FIRE-RESISTANCE TEST ON FIRE COLLARS PROTECTING A CONCRETE SLAB PENETRATED BY SERVICES

Report number FSP 1592
CSIRO job number SP3648
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Client
SNAP FIRE SYSTEMS PTY LTD.

Commercial-in-confidence

CSIRO – MATERIALS SCIENCE AND ENGINEERING
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113
Ph: 02 9490 5444 Fax: 02 9490 5528

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SPONSORED INVESTIGATION No. FSP 1592

FIRE-RESISTANCE TEST ON FIRE COLLARS PROTECTING A CONCRETE SLAB PENETRATED BY SERVICES

SUMMARY

IDENTIFICATION OF SPECIMEN:

The sponsor identified the specimen as Snap Cast-in Fire Collars protecting a concrete slab penetrated by four floor waste systems and one stack pipe.

SPONSOR: Snap Fire Systems Pty Ltd
Unit 2-160 Redland Bay Road
CAPALABA QLD

MANUFACTURER: Snap Fire Systems Pty Ltd
Unit 2-160 Redland Bay Road
CAPALABA QLD

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.

REFERENCE STANDARD:

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

TEST NUMBER: FS 4358/3648

TEST DATE: The fire-resistance test was conducted on 29 May 2013.

DESCRIPTION OF SPECIMEN:

GENERAL

The specimen comprised a 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by four floor waste systems and one stack pipe protected by cast-in Snap Fire System fire collars.

For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4, and 5.

Penetration 1 – H 150 S cast-in fire collar protecting a 160-mm Rehau Raupiano pipe (slab incorporating a 35-mm thick concrete step)

The SNAP Cast-in H 160 S fire collar comprised a 2-mm thick polypropylene casing with a 179-mm inner diameter and a 267-mm diameter base flange. The 150-mm high collar casing incorporated a 588-mm x 110-mm x 6-mm thick intumescent material. The closing mechanism comprised four stainless steel springs, a nylon fuse link and a 640-mm x 109-mm stainless steel mesh as shown in drawing numbered H 150 S-T dated 11 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 160-mm OD Rehau Raupiano pipe, with a wall thickness of 4.2-mm fitted through the collar's sleeve. The pipe projected vertically, 2000-mm above the concrete slab and 500-mm into the furnace chamber. The pipe was supported at 500-mm and 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end using a Kaowool plug.

On the unexposed face, the narrow gap between the pipe and the slab was filled with 3M Fire Barrier Sealant IC 15WB+ sealant to a 10-mm depth.

The concrete slab comprised a 35-mm thick step around half the pipe, as shown in drawing titled "Penetration #1 160 RAUPIANO PLUS/Stack" dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Penetration 2 – LP 80R retrofitted fire collar protecting a 82-mm diameter Polyvinyl Chloride (PVC) pipe incorporating a floor waste

The SNAP Cast-in LP 80R fire collar fixed to the concrete slab with three 6.5/M5-35mm Dynabolts. The collar comprised a 0.95-mm thick Steel casing with a 92-mm inner diameter and a 114-mm outer diameter. The 62-mm high collar casing incorporated a 325-mm x 55-mm x 4-mm thick intumescent material. The closing mechanism comprised three stainless steel springs, a nylon fuse link and a 325-mm x 55-mm stainless steel mesh, as shown in drawing numbered LP 80 R-T-20LB, dated 10 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 82-mm OD PVC pipe, with a wall thickness of 3.2-mm fitted through the LP 80R Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 82-mm OD PVC gully trap was connected to the penetrating pipe, supported by a Saddle Clamp fixed to the concrete slab with 6.5/M5-35mm Dynabolts.

The floor waste gully was charged with water to the level shown in drawing titled "Penetration #2 80 PVC FW", dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Penetration 3 – H 150 S cast-in fire collar protecting a 110-mm Polyvinyl Chloride (PVC) pipe Sandwich Construction (SC) incorporating a floor waste

The SNAP Cast-in H 150 S fire collar comprised a 2-mm thick HDPE casing with a 179-mm inner diameter and a 267-mm diameter base flange. The 110-mm high collar casing incorporated a 588-mm x 110-mm x 6-mm thick intumescent material. The closing mechanism comprised four stainless steel springs, a nylon fuse link and a 640-mm x 109-mm stainless steel mesh, as shown in drawing numbered H 150 S-T, dated 11 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 110-mm OD PVC SC pipe, with a wall thickness of 3.2-mm fitted through the H 150 S Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 110-mm OD PVC gully trap was connected to the penetrating pipe, supported by M10 HKD clamp, fixed to the concrete slab, and M10 nut clip. On the exposed face, the floor waste gully was sealed using a PVC end cap.

The floor waste gully was charged with water to the level shown in drawing titled “Penetration #3 100 PVCsc FW” dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Penetration 4 – L 100 FWS cast-in fire collar protecting a 110-mm diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste

The SNAP Cast-in L 100 FWS fire collar comprised a 1.6-mm thick HDPE casing with a 110-mm inner diameter and a 182-mm diameter base flange. The 115-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick intumescent material. The closing mechanism comprised three stainless steel springs, a nylon fuse link and a 460-mm x 85-mm stainless steel mesh, as shown in drawing numbered L 100 FWS-T, dated 9 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 110-mm OD HDPE pipe, with a wall thickness of 4.7-mm fitted through the L 100 FWS Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 110-mm OD HDPE gully trap was connected to the penetrating pipe, supported by a Saddle Clamp fixed to the concrete slab with 6.5/M5-35mm Dynabolts. On the exposed face, the floor waste gully was sealed using a HDPE end cap.

The floor waste gully was charged with water to the level shown in drawing titled “Penetration #4 110 HDPE FW” dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Penetration 5 – 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 HDPE casing with a 71-mm inner diameter and a 108-mm diameter base flange. The 76-mm high collar casing incorporated a 240-mm x 58-mm x 4-mm thick intumescent material. The closing mechanism comprised three stainless steel springs, a nylon fuse link and a 280-mm x 58-mm stainless steel mesh, as shown in drawing numbered H 50 FWS-T dated 20 April 2013, by SNAP Fire Systems.

The penetrating service comprised a 56-mm OD HDPE pipe, with a wall thickness of 3.5-mm fitted through the H 50 FWS Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 HDPE gully trap was connected to the penetrating pipe, supported by a Saddle Clamp fixed to the concrete slab with 6.5/M5-35mm Dynabolts. On the exposed face, the floor waste gully was sealed using a HDPE end cap.

The floor waste gully was charged with water to the level shown in drawing titled “Penetration #5 56 HDPE FW”, dated 1 June 2013, by Snap Fire Systems Pty Ltd.

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.

ORIENTATION

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

CONDITIONING

The concrete slab was left to cure for a period of sixty three days.

DOCUMENTATION:

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

Drawing titled “Penetration #1 160 RAUPIANO PLUS/ Stack” dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #2 80 PVC FW” dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #3 100 PVCsc FW” dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #4 110 HDPE FW” dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #5 56 HDPE FW” dated 1 June 2013, by Snap Fire Systems Pty Ltd.

Drawing numbered H 50 FWS - T, dated 20 April 2013, by Snap Fire Systems Pty Ltd.

Drawing numbered L 100 FWS - T, dated 9 June 2013, by Snap Fire Systems Pty Ltd.

Drawing numbered LP 80 R - T - 20LB, dated 10 June 2013, by Snap Fire Systems Pty Ltd.

Drawing numbered H 150 S - T, dated 11 June 2013, by Snap Fire Systems Pty Ltd.

Confidential information about the test specimen has been submitted and is retained at CSIRO Materials Science and Engineering.

EQUIPMENT:

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.

TEMPERATURE

The temperature in the furnace chamber was measured by four type K, 3-mm diameter, 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 is shown in photograph #2 and described in the table in Appendix 1.

MEASUREMENT SYSTEM

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

AMBIENT TEMPERATURE:

The temperature of the test area was 17°C at the commencement of the test.

DEPARTURE FROM STANDARD:

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

TERMINATION OF TEST:

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

TEST RESULTS:

CRITICAL OBSERVATIONS

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

2 minutes -	Light smoke is being emitted from the base of the pipe of Penetration #1.
3 minutes -	Smoke emitted from Penetrations #3 and #4.
4 minutes -	Smoke is starting to flue from the end of pipe penetration #1.
5 minutes -	Smoke is emitted from penetrations #4 and #5.
10 minutes -	Smoke is no longer emitted from penetrations #1, #4 and #5.
13 minutes -	Smoke is no longer emitted from penetration #3.
60 minutes -	Moisture patches are forming on the unexposed face of the concrete slab.
107 minutes -	Smoke is being emitted from penetrations #2 & #4.
241 minutes -	Test terminated.

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.

SPECIMEN TEMPERATURE

Figure 2 shows the curve of maximum temperature versus time associated with Penetration #1.

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 #5.

PERFORMANCE

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

Penetration 1 – H 150 S cast-in fire collar protecting a 160-mm High Rehau Raupiano pipe slab incorporating a 35-mm thick concrete step)

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

Penetration 2 – LP 80R retrofitted fire collar protecting a 82-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

Penetration 3 – H 150 S cast-in fire collar protecting a 110-mm Polyvinyl Chloride (PVC) pipe Sandwich Construction (SC) incorporating a floor waste

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

Penetration 4 – L 100 FWS cast-in fire collar protecting a 110-mm 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 5 – H 50 FWS cast-in fire collar protecting a 56-mm 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

This report details methods of construction, the test conditions and the results obtained when 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.

FIRE-RESISTANCE LEVEL (FRL):

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

Penetration 1	-	-/240/240;
Penetration 2	-	-/240/240;
Penetration 3	-	-/240/240;
Penetration 4	-	-/240/240; and
Penetration 5	-	-/240/240.

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.

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 AS1530.4-2005, have been made provided no individual component is removed or reduced.

TESTED BY:

Mario Lara
Testing Officer
18 July 2013

Brett Roddy
Manager, Fire Testing and Assessments

APPENDICES

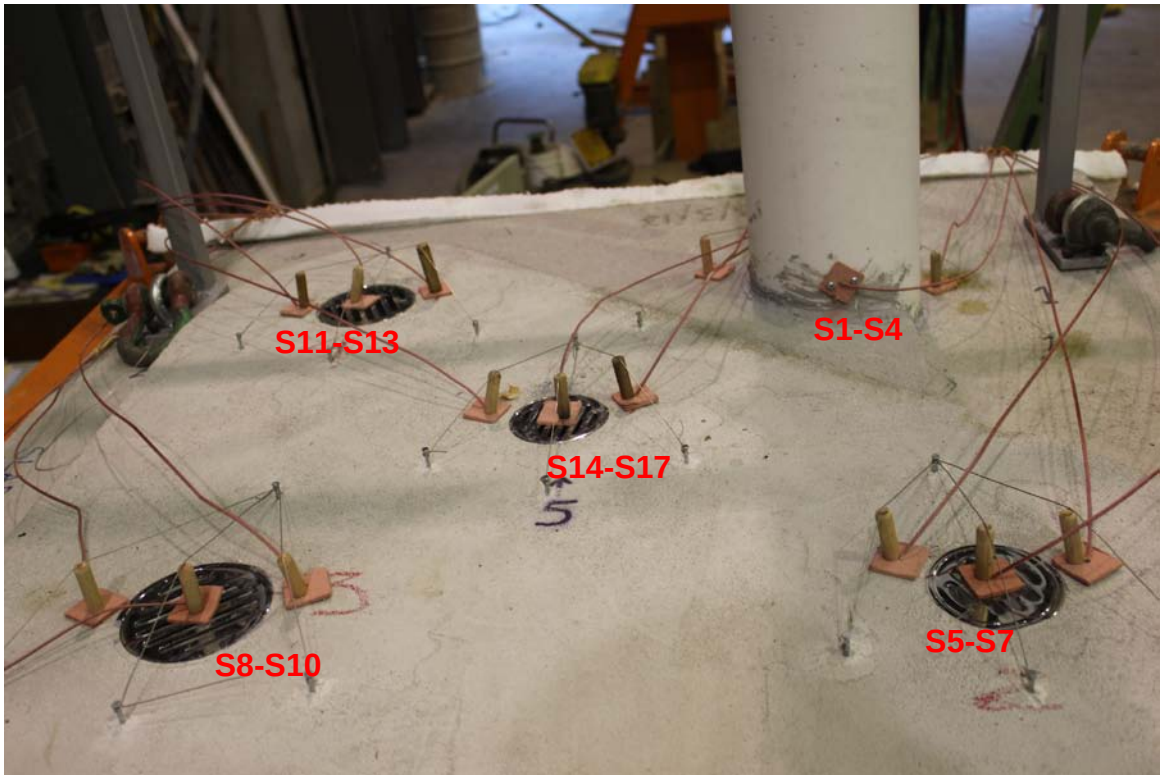
APPENDIX 1

Measurement Location		
Group location	**T/C Position**	**T/C designation**
Specimen		
Penetration 1	On slab - 25-mm from pipe	S1
	On 185-mm thick slab - 25-mm from pipe	S2
	On pipe - 25-mm from slab	S3
	On pipe - 25-mm from 185-mm thick slab	S4
Penetration 2	On slab - 25-mm from grate	S5
	On slab - 25-mm from grate	S6
	On floor grate	S7
Penetration 3	On slab - 25-mm from grate	S8
	On slab - 25-mm from grate	S9
	On floor grate	S10
Penetration 4	On slab - 25-mm from grate	S11
	On slab - 25-mm from grate	S12
	On floor grate	S13
Penetration 5	On slab - 25-mm from grate	S14
	On slab - 25-mm from grate	S15
	On floor grate	S16
	On pipe - 25-mm from slab	S17
	On pipe - 25-mm from slab	S18

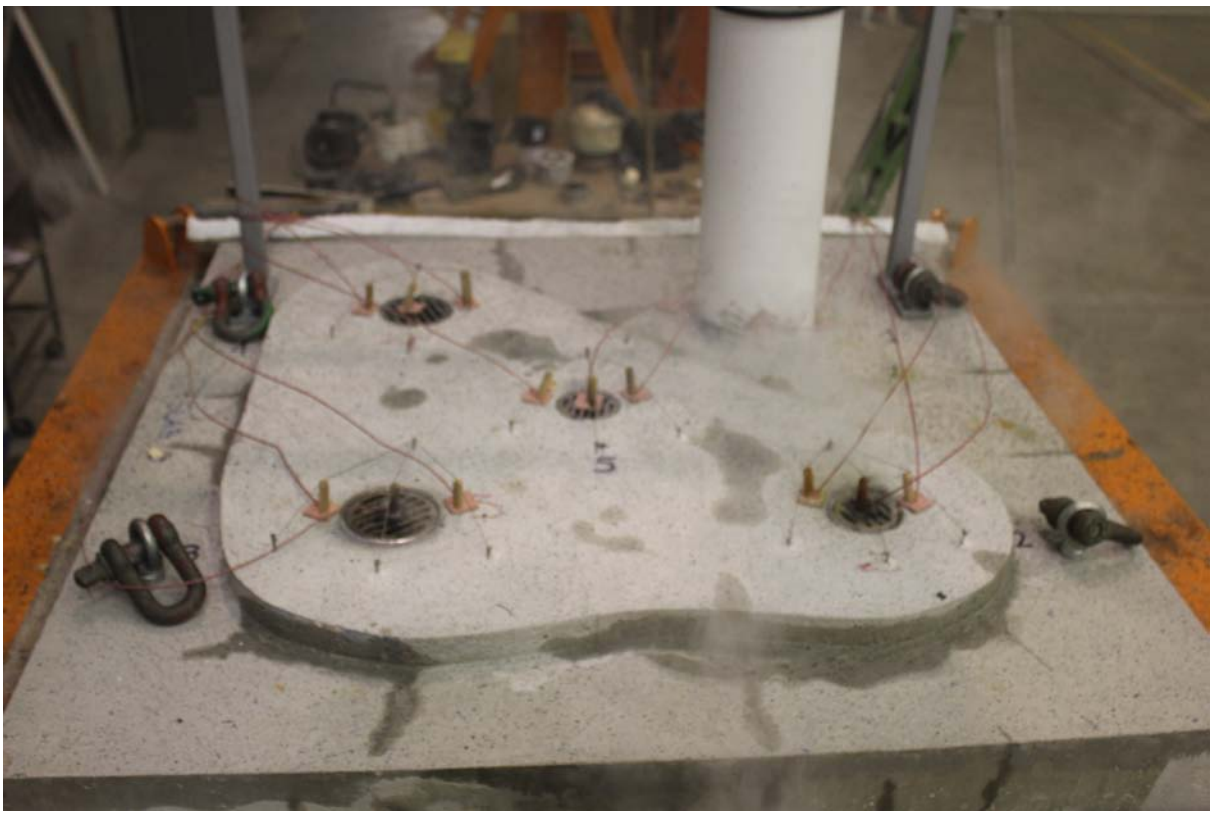
Table 1 – Specimen thermocouple positioning

APPENDIX 2

Photograph 1 – Exposed face of the specimen prior to testing

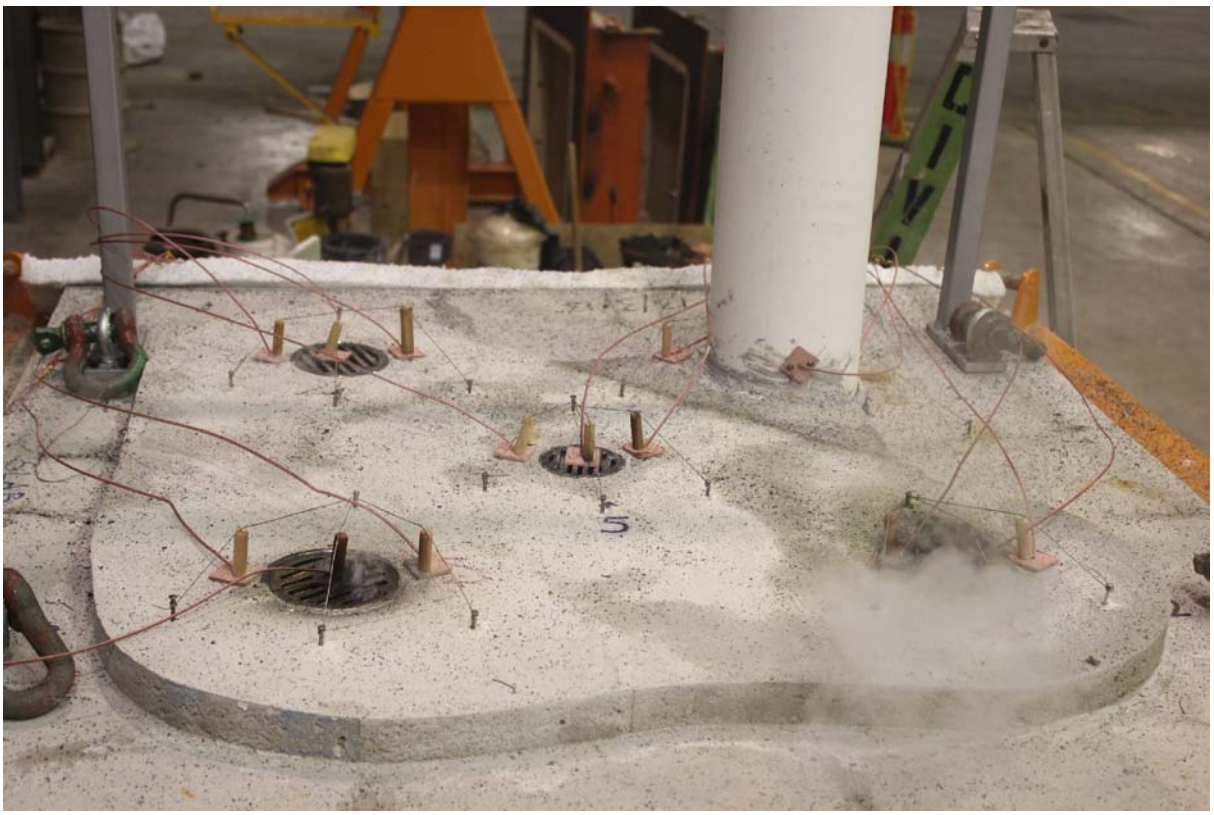


Photograph 2 – Unexposed face of the specimen prior to testing

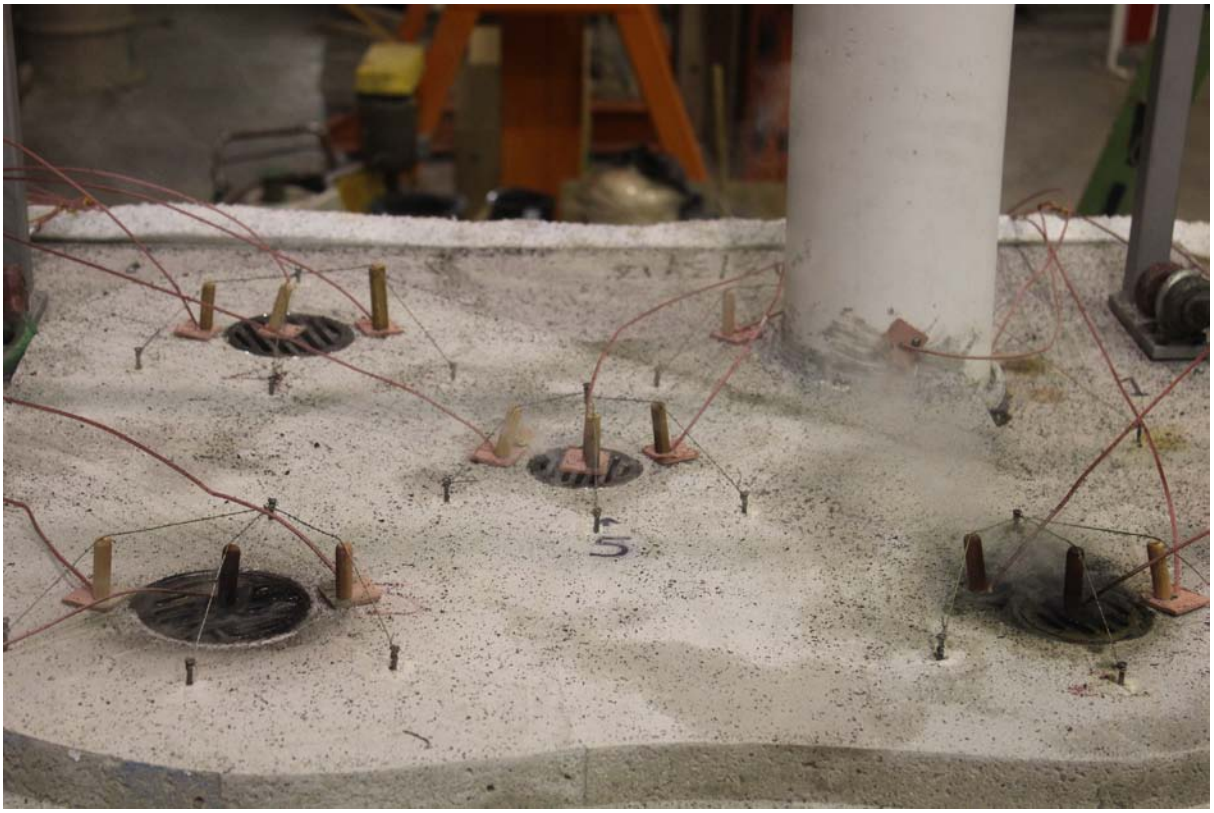


Photograph 3 – Specimens after 60 minutes of testing

Photograph 4 – Specimens after 120 minutes of testing



Photograph 5 – Specimens after 180 minutes of testing



Photograph 6 – Specimens after 240 minutes of testing

Photograph 7 – Exposed face of the specimens at the conclusion of testing

APPENDIX 3

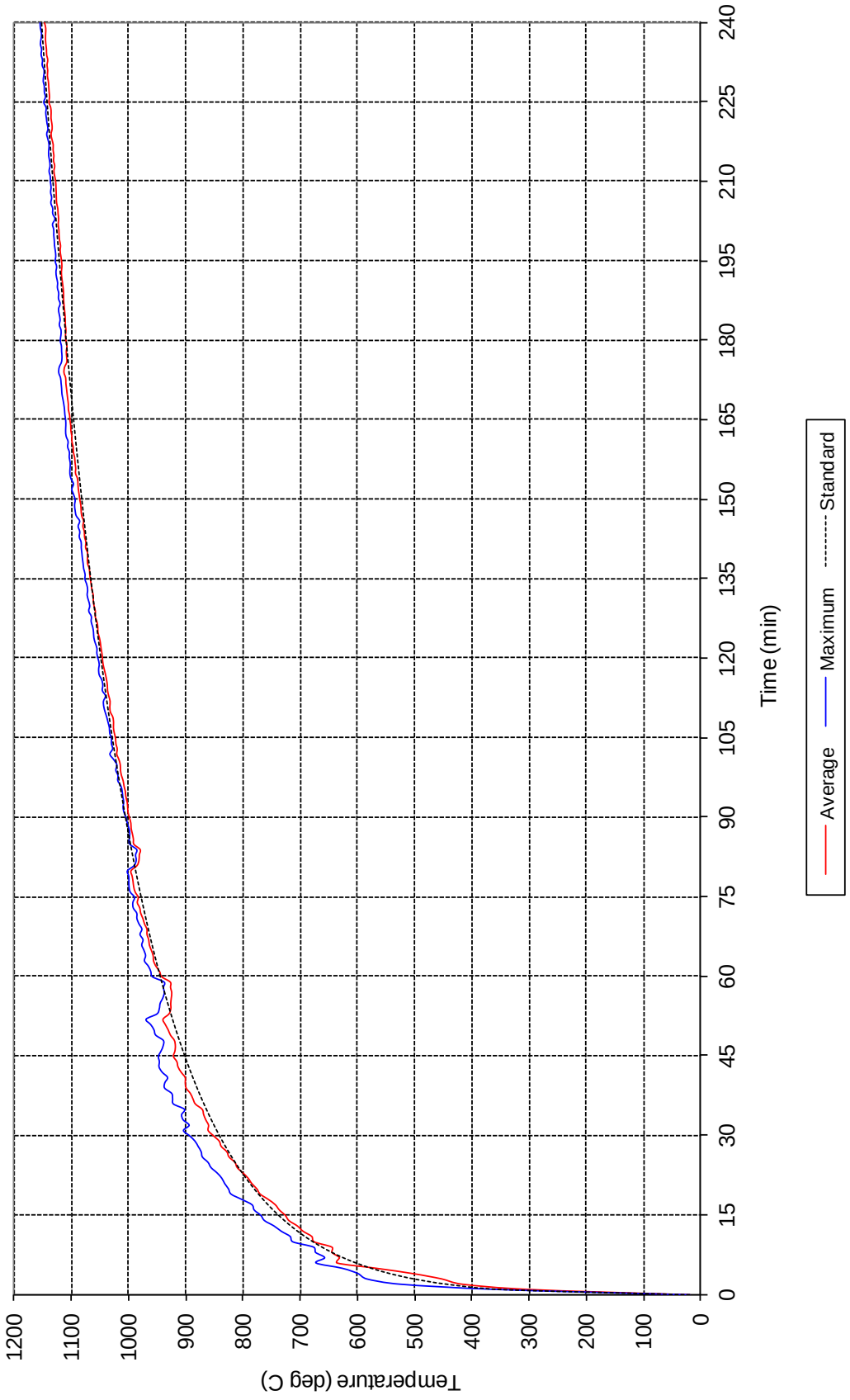


Figure 1 - Furnace temperature

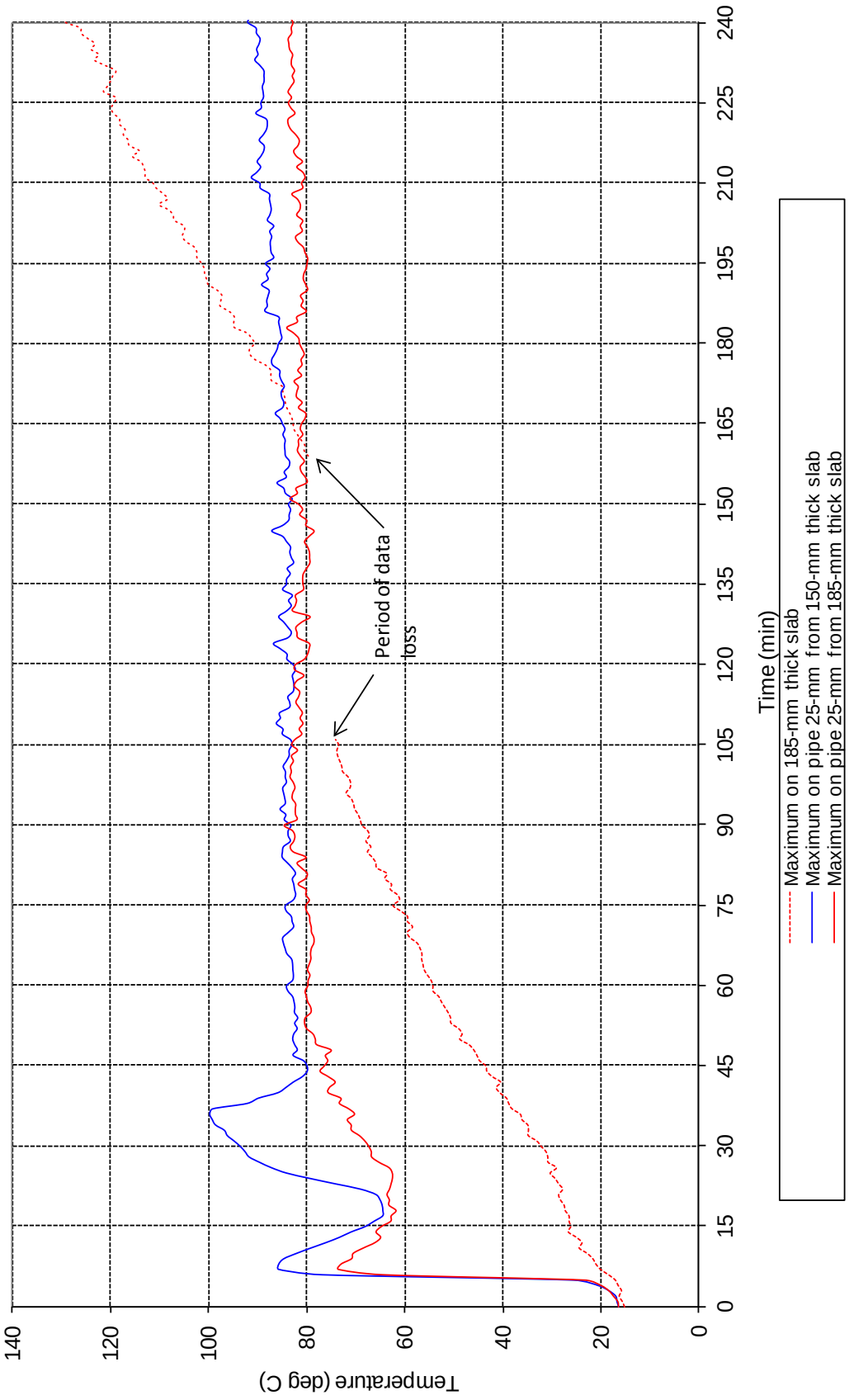


Figure 2 - Specimen temperature – Associated with Penetration 1

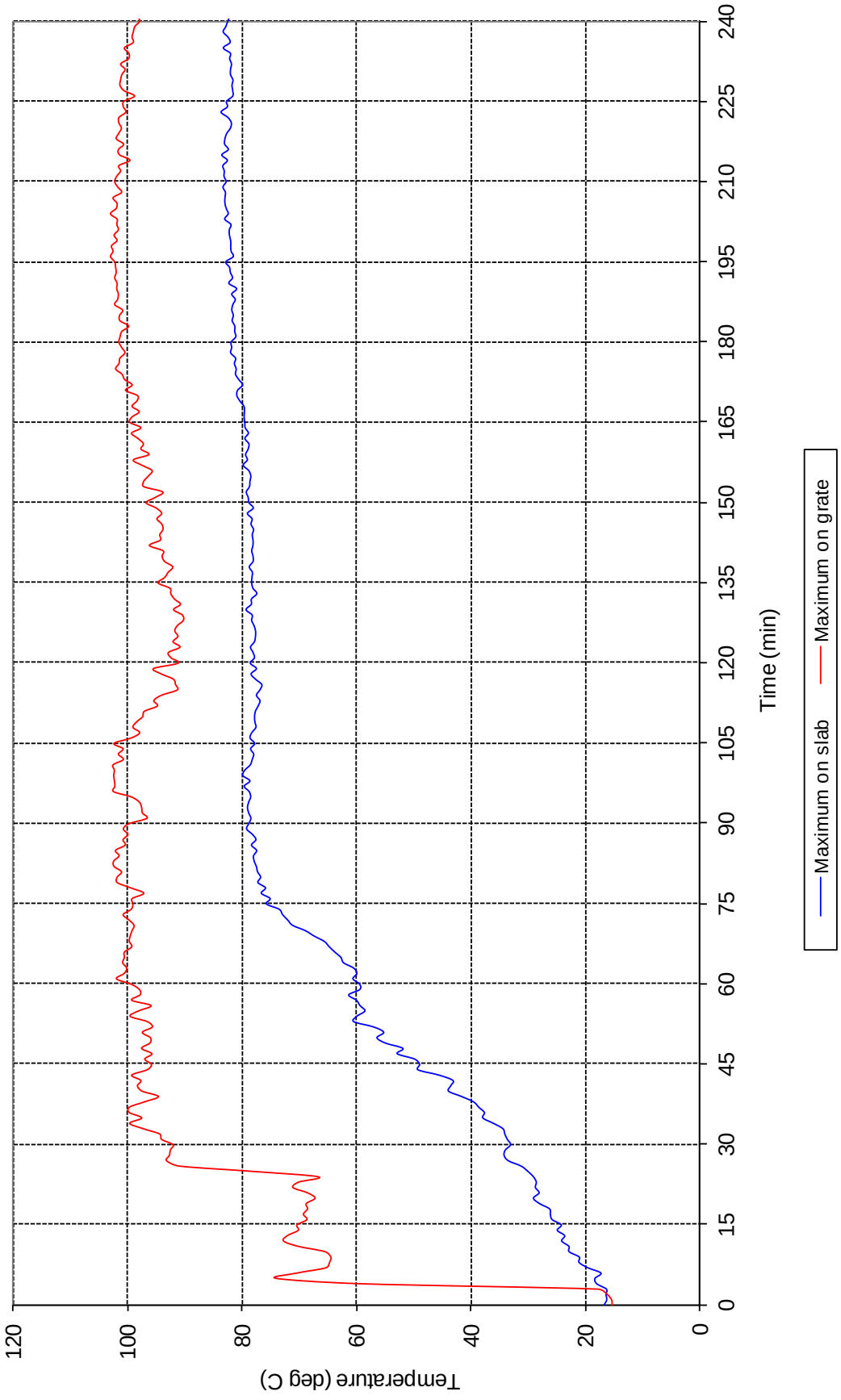


Figure 3 - Specimen temperature – Associated with Penetration 2

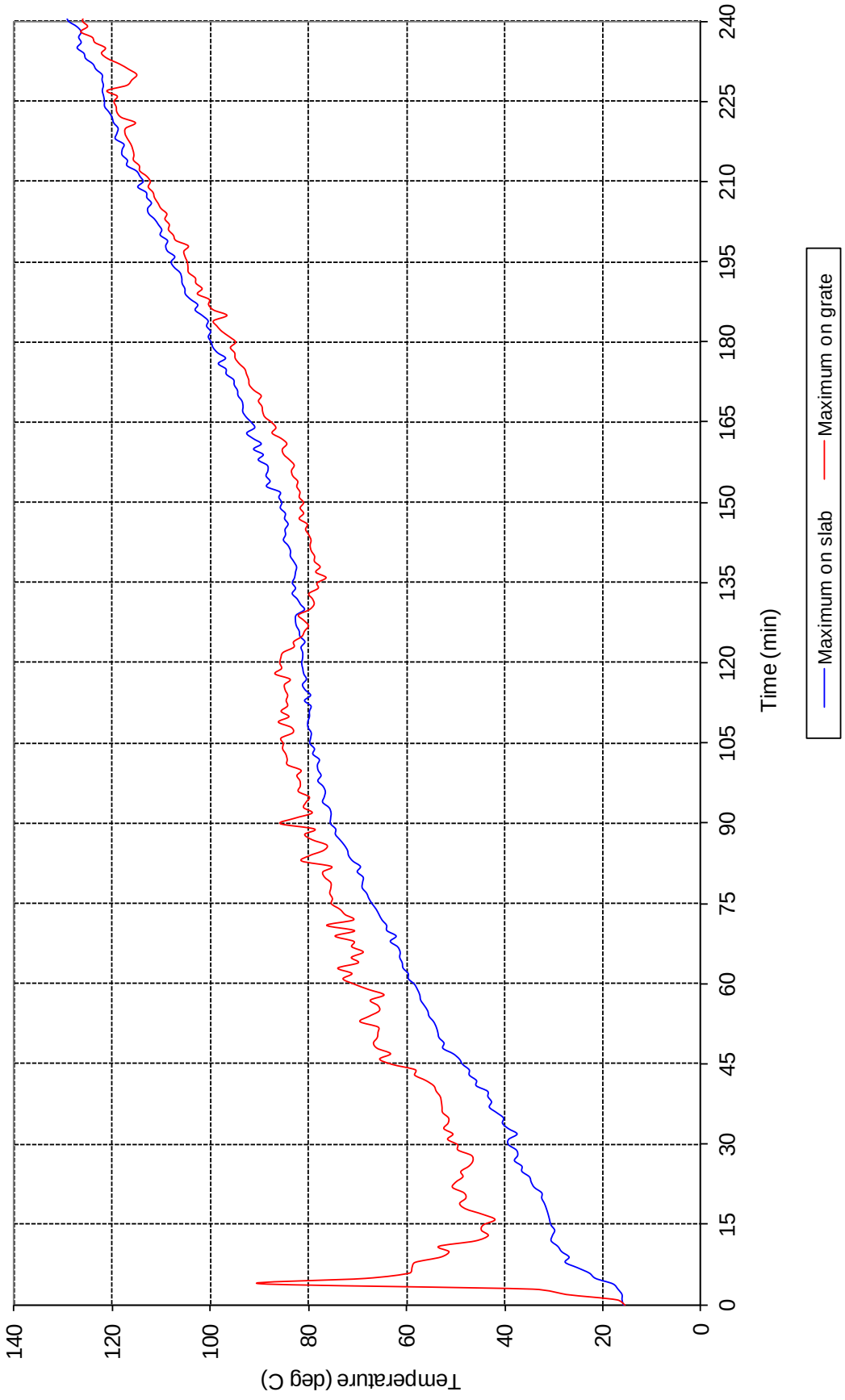


Figure 4 - Specimen temperature – Associated with Penetration 3

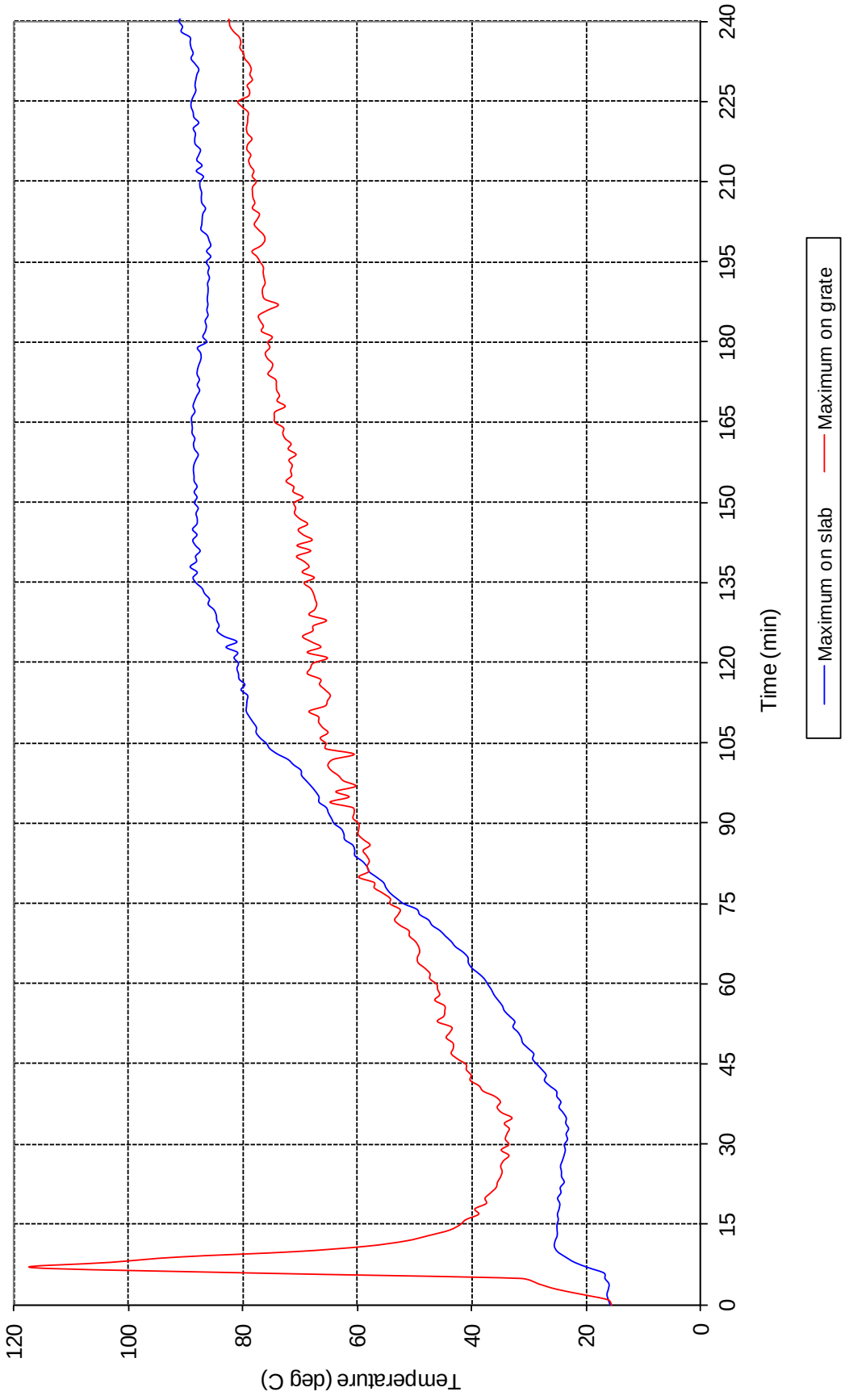


Figure 5 - Specimen temperature – Associated with Penetration 4

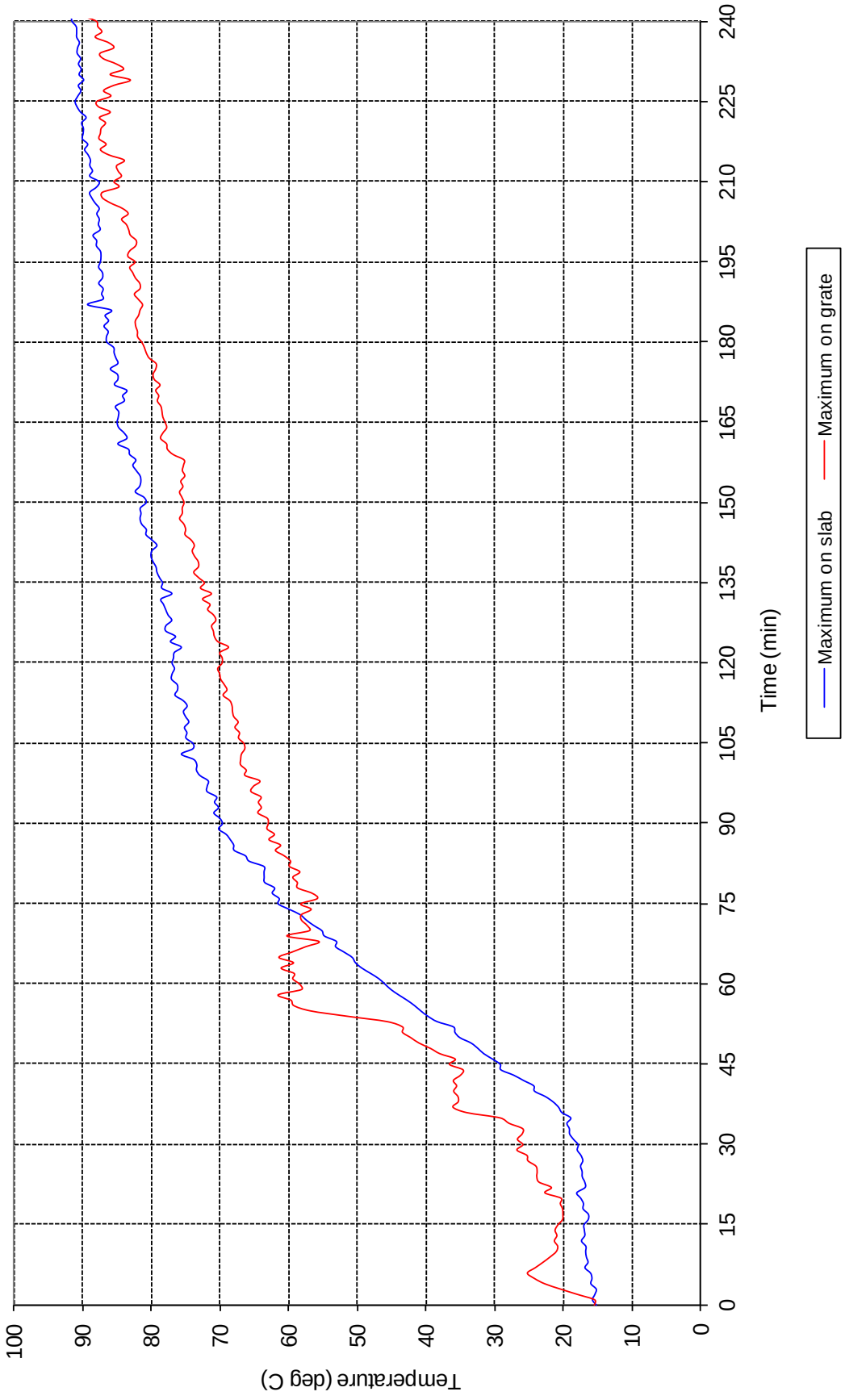
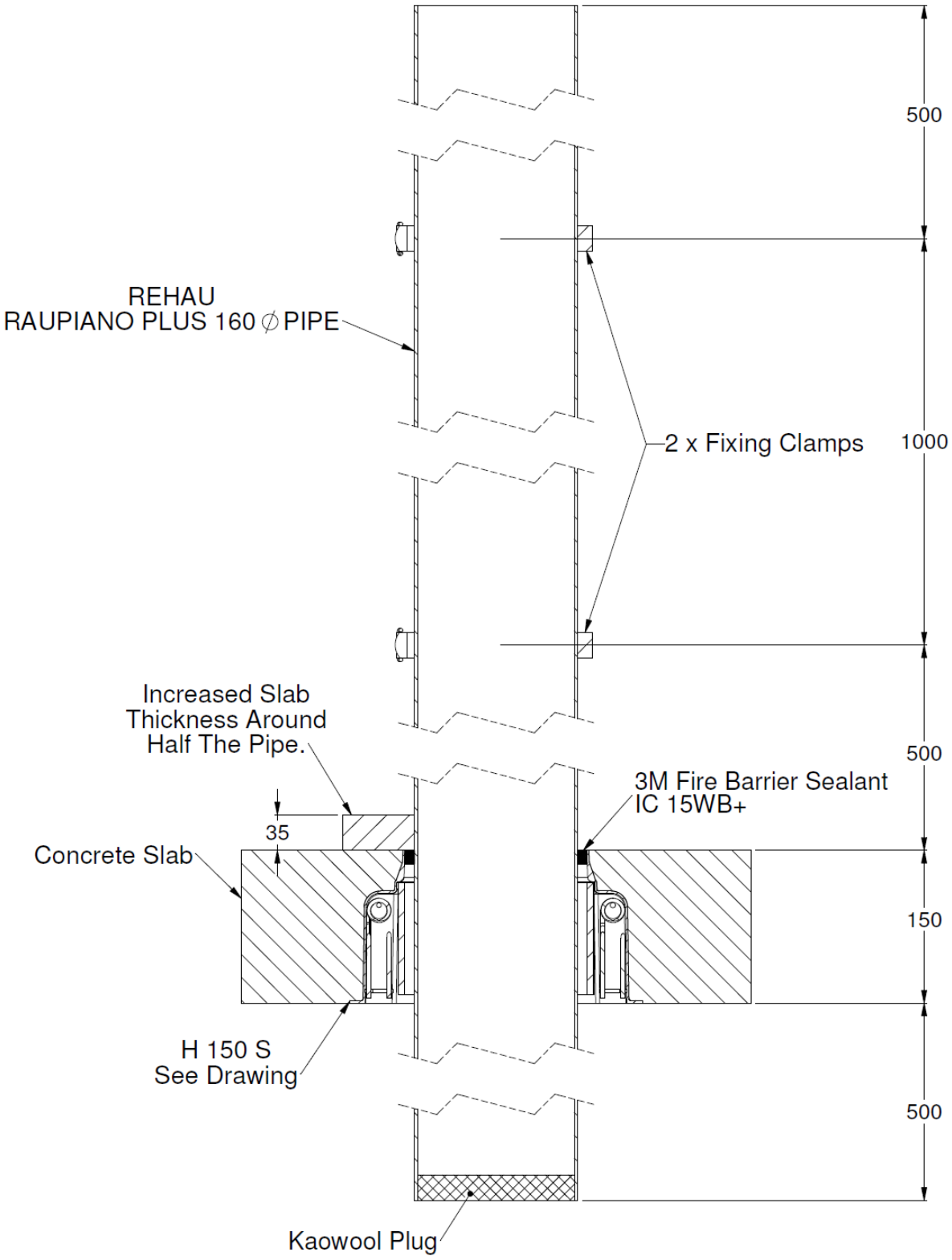


Figure 6 - Specimen temperature – Associated with Penetration 5

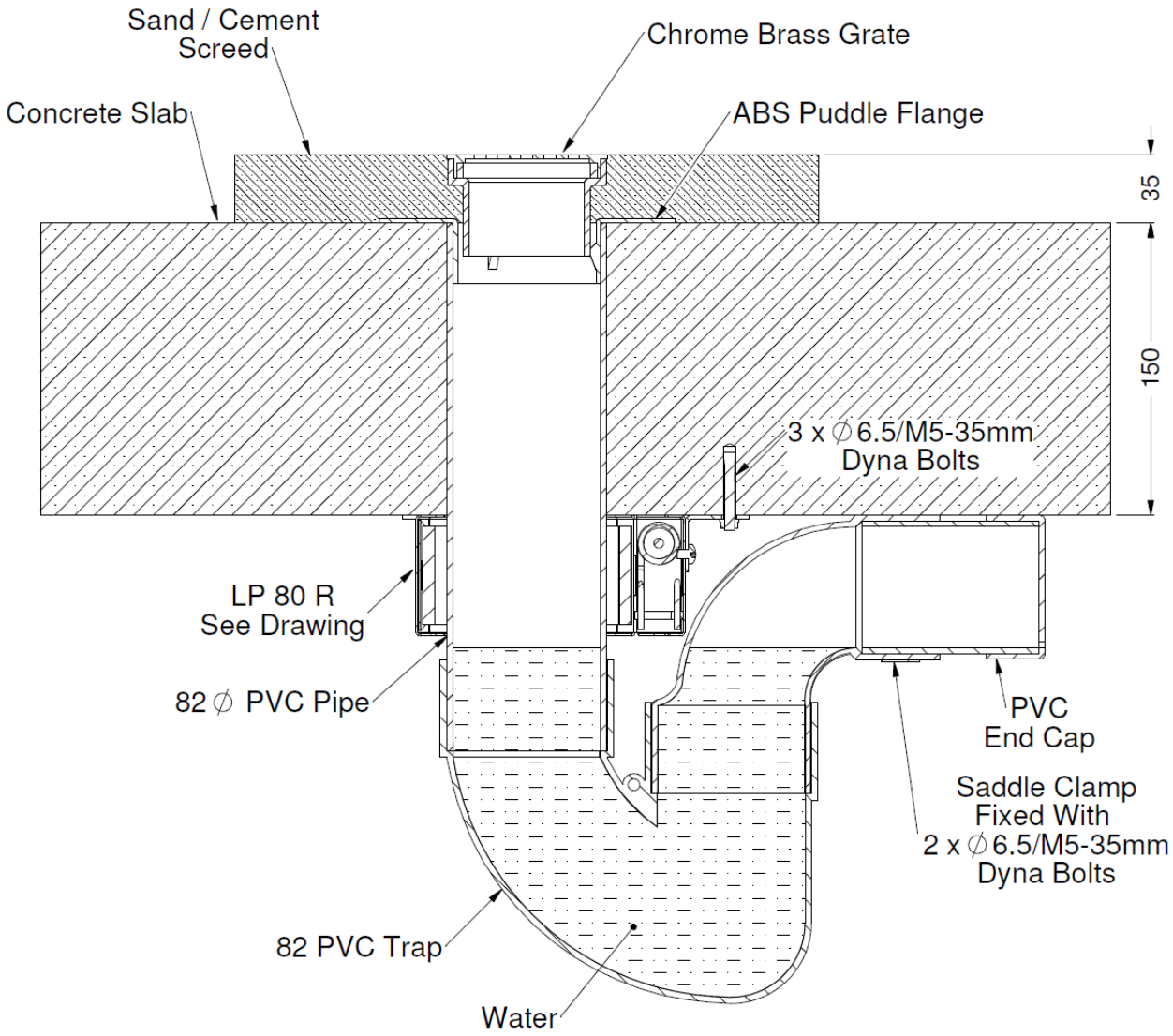
APPENDIX 4

Penetration #1
160 RAUPIANO PLUS/Stack - Date 01/06/2013



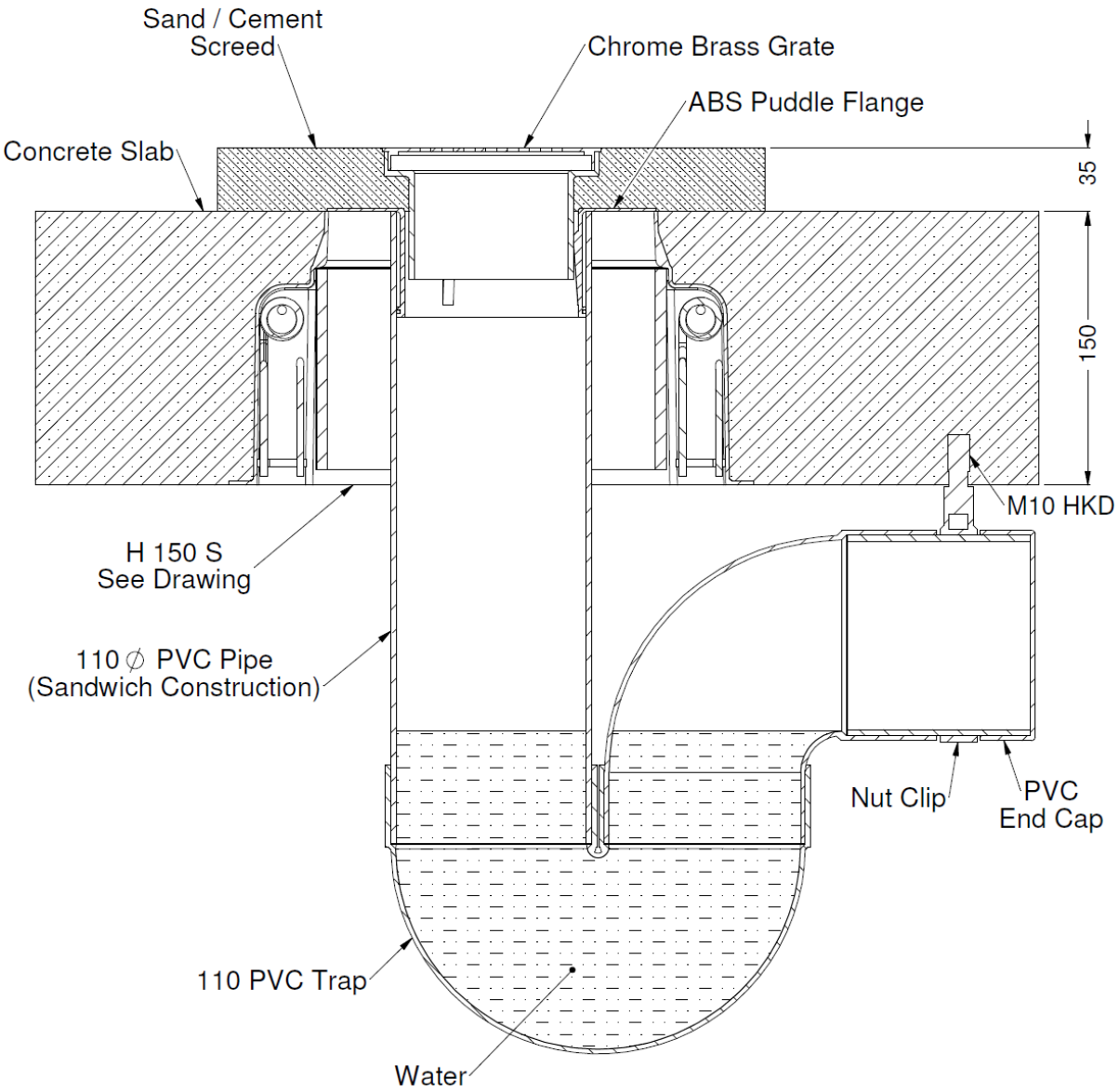
Drawing titled “Penetration #1 160 RAUPIANO PLUS/Stack”, dated 1 June 2013

Penetration #2
80 PVC FW - Date 01-06-2013



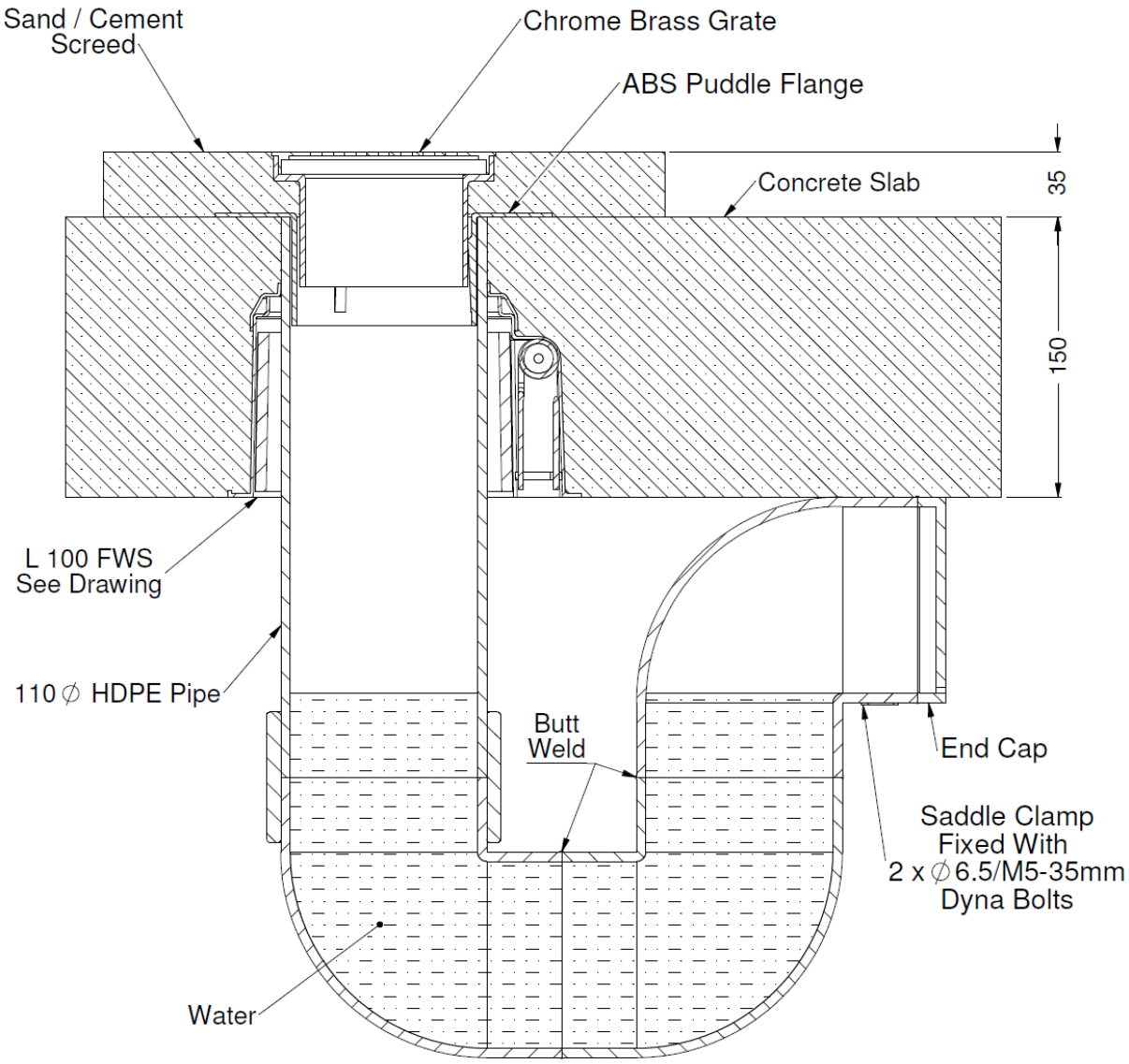
Drawing titled “Penetration #2 80 PVC FW”, dated 1 June 2013

Penetration #3
100 PVCsc FW - Date 01-06-2013



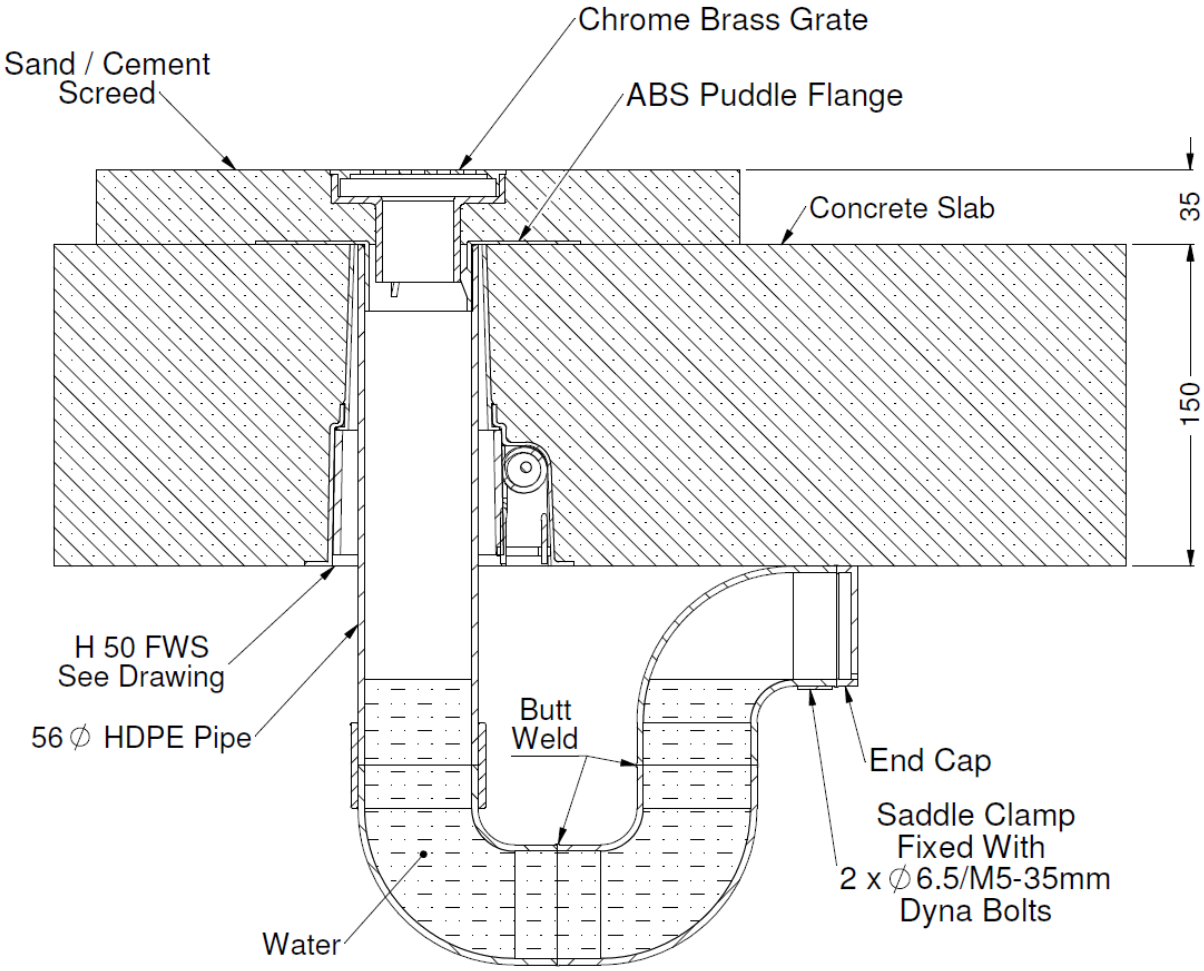
Drawing titled “Penetration #3 100 PVCsc FW”, dated 1 June 2013

Penetration #4
110 HDPE FW - Date 01-06-2013

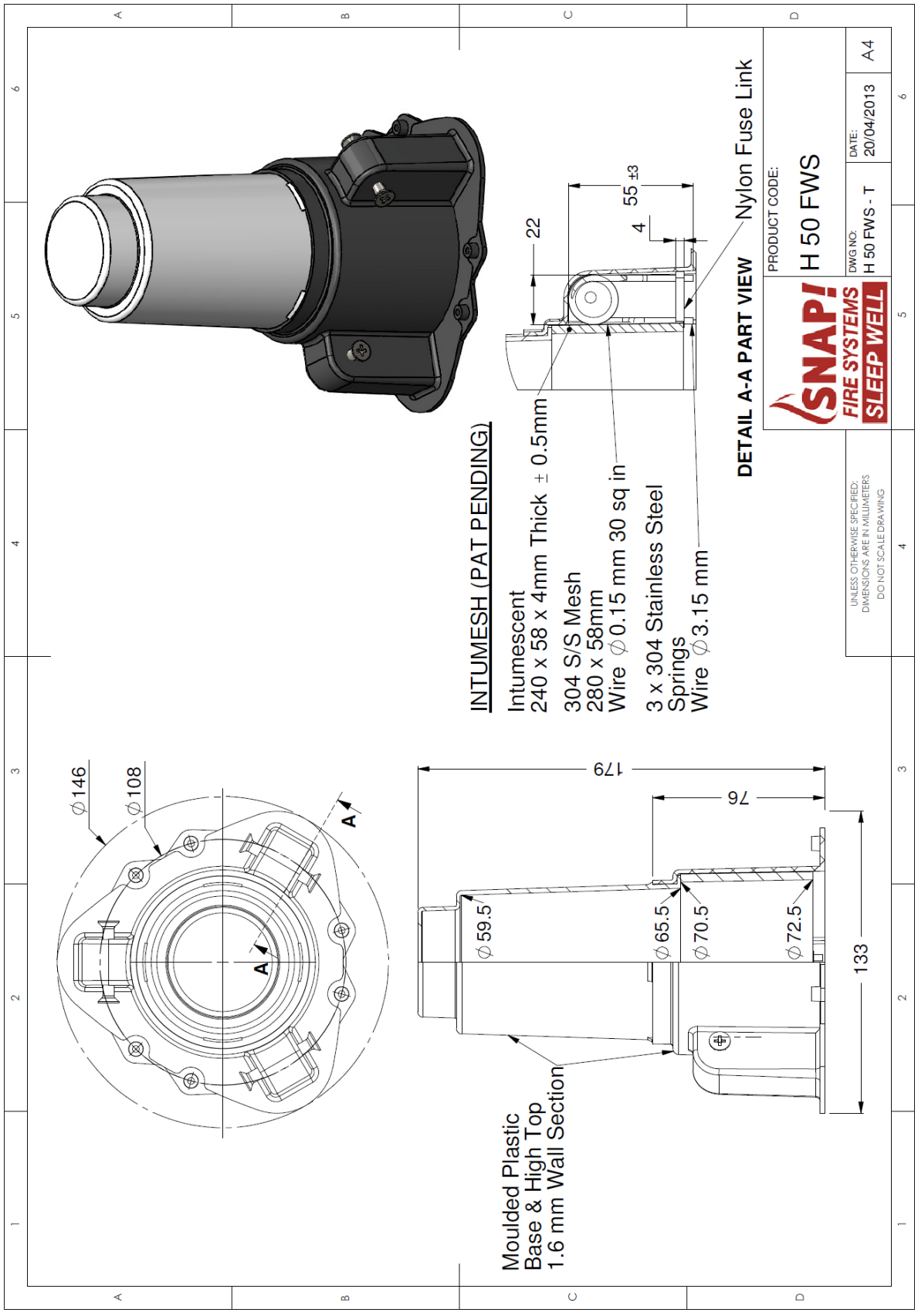


Drawing titled “Penetration #4 100 HDPE FW”, dated 1 June 2013

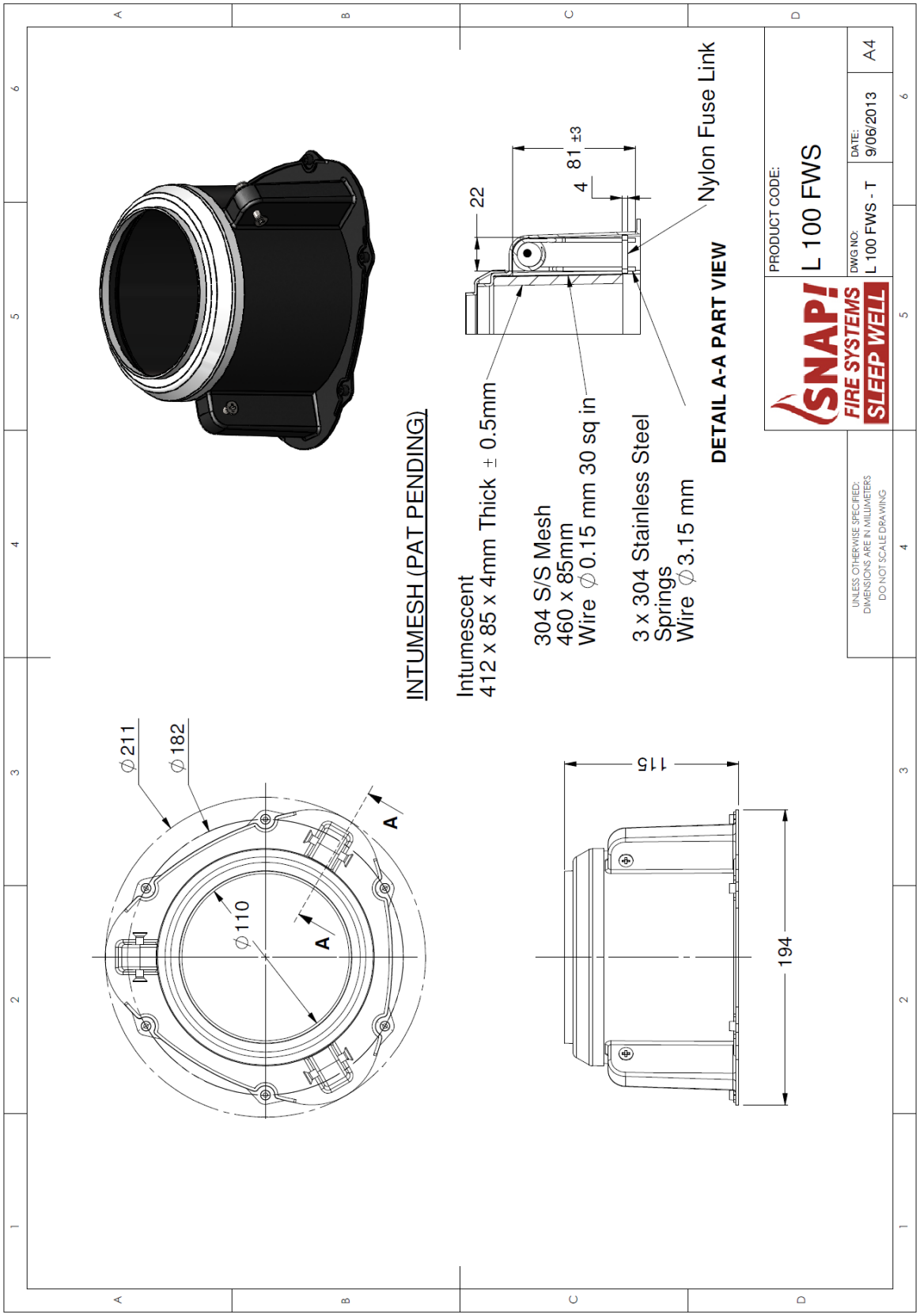
Penetration #5
56 HDPE FW - Date 01-06-2013



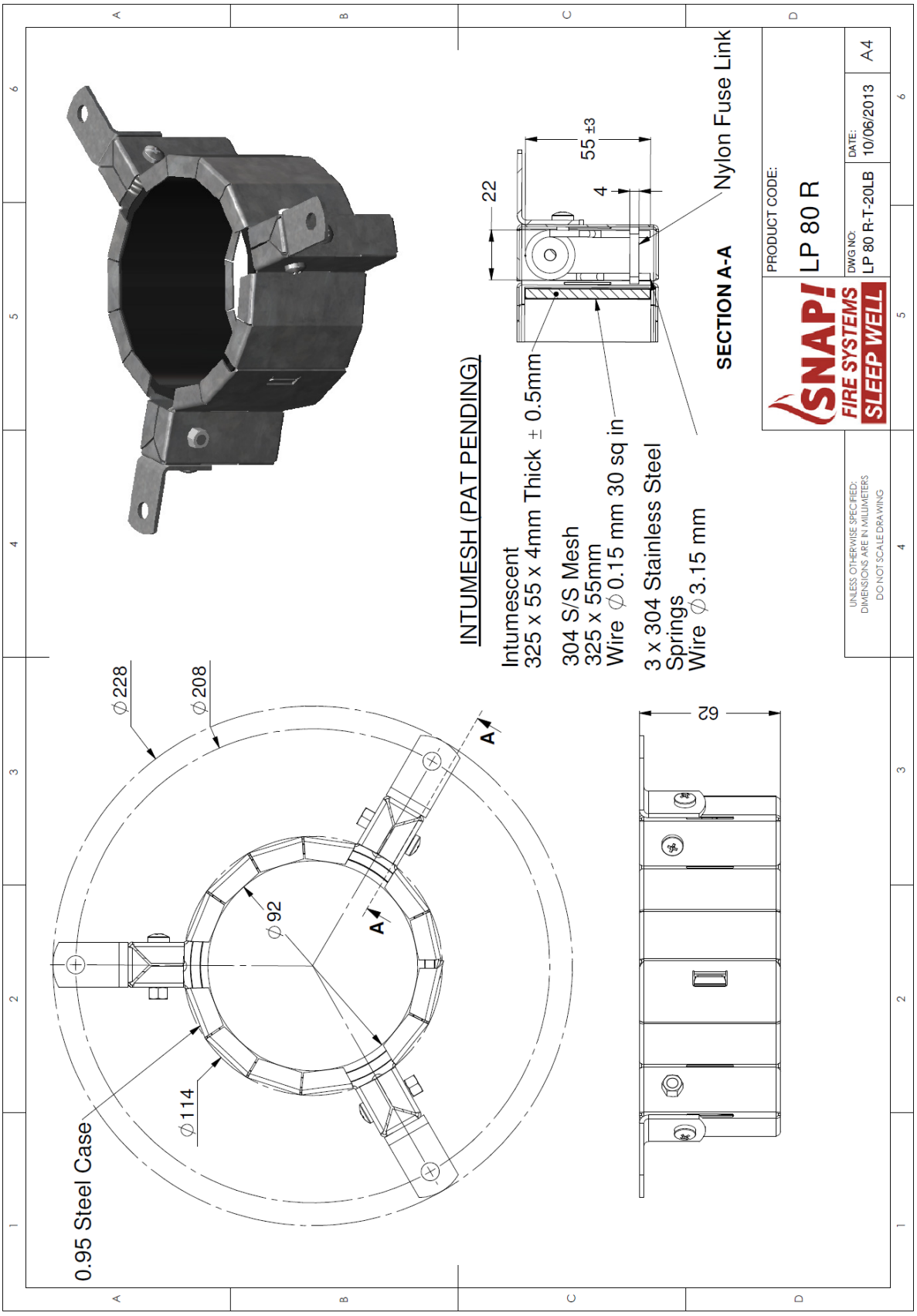
Drawing titled “Penetration #5 56 HDPE FW”, dated 1 June 2013



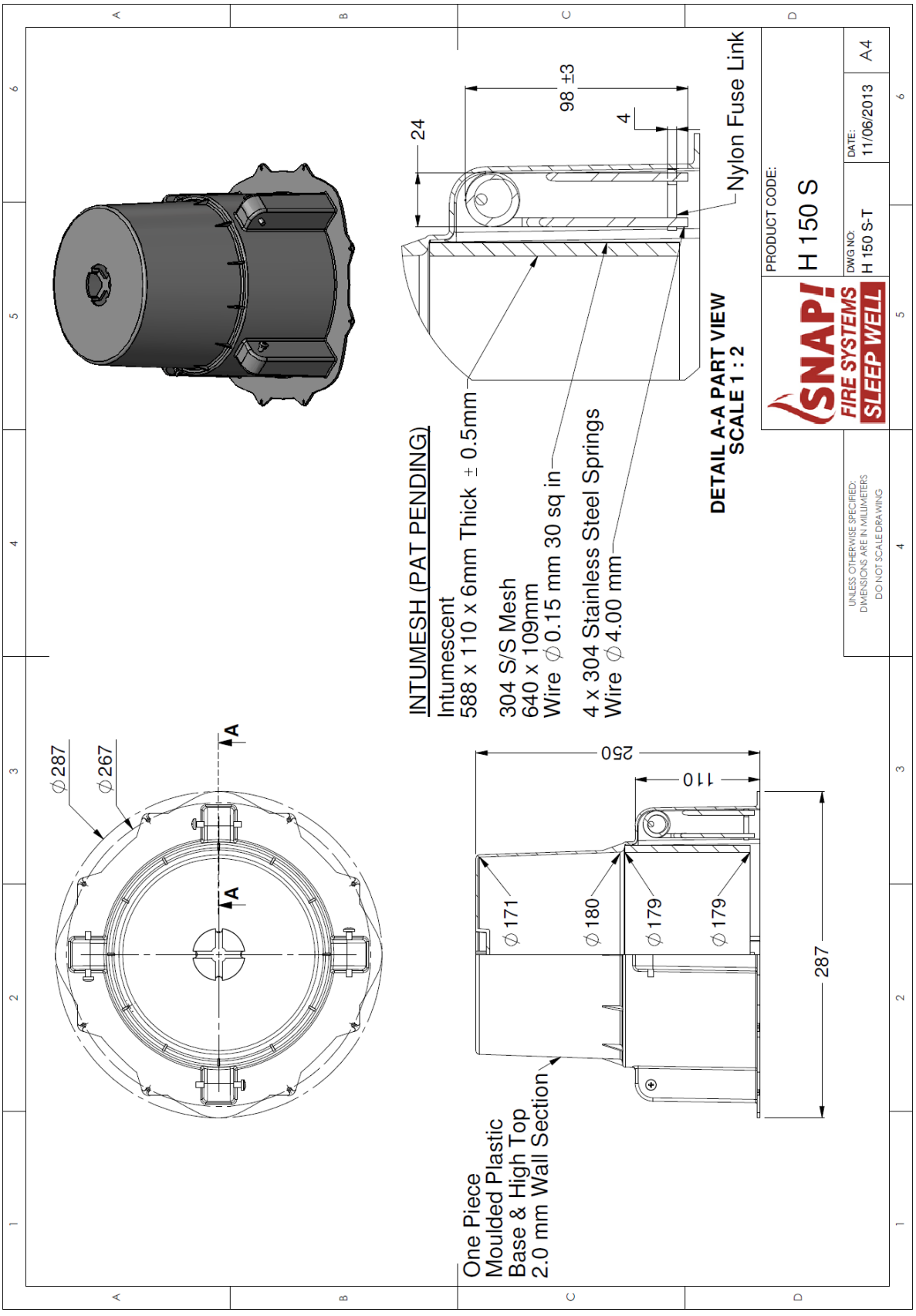
Drawing numbered H 50 FWS - T, dated 20/04/2013, by Snap Fire Systems



Drawing numbered L 100 FWS - T, dated 9/06/2013, by Snap Fire Systems



Drawing numbered LP 80 R - T - 20LB, dated 10/06/2013, by Snap Fire Systems



Drawing numbered H 150 S - T, dated 11/06/2013, by Snap Fire Systems

APPENDIX 5

Certificate of Test

No. 2499

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 1592.

Product Name: Penetration 1 – H 150 S cast-in fire collar protecting a 160-mm Rehau Raupiano pipe (slab incorporating a 35-mm thick concrete step)

Description: The SNAP Cast-in H 160 S fire collar comprised a 2-mm thick polypropylene casing with a 179-mm inner diameter and a 267-mm diameter base flange. The 150-mm high collar casing incorporated a 588-mm x 110-mm x 6-mm thick intumescent material. The closing mechanism comprised four stainless steel springs, a nylon fuse link and a 640-mm x 109-mm stainless steel mesh as shown in drawing numbered H 150 S-T dated 11 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 160-mm OD Rehau Raupiano pipe, with a wall thickness of 4.2-mm fitted through the collar's sleeve. The pipe projected vertically, 2000-mm above the concrete slab and 500-mm into the furnace chamber. The pipe was supported at 500-mm and 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end using a Kaowool plug.

On the unexposed face, the narrow gap between the pipe and the slab was filled with 3M Fire Barrier Sealant IC 15WB+ sealant to a 10-mm depth.

The concrete slab comprised a 35-mm thick step around half the pipe, as shown in drawing titled "Penetration #1 160 RAUPIANO PLUS/ Stack" dated 1 June 2013, by Snap Fire Systems Pty Ltd.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated.

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 -/240/240. 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 the regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara Date of Test: 29 May 2013
Issued on the 12th day of July 2013 without alterations or additions.

Brett Roddy
Manager, Fire Testing and Assessments

CSIRO Materials Science and Engineering
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile:61 2 9490 5555

Copy of Certificate of Test – No 2499

Certificate of Test

No. 2500

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 1592.

Product Name: Penetration 2 – LP 80R retrofitted fire collar protecting a 82-mm diameter Polyvinyl Chloride (PVC) pipe incorporating a floor waste

Description: The SNAP Cast-in LP 80R fire collar fixed to the concrete slab with three 6.5/M5-35mm Dynabolts. The collar comprised a 0.95-mm thick Steel casing with a 92-mm inner diameter and a 114-mm outer diameter. The 62-mm high collar casing incorporated a 325-mm x 55-mm x 4-mm thick intumescent material. The closing mechanism comprised three stainless steel springs, a nylon fuse link and a 325-mm x 55-mm stainless steel mesh, as shown in drawing numbered LP 80 R-T-20LB, dated 10 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 82-mm OD PVC pipe, with a wall thickness of 3.2-mm fitted through the LP 80R Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 82-mm OD PVC gully trap was connected to the penetrating pipe, supported by a Saddle Clamp fixed to the concrete slab with 6.5/M5-35mm Dynabolts.

The floor waste gully was charged with water to the level shown in drawing titled "Penetration #2 80 PVC FW", dated 1 June 2013, by Snap Fire Systems Pty Ltd.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated.

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 -/240/240. 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 the regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara Date of Test: 29 May 2013
Issued on the 12th day of July 2013 without alterations or additions.

Brett Roddy
Manager, Fire Testing and Assessments

CSIRO Materials Science and Engineering
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile:61 2 9490 5555

Copy of Certificate of Test – No 2500

Certificate of Test

No. 2501

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 1592.

Product Name: Penetration 3 – H 150 S cast-in fire collar protecting a 110-mm Polyvinyl Chloride (PVC) pipe Sandwich Construction (SC) incorporating a floor waste

Description: The SNAP Cast-in H 150 S fire collar comprised a 2-mm thick HDPE casing with a 179-mm inner diameter and a 267-mm diameter base flange. The 110-mm high collar casing incorporated a 588-mm x 110-mm x 6-mm thick intumescent material. The closing mechanism comprised four stainless steel springs, a nylon fuse link and a 640-mm x 109-mm stainless steel mesh, as shown in drawing numbered H 150 S-T, dated 11 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 110-mm OD PVC SC pipe, with a wall thickness of 3.2-mm fitted through the H 150 S Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 110-mm OD PVC gully trap was connected to the penetrating pipe, supported by M10 HKD clamps fixed to the concrete slab. On the exposed face, the floor waste gully was sealed using a PVC end cap.

The floor waste gully was charged with water to the level shown in drawing titled "Penetration #3 100 PVCsc FW" dated 1 June 2013, by Snap Fire Systems Pty Ltd.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated.

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 -/240/240. 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 the regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara Date of Test: 29 May 2013
Issued on the 12th day of July 2013 without alterations or additions.

Brett Roddy
Manager, Fire Testing and Assessments

CSIRO Materials Science and Engineering
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile:61 2 9490 5555

Copy of Certificate of Test – No 2501

Certificate of Test

No. 2502

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 1592.

Product Name: Penetration 4 – L 100 FWS cast-in fire collar protecting a 110-mm diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste

Description: The SNAP Cast-in L 100 FWS fire collar comprised a 1.6-mm thick HDPE casing with a 110-mm inner diameter and a 182-mm diameter base flange. The 115-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick intumescent material. The closing mechanism comprised three stainless steel springs, a nylon fuse link and a 460-mm x 85-mm stainless steel mesh, as shown in drawing numbered L 100 FWS-T, dated 9 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 110-mm OD HDPE pipe, with a wall thickness of 4.7-mm fitted through the L 100 FWS Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 110-mm OD HDPE gully trap was connected to the penetrating pipe, supported by a Saddle Clamp fixed to the concrete slab with 6.5/M5-35mm Dynabolts. On the exposed face, the floor waste gully was sealed using a HDPE end cap.

The floor waste gully was charged with water to the level shown in drawing titled "Penetration #4 110 HDPE FW" dated 1 June 2013, by Snap Fire Systems Pty Ltd.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated.

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 -/240/240. 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 the regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara Date of Test: 29 May 2013
Issued on the 12th day of July 2013 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

CSIRO Materials Science and Engineering
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile:61 2 9490 5555

Copy of Certificate of Test – No 2502

Certificate of Test

No. 2503

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 1592.

Product Name: Penetration 5 – H 50 FWS cast-in fire collar protecting a 56-mm diameter High Density Polyethylene (HDPE) pipe incorporating a floor waste

Description: The SNAP Cast-in H 50 FWS fire collar comprised a 1.6-mm thick HDPE casing with a 71-mm inner diameter and a 108-mm diameter base flange. The 76-mm high collar casing incorporated a 240-mm x 58-mm x 4-mm thick intumescent material. The closing mechanism comprised three stainless steel springs, a nylon fuse link and a 280-mm x 58-mm stainless steel mesh, as shown in drawing numbered H 50 FWS-T dated 20 April 2013, by SNAP Fire Systems.

The penetrating service comprised a 56-mm OD HDPE pipe, with a wall thickness of 3.5-mm fitted through the H 50 FWS Snap fire collar. The floor waste system was capped on the unexposed face with chromed brass floor waste grate, 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 HDPE gully trap was connected to the penetrating pipe, supported by a Saddle Clamp fixed to the concrete slab with 6.5/M5-35mm Dynabolts. On the exposed face, the floor waste gully was sealed using a HDPE end cap.

The floor waste gully was charged with water to the level shown in drawing titled "Penetration #5 56 HDPE FW", dated 1 June 2013, by Snap Fire Systems Pty Ltd.

The element of construction described above satisfied the following criteria for fire-resistance for the period stated.

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 -/240/240. 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 the regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara Date of Test: 29 May 2013
Issued on the 12th day of July 2013 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

CSIRO Materials Science and Engineering
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile:61 2 9490 5555

Copy of Certificate of Test – No 2503

APPENDIX 6

MATERIALS SCIENCE & ENGINEERING
www.csiro.au

14 Julius Avenue, North Ryde NSW 2113
PO Box 310, North Ryde NSW 1670, Australia
T (02) 9490 5444 • **ABN** 41 687 119 230

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

LIKELY FIRE PERFORMANCE OF FIRE COLLARS PROTECTING A CONCRETE SLAB PENETRATED BY SERVICES
Assessment Number FCO-3005

INTRODUCTION

We have analysed the data referenced by you on the likely fire-resistance performance of your SNAP H 150 S cast-in fire collar installed in a 150-mm or 185-mm thick slab protecting a 160-mm Rehau Raupiano pipe . The information included:

- our test report numbered FSV 1592, for a full-scale fire-resistance test on fire collars protecting a concrete slab;
- AS4072.1-2005; and
- AS 1530.4-2005.

We have retained these documents and information.

ANALYSIS

- ***CSIRO sponsored investigation report numbered FSP 1592***

  On 29 May 2013, this Division conducted a full-scale fire-resistance test on a 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by four floor waste systems and one stack pipe protected by cast-in Snap Fire System fire collars. For the purpose of the test, the specimens were referenced as Penetrations 1, 2, 3, 4, and 5.

  Penetration 1 – H 150 S cast-in fire collar protecting a 160-mm Rehau Raupiano pipe (slab incorporating a 35-mm thick concrete step)

  The SNAP Cast-in H 160 S fire collar comprised a 2-mm thick polypropylene casing with a 179-mm inner diameter and a 267-mm diameter base flange. The 150-mm high collar casing incorporated a 588-mm x 110-mm x 6-mm thick intumescent material. The closing mechanism comprised four stainless steel springs, a nylon fuse link and a 640-mm x 109-mm stainless steel mesh as shown in drawing numbered H 150 S-T dated 11 June 2013, by SNAP Fire Systems.

The penetrating service comprised a 160-mm OD Rehau Raupiano pipe, with a wall thickness of 4.2-mm fitted through the collar's sleeve. The pipe projected vertically, 2000-mm above the concrete slab and 500-mm into the furnace chamber. The pipe was supported at 500-mm and 1000-mm from the unexposed face of the concrete slab. The pipe was open at the unexposed end and capped on the exposed end using a Kaowool plug.

On the unexposed face, a 35-mm concrete step was constructed on half of the perimeter of the circular opening in the concrete slab.

On the unexposed face, the narrow gap between the pipe and the slab was filled with 3M Fire Barrier Sealant IC 15WB+ sealant to a 10-mm depth.

The system as tested achieved a fire resistance level of -/240/240.

The installation of a cast-in collar in a concrete slab may affect the integrity and the insulation of the slab when exposed to the fire conditions stipulated in AS1530.4-2005. This effect may be due to voids in penetrated the concrete slab created by the installation of the cast-in collar.

During the fire-resistance test there was no evidence of thermocouples positioned on the concrete slab and on 35-mm concrete step exceeding the maximum insulation criterion stipulated in AS1530.4-2005.

CONCLUSION/OPINION

Based on the test results and the performance factors discussed above it is the opinion of this Division that the H 150 S cast-in fire collar protecting a 160-mm Rehau Raupiano pipe through either a 150-mm thick or 185-mm thick concrete slab would be capable of achieving fire-resistance levels of -/240/240 if tested in accordance with AS 1530.4-2005.

TERM OF VALIDITY

This assessment report will lapse on 31 July 2018. Should you wish us to re-examine this assessment with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this report in the light of new knowledge.

Yours faithfully

Mario Lara
Testing Officer

Brett Roddy
Manager, Fire Testing and Assessments

12 July 2013