

Fire-resistance test on service penetrations in a framed wall system

Test Report

Author: Peter Gordon
Report number: FSP 1846
Date: 6 November 2017

Client: BOSS Fire & Safety Pty Ltd

Commercial-in-confidence



NATA Accredited Laboratory
Number: 165
Corporate Site No 3625
Accredited for compliance with ISO/IEC 17025 Testing

Inquiries should be address to:

Fire Testing and Assessments
NATA Registered Laboratory
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
BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW
Telephone +61 1300 502 677

Report Status and Revision History:

VERSION	STATUS	DATE	DISTRIBUTION	ISSUE NUMBER
Revision A	Draft for internal review	23/08/17	CSIRO	FSP 1846
Revision B	Final for issue	06/011/17	CSIRO	FSP 1846

Report Authorization:

AUTHOR	REVIEWED BY	AUTHORISED BY
Peter Gordon	Chris Wojcik	Brett Roddy
		
6 November 2017	6 November 2017	6 November 2017

Use of this Report

Use of Reports – Testing

This report is subject to binding obligations under which it was prepared. In particular, the Report must not be used:

- *as a means of endorsement; or*
- *in a company prospectus or notification to a Stock Exchange document for capital raising, without the prior written consent of CSIRO.*

The Report may be published verbatim and in full, provided that a statement is included on the publication that it is a copy of the Report issued by CSIRO.

Excerpts of the Report may not be published.

Use of Reports – Consultancy

This report is subject to binding obligations under which it was prepared. In particular, the Report may only be used for the following purposes:

- *the information in the Report may be used by the party that commissioned the Report for its internal business operations (but not licensing to third parties);*
- *the report may be copied for distribution within the organisation that commissioned the Report;*
- *copies of the Report (or extracts of the Report) may be distributed to contractors and agents of the organisation that commissioned the Report who have a need for the Report for its internal business operations. Any extracts of the Report distributed for this purpose must clearly note that the extract is part of a larger Report held by the organisation that commissioned the Report and which has been prepared by CSIRO.*

The name, trade mark or logo of the CSIRO must not be used without the prior written consent of CSIRO.

The Report must not be used as a means of endorsement without the prior written consent of CSIRO.

Copyright and disclaimer

© 2017 CSIRO To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of CSIRO.

Important disclaimer

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Contents

1	Introduction	4
1.1	Identification of specimen	4
1.2	Sponsor	4
1.3	Manufacturer	4
1.4	Test standard	4
1.5	Reference standard.....	4
1.6	Test number	4
1.7	Test date	4
2	Description of specimen	5
2.1	General.....	5
2.2	Dimensions	15
2.3	Orientation.....	15
2.4	Conditioning.....	15
3	Documentation	15
4	Equipment.....	15
4.1	Furnace	15
4.2	Temperature	15
4.3	Measurement system	15
5	Ambient temperature	16
6	Departure from standard	16
7	Termination of test	16
8	Test results	16
8.1	Critical observations	16
8.2	Furnace temperature.....	17
8.3	Furnace severity.....	17
8.4	Specimen temperature	17
8.5	Performance	18
9	Fire-resistance level (FRL)	20
10	Field of direct application of test results	20
11	Tested by	20
	Appendices	21
	Appendix A – Measurement location	21
	Appendix B – Test photographs	23
	Appendix C – Test data charts.....	29
	Appendix D – Specimen drawings.....	40
	Appendix E – Certificate(s) of Test	50
	References.....	58

Fire-resistance test on service penetrations in a framed wall system

Sponsored Investigation No. FSP 1846

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimens as a number of services penetrating a plasterboard wall system with various fire stopping systems.

1.2 Sponsor

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

1.3 Manufacturer

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

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 4696/4136

1.7 Test date

The fire-resistance test was conducted on 14 August 2017.

2 Description of specimen

2.1 General


The specimens comprised nine (9) services penetrating a plasterboard wall and protected by various first stopping systems.

The penetrated wall system contained a 116-mm thick plasterboard lined frame wall system comprising two layers of 13-mm thick Fyrchek plasterboard on each side of 64-mm thick metal studs, with an established FRL of -/120/120, report reference FAR2357.


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

Specimen No.	Penetration details
1	BOSS MaxiCollar protecting a 50-mm aperture penetrated by a 48.3-mm OD Spears FlameGuard CPVC pipe.
2	BOSS Maxicollar protecting a 44-mm aperture penetrated by a 42.2-mm OD Spears FlameGuard CPVC pipe.
3	BOSS Maxicollar protecting a 35-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe.
4	A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 58-mm aperture penetrated by a 48.3 OD Spears FlameGuard CPVC pipe.
5	A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 43-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe.
6	FireMastic-HPE sealant protecting a 73-mm aperture penetrated by Spears FlameGuard 33.4-mm OD CPVC pipe.
7	A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 70-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe.
8	FireMastic-HPE sealant protecting a 100-mm aperture penetrated by Spears FlameGuard 60.3-mm OD CPVC pipe.
9	BOSS Maxicollar protecting a 62-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe.


Specimen 1 – BOSS MaxiCollar protecting a 50-mm aperture penetrated by a 48.3-mm OD Spears FlameGuard CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
50-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®1 ½" CPVC pipe.
Size	A 48.3-mm OD, 40.7-mm ID CPVC pipe with a wall thickness of 3.8-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end.
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	BOSS MaxiCollar (MC-50)
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	The BOSS MaxiCollar MC-50 fire collar comprises a metal framed collar (30-mm wide x 70-mm OD) with a three 2-mm layers of an elastomeric intumescent wrap.
Application	The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws and washes.
Photograph	
Drawing	CSIRO 0717 – 04 dated 15/06/17 by BOSS Fire & Safety.


Specimen 2 – BOSS Maxicollar protecting a 44-mm aperture penetrated by a 42.2-mm OD Spears FlameGuard CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
44-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®1 ¼ " CPVC pipe.
Size	A 42.2-mm OD, 35.6-mm ID CPVC pipe with a wall thickness of 3.3-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end.
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	BOSS MaxiCollar (MC-40)
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	The BOSS MaxiCollar MC-40 fire collar comprises a metal framed collar (30-mm wide x 55-mm OD) with a two 2-mm layers of an elastomeric intumescent wrap.
Application	The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws and washes.
Photograph	
Drawing	CSIRO 0717 – 03 dated 15/06/17 by BOSS Fire & Safety.


Specimen 3 – BOSS Maxicollar protecting a 35-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
35-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®1" CPVC pipe.
Size	A 33.4-mm OD, 28.2-mm ID CPVC pipe with a wall thickness of 2.6-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end.
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	BOSS MaxiCollar (MC-32)
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	The BOSS MaxiCollar MC-32 fire collar comprises a metal framed collar (30-mm wide x 47-mm OD) with a two 2-mm layers of an elastomeric intumescent wrap.
Application	The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws.
Photograph	
Drawing	CSIRO 0717 – 02 dated 15/06/17 by BOSS Fire & Safety.

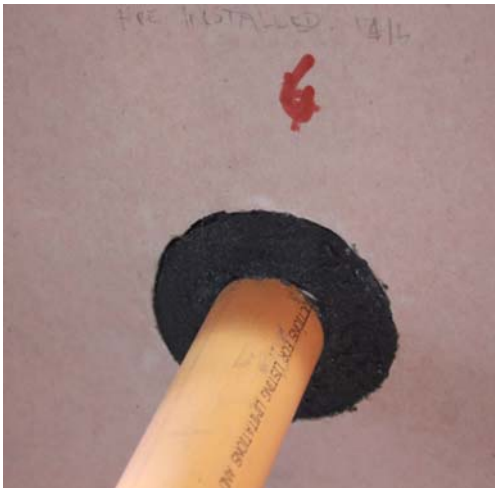
Specimen 4 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 58-mm aperture penetrated by a 48.3 OD Spears FlameGuard CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
58-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	A Spears FlameGuard ®1 ½" CPVC pipe.
Size	A 48.3-mm OD, 40.7-mm ID CPVC pipe with a wall thickness of 3.8-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end.
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade names	FireMastic-300 sealant and BOSS Uniwrap
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	FireMastic-300 sealant is an intumescent one part acrylic emulsion sealant. BOSS UniWrap – an elastomeric intumescent wrap.
Application	The annular gap around the pipe on both sides of the wall was first filled with two layers of UniWrap (2-mm thick and 40-mm wide) wrapped around the pipe within the wall penetration. The resulting gap was then sealed over using a 5-mm x 5-mm fillet of BOSS FireMastic-300 sealant.
Photograph	
Drawing	CSIRO 0717 – 07 dated 15/06/17 by BOSS Fire & Safety.


Specimen 5 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 43-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
58-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®1" CPVC pipe.
Size	A 33.4-mm OD, 28.2-mm ID CPVC pipe with a wall thickness of 2.6-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade names	FireMastic-300 sealant and BOSS Uniwrap
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	FireMastic-300 sealant is an intumescent one part acrylic emulsion sealant. BOSS UniWrap – an elastomeric intumescent wrap.
Application	The annular gap around the pipe on both sides of the wall was first filled with two layers of UniWrap (2-mm thick and 40-mm wide) wrapped around the pipe within the wall penetration. The resulting gap was then sealed over using a 5-mm x 5-mm fillet of BOSS FireMastic-300 sealant.
Photograph	
Drawing	CSIRO 0717 – 06 dated 15/06/17 by BOSS Fire & Safety.

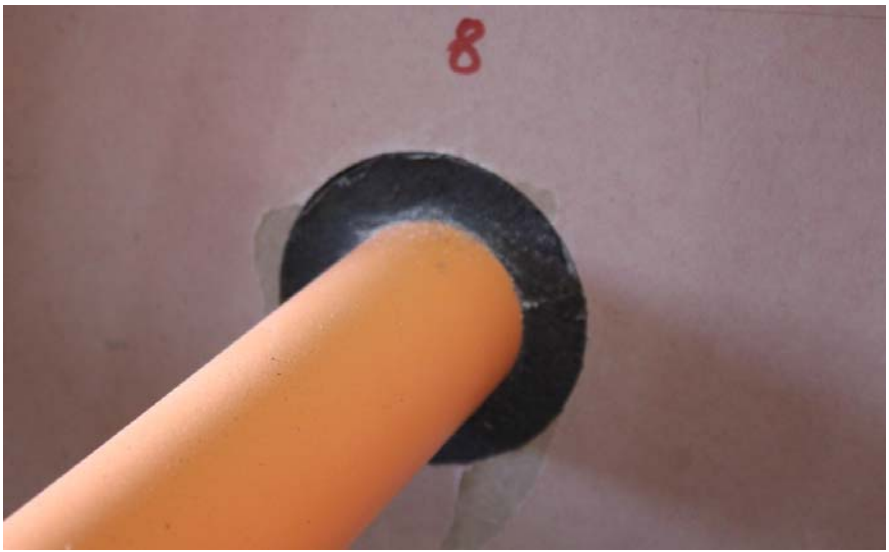
Specimen 6 – FireMastic-HPE sealant protecting a 73-mm aperture penetrated by Spears FlameGuard 33.4-mm OD CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
73-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®1" CPVC pipe.
Size	A 33.4-mm OD, 28.2-mm ID CPVC pipe with a wall thickness of 3.8-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	Fire Mastic-HPE sealant
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	Fire Mastic-HPE is a High Pressure Exerting graphite-based, thixotropic, one-part acrylic sealant
Application	The annular gap around the pipe on both sides of the wall was filled with FireMastic-HPE sealant to a depth of 26-mm and finished flush with wall.
Photograph	
Drawing	CSIRO 0717 – 05 dated 15/06/17 by BOSS Fire & Safety.


Specimen 7 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 70-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
70-mm diameter aperture in a 96-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®2" CPVC pipe.
Size	A 60.3-mm OD, 50.9-mm ID CPVC pipe with a wall thickness of 4.7-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	FireMastic-300 sealant and BOSS Uniwrap
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	FireMastic-300 sealant is an intumescent one part acrylic emulsion sealant. BOSS UniWrap – an elastomeric intumescent wrap.
Application	The annular gap around the pipe on both sides of the wall was first filled with two layers of UniWrap (2-mm thick and 40-mm wide) wrapped around the pipe within the wall penetration. The resulting gaps were then sealed over using a 5-mm x 5-mm fillet of BOSS FireMastic-300 sealant.
Photograph	
Drawing	CSIRO 0717 – 08 dated 15/06/17 by BOSS Fire & Safety.

Specimen 8 – FireMastic-HPE sealant protecting a 100-mm aperture penetrated by Spears FlameGuard 60.3-mm OD CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
100-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®2" CPVC pipe.
Size	A 60.3-mm OD, 50.9-mm ID CPVC pipe with a wall thickness of 4.7-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	Fire Mastic-HPE sealant
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	Fire Mastic-HPE is a High Pressure Exerting graphite-based, thixotropic, one-part acrylic sealant
Application	The annular gap around the pipe on both sides of the wall was filled with FireMastic-HPE sealant to a depth of 26-mm and finished flush with wall.
Photograph	
Drawing	CSIRO 0717 – 9 dated 15/06/17 by BOSS Fire & Safety.

Specimen 9 – BOSS Maxicollar protecting a 62-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe.

SEPARATING ELEMENT	
Plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357.	
TYPE AND SIZE OF CONSTRUCTION	
62-mm diameter aperture in a 116-mm thick wall.	
PENETRATING SERVICE	
Description	Spears FlameGuard ®2" CPVC pipe.
Size	A 50.9-mm ID CPVC pipe with a wall thickness of 4.7-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end using Spears CPVC cap and left open on the unexposed end
Supports	Approximately 440-mm and 1670-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	BOSS MaxiCollar (MC-65)
Manufacturer	BOSS Fire & Safety Pty Ltd
Description	The BOSS MaxiCollar MC-65 fire collar comprises a metal framed collar (30-mm wide x 80-mm OD) with three 2-mm layers of an elastomeric intumescent wrap.
Application	The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws and washes.
Photograph	
Drawing	CSIRO 0717 – 10 dated 15/06/17 by BOSS Fire & Safety.

2.2 Dimensions

The overall dimension of the plasterboard wall was 1100-mm wide x 1100-mm long x 116-mm thick, to suit the opening in the specimen containing frame.

2.3 Orientation

The plasterboard wall was placed vertically against the furnace chamber, and subjected to fire exposure from one side only.

2.4 Conditioning

The specimen constructions was complete on 10 August 2017 and left to cure under standard laboratory atmospheric conditions until the test date.

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:

Drawings numbered CSIRO 0717, numbered 1-10, dated 15 June 2017, by BOSS Fire & Safety.

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 specimens 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 18°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:

- 3 minutes - Light smoke being emitted from the end of Specimens #3 & #6.
- 4 minutes - Light smoke being emitted from the ends of Specimen #5.
Specimen #3 has stop fluing.
- 5 minutes - Smoke being emitted from Specimens #4, #5, #6 and #8
- 6 minutes - Smoke emitted from Specimen #9
- 8 minutes - Specimen #9 has stopped fluing.
- 10 minutes - Specimens #4, #5, #6, #7, and #8 have started to sag between the wall and first supports.
- 12 minutes - Insulation Failure Specimen 8 – maximum temperature rise of 180K is exceeded from the top of the pipe on the unexposed face.
Specimen #8 has melted at the base near wall.
- 13 minutes - Integrity Failure Specimen 8 – Cotton pad test applied over penetration #8 ignition was noted.
- 14 minutes - Specimen #7 has melted at the based near wall, Cotton wool pad test applied with no ignition noted.
- 18 minutes - Specimen #8 Plugged up with ceramic fibre. Base of Penetration #4 starting to melt.
- 20 minutes - Light smoke being emitted from Specimens #9 and #7.
- 35 minutes - Light smoke being emitted from Specimens #1, #2 and #9.
- 60 minutes - Fluing from Specimens #1, #2, and #3 only.

- 79 minutes - Intumescent wrap in Specimens #4, #5 and #7 swelling.
- 86 minutes - Insulation Failure Specimen 5 – maximum temperature rise of 180K is exceeded from the unexposed face on the sealant around the penetration.
- 90 minutes - Penetration #9 stopped fluing.
- 93 minutes - Insulation Failure Specimen 7 – maximum temperature rise of 180K is exceeded from the unexposed face on the sealant around the penetration.
- 96 minutes - Insulation Failure Specimen 4 – maximum temperature rise of 180K is exceeded from the unexposed face on the sealant around the penetration.
- 110 minutes:- Intumescent wrap inside the collars of Specimens #1, #2, #3 and #9 swelling.
- 113 minutes - Insulation Failure Specimen 2 – maximum temperature rise of 180K is exceeded from the unexposed face on to of pipe.
- 115 minutes:- Penetration #9 starting to flue smoke.
- 118 minutes:- Insulation Failure Specimen 9 – maximum temperature rise of 180K is exceeded from the unexposed face on collar around the penetration.
Penetration #9 starting to deform at base near the collar replaced after falling off.
- 120 minutes - Insulation Failure Specimen 1 – maximum temperature rise of 180K is exceeded from the unexposed face on the pipe.
- 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 temperature versus time associated with Penetration 1.

Figure 4 shows the curve of temperature versus time associated with Penetration 2.

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

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

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

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

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

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

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

8.5 Performance

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

Specimen 1 – BOSS MaxiCollar protecting a 50-mm aperture penetrated by a 48.3-mm OD Spears FlameGuard CPVC pipe.

Structural adequacy	-	Not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	120 minutes

Specimen 2 – BOSS Maxicollar protecting a 44-mm aperture penetrated by a 42.2-mm OD Spears FlameGuard CPVC pipe.

Structural adequacy	-	Not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	113 minutes

Specimen 3 – BOSS Maxicollar protecting a 35-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe.

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

Specimen 4 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 58-mm aperture penetrated by a 48.3 OD Spears FlameGuard CPVC pipe.

Structural adequacy	-	Not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	96 minutes

Specimen 5 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 43-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe.

Structural adequacy	-	Not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	86 minutes

Specimen 6 – FireMastic-HPE sealant protecting a 73-mm aperture penetrated by Spears FlameGuard 33.4-mm OD CPVC pipe.

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

Specimen 7 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 70-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe.

Structural adequacy	-	Not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	93 minutes

Specimen 8 – FireMastic-HPE sealant protecting a 100-mm aperture penetrated by Spears FlameGuard 60.3-mm OD CPVC pipe.

Structural adequacy	-	Not applicable
Integrity	-	13 minutes
Insulation	-	12 minutes

Specimen 9 – BOSS Maxicollar protecting a 62-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe.

Structural adequacy	-	Not applicable
Integrity	-	no failure at 121 minutes
Insulation	-	118 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:

Specimen # 1:-	-/120/120	Specimen # 6:-	-/120/120
Specimen # 2:-	-/120/90	Specimen # 7:-	-/120/90
Specimen # 3:-	-/120/120	Specimen # 8:-	-/0/0
Specimen # 4:-	-/120/90	Specimen # 9:-	-/120/90
Specimen # 5:-	-/120/60		

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

The fire-resistance levels (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 1530.4-20014, have been made provided no individual component is removed or reduced.

11 Tested by

Chris Wojcik
Testing Officer

Appendices

Appendix A – Measurement location

Specimen	Thermocouple (T/C) position	Thermocouple
Specimen 1	On plasterboard, 25-mm above collar	S1
	Top of collar	S2
	On collar	S3
	On top of pipe 25-mm from collar	S4
	On side of pipe 25-mm from collar	S5
Specimen 2	On plasterboard, 25-mm above collar	S6
	Top of collar	S7
	On collar	S8
	On top of pipe 25-mm from collar	S9
	On side of pipe 25-mm from collar	S10
Specimen 3	On plasterboard, 25-mm above collar	S11
	Top of collar	S12
	On collar	S13
	On top of pipe 25-mm from collar	S14
	On side of pipe 25-mm from collar	S15
Specimen 4	On plasterboard, 25-mm above sealant	S16
	Top of sealant	S17
	On sealant	S18
	On top of pipe 25-mm from sealant	S19
	On side of pipe 25-mm from sealant	S20
Specimen 5	On plasterboard, 25-mm above sealant	S21
	Top of sealant	S22
	On sealant	S23
	On top of pipe 25-mm from sealant	S24
	On side of pipe 25-mm from sealant	S25
Specimen 6	On plasterboard, 25-mm above sealant	S26
	Top of sealant	S27
	On sealant	S28
	On top of pipe 25-mm from sealant	S29
	On side of pipe 25-mm from sealant	S30
Specimen 7	On plasterboard, 25-mm above sealant	S31
	Top of sealant	S32
	On sealant	S33
	On top of pipe 25-mm from sealant	S34
	On side of pipe 25-mm from sealant	S35

Specimen 8	On plasterboard, 25-mm above sealant	S36
	Top of sealant	S37
	On sealant	S38
	On top of pipe 25-mm from sealant	S39
	On side of pipe 25-mm from sealant	S40
Specimen 9	On plasterboard, 25-mm above collar	S41
	Top of collar	S42
	On collar	S43
	On top of pipe 25-mm from collar	S44
	On side of pipe 25-mm from collar	S45
Rover		S46
Ambient		S47

Appendix B – Test photographs



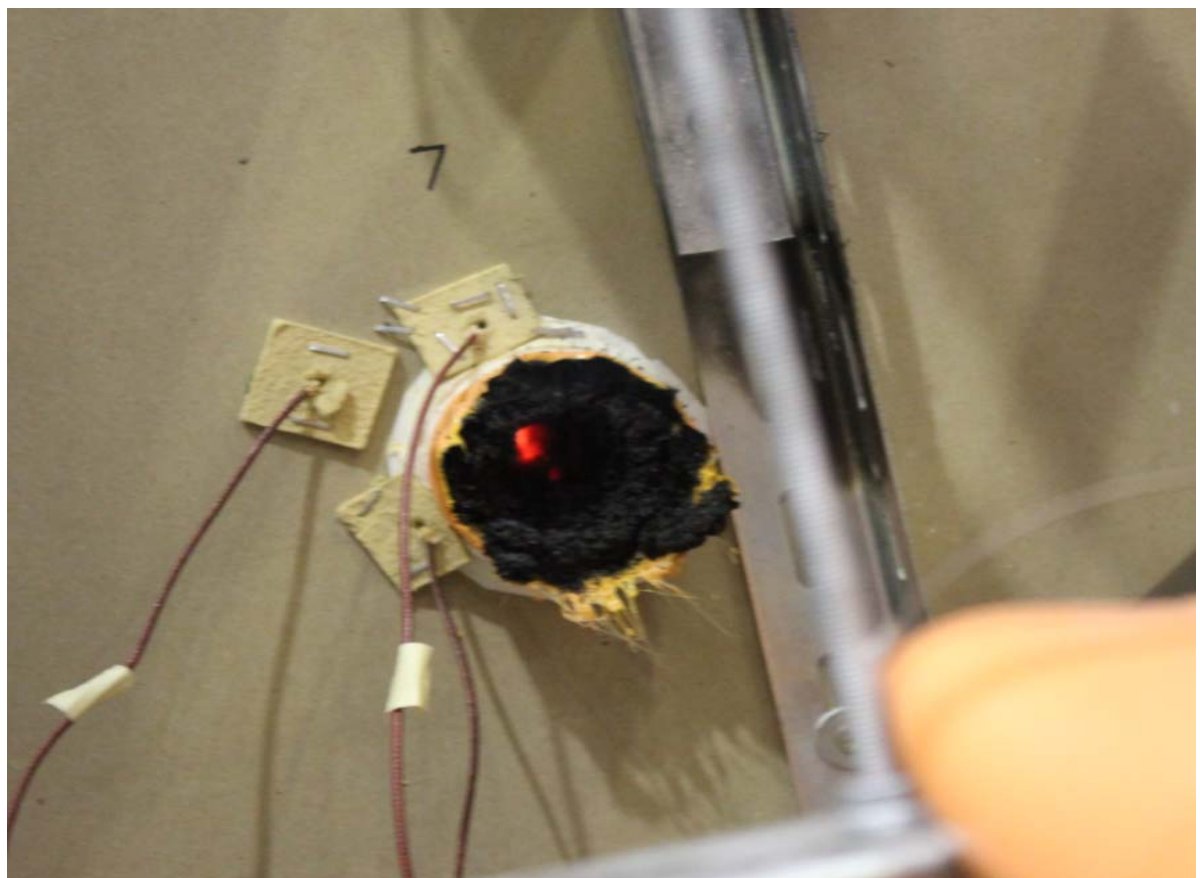
PHOTOGRAPH 1 – UNEXPOSED SIDE OF SPECIMEN PRIOR TO TESTING



PHOTOGRAPH 2 – EXPOSED SIDE OF SPECIMEN PRIOR TO TESTING



PHOTOGRAPH 3 – SPECIMEN #8 AT 11 MINUTES OF TESTING



PHOTOGRAPH 4 – SPECIMEN #7 AFTER 16 MINUTES OF TESTING



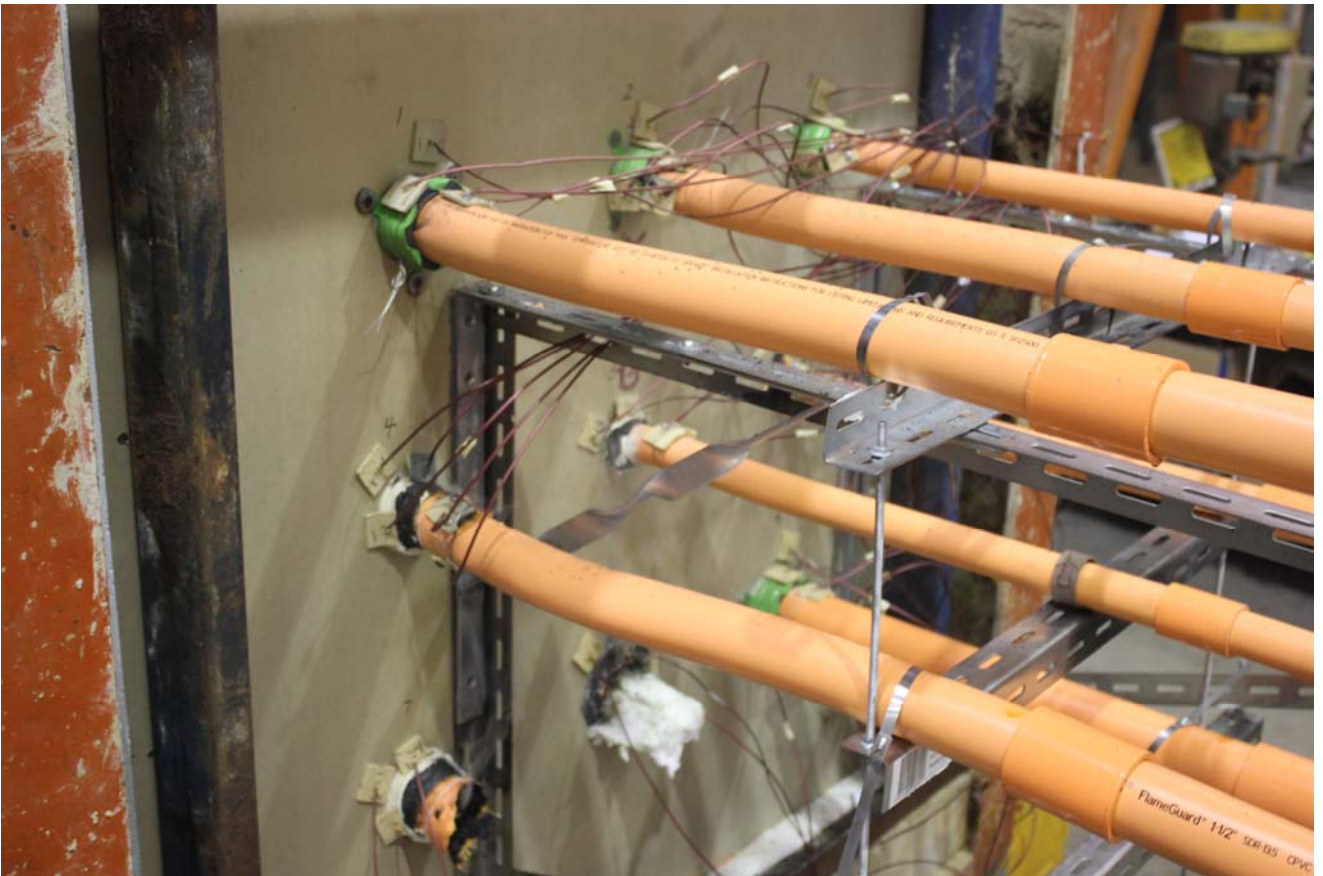
PHOTOGRAPH 5 – SPECIMENS AFTER 30 MINUTES OF TESTING



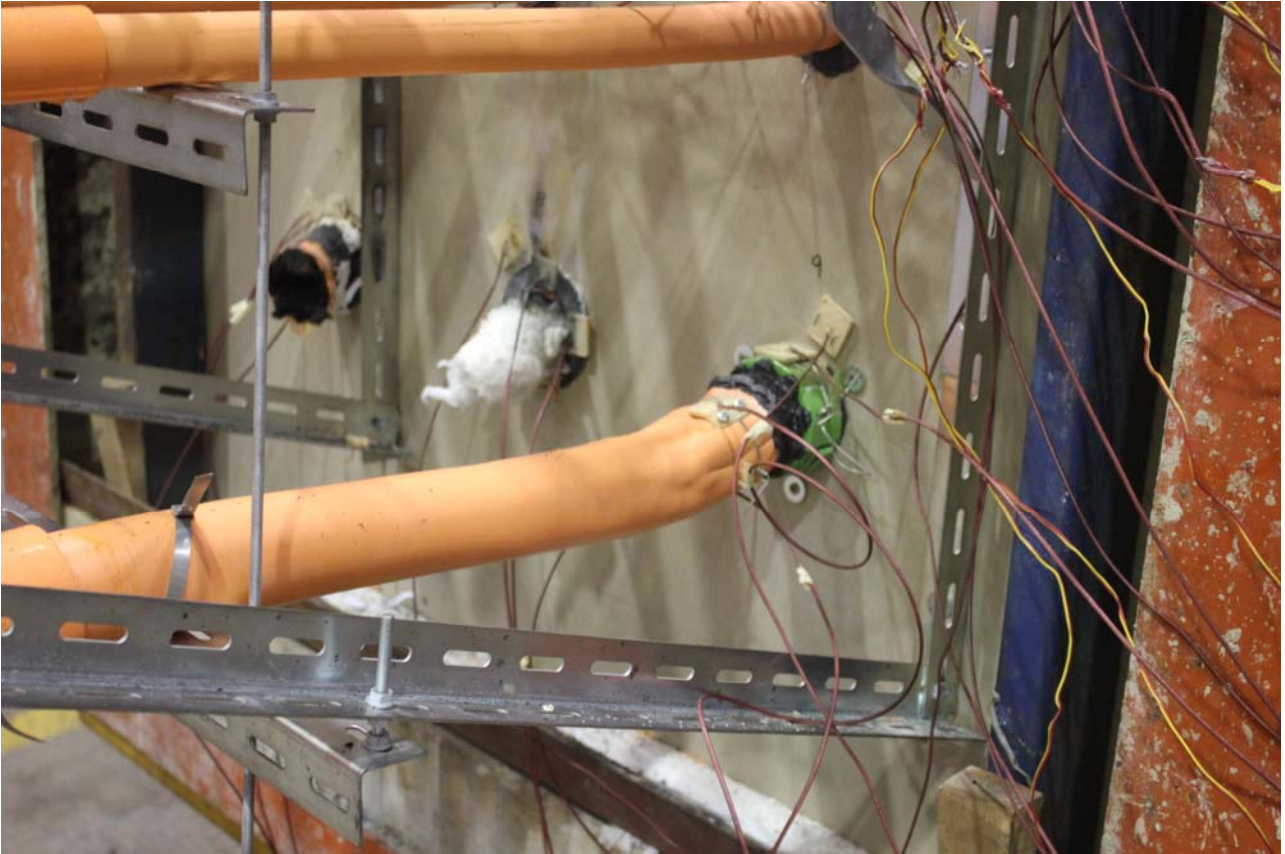
PHOTOGRAPH 6 – SPECIMENS AFTER 60 MINUTES OF TESTING



PHOTOGRAPH 7 – SPECIMENS AFTER 79 MINUTES OF TESTING



PHOTOGRAPH 8 – SPECIMENS AFTER 90 MINUTES OF TESTING



PHOTOGRAPH 9 – SPECIMENS AFTER 118 MINUTES OF TESTING



PHOTOGRAPH 10 – SPECIMENS AFTER 120 MINUTES OF TESTING



PHOTOGRAPH 11 – SPECIMENS AT THE CONCLUSION OF TESTING



PHOTOGRAPH 12 – SPECIMENS EXPOSED FACE AFTER THE CONCLUSION OF TESTING

Appendix C – Test data charts

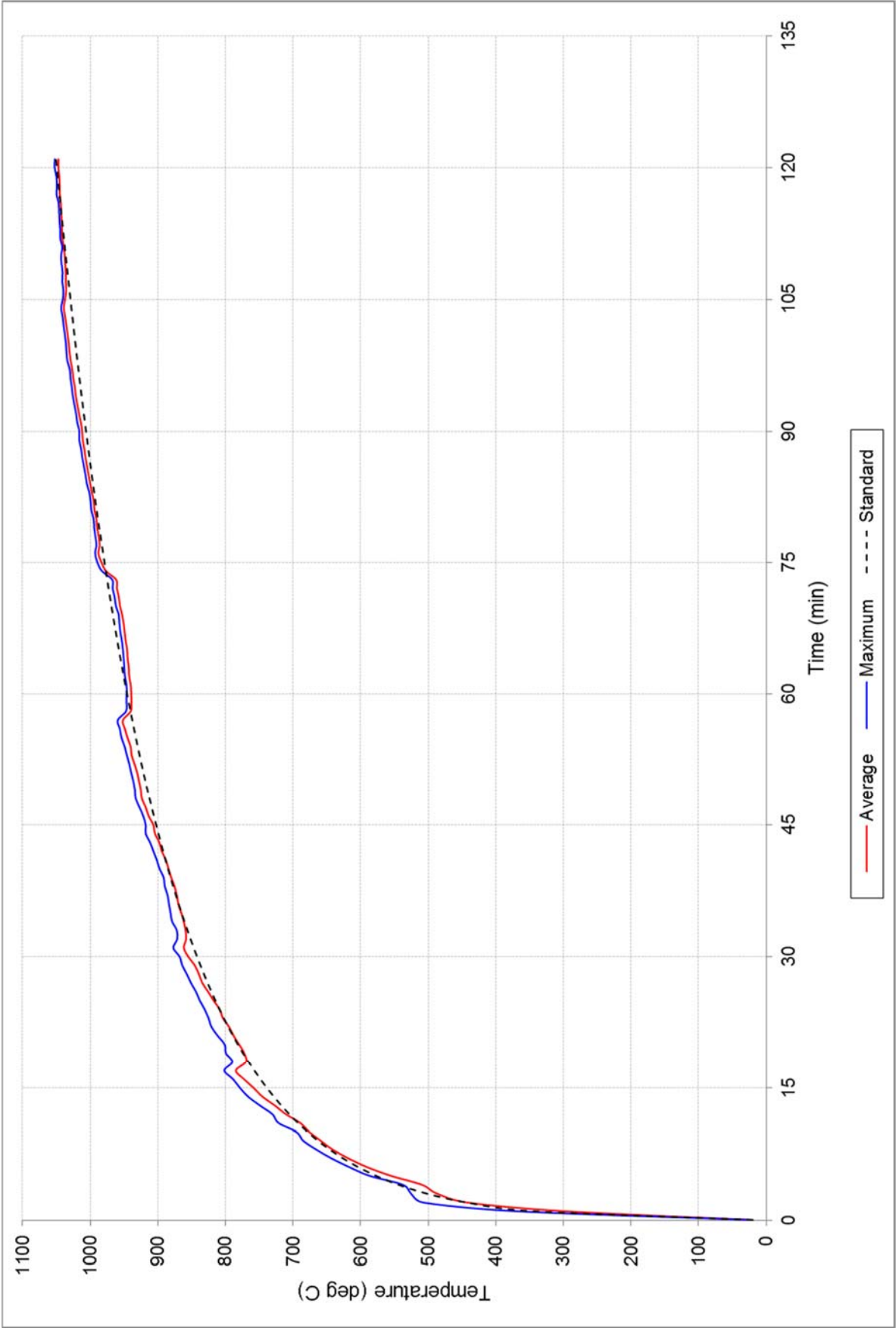


FIGURE 1 – FURNACE TEMPERATURE

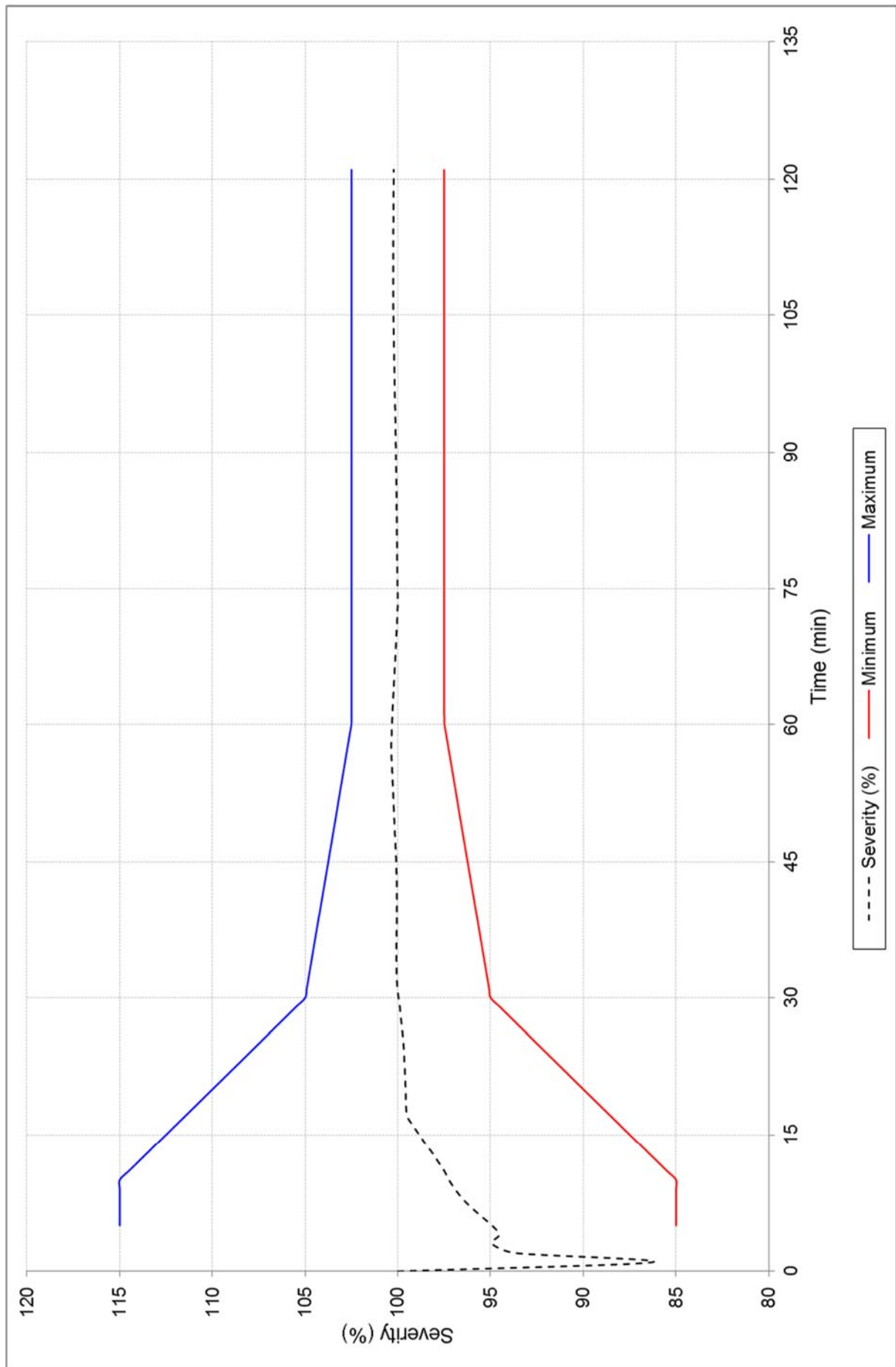


FIGURE 2 – FURNACE SEVERITY

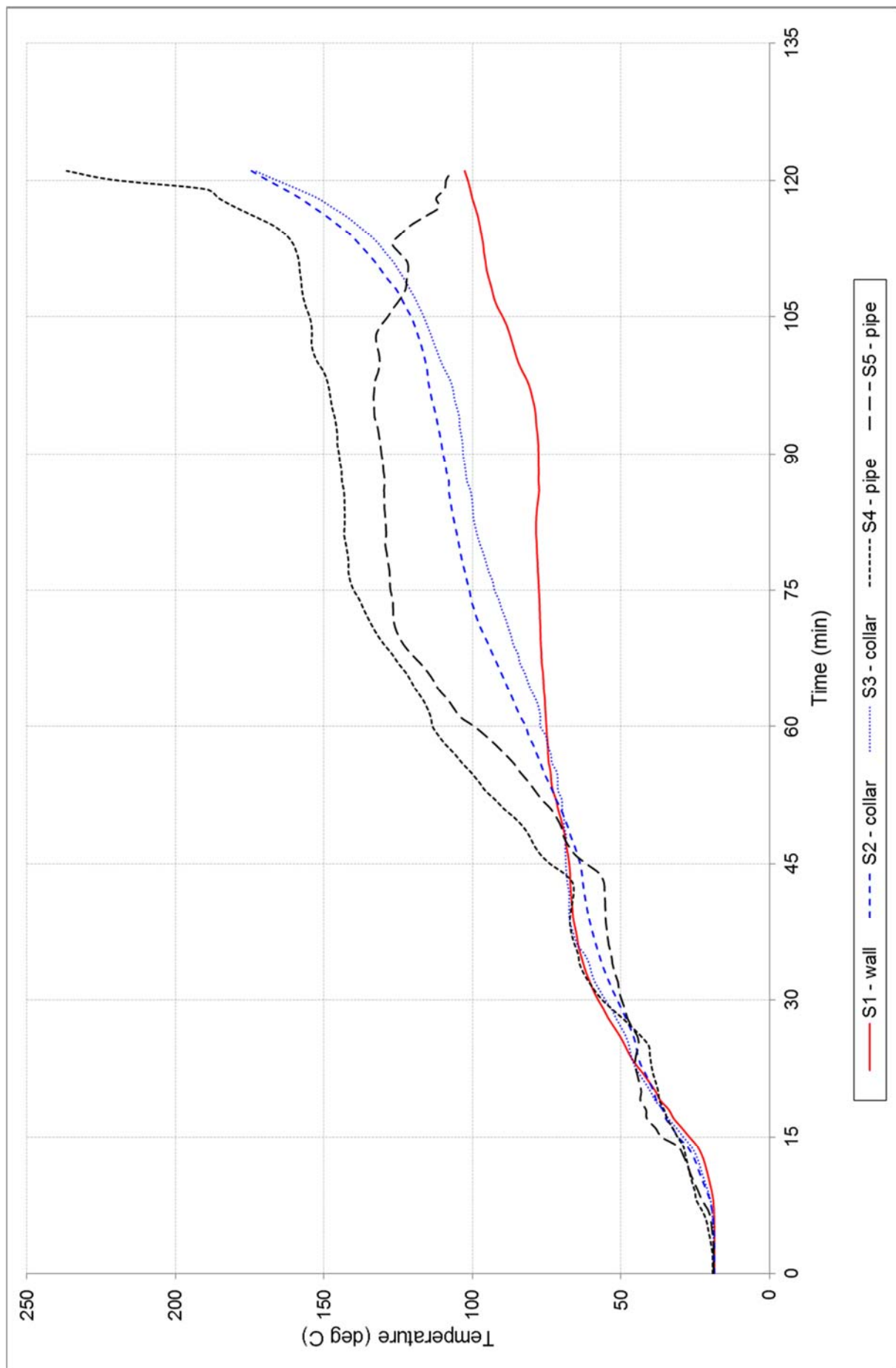


FIGURE 3 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #1

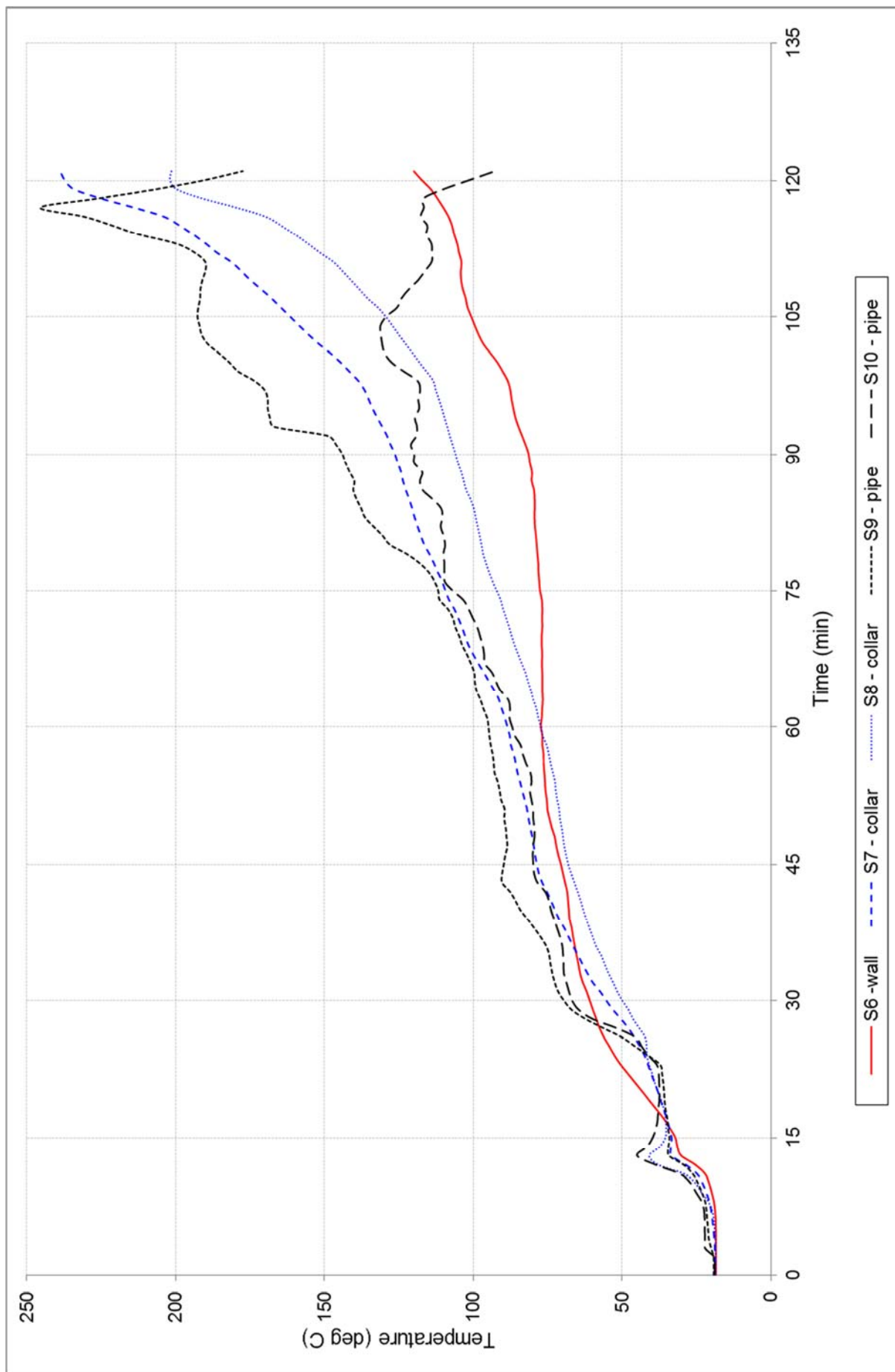


FIGURE 4 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #2

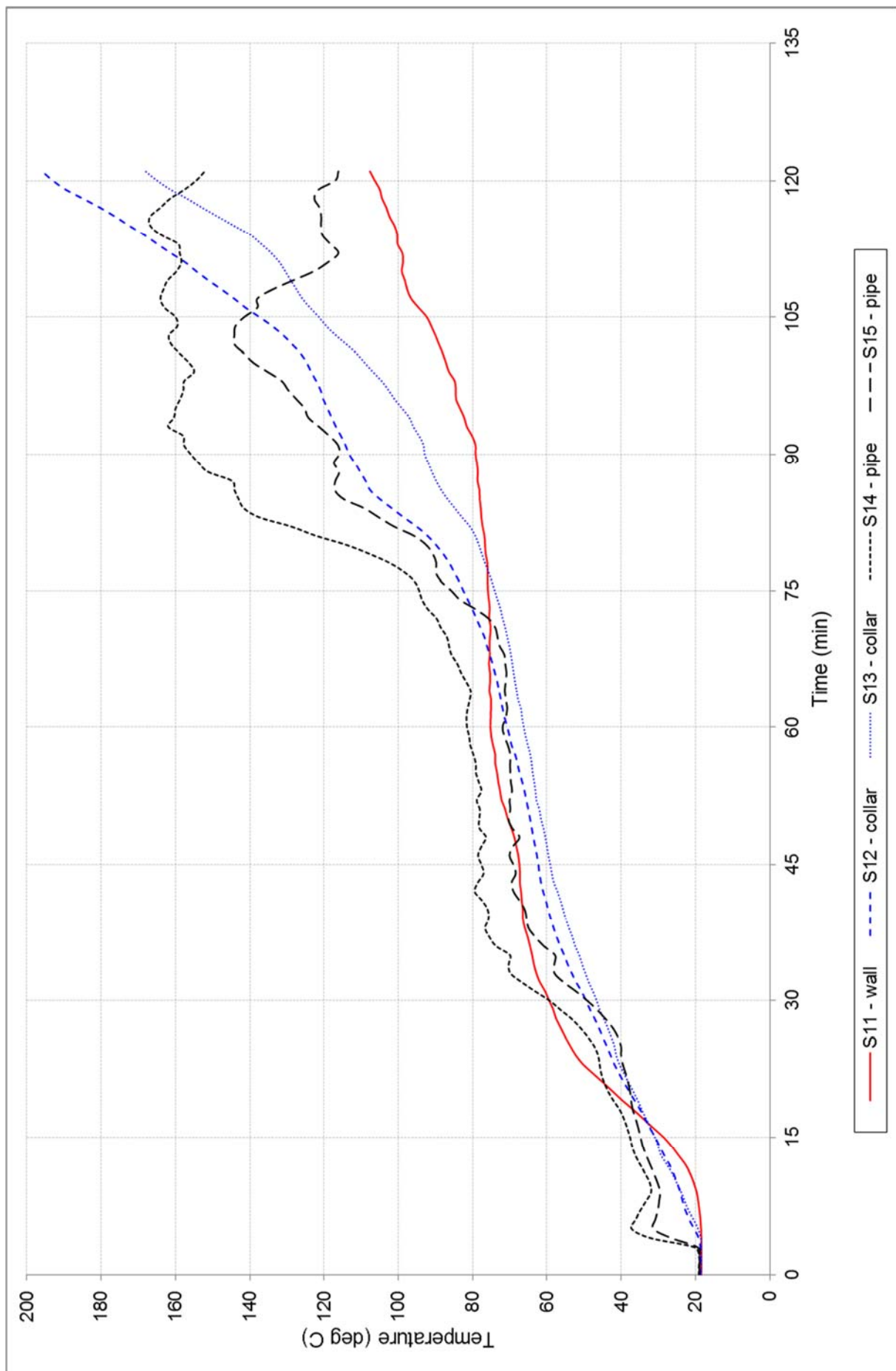


FIGURE 5 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #3

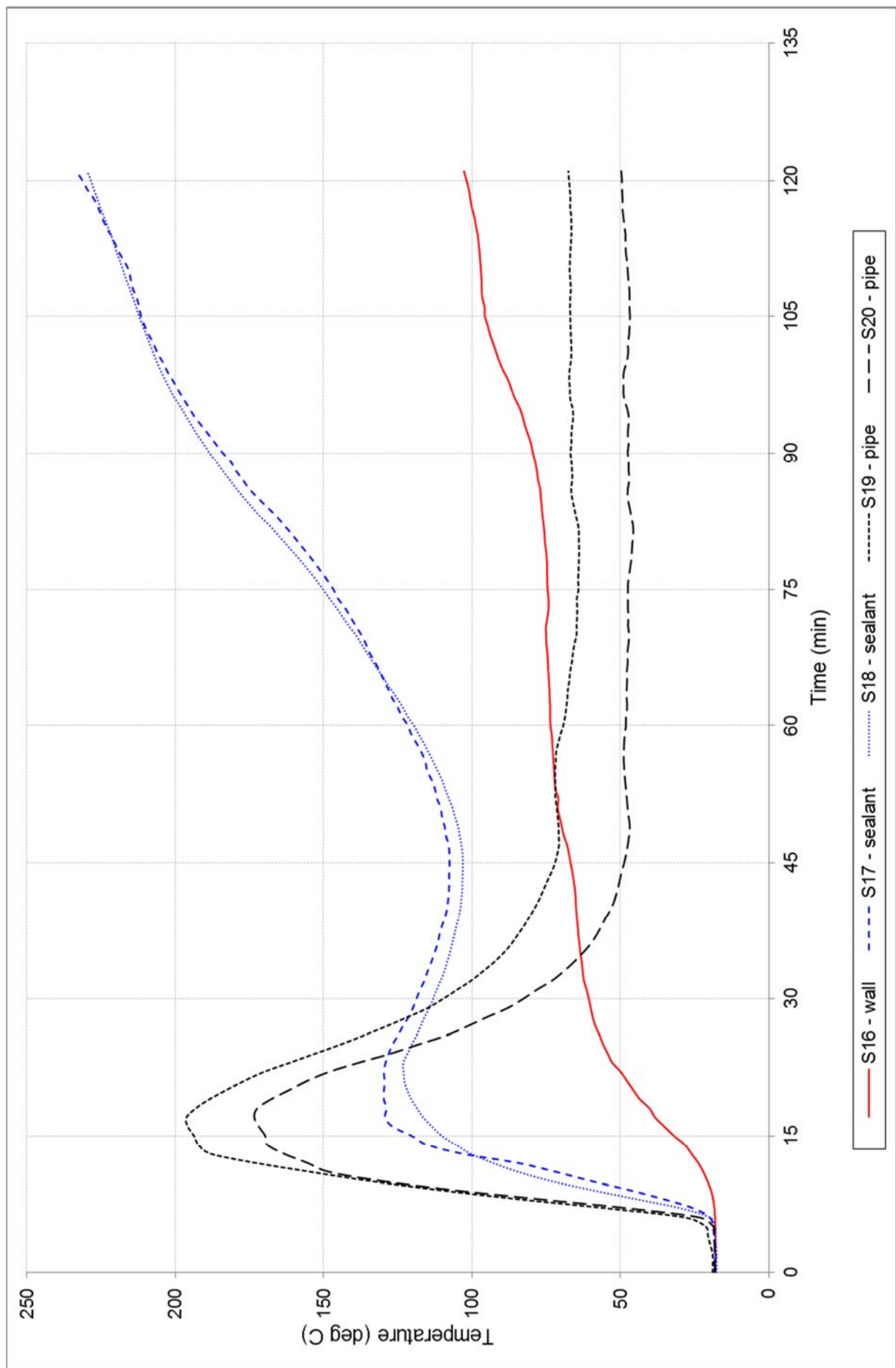


FIGURE 6 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #4

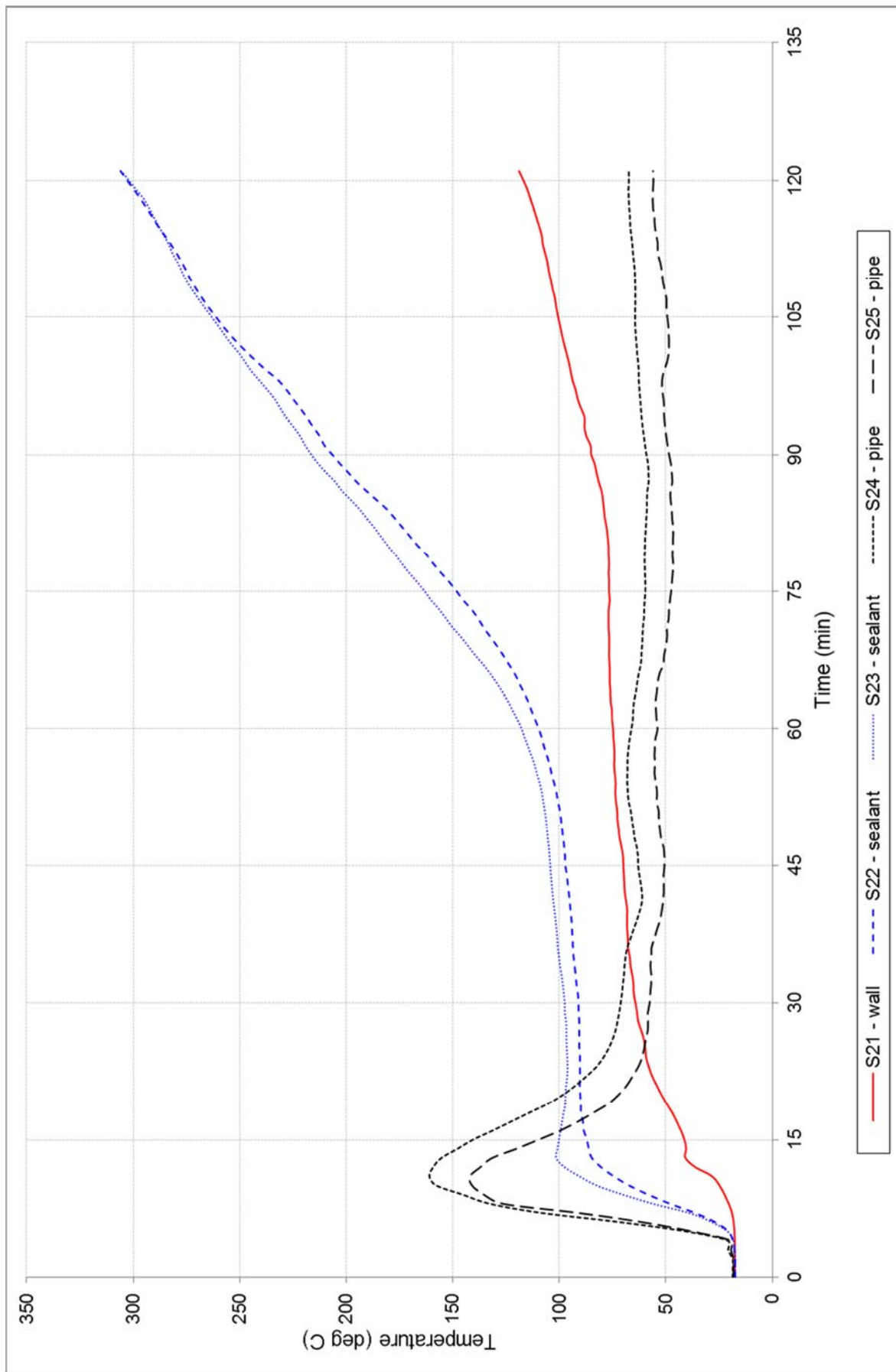


FIGURE 7 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #5

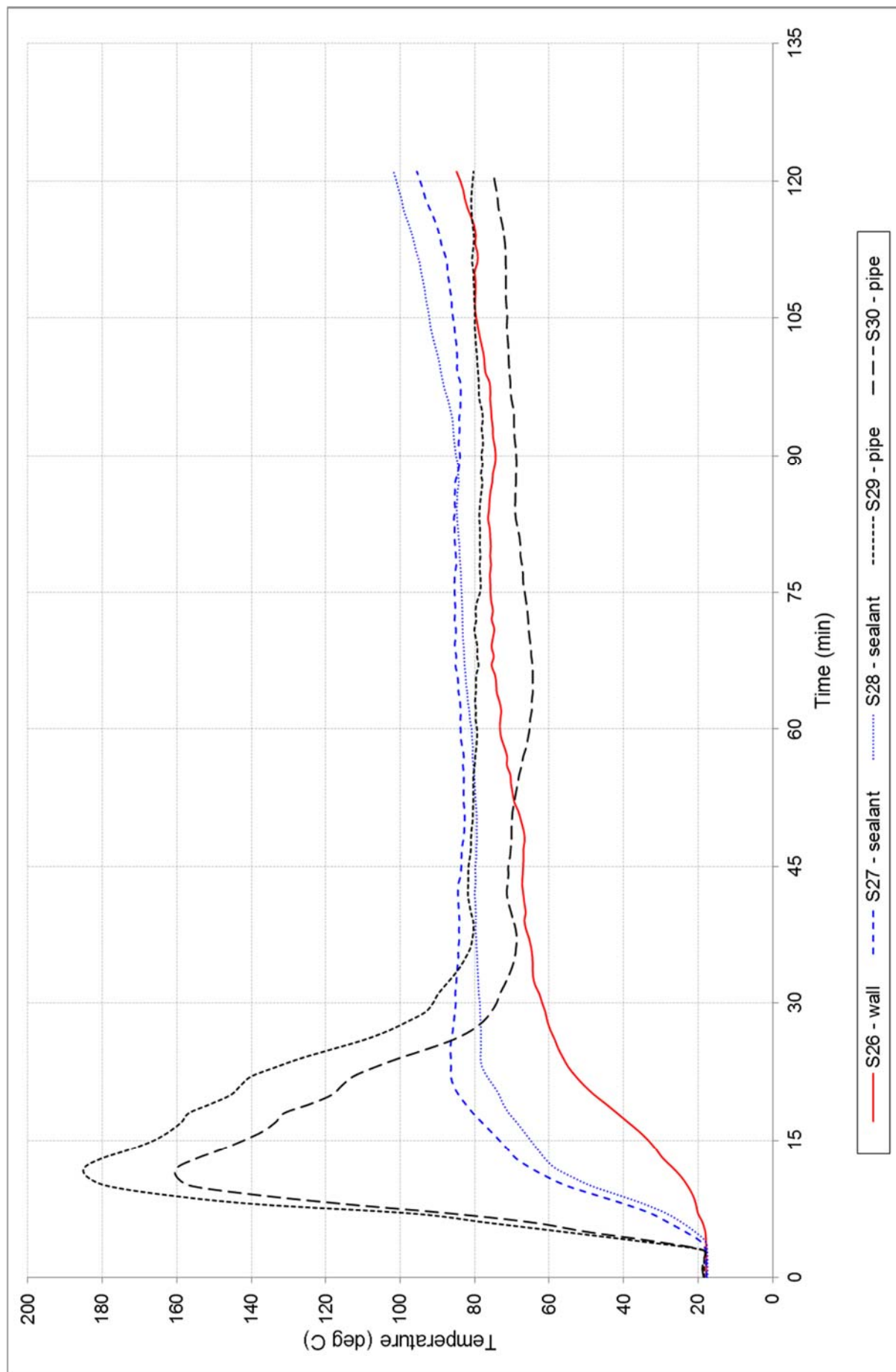


FIGURE 8 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #6

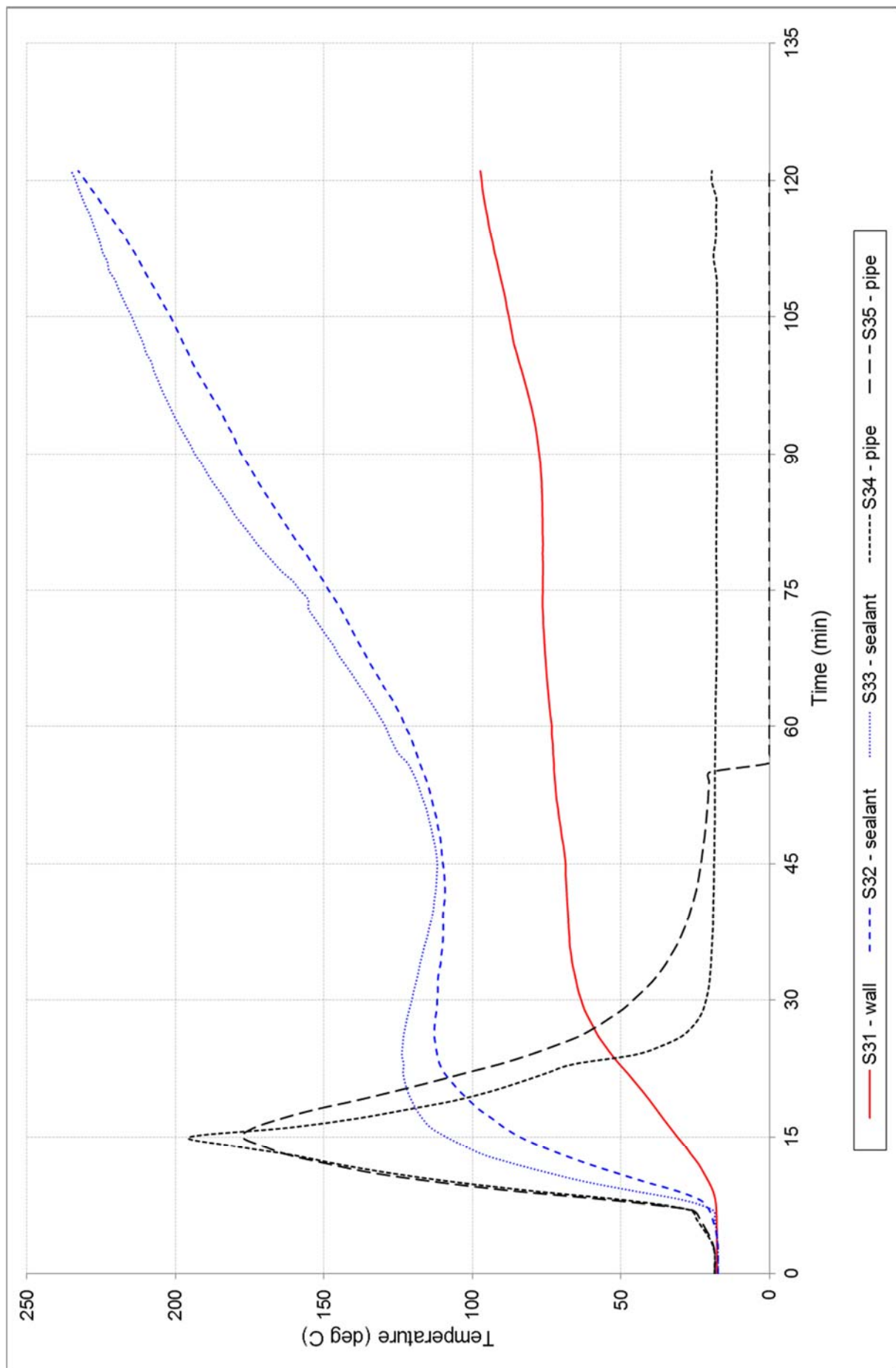


FIGURE 9 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #7

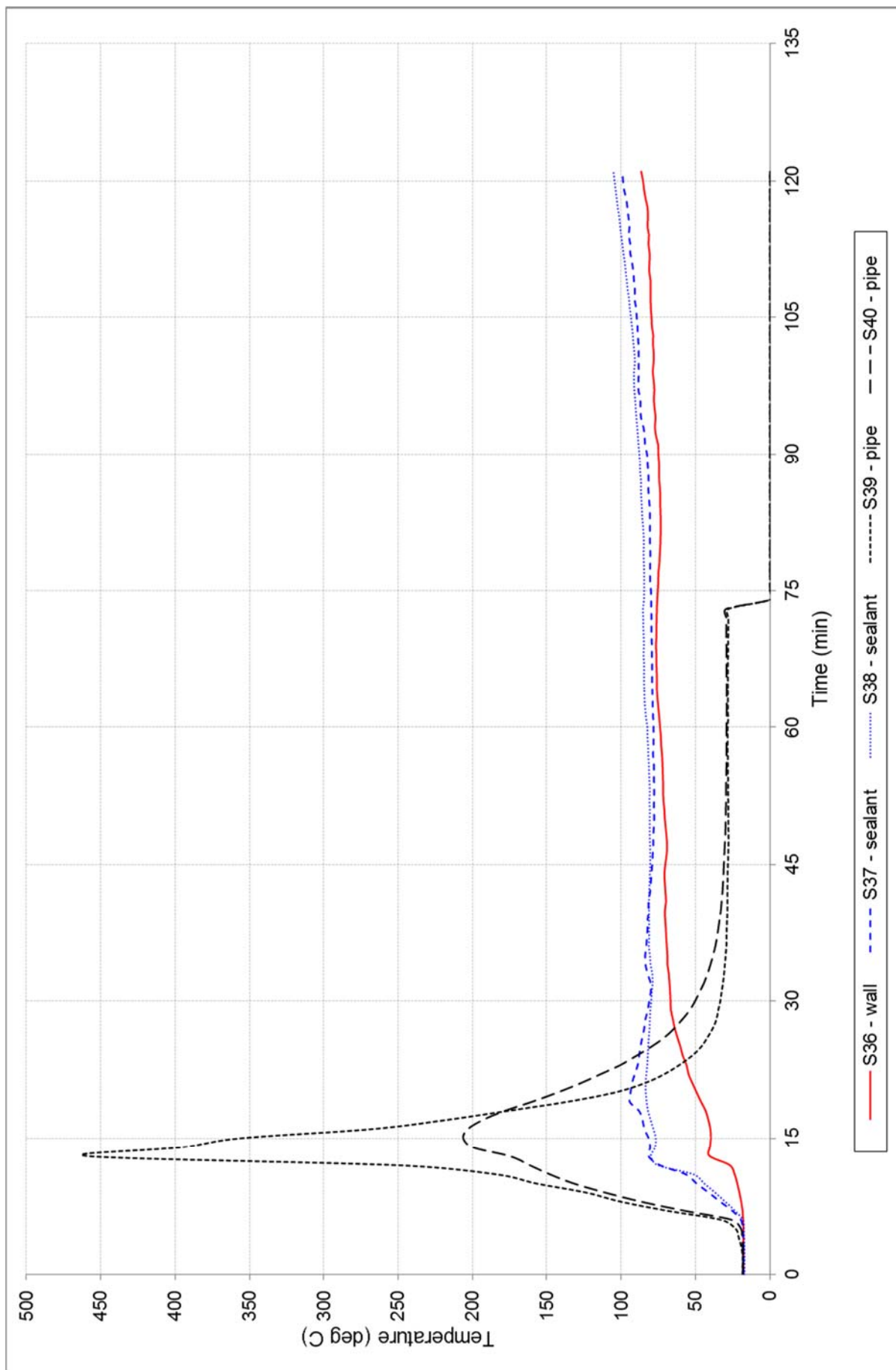


FIGURE 10 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #8

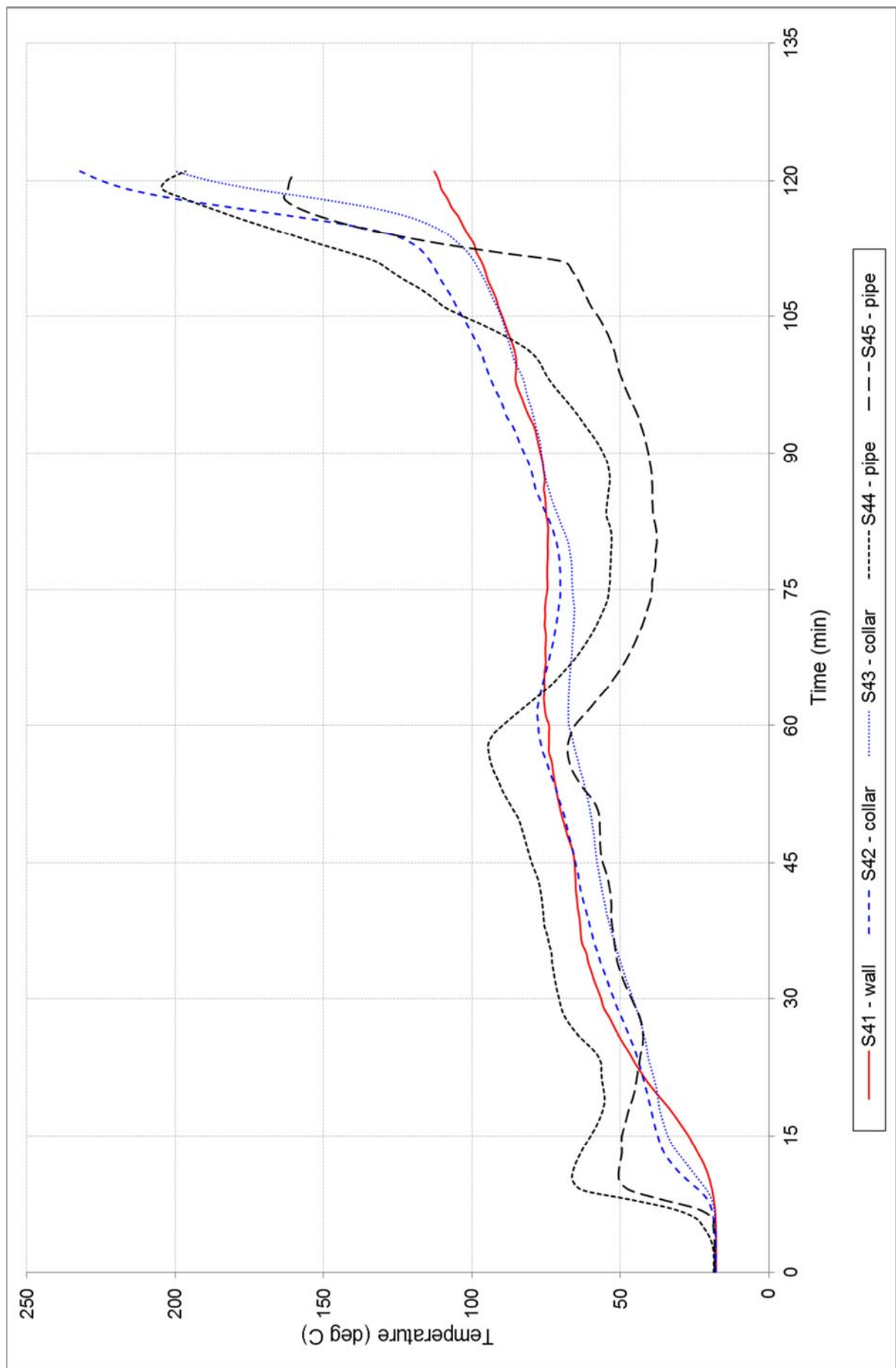
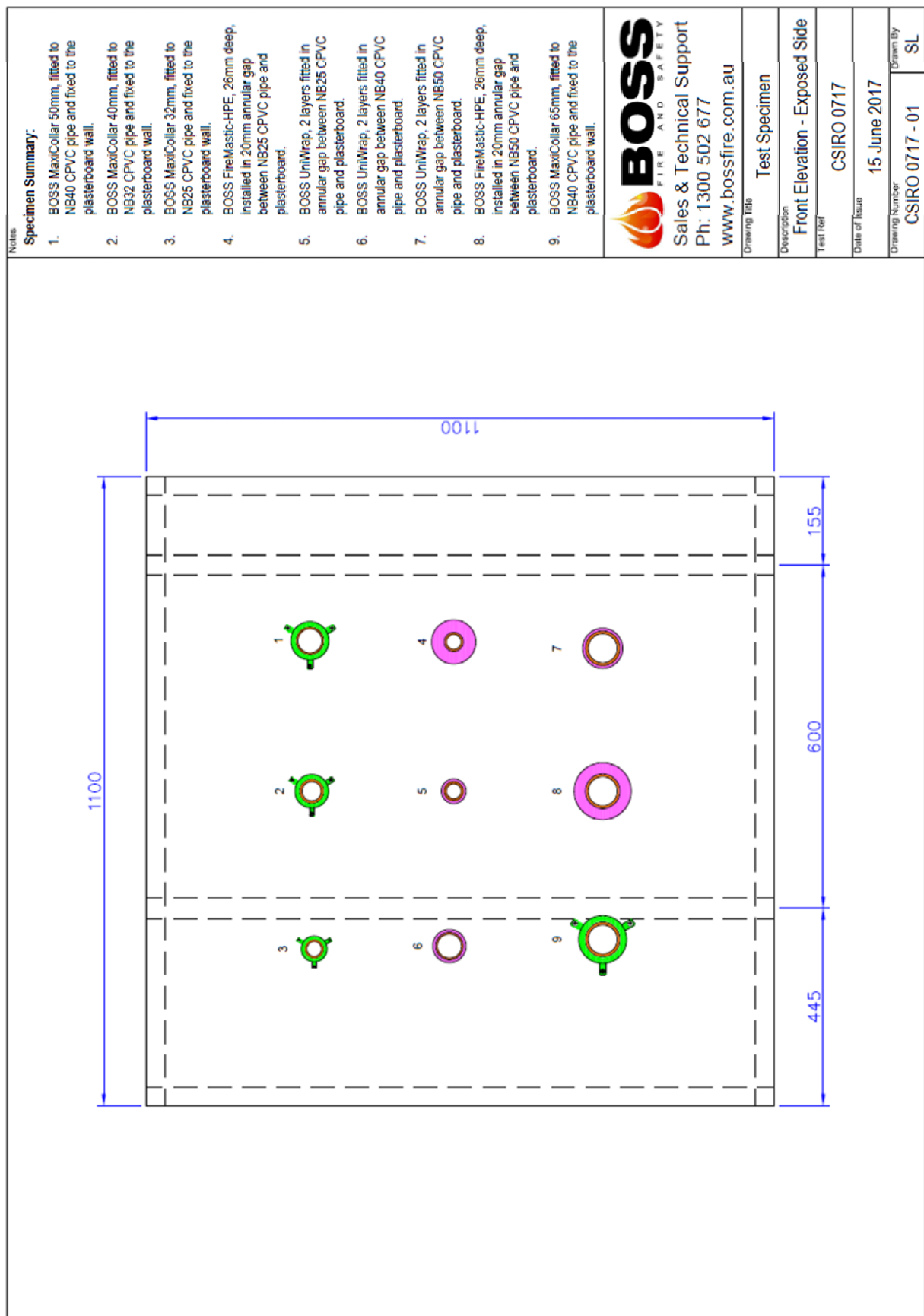


FIGURE 11 – SPECIMEN TEMPERATURE – UNEXPOSED FACE OF PENETRATION #9

Appendix D – Specimen drawings

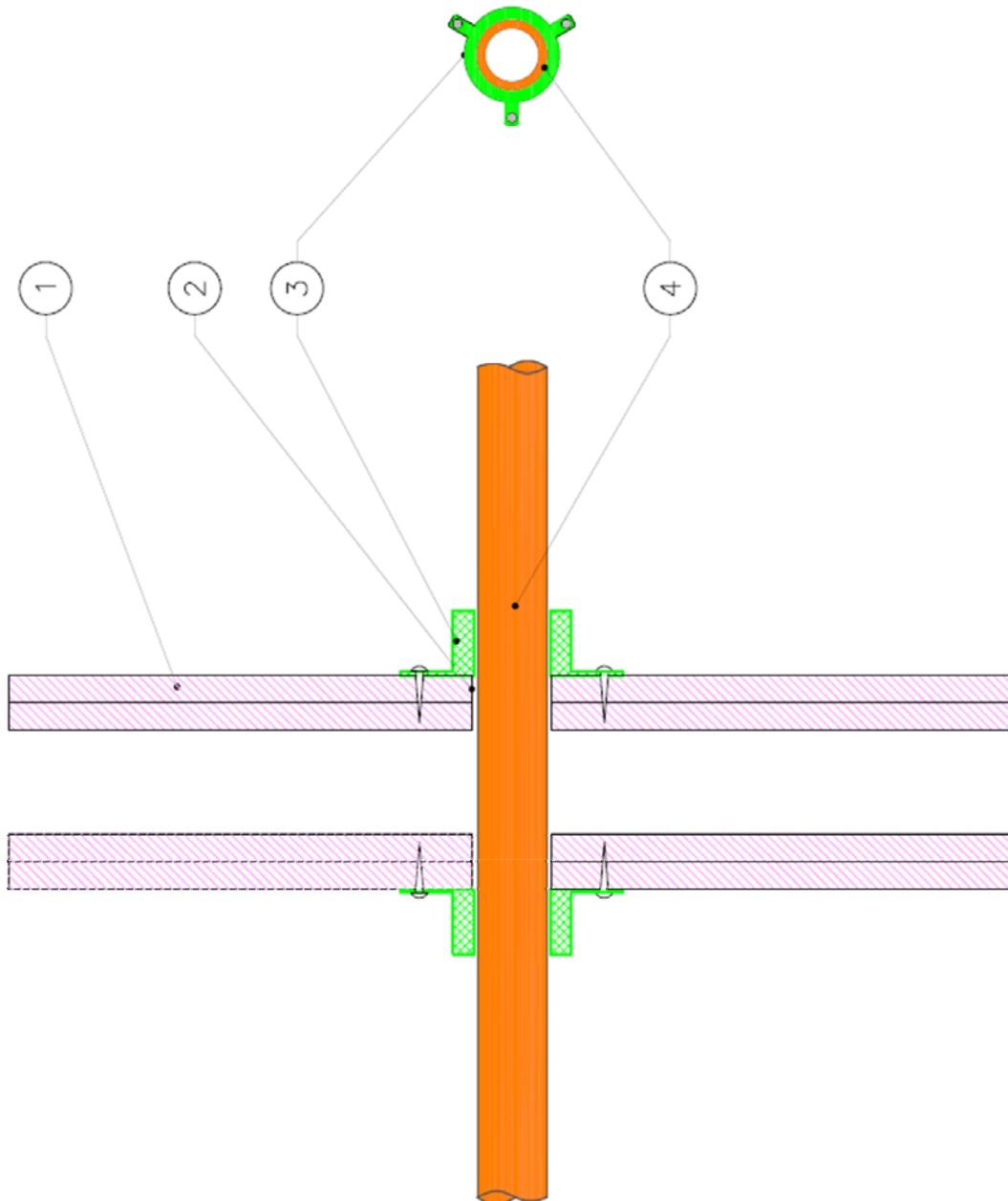


DRAWING NUMBER CSIRO 0717-01 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) Aperture to suit pipe size
- (3) CPVC Pipe, NB25mm
- (4) BOSS MaxiCollar, 32mm



Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

Drawing Title	CPVC Pipe Penetrating 2hr Wall		
Description	BOSS MaxiCollar Seal		
Test Ref	CSIRO 0717		
Date of Issue	15 June 2017		
Drawing Number	CSIRO 0717 - 02	Drawn By	SL

DRAWING NUMBER CSIRO 0717-02 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) Aperture to suit pipe size
- (3) CPVC Pipe, NB32mm
- (4) BOSS MaxiCollar, 40mm



Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

Drawing Title

CPVC Pipe Penetrating 2hr Wall

Description

BOSS MaxiCollar Seal

Test Ref

CSIRO 0717

Date of Issue

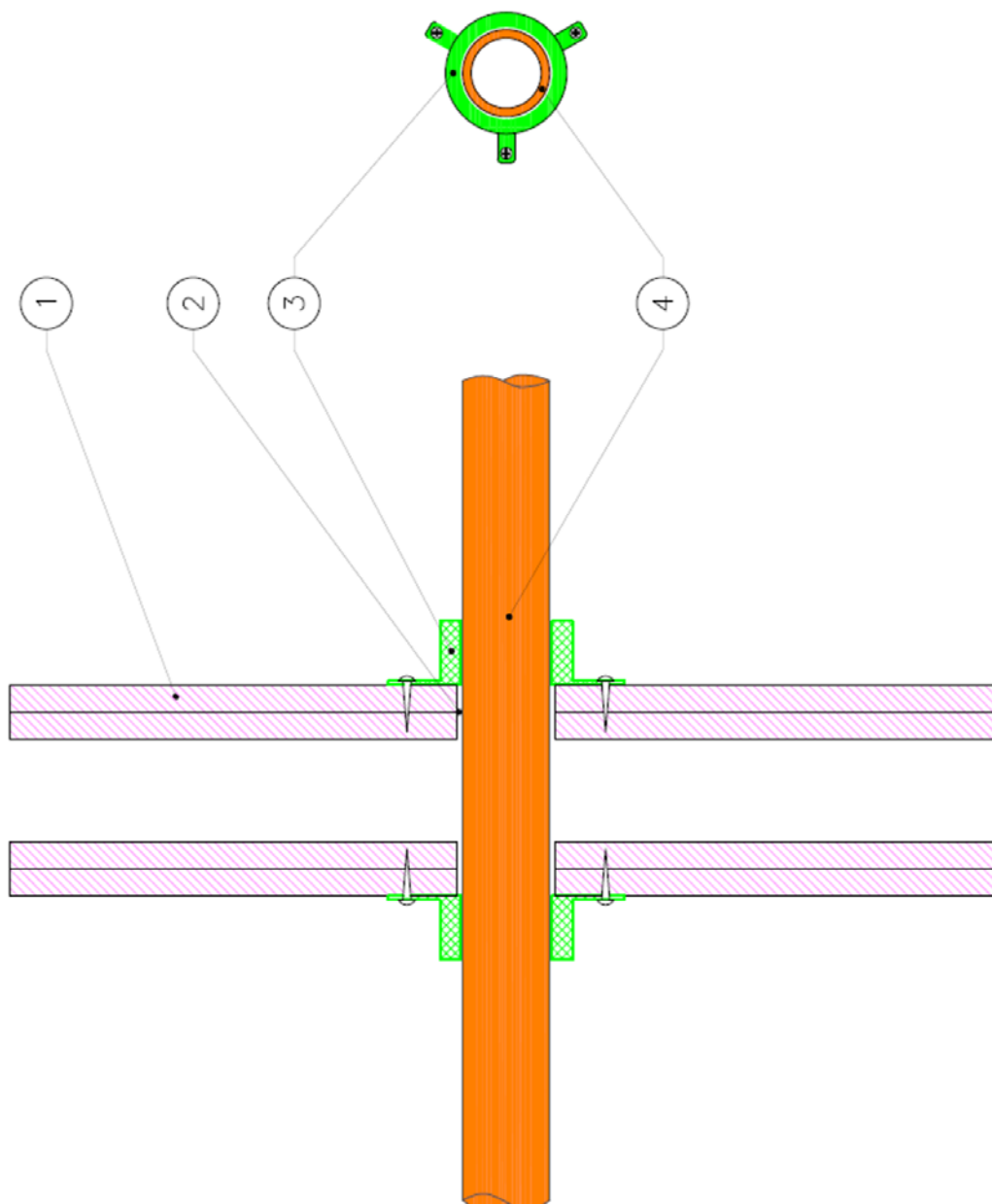
15 June 2017

Drawing Number

CSIRO 0717 - 03

Drawn By

SL

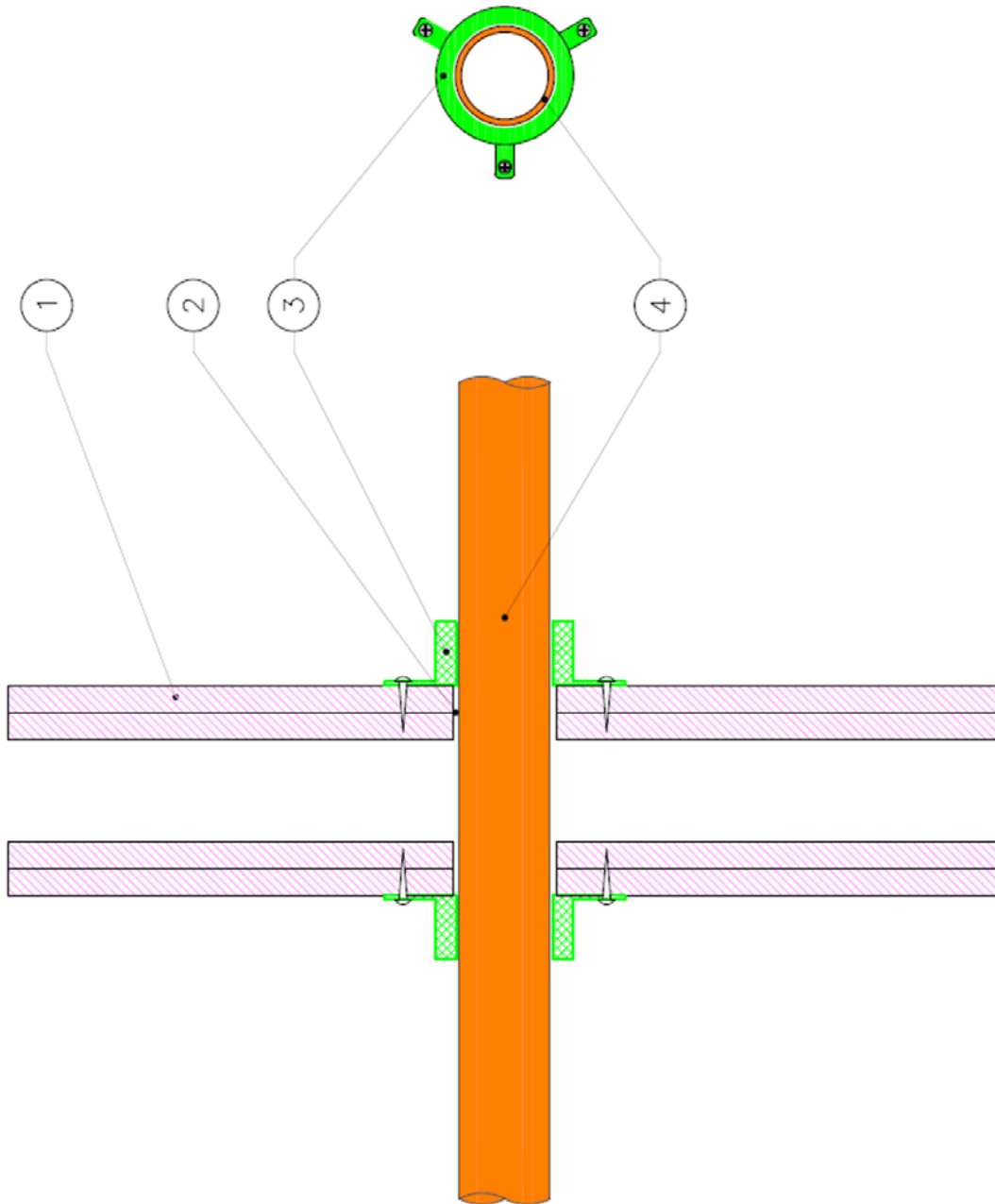


DRAWING NUMBER CSIRO 0717-03 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) Aperture to suit pipe size
- (3) CPVC Pipe, NB40mm
- (4) BOSS MaxiCollar, 50mm



Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

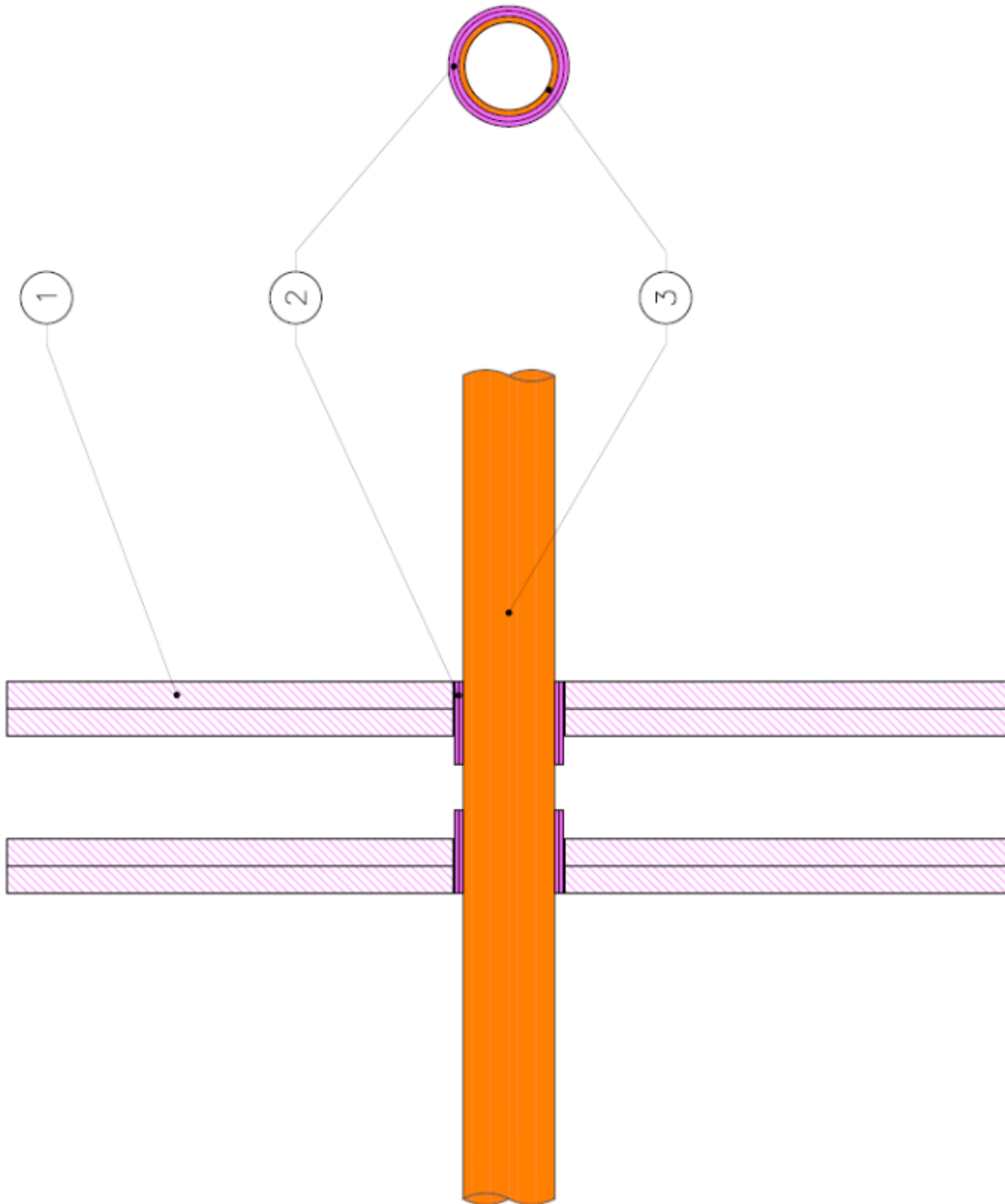
Drawing Title	CPVC Pipe Penetrating 2hr Wall		
Description	BOSS MaxiCollar Seal		
Test Ref	CSIRO 0717		
Date of Issue	15 June 2017		
Drawing Number	CSIRO 0717 - 04	Drawn By	SL

DRAWING NUMBER CSIRO 0717-04 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) 5mm annular gap with 2 x layers of Boss UniWrap
- (3) CPVC Pipe, NB40mm



Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

Drawing Title
CPVC Pipe Penetrating 2hr Wall

Description
BOSS UniWrap Seal

Test Ref
CSIRO 0717

Date of Issue
15 June 2017

Drawing Number
CSIRO 0717 - 05

Drawn By
SL

11.69 x 8.26 in

DRAWING NUMBER CSIRO 0717-05 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) 5mm annular gap with 2 x layers of Boss UniWrap
- (3) CPVC Pipe, NB25mm
- (4) 5mm x 5mm fillet of BOSS FireMastic-300 on each wall surface
(NB not shown on end section to allow for detail of UniWrap layers)



Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

Drawing Title

CPVC Pipe Penetrating 2hr Wall

Description

BOSS UniWrap Seal

Test Ref

CSIRO 0717

Date of Issue

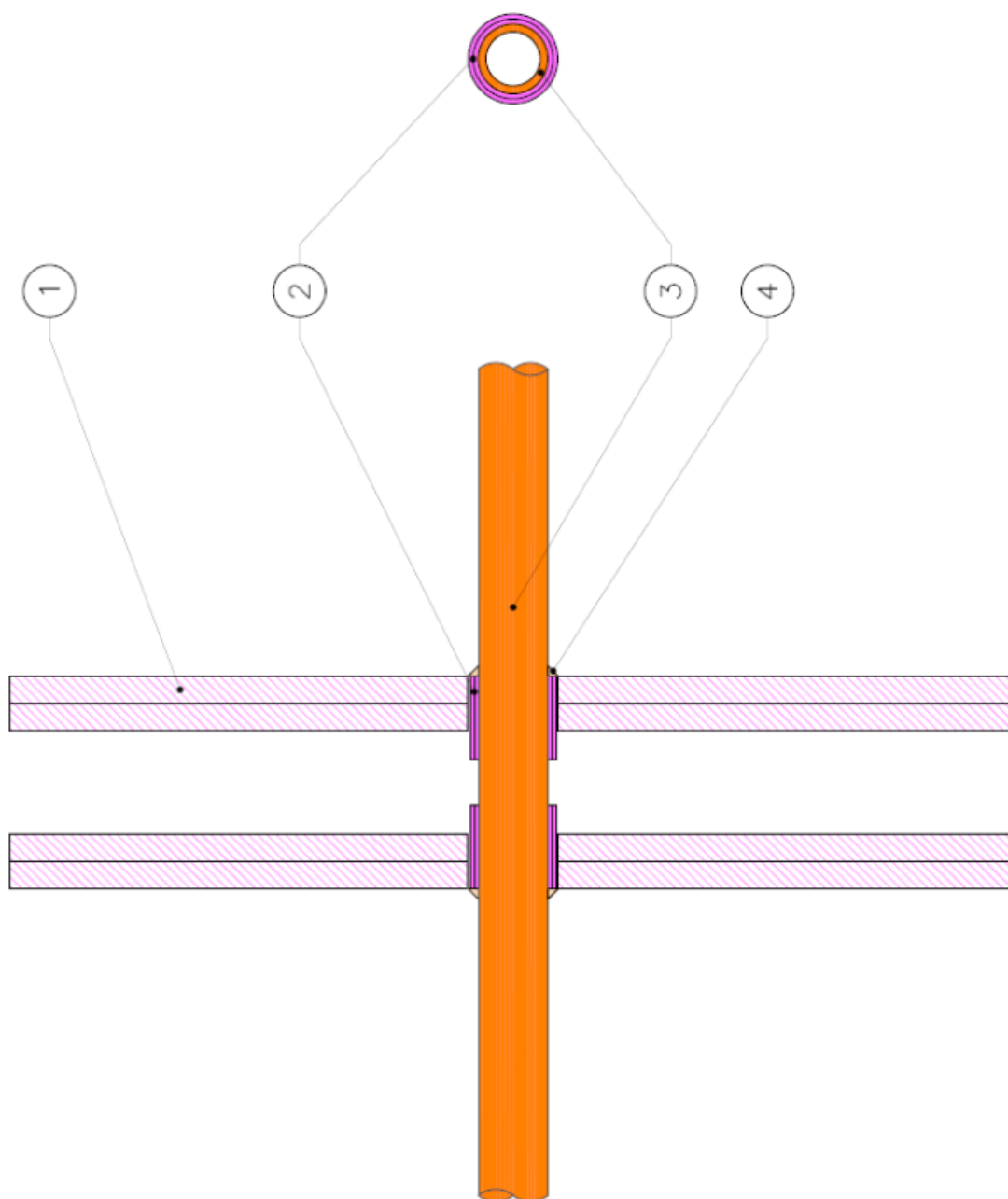
15 June 2017

Drawing Number

CSIRO 0717 - 06

Drawn By

SL



DRAWING NUMBER CSIRO 0717-06 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) 20mm annular gap with 26mm deep FireMastic-HPE seal
- (3) CPVC Pipe, NB25mm

BOSS
PASSIVE FIRE
Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

Drawing Title
CPVC Pipe Penetrating 2hr Wall

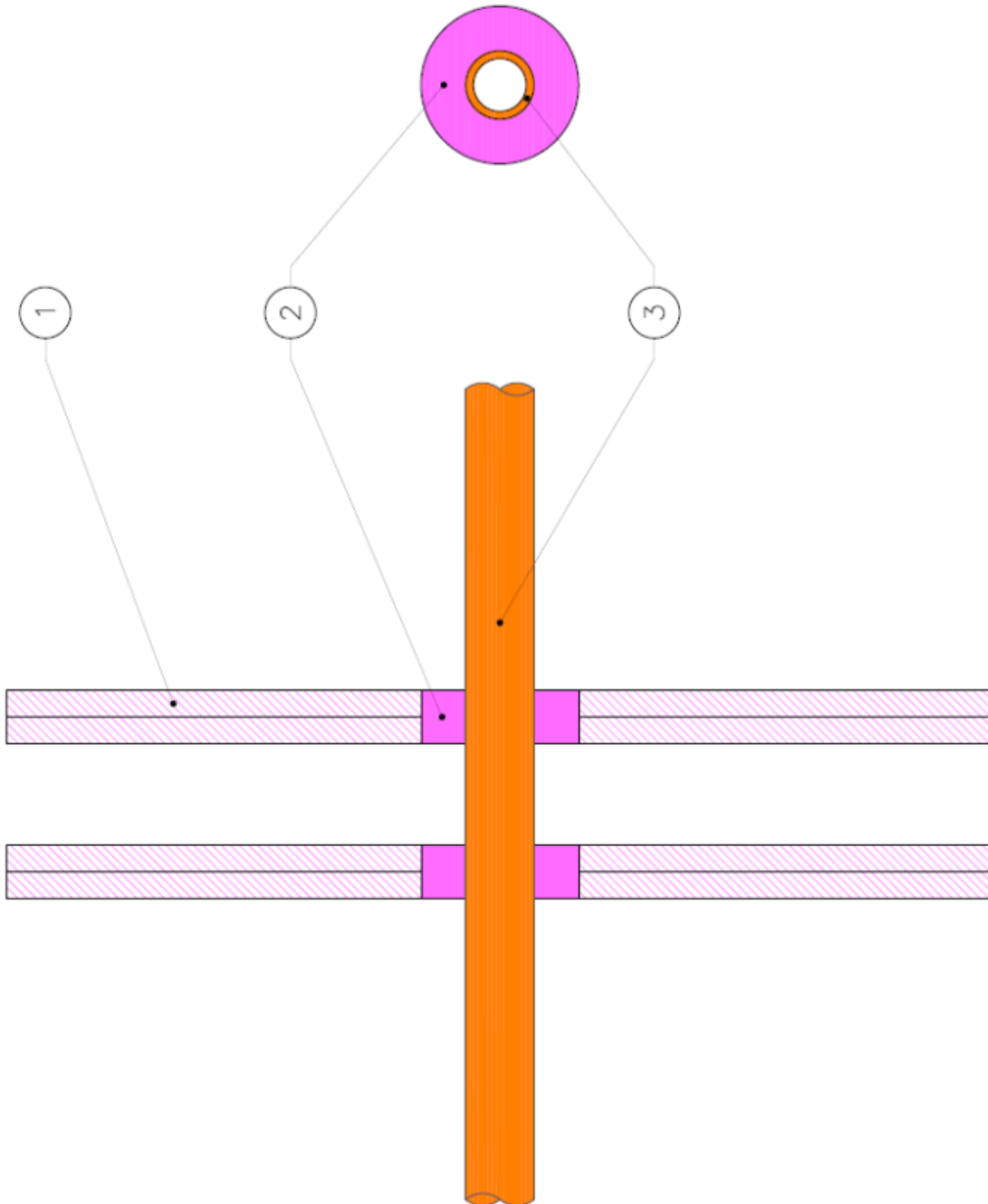
Description
BOSS FireMastic-HPE Seal

Test Ref
CSIRO 0717

Date of Issue
15 June 2017

Drawing Number
CSIRO 0717 - 07

Drawn By
SL

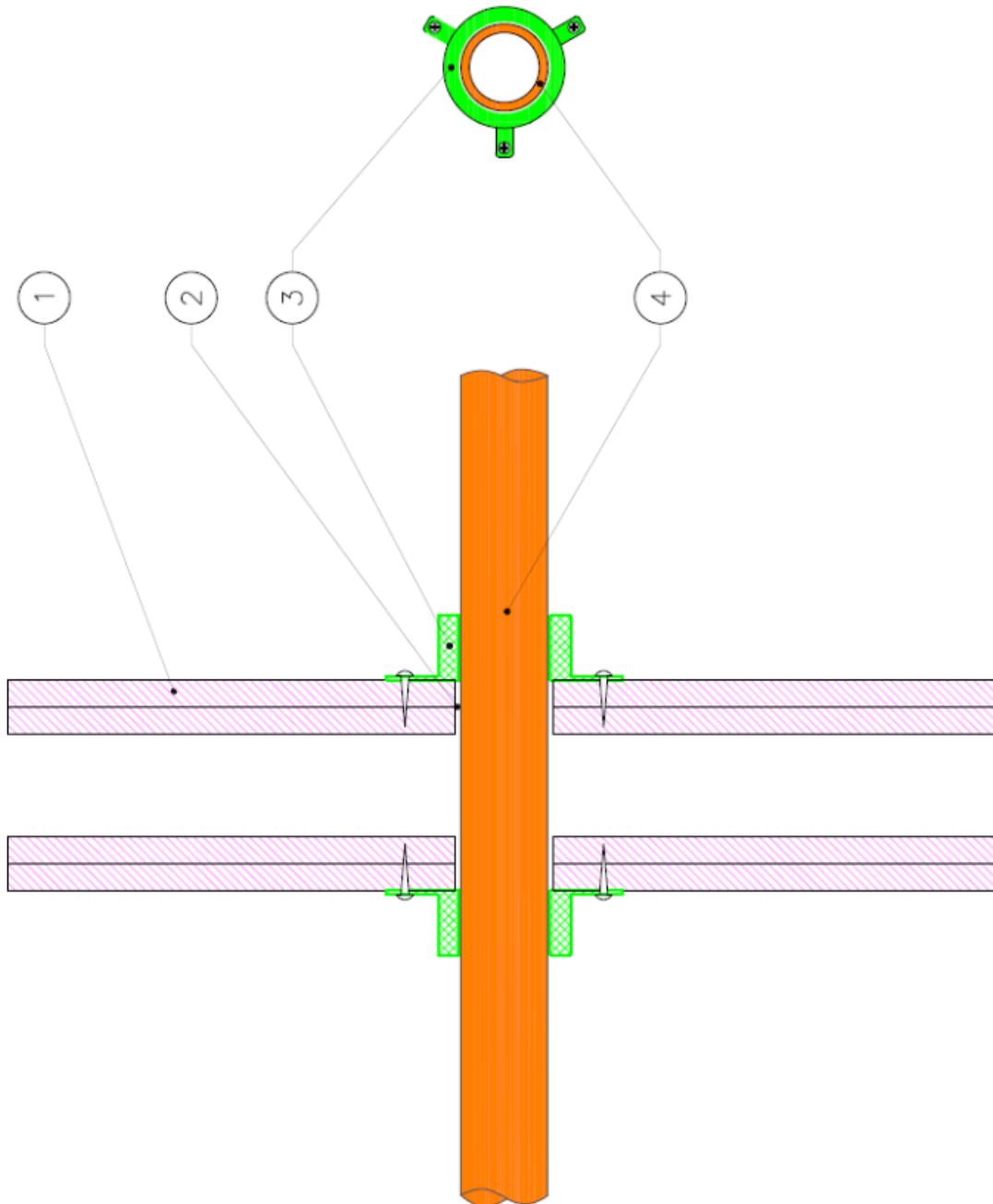


DRAWING NUMBER CSIRO 0717-07 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) Aperture to suit pipe size
- (3) CPVC Pipe, NB50mm
- (4) BOSS MaxiCollar, 65mm



Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

Drawing Title
CPVC Pipe Penetrating 2hr Wall

Description
BOSS MaxiCollar Seal

Test Ref
CSIRO 0717

Date of Issue
15 June 2017

Drawing Number
CSIRO 0717 - 08

Drawn By
SL

DRAWING NUMBER CSIRO 0717-08 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Notes

Component Summary:

- (1) Plasterboard, 2 x 13mm fire-rated
- (2) 20mm annular gap with 26mm deep FireMastic-HPE seal
- (3) CPVC Pipe, NB50mm



Sales & Technical Support
Ph: 1300 502 677
www.bossfire.com.au

Drawing Title

CPVC Pipe Penetrating 2hr Wall

Description

BOSS FireMastic-HPE Seal

Test Ref

CSIRO 0717

Date of Issue

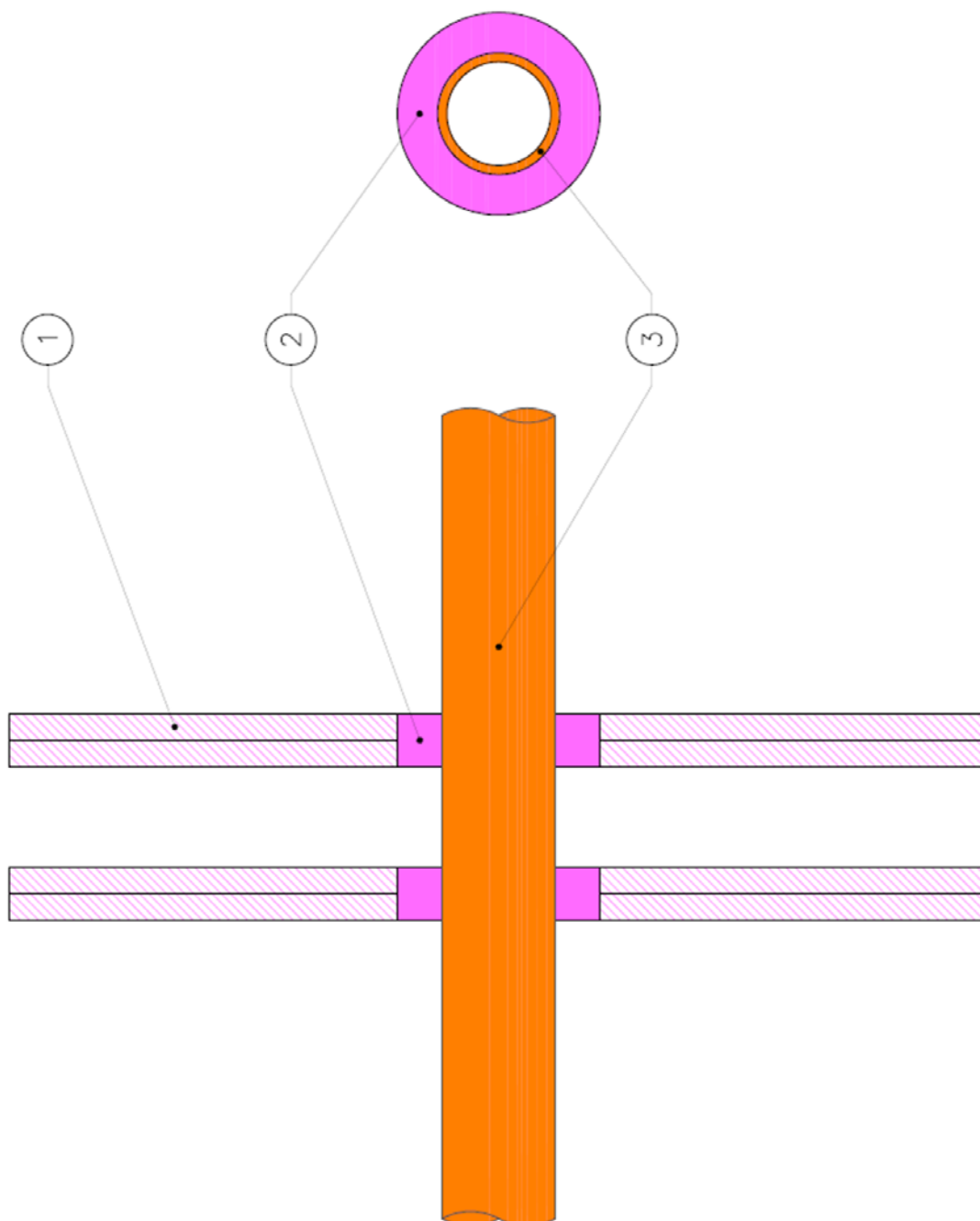
15 June 2017

Drawing Number

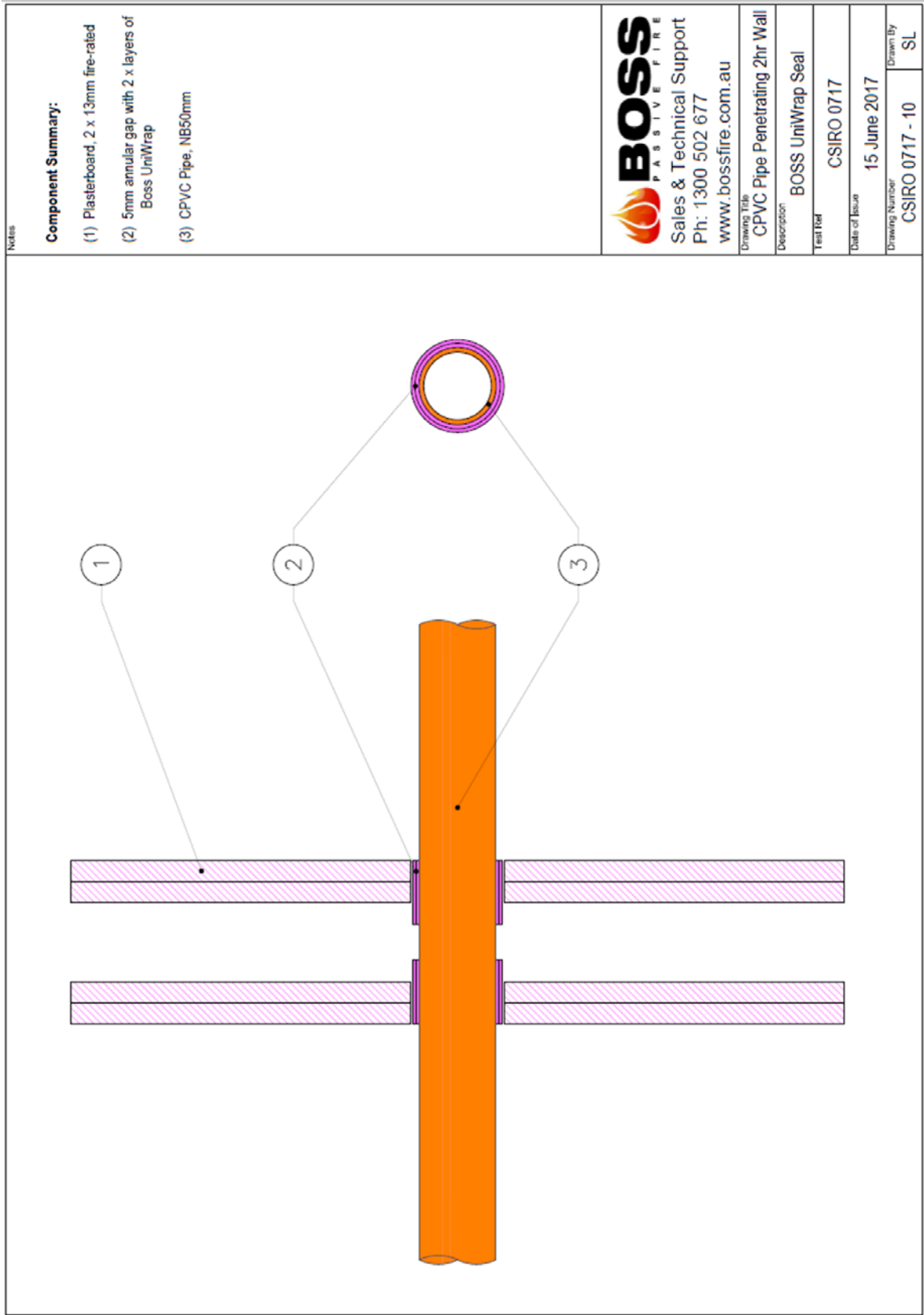
CSIRO 0717 - 09

Drawn By

SL



DRAWING NUMBER CSIRO 0717-09 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY



ODRAWING NUMBER CSIRO 0717-10 DATED 15 JUNE 2017, BY BOSS FIRE AND SAFETY

Appendix E – Certificate(s) of Test

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										
<h3>Certificate of Test</h3>		No. 3038								
<p>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:</p> <p>BOSS Products (Australia) Pty Ltd Unit 8, 15-23 Kumulla Rd Caringbah NSW</p> <p>A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.</p> <p>Product Name: Specimen 1 – BOSS MaxiCollar protecting a 50-mm aperture penetrated by a 48.3-mm OD Spears FlameGuard CPVC pipe.</p> <p>Description: The specimen comprised a 48.3-mm OD Spears FlameGuard CPVC pipe penetrating a 50-mm diameter aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by BOSS MaxiCollar (MC-50). The penetrating services was described as a 48.3-mm OD, 40.7-mm ID CPVC pipe with a wall thickness of 3.8-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as BOSS MaxiCollar MC-50 fire collar comprises a metal framed collar (30-mm wide x 70-mm OD) with a three 2-mm layers of an elastomeric intumescent wrap. The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws and washes. As described in drawing numbered CSIRO 0717 – 04 dated 15/06/17 by BOSS Fire & Safety.</p> <table><tr><td>Structural Adequacy</td><td>not applicable</td></tr><tr><td>Integrity</td><td>no failure at 121 minutes</td></tr><tr><td>Insulation</td><td>120 minutes</td></tr></table> <p>and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/120.</p> <p>The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.</p> <p>Testing Officer: Chris Wojcik Date of Test: 4 August 2017</p> <p>Issued on the 6th day of November 2017 without alterations or additions.</p> <p> Brett Roddy Manager, Fire Testing and Assessments</p> <p>"Copyright CSIRO 2017 ©" Copying or alteration of this report without written authorisation from CSIRO is forbidden</p> <table><tr><td></td><td>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</td></tr></table>			Structural Adequacy	not applicable	Integrity	no failure at 121 minutes	Insulation	120 minutes		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
Structural Adequacy	not applicable									
Integrity	no failure at 121 minutes									
Insulation	120 minutes									
	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. 3038



Certificate of Test

No. 3039

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:

BOSS Products (Australia) Pty Ltd
 Unit 8, 15-23 Kumulla Rd
 Caringbah NSW

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.

Product Name: Specimen 2 – BOSS Maxicollar protecting a 44-mm aperture penetrated by a 42.2-mm OD Spears FlameGuard CPVC pipe.

Description: The specimen comprised a 42.2-mm OD Spears FlameGuard CPVC pipe penetrating a 44-mm aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by BOSS MaxiCollar (MC-40). The penetrating services was described as a 42.2-mm OD, 35.6-mm ID CPVC pipe with a wall thickness of 3.3-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as BOSS MaxiCollar MC-40 fire collar comprises a metal framed collar (30-mm wide x 55-mm OD) with a two 2-mm layers of an elastomeric intumescent wrap. The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws and washes. As described in drawing numbered CSIRO 0717 – 03 dated 15/06/17 by BOSS Fire & Safety.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	113 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/90.

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. 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: 4 August 2017

Issued on the 6th day of November 2017 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

“Copyright CSIRO 2017 ©”

Copying or alteration of this report without written authorisation from CSIRO is forbidden



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. 3039



Certificate of Test

No. 3040

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:

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.

Product Name: Specimen 3 – BOSS Maxicollar protecting a 35-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe.

Description: The specimen comprised a 33.4-mm OD Spears FlameGuard CPVC pipe penetrating a 35-mm aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by BOSS MaxiCollar (MC-32). The penetrating services was described as a 33.4-mm OD, 28.2-mm ID CPVC pipe with a wall thickness of 2.6-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as BOSS MaxiCollar MC-32 fire collar comprises a metal framed collar (30-mm wide x 47-mm OD) with a two 2-mm layers of an elastomeric intumescent wrap. The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws. As described in drawing numbered CSIRO 0717 – 02 dated 15/06/17 by BOSS Fire & Safety.

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 -/120/120.

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. 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: 4 August 2017

Issued on the 6th day of November 2017 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

“Copyright CSIRO 2017 ©”

Copying or alteration of this report without written authorisation from CSIRO is forbidden



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. 3040



Certificate of Test

No. 3041

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:

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.

Product Name: Specimen 4 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 58-mm aperture penetrated by a 48.3 OD Spears FlameGuard CPVC pipe.

Description: The specimen comprised a 48.3 OD Spears FlameGuard CPVC pipe penetrating a 58-mm aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by FireMastic-300 sealant and BOSS Uniwrap. The penetrating services was described as a 48.3-mm OD, 40.7-mm ID CPVC pipe with a wall thickness of 3.8-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as FireMastic-300 sealant, an intumescent one part acrylic emulsion sealant and BOSS UniWrap, an elastomeric intumescent wrap. The annular gap around the pipe on both sides of the wall was first filled with two layers of UniWrap (2-mm thick and 40-mm wide) wrapped around the pipe within the wall penetration. The resulting gap was then sealed over using a 5-mm x 5-mm fillet of BOSS FireMastic-300 sealant. As described in drawing numbered CSIRO 0717 – 07 dated 15/06/17 by BOSS Fire & Safety.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	96 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/90.

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. 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: 4 August 2017

Issued on the 6th day of November 2017 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

“Copyright CSIRO 2017 ©”

Copying or alteration of this report without written authorisation from CSIRO is forbidden



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. 3041



Certificate of Test

No. 3042

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:

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.

Product Name: Specimen 5 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 43-mm aperture penetrated by a 33.4-mm OD Spears FlameGuard CPVC pipe

Description: The specimen comprised a 33.4-mm OD Spears FlameGuard CPVC pipe penetrating a 43-mm aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by FireMastic-300 sealant and BOSS Uniwrap. The penetrating services was described as a 33.4-mm OD, 28.2-mm ID CPVC pipe with a wall thickness of 2.6-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as FireMastic-300 sealant, an intumescent one part acrylic emulsion sealant and BOSS UniWrap, an elastomeric intumescent wrap. The annular gap around the pipe on both sides of the wall was first filled with two layers of UniWrap (2-mm thick and 40-mm wide) wrapped around the pipe within the wall penetration. The resulting gap was then sealed over using a 5-mm x 5-mm fillet of BOSS FireMastic-300 sealant. As described in drawing numbered CSIRO 0717 – 06 dated 15/06/17 by BOSS Fire & Safety.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	86 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/60.

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. 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: 4 August 2017

Issued on the 6th day of November 2017 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

"Copyright CSIRO 2017 ©"
Copying or alteration of this report without written authorisation from CSIRO is forbidden



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. 3042



Certificate of Test

No. 3043

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:

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.

Product Name: Specimen 6 – FireMastic-HPE sealant protecting a 73-mm aperture penetrated by Spears FlameGuard 33.4-mm OD CPVC pipe

Description: The specimen comprised a Spears FlameGuard 33.4-mm OD CPVC pipe penetrating a 73-mm aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by FireMastic-HPE sealant. The penetrating services was described as a 33.4-mm OD, 28.2-mm ID CPVC pipe with a wall thickness of 3.8-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as Fire Mastic-HPE is a High Pressure Exerting graphite-based, thixotropic, one-part acrylic sealant. The annular gap around the pipe on both sides of the wall was filled with FireMastic-HPE sealant to a depth of 26-mm and finished flush with wall. As described in drawing numbered CSIRO 0717 – 05 dated 15/06/17 by BOSS Fire & Safety.

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 -/120/120.

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. 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: 4 August 2017

Issued on the 6th day of November 2017 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

“Copyright CSIRO 2017 ©”

Copying or alteration of this report without written authorisation from CSIRO is forbidden



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. 3043



Certificate of Test

No. 3044

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:

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.

Product Name: Specimen 7 – A combination of FireMastic-300 sealant and BOSS Uniwrap protecting a 70-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe

Description: The specimen comprised a 60.3-mm OD Spears FlameGuard CPVC pipe penetrating a 70-mm aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by FireMastic-300 sealant and BOSS Uniwrap. The penetrating services was described as a 60.3-mm OD, 50.9-mm ID CPVC pipe with a wall thickness of 4.7-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as FireMastic-300 sealant, an intumescent one part acrylic emulsion sealant and BOSS UniWrap, an elastomeric intumescent wrap. The annular gap around the pipe on both sides of the wall was first filled with two layers of UniWrap (2-mm thick and 40-mm wide) wrapped around the pipe within the wall penetration. The resulting gaps were then sealed over using a 5-mm x 5-mm fillet of BOSS FireMastic-300 sealant. As described in drawing numbered CSIRO 0717 – 08 dated 15/06/17 by BOSS Fire & Safety.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	93 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/90.

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. 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: 4 August 2017

Issued on the 6th day of November 2017 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

"Copyright CSIRO 2017 ©"
Copying or alteration of this report without written authorisation from CSIRO is forbidden



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. 3044



Certificate of Test

No. 3045

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:

BOSS Products (Australia) Pty Ltd
Unit 8, 15-23 Kumulla Rd
Caringbah NSW

A full description of the test specimen and the complete test results are detailed in the Division's Sponsored Investigation report numbered FSP 1846.

Product Name: Specimen 9 – BOSS Maxicollar protecting a 62-mm aperture penetrated by a 60.3-mm OD Spears FlameGuard CPVC pipe

Description: The specimen comprised a 60.3-mm OD Spears FlameGuard CPVC pipe penetrating a 62-mm aperture in a plasterboard steel framed wall system – two layers of 13-mm plasterboard both sides, with an established FRL of -/120/120 report reference FAR2357, protected by BOSS MaxiCollar (MC-65). The penetrating services was described as a 50.9-mm ID CPVC pipe with a wall thickness of 4.7-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. The services was sealed on the exposed end using a Spears CPVC cap and left open on the unexposed end. The service was supported approximately 440-mm and 1670-mm away from the wall on the unexposed face. The fire stopping system was described as BOSS MaxiCollar MC-65 fire collar comprising a metal framed collar (30-mm wide x 80-mm OD) with three 2-mm layers of an elastomeric intumescent wrap. The BOSS MaxiCollars was surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 32-mm plasterboard screws and washes. As described in drawing numbered CSIRO 0717 – 10 dated 15/06/17 by BOSS Fire & Safety.

Structural Adequacy	not applicable
Integrity	no failure at 121 minutes
Insulation	118 minutes

and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/120/90.

The fire-resistance level of the wall system is applicable when the system is exposed to fire from either direction. The fire-resistance levels (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 recognized that a single test method will not provide a full assessment of fire hazard under all fire conditions. 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: 4 August 2017

Issued on the 6th day of November 2017 without alterations or additions.

Brett Roddy | Manager, Fire Testing and Assessments

“Copyright CSIRO 2017 ©”

Copying or alteration of this report without written authorisation from CSIRO is forbidden



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. 3045

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

CONTACT US

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

YOUR CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.

FOR FURTHER INFORMATION

Infrastructure Technologies

Chris Wojcik
Manager Fire Resistance Testing
t +61 2 9490 5508
e chris.wojcik@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