Warringtonfire
Chiltern House
Stocking Lane
High Wycombe
HP14 4ND
United Kingdom
T: +44 (0)1494 569750
W: www.warringtonfire.com

Title:

The fire resistance performance of 26 pipe penetration sealing systems, 11 cable penetration sealing systems and a blank penetration sealing system within a cross laminated timber supporting construction, when tested in accordance with BS EN 1363-1: 2012 and BS EN 1366-3: 2009

WF Report No:

412849 Revision A

Prepared for:

Polyseam Ltd
15 St Andrews Road
Huddersfield
West Yorkshire
HD1 6SB

Test date:

9th April 2019

Notified Body No:

1314

This report is a revision to that issued as WF 412849 and dated 22/07/19. The details of the test report WF 412849 are held on file by Warringtonfire. The original report and any previous revisions are replaced by this revised report WF 412849 Revision A.

1762

Contents

1 Fire test summary

Twenty six pipe penetration sealing systems, eleven electrical cable penetration systems and a blank penetration sealing system were tested installed into a 100mm thick cross laminated timber supporting construction and tested to evaluate their fire resisting performance.

2 Specimen verification

The specimens were delivered to Warringtonfire during March 2019. The client supplied a nominally 100mm thick cross laminated timber wall in two sections. The two sections which were jointed using a loose tongue joint which was screwed and installed within a refractory lined restraint frame with assistance from Warringtonfire as required. The client subsequently installed the systems into the supporting construction.

2.1 Conditioning

Warringtonfire stored the specimens in climatic conditions approximate to those in normal service.

2.2 Sampling

The fire stopping products used for the test were sampled by:

Product	Auditor	Date
Protecta FR Service Transit 110mm x 250mm x 4.5mm	Peter Sargieson of BM Trada	09/03/2018
Protecta FR Service Transit 40 x 250mm	Stuart Thompson of UL International	02/04/2019
Protecta FR Acrylic	Peter Sargieson of BM Trada	09/07/2019
Protecta FR Collar Ø110 x 50mm	Peter Sargieson of BM Trada	09/03/2018
Protecta FR Collar Ø160 x 60mm	Peter Sargieson of BM Trada	09/03/2018

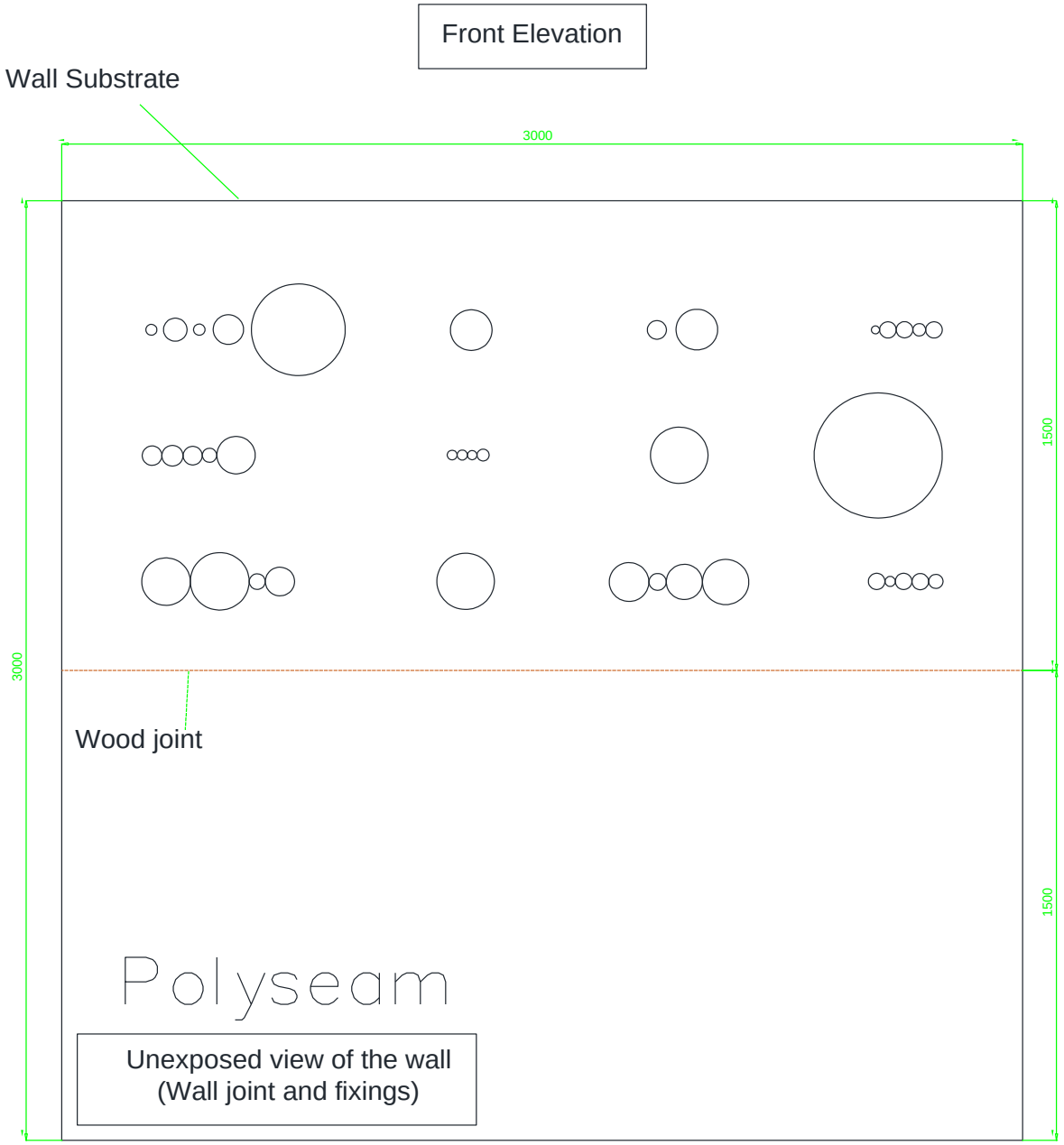
(Details of the sampling documents can be found in the appendix 2).

The pipes and cables used for the test were bought or supplied from standard manufacturing stock either from the manufacturer of the pipe or cable or a distributor.

3 Description of supporting construction

The supporting construction comprised of a 3000mm wide x 3000mm high cross laminated timber wall construction, into a refractory lined steel restraint frame. The timber wall included a joint at mid height of the wall. A timber section stated by client as European Redwood with a nominal density of 510 kg/m^3 sourced from TRADA timber database, measuring 95mm high x 34mm wide was used to connect the upper and lower wall sections via a loose tongue joint.

*TRADA timber database



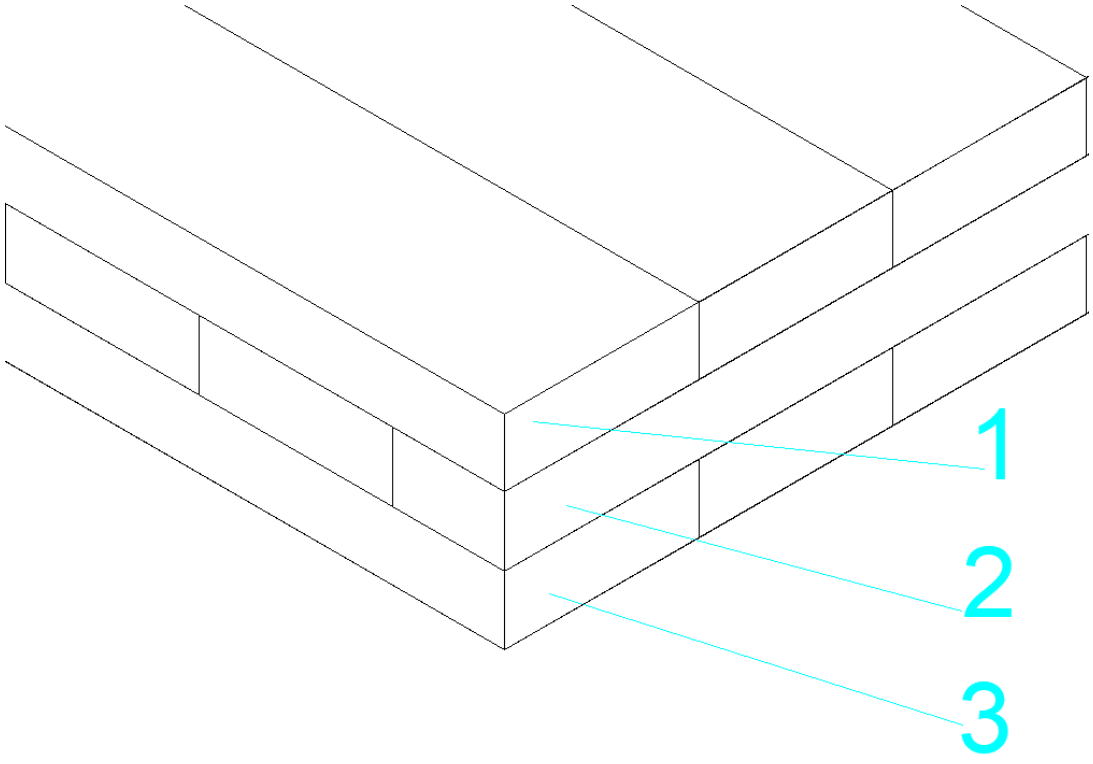
Wall specification supplied by Polyseam Ltd

Product Information – (Stated by client not verified by laboratory).
Cross-glued wood from Splitkon

Material cross-glued wood, also called cross/laminated timber.
Lumber Norwegian Spruce, quality T22 and T15 (T8) NS-EN 338:2016 (structural timber, strength classes).
Glue heat-resistant melamine-urea-formaldehyde from Dynea AS
Moisture content 12 ± 2% (manufacturer stated moisture)

Cross-glued wood are wooden slats that are layered normally on each other and glued together in the HHT. prEN16351 (timber structures, cross laminated timber, requirements), version from November 2018. The wooden slats are finger joined after the NS-EN 15497:2014 (structural finger jointed solid timer, performance requirements and minimum production requirements) and planed before adhesive application. The slats are glued on two sides.

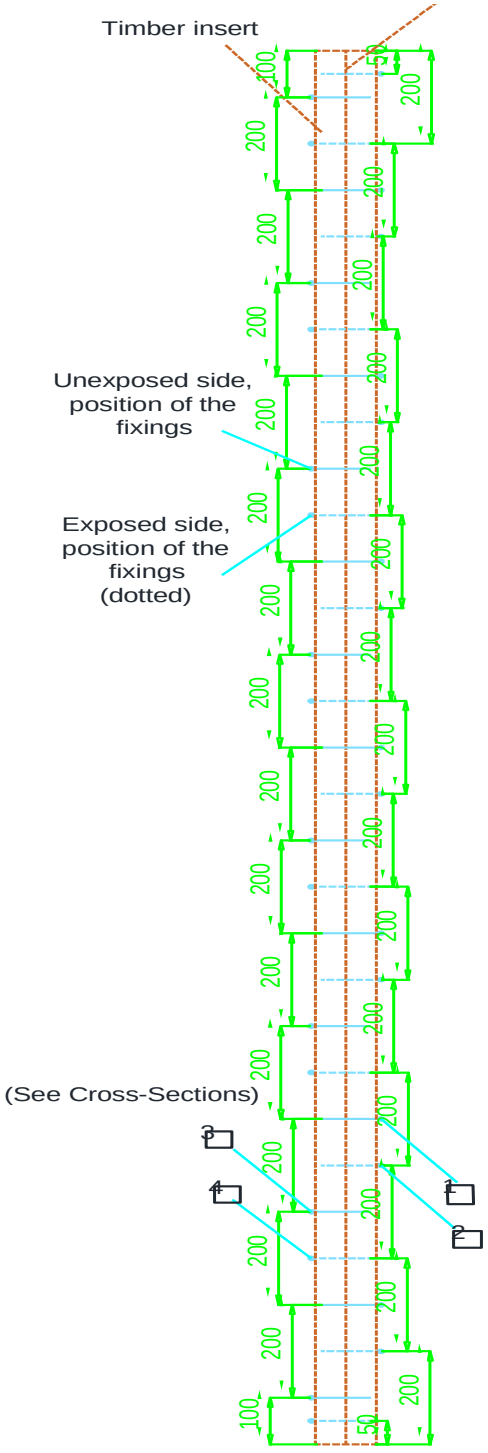
Thickness (mm)	Lamell 1	Lamell 2	Lamell 3
100	33	34	33



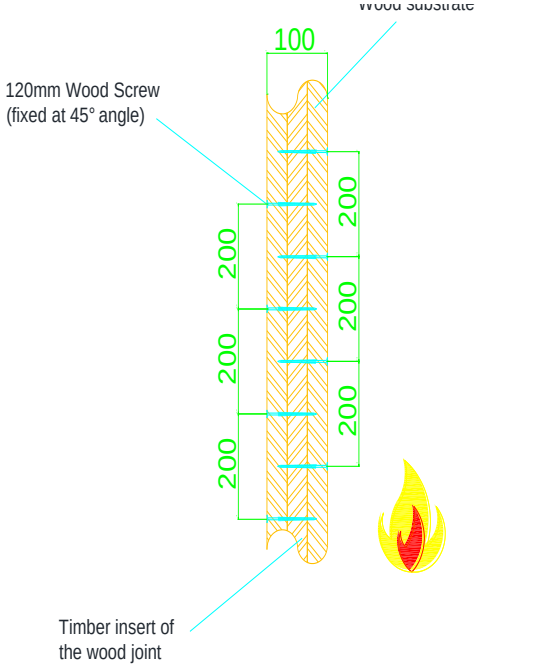
Fixing positions of the timber substrate (two parts)

The drawings below illustrates the two sections of the cross-laminate wall and how the two sections were fixed together. 120mm wood screws was fixed through both the exposed and unexposed sides of the wall at a 45° angle. The fixing positions from left to right for the exposed side of the wall was 50mm from the edge of the wall and spaced 200mm thereafter. The fixings positions from left to right for the unexposed side of the wall was 100mm from the edge of the wall and spaced 200mm thereafter.

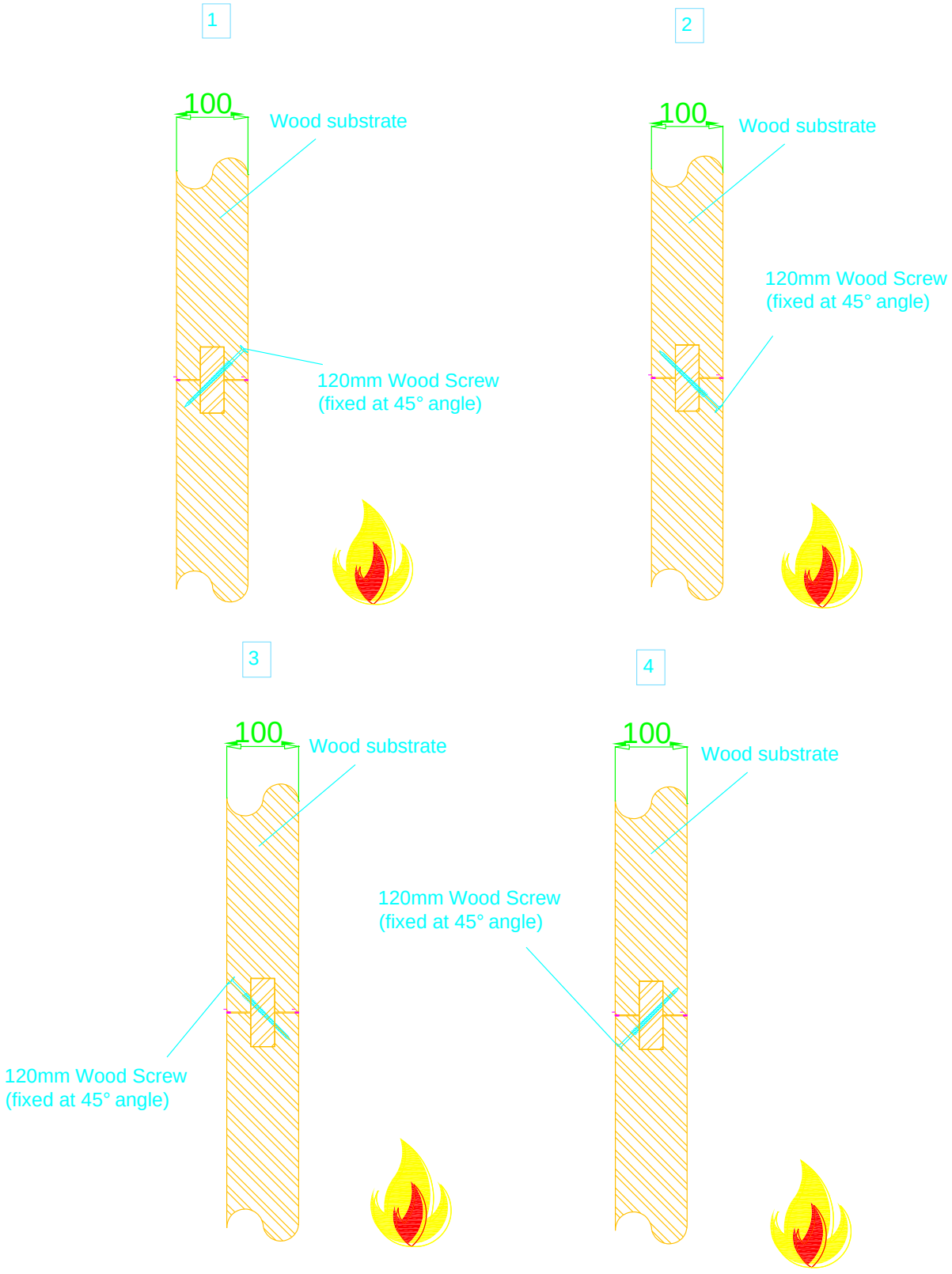
Viewed from the unexposed face



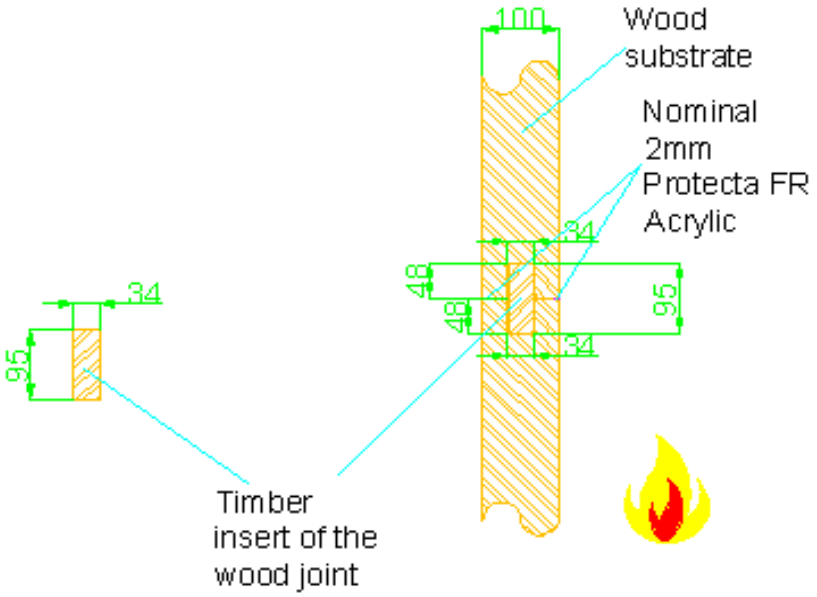
Cross – section viewed from the top.



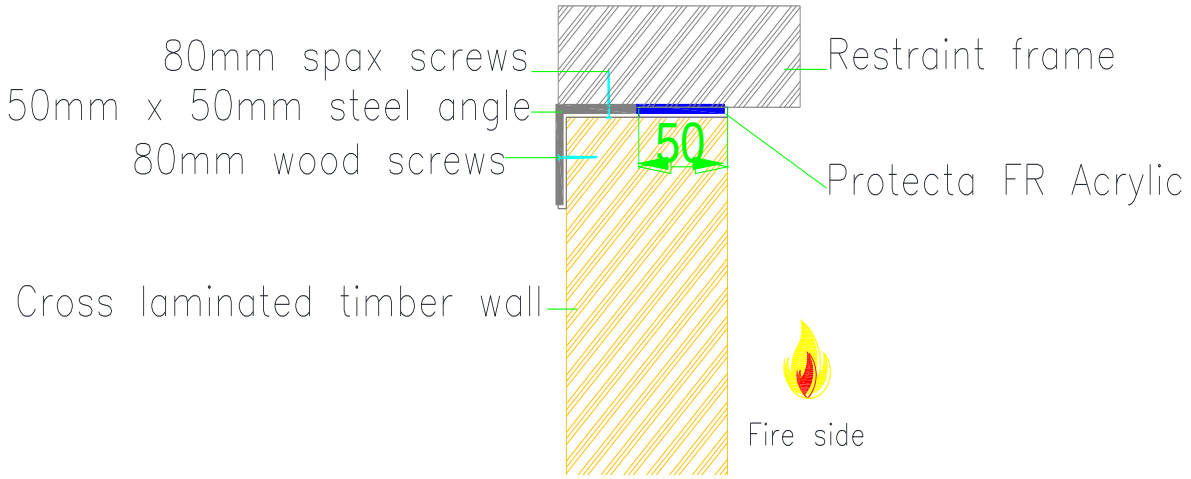
The cross sections below are in reference to the fixing positions on the previous page. This shows the angle to which the screws were fixed with 120mm wood screws.



The drawing below displays the dimentions of the loose tounge joint within the wall with the Protecta FR Acrylic nominally 2mm thick between the two sections.



The supporting construction was fixed to the restraint frame using 50mm x 50mm x 5mm thick steel angles which were 3 meters in length were fixed restraint frame on the top and bottom edges; the vertical edges remained free. Protecta FR Acrylic was used to fill the remaining void between the restraint frame and wall. The gap between the vertical edges and restraint frame were sealed with mineral rock wool.



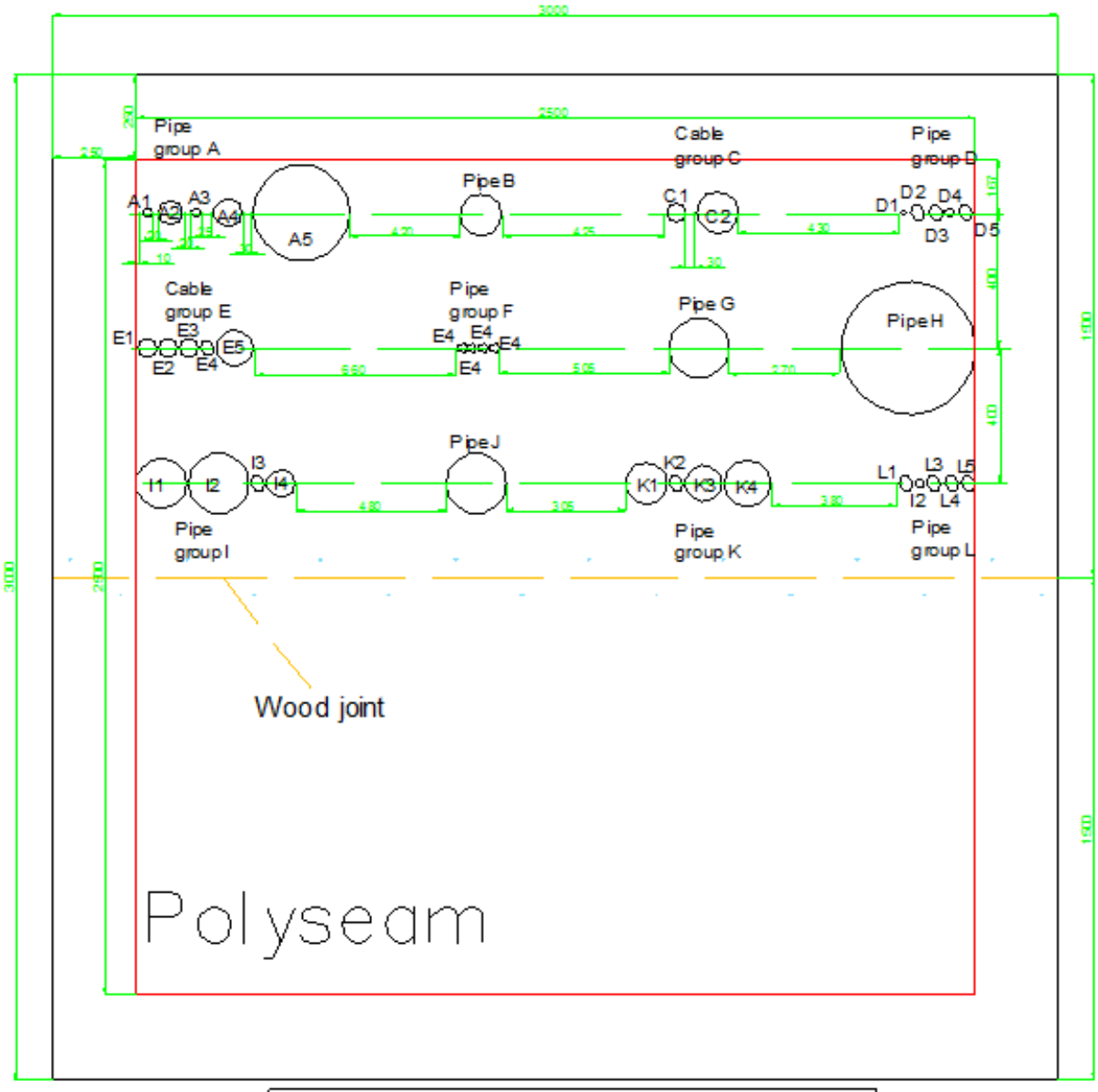
4 Description of specimens

Position details of the specimens are shown below. All measurements are in mm and the descriptions are written viewing the specimens from the unexposed face unless stated otherwise.

Pipes A1-A5 measured nominally 1500mm long with 650mm protruding from the exposed face.

All remaining pipes and cables measured nominally 1200mm long with a minimum of 500mm protruding from the exposed face.

See drawings in Section 7 for details of pipe capping.

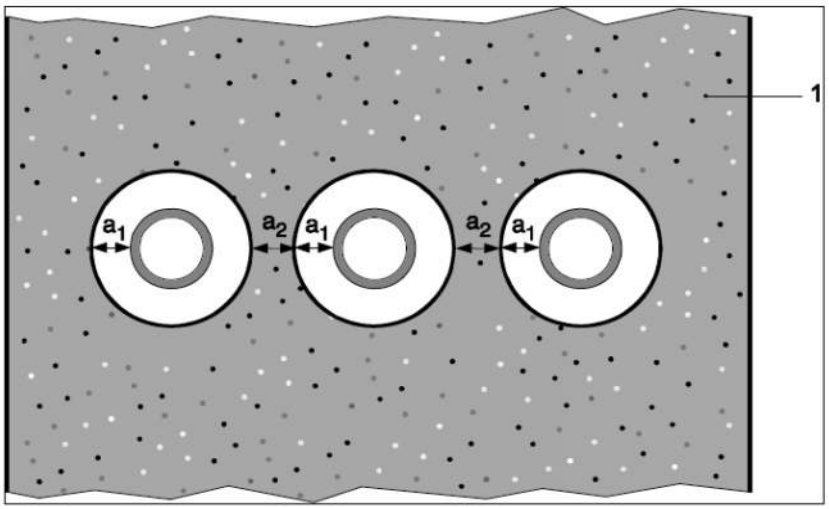


Unexposed view of the wall
(Aperture sizes and distances between)

The pipes A1 – A5, were positioned as per figure E2 option 1 of BS EN 1366-3: 2009 where a1 measured 10mm and a2 measured 0mm after the insulation was installed. See section 7 full dimension details.

The transits C1 and C2, were positioned as per figure E2 option 1 of BS EN 1366-3: 2009 where a1 measured 10mm and a2 measured 30mm once the insulation was installed:

Option 1



Key

1	Supporting construction
a_1	Pipe / edge of seal separation (annular space
a_2	Separation between penetration seals

Key

1	Supporting construction
a1	Cables/edge of seal separation (annular space)
a2	Separation between penetration seals

Pipes and cables E,F,I,K and L were positioned where a1 measured 10mm and a2 measured 0mm:

4.1 Service penetration supports

(Read in conjunction with photograph below)

The service penetration support system consisted of Unistrut steel frame sections and associated attachments.

The Unistrut frame section was constructed using 3mm thick profiled steel ‘U’ channel.

Unexposed face penetration supports

On the unexposed face, 14No. 500mm Unistrut cantilever arm sections provided support for 6No. horizontal lengths of Unistrut and pipe brackets, providing support for the pipes and cables at 250mm and 450mm from the face of the partition, fixed to 5No.vertical lengths of Unistrut fixed to 2No. horizontal lengths of Unistrut fixed to the restraint frame above and below independent from the partition.

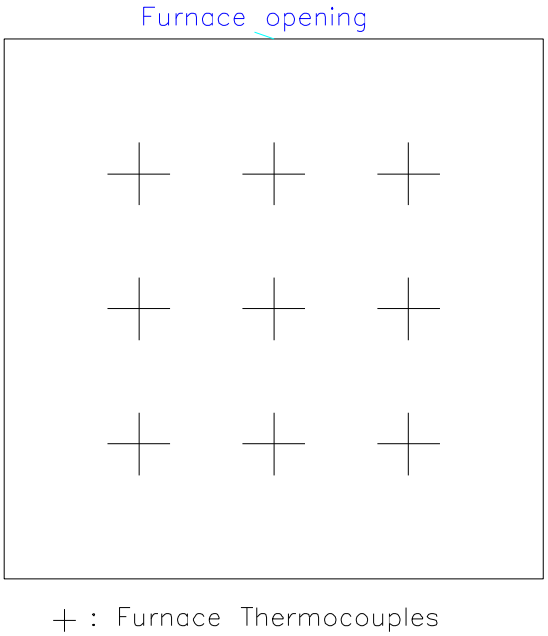
Exposed face penetration reports

On the exposed face, 14No. 500mm long Unistrut cantilever arm sections provided support for 6No. Unistrut ‘U’ section channels and pipe brackets providing horizontal support for the pipes and cables at 450mm from the face of the partition, fixed to 5No. vertical lengths of Unistrut fixed to 2No. horizontal lengths of Unistrut fixed to the restraint frame above and below independent from the partition.

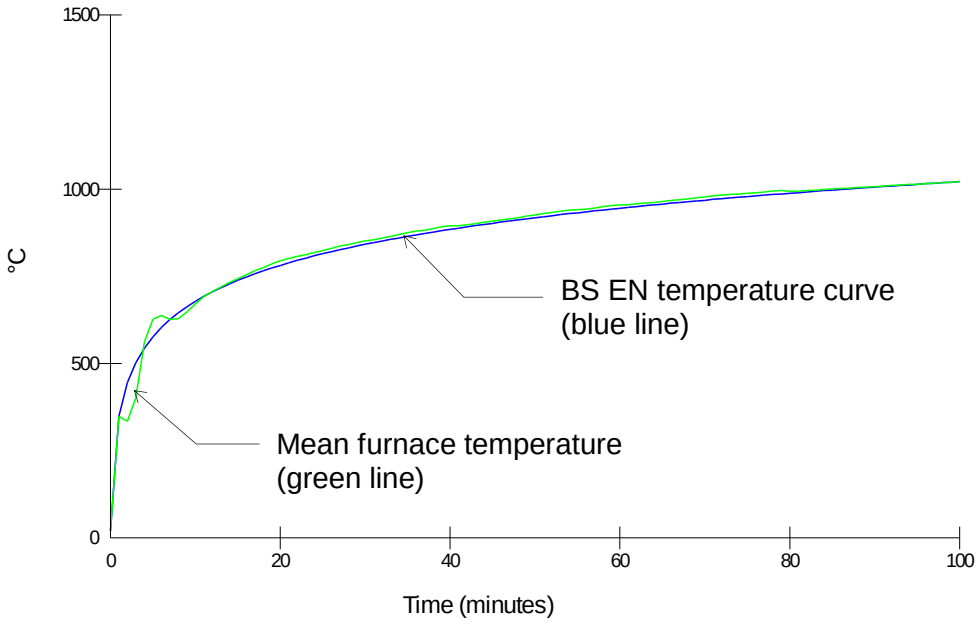
5 Test Conditions

5.1 Furnace temperature

The furnace was controlled to follow the temperature/time relationship specified in BS EN 1363: Part 1: 2012 Section 5.1.1 as closely as possible, using the average of nine plate thermometers suitably distributed within the furnace.

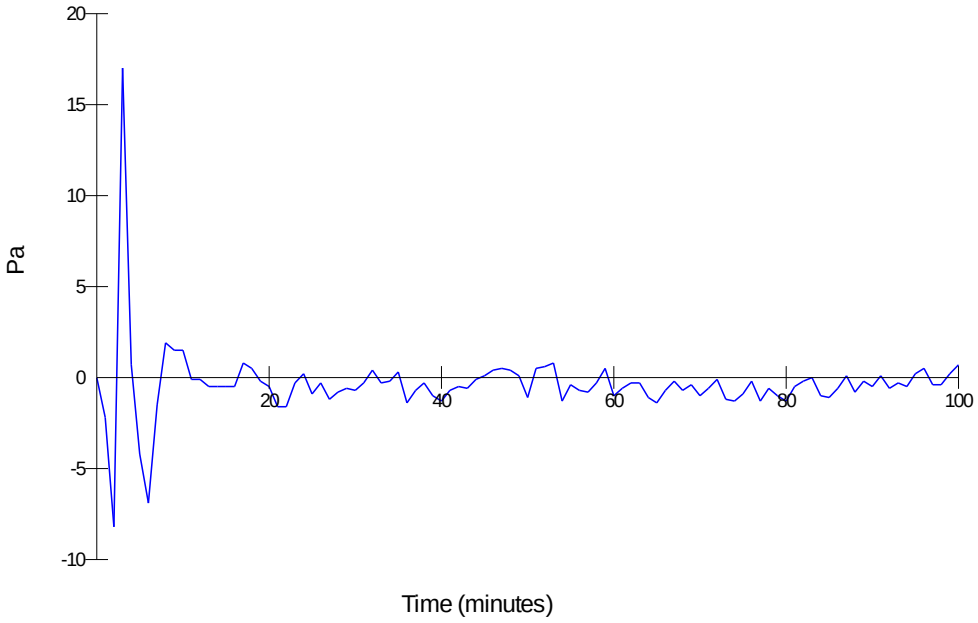


The temperatures recorded are shown graphically below:



5.2 Pressure readings

After the first 5 minutes of the test, the furnace pressure was maintained at -0.3 ± 5 Pa and after 10 minutes was maintained at -0.3 ± 3 Pa with respect to atmosphere equating to 10Pa at the base of the lowest specimens. The pressure readings are shown graphically below.



5.3 Ambient temperature

The ambient temperature of the test area at commencement of the test was 13°C.

5.4 Unexposed face thermocouple positions and test equipment

5.4.1 The temperature of the unexposed face of each specimen was monitored by means of thermocouples positioned in accordance with the test standard to determine the maximum unexposed face temperature rise.

5.4.2 A roving thermocouple was available to monitor any positions suspected of being at a greater temperature than indicated by fixed position thermocouples.

5.4.3 The thermocouple positions are tabulated overleaf and shown on each specimen in Section 7.

5.4.4 The temperatures recorded have been tabulated in the Appendix.

5.4.5 Gap gauges and cotton pads were available to assess integrity of the specimens.

5.5 Thermocouple positions (see also Section 7)

The temperature of the unexposed face was monitored by means of the following thermocouples.

Thermocouple number	Test reference	Type (location)
1	-	Furnace
2	-	Furnace
3	-	Furnace
4	-	Furnace
5	-	Furnace
6	-	Furnace
7	-	Furnace
8	-	Furnace
9	-	Furnace
11	-	Laboratory ambient
Pipe group A		
18	Pipe A1	On wall 25mm from pipe insulation
19	Pipe A1	On pipe insulation 25mm from wall
20	Pipe A1	On pipe 25mm from pipe insulation
21	Pipe A2	On wall 25mm from pipe insulation
22	Pipe A2	On pipe insulation 25mm from wall
23	Pipe A2	On pipe 25mm from pipe insulation
24	Pipe A3	On wall 25mm from pipe insulation
25	Pipe A3	On pipe insulation 25mm from wall
26	Pipe A3	On pipe 25mm from pipe insulation
27	Pipe A4	On wall 25mm from pipe insulation
28	Pipe A4	On pipe insulation 25mm from wall
29	Pipe A4	On pipe 25mm from pipe insulation
30	Pipe A5	On wall 25mm from pipe insulation
31	Pipe A5	On pipe insulation 25mm from wall
32	Pipe A5	On pipe 25mm from pipe insulation
Pipe B		
33	Pipe B	On wall 25mm from fire collar
34	Pipe B	On fire collar
35	Pipe B	On pipe 25mm from fire collar

Thermocouple number	Test reference	Type (location)
Cable group C		
36	Cable C1	On wall 25mm from cable transit
37	Cable C1	On cable transit
38	Cable C1	On cable 25mm from cable transit
39	Cable C2	On wall 25mm from cable transit
40	Cable C2	On cable transit
41	Cable C2	On cable 25mm from cable transit
Pipe group D		
42	Pipe D1	On wall 25mm from pipe seal
43	Pipe D1	On pipe 25mm from pipe seal
44	Pipe D2	On wall 25mm from pipe seal
45	Pipe D2	On pipe 25mm from pipe seal
46	Pipe D3	On wall 25mm from pipe seal
47	Pipe D3	On pipe 25mm from pipe seal
48	Pipe D4	On wall 25mm from pipe seal
49	Pipe D4	On pipe 25mm from pipe seal
50	Pipe D5	On wall 25mm from pipe seal
51	Pipe D5	On pipe 25mm from pipe seal
Cable group E		
52	Cable E1	On wall 25mm from cable seal
53	Cable E1	On cable 25mm from cable seal
54	Cable E2	On wall 25mm from cable seal
55	Cable E2	On cable 25mm from cable seal
56	Cable E3	On wall 25mm from cable seal
57	Cable E3	On cable 25mm from cable seal
58	Cable E4	On wall 25mm from cable seal
59	Cable E4	On cable 25mm from cable seal
60	Cable E5	On wall 25mm from cable seal
61	Cable E5	On cable 25mm from cable seal
Pipe group F		
62	Cable F1	On wall 25mm from cable seal
63	Cable F1	On cable 25mm from cable seal
64	Cable F2	On wall 25mm from cable seal
65	Cable F2	On cable 25mm from cable seal

Thermocouple number	Test reference	Type (location)
66	Cable F3	On wall 25mm from cable seal
67	Cable F3	On cable 25mm from cable seal
68	Cable F4	On wall 25mm from cable seal
69	Cable F4	On cable 25mm from cable seal
Pipe G		
70	Pipe G	On wall 25mm from pipe fire collar
71	Pipe G	On pipe fire collar
72	Pipe G	On pipe 25mm from pipe fire collar
Blank seal H		
73	Seal H	On wall 25mm from seal
74	Seal H	On seal 25mm wall
104	Seal H	On seal
105	Seal H	On seal
106	Seal H	On seal
Pipe group I		
75	Pipe I1	On wall 25mm from pipe insulation
76	Pipe I1	On pipe insulation 25mm from wall
77	Pipe I2	On wall 25mm from pipe insulation
78	Pipe I2	On pipe insulation 25mm from wall
79	Pipe I3	On wall 25mm from pipe insulation
80	Pipe I3	On pipe insulation 25mm from wall
81	Pipe I4	On wall 25mm from pipe insulation
82	Pipe I4	On pipe insulation 25mm from wall
Pipe J		
83	Pipe J	On fire seal batt 25mm from pipe collar
84	Pipe J	On pipe collar
85	Pipe J	On pipe 25mm from pipe collar
Pipe group K		
86	Pipe K1	On wall 25mm from pipe insulation
87	Pipe K1	On pipe insulation 25mm from wall
88	Pipe K2	On wall 25mm from pipe insulation
89	Pipe K2	On pipe insulation 25mm from wall
90	Pipe K3	On wall 25mm from pipe insulation
91	Pipe K3	On pipe insulation 25mm from wall

Thermocouple number	Test reference	Type (location)
92	Pipe K4	On wall 25mm from pipe insulation
93	Pipe K4	On pipe insulation 25mm from wall
Pipe group L		
94	Pipe L1	On wall 25mm from pipe seal
95	Pipe L1	On pipe 25mm from pipe seal
96	Pipe L2	On wall 25mm from pipe seal
97	Pipe L2	On pipe 25mm from pipe seal
98	Pipe L3	On wall 25mm from pipe seal
99	Pipe L3	On pipe 25mm from pipe seal
100	Pipe L4	On wall 25mm from pipe seal
101	Pipe L4	On pipe 25mm from pipe seal
102	Pipe L5	On wall 25mm from pipe seal
103	Pipe L5	On pipe 25mm from pipe seal

The temperatures recorded have been tabulated in the Appendix.

6 Observations

All comments refer to the unexposed face unless stated otherwise.

Time (minutes)	Comments
00:00	Test Started.
03:00	C1 and C2, there is smoke issuing at the collar and the end of the cables.
16:00	H, there is smoke issuing.
18:20	H, there is discoloration.
22:10	H, there is further smoke issuing and discolouration.
26:00	K1, there is smoke issuing.
27:10	K1, the insulation has split open.
27:51	K1, there is a glow visible.
29:18	K1, a cotton pad integrity test was performed at the glow which did not result in the ignition of the cotton pad. No failure.
30:46	K1, a cotton pad integrity test was performed at the glow which resulted in the ignition of the cotton pad therefore constituting **integrity failure**.
32:00	K4, the insulation wrap has split and peeled away at the top left of the base.
32:00	I1 and I2, there is smoke issuing from the base of the pipe.
35:15	I2, there is a glow visible at the base of the pipe.
38:09	I2, a cotton pad integrity test was performed at the glow which did not result in the ignition of the cotton pad. No failure.
39:04	I2, a cotton pad integrity test was performed which resulted in the ignition of the cotton pad therefore constituting **integrity failure**.
39:10	H, there is an increase in smoke issuing and it has cracked at the top.
41:10	B, there is smoke issuing at the top of the collar. K4, there is an increase in smoke issuing.
43:00	I4, there is smoke issuing at the base around the insulation.
44:10	I1, there is a glow visible.
45:09	I1, a cotton pad integrity test was performed at the top which did not result in the ignition of the cotton pad. No failure.
49:20	H, there is a glow visible.

52:01 I1, a cotton pad test was performed which did not result in the ignition of the cotton pad. No failure.

52:26 K4, there is a glow visible at the left side of the base.

55:14 F4, there is smoke issuing and discolouration at the top of the base.

53:20 I1, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

54:46 I1, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

56:58 K4, there is continuous flaming thereby constituting **integrity failure**.

58:00 I4, there is an increase in discolouration.

58:45 A5, there is discolouration underneath the pipe.

61:10 I1, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

62:48 H, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

64:20 I1, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

65:29 I1, a cotton pad integrity test was performed which resulted in the ignition of the cotton pad therefore constituting **integrity failure**.

68:00 A5, there is an increase in discolouration around the whole pipe at the base.

69:33 H, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

71:00 I4 and K3, there is a glow visible and there is an increase in discolouration.

76:40 F4, there is an increase in discolouration and smoke issuing.

79:20 H, there is charring to the wall above.

80:55 I4, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

81:00 L4, there is smoke issuing.

82:18 I4, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

82:50 There is smoke issuing through the joint in the wall.

83:38 I4, a cotton pad integrity test was performed which did not result in the ignition of the cotton pad. No failure.

85:07 I4, a cotton pad integrity test was performed which resulted in the ignition of the cotton pad therefore constituting **integrity failure**.

86:07 A5, there is an increase in discolouration.

86:42 K3, a cotton pad integrity test was performed which resulted in the ignition of the cotton pad therefore constituting **integrity failure**.

88:08 H, a cotton pad integrity test was performed which not result in the ignition of the cotton pad. No failure.

90:00 E5, there is a glow visible above the cables.

91:48 E5, a cotton pad integrity test was performed which resulted in the ignition of the cotton pad therefore constituting **integrity failure**.

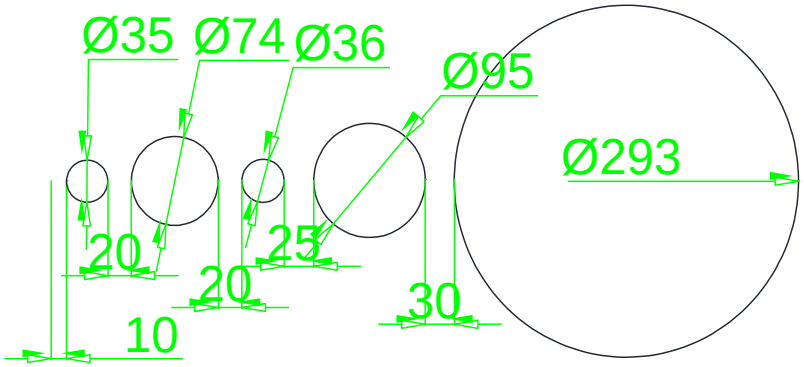
100:58 Test terminated.

7 Penetration sealing systems

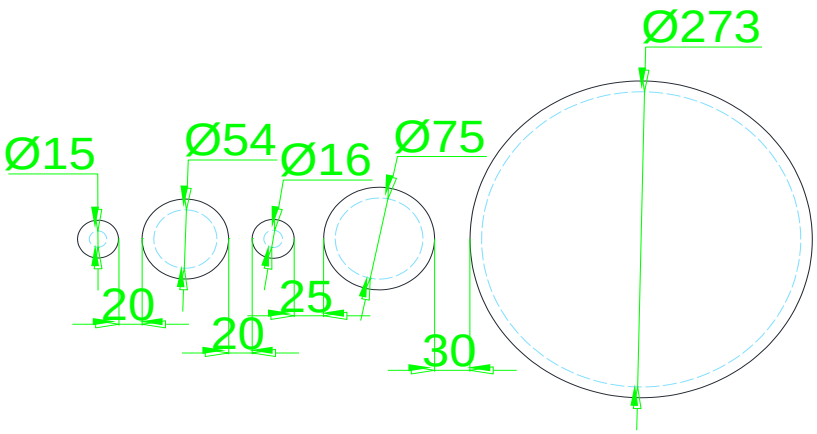
Pipe group A (Polyseam ref. PS Group C)

The pipes A1 – A5, were positioned as per figure E2 option 1 of BS EN 1366-3: 2009 where a1 measured 10mm and a2 measured 0mm after the insulation was installed:

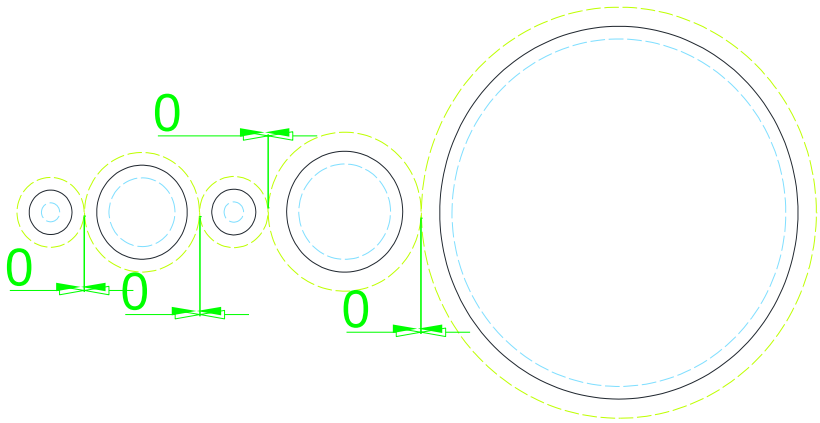
Dimensions and aperture sizes A1 – A5



Pipe dimensions within the apertures A1 – A5



Dimensions between specimens once insulation was installed A1 – A5



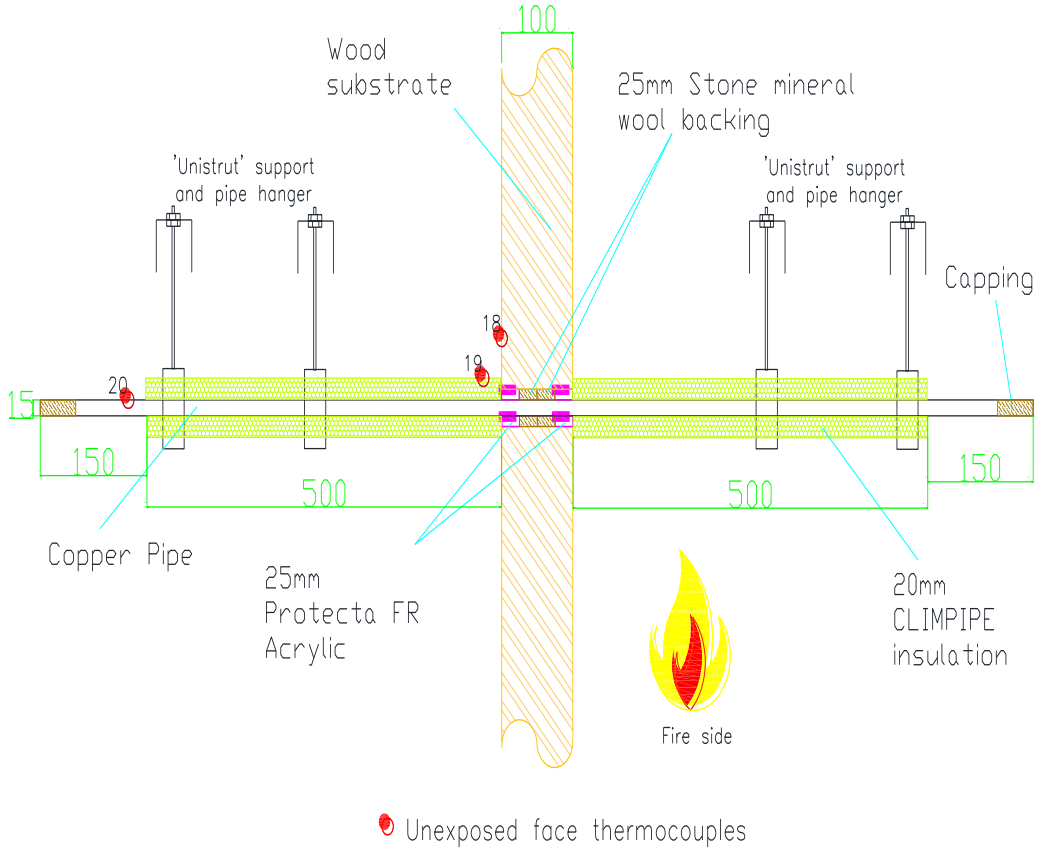
Pipe A1 (Polyseam ref. W058)

Service detail

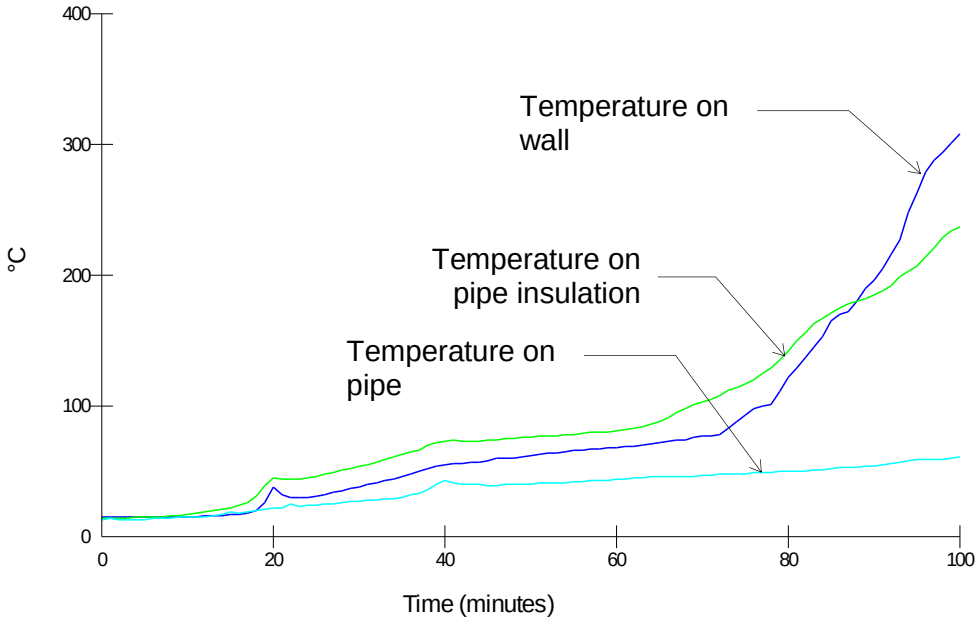
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
A1	Copper	Ø15mm	0.7mm	Ø35mm	20mm thick Isover CLIMPIPE Section Alu2 local interrupted (LI) 500mm each face	C/C

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
A1	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
A1	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	89 (eighty nine) minutes

* No failure of this test criteria at test termination

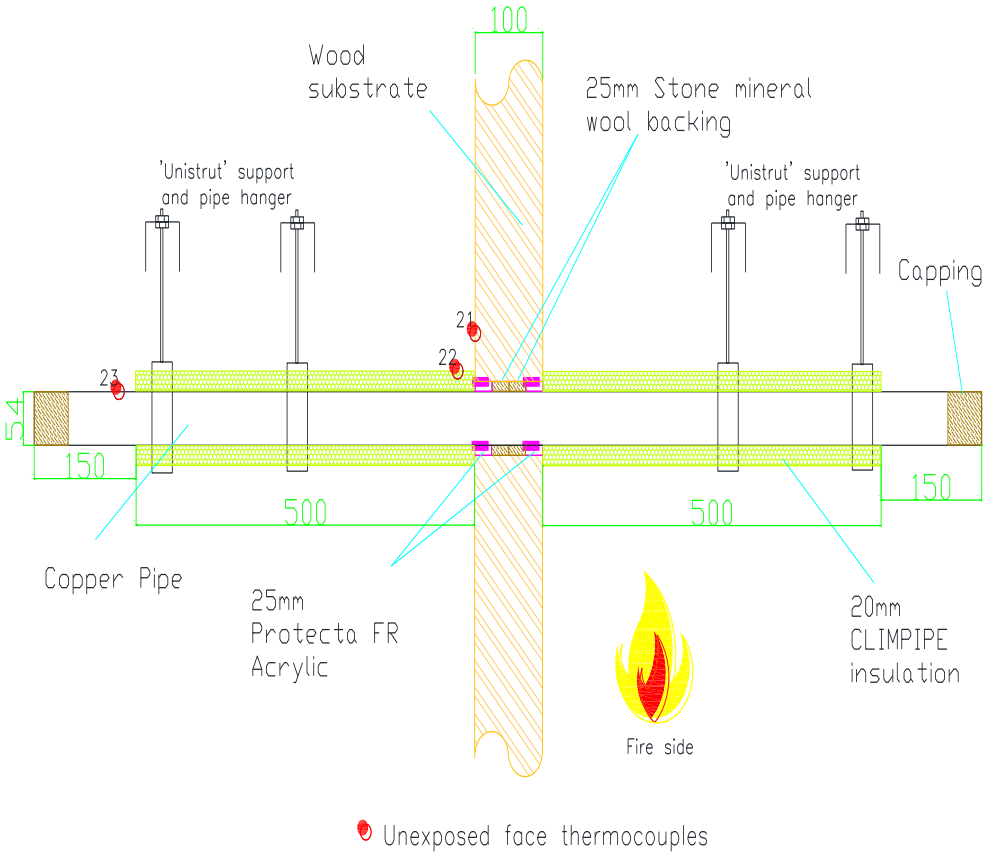
Pipe A2 (Polyseam ref. W059)

Service detail

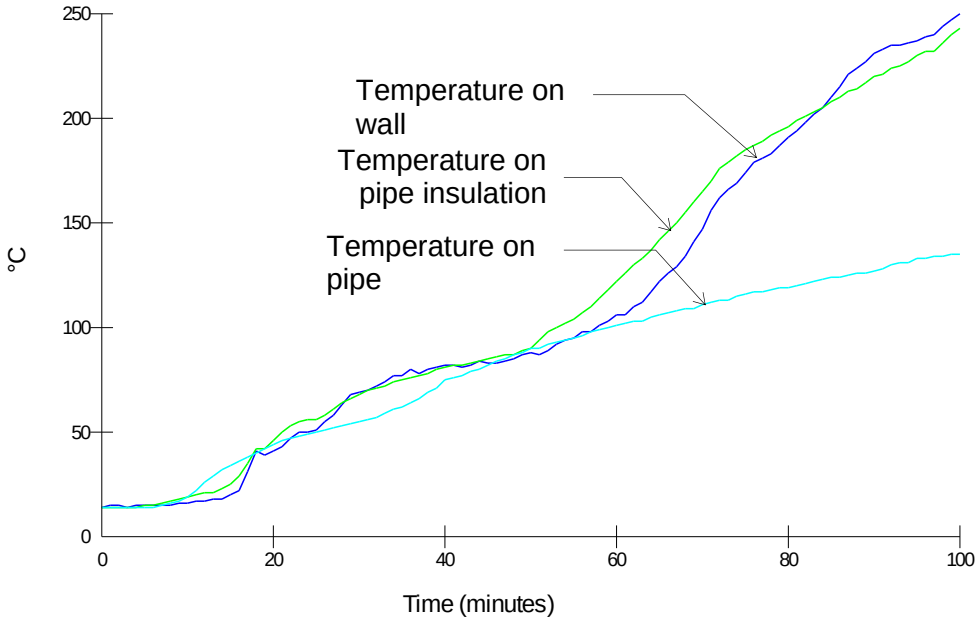
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
A2	Copper	Ø54mm	1.2mm	Ø74mm	20mm thick Isover CLIMPIPE Section Alu2 local interrupted (LI) 500 mm each face	C/C

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
A2	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
A2	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	79 (seventy nine) minutes

* No failure of this test criteria at test termination

Pipe A3 (Polyseam ref. W060)

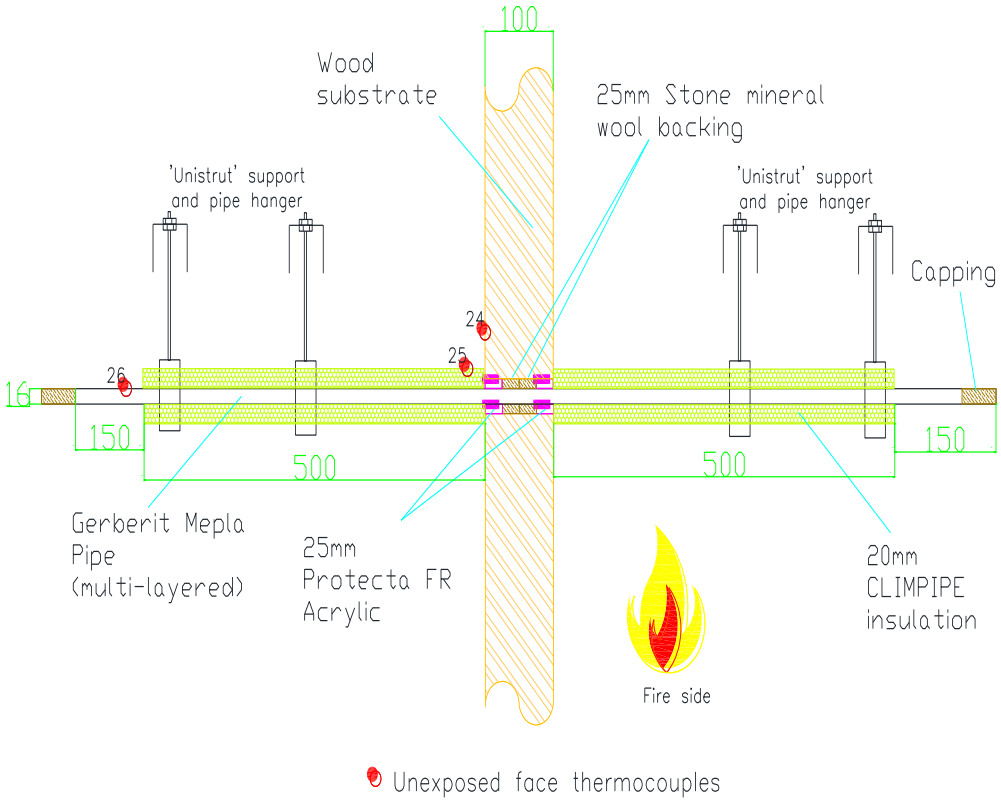
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
A3	Gerberit Mepla	Ø16mm	2.25mm	Ø36mm	20mm thick Isover CLIMPIPE Section Alu2 local interrupted (LI) 500mm each face	C/C

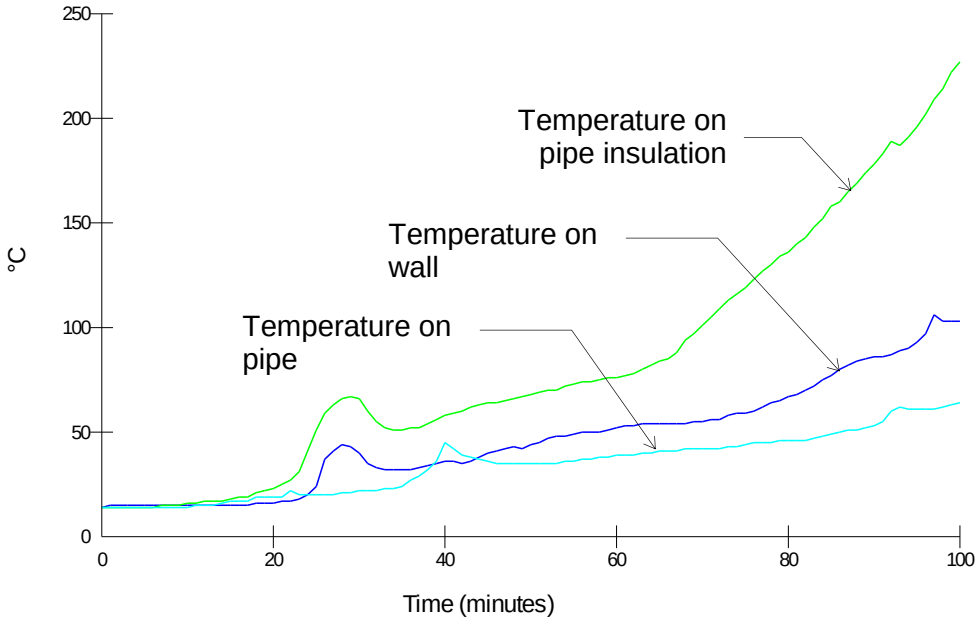
Pipe markings

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
A3	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
A3	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	94 (ninety four) minutes

* No failure of this test criteria at test termination

Pipe A4 (Polyseam ref. W061)

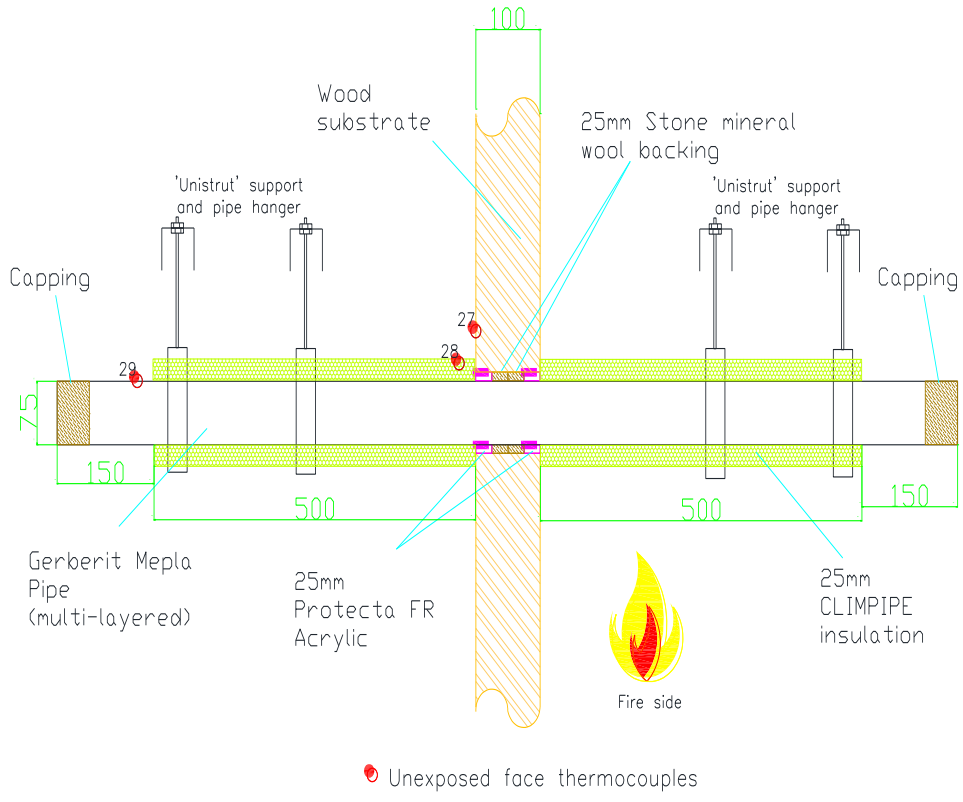
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
A4	Gerberit Mepla	Ø75mm	4.6mm	Ø95mm	25mm thick Isover CLIMPIPE Section Alu2 local interrupted (LI) 500mm each face	C/C

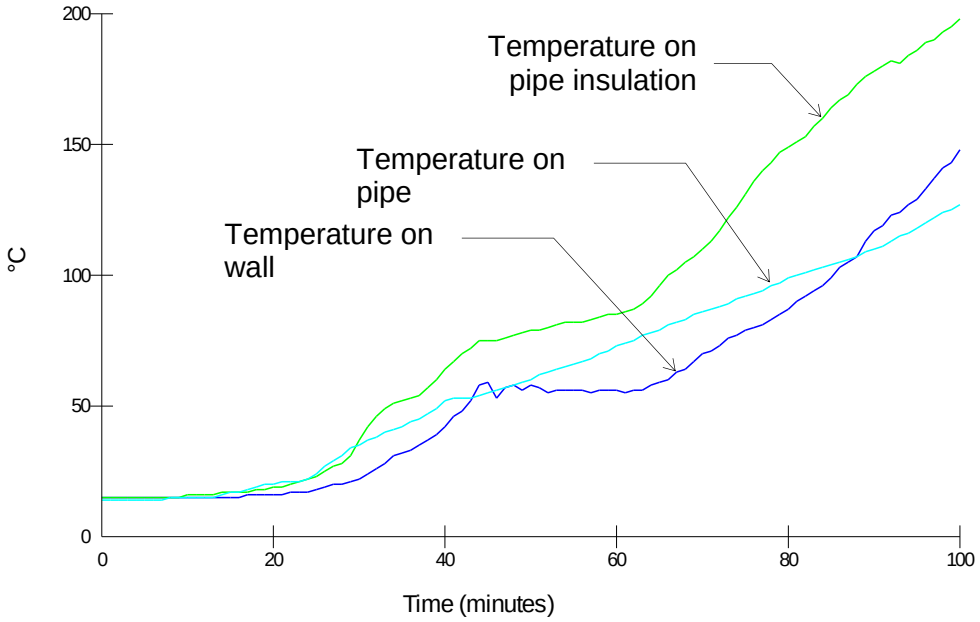
Pipe markings

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
A4	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stonewool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
A4	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	99 (ninety nine) minutes

* No failure of this test criteria at test termination

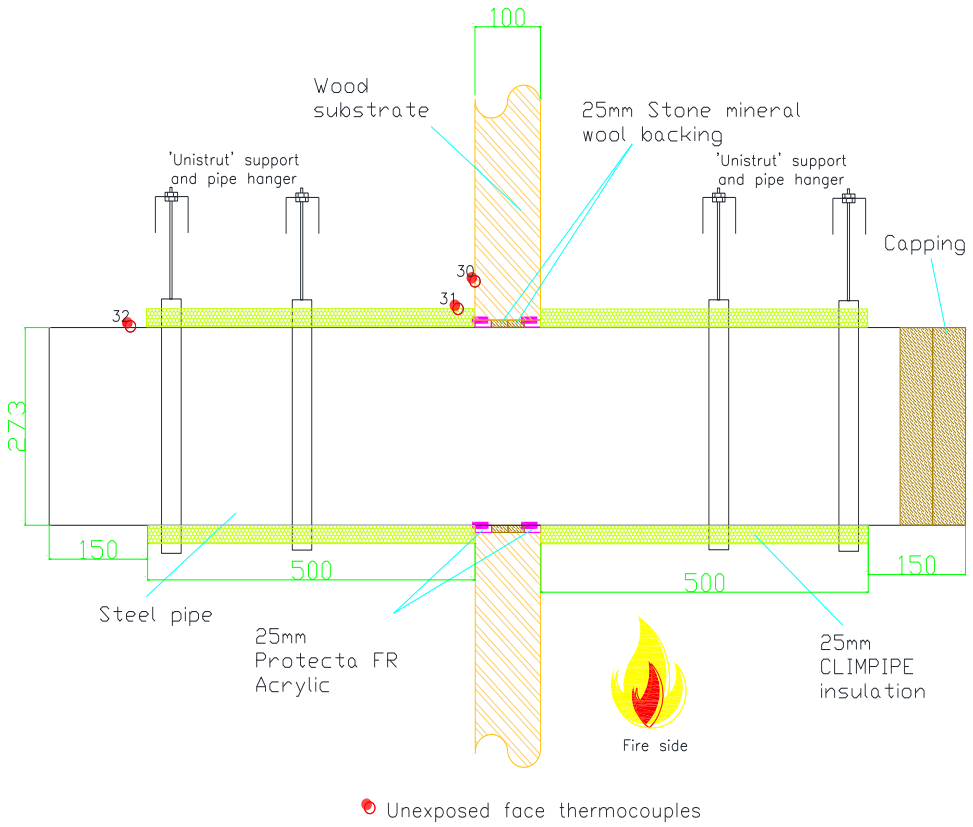
Pipe A5 (Polyseam ref. W057)

Service detail

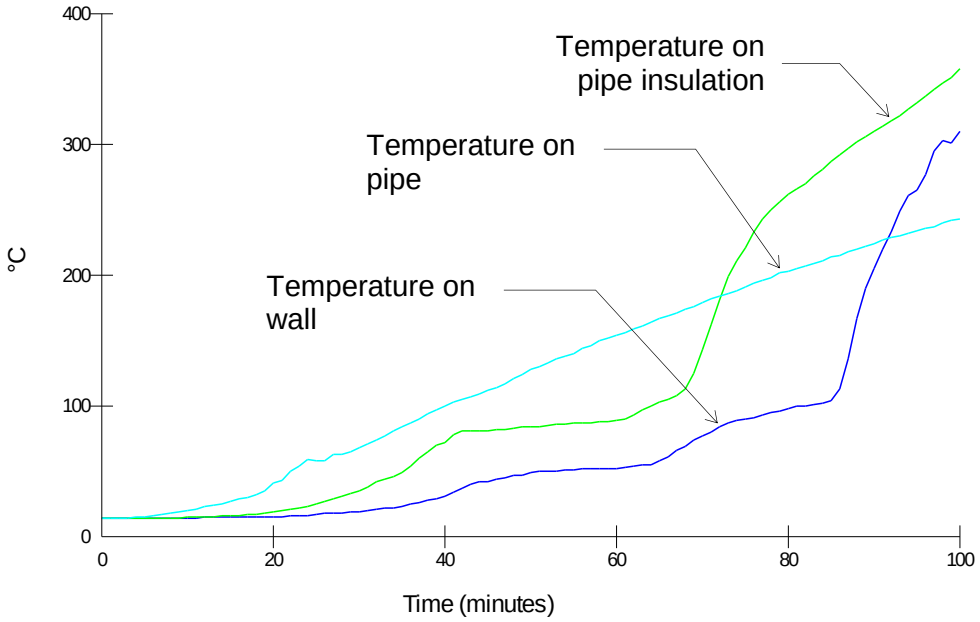
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
A5	Steel	Ø273mm	6.35mm	Ø293mm	25mm thick Isover CLIMPIPE Section Alu2 local interrupted (LI) 500mm each face	C/U

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
A5	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stonewool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
A5	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	72 (seventy two) minutes

* No failure of this test criteria at test termination

Pipe B (Polyseam Ref. W080)

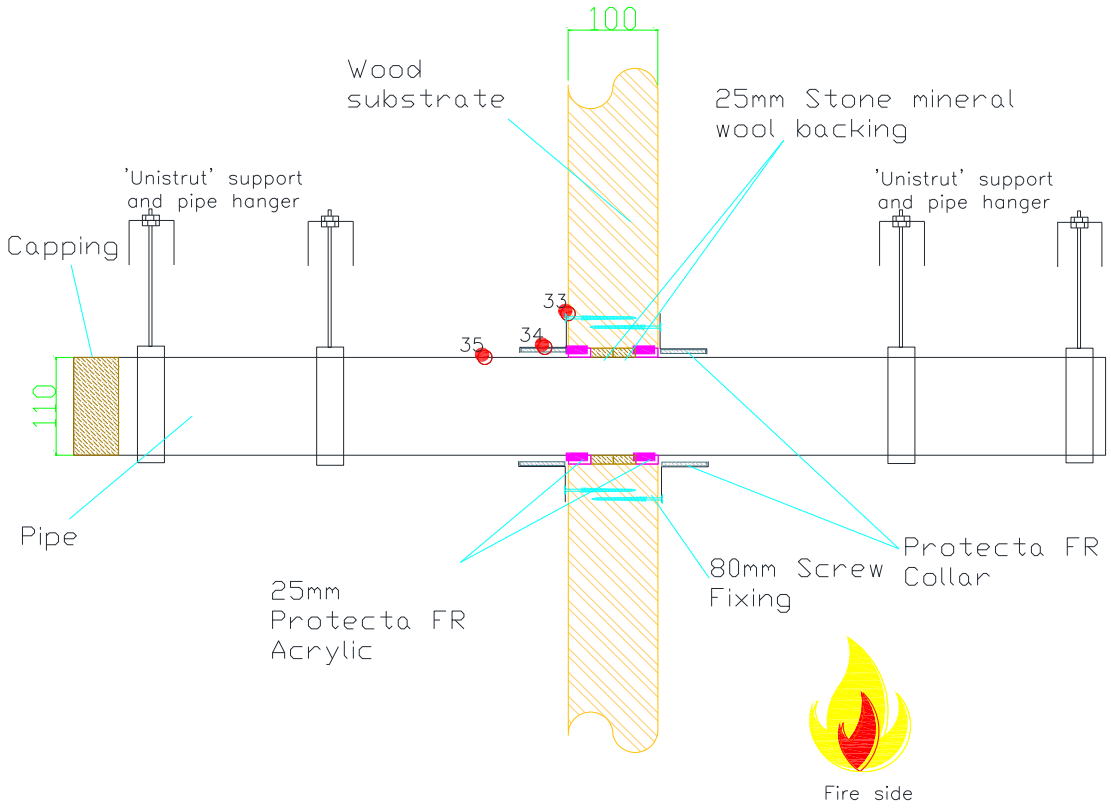
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
B	PVC*	Ø110mm	2.7mm	130mmm	None fitted	U/C

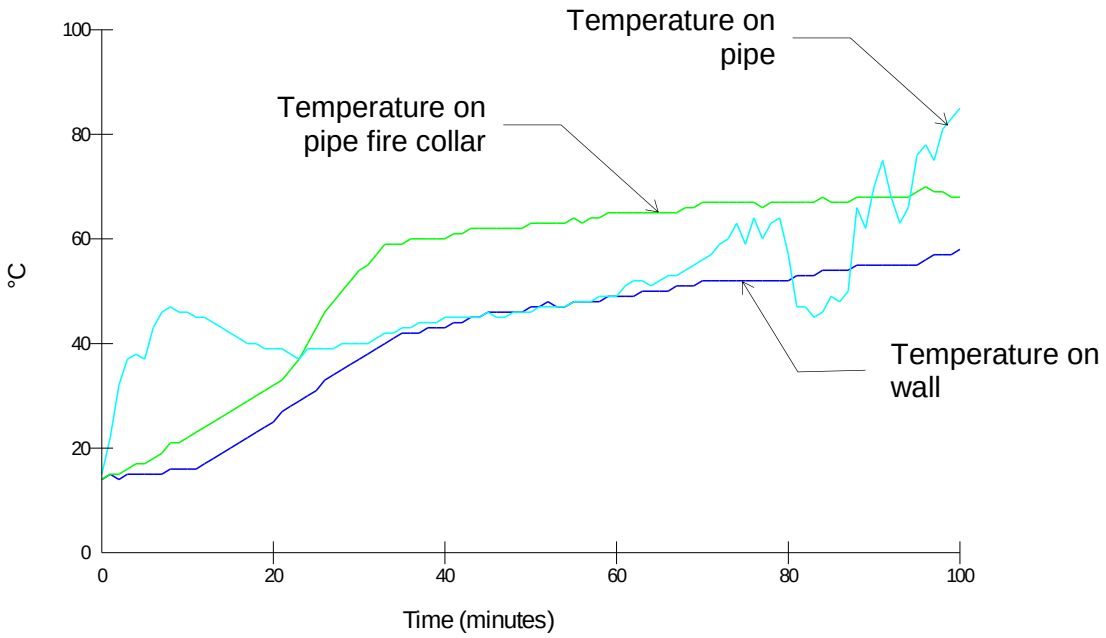
*Pipe manufacturing standard – BS EN 1452

Penetration sealing system

Test reference	Fire sealing	Intumescent size (Collar inlay)	Backing material
B	Protecta FR collar Ø110mm on both faces, fixed to the wall with 80mm long wood screws*	50mm deep x 6mm thick	-
	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
B	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Cable group C (Polyseam ref. PS Transit Group)

Cable C1 (Polyseam Ref. W121)

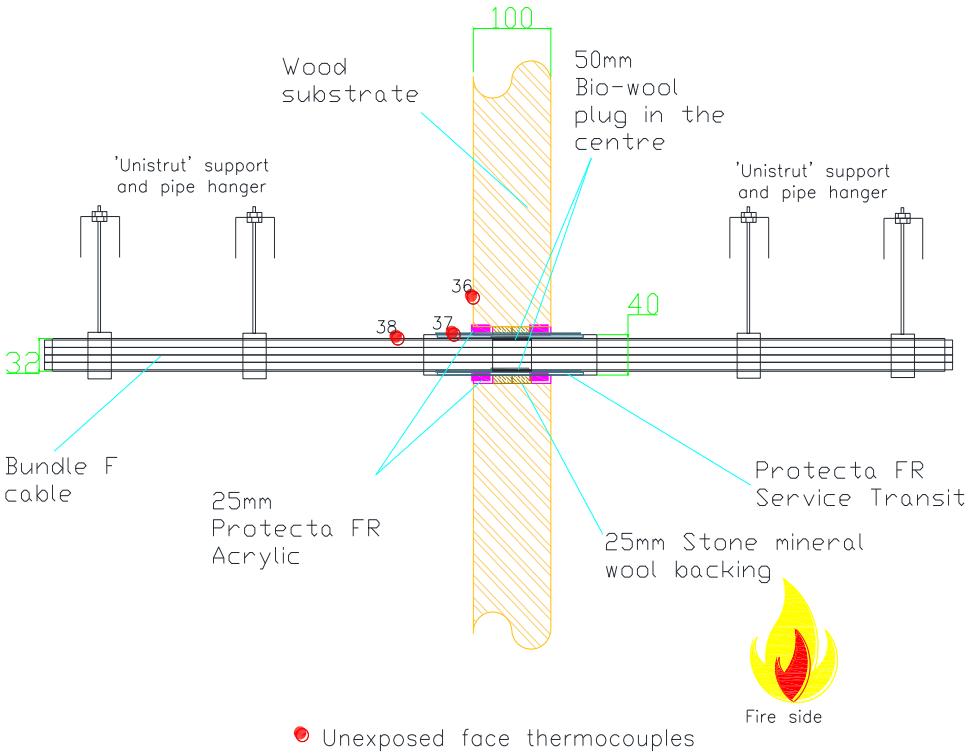
Service detail – Product reference: Protecta FR Service Transit

Test reference	Cable type	Aperture size	Service transit	Service transit size
C1	(Nominally 32Ø bundle) 3 No. type F cables*	Ø60mm	PP – 1.8mm wall thickness	250mm long x Ø40mm

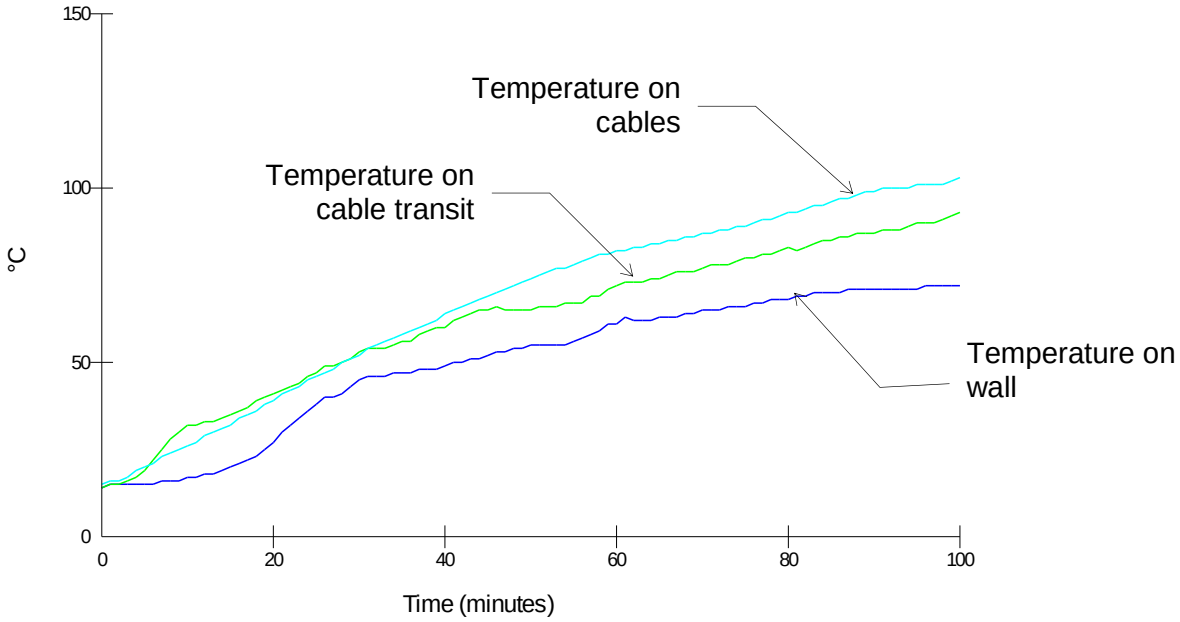
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Material size	Fire sealing position
C1	Protecta V1 Intumescent	210mm wide x 1.5mm thick	Fitted centrally within transit
	Protecta FR Acrylic up to 25mm deep Stone mineral wool backing (density 33 Kg/m^3)	10mm wide x 25mm deep	Sealing transit to wall on both faces
	Protecta Mineral Bio Wool	50mm deep	Fitted centrally within transit filling void between cables and transit



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
C1	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Cable C2 (Polyseam Ref. W122)

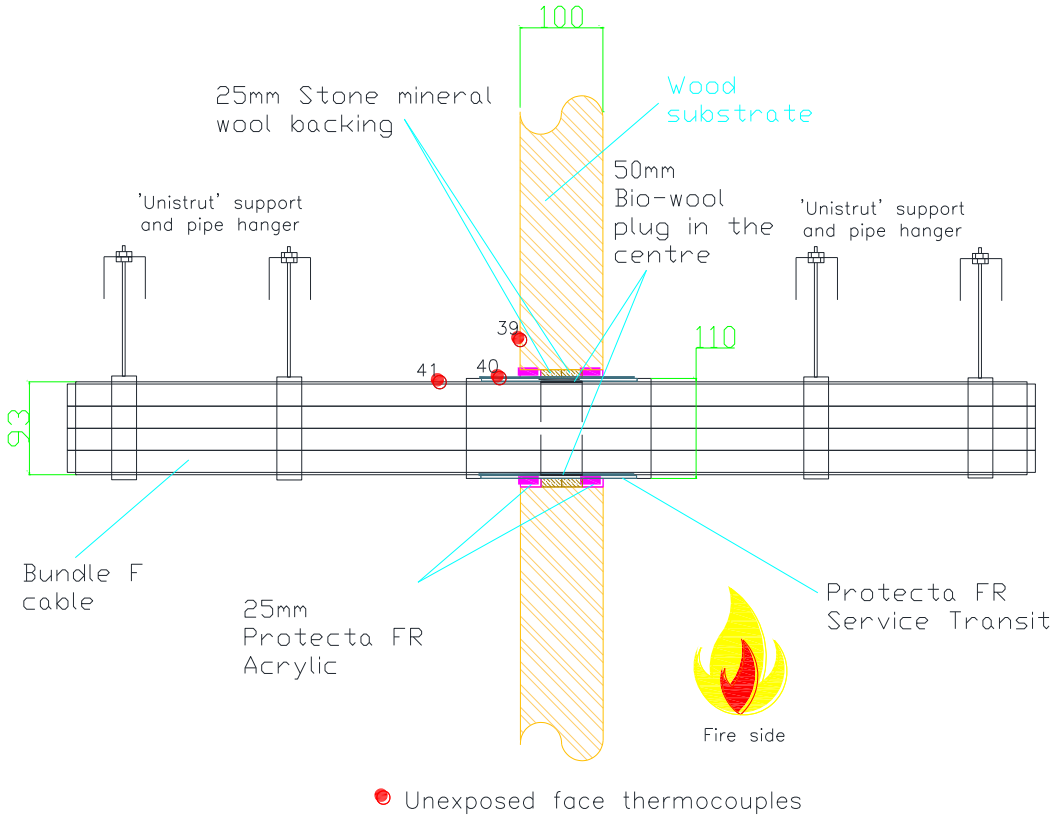
Service detail - Product reference: Protecta FR Service Transit

Test reference	Cable type	Aperture size	Service transit material	Service transit size
C2	(Nominally Ø93mm bundle) 31 No. type F cables*	Ø130mm	PP – 2.7mm wall thickness	250mm long x Ø110mm

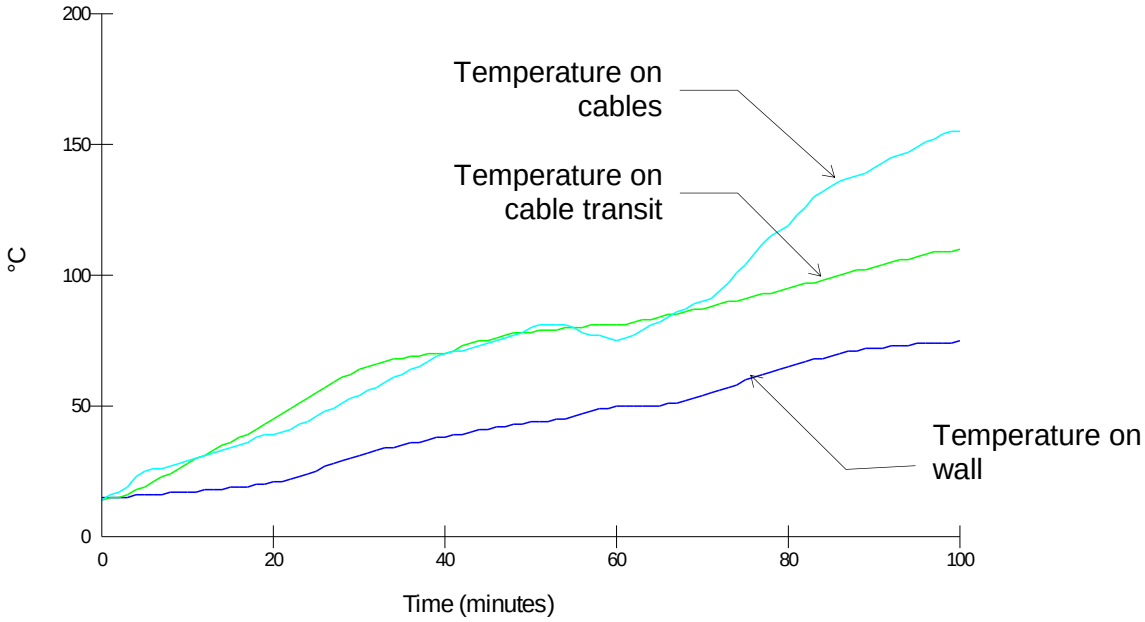
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Material size	Fire sealing position
C2	Protecta V1 Intumescent	210mm wide x 4.5mm thick	Fitted centrally within transit
	Protecta FR Acrylic up to 25mm deep Stone mineral wool backing (density 33 Kg/m^3)	10mm wide x 25mm deep	Sealing transit to wall on both faces
	Protecta Mineral Bio Wool	50mm deep	Fitted centrally within transit filling void between cables and transit



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
C2	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe group D (Polyseam ref. PS Group F)

Pipe D1 (Polyseam ref. W070)

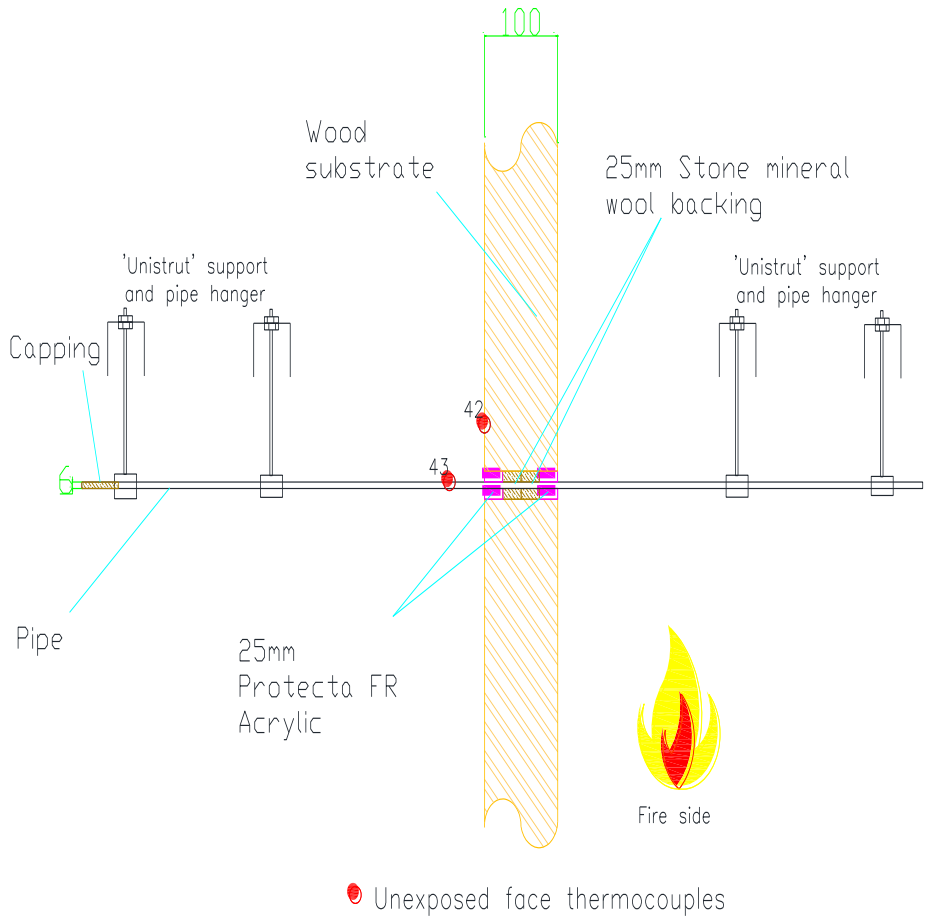
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
D1	PVC-U*	Ø6mm	1.0mm	Ø26mm	None fitted	U/C

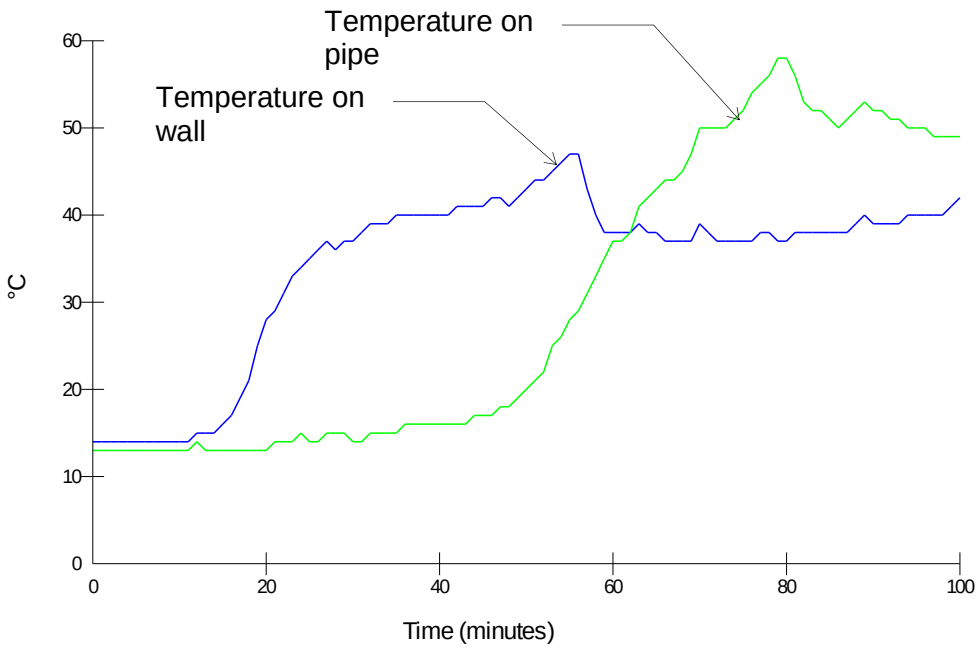
***** Pipe manufacturing standard – EN 1452

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
D1	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
D1	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe D2 (Polyseam ref. W071)

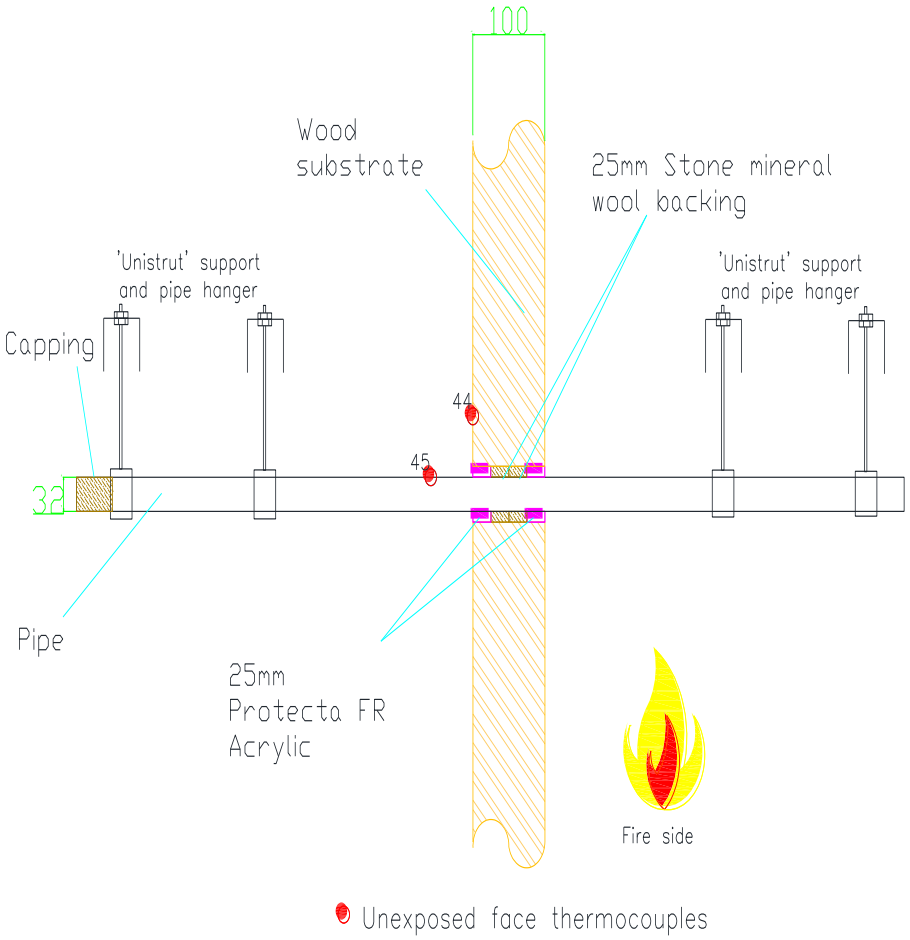
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
D2	PVC-U*	Ø32mm	1.6mm	Ø52mm	None fitted	U/C

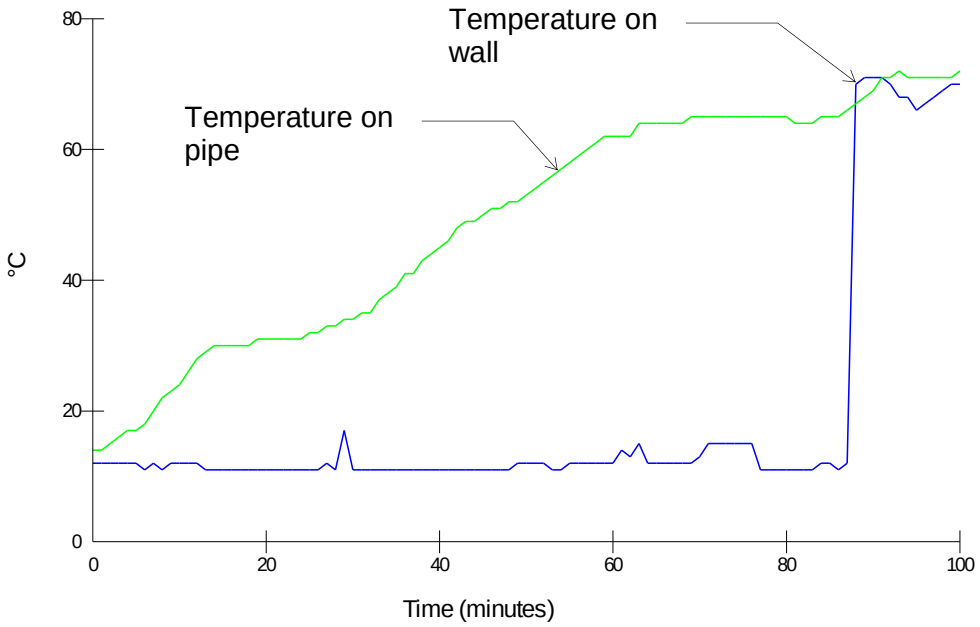
***** Pipe manufacturing standard – EN 1452

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
D2	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
D2	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe D3 (Polyseam ref. W072)

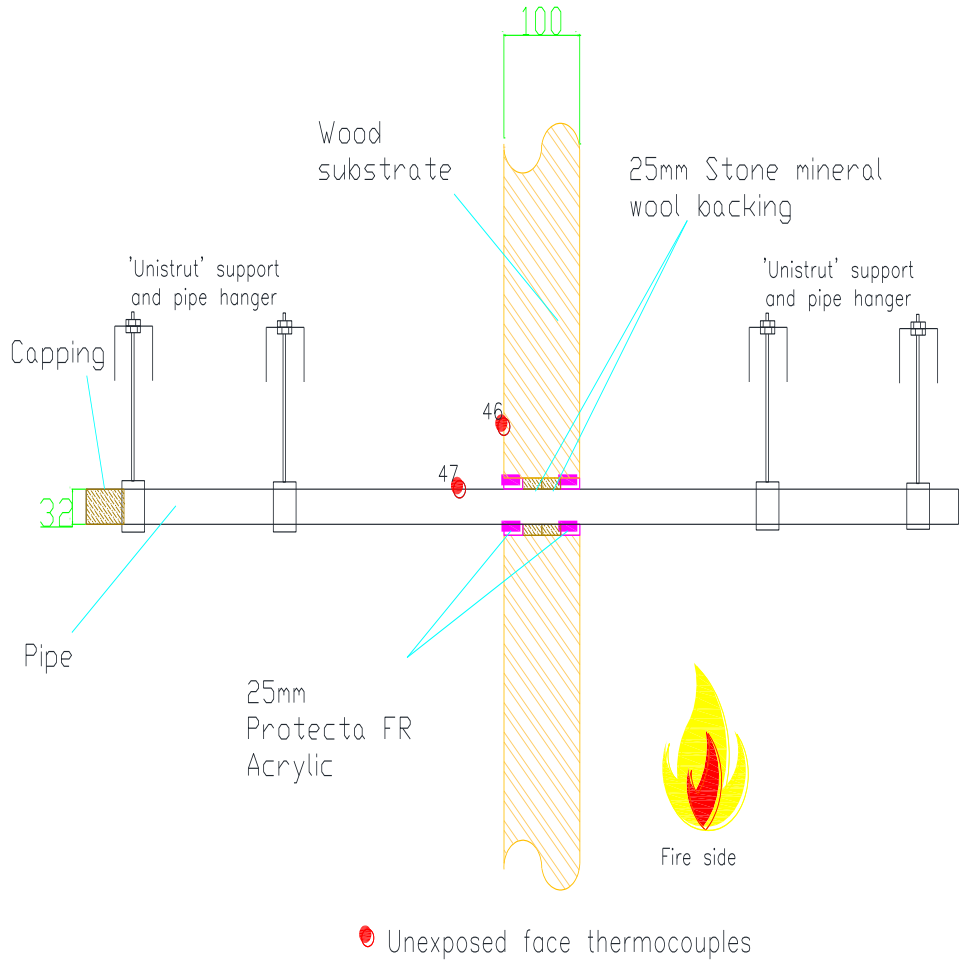
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
D3	PVC-U*	Ø32mm	2.4mm	Ø52mm	None fitted	U/C

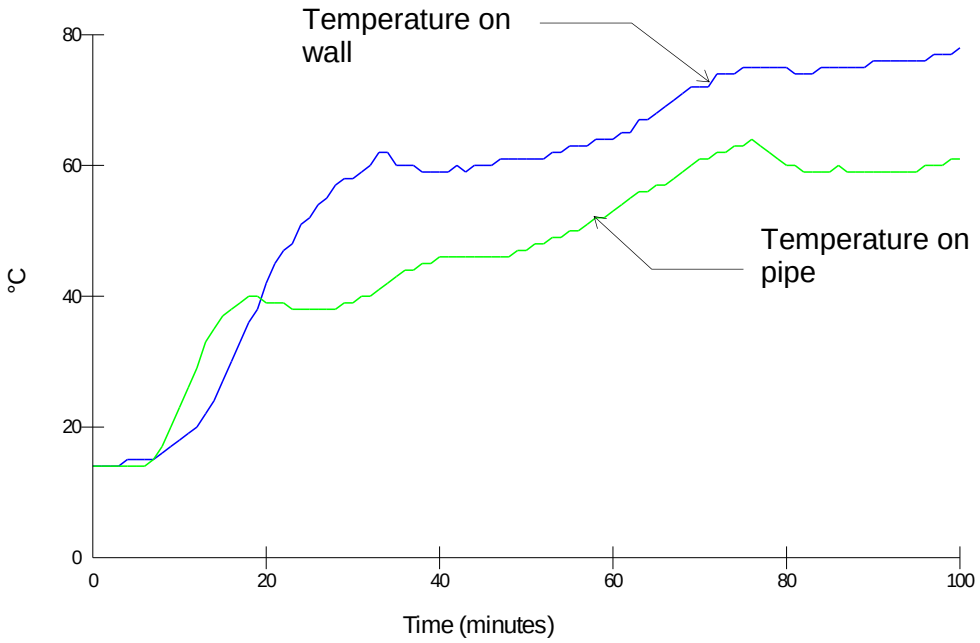
***** Pipe manufacturing standard – EN 1452

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
D3	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
D3	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe D4 (Polyseam ref. W073)

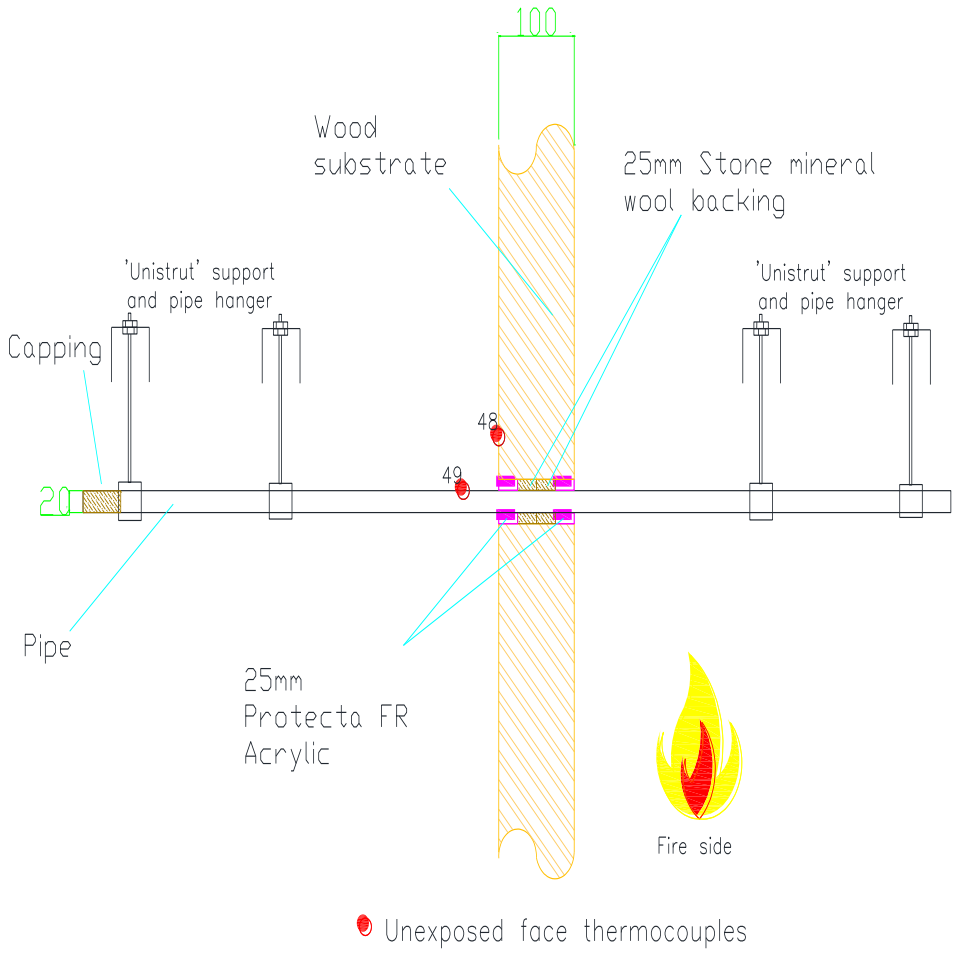
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
D4	PE-HD*	Ø20mm	2.0mm	Ø40mm	None fitted	U/C

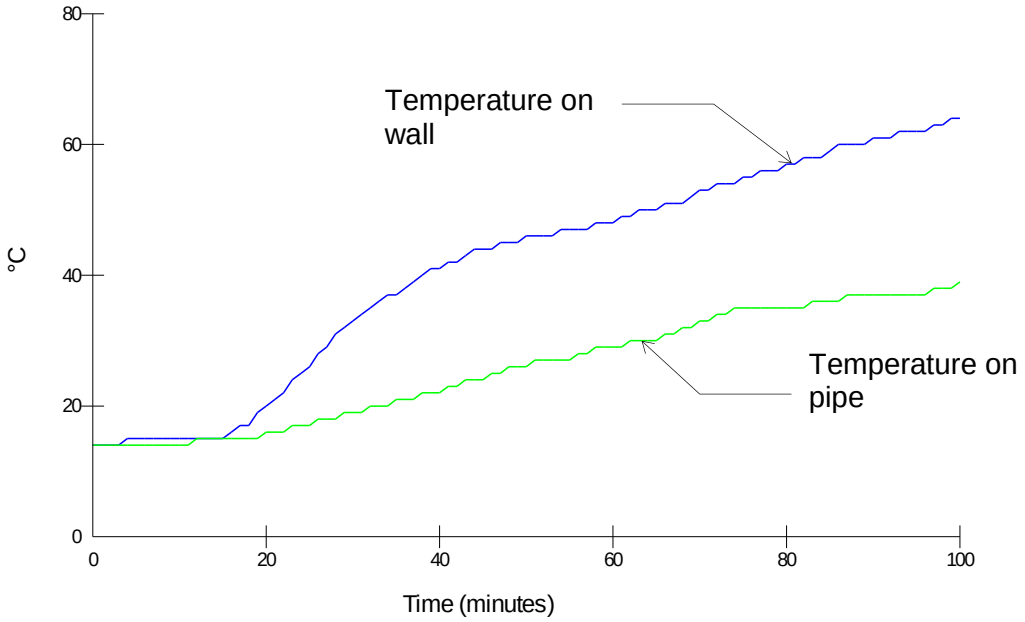
***** Pipe manufacturing standard – EN 12201 & DIN 8074/8075

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
D4	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
D4	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe D5 (Polyseam ref. W074)

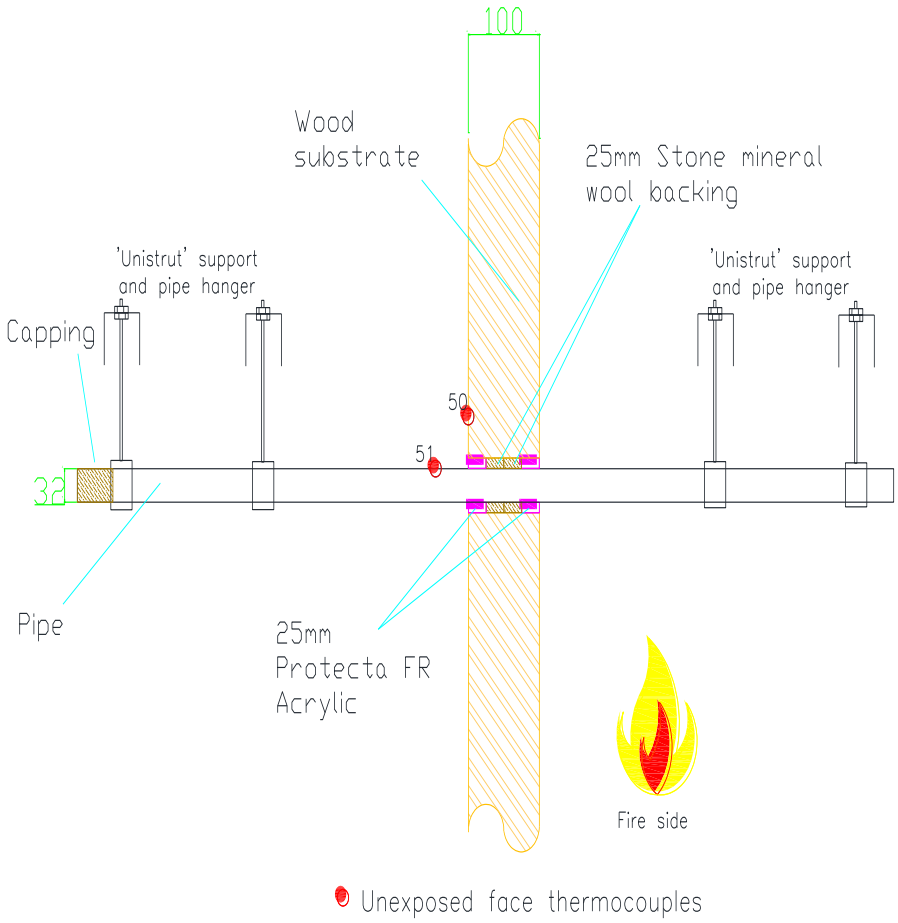
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
D5	PE-HD	Ø32mm	2.0mm	Ø52mm	None fitted	U/C

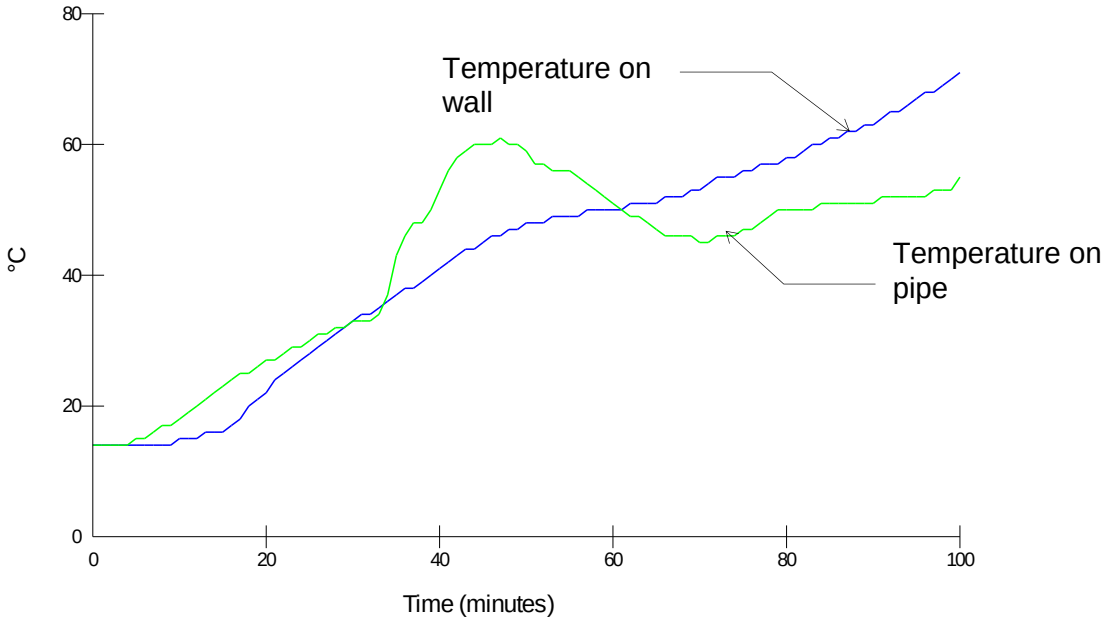
***** Pipe manufacturing standard – EN 12201 & DIN 8074/8075

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
D5	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



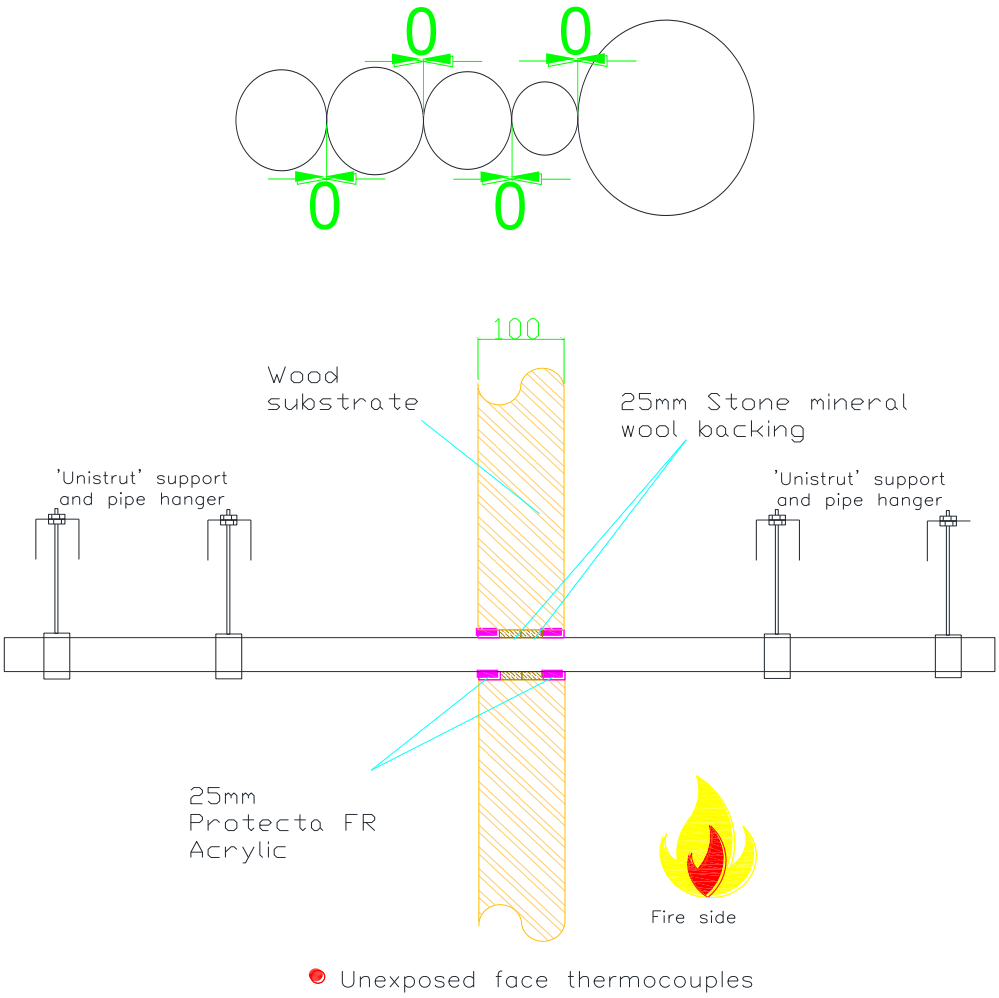
Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
D5	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Cable group E (Polyseam ref. PS Group B)

Intumescent size	Backing material
10mm wide x 25mm deep	25mm deep stone mineral wool (density 33Kg/m^3)



Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
Cable group E	91 (ninety one) minutes*	-	-	40 (forty) minutes**

* Failure recorded on cable E4
** Failure recorded on cable E3

Cable E1 (Polyseam ref. W051)

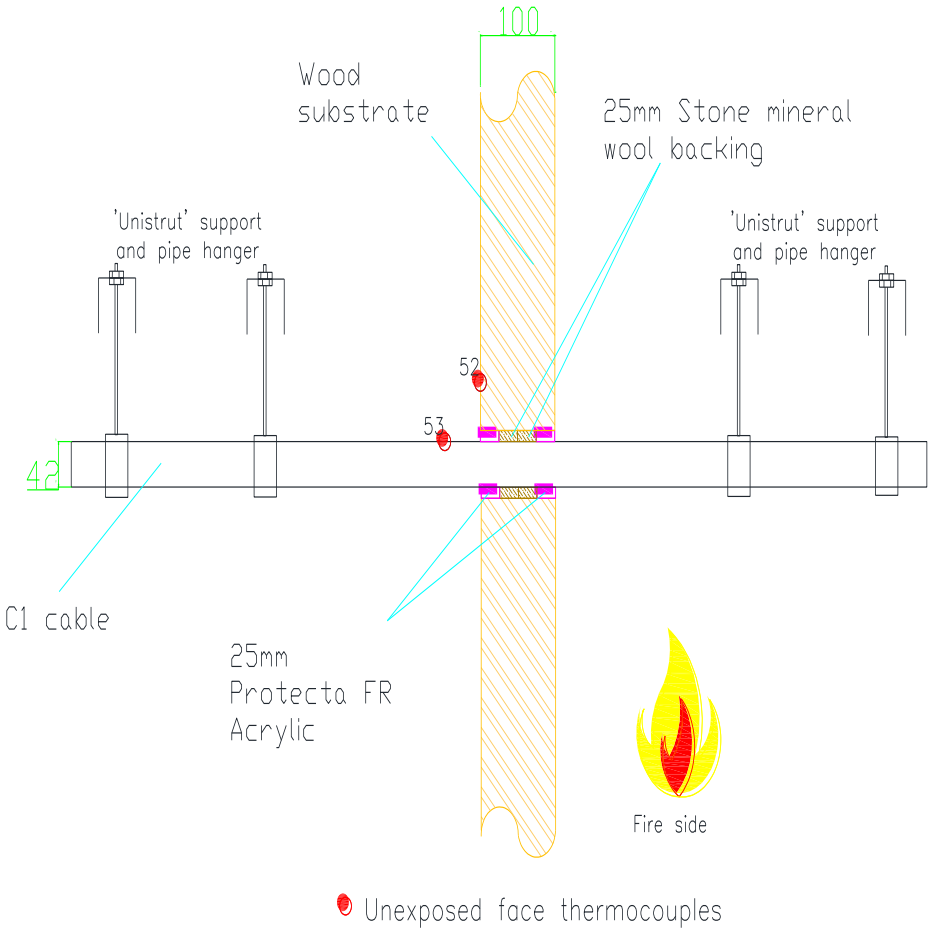
Service detail

Test reference	Cable type	Cable size	Aperture size
E1	Cable C1*	Ø42mm	Ø62mm

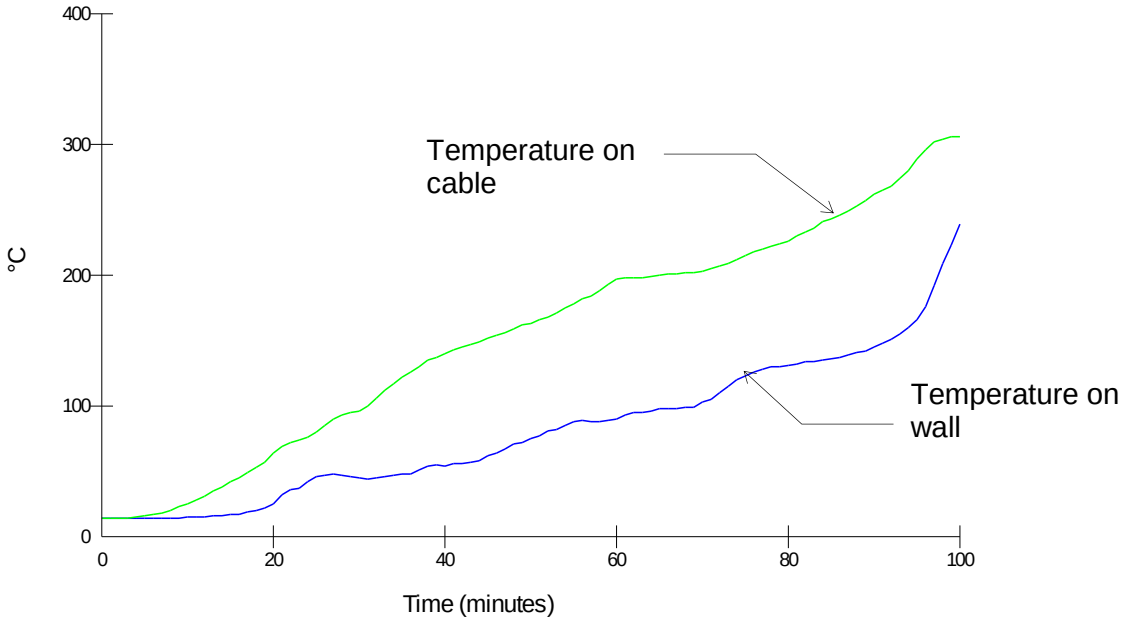
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
E1	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
E1	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	59 (fifty nine) minutes

* No failure of this test criteria at test termination

Cable E2 (Polyseam ref. W052)

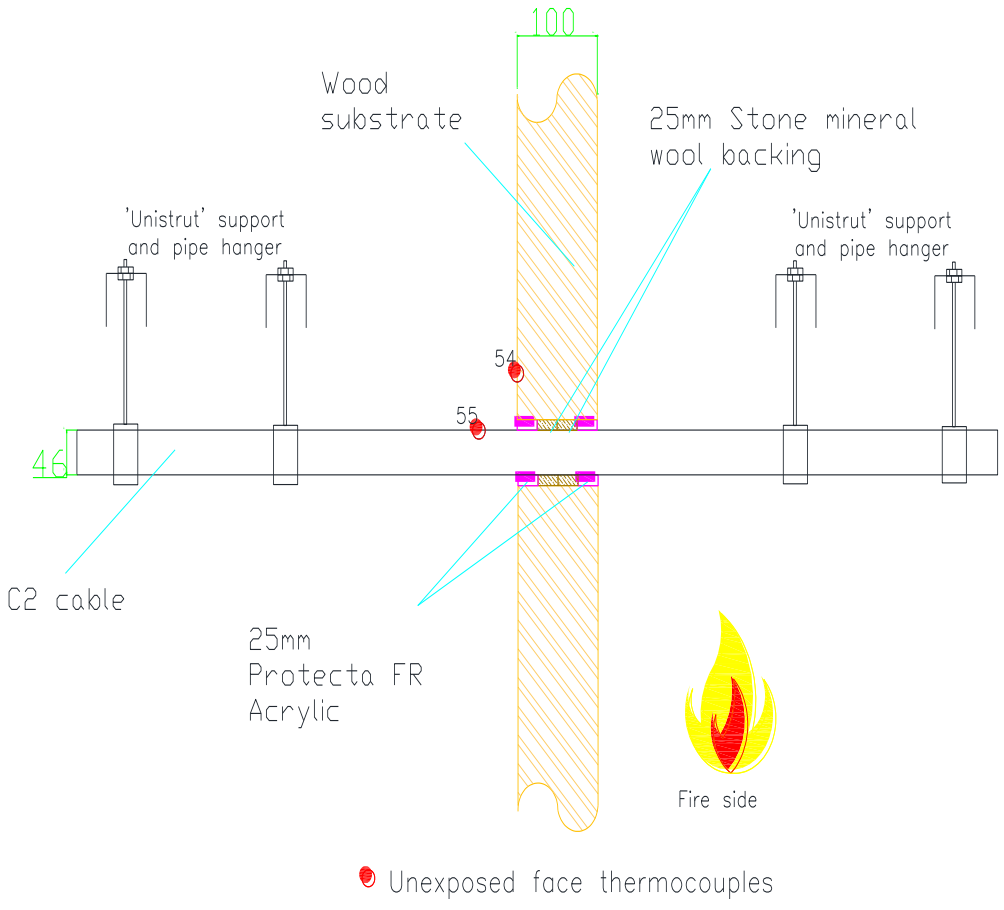
Service detail

Test reference	Cable type	Cable size	Aperture size
E2	Cable C2*	Ø46mm	Ø66mm

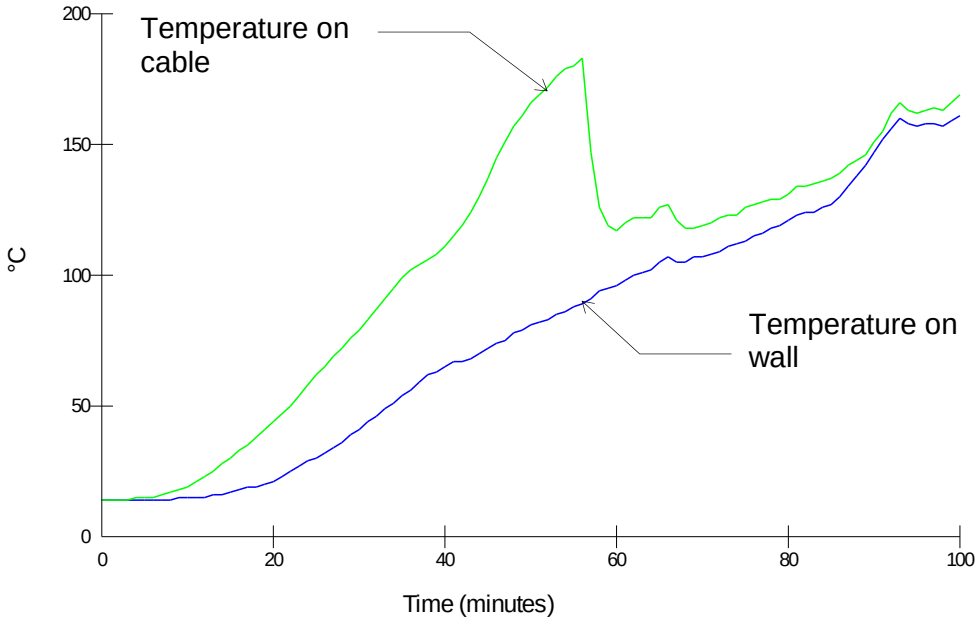
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
E2	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
E2	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Cable E3 (Polyseam ref. W053)

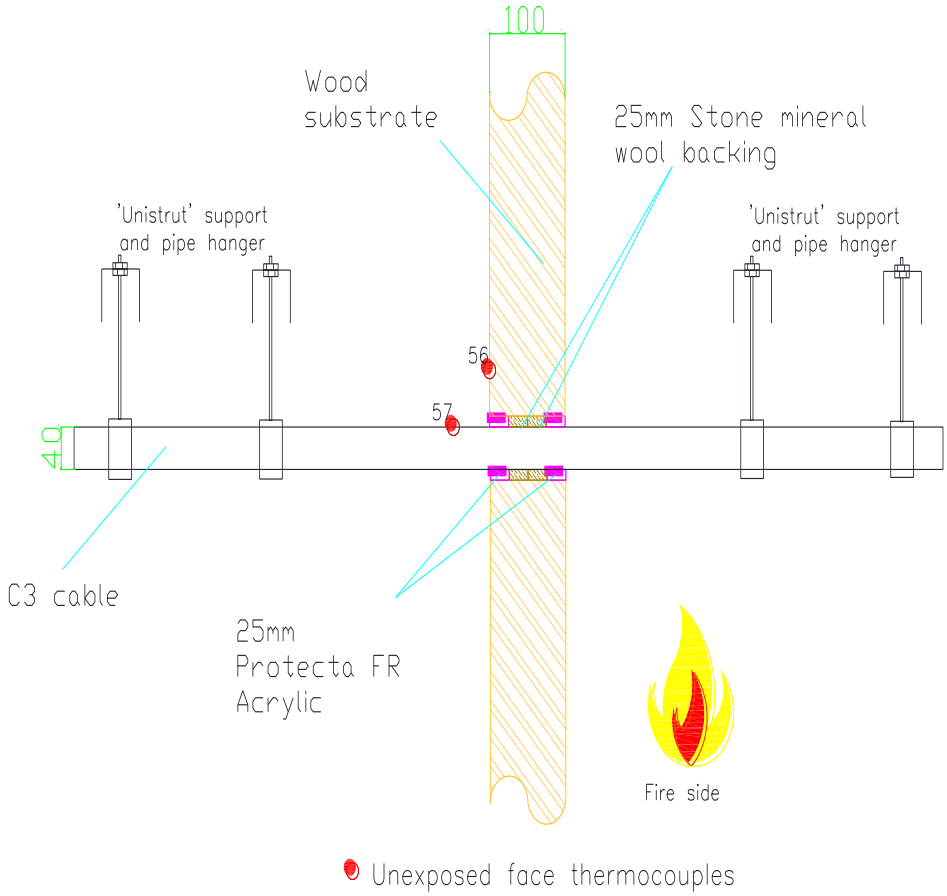
Service detail

Test reference	Cable type	Cable size	Aperture size
E3	Cable C3*	Ø40mm	Ø60mm

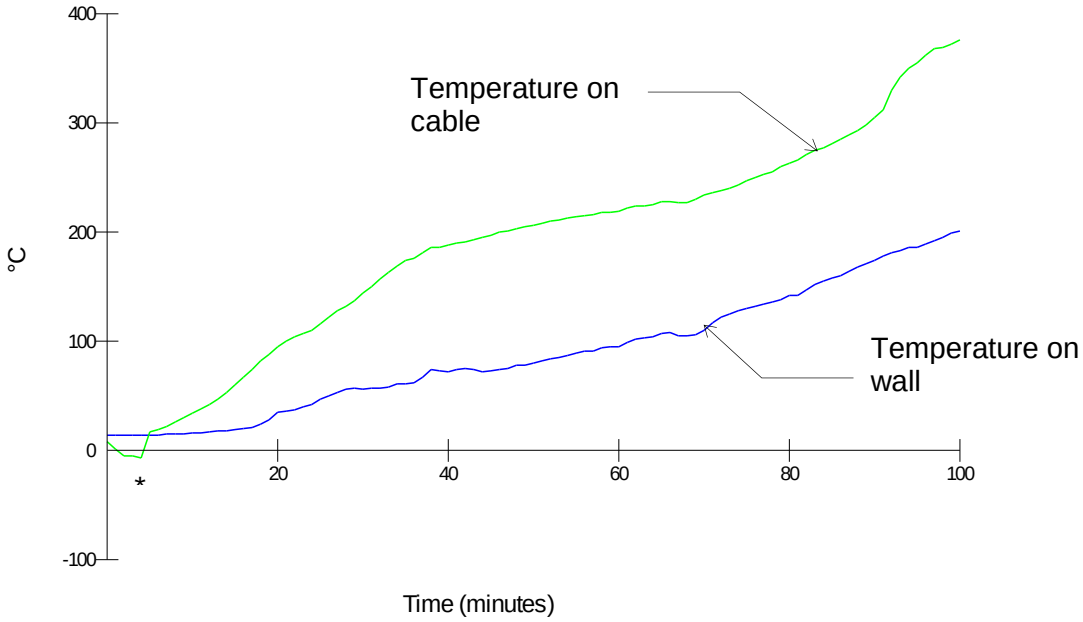
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
E3	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stonewool (density 33 Kg/m^3)



Temperatures recorded on penetration



* Thermocouple replaced after 5 minutes due to malfunction.

Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
E3	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	40(forty) minutes

* No failure of this test criteria at test termination

Cable E4 (Polyseam ref. W055)

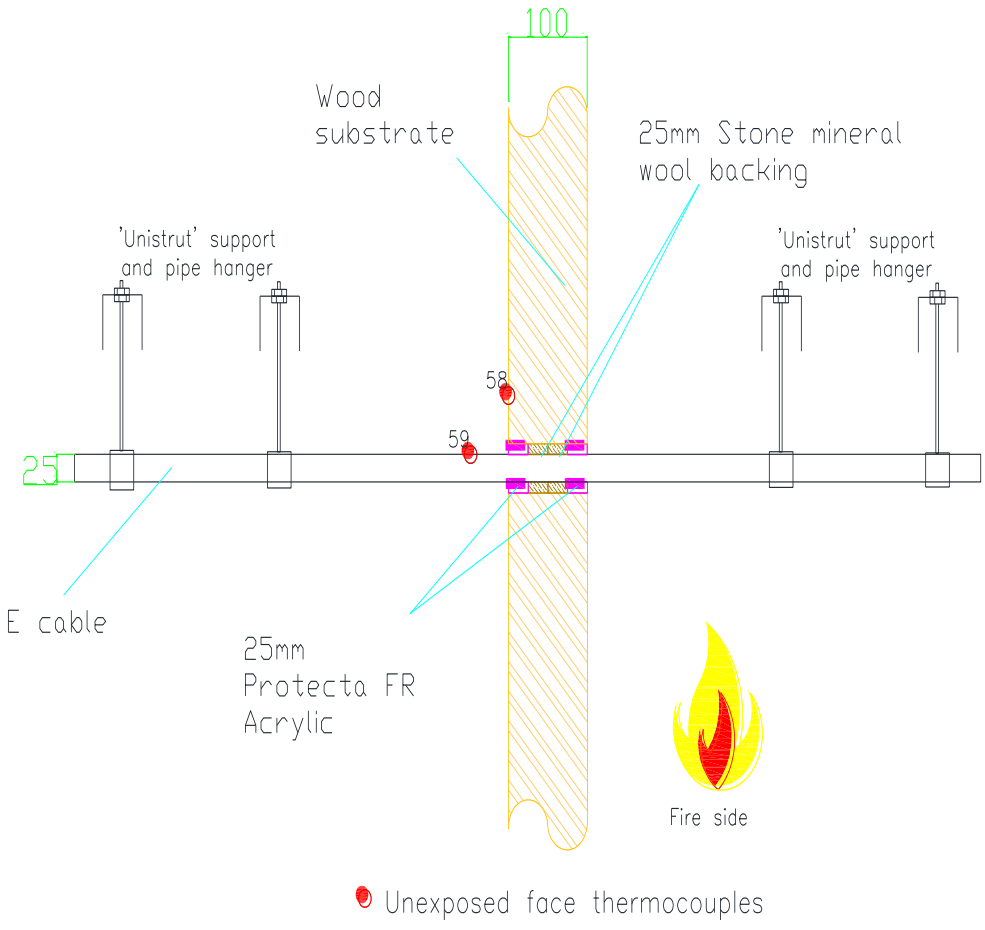
Service detail

Test reference	Cable type	Cable size	Aperture size
E4	Cable E*	Ø25mm	Ø45mm

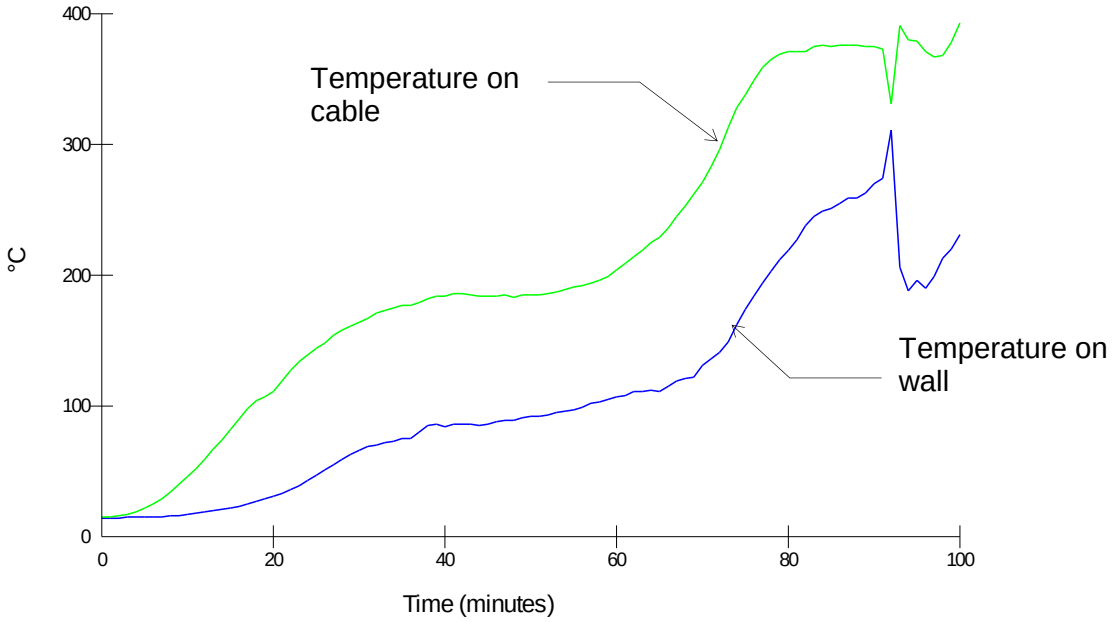
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
E4	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
E4	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	57 (fifty seven) minutes

* No failure of this test criteria at test termination

Cables E5 (Polyseam ref. W056)

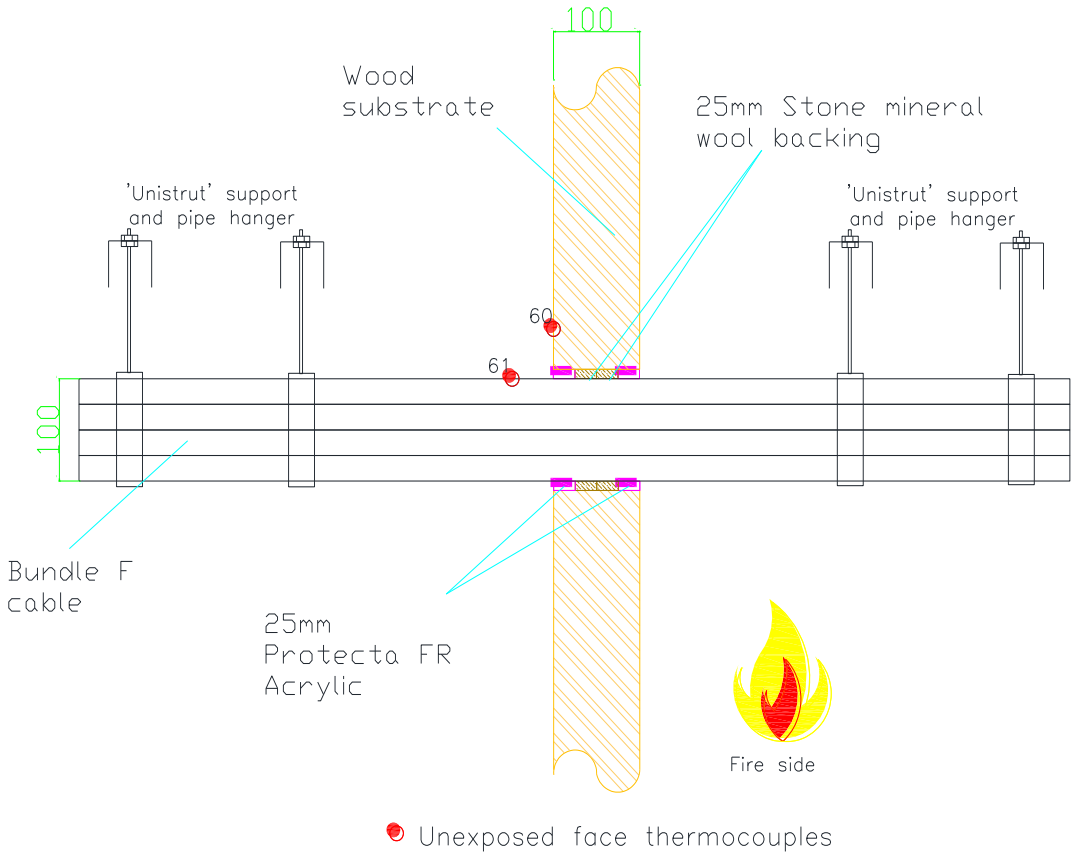
Service detail

Test reference	Cable type	Cable bundle size	Aperture size
E5	35 No. F cables bundle* (Nominally Ø 100mm)	Ø100mm	Ø120mm

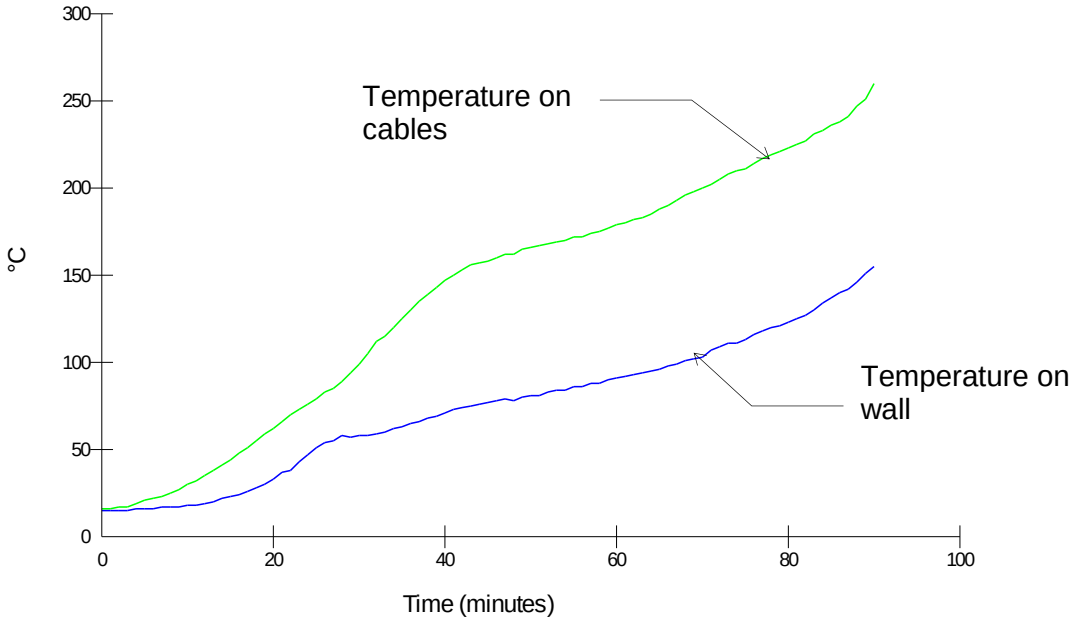
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
E5	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



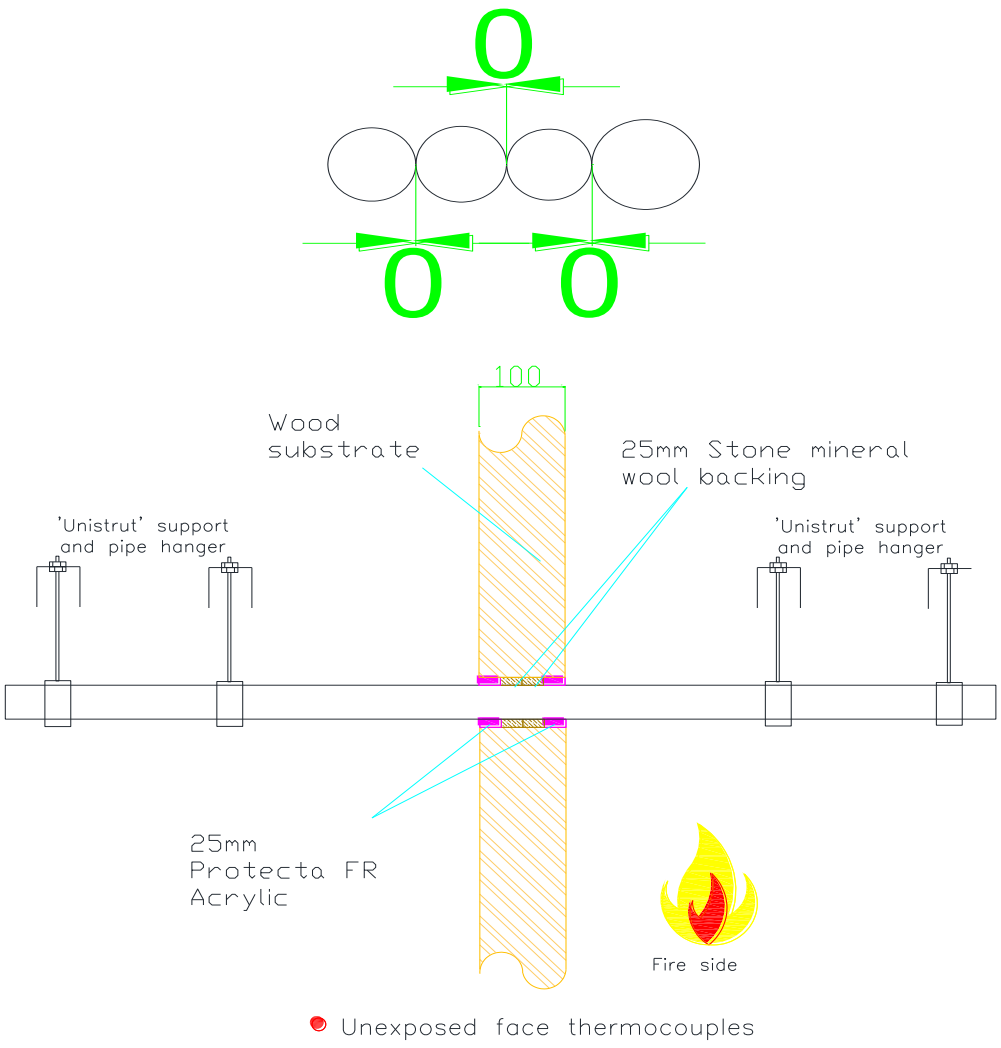
Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
E5	91 (ninety one) minutes	-	-	68 (sixty eight) minutes

* No failure of this test criteria at test termination

Cable group F (Polyseam ref. PS Group A)

Intumescent size	Backing material
10mm wide x 25mm deep	25mm deep stone mineral wool (density 33Kg/m^3)



Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
Cable group F	-	-	-	40 (forty) minutes*

* Failure recorded on cable F3

Cable F1 (Polyseam ref. W047)

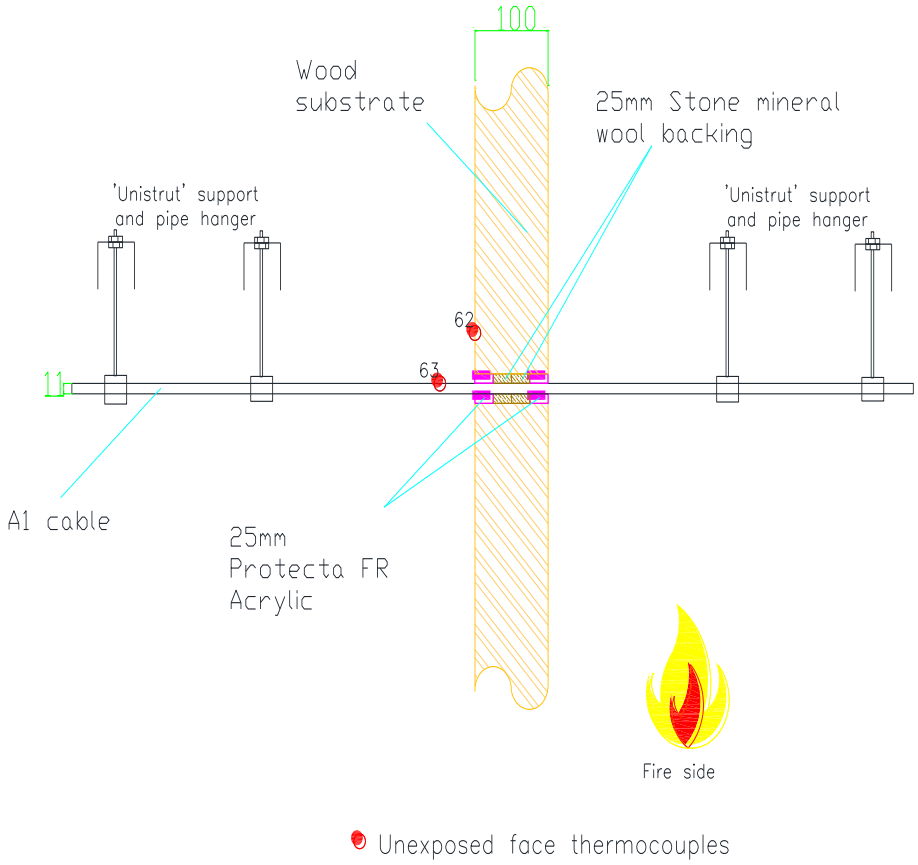
Service detail

Test reference	Cable type	Cable size	Aperture size
F1	Cable A1*	Ø11mm	Ø31mm

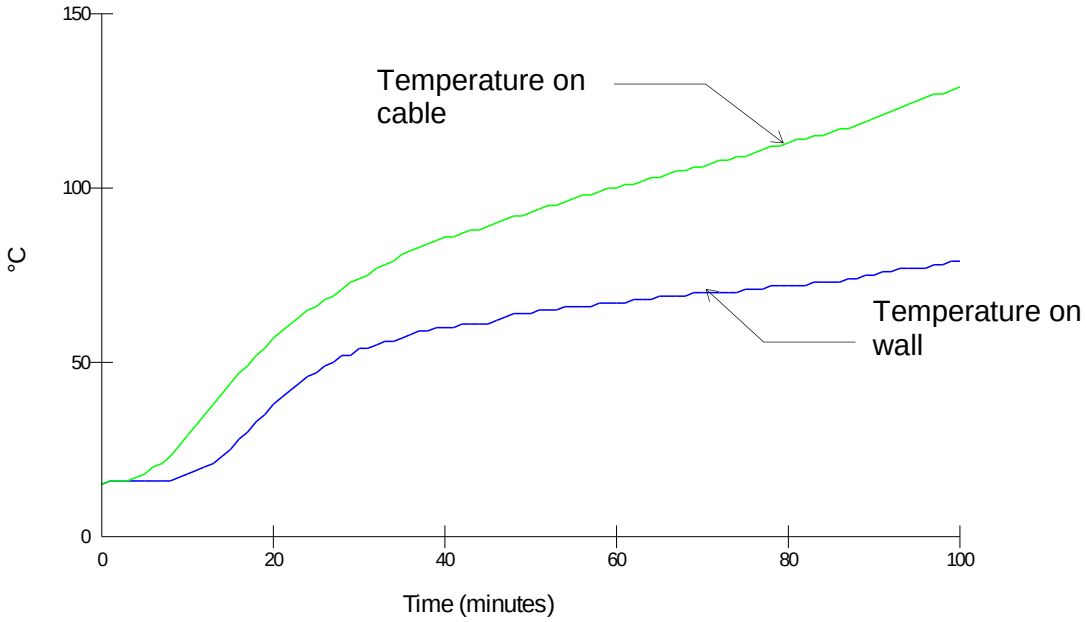
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
F1	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
F1	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Cable F2 (Polyseam ref. W048)

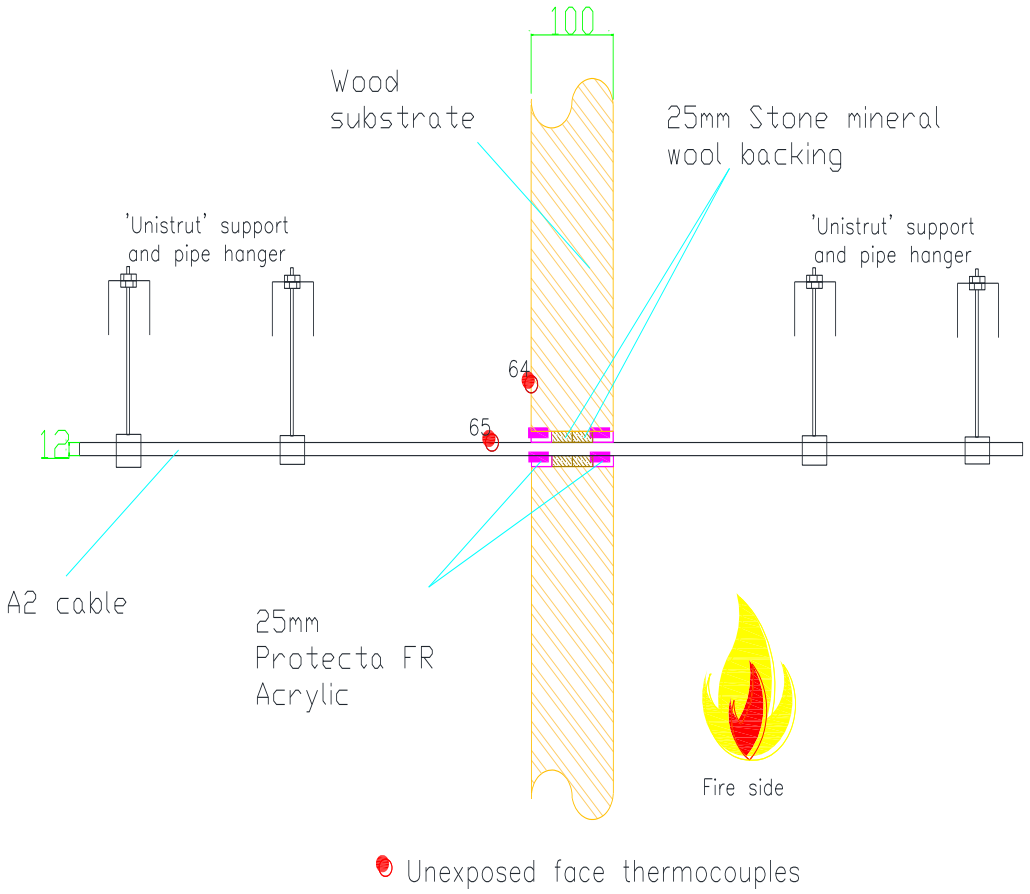
Service detail

Test reference	Cable type	Cable size	Aperture size
F2	Cable A2*	Ø12mm	Ø32mm

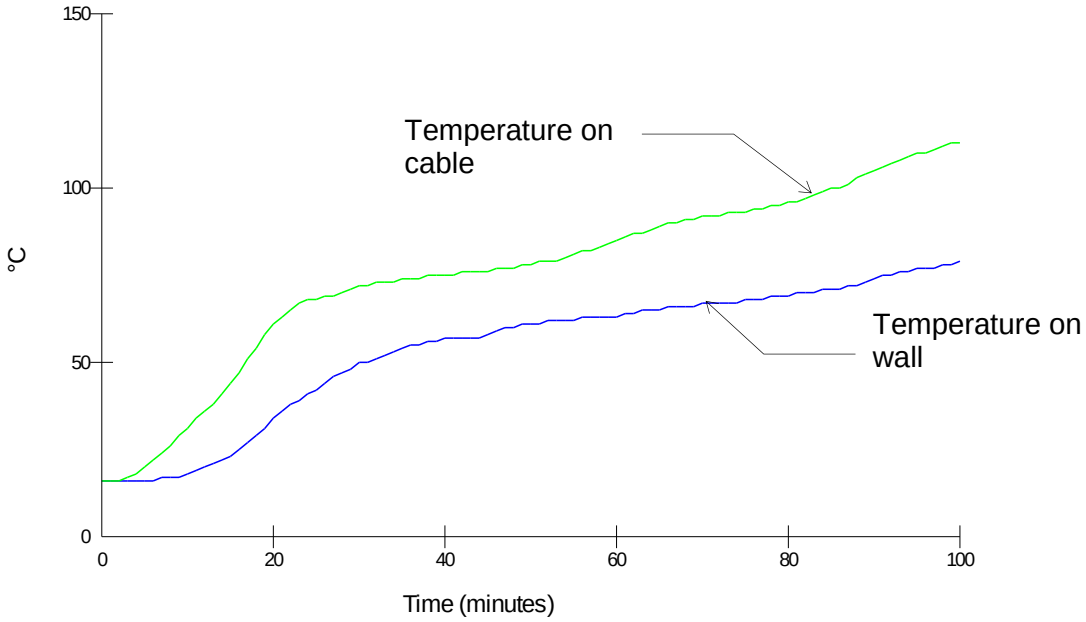
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
F2	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
F2	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Cable F3 (Polyseam ref. W049)

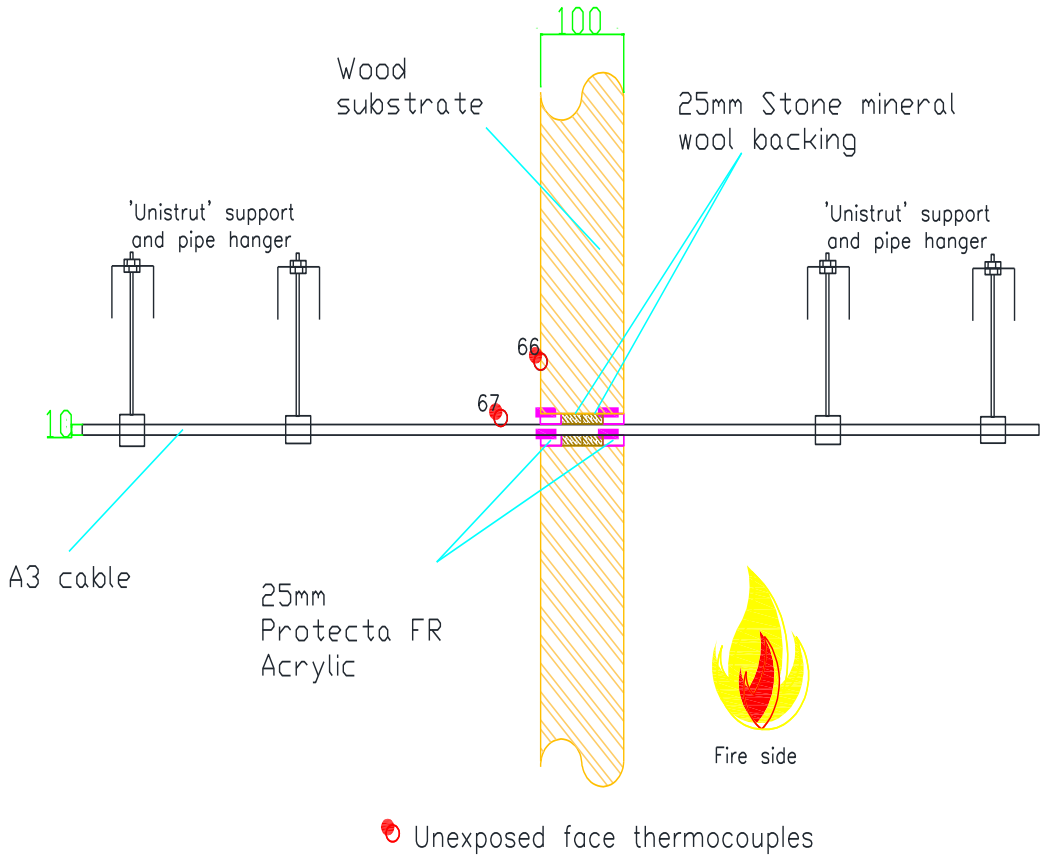
Service detail

Test reference	Cable type	Cable size	Aperture size
F3	Cable A3*	Ø10mm	Ø30mm

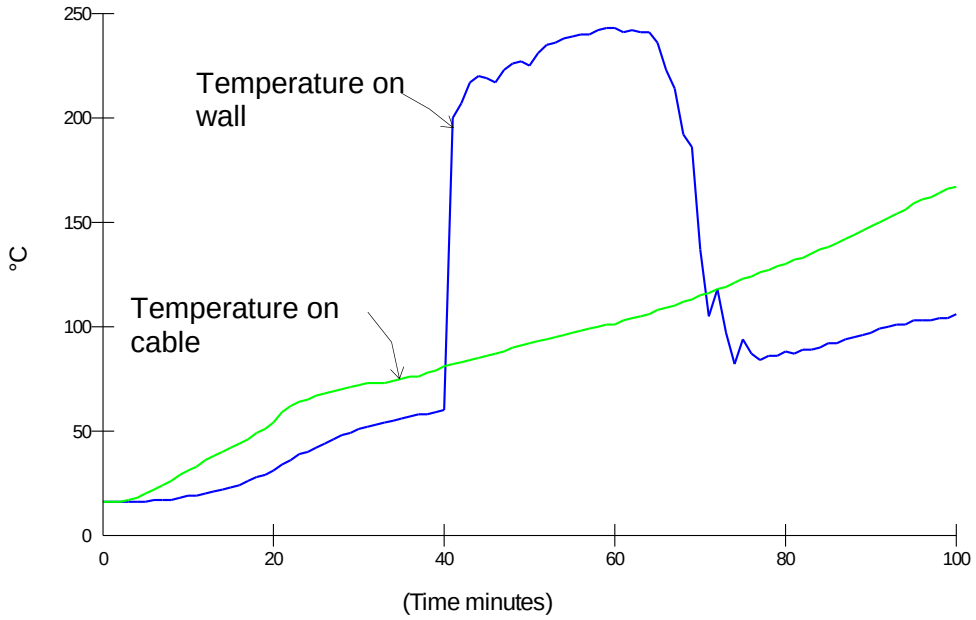
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
F3	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
F3	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	40 (forty) minutes

* No failure of this test criteria at test termination

Cable F4 (Polyseam ref. W050)

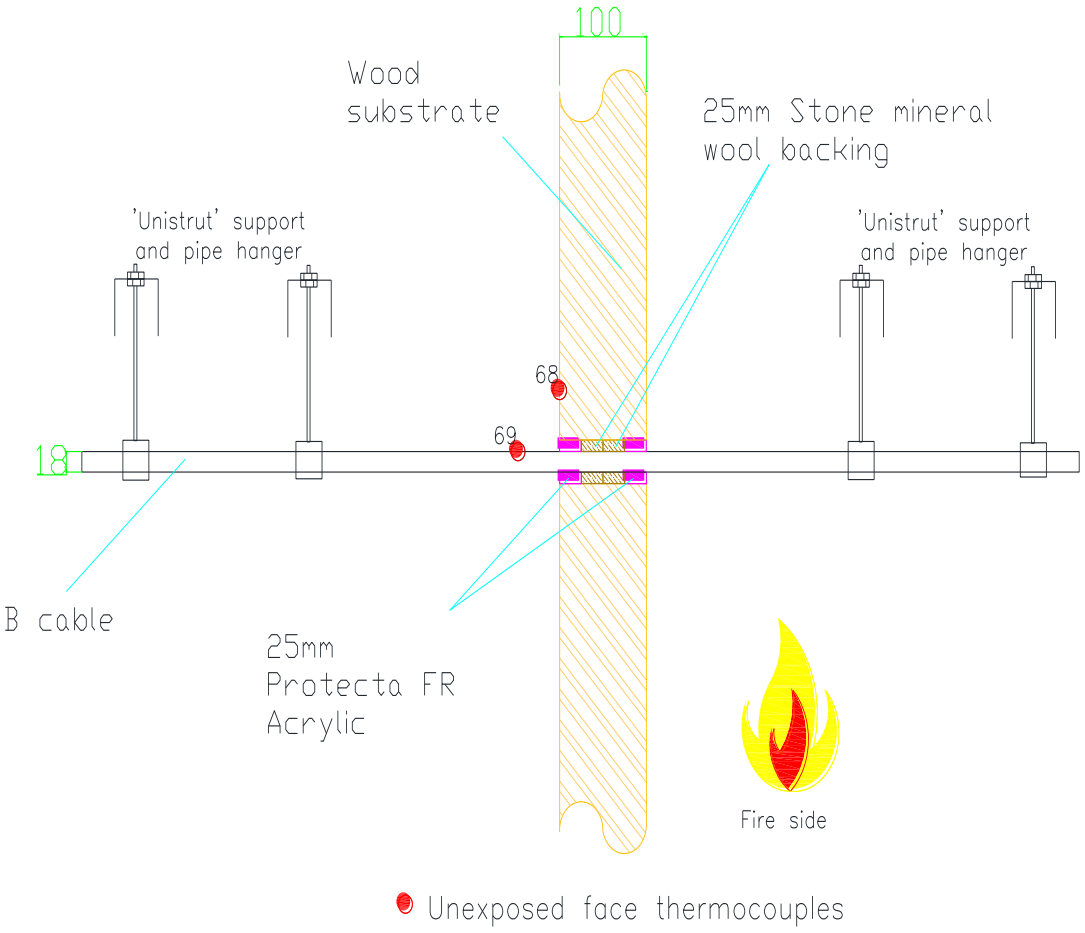
Service detail

Test reference	Cable type	Cable size	Aperture size
F4	Cable B*	Ø18mm	Ø38mm

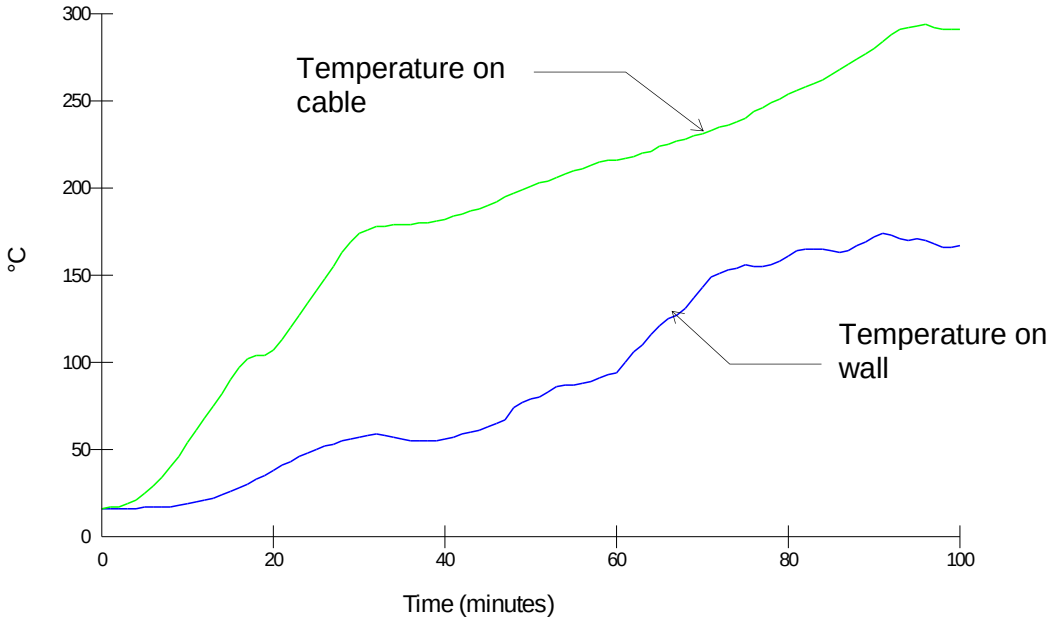
* Cable type from BS EN 1366-3 standard cable configuration

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
F4	Protecta FR Acrylic sealing cable perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
F4	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	47 (forty seven) minutes

* No failure of this test criteria at test termination

Pipe G (Polyseam Ref. W082)

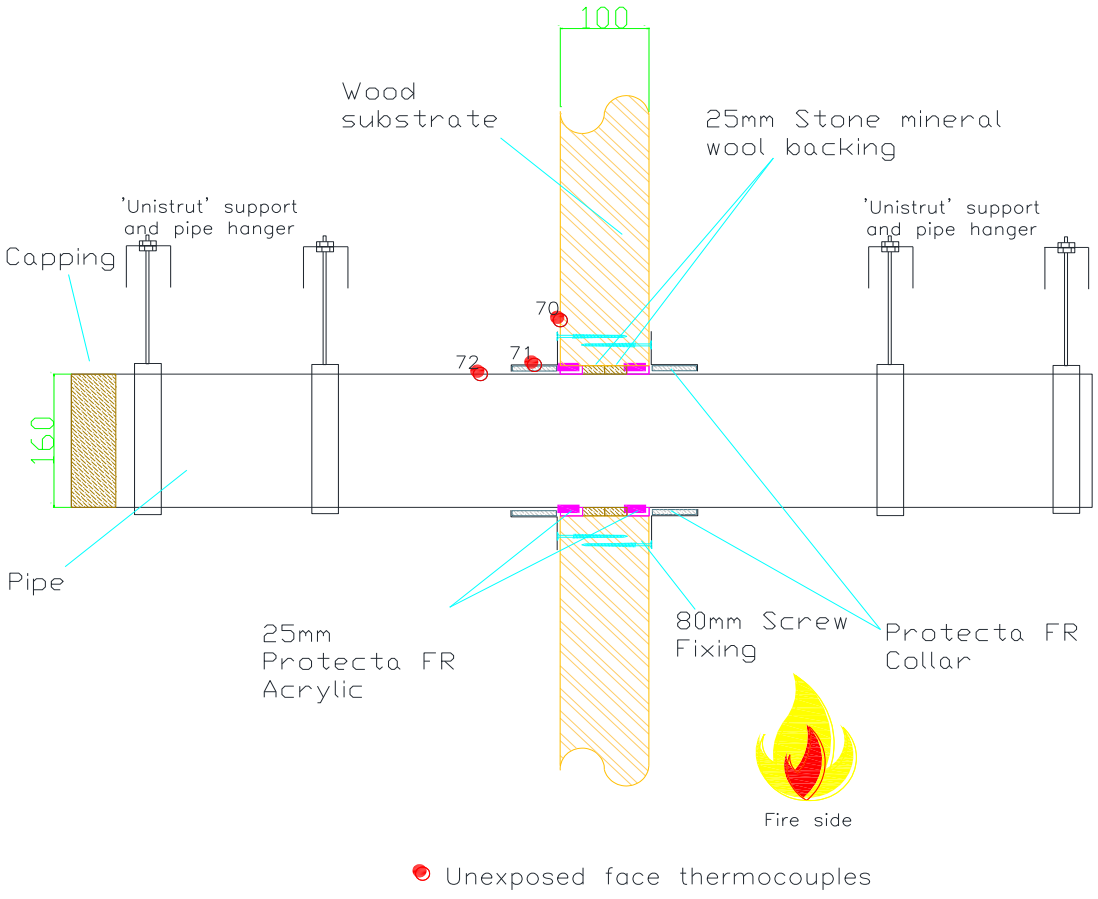
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
G	PE*	Ø160mm	9.5mm	180mm	None fitted	U/C

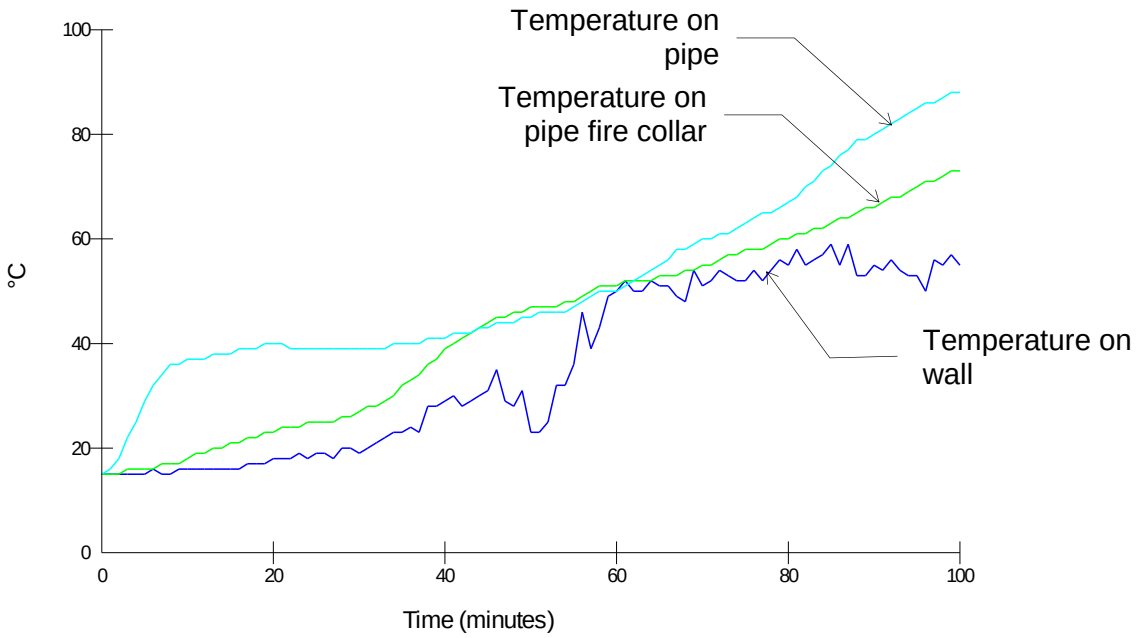
***** Pipe manufacturing standard – EN 12201 & DIN 8074/8075

Penetration sealing system

Test reference	Fire sealing	Intumescent size (Collar inlay)	Backing material
G	Protecta FR collar Ø160mm on both faces, fixed to the wall with 80mm long wood screws	60mm deep x 15mm thick	-
	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
G	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

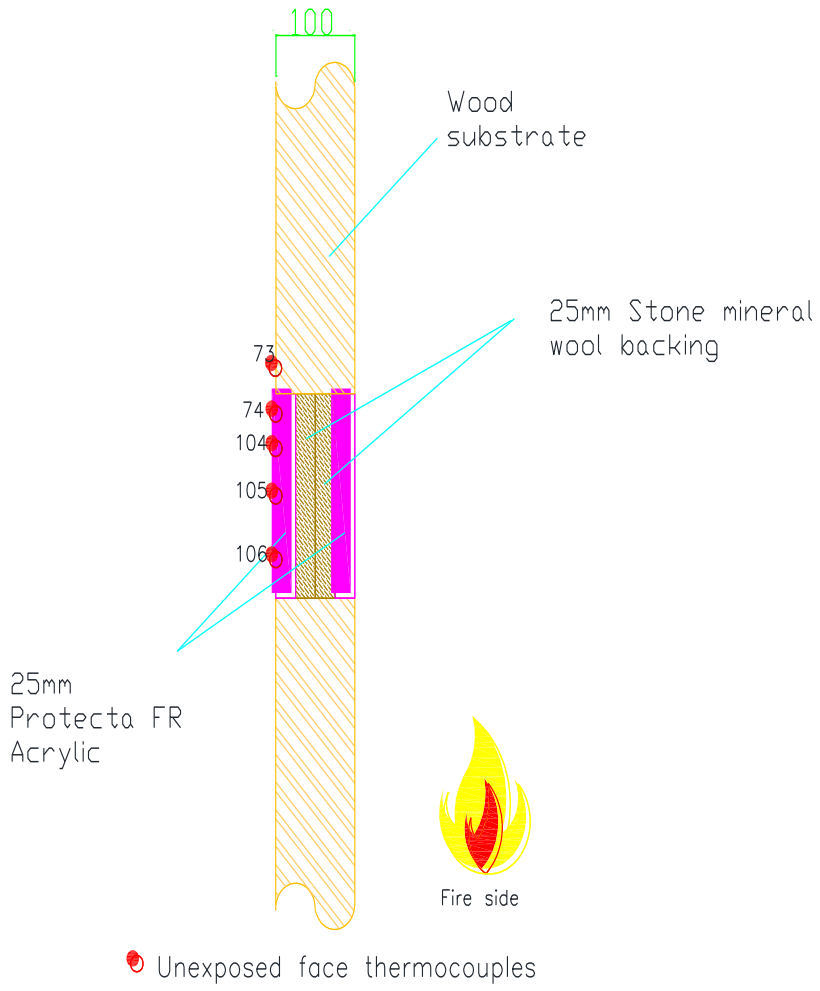
Blank seal H (Polyseam Ref. W083)

Service detail

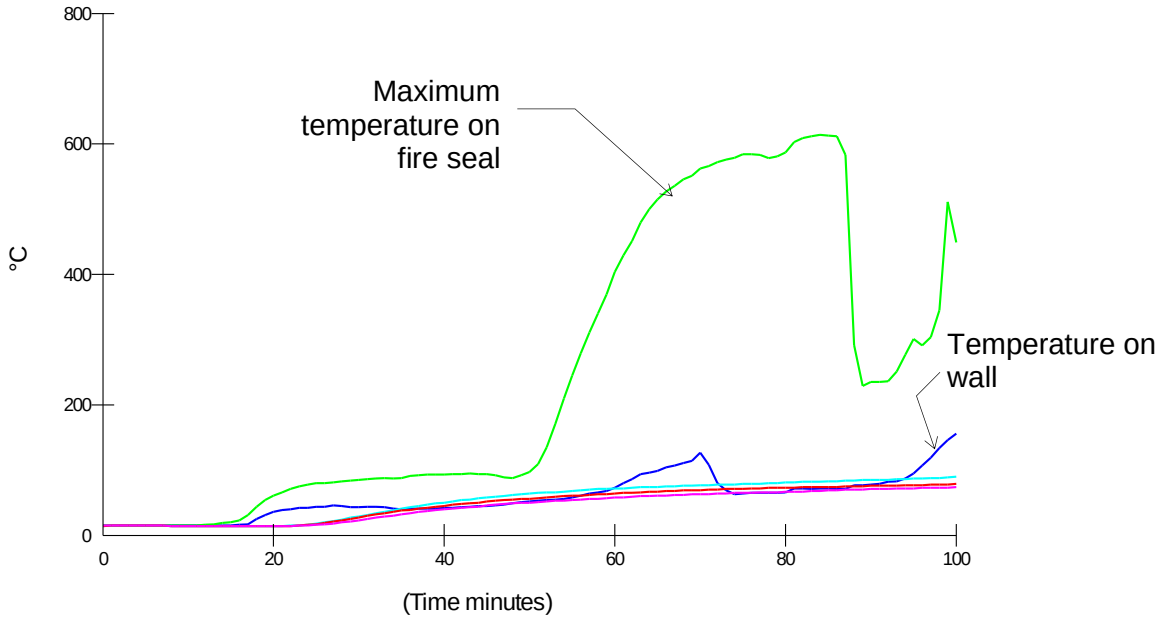
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
H	NA	NA	NA	Ø400mm	NA	NA

Penetration sealing system

Test reference	Fire sealing	Intumescent size (Collar inlay)	Backing material
H	Protecta FR Acrylic sealing on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



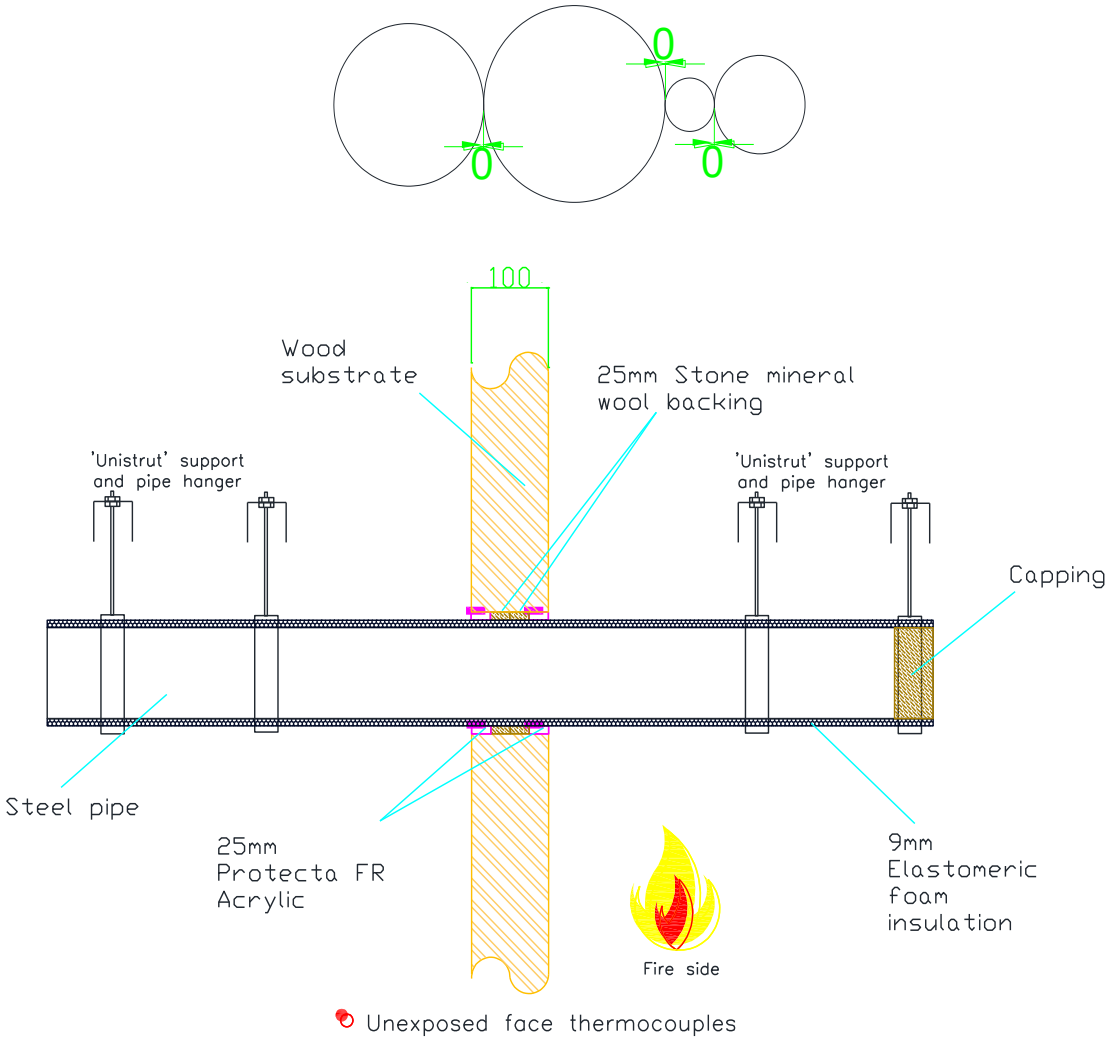
Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
H	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	53 (fifty three) minutes

* No failure of this test criteria at test termination

Pipe group I (Polyseam ref. PS Group D)

Intumescent size	Backing material
10mm wide x 25mm deep	25mm deep stone mineral wool (density 33Kg/m^3)



Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
Cable group I	39 (thirty nine) minutes*	-	-	33 (thirty three) minutes**

* Failure recorded on pipe I2
** Failure recorded on pipe I1

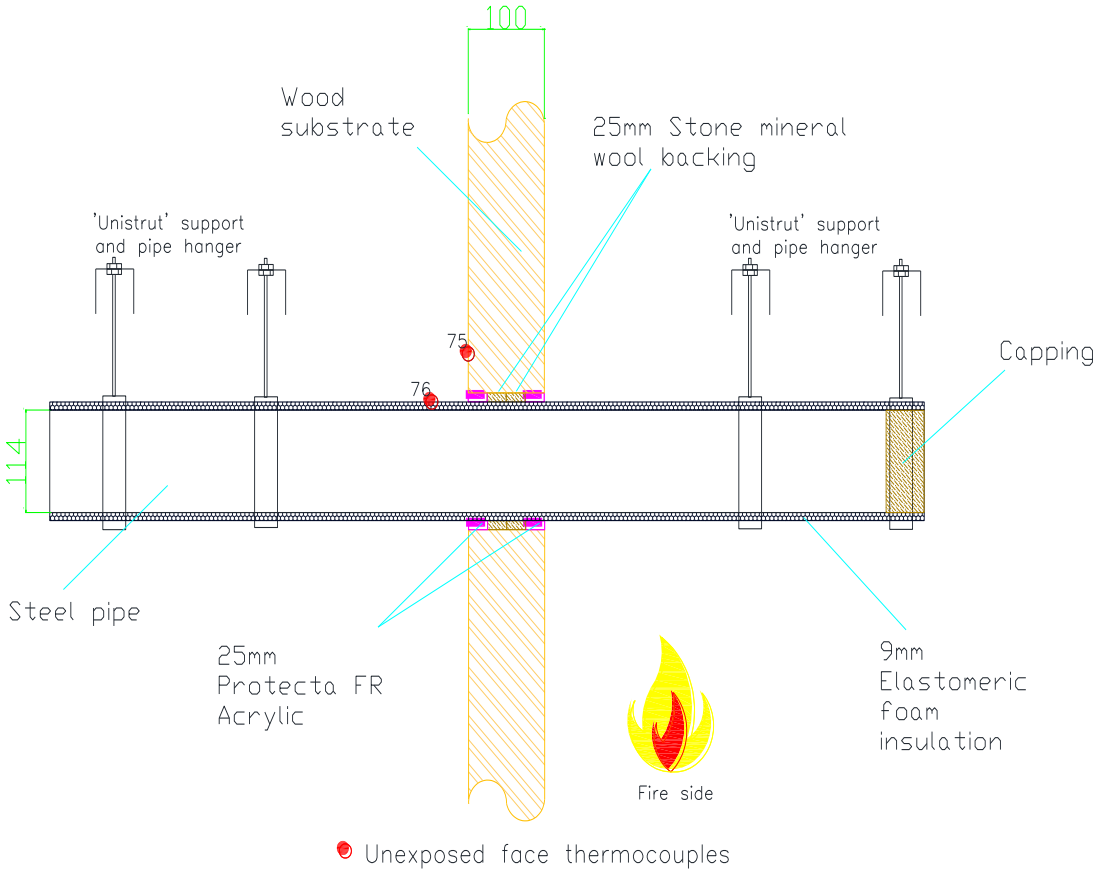
Pipe I1 (Polyseam ref. W062)

Service detail

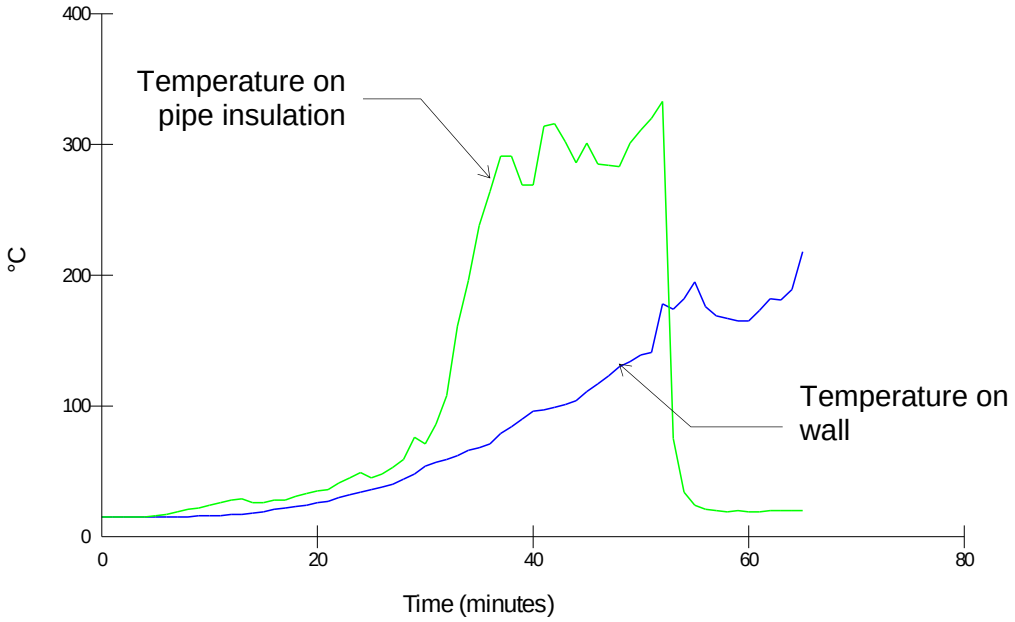
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
I1	Steel	Ø114mm	1.5mm	Ø152mm	9mm thick Armacell Armaflex ACE elastomeric foam continuous sustained (CS)	C/U

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
I1	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stonewool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
I1	65 (sixty five) minutes	-	-	33 (thirty three) minutes

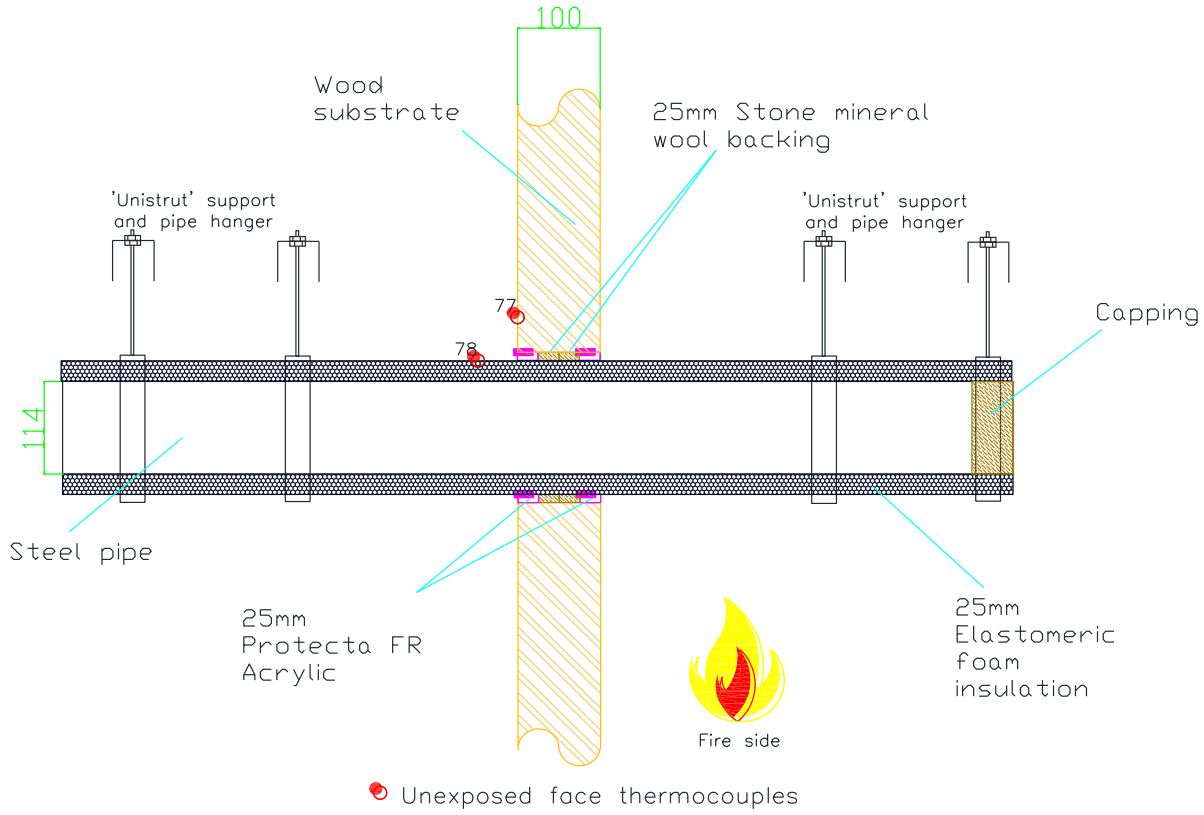
Pipe I2 (Polyseam ref. W063)

Service detail

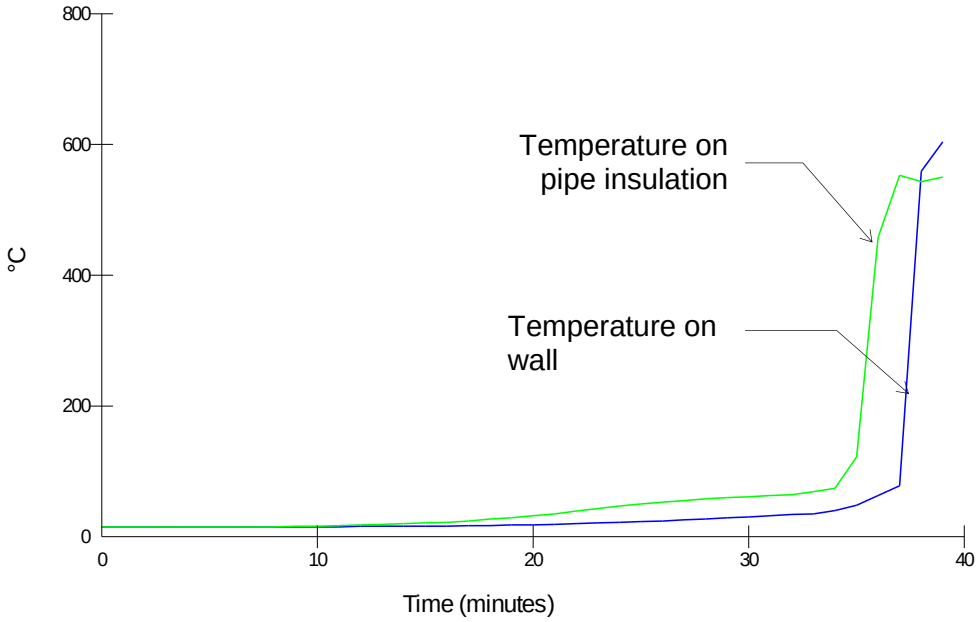
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
I2	Steel	Ø114mm	1.5mm	Ø184mm	25mm thick Armacell Armaflex ACE elastomeric foam continuous sustained (CS)	C/U

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
I2	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
I2	39 (thirty nine) minutes	-	-	35 (thirty five) minutes

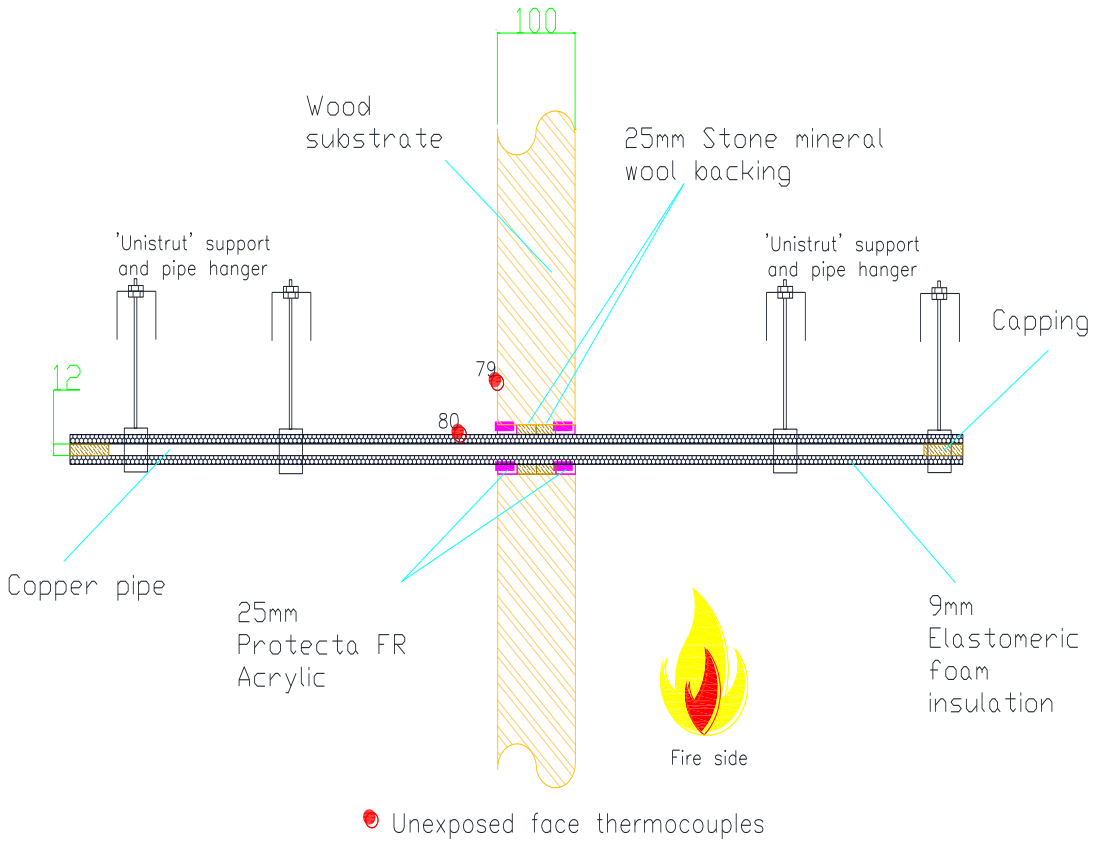
Pipe I3 (Polyseam ref. W064)

Service detail

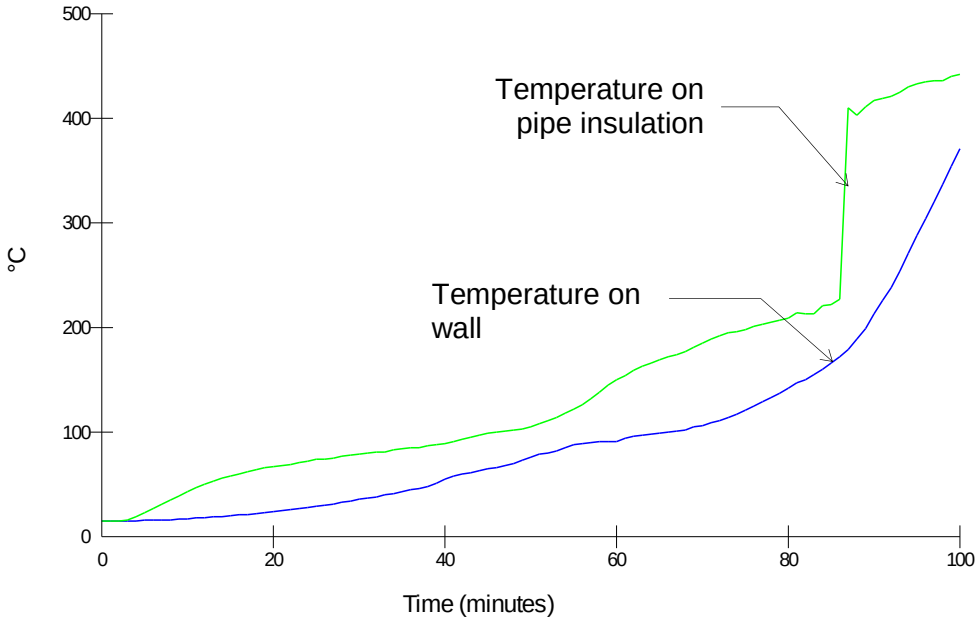
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
I3	Copper	Ø12mm	0.7mm	Ø50mm	9mm thick Armacell Armaflex ACE elastomeric foam continuous sustained (CS)	C/C

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
I3	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
I3	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	73 (seventy three) minutes

* No failure of this test criteria at test termination

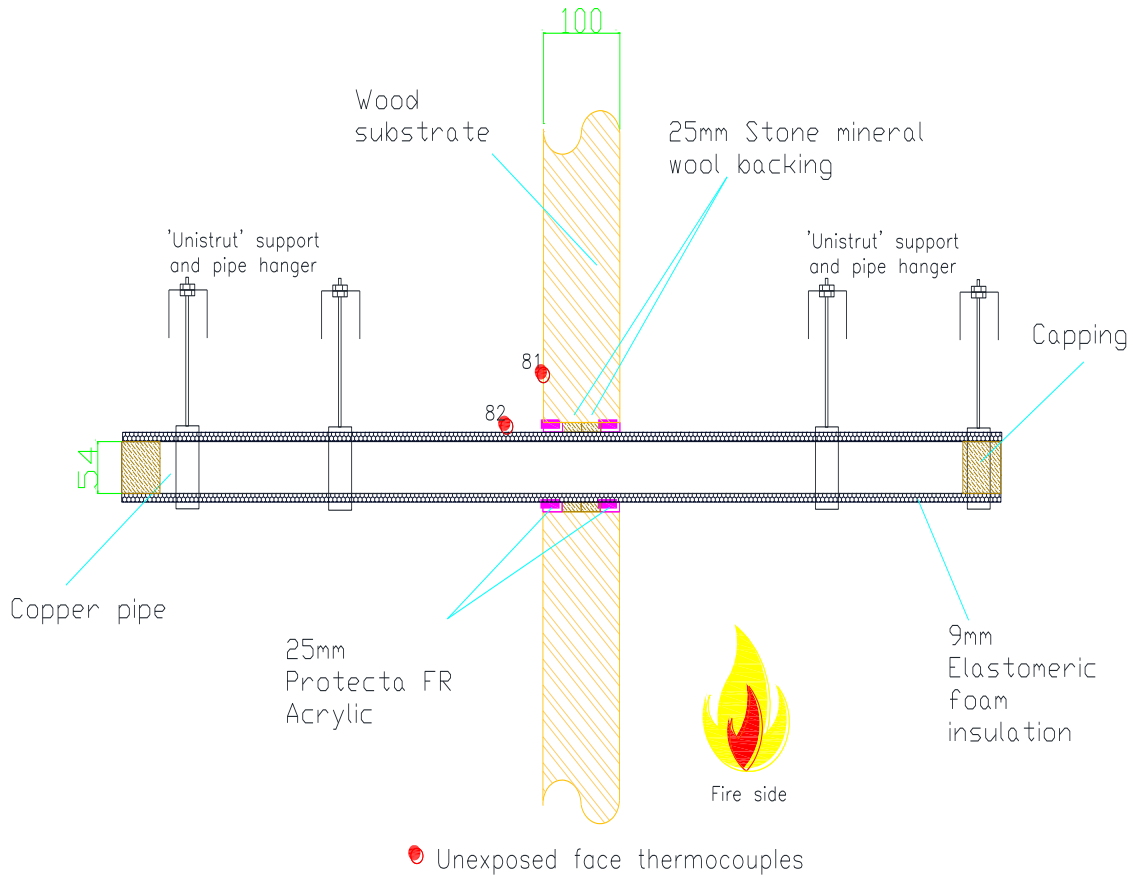
Pipe I4 (Polyseam ref. W065)

Service detail

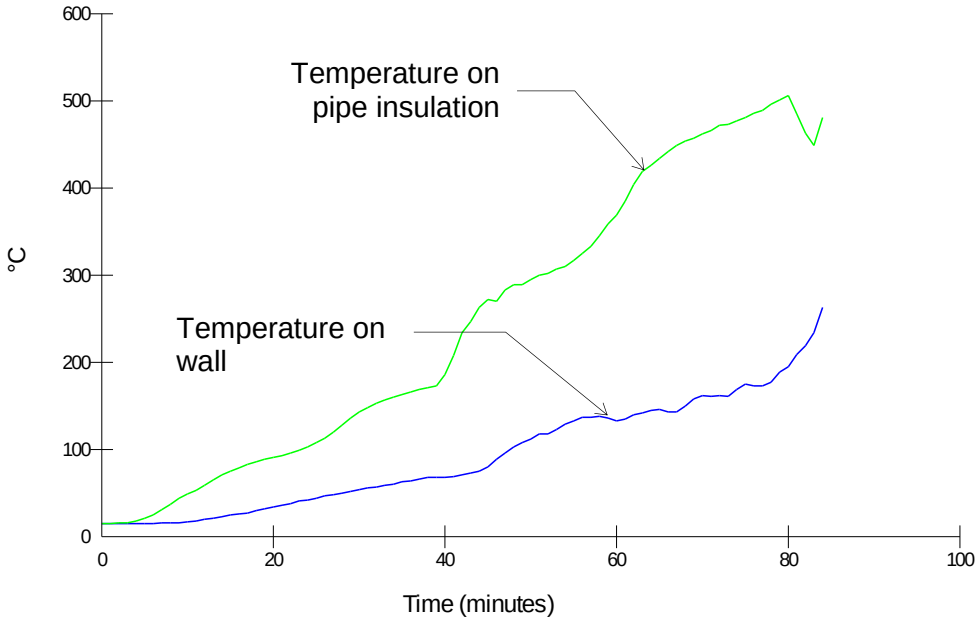
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
I4	Copper	Ø54mm	1.2mm	Ø92mm	9mm thick Armacell Armaflex ACE elastomeric foam continuous sustained (CS)	C/C

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
I4	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
I4	85 (eighty five) minutes	-	-	40 (forty) minutes

Pipe J (Polyseam Ref. W081)

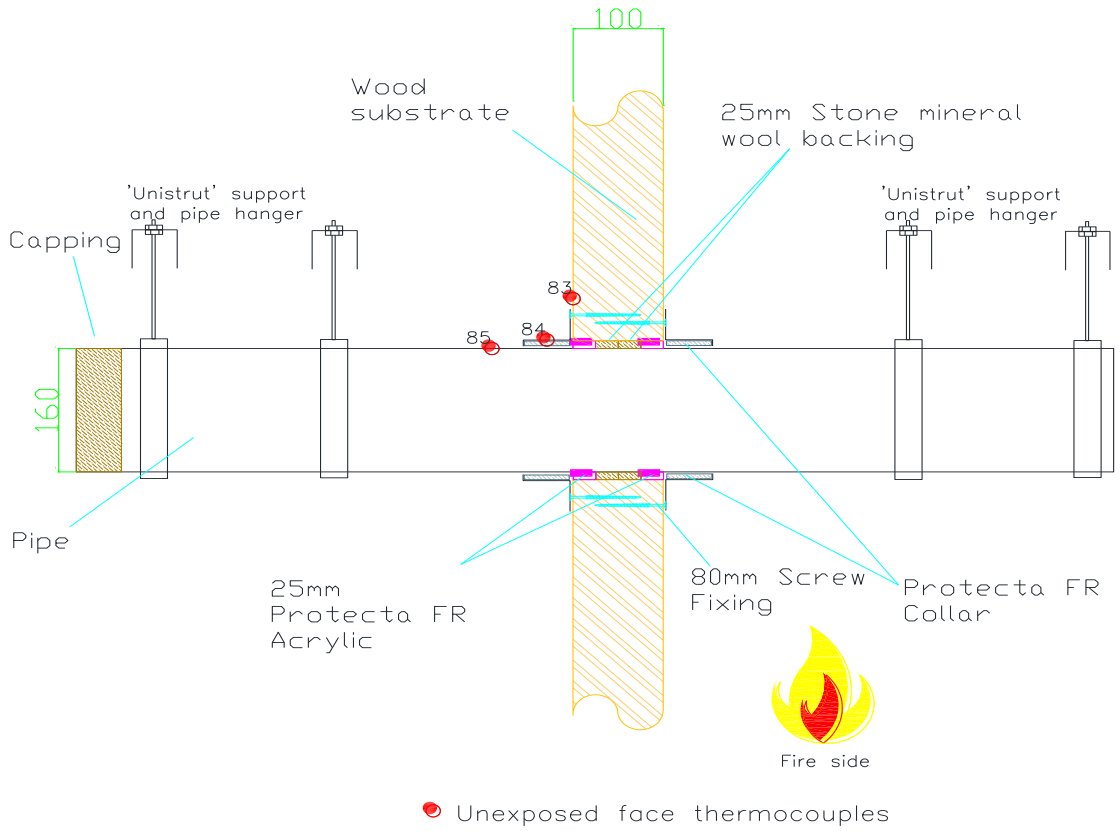
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
J	PP	Ø160mm	4.9mm	180mmm	None fitted	U/C

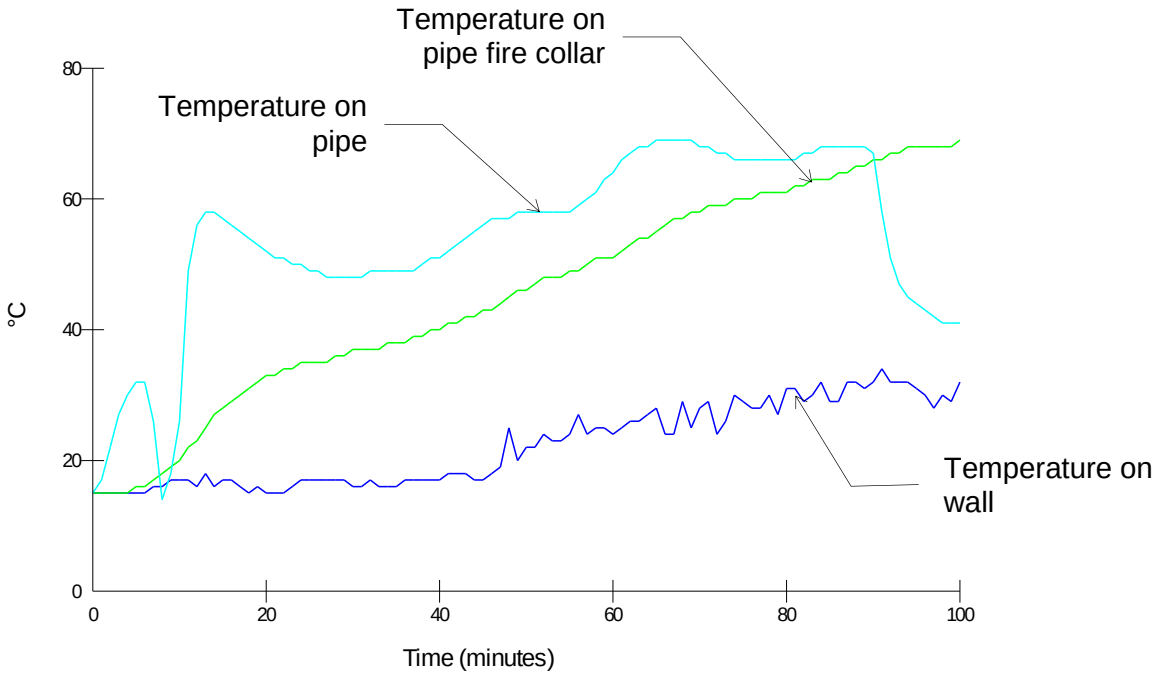
* Pipe manufacturing standard – EN 1451 & DIN 8077/8078

Penetration sealing system

Test reference	Fire sealing	Intumescent size (Collar inlay)	Backing material
J	Protecta FR collar Ø160mm on both faces, fixed to the wall with 80mm long wood screws	60mm deep x 15mm thick	-
	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



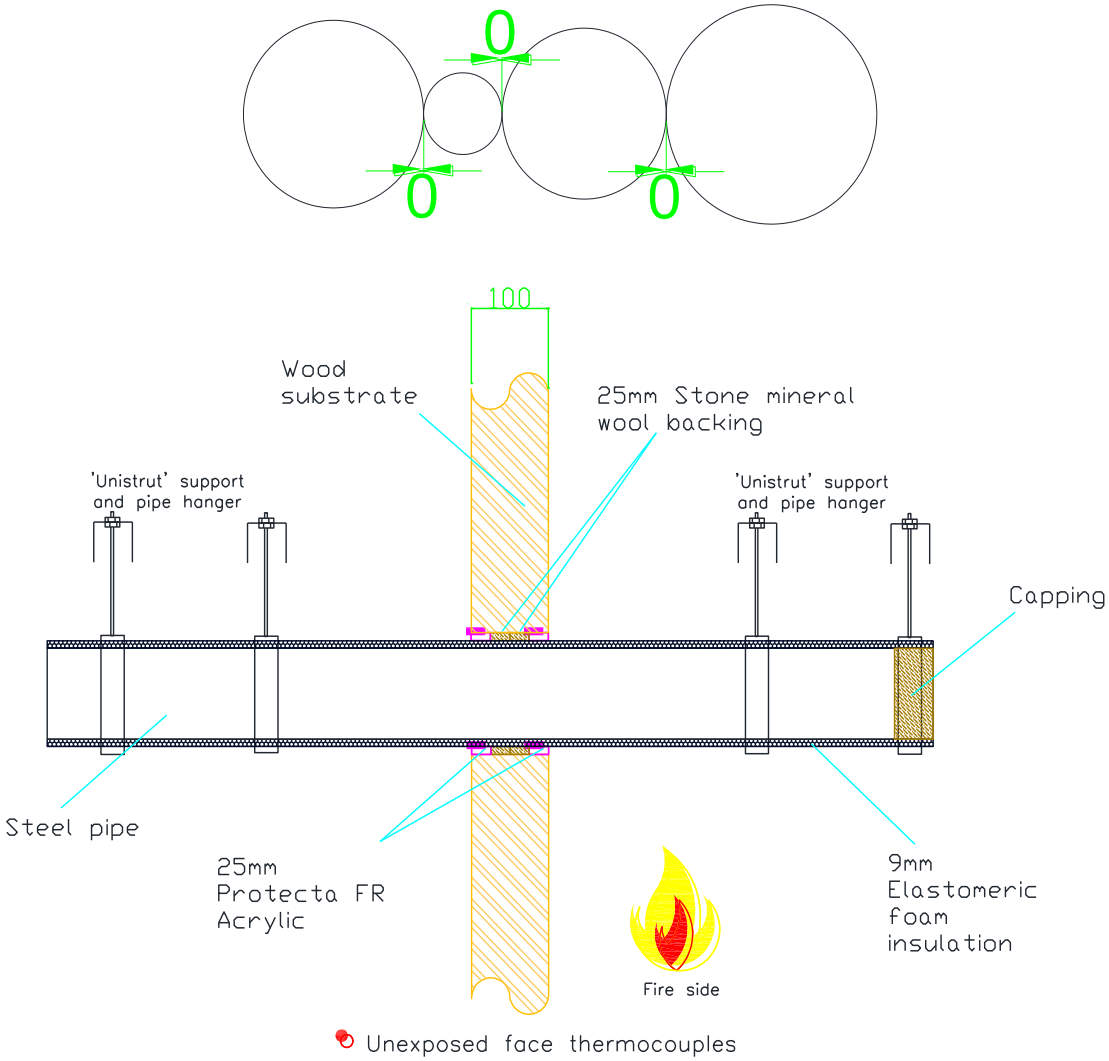
Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
J	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe group K (Polyseam ref. PS Group E)

Intumescent size	Backing material
10mm wide x 25mm deep	25mm deep stone mineral wool (density 33Kg/m^3)



Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
Cable group K	30 (thirty) minutes*	-	-	27 (twenty seven) minutes*

* Failure recorded on pipe K1

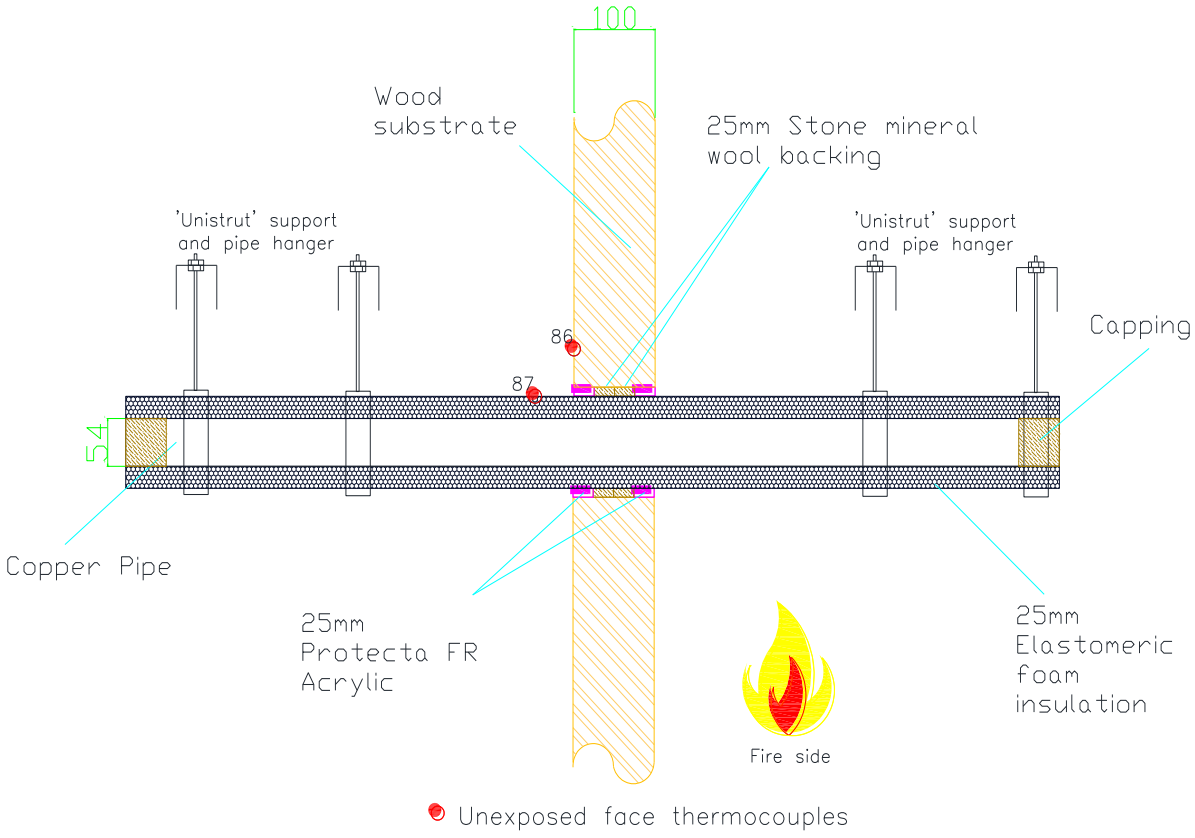
Pipe K1 (Polyseam ref. W066)

Service detail

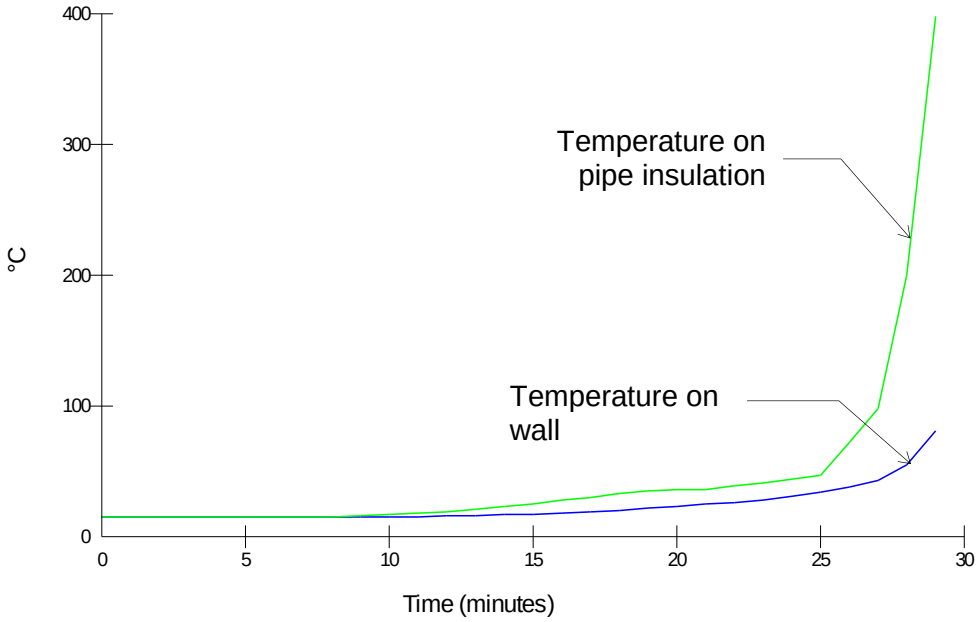
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
K1	Copper	Ø54mm	1.2mm	Ø124mm	25mm thick Armacell Armaflex ACE elastomeric foam continuous sustained (CS)	C/C

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
K1	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
K1	30 (thirty) minutes	-	-	27 (twenty seven) minutes

Pipe K2 (Polyseam ref. W067)

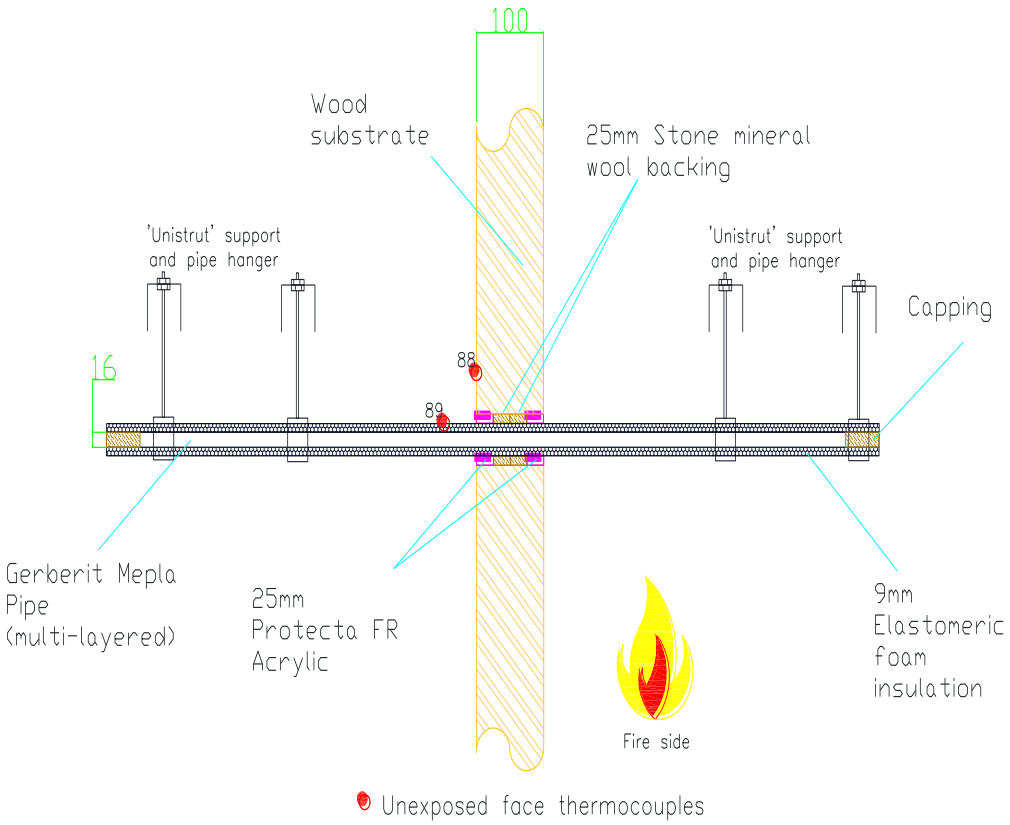
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
K2	Gerberit Mepla	Ø16mm	2.25mm	Ø54mm	9mm thick Armacell Armaflex ACE elastomeric foam continuous sustained	C/C

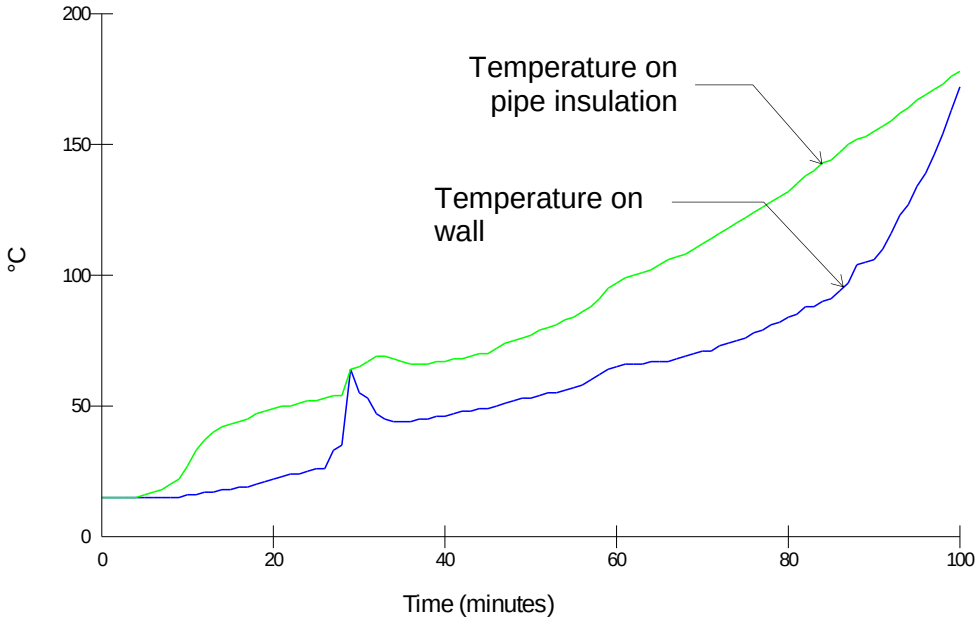
Pipe Markings

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
K2	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
K2	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe K3 (Polyseam ref. W068)

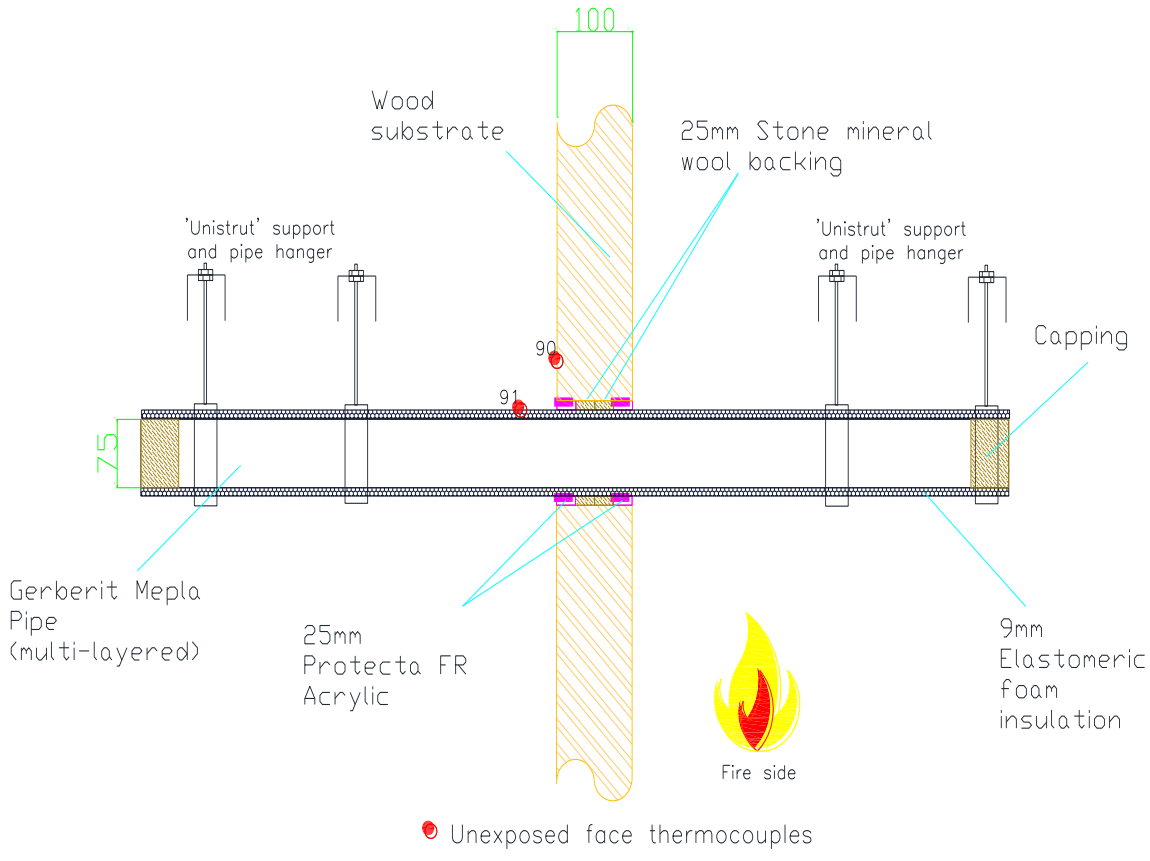
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
K3	Gerberit Mepla	Ø75mm	4.6mm	Ø113mm	9mm thick Armacell Armaflex ACE elastomeric foam continuous sustained	C/C

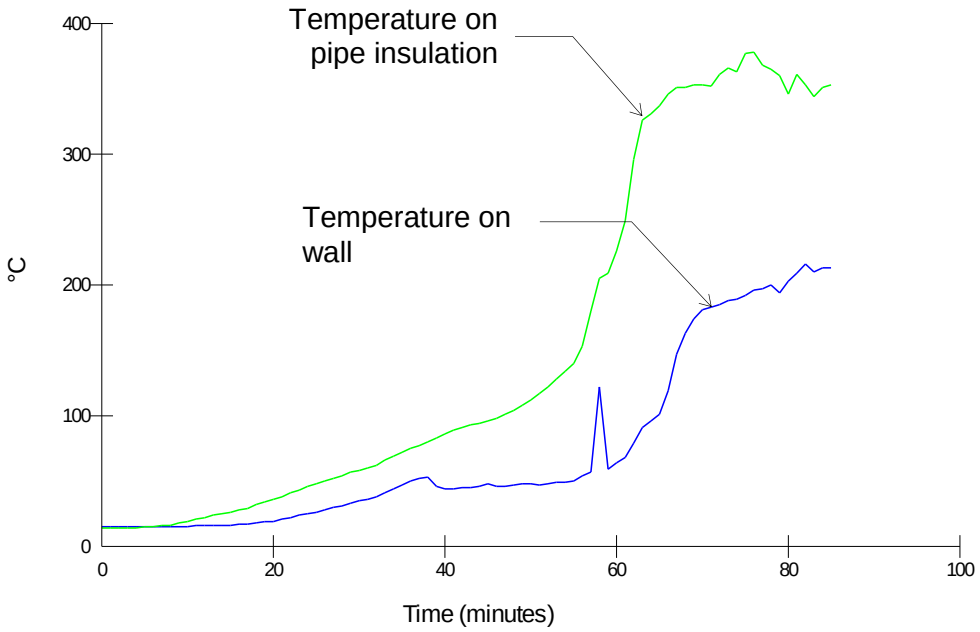
Pipe Markings

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
K3	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
K3	86 (eighty six) minutes	-	-	57 (fifty seven) minutes

Pipe K4 (Polyseam ref. W069)

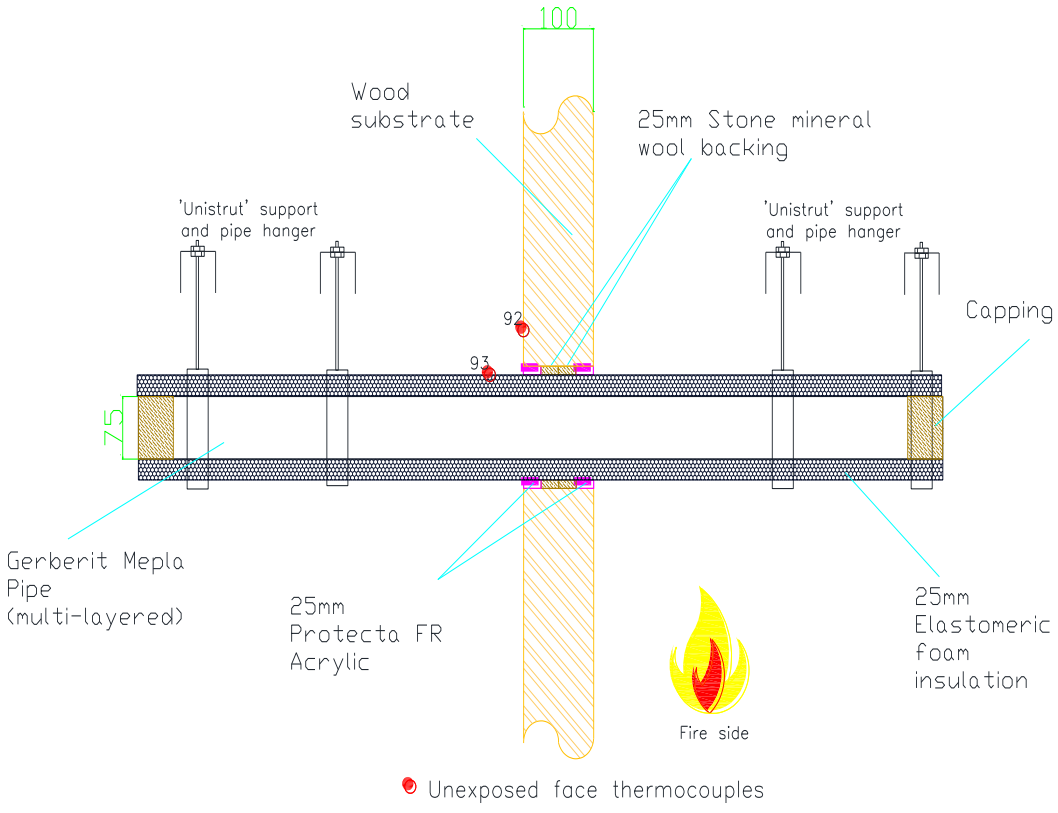
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
K4	Gerberit Mepla	Ø75mm	4.6mm	Ø145mm	25mm thick Armacell Armaflex ACE elastomeric foam continuous sustained	C/C

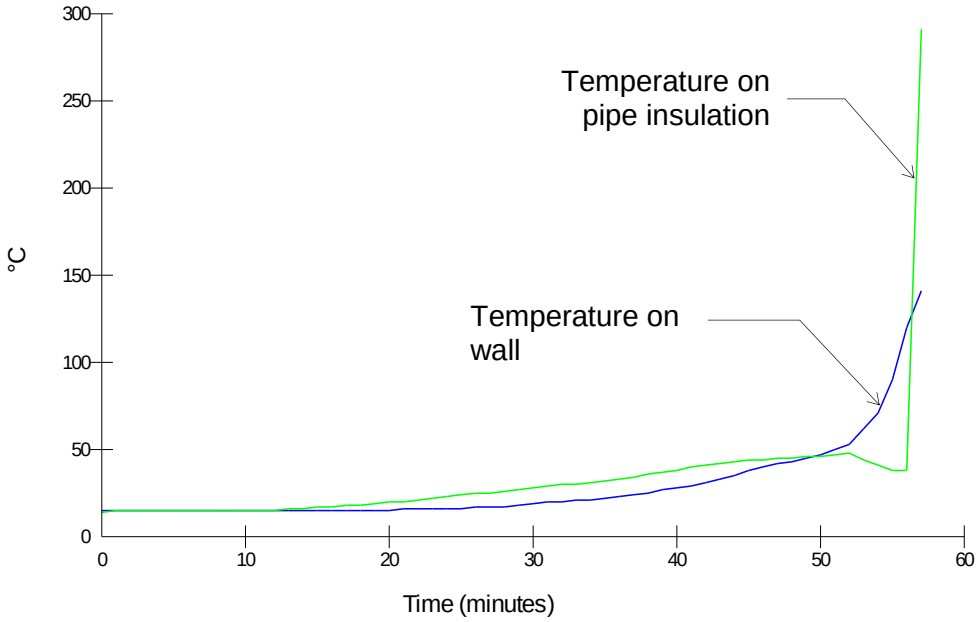
Pipe Markings

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
K4	Protecta FR Acrylic sealing pipe insulation to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration

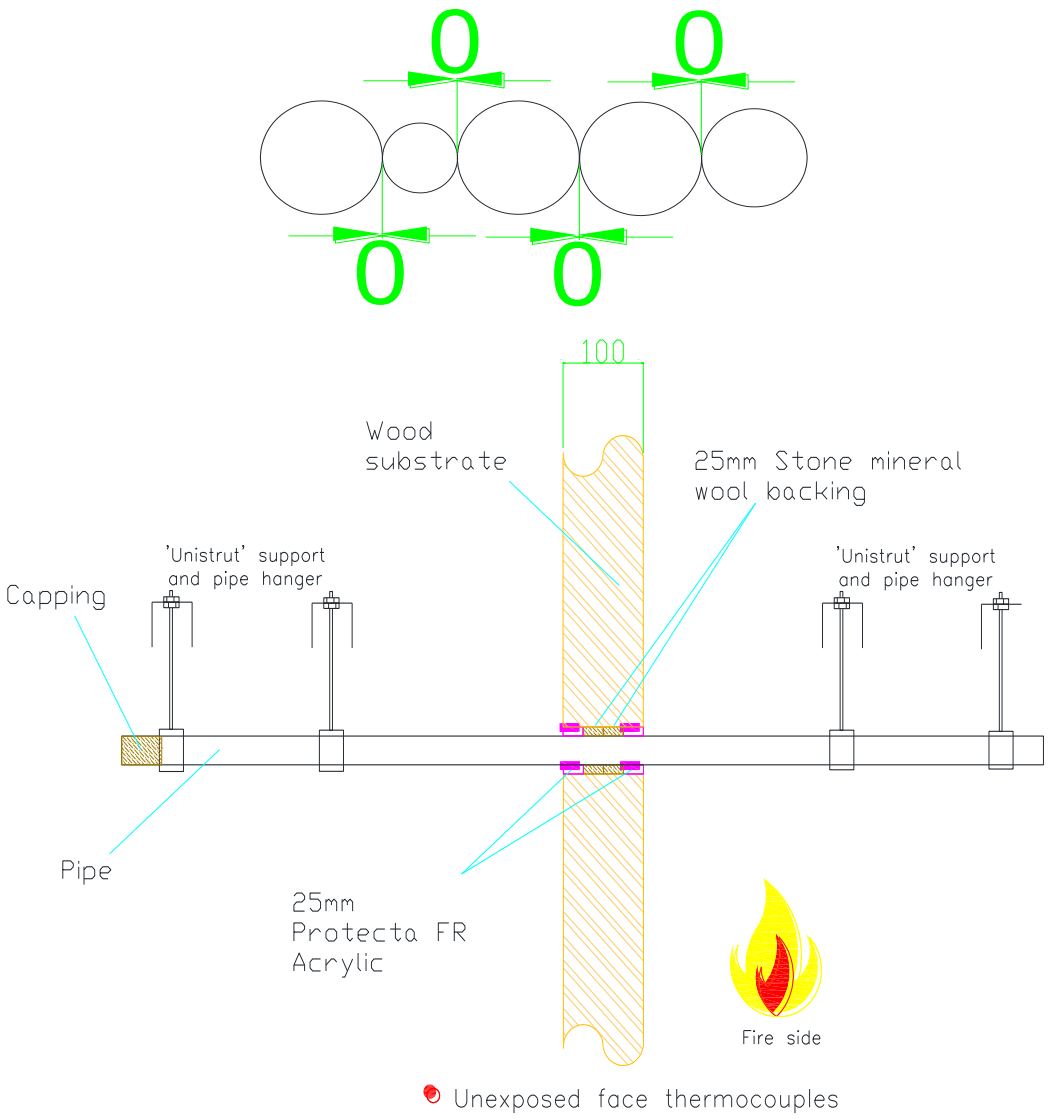


Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
K4	-	-	56 (fifty six) minutes	56 (fifty six) minutes

Pipe group L (Polyseam ref. PS Group G)

Intumescent size	Backing material
10mm wide x 25mm deep	25mm deep stone mineral wool (density 33Kg/m^3)



Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
Cable group L	100 (one hundred) minutes*	100 (one hundred) minutes*	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe L1 (Polyseam ref. W075)

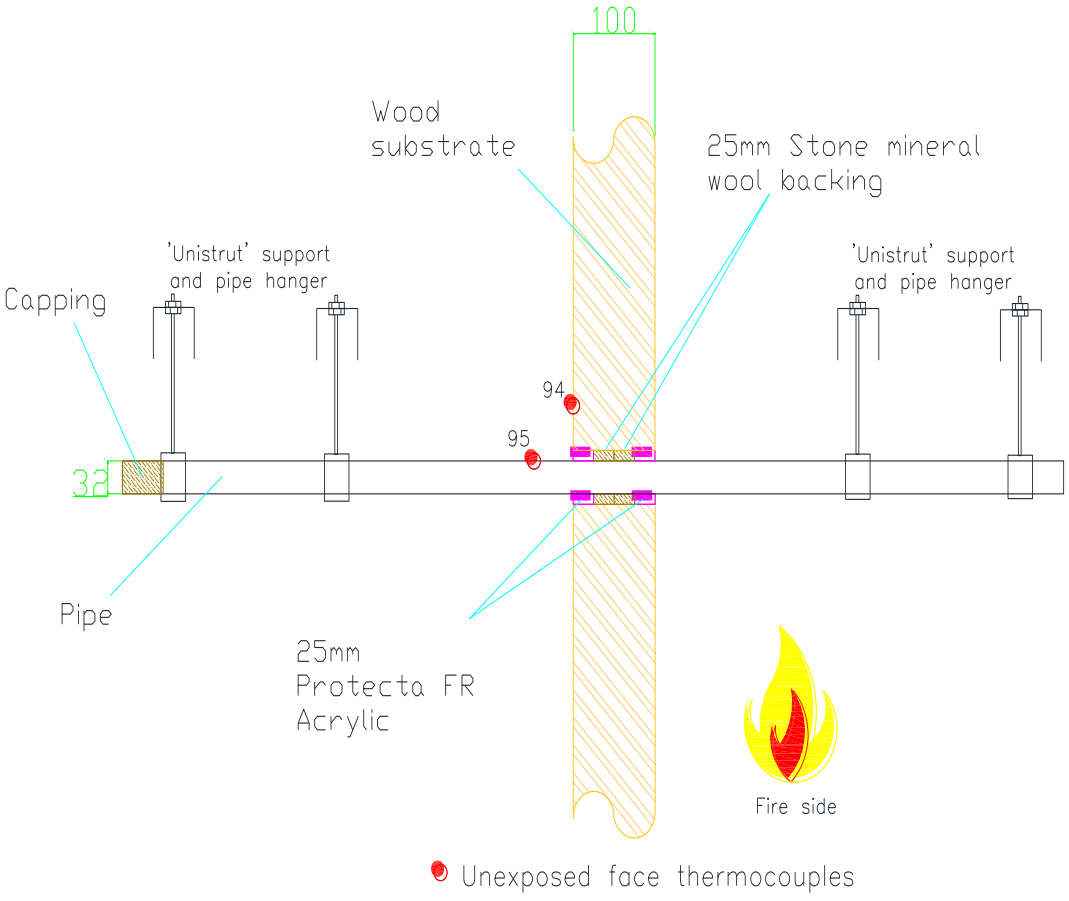
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
L1	PE-HD*	Ø32mm	3.0mm	Ø52mm	None fitted	U/C

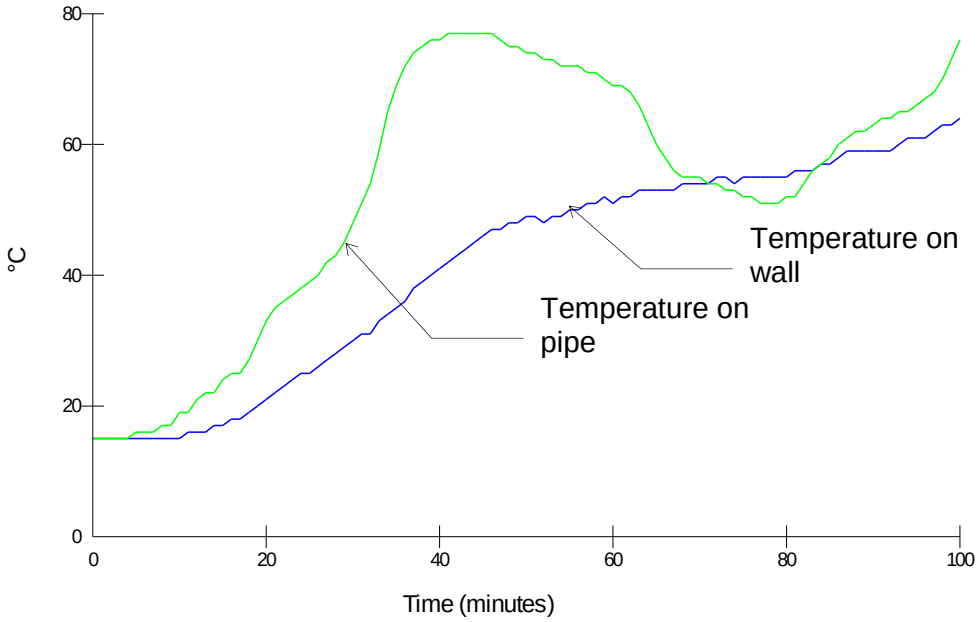
***** Pipe manufacturing standard – EN 12201 & DIN 8074/8075

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
L1	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
L1	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe L2 (Polyseam ref. W076)

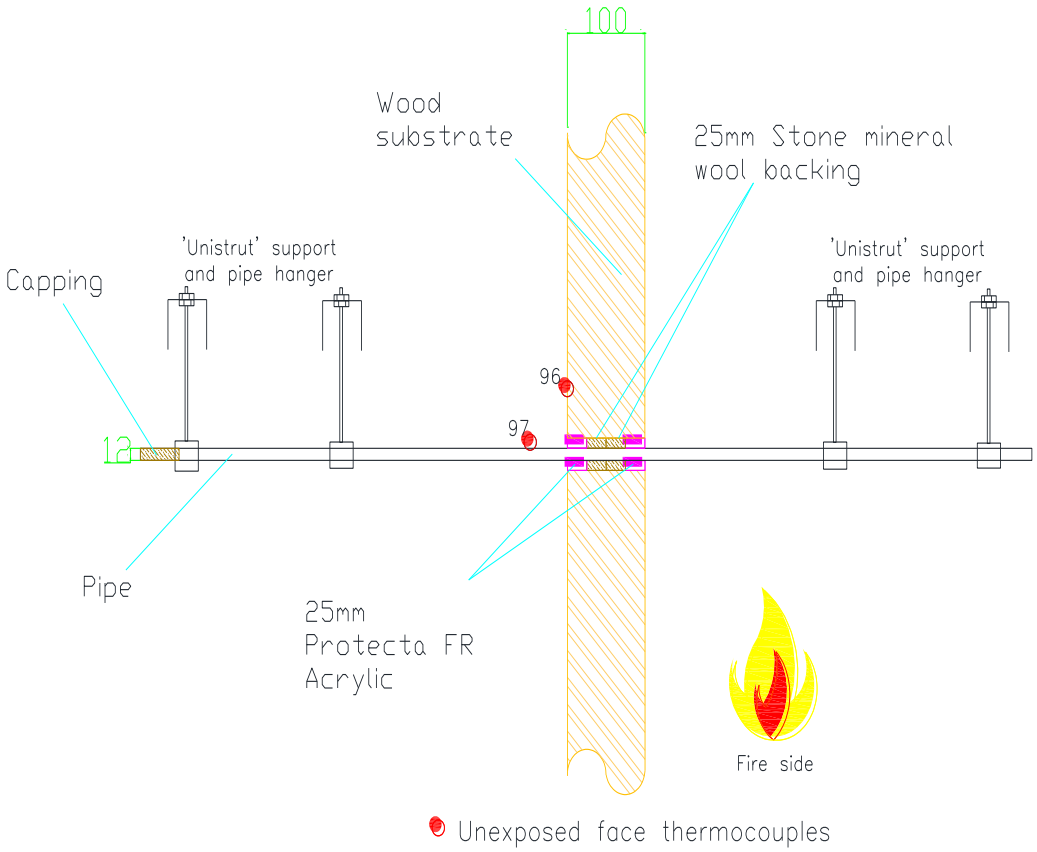
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
L2	PP*	Ø12mm	1.8mm	Ø32mm	None fitted	U/C

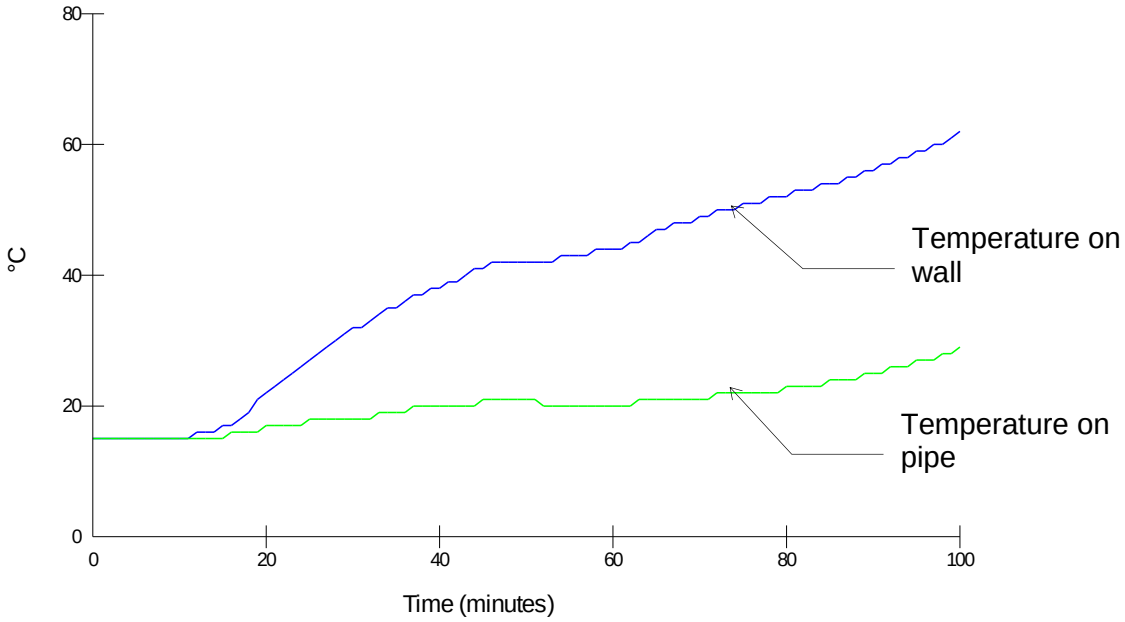
***** Pipe manufacturing standard – DIN 8077/8078

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
L2	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
L2	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe L3 (Polyseam ref. W077)

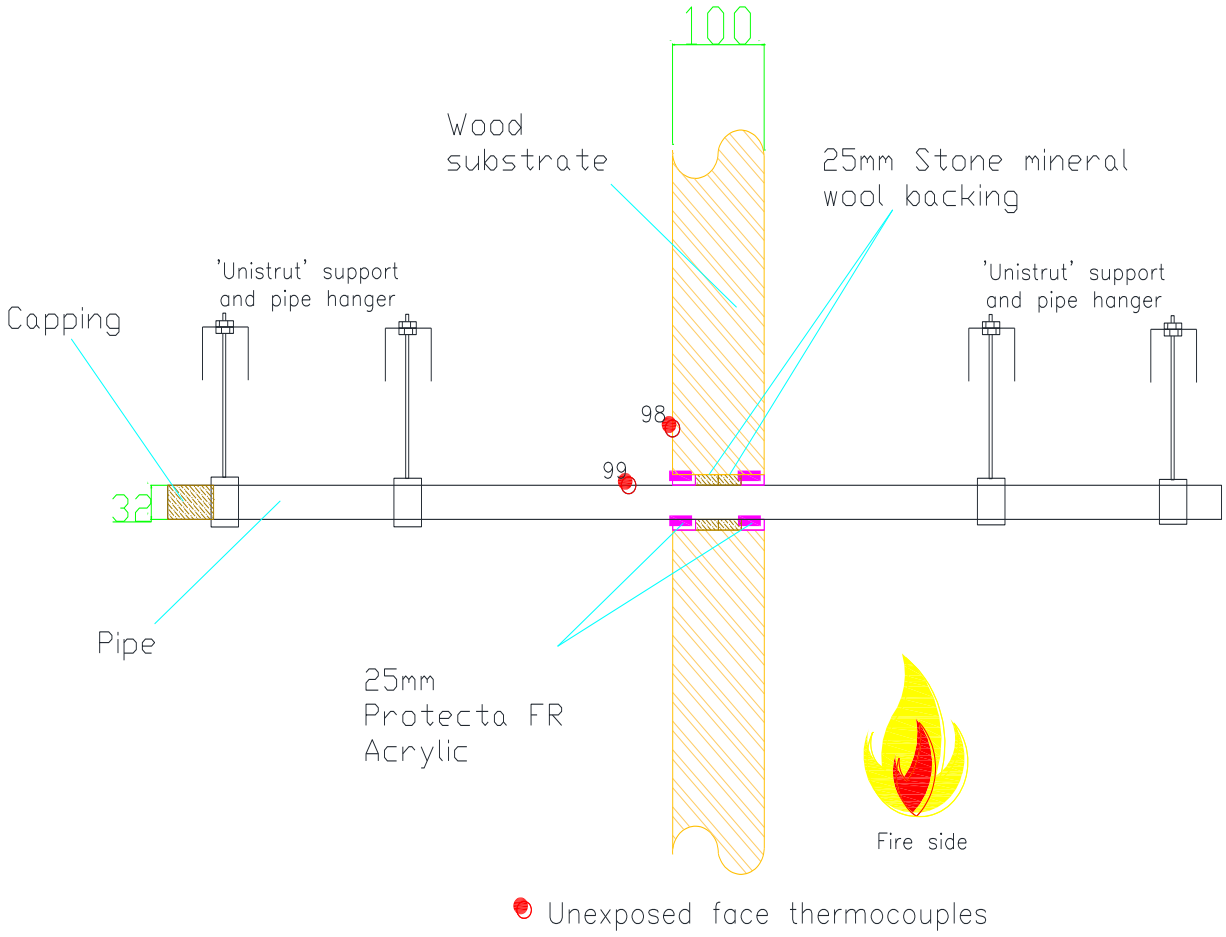
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
L3	PP*	Ø32mm	2.0mm	Ø52mm	None fitted	U/C

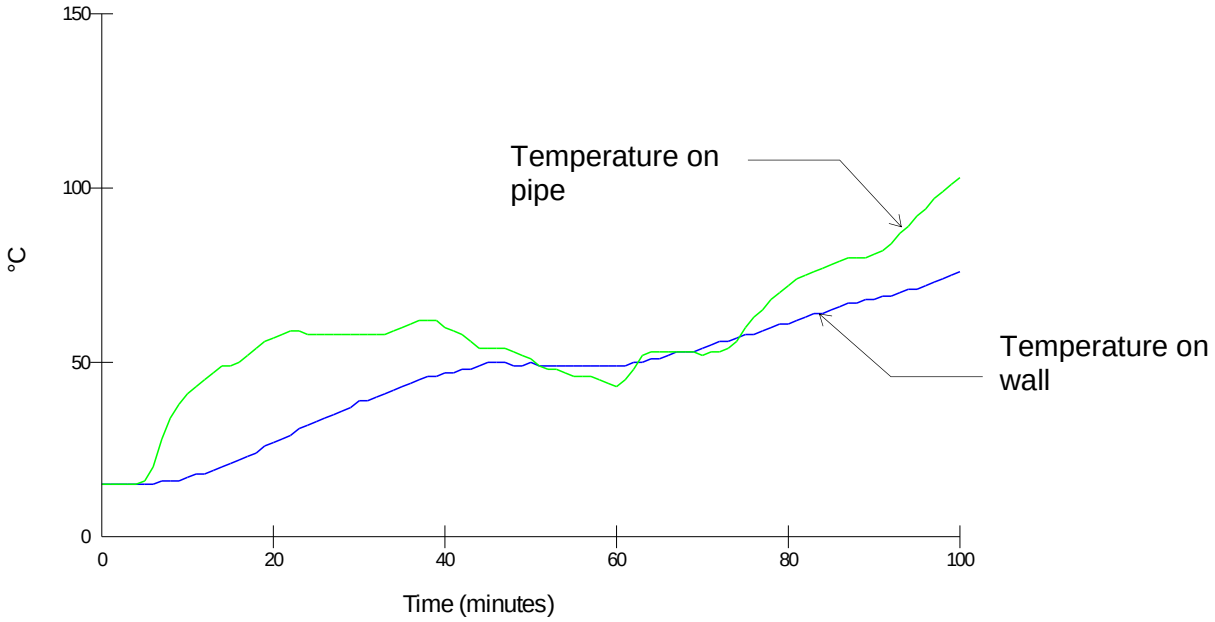
***** Pipe manufacturing standard – DIN 8077/8078

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
L3	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
L3	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

Pipe L4 (Polyseam ref. W078)

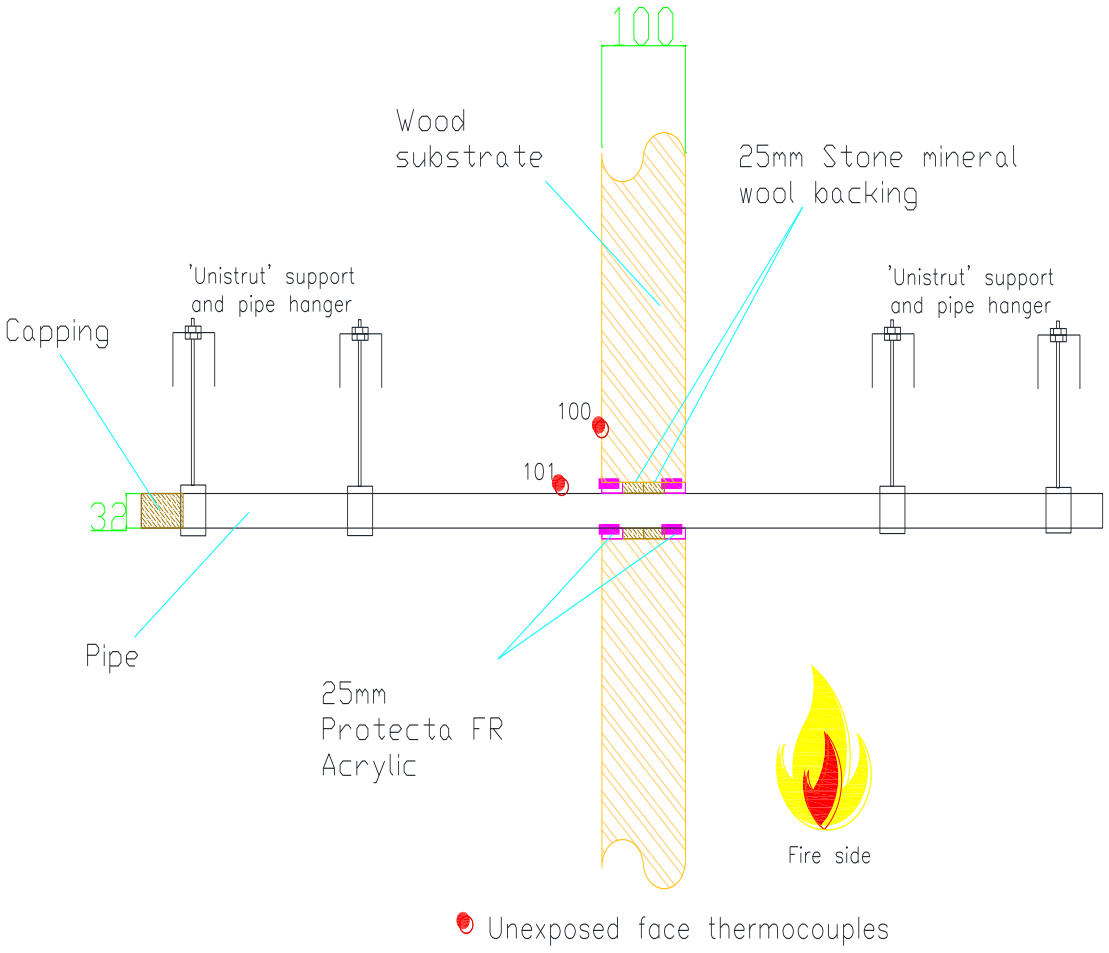
Service detail

Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
L4	PP	Ø32mm	4.4mm	Ø52mm	None fitted	U/C

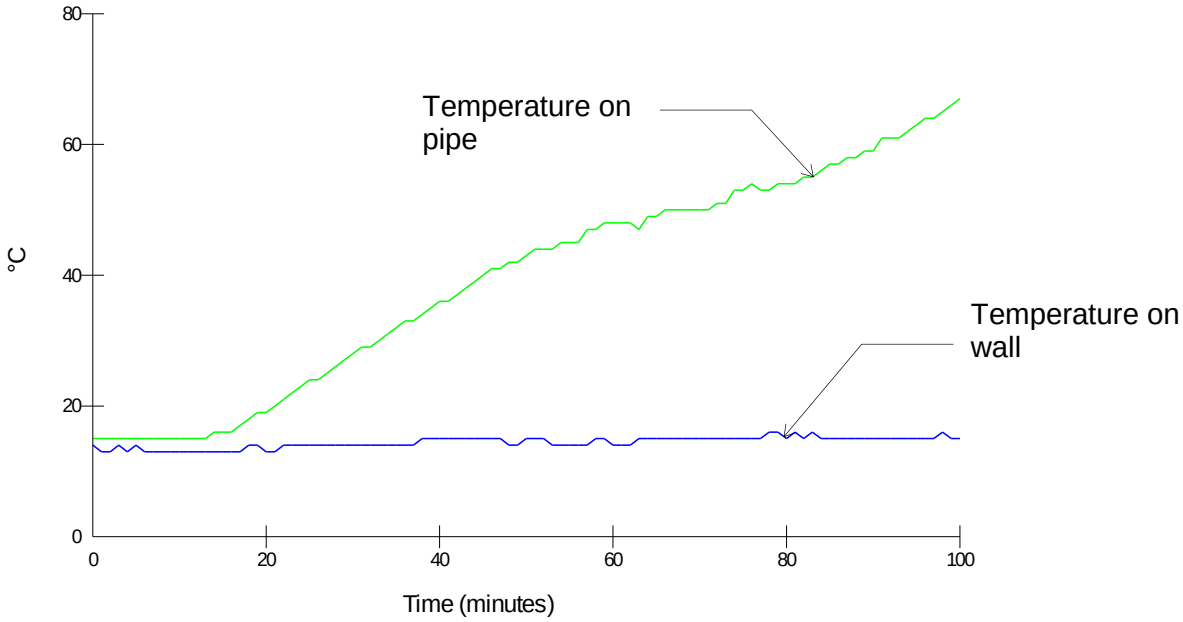
***** Pipe manufacturing standard – DIN 8077/8078

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
L4	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
L4	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

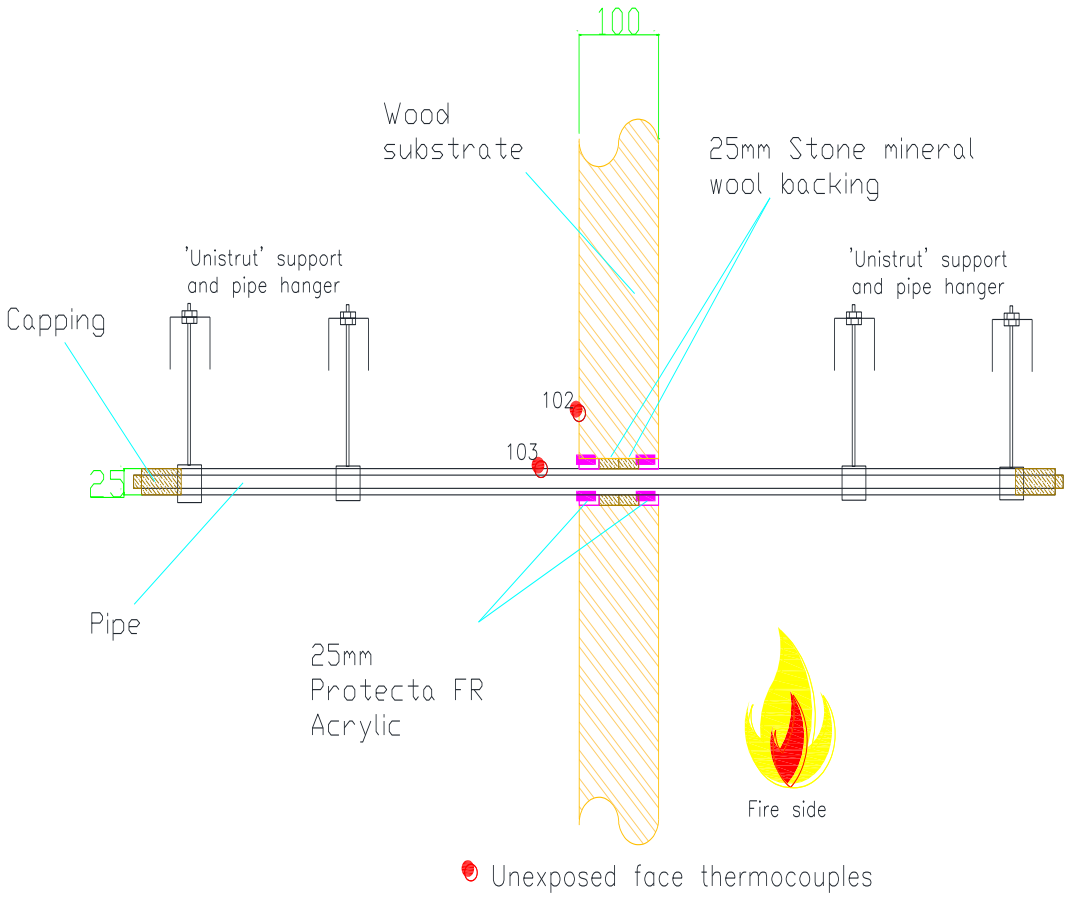
Pipe L5 (Polyseam ref. W079)

Service detail

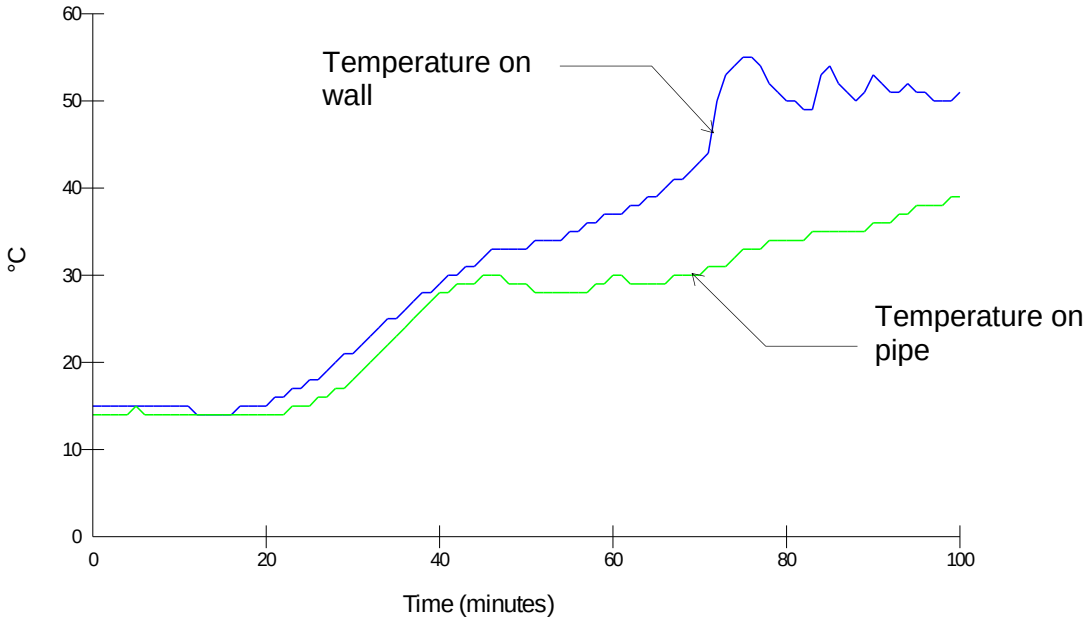
Test reference	Pipe material	Pipe size	Pipe wall thickness	Aperture size	Pipe insulation	Pipe capping
L5	Uponor Wirsbo PEX pipe in pipe system	(Outer) Ø25mm (Inner) Ø 15mm	(Outer) nominally Ø0.6mm (Inner) Ø2.5mm	Ø45mm	None fitted	C/C

Penetration sealing system

Test reference	Fire sealing	Intumescent size	Backing material
L5	Protecta FR Acrylic sealing pipe perimeter to wall on both faces	10mm wide x 25mm deep	25mm deep Stone mineral wool (density 33 Kg/m^3)



Temperatures recorded on penetration



Overall performance

Specimen reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
L5	100 (one hundred) minutes*	100 (one hundred) minutes *	100 (one hundred) minutes*	100 (one hundred) minutes*

* No failure of this test criteria at test termination

8 Limitations

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outline in BS EN 1366-3, BS EN 1363-1, and where appropriate BS EN 1363-2. Any significant deviation with respect to size, construction 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.

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. Warringtonfire will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test 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.

	Written and Checked by:	**Authorised by:**
Signature:		
Name:	Alan McKie	Nikolas Whitelock
Title:	Technical Officer	Technical Manager
Date of issue:	31/07/2019	31/07/2019

Revision A – July 2019 – Correction to appendix 1, raw test data channel 66

9 Field of direct application of test results

The results of the test are directly applicable to similar constructions where one or more of the changes listed in BS EN 1366-3 and BS EN 1366-4, are made and the construction continues to comply with that appropriate design code for its stiffness and stability. Other changes are not permitted by the document. A copy of the field of direct application is available from Warringtonfire upon request.

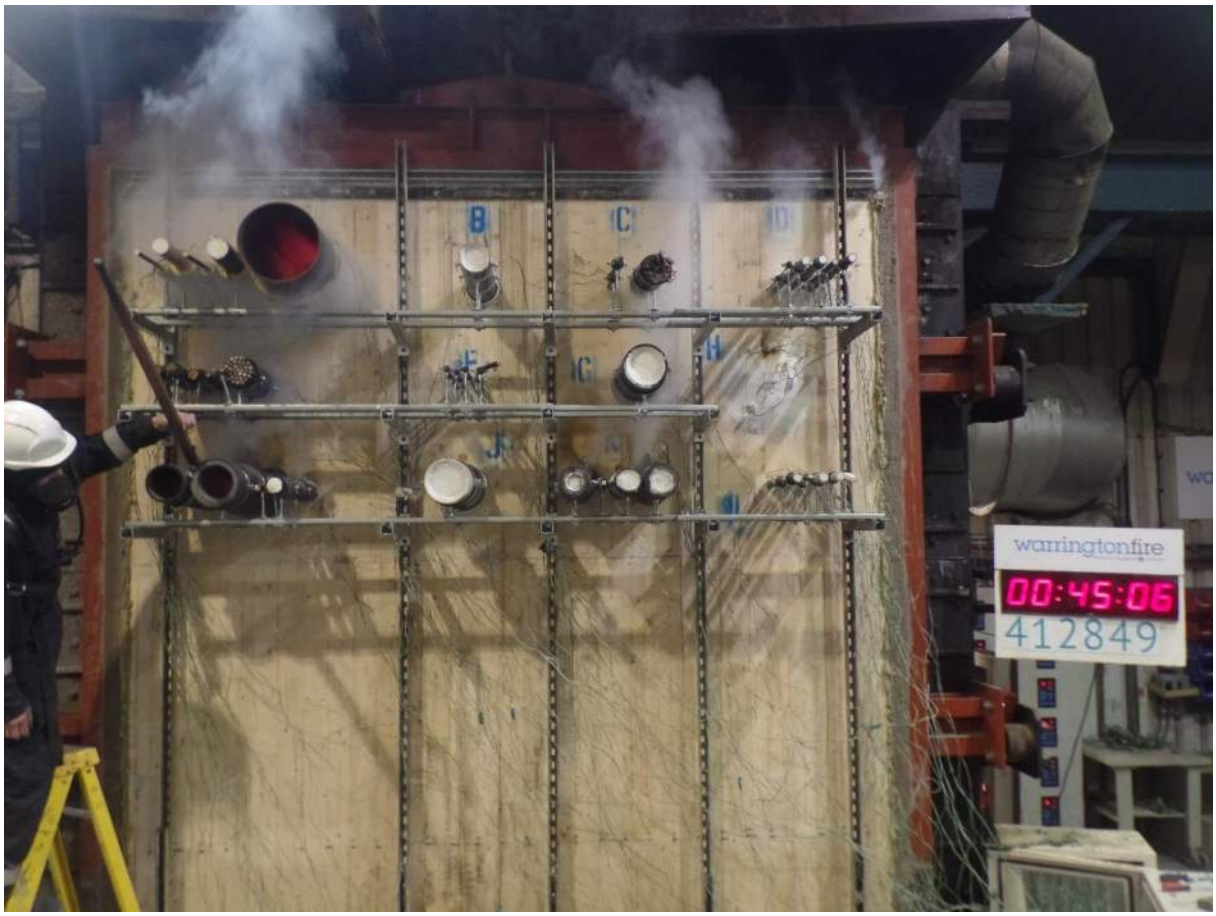
10 Photographs

At start of test

After 15 minutes

After 30 minutes

After 45 minutes

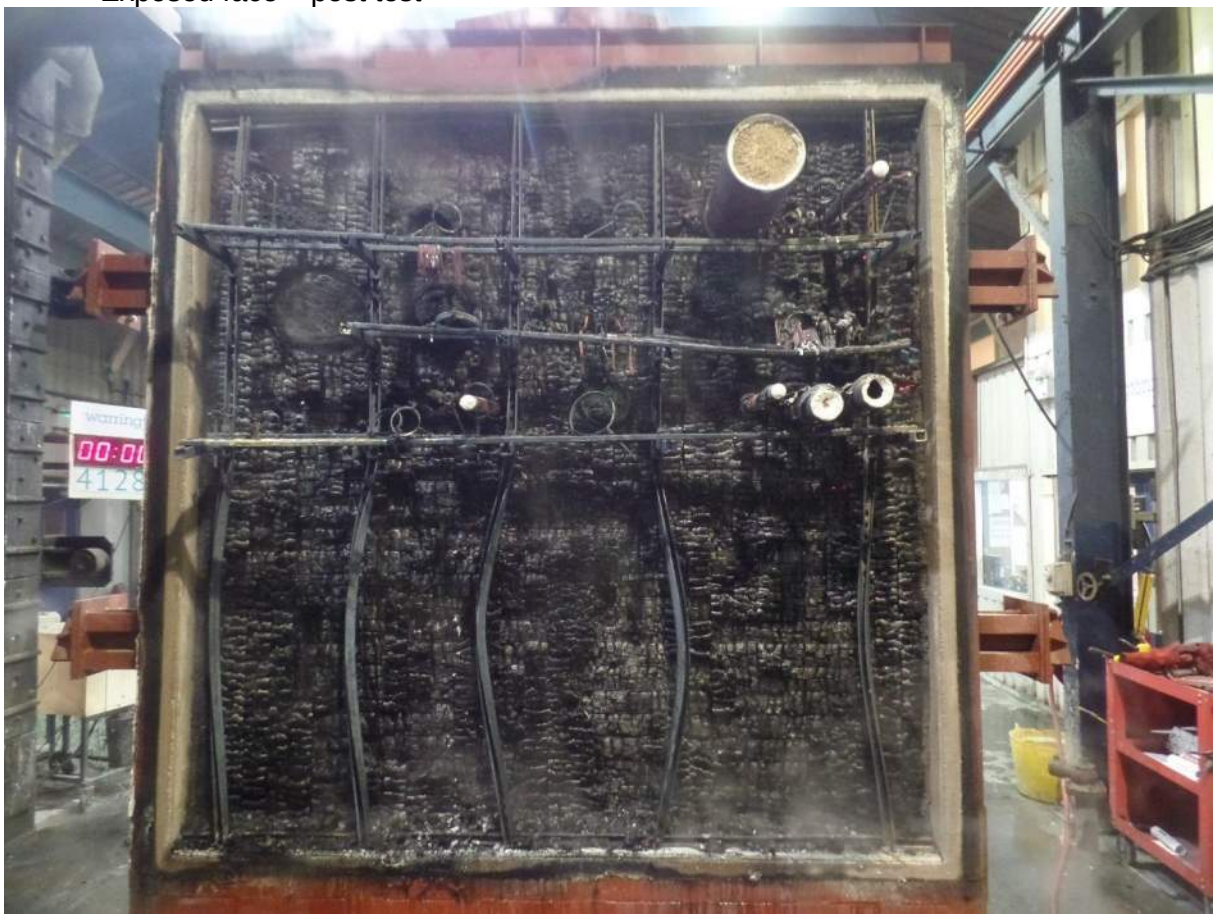


After 60 minutes

After 75 minutes

After 90 minutes

Exposed face – post test



BM

Sampling Report

Chiltern House, Stocking Lane
Hughenden Valley, High Wycombe
Buckinghamshire
HP14 4ND, UK
T: +44 (0) 1494 569700
F: +44 (0) 1494 565487
certification@bmtrada.com
www.bmtrada.com

Contract Reference: PS 18001 Notified Body ID: 1224

Company Name: POLYSEAM LTD.

Location of Sampling: HUDDERSFIELD.

Product: TRANSITS (CABLE BOXES).

Sampled By (Name): PETER SARGISSON Signature: [signature] Date: 05/03/18.

Requirement	Write the names of the people present
Explain the sampling process Yes ☑	WOL HLUCHAN
Explain confidentiality Yes ☑	RESEARCH AND DEVELOPMENT DIRECTOR
Requirement	**Evidence / Comments**
Description of product(s)	PRO 256 110x210 (250 PIPE) TRANSIT WITH 4.5mm INTUMESCENT.
Product identification / reference numbers / codes	5318 110x210 I4.5 FS7 – PHOTO No 6.
Batch number(s)	80086976
Date of manufacture	22/02/2018.
Quantity of stock and size of sample(s) taken	4 / 4.
Traceability of material records: Purchase Orders and links to any certification or QMS (if applicable) including location of these records	ALL RECORDS MAINTAINED ON THE COMPANY'S 123 INSIGHT DATA BASE THIS GIVES FULL TRACEABILITY OF ALL MATERIALS USED. Ref: W/60954/A.
Example of sampler's markings applied to the product(s)	BARCODE PRODUCT IDENTIFICATION LABEL (INCL. BATCH No)
Details of any FPC processes witnessed during the visit	NONE.
Determine the essential characteristics of the product and confirm the details of in-process checks conducted on the sample to ensure conformity.	IN PROCESS CHECKS CARRIED OUT AT EACH STAGE OF MANUFACTURE. ELECTRONIC DATA STORAGE.
Where possible, take photographs of the sampled product after marking. Yes ☑ No ☐	

Declaration by Manufacturer:
I declare that the product/s witnessed during this sampling visit is representative of normal production.

Details of responsible person for manufacturer:

Name: WOL HLUCHAN Signature: [signature]

Position: DIRECTOR Date: 9/3/18

7h6

BM TRADA
Chiltern House, Stocking Lane
Hughenden Valley, High Wycombe
Buckinghamshire
HP14 4ND, UK
T: +44 (0) 1494 569700
F: +44 (0) 1494 565487
certification@bmtrada.com
www.bmtrada.com

Sampling Report

Contract Reference: PS 18001 Notified Body ID: 1224

Company Name: POLYSEAM LTD.

Location of Sampling: HUDDERSFIELD.

Product: COLLARS.

Sampled By (Name): PETER SARGIESON Signature: [signature] Date: 05/03/18.

Requirement	Write the names of the people present
Explain the sampling process Yes ☑	WOL HLUCHAN
Explain confidentiality Yes ☑	RESEARCH AND DEVELOPMENT DIRECTOR
Requirement	**Evidence / Comments**
Description of product(s)	PR0039 COLLAR. WITH 6.0 INTUMESCENT.
Product identification / reference numbers / codes	PROTECTA FR COLLAR 110 DIA X 50mm 5318 — PHOTO N= 26
Batch number(s)	7002855254 7002792280 7002778330
Date of manufacture	15/08/2017
Quantity of stock and size of sample(s) taken	56/56. 1 BOX 24 1 BOX 24 1 BOX 8.
Traceability of material records: Purchase Orders and links to any certification or QMS (if applicable) including location of these records	RECORDS MAINTAINED ON THE COMPANY'S 123 INSIGHT DATA BASE THIS GIVES FULL TRACEABILITY OF ALL MATERIALS USED. SV00B0 W/54642/A
Example of sampler's markings applied to the product(s)	BARCODE PRODUCT IDENTIFICATION LABEL (INCL. BATCH NO ON ITEM/BOX.
Details of any FPC processes witnessed during the visit	NONE.
Determine the essential characteristics of the product and confirm the details of in-process checks conducted on the sample to ensure conformity.	IN PROCESS CHECKS CARRIED OUT AT EACH STAGE OF MANUFACTURE. ELECTRONIC DATA STORAGE.
Where possible, take photographs of the sampled product after marking. Yes ☑ No ☐	

Declaration by Manufacturer:

I declare that the product/s witnessed during this sampling visit is representative of normal production.

Details of responsible person for manufacturer:

Name: WOL HLUCHAN Signature: [signature]

Position: DIRECTOR Date: 9/3/18

24/26

BM TRADA
Chiltern House, Stocking Lane
Hughenden Valley High Wycombe
Buckinghamshire
HP14 4ND UK
T: +44 (0) 1494 569700
F: +44 (0) 1494 565487
certification@bmtrada.com
www.bmtrada.com

Sampling Report

Contract Reference: PS 18001 Notified Body ID: 1224

Company Name: POLYSEAM LTD.

Location of Sampling: HUDDERSFIELD.

Product: COLLARS.

Sampled By (Name): PETER SARGIESON Signature: [signature] Date: 05/03/18.

Requirement	Write the names of the people present
Explain the sampling process Yes ☑	WOL HLUCHAN
Explain confidentiality Yes ☑	RESEARCH AND DEVELOPMENT DIRECTOR
Requirement	**Evidence / Comments**
Description of product(s)	PR0041 COLLAR. WITH 15mm INTUMESCENT.
Product identification / reference numbers / codes	PROTECTA FR COLLAR 160mm DIA X 60mm 5318 FS — PHOTO N°- 24/25
Batch number(s)	7004847678.
Date of manufacture	04/12/2017
Quantity of stock and size of sample(s) taken	54 / 54. 4 BOXES OF 12 1 BOX OF 6
Traceability of material records: Purchase Orders and links to any certification or QMS (if applicable) including location of these records	RECORDS MAINTAINED ON THE COMPANY'S 123 INSIGHT DATA BASE THIS GIVES FULL TRACEABILITY OF ALL MATERIALS USED.
Example of sampler's markings applied to the product(s)	BARCODE PRODUCT IDENTIFICATION LABEL (INCL. BATCH N°ON ITEM/BOX.
Details of any FPC processes witnessed during the visit	NONE.
Determine the essential characteristics of the product and confirm the details of in-process checks conducted on the sample to ensure conformity.	IN PROCESS CHECKS CARRIED OUT AT EACH STAGE OF MANUFACTURE. ELECTRONIC DATA STORAGE.
Where possible, take photographs of the sampled product after marking. Yes ☑ No ☐	

Declaration by Manufacturer:

I declare that the product/s witnessed during this sampling visit is representative of normal production.

Details of responsible person for manufacturer:

Name: WOL HLUCHAN Signature: [signature]

Position: DIRECTOR Date: 9/3/18

BMTRADA

Chiltern House, Stocking Lane
Hughenden Valley, High Wycombe
Buckinghamshire
HP14 4ND, UK

T: +44 (0) 1494 569700
F: +44 (0) 1494 565487
certification@bmtrada.com
www.bmtrada.com

Sampling Report

Contract Reference: PS 18002 **Notified Body ID: 1224**

Company Name: POLYSEAM LTD.

Location of Sampling: 15 ST. ANDREWS ROAD, HUDDERSFIELD

Product: PROTECTA FR ACRYLIC.

Sampled By (Name): PETER SARGIESON **Signature:** [signature] **Date:** 09/07/18

Requirement	Write the names of the people present
Explain the sampling process Yes ☑	PETER SARGIESON LE BMT WOL HLUCHAN POLYSEAM.
Explain confidentiality Yes ☑	
Requirement	**Evidence / Comments**
Description of product(s)	PROTECTA FR ACRYLIC, 310ml CARTRIDGES.
Product identification / reference numbers / codes	PRODUCT CODE: PRO 005 WORKS ORDER. W64463.
Batch number(s)	BN 80095307 - INK JET ON CARTRIDGES
Date of manufacture	08/06/2018.
Quantity of stock and size of sample(s) taken	SAMPLE SIZE. 300 (12 BOXES) FROM 2300 MADE
Traceability of material records: Purchase Orders and links to any certification or QMS (if applicable) including location of these records	RECORDS MAINTAINED ON THE 123 INSIGHT DATA BASE. THIS GIVES FULL TRACEABILITY OF ALL MATERIALS USED.
Example of sampler's markings applied to the product(s)	[signature] 9718.
Details of any FPC processes witnessed during the visit	NONE – STOCK ITEMS.
Determine the essential characteristics of the product and confirm the details of in-process checks conducted on the sample to ensure conformity.	IN PROCESS CHECKS CARRIED OUT AND RECORDED AT EACH STAGE OF MANUFACTURE. FORMS COMPLETED BY OPERATIVE AND ENTERED ON 123 INSIGHT.
Where possible, take photographs of the sampled product after marking. Yes ☑ No ☐	

Declaration by Manufacturer:

I declare that the product/s witnessed during this sampling visit is representative of normal production.

Details of responsible person for manufacturer:

Name: WOL HLUCHAN Signature: [signature]

Position: DIRECTOR Date: 9.7.2018