



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

Test Report

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Commercial-in-confidence



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Report Authorization:

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7 December 2018	7 December 2018	7 December 2018

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

Sponsored Investigation No. FSP 1931

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as a service penetrating a 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 4804/4282

1.7 Test date

The fire-resistance test was conducted on 26 September 2018.

2 Description of specimen

2.1 General

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

The wall was penetrated by a single service.

The pipe used in the test was stated to be manufactured in accordance with:

- AS/NZS 1260 'PVC-U pipes and fittings for drain, waste and vent application'.

Specimen - SNAP HP315R Retrofit fire collar protecting a 315-mm PVC pipe.

The HP315R Retrofit collar comprised a 0.95-mm steel casing with a 327-mm inner diameter and a 501-mm diameter base flange. The 202-mm high collar casing incorporated a closing mechanism that comprised of two soft Intumesh intumescent strips lined within the internal circumference of the collar. The inner and outer strips were 12-mm thick x 197-mm wide x 1064-mm long, and 2.5-mm thick x 197-mm wide x 1111-mm long, respectively. Between the strips was a layer of 316 stainless steel mesh 1102 mm long x 192-mm wide with a wire mesh diameter of 0.15-mm, as shown in drawing numbered HP315R-T dated 16 August 2017, 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 6 mounting brackets using 8-mm threaded rod and 12 x M8 nuts.

The annular gap around the pipe and plasterboard on both sides of the wall was filled with H.B Fullers Firesound sealant to a depth of 10-mm and finished flush with wall.

The penetrating service comprised a 315-mm diameter Iplex Pipelines DWV PVC-U pipe, with a wall thickness of 8.4-mm which penetrated the wall through a 325-mm diameter cut-out hole as shown in drawing titled "Specimen # 1, 315 PVC-U Pipe & HP315R, dated 25 September 2018", 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, 750-mm and 1200-mm from the unexposed face of the plasterboard wall. The pipe was open at the unexposed end and sealed with a PVC-U cap on the exposed end.

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 constructed on 14th September 2018 and left 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:

Drawing numbered HP315R-T dated 16 August 2017, by Snap Fire Systems Pty Ltd.

Drawing titled "Specimen # 1, 315 PVC Pipe & HP315R", dated 25 September 2018, provided by Snap Fire Systems Pty Ltd.

4 Equipment

4.1 Furnace

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

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

4.2 Temperature

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

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

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

4.3 Measurement system

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

5 Ambient temperature

The temperature of the test area was 16°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 181 minutes by the agreement with the sponsor.

8 Test results

8.1 Critical observations

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

Time	Observation
1 minute	Smoke is being emitted from the collar and furnace flues.
2 minutes	Smoke is emitted from the pipe end.
4 minutes	Smoke is being emitted from the furnace flues in large quantities. Smoke is fluing from pipe.
6 minutes	Intumescent material is visible within the pipe.
7 minutes	Smoke continues to be emitted from furnace flues, collar and pipe.
8 minutes	A small red glow is visible down the pipe towards the furnace.
11 minutes	The red glow noted at 8 minutes is no longer visible in the exposed end of the pipe.
12 minutes	Smoke quantity from pipe, collar and furnace flues has diminished.
13 minutes	Smoke quantity has continued to diminish from pipe, collar and furnace flues. Smoke is now restricted to the top of the collar and end of pipe.
39 minutes	Smoke from furnace flues has increased. Smoke from pipe continues to flue.
42 minutes	Condensation is dripping from the collar. Smoke from furnace flues has reduced in quantity.
50 minutes	The pipe assembly has projected out from the plasterboard about 20-mm.
77 minutes	Rover applied to pipe 25-mm from collar.
90 minutes	Smoke from furnace flues has increased.
104 minutes	Smoke fluing from pipe has decreased.
120 minutes	Smoke continues to flue from pipe and is being emitted from the top of collar.

- 134 minutes - Smoke continues to flue from pipe and is being emitted from the top of collar.
- 179 minutes - Insulation Failure of Specimen – maximum temperature rise of 180K is exceeded from the plasterboard above the collar on the unexposed face. The pipe appears to be returning to its original position.
- 181 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.

8.5 Performance

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

Specimen – SNAP HP315R Retrofit fire collar and Firesound sealant protecting a 315-mm (PVC-U) pipe

Structural adequacy	-	not applicable
Integrity	-	no failure at 181 minutes
Insulation	-	179 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 of the test specimen was:-

-/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 1 – SNAP HP315R Retrofit fire collar and Firesound sealant protecting a 315-mm (PVC-U) pipe	On P/B Wall 25-mm above Collar	S1
	On P/B Wall 25-mm Right of Collar	S2
	On top of Collar 25-mm from Plasterboard	S3
	On right side of Collar 25-mm from Plasterboard	S4
	On pipe 25-mm from collar left	S5
	On top of pipe 25-mm from collar	S6
	On pipe 25-mm from collar right	S7
Rover		S8
Ambient		S9

Appendix B – Photographs



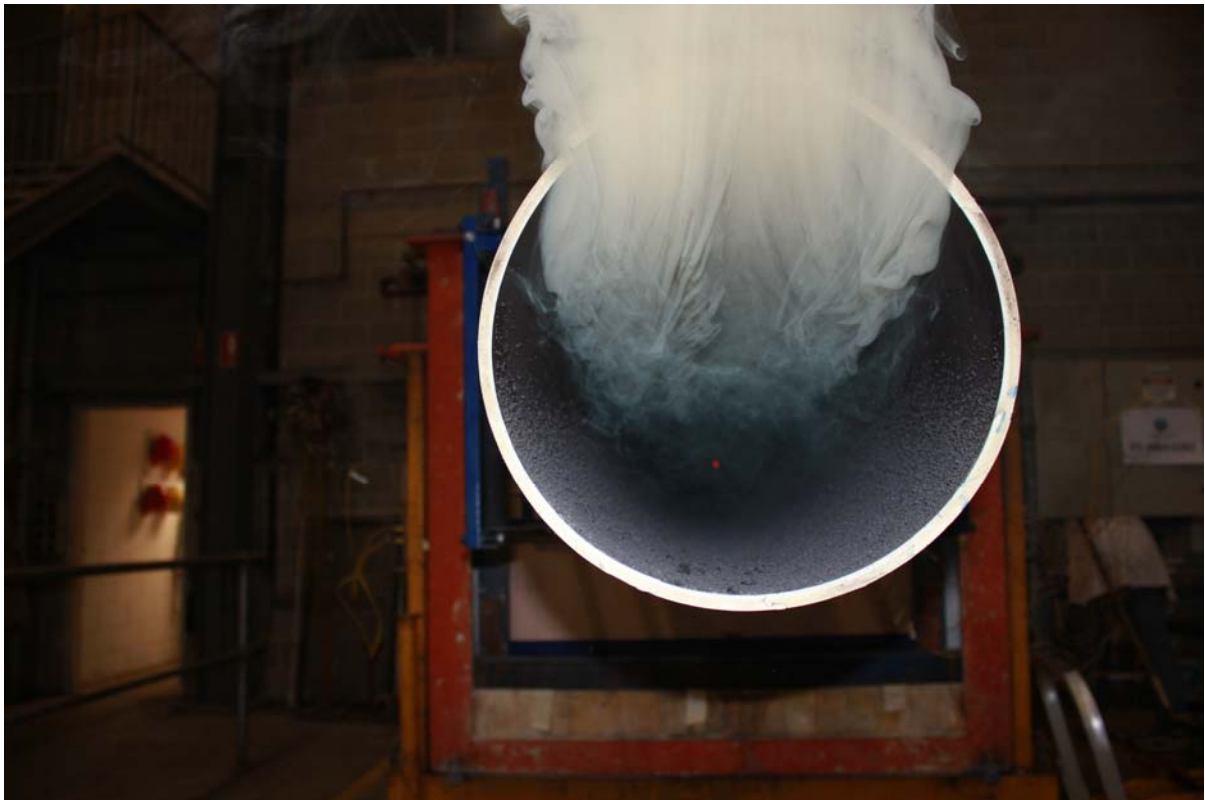
PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMEN PRIOR TO TESTING



PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMEN PRIOR TO TESTING



PHOTOGRAPH 3 – SPECIMEN AFTER 6 MINUTES OF TESTING



PHOTOGRAPH 4 – SPECIMEN AFTER 8 MINUTES OF TESTING



PHOTOGRAPH 5 – SPECIMEN AFTER 30 MINUTES OF TESTING



PHOTOGRAPH 6 – SPECIMEN AFTER 60 MINUTES OF TESTING



PHOTOGRAPH 7 – SPECIMEN AFTER 90 MINUTES OF TESTING



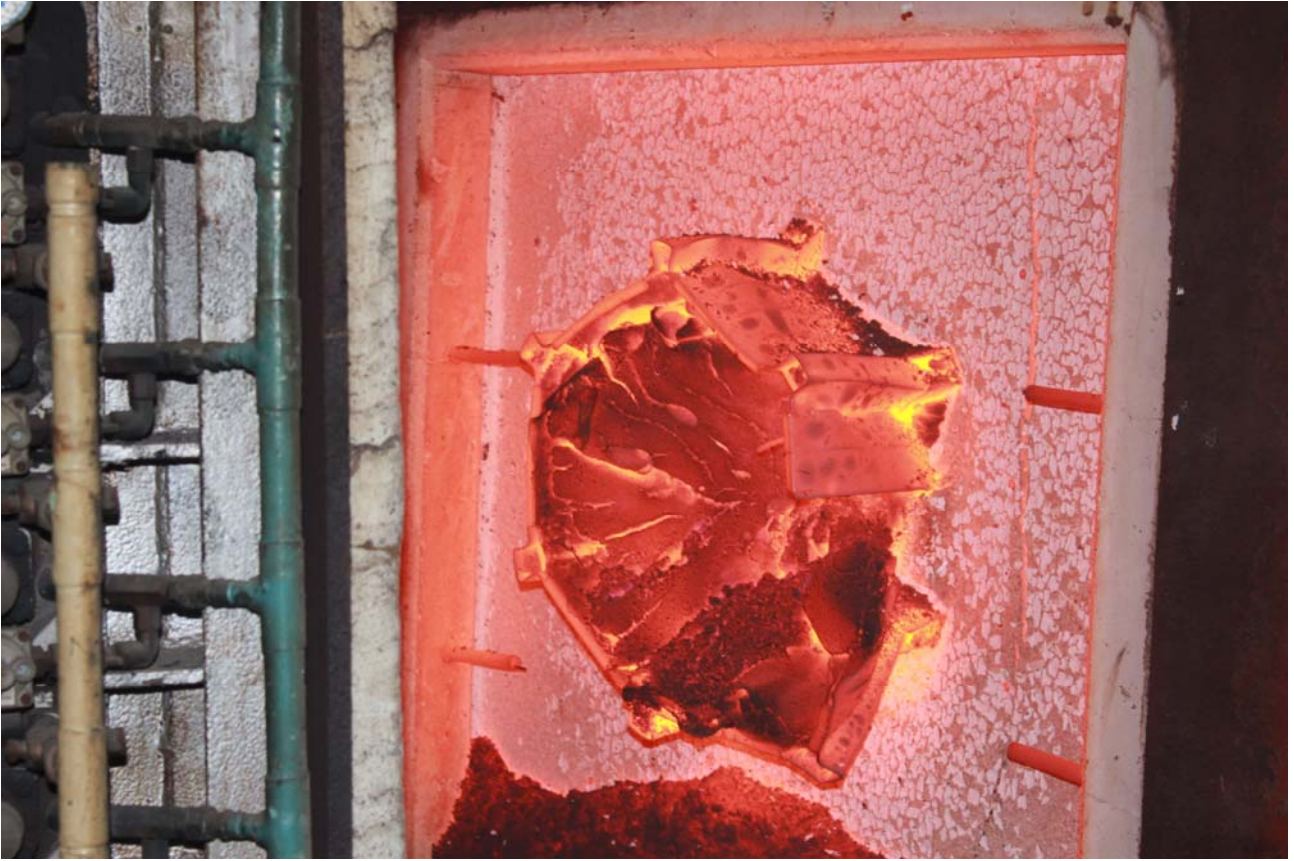
PHOTOGRAPH 8 – SPECIMEN AFTER 120 MINUTES OF TESTING



PHOTOGRAPH 9 – SPECIMEN AFTER 180 MINUTES OF TESTING



PHOTOGRAPH 10 – UNEXPOSED FACE OF SPECIMEN AT THE CONCLUSION OF TESTING



PHOTOGRAPH 11 – EXPOSED FACE OF SPECIMEN AT CONCLUSION OF TESTING

Appendix C – Furnace Temperature

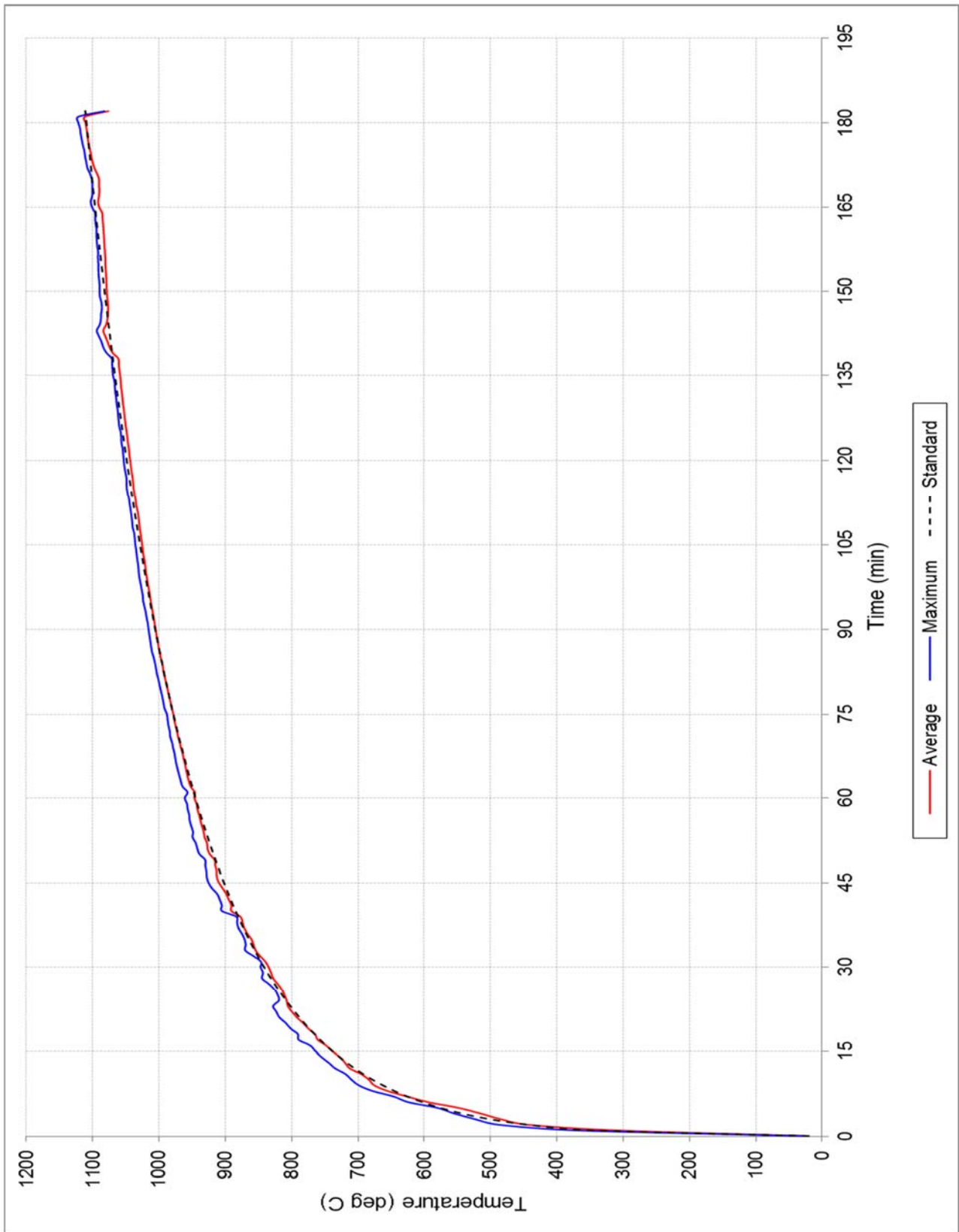


FIGURE 1 – FURNACE TEMPERATURE

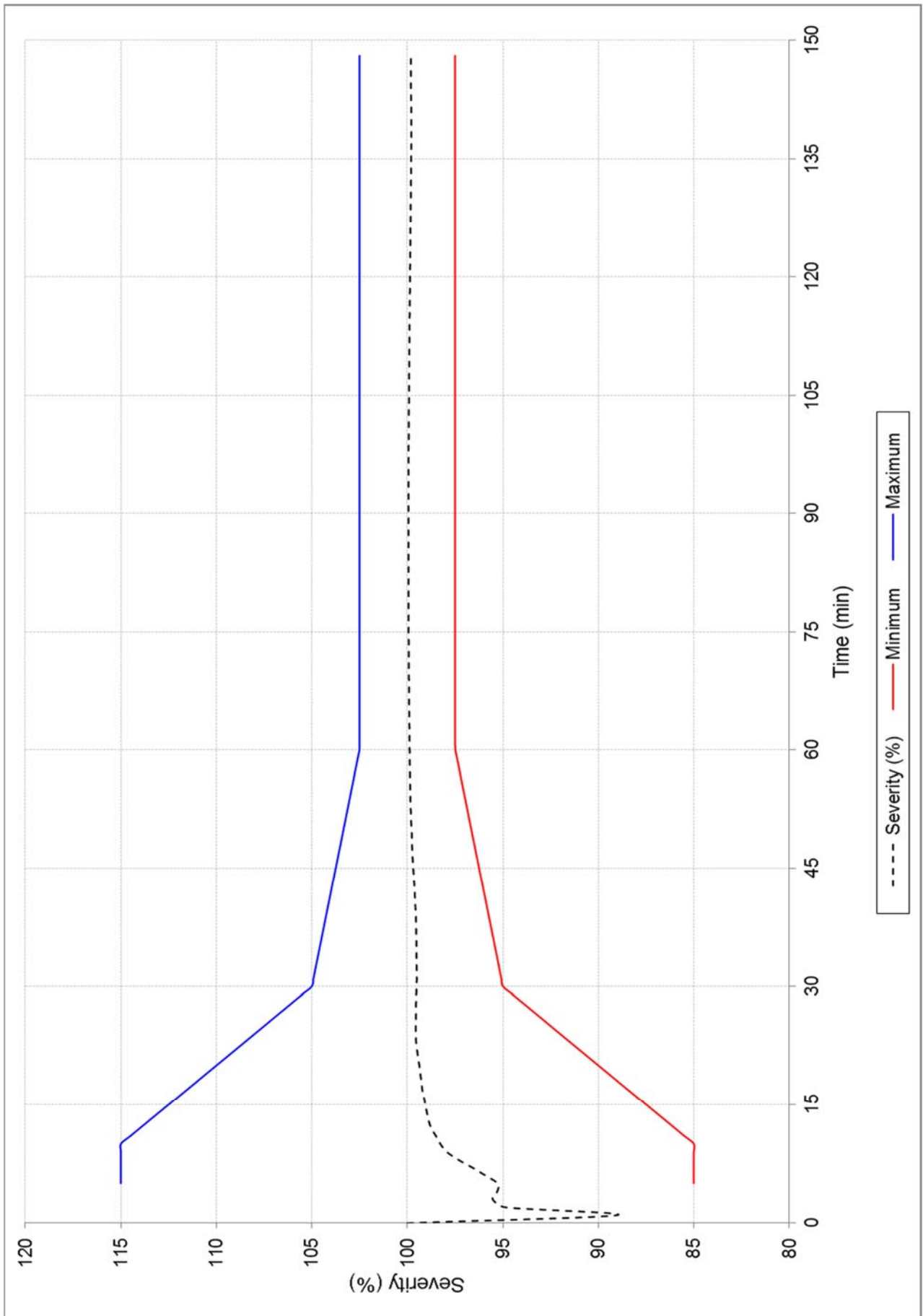


FIGURE 2 – FURNACE SEVERITY

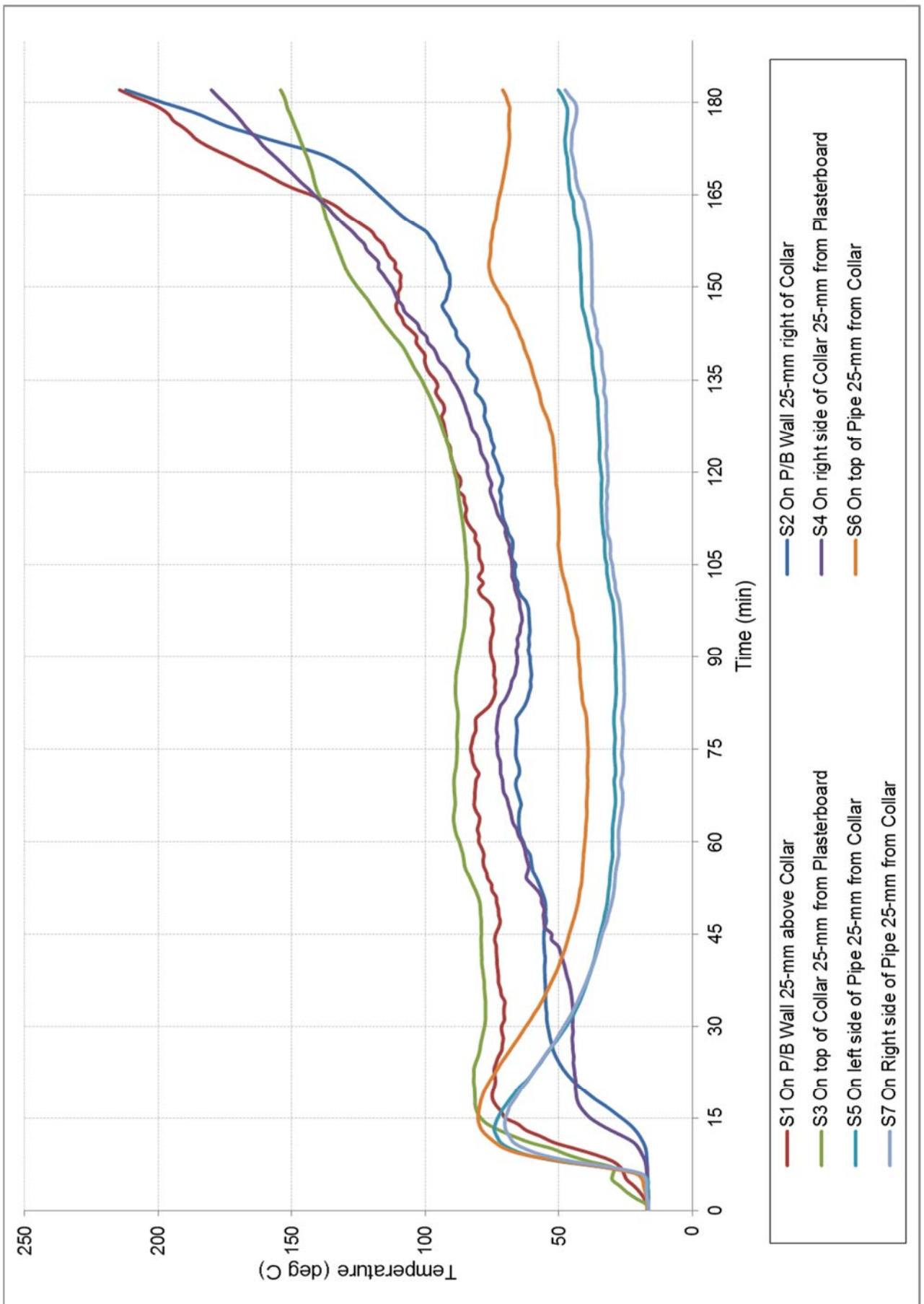
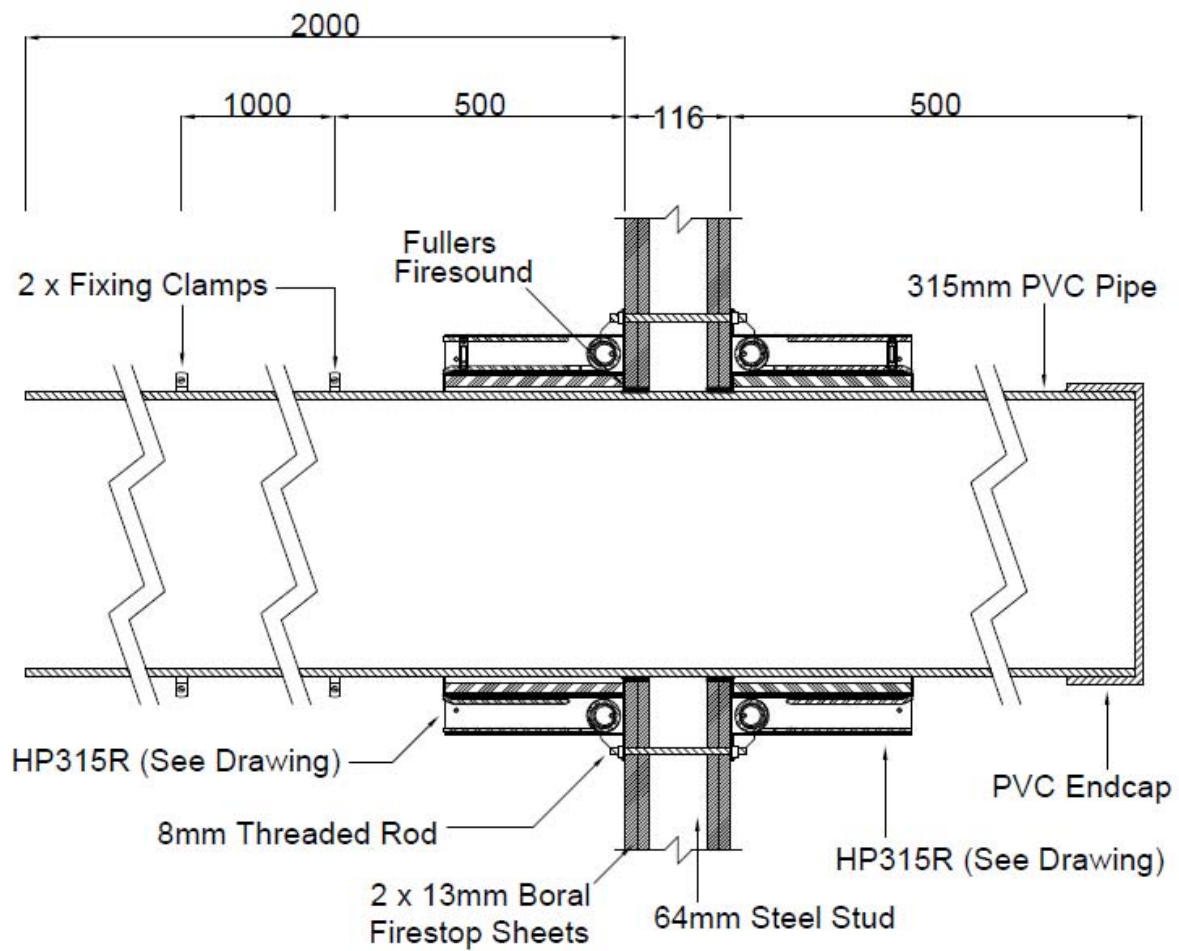


FIGURE 3 SPECIMEN TEMPERATURE

Specimen #1

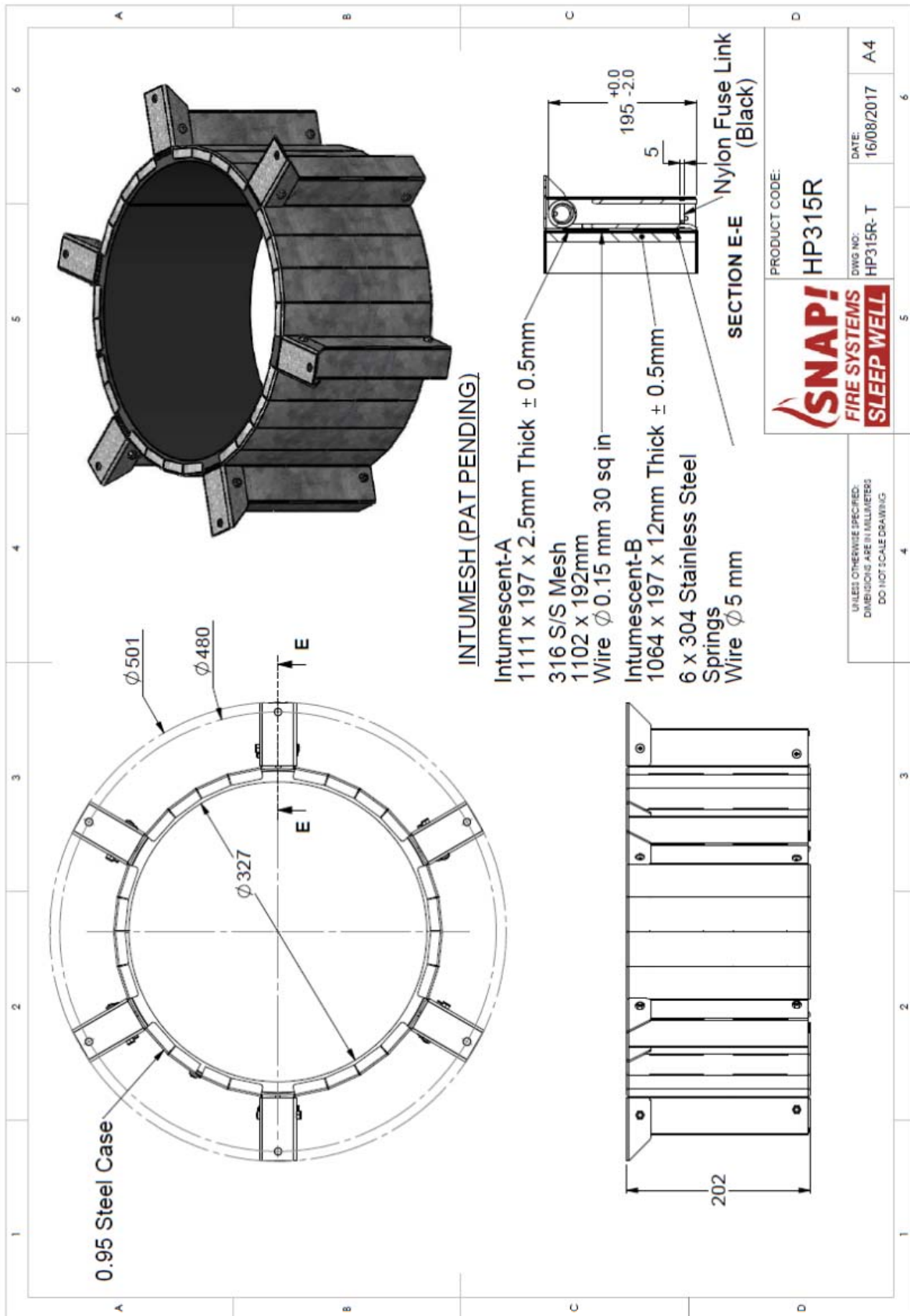
315 PVC Pipe & HP315R

Date: 25 SEP 2018



DRAWING TITLED "SPECIMEN #1 315 PVC PIPE & HP315R" DATED 25 SEPTEMBER 2018, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD.

Appendix E – Specimen Drawings



DRAWING NUMBERED HP315-R-T DATED 16 OCTOBER 2017, BY SNAP FIRE SYSTEMS PTY LTD.

Appendix F – 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		
<h2>Certificate of Test</h2>		No. 3185
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 Sponsored investigation report numbered FSP 1931.		
Product Name: SNAP HP315R Retrofit fire collar protecting a 315-mm PVC pipe.		
Description: The specimen comprised of a service penetrating wall system is described as a 116 mm thick plasterboard lined steel framed wall comprising two layers of 13 mm thick Fyrchek plasterboard on each side of 64 mm deep metal studs Boral reference 5B120.1 with an established FRL of -/120/120. The HP315R Retrofit collar comprised a 0.95-mm steel casing with a 327 mm inner diameter and a 501 mm diameter base flange. The 202-mm high collar casing incorporated a closing mechanism that comprised of two soft intumescent strips lined within the internal circumference of the collar. The inner and outer strips were 12-mm thick x 197-mm wide x 1064-mm long, and 2.5-mm thick x 197-mm wide x 1111-mm long, respectively. Between the strips was a layer of 316 stainless steel mesh 1102 mm long x 192-mm wide with a wire mesh diameter of 0.15-mm, as shown in drawing numbered HP315R-T dated 16 August 2017, 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 6 mounting brackets using 8-mm threaded rod and 12 x M8 nuts. The penetrating service comprised a 315-mm diameter Iplex Pipelines DWV PVC-U pipe, with a wall thickness of 8.4 mm which penetrated the wall through a 325-mm diameter cut-out hole as shown in drawing titled "Specimen # 1, 315 PVC-U Pipe & HP315R, dated 25 September 2018", 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, 750-mm and 1200-mm from the unexposed face of the plasterboard wall. The pipe was open at the unexposed end and sealed with a PVC-U 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 181 minutes
Insulation		179 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 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:	Peter Gordon	Date of Test: 26 September 2018
Issued on the 13 th day of December 2018 without alterations or additions.		
		
Brett Roddy Manager, Fire Testing and Assessments		
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COPY OF CERTIFICATE OF TEST – NO. 3185

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. |

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