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

Test Report

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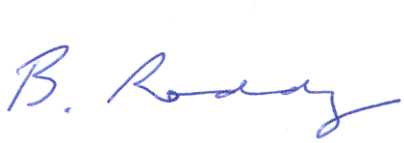
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Fire-resistance test on fire collars protecting a wall penetrated by services

Sponsored Investigation No. FSP 1783

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as Snap Retrofit Fire Collars protecting a 75-mm thick Hebel autoclaved aerated concrete (AAC) panel wall system penetrated by two (2) HDPE pipes, one (1) Pex-B pipe, one (1) by PVC-SC pipe, three (3) PVC pipes, one (1) Px-Al-Px pipe and one (1) PVC Conduit.

1.2 Sponsor

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

1.3 Manufacturer

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

1.4 Test standard

Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4-2014, Fire-resistance tests of elements of construction.

Section 10: Service Penetrations and control joints

1.5 Reference standard

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

1.6 Test number

CSIRO Reference test number: FS 4625/3942

1.7 Test date

The fire-resistance test was conducted on 7 November 2016.

2 Description of specimen

2.1 General

The wall system comprised a 75-mm thick Hebel autoclaved aerated concrete (AAC) panel wall system with an established fire resistance level (FRL) of -/90/90 as detailed in CSIRO test report FSV 0979. The wall was penetrated by nine (9) stack pipes protected by a retro-fitted Snap Fire Systems fire collar.

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

- AS 4176.1-2010 : Multilayer pipes for pressure applications - Multilayer piping systems for hot and cold water plumbing applications - General (ISO 21003-1:2008, MOD)
- AS/NZS 1260 - PVC-U pipes and fittings for drain, waste and vent application
- AS/NZS 5065:2005 'Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications'
- AS/NZS 2492:2007 'Cross-linked polyethylene (PE-X) pipes for pressure applications' and
- AS/NZS 2053:2001 'Conduits and fittings for electrical installations'

For the purpose of the test, the specimens were referenced as Penetrations # 1, 2, 3, 4, 5, 6, 7, 8 and 9.

<u>Penetration # 1 – LP65R Retrofit fire collar protecting a nominal 32-mm High-density polyethylene (HDPE) Pipe</u>

The SNAP Retrofit LP65R fire collar comprised a 0.7-mm stainless steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws.

The penetrating service comprised a 40-mm HDPE Pipe, with a wall thickness of 3.4-mm penetrating the wall through a 44-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 1, 32-mm HDPE Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe incorporated a HDPE Coupling located on the exposed side of the wall. The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Penetration # 2 – 32R Retrofit fire collar protecting a nominal 16-mm Pex-B Pipe

The 32R Retrofit collar comprised a 0.75-mm steel casing with a 40-mm inner diameter and a 106-mm diameter base flange. The 32-mm high collar casing incorporated a closing mechanism that was comprised of two soft Intumesh intumescent strips lined within the internal circumference of the collar. The inner and outer strips were 4-mm thick x 26-mm wide x 135-mm long, and 4-mm thick x 26-mm wide x 154-mm long, respectively. Between the strips was a layer of 304 stainless steel mesh 135 mm long x 25-mm wide with wire mesh diameter of 0.15-mm, as shown in drawing numbered 32R-T dated 12 February 2015, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws.

The penetrating service comprised a 16-mm OD Pex-B Pipe, with a wall thickness of 2.5-mm fitted through the collar's sleeve and penetrating the wall through a 20-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 2, 16-mm Pex-B Pipe – 32R Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Penetration # 3 – LP100R-D Retrofit fire collar protecting a nominal 100-mm Polyvinyl Chloride (PVC-SC) Pipe with fitting inside the collar

The SNAP Retrofit LP100R-D collar comprised a 0.95-mm thick steel casing with a 122-mm inner diameter and a 260-mm x 260-mm square base flange. The 65-mm high collar casing incorporated a layer of 418-mm x 59-mm x 5-mm thick Intumescent material. The closing mechanism comprised 4 x 304 stainless steel springs bound with black nylon fuse links and a 316 stainless steel mesh measuring 415 x 120-mm as shown in drawing numbered LP100R-D-T dated 2 November 2016, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws.

The penetrating service comprised a 110-mm OD PVC-SC Pipe, with a wall thickness of 3.5-mm fitted through the collar's sleeve and penetrating the wall through a 114-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 3, 100-mm PVC-SC Pipe – LP100R-D Retrofit Collar – Fitting Inside Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

Penetration # 4 – LP65R Retrofit fire collar protecting a nominal 40-mm Polyvinyl Chloride (PVC) with fitting inside the collar

The SNAP Retrofit LP65R fire collar comprised a 0.7-mm steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws.

The penetrating service comprised a 43-mm OD PVC pipe, with a wall thickness of 2.1-mm fitted through the collar's sleeve and penetrating the wall through a 48-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 4, 40-mm PVC Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

Penetration # 5 – LP65R Retrofit fire collar protecting a nominal 65-mm Polyvinyl Chloride (PVC) with fitting inside the collar

The SNAP Retrofit LP65R fire collar comprised a 0.7-mm steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws.

The penetrating service comprised a 69-mm OD PVC pipe, with a wall thickness of 3.2-mm fitted through the collar's sleeve and penetrating the wall through a 76-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 5, 65-mm PVC Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

Penetration # 6 – 32R Retrofit fire collar protecting a 20-mm Polyvinyl Chloride (PVC) Conduit filled with 3-Core Cable

The SNAP Retrofit 32R fire collar comprised a 0.75-mm steel casing with a 40-mm inner diameter fitted with three fixing tabs. The 32-mm high collar casing incorporated a closing mechanism that was comprised of two soft Intumesh intumescent strips lined within the internal circumference of the collar. The inner and outer strips were 4-mm thick x 26-mm wide x 135-mm long, and 4-mm thick x 26-mm wide x 154-mm long, respectively. Between the strips was a layer of 304 stainless steel mesh 135 mm long x 25-mm wide with wire mesh diameter of 0.15-mm, as shown in drawing numbered 32R-T dated 12 February 2015, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 20-mm PVC Conduit filled with 3-Core Cable, with a wall thickness of 2.2-mm fitted through the collar's sleeve and penetrating the wall through a 25-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 6, 20-mm PVC Conduit – 32R Retrofit Collar – Filled with 3-Core Cable, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Penetration # 7 – LP100R-D Retrofit fire collar protecting a 110-mm High-density polyethylene (HDPE) Pipe

The SNAP Retrofit LP100R-D collar comprised a 0.95-mm thick steel casing with a 122-mm inner diameter and a 260-mm x 260-mm square base flange. The 65-mm high collar casing incorporated a layer of 418-mm x 59-mm x 5-mm thick Intumescent material. The closing mechanism comprised 4 x 304 stainless steel springs bound with black nylon fuse links and a 316 stainless steel mesh measuring 415 x 120-mm as shown in drawing numbered LP100R-D-T dated 2 November 2016, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws.

The penetrating service comprised a 110-mm OD HDPE pipe, with a wall thickness of 4.6-mm fitted through the collar's sleeve and penetrating the wall through a 114-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 7, 110-mm HDPE Pipe – LP100R-D Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber.

The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Penetration # 8 – GAS32 retrofitted fire collar protecting a nominal 16-mm Px-Al-Px Pipe

The GAS32 Retrofit collar comprised a 0.95-mm thick galvanised steel casing with a 35-mm inner diameter and a 90-mm diameter base flange. The 63-mm high collar casing incorporated a layer of 140-mm x 55-mm x 4-mm thick Intumescent material and a layer of 120-mm x 55-mm x 4-mm thick Intumescent material. The closing mechanism comprised 1 x 304 stainless steel spring bound with a black nylon fuse link and a 316 stainless steel mesh measuring 120 x 54-mm as shown in drawing numbered GAS32-T dated 14 September 2016, by Snap Fire Systems Pty Ltd.

The penetrating service comprised a 16-mm OD Px-Al-Px Pipe, with a wall thickness of 2.3-mm fitted through the collar's sleeve and penetrating the wall through a 20-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 8, 16-mm Px-Al-Px Pipe – GAS32 Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Penetration # 9 – LP65R retrofitted fire collar protecting a nominal 50-mm Polyvinyl Chloride (PVC) Pipe with fitting inside the collar

The SNAP Retrofit LP65R fire collar comprised a 0.7-mm steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws.

The penetrating service comprised a 56-mm OD PVC pipe, with a wall thickness of 2.4-mm fitted through the collar's sleeve and penetrating the wall through a 64-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 9, 50-mm PVC Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

2.2 Dimensions

The wall specimen was nominally 1150-mm wide x 1150-mm high x 75-mm thick. All dimensions are nominal.

2.3 Orientation

The wall specimen system was of symmetrical construction.

2.4 Conditioning

The specimen was left to cure for a period longer than 10 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 numbered GAS32-T, dated 14 September 2016, by Snap Fire Systems Pty Ltd.

Drawing numbered 32R-T, dated 12 February 2015, by Snap Fire Systems Pty Ltd.

Drawing numbered LP65R-T, dated 13 June 2014, by Snap Fire Systems Pty Ltd.

Drawing numbered LP100R-D, dated 2 November 2016, by Snap Fire Systems Pty Ltd.

Drawing titled "Test Wall W-16-C Penetration # 1, 32-mm HDPE Pipe – LP65R Retrofit Collar", dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled "Test Wall W-16-C Penetration # 2, 16-mm Pex-B Pipe – 32R Collar", dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled "Test Wall W-16-C Penetration # 3, 100-mm PVC-SC Pipe – LP100R-D Retrofit Collar – Fitting Inside Collar", dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled "Test Wall W-16-C Penetration # 4, 40-mm PVC Pipe – LP65R Retrofit Collar", dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled "Test Wall W-16-C Penetration # 5, 65-mm PVC Pipe – LP65R Retrofit Collar", dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled "Test Wall W-16-C Penetration # 6, 20-mm PVC Conduit – 32R Retrofit Collar – Filled with 3-Core Cable", dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled “Test Wall W-16-C Penetration # 7, 110-mm HDPE Pipe – LP100R-D Retrofit Collar”, dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled “Test Wall W-16-C Penetration # 8, 16-mm Px-Al-Px Pipe – GAS32 Retrofit Collar”, dated 15 October 2016, by Snap Fire Systems Pty Ltd.

Drawing titled “Test Wall W-16-C Penetration # 9, 50-mm PVC Pipe – LP65R Retrofit Collar”, dated 15 October 2016, by Snap Fire Systems Pty Ltd.

4 Equipment

4.1 Furnace

The furnace had a nominal opening of 1000-mm x 1000-mm for attachment of vertical or horizontal specimens.

The furnace was lined with refractory bricks and materials with the thermal properties as specified in AS 1530.4-2014 and was heated by combustion of a mixture of natural gas and air.

4.2 Temperature

The temperature in the furnace chamber was measured by four type K, 3-mm diameter, and 310 stainless steel Mineral Insulated Metal Sheathed (MIMS) thermocouples. Each thermocouple was housed in high-nickel steel tubes opened at the exposed end.

The temperatures of the specimen were measured by glass-fibre insulated and sheathed K-type thermocouples with a wire diameter of 0.5-mm.

Location of the thermocouples on the unexposed face of the specimen are described in Appendix A.

4.3 Measurement system

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

5 Ambient temperature

The temperature of the test area was 29°C at the commencement of the test.

6 Departure from standard

There were no departures from the requirements of AS 1530.4-2014.

7 Termination of test

The test was terminated at 121 minutes by the agreement with the sponsor.

8 Test results

8.1 Critical observations

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

Time	Observation
1 minute -	Smoke is visible from base of Penetration # 3, Penetration # 7 and Penetration # 9, from inside the collar.
2 minutes -	Fluing is evident from the end of Penetration #1, Penetration # 2 and Penetration # 3.
3 minutes & 30 seconds -	Fluing is evident from the end of Penetration #4 and Penetration # 9.
4 minutes -	Fluing is evident from the end of Penetration #5. Penetration # 2 has stopped fluing.
5 minutes -	Penetration # 4 has stopped fluing.
6 minutes -	Fluing is reduced fluing on Penetration # 1, Penetration # 3, Penetration # 5, Penetration # 7 and Penetration # 9.
7 minutes -	Smoke is evident from the base of Penetration # 7 between the pipe and the collar.
11 minutes -	Smoke is evident from the base of Penetration # 3 between the pipe and the collar.
50 minutes -	Slight fluing is evident from the end of Penetration # 3.
58 minutes -	Smoke is evident from the base of Penetration # 3 between the pipe and the collar.
80 minutes -	Vertical cracks have developed in the wall between Penetrations # 1 and # 4, # 4 and # 7 and # 5 and # 8.
90 minutes -	Smoke is evident the the base of Penetration # 5, between the collar and the pipe.
97 minutes -	Smoke is evident at the base of Penetration # 7, between the collar and the pipe.
102 minutes -	Insulation failure - Penetration 5. Temperature rise exceeding 180 K recorded on the wall, 25-mm above the collar.
103 minutes -	A small amount of smoke is fluing from the end of Penetration # 5. Penetration # 6 is softening and sagging at the base.
107 minutes -	A vertical crack is evident from Penetration # 5 to the bottom of the wall widening. The furnace is visible through the crack.
114 minutes -	Insulation failure - Penetration 1. Temperature rise exceeding 180 K recorded on the wall, 25-mm above the collar.
117 minutes -	Insulation failure - Penetration 3. Temperature rise exceeding 180 K recorded on the wall, 25-mm above the collar.
121 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 # 2.

Figure 5 shows the curve of maximum temperature versus time associated with Penetration # 3.

Figure 6 shows the curve of maximum temperature versus time associated with Penetration # 4.

Figure 7 shows the curve of maximum temperature versus time associated with Penetration # 5.

Figure 8 shows the curve of maximum temperature versus time associated with Penetration # 6.

Figure 9 shows the curve of maximum temperature versus time associated with Penetration # 7.

Figure 10 shows the curve of maximum temperature versus time associated with Penetration # 8.

Figure 11 shows the curve of maximum temperature versus time associated with Penetration # 9.

8.5 Performance

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

Penetration # 1 – LP65R retrofitted fire collar protecting a 32-mm High-density polyethylene (HDPE) Pipe

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	114 minutes

Penetration # 2 – 32R retrofitted fire collar protecting a nominal 16-mm Pex-B Pipe

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	No failure at 121 minutes

Penetration # 3 – LP100R-D retrofitted fire collar protecting a 100-mm Polyvinyl Chloride (PVC-SC) Pipe with fitting inside the collar

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	117 minutes

Penetration # 4 – LP65R retrofitted fire collar protecting a 40-mm Polyvinyl Chloride (PVC) with fitting inside the collar

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	No failure at 121 minutes

Penetration # 5 – LP65R retrofitted fire collar protecting a 65-mm Polyvinyl Chloride (PVC) with fitting inside the collar

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	102 minutes

Penetration # 6 – 32R retrofitted fire collar protecting a 20-mm Polyvinyl Chloride (PVC) Conduit filled with 3-Core Cable

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	No failure at 121 minutes

Penetration # 7 – LP100R-D retrofitted fire collar protecting a 110-mm High-density polyethylene (HDPE) Pipe

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	No failure at 121 minutes

Penetration # 8 – GAS32 retrofitted fire collar protecting a nominal 16-mm Px-Al-Px Pipe

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	No failure at 121 minutes

Penetration # 9 – LP65R retrofitted fire collar protecting a 50-mm Polyvinyl Chloride (PVC) Pipe with fitting inside the collar

Structural adequacy	-	Not applicable
Integrity	-	No failure at 121 minutes
Insulation	-	No failure at 121 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	-	-/90/90	Penetration # 6	-	-/90/90
Penetration # 2	-	-/90/90	Penetration # 7	-	-/90/90
Penetration # 3	-	-/90/90	Penetration # 8	-	-/90/90
Penetration # 4	-	-/90/90	Penetration # 9	-	-/90/90
Penetration # 5	-	-/90/90			

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction.

The fire-resistance level (FRL) are limited to that of the separating element.

For the purposes of AS 1530.4-2014 the results of these fire tests may be used to directly assess fire hazard, but it should be noted that a single test method will not provide a full assessment of fire hazard under all fire conditions.

10 Field of direct application of test results

The results of the fire test contained in this test report are directly applicable, without reference to the testing authority, to similar constructions where one or more changes listed in Clause 10.12 of AS 1530.4-2014, have been made provided no individual component is removed or reduced.

11 Tested by

Chris Wojcik
Testing Officer

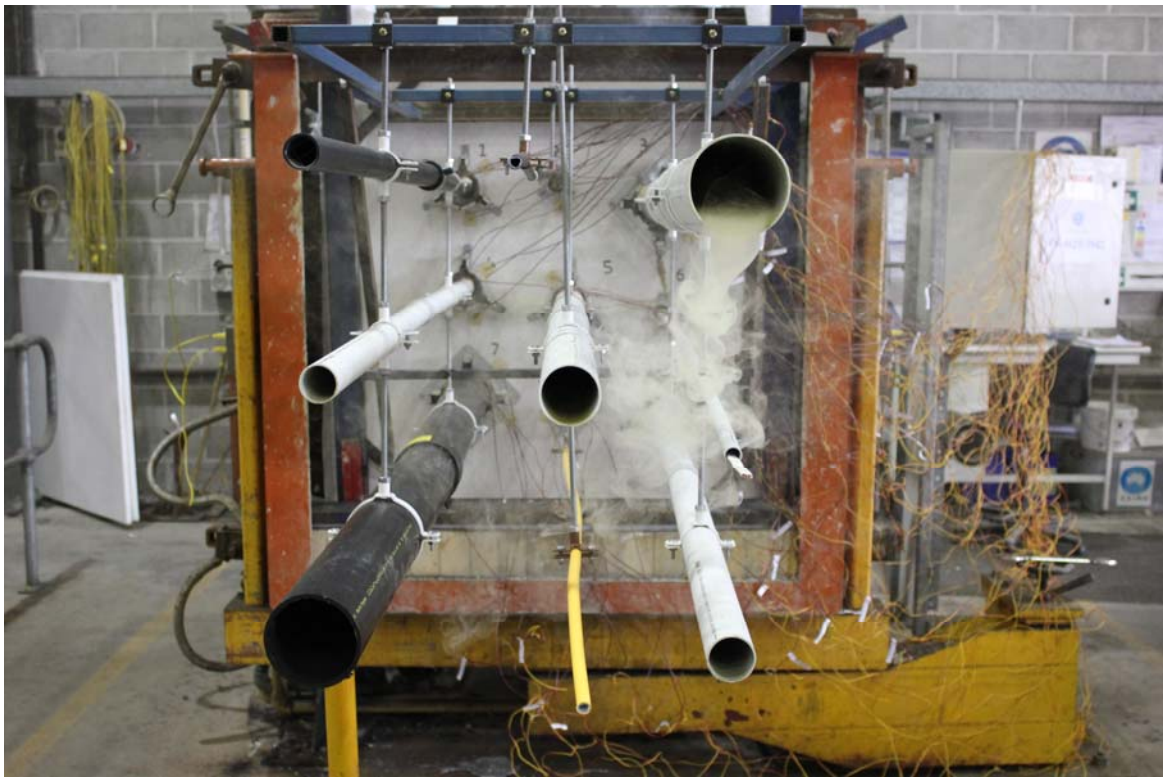
Appendices

Appendix A – Measurement location

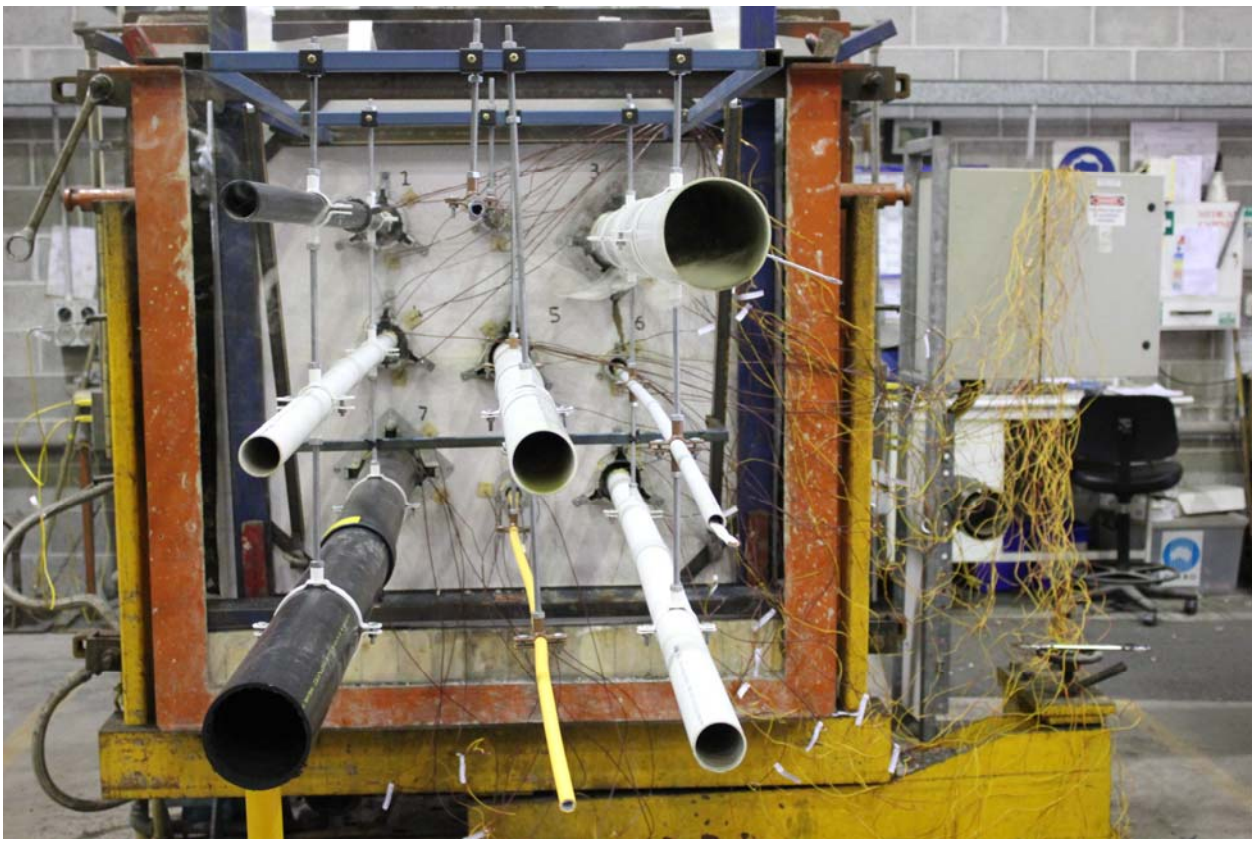
Measurement Location		
Group location / **Specimen**	**T/C Position**	**T/C designation**
Penetration # 1	On the wall, 25-mm from the collar	S1
	On the wall, 25-mm from the collar	S2
	On top of the fire collar	S3
	On the fire collar	S4
	On top of the pipe – 25-mm from the collar	S5
	On the pipe – 25-mm from the collar	S6
Penetration # 2	On the wall, 25-mm from the collar	S7
	On the wall, 25-mm from the collar	S8
	On top of the fire collar	S9
	On the fire collar	S10
	On top of the pipe – 25-mm from the collar	S11
	On the pipe – 25-mm from the collar	S12
Penetration # 3	On the wall, 25-mm from the collar	S13
	On the wall, 25-mm from the collar	S14
	On top of the fire collar	S15
	On the fire collar	S16
	On top of the pipe – 25-mm from the collar	S17
	On the pipe – 25-mm from the collar	S18
Penetration # 4	On the wall, 25-mm from the collar	S19
	On the wall, 25-mm from the collar	S20
	On top of the fire collar	S21
	On the fire collar	S22
	On top of the pipe – 25-mm from the collar	S23
	On the pipe – 25-mm from the collar	S24
Penetration # 5	On the wall, 25-mm from the collar	S25
	On the wall, 25-mm from the collar	S26
	On top of the fire collar	S27
	On the fire collar	S28
	On top of the pipe – 25-mm from the collar	S29
	On the pipe – 25-mm from the collar	S30
Penetration # 6	On the wall, 25-mm from the collar	S31
	On the wall, 25-mm from the collar	S32
	On top of the fire collar	S33
	On the fire collar	S34
	On top of the pipe – 25-mm from the collar	S35
	On the pipe – 25-mm from the collar	S36
Penetration # 7	On the wall, 25-mm from the collar	S37
	On the wall, 25-mm from the collar	S38
	On top of the fire collar	S39
	On the fire collar	S40
	On top of the pipe – 25-mm from the collar	S41
	On the pipe – 25-mm from the collar	S42
Penetration # 8	On the wall, 25-mm from the collar	S43
	On the wall, 25-mm from the collar	S44
	On top of the fire collar	S45
	On the fire collar	S46
	On top of the pipe – 25-mm from the collar	S47
	On the pipe – 25-mm from the collar	S48
Penetration # 9	On the wall, 25-mm from the collar	S49
	On the wall, 25-mm from the collar	S50
	On top of the fire collar	S51
	On the fire collar	S52
	On top of the pipe – 25-mm from the collar	S53
	On the pipe – 25-mm from the collar	S54

Appendix B – Photographs

PHOTOGRAPH 1 – UNEXPOSED FACE OF SPECIMENS PRIOR TO TESTING



PHOTOGRAPH 2 – SPECIMENS AFTER 60 MINUTES OF TESTING



PHOTOGRAPH 3 – SPECIMENS AFTER 120 MINUTES OF TESTING

PHOTOGRAPH 4 – EXPOSED FACE OF SPECIMENS AT CONCLUSION OF TESTING

Appendix C – Furnace Temperature

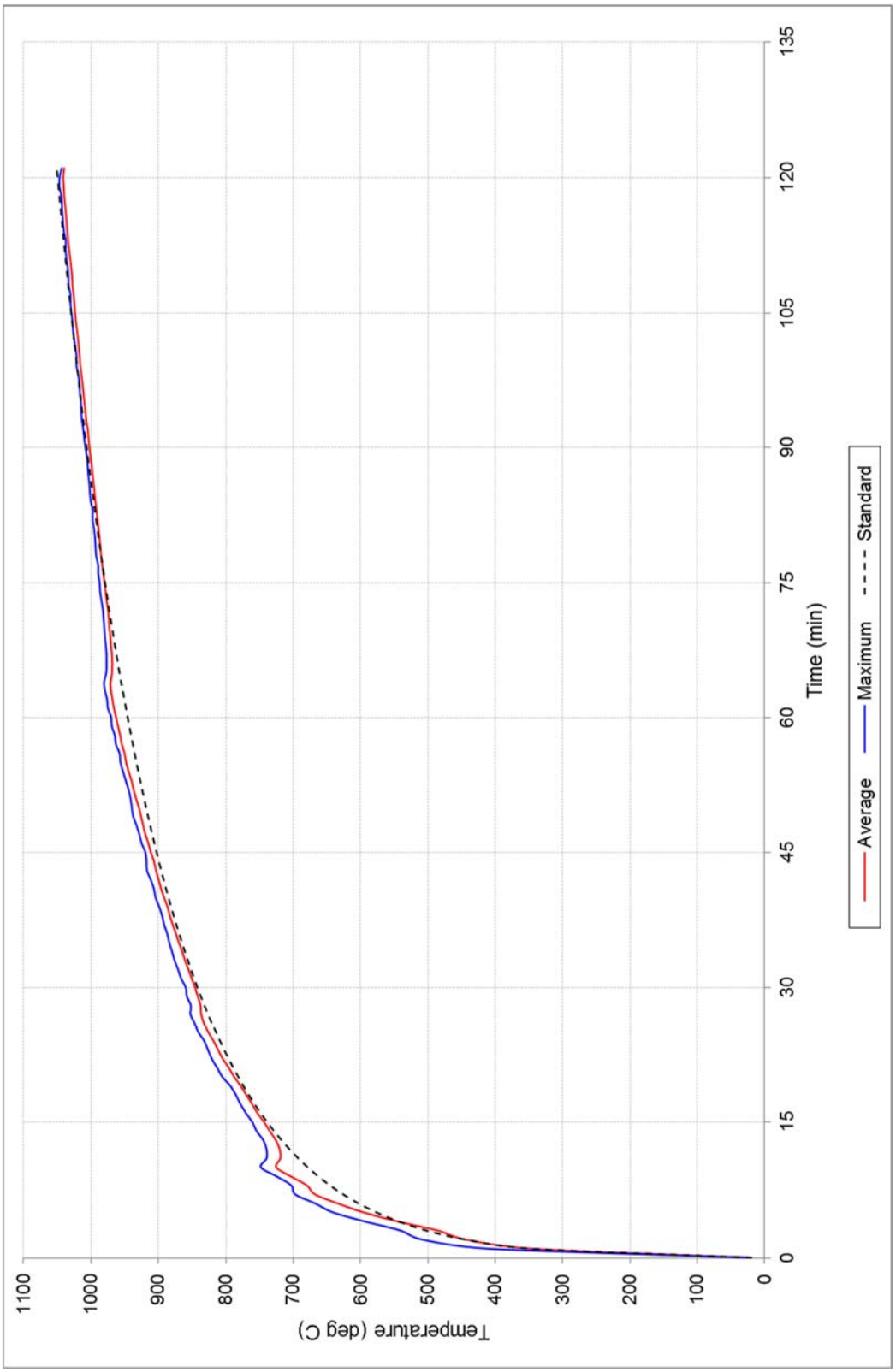


FIGURE 1 – FURNACE TEMPERATURE

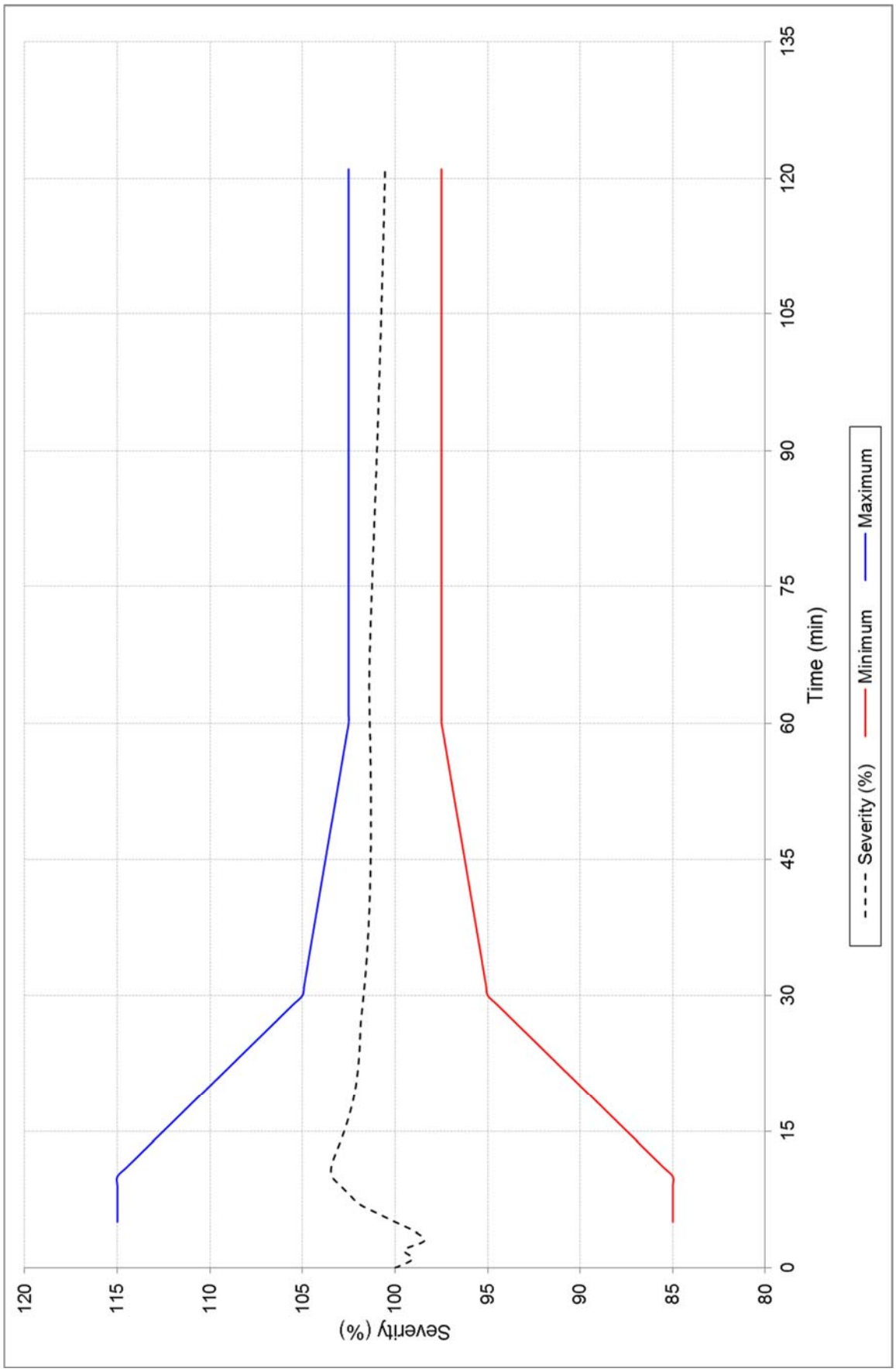


FIGURE 2 – FURNACE SEVERITY

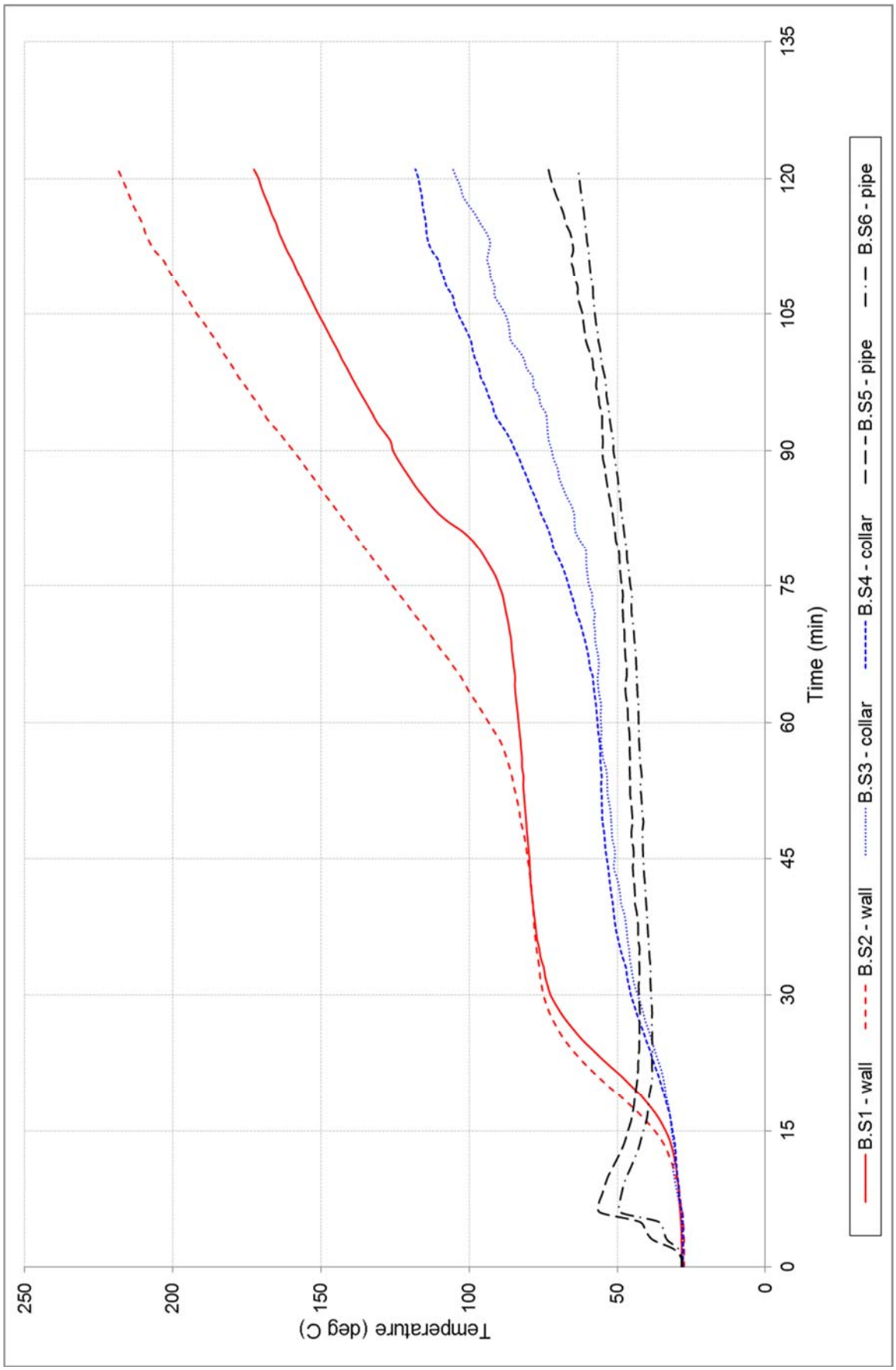


FIGURE 3 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 1

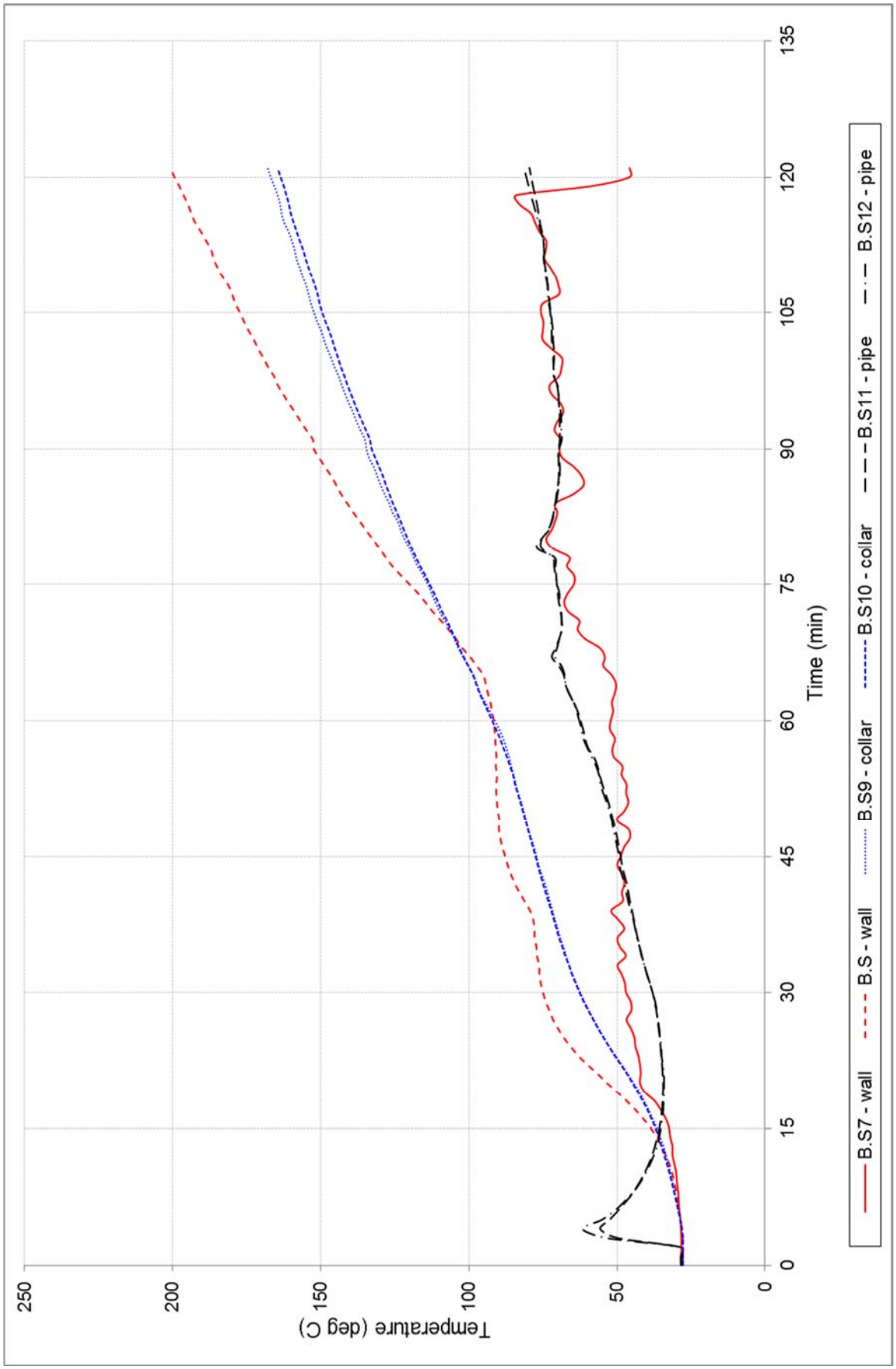


FIGURE 4 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 2

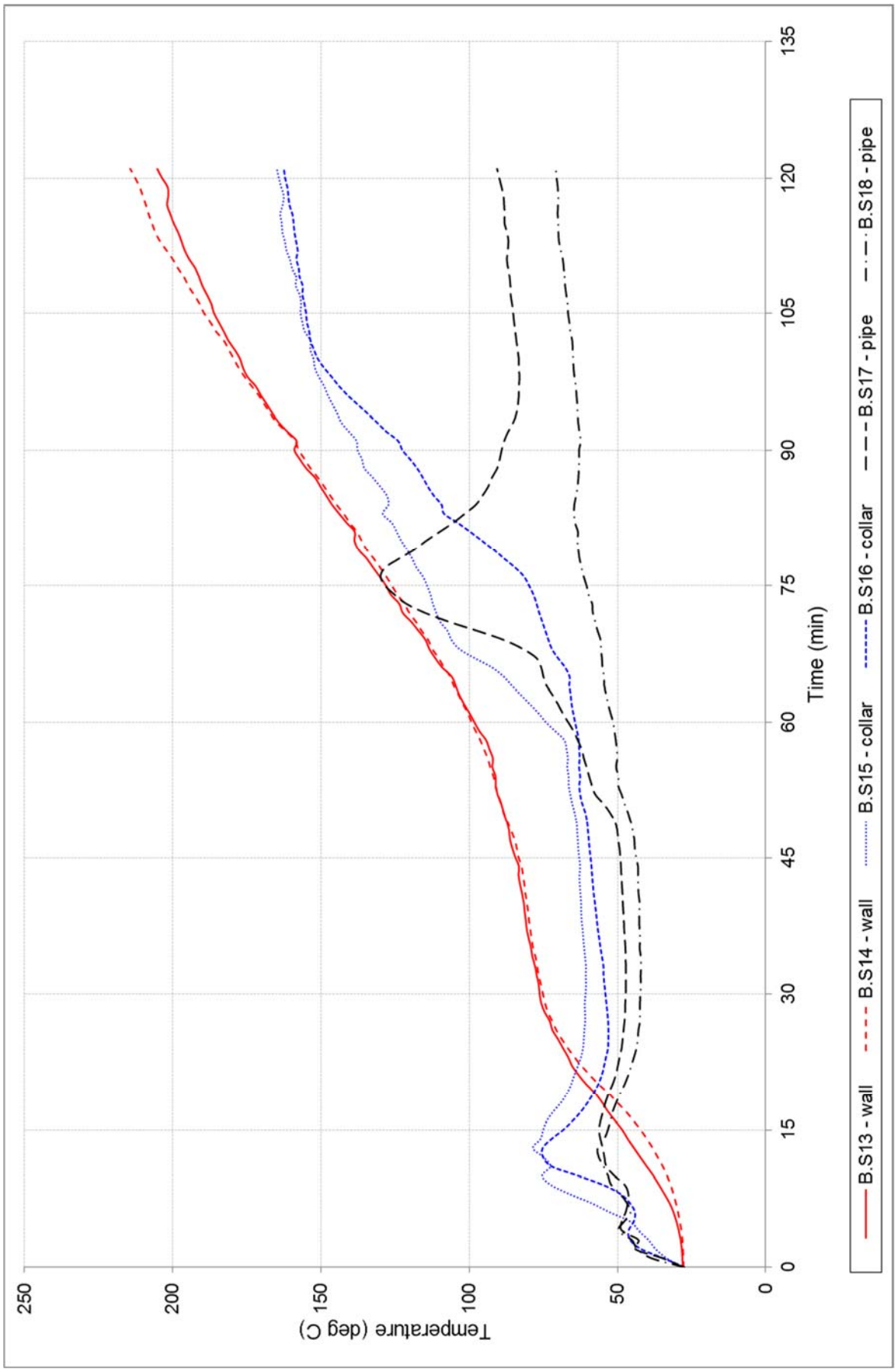


FIGURE 5 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 3

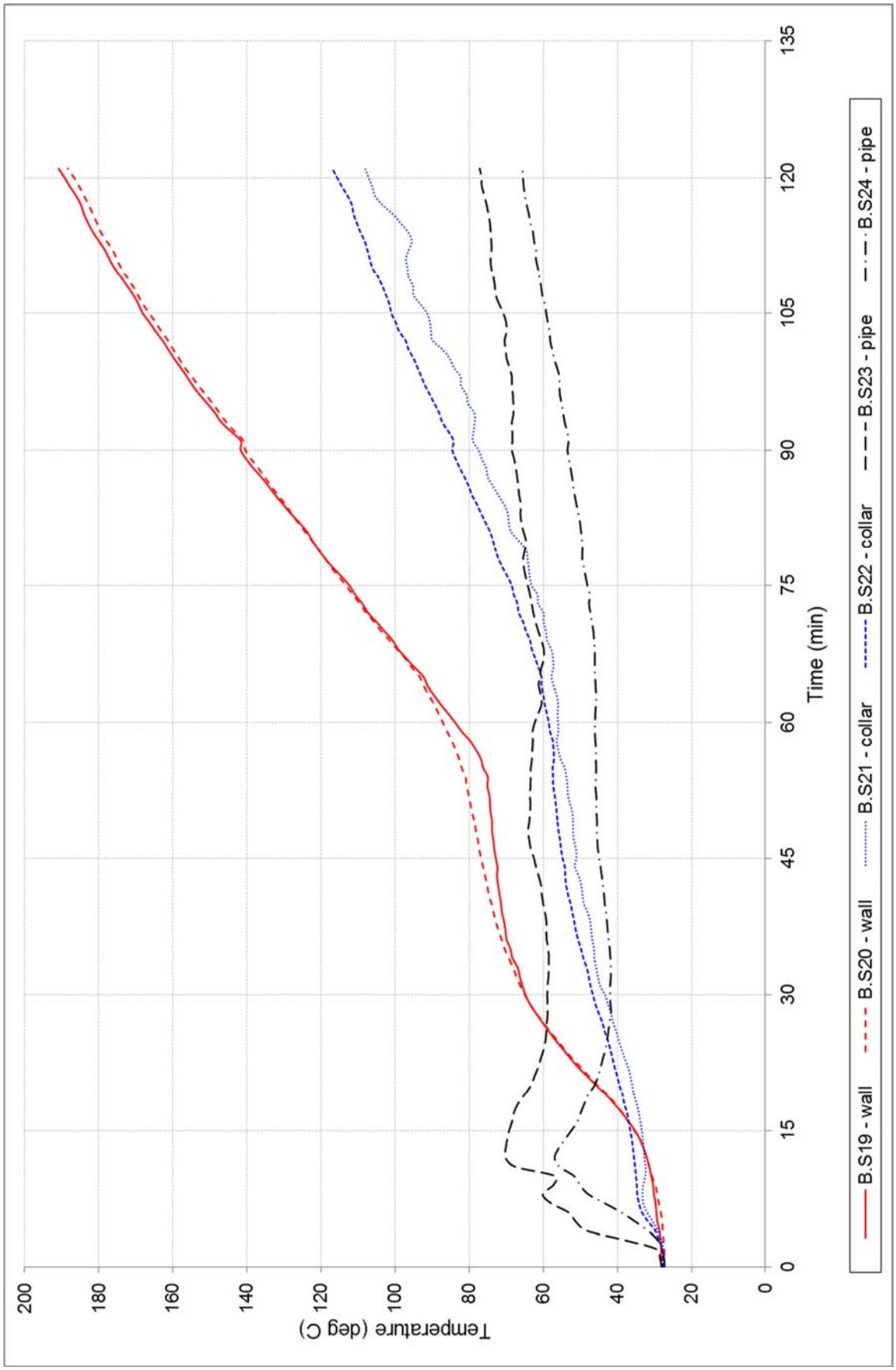


FIGURE 6 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 4

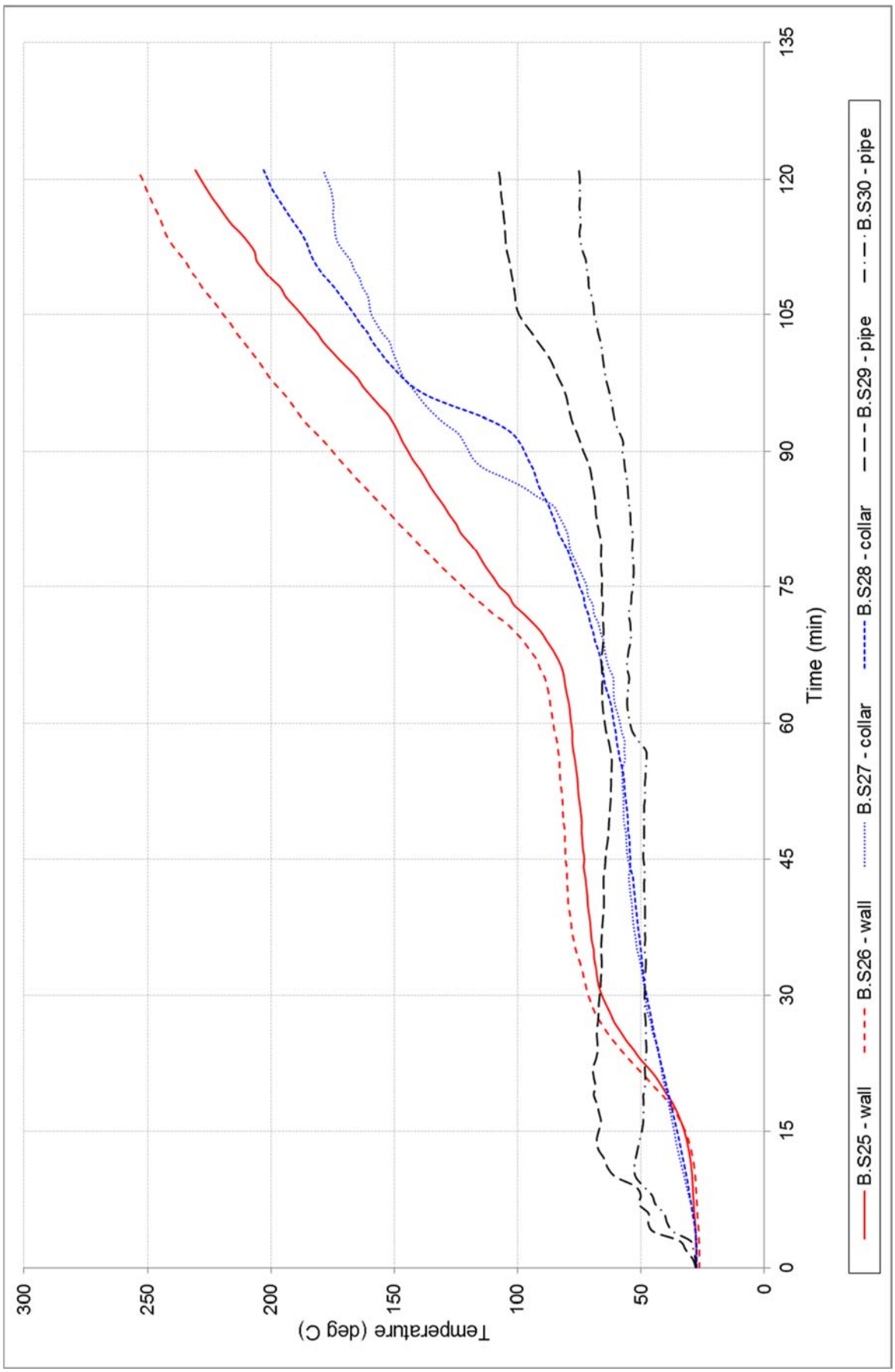


FIGURE 7 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 5

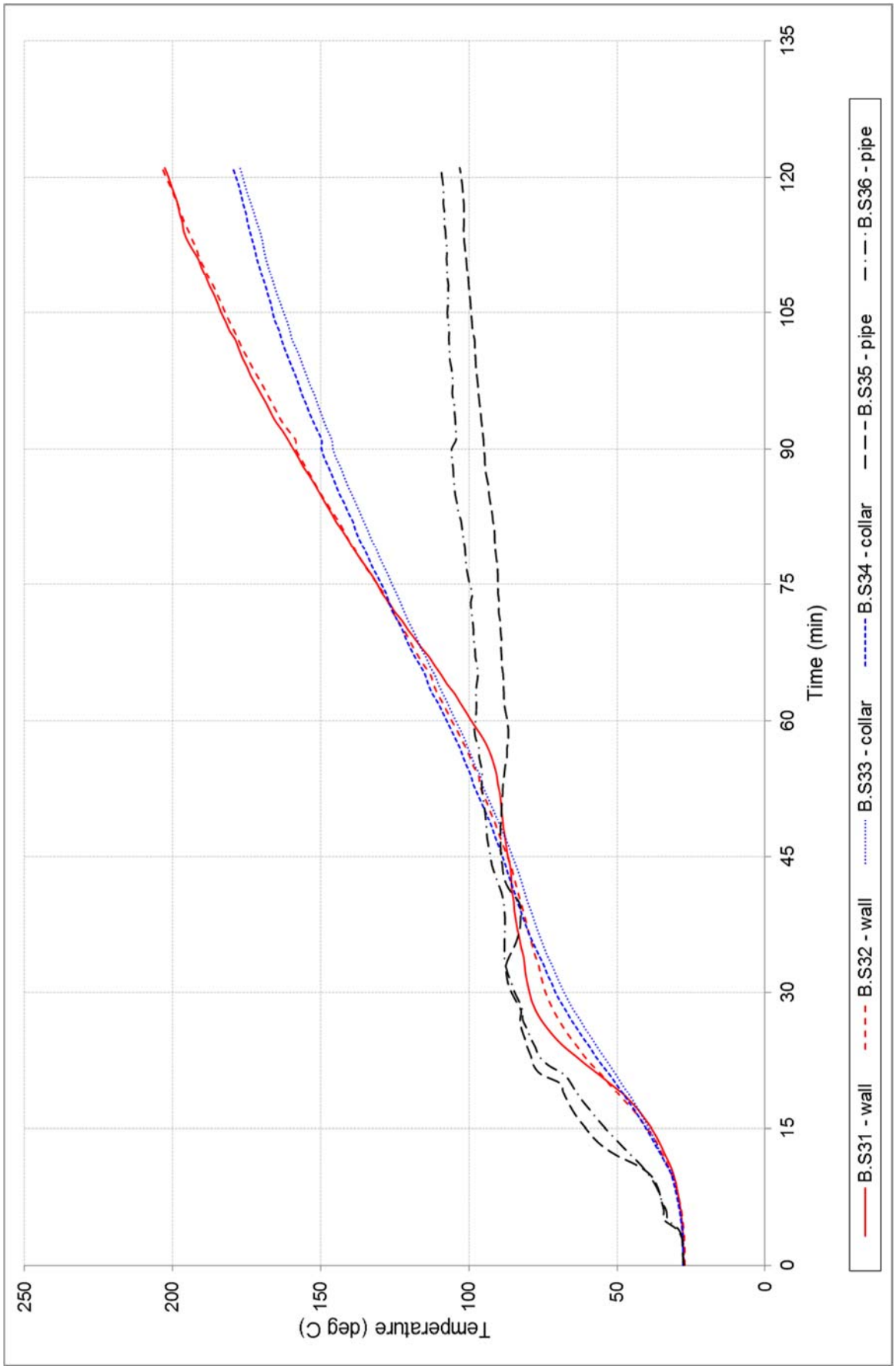


FIGURE 8 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 6

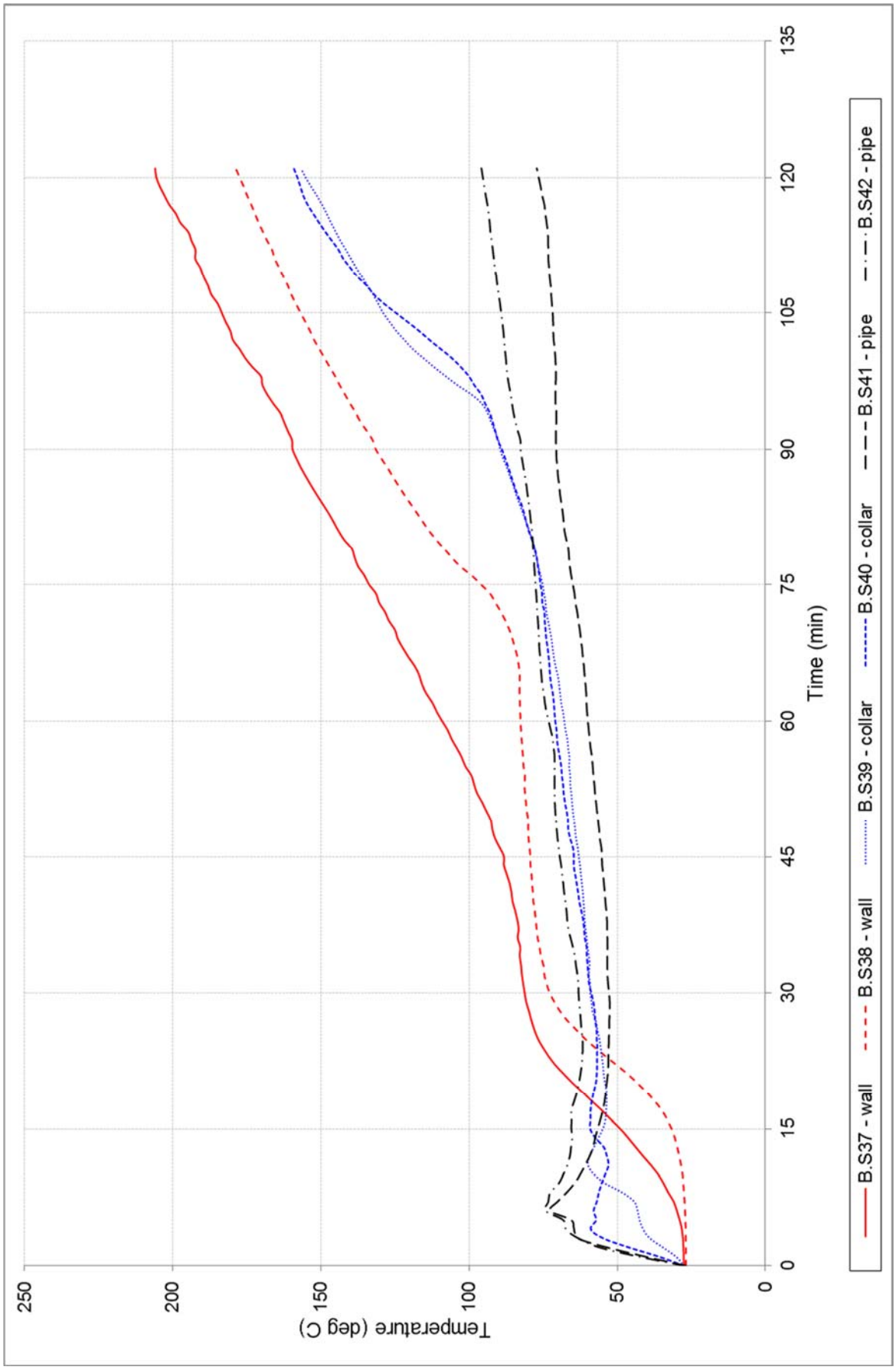


FIGURE 9 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 7

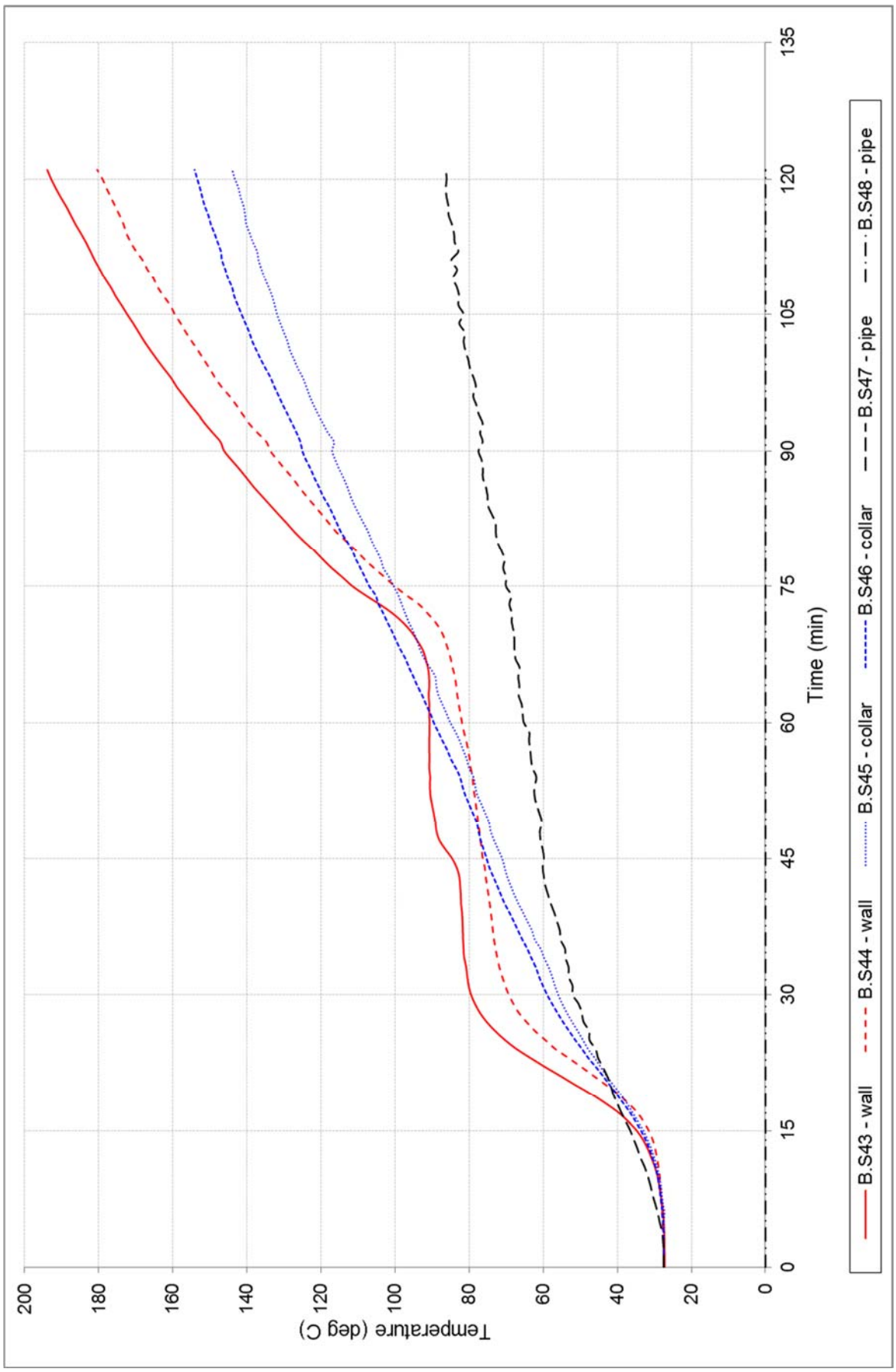


FIGURE 10 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 8

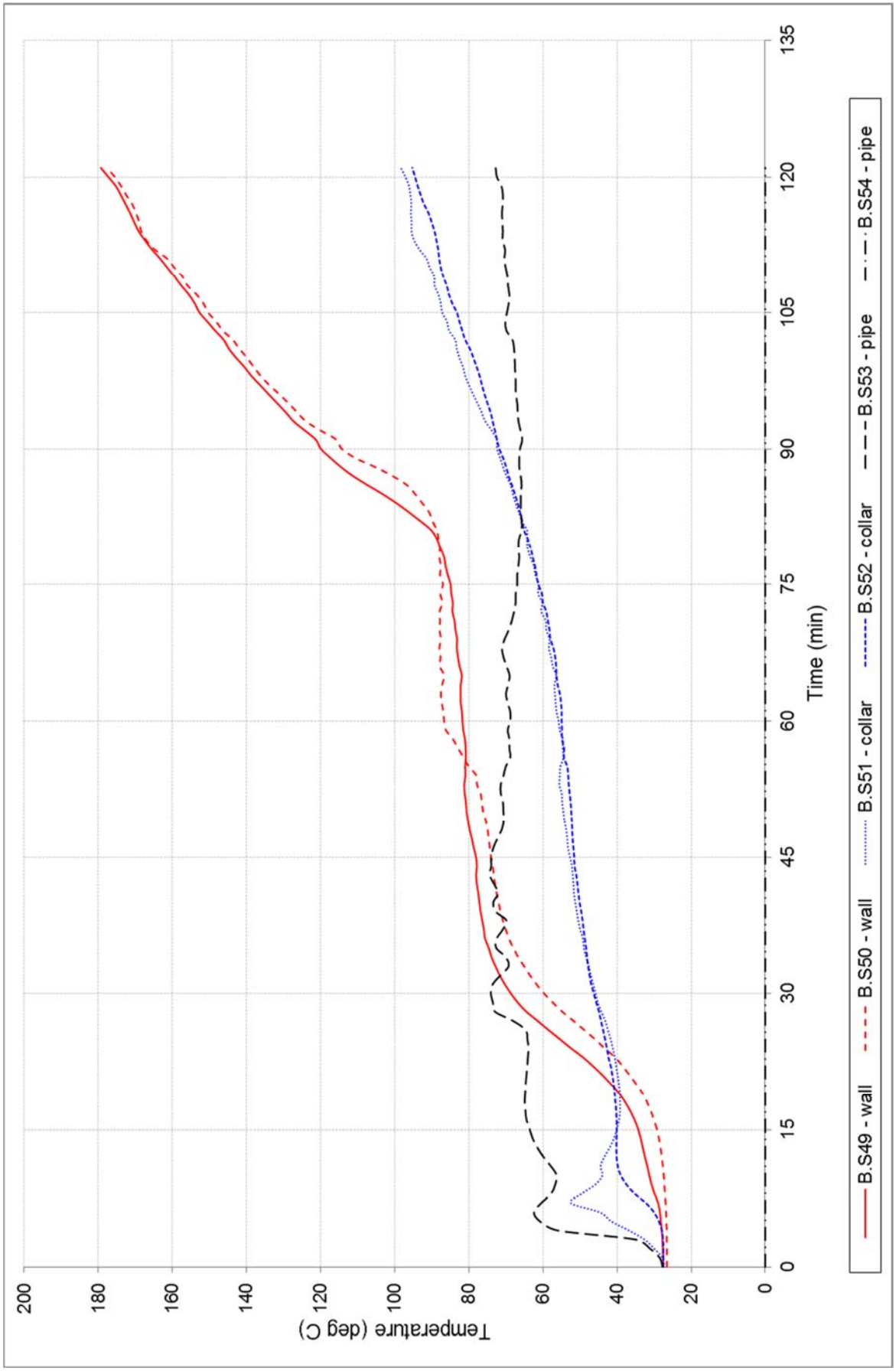
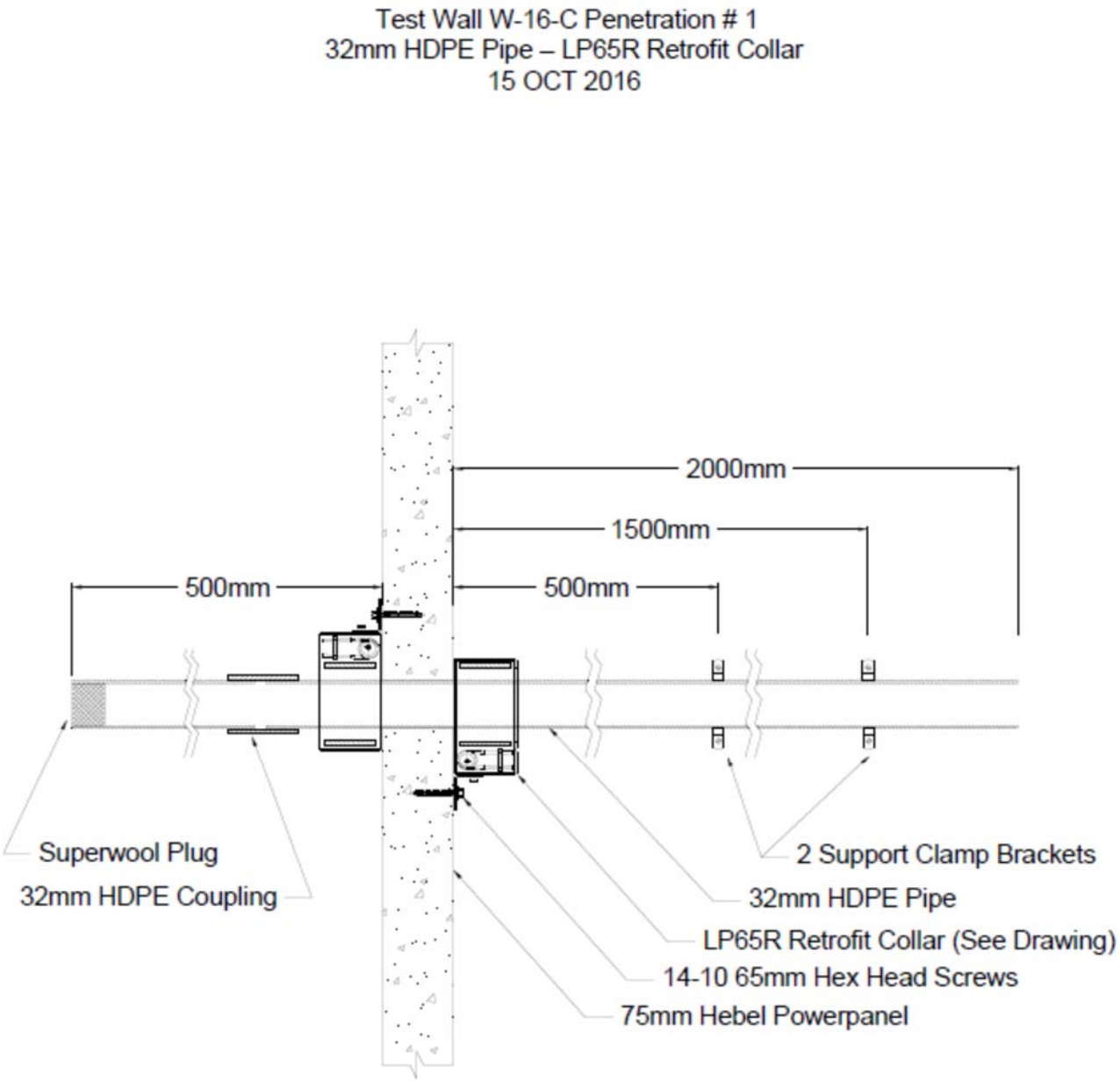


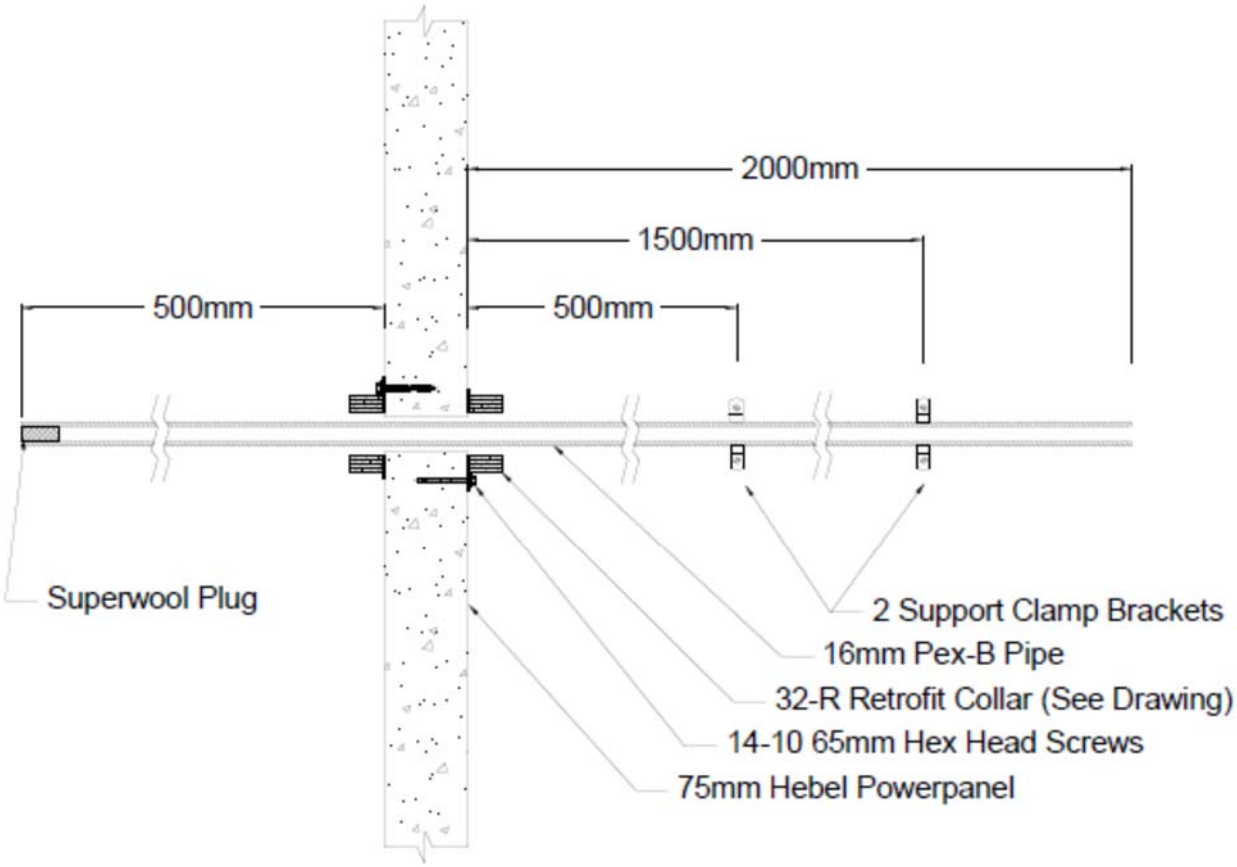
FIGURE 11 – SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 9

Appendix D – Installation drawings



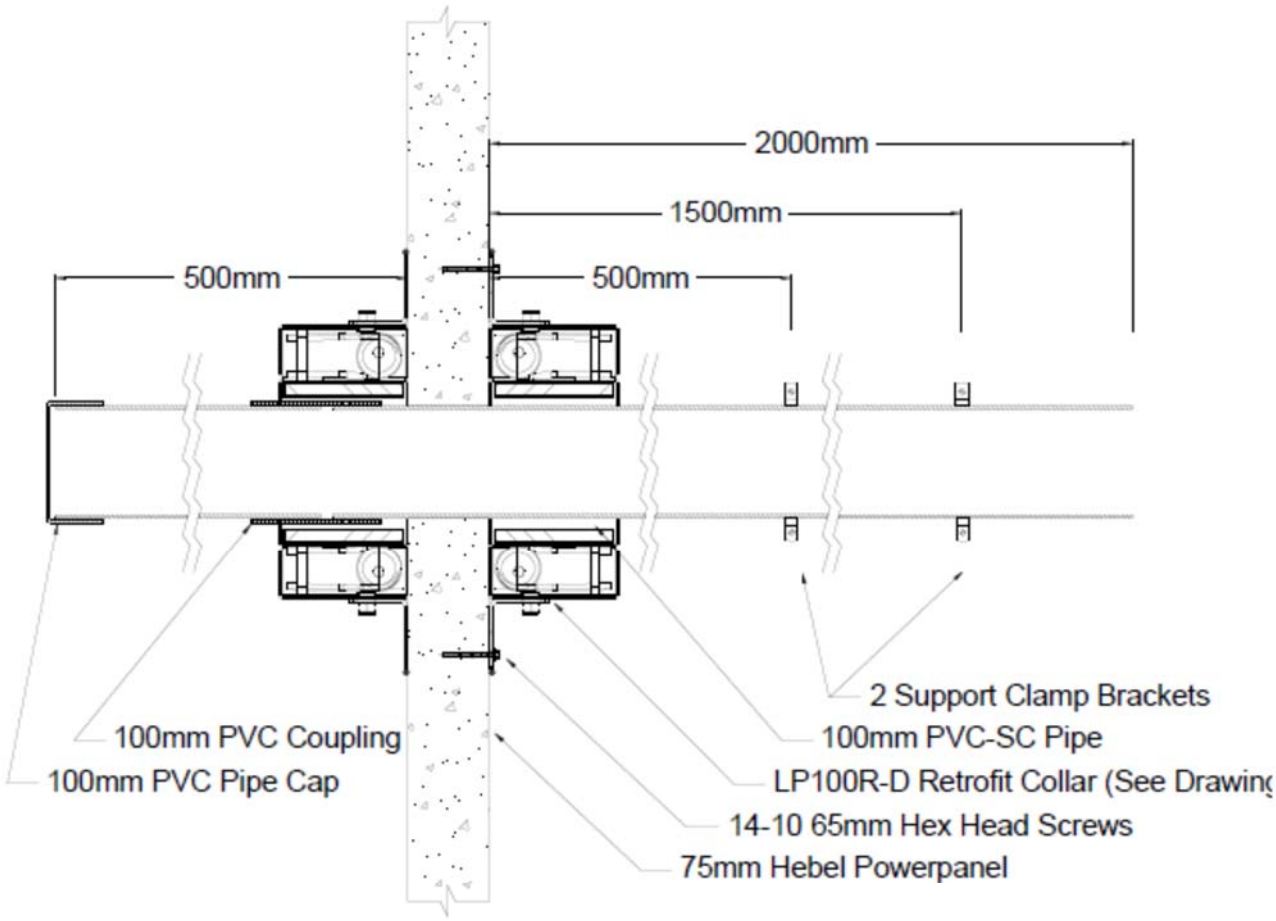
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 1, 32-MM HDPE PIPE – LP65R RETROFIT COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 2
16mm Pex-B Pipe – 32R Retrofit Collar
15 OCT 2016



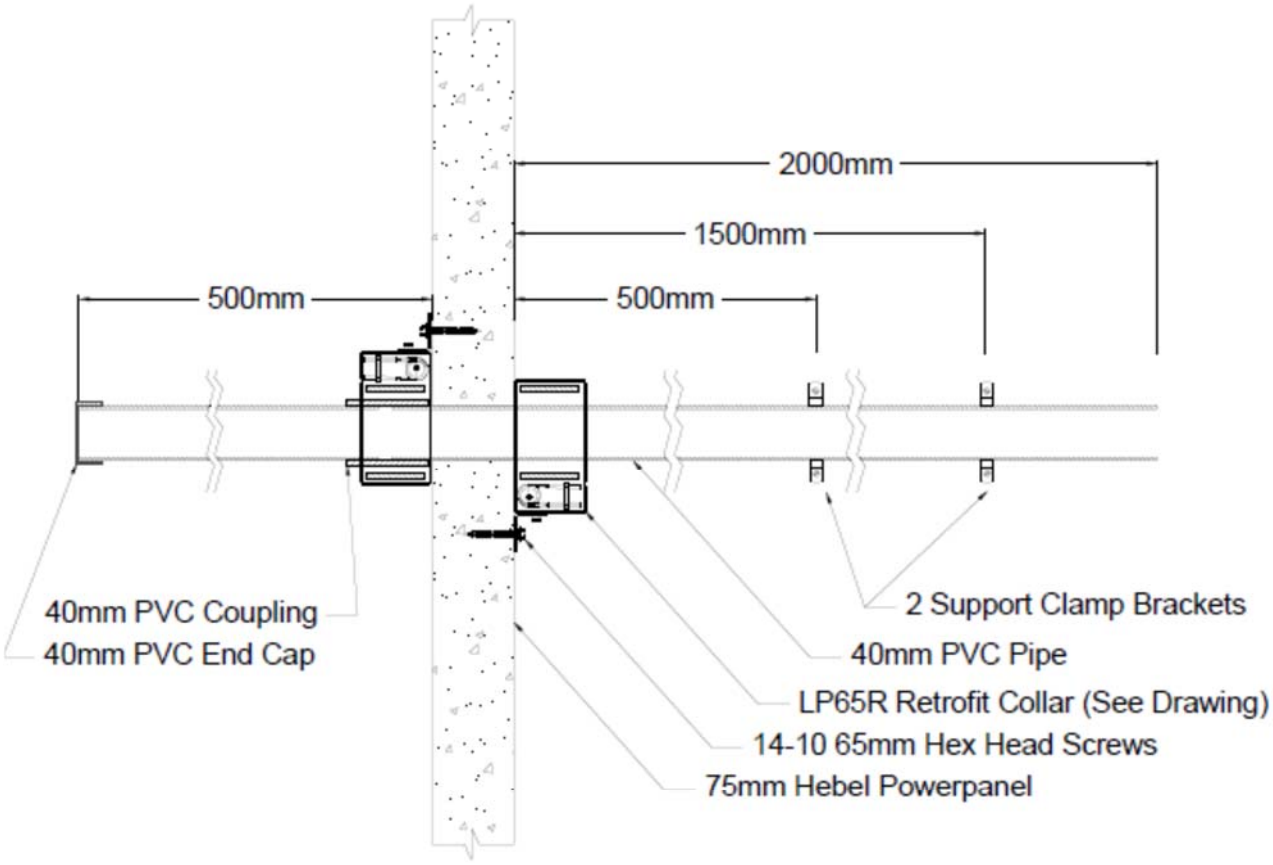
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 2, 16-MM PEX-B PIPE – 32R COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 3
100mm PVC-SC Pipe – LP100R-D Retrofit Collar - Fitting Inside Collar
15 OCT 2016



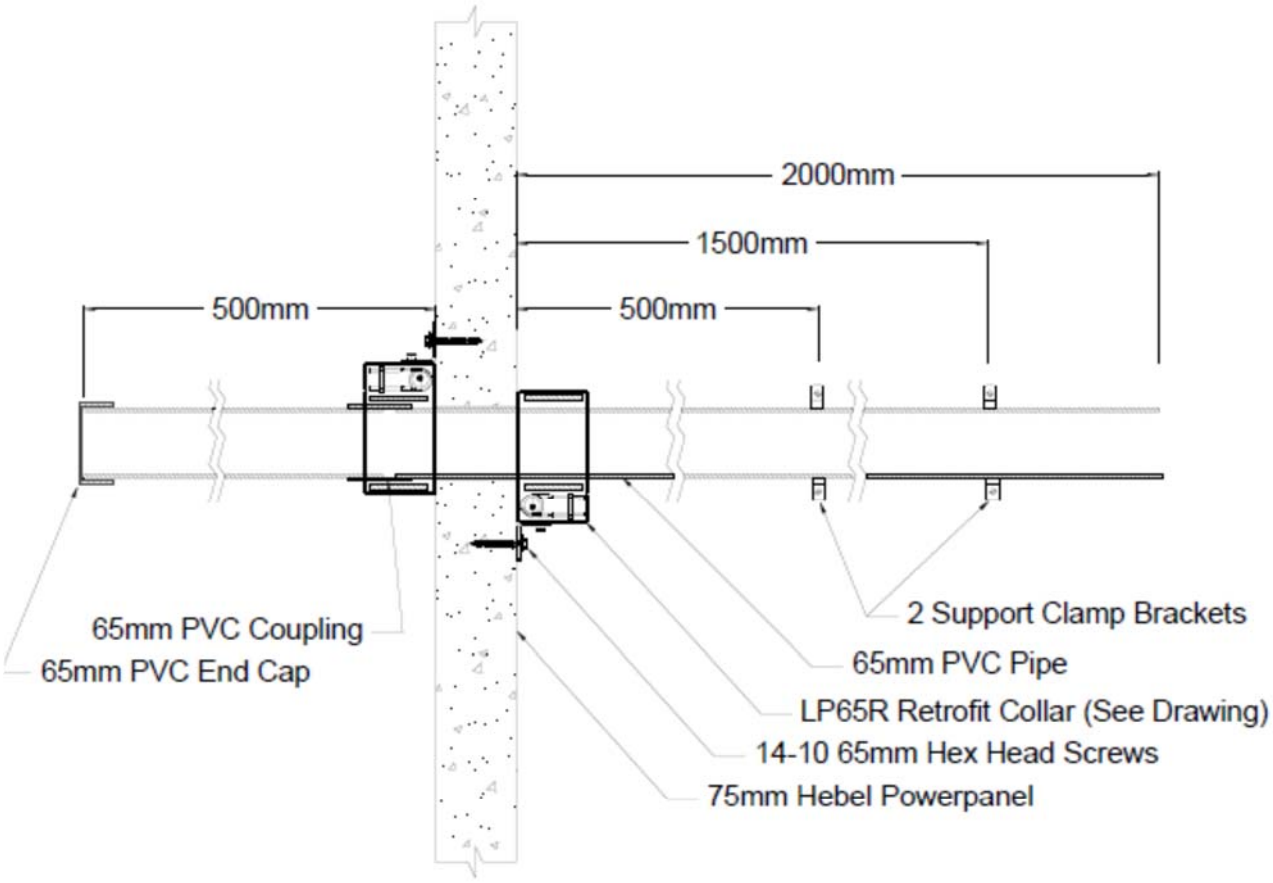
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 3, 100-MM PVC-SC PIPE – LP100R-D RETROFIT COLLAR – FITTING INSIDE COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 4
40mmPVC Pipe – LP65R Retrofit Collar - Fitting Inside Collar
15 OCT 2016



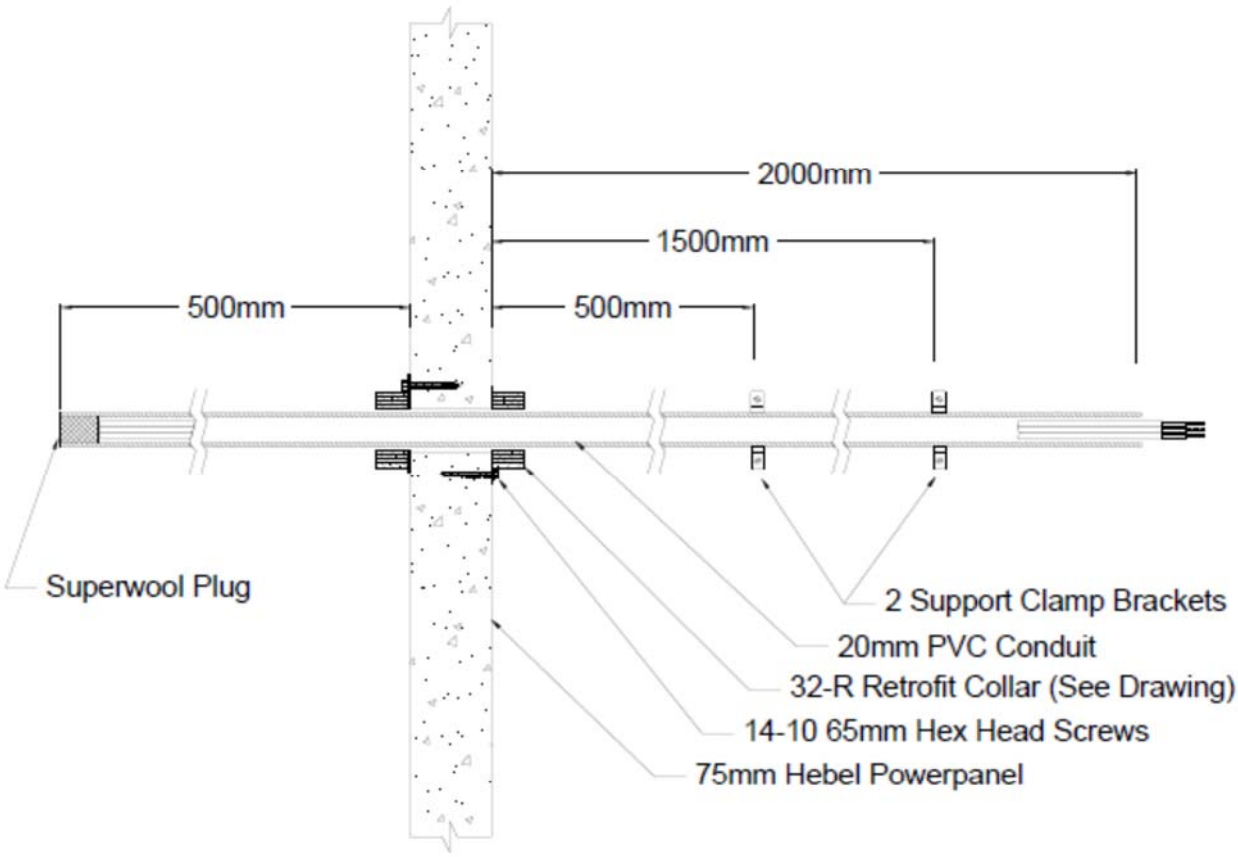
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 4, 40-MM PVC PIPE – LP65R RETROFIT COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 5
65mm PVC Pipe – LP65R Retrofit Collar - Fitting Inside Collar
15 OCT 2016



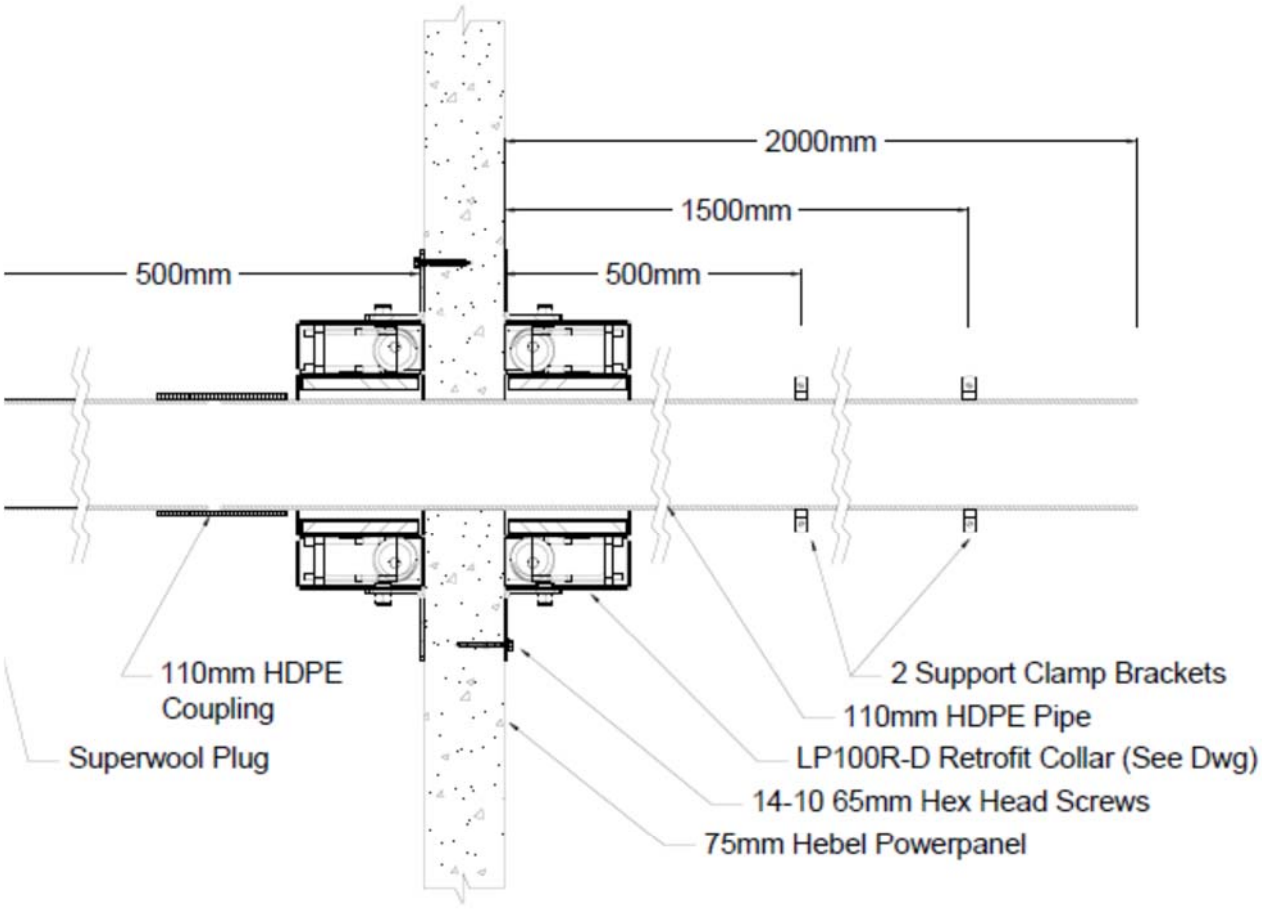
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 5, 65-MM PVC PIPE – LP65R RETROFIT COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 6
20mm PVC Conduit – 32R Retrofit Collar - Filled With 3-Core Cable
15 OCT 2016



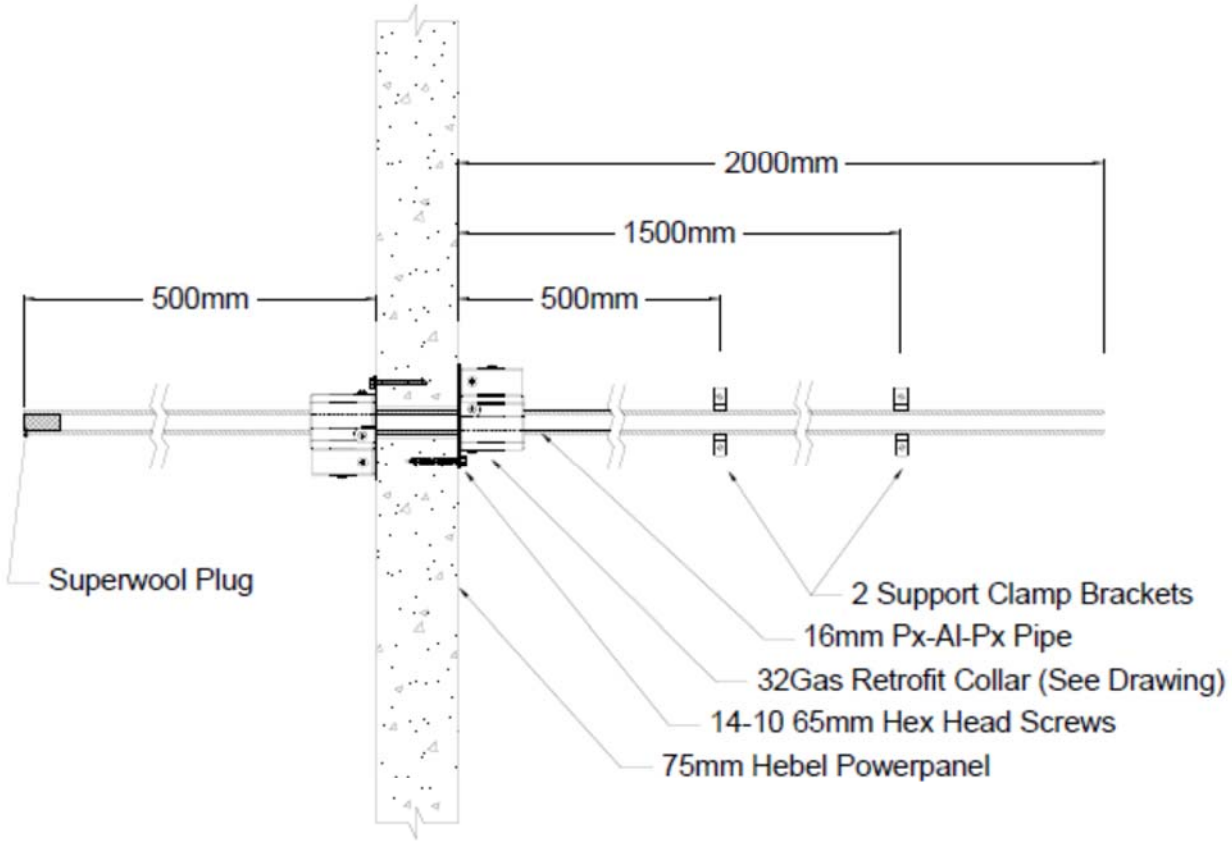
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 6, 20-MM PVC CONDUIT – 32R RETROFIT COLLAR – FILLED WITH 3-CORE CABLE, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 7
110mm HDPE Pipe – LP100R-D Retrofit Collar
15 OCT 2016



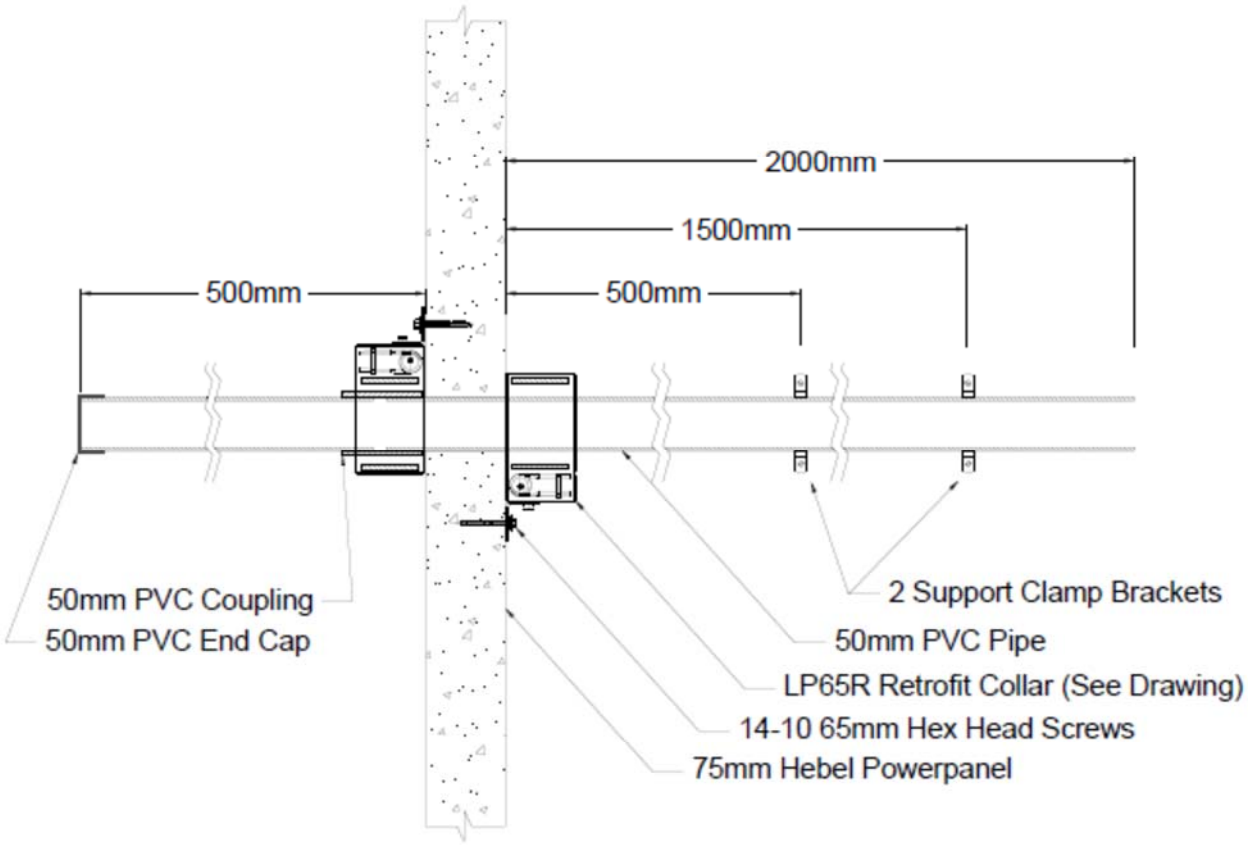
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 7, 110-MM HDPE PIPE – LP100R-D RETROFIT COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 8
16mm Px-Al-Px Pipe – 32Gas Retrofit Collar
15 OCT 2016



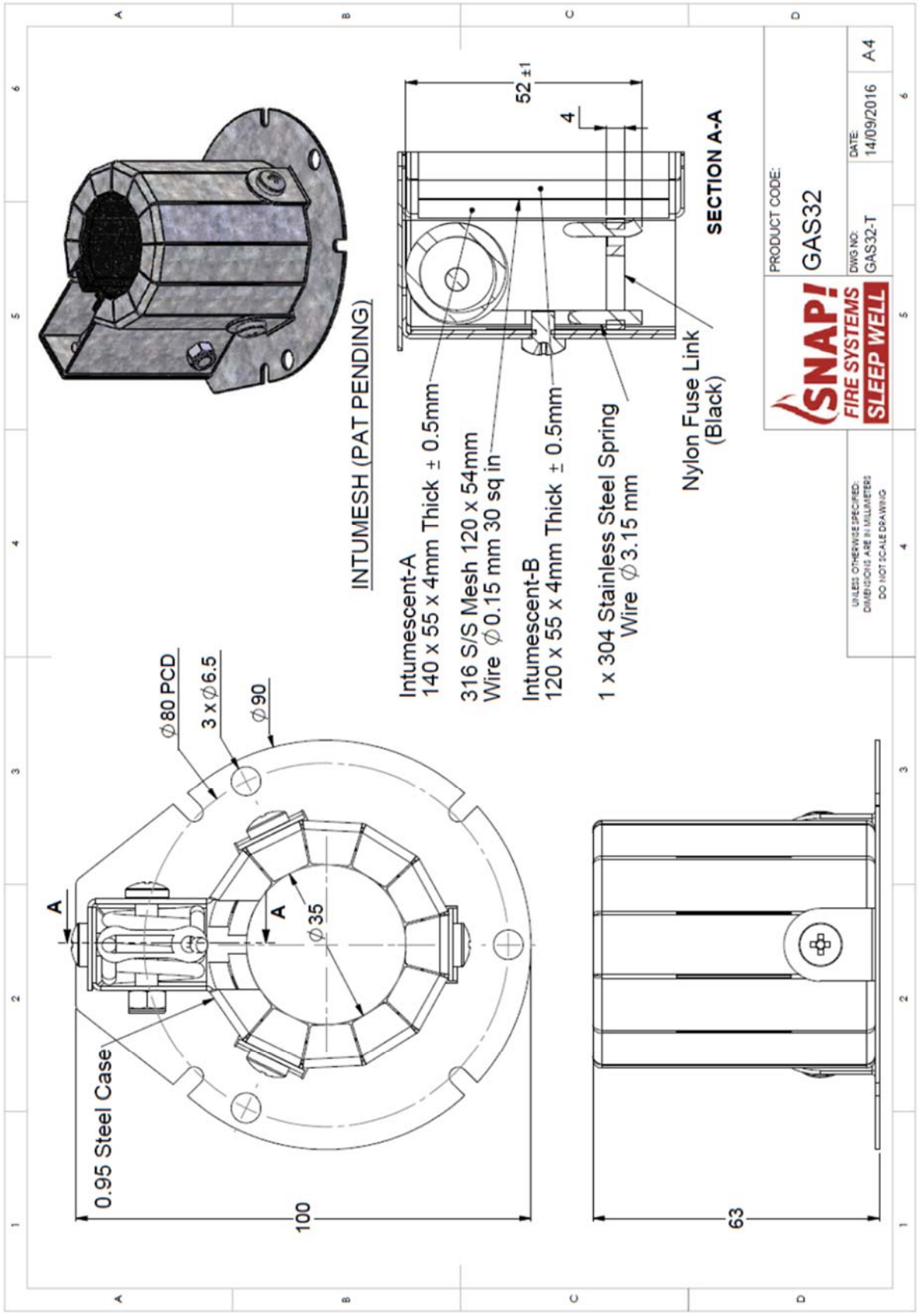
DRAWING TITLED "TEST WALL W-16-C PENETRATION # 8, 16-MM PX-AL-PX PIPE – GAS32 RETROFIT COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Test Wall W-16-C Penetration # 9
50mm PVC Pipe – LP65R Retrofit Collar - Fitting Inside Collar
15 OCT 2016

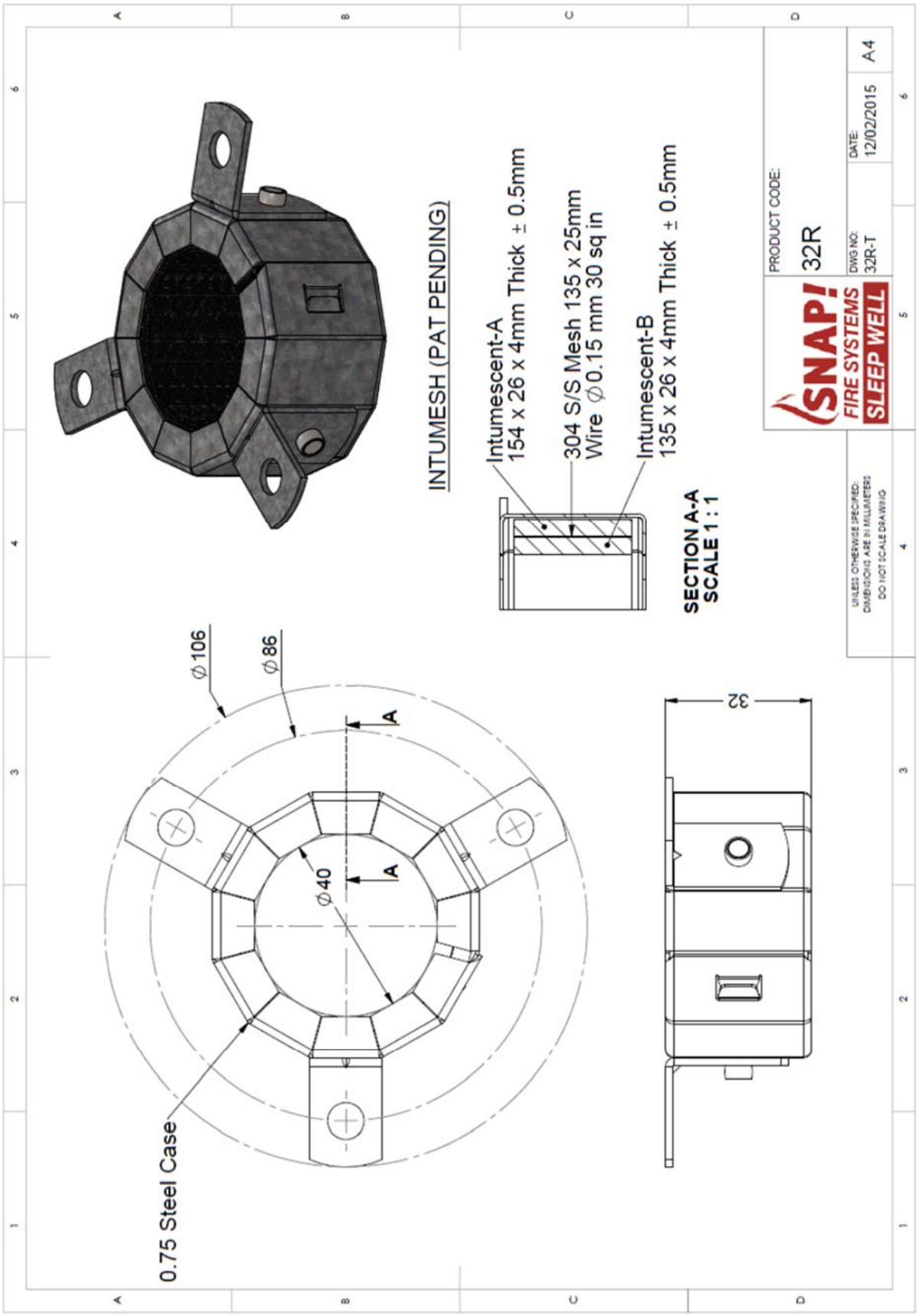


DRAWING TITLED "TEST WALL W-16-C PENETRATION # 9, 50-MM PVC PIPE – LP65R RETROFIT COLLAR, DATED 15 OCTOBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

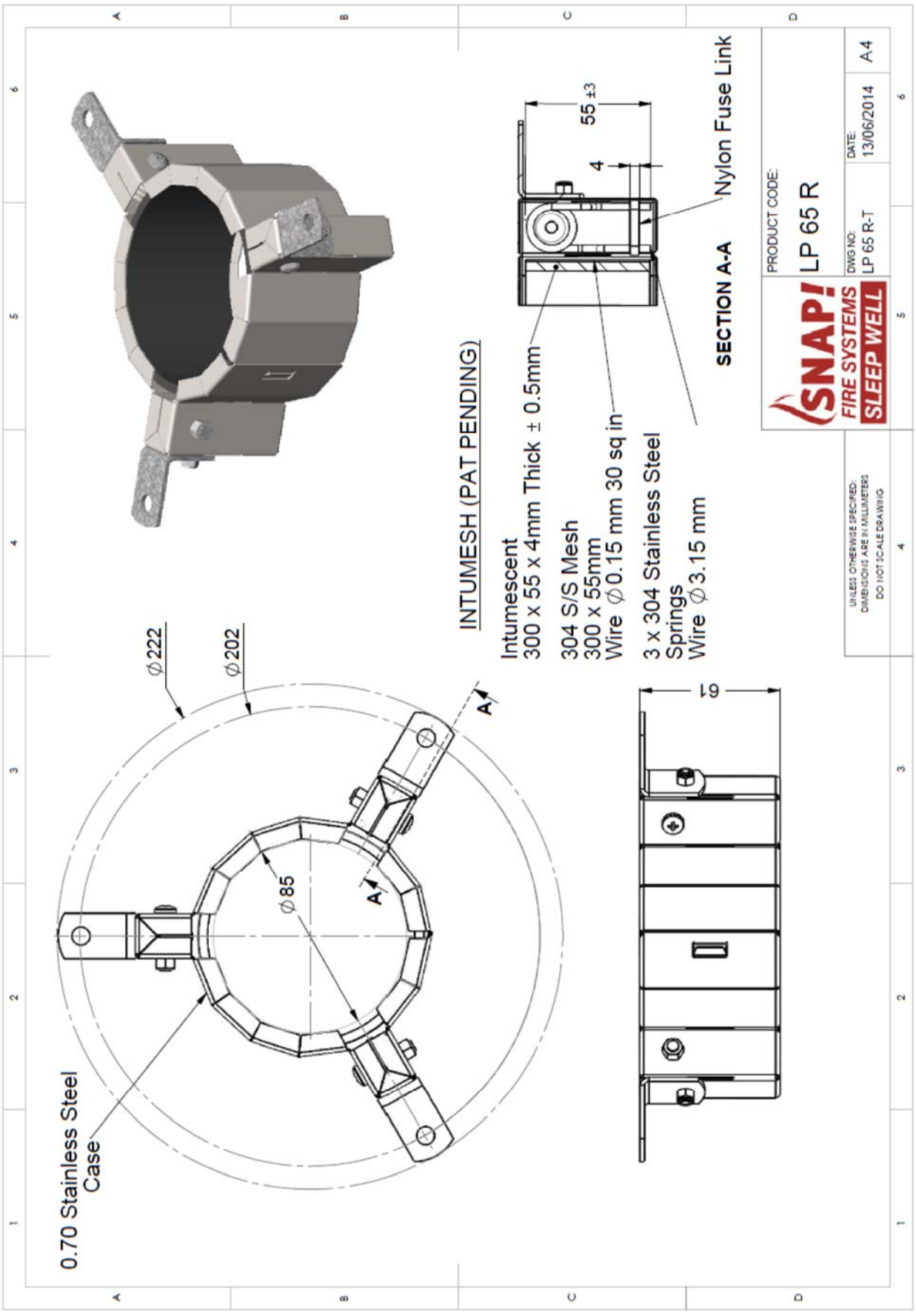
Appendix E – Specimen Drawings



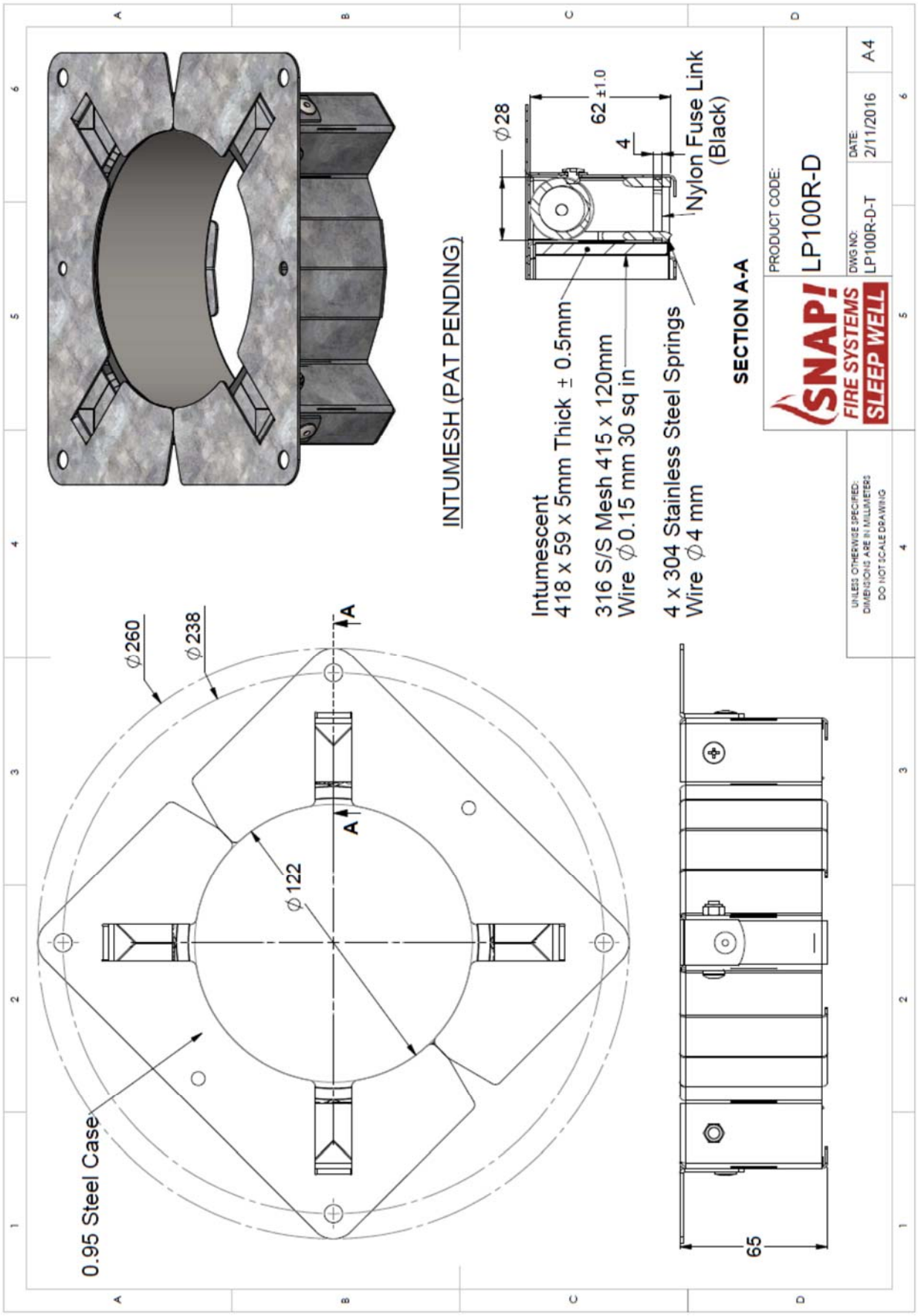
DRAWING NUMBERED GAS32-T, DATED 14 SEPTEMBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.



DRAWING NUMBERED 32R-T, DATED 12 FEBRUARY 2015, BY SNAP FIRE SYSTEMS PTY LTD.



DRAWING NUMBERED LP65R-T, DATED 13 JUNE 2014, BY SNAP FIRE SYSTEMS PTY LTD.



DRAWING NUMBERED LP100R-D, DATED 2 NOVEMBER 2016, BY SNAP FIRE SYSTEMS PTY LTD.

Appendix F – Certificates

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

Certificate of Test

No. 2902

This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014 on behalf of:

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 1 – LP65R Retrofit fire collar protecting a nominal 32-mm High-density polyethylene (HDPE) Pipe

Description: The SNAP Retrofit LP65R fire collar comprised a 0.7-mm stainless steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws. The penetrating service comprised a 40-mm HDPE Pipe, with a wall thickness of 3.4-mm penetrating the wall through a 44-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 1, 32-mm HDPE Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe incorporated a HDPE Coupling located on the exposed side of the wall. The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	114 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

Issued on the 23rd day of February 2017 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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

COPY OF CERTIFICATE OF TEST – NO. 2902

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

Certificate of Test

No. 2903

This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014 on behalf of:

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 2 – 32R Retrofit fire collar protecting a nominal 16-mm Pex-B Pipe

Description: The 32R Retrofit collar comprised a 0.75-mm steel casing with a 40-mm inner diameter and a 106-mm diameter base flange. The 32-mm high collar casing incorporated a closing mechanism that was comprised of two soft Intumesh intumescent strips lined within the internal circumference of the collar. The inner and outer strips were 4-mm thick x 26-mm wide x 135-mm long, and 4-mm thick x 26-mm wide x 154-mm long, respectively. Between the strips was a layer of 304 stainless steel mesh 135 mm long x 25-mm wide with wire mesh diameter of 0.15-mm, as shown in drawing numbered 32R-T dated 12 February 2015, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws. The penetrating service comprised a 16-mm OD Pex-B Pipe, with a wall thickness of 2.5-mm fitted through the collar's sleeve and penetrating the wall through a 20-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 2, 16-mm Pex-B Pipe – 32R Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	no failure at 121 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

Issued on the 23rd day of February 2017 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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

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Certificate of Test

No. 2904

This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014 on behalf of:

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 3 – LP100R-D Retrofit fire collar protecting a nominal 100-mm Polyvinyl Chloride (PVC-SC) Pipe with fitting inside the collar

Description: The SNAP Retrofit LP100R-D collar comprised a 0.95-mm thick steel casing with a 122 mm inner diameter and a 260-mm x 260-mm square base flange. The 65-mm high collar casing incorporated a layer of 418 mm x 59 mm x 5-mm thick Intumescent material. The closing mechanism comprised 4 x 304 stainless steel springs bound with black nylon fuse links and a 316 stainless steel mesh measuring 415 x 120-mm as shown in drawing numbered LP100R-D-T dated 2 November 2016, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws. The penetrating service comprised a 110-mm OD PVC-SC Pipe, with a wall thickness of 3.5 mm fitted through the collar's sleeve and penetrating the wall through a 114-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 3, 100-mm PVC-SC Pipe – LP100R-D Retrofit Collar – Fitting Inside Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500 mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500 mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	117 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

Issued on the 23rd day of February 2017 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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

COPY OF CERTIFICATE OF TEST – NO. 2904

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

Certificate of Test

No. 2905

This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014 on behalf of:

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 4 – LP65R Retrofit fire collar protecting a nominal 40-mm Polyvinyl Chloride (PVC) with fitting inside the collar

Description: The SNAP Retrofit LP65R fire collar comprised a 0.7-mm steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws. The penetrating service comprised a 43-mm OD PVC pipe, with a wall thickness of 2.1-mm fitted through the collar's sleeve and penetrating the wall through a 48-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 4, 40-mm PVC Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	no failure at 121 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

Issued on the 23rd day of February 2017 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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Certificate of Test

No. 2906

This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014 on behalf of:

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 5 – LP65R Retrofit fire collar protecting a nominal 65-mm Polyvinyl Chloride (PVC) with fitting inside the collar

Description: The SNAP Retrofit LP65R fire collar comprised a 0.7-mm steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws. The penetrating service comprised a 69-mm OD PVC pipe, with a wall thickness of 3.2-mm fitted through the collar's sleeve and penetrating the wall through a 76-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 5, 65-mm PVC Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	102 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

Issued on the 23rd day of February 2017 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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Certificate of Test

No. 2907

This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014 on behalf of:

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 6 – 32R Retrofit fire collar protecting a 20-mm Polyvinyl Chloride (PVC) Conduit filled with 3-Core Cable

Description: The SNAP Retrofit 32R fire collar comprised a 0.75-mm steel casing with a 40-mm inner diameter fitted with three fixing tabs. The 32-mm high collar casing incorporated a closing mechanism that was comprised of two soft Intumesh intumescent strips lined within the internal circumference of the collar. The inner and outer strips were 4-mm thick x 26-mm wide x 135-mm long, and 4-mm thick x 26-mm wide x 154-mm long, respectively. Between the strips was a layer of 304 stainless steel mesh 135 mm long x 25-mm wide with wire mesh diameter of 0.15-mm, as shown in drawing numbered 32R-T dated 12 February 2015, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 20-mm PVC Conduit filled with 3-Core Cable, with a wall thickness of 2.2-mm fitted through the collar's sleeve and penetrating the wall through a 25-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 6, 20-mm PVC Conduit – 32R Retrofit Collar – Filled with 3-Core Cable, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	no failure at 121 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

Issued on the 23rd day of February 2017 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

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Certificate of Test

No. 2908

This is to certify that the element of construction described below was tested by CSIRO Infrastructure Technologies in accordance with Australian Standard 1530, Methods for fire tests on building materials, components and structures, Part 4 Fire-resistance tests of elements of construction, 2014 on behalf of:

Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 7 – LP100R-D Retrofit fire collar protecting a 110-mm High-density polyethylene (HDPE) Pipe

Description: The SNAP Retrofit LP100R-D collar comprised a 0.95-mm thick steel casing with a 122-mm inner diameter and a 260-mm x 260-mm square base flange. The 65-mm high collar casing incorporated a layer of 418-mm x 59-mm x 5-mm thick Intumescent material. The closing mechanism comprised 4 x 304 stainless steel springs bound with black nylon fuse links and a 316 stainless steel mesh measuring 415 x 120-mm as shown in drawing numbered LP100R-D-T dated 2 November 2016, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws. The penetrating service comprised a 110-mm OD HDPE pipe, with a wall thickness of 4.6-mm fitted through the collar's sleeve and penetrating the wall through a 114-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 7, 110-mm HDPE Pipe – LP100R-D Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	no failure at 121 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

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Certificate of Test

No. 2909

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Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 8 – GAS32 retrofitted fire collar protecting a nominal 16-mm Px-Al-Px Pipe

Description: The GAS32 Retrofit collar comprised a 0.95-mm thick galvanised steel casing with a 35-mm inner diameter and a 90-mm diameter base flange. The 63-mm high collar casing incorporated a layer of 140-mm x 55-mm x 4-mm thick Intumescent material and a layer of 120-mm x 55-mm x 4-mm thick Intumescent material. The closing mechanism comprised 1 x 304 stainless steel spring bound with a black nylon fuse link and a 316 stainless steel mesh measuring 120 x 54-mm as shown in drawing numbered GAS32-T dated 14 September 2016, by Snap Fire Systems Pty Ltd. The penetrating service comprised a 16-mm OD Px-Al-Px Pipe, with a wall thickness of 2.3-mm fitted through the collar's sleeve and penetrating the wall through a 20-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 8, 16-mm Px-Al-Px Pipe – GAS32 Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a ceramic fibre (Superwool) plug.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	no failure at 121 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

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Snap Fire Systems Pty Ltd
Building A, 1343 Wynnum Road
Tingalpa QLD 4173

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1783.

Product Name: Penetration # 9 – LP65R retrofitted fire collar protecting a nominal 50-mm Polyvinyl Chloride (PVC) Pipe with fitting inside the collar

Description: The SNAP Retrofit LP65R fire collar comprised a 0.7-mm steel casing with a 85-mm inner diameter and a 222-mm diameter base flange. The 61-mm high collar casing incorporated a 300-mm x 55-mm x 4-mm thick Intumesh intumescent material. The closing mechanism comprised three stainless steel springs, with nylon fuse links and a 300-mm x 55-mm stainless steel mesh as shown in drawing numbered LP65R-T dated 13 June 2014, by Snap Fire Systems Pty Ltd. One collar was fixed to each side of the wall in a back-to-back configuration using 14-10 65-mm Hex Head Screws. The penetrating service comprised a 56-mm OD PVC pipe, with a wall thickness of 2.4-mm fitted through the collar's sleeve and penetrating the wall through a 64-mm diameter cut-out hole as shown in drawing titled "Test Wall W-16-C Penetration # 9, 50-mm PVC Pipe – LP65R Retrofit Collar, dated 15 October 2016". The pipe projected horizontally, 2000-mm away from the unexposed face of the wall and approximately 500-mm into the furnace chamber. The pipe incorporated a PVC Coupling located on the exposed side of the wall, fitted within the fire collars sleeve. The pipe was supported at nominally 500-mm and 1500-mm from the unexposed face of the wall by two support clamps spaced apart at nominally 1000-mm. The pipe was open at the unexposed end and capped on the exposed end with a PVC End Cap.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	no failure at 121 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/90/90. The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) are limited to that of the separating element. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Chris Wojcik Date of Test: 7 November 2016

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References

The following informative documents are referred to in this Report:

AS 1530.4-2014	Methods for fire tests on building materials, components and structures part 4: fire-resistance tests of elements of building construction.
AS 4072.1-2005	Components for the protection of openings in fire-resistant separating elements. Part 1: service penetrations and control joints.

----end of report----

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