

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

Test Report

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Client: IG6 Pty Ltd as 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 2072

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as five (5) fire collars protecting a 150-mm thick concrete slab penetrated by five (5) stack pipes.

1.2 Sponsor

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

1.3 Manufacturer

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

1.4 Test standard

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

Section 10: Service penetrations and control joints

1.5 Reference standard

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

1.6 Test number

CSIRO Reference test number: FS 4945/4469

1.7 Test date

The fire-resistance test was conducted on 8 January 2020.

2 Description of specimen

2.1 General

The specimen comprised an 1150-mm x 1150-mm x 150-mm thick concrete slab penetrated by five (5) stack pipes protected by five Snap Fire Systems fire collars.

The penetrated slab comprised a 150-mm thick concrete slab 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.

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

- AS/NZS 2492:2007 'Cross-linked polyethylene (PE-X) pipes for pressure applications'; and
- AS/NZS 7671:2010 Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings— Polypropylene (PP).

For the purpose of the test, the five penetrations were referenced as Specimens 1, 2, 3, 4, and 5. Documents containing a complete description of each specimen were supplied by the sponsor and are retained on file.

Specimen 1 – SNAP H110S Cast-in fire collar protecting a nominal 110-mm Valsir Triplus polypropylene stack pipe with bell-end joint inside collar.

The SNAP Cast-in H110S fire collar comprised a 1.6-mm thick polypropylene casing with a 140-mm inner diameter and a 194-mm x 184-mm base flange. The 248-mm high collar casing incorporated a layer of 451-mm long x 85-mm wide x 4-mm thick Intumescent material. The closing mechanism comprised four equally spaced steel springs held with nylon fuse links. The springs were fabricated using galvanised steel wire having a diameter of 3.15-mm, with the springs acting against a layer of 316 grade stainless steel mesh measuring 503-mm x 83-mm as shown in drawing number H110S, dated 15 February 2019, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 110-mm outside diameter Valsir Triplus polypropylene pipe with a wall thickness of 3.7-mm fitted through the collar's sleeve. The annular gap between the OD of the pipe and the inside collar was left unprotected as shown in drawing titled "Specimen #1, 110mm Triplus Stack with Bell End in Collar & H110S", dated 1 November 2019, provided by Snap Fire Systems Pty Ltd.

The pipe projected vertically, 2000-mm above from the unexposed face of the concrete slab 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 closed with a ceramic fibre plug on the exposed end.

Specimen 2 – SNAP H110S Cast-in fire collar protecting a nominal 110-mm Rehau Raupiano polypropylene stack pipe.

The SNAP Cast-in H110S fire collar comprised a 1.6-mm thick polypropylene casing with a 140-mm inner diameter and a 194-mm x 184-mm base flange. The 248-mm high collar casing incorporated a layer of 451-mm long x 85-mm wide x 4-mm thick Intumescent material. The closing mechanism comprised four equally spaced steel springs held with nylon fuse links. The springs were fabricated using galvanised steel wire having a diameter of 3.15-mm, with the springs acting against a layer of 316 grade stainless steel mesh measuring 503-mm x 83-mm as shown in drawing number H110S, dated 15 February 2019, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 110.8-mm outside diameter Rehau Raupiano polypropylene pipe with a wall thickness of 2.92-mm fitted through the collar's sleeve. The annular gap between the OD of the pipe and the inside collar was left unprotected as shown in drawing titled "Specimen #2, 110mm Raupiano Stack & H110S", dated 1 November 2019, provided by Snap Fire Systems Pty Ltd.

The pipe projected vertically, 2000-mm above from the unexposed face of the concrete slab 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 closed with a Raupiano end cap on the exposed end.

Specimen 3 – SNAP 50R Retrofit collar protecting a nominal 50-mm Rehau Raupiano polypropylene stack pipe.

The SNAP Retrofit 50R fire collar comprised a 0.75-mm steel casing with a 62-mm inner diameter and a 147-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 220-mm long and Intumescent B was 4-mm thick x 43-mm wide x 200-mm long. Between the strips was a layer of 316 grade stainless steel mesh measuring 210-mm long x 42-mm wide with a wire mesh diameter of 0.15-mm, as shown in drawing titled "SNAP 50 Retro", dated 18 January 2019, by Snap Fire Systems Pty Ltd. The Snap collar was surface mounted around the pipe on the exposed face (underside) of the slab and fixed through 3 mounting brackets using 5-mm x 30-mm concrete screw bolts.

The annular gap between the pipe and concrete slab on the unexposed face was protected with a bead of Fullers Firesound sealant.

The penetrating service comprised a 50.2-mm outside diameter Rehau Raupiano polypropylene pipe with a wall thickness of 2.06-mm fitted through the collar's sleeve. A 60-mm diameter opening was cut into slab and the collar fixed centrally over the hole as shown in drawing titled "Specimen #3, 50mm Raupiano Stack & 50R", dated 31 October 2019, provided by Snap Fire Systems Pty Ltd.

The pipe projected vertically 2000-mm above the concrete slab 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 closed with a Raupiano polypropylene end cap on the exposed end.

Specimen 4 – SNAP 110R Retrofit fire collar protecting a nominal 110-mm Rehau Raupiano polypropylene pipe.

The SNAP Retrofit 110R 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 that was comprised of three soft Intumesh intumescent wraps and wire meshes 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 had wire mesh diameters of 0.15-mm, as shown in drawing titled “SNAP 110 Retro”, dated 16 January 2019, by Snap Fire Systems Pty Ltd. The Snap collar was surface mounted around the pipe on the exposed face of the slab and fixed through 3 mounting brackets using 5-mm x 30 mm Concrete Screws.

The annular gap between the pipe and concrete slab on the unexposed face was protected with a bead of Fullers Firesound sealant.

The penetrating service comprised a 110.8-mm outside diameter Rehau Raupiano polypropylene pipe with a wall thickness of 2.92-mm fitted through the collar’s sleeve. A 114-mm diameter opening was cut into the slab and the collar fixed centrally over the hole as shown in drawing titled “Specimen #4 110mm Raupiano Stack & 110R”, dated 31 October 2019, provided by Snap Fire Systems Pty Ltd.

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

Specimen 5 – SNAP H50S-RR Cast-in collar protecting a nominal 32-mm Rehau Rautitan PE-Xa stack pipe.

The SNAP Cast-in H50S-RR 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 numbered H50S-RR-T dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 32-mm outside diameter Rehau Rautitan PE-XA pipe with a wall thickness of 4.95-mm through the collar’s sleeve. The annular gap between the pipe and the inside collar incorporated a PE backing rod, back filled with grout to a depth of 30 mm and finished flush with the slab as shown in drawing titled “Specimen #5, 32mm PE-Xa Stack & H50S-RR”, dated 31 October 2019, provided by Snap Fire Systems Pty Ltd.

The pipe projected vertically, 2000-mm above from 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 closed with a ceramic fibre plug on the exposed end.

2.2 Dimensions

The specimen comprised an 1150-mm x 1150-mm x 150-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.

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

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

3 Documentation

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

Drawing titled “Test Slab S-19-H Layout”, dated 2 October 2019 provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #1, 110mm Triplus Stack with Bell End in Collar & H110S”, dated 1 November 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #2, 110mm Raupiano Stack & H110S”, dated 1 November 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #3, 50mm Raupiano Stack & 50R”, dated 31 October 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #4 110mm Raupiano Stack & 110R”, dated 31 October 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #5, 32mm Pex-a Stack & H50S-RR”, dated 31 October, provided by Snap Fire Systems Pty Ltd.

Drawing number H110S, dated 15 February 2019, by Snap Fire Systems Pty Ltd.

Drawing titled “SNAP 50 Retro”, dated 18 January 2019, by Snap Fire Systems Pty Ltd.

Drawing titled “SNAP 110 Retro”, dated 16 January 2019, by Snap Fire Systems Pty Ltd.

Drawing number H50S-RR-T, dated 29 September 2017, by Snap Fire Systems Pty Ltd.

4 Equipment

4.1 Furnace

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

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

4.2 Temperature

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

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

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

4.3 Measurement system

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

5 Ambient temperature

The temperature of the test area was 23°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
1 minutes -	Smoke has begun fluing from the end of the pipe of Specimen 3.
2 minutes -	Light smoke has begun fluing from the end of the pipe of Specimen 1.
3 minutes -	Smoke has begun fluing from the end of the pipe of Specimens 2, 4 and 5. Smoke has ceased fluing from the end of the pipe of Specimens 1 and 3.
4 minutes -	Smoke is intermittently fluing from the end of the pipe of Specimen 3.
5 minutes -	The base of the pipe of Specimen 4 has begun to distort.
6 minutes -	The base of the pipe of Specimen 1 has begun to distort.

- 7 minutes - Only Specimen 5 continues to flue.
- 9 minutes - The base of the pipe of Specimens 1 and 4 continue to distort.
The base if Specimen 5 has bowed slightly.
- 11 minutes - Smoke has ceased fluing from the end of the pipe of Specimen 5.
- 15 minutes - Light smoke has resumed fluing from the end of the pipe of Specimen 1.
- 23 minutes - Steam is venting from the concrete slab around the base of Specimens 1, 3 and 4.
- 25 minutes - Smoke has ceased fluing from the end of the pipe of Specimen 5.
- 29 minutes - Water has begun pooling on the concrete slab at the base of Specimen 1.
Sealant around the base of the pipe of Specimen 4 has begun to swell.
- 34 minutes - Water has begun pooling on the concrete slab at the base of Specimen 2.
The pipe at the base Specimen 1 continues to distort with molten blue and black material visible inside the collar. (Photograph 6)
- 40 minutes - Water has begun pooling on the concrete slab at the base of Specimen 5.
- 90 minutes - Water pooling at the base of all specimens has evaporated.
Steam from the concrete slab is visible around Specimens 3 and 5.
- 95 minutes - White material inside the collar of Specimen 1 has begun to melt.
(Photograph 9)
- 180 minutes - The white material inside the collar of Specimen 1 continues to melt and is being pushed up towards the top of concrete slab. (Photograph 11)
Little visible change to Specimens 2, 3, 4, and 5.
- 210 minutes - A small quantity of smoke is venting inside the collar of Specimen 2.
- 230 minutes - Light smoke resumes fluing from the end of the pipe of Specimen 5.
- 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 1.

Figure 4 shows the curve of temperature versus time associated with Specimen 2.

Figure 5 shows the curve of temperature versus time associated with Specimen 3.

Figure 6 shows the curve of temperature versus time associated with Specimen 4.

Figure 7 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 1 – SNAP H110S Cast-in fire collar protecting a nominal 110-mm Valsir Triplus polypropylene stack pipe with bell-end joint inside collar.

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

Specimen 2 – SNAP H110S Cast-in fire collar protecting a nominal 110-mm Rehau Raupiano polypropylene stack pipe with bell-end joint inside collar.

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

Specimen 3 – SNAP 50R Retrofit collar protecting a nominal 50-mm Rehau Raupiano polypropylene stack pipe.

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

Specimen 4 – SNAP 110R Retrofit fire collar protecting a nominal 110-mm Rehau Raupiano polypropylene pipe.

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

Specimen 5 – SNAP H50S-RR Cast-in collar protecting a nominal 32-mm Rehau Rautitan PE-Xa stack pipe.

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 this standard. Any significant variation with respect to size, constructional details, loads, stresses, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not covered by this report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

9 Fire-resistance level (FRL)

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

Specimen 1	-	-/240/180
Specimen 2	-	-/240/180
Specimen 3	-	-/240/180
Specimen 4	-	-/240/180
Specimen 5	-	-/240/180

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

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
Specimen 1 - Valsir Triplus polypropylene 110-mm OD x 3.7-mm wall thickness stack pipe protected with a H110S Cast-in fire collar (bell end joint inside the collar). The 10-mm annular gap around the pipe on the exposed side was left open.	On top of the slab 25-mm from collar West	S1
	On top of the slab 25-mm from collar North/East	S2
	On pipe 25-mm above collar North	S3
	On pipe 25-mm above collar East	S4
Specimen 2 Rehau Raupiano polypropylene 110.8-mm OD x 2.92-mm wall thickness stack pipe protected with a H110S Cast-in fire collar. The 10-mm annular gap around the pipe on the exposed side was left open.	On top of the slab 25-mm from collar West	S5
	On top of the slab 25-mm from collar East	S6
	On pipe 25-mm above collar N/East	S7
	On pipe 25-mm above collar South/West	S8
Specimen 3 – Rehau Raupiano 50.2-mm OD x 2.06-mm wall thickness stack pipe protected with a 50R Retro fire collar. Hole size: 60-mm; Service: The annular gap around the pipe on the exposed side was sealed with a bead of Fullers Firesound sealant.	On top of the slab 25-mm from sealant North/East	S9
	On top of the slab 25-mm from sealant South/West	S10
	On pipe 25-mm above sealant West	S11
	On pipe 25-mm above sealant East	S12
Specimen 4 – Rehau Raupiano polypropylene 110.8-mm OD x 2.92-mm wall thickness stack pipe protected with a 110R Retro fire collar. Hole size: 114-mm; Service: The annular gap around the pipe on the exposed side was sealed with a bead of Fullers Firesound sealant.	On top of the slab 25-mm from sealant West	S13
	On top of the slab 25-mm from sealant East	S14
	On pipe 25-mm above sealant West	S15
	On pipe 25-mm above sealant East	S16
Specimen 5 Rehau PE-Xa 32-mm OD x 4.95-mm wall thickness stack pipe protected with a H50S -RR Cast in fire collar. The annular gap around the pipe on the collar on the unexposed face was backfilled with grout to a depth of 30-mm from the foam backing rod. Pipe was plugged on the exposed end with Superwool.	On top of the slab 25-mm from grout West	S17
	On top of the slab 25-mm from grout East	S18
	On grout 25-mm from pipe West	S19
	On grout 25-mm from pipe East	S20
	On pipe 25-mm above grout West	S21
	On pipe 25-mm above grout South/East	S22
Rover	Rover	S23
Ambient	Ambient	S24

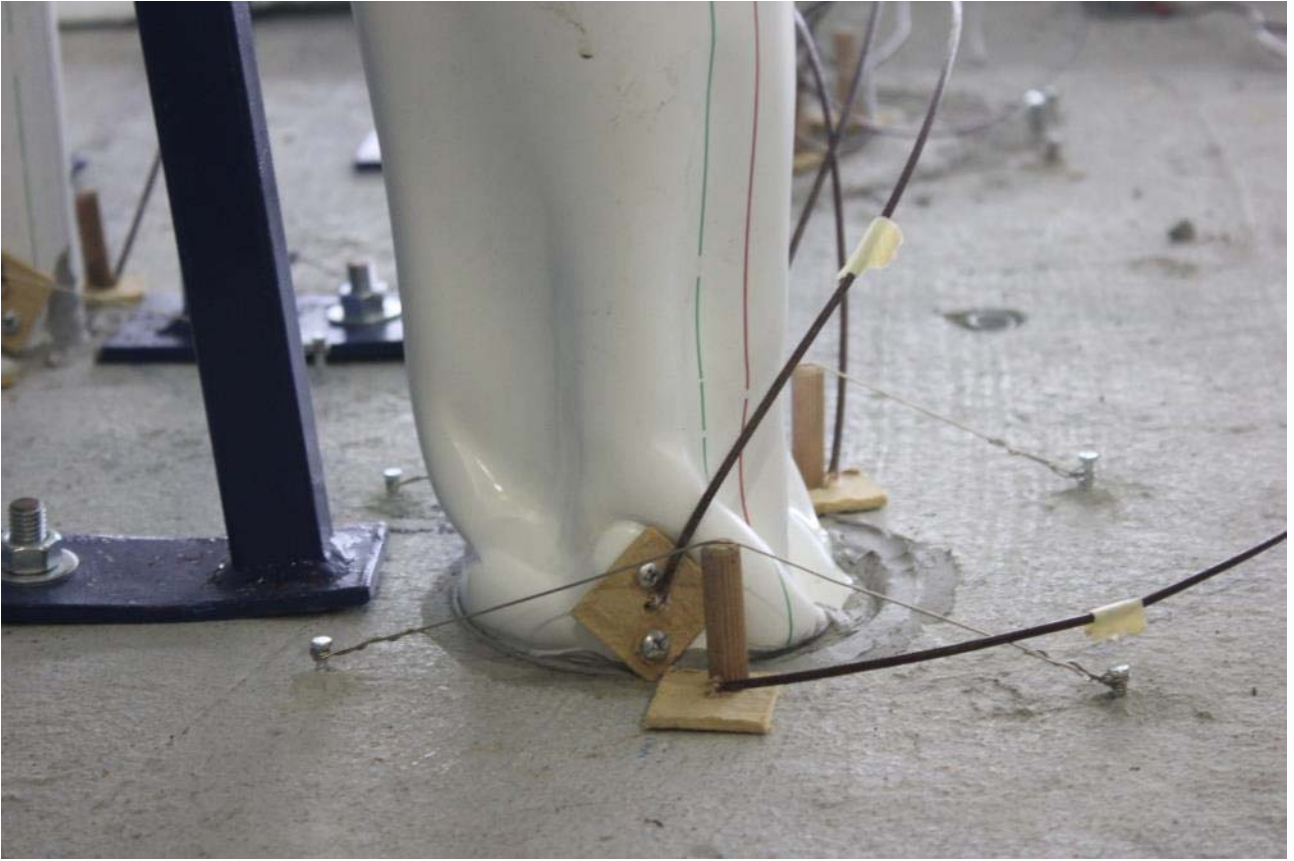
Appendix B – Photographs



PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMENS PRIOR TO TESTING



PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMENS PRIOR TO TESTING



PHOTOGRAPH 3 – SPECIMEN 4 AFTER 5 MINUTES OF TESTING



PHOTOGRAPH 4 – SPECIMEN 1 AFTER 15 MINUTES OF TESTING



PHOTOGRAPH 5 – SPECIMENS AFTER 30 MINUTES OF TESTING



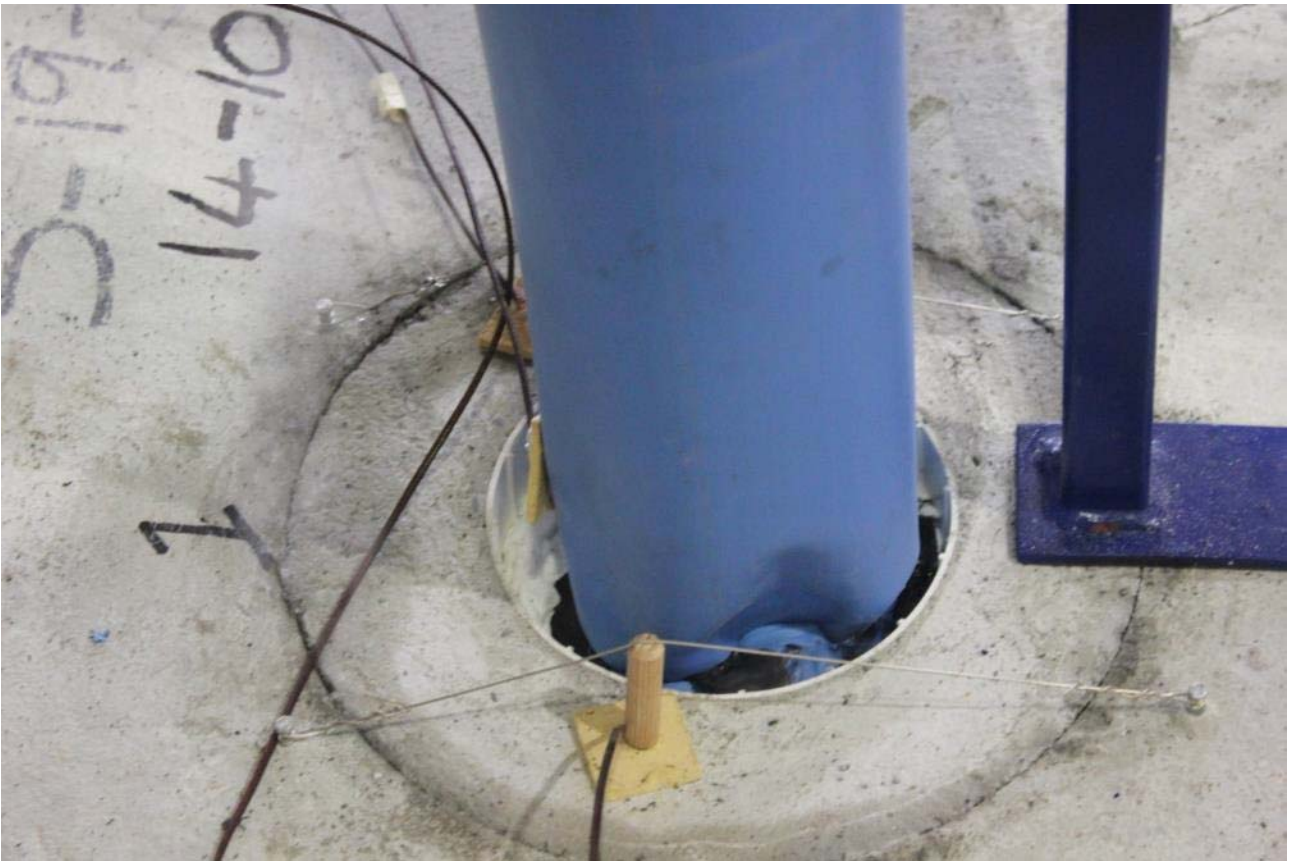
PHOTOGRAPH 6 – SPECIMEN1 AFTER 34 MINUTES OF TESTING



PHOTOGRAPH 7 – SPECIMENS AFTER 60 MINUTES OF TESTING



PHOTOGRAPH 8 – SPECIMENS AFTER 90 MINUTES OF TESTING



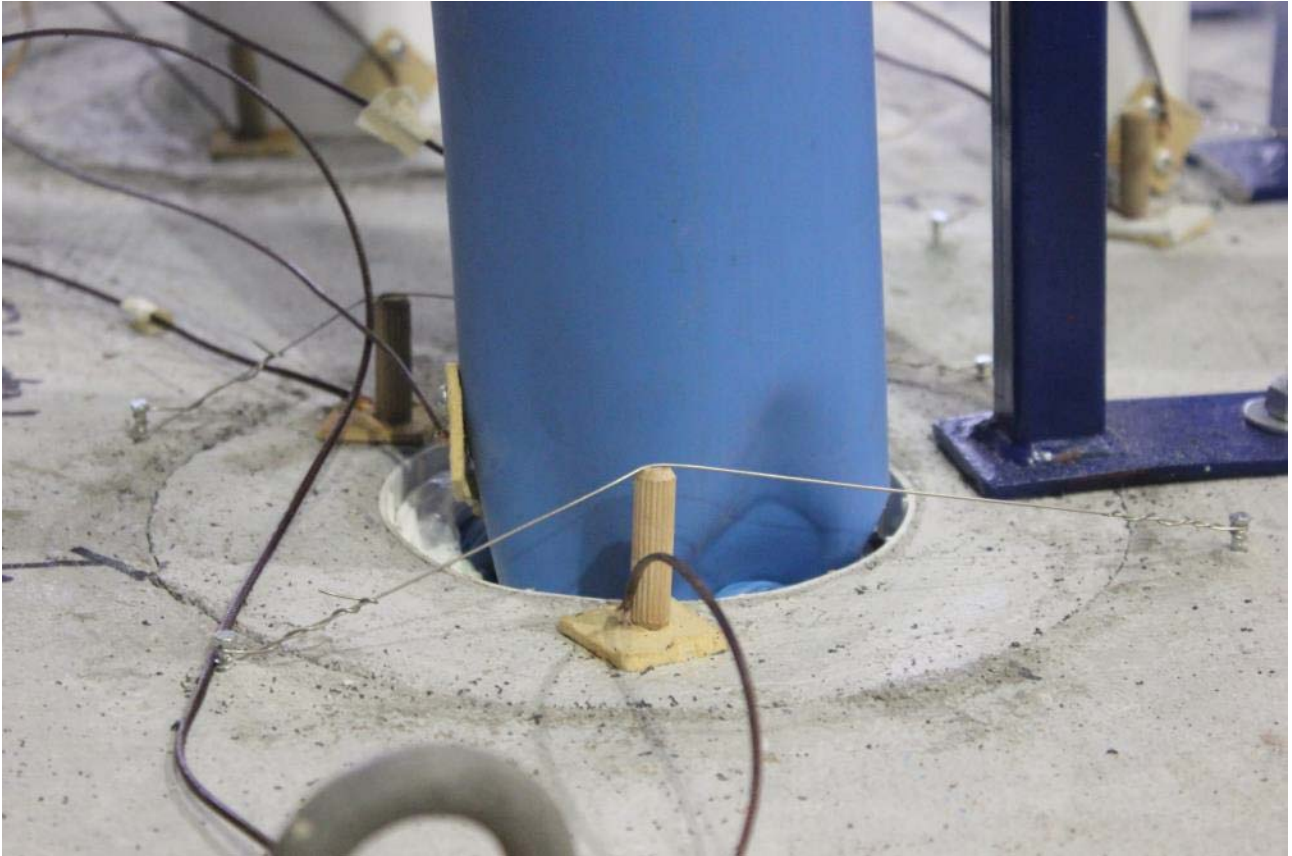
PHOTOGRAPH 9 – SPECIMEN 1 AFTER 95 MINUTES OF TESTING



PHOTOGRAPH 10 – SPECIMENS AFTER 120 MINUTES OF TESTING



PHOTOGRAPH 11 – SPECIMENS AFTER 180 MINUTES OF TESTING



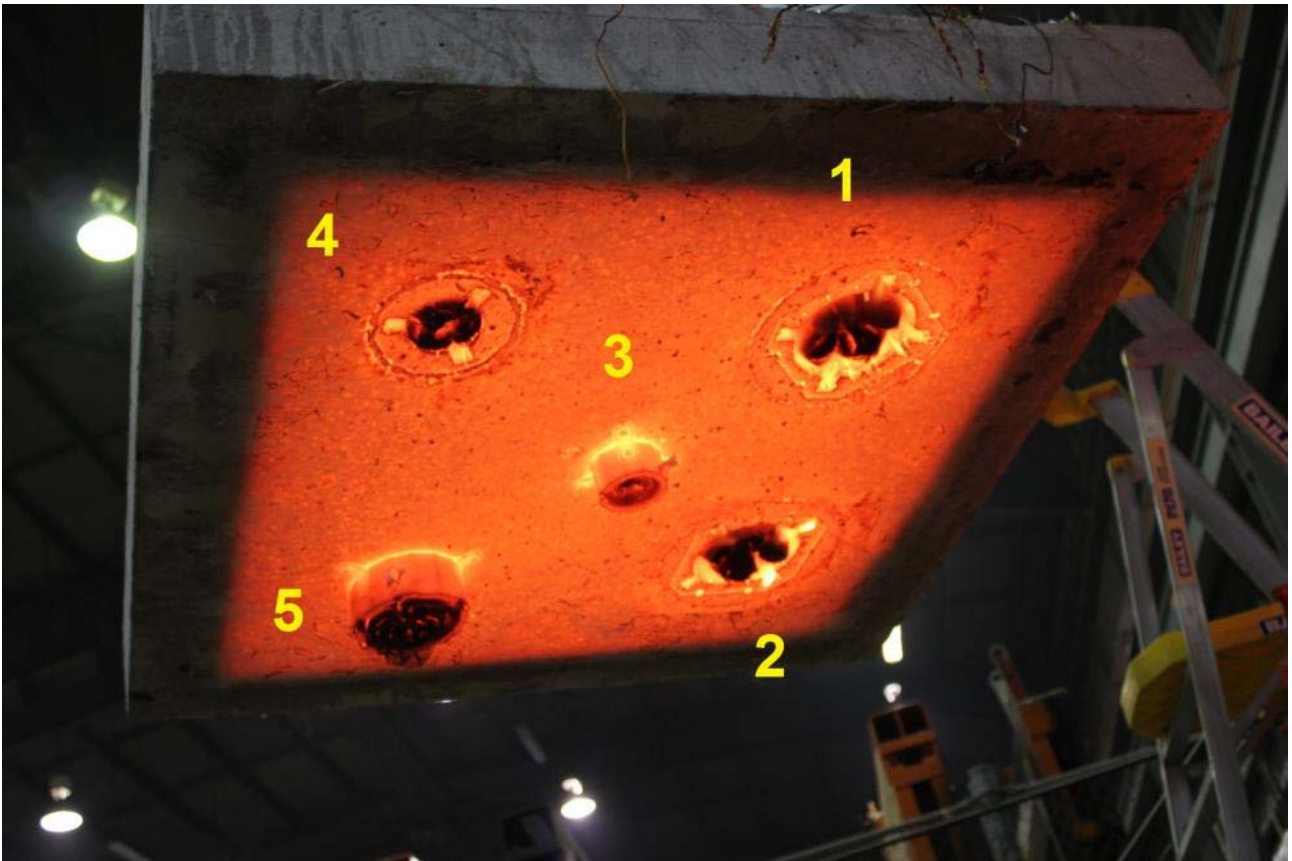
PHOTOGRAPH 12 – SPECIMEN 1 AFTER 181 MINUTES OF TESTING



PHOTOGRAPH 13 – SPECIMENS AFTER 210 MINUTES OF TESTING



PHOTOGRAPH 14 – SPECIMENS AFTER 240 MINUTES OF TESTING



PHOTOGRAPH 15 – EXPOSED FACE OF SPECIMENS AFTER THE CONCLUSION OF TESTING

Appendix C – Test Data Charts

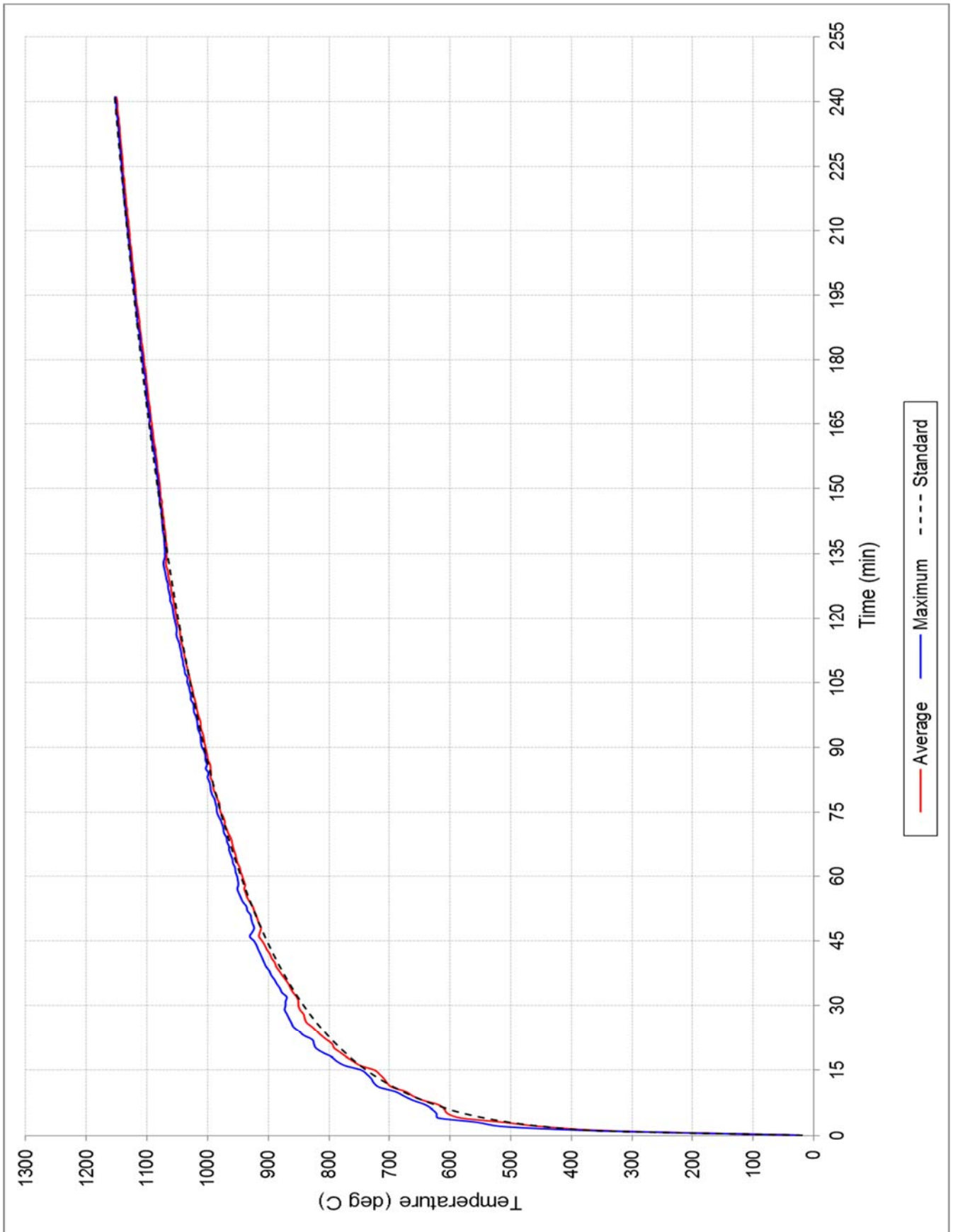


FIGURE 1 – FURNACE TEMPERATURE

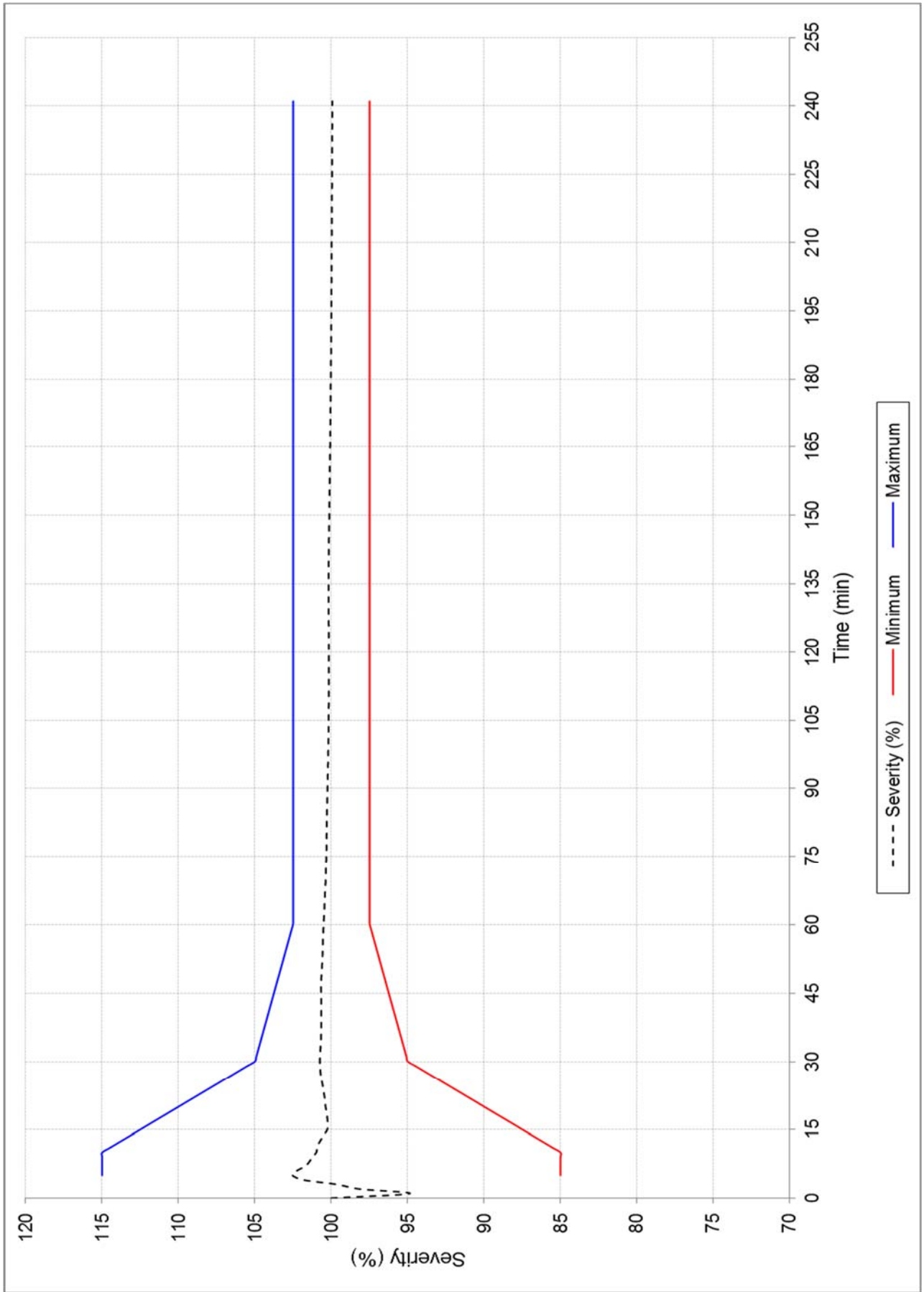


FIGURE 2 – FURNACE SEVERITY

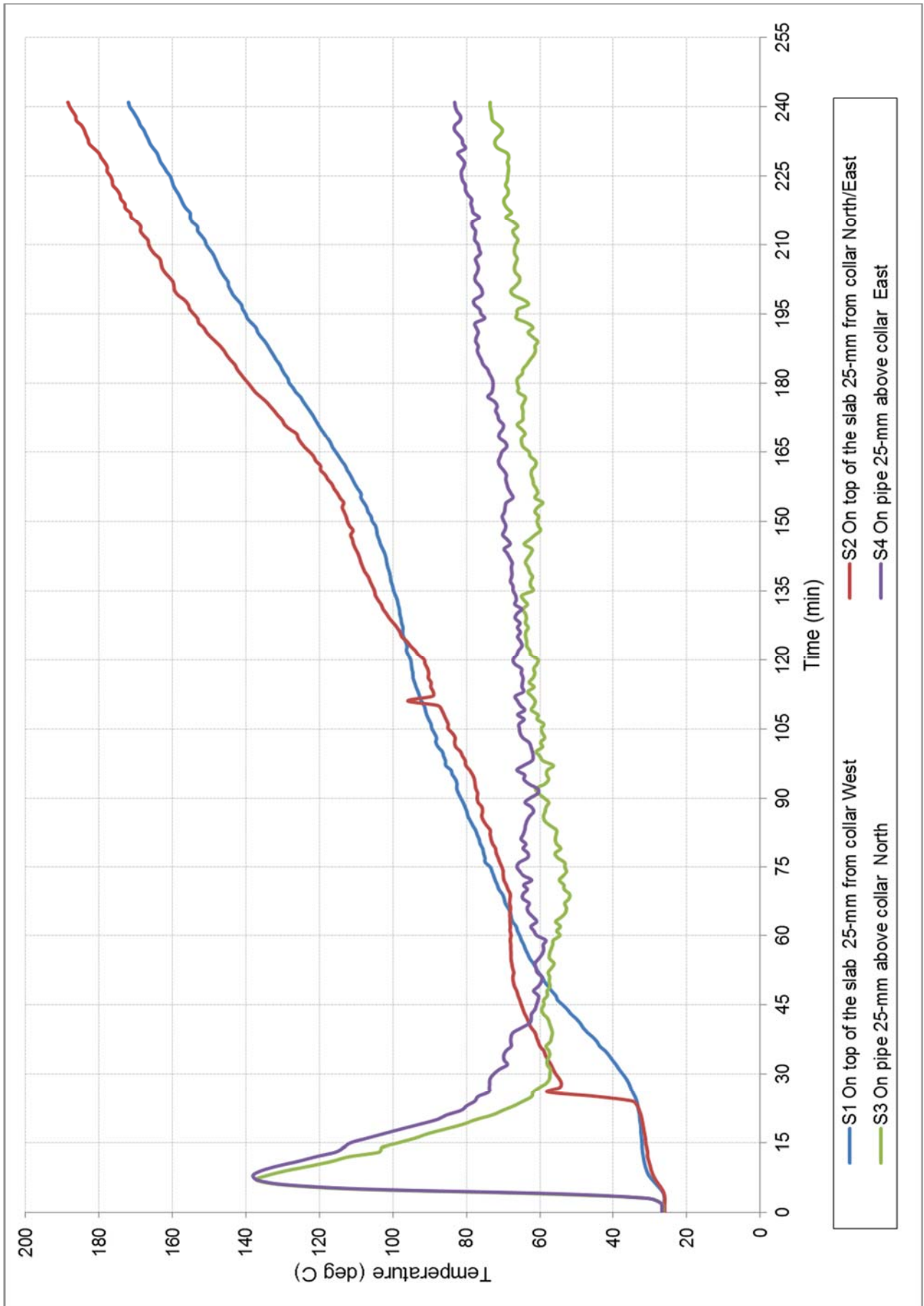


FIGURE 3 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 1

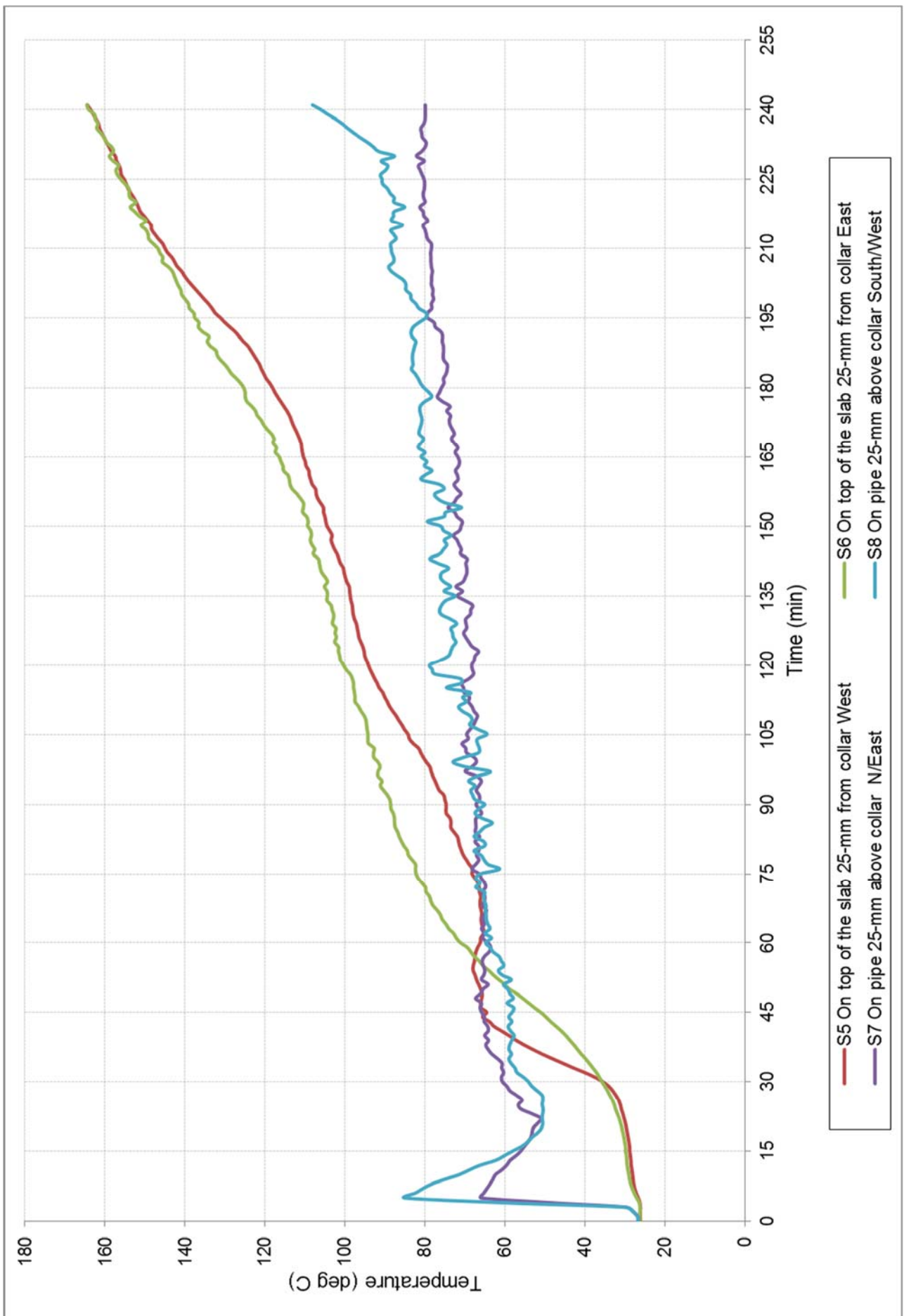


FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 2

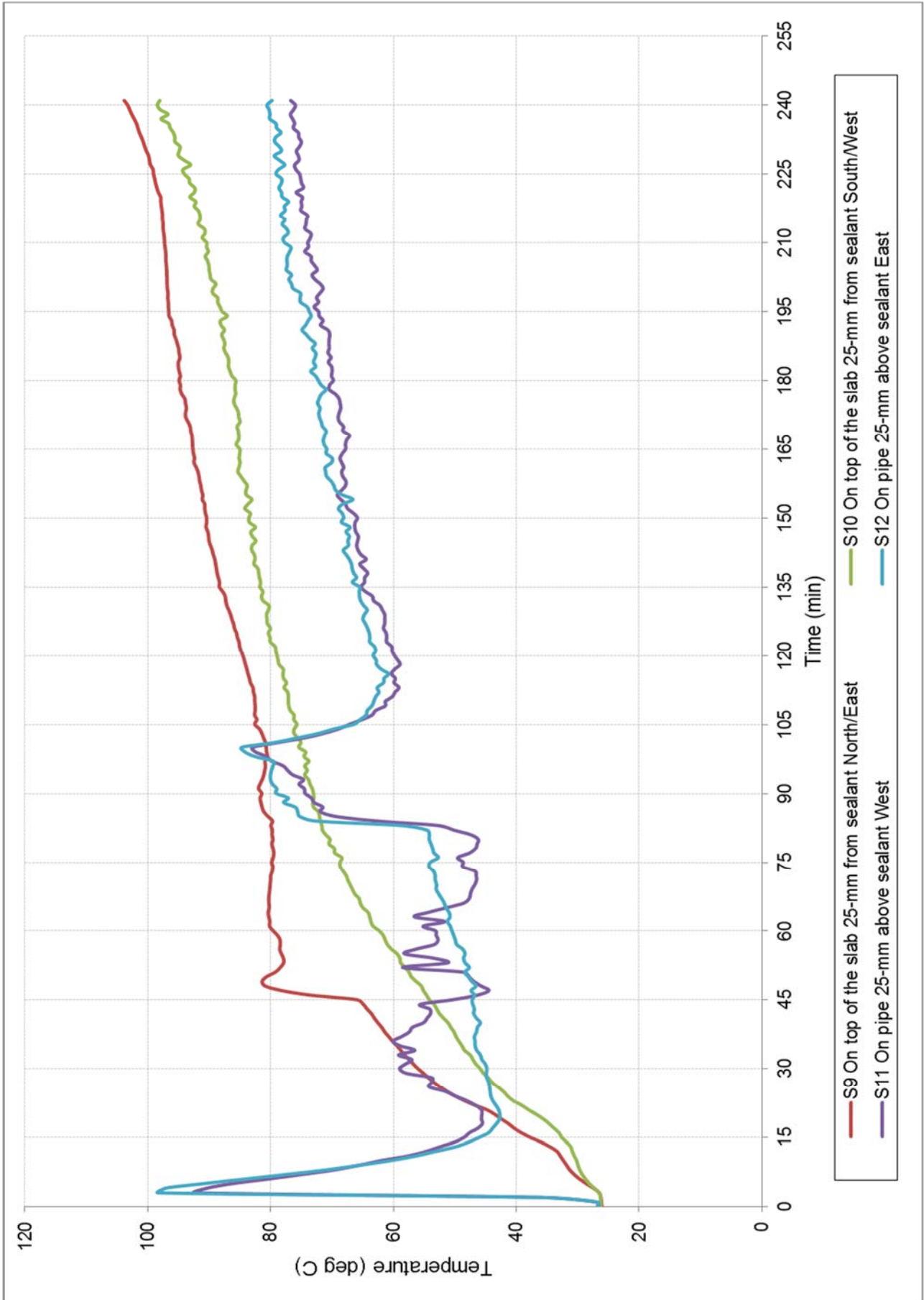


FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 3

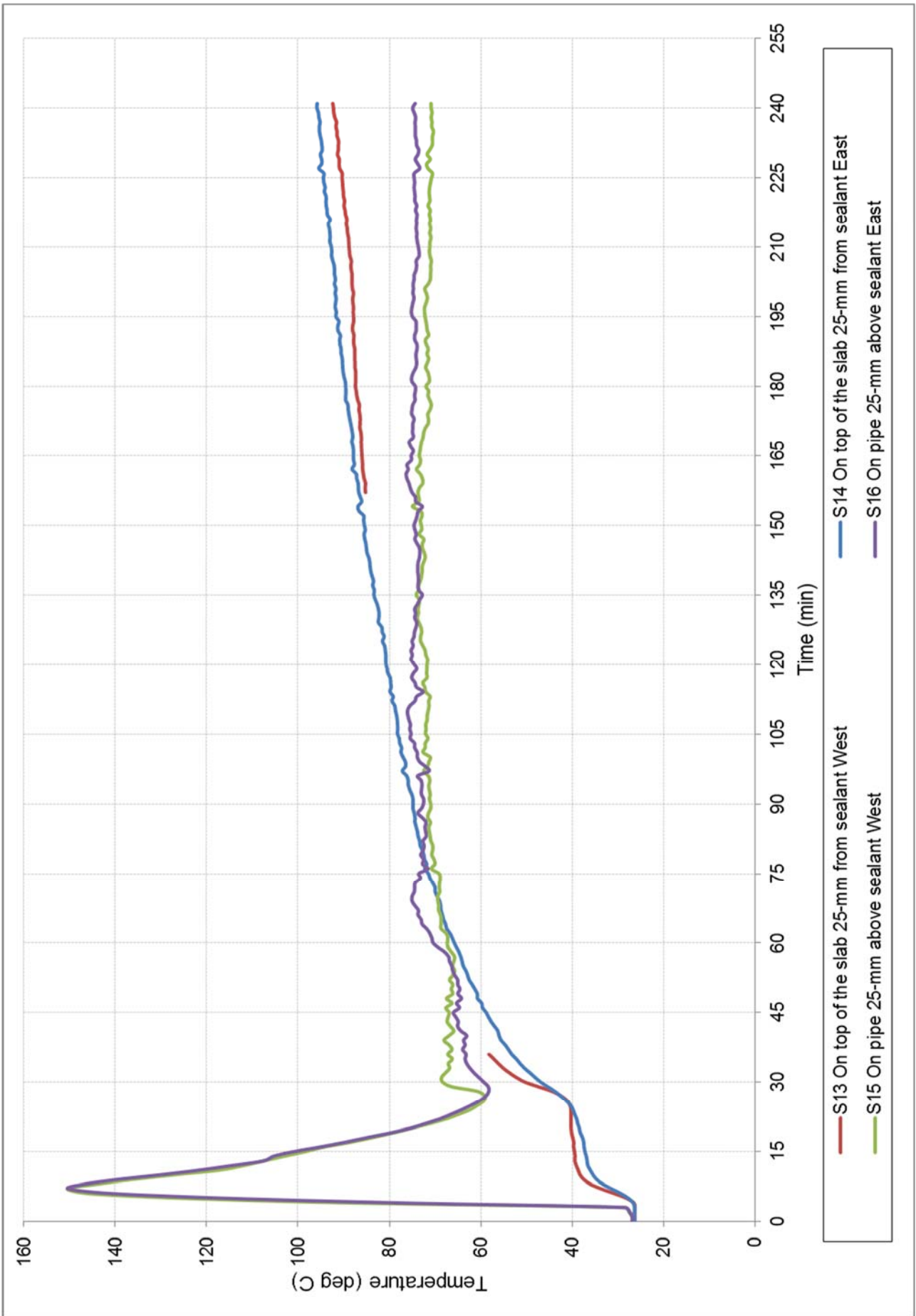


FIGURE 6 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 4

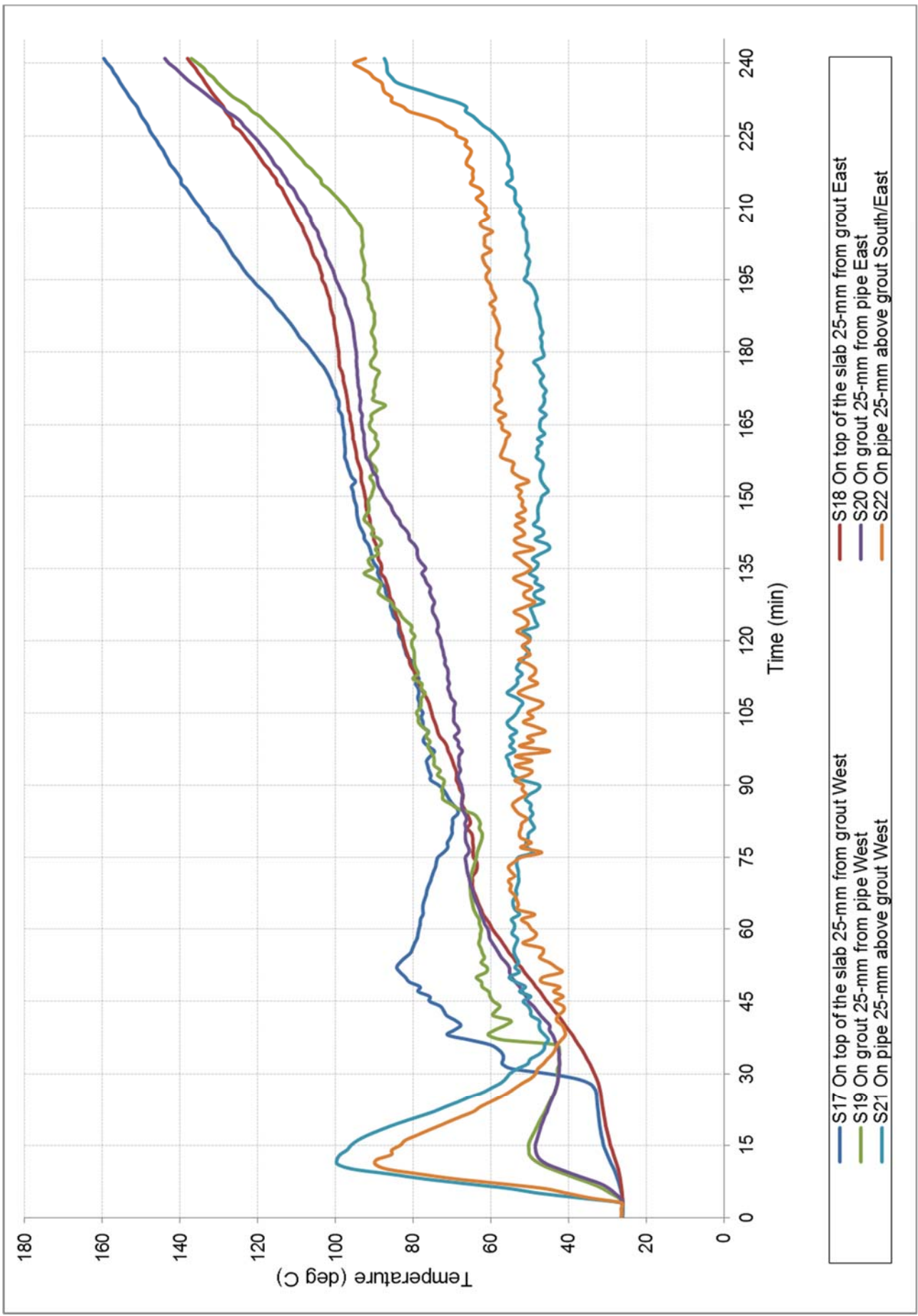


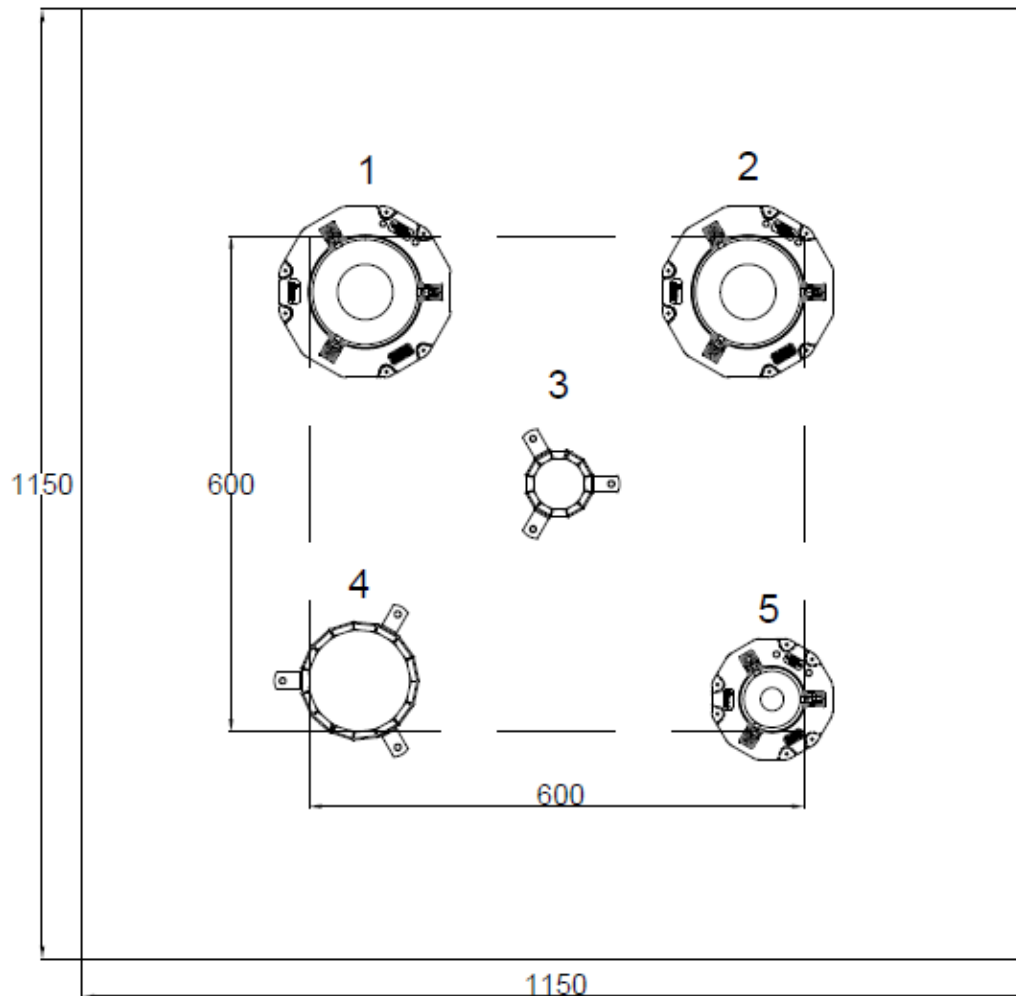
FIGURE 7 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 5

Appendix D – Installation drawings

Snap Fire Systems Pty Ltd

Test Slab S-19-H Layout

Date: 02 OCT 2019



Penetration	Collar Code	Pipe Type	Pipe Diameter (mm)	Fitting
1	H110S-RR	Triplus	110	Yes
2	H110S-RR	Raupiano	110	N/A
3	50R	Raupiano	50	N/A
4	110R	Raupiano	110	N/A
5	H50S-RR	Pex-a	32	N/A

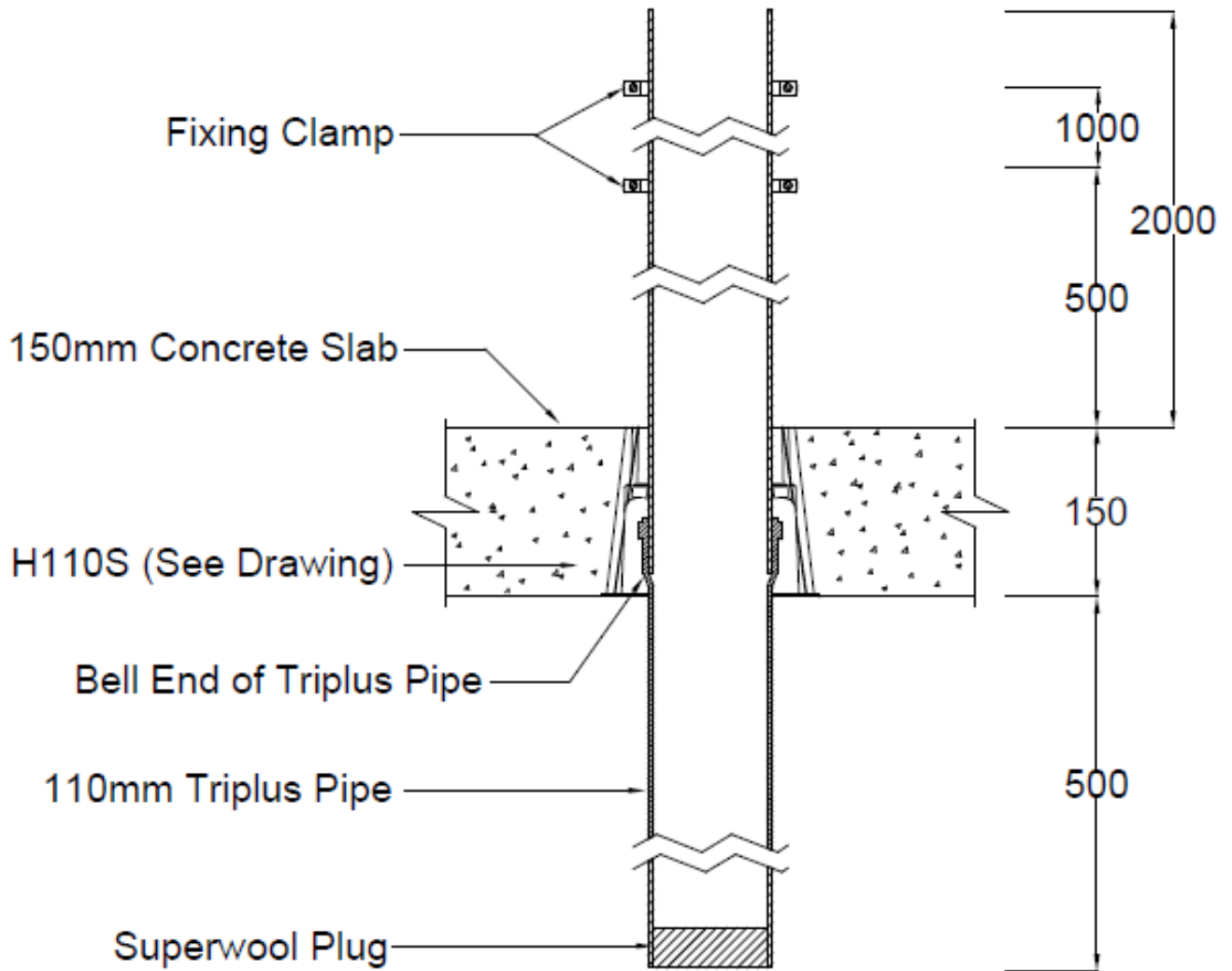
DRAWING TITLED "TEST SLAB S-19-H LAYOUT", DATED 2 OCTOBER 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd

Specimen #1

110mm Triplus Stack with Bell End in Collar & H110S

Date: 01 NOV 2019



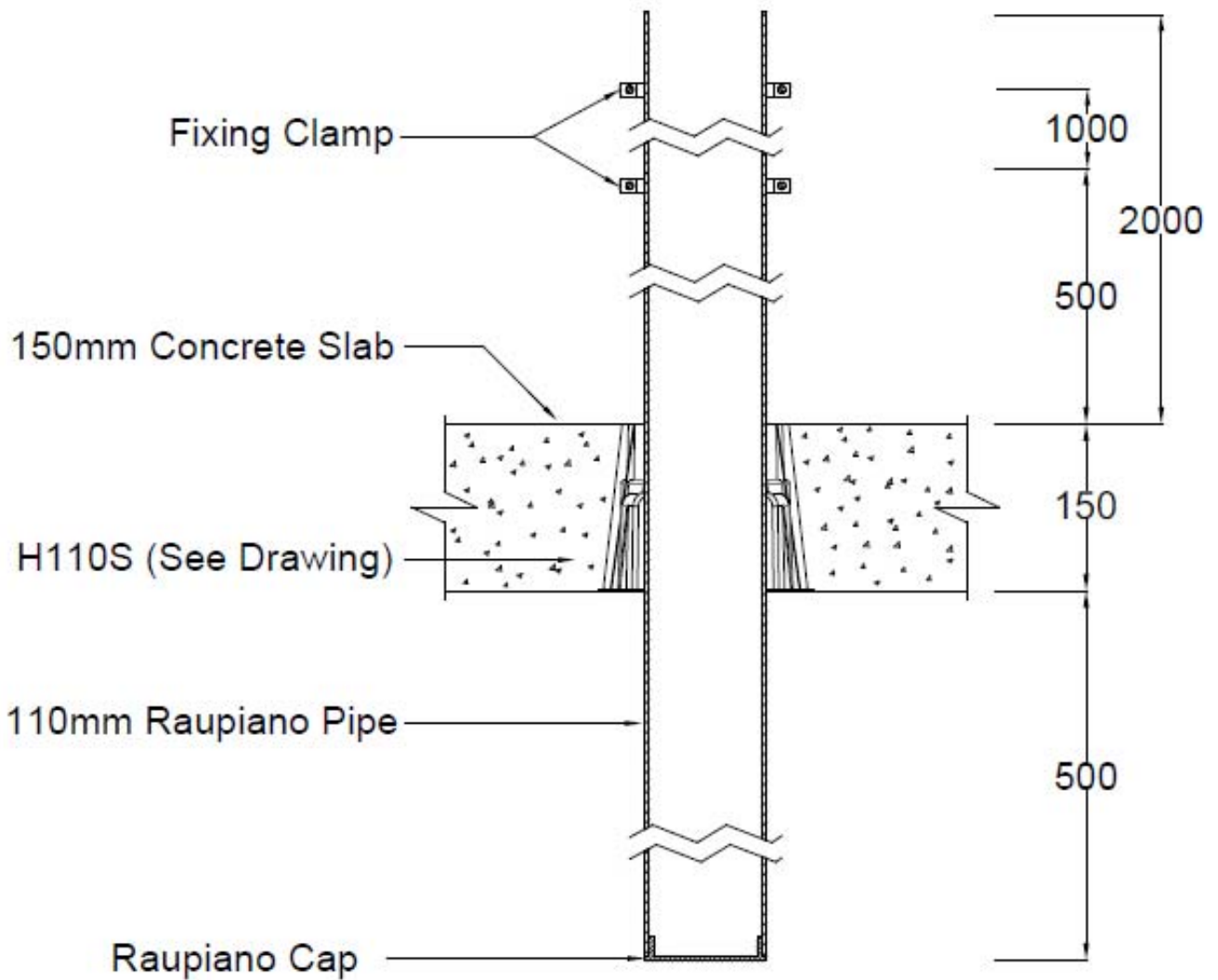
DRAWING "SPECIMEN #1, 110MM TRIPLUS STACK WITH BELL END IN COLLAR & H110S", DATED 1 NOVEMBER 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd

Specimen #2

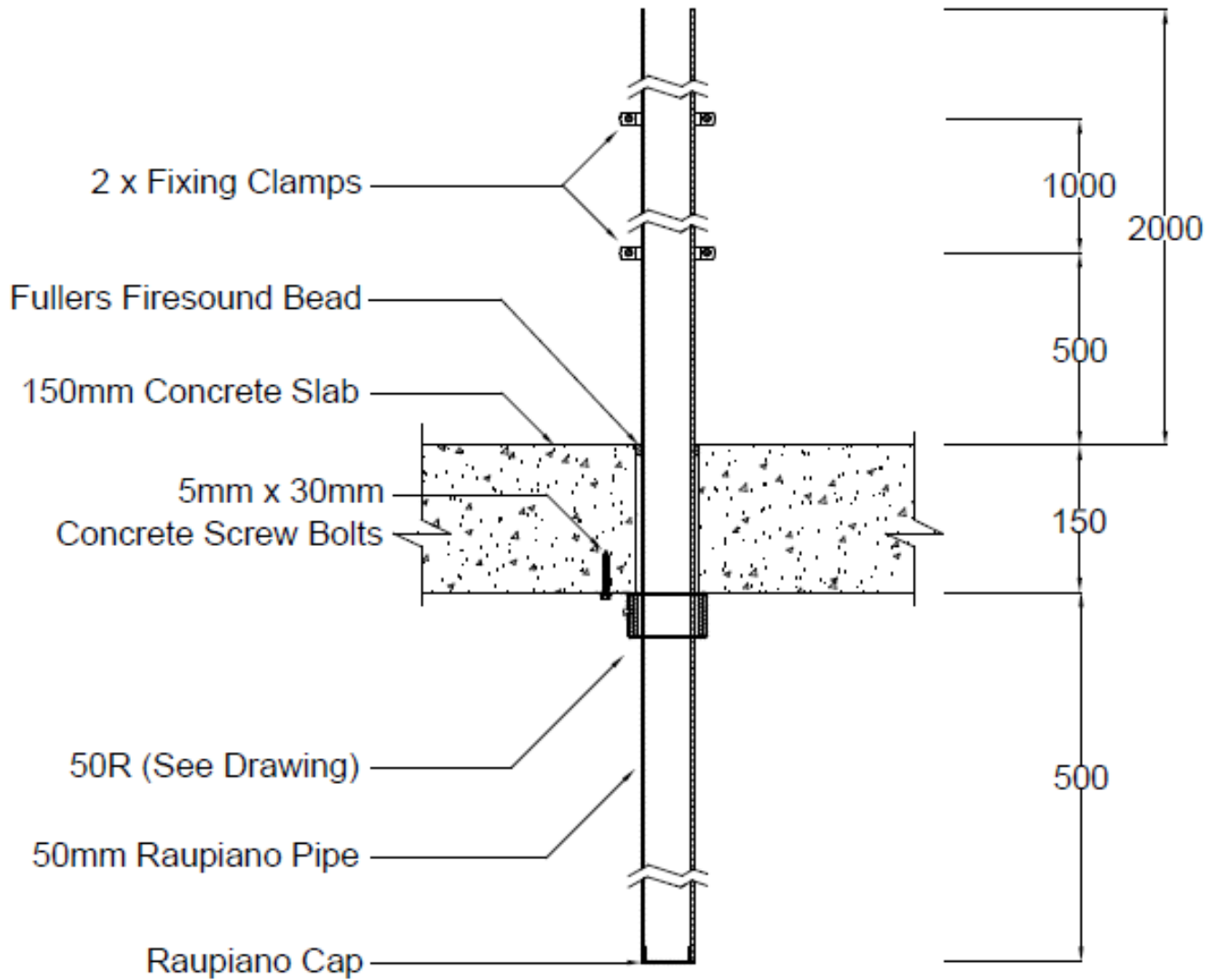
110mm Raupiano Stack & H110S

Date: 01 NOV 2019



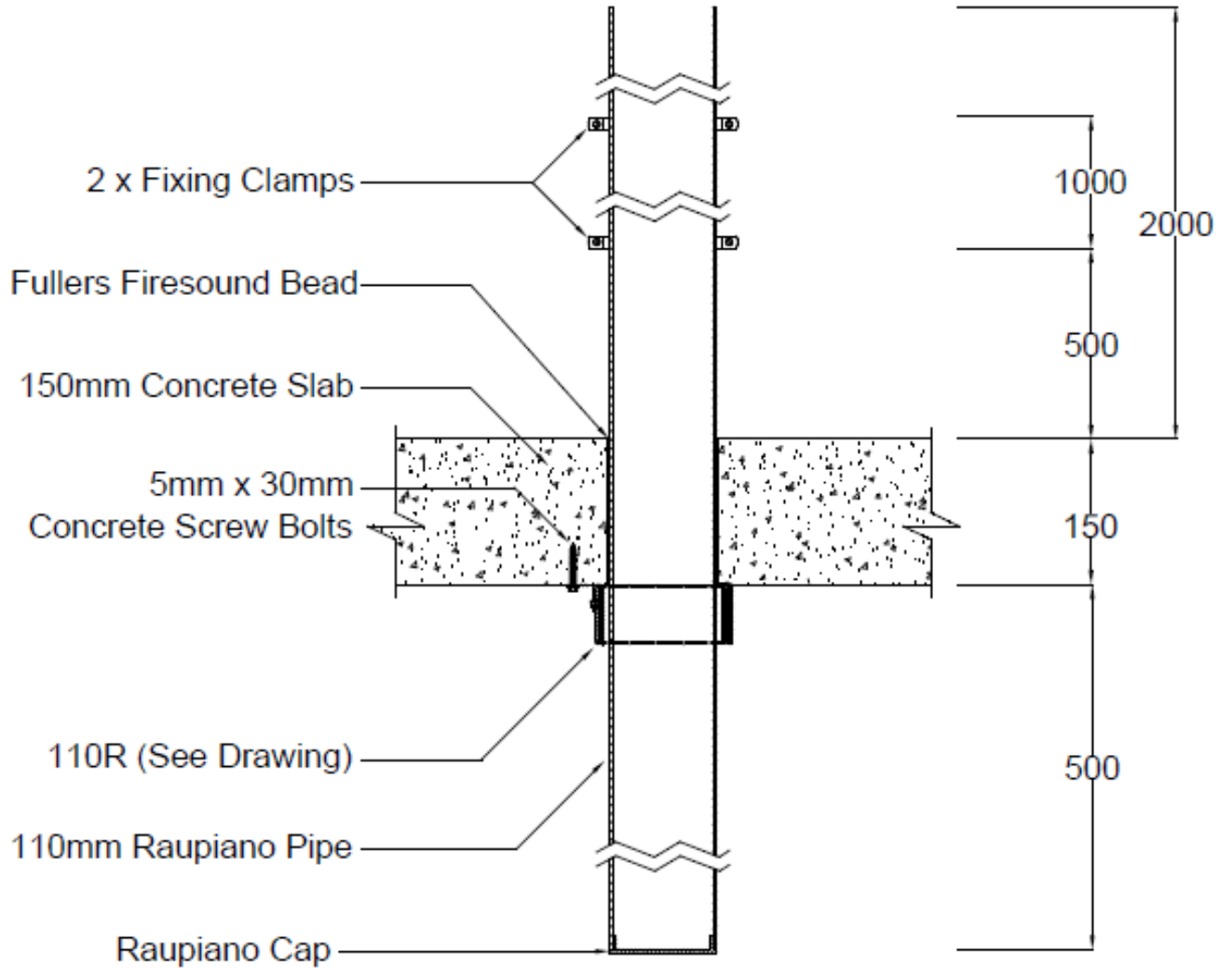
DRAWING TITLED "SPECIMEN # 2, 110MM RAUPIANO STACK & H110S", DATED 1 NOVEMBER 2019,
PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd
Specimen #3
50mm Raupiano Stack & 50R
Date: 31 OCT 2019



DRAWING TITLED "SPECIMEN # 3, 50MM RAUPIANO STACK & 50R", DATED 31 OCTOBER 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd
Specimen #4
110mm Raupiano Stack & 110R
Date: 31 OCT 2019



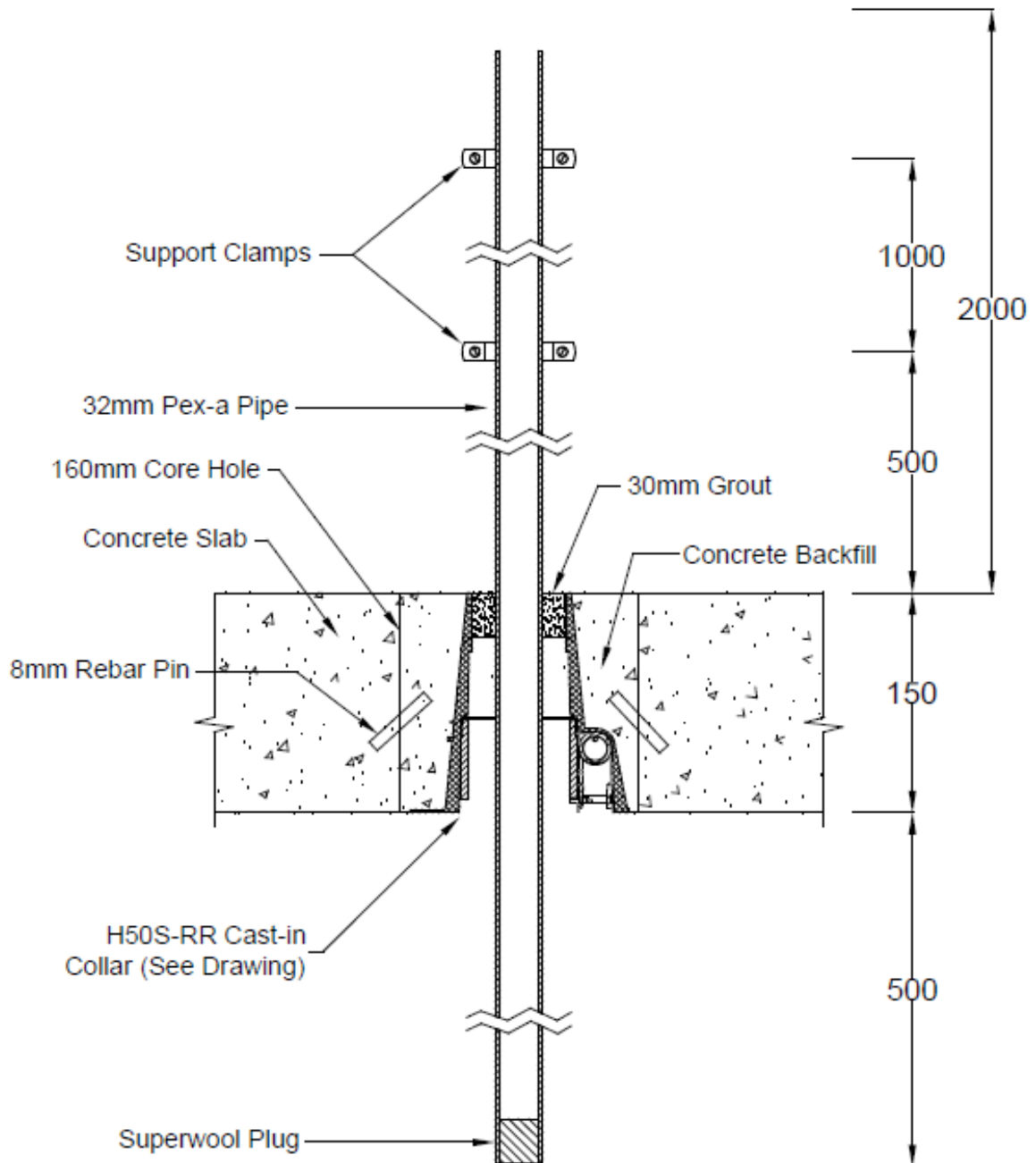
DRAWING TITLED "SPECIMEN #4, 110MM RAUPIANO STACK & 110R", DATED 31 OCTOBER 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

Snap Fire Systems Pty Ltd

Specimen #5

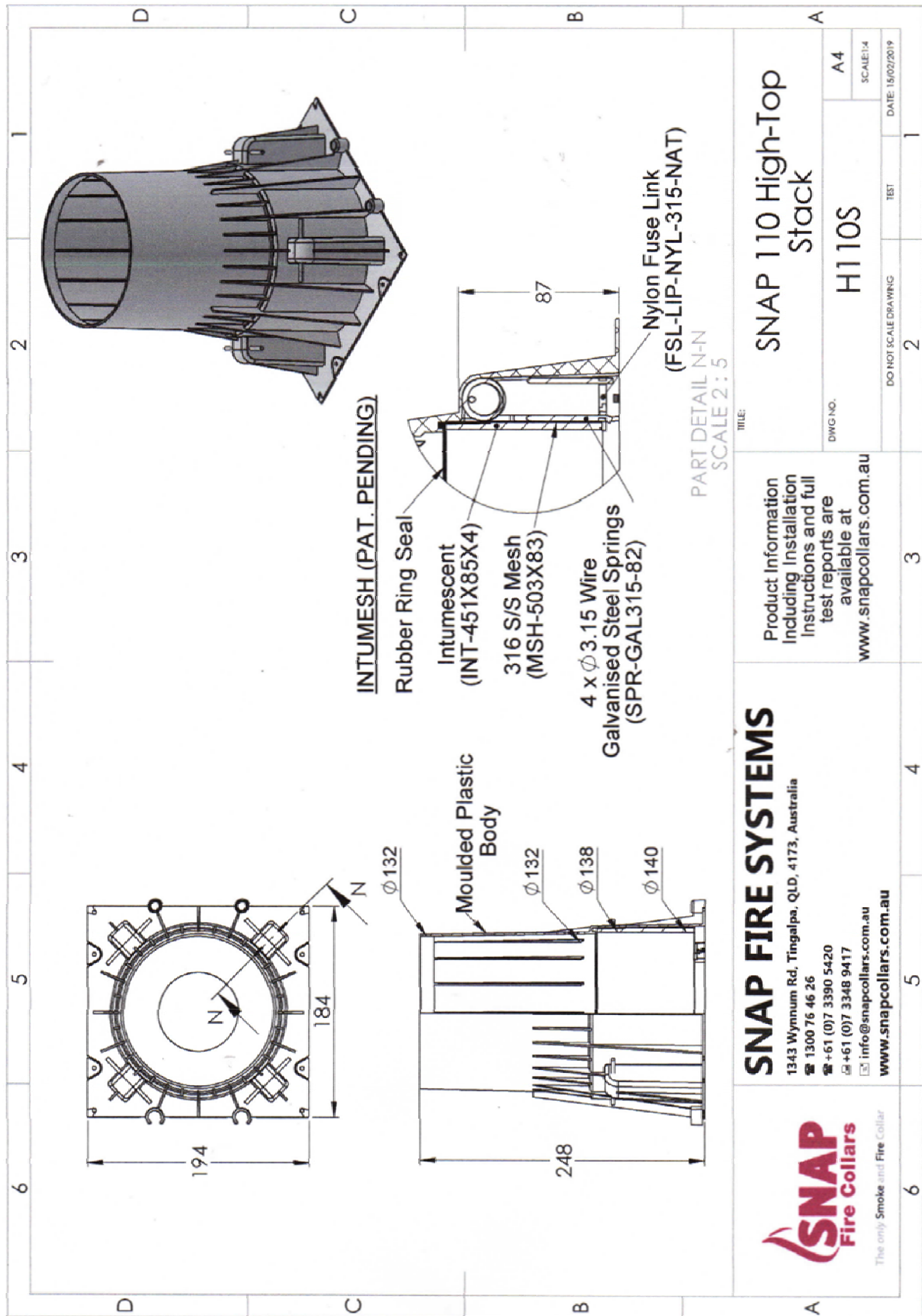
32mm Pex-a Stack & H50S-RR

Date: 31 OCT 2019



DRAWING TITLED "SPECIMEN #5, 32MM PEX-A STACK & H50S-RR", DATED 31 OCTOBER 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

Appendix E – Specimen Drawings



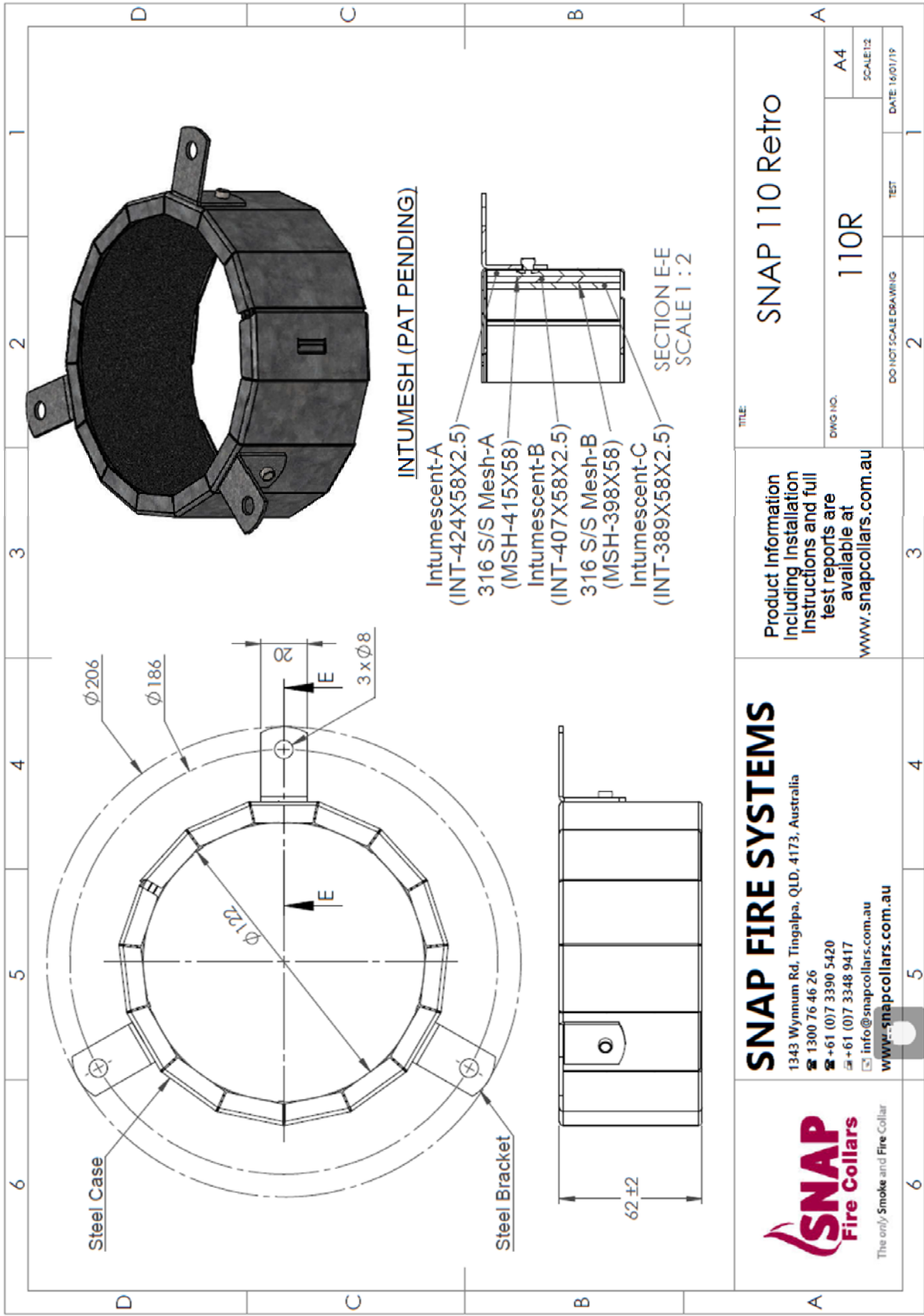
SNAP 110 High-Top Stack	
DWG NO.	H110S
SCALE	A4
DATE	15/02/2019
DO NOT SCALE DRAWING	TEST

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

SNAP FIRE SYSTEMS
 1343 Wynnham Rd, Tingalpa, QLD, 4173, Australia
 ☎ 1300 76 46 26
 ☎ +61 (0)7 3390 5420
 ✉ info@snapcollars.com.au
www.snapcollars.com.au

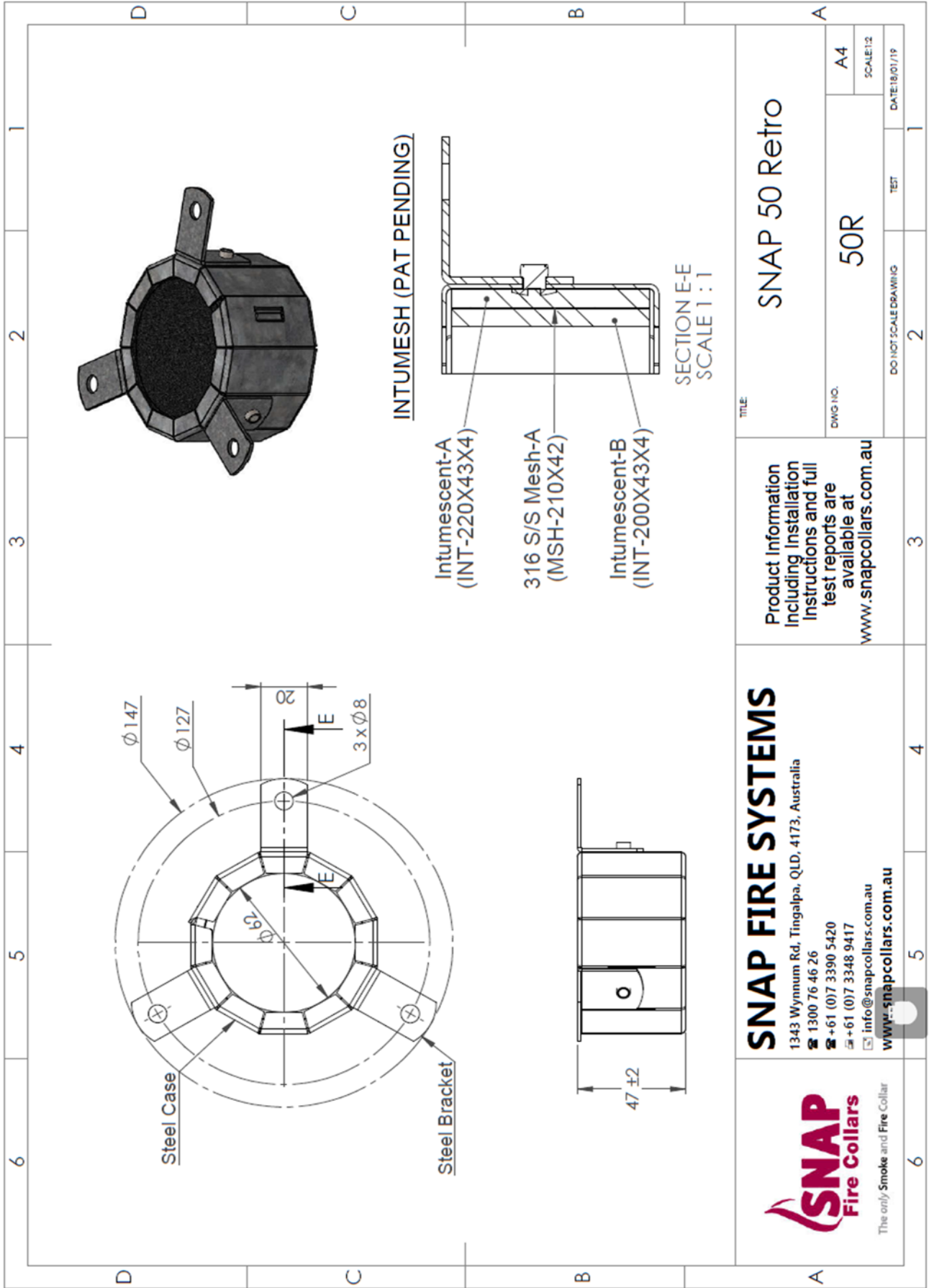


DRAWING NUMBER H110S, DATED 15 FEBRUARY 2019, BY SNAP FIRE SYSTEMS PTY LTD



	SNAP FIRE SYSTEMS 1343 Wynnnum Rd, Tingalpa, QLD, 4173, Australia ☎ 1300 76 46 26 ☎ +61 (0)7 3390 5420 ☎ +61 (0)7 3348 9417 ✉ info@snapcollars.com.au www.snapcollars.com.au		SNAP 110 Retro Product Information including Installation Instructions and full test reports are available at www.snapcollars.com.au	
	DWG NO. 110R SCALE: 1:2 DATE: 16/01/19	DO NOT SCALE DRAWING TEST 2	1	1

DRAWING TITLED "SNAP 110 RETRO", DATED 16 JANUARY 2019, BY SNAP FIRE SYSTEMS PTY LTD.



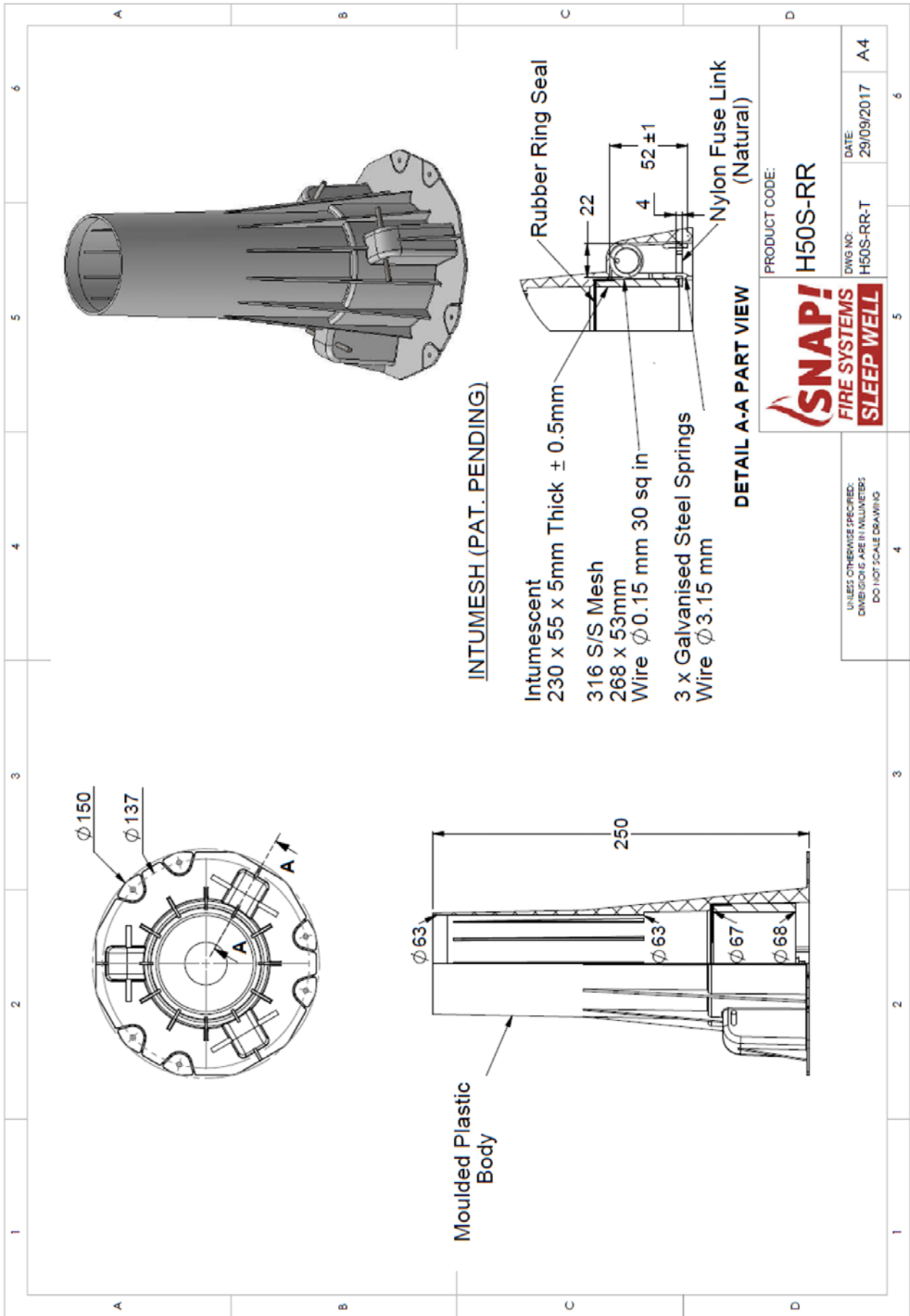
TITLE		SNAP 50 Retro	
DWG NO.		50R	
SCALE		A4	
DATE		18/01/19	
DO NOT SCALE DRAWING	TEST	2	1

Product Information including installation instructions and full test reports are available at www.snapcollars.com.au

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DRAWING TITLED "SNAP 50 RETRO", DATED 18 JANUARY 2019, BY SNAP FIRE SYSTEMS PTY LTD.



DRAWING NUMBER H50S-RR-T, DATED 29 SEPTEMBER 2017, BY SNAP FIRE SYSTEMS PTY LTD.

Appendix F – Certificate(s) of Test

INFRASTRUCTURE TECHNOLOGIES www.csiro.au		
14 Julius Avenue, North Ryde NSW 2113 PO Box 52, North Ryde NSW 1670, Australia T (02) 9490 5444 • ABN 41 687 119 230		
<h2>Certificate of Test</h2>		No. 3400
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 2072.		
Product Name:	SNAP H110S Cast-in fire collar protecting a nominal 110-mm Valsir Triplus polypropylene stack pipe with bell-end joint inside collar (Specimen 1)	
Description:	The specimen comprised an 1150-mm x 1150-mm x 150-mm thick concrete slab penetrated by a stack pipe protected by Snap Fire Systems fire collars. The penetrated slab comprised a 150-mm thick concrete slab 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. The SNAP Cast-in H110S fire collar comprised a 1.6-mm thick polypropylene casing with a 140-mm inner diameter and a 194-mm x 184-mm base flange. The 248-mm high collar casing incorporated a layer of 451-mm long x 85-mm wide x 4-mm thick Intumescent material. The closing mechanism comprised four equally spaced steel springs held with nylon fuse links. The springs were fabricated using galvanised steel wire having a diameter of 3.15-mm, with the springs acting against a layer of 316 grade stainless steel mesh measuring 503-mm x 83-mm as shown in drawing number H110S, dated 15 February 2019, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 110-mm outside diameter Valsir Triplus polypropylene pipe with a wall thickness of 3.7-mm fitted through the collar's sleeve. The annular gap between the OD of the pipe and the inside collar was left unprotected as shown in drawing titled "Specimen #1, 110mm Triplus Stack with Bell End in Collar & H110S", dated 1 November 2019, provided by Snap Fire Systems Pty Ltd. The pipe projected vertically, 2000-mm above from the unexposed face of the concrete slab 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 closed with a ceramic fibre plug on the exposed end.	
Performance observed in respect of the following AS 1530.4-2014 criteria		
Structural Adequacy	-	not applicable
Integrity	-	no failure at 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 (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The maximum FRL of any test specimen cannot exceed the FRL achieved by the system 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: 8 January 2020
Issued on the 11 th day of May 2020 without alterations or additions.		
 Brett Roddy Manager, Fire Testing and Assessments		
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	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. 3400



Certificate of Test

No. 3401

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 2072.

Product Name: SNAP H110S Cast-in fire collar protecting a nominal 110-mm Rehau Raupiano polypropylene stack pipe (Specimen 2)

Description: The specimen comprised an 1150-mm x 1150-mm x 150-mm thick concrete slab penetrated by a stack pipe protected by Snap Fire Systems fire collars. The penetrated slab comprised a 150-mm thick concrete slab 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. The SNAP Cast-in H110S fire collar comprised a 1.6-mm thick polypropylene casing with a 140-mm inner diameter and a 194-mm x 184-mm base flange. The 248-mm high collar casing incorporated a layer of 451-mm long x 85-mm wide x 4-mm thick Intumescent material. The closing mechanism comprised four equally spaced steel springs held with nylon fuse links. The springs were fabricated using galvanised steel wire having a diameter of 3.15-mm, with the springs acting against a layer of 316 grade stainless steel mesh measuring 503-mm x 83-mm as shown in drawing number H110S, dated 15 February 2019, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 110.8-mm outside diameter Rehau Raupiano polypropylene pipe with a wall thickness of 2.92-mm fitted through the collar's sleeve. The annular gap between the OD of the pipe and the inside collar was left unprotected as shown in drawing titled "Specimen #2, 110mm Raupiano Stack & H110S", dated 1 November 2019, provided by Snap Fire Systems Pty Ltd. The pipe projected vertically, 2000-mm above from the unexposed face of the concrete slab 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 closed with a Raupiano 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 -/240/180.

The fire-resistance level (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The maximum FRL of any test specimen cannot exceed the FRL achieved by the system 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: 8 January 2020

Issued on the 11th day of May 2020 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

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Certificate of Test

No. 3402

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 2072.

Product Name: SNAP 50R Retrofit collar protecting a nominal 50-mm Rehau Raupiano polypropylene stack pipe (Specimen 3)

Description: The specimen comprised an 1150-mm x 1150-mm x 150-mm thick concrete slab penetrated by a stack pipe protected by Snap Fire Systems fire collars. The penetrated slab comprised a 150-mm thick concrete slab 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. The SNAP Retrofit 50R fire collar comprised a 0.75-mm steel casing with a 62-mm inner diameter and a 147-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 220-mm long and Intumescent B was 4-mm thick x 43-mm wide x 200-mm long. Between the strips was a layer of 316 grade stainless steel mesh measuring 210-mm long x 42-mm wide with a wire mesh diameter of 0.15-mm, as shown in drawing titled "SNAP 50 Retro", dated 18 January 2019, by Snap Fire Systems Pty Ltd. The Snap collar was surface mounted around the pipe on the exposed face (underside) of the slab and fixed through 3 mounting brackets using 5-mm x 30-mm concrete screw bolts. The annular gap between the pipe and concrete slab on the unexposed face was protected with a bead of Fullers Firesound sealant. The penetrating service comprised a 50.2-mm outside diameter Rehau Raupiano polypropylene pipe with a wall thickness of 2.06-mm fitted through the collar's sleeve. A 60-mm diameter opening was cut into slab and the collar fixed centrally over the hole as shown in drawing titled "Specimen #3, 50mm Raupiano Stack & 50R", dated 31 October 2019, provided by Snap Fire Systems Pty Ltd. The pipe projected vertically 2000-mm above the concrete slab 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 closed with a Raupiano polypropylene 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 -/240/180.

The fire-resistance level (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The maximum FRL of any test specimen cannot exceed the FRL achieved by the system 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: 8 January 2020

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Certificate of Test

No. 3403

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 2072.

Product Name: SNAP 110R Retrofit fire collar protecting a nominal 110-mm Rehau Raupiano polypropylene pipe (Specimen 4)

Description: The specimen comprised an 1150-mm x 1150-mm x 150-mm thick concrete slab penetrated by a stack pipe protected by Snap Fire Systems fire collars. The penetrated slab comprised a 150-mm thick concrete slab 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. The SNAP Retrofit 110R 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 that was comprised of three soft Intumesh intumescent wraps and wire meshes 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 had wire mesh diameters of 0.15-mm, as shown in drawing titled "SNAP 110 Retro", dated 16 January 2019, by Snap Fire Systems Pty Ltd. The Snap collar was surface mounted around the pipe on exposed face of slab and fixed through 3 mounting brackets using 5-mm x 30 mm Concrete Screws. The annular gap between the pipe and concrete slab on unexposed face was protected with a bead of Fullers Firesound sealant. The penetrating service comprised a 110.8-mm outside diameter Rehau Raupiano polypropylene pipe with a wall thickness of 2.92-mm fitted through the collar's sleeve. A 114-mm diameter opening was cut into the slab and collar fixed centrally over the hole as shown in drawing titled "Specimen #4 110mm Raupiano Stack & 110R", dated 31 October 2019, provided by Snap Fire Systems Pty Ltd. The pipe projected vertically, approximately 2000-mm above from unexposed face of the concrete floor and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from unexposed face of the slab. The pipe was open at unexposed end and closed with a Raupiano polypropylene end cap on 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 -/240/180.

The fire-resistance level (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The maximum FRL of any test specimen cannot exceed the FRL achieved by the system 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: 8 January 2020

Issued on the 11th day of May 2020 without alterations or additions.

B. Roddy

Brett Roddy | Manager, Fire Testing and Assessments

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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 2072.

Product Name: SNAP H50S-RR Cast-in collar protecting a nominal 32-mm Rehau Rautitan PE-Xa stack pipe (Specimen 5)

Description: The specimen comprised an 1150-mm x 1150-mm x 150-mm thick concrete slab penetrated by a stack pipe protected by Snap Fire Systems fire collars. The penetrated slab comprised a 150-mm thick concrete slab 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. The SNAP Cast-in H50S-RR 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 numbered H50S RR-T dated 29 September 2017, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 32-mm outside diameter Rehau Rautitan PE-XA pipe with a wall thickness of 4.95 mm through the collar's sleeve. The annular gap between the pipe and the inside collar incorporated a PE backing rod, back filled with grout to a depth of 30 mm and finished flush with the slab as shown in drawing titled "Specimen #5, 32mm PE-Xa Stack & H50S-RR", dated 31 October 2019, provided by Snap Fire Systems Pty Ltd. The pipe projected vertically, 2000-mm above from 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 closed with a ceramic fibre plug on the exposed end.

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

Structural Adequacy	-	not applicable
Integrity	-	no failure at 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 (FRL) of the specimen is applicable when the system is exposed to fire from the same direction as tested. The maximum FRL of any test specimen cannot exceed the FRL achieved by the system 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: 8 January 2020

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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 of elements of building construction. |
| AS 4072.1-2005 | Components for the protection of openings in fire-resistant separating elements. Part 1: Service penetrations and control joints. |
| AS 3600-2018 | Concrete structures |

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FOR FURTHER INFORMATION

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