

# UL-EU CERTIFICATE

**Certificate No.** UL-EU-00912-CPR  
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**Date of Issue** 2015-10-09  
**Revised** 2023-05-22

**Certificate Holder** Polyseam Ltd  
15. St. Andrews Road  
Huddersfield, West Yorkshire  
HD1 6SB, UK

**Manufacturer** Polyseam Ltd  
15. St. Andrews Road  
Huddersfield, West Yorkshire  
HD1 6SB, UK

**Certified Product Type** Fire Stop - Sealant  
**Product Trade Name** Protecta FR Acrylic  
**Trademark** N/A  
**Rating/Classification** See Appendix

**Harmonised Technical Specifications** EAD 350454-00-1104, September 2017/ EAD 350141-00-1106, September 2017 / EN 13501-2

**Supporting Documentation** 0843-UKTA-22/0031, 0843-UKTA-22/0032, UK –  
CERTIFICATE OF CONSTANCY OF PERFORMANCE -  
0843 – CPR – 1226, and Classification Report No.  
13CA21782 A Issue 2 / 4786594903 A Issue 2 /  
4788077223 Issue 1 / 4788672831 Issue 1 / 4789129519  
Issue 1/ 4789553848 and 4790592026

**Additional information** Additional test evidence is held on file  
**Expiry date** 2025-10-08



A blue ink signature of Chris Johnson.

**Authorized Certification Decision Maker**  
Chris Johnson

This is to certify that representative samples of the Certified Product listed above have been investigated by Underwriters Laboratories to the Standard(s) indicated on this Certificate, in accordance with the UL Global Services Agreement and the UL-EU Mark Service Terms and Conditions ("Agreement"). The Certificate Holder is entitled to use the UL-EU Mark for the Certified Product listed on the certificate and manufactured at the production site(s) listed, in accordance with the terms of the Agreement. Only those products bearing the UL-EU Mark for Europe should be considered as being covered by UL's UL-EU Mark Service. This Certificate shall remain valid through the Expiration date, unless a Standard identified on this Certificate is amended or withdrawn prior to that date or there is a non-compliance with the Agreement.



# Appendix UL-EU CERTIFICATE

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This certificate relates to the use of Protecta FR Acrylic for fire stopping where there are joints in or between walls & floors or service penetrations through floors and walls. The detailed scope is given in pages 3 to 94 of this Certificate. This shows the thickness and acceptable dimensions, substrates and orientations required to provide fire resistance periods of up to 240 minutes for differing services and wall/floor constructions.

The product is certificated on the basis of:

- i) UKTA 22/0031 & UKTA 22/0032
- ii) UK – CERTIFICATE OF CONSTANCY OF PERFORMANCE 0843 – CPR – 1226
- iii) Inspection and surveillance of factory production control by UL
- iv) Fire resistance test data in accordance with EN 1366-3 and 1366-4
- v) Classification in accordance with EN 13501-2
- vi) Durability and Serviceability as defined in EAD 350141-00-1106\*

\* Protecta FR Acrylic sealant has been tested in accordance with BS EN ISO 8339: 2005 and BS EN ISO 9046: 2004 to demonstrate its suitability for use in internal conditions with humidity lower than 85 % RH, excluding temperatures below 0°C, without exposure to rain or UV. These conditions are designated Z<sub>2</sub> in EAD 350454-00-1104, September 2017 and EAD 350141-00-1106.

The movement capability of Protecta FR Acrylic joint seals is restricted to ≤ 7.5%

Protecta FR Acrylic is a sealant used to form a penetration seal around metallic pipes, plastic pipes, composite pipes, combustible cable conduits and electrical cables to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services. It is also used to form linear gap seals where gaps are present in wall and floor constructions and linear joint seals where wall and floor constructions abut.

Protecta FR Acrylic is supplied in liquid form contained within 310 & 380 ml cartridges and 300 to 600 ml foil packs. The sealant is gunned into the aperture in the separating element/elements and around the service or services, to a specified depth utilising a backing material.



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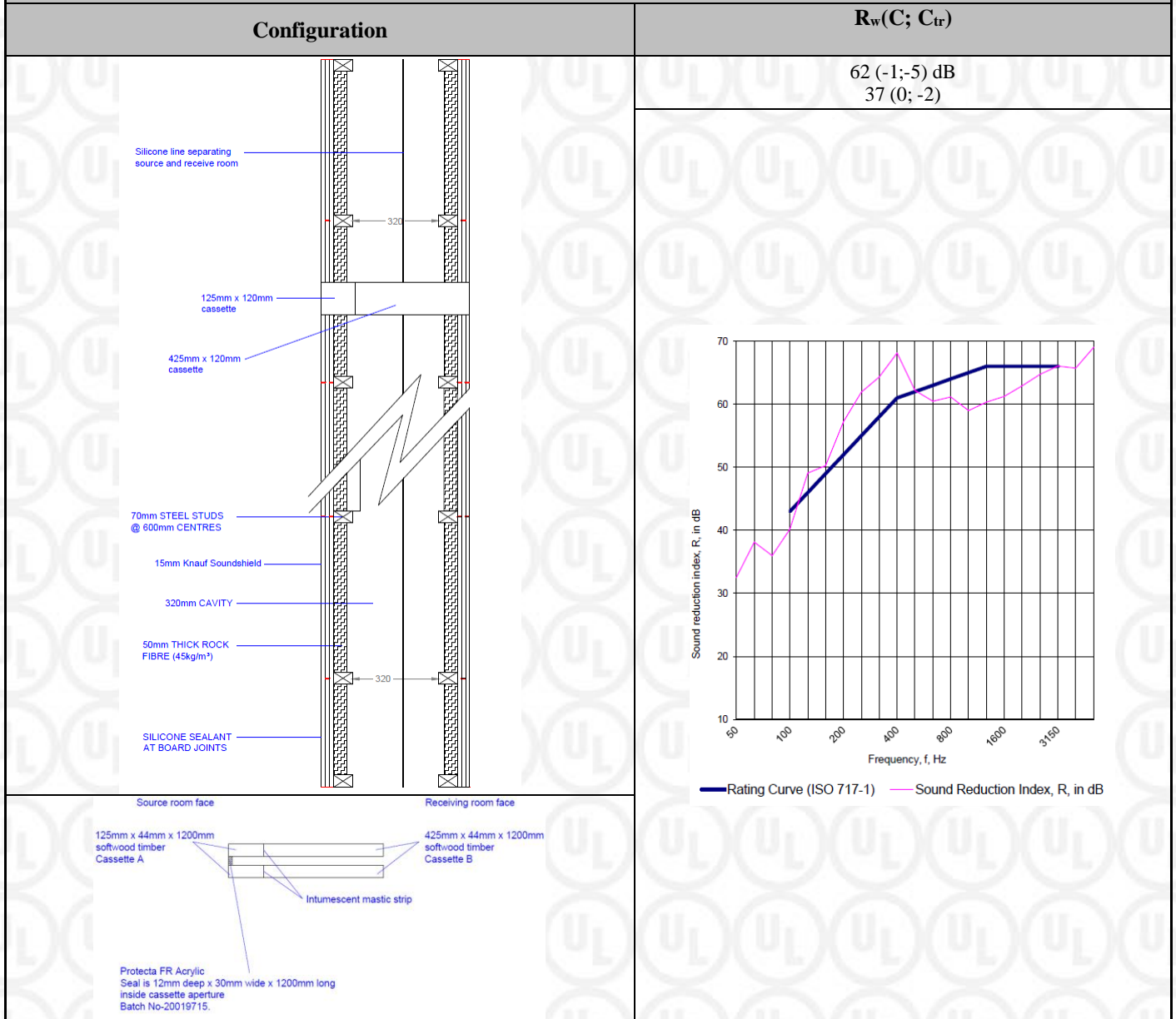
Product-type: Sealant		Intended use: Linear Joint, Gap Seal & Penetration Seal
Assessment method	Essential characteristic	Product Performance
<b>BWR 2 Safety in case of fire</b>		
EN 13501-1	Reaction to fire	Class B-s1, d0
EN 13501-2	Resistance to fire	See pages 4 & 94
<b>BWR 3 Hygiene, health and environment</b>		
Declaration of manufacturer & EN 16516	Content, emission and/or release of dangerous substances	Use categories: IA1, S/W2 Declaration of manufacturer
EN 1026:2000	Air permeability (material property)	See page 95#
EAD 350141-00-1106, Annex C & EN 12390-8	Water permeability (material property)	No performance determined
<b>BWR 4 Safety in use</b>		
EOTA TR 001:2003	Mechanical resistance and stability	No performance determined
EOTA TR 001:2003	Resistance to impact/movement	No performance determined
EOTA TR 001:2003 ISO 11600 & EAD 350141-00-1106, Clause 2.2.13	Adhesion	No performance determined
EAD 350141-00-1106, Clause 2.2.12	Durability	Z <sub>2</sub>
EAD 350141-00-1106, Clause 2.2.13	Movement capacity	No performance determined
EAD 350141-00-1106, Clause 2.2.14	Cycling of perimeter seals for curtain walls	No performance determined
EAD 350141-00-1106, Clause 2.2.15	Compression set	No performance determined
EAD 350141-00-1106, Clause 2.2.16	Linear expansion on setting	No performance determined
<b>BWR 5 Protection against noise</b>		
EN 10140-1,2,4,5/ EN ISO 717-1	Airborne sound insulation	Rw(C;Ctr)= 62 (-1;-5) dB*
<b>BWR 6 Energy economy and heat retention</b>		
EN 12664, EN 12667, EN 12939, EN ISO 8990, EN ISO 6946, EN ISO 10456	Thermal properties	No performance determined
EN ISO 12572, EN 12086, EN ISO 10456	Water vapour permeability	No performance determined
*12 mm depth		
# Applicable to penetration seals only		



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## Protecta FR Acrylic: Acoustic performance according to BS EN ISO 10140-2:2010



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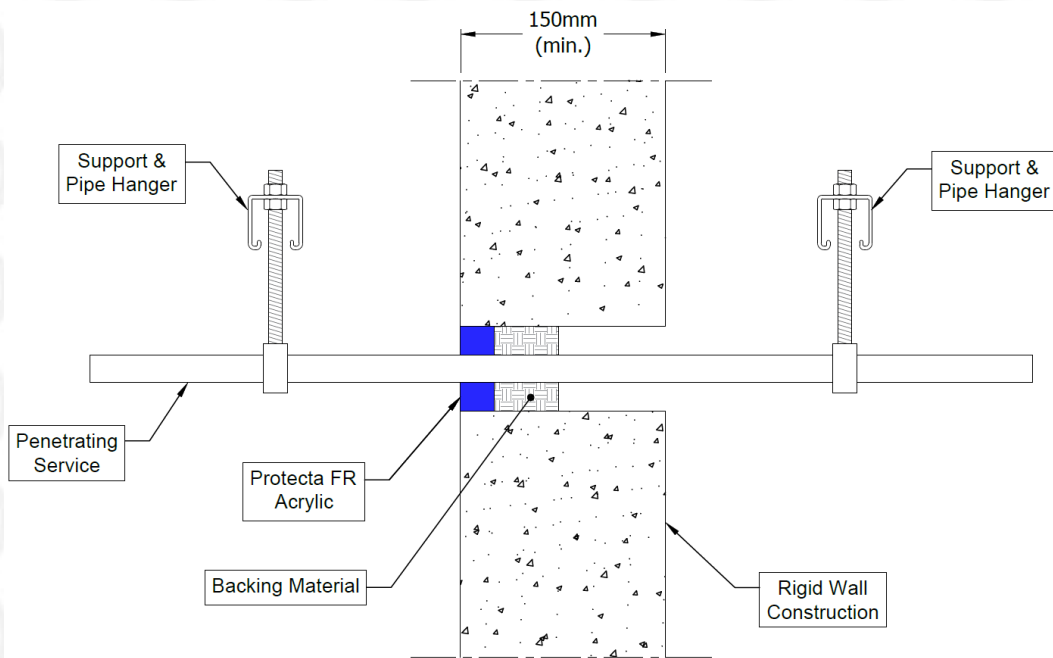
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Rigid wall constructions according to 1.2.1 with wall thickness of minimum 150 mm

## Single side penetration seal with cables

**Penetration Seal:** Cables (single) fitted at any position within the aperture, with Protecta FR Acrylic to either side of the wall (or at any position in between), backed with 'Protecta Mineral Fibre BIO'. Minimum separation between cables and the edge of the seal of 7 mm.

Construction details:



Services	Sealant depth	Backing	Maximum seal size	Classification
Single electrical cables up to 21 mm Ø	25 mm	48 mm deep Protecta Mineral Fibre BIO	87 mm Ø	E 240, EI 90
Blank seals	25 mm	48 mm Protecta Mineral Fibre BIO insulation	300 x 300 mm	E 240, EI 60
Electric cables up to 21 mm diameter, single.			35 x 35 mm / 36 mm Ø	E 240, EI 120
Blank seals				
Electric cables up to 21 mm diameter, single.				



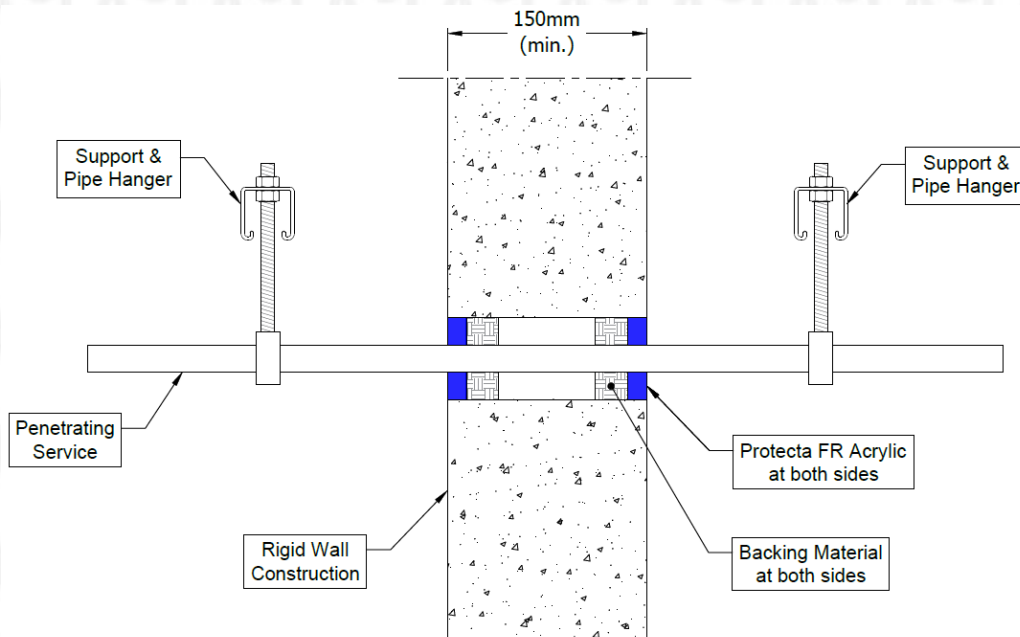
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## Double side penetration seal with cables

**Penetration Seal:** Cables fitted with Protecta FR Acrylic to both sides of the wall, backed with stone wool or mineral fibre insulation. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

Construction details:



Services	Sealant depth	Backing (minimum)	Insulation	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m <sup>3</sup>	None	EI 240
Electric cables up to 21 mm diameter, single or in a bundle.				E 240, EI 120
Electric cables 22-80 mm diameter, single or in a bundle.				E 120, EI 60
Blank seals	25 mm	48 mm Protecta Mineral Fibre BIO		EI 240
Electric cables up to 80 mm diameter, single or in a bundle.				E 240, EI 60
Cables up to 21 mm diameter, single or in a bundle up to 100 mm diameter				EI 240



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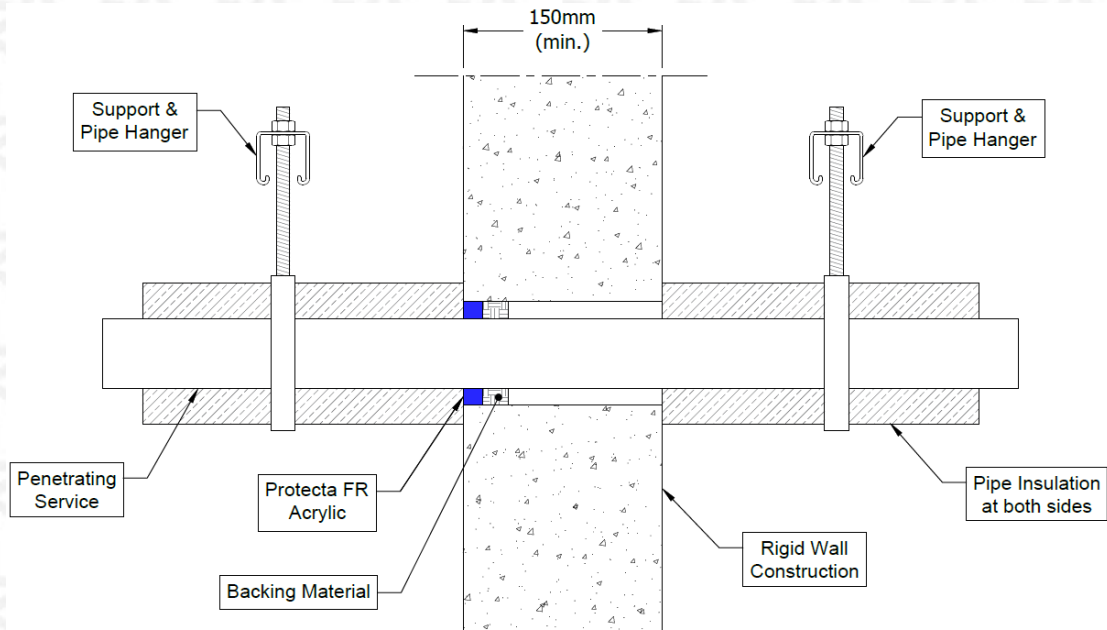
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## Single side penetration seal with metallic (and composite) pipes

**Penetration Seal:** LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 15 mm deep Protecta FR Acrylic to either side of the wall (or at any position between), backed with 20 mm deep minimum 40 kg/m<sup>3</sup> stone wool insulation\*.

Construction details:



Services	Seal width around pipe	Insulation (minimum)	Classification
Copper or steel pipe up to 54 mm diameter/ 0.9-14.2 mm wall	8-9 mm	1000 mm length 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 180 C/U
Copper or steel pipe up to 12 mm diameter/ 0.9-5 mm wall	8 mm		EI 240 C/U
Alupex composite pipe 75 mm diameter/ 7.5 mm wall	30 mm	25 mm Protecta Mineral Fibre BIO insulation, 600 mm long (min.)	EI 120 C/U

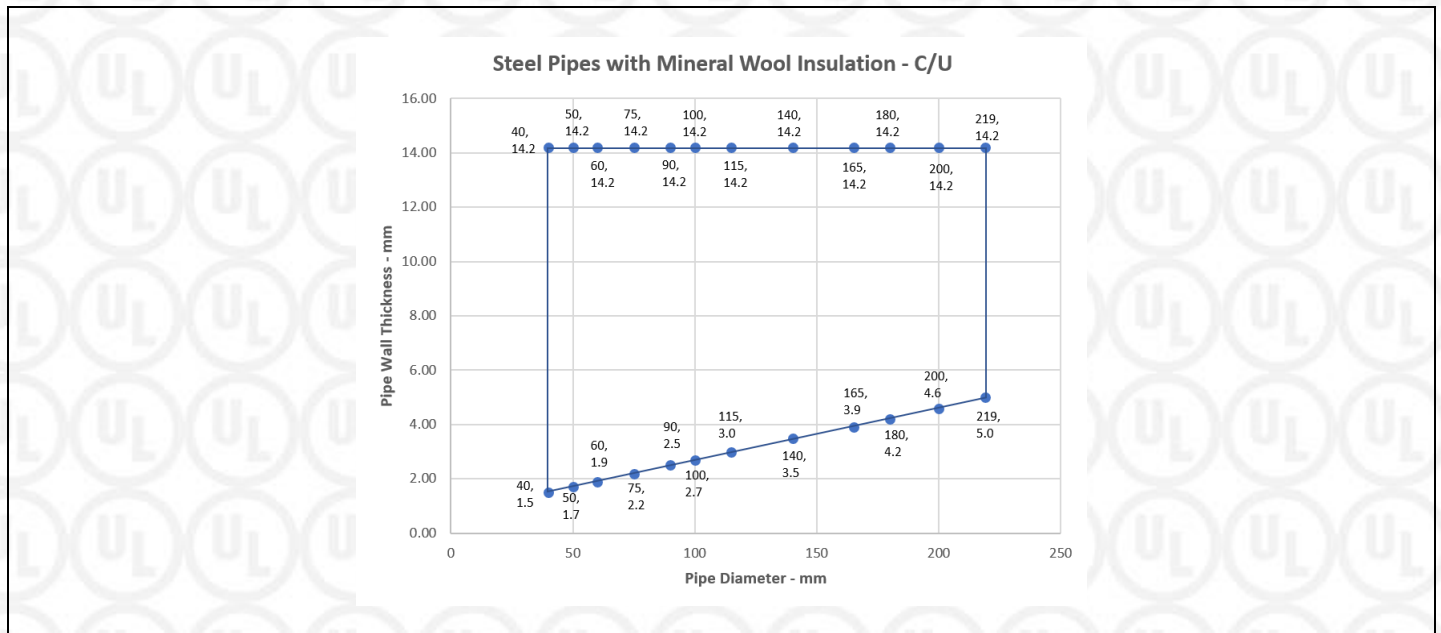


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Services	Seal width around pipe	Insulation (minimum)	Classification
<b>Mild or stainless steel pipe</b>			
40 mm diameter/1.5-14.2 mm wall*	6-18 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	<b>EI 240 C/U</b>
40 mm diameter/1.5-14.2 mm wall*			
50 mm diameter/1.7-14.2 mm wall*		1000 mm length of 30 mm Stone wool insulation 80 kg/m <sup>3</sup>	<b>E 180 C/U, EI 90 C/U</b>
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

\* Typical pipe diameters shown, see below graph for intermediate sizes





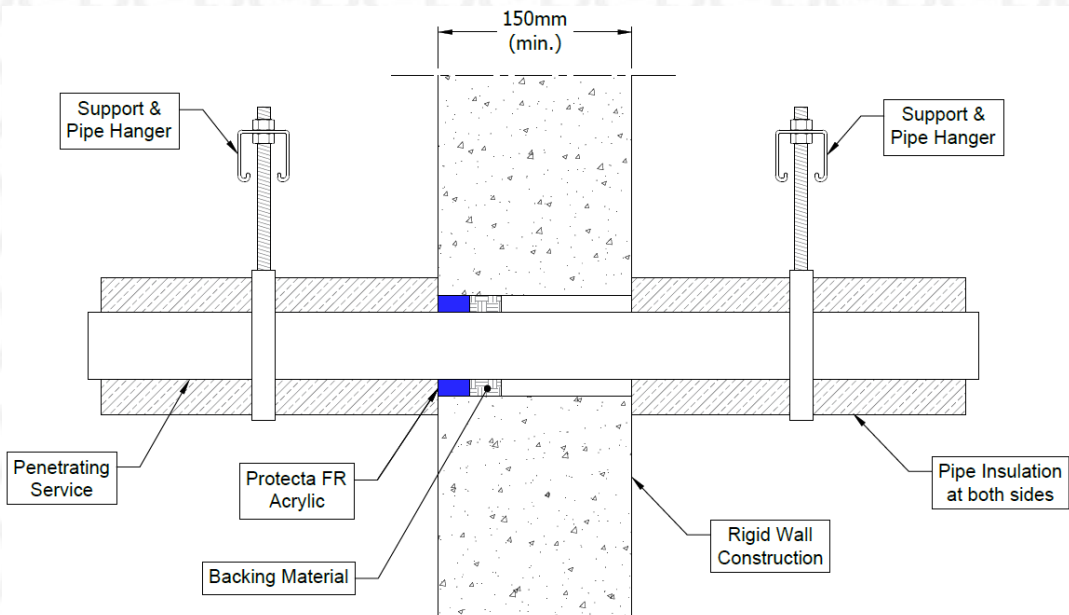
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## Single side penetration seal with metallic (and composite) pipes

**Penetration Seal:** LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 25 mm deep Protecta FR Acrylic to either side of the wall (or at any position between), backed with 25 mm deep minimum 40 kg/m<sup>3</sup> stone wool insulation\*.

Construction details:



Services	Maximum Seal size	Insulation (minimum)	Classification
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall	300 x 300 mm	1000 mm length 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 60 C/U
Alupex composite pipe 75 mm diameter/7.5 mm wall		25 mm Protecta Mineral Fibre BIO insulation, 600 mm long (min.)	

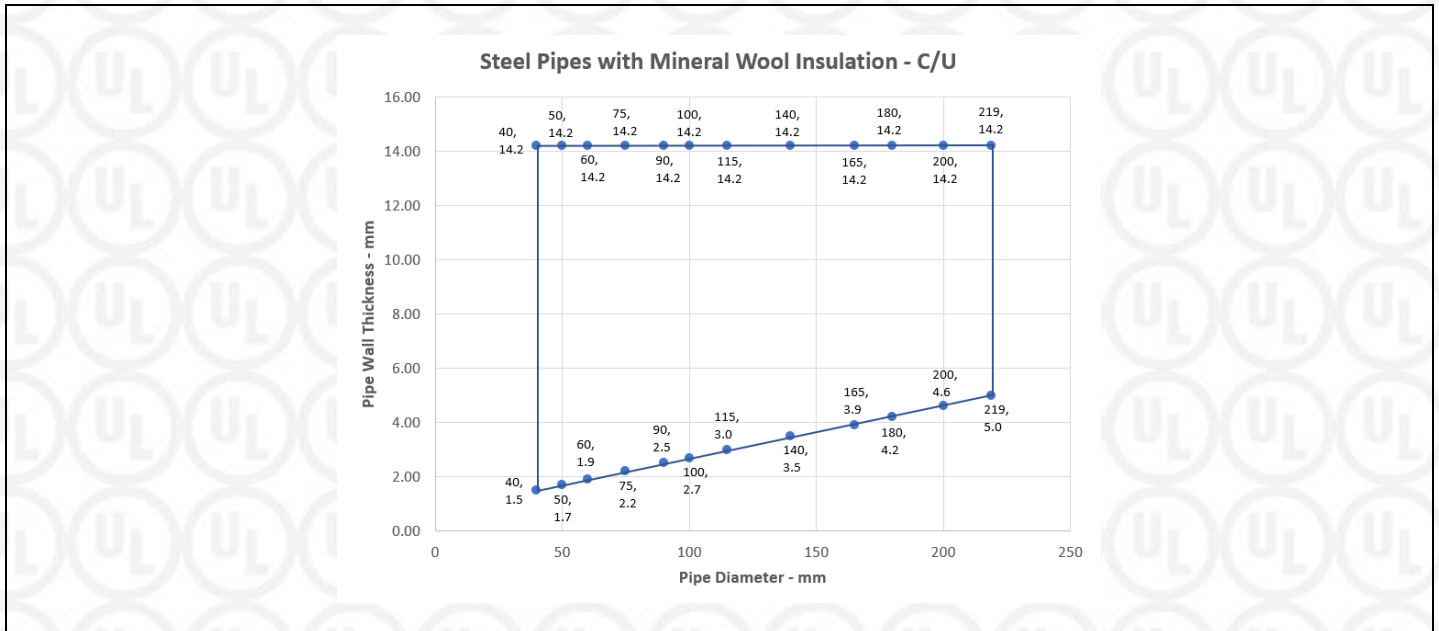


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Services	Maximum seal size	Insulation (minimum)	Classification
<b>Mild or stainless steel pipe</b>			
40 mm diameter/1.5-14.2 mm wall*	300 x 300 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	<b>E 240 C/U, EI 60 C/U</b>
40 mm diameter/1.5-14.2 mm wall*			
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*		1000 mm length of 30 mm Stone wool insulation 80 kg/m <sup>3</sup>	
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

\* Typical pipe diameters shown, see below graph for intermediate sizes



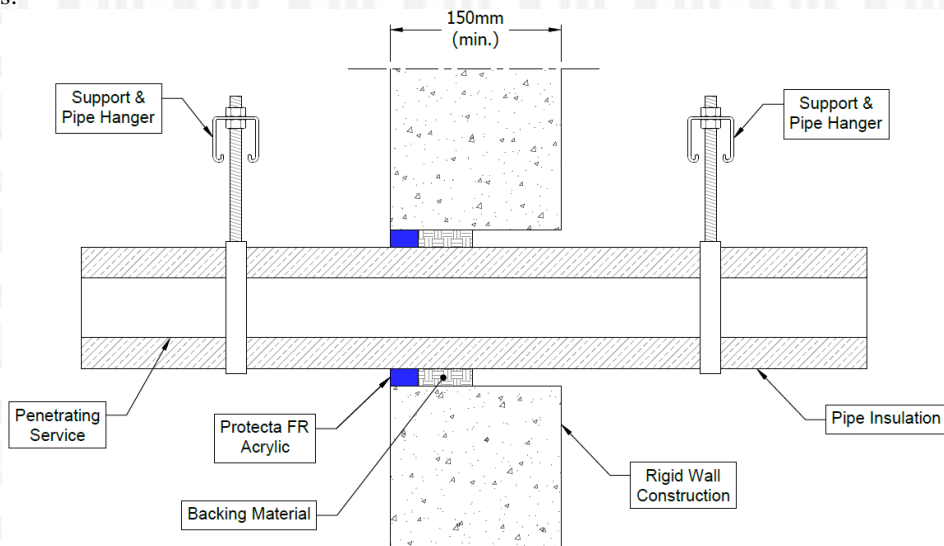
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## Single side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic (single), with 25 mm deep Protecta FR Acrylic to either side of the wall (or at any position between), backed with 48 mm deep Protecta Mineral Fibre BIO insulation. Minimum annular space 10 mm and minimum separation between penetrations seals of 30 mm. Maximum seal size 300 x 300 mm or 504 mm Ø.

Construction details:



## Single side penetration seal with pipes

Services	Insulation	Classification
<b>Mild or stainless steel pipe</b>		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	<b>EI 240 C/U</b>
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	<b>EI 180 C/U</b>
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*		
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		

\* Typical pipe diameters shown, see below graph for intermediate sizes

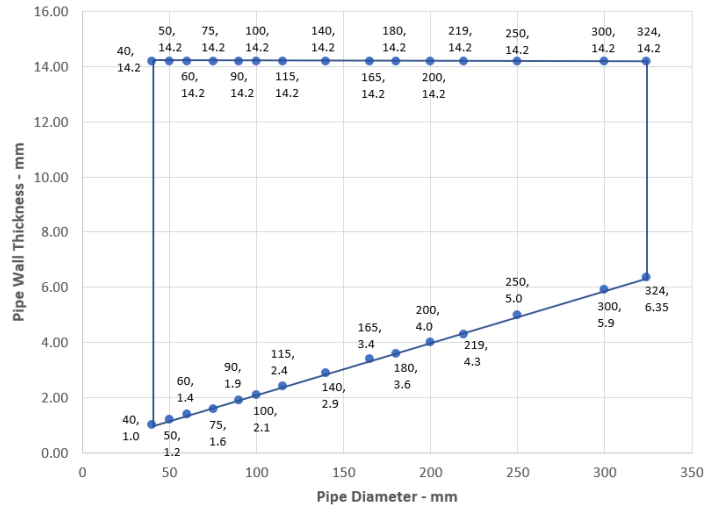
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Steel Pipes with Mineral Wool Insulation - C/U



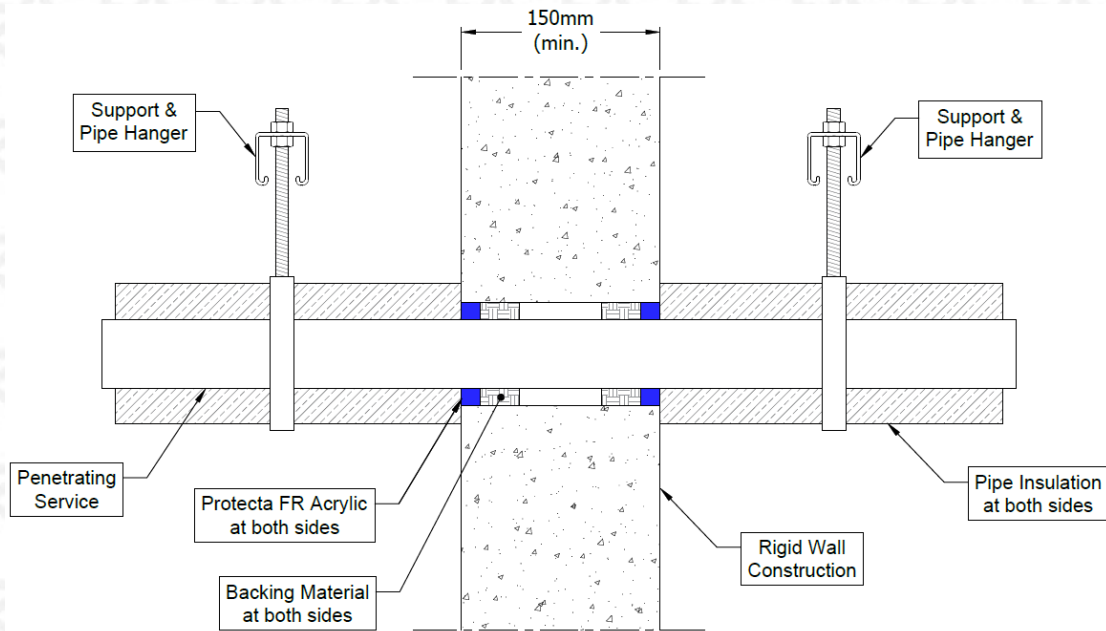
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## Double side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Protecta FR Acrylic to both sides of the wall, backed with 20 or 30 mm deep minimum 40 kg/m<sup>3</sup> stone wool insulation.

Construction details:



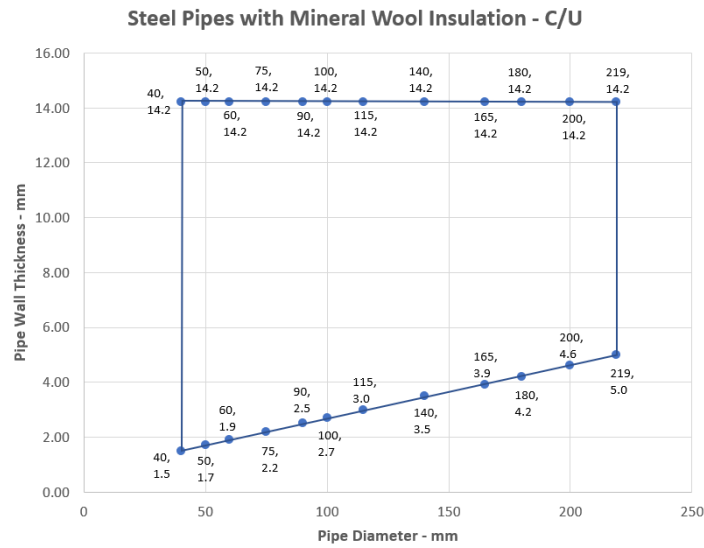
Services	Maximum seal size	Insulation (minimum)	Classification
<b>Mild or stainless steel pipe</b>			
40 mm diameter/1.5-14.2 mm wall*	300 x 300 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240, EI 120 C/U
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

\* Typical pipe diameters shown, see below graph for intermediate sizes



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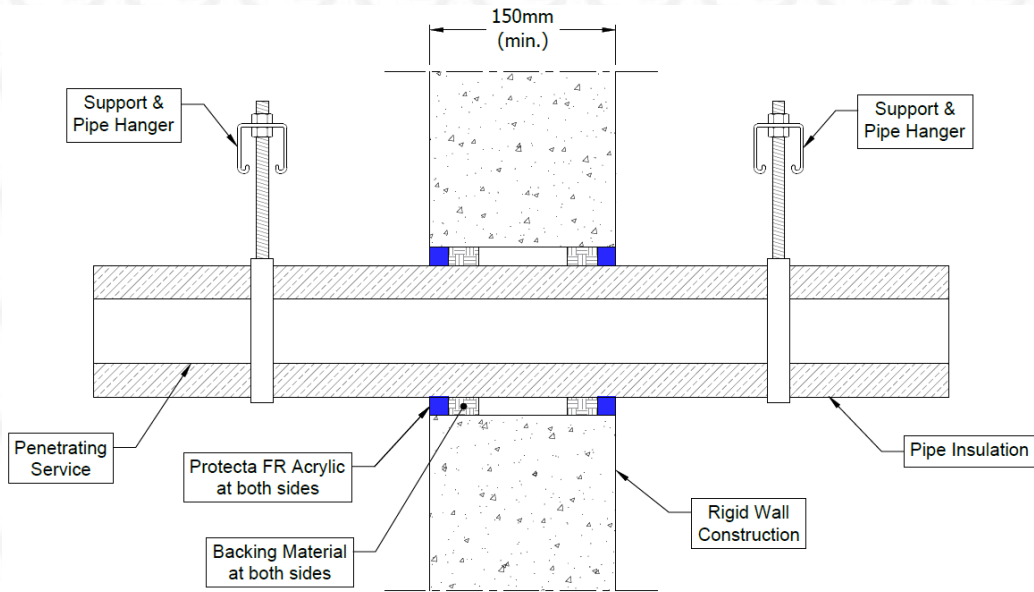
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## Double side penetration seal with metallic pipes

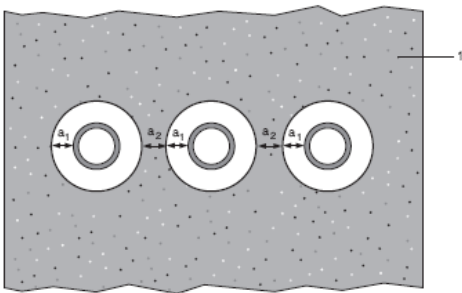
**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm Protecta FR Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:



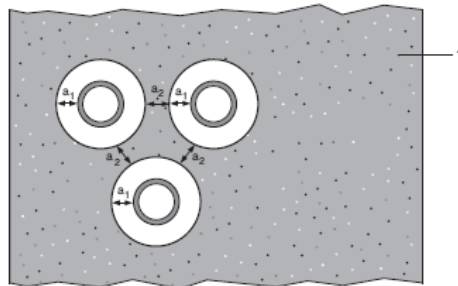
Configuration 1:

Option 1



Configuration 2:

Option 2



### Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation



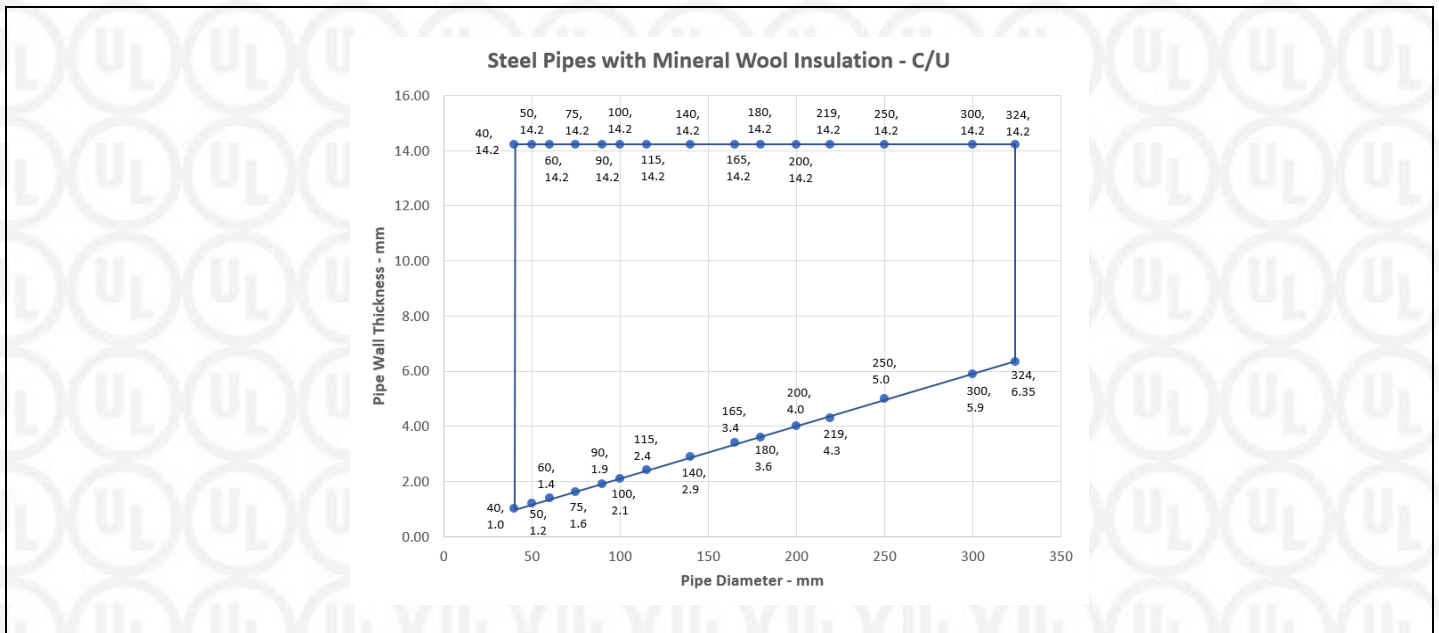
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## Double side penetration seal with pipes

Services	Insulation	Classification
<b>Mild or stainless steel pipe</b>		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	<b>EI 240 C/U</b>
40 mm diameter/1-14.2 mm wall*		
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		

\* Typical pipe diameters shown, see below graph for intermediate sizes





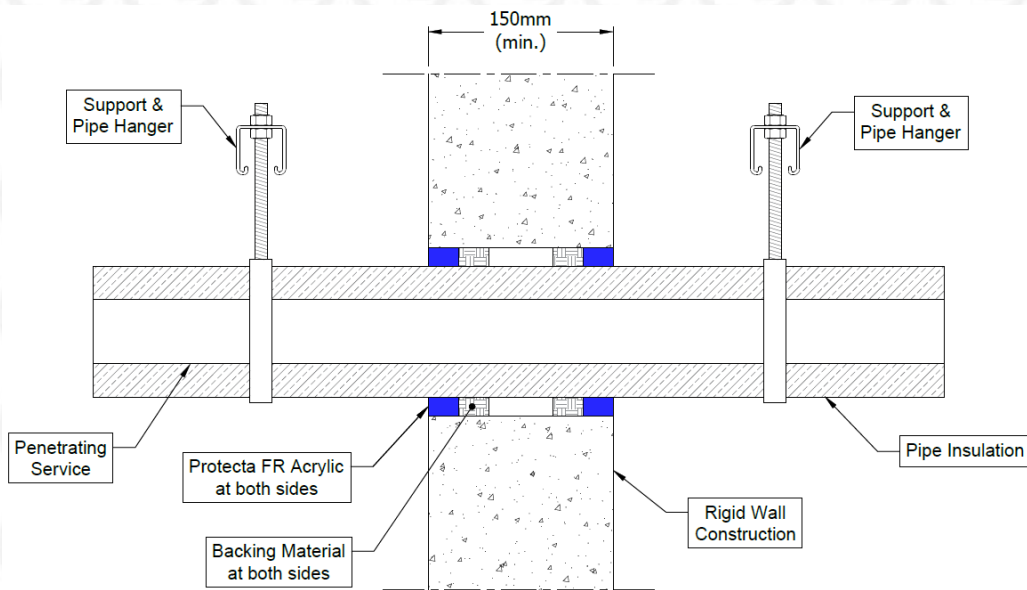
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## Double side penetration seal with metallic pipes with combustible insulation

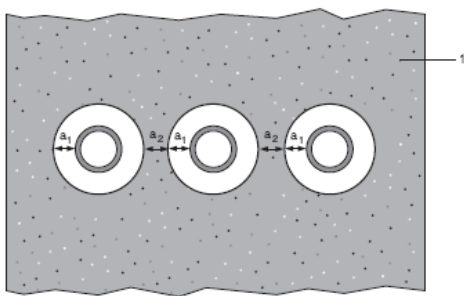
**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm Protecta FR Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø

Construction details:



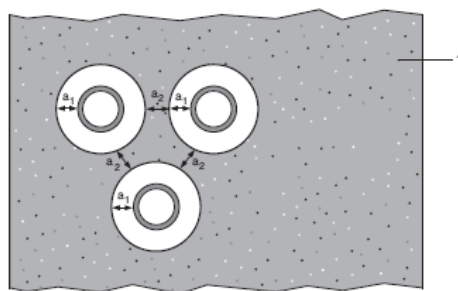
Configuration 1:

Option 1



Configuration 2:

Option 2



### Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation



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## Double side penetration seal with metallic pipes with combustible insulation

Services	Insulation	Classification
<b>Mild or stainless steel pipe</b>		
22 mm diameter/2-11 mm wall	13 mm thick Elastomeric insulation minimum class B-s3,d0	E 240 C/U, EI 180 C/U
22-114 mm diameter/2-14.2 mm wall	13-25 mm thick Elastomeric insulation minimum class B-s3,d0	E 120 C/U, EI 90 C/U
22-114 mm diameter/2-14.2 mm wall	25-50 mm thick Elastomeric insulation minimum class B-s3,d0	EI 60 C/U



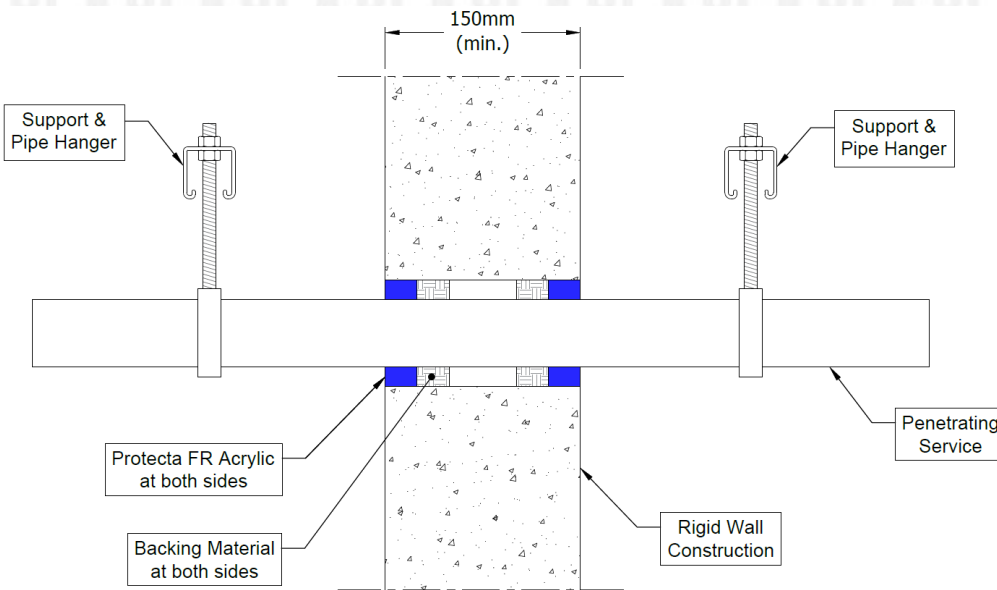
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## Double side penetration seal with plastic pipes

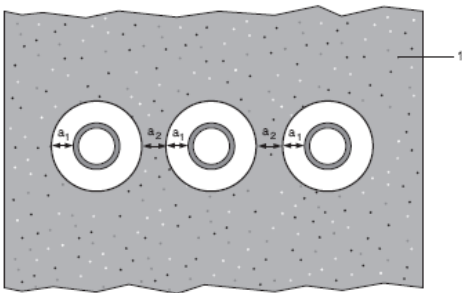
**Penetration Seal:** Plastic and metal pipes (single) fitted at any position within the aperture, with 25 mm Protecta FR Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø

Construction details:



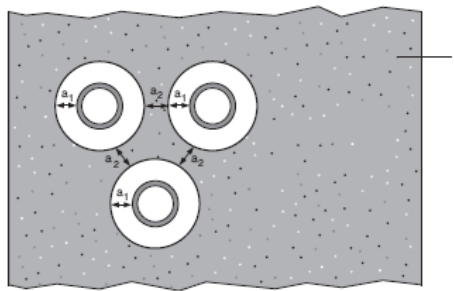
Configuration 1:

Option 1



Configuration 2:

Option 2



### Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation



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## Double side penetration seal with plastic pipes

Pipe material	Size	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	6-32 mm diameter/1.0-2.4 mm wall	EI 240 U/C
PVC with bundle of cables up to 21 mm diameter	6-32 mm diameter/1.0-2.4 mm wall	E 240 U/C, EI 120 U/C
PVC with bundle of cables up to 21 mm diameter	40 mm diameter/3.0 mm wall	E 240 U/C, EI 120 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078	32 mm diameter/2.0-4.4 mm wall	EI 180 C/U
	12-32 mm diameter/1.8-4.4 mm wall	EI 240 C/U
PP with bundle of cables up to 21 mm diameter	12-32 mm diameter/1.8-4.4 mm wall	E 180 U/C, EI 120 U/C
PP with bundle of cables up to 21 mm diameter	40 mm diameter/3.7 mm wall	E 180 U/C, EI 120 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1	20-32 mm diameter/2.0 mm wall	EI 240 C/U
	20-32 mm diameter/2.0-4.4 mm wall	EI 120 C/U
PE with bundle of cables up to 21 mm diameter	20-32 mm diameter/2.0-4.4 mm wall	EI 120 U/C
PE with bundle of cables up to 21 mm diameter	40 mm diameter/3.7 mm wall	EI 240 U/C
Copper and steel pipe	6-12 mm diameter/0.6-6.0 mm wall	E 240 C/C, EI 120 C/C
Steel pipe	4-65 mm diameter/1.0-14.2 mm wall	E 240 C/U, EI 20 C/U



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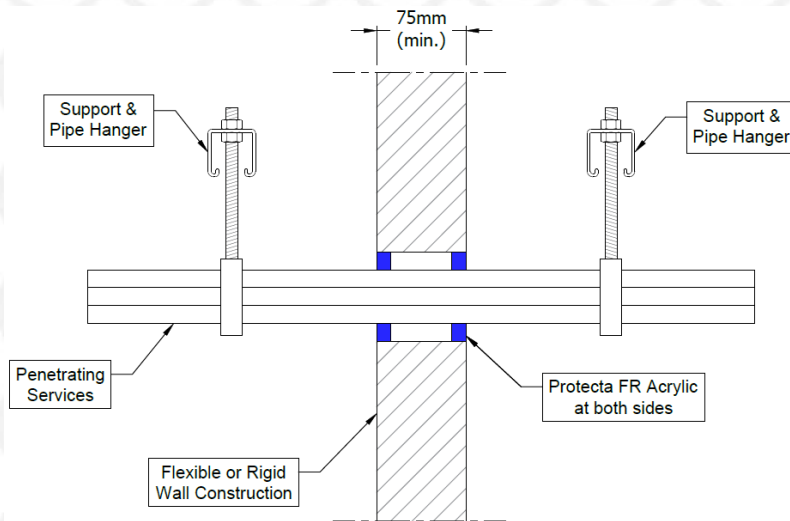
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Flexible and rigid wall constructions according to 2. 2) with wall thickness of minimum 75 mm

## Double side penetration seal with cables

**Penetration Seal:** Cables (single or bundles up to 100 mm Ø) and pipes fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 150 x 150 mm / 344 mm diameter (when incorporating a pipe of seal diameter -20 mm).

Construction details:



Services	Sealant depth	Backing	Classification
None (blank)	12.5 mm	Any material	EI 60
Cables up to 21 mm Ø, single		None	E 60, EI 45
Cables up to 21 mm Ø, in bundles up to 100 mm Ø			E 45, EI 30
<b>Mild or stainless steel pipe</b>			
4 mm diameter /0.7-2.0 mm wall	12.5 mm	None	E 60 C/U, EI 45 C/U
5-22 mm diameter /0.7-11 mm wall*			E 60 C/U, EI 30 C/U
<b>Mild or stainless steel pipe with minimum 80 kg/m<sup>3</sup> density stone wool insulation Continuous Sustained (CS)</b>			
40 mm diameter /1-14.2 mm wall, 20 mm insulation	12.5 mm	None	E 60 C/U, EI 45 C/U
40-324 mm diameter /1.0-14.2 mm wall, 30 mm insulation*			
<b>PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>			
6-32 mm Ø/1.0-1.8 mm wall, with bundle of cables up to 21 mm diameter*	12.5 mm	None	E 60 U/C, EI 45 U/C

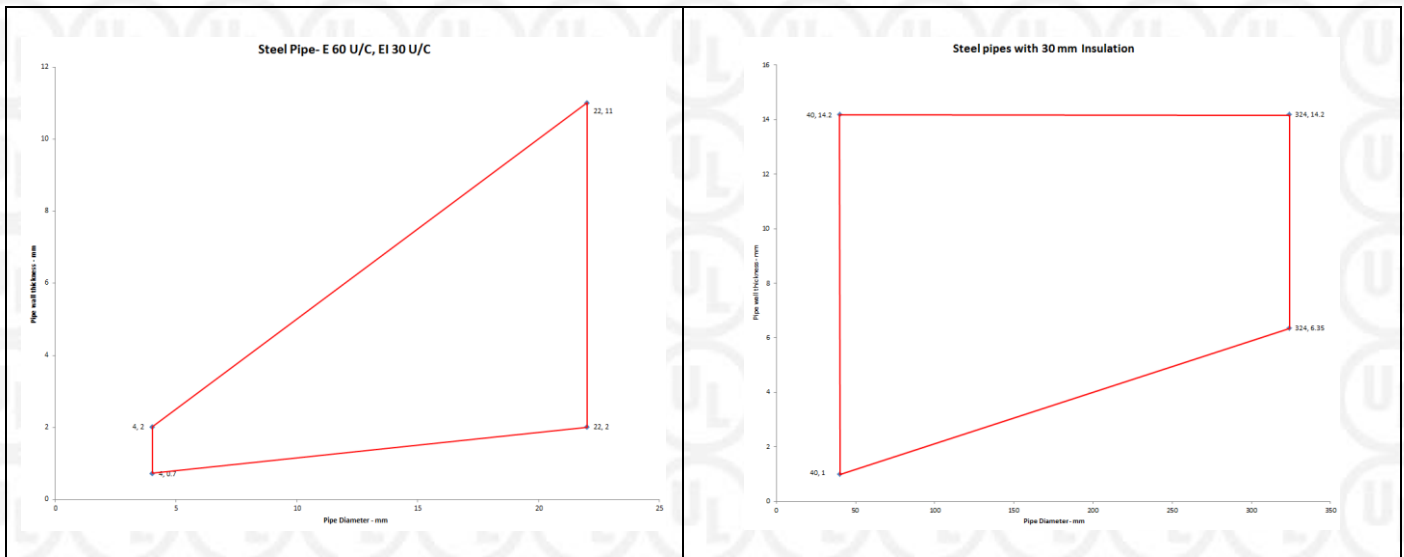


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Services	Sealant depth	Backing	Classification
<b>PP pipe according to EN 1451-1 or DIN 8077/8078</b>			
20 mm Ø/2.3 mm wall	12.5 mm	None	EI 45 U/C
21-32 mm Ø/2.3-4.4 mm wall*			EI 30 U/C
21-32 mm Ø/2.3-4.4 mm wall, with bundle of cables up to 21 mm diameter*			E 45 U/C, EI 30 U/C
<b>PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
20 mm Ø/2.0 mm wall	12.5 mm	None	EI 45 U/C
21-32 mm Ø/2.0-3.0 mm wall*			EI 30 U/C
21-32 mm Ø/2.0-3.0 mm wall, with bundle of cables up to 21 mm* diameter			E 45 U/C, EI 30 U/C

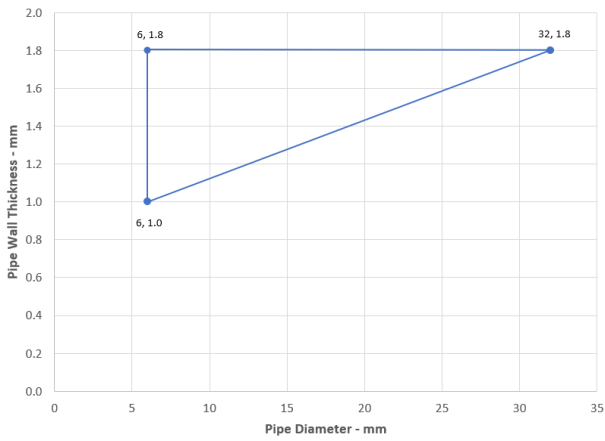
\* See below graphs for interpolated pipe sizes



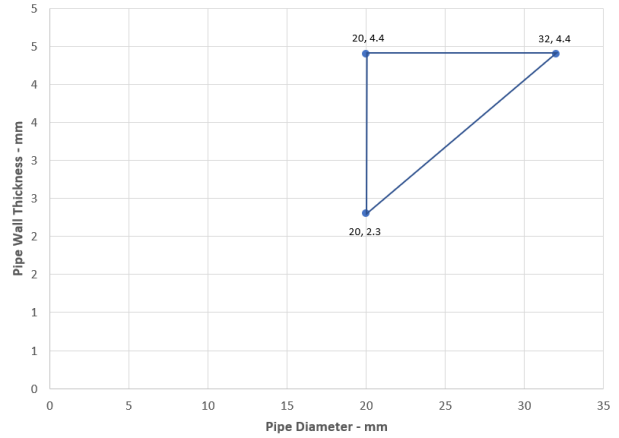
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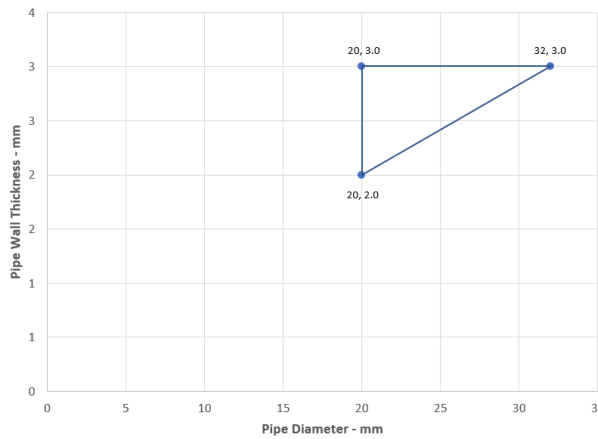
PVC-U Pipes - U/C



PP Pipes - EI 30 U/C



PE Pipes - EI 30 U/C



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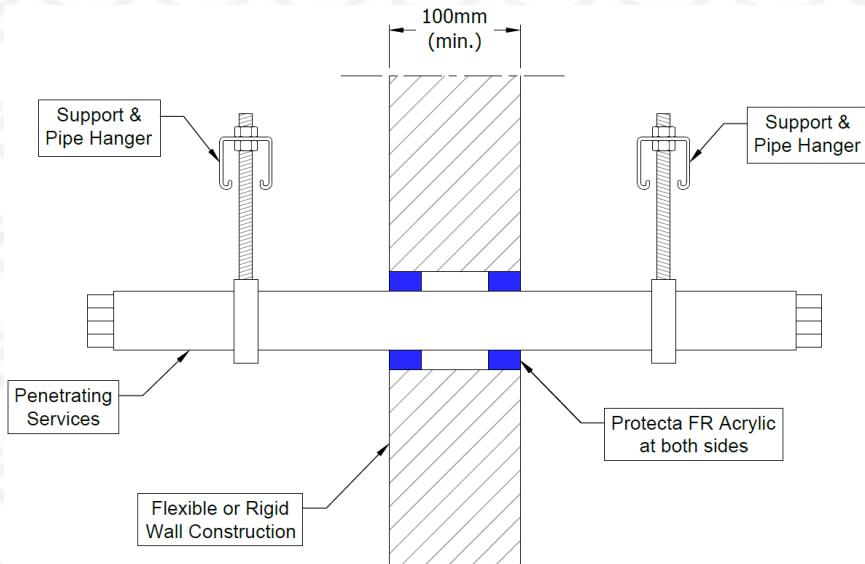
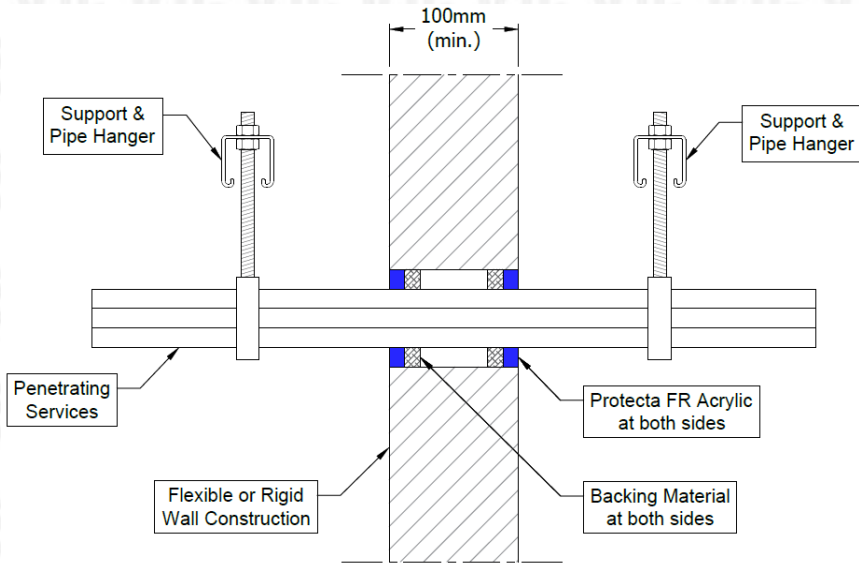
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Flexible and rigid wall constructions according to 2.2) with wall thickness of minimum 100 mm

## Double side penetration seal with cables

**Penetration Seal:** Cables (single or bundles up to 100 mm Ø) and conduits fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall.

Construction details:





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Services	Sealant depth	Backing	Maximum aperture	Classification
None (blank)	12.5 mm	Stone wool 20 mm deep 35-140 kg/m <sup>3</sup>	300 x 300 mm*	EI 120
Cables up to 21 mm Ø, single or in bundles up to 50 mm Ø	12.5 mm	Stone wool 12.5 mm deep min. 33 kg/m <sup>3</sup>		E 120, EI 90
Electrical cables up to 21 mm Ø, single or in bundles up to 100 mm Ø	25 mm	Stone wool 20 mm deep min. 40 kg/m <sup>3</sup>		EI 120
Electrical cables up to 80 mm Ø, single or in bundles up to 100 mm Ø		25 mm Protecta Mineral Fibre BIO		E 120, EI 60
Single 'E cable' - 1 x 185 mm <sup>2</sup> core HD603.3 electrical cable with PVC insulation, PVC sheath and 23-27 mm diameter	12.5 mm	Stone wool 20 mm deep min. 140 kg/m <sup>3</sup>		E 120, EI 60
Single or bundled electrical cables up to 21 mm Ø, with or without trays	12.5 mm	25 mm Protecta Mineral Fibre BIO	600 x 600 mm	E 90, EI 60
Single or bundled electrical cables up to 80 mm Ø, with or without trays				E 90, EI 30
Single or bundled electrical conduits up to 32 mm Ø, with or without trays				E 60, EI 45

\* Or 30 mm wide x 3000 mm high for cables up to 21 mm Ø

Services	Sealant depth	Backing	Maximum Annular space	Classification
<b>PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1</b>				
Maximum diameter 40 mm, wall thickness 1.0-1.9 mm for PVC pipes, fully or partially filled conduits with cables up to 21 mm diameter	25 mm	none	30 mm	EI 120 U/C
<b>PE pipe according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>				
Maximum diameter 40 mm, wall thickness 2.0-3.0 mm for PE pipes, fully or partially filled conduits with cables up to 21 mm diameter	25 mm	none	30 mm	EI 90 U/C
<b>PP pipe according to EN 1852-1: 2009 or DIN 8077/8078</b>				
Maximum diameter 40 mm, wall thickness 1.8-2.2 mm for PP pipes, fully or partially filled conduits with cables up to 21 mm diameter	25 mm	none	30 mm	EI 90 U/C



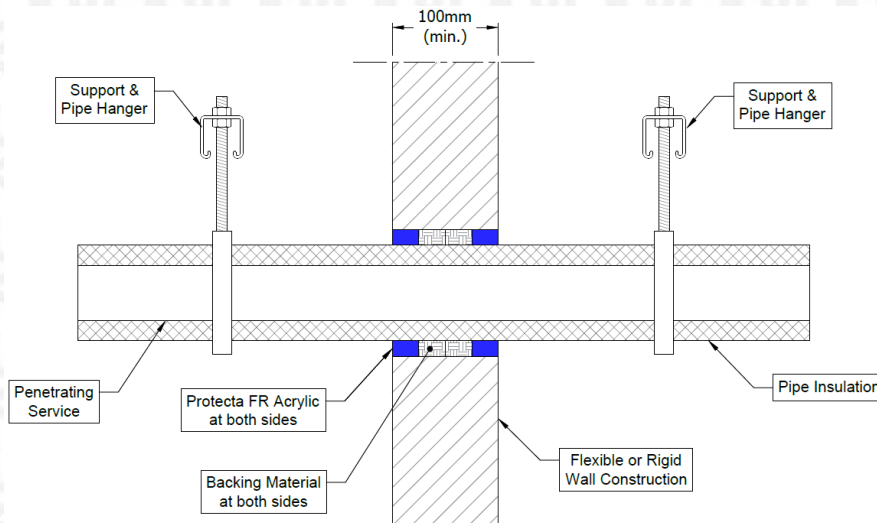
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## Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, backed with stone wool insulation or 'Protecta Mineral Fibre BIO', 300 x 300 mm maximum seal size.

Construction details:



Services	Sealant depth	Backing (minimum)	Insulation	Classification	
<b>Mild or stainless steel pipe</b>					
22 mm diameter/3-10 mm wall	25 mm	Stone wool 25 mm deep 35 kg/m <sup>3</sup>	None	<b>EI 120 C/C</b>	
Maximum 165 mm diameter/ wall*	12.5 mm	12.5 mm stone wool 33 kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	<b>E 90 C/U</b> <b>EI 45 C/U</b>	
			13 -25 mm Elastomeric insulation minimum class D-s3, d0	<b>EI 60 C/U</b>	
40 mm diameter/1-14.2 mm wall*	12.5 mm	20 mm Stone wool 40 kg/m <sup>3</sup>	13 -19 mm Elastomeric insulation minimum class B-s3,d0	<b>EI 120 C/C</b>	
40 mm diameter/1-14.2 mm wall*	25 mm	25 mm Protecta Mineral Fibre BIO			<b>E 120 C/C</b> <b>EI 60 C/C</b>
50 mm diameter/1.3-14.2 mm wall*					
60 mm diameter/1.6-14.2 mm wall*					
75 mm diameter/2-14.2 mm wall*					
90 mm diameter/2.4-14.2 mm wall*					
100 mm diameter/2.7-14.2 mm wall*					
115 mm diameter/3.1-14.2 mm wall*					
140 mm diameter/3.8-14.2 mm wall*					
165 mm diameter/4.5-14.2 mm wall*					

\* Typical pipe diameters shown, see below graph for intermediate sizes

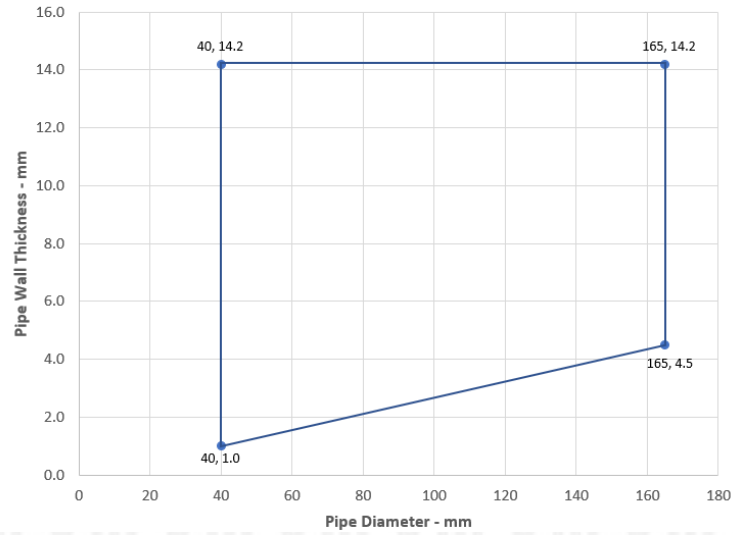
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Steel Pipes with Elastomeric Insulation - C/U



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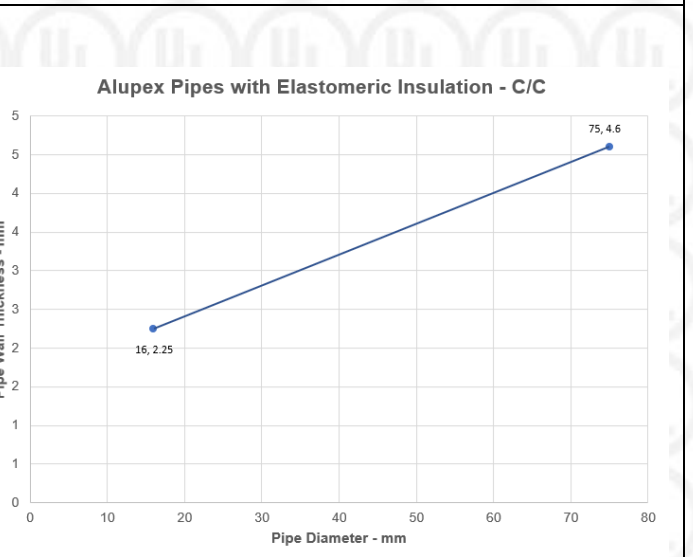
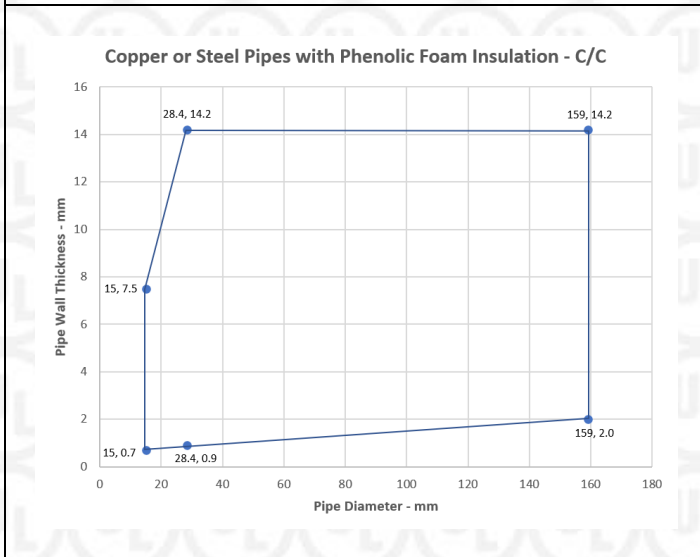
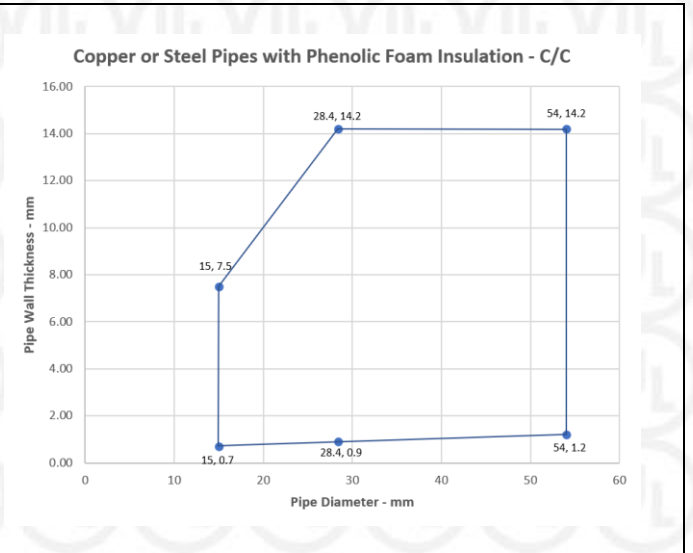
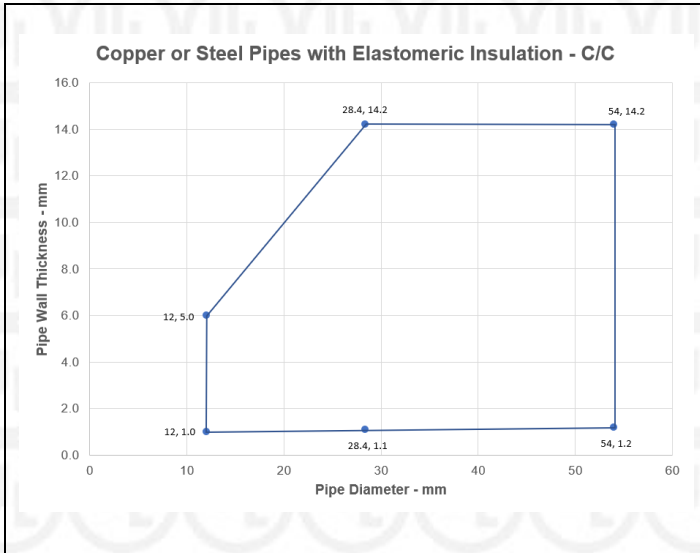
Services	Sealant depth	Backing	Insulation	Classification	
<b>Copper or steel pipe</b>					
12 mm diameter/1-6 mm wall	25 mm	25 mm Protecta Mineral Fibre BIO	9 mm Elastomeric insulation minimum class B-s3,d0	<b>EI 120 C/C</b>	
12-54 mm diameter/1-14.2 mm wall*			9-18 mm Elastomeric insulation minimum class B-s3,d0	<b>E 120 C/C, EI 60 C/C</b>	
12-54 mm diameter/1-14.2 mm wall*			19 mm Elastomeric insulation minimum class B-s3,d0	<b>E 120 C/C, EI 90 C/C</b>	
12-54 mm diameter/1-14.2 mm wall*			20-25 mm Elastomeric insulation minimum class B- s3,d0	<b>EI 60 C/C</b>	
15-54 mm diameter/0.7-14.2 mm wall*		None required	15 mm Phenolic foam insulation	<b>E 120 C/C, EI 60 C/C</b>	
15-54 mm diameter/0.7-14.2 mm wall*			16-30 mm Phenolic foam insulation	<b>E 90 C/C, EI 60 C/C</b>	
15-159 mm diameter/0.7-14.2 mm wall*			15-100 mm Phenolic foam insulation	<b>E 45 C/C, EI 30 C/C</b>	
15-159 mm diameter/0.7-14.2 mm wall*		25 mm around one layer of Protecta FR Pipe Wrap (1.8 x 50 mm)	100 mm Phenolic foam insulation	<b>EI 60 C/C</b>	
<b>Alupex Composite Pipe</b>					
16 mm diameter/ wall*		12.5 mm	12.5 mm stone wool 33 kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	<b>E 120 C/C EI 90 C/C</b>
Maximum 75 mm diameter/ wall*	13-24 mm Elastomeric insulation minimum class D-s3, d0			<b>E 90 C/C EI 60 C/C</b>	
	25 mm Elastomeric insulation minimum class D-s3, d0			<b>EI 90 C/C</b>	
16 mm diameter/2.25 mm wall	25 mm	25 mm Protecta Mineral Fibre BIO	9 mm Elastomeric insulation minimum class B-s3,d0	<b>EI 120 C/C</b>	
16 mm diameter/2.25 mm wall			9-25 mm Elastomeric insulation minimum class B- s3,d0	<b>EI 60 C/C</b>	
20 mm diameter/2.5 mm wall					
26 mm diameter/3 mm wall					
32 mm diameter/3 mm wall					
40 mm diameter/3.5 mm wall					
50 mm diameter/4 mm wall					
63 mm diameter/4.5 mm wall					
75 mm diameter/4.7 mm wall					

\* Typical pipe diameters shown, see below graph for intermediate sizes



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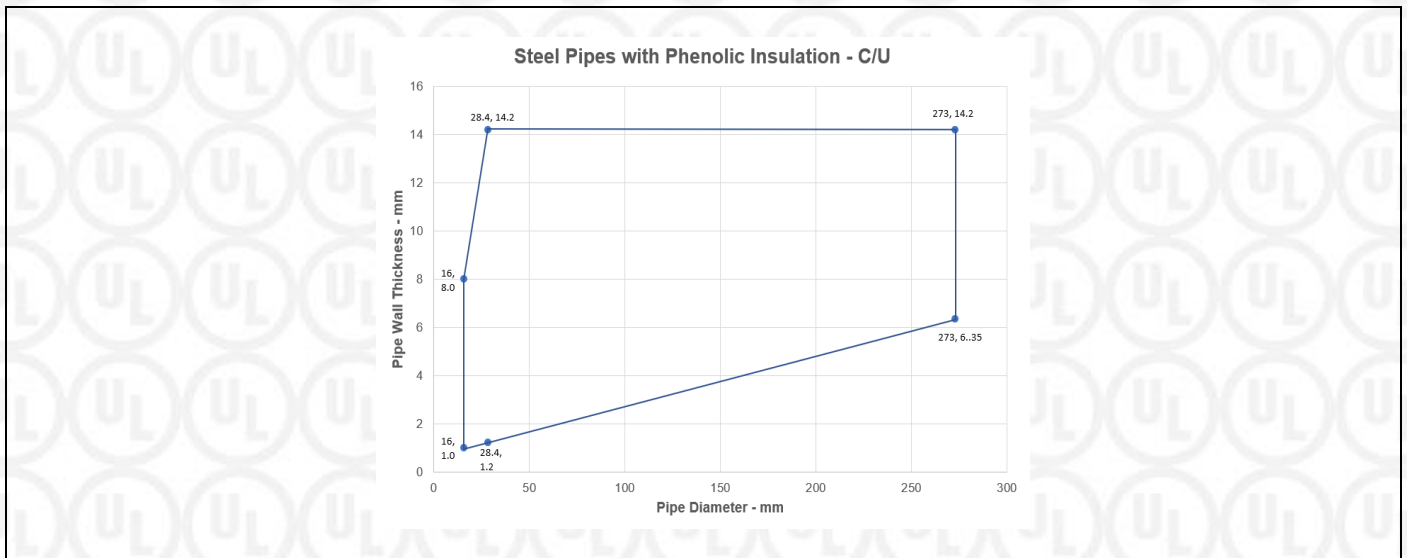


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Services	Sealant depth	Backing (minimum)	Insulation	Classification
Mild or stainless steel pipe	25 mm	None	15 mm thick phenolic insulation	EI 90 C/U
16 mm diameter/ wall*			25 mm thick phenolic insulation	E 90 C/U, EI 60 C/U
Maximum 273 mm/ wall*			26-100 mm thick phenolic insulation	EI 60 C/U

\* Typical pipe diameters shown, see below graph for intermediate sizes



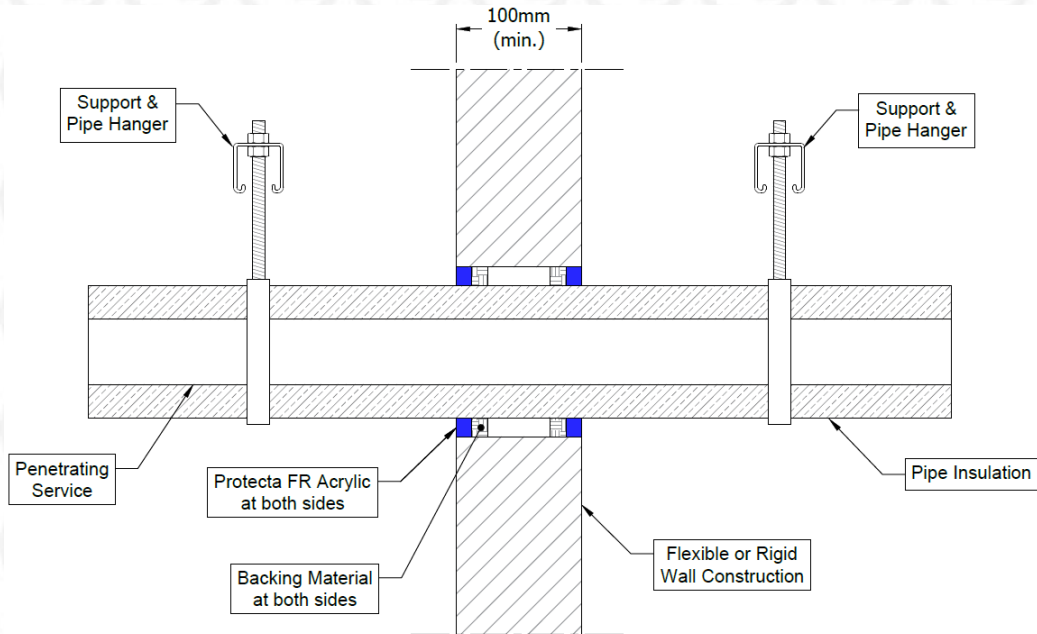
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## Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 12.5 mm Protecta FR Acrylic to both sides of the wall, backed with 12.5 mm deep stone wool insulation minimum 35 kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

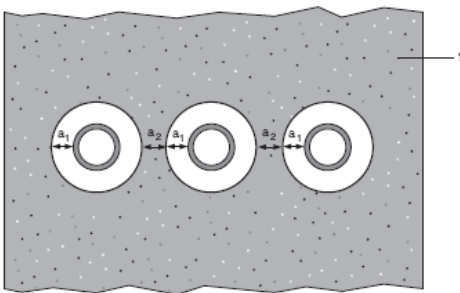
Construction details:



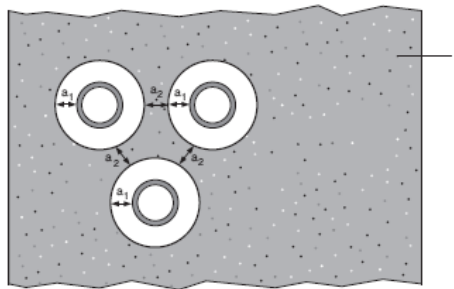
Configuration 1:

Configuration 2:

Option 1



Option 2



### Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

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## Double side penetration seal with pipes

Services	Insulation	Classification
<b>Mild or stainless steel pipe</b>		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	<b>E 120 C/U</b> <b>EI 90 C/U</b>
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*		
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		<b>EI 60 C/C</b>
12 mm diameter/0.6-6.0 mm wall	20 mm thick glass or stone, mineral wool min. 75 kg/m <sup>3</sup> (CS, or LS at 550 mm each side)	
40 mm diameter/1.1-14.2 mm wall*	30-60 mm thick glass or stone, mineral wool min. 75 kg/m <sup>3</sup> (CS, or LS at 550 mm each side)	
50 mm diameter/1.3-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.7-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.8-14.2 mm wall*		
165 mm diameter/ 3.2-14.2 mm wall*		
180 mm diameter/ 3.5-14.2 mm wall*		
200 mm diameter/ 3.8-14.2 mm wall*		
219 mm diameter/ 4.1-14.2 mm wall*		
250 mm diameter/ 4.6-14.2 mm wall*		
273 mm diameter/ 5.0-14.2 mm wall*		

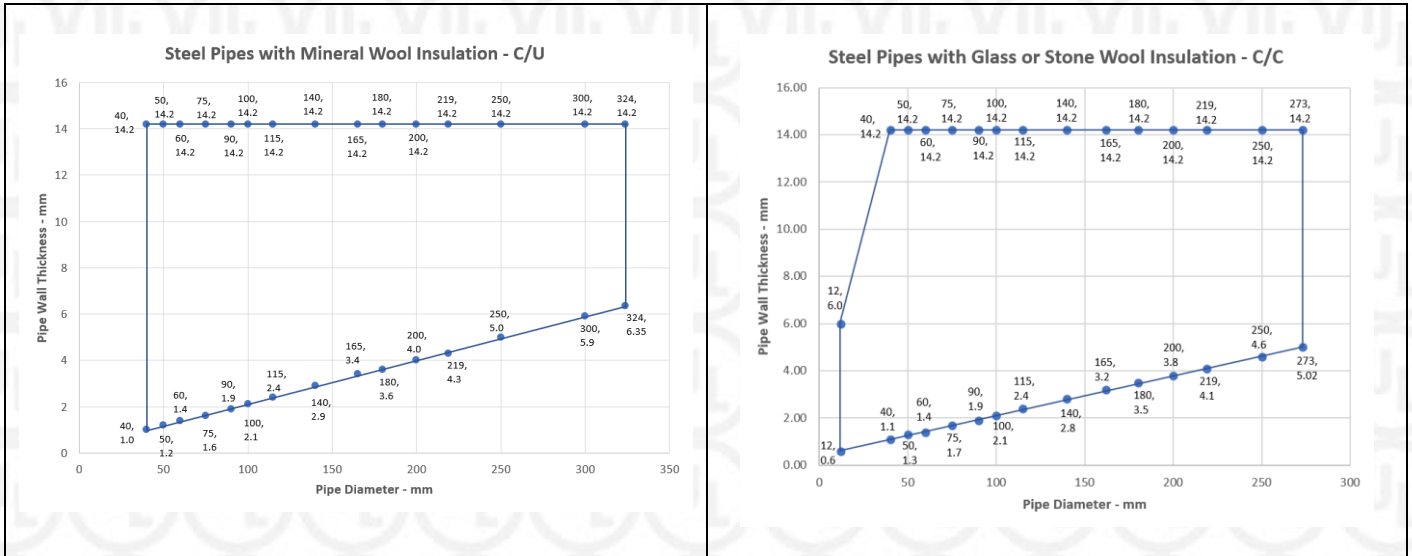
\* See below graphs for interpolated pipe sizes





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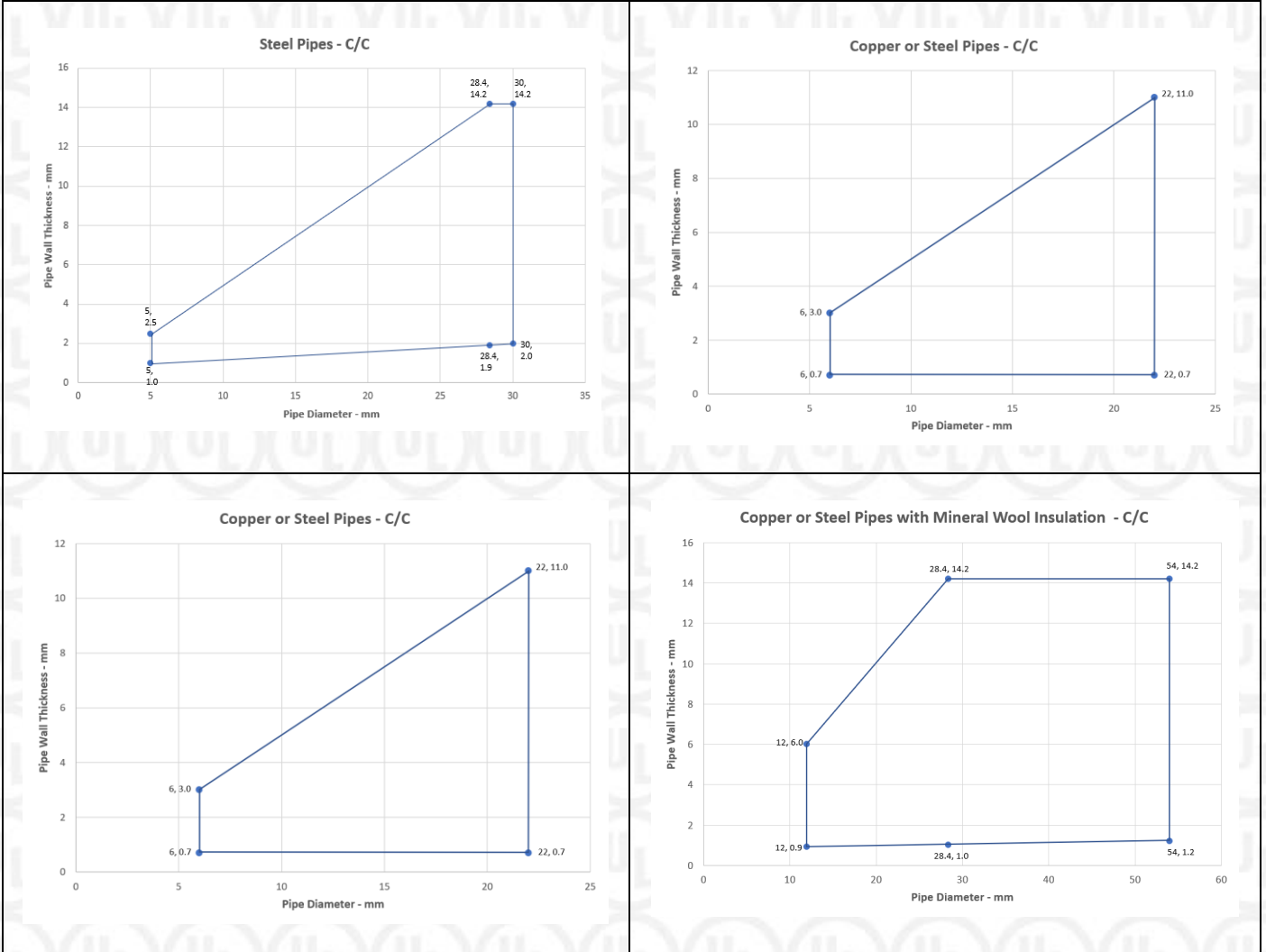
Services	Insulation	Classification
<b>PEX pipe in pipe system</b>		
15 mm diameter x 2.5 mm wall inner /25mm diameter outer	None	EI 120 C/C
<b>Alupex pipe</b>		
16-20 mm diameter/2.0 mm wall	None	EI 120 C/C
16-75 mm diameter/2.25-4.6 mm	20-50 mm thick glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup>	EI 120 C/C
16-75 mm diameter/2.25-4.7 mm	60 mm thick glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup>	EI 60 C/C
<b>Mild or Stainless Steel pipe</b>		
4 mm diameter/1.0-2.0 mm wall	None	EI 90 C/C
5-30 mm diameter/1.0-14.2 mm wall*		EI 120 C/U
30 mm diameter/2.0-14.2 mm wall		
<b>Copper or Steel pipe</b>		
6-12 mm diameter/0.7-6.0 mm wall*	None	E 90 C/C, EI 60 C/C
13-22 mm diameter/0.7-11 mm wall*		E 90 C/C, EI 30 C/C
12-54 mm diameter/0.9-14.2 mm wall*	20-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	E 120 C/C, EI 60 C/C
12-54 mm diameter/0.6-14.2 mm wall*	20-60 mm thick glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> (CS, or LS at 550 mm each side)	EI 60 C/C

\* See below graphs for interpolated pipe sizes



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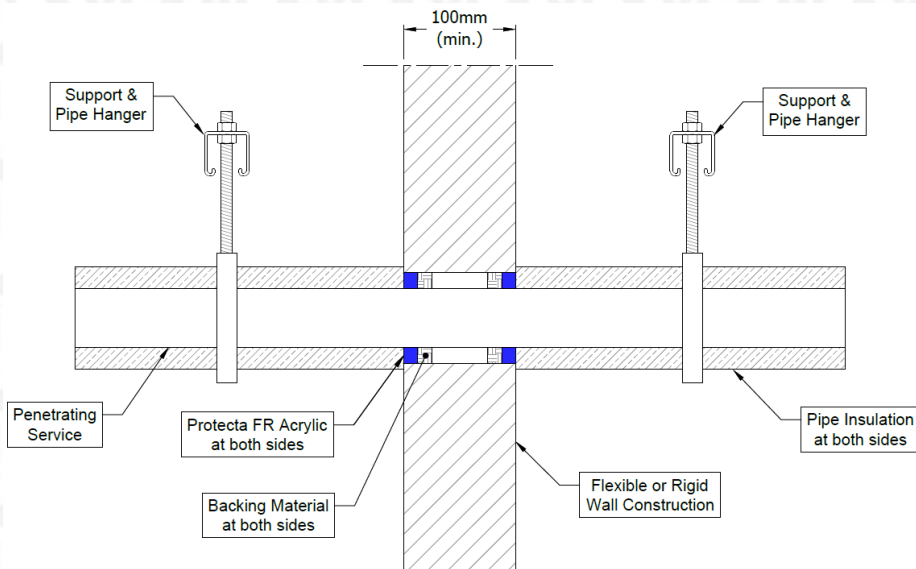
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## Double side penetration seal with composite pipes

**Penetration Seal:** CI (Continuous Interrupted) or LI (Locally Interrupted) insulated composite pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, minimum 10 mm seal width around service, maximum seal size 300 x 300 mm, backed with stonewool.

Construction details:



Services	Sealant depth	Backing (minimum)	Insulation (minimum)	Classification
<b>Alupex Composite Pipe</b>				
16 mm diameter/2.25 mm wall	12.5 mm	12.5 mm stonewool 40 kg/m <sup>3</sup>	20 mm stonewool 80 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	<b>EI 120 C/C</b>
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall	12.5 mm	12.5 mm stonewool 33 kg/m <sup>3</sup>	20 mm glass wool 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	<b>EI 120 C/C</b>
16 mm diameter/2.25 mm wall				
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				



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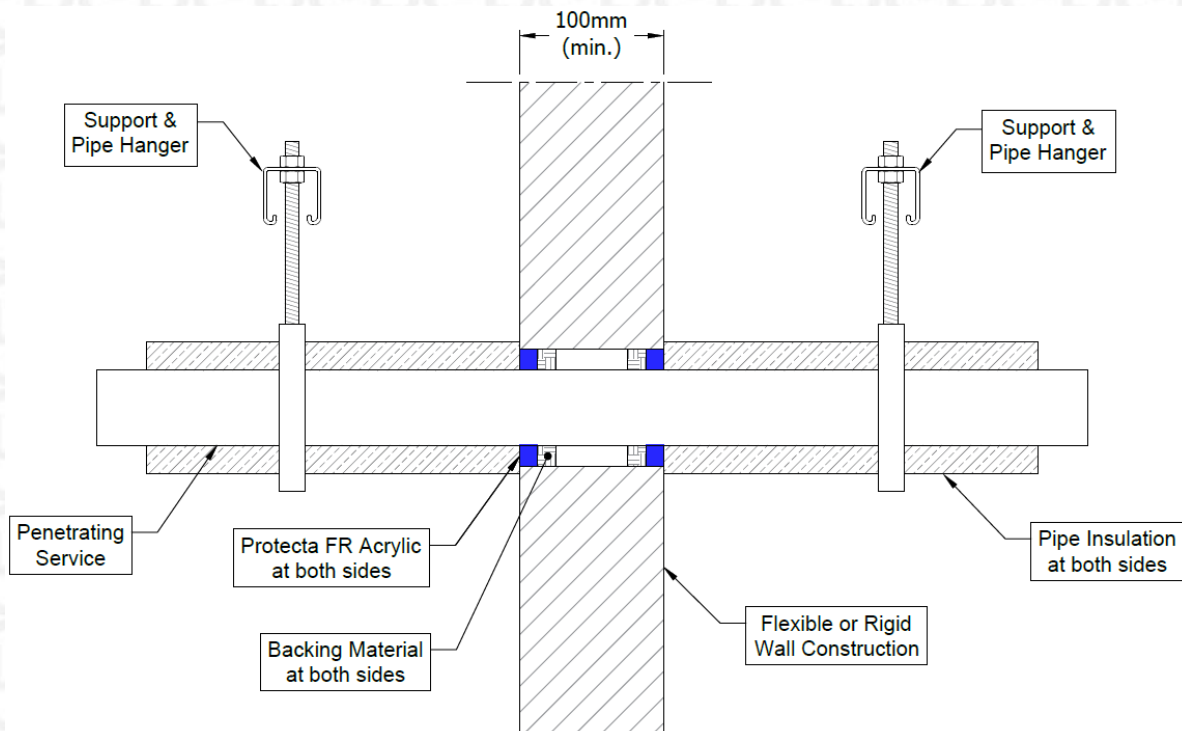
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## Double side penetration seal with metallic (and composite) pipes

**Penetration Seal:** LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic pipes and composite (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, min. 10 mm seal width around service, backed with stone wool insulation or 'Protecta Mineral Fibre BIO'.

Construction details:



Services	Sealant depth	Backing (minimum)	Insulation (minimum)	Classification
<b>Maximum aperture size 300 x 300 mm</b>				
Copper or steel pipe up to 54 mm diameter/1-14.2 mm wall	12.5 mm	20 mm Stone wool 40 kg/m <sup>3</sup>	500 mm length of 20 mm stone wool 80 kg/m <sup>3</sup>	<b>EI 120 C/U</b>
Copper or steel pipe up to 159 mm diameter/0.6-14.2 mm wall		12.5 mm stone wool 33 kg/m <sup>3</sup>	1000 mm length of 30 mm stone wool 80 kg/m <sup>3</sup>	<b>EI 60 C/C</b>
Copper or steel pipe up to 54 mm diameter/0.6-14.2 mm wall		12.5 mm stone wool 33 kg/m <sup>3</sup>	500 mm length of 20 mm glass wool 75 kg/m <sup>3</sup>	<b>E 120 C/C, EI 60 C/C</b>
Copper or steel pipe up to 108 mm diameter/0.6-14.2 mm wall		12.5 mm stone wool 33 kg/m <sup>3</sup>	500 mm length of 30 mm glass wool 75 kg/m <sup>3</sup>	<b>E 120 C/C, EI 30 C/C</b>
Alupex composite pipe 75 mm diameter/7.5 mm wall		20 mm Stone wool 140 kg/m <sup>3</sup>	600 mm length of 25 mm Protecta Mineral Fibre BIO	<b>EI 60 C/U</b>

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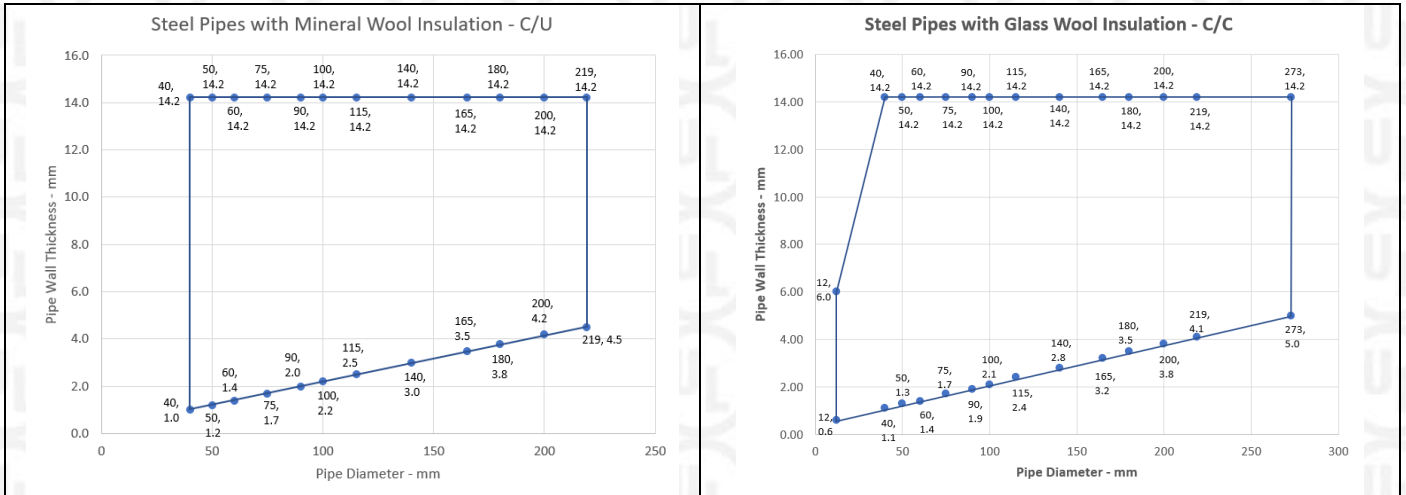
Services	Sealant depth	Backing (minimum)	Insulation (minimum)	Classification
Mild or stainless steel pipe				
Maximum aperture size 300 x 300 mm				
40 mm diameter/1-14.2 mm wall	12.5 mm	20mm Stone wool 40 kg/m <sup>3</sup>	500 mm length of 20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/U
40 mm diameter/1-14.2 mm wall*			500 mm length of 30 mm stone wool 80 kg/m <sup>3</sup>	
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*	12.5 mm	20mm Stone wool 40 kg/m <sup>3</sup>	500 mm length of 30 mm stone wool 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				
12 mm diameter/0.6-6.0 mm wall	12.5 mm	12.5mm Stone wool 33 kg/m <sup>3</sup>	500 mm length of 30 mm glass wool 75 kg/m <sup>3</sup>	E 120 C/C, EI 60 C/C
40 mm diameter/1.1-14.2 mm wall*				
50 mm diameter/1.3-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/1.9-14.2 mm wall*				
100 mm diameter/2.1-14.2 mm wall*				
115 mm diameter/2.4-14.2 mm wall*				
140 mm diameter/2.8-14.2 mm wall*				
165 mm diameter/3.2-14.2 mm wall*				
180 mm diameter/3.5-14.2 mm wall*				
200 mm diameter/3.8-14.2 mm wall*				
219 mm diameter/4.1-14.2 mm wall*				
273 mm diameter/5.0-14.2 mm wall*				

\* Typical pipe diameters shown, see below graph for intermediate sizes



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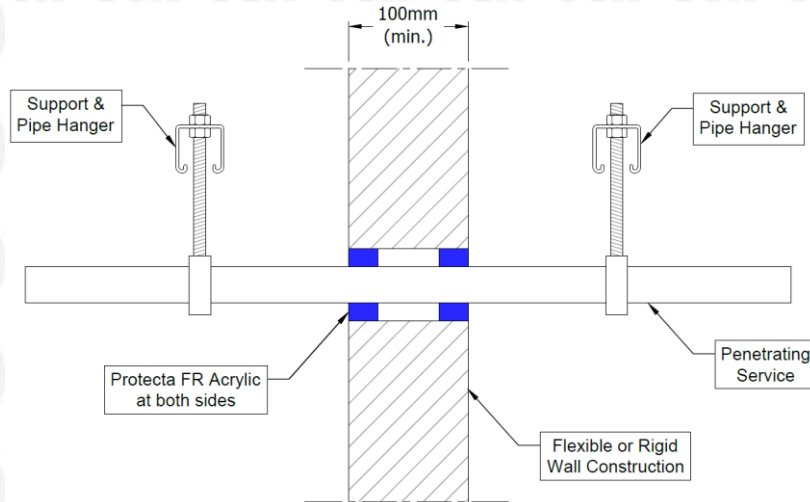
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## Double side penetration seal with plastic pipes

**Penetration Seal:** Combustible pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, Minimum annular space 10 mm and minimum separation between penetration seals 30 mm (A2).

Construction details:



Pipe material	Sealant depth	Pipe size	Maximum Annular space	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	25 mm	6-32 mm Ø/1.0-2.4 mm wall*	10 mm	EI 120 U/C
		6-32 mm Ø/1.0-1.6 mm wall	30 mm	E 120 U/C, EI 90 U/C
20 mm Ø/2.2 mm wall		EI 120 C/C		
PP pipe according to EN 1451-1 or DIN 8077/8078		20 mm Ø/2.2-4.4 mm wall	30 mm	EI 60 U/C
		20-32 mm Ø/1.8-4.4 mm wall	30 mm	EI 60 C/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1		20 mm Ø/2.0 mm wall	30 mm	EI 120 U/C
		20-32 mm Ø/2.0-3.0 mm wall	30 mm	EI 90 C/C
Uponor Wirsbo PEX pipe in pipe system according to ISO 15875		Diameter up to 54 mm/0.4 mm wall thickness (outer pipe), 28 mm diameter/4.0 mm wall thickness (inner pipe)	30 mm	E 60 C/C, EI 45 C/C
Insulated pipe in pipe system according to ISO 15875		Diameter up to 34 mm/1.0 mm wall thickness (outer pipe), 22 mm diameter/3.0 mm wall thickness (inner pipe), insulated with 9 mm thick polyethylene foam	30 mm	EI 45 C/C

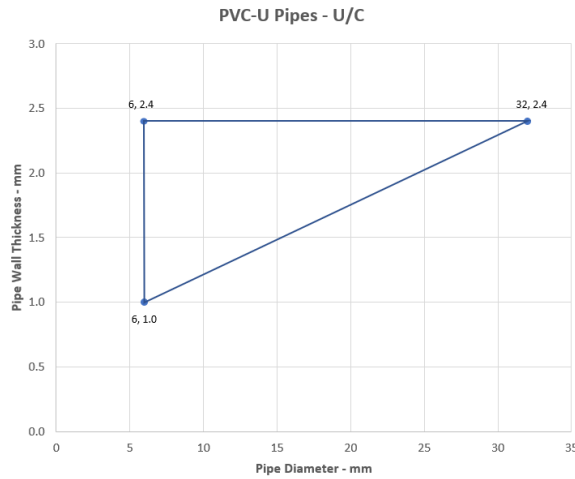
\* See below graphs for interpolated pipe sizes

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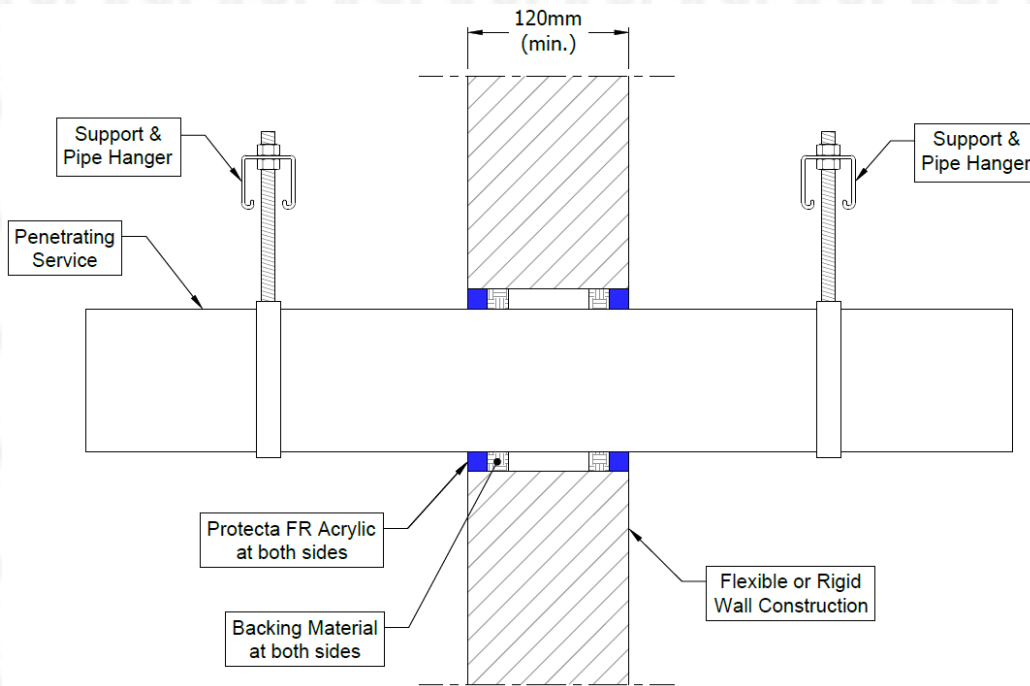
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Flexible and rigid wall constructions according to 2.2) with wall thickness of minimum 120 mm

## Double side penetration seal with cables

**Penetration Seal:** Non-insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Protecta FR Acrylic to both sides of the wall, backed with stone wool insulation.

Construction details:



Services	Sealant depth	Backing	Classification
<b>Mild or stainless steel pipe</b>			
30 -324 mm diameter /1.6-14.2 mm wall	15 mm	15 mm stone wool	E 120 C/U
<b>Copper or steel pipe</b>			
12 -54 mm diameter /0.9-14.2 mm wall	15 mm	15 mm stone wool	E 120 C/C
<b>Alupex Pipe</b>			
16-75 mm diameter/2.0-4.6 mm wall	15 mm	15 mm stone wool	E 120 C/C, EI 30 C/C



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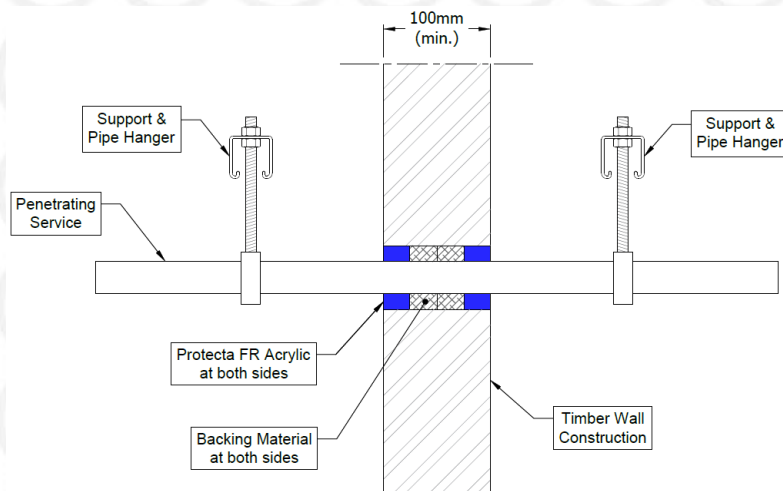
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**Timber wall constructions with wall thickness of minimum 100 mm**

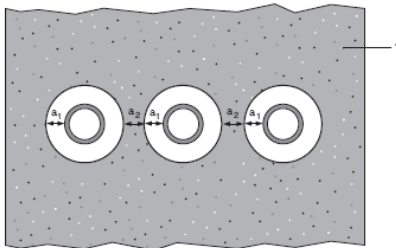
**Double side penetration seal with cables**

**Penetration Seal:** Cables fitted at any position within the aperture, sealed with Protecta FR Acrylic, minimum 25 mm deep to both sides of the wall and backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



**Key**

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

Services	Sealant depth	Backing	Maximum aperture	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 180 mm	EI 120
Cables up to 14 mm Ø, single or in bundles up to 100 mm Ø				EI 90
Cables up to 21 mm Ø, single or in bundles up to 100 mm Ø				E 90, EI 30
Cables up to 50 mm Ø, single or in bundles up to 100 mm Ø				E 90, EI 30
Telecom cables up to 14 mm Ø, single or in bundles up to 100 mm Ø				E 90, EI 60

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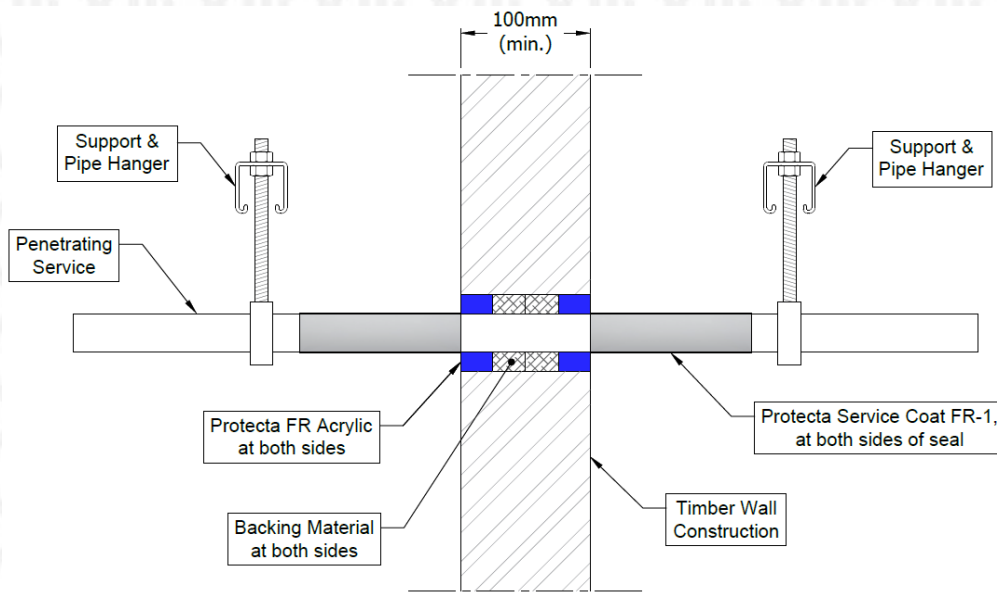
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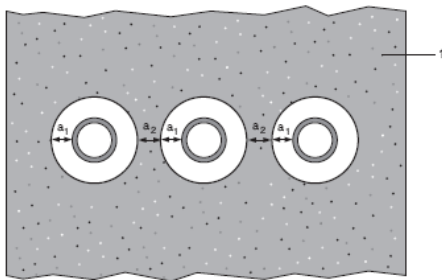
## Double side penetration seal with cables and Protecta Service Coat FR-1

**Penetration Seal:** Cables fitted at any position within the aperture with Protecta Service Coat FR-1, sealed with Protecta FR Acrylic, minimum 25 mm deep to both sides of the wall and backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



### Key

1 Supporting construction

a1 Pipe / edge of seal separation (annular space)

a2 Separation between penetration seals

Services	Sealant depth	Backing	Maximum aperture	Insulation, minimum	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 180 mm	Protecta Service Coat FR-1, 260-micron DFT extending 150 mm from both sides of the seal	EI 120
Cables up to 21 mm Ø, single					EI 90
Cables up to 50 mm Ø, single or in bundles up to 100 mm Ø					E 90, EI 60



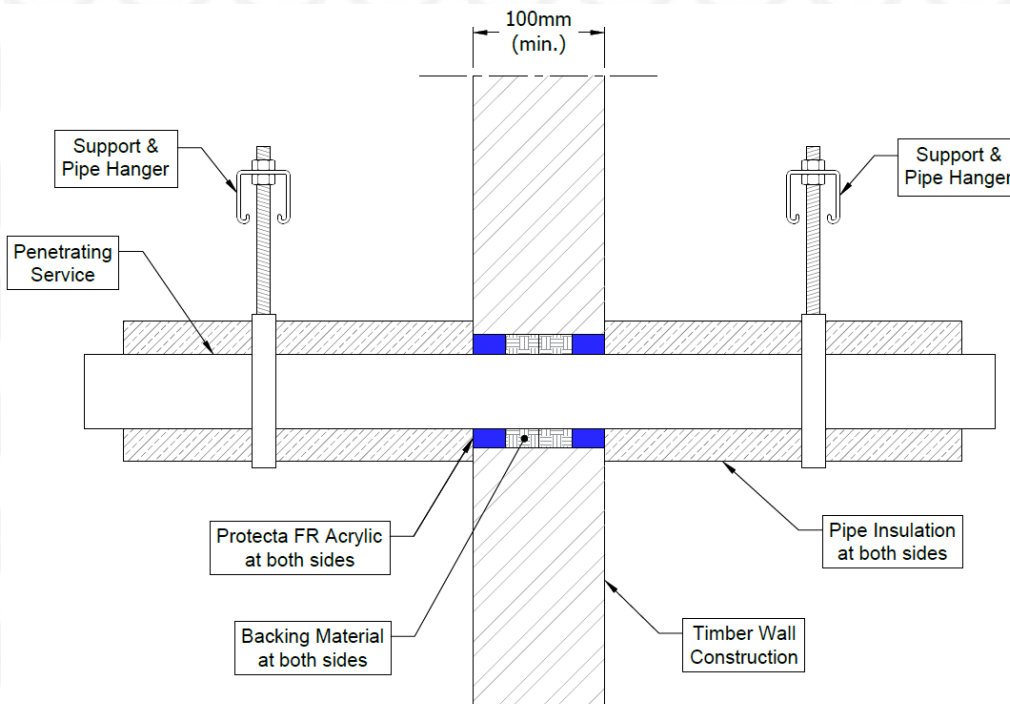
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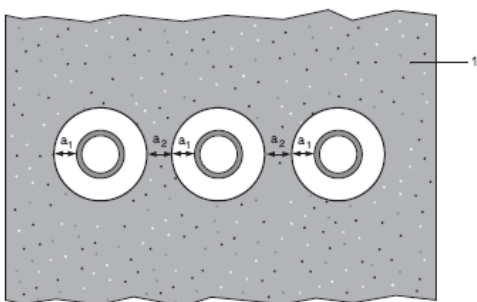
## Double side penetration seal with metallic pipes

**Penetration Seal:** 500 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes and composite pipes (single) with glass wool or stone, mineral wool min. 75 kg/m<sup>3</sup>, fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



### Key

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

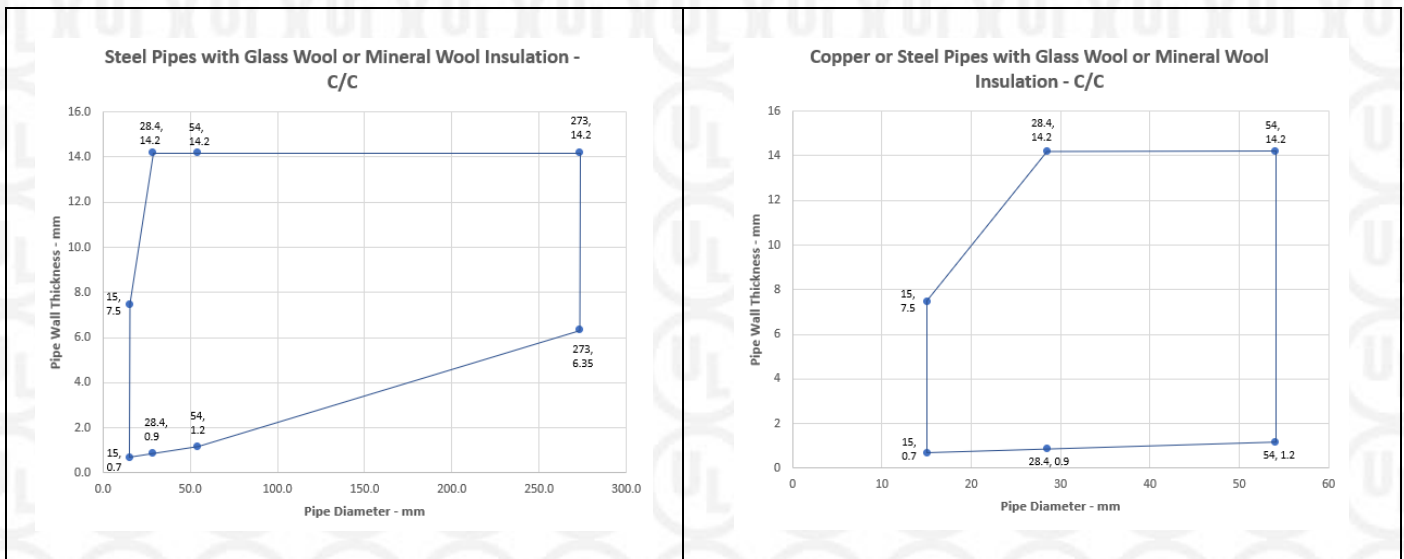


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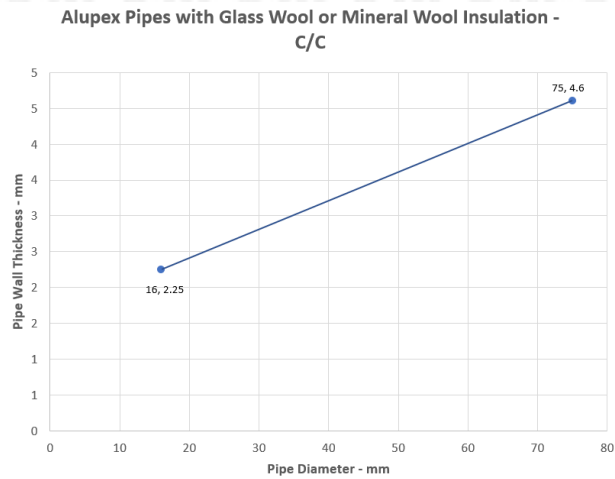
Services	Maximum aperture	Sealant depth	Backing	Insulation, minimum	Classification
<b>Mild or stainless steel pipe</b>					
Maximum 273 mm diameter / 6.35-14.2 mm wall*	Ø 293 mm	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	25 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	E 90 C/C, EI 60 C/C
<b>Copper or steel pipe</b>					
Maximum 54 mm diameter / 1.2-14.2 mm wall*	Ø 180 mm	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	20 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	E 90 C/C, EI 60 C/C
<b>Alupex Pipe</b>					
Maximum 75 mm diameter / wall 2.25-4.6 mm wall*	Ø 180 mm	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	25 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	EI 90 C/C

\* Typical pipe diameters shown, see below graph for intermediate sizes



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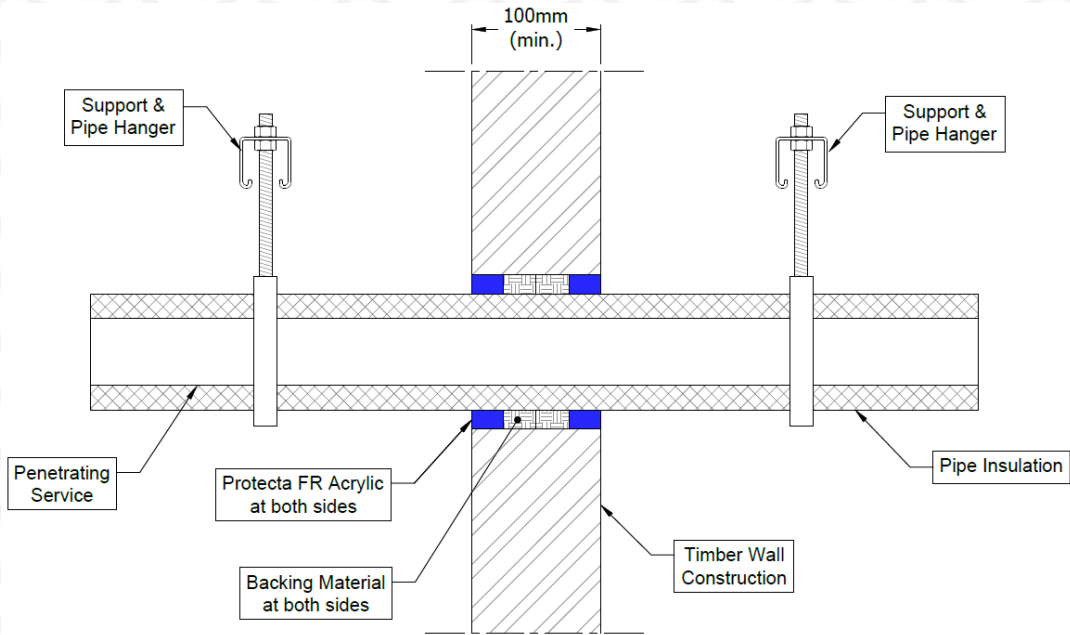
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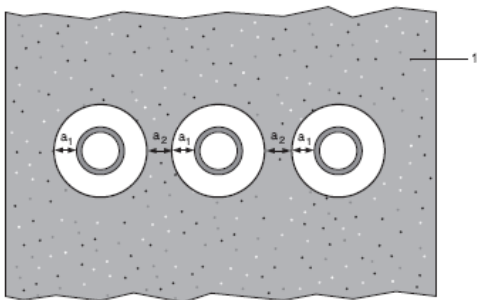
## Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, min. 10 mm seal width around service, backed with stone, mineral wool min. 33 kg/m<sup>3</sup>. Minimum annular space 10 mm and maximum 30 mm (a1), and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



### Key

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

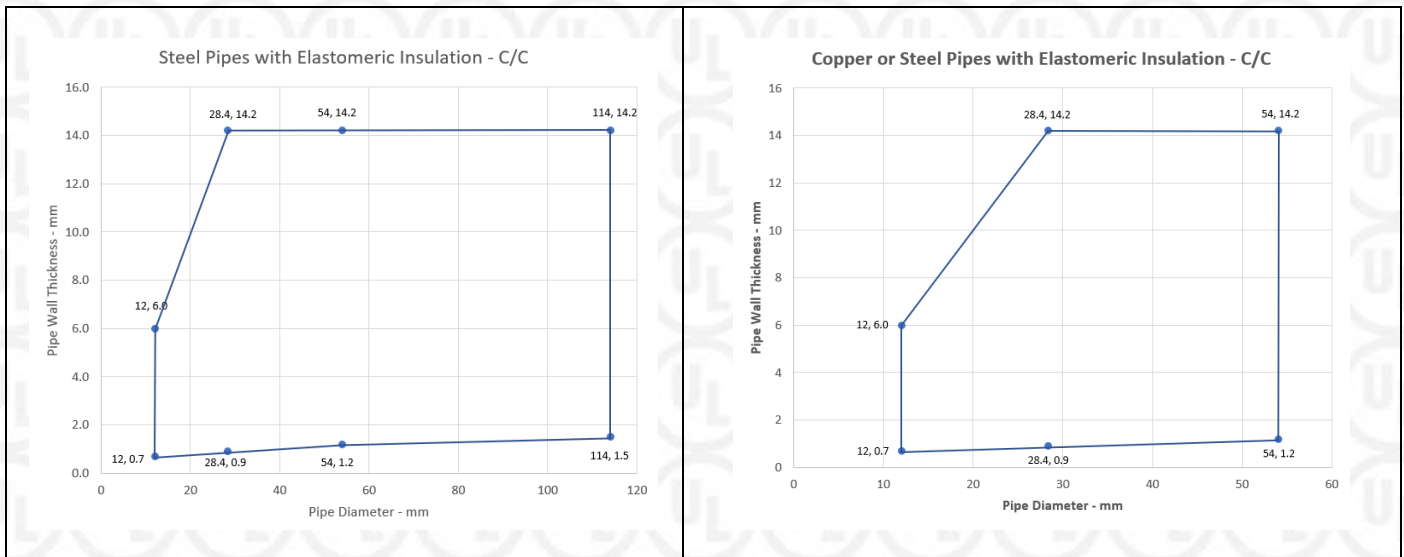


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Services	Sealant depth	Backing	Insulation, minimum	Classification
<b>Mild or stainless steel pipe</b>				
Maximum 114 mm diameter /1.5-14.2 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	9-25 mm Elastomeric insulation minimum class D-s3, d0	EI 30 C/U
<b>Copper or steel pipe</b>				
Maximum 12 mm diameter /0.7-6 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	E 90 C/C, EI 60 C/C
Maximum 54 mm diameter /1.2-14.2 mm wall*			10-25 mm Elastomeric insulation minimum class D-s3, d0	E 60 C/C, EI 30 C/C
Maximum 54 mm diameter /1.2-14.2 mm wall*				E 30 C/C, EI 20 C/C
<b>Alupex Pipe</b>				
Maximum 16 mm diameter/wall 2.25 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	9 mm Elastomeric insulation minimum class D-s3, d0	EI 90 C/C
Maximum 75 mm diameter/wall 4.6 mm wall*			10-25 mm Elastomeric insulation minimum class D-s3, d0	E 60 C/C, EI 45 C/C
Maximum 75 mm diameter/wall 4.6 mm wall*				EI 45 C/C

\* Typical pipe diameters shown, see below graph for intermediate sizes

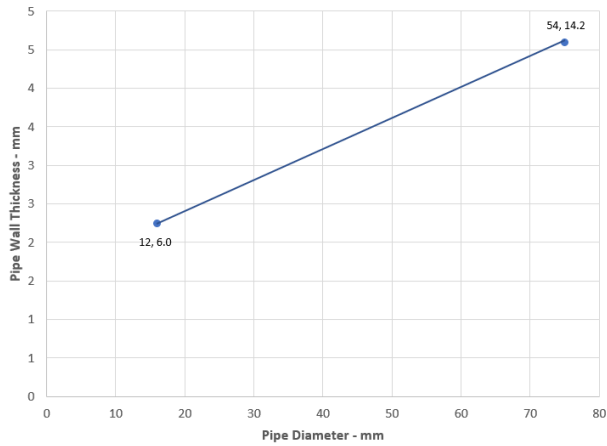




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Alupex Pipes with Elastomeric Insulation - C/C



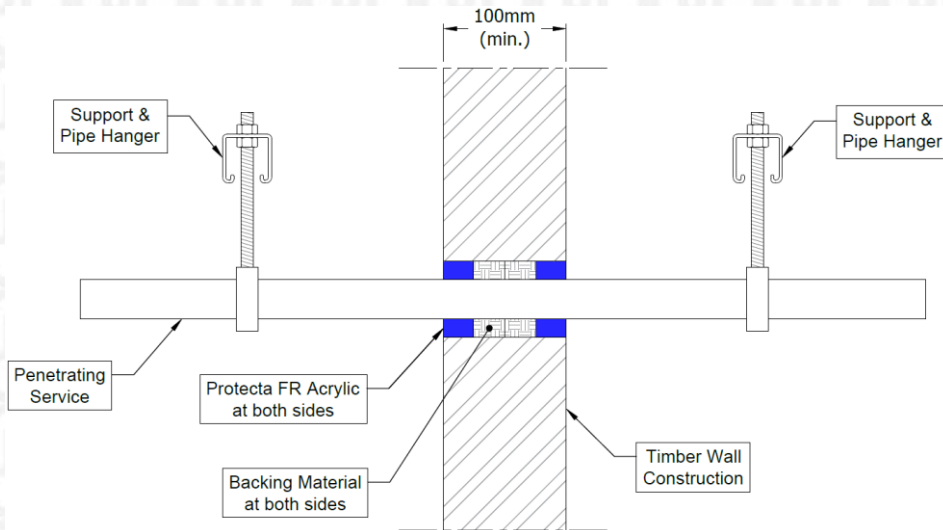
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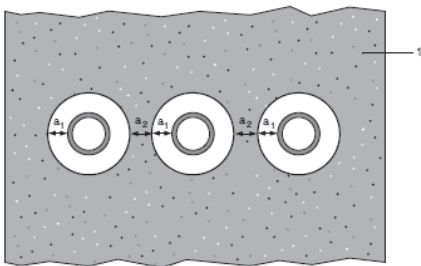
## Double side penetration seal with plastic pipes and composite pipes

**Penetration Seal:** Plastic and composite pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, backed with stone, mineral wool min. 33 kg/m<sup>3</sup>. Minimum annular space 10 mm and maximum 30 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



**Key**

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

Services	Sealant depth	Backing	Classification
<b>PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>			
Maximum 32 mm diameter/1.0-2.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 90 U/C</b>
<b>PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Maximum 32 mm diameter/2.0-3.0 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 90 U/C</b>

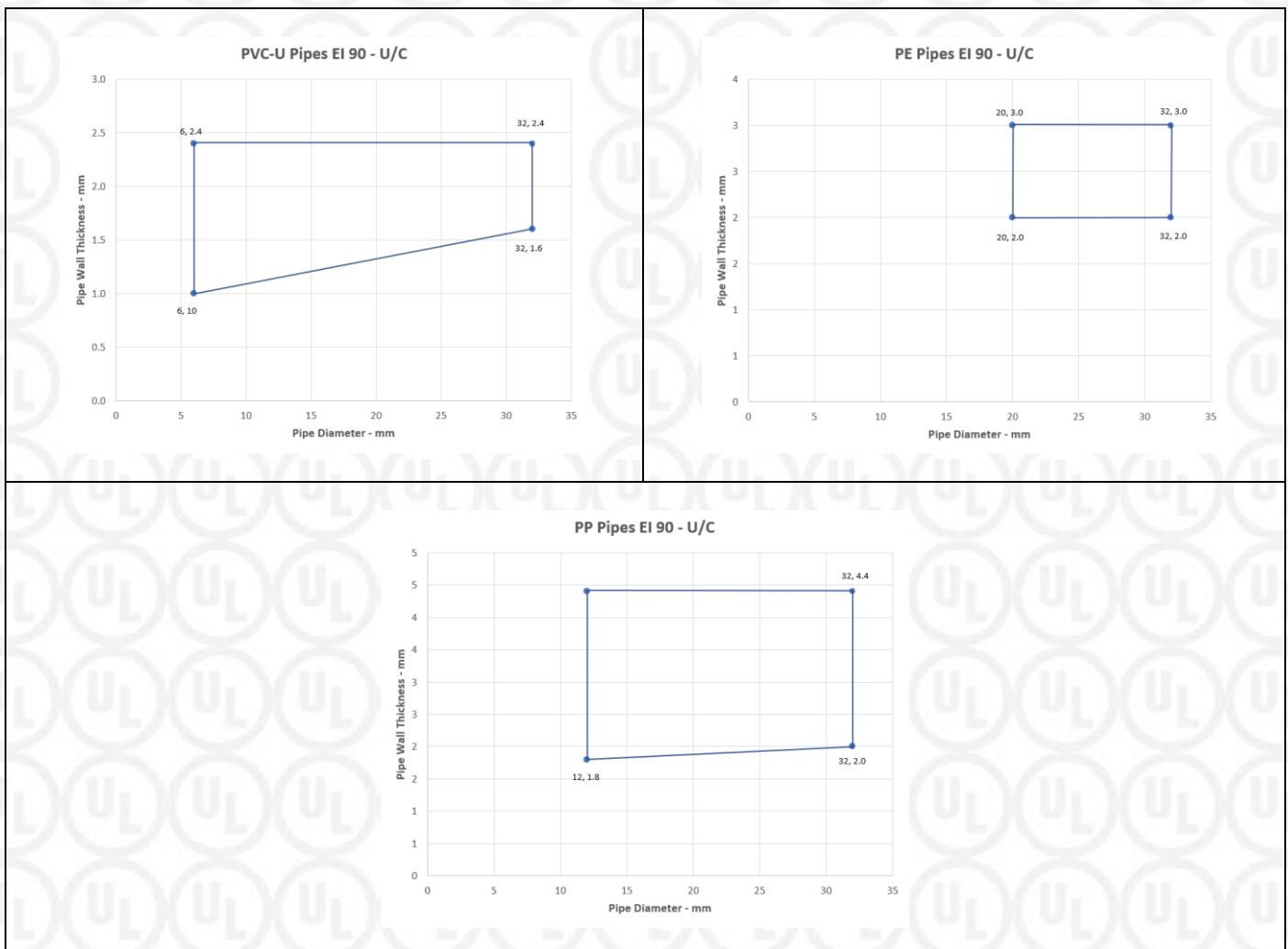


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Services	Sealant depth	Backing	Classification
<b>PP pipe according to EN 1451-1 or DIN 8077/8078</b>			
Maximum 32 mm diameter/1.8-4.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 90 U/C</b>
<b>PEX pipe in pipe system</b>			
25 mm diameter outer /15 mm diameter x 2.5 mm wall inner	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 90 C/C</b>

\* Typical pipe diameters shown, see below graph for intermediate sizes



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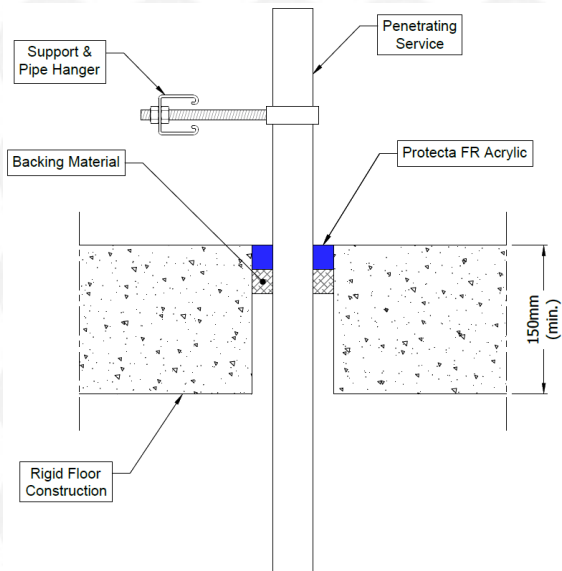
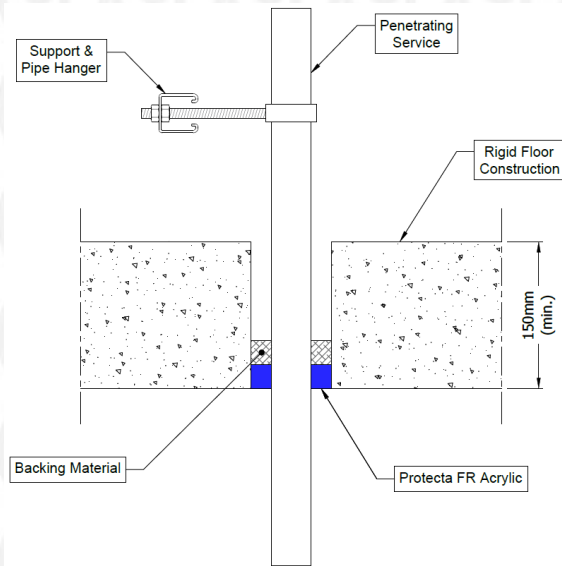
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**Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm**

**Single side penetration seal with cables**

**Penetration Seal:** Cables (single) fitted at any position within the aperture, min. 10 mm from the edges, with Protecta FR Acrylic to either side of the floor (or at any position in between), backed with 'Protecta Mineral Fibre BIO'.

Construction details:



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Services	Sealant depth	Backing (minimum)	Aperture (maximum)	Classification
Single electrical cables up to 21 mm Ø	25 mm	Protecta Mineral Fibre BIO 25 mm deep	82 mm Ø or 100 x 1000 mm	E 120, EI 60



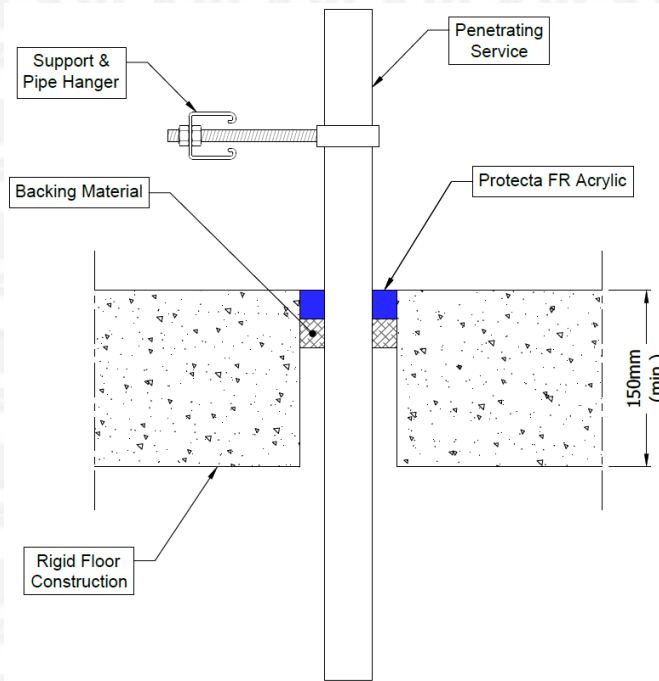
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## Single side penetration seal with cables

**Penetration Seal:** Cables fitted with Protecta FR Acrylic to the top side of the floor, backed with stone wool insulation minimum 35kg/m<sup>3</sup> or Protecta Mineral Fibre BIO. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

Construction details:



Services	Sealant depth	Backing (minimum)	Insulation	Classification
Blank seals	15 mm	20 mm Stone wool 35 kg/m <sup>3</sup>	None	<b>E 90, EI 60</b>
	25 mm	25 mm Stone wool 35 kg/m <sup>3</sup>		<b>EI 120</b>
48 mm Mineral Fibre BIO		<b>EI 240</b>		
		<b>E 120, EI 90</b>		
Electric cables up to 21 mm diameter, single. 23-27 mm diameter, 1 mm × 185 mm <sup>2</sup> core, PVC sheath and insulation electrical cable, single				<b>EI 240</b>



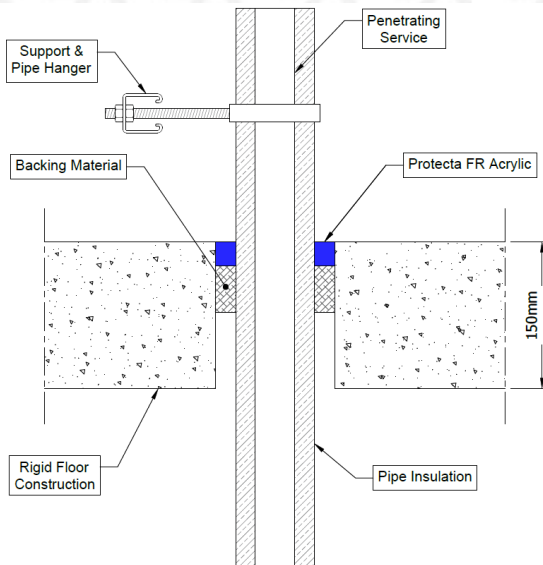
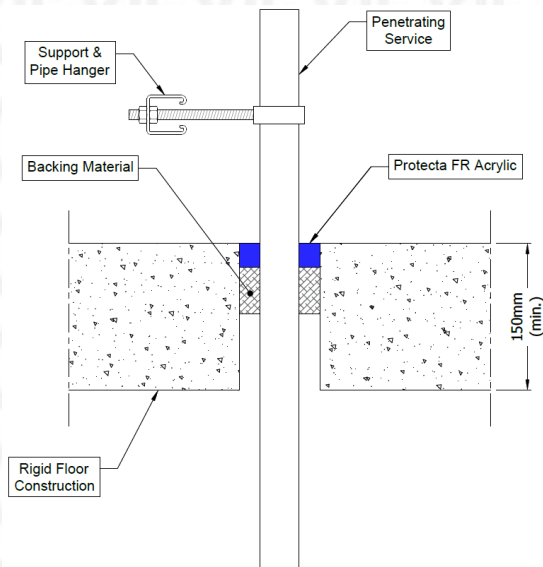
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## Single side penetration seal with pipes

**Penetration Seal:** Pipes fitted at any position within the aperture, with Protecta FR Acrylic to the top face of the floor, backed with 48 mm stone wool minimum 33kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

Construction details:



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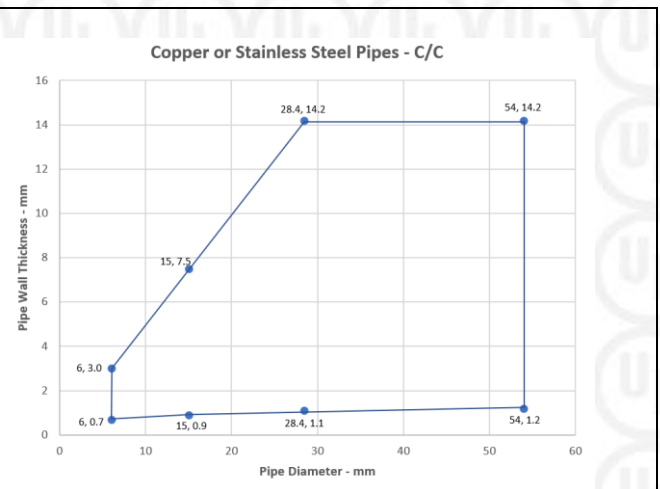
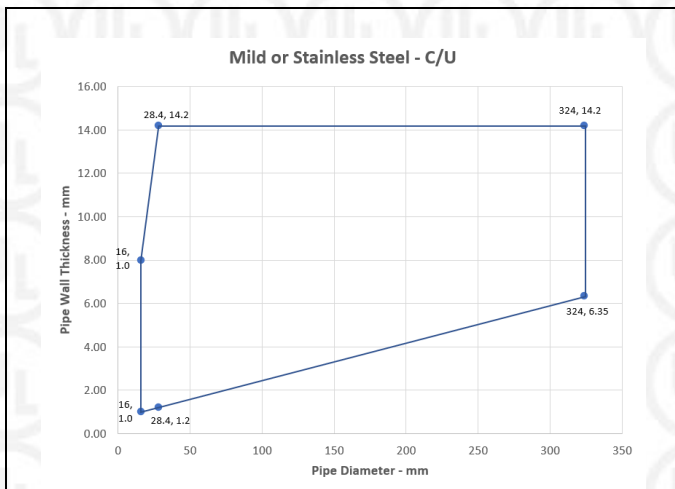


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Services	Sealant depth	Backing	Classification
<b>Mild or stainless steel pipe</b>			
4 -16 mm diameter /1.0-8.0 mm wall	25 mm	48 mm stone wool	EI 120 C/U
17 -324 mm diameter /1.0-14.2 mm wall*			E 120 C/U
<b>Mild or stainless steel pipe with minimum 75 kg/m<sup>3</sup> density stone or glass wool insulation Continuous Sustained (CS)</b>			
12-273 mm diameter/0.7-14.2 mm wall, 30 mm insulation*	25 mm	48 mm stone wool	E 120 C/C, EI 90 C/C
<b>Copper or steel pipe</b>			
6 mm diameter /0.7-3.0 mm wall	25 mm	48 mm stone wool	EI 120 C/C
6 -15 mm diameter /0.7-7.5 mm wall*			E 120 C/C, EI 60 C/C
16 - 54 mm diameter /0.7-14.2mm wall*			E 120 C/C
<b>Copper or steel pipe with minimum 80 kg/m<sup>3</sup> density stone wool insulation Continuous Sustained (CS)</b>			
12 mm diameter/0.9-6 mm wall, 20-80 mm insulation	25 mm	48 mm stone wool	EI 240 C/C
13-54 mm diameter/0.9-14.2 mm wall, 20-80 mm insulation*			E 240 C/C, EI 180 C/C
<b>Copper or steel pipe with minimum 75 kg/m<sup>3</sup> density glass wool insulation Continuous Sustained (CS)</b>			
12 mm diameter/0.7-6.0 mm wall, 20 mm insulation	25 mm	48 mm stone wool	EI 120 C/C
<b>Alupex Pipe</b>			
16 -20 mm diameter/2.0 mm wall	25 mm	48 mm stone wool	EI 120 C/C
21-75 mm diameter/2.0-4.6 mm wall			E 120 C/C, EI 90 C/C
16-75 mm diameter/2.25-4.6 mm wall with 20-50 mm thick glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> insulation Continuous Sustained (CS)			E 180 C/C, EI 120 C/C
16-75 mm diameter/2.25-4.7 mm wall with 60 mm thick glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> insulation Continuous Sustained (CS)*			E 120 C/C, EI 90 C/C

\*See below graphs for interpolated pipe sizes



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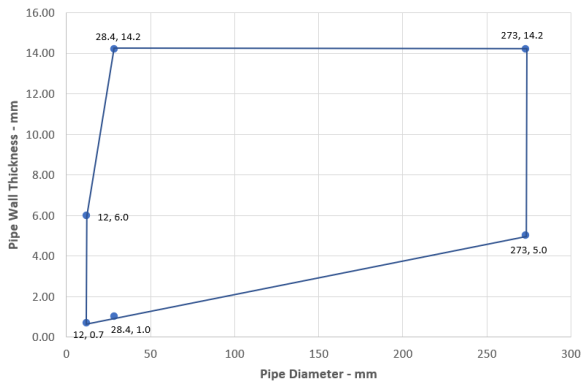




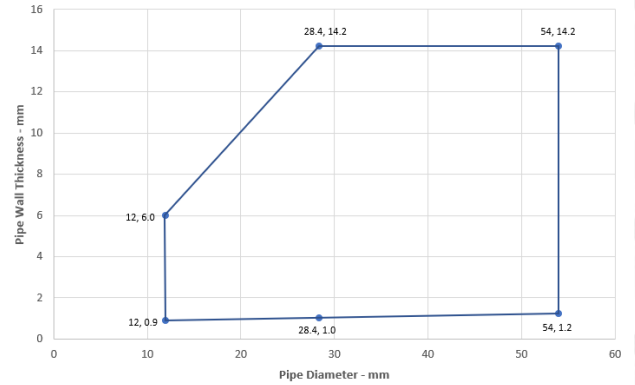
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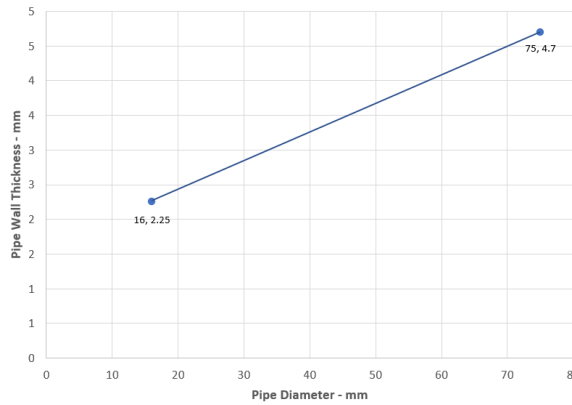
Mild or Stainless Steel Pipes with Stone or Glass Wool Insulation - C/C



Copper or Steel Pipes with 20-80 mm stone wool Insulation CS E 240 C/C, EI 180 C



Aluplex Pipes with Stone or Glass Wool Insulation - C/C



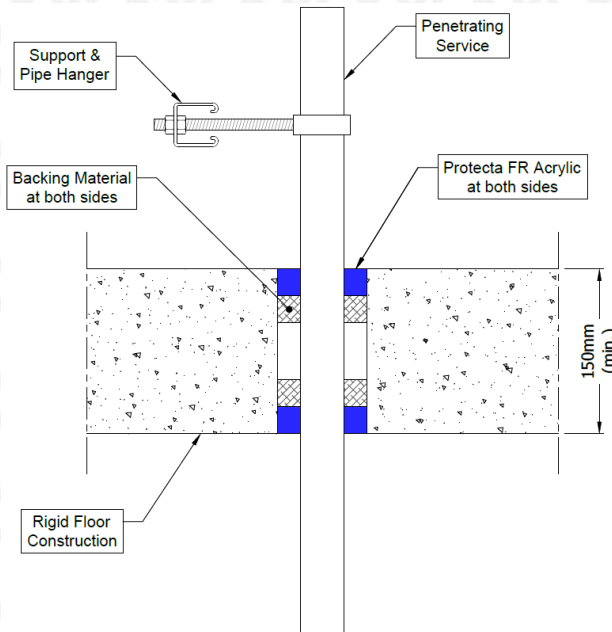
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## Double side penetration seal with pipes

**Penetration Seal:** Pipes fitted at any position within the aperture, with Protecta FR Acrylic to the both faces of the floor, backed with 25 mm stone wool minimum 33kg/m<sup>3</sup>. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

Construction details:



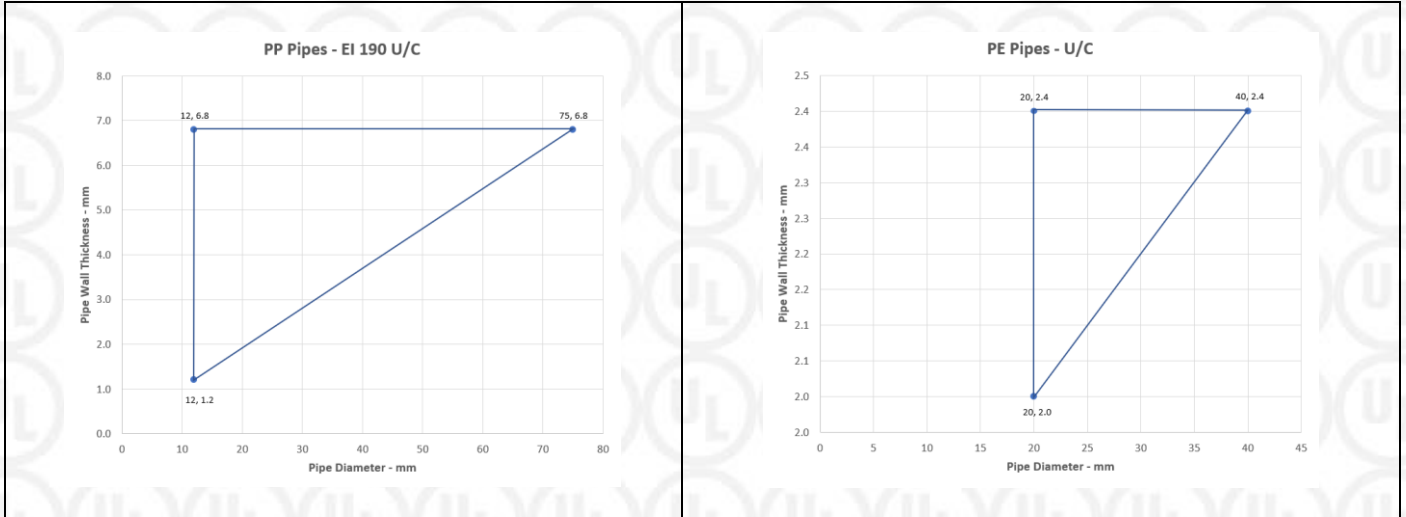
Services	Sealant depth	Backing	Classification
<b>PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>			
Up to 50 mm Ø/1.6-3.7 mm wall	25 mm	25 mm Stone wool	EI 240 U/C
Up to 40 mm Ø/1.6-3.7 mm wall, with bundle of cables up to 21 mm diameter			
<b>PP pipe according to EN 1451-1 or DIN 8077/8078</b>			
12 mm Ø/1.2 mm wall	25 mm	25 mm Stone wool	EI 240 U/C
13-40 mm Ø/1.2-3.7 mm wall			EI 180 U/C
41-75 mm Ø/1.2-6.8 mm wall*			EI 90 U/C
Up to 40 mm Ø/1.2-3.7 mm wall, with bundle of cables up to 21 mm diameter			EI 180 U/C
<b>PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
20-40 mm Ø/2.0-3.7 mm wall*	25 mm	25 mm Stone wool	EI 240 U/C
Up to 40 mm Ø/2.0-3.7 mm wall, with bundle of cables up to 21 mm diameter			EI 180 U/C

\*See below graphs for interpolated pipe sizes



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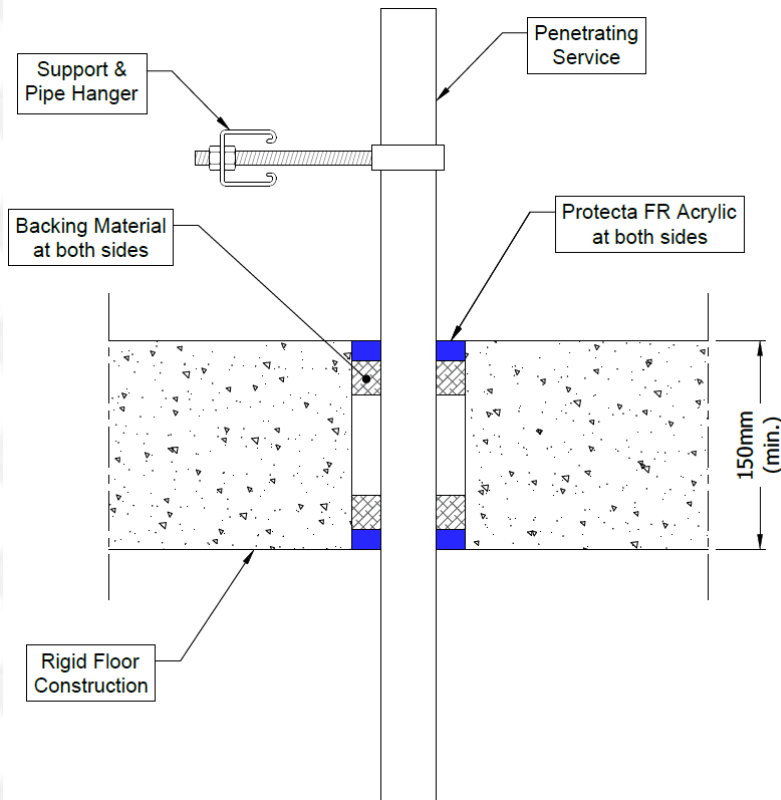
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## Double side penetration seal with cables

**Penetration Seal:** Cables fitted circular apertures or min. 7 mm from the edges of rectilinear apertures, with Protecta FR Acrylic to both sides of the floor, backed with stone wool insulation minimum 35kg/m<sup>3</sup>.

Construction details:



Services	Sealant depth	Backing	Maximum Aperture	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m <sup>3</sup>	300 x 300 mm	EI 240
Electric cables up to 21 mm diameter, single or in a bundle.				EI 120
Electric cables 22-50 mm diameter, single or in a bundle.				E 120, EI 90
Electric cables 51-80 mm diameter, single or in a bundle.				E 120, EI 60

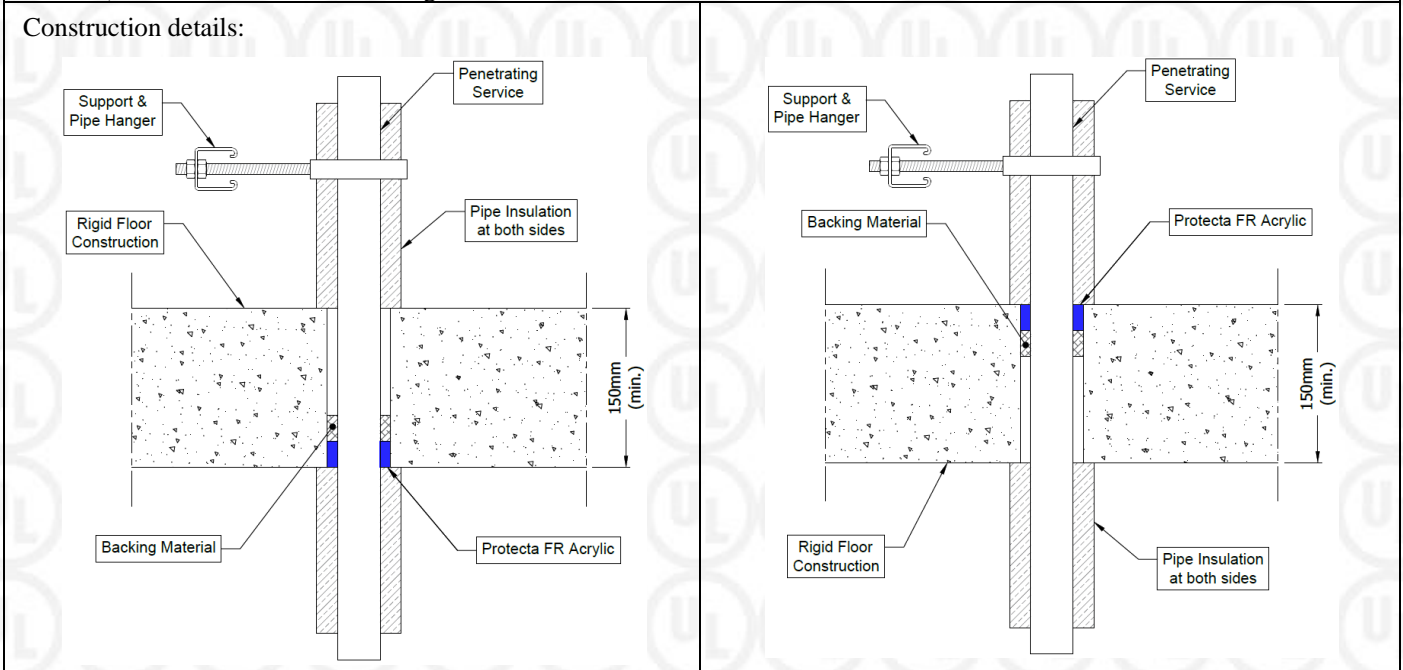


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## Single side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 or 25 mm deep Protecta FR Acrylic to either side of the floor (or at any position between), backed with minimum 40 kg/m<sup>3</sup> stone wool insulation or Protecta Mineral Fibre BIO.



Services	Max. seal size	Insulation (min)	Sealant depth	Classification
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall	10 mm width around pipe	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	<b>E 240 C/U, EI 180 C/U</b>
Copper or steel pipe up to 12 mm diameter/0.9-5 mm wall				<b>EI 240 C/U</b>
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall	Up to 100 x 1000 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	25 mm	<b>EI 120 C/U</b>
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall	300 x 300 mm		15 mm	<b>E 90 C/U, EI 60 C/U</b>
Copper or steel pipe up to 12 mm diameter/0.9-5 mm wall				25 mm
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall				



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Services	Max. Seal Size	Insulation (min)	Sealant Depth	Classification
<b>Mild or stainless steel pipe</b>				
40 mm diameter/1-14.2 mm wall	10 mm width around pipe	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	EI 240 C/U
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>		
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				
40 mm diameter/1-14.2 mm wall*	Up to 100 x 1000 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	25 mm	E120 C/U, EI 90 C/U
50 mm diameter/1.2-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>		
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				

\* Typical pipe diameters shown, see below graph for intermediate sizes



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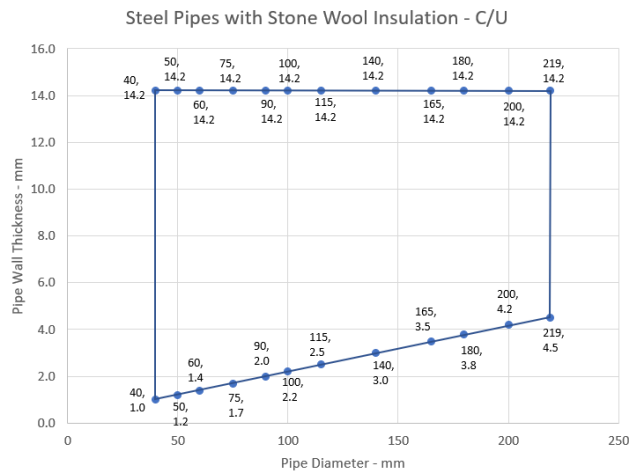
Services	Max. Seal Size	Insulation (minimum)	Sealant Depth	Classification
<b>Mild or stainless steel pipe</b>				
40 mm diameter/1-14.2 mm wall	300 x 300 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	15 mm	E 90 C/U, EI 60 C/U
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>		
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				
40 mm diameter/1-14.2 mm wall*	30 mm Stone wool insulation 80 kg/m <sup>3</sup>		20 mm Stone wool insulation 80 kg/m <sup>3</sup>	25 mm
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
165 mm diameter/3.5-14.2 mm wall*				
180 mm diameter/3.8-14.2 mm wall*				
200 mm diameter/4.2-14.2 mm wall*				
219 mm diameter/4.5-14.2 mm wall*				

\* Typical pipe diameters shown, see below graph for intermediate sizes



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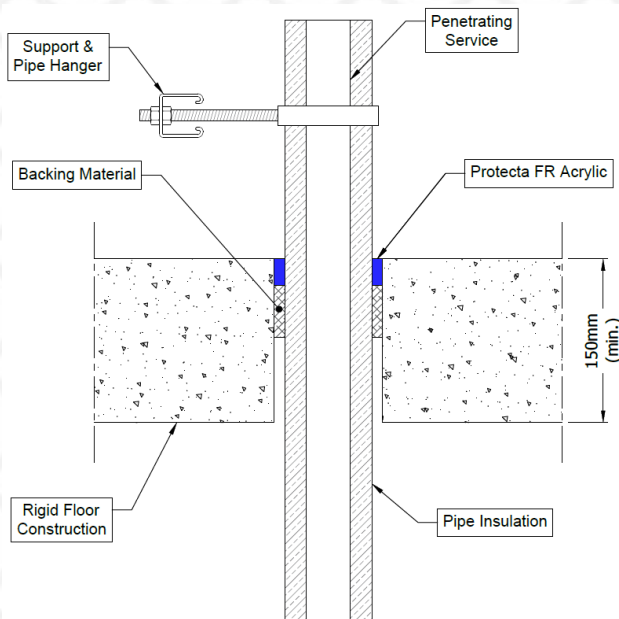
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## Single side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm Protecta FR Acrylic to the top of the floor, backed with 48 mm deep Protecta Mineral Fibre BIO insulation. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

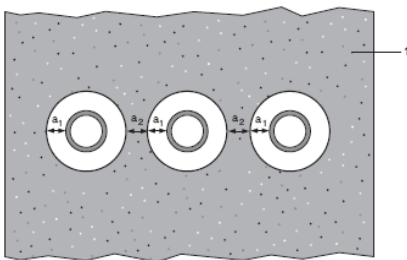
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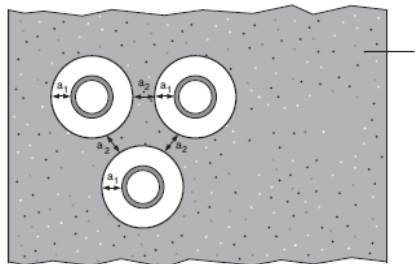
Configuration 1:

Configuration 2:

Option 1



Option 2



### Key

- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation



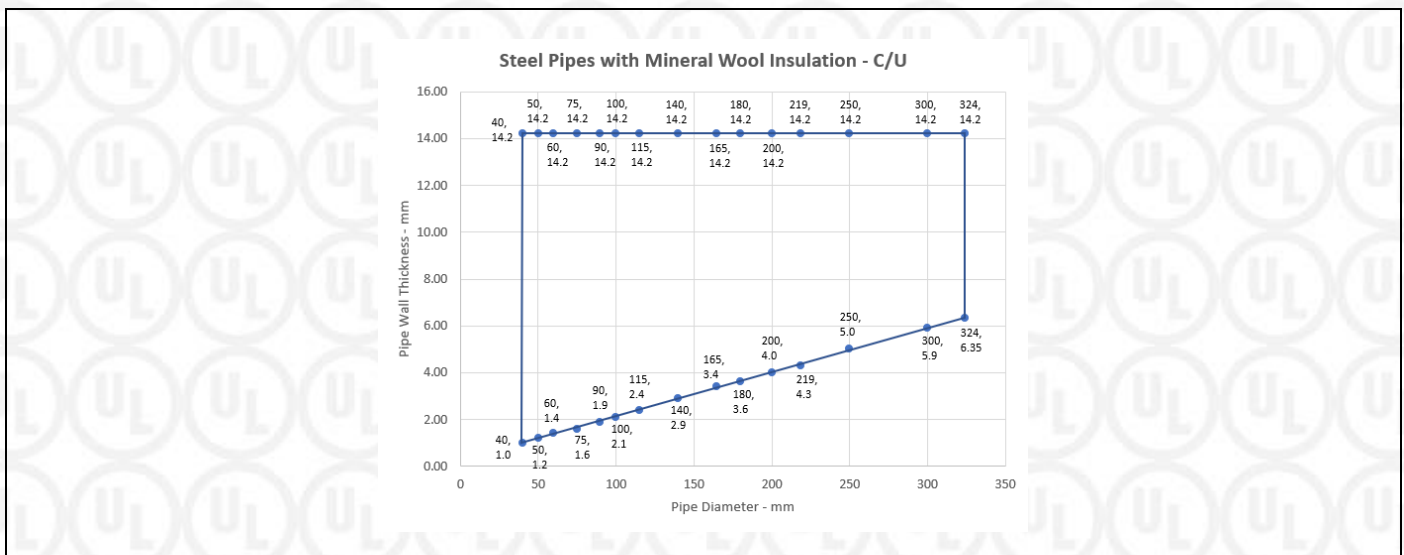
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## Single side penetration seal with pipes

Services	Insulation	Classification
<b>Mild or stainless steel pipe</b>		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall*		
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
75 mm diameter/1.6-14.2 mm wall*		
90 mm diameter/1.9-14.2 mm wall*		
100 mm diameter/2.1-14.2 mm wall*		
115 mm diameter/2.4-14.2 mm wall*		
140 mm diameter/2.9-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	
165 mm diameter/ 3.4-14.2 mm wall*		
180 mm diameter/ 3.6-14.2 mm wall*		
200 mm diameter/ 4.0-14.2 mm wall*		
219 mm diameter/ 4.3-14.2 mm wall*		
250 mm diameter/ 5.0-14.2 mm wall*		
300 mm diameter/ 5.9-14.2 mm wall*		
324 mm diameter/ 6.35-14.2 mm wall*		
<b>PEX pipe in pipe system</b>		
15 mm diameter x 2.5 mm wall inner /25mm diameter outer	None	EI 90 C/C

\* Typical pipe diameters shown, see below graph for intermediate sizes



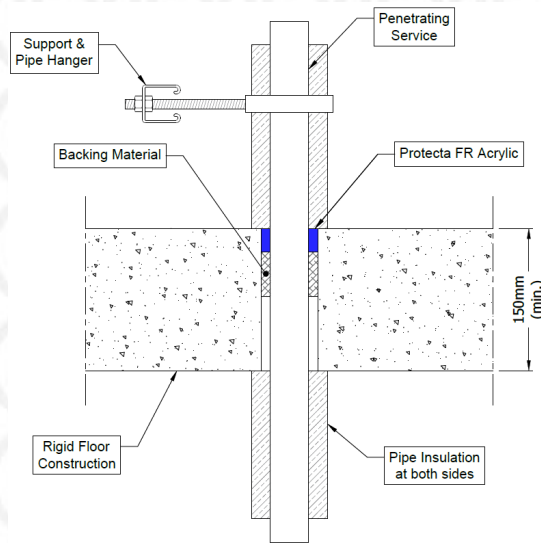
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## Single side penetration seal with metallic pipes

**Penetration Seal:** LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm deep Protecta FR Acrylic to the top side of the floor, backed with 48 mm deep minimum 33 kg/m<sup>3</sup> stone wool insulation or Protecta Mineral Fibre BIO.

Construction details:



Services	Max. seal size	Insulation (min)	Sealant depth	Classification
Copper or steel pipe up to 54 mm diameter / 0.7-14.2 mm wall	300 x 300 mm	20 mm Glass or Stone wool 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	25 mm	EI 180 C/C
Copper or steel pipe up to 108 mm diameter / 0.7-14.2 mm wall	300 x 300 mm	30 mm Glass or Stone wool 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	25 mm	E 180 C/C, EI 30 C/C
Copper or steel pipe up to 159 mm diameter / 0.7-14.2 mm wall	300 x 300 mm	30 mm Stone wool 80 kg/m <sup>3</sup> , 1000 mm length from both sides of the seal	25 mm	E 90 C/C, EI 20 C/C
Steel pipe up to 273 mm diameter / 0.7-14.2 mm wall	300 x 300 mm	30 mm Glass or Stone wool 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	25 mm	E 180 C/C, EI 60 C/C
Alupex pipe up to 16 mm diameter/2.25 mm wall	300 x 300 mm	20 mm Glass or Stone wool 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	25 mm	EI 180 C/C
Alupex pipe up to 75 mm diameter/2.25-4.7 mm wall	300 x 300 mm	25 mm Glass or Stone wool 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	25 mm	E 180 C/C, EI 120 C/C



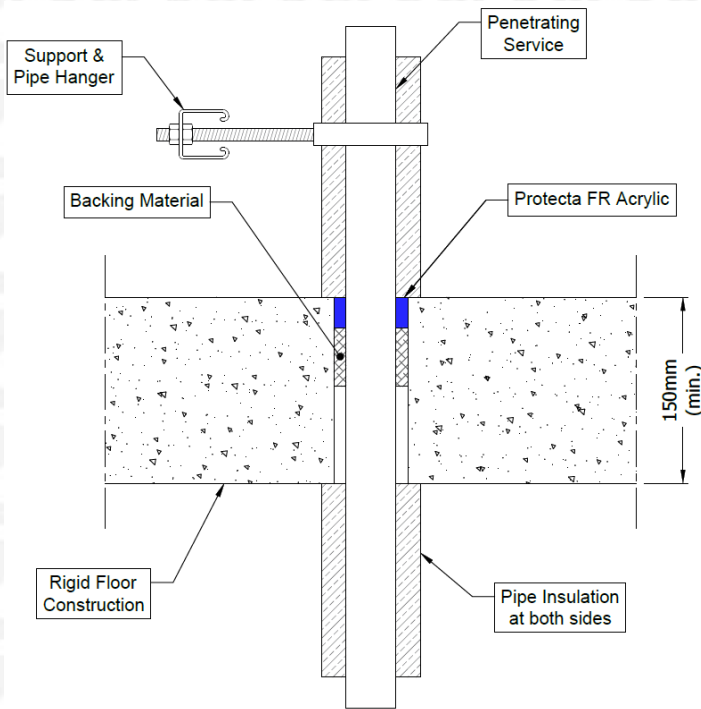
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## Single side penetration seal with composite pipes

**Penetration Seal:** CI (Continuous Interrupted) or LI (Locally Interrupted) insulated composite pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic, minimum 10 mm seal width around service and maximum 300 x 300 mm seal, backed with 'Protecta Mineral Fibre BIO'.

Construction details:



Services	Sealant depth	Backing	Insulation (minimums)	Classification
<b>Alupex Composite Pipe</b>				
16 mm diameter/2.25 mm wall	25 mm	48 mm Protecta Mineral Fibre BIO	20 mm stonewool 80 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	<b>EI 240 C/C</b>
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				

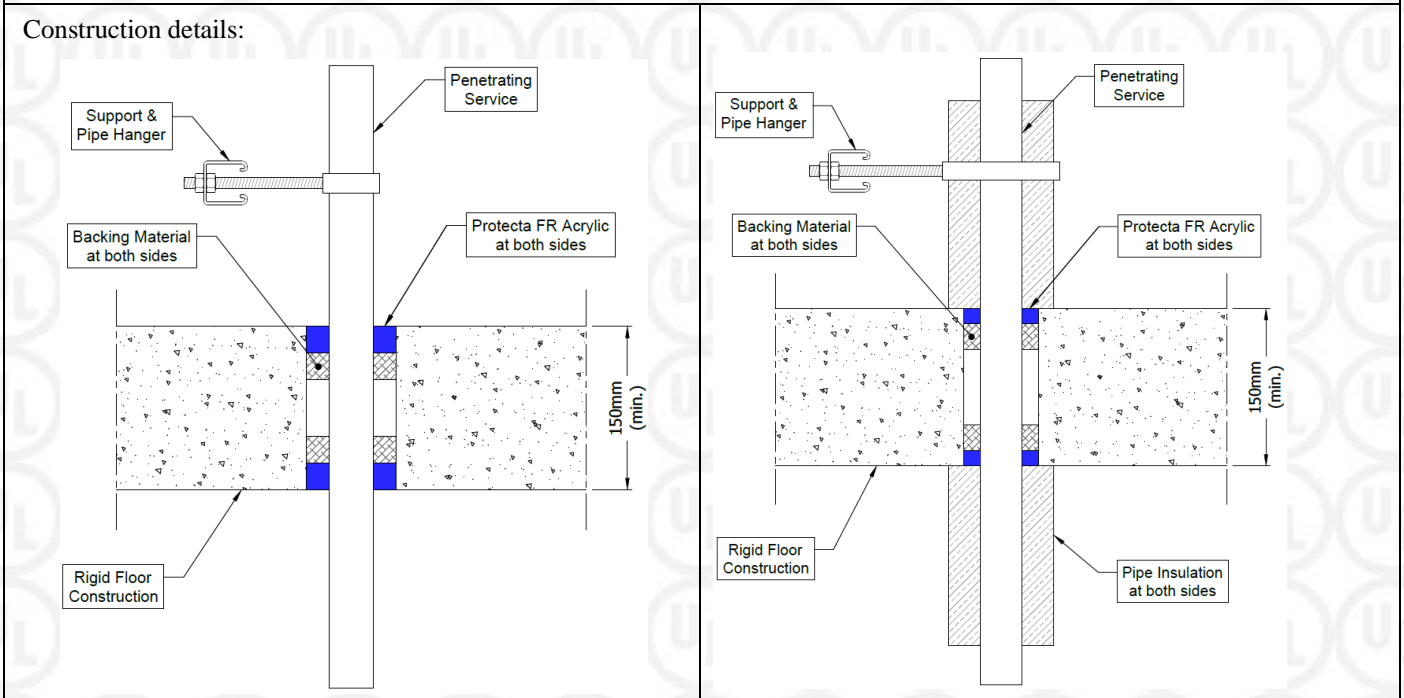


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## Double side penetration seal with metallic pipes

**Penetration Seal:** Non-insulated or insulated metallic pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, backed with stone wool or mineral fibre insulation.



Services	Max. Seal Size	Insulation	Sealant depth	Backing (minimum)	Classification
Copper or steel pipe 54 mm diameter/2-14.2 mm wall	300 x 300 mm	None	25 mm	25 mm deep 140 kg/m <sup>3</sup> stone wool	<b>E 120 C/U,</b> <b>EI 20 C/U</b>
Copper or steel pipe maximum 108 mm diameter /0.7-14.2 mm wall*		30 mm Glass or Stone wool 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	15 mm	25 mm deep 33 kg/m <sup>3</sup> stone wool	<b>E 120 C/C,</b> <b>EI 45 C/C</b>
Mild steel pipe 16 mm diameter/1.5-7.5 mm wall		None	25 mm	25 mm deep 140 kg/m <sup>3</sup> stone wool	<b>EI 240 C/U</b>
Mild steel pipe maximum 63 mm diameter/1.5-14.2 mm wall	15 mm		25 mm deep 35 kg/m <sup>3</sup> stone wool	<b>E 240 C/U</b> <b>EI 30 C/U</b>	
Mild steel pipe 16 mm diameter/1.5-7.5 mm wall	Up to 100 x 1000 mm	None	25 mm	Protecta Mineral Fibre BIO 25 mm deep	<b>EI 120 C/U</b>

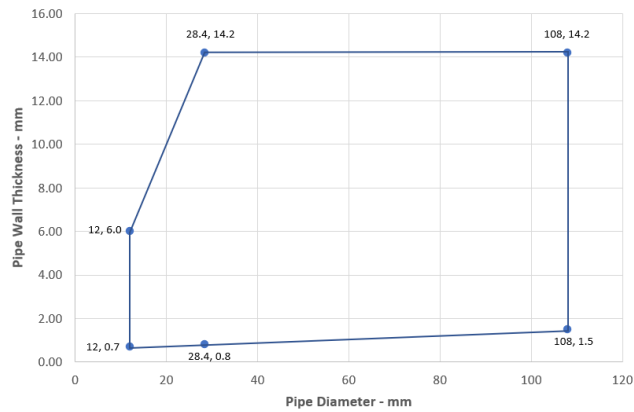
\* Typical pipe diameters shown, see below graph for intermediate sizes



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Copper or Steel Pipes with Stone or Glass Wool Insulation  
- C/C



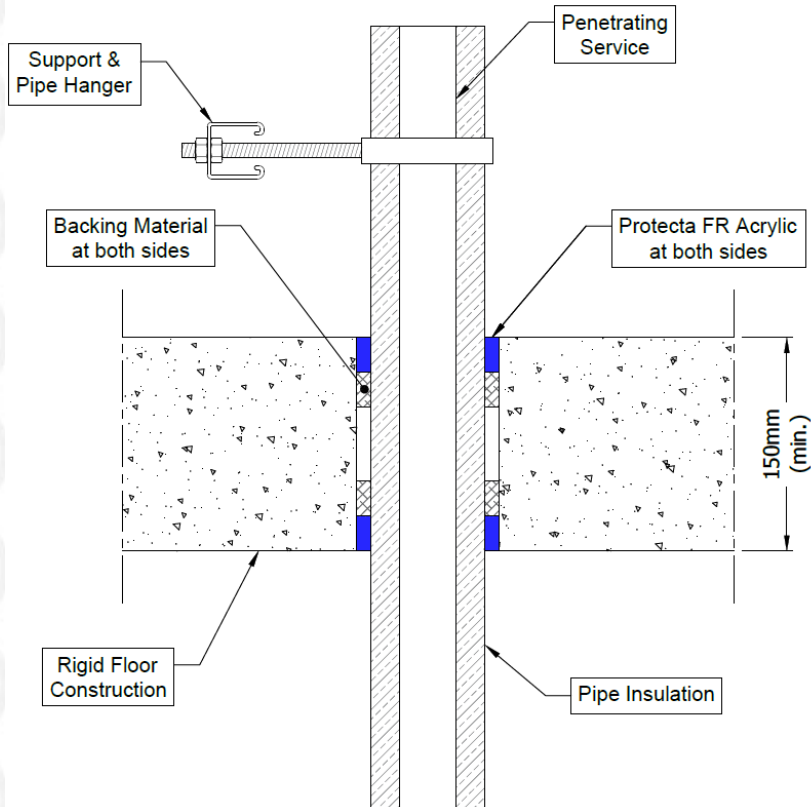
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## Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, maximum 300 x 300 mm seal width around service, backed with stone wool insulation or 'Protecta Mineral Fibre BIO'.

Construction details:

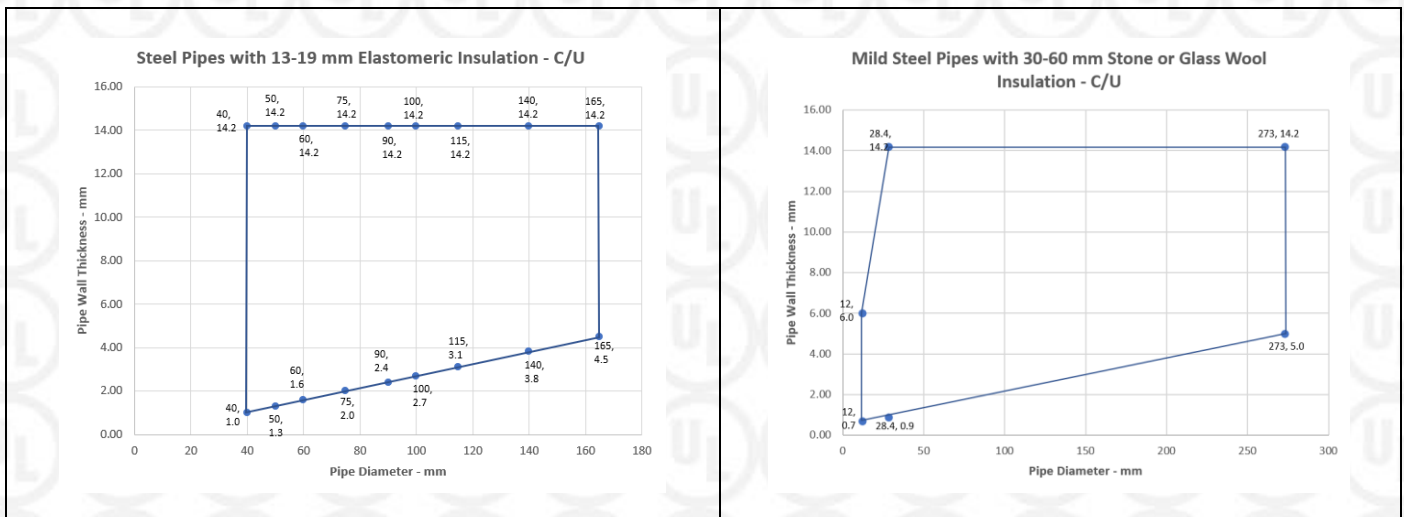


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Services	Sealant depth	Backing (minimum)	Insulation	Classification
<b>Mild or stainless steel pipe</b>				
40 mm diameter/1-14.2 mm wall	25 mm	20 mm Stone wool 40 kg/m <sup>3</sup>		<b>EI 180 C/U</b>
40 mm diameter/1-14.2 mm wall*			13 -19 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	<b>EI 60 C/U</b>
50 mm diameter/1.3-14.2 mm wall*				
60 mm diameter/1.6-14.2 mm wall*				
75 mm diameter/2-14.2 mm wall*				
90 mm diameter/2.4-14.2 mm wall*	25 mm	25 mm Protecta Mineral Fibre BIO		
100 mm diameter/2.7-14.2 mm wall*				
115 mm diameter/3.1-14.2 mm wall*				
140 mm diameter/3.8-14.2 mm wall*				
165 mm diameter/4.5-14.2 mm wall*				
12-273 mm diameter/0.7-14.2 mm wall	15 mm	25 mm Stone wool 33 kg/m <sup>3</sup>	30-60 mm thick glass or stone, mineral wool min. 75 kg/m <sup>3</sup>	<b>EI 60 C/U</b>

\* Typical pipe diameters shown, see below graph for intermediate sizes



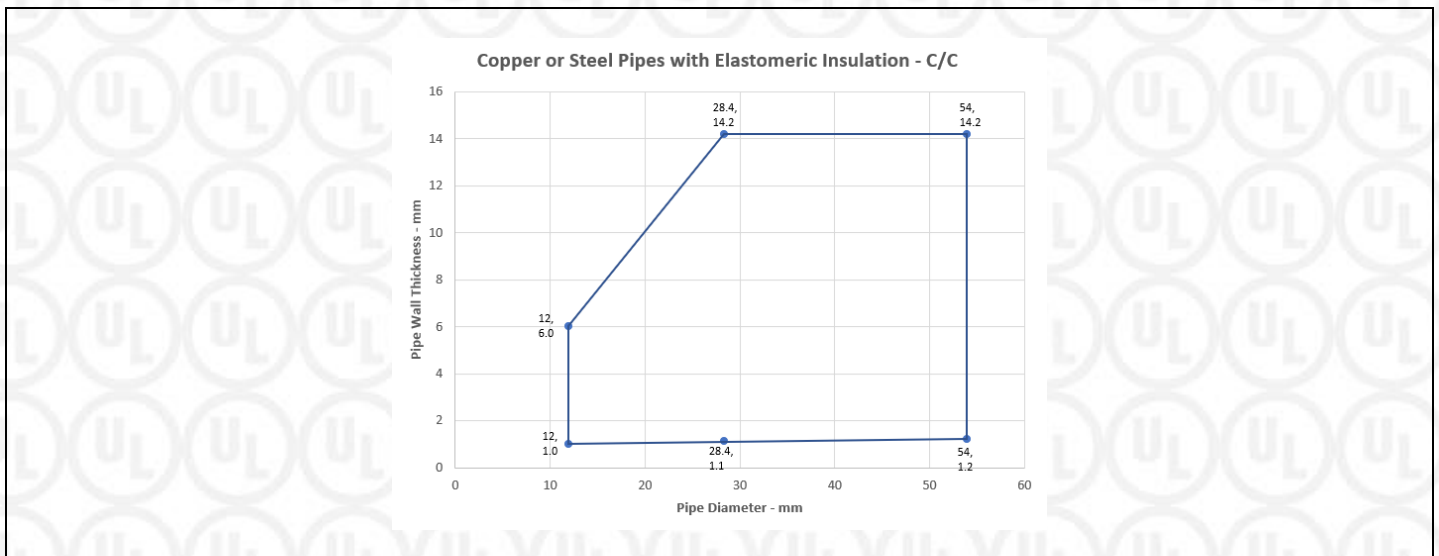


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Services	Sealant depth	Backing (minimum)	Insulation	Classification
<b>Copper or steel pipe</b>				
12 mm diameter/1-6 mm wall	25 mm	25 mm Protecta Mineral Fibre BIO	9 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	<b>E 240 C/C, EI 180 C/C</b>
12-54 mm diameter/1-14.2 mm wall*			9-13 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	<b>E 180 C/C, EI 120 C/C</b>
12-54 mm diameter/1-14.2 mm wall*			13-25 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	<b>E 90 C/C, EI 60 C/C</b>
12-54 mm diameter/0.7-14.2 mm wall	15 mm	25 mm Stone wool 33 kg/m <sup>3</sup>	20-60 mm thick glass or stone, mineral wool min. 75 kg/m <sup>3</sup>	<b>EI 120 C/C</b>

\* Typical pipe diameters shown, see below graph for intermediate sizes



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Services	Sealant depth	Backing (minimum)	Insulation	Classification
<b>Alupex Composite Pipe</b>				
16 mm diameter/2.25 mm wall	25 mm	25 mm Protecta Mineral Fibre BIO	9 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	<b>EI 180 C/C</b>
16 mm diameter/2.25 mm wall			9-13 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	<b>EI 60 C/C</b>
75 mm diameter/4.7 mm wall				
16 mm diameter/2.25 mm wall				
20 mm diameter/2.5 mm wall				
26 mm diameter/3 mm wall				
32 mm diameter/3 mm wall				
40 mm diameter/3.5 mm wall				
50 mm diameter/4 mm wall				
63 mm diameter/4.5 mm wall				
75 mm diameter/4.7 mm wall				



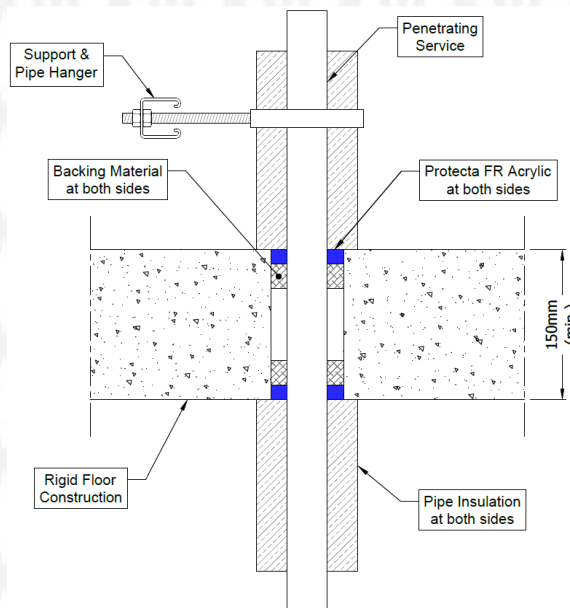
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## Double side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Protecta FR Acrylic to both sides of the floor (or at any position between), backed with 20 mm deep minimum 40 kg/m<sup>3</sup> stone wool insulation\*.

Construction details:



Services	Maximum seal size	Insulation (minimum)	Classification
<b>Mild or stainless steel pipe</b>			
40 mm diameter/1-14.2 mm wall	300 x 300 mm or 100 x 1000 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 120 C/U
50 mm diameter/1.2-14.2 mm wall*			
60 mm diameter/1.4-14.2 mm wall*			
75 mm diameter/1.7-14.2 mm wall*			
90 mm diameter/2-14.2 mm wall*			
100 mm diameter/2.2-14.2 mm wall*			
115 mm diameter/2.5-14.2 mm wall*			
140 mm diameter/3-14.2 mm wall*			
165 mm diameter/3.5-14.2 mm wall*			
180 mm diameter/3.8-14.2 mm wall*			
200 mm diameter/4.2-14.2 mm wall*			
219 mm diameter/4.5-14.2 mm wall*			

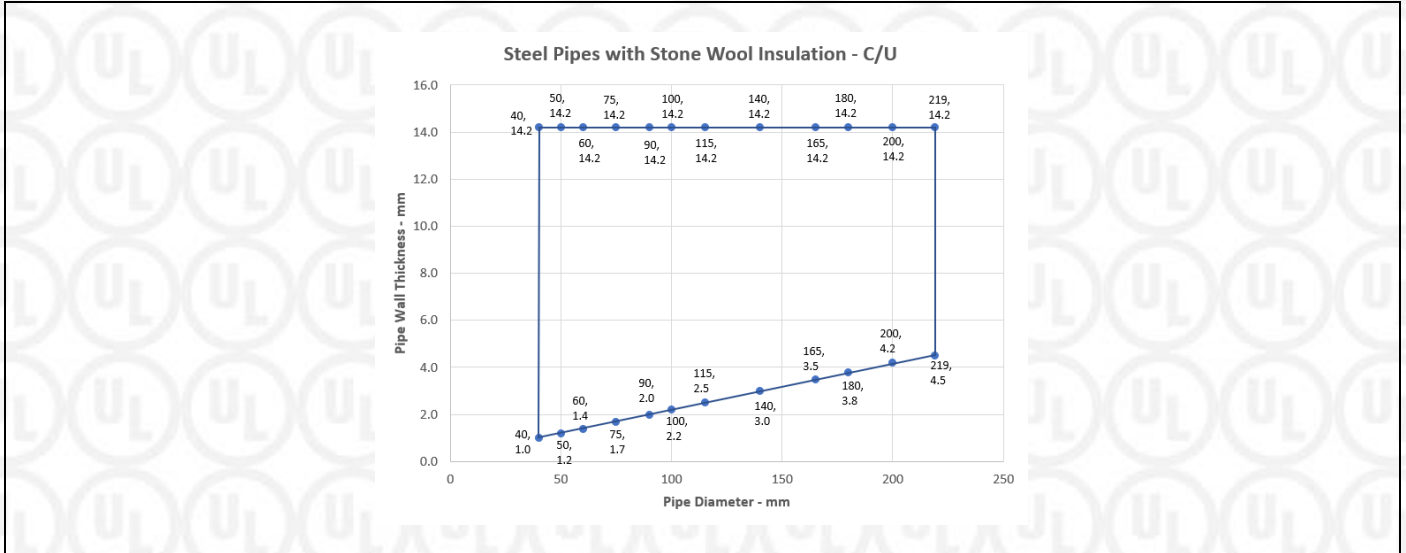
\* Typical pipe diameters shown, see below graph for intermediate sizes

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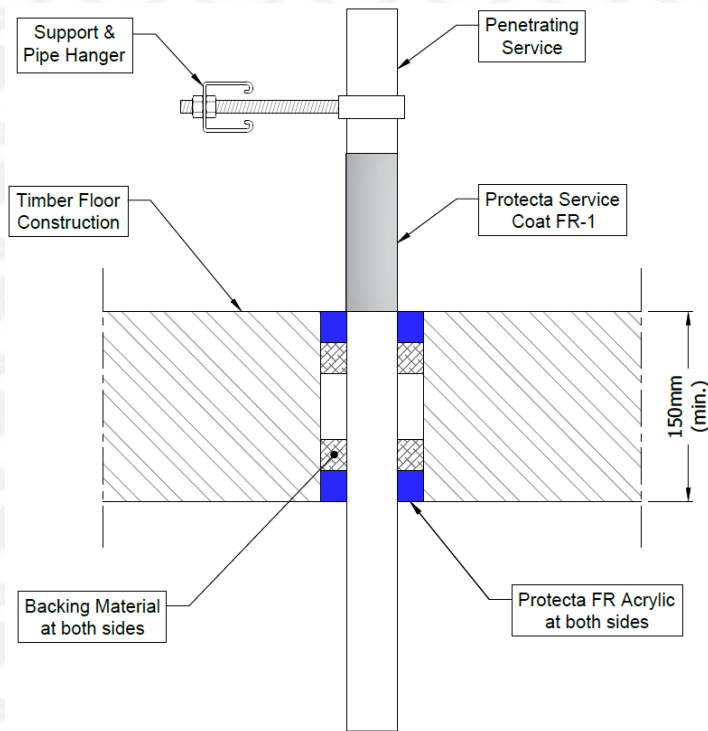
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**Timber floor constructions with floor thickness of minimum 150 mm**

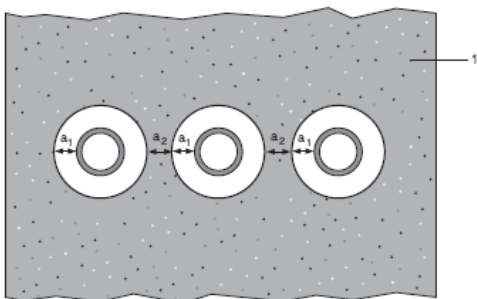
## Double sided penetration seal with cables

**Penetration Seal:** Cables fitted at any position within the aperture, sealed with Protecta FR Acrylic, minimum 25 mm deep to both sides of the floor and backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



### Configuration 1:



#### Key

1 Supporting construction

a1 Pipe / edge of seal separation (annular space)

a2 Separation between penetration seals



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Services	Sealant depth	Backing	Maximum aperture	Insulation, minimum	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	Ø 220 mm	None	EI 120
Cables up to 14 mm Ø, single or in bundles up to 100 mm Ø					EI 120
Cables up to 21 mm Ø, single or in bundles up to 100 mm Ø				Protecta Service Coat FR-1, 260-micron DFT extending 150 mm from top side of the seal	E 120, EI 90
Cables up to 50 mm Ø, single or in bundles up to 100 mm Ø					E 120, EI 90
Telecom cables up to 14 mm Ø, single or in bundles up to 100 mm Ø					E 120, EI 90



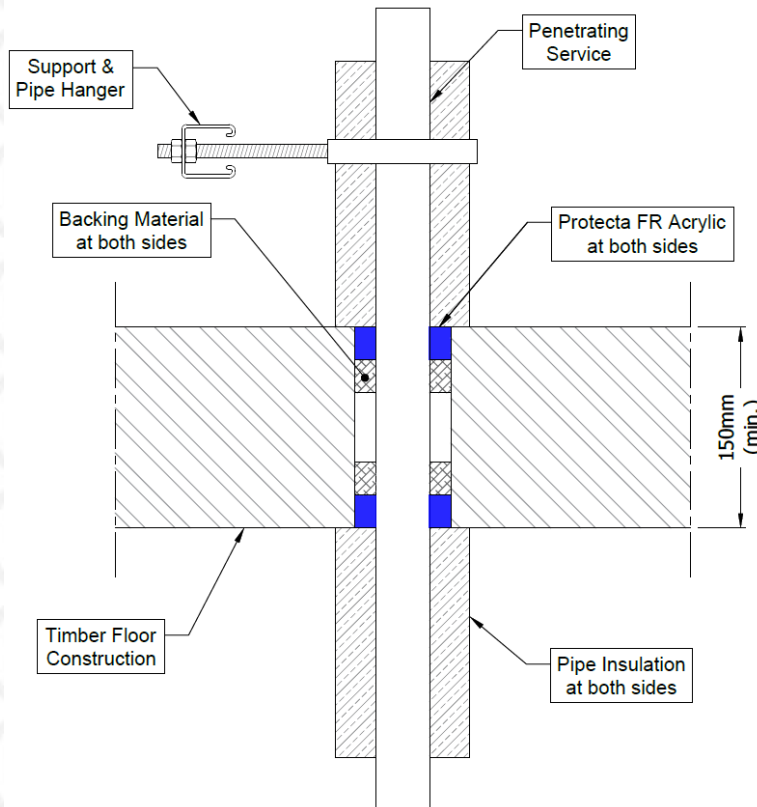
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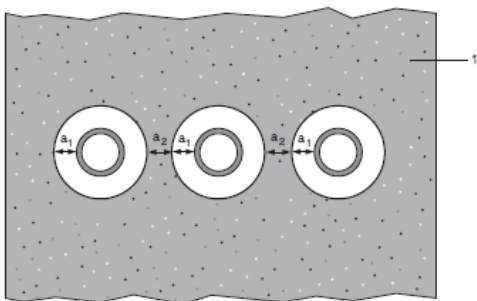
## Double side penetration seal with metallic pipes

**Penetration Seal:** 500 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes and composite pipes (single) with glass wool or stone, mineral wool min. 75 kg/m<sup>3</sup>, fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, backed with stone wool insulation (minimum 33kg/m<sup>3</sup>), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



### Key

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

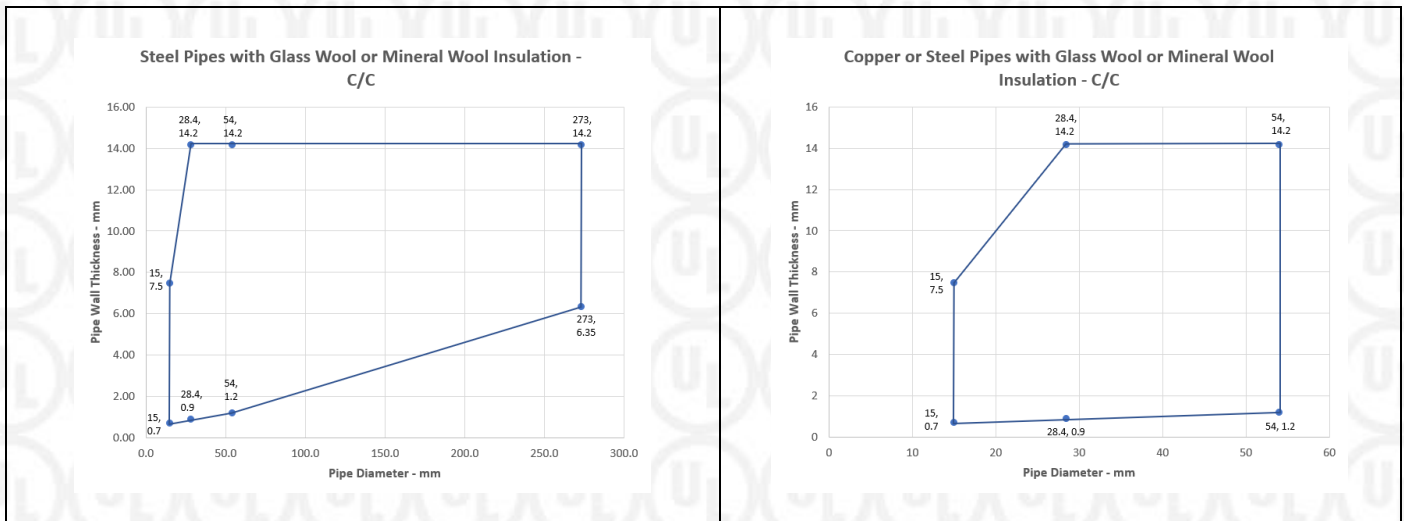


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Services	Maximum aperture	Sealant depth	Backing	Insulation, minimum	Classification
<b>Mild or stainless steel pipe</b>					
Maximum 273 mm diameter /6.35-14.2 mm wall*	Ø 293 mm	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	25 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	<b>E 120 C/C, EI 60 C/C</b>
<b>Copper or steel pipe</b>					
Maximum 15 mm diameter /0.7-7.5 mm wall*	Ø 220 mm	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	20 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	<b>EI 120 C/C</b>
Maximum 54 mm diameter /1.2-14.2 mm wall*					<b>E 120 C/C, EI 90 C/C</b>
<b>Alupex Pipe</b>					
Maximum 16 mm diameter / 2.25 mm wall*	Ø 220 mm	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	20 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	<b>EI 120 C/C</b>
Maximum 75 mm diameter / 4.6 mm wall*				25 mm glass wool or stone, mineral wool min. 75 kg/m <sup>3</sup> , 500 mm length from both sides of the seal	<b>E 120 C/C, EI 90 C/C</b>

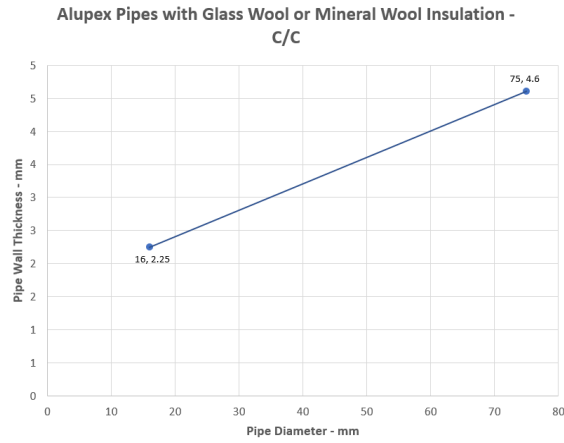
\* Typical pipe diameters shown, see below graph for intermediate sizes





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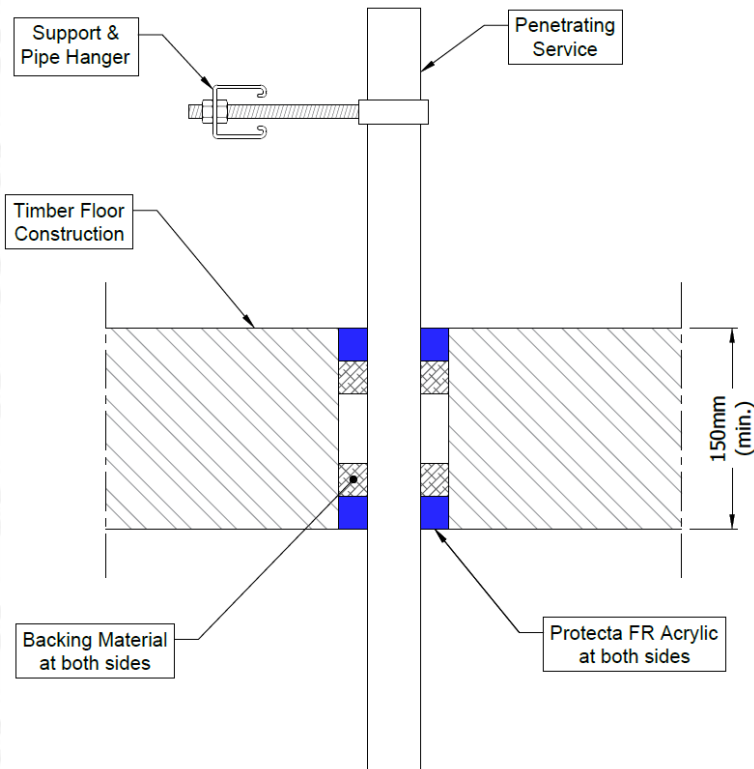
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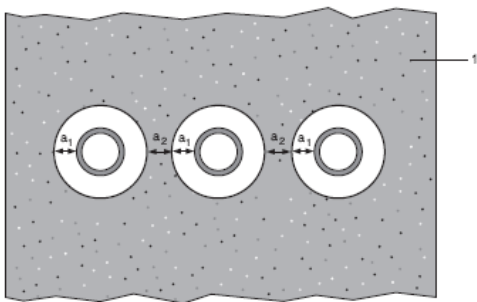
## Double side penetration seal with plastic pipes and composite pipes

**Penetration Seal:** Plastic and composite pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, backed with stone, mineral wool min. 33 kg/m<sup>3</sup>. Minimum annular space 10 mm and maximum 30 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



### Key

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

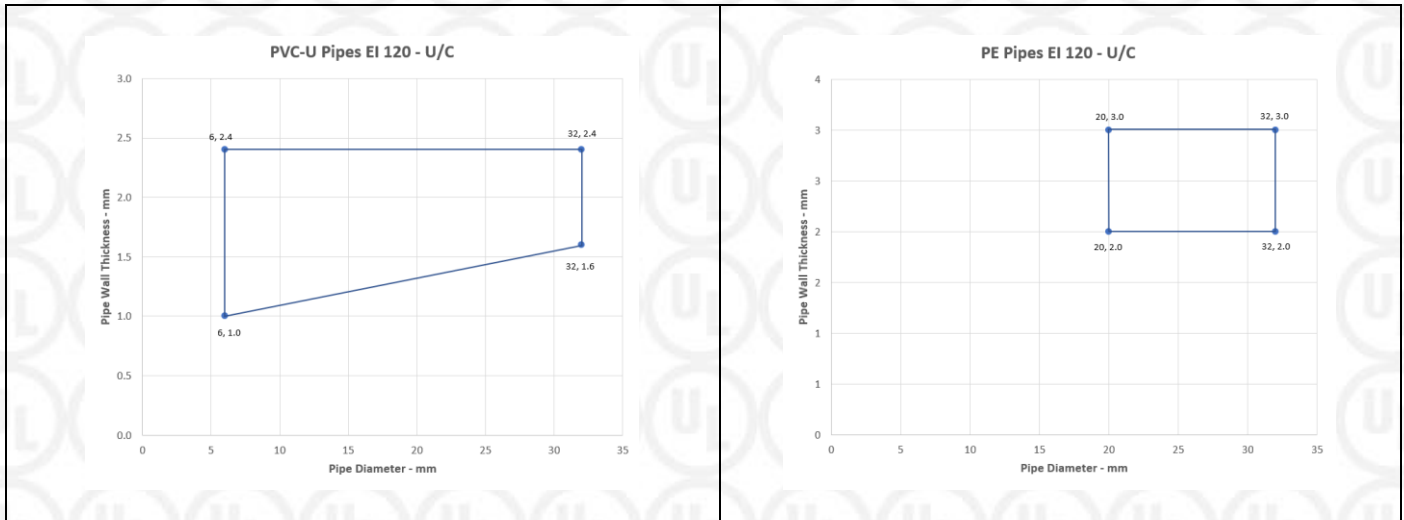


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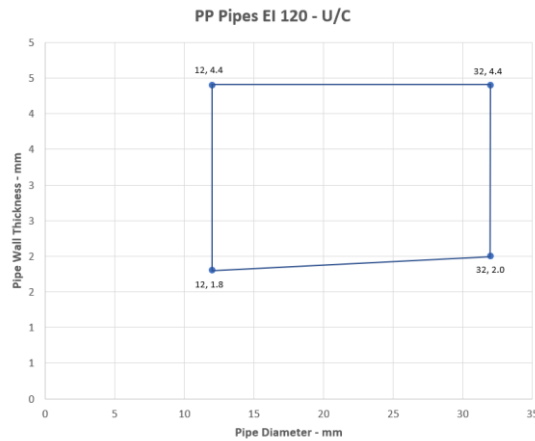
Services	Sealant depth	Backing	Classification
<b>PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>			
Maximum 32 mm diameter/1.0-2.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 120 U/C</b>
<b>PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Maximum 32 mm diameter/2.0-3.0 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 120 U/C</b>
<b>PP pipe according to EN 1451-1 or DIN 8077/8078</b>			
Maximum 32 mm diameter/1.8-4.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 120 U/C</b>
<b>PEX pipe in pipe system</b>			
25 mm diameter outer /15 mm diameter x 2.5 mm wall inner	25 mm	Stone wool 25 mm deep min. 33kg/m <sup>3</sup>	<b>EI 120 C/C</b>

\* Typical pipe diameters shown, see below graph for intermediate sizes



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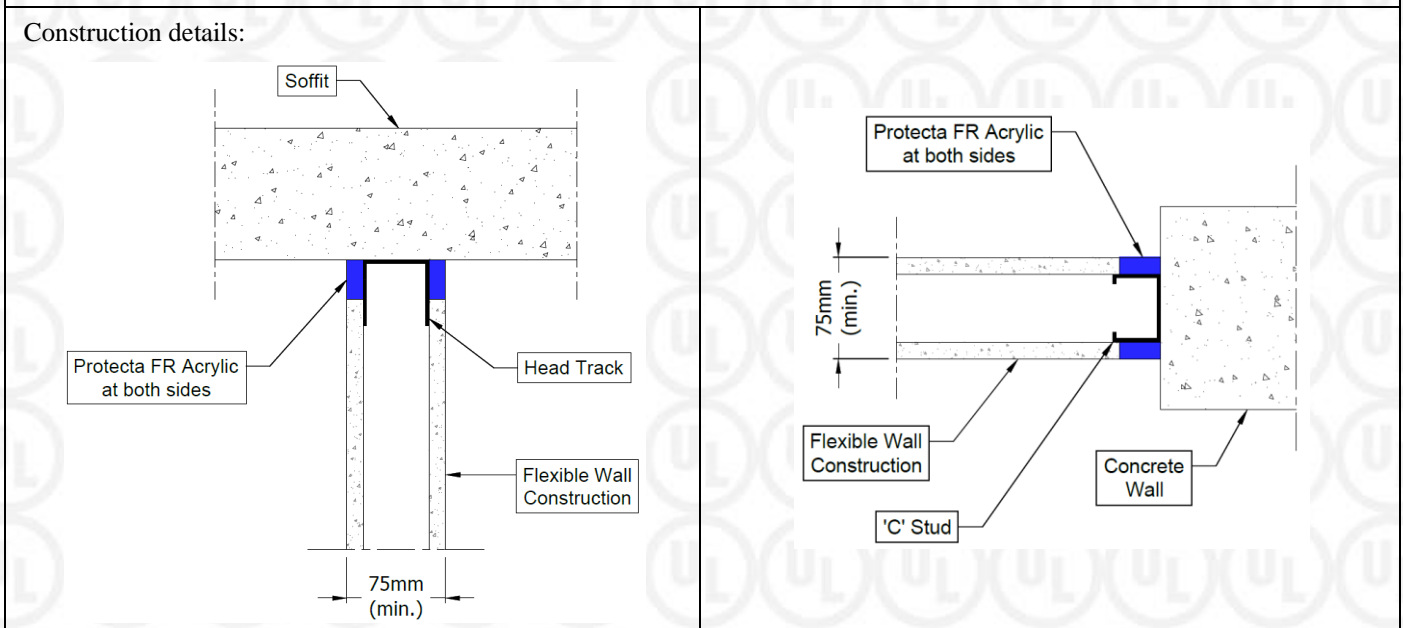
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Flexible wall constructions according to 2 1) with wall thickness of minimum 75 mm and minimum 1 x layer of 12.5 mm board per side

Linear joint seals, between head of flexible wall and soffit of concrete floor and vertical end of flexible wall and concrete wall

**Joint Seal:** Protecta FR Acrylic to both sides of the wall, joint widths up to 30 mm



Substrate	Depth (mm)	Backing (minimum)	Classification
Plasterboard/ concrete	12.5 min.	50 mm steel partition head track/ stud	E 60 – T – X – F – W 25 EI 45 – T – X – F – W 25
			E 60 – V – X – F – W 15 EI 45 – V – X – F – W 15



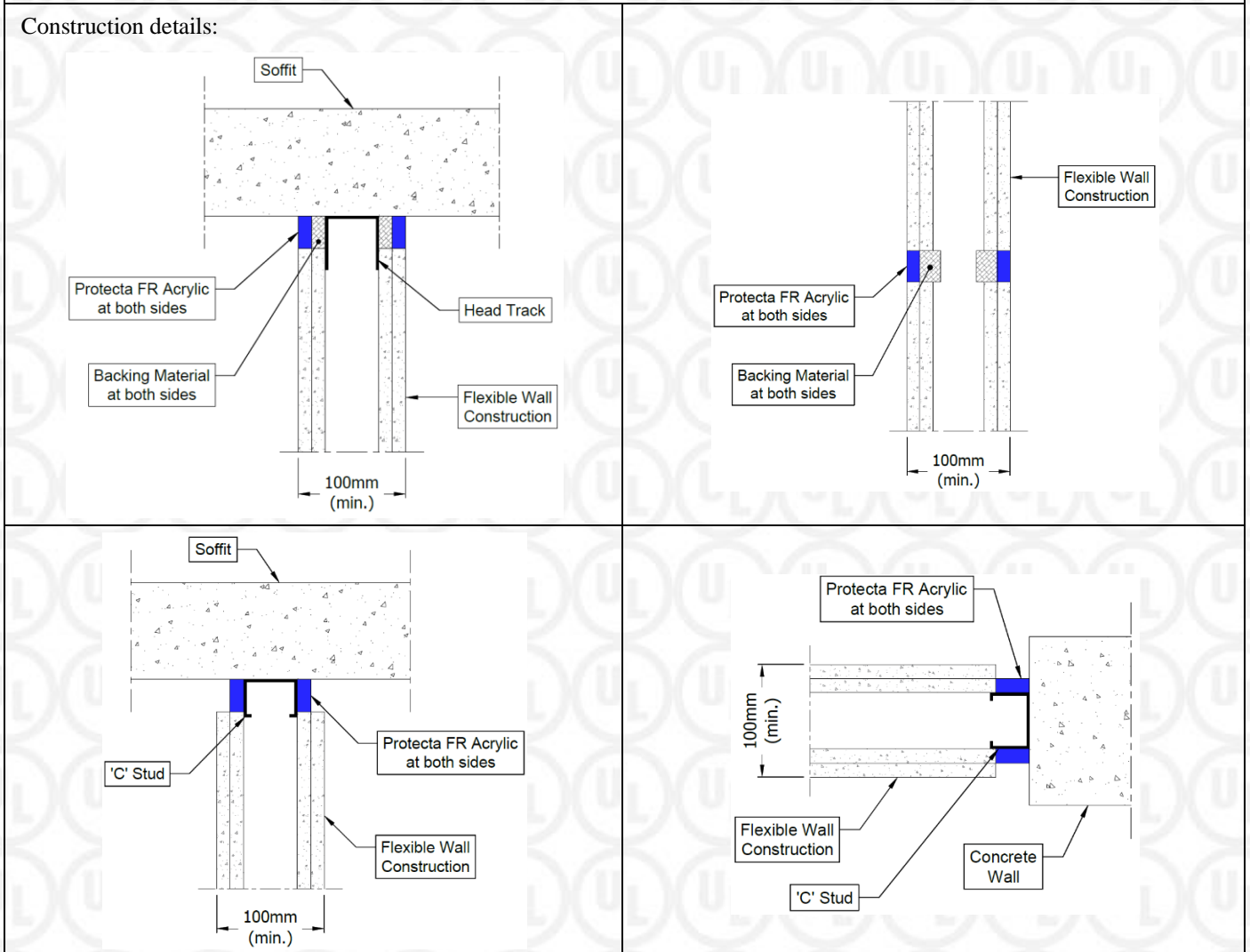
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Flexible wall constructions according to 1.2.1 with wall thickness of minimum 100 mm and minimum 2 x layer of 12.5 mm board per side

Linear joint seals, between head of flexible wall and soffit of concrete floor and vertical end of flexible wall and concrete wall

**Joint Seal:** Protecta FR Acrylic to both sides of the wall, joint widths up to 30 mm



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Substrate	Depth (mm)	Backing (minimum)	Classification
Plasterboard/ concrete	12.5 min.	12.5 mm Stone wool 35 kg/m <sup>3</sup> plus 50 mm steel partition head track	EI 120 – T – X – F – W 30
		20 mm Stone wool 35 kg/m <sup>3</sup>	EI 120 – V – X – F – W 30
	25 min.	50 mm steel partition head track /stud	EI 120 – T – X – F – W 30
	12.5 min.		EI 90 – T – X – F – W 25
			EI 90 – V – X – F – W 15



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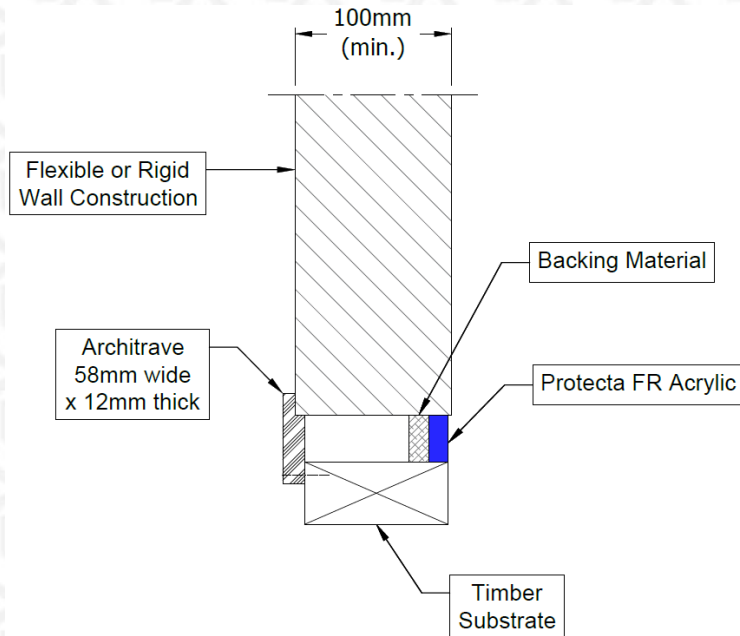
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**Flexible or rigid wall construction with wall thickness of minimum 100 mm and timber substrates and architraves**

**Linear joint or gap seals, vertically or horizontal orientated with backing materials**

**Joint Seal:** Protecta FR Acrylic to one side of the wall, joint widths up to 30 mm

Construction details:



Substrate	Depth (mm)	Facing (minimum)	Backing	Classification
Flexible or rigid wall / Timber	12.5 min.	Single sided linear seals in flexible or rigid walls against wooden frames covered with architraves on the other side fixed with 25 mm steel pins at nominal 300 mm centres.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	EI 60 – V – X – F – W 30
				EI 60 – T – X – F – W 30





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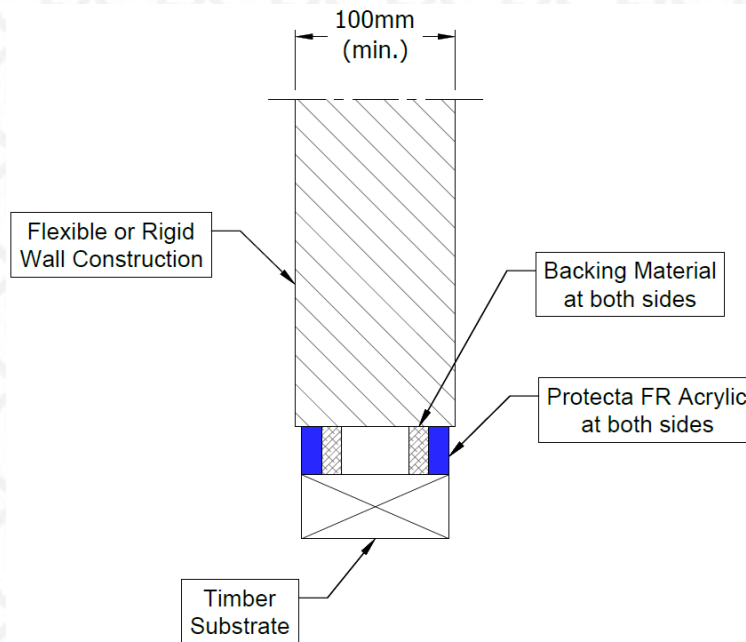
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**Flexible or rigid wall construction with wall thickness of minimum 100 mm and timber substrates**

**Linear joint or gap seals, vertically or horizontal orientated with backing materials**

**Joint Seal:** Protecta FR Acrylic to both sides of the wall, joint widths up to 30 mm

Construction details:



Substrate	Depth (mm)	Backing	Classification
Flexible or rigid wall / Timber	12.5 min.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	E 90 - V - X - F - W 30
			EI 60 - V - X - F - W 30
			E 90 - T - X - F - W 30
			EI 60 - T - X - F - W 30



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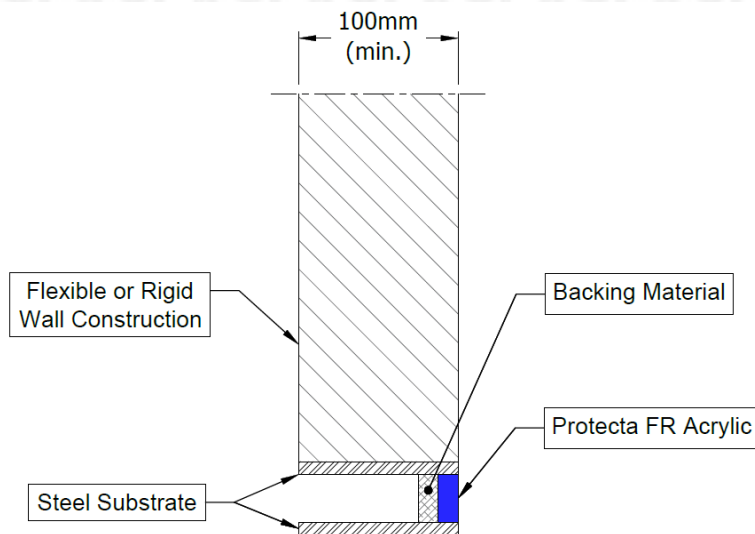
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Flexible or rigid wall construction with wall thickness of minimum 100 mm and steel substrates

Linear joint or gap seals, vertically or horizontal orientated with backing materials

**Joint Seal:** Protecta FR Acrylic to one side of the wall, with joint widths up to 30 mm.

Construction details:



Substrate	Depth (mm)	Backing	Classification
Steel / steel	12.5 min.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	E 120 - V - X - F - W 30
			EI 30 - V - X - F - W 30
			E 120 - T - X - F - W 30
			EI 30 - T - X - F - W 30



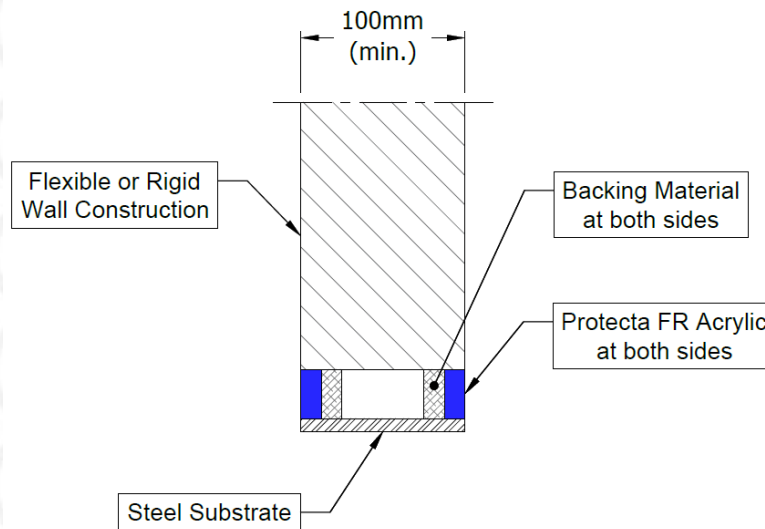
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## Linear joint or gap seals, vertically or horizontal orientated with backing materials

**Joint Seal:** Protecta FR Acrylic to both sides of the wall, with joint widths up to 30 mm.

Construction details:



Substrate	Depth (mm)	Backing	Classification
Flexible or rigid wall / Steel	12.5 min.	Stonewool, 12.5 mm deep min. 35 kg/m <sup>3</sup>	E 120 – V – X – F – W 30 <sup>1</sup> EI 30 – V – X – F – W 30 <sup>2</sup>
			E 120 – T – X – F – W 30 <sup>3</sup> EI 45 – T – X – F – W 30 <sup>4</sup>

\*Additional and for information only.

The classifications provided in Table A.2.5.1 consider the insulation performance of all components within the firestopping system as per the requirements of EN 1366-4. This includes temperature evaluation of the steel substrate.

In relation to each of the above classifications, temperatures recorded on the seal (exclusive of the supporting construction) exceeded the maximum allowable after the following times (rounded down):

<sup>1</sup> 120, <sup>2</sup> 90, <sup>3</sup> 120, <sup>4</sup> 60



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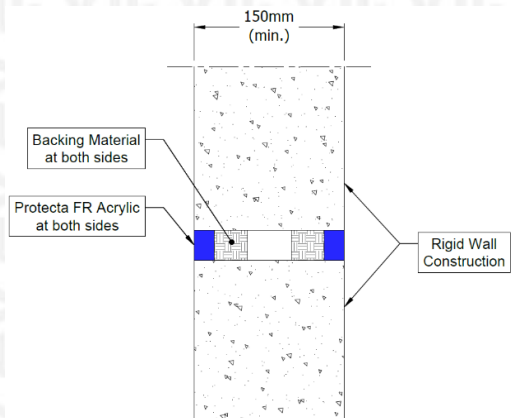
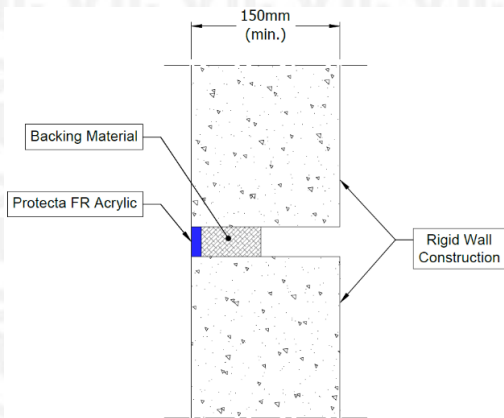
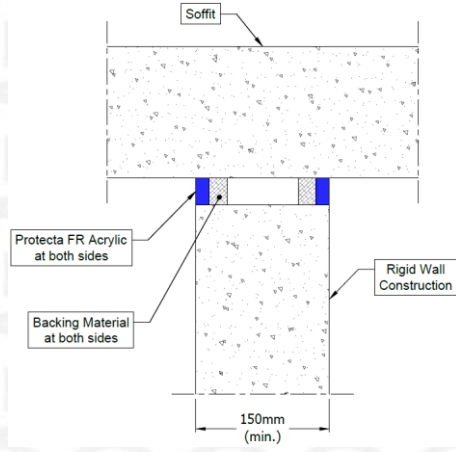
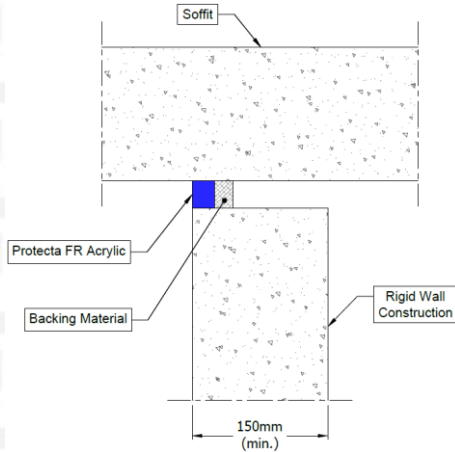
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Rigid wall constructions according to 1.2.1 with wall thickness of minimum 150 mm

Linear joint or gap seal, between head of rigid wall and soffit of concrete floor / between rigid walls

**Joint Seal:** Protecta FR Acrylic to either side (or any position between) or both sides of the wall, joint widths up to 30 mm

Construction details:



Substrate	Depth (mm)	Backing (minimum)	Classification
masonry/ concrete	25 min. (one side)	20 mm Stone wool 40 kg/m <sup>3</sup>	E 240 - T - X - F - W 30 EI 60 - T - X - F - W 30
	15 min. (both sides)		EI 240 - V - X - F - W 30 EI 240 - T - X - F - W 30
	10 min. (one side)	60 mm Stone wool 33 kg/m <sup>3</sup>	E 240 - T - X - F - W 50 EI 60 - T - X - F - W 50 EI 120 - V - X - F - W 50
	25 min. (one side)	48 mm Protecta Mineral Fibre BIO	E 240 - T - X - F - W 30 EI 120 - T - X - F - W 30

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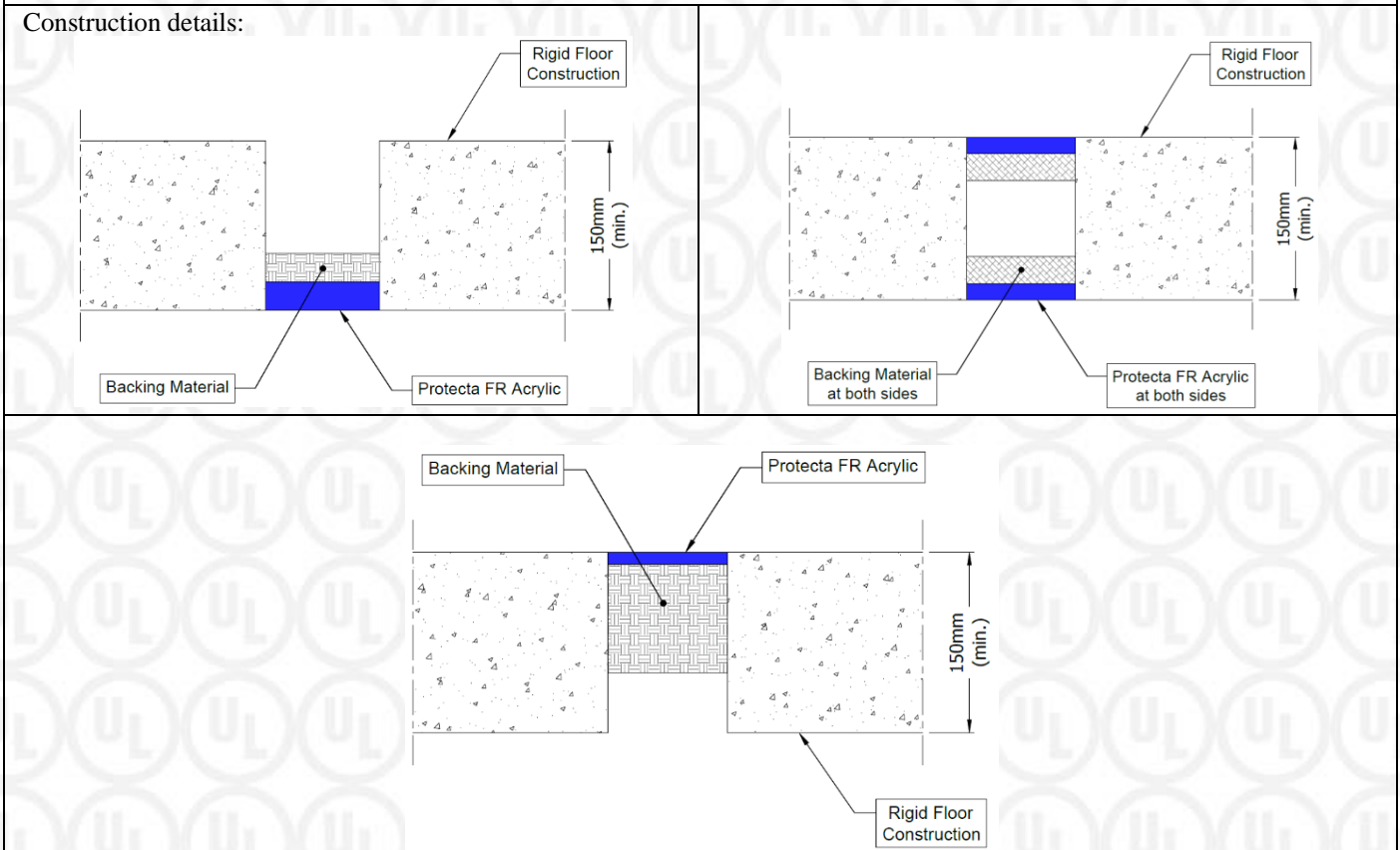
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**Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm**

**Linear joint or gap seal, between floor slabs or between floor slab and wall with sealant to the top face of the floor only**

**Joint Seal:** Protecta FR Acrylic to either side (or any position between) or both sides of the floor, joint widths up to 100 mm



Substrate	Depth (mm)	Backing (minimum)	Classification
masonry/ concrete	25 min. (any position)	25 mm Protecta Mineral Fibre BIO	E 120 - H - X - F - W 100 EI 60 - H - X - F - W 100
	25 min (top face)		EI 180 - H - X - F - W 100
	15 min. (both sides)	25 mm Stone wool 40 kg/m <sup>3</sup>	EI 120 - H - X - F - W 100
		25 mm Stone wool 140 kg/m <sup>3</sup>	EI 180 - H - X - F - W 100
	15 min. (both sides)	25 mm stone wool 35 kg/m <sup>3</sup> insulation	EI 240 - H - X - F - W 30
	10 min. (top face)	90 mm Stone wool 33 kg/m <sup>3</sup>	EI 240 - H - X - F - W 100



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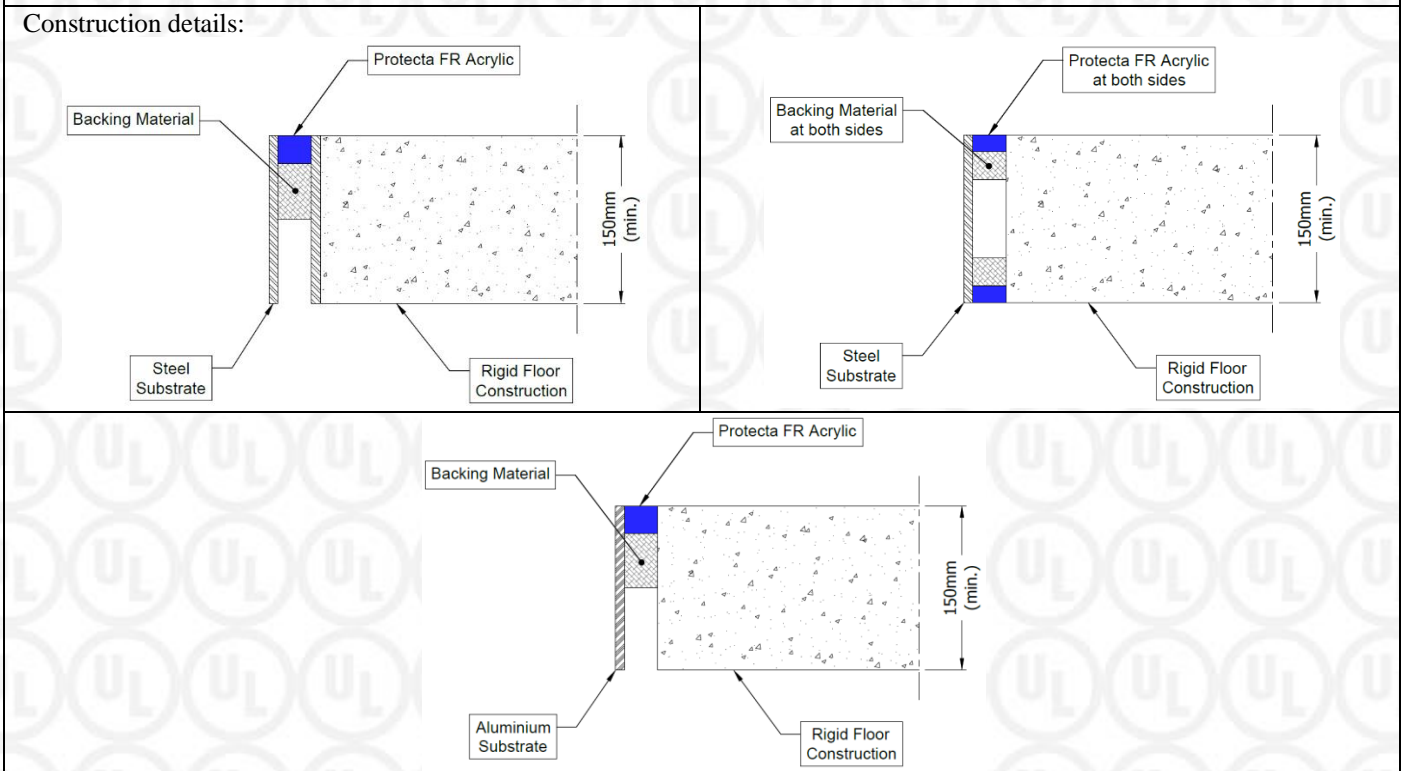
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## Linear joint or gap seals, in or between rigid floors

**Joint Seal:** Protecta FR Acrylic in floor, joint widths up to 30 mm



Substrate	Depth (mm)	Backing	Position	Classification
Steel/ steel or Steel/ concrete	25 min.	Stonewool, 50 mm deep min. 35 kg/m <sup>3</sup>	Top	<b>E 240 – H – X – F – W 30<sup>1</sup></b> <b>EI 30 – H – X – F – W 30<sup>2</sup></b>
	15 min.	Stonewool, 25 mm deep min. 35 kg/m <sup>3</sup>	Both	<b>E 240 – H – X – F – W 30<sup>3</sup></b> <b>EI 45 – H – X – F – W 30<sup>4</sup></b>
Aluminium / concrete	25 min.	Stonewool, 50 mm deep min. 35 kg/m <sup>3</sup>	Top	<b>E 180 – H – X – F – W 30<sup>5</sup></b> <b>EI 20 – H – X – F – W 30<sup>6</sup></b>

\*Additional and for information only.

The classifications provided in Table A.4.2.1 consider the insulation performance of all components within the firestopping system as per the requirements of EN 1366-4. This includes temperature evaluation of the steel substrate.

In relation to each of the above classifications, temperatures recorded on the seal (exclusive of the supporting construction) exceeded the maximum allowable after the following times (rounded down):

<sup>1</sup> 240, <sup>2</sup> 60, <sup>3</sup> 240, <sup>4</sup> 120, <sup>5</sup> 180, <sup>6</sup> 60

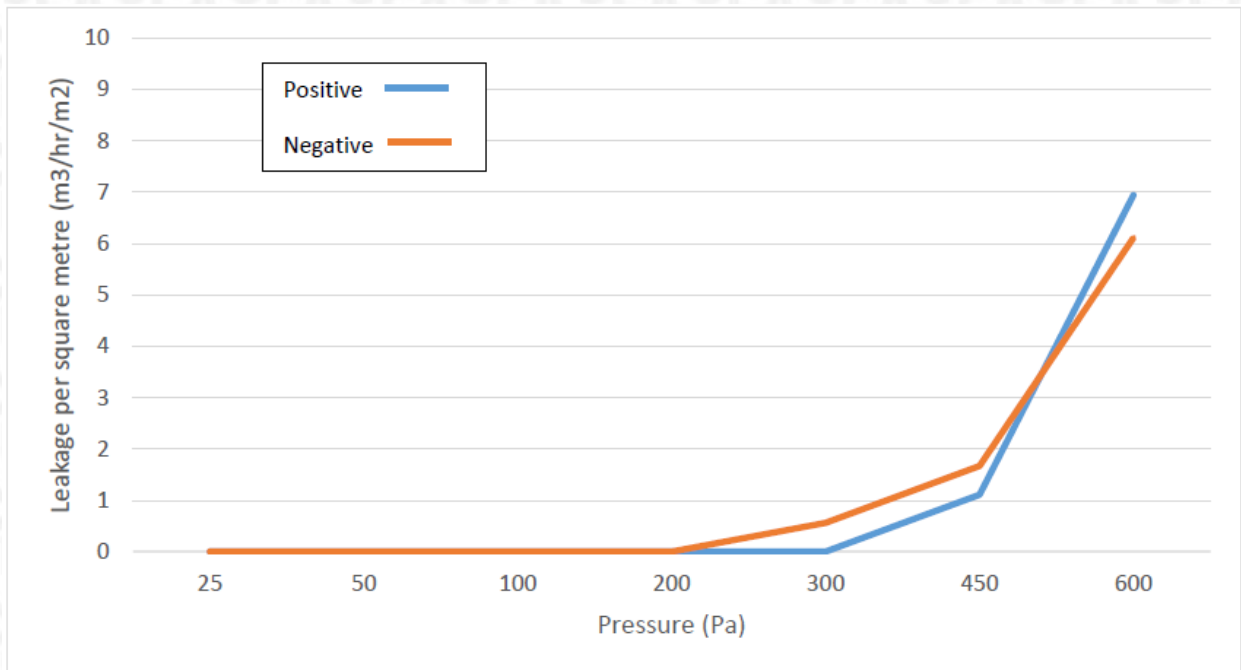
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Product tested	10mm deep x 30mm wide Protecta FR Acrylic		
	Summary of testing procedure		Result
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.02	0.56
	450	0.06	1.67
	600	0.22	6.11
Results under positive chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.00	0.00
	450	0.04	1.11
	600	0.25	6.94



# Appendix UL-EU Certificate

<b>Certification Mark</b>	<b>UL-EU mark</b>
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The UL-EU Mark, as displayed below, shall appear on certified products only. Minimum size is not specified, as long as the Mark is legible. The following is suggested.



The minimum height of the registered trademark symbol ® shall be 1 mm. When the overall diameter of the UL-EU Mark is less than 9.5 mm, the trademark symbol may be omitted if it is not legible to the naked eye.

The UL-EU Mark may appear on a label, nameplate, or may be cast, stamped or molded into the product. When appearing on a label or nameplate, the Manufacturer's name or trademark along with a model number are also required on that same label or nameplate. If cast, stamped or molded, the Manufacturer's name or trademark and model number shall also appear elsewhere on the product.

All content shall be in accordance with the details provided on this UL-EU Certificate.

## PROCUREMENT

The Production site may reproduce the Mark or obtain it from a UL authorized supplier. The list of UL authorized suppliers can be found on UL's online directory at [www.ul.com](http://www.ul.com).

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