

European Technical Assessment

ETA 22/0735 of 27/04/2026

General Part

Technical Assessment Body issuing the European Technical Assessment:

UL International (Netherlands) B.V.

Trade name of the construction product

Protecta FR Acrylic

Product family to which the construction product belongs

Fire Stopping and Sealing Product:

- Penetration Seals

Manufacturer

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Manufacturing plant(s)

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HD1 6SB, UK

This European Technical Assessment contains

143 pages including 1 Annex which forms an integral part of this assessment.

This European Technical Assessment is issued in accordance with Article 95(4) of Regulation (EU) 2024/3110, on the basis of

EAD 350454-00-1104, September 2017.

This version replaces

ETA 22/0735, issued on 27/04/2023

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I. SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

- 1) 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.
- 2) The 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.
- 3) Protecta FR Acrylic contains no carcinogenic substances or mutagenic substances, flame retardants or antimicrobiological agents.
- 4) Polyseam AS submitted a written declaration that Protecta FR Acrylic does not contain substances which have to be classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the EGDS - taking into account the installation conditions of the construction product and the release scenarios resulting from there. An emission report has also been provided, please refer to Appendix C

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

- 5) The use category of Protecta FR Acrylic in relation to BWR 3 (Hygiene, health and environment) is IA1, S/W2

2 Specification of the intended use(s) of the product in accordance with the applicable European Assessment Document (Hereinafter EAD): EAD 350454-00-1104: 2017

Detailed information and data is given in Annex A.

1. The intended use of system Protecta FR Acrylic is to reinstate the fire resistance performance of wall and floor constructions where they are penetrated by various metal pipe services with and without combustible insulation, plastic pipes, combustible cable conduits, composite pipes and electrical cables.
2. The specific elements of construction that the system Protecta FR Acrylic may be used to provide a penetration seal in, are as follows:
 - a. Flexible walls: The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs lined on both faces with minimum 1 layer of 12.5 mm thick boards. Flexible wall solutions may also be used in rigid walls, with a minimum density of 350 kg/m³.
 - b. Timber walls: The wall must have a minimum thickness of 100 mm and comprise solid wood or cross-laminated timber.

- c. Panel walls: The wall must have a minimum thickness of 100 mm and comprise steel sheets on both sides of a mineral fibre core. Apertures are not required to be lined, unless advised by the manufacturer of the walls. Further details are as follows:
- Sandwich panel to have a minimum thickness of 100 mm
 - Sandwich panels to comprise a stone wool structural core at minimum 115 kg/m³, with 0.5 mm thick steel facings
 - Abutting panels to be fixed together with minimum 45 mm long by 6 mm diameter stainless steel fasteners and 15 mm washers at nominal 300 mm centres
 - Sandwich panels in vertical orientation only
- d. Rigid walls: The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³.
- e. Flexible floors: The floor must have a minimum thickness of 228 mm and comprise timber joists with minimum 1 layer of 18.0 mm thick boards at top face, and 12.5 mm at soffit face. Flexible floor solutions may also be used in rigid floors, with a minimum density of 350 kg/m³.
- f. Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m³.
- g. Timber floors: The floor must have a minimum thickness of 150 mm and comprise solid wood or cross-laminated timber.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

Protecta Fire Protection Systems which involve services penetrating both sides of a flexible wall or floor may also be used in the situation where the services penetrates one side of the wall or floor only and the remaining side of the wall or floor is not penetrated at the same point (i.e. the services continues on the inside of the wall or floor). All fire integrity and thermal insulation ratings for such single-sided penetrations remain the same as for the equivalent double-sided penetration.

3. The system Protecta FR Acrylic may be used to provide a penetration seal with specific single insulated metal pipes, uninsulated metal pipes, plastic pipes, combustible cable conduits, composite pipes and with specific electrical cables, single or in a bundle (for details see Annex A).
4. Apertures in the separating element shall be maximum \varnothing 504 mm, 600 x 600 mm or 100 x 1000 mm. The annular space/gap around the services shall be infilled with Protecta FR Acrylic sealant and in some cases a mineral fibre insulation backing material. Minimum separation between services and the edge of the seal within each aperture should be 10 mm to allow for correct fitting of backing and seal depth, however, less width will sustain fire resistance if correct fitting of the fire seal is achieved. Blank seals up to 300 x 300 mm are permitted. For full details, see Annex A.
5. Pipes shall be supported at maximum 350 mm away from both faces of the wall constructions and 550 mm from the upper face of floor constructions. Where cable carriers (e.g. trays, ladders, baskets) are discontinued on both sides of the penetration seal, the maximum distance from the penetration seal to the cable carriers are 150 mm. There is no minimum distance required for the fixings of the cable carriers to the supporting construction. However, it is suggested such fixings and the cable carriers are constructed in such a way, they provide support for the duration of the required fire classification of the penetration seal, to avoid damage to the penetration seal in a fire scenario.

6. Where a backing material is described in Annex A, this can be replaced with Protecta FR Acrylic if the total seal depth is the same or greater.
7. Where single sided top face seals are described in Annex A, these can also be used in composite floors if the thickness of the concrete where the seal is placed is the same or greater than the required depth of the fire seal.
8. When installing the system Protecta FR Acrylic in hollow floor slabs, top sided seals should be completed double sided without reduction of the seal depth on either side. There must be sufficient thickness of concrete below and above the void for the depth of the fire seal. Where this is not the case, tubular voids should be plugged with stone wool backing material before sealing the aperture.
9. Solutions given in Annex A for Protecta FR Acrylic within 100 mm thick flexible walls, can be used in panel walls limited to EI 60. All seals must be fitted as described in Annex A, but with minimum 25 mm deep Protecta FR Acrylic to both sides of the wall, backed with minimum 25 mm deep stone wool fibre insulation.
10. Where steel pipes are mentioned in Annex A, this includes iron pipes. Where PVC pipes are mentioned in Annex A, this includes PVC-U, PVC-C and similar if the pipe is according to EN 1329-1, EN 1452-2, EN 1453-1[^] and EN 1566-1. Where PP pipes are mentioned in Annex A, this includes PP-MV, PP-H, PP-R and similar if the pipe is according to EN 1451-1 or DIN 8077/8078. Where PE pipes are mentioned, this includes PE-LD, PE-MD, PE-HD, PE-X and similar according to EN 1519-1, EN 12201-2 or EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1.
11. An aperture with or without penetrating services, fire sealed with the system Protecta FR Acrylic, can include a steel or plastic sleeve casted or friction fitted within rigid constructions. The plastic sleeve should have a maximum wall thickness of 14.6 mm.
12. Services through the system Protecta FR Acrylic may be used in all angles between 90° and 45° in all directions, subject to metallic pipes only.
13. The provisions made in this European Technical Approval are based on an assumed working life of the Protecta FR Acrylic of 25 years, provided that the conditions laid down in the manufacturers datasheet and instructions for the packaging/transport/ storage/installation/use/repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.
14. Type Z₂: Intended for uses in internal conditions with humidity lower than 85 % RH excluding temperatures below 0°C, without exposure to rain or UV.

3 Performance of the product and references to the methods used for its assessment

Product-type: Sealant		Intended use: Penetration Seal
Basic requirement for construction work	Essential characteristic	Performance
BWR 2 Safety in case of fire		
EN 13501-1	Reaction to fire	Class B-s1, d0
EN 13501-2	Resistance to fire	Annex A
BWR 3 Hygiene, health and environment		
EN 1026	Air permeability	Annex B
EAD 350454-00-1104, Annex C	Water permeability	No performance determined
Declaration of manufacturer & EN 16516	Content, emission and/or release of dangerous substances	Use categories: IA1, S/W2 Annex C
BWR 4 Safety in use		
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	Adhesion	No performance determined
EAD 350454-00-1104, Clause 2.2.9	Durability	Z ₂
BWR 5 Protection against noise		
EN 10140-1,2,4,5/ EN ISO 717-1	Airborne sound insulation	Rw(C;Ctr)= 62 (-1;-5) dB*
BWR 6 Energy economy and heat retention		
EN 12664, EN 12667, EN 12939, EN ISO 8990, EN ISO 6946, EN ISO 14683, EN ISO 10211, EN ISO 10456	Thermal properties	No performance determined
EN ISO 12572, EN 12086, EN ISO 10456	Water vapour permeability	No performance determined

* At 12 mm depth

4 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (HEREINAFTER AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE

According to the decision 1999/454/EC – Commission Decision of date 22nd June 1999 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, published in the Official Journal of the European Union (OJEU) L178/52 of 14/07/1999, (see <https://eur-lex.europa.eu/oj/direct-access.html>) of the European Commission¹, as amended, the system(s) of assessment and verification of constancy of performance (see Annex IX to Regulation (EU) No 2024/3110) given in the following table(s) applies (apply).

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Fire stopping and Fire Sealing Products	For fire compartmentation and/or fire protection or fire performance	Any	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Tasks of the manufacturer:

Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European Technical Assessment.

The factory production control shall be in accordance with the Control Plan of 13th September 2024 relating to the European Technical Assessment ETA 22/0735 issued on 27/04/2024 which is part of the technical documentation of this European Technical Assessment. The "Control Plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at UL International (Netherlands) B.V.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control Plan.

¹ Official Journal of the European Communities L178/52 of 14/7/1999
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Other tasks of the manufacturer:

Additional information

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information:

(a) Technical data sheet:

- Field of application:
- Building elements for which the penetration seal is suitable, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions – the construction requirements.
- Limits in size, minimum thickness etc. of the penetration seal
- Construction of the penetration seal including the necessary components and additional products (e.g. backfilling material) with clear indication whether they are generic or specific.
- Services which the penetration seal is suitable, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. pipe trays)

(b) Installation instruction:

- Steps to be followed
- Procedure in case of retrofitting
- Stipulations on maintenance, repair and replacement

6 Issued on:

27th April 2026

Report by:



D. Yates
Staff Engineer
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Verified by:



C. Johnson
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Validated by:



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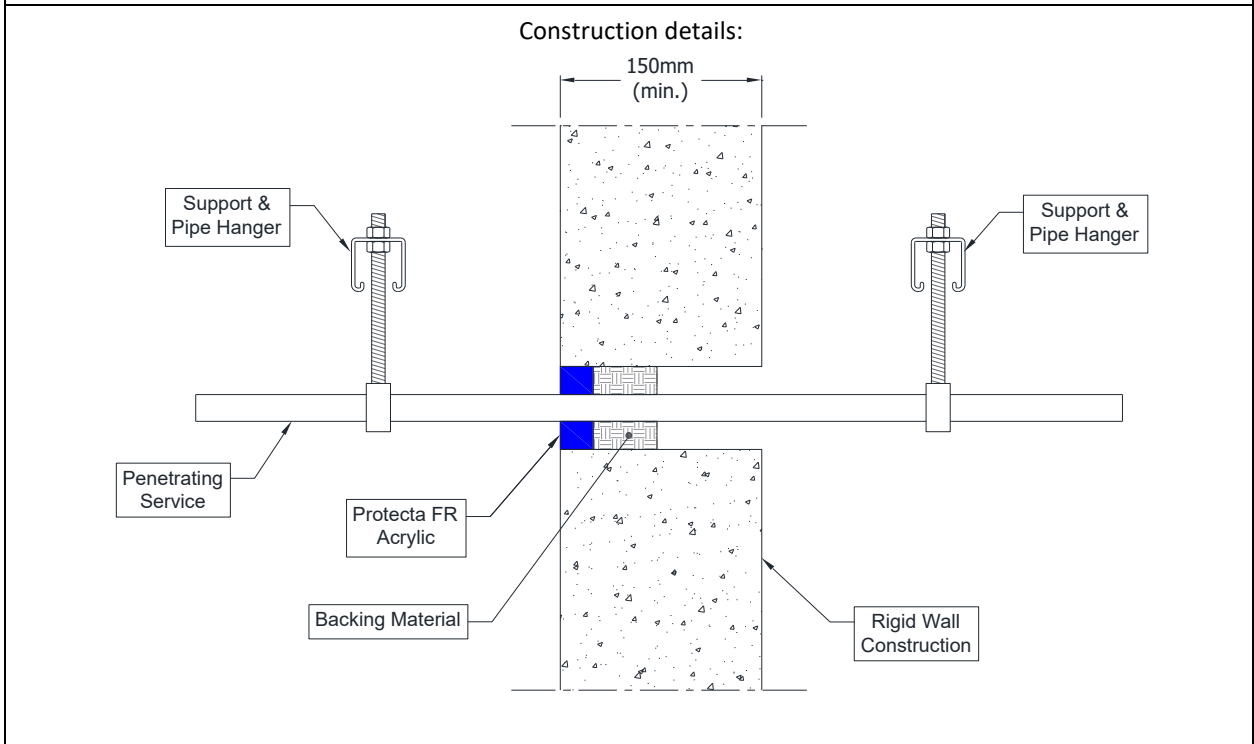
For and on behalf of UL International (Netherlands) B.V.

ANNEX A – Resistance to Fire Classification – Protecta FR Acrylic

A.1 Rigid wall constructions according to 1.2.1 with wall thickness of minimum 150 mm

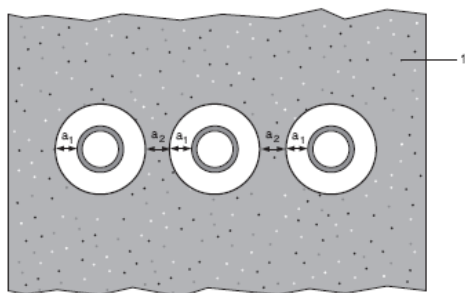
A.1.1 Single side penetration seal with cables

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 annular space 7 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.



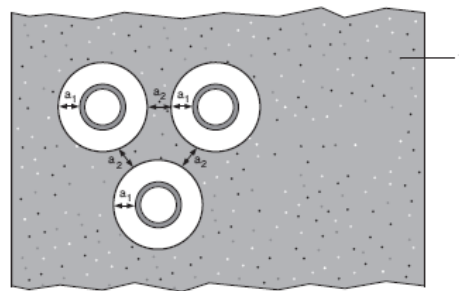
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

- 1 Supporting construction
- a1 Cable / top edge of seal separation
- a2 Cable / side edge of seal separation
- a3 Cable / cable separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

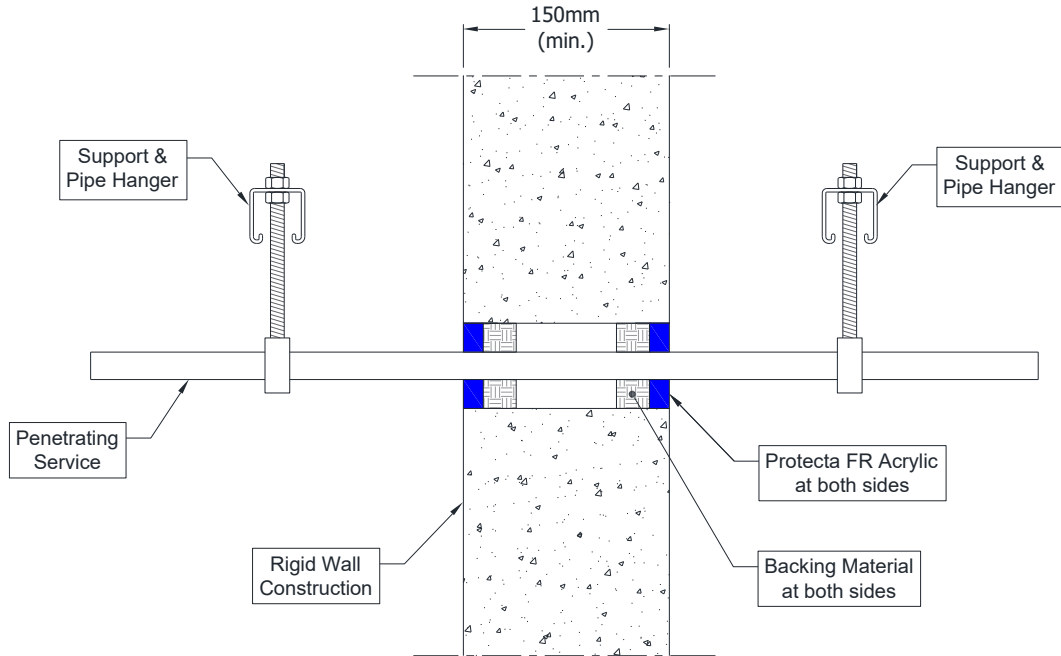
A.1.1.1

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.				

A.1.2 Double side penetration seal with cables

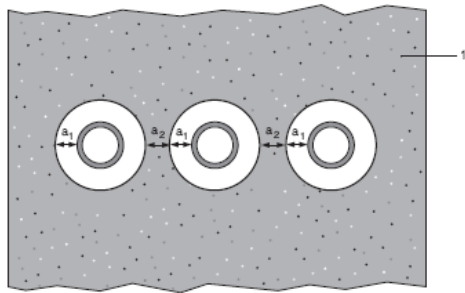
Penetration Seal: Cables fitted with Protecta FR Acrylic to both sides of the wall, backed with stone wool or mineral fibre insulation. Maximum seal size of 300 x 300 mm. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



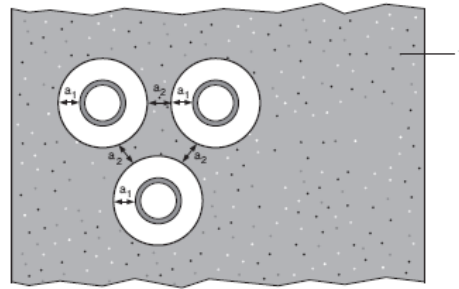
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

- 1 Supporting construction
- a1 Cable / top edge of seal separation
- a2 Cable / side edge of seal separation
- a3 Cable / cable separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

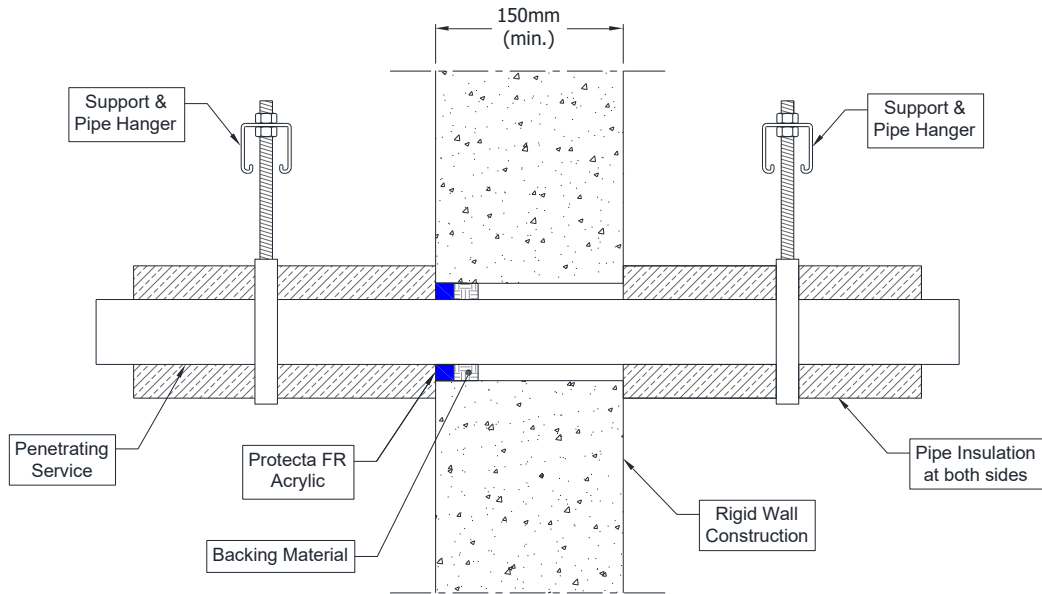
A.1.2.1

Services	Sealant depth	Backing (minimum)	Insulation	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m ³	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

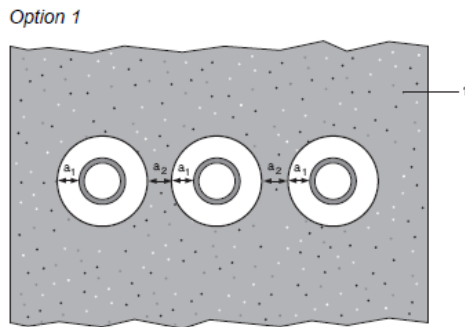
A.1.3 Single side penetration seal with metallic (and composite) pipes

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/m³ stone wool insulation. Minimum annular space 6 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

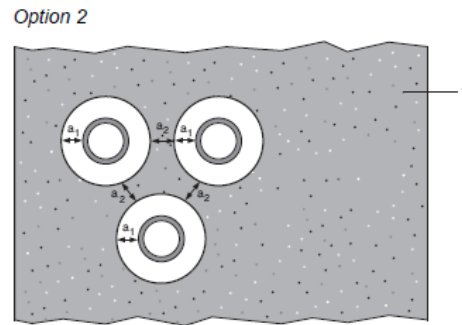
Construction details:



Configuration 1:



Configuration 2:



Key

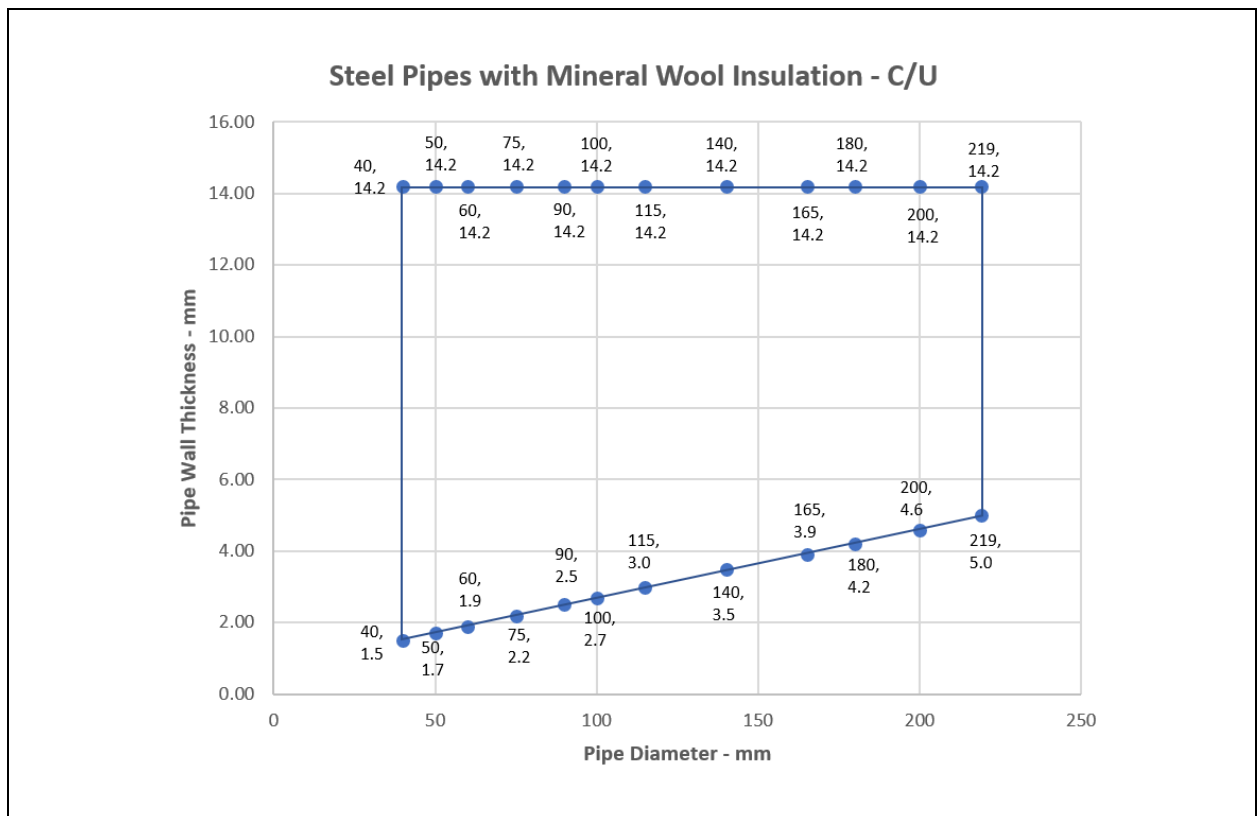
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.1.3.1

Services	Maximum annular gap	Insulation (minimum)	Classification
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall	9 mm	1000 mm length 20 mm Stone wool insulation 80 kg/m ³	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
Mild or stainless steel pipe			
40 mm diameter/1.5-14.2 mm wall*	18 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m ³	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall*		1000 mm length of 30 mm Stone wool insulation 80 kg/m ³	E 180 C/U, EI 90 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*			

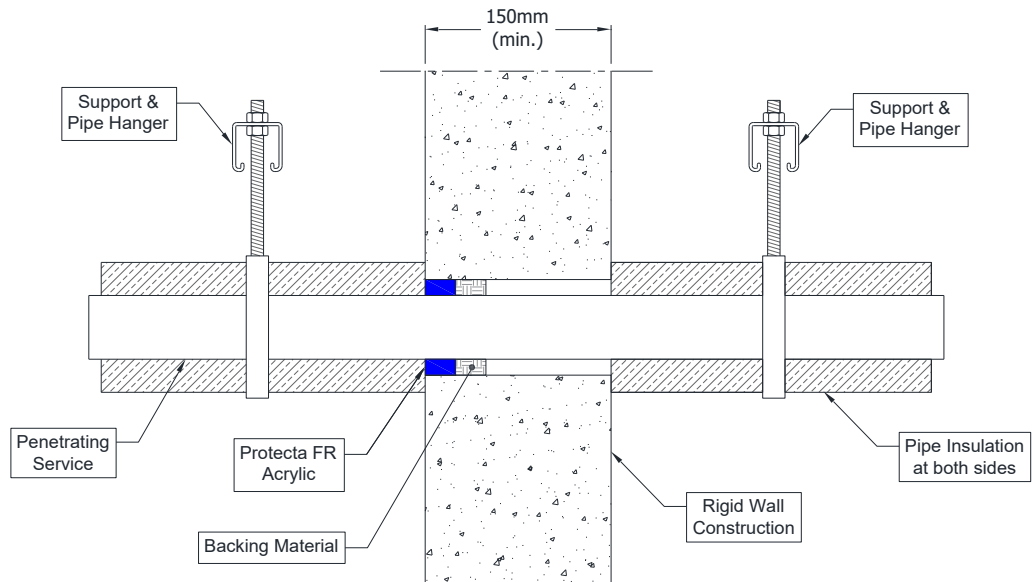
* Typical pipe diameters shown, see below graph for intermediate sizes



A.1.4 Single side penetration seal with metallic (and composite) pipes

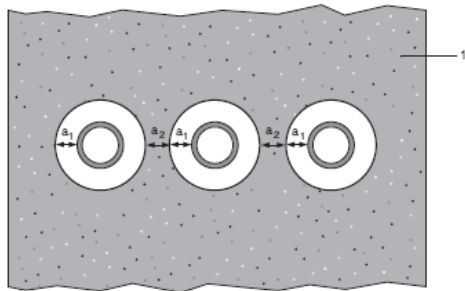
Penetration Seal: LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 25 mm deep Protecta FR Acrylic to either side of the wall (or at any position between), backed with 25 mm deep minimum 40 kg/m³ stone wool insulation. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



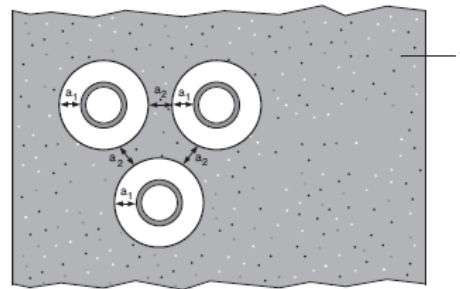
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

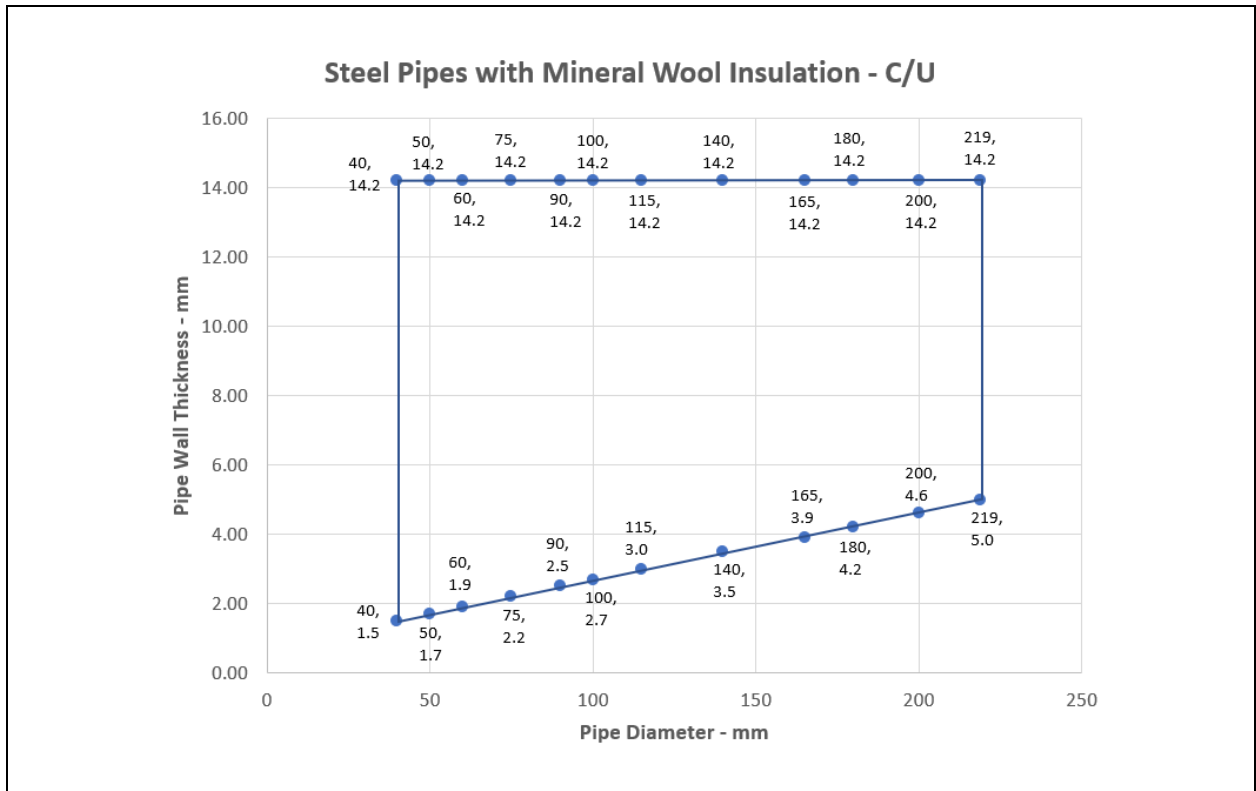
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.1.4.1

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 ³	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.)	
Mild or stainless steel pipe			
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 ³	E 240 C/U, EI 60 C/U
40 mm diameter/1.5-14.2 mm wall*		1000 mm length of 30 mm Stone wool insulation 80 kg/m ³	
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*			

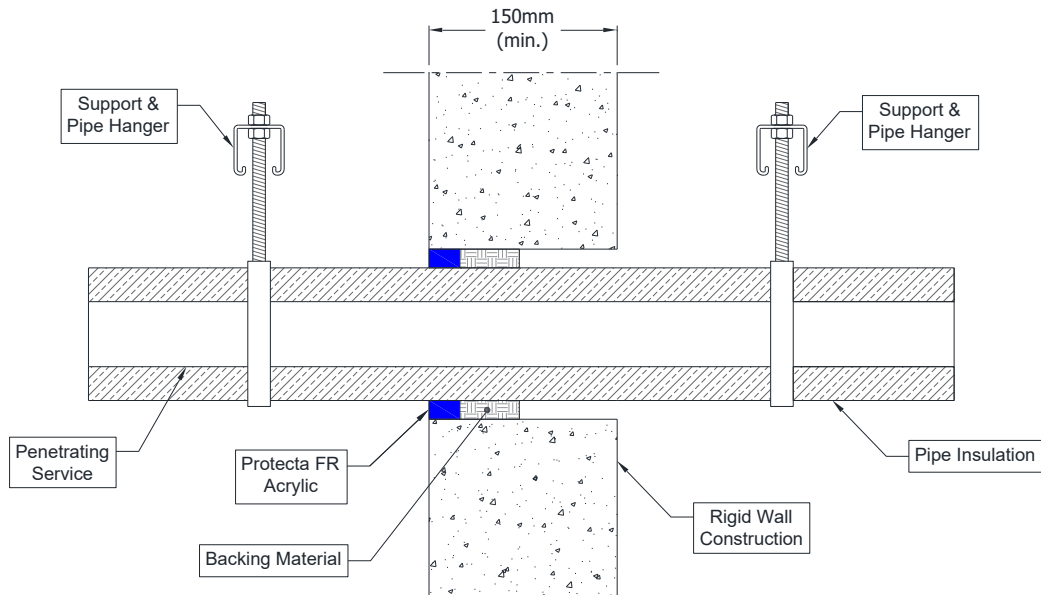
* Typical pipe diameters shown, see below graph for intermediate sizes



A.1.5 Single side penetration seal with metallic pipes

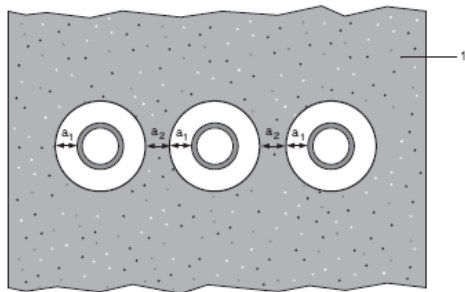
Penetration Seal: CS (Continuous Sustained) insulated metallic (single), with 25 mm deep Protecta FR Acrylic to either side of the wall (or at any position between), backed with 48 mm deep Protecta Mineral Fibre BIO insulation. Maximum seal size 300 x 300 mm or 504 mm Ø. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



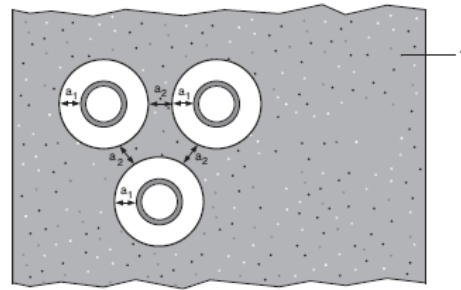
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

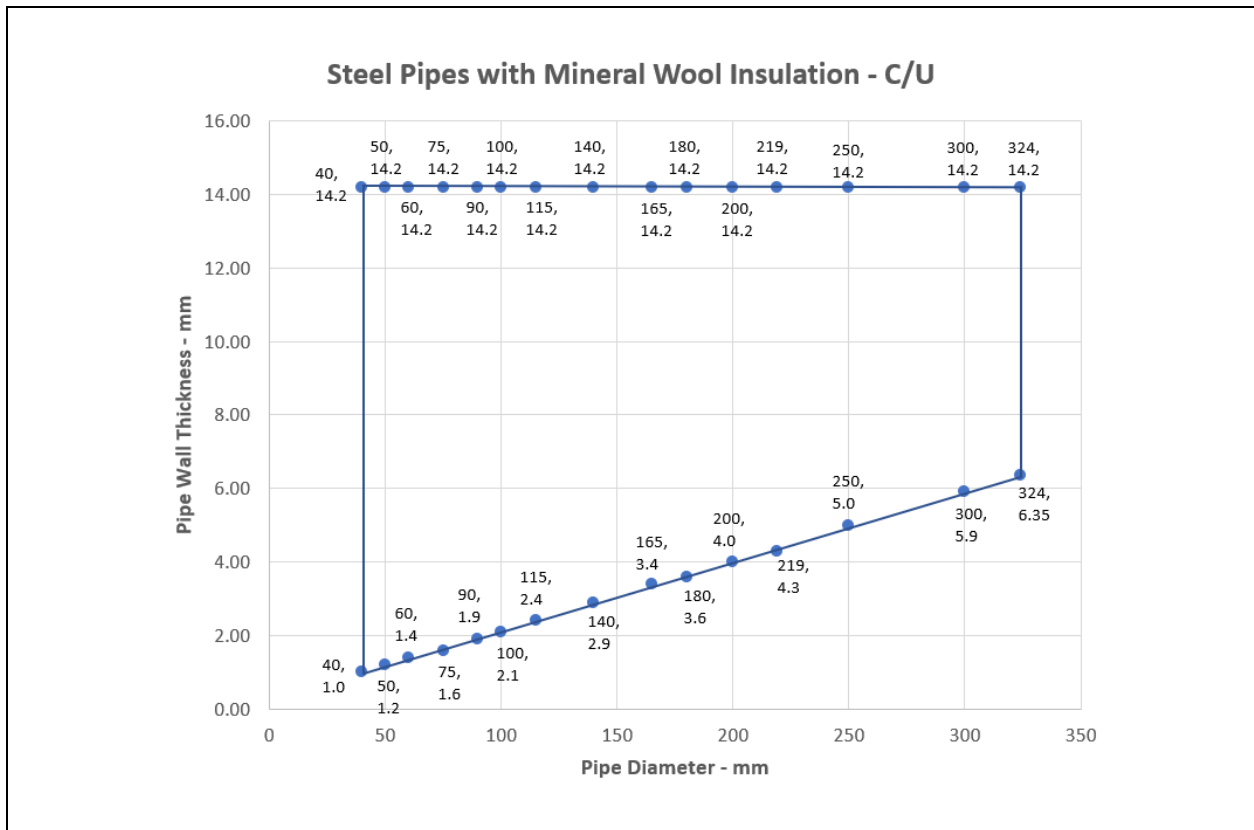
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.1.5.1 Single side penetration seal with pipes

Services	Insulation	Classification
Mild or stainless steel pipe		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m ³	EI 240 C/U
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m ³	EI 180 C/U
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*		

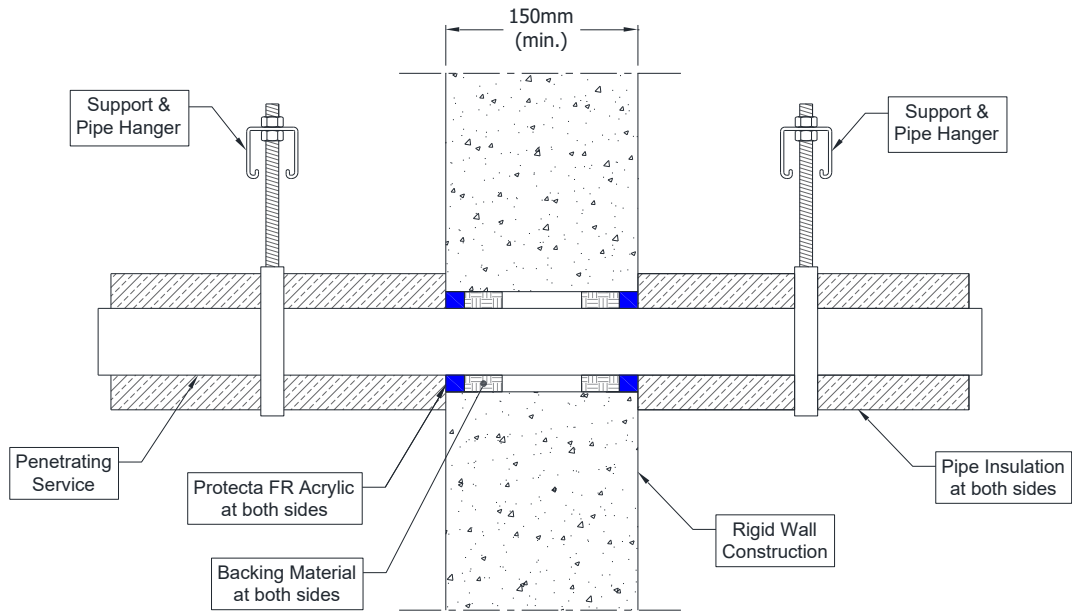
* Typical pipe diameters shown, see below graph for intermediate sizes



A.1.6 Double side penetration seal with metallic pipes

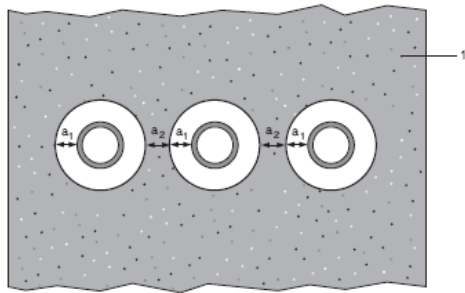
Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Protecta FR Acrylic to both sides of the wall, backed with 20 or 30 mm deep minimum 40 kg/m³ stone wool insulation. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



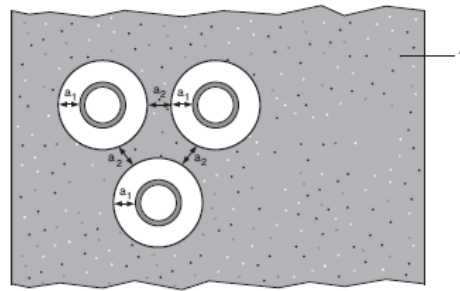
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

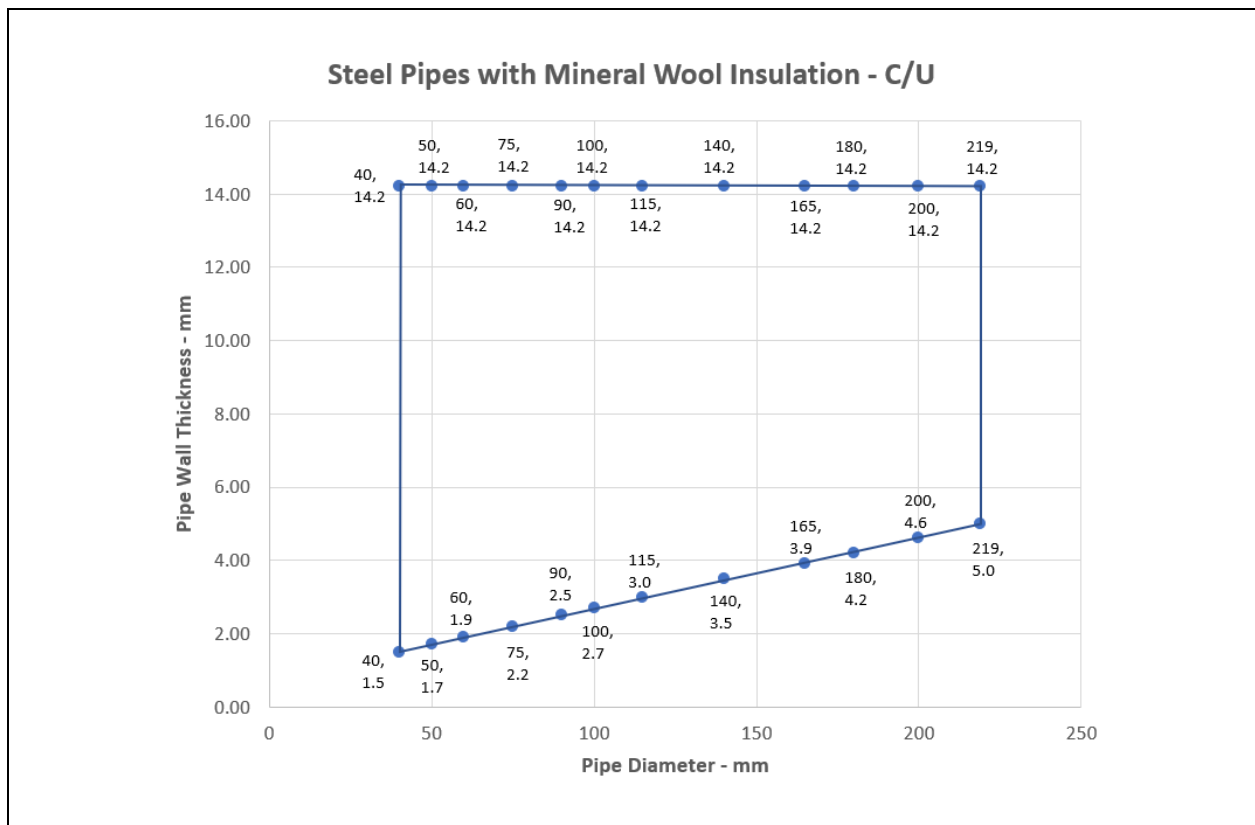
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.1.6.1

Services	Maximum seal size	Insulation (minimum)	Classification
Mild or stainless steel pipe	300 x 300 mm	20 mm Stone wool insulation 80 kg/m ³	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall*			30 mm Stone wool insulation 80 kg/m ³
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*			
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*			

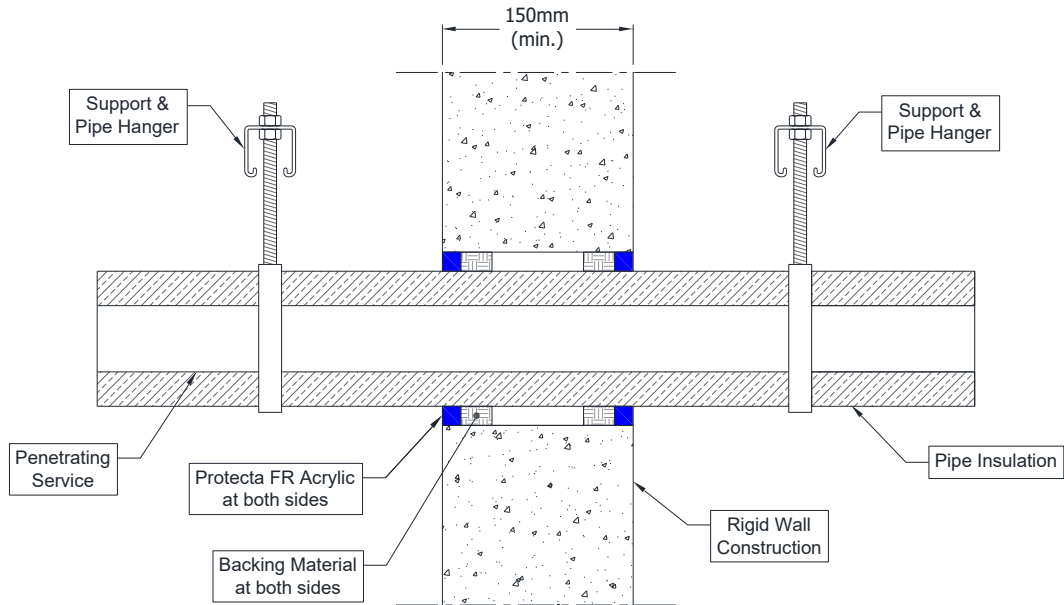
* Typical pipe diameters shown, see below graph for intermediate sizes



A.1.7 Double side penetration seal with metallic pipes

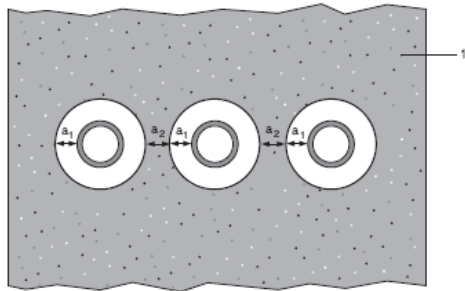
Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm Protecta FR Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m³. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *. Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:



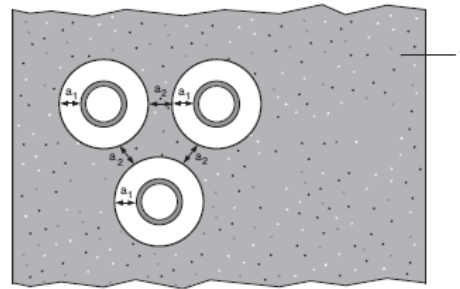
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

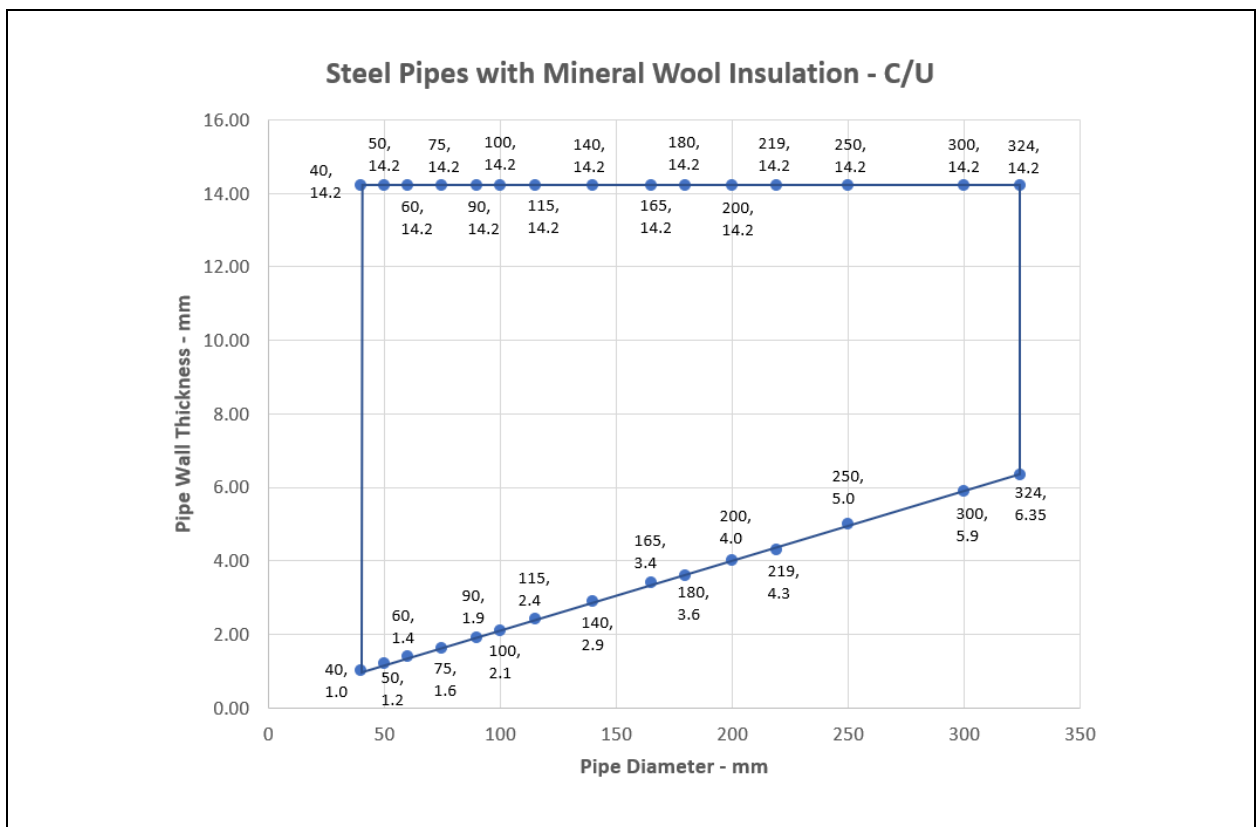
a3 Pipe / pipe separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.1.7.1 Double side penetration seal with pipes

Services	Insulation	Classification
Mild or stainless steel pipe		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m ³	EI 240 C/U
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m ³	
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*		

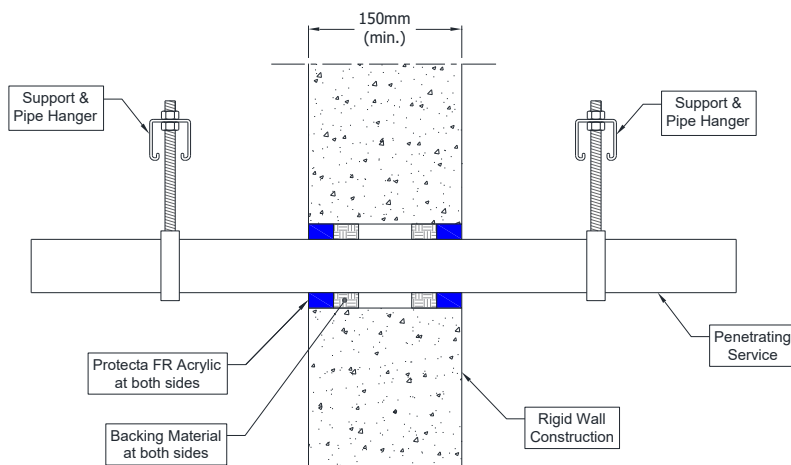
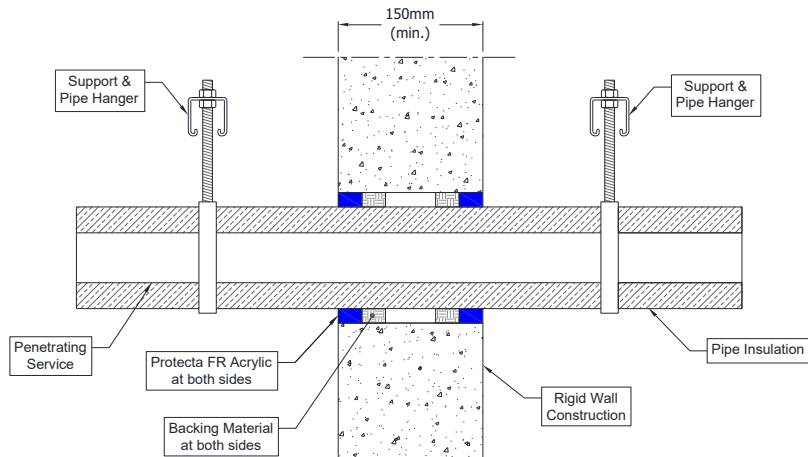
* Typical pipe diameters shown, see below graph for intermediate sizes



A.1.8 Double side penetration seal with metallic pipes with combustible insulation

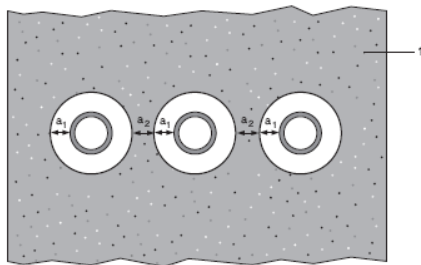
Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm Protecta FR Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m³. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *. Maximum seal size 300 x 300 mm / 300 mm ϕ

Construction details:



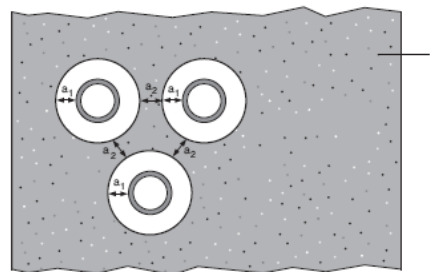
Configuration 1:

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

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to E 240, EI 180

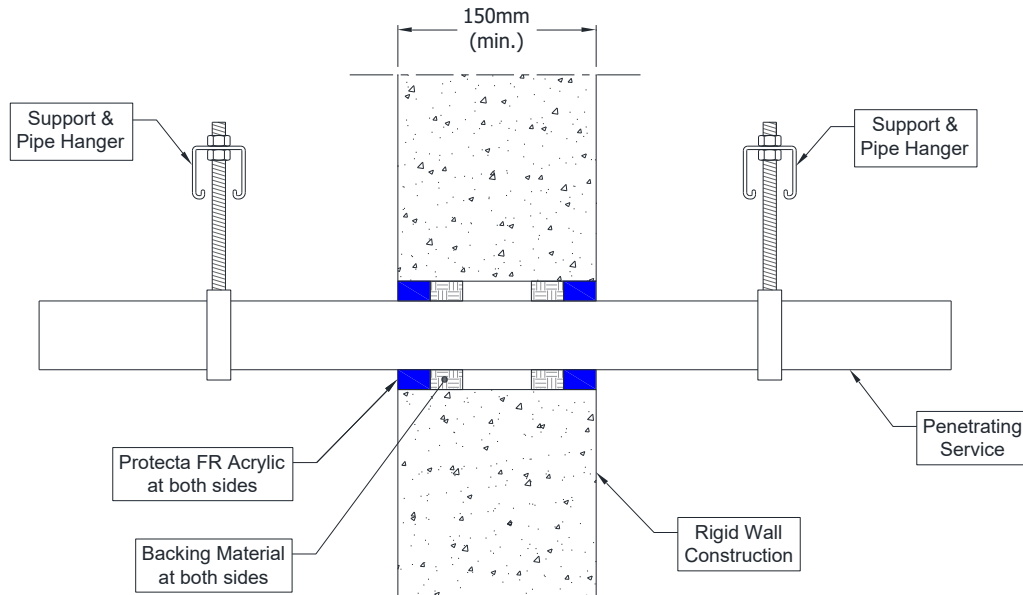
A.1.8.1 Double side penetration seal with metallic pipes with combustible insulation

Services	Insulation	Classification
Mild or stainless steel pipe		
4-65 mm diameter/1.0-14.2 mm wall	None	E 240 C/U, EI 20 C/U
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
Copper and steel pipes		
6-12 mm diameter/0.6-6.0 mm wall	None	E 240 C/C, EI 120 C/C

A.1.9 Double side penetration seal with plastic pipes

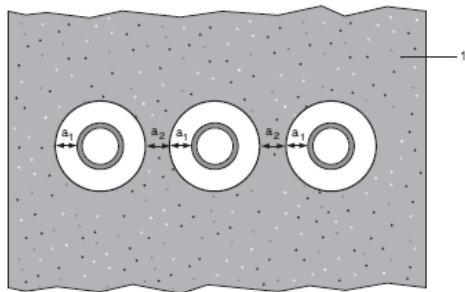
Penetration Seal: Plastic and metal pipes (single) fitted at any position within the aperture, with 25 mm Protecta FR Acrylic to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m³. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *. Maximum seal size 300 x 300 mm / 300 mm \varnothing

Construction details:



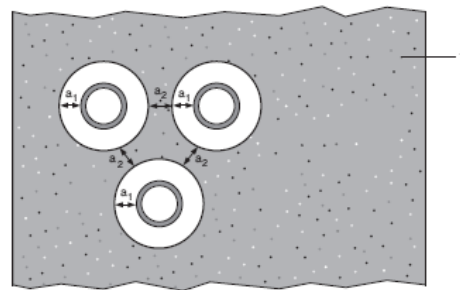
Configuration 1:

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

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.1.9.1 Double side penetration seal with plastic pipes

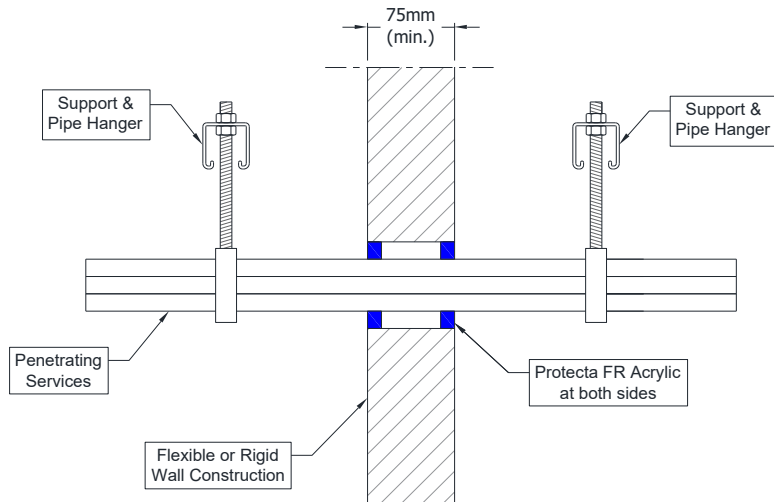
Pipe material	Size	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1	6-32 mm diameter/1.0-2.4 mm wall	EI 240 U/C
PVC with bundle of cables up to 21 mm diameter	6-32 mm diameter/1.0-2.4 mm wall	E 240 U/C, EI 120 U/C
PVC with bundle of cables up to 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

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

A.2.1 Double side penetration seal with cables

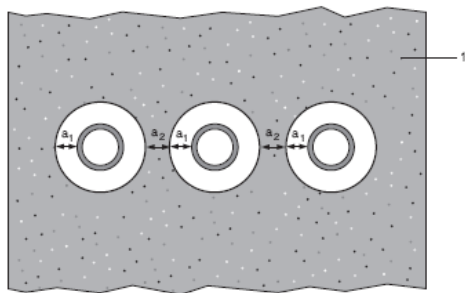
Penetration Seal: Cables (single or bundles up to 100 mm Ø) and pipes fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2), maximum seal size 150 x 150 mm / 344 mm diameter (when incorporating a pipe of seal diameter -20 mm).

Construction details:



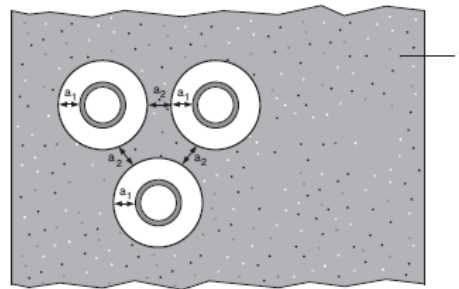
Configuration 1:

Option 1



Configuration 2:

Option 2



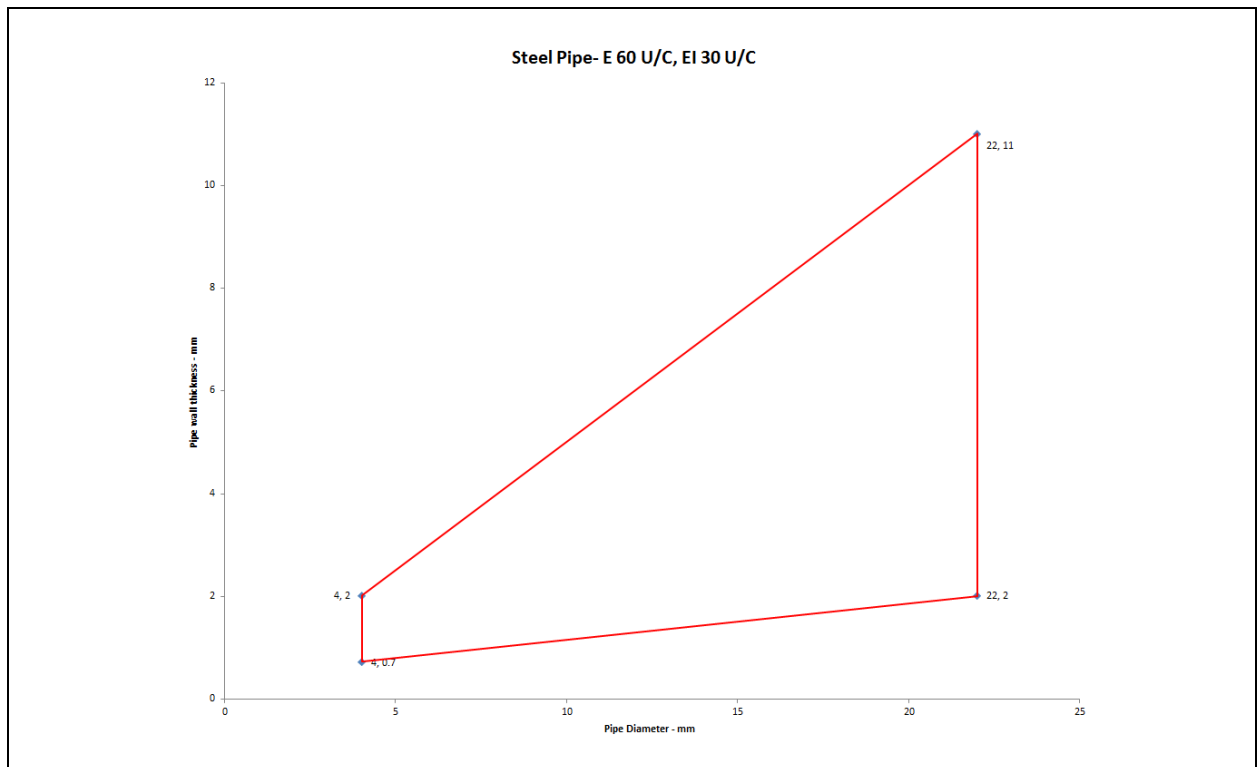
Key

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

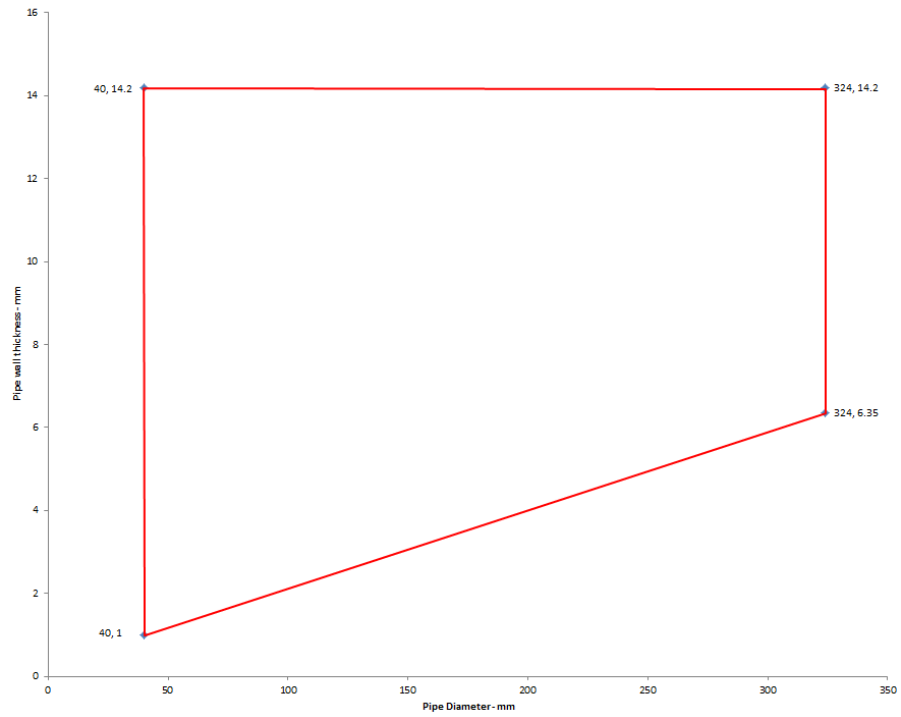
A.2.1.1

Services	Sealant depth	Backing	Classification
None (blank)	12.5 mm	Any material	EI 60
Cables up to 21 mm \varnothing , single		None	E 60, EI 45
Cables up to 21 mm \varnothing , in bundles up to 100 mm \varnothing			E 45, EI 30
Mild or stainless steel pipe			
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
Mild or stainless steel pipe with minimum 80 kg/m ³ density stone wool insulation Continuous Sustained (CS)			
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*			
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 \varnothing /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
PP pipe according to EN 1451-1 or DIN 8077/8078			
20 mm \varnothing /2.3 mm wall	12.5 mm	None	EI 45 U/C
21-32 mm \varnothing /2.3-4.4 mm wall*			EI 30 U/C
21-32 mm \varnothing /2.3-4.4 mm wall, with bundle of cables up to 21 mm diameter*			E 45 U/C, EI 30 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 mm \varnothing /2.0 mm wall	12.5 mm	None	EI 45 U/C
21-32 mm \varnothing /2.0-3.0 mm wall*			EI 30 U/C
21-32 mm \varnothing /2.0-3.0 mm wall, with bundle of cables up to 21 mm* diameter			E 45 U/C, EI 30 U/C

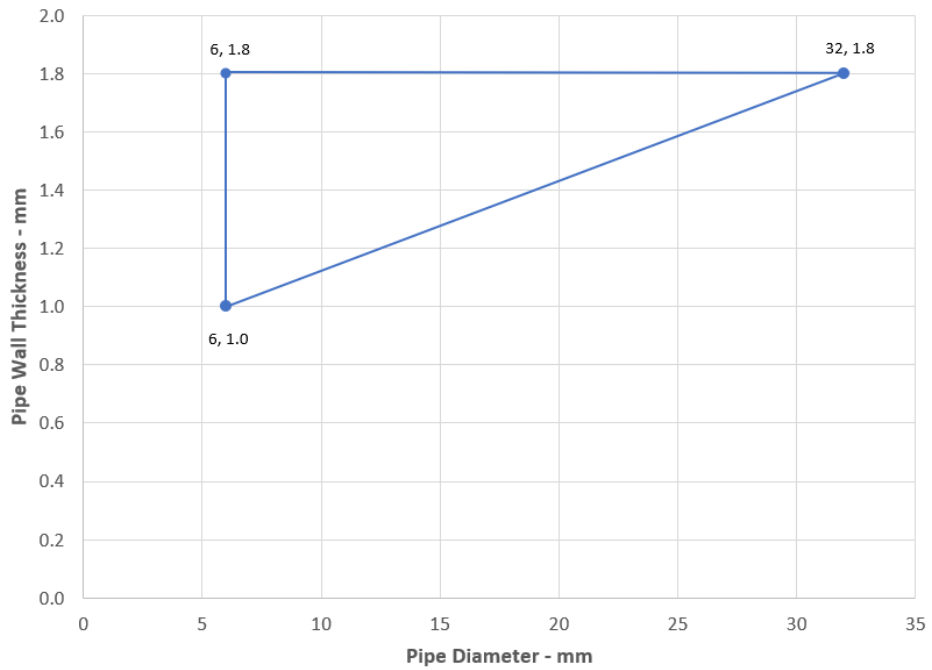
* See below graphs for interpolated pipe sizes



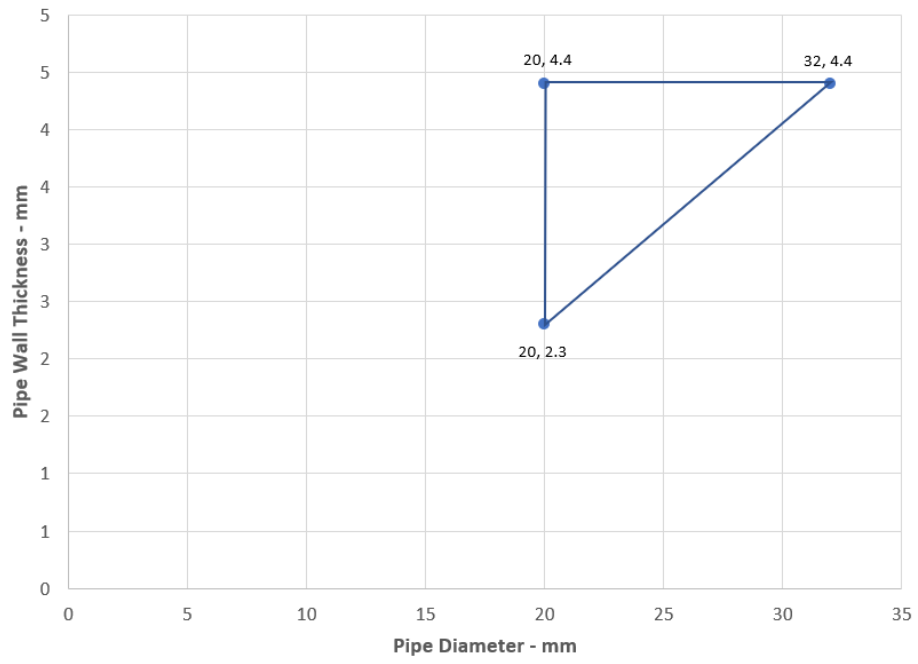
Steel pipes with 30 mm Insulation



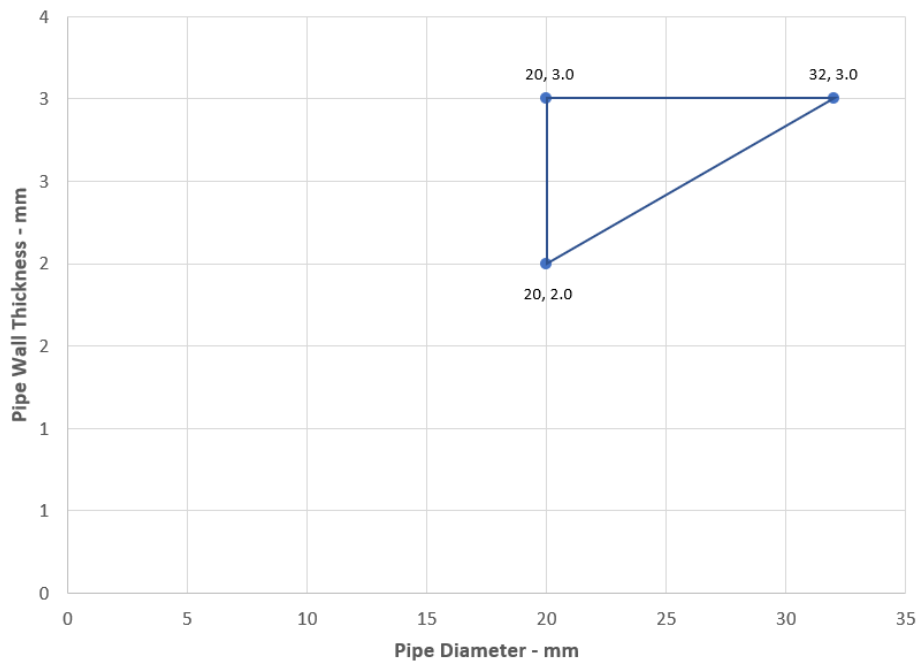
PVC-U Pipes - U/C



PP Pipes - EI 30 U/C



PE Pipes - EI 30 U/C

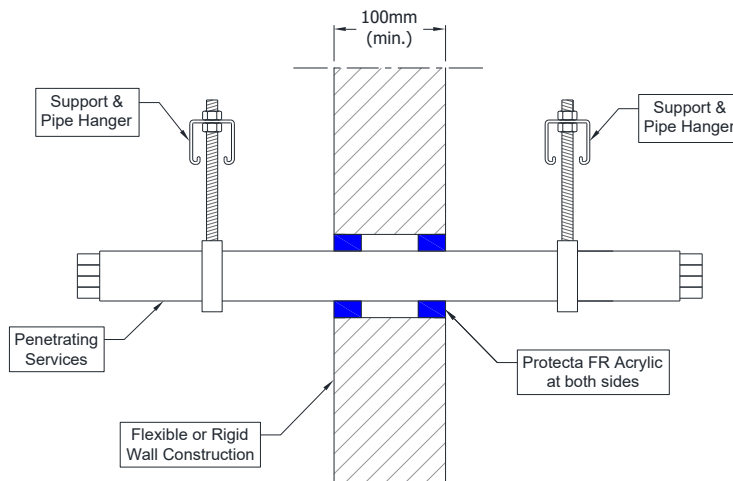
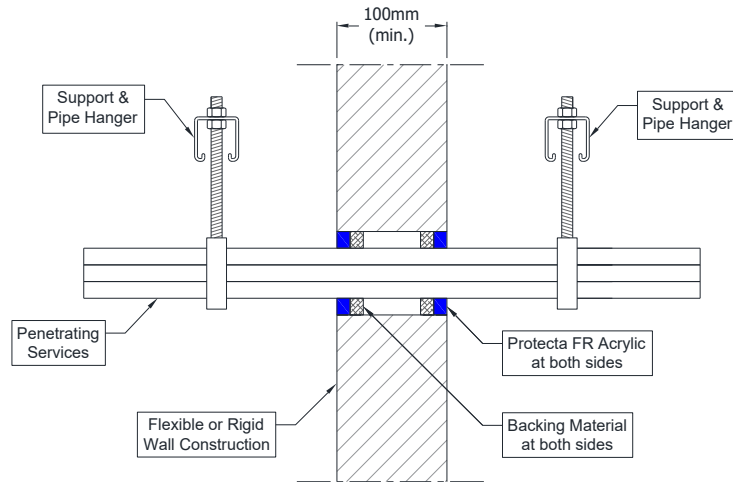


A.3 Flexible and rigid wall constructions according to 2.2) with wall thickness of minimum 100 mm

A.3.1 Double side penetration seal with cables

Penetration Seal: Cables (single or bundles up to 100 mm \varnothing) and conduits fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall. Minimum annular space 10 mm (a_1) and minimum separation between penetration seals 0 mm (a_2).

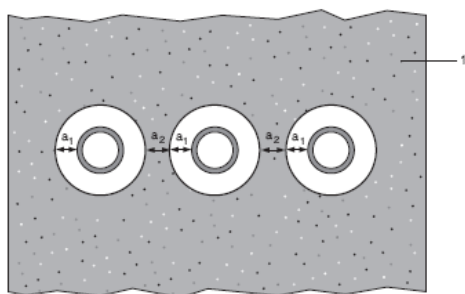
Construction details:



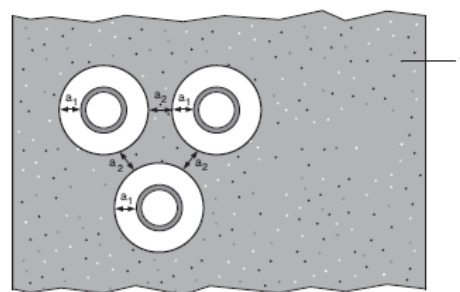
Configuration 1:

Configuration 2:

Option 1



Option 2



Key

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

A.3.1.1

Services	Sealant depth	Backing	Maximum aperture	Classification
None (blank)	12.5 mm	Stone wool 20 mm deep 35-140 kg/m ³	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 ³		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 ³		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 ² 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 ³		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
Galvanised steel Unistrut channel up to 41 x 41 mm	12.5 mm	Stone wool 12.5 mm deep min. 33 kg/m ³	300 x 300 mm	E 120, EI 60
Corrugated plastic conduit up to 16 mm Ø, with single cables up to 16 mm Ø	15 x 15 mm, face fillet	None	Approx. same as conduit	EI 120

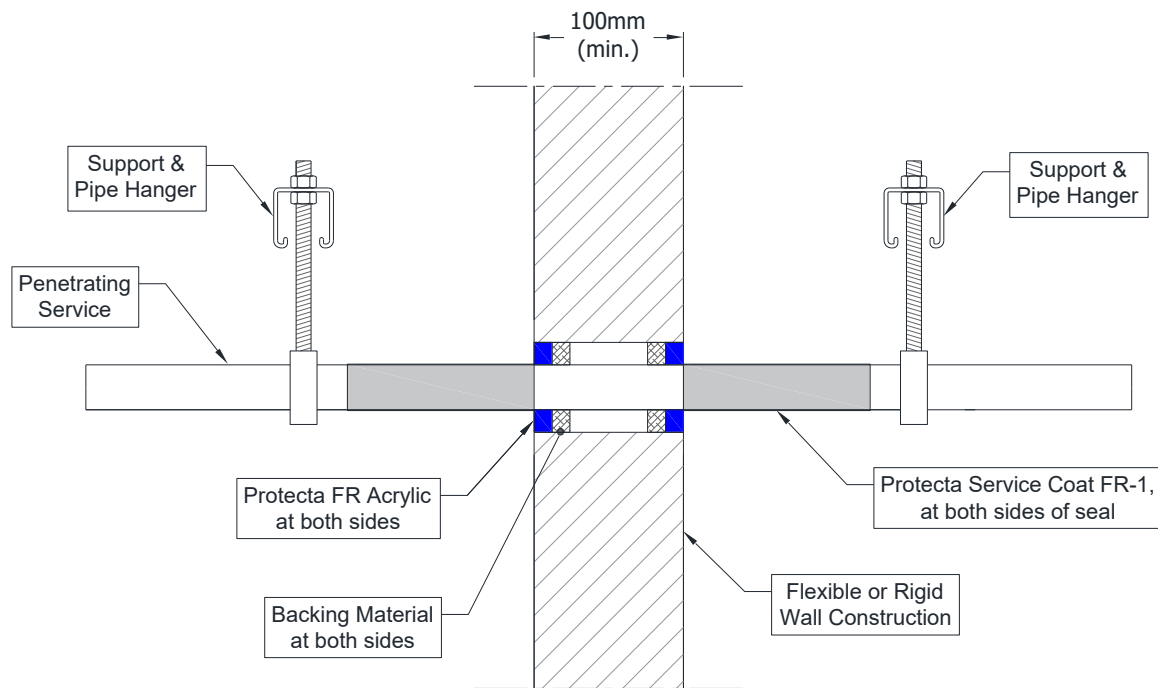
* Or 30 mm wide x 3000 mm high for cables up to 21 mm Ø

Services	Sealant depth	Backing	Maximum Annular space	Classification
PVC-U pipe according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1				
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
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				
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
PP pipe according to EN 1852-1: 2009 or DIN 8077/8078				
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

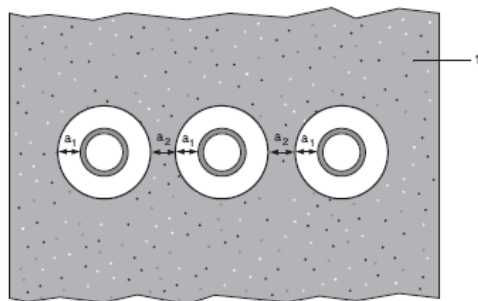
A.3.2 Double side penetration seal with metallic pipes and Protecta Service Coat FR-1

Penetration Seal: Pipes fitted at any position within the aperture with Protecta Service Coat FR-1, sealed with Protecta FR Acrylic, to both sides of the wall and backed with stone wool insulation. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



Key

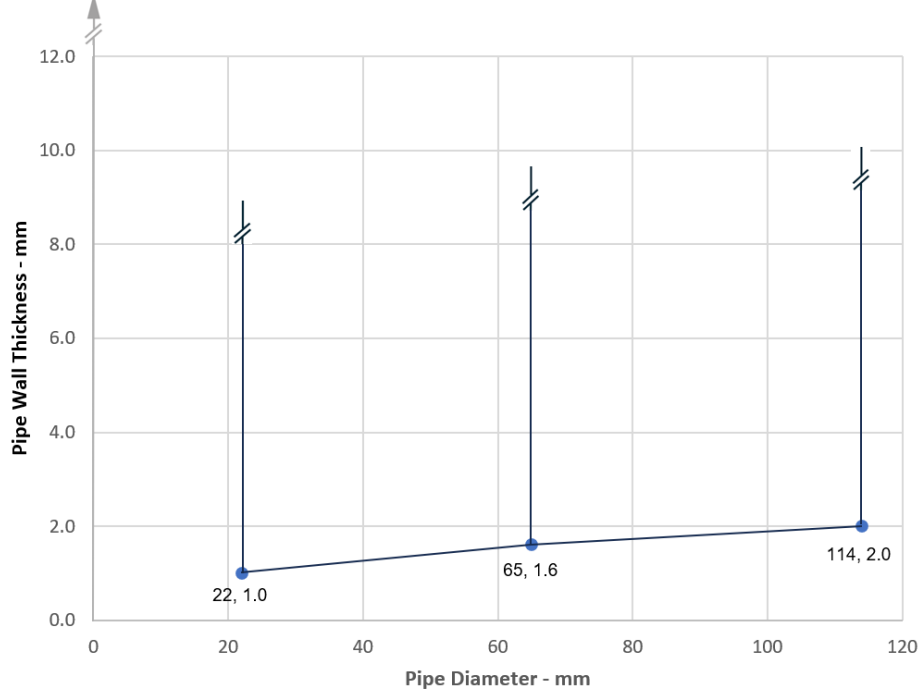
- 1 Supporting construction
- a1 Pipe / edge of seal separation (annular space)
- a2 Separation between penetration seals

A.3.2.1

Services	Sealant depth	Backing	Maximum aperture	Insulation, minimum	Classification
Mild or stainless steel pipe					
≤22 mm diameter / ≥1.0 mm wall*	12.5 mm	Stone wool 12.5 mm deep min. 33kg/m ³	300 x 300 mm / 504 mm Ø	Protecta Service Coat FR-1, 1500-micron DFT extending 300 mm from both sides of the seal	EI 120 C/U
≤65 mm diameter / ≥1.6 mm wall*					E 120, EI 90 C/U
≤114 mm diameter / ≥2.0 mm wall*					E 120, EI 45 C/U

* See below graphs for interpolated pipe sizes

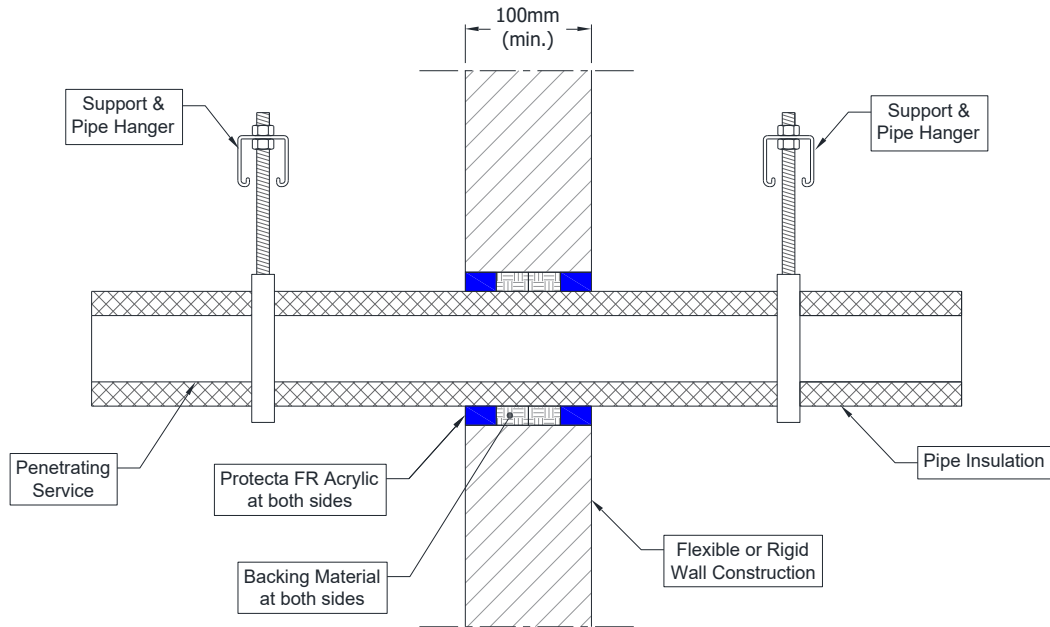
Mild or Stainless Steel Pipes with Protecta Service Coat FR-1 - C/U



A.3.3 Double side penetration seal with metallic pipes

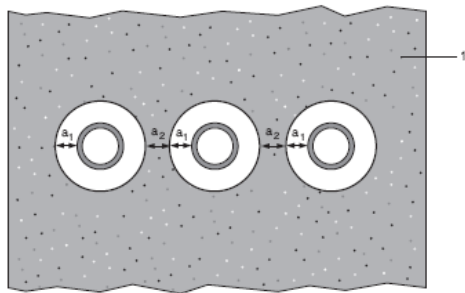
Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, backed with stone wool insulation or 'Protecta Mineral Fibre BIO', 300 x 300 mm or 493 Ø maximum seal size. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



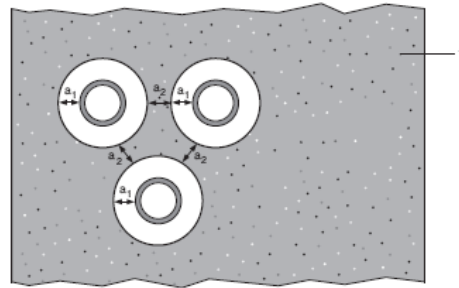
Configuration 1:

Option 1



Configuration 2:

Option 2



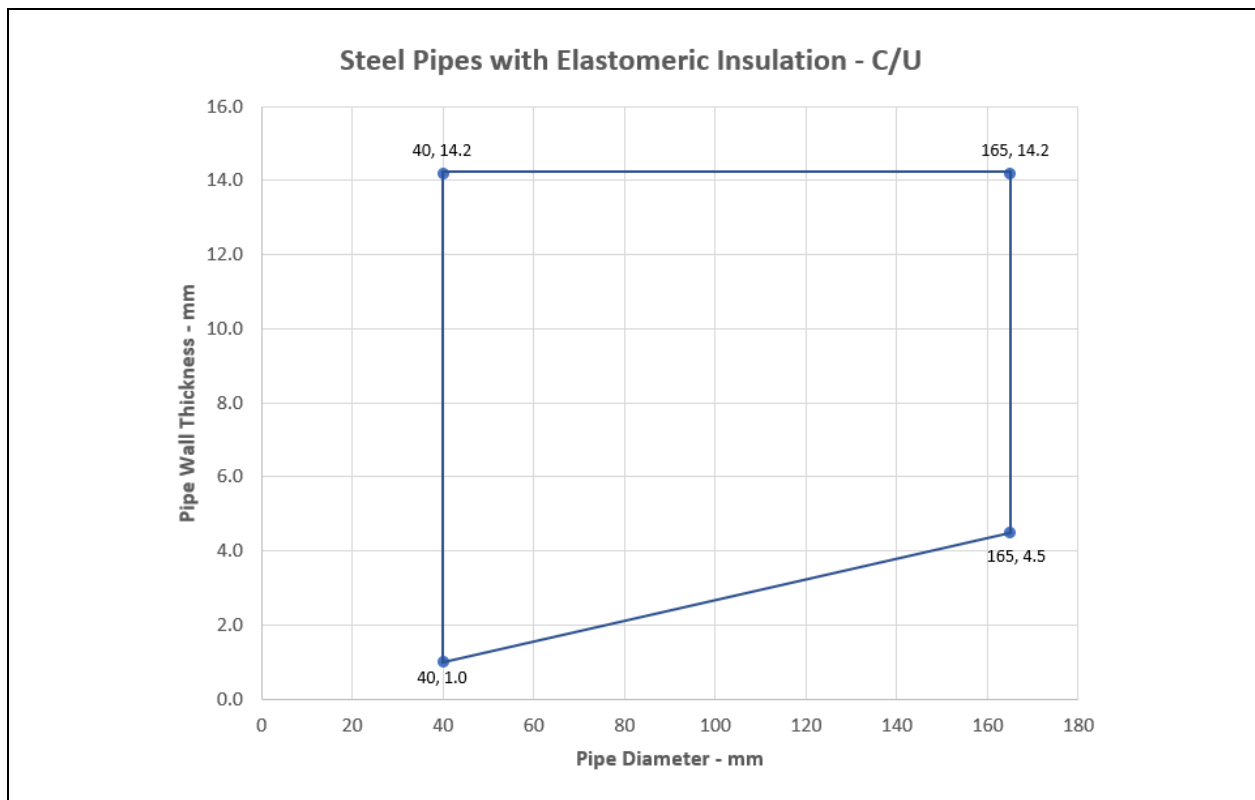
Key

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

A.3.3.1

Services	Sealant depth	Backing (minimum)	Insulation	Classification
Mild or stainless steel pipe				
22 mm diameter/3-10 mm wall	25 mm	Stone wool 25 mm deep 35 kg/m ³	None	EI 120 C/C
Maximum 165 mm diameter/ wall*	12.5 mm	12.5 mm stone wool 33 kg/m ³	9 mm Elastomeric insulation minimum class D-s3, d0	E 90 C/U EI 45 C/U
			13 -25 mm Elastomeric insulation minimum class D-s3, d0	EI 60 C/U
40 mm diameter/1-14.2 mm wall*	12.5 mm	20 mm Stone wool 40 kg/m ³	13 -19 mm Elastomeric insulation minimum class B-s3,d0	EI 120 C/C
40 mm diameter/1-14.2 mm wall*	25 mm	25 mm Protecta Mineral Fibre BIO		E 120 C/C EI 60 C/C
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*				

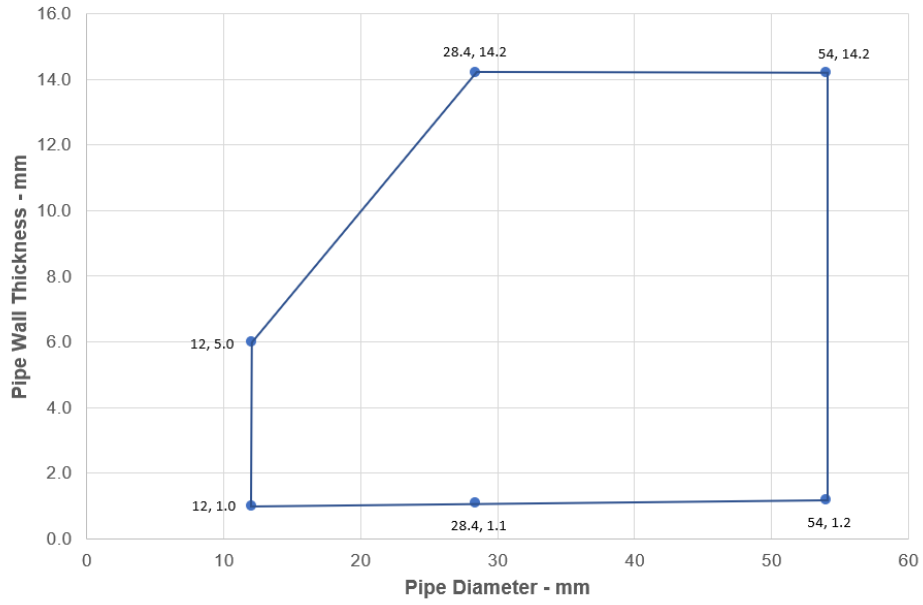
* Typical pipe diameters shown, see below graph for intermediate sizes



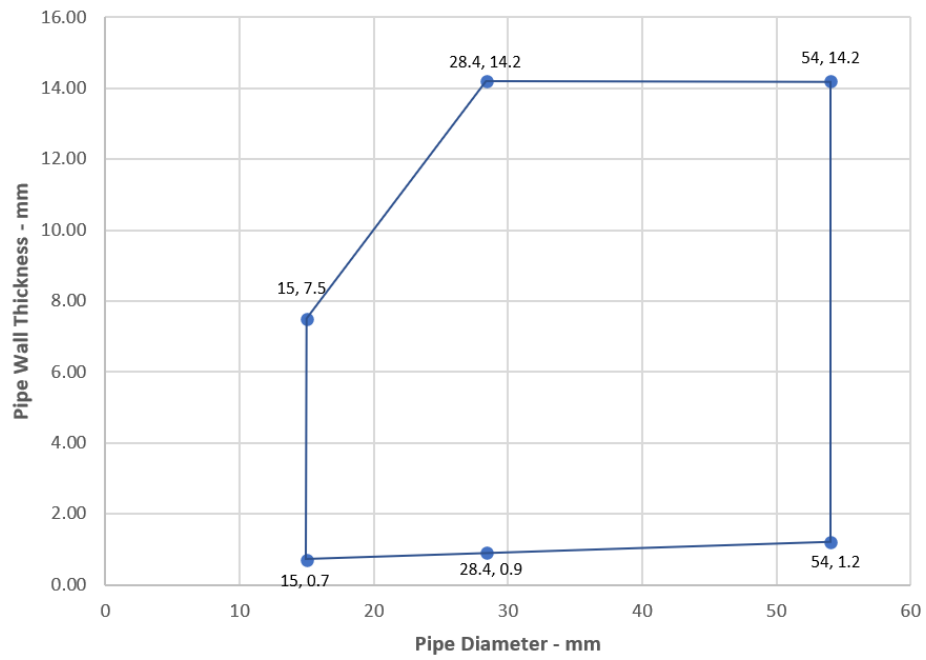
Services	Sealant depth	Backing	Insulation	Classification	
Copper or steel pipe					
12 mm diameter/1-6 mm wall	25 mm	25 mm Protecta Mineral Fibre BIO	9 mm Elastomeric insulation minimum class B-s3,d0	EI 120 C/C	
12-54 mm diameter/1-14.2 mm wall*			9-18 mm Elastomeric insulation minimum class B-s3,d0	E 120 C/C, EI 60 C/C	
12-54 mm diameter/1-14.2 mm wall*			19 mm Elastomeric insulation minimum class B-s3,d0	E 120 C/C, EI 90 C/C	
12-54 mm diameter/1-14.2 mm wall*			20-25 mm Elastomeric insulation minimum class B-s3,d0	EI 60 C/C	
15-54 mm diameter/0.7-14.2 mm wall*		None required	15 mm Phenolic foam insulation	E 120 C/C, EI 60 C/C	
15-54 mm diameter/0.7-14.2 mm wall*			16-30 mm Phenolic foam insulation	E 90 C/C, EI 60 C/C	
15-159 mm diameter/0.7-14.2 mm wall*			15-100 mm Phenolic foam insulation	E 45 C/C, EI 30 C/C	
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	EI 60 C/C	
Alupex Composite Pipe					
16 mm diameter/ wall*		12.5 mm	12.5 mm stone wool 33 kg/m ³	9 mm Elastomeric insulation minimum class D-s3, d0	E 120 C/C EI 90 C/C
Maximum 75 mm diameter/ wall*	13-24 mm Elastomeric insulation minimum class D-s3, d0			E 90 C/C EI 60 C/C	
	25 mm Elastomeric insulation minimum class D-s3, d0			EI 90 C/C	
16 mm diameter/2.25 mm wall	25 mm	25 mm Protecta Mineral Fibre BIO	9 mm Elastomeric insulation minimum class B-s3,d0	EI 120 C/C	
16 mm diameter/2.25 mm wall			9-25 mm Elastomeric insulation minimum class B-s3,d0	EI 60 C/C	
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

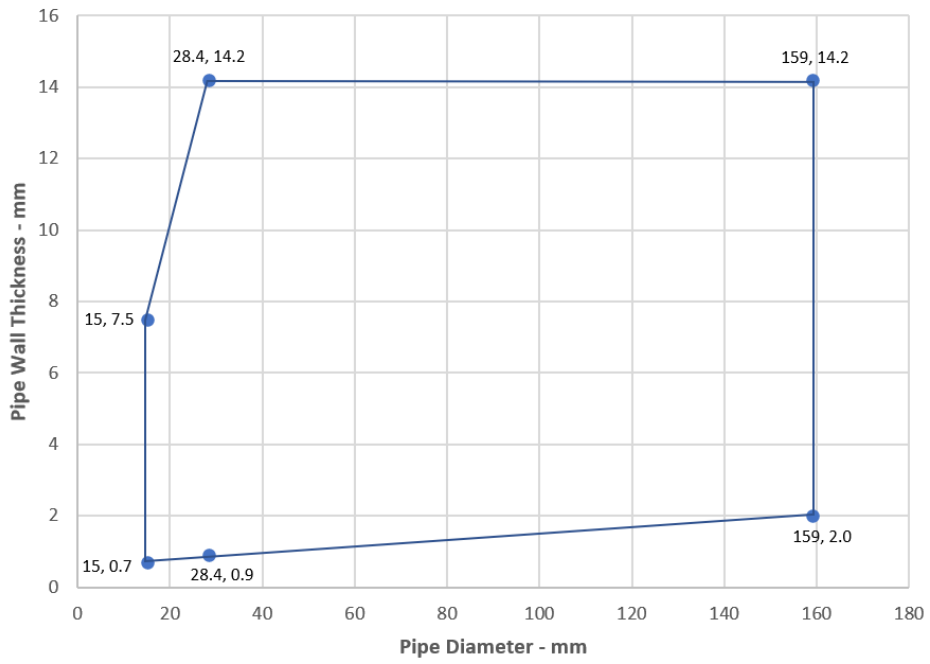
Copper or Steel Pipes with Elastomeric Insulation - C/C



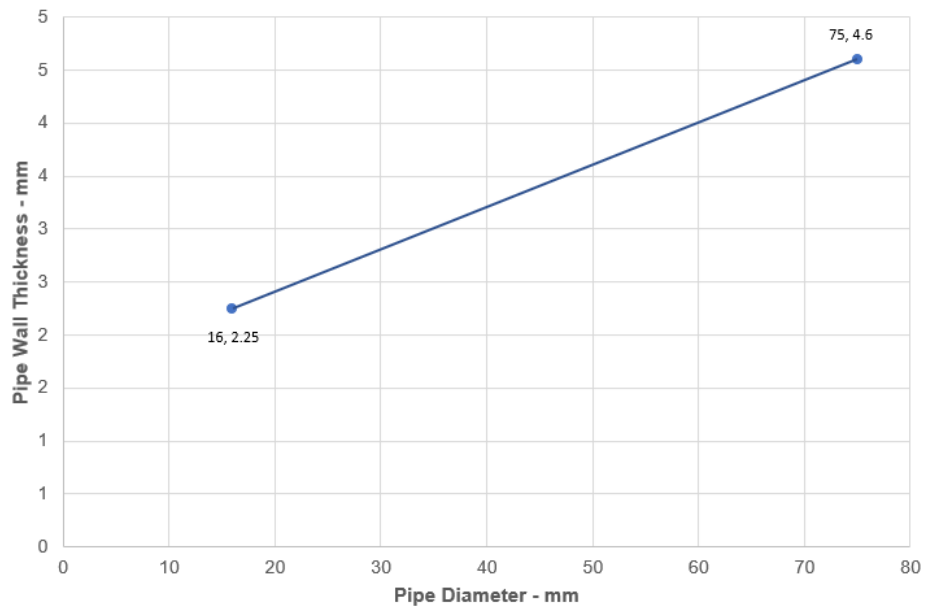
Copper or Steel Pipes with Phenolic Foam Insulation - C/C



Copper or Steel Pipes with Phenolic Foam Insulation - C/C

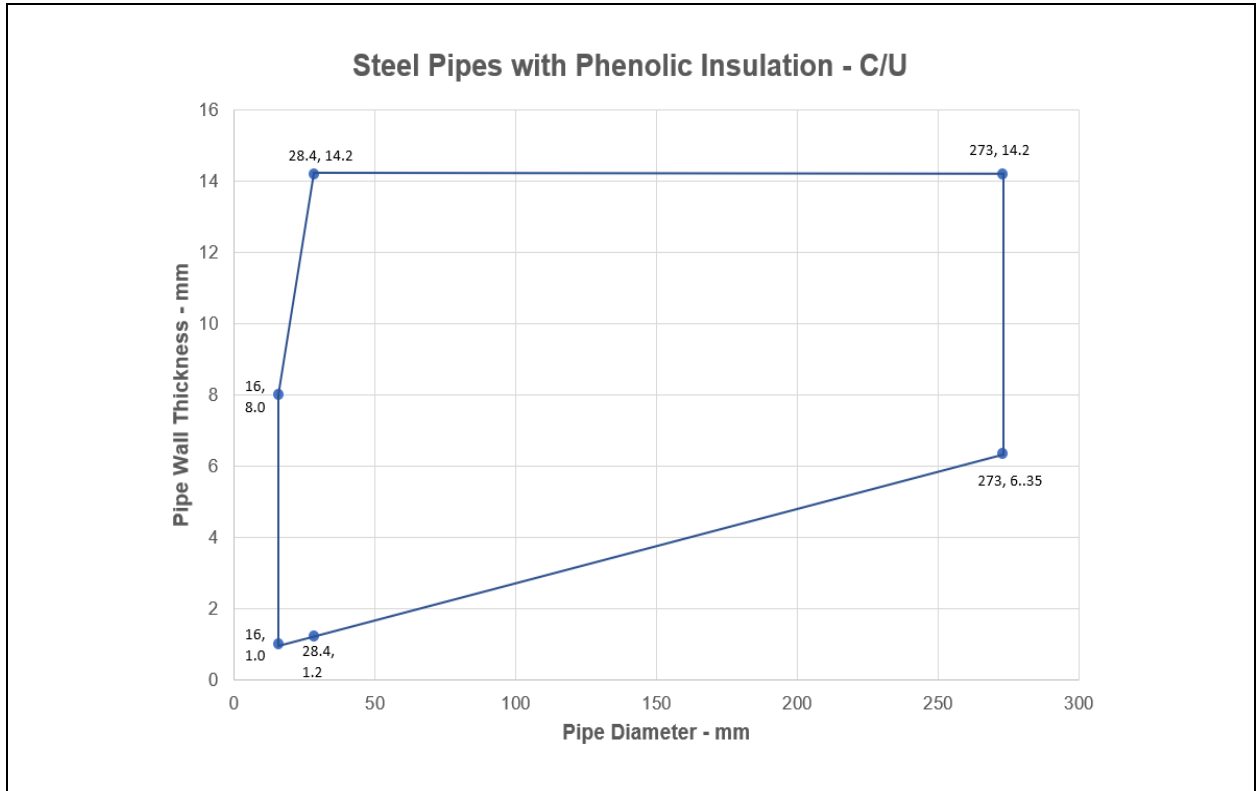


Alupex Pipes with Elastomeric Insulation - C/C



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

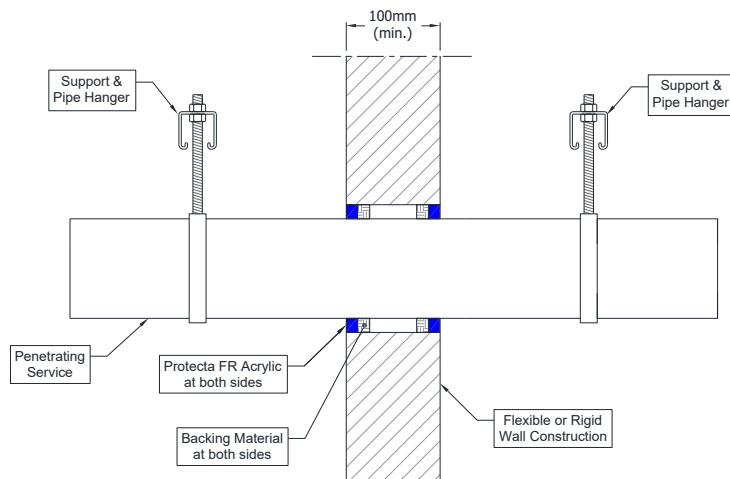
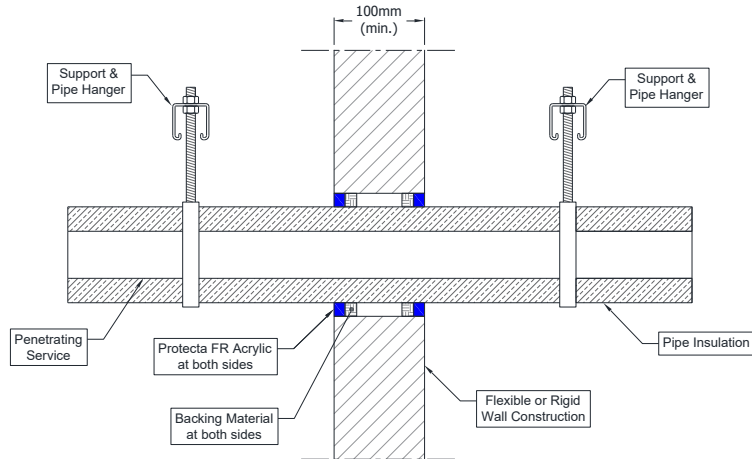
* Typical pipe diameters shown, see below graph for intermediate sizes



A.3.4 Double side penetration seal with pipes

Penetration Seal: CS (Continuous Sustained) insulated 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/m³. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2). Maximum seal size 300 x 300 mm / 504 mm \varnothing

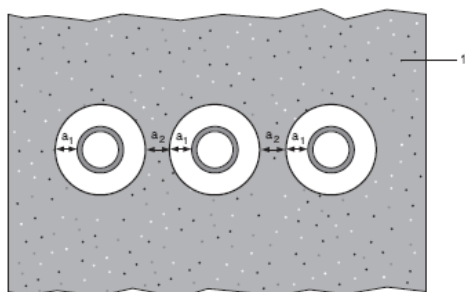
Construction details:



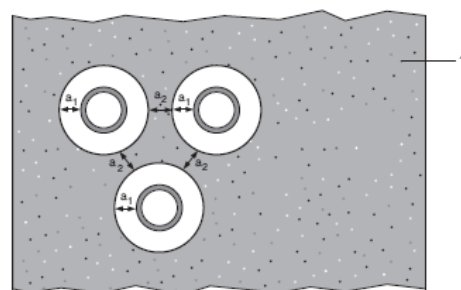
Configuration 1:

Configuration 2:

Option 1



Option 2



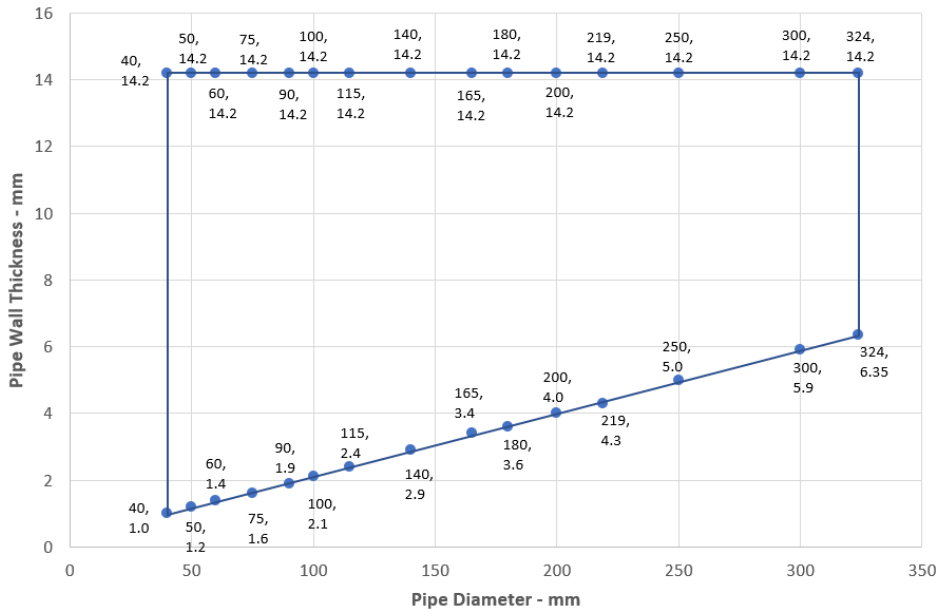
Key

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

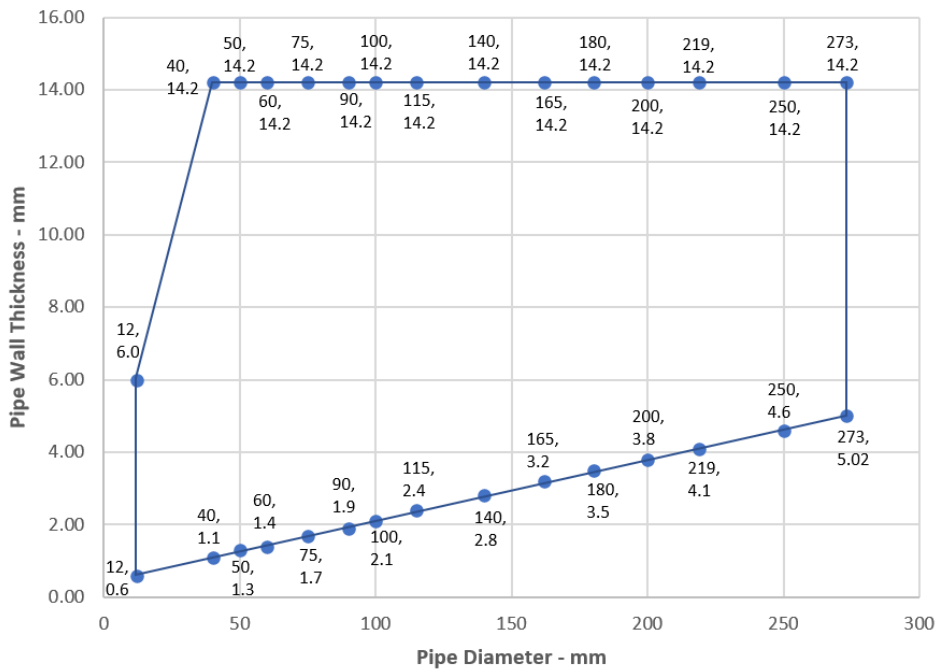
A.3.4.1 Double side penetration seal with pipes

Services	Insulation	Classification
Mild or stainless steel pipe		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m ³	E 120 C/U EI 90 C/U
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m ³	
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*		
12 mm diameter/0.6-6.0 mm wall	20 mm thick glass or stone, mineral wool min. 75 kg/m ³ (CS, or LS at 550 mm each side)	EI 60 C/C
40 mm diameter/1.1-14.2 mm wall*	30-60 mm thick glass or stone, mineral wool min. 75 kg/m ³ (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*		

Steel Pipes with Mineral Wool Insulation - C/U



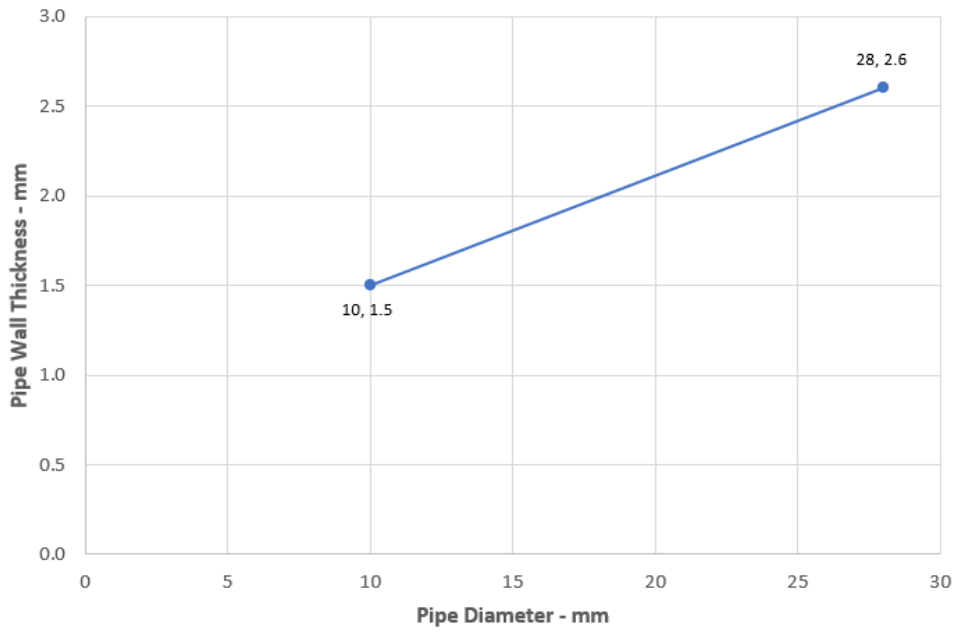
Steel Pipes with Glass or Stone Wool Insulation - C/C



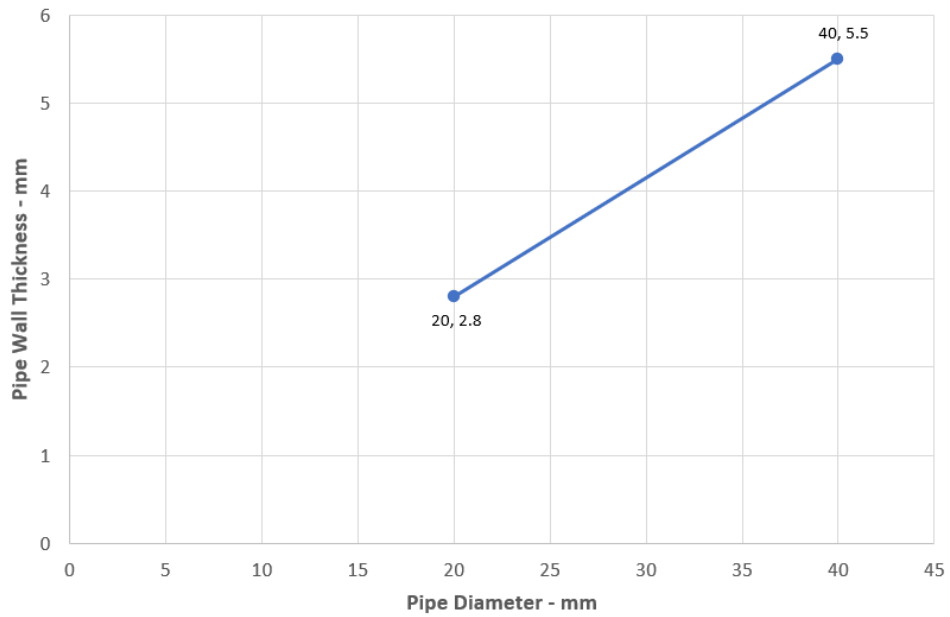
Services	Insulation	Classification
PEX pipe in pipe system		
15 mm diameter x 2.5 mm wall inner /25mm diameter outer	None	EI 120 C/C
Polybutylene pipe		
Diameter up to 28 mm/1.5-2.6 mm wall*	None	EI 120 C/C
Aquatechnik Faser Fiber-T pipe		
Diameter up to 20 mm/2.8 mm wall*	None	EI 120 C/C
Diameter up to 40 mm/2.8-5.5 mm wall*	None	EI 90 C/C
Flexigas Double Sleeve pipe		
Diameter up to 26 mm/3.6 mm wall*	None	E 120 C/C, EI 90 C/C
Diameter up to 73 mm/3.6-4.65 mm wall*	None	E 120 C/C, EI 60 C/C
Alupex pipe		
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 ³	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 ³	EI 60 C/C
Mild or Stainless Steel pipe		
4 mm diameter/1.0-2.0 mm wall	None	EI 90 C/C
5-30 mm diameter/1.0-14.2 mm wall*		
30 mm diameter/2.0-14.2 mm wall		EI 120 C/U
Copper or Steel pipe		
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 ³	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 ³ (CS, or LS at 550 mm each side)	EI 60 C/C

* See below graphs for interpolated pipe sizes

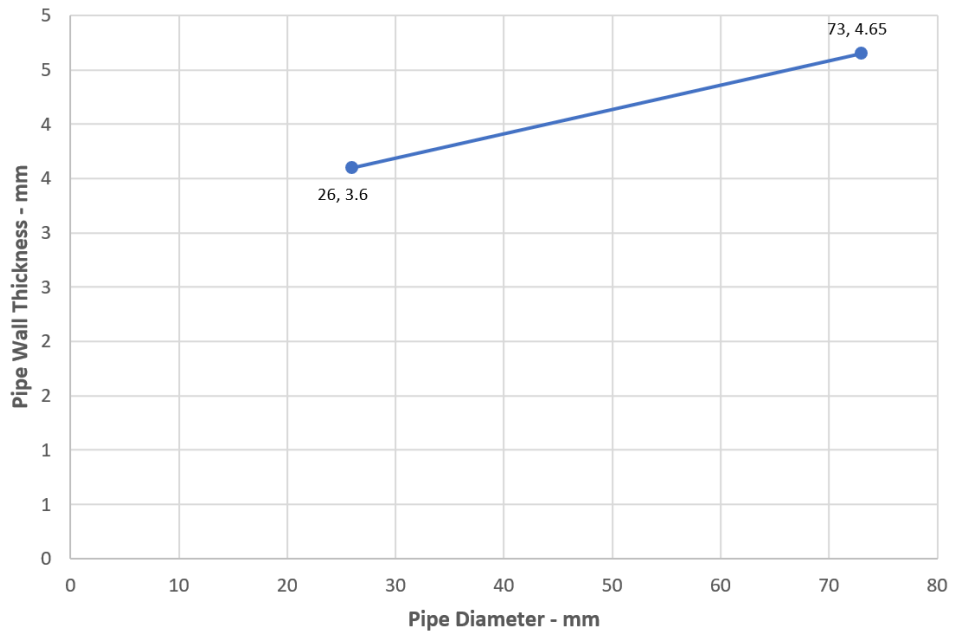
Polybutylene Pipes - EI 120 C/C



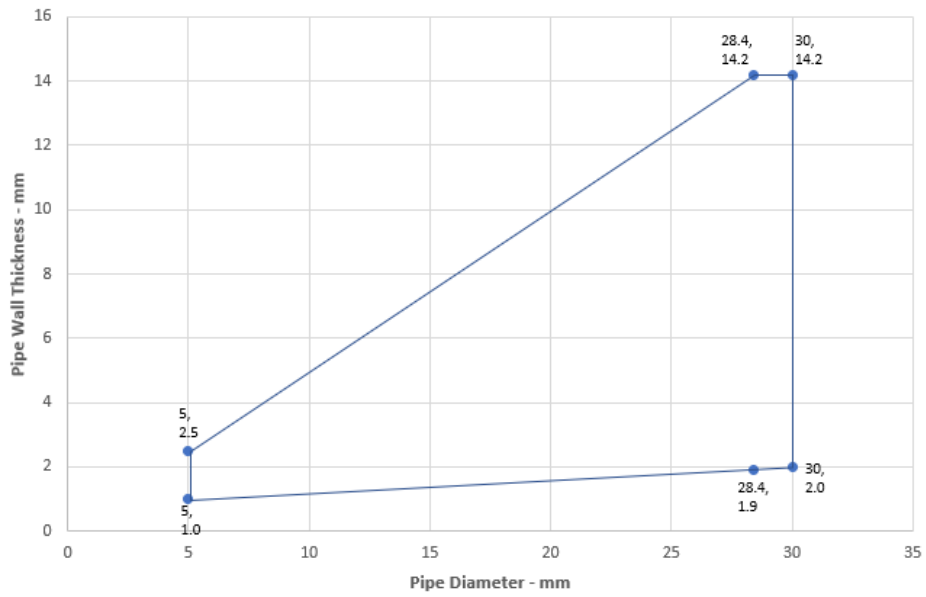
Aquatechnik Faser Fiber-T Pipes - EI 90 C/C



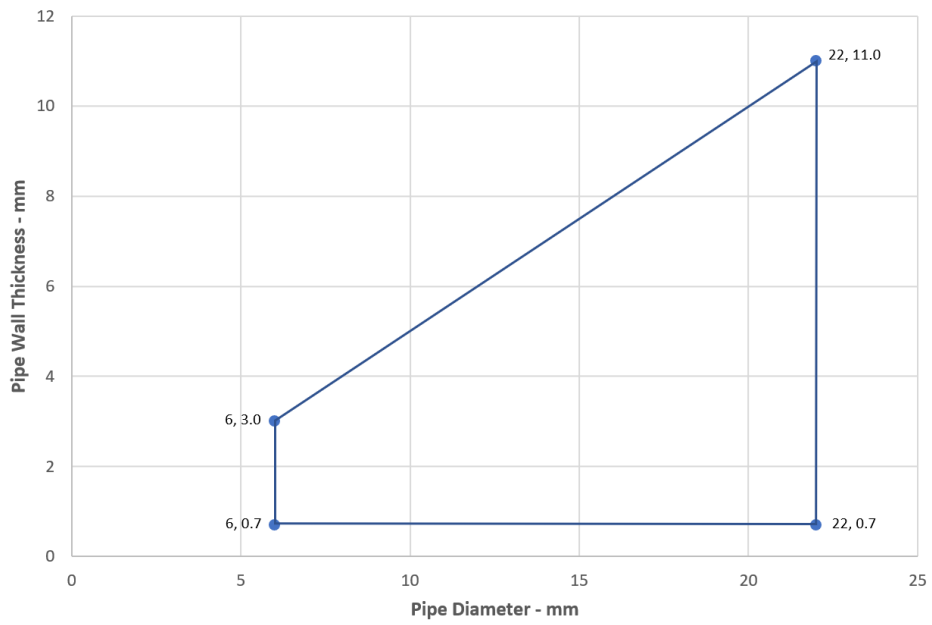
Flexigas Double Sleeve Pipes - EI 90 C/C



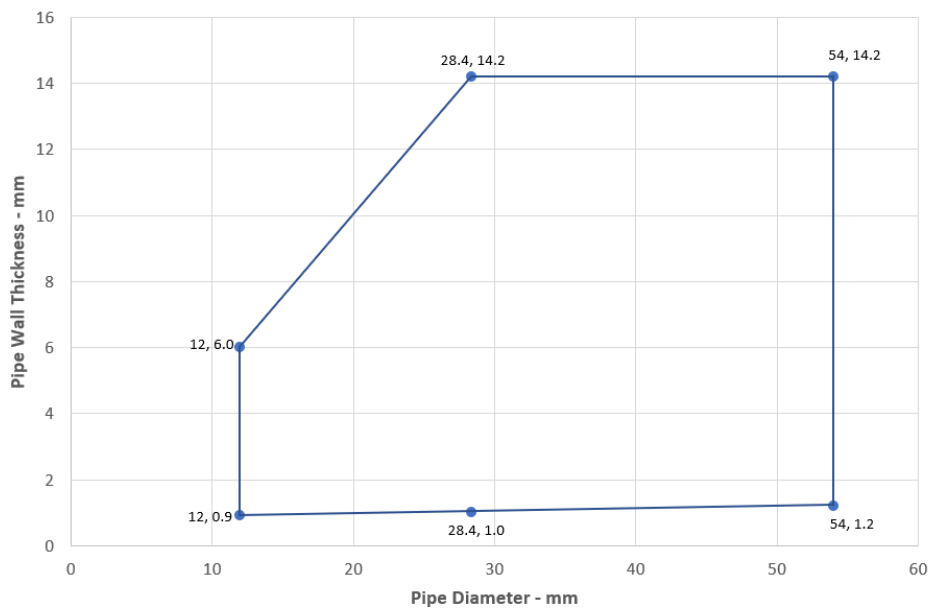
Steel Pipes - C/C



Copper or Steel Pipes - C/C



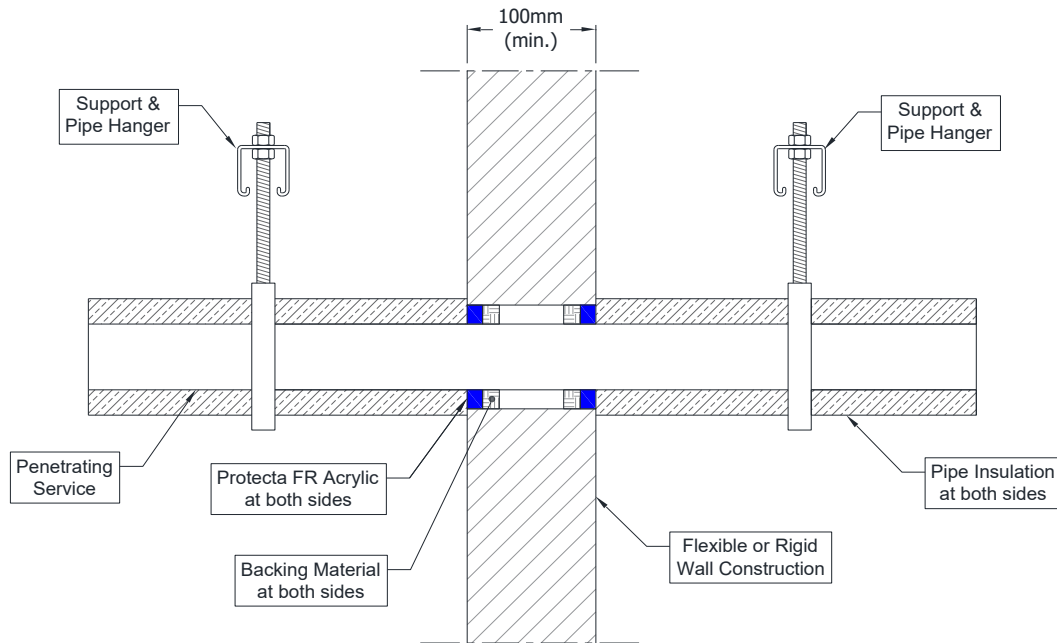
Copper or Steel Pipes with Mineral Wool Insulation - C/C



A.3.5 Double side penetration seal with composite pipes

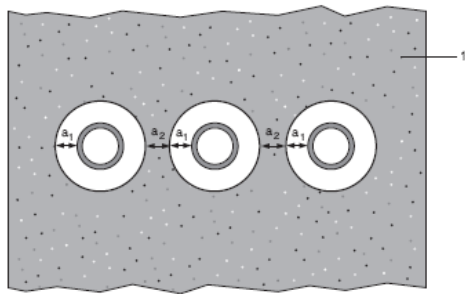
Penetration Seal: CI (Continuous Interrupted) or LI (Locally Interrupted) insulated composite pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, maximum seal size 300 x 300 mm, backed with stonewool. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



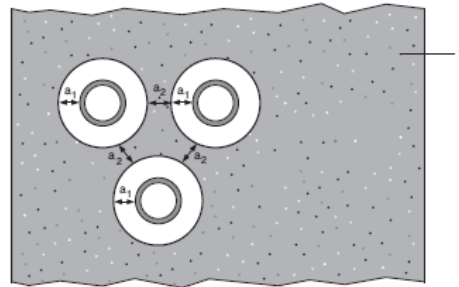
Configuration 1:

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

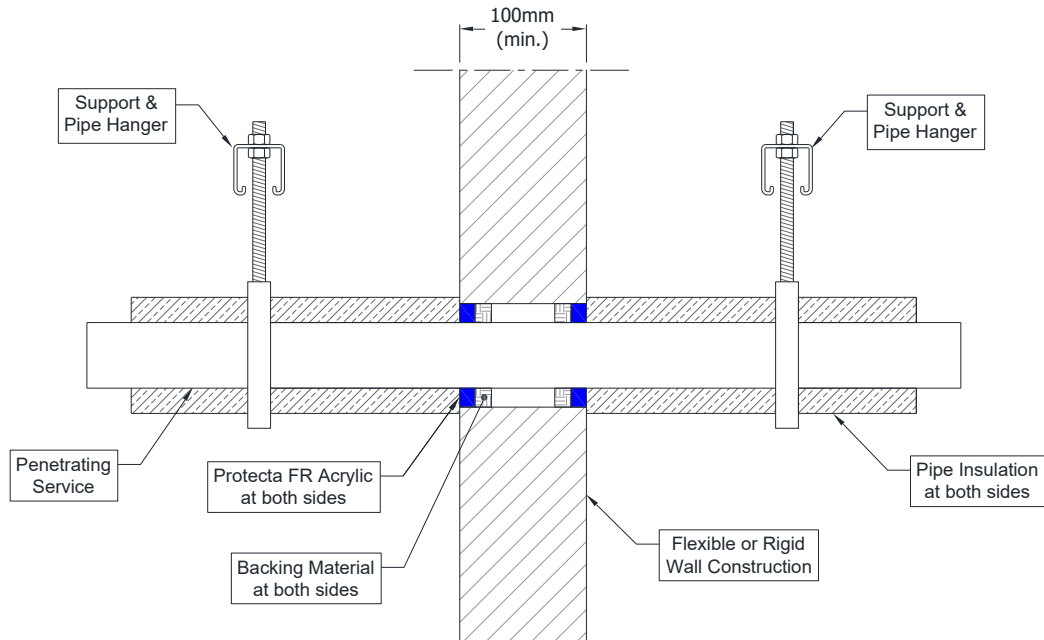
A.3.5.1

Services	Sealant depth	Backing (minimum)	Insulation (minimum)	Classification
Alupex Composite Pipe				
16 mm diameter/2.25 mm wall	12.5 mm	12.5 mm stonewool 40 kg/m ³	20 mm stonewool 80 kg/m ³ , 500 mm length from both sides of the seal	EI 120 C/C
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				
16 mm diameter/2.25 mm wall	12.5 mm	12.5 mm stonewool 33 kg/m ³	20 mm glass wool 75 kg/m ³ , 500 mm length from both sides of the seal	EI 120 C/C
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				

A.3.6 Double side penetration seal with metallic (and composite) pipes

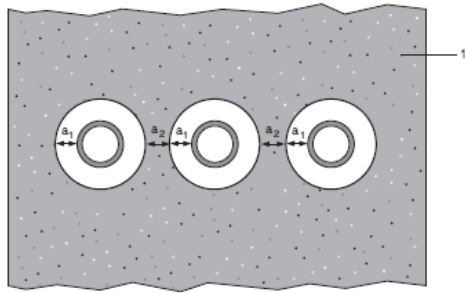
Penetration Seal: LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic pipes and composite (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, backed with stone wool insulation or 'Protecta Mineral Fibre BIO'. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



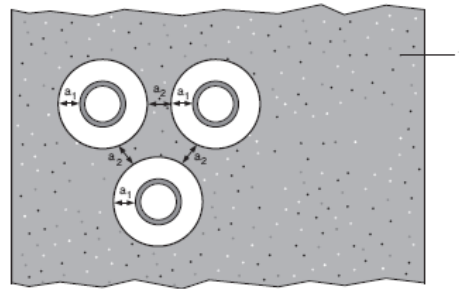
Configuration 1:

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

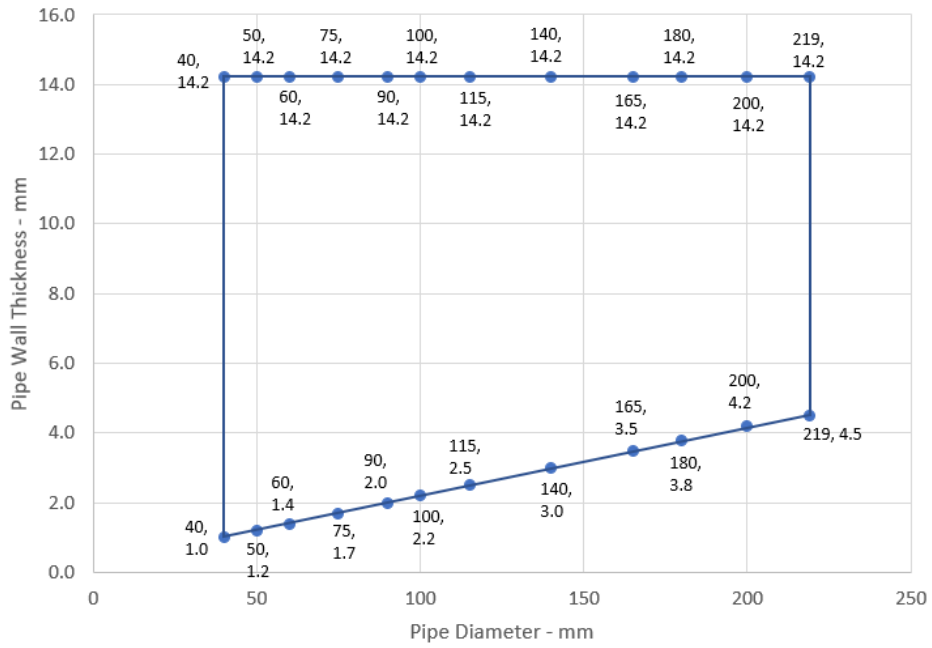
A.3.6.1

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

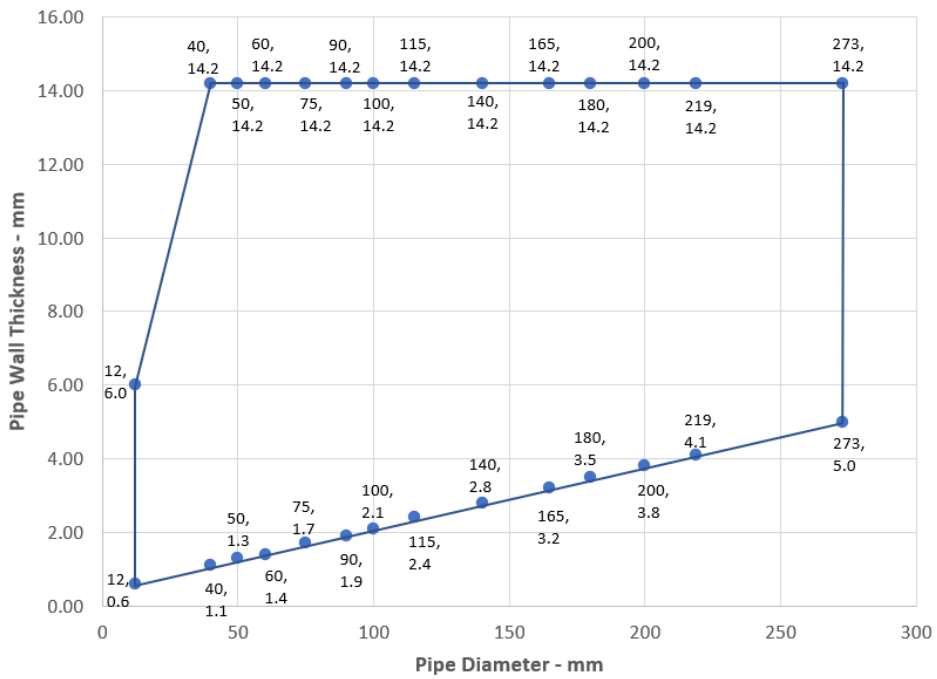
Services	Sealant depth	Backing (minimum)	Insulation (minimum)	Classification
Mild or stainless steel pipe				
Maximum aperture size 300 x 300 mm				
40 mm diameter/1-14.2 mm wall	12.5 mm	20mm Stone wool 40 kg/m ³	500 mm length of 20 mm stone wool 80 kg/m ³	EI 120 C/U
40 mm diameter/1-14.2 mm wall*			500 mm length of 30 mm stone wool 80 kg/m ³	E 120 C/U, EI 90 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*	12.5 mm	20mm Stone wool 40 kg/m ³	500 mm length of 30 mm stone wool 80 kg/m ³	E 120 C/U, EI 90 C/U
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 ³	500 mm length of 30 mm glass wool 75 kg/m ³	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

Steel Pipes with Mineral Wool Insulation - C/U



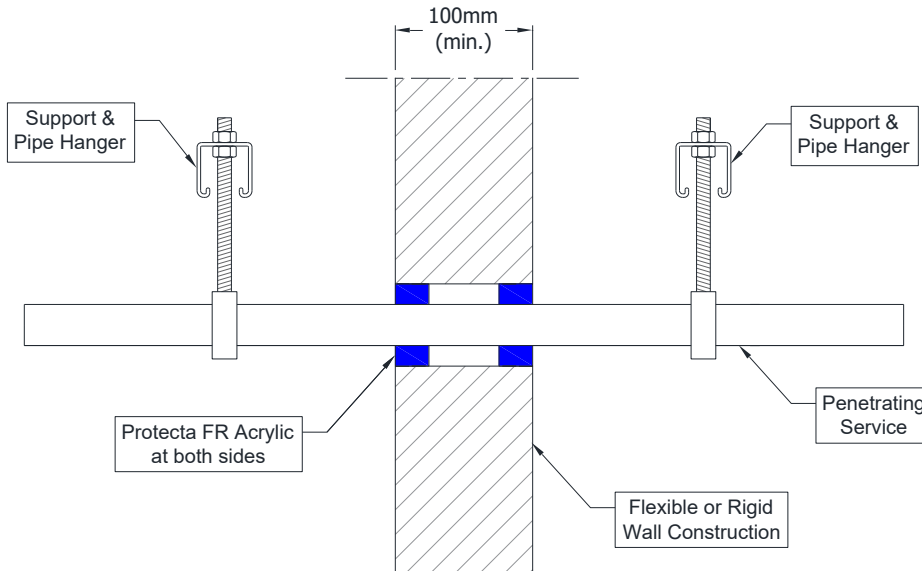
Steel Pipes with Glass Wool Insulation - C/C



A.3.7 Double side penetration seal with plastic pipes

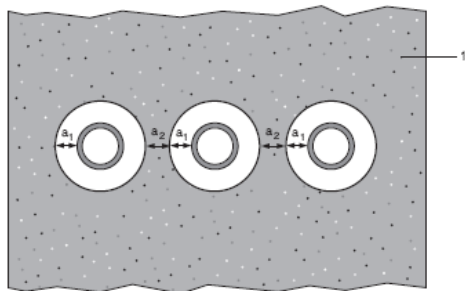
Penetration Seal: Combustible pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



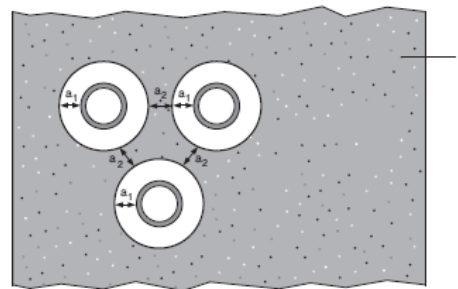
Configuration 1:

Option 1



Configuration 2:

Option 2



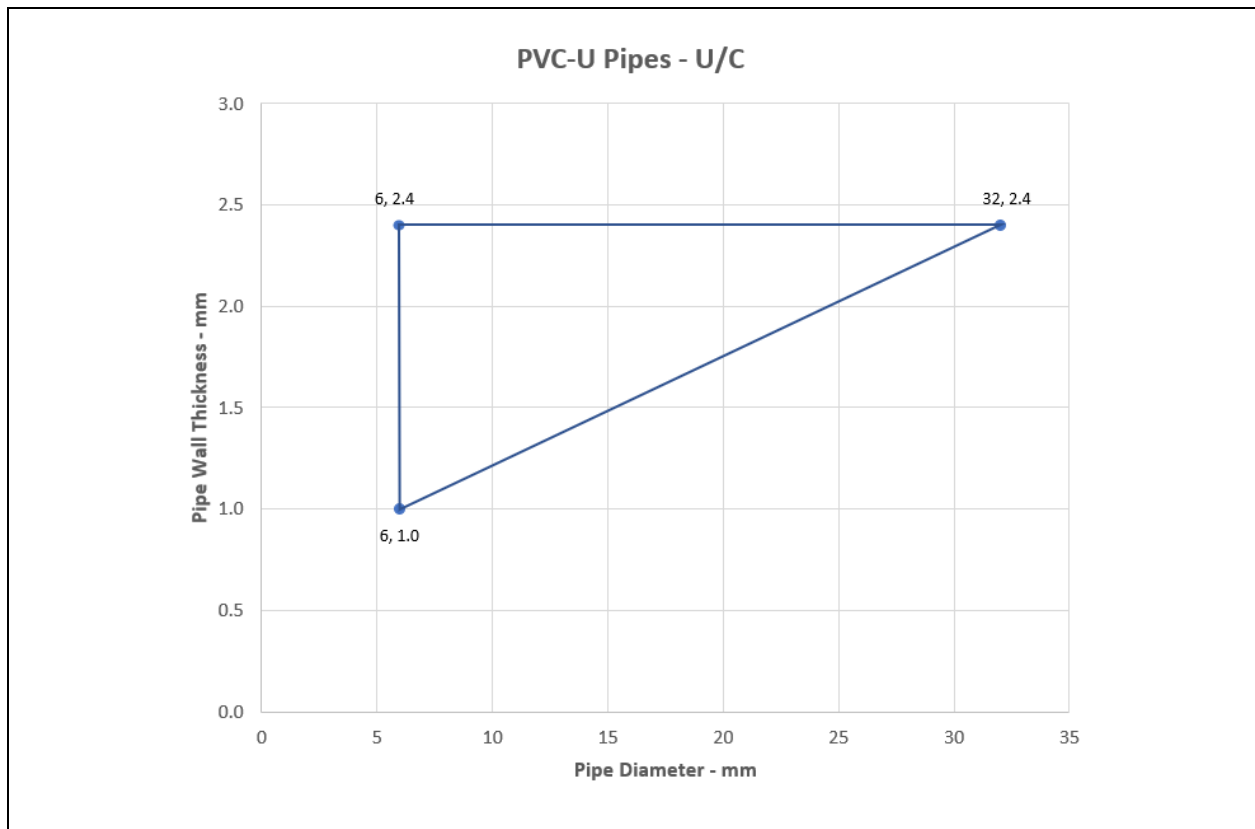
Key

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

A.3.7.1

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 \varnothing /1.0-2.4 mm wall*	10 mm	EI 120 U/C
		6-32 mm \varnothing /1.0-1.6 mm wall	30 mm	E 120 U/C, EI 90 U/C
20 mm \varnothing /2.2 mm wall		EI 120 C/C		
20 mm \varnothing /2.2-4.4 mm wall		EI 120 U/C		
PP pipe according to EN 1451-1 or DIN 8077/8078		20-32 mm \varnothing /1.8-4.4 mm wall	30 mm	EI 60 U/C
		20-32 mm \varnothing /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 \varnothing /2.0 mm wall	30 mm	EI 120 U/C
		20-32 mm \varnothing /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

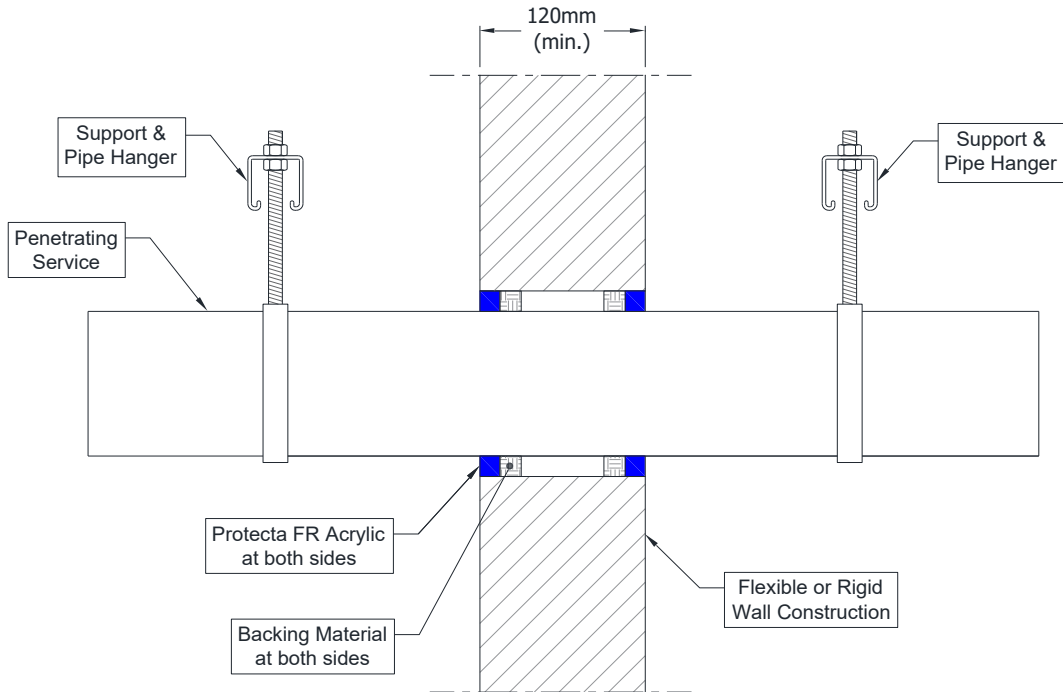


A.4 Flexible and rigid wall constructions according to 2.2) with wall thickness of minimum 120 mm

A.4.1 Double side penetration seal with pipes

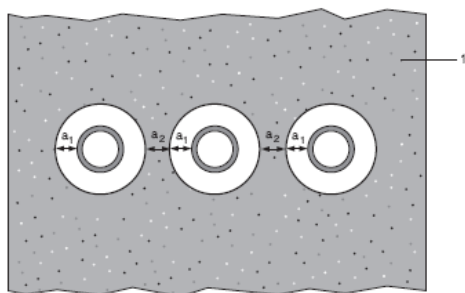
Penetration Seal: Non-insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Protecta FR Acrylic to both sides of the wall, backed with stone wool insulation. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2). Maximum seal size 300 x 300 mm / 344 mm Ø.

Construction details:



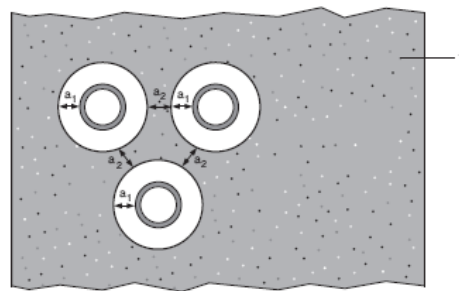
Configuration 1:

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

A.4.1.1

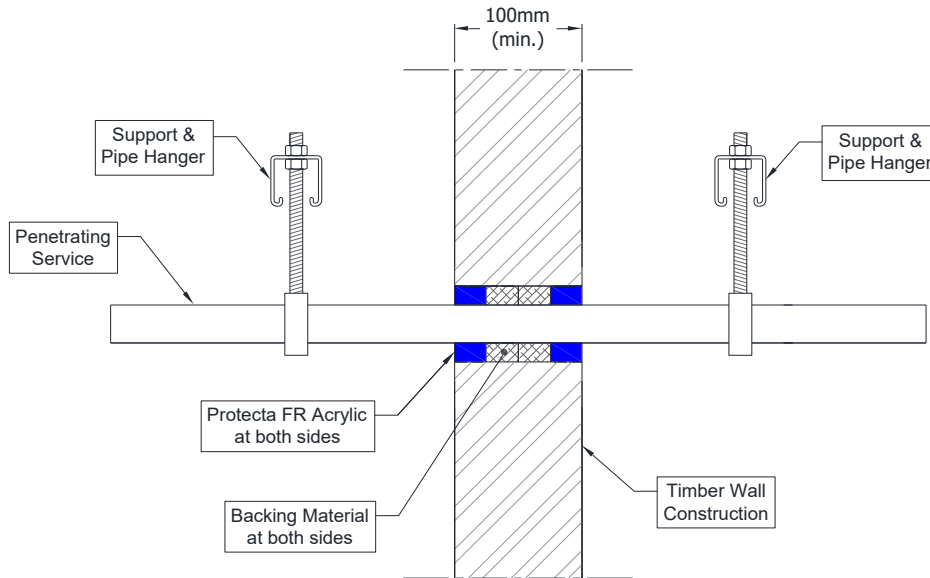
Services	Sealant depth	Backing	Classification
Mild or stainless steel pipe			
30 -324 mm diameter /1.6-14.2 mm wall	15 mm	15 mm stone wool	E 120 C/U
Copper or steel pipe			
12 -54 mm diameter /0.9-14.2 mm wall	15 mm	15 mm stone wool	E 120 C/C
Alupex Pipe			
16-75 mm diameter/2.0-4.6 mm wall	15 mm	15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

A.5 Timber wall constructions with wall thickness of minimum 100 mm

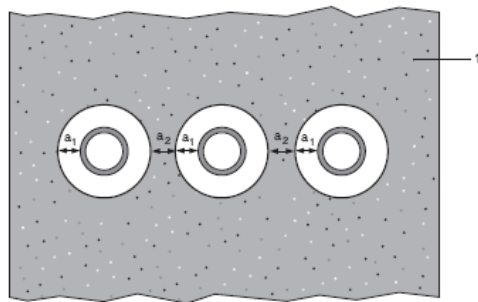
A.5.1 Double side penetration seal with cables

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/m³), 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 Cable / edge of seal separation (annular space)
- a2 Separation between penetration seals

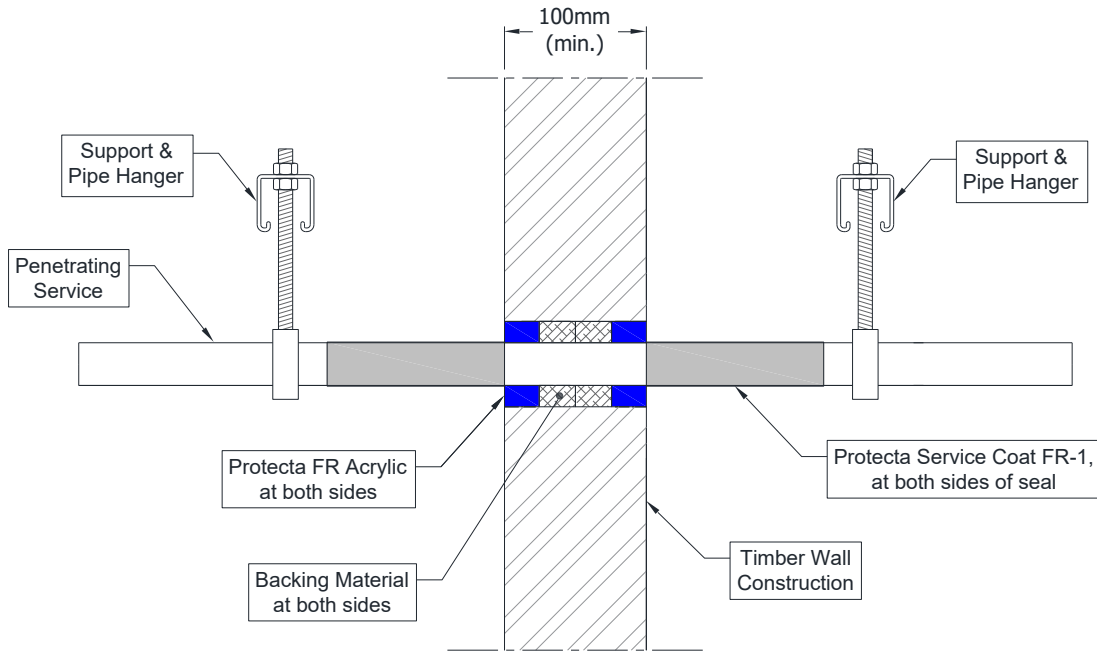
A.5.1.1

Services	Sealant depth	Backing	Maximum aperture	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m ³	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

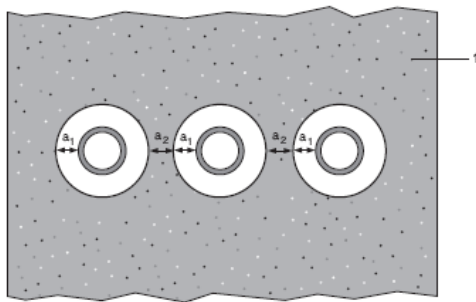
A.5.2 Double side penetration seal with cables and Protecta Service Coat FR-1

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/m³), 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 Cables / edge of seal separation (annular space)
- a2 Separation between penetration seals

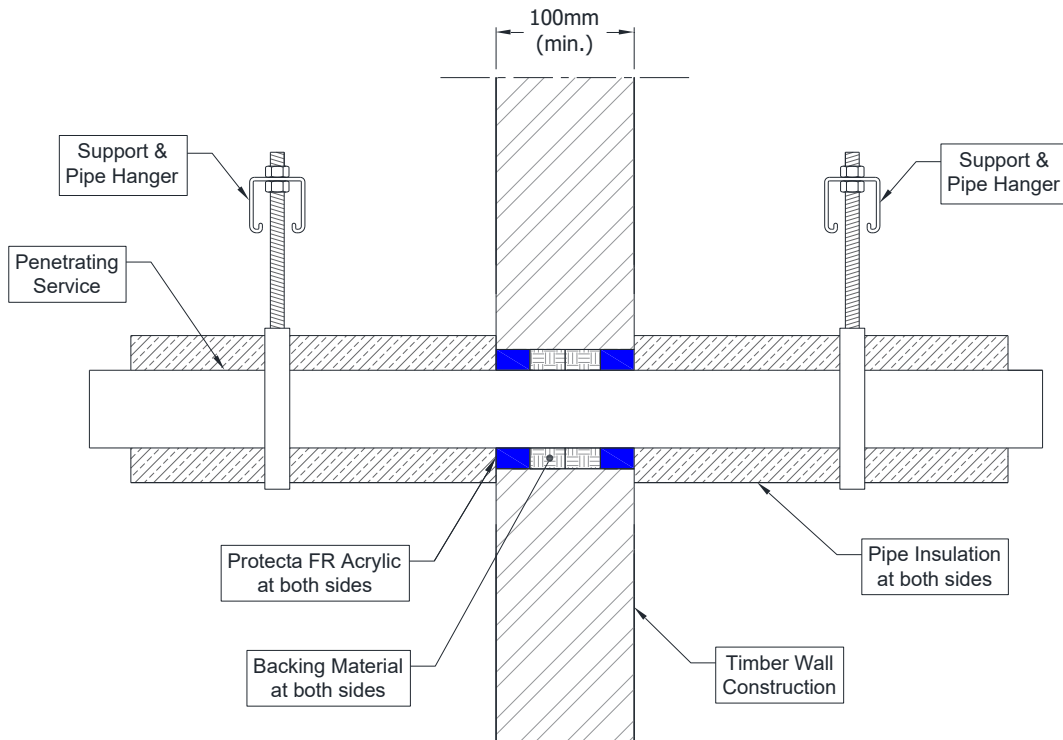
A.5.2.1

Services	Sealant depth	Backing	Maximum aperture	Insulation, minimum	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m ³	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

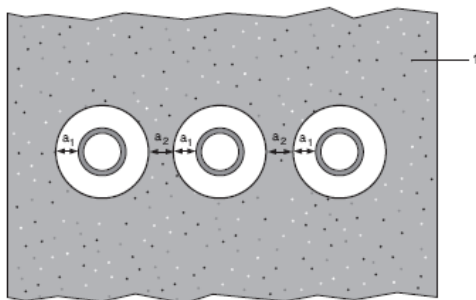
A.5.3 Double side penetration seal with metallic pipes

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/m³, fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the wall, backed with stone wool insulation (minimum 33kg/m³), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



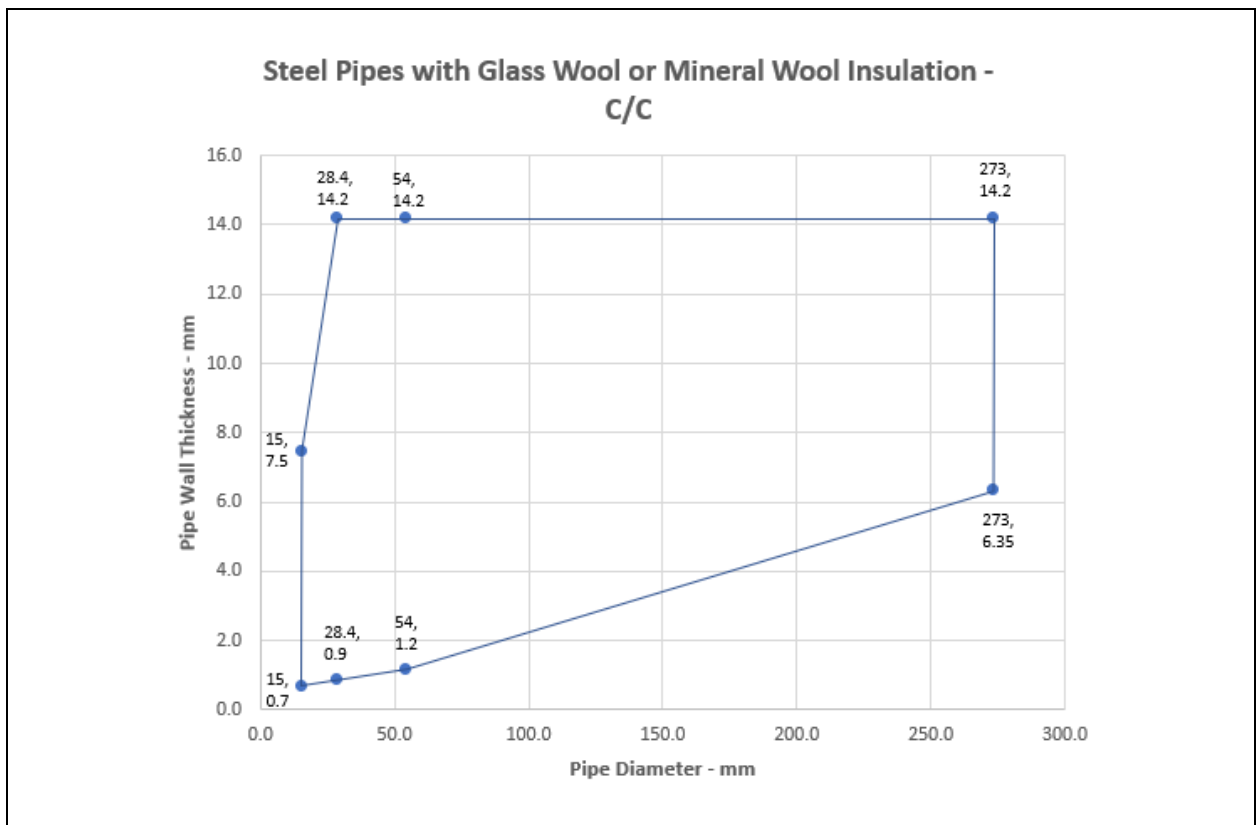
Key

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

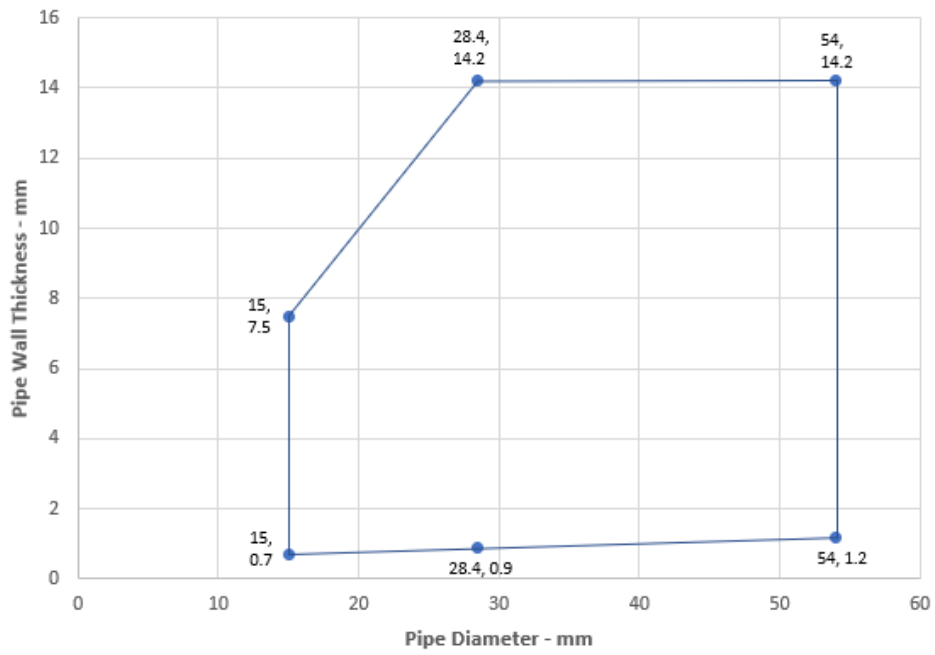
A.5.3.1

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

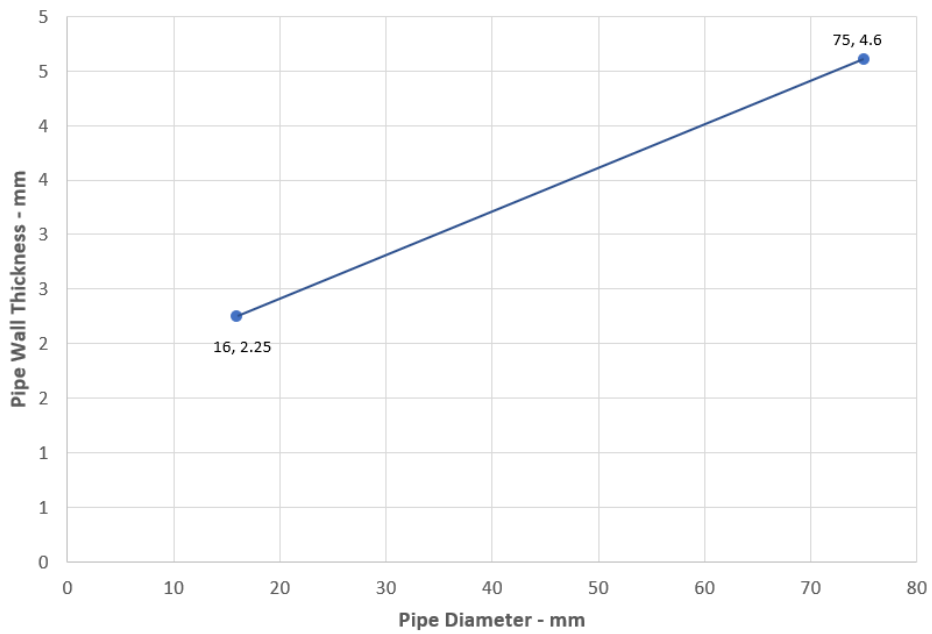
* Typical pipe diameters shown, see below graph for intermediate sizes



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



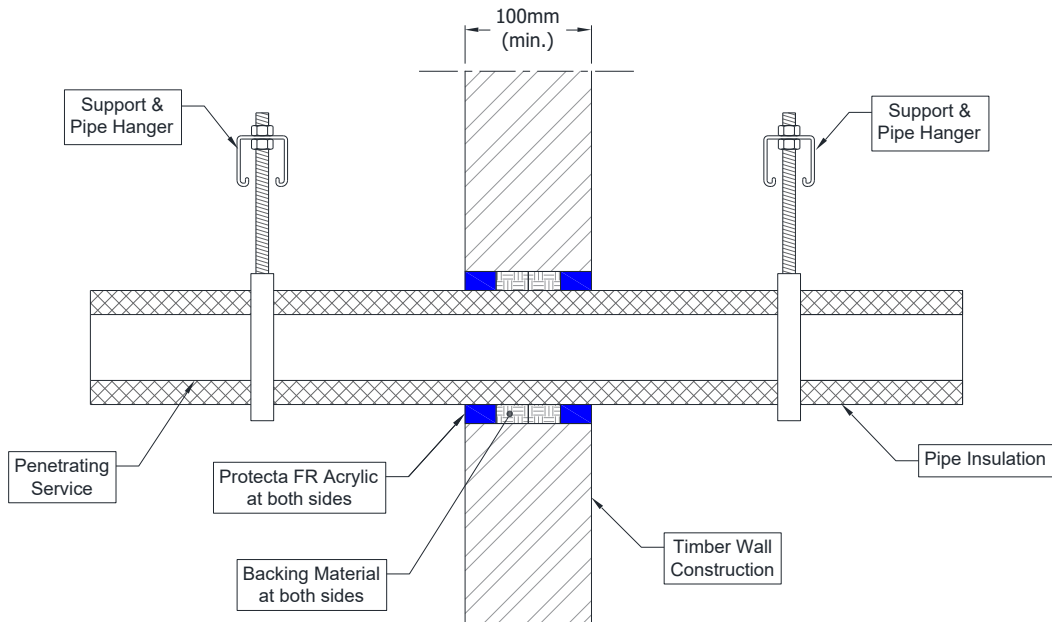
Alupex Pipes with Glass Wool or Mineral Wool Insulation - C/C



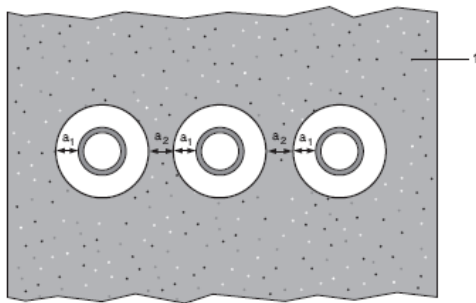
A.5.4 Double side penetration seal with metallic pipes

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/m³. Minimum annular space 10 mm and maximum 30 mm (a1), and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



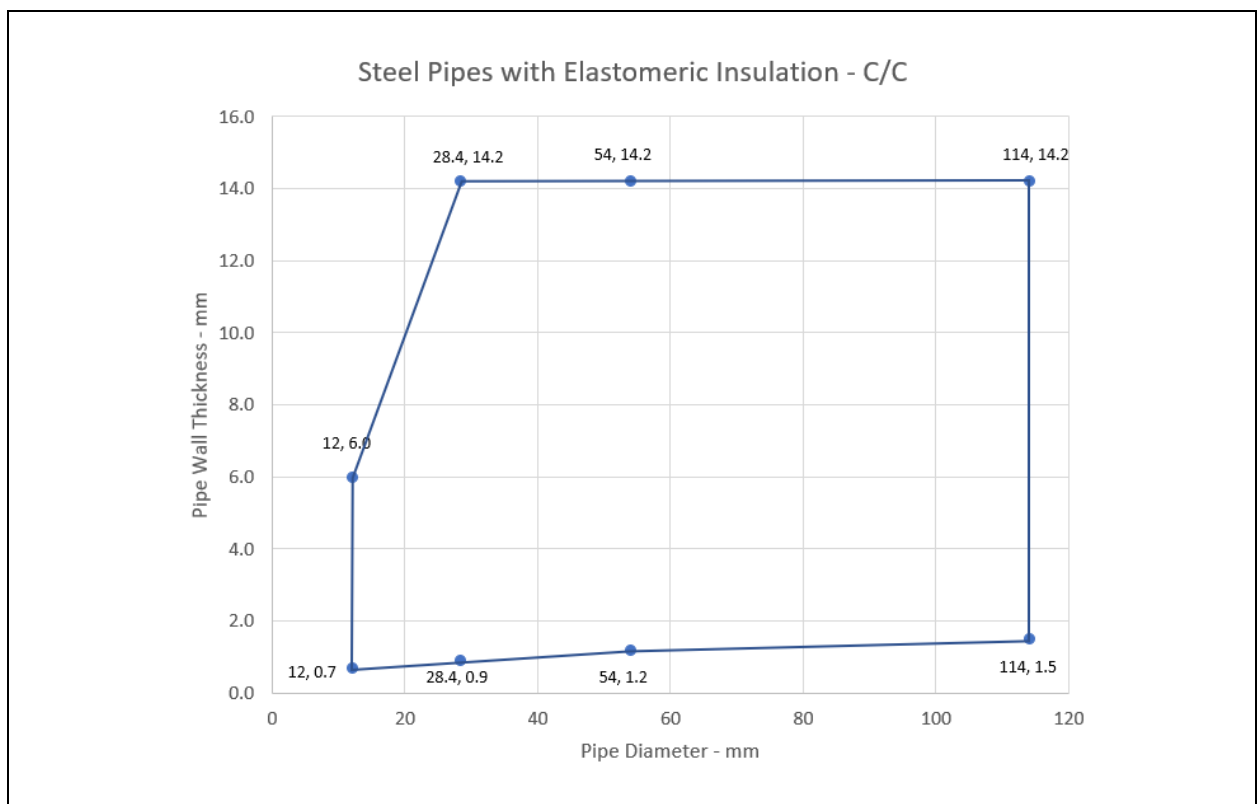
Key

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

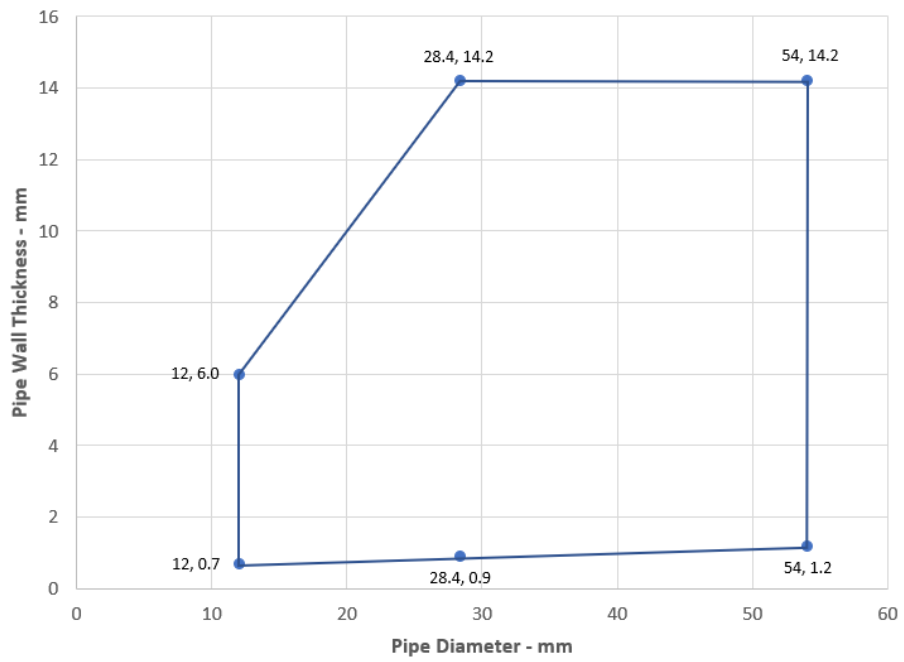
A.5.4.1

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

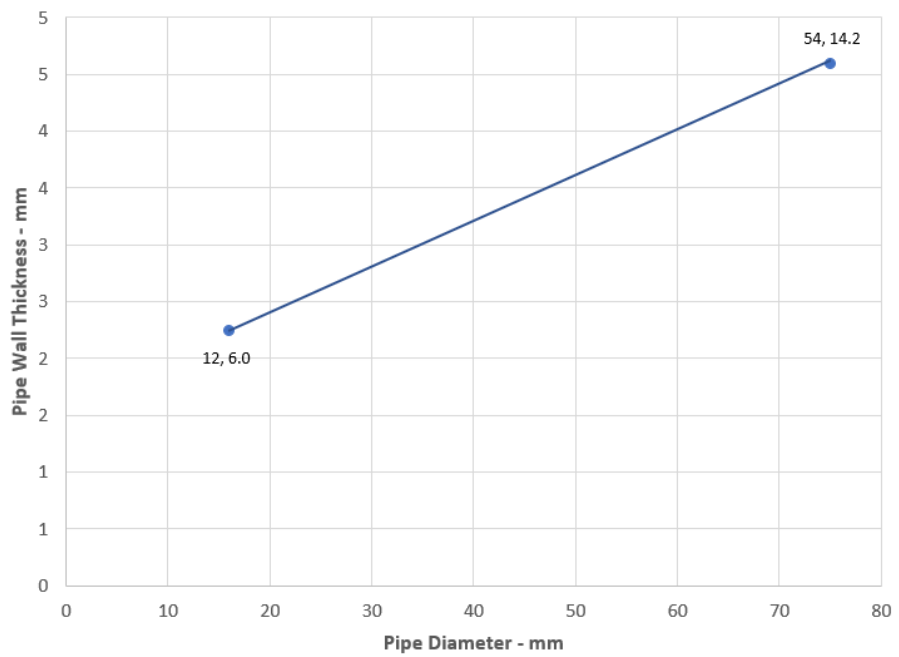
* Typical pipe diameters shown, see below graph for intermediate sizes



Copper or Steel Pipes with Elastomeric Insulation - C/C



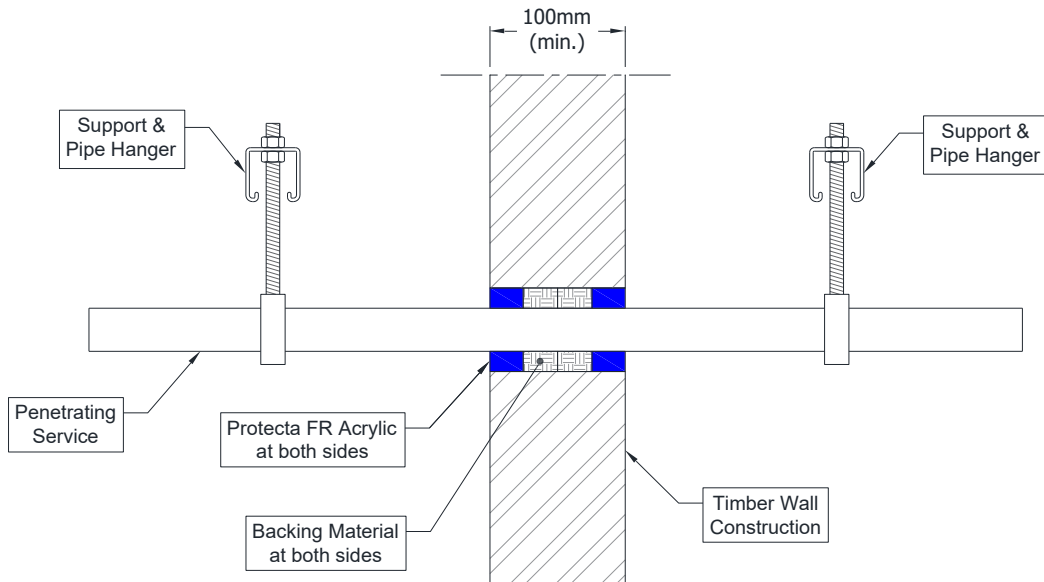
Alupex Pipes with Elastomeric Insulation - C/C



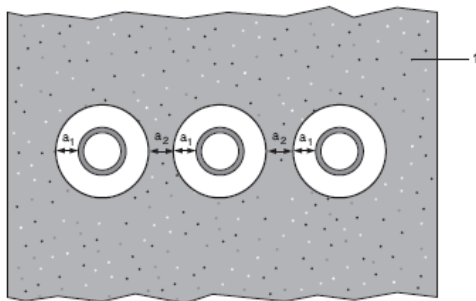
A.5.5 Double side penetration seal with plastic pipes and composite pipes

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/m³. Minimum annular space 10 mm and maximum 30 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



Key

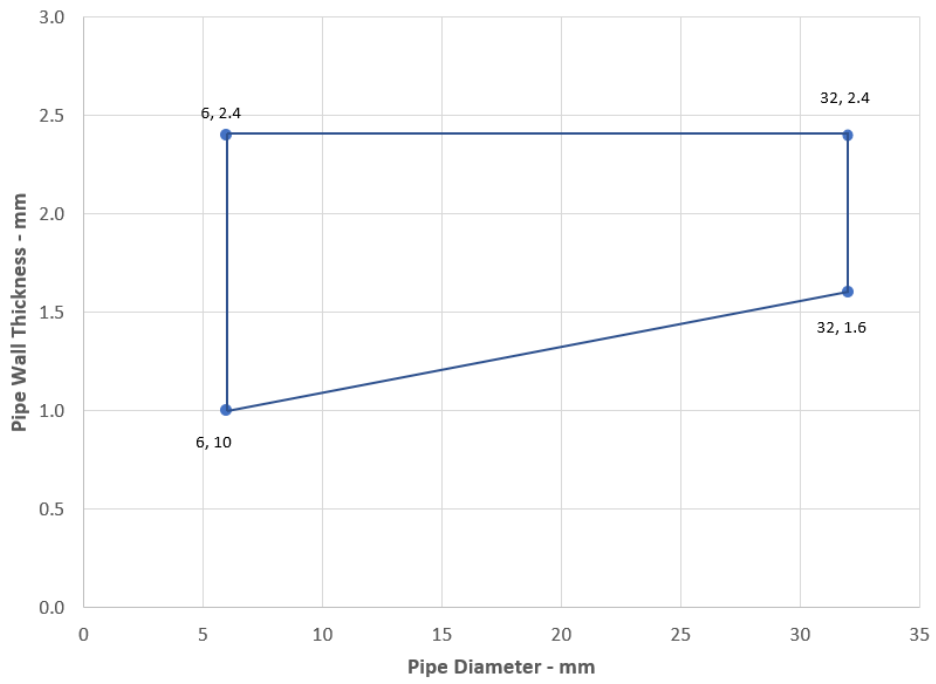
- 1 Supporting construction
- a1 Pipe / edge of seal separation (annular space)
- a2 Separation between penetration seals

A.5.5.1

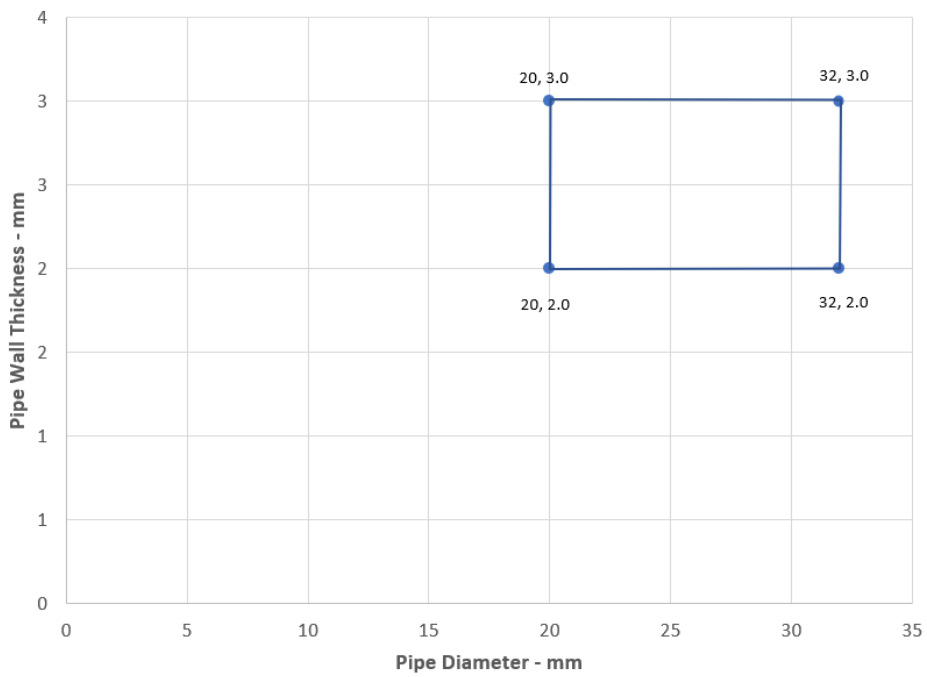
Services	Sealant depth	Backing	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Maximum 32 mm diameter/1.0-2.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m ³	EI 90 U/C
PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1			
Maximum 32 mm diameter/2.0-3.0 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m ³	EI 90 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078			
Maximum 32 mm diameter/1.8-4.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m ³	EI 90 U/C
PEX pipe in pipe system			
25 mm diameter outer /15 mm diameter x 2.5 mm wall inner	25 mm	Stone wool 25 mm deep min. 33kg/m ³	EI 90 C/C

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

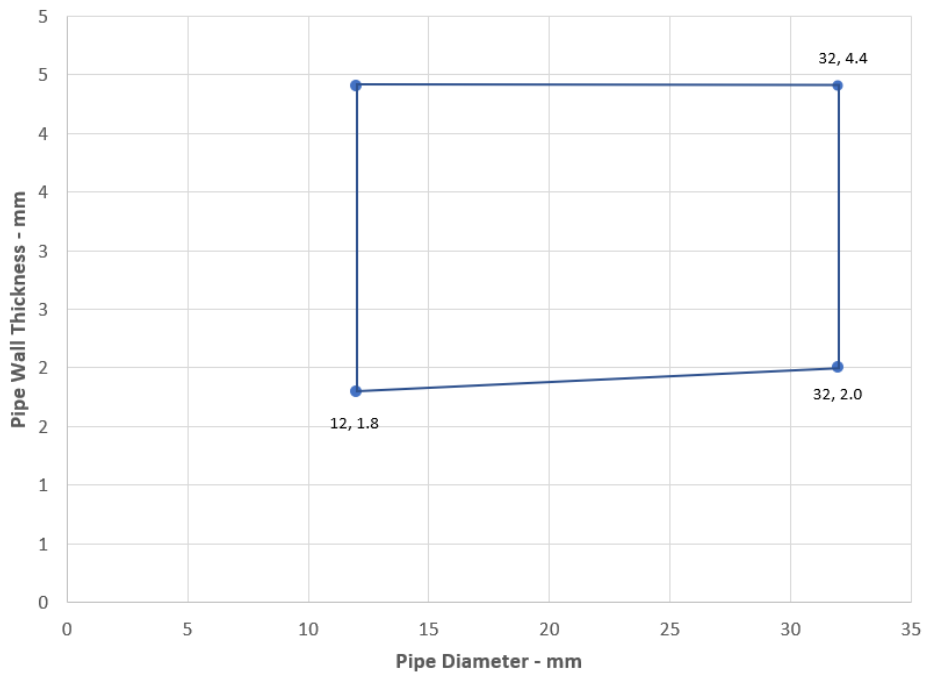
PVC-U Pipes EI 90 - U/C



PE Pipes EI 90 - U/C



PP Pipes EI 90 - U/C

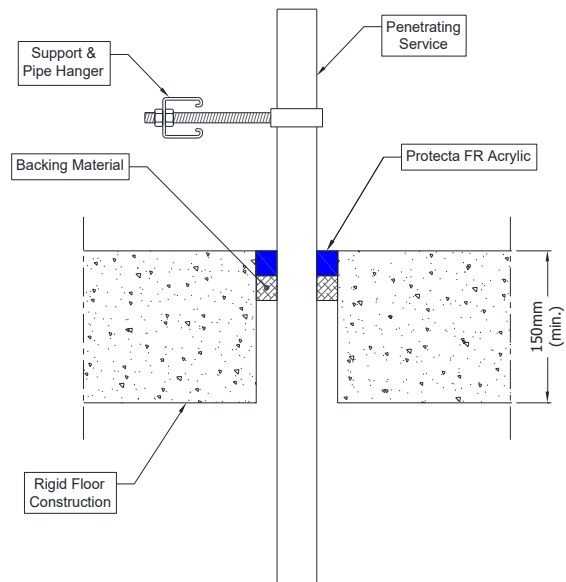
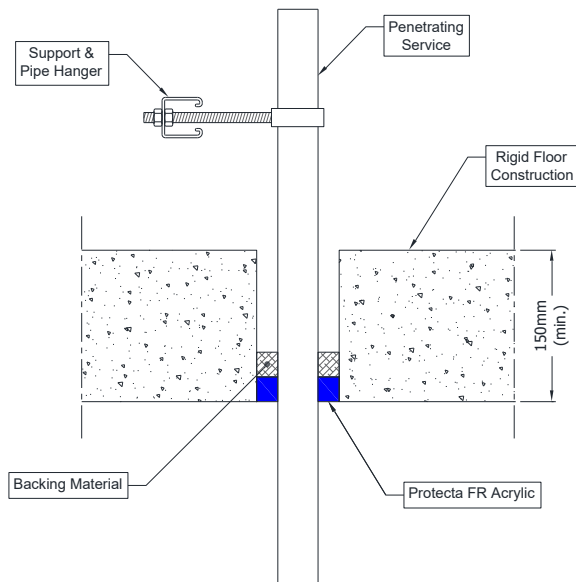


A.6 Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm

A.6.1 Single side penetration seal with cables

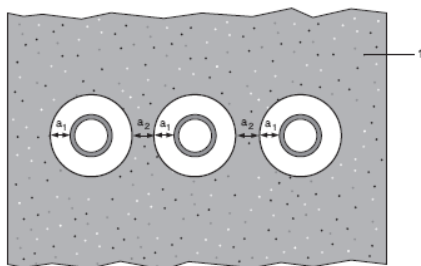
Penetration Seal: Cables (single) fitted at any position within the aperture, with Protecta FR Acrylic to either side of the floor (or at any position in between), backed with 'Protecta Mineral Fibre BIO'. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



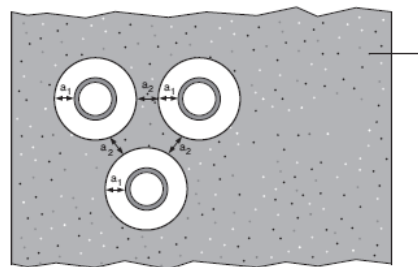
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

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

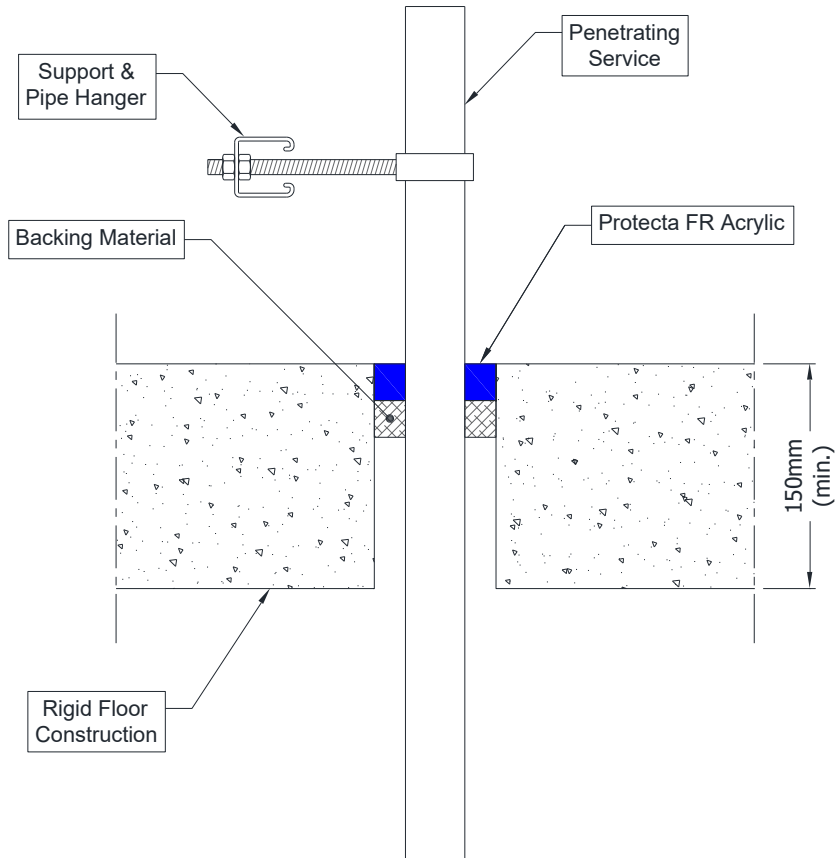
A.6.1.1

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

A.6.2 Single side penetration seal with cables

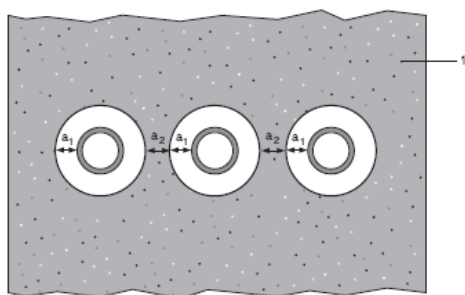
Penetration Seal: Cables fitted with Protecta FR Acrylic to the top side of the floor, backed with stone wool insulation minimum 35kg/m³ or Protecta Mineral Fibre BIO. Maximum seal size of 300 x 300 mm. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



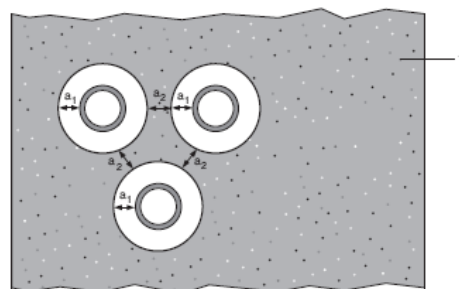
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

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

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

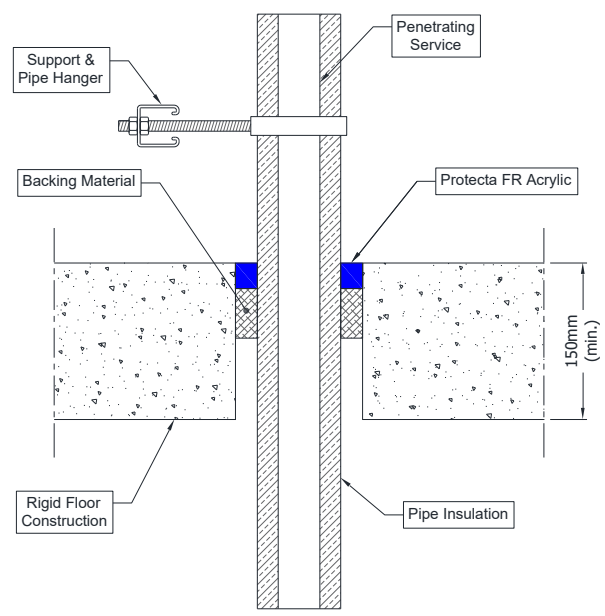
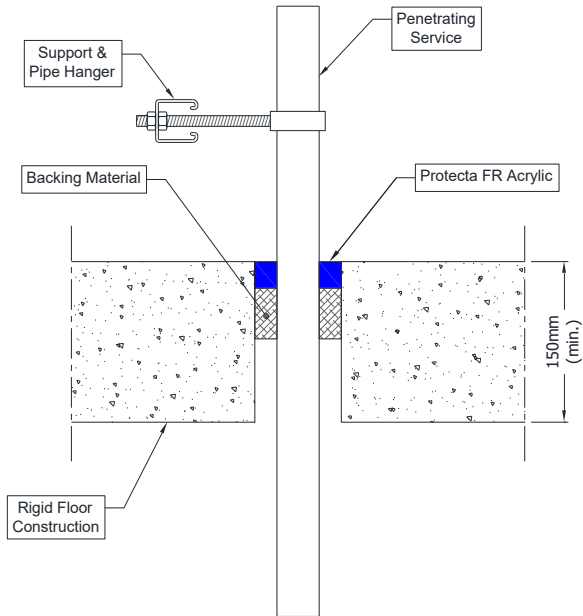
A.6.2.1

Services	Sealant depth	Backing (minimum)	Insulation	Classification
Blank seals	15 mm	20 mm Stone wool 35 kg/m ³	None	E 90, EI 60
	25 mm	25 mm Stone wool 35 kg/m ³		EI 120
		48 mm Mineral Fibre BIO		EI 240
Electric cables up to 21 mm diameter, single.	25 mm	48 mm Mineral Fibre BIO		E 120, EI 90
23-27 mm diameter, 1 mm × 185 mm ² core, PVC sheath and insulation electrical cable, single				EI 240
Galvanised steel Unistrut channel up to 41 x 41 mm	25 mm	48 mm Stone wool 33 kg/m ³	None	EI 180

A.6.3 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/m³. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *, maximum seal size 300 x 300 mm / 353 mm diameter.

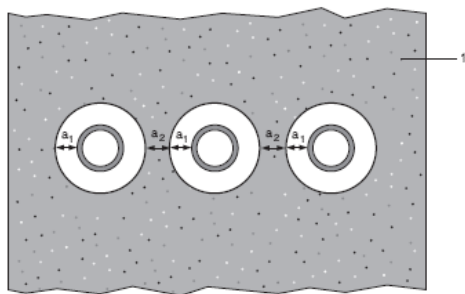
Construction details:



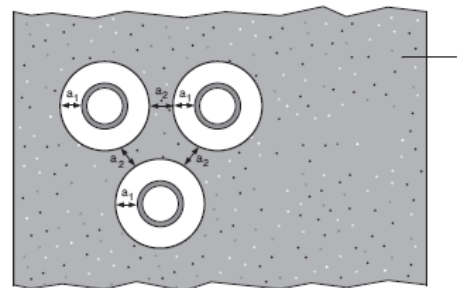
Configuration 1:

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

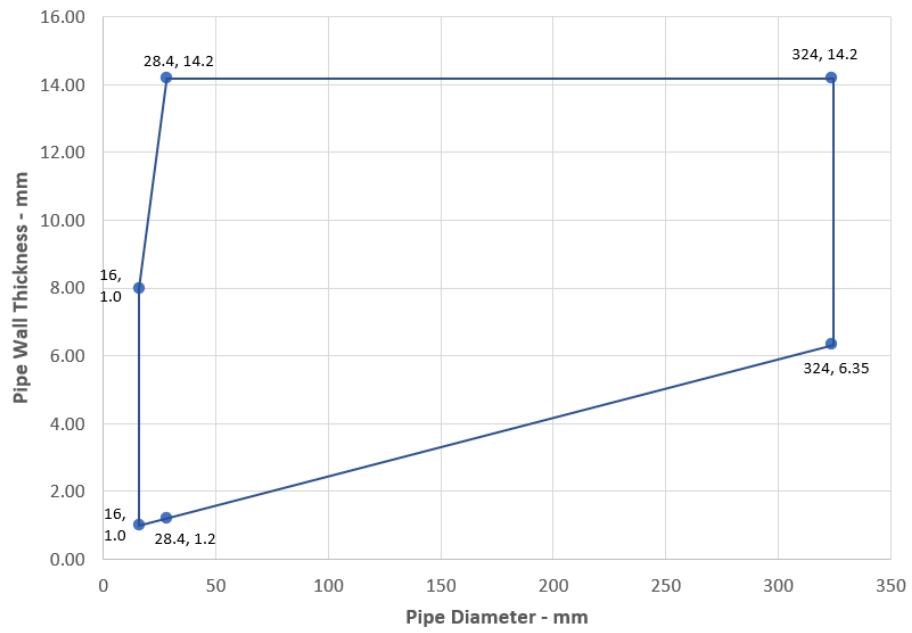
* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.6.3.1

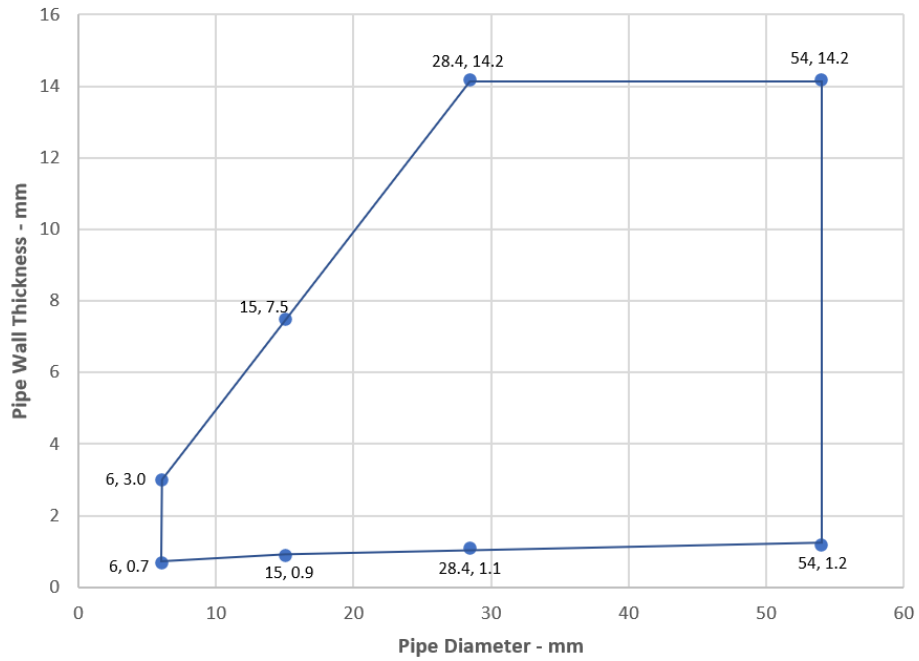
Services	Sealant depth	Backing	Classification
Mild or stainless steel pipe			
4 -16 mm diameter /1.0-8.0 mm wall	25 mm	48 mm stone wool	EI 120 C/U
17 -324 mm diameter /1.0-14.2 mm wall*			E 120 C/U
Mild or stainless steel pipe with minimum 75 kg/m ³ density stone or glass wool insulation Continuous Sustained (CS)			
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
Copper or steel pipe			
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
Copper or steel pipe with minimum 80 kg/m ³ density stone wool insulation Continuous Sustained (CS)			
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
Copper or steel pipe with minimum 75 kg/m ³ density glass wool insulation Continuous Sustained (CS)			
12 mm diameter/0.7-6.0 mm wall, 20 mm insulation	25 mm	48 mm stone wool	EI 120 C/C
Alupex Pipe			
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 ³ 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 ³ insulation Continuous Sustained (CS)*			E 120 C/C, EI 90 C/C
Aquatechnik Faser Fiber-T pipe			
Diameter up to 40 mm/2.8-5.5 mm wall*	25 mm	48 mm stone wool	EI 120 C/C
Flexigas Double Sleeve pipe			
Diameter up to 26 mm/3.6 mm wall*	25 mm	48 mm stone wool	E 240 C/C, EI 120 C/C
Diameter up to 73 mm/3.6-4.65 mm wall*			E 120 C/C, EI 90 C/C

*See below graphs for interpolated pipe sizes

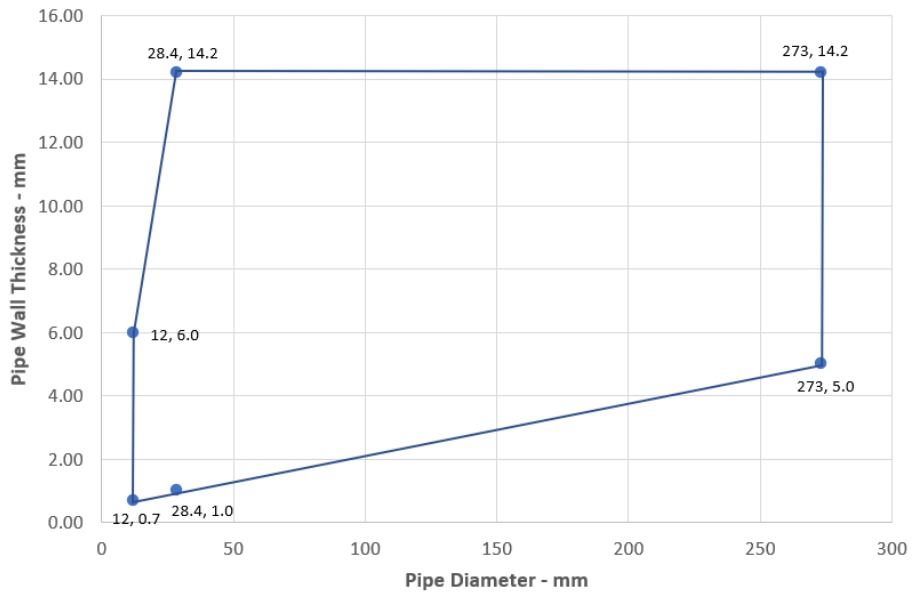
Mild or Stainless Steel - C/U



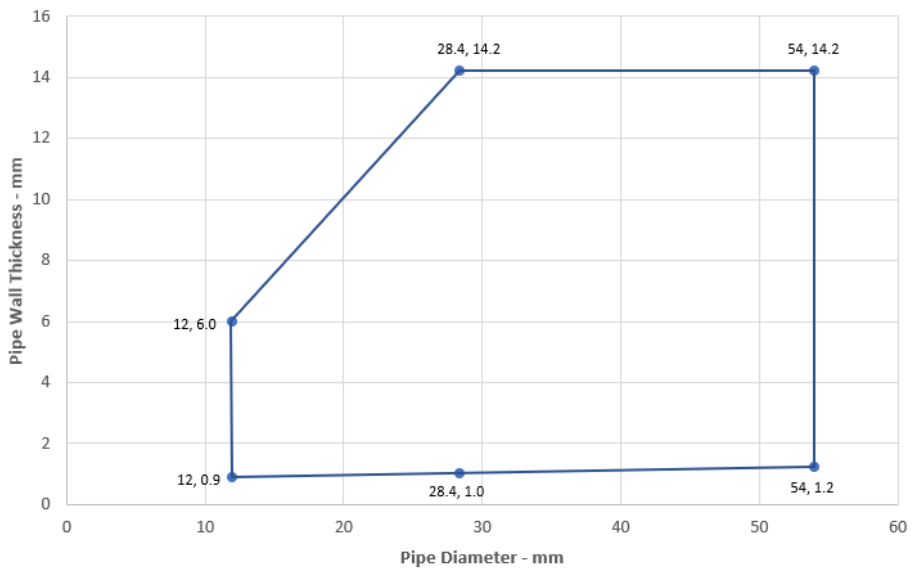
Copper or Stainless Steel Pipes - C/C



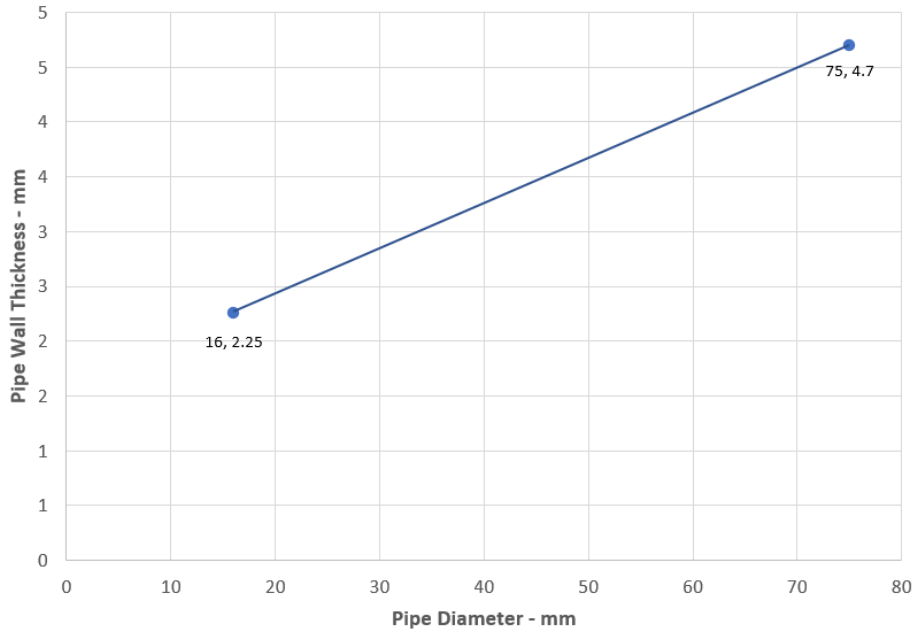
**Mild or Stainless Steel Pipes with Stone or Glass Wool
Insulation - C/C**



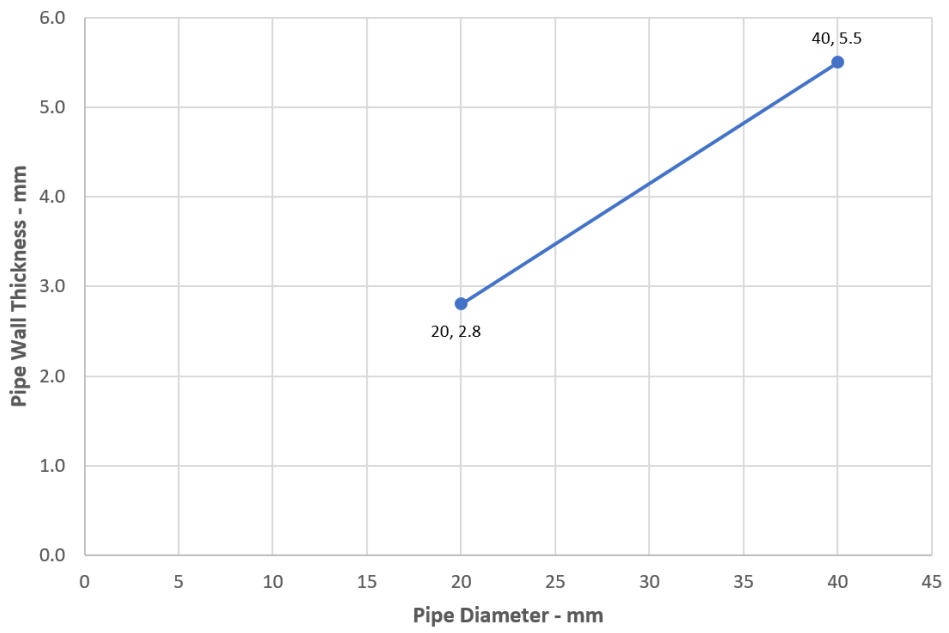
**Copper or Steel Pipes with 20-80 mm stone wool Insulation CS
E 240 C/C, EI 180 C**



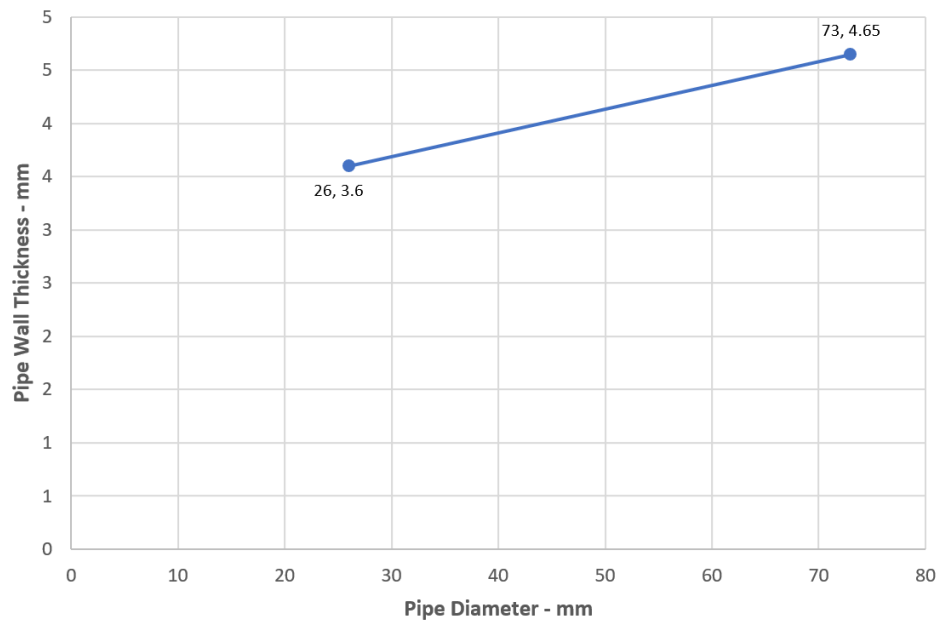
Alupex Pipes with Stone or Glass Wool Insulation - C/C



Aquatechnik Faser Fiber-T Pipes - EI 120 C/C



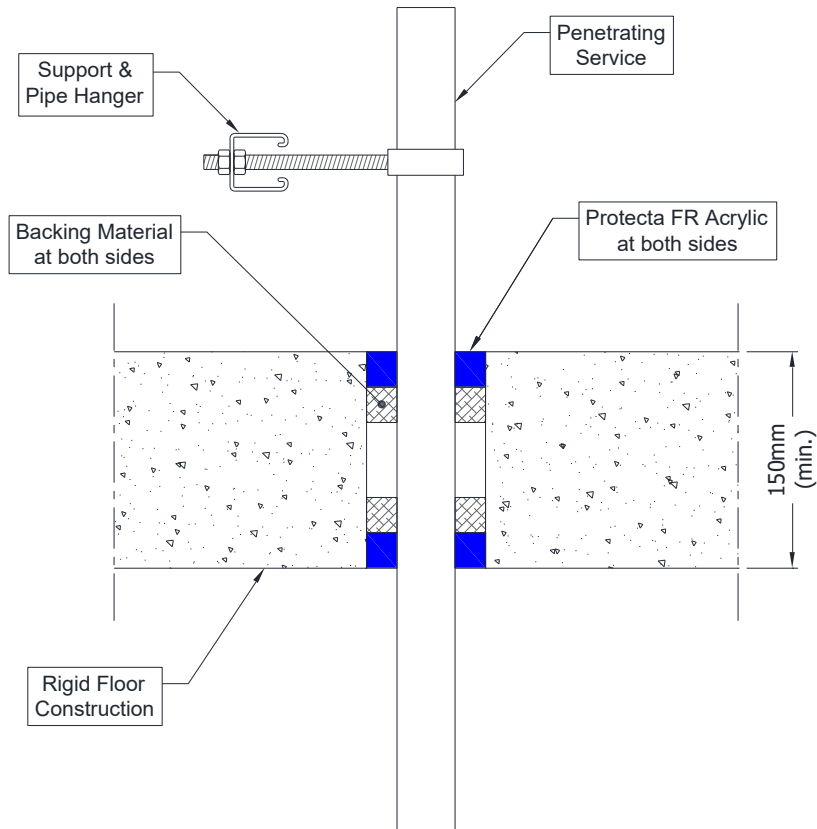
Flexigas Double Sleeve Pipes - E 120, EI 90 C/C



A.6.4 Double side penetration seal with pipes

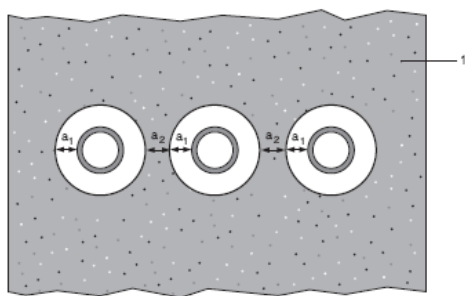
Penetration Seal: Pipes fitted at any position within the aperture, with Protecta FR Acrylic to the both faces of the floor, backed with 25 mm stone wool minimum 33kg/m³. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *, maximum seal size 300 x 300 mm / 300 mm diameter.

Construction details:



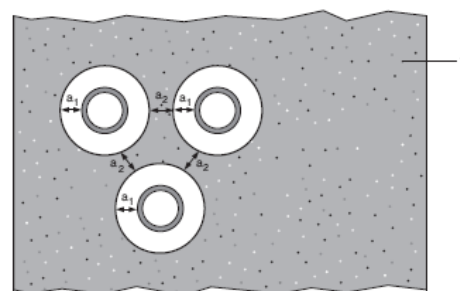
Configuration 1:

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

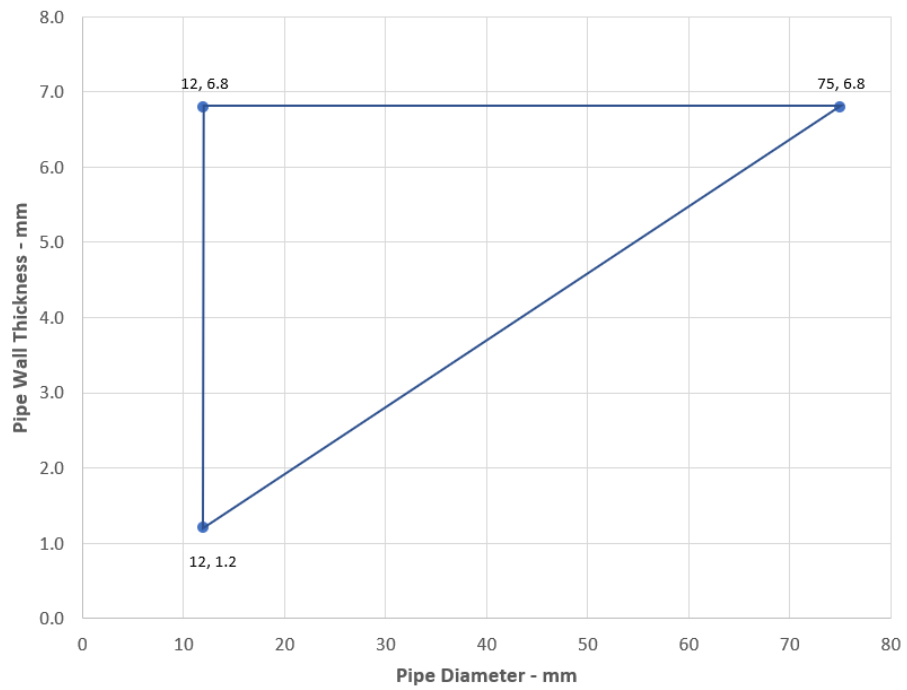
* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.6.4.1

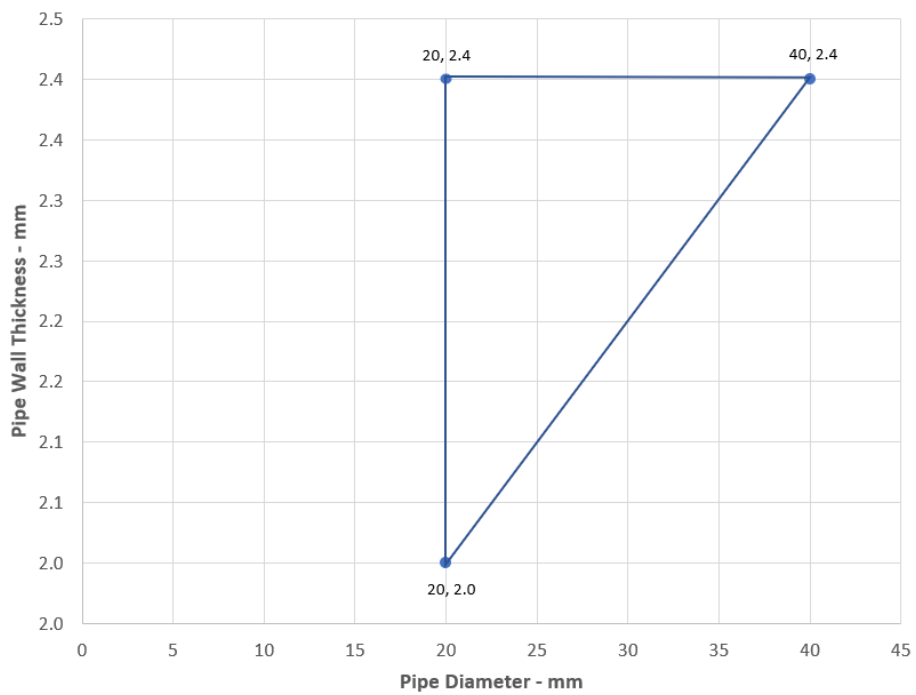
Services	Sealant depth	Backing	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Up to 50 mm \varnothing /1.6-3.7 mm wall	25 mm	25 mm Stone wool	EI 240 U/C
Up to 40 mm \varnothing /1.6-3.7 mm wall, with bundle of cables up to 21 mm diameter			
PP pipe according to EN 1451-1 or DIN 8077/8078			
12 mm \varnothing /1.2 mm wall	25 mm	25 mm Stone wool	EI 240 U/C
13-40 mm \varnothing /1.2-3.7 mm wall			EI 180 U/C
41-75 mm \varnothing /1.2-6.8 mm wall*			EI 90 U/C
Up to 40 mm \varnothing /1.2-3.7 mm wall, with bundle of cables up to 21 mm diameter			EI 180 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			
20-40 mm \varnothing /2.0-3.7 mm wall*	25 mm	25 mm Stone wool	EI 240 U/C
Up to 40 mm \varnothing /2.0-3.7 mm wall, with bundle of cables up to 21 mm diameter			EI 180 U/C
PEX pipe with an inner and outer layer of polyethylene (tested pipe is Roth MULTIPLEX 32x4, 4/42 PiP)			
Up to 44 mm diameter outer /32 mm diameter x 4.62 mm wall inner*	25 mm	25 mm Protecta Mineral Fibre BIO	EI 90 C/C
44 mm diameter outer /32 mm diameter x 4.62 mm wall inner	25 mm	25 mm Stone wool	EI 240 C/C
PEX pipe with an inner and outer layer of polyethylene (tested pipe is LK PE-X Universal Pipe with additional insulated conduit pipes, PiP Extra)			
25 mm diameter outer /16 mm diameter x 2.0 mm wall inner, with 9 mm thick continuous-sustained (CS) PE foam insulation	25 mm	25 mm Stone wool	EI 60 C/C
Polybutylene pipe			
10- 28 mm \varnothing /1.5-2.6 mm wall*	15 mm	25 mm Stone wool	EI 240 C/C

*See below graphs for interpolated pipe sizes

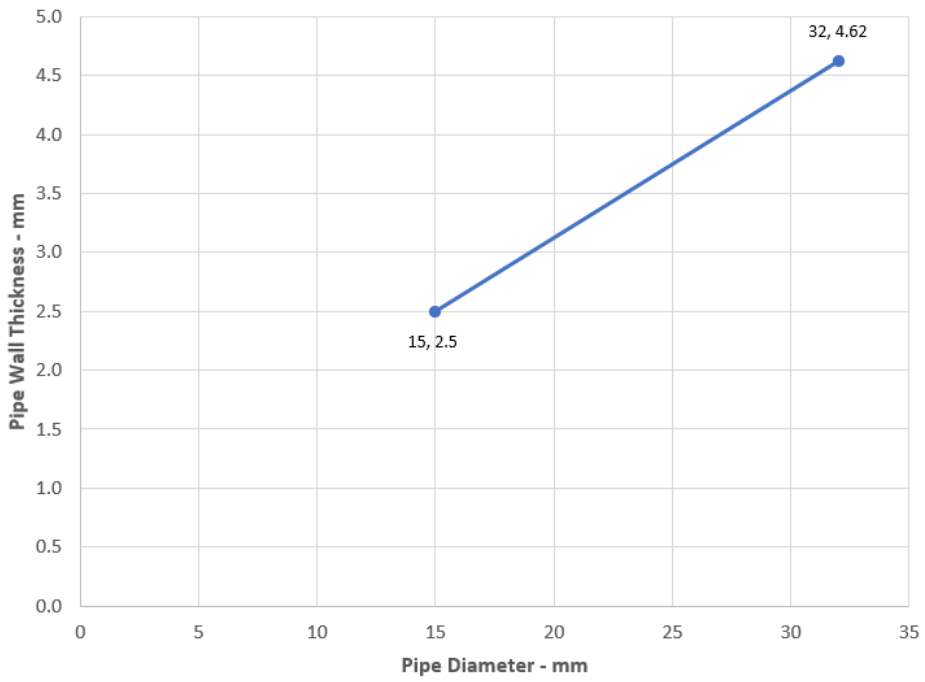
PP Pipes - EI 190 U/C



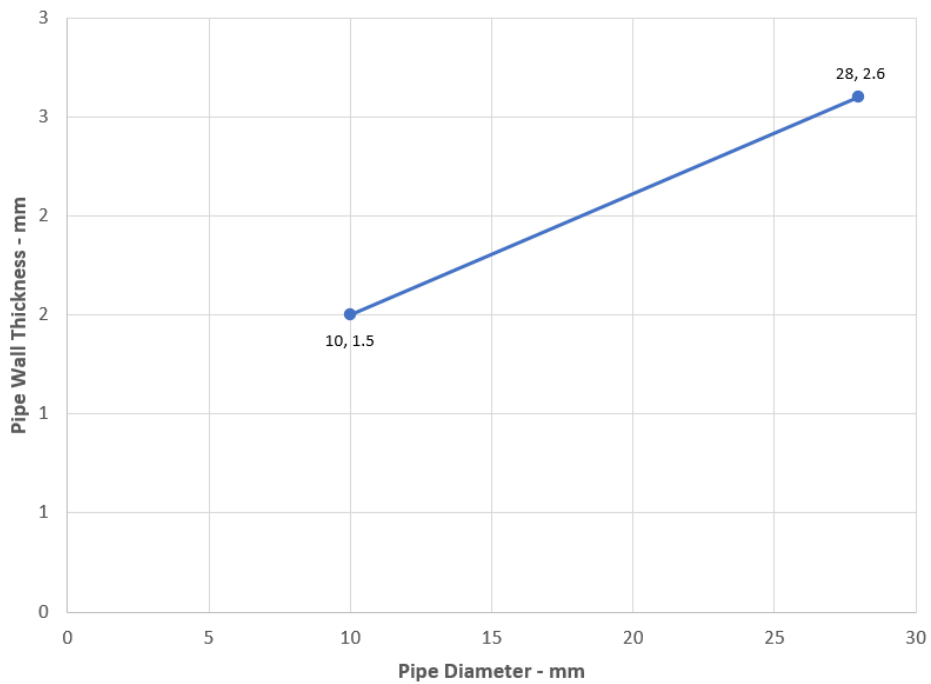
PE Pipes - U/C



PEX Pipes (Inner Wall Diameters) - EI 90 C/C



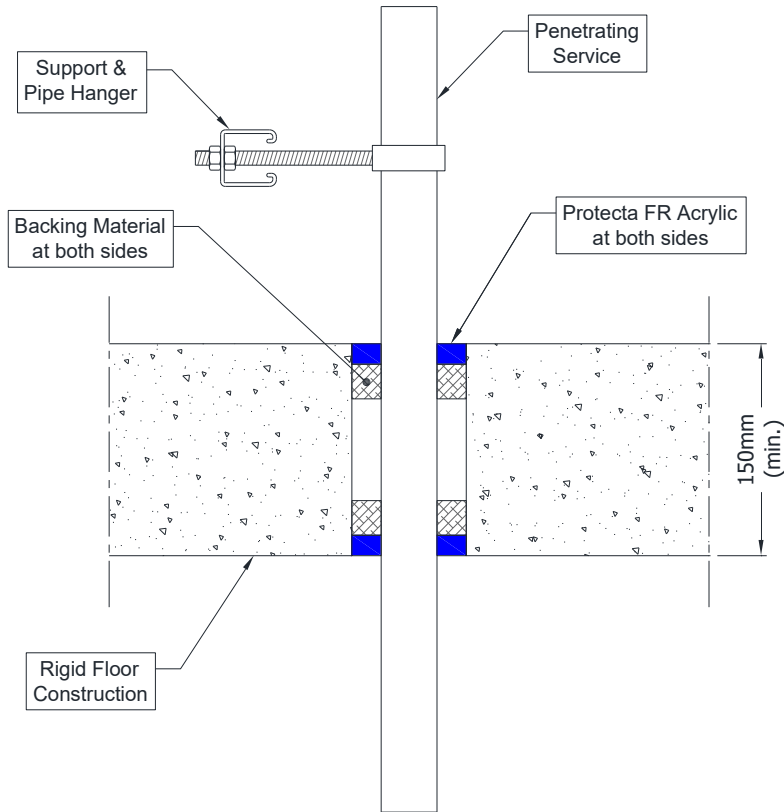
Polybutylene Pipes - EI 240 C/C



A.6.5 Double side penetration seal with cables

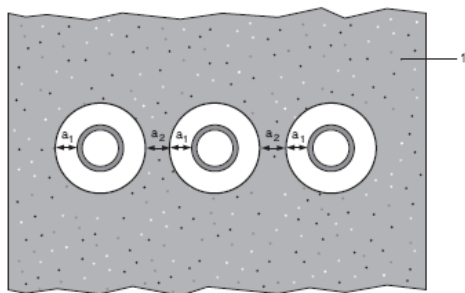
Penetration Seal: Cables with Protecta FR Acrylic to both sides of the floor, backed with stone wool insulation minimum 35kg/m³. Minimum annular space 7 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



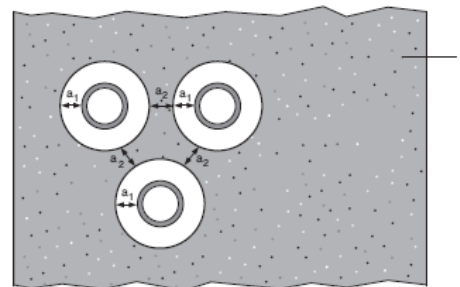
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

- 1 Supporting construction
- a1 Cable / top edge of seal separation
- a2 Cable / side edge of seal separation
- a3 Cable / cable separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

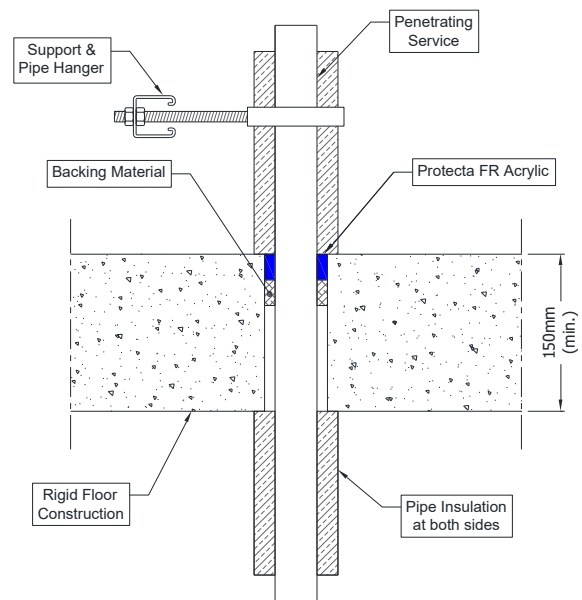
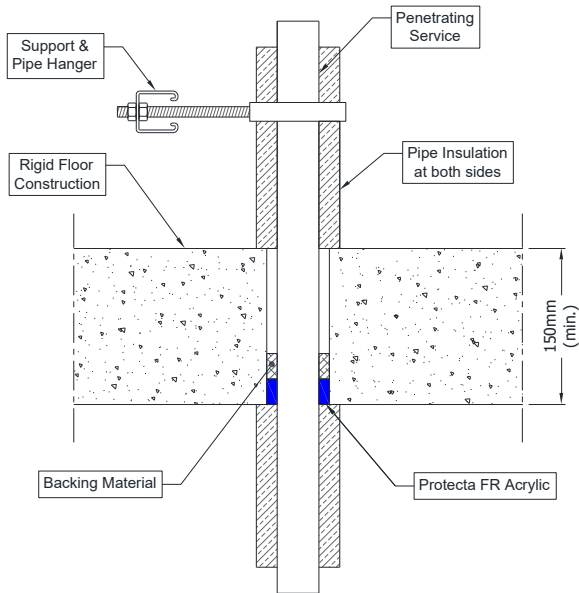
A.6.5.1

Services	Sealant depth	Backing	Maximum Aperture	Classification
Blank seals	15 mm	25 mm Stone wool 35 kg/m ³	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

A.6.6 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/m³ stone wool insulation or Protecta Mineral Fibre BIO. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

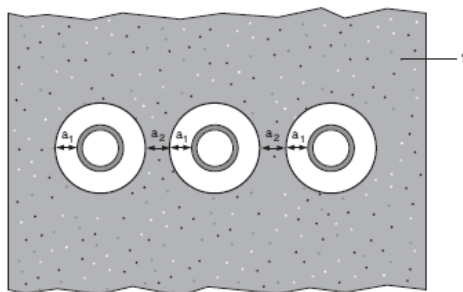
Construction details:



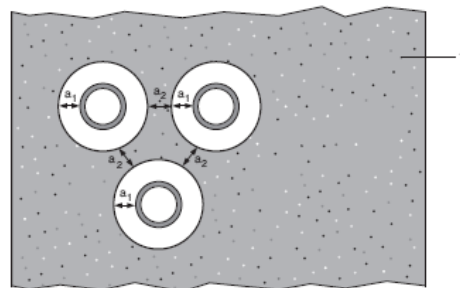
Configuration 1:

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

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.6.6.1

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 ³	15 mm	E 240 C/U, EI 180 C/U
Copper or steel pipe up to 12 mm diameter/0.9-5 mm wall				EI 240 C/U
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall	Up to 100 x 1000 mm		25 mm	EI 120 C/U
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall	300 x 300 mm	20 mm Stone wool insulation 80 kg/m ³	15 mm	E 90 C/U, EI 60 C/U
Copper or steel pipe up to 12 mm diameter/0.9-5 mm wall				
Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall			25 mm	EI 120 C/U

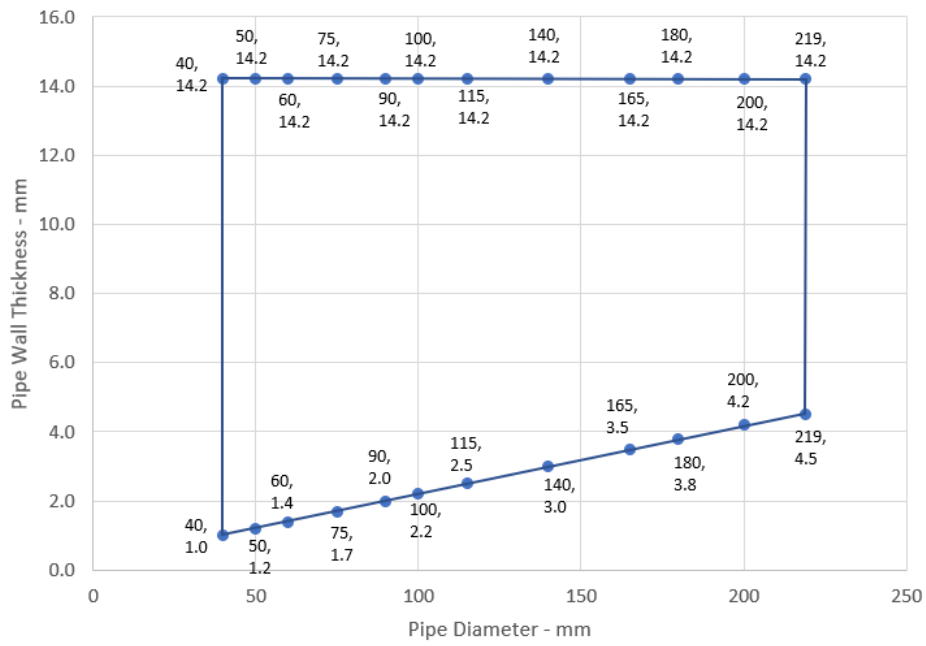
Services	Max. seal size	Insulation (min)	Sealant depth	Classification
Mild or stainless steel pipe	10 mm width around pipe	20 mm Stone wool insulation 80 kg/m ³	15 mm	EI 240 C/U
40 mm diameter/1-14.2 mm wall				
40 mm diameter/1-14.2 mm wall*				
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 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*	Up to 100 x 1000 mm	30 mm Stone wool insulation 80 kg/m ³	25 mm	E120 C/U, EI 90 C/U
219 mm diameter/4.5-14.2 mm wall*				
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/1.7-14.2 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

Services	Max. Seal Size	Insulation (minimum)	Sealant Depth	Classification
Mild or stainless steel pipe				
40 mm diameter/1-14.2 mm wall	300 x 300 mm	20 mm Stone wool insulation 80 kg/m ³	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 ³		
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*				
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

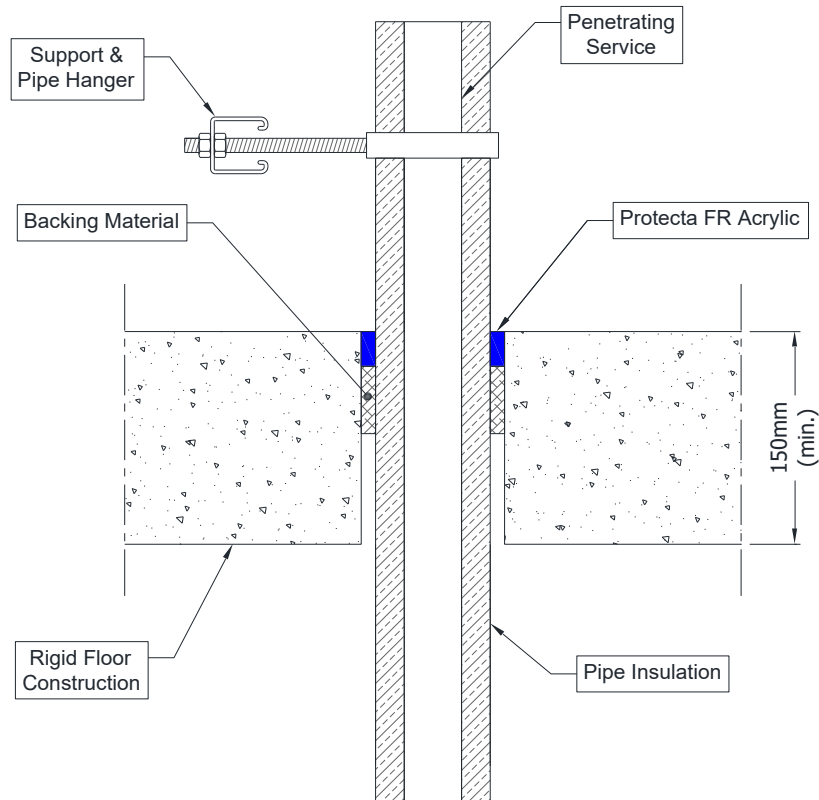
Steel Pipes with Stone Wool Insulation - C/U



A.6.7 Single side penetration seal with metallic pipes

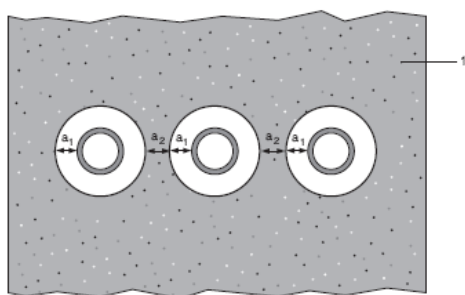
Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm Protecta FR Acrylic to the top of the floor, backed with 48 mm deep Protecta Mineral Fibre BIO insulation. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *. Maximum seal size 300 x 300 mm / 504 mm \varnothing .

Construction details:



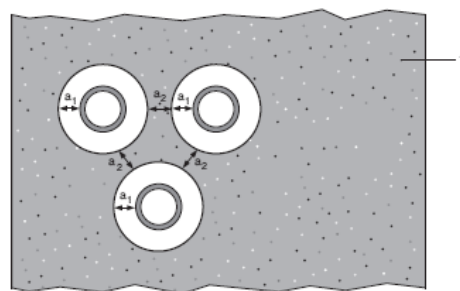
Configuration 1:

Option 1



Configuration 2:

Option 2



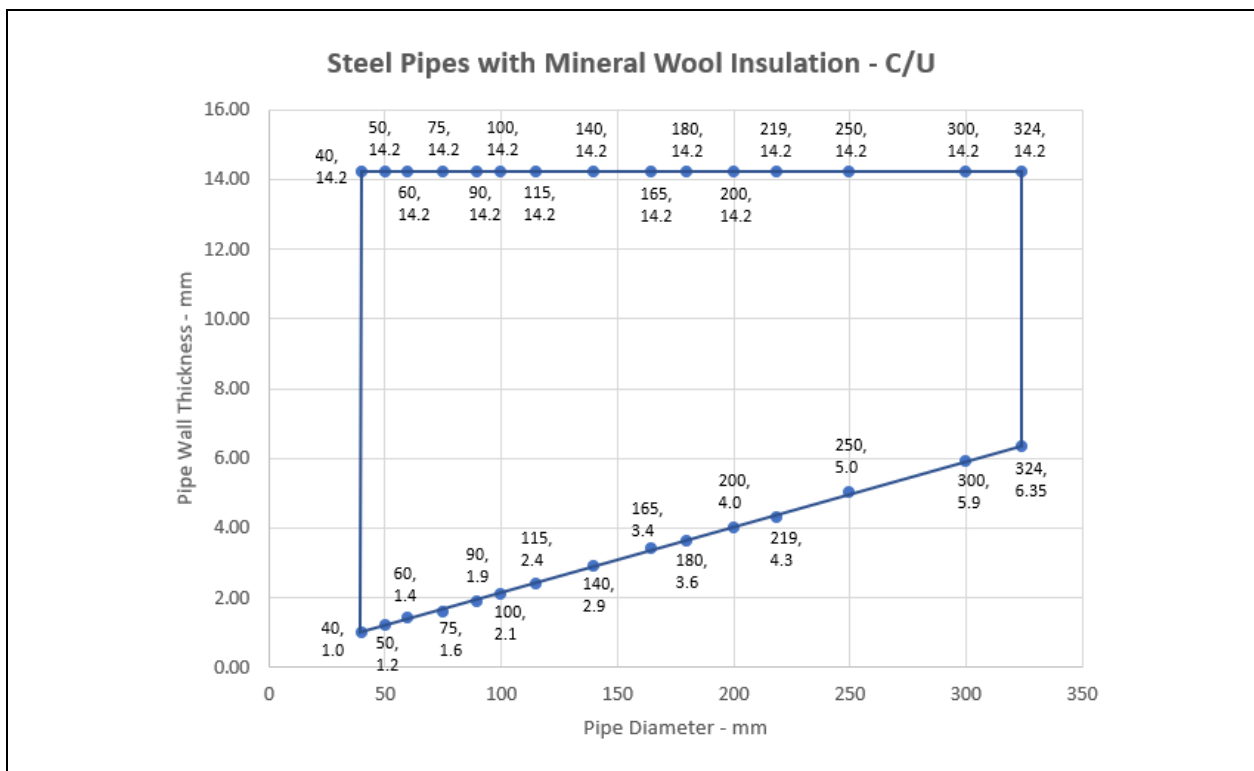
Key

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

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.6.7.1 Single side penetration seal with pipes

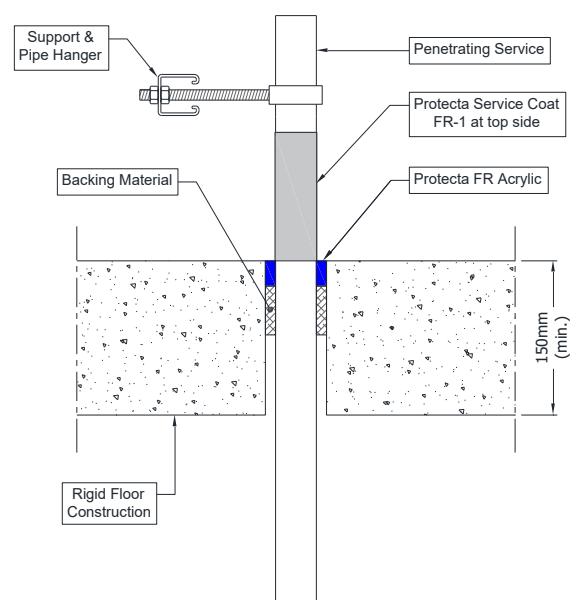
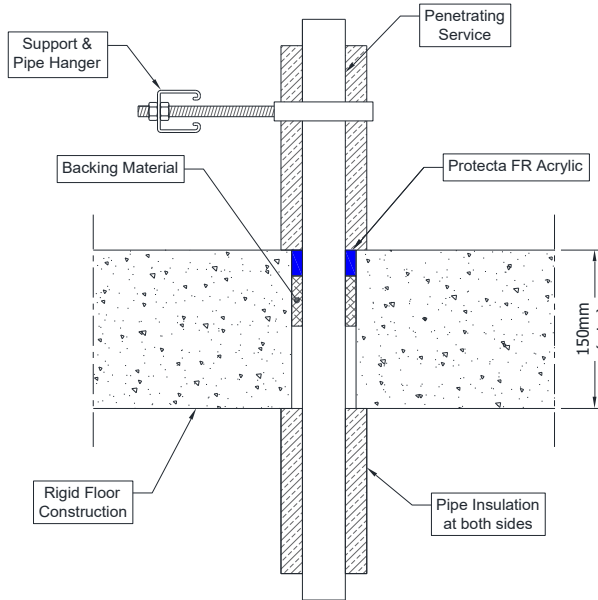
Services	Insulation	Classification
Mild or stainless steel pipe		
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m ³	EI 240 C/U
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m ³	
50 mm diameter/1.2-14.2 mm wall*		
60 mm diameter/1.4-14.2 mm wall*		
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*		
PEX pipe in pipe system		
15 mm diameter x 2.5 mm wall inner /25mm diameter outer	None	EI 90 C/C



A.6.8 Single side penetration seal with metallic pipes

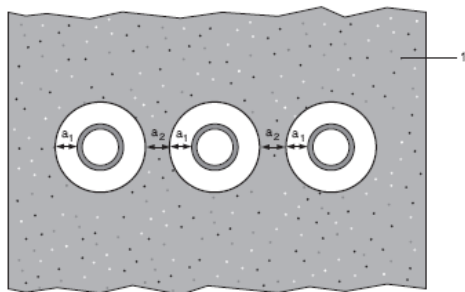
Penetration Seal: LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm deep Protecta FR Acrylic to the top side of the floor, backed with 48 mm deep minimum 33 kg/m³ stone wool insulation or Protecta Mineral Fibre BIO. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



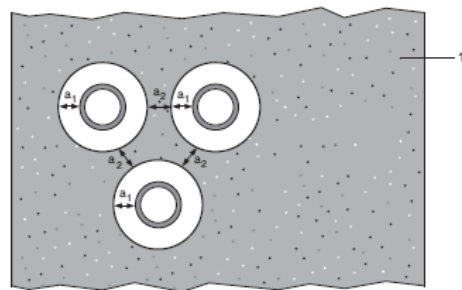
Configuration 1:

Option 1



Configuration 2:

Option 2



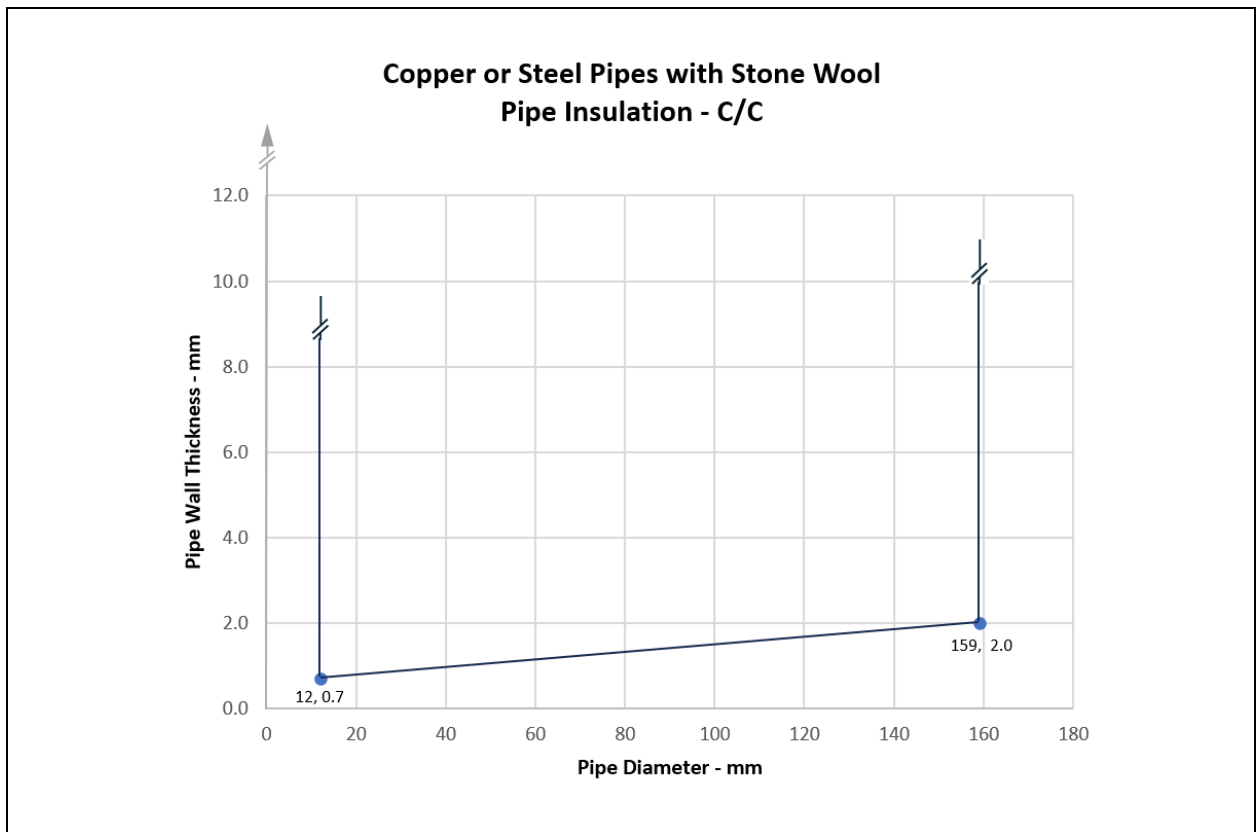
Key

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

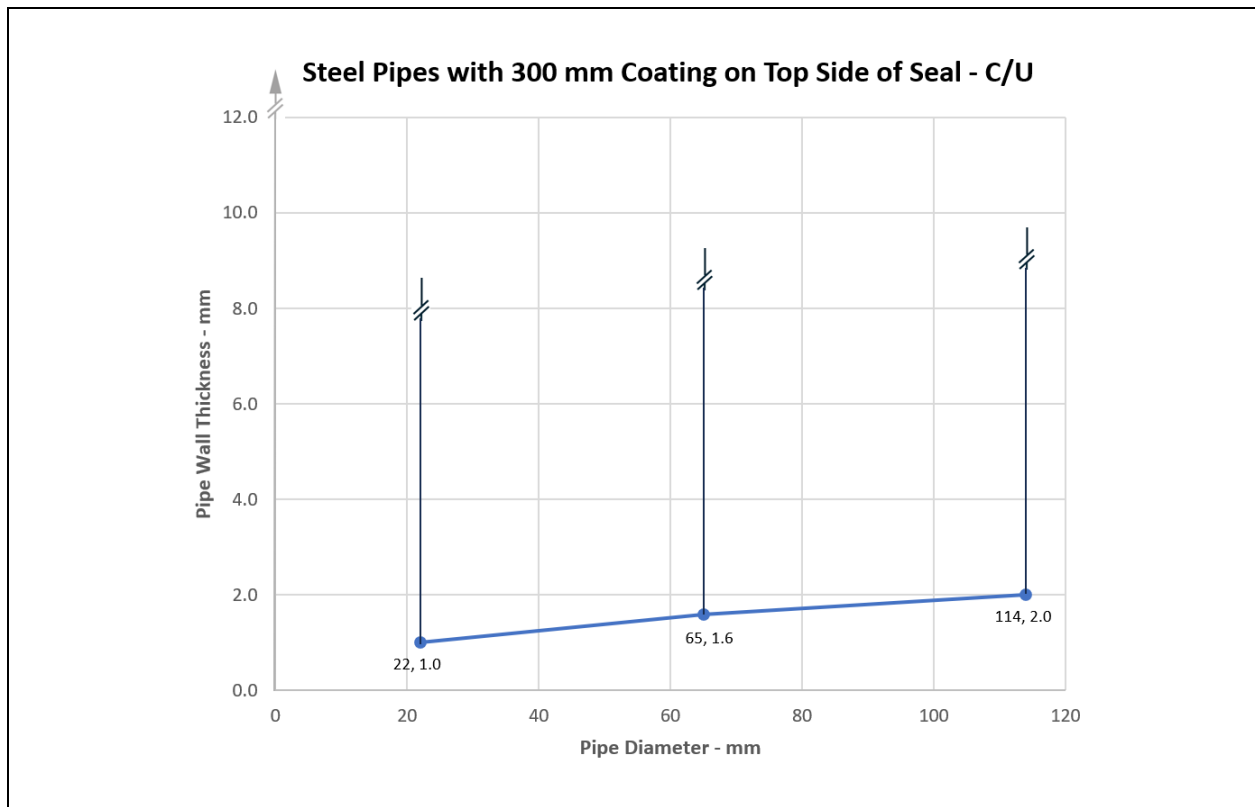
* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

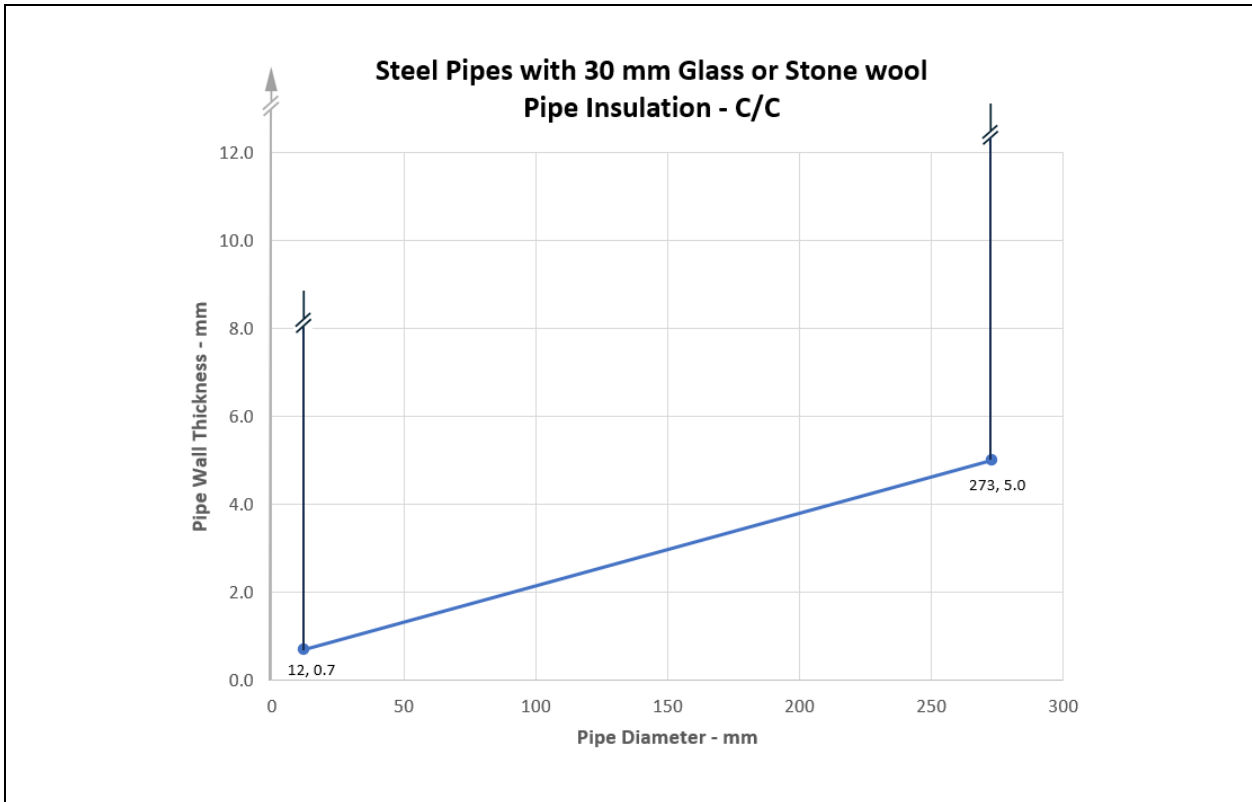
A.6.8.1

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 ³ , 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 ³ , 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 ³ , 1000 mm length from both sides of the seal	25 mm	E 90 C/C, EI 20 C/C
Copper or steel pipe up to 159 mm diameter/ ≥0.7 mm wall*	300 x 300 mm	30 mm Stone wool 80 kg/m ³ , 1000 mm length from both sides of the seal, adhered to pipe with Protecta FR Adhesive	25 mm	E 180 C/C, EI 60 C/C



Services	Max. seal size	Insulation (min)	Sealant depth	Classification
Steel pipe up to 22 mm diameter/ ≥1.0 mm wall*	300 x 300 mm	Protecta Service Coat FR-1, 1000-micron DFT extending 300 mm from top side of the seal	25 mm	EI 120 C/U
Steel pipe up to 65 mm diameter/ ≥1.0 mm wall*	300 x 300 mm	Protecta Service Coat FR-1, 1333-micron DFT extending 300 mm from top side of the seal	25 mm	E 240 C/U, EI 60 C/U
Steel pipe up to 114 mm diameter/ ≥1.0 mm wall*	300 x 300 mm	Protecta Service Coat FR-1, 1000-micron DFT extending 300 mm from top side of the seal	25 mm	E 120 C/U, EI 45 C/U
Steel pipe up to 273 mm diameter/0.7-14.2 mm wall*	300 x 300 mm / 353 mm Ø	30 mm Glass or Stone wool 75 kg/m ³ , 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 ³ , 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 ³ , 500 mm length from both sides of the seal	25 mm	E 180 C/C, EI 120 C/C

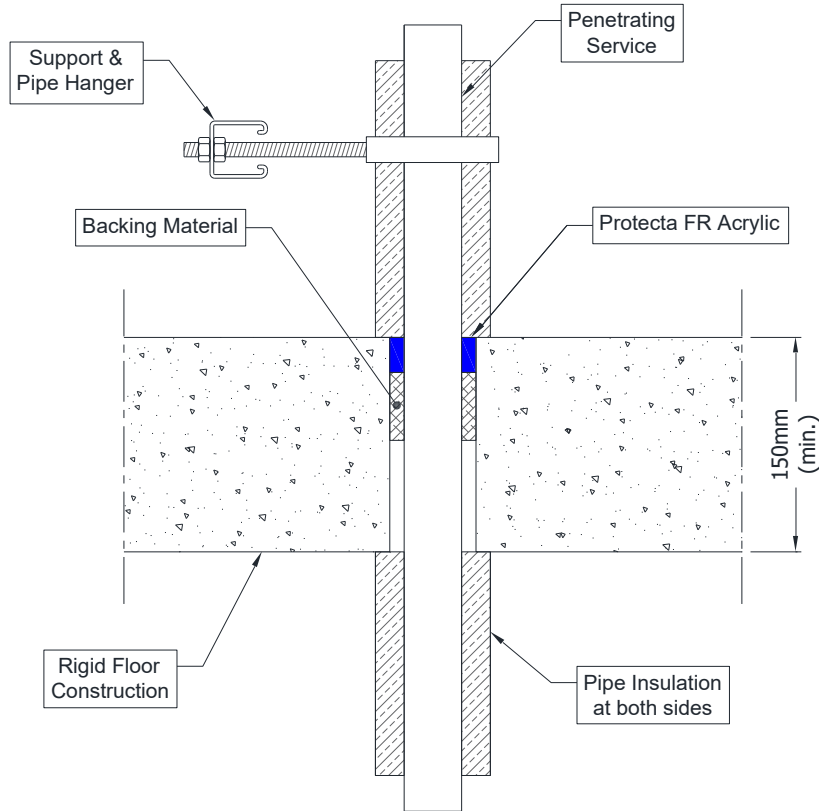




A.6.9 Single side penetration seal with composite pipes

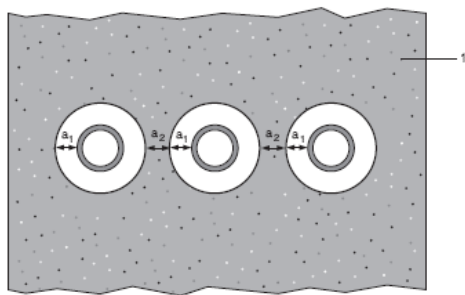
Penetration Seal: CI (Continuous Interrupted) or LI (Locally Interrupted) insulated composite pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic, maximum 300 x 300 mm seal, backed with 'Protecta Mineral Fibre BIO'. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



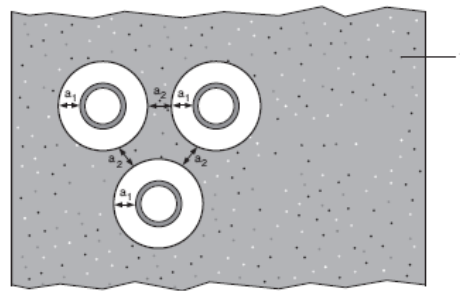
Configuration 1:

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

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

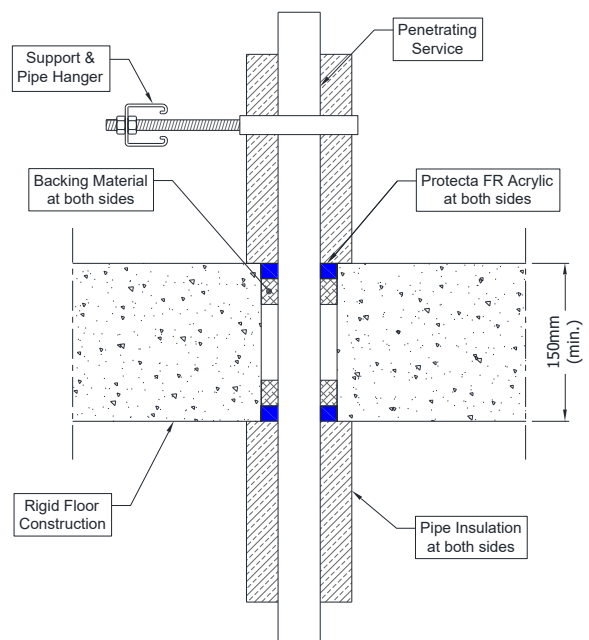
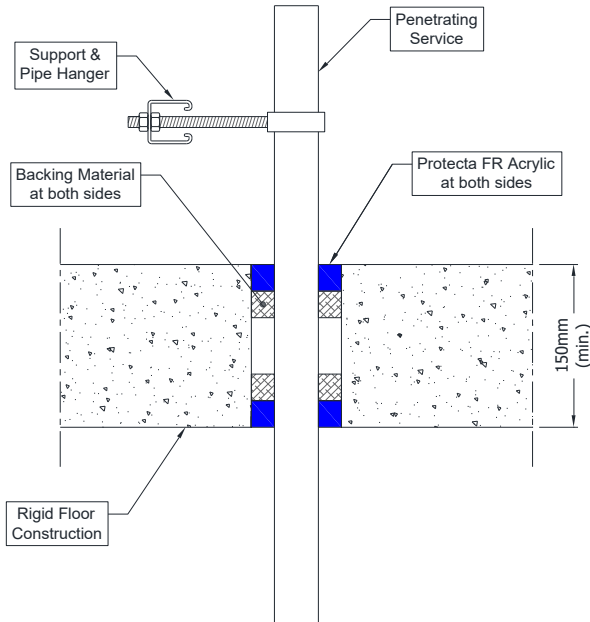
A.6.9.1

Services	Sealant depth	Backing	Insulation (minimums)	Classification
Alupex Composite Pipe	25 mm	48 mm Protecta Mineral Fibre BIO	20 mm stonewool 80 kg/m ³ , 500 mm length from both sides of the seal	EI 240 C/C
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				

A.6.10 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. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

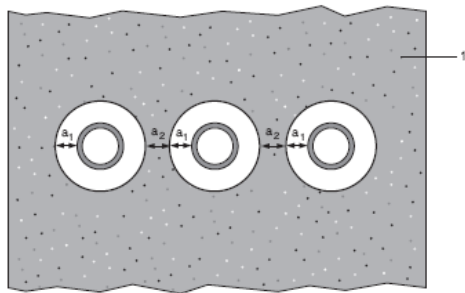
Construction details:



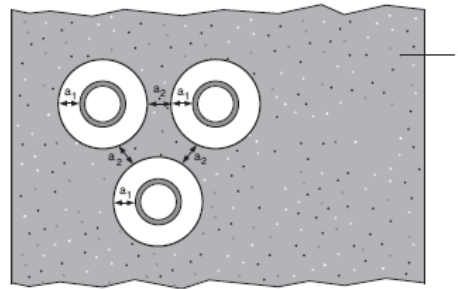
Configuration 1:

Configuration 2:

Option 1



Option 2



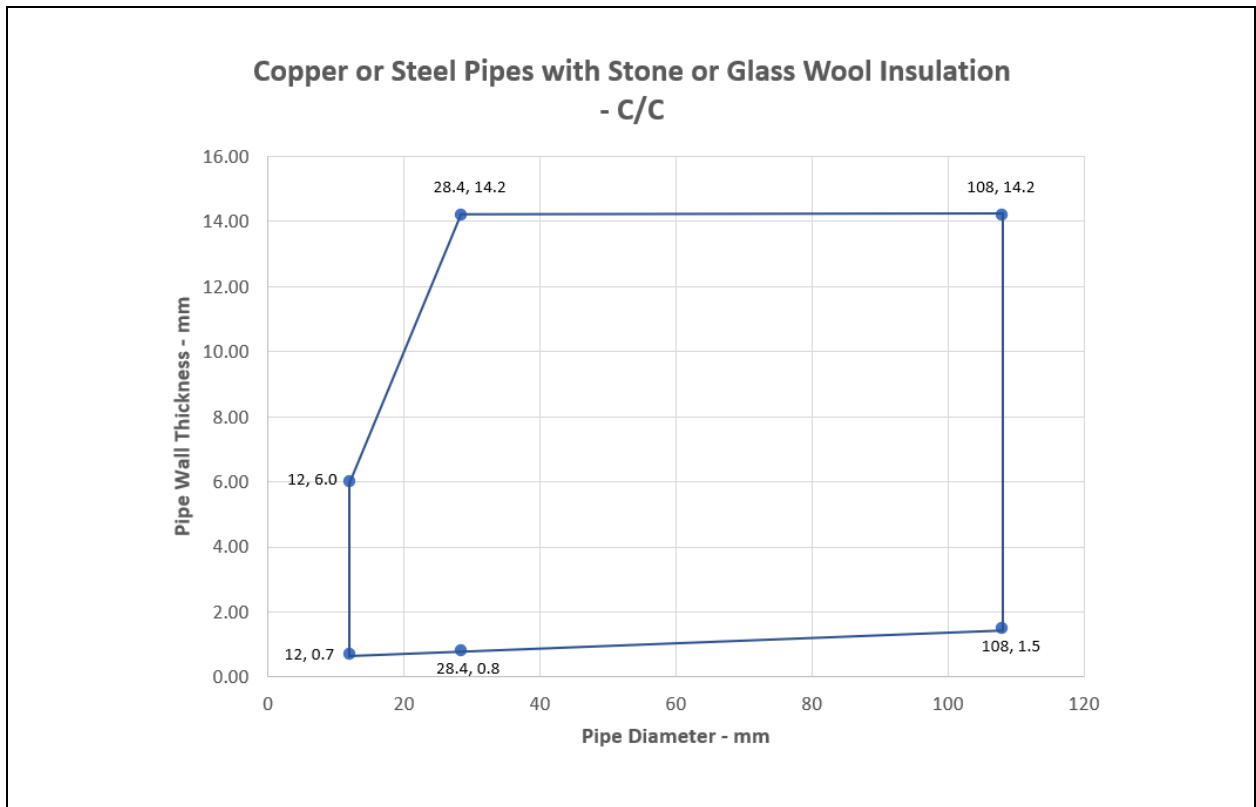
Key

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

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.6.10.1

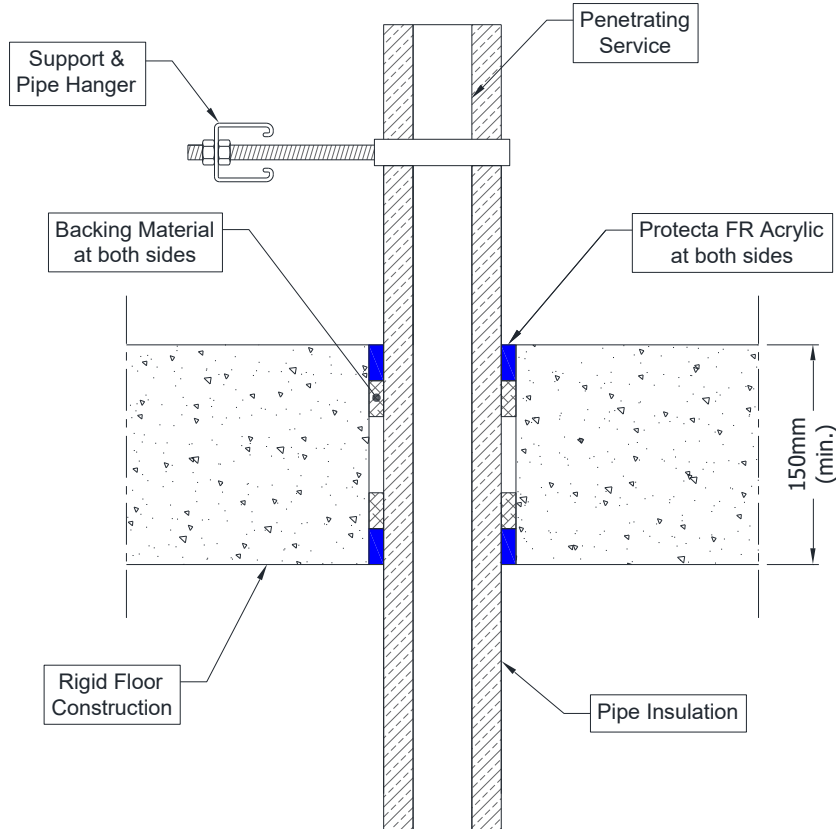
Services	Max. Seal Size	Insulation	Sealant depth	Backing (minimum)	Classification
Copper or steel pipe 54 mm diameter/2-14.2 mm wall	300 x 300 mm	None	25 mm	25 mm deep 140 kg/m ³ stone wool	E 120 C/U, EI 20 C/U
Copper or steel pipe maximum 108 mm diameter /0.7-14.2 mm wall*		30 mm Glass or Stone wool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



A.6.11 Double side penetration seal with metallic pipes

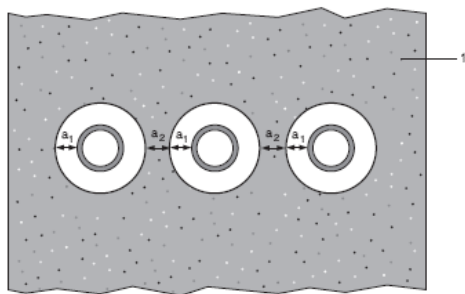
Penetration Seal: CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, maximum aperture 300 x 300 mm or 413 mm \varnothing , backed with stone wool insulation or 'Protecta Mineral Fibre BIO'. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



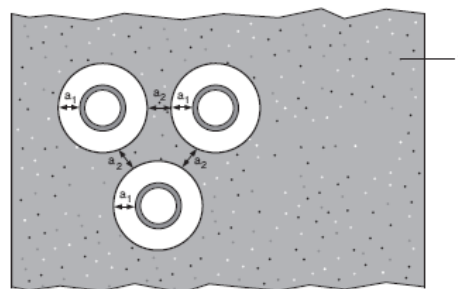
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

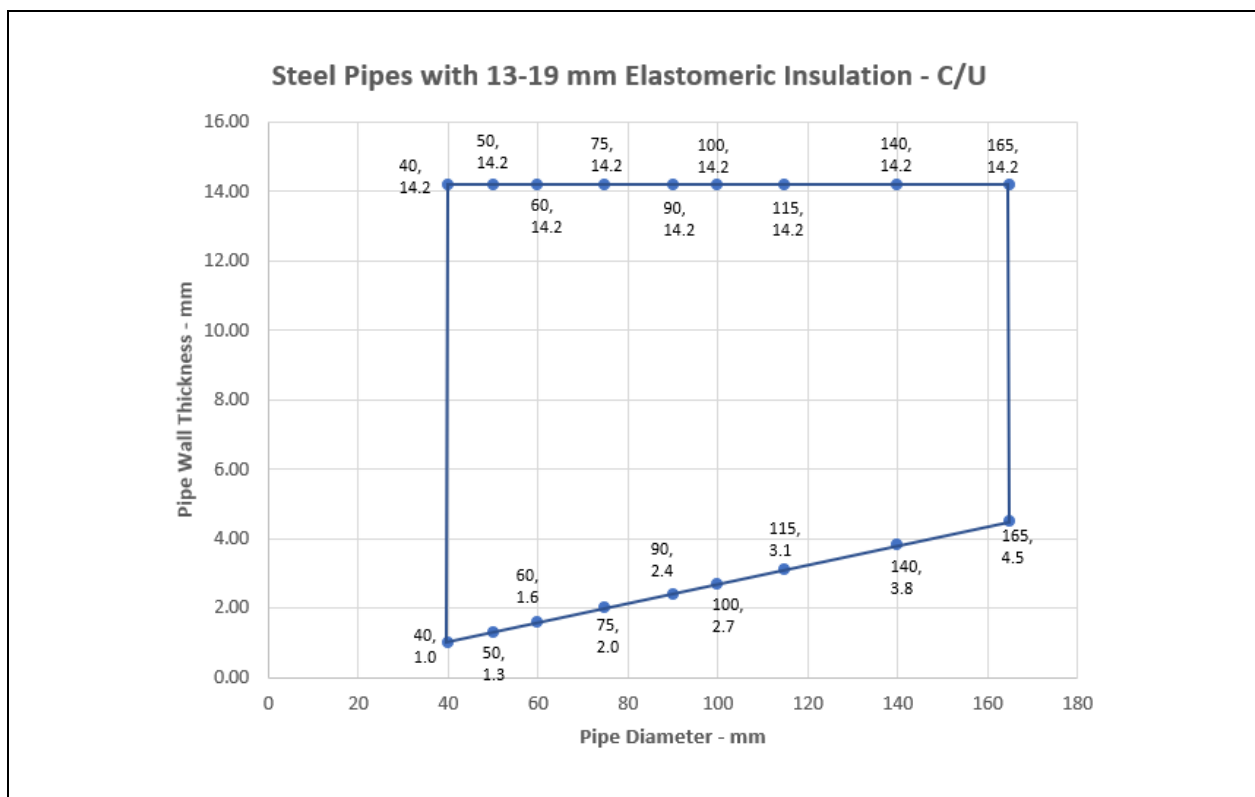
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

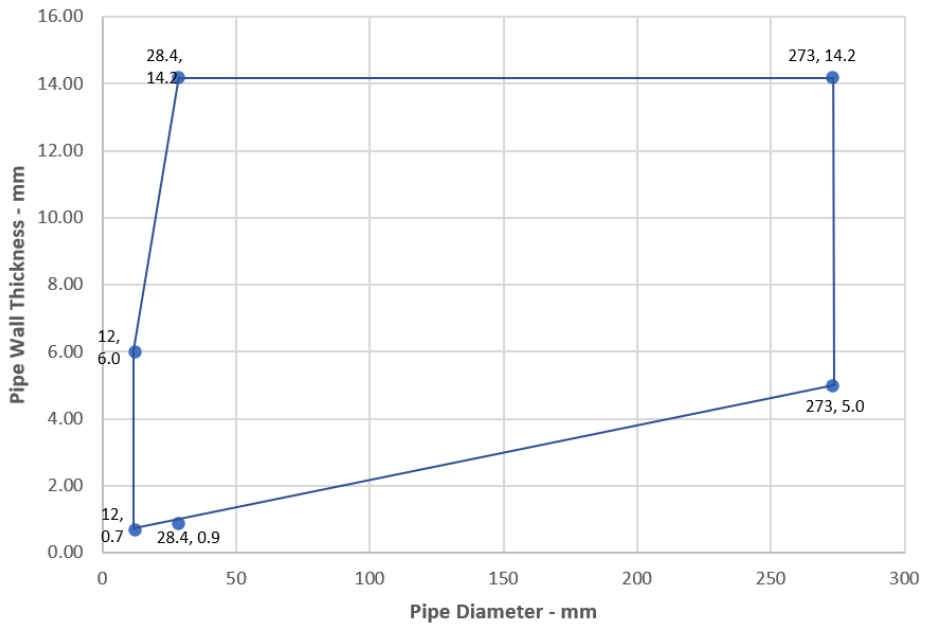
A.6.11.1

Services	Sealant depth	Backing (minimum)	Insulation	Classification
Mild or stainless steel pipe				
40 mm diameter/1-14.2 mm wall	25 mm	20 mm Stone wool 40 kg/m ³	13 -19 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	EI 180 C/U
40 mm diameter/1-14.2 mm wall*	25 mm	25 mm Protecta Mineral Fibre BIO		EI 60 C/U
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*				
12-273 mm diameter/0.7-14.2 mm wall	15 mm	25 mm Stone wool 33 kg/m ³	30-60 mm thick glass or stone, mineral wool min. 75 kg/m ³	EI 60 C/U

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

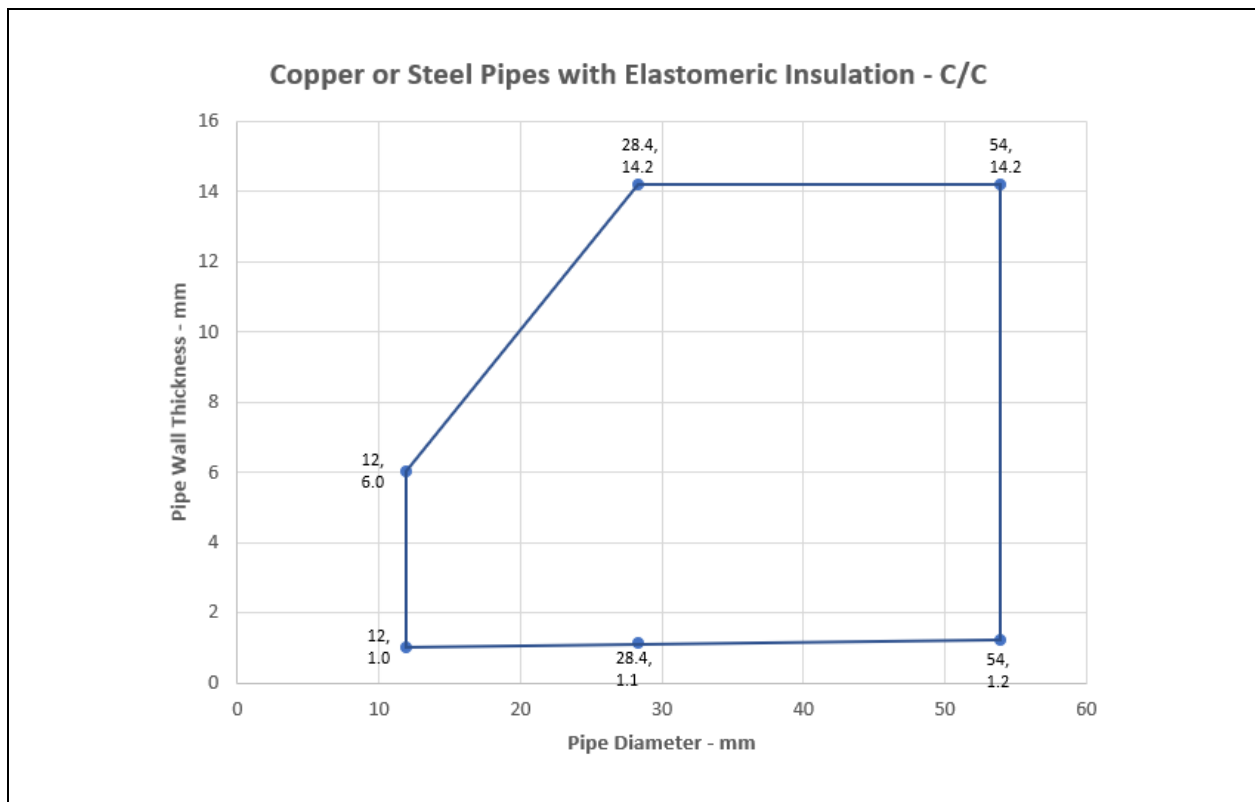


Mild Steel Pipes with 30-60 mm Stone or Glass Wool
Insulation - C/U



Services	Sealant depth	Backing (minimum)	Insulation	Classification
Copper or steel pipe				
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	E 240 C/C, EI 180 C/C
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	E 180 C/C, EI 120 C/C
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	E 90 C/C, EI 60 C/C
12-54 mm diameter/0.7-14.2 mm wall	15 mm	25 mm Stone wool 33 kg/m ³	20-60 mm thick glass or stone, mineral wool min. 75 kg/m ³	EI 120 C/C

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

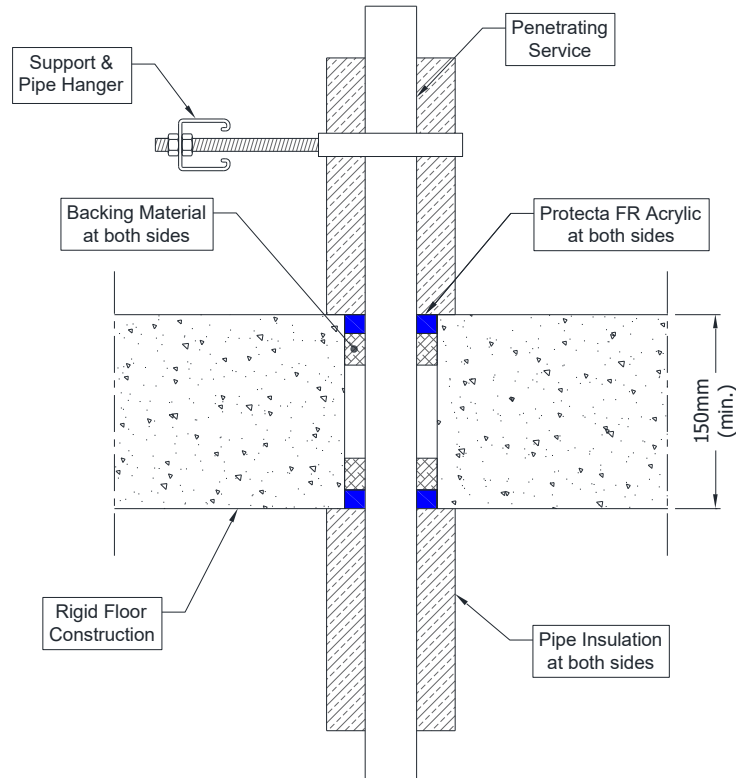


Services	Sealant depth	Backing (minimum)	Insulation	Classification
Alupex Composite Pipe				
16 mm diameter/2.25 mm wall	25 mm	25 mm Protecta Mineral Fibre BIO	9 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	EI 180 C/C
16 mm diameter/2.25 mm wall			9-13 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				
75 mm diameter/4.7 mm wall			13-25 mm Elastomeric insulation minimum class B-s3,d0, phenolic foam insulation or PU foam insulation	EI 60 C/C
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				

A.6.12 Double side penetration seal with metallic pipes

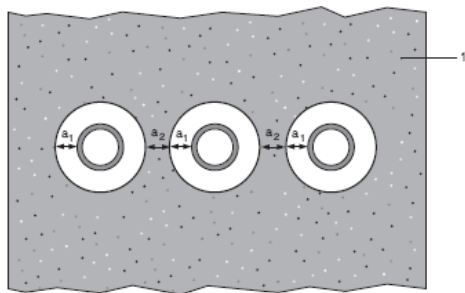
Penetration Seal: 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep Protecta FR Acrylic to both sides of the floor (or at any position between), backed with 20 mm deep minimum 40 kg/m³ stone wool insulation. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2) *.

Construction details:



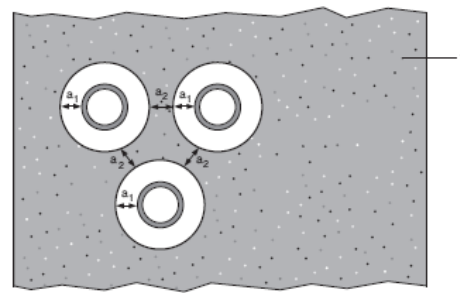
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

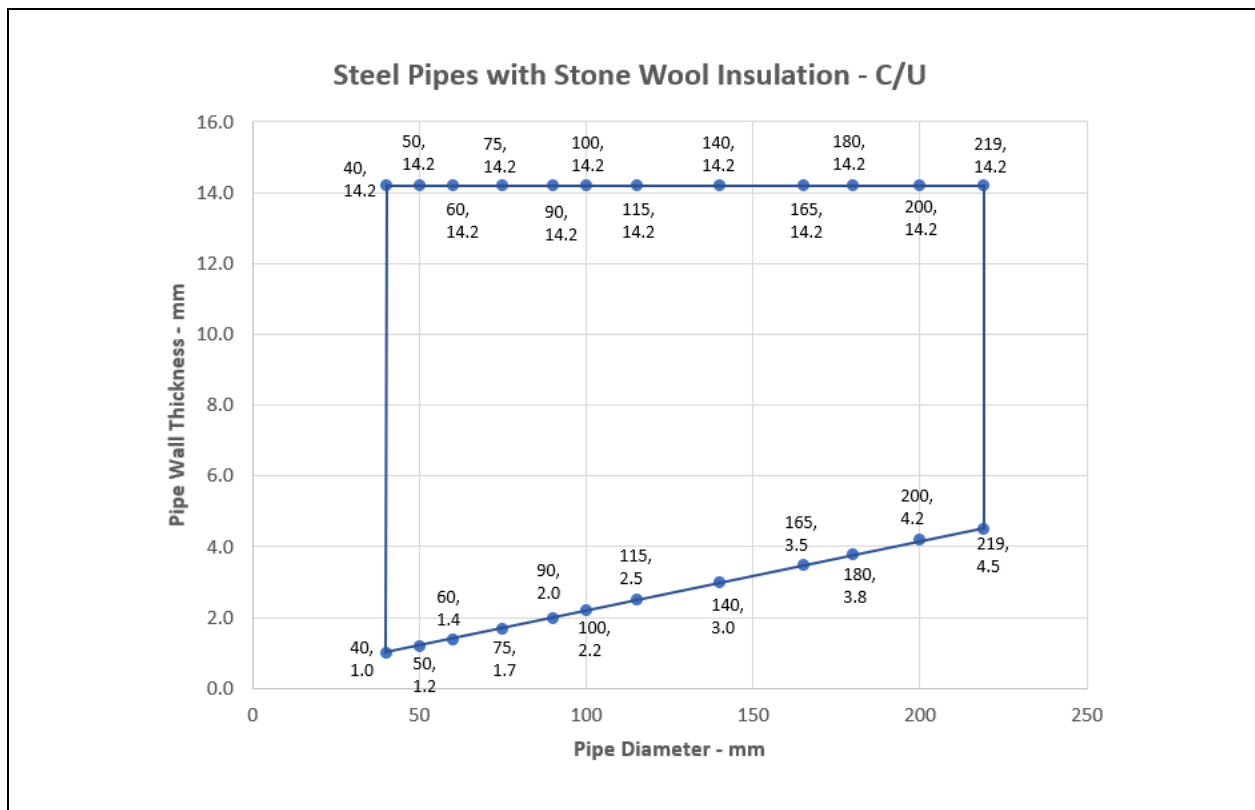
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation
- a3 Pipe / pipe separation

* Minimum separation between penetration seals (a2) = 0 mm up to EI 120, 30 mm (a2) up to EI 240

A.6.12.1

Services	Maximum seal size	Insulation (minimum)	Classification
Mild or stainless steel pipe			
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 ³	EI 240 C/U
40 mm diameter/1-14.2 mm wall*			
50 mm diameter/1.2-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m ³	E 240 C/U, EI 120 C/U
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*			

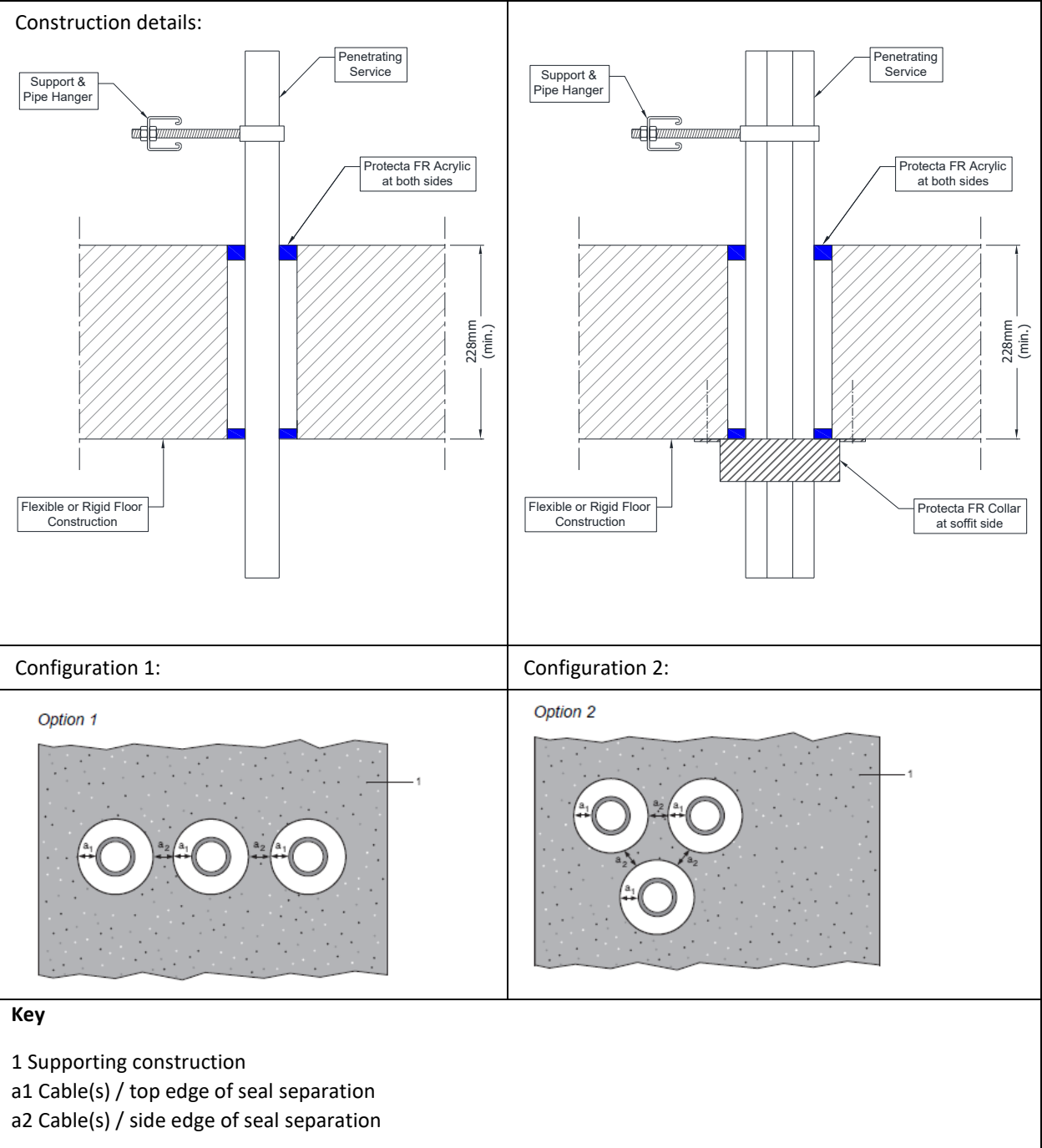
* Typical pipe diameters shown, see below graph for intermediate sizes



A.7 Flexible and rigid floor constructions according to 2.2) with floor thickness of minimum 228 mm.

A.7.1 Double sided penetration seal with cables and conduits

Penetration Seal: Cables or conduits fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

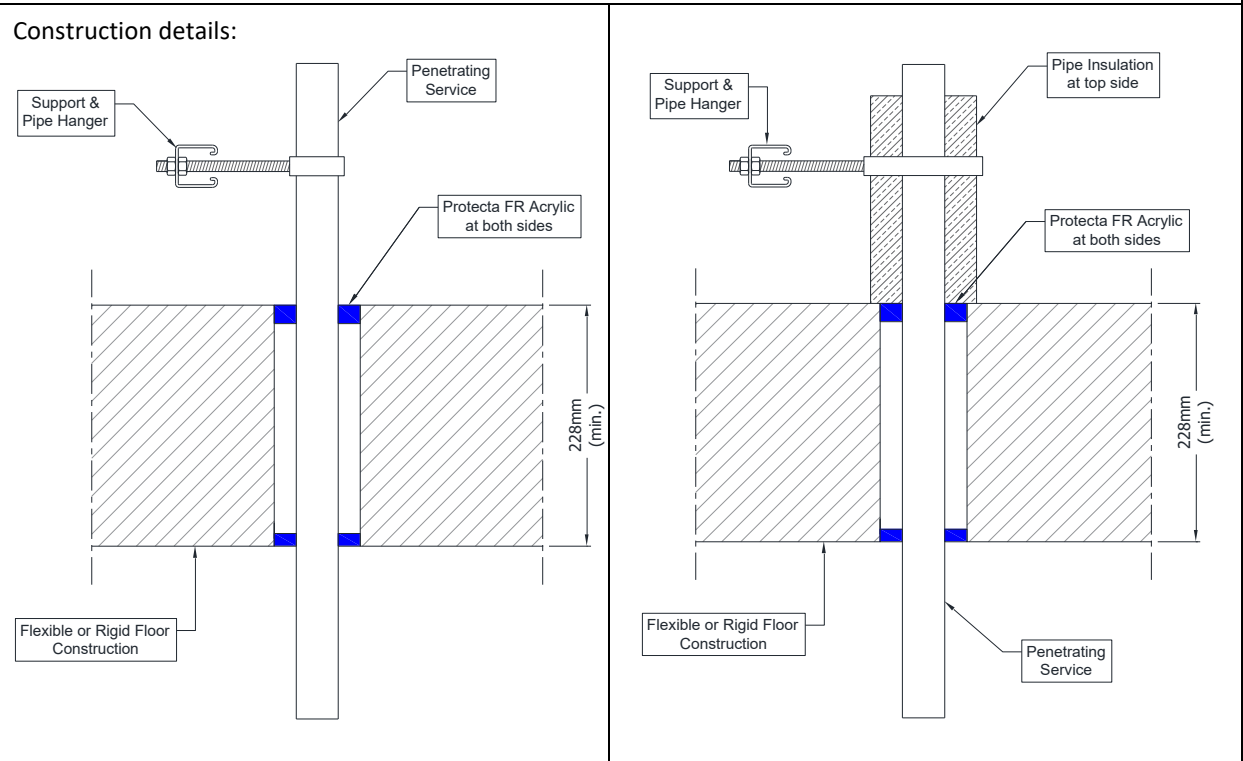


A.7.1.1

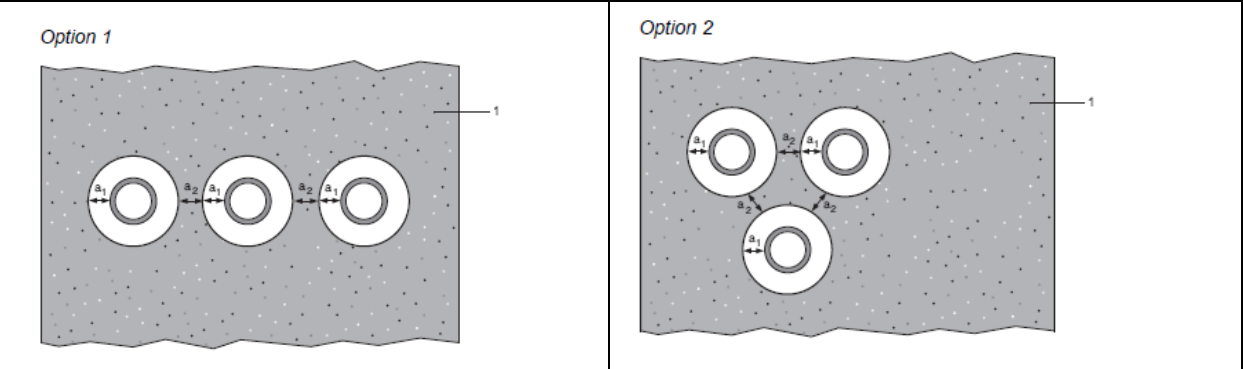
Services	Sealant depth (minimum)	Backing (minimum)	Aperture (maximum)	Classification
Blank seal	18.0 mm at top face and 12.5 mm at soffit face	None required	300 x 300 mm	EI 30
Cables up to 80 mm diameter, single or in a bundle up to 100 mm diameter				EI 30
Single plastic conduit up to 32 mm diameter/ rigid, flexible or pliable, with or without cables				EI 30 U/U
Plastic conduits in a bundle up to 70 mm diameter, with conduits up to 32 mm diameter/ rigid, flexible or pliable, with or without cables			18.0 mm at top face and 12.5 mm at soffit face, and Protecta FR Collar 75/30, with 30 mm high x 4.2 mm thick graphite inlay, fitted at soffit side with 4 No. M5 x 52 mm hollow wall anchors and washers	340 mm Ø

A.7.2 Double side penetration seal with pipes

Penetration Seal: Non-insulated or interrupted insulated pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).



Configuration 1: Configuration 2:



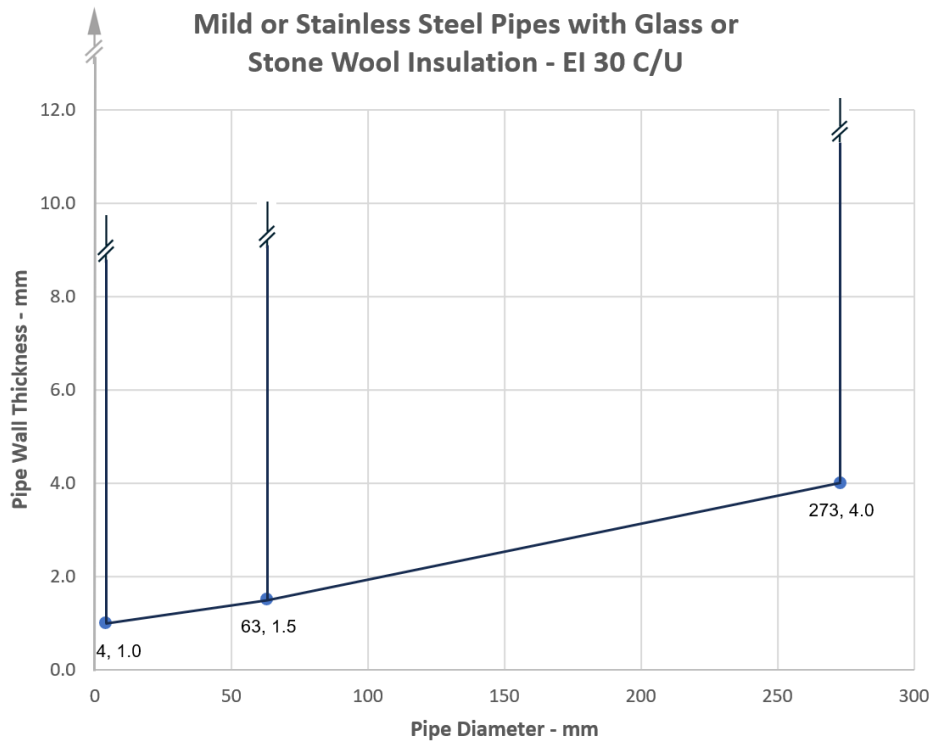
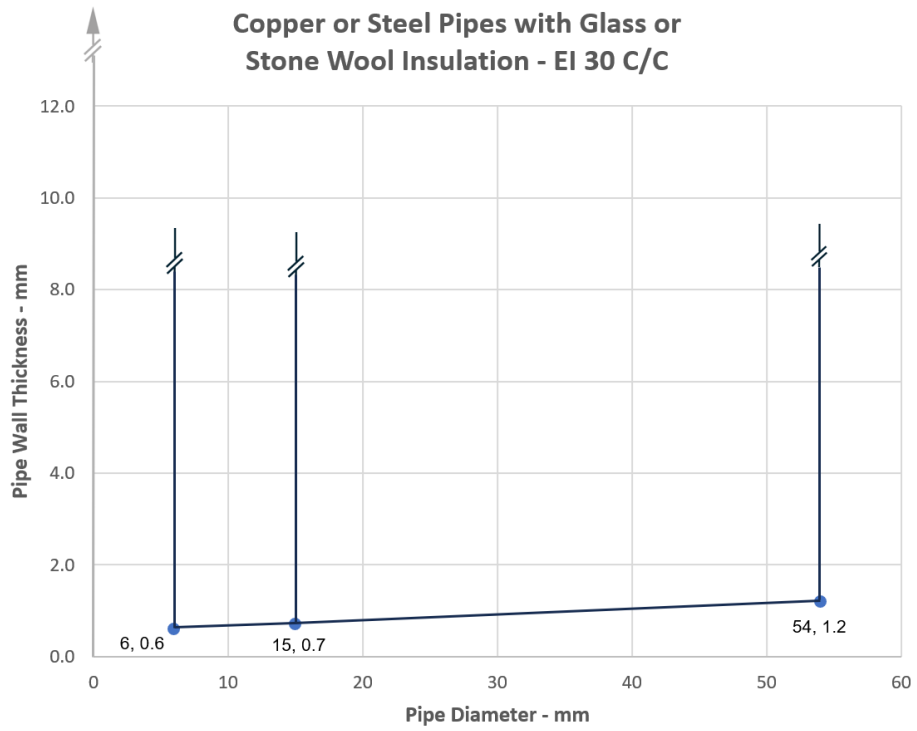
Key

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

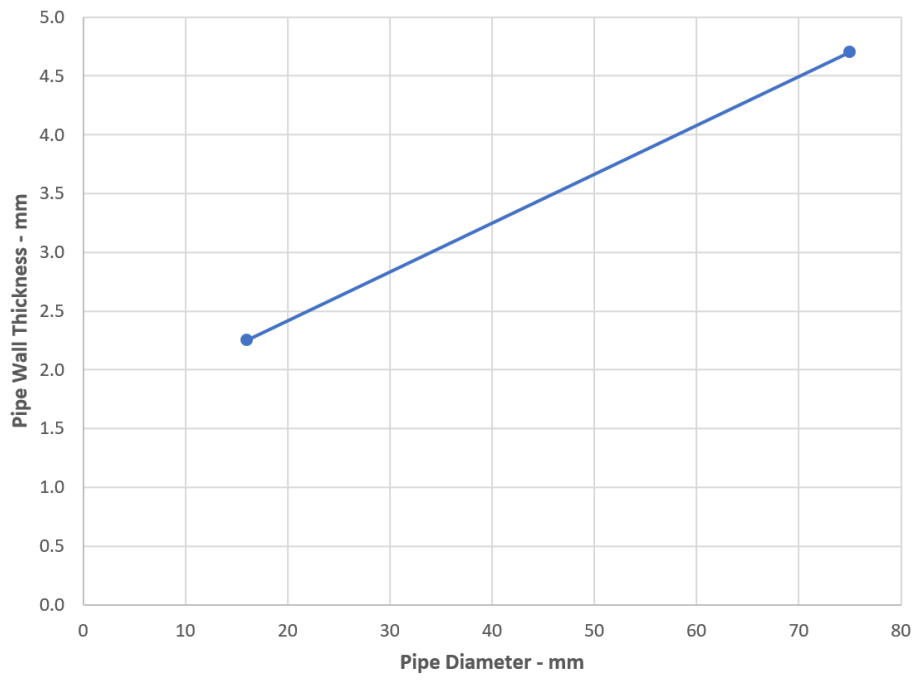
A.7.2.1

Services	Max. Seal Size	Insulation (minimum)	Sealant depth and backing (minimum)	Classification
Copper or steel pipe				
≤15 mm diameter/ ≥0.6 mm wall*	300 x 300 mm	None required	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 C/C
≤54 mm diameter/ ≥0.6 mm wall*		20 mm Glass or Stone wool 75 kg/m ³ , 500 mm length from top side of the seal		EI 30 C/C
Mild or stainless steel pipe				
≤63 mm diameter/ ≥1.0 mm wall*	300 x 300 mm	None required	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 C/U
≤273 mm diameter/ ≥1.0 mm wall		30 mm Glass or Stone wool 75 kg/m ³ , 500 mm length from top side of the seal		EI 30 C/U
Alupex pipe (PE/AL/PE) (tested pipes were Geberit Mepla)				
Up to 75 mm diameter/ 2.25-4.7 mm wall*	300 x 300 mm	None required	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 C/C
PEX pipe with an inner and outer layer of polyethylene (tested pipe is LK PE-X Universal Pipe PiP)				
25 mm diameter outer /16 mm diameter x 2.0 mm wall inner	300 x 300 mm	None	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 C/C
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1				
Maximum 40 mm diameter/ 1.0-3.0 mm wall*	300 x 300 mm	None	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 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				
Maximum 40 mm diameter/ 1.8-3.7 mm wall	300 x 300 mm	None	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078				
Maximum 40 mm diameter/ 1.8-3.7 mm wall*	300 x 300 mm	None	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 U/C

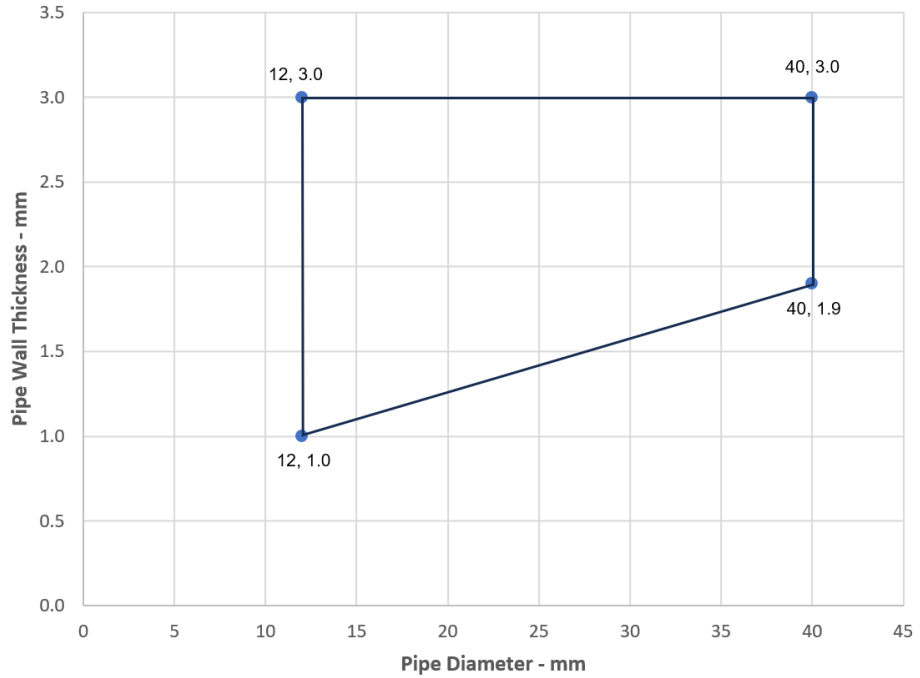
* Typical pipe diameters shown, see below graph for intermediate sizes



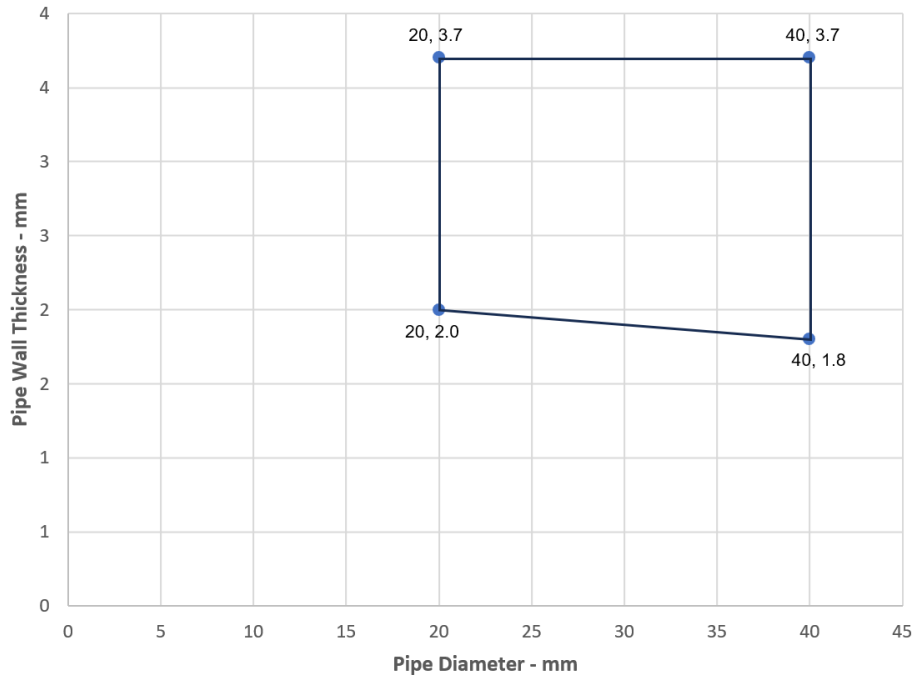
Alupex Pipes - EI 30 C/C



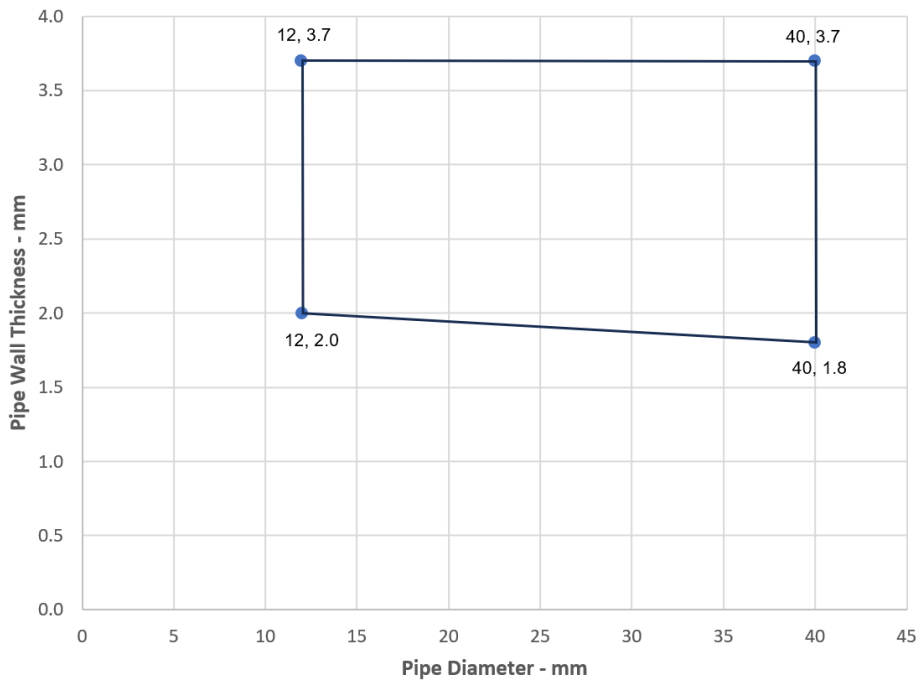
PVC-U Pipes - EI 30 U/C



PE Pipes - EI 30 U/C



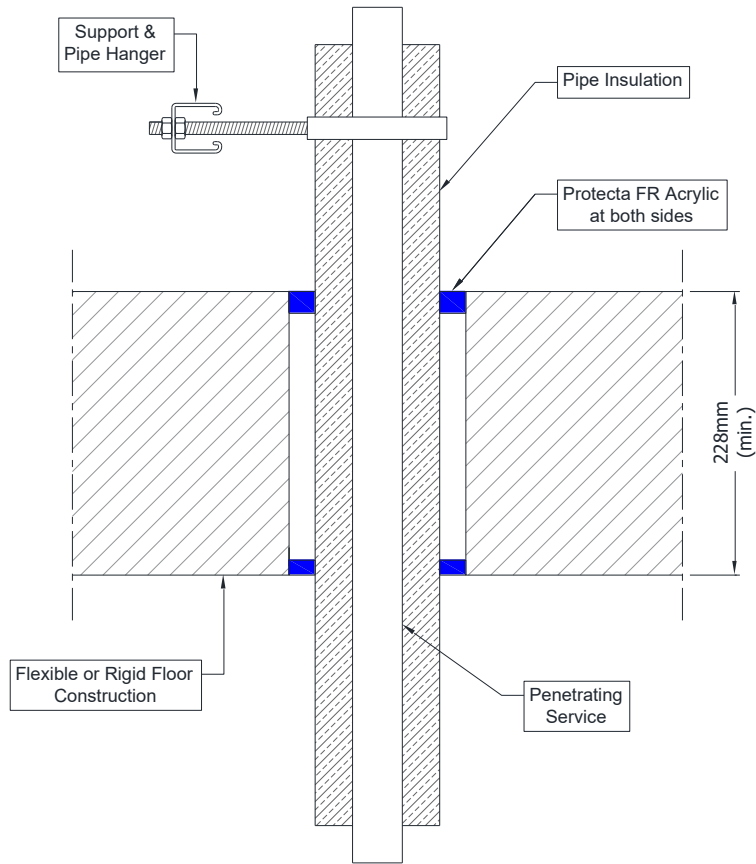
PP Pipes - EI 30 U/C



A.7.3 Double side penetration seal with pipes

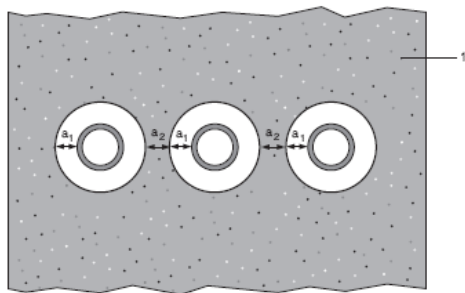
Penetration Seal: Continuous sustained insulated pipes fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



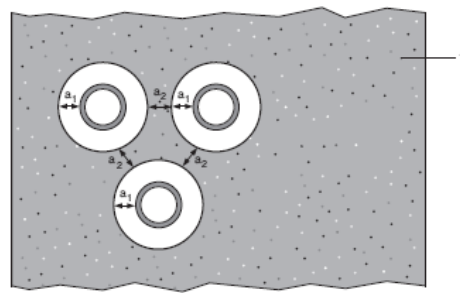
Configuration 1:

Option 1



Configuration 2:

Option 2

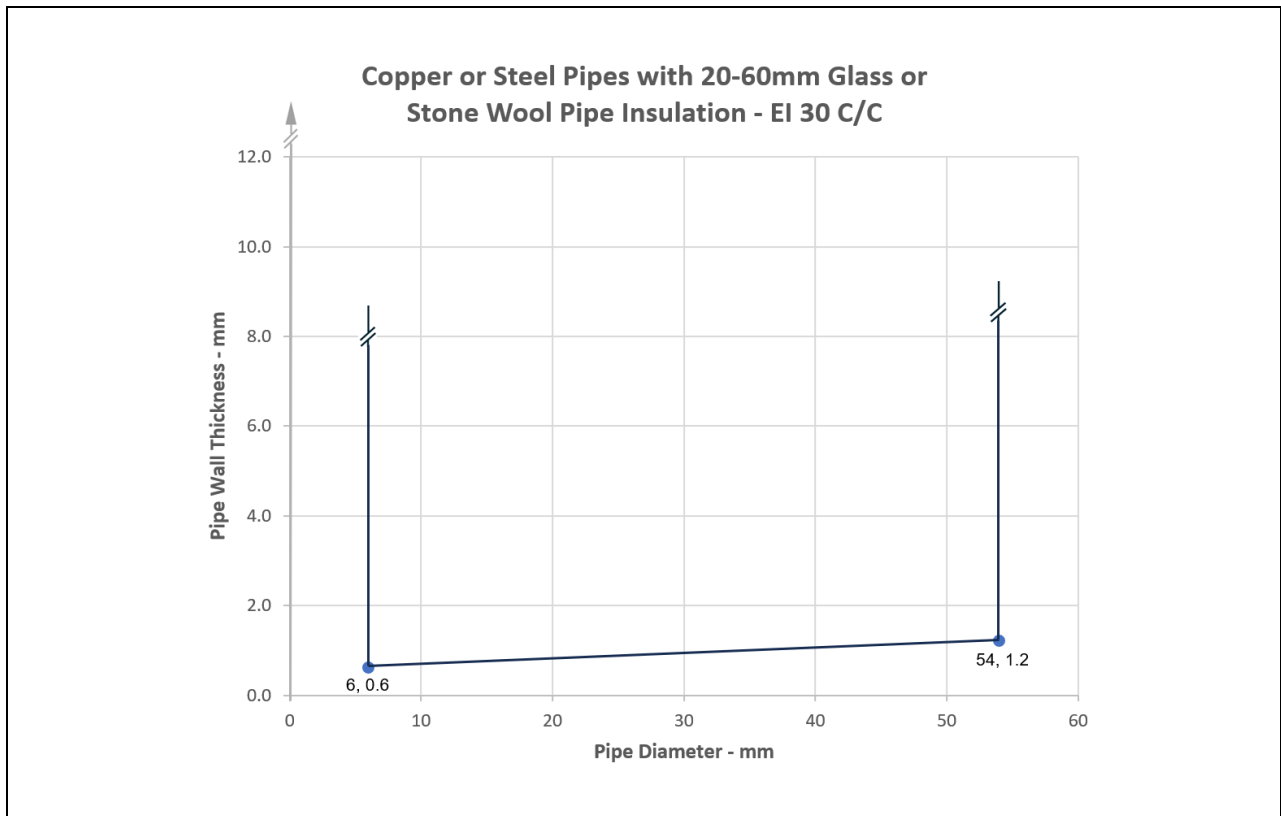


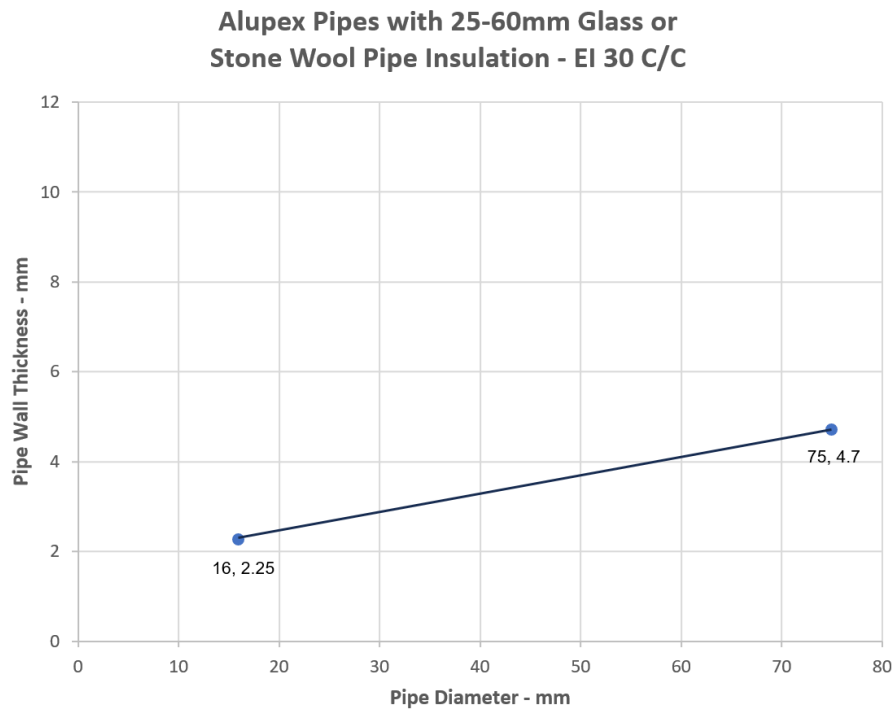
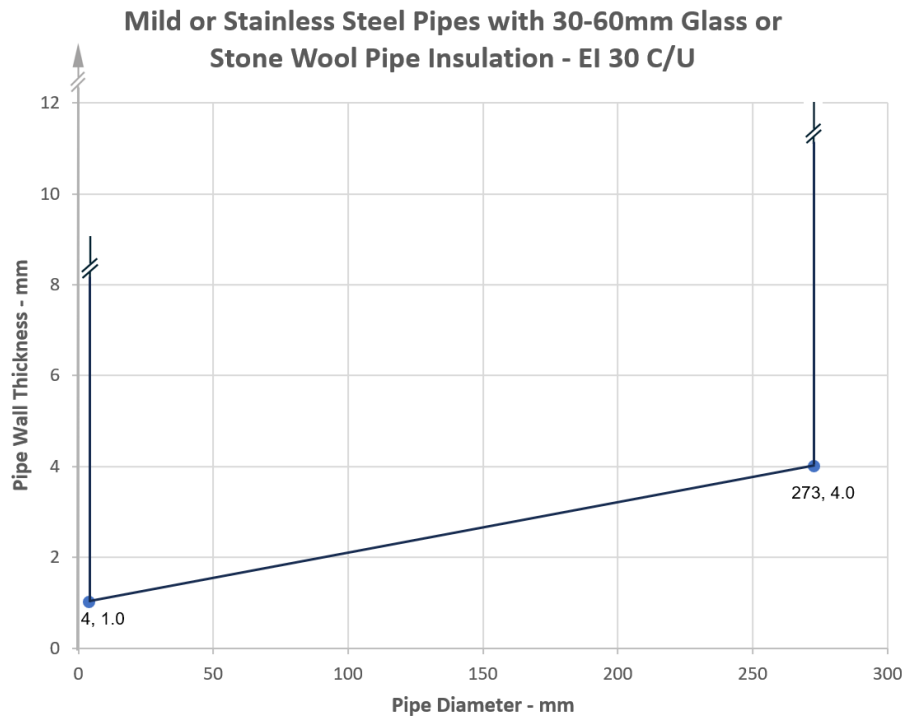
Key

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

A.7.3.1

Services	Max. Seal Size	Insulation	Sealant Depth and Backing (minimum)	Classification
Copper or steel pipe				
≤54 mm diameter/ ≥0.6 mm wall*	300 x 300 mm	20-60 mm Glass or Stone wool 75 kg/m ³	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 C/C
Mild or stainless steel pipe				
≤273 mm diameter/ ≥1.0 mm wall*	300 x 300 mm/ 413 mm Ø	30-60 mm Glass or Stone wool 75 kg/m ³	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 C/U
Alupex pipe (PE/AL/PE) (tested pipes were Geberit Mepla)				
Up to 75 mm diameter/ 2.25-4.7 mm wall	300 x 300 mm	25-60 mm Glass or Stone wool 75 kg/m ³	18.0 mm at top face and 12.5 mm at soffit face, no backing required	EI 30 C/C

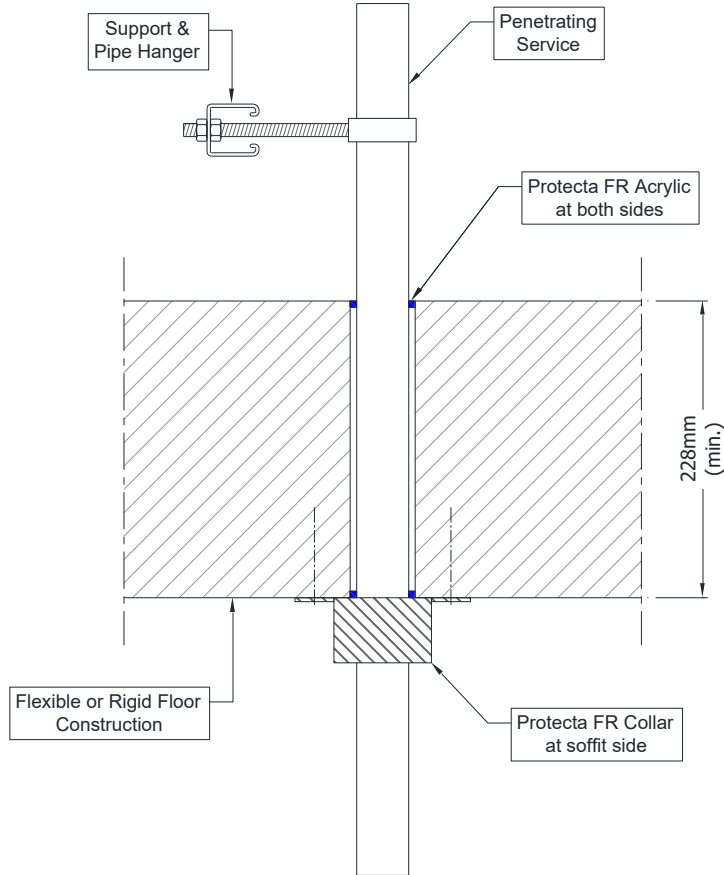




A.7.4 Double side penetration seal with pipes

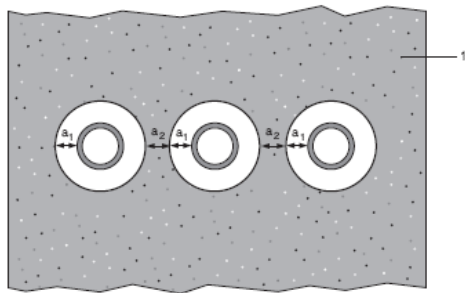
Penetration Seal: Pipes fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, and with Protecta FR Collar to the soffit face. Minimum annular space 5 mm (a1) and minimum separation between penetration seals 30 mm (a2).

Construction details:



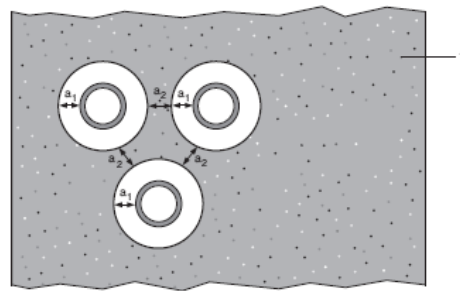
Configuration 1:

Option 1



Configuration 2:

Option 2



Key

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

A.7.4.1

Services	Max. Aperture	FR Collar (min. height and max. diameter) *	Sealant Depth and Backing (minimum)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1				
Maximum 50 mm diameter/ 2.4 mm wall*	5.0 mm wide annular gap **	30 mm/50 mm Ø, with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 30 U/U
Maximum 110 mm diameter/ 3.2-6.6 mm wall*		30 mm/110 mm Ø, with 30 x 6 mm inlay		EI 30 U/U
Maximum 160 mm diameter/ 3.2-9.5 mm wall*		60 mm/160 mm Ø, with 60 x 15 mm inlay		EI 30 U/C
Maximum 32 mm diameter/ 1.0-4.0 mm wall, in pipe bundles up to 110 mm Ø ¹⁾		30 mm/110 mm Ø, with 30 x 6 mm inlay		EI 30 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				
Maximum 50 mm diameter/ 3.0-4.6 mm wall*	5.0 mm wide annular gap **	30 mm/50 mm Ø, with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 30 U/U
Maximum 110 mm diameter/ 3.4-10.0 mm wall*		30 mm/110 mm Ø, with 30 x 6 mm inlay		EI 30 U/C
Maximum 110 mm diameter/ 3.4-10.0 mm wall		50 mm/110 mm Ø, with 50 x 6 mm inlay		EI 30 U/U
Maximum 160 mm diameter/ 4.9-14.6 mm wall*		60 mm/160 mm Ø, with 60 x 15 mm inlay		EI 30 U/C
Maximum 32 mm diameter/ 2.0-3.0 mm wall, in pipe bundles up to 110 mm Ø ¹⁾		30 mm/110 mm Ø, with 30 x 6 mm inlay		EI 30 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078				
Maximum 50 mm diameter/ 1.8-4.6 mm wall*	5.0 mm wide annular gap **	30 mm/50 mm Ø, with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 30 U/U
Maximum 110 mm diameter/ 4.2-6.3 mm wall*		30 mm/110 mm Ø, with 30 x 6 mm inlay		EI 30 U/C
Maximum 110 mm diameter/ 6.3 mm wall*		50 mm/110 mm Ø, with 50 x 6 mm inlay		EI 30 U/U
Maximum 160 mm diameter/ 4.9-14.6 mm wall*		60 mm/160 mm Ø, with 60 x 15 mm inlay		EI 30 U/C
Maximum 32 mm diameter/ 1.9-4.4 mm wall, in pipe bundles up to 110 mm Ø ¹⁾		30 mm/110 mm Ø, with 30 x 6 mm inlay		EI 30 U/C
PEX pipe with an inner layer of polyethylene (tested pipe is MULTIPEX PIPE ROTH PiP) PEX pipe-in-pipe				
Maximum 32 mm diameter/ 4.4 mm wall inner, 44 mm diameter outer*	5.0 mm wide annular gap **	30 mm/50 mm Ø, with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 30 C/C
PEX pipe with an inner and outer layer of polyethylene (tested pipe is Uponor Combi 25 x 3 PE-X)				
15 mm diameter/ 2.5 mm wall inner, 25 mm diameter outer, in pipe bundles up to 50 mm Ø	5.0 mm wide annular gap **	30 mm/50 mm Ø, with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 30 C/C

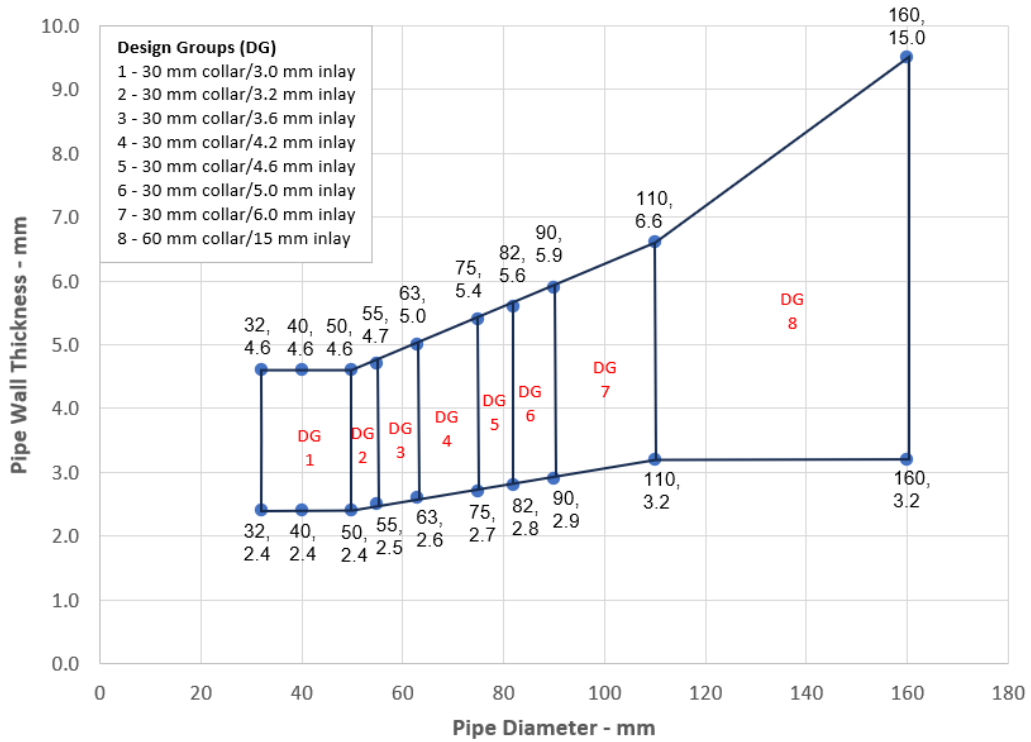
* Typical pipe diameters shown, see below graph for intermediate sizes

** If the annular gap is above 5 mm, an oversized collar may be used with maximum size of 160 mm, subject to an

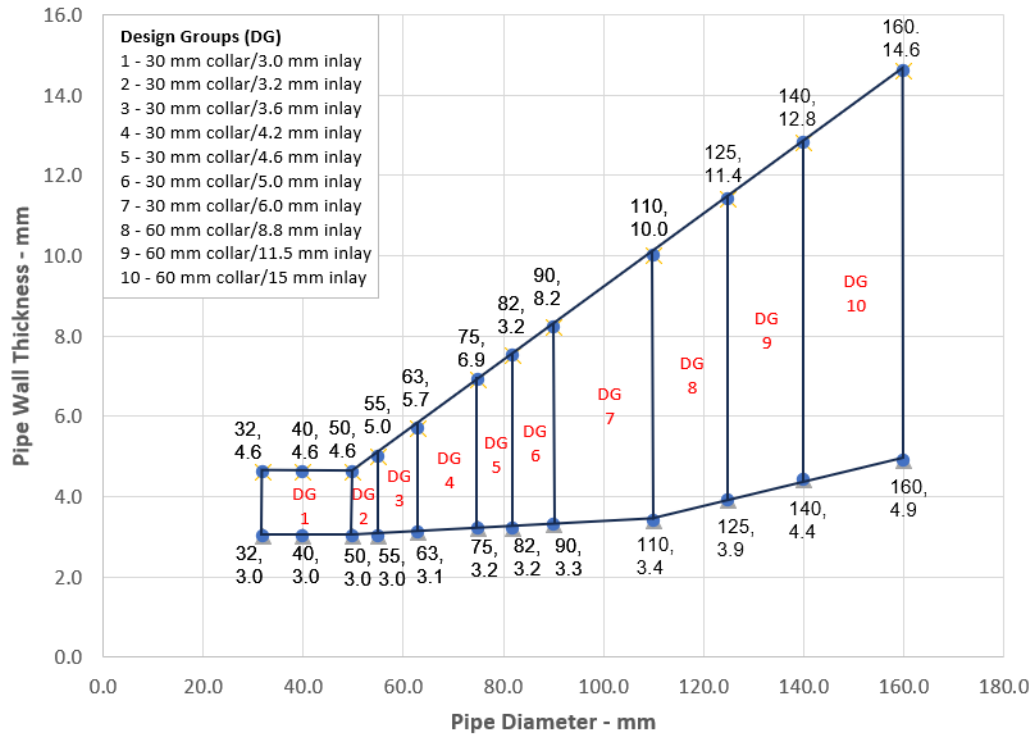
increase in sealant depth to minimum 18.0 mm at top face and 12.5 mm at soffit face.

¹⁾ PVC, PE and PP pipes can be mixed in the same bundle.

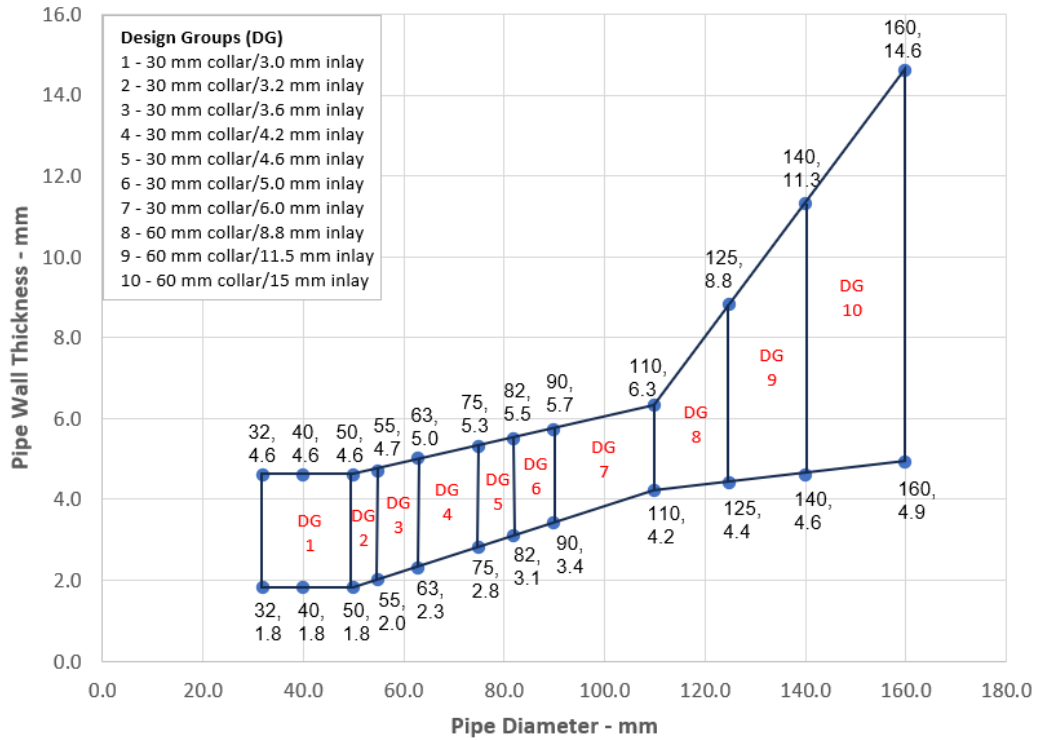
PVC-U Pipes / 30-60 mm Collar - EI 30 U/C



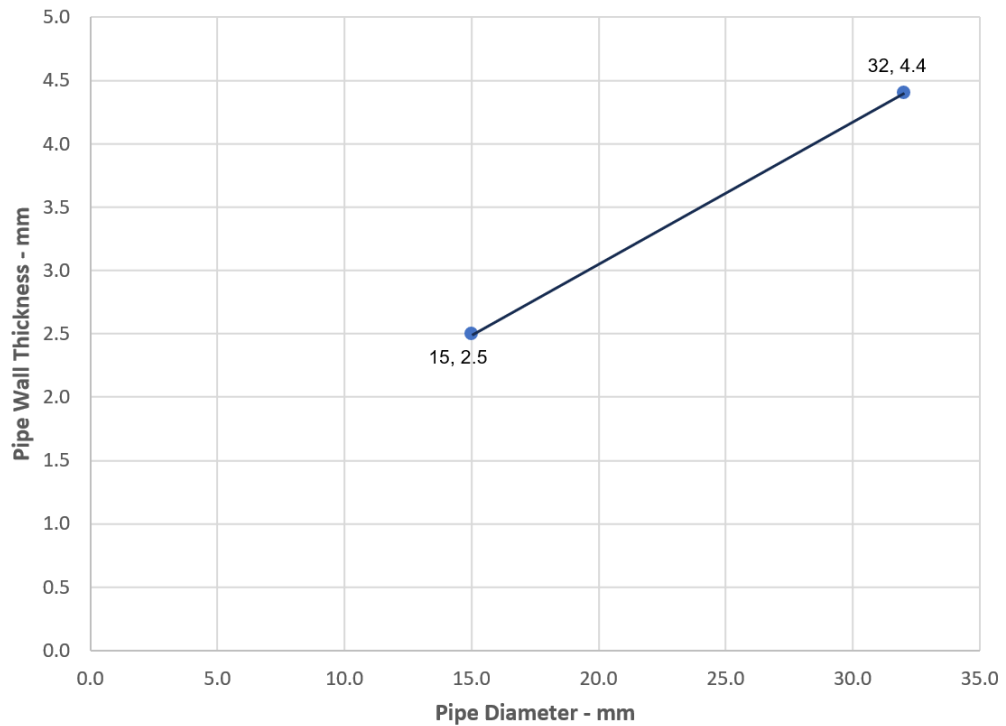
PE Pipes / 30-60 mm Collar - EI 30 U/C



PP Pipes / 30-60 mm Collar - EI 30 U/C



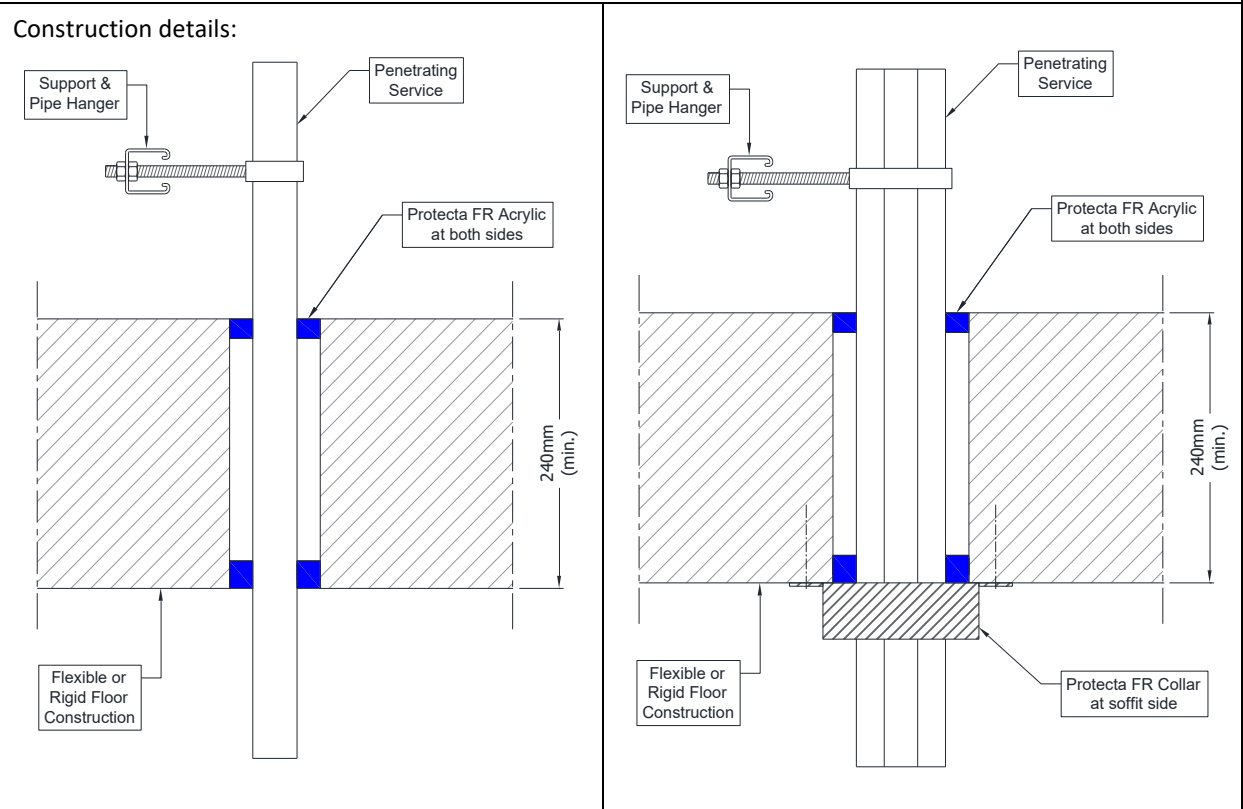
PEX Pipes (Inner Wall Diameters) - EI 30 C/C



A.7.5 Flexible and rigid floor constructions according to 2. 2) with floor thickness of minimum 240 mm

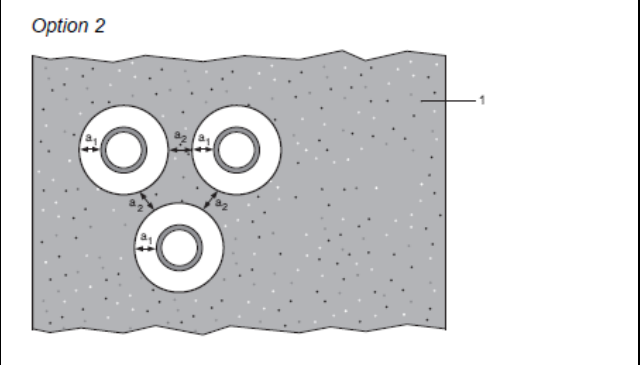
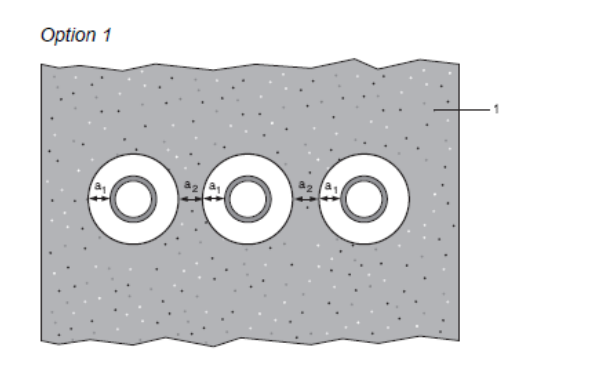
A.7.5.1 Double sided penetration seal with cables and conduits

Penetration Seal: Cables or conduits fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).



Configuration 1:

Configuration 2:



Key

1 Supporting construction
a1 Cable(s) / top edge of seal separation
a2 Cable(s) / side edge of seal separation

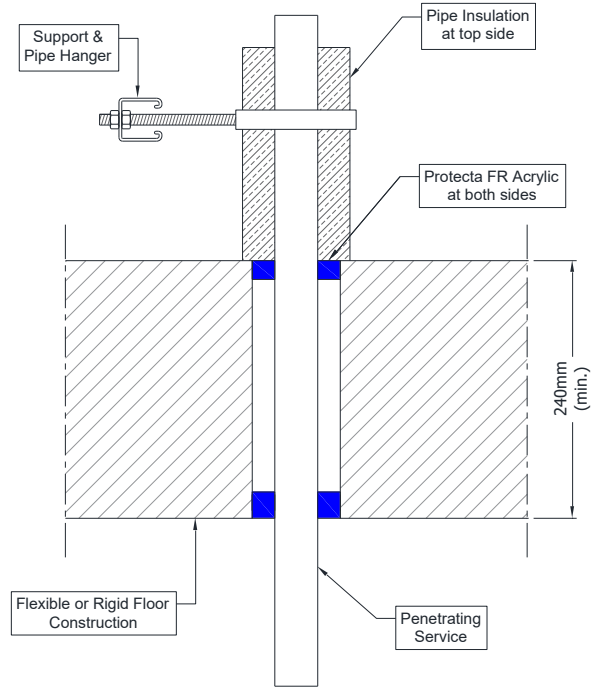
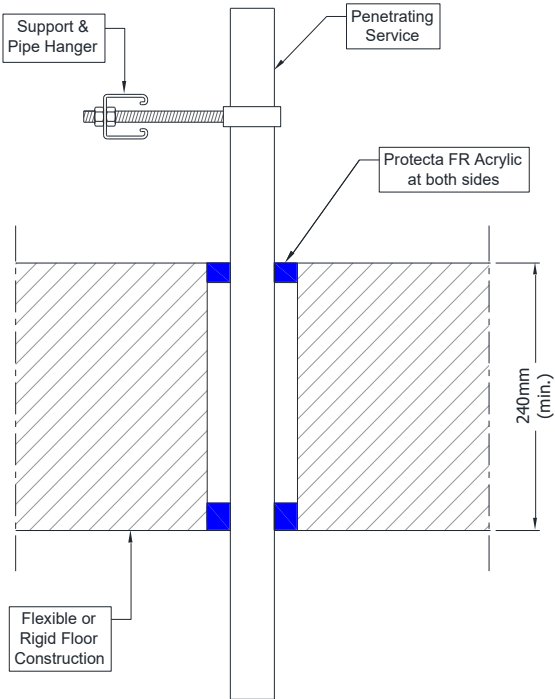
A.7.5.1.1

Services	Sealant depth (minimum)	Backing (minimum)	Aperture (maximum)	Classification
Blank seal	18.0 mm at top face and 25.0 mm at soffit face	None required	150 x 150 mm	EI 60
Cables up to 80 mm diameter, single or in a bundle up to 100 mm diameter				EI 60
Single plastic conduit up to 32 mm diameter, rigid, flexible or pliable, with or without cables				EI 60 U/U
Plastic conduits up to 32 mm diameter, rigid, flexible or pliable, with or without cables, in a bundle up to 70 mm diameter			18.0 mm at top face and 25.0 mm at soffit face, and Protecta FR Collar 30 mm/110 mm Ø, with 30 x 6 mm inlay fitted at soffit side with hollow wall anchors and washers	170 mm Ø

A.7.6 Double side penetration seal with pipes

Penetration Seal: Non-insulated or interrupted insulated pipes (single) fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

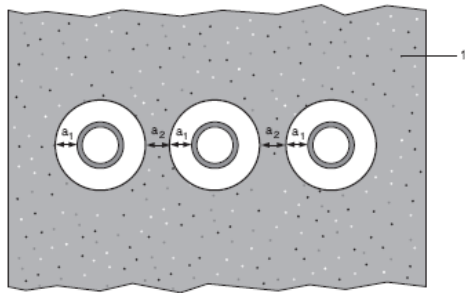
Construction details:



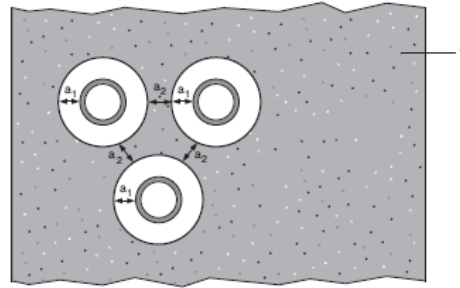
Configuration 1:

Configuration 2:

Option 1



Option 2



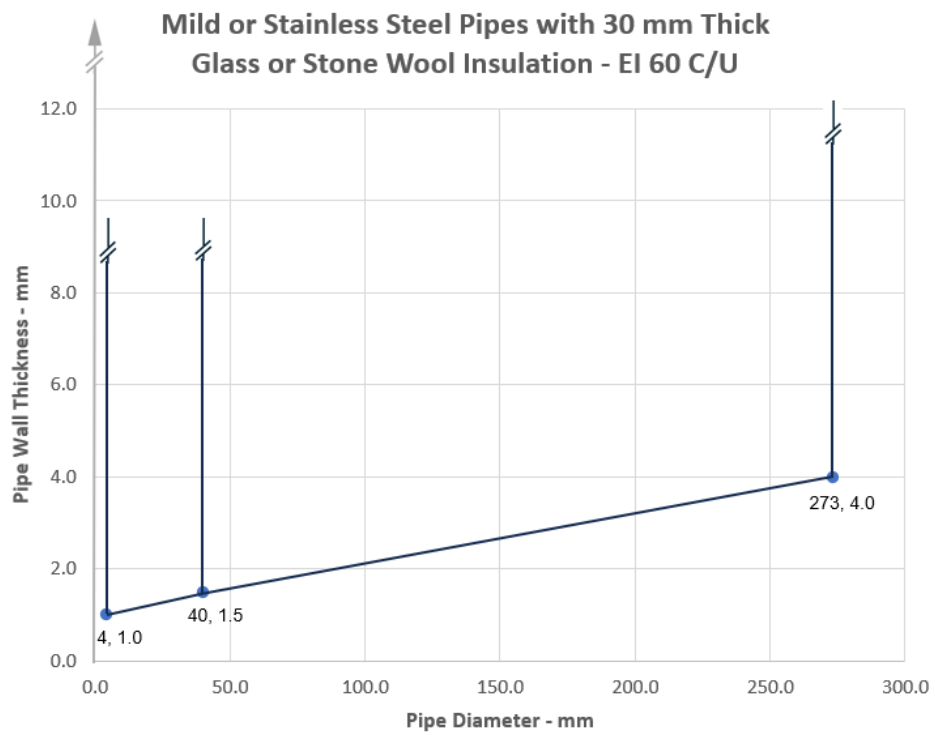
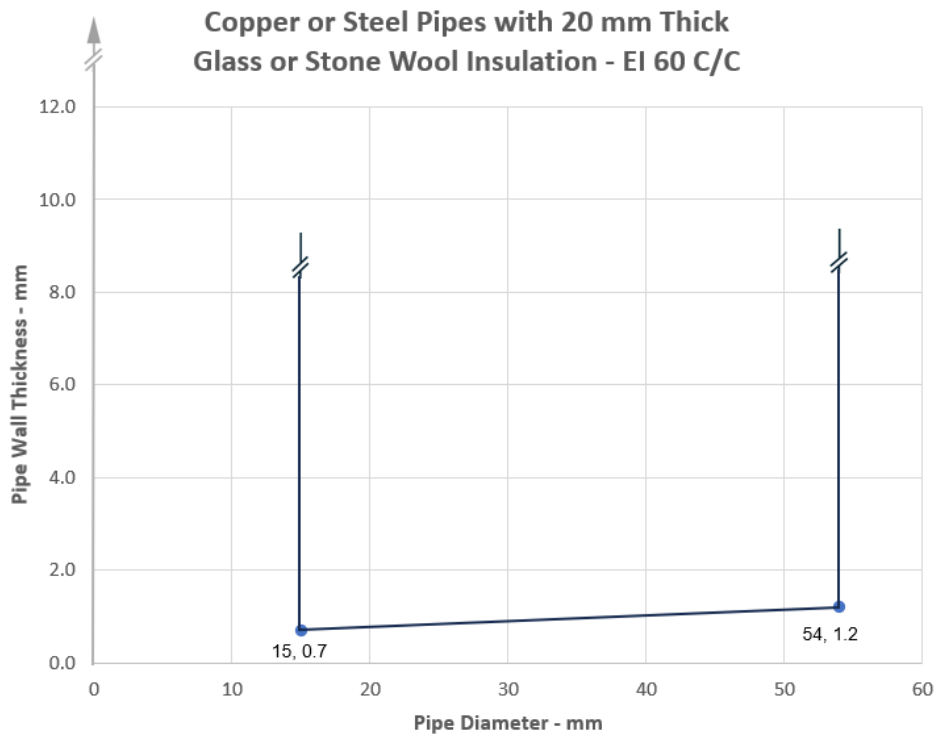
Key

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

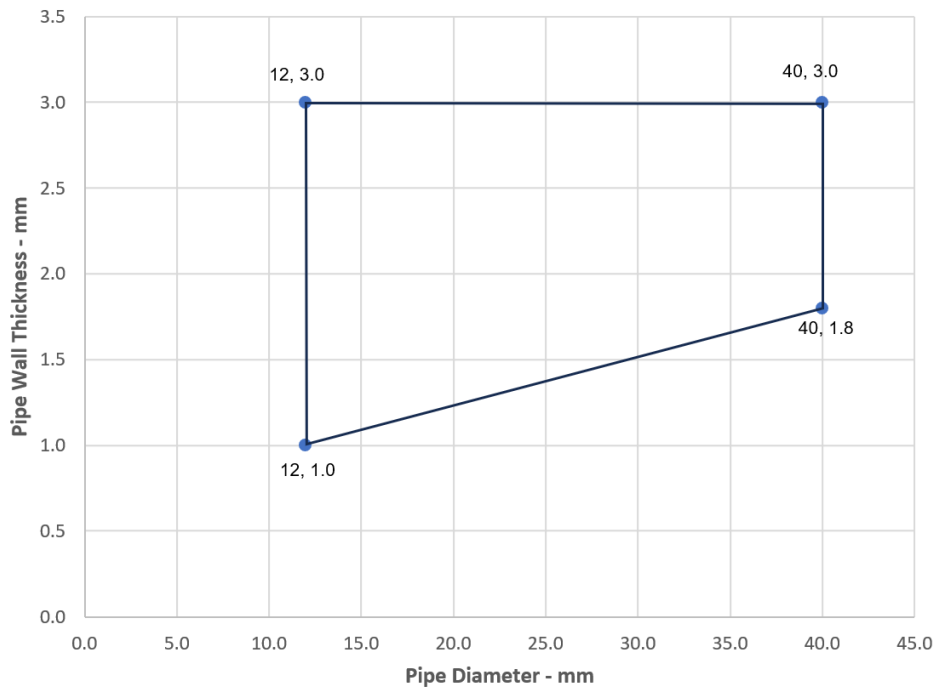
A.7.6.1

Services	Max. Seal Size	Insulation (minimum)	Sealant depth and backing (minimum)	Classification
Copper or steel pipe				
≤ 15 mm diameter/ ≥0.7 mm wall	150 x 150 mm	None required	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 C/C
≤ 54 mm diameter/ ≥0.7 mm wall*		20 mm Glass or Stone wool 75 kg/m ³ , 500 mm length from top side of the seal		EI 60 C/C
Mild or stainless steel pipe				
≤ 40 mm diameter/ ≥1.0 mm wall	150 x 150 mm/ 293 mm Ø	None required	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 C/U
≤ 273 mm diameter/ ≥1.0 mm wall*		30 mm Glass or Stone wool 75 kg/m ³ , 500 mm length from top side of the seal		EI 60 C/U
Alupex pipe (PE/AL/PE) (tested pipes were Geberit Mepla MLC)				
16-32 mm diameter/ 2.25-2.5 mm wall	150 x 150 mm	None required	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 C/C
16-75 mm diameter/ 2.25-4.7 mm wall		20 mm Glass or Stone wool 75 kg/m ³ , 500 mm length from top side of the seal		EI 60 C/C
PEX pipe with an inner layer of polyethylene (tested pipe is LK PE- Universal Pipe PiP)				
16 mm diameter/ 2.0 mm wall inner, 25mm diameter outer	150 x 150 mm	None	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 C/C
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1				
Maximum 40 mm diameter/ 1.0-3.0 mm wall*	150 x 150 mm	None	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 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				
Maximum 40 mm diameter/ 2.0-3.7 mm wall*	150 x 150 mm	None	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078				
Maximum 32 mm diameter/ 1.8-4.4 mm wall*	150 x 150 mm	None	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 U/C

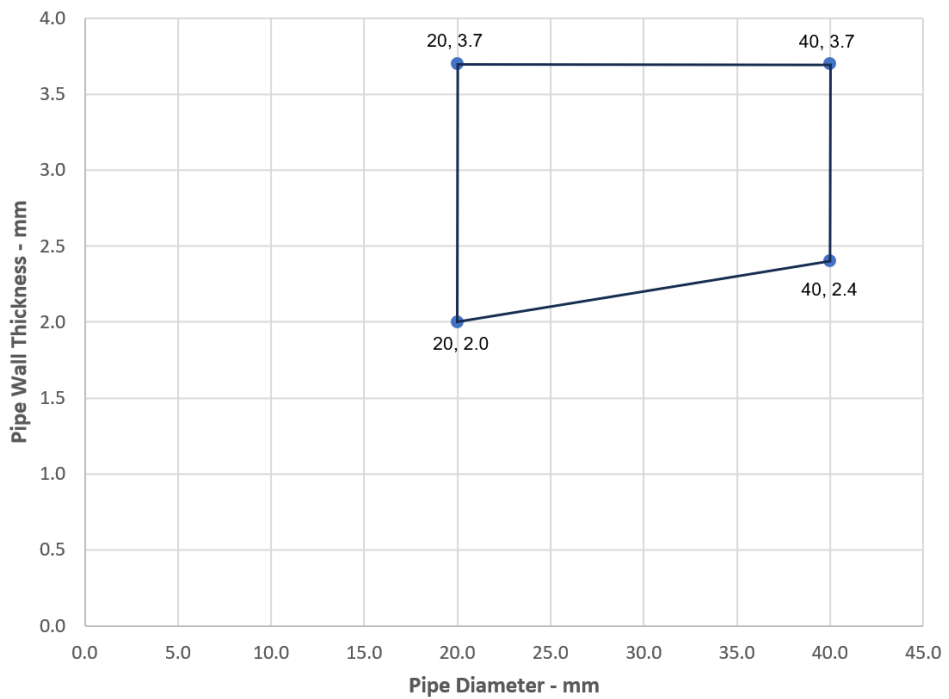
* Typical pipe diameters shown, see below graph for intermediate sizes



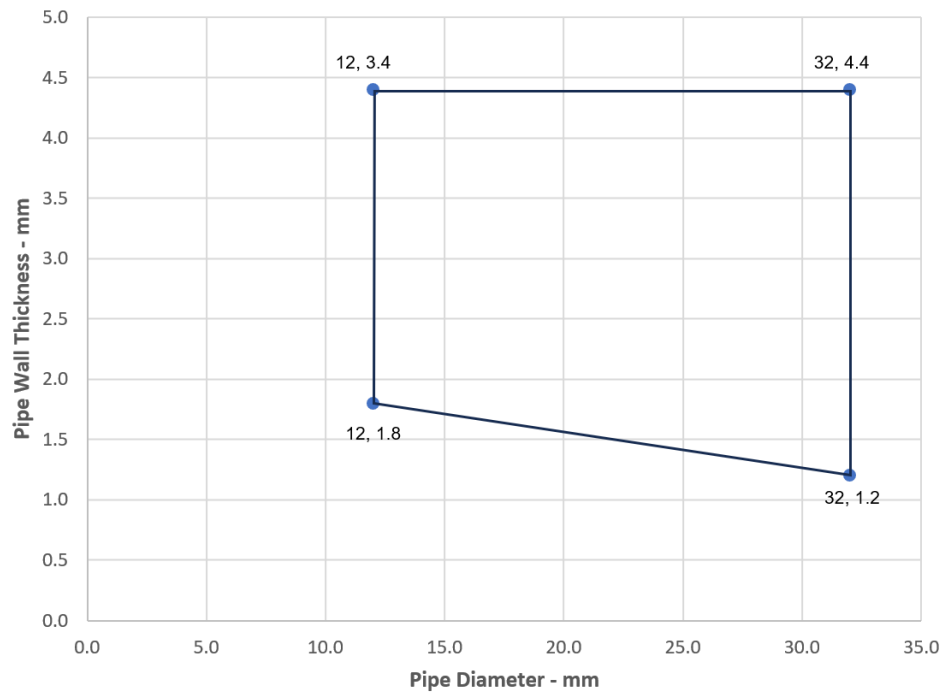
PVC-U Pipes - EI 60 U/C



PE Pipes - EI 60 U/C



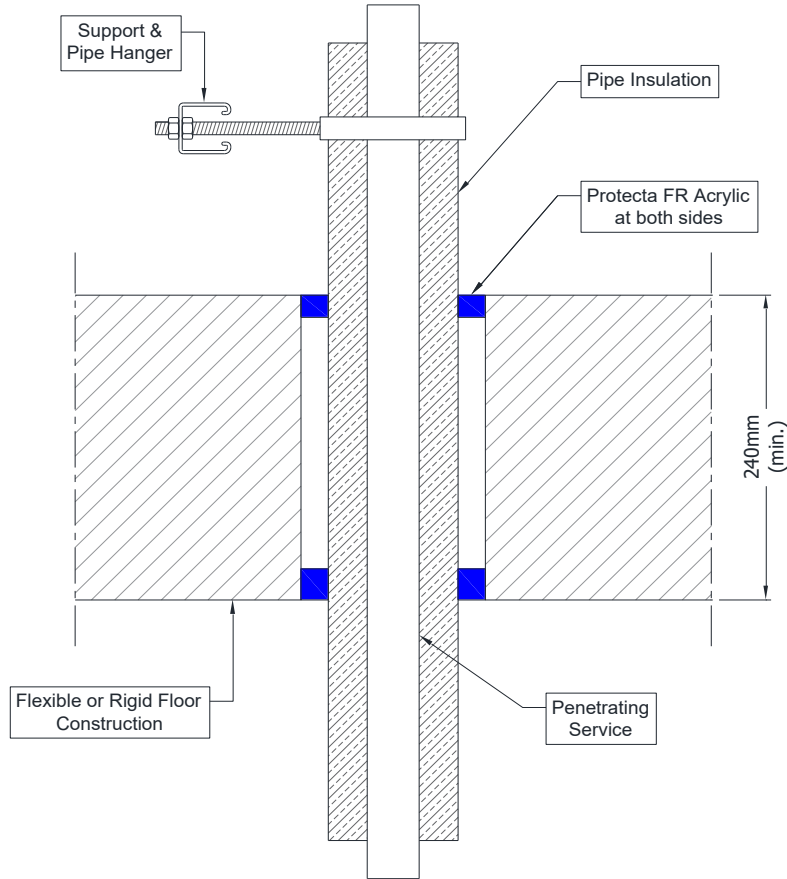
PP Pipes - EI 60 U/C



A.7.7 Double side penetration seal with pipes

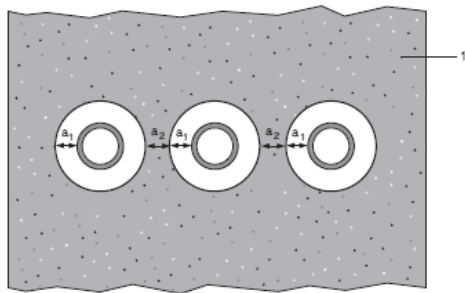
Penetration Seal: Continuous sustained insulated pipes fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



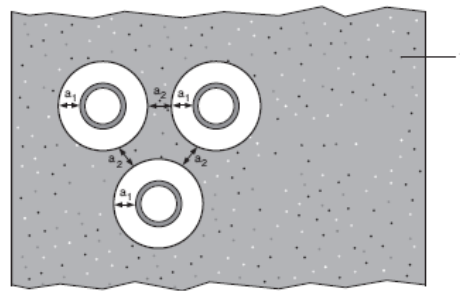
Configuration 1:

Option 1



Configuration 2:

Option 2



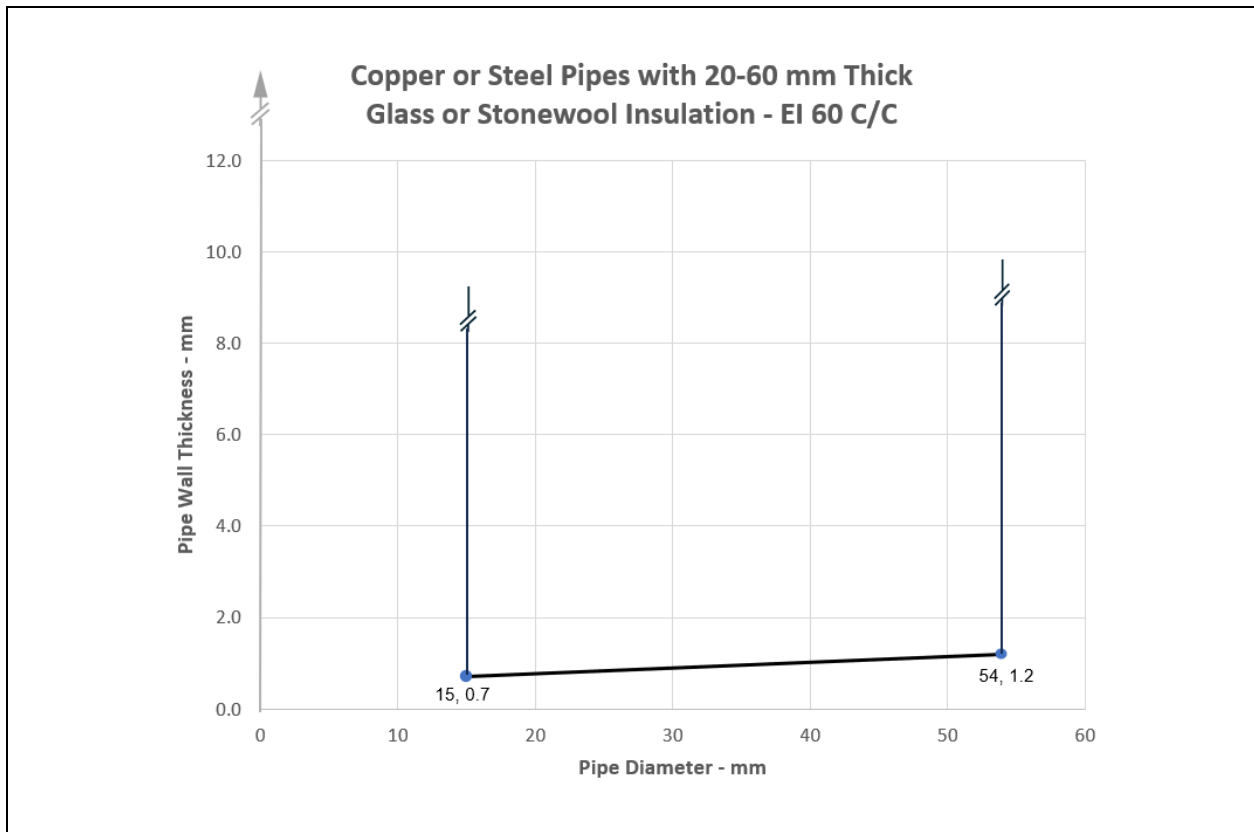
Key

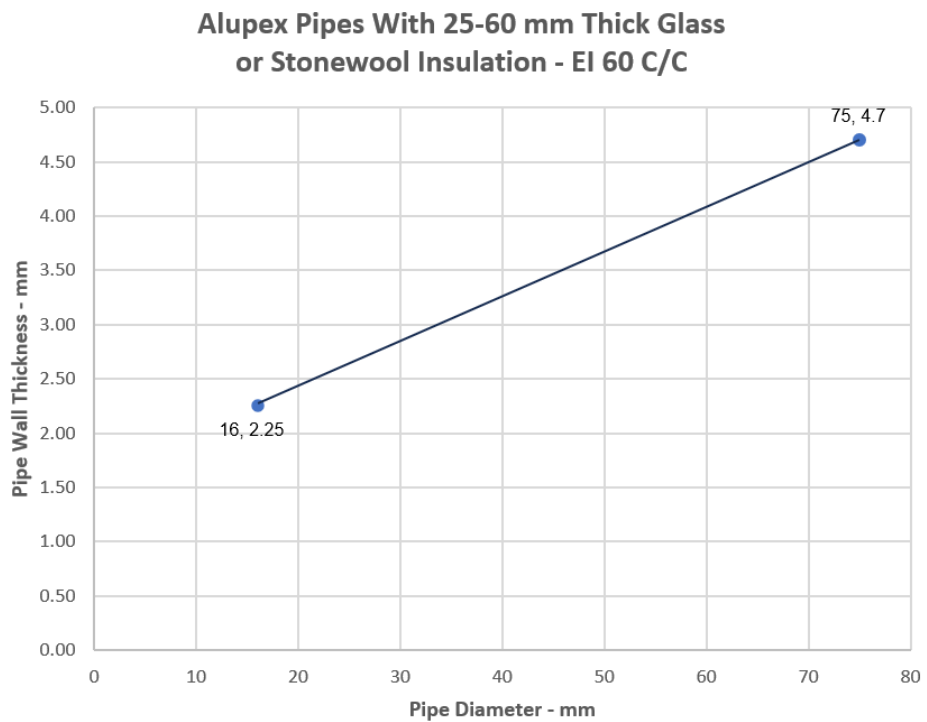
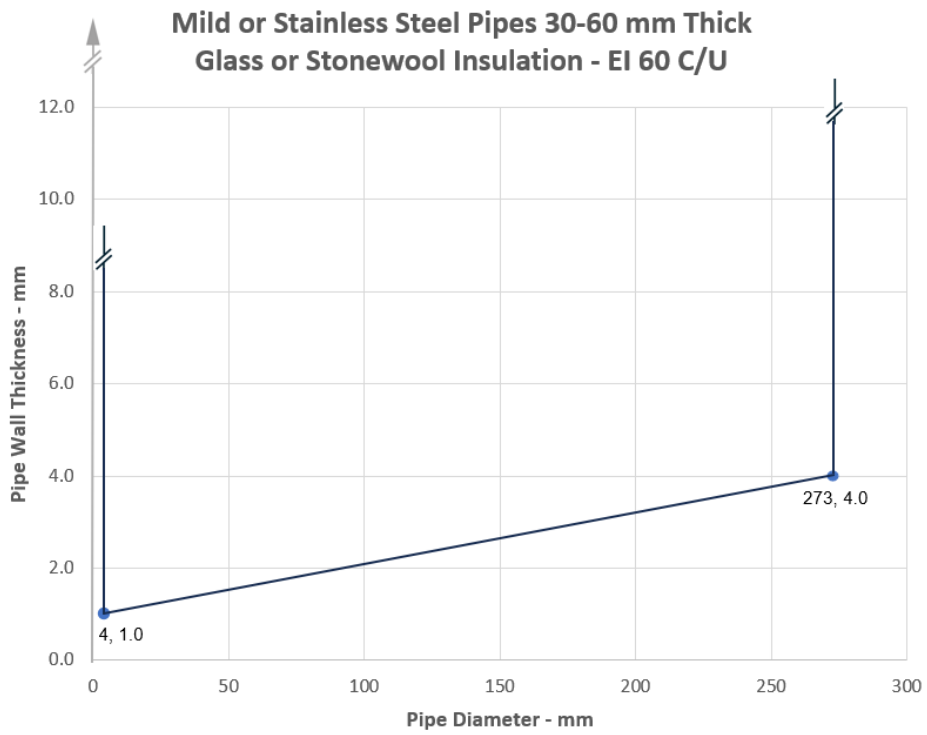
- 1 Supporting construction
- a1 Pipe / top edge of seal separation
- a2 Pipe / side edge of seal separation

A.7.7.1

Services	Max. Seal Size	Insulation	Sealant Depth and Backing (minimum)	Classification
Copper or steel pipe				
≤54 mm diameter/ ≥0.7 mm wall*	150 x 150 mm/ 194 mm Ø	20-60 mm Glass or Stone wool 75 kg/m ³	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 C/C
Mild or stainless steel pipe				
≤273 mm diameter/ ≥1.0 mm wall*	150 x 150 mm/ 413 mm Ø	30-60 mm Glass or Stone wool 75 kg/m ³	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 C/U
Alupex pipe (PE/AL/PE) (tested pipes were Geberit Mepla MCL)				
16-75 mm diameter/ 2.25-4.7 mm wall*	150 x 150 mm/ 215 mm Ø	25-60 mm Glass or Stone wool 75 kg/m ³	18.0 mm at top face and 25.0 mm at soffit face, no backing required	EI 60 C/C

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

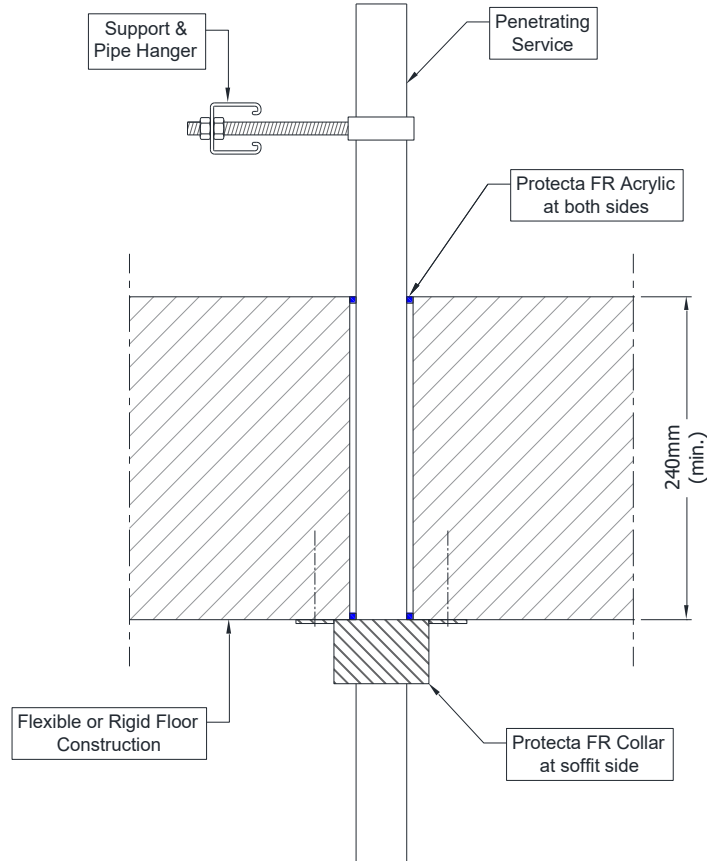




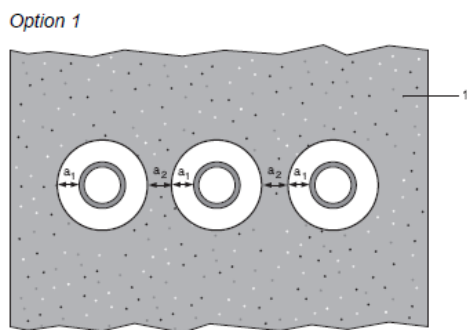
A.7.8 Double side penetration seal with pipes

Penetration Seal: Pipes fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, and with Protecta FR Collar to the soffit face. Minimum annular space 5 mm (a1) and minimum separation between penetration seals 30 mm (a2).

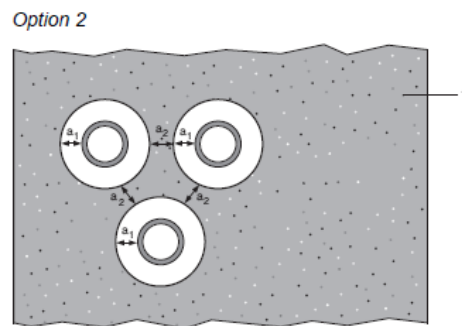
Construction details:



Configuration 1:



Configuration 2:



Key

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

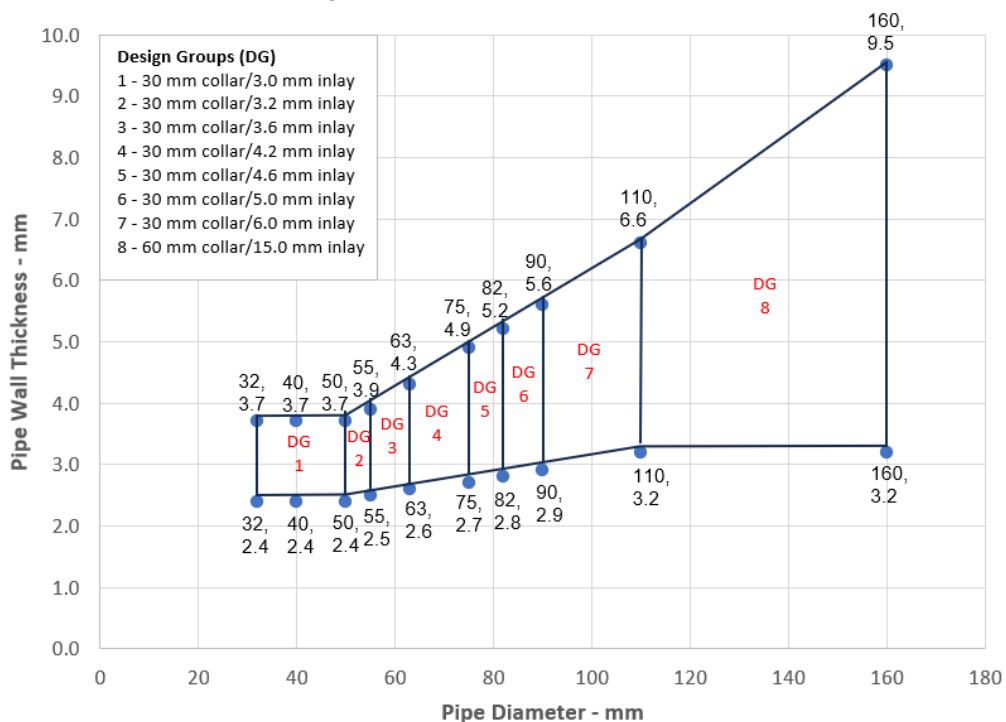
A.7.8.1

Services	Max. Aperture	FR Collar (min. height and max. diameter) *	Sealant Depth and Backing (minimum)	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1				
Maximum 50 mm diameter/ 2.4-3.7 mm wall*	5.0 mm wide annular gap *	30mm/50 mm \emptyset , with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 60 U/U
Maximum 110 mm diameter/ 3.2-6.6 mm wall*		30mm/110 mm \emptyset , with 30 x 6 mm inlay		EI 60 U/U
Maximum 160 mm diameter/ 3.2-9.5 mm wall*		60mm/160 mm \emptyset , with 60 x 15 mm inlay		EI 60 U/C
Maximum 32 mm diameter/ 1.0-4.0 mm wall, in pipe bundles up to 110 mm \emptyset ¹⁾		30mm/110 mm \emptyset , with 30 x 6 mm inlay		EI 60 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				
Maximum 50 mm diameter/ 3.0-4.6 mm wall*	5.0 mm wide annular gap *	30mm/50 mm \emptyset , with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 60 U/U
Maximum 110 mm diameter/ 3.4-10.0 mm wall*		30mm/110 mm \emptyset , with 30 x 6 mm inlay		EI 60 U/C
Maximum 110 mm diameter/ 3.4-10.0 mm wall*		50mm/110 mm \emptyset , with 50 x 6 mm inlay		EI 60 U/U
Maximum 160 mm diameter/ 4.9-14.6 mm wall*		60mm/160 mm \emptyset , with 60 x 15 mm inlay		EI 60 U/C
Maximum 32 mm diameter/ 2.0-3.0 mm wall, in pipe bundles up to 110 mm \emptyset ¹⁾		30mm/110 mm \emptyset , with 30 x 6 mm inlay		EI 60 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078				
Maximum 50 mm diameter/ 1.8-4.6 mm wall*	5.0 mm wide annular gap *	30mm/50 mm \emptyset , with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 60 U/U
Maximum 110 mm diameter/ 4.2-6.3 mm wall*		30mm/110 mm \emptyset , with 30 x 6 mm inlay		EI 60 U/C
Maximum 110 mm diameter/ 4.2-6.3 mm wall*		50mm/110 mm \emptyset , with 50 x 6 mm inlay		EI 60 U/U
Maximum 160 mm diameter/ 4.9-14.6 mm wall*		60mm/160 mm \emptyset , with 60 x 15 mm inlay		EI 60 U/C
Maximum 32 mm diameter/ 1.9-4.4 mm wall, in pipe bundles up to 110 mm \emptyset ¹⁾		30mm/110 mm \emptyset , with 30 x 6 mm inlay		EI 60 U/C
PEX pipe with an inner layer of polyethylene (tested pipe is Roth-MULTIPEX PiP)				
Maximum 32 mm diameter/ 4.4 mm wall inner, 44 mm diameter outer	5.0 mm wide annular gap *	30mm/50 mm \emptyset , with 30 x 3 mm inlay	5.0 mm at top face and 5.0 mm at soffit face, no backing required *	EI 60 C/C
15 mm diameter/ 2.5 mm wall inner, 25 mm diameter outer, in pipe bundles up to 50 mm \emptyset		30mm/50 mm \emptyset , with 30 x 3 mm inlay		EI 60 C/C

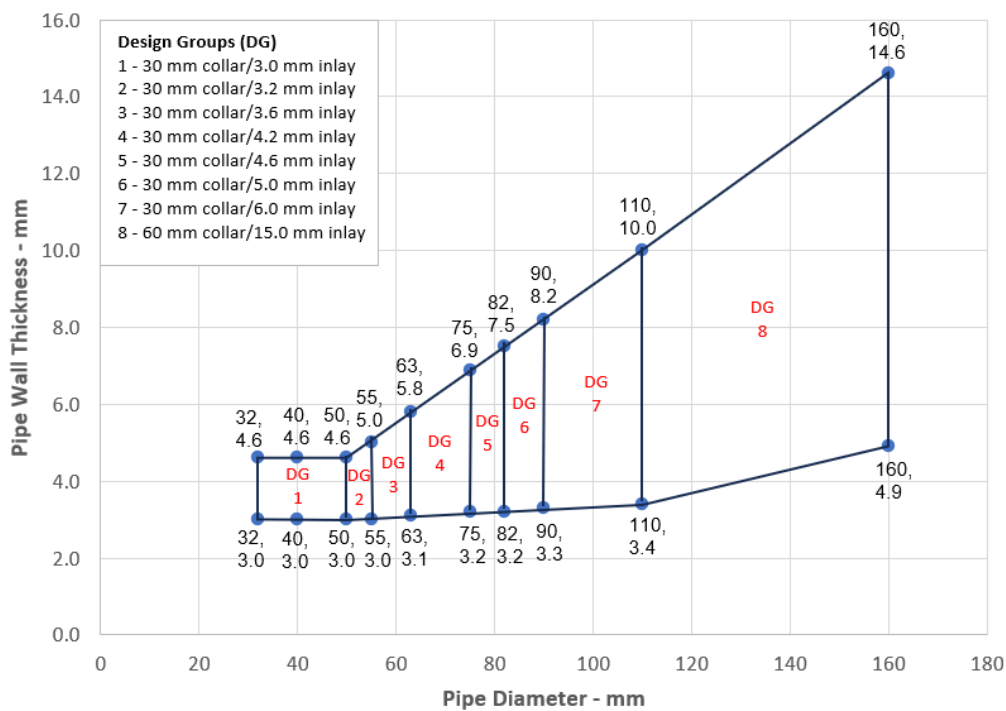
* If the annular gap is above 5 mm, an oversized collar may be used with maximum size of 160 mm, subject to an increase in sealant depth to minimum 18.0 mm at top face and 25 mm at soffit face.

¹⁾ PVC, PE and PP pipes can be mixed in the same bundle.

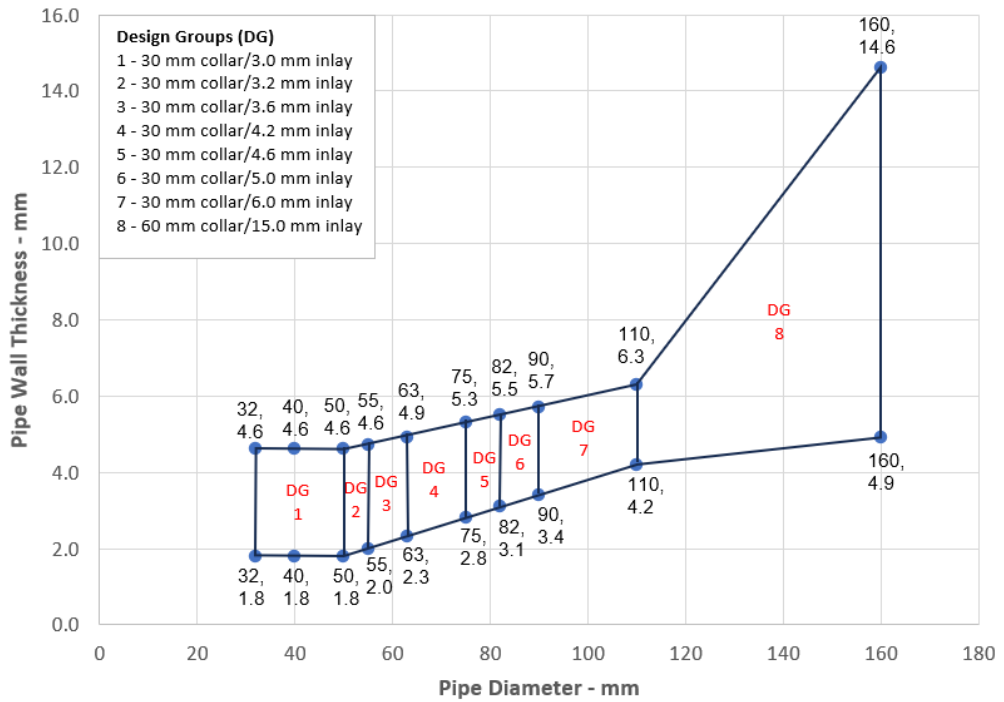
PVC-U Pipes / 30-60 mm Collar - EI 60 U/C



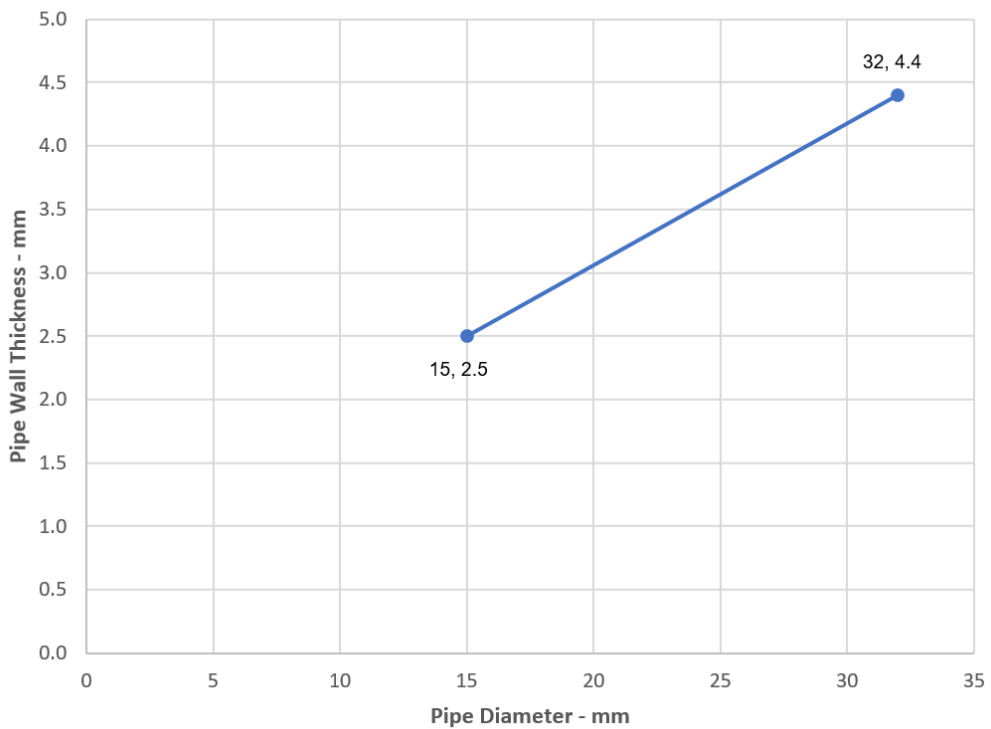
PE Pipes / 30-60 mm Collar - EI 60 U/C



PP Pipes / 30-60 mm Collar - EI 60 U/C



PEX Pipes (Inner Wall Diameters) - EI 60 C/C

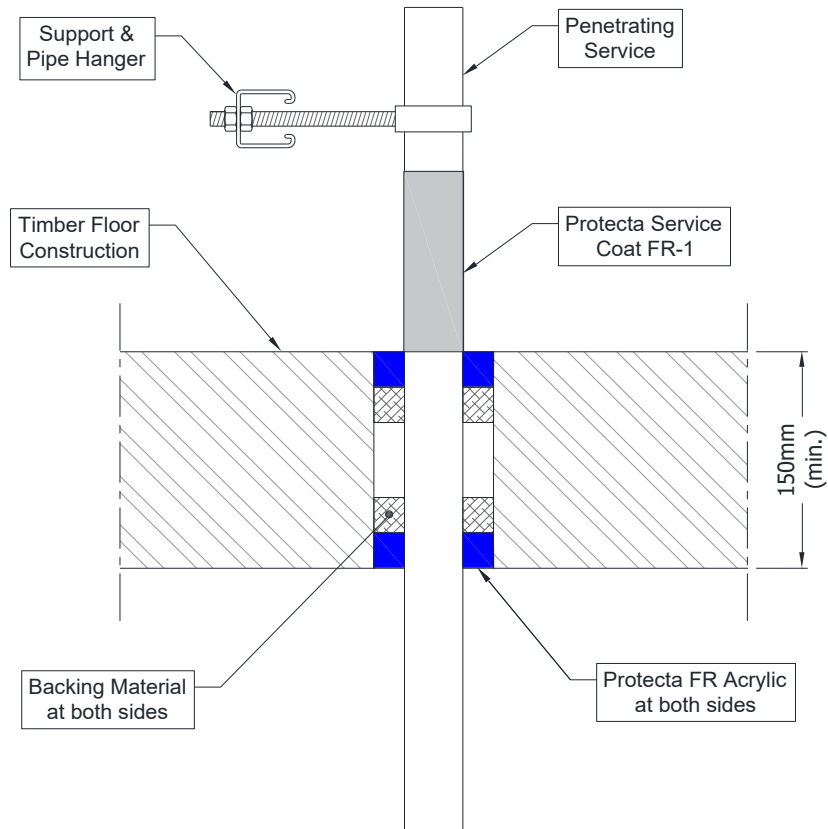


A.8 Timber floor constructions with floor thickness of minimum 150 mm

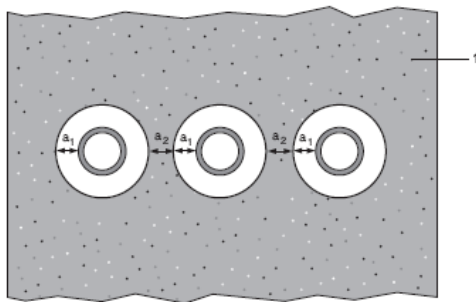
A.8.1 Double sided penetration seal with cables

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/m³), 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 Cables / edge of seal separation (annular space)
- a2 Separation between penetration seals

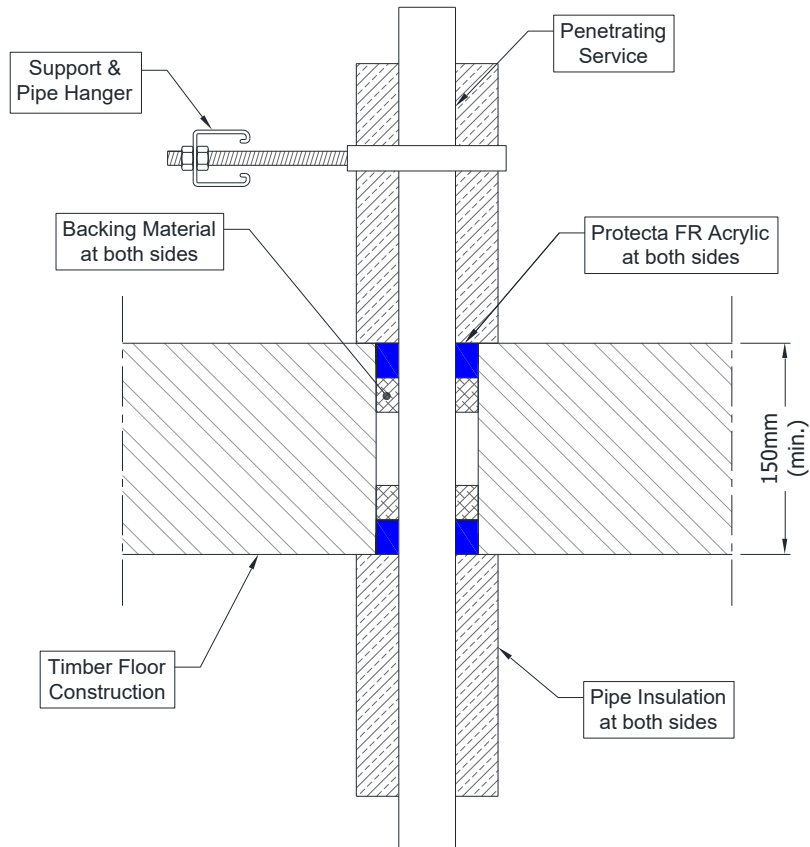
A.8.1.1

Services	Sealant depth	Backing	Maximum aperture	Insulation, minimum	Classification
None (blank)	25 mm	Stone wool 25 mm deep min. 33kg/m ³	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

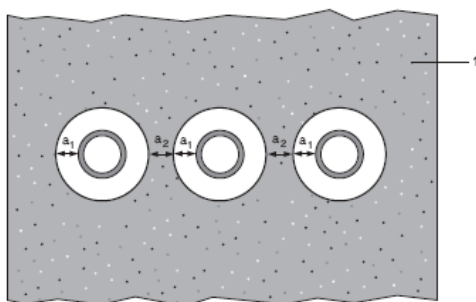
A.8.2 Double side penetration seal with metallic pipes

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/m³, fitted at any position within the aperture, with Protecta FR Acrylic to both sides of the floor, backed with stone wool insulation (minimum 33kg/m³), minimum 25 mm deep. Minimum annular space 10 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



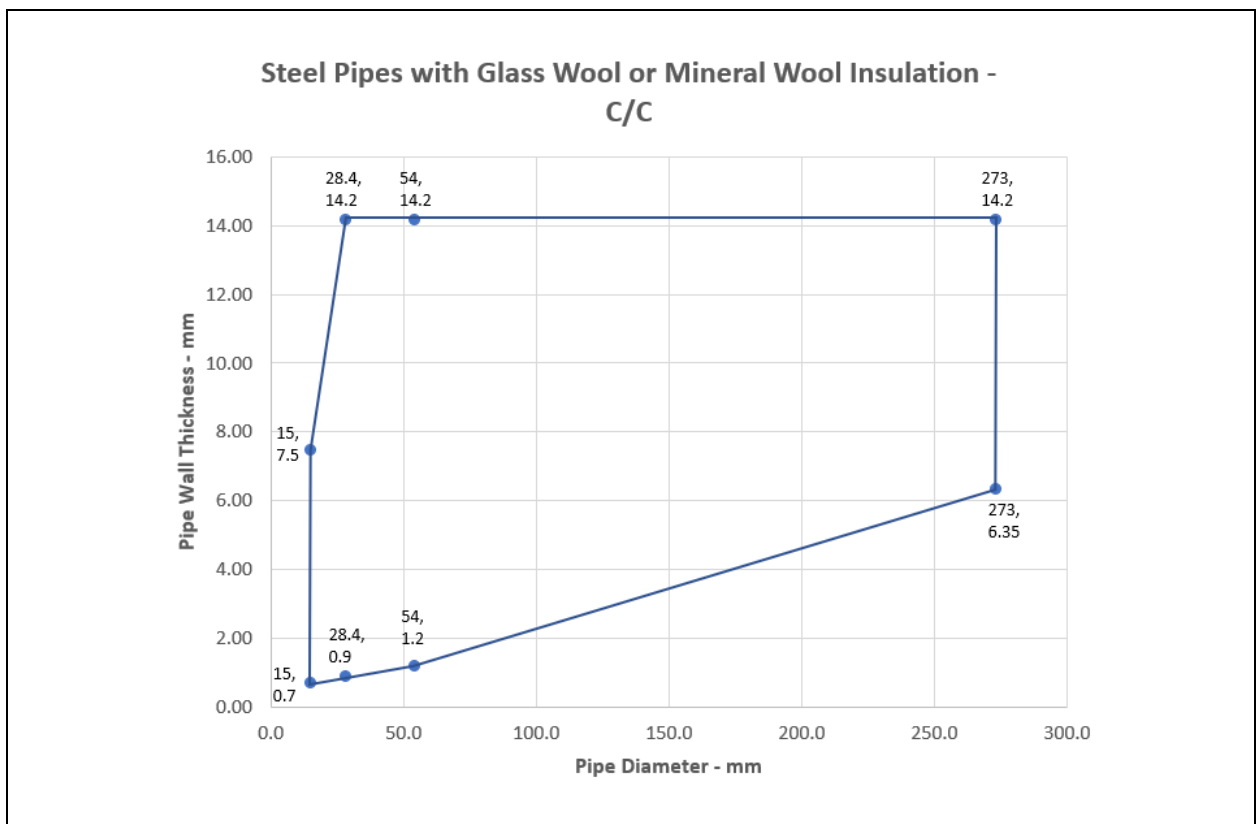
Key

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

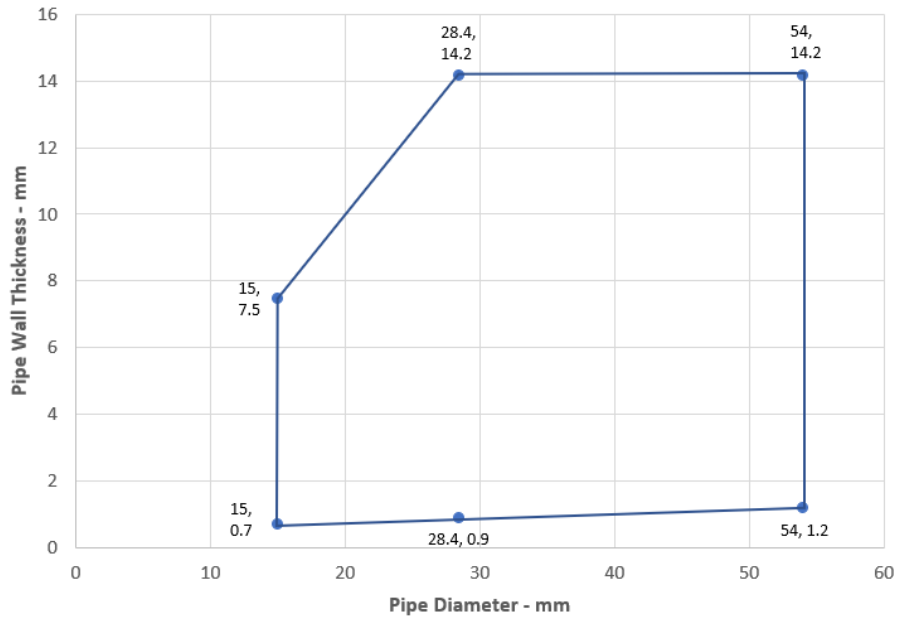
A.8.2.1

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

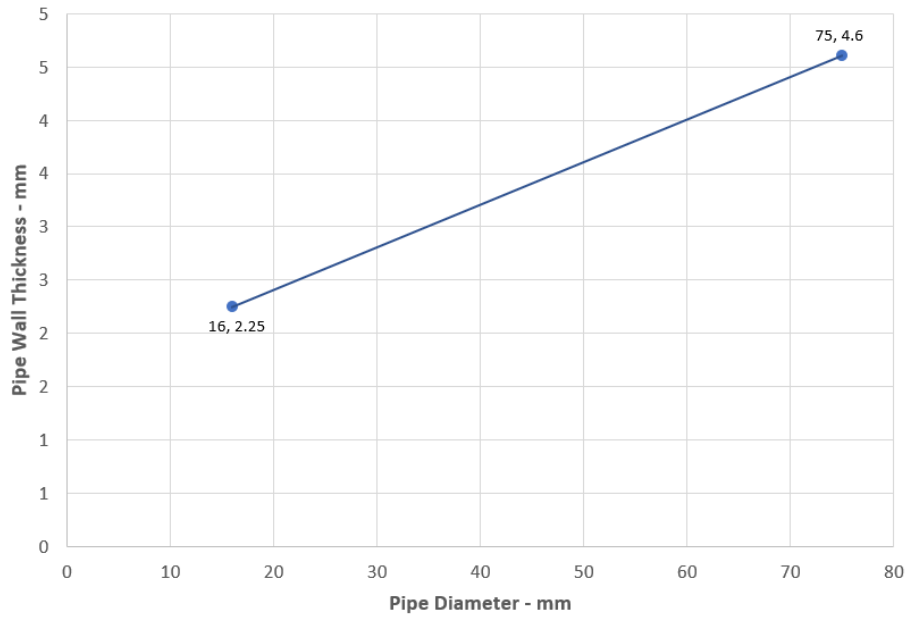
* Typical pipe diameters shown, see below graph for intermediate sizes



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



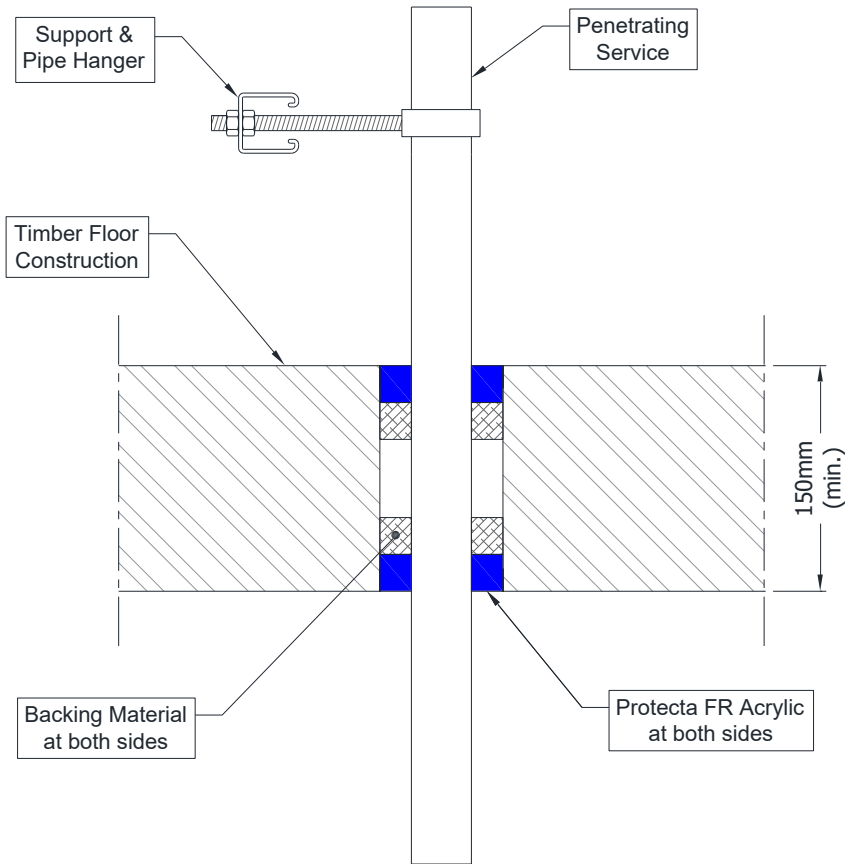
Alupex Pipes with Glass Wool or Mineral Wool Insulation - C/C



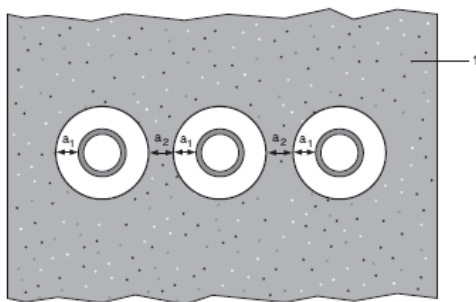
A.8.3 Double side penetration seal with plastic pipes and composite pipes

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/m³. Minimum annular space 10 mm and maximum 30 mm (a1) and minimum separation between penetration seals 0 mm (a2).

Construction details:



Configuration 1:



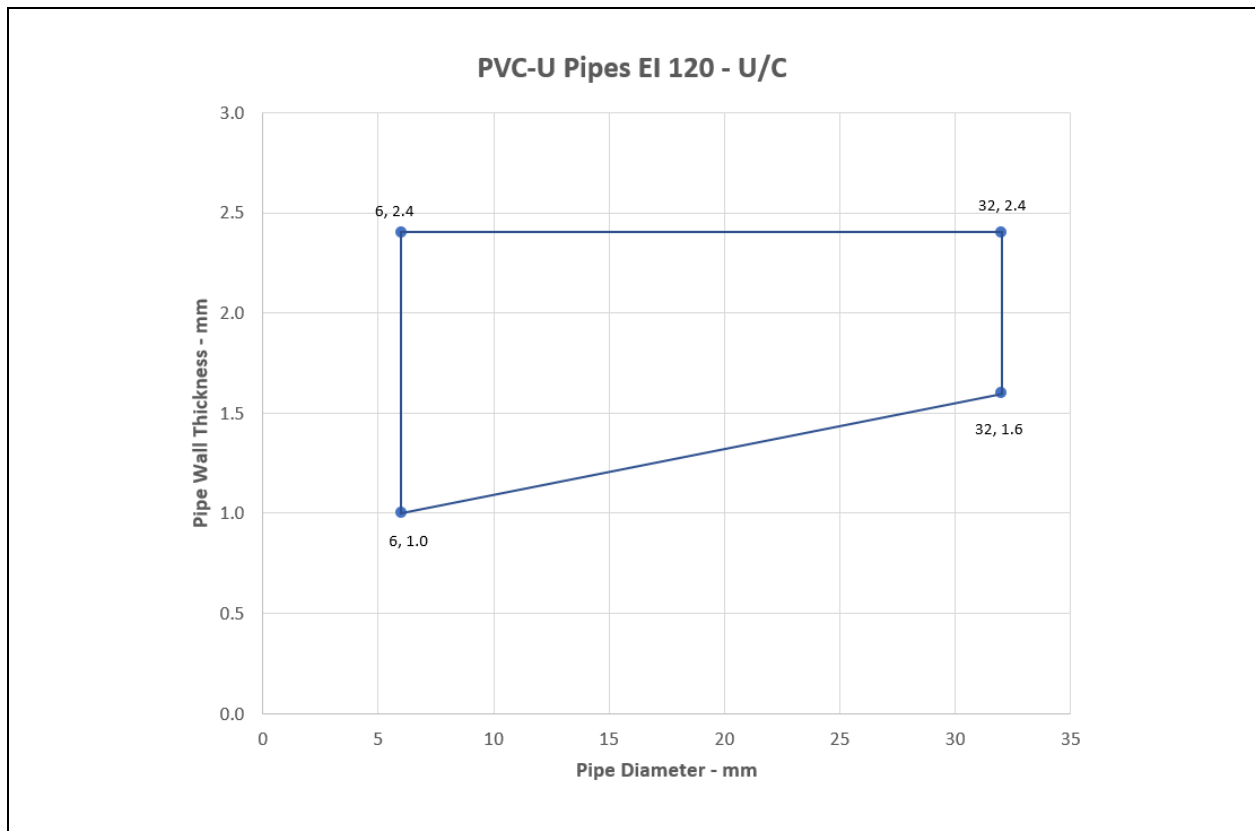
Key

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

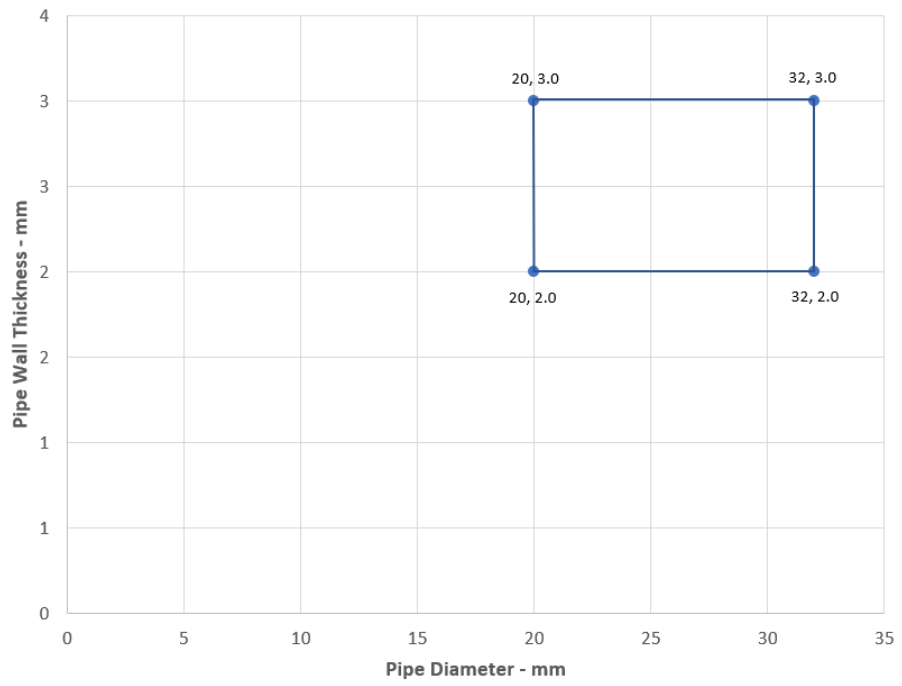
A.8.3.1

Services	Sealant depth	Backing	Classification
PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1			
Maximum 32 mm diameter/1.0-2.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m ³	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			
Maximum 32 mm diameter/2.0-3.0 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m ³	EI 120 U/C
PP pipe according to EN 1451-1 or DIN 8077/8078			
Maximum 32 mm diameter/1.8-4.4 mm wall*	25 mm	Stone wool 25 mm deep min. 33kg/m ³	EI 120 U/C
PEX pipe in pipe system			
25 mm diameter outer /15 mm diameter x 2.5 mm wall inner	25 mm	Stone wool 25 mm deep min. 33kg/m ³	EI 120 C/C

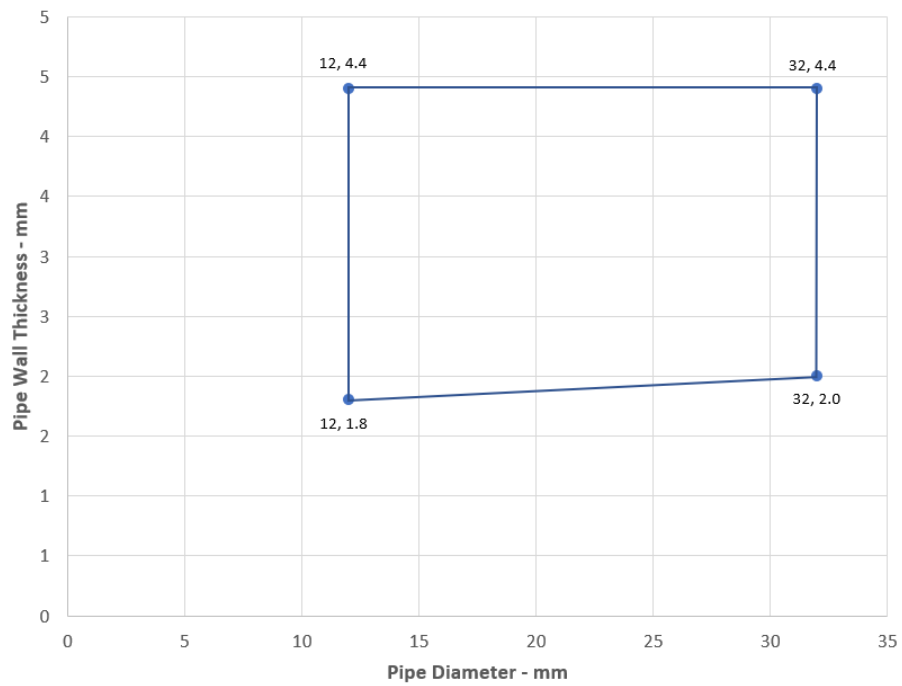
* Typical pipe diameters shown, see below graph for intermediate sizes



PE Pipes EI 120 - U/C

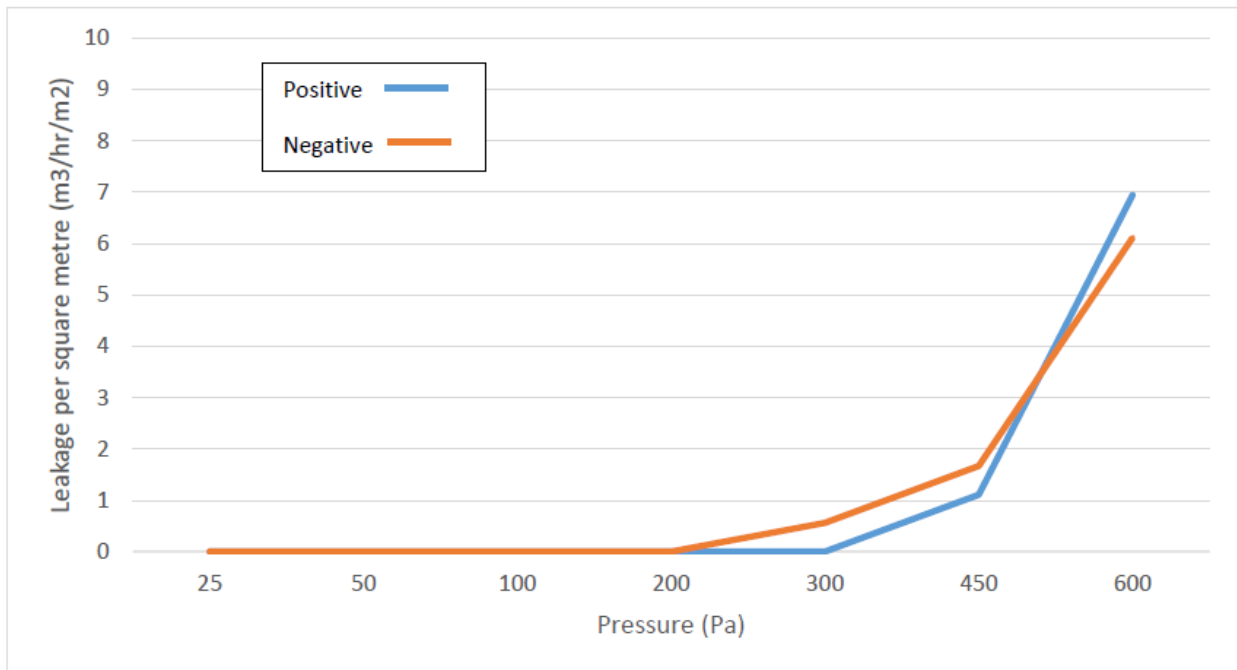


PP Pipes EI 120 - U/C




ANNEX B – Air Permeability – Protecta FR Acrylic

Product tested	10mm deep x 30mm wide Protecta FR Acrylic		
Summary of testing procedure		Result	
	Pressure (Pa)	Leakage (m ³ /h)	Leakage (m ³ /m ² /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



ANNEX C – VOC Emission Attestation – Protecta FR Acrylic

Regulation or protocol	Conclusion	Version of regulation of protocol
French VOC regulations		Arrêté du 28 mai 2009 modifiant l'arrêté du 30 avril 2009, Arrêté du 20 février 2012 modifiant l'arrêté du 19 avril 2011, Décret no 2011-321 du 23 mars 2011
German AgBB (2021)/ABG (2022)	Pass	AgBB - Evaluation procedure for VOC emissions from building products; June 2021
Belgian legislation	Pass	Royal Decree: 8 MEI 2014
Italian regulation (public procurement)	Pass	Decree 11 October 2017
Emicode	Pass/EC1 ^{PLUS}	EMICODE, Edition: 02.03.2022
LEED-EU (v4.1) BETA	Pass	LEED v4.1 Building design and construction July 2022
BREEAM International	Pass/Exemplary	BREEAM International New Construction 2021 v6.0
BREEAM UK	Pass/Exemplary	BREEAM UK New Construction 2022 v6.0
BREEAM NL	Pass/Exemplary	BREEAM-NL Nieuwbouw 2020
BREEAM Norway	Pass/Exemplary	BREEAM-NOR 2022 v6.0: New Construction
WELL (EU)	Pass	WELL v2 2021 - Concept Materials X06 VOC restrictions
Finnish M1 Classification	Pass/M1	M1 Emission Classification of Building Materials version 15.11.2017 + CMR update January 2019
DICL	Pass/ Emission Class 1	Danish Indoor Climate Labelling, General test and labelling criteria, 7th Edition, May 2021
ECOproduct	Pass/very low emitting	ECOproduct Method description version 5.1, 29-10-2020
Blue Angel (DE-UZ 123)	Pass	Low-Emission Sealants for Interior Use, 2019 v4
SINTEF	Pass	SINTEF Environmental certificate v09/05/2022
Byggarubedömningen	Pass	SWEDISH BUILDING MATERIALS ASSESSMENT Version 5.0