

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

Test Report

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

Commercial-in-confidence

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

Sponsored Investigation No. FSP 1904

1 Introduction

1.1 Identification of specimen

The sponsor identified the specimen as a cast-in fire collar protecting a HDPE pipe penetrating a 150-mm thick concrete floor slab.

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 – 2005(R2016), 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 4758/4245

1.7 Test date

The fire-resistance test was conducted on 23 April 2018.

2 Description of specimen

2.1 General

The specimen comprised an 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by a total of two (2) stack pipes. All service penetrations were protected by fire collars.

A single stack pipe referenced as Specimen 2 penetrating the concrete slab is the subject of this report.



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

- AS/NZS 5065 – 2005(R2017) 'Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications'

For the purpose of the test, the specimens were referenced as Penetrations 1 and 2 as detailed in the table below. Documents containing a complete description of each specimen were supplied by the sponsor and are retained on file.

Specimen No.	Penetration details
1	Not being reported on.
2	SNAP H150S-RR cast in fire collar protecting a penetrated by a 110-mm OD (HDPE SDR26) Pipe.

Specimen 2 – SNAP H150S-RR cast in fire collar protecting a slab penetrated by a 110-mm OD (HDPE SDR26) pipe.

SEPARATING ELEMENT	
150-mm thick reinforced concrete slab.	
TYPE AND SIZE OF CONSTRUCTION	
Cast in fire collar	
PENETRATING SERVICE	
Description	Valsir 110 HDPE SDR26 pipe.
Size	A 110-mm OD, HDPE pipe with a wall thickness of 4.2-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face.
End conditions	Sealed on the exposed end with a HDPE Cap plug and left open on the unexposed end.
Supports	Approximately 500-mm and 1500-mm away from the wall on the unexposed face.
FIRE STOPPING SYSTEM	
Trade name	H150S-RR
Manufacturer	SNAP Fire Systems Pty Ltd
Description	The H150R-SS collar comprised a plastic casing with a 182-mm inner diameter and a 283-mm external diameter base flange. The 250-mm high collar casing incorporated a layer of 600-mm x 110-mm x 6-mm thick intumescent material, as shown in drawing titled H150S-RR-T provided by SNAP Pty Ltd.
Application	The Snap collar was cast face down on exposed face of the slab.
Photograph	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Unexposed face</p> </div> <div style="text-align: center;">  <p>Exposed face</p> </div> </div>
Drawing	Drawing titled “Specimen 2 110 HDPE Stack and H150S-RR” dated 12 April 2018, provided by Snap Fire Systems Pty Ltd.

2.2 Dimensions

The overall dimension of the concrete slab was 1150-mm wide x 1150-mm long x 150-mm thick, to suit the opening in the specimen containing frame.

2.3 Orientation

The reinforced concrete slab was placed horizontally on top of the furnace chamber, and subjected to fire exposure from the underside.

2.4 Conditioning

The specimen was delivered in early April 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 titled "Specimen 2 110 HDPE Stack and H150S-RR" dated 12 April 2018, provided by Snap Fire Systems Pty Ltd.

Drawing numbered H150S-RR-T, dated 29 September 2017 provided by SNAP 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 22°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 186 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
4 minutes -	Smoke is fluing from the pipe of Specimen 2
7 minutes -	The collar in Specimen 2 appears to have closed has the amount of smoke fluing has diminished
26 minutes -	A large amount of water is pooling at the base of Specimen 2
60 minutes -	Little visible change to Specimen 2.
90 minutes -	Little visible change to Specimen 2.
86 minutes -	Test terminated.

8.2 Furnace temperature

Figure 1 shows the standard curves of temperature versus time for heating the furnace chamber and the actual curves of average and maximum temperature versus time recorded during the heating period.

8.3 Furnace severity

Figure 2 shows the curve of furnace severity versus time during the heating period.

8.4 Specimen temperature

Figure 3 shows the curve of maximum temperature versus time associated with Specimen 2.

8.5 Performance

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

Specimen 2 SNAP H150S-RR cast in fire collar protecting a slab penetrated by a 110-mm OD (HDPE SDR26) Pipe

Structural adequacy	-	not applicable
Integrity	-	no failure at 186 minutes
Insulation	-	no failure at 186 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 specimen is as follows:

Specimen 2 - -/180/180

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

10 Field of direct application of test results

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

11 Tested by



Peter Gordon
Testing Officer

Appendices

Appendix A – Measurement location

Specimen	T/C Position	T/C designation
Specimen 2 – Valsir HDPE stack pipe 110-mm OD	On the slab – 25-mm from the pipe North	S6
	On the slab – 25-mm from the pipe South	S7
	On mastic - 25-mm from the slab N/W	S8
	On mastic - 25-mm from the slab S/E	S9
Rover		S10
Ambient		S11

Appendix B – Photographs



PHOTOGRAPH 1 – EXPOSED FACE OF SPECIMEN 2 PRIOR TO TESTING



PHOTOGRAPH 2 – UNEXPOSED FACE OF SPECIMEN 2 PRIOR TO TESTING



PHOTOGRAPH 3 – SPECIMEN 2 AFTER 7 MINUTES OF TESTING



PHOTOGRAPH 4 – SPECIMEN 2 AFTER 30 MINUTES OF TESTING



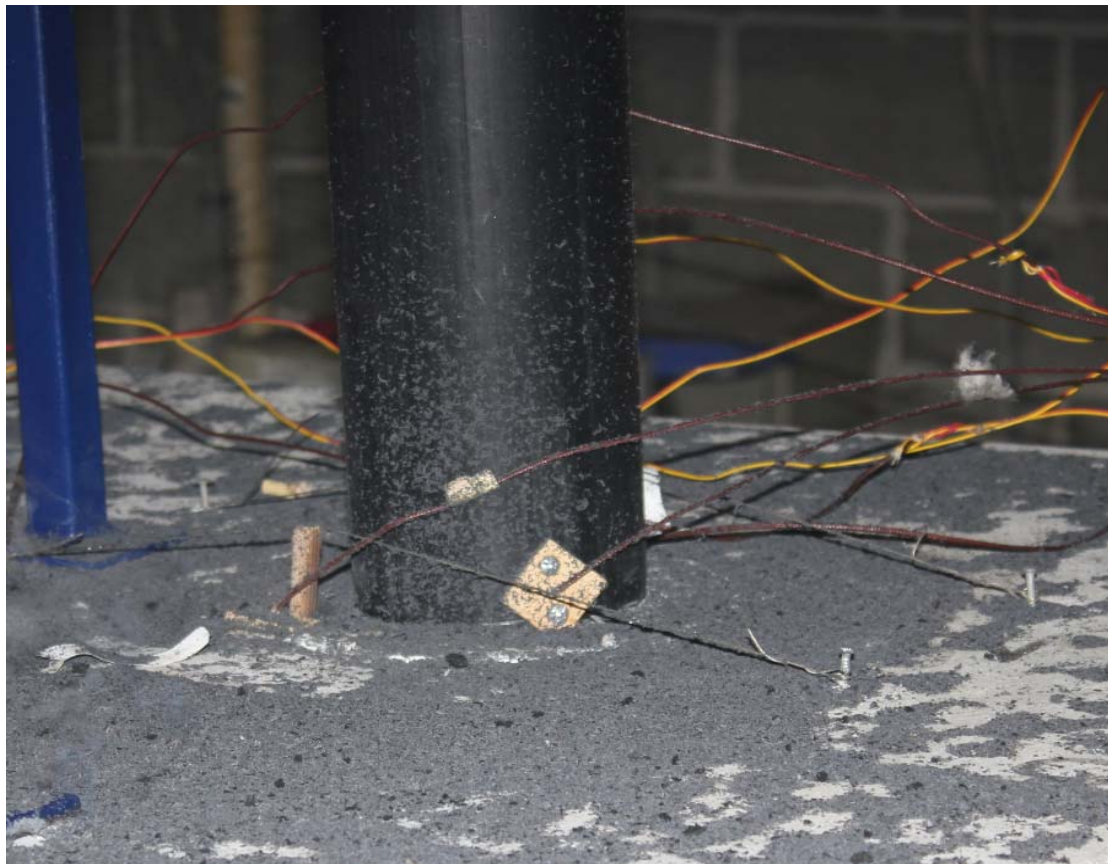
PHOTOGRAPH 5 – SPECIMEN 2 AFTER 60 MINUTES OF TESTING



PHOTOGRAPH 6 – SPECIMEN 2 AFTER 120 MINUTES OF TESTING



PHOTOGRAPH 7 – SPECIMEN 2 AFTER 180 MINUTES OF TESTING



PHOTOGRAPH 8 – UNEXPOSED FACE OF SPECIMEN 2 AT THE CONCLUSION OF TESTING



PHOTOGRAPH 9 – EXPOSED FACE OF SPECIMEN 2 AT CONCLUSION OF TESTING

Appendix C – Furnace Temperature

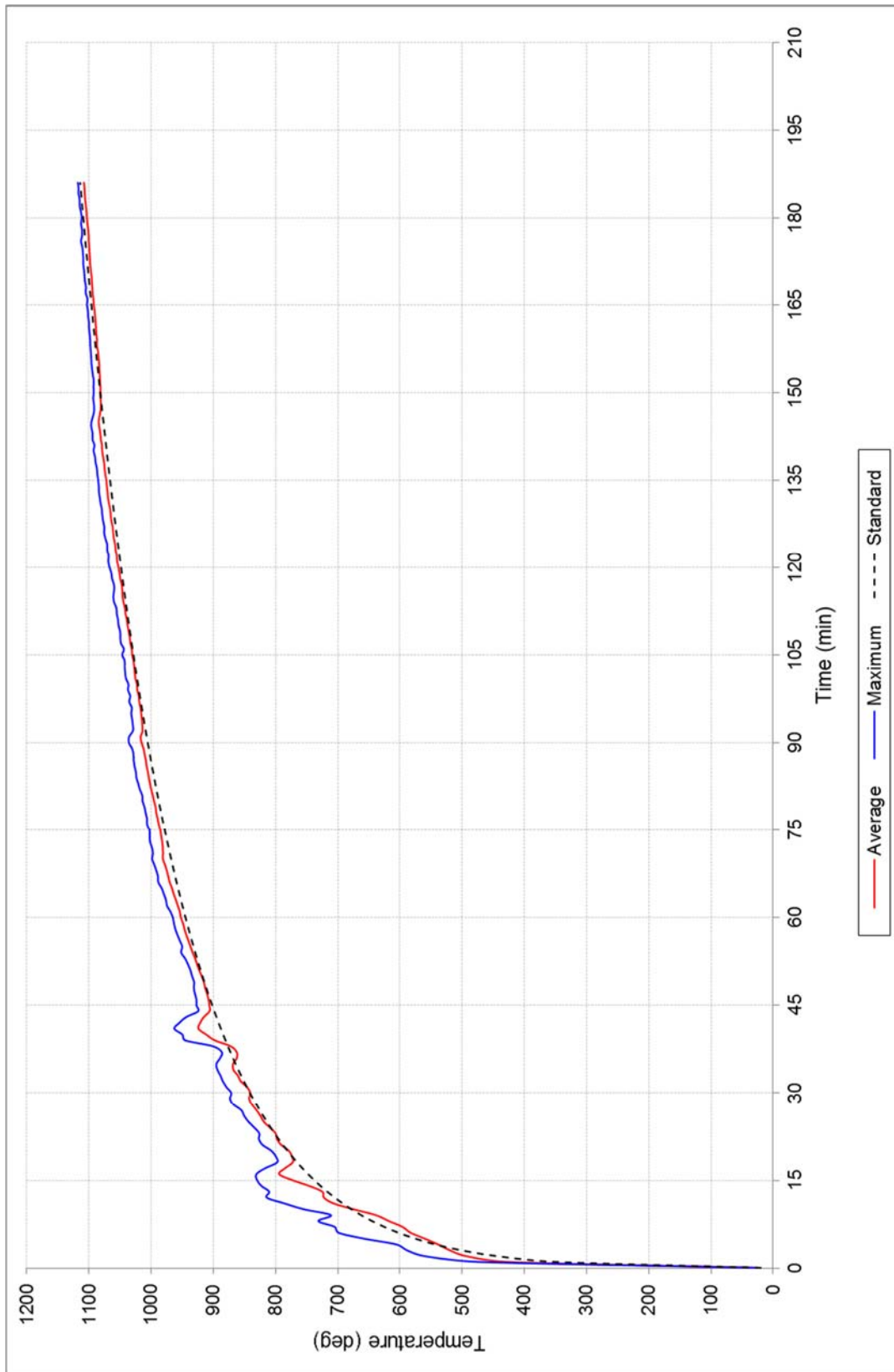


FIGURE 1 – FURNACE TEMPERATURE

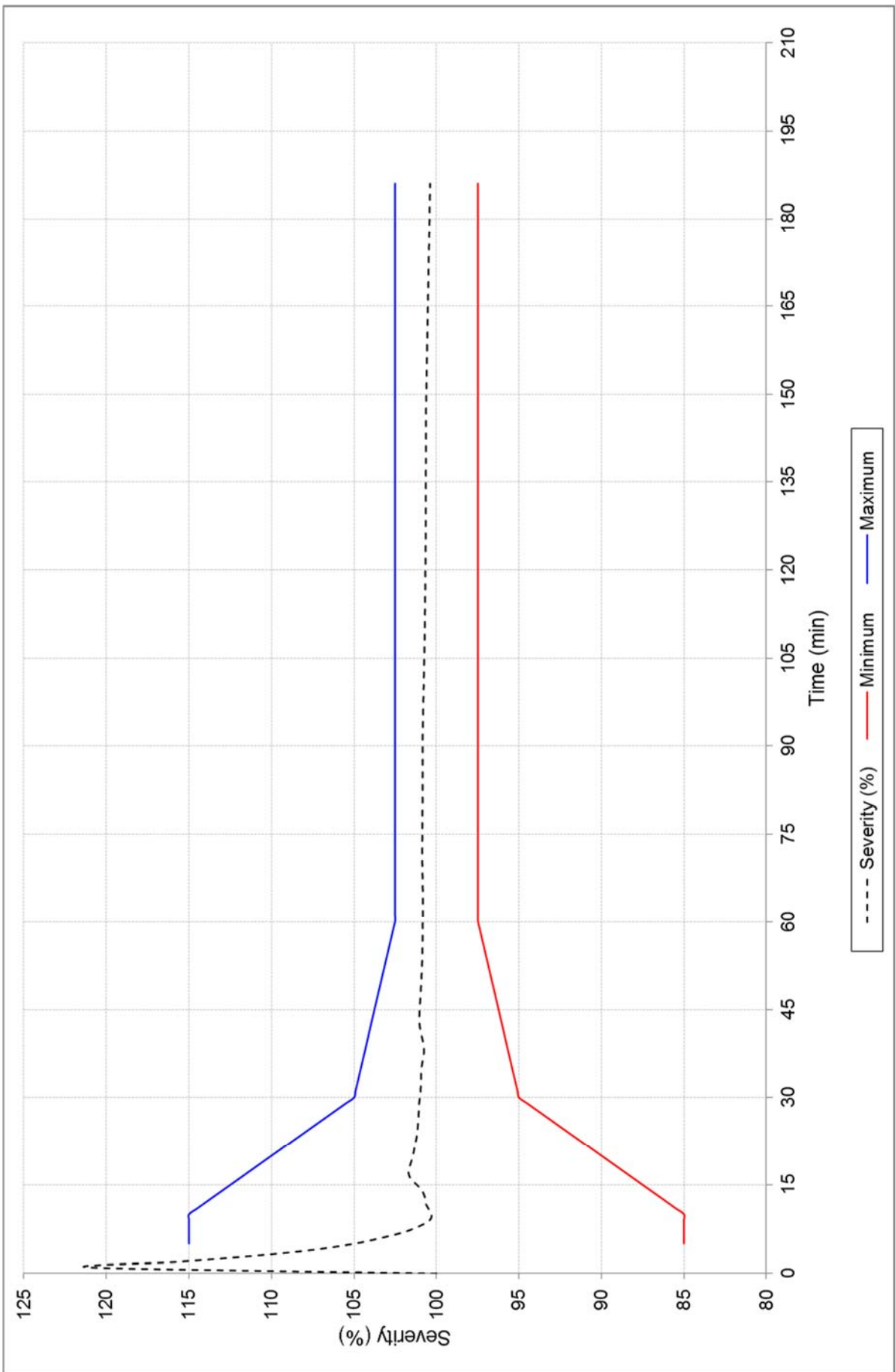


FIGURE 2 – FURNACE SEVERITY

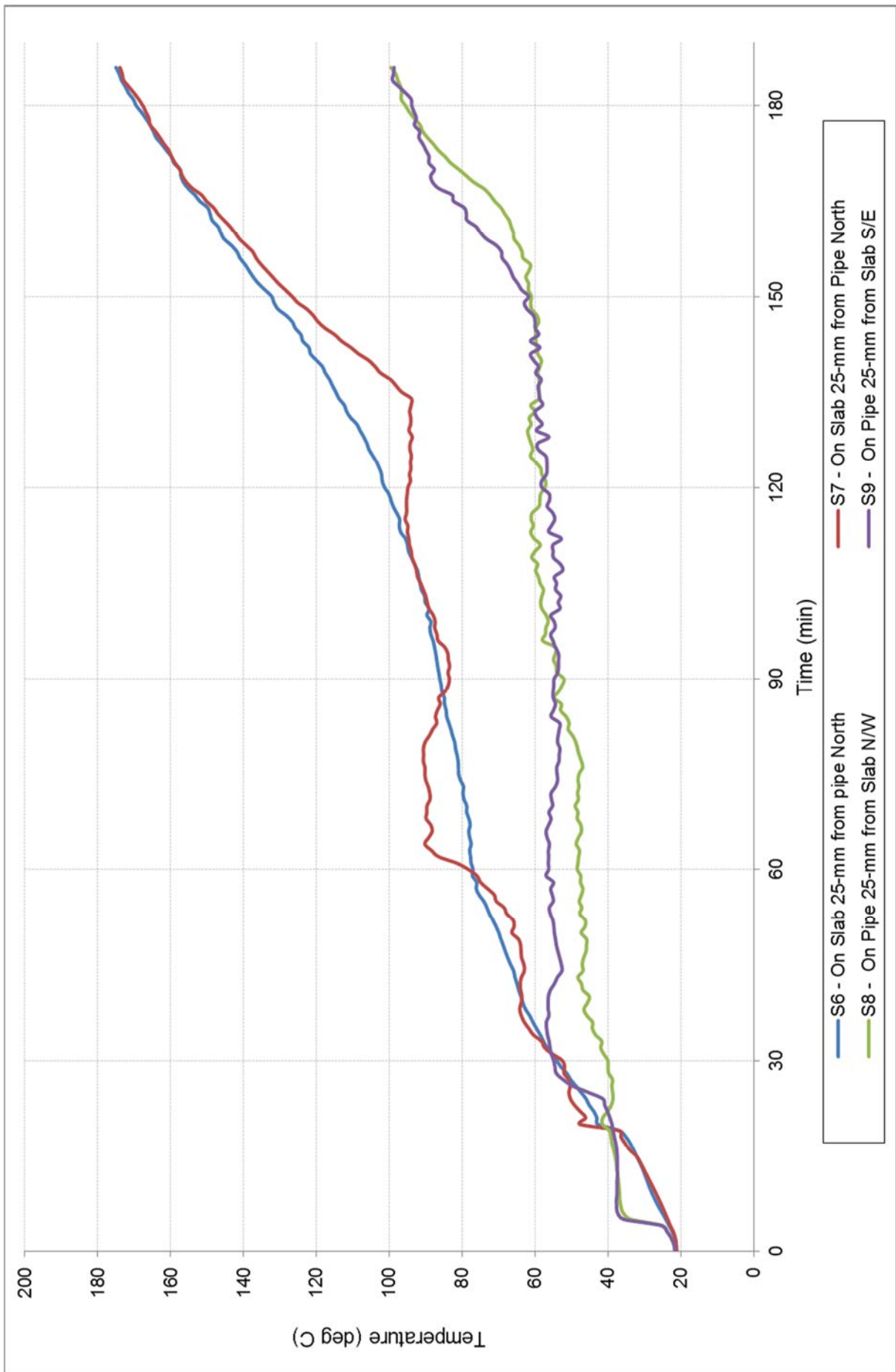
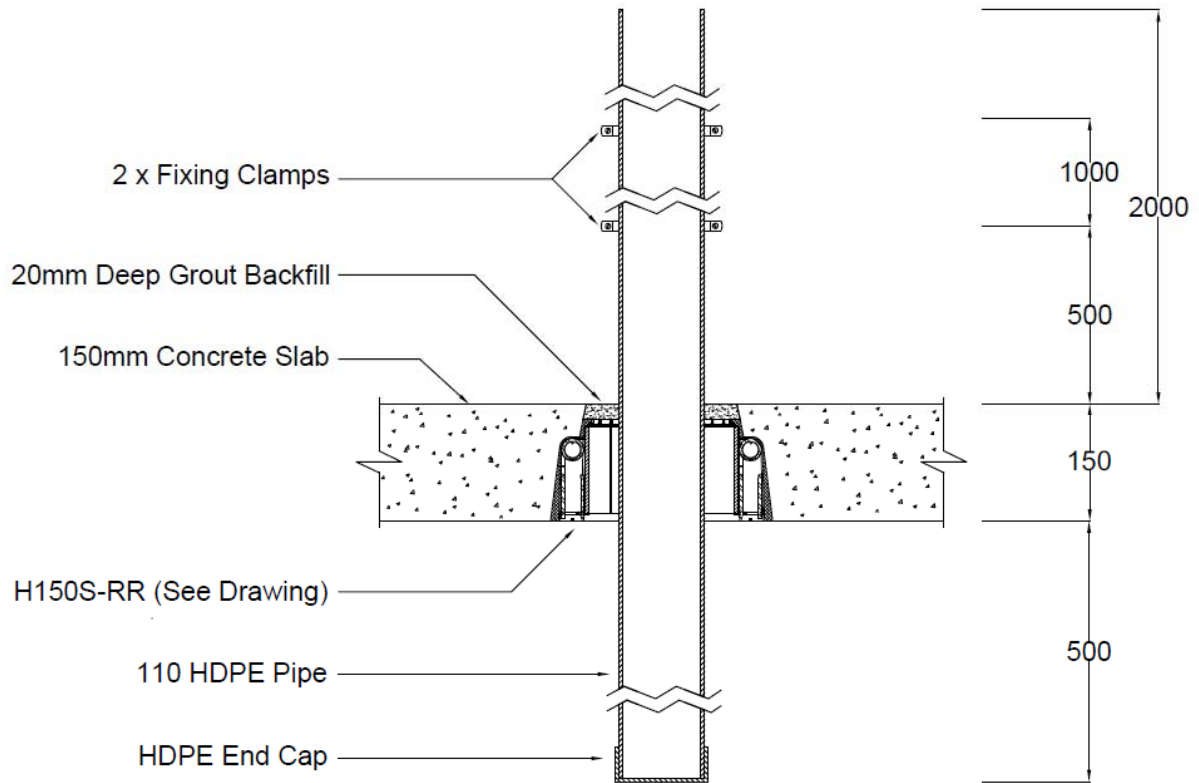


FIGURE 3 SPECIMEN TEMPERATURE – ASSOCIATED WITH PENETRATION # 2

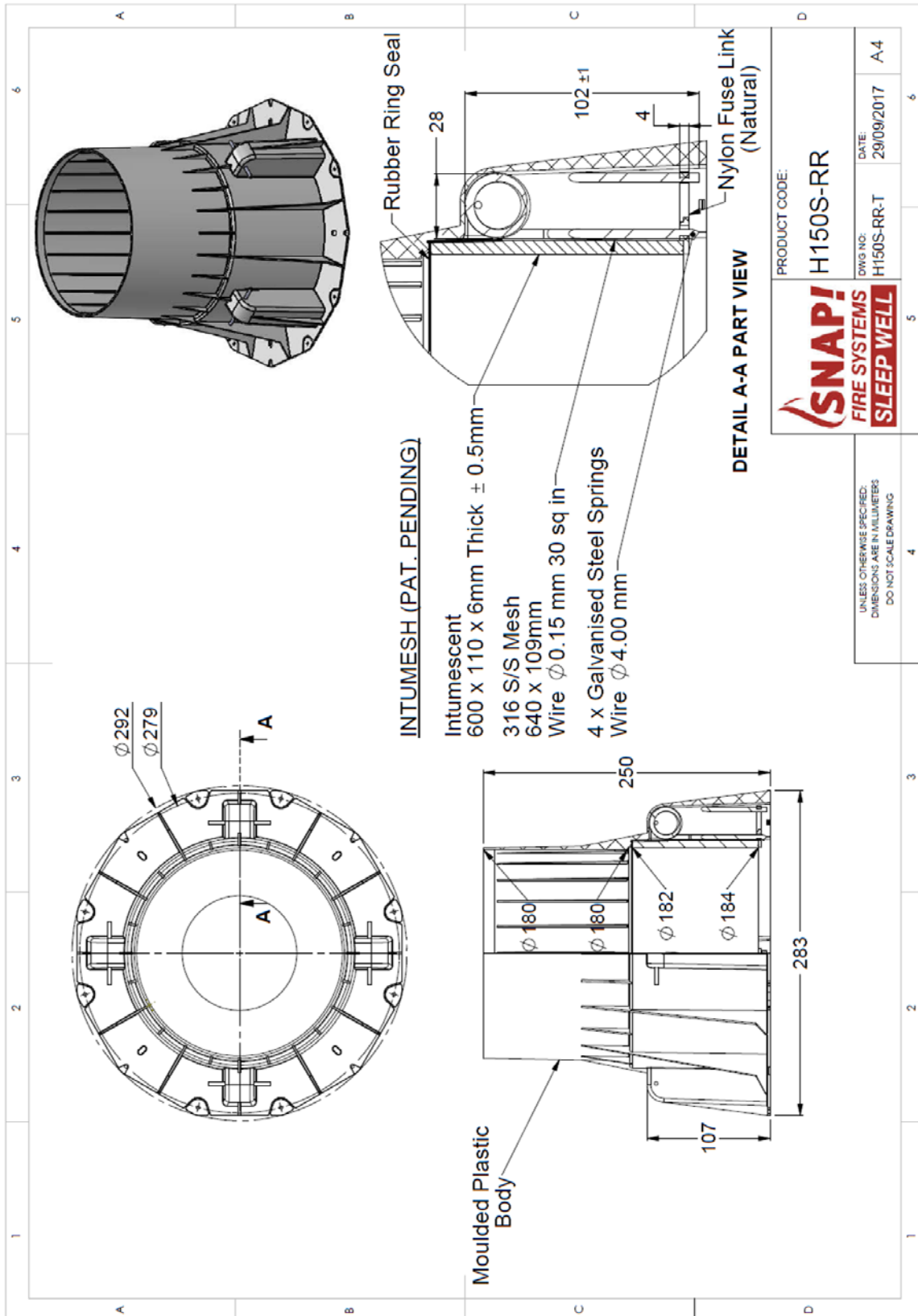
Appendix D –Installation drawing

Specimen #2
110 HDPE Stack & H150S-RR
Date: 12 APR 2018



DRAWING TITLED "SPECIMEN #2 110 HDPE STACK & H150S-RR" DATED 12 APRIL 2018, PROVIDED BY SNAP FIRE SYSTEMS PTY LTD.

Appendix E – Specimen Drawings



DRAWING NUMBERED H150S-RR DATED 29 SEPTEMBER 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. 3127
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 1904.		
Product Name: SNAP H150S-RR cast in fire collar protecting a slab penetrated by a 110-mm OD (HDPE SDR26) pipe		
Description: <u>Separating element</u> : 150-mm thick reinforced concrete slab. <u>Penetrating Service description</u> : Valsir 110 HDPE SDR26 pipe. A 110-mm OD, HDPE pipe with a wall thickness of 4.2-mm. The pipe extended 2000-mm from the unexposed side and 500-mm from the exposed face. <u>End conditions</u> : Sealed on the exposed end with a HDPE Cap plug and left open on the unexposed end. <u>Supports</u> : Approximately 500-mm and 1500-mm away from the wall on the unexposed face. <u>Fire stopping system</u> : The H150S-RR collar, manufactured by SNAP Fire Systems Pty Ltd, comprised a plastic casing with 182-mm inner dia. & 283-mm external dia. base flange. The 250-mm high collar casing incorporated a layer of 600-mm x 110-mm x 6-mm thick intumescent material. <u>Fire stopping Application</u> : The Snap collar was cast face down on exposed face of the slab. <u>Drawing</u> : Specimen 2 110 HDPE Stack and H150S-RR, dated 12 April 2018, provided by Snap Fire Systems Pty Ltd.		
Performance observed in respect of the following AS 1530.4-2014 criteria:		
Structural Adequacy		not applicable
Integrity		no failure at 186 minutes
Insulation		no failure at 186 minutes
and therefore for the purpose of Building Regulations in Australia, achieved a fire-resistance level (FRL) of -/180/180.		
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: 23 April 2018
Issued on the 10 th day of August 2018 without alterations or additions.		
		
Brett Roddy Manager, Fire Testing and Assessments		
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	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. 3127

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 (R2016) | Components for the protection of openings in fire-resistant separating elements. Part 1: Service penetrations and control joints. |

-----end of report-----

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