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

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# European Technical Assessment

# ETA 15/0037 of 20/11/2019

| | |
|---|---|
| **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** | TYTAN B1 Fire Acryl |
| **Product family to which the construction product belongs** | Fire Stopping and Sealing Product:<br>• Penetration Seals |
| **Manufacturer** | Selena FM S.A.<br>Ul. Strzegomska 2-4<br>53-611 Wrocław, Poland<br>www.selena.com |
| **Manufacturing plant(s)** | A/003 |
| **This European Technical Assessment contains** | 62 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** | EAD 350454-00-1104, September 2017. |
| **This version replaces** | ETA 15/0037 issued 17/03/2017 |

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## I. SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT

### 1 Technical description of the product

1) TYTAN B1 Fire Acryl is a sealant used to form a penetration seal around metallic pipes, plastic pipes, composite pipes, combustible cable conduits and electrical cables to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services.

2) The TYTAN B1 Fire Acryl is supplied in liquid form contained within 310 & 380 ml cartridges and 600 ml foil packs. The sealant is gunned into the aperture in the separating element/elements and around the service or services, to a specified depth utilising mineral fibre insulation backing material.

3) TYTAN B1 Fire Acryl contains no carcinogenic substances or mutagenic substances, flame retardants or antimicrobiological agents.

4) The applicant has submitted a written declaration that TYTAN B1 Fire Acryl does not contain substances which have to be classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the EGDS - taking into account the installation conditions of the construction product and the release scenarios resulting from there. An emission report has also been provided.

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

5) The use category of TYTAN B1 Fire Acryl in relation to BWR 3 (Hygiene, health and environment) is IA1

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

Detailed information and data is given in Annex A.

1) The intended use of system TYTAN B1 Fire Acryl is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by various metal pipe services with and without combustible insulation, plastic pipes, combustible cable conduits, composite pipes and electrical cables.

2) The specific elements of construction that the system TYTAN B1 Fire Acryl may be used to provide a penetration seal in, are as follows:

   a. Flexible walls: The wall must have a minimum thickness of 75 mm and comprise steel studs or timber studs* lined on both faces with minimum 1 layers of 12.5 mm thick boards.

   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/$m^3$.

* 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.

Selena FM S.A. Fire Protection Systems which involve services penetrating both sides of a flexible wall may also be used in the situation where the services penetrates 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

3) The system TYTAN B1 Fire Acryl may be used to provide a penetration seal with specific single insulated metal pipes, uninsulated metal pipes, plastic pipes, combustible cable conduits, composite pipes and with specific electrical cables, single or in a bundle (for details see Annex A).

4) Apertures in the separating element shall be maximum Ø 504 mm, 300 x 300 mm or 100 x 1000 mm. The annular space/gap around the services shall be infilled with TYTAN B1 Fire Acryl sealant and in some cases a mineral fibre insulation backing material. Blank seals up to 300 x 300 mm are permitted. For full details, see Annex A.

5) Pipes shall be supported at maximum 350 mm away from both faces of the wall constructions and from the upper face of floor constructions.

6) The provisions made in this European Technical Approval are based on an assumed working life of the TYTAN B1 Fire Acryl of 30 years, provided that the conditions laid down in sections 4.2/5.1/5.2 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.

7) Type $Z_2$: Intended for uses in internal conditions with humidity lower than 85 % RH excluding temperatures below 0°C, without exposure to rain or UV.

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

| Product-type: Sealant | Intended use: Penetration Seal | |
|---|---|---|
| Assessment method | Essential characteristic | Product Performance |
| **BWR 2 Safety in case of fire** | | |
| EN 13501-1 | Reaction to fire | Class D-s1, d1 |
| EN 13501-2 | Resistance to fire | Annex A |
| **BWR 3 Hygiene, health and environment** | | |
| EN 1026 | Air permeability | No performance determined |
| 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<br>Declaration of manufacturer |
| **BWR 4 Safety in use** | | |
| EOTA TR 001:2003 | Mechanical resistance and stability | No performance determined |
| EOTA TR 001:2003 | Resistance to impact/movement | No performance determined |
| EOTA TR 001:2003 | Adhesion | No performance determined |
| EAD 350454-00-1104, Clause 2.2.9 | Durability | $Z_2$ |
| **BWR 5 Protection against noise** | | |
| EN 10140-1,2,4,5/ EN ISO 717-1 | Airborne sound insulation | No performance determined |
| **BWR 6 Energy economy and heat retention** | | |
| EN 12664, EN 12667, EN 12939, EN ISO 8990, EN ISO 6946, EN ISO 14683, EN ISO 10211, EN ISO 10456 | Thermal properties | No performance determined |
| EN ISO 12572, EN 12086, EN ISO 10456 | Water vapour permeability | No performance determined |

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

According to the decision 1999/454/EC – Commission Decision of date 22nd June 1999 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, published in the Official Journal of the European Union (OJEU) L178/52 of 14/07/1999, see 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 4th June 2018 relating to the European technical assessment ETA 15/0037 issued on 20/11/2019 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.

[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 linear joint seal or 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 joint or penetration seal
- Construction of the linear joint seal or 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:

**20th November 2019**

Report by:

D. Yates
Project Engineer
Building and Life Safety Technologies

Reviewed by:

C. Johnson
Staff Engineer
Building and Life Safety Technologies

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

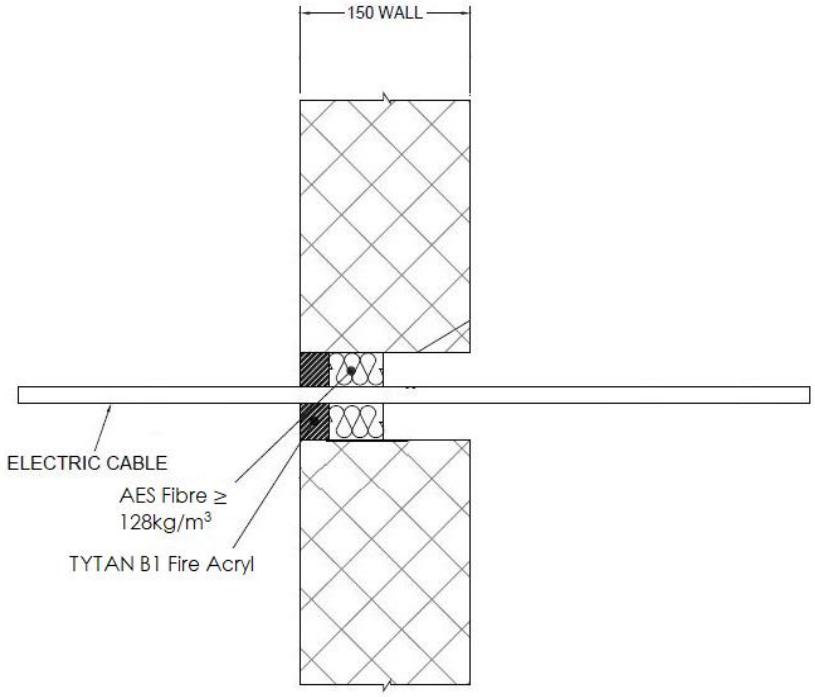
# ANNEX A – Resistance to Fire Classification – TYTAN B1 Fire Acryl

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

### A.1.1 Single side penetration seal with cables

**Penetration Seal:** Cables (single) fitted at any position within the aperture, with TYTAN B1 Fire Acryl to either side of the wall (or at any position in between), backed with 'AES Fibre ≥ 128kg/m³'. Minimum separation between cables and the edge of the seal of 7 mm.

Construction details:



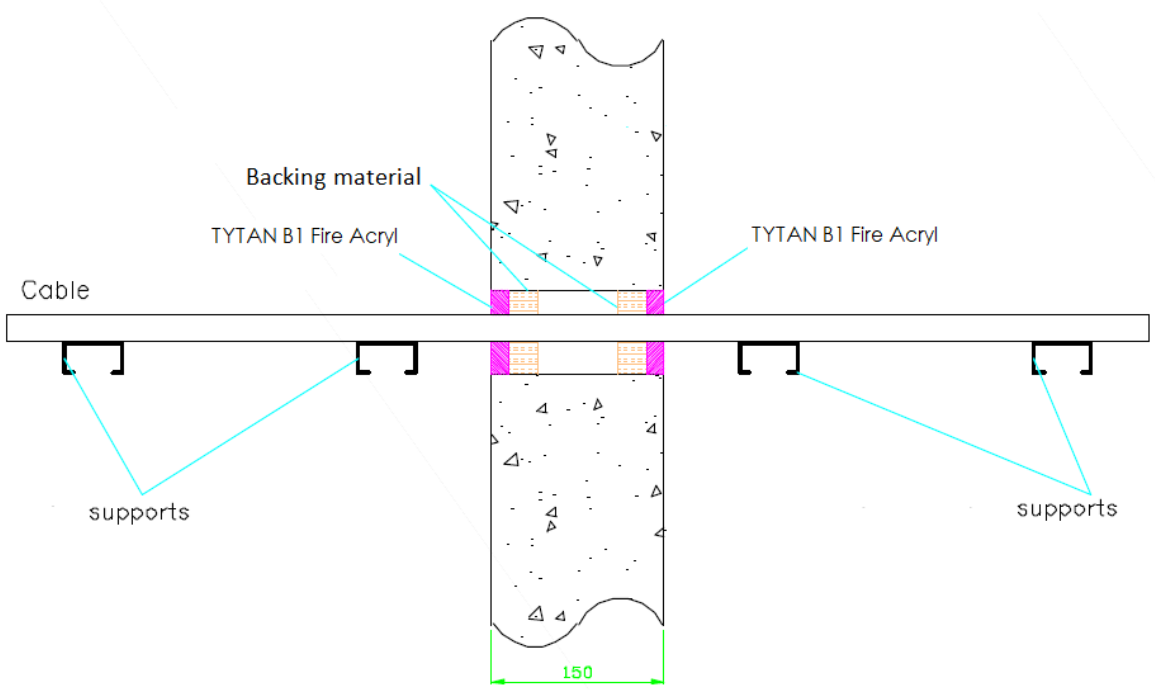

**A.1.1.1**

| Services | Sealant depth | Backing | Maximum seal size | Classification |
|---|---|---|---|---|
| Single electrical cables up to 21 mm Ø | 25 mm | 48 mm deep AES Fibre ≥ 128kg/m³ | 87 mm Ø | **E 240, EI 90** |
| Blank seals | 25 mm | 48 mm AES Fibre ≥ 128kg/m³ insulation | 300 x 300 mm | **E 240, EI 60** |
| Electric cables up to 21 mm diameter, single. | | | | |
| Blank seals | | | 35 x 35 mm / 36 mm Ø | **E 240, EI 120** |
| Electric cables up to 21 mm diameter, single. | | | | |

### A.1.2 Double side penetration seal with cables

**Penetration Seal:** Cables fitted with TYTAN B1 Fire Acryl to both sides of the wall, backed with stone wool or mineral fibre insulation. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

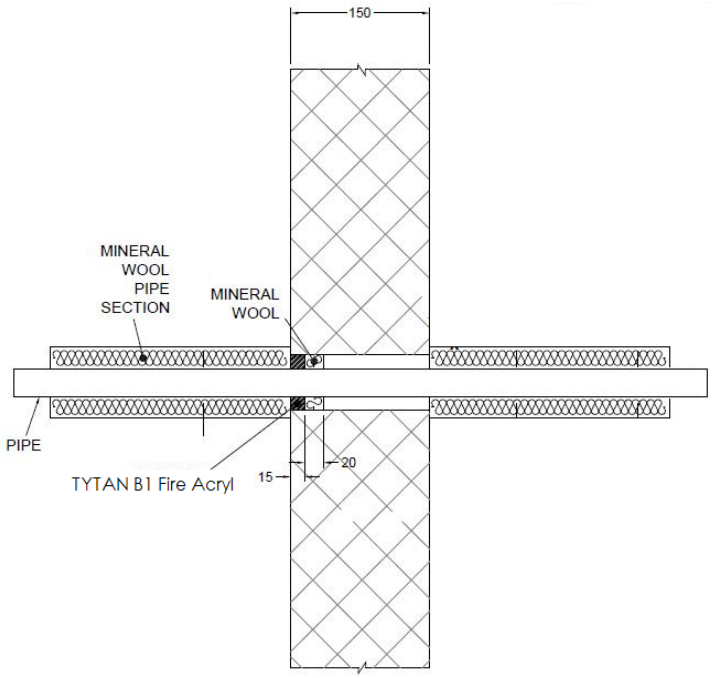
Construction details:




#### A.1.2.1

| Services | Sealant depth | Backing (minimum) | Insulation | Classification |
|---|---|---|---|---|
| Blank seals | 15 mm | 25 mm Stone wool 35 kg/m$^3$ | None | **EI 240** |
| Electric cables up to 21 mm diameter, single or in a bundle. | | | | **E 240 EI 120** |
| Electric cables 22-80 mm diameter, single or in a bundle. | | | | **E 120 EI 60** |
| Blank seals | 25 mm | 48 mm AES Fibre ≥ 128kg/m$^3$ | | **EI 240** |
| Electric cables up to 80 mm diameter, single or in a bundle. | | | | **E 240 EI 60** |
| Cables up to 21 mm diameter, single or in a bundle up to 100 mm diameter | | | | **EI 240** |

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

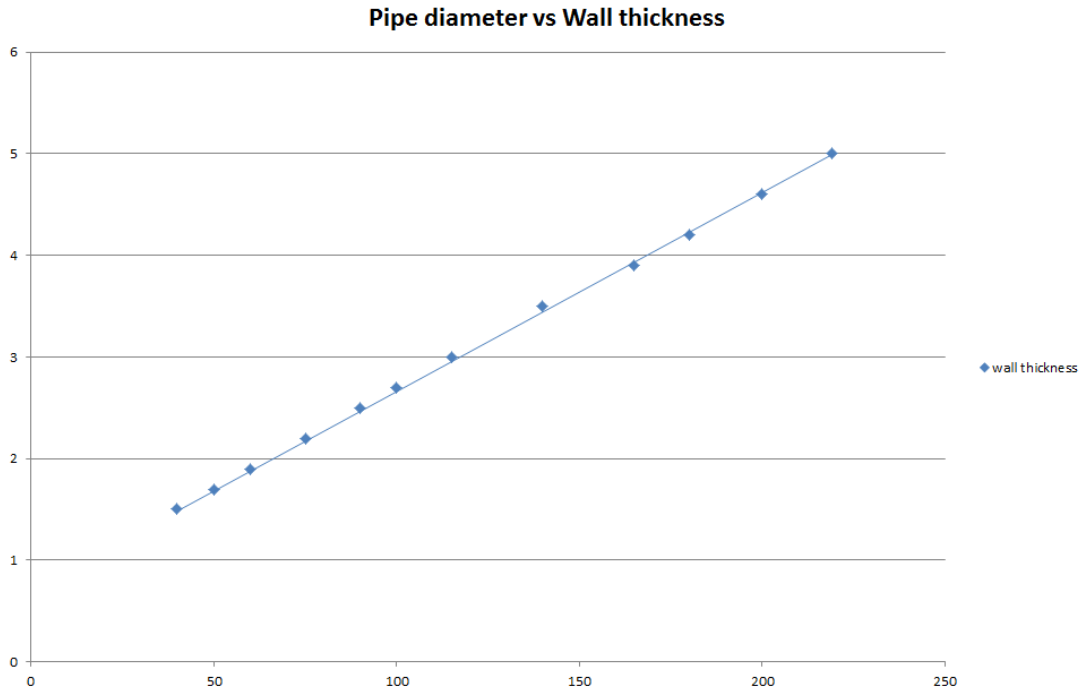
| |
|---|
| **Penetration Seal:** LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 15 mm deep TYTAN B1 Fire Acryl to either side of the wall (or at any position between), backed with 20 mm deep minimum 40 kg/m$^3$ stone wool insulation*. |
| Construction details:<br>  <br> |

#### A.1.3.1

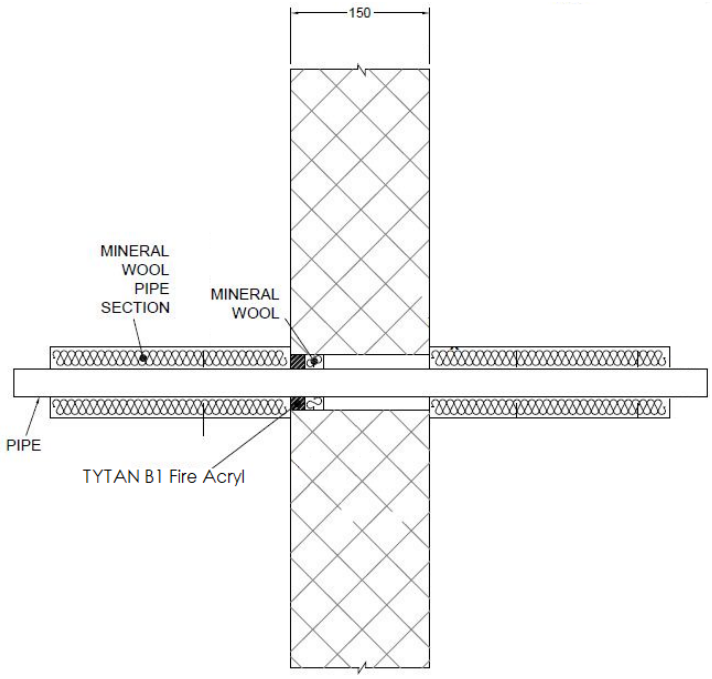
| Services | Seal width around pipe | Insulation (minimum) | Classification |
|---|---|---|---|
| Copper pipe up to 54 mm diameter/0.9-14.2 mm wall | 8-9 mm | 1000 mm length 20 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 180 C/U** |
| Copper pipe up to 12 mm diameter/0.9-5 mm wall | 8 mm | | **EI 240 C/U** |
| Alupex composite pipe 75 mm diameter/7.5 mm wall | 30 mm | 25 mm AES Fibre ≥ 128kg/m$^3$ insulation, 600 mm long (min.) | **EI 120 C/U** |

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

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



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

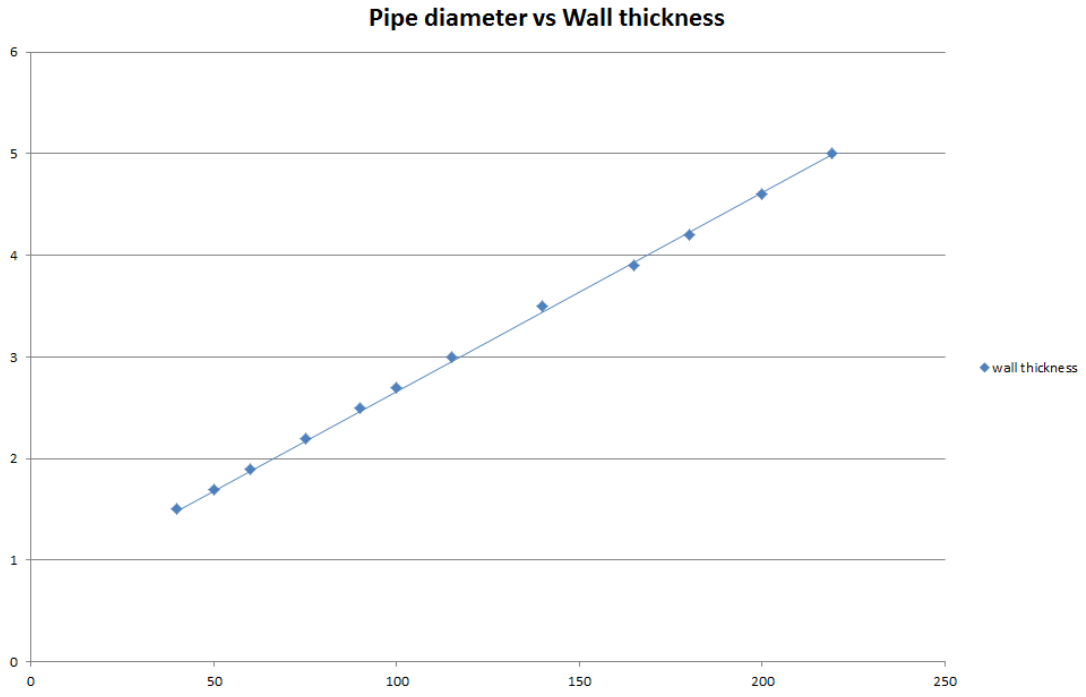
| |
|---|
| **Penetration Seal:** LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic and composite pipes (single) fitted at any position within the aperture, with 25 mm deep TYTAN B1 Fire Acryl to either side of the wall (or at any position between), backed with 25 mm deep minimum 40 kg/m$^3$ stone wool insulation*. |
| Construction details:<br>  <br> |

**A.1.4.1**

| Services | Maximum Seal size | Insulation (minimum) | Classification |
|---|---|---|---|
| Copper pipe up to 54 mm diameter/0.9-14.2 mm wall | 300 x 300 mm | 1000 mm length 20 mm Stone wool insulation 80 kg/m$^3$ | **E 240 C/U, EI 60 C/U** |
| Alupex composite pipe 75 mm diameter/7.5 mm wall | | 25 mm AES Fibre ≥ 128kg/m$^3$ insulation, 600 mm long (min.) | |

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

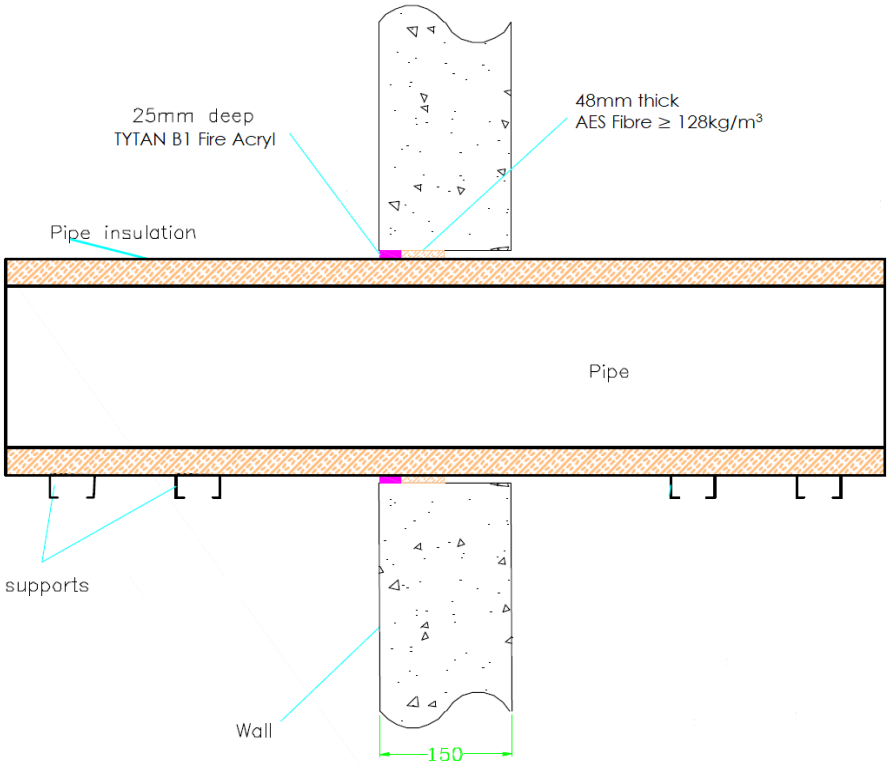
* Typical pipe diameters shown, see below graph for intermediate sizes



### A.1.5 Single side penetration seal with metallic pipes

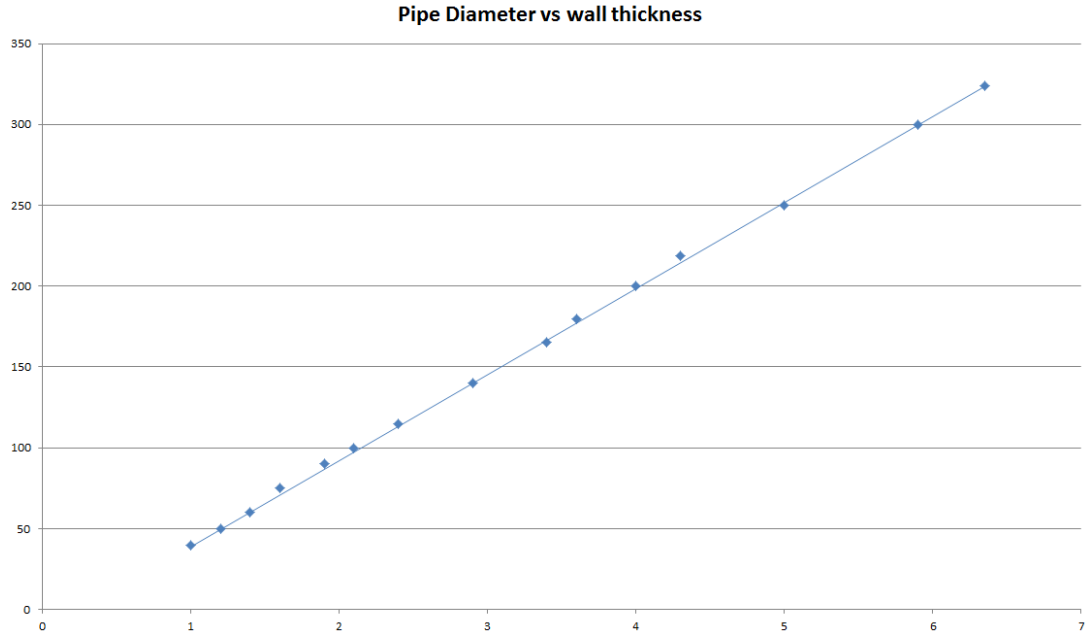
**Penetration Seal:** CS (Continuous Sustained) insulated metallic (single), with 25 mm deep TYTAN B1 Fire Acryl to either side of the wall (or at any position between), backed with 48 mm deep AES Fibre ≥ 128kg/m$^3$ insulation. Minimum annular space 10 mm and minimum separation between penetrations seals of 30 mm. Maximum seal size 300 x 300 mm or 504 mm Ø.

Construction details:



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

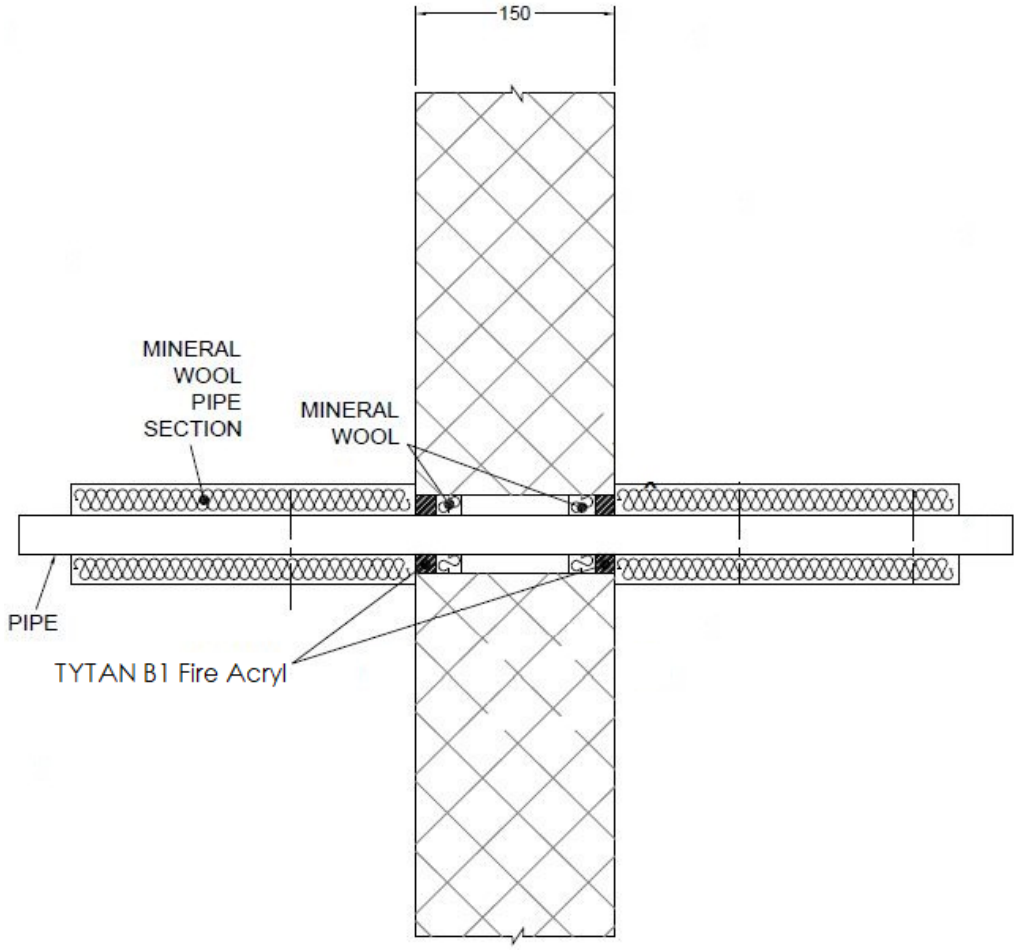
| Mild or stainless steel pipe | Insulation | Classification |
|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 20 mm thick stone, mineral wool min. 80 kg/m$^3$ | **EI 240 C/U** |
| 40 mm diameter/1-14.2 mm wall* | 30-80 mm thick stone, mineral wool min. 80 kg/m$^3$ | **EI 180 C/U** |
| 50 mm diameter/1.2-14.2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



### A.1.6 Double side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep TYTAN B1 Fire Acryl to both sides of the wall, backed with 20 or 30 mm deep minimum 40 kg/m$^3$ stone wool insulation.

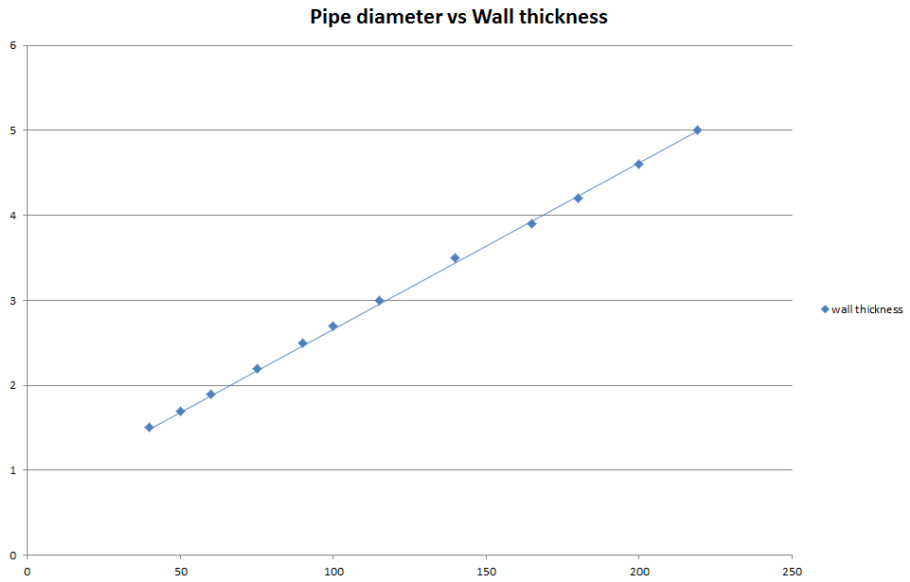
Construction details:



**A.1.6.1**

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

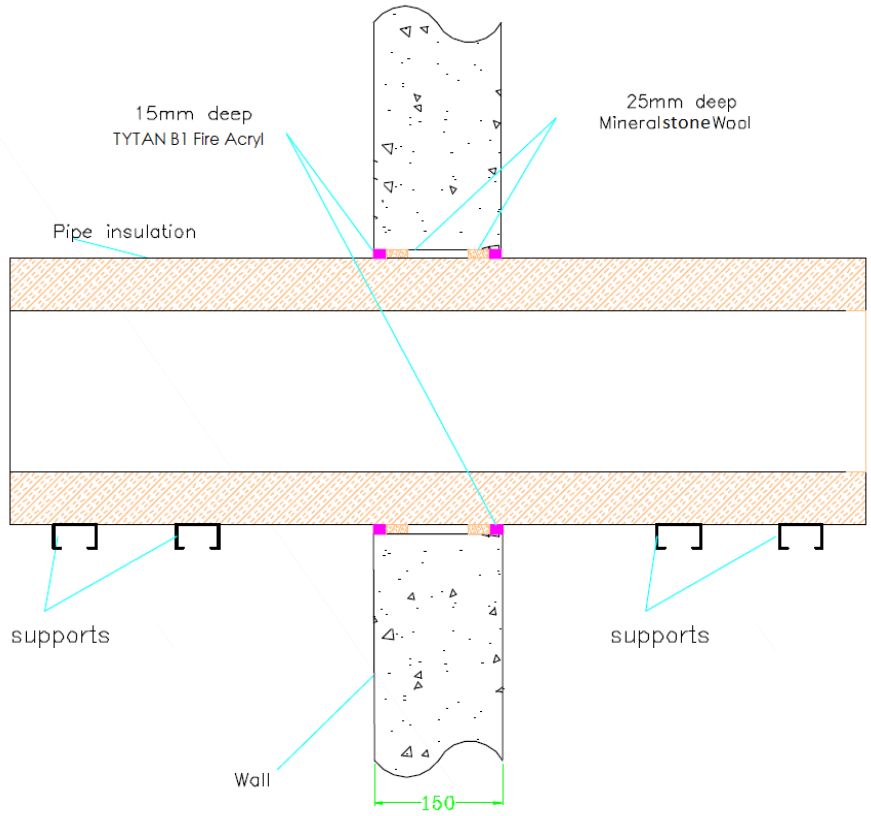
* Typical pipe diameters shown, see below graph for intermediate sizes

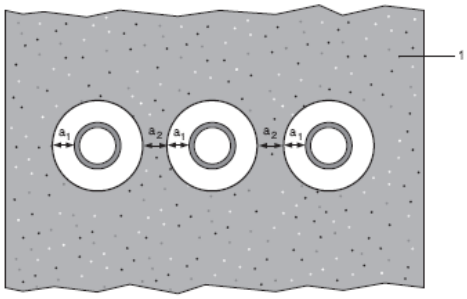
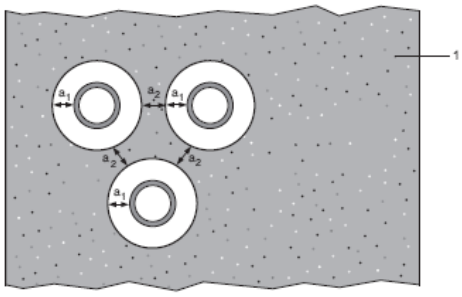


### A.1.7 Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm TYTAN B1 Fire Acryl to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m$^3$. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:




| Configuration 1 | Configuration 2 |
|---|---|
| *Option 1*  | *Option 2*  |

**Key**

1 Supporting construction

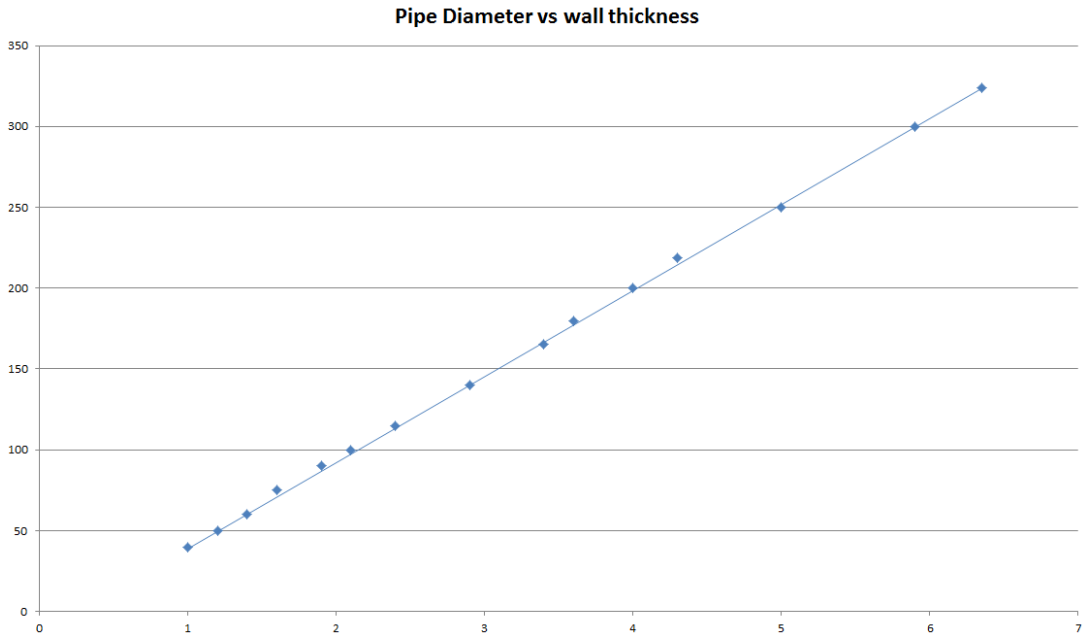
a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

### A.1.7.1 Double side penetration seal with pipes

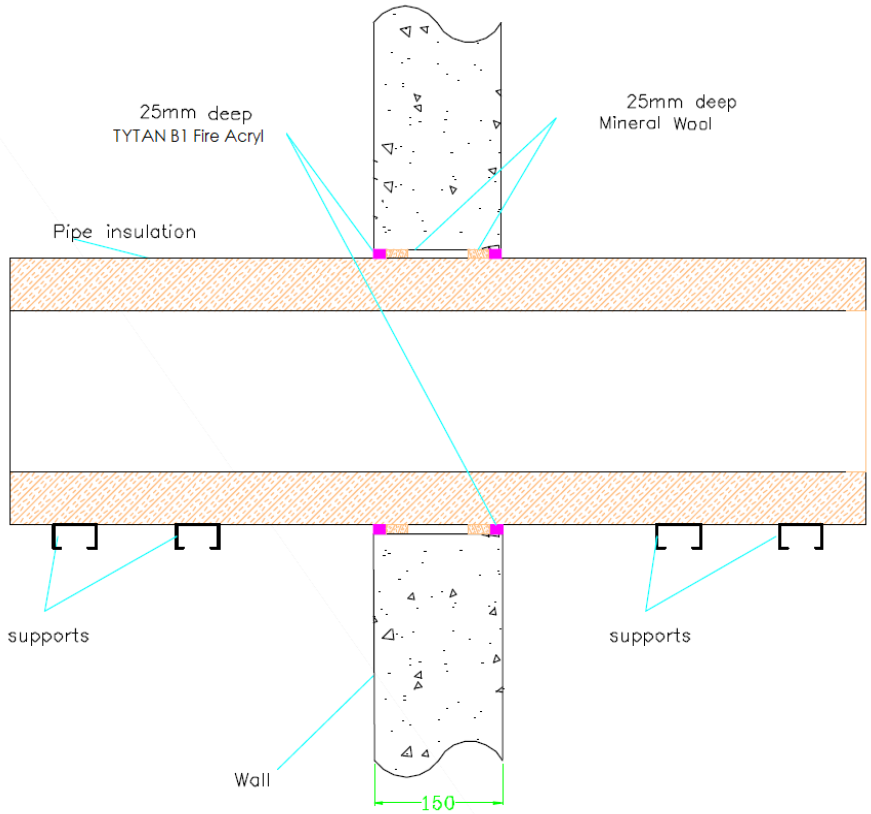
| Mild or stainless steel pipe | Insulation | Classification |
|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 20 mm thick stone, mineral wool min. 80 kg/m$^3$ | **EI 240 C/U** |
| 40 mm diameter/1-14.2 mm wall* | 30-80 mm thick stone, mineral wool min. 80 kg/m$^3$ | |
| 50 mm diameter/1.2-14.2 mm wall*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

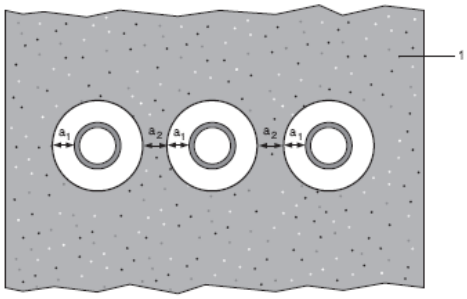
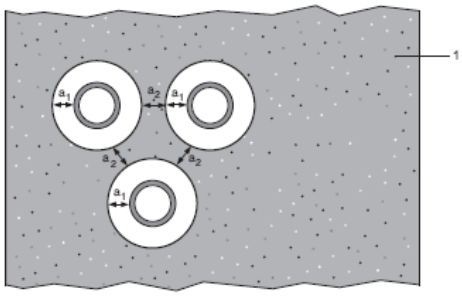


### A.1.8 Double side penetration seal with metallic pipes with combustible insulation

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm TYTAN B1 Fire Acryl to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m$^3$. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø

Construction details:




| Configuration 1 | Configuration 2 |
|---|---|
| *Option 1*  | *Option 2*  |

**Key**

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

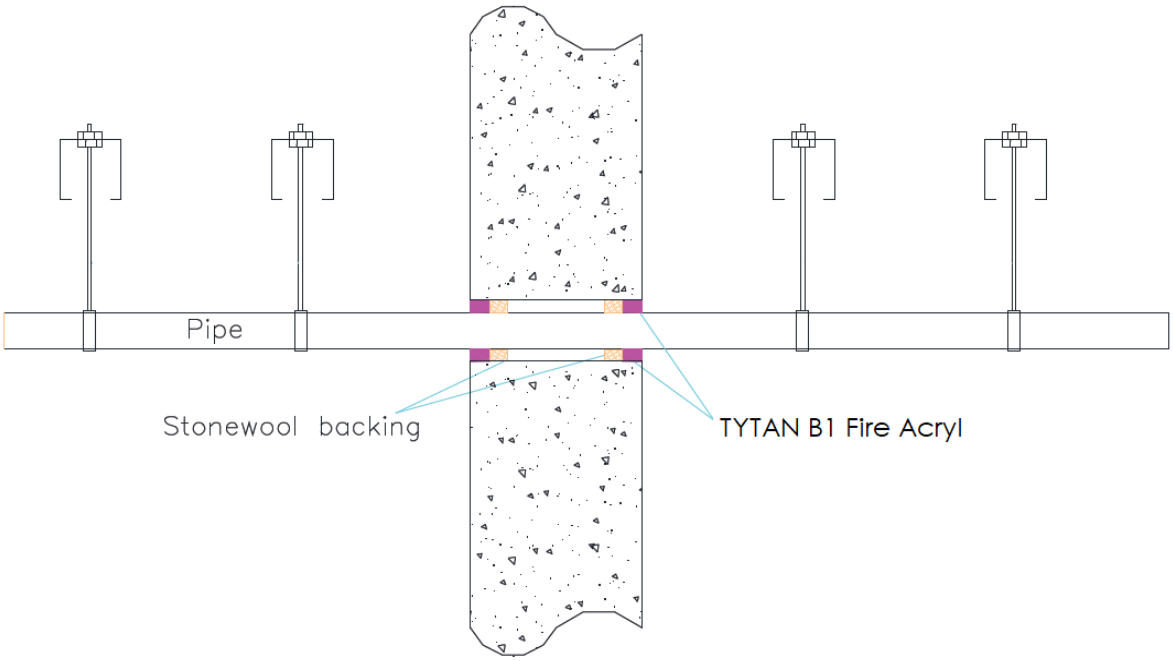
### A.1.8.1 Double side penetration seal with metallic pipes with combustible insulation

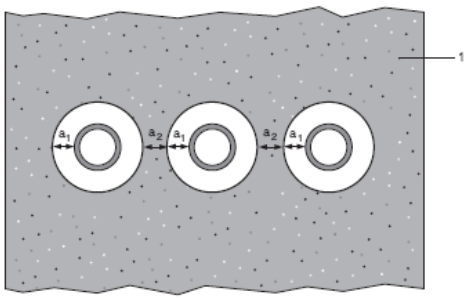
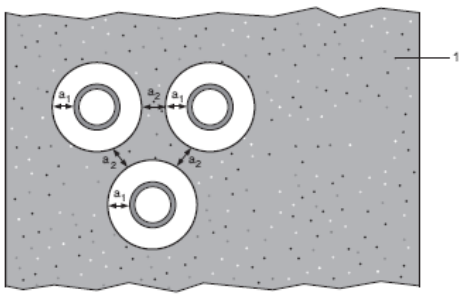
| Mild or stainless steel pipe | Insulation | Classification |
|---|---|---|
| 22 mm diameter/2-11 mm wall | 13 mm thick Elastomeric insulation minimum class B-s3,d0 | **E 240 C/U, EI 180 C/U** |
| 22-114 mm diameter/2-14.2 mm wall | 13-25 mm thick Elastomeric insulation minimum class B-s3,d0 | **E 120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

### A.1.9 Double side penetration seal with plastic pipes

**Penetration Seal:** Plastic pipes (single) fitted at any position within the aperture, with 25 mm TYTAN B1 Fire Acryl to both sides of the wall, backed with 25 mm deep stone wool insulation minimum 35 kg/m³. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 300 mm Ø

Construction details:




| Configuration 1 | Configuration 2 |
|---|---|
| *Option 1*  | *Option 2*  |

**Key**

1 Supporting construction

a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

### A.1.9.1 Double side penetration seal with plastic pipes

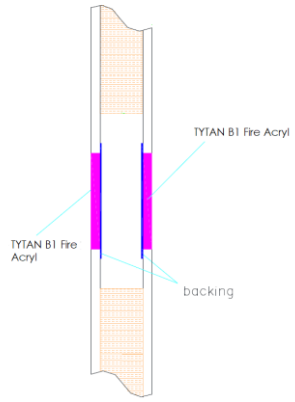
| Pipe material | Size | Classification |
|---|---|---|
| PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1 | 6-32 mm diameter/1.0-1.6 mm wall | **EI 240 U/C** |
| PP pipe according to EN 1451-1 | 32 mm diameter/2.0-4.4 mm wall | **EI 180 C/U** |
| PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1 | 20-32 mm diameter/2.0 mm wall | **EI 240 C/U** |

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

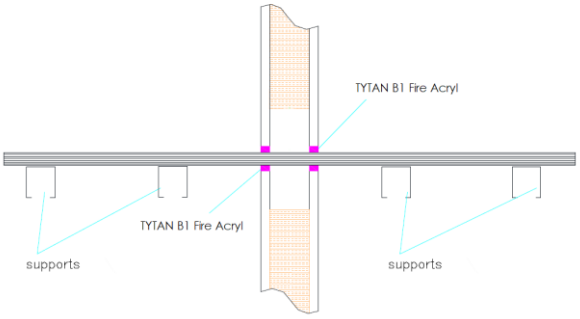
### A.2.1 Double side penetration seal with cables

**Penetration Seal:** Cables (single or bundles up to 100 mm Ø) and pipes fitted at any position within the aperture, with TYTAN B1 Fire Acryl to both sides of the wall. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 150 x 150 mm / 344 mm diameter (when incorporating a pipe of seal diameter -20 mm).

Construction details:



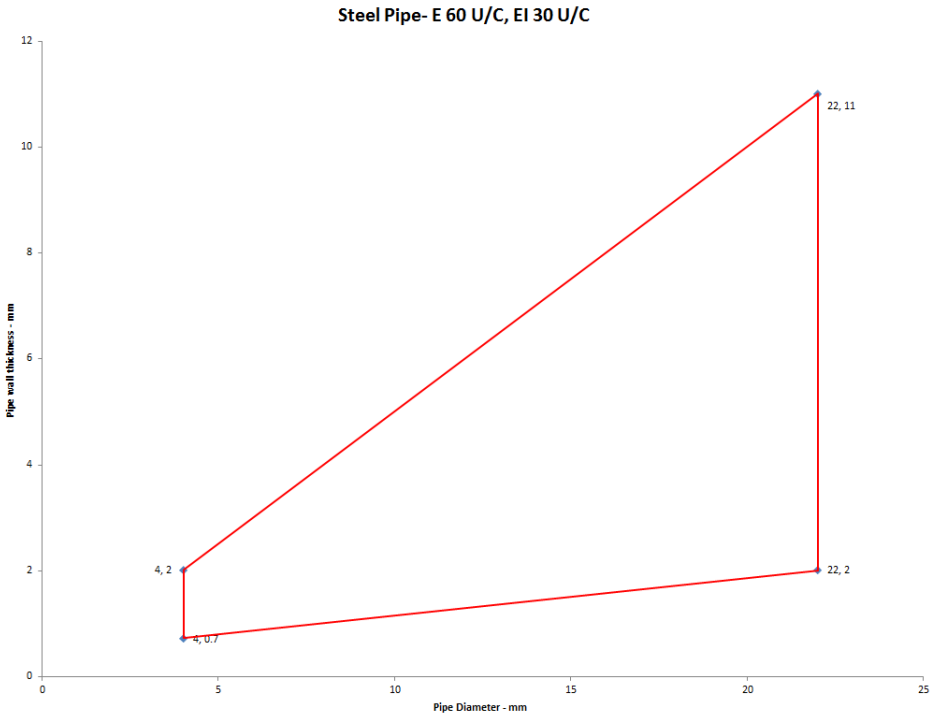

Construction details:

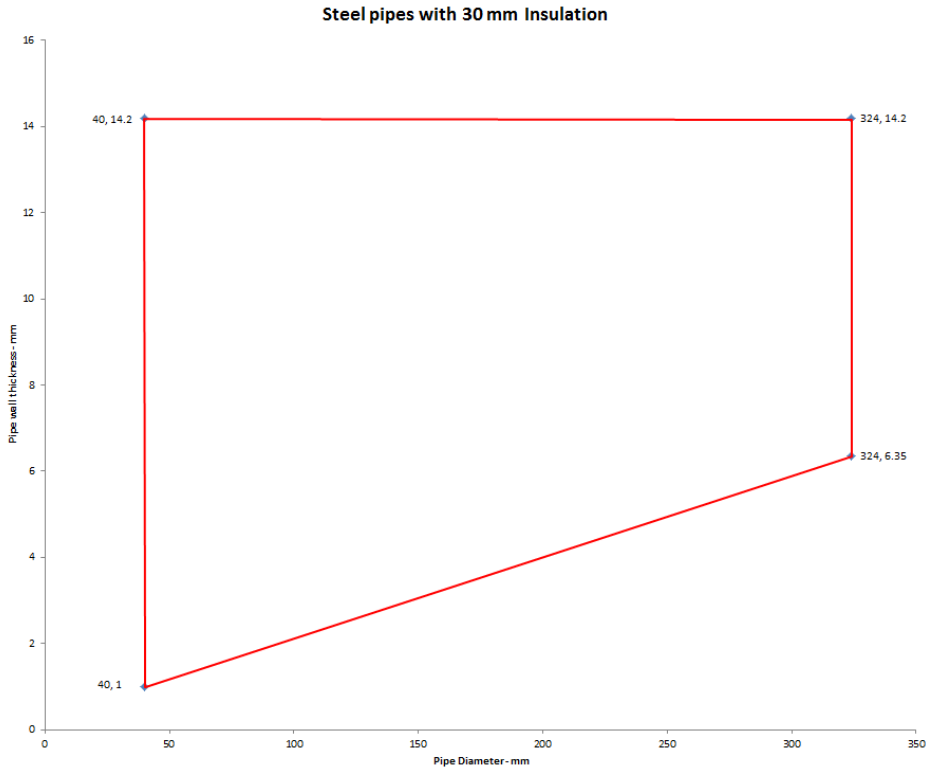


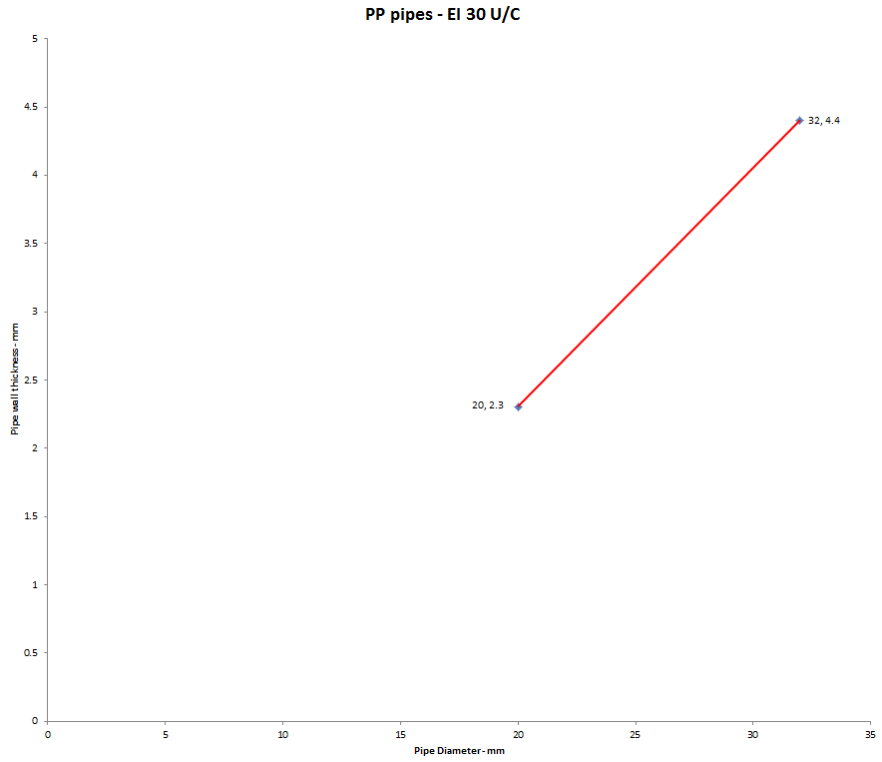

#### A.2.1.1

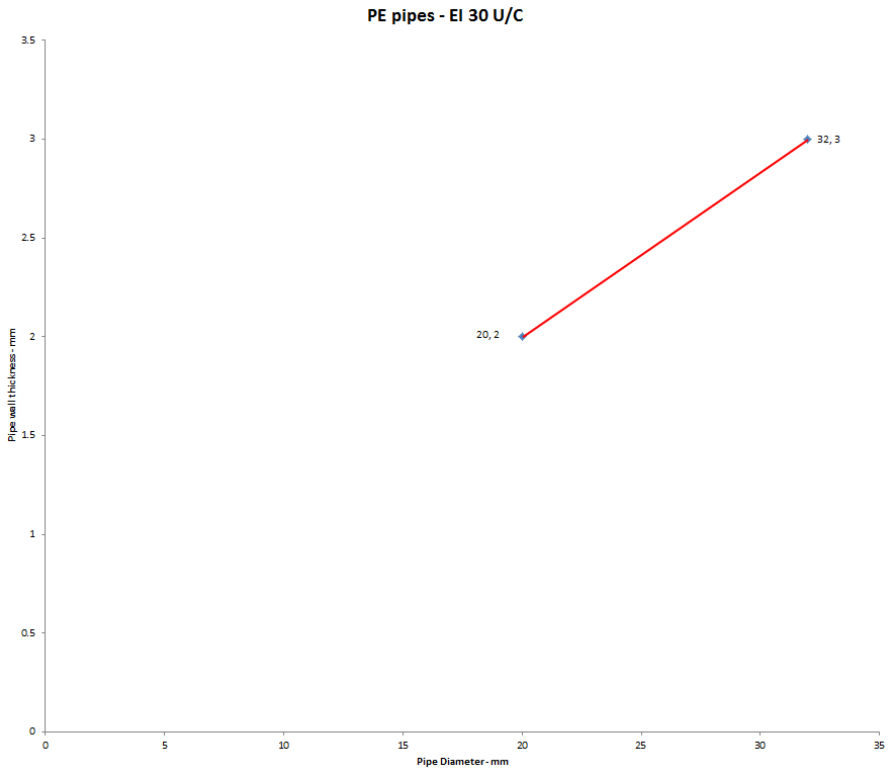
| Services | Sealant depth | Backing | Classification |
|---|---|---|---|
| None (blank) | 12.5 mm | Any material | **EI 60** |
| Cables up to 21 mm Ø, single | | None | **E 60, EI 45** |
| Cables up to 21 mm Ø, in bundles up to 100 mm Ø | | | **E 45, EI 30** |
| Mild or stainless steel pipe | | | |
| 4 mm diameter /0.7-2.0 mm wall | 12.5 mm | None | **E 60 C/U, EI 45 C/U** |
| 5-22 mm diameter /0.7-11 mm wall* | | | **E 60 C/U, EI 30 C/U** |
| Mild or stainless steel pipe with minimum 80 kg/m$^3$ density stone wool insulation Continuous Sustained (CS) | | | |
| 40 mm diameter /1-14.2 mm wall, 20 mm insulation | 12.5 mm | None | **E 60 C/U, EI 45 C/U** |
| 40-324 mm diameter /1.0-14.2 mm wall, 30 mm insulation* | | | |
| PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1 | | | |
| 6-32 mm Ø/1.0-1.8 mm wall, with bundle of cables up to 21 mm diameter* | 12.5 mm | None | **E 60 U/C, EI 45 U/C** |
| PP pipe according to EN 1451-1 | | | |
| 20 mm Ø/2.3 mm wall | 12.5 mm | None | **EI 45 U/C** |
| 21-32 mm Ø/2.3-4.4 mm wall* | | | **EI 30 U/C** |
| 21-32 mm Ø/2.3-4.4 mm wall, with bundle of cables up to 21 mm diameter* | | | **E 45 U/C, EI 30 U/C** |
| PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1 | | | |
| 20 mm Ø/2.0 mm wall | 12.5 mm | None | **EI 45 U/C** |
| 21-32 mm Ø/2.0-3.0 mm wall* | | | **EI 30 U/C** |
| 21-32 mm Ø/2.0-3.0 mm wall, with bundle of cables up to 21 mm* diameter | | | **E 45 U/C, EI 30 U/C** |

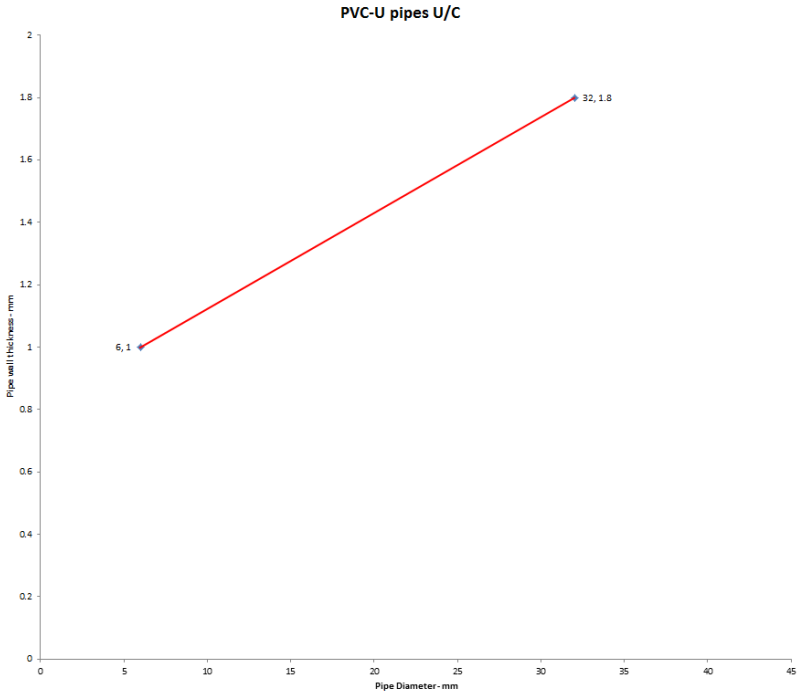
* See below graphs for interpolated pipe sizes


Steel Pipe- E 60 U/C, EI 30 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
22, 11
4, 2
22, 2
4, 0.7
0
2
4
6
8
10
12
0
5
10
15
20
25


Steel pipes with 30 mm Insulation
Pipe wall thickness - mm
Pipe Diameter - mm
40, 14.2
324, 14.2
324, 6.35
40, 1
0
2
4
6
8
10
12
14
16
0
50
100
150
200
250
300
350


PP pipes - EI 30 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
32, 4.4
20, 2.3
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
5
10
15
20
25
30
35


PE pipes - EI 30 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
32, 3
20, 2
0
0.5
1
1.5
2
2.5
3
3.5
0
5
10
15
20
25
30
35

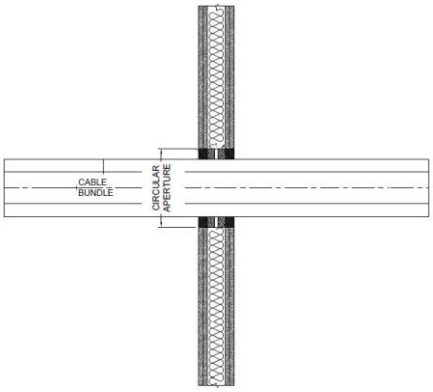

PVC-U pipes U/C
Pipe wall thickness - mm
Pipe Diameter - mm
6, 1
32, 1.8
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
40
45

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

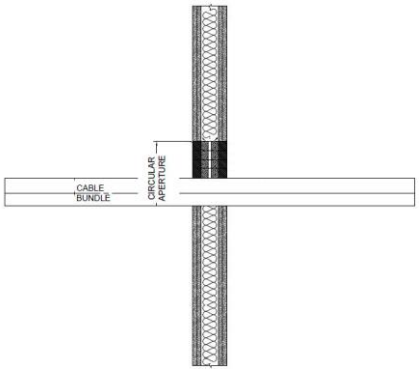
### A.3.1 Double side penetration seal with cables

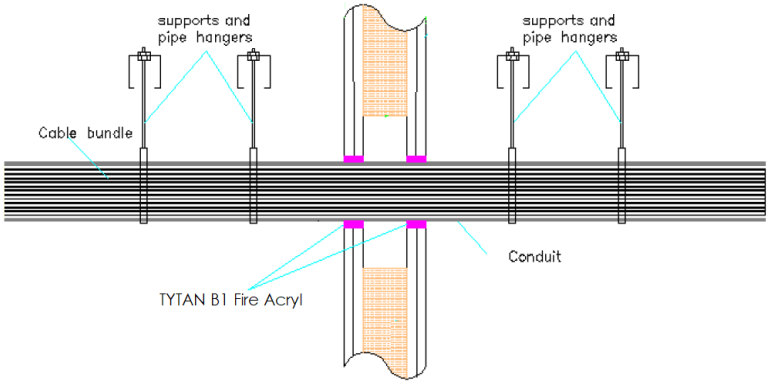
**Penetration Seal:** Cables (single or bundles up to 100 mm Ø) and conduits fitted at any position within the aperture, with TYTAN B1 Fire Acryl to both sides of the wall.

Construction details:




Construction details:




#### A.3.1.1

| Services | Sealant depth | Backing | Maximum aperture | Classification |
|---|---|---|---|---|
| None (blank) | 12.5 mm | Stone wool 20 mm deep 35-140 kg/m$^3$ | 300 x 300 mm* | **EI 120** |
| Cables up to 21 mm Ø, single or in bundles up to 50 mm Ø | 12.5 mm | Stone wool 12.5 mm deep min. 33 kg/m$^3$ | | **E 120, EI 90** |
| Electrical cables up to 21 mm Ø, single or in bundles up to 100 mm Ø | 25 mm | Stone wool 20 mm deep min. 40 kg/m$^3$ | | **EI 120** |
| Electrical cables up to 80 mm Ø, single or in bundles up to 100 mm Ø | | 25 mm AES Fibre ≥ 128kg/m$^3$ | | **E 120, EI 60** |
| Cables up to 21 mm Ø single or in bundles up to 100 mm Ø | | Stone wool 20 mm deep min. 40 kg/m$^3$ | | **EI120** |
| Single 'E cable' - 1 x 185 mm$^2$ core HD603.3 electrical cable with PVC insulation, PVC sheath and 23-27 mm diameter | 12.5 mm | Stone wool 20 mm deep min. 140 kg/m$^3$ | | **E 120, EI 60** |

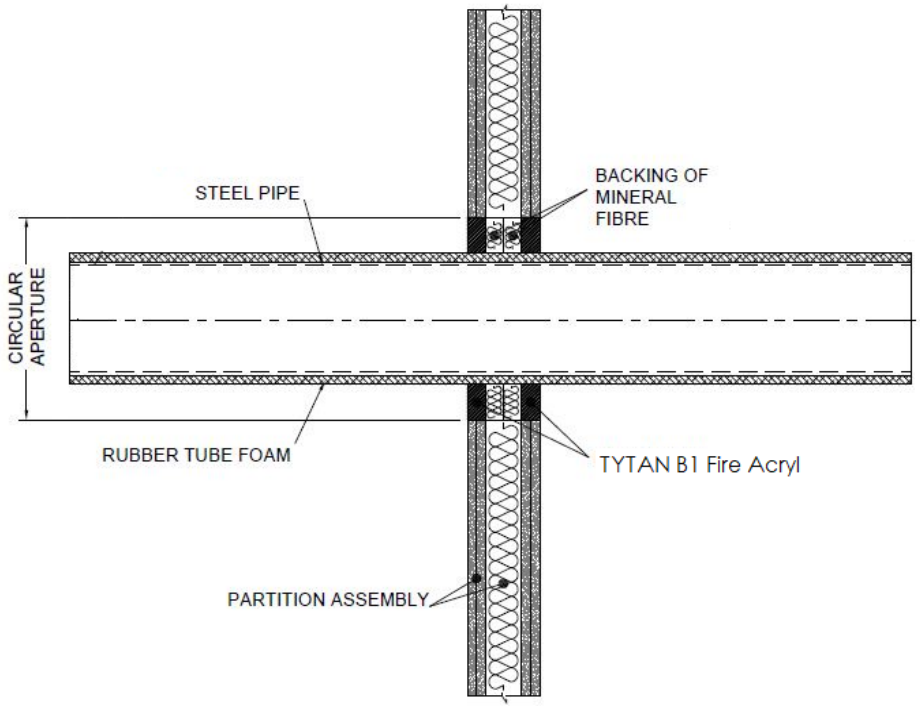
* Or 30 mm wide x 3000 mm high for cables up to 21 mm Ø

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

### A.3.2 Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with TYTAN B1 Fire Acryl to both sides of the wall, backed with stone wool insulation or 'AES Fibre ≥ 128kg/m$^3$', 300 x 300 mm maximum seal size.

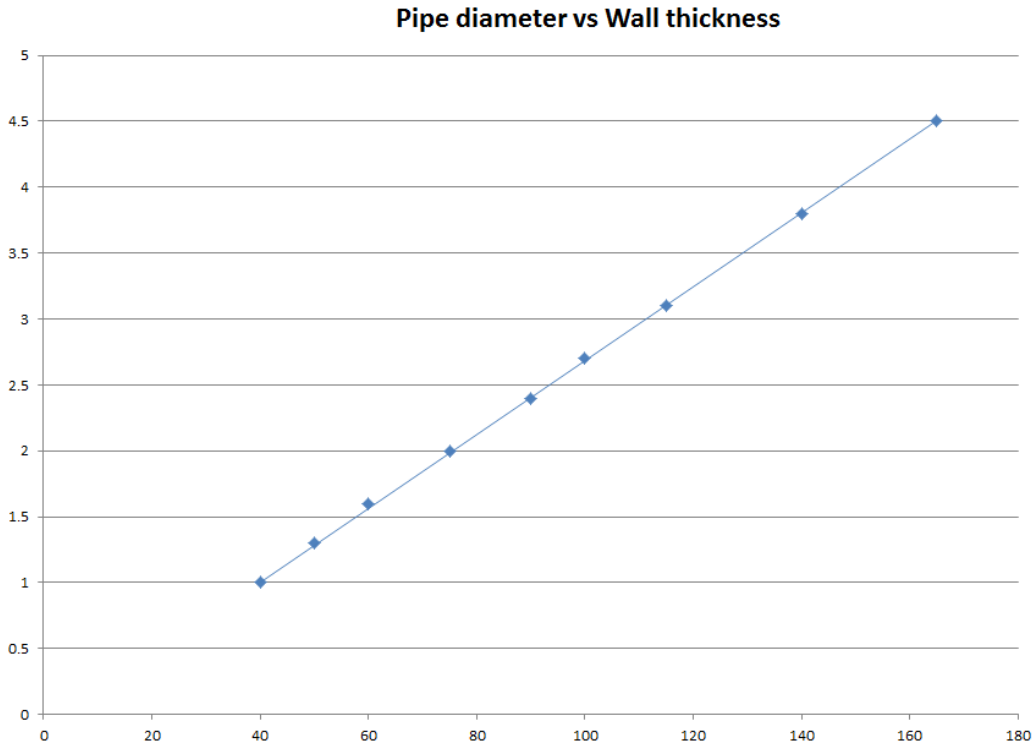
Construction details:



**A.3.2.1**

| Services<br>Mild or stainless steel pipe | Sealant depth | Backing (minimum) | Insulation | Classification |
|---|---|---|---|---|
| 22 mm diameter/3-10 mm wall | 25 mm | Stone wool 25 mm deep 35 kg/m$^3$ | None | **EI 120 C/C** |
| 40 mm diameter/1-14.2 mm wall | 12.5 mm | 20 mm Stone wool 40 kg/m$^3$ | 13 -19 mm Elastomeric insulation minimum class B-s3,d0 | **EI 120 C/C** |
| 40 mm diameter/1-14.2 mm wall* | 25 mm | 25 mm AES Fibre ≥ 128kg/m$^3$ | | **E 120 C/C**<br>**EI 60 C/C** |
| 50 mm diameter/1.3-14.2 mm wall* | | | | |
| 60 mm diameter/1.6-14.2 mm wall* | | | | |
| 75 mm diameter/2-14.2 mm wall* | | | | |
| 90 mm diameter/2.4-14.2 mm wall* | | | | |
| 100 mm diameter/2.7-14.2 mm wall* | | | | |
| 115 mm diameter/3.1-14.2 mm wall* | | | | |
| 140 mm diameter/3.8-14.2 mm wall* | | | | |
| 165 mm diameter/ 4.5-14.2 mm wall* | | | | |

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

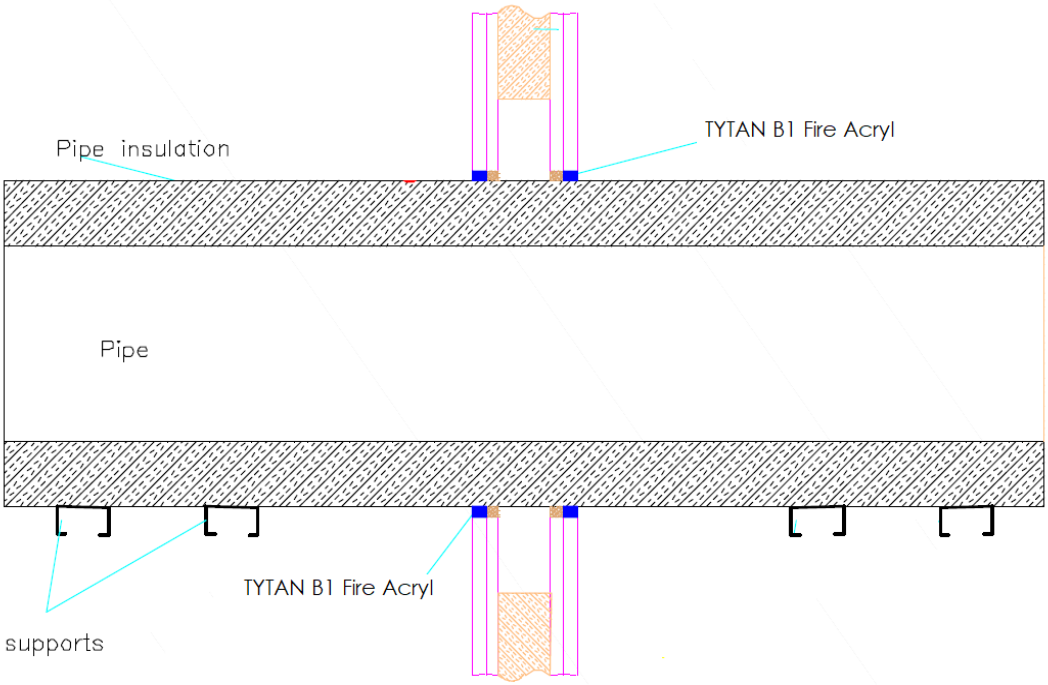


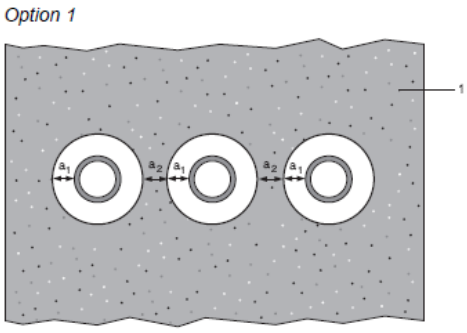
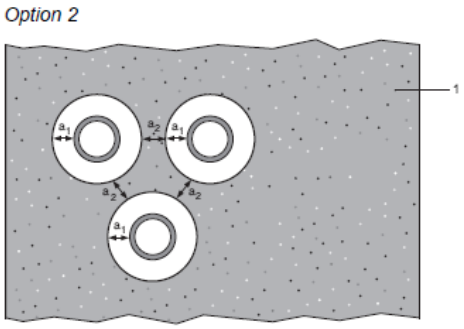
| Services | Sealant depth | Backing | Insulation | Classification |
|---|---|---|---|---|
| Copper pipe | | | | |
| 12 mm diameter/1 mm wall | 25 mm | 25 mm AES Fibre ≥ 128kg/$m^3$ | 9 mm Elastomeric insulation minimum class B-s3,d0 | **EI 120 C/C** |
| 12-54 mm diameter/1-1.2 mm wall | | | 9-13 mm Elastomeric insulation minimum class B-s3,d0 | **E 120, EI 60 C/C** |
| 12-54 mm diameter/1-1.2 mm wall | | | 13-25 mm Elastomeric insulation minimum class B-s3,d0 | **EI 60 C/C** |
| Alupex Composite Pipe | | | | |
| 16 mm diameter/2.25 mm wall | 25 mm | 25 mm AES Fibre ≥ 128kg/$m^3$ | 9 mm Elastomeric insulation minimum class B-s3,d0 | **EI 120 C/C** |
| 16 mm diameter/2.25 mm wall | | | 9-25 mm Elastomeric insulation minimum class B-s3,d0 | **EI 60 C/C** |
| 20 mm diameter/2.5 mm wall | | | | |
| 26 mm diameter/3 mm wall | | | | |
| 32 mm diameter/3 mm wall | | | | |
| 40 mm diameter/3.5 mm wall | | | | |
| 50 mm diameter/4 mm wall | | | | |
| 63 mm diameter/4.5 mm wall | | | | |
| 75 mm diameter/4.7 mm wall | | | | |

### A.3.3 Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 12.5 mm TYTAN B1 Fire Acryl to both sides of the wall, backed with 12.5 mm deep stone wool insulation minimum 35 kg/m$^3$. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:




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





**Key**

1 Supporting construction

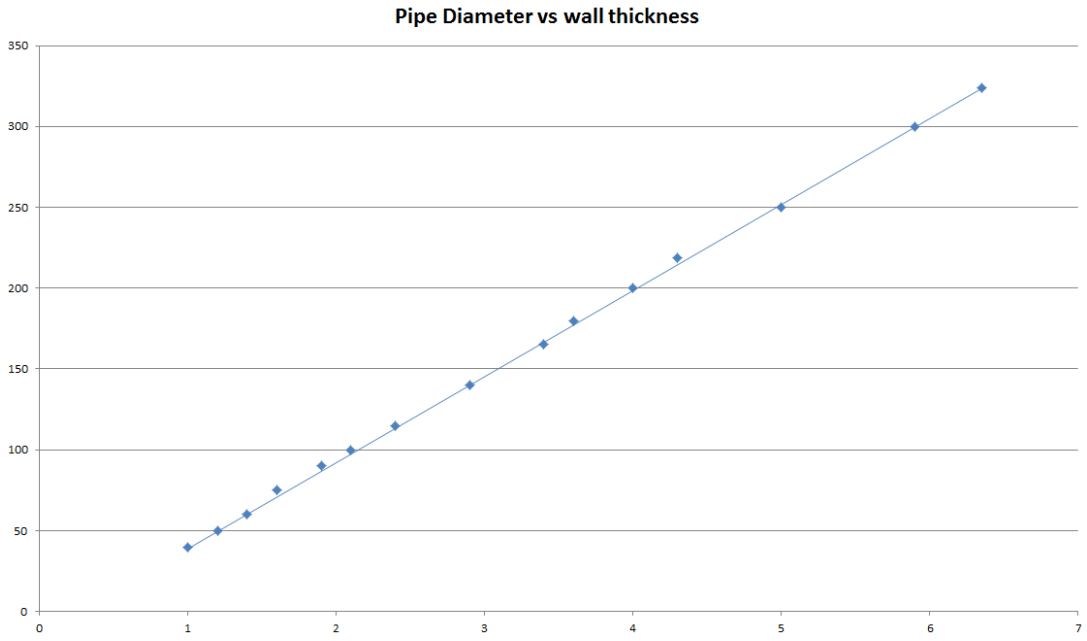
a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

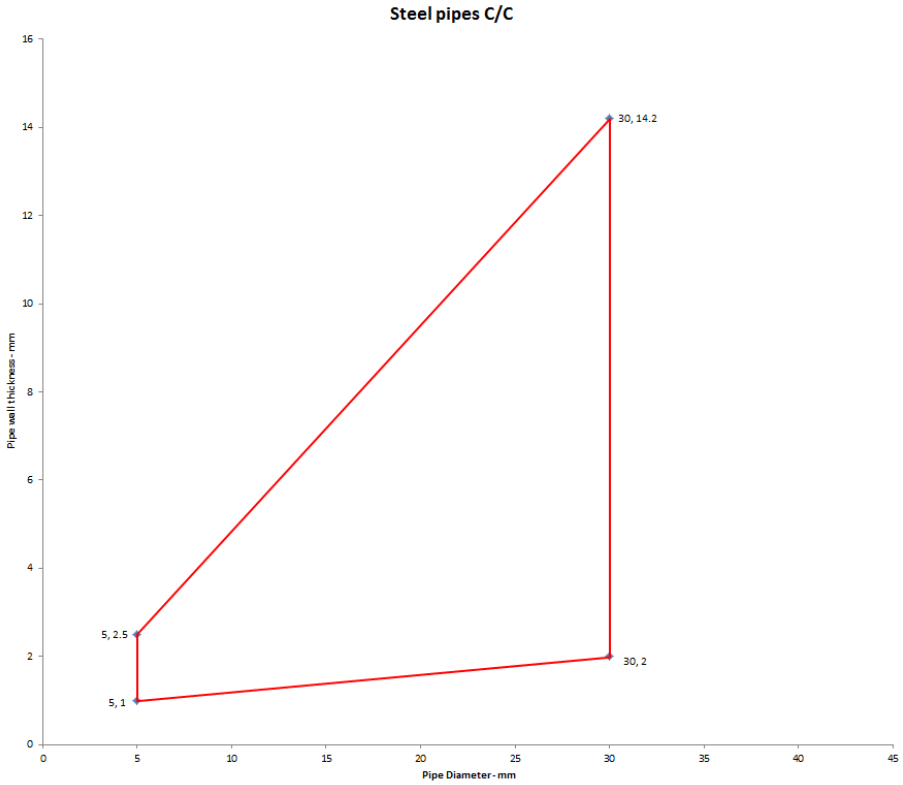
### A.3.3.1 Double side penetration seal with pipes

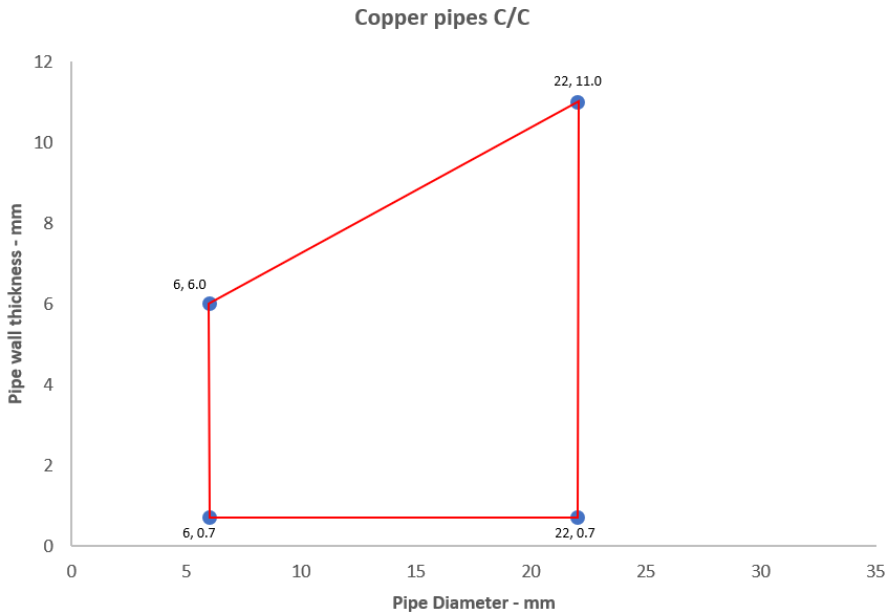
| Mild or stainless steel pipe | Insulation | Classification |
|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 20 mm thick stone, mineral wool min. 80 kg/m$^3$ | **E 120 C/U**<br>**EI 90 C/U** |
| 40 mm diameter/1-14.2 mm wall* | 30-80 mm thick stone, mineral wool min. 80 kg/m$^3$ | |
| 50 mm diameter/1.2-14.2 mm wall* | | |
| 60 mm diameter/1.4-14.2 mm wall* | | |
| 75 mm diameter/1.6-14.2 mm wall* | | |
| 90 mm diameter/1.9-14.2 mm wall* | | |
| 100 mm diameter/2.1-14.2 mm wall* | | |
| 115 mm diameter/2.4-14.2 mm wall* | | |
| 140 mm diameter/2.9-14.2 mm wall* | | |
| 165 mm diameter/ 3.4-14.2 mm wall* | | |
| 180 mm diameter/ 3.6-14.2 mm wall* | | |
| 200 mm diameter/ 4.0-14.2 mm wall* | | |
| 219 mm diameter/ 4.3-14.2 mm wall* | | |
| 250 mm diameter/ 5.0-14.2 mm wall* | | |
| 300 mm diameter/ 5.9-14.2 mm wall* | | |
| 324 mm diameter/ 6.35-14.2 mm wall* | | |



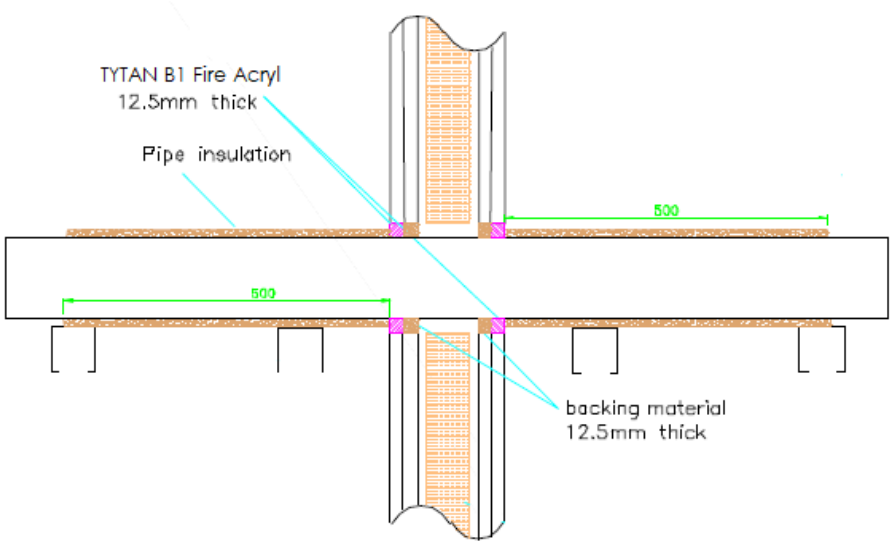
| PEX pipe in pipe system | Insulation | Classification |
|---|---|---|
| 15 mm diameter x 2.5 mm wall inner /25mm diameter outer | None | **EI 120 C/C** |
| **Alupex pipe** | **Insulation** | **Classification** |
| 16-20 mm diameter/2.0 mm wall | None | **EI 120 C/C** |
| 16-75 mm diameter/2.25-4.6 mm | 20-50 mm thick glass wool or stone, mineral wool min. 75 kg/m$^3$ | **EI 120 C/C** |
| **Mild or Stainless Steel pipe** | **Insulation** | **Classification** |
| 4 mm diameter/1.0-2.0 mm wall | None | **EI 90 C/C** |
| 5-30 mm diameter/1.0-14.2 mm wall* | | |
| 30 mm diameter/2.0-14.2 mm wall | | **EI 120 C/U** |
| **Copper or Steel pipe** | **Insulation** | **Classification** |
| 6-12 mm diameter/0.7-6.0 mm wall | None | **E 90 C/C, EI 60 C/C** |
| 13-22 mm diameter/0.7-11 mm wall | | **E 90 C/C, EI 30 C/C** |
| 12-54 mm diameter/0.9-1.2 mm wall | 20-80 mm thick stone, mineral wool min. 80 kg/m$^3$ | **E 120 C/C, EI 60 C/C** |

* See below graphs for interpolated pipe sizes




Copper pipes C/C
Pipe wall thickness - mm
Pipe Diameter - mm
22, 11.0
6, 6.0
6, 0.7
22, 0.7
0
2
4
6
8
10
12
0
5
10
15
20
25
30
35

### A.3.4 Double side penetration seal with composite pipes

| |
|---|
| **Penetration Seal:** CI (Continuous Interrupted) or CS (Continuous Sustained) insulated composite pipes (single) fitted at any position within the aperture, with TYTAN B1 Fire Acryl to both sides of the wall, minimum 10 mm seal width around service, maximum seal size 300 x 300 mm, backed with stonewool. |
| Construction details:<br>  <br> |

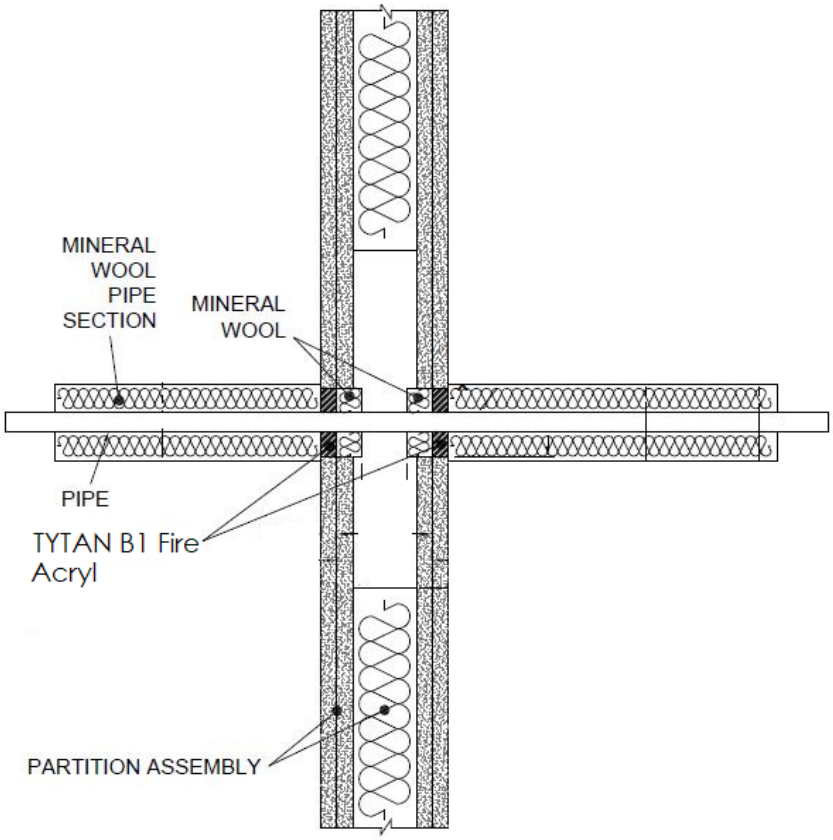
#### A.3.4.1

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

### A.3.5 Double side penetration seal with metallic (and composite) pipes

**Penetration Seal:** LI (Local Interrupted) of minimum length stated below or CI (Continuous Interrupted) insulated metallic pipes and composite (single) fitted at any position within the aperture, with TYTAN B1 Fire Acryl to both sides of the wall, min. 10 mm seal width around service, backed with stone wool insulation or 'AES Fibre ≥ 128kg/m$^3$'.

Construction details:

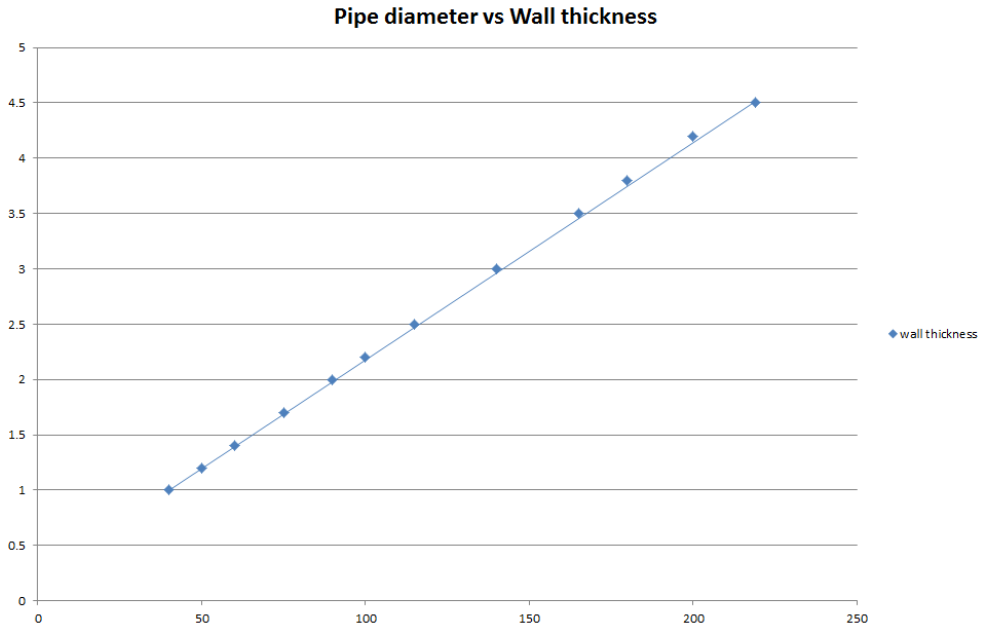



**A.3.5.1**

| Services | Sealant depth | Backing (minimum) | Insulation (minimum) | Classification |
|---|---|---|---|---|
| **Maximum aperture size 300 x 300 mm** | | | | |
| Copper or steel pipe up to 54 mm diameter/1-14.2 mm wall | 12.5 mm | 20 mm Stone wool 40 kg/m$^3$ | 500 mm length of 20 mm stone wool 80 kg/m$^3$ | **EI 120 C/U** |
| Alupex composite pipe 75 mm diameter/7.5 mm wall | | 20 mm Stone wool 140 kg/m$^3$ | 600 mm length of 25 mm AES Fibre ≥ 128kg/m$^3$ | **EI 60 C/U** |

| Services<br>Mild or stainless steel pipe | Sealant depth | Backing (minimum) | Insulation (minimum) | Classification |
|---|---|---|---|---|
| **Maximum aperture size 300 x 300 mm** | | | | |
| 40 mm diameter/1-14.2 mm wall | 12.5 mm | 20mm Stone wool 40 kg/m$^3$ | 500 mm length of 20 mm stone wool 80 kg/m$^3$ | **EI 120 C/U** |
| 40 mm diameter/1-14.2 mm wall* | | | 500 mm length of 30 mm stone wool 80 kg/m$^3$ | **E 120, EI 90 C/U** |
| 50 mm diameter/1.2-14.2 mm wall* | | | | |
| 60 mm diameter/1.4-14.2 mm wall* | | | | |
| 75 mm diameter/1.7-14.2 mm wall* | | | | |
| 90 mm diameter/2-14.2 mm wall* | | | | |
| 100 mm diameter/2.2-14.2 mm wall* | | | | |
| 115 mm diameter/2.5-14.2 mm wall* | | | | |
| 140 mm diameter/3-14.2 mm wall* | | | | |
| 165 mm diameter/3.5-14.2 mm wall* | 12.5 mm | 20mm Stone wool 40 kg/m$^3$ | 500 mm length of 30 mm stone wool 80 kg/m$^3$ | **E 120, EI 90 C/U** |
| 180 mm diameter/3.8-14.2 mm wall* | | | | |
| 200 mm diameter/4.2-14.2 mm wall* | | | | |
| 219 mm diameter/4.5-14.2 mm wall* | | | | |

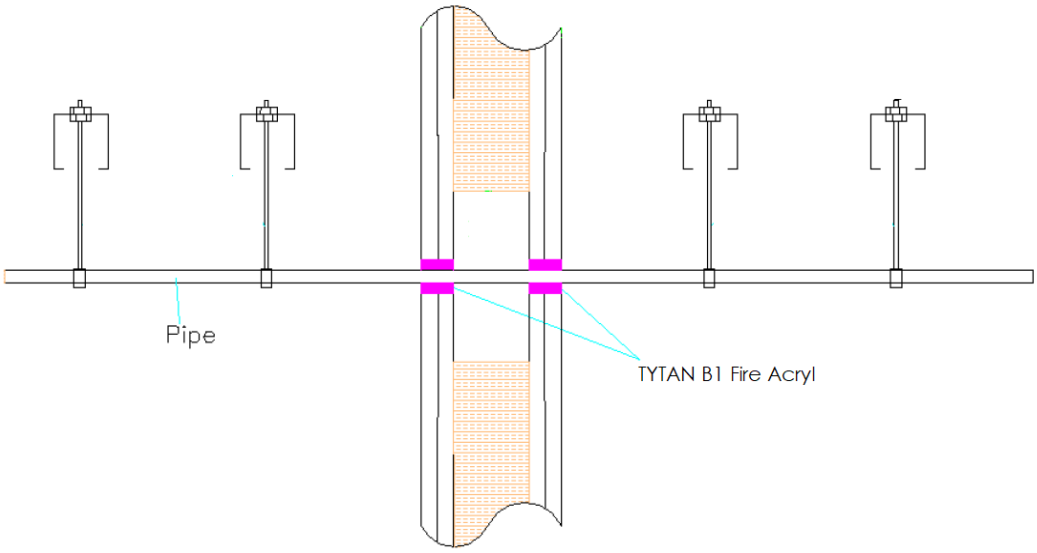
* Typical pipe diameters shown, see below graph for intermediate sizes



### A.3.6 Double side penetration seal with plastic pipes

**Penetration Seal:** Combustible pipes (single) fitted at any position within the aperture, with TYTAN B1 Fire Acryl to both sides of the wall, Minimum annular space 10 mm and minimum separation between penetration seals 30 mm (A2).

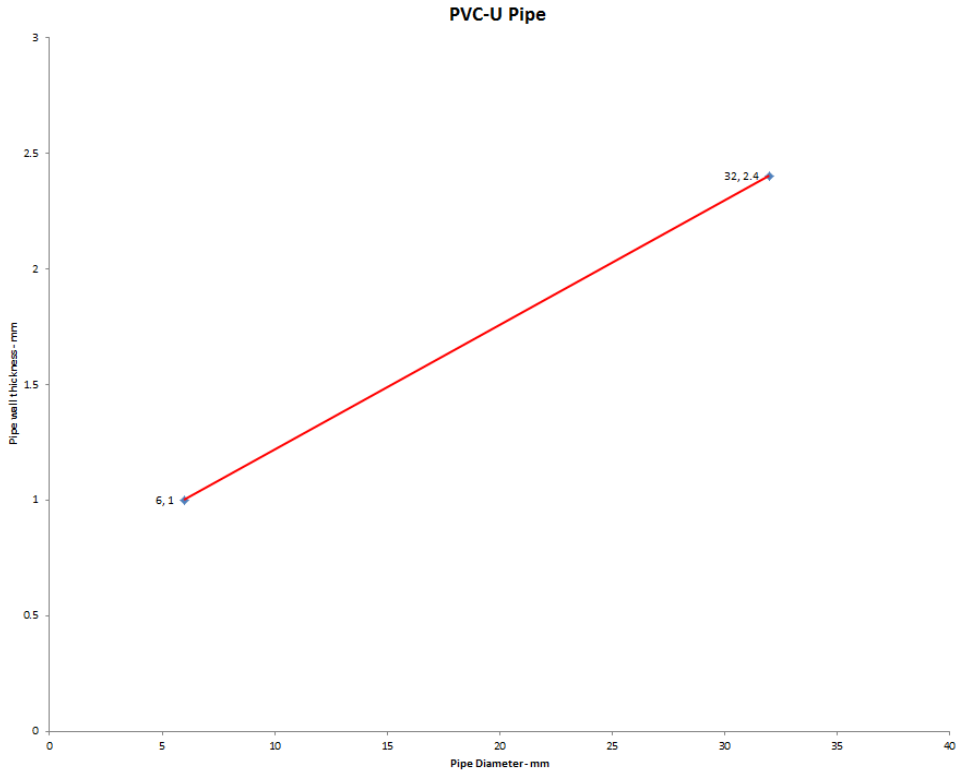
Construction details:




#### A.3.6.1

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

***** See below graphs for interpolated pipe sizes

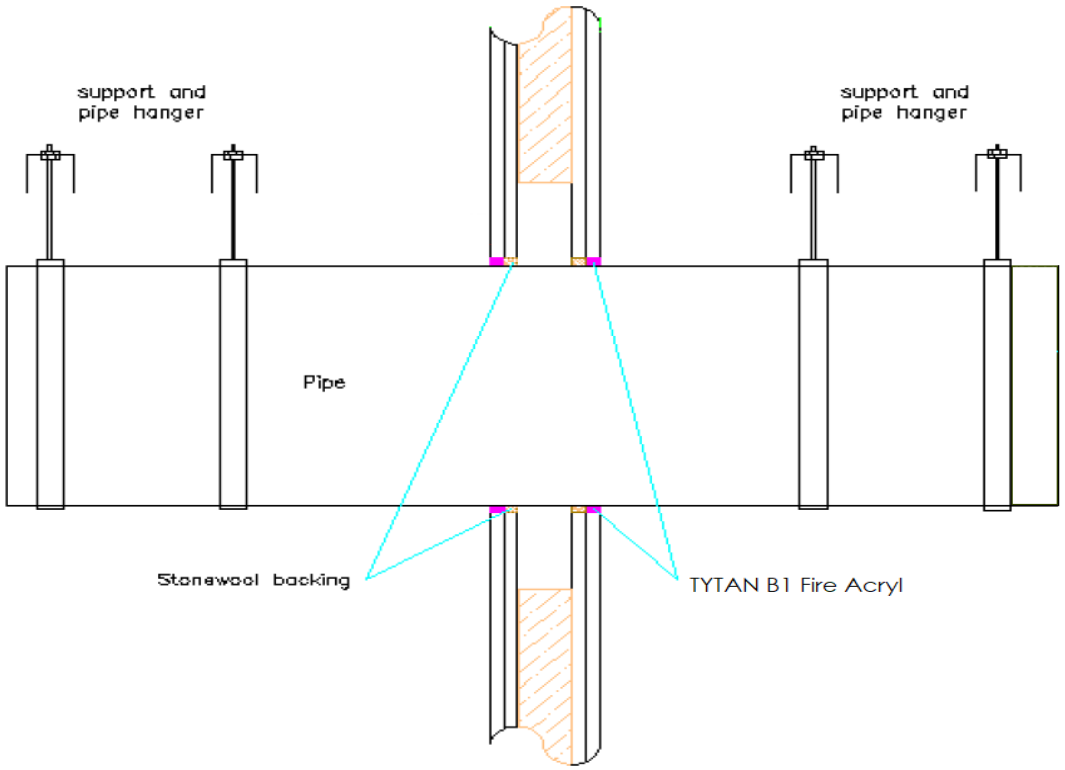

PVC-U Pipe
Pipe wall thickness - mm
Pipe Diameter - mm
6, 1
32, 2.4
0
0.5
1
1.5
2
2.5
3
0
5
10
15
20
25
30
35
40

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

### A.4.1 Double side penetration seal with cables

**Penetration Seal:** Non-insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep TYTAN B1 Fire Acryl to both sides of the wall, backed with stone wool insulation.

Construction details:




#### A.4.1.1

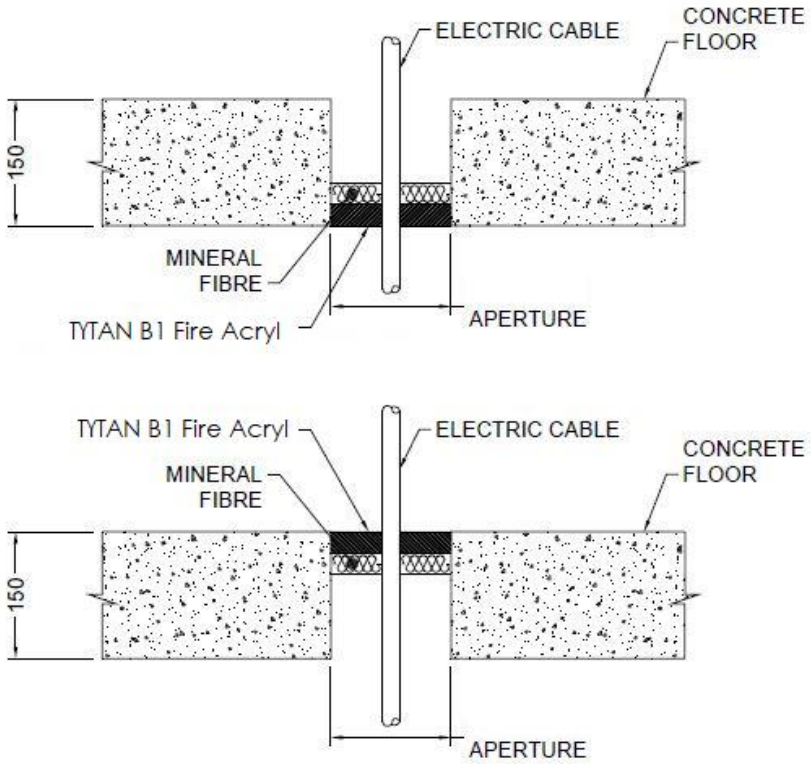
| Services | Sealant depth | Backing | Classification |
|---|---|---|---|
| Mild or stainless steel pipe | | | |
| 30 -324 mm diameter /1.6-14.2 mm wall | 15 mm | 15 mm stone wool | **E 120 C/U** |
| Copper or steel pipe | | | |
| 12 -54 mm diameter /0.9-14.2 mm wall | 15 mm | 15 mm stone wool | **E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

## A.5 Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm

### A.5.1 Single side penetration seal with cables

**Penetration Seal:** Cables (single) fitted at any position within the aperture, min. 10 mm from the edges, with TYTAN B1 Fire Acryl to either side of the floor (or at any position in between), backed with 'AES Fibre ≥ 128kg/m³'.

Construction details:



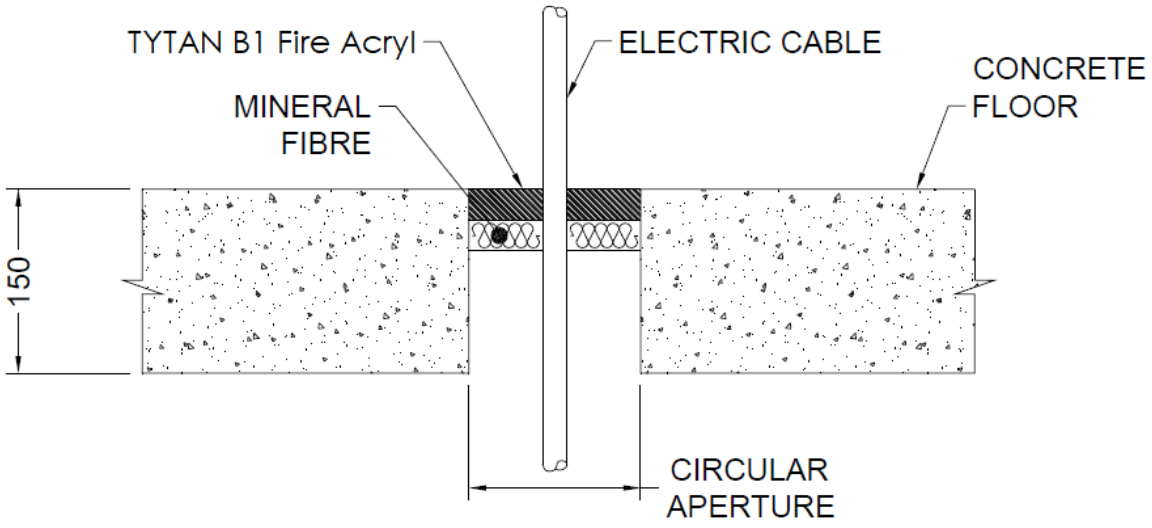

**A.5.1.1**

| Services | Sealant depth | Backing (minimum) | Aperture (maximum) | Classification |
|---|---|---|---|---|
| Single electrical cables up to 21 mm Ø | 25 mm | AES Fibre ≥ 128kg/m³ 25 mm deep | 82 mm Ø or 100 x 1000 mm | **E 120, EI 60** |

### A.5.2 Single side penetration seal with cables

**Penetration Seal:** Cables fitted with TYTAN B1 Fire Acryl to the top side of the floor, backed with stone wool insulation minimum 35kg/m$^3$ or AES Fibre ≥ 128kg/m$^3$. Maximum seal size of 300 x 300 mm and minimum separation between cables and the edge of the seal of 10 mm.

Construction details:



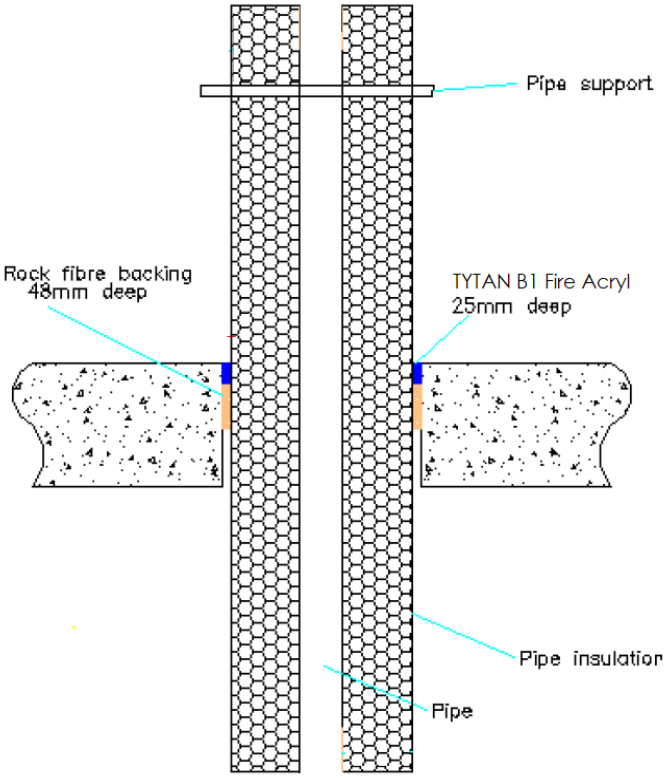

#### A.5.2.1

| Services | Sealant depth | Backing (minimum) | Insulation | Classification |
|---|---|---|---|---|
| Blank seals | 15 mm | 20 mm Stone wool 35 kg/m$^3$ | None | **E 90 EI 60** |
| | 25 mm | 25 mm Stone wool 35 kg/m$^3$ | | **EI 120** |
| | | 48 mm AES Fibre ≥ 128kg/m$^3$ | | **EI 240** |
| Electric cables up to 21 mm diameter, single. | | | | **E 120 EI 90** |
| 23-27 mm diameter, 1 mm × 185 mm$^2$ core, PVC sheath and insulation electrical cable, single | | | | **EI 240** |

### A.5.3 Single side penetration seal with pipes

**Penetration Seal:** Pipes fitted at any position within the aperture, with TYTAN B1 Fire Acryl to the top face of the floor, backed with 48 mm stone wool minimum 33kg/m$^3$. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

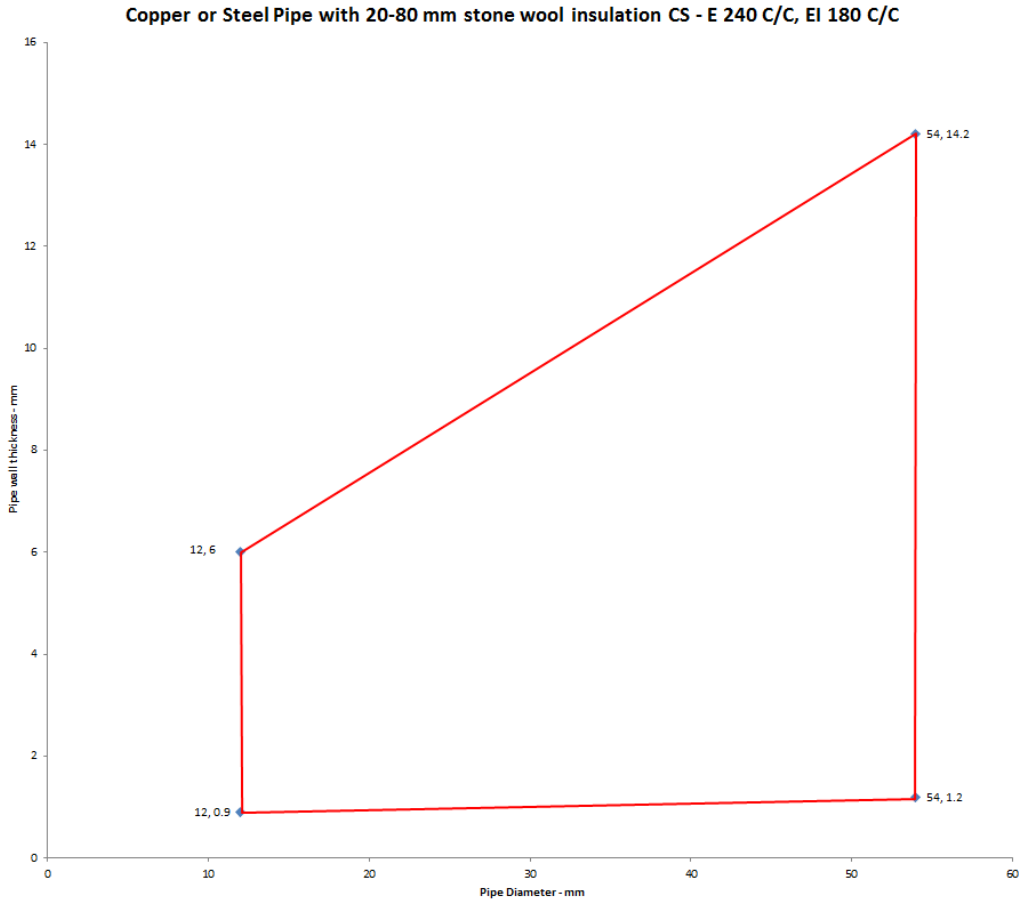
Construction details:




#### A.5.3.1

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

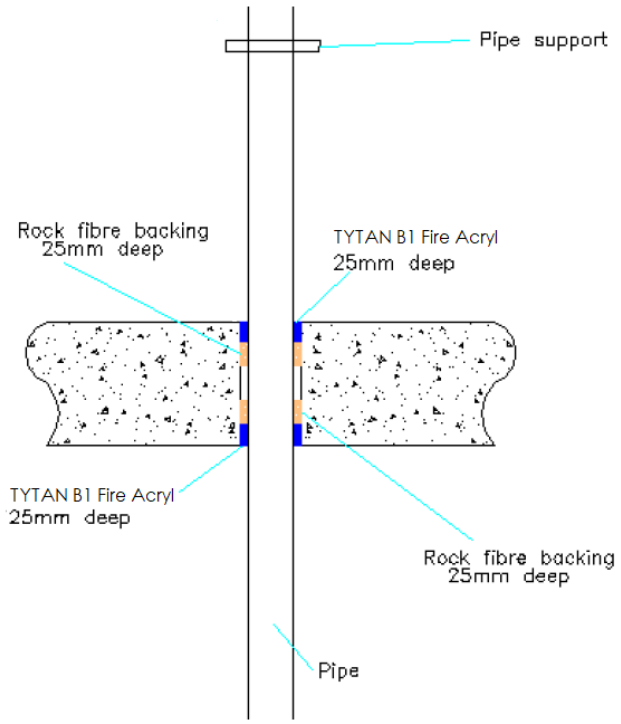
*See below graphs for interpolated pipe sizes


Copper or Steel Pipe with 20-80 mm stone wool insulation CS - E 240 C/C, EI 180 C/C
Pipe wall thickness - mm
Pipe Diameter - mm
54, 14.2
12, 6
12, 0.9
54, 1.2
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60

### A.5.4 Double side penetration seal with pipes

**Penetration Seal:** Pipes fitted at any position within the aperture, with TYTAN B1 Fire Acryl to the both faces of the floor, backed with 25 mm stone wool minimum 33kg/m$^3$. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2), maximum seal size 300 x 300 mm / 300 mm diameter.

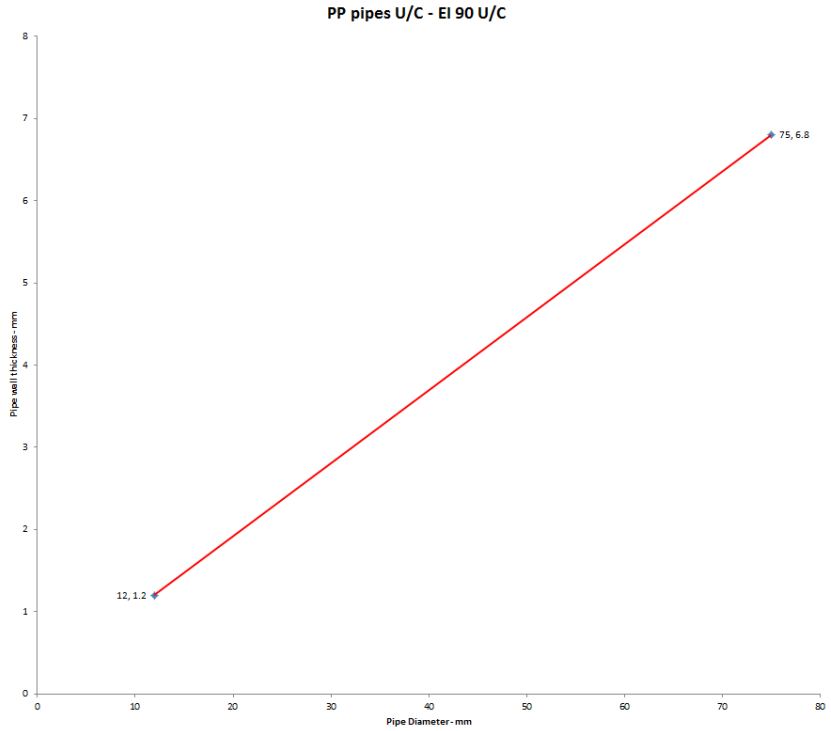
Construction details:

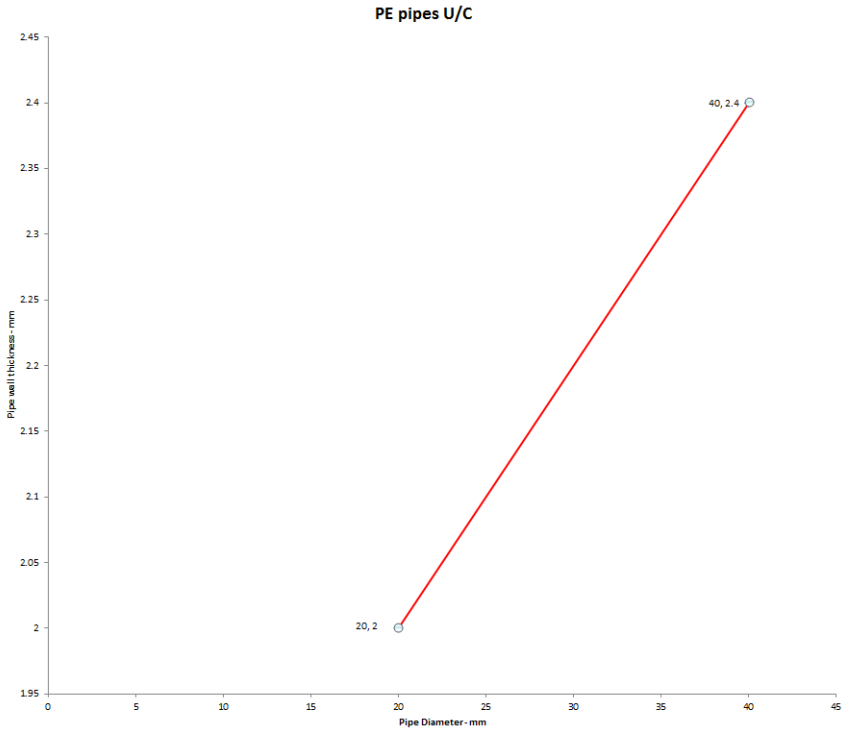



#### A.5.4.1

| Services | Sealant depth | Backing | Classification |
|---|---|---|---|
| PVC-U pipe according to EN 1329-1, EN 1452-1 and EN 1453-1, PVC-C according to EN 1566-1 | | | |
| Up to 50 mm Ø/1.6-3.7 mm wall | 25 mm | 25 mm Stone wool | **EI 240 U/C** |
| Up to 40 mm Ø/1.6-3.7 mm wall, with bundle of cables up to 21 mm diameter | | | |
| PP pipe according to EN 1451-1 | | | |
| 12 mm Ø/1.2 mm wall | 25 mm | 25 mm Stone wool | **EI 240 U/C** |
| 13-75 mm Ø/1.2-6.8 mm wall* | | | **EI 90 U/C** |
| Up to 40 mm Ø/1.2-1.8 mm wall, with bundle of cables up to 21 mm diameter | | | **EI 180 U/C** |
| PE pipe according to EN 1519-1, EN 12201-2 and EN 12666-1, ABS according to EN 1455-1 and pipes made from SAN+PVC according to EN 1565-1 | | | |
| 20-40 mm Ø/2.0-2.4 mm wall* | 25 mm | 25 mm Stone wool | **EI 240 U/C** |
| Up to 40 mm Ø/2.0-2.4 mm wall, with bundle of cables up to 21 mm diameter | | | **EI 180 U/C** |

*See below graphs for interpolated pipe sizes

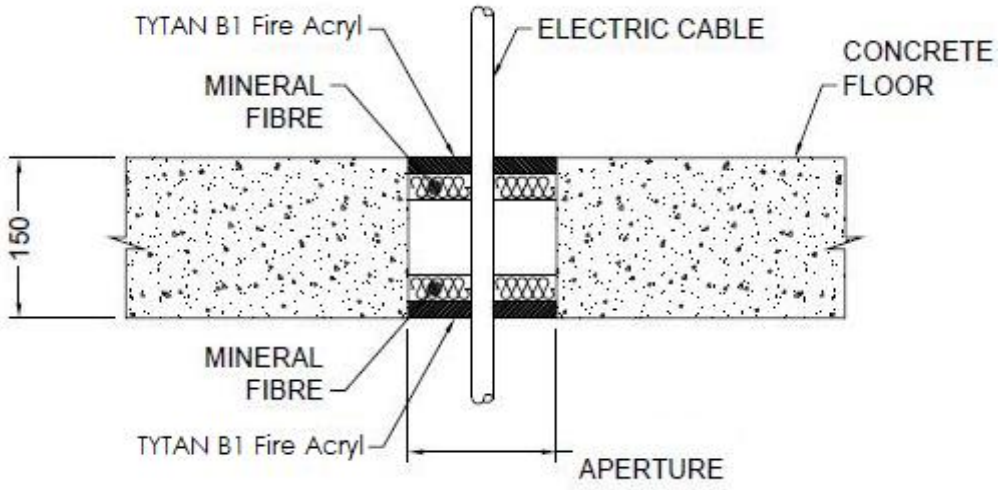

PP pipes U/C - EI 90 U/C
Pipe wall thickness - mm
Pipe Diameter - mm
75, 6.8
12, 1.2
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80


PE pipes U/C
Pipe wall thickness - mm
Pipe Diameter - mm
40, 2.4
20, 2
1.95
2
2.05
2.1
2.15
2.2
2.25
2.3
2.35
2.4
2.45
0
5
10
15
20
25
30
35
40
45

### A.5.5 Double side penetration seal with cables

**Penetration Seal:** Cables fitted circular apertures or min. 7 mm from the edges of rectilinear apertures, with TYTAN B1 Fire Acryl to both sides of the floor, backed with stone wool insulation minimum 35kg/m$^3$.

Construction details:



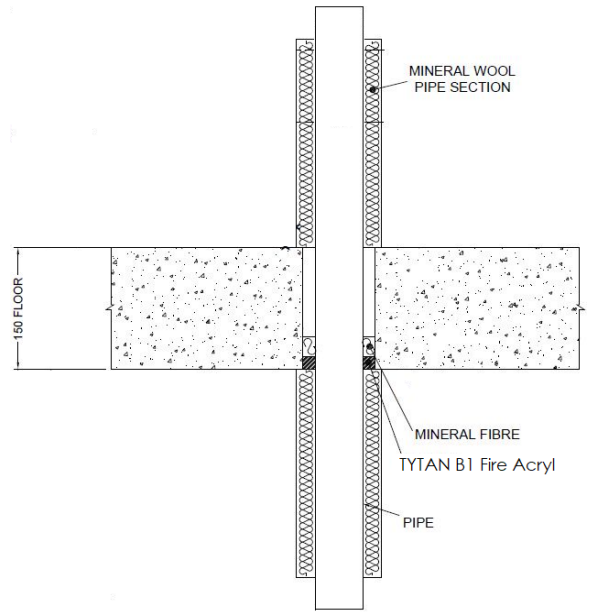

**A.5.5.1**

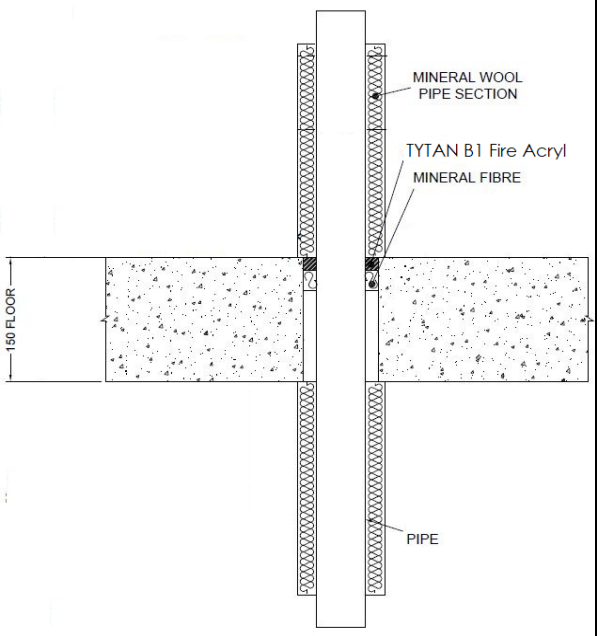
| Services | Sealant depth | Backing | Maximum Aperture | Classification |
|---|---|---|---|---|
| Blank seals | 15 mm | 25 mm Stone wool 35 kg/m$^3$ | 300 x 300 mm | **EI 240** |
| Electric cables up to 21 mm diameter, single or in a bundle. | | | | **EI 120** |
| Electric cables 22-50 mm diameter,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

### A.5.6 Single side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 or 25 mm deep TYTAN B1 Fire Acryl to either side of the floor (or at any position between), backed with minimum 40 kg/m$^3$ stone wool insulation or AES Fibre ≥ 128kg/m$^3$.

Construction details:




**A.5.6.1**

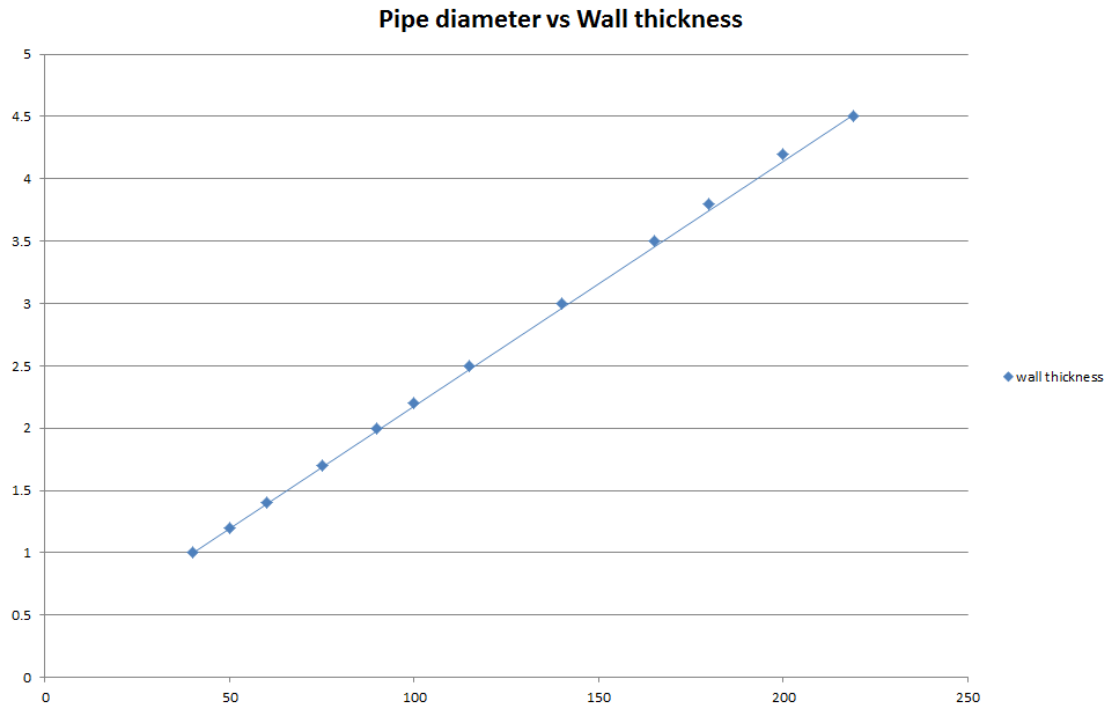
| Services | Max. seal size | Insulation (min) | Sealant depth | Classification |
|---|---|---|---|---|
| Copper or steel pipe up to 54 mm diameter/0.9-14.2 mm wall | 10 mm width around pipe | 20 mm Stone wool insulation 80 kg/m$^3$ | 15 mm | **E 240 C/U, EI 180 C/U** |
| Copper or steel pipe up to 12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

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

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

| Services<br>Mild or stainless steel pipe | Max. Seal Size | Insulation (minimum) | Sealant Depth | Classification |
|---|---|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 300 x 300 mm | 20 mm Stone wool insulation 80 kg/m$^3$ | 15 mm | **E 90 C/U, EI 60 C/U** |
| 40 mm diameter/1-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | | |
| 50 mm diameter/1.2-14.2 mm wall* | | | | |
| 60 mm diameter/1.4-14.2 mm wall* | | | | |
| 75 mm diameter/1.7-14.2 mm wall* | | | | |
| 90 mm diameter/2-14.2 mm wall* | | | | |
| 100 mm diameter/2.2-14.2 mm wall* | | | | |
| 115 mm diameter/2.5-14.2 mm wall* | | | | |
| 140 mm diameter/3-14.2 mm wall* | | | | |
| 165 mm diameter/3.5-14.2 mm wall* | | | | |
| 180 mm diameter/3.8-14.2 mm wall* | | | | |
| 200 mm diameter/4.2-14.2 mm wall* | | | | |
| 219 mm diameter/4.5-14.2 mm wall* | | | | |
| 40 mm diameter/1-14.2 mm wall* | | 20 mm Stone wool insulation 80 kg/m$^3$ | 25 mm | **E120, EI 90 C/U** |
| 50 mm diameter/1.2-14.2 mm wall* | | 30 mm Stone wool insulation 80 kg/m$^3$ | | |
| 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* | | | | |

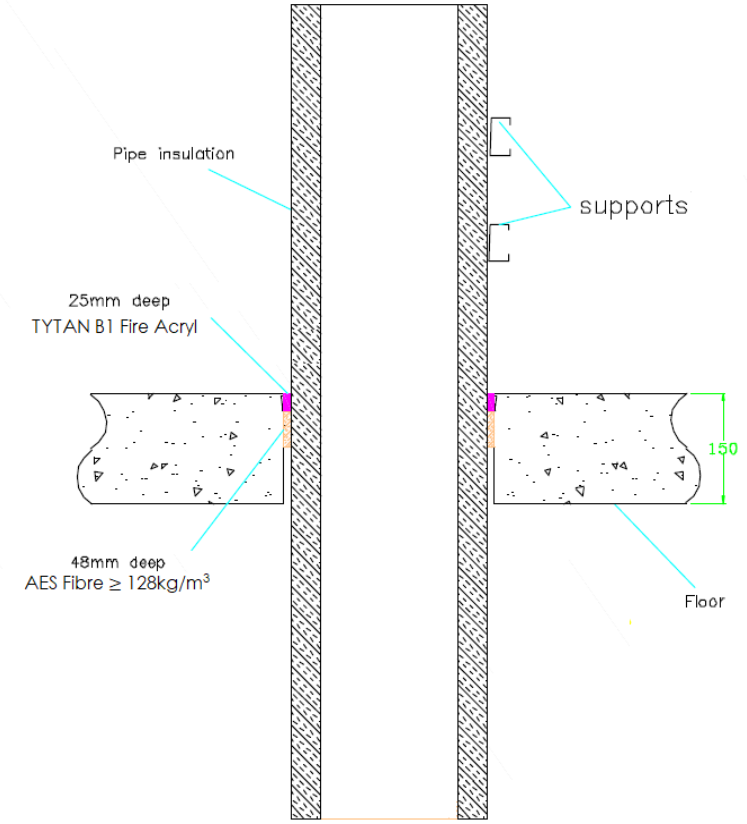
* Typical pipe diameters shown, see below graph for intermediate sizes

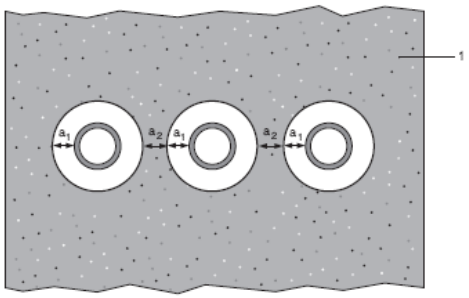
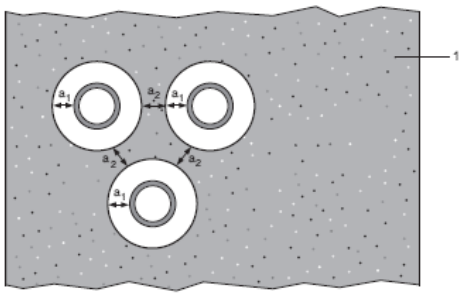

Pipe diameter vs Wall thickness
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
50
100
150
200
250
wall thickness

### A.5.7 Single side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm TYTAN B1 Fire Acryl to the top of the floor, backed with 48 mm deep AES Fibre ≥ 128kg/m³ insulation. Minimum annular space 10 mm (A1) and minimum separation between penetration seals 30 mm (A2). Maximum seal size 300 x 300 mm / 504 mm Ø

Construction details:




| Configuration 1 | Configuration 2 |
|---|---|
| *Option 1*  | *Option 2*  |

**Key**

1 Supporting construction

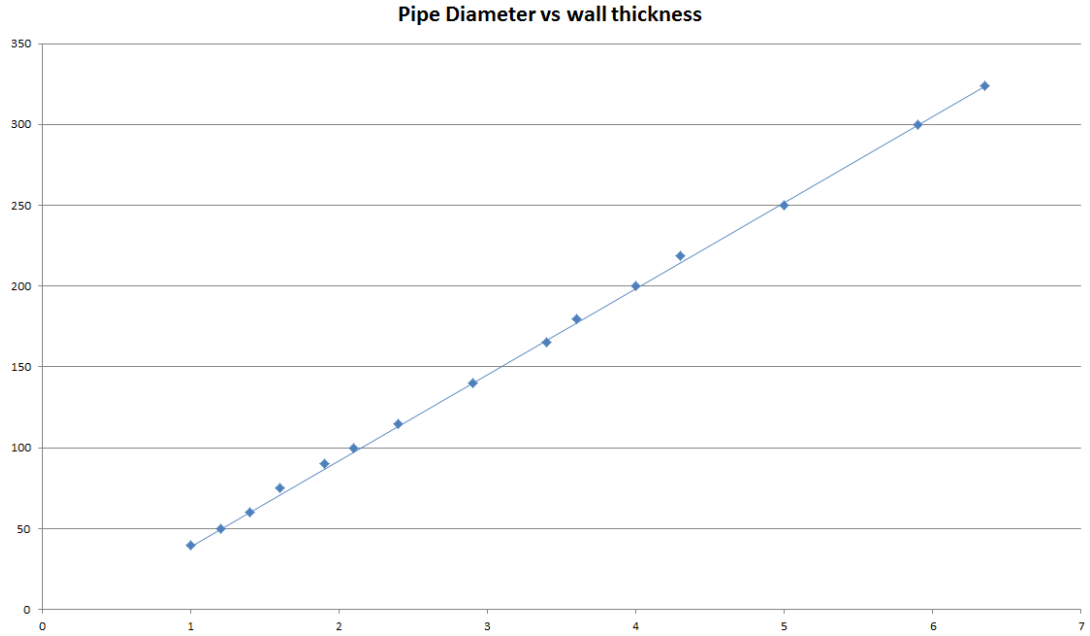
a1 Pipe / top edge of seal separation

a2 Pipe / side edge of seal separation

a3 Pipe / pipe separation

### A.5.7.1 Single side penetration seal with pipes

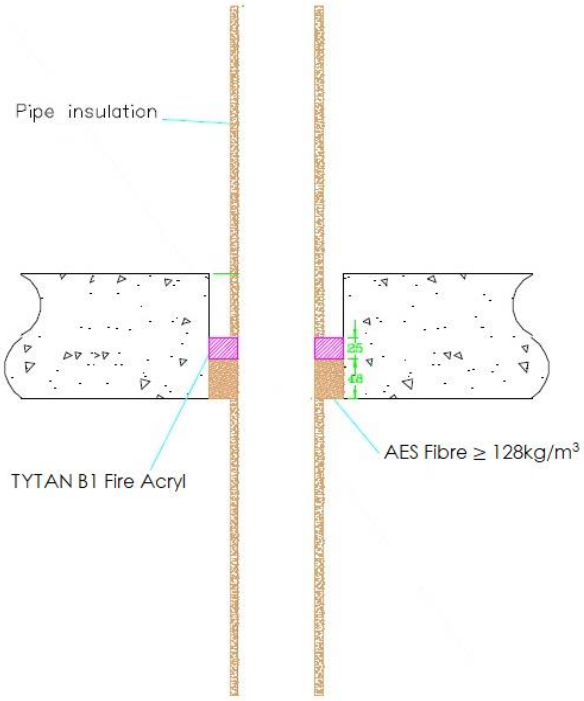
| Mild or stainless steel pipe | Insulation | Classification |
|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 20 mm thick stone, mineral wool min. 80 kg/m$^3$ | **EI 240 C/U** |
| 40 mm diameter/1-14.2 mm wall* | 30-80 mm thick stone, mineral wool min. 80 kg/m$^3$ | |
| 50 mm diameter/1.2-14.2 mm wall*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



### A.5.8 Single side penetration seal with composite pipes

**Penetration Seal:** CI (Continuous Interrupted) insulated composite pipes (single) fitted at any position within the aperture, with TYTAN B1 Fire Acryl, minimum 10 mm seal width around service and maximum 300 x 300 mm seal, backed with 'AES Fibre ≥ 128kg/m$^3$'.

Construction details:



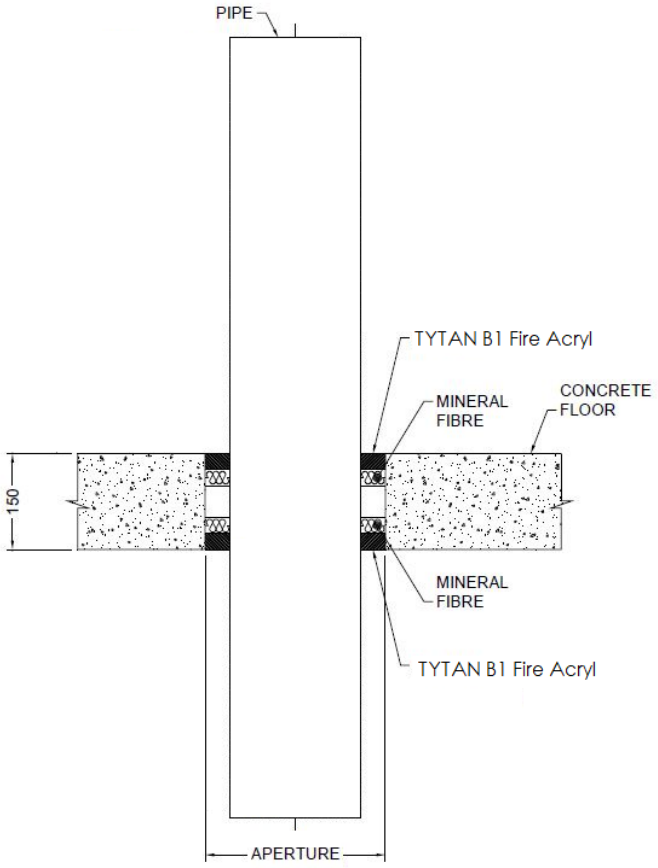

**A.5.8.1**

| Services<br>Alupex Composite Pipe | Sealant depth | Backing | Insulation (minimums) | Classification |
|---|---|---|---|---|
| 16 mm diameter/2.25 mm wall | 25 mm | 48 mm AES Fibre ≥ 128kg/m$^3$ | 20 mm stonewool 80 kg/m$^3$, 500 mm length from both sides of the seal | **EI 240 C/C** |
| 20 mm diameter/2.5 mm wall | | | | |
| 26 mm diameter/3 mm wall | | | | |
| 32 mm diameter/3 mm wall | | | | |
| 40 mm diameter/3.5 mm wall | | | | |
| 50 mm diameter/4 mm wall | | | | |
| 63 mm diameter/4.5 mm wall | | | | |
| 75 mm diameter/4.7 mm wall | | | | |

### A.5.9 Double side penetration seal with metallic pipes

**Penetration Seal:** Non-insulated metallic pipes (single) fitted at any position within the aperture, with 25 mm deep TYTAN B1 Fire Acryl to both sides of the floor, backed with stone wool or mineral fibre insulation.

Construction details:



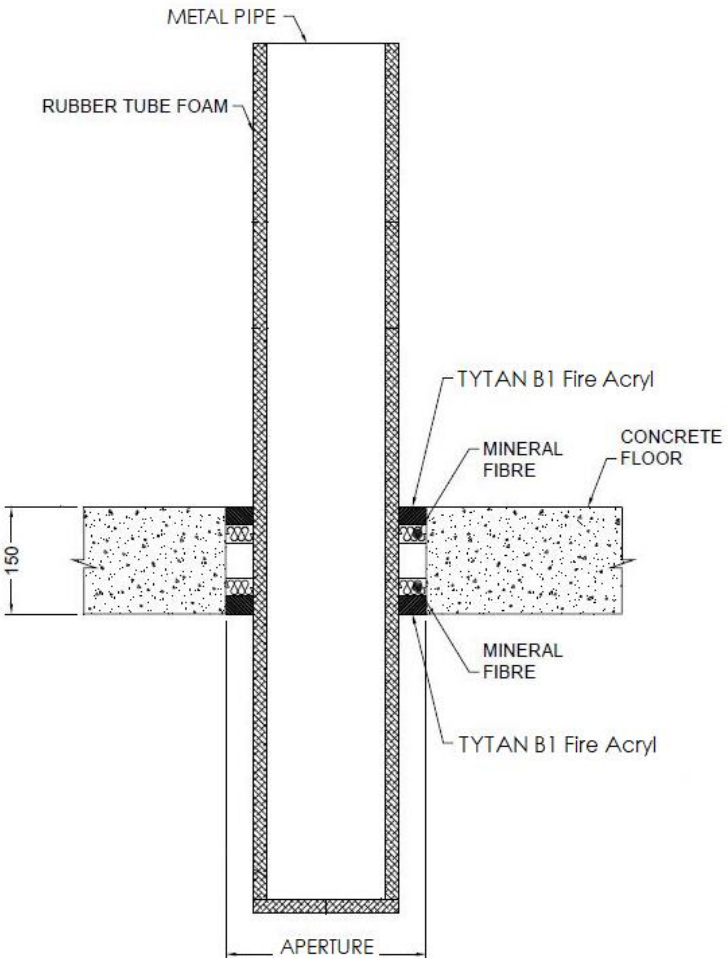

#### A.5.9.1

| Services | Max. Seal Size | Insulation | Backing (minimum) | Classification |
|---|---|---|---|---|
| Copper or steel pipe 54 mm diameter/2-14.2 mm wall | 300 x 300 mm | None | 25 mm deep 140 kg/m$^3$ stone wool | **E 120 C/U, EI 20 C/U** |
| Mild steel pipe 16 mm diameter/1.5-7.5 mm wall | | | | **EI 240 C/U** |
| Mild steel pipe 16 mm diameter/1.5-7.5 mm wall | Up to 100 x 1000 mm | | AES Fibre ≥ 128kg/m$^3$ 25 mm deep | **EI 120 C/U** |

### A.5.10 Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted at any position within the aperture, with TYTAN B1 Fire Acryl to both sides of the floor, maximum 300 x 300 mm seal width around service, backed with stone wool insulation or 'AES Fibre ≥ 128kg/m$^3$'.

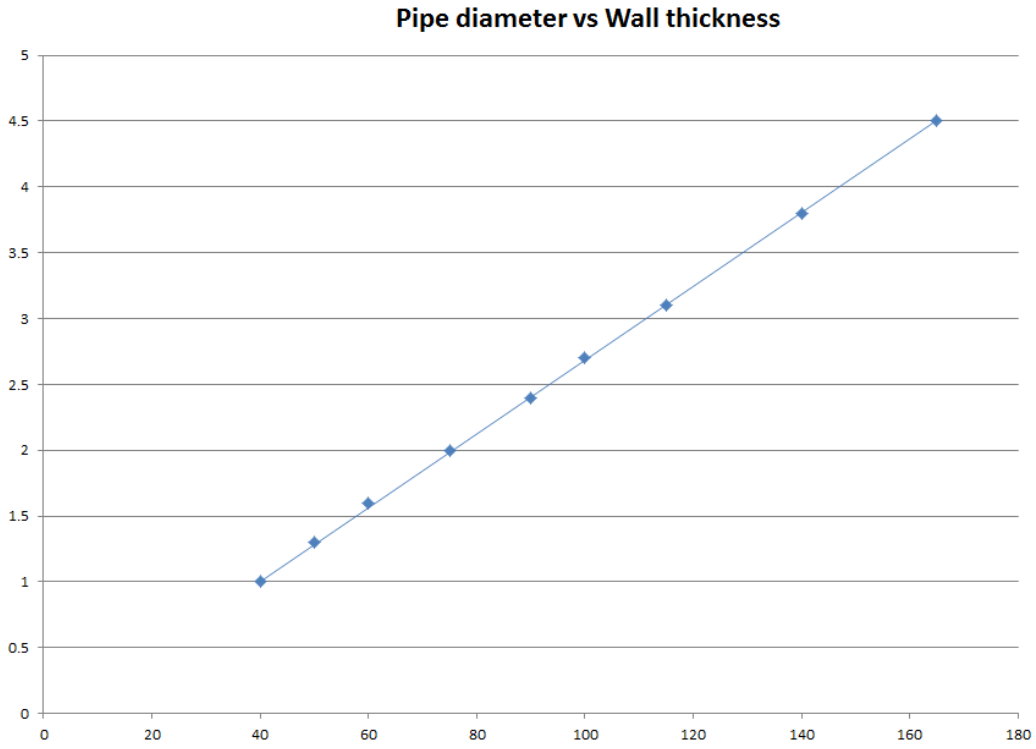
Construction details:



**A.5.10.1**

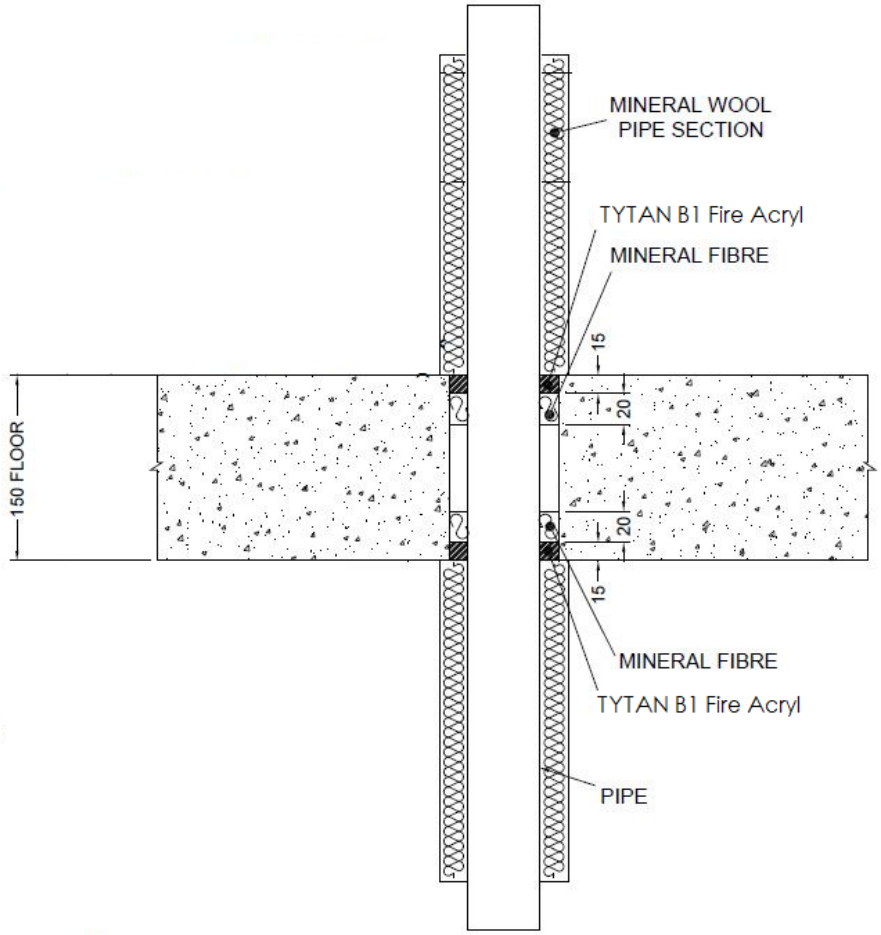
| Services<br>Mild or stainless steel pipe | Sealant depth | Backing (minimum) | Insulation | Classification |
|---|---|---|---|---|
| 40 mm diameter/1-14.2 mm wall | 25 mm | 20 mm Stone wool 40 kg/m$^3$ | 13 -19 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation | **EI 180** |
| 40 mm diameter/1-14.2 mm wall* | 25 mm | 25 mm AES Fibre ≥ 128kg/m$^3$ | | **EI 60** |
| 50 mm diameter/1.3-14.2 mm wall* | | | | |
| 60 mm diameter/1.6-14.2 mm wall* | | | | |
| 75 mm diameter/2-14.2 mm wall* | | | | |
| 90 mm diameter/2.4-14.2 mm wall* | | | | |
| 100 mm diameter/2.7-14.2 mm wall* | | | | |
| 115 mm diameter/3.1-14.2 mm wall* | | | | |
| 140 mm diameter/3.8-14.2 mm wall* | | | | |
| 165 mm diameter/ 4.5-14.2 mm wall* | | | | |

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

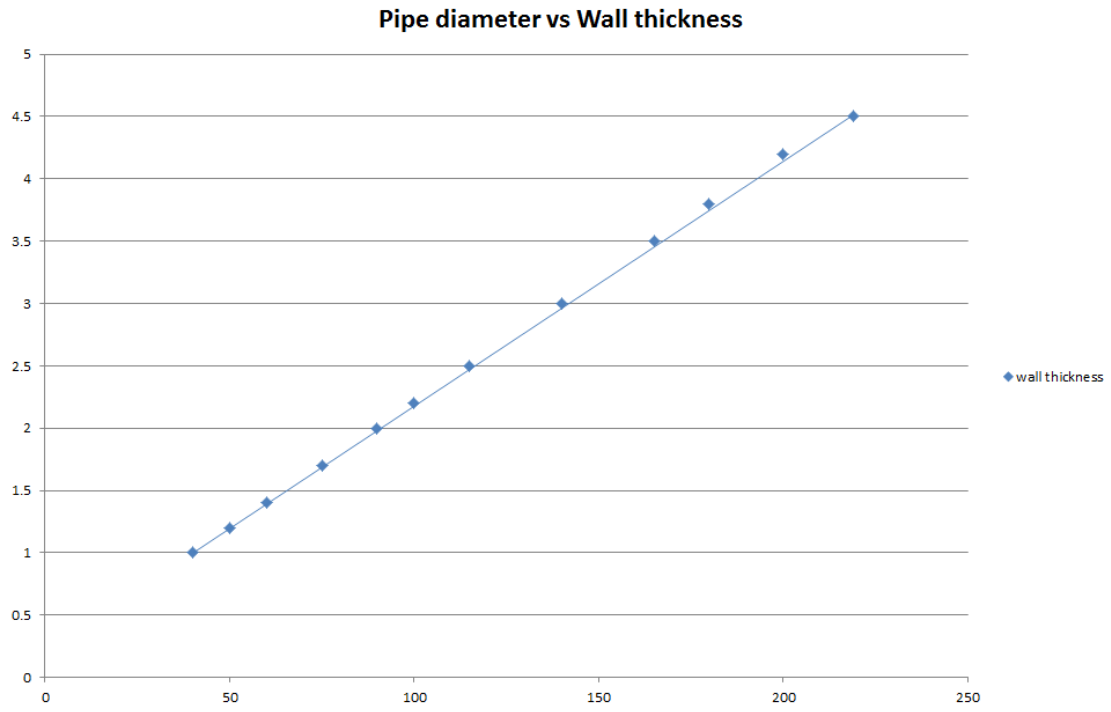


| Services | Sealant depth | Backing (minimum) | Insulation | Classification |
|---|---|---|---|---|
| Copper or steel pipe | | | | |
| 12 mm diameter/1 mm wall | 25 mm | 25 mm AES Fibre ≥ 128kg/m$^3$ | 9 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation | **E 240 C/C, EI 180 C/C** |
| 12-54 mm diameter/1-1.2 mm wall | | | 9-13 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation | **E 180, EI 120 C/C** |
| 12-54 mm diameter/1-1.2 mm wall | | | 13-25 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation | **E 90 C/C, EI 60 C/C** |
| Alupex Composite Pipe | | | | |
| 16 mm diameter/2.25 mm wall | 25 mm | 25 mm AES Fibre ≥ 128kg/m$^3$ | 9 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation | **EI 180 C/C** |
| 16 mm diameter/2.25 mm wall | | | 9-13 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation | **E 120 C/C, EI 60 C/C** |
| 20 mm diameter/2.5 mm wall | | | | |
| 26 mm diameter/3 mm wall | | | | |
| 32 mm diameter/3 mm wall | | | | |
| 40 mm diameter/3.5 mm wall | | | | |
| 50 mm diameter/4 mm wall | | | | |
| 63 mm diameter/4.5 mm wall | | | | |
| 75 mm diameter/4.7 mm wall | | | | |
| 16 mm diameter/2.25 mm wall | | | 13-25 mm Elastomeric insulation minimum class B-s3,d0 or phenolic foam insulation | **EI 60 C/C** |
| 20 mm diameter/2.5 mm wall | | | | |
| 26 mm diameter/3 mm wall | | | | |
| 32 mm diameter/3 mm wall | | | | |
| 40 mm diameter/3.5 mm wall | | | | |
| 50 mm diameter/4 mm wall | | | | |
| 63 mm diameter/4.5 mm wall | | | | |
| 75 mm diameter/4.7 mm wall | | | | |

### A.5.11 Double side penetration seal with metallic pipes

| |
|---|
| **Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted at any position within the aperture, with 15 mm deep TYTAN B1 Fire Acryl to both sides of the floor (or at any position between), backed with 20 mm deep minimum 40 kg/m$^3$ stone wool insulation*. |
| Construction details:<br>  <br> |

**A.5.11.1**

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

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