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

Test Report

Author: Mario Lara-Ledermann
Report number: FSP 1686
Date: 6 August 2015

Client: Snap Fire Systems Pty Ltd

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Report Status and Revision History:

VERSION	STATUS	DATE	DISTRIBUTION	ISSUE NUMBER
Revision A	Final for issue	16/07/15	CSIRO/SNAP	FSP 1686
Revision B	Final for issue	06/08/15	CSIRO/SNAP	FSP 1686

Report Authorization:

AUTHOR	REVIEWED BY	AUTHORISED BY
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6 August 2015	6 August 2015	6 August 2015

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Contents

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

Sponsored Investigation No. FSP 1686

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as Snap Cast-in Fire Collars protecting a 150-mm mm thick Stramit Condeck HP composite steel and reinforced concrete slab penetrated by four (4) floor wastes and one (1) stack pipe.

1.2 Sponsor

Snap Fire Systems Pty Ltd
Unit 2/160 Redland Bay Road
CAPALABA QLD

1.3 Manufacturer

Snap Fire Systems Pty Ltd
Unit 2/160 Redland Bay Road
CAPALABA QLD

1.4 Test standard

Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2005, Fire-resistance tests of elements of construction.

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 4462/3819

1.7 Test date

The fire-resistance test was conducted on 26 November 2014.

2 Description of specimen

2.1 General

The specimen comprised an 1150-mm x 1150-mm x 150-mm thick Stramit Condeck HP composite steel and reinforced concrete slab penetrated by by four (4) floor wastes and one (1) stack pipe protected by cast-in and retrofit Snap Fire System fire collars. The Stramit Condeck HP composite steel and reinforced concrete slab was stated to have a Fire-resistance level FRL of 180/180/180.

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
- EN 1519-1:2000 - Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Polyethylene (PE). Specifications for pipes, fittings and the system

For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4 and 5. Only three (3) specimens are included in this report (Penetrations 2, 3, and 4).

Penetration 2 – H 50 FWS cast-in fire collar protecting a 56-mm diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste

The SNAP cast-in H 50 FWS fire collar comprised a 1.6-mm thick polypropylene casing with a 70.5-mm inner diameter and a 146-mm diameter base flange. The 75-mm high collar casing incorporated a 240-mm x 58-mm x 4-mm thick Intumesh intumescent material. The closing mechanism incorporated three stainless steel springs, with nylon fuse links and a 280-mm x 58-mm stainless steel mesh as shown in drawing numbered H 50 FWS-T dated 26 September 2014, by SNAP Fire Systems.

The penetrating service comprised a 56-mm outter diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste, with a wall thickness of 4-mm fitted through the H 50 FWS Snap fire collar. The floor waste system was fitted with a chromed brass floor waste grate through a 92-mm OD hole drilled into the steel formwork of the slab to accommodate the penetrating service. A 35-mm thick cement screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 56-mm OD PVC HDPE gully trap was connected to the penetrating pipe, supported by a steel pipe bracket fixed to the concrete slab with steel wedge anchors. 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 “Penetration #2 H50 FWS Floor Waste on 56 Ø HDPE”, dated 26 November 2014, by Snap Fire Systems Pty Ltd.

Penetration 3 – 50 R retrofitted fire collar protecting a 56-mm diameter Polyvinyl Chloride (PVC) stack pipe

The SNAP Retrofit 50 R fire collar comprised a 0.75-mm steel casing with a 62-mm inner diameter and three fixing brackets fixed onto the collar casing. The 47-mm high collar casing incorporated 200-mm x 43-mm x 4-mm thick Intumesh intumescent material and a 210-mm x 42-mm stainless steel mesh as shown in drawing numbered 50 R-T dated 4 November 2013, by SNAP Fire Systems. The collar was fixed to the underside of the slab with 3 brackets with Steel Wedge Anchors.

The penetrating service comprised a 56-mm OD PVC pipe, with a wall thickness of 2.5-mm fitted through the collar’s sleeve. The pipe projected vertically, 2000-mm above the concrete slab. The pipe was supported at 500-mm and 1000-mm from the unexposed face of the concrete slab as shown in drawing titled “Penetration #3 – 50 R Stack” dated 26 November 2014, by Snap Fire Systems Pty Ltd. On the exposed end, the pipe was capped with a PVC end cap.

Penetration 4 – H 50 FWS cast-in fire collar protecting a 56-mm diameter Polyvinyl Chloride (PVC) pipe incorporating a floor waste

The SNAP cast-in H 50 FWS fire collar comprised a 1.6-mm thick polypropylene casing with a 70.5-mm inner diameter and a 146-mm diameter base flange. The 75-mm high collar casing incorporated a 240-mm x 58-mm x 4-mm thick Intumesh intumescent material. The closing mechanism incorporated three stainless steel springs, with nylon fuse links and a 280-mm x 58-mm stainless steel mesh as shown in drawing numbered H 50 FWS-T dated 26 September 2014, by SNAP Fire Systems.

The penetrating service comprised a 56-mm OD Polyvinyl Chloride (PVC) pipe, with a wall thickness of 2.5-mm fitted through the H 50 FWS Snap fire collar. The floor waste system was fitted with a chromed brass floor waste grate through a 92-mm OD hole drilled into the steel formwork of the slab to accommodate the penetrating service. A 35-mm thick cement screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 56-mm OD PVC gully trap was connected to the penetrating pipe, supported by a M10 HKD and 56 mm nut clip to the concrete slab. On the exposed face, the gully trap was capped using a PVC end cap.

The floor waste gully was charged with water to the level shown in drawing titled “Penetration #4 H50 FWS Floor Waste on Steel Formwork”, dated 26 November 2014, by Snap Fire Systems Pty Ltd.

2.2 Dimensions

The overall dimension of the concrete slab was 1150-mm wide x 1150-mm long, 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 Penetration #2 “H50 FWS Floor Waste on 56 Ø HDPE”, dated 26 November 2014, by Snap Fire Systems Pty Ltd.

Drawing titled Penetration #3 “50 R Stack” dated 26 November 2014, by Snap Fire Systems Pty Ltd.

Drawing titled Penetration #4 “H50 FWS Floor Waste on Steel Formwork”, dated 26 November 2014, by Snap Fire Systems Pty Ltd.

Drawing numbered 50 FWS – T, dated 26 September 2014, by Snap Fire Systems Pty Ltd.

Drawing numbered 50R – T, dated 4 November 2013, 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 1530.4-2005 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 21°C at the commencement of the test.

6 Departure from standard

There were no departures from the requirements of AS 1530.4-2005.

7 Termination of test

The test was terminated at 241 minutes by the agreement with the sponsor.

8 Test results

8.1 Critical observations

The following observations were made during the fire-resistance test:

Time	Observation
1 minute -	Smoke is visible from the unexposed end of Penetration 3 (stack pipe).
7 minutes -	Smoke is visible from Penetration 3.
8 minutes -	Large amount of smoke is visible being emitted from furnace flues.
9 minutes -	Smoke from Penetrations 2 and 4. No smoke visible from stack pipe.
10 minutes -	Penetration 3 has deformed slightly near the base of the pipe.
15 minutes -	A small amount of smoke is visible from penetration 4.
25 minutes -	Intermittent spalling sounds can be heard.
34 minutes -	Steam and smoke is visible from the base of the stack pipe.
60 minutes -	Light steam/smoke is visible from base of Penetration 3 (stack pipe).
120 minutes -	Little visible change is observed on the unexposed face of the specimen.
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.

8.5 Performance

Performance observed in respect of the following AS 1530.4-2005 criteria:

Penetration 2 – H 50 FWS cast-in fire collar protecting a 56-mm diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste

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

Penetration 3 – 50 R retrofitted fire collar protecting a 56-mm diameter Polyvinyl Chloride (PVC) stack pipe

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

Penetration 4 – H 50 FWS cast-in fire collar protecting a 56-mm diameter Polyvinyl Chloride (PVC) pipe incorporating a floor waste

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

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in this standard. Any significant variation with respect to size, constructional details, loads, stresses, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not covered by this report.

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

9 Fire-resistance level (FRL)

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

Penetration 2	-	-/180/180;
Penetration 3	-	-/180/180; and
Penetration 4	-	-/180/180.

For the purposes of AS 1530.4-2005 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 1530.4-2005, have been made provided no individual component is removed or reduced.

11 Tested by

Mario Lara-Ledermann
Testing Officer

Appendices

Appendix A – Measurement location

Measurement Location		
Group location	**T/C Position**	**T/C designation**
Specimen		
Penetration 1	On step – 25-mm from grate.	S1
	On step – 25-mm from grate.	S2
	On grate.	S3
Penetration 2	On step – 25-mm from grate.	S4
	On step – 25-mm from grate.	S5
	On grate	S6
Penetration 3	On slab – 25-mm from pipe.	S7
	On slab – 25-mm from pipe.	S8
	On pipe – 25-mm from slab.	S9
	On pipe – 25-mm from slab.	S10
Penetration 4	On step – 25-mm from grate.	S11
	On step – 25-mm from grate.	S12
	On grate.	S13
Penetration 5	On step – 25-mm from grate.	S14
	On step – 25-mm from grate.	S15
	On grate.	S16

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 – EXPOSED FACE OF SPECIMENS AT CONCLUSION OF TESTING

Appendix C – Furnace Temperature

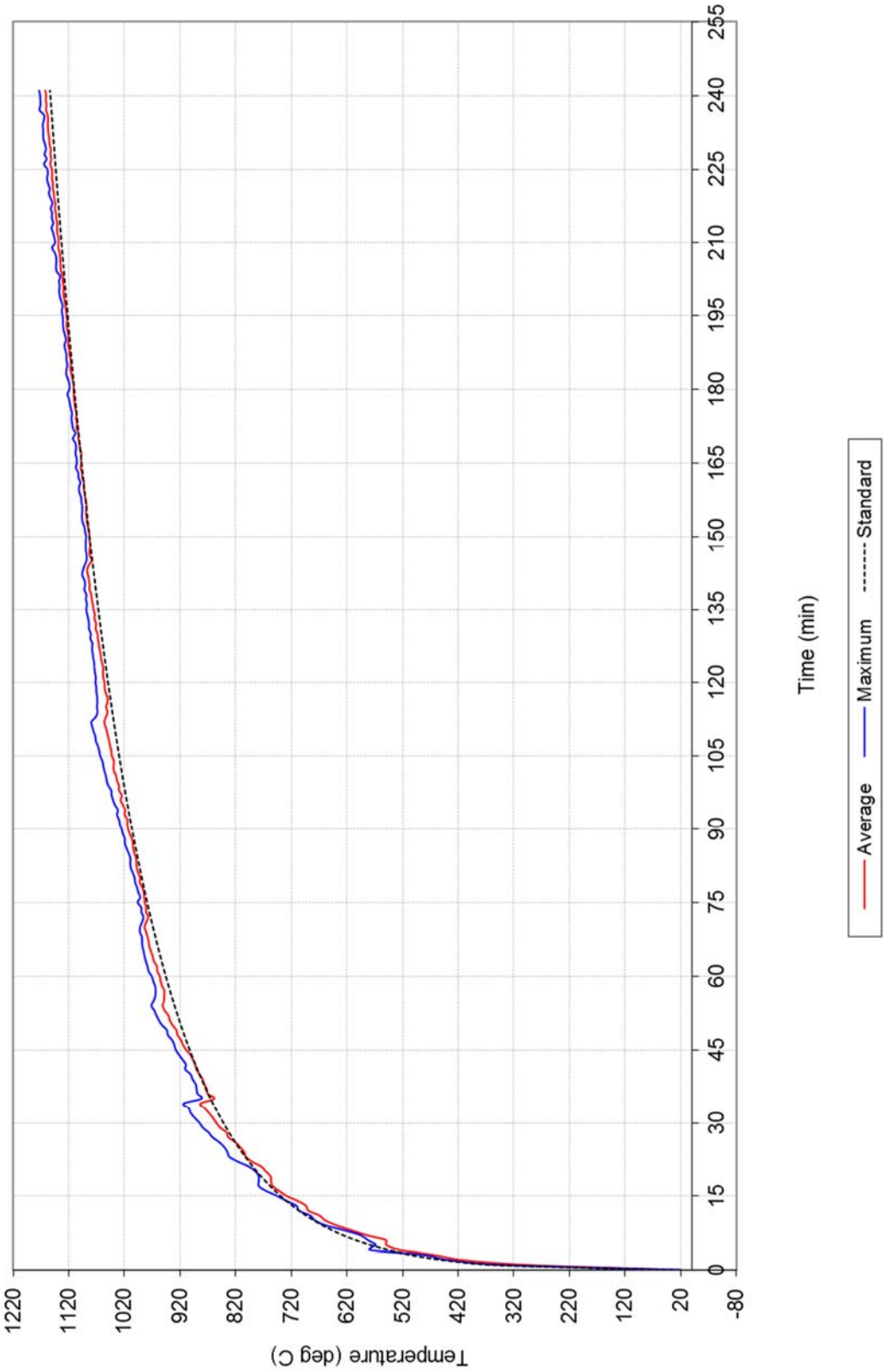


FIGURE 1 – FURNACE TEMPERATURE

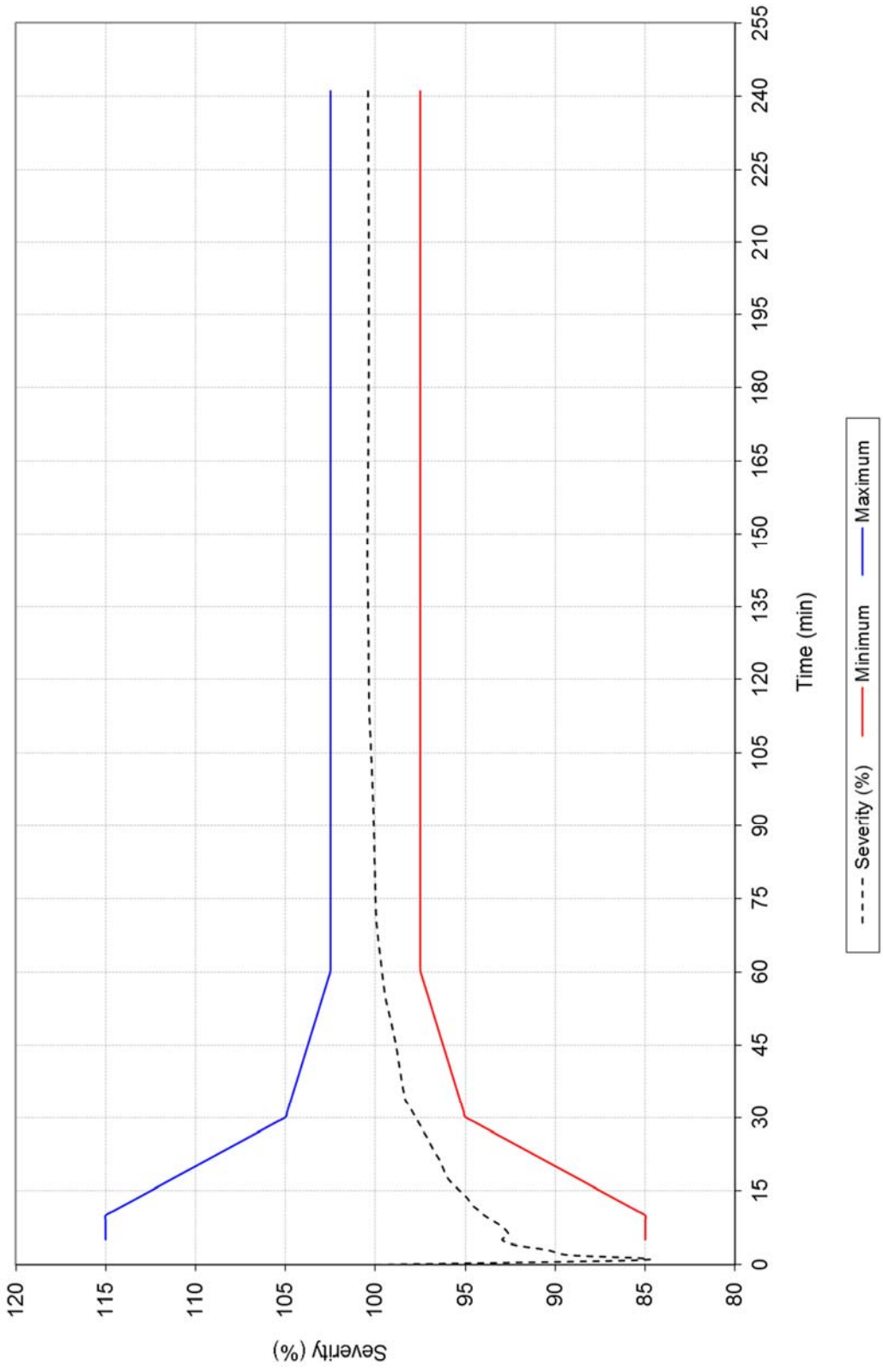


FIGURE 2 – FURNACE SEVERITY

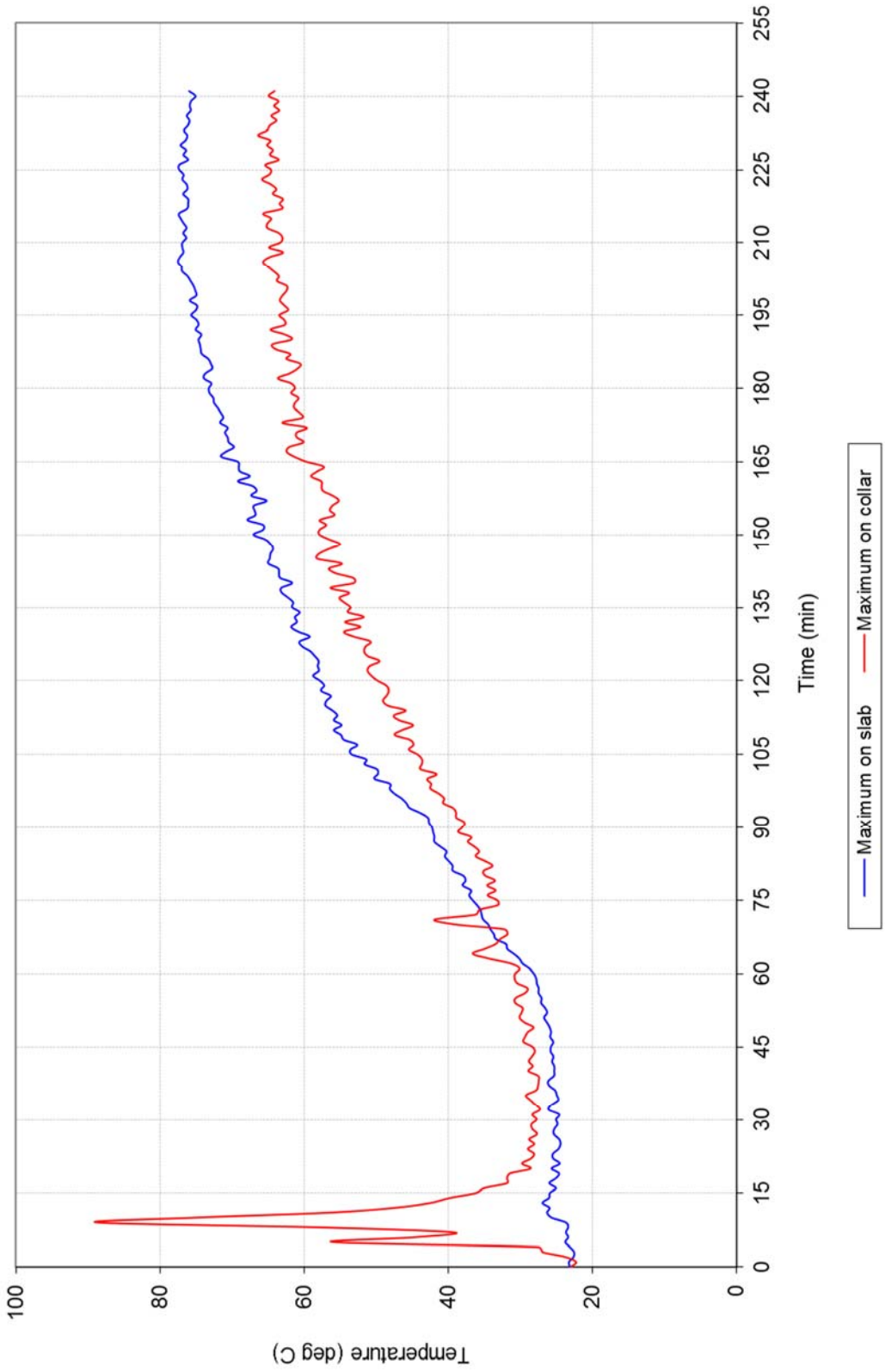


FIGURE 3 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION 2

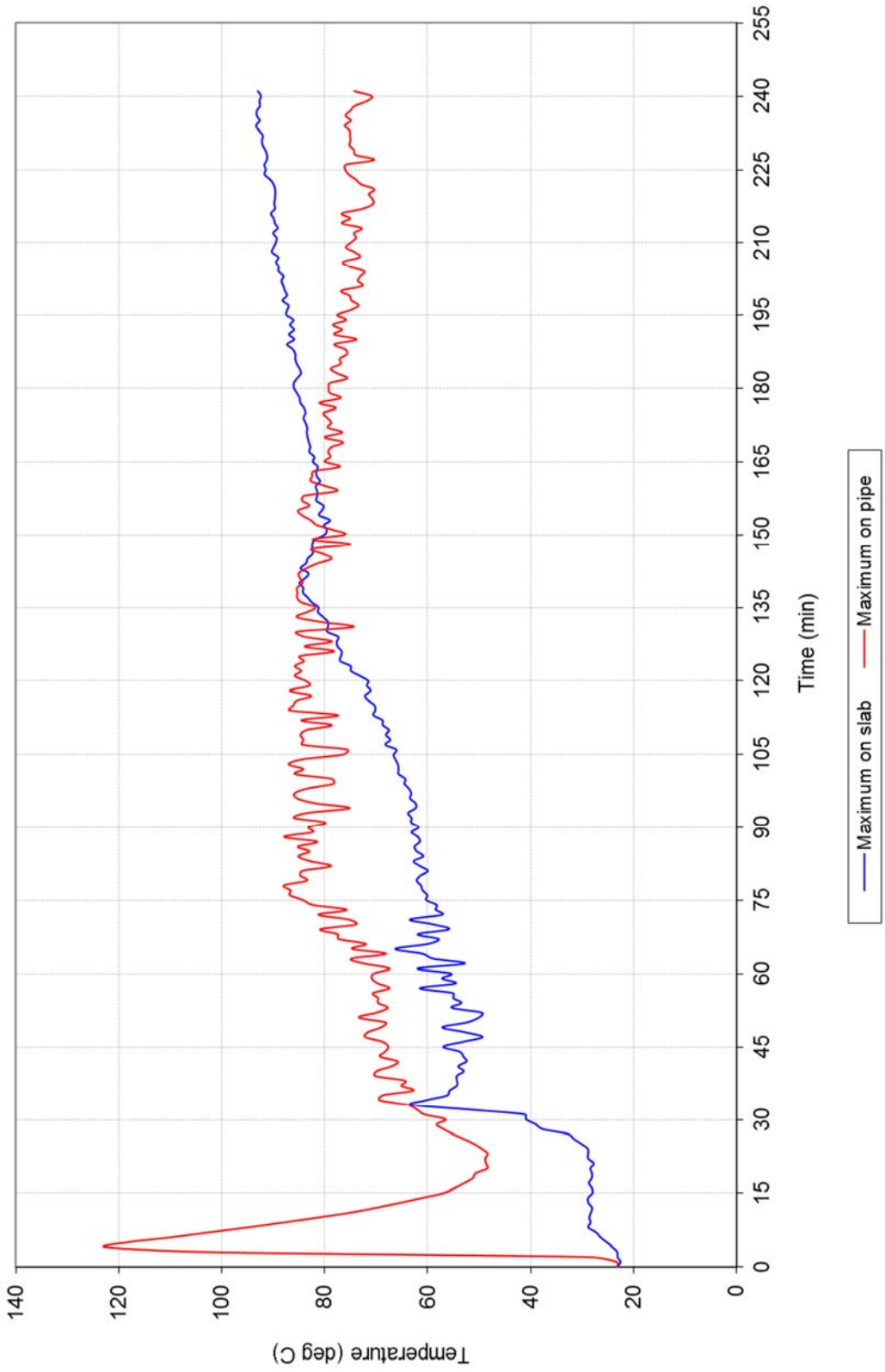


FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION 3

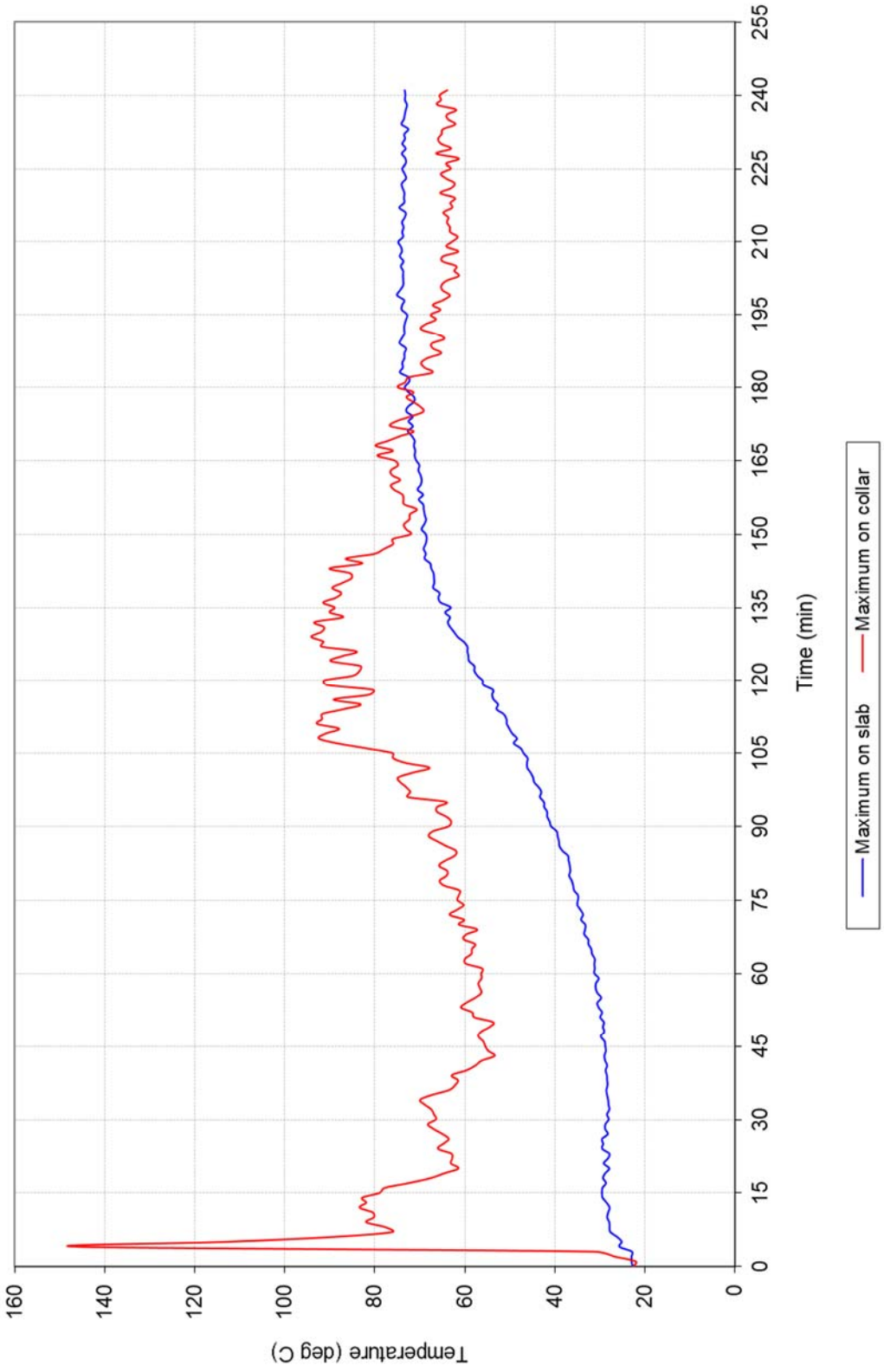
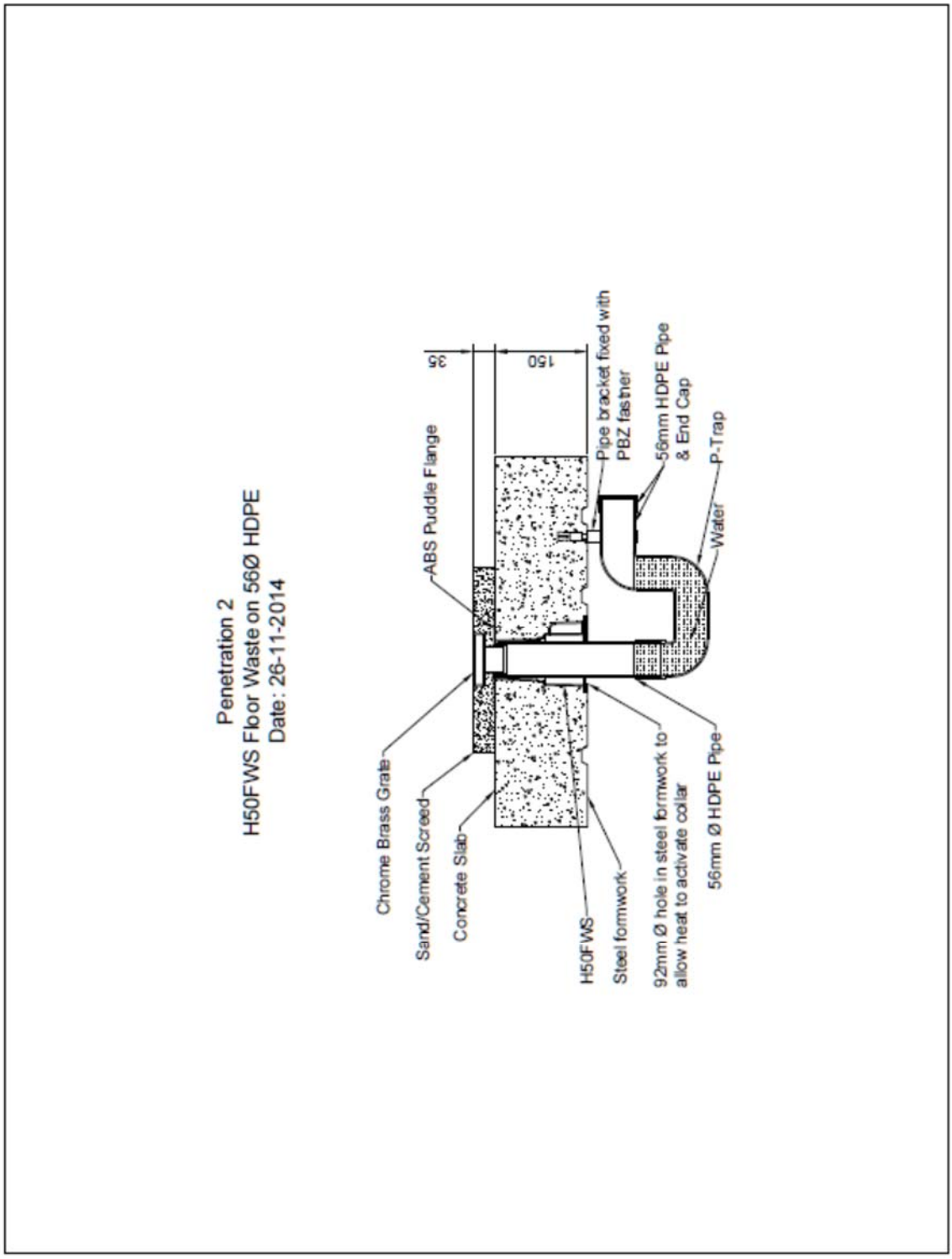
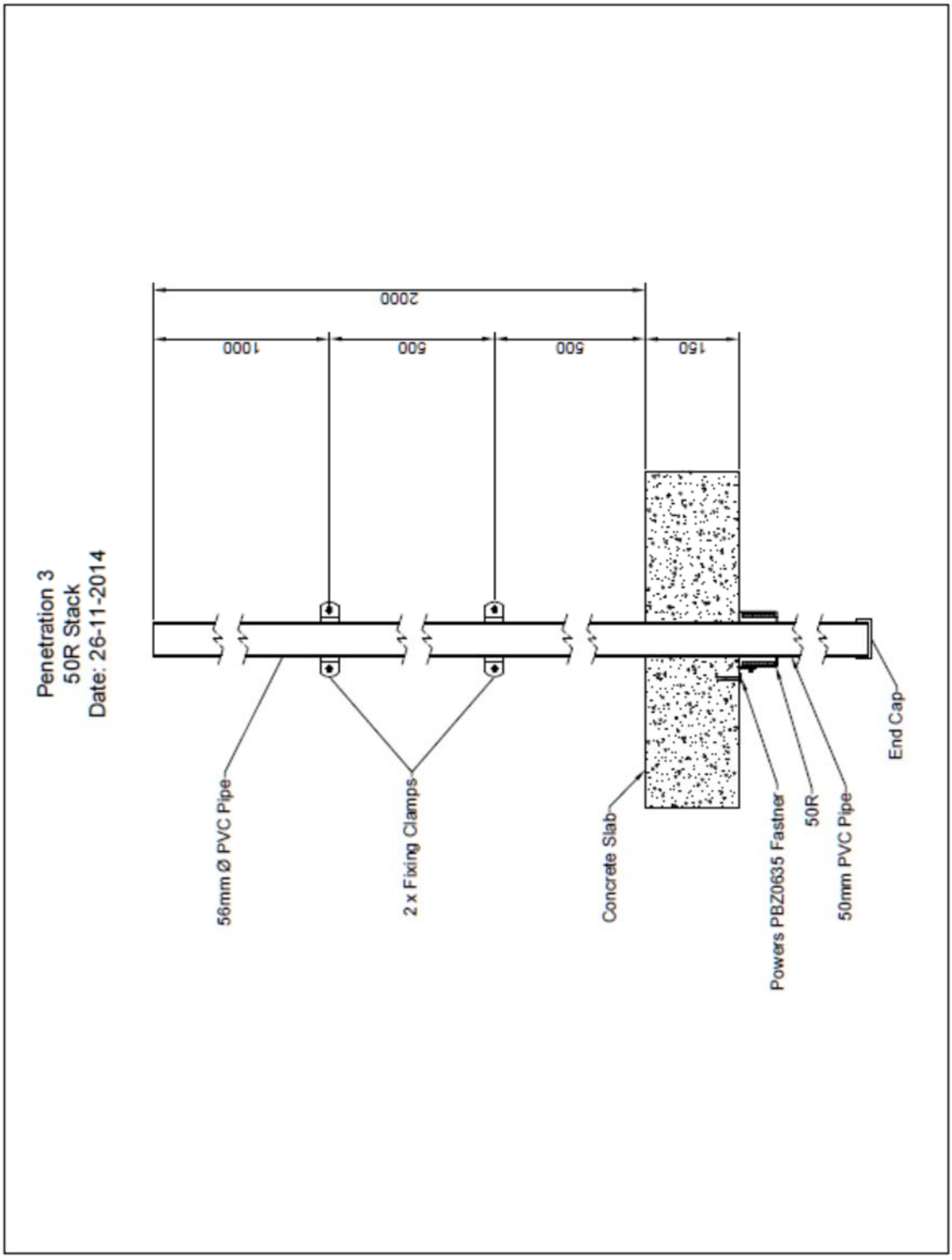


FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION 4

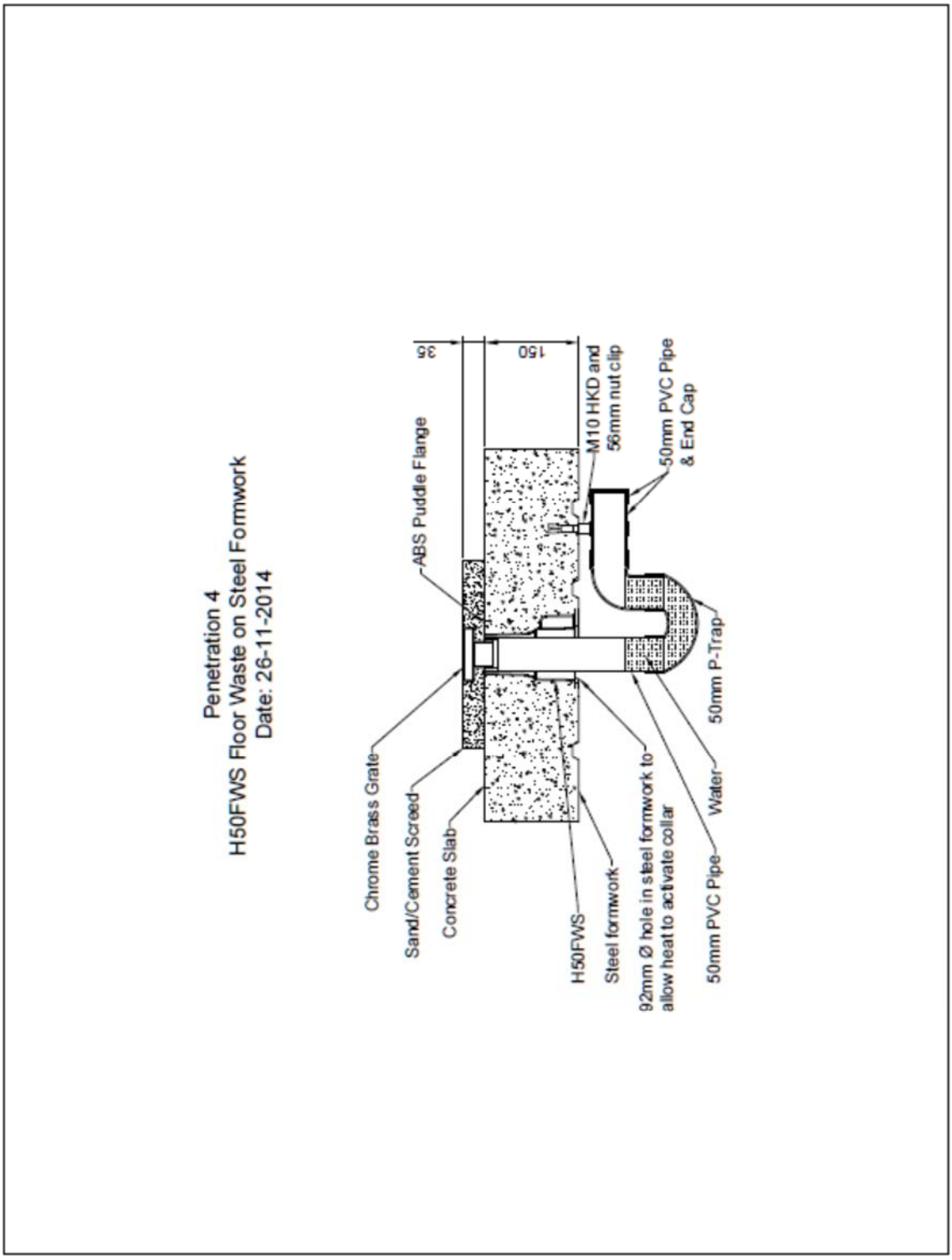
Appendix D – Installation drawings



DRAWING NUMBERED PENETRATION #2 – "H50 FWS FLOOR WASTE ON 56 Ø HDPE" DATED 26 NOVEMBER 2014, BY SNAP FIRE SYSTEMS PTY LTD

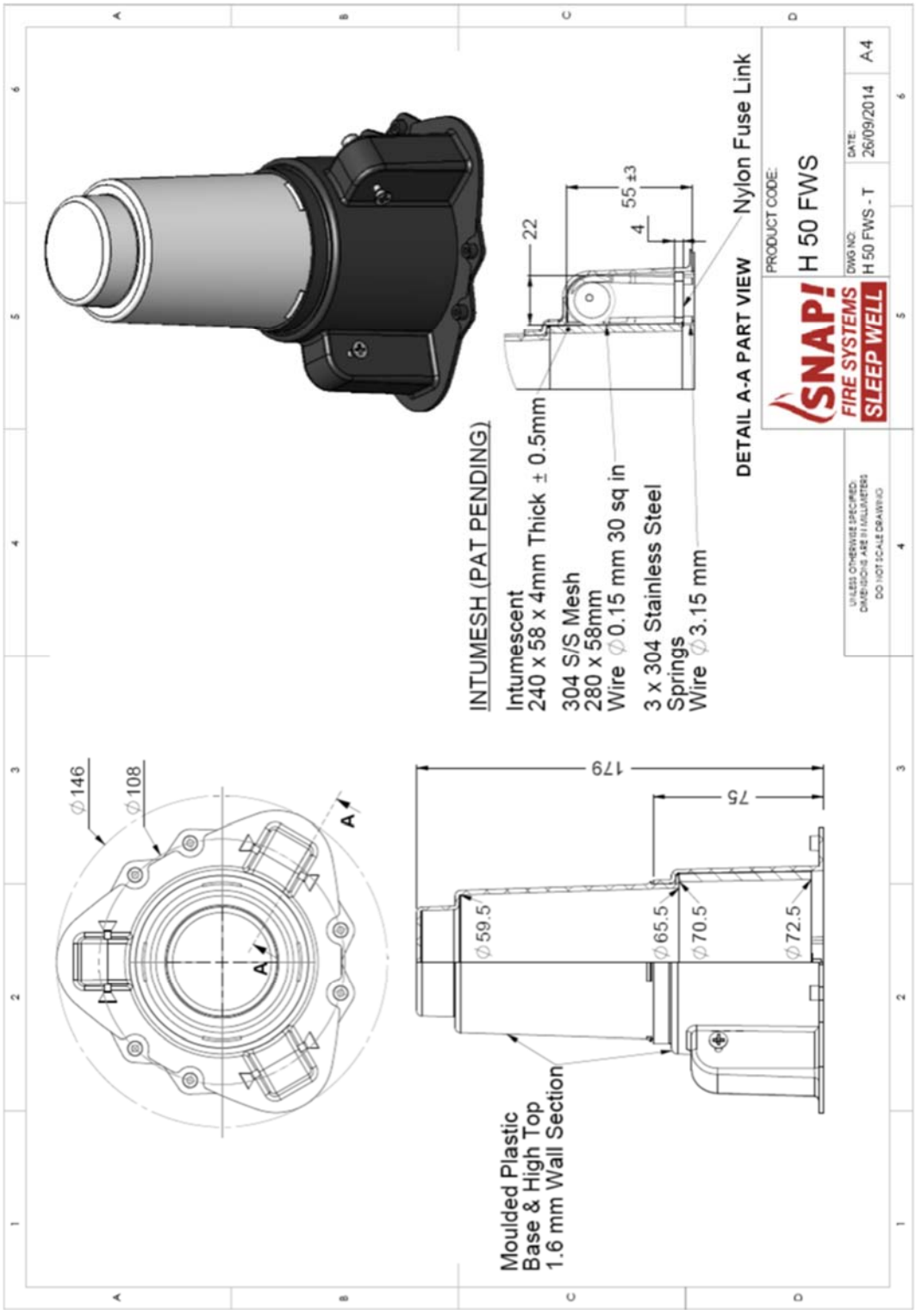


DRAWING NUMBERED PENETRATION #3 – "50 R STACK" DATED 26 NOVEMBER 2014, BY SNAP FIRE SYSTEMS PTY LTD

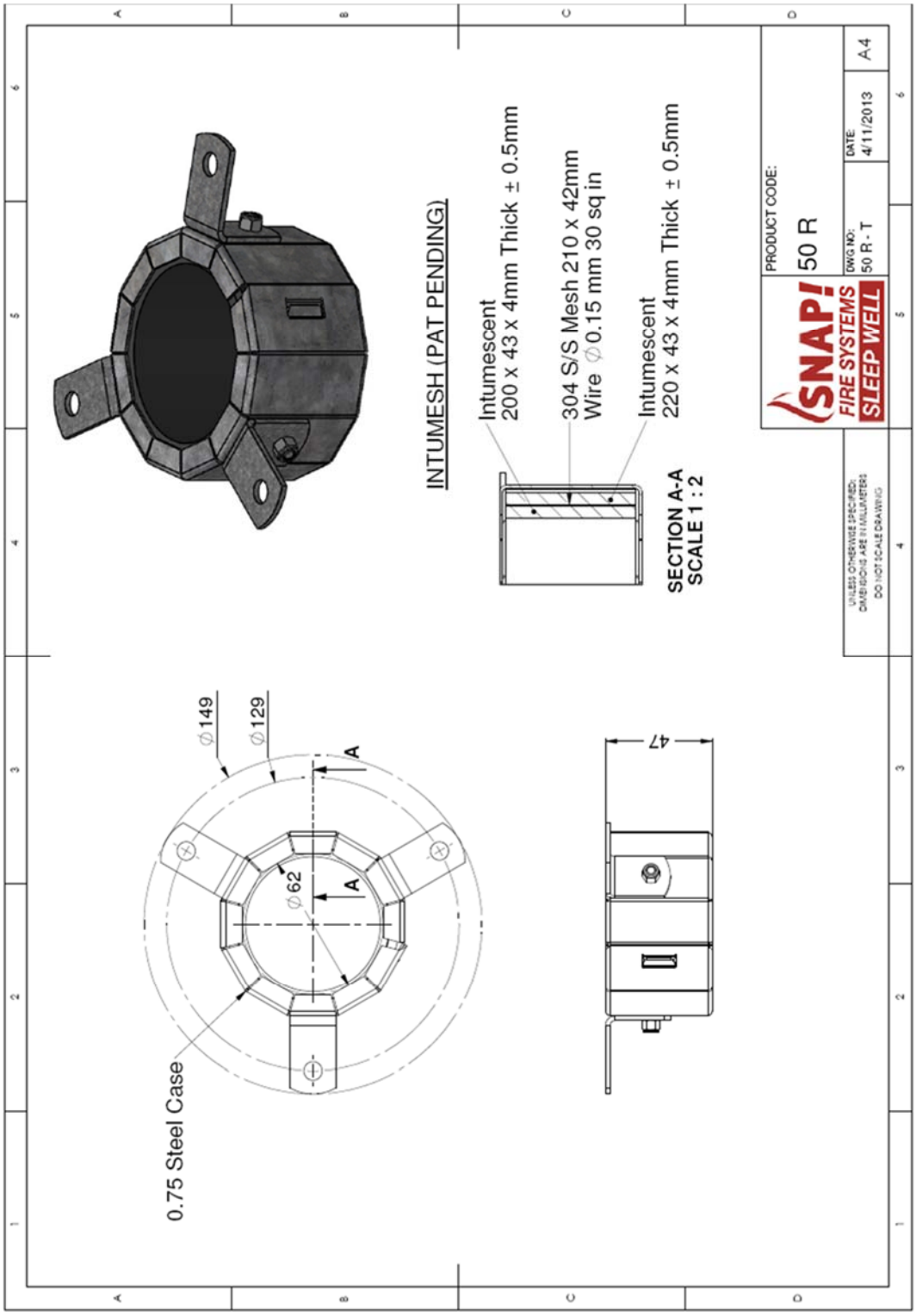


DRAWING NUMBERED PENETRATION #4 – "H50 FWS FLOOR WASTE ON STEEL FORMWORK" DATED 26 NOVEMBER 2014, BY SNAP FIRE SYSTEMS PTY LTD

Appendix E – Specimen Drawings



DRAWING NUMBERED H 50 FWS-T DATED 26 SEPTEMBER 2014, BY SNAP FIRE SYSTEMS



DRAWING NUMBERED 50 R-T DATED 4 NOVEMBER 2013, BY SNAP FIRE SYSTEMS

References

The following informative documents are referred to in this Report:

AS 1530.4-2005	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.

Appendix F – Certificates

COPY OF CERTIFICATE OF TEST – NO. 2650

COPY OF CERTIFICATE OF TEST – NO. 2651

COPY OF CERTIFICATE OF TEST – NO. 2652

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Certificate of Test

No. 2650

This is to certify that the element of construction described below was tested by the CSIRO Division of Materials Science and Engineering in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2005 on behalf of:

Snap Fire Systems Pty Ltd
Unit 2/160 Redland Bay Road
CAPALABA QLD

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1686.

Product Name: Penetration 2 – H 50 FWS cast-in fire collar protecting a 56-mm diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste

Description: The specimen comprised an 1150-mm x 1150-mm x 150-mm thick Stramit Condeck HP composite steel and reinforced concrete slab penetrated by four (4) floor wastes and one (1) stack pipe protected by cast-in and retrofit Snap Fire System fire collars. The Stramit Condeck HP composite steel and reinforced concrete slab was stated to have a Fire-resistance level FRL of 180/180/180. 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
- EN 1519-1:2000 - Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Polyethylene (PE). Specifications for pipes, fittings and the system

For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4 and 5. Only one (1) specimen, referenced as Penetration 2, is included in this Certificate.

The SNAP cast-in H 50 FWS fire collar comprised a 1.6-mm thick polypropylene casing with a 70.5-mm inner diameter and a 146-mm diameter base flange. The 75-mm high collar casing incorporated a 240-mm x 58-mm x 4-mm thick Intumesh intumescent material. The closing mechanism incorporated three stainless steel springs, with nylon fuse links and a 280-mm x 58-mm stainless steel mesh as shown in drawing numbered H 50 FWS-T dated 26 September 2014, by SNAP Fire Systems. The penetrating service comprised a 56-mm outer diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste, with a wall thickness of 4-mm fitted through the H 50 FWS Snap fire collar. The floor waste system was fitted with a chromed brass floor waste grate through a 92-mm OD hole drilled into the steel formwork of the slab to accommodate the penetrating service. A 35-mm thick cement screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 56-mm OD PVC HDPE gully trap was connected to the penetrating pipe, supported by a steel pipe bracket fixed to the concrete slab with steel wedge anchors. On the exposed face, the gully trap was capped using a HDPE end cap. The floor waste gully was charged with water to level shown in drawing titled "Penetration #2 H50 FWS Floor Waste on 56 Ø HDPE", dated 26 November 2014, by Snap Fire Systems Pty Ltd.

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 -/180/180. The FRL is applicable for exposure to the fire from the same direction as tested.

This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara-Ledermann Date of Test: 26 November 2014

Issued on the 6th day of August 2015 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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Certificate of Test

No. 2651

This is to certify that the element of construction described below was tested by the CSIRO Division of Materials Science and Engineering in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2005 on behalf of:

Snap Fire Systems Pty Ltd
Unit 2/160 Redland Bay Road
CAPALABA QLD

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1686.

Product Name: Penetration 3 – 50 R retrofitted fire collar protecting a 56-mm diameter Polyvinyl Chloride (PVC) stack pipe

Description: The specimen comprised an 1150-mm x 1150-mm x 150-mm thick Stramit Condeck HP composite steel and reinforced concrete slab penetrated by four (4) floor wastes and one (1) stack pipe protected by cast-in and retrofit Snap Fire System fire collars. The Stramit Condeck HP composite steel and reinforced concrete slab was stated to have a Fire-resistance level FRL of 180/180/180.

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
- EN 1519-1:2000 - Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Polyethylene (PE). Specifications for pipes, fittings and the system

For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4 and 5. Only one (1) specimen, referenced as Penetration 3, is included in this Certificate.

The SNAP Retrofit 50 R fire collar comprised a 0.75-mm steel casing with a 62-mm inner diameter and three fixing brackets fixed onto the collar casing. The 47-mm high collar casing incorporated 200-mm x 43-mm x 4-mm thick Intumesh intumescent material and a 210-mm x 42-mm stainless steel mesh as shown in drawing numbered 50 R-T dated 4 November 2013, by SNAP Fire Systems. The collar was fixed to the underside of the slab with 3 brackets with Steel Wedge Anchors. The penetrating service comprised a 56-mm OD PVC pipe, with a wall thickness of 2.5-mm fitted through the collar's sleeve. The pipe projected vertically, 2000-mm above the concrete slab. The pipe was supported at 500-mm and 1000-mm from the unexposed face of the concrete slab as shown in drawing titled "Penetration #3 – 50 R Stack" dated 26 November 2014, by Snap Fire Systems Pty Ltd. On the exposed end, the pipe was capped with a PVC end cap.

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 -/180/180. The FRL is applicable for exposure to the fire from the same direction as tested.

This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara-Ledermann Date of Test: 26 November 2014

Issued on the 6th day of August 2015 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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Certificate of Test

No. 2652

This is to certify that the element of construction described below was tested by the CSIRO Division of Materials Science and Engineering in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2005 on behalf of:

Snap Fire Systems Pty Ltd
Unit 2/160 Redland Bay Road
CAPALABA QLD

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1686.

Product Name: Penetration 4 – H 50 FWS cast-in fire collar protecting a 56-mm diameter Polyvinyl Chloride (PVC) pipe incorporating a floor waste

Description: The specimen comprised an 1150-mm x 1150-mm x 150-mm thick Stramit Condeck HP composite steel and reinforced concrete slab penetrated by four (4) floor wastes and one (1) stack pipe protected by cast-in and retrofit Snap Fire System fire collars. The Stramit Condeck HP composite steel and reinforced concrete slab was stated to have a Fire-resistance level FRL of 180/180/180.
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
- EN 1519-1:2000 - Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Polyethylene (PE). Specifications for pipes, fittings and the system

For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4 and 5. Only one (1) specimen, referenced as Penetration 4, is included in this Certificate.

The SNAP cast-in H 50 FWS fire collar comprised a 1.6-mm thick polypropylene casing with a 70.5-mm inner diameter and a 146-mm diameter base flange. The 75-mm high collar casing incorporated a 240-mm x 58-mm x 4-mm thick Intumesh intumescent material. The closing mechanism incorporated three stainless steel springs, with nylon fuse links and a 280-mm x 58-mm stainless steel mesh as shown in drawing numbered H 50 FWS-T dated 26 September 2014, by SNAP Fire Systems. The penetrating service comprised a 56-mm OD Polyvinyl Chloride (PVC) pipe, with a wall thickness of 2.5-mm fitted through the H 50 FWS Snap fire collar. The floor waste system was fitted with a chromed brass floor waste grate through a 92-mm OD hole drilled into the steel formwork of the slab to accommodate the penetrating service. A 35-mm thick cement screed was laid on top of the concrete slab and finished flush with the floor grate. On the exposed side of the slab, a 56-mm OD PVC gully trap was connected to the penetrating pipe, supported by a M10 HKD and 56 mm nut clip to the concrete slab. On the exposed face, the gully trap was capped using a PVC end cap.
The floor waste gully was charged with water to the level shown in drawing titled "Penetration #4 H50 FWS Floor Waste on Steel Formwork", dated 26 November 2014, by Snap Fire Systems Pty Ltd.

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 -/180/180. The FRL is applicable for exposure to the fire from the same direction as tested.

This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara-Ledermann Date of Test: 26 November 2014

Issued on the 6th day of August 2015 without alterations or additions.

B. Roddy

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FOR FURTHER INFORMATION

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