

# UL-EU CERTIFICATE

**Certificate No.** UL-EU-00911-CPR  
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**Date of Issue** 2015-10-09  
**Revised** 2023-06-29

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

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

**Certified Product Type** Fire Stop – Mortar  
**Product Trade Name** Protecta EX Mortar  
**Trademark** N/A  
**Rating/Classification** See Appendix

**Harmonised Technical Specifications** EAD 350454-00-1104, September 2017 / EN 13501-2  
**Supporting Documentation** 0843-UKTA-22/0033, UK – CERTIFICATE OF  
CONSTANCY OF PERFORMANCE - 0843 – CPR – 1227,  
Classification report No. 13CA21782 C/ 4786594904 A  
Issue 2 / Classification report No. 4787998082 /  
Classification report No. 4789231572 & Classification  
Report No. 4790592811-01  
**Additional information** Additional test evidence is held on file  
**Expiry date** 2025-10-08



**Authorized Certification Decision Maker**  
Chris Johnson



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shall remain valid through the Expiration date, unless a Standard identified on this Certificate is amended or withdrawn prior to that date or there is a non-compliance with the Agreement.



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This certificate relates to the use of Protecta EX Mortar for fire stopping where there are service penetrations through floors and walls. The detailed scope is given in pages 3 to 85 of this Certificate. This shows the thickness and acceptable dimensions, substrates and orientations required to provide fire resistance periods of up to 240 minutes for differing services and wall/floor constructions.

The product is certificated on the basis of:

- i) UKTA 22/0033
- ii) UK – CERTIFICATE OF CONSTANCY OF PERFORMANCE 0843 – CPR – 1227
- iii) Inspection and surveillance of factory production control by UL
- iv) Fire resistance test data in accordance with EN 1366-3: 2009
- v) Classification in accordance with EN 13501-2
- vi) Durability and Servicability as defined in EAD 350454-00-1104

Protecta EX Mortar has been tested in accordance with the requirements of EAD 350454-00-1104 to demonstrate its suitability for use in internal conditions with humidity lower than 85 % RH, excluding temperatures below 0°C, without exposure to rain or UV. These conditions are designated Z<sub>2</sub> in EAD 350454-00-1104.

Protecta EX Mortar is a gypsum based mortar material, used to reinstate the fire resistance performance of wall and floor constructions where they have been provided with apertures for the penetrations of multiple services.

## Specific Supporting Construction Specifications

- 1) The intended use of Protecta EX Mortar is to reinstate the fire resistance performance of flexible wall, rigid wall and floor constructions where they are penetrated by various cables, trays and metallic, plastic and composite pipes.
- 2) The specific elements of construction that the system Protecta EX Mortar may be used to provide a penetration seal in, are as follows:
  - a. Flexible walls: The wall must have a minimum thickness of 100 mm and comprise steel studs or timber studs\* lined on both faces with minimum 2 layers of 12.5 mm thick boards. Flexible wall solutions may also be used in rigid walls, with a minimum density of 350 kg/m<sup>3</sup>.
  - b. Rigid walls: The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.
  - c. Rigid floors: The floor must have a minimum thickness of 100 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

\* no part of the penetration seal may be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud, and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1 must be provided within the cavity between the penetration seal and the stud.

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



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## Specific Supporting Construction Specifications (Continued)

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

Where a backing material is described in pages 5 to 85, this can be replaced with Protecta EX Mortar if the total seal depth is the same or greater.

- 3) The System Protecta EX Mortar may be used to provide a penetration seal with cables, cable trays, plastic pipes, composite pipes and metallic pipes with and without insulation, with mixed services in the same seal/aperture (for details see pages 5 to 85).
- 4) The system Protecta EX Mortar may be used to seal apertures in the separating element up to 2400 mm wide by 1200 mm high in a wall, and 2400 mm by 1200 mm in a floor. The additional sizes that are permitted in floors are:

Width (mm)	Length (mm)
1100	2900
1000	4000
900	7000
≤ 800	∞ (infinite)

The minimum permitted separation between adjacent seals/apertures is 100 mm. Services within the system Protecta EX Mortar seal do not require a minimum separation, except where specifically detailed in pages 5 to 85.

- 5) Services in floors shall be supported at maximum 450 mm from the top face. Services in walls shall be supported at maximum 270 mm from both faces of the wall.
- 6) Where minimum 100 mm depth of the system Protecta EX Mortar is described in pages 5 to 85, this can be reduced with 50 mm if a 50 mm high 45 ° angled cone made of mortar is added around services. If the reduction reduces the thickness to less than 100 mm, a stone wool backing board is required, as specified in pages 5 to 85.
- 7) An aperture with or without penetrating services, fire sealed with the system Protecta EX Mortar, can include a steel sleeve casted or friction fitted within rigid constructions. The sleeve must be protected against corrosion before adding the mortar seal.
- 8) Where single sided top face seals are described in pages 5 to 85, these can also be used in composite floors (e.g., concrete filled, steel trapezoidal decking) if the floor thickness supersedes the required mortar thickness.
- 9) Services through the system Protecta EX Mortar may be used in all angles between 90° and 45° in all directions, subject to metallic pipes only.
- 10) 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.



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Product-type: Mortar		Intended use: Penetration Seal
Assessment method	Essential characteristic	Product Performance
<b>BWR 2 Safety in case of fire</b>		
EN 13501-1	Reaction to fire	Class 'A1'
EN 13501-2	Resistance to fire	See pages 5 to 85
<b>BWR 3 Hygiene, health and environment</b>		
EN 1026	Air permeability	See pages 86 & 87
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 Declaration of manufacturer
<b>BWR 4 Safety in use</b>		
EOTA TR 001:2003	Mechanical resistance and stability	Suitable for use in walls and floors in Zone Types I, II, III & IV*
EOTA TR 001:2003	Resistance to impact/movement	
EOTA TR 001:2003	Adhesion	
EAD 350454-00-1104, Clause 2.2.9	Durability	Z <sub>2</sub>
<b>BWR 5 Protection against noise</b>		
EN 10140-1,2,4,5/ EN ISO 717-1	Airborne sound insulation	Rw 48 (-1;-3) dB
<b>BWR 6 Energy economy and heat retention</b>		
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



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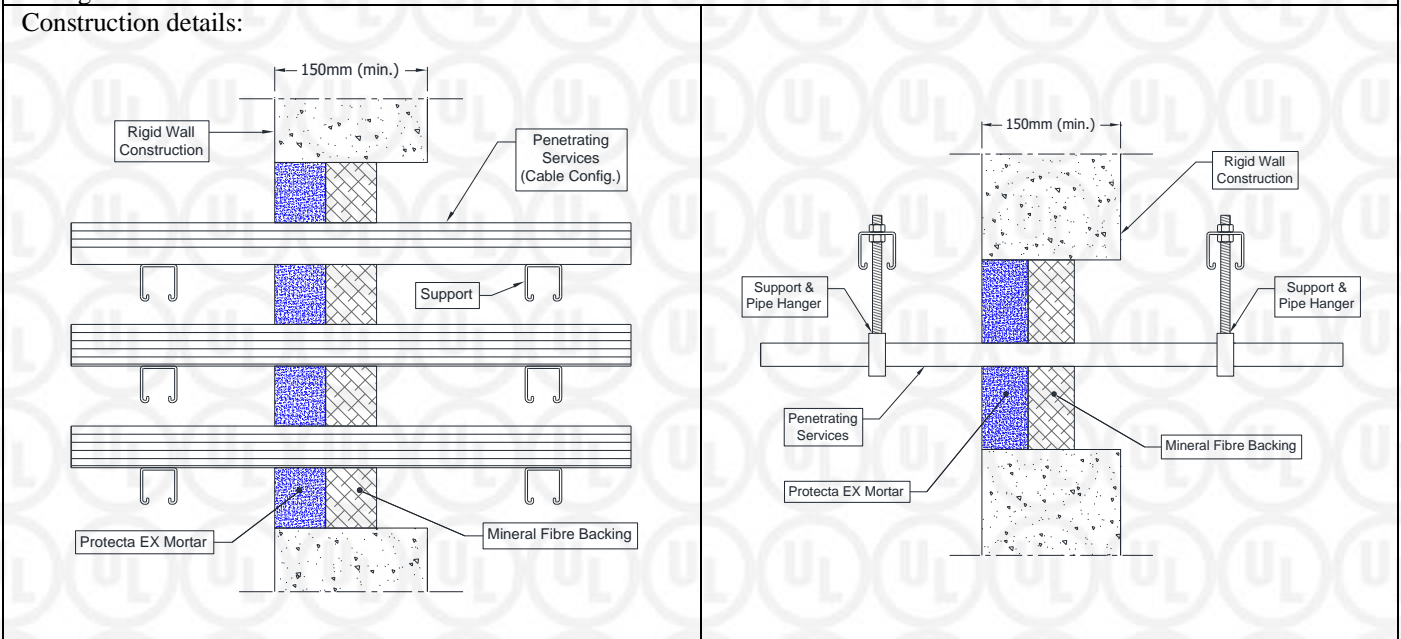
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**Rigid wall constructions with wall thickness of minimum 150 mm**

**Cable penetration seal with 50 mm deep Protecta EX Mortar backed with mineral fibre board**

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 25 mm from seal edges), with min. 50 mm Protecta EX Mortar to either side of the wall (or at any position in between), backed with min. 50 mm stone wool board min. 150 kg/m<sup>3</sup>.

Construction details:



**Single side penetration seal with cables**

Services	Maximum aperture	Classification
None (blank)	As section 4 (page 3)	<b>E 180, EI 120</b>
Single electrical cables up to 21 mm Ø		<b>E 180, EI 60</b>
Single electrical cables up to 21 mm Ø	80 x 80 mm	<b>E 240, EI 60</b>
Electrical cables up to 21 mm Ø (single, bundled and on trays)	As section 4 (page 3)	<b>E 180, EI 60</b>
Electrical cables up to 50 mm Ø (single, bundled and on trays)		<b>E 180, EI 45</b>
Electrical cables up to 80 mm Ø (single, bundled and on trays)		<b>E 120, EI 45</b>
Telecommunication cables up to 21 mm Ø (single or bundles up to 100 mm Ø)		<b>E 180, EI 90</b>
Steel cable trays & ladders		<b>E 180, EI 60</b>
Non-sheathed wires up to 17 mm Ø		<b>E 180, EI 45</b>
Non-sheathed wires up to 24 mm Ø		<b>E 180, EI 30</b>
Copper conduits up to 16 mm Ø		<b>E 180 C/U, EI 30 C/U</b>
Steel conduits up to 16 mm Ø		<b>E 180 C/U, EI 60 C/U</b>
PVC conduits up to 16 mm Ø		<b>E 180 C/U, E 180 C/C, EI 60 C/U, EI 60 C/C</b>



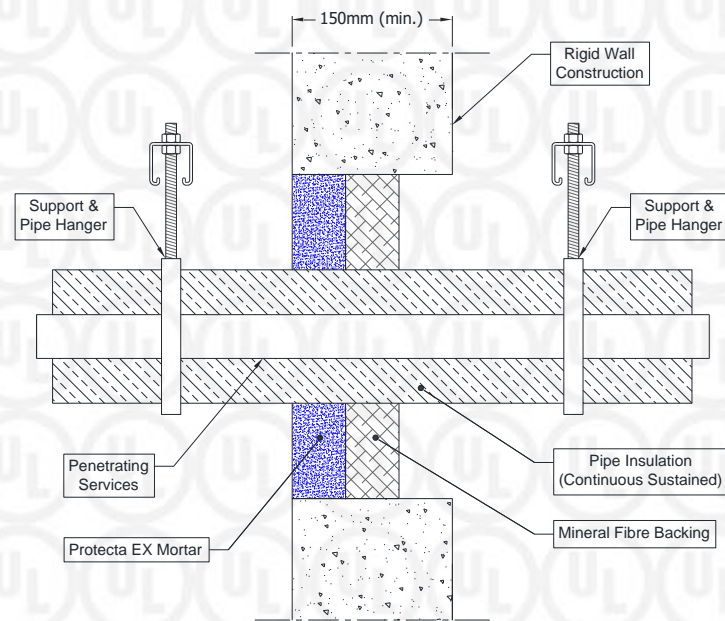
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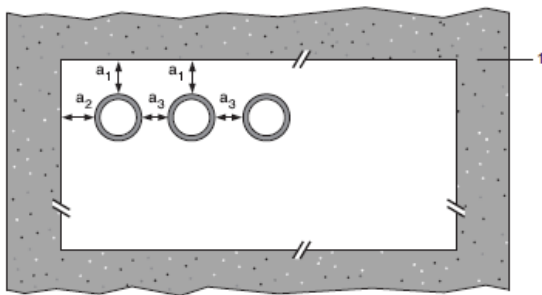
## Pipe penetration seal with 50 mm deep Protecta EX Mortar backed with mineral fibre board

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges, with min. 50 mm Protecta EX Mortar to either sides of the wall (or any position in between), backed with min. 50 mm stone wool min. 150 kg/m<sup>3</sup>.

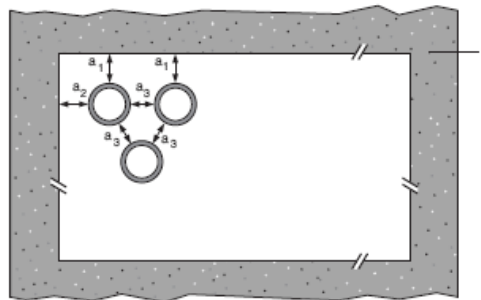
Construction details:



### 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



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## Single side penetration seal with pipes

Services	Maximum aperture	Insulation	Classification
Steel pipes 219 diameter/ 5-14.2 mm wall	As section 4 (page 3)	30 mm stone wool min. 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U



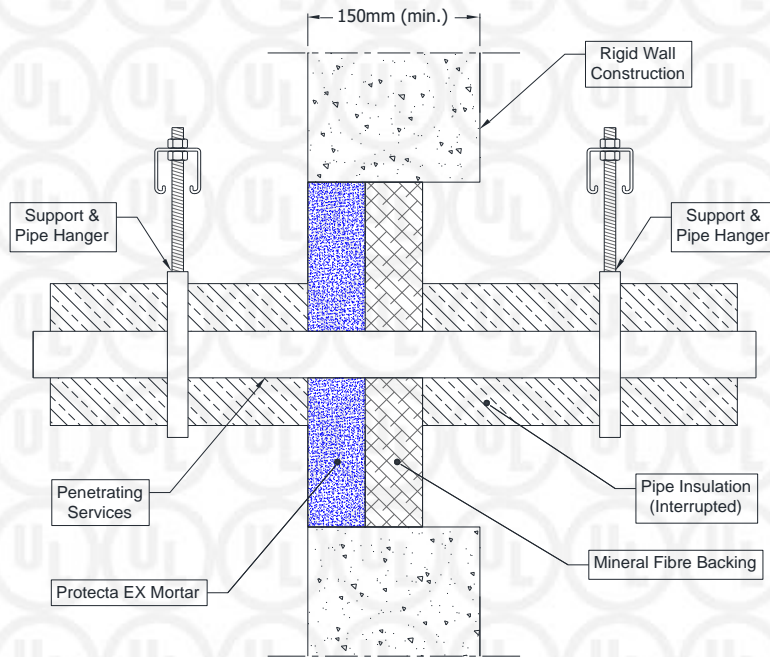
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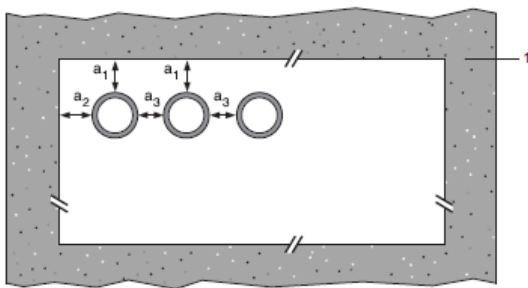
## Pipe penetration seal with 50 mm deep Protecta EX Mortar backed with mineral fibre board

**Penetration Seal:** LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic and composite pipes fitted at any position within the aperture (min. separation 30 mm from seal edges, with min. 50 mm Protecta EX Mortar to either sides of the wall (or any position in between), backed with min. 50 mm stone wool min. 150 kg/m<sup>3</sup>).

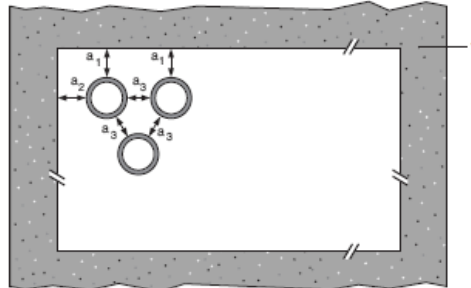
Construction details:



**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





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## Single side penetration seal with pipes

Services	Maximum aperture	Insulation, minimum length, thickness and density	Classification
Copper or steel pipes up to 12 mm diameter/ 0.9-5 mm wall	70 x 70 mm	1000 mm long, 20 mm stone wool 80 kg/m <sup>3</sup>	EI 240 C/C
Copper or steel pipes up to 54 mm diameter/ 1-14.2 mm wall	115 x 115 mm	1000 mm long, 20 mm stone wool 80 kg/m <sup>3</sup>	E 240 C/C, EI 120 C/C
Copper or steel pipes up to 54 mm diameter/ 1-14.2 mm wall	As section 4 (page 3)	1000 mm long, 20 mm stone wool 80 kg/m <sup>3</sup>	E 180 C/C, EI 120 C/C
75 mm Alupex composite pipes with 7.5 mm wall		600 mm long, 32 mm Elastomeric insulation minimum class B-s3,d0	EI 60 C/C

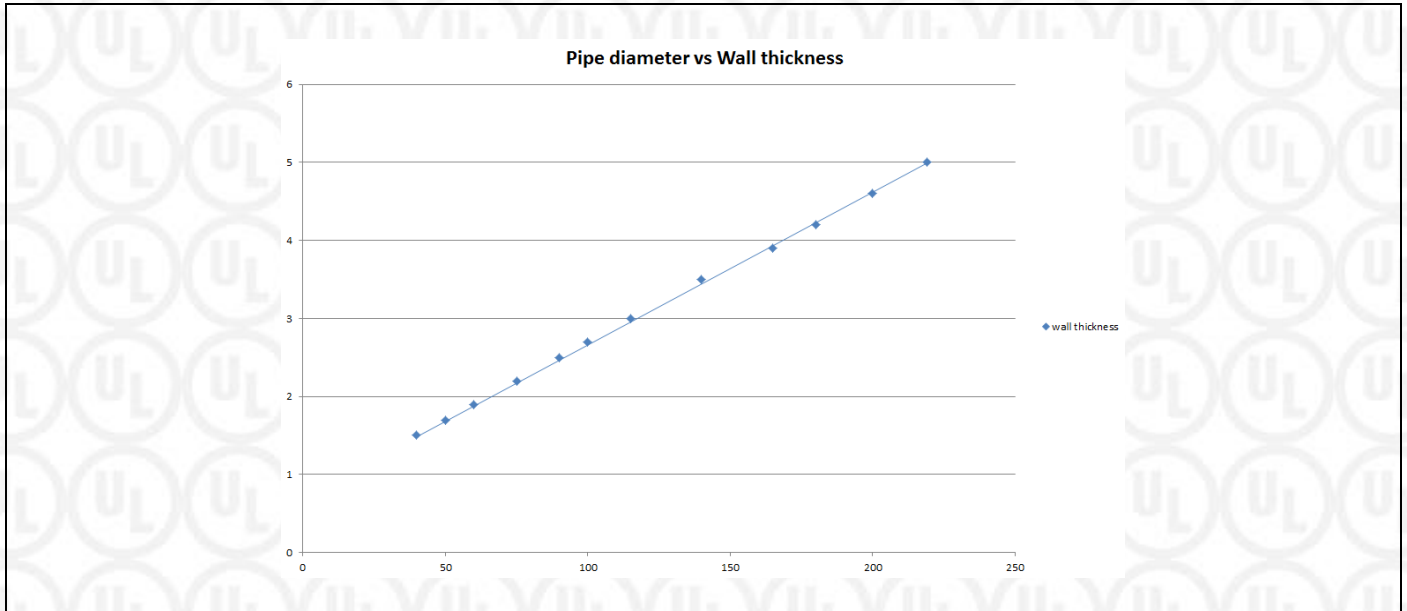
Services	Maximum aperture	Insulation, minimum length, thickness and density	Classification
<b>Mild or stainless steel pipes</b>	100 x 100 mm	1000 mm long, 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall*			E 180 C/U, EI 120 C/U
40 mm diameter/1.5-14.2 mm wall*	As section 4 (page 3)	1000 mm long, 30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U
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



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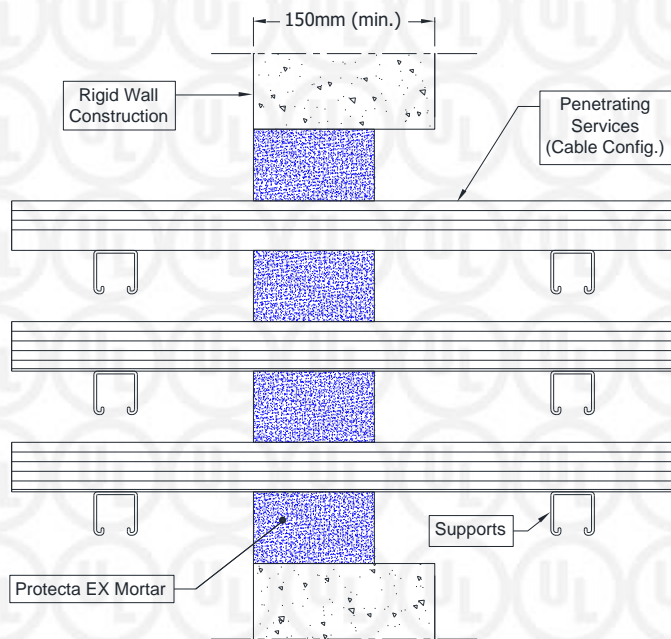
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## Cable penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 25 mm from seal edges), with min. 100 mm Protecta EX Mortar to either side of the wall (or at any position in between).

Construction details:



## Single side penetration seal with cables

Services	Maximum aperture	Classification
None (blank)	As section 4 (page 3)	EI 240
Electrical cables up to 21 mm Ø (single, bundled and on trays)		E 240, EI 60
Electrical cables up to 80 mm Ø (single, bundled and on trays)		
Cables up to 21mm Ø in tied bundles up to 100mm Ø		EI 120
Steel cable trays & ladders		E 120, EI 60
Non-sheathed cables up to 24 mm Ø		E 180 C/U, EI 30 C/U
Copper conduits up to 16 mm Ø		E 180 C/U, EI 60 C/U
Steel conduits up to 16 mm Ø		EI 240 C/U, EI 240 C/C
PVC conduits up to 16 mm Ø		



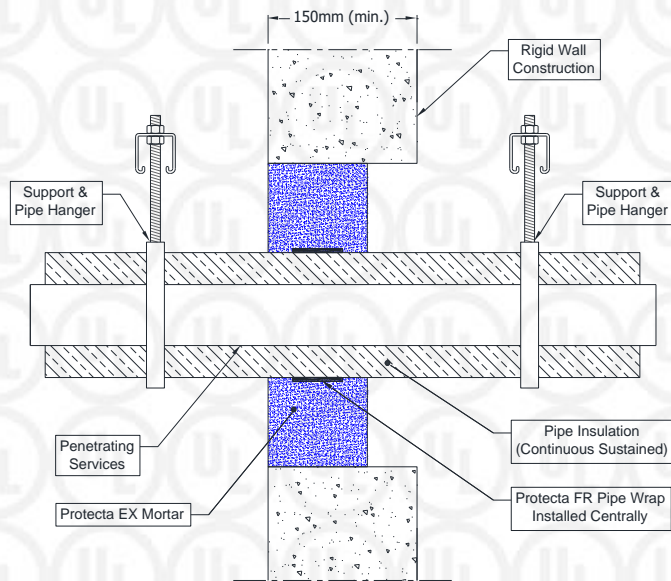
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## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 10 mm from seal edges), with min. 100 mm Protecta EX Mortar to either side of the wall. Protecta FR Pipe wraps are required to be centrally within the seal for pipes with combustible insulation. Maximum seal size as section 4 (page 3).

Construction details:



## Single side penetration seal with pipes

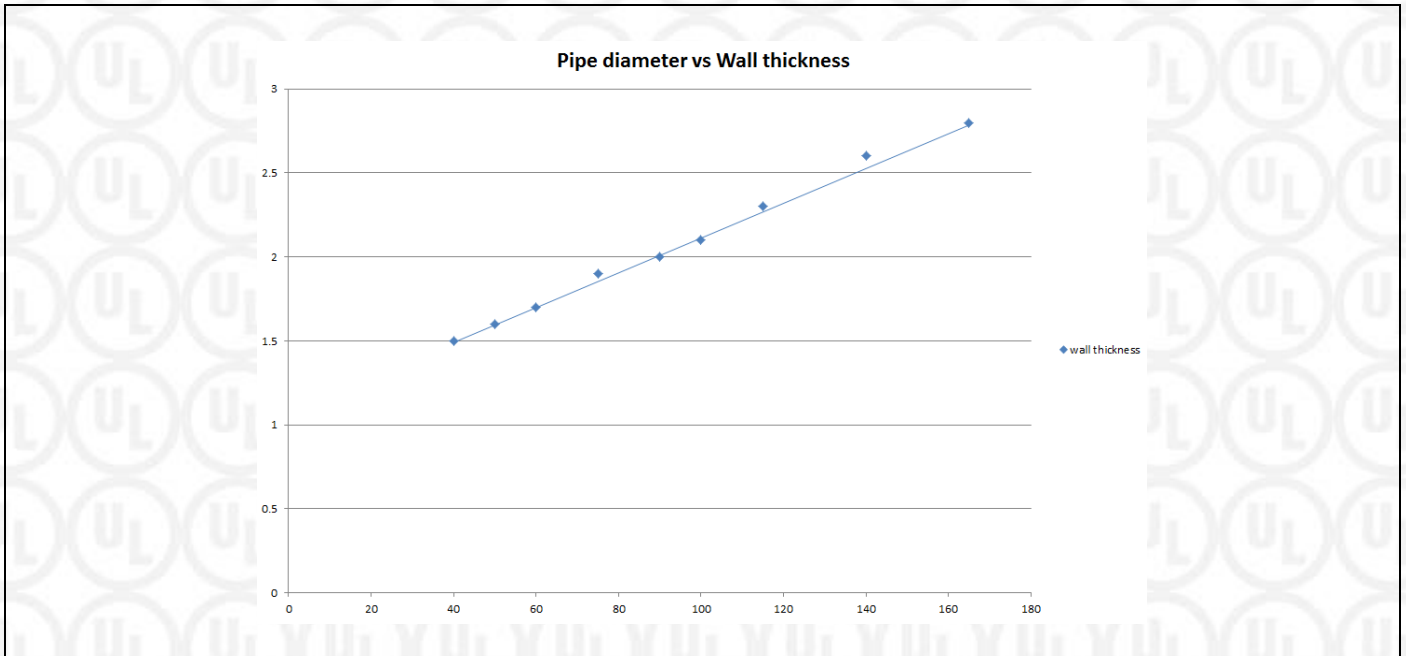
Services	Wrap	Insulation	Classification
<b>Mild or stainless steel pipes</b>			
40 mm diameter/1.5-14.2 mm wall	1 off 50 x 3.6mm Protecta FR Pipe Wrap, fitted central	13 mm Elastomeric insulation minimum class B-s3,d0	<b>EI 240 C/U</b>
165 mm diameter/4.5-14.2 mm wall		9 mm Elastomeric insulation minimum class B-s3,d0	<b>E 240 C/U, EI 30 C/U</b>
40 mm diameter/1.5-14.2 mm wall*	1 off 50 x 1.8mm Protecta FR Pipe Wrap, fitted central	13 -19 mm Elastomeric insulation minimum class B-s3,d0	<b>E 240 C/U, EI 60 C/U</b>
50 mm diameter/1.6-14.2 mm wall*			
60 mm diameter/1.7-14.2 mm wall*			
75 mm diameter/1.9-14.2 mm wall*			
90 mm diameter/2-14.2 mm wall*			
100 mm diameter/2.1-14.2 mm wall*			
115 mm diameter/2.3-14.2 mm wall*			
140 mm diameter/2.6-14.2 mm wall*			
165 mm diameter/2.8-14.2 mm wall*			

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



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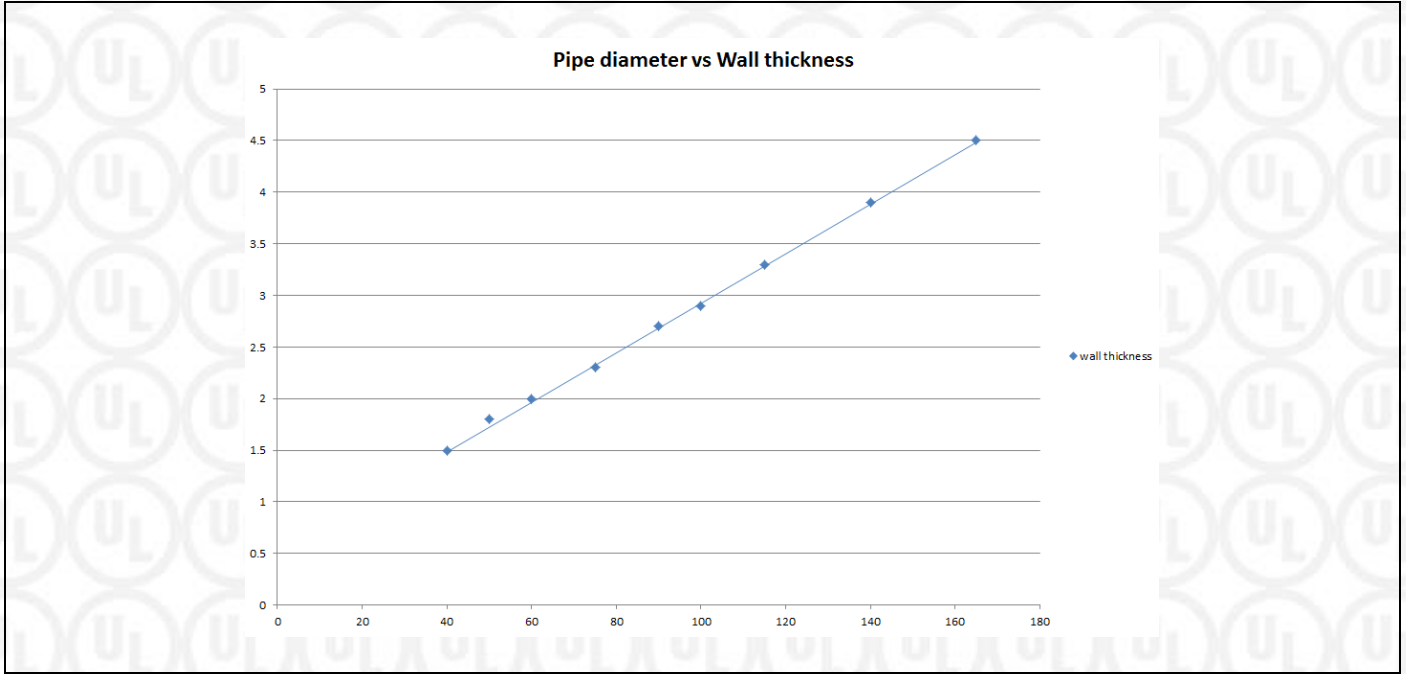
Services	Wrap	Insulation	Classification
<b>Mild or stainless steel pipes</b>			
40 mm diameter/1.5-14.2 mm wall*	1 off 50 x 3.6mm Protecta FR Pipe Wrap, fitted central	13-25 mm Elastomeric insulation minimum class B-s3,d0	<b>E 180 C/U, EI 60 C/U</b>
50 mm diameter/1.8-14.2 mm wall*			
60 mm diameter/2-14.2 mm wall*			
75 mm diameter/2.3-14.2 mm wall*			
90 mm diameter/2.7-14.2 mm wall*			
100 mm diameter/2.9-14.2 mm wall*			
115 mm diameter/3.3-14.2 mm wall*			
140 mm diameter/3.9-14.2 mm wall*			
165 mm diameter/4.5-14.2 mm wall*			

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



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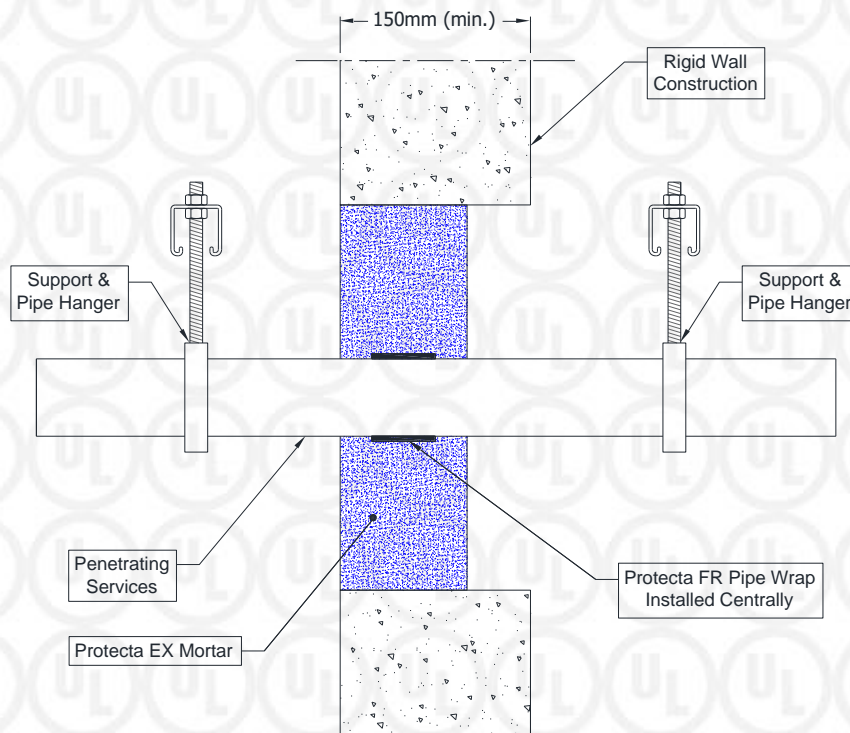
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## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** plastic pipes fitted at any position within the aperture (min. separation 10 mm from seal edges), with min. 100 mm Protecta EX Mortar to either side of the wall. Protecta FR Pipe wraps are required to be centrally within the seal. Maximum seal size as section 4 (page 3).

Construction details:



## Single side penetration seal with pipes

Services	Wrap	Insulation	Classification
PVC-U pipes according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1			
315 mm diameter/9.2 mm wall	1 off 75 x 18 mm Protecta FR Pipe Wrap, fitted central	None	EI 120 C/C



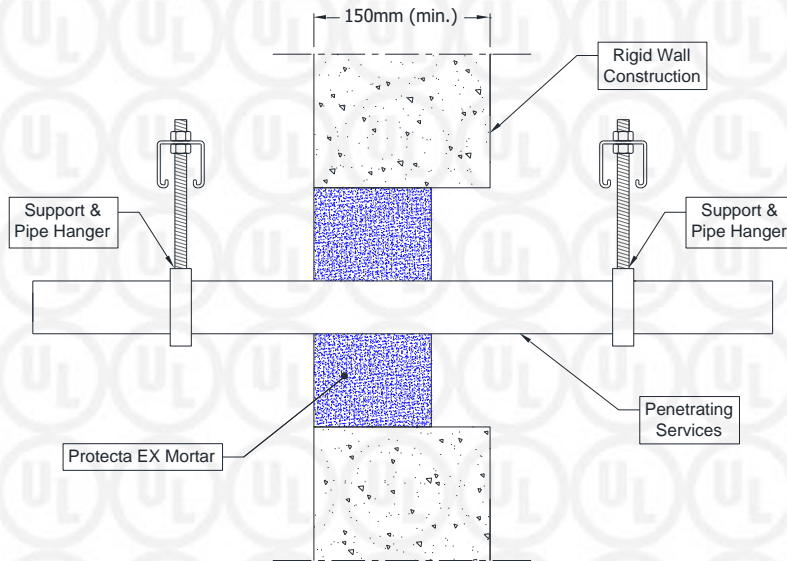
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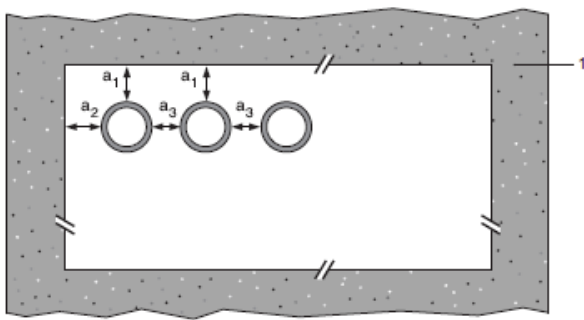
## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** Combustible pipes sealed with Protecta EX Mortar, to either side of the wall. Minimum separation between pipes of 30 mm ( $a_3$ ) and from seal edges 30 mm ( $a_1$  &  $a_2$ ). Maximum seal size as section 4 (page 3).

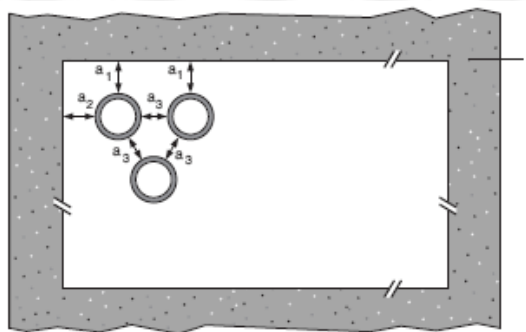
Construction details:



**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





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## Single side penetration seal with pipes

Services	Seal Depth, minimum	Permitted configuration for seal separation	Classification
<b>PVC-U pipes according to EN 1329-1, EN 1452-2 and EN 1453-1<sup>^</sup>, PVC-C according to EN 1566-1</b>			
Diameter up to 32 mm, wall thickness 1.6 – 2.4 mm	100 mm	1 & 2	EI 120 U/C, C/C
<b>PE pipes according to EN 1519-1, EN 12201-2 and EN 12006-1<sup>§</sup>, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Diameter up to 32 mm, wall thickness 1.8 – 3.0 mm	100 mm	1 & 2	EI 120 U/C, C/C
<b>PP pipes according to EN 1852-1: 2009</b>			
Diameter up to 32 mm, wall thickness 1.9 – 4.4 mm	100 mm	1 & 2	EI 120 U/C, C/C



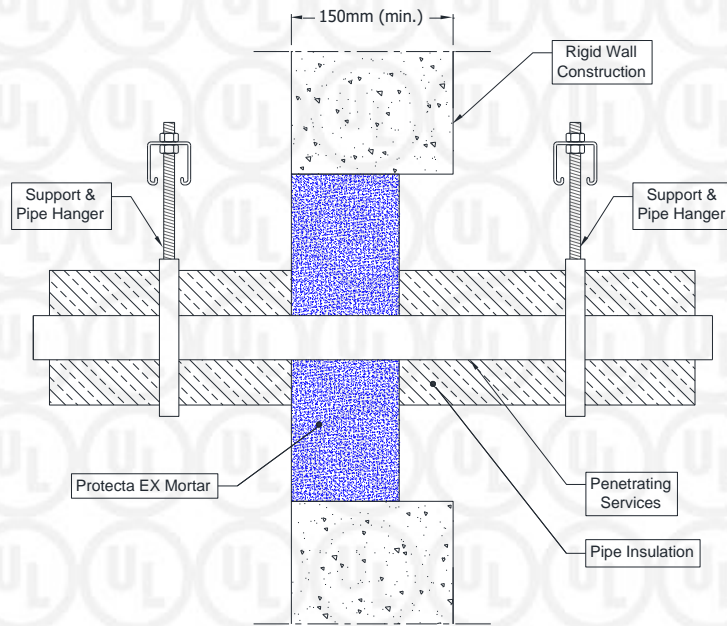
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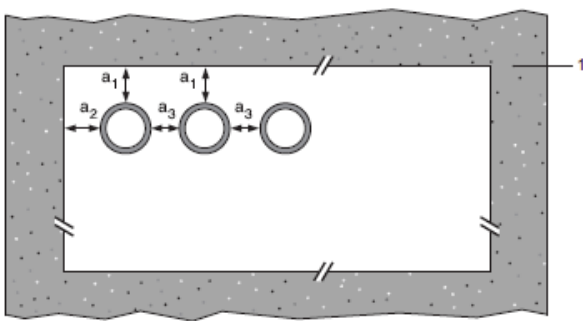
## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes fitted at any position within the aperture (min. separation 20 mm from seal edges, with min. 100 mm Protecta EX Mortar to either sides of the wall (or any position in between))

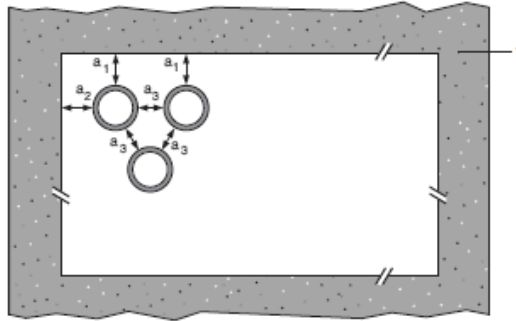
Construction details:



### 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



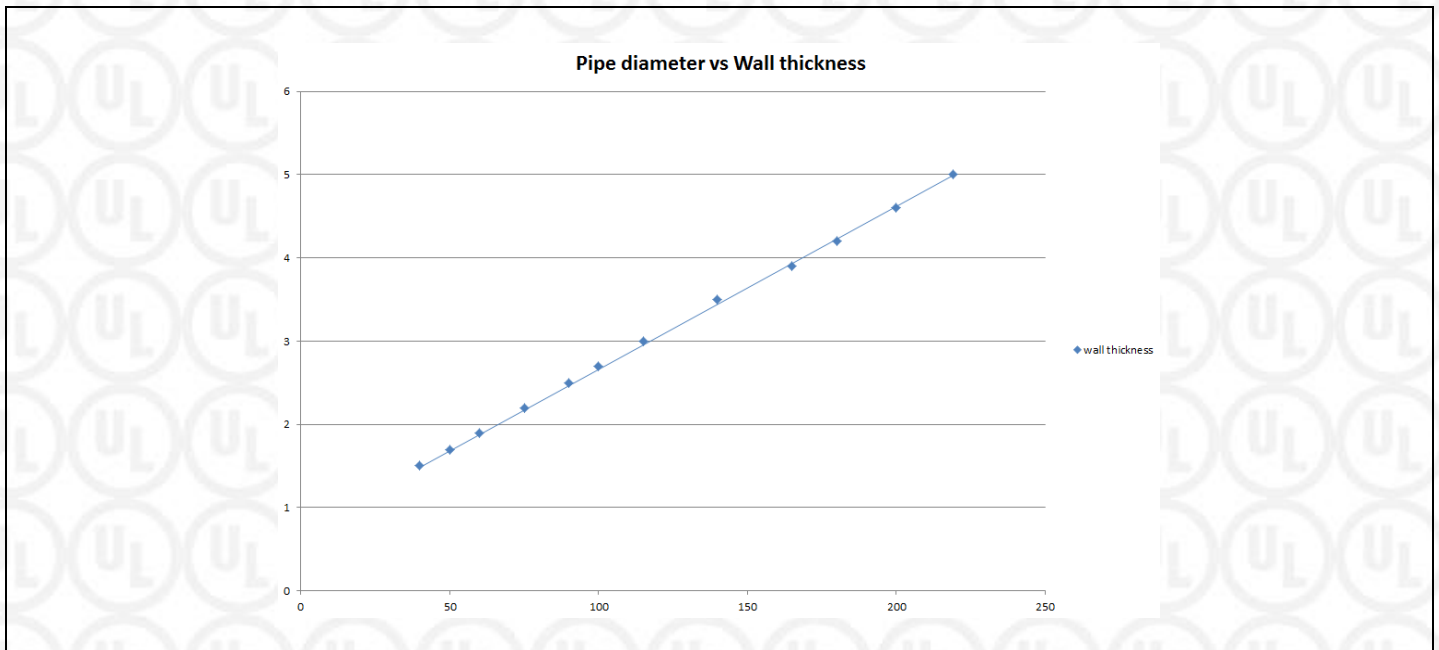
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## Single side penetration seal with pipes

Services	Maximum aperture	Insulation, minimum thickness and density	Classification
Mild or stainless steel pipes			
40 mm diameter/1.5-14.2 mm wall*	As section 4 (page 3)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 120 C/U
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

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



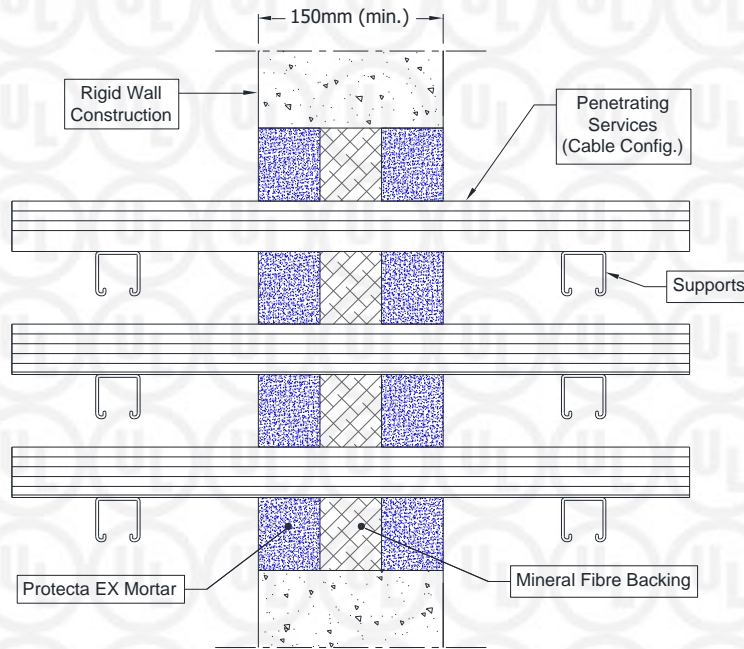
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## Pipe penetration seal with 50 mm deep Protecta EX Mortar to both faces

**Penetration Seal:** Cables fitted with Protecta EX Mortar to both sides of the wall, backed with stone wool insulation board min. 150kg/m<sup>3</sup>. Maximum seal size as section 4 (page 3) and minimum separation between cables and the edge of the seal of 30 mm.

Construction details:



## Single side penetration seal with pipes

Services	Mortar depth	Backing	Insulation	Classification
Blank seals	Min. 50 mm	Min. 50 mm Stone wool min. 150 kg/m <sup>3</sup>	None	EI 240
Electric cables up to 80 mm diameter, single or in a bundle.				E 240, EI 60
Steel cable trays and ladders up to 500 mm wide				EI 60
Telecoms cables up to 21 mm diameter, single or in a bundle up to 100 mm diameter				E 240, EI 120
Unsheathed wires up to 24 mm diameter				



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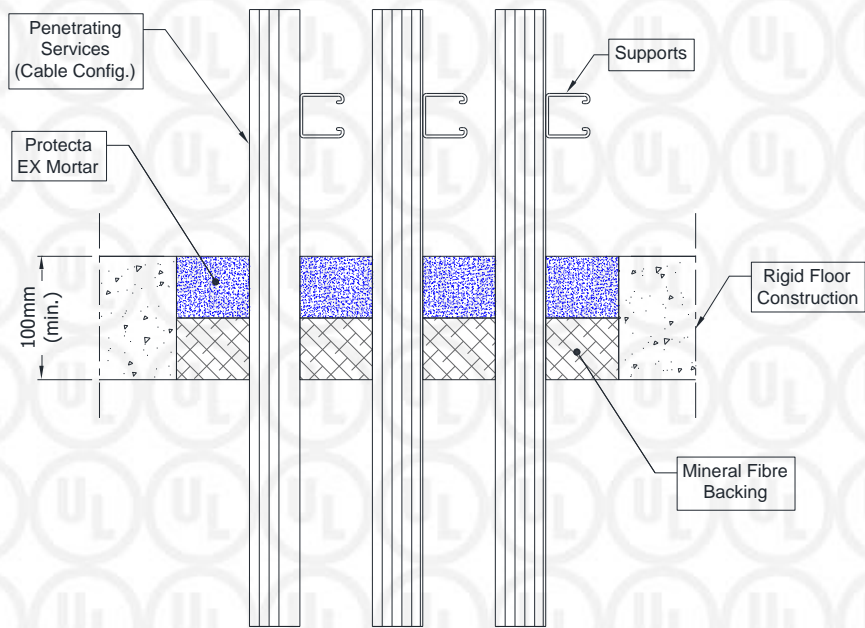
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**Rigid floor constructions according to 1.2.1 with floor thickness of minimum 100 mm**

**Cable penetration seal with 50 mm deep Protecta EX Mortar backed with mineral fibre board**

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 50 mm Protecta EX Mortar flush with the top of the floor, backed with min. 50 mm stone wool min. 150 kg/m<sup>3</sup>

Construction details:



## Single side penetration seal with cables

Services	Maximum aperture	Classification
None (blank)	As section 4 (page 3)	EI 180
Single* electrical cables up to 21 mm Ø		E 180, EI 90
Electrical cables up to 21 mm Ø (single, bundled and on trays)		E 180, EI 60
Electrical cables up to 80 mm Ø (single, bundled and on trays)		E 90, EI 45
Cables up to 21mm Ø in tied bundles up to 100mm Ø		EI 180
Steel cable trays & ladders		E 90, EI 60
Non-sheathed wires up to 17 mm Ø		E 180, EI 60
Non-sheathed wires up to 24 mm Ø		E 180, EI 30
PVC conduits up to 16 mm Ø		EI 180 C/U, EI 180 C/C

\* To be separated by at least 30 mm



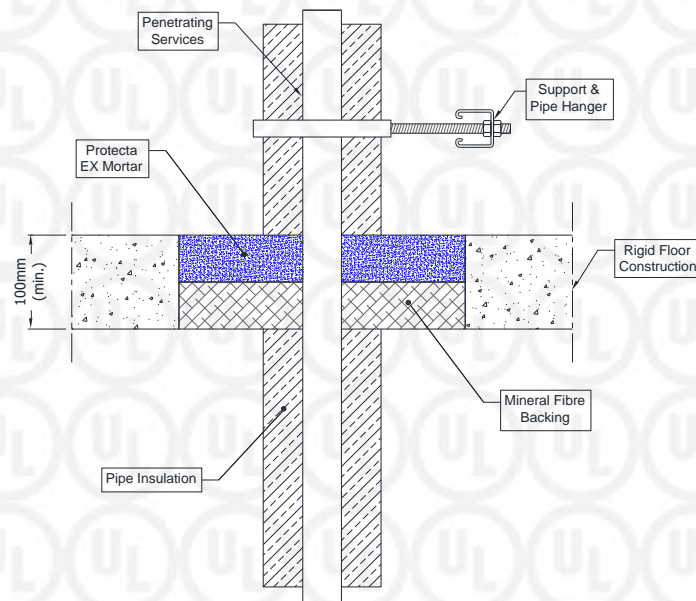
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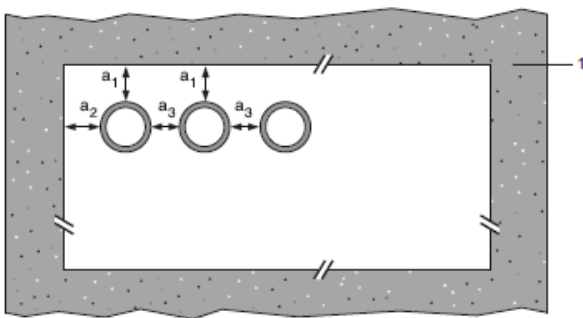
## Pipe penetration seal with 50 mm deep Protecta EX Mortar backed with mineral fibre board

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges, with min. 50 mm Protecta EX Mortar flush with the top of floor, backed with min. 50 mm stone wool min. 150 kg/m<sup>3</sup>)

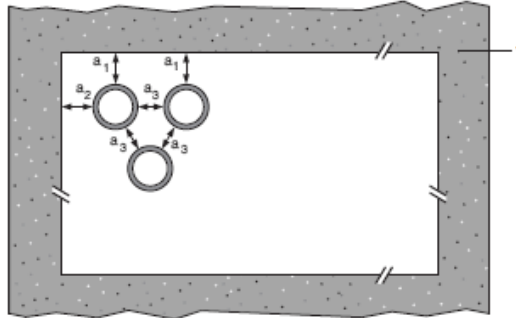
Construction details:



### 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



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## Single side penetration seal with pipes

Services	Maximum aperture	Insulation, minimum thickness and density	Classification
Copper or steel pipes up to 12 mm diameter/ 1-5 mm wall	70 x 70 mm	20 mm stone wool 80 kg/m <sup>3</sup>	EI 240 C/C
Copper or steel pipes up to 54 mm diameter/ 1-14.2 mm wall	115 x 115 mm		E 240 C/C, EI 180 C/C
Copper or steel pipes up to 54 mm diameter/ 1-14.2 mm wall	As section 2. 4)		EI 180 C/C

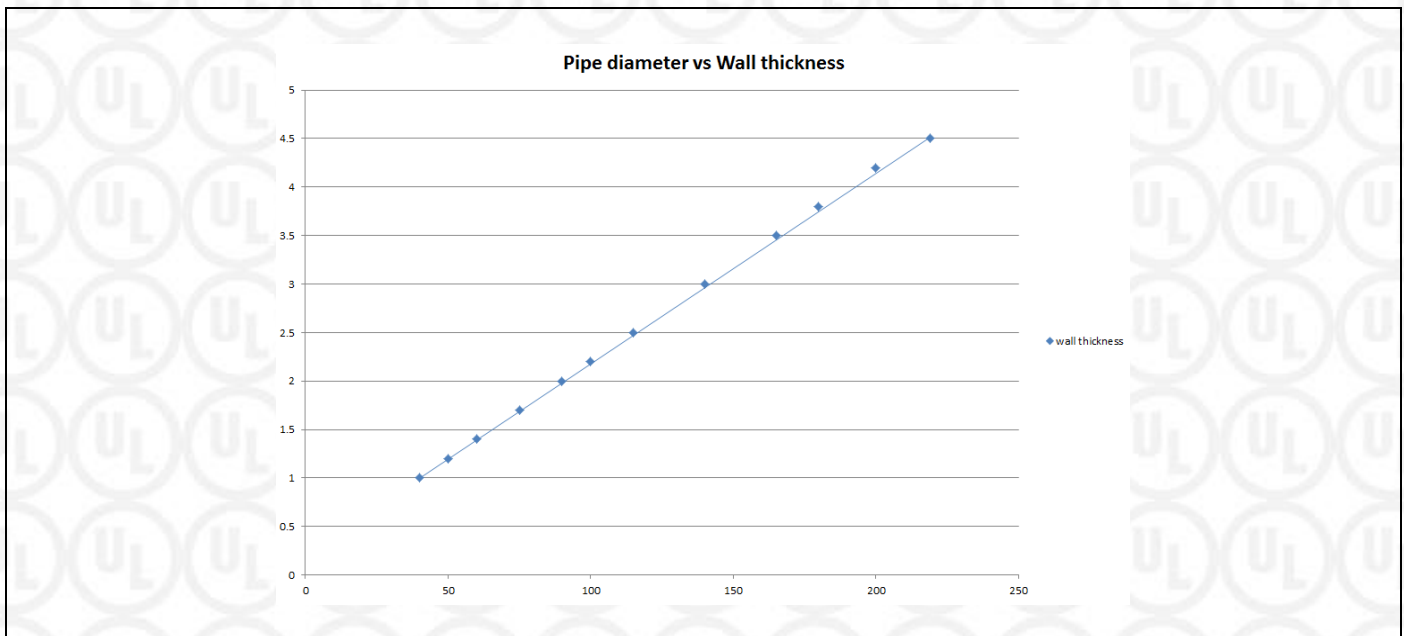


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Services	Maximum aperture	Insulation, minimum thickness and density	Classification
Mild or stainless steel pipes			
40 mm diameter/1-14.2 mm wall*	280 x 280 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall*			
50 mm diameter/1.2-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 90 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

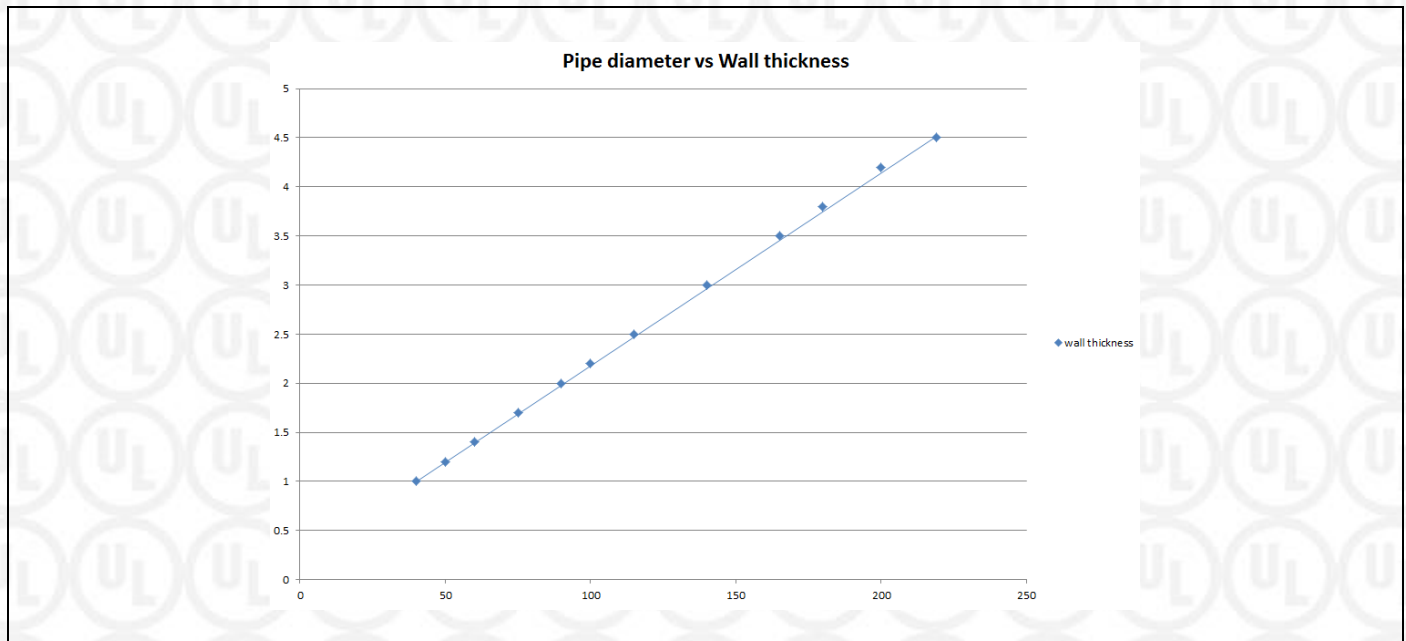




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Services	Maximum aperture	Insulation, minimum thickness and density	Classification
<b>Mild or stainless steel pipes</b>			
40 mm diameter/1-14.2 mm wall*	As section 4 (page 3)	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	<b>EI 180 C/U</b>
40 mm diameter/1-14.2 mm wall*			
50 mm diameter/1.2-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	<b>E 180 C/U, EI 90 C/U</b>
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*			



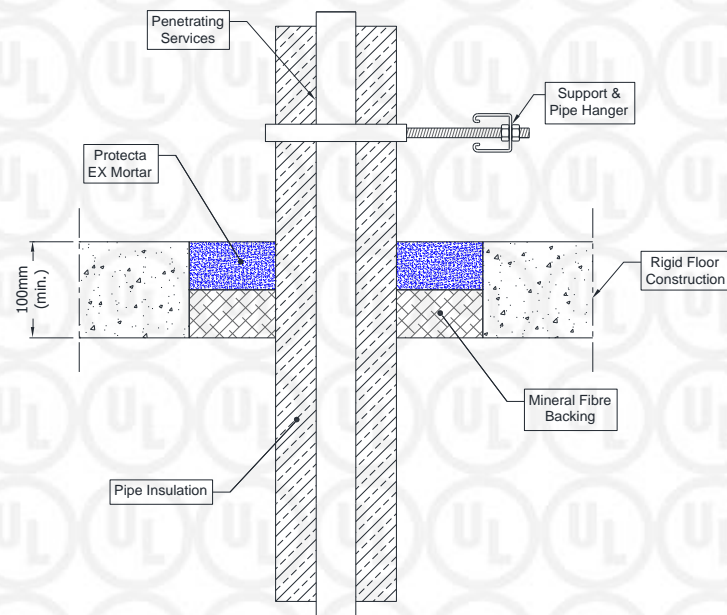
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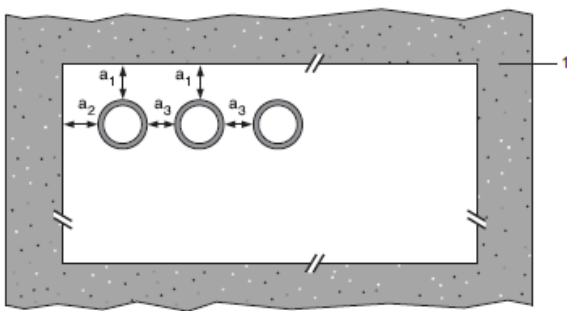
## Pipe penetration seal with 50 mm deep Protecta EX Mortar backed with mineral fibre board

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with min. 50 mm Protecta EX Mortar, backed with min. 50 mm stone wool min. 140 kg/m<sup>3</sup> positioned at any height within the depth of the floor. Minimum separation between penetration seals and seal edges of 30 mm (configuration 1 & 2). Maximum aperture size as section 4 (page 3).

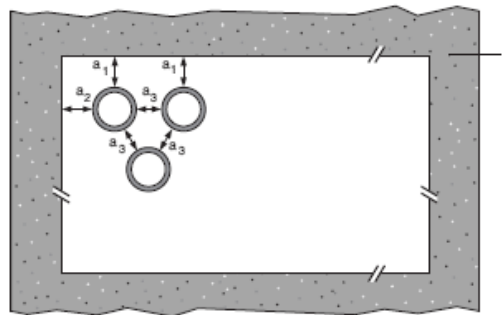
Construction details:



### 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

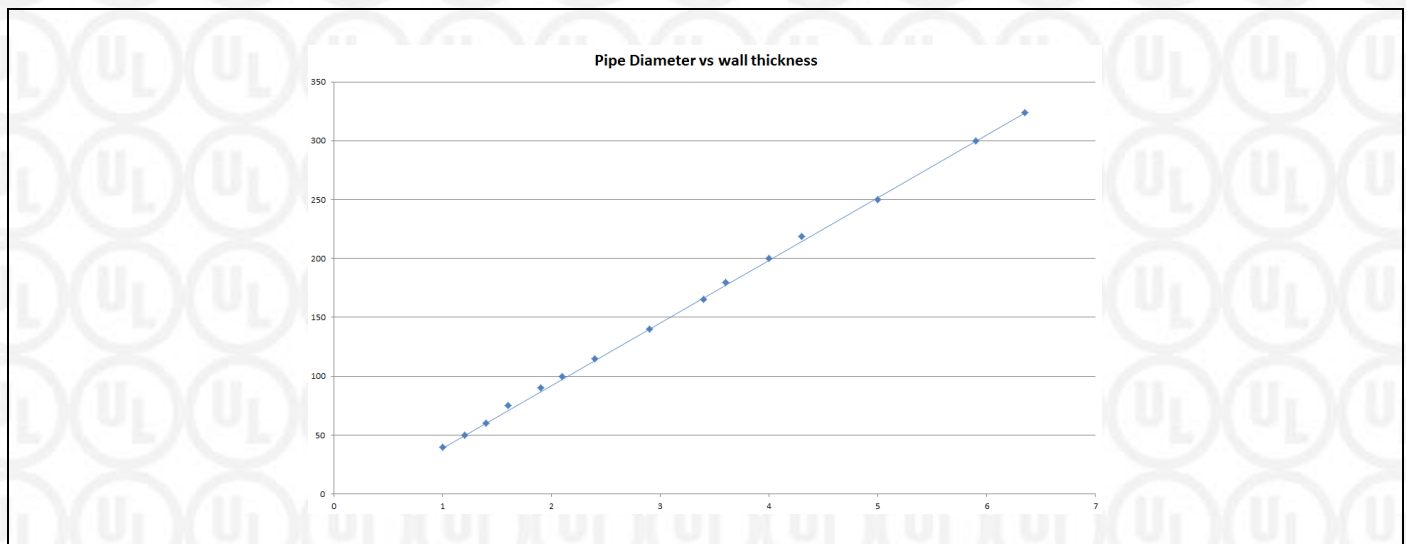


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Mild or stainless steel pipes	Insulation	Classification
40 mm diameter/1-14.2 mm wall	20 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	<b>EI 180 C/U (EI 240 C/U)*</b>
40 mm diameter/1-14.2 mm wall*	30-80 mm thick stone, mineral wool min. 80 kg/m <sup>3</sup>	
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 systems	Insulation	Classification
15 mm diameter x 2.5 mm wall inner /25mm diameter outer	None	<b>EI 180 C/C (EI 240 C/C)*</b>

\* EI 240 in apertures up to a maximum of 550 x 1100 mm



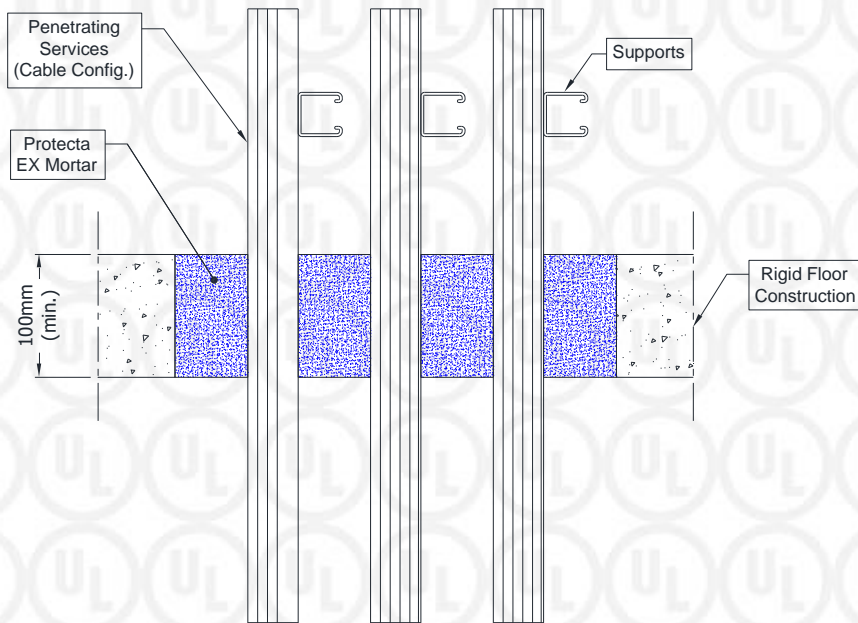
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## Cable penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 100 mm Protecta EX Mortar flush with the top of the floor

Construction details:



### Single side penetration seal with cables

Services	Maximum aperture	Classification
None (blank)	As section 4 (page 3)	EI 240
Electrical cables up to 50 mm Ø (single, bundled and on trays)		E 180, EI 60
Electrical cables up to 80 mm Ø (single, bundled and on trays)		E 120, EI 60
Cables up to 21mm Ø in tied bundles up to 100mm Ø		E 180, EI 120
Steel cable trays & ladders		E 120, EI 60
Non-sheathed cables up to 17 mm Ø		E 180, EI 90
Non-sheathed cables up to 24 mm Ø		E 180, EI 20
PVC conduits up to 16 mm Ø		EI 180 C/U, EI 180 C/C



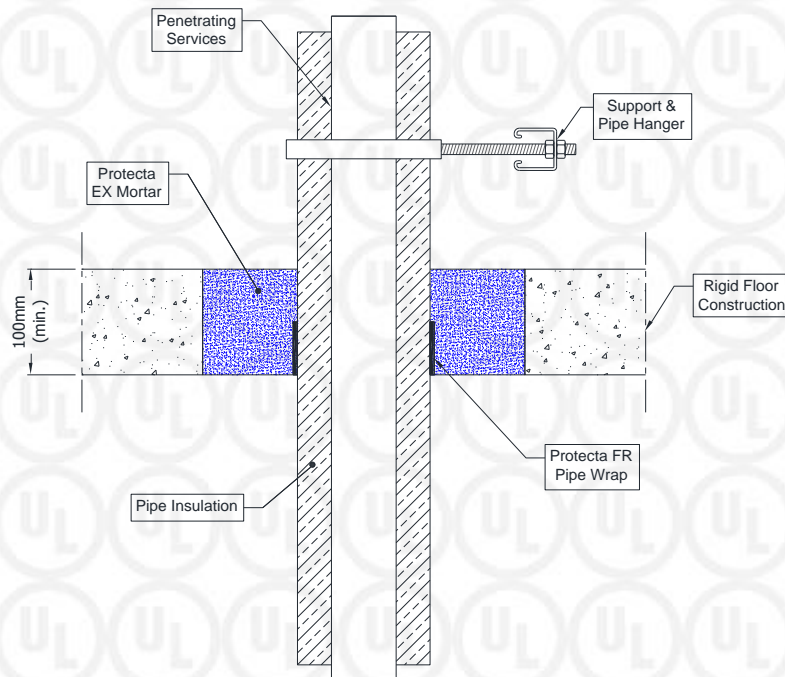
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## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 25 mm from seal edges and 30 mm from other services), with min. 100 mm Protecta EX Mortar at any position within the floor. Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation. Maximum seal size section 4 (page 3).

Construction details:



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## Single side penetration seal with pipes

Services	Wrap	Insulation	Classification
<b>Copper and steel pipes</b>			
12 mm diameter/1 mm wall	50 x 3.6 mm Protecta FR Pipe Wrap fitted to the soffit	9 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	<b>EI 240 C/C</b>
12-54 mm diameter/1-1.2 mm wall		19 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	<b>E 180 C/C, EI 120 C/C</b>
12-54 mm diameter/1-1.2 mm wall		9-18 & 20-25 mm Elastomeric insulation minimum class B- s3,d0 or foil faced Phenolic Foam insulation	<b>180 C/C, EI 60 C/C</b>
12-54 mm diameter/1-1.2 mm wall		25 mm foil faced Phenolic Foam insulation	<b>E 180 C/C, EI 120 C/C</b>
12-54 mm diameter/1-1.2 mm wall		40 mm PU Foam insulation	<b>E 120 C/C, EI 60 C/C</b>
<b>Alupex pipes</b>			
16 mm diameter/2.25 mm wall	50 x 3.6 mm Protecta FR Pipe Wrap fitted to the soffit	9 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	<b>EI 240 C/C</b>
16 mm diameter/2.25 mm wall		9-13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	<b>E 240 C/C, EI 180 C/C</b>
20 mm diameter/2.25 mm wall			
25 mm diameter/2.5 mm wall		9-24 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	<b>E 180 C/C, EI 90 C/C</b>
16 mm diameter/2.25 mm wall			
20 mm diameter/2.5 mm wall			
26 mm diameter/3 mm wall			
32 mm diameter/3 mm wall			
40 mm diameter/3.5 mm wall			
50 mm diameter/4 mm wall			
63 mm diameter/4.5 mm wall		25 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	<b>EI 180 C/C</b>
75 mm diameter/4.7 mm wall			
16 mm diameter/2.25 mm wall			
20 mm diameter/2.5 mm wall			
26 mm diameter/3 mm wall			
32 mm diameter/3 mm wall			
40 mm diameter/3.5 mm wall			
50 mm diameter/4 mm wall			
63 mm diameter/4.5 mm wall			
75 mm diameter/4.7 mm wall			



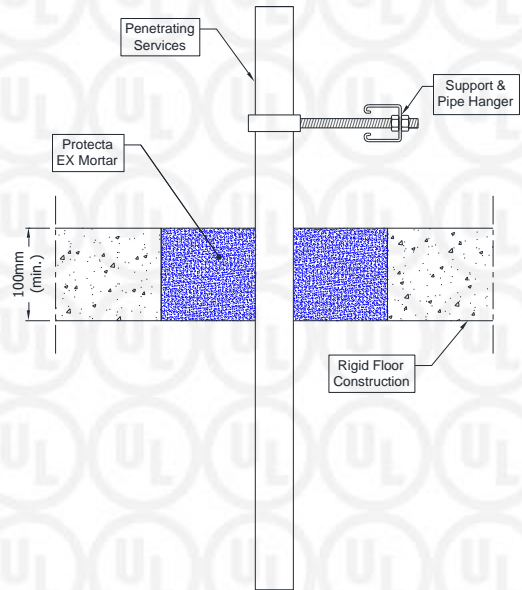
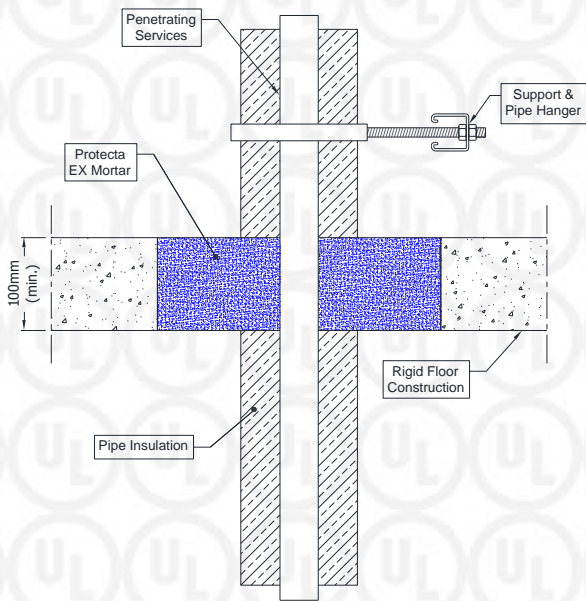
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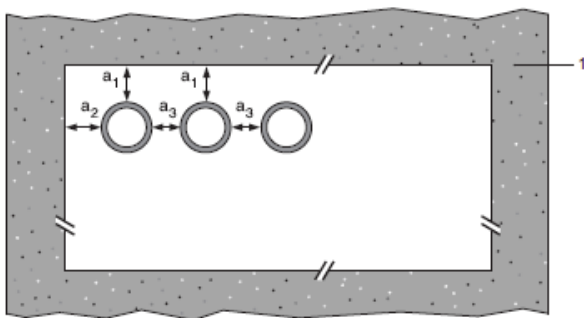
## Pipe penetration seal with Protecta EX Mortar

**Penetration Seal:** 1000 mm (min.)\* LI (Local Interrupted) or CI (Continuous Interrupted) insulated and non-insulated metallic and composite pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with Protecta EX Mortar to either surface of the floor or anywhere between. Maximum seal size as section 4 (page 3).

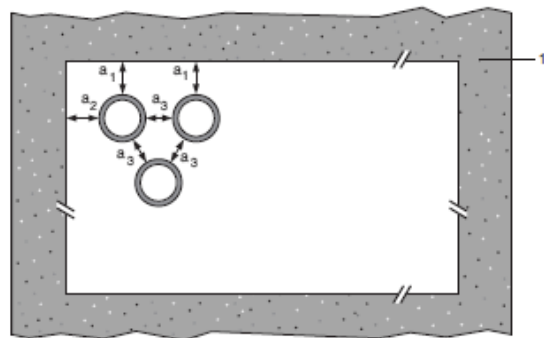
Construction details:



**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



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## Single side penetration seal with pipes

Services	Minimum mortar depth and floor thickness	Insulation	Classification
Up to 16 mm diameter steel pipes 1.5-7 mm wall	100 mm	None	E 240 C/C, EI 120 C/C
Up to 63.5 mm diameter steel pipes 1.6-14.2 mm wall	150 mm		E 180 C/U, EI 90 C/U
Up to 63 mm diameter steel pipes 1.5-14.2 mm wall	100 mm	Protecta FR Service Coat FR-1, 1.5 mm DFT extending 300 mm from the top face of the fire seal	E 240 C/U, EI 45 C/U
Up to 90 mm diameter steel pipes 1.5-14.2 mm wall	100 mm		E 240 C/U, EI 30 C/U
Up to 12 mm diameter Copper and steel pipes 0.7-1.5 mm wall	120 mm	None	E 240 C/C, EI 180 C/C
Up to 54 mm diameter Copper and steel pipes 1.5-14.2 mm wall	100 mm		E 120 C/C, EI 20 C/C
75 mm Alupex composite pipes with 4.6 mm wall	100 mm		E 240 U/C, EI 20 U/C

Services	Minimum mortar depth and floor thickness	Insulation, minimum thickness and density	Classification
<b>Mild or stainless steel pipes</b>			
40 mm diameter/1.5-14.2 mm wall*	100 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 120 C/U
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.8-14.2 mm wall*			
75 mm diameter/2.1-14.2 mm wall*			
90 mm diameter/2.3-14.2 mm wall*			
100 mm diameter/2.5-14.2 mm wall*			
115 mm diameter/2.8-14.2 mm wall*			
140 mm diameter/3.2-14.2 mm wall*			
165 mm diameter/ 3.6-14.2 mm wall*			
180 mm diameter/ 3.9-14.2 mm wall*			
200 mm diameter/ 4.2-14.2 mm wall*			
219 mm diameter/ 4.5-14.2 mm wall*			

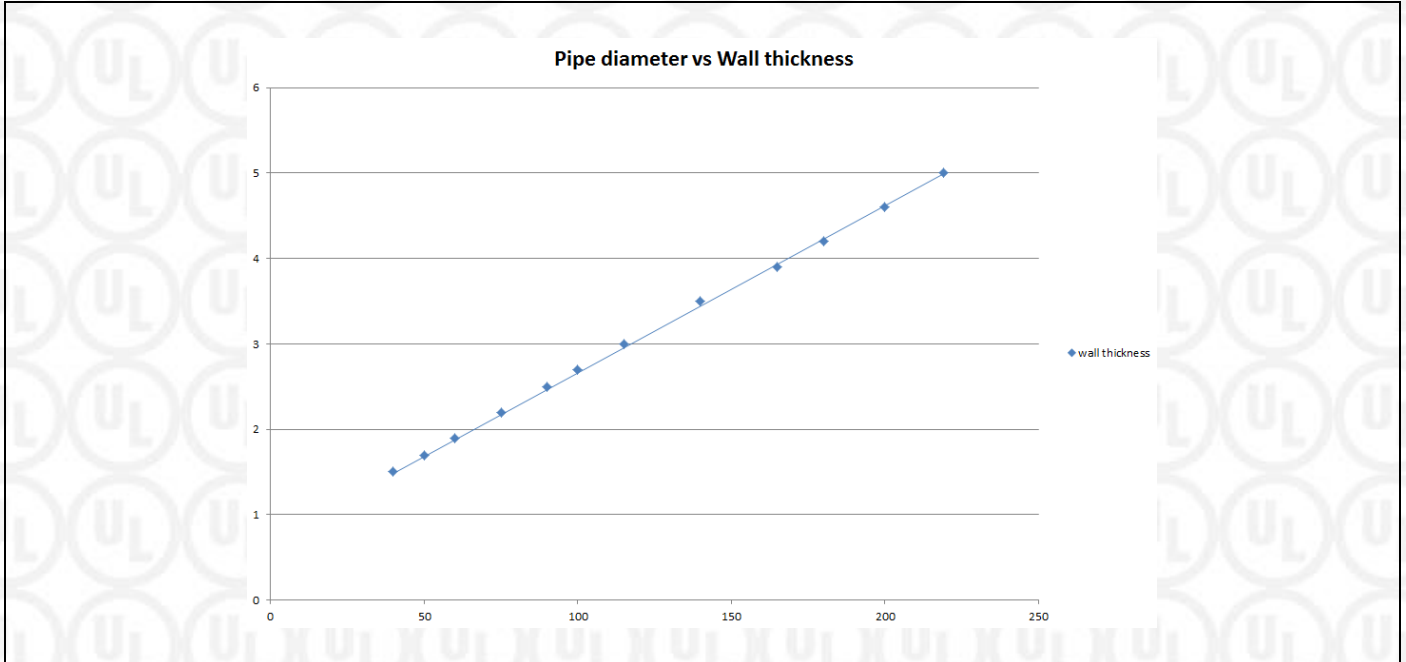
\* Typical pipe diameters shown, see below graph for intermediate sizes





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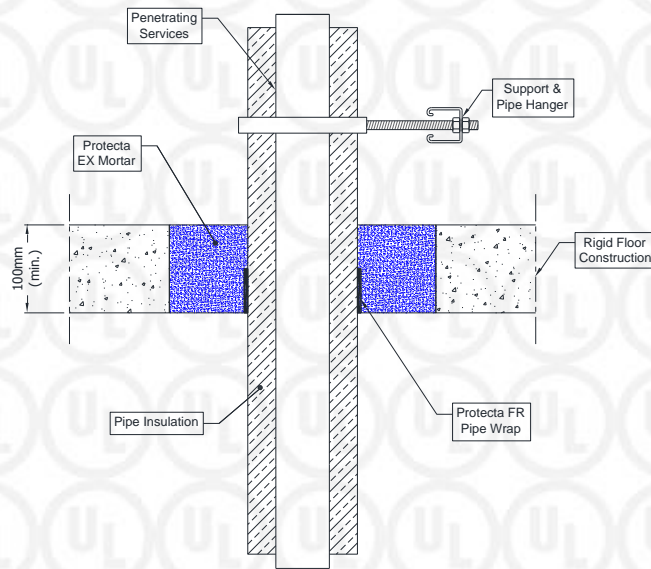
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## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with min. 100 mm Protecta EX Mortar to the top surface of the floor. Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation. Maximum seal size as section 4 (page 3).

Construction details:



## Single side penetration seal with pipes

Services	Wrap	Insulation	Classification
<b>Mild or stainless steel pipes</b>			
40 mm diameter/1.5-14.2 mm wall	1 off 50 x 1.8 mm Protecta FR Pipe Wrap, fitted at soffit	13 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	<b>EI 180 C/U</b>
40 mm diameter/1.5-14.2 mm wall*		13 -19 mm Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	
50 mm diameter/1.6-14.2 mm wall*			
60 mm diameter/1.7-14.2 mm wall*			
75 mm diameter/1.9-14.2 mm wall*			
90 mm diameter/2-14.2 mm wall*			
100 mm diameter/2.1-14.2 mm wall*			
115 mm diameter/2.3-14.2 mm wall*			
140 mm diameter/2.6-14.2 mm wall*			
165 mm diameter/2.8-14.2 mm wall*			

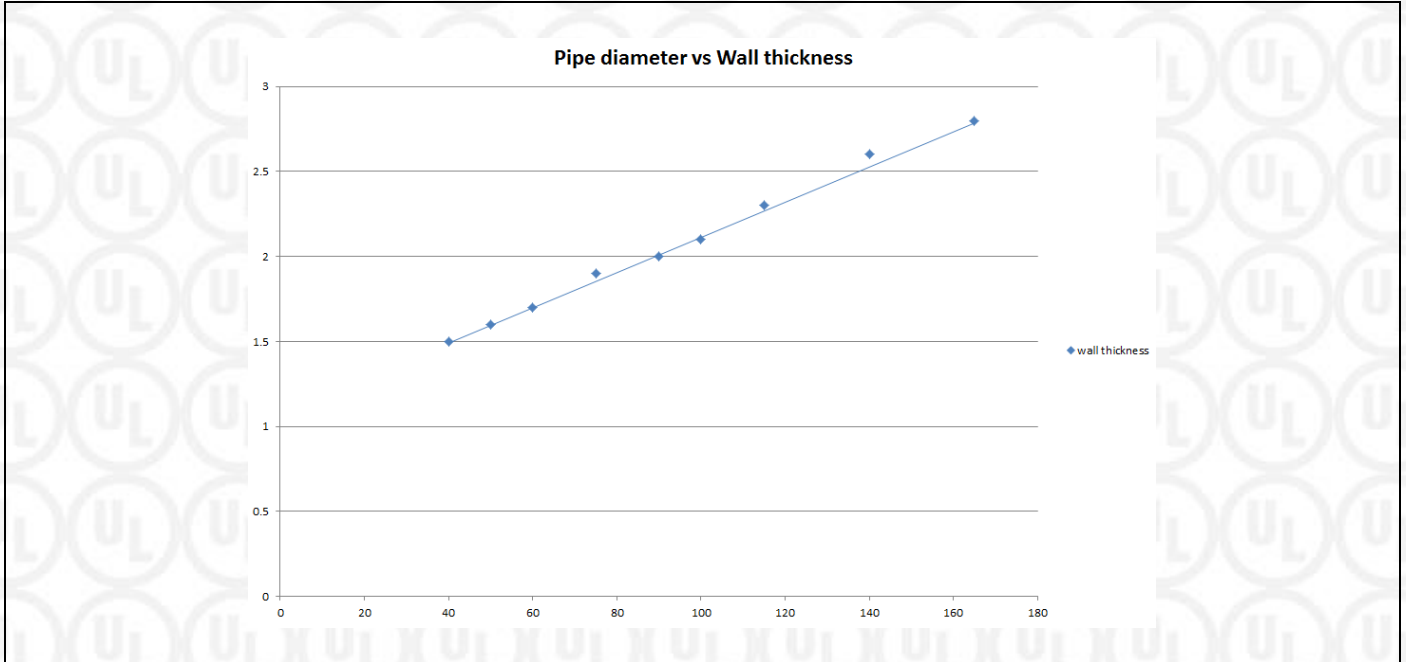
\* Typical pipe diameters shown, see below graph for intermediate sizes

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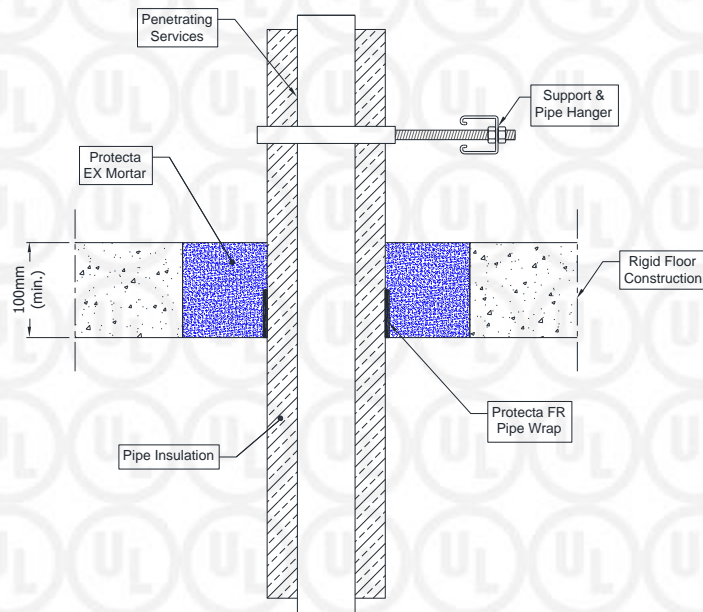
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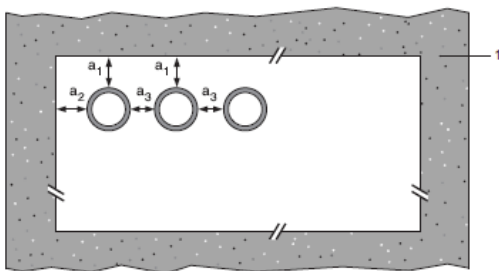
## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes sealed with Protecta FR wraps, fitted at any position within the aperture, with min. 100 mm Protecta EX Mortar Seal. Minimum separation between penetration seals and seal edges of 30 mm (Configuration 1 & 2). Maximum seal size as section 4 (page 3).

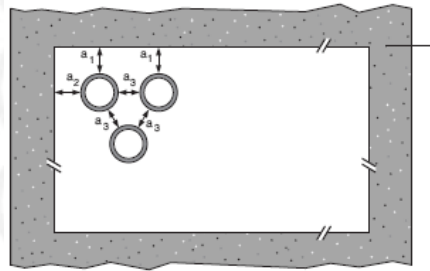
Construction details:



### 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



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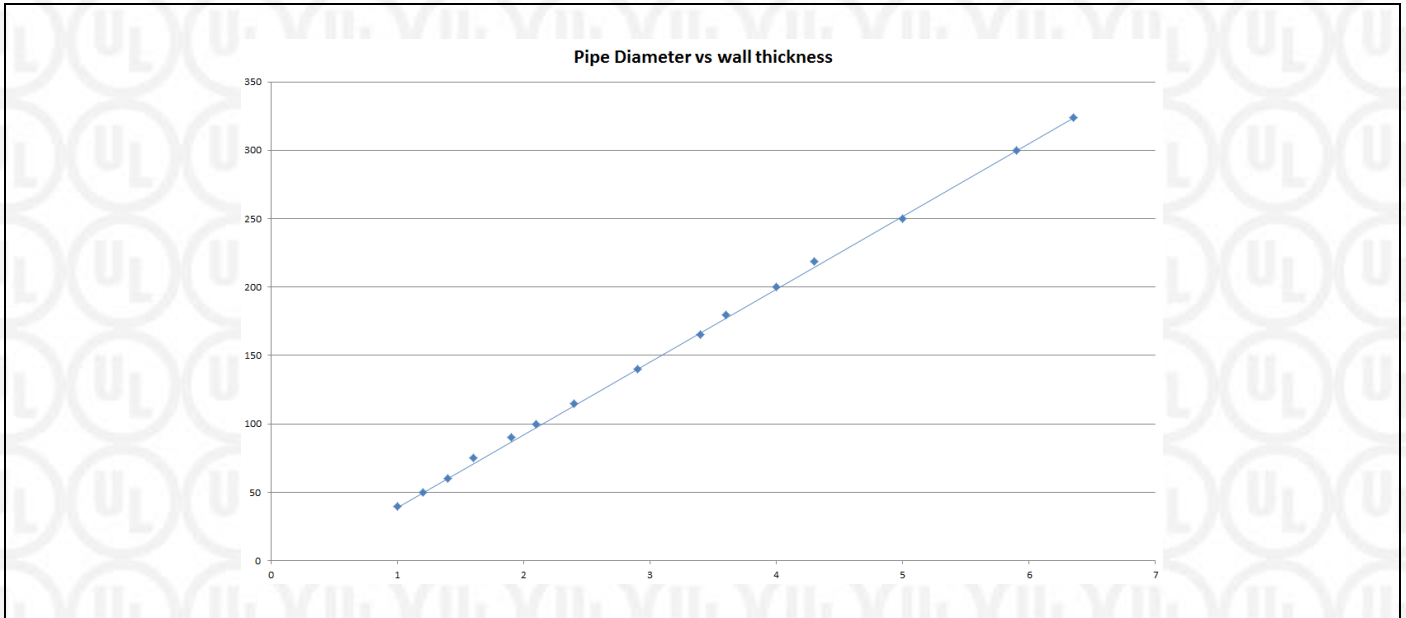
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Mild or stainless steel pipes	Insulation	Protecta FR Wrap	Classification
40 mm diameter/1-14.2 mm wall	25 mm thick Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation		EI 240 C/U
40 mm diameter/1-14.2 mm wall*	25mm thick Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	50 x 3.6 mm (2 x 1.8 layer)	E 240 C/U EI 120 C/U
50 mm diameter/1.2-14.2 mm wall*			
60 mm diameter/1.4-14.2 mm wall*			
75 mm diameter/1.6-14.2 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*			
40 mm diameter/1-14.2 mm wall*	25-50mm thick Elastomeric insulation minimum class B-s3,d0 or foil faced Phenolic Foam insulation	50 x 5.4 mm (3 x 1.8 layer)	EI 120 C/U
50 mm diameter/1.2-14.2 mm wall*			
60 mm diameter/1.4-14.2 mm wall*			
75 mm diameter/1.6-14.2 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*			



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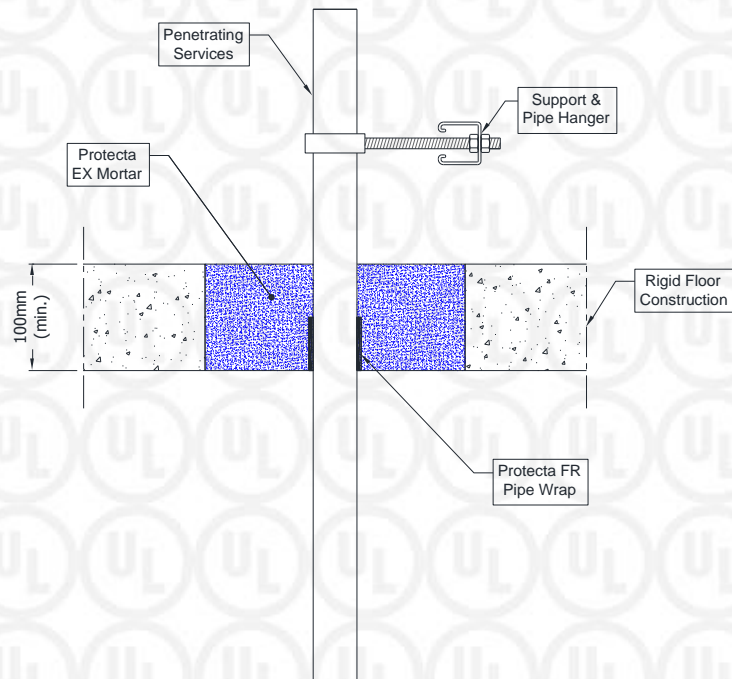
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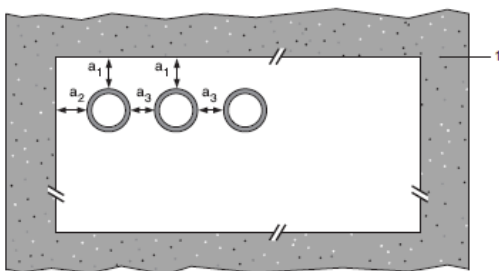
## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** Plastic pipes fitted at any position within the aperture, with min. 100 mm Protecta EX Mortar to the either surface of the floor or anywhere between. Protecta FR Pipe wraps are required to be fitted to the bottom of the seal, as indicated below. Minimum separation between penetration seals and seal edges of 30 mm (Configuration 1 & 2).

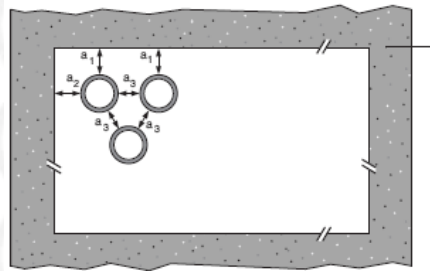
Construction details:



**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



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## Single side penetration seal with pipes

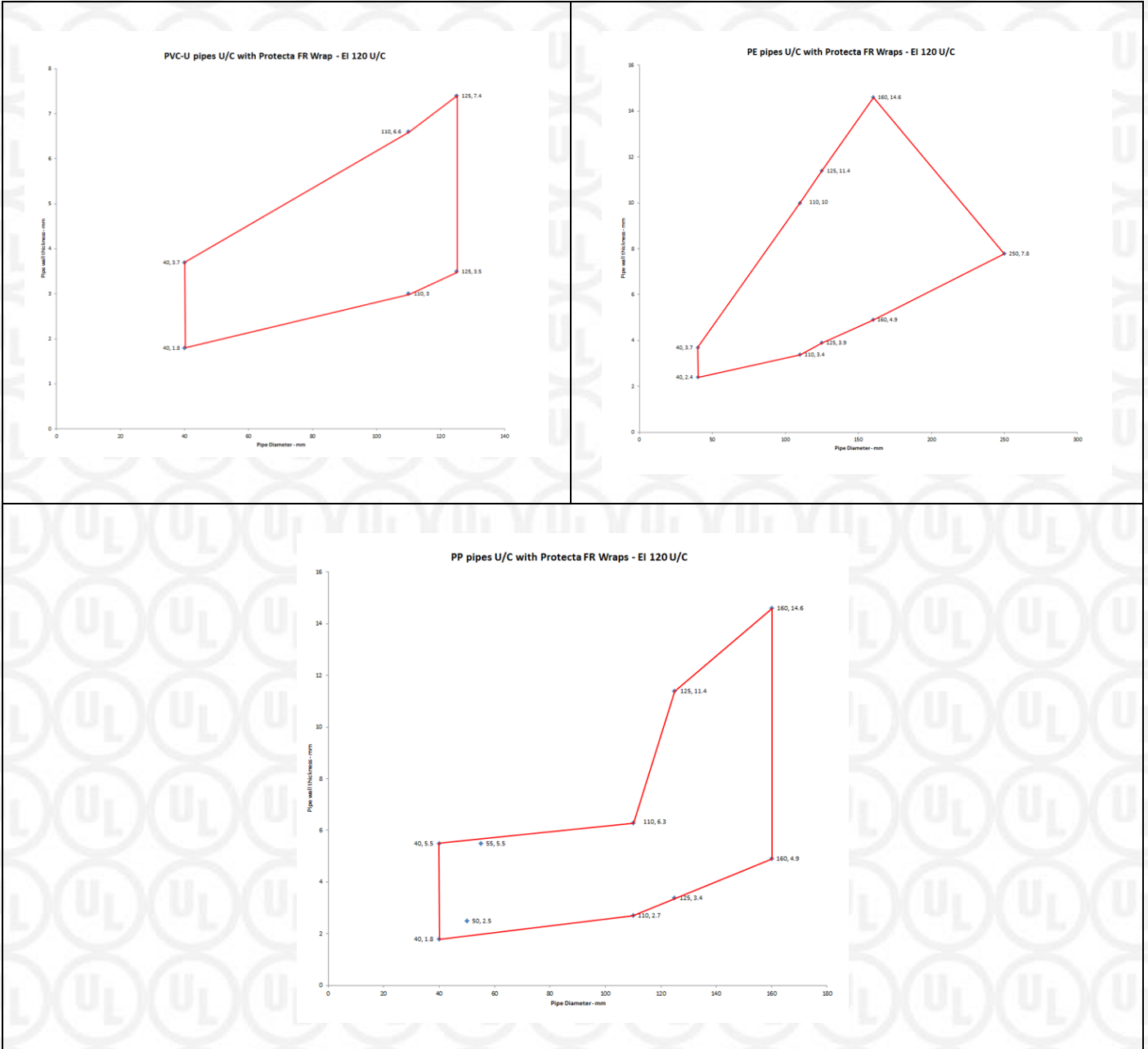
Services	Wrap	Maximum aperture	Classification
<b>PVC-U pipes according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>			
Up to 40 mm diameter / 1.8-3.7 mm wall	50 x 1.8 mm	As section 4 (page 3)	E 180 U/U, EI 120 U/U
Up to 110 mm diameter / 3.0-6.6 mm wall	50 x 3.6 mm		EI 240 U/C
Up to 125 mm diameter / 3.5-7.4 mm wall	50 x 7.2 mm		EI 120 U/C
Up to 160 mm diameter / 4.5 mm wall	50 x 10.8 mm		EI 240 C/C
Up to 160 mm diameter / 4.5-9.5 mm wall	50 x 10.8 mm		EI 90 C/C
Up to 110 mm diameter bundles containing pipes up to 20 mm diameter/ 1.0-1.5 mm wall, with or without up to 14 mm Ø cables (may be combined with PP and PE conduits)	50 x 3.6 mm		E 90 U/U, EI 60 U/U
Up to 110 mm diameter/ 2.7-6.6 mm wall, containing up to 90mm Ø bundle of up to 14 mm Ø cables	50 x 3.6 mm		EI 120 U/C
<b>PP pipes according to EN 1451-1</b>			
Up to 40 mm diameter /1.8-4.4 mm wall	None	As section 4 (page 3)	EI 120 U/C
Up to 40 mm diameter /1.8-5.5 mm wall	50 x 1.8 mm		EI 120 U/U
Up to 50 mm diameter /2.5-5.5 mm wall	50 x 3.6 mm		EI 240 C/C
Up to 75 mm diameter /3.5-5.5 mm wall	50 x 3.6 mm		EI 240 C/C
Up to 110 mm diameter /2.7-6.3 mm wall	50 x 3.6 mm		EI 240 U/C
Up to 125 mm diameter /3.4-11.4 mm wall	50 x 7.2 mm		EI 240 U/C
Up to 160 mm diameter /4.9-14.6 mm wall	50 x 10.8 mm		EI 240 U/C
Up to 110 mm diameter bundles containing pipes up to 20 mm diameter/ 1.9 mm wall, with or without up to 14 mm Ø cables (may be combined with PVC and PE conduits)	50 x 3.6 mm		E 90 U/U, EI 60 U/U
Up to 110 mm diameter/ 3.4-6.3 mm wall, containing up to 90mm Ø bundle of up to 14 mm Ø cables	50 x 3.6 mm		EI 60 U/C
<b>PE pipes according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Up to 40 mm diameter / 2.0-4.4 mm wall	None	As section 4 (page 3)	EI 120 U/C
Up to 40 mm diameter / 2.4-3.7 mm wall	50 x 1.8 mm		EI 240 U/U
Up to 110 mm diameter / 3.4-10.0 mm wall	50 x 3.6 mm		EI 120 U/C
Up to 125 mm diameter / 3.9-11.4 mm wall	50 x 7.2 mm		EI 240 U/C
Up to 160 mm diameter / 4.9-14.6 mm wall	50 x 10.8 mm		EI 120 U/C
Up to 250 mm diameter / 7.8 mm wall	75 x 12.6 mm		EI 180 C/C
Up to 110 mm diameter bundles containing pipes up to 32 mm diameter/ 2.0-2.3 mm wall, with or without up to 14 mm Ø cables (may be combined with PVC and PP conduits)	50 x 3.6 mm		E 90 U/U, EI 60 U/U
Up to 110 mm diameter/ 2.7-10.0 mm wall, containing up to 90mm Ø bundle of up to 14 mm Ø cables	50 x 3.6 mm		E 120 U/C, EI 60 U/C





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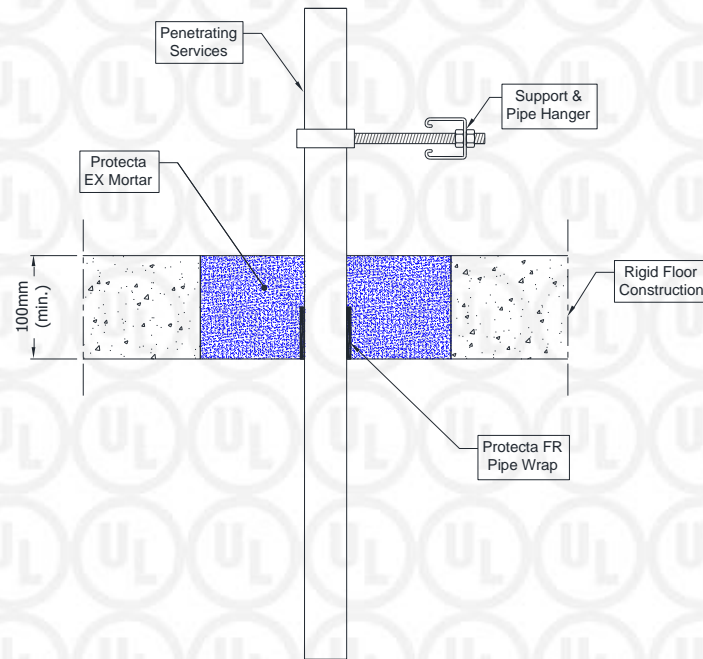
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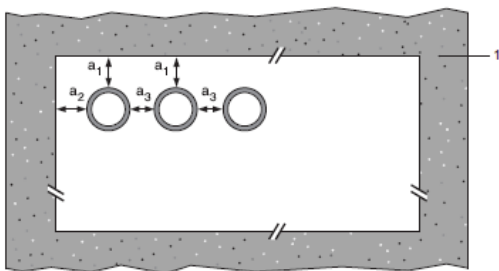
## Pipe penetration seal with 100 mm deep Protecta EX Mortar

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with min. 100 mm Protecta EX Mortar to either surface of the floor or anywhere between. Protecta FR Pipe Wraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size as section 4 (page 3).

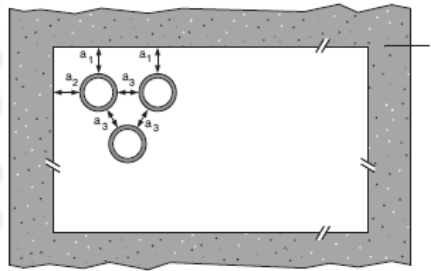
Construction details:



### 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



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Services	Wrap	Permitted configuration for seal separation	Classification
<b>PVC-U pipes according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>			
160 mm diameter / 9.5 mm wall	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 90 U/C
<b>PEX pipe in pipe systems according to ISO 15875</b>			
Maximum 54 mm diameter/0.4 mm wall thickness (outer pipe), 28 mm diameter/4.0 mm wall thickness (inner pipe)	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 C/C
Maximum 25 mm diameter/0.6 mm wall thickness (outer pipe), 15 mm diameter/2.5 mm wall thickness (inner pipe), single, or in bundles maximum 50 mm diameter	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 C/C
<b>Rehau Raupiano Plus PP-DD according to DIN 4102</b>			
40-50 mm diameter/1.8-2.7 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter/2.7 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C
125 mm diameter/3.1 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	E 240 U/C, EI 120 U/C
160 mm diameter/3.9 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 120 U/C
<b>Polo-Kal NG Poloplast PP-MV according to DIN 4102</b>			
32-50 mm diameter/2.0 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	E 240 U/C, EI 180 U/C
51-110 mm diameter/3.4 mm wall thickness	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 180 U/C
125 mm diameter/3.9 mm wall thickness	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	EI 240 U/C
160 mm diameter/4.3 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 240 U/C
<b>Aquatherm Green SDR9 MF PP-RP according to ISO 21003</b>			
32 mm diameter/3.6 mm wall thickness	50 x 1.8 mm (1 x 1.8 layer)	1 & 2	EI 240 C/C
40-50 mm diameter/5.6-12.3 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 C/C
63-110 mm diameter/12.3 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 C/C
<b>Wavin SiTech + PP-M B according to EN 13501-1</b>			
32-50 mm diameter/1.8-3.4 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter/3.4 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C

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

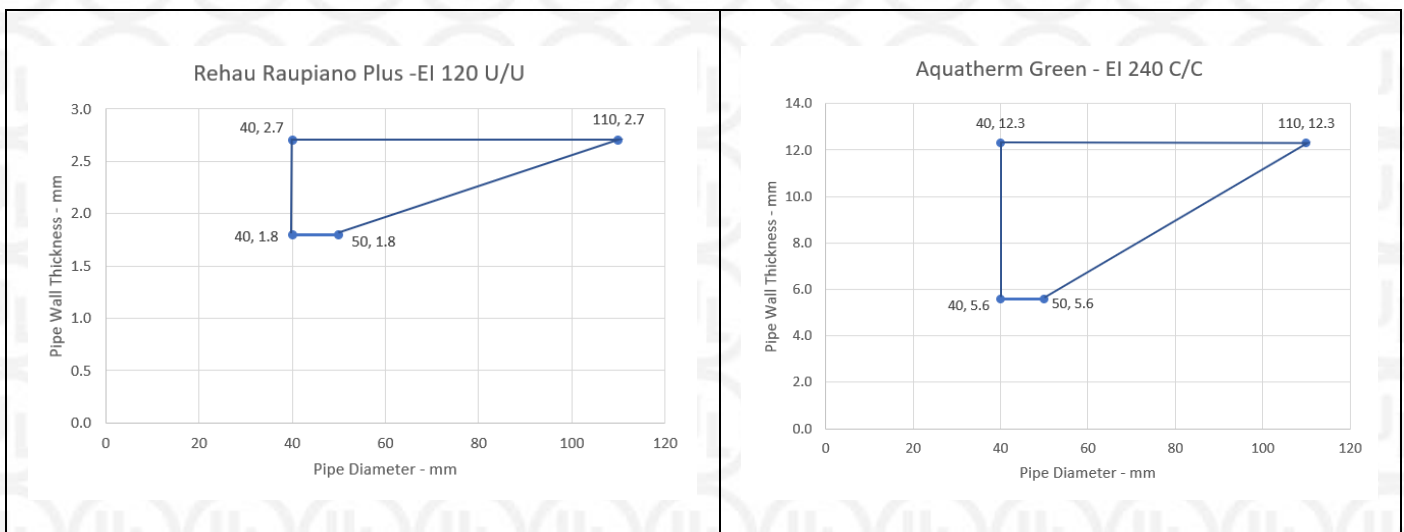


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Services	Wrap	Permitted configuration for seal separation	Classification
<b>Gilbert Silent PP according to DIN 4102</b>			
32-50 mm diameter/1.8-3.4 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter/3.4 mm wall thickness*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C
<b>BluePower Multilayer pipes according to EN 1451-1</b>			
32-50 mm diameter*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 U/U
75-110 mm diameter*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C
125 mm diameter/3.9 mm wall thickness*	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	EI 120 U/C
160 mm diameter/4.9 mm wall thickness*	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	EI 240 U/C
<b>Uponor Decibel pipes according to EN 14366</b>			
32-50 mm diameter*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/U
75-110 mm diameter*	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 120 U/C
<b>Wavin AS+ pipes according to EN 12056 and DIN 1986-100</b>			
32-50 mm diameter *	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 U/C
75-110 mm diameter *	50 x 3.6 mm (2 x 1.8 layers)	1 & 2	EI 240 C/C

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

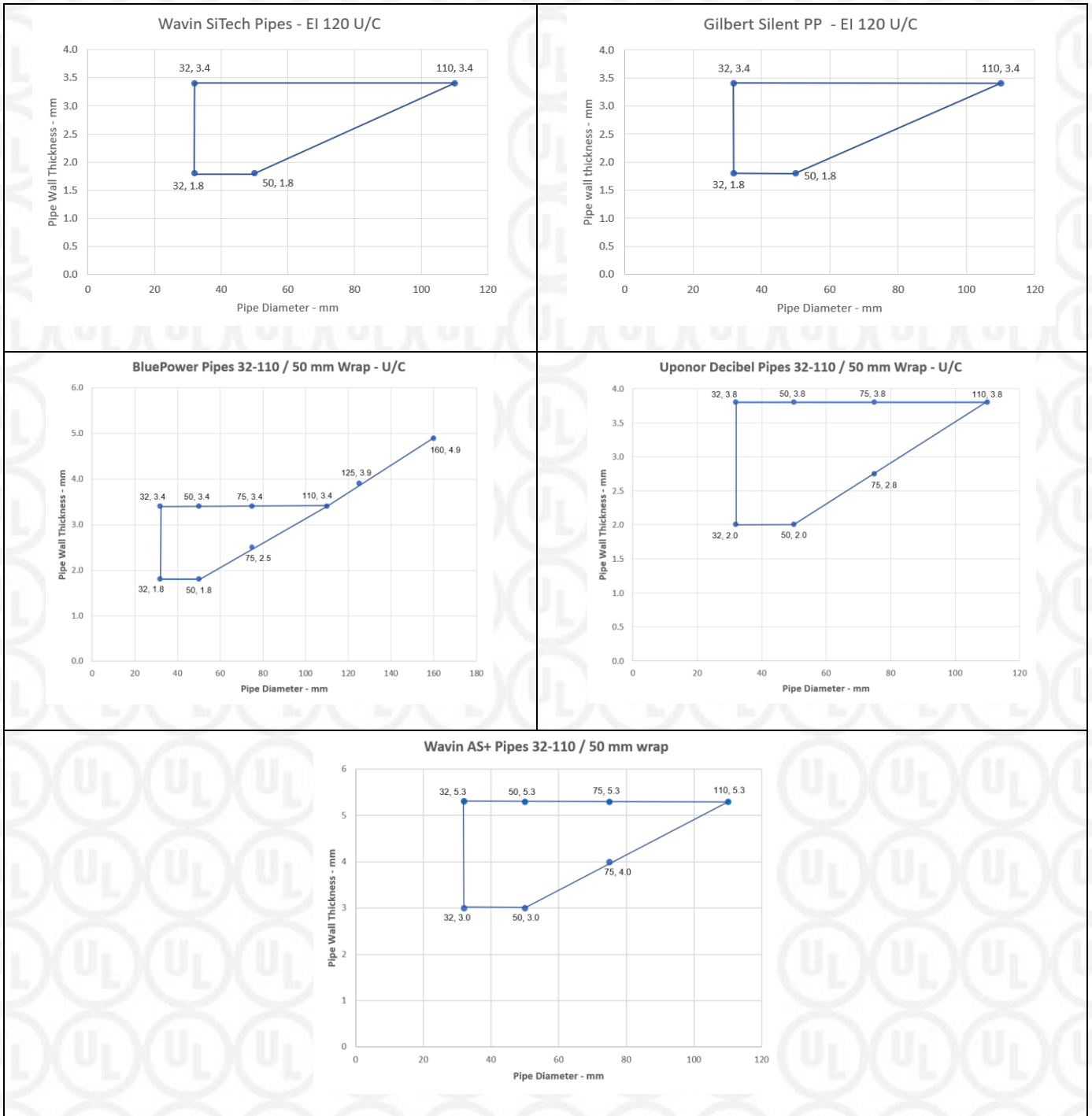


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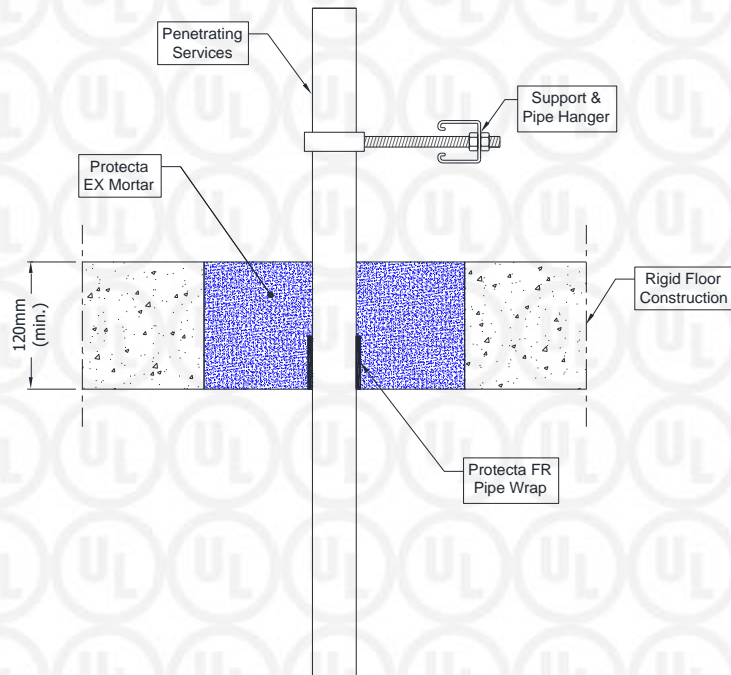
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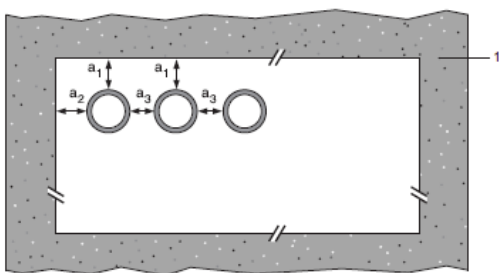
## Pipe penetration seal with Protecta EX Mortar

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with Protecta EX Mortar to either surface of the floor or anywhere between. Protecta FR Pipe Wraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size as section 4 (page 3).

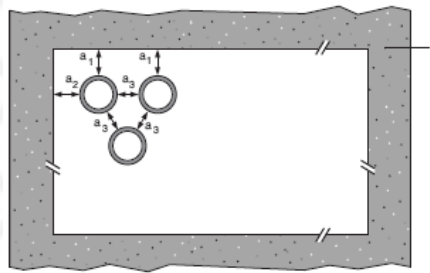
Construction details:



**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



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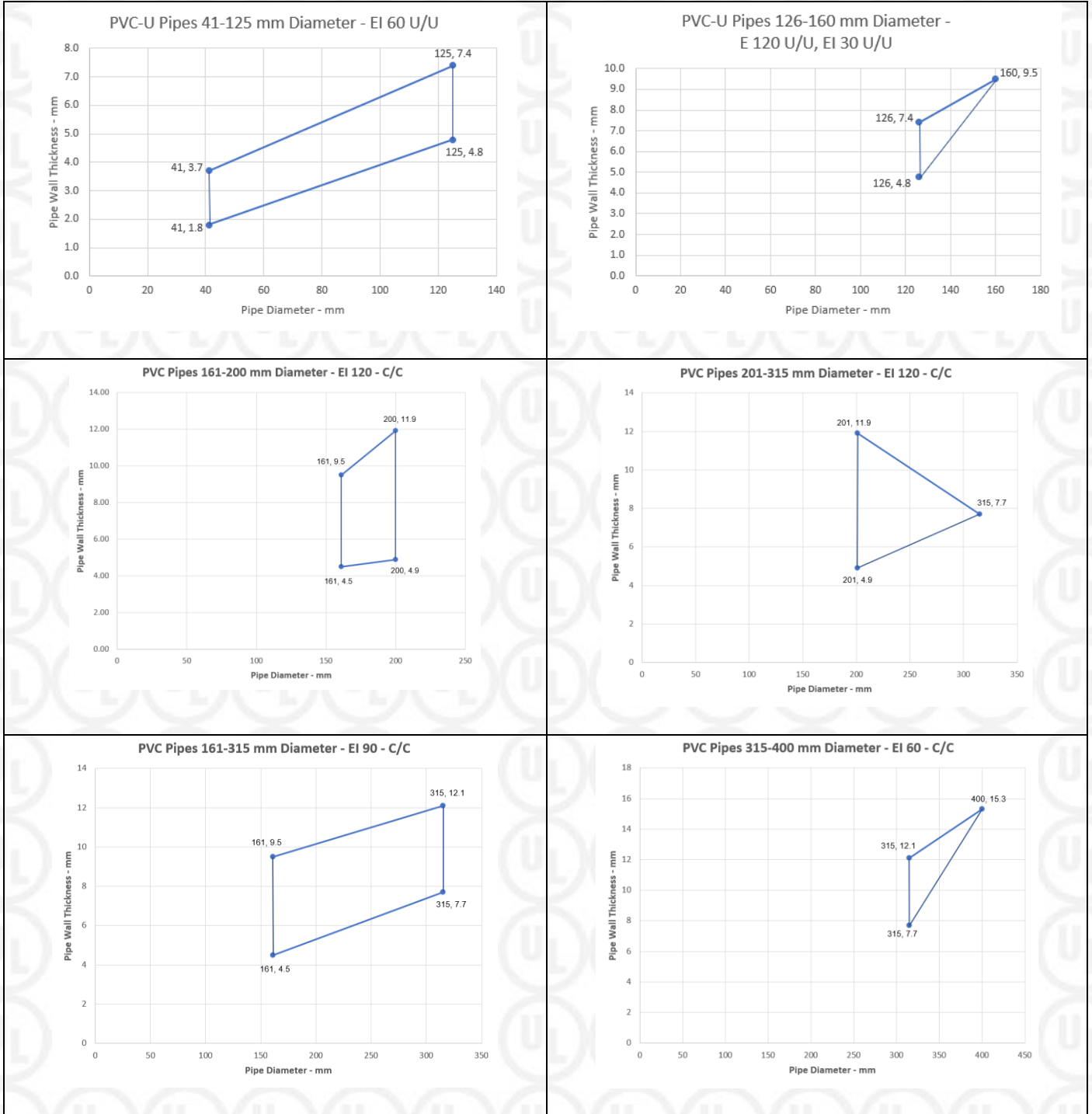
Services	Wrap	Permitted configuration for seal separation	Min. mortar depth and floor thickness	Classification
<b>PVC-U pipes according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>				
Diameter 41 mm, wall thickness 1.8-3.7 mm to diameter 125 mm, wall thickness 4.8-7.4 mm*	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	EI 60 U/U
125 mm diameter / 7.4 mm wall	50 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	EI 120 U/U
Diameter 126 mm, wall thickness 4.8-7.4 mm to diameter 160 mm, wall thickness 9.5 mm*	75 x 10.8 mm (6 x 1.8 layers)	1	150 mm	E 120 U/U, EI 30 U/U
160 mm diameter / 9.5 mm wall	75 x 7.2 mm (4 x 1.8 layers)	1	150 mm	E 120 U/U, EI 30 U/U
160 mm diameter / 4.5-9.5 mm wall thickness	50 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 120 U/C, EI 120 C/C
Diameter 161 mm, wall thickness 4.5-9.5 mm to diameter 200 mm, wall thickness 4.9-11.9 mm*	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 120 C/C
200 mm diameter / 4.9-11.9 mm wall thickness	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 240 C/C
Diameter 201 mm, wall thickness 4.9-11.9 mm to diameter 315 mm, wall thickness 7.7 mm*	75 x 18 mm (10 x 1.8 layers)	1	120 mm	EI 120 C/C
315 mm diameter / 7.7 mm wall thickness	75 x 18 mm (10 x 1.8 layers)	1	120 mm	EI 120 C/C
Diameter 161 mm, wall thickness 4.5-9.5 mm to diameter 315 mm, wall thickness 7.7-12.1 mm*	75 x 18 mm (10 x 1.8 layers)	1	120 mm	EI 90 C/C
315 mm diameter / 12.1 mm wall thickness	75 x 18 mm (10 x 1.8 layers)	1	120 mm	EI 90 C/C
Diameter 315 mm, wall thickness 7.7-12.1 mm to diameter 400 mm, wall thickness 15.3 mm*	75 x 28.8 mm (16 x 1.8 layers)	1	120 mm	EI 60 C/C
400mm diameter / 15.3 mm wall thickness	75 x 28.8 mm (16 x 1.8 layers)	1 & 2	120 mm	EI 60 C/C

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



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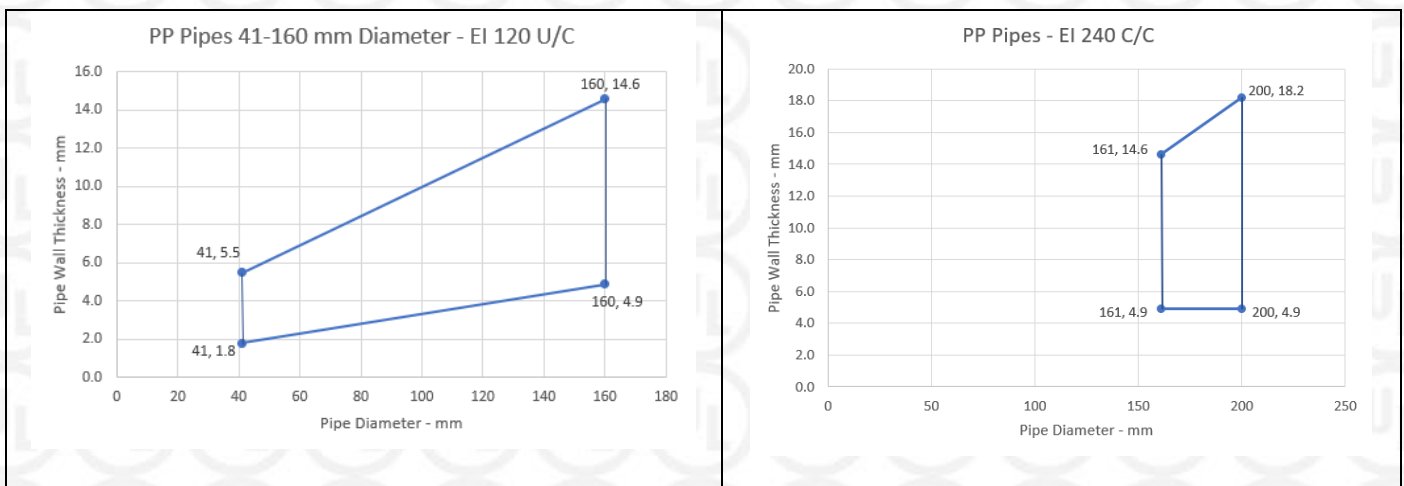


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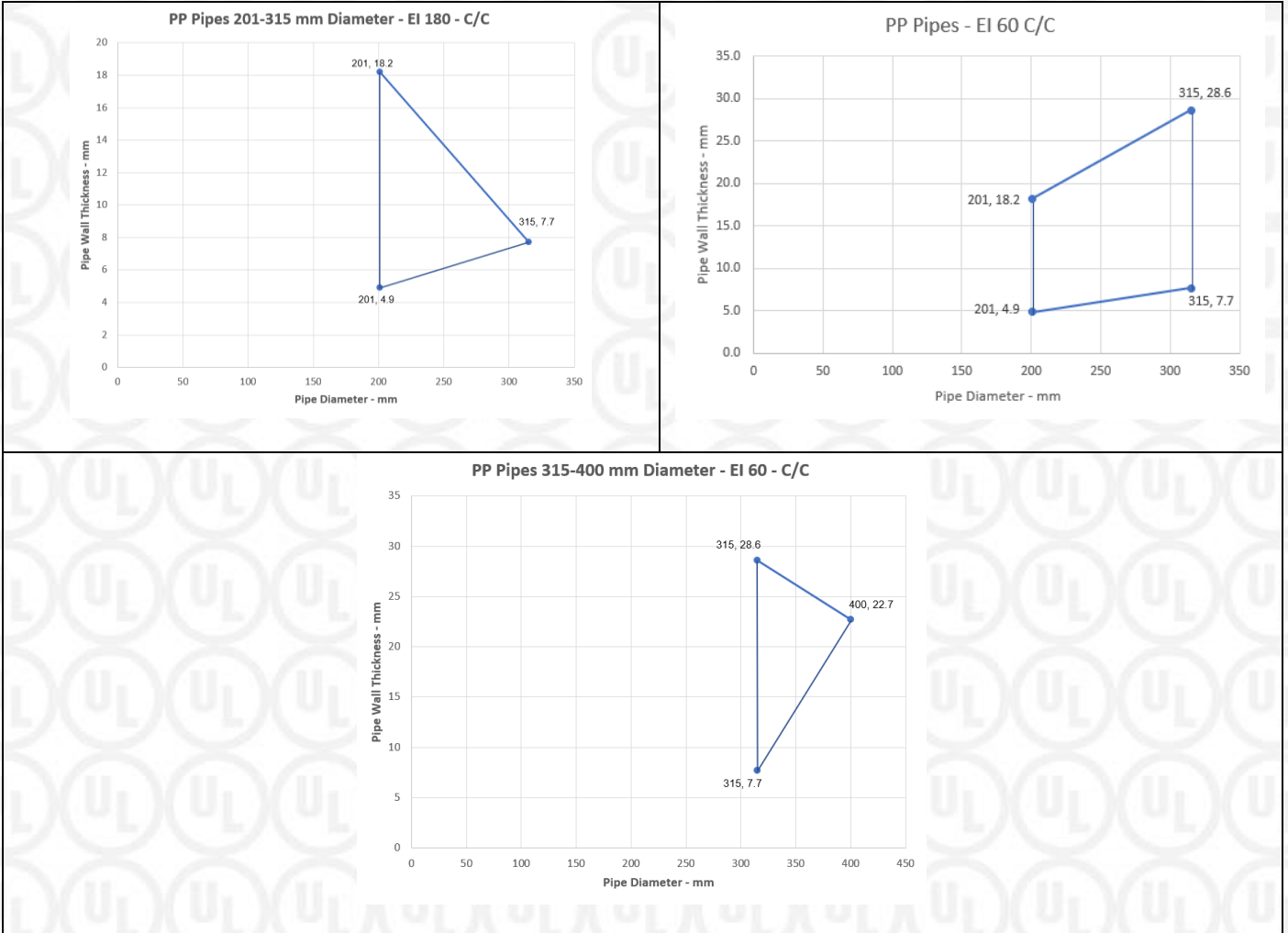
Services	Wrap	Permitted configuration for seal separation	Min. mortar depth and floor thickness	Classification
<b>PP pipes according to EN 1451-1</b>				
Diameter 41 mm, wall thickness 1.8-5.5 mm to diameter 160 mm, wall thickness 4.9-14.6 mm*	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	150 mm	EI 120 U/C
160 mm diameter / 14.6 mm wall	75 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	EI 240 U/U
Diameter 161 mm, wall thickness 4.9-14.6 mm to diameter 200 mm, wall thickness 4.9-18.2 mm*	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 240 C/C
Diameter 201 mm, wall thickness 4.9-18.2 mm to diameter 315 mm, wall thickness 7.7 mm*	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 180 C/C
Diameter 201 mm, wall thickness 4.9-18.2 mm to diameter 315 mm, wall thickness 7.7-28.6 mm*	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 60 C/C
315 mm diameter / 7.7 mm wall	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 180 C/C
315 mm diameter / 7.7-28.6 mm wall	75 x 18 mm (10 x 1.8 layers)	1	150 mm	EI 60 C/C
Diameter 315 mm, wall thickness 7.7-28.6 mm to diameter 400 mm, wall thickness 22.7 mm*	75 x 28.8 mm (16 x 1.8 layers)	1	150 mm	EI 60 C/C
400mm diameter / 22.7 mm wall thickness	75 x 28.8 mm (16 x 1.8 layers)	1 & 2	150 mm	EI 60 C/C

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



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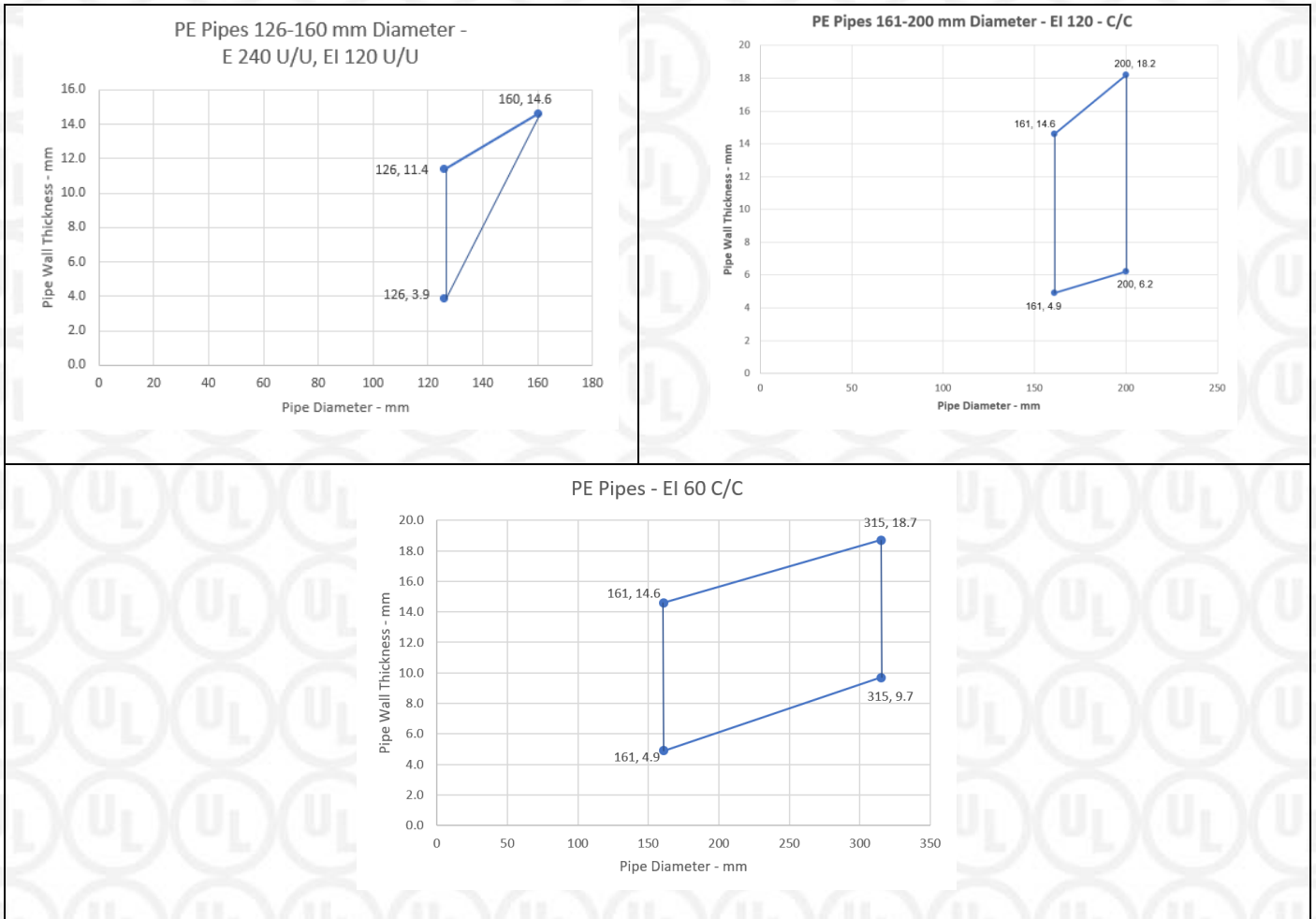
Services	Wrap	Permitted configuration for seal separation	Min. mortar depth and floor thickness	Classification
<b>PE pipes according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>				
Diameter 126 mm, wall thickness 3.9-11.4 mm to diameter 160 mm, wall thickness 14.6*	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	E 240 U/U, EI 120 U/U
160 mm diameter / 14.6 mm wall	75 x 7.2 mm (4 x 1.8 layers)	1 & 2	150 mm	E 240 U/U, EI 120 U/U
Diameter 161 mm, wall thickness 4.9-14.6 mm to diameter 200 mm, wall thickness 6.2-18.2 mm*	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	150 mm	EI 120 C/C
200 mm diameter / 6.2-18.2 mm wall thickness	75 x 10.8 mm (6 x 1.8 layers)	1 & 2	120 mm	EI 240 C/C
Diameter 161 mm, wall thickness 4.9-14.6 mm to diameter 315 mm, wall thickness 9.7-18.7 mm*	75 x 18 mm (10 x 1.8 layers)	N/A	150 mm	EI 60 C/C

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



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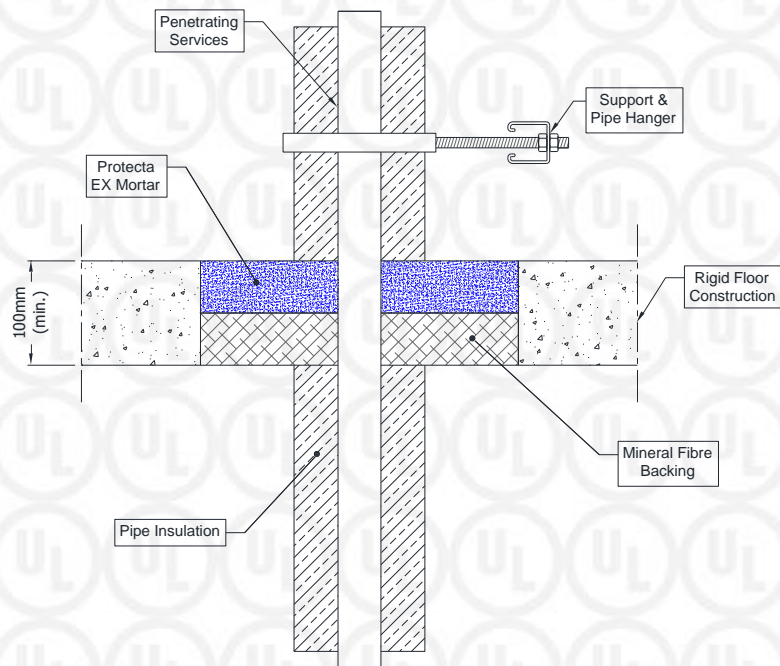
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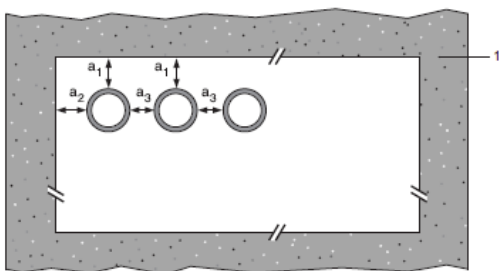
## Pipe penetration seal with 50 mm deep Protecta EX Mortar

**Penetration Seal:** CI (Continuous Interrupted) or LI (Local Interrupted) insulated composite pipes fitted at any position within the aperture (min. separation 10 mm from seal edges), with min. 50 mm Protecta EX Mortar to either surface of the floor or anywhere between, backed with min. 50 mm stone wool min. 150 kg/m<sup>3</sup>.

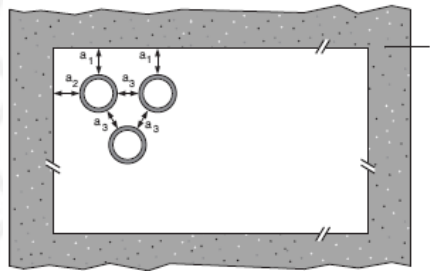
Construction details:



**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



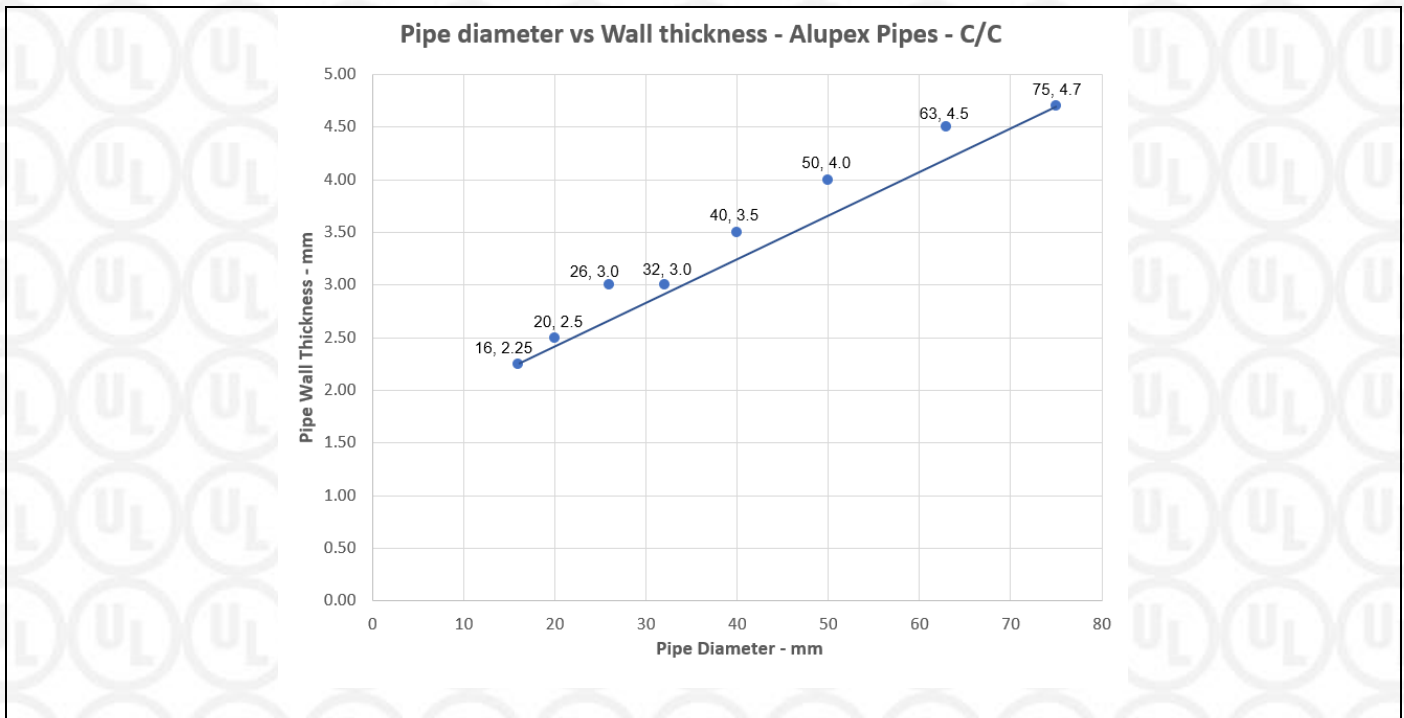
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## Single side penetration seal with pipes

Services	Maximum Aperture	Insulation	Classification
<b>Alupex pipes</b>			
16 mm diameter/2.25 mm wall*	135 x 135 mm	500 mm long, minimum 20 mm Stone wool insulation minimum 80 kg/m <sup>3</sup>	EI 240 C/C
16 mm diameter/2.25 mm wall*			E 240 C/C, EI 180 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*			
20 mm diameter/2.5 mm wall*			
26 mm diameter/3 mm wall*			
32 mm diameter/3 mm wall*			
40 mm diameter/3.5 mm wall*			
50 mm diameter/4 mm wall*			
63 mm diameter/4.5 mm wall*			
75 mm diameter/4.7 mm wall*			

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



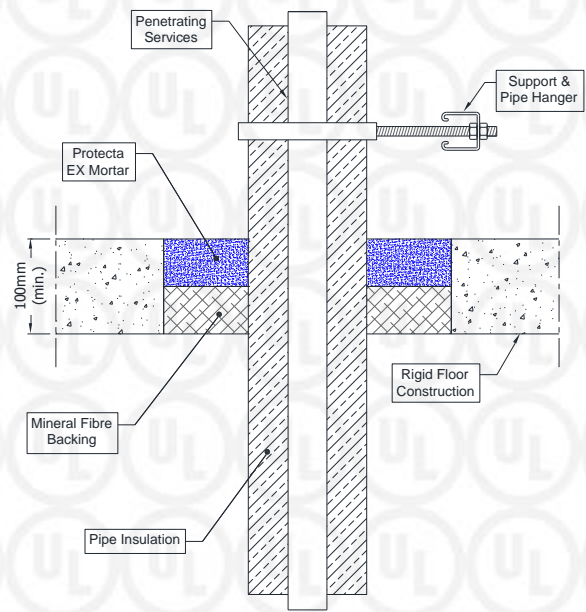
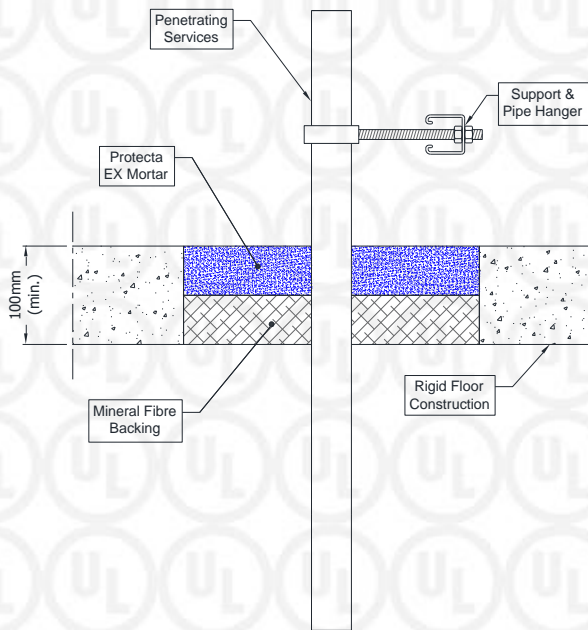
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## Pipe penetration seal with 50 mm deep Protecta EX Mortar

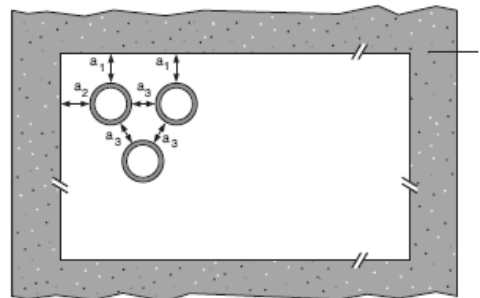
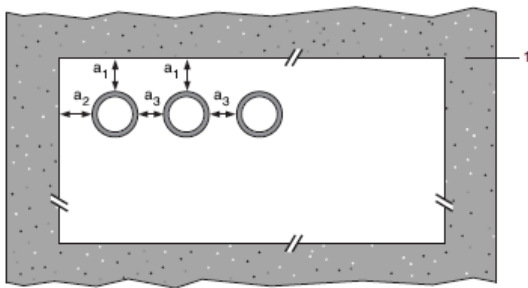
**Penetration Seal:** CS (Continuous Sustained) insulated metal pipes, uninsulated metal pipes and composite with Protecta EX Mortar, to either side of the floor, backed with stone wool board min. 150 kg/m<sup>3</sup>. Minimum separation from pipes to seal edges of 30 mm (a1 & a2). Maximum seal size as section 4 (page 3).

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



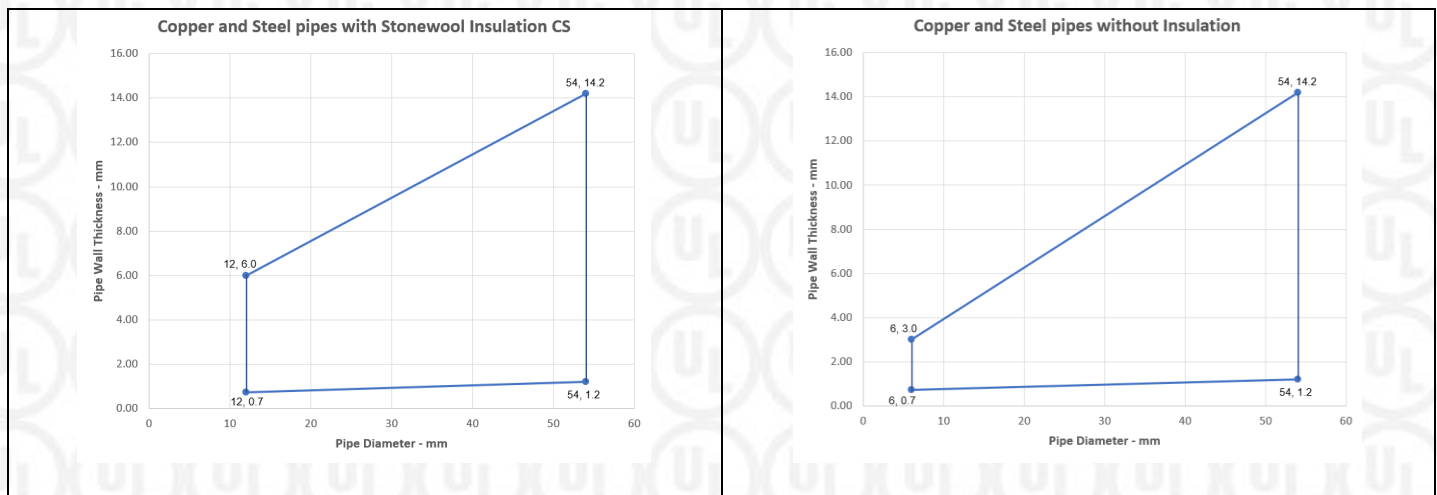
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## Single side penetration seal with pipes

Services	Maximum Aperture	Insulation	Classification
<b>Copper or steel pipes</b>	As section 4 (page 3)	20-80 mm Stone wool insulation minimum 80 kg/m <sup>3</sup>	E 180 C/C, EI 120 C/C
12 -54 mm diameter/0.7-14.2 mm wall*			E 180 C/C, EI 120 C/C
6 mm diameter/0.7-3 mm wall*		None	E 180 C/C, EI 120 C/C
7-15 mm diameter/0.7-7.5 mm wall*			E 180 C/C, EI 30 C/C
16-54mm diameter/1.2-14.2mm wall*			E 180 C/C
<b>Steel pipes</b>		None	EI 180 C/U
4-16 mm diameter/1.0-8.0 mm wall*			E 180 C/U, EI 20 C/U
17-324 mm diameter/6.35-14.2 mm wall*		None	EI 180 C/C
<b>Alupex Pipes</b>			E 180 C/C, EI 30 C/C
16-20 mm diameter/2.0 mm wall		20 mm glass- or stone wool insulation minimum 75 kg/m <sup>3</sup>	EI 180 C/C
75mm diameter/4.6mm wall			E 180 C/C, EI 30 C/C
16 mm diameter/2.25 mm wall		25-50 mm glass- or stone wool insulation minimum 75 kg/m <sup>3</sup>	EI 180 C/C
16-75 mm diameter/2.25-4.6 wall*			EI 120 C/C

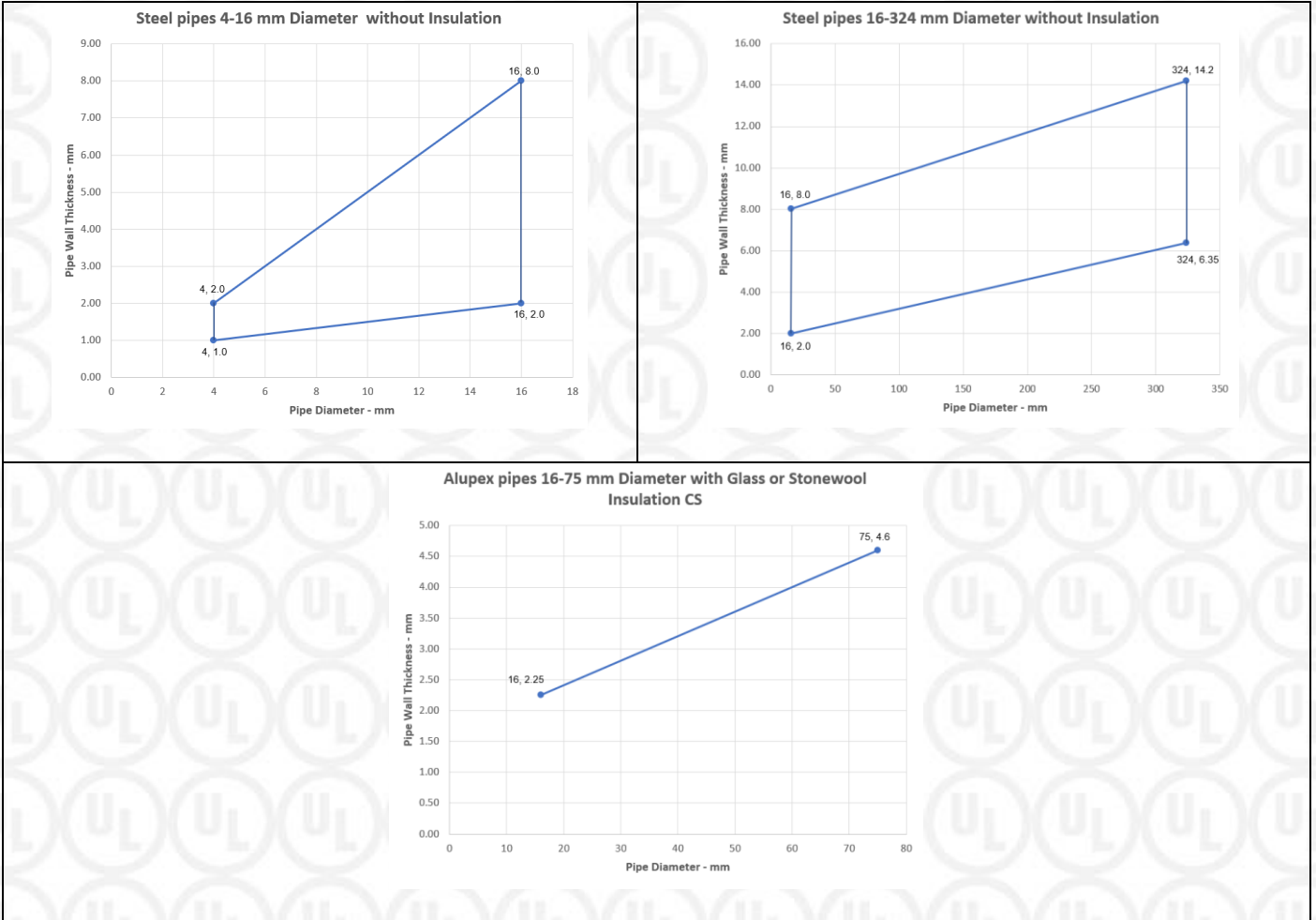
\* Typical pipe diameters shown, see below graph for intermediate sizes





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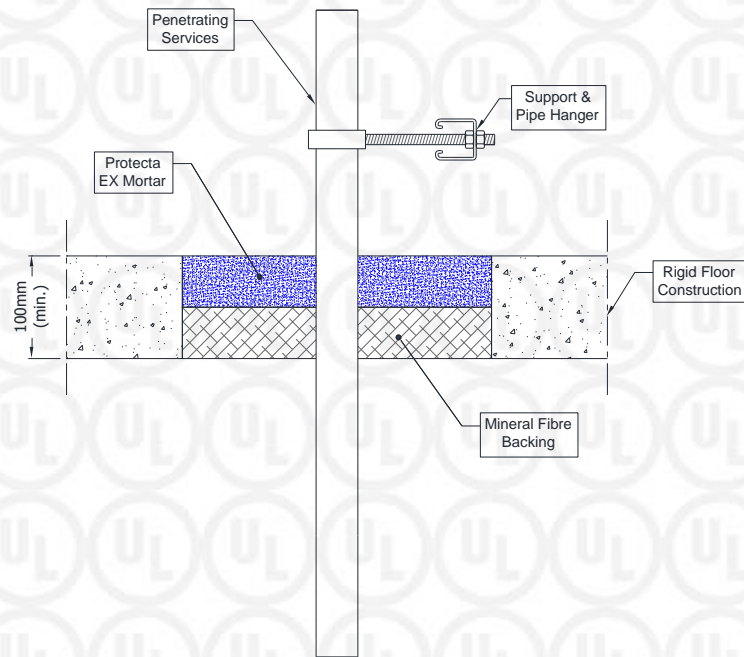
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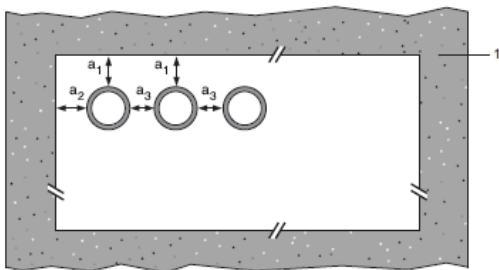
## Pipe penetration seal with 50 mm deep Protecta EX Mortar

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with min. 50 mm Protecta EX Mortar flush with the top of floor, backed with min. 50 mm stone wool min. 150 kg/m<sup>3</sup>

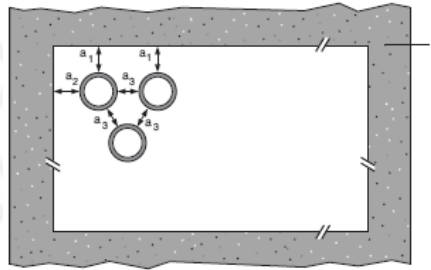
Construction details:



### 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



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## Single sided penetration seal with pipes

Services	Wrap	Maximum aperture	Classification
40 mm diameter /3 mm wall PP pipes according to EN 1451-1	None	As section 4 (page 3)	EI 120 C/C
40 mm diameter /4 mm wall PE pipes 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			
110 mm diameter /4.3 mm wall PE pipes 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	50 x 1.8mm		EI 60 C/C



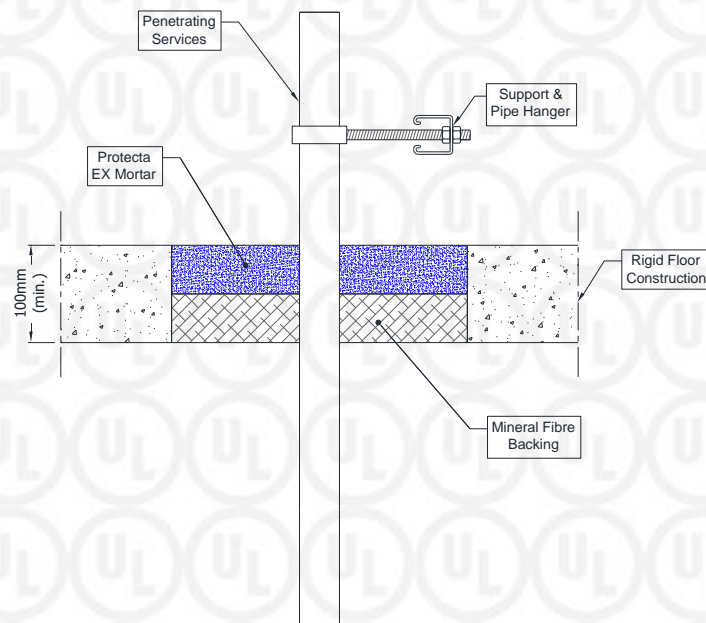
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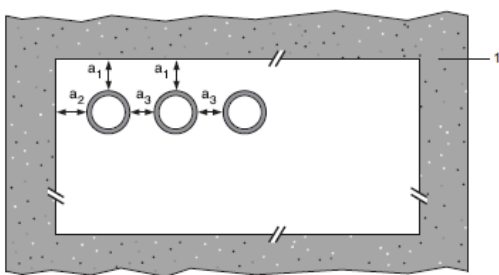
## Pipe penetration seal with 50 mm deep Protecta EX Mortar

**Penetration Seal:** Combustible pipes sealed with Protecta EX Mortar, to either side of the floor, backed with stone wool board min. 150 kg/m<sup>3</sup>. Minimum separation between pipes of 30 mm (a3) and from seal edges 30 mm (a1 & a2). Maximum seal size as section 4 (page 3).

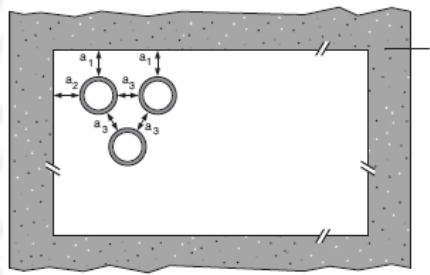
Construction details:



**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



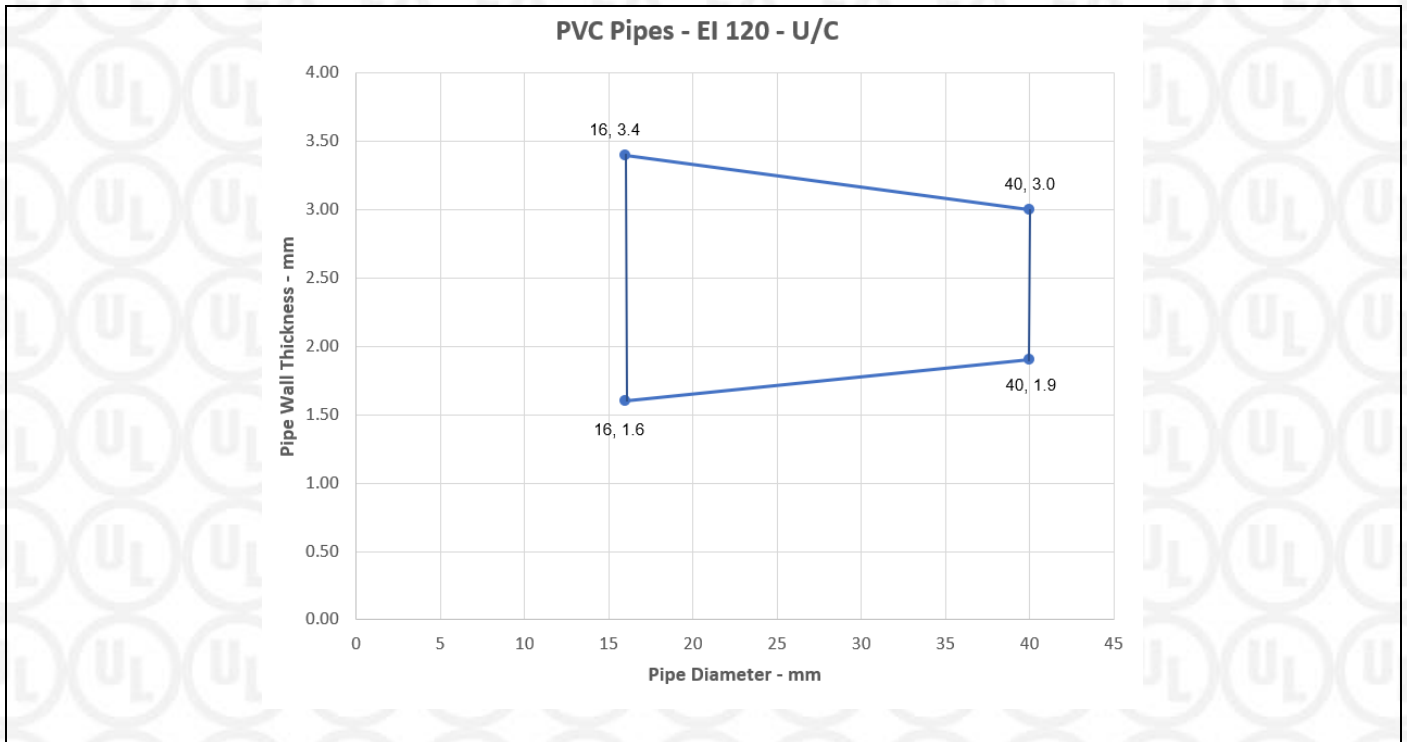
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## Single side penetration seal with pipes

Services	Seal Depth	Permitted configuration for seal separation	Classification
PVC-U pipes according to EN 1329-1, EN 1452-2 and EN 1453-1^, PVC-C according to EN 1566-1			
Diameter 16 mm, wall thickness 1.6 – 3.4 mm, to diameter 40 mm, wall thickness 1.9-3.0 mm*	Min. 50 mm	1 & 2 between all specified pipes	EI 120 U/C, C/C

\* See below graph for intermediate sizes



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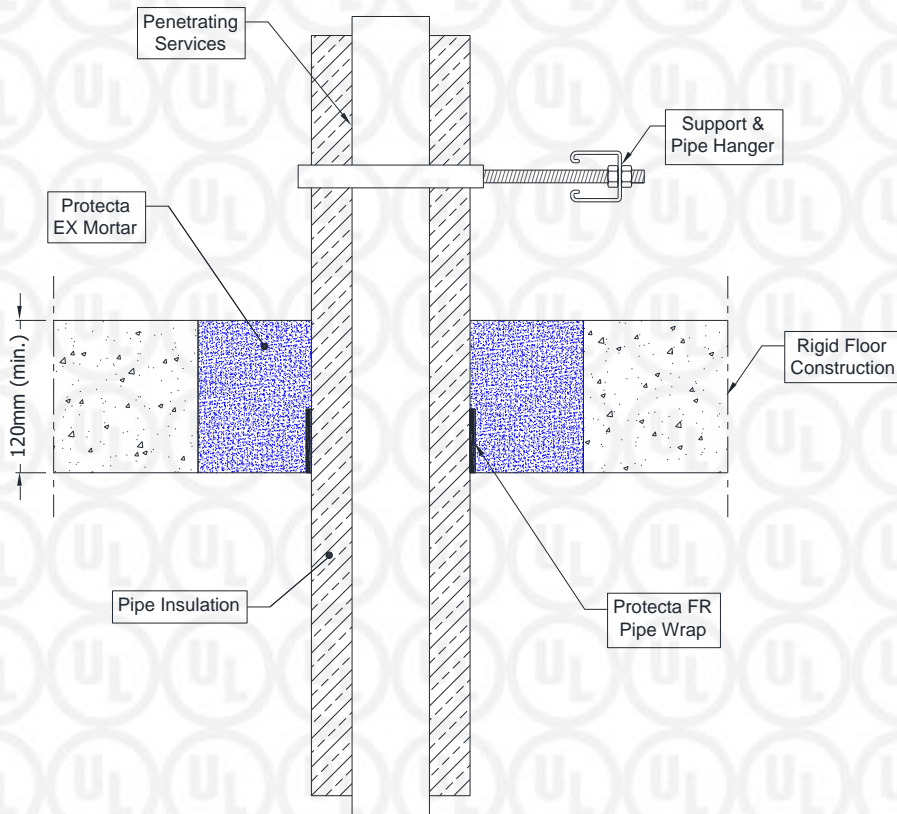
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**Rigid floor constructions according to 1.2.1 with floor thickness of minimum 120 mm**

**Pipe penetration seal with 120 mm deep Protecta EX Mortar**

**Penetration Seal:** CS (Continuous Sustained) insulated plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with min. 120 mm Protecta EX Mortar to either surface of the floor or anywhere between. Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation to the bottom of the seal, as indicated below. Maximum seal size as section 4 (page 3).

Construction details:



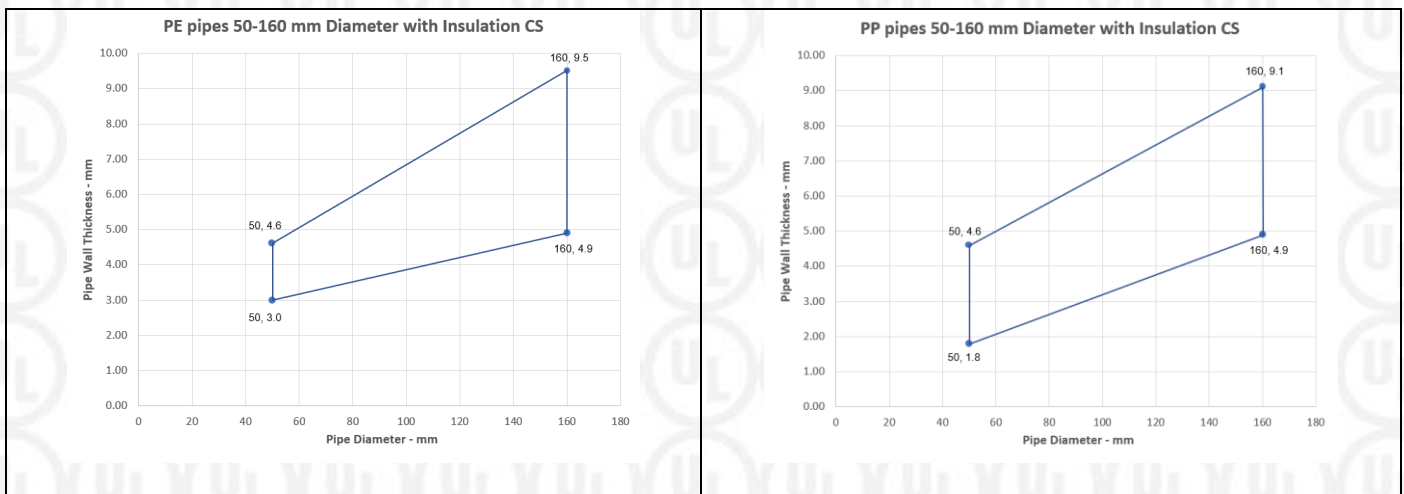
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## Single sided penetration seal with pipes

Services	Outer diameter including insulation	Pipe wrap	Pipe insulation	Classification
<b>PE pipes according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>				
Maximum 160 mm diameter pipe*	Maximum 68 mm diameter	50 x 3.6 mm (2 x 1.8 layers)	9-50 mm Elastomeric insulation minimum class B-s3,d0 or foil faced phenolic foam insulation	EI 240 C/C
	Maximum 178 mm diameter	75 x 10.8 mm (6 x 1.8 layers)		EI 120 C/C
	Maximum 260 mm diameter	75 x 18.0 mm (10 x 1.8 layers)		
<b>PP pipes according to EN 1852-1: 2009</b>				
Maximum 160 mm diameter pipe*	Maximum 68 mm diameter	50 x 3.6 mm (2 x 1.8 layers)	9-50 mm Elastomeric insulation minimum class B-s3,d0 or foil faced phenolic foam insulation	E 240 C/C, EI 180 C/C
	Maximum 178 mm diameter	75 x 10.8 mm (6 x 1.8 layers)		EI 240 C/C
	Maximum 260 mm diameter	75 x 18.0 mm (10 x 1.8 layers)		EI 120 C/C

\*See below graph for interpolation pipe sizes



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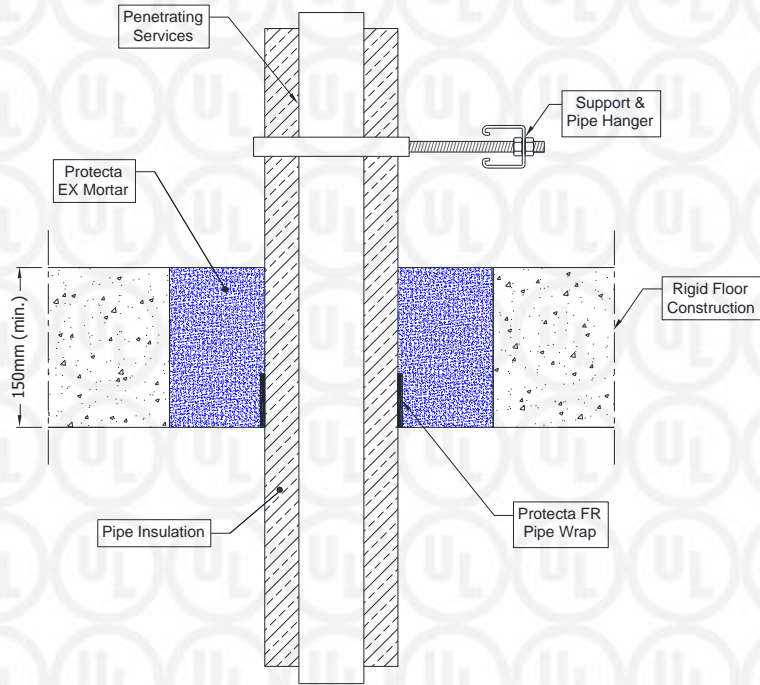
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**Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm**

**Pipe penetration seal with 150 mm deep Protecta EX Mortar**

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and 30 mm from other services), with min. 150 mm Protecta EX Mortar to either surface of the floor or anywhere between. Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation. Maximum seal size as section 4 (page 3).

Construction details:



## Single side penetration seal with pipes

Services	Wrap	Insulation	Classification
Mild or stainless steel pipes			
12 mm diameter/ 1.0 mm wall	1 off 50 x 1.8 mm Protecta FR Pipe Wrap, fitted at soffit	9 mm PE foam insulation	EI 180 C/U
Maximum 76 mm diameter/ 1.5-14.2 mm wall*	2 off 50 x 1.8 mm Protecta FR Pipe Wrap, fitted at soffit	9-30 mm PE foam insulation	E 180 C/U EI 60 C/U

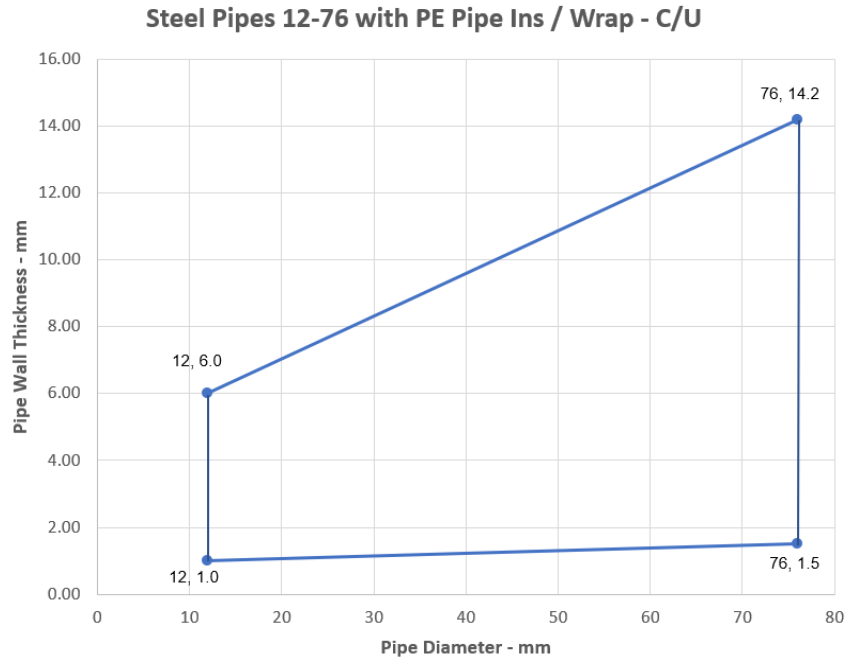
\* See below graph for intermediate sizes





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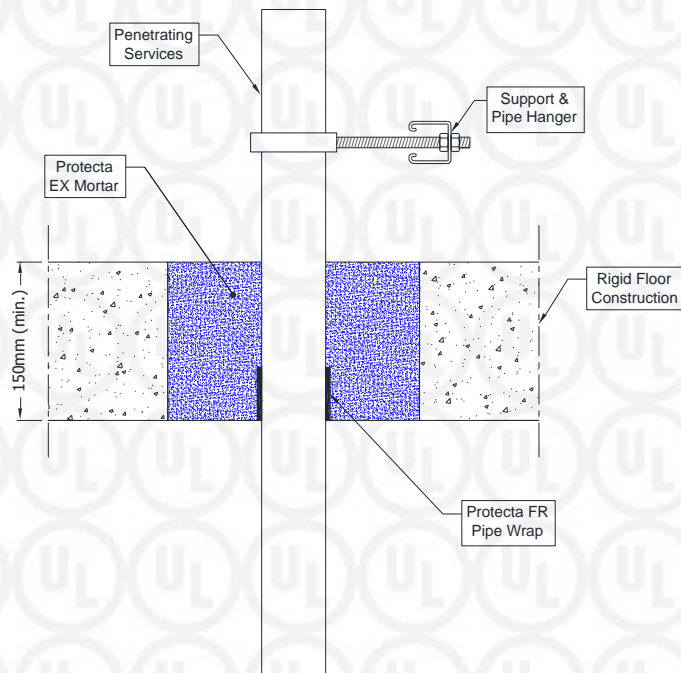
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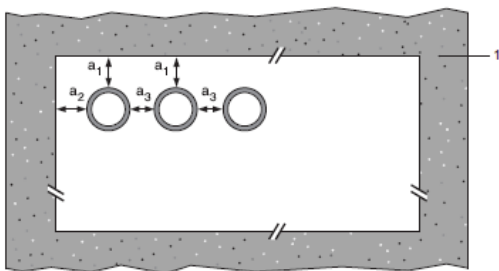
## Pipe penetration seal with 150 mm deep Protecta EX Mortar

**Penetration Seal:** Plastic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges and from other services), with 150 mm Protecta EX Mortar to either surface of the floor or anywhere between. Protecta FR Pipe Wraps are required to be fitted to the bottom of the seal, as indicated below. Maximum seal size as section 4 (page 3).

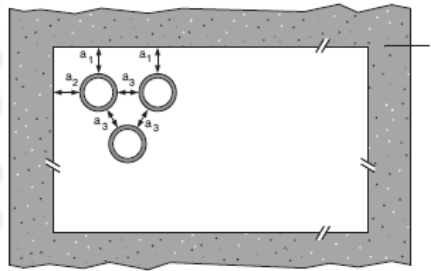
Construction details:



### 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

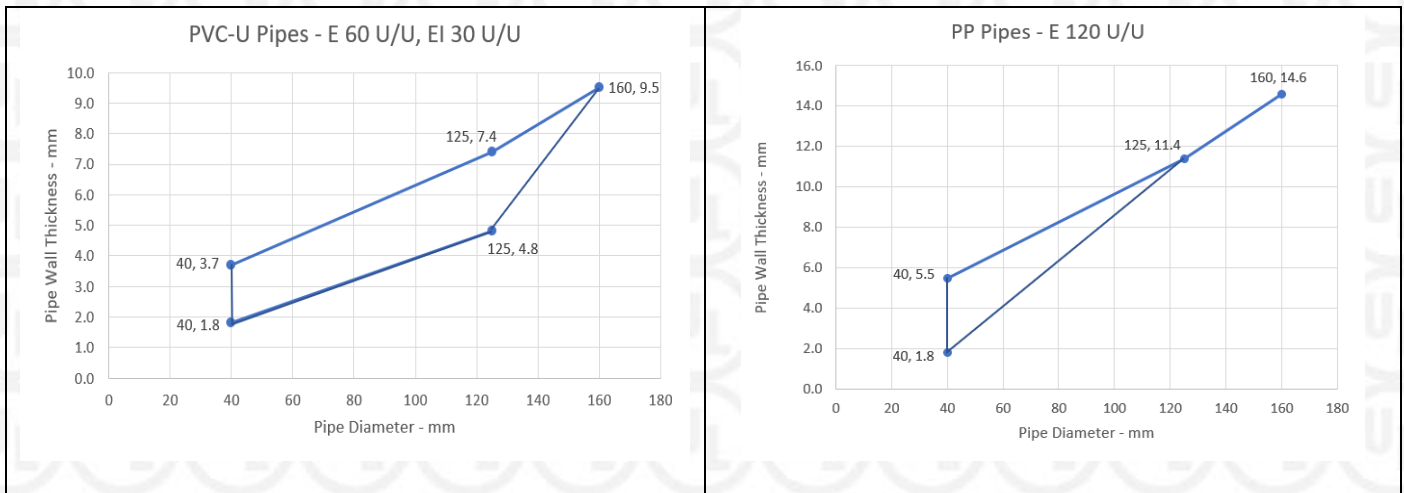


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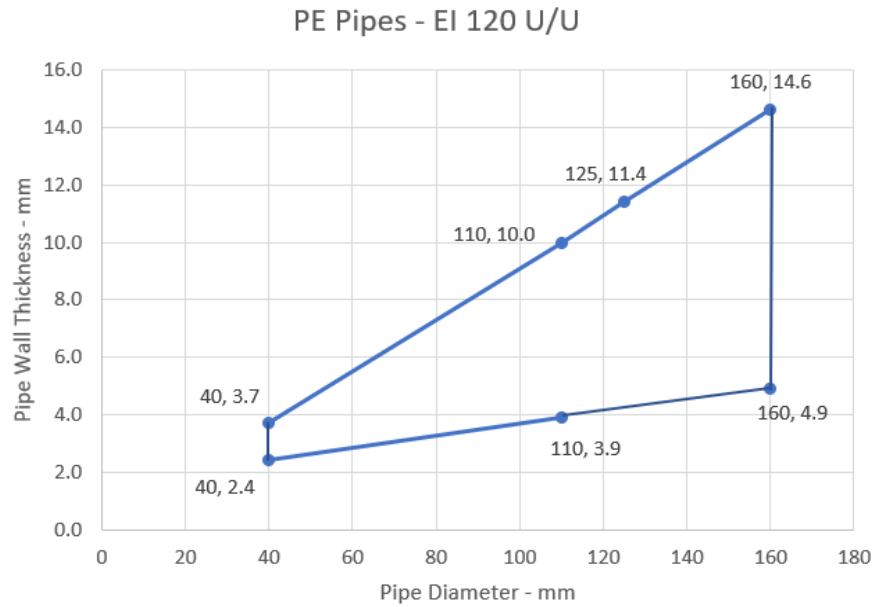
Services	Wrap	Permitted configuration for seal separation	Classification
<b>PVC-U pipes according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1</b>			
Up to 40 mm diameter/1.8-3.7 mm wall*	50 x 1.8	1 & 2	EI 120 U/U
Up to 125 mm diameter / 4.8-7.4 mm wall*	50 x 7.2 mm		EI 60 U/U
Up to 160 mm diameter/9.5 mm wall*	75 x 7.2 mm		E 120 U/U, EI 30 U/U
<b>PP pipes according to EN 1451-1</b>			
Up to 40 mm diameter/1.8-5.5 mm wall*	50 x 1.8	1 & 2	EI 120 U/U
Up to 125 mm diameter / 11.4 mm wall*	50 x 7.2 mm		EI 240 U/U
Up to 160 mm diameter/14.6 mm wall*	75 x 7.2 mm		EI 240 U/U
<b>PE pipes according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Up to 40 mm diameter/2.4-3.7 mm wall*	50 x 1.8 mm	1 & 2	EI 240 U/U
Up to 110 mm diameter/3.4-10 mm wall*	75 x 5.4 mm		EI 240 U/U
Up to 125 mm diameter/11.4 mm wall*	50 x 7.2 mm		EI 240 U/U
Up to 160 mm diameter/4.9-14.6 mm wall*	75 x 7.2 mm		EI 120 U/U

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



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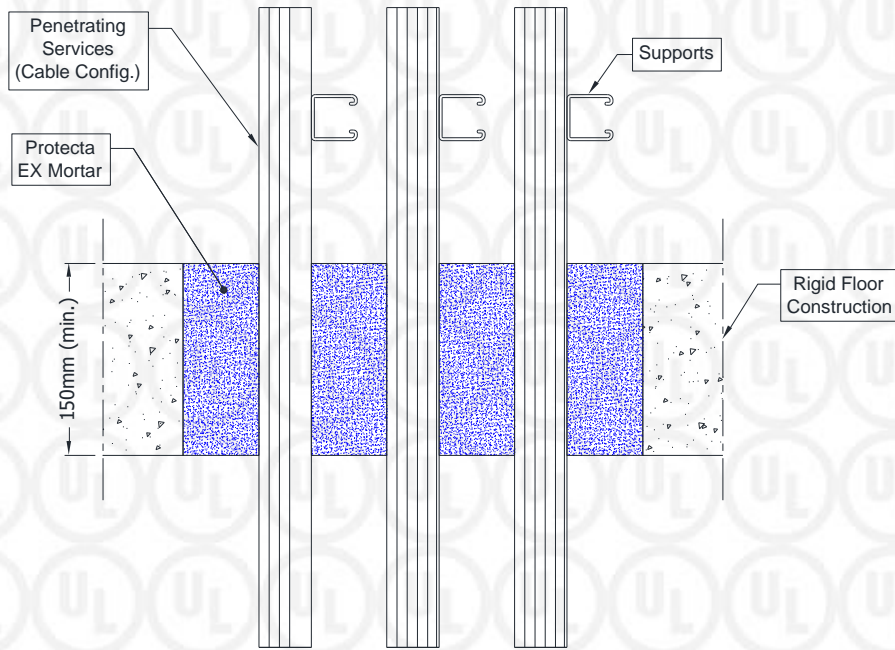
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## Cable penetration seal with 150 mm deep Protecta EX Mortar

**Penetration Seal:** Cables fitted with Protecta EX Mortar to either side of floor. Maximum seal size as section 2. 4) and minimum separation between cables and the edge of the seal of 30 mm.

Construction details:



### Single side penetration seal with cables

Services	Mortar depth	Backing	Insulation	Classification
Blank seals	Min. 150 mm	None	None	EI 240
Electric cables up to 21 mm diameter, single or in a bundle.				E 240 EI 120
Steel cable trays and ladders up to 500 mm wide				E 240 EI 90
Electric cables 22-50 mm diameter, single or in a bundle.				E 90 EI 60
Electric cables 51-80 mm diameter, single or in a bundle.				EI 120
Unsheathed wire up to 24 mm diameter				



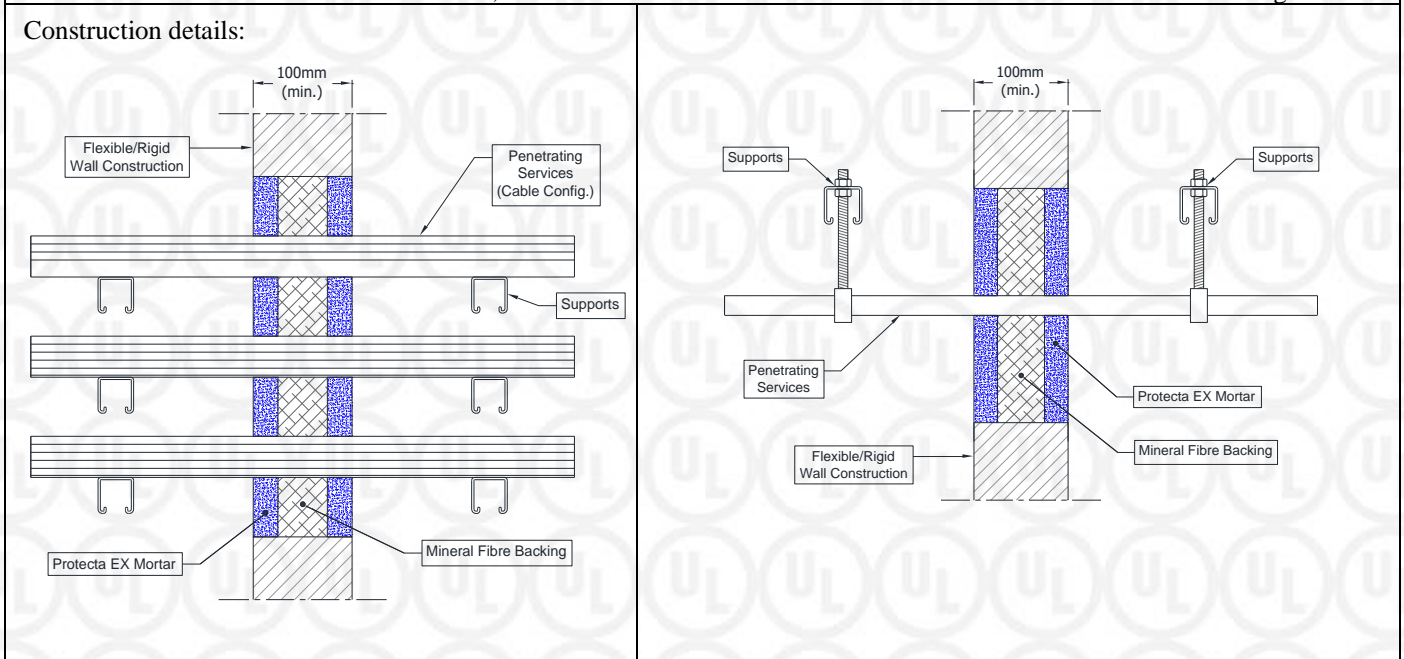
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**Flexible and rigid wall constructions according to 1.2.1 with wall thickness of min. 100 mm**

**Cable penetration seal with 25 mm deep Protecta EX Mortar to both faces backed with 50 mm mineral fibre board**

**Penetration Seal:** Cables fitted at any position within the aperture (min. separation 25 mm from seal edges), with min. 25 mm Protecta EX Mortar to both sides of the wall, backed with min. 1 x 50 mm or 2 x 25 mm stone wool board min. 150 kg/m<sup>3</sup>.



## Double side penetration seal with cables

Services	Maximum aperture	Classification
None (blank)	As section 4 (page 3)	EI 120
Single electrical cables up to 21 mm Ø (min.100 separation from other services)		E 120, EI 90
Electrical cables up to 80 mm Ø (single, bundled and on trays)		E 120, EI 60
Steel cable trays & ladders		E 120 C/U, EI 60 C/U
Steel conduits up to 16 mm Ø		E 120 C/U, EI 45 C/U
copper conduits up to 16 mm Ø		E 120, EI 45
Unsheathed wires up to 24 mm Ø		EI 120 C/U, EI 120 C/C
PVC conduits up to 16 mm Ø		

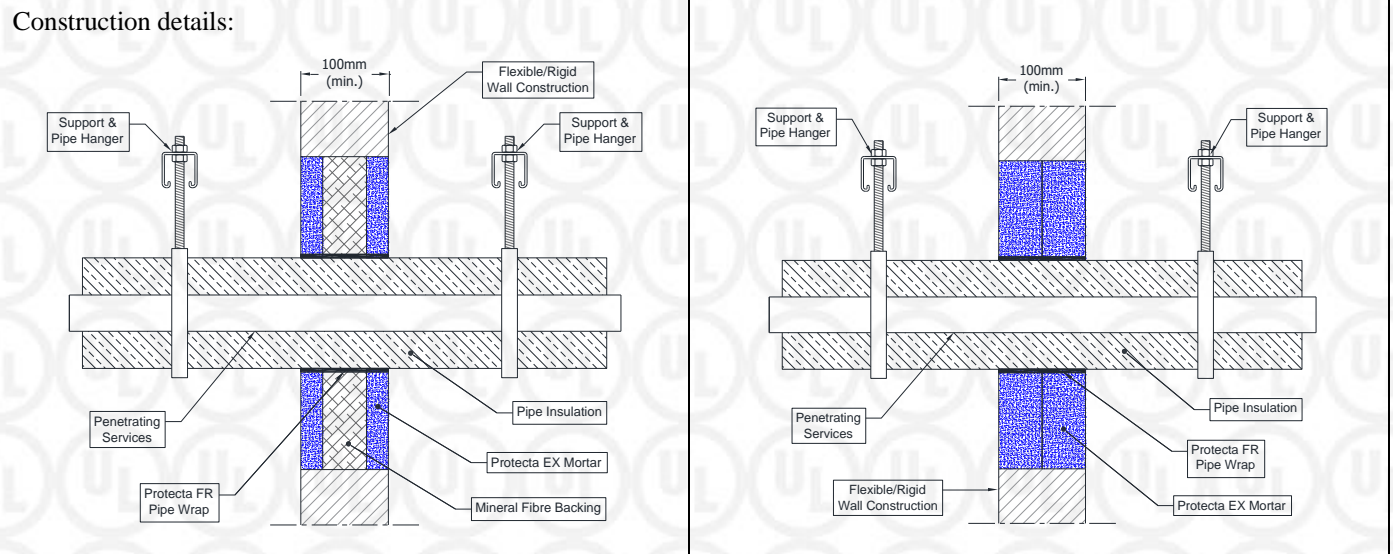


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## Pipe penetration seal with 25 mm deep Protecta EX Mortar to both faces backed with 50 mm mineral fibre board

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 25 mm Protecta EX Mortar to both sides of the wall, backed with min. 1 x 50 mm or 2 x 25 mm stone wool board min. 150 kg/m<sup>3</sup> or min. 50 mm Protecta EX Mortar to both sides of the wall without backing\*. Protecta FR Pipe wraps are required to be fitted to both faces of the seal.



\* Maximum seal size as section 4 (page 3)

## Double side penetration seal with pipes

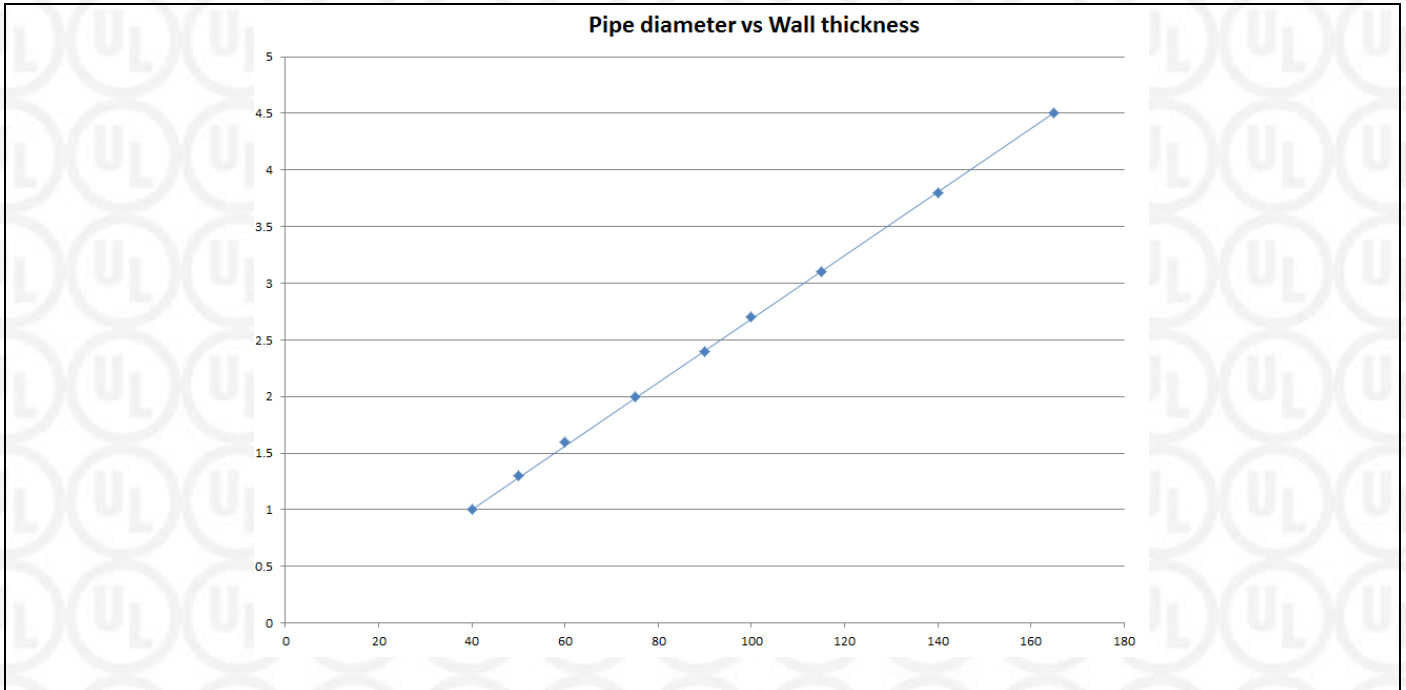
Services	Wrap	Insulation	Classification
<b>Mild or stainless steel pipes</b>			
40 mm diameter/1-14.2 mm wall	2 off 50 x 1.8 mm Protecta FR Pipe Wrap, one fitted flush to each face of seal		<b>EI 120 C/U</b>
40 mm diameter/1-14.2 mm wall*	2 off 50 x 3.6 mm Protecta FR Pipe Wrap, one fitted flush to each face of seal	13 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	<b>E 120 C/U, EI 60 C/U</b>
50 mm diameter/1.3-14.2 mm wall*			
60 mm diameter/1.6-14.2 mm wall*			
75 mm diameter/2-14.2 mm wall*			
90 mm diameter/2.4-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3.1-14.2 mm wall*			
140 mm diameter/3.8-14.2 mm wall*			
165 mm diameter/ 4.5-14.2 mm wall*			

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



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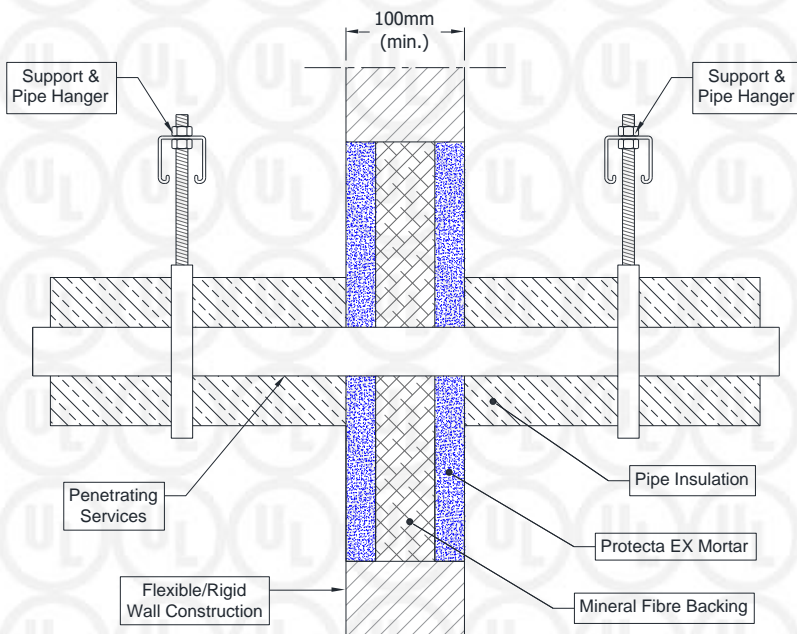
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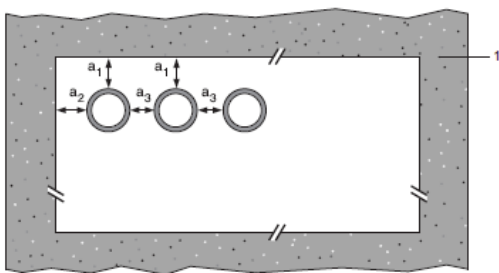
## Pipe penetration seal with 25 mm deep Protecta EX Mortar to both faces backed with 50 mm mineral fibre board

**Penetration Seal:** 500 mm (min.)\* LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic (and composite) pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 25 mm Protecta EX Mortar to both sides of the wall backed with min. 1 x 50 mm or 2 x 25 mm stone wool board min. 150 kg/m<sup>3</sup>. Maximum seal size as section 4 (page 3).

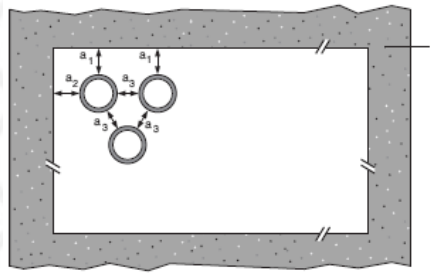
Construction details:



### 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 600 mm long insulation required for Alupex pipe.



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## Double side penetration seal with pipes

Services	Insulation	Classification
Copper or steel pipes up to 54 mm diameter/1-14.2 mm wall	Min. 20 mm stone wool min. 80 kg/m <sup>3</sup>	EI 120 C/C
Alupex composite pipe 75 mm diameter/7.5 mm wall	600 mm length of 25 mm Protecta Mineral Fibre BIO	EI 60 U/U, EI 60 U/C, EI 60 C/U, EI 60 C/C

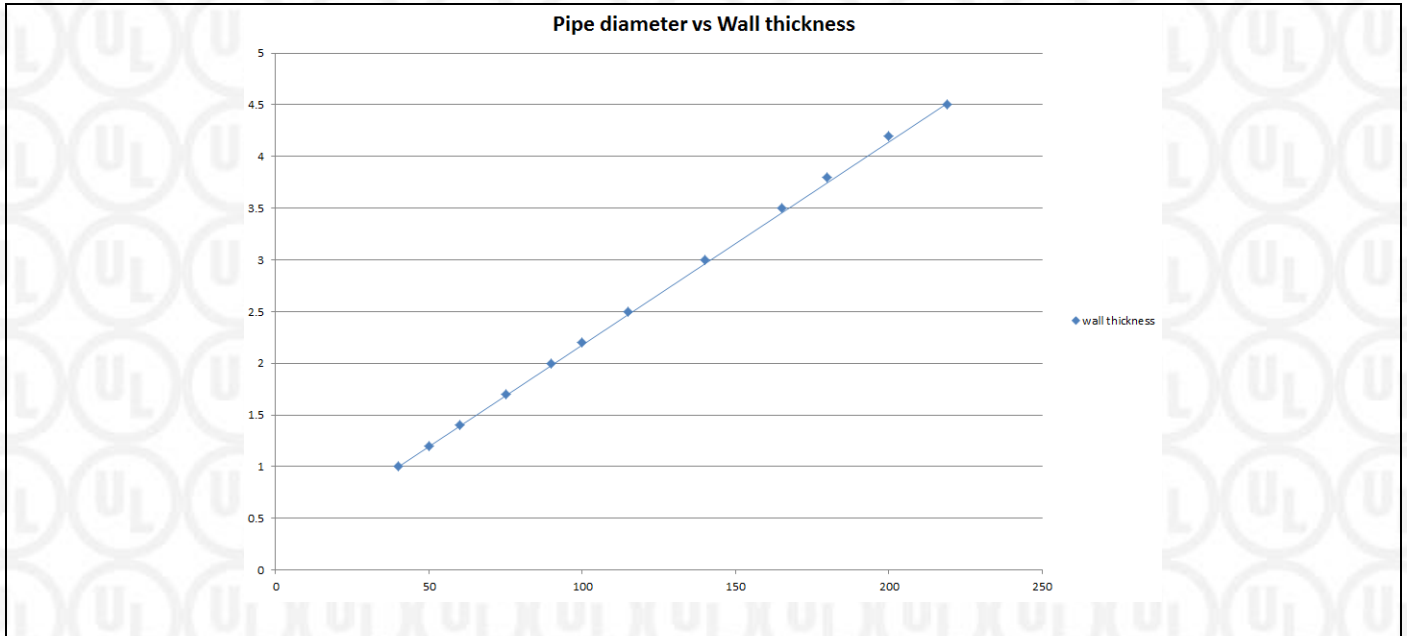
Services	Insulation, minimum thickness and density	Classification
<b>Mild or stainless steel pipe</b>		
40 mm diameter/1-14.2 mm wall	20 mm stone wool 80 kg/m <sup>3</sup>	EI 120 C/U
40 mm diameter/1-14.2 mm wall*	30 mm stone wool 80 kg/m <sup>3</sup>	E 120 C/U, EI 90 C/U
50 mm diameter/1.2-14.2 mm wall*		
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*		
180 mm diameter/3.8-14.2 mm wall*		
200 mm diameter/4.2-14.2 mm wall*		
219 mm diameter/4.5-14.2 mm wall*		

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



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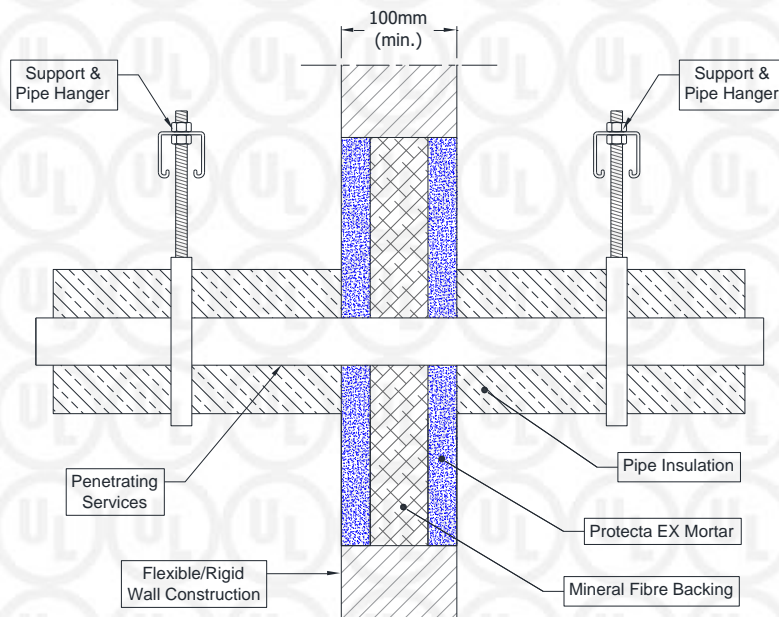
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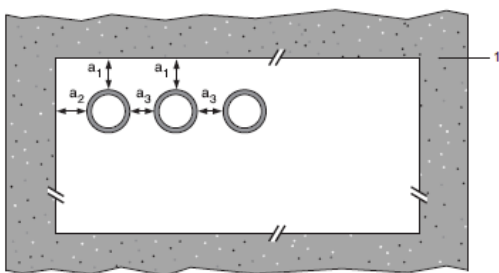
## Pipe penetration seal with 25 mm deep Protecta EX Mortar to both faces backed with 50 mm mineral fibre board

**Penetration Seal:** 500 mm (min.)\* LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic (and composite) pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), with min. 25 mm Protecta EX Mortar to both sides of the wall backed with min. 1 x 50 mm or 2 x 25 mm stone wool board min. 150 kg/m<sup>3</sup>. Maximum seal size as section 4 (page 3).

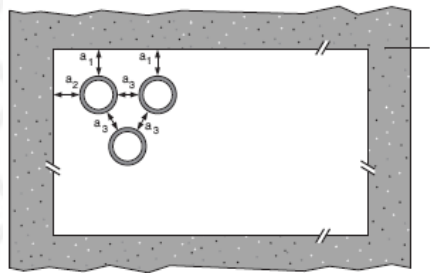
Construction details:



### 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



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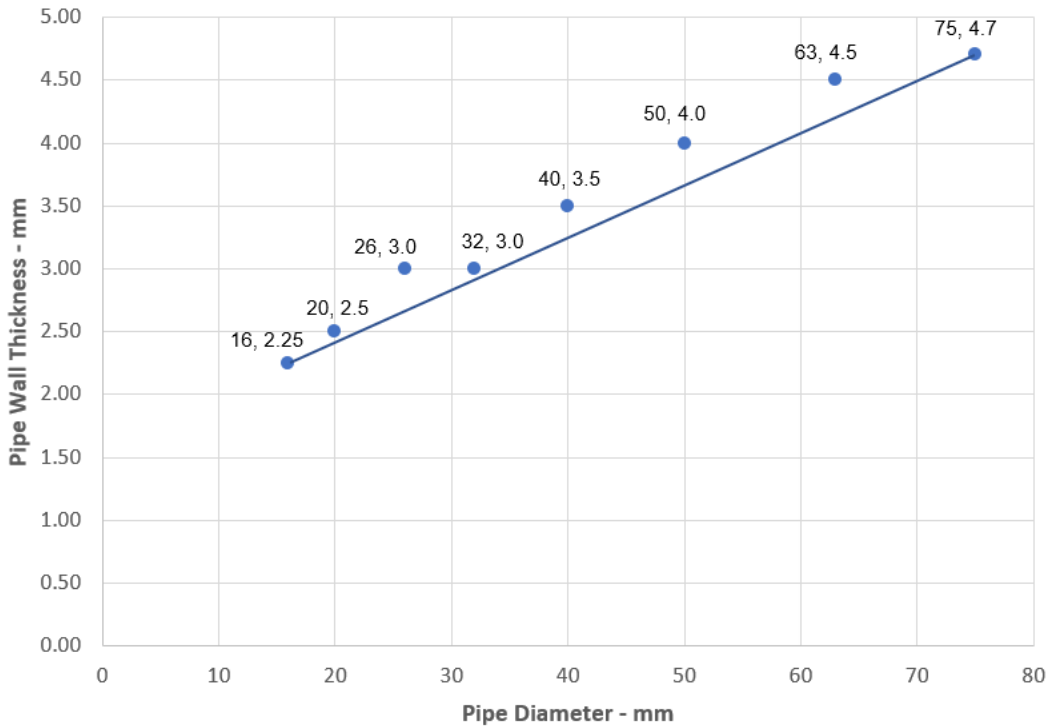
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## Double side penetration seal with pipes

Services	Insulation	Classification
<b>Alupex pipes</b>	Minimum 20 mm stone wool, minimum 80 kg/m <sup>3</sup>	<b>EI 120 C/C</b>
16 mm diameter/2.25 mm wall		
20 mm diameter/2.5 mm wall		
26 mm diameter/3 mm wall		
32 mm diameter/3 mm wall		
40 mm diameter/3.5 mm wall		
50 mm diameter/4 mm wall		
63 mm diameter/4.5 mm wall		
75 mm diameter/4.7 mm wall		

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

**Pipe diameter vs Wall thickness - Alupex Pipes with Insulation LI**



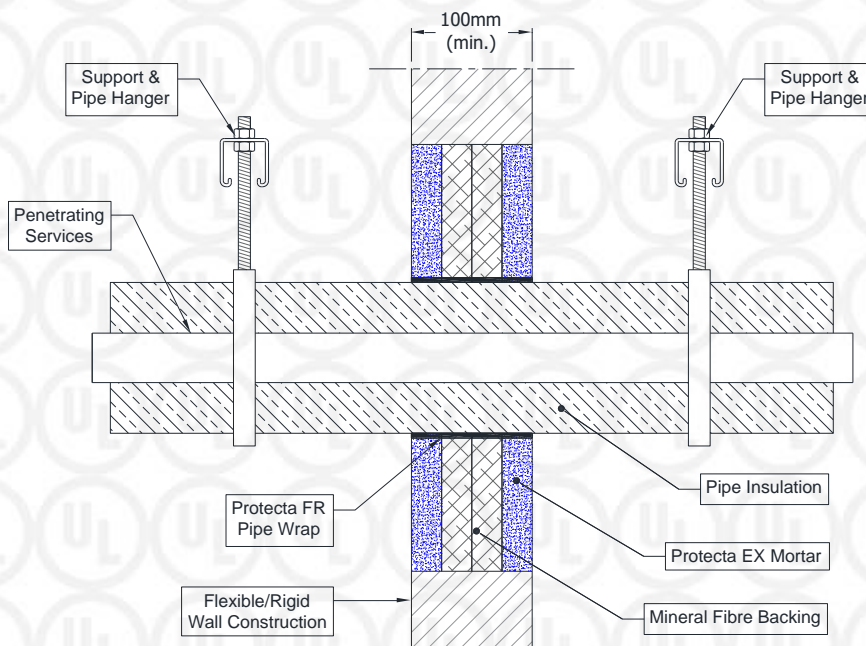
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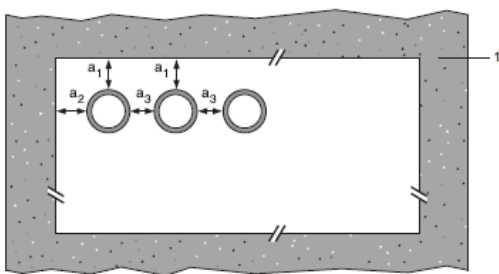
## Pipe penetration seal with 25 mm deep Protecta EX Mortar to both faces backed with 50 mm mineral fibre board

**Penetration Seal:** CS (Continuous Sustained) insulated metallic and composite pipes fitted at any position within the aperture (min. separation 25 mm from seal edges), with min. 25 mm Protecta EX Mortar to both sides of the wall, backed with min. 25 mm stone wool min. 150 kg/m<sup>3</sup>. Protecta FR Pipe wraps are required to be fitted to both faces of the seal. Maximum seal size as section 4 (page 3).

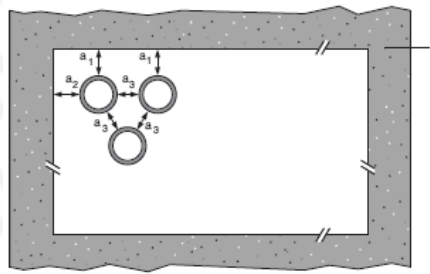
Construction details:



**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



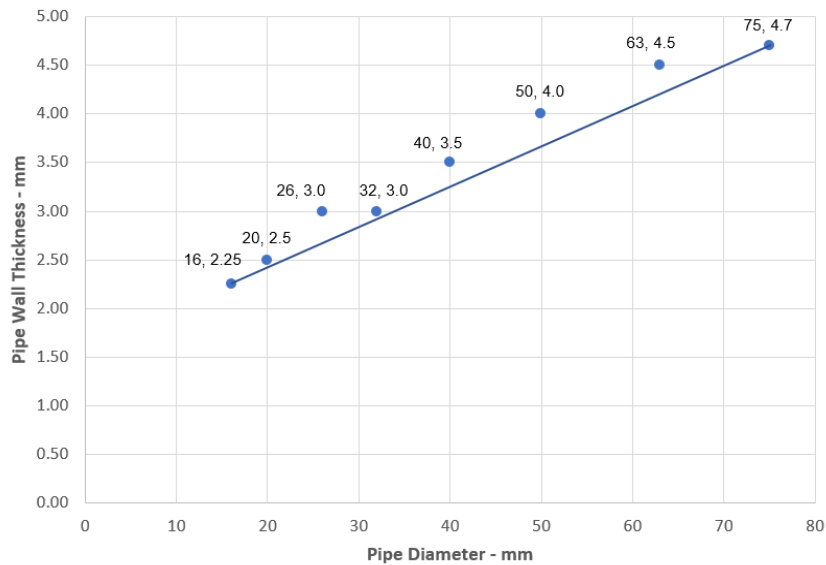
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## Double side penetration seal with pipes

Services	Wrap	Insulation	Classification
<b>Copper and steel pipes</b>			
12-54 mm diameter/1-1.2 mm wall	50 x 3.6 mm Protecta FR Pipe Wrap fitted to both sides of the seal	9-25 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	EI 120 C/C
<b>Alupex pipes</b>			
16 mm diameter/2.25 mm wall	50 x 3.6 mm Protecta FR Pipe Wrap fitted to both sides of the seal	9-25 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	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			

Pipe diameter vs Wall thickness - Alupex Pipes with Insulation CS



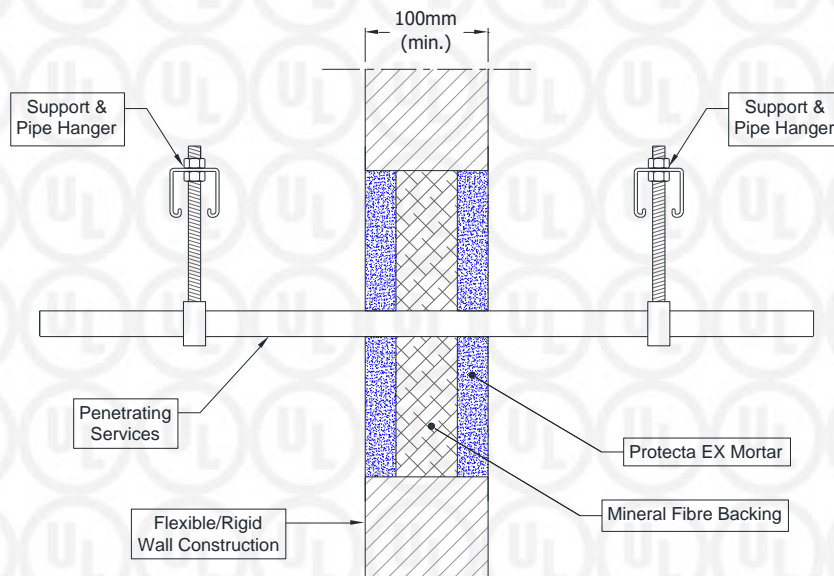
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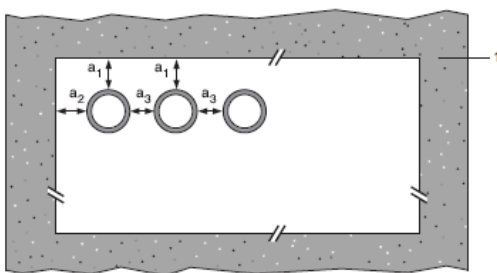
## Pipe penetration seal with 25 mm deep Protecta EX Mortar to both faces backed with 50 mm mineral fibre board

**Penetration Seal:** Combustible pipes sealed with Protecta EX Mortar, to both sides of the wall, backed with stone wool board min. 140 kg/m<sup>3</sup>. Minimum separation between pipes of 30 mm (a<sub>3</sub>) and from seal edges 30 mm (a<sub>1</sub> & a<sub>2</sub>). Maximum seal size as section 4 (page 3).

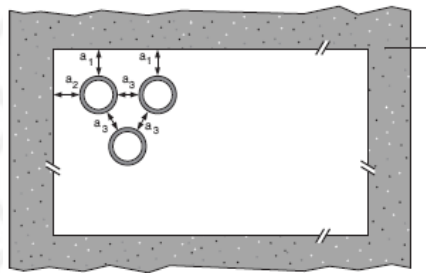
Construction details:



### 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





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## Double side penetration seal with pipes

Services	Seal Depth	Permitted configuration for seal separation	Classification
<b>PVC-U pipes according to EN 1329-1, EN 1452-2 and EN 1453-1, PVC-C according to EN 1566-1</b>			
Diameter up to 32 mm, wall thickness 1.6 – 2.4 mm	Min. 25 mm	1 & 2 between all specified pipes	EI 120 U/C, C/C
<b>PE pipes according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Diameter up to 32 mm, wall thickness 1.8 – 3.0 mm	Min. 25 mm	1 & 2 between all specified pipes	EI 120 U/C, C/C
<b>PP pipes according to EN 1852-1: 2009</b>			
Diameter up to 32 mm, wall thickness 1.9 – 4.4 mm	Min. 25 mm	1 & 2 between all specified pipes	EI 120 U/C, C/C



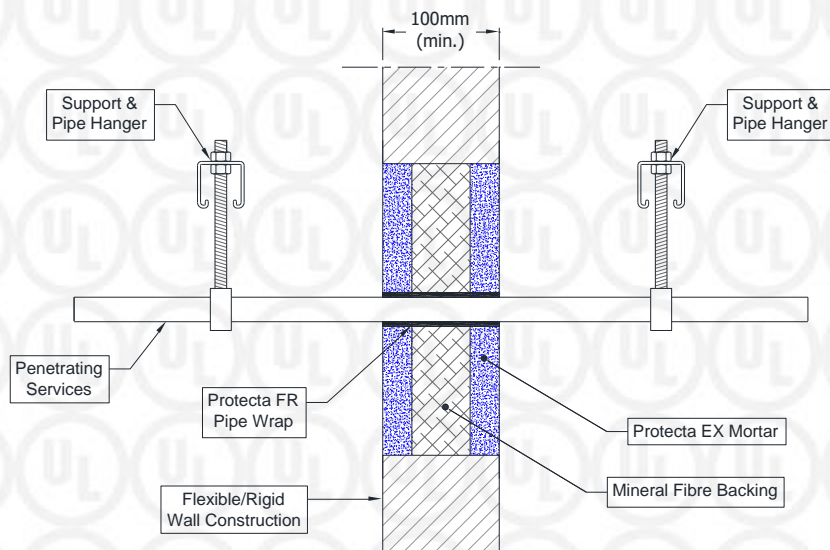
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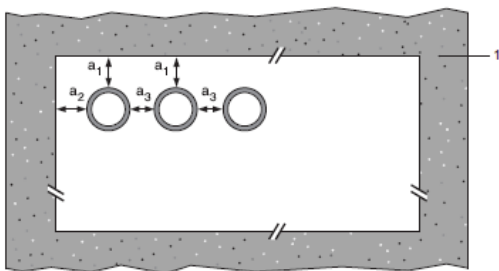
**Pipe penetration seal with 25 mm deep Protecta EX Mortar to both faces backed with 50 mm mineral fibre board**

**Penetration Seal:** Combustible pipes sealed with Protecta FR Pipe Wrap, installed into Protecta EX Mortar seals. Minimum separation between penetration seals and seal edges of 30 mm. Minimum seal size as section 4 (page 3).

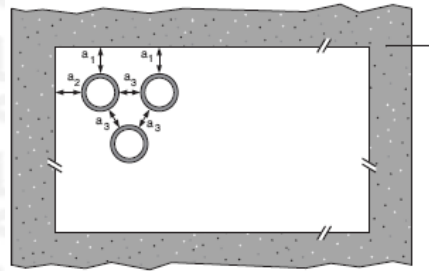
Construction details:



**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

\* Partition wall must incorporate a full fill core insulation of Stonewool (35kg/m<sup>3</sup> density)



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## Double side penetration seal with pipes

Services	Wraps (both sides)	Permitted configuration for seal separation	Classification
<b>PVC-U pipes according to EN 1329-1, EN 1452-2 and EN 1453-1 and PVC-C according to EN 1566-1</b>			
Diameter up to 40 mm, wall thickness 3.0 – 4.3 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	E 120 U/C, E 120 C/U, EI 60 U/C, EI 60 C/C
Diameter up to 110 mm, wall thickness 2.7 - 6.6 mm	50 x 3.6 mm (2 x 1.8 layer)		E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Diameter up to 125 mm, wall thickness 3.7 – 7.4 mm	50 x 5.4 mm (3 x 1.8 layer)		EI 120 U/C, EI 120 C/C
Diameter up to 160 mm, wall thickness 3.2 - 9.5 mm	50 x 7.2 mm (4 x 1.8 layer)		EI 60 U/C, EI 60 C/C
<b>PE pipes according to EN 1519-1, EN 12201-2 and EN 12006-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1</b>			
Diameter up to 40 mm, wall thickness 3.2 – 3.7 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/C, EI 120 C/C
Diameter up to 110 mm, wall thickness 4.2 - 10 mm	50 x 3.6 mm (2 x 1.8 layer)		EI 60 U/C, EI 60 C/C
Diameter up to 125 mm, wall thickness 12 mm	50 x 5.4 mm (3 x 1.8 layer)		EI 120 U/C, EI 120 C/C
Diameter up to 160 mm, wall thickness 4.9 – 12.0 mm	50 x 7.2 mm (4 x 1.8 layer)		E 120 U/C, E 120 C/C
Diameter up to 160 mm, wall thickness 12.0 mm			EI 90 U/C, EI 90 C/C
<b>PP pipes according to EN 1852-1: 2009</b>			
Diameter up to 40 mm, wall thickness 4.0 – 5.5 mm	50 x 1.8 mm (1 layer)	1 & 2 between PVC-U/PVC-C, PE/ABS/SAN+PVC and PP pipes in any combination	EI 120 U/C, EI 120 C/C
Diameter up to 110 mm, wall thickness 6.6 mm	50 x 3.6 mm (2 x 1.8 layer)		E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Diameter up to 125 mm, wall thickness 17.1 mm	50 x 5.4 mm (3 x 1.8 layer)		E 120 U/C, E 120 C/C EI 90 U/C, EI 90 C/C
Diameter up to 160 mm, wall thickness 4.0 - 21.9 mm	50 x 7.2 mm (4 x 1.8 layer)		E 120 U/C, E 120 C/C
Diameter up to 160 mm, wall thickness 21.9 mm			EI 60 U/C, EI 60 C/C



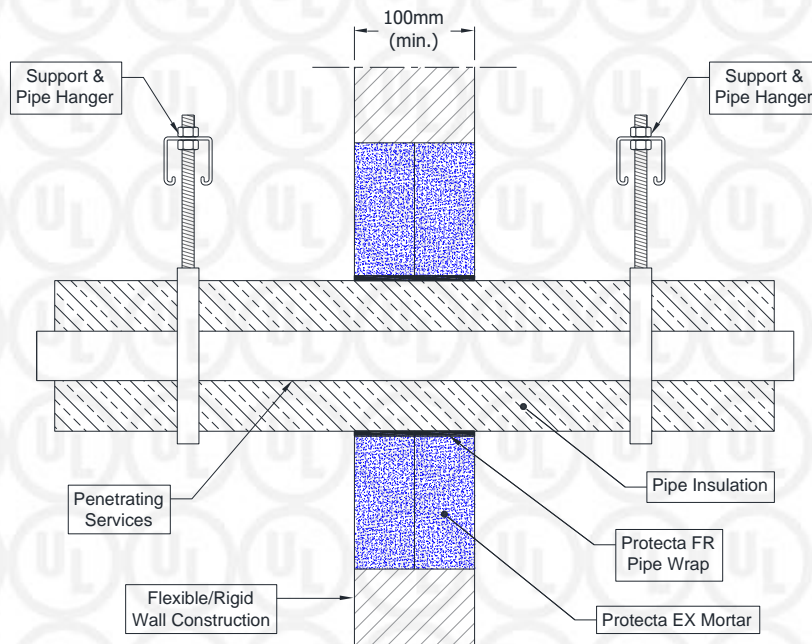
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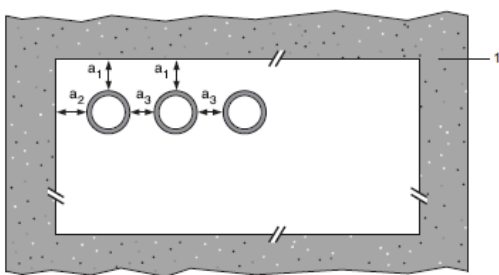
## Pipe penetration seal with 50 mm deep Protecta EX Mortar to both faces

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture (min. separation 30 mm from seal edges), min. 50 mm Protecta EX Mortar to both sides of the wall without backing\*. Protecta FR Pipe wraps are required to be fitted to both faces of the seal.

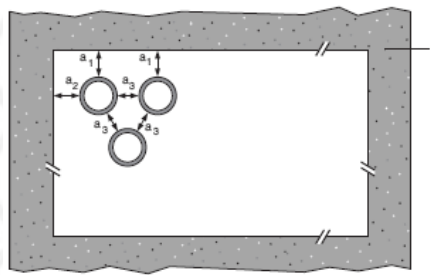
Construction details:



**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

\* Maximum seal size as section 4 (page 3)



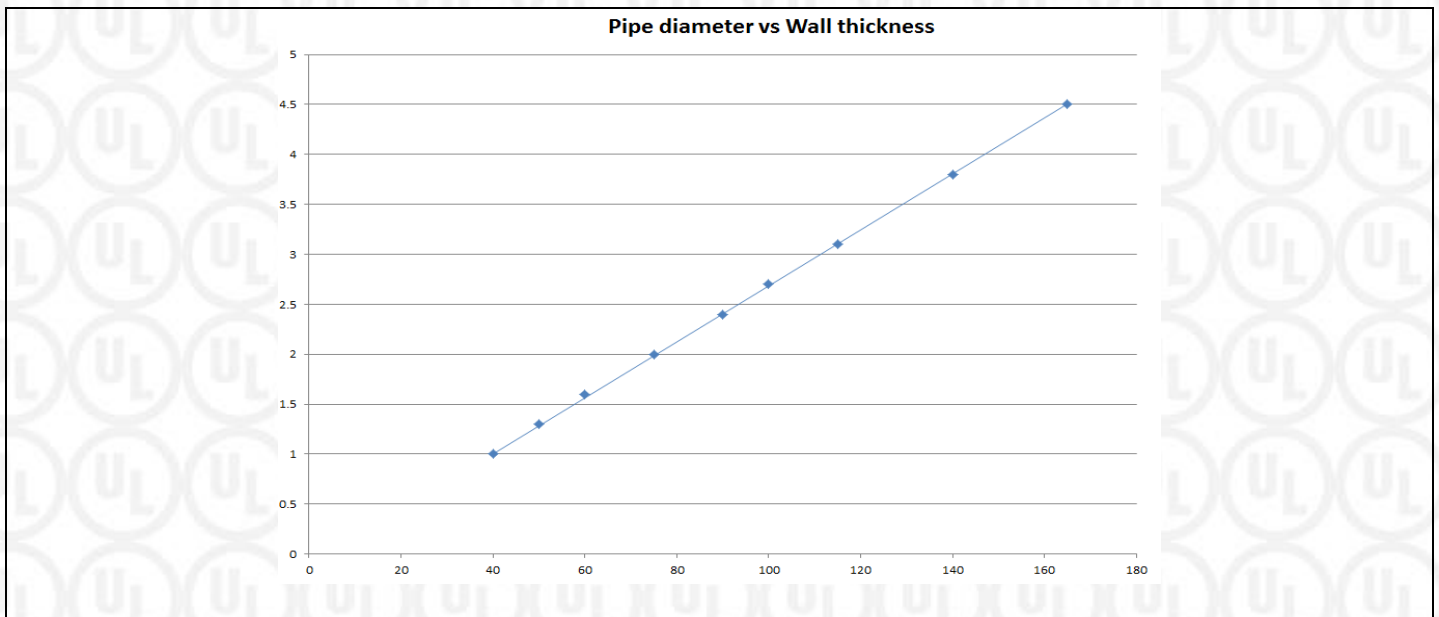
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## Double side penetration seal with pipes

Services	Wrap	Insulation	Classification
<b>Mild or stainless steel pipe</b>			
40 mm diameter/1-14.2 mm wall*	2 off 50 x 3.6 mm Protecta FR Pipe Wrap, one fitted flush to each face of seal	13 -32 mm Elastomeric insulation minimum class B-s3,d0 or PE Foam insulation	<b>E 120 C/U, EI 60 C/U</b>
50 mm diameter/1.3-14.2 mm wall*			
60 mm diameter/1.6-14.2 mm wall*			
75 mm diameter/2-14.2 mm wall*			
90 mm diameter/2.4-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3.1-14.2 mm wall*			
140 mm diameter/3.8-14.2 mm wall*			
165 mm diameter/ 4.5-14.2 mm wall*			

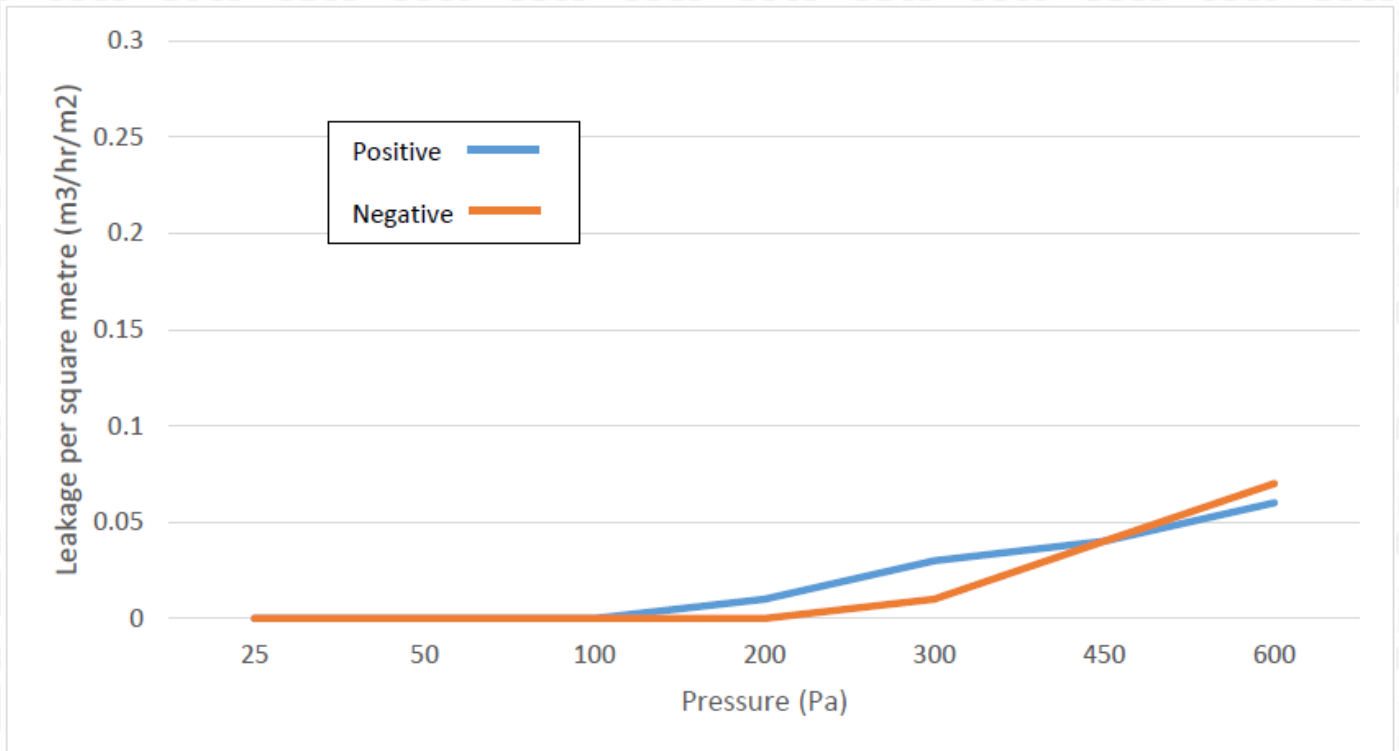
\* Typical pipe diameters shown, see below graph for intermediate sizes



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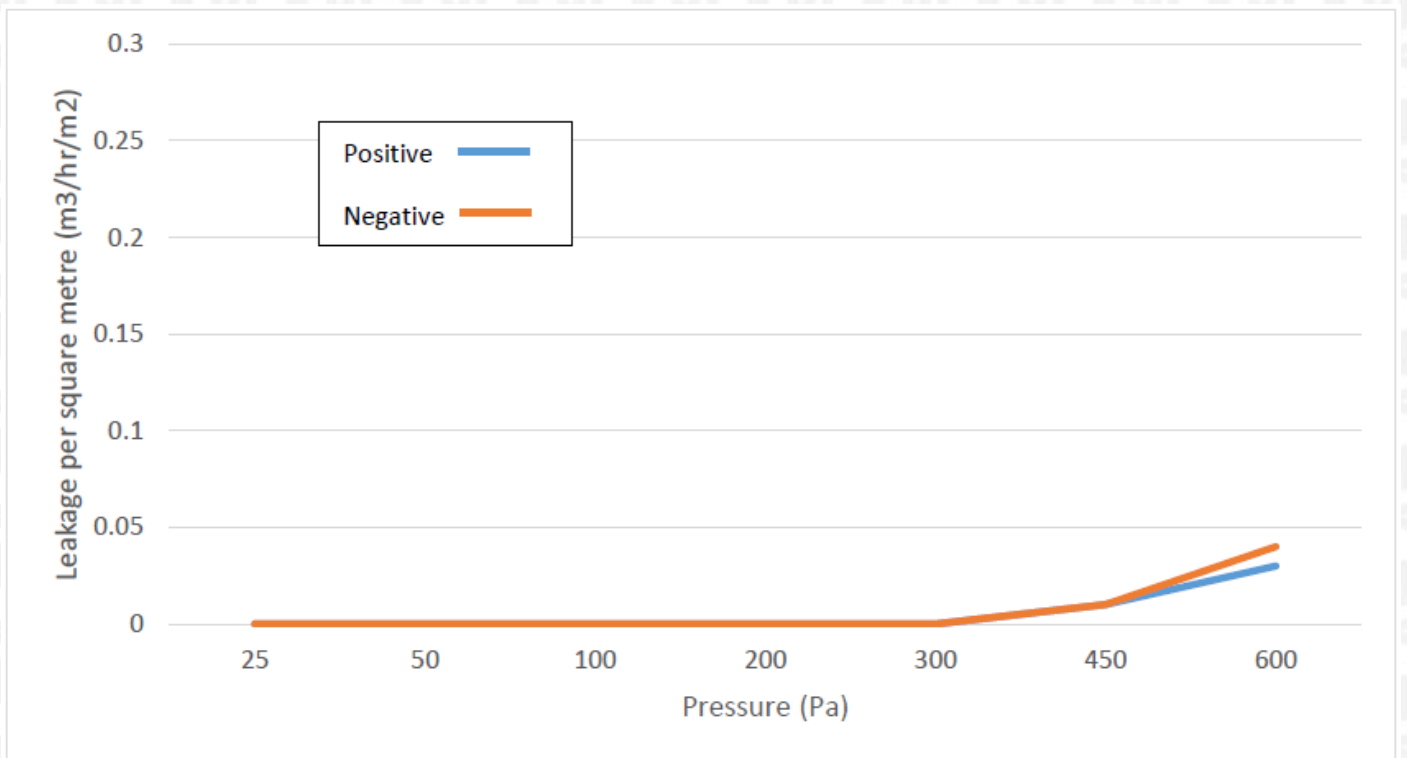
Product tested	1200 mm high x 600 mm wide x 50 mm deep Protecta EX Mortar		
Summary of testing procedure		Result	
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.01	0.01
	450	0.03	0.04
	600	0.05	0.07
Results under positive chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.01	0.01
	300	0.02	0.03
	450	0.03	0.04
	600	0.04	0.06



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Product tested	600 mm high x 600 mm wide x 100 mm deep Protecta EX Mortar inc. 110 mm plastic pipe with 2no layers 50 mm x 1.8 mm Protecta FR Wrap cast to one face in centre of seal		
Summary of testing procedure		Result	
	Pressure (Pa)	Leakage (m <sup>3</sup> /h)	Leakage (m <sup>3</sup> /m <sup>2</sup> /h)
Results under negative chamber pressure	25	0.00	0.00
	50	0.00	0.00
	100	0.00	0.00
	200	0.00	0.00
	300	0.00	0.00
	450	0.01	0.01
	600	0.03	0.04
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	0.01	0.01
	600	0.02	0.03



# Appendix UL-EU Certificate

<b>Certification Mark</b>	<b>UL-EU mark</b>
<b>Certificate No.</b>	UL-EU-00911-CPR
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The UL-EU Mark, as displayed below, shall appear on certified products only. Minimum size is not specified, as long as the Mark is legible. The following is suggested.



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

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

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

## PROCUREMENT

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

Form-ULID-006104 (DCS:27-CP-F0855) 6.0

