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

Test Report

Author: Chris Wojcik
Report number: FSP 1883
Date: 14 August 2018

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

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	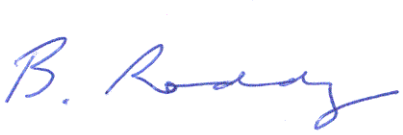	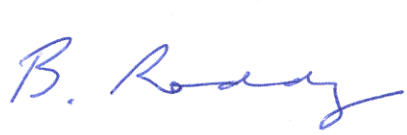
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Contents

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

Sponsored Investigation No. FSP 1883

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as five (5) cast-in fire collars protecting a combination of a 120-mm thick Bondek floor slab and a 150-mm thick concrete slab penetrated by four (4) polyethylene (PE) pipes and one one (1) High Density Polyethylene (HDPE) stack pipe.

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 4738/SP4210

1.7 Test date

The fire-resistance test was conducted on 22 February 2018.

2 Description of specimen

2.1 General

The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab consisting of nominal 1000-mm x 800-mm x 120-mm thick section of Bondek floor slab and the remainder a 150-mm thick concrete slab penetrated by four (4) stack pipes and one (1) floor waste protected by cast in fire collars. The FRL of the penetrated element has not been verified by the test sponsor.

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

- AS/NZS 5065: 2005 'Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications'
- AS/NZS 4401 Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings – Polythylene (PE)

Seven (7) specimens were tested. For the purpose of the test, only five (5) are reported here. the specimens were referenced as Penetrations 2, 3, 4, 6 and 7. Documents containing a complete description of each specimen were supplied by the sponsor and are retained on file.

<u>Penetration 2 – H100S-RR cast-in fire collar protecting a nominal 110-mm polyethylene (PE100) stack pipe</u>

The SNAP H100S-RR fire collar comprised a 1.6-mm thick polypropylene casing with a 126.5-mm inner diameter and a 213-mm base flange. The 250-mm high collar casing incorporated a layer of 412-mm x 85-mm x 4-mm thick Intumescent material. The closing mechanism comprised 3 x galvanised steel springs bound with a natural nylon fuse links and 316 stainless steel mesh measuring 460 x 83-mm as shown in drawing numbered H100S-RR dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 110-mm diameter PE100 pipe with a total wall thickness of 5-mm fitted through the collar's sleeve. A 177-mm diameter opening was cut into the Bondek sheet with a holesaw and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500-mm into the furnace chamber and was supported at 500-mm and 1500-mm from the unexposed face of the slab as shown in drawing titled "Specimen #2, 110 PE100 Stack & H100S-RR", dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

The pipe was open at the unexposed end and capped on the exposed end with ceramic fibre.

On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

Penetration 3 – H50 S-RR cast-in fire collar protecting a nominal 50-mm polyethylene (PE100) stack pipe

The SNAP H50 S-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 316 stainless steel mesh measuring 268 x 53-mm as shown in drawing numbered H50S-RR dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 56-mm diameter PE100 pipe with a total wall thickness of 4-mm fitted through the collar's sleeve. A 120-mm diameter opening was cut into the Bondek sheet with a holesaw and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500-mm into the furnace chamber and was supported at 500-mm and 1500-mm from the unexposed face of the slab as shown in drawing titled "Specimen #3, Nominal 50 PE100 Stack & H50S-RR", dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

The pipe was open at the unexposed end and capped on the exposed end with ceramic fibre.
On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

Penetration 4 – H50FWS-RR cast-in fire collar protecting a nominal 50-mm floor waste system incorporating a p-trap

The SNAP cast-in H50FWS-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 316 stainless steel mesh measuring 268 x 53-mm as shown in drawing numbered H50FWS-RR dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 56-mm PE100 with a total wall thickness of 4-mm fitted through the collar's sleeve. A 121–mm diameter opening was cut into the Bondek sheet and the collar fixed centrally over the hole. The floor waste system was fitted with a chrome brass grate. 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 was connected to the penetrating pipe, 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 HDPE End Cap.
The floor waste gully was charged with water to the level shown in drawing titled "Specimen #4, Nominal 50 PE100 Floorwaste & H50FWS-RR", dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

Penetration 6 – H50 S-RR cast-in fire collar protecting a nominal 40-mm High-density polyethylene (HDPE) Pipe

The SNAP H50 S-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 316 stainless steel mesh measuring 268 x 53-mm as shown in drawing numbered H50S-RR dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 50-mm diameter HDPE Pipe with a total wall thickness of 4-mm fitted through the collar's sleeve. A 121-mm diameter opening was cut into the Bondek sheet and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500-mm into the furnace chamber and was supported at 500-mm and 1500-mm from the unexposed face of the slab as shown in drawing titled "Specimen #6, Nominal 40 HDPE Stack & H50S-RR", dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

The pipe was open at the unexposed end and capped on the exposed end with ceramic fibre.

On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

Penetration 7 – H50 S-RR cast-in fire collar protecting a nominal 32-mm polyethylene (PE80) stack pipe

The SNAP H50 S-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 316 stainless steel mesh measuring 268 x 53-mm as shown in drawing numbered H50S-RR dated 29 September 2017, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 40-mm diameter PE80 pipe with a total wall thickness of 3.5-mm fitted through the collar's sleeve. A 121-mm diameter opening was cut into the Bondek sheet and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500-mm into the furnace chamber and was supported at 500-mm and 1500-mm from the unexposed face of the slab as shown in drawing titled "Specimen #7, Nominal 32 PE80 Stack & H50S-RR", dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

The pipe was open at the unexposed end and capped on the exposed end with a superwool plug.
On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

2.2 Dimensions

The specimen comprised an 1150-mm x 1150-mm x 120-mm thick concrete slab consisting of nominal 1000-mm x 800-mm x 120-mm thick section of Bondek floor slab and the remainder a 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 cast on 21 December 2017.

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

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

Drawing numbered H50FWS-RR dated 29 September 2017, by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #2, 110 PE100 Stack & H100S-RR”, dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #3, Nominal 50 PE100 Stack & H50S-RR”, dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #4, Nominal 50 PE100 Floorwaste & H50FWS-RR”, dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #6, Nominal 40 HDPE Stack & H50S-RR”, dated 7 March 2018, provided by Snap Fire Systems Pty Ltd.

Drawing titled “Specimen #7, Nominal 32 PE80 Stack & H50S-RR”, dated 7 March 2018, provided 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 26°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
2 minutes -	Smoke is observed fluing from unexposed end of Penetration 3.
3:30 minutes -	Penetration 3 has ceased fluing.
5 minutes -	Floor waste is smoking at the centre. Penetration 3 has commenced fluing.
6 minutes -	Penetration 2 has commenced fluing.
6:30 minutes -	Penetration 3 has ceased fluing.
8 minutes -	Smoke is fluing from Penetration 2 only.
9:30 minutes -	Penetration 2 has ceased fluing.
90 minutes -	No apparent change.
138 minutes -	Mastic is swelling at the base of Penetrations 2, 3, 6 and 7. The melted plastic of Penetration 5 is pushing up to the slab level.
159 minutes -	Insulation failure – Penetration 4.
164 minutes -	Insulation failure – Penetration 2.
179 minutes -	Cotton Wool Pad test applied. No ignition noted 240°C Penetration 4. Intumescent material is observed coming out of grate in Penetration 4.
181 minutes -	Insulation failure – Penetration 6.
183 minutes -	Insulation failure – Penetration 3.
199 minutes -	Molten material has squeezed up through grate on Penetration 4.
200 minutes -	Insulation failure – Penetration 7.

210 minutes - Smoke is being emitted from the grate on Penetration 4.

230 minutes - Smoke is being emitted from the intumescent seal on Penetration 7.

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 maximum temperature versus time associated with Penetration 2.

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

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

Figure 6 shows the curve of maximum temperature versus time associated with Penetration 6.

Figure 7 shows the curve of maximum temperature versus time associated with Penetration 7.

8.5 Performance

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

Penetration 2 – H100S-RR cast-in fire collar protecting a nominal 110-mm polyethylene (PE100) stack pipe

Structural adequacy	-	not applicable
Integrity	-	No failure at 241 minutes
Insulation	-	164 minutes

Penetration 3 – H50 S-RR cast-in fire collar protecting a 56-mm polyethylene (PE100) stack pipe

Structural adequacy	-	not applicable
Integrity	-	No failure at 241 minutes
Insulation	-	183 minutes

Penetration 4 – H50FWS-RR cast-in fire collar protecting a 56-mm PE100 floor waste system incorporating a p-trap

Structural adequacy	-	not applicable
Integrity	-	No failure at 241 minutes
Insulation	-	159 minutes

Penetration 6 – H50 S-RR cast-in fire collar protecting a 50-mm High-density polyethylene (HDPE) Stack Pipe

Structural adequacy	-	not applicable
Integrity	-	No failure at 241 minutes
Insulation	-	181 minutes

Penetration 7 – H50 S-RR cast-in fire collar protecting a 40-mm polyethylene (PE100) stack pipe

Structural adequacy	-	not applicable
Integrity	-	No failure at 241 minutes
Insulation	-	200 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 2 - -/240/120

Specimen 3 - -/240/180

Specimen 4 - -/240/120

Specimen 6 - -/240/180

Specimen 7 - -/240/180

As the FRL of the composite concrete slab has not been verified, the supporting construction shall have an FRL equal to or greater than that of the penetration system as required by clause 10.4.4 of AS 1530.4-2014.

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

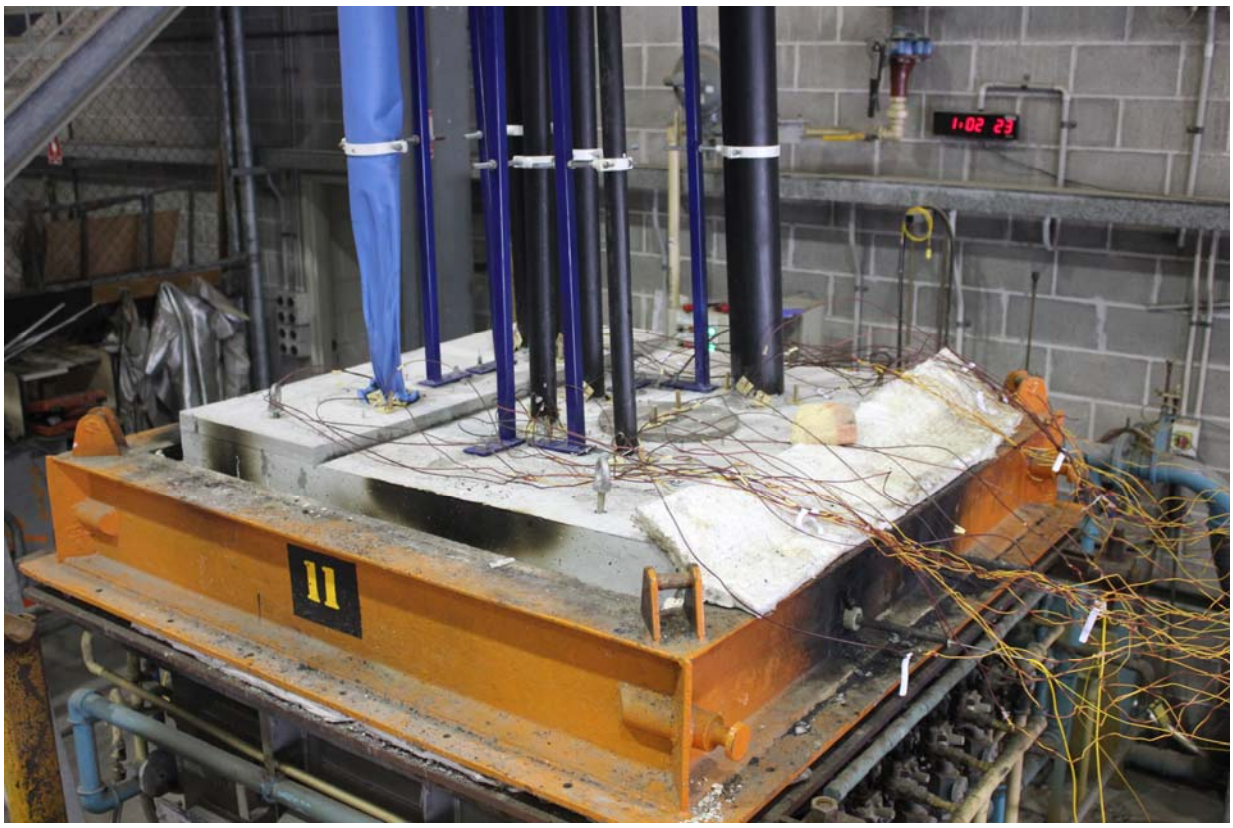
Appendix A – Measurement location

Measurement Location		Data Logger Channel Information
Group location **Specimen**	**T/C Position**	**T/C designation**
Specimen 2 – Mueller PE-100 stack pipe 110-mm OD x 5-mm wall thickness.	On the slab – 25-mm from mastic	S7
	On the slab – 25-mm from mastic	S8
	On the mastic	S9
	On the mastic	S10
	On the pipe - 25-mm from mastic	S11
	On the pipe - 25-mm from mastic	S12
Specimen 3 – Vindex PE 100 stack pipe 57-mm OD x 4-mm wall thickness	On the slab – 25-mm from mastic	S13
	On the slab – 25-mm from mastic	S14
	On the mastic	S15
	On the mastic	S16
	On the pipe - 25-mm from mastic	S17
	On the pipe - 25-mm from mastic	S18
Specimen 4 -Vindex PE 100 – waste trap 57-mm OD x 4-mm wall thickness	On the screed – 25-mm from grate	S19
	On the screed – 25-mm from grate	S20
	On centre of grate	S21
Specimen 6 – Pipemakers PVC stack pipe 56-mm OD x 2.55-mm wall thickness	On the slab – 25-mm from mastic	S28
	On the slab – 25-mm from mastic	S29
	On the mastic	S30
	On the mastic	S31
	On the pipe - 25-mm from mastic	S32
	On the pipe - 25-mm from mastic	S33
Specimen 7 – Mueller PE 80 stack pipe 40-mm OD x 3.5-mm wall thickness	On the slab – 25-mm from mastic	S34
	On the slab – 25-mm from mastic	S35
	On the mastic	S36
	On the mastic	S37
	On the pipe - 25-mm from mastic	S38
	On the pipe - 25-mm from mastic	S39
Rover		S40
Ambient		S41

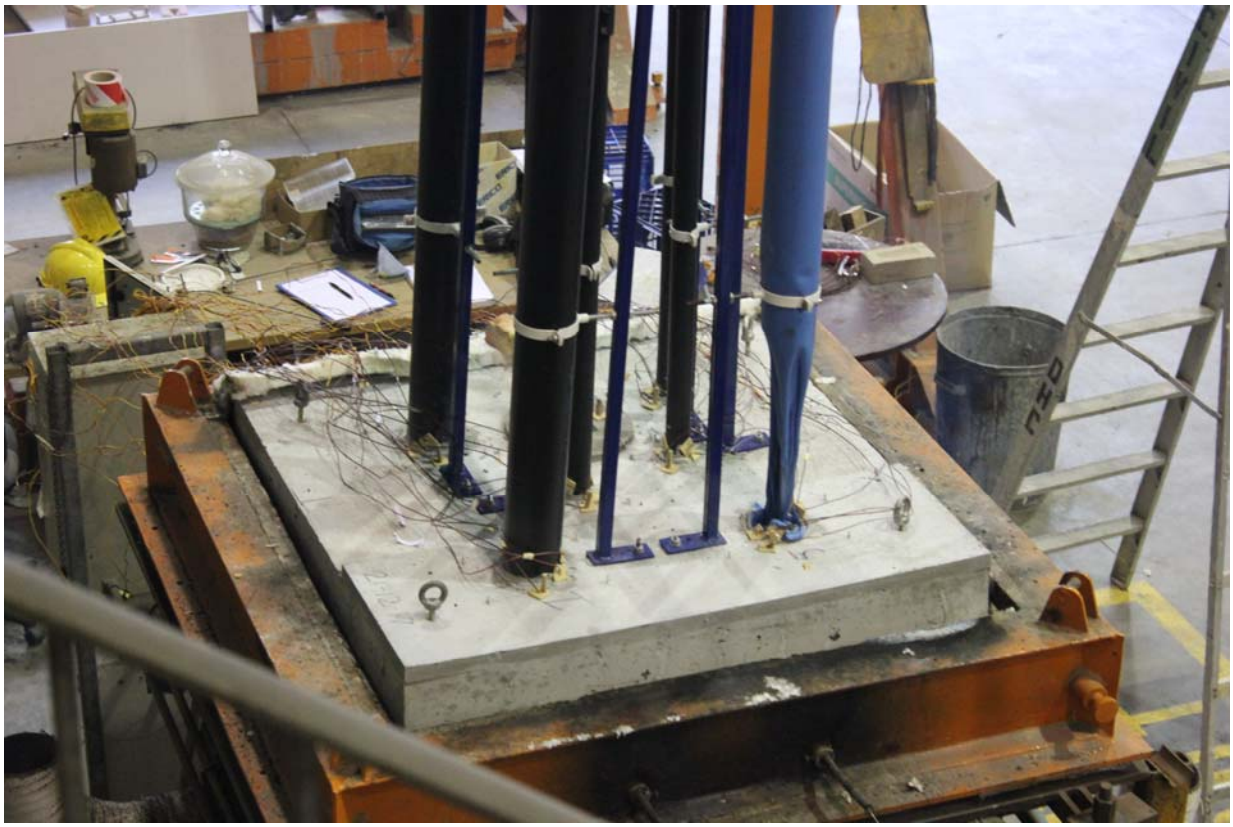
Appendix B – Photographs

PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMENS PRIOR TO TESTING

PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMENS PRIOR TO TESTING



PHOTOGRAPH 3 – SPECIMENS AFTER 60 MINUTES OF TESTING



PHOTOGRAPH 4 – SPECIMENS AFTER 120 MINUTES OF TESTING

PHOTOGRAPH 5 – SPECIMENS AFTER 180 MINUTES OF TESTING

PHOTOGRAPH 6 – UNEXPOSED FACED OF SPECIMEN AT CONCLUSION OF TESTING

PHOTOGRAPH 7 – EXPOSED FACE OF SPECIMENS AT CONCLUSION OF TESTING

Appendix C – Furnace Temperature

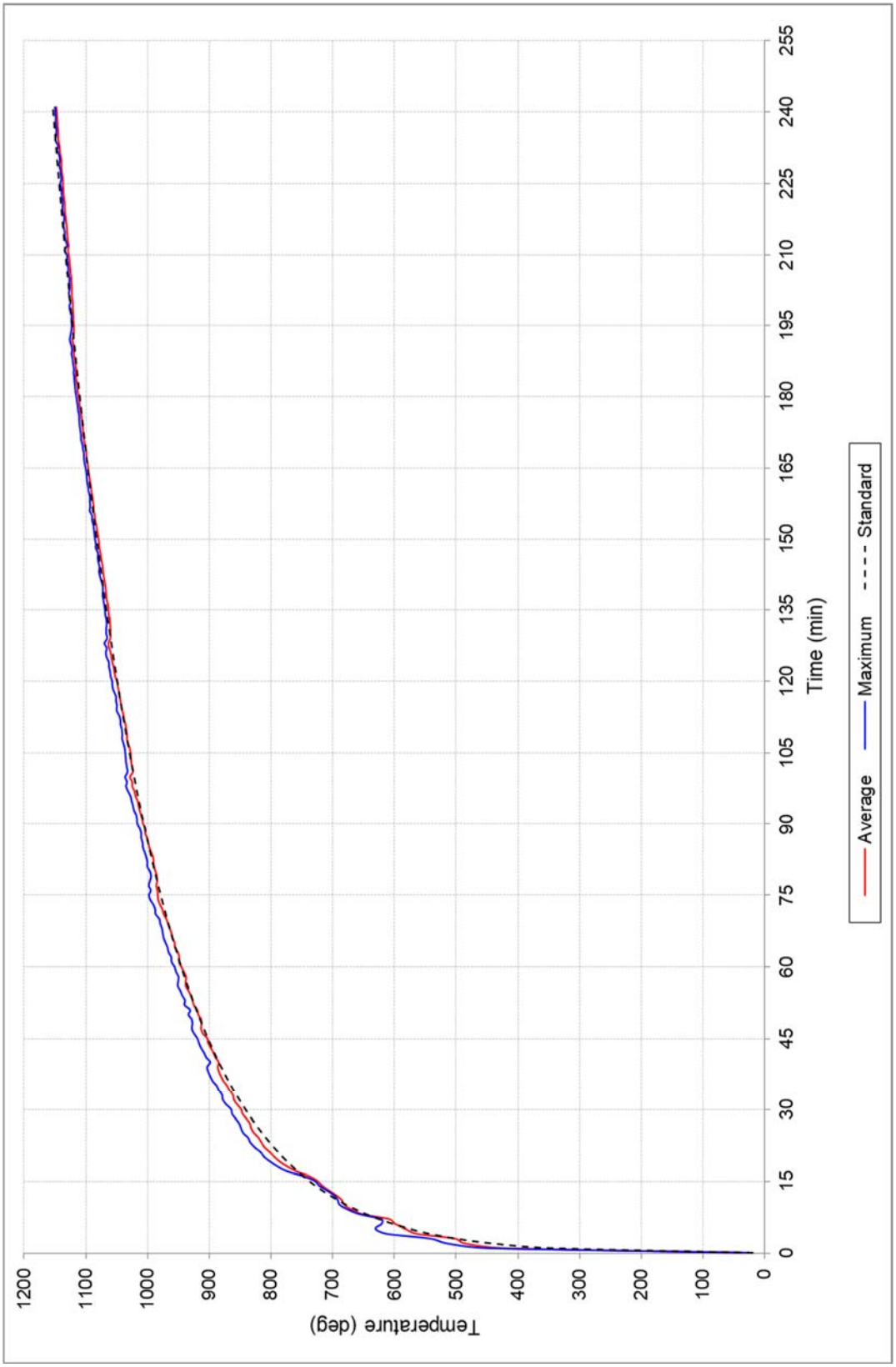


FIGURE 1 – FURNACE TEMPERATURE

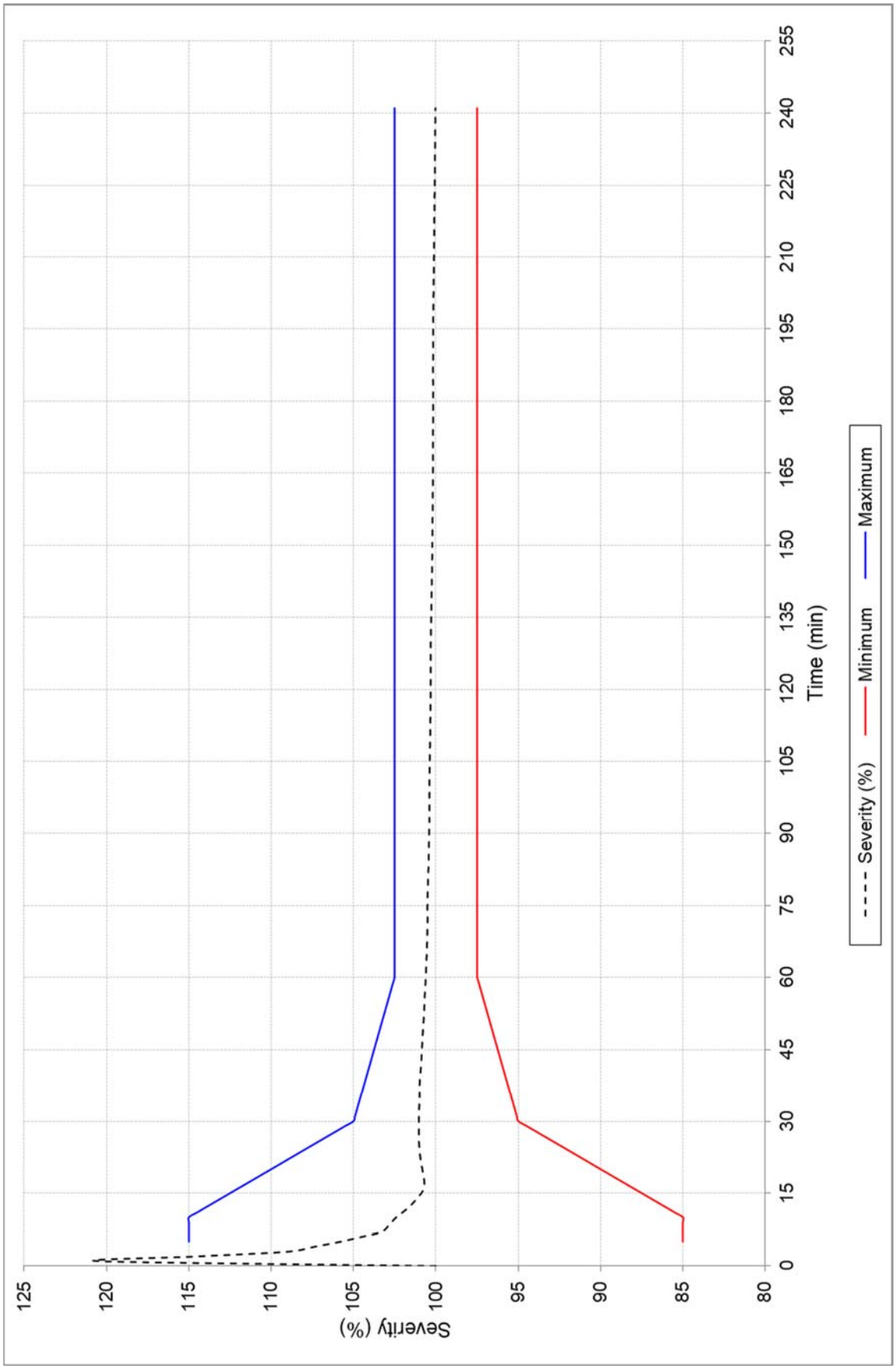


FIGURE 2 – FURNACE SEVERITY

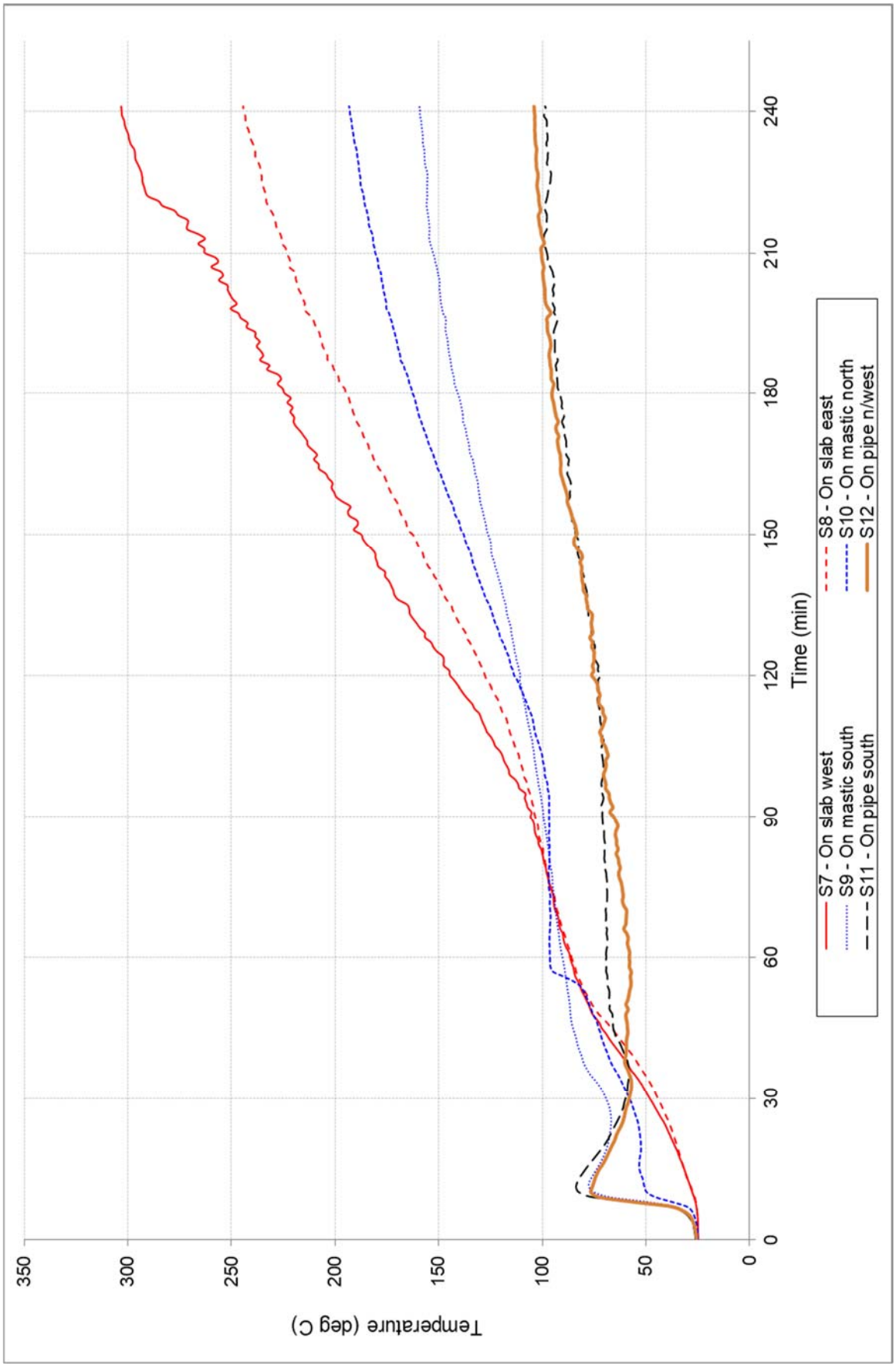


FIGURE 3 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 2

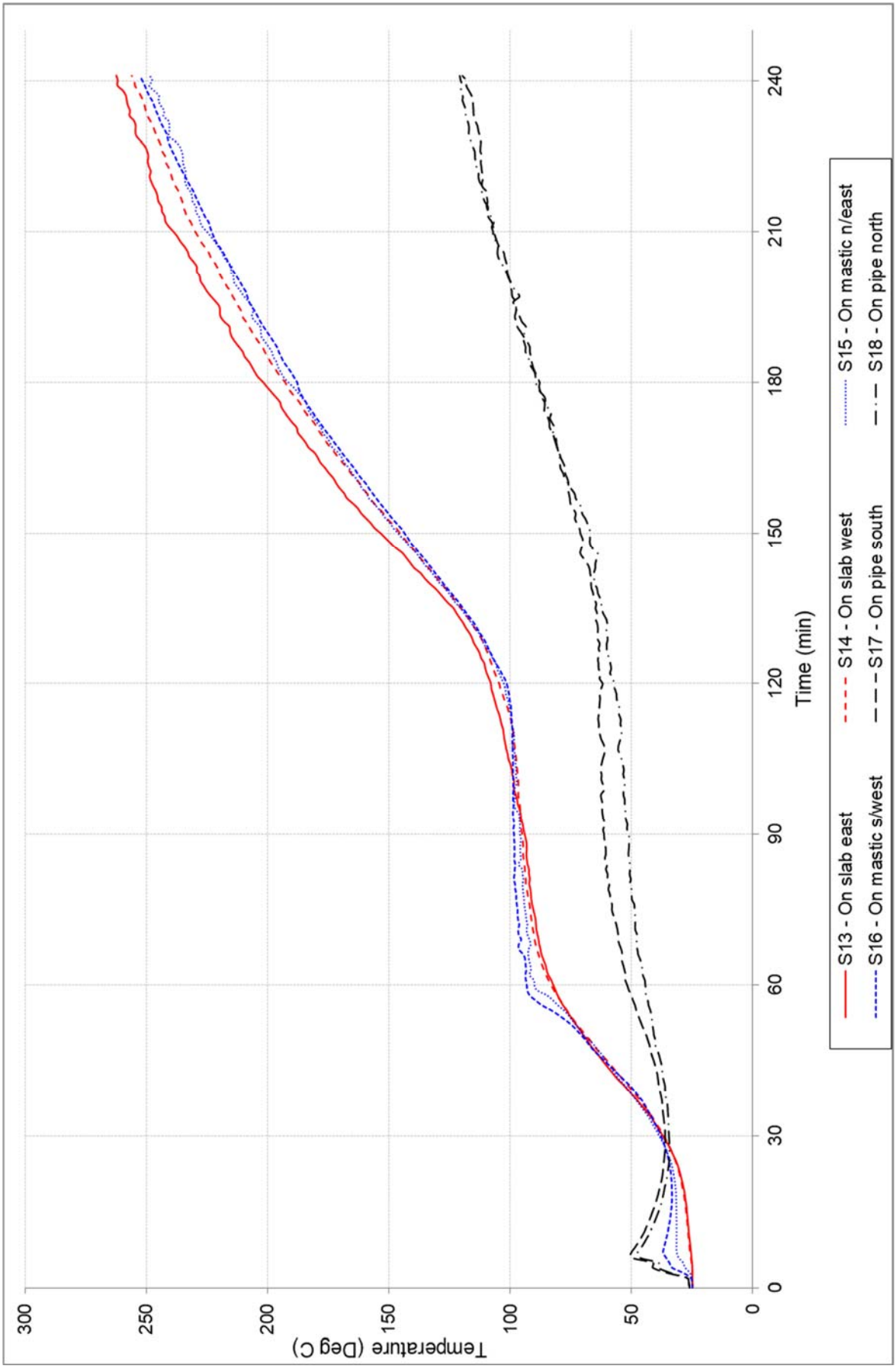


FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 3

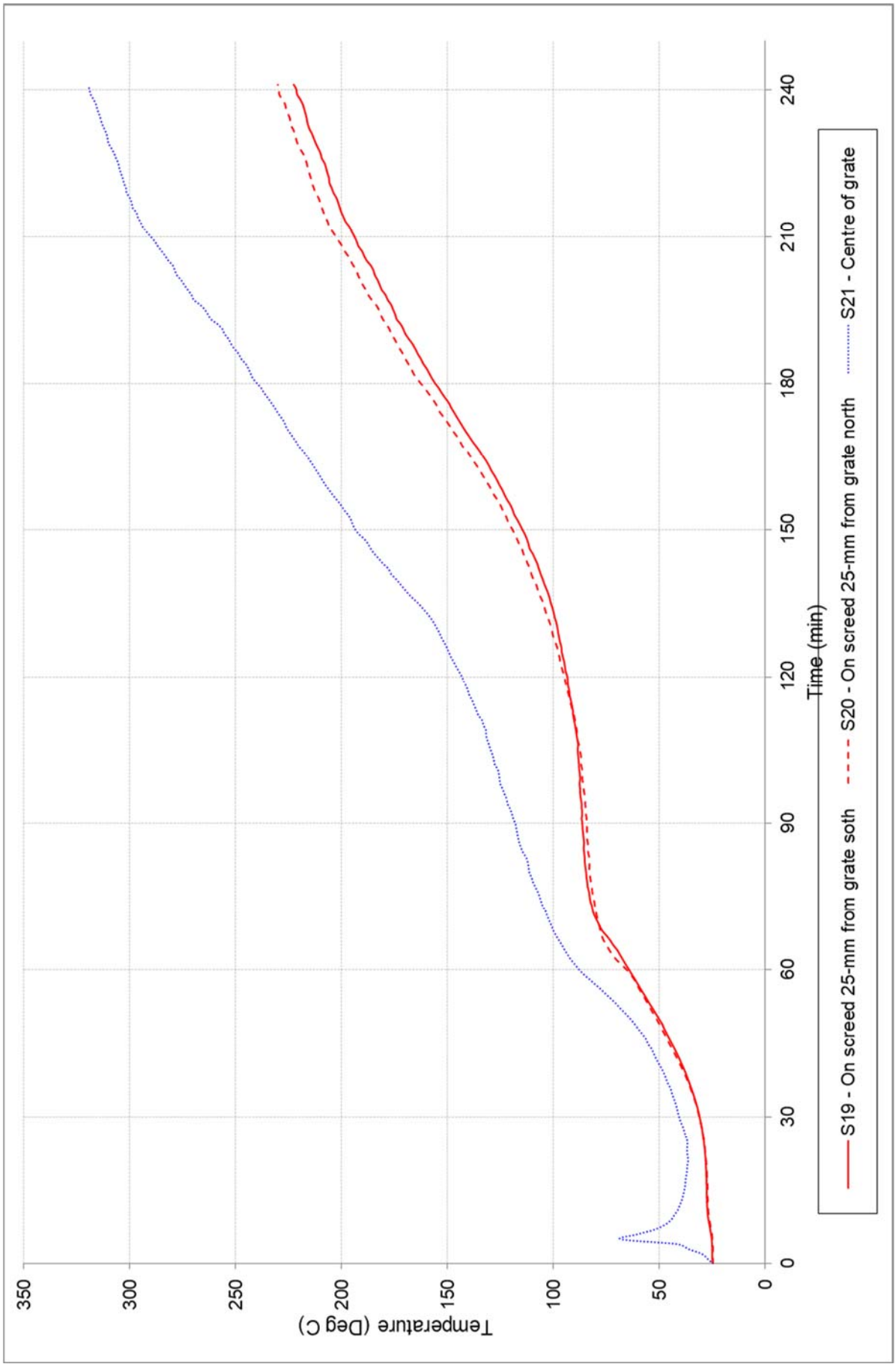


FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 4

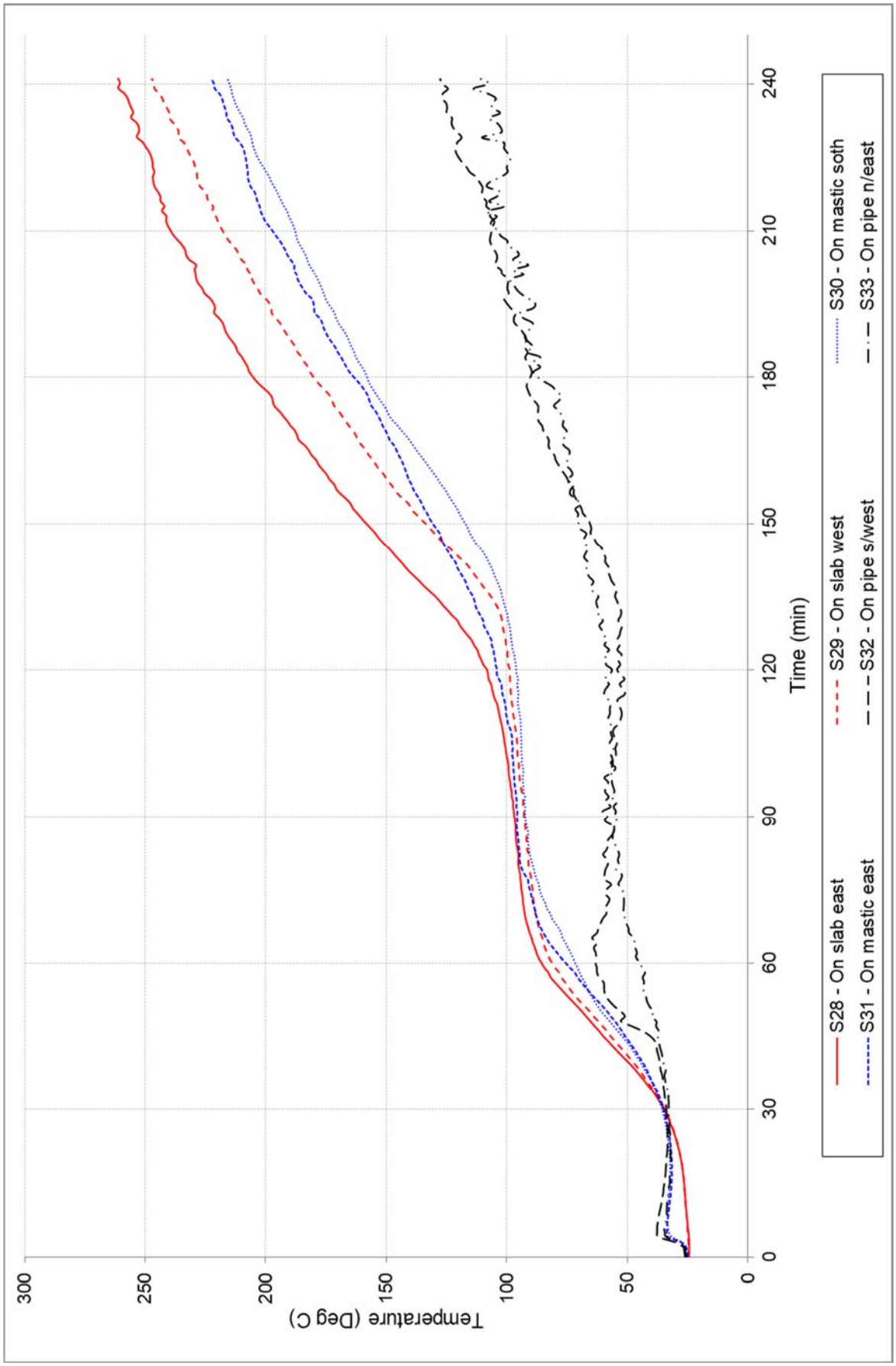


FIGURE 6 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 6

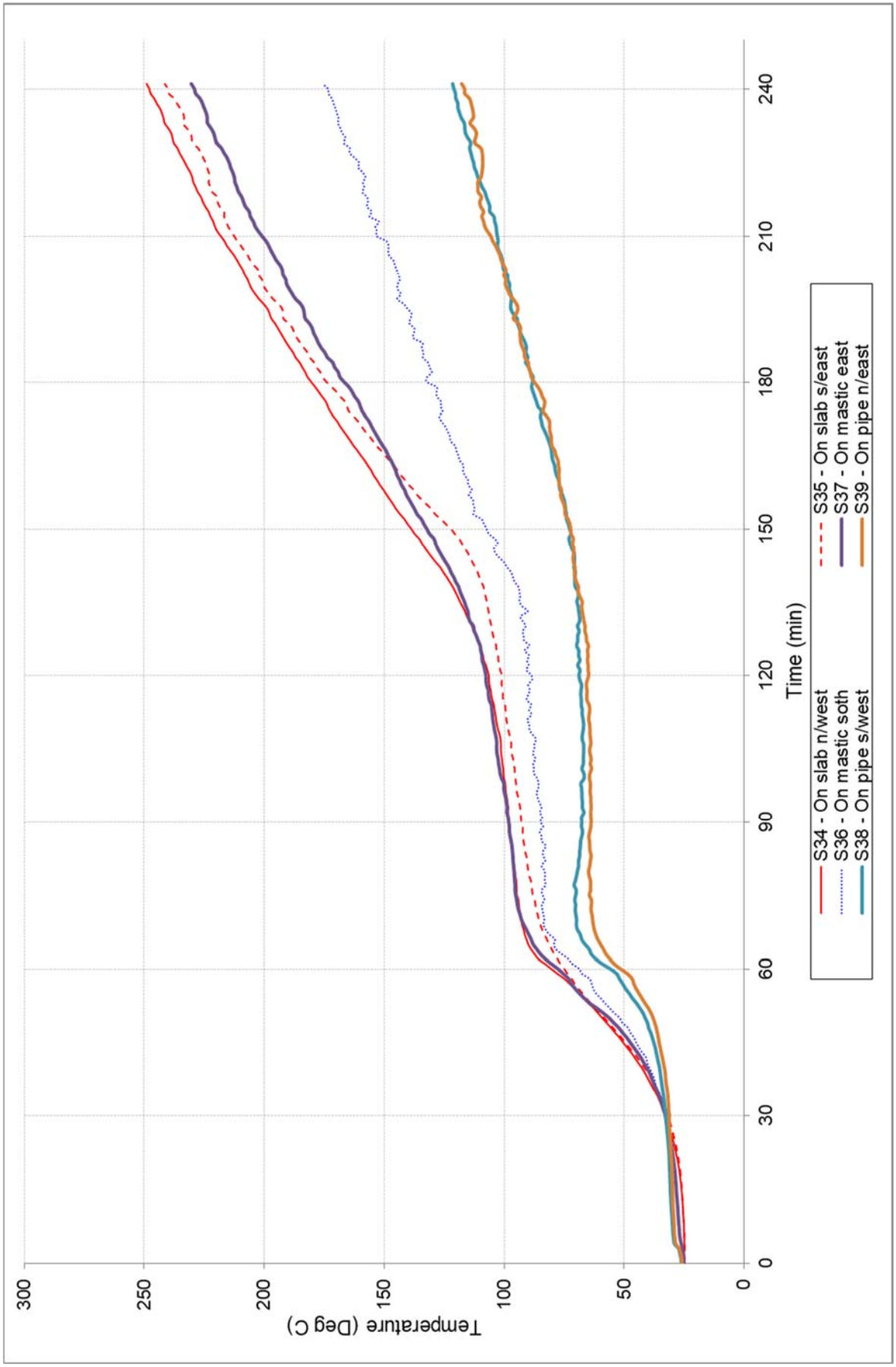
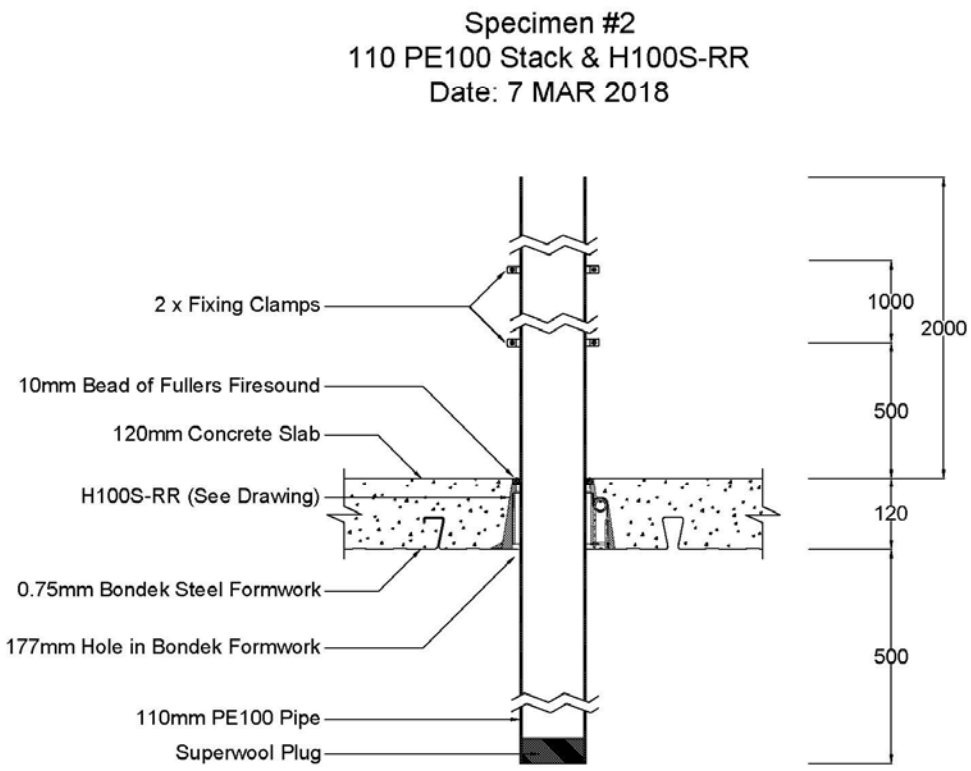
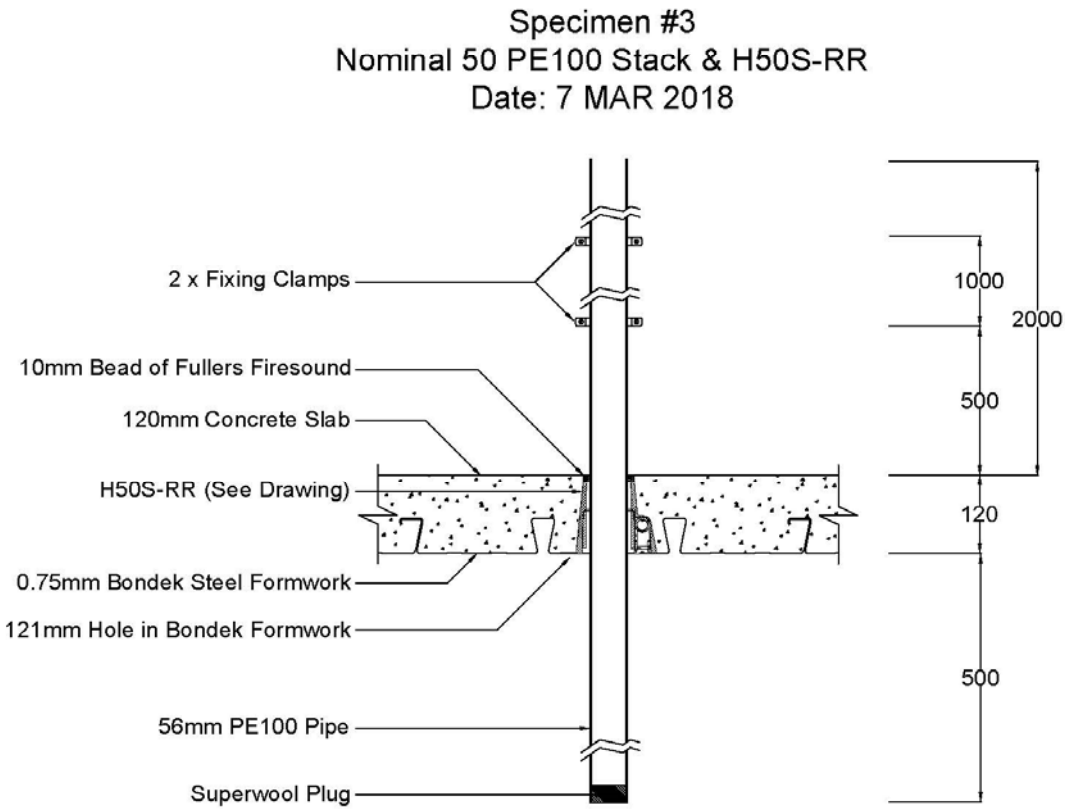


FIGURE 7 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 7

Appendix D – Installation drawings

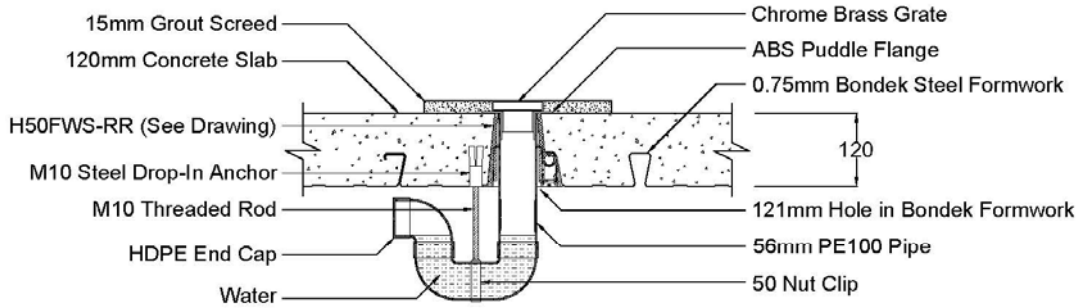


DRAWING TITLED "SPECIMEN #2, 110 PE100 STACK & H100S-RR", DATED 7 MARCH 2018, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD



DRAWING TITLED "SPECIMEN #3, NOMINAL 50 PE100 STACK & H50S-RR", DATED 7 MARCH 2018, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

Specimen #4
Nominal 50 PE100 Floorwaste & H50FWS-RR
Date: 7 MAR 2018



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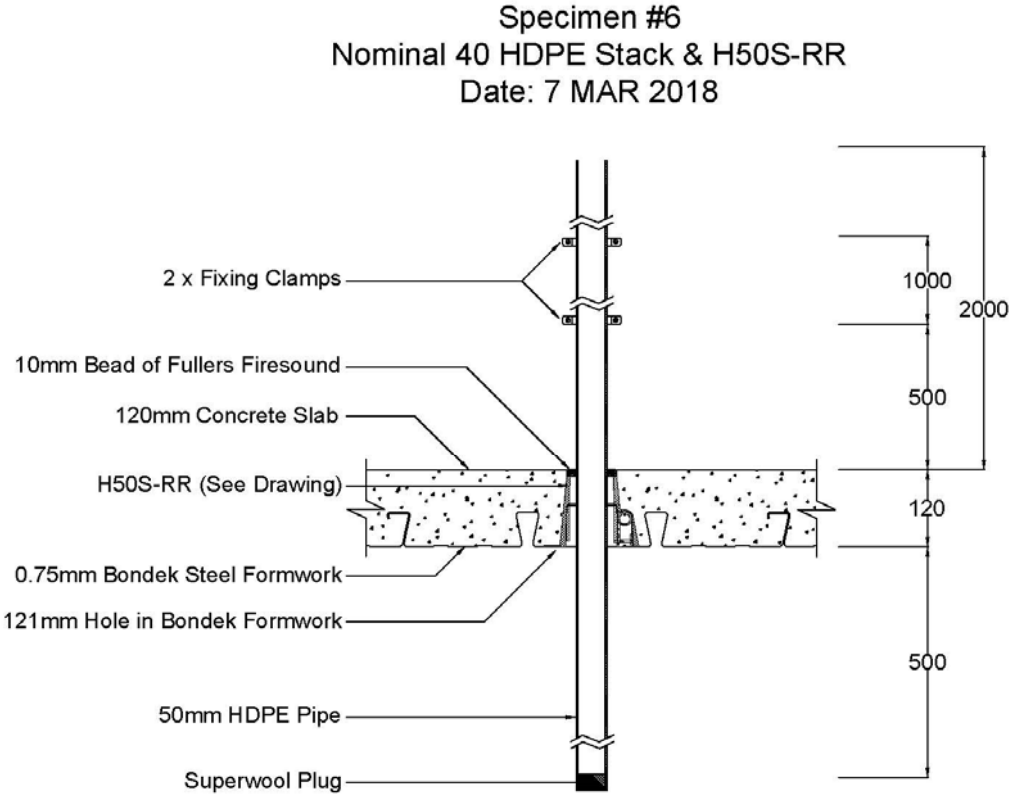
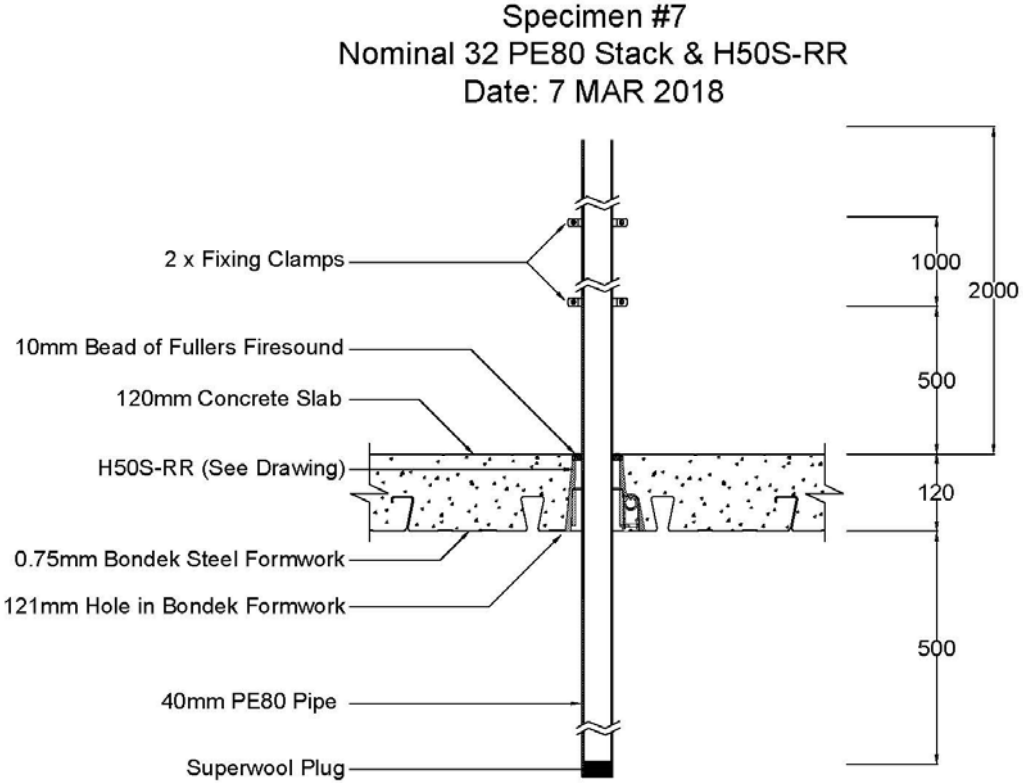
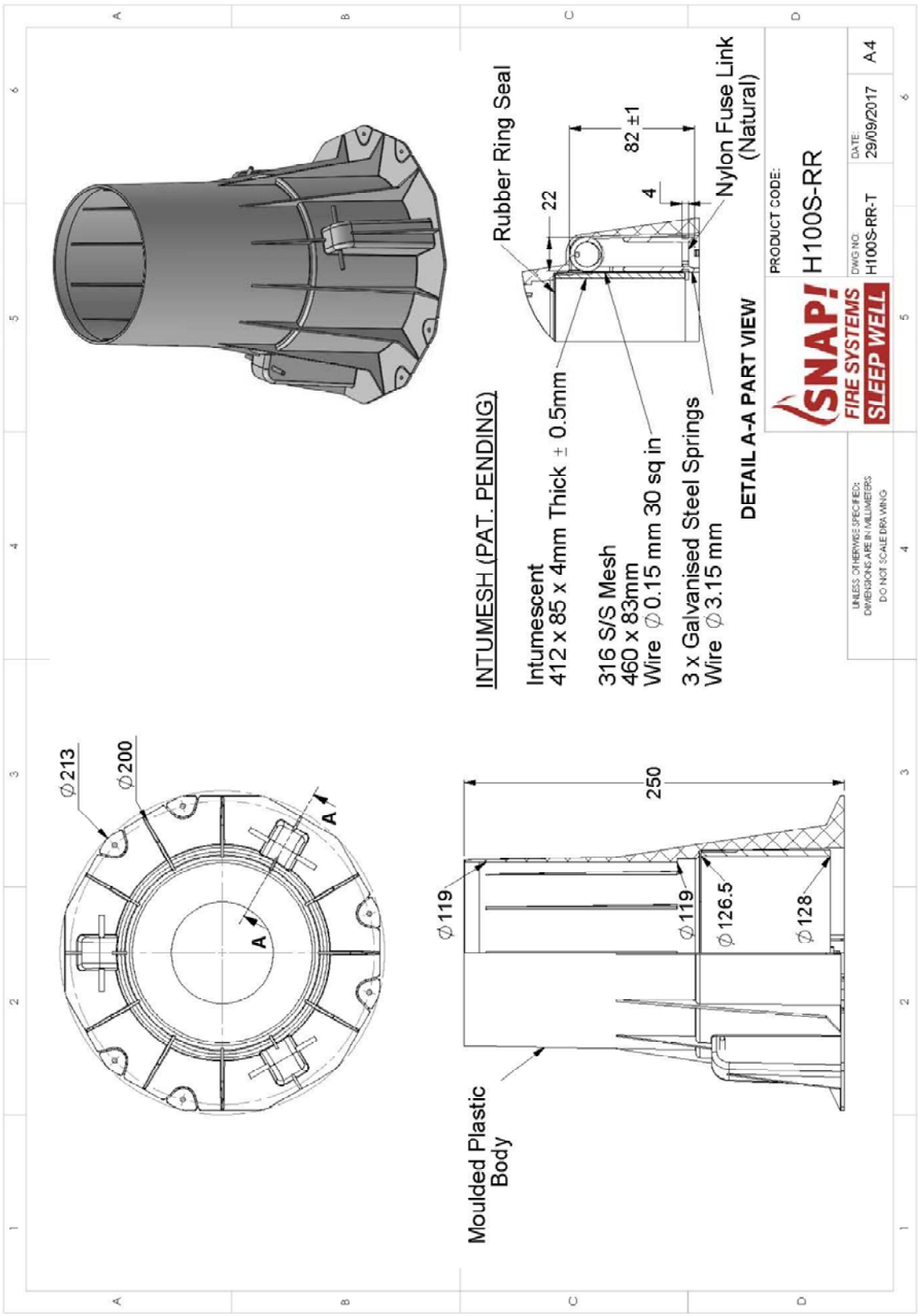


DRAWING TITLED "SPECIMEN #6, NOMINAL 40 HDPE STACK & H50S-RR", DATED 7 MARCH 2018, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

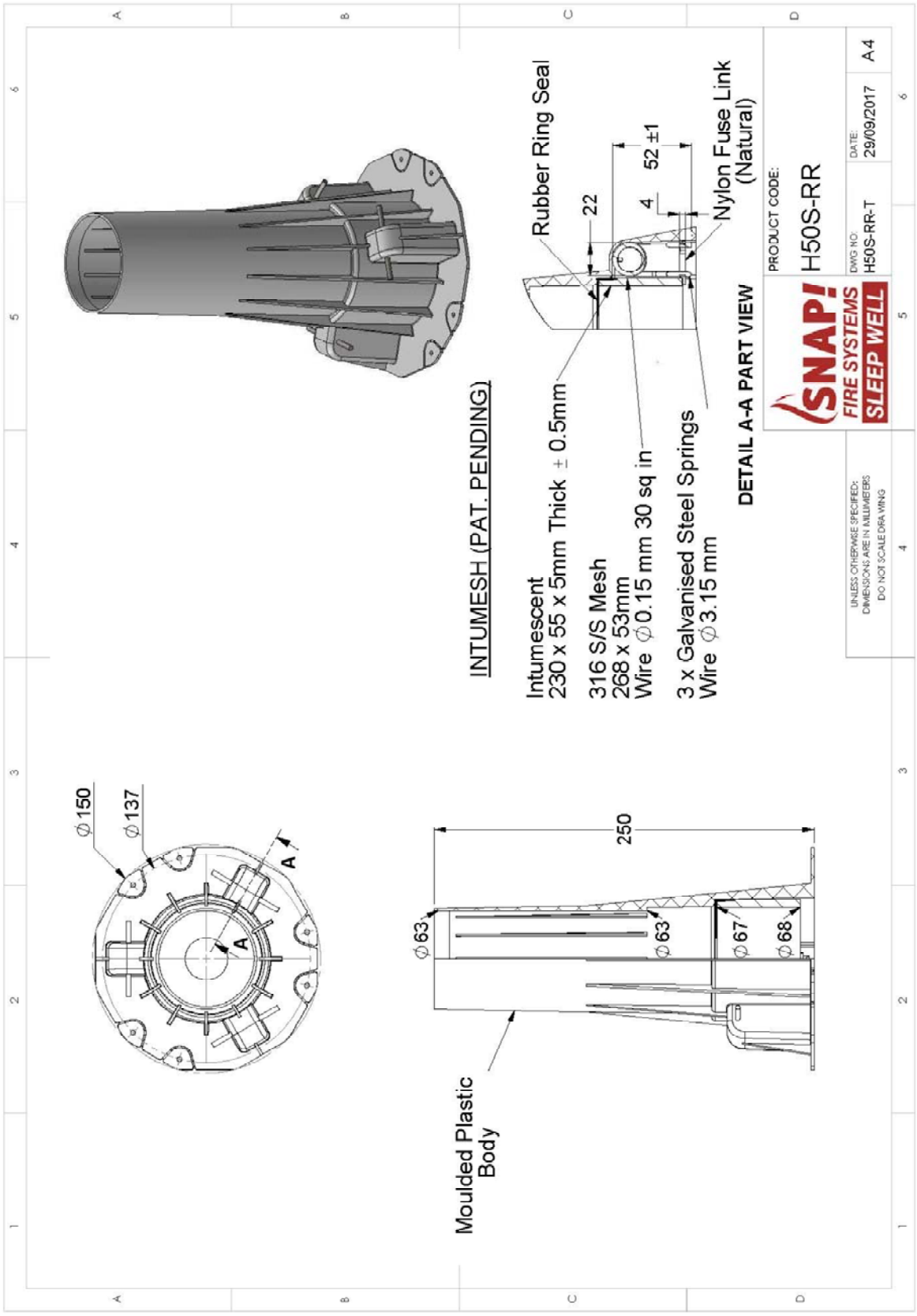


DRAWING TITLED "SPECIMEN #7, NOMINAL 32 PE80 STACK & H50S-RR", DATED 7 MARCH 2018, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD

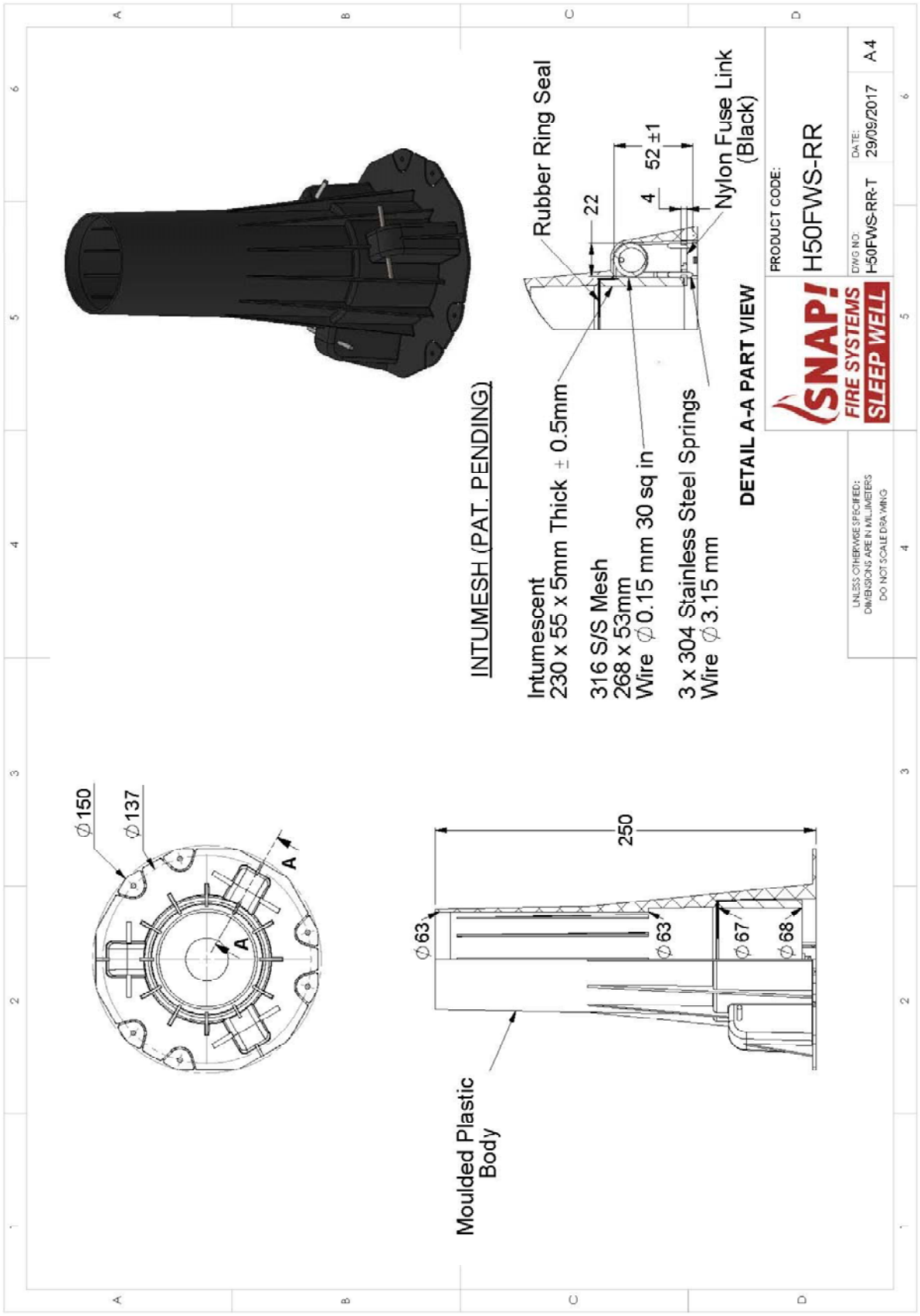
Appendix E – Specimen Drawings



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



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



DRAWING NUMBERED H50FWS-RR DATED 29 SEPTEMBER 2017, BY SNAP FIRE SYSTEMS PTY LTD.

Appendix F – Certificate(s) of Test

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14 Julius Avenue, North Ryde NSW 2113
PO Box 52, North Ryde NSW 1670, Australia
T (02) 9490 5444 • ABN 41 687 119 230

Certificate of Test

No. 3128

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 Sponsored Investigation report numbered FSP 1883.

Product Name: H100S-RR cast-in fire collar protecting a nominal 110-mm polyethylene (PE100) stack pipe

Description: The sponsor identified the specimen as a cast-in fire collar protecting a nominal 1000-mm x 800-mm x 120-mm thick section of Bondek floor slab penetrated by a polyethylene (PE) pipe. The SNAP H100S-RR fire collar comprised a 1.6-mm thick polypropylene casing with a 126.5-mm inner diameter and a 213-mm base flange. The 250-mm high collar casing incorporated a layer of 412-mm x 85-mm x 4-mm thick Intumescent material. The closing mechanism comprised 3 x galvanised steel springs bound with a natural nylon fuse links and 316 stainless steel mesh measuring 460 x 83-mm. The penetrating service comprised a 110-mm diameter PE100 pipe with a total wall thickness of 5-mm fitted through the collar's sleeve. A 177-mm diameter opening was cut into the Bondek sheet with a holesaw and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500-mm into the furnace chamber and was supported at 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and capped on the exposed end with ceramic fibre. On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

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

Structural Adequacy	not applicable
Integrity	no failure at 241 minutes
Insulation	164 minutes

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

As the FRL of the composite concrete slab has not been verified, the supporting construction shall have an FRL equal to or greater than that of the penetration system as required by clause 10.4.4 of AS 1530.4-2014.

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: 22 February 2018

Issued on the 14th day of August 2018 without alterations or additions.

Brett Roddy
Manager, Fire Testing and Assessments

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

COPY OF CERTIFICATE OF TEST – NO. 3128

INFRASTRUCTURE TECHNOLOGIES
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14 Julius Avenue, North Ryde NSW 2113
PO Box 52, North Ryde NSW 1670, Australia
T (02) 9490 5444 • **ABN** 41 687 119 230

Certificate of Test

No. 3129

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 Sponsored Investigation report numbered FSP 1883.

Product Name: H50 S-RR cast-in fire collar protecting a nominal 50-mm polyethylene (PE100) stack pipe

Description: The sponsor identified the specimen as a cast-in fire collar protecting a nominal 1000-mm x 800-mm x 120-mm thick section of Bondek floor slab penetrated by a polyethylene (PE) pipe. The SNAP H50 S-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 316 stainless steel mesh measuring 268 x 53-mm. The penetrating service comprised a 56-mm diameter PE100 pipe with a total wall thickness of 4 mm fitted through the collar's sleeve. A 120-mm diameter opening was cut into the Bondek sheet with a holesaw and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500 mm into the furnace chamber and was supported at 500-mm and 1500 mm from the unexposed face of the slab. The pipe was open at the unexposed end and capped on the exposed end with ceramic fibre. On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

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

Structural Adequacy	not applicable
Integrity	no failure at 241 minutes
Insulation	183 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/180.

As the FRL of the composite concrete slab has not been verified, the supporting construction shall have an FRL equal to or greater than that of the penetration system as required by clause 10.4.4 of AS 1530.4-2014.

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: 22 February 2018

Issued on the 14th day of August 2018 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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Certificate of Test

No. 3130

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 Sponsored Investigation report numbered FSP 1883.

Product Name: H50FWS-RR cast-in fire collar protecting a nominal 50-mm floor waste system incorporating a p-trap

Description: The sponsor identified the specimen as a cast-in fire collar protecting a nominal 1000-mm x 800-mm x 120-mm thick section of Bondek floor slab penetrated by a floor waste system incorporating a p-trap. The SNAP cast-in H50FWS-RR fire collar comprised a 1.6-mm thick polypropylene casing with a 67-mm inner dia. and a 150-mm dia. base flange. The 250-mm high collar casing incorporated a 230-mm x 55-mm x 5-mm thick Intumesh intumescent material and rubber ring seal. Closing mechanism comprised three galvanised steel springs bound with nylon fuse links and a 316 stainless steel mesh measuring 268 x 53-mm. The penetrating service comprised a 56-mm PE100 with total wall thickness of 4-mm fitted through the collar's sleeve. A 121–mm dia. opening was cut into the Bondek sheet and collar fixed centrally over the hole. Floor waste system was fitted with a chrome brass grate. 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 was connected to the penetrating pipe, 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 HDPE End Cap and charged with water to the level shown in drawing "Specimen #4, Nominal 50 PE100 Floorwaste & H50FWS-RR", dated 7 March 2018.

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

Structural Adequacy	not applicable
Integrity	no failure at 241 minutes
Insulation	159 minutes

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

As the FRL of the composite concrete slab has not been verified, the supporting construction shall have an FRL equal to or greater than that of the penetration system as required by clause 10.4.4 of AS 1530.4-2014.

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: 22 February 2018

Issued on the 14th day of August 2018 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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PO Box 52, North Ryde NSW 1670, Australia
T (02) 9490 5444 • **ABN** 41 687 119 230

Certificate of Test

No. 3131

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 Sponsored Investigation report numbered FSP 1883.

Product Name: H50 S-RR cast-in fire collar protecting a nominal 40-mm High-density polyethylene (HDPE) Pipe

Description: The sponsor identified the specimen as a cast-in fire collar protecting a nominal 1000-mm x 800-mm x 120-mm thick section of Bondek floor slab penetrated by a HDPE Pipe. The SNAP H50 S-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 316 stainless steel mesh measuring 268 x 53-mm. The penetrating service comprised a 50-mm diameter HDPE Pipe with a total wall thickness of 4-mm fitted through the collar's sleeve. A 121-mm diameter opening was cut into the Bondek sheet and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500-mm into the furnace chamber and was supported at 500-mm and 1500-mm from the unexposed face of the slab. The pipe was open at the unexposed end and capped on the exposed end with ceramic fibre. On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

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

Structural Adequacy	not applicable
Integrity	no failure at 241 minutes
Insulation	181 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/180.

As the FRL of the composite concrete slab has not been verified, the supporting construction shall have an FRL equal to or greater than that of the penetration system as required by clause 10.4.4 of AS 1530.4-2014.

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: 22 February 2018

Issued on the 14th day of August 2018 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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Certificate of Test

No. 3132

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 Sponsored Investigation report numbered FSP 1883.

Product Name: H50 S-RR cast-in fire collar protecting a nominal 32-mm polyethylene (PE80) stack pipe

Description: The sponsor identified the specimen as a cast-in fire collar protecting a nominal 1000-mm x 800-mm x 120-mm thick section of Bondek floor slab penetrated by a PE stack pipe. The SNAP H50 S-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 316 stainless steel mesh measuring 268 x 53-mm. The penetrating service comprised a 40-mm diameter PE80 pipe with a total wall thickness of 3.5 mm fitted through the collar's sleeve. A 121-mm diameter opening was cut into the Bondek sheet and the collar fixed centrally over the hole. The pipe projected vertically 2000-mm above the concrete and 500 mm into the furnace chamber and was supported at 500-mm and 1500 mm from the unexposed face of the slab. The pipe was open at the unexposed end and capped on the exposed end with a superwool plug. On the unexposed side of the slab, there was a 10-mm deep bead of Fullers Firesound around the base of the pipe.

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

Structural Adequacy	not applicable
Integrity	no failure at 241 minutes
Insulation	200 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/180.

As the FRL of the composite concrete slab has not been verified, the supporting construction shall have an FRL equal to or greater than that of the penetration system as required by clause 10.4.4 of AS 1530.4-2014.

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: 22 February 2018

Issued on the 14th day of August 2018 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

COPY OF CERTIFICATE OF TEST – NO. 3132

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.

-----end of report-----

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FOR FURTHER INFORMATION

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