

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

Test Report

Author: Mario Lara-Ledermann
Report number: FSP 1713
Date: 18 December 2015

Client: Snap Fire Systems Pty Ltd

Commercial-in-confidence

Inquiries should be address to:

Fire Testing and Assessments
Infrastructure Technologies
14 Julius Avenue
North Ryde, NSW 2113
Telephone +61 2 9490 5444




Author
Infrastructure Technologies
14 Julius Avenue
North Ryde, NSW 2113
Telephone +61 2 9490 5500

The Client
Snap Fire Systems Pty Ltd
Unit 2/160 Redland Bay Road
Capalaba QLD
Telephone +61 7 3245 2133

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AUTHOR	REVIEWED BY	AUTHORISED BY
Mario Lara-Ledermann	Brett Roddy	Brett Roddy
		
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Fire-resistance test on fire collars protecting a concrete slab penetrated by services

Sponsored Investigation No. FSP 1713

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as Snap Cast-in Fire Collars protecting a 150-mm thick 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 4511/3866

1.7 Test date

The fire-resistance test was conducted on 17 August 2015.

2 Description of specimen

2.1 General

The specimen comprised an 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by three (3) floor waste systems and two (2) stack pipes protected by Retrofit Snap Fire System fire collar.

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;
- AS/NZS 7671:2010 'Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings - Polypropylene (PP)(ISO 7671:2003), MOD'; and
- EN 1451-1:2000 'Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure. Polypropylene (PP). 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 four (4) specimens are included in this report (Penetration 1, 3, 4 and 5). Documents containing a complete description of each specimen were supplied by the sponsor and are retained on file.

Penetration 1 – LP100R-B retrofitted fire collar protecting a 110-mm diameter Polyvinyl Chloride (PVC-SC) pipe incorporating a floor waste and a fitting inside the collar

The SNAP retrofitted LP100R-B fire collar comprised a 0.95 steel casing with a 122-mm inner diameter and a 257-mm diameter base flange. The 65-mm high collar casing incorporated:

- Intumesh Intumescent A - 424-mm x 58-mm x 2.5-mm thick intumescent material
- Intumesh Intumescent B – 407-mm x 58-mm x 2.5-mm thick intumescent material; and
- Intumesh Intumescent C – 389-mm x 58-mm x 2.5-mm thick intumescent material.

The closing mechanism comprised four stainless steel springs, nylon fuse links and a 304 stainless steel mesh measuring 415-mm x 58-mm, as shown in drawing numbered LP100R-B, dated 10 September 2015, by SNAP Fire Systems.

The collar was fixed to the underside of the slab with steel wedge anchors 6 x 35-mm as shown in drawing titled "Test Slab S-15-E Penetration # 1 110-mm PVC-SC Pipe – Floorwaste + Fitting inside Collar – LP100R-B", dated 21 September 2015, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 110-mm OD PVC-SC pipe, with a wall thickness of 3.6-mm fitted through the LP100R-B Snap fire collar. The floor waste system was fitted with a 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-SC 90° elbow was fitted to the pipe within the collar, supported by a M10 HKD clamp and 110-mm nut clip fixed to the concrete slab. On the exposed face, the penetration was capped using a PVC end cap.

The floor waste gully was charged with water to the level shown in drawing titled "Test Slab S-15-E Penetration # 1 110-mm PVC-SC Pipe – Floorwaste + Fitting inside Collar – LP100R-B", dated 21 September 2015, by Snap Fire Systems Pty Ltd.

Penetration 3 – LP50R retrofitted fire collar protecting a 50-mm diameter Rehau Raupiano pipe incorporating a floor waste and fitting inside the collar

The SNAP retrofitted LP50R fire collar comprised a 0.75 steel casing with a 69-mm inner diameter and a 203-mm diameter base flange. The 62-mm high collar casing incorporated a 255 x 58 x 4-mm thick Intumesh Intumescent material.

The closing mechanism comprised three stainless steel springs, nylon fuse links and a 304 stainless steel mesh measuring 260-mm x 58-mm, as shown in drawing numbered LP50R-T, dated 14 January 2015, by Snap Fire Systems Pty Ltd.

The collar was fixed to the underside of the slab with steel wedge anchors 6 x 35-mm as shown in drawing titled “Test Slab S-15-E Penetration # 3 50-mm Raupiano Pipe – Floorwaste + Fitting inside Collar – LP100R-B”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 50-mm Raupiano pipe, with a wall thickness of 2-mm fitted through the LP50R Snap fire collar. The floor waste system was fitted with a 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, two (2) 50-mm Rehau Raupiano 45° elbows were fitted to the pipe within the collar, supported by a M10 HKD clamp and 50-mm Raupiano nut clip fixed to the concrete slab. On the exposed face, the penetration was capped using a 50-mm Raupiano end cap.

The floor waste gully was charged with water to the level shown in drawing titled “Test Slab S-15-E Penetration # 3 50-mm Raupiano Pipe – Floorwaste + Fitting inside Collar – LP50R”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

Penetration 4 – LP100R-B retrofitted fire collar protecting a 110-mm diameter Rehau Raupiano pipe stack and fitting inside the collar

The SNAP retrofitted LP100R-B fire collar comprised a 0.95 steel casing with a 122-mm inner diameter and a 257-mm diameter base flange. The 65-mm high collar casing incorporated:

- Intumescent A - 424-mm x 58-mm x 2.5-mm thick intumescent material
- Intumescent B – 407-mm x 58-mm x 2.5-mm thick intumescent material; and
- Intumescent C – 389-mm x 58-mm x 2.5-mm thick intumescent material.

The closing mechanism comprised four stainless steel springs, nylon fuse links, and a 304 stainless steel mesh measuring 415-mm x 58-mm, as shown in drawing numbered LP100R-B, dated 10 September 2015, by SNAP Fire Systems.

The collar was fixed to the underside of the slab with metal pin anchors 6 x 35-mm as shown in drawing titled “Test Slab S-15-E Penetration # 4 110-mm Raupiano Pipe – Stack + Fitting Inside Collar – LP100R-B, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 110-mm OD Rehau Raupiano PVC-SC pipe, with a wall thickness of 3-mm fitted through the LP100R-B Snap fire collar. 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. On the exposed face, 110-mm Rehau Raupiano Coupling was fitted to the penetration within the collar with the top lip recessed inside the slab. The penetration was capped using a Kaowool Plug.

Penetration 5 – LP50R retrofitted fire collar protecting a 40-mm diameter Rehau Raupiano pipe stack and fitting inside the collar

The SNAP retrofitted LP50R fire collar comprised a 0.75 steel casing with a 69-mm inner diameter and a 203-mm diameter base flange. The 62-mm high collar casing incorporated a 255 x 58 x 4-mm thick Intumesh Intumescent material.

The closing mechanism comprised three stainless steel springs, nylon fuse links and a 304 stainless steel mesh measuring 260-mm x 58-mm, as shown in drawing numbered LP50R-T, dated 14 January 2015, by Snap Fire Systems Pty Ltd.

The collar was fixed to the underside of the slab with steel wedge anchors 6 x 35-mm as shown in drawing titled “Test Slab S-15-E Penetration # 5 40-mm Raupiano Pipe – Stack + Fitting inside Collar – LP50R”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 40-mm OD Raupiano pipe stack, with a wall thickness of 2.1-mm fitted through the LP50R Snap fire collar. 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. On the exposed face a 40-mm Raupiano Coupling was fitted to the penetration within the collar. The penetration was capped using a Kaowool Plug.

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 “Test Slab S-15-E Penetration # 1 110-mm PVC-SC Pipe – Floorwaste + Fitting inside Collar – LP100R-B”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

Drawing titled “Test Slab S-15-E Penetration # 3 50-mm Raupiano Pipe – Floorwaste + Fitting inside Collar – LP100R-B”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

Drawing titled “Test Slab S-15-E Penetration # 4 110-mm Raupiano Pipe – Stack + Fitting Inside Collar – LP100R-B”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

Drawing titled “Test Slab S-15-E Penetration # 5 40-mm Raupiano Pipe – Stack + Fitting inside Collar – LP100R-B”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.

Drawing numbered LP100R-B, dated 10 September 2015, 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 -	Light smoke is observed on Penetration 5.
3 minutes -	Smoke is fluing from Penetrations 4 and 5.
6 minutes -	Base of Penetration 4 is deforming.
8 minutes -	Smoke is being emitted from Penetration 1. Cotton wool pad test applied and no ignition noted.
10 minutes -	Smoke is no longer fluing from Penetration 4 and 5.
60 minutes -	No change noted.
120 minutes -	No change noted.
180 minutes -	No change noted.
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 1.

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.

8.5 Performance

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

Penetration 1 – LP100R-B retrofitted fire collar protecting a 110-mm diameter Polyvinyl Chloride (PVC-SC) pipe incorporating a floor waste and fitting inside the collar

Structural adequacy - not applicable

Integrity - no failure at 241 minutes

Insulation - 213 minutes

Penetration 3 – LP50R retrofitted fire collar protecting a 50-mm diameter Rehau Raupiano pipe incorporating a floor waste and fitting inside the collar

Structural adequacy - not applicable

Integrity - no failure at 241 minutes

Insulation - no failure at 241 minutes

Penetration 4 – LP100R-B retrofitted fire collar protecting a 110-mm diameter Rehau Raupiano pipe stack and fitting inside the collar

Structural adequacy - not applicable

Integrity - no failure at 241 minutes

Insulation - no failure at 241 minutes

Penetration 5 – LP50R retrofitted fire collar protecting a 40-mm diameter Rehau Raupiano pipe stack and fitting inside the collar

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 1	-	-/240/180	Penetration 4	-	-/240/240; and
Penetration 3	-	-/240/240	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.

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 grate	S1
	On step 25-mm from grate.	S2
	On step 25-mm from grate.	S3
	On slab.	S4
Penetration 2	On grate	S5
	On step 25-mm from grate.	S6
	On step 25-mm from grate.	S7
Penetration 3	On slab.	S8
	On grate.	S9
	On step 25-mm from grate.	S10
	On step 25-mm from grate.	S11
Penetration 4	On slab.	S12
	On slab 25-mm from pipe.	S13
	On slab 25-mm from pipe.	S14
	On pipe 25-mm from slab.	S15
Penetration 5	On pipe 25-mm from slab.	S16
	On slab 25-mm from pipe.	S17
	On slab 25-mm from pipe.	S18
	On pipe 25-mm from slab.	S19
	On pipe 25-mm from slab.	S20

Appendix B – Photographs



PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMEN PRIOR TO TESTING



PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMENS PRIOR TO TESTING



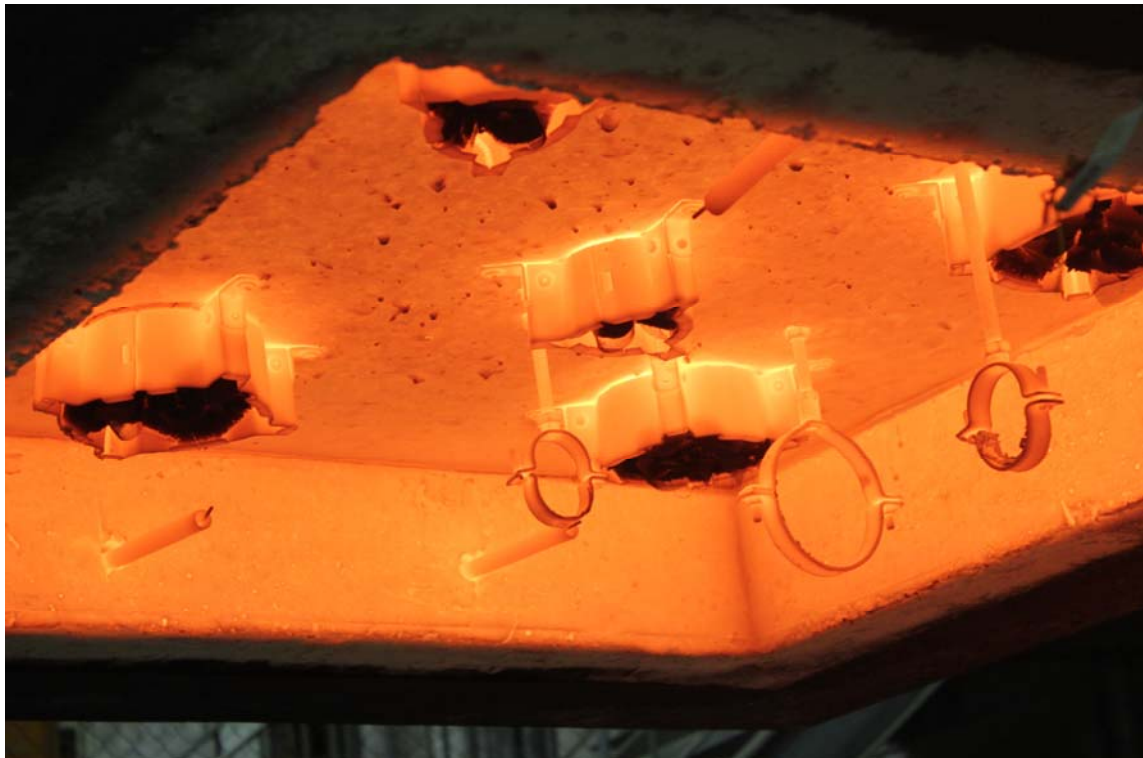
PHOTOGRAPH 3 – SPECIMENS AFTER 60 MINUTES OF TESTING



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

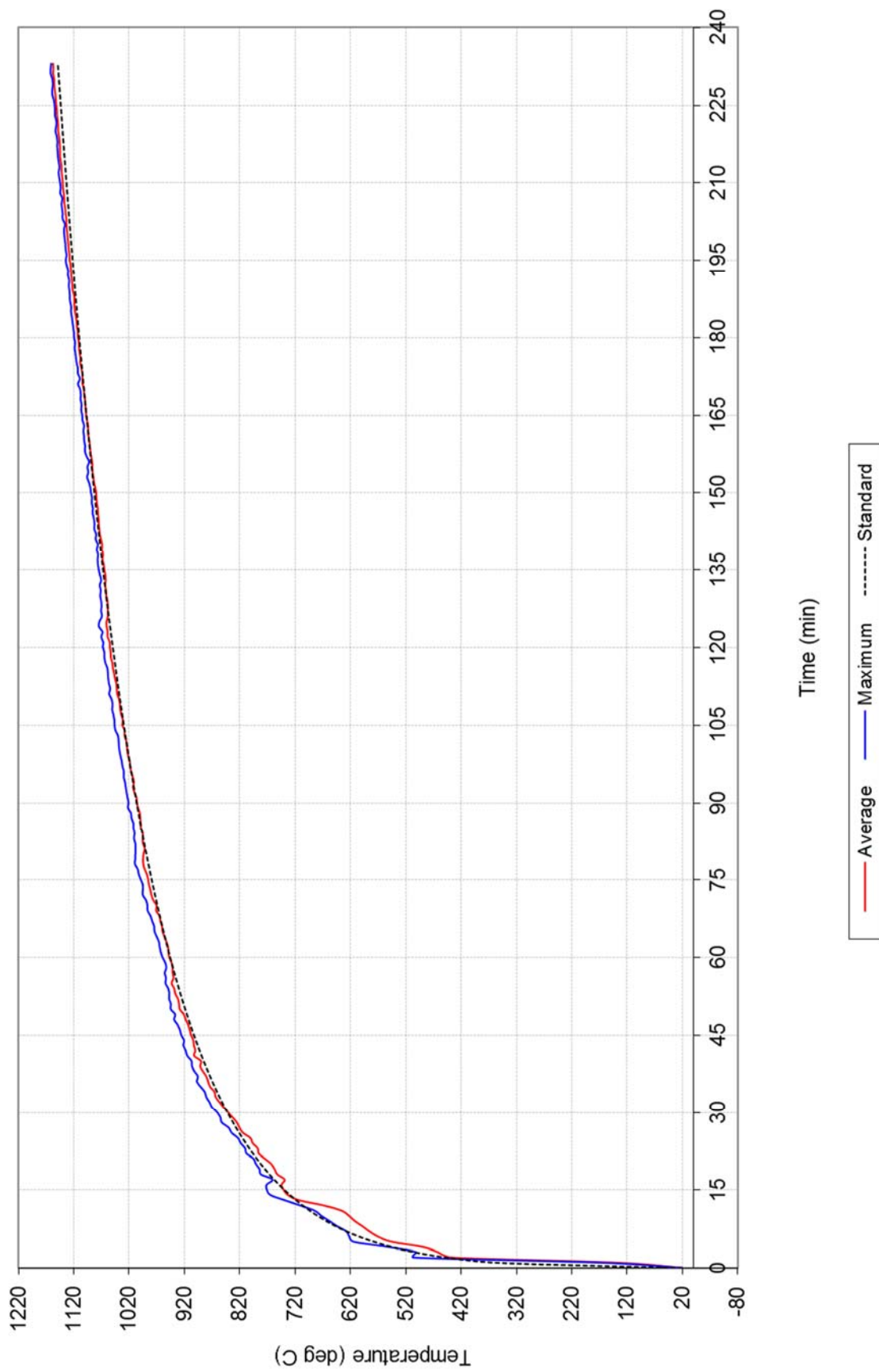


FIGURE 1 – FURNACE TEMPERATURE

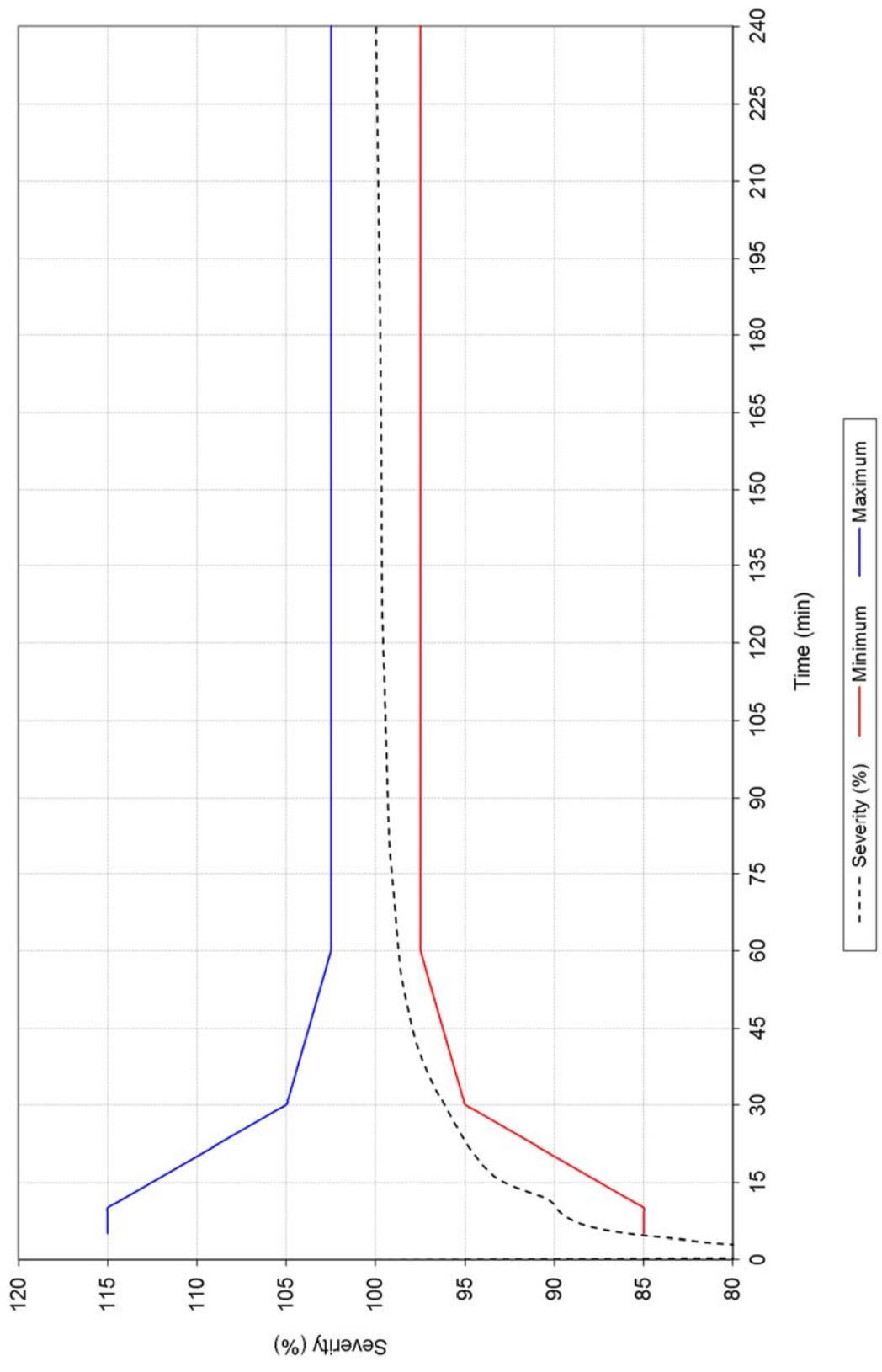


FIGURE 2 – FURNACE SEVERITY

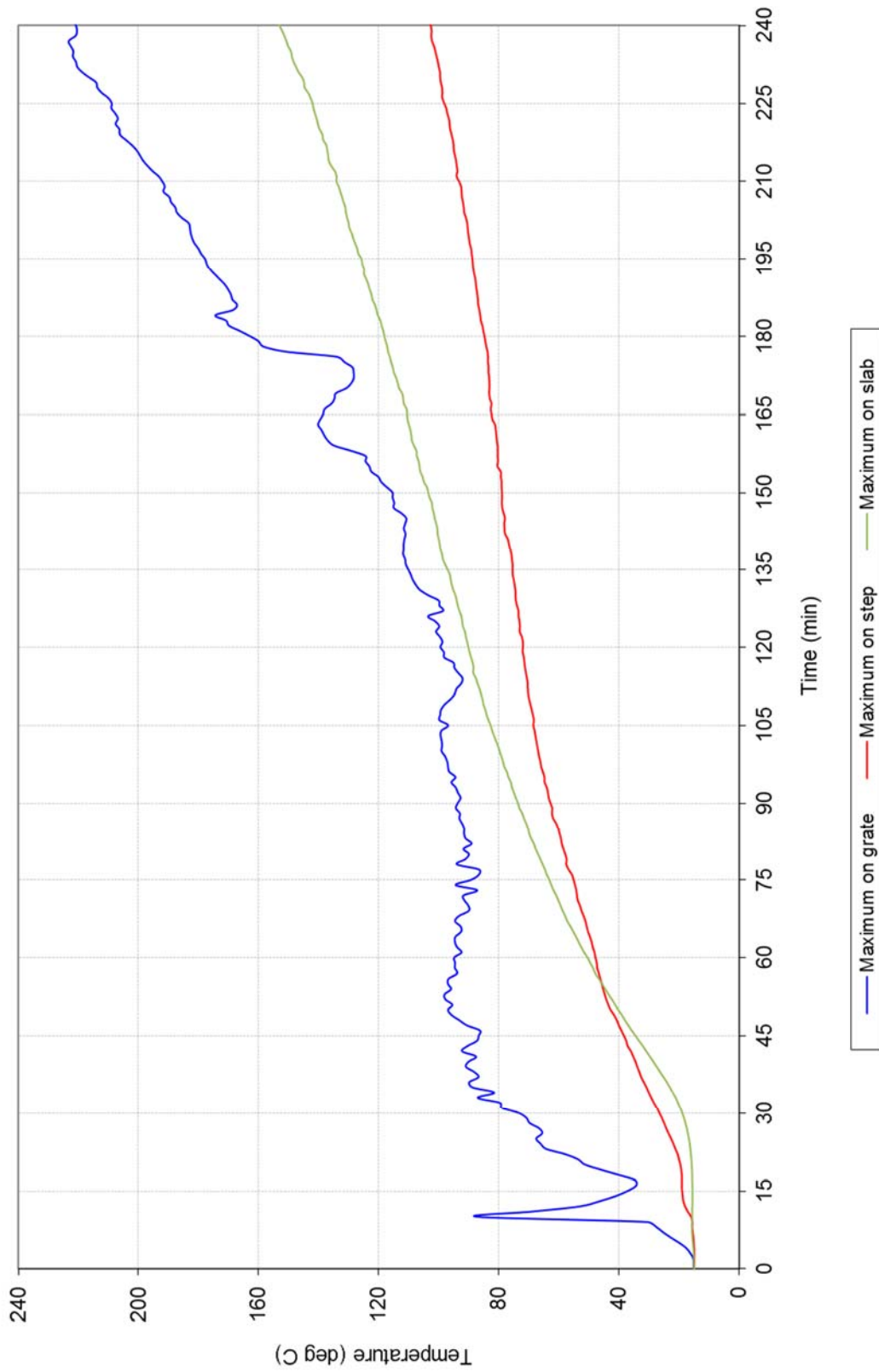


FIGURE 3 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION 1

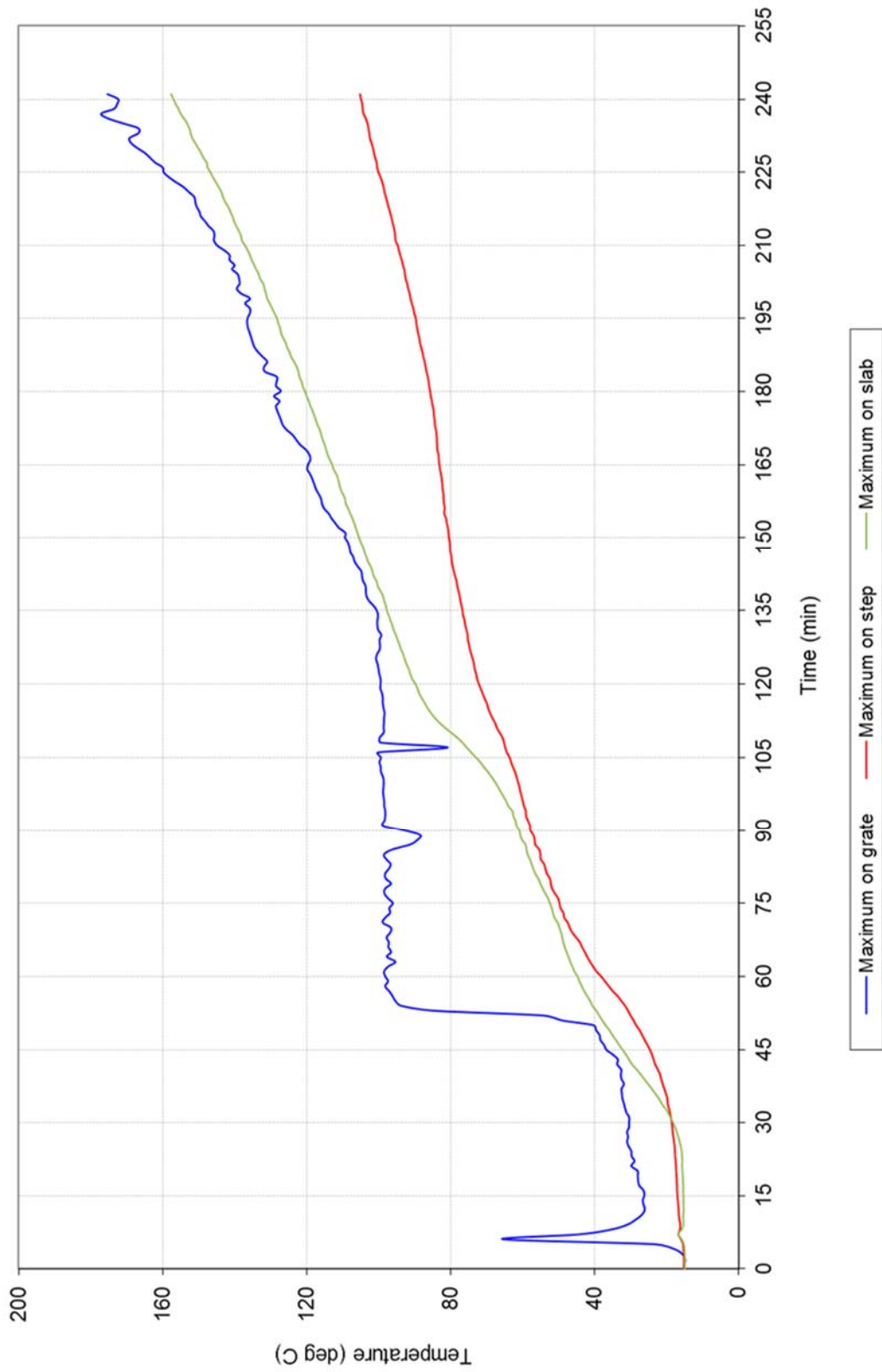


FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION 3

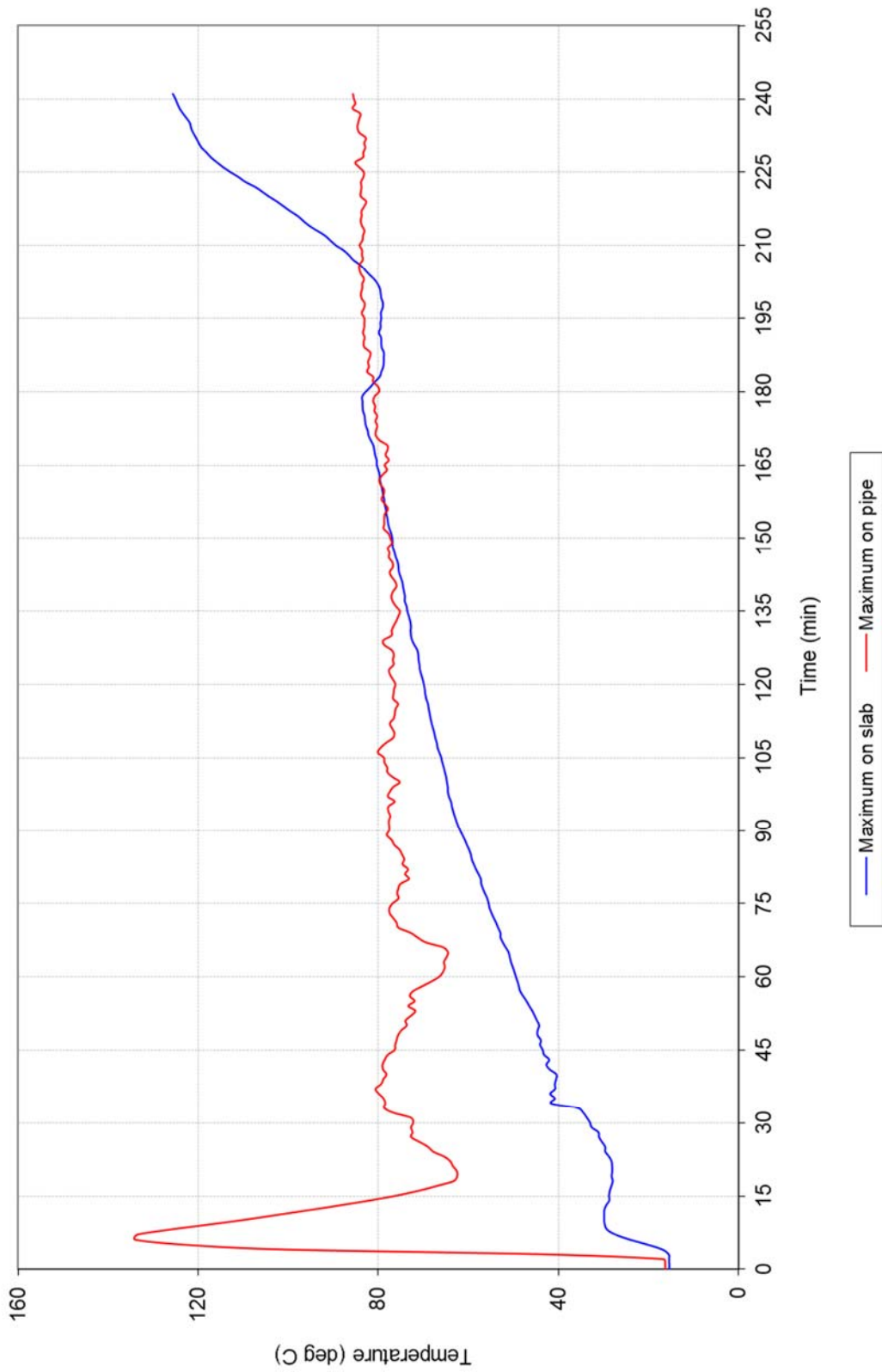


FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION 4

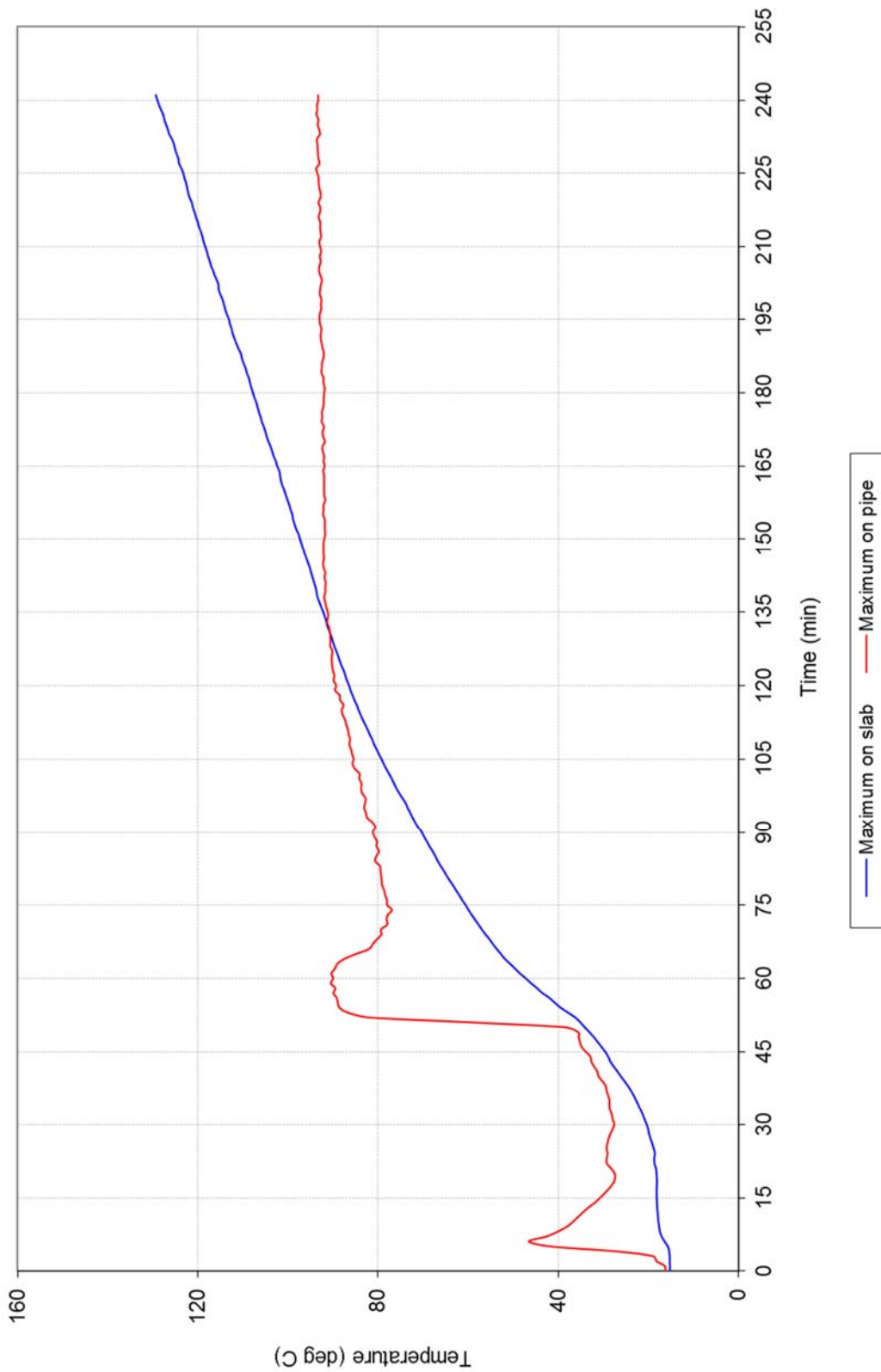
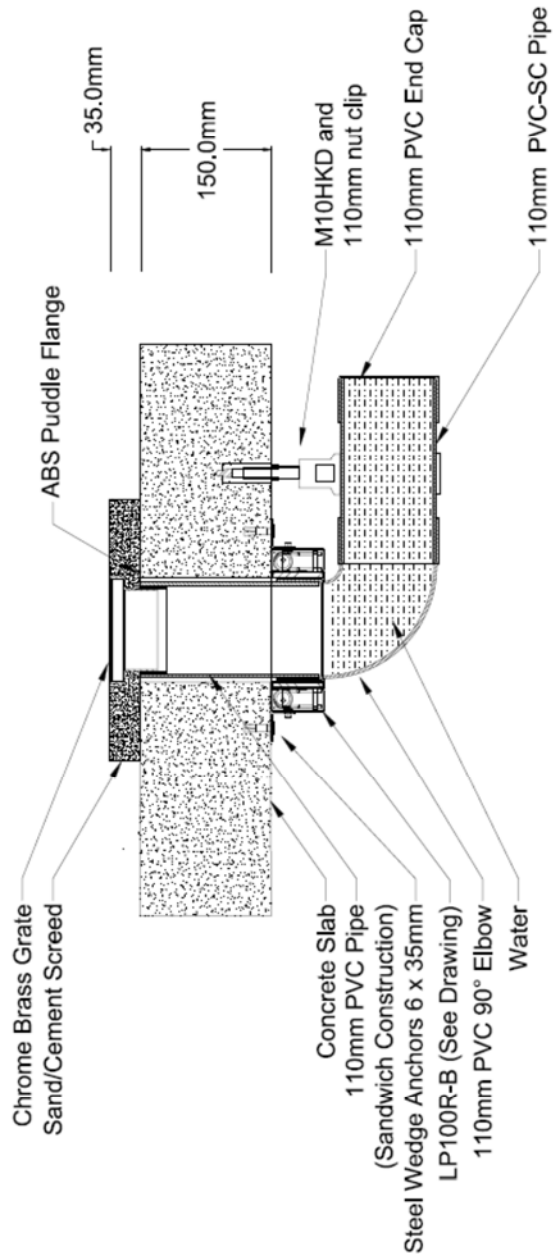


FIGURE 6 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION 5

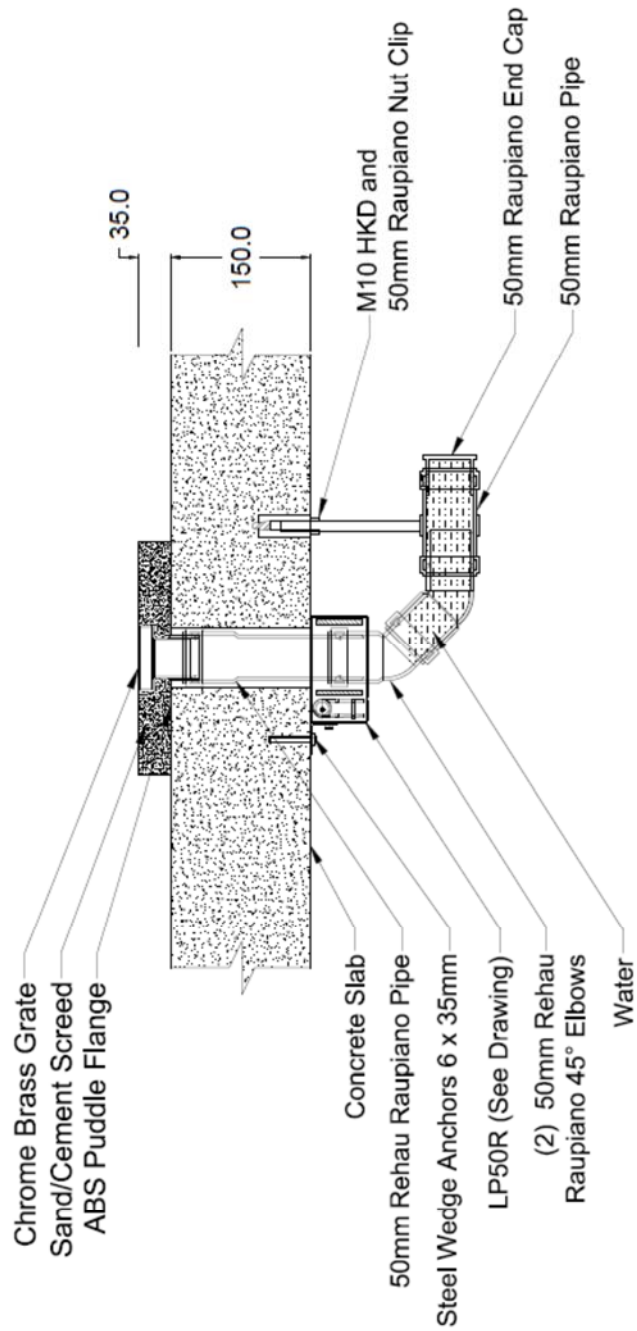
Appendix D – Installation drawings

Test Slab S-15-E Penetration 1
 110mm PVC-SC Pipe – Floorwaste + Fitting Inside Collar – LP100R-B
 Date: 21 Sep 2015



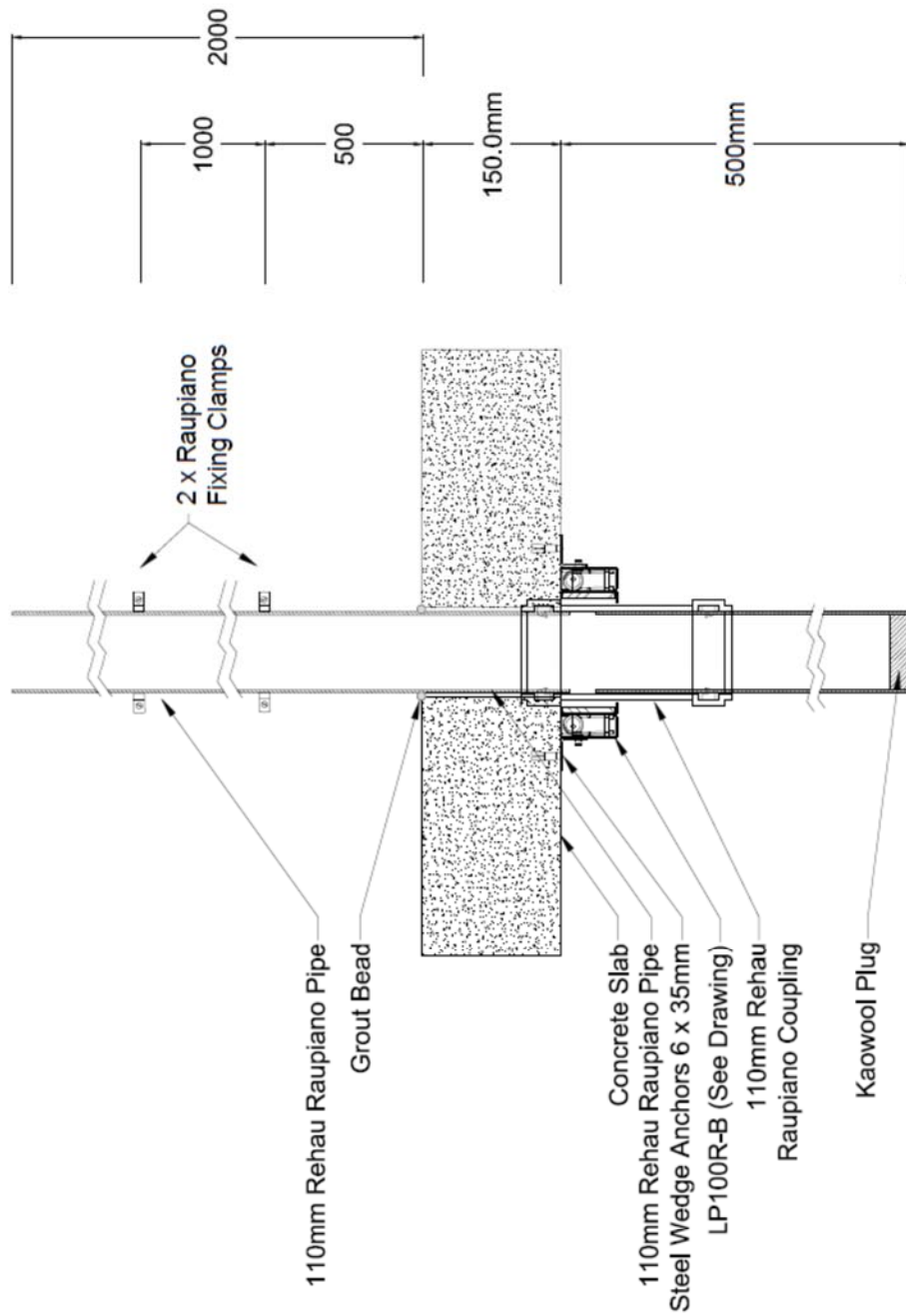
DRAWING TITLED “TEST SLAB S-15-E PENETRATION # 1 110-MM PVC-SC PIPE – FLOORWASTE + FITTING INSIDE COLLAR – LP100R-B”, DATED 21 SEPTEMBER 2015, BY SNAP FIRE SYSTEMS PTY LTD

Test Slab S-15-E Penetration # 3
 50mm Raupiano Pipe – Floorwaste + Fitting Inside Collar – LP50R
 Date 21 Sept. 2015



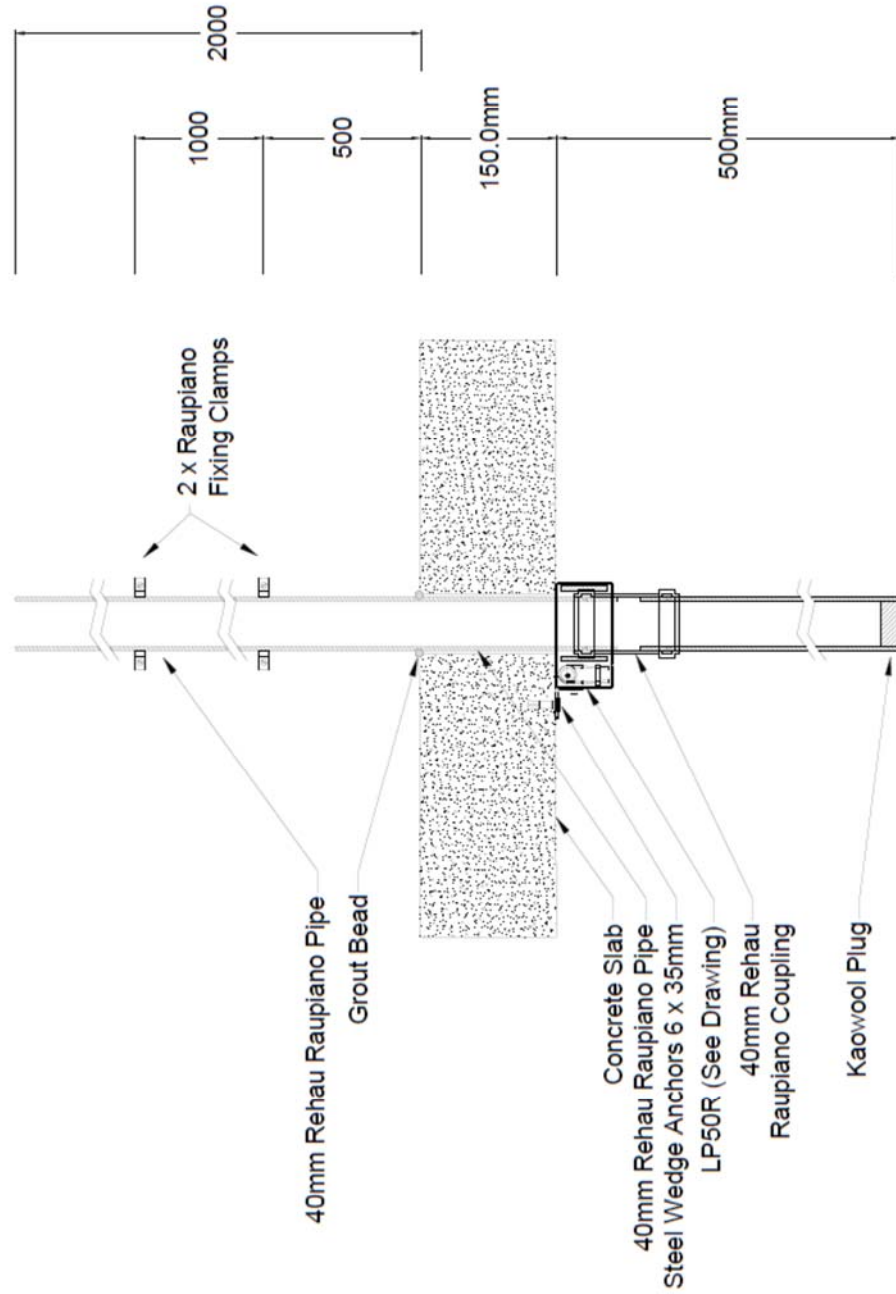
DRAWING TITLED “TEST SLAB S-15-E PENETRATION # 3 50-MM RAUPIANO PIPE – FLOORWASTE + FITTING INSIDE COLLAR – LP50R”, DATED 21 SEPTEMBER 2015, BY SNAP FIRE SYSTEMS PTY LTD

Test Slab S-15-E Penetration 4
 110mm Raupiano Pipe - Stack + Fitting Inside Collar - LP100R-B
 Date: 21 Sep 2015



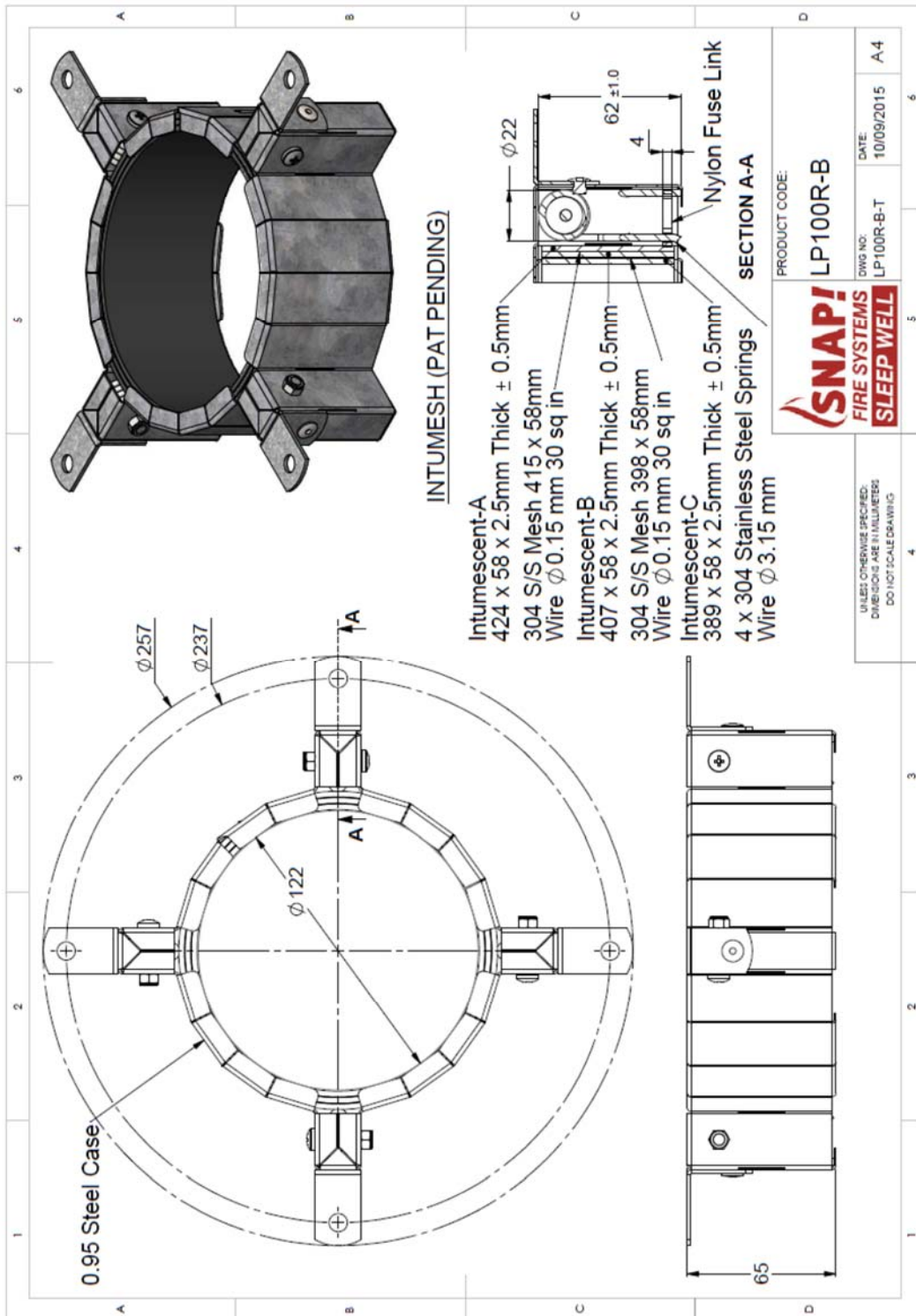
DRAWING TITLED "TEST SLAB S-15-E PENETRATION # 4 110-MM RAUPIANO PIPE - STACK + FITTING INSIDE COLLAR - LP100R-B, DATED 21 SEPTEMBER 2015, BY SNAP FIRE SYSTEMS PTY LTD.

Test Slab S-15-E Penetration 5
 40mm Raupiano Pipe – Stack + Fitting Inside Collar – LP50R
 Date: 21Sep 2015

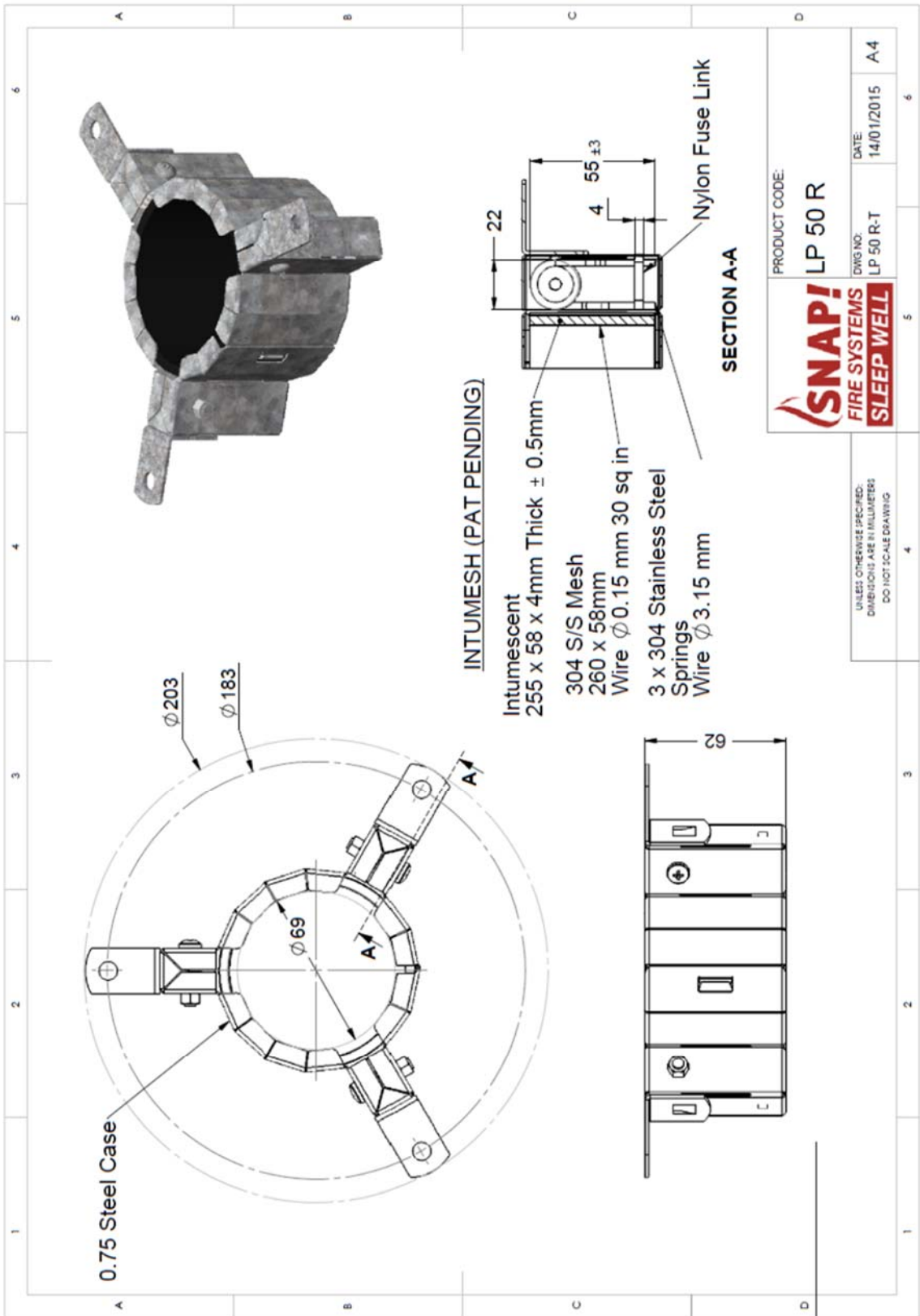


DRAWING TITLED “TEST SLAB S-15-E PENETRATION # 5 50-MM RAUPIANO PIPE – STACK + FITTING INSIDE COLLAR – LP50R”, DATED 21 SEPTEMBER 2015, BY SNAP FIRE SYSTEMS PTY LTD.

Appendix E – Specimen Drawings




DRAWING NUMBERED LP100R-B, DATED 10 SEPTEMBER 2015, BY SNAP FIRE SYSTEMS PTY LTD.



DRAWING NUMBERED LP50R-T, DATED 14 JANUARY 2015, BY SNAP FIRE SYSTEMS PTY LTD.

Appendix F – Certificates

INFRASTRUCTURE TECHNOLOGIES www.csiro.au		
14 Julius Avenue, North Ryde NSW 2113 PO Box 52, North Ryde NSW 1670, Australia T (02) 9490 5444 • ABN 41 687 119 230		
<h2>Certificate of Test</h2>		No. 2770
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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 1713.		
Product Name: Penetration 1 – LP100R-B retrofitted fire collar protecting a 110-mm diameter Polyvinyl Chloride (PVC-SC) pipe incorporating a floor waste and a fitting inside the collar		
Description: The SNAP retrofitted LP100R-B fire collar comprised a 0.95 steel casing with a 122-mm inner diameter and a 257-mm diameter base flange. The 65-mm high collar casing incorporated Intumesh Intumescent A - 424-mm x 58-mm x 2.5-mm thick intumescent material; Intumesh Intumescent B – 407-mm x 58-mm x 2.5-mm thick intumescent material; and Intumesh Intumescent C – 389-mm x 58-mm x 2.5-mm thick intumescent material. The closing mechanism comprised four stainless steel springs, nylon fuse links and a 304 stainless steel mesh measuring 415-mm x 58-mm, as shown in drawing numbered LP100R-B, dated 10 September 2015, by SNAP Fire Systems. The collar was fixed to the underside of the slab with steel wedge anchors 6 x 35-mm as shown in drawing titled “Test Slab S-15-E Penetration # 1 110-mm PVC-SC Pipe – Floorwaste + Fitting inside Collar – LP100R-B”, dated 21 September 2015, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 110-mm OD PVC-SC pipe, with a wall thickness of 3.6-mm fitted through the LP100R-B Snap fire collar. The floor waste system was fitted with a 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-SC 90° elbow was fitted to the pipe within the collar, supported by a M10 HKD clamp and 110-mm nut clip fixed to the concrete slab. On the exposed face, the penetration was capped using a PVC end cap. The floor waste gully was charged with water to the level shown in drawing titled “Test Slab S-15-E Penetration # 1 110-mm PVC-SC Pipe – Floorwaste + Fitting inside Collar – LP100R-B”, dated 21 September 2015, by Snap Fire Systems Pty Ltd.		
Structural Adequacy	not applicable	
Integrity	no failure at 241 minutes	
Insulation	213 minutes	
and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/240/180. 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: 17 August 2015
Issued on the 18 th day of December 2015 without alterations or additions.		
		
Brett Roddy Manager, Fire Testing and Assessments		
	This document is issued in accordance with NATA's accreditation requirements. Accreditation No. 165 – Corporate Site No. 3625 Accredited for compliance with ISO/IEC 17025	

COPY OF CERTIFICATE OF TEST – NO. 2770



Certificate of Test

No. 2771

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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 1713.

Product Name: Penetration 3 – LP50R retrofitted fire collar protecting a 50 mm diameter Rehau Raupiano pipe incorporating a floor waste and fitting inside the collar

Description: The SNAP retrofitted LP50R fire collar comprised a 0.75 steel casing with a 69-mm inner diameter and a 203-mm diameter base flange. The 62-mm high collar casing incorporated a 255 x 58 x 4-mm thick Intumesh Intumescent material. The closing mechanism comprised three stainless steel springs, nylon fuse links and a 304 stainless steel mesh measuring 260-mm x 58-mm, as shown in drawing numbered LP50R-T, dated 14 January 2015, by Snap Fire Systems Pty Ltd. The collar was fixed to the underside of the slab with steel wedge anchors 6 x 35-mm as shown in drawing titled "Test Slab S-15-E Penetration # 3 50-mm Raupiano Pipe – Floorwaste + Fitting inside Collar – LP100R-B", dated 21 September 2015, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 50-mm Raupiano pipe, with a wall thickness of 2 mm fitted through the LP50R Snap fire collar. The floor waste system was fitted with a 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, two (2) 50-mm Rehau Raupiano 45° elbows were fitted to the pipe within the collar, supported by a M10 HKD clamp and 50-mm Raupiano nut clip fixed to the concrete slab. On the exposed face, the penetration was capped using a 50-mm Raupiano end cap. The floor waste gully was charged with water to the level shown in drawing titled "Test Slab S-15-E Penetration # 3 50-mm Raupiano Pipe – Floorwaste + Fitting inside Collar – LP50R", dated 21 September 2015, 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 -/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 regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara-Ledermann **Date of Test:** 17 August 2015
Issued on the 18th day of December 2015 without alterations or additions.

Brett Roddy
Manager, Fire Testing and Assessments



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Certificate of Test

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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 1713.

Product Name: Penetration 4 – LP100R-B retrofitted fire collar protecting a 110 mm diameter Rehau Raupiano pipe stack and fitting inside the collar

Description: The SNAP retrofitted LP100R-B fire collar comprised a 0.95 steel casing with a 122-mm inner diameter and a 257-mm diameter base flange. The 65-mm high collar casing incorporated Intumescent A - 424-mm x 58-mm x 2.5-mm thick intumescent material; Intumescent B – 407-mm x 58-mm x 2.5-mm thick intumescent material; and Intumescent C – 389-mm x 58-mm x 2.5-mm thick intumescent material. The closing mechanism comprised four stainless steel springs, nylon fuse links, and a 304 stainless steel mesh measuring 415-mm x 58-mm, as shown in drawing numbered LP100R-B, dated 10 September 2015, by SNAP Fire Systems. The collar was fixed to the underside of the slab with metal pin anchors 6 x 35-mm as shown in drawing titled "Test Slab S-15-E Penetration # 4 110-mm Raupiano Pipe – Stack + Fitting inside Collar – LP100R-B, dated 21 September 2015, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 110-mm OD Rehau Raupiano PVC-SC pipe, with a wall thickness of 3 mm fitted through the LP100R-B Snap fire collar. 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. On the exposed face, 110-mm Rahau Raupiano Coupling was fitted to the penetration within the collar with the top lip recessed inside the slab. The penetration was capped using a Kaowool Plug.

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 regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara-Ledermann Date of Test: 17 August 2015
Issued on the 18th day of December 2015 without alterations or additions.

Brett Roddy
Manager, Fire Testing and Assessments



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Certificate of Test

No. 2773

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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 1713.

Product Name: Penetration 5 – LP50R retrofitted fire collar protecting a 40 mm diameter Rehau Raupiano pipe stack and fitting inside the collar

Description: The SNAP retrofitted LP50R fire collar comprised a 0.75 steel casing with a 69-mm inner diameter and a 203-mm diameter base flange. The 62-mm high collar casing incorporated a 255 x 58 x 4-mm thick Intumesh Intumescent material. The closing mechanism comprised three stainless steel springs, nylon fuse links and a 304 stainless steel mesh measuring 260-mm x 58-mm, as shown in drawing numbered LP50R-T, dated 14 January 2015, by Snap Fire Systems Pty Ltd. The collar was fixed to the underside of the slab with steel wedge anchors 6 x 35-mm as shown in drawing titled "Test Slab S-15-E Penetration # 5 40-mm Raupiano Pipe – Stack + Fitting inside Collar – LP50R", dated 21 September 2015, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 40-mm OD Raupiano pipe stack, with a wall thickness of 2.1 mm fitted through the LP50R Snap fire collar. 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. On the exposed face a 40-mm Rehau Raupiano Coupling was fitted to the penetration within the collar. The penetration was capped using a Kaowool Plug.

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 regulatory requirements for evidence of compliance.

Testing Officer: Mario Lara-Ledermann **Date of Test:** 17 August 2015
Issued on the 18th day of December 2015 without alterations or additions.

Brett Roddy
Manager, Fire Testing and Assessments



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COPY OF CERTIFICATE OF TEST – NO. 2773

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. |

CONTACT US

t 1300 363 400
+61 3 9545 2176
e enquiries@csiro.au
w www.csiro.au

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FOR FURTHER INFORMATION

Infrastructure Technologies

Mario Lara-Ledermann
Senior Fire Resistance and Assessments Engineer
t +61 2 94905500

e mario.lara@csiro.au

w www.csiro.au/Organisation-Structure/Divisions/CMSE/Infrastructure-Technologies/Fire-safety.aspx

Infrastructure Technologies

Brett Roddy
Team Leader, Fire Testing and Assessments

t +61 2 94905449

e brett.rodny@csiro.au

w www.csiro.au/Organisation-Structure/Divisions/CMSE/Infrastructure-Technologies/Fire-safety.aspx