



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

Test Report

Author: Peter Gordon
Report number: FSP 1996
Date: 9 May 2019

Client: IG6 Pty Ltd as trustee for the IG6 IP Trust

Commercial-in-confidence



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




Inquiries should be addressed to:

Fire Testing and Assessments	Author	The Client
NATA Registered Laboratory	Infrastructure Technologies	IG6 Pty Ltd as trustee for the IG6 IP Trust
14 Julius Avenue	14 Julius Avenue	3 Skirmish Court
North Ryde, NSW 2113	North Ryde, NSW 2113	Victoria Point Qld 4165
Telephone +61 2 9490 5444	Telephone +61 2 9490 5500	Telephone + 61 7 3390 5420

Report Status and Revision History:

VERSION	STATUS	DATE	DISTRIBUTION	ISSUE NUMBER
Revision A	Draft for review	05/04/2019	CSIRO / Client	FSP 1996
Revision B	Final for issue	09/05/2019	CSIRO / Client	FSP 1996

Report Authorization:

AUTHOR	REVIEWED BY	AUTHORISED BY
Peter Gordon	Glenn Williams	Brett Roddy
		
9 May 2019	9 May 2019	9 May 2019

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Excerpts of the Report may not be published.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

© 2019 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	5
1.1	Identification of specimen	5
1.2	Sponsor	5
1.3	Manufacturer	5
1.4	Test standard	5
1.5	Reference standard.....	5
1.6	Test number.....	5
1.7	Test date	6
2	Description of specimen	6
2.1	General.....	6
2.2	Dimensions	8
2.3	Orientation.....	8
2.4	Conditioning.....	8
3	Documentation	9
4	Equipment.....	9
4.1	Furnace	9
4.2	Temperature	9
4.3	Measurement system	9
5	Ambient temperature	10
6	Departure from standard	10
7	Termination of test	10
8	Test results	10
8.1	Critical observations	10
8.2	Furnace temperature.....	11
8.3	Furnace severity.....	11
8.4	Specimen temperature	11
8.5	Performance	12
9	Fire-resistance level (FRL)	13
10	Field of direct application of test results	13
11	Tested by	13
	Appendices	14
	Appendix A – Measurement location	14
	Appendix B – Photographs	15
	Appendix C – Furnace Temperature	21
	Appendix D – Specimen layout and installation drawings.....	27
	Appendix E – Specimen Drawings.....	32
	Appendix F – Copy of Certificate(s) of Test.....	34
	References.....	38

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

Sponsored Investigation No. FSP 1996

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as five (5) pairs of retrofit fire collars protecting a steel framed plasterboard wall system.

1.2 Sponsor

IG6 Pty Ltd as trustee for the IG6 IP Trust
3 Skirmish Court
Victoria Point Qld 4165

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 4857/4383

1.7 Test date

The fire-resistance test was conducted on 4 April 2019.

2 Description of specimen

2.1 General

The specimen comprised an 1160-mm x 1160-mm x 116-mm thick wall penetrated by five (5) pipes protected by retrofitted Snap Fire Systems fire collars.

The wall system was described as a 116-mm thick plasterboard lined steel framed wall comprising two layers of 13-mm thick Firestop plasterboard on each side of 64-mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120.

For the purpose of the test, the specimens were referenced as Specimen 1, 2, 3, 4 and 5. Only four (4) specimens are the subject of this report (Specimens 2, 3, 4 and 5). Documents containing a complete description of each specimen were supplied by the sponsor and are retained on file.

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

- AS/NZS 1260 'PVC-U pipes and fittings for drain, waste and vent application';
- AS/NZS 5065 'Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications'; and
- AS/NZS 7671:2010 : Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings - Polypropylene (PP)(ISO 7671:2003, MOD).

Specimen 2 - SNAP 50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Triplus) pipe.

The SNAP Retrofit 50R fire collar comprised a 0.75-mm steel casing with a 62-mm inner diameter and a 147-mm diameter base flange. The 47-mm high collar casing incorporated a closing mechanism which comprised two soft Intumesh intumescent wraps lined within the internal circumference of the collar. Intumescent A was 4-mm thick x 43-mm wide x 220-mm long, and Intumescent B was 4-mm thick x 43-mm wide x 200-mm long. Between the strips was a layer of 316 grade stainless steel mesh 210-mm long x 42-mm wide with wire mesh diameter of 0.15-mm, as shown in drawing titled "SNAP 50 Retro", dated 18 January 2019, by Snap Fire Systems Pty Ltd. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 38-mm (10g) coarse thread laminating screws.

The penetrating service comprised a 40-mm outside diameter polypropylene pipe, with a wall thickness of 2-mm which penetrated the wall through a 51-mm diameter cut-out hole as shown in drawing titled "Specimen #2, 40 Triplus Stack & 50R", dated 20 March 2019, provided by Snap Fire Systems Pty Ltd. 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 plasterboard wall. The pipe was open at the unexposed end and capped with polypropylene end cap on the exposed end.

Specimen 3 - SNAP 50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Raupiano) pipe.

The SNAP Retrofit 50R fire collar comprised a 0.75-mm steel casing with a 62-mm inner diameter and a 147-mm diameter base flange. The 47-mm high collar casing incorporated a closing mechanism which comprised two soft Intumesh intumescent wraps lined within the internal circumference of the collar. Intumescent A was 4-mm thick x 43-mm wide x 220-mm long, and Intumescent B was 4-mm thick x 43-mm wide x 200-mm long. Between the strips was a layer of 316 grade stainless steel mesh 210-mm long x 42-mm wide with wire mesh diameter of 0.15-mm, as shown in drawing titled "SNAP 50 Retro", dated 18 January 2019, by Snap Fire Systems Pty Ltd. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 38-mm (10g) course thread laminating screws.

The penetrating service comprised a 40-mm outside diameter polypropylene pipe, with a wall thickness of 2.12-mm which penetrated the wall through a 51-mm diameter cut-out hole as shown in drawing titled "Specimen #3, 40 Raupiano Stack & 50R", dated 20 March 2019, provided by Snap Fire Systems Pty Ltd. 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 plasterboard wall. The pipe was open at the unexposed end and capped with polypropylene end cap on the exposed end.

Specimen 4 - SNAP 110R Retrofit fire collar protecting a nominal 110-mm Polypropylene (Raupiano) pipe.

The SNAP Retrofit 110R fire collar comprised a 0.75-mm steel casing with a 122-mm inner diameter and a 206-mm diameter base flange. The 62-mm high collar casing incorporated a closing mechanism that was comprised of three soft Intumesh intumescent wraps and wire meshes lined within the internal circumference of the collar. Intumescent A was 2.5-mm thick x 58-mm wide x 424-mm long, Intumescent B was 2.5-mm thick x 58-mm wide x 407-mm long and Intumescent C was 2.5-mm thick x 58-mm wide x 389-mm long. Between intumescent strips A and B was a layer of 316 stainless steel mesh 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh 398-mm long x 58-mm wide both had wire mesh diameters of 0.15-mm, as shown in drawing titled "SNAP 110 Retro", dated 16 January 2019, by Snap Fire Systems Pty Ltd. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 38-mm (10g) course thread laminating screws.

The penetrating service comprised a 110-mm outside diameter polypropylene pipe, with a wall thickness of 3.13-mm fitted through the collar's sleeve. The pipe penetrated the wall through a 114-mm diameter opening and 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 plasterboard wall, as shown in drawing titled "Specimen #4, 110 Raupiano Stack & 110R", dated 20 March 2019, provided by Snap Fire Systems Pty Ltd. The pipe was open on the unexposed end and capped on the exposed end with a polypropylene end cap.

Specimen 5 – SNAP 110R Retrofit fire collar protecting a nominal 100-mm Polyvinyl Chloride sandwich construction (PVC-SC) pipe incorporating a coupling inside the collar.

The SNAP Retrofit 110R fire collar comprised a 0.75-mm steel casing with a 122-mm inner diameter and a 206-mm diameter base flange. The 62-mm high collar casing incorporated a closing mechanism that was comprised of three soft Intumesh intumescent wraps and wire meshes lined within the internal circumference of the collar. Intumescent A was 2.5-mm thick x 58-mm wide x 424-mm long, Intumescent B was 2.5-mm thick x 58-mm wide x 407-mm long and Intumescent C was 2.5-mm thick x 58-mm wide x 389-mm long. Between intumescent strips A and B was a layer of 316 stainless steel mesh 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh 398-mm long x 58-mm wide both had wire mesh diameters of 0.15-mm, as shown in drawing titled “SNAP 110 Retro”, dated 16 January 2019, by Snap Fire Systems Pty Ltd. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using M4 expandable steel anchors.

The penetrating service comprised a 110-mm outside diameter PVC-SC pipe with a wall thickness of 3.58-mm and a PVC coupling with a wall thickness of 2.8-mm (with a total wall thickness of 6.38-mm fitted through the collar’s sleeve on the exposed side only) penetrating the plasterboard wall through a 120-mm diameter opening and 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 plasterboard wall, as shown in drawing titled “Specimen #5, 100 PVC-SC Stack & 110R”, dated 20 March 2019, provided by Snap Fire Systems Pty Ltd. The pipe was open on 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 116-mm thick. All dimensions are nominal.

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 wall was delivered on 3 April 2019 and stored under 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:

- Drawing titled “Test Wall W-19-C Layout”, dated 19 March 2019, by Snap Fire Systems Pty Ltd.
- Drawing titled “Specimen #2, 40 Triplus Stack & 50R”, dated 20 March 2019, provided by Snap Fire Systems Pty Ltd.
- Drawing titled “Specimen #3, 40 Raupiano Stack & 50R”, dated 20 March 2019, provided by Snap Fire Systems Pty Ltd.
- Drawing titled “Specimen #4, 110 Raupiano Stack & 110R”, dated 20 March 2019, provided by Snap Fire Systems Pty Ltd.
- Drawing titled “Specimen #5, 100 PVC-SC Stack & 110R”, dated 20 March 2019, provided by Snap Fire Systems Pty Ltd.
- Drawing titled “SNAP 110 Retro”, dated 16 January 2019, by Snap Fire Systems Pty Ltd.
- Drawing titled “SNAP 50 Retro”, dated 18 January 2019, 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.

Additional thermocouples were placed on the unexposed face on the pipes and cable of Specimens 2 which were not taken into consideration for the insulation criterion. Thermal data from these thermocouples is depicted in a separate graph.

4.3 Measurement system

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

5 Ambient temperature

The temperature of the test area was 21°C at the commencement of the test.

6 Departure from standard

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

7 Termination of test

The test was terminated at 161 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
30 seconds -	Smoke being emitted from the base of pipe and collar of Specimen 4.
60 seconds -	Smoke being emitted from the base of pipe and collar of Specimen 5.
90 seconds -	Smoke fluing from the end of pipe of Specimen 5 and between the collar and pipe on the unexposed side.
2 minutes -	Smoke being emitted from the collar of Specimen 5 has increased.
2:30 minutes -	Intumescent material emitted from the collars of Specimens 2 and 3.
4 minutes -	Smoke fluing from the end of pipe of Specimens 2 and 4.
5 minutes -	The amount of smoke fluing from of Specimens 2 and 5 has reduced.
8 minutes -	Specimens 4 and 5 continue to flue from the end of pipes.
10 minutes -	Smoke fluing from the end of pipe of Specimens 2, 3 has ceased. Smoke emitted from the collars of Specimens 2, 4, and 5 has ceased, with limited smoke emitted from the collar of specimen 3.
20 minutes -	Specimens 4 has ceased fluing, the amount of smoke fluing from Specimen 5 has reduced.
30 minutes -	Smoke continues to be emitted from the collar of Specimen 3. (Photograph 4)
60 minutes -	Smoke continues be emitted from the collar of Specimen 3. (Photograph 5)
61 minutes -	Smoke resumes fluing from the end of pipe of Specimens 2 and 4.
64 minutes -	Light smoke is being emitted between the collar and pipes of Specimen 4.
80 minutes -	Light smoke is being emitted between the collar and pipes of Specimen 5.

- 98 minutes - The base of pipe inside the collar of Specimen 3 has softened and collapsed. Cotton pad applied at the base of pipe next to collar no ignition noted.
- 117 minutes - The base of pipe inside the collar of Specimen 5 has softened and collapsed. Cotton pad applied at the base of pipe next to collar no ignition noted.
- 118 minutes - The base of pipe inside the collar of Specimen 4 has softened and collapsed. Cotton pad applied at the base of pipe and collar no ignition noted.
- 123 minutes - Insulation Failure of Specimen 3 - maximum temperature rise of 180K is exceeded from the top of pipe 25-mm from collar on the unexposed face. (Thermocouple #11)
- 128 minutes - Insulation Failure of Specimen 5 - maximum temperature rise of 180K is exceeded from the top of collar on the unexposed face. (Thermocouple #27)
The base of pipe inside the collar of Specimen 1 has softened and collapsed.
- 134 minutes - Insulation Failure of Specimen 2 - maximum temperature rise of 180K is exceeded from the top of pipe 25-mm from collar on the unexposed face. (Thermocouple #11)
- 138 minutes - Cotton pad applied over the pipe near collar of Specimen 2 no ignition noted.
- 142 minutes - Liquid emitted from the end the pipe of specimen 5.
- 159 minutes - Insulation Failure of Specimen 4 – maximum temperature rise of 180K is exceeded from the top of collar on the exposed. (Thermocouple #21)
- 161 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 Specimen 2.

Figure 4 shows the curve of temperature versus time associated with Specimen 3.

Figure 5 shows the curve of temperature versus time associated with Specimen 4.

Figure 6 shows the curve of temperature versus time associated with Specimen 5.

8.5 Performance

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

Specimen 2 - SNAP 50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Triplus) pipe.

Structural adequacy	-	not applicable
Integrity	-	no failure at 161 minutes
Insulation	-	134 minutes

Specimen 3 - SNAP 50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Raupiano) pipe.

Structural adequacy	-	not applicable
Integrity	-	no failure at 161 minutes
Insulation	-	123 minutes

Specimen 4 - SNAP 110R Retrofit fire collar protecting a nominal 110-mm Polypropylene (Raupiano) pipe.

Structural adequacy	-	not applicable
Integrity	-	no failure at 161 minutes
Insulation	-	159 minutes

Specimen 5 – SNAP 110R Retrofit fire collar protecting a nominal 100-mm Polyvinyl Chloride sandwich construction (PVC-SC) pipe incorporating a coupling inside the collar.

Structural adequacy	-	not applicable
Integrity	-	no failure at 161 minutes
Insulation	-	128 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, and 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 of the test specimen was:-

Specimen 2 - -/120/120

Specimen 3 - -/120/120

Specimen 4 - -/120/120

Specimen 5 - -/120/120

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

The fire-resistance level (FRL) is 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 10.11 of AS 1530.4-2014, have been made provided no individual component is removed or reduced.

11 Tested by



Peter Gordon
Testing Officer

Appendices

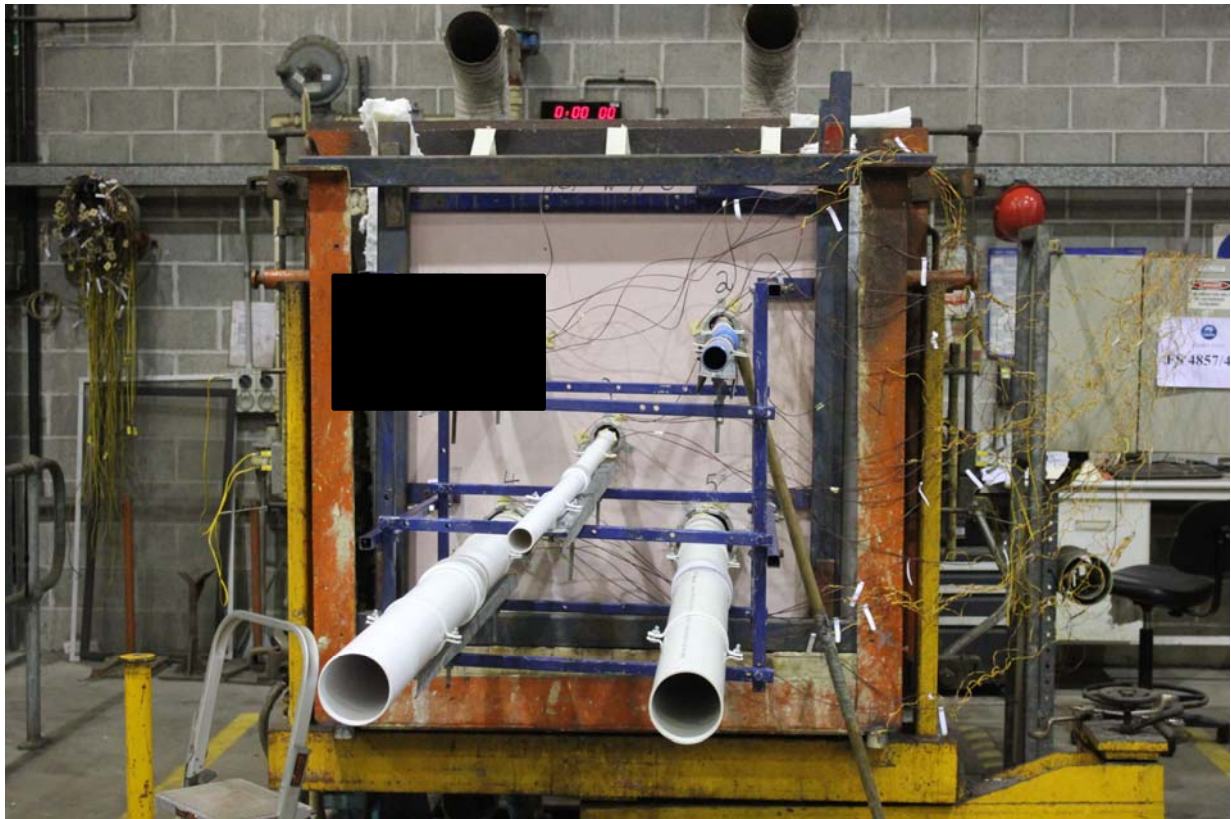
Appendix A – Measurement location

Specimen	T/C Position	T/C designation
SPECIMEN 2 40.25-mm OD Valsir Triplus Polypropylene pipe with a wall thickness of 2-mm protected with Snap 50R Fire collars retro-fitted to both sides of the wall. Hole size: 51-mm; annular gap left unsealed.	On Plasterboard 25 mm above collar	S7
	On Plasterboard 25 mm left of collar	S8
	On collar top	S9
	On collar left side	S10
	On top of pipe 25-mm from collar	S11
	On left side of pipe 25-mm from collar	S12
SPECIMEN 3 40-mm OD Rehau Raupiano Polypropylene pipe with a wall thickness of 2.12-mm protected with Snap 50R Fire collars retro-fitted to both sides of the wall. Hole size: 51-mm; annular gap left unsealed.	On Plasterboard 25 mm above collar	S13
	On Plasterboard 25 mm left of collar	S14
	On collar top	S15
	On collar left side	S16
	On top of pipe 25-mm from collar	S17
	On right side of pipe 25-mm from collar	S18
SPECIMEN 4 110.5-mm OD Rehau Raupiano Polypropylene pipe with a wall thickness of 3.13-mm protected with Snap 110R Fire collars retro-fitted to both sides of the wall. Hole size: 114-mm; annular gap left unsealed.	On Plasterboard 25 mm above collar	S19
	On Plasterboard 25 mm right of collar	S20
	On collar top	S21
	On collar right side	S22
	On top of pipe 25-mm from collar	S23
	On right side of pipe 25-mm collar	S24
SPECIMEN 5 110-mm OD Iplex pipe Polyvinyl Chloride sandwich construction (PVC-SC), having a wall thickness of 3.58-mm protected with Snap 110R Fire collars retro-fitted to both sides of the wall. Hole size: 120-mm; annular gap left unsealed.	On Plasterboard 25 mm above collar	S25
	On Plasterboard 25 mm left of collar	S26
	On collar top	S27
	On collar left side	S28
	On top of pipe 25-mm from collar	S29
	On left side of pipe 25-mm from collar	S30
Rover		S31
Ambient		S32

Appendix B – Photographs



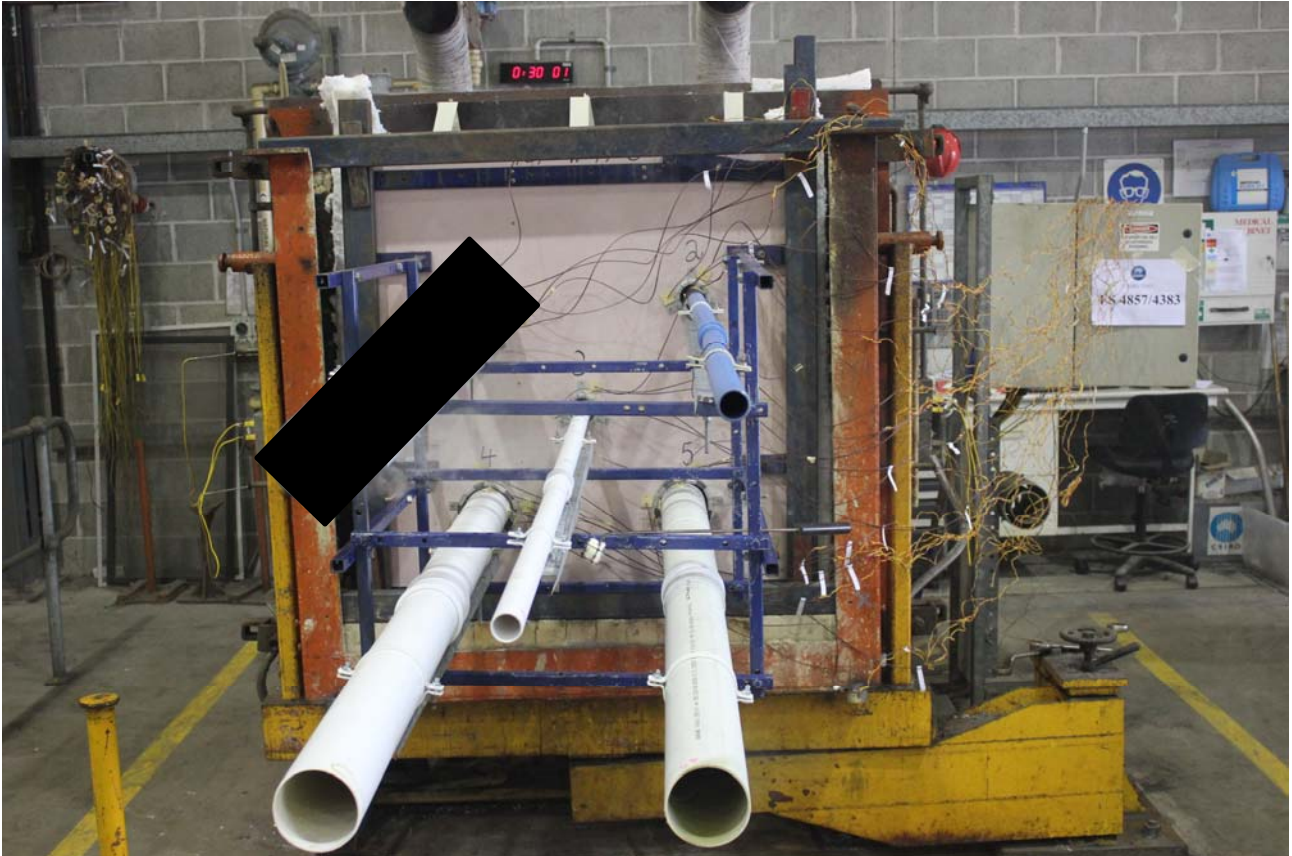
PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMENS PRIOR TO TESTING



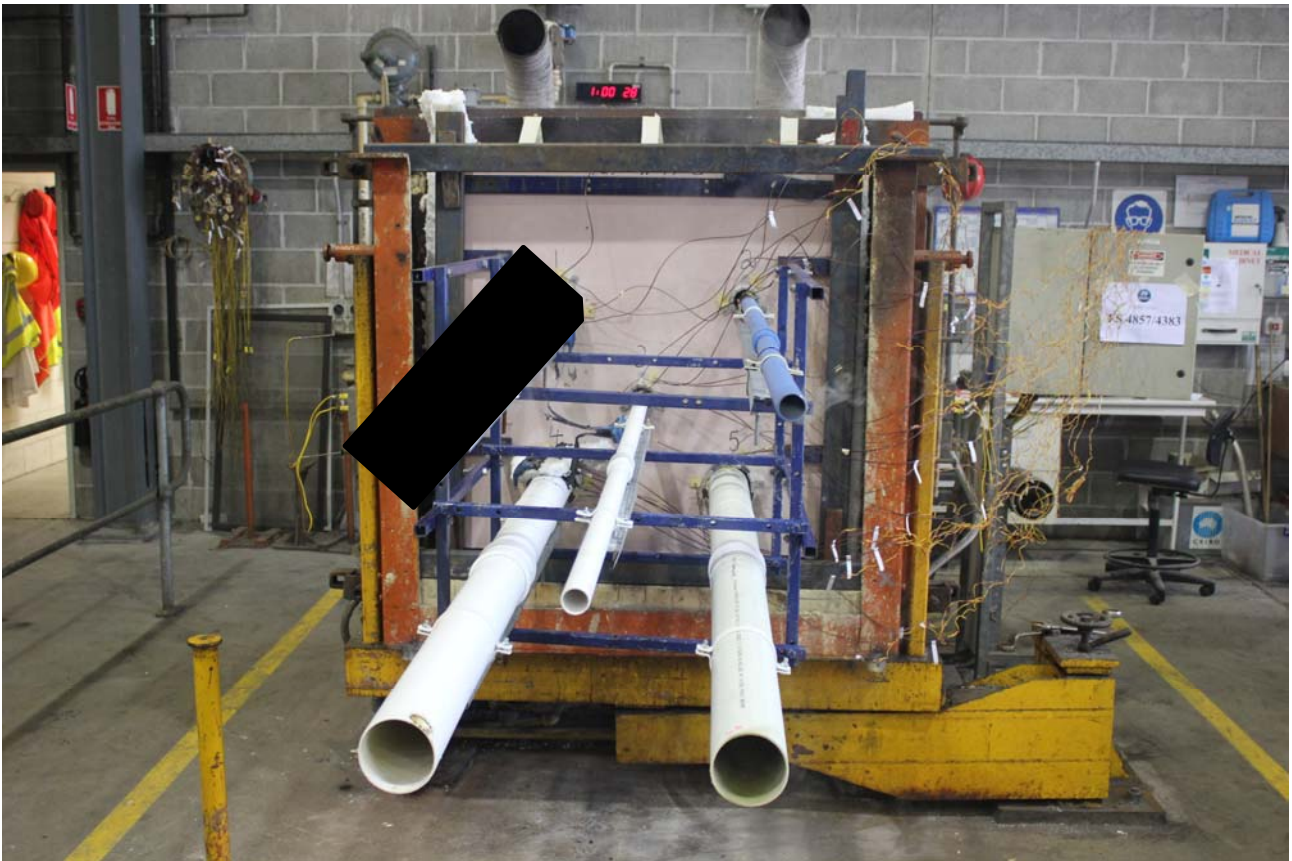
PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMENS PRIOR TO TESTING



PHOTOGRAPH 3 – SPECIMENS AFTER 7 MINUTES OF TESTING



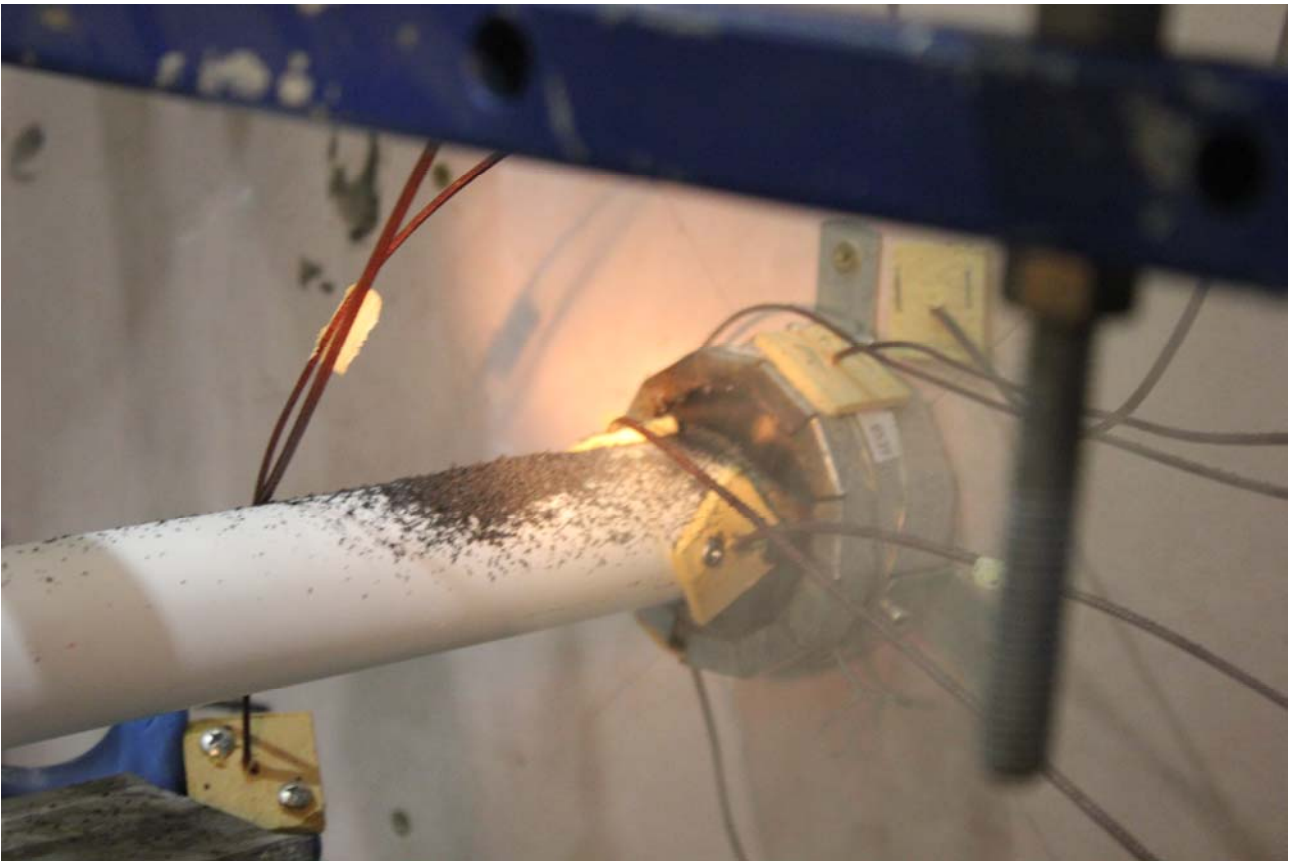
PHOTOGRAPH 4 – SPECIMENS AFTER 30 MINUTES OF TESTING



PHOTOGRAPH 5 – SPECIMENS AFTER 60 MINUTES OF TESTING



PHOTOGRAPH 6 – SPECIMENS AFTER 90 MINUTES OF TESTING



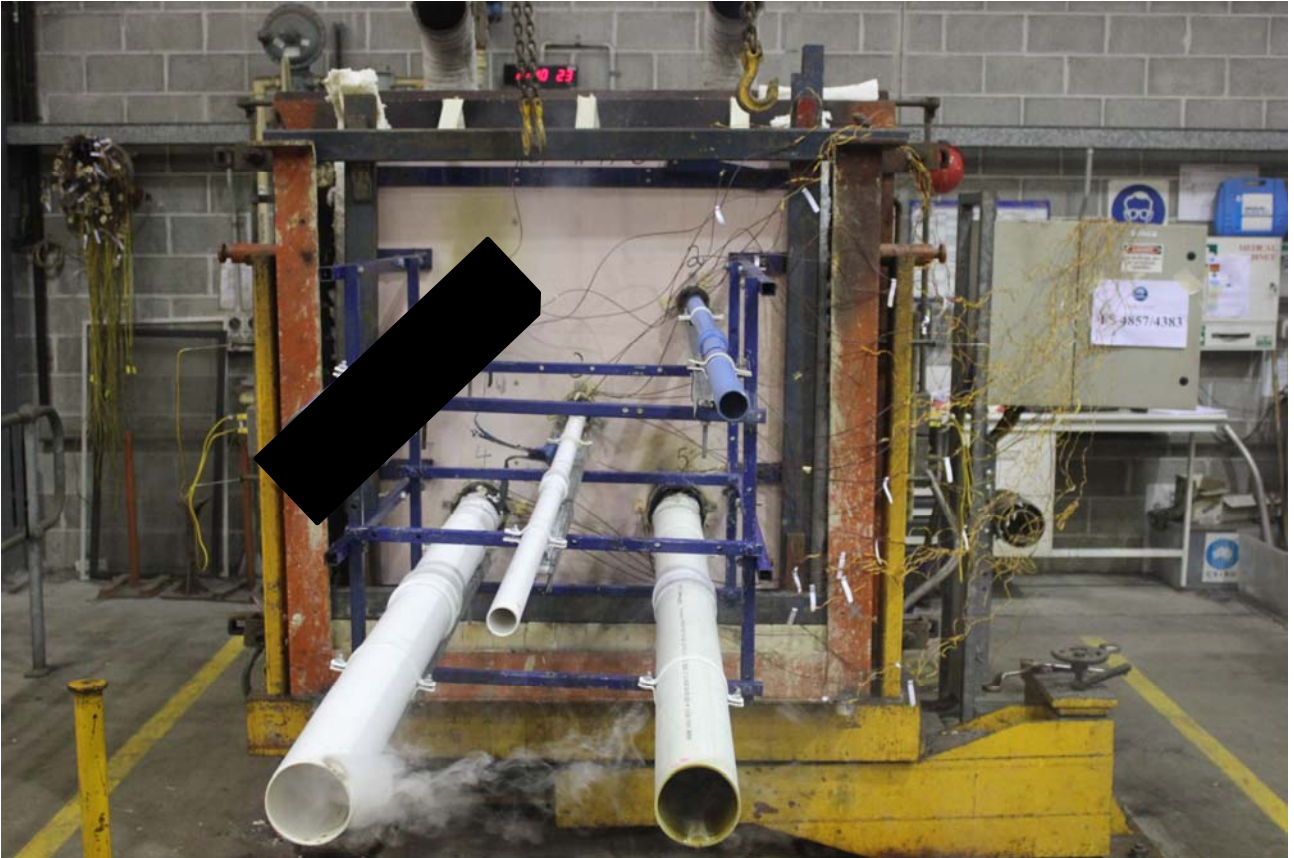
PHOTOGRAPH 7 – SPECIMEN 3 AFTER 100 MINUTES OF TESTING



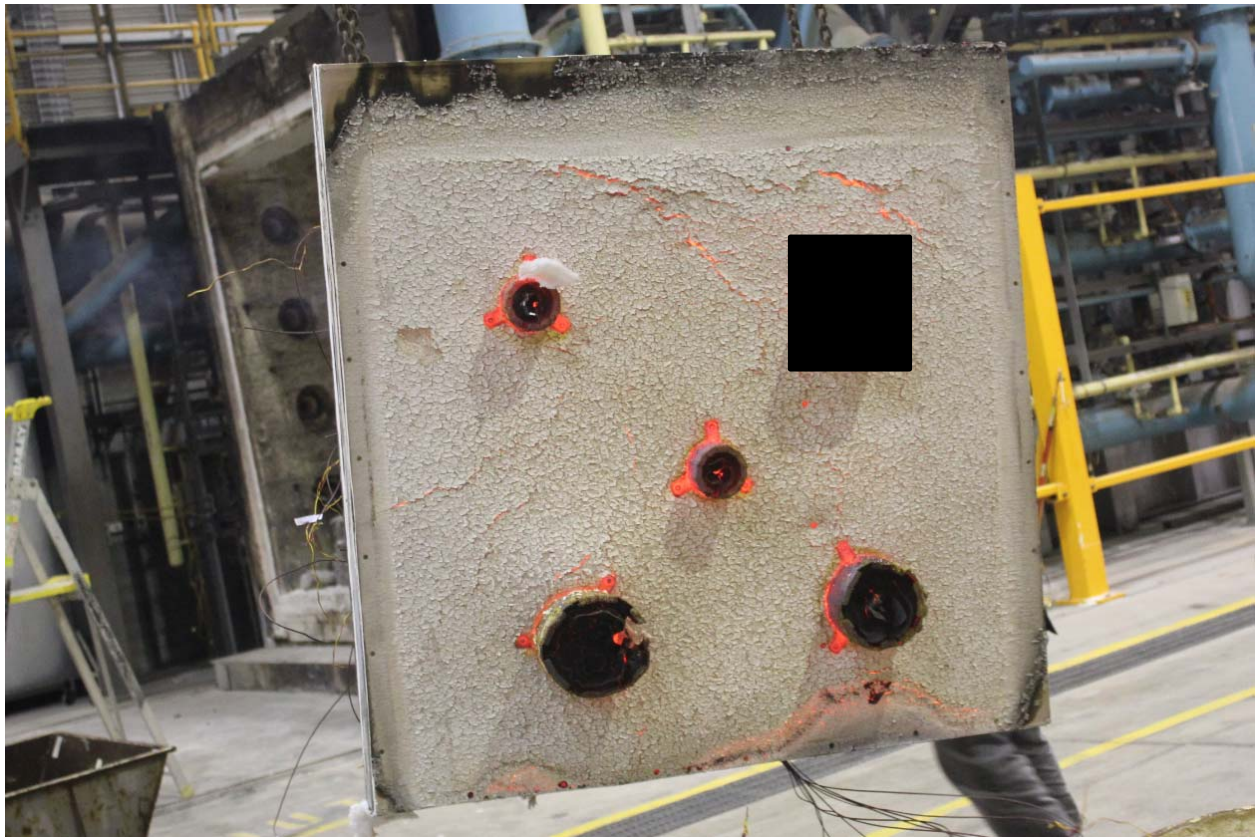
PHOTOGRAPH 8 – SPECIMENS AFTER 120 MINUTES OF TESTING



PHOTOGRAPH 9 – SPECIMENS AFTER 152 MINUTES OF TESTING



PHOTOGRAPH 10 – SPECIMENS AT THE CONCLUSION OF TESTING



PHOTOGRAPH 11 – EXPOSED FACE OF SPECIMENS AT THE CONCLUSION OF TESTING

Appendix C – Furnace Temperature

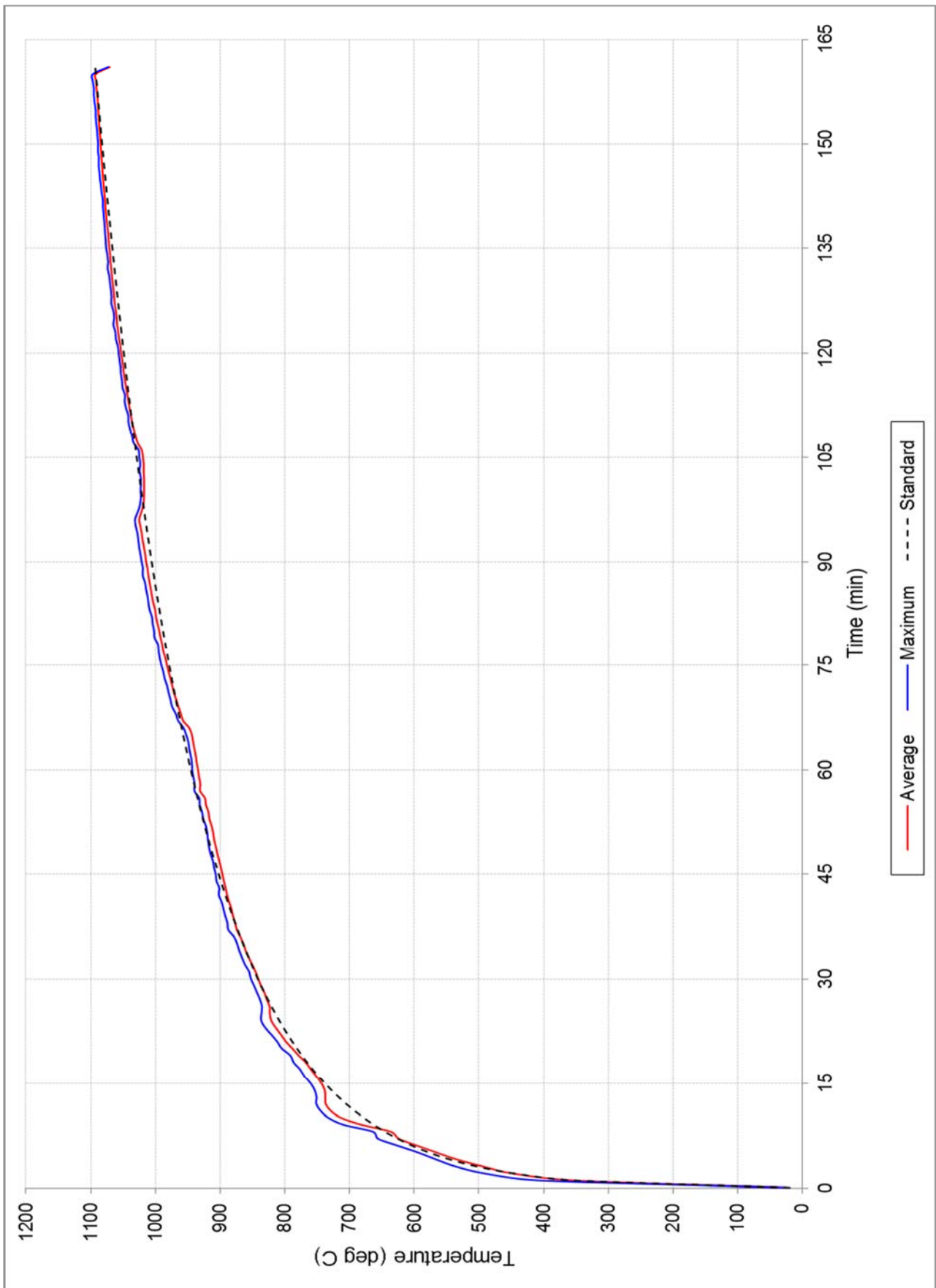


FIGURE 1 – FURNACE TEMPERATURE

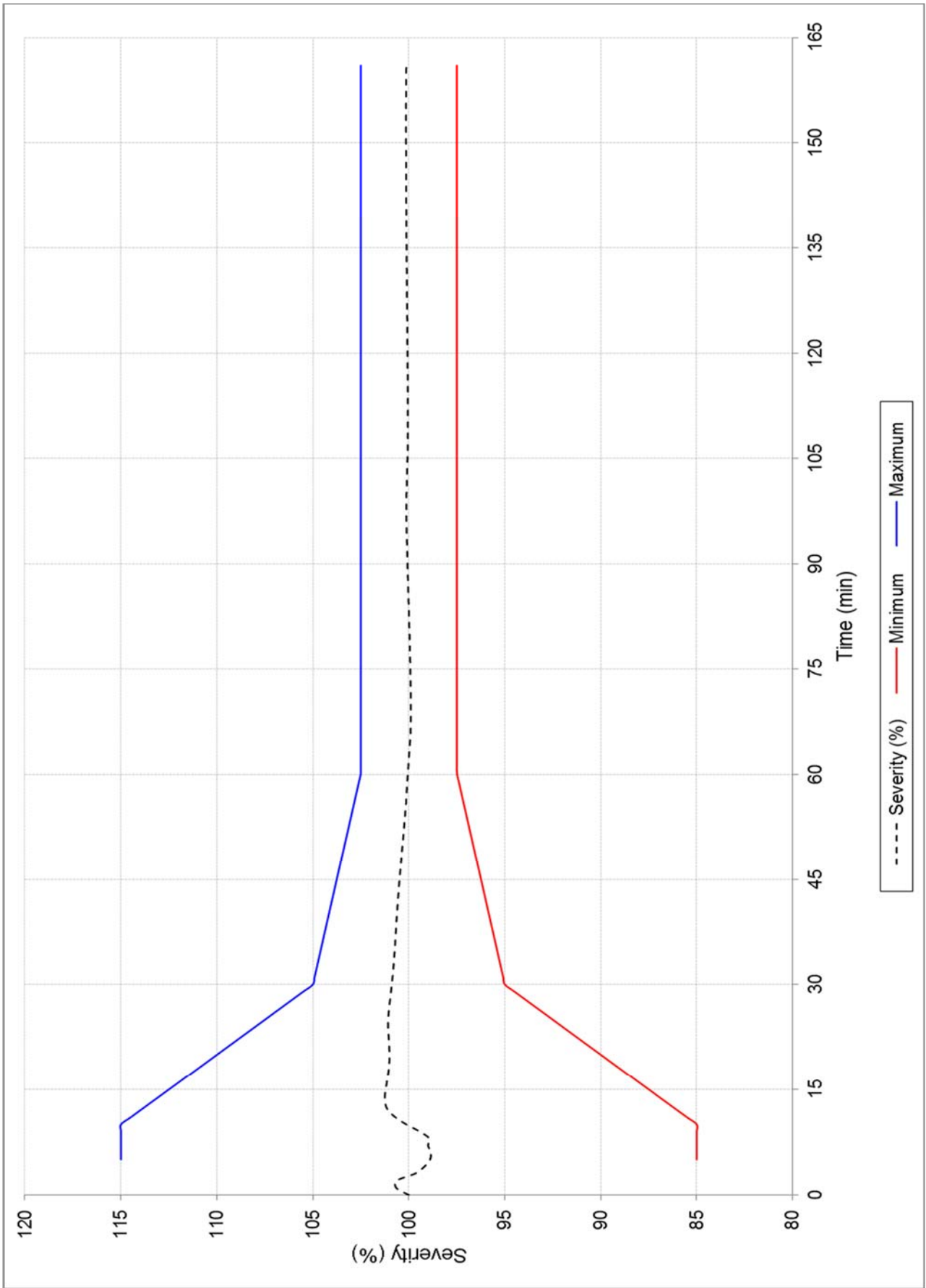


FIGURE 2 – FURNACE SEVERITY

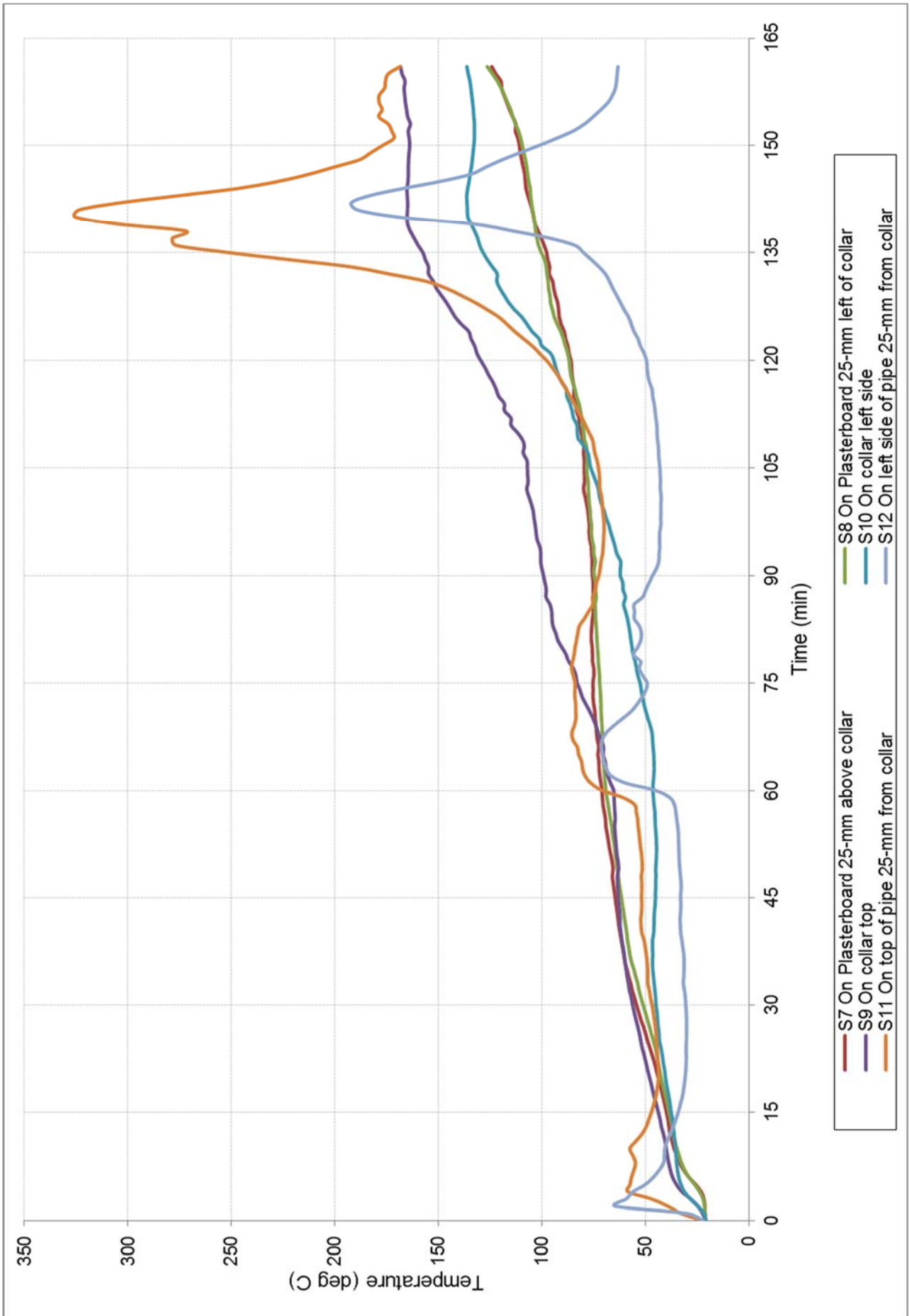


FIGURE 3 - SPECIMEN 2 TEMPERATURE

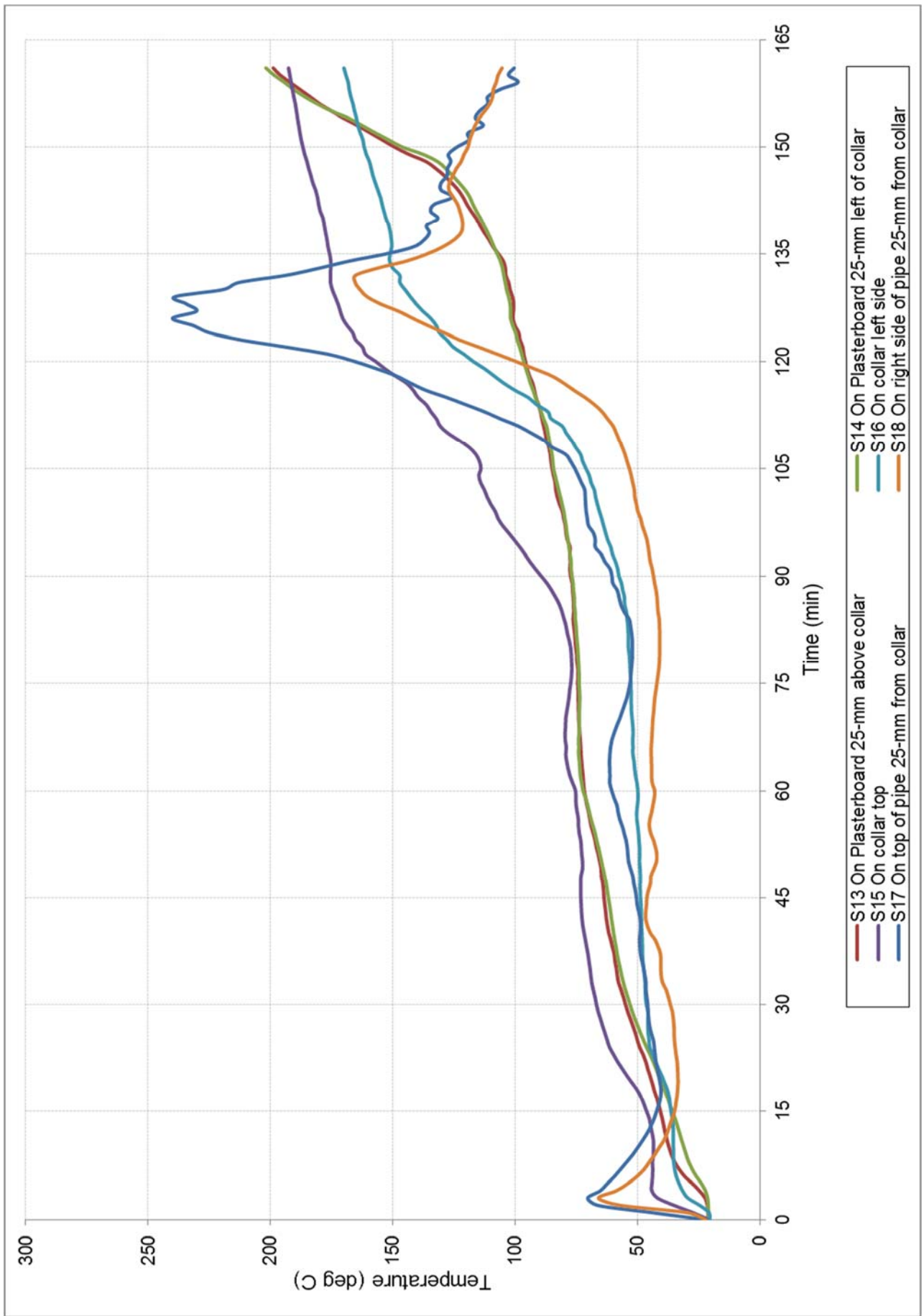


FIGURE 4 - SPECIMEN 3 TEMPERATURE

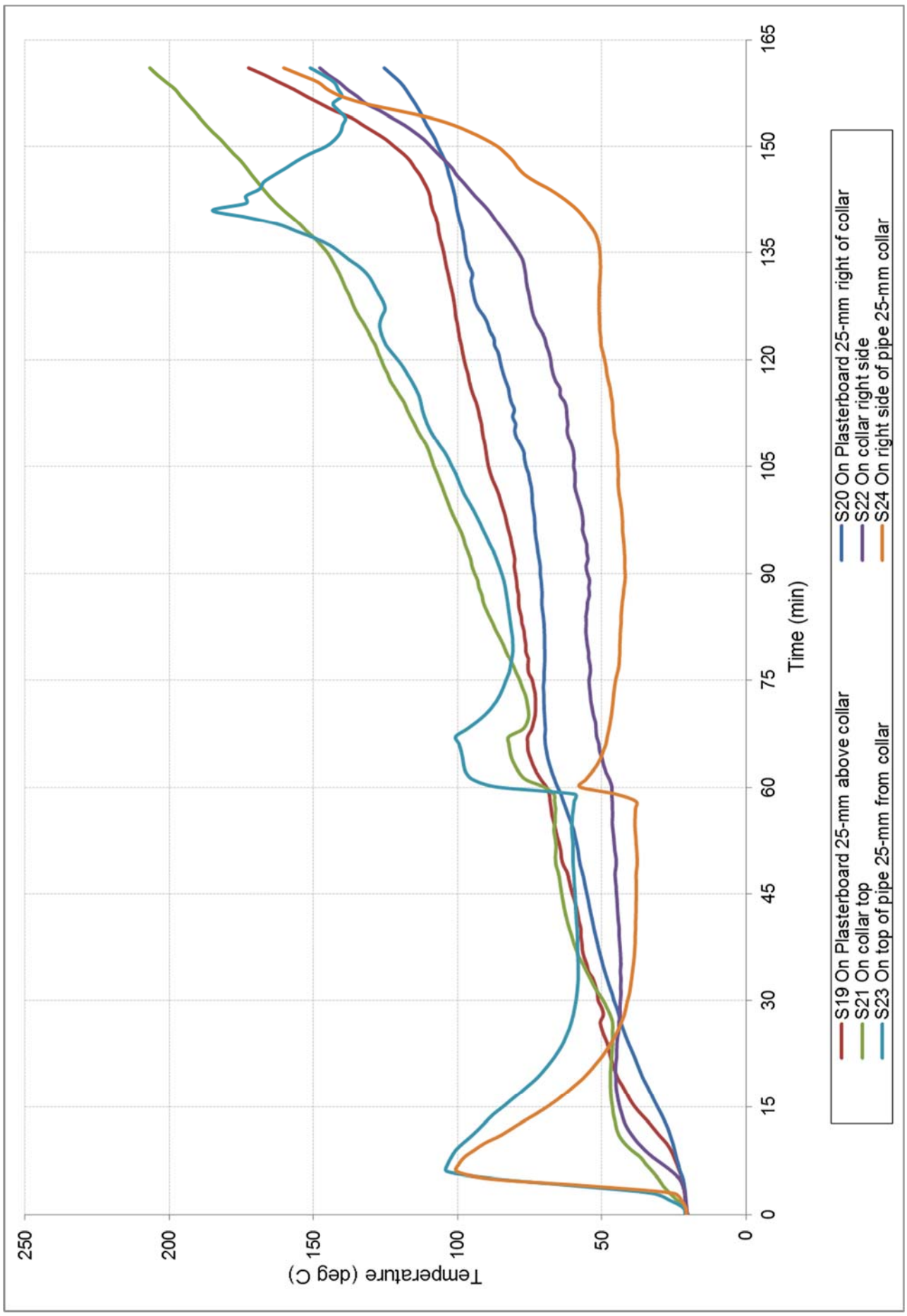


FIGURE 5 - SPECIMEN 4 TEMPERATURE

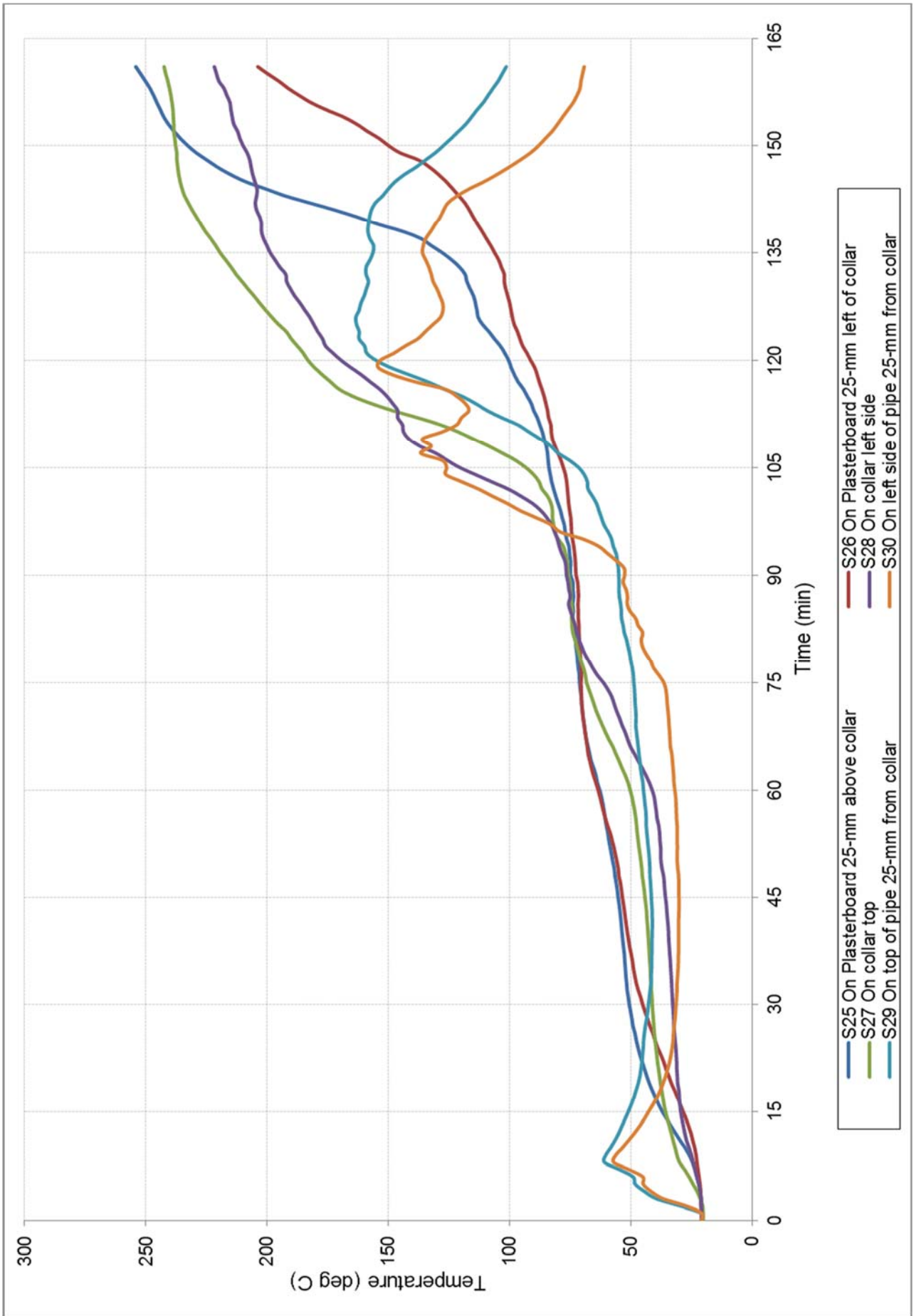


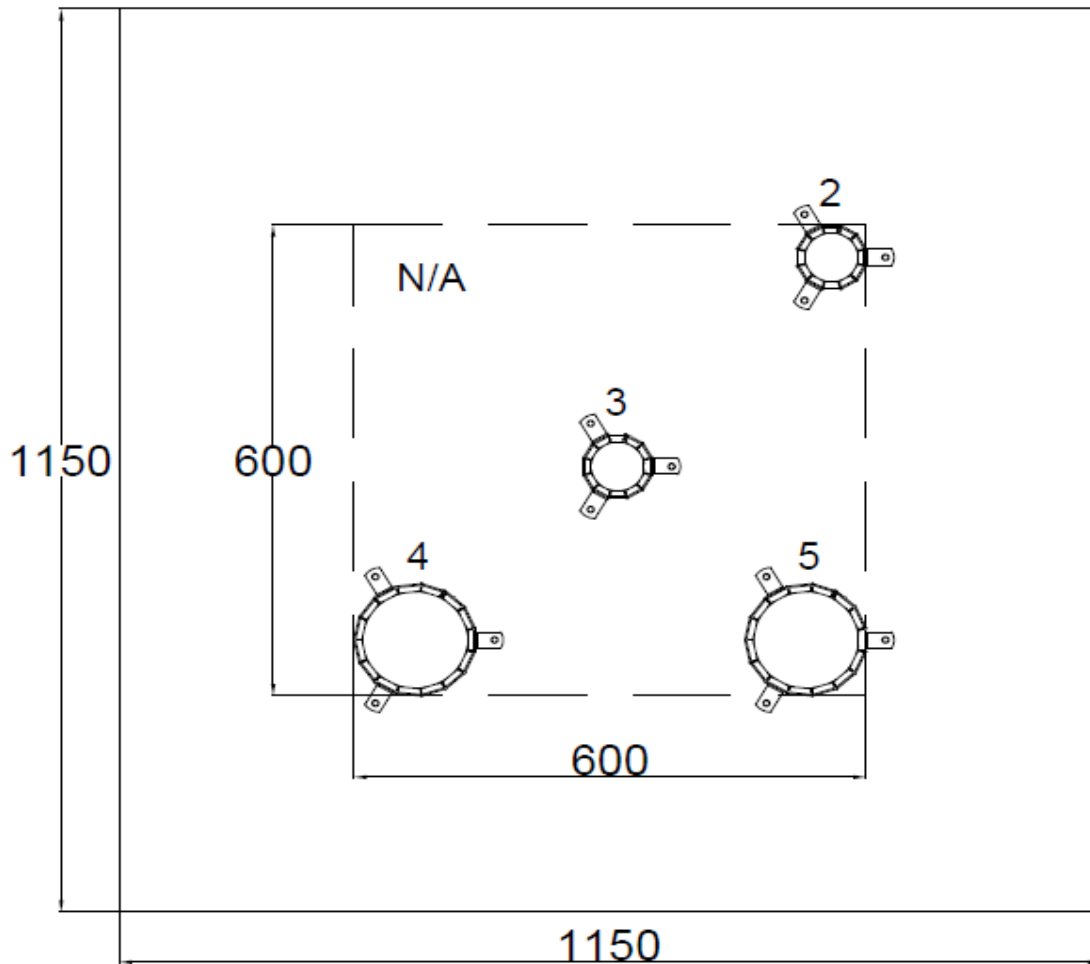
FIGURE 6 - SPECIMEN 5 TEMPERATURE

Appendix D – Specimen layout and installation drawings

Snap Fire Systems Pty Ltd

Test Wall W-19-C Layout

Date: 19 MAR 2019



Penetration	Collar Code	Pipe Type	Pipe Diameter (mm)	Sealant
2	50R	Triplus	40	
3	50R	Raupiano	40	
4	110R	Raupiano	110	
5	110R	PVC-SC	110	

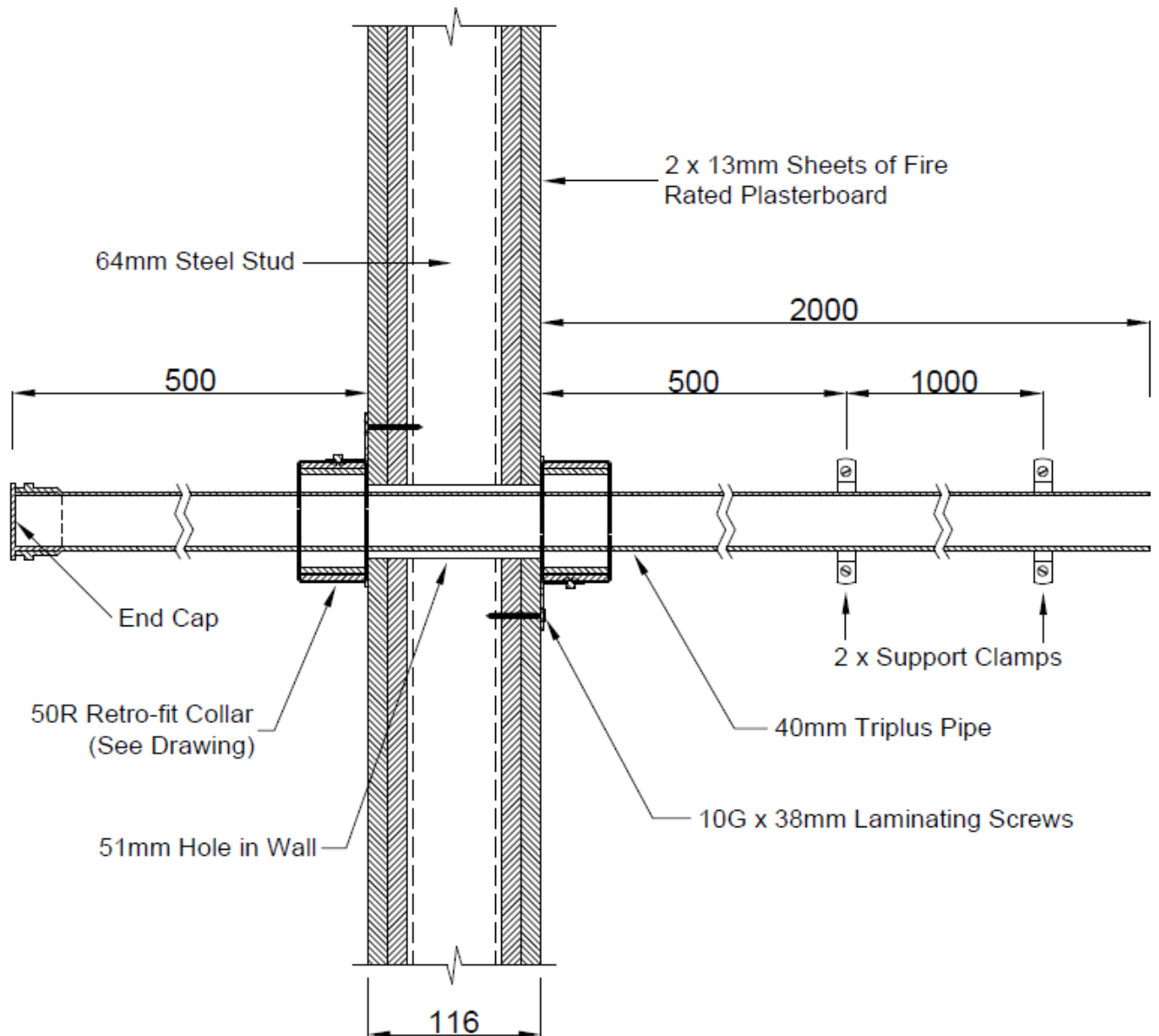
DRAWING TITLED "TEST WALL W-19-C LAYOUT" DATED 19 MARCH 2019, BY SNAP FIRE SYSTEMS PTY LTD.

Snap Fire Systems Pty Ltd

Specimen #2

40 Triplus Stack & 50R

Date: 20 MAR 2019



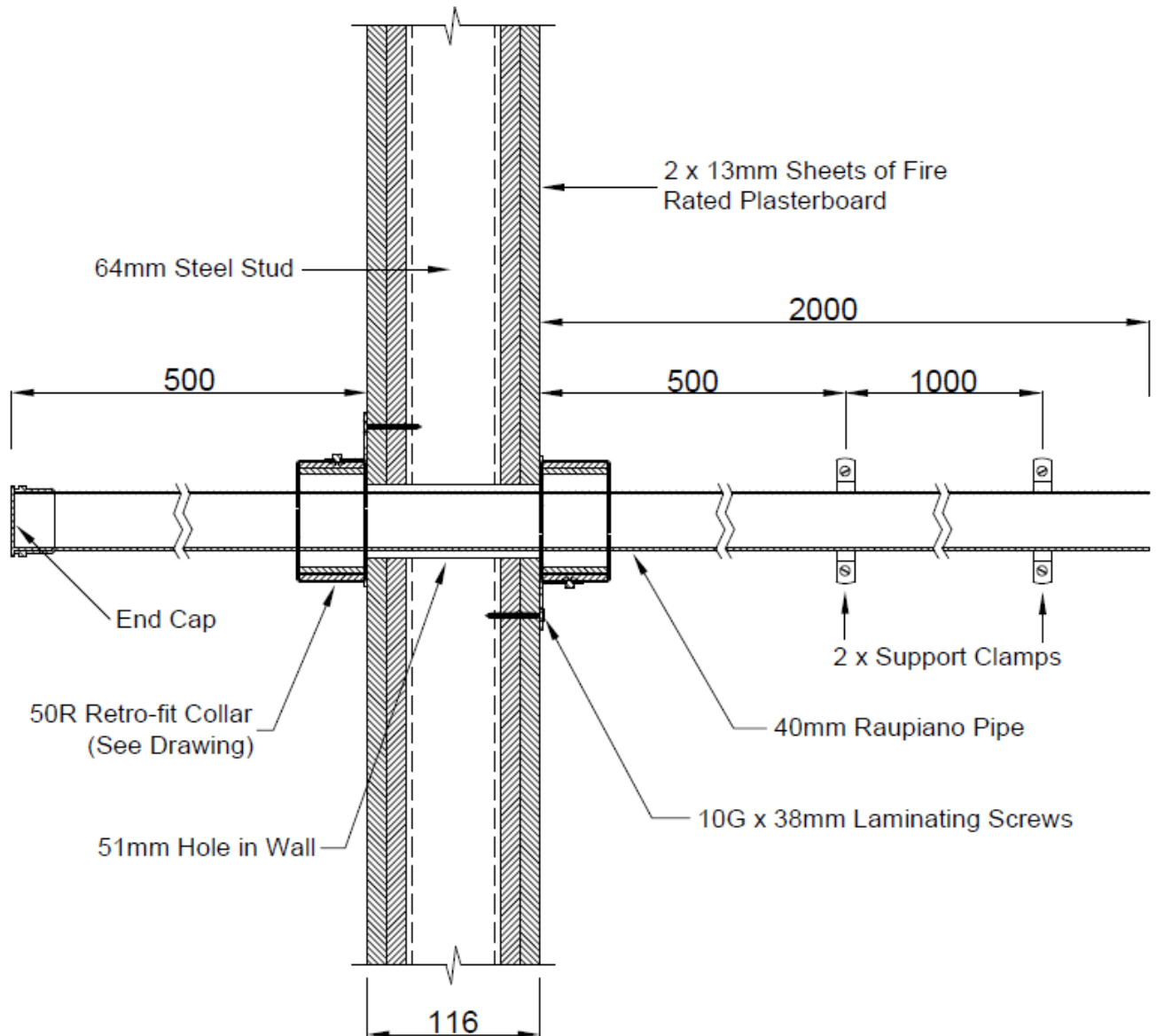
DRAWING TITLED "SPECIMEN #2, 40 TRIPLUS STACK & 50R", DATED 20 MARCH 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD.

Snap Fire Systems Pty Ltd

Specimen #3

40 Raupiano Stack & 50R

Date: 20 MAR 2019



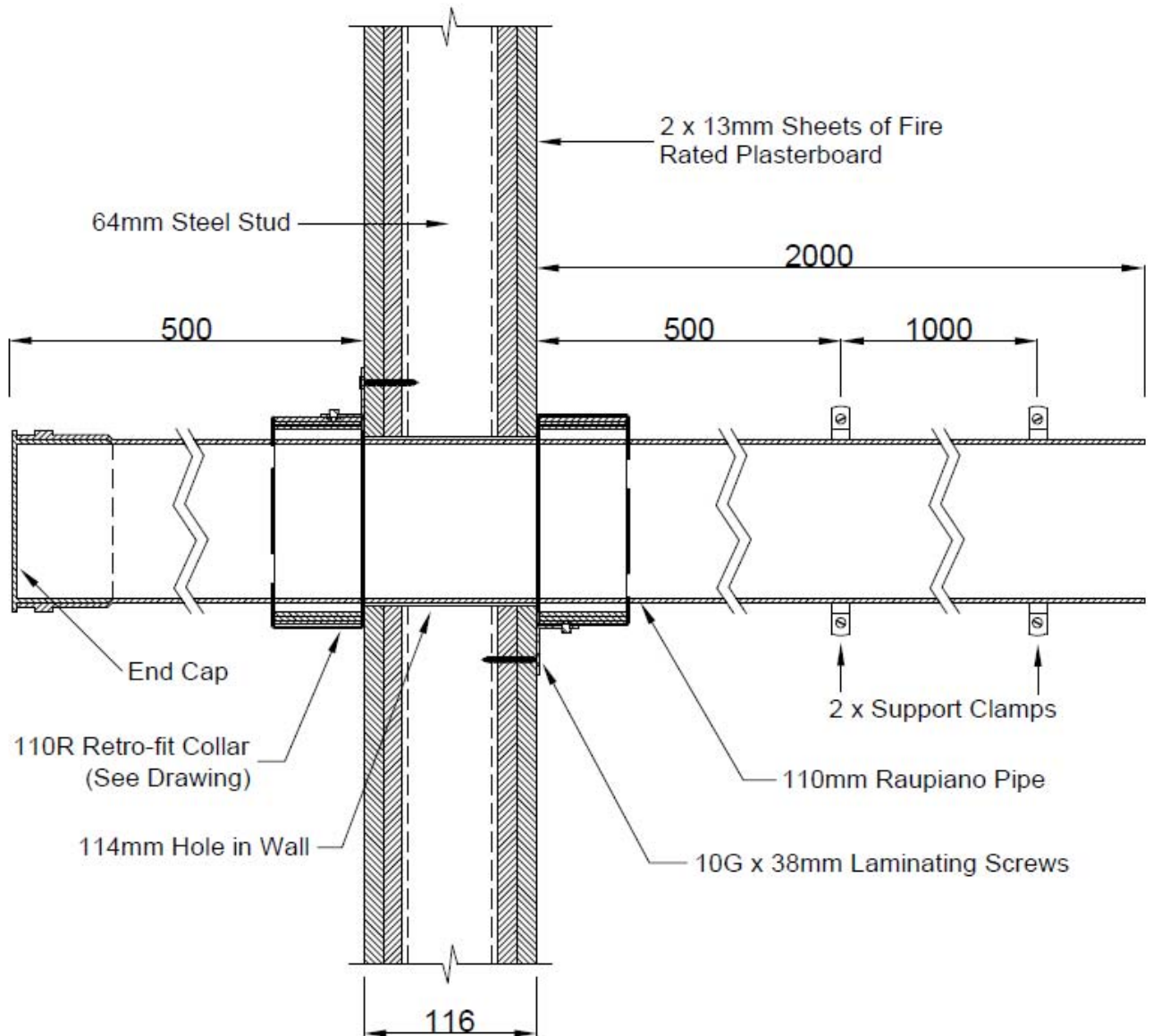
DRAWING TITLED "SPECIMEN #3, 40 RAUPIANO STACK & 50R", DATED 20 MARCH 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD.

Snap Fire Systems Pty Ltd

Specimen #4

110 Raupiano Stack & 110R

Date: 20 MAR 2019



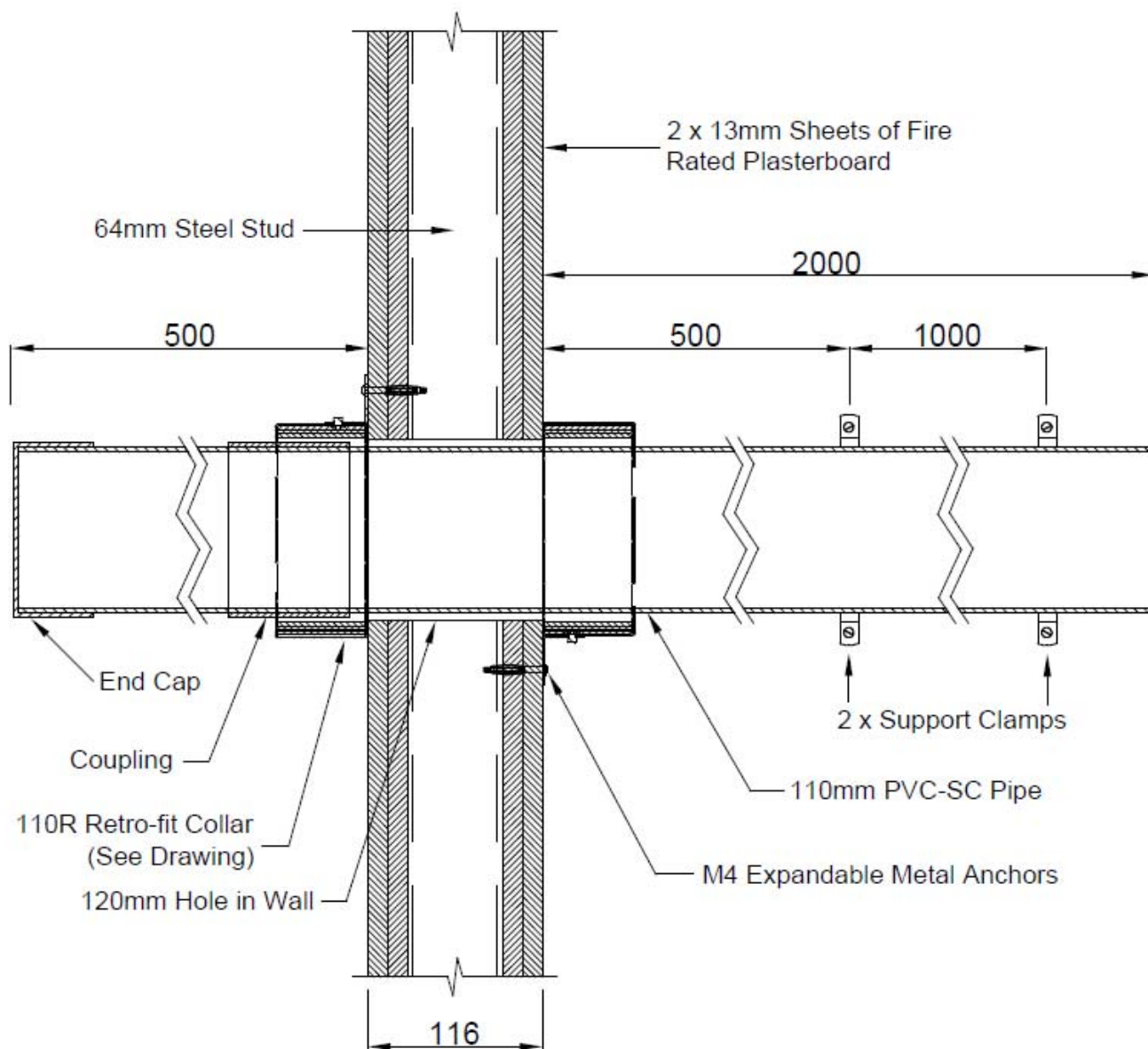
DRAWING TITLED "SPECIMEN #4, 110 RAUPIANO STACK & 110R", DATED 20 MARCH 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD.

Snap Fire Systems Pty Ltd

Specimen #5

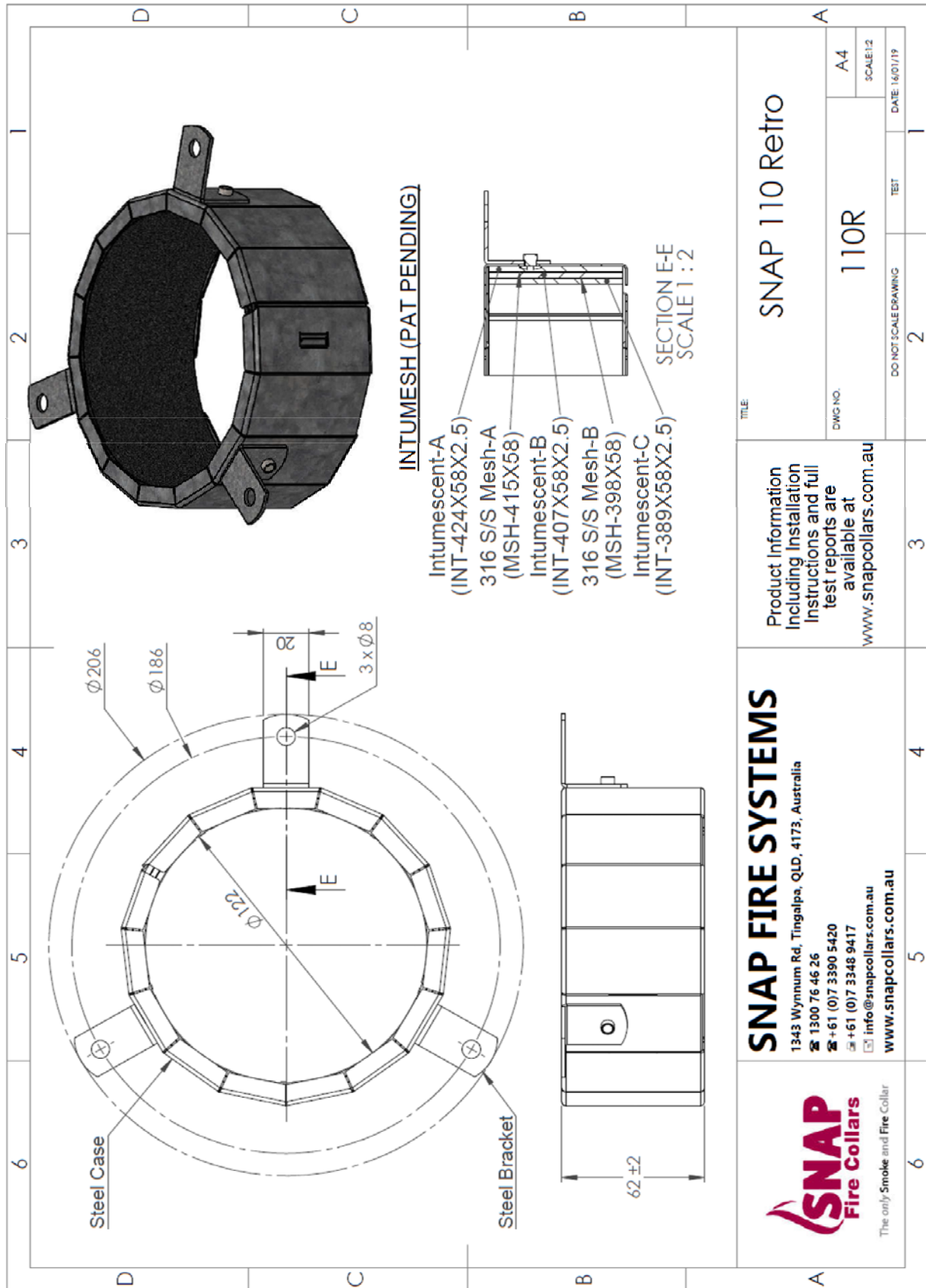
100 PVC-SC Stack & 110R

Date: 20 MAR 2019

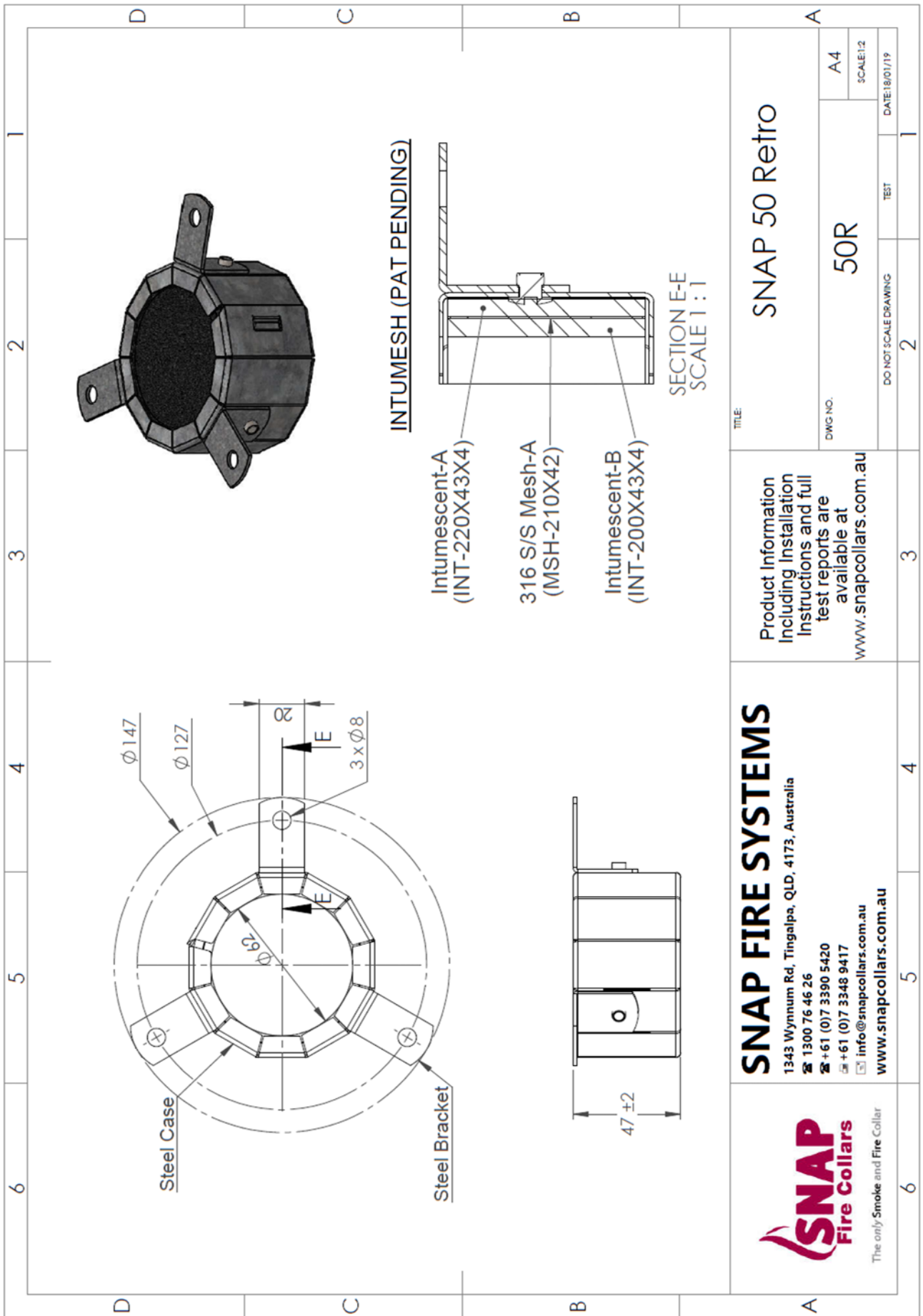


DRAWING TITLED "SPECIMEN #5, 100 PVC-SC STACK & 110R", DATED 20 MARCH 2019, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD.

Appendix E – Specimen Drawings



DRAWING NUMBERED 110R, SNAP 110 RETRO, DATED 16 JANUARY 2019, BY SNAP FIRE SYSTEMS PTY LTD.




DRAWING NUMBERED 50R, SNAP 50 RETRO, DATED 18 JANUARY 2019, BY SNAP FIRE SYSTEMS PTY LTD.

Appendix F – Copy of 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



Certificate of Test

No. 3250

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 (Section 10, Service penetrations and control joints), on behalf of:

IG6 Pty Ltd as trustee for the IG6 IP Trust
3 Skirmish Court
Victoria Point Qld 4165

A full description of the test specimen and the complete test results are detailed in the Division's report numbered FSP 1996.

Product Name: SNAP 50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Triplus) pipe

Description: The specimen comprised an 1160-mm x 1160-mm x 116-mm thick wall penetrated by a nominal 40-mm Polypropylene (Triplus) pipe protected by SNAP 50R Retrofit fire collar. The wall system was described as a 116 mm thick plasterboard lined steel framed wall comprising two layers of 13 mm thick Firestop plasterboard on each side of 64 mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. The SNAP Retrofit 50R fire collar comprised a 0.75-mm steel casing with a 62 mm inner diameter and a 147-mm diameter base flange. The 47-mm high collar casing incorporated a closing mechanism which comprised two soft Intumesh intumescent wraps lined within the internal circumference of the collar. Intumescent A was 4-mm thick x 43-mm wide x 220-mm long, and Intumescent B was 4 mm thick x 43-mm wide x 200-mm long. Between the strips was a layer of 316 grade stainless steel mesh 210-mm long x 42-mm wide with wire mesh diameter of 0.15-mm. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 38-mm (10g) coarse thread laminating screws. The penetrating service comprised a 40-mm outside diameter polypropylene pipe, with a wall thickness of 2 mm which penetrated the wall through a 51-mm diameter cut-out hole. 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 plasterboard wall. The pipe was open at the unexposed end and capped with polypropylene end cap on the exposed end.

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

Structural Adequacy	not applicable
Integrity	no failure at 161 minutes
Insulation	134 minutes

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

The fire-resistance level is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) is 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. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.


Testing Officer: Peter Gordon **Date of Test:** 4 April 2019

Issued on the 9th day of May 2019 without alterations or additions.

B. Roddy

Brett Roddy
Manager, Fire Testing and Assessments

"Copyright CSIRO 2019 ©"
Copying or alteration of this report without written authorisation from CSIRO is forbidden

	<p>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</p>
---	---

COPY OF CERTIFICATE OF TEST – NO. 3250



Certificate of Test

No. 3251

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 (Section 10, Service penetrations and control joints), on behalf of:

IG6 Pty Ltd as trustee for the IG6 IP Trust
 3 Skirmish Court
 Victoria Point Qld 4165

A full description of the test specimen and the complete test results are detailed in the Division's report numbered FSP 1996.

Product Name: SNAP 50R Retrofit fire collar protecting a nominal 40-mm Polypropylene (Raupiano) pipe

Description: The specimen comprised an 1160-mm x 1160-mm x 116-mm thick wall penetrated by a nominal 40-mm Polypropylene (Raupiano) pipe protected by SNAP 50R Retrofit fire collar. The wall system was described as a 116 mm thick plasterboard lined steel framed wall comprising two layers of 13 mm thick Firestop plasterboard on each side of 64 mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. The SNAP Retrofit 50R fire collar comprised a 0.75-mm steel casing with a 62 mm inner diameter and a 147-mm diameter base flange. The 47-mm high collar casing incorporated a closing mechanism which comprised two soft Intumescent intumescent wraps lined within the internal circumference of the collar. Intumescent A was 4-mm thick x 43-mm wide x 220-mm long, and Intumescent B was 4 mm thick x 43-mm wide x 200-mm long. Between the strips was a layer of 316 grade stainless steel mesh 210-mm long x 42-mm wide with wire mesh diameter of 0.15-mm. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 38-mm (10g) coarse thread laminating screws. The penetrating service comprised a 40-mm outside diameter polypropylene pipe, with a wall thickness of 2.12 mm which penetrated the wall through a 51-mm diameter cut-out hole. 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 plasterboard wall. The pipe was open at the unexposed end and capped with polypropylene end cap on the exposed end.

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

Structural Adequacy	not applicable
Integrity	no failure at 161 minutes
Insulation	123 minutes

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

The fire-resistance level is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) is 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. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Peter Gordon Date of Test: 4 April 2019

Issued on the 9th day of May 2019 without alterations or additions.

Brett Roddy
 Manager, Fire Testing and Assessments

“Copyright CSIRO 2019 ©”

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



Certificate of Test

No. 3252

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 (Section 10, Service penetrations and control joints), on behalf of:

IG6 Pty Ltd as trustee for the IG6 IP Trust
 3 Skirmish Court
 Victoria Point Qld 4165

A full description of the test specimen and the complete test results are detailed in the Division's report numbered FSP 1996.

Product Name: SNAP 110R Retrofit fire collar protecting a nominal 110-mm Polypropylene (Raupiano) pipe

Description: The specimen comprised an 1160-mm x 1160-mm x 116-mm thick wall penetrated by nominal 110-mm Polypropylene (Raupiano) pipe protected by SNAP 110R Retrofit fire collar. The wall system was described as a 116 mm thick plasterboard lined steel framed wall comprising two layers of 13 mm thick Firestop plasterboard on each side of 64 mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. The SNAP Retrofit 110R fire collar comprised a 0.75-mm steel casing with a 122 mm inner diameter and a 206-mm diameter base flange. The 62-mm high collar casing incorporated a closing mechanism that was comprised of three soft Intumesh intumescent wraps and wire meshes lined within the internal circumference of the collar. Intumescent A was 2.5-mm thick x 58-mm wide x 424-mm long, Intumescent B was 2.5-mm thick x 58-mm wide x 407-mm long and Intumescent C was 2.5-mm thick x 58-mm wide x 389-mm long. Between intumescent strips A and B was a layer of 316 stainless steel mesh 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh 398-mm long x 58-mm wide both had wire mesh diameters of 0.15-mm. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using 38-mm (10g) course thread laminating screws. The penetrating service comprised a 110-mm outside diameter polypropylene pipe, with a wall thickness of 3.13 mm fitted through the collar's sleeve. The pipe penetrated the wall through a 114 mm diameter opening and 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 plasterboard wall. The pipe was open on the unexposed end and capped on the exposed end with a polypropylene end cap.

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

Structural Adequacy	not applicable
Integrity	no failure at 161 minutes
Insulation	159 minutes

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

The fire-resistance level is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) is 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. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Peter Gordon Date of Test: 4 April 2019

Issued on the 9th day of May 2019 without alterations or additions.

Brett Roddy
 Manager, Fire Testing and Assessments

"Copyright CSIRO 2019 ©"
 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



Certificate of Test

No. 3253

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 (Section 10, Service penetrations and control joints), on behalf of:

IG6 Pty Ltd as trustee for the IG6 IP Trust
 3 Skirmish Court
 Victoria Point Qld 4165

A full description of the test specimen and the complete test results are detailed in the Division's report numbered FSP 1996.

Product Name: SNAP 110R Retrofit fire collar protecting a nominal 100-mm Polyvinyl Chloride sandwich construction (PVC-SC) pipe incorporating a coupling inside the collar

Description: The specimen comprised an 1160-mm x 1160-mm x 116-mm thick wall penetrated by a nominal 100-mm Polyvinyl Chloride sandwich construction (PVC-SC) pipe protected by SNAP 110R Retrofit fire collar incorporating a coupling inside the collar. The wall system was described as a 116 mm thick plasterboard lined steel framed wall comprising two layers of 13 mm thick Firestop plasterboard on each side of 64 mm deep metal studs, Boral reference SB120.1 with an established FRL of -/120/120. The SNAP Retrofit 110R fire collar comprised a 0.75-mm steel casing with a 122 mm inner dia. and a 206-mm dia. base flange. The 62-mm high collar casing incorporated a closing mechanism that was comprised of three soft Intumesh intumescent wraps and wire meshes lined within the internal circumference of the collar. Intumescent A was 2.5-mm thick x 58-mm wide x 424-mm long, Intumescent B was 2.5-mm thick x 58-mm wide x 407-mm long and Intumescent C was 2.5-mm thick x 58-mm wide x 389-mm long. Between intumescent strips A and B was a layer of 316 stainless steel mesh 415-mm long x 58-mm wide and between intumescent strips B and C was a layer of 316 stainless steel mesh 398-mm long x 58-mm wide both had wire mesh dia. of 0.15-mm. The Snap collars were surface mounted around the pipe on both the exposed and unexposed face of the wall and fixed through 3 mounting brackets using M4 expandable steel anchors. The penetrating service comprised a 110-mm outside dia. PVC-SC pipe with a wall thickness of 3.58-mm and a PVC coupling with a wall thickness of 2.8-mm (with a total wall thickness of 6.38 mm fitted through the collar's sleeve on the exposed side only) penetrating the plasterboard wall through a 120 mm dia. opening and 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 plasterboard wall. The pipe was open on the unexposed end and capped on the exposed end with a PVC end cap.

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

Structural Adequacy	not applicable
Integrity	no failure at 161 minutes
Insulation	128 minutes

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

The fire-resistance level is applicable when the system is exposed to fire from either direction. The fire-resistance level (FRL) is 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. This certificate is provided for general information only and does not comply with regulatory requirements for evidence of compliance.

Testing Officer: Peter Gordon Date of Test: 4 April 2019

Issued on the 9th day of May 2019 without alterations or additions.

Brett Roddy
 Manager, Fire Testing and Assessments

"Copyright CSIRO 2019 ©"
 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

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. |

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 <https://www.csiro.au/en/Do-business/Services/Materials-infrastructure/Fire-safety>

Infrastructure Technologies

Brett Roddy
Team Leader, Fire Testing and Assessments

t +61 2 94905449

e brett.rodny@csiro.au

w <https://www.csiro.au/en/Do-business/Services/Materials-infrastructure/Fire-safety>