

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

## Test Report

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**Report number:** FSP 2002  
**Date:** 26 June 2019

**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 floor slab penetrated by services

## Sponsored Investigation No. FSP 2002

### 1 Introduction

#### 1.1 Identification of specimen

The sponsor identified the specimen as four (4) retrofit fire collars and one (1) cast-in fire collar protecting a 120-mm thick concrete floor slab penetrated by two (2) floor wastes and three (3) 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 4864/4386

## 1.7 Test date

The fire-resistance test was conducted on 24 April 2019.

# 2 Description of specimen

## 2.1 General

The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab penetrated by two (2) floor wastes and three (3) stack pipes protected by four (4) Retrofit Snap Fire Systems fire collars and one (1) Cast-in Snap Fire Systems fire collar.

The penetrated slab comprised a 120-mm thick concrete slab reinforced with a single layer of steel reinforcement providing a Fire-resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018 - Concrete Structures.

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

- AS/NZS 1260 'PVC-U pipes and fittings for drain, waste and vent application'; 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 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 LP100R-D Retrofit fire collar protecting a nominal 110-mm polypropylene (Raupiano Plus) floor waste incorporating a 4-way riser.

The SNAP Retrofit LP100R-D fire collar comprised a 0.95-mm steel casing with a 122-mm inner diameter and a 260-mm diameter base flange. The 65-mm high collar casing incorporated a closing mechanism that comprised of a soft Intumesh intumescent strip and wire mesh lined within the internal circumference of the collar. The Intumescent strip was 5-mm thick x 59-mm wide x 418-mm long. Folded over the intumescent strip was a layer of 316 stainless steel mesh 415-mm long x 120-mm wide with a mesh wire diameter of 0.15-mm, as shown in drawing numbered LP100R-D-T dated 10 January 2017, 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 4 mounting brackets using 5-mm x 30-mm concrete screw bolts.

The penetrating service comprised a 109.5-mm outside diameter polypropylene pipe with a wall thickness of 3.02-mm fitted through the collar's sleeve. A 125-mm diameter opening was cut into the slab and the collar fixed centrally over the hole. The floor waste system was fitted with a chrome brass grate and ABS Puddle Flange. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 4-way riser was connected to the penetrating pipe, supported by two M10 threaded rods and steel drop-in anchors to the concrete slab. On the exposed face, the 4-way riser was capped using a polypropylene end cap(s). The floor waste gully was charged with water to the level shown in drawing titled "Specimen #1, 110 Raupiano Floorwaste & LP100R-D", dated 3 April 2019, provided by Snap Fire Systems Pty Ltd.

Specimen 2 – SNAP 110R Retrofit fire collar protecting a nominal 110-mm polypropylene (Raupiano Plus) stack 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 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 304 stainless steel mesh measuring 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh measuring 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 (underside) of the slab and fixed through 4 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 109.5-mm outside diameter polypropylene pipe with a wall thickness of 3.02-mm fitted through the collar’s sleeve. A 117-mm diameter opening was cut into the slab and the collar fixed centrally over the hole as shown in drawing titled “Specimen # 2, 110 Raupiano Stack & 110R”, dated 3 April 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 polypropylene end cap on the exposed end.

Specimen 3 – SNAP 50R Retrofit collar protecting a nominal 40-mm polypropylene (Raupiano) 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 floor and fixed through 4 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 40.14-mm outside diameter polypropylene pipe with a wall thickness of 1.98-mm fitted through the collar’s sleeve. A 52-mm diameter opening was cut into slab and the collar fixed centrally over the hole as shown in drawing titled “Specimen # 3, 40 Raupiano Stack & 50R”, dated 3 April 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 polypropylene end cap on the exposed end.

#### Specimen 4 – SNAP H100S-RR Cast-in collar protecting a nominal 50-mm polyvinyl chloride (PVC-U) stack pipe.

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

The penetrating service comprised a 55.8-mm outside diameter PVC pipe with a wall thickness of 2.21-mm through the collar's sleeve. A 225-mm diameter opening was cut into the slab and 5 x 65-mm steel bolts were secured into the slab, the collar was placed centrally over the opening and backfilled with cement between the collar and the slab with grout over a cardboard gasket between the collar and pipe as shown in drawing titled "Specimen #4, 50 PVC Stack & H100S-RR", dated 21 March 2019, provided by Snap Fire Systems Pty Ltd. The pipe projected vertically, approximately 2000-mm above from the unexposed face of the concrete slab 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 PVC end cap on the exposed end.

#### Specimen 5 – SNAP LP50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Raupiano Plus) floor waste incorporating a p-trap.

The SNAP retrofit LP50R fire collar comprised a 0.75-mm steel case with a 69-mm inner diameter and a 203-mm diameter base flange. The 62-mm high collar casing incorporated a 255-mm x 58-mm x 4-mm thick Intumesh intumescent material. The closing mechanism incorporated three 316 stainless steel springs, with nylon fuse links and a 260-mm x 58-mm stainless steel mesh as shown in drawing numbered LP50R-T dated 6 October 2017, by SNAP Fire Systems Pty Ltd. The Snap collar was surface mounted around the pipe on the underside of the slab and fixed through 3 mounting brackets using 5-mm x 30-mm concrete screw bolts.

The penetrating service comprised a 50.3-mm outside diameter polypropylene pipe with a wall thickness of 2.35-mm through the collar's sleeve. The floor waste system was fitted with a chrome brass grate and ABS Puddle Flange. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a waste trap incorporating a p-trap was connected to the penetrating pipe, supported by supported by an M10 threaded rod and steel drop-in anchor to the concrete slab. On the exposed face, the gully trap was capped using a polypropylene end cap. The floor waste gully was charged with water to the level shown in drawing titled "Specimen #5, 40 Raupiano Floor waste & LP50R", dated 3 April 2019, provided by Snap Fire Systems Pty Ltd.

## 2.2 Dimensions

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

## 2.3 Orientation

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



## 2.4 Conditioning

The concrete slab was left to cure for a period longer than 30 days.

# 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-B Layout", dated 19 March 2019 provided by Snap Fire Systems Pty Ltd.

Drawing titled "Specimen #1, 110 Raupiano Floor waste & LP100R-D", dated 3 April 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled "Specimen #2, 110 Raupiano Stack & 110R", dated 3 April 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled "Specimen #3, 40 Raupiano Stack & 50R", dated 3 April 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled "Specimen #4, 50 PVC Stack & H100S-RR", dated 21 March 2019, provided by Snap Fire Systems Pty Ltd.

Drawing titled "Specimen #5, 40 Raupiano Floor waste & LP50R", dated 3 April 2019, provided by Snap Fire Systems Pty Ltd.

Drawing numbered LP100R-D-T dated 10 February 2017, by Snap Fire Systems Pty Ltd.

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

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

Drawing numbered H100S-RR-T dated 29 September 2017, by Snap Fire Systems Pty Ltd

Drawing numbered LP50R-T dated 6 October 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 24°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:

<b>Time</b>	<b>Observation</b>
1:00 minutes -	Smoke is being emitted from the grate of Specimen 5 - floor waste.
1:30 minutes -	Cotton wool pad test applied above the grate of Specimen 5. No ignition noted at this time.
2 minutes -	Smoke is fluing from stack pipes of Specimens 2 and 3.
3 minutes -	Smoke is being emitted from the grate of Specimen 1- floor waste. Cotton wool pad test applied above the grate of Specimen 1. No ignition noted at this time.
5 minutes -	Cotton wool pad test applied above the grate of Specimen 5. No ignition noted at this time.
6 minutes -	Smoke has ceased fluing from grate of Specimen 1 floor waste and pipe of Specimen 3. Smoke continues to flue from Specimen 2.
7 minutes -	Smoke is fluing from end of pipe of Specimen 4.
8 minutes -	The base of pipe in Specimen 2 has distorted. Smoke has ceased fluing from the grate of Specimen 5 floor waste. Cotton wool pad test applied above the grate of Specimen 1. No ignition noted at this time.
10 minutes -	Thermocouple #13 on the base of Specimen 2 pipe has pulled away from the surface. Mastic around the base of the pipe has begun to swell.
11 minutes -	Light smoke has resumed fluing from floor waste of Specimen 1.

- 18 minutes - Steam is being emitted from the concrete at the base of Specimen 4 with water pooling on the concrete and grout.
- 30 minutes - Steam is being emitted around the base of Specimen 3 and both floor wastes of Specimens 1 and 5. A small amount of smoke is fluing from stack pipe of Specimen 3.
- 45 minutes - Steam continues to be emitted from around the base of pipes and floor wastes.
- 60 minutes - Smoke levels from both grates of Specimens 1 and 5 have diminished. No fluing from the stack pipes.
- 87 minutes - Smoke has resumed fluing from the end of Specimen 2.
- 104 minutes - The level of fluing from the pipe of Specimen 2 has increased. The base of Specimen 2 pipe has softened and deformed.
- 106 minutes - Large gaps around the base of Specimen 2 have developed where the pipe has soften and deformed exposing a red glow from the intumescent material inside the collar. Cotton wool pad test applied over the gap, no ignition noted at this time.
- 113 minutes - Molten plastic from the base of Specimen 2 pipe is dripping down onto the intumescent material of the collar below.
- 114 minutes - Insulation failure of Specimen 2 - maximum temperature rise of 180K is exceeded on the pipe 25-mm above the mastic on the unexposed face.
- 119 minutes - Cotton wool pad test applied above the gap at the base of Specimen 2, no ignition noted at this time.
- 149 minutes - Thermocouple wires #16 and #20 located close to the gaps formed from Specimen 2 have been affected by heat and should be disregarded.
- 151 minutes - Integrity failure of Specimen 2 - Cotton wool pad test applied above the opening of Specimen 2, ignition noted at this time.
- 153 minutes - The opening of Specimen 2 has been plugged with ceramic wool.
- 183 minutes - Smoke is fluing from Specimens 1, 3 and 5.
- 233 minutes - Insulation failure of Specimen 5 - maximum temperature rise of 180K is exceeded on the slab 25-mm from mastic on the unexposed face.
- 234 minutes - Insulation failure of Specimen 4 - maximum temperature rise of 180K is exceeded on the slab 25-mm from mastic on the unexposed face.
- 236 minutes - Smoke continues to flue from Specimens 1, 3 and 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 LP100R-D Retrofit fire collar protecting a nominal 110-mm Polypropylene (Raupiano Plus) floor waste incorporating a 4-way riser.

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

Specimen 2 – SNAP 110R Retrofit fire collar protecting a nominal 110-mm Polypropylene (Raupiano Plus) stack pipe.

Structural adequacy	-	not applicable
Integrity	-	151 minutes
Insulation	-	114 minutes

Specimen 3 – SNAP 50R Retrofit collar protecting a nominal 40-mm Polypropylene (Raupiano) stack pipe.

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

Specimen 4 – SNAP H100S-RR Cast-in collar protecting a nominal 50-mm Polyvinyl Chloride (PVC-U) stack pipe.

Structural adequacy	-	not applicable
Integrity	-	no failure at 241 minutes
Insulation	-	234 minutes

Specimen 5 – SNAP LP50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Raupiano Plus) floor waste incorporating a p-trap.

Structural adequacy	-	not applicable
Integrity	-	no failure at 241 minutes
Insulation	-	233 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	-	-/240/120
Specimen 2	-	-/120/90
Specimen 3	-	-/240/120
Specimen 4	-	-/240/120
Specimen 5	-	-/240/120

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

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

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

## 10 Field of direct application of test results

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

## 11 Tested by



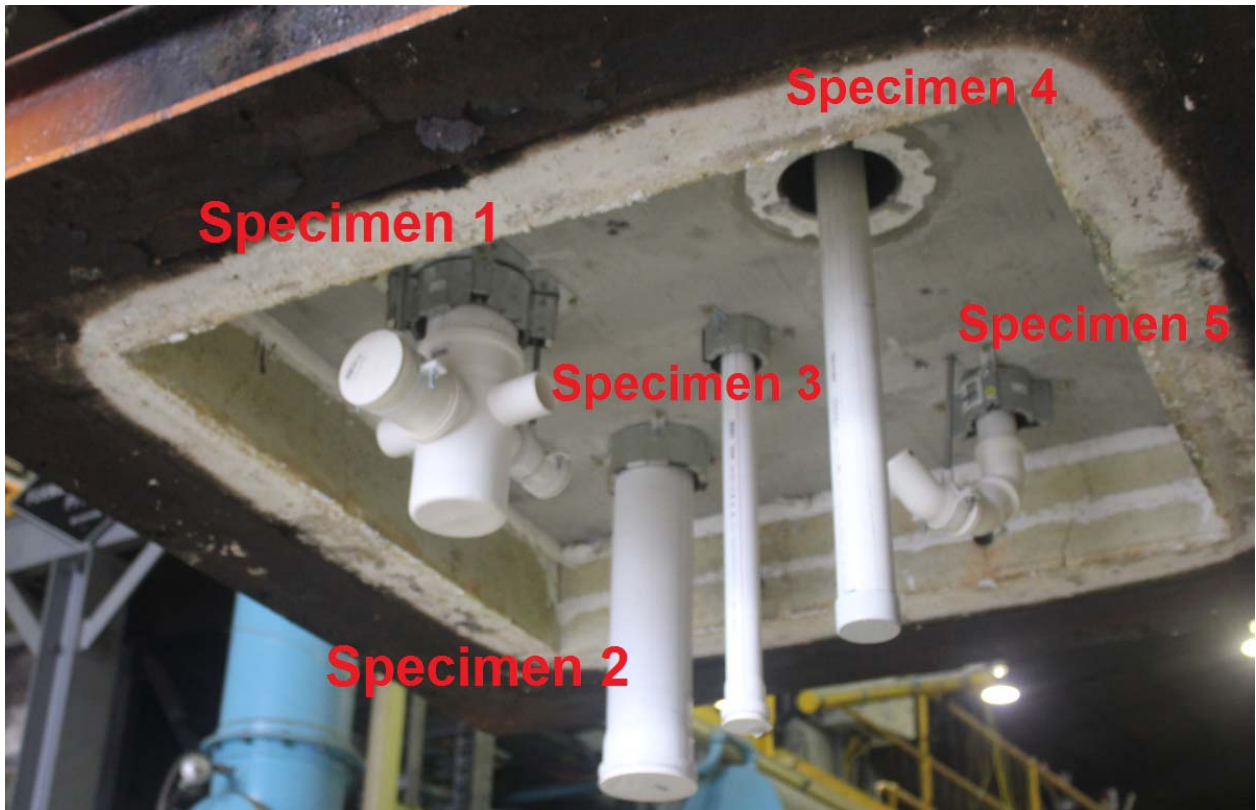
Peter Gordon  
Testing Officer

# Appendices

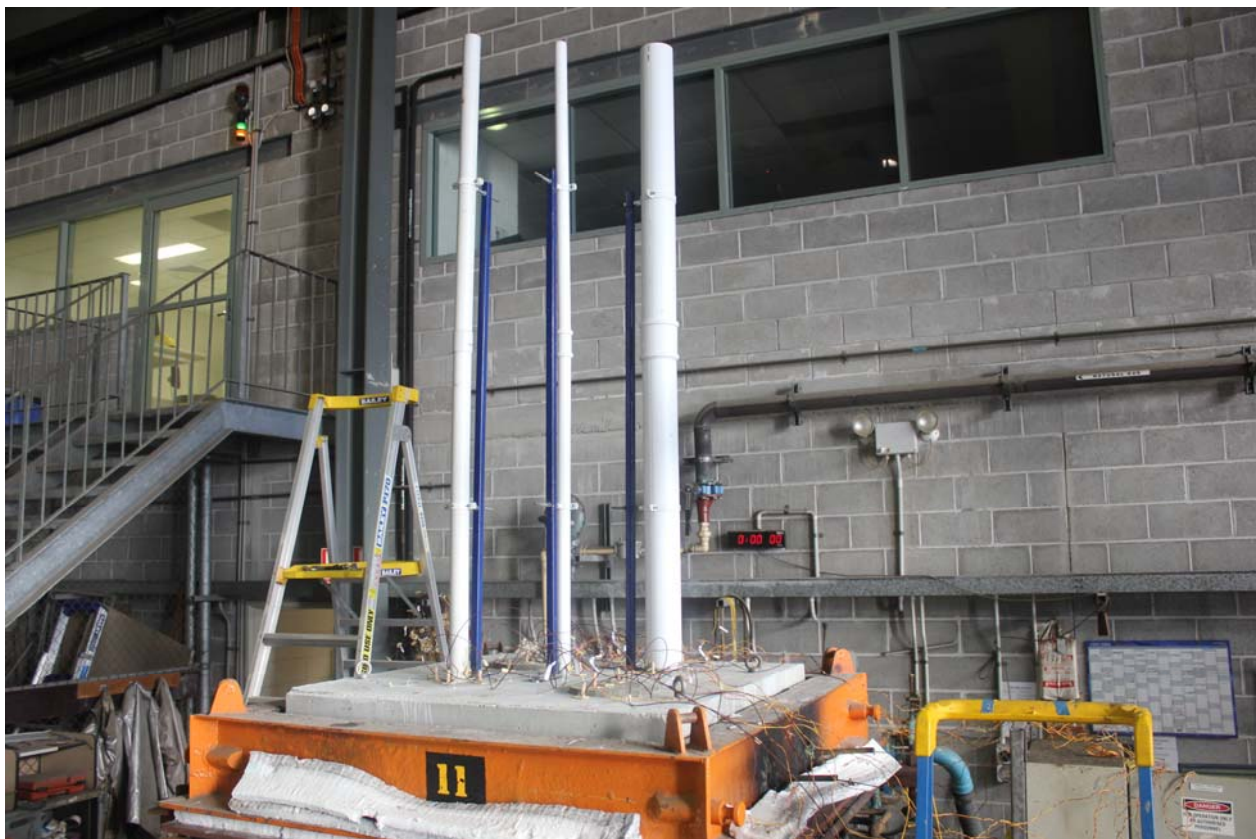
## Appendix A – Measurement location

Specimen	T/C Position	T/C designation
SPECIMEN 5 – Rahau polypropylene pipe 50.3-mm OD x 2.35-mm thick pipe with a p-trap protected with a LP50R retro fire collar.	On top of the slab – 25-mm from screed (North)	S1
	On top of the slab – 25-mm from screed (South)	S2
	On Screed 25-mm from Grate (North)	S3
	On Screed 25-mm from Grate (South)	S4
	On centre of the Grate	S5
SPECIMEN 1 – Rahau polypropylene pipe 109.5-mm OD x 3.02-mm thick pipe with 4-Way riser protected with a LP100R-D retro fire collar.	On top of the slab – 25-mm from screed (North)	S6
	On top of the slab – 25-mm from screed (South)	S7
	On Screed 25-mm from Grate (North)	S8
	On Screed 25-mm from Grate (South)	S9
	On centre of the Grate	S10
SPECIMEN 2 – Rahau polypropylene pipe 109.5-mm OD x 3.02-mm thick stack pipe protected with a 100R retrofit fire collar.	On top of the slab – 25-mm from Mastic (North)	S11
	On top of the slab – 25-mm from Mastic (South)	S12
	On Pipe 25-mm above mastic (North)	S13
	On Pipe 25-mm above mastic(South)	S14
SPECIMEN 3 – Rahau polypropylene pipe 40.14-mm OD x 1.98-mm thick stack pipe protected with a 50R retro fire collar.	On top of the slab – 25-mm from Mastic (East)	S15
	On top of the slab – 25-mm from Mastic (West)	S16
	On Pipe 25-mm above mastic (East)	S17
	On Pipe 25-mm above mastic(West)	S18
SPECIMEN 4 – Ipex PVC pipe 55.8-mm OD x 2.21-mm thick stack pipe protected with a H100S-RRCast-in fire collar.	On top of the slab – 25-mm from Mastic (East)	S19
	On top of the slab – 25-mm from Mastic (West)	S20
	On grout 25-mm from pipe (North)	S21
	On grout 25-mm from pipe (South)	S22
	On Pipe 25-mm from Grout (North)	S23
	On Pipe 25-mm from Grout (South)	S24
Rover	Rover	S25
Ambient	Ambient	S26

Appendix B – Photographs



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



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



**PHOTOGRAPH 3 – SPECIMENS AFTER 18 MINUTES OF TESTING**



**PHOTOGRAPH 4 – SPECIMENS AFTER 30 MINUTES OF TESTING**

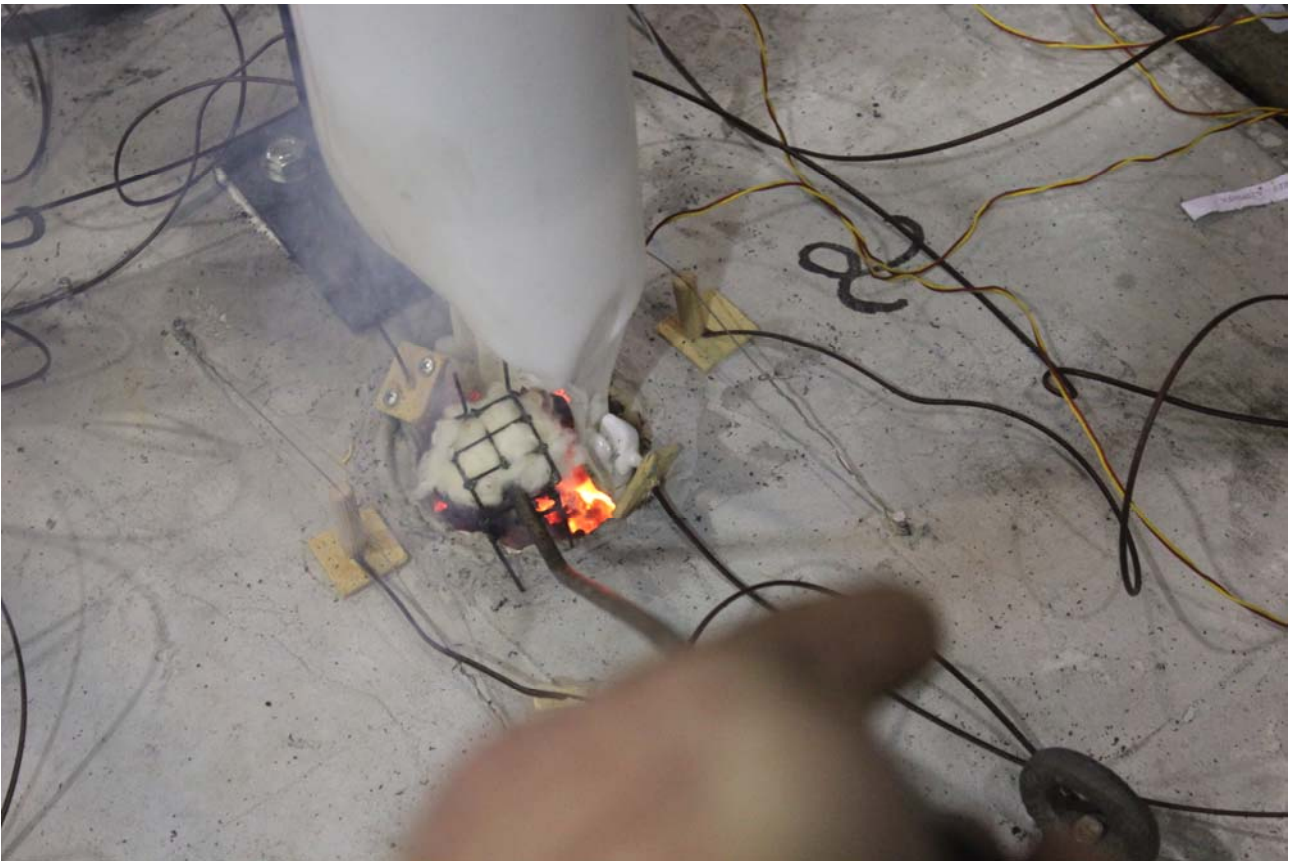




**PHOTOGRAPH 5 – SPECIMENS AFTER 60 MINUTES OF TESTING**



**PHOTOGRAPH 6 – SPECIMENS AFTER 90 MINUTES OF TESTING**



**PHOTOGRAPH 7 – SPECIMEN 2 AFTER 119 MINUTES OF TESTING**



**PHOTOGRAPH 8 – SPECIMENS AFTER 121 MINUTES OF TESTING**



**PHOTOGRAPH 9 – SPECIMENS AFTER 182 MINUTES OF TESTING**



**PHOTOGRAPH 10 – SPECIMENS AFTER 240 MINUTES OF TESTING**



**PHOTOGRAPH 11 – UNEXPOSED FACED OF SPECIMEN AT THE CONCLUSION OF TESTING**



**PHOTOGRAPH 12 – EXPOSED FACE OF SPECIMENS AT THE CONCLUSION OF TESTING**

## Appendix C – Test Data Sheets

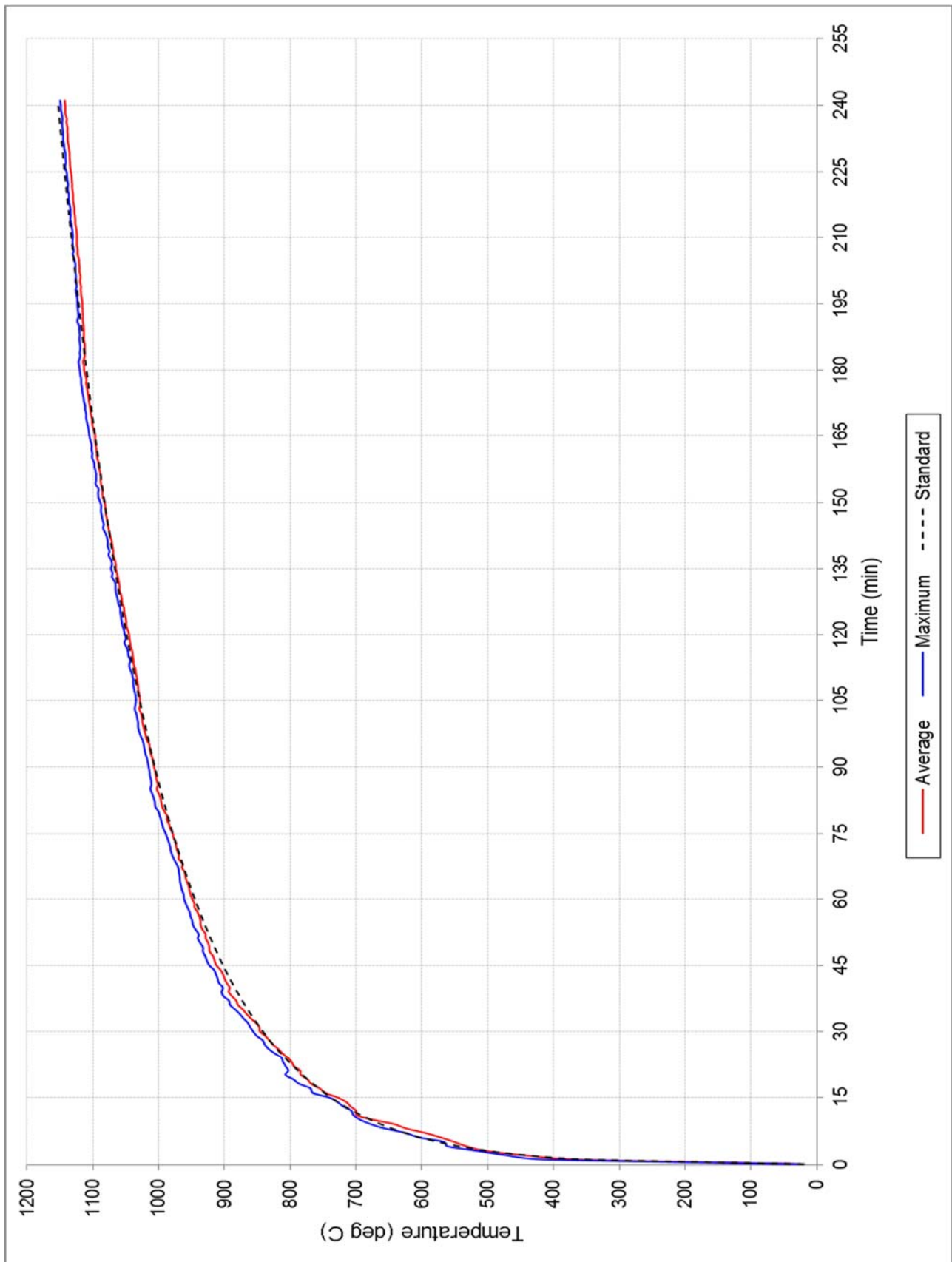


FIGURE 1 – FURNACE TEMPERATURE

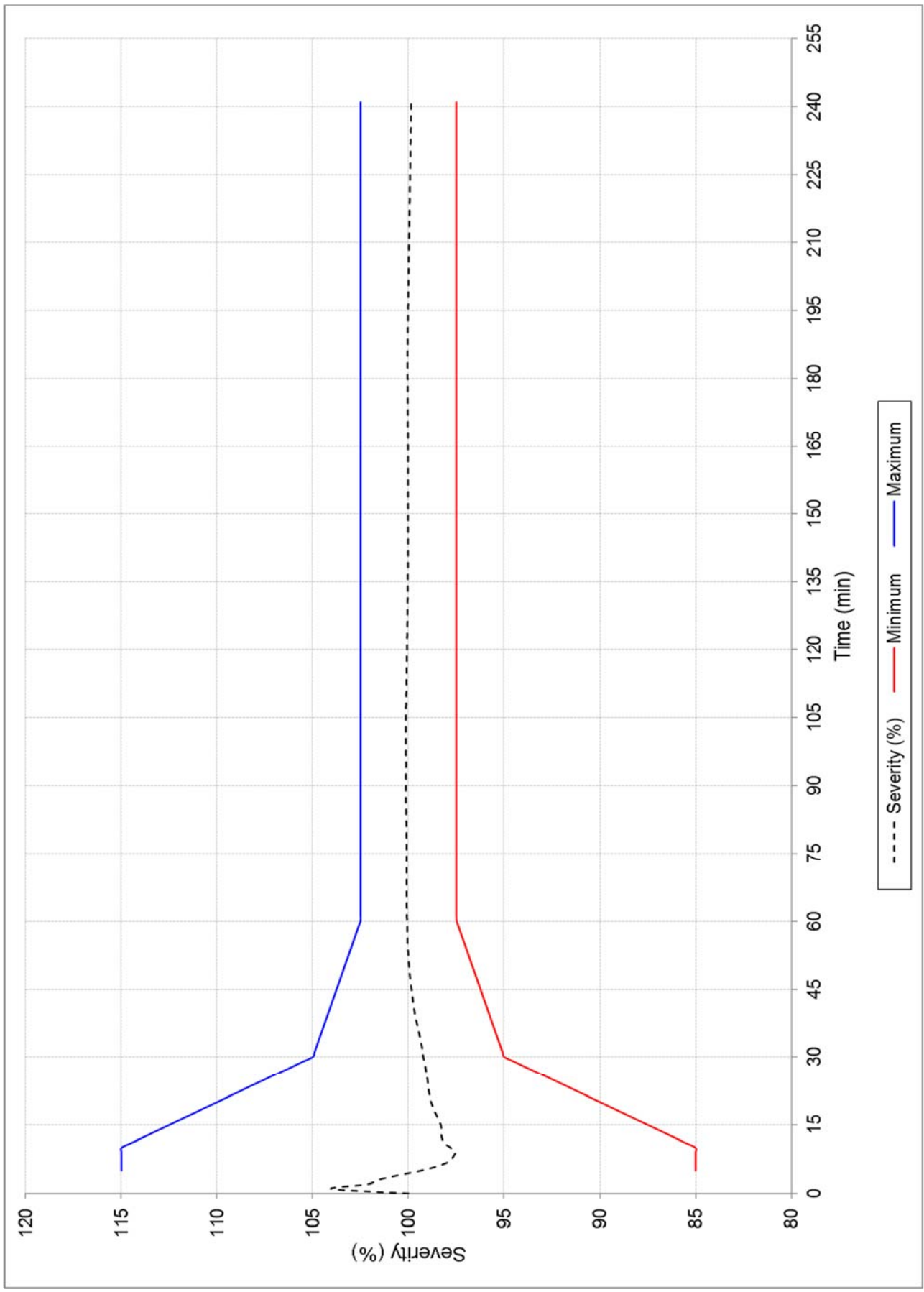


FIGURE 2 – FURNACE SEVERITY

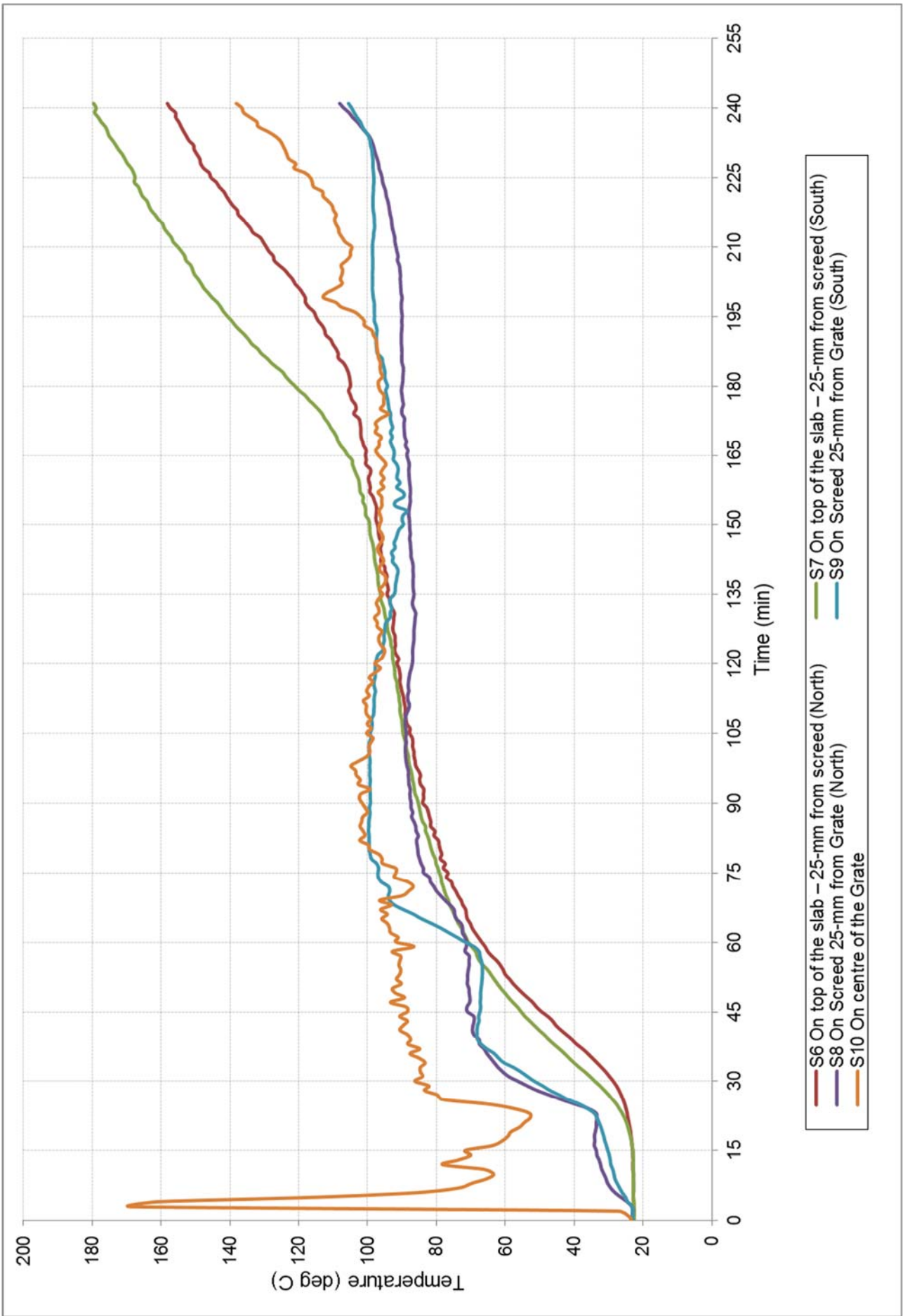


FIGURE 3 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 1

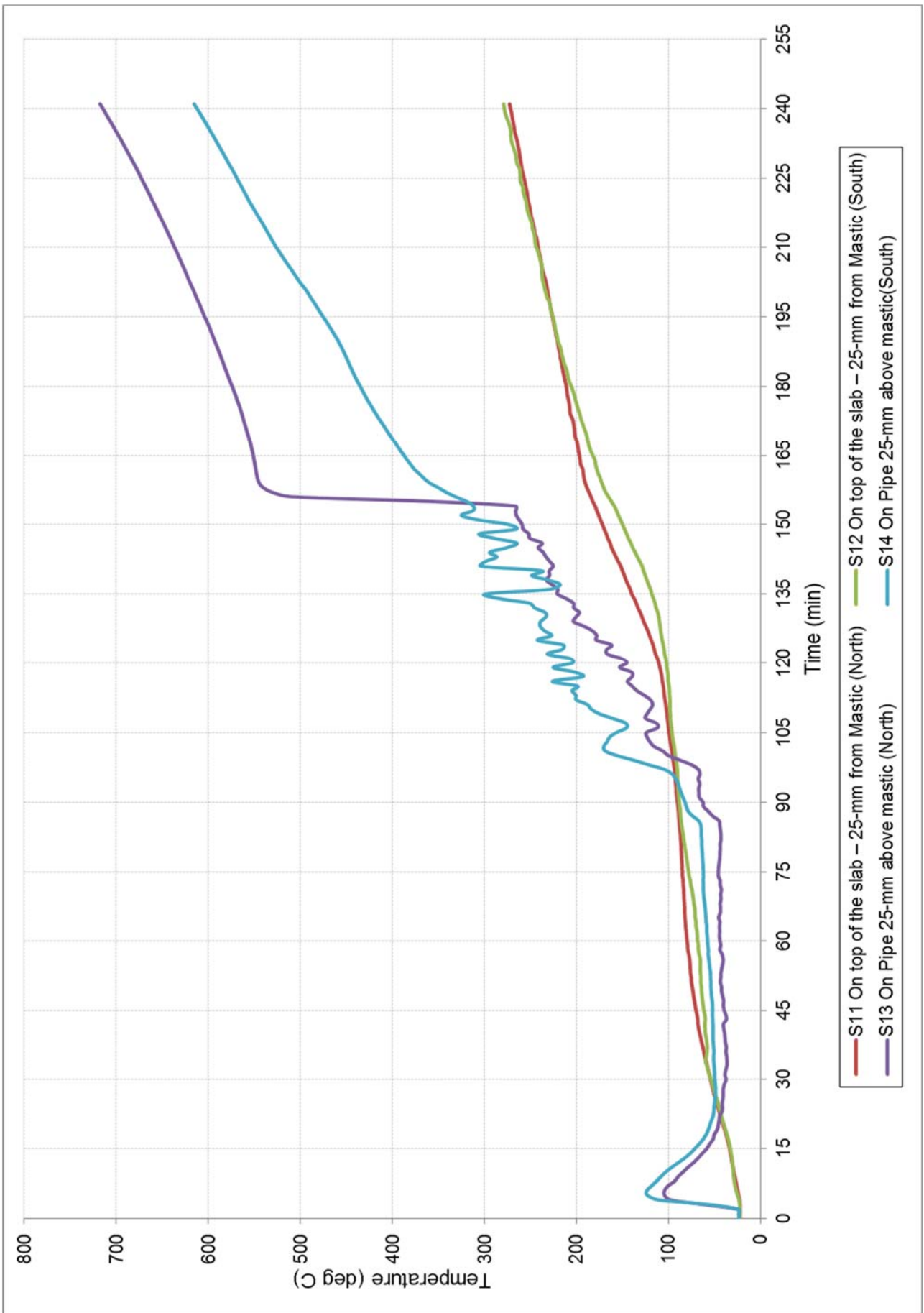


FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 2



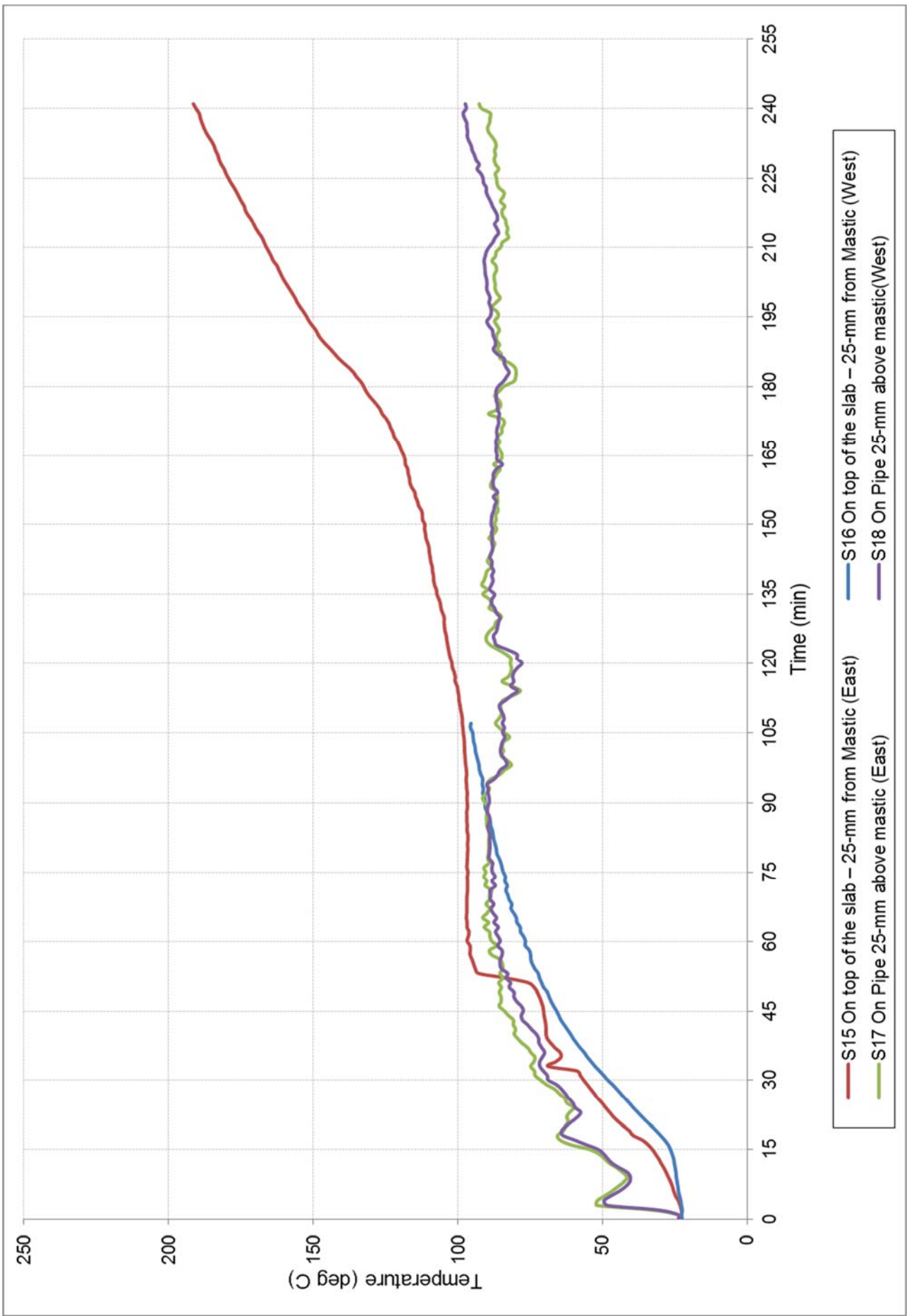


FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 3

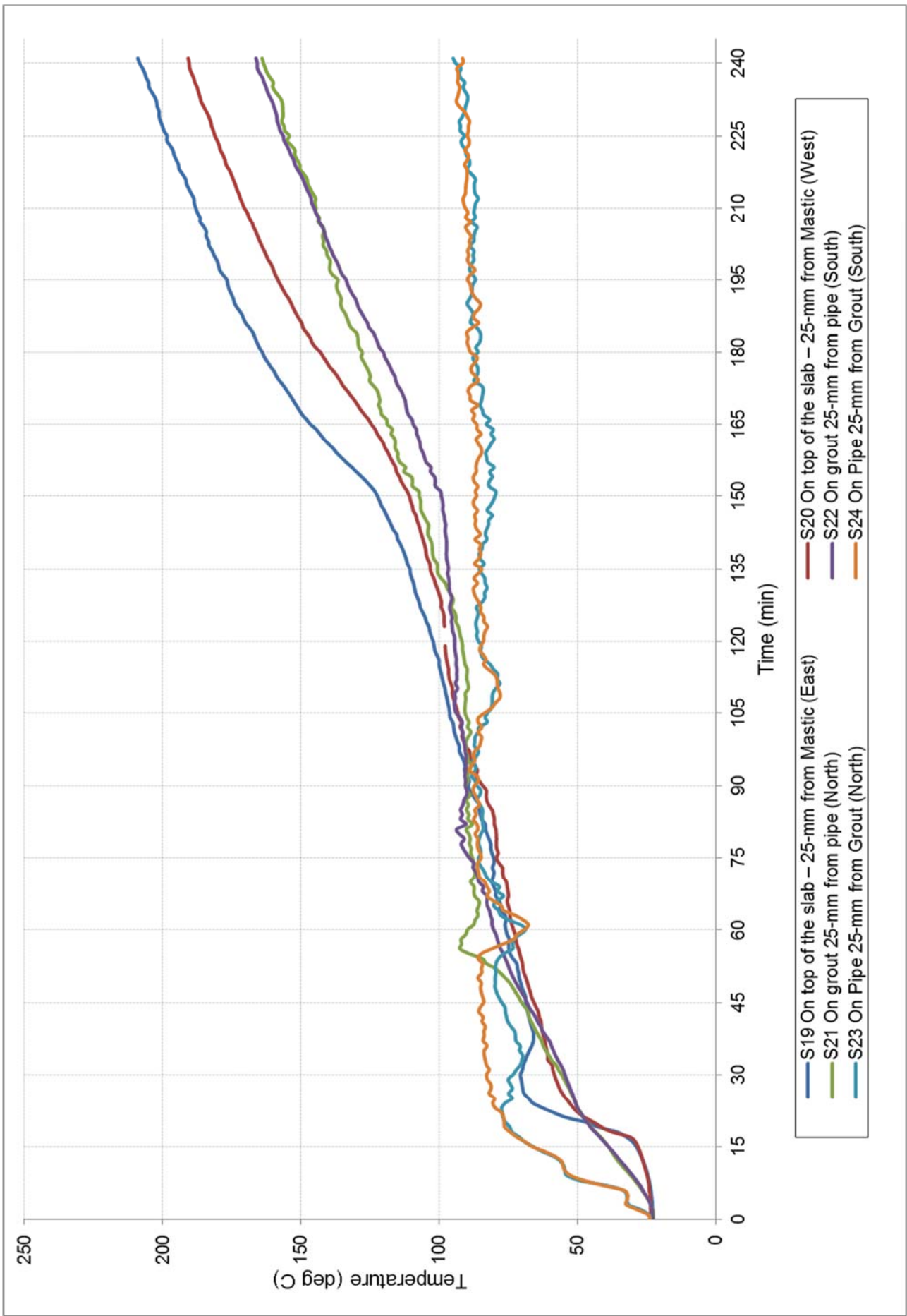


FIGURE 6 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 4

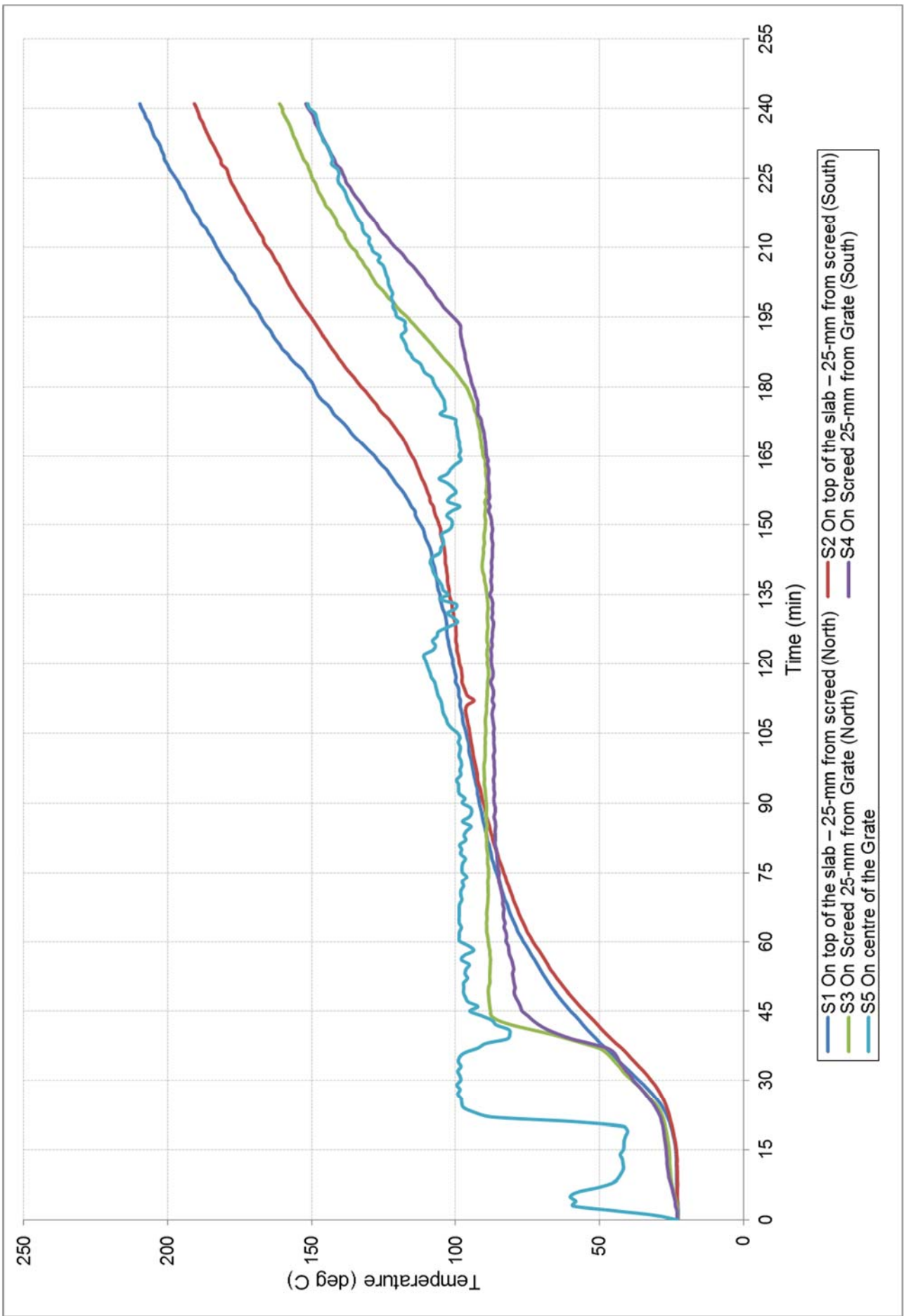


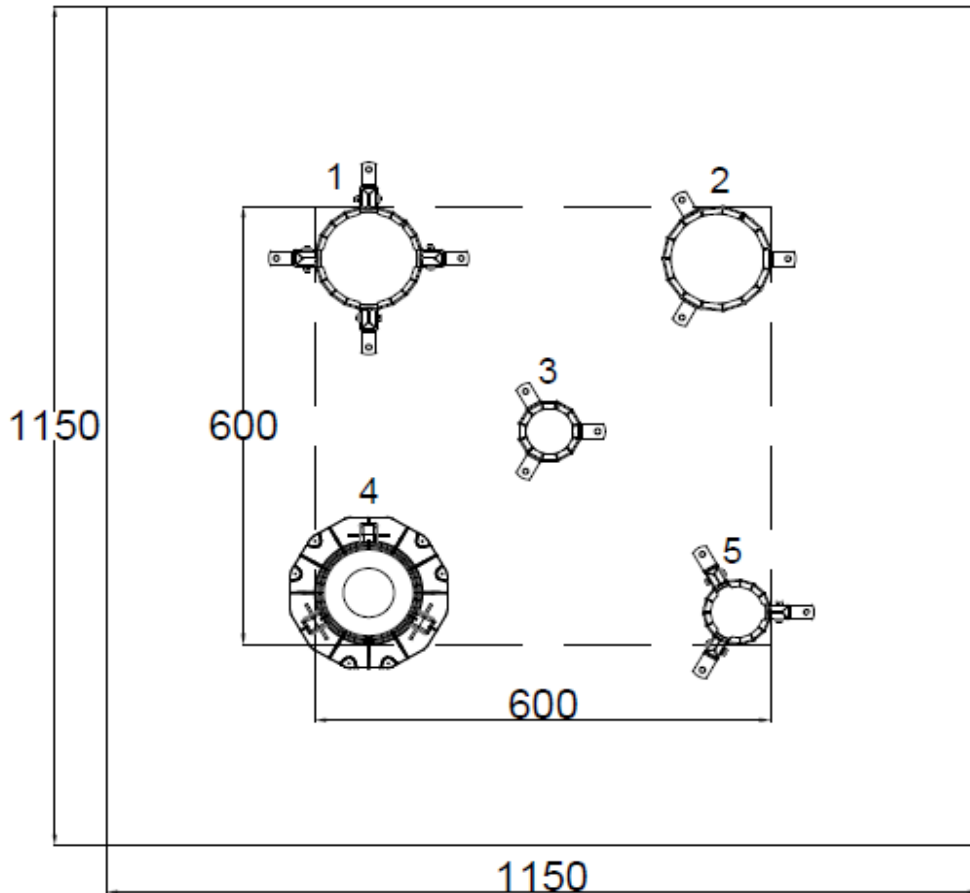
FIGURE 7 – SPECIMEN TEMPERATURE – ASSOCIATED WITH SPECIMEN 5

Appendix D – Installation drawings

## Snap Fire Systems Pty Ltd

Test Slab S-19-B Layout

Date: 19 MAR 2019



Penetration	Collar Code	Pipe Type	Pipe Diameter (mm)	Sealant
1	LP100R-D	Raupiano	110	-
2	110R	Raupiano	110	Firesound
3	50R	Raupiano	40	Firesound
4	H100S-RR	PVC	50	Firesound
5	LP50R	Raupiano	50	Firesound

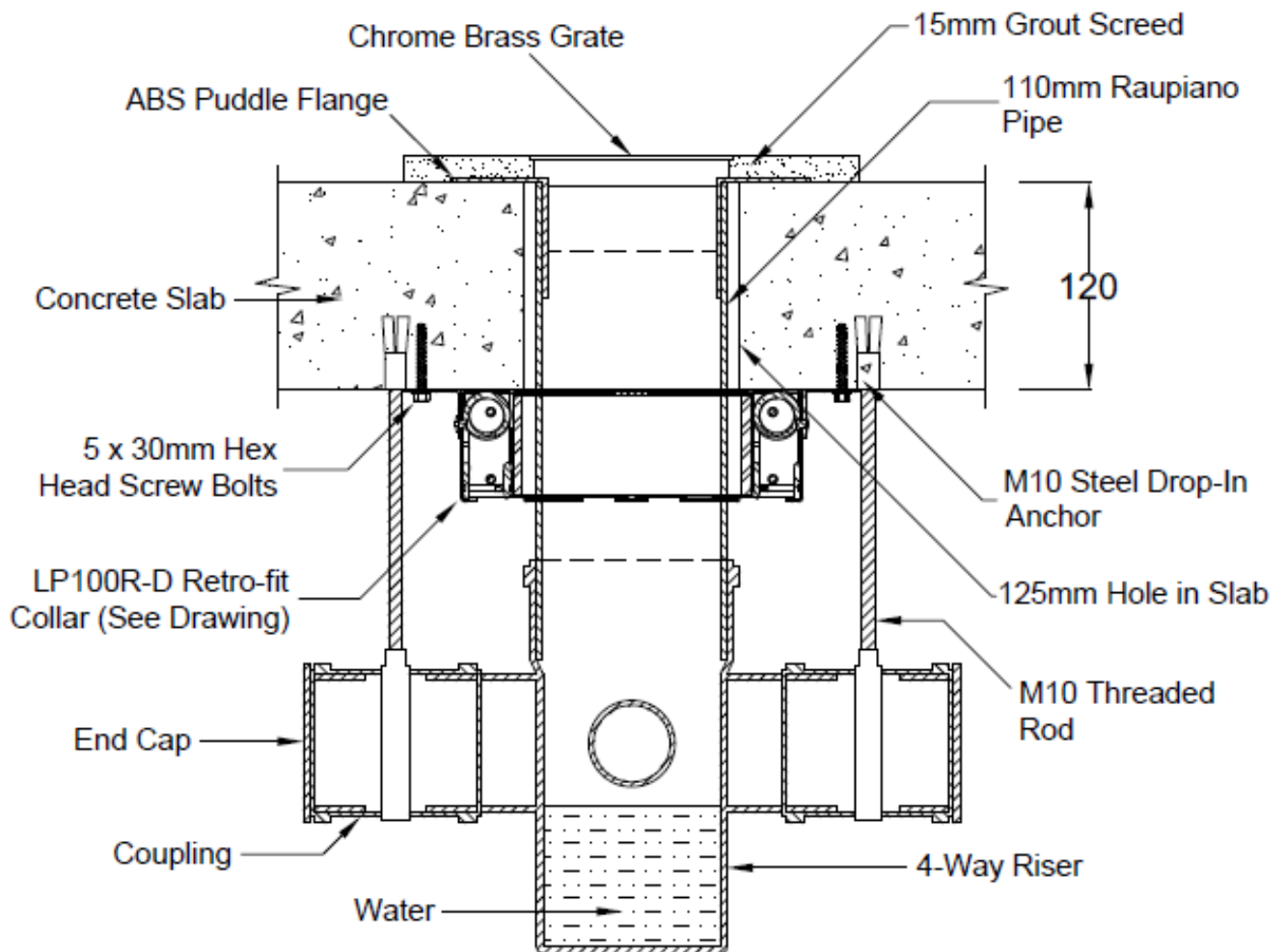
**DRAWING TITLED "TEST SLAB S-19-B LAYOUT", DATED 19 MARCH 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD**

# Snap Fire Systems Pty Ltd

Specimen #1

110 Raupiano Floorwaste & LP100R-D

Date: 03 APR 2019



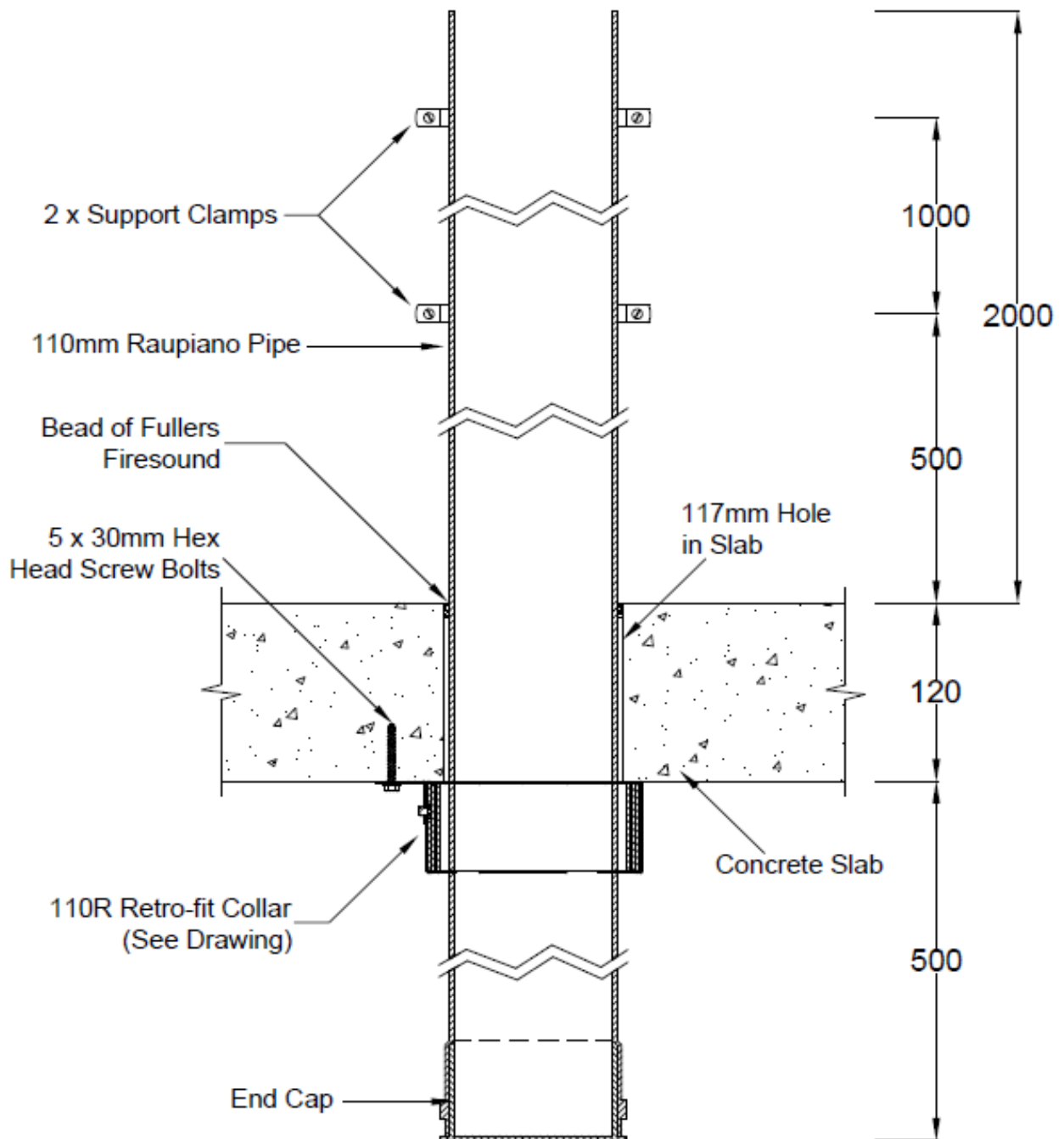
DRAWING "SPECIMEN #1, 110 RAUPIANO FLOORWASTE & LP100R-D", DATED 3 APRIL 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

# Snap Fire Systems Pty Ltd

Specimen #2

110 Raupiano Stack & 110R

Date: 03 APR 2019



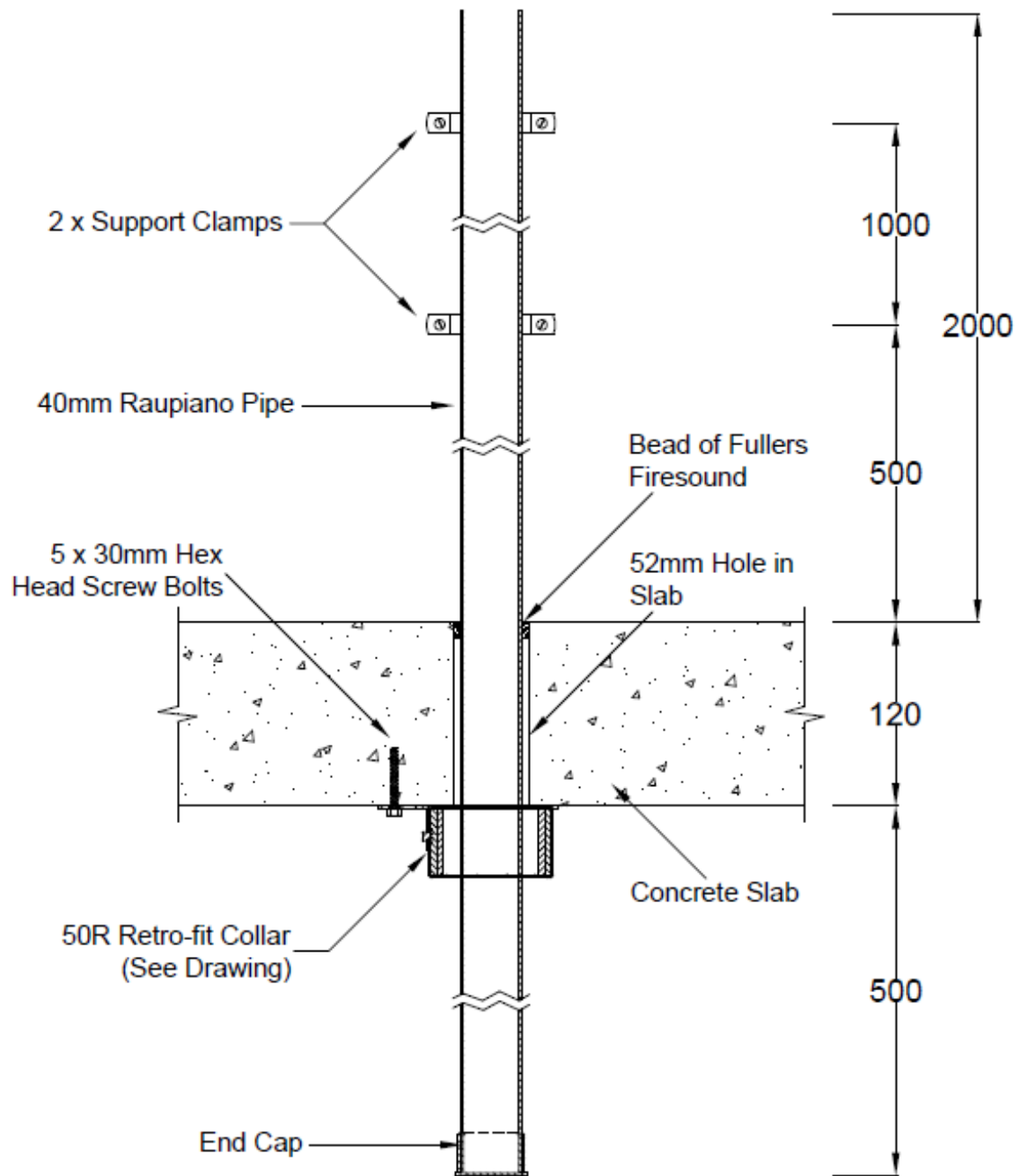
DRAWING TITLED "SPECIMEN # 2, 110 RAUPIANO STACK & 110R", DATED 3 APRIL 2019, PROVIDED BY NAP FIRE SYSTEMS PTY LTD

# Snap Fire Systems Pty Ltd

Specimen #3

40 Raupiano Stack & 50R

Date: 03 APR 2019



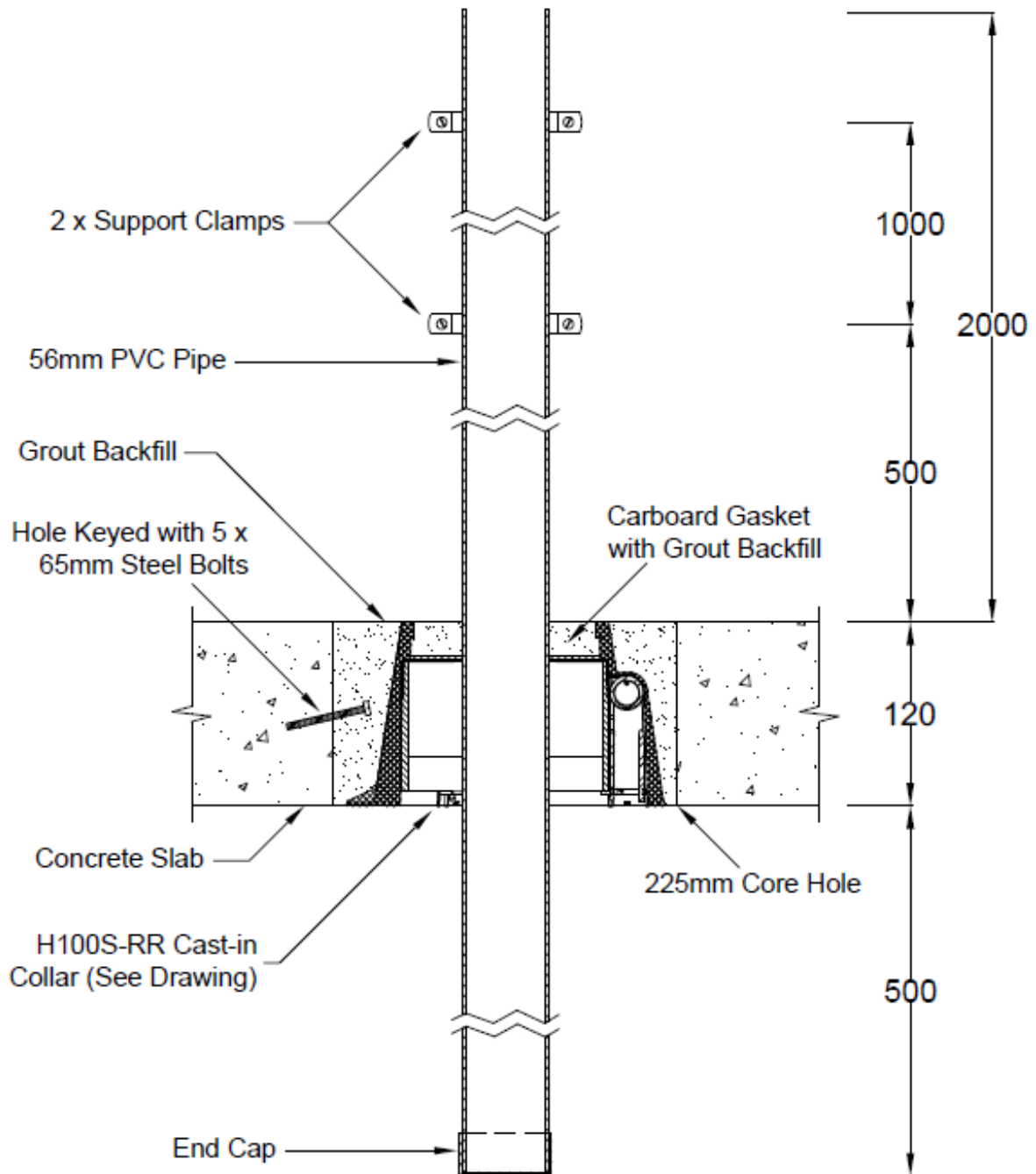
DRAWING TITLED "SPECIMEN # 3, 40 RAUPIANO STACK & 50R", DATED 3 APRIL 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

# Snap Fire Systems Pty Ltd

Specimen #4

50 PVC Stack & H100S-RR

Date: 21 MAR 2019



DRAWING TITLED "SPECIMEN #4, 50 PVC STACK & H100S-RR", DATED 21 MARCH 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

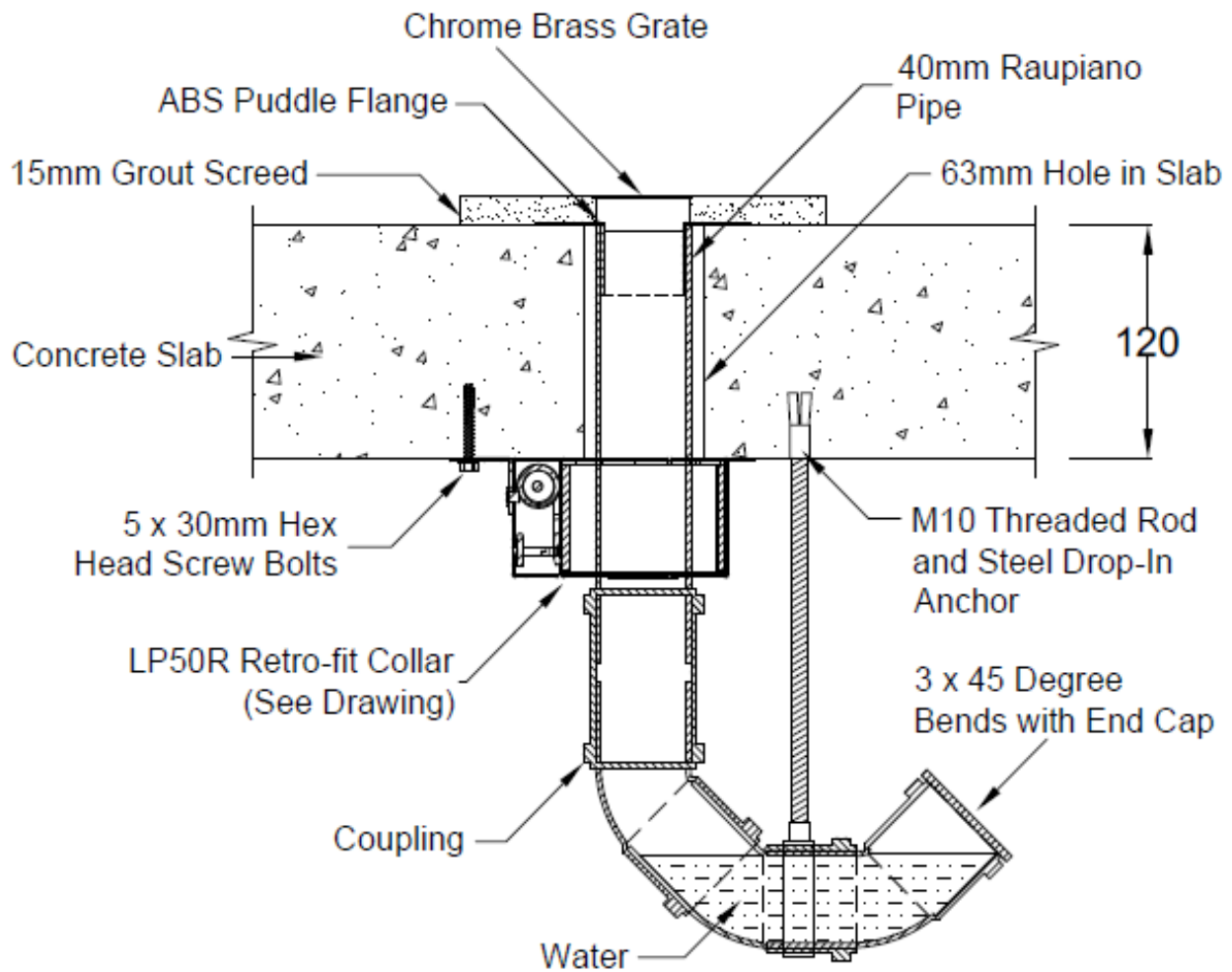


# Snap Fire Systems Pty Ltd

Specimen #5

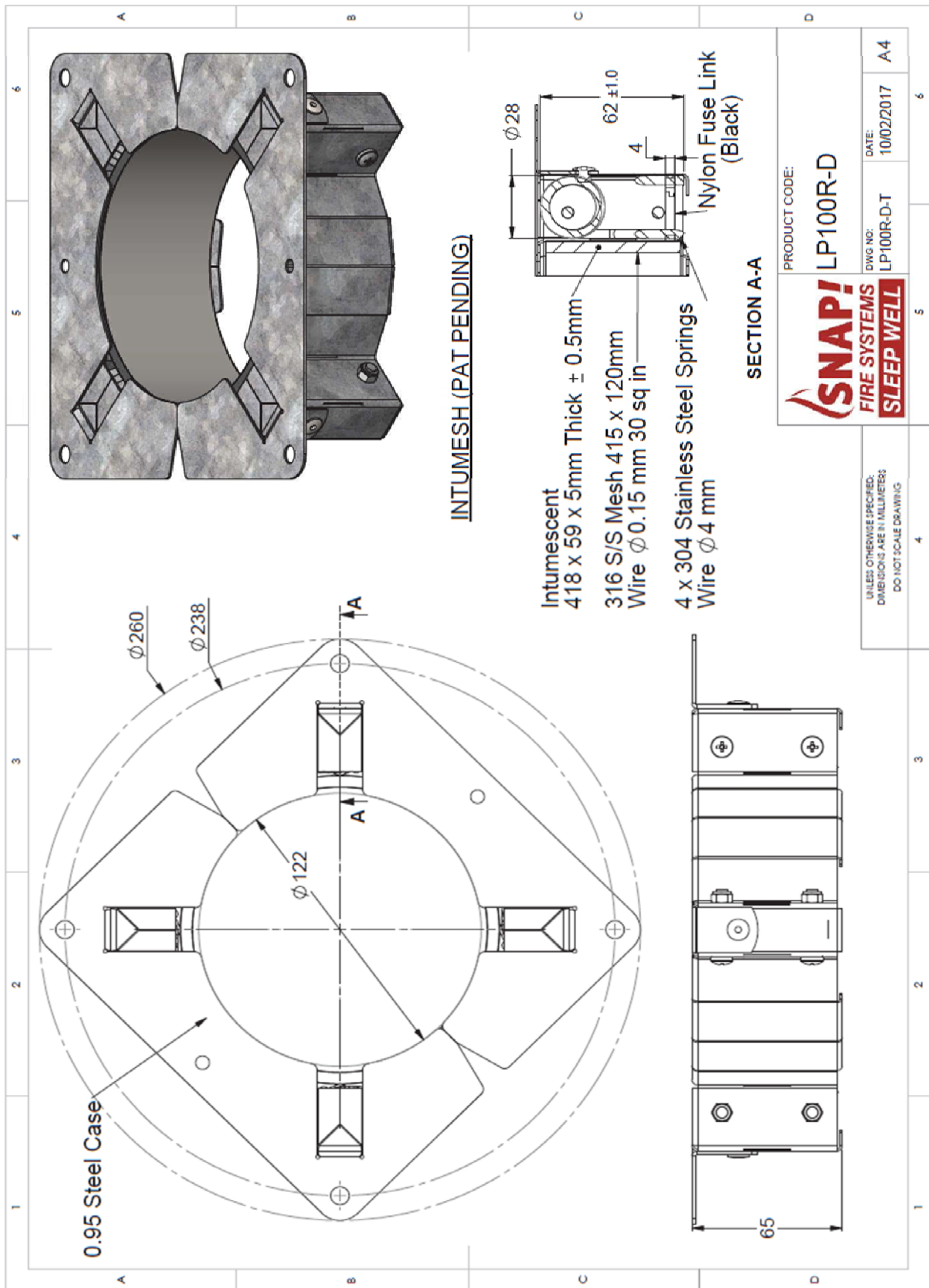
40 Raupiano Floorwaste & LP50R

Date: 03 APR 2019

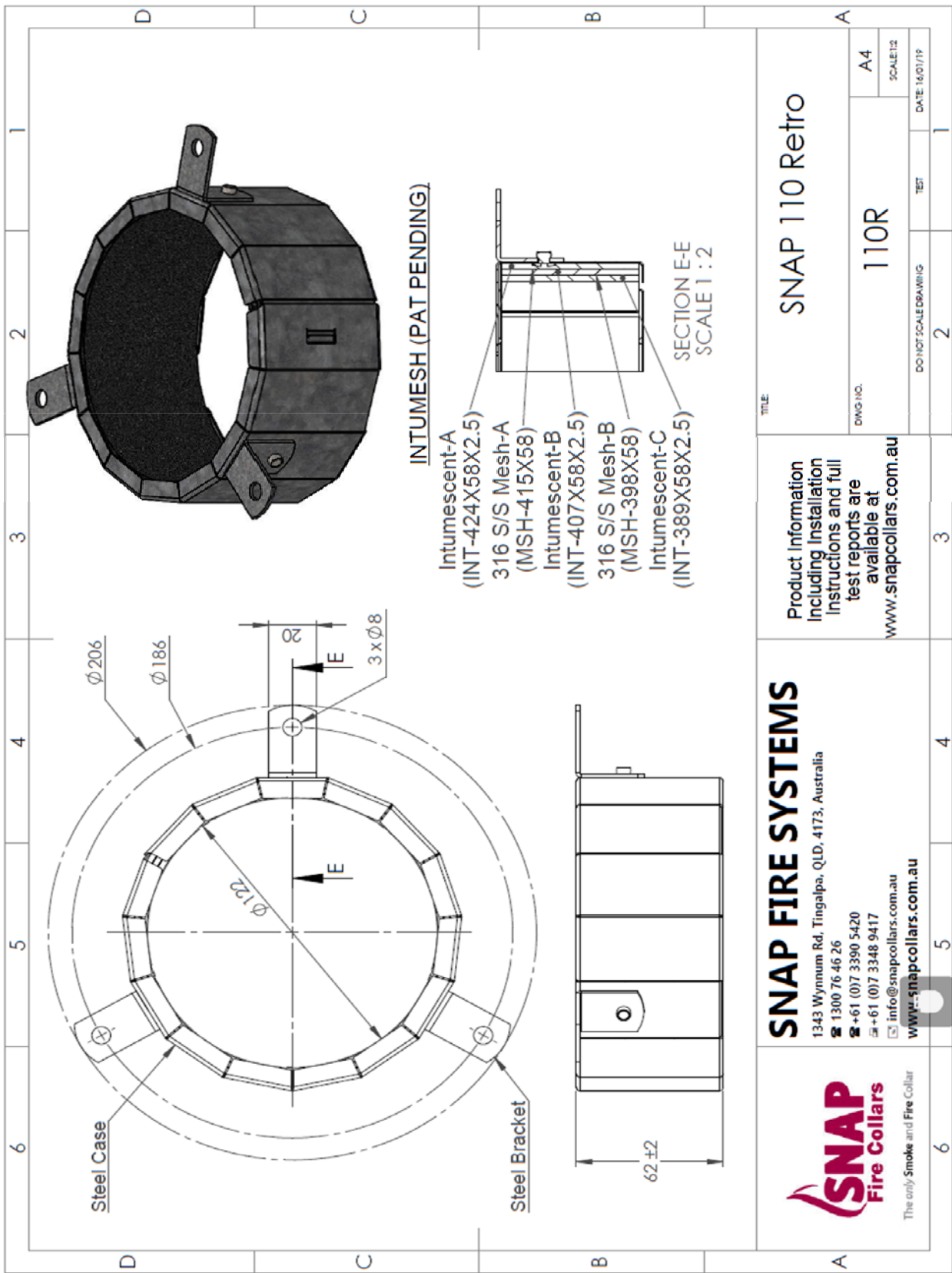


DRAWING TITLED "SPECIMEN #5, 40 RAUPIANO FLOORWASTE & LP50R", DATED 3 APRIL 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

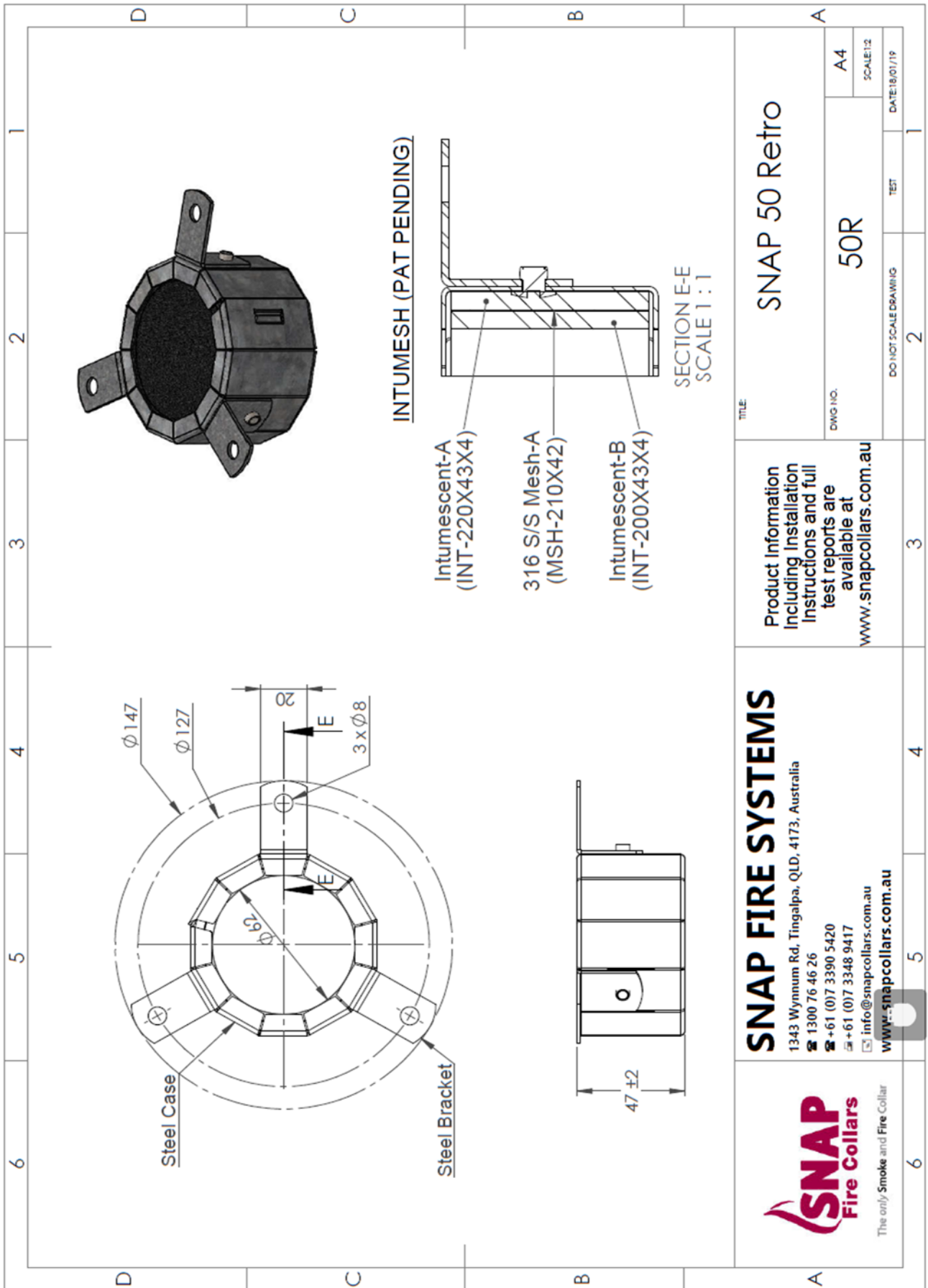
Appendix E – Specimen Drawings



DRAWING NUMBERED LP100R-D-T DATED 10 FEBRUARY 2017, BY SNAP FIRE SYSTEMS PTY LTD.

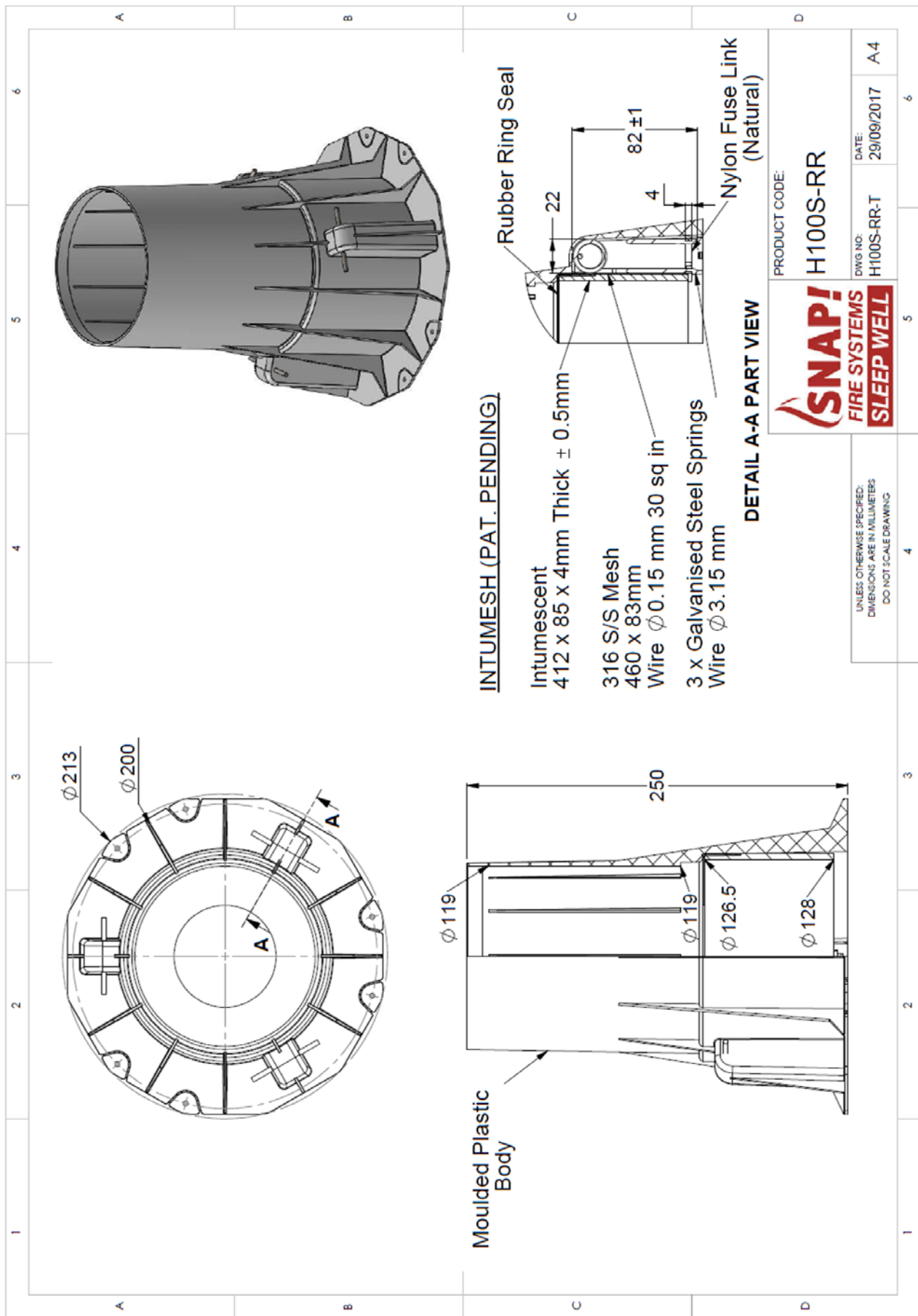


DRAWING TITLED "SNAP 110 RETRO", DATED 16 JANUARY 2019, BY SNAP FIRE SYSTEMS PTY LTD.

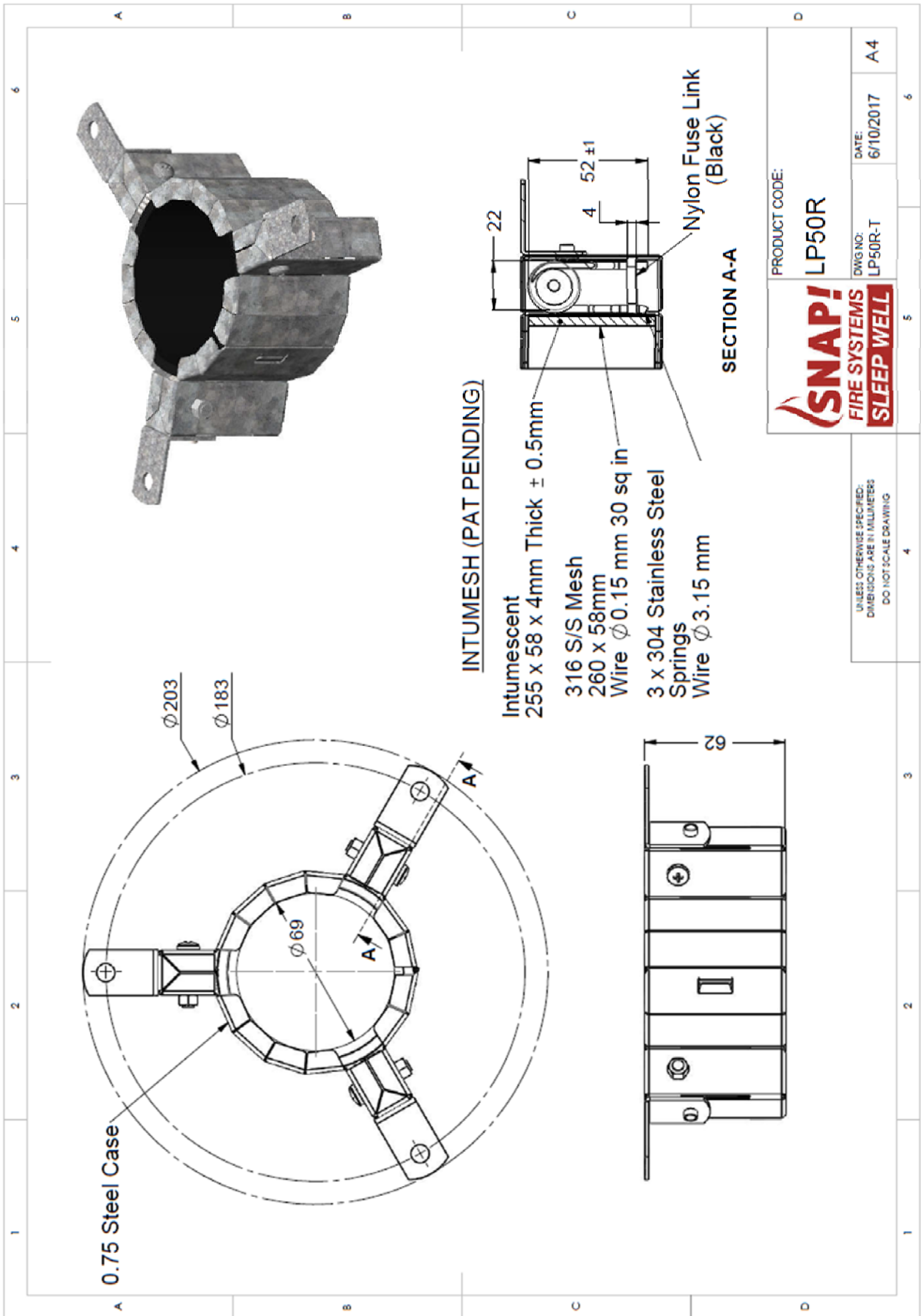


<b>SNAP FIRE SYSTEMS</b> 1343 Wynnnum Rd, Tingalpa, QLD, 4173, Australia ☎ 1300 76 46 26 ☎ +61 (0)7 3390 5420 ✉ +61 (0)7 3348 9417 ✉ info@snapcollars.com.au www.snapcollars.com.au	TITLE <b>SNAP 50 Retro</b>	
	Product Information Including Installation Instructions and full test reports are available at <a href="http://www.snapcollars.com.au">www.snapcollars.com.au</a>	
	DWG NO. <b>50R</b>	DATE: 18/01/19
	DO NOT SCALE DRAWING	TEST

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






DRAWING NUMBER H100S-RR-T, DATED 29 SEPTEMBER 2017, BY SNAP FIRE SYSTEMS PTY LTD.



DRAWING NUMBERED LP50R-T DATED 6 OCTOBER 2017 2015, BY SNAP FIRE SYSTEMS PTY LTD.

# Appendix F – Certificate(s) of Test

<b>INFRASTRUCTURE TECHNOLOGIES</b> <a href="http://www.csiro.au">www.csiro.au</a>		
14 Julius Avenue, North Ryde NSW 2113 PO Box 52, North Ryde NSW 1670, Australia T (02) 9490 5444 • ABN 41 687 119 230		
<h2>Certificate of Test</h2>		No. 3266
<p>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:</p>		
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 2002.		
<b>Product Name:</b> SNAP LP100R-D Retrofit fire collar protecting a nom. 110-mm polypropylene (Raupiano Plus) floor waste incorporating a 4-way riser (Specimen 1)		
<b>Description:</b> The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab penetrated a nom. 110-mm polypropylene (Raupiano Plus) floor waste incorporating a 4-way riser protected by a SNAP LP100R-D Retrofit fire collar. The slab was reinforced with a single layer of steel reinforcement providing a Fire-resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018. The SNAP Retrofit LP100R-D fire collar comprised a 0.95-mm steel casing with a 122-mm inner dia. and a 260-mm dia. base flange. The 65-mm high collar casing incorporated a closing mechanism that comprised of a soft Intumesh intumescent strip (5-mm thick x 59-mm wide x 418-mm long) and wire mesh lined within the internal circumference of the collar. Folded over the Intumesh was a layer of 316 stainless steel mesh 415-mm long x 120-mm wide with a mesh wire dia. of 0.15-mm. The collar was surface mounted around the pipe on exposed face (underside) of the slab and fixed through 4 mounting brackets. The penetrating service comprised a 109.5-mm outside dia. polypropylene pipe with wall thickness of 3.02-mm fitted through the collar's sleeve. A 125-mm dia. opening was cut into the slab and collar fixed centrally over hole. The floor waste was fitted with a chrome brass grate and ABS Puddle Flange. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 4-way riser was connected to the penetrating pipe. On the exposed face, the 4-way riser was capped using a polypropylene end cap(s). The floor waste gully was charged with water to level shown in drawing "Specimen #1, 110 Raupiano Floorwaste & LP100R-D".		
<b>Performance observed in respect of the following AS 1530.4-2014 criteria</b>		
Structural Adequacy	-	not applicable
Integrity	-	no failure at 241 minutes
Insulation	-	no failure at 241 minutes
and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/120.		
The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. The fire-resistance level (FRL) is limited to that of the separating element. For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be recognized 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.		
<b>Testing Officer:</b>	Peter Gordon	<b>Date of Test:</b> 24 April 2019
Issued on the 26 <sup>th</sup> day of June 2019 without alterations or additions.		
 Brett Roddy   Manager, Fire Testing and Assessments		
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	<small>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</small>	

**COPY OF CERTIFICATE OF TEST – NO. 3266**



## Certificate of Test

No. 3267

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 2002.

Product Name: SNAP 110R Retrofit fire collar protecting a nominal 110-mm polypropylene (Raupiano Plus) stack pipe (Specimen 2)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab penetrated by a nom. 110-mm polypropylene (Raupiano Plus) stack pipe protected by a SNAP 110R Retrofit fire collar. The slab was reinforced with a single layer of steel reinforcement providing a Fire-resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018. The SNAP Retrofit 110R fire collar comprised a 0.75-mm steel casing with a 122-mm inner dia. and a 206-mm dia. base flange. The 62-mm high collar casing incorporated a closing mechanism that was comprised of 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 304 stainless steel mesh measuring 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh measuring 398-mm long x 58-mm wide. Both had wire mesh dia. of 0.15-mm. The collar was surface mounted around the pipe on exposed face (underside) of slab and fixed through 4 mounting brackets. Annular gap between pipe and concrete slab on unexposed face was protected with a bead of Fullers Firesound sealant. The penetrating service comprised a 109.5-mm outside dia. polypropylene pipe with a wall thickness of 3.02-mm fitted through collar's sleeve. A 117-mm dia. opening was cut into slab and collar fixed centrally over the hole. The pipe projected vertically, approx. 2000-mm above from unexposed face of concrete floor and approximately 500-mm into the furnace chamber. The pipe was supported at nom. 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at unexposed end and closed with a polypropylene end cap on exposed end.

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

Structural Adequacy	-	not applicable
Integrity	-	151 minutes
Insulation	-	114 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/90.

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. The fire-resistance level (FRL) is limited to that of the separating element. For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be recognized 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: 24 April 2019

Issued on the 26<sup>th</sup> day of June 2019 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

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## Certificate of Test

No. 3268

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 2002.

Product Name: SNAP 50R Retrofit collar protecting a nominal 40-mm polypropylene (Raupiano) stack pipe (Specimen 3)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab penetrated by a nom. 40-mm polypropylene (Raupiano) stack pipe protected by a SNAP 50R Retrofit collar. The slab was reinforced with a single layer of steel reinforcement providing a Fire-resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018. 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. The Snap collar was surface mounted around the pipe on the exposed face (underside) of the floor and fixed through 4 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 40.14-mm outside diameter polypropylene pipe with a wall thickness of 1.98-mm fitted through the collar's sleeve. A 52-mm diameter opening was cut into slab and the collar fixed centrally over the hole. 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 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 -/240/120.

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. The fire-resistance level (FRL) is limited to that of the separating element. For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be recognized 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: 24 April 2019

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Brett Roddy | Manager, Fire Testing and Assessments

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## Certificate of Test

No. 3269

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 2002.

Product Name: SNAP H100S-RR Cast-in collar protecting a nominal 50-mm Polyvinyl Chloride (PVC-U) stack pipe (Specimen 4)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab penetrated by a nom. 50-mm Polyvinyl Chloride (PVC-U) stack pipe protected by a SNAP H100S-RR Cast-in collar. The slab was reinforced with a single layer of steel reinforcement providing a Fire-resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018. The SNAP Cast-in H100S-RR fire collar comprised a 1.6-mm thick polypropylene casing with a 126.5-mm inner diameter and a 213-mm diameter base flange. The 250-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh intumescent material and a rubber ring seal. The closing mechanism comprised three galvanised steel springs bound with nylon fuse links and a 460-mm x 85-mm 316 stainless steel mesh as shown in drawing numbered H100S-RR-T dated 29 September 2017, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 55.8-mm outside diameter PVC pipe with a wall thickness of 2.21-mm through the collar's sleeve. A 225-mm diameter opening was cut into the slab and 5 x 65-mm steel bolts were secured into the slab, the collar was placed centrally over the opening and backfilled with cement between the collar and the slab with grout over a cardboard gasket between the collar and pipe as shown in drawing titled "Specimen #4, 50 PVC Stack & H100S-RR", dated 21 March 2019, provided by Snap Fire Systems Pty Ltd. The pipe projected vertically, approximately 2000-mm above from the unexposed face of the concrete slab 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 PVC end cap on the exposed end.

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

Structural Adequacy	-	not applicable
Integrity	-	no failure at 241 minutes
Insulation	-	234 minutes

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

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. The fire-resistance level (FRL) is limited to that of the separating element. For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be recognized 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: 24 April 2019

Issued on the 26<sup>th</sup> day of June 2019 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

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## Certificate of Test

No. 3270

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 2002.

Product Name: SNAP LP50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Raupiano Plus) floor waste incorporating a p-trap (Specimen 5)

Description: The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab penetrated by a nom. 40-mm Polypropylene (Raupiano Plus) floor waste incorporating a p-trap protected by a SNAP LP50R Retrofit fire collar. The slab was reinforced with a single layer of steel reinforcement providing a Fire-resistance Period (FRP) for insulation of 120 minutes in accordance with Table 5.5.1 of AS 3600:2018. The SNAP retrofit LP50R fire collar comprised a 0.75-mm steel case with a 69-mm inner diameter and a 203-mm diameter base flange. The 62-mm high collar casing incorporated a 255-mm x 58-mm x 4-mm thick Intumesh intumescent material. The closing mechanism incorporated three 316 stainless steel springs, with nylon fuse links and a 260-mm x 58-mm stainless steel mesh. The Snap collar was surface mounted around the pipe on the underside of the slab and fixed through 3 mounting brackets using 5-mm x 30-mm concrete screw bolts. The penetrating service comprised a 50.3-mm outside diameter polypropylene pipe with a wall thickness of 2.35-mm through the collar's sleeve. The floor waste system was fitted with a chrome brass grate and ABS Puddle Flange. A 15-mm thick grout screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a waste trap incorporating a p-trap was connected to the penetrating pipe, supported by supported by an M10 threaded rod and steel drop-in anchor to the concrete slab. On the exposed face, the gully trap was capped using a polypropylene end cap. The floor waste gully was charged with water to the level shown in drawing titled "Specimen #5, 40 Raupiano Floor waste & LP50R".

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

Structural Adequacy	-	not applicable
Integrity	-	no failure at 241 minutes
Insulation	-	233 minutes

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

The fire-resistance level of the specimen is applicable when the system is exposed to fire from the same direction as tested. The fire-resistance level (FRL) is limited to that of the separating element. For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be recognized 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: 24 April 2019

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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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**w** www.csiro.au

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#### FOR FURTHER INFORMATION

##### **Infrastructure Technologies**

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