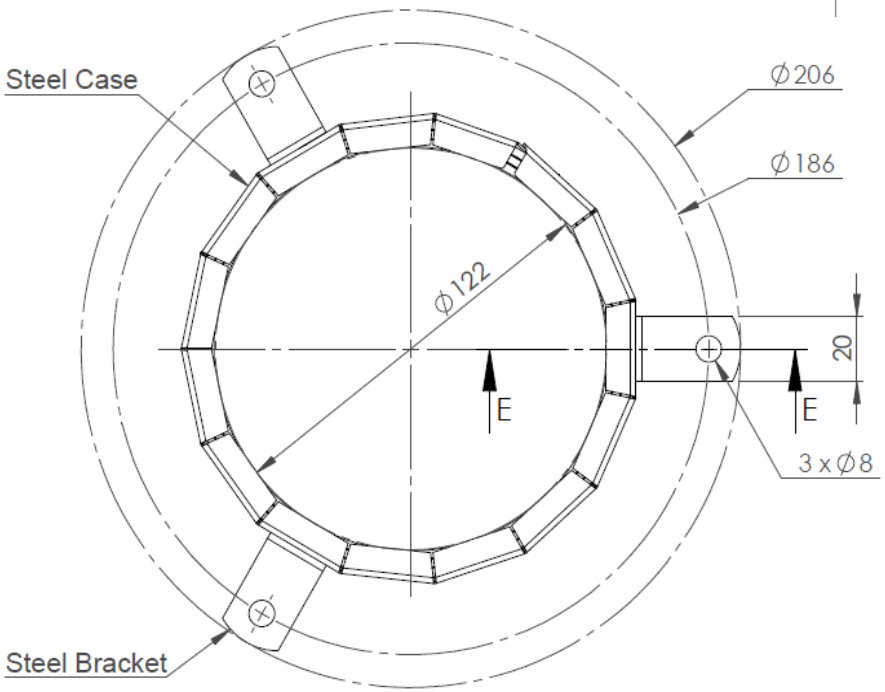


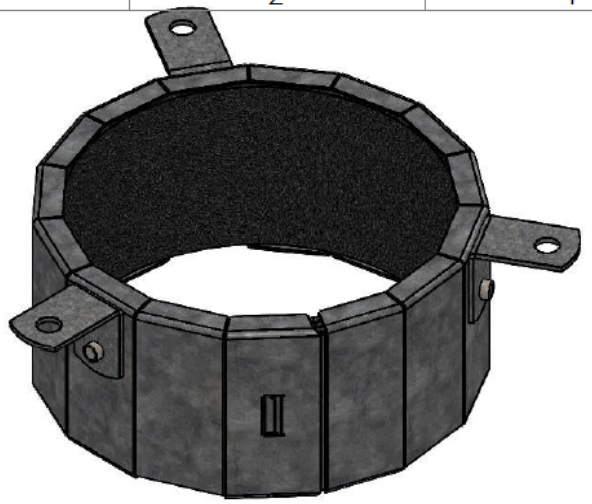
DRAWING TITLED 'SPECIMEN #4 100 PN12 PVC STACK & 110R', DATED 10 SEPTEMBER 2022 BY SNAP FIRE SYSTEMS PTY LTD

Appendix E – Specimen Drawings

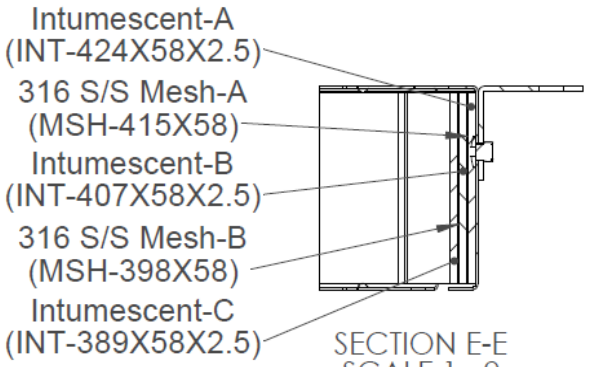


DRAWING TITLED 'SNAP 63 RETRO', DATED 25 MARCH 2019, BY SNAP FIRE SYSTEMS PTY LTD





INTUMESH (PAT PENDING)



SECTION E-E
SCALE 1 : 2

SNAP FIRE SYSTEMS
1343 Wynnum Rd, Tingalpa, QLD, 4173, Australia
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☎ +61 (0)7 3390 5420
+61 (0)7 3348 9417
info@snapcollars.com.au
www.snapcollars.com.au

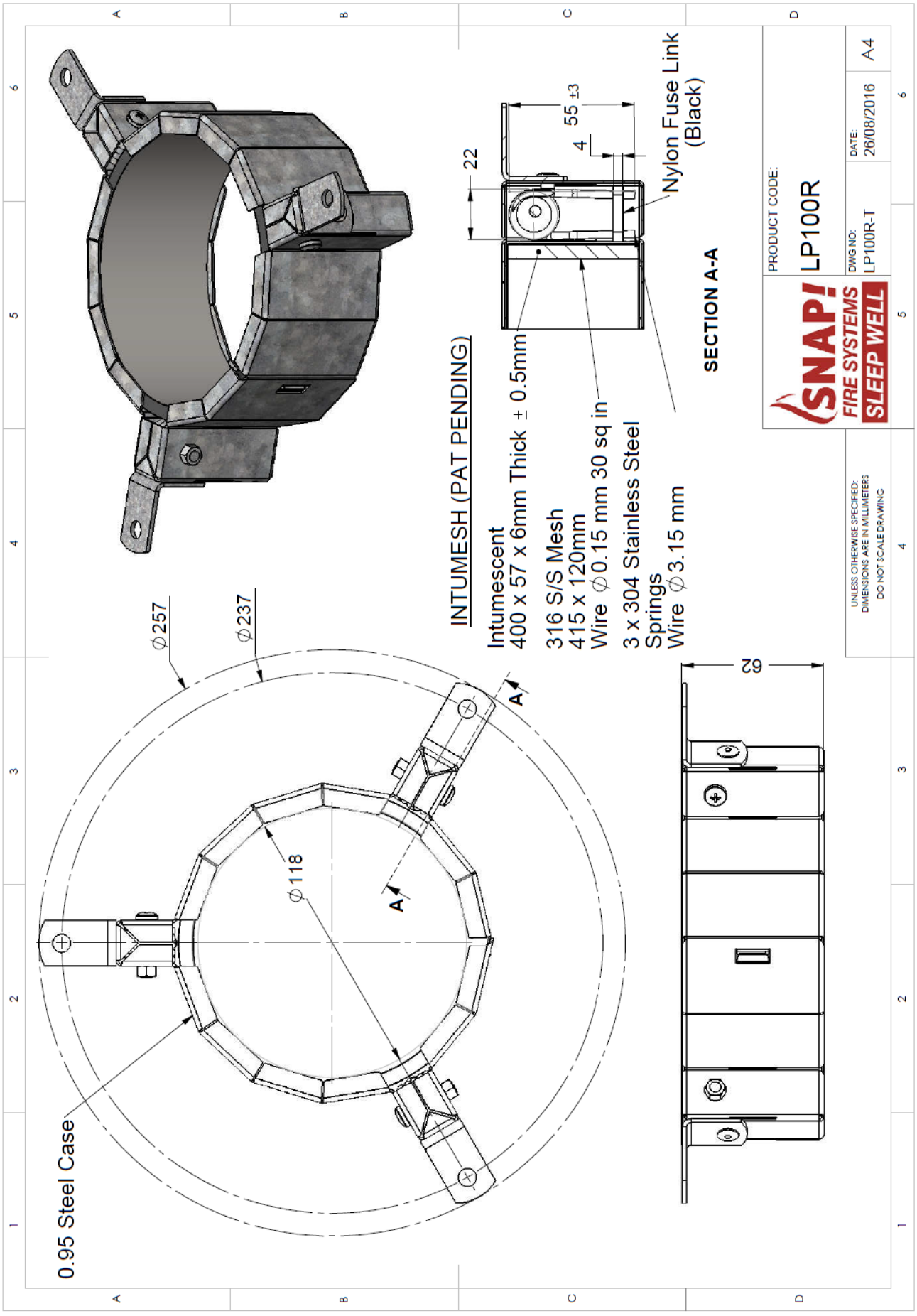
SNAP Fire Collars
The *only* Smoke and Fire Collar

Product Information Including Installation Instructions and full test reports are available at www.snapcollars.com.au

TITLE: SNAP 110 Retro

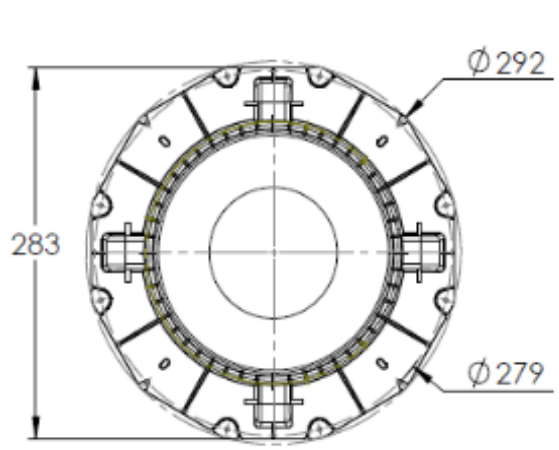
DWG NO. 110R | A4 | SCALE:1:2

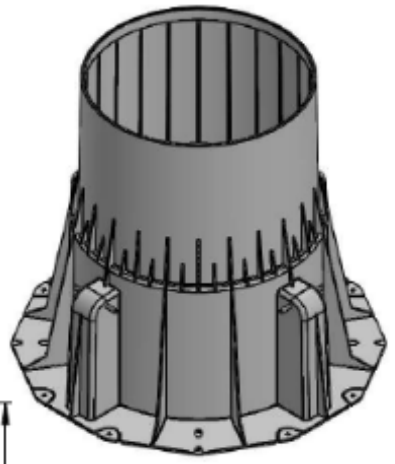
DO NOT SCALE DRAWING | TEST | DATE: 16/01/19



DRAWING NUMBER 'LP100R-T', DATED 26 AUGUST 2016, BY SNAP FIRE SYSTEMS PTY LTD

DRAWING TITLED 'SNAP 150 HIGH-TOP STACK', DATED 29 SEPTEMBER 2017, BY SNAP FIRE SYSTEMS PTY LTD





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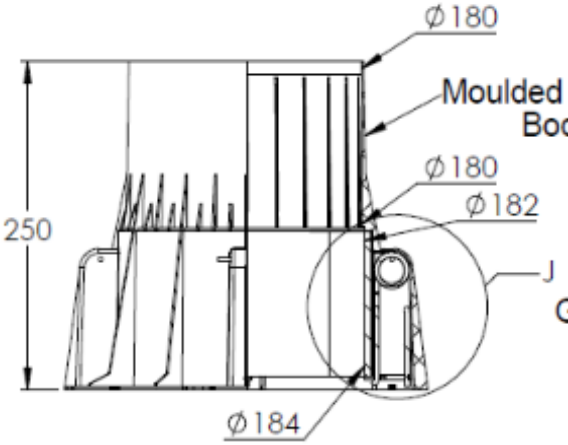

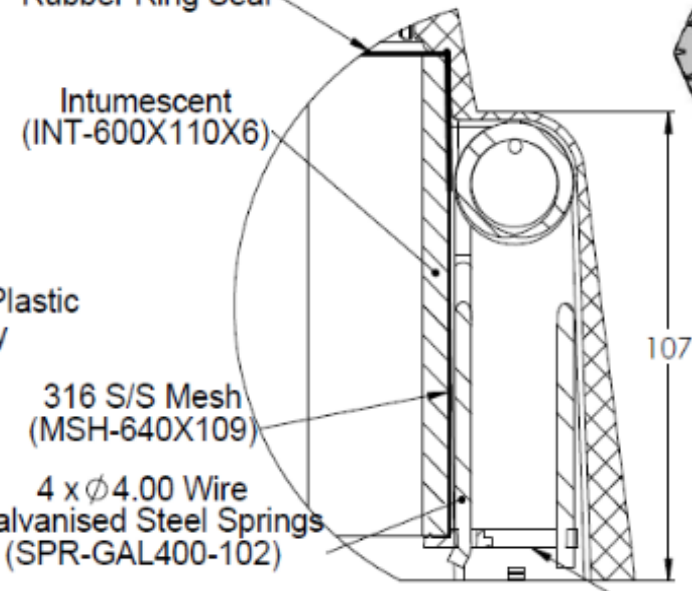

DETAIL J
SCALE 2 : 3

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info@snapcollars.com.au
www.snapcollars.com.au

Product Information Including Installation Instructions and full test reports are available at www.snapcollars.com.au

TITLE: SNAP 150 High-Top Stack

DWG NO. H150S-RR

A4

SCALE:1:5

DO NOT SCALE DRAWING | TEST | DATE: 29/09/2017

Appendix F – Certificate(s) of Test

INFRASTRUCTURE TECHNOLOGIES
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Certificate of Test

No. 3764

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 The 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 2315.

Product Name: A SNAP 63R Retrofit fire collar protecting a DN50 PN12 uPVC stack pipe penetrating a 65-mm diameter core hole (Specimen 1)

Description: The specimen comprised a 1150-mm x 1150-mm x 150-mm thick concrete slab which was penetrated by multiple services protected by three retrofit fire collars and once cast in fire collar. The 150-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 180 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. For the purpose of the test, the penetrations were referenced as Specimen 1, 2, 3 and 4. Specimen 1 is the subject of this Certificate. The SNAP 63R Retrofit fire collar comprised a 0.75-mm steel casing with a 72-mm inner diameter and a 156-mm diameter base flange. The 47-mm high collar casing incorporated a closing mechanism which comprised two soft Intumesh intumescent wraps lined within the internal circumference of the collar. Intumescent A was 4-mm thick x 43-mm wide x 261-mm long, and Intumescent B was 4-mm thick x 43-mm wide x 235-mm long. Between the intumescent strips was a layer of 316 grade stainless steel mesh 243-mm long x 42-mm wide with a wire mesh diameter of 0.15-mm. The SNAP 63R fire collar was centrally located over a 65-mm diameter core hole on the underside (exposed face) of the concrete slab and was fixed through 3 mounting brackets using 5-mm x 30 mm long concrete screw bolts. The penetrating pipe comprised a Plastcorp PN12 uPVC pipe with a 60-mm outside diameter and a wall thickness of 3.47-mm. The pipe was fitted through the fire collar sleeve and penetrated the concrete slab through a 65-mm diameter core hole. On the unexposed face concrete slab, the nominal 2.5-mm annular gap between the pipe and the core hole was left unprotected. The pipe projected vertically 2000-mm above the unexposed face of the concrete slab and 500 mm below into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab, left open at the unexposed end and capped with a ceramic fibre (Superwool) plug on the exposed end. The Sponsor provided drawings titled 'Test Slab S-22-M' Layout', dated 9 September 2022, 'Specimen #1, 50 PN12 PVC Stack & 63R', dated 10 September 2022, 'SNAP 63 Retro', dated 25 March 2019, all by Snap Fire Systems Pty Ltd as a complete description of the specimen and should be read in conjunction with this Certificate.

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 -/240/180.

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. Specimens were tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 180 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: 4 October 2022

Issued on the 22nd day of November 2022 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. 3764

INFRASTRUCTURE TECHNOLOGIES
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14 Julius Avenue,
North Ryde NSW 2113 Australia
T (02) 9490 5444 • **ABN** 41 687 119 230

Certificate of Test

No. 3765

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 The 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 2315.

Product Name: A SNAP H150S-RR High-Top Stack cast-in fire collar protecting a DN110 Valsir Triplus polypropylene stack pipe (Specimen 2)

Description: The specimen comprised a 1150-mm x 1150-mm x 150-mm thick concrete slab which was penetrated by multiple services protected by three retrofit fire collars and once cast in fire collar. The 150-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 180 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. For the purpose of the test, the penetrations were referenced as Specimen 1, 2, 3 and 4. Specimen 2 is the subject of this Certificate. The SNAP H150S-RR High Top Stack fire collar comprised a white 2-mm thick polypropylene casing with a 180-mm inner diameter sleeve and a 292-mm diameter base flange. The 250-mm high collar casing incorporated a 600-mm long x 110-mm wide x 6-mm thick strip of intumescent material and a rubber ring seal. The closing mechanism comprised four x 4-mm diameter galvanised steel springs, four nylon fuse links and a 640 mm x 109-mm 316 stainless steel mesh. The SNAP H150S-RR High-Top Stack fire collar was cast into a 150-mm thick concrete slab with the collar casing cut down to 150-mm high finishing flush with the unexposed face of the concrete slab. The penetrating pipe comprised a Valsir Triplus pipe with a 110.3 mm outside diameter and a wall thickness of 3.7-mm fitted through the collar sleeve. The pipe projected vertically 2000-mm above the unexposed face of the concrete slab and 500 mm below into the furnace chamber. The pipe was supported at 500-mm and 1500-mm from the unexposed face of the slab, left open at the unexposed end and capped with a ceramic fibre (Superwool) plug on the exposed end. On the unexposed face of the slab the 35-mm wide annular gap between the pipe and the collar was backfilled with grout to a depth of 30-mm. The Sponsor provided drawings titled 'Test Slab S-22-M' Layout', dated 9 September 2022, 'Specimen #2, 110 Triplus Stack & H150S-RR', dated 10 September 2022, 'SNAP 150 High-Top Stack', dated 29 September 2017, all by Snap Fire Systems Pty Ltd as a complete description of the specimen and should be read in conjunction with this Certificate.

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 -/240/180.

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. Specimens were tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 180 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: 4 October 2022

Issued on the 22nd day of November 2022 without alterations or additions.

B. Roddy

Brett Roddy | Manager, Fire Testing and Assessments

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Certificate of Test

No. 3766

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 The 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 2315.

Product Name: A SNAP LP100R Low Profile Retrofit fire collar protecting a DN100 uPVC pipe incorporating a floor waste and P-trap penetrating a 120-mm diameter core hole (Specimen 3)

Description: The specimen comprised a 1150-mm x 1150-mm x 150-mm thick concrete slab which was penetrated by multiple services protected by three retrofit fire collars and once cast in fire collar. The 150-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 180 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. For the purpose of the test, the penetrations were referenced as Specimen 1, 2, 3 and 4. Specimen 3 is the subject of this Certificate. The SNAP LP100R Low Profile Retrofit fire collar comprised a 0.95-mm steel casing with a 118 mm inner diameter and a 257-mm diameter base flange. The 62-mm high fire collar casing incorporated a closing mechanism which comprised a 6-mm thick x 57-mm wide x 400-mm long Intumesh intumescent wrap lined within the internal circumference of the fire collar casing. The closing mechanism comprised three 3.15-mm diameter 304 stainless steel springs with black nylon fuse links and a 415-mm long x 120-mm wide stainless steel wire mesh with a diameter of 0.15-mm. The LP100R Low Profile Retrofit fire collar was centrally located over a 120-mm core hole on the underside (exposed face) of the concrete slab and fixed in position through the 3 mounting brackets of the fire collar casing using 5-mm x 30-mm long concrete screw bolts. The penetrating service comprised a Pipemakers uPVC (sandwich construction) 110.3-mm outside diameter pipe with a wall thickness of 3.18-mm fitted through the fire collar sleeve and penetrated the slab through a 120 mm core hole. On the unexposed side of the slab, the top of the PVC (SC) pipe finished flush with the concrete slab and was fitted with a plastic puddle flange and a chrome plated brass floor waste grate. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor waste grate. On the exposed side of the slab, a PVC P-Trap was connected to the penetrating pipe, supported by a M10 threaded rod, nut clip and a steel drop-in anchor. The P-Trap was capped using a PVC End Cap. The P-Trap was charged with 2 litres of water to the level shown in drawing titled 'Specimen #3 100 PVC(SC) Floor Waste & LP100R'. The Sponsor provided drawings titled 'Test Slab S-22-M' Layout', dated 9 September 2022, 'Specimen #3 100 PVC(SC) Floor Waste & LP100R', dated 14 September 2022, 'LP100R', dated 26 August 2016, all by Snap Fire Systems Pty Ltd as a complete description of the specimen and should be read in conjunction with this Certificate.

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 -/240/180.

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. Specimens were tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 180 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: 4 October 2022

Issued on the 22nd day of November 2022 without alterations or additions.

B. Roddy

Brett Roddy | Manager, Fire Testing and Assessments

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Certificate of Test

No. 3767

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 The 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 2315.

Product Name: A SNAP 110R Retrofit fire collar protecting a DN100 PN12 uPVC stack pipe penetrating a 120-mm diameter core hole (Specimen 4)

Description: The specimen comprised a 1150-mm x 1150-mm x 150-mm thick concrete slab which was penetrated by multiple services protected by three retrofit fire collars and once cast in fire collar. The 150-mm thick concrete slab was reinforced with a single layer of steel reinforcement providing a Fire Resistance Period (FRP) for insulation of 180 minutes in accordance with table 5.5.1 of AS 3600:2018 - Concrete structures. For the purpose of the test, the penetrations were referenced as Specimen 1, 2, 3 and 4. Specimen 4 is the subject of this Certificate. The SNAP 110R Retrofit fire collar comprised a 0.75-mm steel casing with a 122-mm inner diameter and a 206-mm diameter base flange. The 62-mm high collar casing incorporated a closing mechanism which comprised three soft Intumesh intumescent wraps and wire mesh lined within the internal circumference of the collar. Intumescent A was 2.5-mm thick x 58-mm wide x 424-mm long, intumescent B was 2.5-mm thick x 58-mm wide x 407-mm long and intumescent C was 2.5-mm thick x 58-mm wide x 389-mm long. Between intumescent strips A and B was a layer of 316 stainless steel mesh 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh, 398-mm long x 58-mm wide. Both wire mesh diameters measured 0.15-mm. The SNAP 110R fire collar was centrally located over a 120-mm core hole on the underside (exposed face) of the concrete slab and fixed through 3 mounting brackets using 5-mm x 30-mm long concrete screw bolts. The penetrating pipe comprised a Iplex PN12 uPVC pipe with a 114.5-mm outside diameter and a wall thickness of 6.25-mm. The pipe was fitted through the fire collar sleeve and penetrated the concrete slab through a 120-mm diameter core hole. On the unexposed face of concrete slab, the nominal 3-mm annular gap between the pipe and the core hole was left unprotected. The pipe projected vertically 2000-mm above the unexposed face of the concrete slab and 500 mm below into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the slab, left open at the unexposed end and capped with a ceramic fibre (Superwool) plug on the exposed end. The Sponsor provided drawings titled 'Test Slab S-22-M' Layout', dated 9 September 2022, 'Specimen #4, 110mm PN12 PVC Stack & 110R', dated 10 September 2022, and 'SNAP 110 Retro', dated 16 January 2019, all by Snap Fire Systems Pty Ltd as a complete description of the specimen and should be read in conjunction with this Certificate.

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 -/240/180.

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. Specimens were tested in a concrete slab with a Fire Resistance Period (FRP) for insulation of 180 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: 4 October 2022

Issued on the 22nd day of November 2022 without alterations or additions.

B. Roddy

Brett Roddy | Manager, Fire Testing and Assessments

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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.

** end of report **

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