

## **CLASSIFICATION OF FIRE RESISTANCE FIRES-CR-199-16-AUPE**

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**Penetration seals of plastic pipes, metal pipes, electrical cables and blank seal installed in wall**

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# CLASSIFICATION OF FIRE RESISTANCE IN ACCORDANCE WITH EN 13501-2: 2007 + A1: 2009 with direct field of application

## FIRES-CR-199-16-AUPE

**Name of the product:** Penetration seals of plastic pipes, metal pipes, electrical cables and blank seal installed in wall

**Sponsor:** Britchem Ltd  
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## 1. INTRODUCTION

This classification report defines the resistance to fire classification assigned to element Penetration seals of plastic pipes, metal pipes, cables and blank seal in accordance with the procedures given in EN 13501-2 + A1: 2009.

## 2. DETAILS OF CLASSIFIED PRODUCT

### 2.1 GENERAL

The element, Separate Penetration seals of plastic pipes, metal pipes, cables and blank seal build in flexible wall constructions with thickness 100 mm, (steel construction with 50 mm width, double layers of gypsum boards type F with thickness 12,5 mm and mineral wool with a thickness of 50 mm and with a bulk density of 100 kg/m<sup>3</sup>). The product is defined as a penetration seal to maintain the fire resistance of a separating element at the position at which it has been penetrated by a service.

### 2.2 PRODUCT DESCRIPTION

#### 2.2.1 Britchem Ablative batt

**Batt No. 1 - Blank seal** is single layer of board Britchem Ablative batt, fitted in opening 1200 x 550 mm (board of mineral wool with thickness of 50 mm and bulk density of 133 kg/m<sup>3</sup>). The board is covered from both sides by layer of Britchem FR20 Coating with thickness of 0,7 mm, perimeter sealed with Britchem FR Acrylic Sealant.

**Batt No. 2** - are two layers of board Rockwool, fitted in opening 1200 x 350 mm (board of mineral wool with thickness of 50 mm and bulk density of 167 kg/m<sup>3</sup>). The board is covered from both sides by layer of Rockwool Ablative Batt Coating, perimeter sealed with Britchem FR Acrylic Sealant.

The batt 2 consists following seals:

Reference	Penetration	Aperture Size	Fire Seal	Description
<b>Seal J</b>	110mm Ø PVC pipe, 3.2 mm wall thickness, U/C	160 mm Ø	Britchem 110 mm Ø pipe sleeve. Length 150 mm installed symmetrically within the batts	25 mm mineral wool pipe with bulk density of 100 kg/m <sup>3</sup> . Insulation containing 2 x 150 mm layers intumescent strip nominal thickness 1.8 mm. Total thickness of intumescent 3.6 mm
<b>Seal K</b>	110 mm Ø PE pipe, 6,6 mm wall thickness, U/C	160 mm Ø	Britchem 110 mm Ø pipe sleeve. Length 150 mm installed symmetrically within the batts	25 mm mineral wool pipe with bulk density of 100 kg/m <sup>3</sup> . Insulation containing 2 x 150 mm layers intumescent strip nominal thickness 1.8 mm. Total thickness of intumescent 3.6 mm

**Batt No. 3** - are two layers of board Britchem Ablative batt, fitted in opening 1200 x 550 mm (board of mineral wool with thickness of 50 mm and bulk density of 133 kg/m<sup>3</sup>). The board is covered from both sides by layer of Britchem FR20 Coating with thickness of 0,7 mm, perimeter sealed with Britchem FR Acrylic Sealant.



The batt 3 consists following seals:

Reference	Penetration	Aperture Size	Fire Seal	Description
<b>Seal A</b>	160 mm Ø PVC pipe, 4 mm wall thickness, U/C	210 mm Ø	Britchem 160 mm Ø pipe sleeve. Length 150 mm installed symmetrically within the batts	25 mm mineral wool pipe with bulk density of 100 kg/m <sup>3</sup> . Insulation containing 4 x 150 mm layers intumescent strip nominal thickness 1.8 mm. Total thickness of intumescent 7.2 mm
<b>Seal B</b>	55 mm Ø PVC pipe, 3.2 mm wall thickness U/C	85 mm Ø	Britchem Hi Expansion Graphite Intumescent Sealant	15 mm thickness x 100 mm depth sealant
<b>Seal C</b>	82 mm Ø PVC pipe, 3.2 mm wall thickness, U/C	132 mm Ø	Britchem 82 mm Ø pipe sleeve. Length 150 mm installed symmetrically within the batts	25 mm mineral wool pipe with bulk density of 100 kg/m <sup>3</sup> . Insulation containing 1 x 150 mm layers intumescent strip nominal thickness 1.8 mm. Total thickness of intumescent 1.8 mm
<b>Seal D</b>	160 mm Ø PVC pipe, 4 mm wall thickness, U/C	200 mm Ø	Britchem Hi Expansion Graphite Intumescent Sealant	20 mm thickness x 100 mm depth sealant

**Batt No. 4** - is single layer of board Britchem Ablative batt, fitted in opening 1200 x 550 mm (board of mineral wool with thickness of 50 mm and bulk density of 133 kg/m<sup>3</sup>). The board is covered from both sides by layer of Britchem FR20 Coating with thickness of 0,7 mm, perimeter sealed with Britchem FR Acrylic Sealant.

The batt 4 consists following seals:

Reference	Penetration	Aperture Size	Fire Seal	Description
<b>Seal E</b>	110 mm Ø PVC pipe, 3.2 mm wall thickness, U/C	118 mm Ø	Britchem 110 mm Ø pipe wrap. Length 50 mm installed symmetrically within the batt	Pipe wrap containing 2 layers intumescent strip nominal thickness 1.8 mm. Total thickness of intumescent 3.6 mm
<b>Seal F</b>	28 mm Ø copper pipe, 1 mm wall thickness with continuous 25 mm thick Armaflex insulation, C/U	78 mm Ø	Britchem 80 mm Ø pipe wrap. Length 50 mm installed symmetrically within the batt	Pipe wrap containing 1 layer intumescent strip nominal thickness 1.8 mm. Total thickness of intumescent 1.8 mm
<b>Seal G</b>	160 mm Ø steel pipe, 6,3 mm wall	210 mm Ø	Britchem 210 mm Ø pipe wrap. Length 50 mm installed symmetrically within the batt	Pipe wrap containing 2 layers intumescent strip nominal thickness 1.8



	thickness with continuous 25 mm thick Armaflex insulation, C/U			mm. Total thickness of intumescent 3.6 mm
<b>Seal H</b>	160 mm Ø PVC pipe, 4 mm wall thickness, U/C	175 mm Ø	Britchem 160 mm Ø pipe wrap. Length 50 mm installed symmetrically within the batt	Pipe wrap containing 4 layers intumescent strip nominal thickness 1.8 mm. Total thickness of intumescent 7.2 mm

**Separate/single sealing system installed in flexible wall - 100 mm thick**

<b>Service No.</b>	<b>Penetration</b>	<b>Aperture Size</b>	<b>Fire Seal</b>	<b>Description</b>
<b>Seal 5</b>	28 mm Ø copper pipe, 1 mm wall thickness, C/U	48 mm Ø	Britchem FR acrylic sealant	10 mm width x 15 mm depth, sealed on both sides of wall. 150 mm coatback on unexposed side only
<b>Seal 7</b>	160 mm Ø steel pipe, 6,3 mm wall thickness, C/U	190 mm Ø	Britchem FR acrylic sealant	15 mm width x 20 mm depth, sealed on both sides of wall. 150 mm coatback on unexposed side only
<b>Seal 12</b>	108 mm Ø copper pipe, 2,5 mm wall thickness, C/U	158 mm Ø	Britchem FR acrylic sealant	20 mm width x 20 mm depth, sealed on both sides of wall. 150 mm coatback on unexposed side only
<b>Seal 9</b>	Electric cables + steel cable tray - Cable 1 approximately Ø 64 - Cable 2 approximately Ø 54 - Cable 3 approximately Ø 15 - Cable 4 approximately Ø 15 - Cable 5 approximately Ø 44	270 x 70 mm	Britchem FR acrylic sealant	10 mm width x 20 mm depth, sealed on both sides of wall. 150 mm coatback on unexposed side only
<b>Seal 10</b>	160 mm Ø PE pipe, 10.2 mm wall thickness, U/C	210 mm Ø	Britchem Hi Expansion Graphite Intumescent Sealant	25 mm thickness x 100 mm depth sealant
<b>Seal 11</b>	110 mm Ø PE pipe, 8.2 mm wall thickness, U/C	160 mm Ø	Britchem Pressure Exerting Graphite Sealant	25 mm thickness x 100 mm depth sealant
<b>Seal 6</b>	28 mm Ø copper pipe, 1 mm wall thickness, C/U	58 mm Ø	Britchem FR acrylic sealant	15 mm width x 15 mm depth, sealed on both sides of wall. 150 mm coatback on unexposed side only
<b>Seal 8</b>	160 mm Ø steel pipe, 6,3 mm wall thickness, C/U	210 mm Ø	Britchem FR acrylic sealant	25 mm width x 20 mm depth, sealed on both sides of wall. 150 mm coatback on unexposed side only
<b>Seal 13</b>	108 mm Ø copper pipe, 2,5 mm wall thickness, C/U	158 mm Ø	Britchem FR acrylic sealant	25 mm width x 20 mm depth, sealed on both sides of wall. 150 mm coatback on unexposed side only



More detailed information is shown in the drawings which form an integral part of this classification.

### 3. TEST REPORTS IN SUPPORT OF CLASSIFICATION

#### 3.1 TEST REPORTS

No.	Name of laboratory	Test report No.	Date of the test	Test method
[1]	FIRES, s.r.o., Batizovce, SR	FIRES-FR-151-16-AUNE	13.07.2016	EN 1366-3

[1] Test specimens were conditioned according to EN 1363-1 before the fire resistance test.

#### 3.2 TEST RESULTS

No./ Test method	Parameter	Results
[1] EN 1366-3: 2009	applied load	additional load of the cable supports is applied acc. to cl. A.1.5 of EN 1366-3;
	supporting construction	flexible wall construction with thickness 100 mm
	temperature curve	standard temperature time curve

Following table contains test results for each tested service:

<u>Specimen No.</u>	<u>Reference</u>	<u>Type of service</u>	<u>Performance criterion / Time till the performance criterion is achieved [min]</u>	
			<u>Integrity</u>	<u>Insulation</u>
<b>Batt No. 1</b>		Blank seal	112 minutes no failure	62 minutes
<b>Batt No. 2</b>	Seal J	Ø 110 mm PVC pipe	112 minutes no failure	112 minutes no failure
	Seal K	Ø 110 mm PE pipe	112 minutes no failure	112 minutes no failure
<b>Batt No. 3</b>	Seal A	Ø 160 mm PVC pipe	112 minutes no failure	91 minutes
	Seal B	Ø 55 mm PVC pipe	112 minutes no failure	112 minutes no failure
	Seal C	Ø 82 mm PVC pipe	67 minutes	67 minutes
	Seal D	Ø 160 mm PVC pipe	91 minutes	88 minutes
<b>Batt No. 4</b>	Seal E	Ø 110 mm PVC pipe	99 minutes	60 minutes
	Seal F	Ø 28 mm Cu pipe + 25 mm Armaflex	112 minutes no failure	47 minutes
	Seal G	Ø 160 mm steel pipe + 25 mm Armaflex	63 minutes	40 minutes
	Seal H	Ø 160 mm PVC pipe	112 minutes no failure	41 minutes
<b>Seal 5</b>		Ø 28 mm Cu pipe	112 minutes no failure	24 minutes
<b>Seal 6</b>		Ø 28 mm Cu pipe	112 minutes no failure	36 minutes
<b>Seal 7</b>		Ø 160 mm steel pipe	66 minutes	24 minutes
<b>Seal 8</b>		Ø 160 mm steel pipe	112 minutes no failure	23 minutes
<b>Seal 9</b>		250 x 75 mm steel cable tray	91 minutes	91 minutes
<b>Seal 10</b>		Ø 160 mm PE pipe	106 minutes	106 minutes
<b>Seal 11</b>		Ø 110 mm PE pipe	112 minutes no failure	112 minutes no failure
<b>Seal 12</b>		Ø 108 mm Cu pipe	112 minutes no failure	20 minutes



<b>Seal 13</b>		Ø 108 mm Cu pipe	112 minutes no failure	19 minutes
<b>Cable 1</b>		approximately Ø 64 mm	91 minutes	91 minutes
<b>Cable 2</b>		approximately Ø 54 mm	91 minutes	91 minutes
<b>Cable 3</b>		approximately Ø 15 mm	91 minutes	68 minutes
<b>Cable 4</b>		approximately Ø 15 mm	91 minutes	87 minutes
<b>Cable 5</b>		approximately Ø 44 mm	91 minutes	74 minutes

[1] The test was terminated after period of 113<sup>th</sup> minutes of test.

#### 4. CLASSIFICATION AND FIELD OF APPLICATION

##### 4.1 REFERENCE OF CLASSIFICATION

This classification has been carried out in accordance with clause 7.5.8 of EN 13501-2: 2007 + A1: 2009.

##### 4.2 CLASSIFICATION

**4.2.1** The element, **Britchem Ablative batt** blank seal is classified according to the following combinations of performance parameters and classes as appropriate.

Type of service	Opening(mm)	Fire resistance classification
<b>Batt No. 1</b> <b>Blank seal</b>	<b>1200x550</b>	<b>E 90 , EI 60</b>

The element, **Britchem pipe sleeve (Seal A, Seal C)** fitted in **Batt No. 3** is classified according to the following combinations of performance parameters and classes as appropriate.

Type of pipe	Maximum diameter / pipe wall thickness	Fire resistance classification
<b>Seal A</b> <b>PVC</b>	Ø 160 mm / 4	<b>E 90-U/C</b> <b>EI 90-U/C</b>
<b>Seal C</b> <b>PVC</b>	Ø 82 mm / 3,2	<b>E 60-U/C,</b> <b>EI 60-U/C</b>

The element, **Britchem pipe sleeve (Seal J, Seal K)** fitted in **Batt No. 2** is classified according to the following combinations of performance parameters and classes as appropriate



Type of pipe	Maximum diameter / pipe wall thickness	Fire resistance classification
Seal J PVC	Ø 110 mm / 3,2	E 90-U/C, EI 90-U/C
Seal K PE	Ø 110 mm / 6,6	E 90-U/C, EI 90-U/C

**FIELD OF APPLICATION**

This classification is valid according to standard for the following end use applications:

1. Pipe end configuration – results are valid for pipe end conditions U/C and C/C
2. Separations – the annular space between the pipe and the supporting construction shall remain within the tested range.
3. Supporting construction

Test results obtained with the standard flexible wall constructions according to cover all flexible wall constructions of the same fire resistance classification provided:

- the construction is classified in accordance with EN 13501-2;
- the construction has an overall thickness not less than the minimum thickness of 100 mm for the standard flexible wall used in the test. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides;
- the number of board layers and the overall board layer thickness is equal or greater than that tested when no aperture framing is used;
- flexible wall constructions with timber studs are constructed with at least the same number of layers as given in Table 3 EN 1366-3: 2009, no part of the penetration seal is closer than 100 mm to a stud, the cavity is closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 is provided within the cavity between the penetration seal and the stud;

The standard flexible wall construction does not cover sandwich panel constructions and flexible walls where the lining does not cover the studs on both sides. Penetrations in such constructions shall be tested on a case by case basis.

Test results obtained with flexible supporting walls may be applied to concrete or masonry elements of an overall thickness equal to or greater than that of the element used in the tests. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides.

**4.2.3** The element, **Britchem Hi Expansion Graphite Intumescent Sealant (Seal B, Seal D, Seal 10, Seal 11)** is classified according to the following combinations of performance parameters and classes as appropriate.





Type of pipe	Maximum diameter / pipe wall thickness	Fire resistance classification
Seal B PVC	Ø 55 mm / 3,2	E 90-U/C EI 90-U/C
Seal D PVC	Ø 160 mm / 4	E 90-U/C, EI 60-U/C
Seal 10 PE	Ø 160 mm / 10,2	E 90-U/C, EI 90-U/C
Seal 11 PE	Ø 110 mm / 8,2	E 90-U/C, EI 90-U/C

## FIELD OF APPLICATION

This classification is valid according to standard for the following end use applications:

4. Pipe end configuration – results are valid for pipe end conditions U/C and C/C
5. Separations – the annular space between the pipe and the supporting construction shall remain within the tested range.
6. Supporting construction

Test results obtained with the standard flexible wall constructions according to cover all flexible wall constructions of the same fire resistance classification provided:

- the construction is classified in accordance with EN 13501-2;
- the construction has an overall thickness not less than the minimum thickness of 100 mm for the standard flexible wall used in the test. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides;
- the number of board layers and the overall board layer thickness is equal or greater than that tested when no aperture framing is used;
- flexible wall constructions with timber studs are constructed with at least the same number of layers as given in Table 3 EN 1366-3: 2009, no part of the penetration seal is closer than 100 mm to a stud, the cavity is closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 is provided within the cavity between the penetration seal and the stud;

The standard flexible wall construction does not cover sandwich panel constructions and flexible walls where the lining does not cover the studs on both sides. Penetrations in such constructions shall be tested on a case by case basis.

Test results obtained with flexible supporting walls may be applied to concrete or masonry elements of an overall thickness equal to or greater than that of the element used in the tests. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides.



4.2.4 The element, **Britchem FR acrylic sealant (Seal 5, Seal 6, Seal 7, Seal 8, Seal 9, Seal 12, Seal 13)** is classified according to the following combinations of performance parameters and classes as appropriate.

Type of service	Maximum diameter / pipe wall thickness	Fire resistance classification
<b>Seal 5 Copper</b>	Ø 28 mm / 1,0	<b>E 90-C/U EI 20-C/U</b>
<b>Seal 6 Copper</b>	Ø 28 mm / 1,0	<b>E 90-C/U EI 30-C/U</b>
<b>Seal 12 Copper</b>	Ø 108 mm / 2,5	<b>E 90-C/U EI 20-C/U</b>
<b>Seal 13 Copper</b>	Ø 108 mm / 2,5	<b>E 90-C/U EI 15-C/U</b>

Type of service	Maximum diameter / pipe wall thickness	Fire resistance classification
<b>Seal 7 Steel</b>	Ø 160 mm / 6,3	<b>E 60-C/U EI 20-C/U</b>
<b>Seal 8 Steel</b>	Ø 160 mm / 6,3	<b>E 90-C/U EI 20-C/U</b>

Type of service	Maximum diameter of cable	Fire resistance classification
<b>Cable 1</b>	Ø 64 mm	<b>E 90-U/C EI 90-U/C</b>
<b>Cable 2</b>	Ø 54 mm	<b>E 90-U/C EI 90-U/C</b>
<b>Cable 3</b>	Ø 15 mm	<b>E 90-U/C EI 60-U/C</b>



<b>Cable 4</b>	Ø 15 mm	<b>E 90-U/C EI 60-U/C</b>
<b>Cable 5</b>	Ø 44 mm	<b>E 90-U/C EI 60-U/C</b>

**FIELD OF APPLICATION**

This classification is valid according to standard for the following end use applications:

1. Type of pipe material – pipe materials with a thermal conductivity lower than that tested, subject to the material having a melting point at least equal to that of the material tested or greater than the furnace temperature achieved at the required classification period.
2. Separations – the annular space between the pipe and the supporting construction shall remain within the tested range.
3. Diameter of the copper pipes can be decreased.
4. A test conducted on insulated pipes does not cover non-insulated pipes.
5. The test result with insulation case LS covers interrupted isolation. The length of the insulation can be increased.
6. Supporting construction

Test results obtained with the standard flexible wall constructions according to cover all flexible wall constructions of the same fire resistance classification provided:

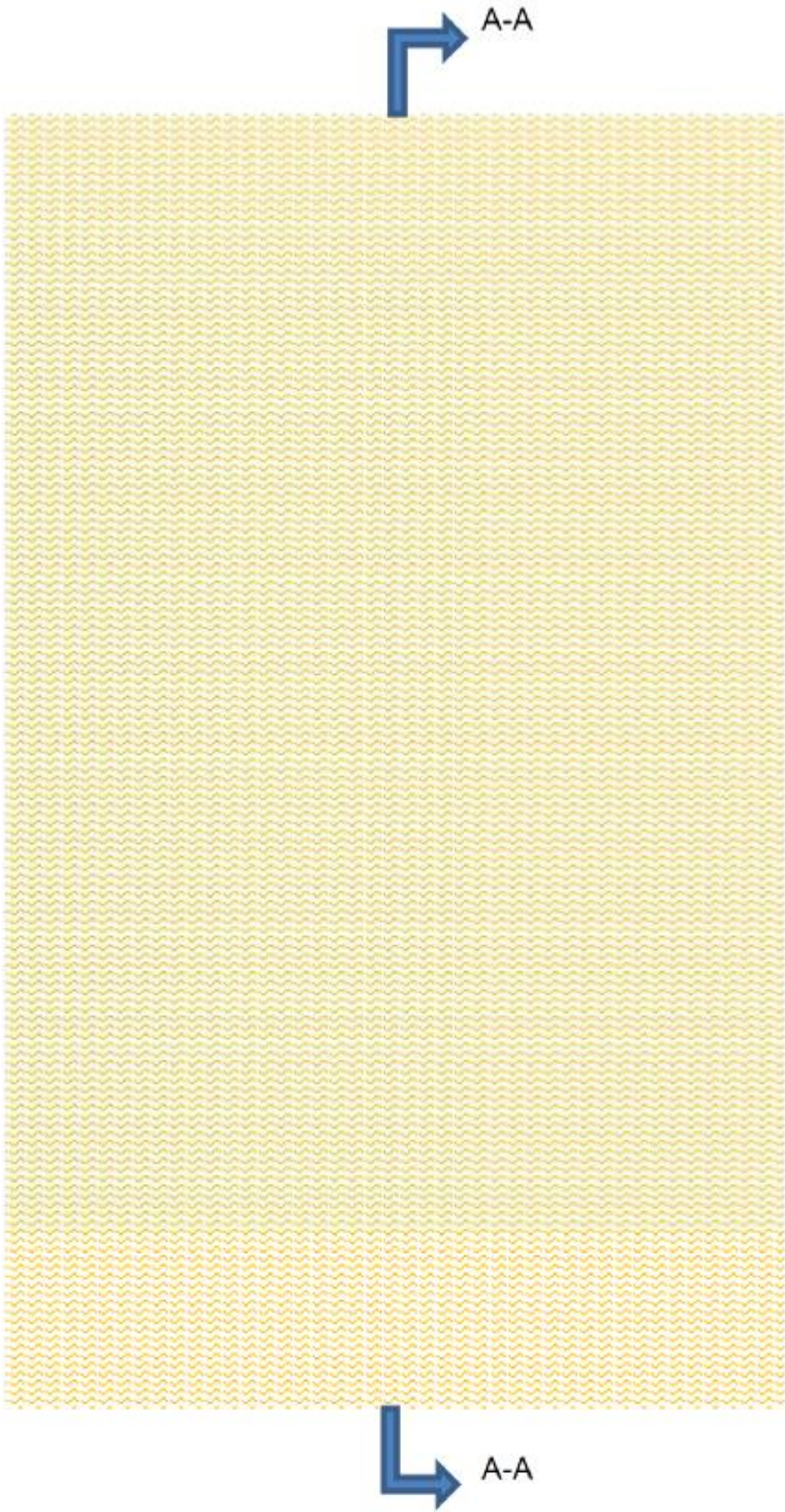
- the construction is classified in accordance with EN 13501-2;
- the construction has an overall thickness not less than the minimum thickness of 100 mm for the standard flexible wall used in the test. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides;
- the number of board layers and the overall board layer thickness is equal or greater than that tested when no aperture framing is used;
- flexible wall constructions with timber studs are constructed with at least the same number of layers as given in Table 3 EN 1366-3: 2009, no part of the penetration seal is closer than 100 mm to a stud, the cavity is closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 is provided within the cavity between the penetration seal and the stud;

The standard flexible wall construction does not cover sandwich panel constructions and flexible walls where the lining does not cover the studs on both sides. Penetrations in such constructions shall be tested on a case by case basis.

Test results obtained with flexible supporting walls may be applied to concrete or masonry elements of an overall thickness equal to or greater than that of the element used in the tests. This rule does not apply to pipe closure devices positioned within the supporting construction unless the length of the seal is increased by an equal amount and the distance from the surface of the supporting construction remains the same on both sides.



6. DRAWINGS



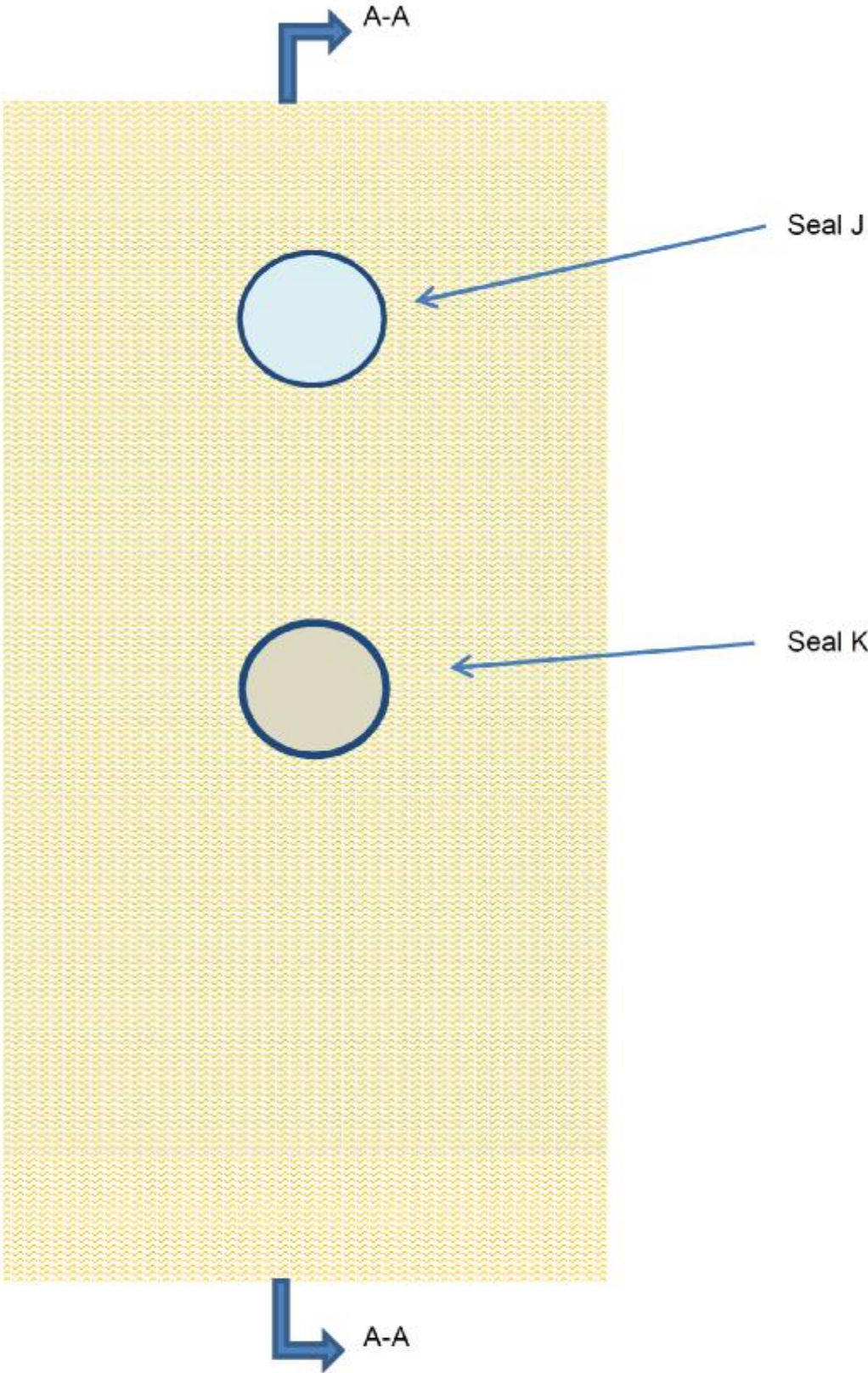
Batt 1 Elevation



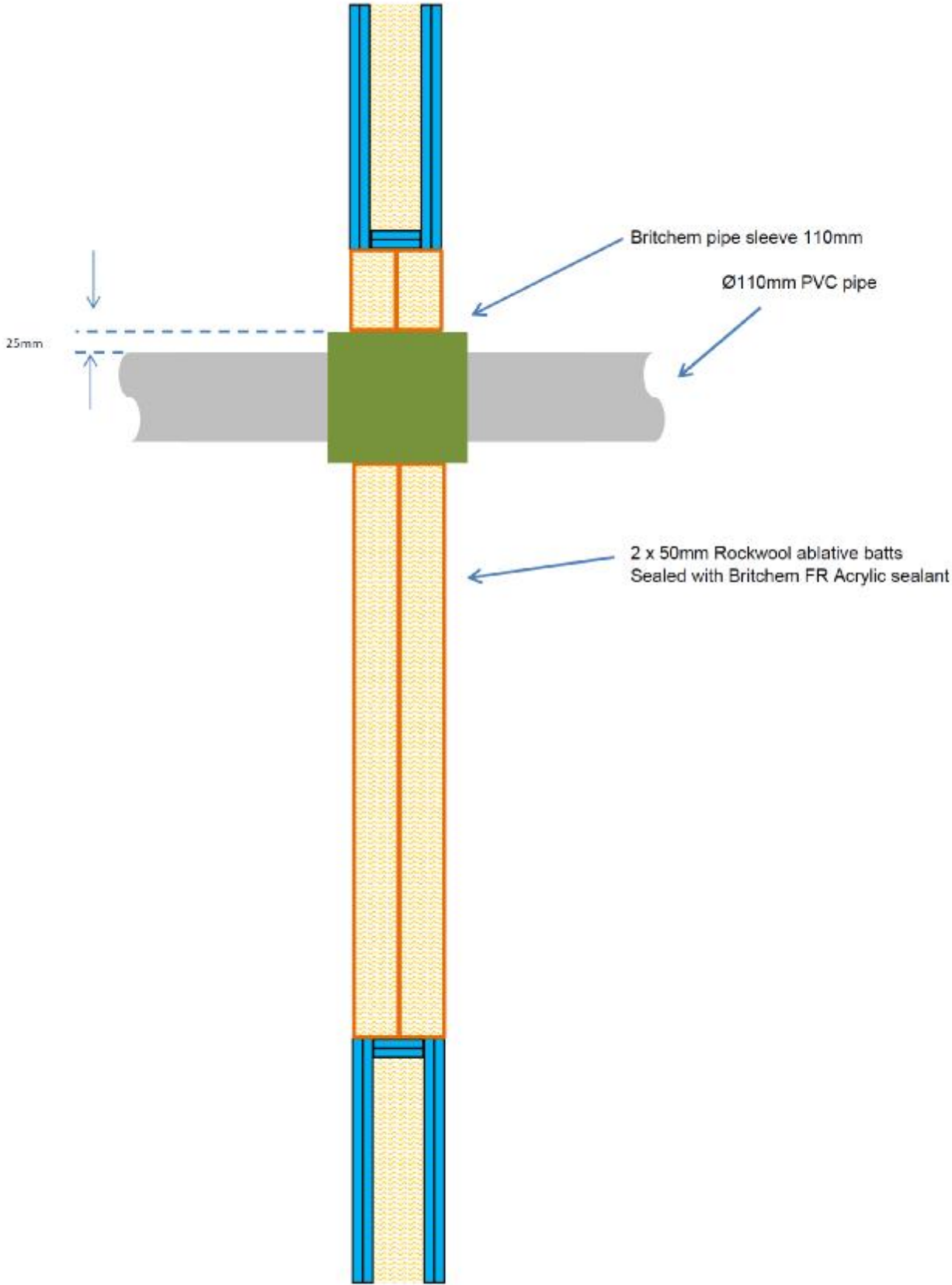
← 1 x 50mm Britchem ablative batt  
Sealed with Britchem FR Acrylic sealant

Batt 1

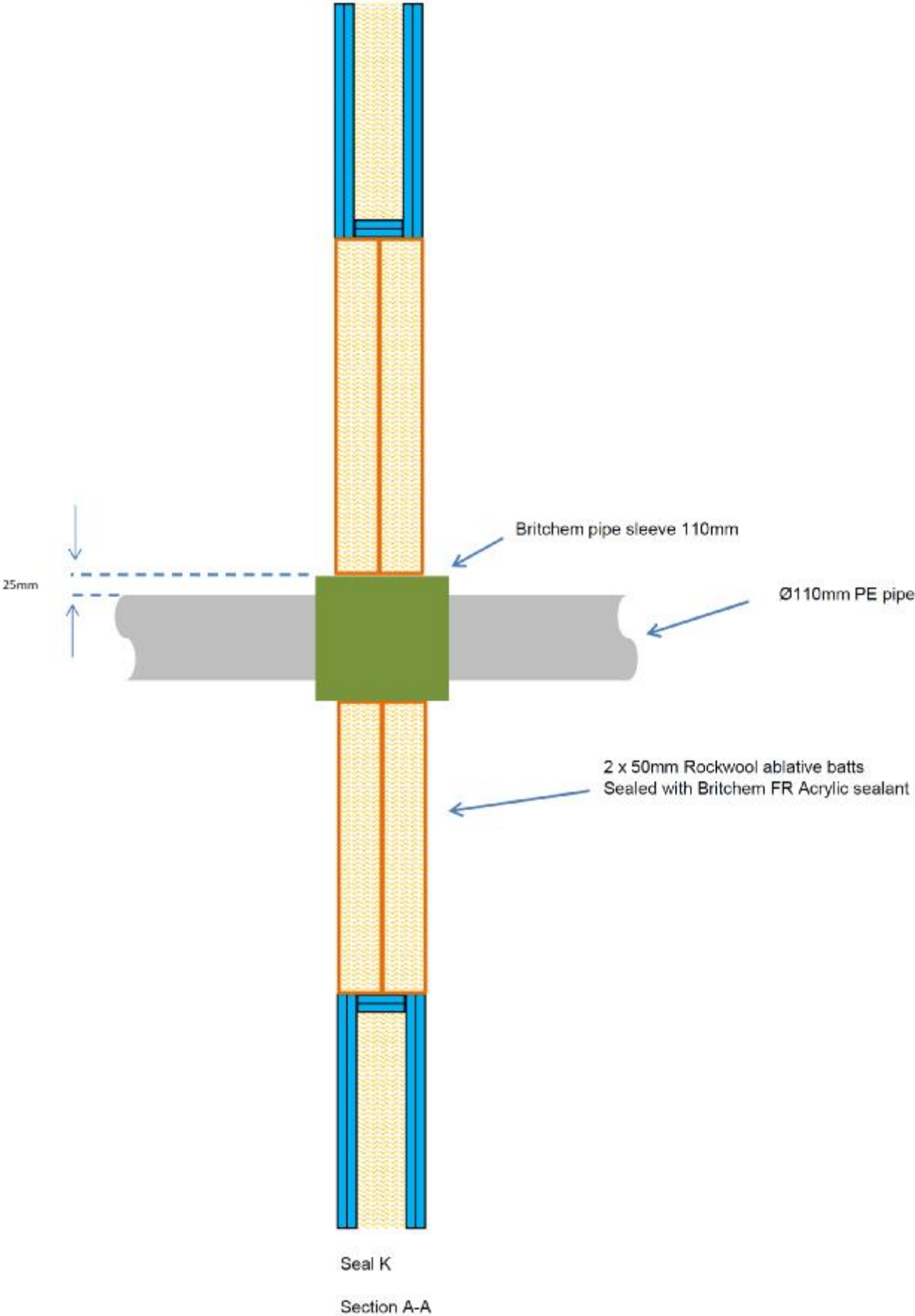
Section A-A



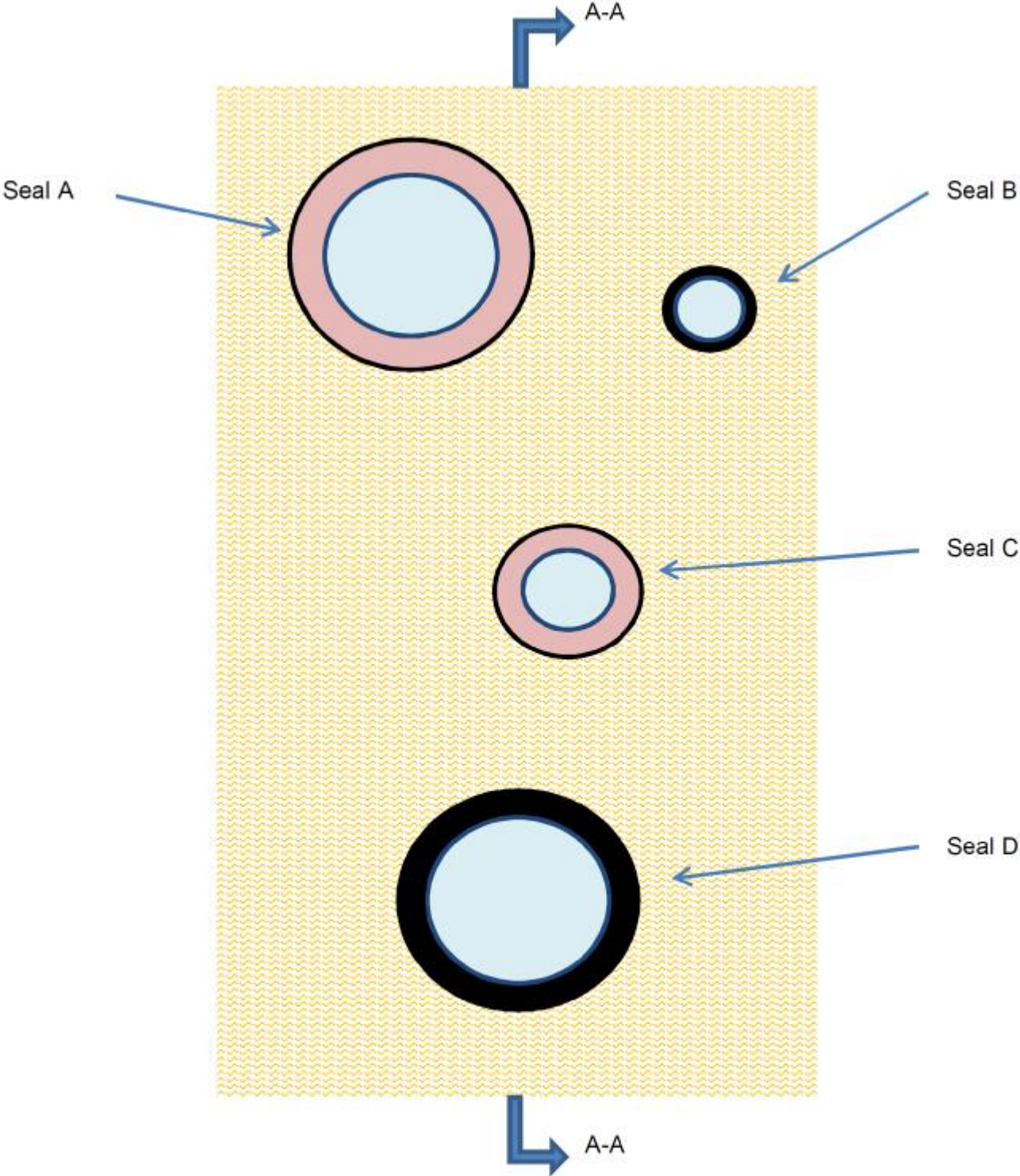
Batt 2 Elevation  
Drawing NTS



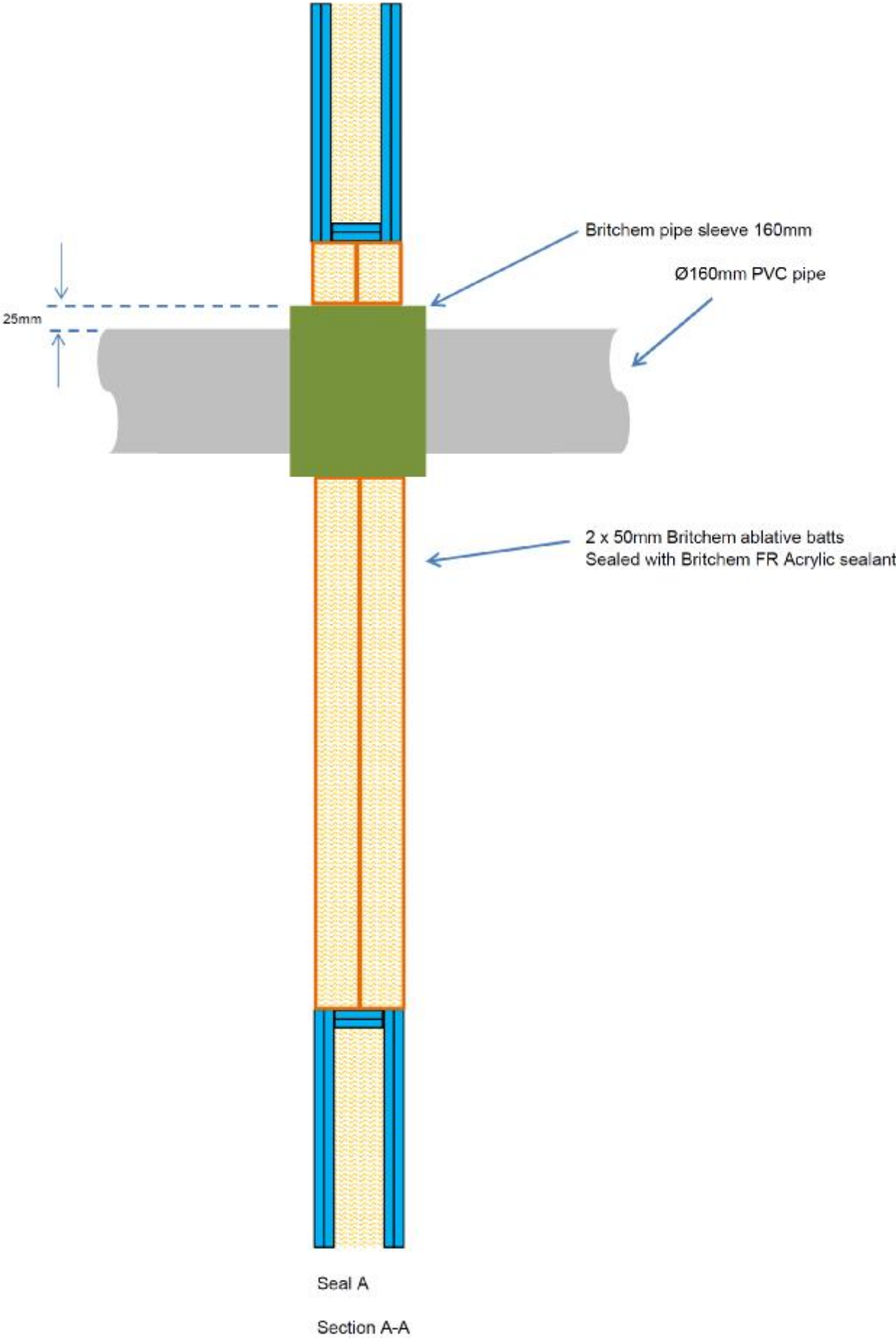
Seal J  
Section A-A

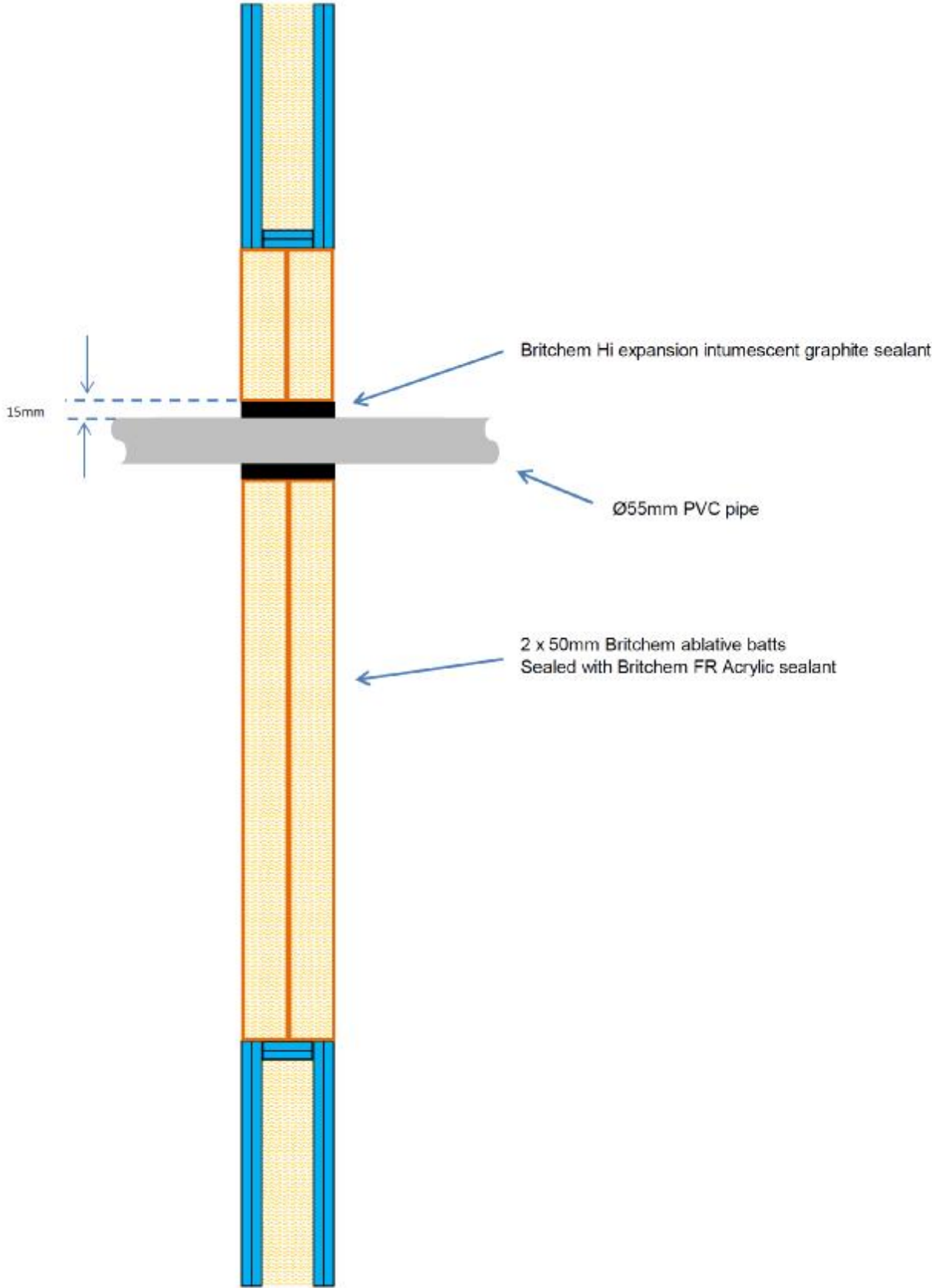




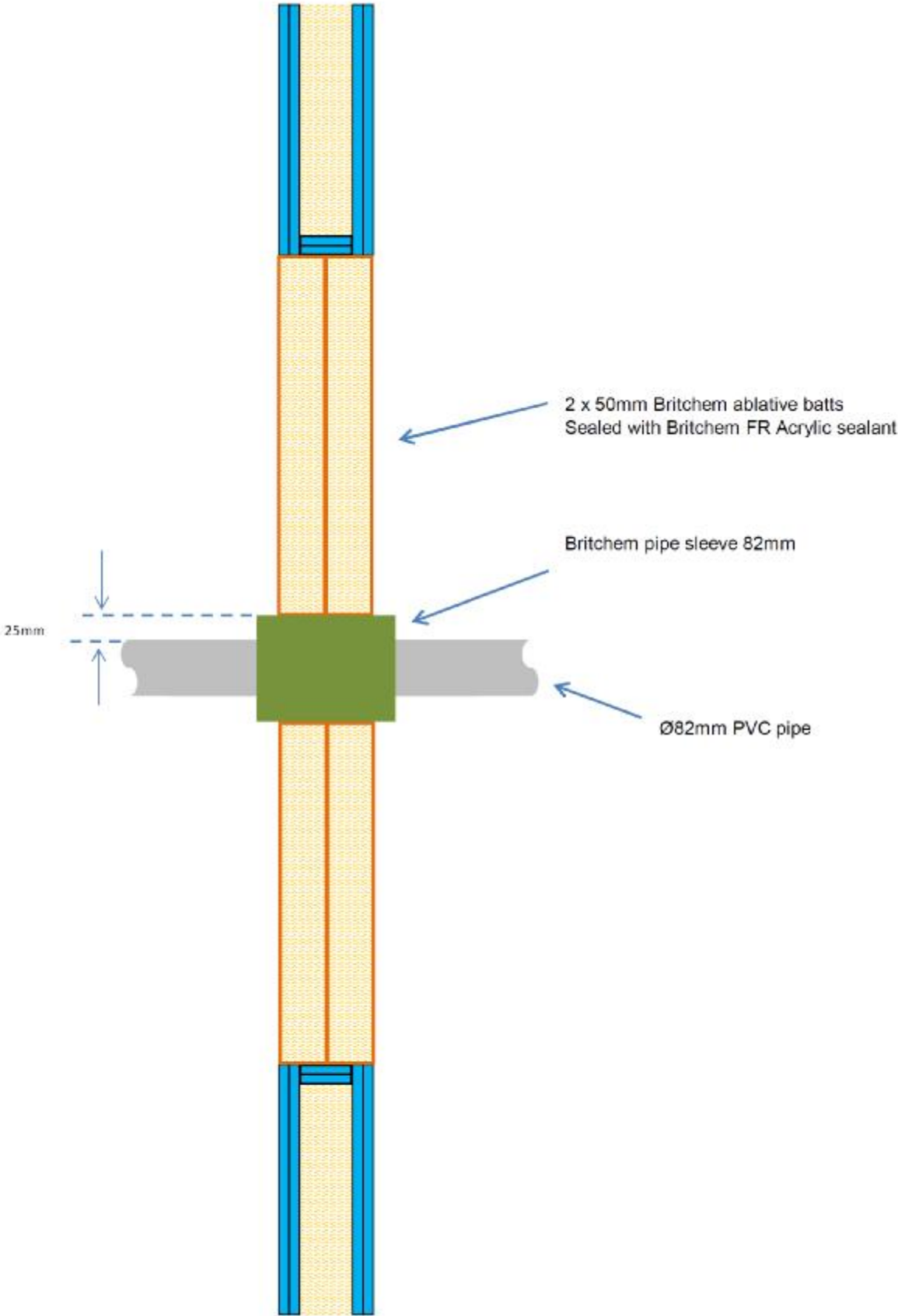


Batt 3 Elevation  
Drawing NTS



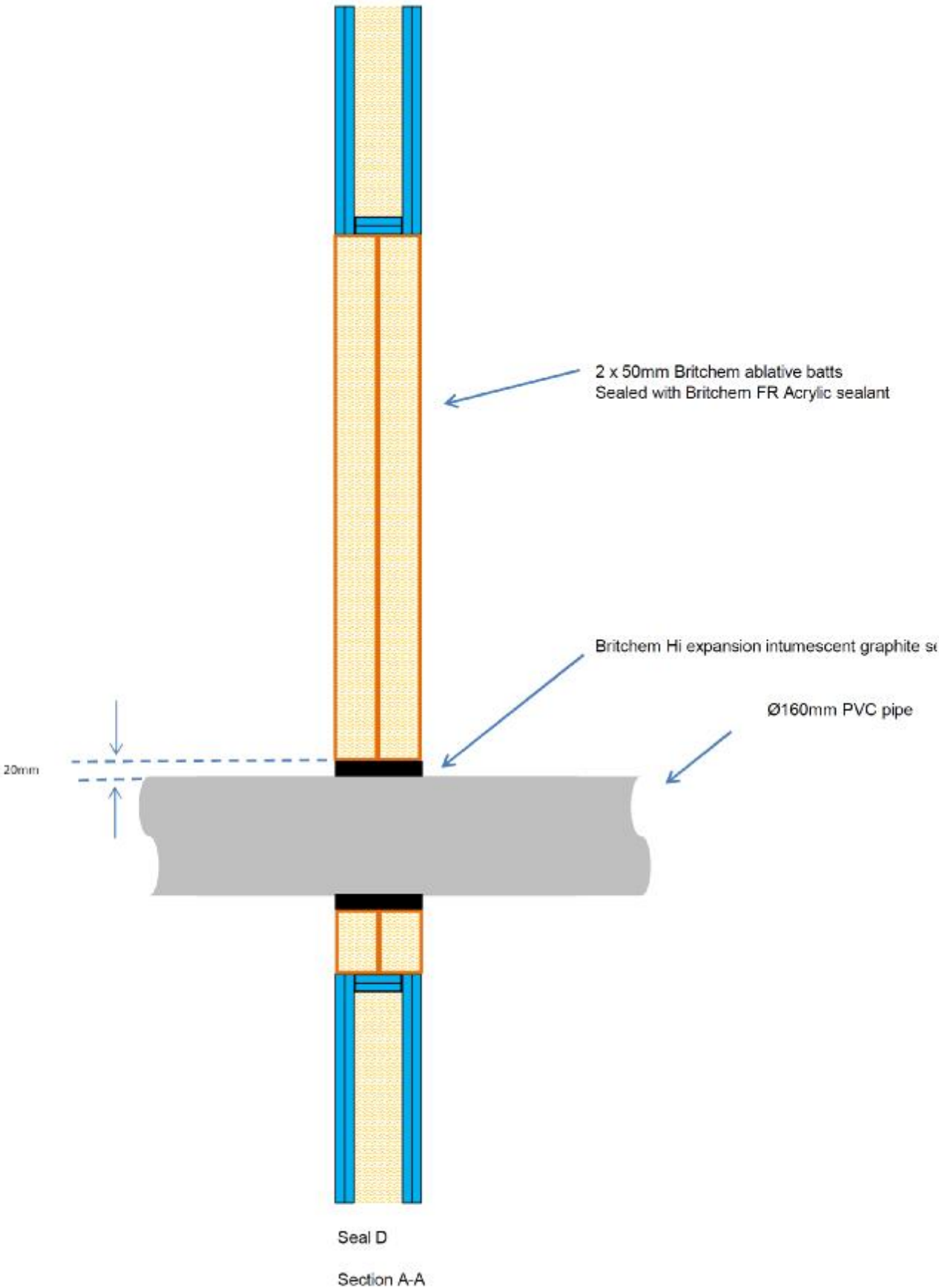


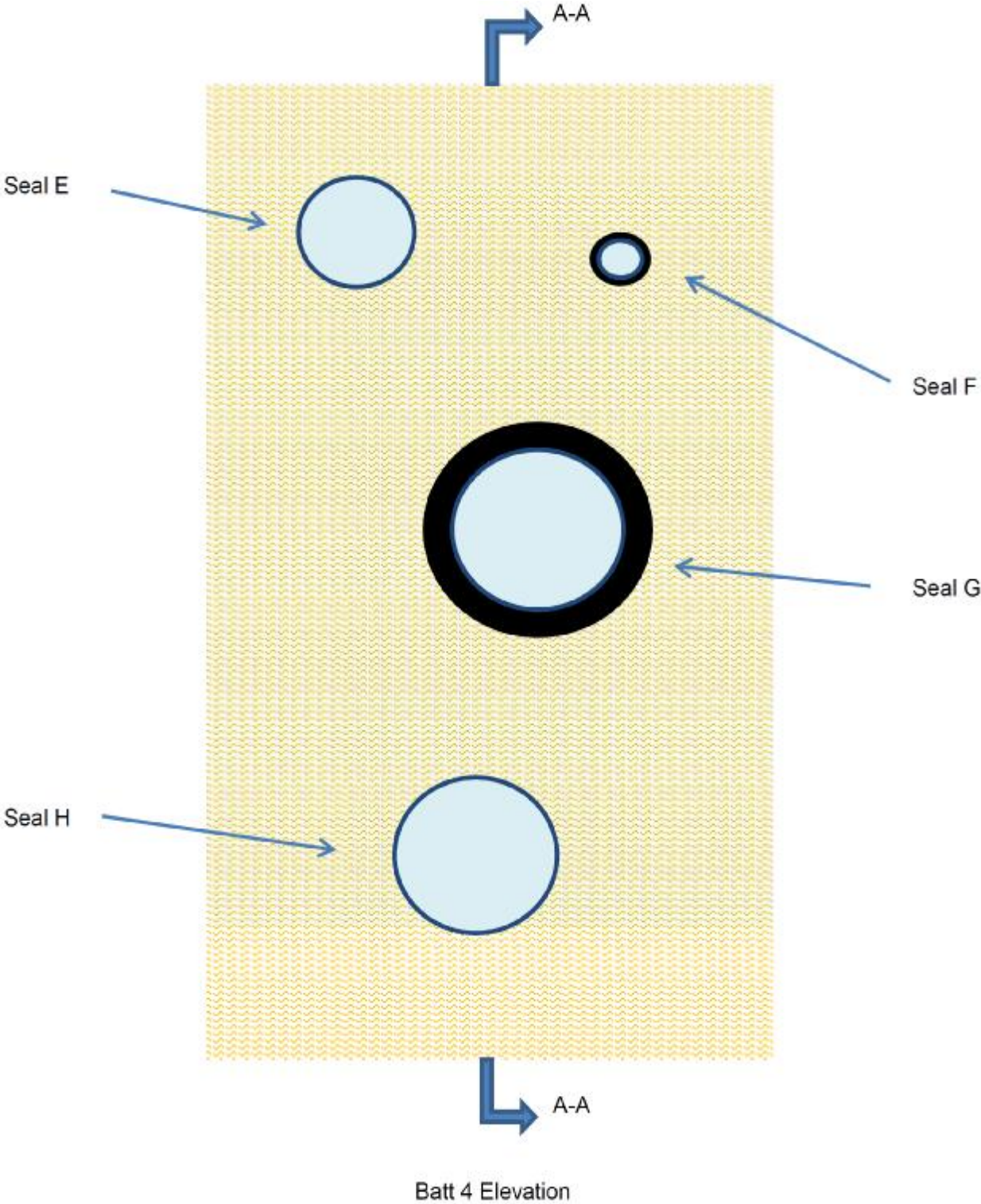
Seal B  
Section A-A

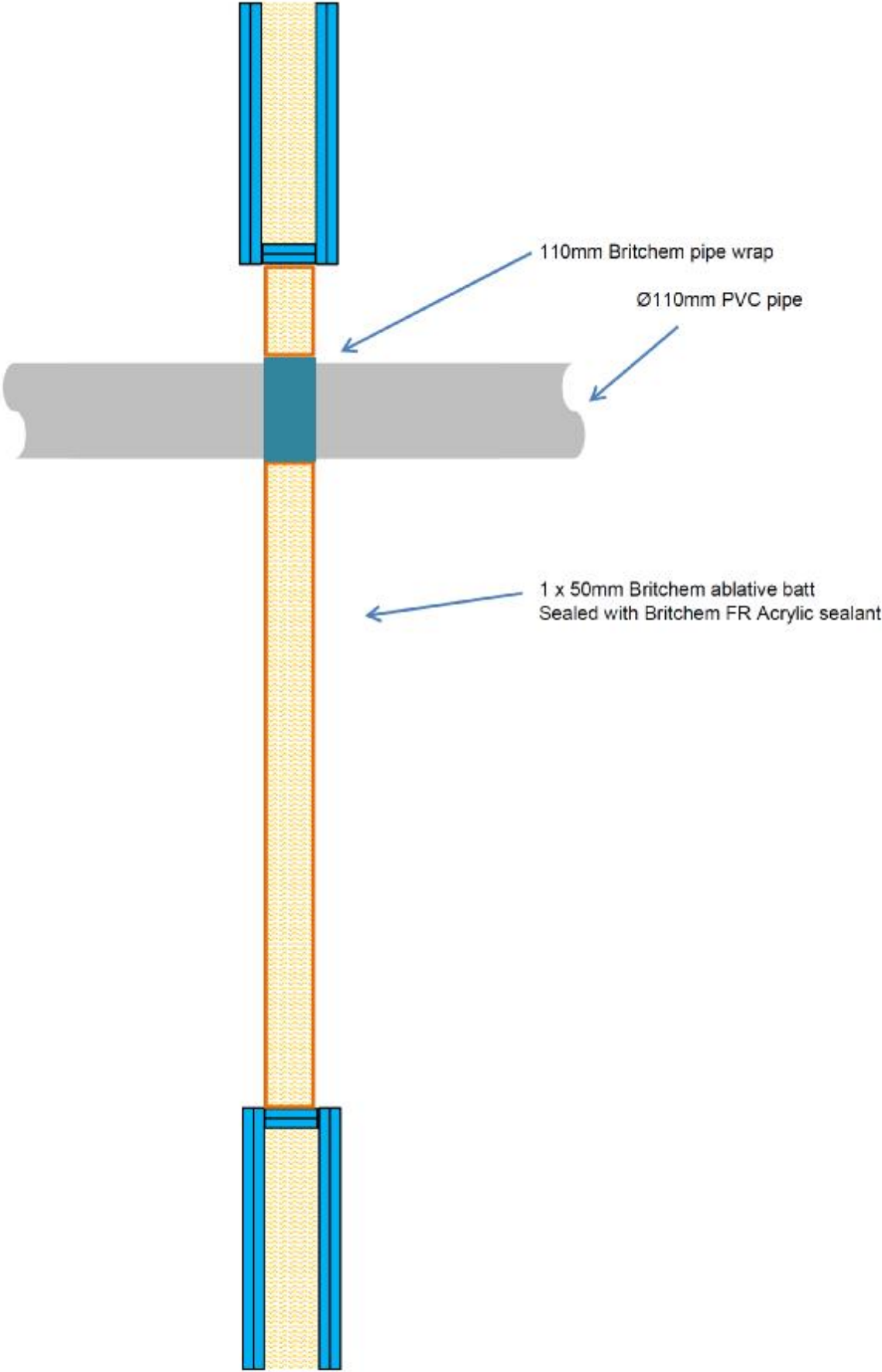


Seal C

Section A-A

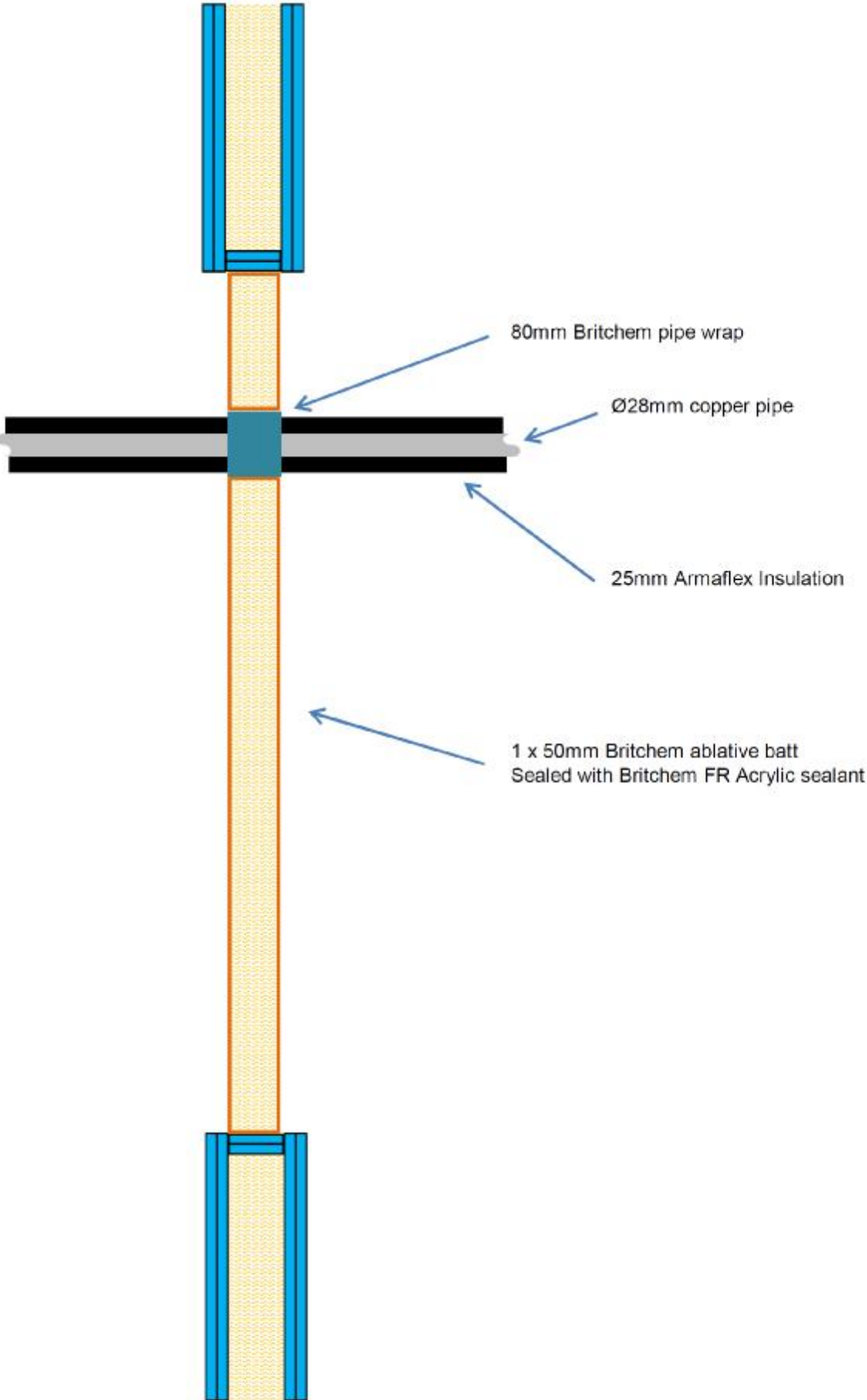






Seal E

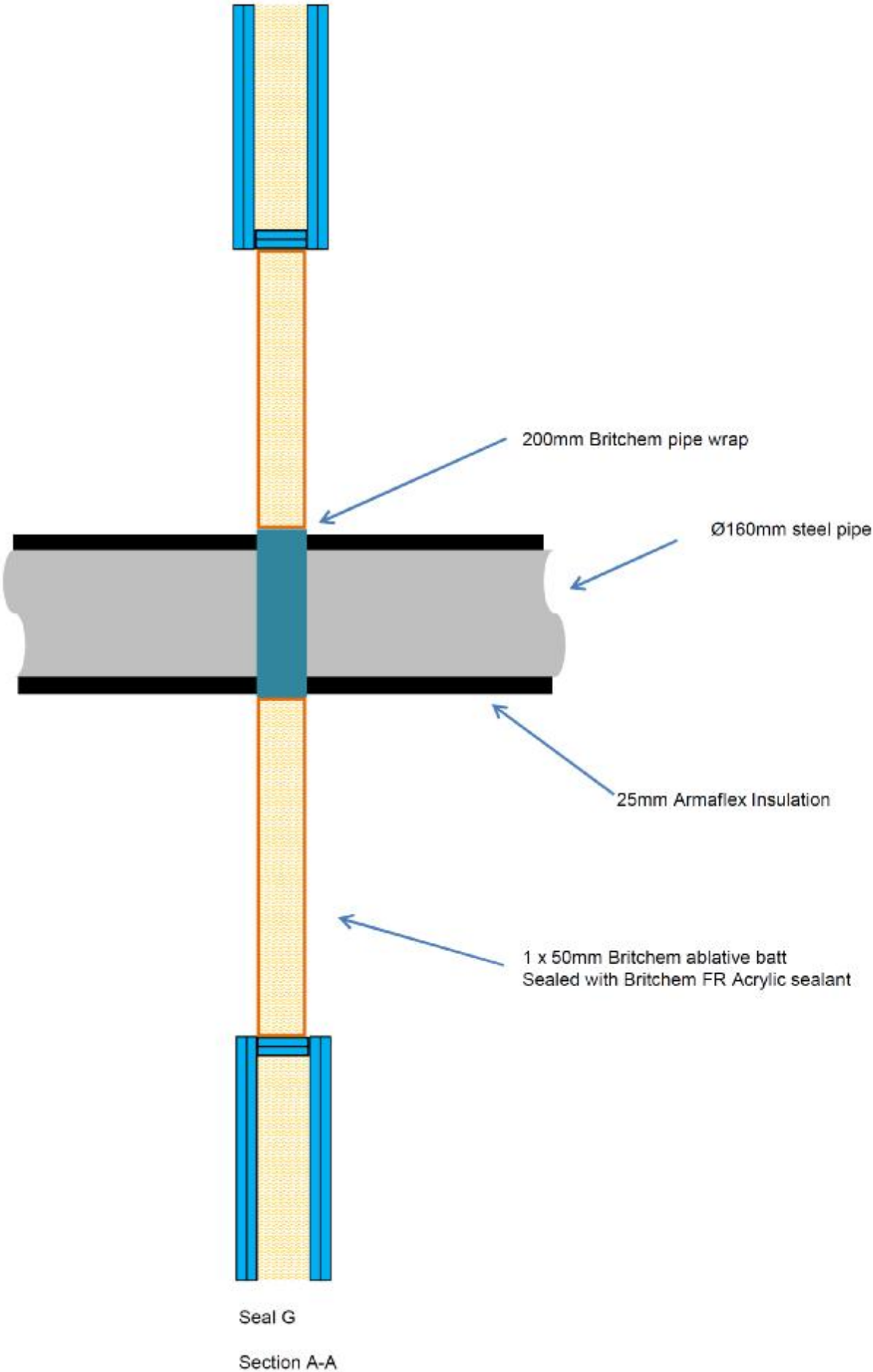
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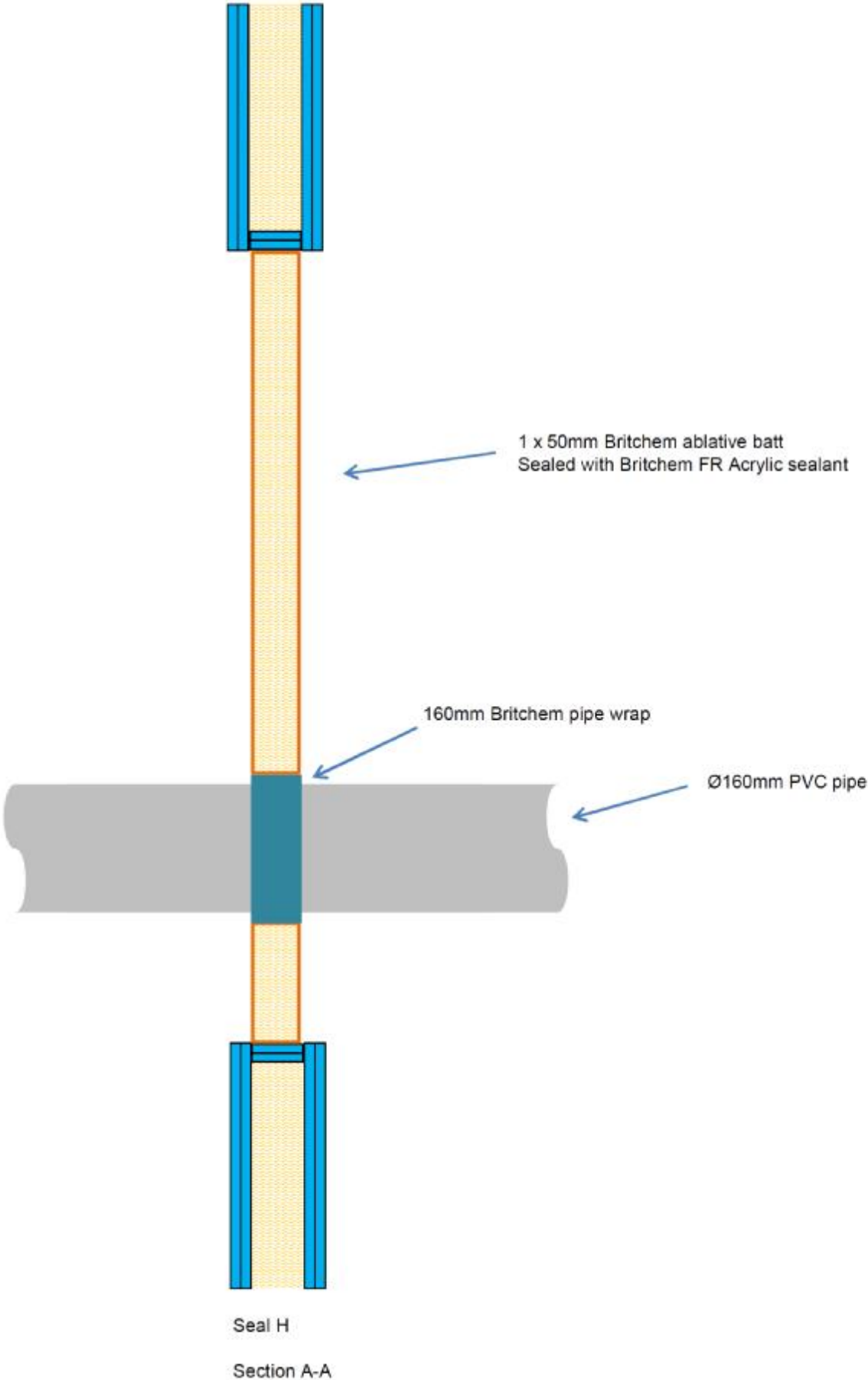


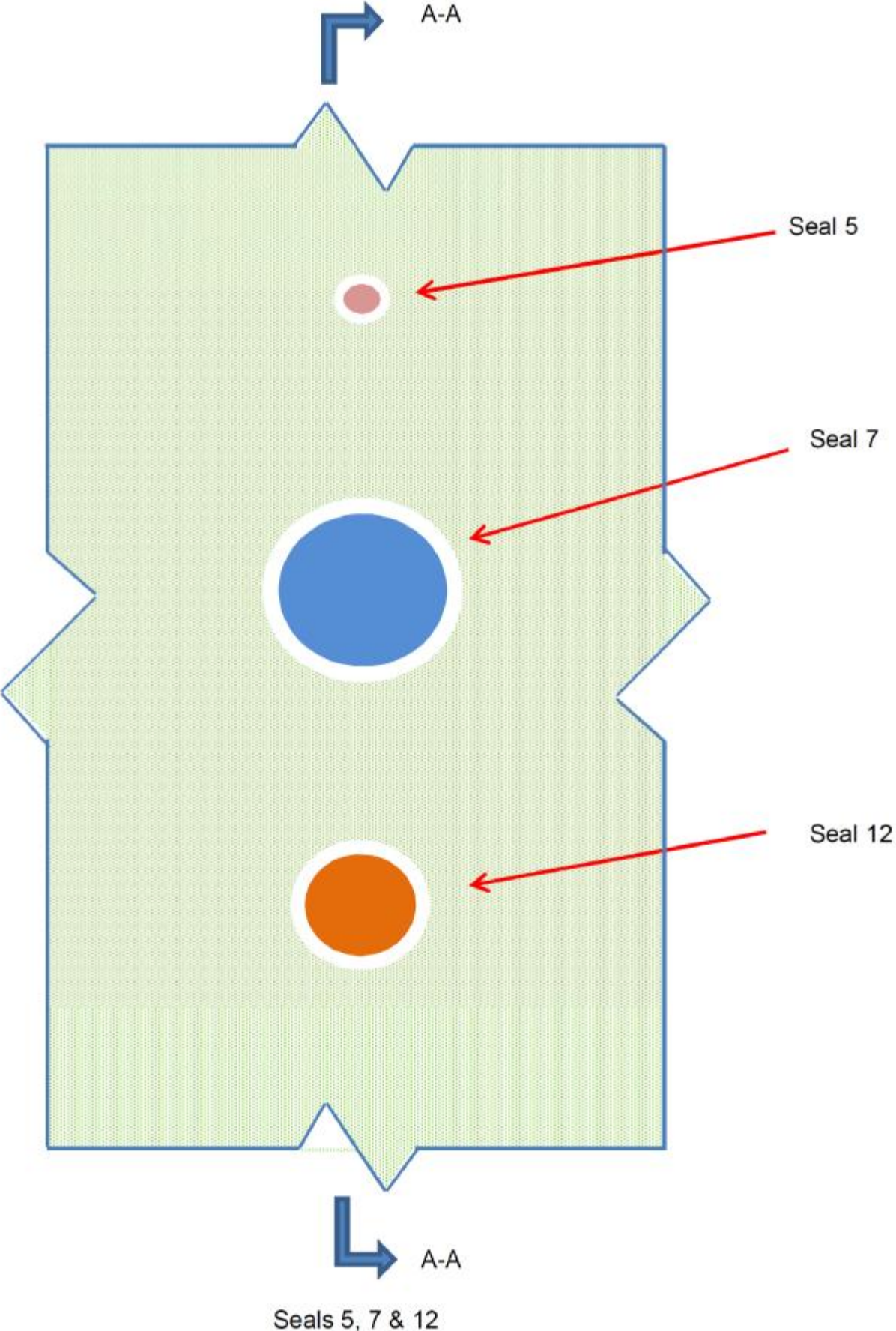
Seal F

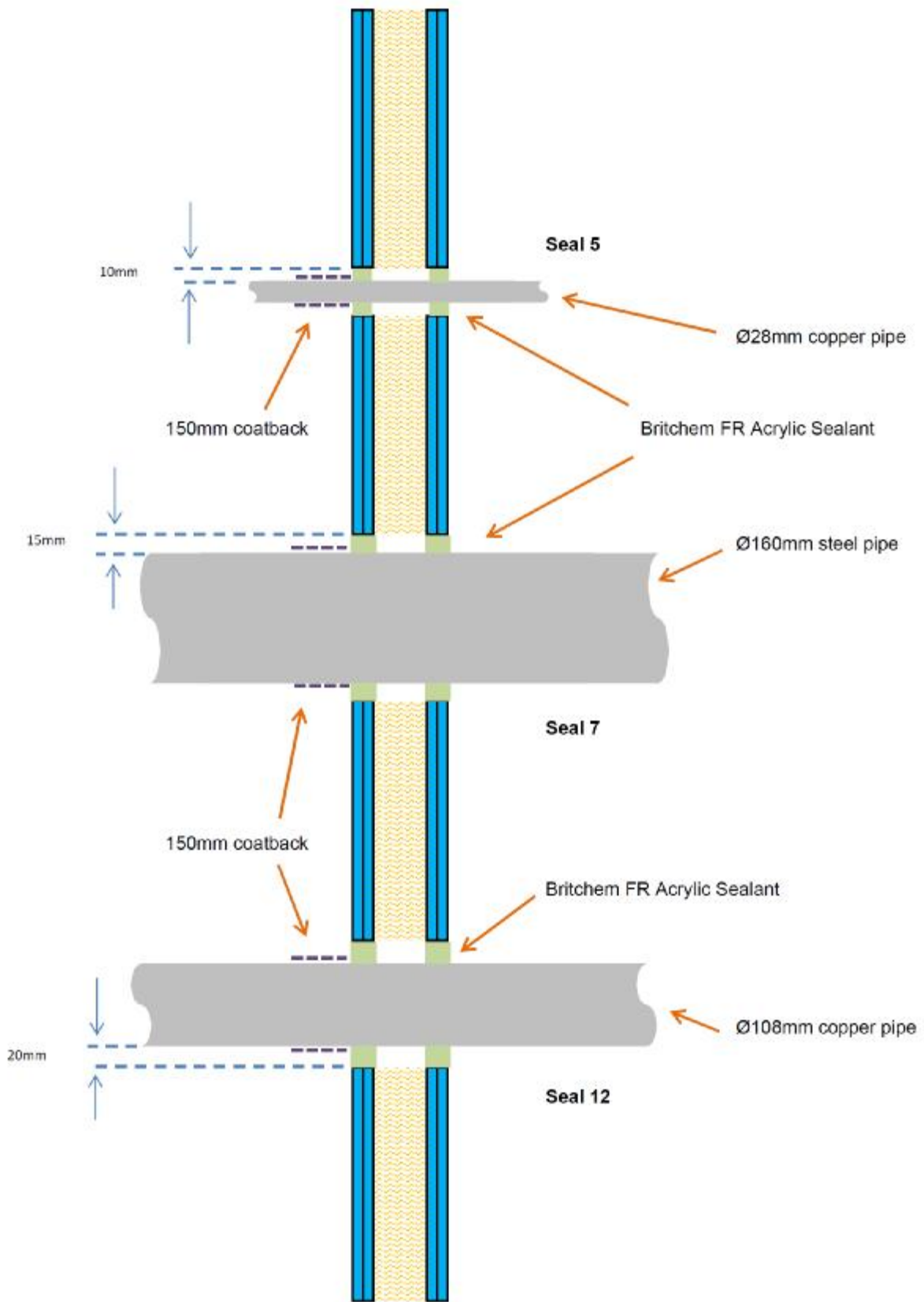
Section A-A





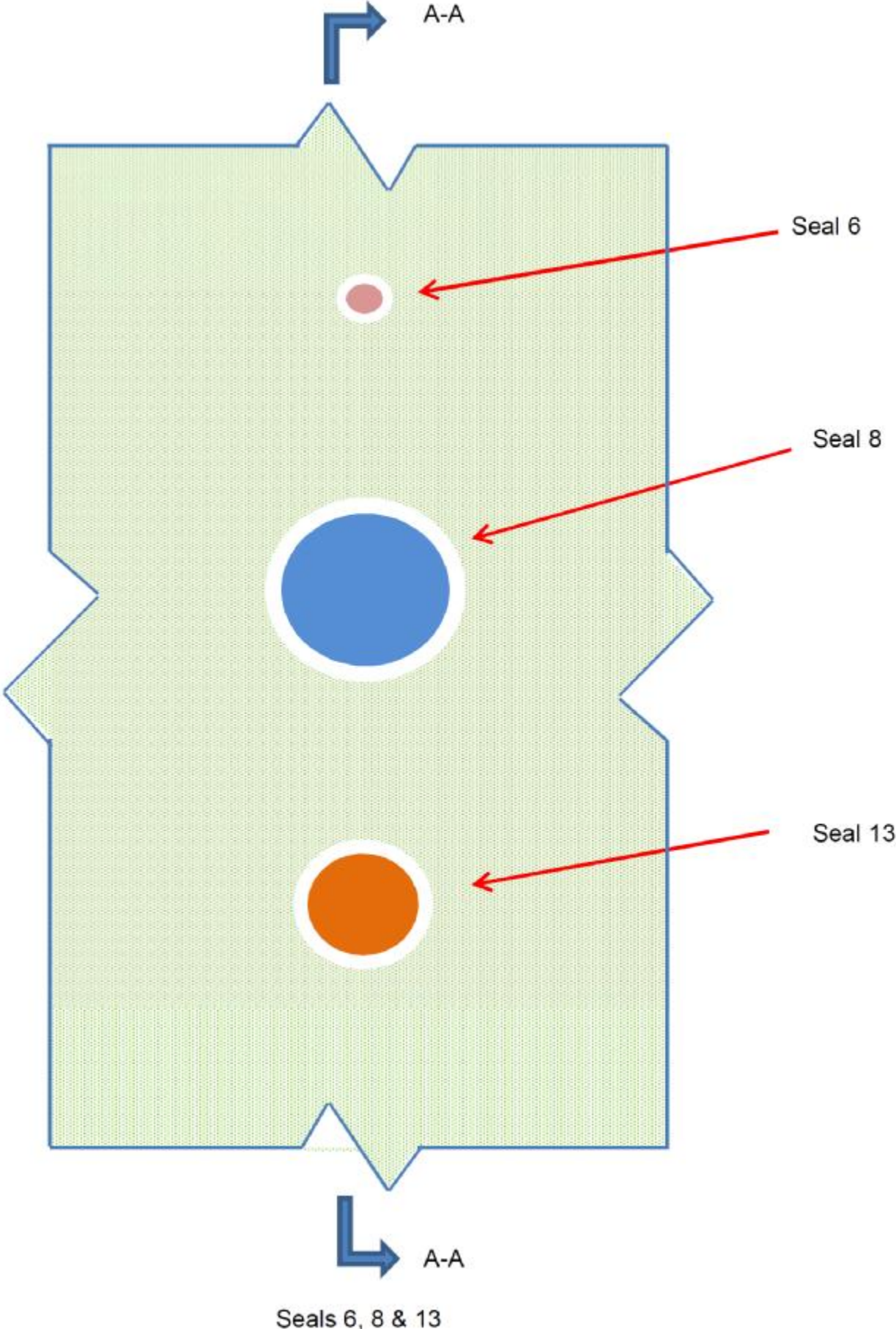


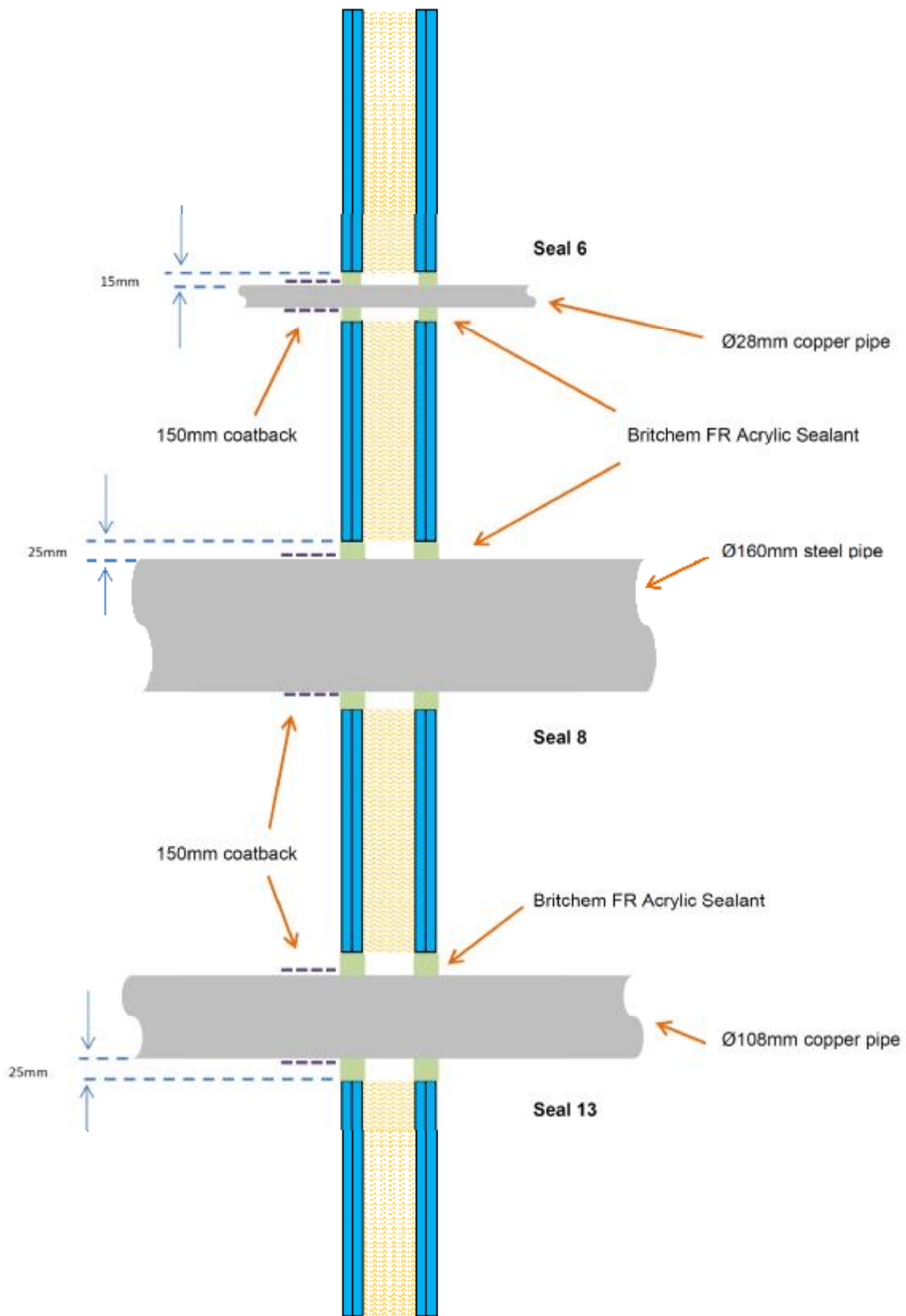




Seals 5, 7 & 12

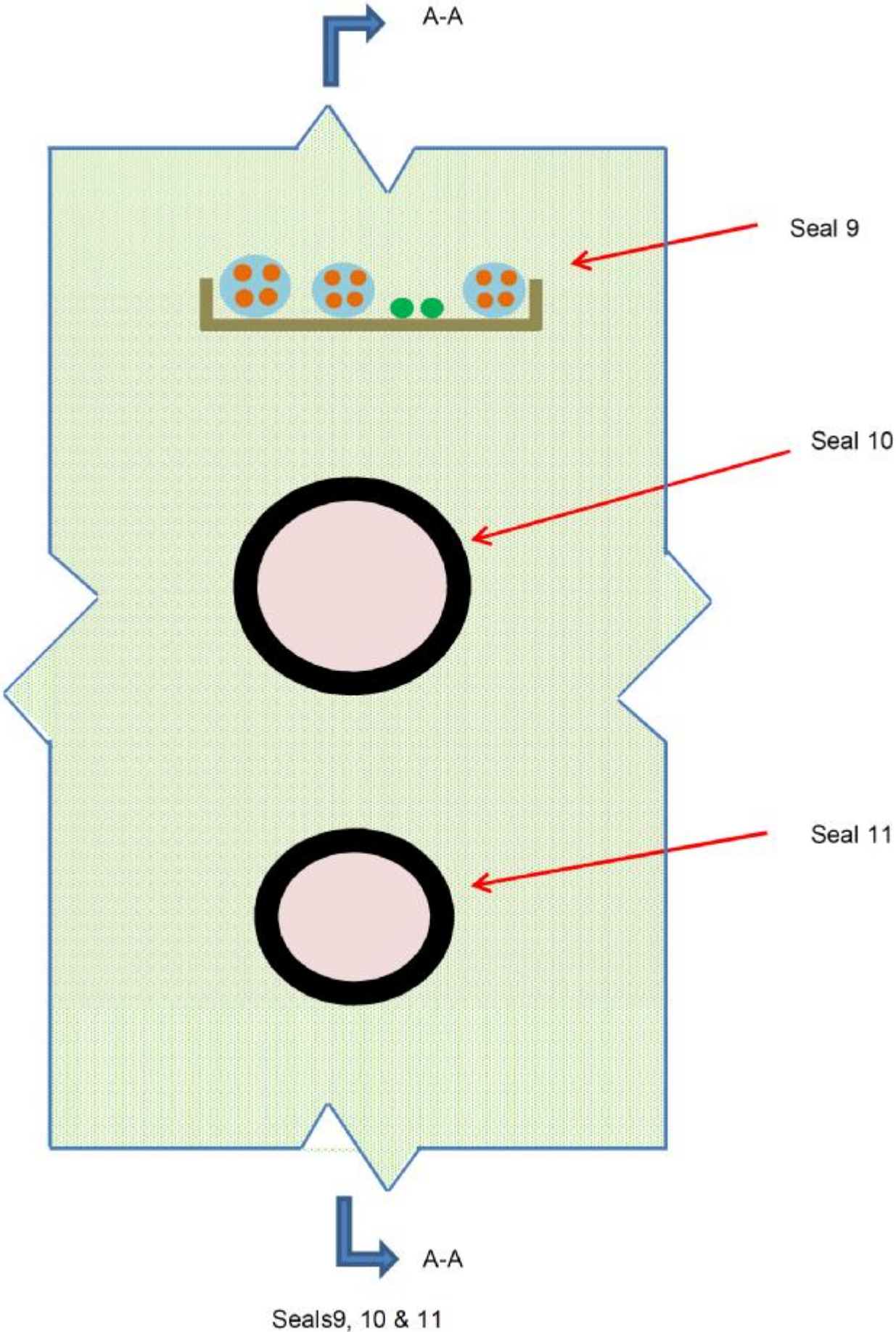
Section A-A

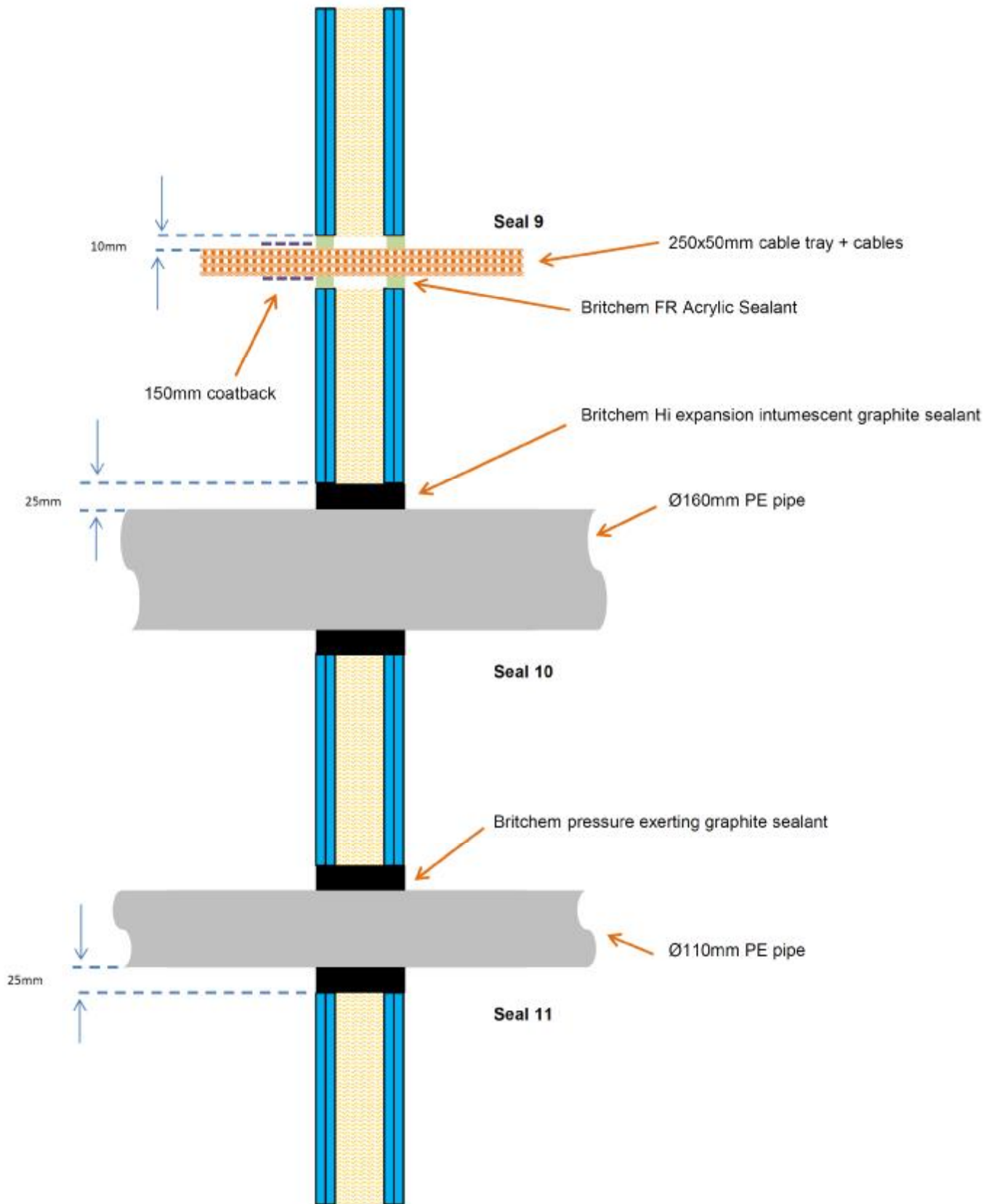




Seals 6, 8 & 13

Section A-A





Seals 9, 10 & 11

Section A-A





## 7. LIMITATIONS

This classification document does not represent type approval or certification of the product.

The classification is valid provided that the product, field of application and standards and regulations are not changed.

Approved:

Ing. Štefan Rástocký  
leader of the testing laboratory



Signed:

Martin Král  
technician of the testing laboratory