UL INTERNATIONAL (UK) LTD
Wonersh House, Building C,
The Guildway,
Old Portsmouth Road,
Guildford. GU3 1LR.
United Kingdom.

Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
www.eota.eu

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# European Technical Assessment

# ETA 13/0673
## of 17/07/2017

| | |
|---|---|
| **Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011:** | **UL International (UK) Ltd** |
| **Trade name of the construction product** | Protecta FR Board |
| **Product family to which the construction product belongs** | Fire Stopping and Sealing Product:<br>• Penetration Seals |
| **Manufacturer** | Polyseam AS<br>Ravneveien 7<br>Linnestad Næringsområde<br>N-3174 Revetal, Norway<br>http://www.polyseam.com |
| **Manufacturing plant(s)** | Polyseam Ltd<br>Shaw Park<br>Silver Street<br>Huddersfield, West Yorkshire<br>HD5 9AF, UK |
| **This European Technical Assessment contains** | 51 pages including 1 Annex which forms an integral part of this assessment. |
| **This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of** | ETAG 026-2, edition 2011, used as European Assessment Document (EAD). |
| **This version replaces** | ETA 13/0673 issued on 21/09/2016 |

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## I. SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

### 1 Technical description of the product

1) Protecta FR Board is a coated mineral wool board used to reinstate the fire resistance performance of wall and floor constructions where they have been provided with apertures for the penetration of single or multiple services.

2) The Protecta FR Board is supplied coated on one face, referenced 1-S, or on both faces, referenced 2-S. The board or boards are then cut to allow the penetration of the required services, before being inserted into the aperture in the wall.

3) Protecta FR Pipe Wraps are required to be used in conjunction with Protecta FR Board depending upon the required application and classification (see Annex B). Protecta FR Pipe Wraps are the subject of a separate ETA which is not declared in the document for confidentiality reasons.

4) Polyseam AS submitted a written declaration that Protecta FR Board does not contain substances which have to be classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the EGDS - taking into account the installation conditions of the construction product and the release scenarios resulting from there.

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

### 2 Specification of the intended uses of the product in accordance with the applicable European Assessment Document (Hereinafter EAD): ETAG 026-2

Detailed information and data is given in Annex A.

1) The intended use of Protecta FR Board is to reinstate the fire resistance performance of flexible wall, rigid wall and floor constructions where they are penetrated by various cables, metallic pipes, composite pipes and plastic pipes.

2) The specific elements of construction that the system Protecta FR Board may be used to provide a penetration seal in, are as follows:

a. Flexible walls: The wall must have a minimum thickness of 75 mm and comprise steel studs lined on both faces with minimum 1 layers of 12.5 mm thick boards. Apertures are not required to be lined.

b. Rigid walls: The wall must have a minimum thickness of 75 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/$m^3$.

c. Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/$m^3$.

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

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3) The System Protecta FR Board may be used to provide a penetration seal with cables, cable trays, metallic pipes, composite pipes and plastic pipes, with and without insulation, with mixed services within the same seal/aperture (for details see Annex A).

4) The total amount of cross sections of services (including insulation) should not exceed 60% of the penetration area.

5) The system Protecta FR Board may be used to seal apertures in the separating element of unlimted width by 1200mm high in a wall (uninterupted separating studs will be required at 2400 mm centres or less in flexible walls), and 2400mm by 1200 mm in a floor. The minimum permitted separation between adjacent seals/apertures is 200mm. Services should be a minimum of 25mm from seal edges. Services within the system Protecta FR Board seal do not require a minimum separation, except pipes where pipe insulation penetrates the seal and plastic pipe penetrations which should be a minimum of 30 mm from other services in the aperture.

6) Services in floors shall be supported at 250mm and 400mm from the top face. Services in walls shall be supported at 270mm and 470mm from both faces of the wall.

7) The provisions made in this European Technical Assessment are based on an assumed working life of the Protecta FR Board of 25 years, provided that the conditions laid down in the product datasheet for the packaging/transport/ storage/installation/use/repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

8) Type $Y_1$: intended for use at temperatures below 0°C with exposure to UV but no exposure to rain. Includes lower classes $Y_2$, $Z_1$, $Z_2$.

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

| Product-type: Sealant | Intended use: Penetration Seal | |
|---|---|---|
| Basic requirement for construction work | Essential characteristic | Performance |
| | Mechanical resistance and stability | |
| - | None | Not relevant |
| Safety in case of fire | | |
| EN 13501-1 | Reaction to fire | Class F (untested) |
| EN 13501-2 | Resistance to fire | Annex A |
| Hygiene, health and environment | | |
| EN 1026:2000 | Air permeability (material property) | No performance determined |
| ETAG 026-2, Annex C | Water permeability (material property) | No performance determined |
| Declaration of manufacturer | Release of dangerous substances | Declaration of manufacturer |
| Safety in use | | |
| EOTA TR 001:2003 | Mechanical resistance and stability | No performance determined |
| EOTA TR 001:2003 | Resistance to impact/movement | No performance determined |
| EOTA TR 001:2003 | Adhesion | No performance determined |
| Protection against noise | | |
| EN 10140-2/ EN ISO 717-1 | Airborne sound insulation | No performance determined |
| Energy economy and heat retention | | |
| EN 12664, EN 12667 or EN 12939 | Thermal properties | No performance determined |
| EN ISO 12572<br>EN 12086 | Water vapour permeability | No performance determined |
| General aspects relating to fitness for use | | |
| EN 13162 or EN 14303, EN ISO 1519 | Durability and serviceability | $Y_1$ |

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

According to the decision 1999/454/EC – Commission Decision of date 22nd June 1999 on on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, published in the Official Journal of the European Union (OJEU) L178/52 of 14/07/1999, see http://eur-lex.europa.eu/JOIndex.do) of the European Commission[1], as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table(s) applies (apply).

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

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

Tasks of the manufacturer:

Factory production control

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

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

The factory production control shall be in accordance with the Control Plan of 8th April 2013 relating to the European technical assessment ETA 13/0673 issued on 17/07/2017 which is part of the technical documentation of this European technical approval. The "Control Plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at UL International (UK) Ltd.

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

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[1] Official Journal of the European Communities L178/52 of 14/7/1999

Other tasks of the manufacturer

Additional information

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

(a) Technical data sheet:

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

(b) Installation instruction:

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

**6 Issued on:**

**17th July 2017**

Report by:

C. Johnson
Staff Engineer
Built Environment Sector

Reviewed by:

C. W. Miles
Business Manager – Europe & Latin America
Built Environment Sector

**For and on behalf of UL International (UK) Ltd**.

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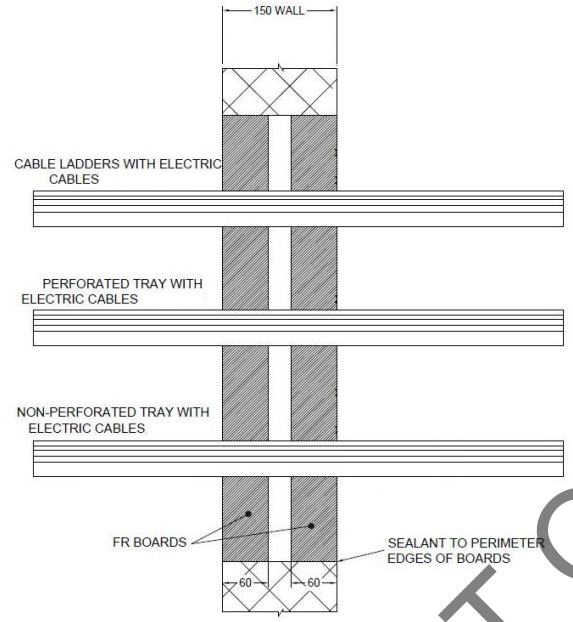
# ANNEX A – Resistance to Fire Classification – Protecta FR Board

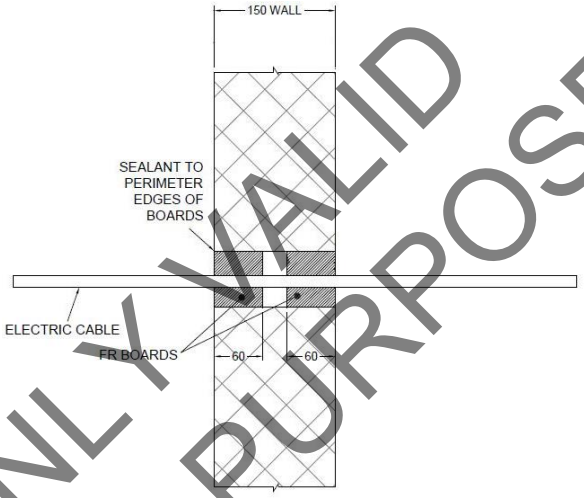
## A.1 Rigid wall constructions according to 2. 2) with wall thickness of minimum 150 mm

### A.1.1 Cable penetration seal with 2x 60 mm thick Protecta FR Board 2-S

**Penetration Seal:** Cables fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to both sides of the wall.

Construction details:




#### A.1.1.1 Double side penetration seal with cables

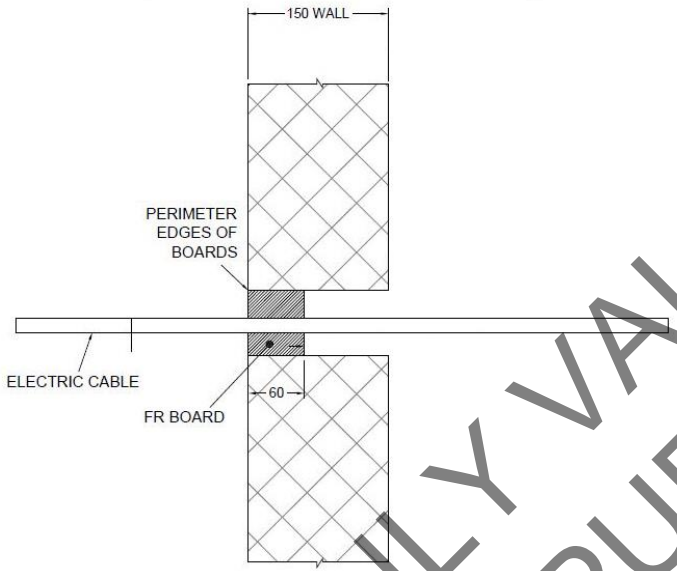
| Services | Classification |
|---|---|
| None (blank), at max. 1200 x 1200 mm | **EI 240** |
| None (blank) | **E 240, EI 180** |
| Single electrical cables up to 21 mm Ø | |
| Single or bundled electrical cables up to 21 mm Ø, with or without trays | **E 240, EI 180** |
| Electrical cables up to 80 mm Ø (single, bundled and on trays) | **E 180, EI 60** |
| Cables up to 21mm Ø in tied bundles up to 100mm Ø | **E 180, EI 120** |
| Steel cable trays & ladders | **E 180, EI 60** |
| PVC conduit up to 16 mm Ø | **EI 180 C/U, EI 180 C/C** |

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### A.1.2 Cable penetration seal with 1x 60 mm thick Protecta FR Board 2-S

**Penetration Seal:** Cables (single) fitted at any position within the aperture, with Protecta FR Board 2-S positioned to either face of the wall (or anywhere in between).

Construction details:




#### A.1.2.1 Single side penetration seal with cables

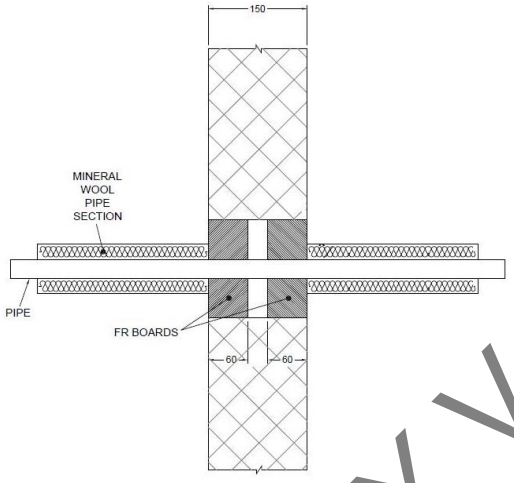
| Services | Maximum aperture | Classification |
|---|---|---|
| None (blank) | As section 2. 5) | **E 240, EI 90** |
| Single electrical cables up to 21 mm Ø | | |
| Single A1 cable = 5 x 1.5 $mm^2$ core HD603.3 electrical cable with PVC insulation, PVC sheath and 14 mm diameter | 70 x 70 mm | **EI 240** |
| Single A2 cable = 5 x 1.5 $mm^2$ core HD22.4 electrical cable with EPR insulation, PO sheath and 11.2-14.4 mm diameter | | |
| Single A3 cable = 5 x 1.5 $mm^2$ core HD604.5 electrical cable with XLPE insulation, EVA sheath and 13 mm diameter | | |

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### A.1.3 Pipe penetration seal with 2x 60 mm thick Protecta FR Board 2-S

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 60 mm Protecta FR Board to both sides of the wall.

Construction details:



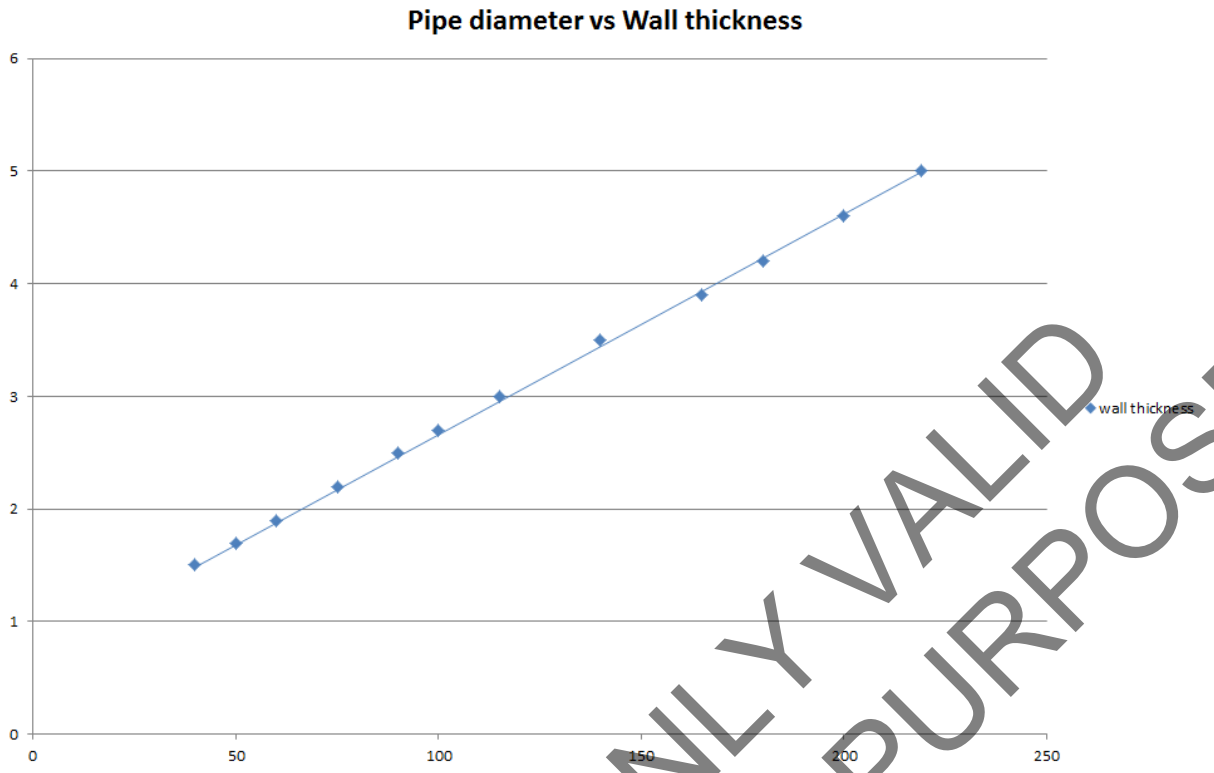

#### A.1.3.1 Double side penetration seal with pipes

| Services<br>Mild or stainless steel pipe | Maximum aperture | Insulation | Classification |
|---|---|---|---|
| 40 mm diameter/1.5-14.2 mm wall* | 1200 x 1200 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | **EI 240 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | As section 2. 5) | | **E 240 C/U, EI 180 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 90 C/U** |
| 50 mm diameter/1.7-14.2 mm wall* | | | |
| 60 mm diameter/1.9-14.2 mm wall* | | | |
| 75 mm diameter/2.2-14.2 mm wall* | | | |
| 90 mm diameter/2.5-14.2 mm wall* | | | |
| 100 mm diameter/2.7-14.2 mm wall* | | | |
| 115 mm diameter/3-14.2 mm wall* | | | |
| 140 mm diameter/3.5-14.2 mm wall* | | | |
| 165 mm diameter/ 3.9-14.2 mm wall* | | | |
| 180 mm diameter/ 4.2-14.2 mm wall* | | | |
| 200 mm diameter/ 4.6-14.2 mm wall* | | | |
| 219 mm diameter/ 5.0-14.2 mm wall* | | | |

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

| Services<br>Alupex composite | Maximum aperture | Insulation | Classification |
|---|---|---|---|
| 16 mm diameter/2.25 mm wall | 1200 x 1200 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | **EI 240 U/C** |
| 16 mm diameter/2.25 mm wall | As section 2. 5) | | **E 240 U/C**<br>**EI 180 U/C** |

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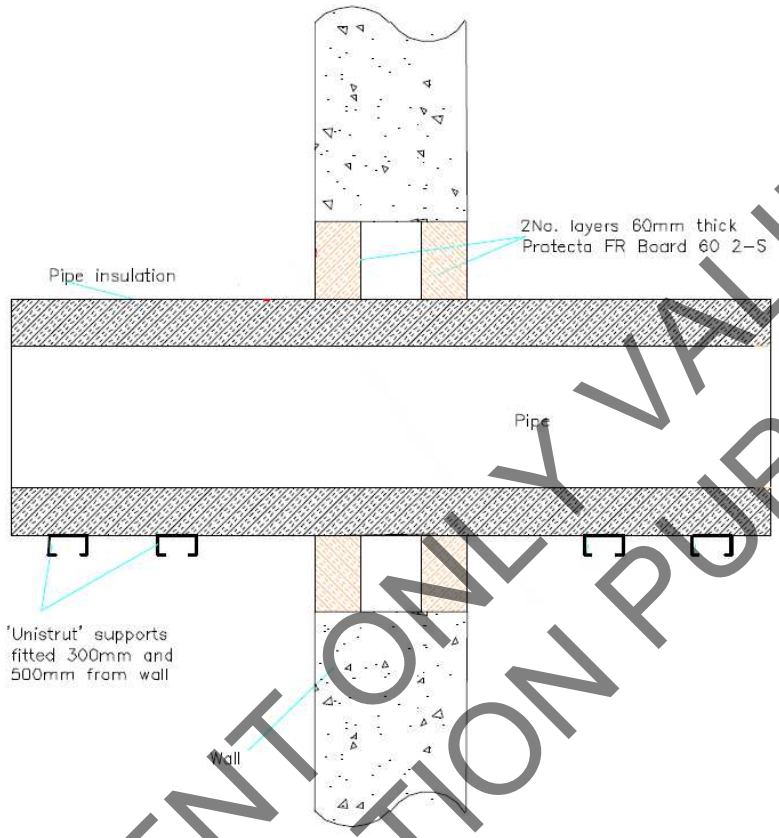


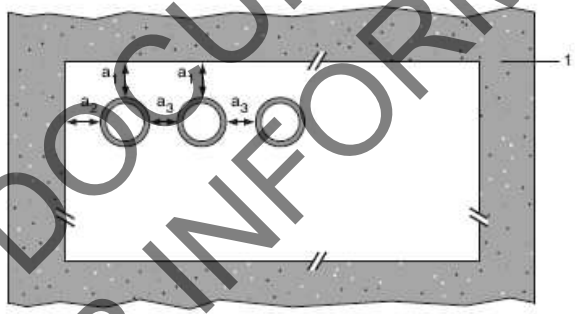
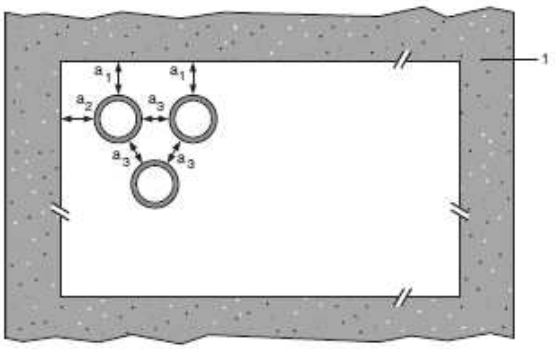

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### A.1.4 Pipe penetration seal with 2x Protecta FR Board 2-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm.

Construction details:




| Configuration 1 | Configuration 2 |
|---|---|
|  |  |

**Key**

1 Supporting construction

a1 Pipe / top edge of seal separation

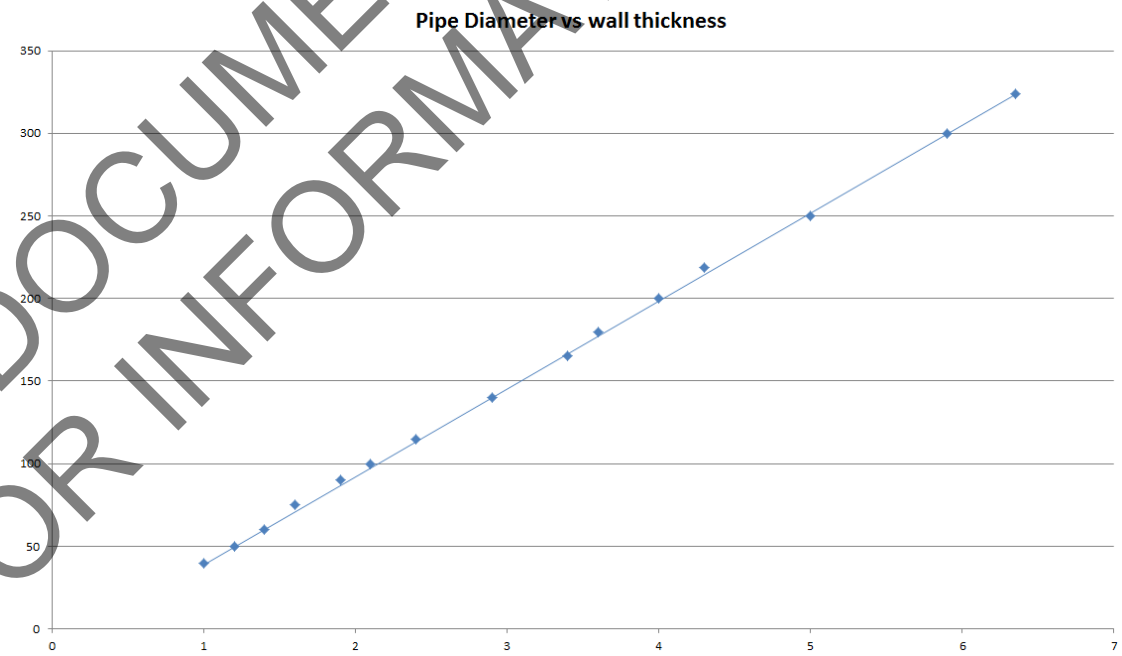
a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

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### A.1.4.1 Double side penetration seal with pipes

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

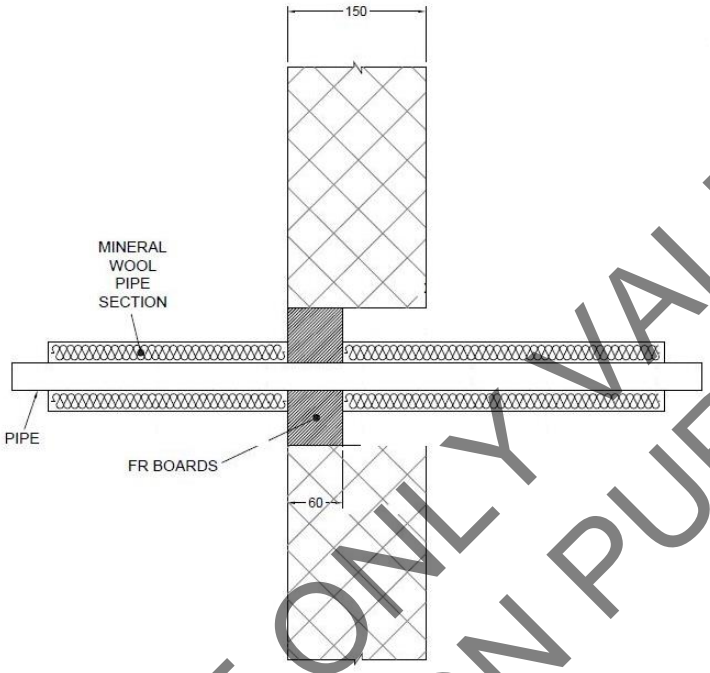



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### A.1.5 Pipe penetration seal with 1x 60 mm thick Protecta FR Board 2-S

**Penetration Seal:** 1000 mm (min.)* LI (Local Interrupted), CI (Continuous Interrupted) or CS (continuous sustained) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 60 mm Protecta FR Board to one side of the wall.

Construction details:




* 600 mm long insulation required for Alupex pipes

#### A.1.5.1 Single side penetration seal with pipes

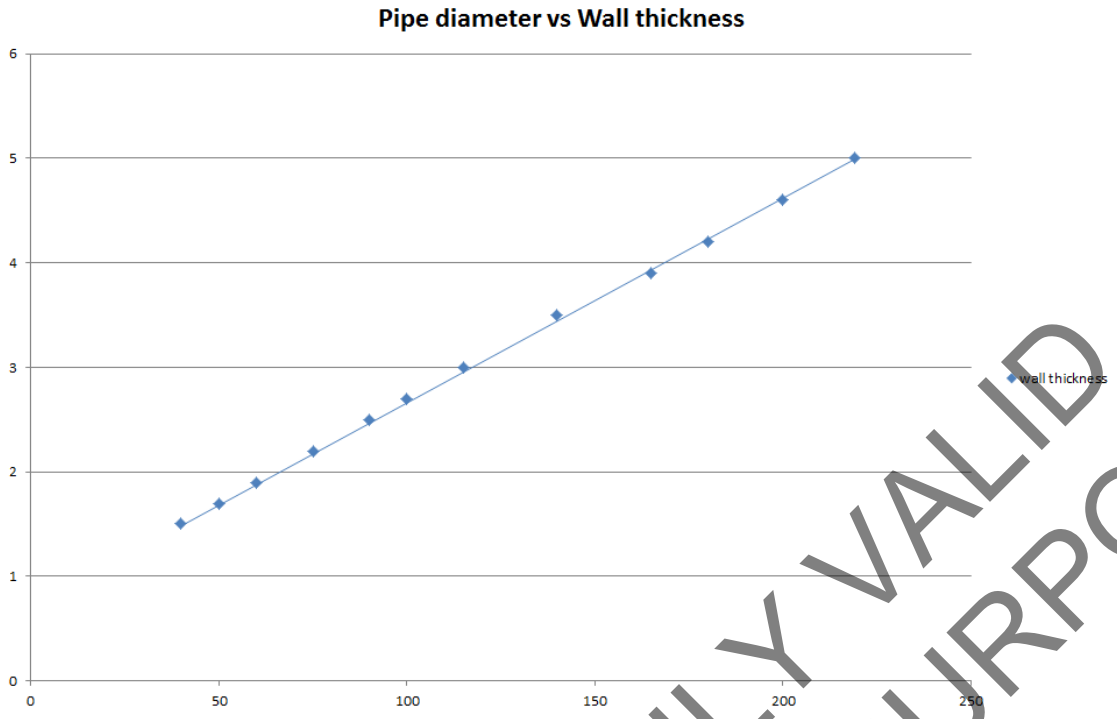
| Services | Maximum Aperture | Insulation | Classification |
|---|---|---|---|
| Up to 12 mm diameter Copper pipe 0.9-14.2 mm wall | 70 x 70 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | **EI 240 C/U** |
| Up to 54 mm diameter Copper pipe 0.9-14.2 mm wall | 115 x 115 mm | | **E 240 C/U, EI 120 C/U** |
| 75 mm diameter Alupex composite pipe 7.5 mm diameter | 200 x 200 mm | 30 mm Stone wool insulation 80 kg/m$^3$ | **EI 120 C/C** |
| Up to 54 mm diameter Copper pipe 0.9-14.2 mm wall | As section 2. 5) | 20 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 90 C/U** |
| Up to 75 mm diameter Alupex composite pipe 7.5 mm diameter | | 30 mm Stone wool insulation 80 kg/m$^3$ | **E 120 C/C, EI 90 C/C** |
| 325 mm diameter Steel pipe 6.35-14.2 mm wall | | | **E 120 C/U, EI 90 C/U** |

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| Services<br>Mild or stainless steel pipe | Maximum Aperture | Insulation | Classification |
|---|---|---|---|
| 40 mm diameter/1.5-14.2 mm wall* | 280 x 280 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | **EI 240 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | |
| 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* | | | |
| 40 mm diameter/1.5-14.2 mm wall* | As section 2. 5) | 20 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 90 C/U** |
| 50 mm diameter/1.7-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | |
| 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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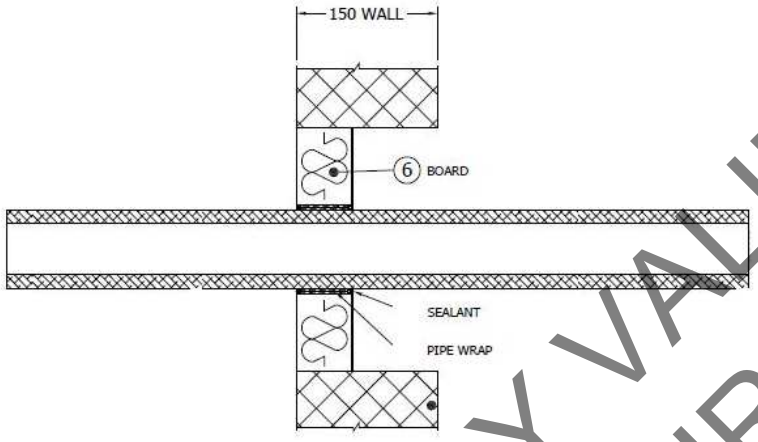



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### A.1.5 Pipe penetration seal with 1x Protecta FR Board 2-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to either side of the wall (or anywhere in between). Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation.

Construction details:




#### A.1.5.1 Single side penetration seal with pipes

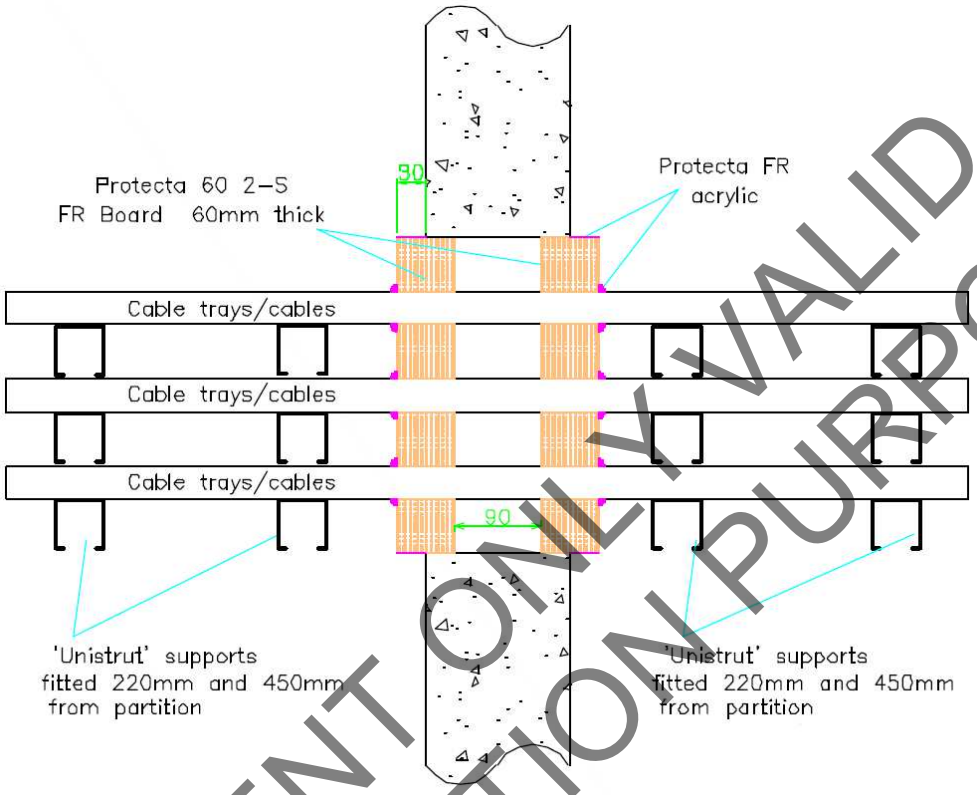
| Services | Wrap | Insulation | Classification |
|---|---|---|---|
| Mild or stainless steel pipe | | | |
| 165 mm diameter/ 4.5-14.2 mm wall | 50 x 1.8 mm Protecta FR Pipe Wrap fitted centrally | 9-25 mm Kaiflex ST/KK insulation | **E 120 U/C, E 120 C/U, E 120 C/C, EI 45 U/C, EI 45 C/U, EI 45 C/C** |
| 219 mm diameter/ 5-14.2 mm wall | Not required | 30 mm stone wool 80 kg/m$^3$ | **E 240 U/C, E 240 C/U, E 240 C/C, EI 60 U/C, EI 60 C/U, EI 60 C/C** |

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### A.1.6 Protecta FR Board 60 mm 2-S penetration seal (protruding) blank and with cables, in rigid wall min. 150 mm thick

**Penetration Seal:** Cables fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to both sides of the wall. Boards to be separated by minimum 90 mm.

Construction details:




#### A.1.6.1 Two side penetration seal with cables

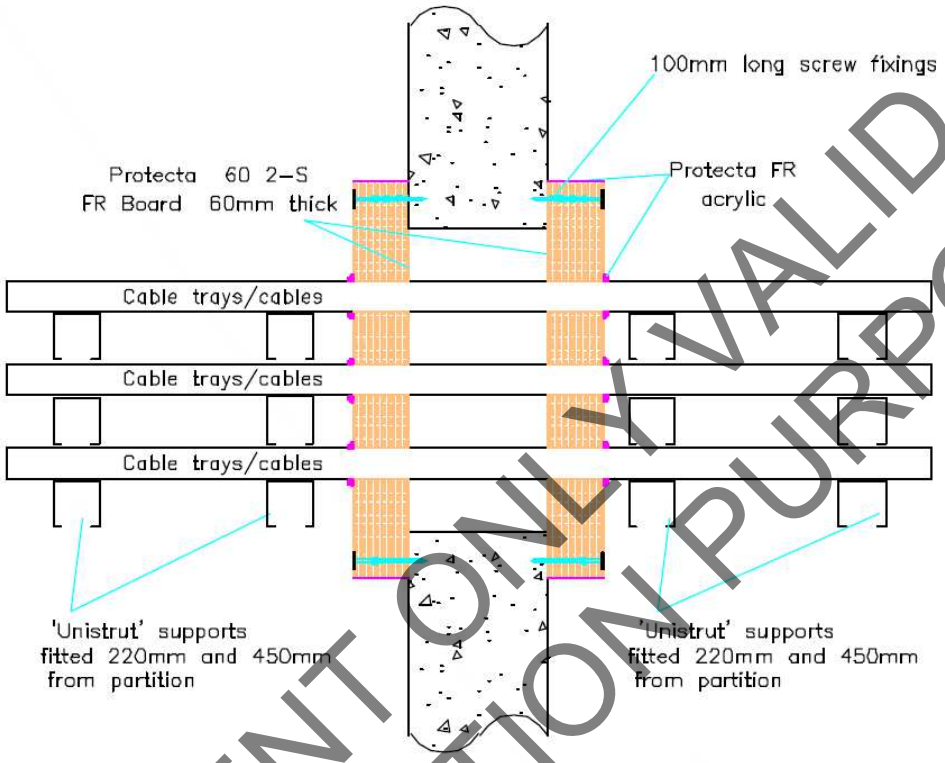
| Services | Maximum aperture | Classification |
|---|---|---|
| None (blank) | 600 mm wide x 600 mm high | **E 240, EI 180** |
| Single or bundled electrical cables up to 21 mm Ø, with or without trays | | **E 240, EI 120** |
| Electrical cables up to 80 mm Ø (single, bundled and on trays) | | **E 240, EI 60** |
| Cables up to 21mm Ø in tied bundles up to 100mm Ø | | **EI 240** |
| Steel cable trays & ladders | | **E 240, EI 180** |
| Non-Sheathed wires up to 17 mm Ø | | **E 240 , EI 180** |
| Non-Sheathed wires up to 24 mm Ø | | **E 240 , EI 90** |

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### A.1.7 FR Board 60 mm 2-S penetration seal (pattress) blank and with cables, in rigid wall min. 150 mm thick

**Penetration Seal:** Cables fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to both sides of the wall. Boards to be pattress fixed with 100 mm steel screws and penny washers at 350 mm centres and with a minimum 50 mm overlap around the opening.

Construction details:




#### A.1.7.1 Two side penetration seal with cables

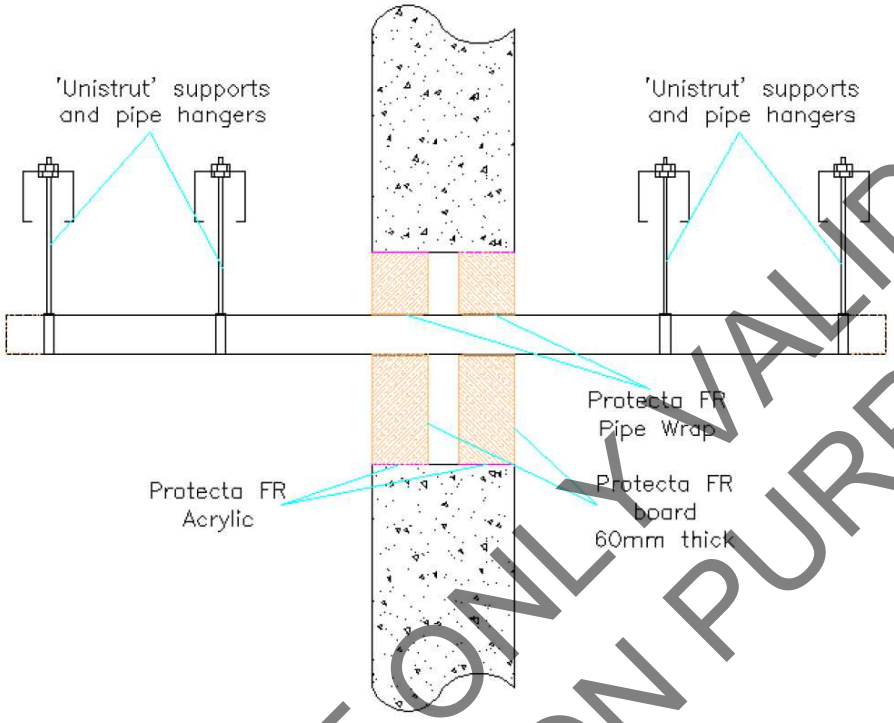
| Services | Maximum aperture | Classification |
|---|---|---|
| None (blank) | 600 mm wide x 600 mm high | **E 240, EI 180** |
| Single or bundled electrical cables up to 50 mm Ø, with or without trays | | **E 240, EI 90** |
| Single or bundled electrical cables up to 80 mm Ø (single, bundled and on trays) | | **E 240, EI 60** |
| Cables up to 21mm Ø in tied bundles up to 100mm Ø | | **EI 240** |
| Steel cable trays & ladders | | **E 240, EI 180** |
| Non-Sheathed wires up to 24 mm Ø | | **E 240 , EI 120** |

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### A.1.8 Penetration seal with 2x Protecta FR Board 2-S

**Penetration Seal:** Plastic pipes fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to both sides of the wall. Protecta FR Pipes Wraps are required to be fitted around pipes. Min. 30 mm separation between pipes.

Construction details:




#### A.1.8.1 Double side penetration seal with pipes

| Services | Wrap | Classification |
|---|---|---|
| **PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1** | | |
| Up to 40 mm diameter / 1.9-3.0 mm wall | 50 x 1.8 mm | **EI 240 U/C** |
| Up to 110 mm diameter / 2.7-6.6 mm wall | 50 x 3.6 mm | |
| Up to 125 mm diameter / 4.7-7.4 mm wall | 50 x 7.2 mm | |
| Up to 160 mm diameter / 4.0-9.5 mm wall | 50 x 10.8 mm | |
| **PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1** | | |
| Up to 40 mm diameter / 2.4-4.6 mm wall | 50 x 1.8 mm | **EI 240 U/C** |
| Up to 110 mm diameter / 3.4-10.0 mm wall | 50 x 3.6 mm | |
| Up to 125 mm diameter / 3.9-7.4 mm wall | 50 x 7.2 mm | |
| Up to 160 mm diameter / 4.9-9.5 mm wall | 50 x 10.8 mm | |
| **PP pipe according to EN 1451-1** | | |
| Up to 40 mm diameter / 1.8-5.5 mm wall | 50 x 1.8 mm | **EI 240 U/C** |
| Up to 110 mm diameter / 2.7-10.0 mm wall | 50 x 3.6 mm | **EI 240 C/C** |
| Up to 125 mm diameter / 3.1-11.4 mm wall | 50 x 7.2 mm | |
| Up to 160 mm diameter / 4.9-14.6 mm wall | 50 x 10.8 mm | |

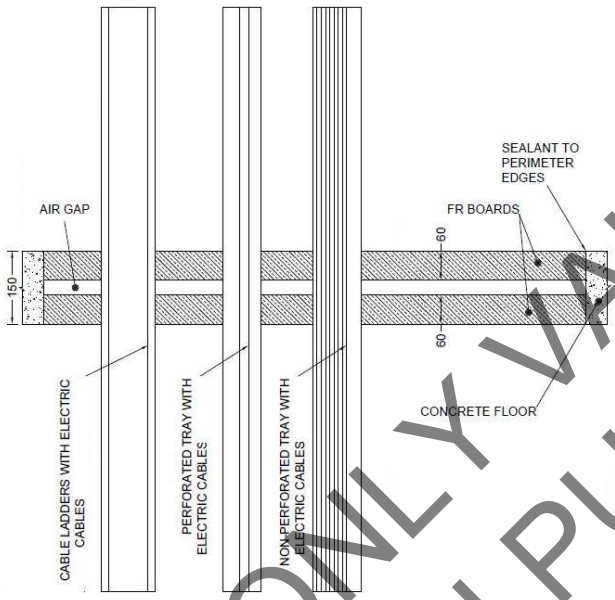
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## A.2 Rigid floor constructions according to 2. 2) with floor thickness of minimum 150 mm

### A.2.1 Cable penetration seal with 2x Protecta FR Board 2-S

**Penetration Seal:** Cables fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to both sides of the floor.

Construction details:




#### A.2.1.1 Double side penetration seal with cables

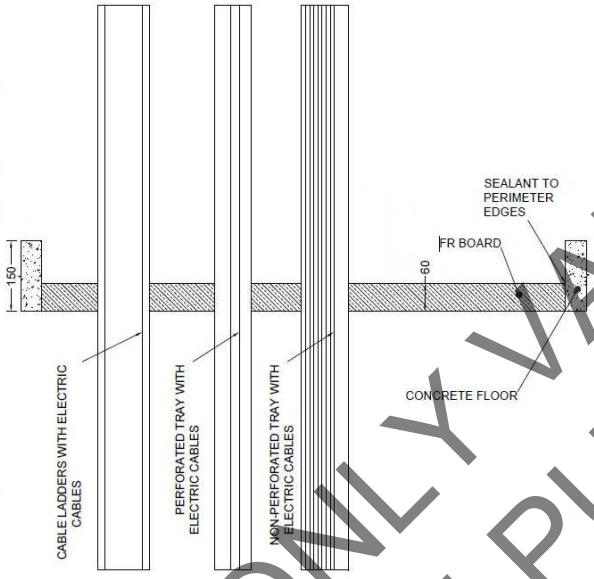
| Services | Maximum aperture | Classification |
|---|---|---|
| None (blank) | 1200 x 600 mm | **EI 180** |
| None (blank) | 2400 mm x 1200 mm | **E 180, EI 120** |
| Electrical cables up to 21 mm Ø (single, bundled and on trays) | | **EI 120** |
| Electrical cables up to 80 mm Ø (single, bundled and on trays) | | **E 120, EI 60** |
| Cables up to 21mm Ø in tied bundles up to 100mm Ø | | **EI 120** |
| Steel cable trays & ladders | | **E 120, EI 60** |
| Non-sheathed wires up to 24 mm Ø | | **E 180, EI 45** |
| PVC conduit up to 16 mm Ø | | **E 120 C/U, E 120 C/C, EI 90 C/U, EI 90 C/C** |

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### A.2.2 Cable penetration seal with 1x Protecta FR Board 2-S

**Penetration Seal:** Cables fitted at any position within the aperture, with Protecta FR Board 2-S positioned to either face of the floor (or anywhere in between).

Construction details:




#### A.2.2.1 Single side penetration seal with cables

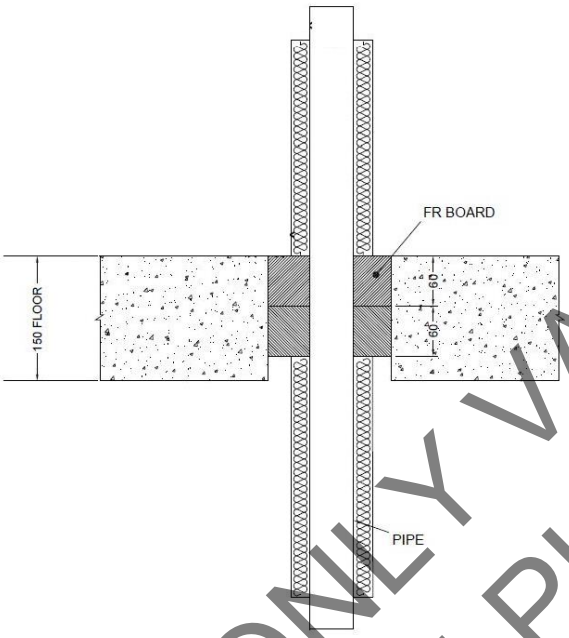
| Services | Maximum aperture | Classification |
|---|---|---|
| None (blank) | 1200 x 600 mm | **E 240, EI 120** |
| None (blank) | 2400 mm x 1200 mm | **E 120, EI 90** |
| Single* electrical cables up to 21 mm Ø | | **E 120, EI 30** |
| Single* electrical cables up to 21 mm Ø | 600 mm x 1200 mm | **E 240, EI 30** |
| Electrical cables up to 21 mm Ø (single, bundled and on trays) | 2400 mm x 1200 mm | **E 90, EI 45** |
| Electrical cables up to 80 mm Ø (single, bundled and on trays) | | **E 90, EI 30** |
| Cables up to 21mm Ø in tied bundles up to 100mm Ø | | **EI 45** |
| Steel cable trays & ladders | | **EI 45** |
| Non-sheathed wires up to 17 mm Ø | | **E 45, EI 30** |
| Non-sheathed wires up to 24 mm Ø | | **E 45, EI 20** |
| PVC conduit up to 16 mm Ø | | **EI 45 C/U, EI 45 C/C** |
| Steel or copper conduit up to 16 mm Ø | | **E 45 C/U, EI 15 C/U** |

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### A.2.3 Pipe penetration seal with 2x Protecta FR Board 2-S

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 2 layers of 60 mm Protecta FR Board 2-S together within the floor.

Construction details:

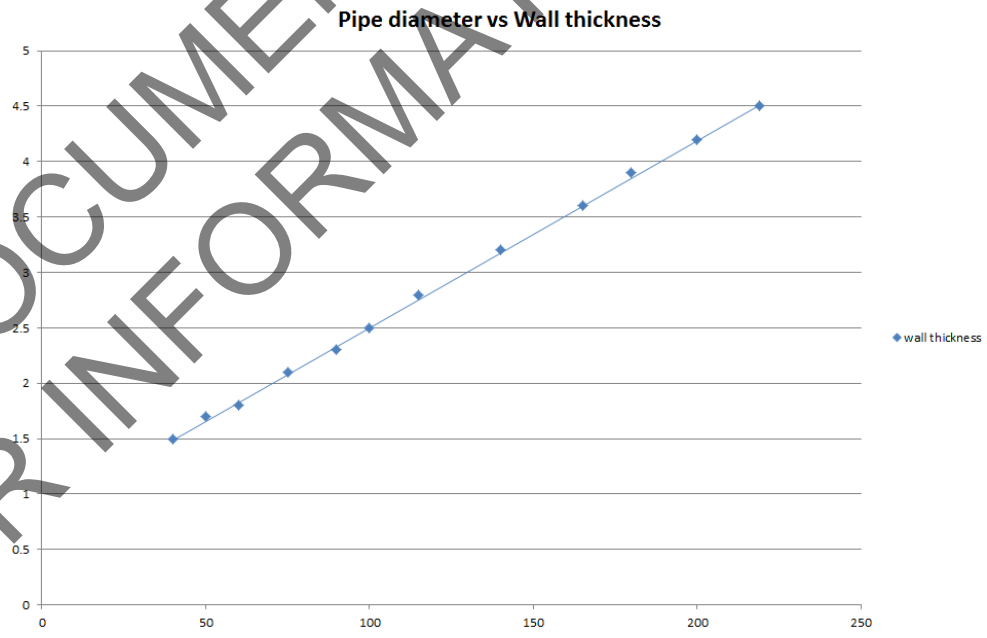



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### A.2.3.1 Two layer penetration seal with pipes

| Services<br>Mild or stainless steel pipe | Maximum aperture | Insulation | Classification |
|---|---|---|---|
| 40 mm diameter/1.5-14.2 mm wall* | 1200 x 600 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | **EI 180 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | 280 x 280 mm | | **EI 240 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | 2400 x 1200 mm | | **E 180 C/U, EI 120 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | **E 180 C/U, EI 60 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

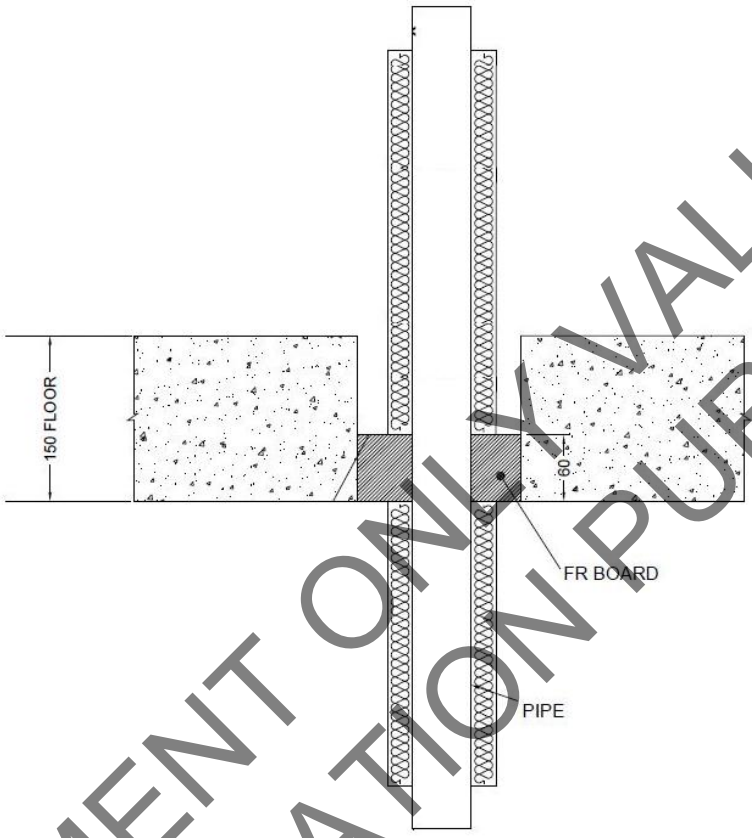



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### A.2.4 Pipe penetration seal with 1x Protecta FR Board 2-S

**Penetration Seal:** 1000 mm (min.)* LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to either side of the floor (or anywhere in between).

Construction details:




#### A.2.4.1 Single side penetration seal with pipes

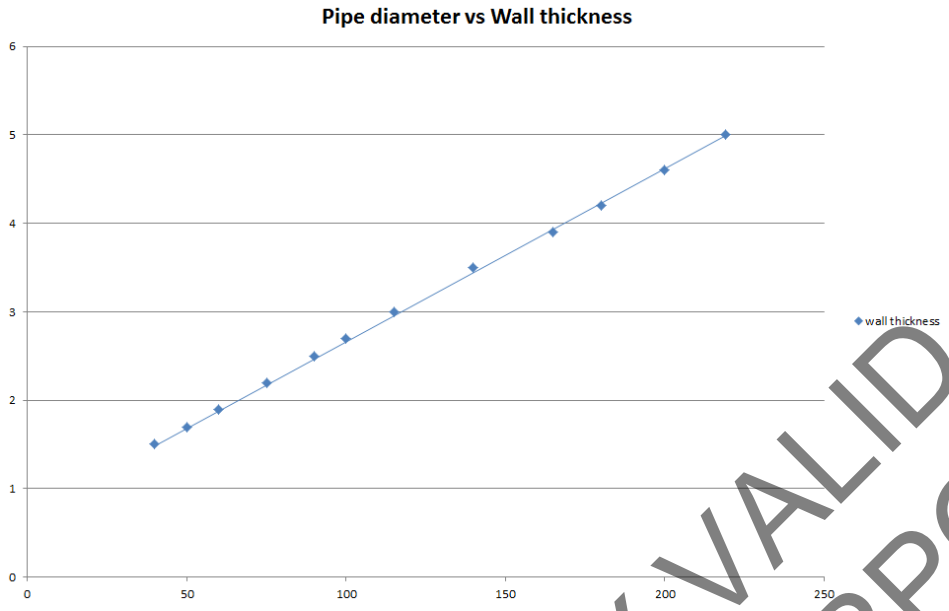
| Services | Maximum Aperture | Insulation | Classification |
|---|---|---|---|
| Up to 12 mm diameter Copper pipe 0.9-14.2 mm wall | 1200 x 600 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 45 C/U** |
| Up to 54 mm diameter Copper pipe 0.9-14.2 mm wall | 1200 x 600 mm | | **E 240 C/U** |
| | 2400 mm x 1200 mm | | **E 120 C/U** |
| 114 mm diameter mild or stainless steel pipe 11-14.2 mm wall | 600 x 1200 mm | None | **E 240 C/C, EI 20 C/C** |
| | 2400 mm x 1200 mm | | **E 120 C/C, EI 20 C/C** |

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| Services<br>Mild or stainless steel pipe | Maximum Aperture | Insulation | Classification |
|---|---|---|---|
| 40 mm diameter/1.5-14.2 mm wall* | 600 x 1200 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 60 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 90 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* | | | |
| 40 mm diameter/1.5-14.2 mm wall* | 2400 mm wide by 1200 mm high | 20 mm Stone wool insulation 80 kg/m$^3$ | **E 120 C/U, EI 60 C/U** |
| 40 mm diameter/1.5-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | **E 120 C/U, EI 90 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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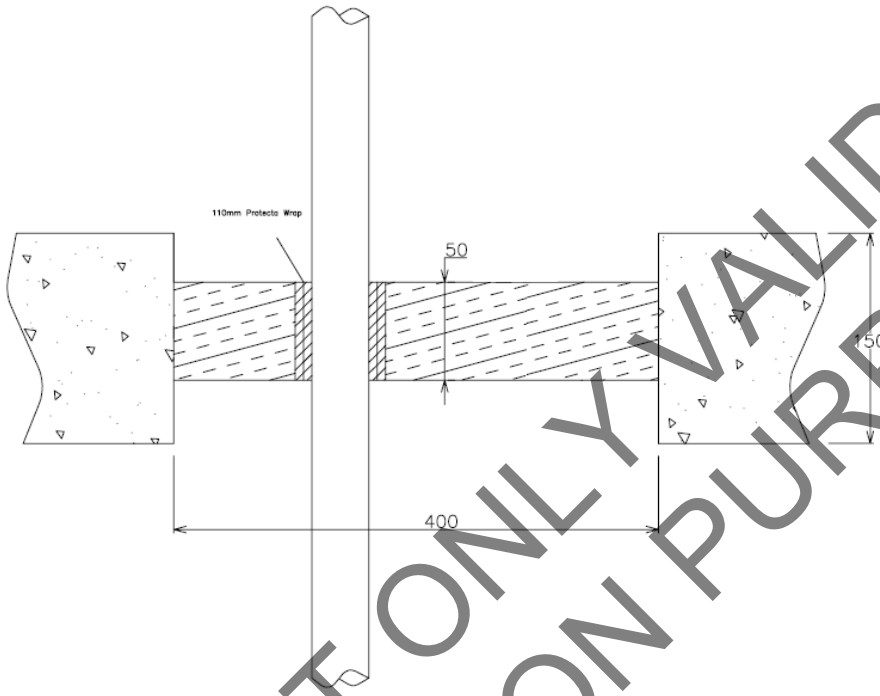

| Services<br>Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe) | Maximum Aperture | Insulation (minimum) | Classification |
|---|---|---|---|
| 16 mm diameter/2.25 mm wall | 75 x 75 mm | 500 mm long, 20 mm Stone wool insulation 80 kg/$m^3$ | **E 240 C/C, EI 180 C/C** |
| 16 mm diameter/2.25 mm wall | 600 x 1200 mm | | **E 240 C/C, EI 90 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 | 2400 mm x 1200 mm | | **E 120 C/C, EI 90 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 | | | |

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### A.2.5 Pipe penetration seal with 1x Protecta FR Board 2-S

**Penetration Seal:** Combustible pipes fitted at any position within the aperture, with 50 mm Protecta FR Board 2-S at mid-depth of the floor. Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation. Maximum aperture size 2400 mm x 1200 mm

Construction details:




#### A.2.5.1 Central penetration seal with pipes

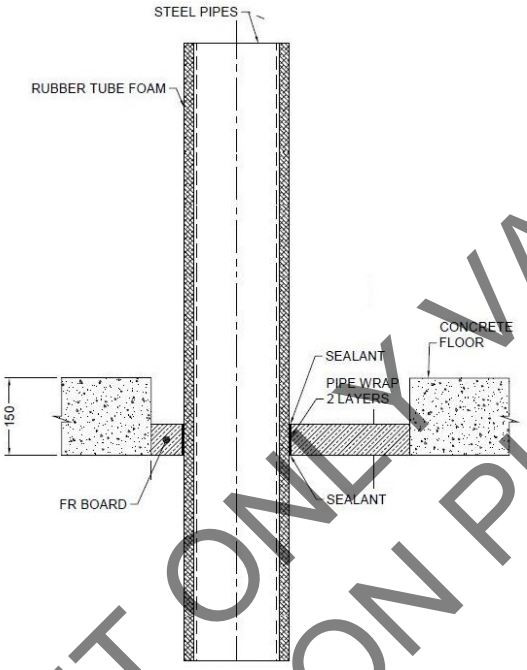
| Services | Wrap | Classification |
|---|---|---|
| PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1*<br>110 mm diameter/ 3.4mm wall | 50 x 3.6 mm Protecta FR Pipe Wrap | **EI 90 U/C, EI 90 C/C** |

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### A.2.6 Pipe penetration seal with 1x Protecta FR Board 2-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to either side of the floor (or anywhere in between). Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation. Maximum aperture size 2400 mm x 1200 mm

Construction details:




#### A.2.6.1 Single side penetration seal with pipes

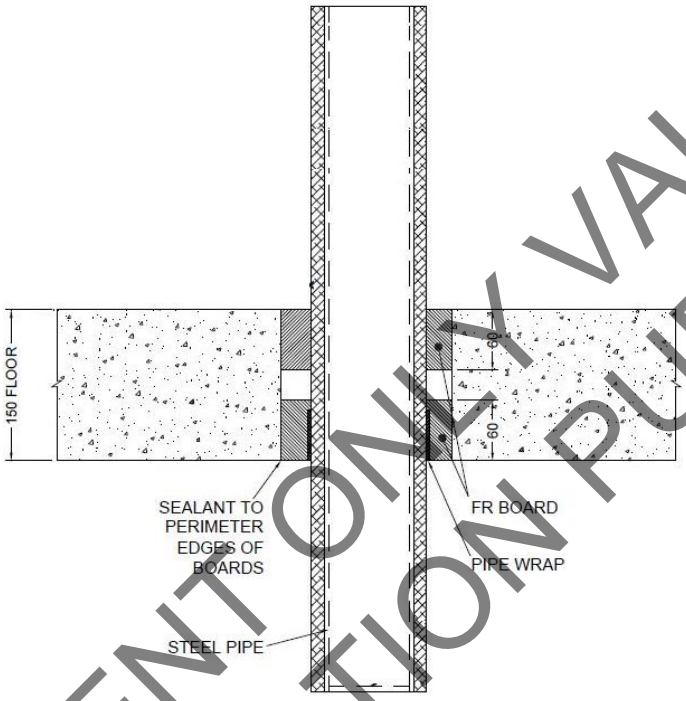
| Services | Wrap | Insulation | Classification |
|---|---|---|---|
| Mild or stainless steel pipe | | | |
| 165 mm diameter/ 4.5-14.2 mm wall | 50 x 3.6 mm Protecta FR Pipe Wrap fitted at bottom of seal | 13 mm Kaiflex ST insulation | **E 90 C/U, EI 45 C/U** |
| | | 19 mm Kaiflex ST insulation | **EI 90 C/U** |
| | Not required | 25-40 mm stone wool 80 kg/m$^3$ | **E 90 C/U, EI 60 C/U** |

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### A.2.7 Pipe penetration seal with 2x Protecta FR Board 2-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 60 mm Protecta FR Board 2-S to both sided of the floor. Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation at the soffit. Maximum aperture size 2400 mm x 1200 mm

Construction details:




#### A.2.7.1 Double side penetration seal with pipes

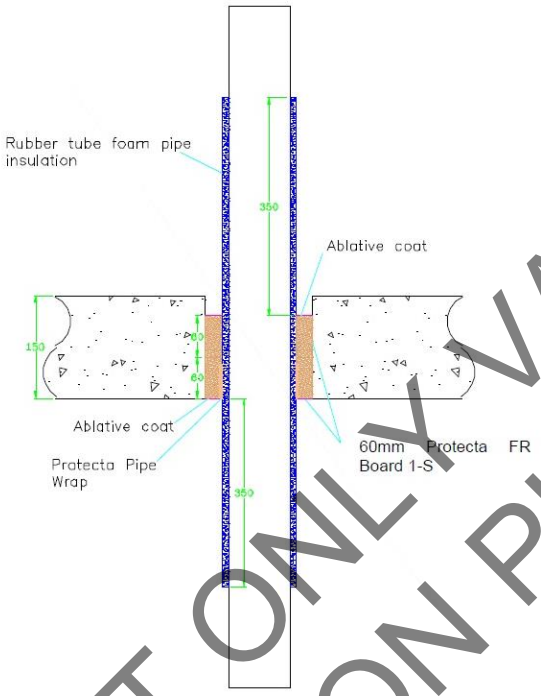
| Services | Wrap | Insulation | Classification |
|---|---|---|---|
| Mild or stainless steel pipe | | | |
| 40 mm diameter/ 1-14.2 mm wall | 50 x 1.8 mm Protecta FR Pipe Wrap | 13 mm Kaiflex ST insulation | **E 180 C/U, EI 120 C/U** |

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### A.2.8 Pipe penetration seal with 2x Protecta FR Board 2-S (back to back)

**Penetration Seal:** CS (Continuous Sustained) insulated metallic and composite pipes fitted at any position within the aperture, with two layers of 60 mm Protecta FR Board 1-S installed together to either side of the floor (or anywhere in between). Protecta FR Pipes Wraps are required to be fitted around combustible pipe insulation at the bottom of the seal. Maximum aperture size 2400 mm x 1200 mm

Construction details:




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### A.2.8.1 Back to back penetration seal with pipes

| Services | Wrap | Insulation | Classification |
|---|---|---|---|
| Copper pipe | | | |
| 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 | 9-13 mm Kaiflex ST insulation | **E240 C/C, EI 60 C/C** |
| 12-54 mm diameter/1-1.2 mm wall | | 13-25 mm Kaiflex ST insulation | **E 180 C/C, EI 45 C/C** |
| Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe) | | | |
| 16 mm diameter/2.25 mm wall | 50 x 3.6 mm Protecta FR Pipe Wrap fitted to both sides of the seal | 9 mm Kaiflex ST 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 | | | |
| 16 mm diameter/2.25 mm wall | | 13-25 mm Kaiflex ST insulation | **E 60 C/C, EI 45 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 | | | |

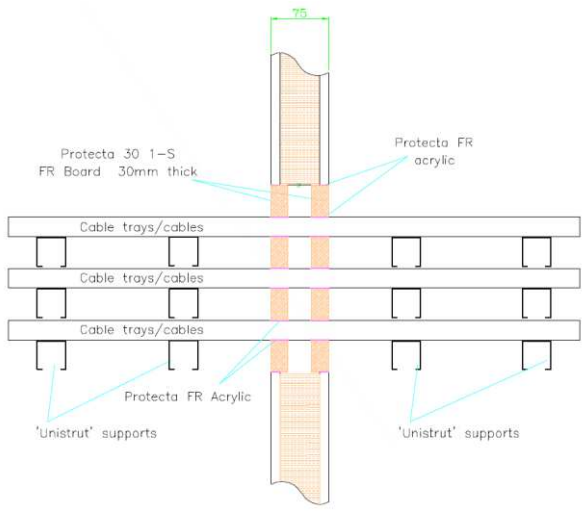
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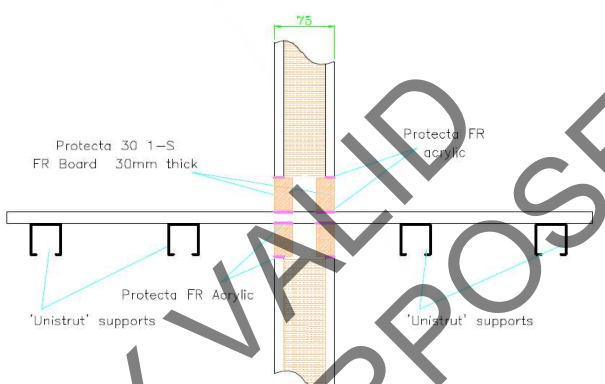
## A.3 Flexible wall constructions according to 2. 2) with wall thickness of minimum 75 mm and 1 x layers of 12.5 mm Type F Gypsum board on both faces

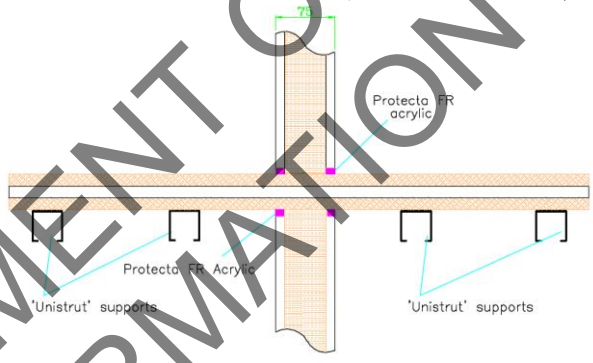
### A.3.1 Cable penetration seal with 2x Protecta FR Board 30 1-S

**Penetration Seal:** Cables fitted at any position within the aperture, with 30 mm Protecta FR Board 1-S to both sides of the wall. Minimum 30 mm separation between pipes

Construction details:




#### A.3.1.1 Double side penetration seal with cables

| Services | Maximum aperture | Classification |
|---|---|---|
| Electrical cables up to 21 mm Ø (single, bundled and on trays) | 1200 mm wide x 600 mm high | **EI 45** |
| Electrical cables up to 80 mm Ø (single, bundled and on trays) | | **E 45, EI 30** |
| Cables including telecoms up to 21mm Ø in tied bundles up to 100mm Ø | | |
| Steel cable trays & ladders | | |
| Unsheathed wires up to 24 mm Ø | | **E 45, EI 20** |
| uPVC* pipe 6 mm diameter / 1.0 mm wall | | **EI 45** |
| uPVC* pipe 32 mm diameter / 1.8 mm wall | | |

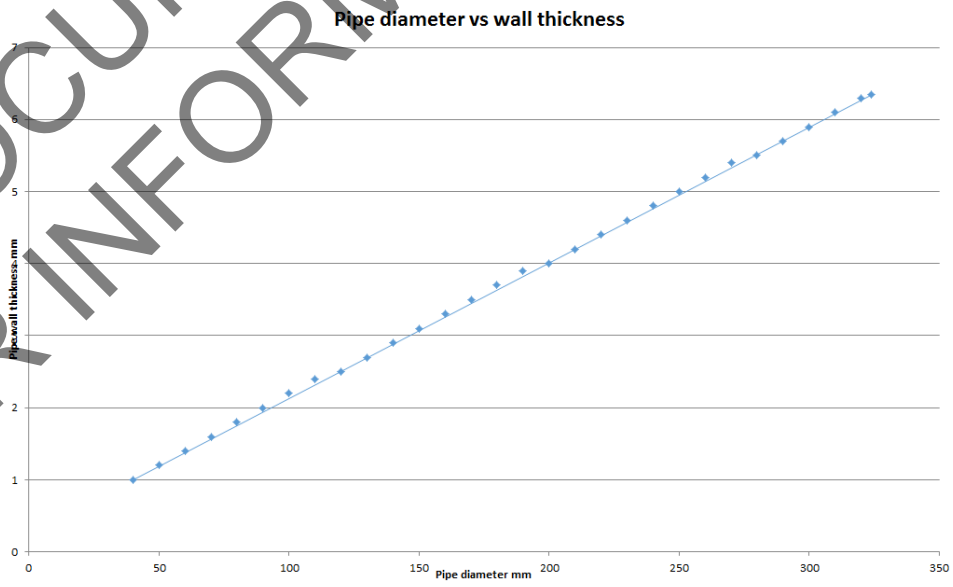
* PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1

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| Services<br>Mild or stainless steel pipe | Maximum Aperture | Insulation CS | Classification |
|---|---|---|---|
| 4 mm diameter/0.7-14.2 mm wall | 1200 mm wide x 600 mm high | None | **EI 45 C/U** |
| 22 mm diameter/2.0-14.2 mm wall | | | **E 45 C/U, EI 30 C/U** |
| 40 mm diameter/1.0-14.2 mm wall* | | 20 mm Stone wool insulation 80 kg/m$^3$ | **EI 45 C/U** |
| 40 mm diameter/1.0-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | **EI 45 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* | | | |
| 250 mm diameter/ 5.0-14.2 mm wall* | | | |
| 300 mm diameter/ 5.9-14.2 mm wall* | | | |
| 324 mm diameter/ 6.35-14.2 mm wall* | | | |

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

CS – Continuous Sustained



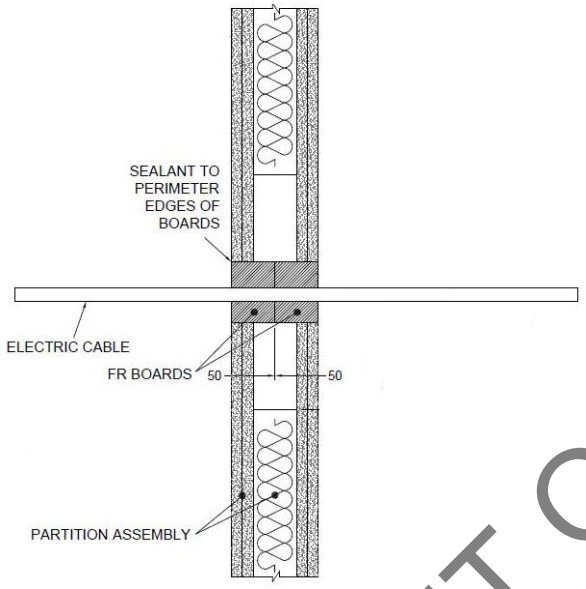

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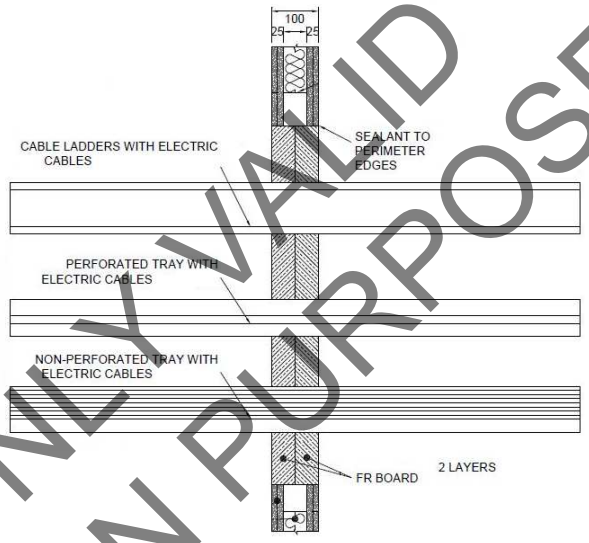
## A.4 Flexible wall constructions according to 2. 2) with wall thickness of minimum 100 mm and 2 x layers of 12.5 mm Type F Gypsum board on both faces

### A.4.1 Cable penetration seal with 2x Protecta FR Board 1-S

**Penetration Seal:** Cables fitted at any position within the aperture, with 50 mm Protecta FR Board 1-S to both sides of the wall.

Construction details:




Note: Insulated metal pipes may also be included within the same seal as cables subject to minimum 100 mm separation. See separate classification for pipes.

#### A.4.1.1 Double side penetration seal with cables

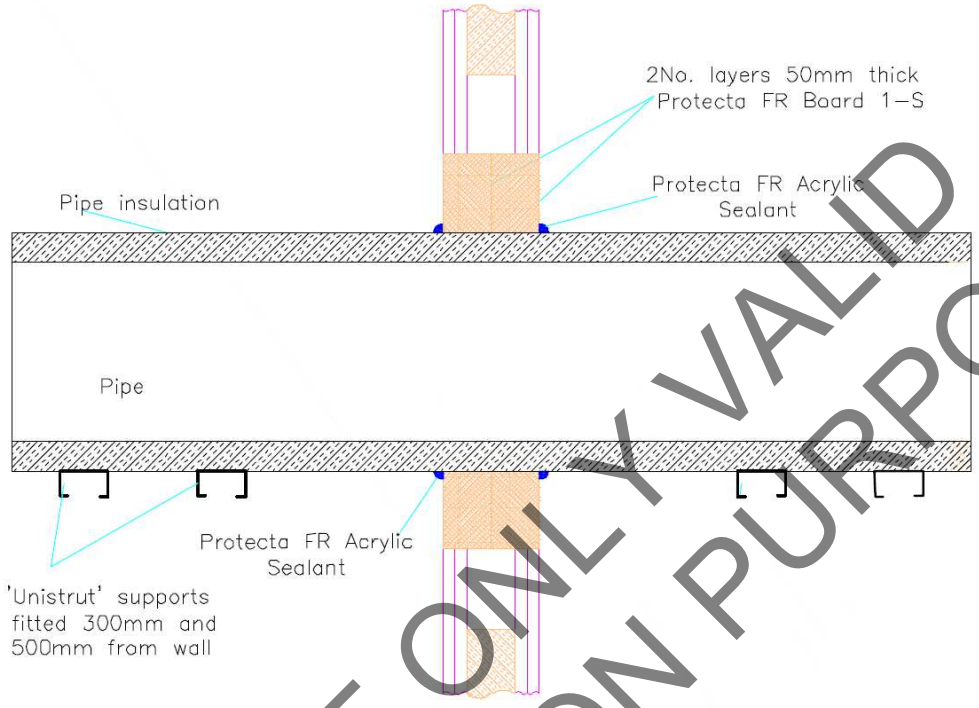
| Services | Maximum aperture | Classification |
|---|---|---|
| None (blank) | 2400 mm wide x 1200 mm high | **EI 120** |
| Single electrical cables up to 21 mm Ø | | **E 120, EI 60** |
| Electrical cables up to 80 mm Ø (single, bundled and on trays) | | **EI 60** |
| Cables up to 21mm Ø in tied bundles up to 100mm Ø | | |
| Steel cable trays & ladders | | |
| Steel conduit up to 16 mm Ø | | **EI 60 C/U** |
| copper conduit up to 16 mm Ø | | **E 60 C/U, EI 45 C/U** |
| Unsheathed wires up to 24 mm Ø | | **E 60, EI 30** |
| PVC conduit up to 16 mm Ø | | **EI 60 C/U, EI 60 C/C** |

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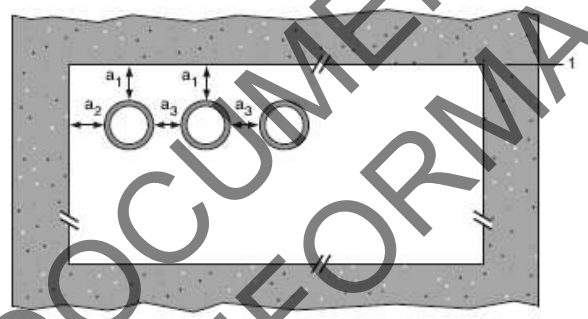
### A.4.2 Pipe penetration seal with 2x Protecta FR Board 1-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 50 mm Protecta FR Board 1-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm.

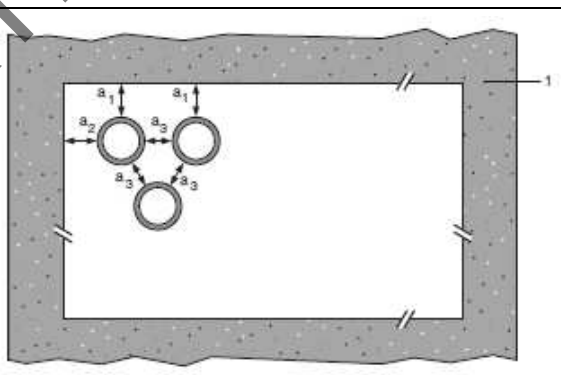
Construction details:




**Configuration 1**




**Configuration 2**




**Key**

1 Supporting construction

a1 Pipe / top edge of seal separation

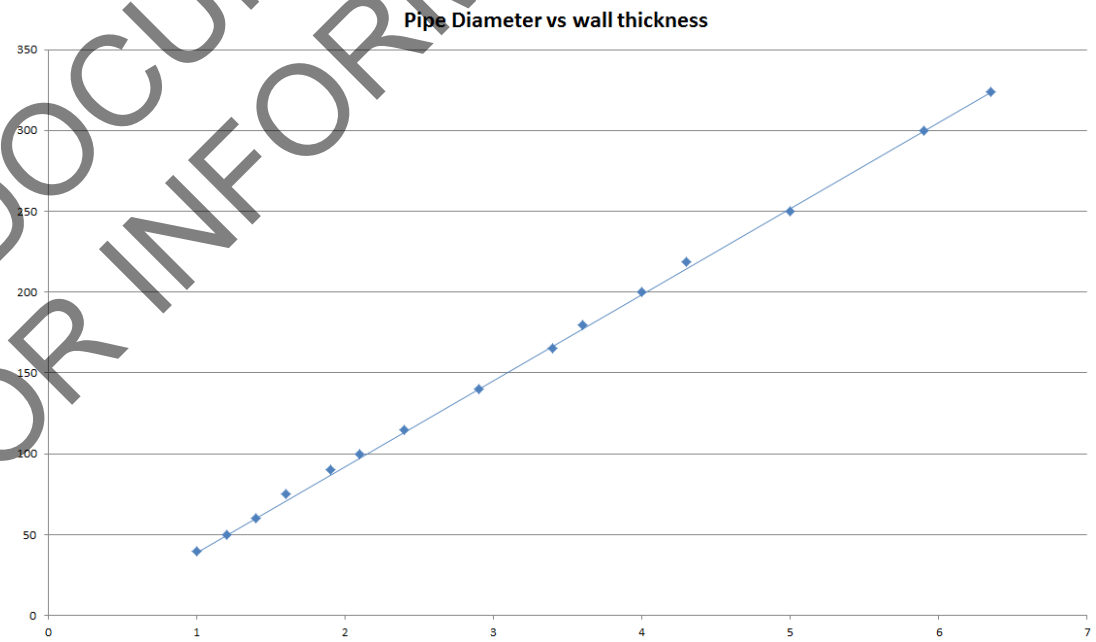
a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

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### A.4.2.1 Double side penetration seal with pipes

| Mild or stainless steel pipe | Insulation | Classification |
|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 20 mm thick stone, mineral wool 80 kg/m$^3$ | EI 120 C/U |
| 40 mm diameter/1-14.2 mm wall* | 30-80 mm thick stone, mineral wool min. 80 kg/m$^3$ | |
| 50 mm diameter/1.2-14.2 mm wall* | | |
| 60 mm diameter/1.4-14.2 mm wall* | | |
| 75 mm diameter/1.6-14.2 mm wall* | | |
| 90 mm diameter/1.9-14.2 mm wall* | | |
| 100 mm diameter/2.1-14.2 mm wall* | | |
| 115 mm diameter/2.4-14.2 mm wall* | | |
| 140 mm diameter/2.9-14.2 mm wall* | | |
| 165 mm diameter/ 3.4-14.2 mm wall* | | |
| 180 mm diameter/ 3.6-14.2 mm wall* | | |
| 200 mm diameter/ 4.0-14.2 mm wall* | | |
| 219 mm diameter/ 4.3-14.2 mm wall* | | |
| 250 mm diameter/ 5.0-14.2 mm wall* | | |
| 300 mm diameter/ 5.9-14.2 mm wall* | | |
| 324 mm diameter/ 6.35-14.2 mm wall* | | |
| **PEX pipe in pipe system** | **Insulation** | **Classification** |
| 15 mm diameter x 2.5 mm wall inner /25mm diameter outer | None | **EI 90 C/C** |




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| Mild or stainless steel pipe | Insulation | Classification |
|---|---|---|
| 4 mm diameter/1-14.2 mm wall | None | **EI 120 C/U** |
| 22 mm diameter/2-14.2 mm wall | | **E 120 C/U, EI 60 C/U** |
| **Copper, mild or stainless steel pipe** | **Insulation** | **Classification** |
| 6 mm diameter/0.7-14.2 mm wall | None | **E 120 C/C, EI 60 C/C** |
| **PE-Xb/Al/PE-Xb pipe** | **Insulation** | **Classification** |
| 16 -20 mm diameter/2.0 mm wall | None | **EI 120 C/C** |
| **PVC-U* pipe** | **Insulation** | **Classification** |
| 6 mm diameter/1.0 mm wall | None | **EI 120 U/C** |
| 6-32 mm diameter/1.8-2.4 mm wall | | **E 90 U/C, EI 60 U/C** |
| 32 mm diameter/2.4 mm wall | | **EI 90 U/C** |
| **PE^ pipe** | **Insulation** | **Classification** |
| 20 mm diameter/2.0 mm wall | None | **E 120 U/C, EI 90 U/C** |
| 20-32 mm diameter/2.0-3.0 mm wall | | **EI 60 U/C** |
| 32 mm diameter/3.0 mm wall | | **EI 90 U/C** |
| **PP pipe** | **Insulation** | **Classification** |
| 20 mm diameter/2.2 mm wall | None | **E 120 U/C, EI 60 U/C** |
| 32 mm diameter/1.8 mm wall | | |

* PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1

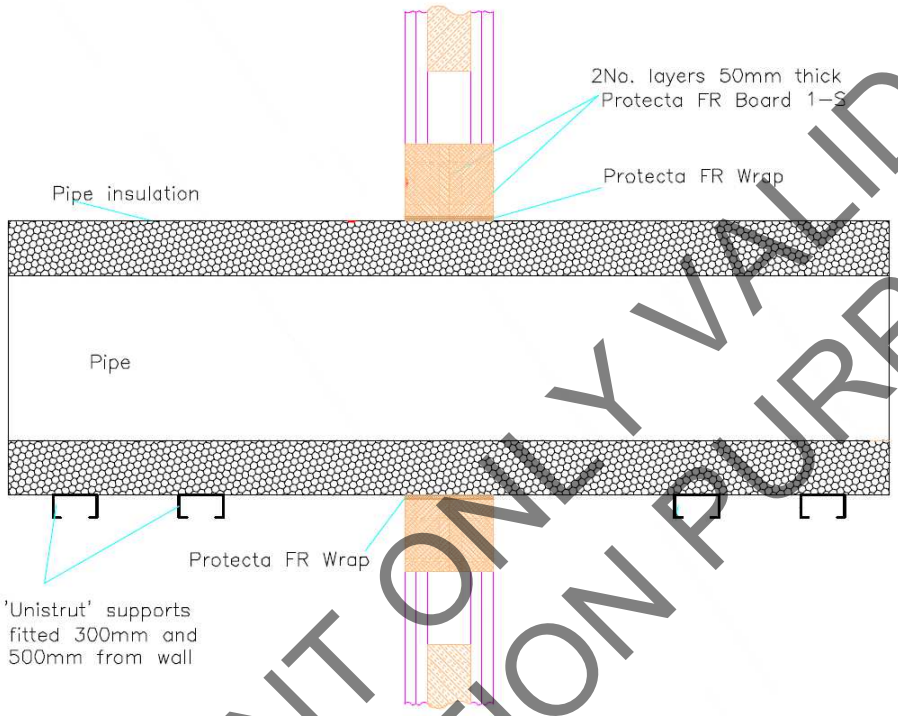
^ PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1

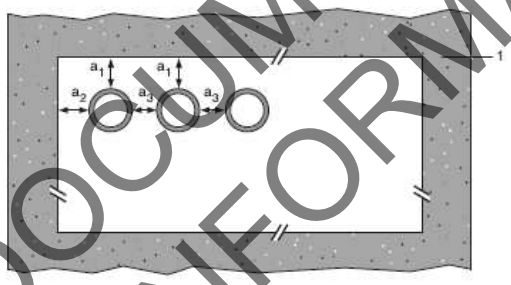
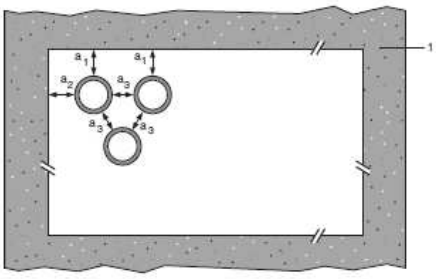
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### A.4.3 Pipe penetration seal with 2x Protecta FR Board 1-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 50 mm Protecta FR Board 1-S to both sides of the wall. Minimum separation between penetration seals and seal edges of 30 mm. Protecta FR Pipes Wraps are required to be fitted around the pipe insulation.

Construction details:




| Configuration 1 | Configuration 2 |
|---|---|
|  |  |

**Key**

1 Supporting construction

a1 Pipe / top edge of seal separation

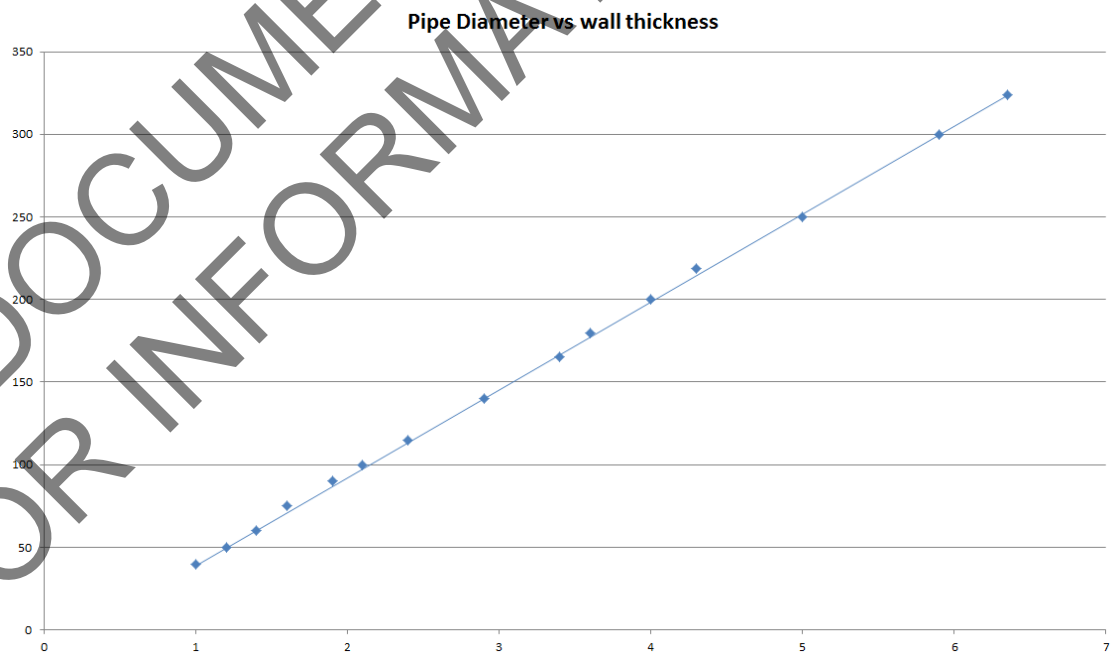
a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

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### A.4.3.1 Double side penetration seal with pipes

| Mild or stainless steel pipe | Insulation | Protecta FR Wrap | Classification |
|---|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 32 mm thick K-flex Elastomeric insulation | **3 layers 50 x 1.8 mm** | **EI 90 C/U** |
| 40 mm diameter/1-14.2 mm wall* | 32-50 mm thick K-flex Elastomeric insulation | | |
| 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* | | | |

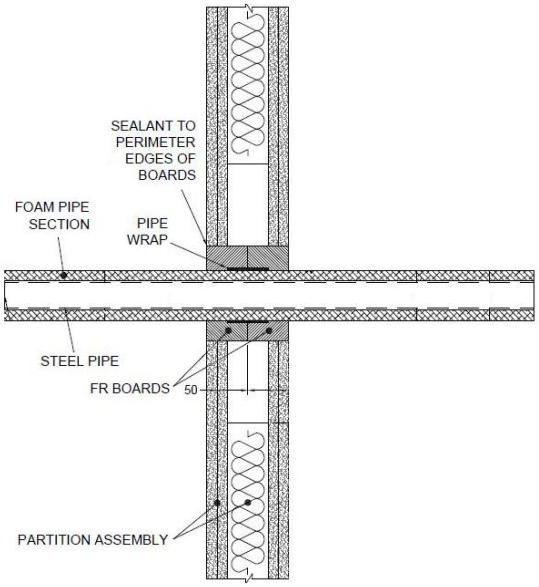


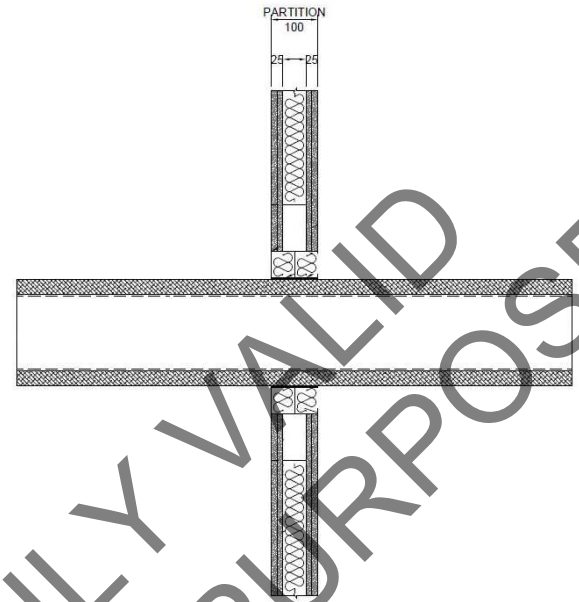

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### A.4.4 Pipe penetration seal with 2x Protecta FR Board 1-S

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes fitted at any position within the aperture, with 50 mm Protecta FR Board 1-S to both sides of the wall. Protecta FR Pipes Wraps are required to be fitted around the pipe insulation.

Construction details:



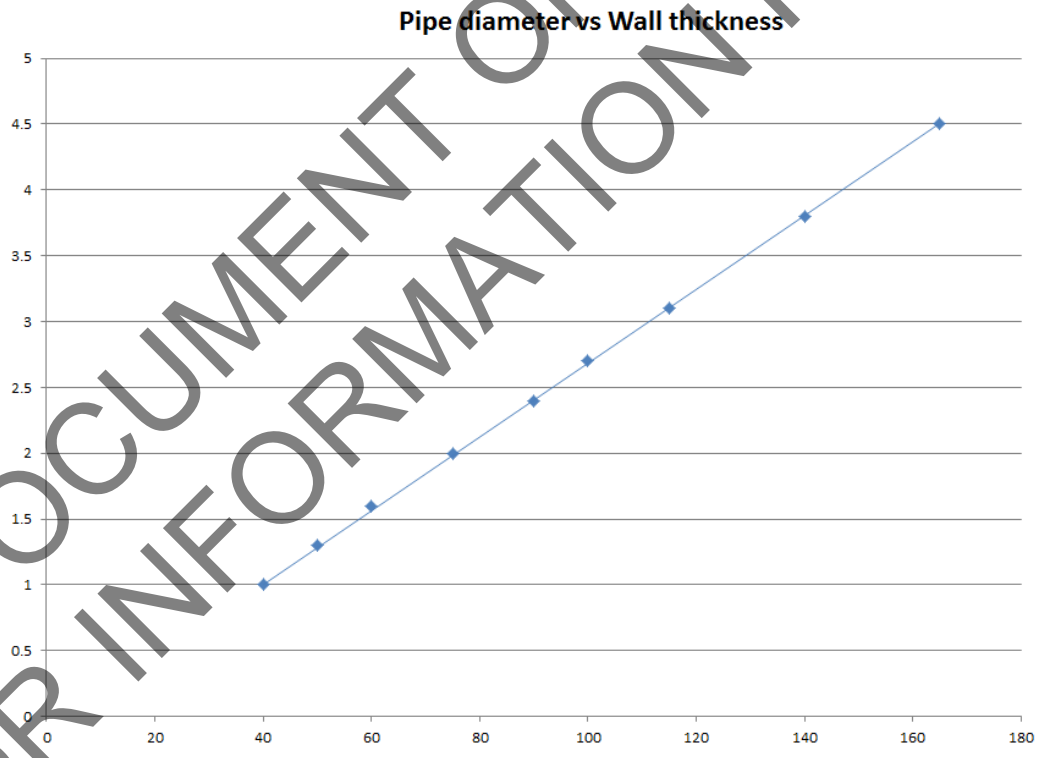




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### A.4.4.1 Two layer penetration seal with pipes

| Services | Wrap | Insulation | Classification |
|---|---|---|---|
| Mild or stainless steel pipe | | | |
| 40 mm diameter/1-14.2 mm wall | 50 x 1.8 mm Protecta FR Pipe Wrap fitted centrally | 13 mm Kaiflex ST insulation | **EI 120 U/C, EI 120 U/U, EI 120 C/U, EI 120 C/C** |
| 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 - 32mm Kaiflex ST insulation | **E 120 U/C, E 120 U/U, E 120 C/U, E 120 C/C, EI 60 U/C, EI 60 U/U, EI 60 C/U, EI 60 C/C** |
| 50 mm diameter/1.3-14.2 mm wall* | | | |
| 60 mm diameter/1.6-14.2 mm wall* | | | |
| 75 mm diameter/2-14.2 mm wall* | | | |
| 90 mm diameter/2.4-14.2 mm wall* | | | |
| 100 mm diameter/2.7-14.2 mm wall* | | | |
| 115 mm diameter/3.1-14.2 mm wall* | | | |
| 140 mm diameter/3.8-14.2 mm wall* | | | |
| 165 mm diameter/ 4.5-14.2 mm wall* | | | |

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

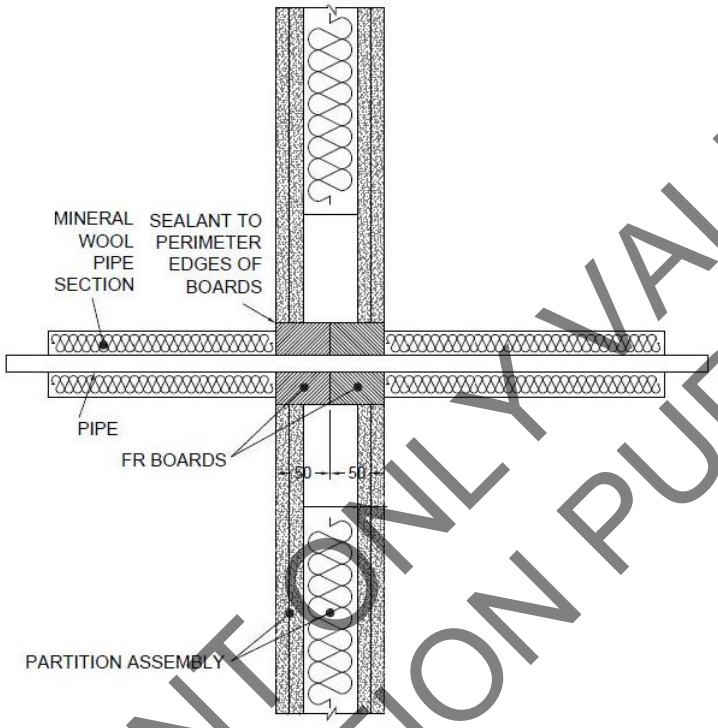



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### A.4.5 Pipe penetration seal with 2x Protecta FR Board 1-S

**Penetration Seal:** 500 mm (min.)* LI (Local Interrupted) or CI (Continuous Interrupted) insulated or uninsulated metallic and composite pipes (single) fitted at any position within the aperture, with 50 mm Protecta FR Board 1-S to both sides of the wall.

Construction details:




* Minimum 600 mm long insulation required for Alupex pipe.

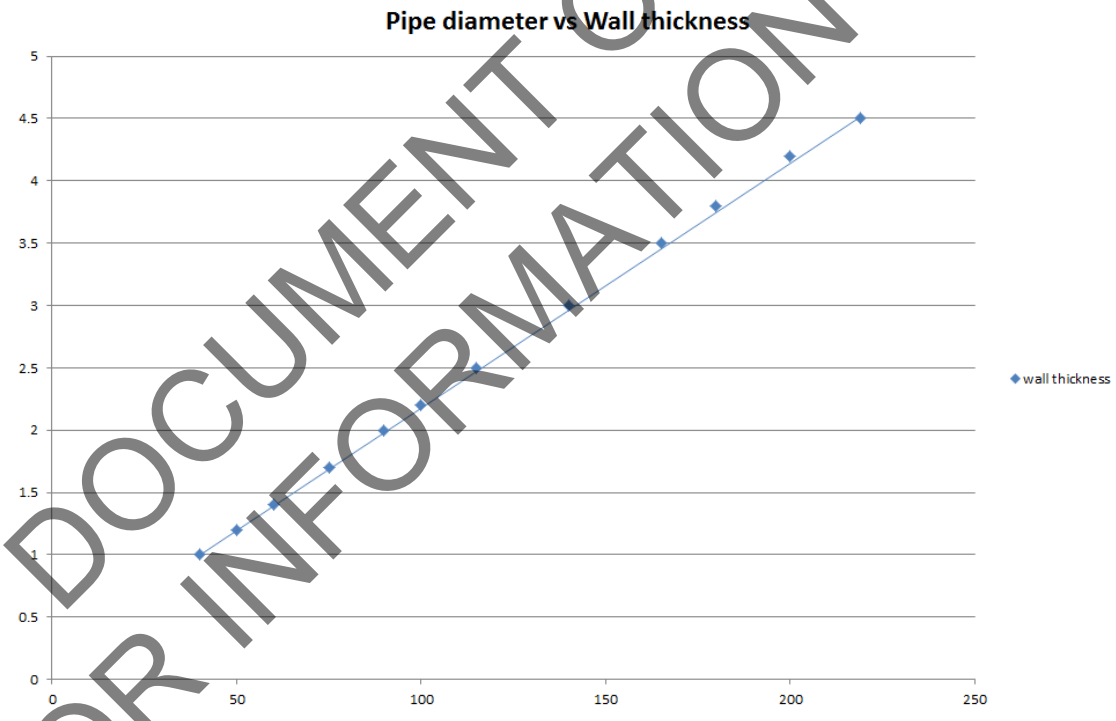
#### A.4.5.1 Two layer penetration seal with pipes

| Services | Insulation | Classification |
|---|---|---|
| Copper pipe up to 54 mm diameter/1-14.2 mm wall | 20 mm stone wool 80 kg/m$^3$ | **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 C/U** |
| Mild or stainless steel pipe 114 mm diameter/11 mm wall | None | **E 90 C/U, EI 20 C/U** |

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| Services | Insulation | Classification |
|---|---|---|
| Mild or stainless steel pipe | | |
| 40 mm diameter/1-14.2 mm wall | 20 mm stone wool 80 kg/m$^3$ | **EI 120 C/U** |
| 40 mm diameter/1-14.2 mm wall* | 30 mm stone wool 80 kg/m$^3$ | **E 120 C/U, EI 90 C/U** |
| 50 mm diameter/1.2-14.2 mm wall* | | |
| 60 mm diameter/1.4-14.2 mm wall* | | |
| 75 mm diameter/1.7-14.2 mm wall* | | |
| 90 mm diameter/2-14.2 mm wall* | | |
| 100 mm diameter/2.2-14.2 mm wall* | | |
| 115 mm diameter/2.5-14.2 mm wall* | | |
| 140 mm diameter/3-14.2 mm wall* | | |
| 165 mm diameter/3.5-14.2 mm wall* | | |
| 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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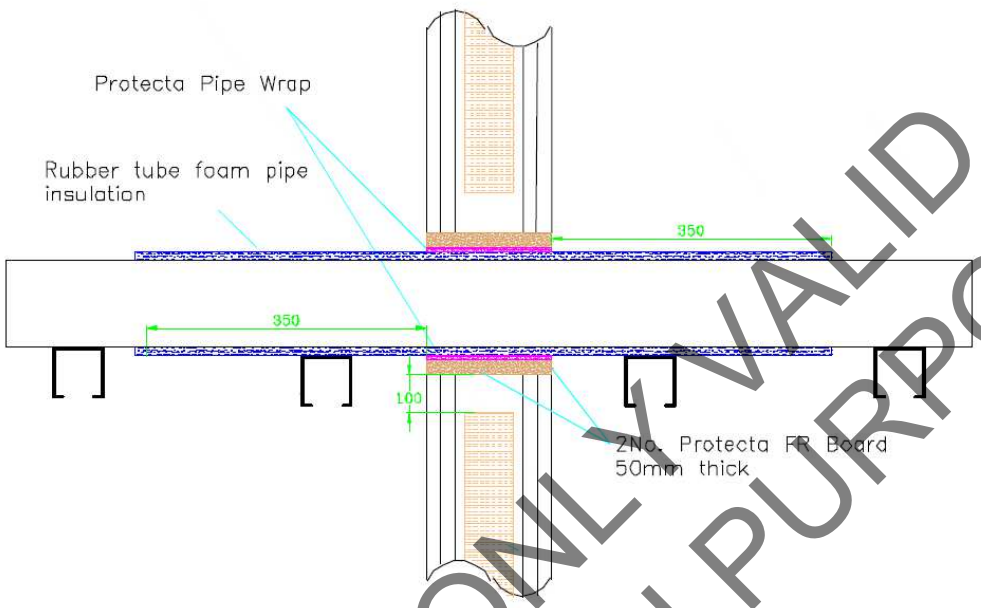
| Services | Insulation (minimum) | Classification |
|---|---|---|
| Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD) pipe* | | |
| 16 mm diameter/2.25 mm wall | 20 mm stone wool 80 kg/m$^3$ | **EI 120 C/C** |
| 20 mm diameter/2.5 mm wall | | **EI 60 C/C** |
| 26 mm diameter/3 mm wall | | |
| 32 mm diameter/3 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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### A.4.6 Pipe penetration seal with 2x Protecta FR Board 1-S

**Penetration Seal:** LS (Local Sustained) or CS (Continuous Sustained) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 50 mm Protecta FR Board 1-S to both sides of the wall. Protecta FR Pipes Wraps are required to be fitted around the pipe to both sides of the seal.

Construction details:




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### A.4.6.1 Two layer penetration seal with pipes

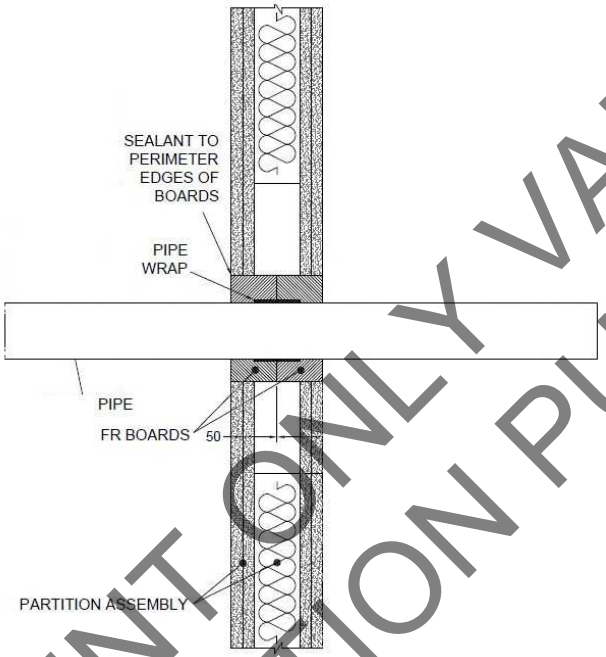
| Services | Wrap | Insulation | Classification |
|---|---|---|---|
| Copper pipe | | | |
| 12 mm diameter/1 mm wall | 50 x 3.6 mm Protecta FR Pipe Wrap fitted to both sides of the seal | 9 mm Kaiflex ST insulation | **EI 120 C/C** |
| 12-54 mm diameter/1-1.2 mm wall | | 9-13 mm Kaiflex ST insulation | **E 120 C/C, EI 90 C/C** |
| 12-54 mm diameter/1-1.2 mm wall | | 13-25 mm Kaiflex ST insulation | **E 120 C/C, EI 60 C/C** |
| Geberit Mepla MLC (PE-Xb/Aluminium/PE-HD pipe)* | | | |
| 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 Kaiflex ST 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 | | | |

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### A.4.7 Plastic pipe penetration seal with 2x Protecta FR Board 1-S

**Penetration Seal:** Combustible pipes (single) fitted central within the aperture, with Protecta FR Board 1-S to both sides of the wall. Protecta FR Pipes Wraps are required to be fitted around the pipe.

Construction details:




#### A.4.7.1 Two layer penetration seal with pipes

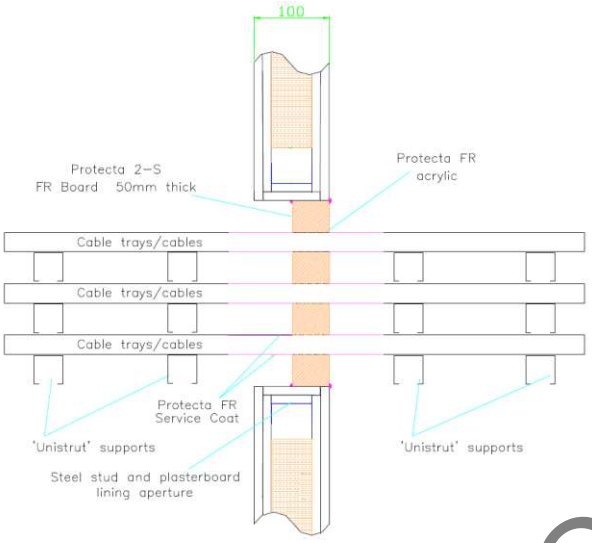
| Services | Pipe Wrap | Classification |
|---|---|---|
| PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1<br>315 mm Ø/9.2 mm wall | Protecta FR Pipe Wrap 75 x 18 mm fitted centrally around the pipe | **EI 45 C/C** |

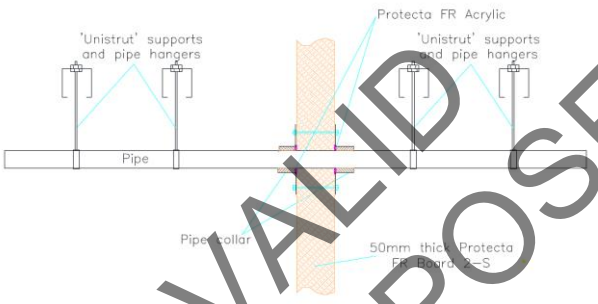
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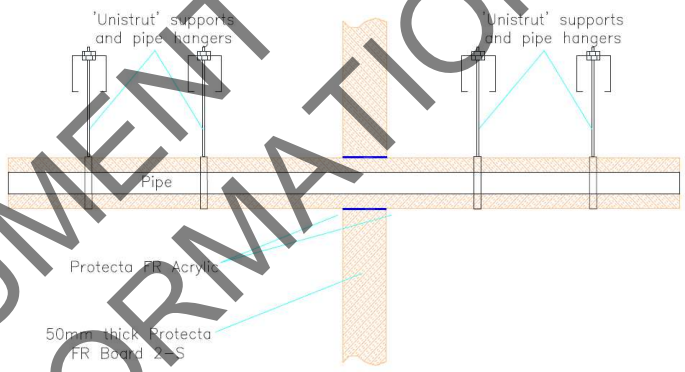
### A.4.8 Cable penetration seal with 1x Protecta FR Board 50 2-S in framed aperture

**Penetration Seal:** Cables fitted at any position within the aperture, with 50 mm Protecta FR Board 2-S positioned to either face of the wall (or anywhere in between). Minimum 30 mm separation between pipes. Protecta FR collars fixed with penetrating threaded rod and nuts. Cables and cable trays coated 150mm each side of FR Board with nominally 300µm WFT Protecta FR Service Coat

Construction details:




#### A.4.8.1 Single side penetration seal with cables and pipes

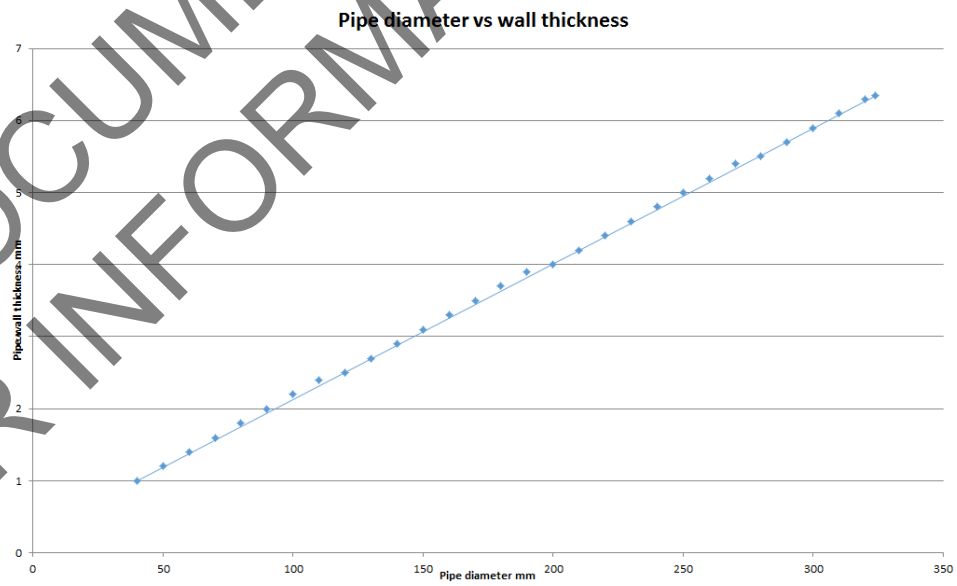
| Services | Maximum aperture | Classification |
|---|---|---|
| Electrical cables up to 80 mm Ø (single, bundled and on trays) | 1200 mm wide x 600 mm high | **EI 60** |
| Cables up to 21mm Ø in tied bundles up to 100mm Ø | | |
| Perforated Steel cable trays & ladders | | **EI 60** |
| Unperforated steel cable trays | | **E 60, EI 45** |
| Unsheathed wires up to 24 mm Ø | | **E 60, EI 45** |

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| Services<br>Mild or stainless steel pipe | Maximum Aperture | Insulation CS | Classification |
|---|---|---|---|
| 40 mm diameter/1.0-14.2 mm wall* | 1200 mm wide x 600 mm high | 20 mm Stone wool insulation 80 kg/m$^3$ | E 90 C/U, EI 60 C/U |
| 40 mm diameter/1.0-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | |
| 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* | | | |
| 250 mm diameter/ 5.0-14.2 mm wall* | | | |
| 300 mm diameter/ 5.9-14.2 mm wall* | | | |
| 324 mm diameter/ 6.35-14.2 mm wall* | | | |

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

CS – Continuous Sustained




DOCUMENT ONLY VALID FOR INFORMATION PURPOSES

| Services | Collar Inlay | Classification |
|---|---|---|
| PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1 and PVC-C according to EN 1566-1 | | |
| Diameter 32 mm, wall thickness 1.9 mm | 30 x 2.4 mm | **E 90 U/C, EI 45 U/C** |
| Diameter 40 mm, wall thickness 1.9 mm | | |
| Diameter 50 mm, wall thickness 3.7-6.6 mm | 30 x 3.0 mm | **E 90 U/C, EI 30 U/C** |
| Diameter 55 mm, wall thickness 3.7-6.6 mm | 30 x 3.2 mm | |
| Diameter 63 mm, wall thickness 3.7-6.6 mm | 30 x 4.0 mm | |
| Diameter 75 mm, wall thickness 3.7-6.6 mm | 30 x 4.2 mm | |
| Diameter 82 mm, wall thickness 3.7-6.6 mm | 30 x 5.0 mm | |
| Diameter 90 mm, wall thickness 3.7-6.6 mm | | |
| Diameter 110 mm, wall thickness 3.7-6.6 mm | 30 x 6.0 mm | **E 90 U/C, EI 60 U/C** |

| Services | Collar Inlay | Classification |
|---|---|---|
| PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1 | | |
| Diameter 32 mm, wall thickness 3.4-10.0 mm | 30 x 3.0 mm | **E 60 U/C, EI 45 U/C** |
| Diameter 40 mm, wall thickness 3.4-10.0 mm | | |
| Diameter 50 mm, wall thickness 3.4-10.0 mm | | |
| Diameter 55 mm, wall thickness 3.4-10.0 mm | 30 x 3.2 mm | |
| Diameter 63 mm, wall thickness 3.4-10.0 mm | 30 x 4.0 mm | |
| Diameter 75 mm, wall thickness 3.4-10.0 mm | 30 x 4.2 mm | |
| Diameter 82 mm, wall thickness 3.4-10.0 mm | 30 x 5.0 mm | |
| Diameter 90 mm, wall thickness 3.4-10.0 mm | | |
| Diameter 110 mm, wall thickness 3.4-10.0 mm | 30 x 6.0 mm | |

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