AGNITEK PTY LTD

FIRE RESISTANCE TEST REPORT

Test standard: Sections 2 and 10 of AS 1530.4:2014
Reference Standard: AS 4072.1-2005 AMDT 1 (Rec:2016)
Test sponsor**:** Agnitek Pty Ltd
Products: Agnitek fire collars and sealants protecting various penetrations in a 2 hour fire-rated wall system
Job number**:** FRT251395
Revision: R1.0
Test date: 10 July 2025

Accredited for compliance with ISO/IEC 17025 – Testing

JENSEN HUGHES

jensenhughes.com/pacific

ilac-MRA

NATA
Accreditation No. 3277

Quality management

Revision	Date	Revision description		
R1.0	29 July 2025	Initial issue.		
		Prepared	**Reviewed**	**Authorised**
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Jensen Hughes Fire Testing Pty Ltd
ABN 81 050 241 524
Formerly Warringtonfire Australia Pty Ltd[1]

[1] Warringtonfire Australia Pty Ltd was acquired by Jensen Hughes in December 2023. Jensen Hughes Fire Testing Pty Ltd is not affiliated, associated, authorised, or endorsed by Warringtonfire Australia Pty Ltd, Warringtonfire Testing and Certification Limited or its "Warringtonfire" or "Certifire" brands.

Executive summary

This report documents the findings of the fire resistance test of penetration systems in accordance with sections 2 and 10 of AS 1530.4:2014 with reference to AS 4072.1–2005 AMDT 1 (Rec:2016). The testing was done on 10 July 2025.

Jensen Hughes performed the test at the request of Agnitek Pty Ltd.

Table 1 provides details of the test assembly, and Table 2 provides a summary of the test specimen. A summary of the results is provided in Table 3.

Table 1 Test assembly

Item	Detail	
Separating element	2-hour fire rated plasterboard wall	
Nominal separating element size	Width	1200 mm
	Height	1200 mm
	Thickness	116 mm
Number of penetration systems	Ten	
Restraint conditions	Restrained on all edges	

Table 2 Test specimen

Penetration system	Service	Local fire-stopping protection	Local aperture size (mm)
A	DN40 DWV uPVC pipe with straight coupling	AGNI-Collar40 with AGNI-Seal	Ø57
B	DN50 DWV uPVC pipe with straight coupling	AGNI-Collar50 with AGNI-Seal	Ø70
C	DN65 DWV uPVC pipe with straight coupling	AGNI-Collar65 with AGNI-Seal	Ø80
D	DN80 DWV uPVC pipe with straight coupling	AGNI-Collar80 with AGNI-Seal	Ø95
E	DN100 DWV uPVC pipe with straight coupling	AGNI-Collar100 with AGNI-Seal	Ø127
F	DN150 DWV uPVC pipe with straight coupling	AGNI-Collar150 with AGNI-Seal	Ø165
G	DN40 DWV uPVC pipe E-Flex® insulation	AGNI-Collar40 with AGNI-Seal	Ø65
H	DN25 uPVC pressure pipe	AGNI-Black	Ø48.6
I	Optical fibre cable	AGNI-Black	Ø5
J	+ 8 × optical fibre cables + Ø25 mm uPVC conduit	AGNI-Black	Ø35

Table 3 Test results

Penetration system	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
B	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
C	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
D	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
E	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
F	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
G	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
H	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
I	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
J	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	

Note: The FRLs for the specimens A to G only apply to the tested orientation. As the FRL was only determined for one direction, an FRL cannot be assigned for the other direction.

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1.0 Introduction

This report documents the findings of the fire resistance test of penetration systems in accordance with sections 2 and 10 of AS 1530.4:2014 with reference to AS 4072.1–2005 AMDT 1 (Rec:2016). The testing was done on 10 July 2025.

Jensen Hughes performed the test at the request of the test sponsor listed in Table 4.

Table 4 Test sponsor details

Test sponsor	Address
Agnitek Pty Ltd	8 Clare Street Baywater VIC 3153 Australia

2.0 Test specimen

2.1 Schedule of components

Table 5 describes the test specimen and lists the schedule of components. These were provided by the test sponsor and surveyed by Jensen Hughes.

All measurements were done by Jensen Hughes – unless indicated otherwise.

Detailed drawings of the test specimen are provided in Appendix A.

Table 5 Schedule of components

Item	Description		
Separating element (SE)			
1.	Item name	Wall frame	
	Product name	+ Rondo 64 steel studs + Rondo 64 steel noggings + Rondo 64 steel tracks	
	Manufacturer	Rondo Building Services Pty Ltd	
	Size	Rondo 64 steel studs	64 mm × 36 mm × 0.50 BMT
		Rondo 64 steel noggings	64 mm × 28 mm × 0.50 BMT
		Rondo 64 steel tracks	64 mm × 28 mm × 0.50 BMT
	Material	Galvanised steel	
2.	Item name	Fire rated plasterboard	
	Product name	GYPROCK® FYRCHEK™ plasterboard	
	Manufacturer	CSR Building Products Ltd	
	Size	13 mm × 1200 mm × 3600 mm (cut to size)	
	Areal density	11 kg/m²	
3.	Item name	Button head screws	
	Product name	#8 × 12 mm, button head, needle point, zinc yellow screws	
	Manufacturer	CSR Building Products Ltd	
4.	Item name	First layer plasterboard screws	
	Product name	#6 × 32 mm, bugle head, needle point, fine thread plasterboard screws	
	Manufacturer	CSR Building Products Ltd	
5.	Item name	Second layer plasterboard screws	
	Product name	#6 × 40 mm, bugle head, needle point, fine thread plasterboard screws	
	Manufacturer	CSR Building Products Ltd	
6.	Item name	Masonry anchors	
	Product name	Ø6 × 50 mm, hexagonal flange head, zinc plated masonry screw anchor	
	Manufacturer	Bremick Fasteners	
7.	Item name	Acrylic sealant	
	Product name	GYPROCK® fire mastic acrylic sealant	

Item	Description		
	Manufacturer	CSR Building Products Ltd	
SE	Overall size	1200 mm × 1200 mm × 116 mm	
	Restraint conditions	Restrained on all edges	
	Installation	+ The wall system consisted of 64 mm deep wall framing (item 1) clad with two layers of fire rated plasterboard (item 2) on both the exposed and unexposed sides. + The wall frame system was secured to the test frame using masonry anchors (item 6) located at nominal 500 mm centres, starting 50 mm from both edges. + The inner layer of plasterboard was secured to the steel frame system using first layer plasterboard screws (item 4), along the studs at 600 mm vertical centres. + The outer layer of plasterboard was secured to the steel frame system using plasterboard screws (item 5), along the studs at 300 mm vertical centres. + There was a nominal 5 mm perimeter gap between the edges of the plasterboard and the test frame blockwork. + The gap around the perimeter of the plasterboard was filled with acrylic sealant (item 7) to the full depth of the plasterboard and finished flush on both he exposed and the unexposed sides.	
Fire-stopping protections			
Sealant			
8.	Item name	Fire rated acrylic sealant	
	Product name	AGNI-Seal	
	Manufacturer	Agnitek Pty Ltd	
	Density	1510 kg/m^3	
	Batch number	SEGR600310124	
9.	Item name	Fire rated intumescent sealant	
	Product name	AGNI-Black	
	Density	1220 kg/m³ (provided by supplier)	
		1166 kg/m³ (measured)	
	Batch number	MR191124	
Fire collar			
10.	Item name	40 mm fire collar	
	Product name	AGNI-Collar40	
	Manufacturer	Agnitek Pty Ltd	
	Collar details	Outer diameter	63 mm
		Inner diameter	52 mm
		Depth	49 mm
		Number of fixing tabs	2
		Outer shell material	Powder coated mild steel
		Outer shell thickness	0.8 mm BMT
		Number of layers	1

Item	Description		
	Intumescent details	Width	47 mm
		Thickness	3.5 mm
		Density	1232 kg/m^3
	Batch number	Not present	
11.	Item name	50 mm fire collar	
	Product name	AGNI-Collar50	
	Manufacturer	Agnitek Pty Ltd	
	Collar details	Outer diameter	88 mm
		Inner diameter	70 mm
		Depth	49 mm
		Number of fixing tabs	3
		Outer shell material	Powder coated mild steel
		Outer shell thickness	0.8 mm BMT
	Intumescent details	Number of layers	2
		Width	47 mm
		Thickness	3.5 mm
		Density	1232 kg/m^3
	Batch number	Not present	
12.	Item name	65 mm fire collar	
	Product name	AGNI-Collar65	
	Manufacturer	Agnitek Pty Ltd	
	Collar details	Outer diameter	102 mm
		Inner diameter	84 mm
		Depth	49 mm
		Number of fixing tabs	3
		Outer shell material	Powder coated mild steel
		Outer shell thickness	0.8 mm BMT
	Intumescent details	Number of layers	2
		Width	47 mm
		Thickness	3.5 mm
		Density	1232 kg/m^3
	Batch number	Not present	
13.	Item name	80 mm fire collar	
	Product name	AGNI-Collar80	
	Manufacturer	Agnitek Pty Ltd	
	Collar details	Outer diameter	120 mm
		Inner diameter	102 mm

Item	Description		
		Depth	49 mm
		Number of fixing tabs	3
		Outer shell material	Powder coated mild steel
		Outer shell thickness	0.8 mm BMT
	Intumescent details	Number of layers	2
		Width	47 mm
		Thickness	3.5 mm
		Density	1232 kg/m^3
	Batch number	Not present	
14.	Item name	100 mm fire collar	
	Product name	AGNI-Collar100	
	Manufacturer	Agnitek Pty Ltd	
	Collar details	Outer diameter	145 mm
		Inner diameter	127 mm
		Depth	49 mm
		Number of fixing tabs	4
		Outer shell material	Powder coated mild steel
		Outer shell thickness	0.8 mm BMT
	Intumescent details	Number of layers	2
		Width	47 mm
		Thickness	3.5 mm
		Density	1232 kg/m^3
	Batch number	Not present	
15.	Item name	150 mm fire collar	
	Product name	AGNI-Collar150	
	Manufacturer	Agnitek Pty Ltd	
	Collar details	Outer diameter	190 mm
		Inner diameter	160 mm
		Depth	79 mm
		Number of fixing tabs	6
		Outer shell material	Galvanised steel
		Outer shell thickness	0.8 mm BMT
	Intumescent details	Number of layers	3
		Width	76 mm
		Thickness	3.5 mm
		Density	1232 kg/m^3
	Batch number	Not present	

Item	Description		
Services			
16.	Item name	DN40 DWV uPVC Pipe	
	Product name	PIPE KING BEP PVC 40 DWV PVCU	
	Manufacturer	Pipe King	
	Material	uPVC	
	Size	Outer diameter	43 mm
		Wall thickness	2.4 mm
17.	Item name	DN50 DWV uPVC Pipe	
	Product name	PIPE KING BEP PVC 50 DWV PVCU	
	Manufacturer	Pipe King	
	Material	uPVC	
	Size	Outer diameter	56 mm
		Wall thickness	2.5 mm
18.	Item name	DN65 DWV uPVC Pipe	
	Product name	PIPE KING BEP PVC 65 DWV PVCU	
	Manufacturer	Pipe King	
	Material	uPVC	
	Size	Outer diameter	68 mm
		Wall thickness	2.8 mm
19.	Item name	DN80 DWV uPVC Pipe	
	Product name	PIPE KING BEP PVC 80 DWV PVCU	
	Manufacturer	Pipe King	
	Material	uPVC	
	Size	Outer diameter	83 mm
		Wall thickness	3.0 mm
20.	Item name	DN100 DWV uPVC Pipe	
	Product name	PIPE KING BEP PVC 100 DWV PVCU SN6SC	
	Manufacturer	Pipe King	
	Material	uPVC	
	Size	Outer diameter	111 mm
		Wall thickness	4.0 mm
21.	Item name	DN150 DWV uPVC Pipe	
	Product name	PIPE KING BEP PVC 150 DWV PVCU SN4SC	
	Manufacturer	Pipe King	
	Material	uPVC	
	Size	Outer diameter	160 mm
		Wall thickness	5.0 mm

Item	Description		
22.	Item name	Ø 25 mm uPVC conduit	
	Product name	Aussie Duct BEP PVC uPVC communications conduit 25 mm ID 0/60	
	Manufacturer	Aussie Duct	
	Material	uPVC	
	Size	Outer diameter	25.0 mm
		Wall thickness	2.0 mm
23.	Item name	DN25 uPVC pressure pipe	
	Product name	BEP PVC Series 1 25 PVCU PN12 25.01.15 Syd AS/NZS1477 Lic 21919	
	Manufacturer	Pipe King	
	Material	uPVC	
	Size	Outer diameter	33.8 mm
		Wall thickness	2.0 mm
24.	Item name	Optical fibre cable	
	Product name	MSS Data solution 2F 9/125 4.3 mm LSZH IOR MSS-CAB IOR-02-SM-TL E1508 0038 08/20	
	Product number	MSS-CAB-IOR-02-SM-YL	
	Supplier	MSS Data solution	
	Size	Outer diameter	4.4 mm
25.	Item name	Pipe insulation	
	Product name	E-Flex® ST BS 476 FR-V NFPA-274 Si 13 mm WT × 42 mm ID	
	Supplier	Reece Limited	
	Size	Outer diameter	67.8 mm
		Wall thickness	13 mm
26.	Item name	DN40 straight coupling (socket)	
	Supplier	Pipe king	
	Size	Length	56 mm
		Wall thickness	2.6 mm
27.	Item name	DN50 straight coupling (socket)	
	Supplier	Pipe king	
	Size	Length	65 mm
		Wall thickness	2.2 mm
28.	Item name	DN65 straight coupling (socket)	
	Supplier	Pipe king	
	Size	Length	75 mm
		Wall thickness	2.5 mm
29.	Item name	DN80 straight coupling (socket)	
	Supplier	Pipe king	
	Size	Length	85 mm

Item	Description		
		Wall thickness	2.7 mm
30.	Item name	DN100 straight coupling (socket)	
	Supplier	Pipe king	
	Size	Length	110 mm
		Wall thickness	2.6 mm
31.	Item name	DN150 straight coupling (socket)	
	Supplier	Pipe king	
	Size	Length	155 mm
		Wall thickness	3.4 mm
Fixings			
32.	Item name	Fire collar screws	
	Product description	#10-8 × 50 mm, ZINC YELLOW PASSIVATE CHIPBOARDCSK RIBBED AS3566 PHILLIPS DRIVE	
	Manufacturer	DRiLLX	
	LOT	H230999	
Penetration system A			
A	Service	1 × DN40 DWV uPVC pipe (item 16) with DN40 straight coupling (item 26)	
	Service detail	The service was installed through the aperture in the separating element. The service protruded nominally 500 mm on the exposed side and extended 2000 mm on the unexposed side. Two lengths of pipe were combined using a straight coupling (item 26) to make full tested length. The straight coupling was installed such that it was wholly on the exposed side of separating wall butting up against the wall. The exposed side of the pipe system was capped using a uPVC end cap.	
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.	
	Aperture size	Ø57 mm	
	Annular gap	7.1 mm	
	Local fire-stopping protection		
	Protection	Fire rated acrylic sealant (item 8) was applied in the annular gap to a nominal depth of 13 mm, on both the exposed and unexposed sides. A 40 mm fire collar (item 10) was installed around the service on both the exposed and the unexposed sides, and fixed to the separating element using two fire collar screws (item 32)	
Penetration system B			
B	Service	1 × DN50 DWV uPVC pipe (item 17) with DN50 straight coupling (item 27)	
	Service detail	The service was installed through the aperture in the separating element. The service protruded nominally 500 mm on the exposed side and extended 2000 mm on the unexposed side.	

Item	Description	
		Two lengths of pipe were combined using a straight coupling (item 27) to make full tested length. The straight coupling was installed such that it was wholly on the exposed side of separating wall butting up against the wall. The exposed side of the pipe system was capped using a uPVC end cap.
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.
	Aperture size	Ø70 mm
	Annular gap	7.1 mm
	Local fire-stopping protection	
	Protection	Fire rated acrylic sealant (item 8) was applied in the annular gap to a nominal depth of 13 mm, on both the exposed and unexposed sides. A 50 mm fire collar (item 11) was installed around the service on both the exposed and the unexposed sides, and fixed to the separating element using three fire collar screws (item 32)
Penetration system C		
C	Service	1 × DN65 DWV uPVC pipe (item 18) with DN65 straight coupling (item 28)
	Service detail	The service was installed through the aperture in the separating element. The service protruded nominally 500 mm on the exposed side and extended 2000 mm on the unexposed side. Two lengths of pipe were combined using a straight coupling (item 28) to make full tested length. The straight coupling was installed such that it was wholly on the exposed side of separating wall butting up against the wall. The exposed side of the pipe system was capped using a uPVC end cap.
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.
	Aperture size	Ø80 mm
	Annular gap	5.6 mm
	Local fire-stopping protection	
	Protection	Fire rated acrylic sealant (item 8) was applied in the annular gap to a nominal depth of 13 mm, on both the exposed and unexposed sides. A 65 mm fire collar (item 12) was installed around the service on both the exposed and the unexposed sides, and fixed to the separating element using three fire collar screws (item 32)
Penetration system D		
D	Service	1 × DN80 DWV uPVC pipe (item 19) with DN80 straight coupling (item 29)
	Service detail	The service was installed through the aperture in the separating element. The service protruded nominally 500 mm on the exposed side and extended 2000 mm on the unexposed side. Two lengths of pipe were combined using a straight coupling (item 29) to make full tested length. The straight coupling was installed such that it was wholly on the exposed side of separating wall butting up against the wall. The exposed side of the pipe system was capped using a uPVC end cap.
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.
	Aperture size	Ø95 mm

Item	Description	
	Annular gap	6.3 mm
	Local fire-stopping protection	
	Protection	Fire rated acrylic sealant (item 8) was applied in the annular gap to a nominal depth of 13 mm, on both the exposed and unexposed sides. A 80 mm fire collar (item 13) was installed around the service on both the exposed and the unexposed sides, and fixed to the separating element using three fire collar screws (item 32)
Penetration system E		
E	Service	1 × DN100 DWV uPVC pipe (item 20) with DN100 straight coupling (item 30)
	Service detail	The service was installed through the aperture in the separating element. The service protruded nominally 500 mm on the exposed side and extended 2000 mm on the unexposed side. Two lengths of pipe were combined using a straight coupling (item 30) to make full tested length. The straight coupling was installed such that it was wholly on the exposed side of separating wall butting up against the wall. The exposed side of the pipe system was capped using a uPVC end cap.
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.
	Aperture size	Ø127 mm
	Annular gap	8.5 mm
	Local fire-stopping protection	
	Protection	Fire rated acrylic sealant (item 8) was applied in the annular gap to a nominal depth of 13 mm, on both the exposed and the unexposed sides. A 100 mm fire collar (item 14) was installed around the service on both the exposed and the unexposed sides, and fixed to the separating element using four fire collar screws (item 32)
Penetration system F		
F	Service	1 × DN150 DWV uPVC pipe (item 21) with DN150 straight coupling (item 31)
	Service detail	The service was installed through the aperture in the separating element. The service protruded nominally 500 mm on the exposed side and extended 2000 mm on the unexposed side. Two lengths of pipe were combined using a straight coupling (item 31) to make full tested length. The straight coupling was installed such that it was wholly on the exposed side of separating wall butting up against the wall. The exposed side of the pipe system was capped using a uPVC end cap.
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.
	Aperture size	Ø165 mm
	Annular gap	2.5 mm
	Local fire-stopping protection	
	Protection	Fire rated acrylic sealant (item 8) was applied in the annular gap to a nominal depth of 13 mm, on both the exposed and the unexposed sides. A 150 mm fire collar (item 15) was installed around the service on both the exposed and the unexposed sides, and fixed to the separating element using six fire collar screws (item 32)

Item	Description		
Penetration system G			
G	Service	DN40 uPVC DWV uPVC pipe (item 16) with pipe insulation (item 25)	
	Service detail	The pipe was installed through the aperture in the separating element. The pipe protruded nominally 500 mm on the exposed side and 2000 mm on the unexposed side. The pipe was lagged to full length with pipe insulation (item 25). The exposed side of the pipe was capped using a uPVC end cap.	
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.	
	Aperture size	Ø65 mm	
	Annular gap	0 mm	
	Local fire-stopping protection		
	Protection	Fire rated acrylic sealant (item 8) was applied in the corner between the pipe insulation and the plasterboard. A 40 mm fire collar (item 10) was installed around the service on both the exposed and the unexposed sides, and fixed to the separating element using two fire collar screws (item 32)	
Penetration system H			
H	Service	DN25 uPVC pressure pipe (item 23)	
	Service detail	The pipe was installed through the aperture in the separating element. The pipe protruded nominally 500 mm on the exposed side and 2000 mm on the unexposed side. The exposed side of the pipe was capped using a uPVC end cap.	
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.	
	Aperture size	Ø49 mm	
	Annular gap	Minimum	6.3 mm
		Maximum	10.2 mm
	Local fire-stopping protection		
	Protection	Fire rated intumescent sealant (item 9) was applied in the annular gap to a nominal depth of 26 mm and finished with 5 mm × 5 mm fillet, on both the exposed and the unexposed sides surface.	
Penetration system I			
I	Service	1 × optical fibre cable (item 24)	
	Service detail	The pipe was installed through the aperture in the separating element. The pipe protruded nominally 500 mm on the exposed side and 2000 mm on the unexposed side.	
	Service support	The service was supported on the unexposed side of the separating element using channel struts and stainless steel cable ties located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.	
	Aperture size	Ø 5 mm	
	Annular gap	0.3 mm	
	Local fire-stopping protection		

Item	Description		
	Protection	Fire rated intumescent sealant (item 9) was applied on the interface between the service and the separating element and finished with 20 mm × 10 mm fillet, on both the exposed and the unexposed sides surface.	
Penetration system J			
J	Service	8 × optical fibre cables (item 24) inside Ø 25 mm uPVC conduit (item 22)	
	Service detail	The pipe was installed through the aperture in the separating element. The pipe protruded nominally 500 mm on the exposed side and 2000 mm on the unexposed side. Eight optical fibre cables were inserted into the conduit. The exposed side of the pipe was capped using ceramic fibre wool, fire rated sealant.	
	Service support	The service was supported on the unexposed side of the separating element using channel struts and pipe clamps located nominally 500 mm and 1500 mm from the separating element to the centre of the channel strut.	
	Aperture size	Ø 35 mm	
	Annular gap	Minimum	3.6 mm
		Maximum	11 mm
	Local fire-stopping protection		
	Protection	Fire rated intumescent sealant (item 9) was applied in the annular gap to a nominal depth of 26 mm and finished with 5 mm × 5 mm, on both the exposed and the unexposed sides surface.	

2.2 Installation details

Table 6 lists the installation details for the test specimen.

Table 6 Installation details

Item	Detail
Start date for construction of separating element	11 June 2025
Start date for installation of fire-stopping protection for the penetration systems	16 June 2025
Completion date for constructing and installing the test specimen	26 June 2025
Separating element and penetration constructed by	Representatives of Jensen Hughes
Fire-stopping protection for penetration systems installed by	Representatives of the test sponsor
Symmetry	Services A to G Asymmetrical: as the pipe coupling socket was only located on the exposed side of the wall. Service H to J, symmetrical.

3.0 Test procedure

Table 7 details the test procedure for this fire resistance test.

Table 7 Test procedure

Item	Detail	
Statement of compliance	The test was performed in accordance with the requirements of sections 2 and 10 of AS 1530.4:2014 appropriate for penetration systems.	
Variations	The pressure was up to 1 Pa above the limits prescribed in the standard during the 30-35 minute period. The pressure and temperature were within the limits for the rest of the test. This overpressure resulted in more onerous test conditions, so would not have invalidated the test result.	
Pre-test conditioning	The construction and installation of the test specimen was completed on 26 June 2025. The test specimen was subjected to normal laboratory temperatures and conditions between the completion of construction of the test specimen and the start of the test.	
Sampling / specimen selection	The laboratory was not involved in sampling or selecting the test specimen for the fire resistance test. The results obtained during the test only apply to the test samples as received and tested by Jensen Hughes.	
Ambient laboratory temperature	Start of the test	13 °C
	Minimum temperature	13 °C
	Maximum temperature	15 °C
Test duration	121 minutes	
Instrumentation and equipment	The instrumentation was provided in accordance with AS 1530.4:2014 as follows: + The furnace temperature was measured by four mineral insulated metal sheathed (MIMS) Type K thermocouples – with wire diameters not greater than 1 mm, an overall diameter of 3 mm, and the measuring junction insulated from the sheath. The thermocouples protruded a minimum of 25 mm from steel supporting tubes. + The unexposed side specimen temperatures were measured by Type K thermocouples with wire diameters less than 0.5 mm soldered to 12 mm diameter × 0.2 mm thick copper discs covered by 30 mm × 30 mm × 2.0 mm thick inorganic insulating pads. + The thermocouple positions are shown in Table 10 and in Figure 10 in Appendix D. + A roving thermocouple was available to measure temperatures at positions that appeared hotter than the positions monitored by the fixed thermocouples. + Cotton pads were available during the test to assess the performance of the specimen under the criteria of integrity. + The furnace pressure was measured at approximately 700 mm above the centre of the lowest penetration service. It was monitored using a differential pressure transmitter. + All electronic data was sampled at 5 second intervals.	

4.0 Test measurements and results

Table 8 summarises the results the specimen achieved against the performance criteria listed in sections 2 and 10 of AS 1530.4:2014.

Appendix E includes details of the measurements taken during the test.

Table 9 in Appendix B includes observations of any significant behaviour of the specimen and details of the occurrence of the various performance criteria specified in AS 1530.4:2014.

Appendix D includes instrumentation details of the specimen.

Photographs of the specimen are included in Appendix F.

Table 8 Test results

Penetration system	Criteria	Results	Fire resistance level (FRL)
A	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
B	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
C	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
D	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
E	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
F	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
G	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
H	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	
I	Structural adequacy	Not applicable	**-/120/120**
	Integrity	No failure at 121 minutes	

Penetration system	Criteria	Results	Fire resistance level (FRL)
	Insulation	No failure at 121 minutes	
J	Structural adequacy	Not applicable	-/120/120
	Integrity	No failure at 121 minutes	
	Insulation	No failure at 121 minutes	

Note: The FRLs for the specimens A to G only apply to the tested orientation. As the FRL was only determined for one direction, an FRL cannot be assigned for the other direction.

5.0 Application of test results

5.1 Test limitations

The results of these fire tests may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

These results only relate to the behaviour of the specimen of the element of construction under the particular conditions of the test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use, and they do not necessarily reflect the actual behaviour in fires.

5.2 Variations from the tested specimen

This report details methods of construction, the test conditions and the results obtained when the specific element of construction described here was tested following the procedure outlined in AS 1530.4:2014. Any significant variation with respect to size, construction details, loads, stresses, edge or end conditions, other than that allowed under the field of direct application in the relevant test method, is not covered by this report.

It is recommended that any proposed variation to the tested configuration – other than as permitted under the field of direct application specified in Appendix C – should be referred to the test sponsor. They should then obtain appropriate documentary evidence of compliance from Jensen Hughes Fire Testing or another accredited testing authority.

5.3 Uncertainty of measurements

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 for the result.

Appendix A Drawings of test assembly

The leaders in the drawings represent the items listed in section 2.1. All measurements – unless indicated – are in millimetres.

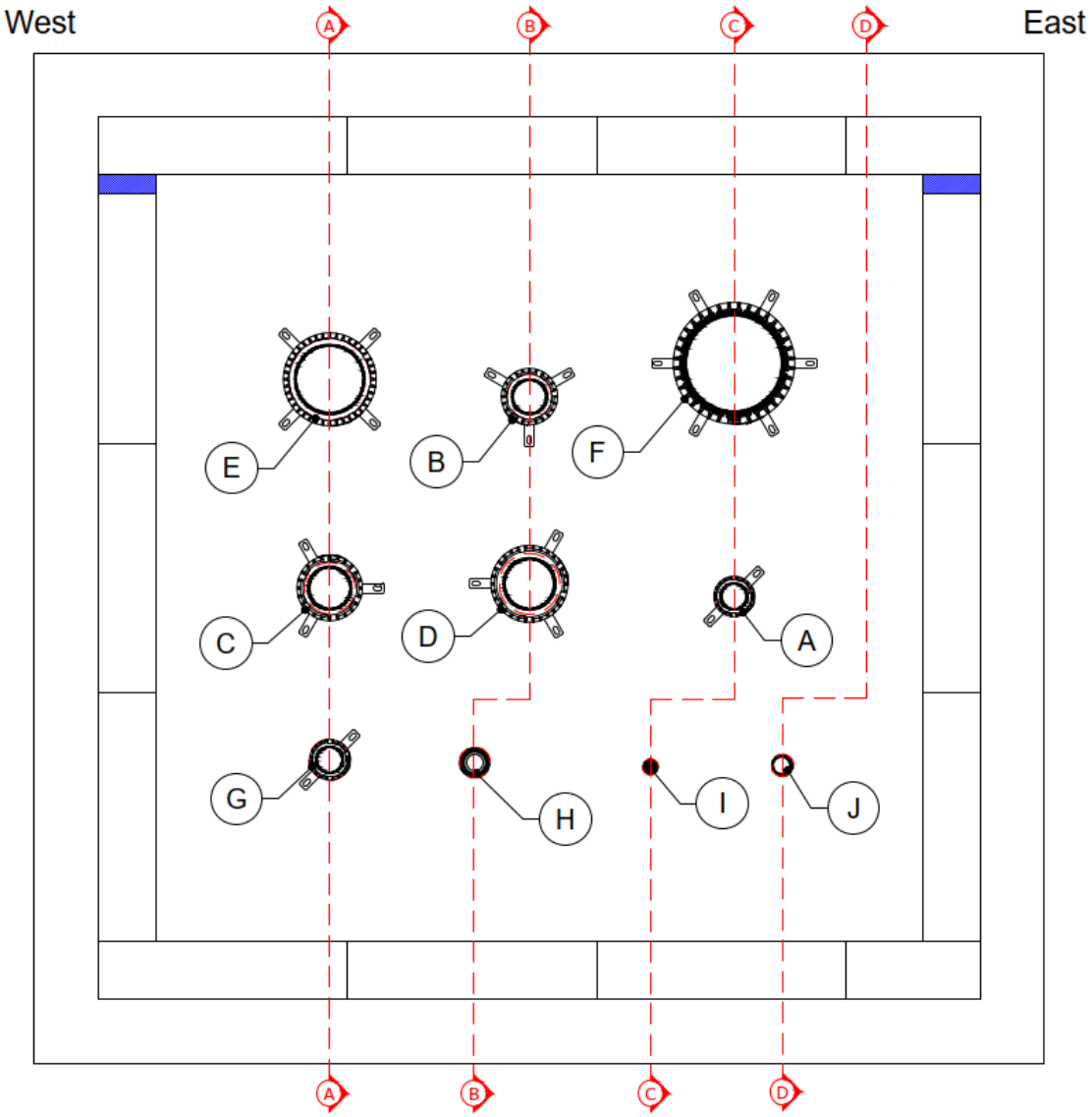


Figure 1 Elevation view of test specimens (unexposed side)

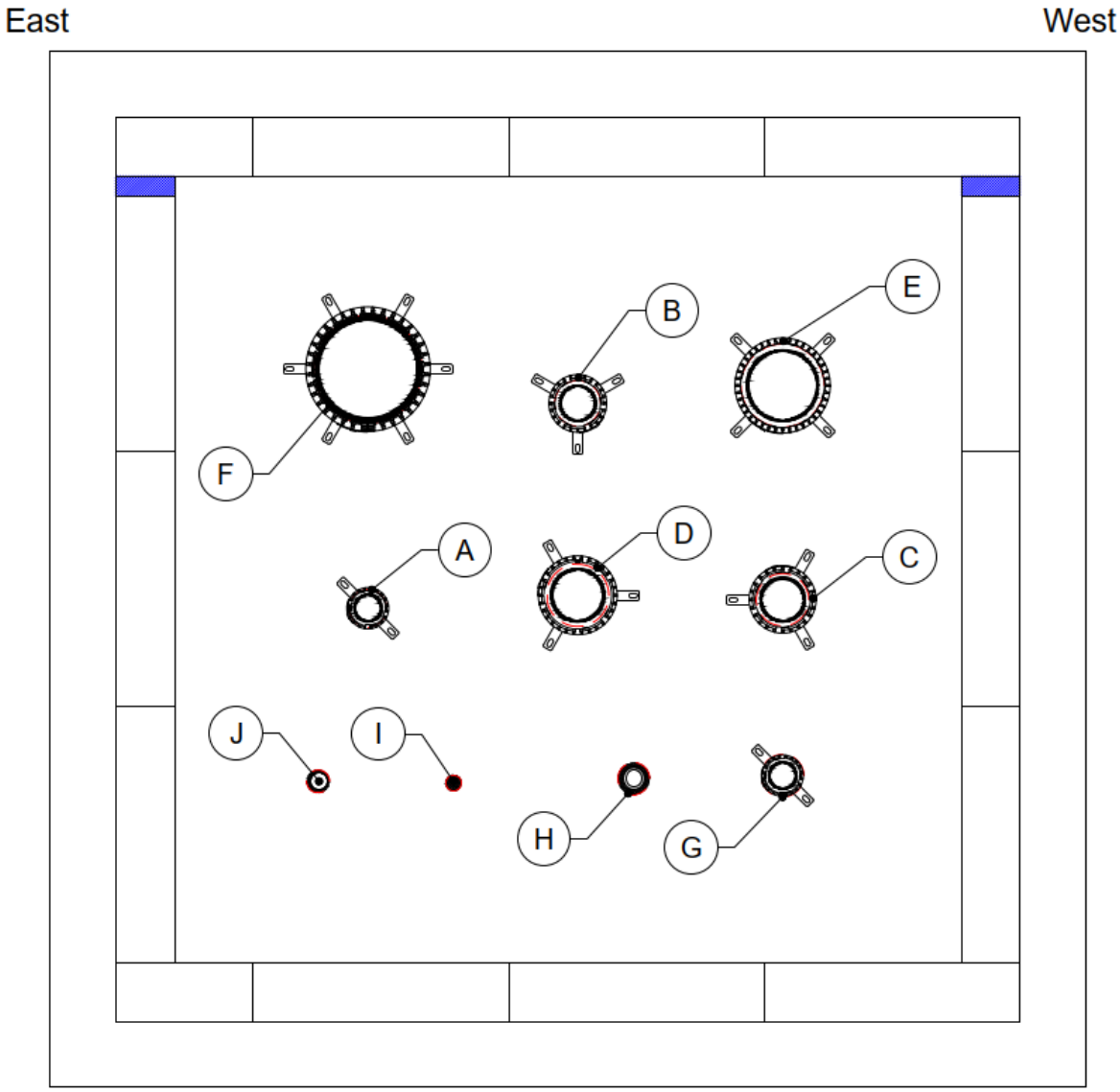


Figure 2 Elevation view of test specimens (exposed side)

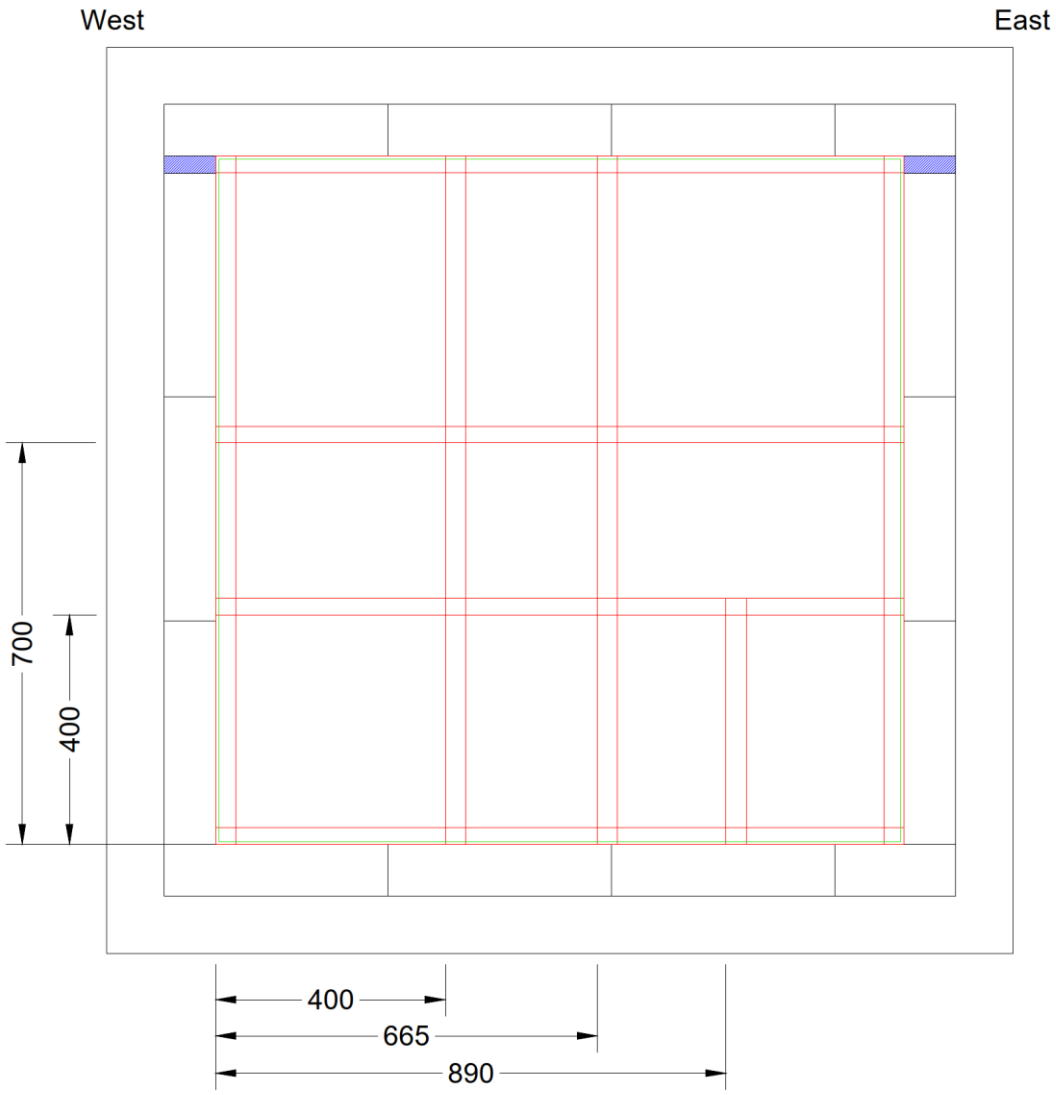


Figure 3 Elevation view of wall frame (unexposed side)

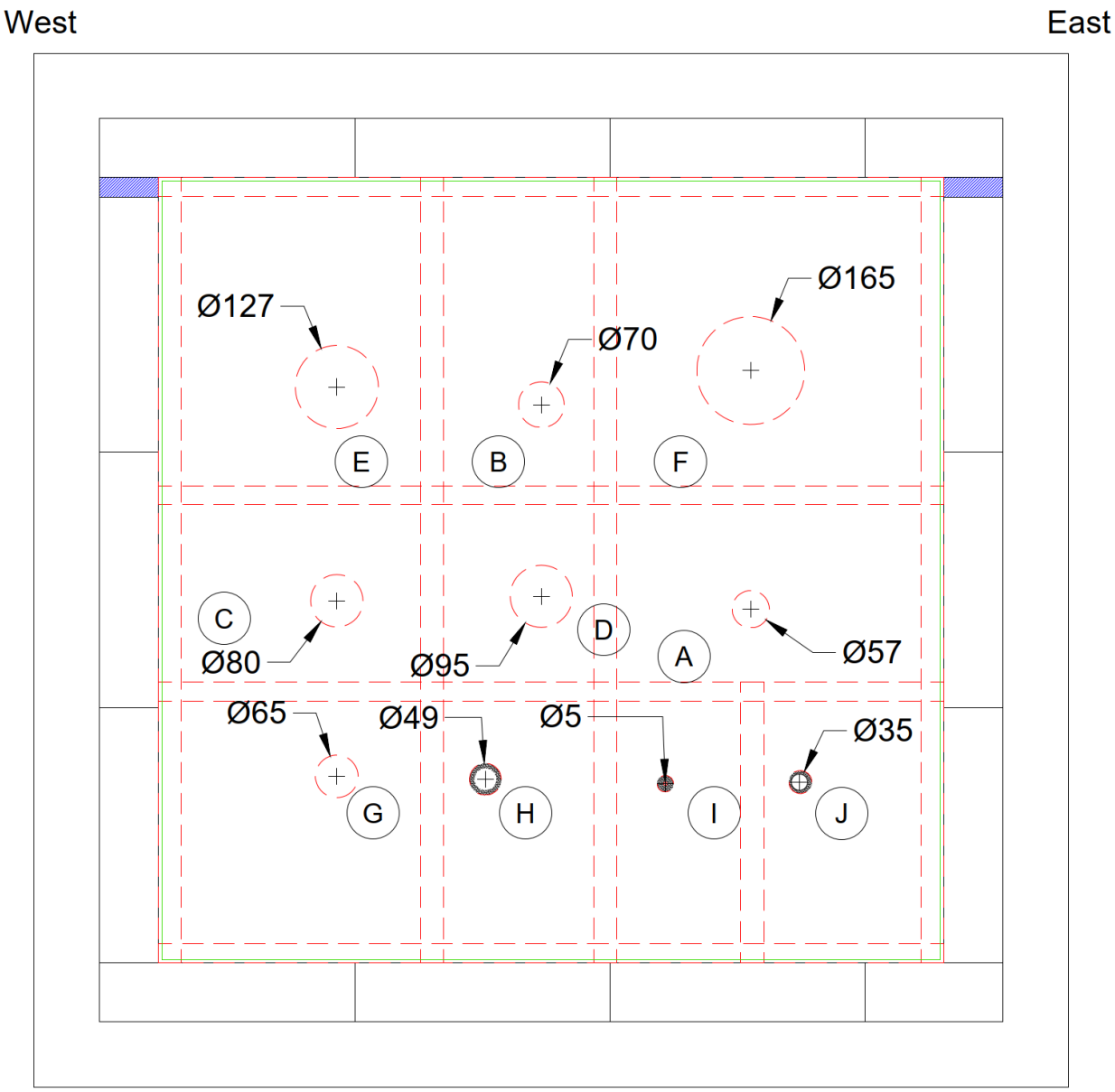


Figure 4 Elevation view of aperture sizes of the test specimens (unexposed side)

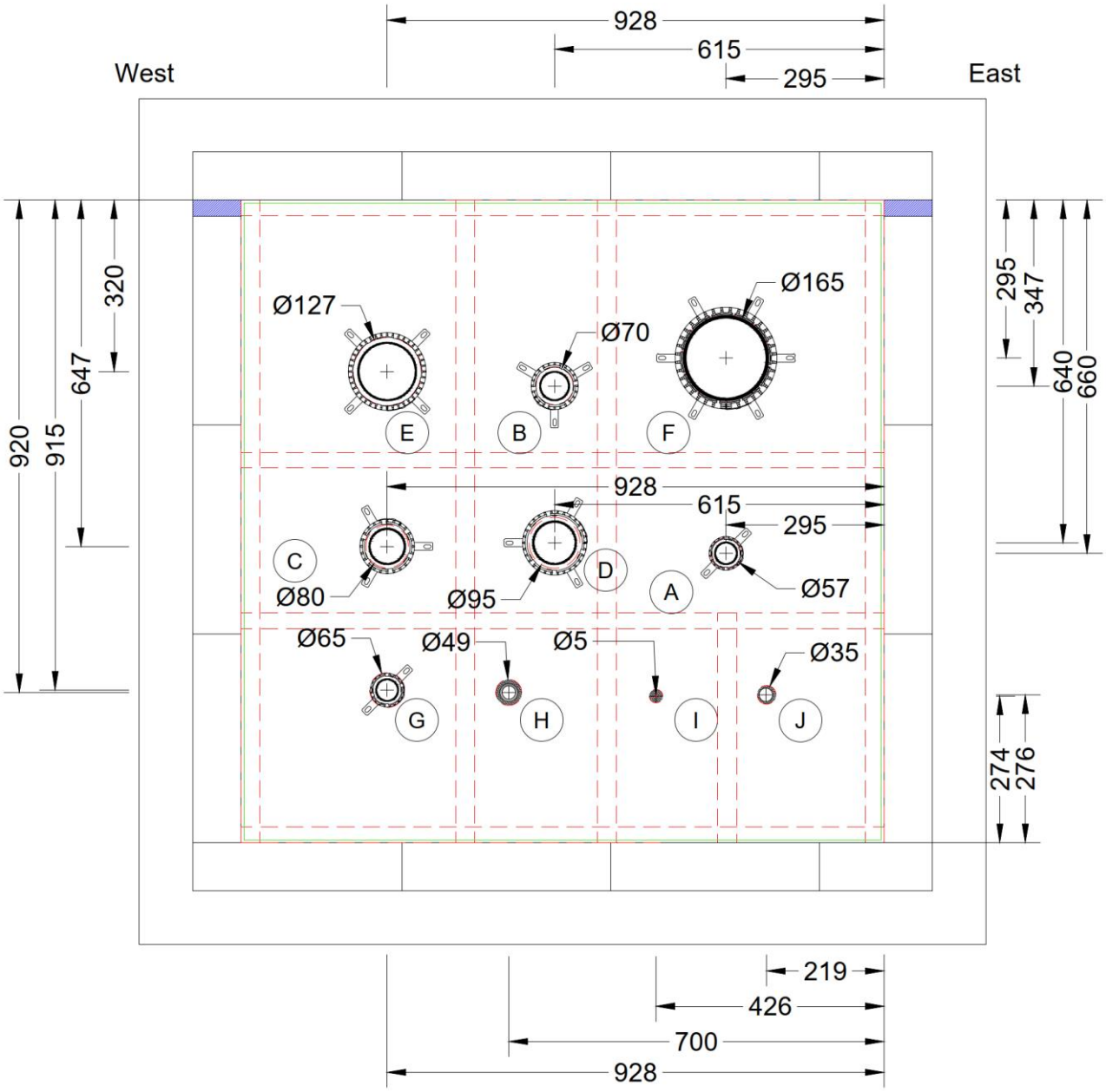


Figure 5 Elevation view of location of the test specimens (unexposed side)

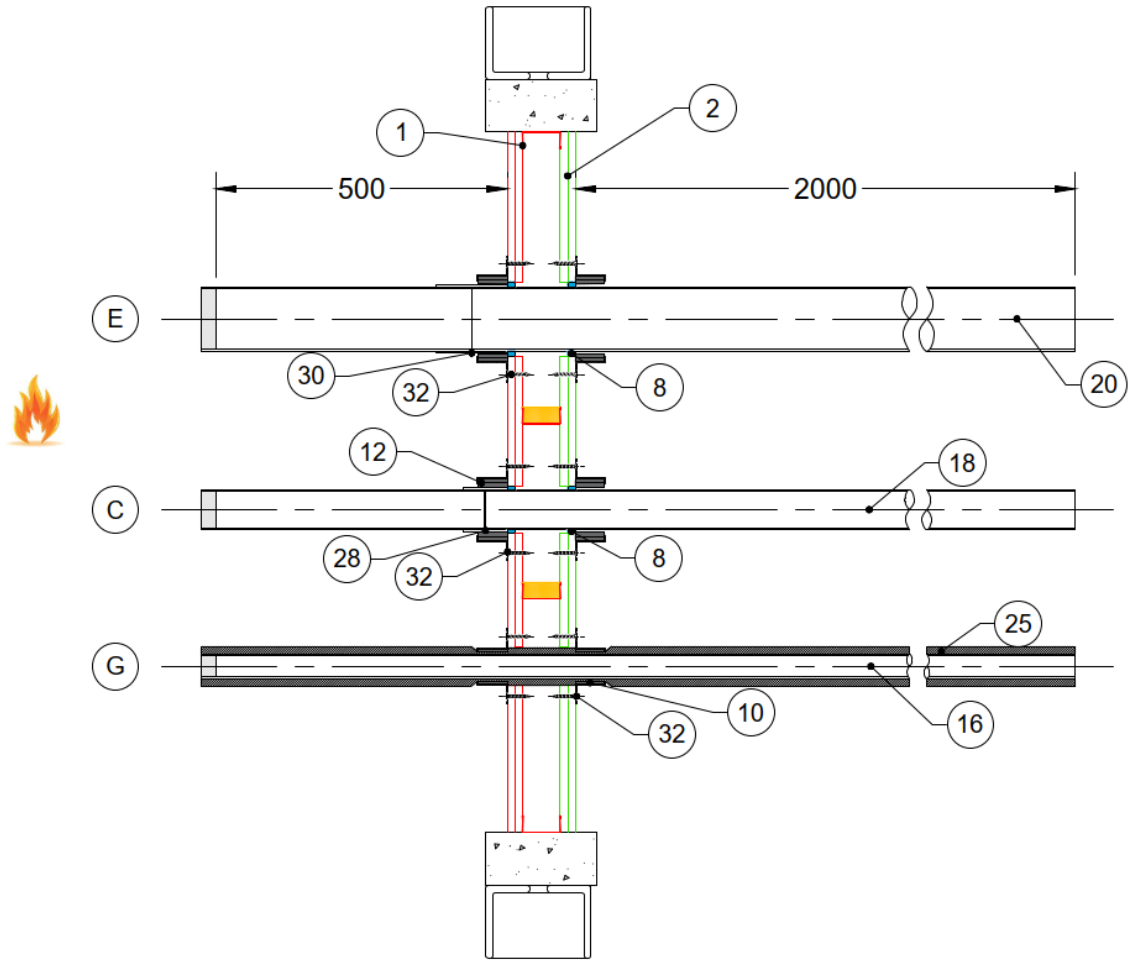


Figure 6 Cross-section A-A

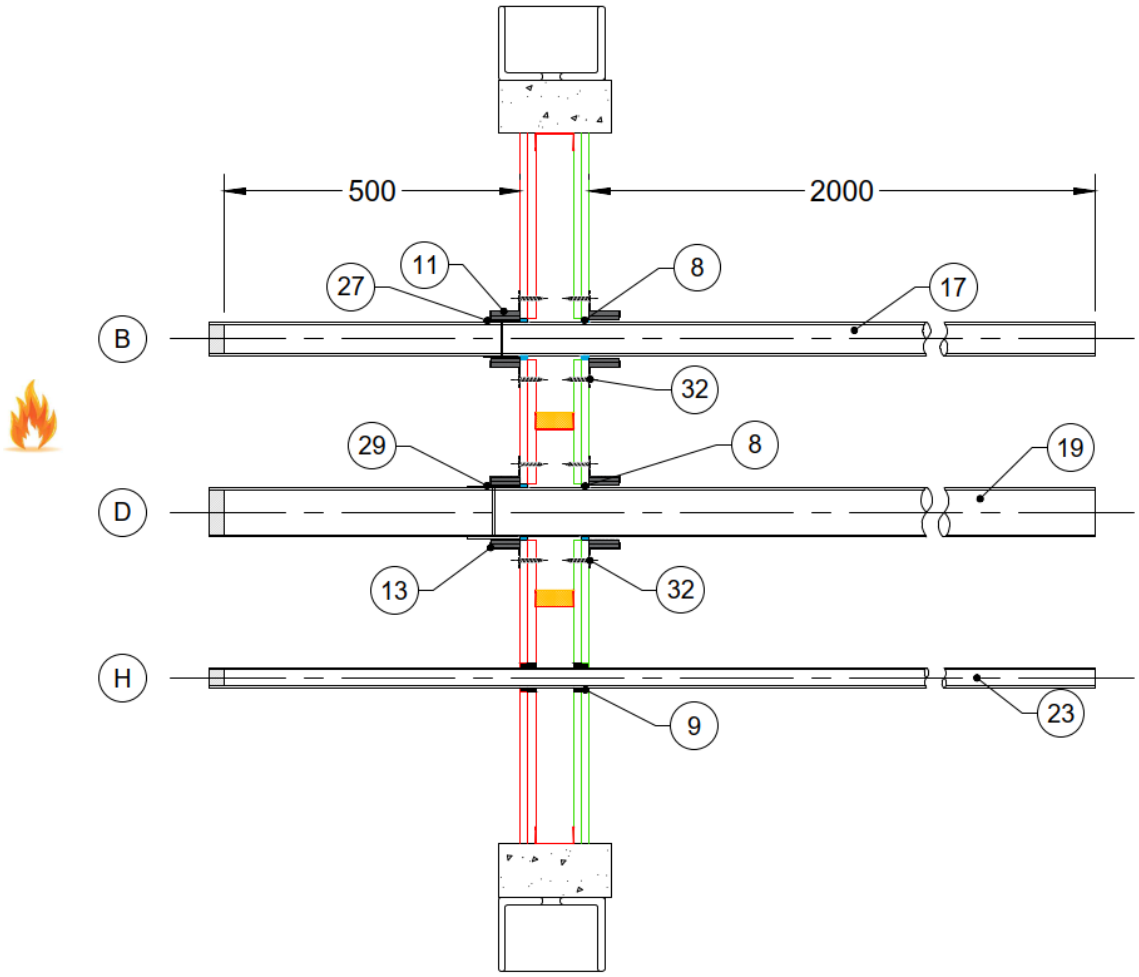


Figure 7 Cross-section B-B

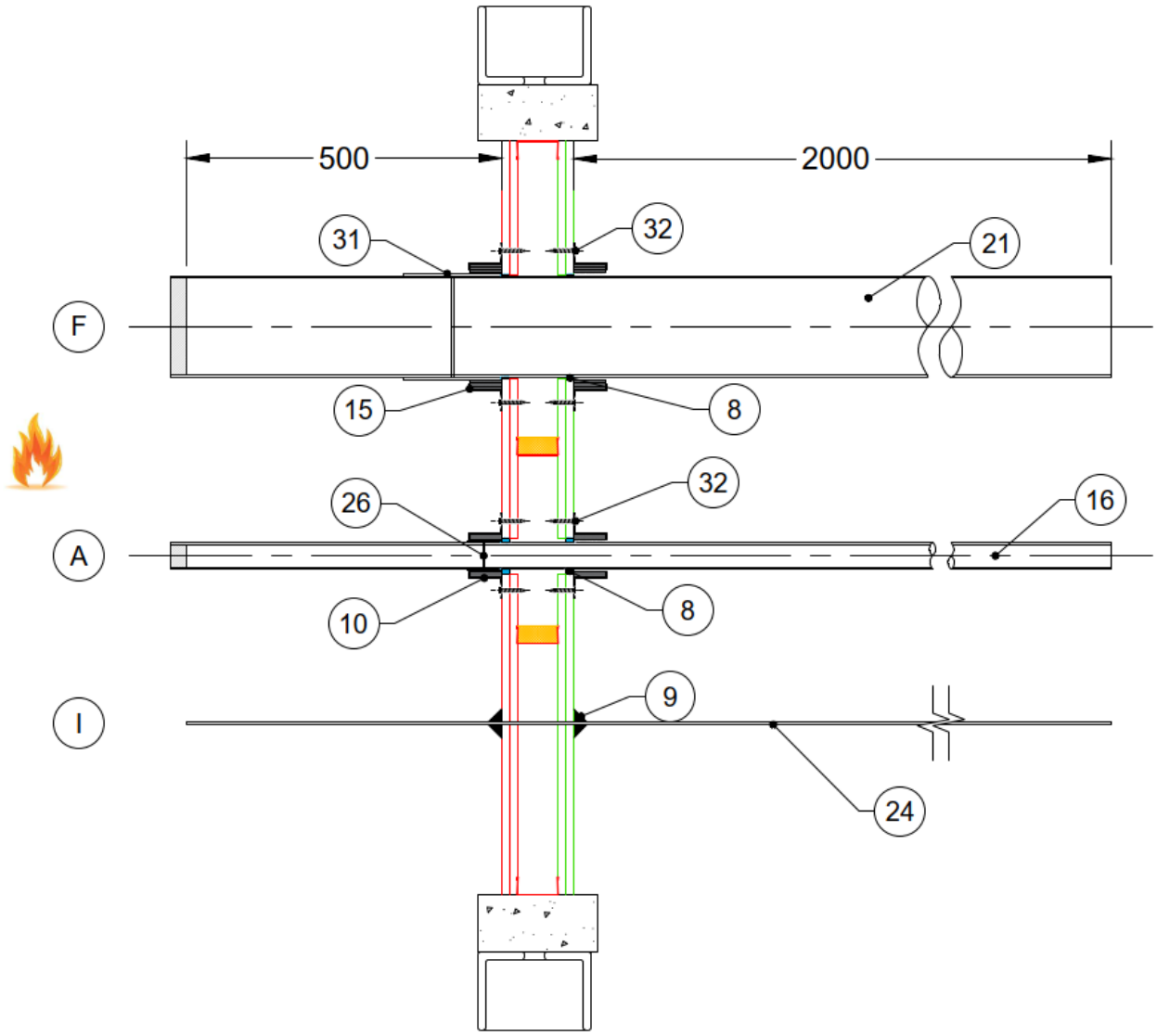


Figure 8 Cross-section C-C

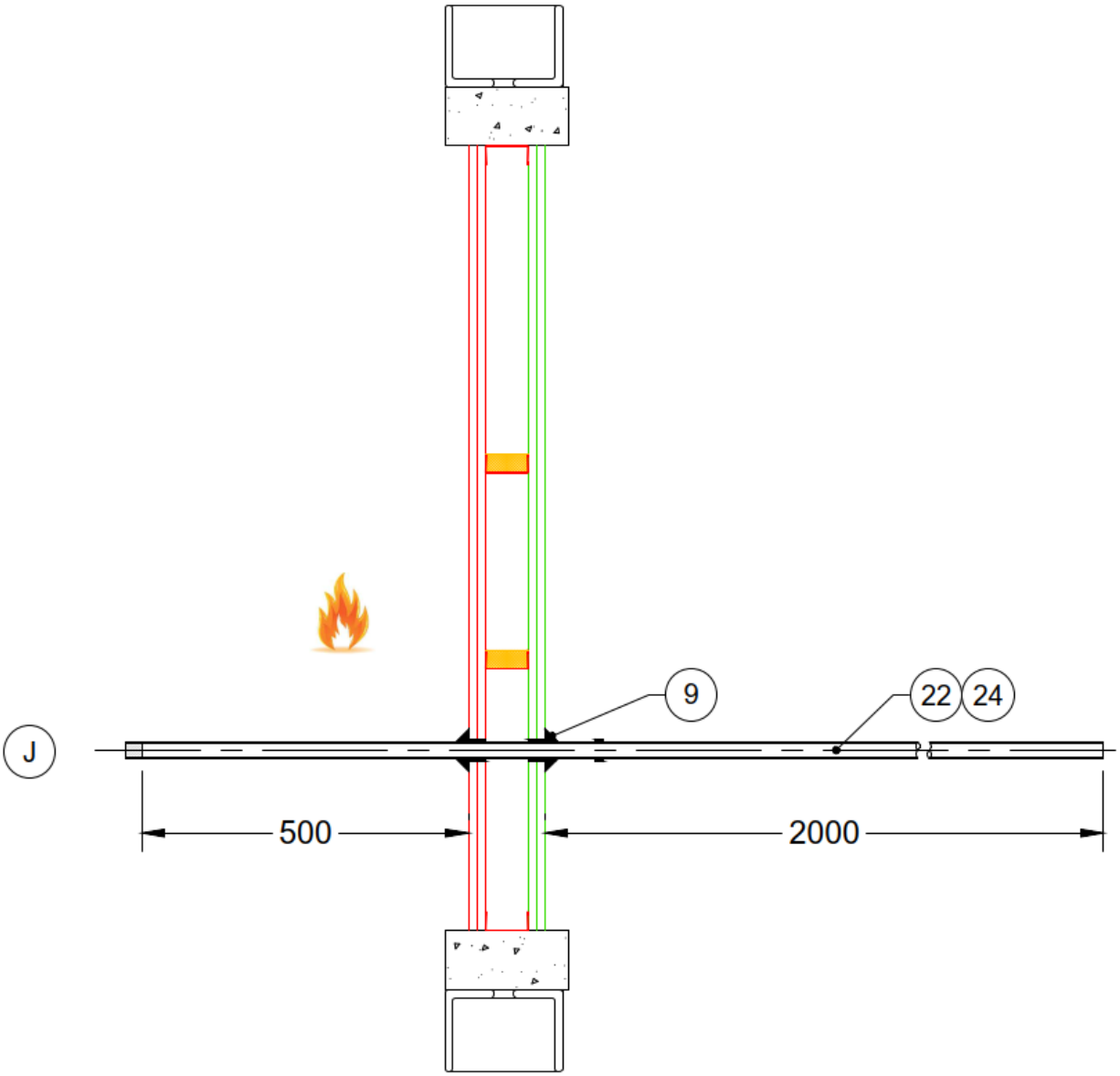


Figure 9 Cross-section D-D

Appendix B Test observations

Table 9 shows the observations of any significant behaviour of the specimen during the test.

Table 9 Test observations

Time		Observation
Min	Sec	
Penetration system A		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
1	46	Smoke venting from the end of the pipe
8	30	Smoke venting from the end of the pipe had ceased.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
80	00	Smoke venting from the end of the pipe had restarted
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
105	00	The volume of smoke venting from the end of the pipe had increased.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system B		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
1	50	Smoke venting from the end of the pipe
8	30	Smoke venting from the end of the pipe had ceased.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
21	25	Smoke emitting from the base of the pipe
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
105	00	The volume of smoke venting from the end of the pipe had increased.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system C		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
8	30	Light amount of smoke venting from the end of the pipe.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.

Time		Observation
Min	Sec	
41	41	A dark liquid was dripping off from the collar to the separating element.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
105	00	The volume of smoke venting from the end of the pipe had increased.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system D		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
4	00	Smoke venting from the end of the pipe becomes dark brown colour.
8	30	Smoke venting from the end of the pipe had ceased.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
21	25	Smoke emitting from the base of the pipe.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
34	00	Smoke venting from the end of the pipe had restarted
41	41	A dark liquid was dripping off from the collar to the separating element.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
105	00	The volume of smoke venting from the end of the pipe had increased.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system E		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 13 °C.
3	18	Smoke venting from the end of the pipe
4	00	Smoke venting from the end of the pipe became dark brown colour.
8	30	Smoke venting from the end of the pipe had decreased significantly. Only light smoke venting from the end of the pipe.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
17	00	There was deformation near the base of the pipe.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
105	00	The amount of smoke venting from the end of the pipe had increased.

Time		Observation
Min	Sec	
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system F		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
3	48	Smoke venting from the end of the pipe
4	28	Smoke venting from the end of the pipe become dark brown colour.
6	30	The pipe deformed and was sagging near the collar.
8	30	Smoke venting from the end of the pipe had decreased significantly. Only light smoke venting from the end of the pipe
8	40	Smoke emitting from the base of the pipe
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
21	25	Smoke emitting from the base of the pipe
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system G		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
2	05	Smoke venting from the end of the pipe
3	00	Smoke venting from the end of the pipe become yellow colour.
8	30	Smoke venting from the end of the pipe had ceased.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
54	36	Smoke venting from the end of the pipe had restarted
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system H		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.

Time		Observation
Min	Sec	
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system I		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped
Penetration system J		
0	00	The fire resistance test started. The initial temperature of the test specimen was approximately 12 °C.
0	30	Smoke venting from the end of the pipe
3	35	Smoke venting from the end of the pipe had ceased
15	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
30	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
45	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
60	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
90	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
120	00	The test specimen continued to maintain integrity and insulation in accordance with AS 1530.4:2014.
121	00	Test stopped

Appendix C Direct field of application

The text, figures and tables in this appendix have been taken from section 10 of AS 1530.4:2014.

C.1 General

The results of the fire test contained in the test report are directly applicable without reference to the testing authority to similar constructions where one or more of the changes set out in clauses 10.12.2, 10.12.4 and 10.12.5 of AS 1530.4:2014 have been made.

C.2 Separating elements

Results obtained for sealing systems in various types of masonry and concrete construction may be applied as follows:

- For elements manufactured from similar types of concrete or masonry, the results of the prototype test may be applied to materials of density within ±15% of the tested specimen. For greater variations, the opinion of a registered testing authority shall be obtained.
- Test results obtained in conjunction with hollow concrete blocks may be used in a solid concrete element of the same overall thickness. The reverse does not apply.
- Results obtained from framed wall systems may be applied to the performance of a system in concrete, masonry or solid gypsum blocks of greater or equal thickness to that of the tested prototype. The reverse does not apply.
- Results obtained from framed wall systems may be applied to similar walls having studs of the same material with sizes greater than the tested prototype.
- Results obtained from a prototype test may be applied to framed wall systems of similar construction but having thicker facings of the same material applied to the studs.

C.3 Electrical and communication cables

Where standard configurations are used for electrical and communication cables, the results of tests may be applied to all PVC and XLPE insulated and PVC sheathed power and communication cables with copper conductors, provided the results are for the same penetration sealing system in the same separating element and all of the specimens achieved the designated FRL or greater.

Note: For information on recommended standard configurations for electrical and communication cables, see Appendix D.

C.4 Plastic pipes

C.4.1 General

In addition to the requirements of clause 10.12.2 of AS 1530.4:2014, test results may be directly applied to masonry and concrete elements thicker than the tested prototype when installed in accordance with figure 10.12.5.1 of AS 1530.4:2014.

Results obtained from a particular test shall not be applied to plastics pipes of different diameters, wall thicknesses or material types.

Results obtained from tests on penetrations through vertical separating elements shall not be used to assess performance in horizontal elements, and vice versa.

As penetration seals for plastic pipes are dependent for activation upon exposure to fire conditions, they shall always be installed with the same orientation and fire exposure as was established in the fire resistance test.

C.4.2 Services not perpendicular to the fire separation

Penetrations not perpendicular to the plane of the element are acceptable, provided the fire-stopping system has similar exposure and dimensions to the tested prototype.

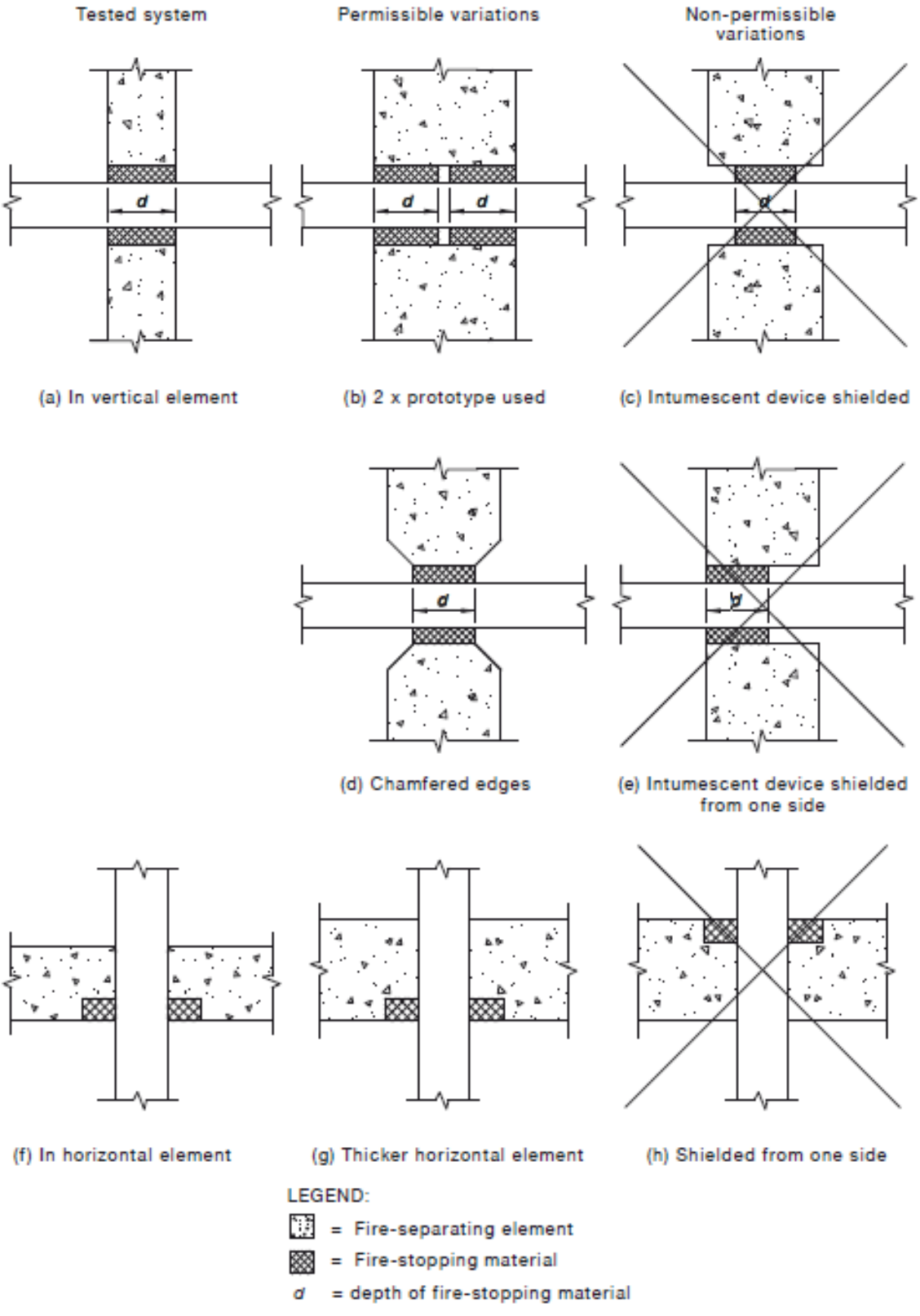


FIGURE 10.12.5.1 EQUIVALENT EXPOSURE OF UPVC PIPE FIRE-STOPPING SYSTEMS

Appendix D Instrumentation locations

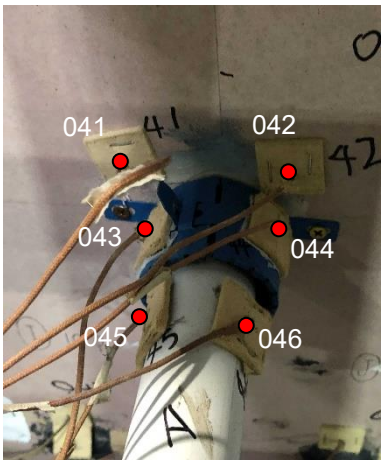


Figure 10 Penetration system A

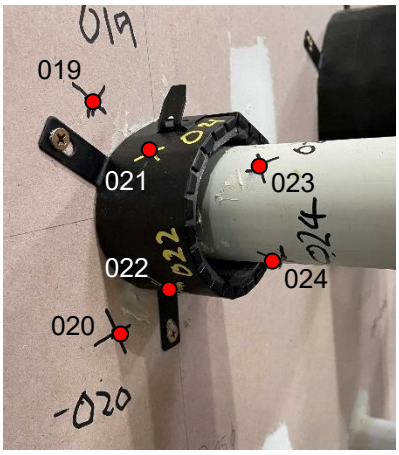


Figure 11 Penetration system B

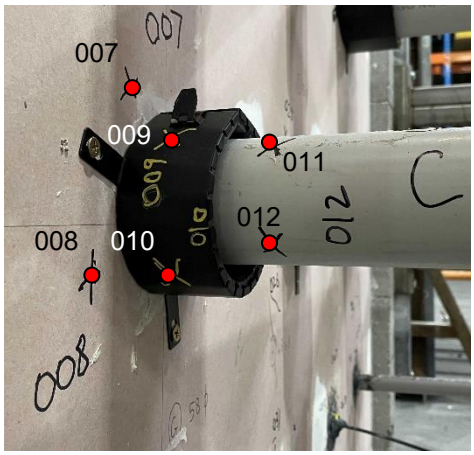


Figure 12 Penetration system C

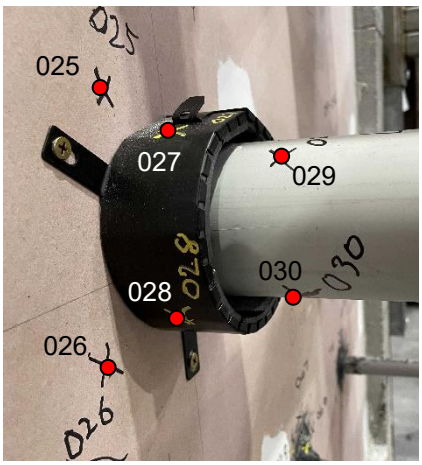


Figure 13 Penetration system D

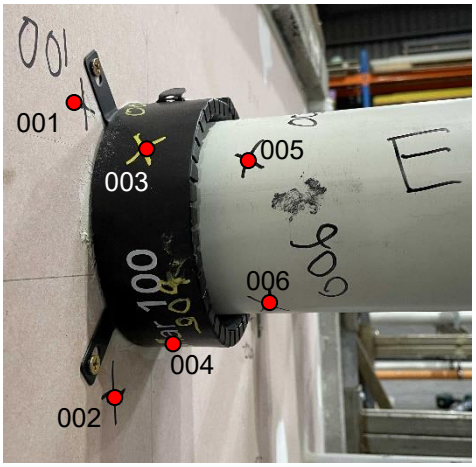


Figure 14 Penetration system E

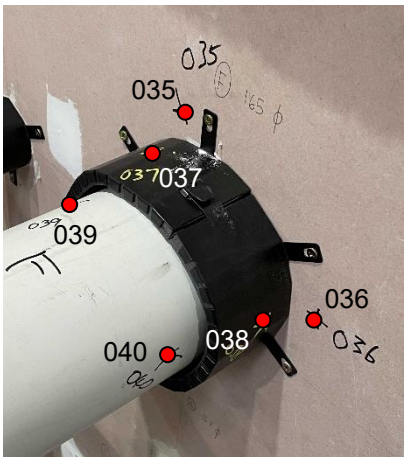


Figure 15 Penetration system F

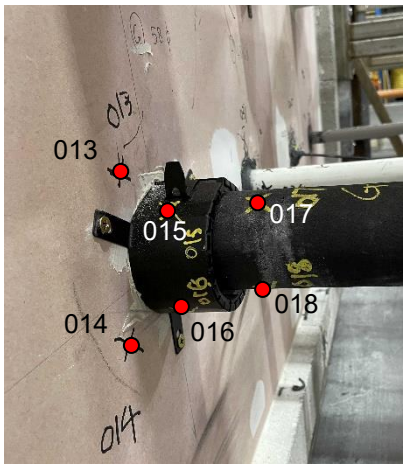


Figure 16 Penetration system G

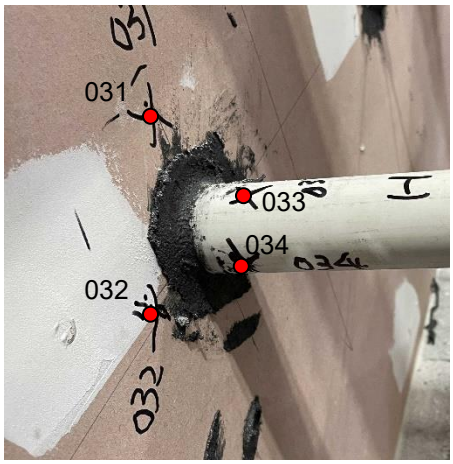


Figure 17 Penetration system H

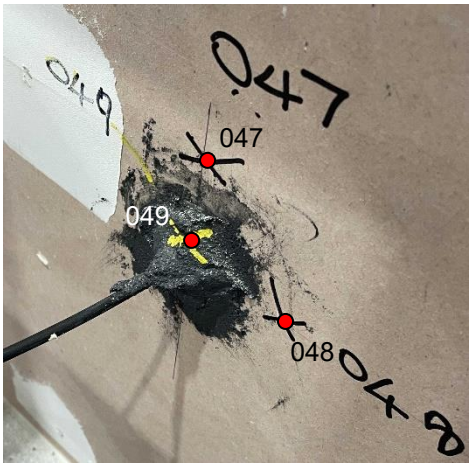


Figure 18 Penetration system I

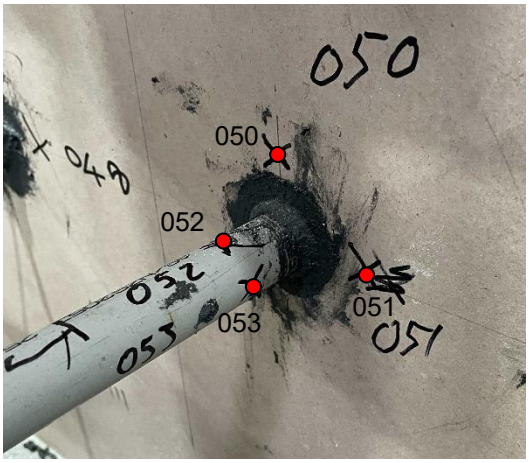


Figure 19 Penetration system J

Table 10 Thermocouple locations

Penetration system	TC No.	Description
A	041	On the separating element, 25 mm away from the top of the collars
	042	On the separating element, 25 mm away from the side of the collars
	043	On the top of the collar, at mid length.
	044	On the side of the collar, at mid length.
	045	On the service, 25 mm away from the top of the collar
	046	On the service, 25 mm away from the side of the collar
B	019	On the separating element, 25 mm away from the top of the collars
	020	On the separating element, 25 mm away from the side of the collars
	021	On the top of the collar, at mid length.
	022	On the side of the collar, at mid length.
	023	On the service, 25 mm away from the top of the collar
	024	On the service, 25 mm away from the side of the collar
C	007	On the separating element, 25 mm away from the top of the collars
	008	On the separating element, 25 mm away from the side of the collars
	009	On the top of the collar, at mid length.
	010	On the side of the collar, at mid length.
	011	On the service, 25 mm away from the top of the collar
	012	On the service, 25 mm away from the side of the collar
D	025	On the separating element, 25 mm away from the top of the collars
	026	On the separating element, 25 mm away from the side of the collars
	027	On the top of the collar, at mid length.
	028	On the side of the collar, at mid length.
	029	On the service, 25 mm away from the top of the collar
	030	On the service, 25 mm away from the side of the collar
E	001	On the separating element, 25 mm away from the top of the collars
	002	On the separating element, 25 mm away from the side of the collars
	003	On the top of the collar, at mid length.
	004	On the side of the collar, at mid length.
	005	On the service, 25 mm away from the top of the collar
	006	On the service, 25 mm away from the side of the collar
F	035	On the separating element, 25 mm away from the top of the collars
	036	On the separating element, 25 mm away from the side of the collars
	037	On the top of the collar, at mid length.
	038	On the side of the collar, at mid length.
	039	On the service, 25 mm away from the top of the collar
	040	On the service, 25 mm away from the side of the collar

Penetration system	TC No.	Description
G	013	On the separating element, 25 mm away from the top of the collars
	014	On the separating element, 25 mm away from the side of the collars
	015	On the top of the collar, at mid length.
	016	On the side of the collar, at mid length.
	017	On the service insulation, 25 mm away from the top of the collar
	018	On the service insulation, 25 mm away from the side of the collar
H	031	On the separating element, 25 mm away from the top of the aperture
	032	On the separating element, 25 mm away from the side of the aperture
	033	On the top of service, 25 mm away from the separating element
	034	On the side of service, 25 mm away from the separating element
I	047	On the separating element, 25 mm away from the top of the sealant fillet
	048	On the separating element, 25 mm away from the side of the sealant fillet
	049	On the top of the sealant fillet, at mid-length.
J	050	On the separating element, 25 mm away from the top of the aperture
	051	On the separating element, 25 mm away from the side of the aperture
	052	On the service, 25 mm away from the top of the separating element
	053	On the service, 25 mm away from the side of the separating element

Appendix E Test data

E.1 Furnace temperature and severity

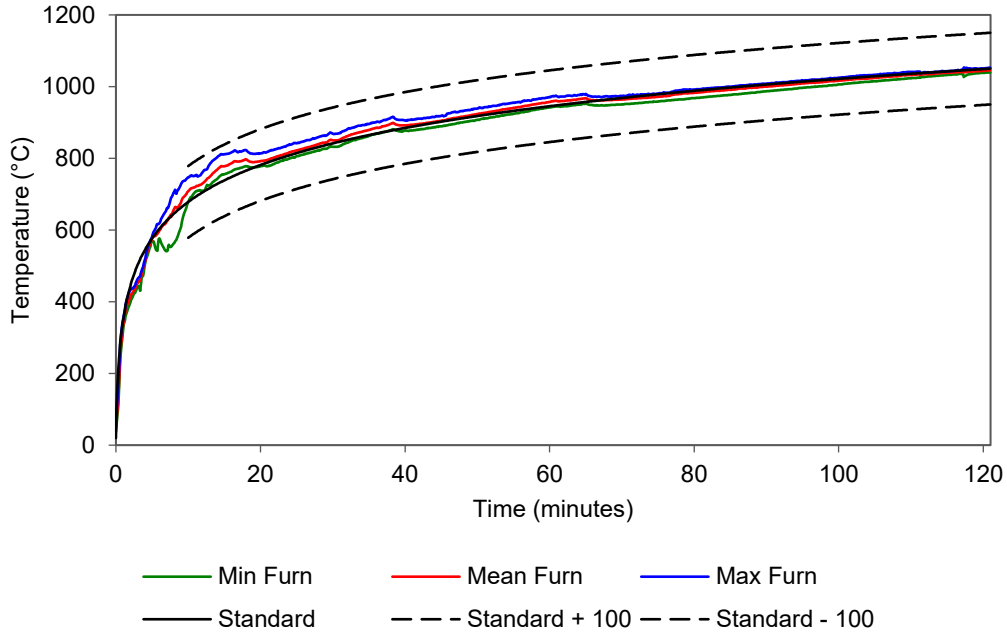


Figure 20 Furnace thermocouple temperature vs time

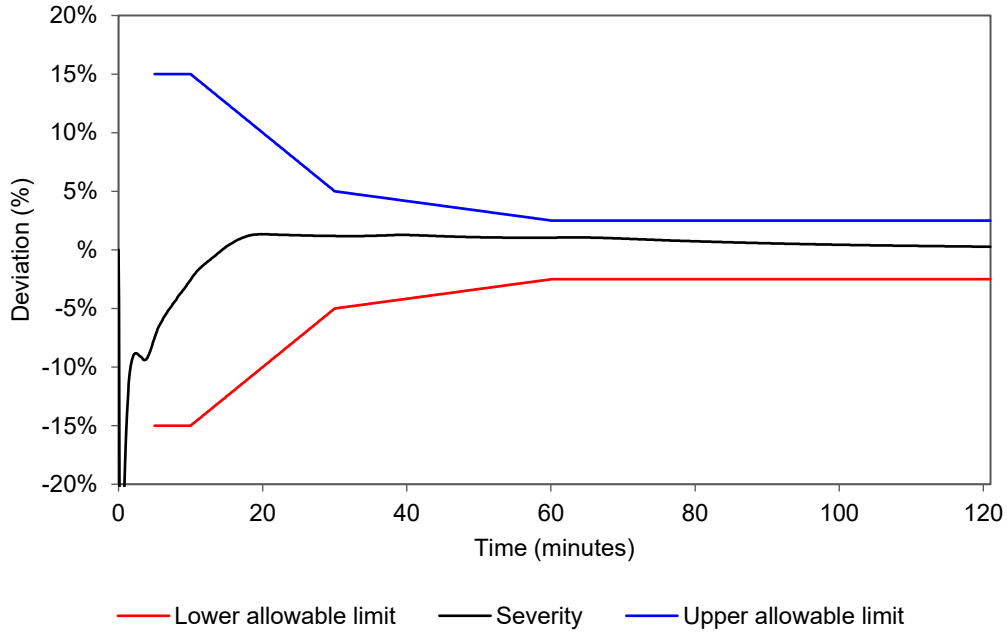


Figure 21 Percentage deviation of exposure severity vs time

E.2 Furnace pressure

The furnace pressure was measured 700 mm above mid-height of the lowest penetration and corrected to mid-height of the lowest penetration.

Table 11 Furnace pressure

Time (minutes)	Average pressure (Pa)	Time (minutes)	Average pressure (Pa)	Time (minutes)	Average pressure (Pa)
5-10	16	45-50	14	85-90	16
10-15	16	50-55	15	90-95	16
15-20	15	55-60	16	95-100	16
20-25	15	60-65	15	100-105	16
25-30	15	65-70	16	105-110	14
30-35	19	70-75	16	110-115	16
35-40	14	75-80	15	115-120	15
40-45	13	80-85	15		

E.3 Specimen temperatures

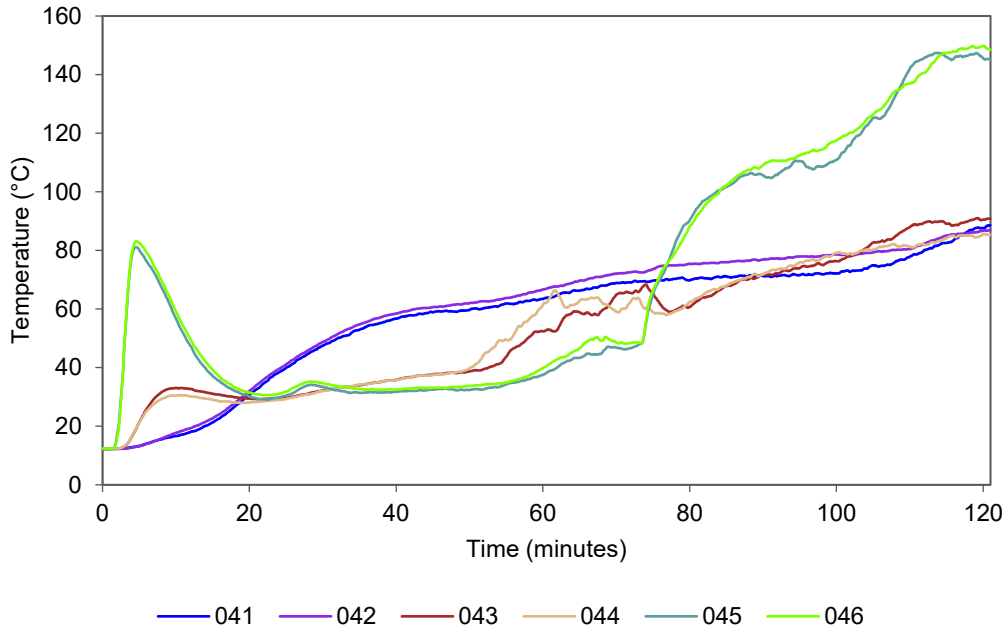


Figure 22 Penetration system A – temperature vs time

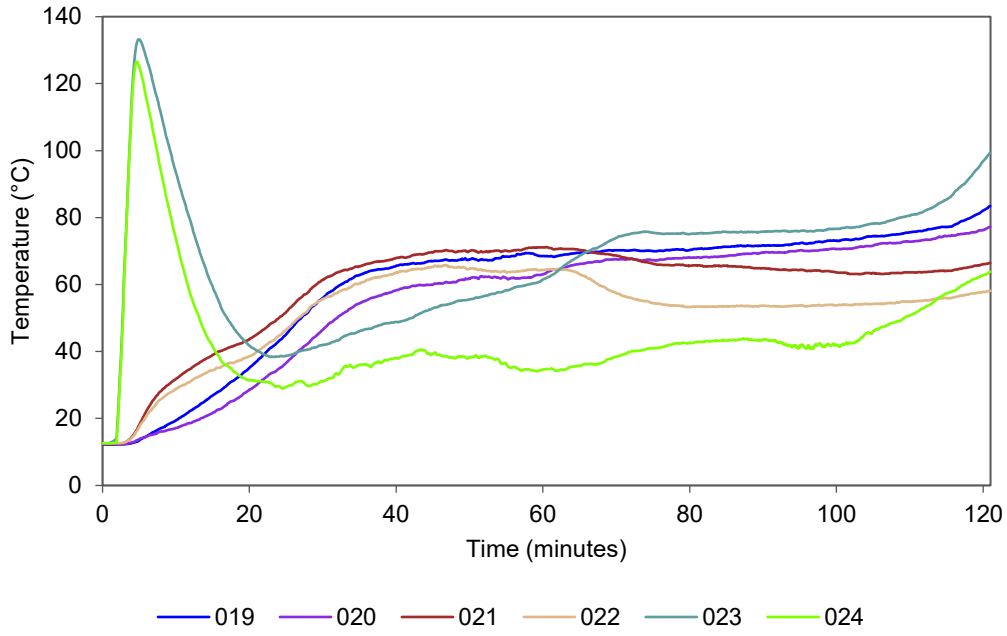


Figure 23 Penetration system B – temperature vs time

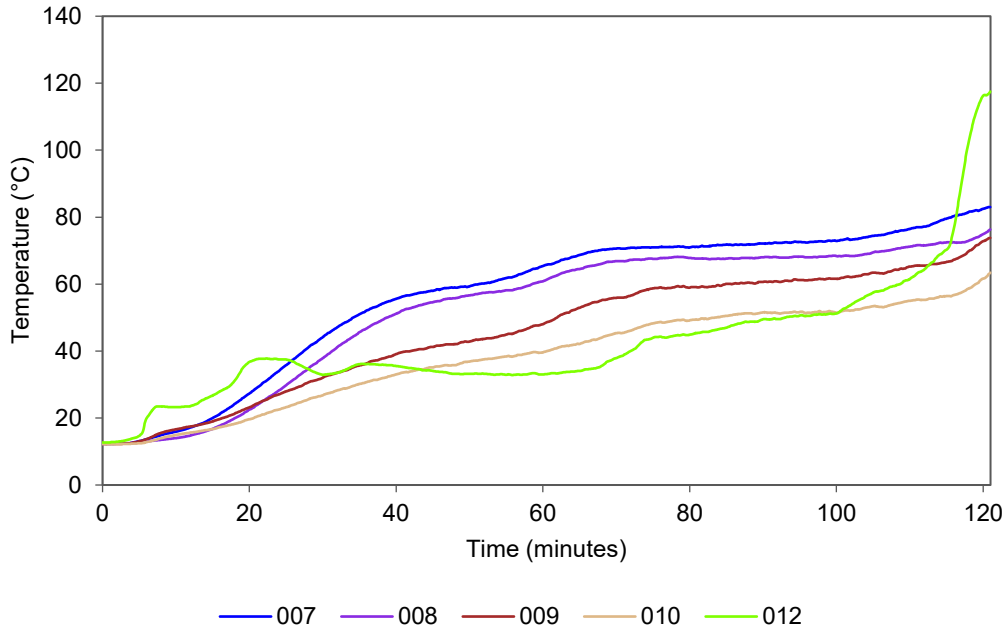


Figure 24 Penetration system C – temperature vs time

Note: TC011 malfunctioned for the duration of the test.

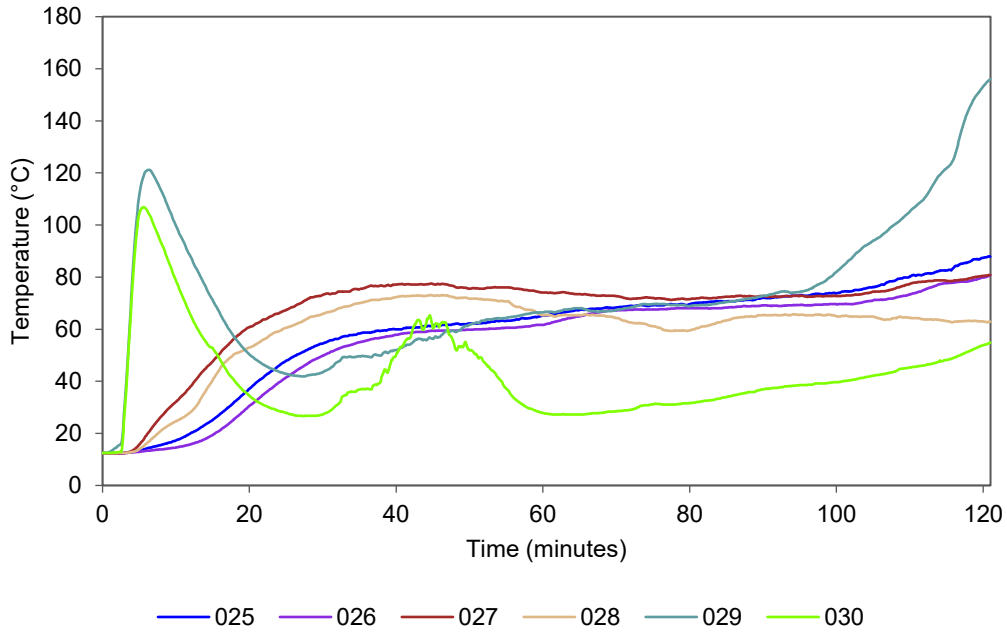


Figure 25 *Penetration system D – temperature vs time*

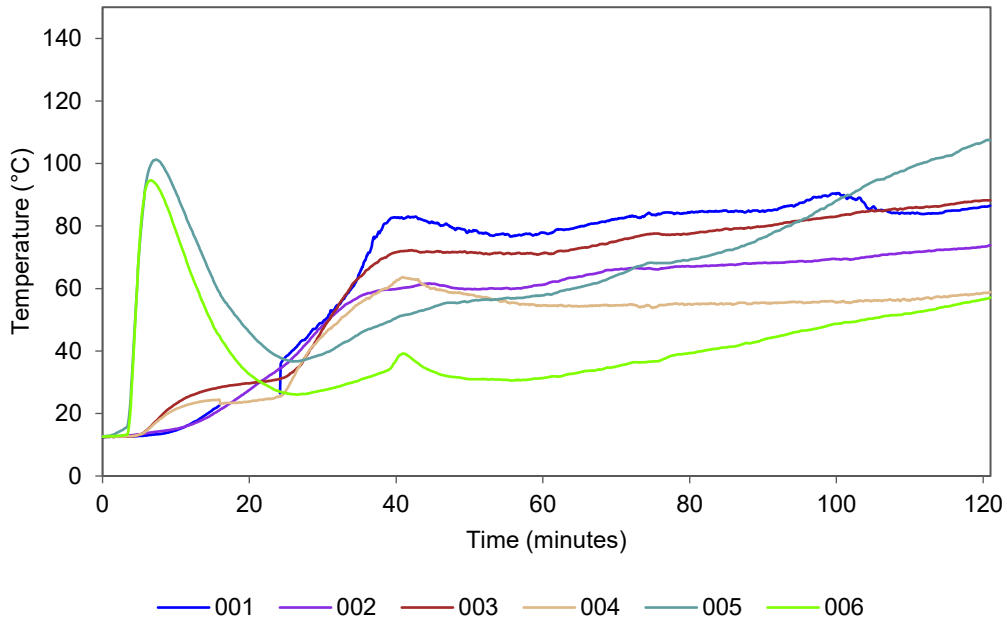


Figure 26 *Penetration system E – temperature vs time*

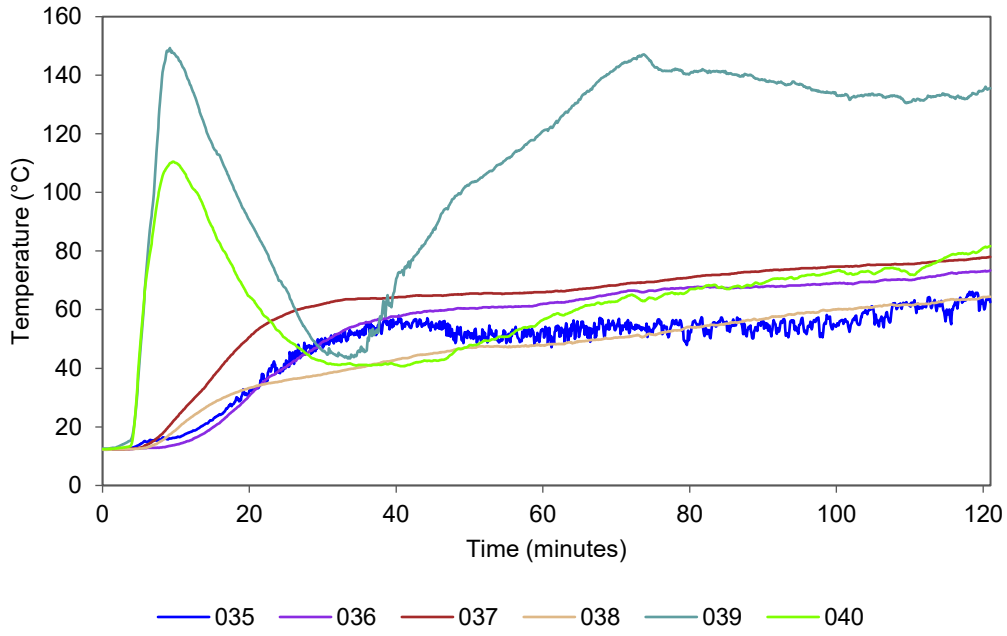


Figure 27 *Penetration system F – temperature vs time*

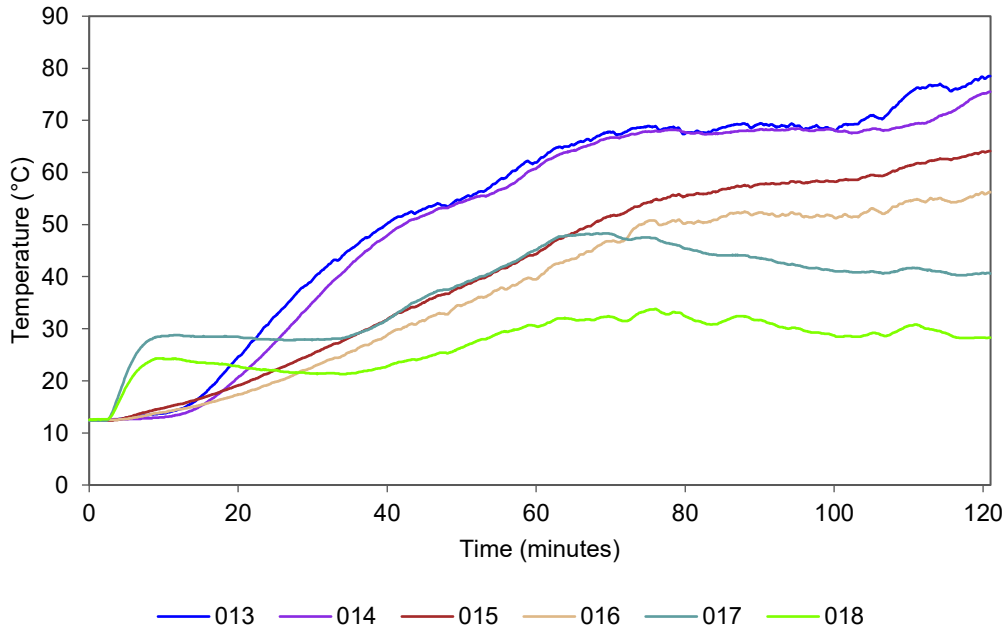


Figure 28 *Penetration system G – temperature vs time*

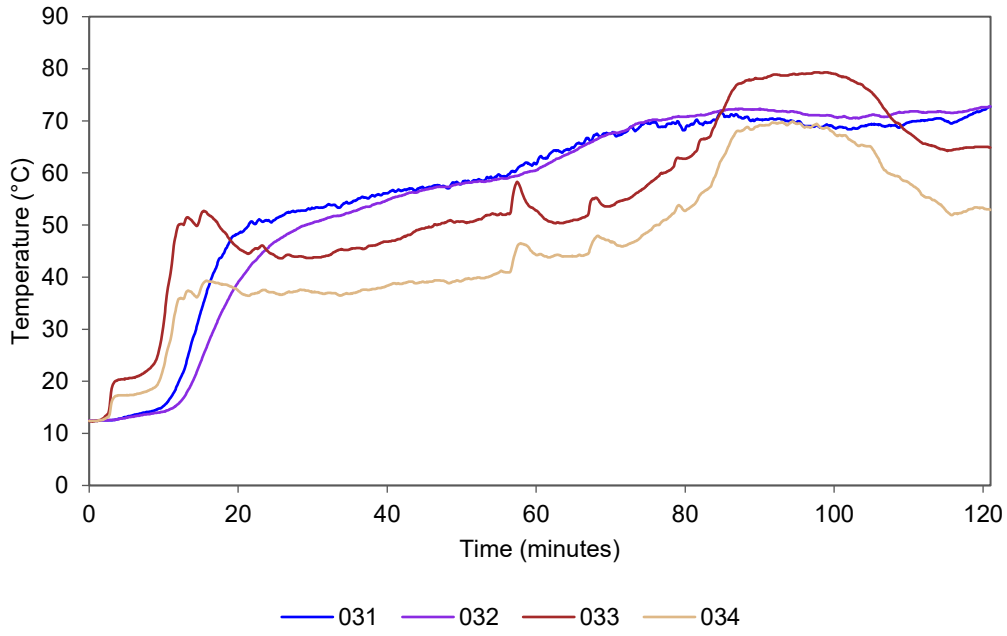


Figure 29 Penetration system H – temperature vs time

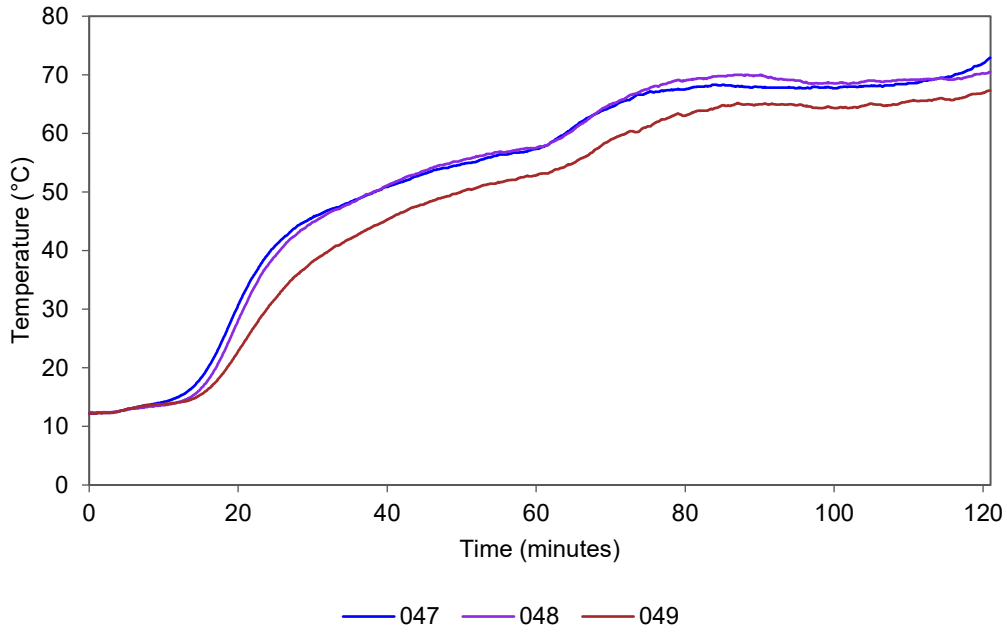


Figure 30 Penetration system I – temperature vs time

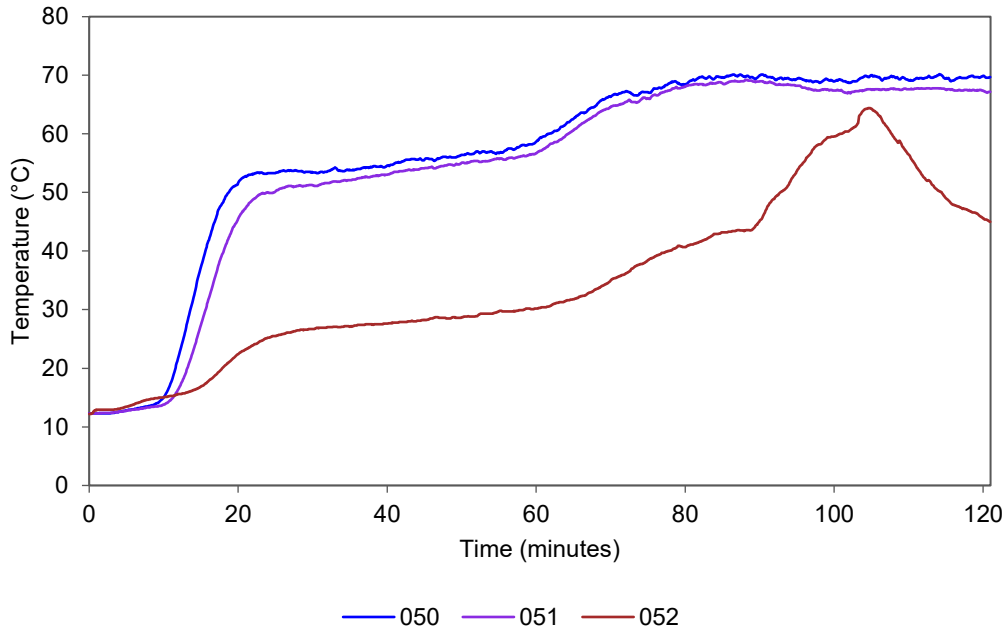


Figure 31 Penetration system J – temperature vs time

Note: TC053 malfunctioned for the duration of the test.

Table 12 Test specimen temperatures

Penetration system	TC No.	Description[1]	Temp (°C) at t (minutes)					Limit[2] (minutes)
			t=0	t=30	t=60	t=90	t=120	
A	041	On the separating element	12	48	63	71	88	-
	042	On the separating element	12	49	67	77	87	-
	043	On the collar	12	32	52	72	90	-
	044	On the collar	12	32	61	72	86	-
	045	On the service	12	34	38	106	146	-
	046	On the service	12	35	40	109	150	-
B	019	On the separating element	12	56	68	72	82	-
	020	On the separating element	12	46	63	70	76	-
	021	On the collar	12	61	71	65	66	-
	022	On the collar	13	56	64	54	58	-
	023	On the service	12	42	61	76	97	-
	024	On the service	13	31	35	44	63	-
C	007	On the separating element	12	44	65	72	82	-
	008	On the separating element	12	38	61	68	75	-
	009	On the collar	12	32	48	61	73	-
	010	On the collar	12	27	40	52	62	-
	011	On the service	#	#	#	#	#	#
	012	On the service	13	33	33	50	116	-
D	025	On the separating element	12	54	65	72	87	-
	026	On the separating element	12	50	62	69	80	-
	027	On the collar	12	73	74	73	80	-
	028	On the collar	12	66	65	66	63	-
	029	On the service	12	43	66	73	153	-
	030	On the service	12	27	28	37	54	-
E	001	On the separating element	12	49	78	85	86	-
	002	On the separating element	13	48	61	68	73	-
	003	On the collar	12	47	71	80	88	-
	004	On the collar	13	45	54	55	58	-
	005	On the service	13	39	58	76	107	-
	006	On the service	13	27	31	44	56	-
F	035	On the separating element	12	49	53	56	63	-
	036	On the separating element	12	49	62	68	73	-
	037	On the collar	12	62	66	73	78	-
	038	On the collar	12	38	48	57	64	-
	039	On the service	13	46	121	138	135	-
	040	On the service	12	42	56	69	81	-

Penetration system	TC No.	Description[1]	Temp (°C) at t (minutes)					Limit[2] (minutes)
			t=0	t=30	t=60	t=90	t=120	
G	013	On the separating element	12	39	62	69	78	-
	014	On the separating element	12	35	61	68	75	-
	015	On the collar	12	25	44	58	64	-
	016	On the collar	12	22	40	52	56	-
	017	On the service insulation	12	28	45	44	41	-
	018	On the service insulation	12	21	30	32	28	-
H	031	On the separating element	12	53	62	70	72	-
	032	On the separating element	12	50	60	72	73	-
	033	On the service	12	44	53	78	65	-
	034	On the service	12	37	44	69	53	-
I	047	On the separating element	12	46	57	68	72	-
	048	On the separating element	12	45	58	70	70	-
	049	On the sealant fillet	12	38	53	65	67	-
J	050	On the separating element	12	54	59	70	70	-
	051	On the separating element	12	51	57	69	67	-
	052	On the service	12	27	30	45	46	-
	053	On the service	#	#	#	#	#	#

Note:

[1] Refer to Table 10 for the locations of thermocouples as only a generic description is included in the table.

[2] Limit time is the time to the nearest whole minute, rounded down to the nearest minute, at which the temperature recorded by the thermocouple does not rise by more than 180 K above the initial temperature.

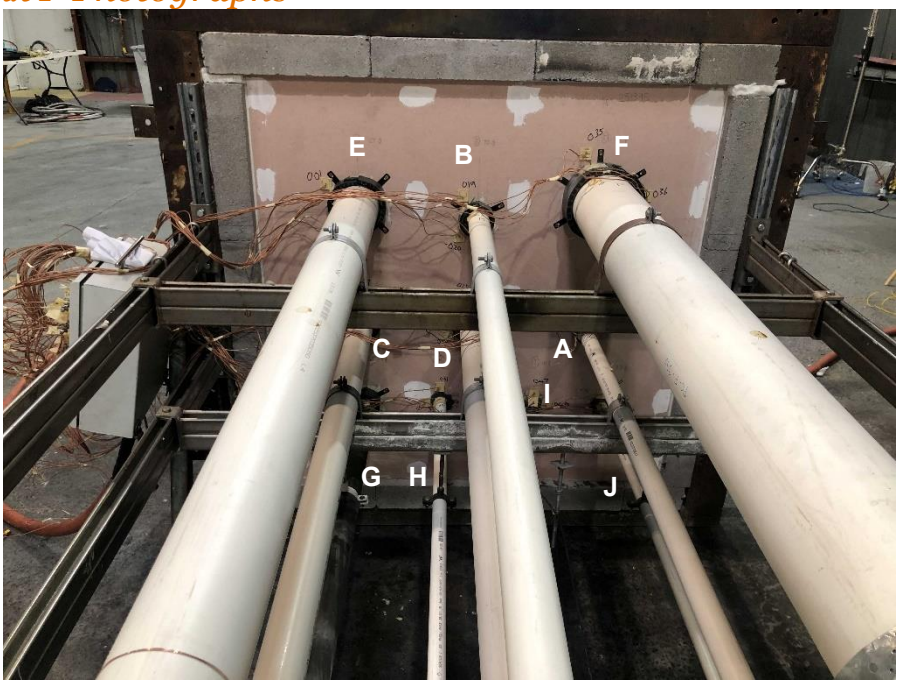
3 No insulation failure before thermocouple malfunction.

Thermocouple malfunction.

'-' Under limit column indicates the temperature limit was not exceeded during the test period or up until the time of integrity failure if a failure occurred.

Appendix F Photographs

West



East

Figure 32 Unexposed face of the specimen before the test

East

West

Figure 33 Exposed face of the specimen before the test

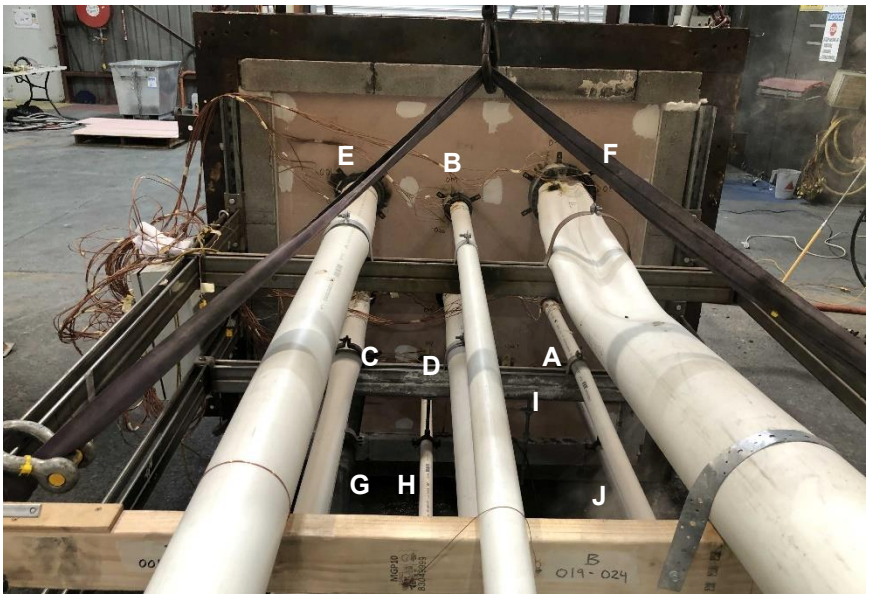


Figure 34 Unexposed face of the specimen at the end of the test

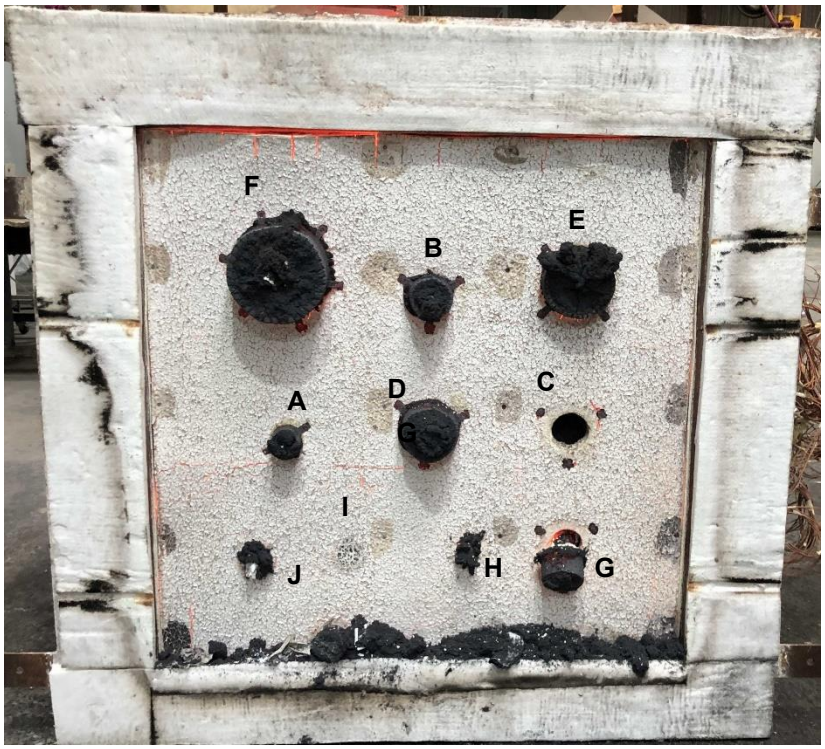


Figure 35 Exposed face of the specimen at the end of the test

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