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

Report number FSP 1564
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Client
SNAP FIRE SYSTEMS PTY LTD.

Commercial-in-confidence

CSIRO – MATERIALS SCIENCE AND ENGINEERING
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SPONSORED INVESTIGATION No. FSP 1564

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 two REHAU RAUPIANO PLUS pipes and three floor waste systems.

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

REHAU Pty Ltd
Level 8, 1 Rider Blvd
RHODES NSW

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 4320/3609

TEST DATE: The fire-resistance test was conducted on 26 November 2012.

DESCRIPTION OF SPECIMEN:

GENERAL

The specimen comprised a 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by five plastic pipes protected by

cast-in Snap Fire System fire collars. Three of the penetrations were fitted with chromed brass floor grates. A 35-mm thick cement screed was laid on top of the concrete slab and finished flush with the floor grates.

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

Penetration 1 – H 50 S cast-in fire collar protecting a 40-mm REHAU RAUPIANO PLUS pipe

The SNAP Cast-in H 50 S fire collar comprised a 1.6-mm thick plastic casing with a 72-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 Intumesh graphite based intumescent material. The closing mechanism comprised three galvanised steel springs, a nylon fuse link and a 280-mm x 58-mm stainless steel mesh as shown in drawing numbered H 50 S-T, dated 2 December 2012, by SNAP Fire Systems.

The penetrating service comprised a 40-mm OD REHAU RAUPIANO PLUS pipe, with a wall thickness of 1.8-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 1500-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 gap between the pipe and the collar was filled with 3M Fire Barrier Sealant IC 15WB+.

Detail of construction is shown in drawing titled "Penetration #1 40 REHAU RAUPIANO PLUS/Stack", dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Penetration 2 – H 100 S-RR cast-in fire collar protecting a 110-mm REHAU RAUPIANO PLUS pipe

The SNAP Cast-in H 100 S-RR fire collar comprised a 1.6-mm thick plastic casing with a 129-mm inner diameter and a 182-mm diameter base flange. The 107-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh graphite based intumescent material. The closing mechanism comprised three galvanised steel springs, a nylon fuse link and a 460-mm x 85-mm stainless steel mesh as shown in drawing numbered H 100 S-RR - T, dated 27 November 2012, by SNAP Fire Systems.

The penetrating service comprised an 110-mm OD REHAU RAUPIANO PLUS pipe, with a wall thickness of 2.7-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 1500-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 gap between the pipe and the collar was filled with 3M Fire Barrier Sealant IC 15WB+.

Detail of construction is shown in drawing titled “Penetration #2 110 REHAU RAUPIANO PLUS/Stack”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Penetration 3 – H 100 FWS cast-in fire collar protecting a 110-mm diameter REHAU RAUPIANO PLUS pipe incorporating a floor waste

The H 100 FWS cast-in Snap fire collar comprised a 1.6-mm thick plastic casing with a 129-mm inner diameter and a 182-mm diameter base flange. The 107-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh graphite based 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 H 100 FWS - T, dated 18 August 2012, by SNAP Fire Systems.

The penetrating service comprised a 110-mm OD REHAU RAUPIANO PLUS pipe, with a wall thickness of 2.7-mm fitted through the H 100 FWS cast-in Snap fire collar. On the exposed side of the slab a REHAU RAUPIANO PLUS floor waste gully was connected to the penetrating pipe, supported by steel rods fixed to the concrete slab. The floor waste gully projected approximately 250-mm into the furnace chamber as shown in photograph #1. On the exposed face, the floor waste gully was sealed using a Kaowool plug and a REHAU RAUPIANO PLUS end cap.

The floor waste gully was charged with water to the level shown in drawing titled “Penetration #3 110 REHAU RAUPIANO PLUS/Floorwaste”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Detail of construction is shown in drawing titled “Penetration #3 110 REHAU RAUPIANO PLUS/Floorwaste”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Penetration 4 – H 50 FWS cast-in fire collar protecting a 56-mm diameter PVC pipe incorporating a floor waste and pipe fitting

The H 50 FWS cast-in Snap fire collar comprised a 1.6-mm thick plastic casing with a 72-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 Intumesh graphite based 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 7 August 2012, by SNAP Fire Systems.

The penetrating service comprised a 56-mm OD PVC pipe which was fitted through H 50 FWS cast-in Snap fire collar. On the exposed side of the slab a PVC 90º elbow was connected to the penetrating pipe within the fire collar and supported by a steel support clamp as shown in photograph #1. The pipe was capped on the exposed face of the slab with a REHAU RAUPIANO PLUS end cap, and on the unexposed face with a standard chrome plated brass floor grate.

Detail of construction is shown in drawing titled “Penetration #4 56 PVC with Fitting/Floorwaste”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Penetration 5 – H 50 FWS cast-in fire collar protecting a 50-mm diameter REHAU RAUPIANO PLUS pipe incorporating a floor waste

The H 50 FWS cast-in Snap fire collar comprised a 1.6-mm thick plastic casing with a 72-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 Intumesh graphite based 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 drawing in numbered H 50 FWS - T, dated 7 August 2012, by SNAP Fire Systems.

The penetrating service comprised a 50-mm OD REHAU RAUPIANO PLUS pipe with a wall thickness of 1.8-mm fitted through H 50 FWS cast-in Snap fire collar. On the exposed side of the slab REHAU RAUPIANO PLUS 45º elbows were connected to the penetrating pipe and supported by a steel rod fixed to the concrete slab as shown in photograph #1. The pipe was capped on the exposed face of the slab with a REHAU RAUPIANO PLUS end cap, and on the unexposed face with a standard chrome plated brass floor grate.

Detail of construction is shown in drawing titled “Penetration #5 50 REHAU RAUPIANO PLUS/Floorwaste”, dated 15 December 2012, 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 specimen was left to cure for a period of eight weeks.

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 numbered H 50 S - T, dated 2 December 2012, by Snap Fire System.

Drawing numbered H 50 FWS - T, dated 7 August 2012, by Snap Fire System.

Drawing numbered H 100 FWS - T, dated 18 August 2012, by Snap Fire System.

Drawing numbered H 100 S - RR - T, dated 27 November 2012, by Snap Fire System.

Drawing titled “Penetration #1 40 REHAU RAUPIANO PLUS/Stack”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #2 110 REHAU RAUPIANO PLUS/Stack”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #3 110 REHAU RAUPIANO PLUS/Floorwaste”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #4 56 PVC with Fitting/Floorwaste”, dated 15 December 2012, by Snap Fire Systems Pty Ltd.

Drawing titled “Penetration #5 50 REHAU RAUPIANO PLUS/Floorwaste”, dated 15 December 2012, 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 photographs 2 & 3.

PRESSURE

The furnace pressure was measured by a differential low-pressure transducer with a range of ± 50 Pa.

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 22°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 -	Smoke is fluing from pipe #2.
4 minutes -	Smoke is fluing from penetration #3.
6 minutes -	Smoke fluing from penetration 3 has stopped.
	Smoke fluing from penetration #2 has decreased.
7 minutes -	Small amount of smoke is fluing from penetration #4.
12 minutes -	Smoke is no longer fluing from penetration #4.
	Small amount of smoke is fluing from penetration #2.
15 minutes -	Smoke is being emitted from around the base of penetration #2.
19 minutes -	Smoke is emitted from base of penetration #4.
120 minutes -	A small amount of smoke is being emitted from penetrations #3 and #4.
180 minutes -	No apparent change to the specimen.

241 minutes - No apparent change to the specimen.
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:

<u>Penetration 1 –H 50 S cast-in fire collar protecting a 40-mm REHAU RAUPIANO PLUS pipe</u>

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

<u>Penetration 2 –H 100 S-RR cast-in fire collar protecting a 110-mm REHAU RAUPIANO PLUS pipe</u>

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

Penetration 3 – H 100 FWS cast-in fire collar protecting a 110-mm diameter REHAU RAUPIANO PLUS pipe incorporating a floor waste

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 PVC pipe incorporating a floor waste and pipe fitting

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 50-mm diameter REHAU RAUPIANO PLUS 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:

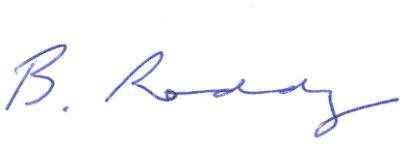
Penetration 1 - -/240/240;
Penetration 2 - -/240/240;
Penetration 3 - -/240/240;
Penetration 4 - -/240/240; and
Penetration 5 - -/240/240.

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

For Garry E Collins
Manager, Fire Testing and Assessments

30 January 2013

APPENDICES

APPENDIX 1

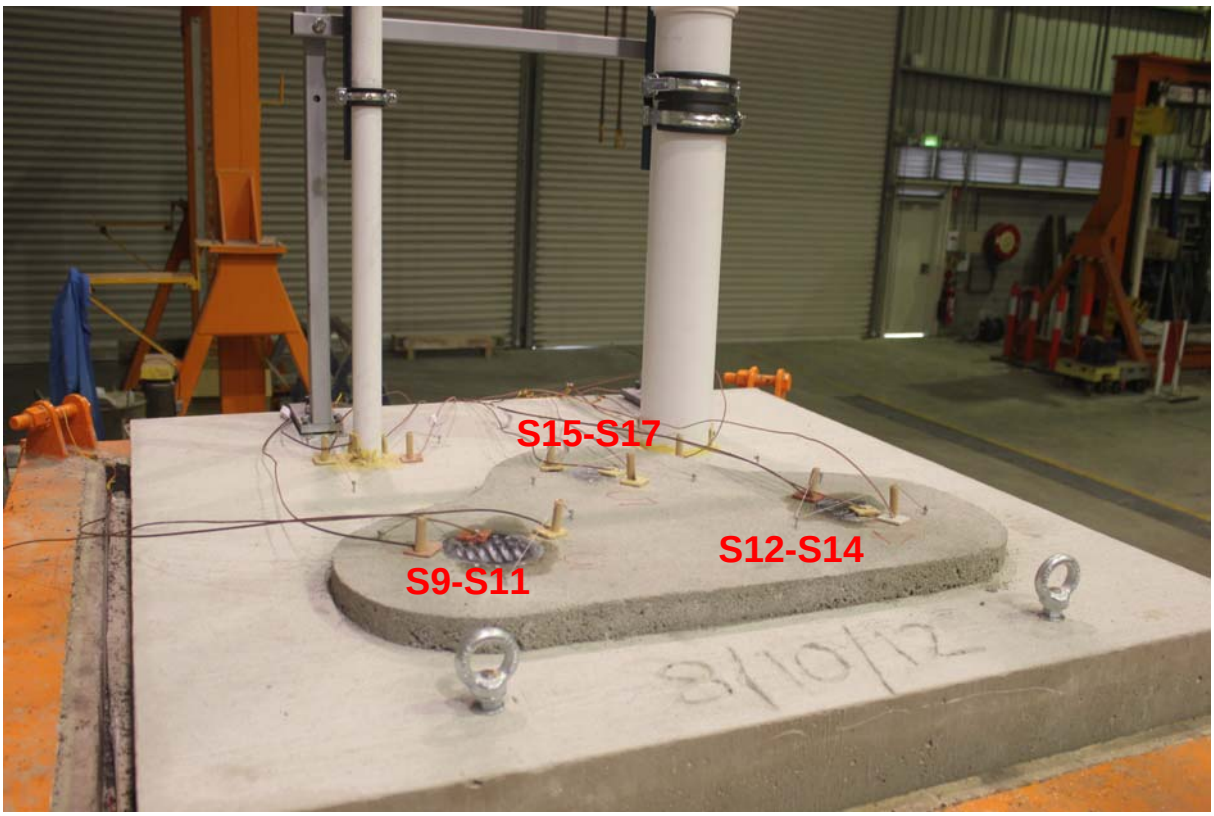
Measurement Location		
Group location	**T/C Position**	**T/C designation**
Specimen		
Penetration 1	On slab – 25-mm from pipe	S1
	On slab – 25-mm from pipe	S2
	On pipe - 25-mm from slab	S3
	On pipe - 25-mm from slab	S4
Penetration 2	On slab – 25-mm from pipe	S5
	On slab – 25-mm from pipe	S6
	On pipe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

Table 1 – Specimen thermocouples positioning

APPENDIX 2

Photograph 1 – Exposed face of the specimen prior to testing

Photograph 2 – Unexposed face of penetrations #1 and #2 prior to testing

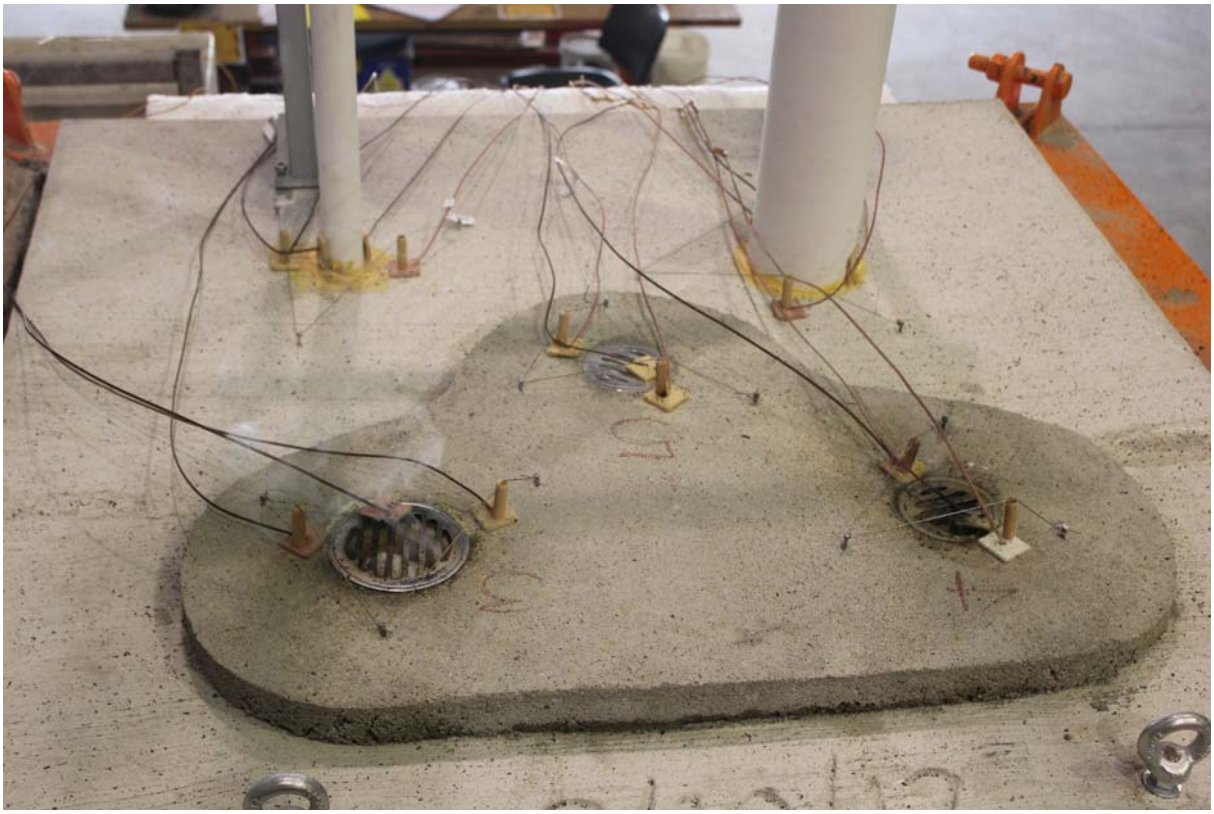


Photograph 3 – Unexposed face of penetrations #3, #4 and #5 prior to testing

Photograph 4 – Specimens after 60 minutes of testing

Photograph 5 – Specimens after 120 minutes of testing

Photograph 6 – Specimens after 180 minutes of testing



Photograph 7 – Specimens at the conclusion of testing

Photograph 8 – Exposed face of the specimens at the conclusion of testing

APPENDIX 3

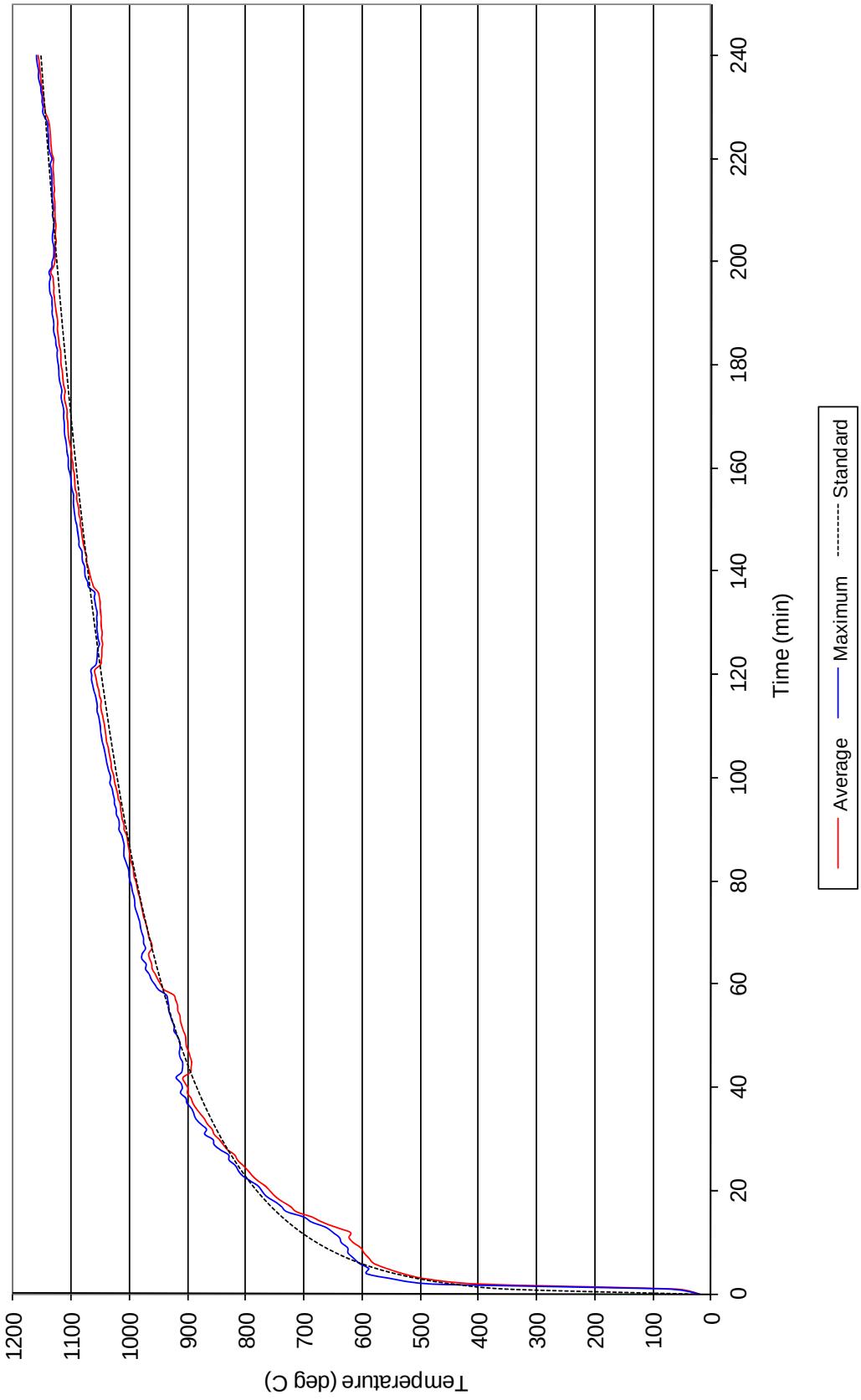


Figure 1 - Furnace temperature

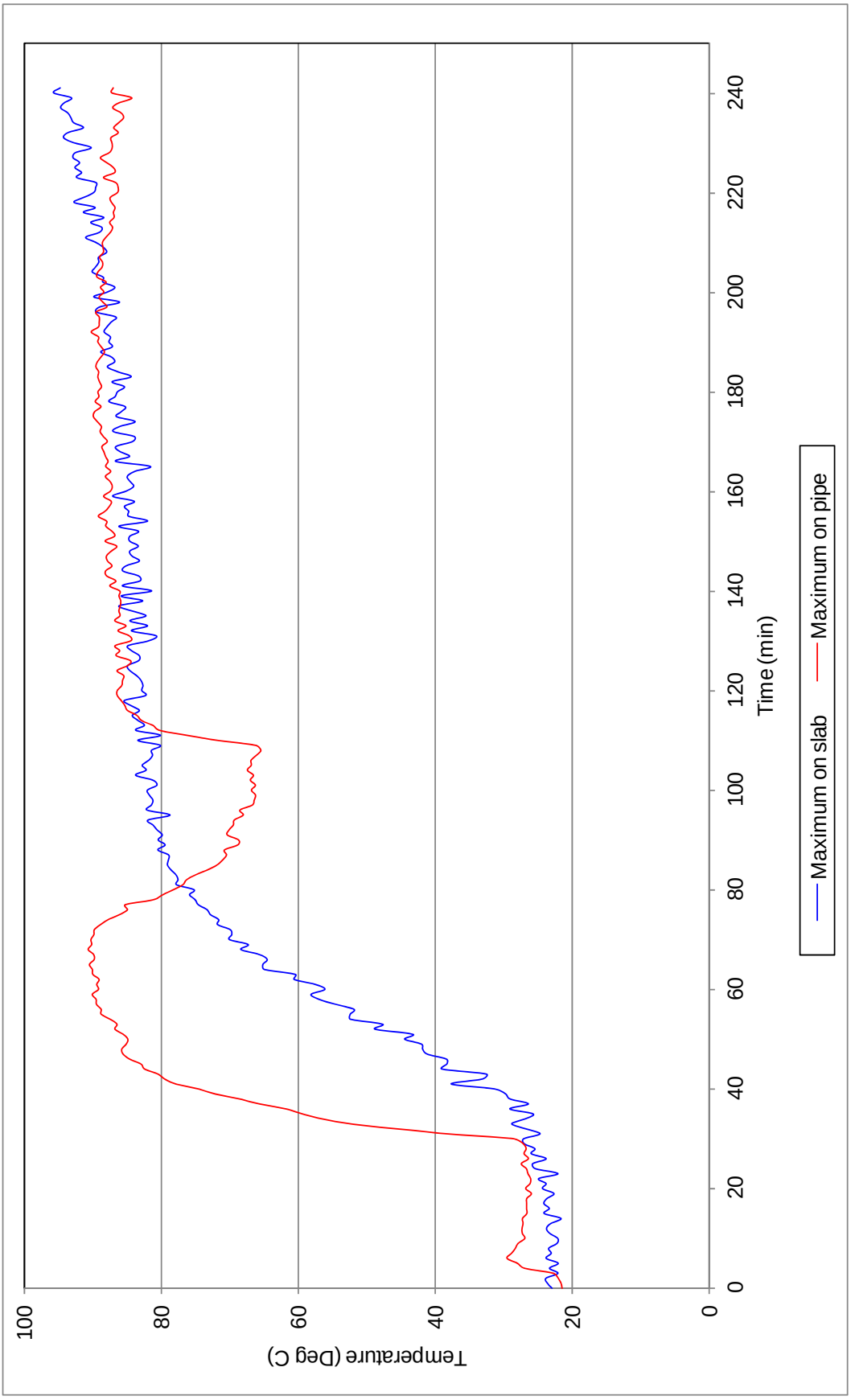


Figure 2 - Specimen temperature – Associated with Penetration 1

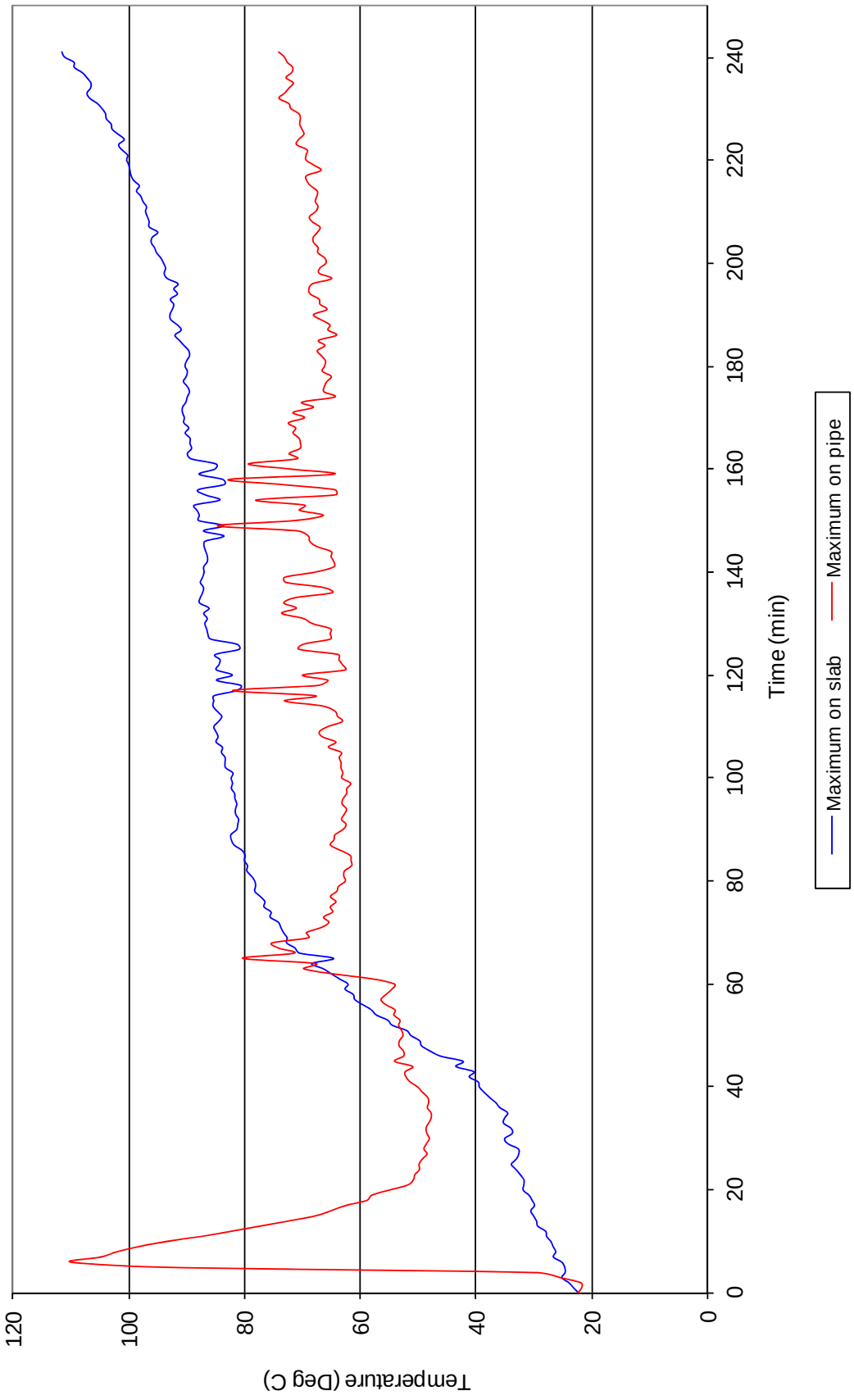


Figure 3 - Specimen temperature – Associated with Penetration 2

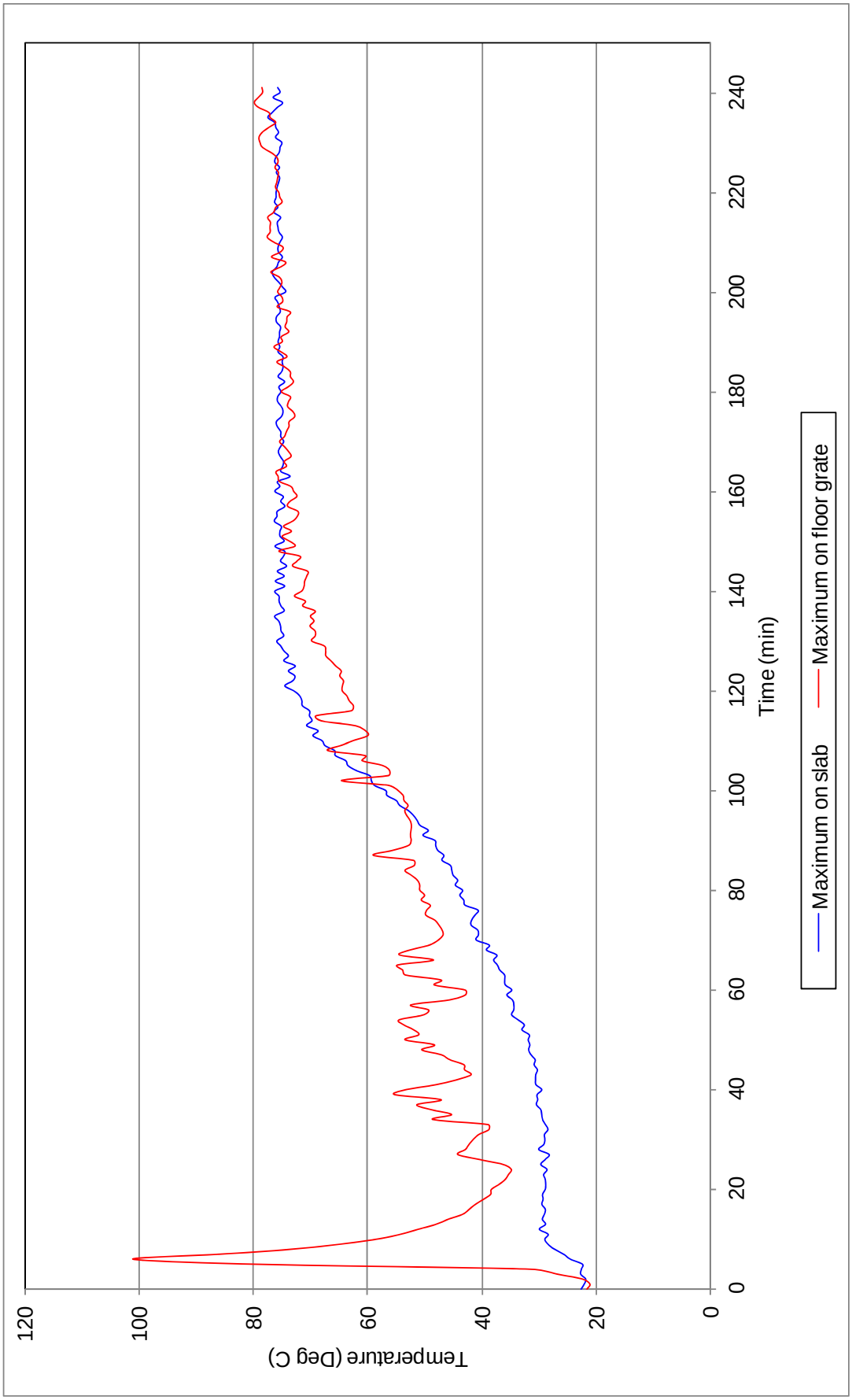


Figure 4 - Specimen temperature – Associated with Penetration 3

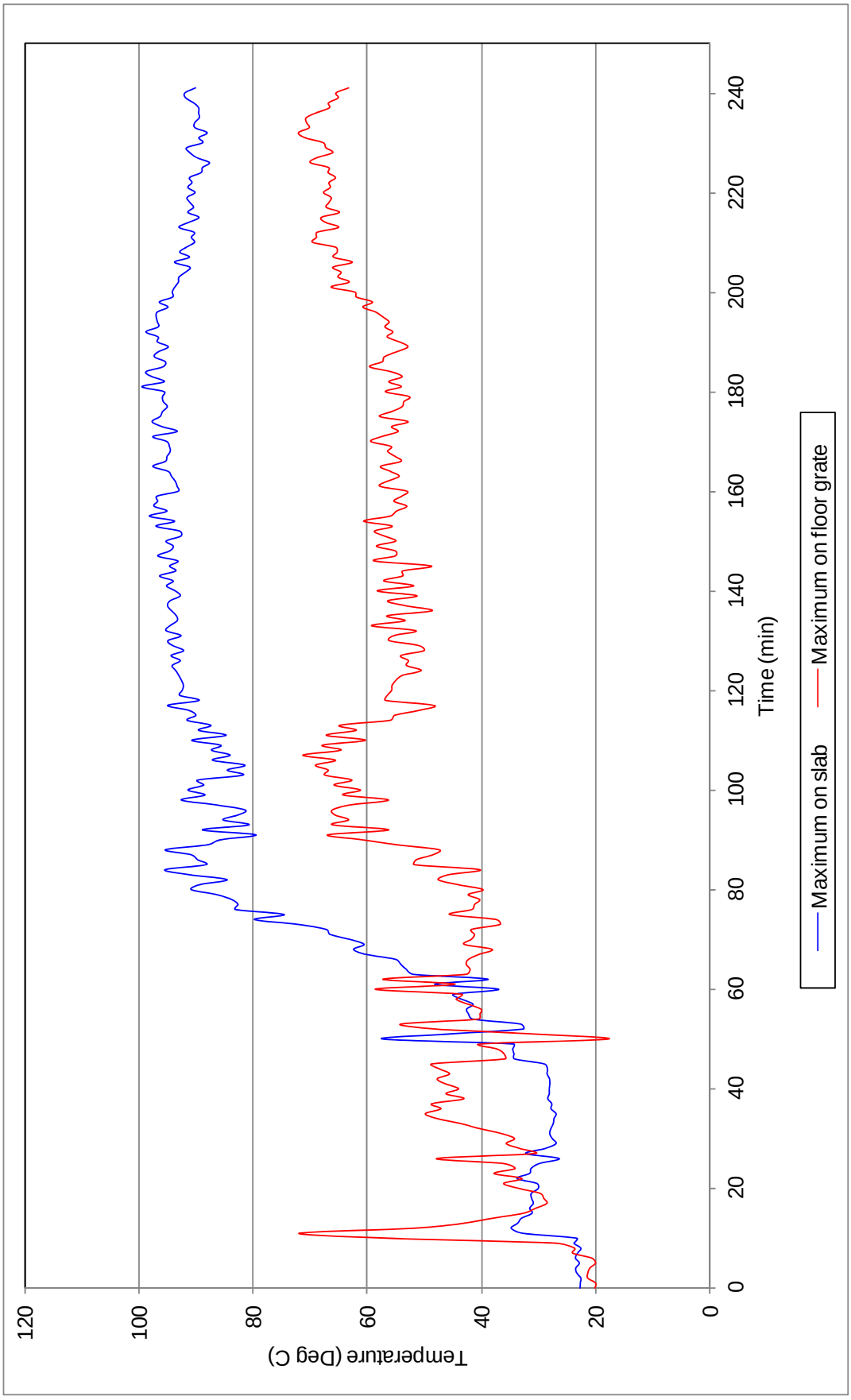


Figure 5 - Specimen temperature – Associated with Penetration 4

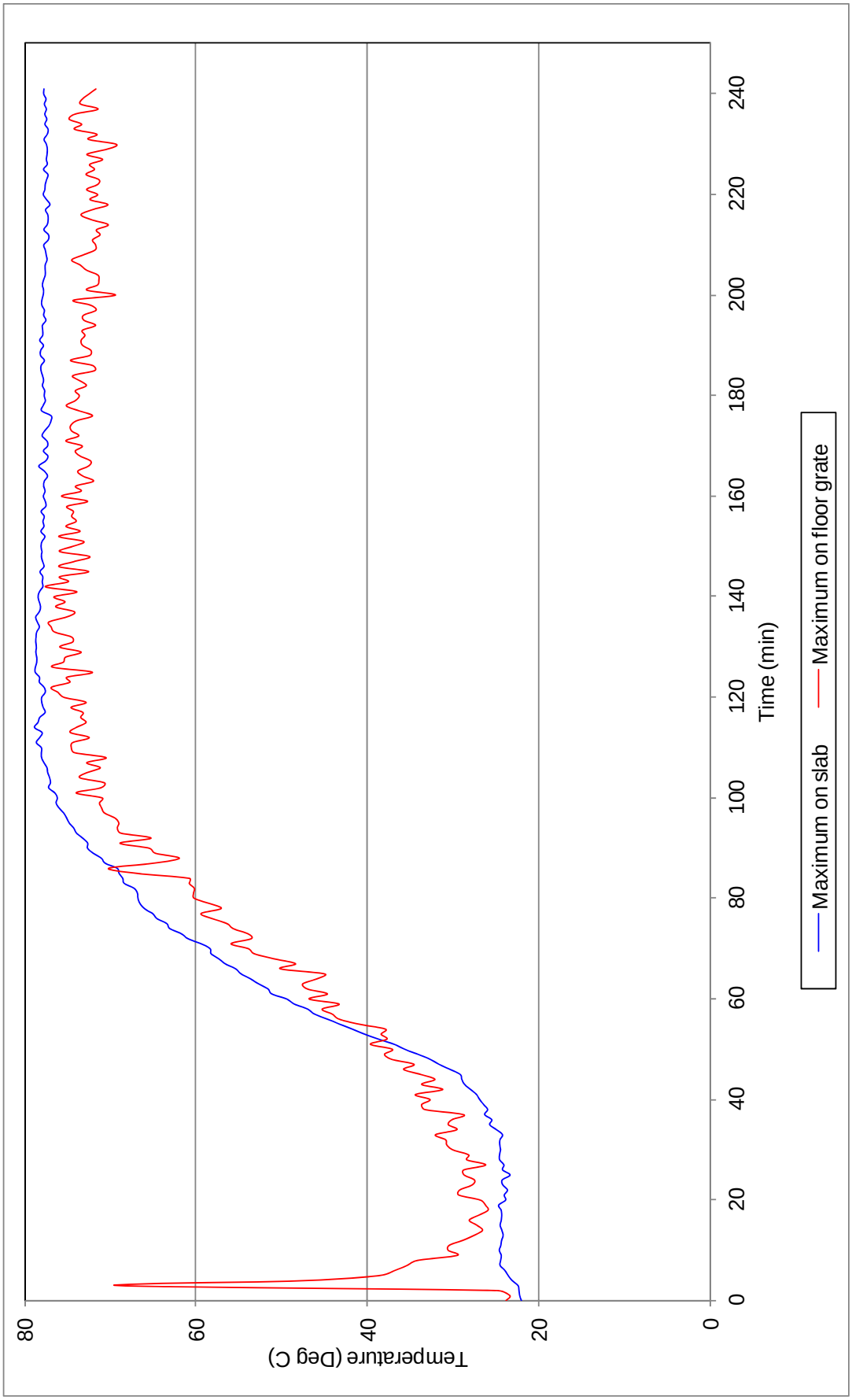
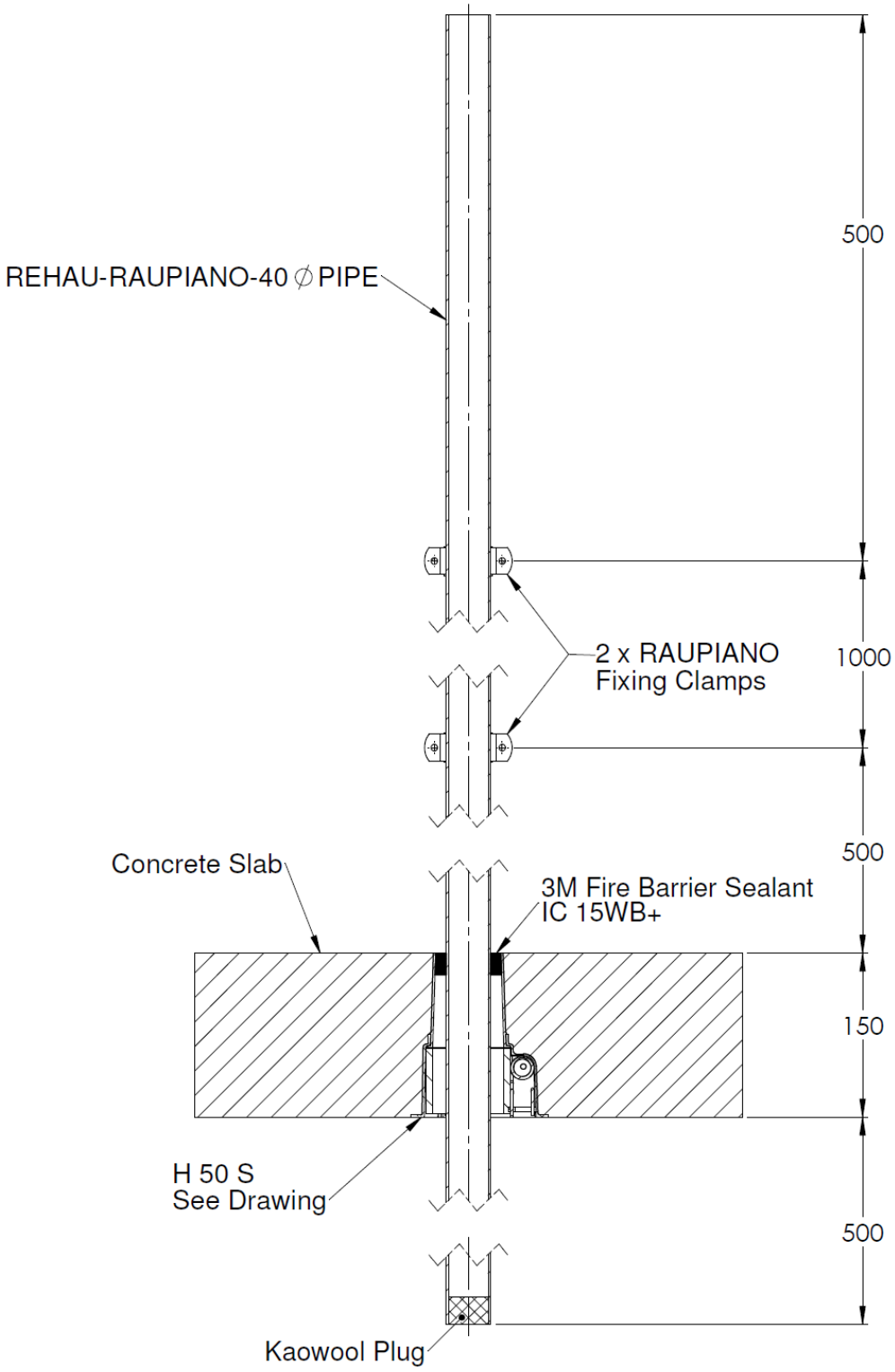


Figure 6 - Specimen temperature – Associated with Penetration 5

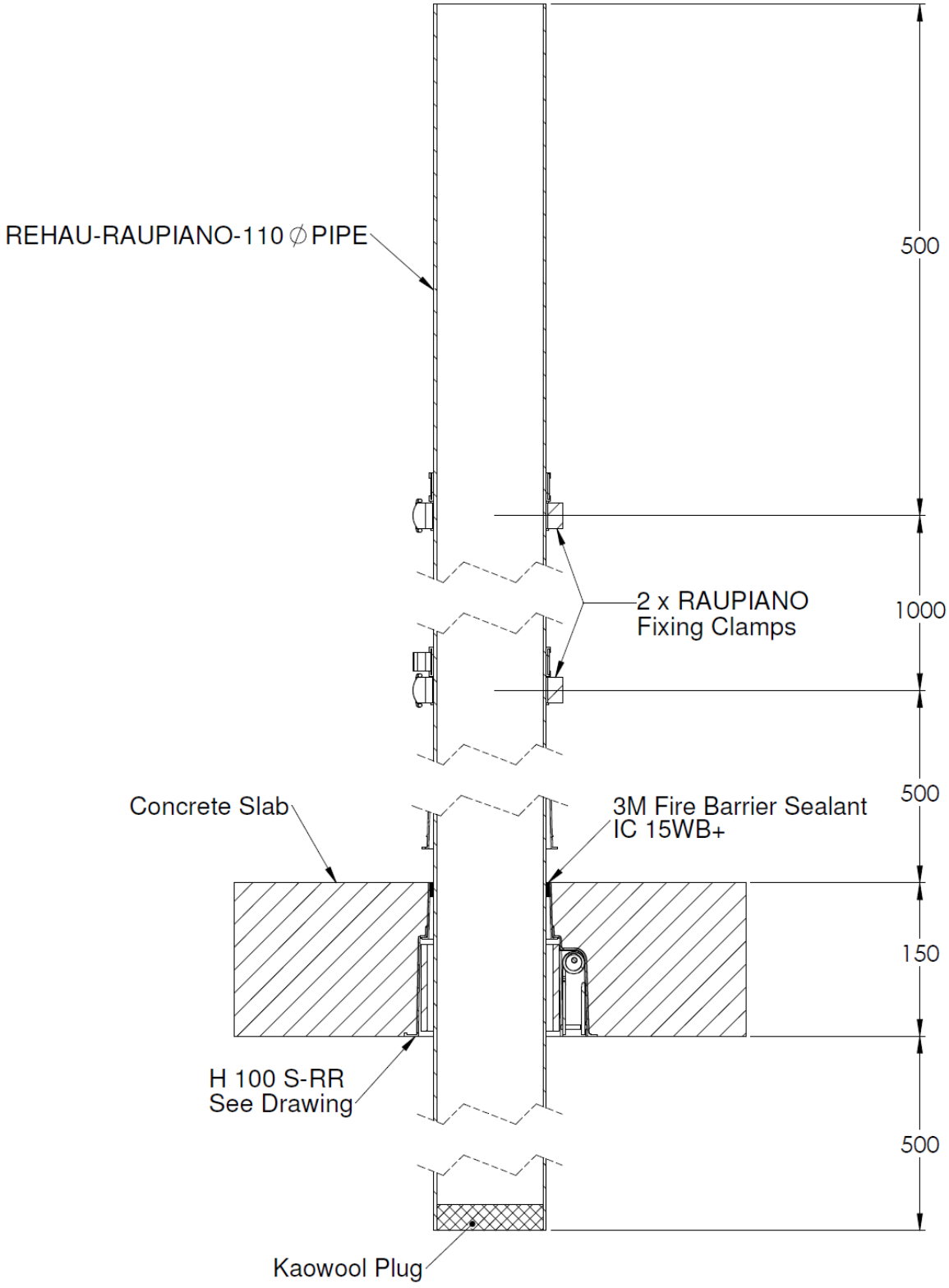
APPENDIX 4

Penetration #1
40 REHAU RAUPIANO PLUS/Stack - Date 15/12/2012.



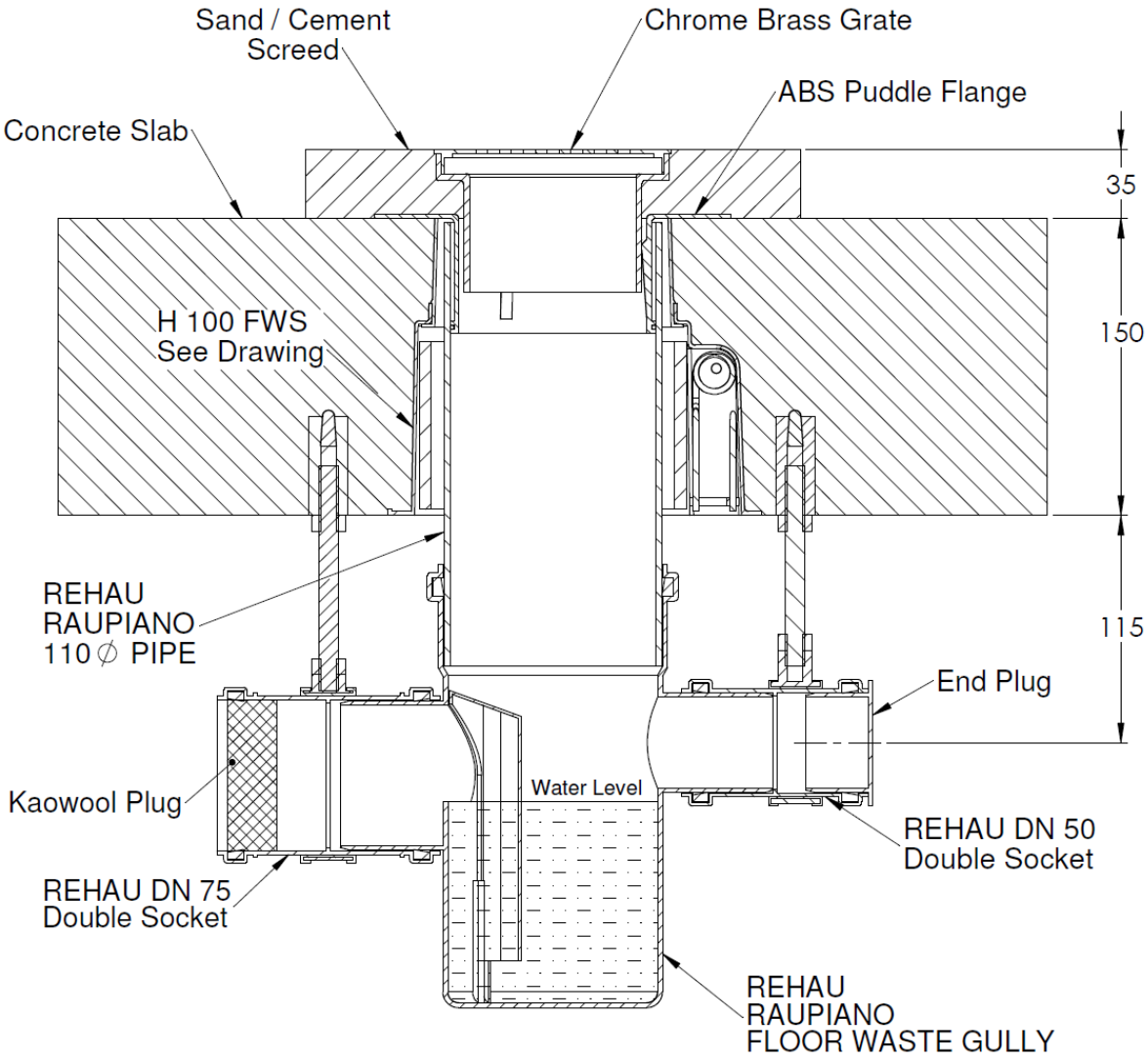
Drawing titled “Penetration #1 40REHAU RAUPIANO PLUS/Stack”, dated 15 December 2012

Penetration #2
110 REHAU RAUPIANO PLUS/Stack - Date 15/12/2012.



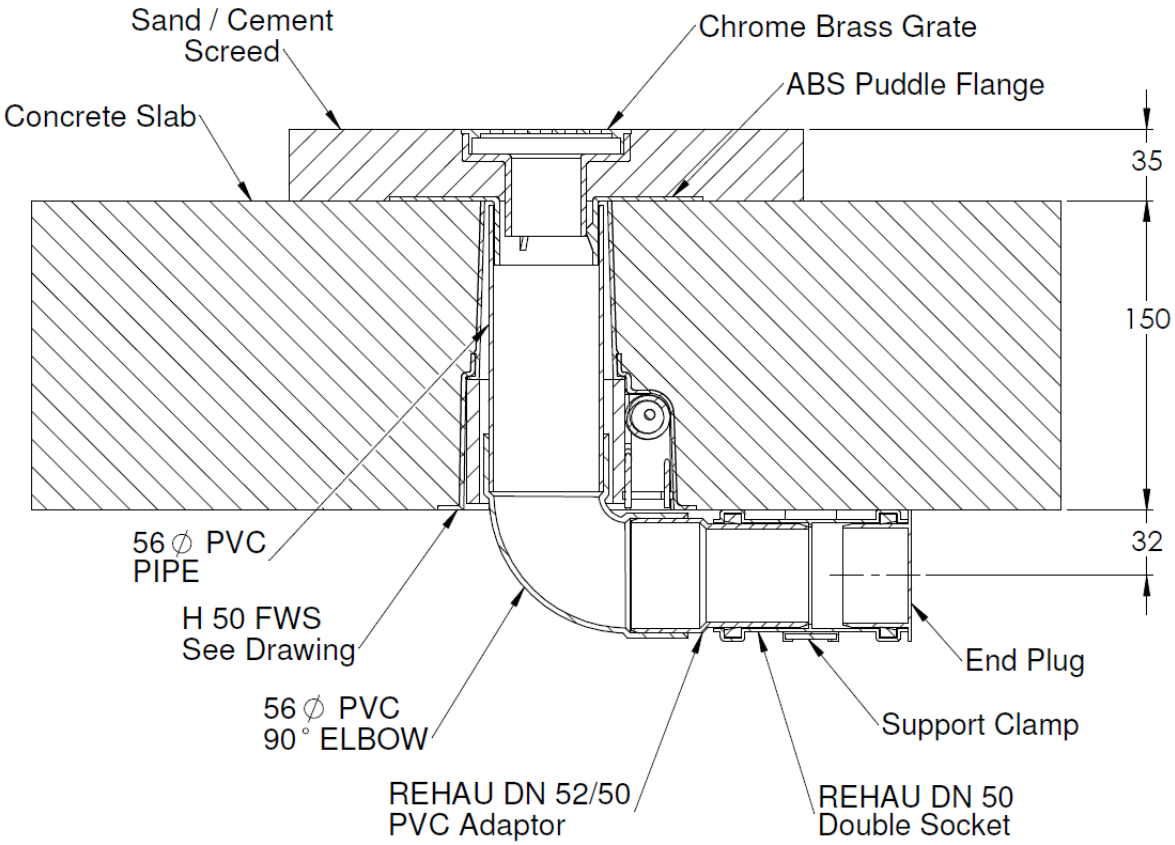
Drawing titled “Penetration #2 110 REHAU RAUPIANO PLUS/Stack”, dated 15 December 2012

Penetration #3
110 REHAU RAUPIANO PLUS/Floorwaste - Date 15/12/2012.



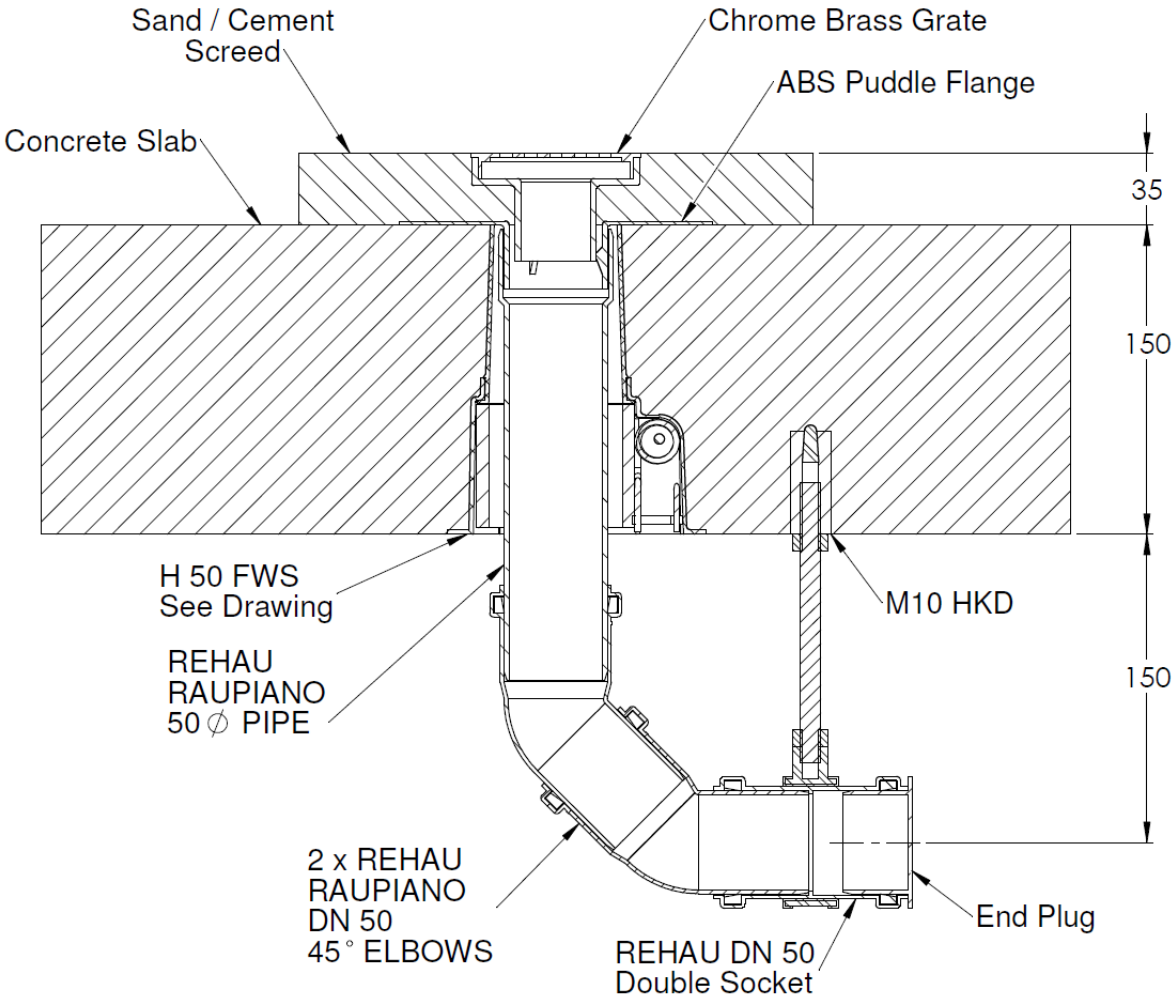
Drawing titled “Penetration #3 110 REHAU RAUPIANO PLUS/Floorwaste”, dated 15 December 2012

Penetration #4
56 PVC with Fitting/Floorwaste - Date 15/12/2012.

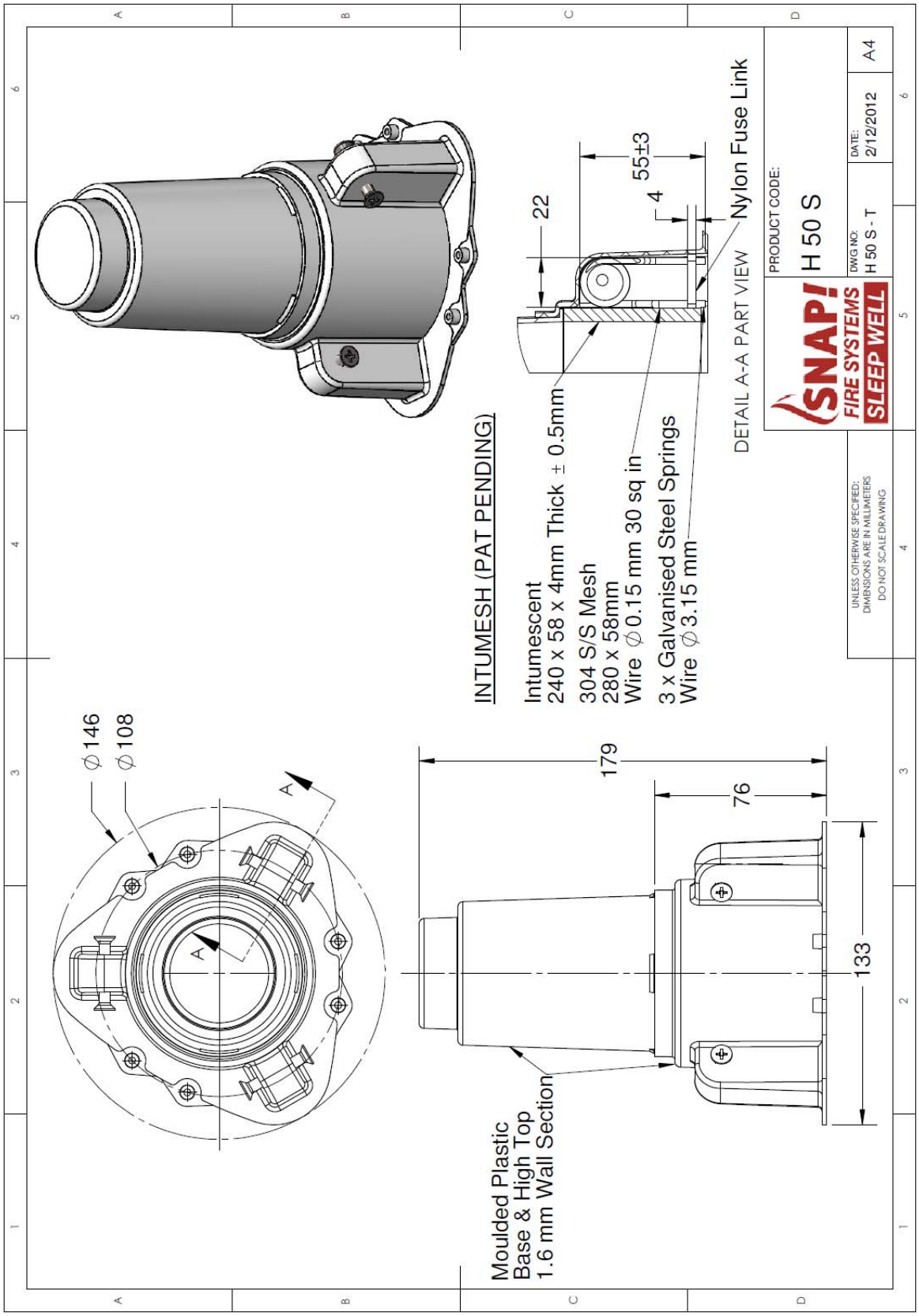


Drawing titled “Penetration #4 56 PVC Fitting/Floorwaste”, dated 15 December 2012

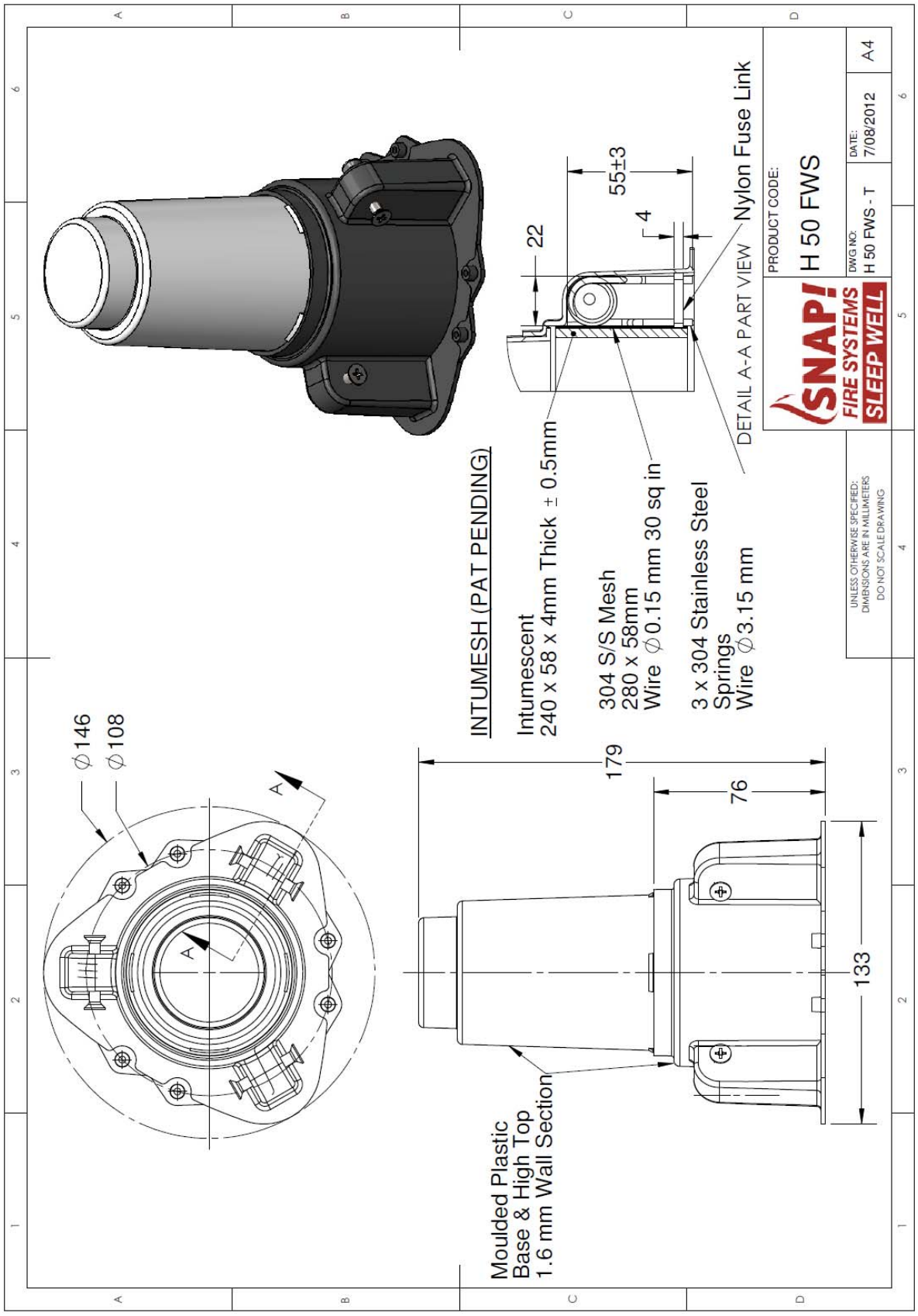
Penetration #5
50 REHAU RAUPIANO PLUS/Floorwaste - Date 15/12/2012.



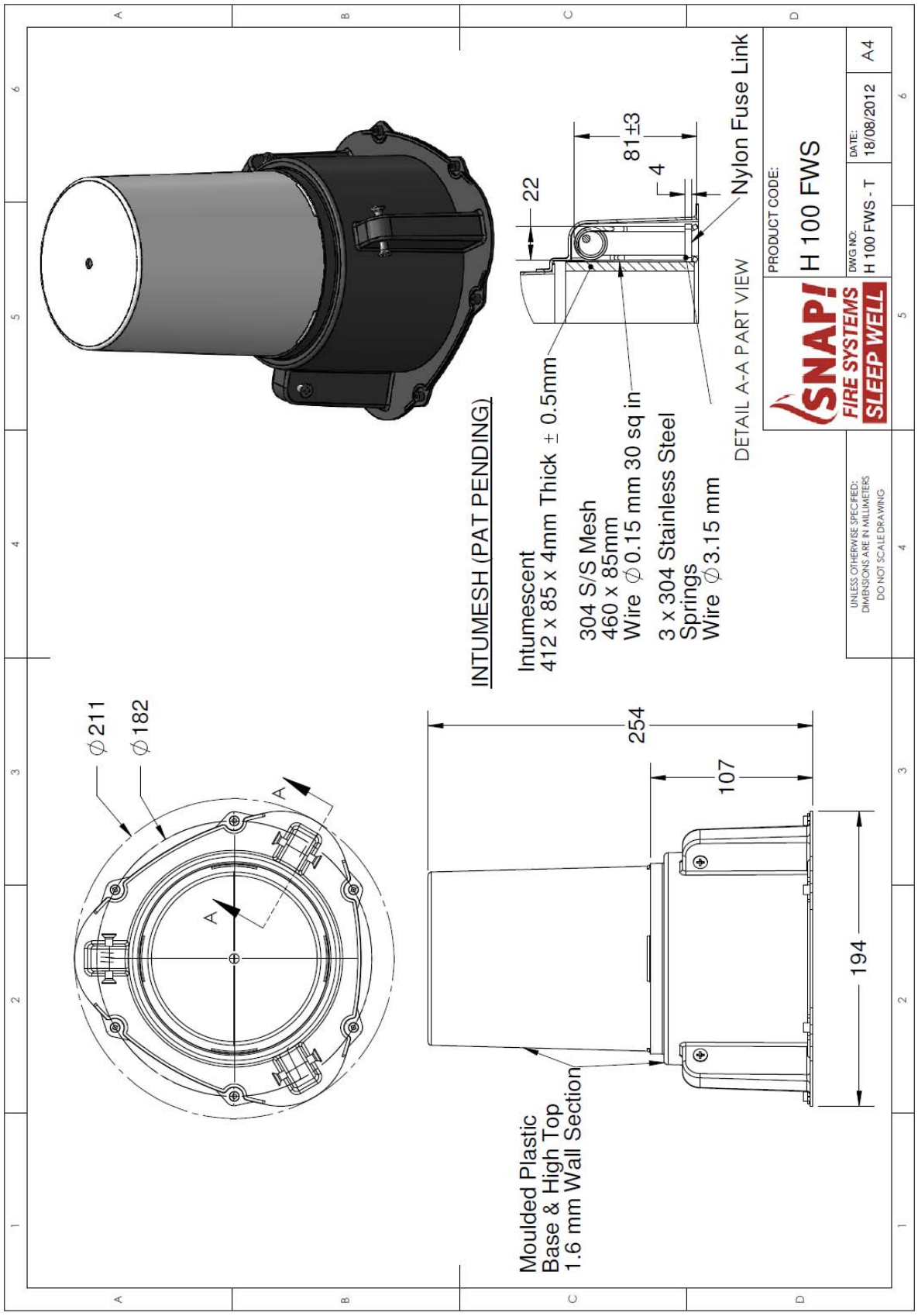
Drawing titled “Penetration #5 50 REHAU RAUPIANO PLUS/Floorwaste”, dated 15 December 2012



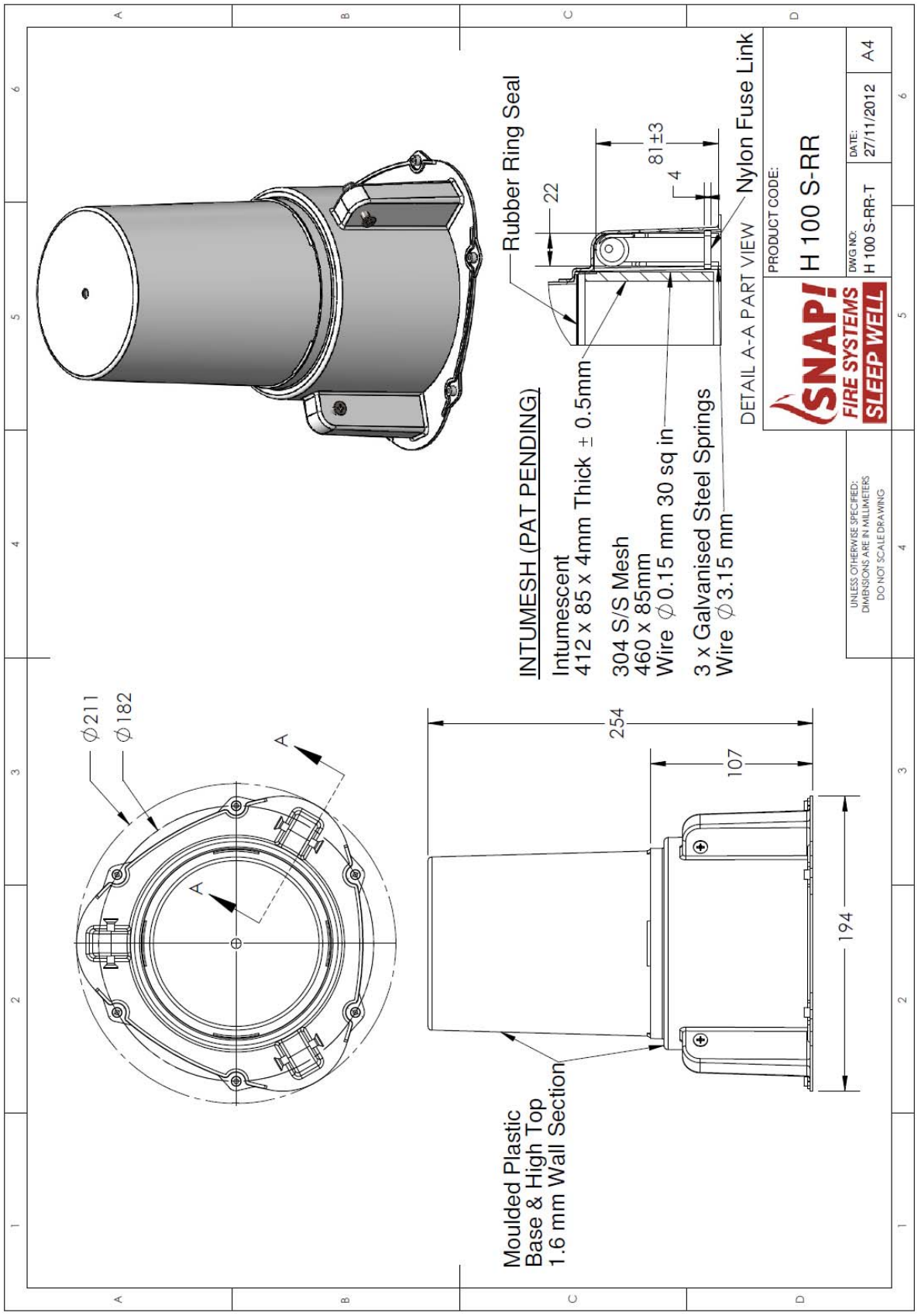
Drawing numbered H 50 S - T, dated 2/12/2012, by Snap Fire Systems



Drawing numbered H 50 FWS - T, dated 7/08/2012, by Snap Fire Systems



Drawing numbered H 100 FWS - T, dated 18/08/2012, by Snap Fire Systems



Drawing numbered H 100 S-RR - T, dated 27/11/2012, by Snap Fire Systems

APPENDIX 5

Certificate of Test

No. 2451

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 1564.

Product Name: Penetration 1 – H 50 S cast-in fire collar protecting a 40-mm REHAU RAUPIANO PLUS pipe

Description: The SNAP Cast-in H 50 S fire collar comprised a 1.6-mm thick plastic casing with a 72-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 Intumesh graphite based intumescent material. The closing mechanism comprised three galvanised steel springs, a nylon fuse link and a 280-mm x 58-mm stainless steel mesh as shown in drawing numbered H 50 S-T, dated 2 December 2012, by SNAP Fire Systems.

The penetrating service comprised a 40-mm OD REHAU RAUPIANO PLUS pipe, with a wall thickness of 1.8-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 1500-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 gap between the pipe and the collar was filled with 3M Fire Barrier Sealant IC 15WB+.

Detail of construction is shown in drawing titled "Penetration #1 40 REHAU RAUPIANO PLUS/Stack", dated 15 December 2012, 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: 26 November 2012.
Issued on the 18th day of January 2013 without alterations or additions.

Garry E Collins
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.2451

Certificate of Test

No. 2452

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 1564.

Product Name: Penetration 2 – H 100 S-RR cast-in fire collar protecting a 110-mm REHAU RAUPIANO PLUS pipe

Description: The SNAP Cast-in H 100 S-RR fire collar comprised a 1.6-mm thick plastic casing with a 129-mm inner diameter and a 182-mm diameter base flange. The 107-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh graphite based intumescent material. The closing mechanism comprised three galvanised steel springs, a nylon fuse link and a 460-mm x 85-mm stainless steel mesh as shown in drawing numbered H 100 S-RR - T, dated 27 November 2012, by SNAP Fire Systems.
The penetrating service comprised an 110-mm OD REHAU RAUPIANO PLUS pipe, with a wall thickness of 2.7-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 1500-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 gap between the pipe and the collar was filled with 3M Fire Barrier Sealant IC 15WB+.
Detail of construction is shown in drawing titled "Penetration #2 110 REHAU RAUPIANO PLUS/Stack", dated 15 December 2012, 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: 26 November 2012.
Issued on the 18th day of January 2013 without alterations or additions.

Garry E Collins
Manager, Fire Testing and Assessments

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Copy of Certificate of Test - No.2452

Certificate of Test

No. 2453

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 1564.

Product Name: Penetration 3 – H 100 FWS cast-in fire collar protecting a 110-mm diameter REHAU RAUPIANO PLUS pipe incorporating a floor waste

Description: The H 100 FWS cast-in Snap fire collar comprised a 1.6-mm thick plastic casing with a 129-mm inner diameter and a 182-mm diameter base flange. The 107-mm high collar casing incorporated a 412-mm x 85-mm x 4-mm thick Intumesh graphite based 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 H 100 FWS - T, dated 18 August 2012, by SNAP Fire Systems.
The penetrating service comprised a 110-mm OD REHAU RAUPIANO PLUS pipe, with a wall thickness of 2.7-mm fitted through the H 100 FWS cast-in Snap fire collar. On the exposed side of the slab a REHAU RAUPIANO PLUS floor waste gully was connected to the penetrating pipe, supported by steel rods fixed to the concrete slab. The floor waste gully projected approximately 250-mm into the furnace chamber as shown in photograph #1. On the exposed face, the floor waste gully was sealed using a Kaowool plug and a REHAU RAUPIANO PLUS end cap.
The floor waste gully was charged with water to the level shown in drawing titled "Penetration #3 110 REHAU RAUPIANO PLUS/Floorwaste", dated 15 December 2012, by Snap Fire Systems Pty Ltd.
Detail of construction is shown in drawing titled "Penetration #3 110 REHAU RAUPIANO PLUS/Floorwaste", dated 15 December 2012, 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: 26 November 2012.
Issued on the 18th day of January 2013 without alterations or additions.

Garry E Collins
Manager, Fire Testing and Assessments

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Copy of Certificate of Test - No.2453

Certificate of Test

No. 2454

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 1564.

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

Description: The H 50 FWS cast-in Snap fire collar comprised a 1.6-mm thick plastic casing with a 72-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 Intumesh graphite based 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 7 August 2012, by SNAP Fire Systems.

The penetrating service comprised a 56-mm OD PVC pipe which was fitted through H 50 FWS cast-in Snap fire collar. On the exposed side of the slab a PVC 90° elbow was connected to the penetrating pipe within the fire collar and supported by a steel support clamp as shown in photograph #1. The pipe was capped on the exposed face of the slab with a REHAU RAUPIANO PLUS end cap, and on the unexposed face with a standard chrome plated brass floor grate.

Detail of construction is shown in drawing titled "Penetration #4 56 PVC with Fitting/Floorwaste", dated 15 December 2012, 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: 26 November 2012.
Issued on the 18th day of January 2013 without alterations or additions.

Garry E Collins
Manager, Fire Testing and Assessments

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Certificate of Test

No. 2455

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 1564.

Product Name: Penetration 5 – H 50 FWS cast-in fire collar protecting a 50-mm diameter REHAU RAUPIANO PLUS pipe incorporating a floor waste

Description: The H 50 FWS cast-in Snap fire collar comprised a 1.6-mm thick plastic casing with a 72-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 Intumesh graphite based 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 drawing in numbered H 50 FWS - T, dated 7 August 2012, by SNAP Fire Systems.

The penetrating service comprised a 50-mm OD REHAU RAUPIANO PLUS pipe with a wall thickness of 1.8-mm fitted through H 50 FWS cast-in Snap fire collar. On the exposed side of the slab REHAU RAUPIANO PLUS 45º elbows were connected to the penetrating pipe and supported by a steel rod fixed to the concrete slab as shown in photograph #1. The pipe was capped on the exposed face of the slab with a REHAU RAUPIANO PLUS end cap, and on the unexposed face with a standard chrome plated brass floor grate.

Detail of construction is shown in drawing titled "Penetration #5 50 REHAU RAUPIANO PLUS/Floorwaste", dated 15 December 2012, 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: 26 November 2012.
Issued on the 18th day of January 2013 without alterations or additions.

Garry E Collins
Manager, Fire Testing and Assessments

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