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Member of EOTA

## European Technical Approval ETA-13/0989

UL Project No. 13CA37557  
[Original version in English language]

Trade name

**Fire Resistant Acrylic Joint Sealant - ACR 240**

Manufacturing Plant

**A/003**

Holder of approval

**Würth International AG  
Aspermontstrasse 1  
CH- 7000 Chur**

Generic type and use  
of construction product

**Fire Stopping and Sealing Product:**

- **Penetration Seals**

Validity:           from  
                          to

**2013-06-26  
2018-06-20**

This Approval contains

*34 pages including 2 Annexes*



European Organisation for Technical Approvals

UL International (UK) Ltd.



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## **I. LEGAL BASES AND GENERAL CONDITIONS**

- 1** This European Technical Approval is issued by UL International (UK) Ltd in accordance with:
  - The Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup> modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>
  - UK implementation of CPD Statutory Instruments 1991, No 1620 Building and Buildings The Construction Products Regulations 1991- made 15 July 1991, laid before Parliament 22 July 1991, coming into force 27 December 1991, and amended by The Construction Products (Amendment) Regulations 1994 (Statutory Instruments 1994, No 3051)
  - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC<sup>4</sup>
  - Guideline for European Technical Approval of Fire Stopping and Fire Sealing Products: ETAG 026 Part 1: "General" and Part 2 : "Penetration Seals"
- 2** UL International (UK) Ltd is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for intended use remains with the holder of the European Technical Approval.
- 3** This European Technical Approval is not to be transferred to other manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.
- 4** This European Technical Approval may be withdrawn by UL International (UK) Ltd pursuant to Article 5.1 of the Council Directive 89/106/EEC.
- 5** Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of UL International (UK) Ltd. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6** The European technical approval is issued by the approval body in its official language of English. These versions should correspond fully to the version used by EOTA for circulation. Translations in other languages have to be designated as such.

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<sup>1</sup> Official Journal of the European Communities N° L40, 11.2.1989, p. 12

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.08.1993, p. 1

<sup>3</sup> Official Journal of the European Union N° L 284, 31.10.2003, p. 1

<sup>4</sup> Official Journal of the European Communities N° L17, 20.1.1994, p. 34



## II. SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of product and intended use

#### 1.1 Definition of the construction product

- 1) Fire Resistant Acrylic Joint Sealant - ACR 240 is a sealant used to form a penetration seal around metallic pipes 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 Fire Resistant Acrylic Joint Sealant - ACR 240 is supplied in liquid form contained within 310 ml cartridges. 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) Fire Resistant Acrylic Joint Sealant - ACR 240 contains no carcinogenic substances or mutagenic substances, flame retardants or antimicrobiological agents.
- 4) Installation of the system Fire Resistant Acrylic Joint Sealant - ACR 240 – See 4.2

#### 1.2 Intended use and use category

##### 1.2.1 Intended Use – Penetration Seal

The intended use of system Fire Resistant Acrylic Joint Sealant - ACR 240 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 and electrical cables.

- 1) The specific elements of construction that the system Fire Resistant Acrylic Joint Sealant - ACR 240 may be used to provide a penetration seal in, are as follows:

Flexible walls:	The wall must have a minimum thickness of 10 mm and comprise steel studs lined on both faces with minimum 2 layers of 12.5 mm thick boards.
Rigid walls:	The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m <sup>3</sup> .
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 <sup>3</sup> .

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

- 2) The system Fire Resistant Acrylic Joint Sealant - ACR 240 may be used to provide a penetration seal with specific single insulated metal pipes, uninsulated metal pipes and with specific electrical cables, single or in a bundle (for details see Annex B).
- 3) Apertures in the separating element shall be maximum 2400 mm x 1200 mm. The annular space/gap around the services shall be infilled with mineral fibre insulation backing material and



Fire Resistant Acrylic Joint Sealant - ACR 240 sealant. Blank seals up to 170 mm diameter are permitted. For full details, see Annex B.

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

The provisions made in this European Technical Approval are based on an assumed working life of the Fire Resistant Acrylic Joint Sealant - ACR 240 of 10 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.

- 1.2.2** Type Z<sub>2</sub>: Intended for uses in internal conditions with humidity lower than 85 % RH excluding temperatures below 0°C, without exposure to rain or UV.



## 2 Characteristics of product(s) and methods of verification

The identification tests and the assessment of the fitness for use according to the Essential Requirements were carried out in compliance with the “ETA Guidance no. 026-Part 2” concerning Penetration Seals – Progress File August 2011.

ETAG 026-2 Clause No.	ETA Clause No.	Characteristic	Assessment of characteristic
Mechanical resistance and stability			
		None	Not relevant
Safety in case of fire			
2.4.1	2.1	Reaction to fire	Class F according to EN 13501-1
2.4.2	2.2	Resistance to fire	Annex B
Hygiene, health and environment			
2.4.3	2.3	Air permeability (material property)	No performance determined
2.4.4	2.4	Water permeability (material property)	No performance determined
2.4.5	2.5	Release of dangerous substances	Declaration of manufacturer
Safety in use			
2.4.6	2.6	Mechanical resistance and stability	No performance determined
2.4.7	2.7	Resistance to impact/movement	No performance determined
2.4.8	2.8	Adhesion	No performance determined
Protection against noise			
2.4.9	2.9	Airborne sound insulation	No performance determined
Energy economy and heat retention			
2.4.10	2.10	Thermal properties	No performance determined
2.4.11	2.11	Water vapour permeability	No performance determined
General aspects relating to fitness for use			
2.4.12	2.12	Durability and serviceability	Z <sub>2</sub>



## **2.1 Reaction to fire**

System Fire Resistant Acrylic Joint Sealant - ACR 240 has not been subjected to reaction to fire testing and therefore is classified 'F' in accordance with EN 13501-1.

## **2.2 Resistance to fire**

### **2.2.1 Penetration Seals**

System Fire Resistant Acrylic Joint Sealant - ACR 240 has been tested in accordance with EN 1366-3: 2009 and based upon the test results and the field of direct application specified within EN 1366-3: 2009, the system Fire Resistant Acrylic Joint Sealant - ACR 240 has been classified in accordance with EN 13501-2, as given in Annex B.

The seals may only be penetrated by the services described in Annex B; other parts or support constructions must not penetrate the seal.

The service support construction must be fixed to the building element containing the penetration seal or a suitable adjacent building element, on both sides of the penetration in such a manner that in the case of fire, no additional load is imposed on the seal. Furthermore it is assumed that this support is maintained on the unexposed side, for the required period of fire resistance.

Pipes and cables must be perpendicular to the seal surface.

It is assumed that compressed air systems are switched off by other means in the case of fire.

The function of the pipe seal in case of pneumatic dispatch systems, pressurised air systems etc. is guaranteed only when the systems are shut off in case of fire.

The assessment does not cover the avoidance of destruction of the seal or of the abutting building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

NOTE For example, for non-insulated metal pipes the elongation to be considered can be calculated using the relevant temperature from the standard time temperature curve at the fire resistance period required.

The approval does not address any risks associated with leakage of dangerous liquids or gases caused by failure of the pipe(s) in case of fire.

The durability assessment does not take account of the possible effect of substances permeating through the pipe on the penetration seal.

The classifications for pipes relate to C/U (capped inside/uncapped outside the furnace) or C/C (capped inside/capped outside the furnace) as indicated in Annex B. For further information refer to national regulations.

## **2.3 Air permeability**

No performance determined



#### **2.4 Water permeability**

No performance determined

#### **2.5 Dangerous substances**

The approval holder has submitted a written declaration that Fire Resistant Acrylic Joint Sealant - ACR 240 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 approval, 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 Directive, these requirements need also to be complied with, when and where they apply.

#### **2.6 Mechanical resistance and stability**

No performance determined

#### **2.7 Resistance to impact/movement**

No performance determined

#### **2.8 Adhesion**

No performance determined

#### **2.9 Airborne sound insulation**

No performance determined

#### **2.10 Thermal properties**

No performance determined

#### **2.11 Water vapour permeability**

No performance determined





## **2.12 Durability and serviceability**

Fire Resistant Acrylic Joint Sealant - ACR 240 has been tested in accordance with EOTA TR024 with the Type Z<sub>2</sub> conditions as specified in ETAG 026-2, and the results of the tests have demonstrated suitability for penetration seals in internal conditions with humidity lower than 85 % RH excluding temperatures below 0°C, without exposure to rain or UV.

## **3 Evaluation of Conformity and CE marking**

### **3.1 Attestation of Conformity system**

System 1 of attestation of conformity (CDP Annex III) applies, as laid down by the European Commission. This system of attestation of conformity is defined as follows:

- (1) factory production control;
  - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;
- (b) Tasks for the notified body
- (1) initial type-testing of the product;
  - (2) initial inspection of factory and of factory production control;
  - (3) continuous surveillance, assessment and approval of factory production control.

### **3.2 Responsibilities**

#### **3.2.1 Tasks of the manufacturer:**

##### **3.2.1.1 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 approval.

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

The factory production control shall be in accordance with the Control Plan of 8<sup>th</sup> April 2013 relating to the European technical approval ETA 13/0989 issued on 26/06/2013 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.



## 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

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of penetration seals in order to undertake the actions laid down in section 3.3. For this purpose, the "control plan" referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body or bodies involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European technical approval ETA 13/0989 issued on 26/06/2013.

Tasks of the Notified Bodies:

### 3.2.2 Tasks of approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control, in accordance with the provisions laid down in the "Control Plan of 8<sup>th</sup> April 2013 relating to the European technical approval ETA 13/0989 issued on 26/06/2013.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report. The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval. In cases where the provisions of the European technical approval and its "Control Plan" are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform the UL International (UK) Ltd without delay.



### **3.3 CE marking**

The CE marking shall consist of the letters 'CE' in the form laid down in Council Directive 93/68/EEC, followed by the identification number of the notified certification body.

The CE marking shall be affixed on a visible part of the product, a label attached to the product, the packaging or on accompanying commercial documents. The CE marking shall be accompanied by the following information:

- the name and address of the producer or the authorised representative established in the EEA,
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European Technical Approval,
- number of the ETAG used
- intended use, use category as relevant

## **4 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed.**

### **4.1 Manufacturing**

The European technical approval is issued for Fire Resistant Acrylic Joint Sealant - ACR 240 on the basis of agreed data/information, deposited with UL International (UK) Ltd, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to UL International (UK) Ltd before the changes are introduced. UL International (UK) Ltd will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

### **4.2 Installation**

Installation of system Fire Resistant Acrylic Joint Sealant - ACR 240 shall be conducted as follows:

1. Before installing Fire Resistant Acrylic Joint Sealant - ACR 240 ensure that the surface of all service penetrations and surrounding construction is free from all loose contaminants, dust and grease.
2. Make sure that the gap to be sealed is wide enough to accommodate the correct backing material where this is a requirement. In practice, this should not be less than 10mm.
3. When installing any backing material, cut this slightly oversize and insert into the gap ensuring a tight friction fit. Make sure the correct depth is achieved.
4. Fill the gap or joint with Fire Resistant Acrylic Joint Sealant - ACR 240 to the required depth. For type of sealing and necessary depth of the joint, see the tables on the left and the drawings in Annex B.



5. Apply the sealant generously to prevent air bubbles. Finish the bead with a moist spatula, pallet knife or brush.
6. Where Fire Resistant Acrylic Joint Sealant - ACR 240 is to be installed against surfaces that cannot tolerate direct contact, appropriate surface preparation should be taken (contact Würth International AG for guidance in these cases). For paints sensitive to sealing compounds, priming with a PVA primer is recommended.
7. Fire Resistant Acrylic Joint Sealant - ACR 240 can be overpainted with most emulsion or alkyd (gloss) paints.
8. As Fire Resistant Acrylic Joint Sealant - ACR 240 is water based, in cases where corrosion protection is a problem, some metals may require a barrier between the sealant and the surface.
9. When installing the sealant in gypsum boards, the exposed edges of the board can be wetted with water, or Fire Resistant Acrylic Joint Sealant - ACR 240 diluted with water to prevent excessive joint shrinkage.
10. When installing Fire Resistant Acrylic Joint Sealant - ACR 240 in hollow floor slabs or planks, fire sealing should be carried out from the soffit of the floor assuming there is sufficient thickness of concrete below the void. Where this is not the case, the tubular voids should be filled with stone wool normally the same thickness as the depth of the floor slab. Alternatively, simply fire seal on both sides.

## **5 Indications to the manufacturer**

### **5.1 Packaging, transport and storage**

The following measures should be adopted with regard to handling and storage of the Fire Resistant Acrylic Joint Sealant - ACR 240:

- Handling
  - Information for safe handling: No special measures required.
  - Information about protection against explosions and fires: No special measures required.
- Storage
  - Don't store the product under 5°C and not over +35 °C



## 5.2 Recommendations on use, maintenance and repair

The system Fire Resistant Acrylic Joint Sealant - ACR 240 should be installed and used as described earlier in this document.

System Fire Resistant Acrylic Joint Sealant - ACR 240 seals which are damaged after installation, should be removed and replaced with undamaged seals.

In the area covered by the ETA when the set up recommendation have been followed there is no maintenance protocol to be followed. The product does not need any maintenance in the life time indicated in the ETA.

## 6 Signatories

Report by:

A handwritten signature in blue ink, appearing to be 'C. Johnson'.

C. Johnson

Staff Engineer  
Product Safety

Reviewed by:

A handwritten signature in blue ink, appearing to be 'C. W. Miles'.

C. W. Miles

Business Manager – Europe & Latin America  
Built Environment Sector

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



European technical approval ETA-13/0989, with validity from  
26/06/2013 to 20/06/2018

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## **ANNEX A – Reference Documents**

### **A.1 References to standards mentioned in the ETA:**

EN 13501-1 Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests

EN 13501-2 Fire classification of construction products and building elements – Part 2: Classification using test data from fire resistance tests

### **A.2 Other reference documents:**

EOTA TR 024 Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products

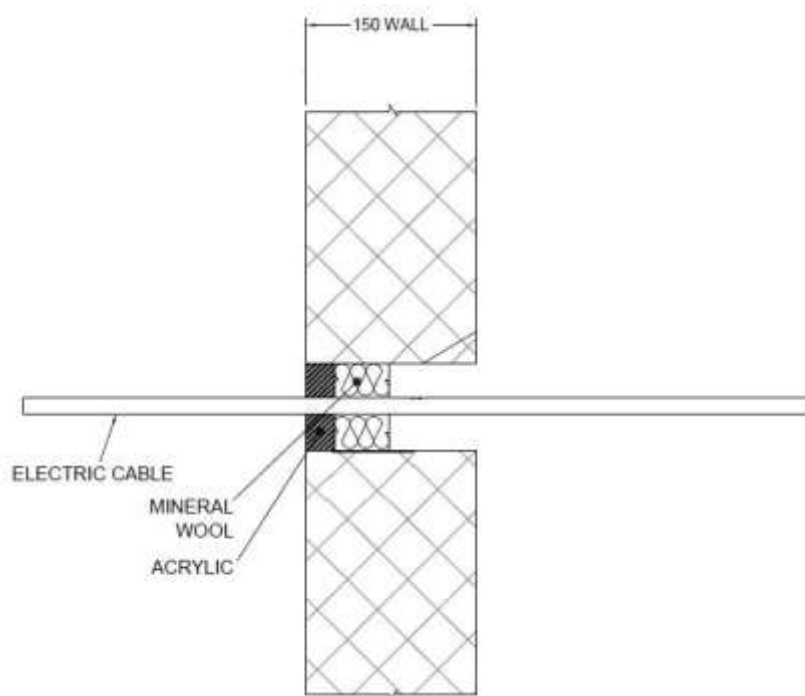
**ANNEX B – Resistance to Fire Classification – Fire Resistant Acrylic Joint Sealant - ACR 240**

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

**B.1.1 Single side penetration seal with cables**

**Penetration Seal:** Cables (single) fitted at centrally within the aperture, with Fire Resistant Acrylic Joint Sealant - ACR 240 to either side of the wall (or at any position in between), backed with stone wool insulation 35kg/m<sup>3</sup> or 'AES Fibre ≥ 128kg/m<sup>3</sup>'.

Construction details:



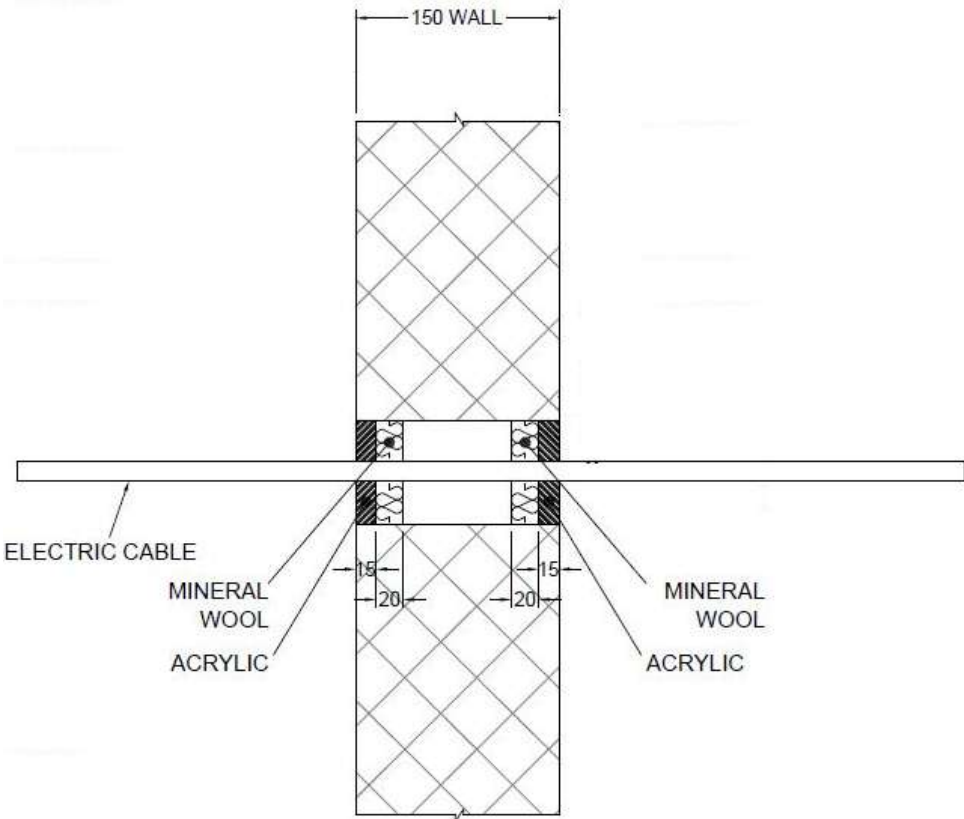
**B.1.1.1**

Services	Sealant depth	Backing	Aperture Ø	Classification
Single electrical cables up to 21 mm Ø	25 mm	48 mm deep AES Fibre ≥ 128kg/m <sup>3</sup>	36-82 mm	<b>E 240, EI 90</b>

### B.1.2 Single side penetration seal with cables

**Penetration Seal:** Cables (single) fitted at centrally within the aperture, with Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the wall, backed with stone wool insulation 40kg/m<sup>3</sup>.

Construction details:



The diagram illustrates the construction details of a single side penetration seal with cables. It shows a cross-section of a wall with a width of 150 mm. Two electric cables are shown passing through the wall. The cables are surrounded by a 15 mm deep layer of acrylic sealant. Behind the acrylic sealant is a 20 mm deep layer of mineral wool insulation. The wall is shown with a cross-hatched pattern. Labels include: 150 WALL, ELECTRIC CABLE, MINERAL WOOL, and ACRYLIC.

#### B.1.2.1

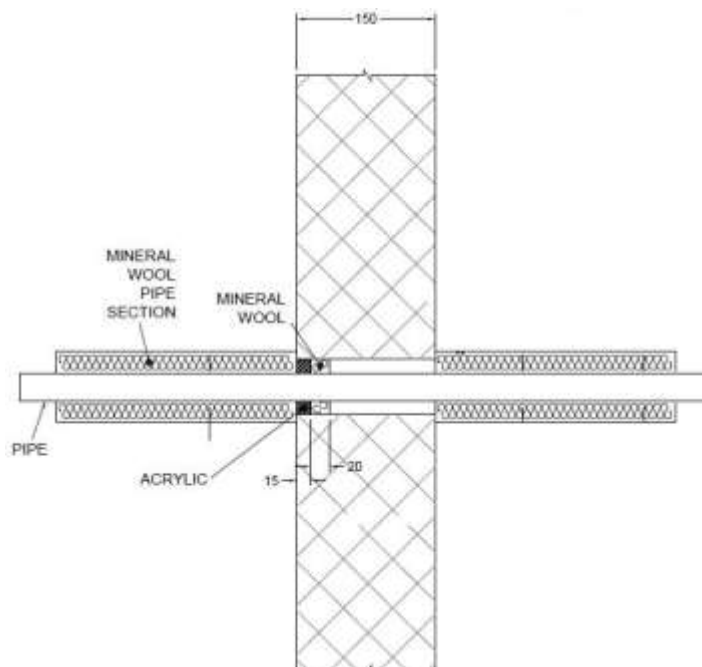
Services	Sealant depth	Backing	Aperture $\varnothing$	Classification
Single electrical cables up to 21 mm $\varnothing$	15 mm	Stone wool 20 mm deep, 40 kg/m <sup>3</sup>	36-82 mm	<b>E 240, EI 90</b>



### B.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 central within the aperture, with 15 mm deep Fire Resistant Acrylic Joint Sealant - ACR 240 to either side of the wall (or at any position between), backed with 20 mm deep 40 kg/m<sup>3</sup> stone wool insulation\*.

Construction details:



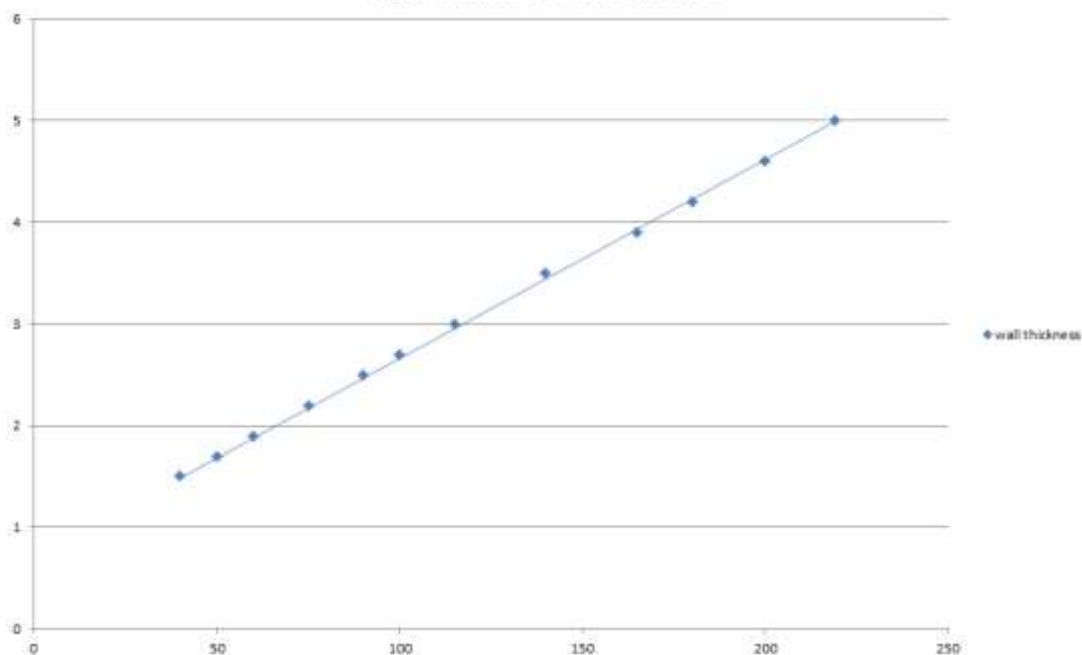
#### B.1.3.1

Services	Seal width around pipe	Insulation	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 <sup>3</sup>	<b>E 240 C/U, EI 180 C/U</b>
Copper pipe up to 12 mm diameter/0.9-5 mm wall	8 mm		<b>EI 240 C/U</b>
Alupex composite pipe 75 mm diameter/7.5 mm wall	30 mm	25 mm AES Fibre ≥ 128kg/m <sup>3</sup> insulation, 600 mm long (min.)	<b>EI 120 C/U</b>

Services	Seal width around pipe	Insulation	Classification
Mild or stainless steel pipe			
40 mm diameter/1.5-14.2 mm wall*	6-18 mm	1000 mm length of 20 mm Stone wool insulation 80 kg/m <sup>3</sup>	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 <sup>3</sup>	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

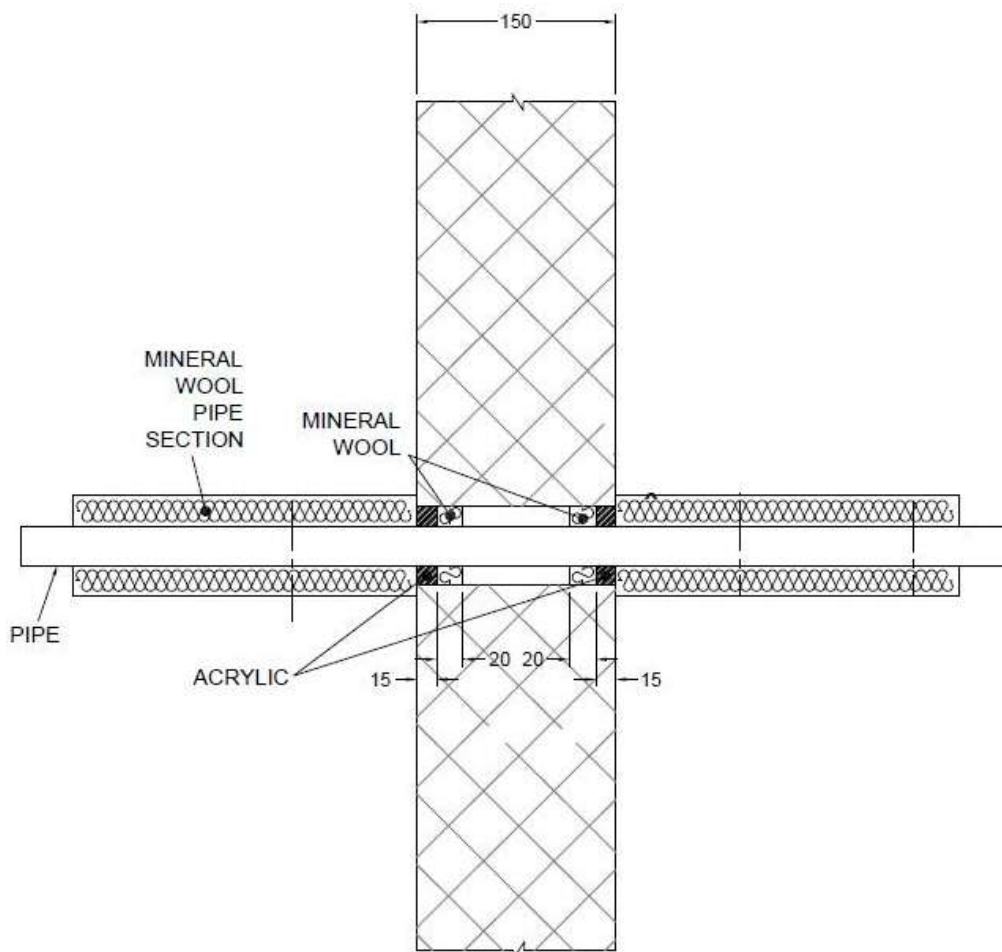
Pipe diameter vs Wall thickness



### B.1.4 Double side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted central within the aperture, with 15 mm deep Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the), backed with 20 mm deep 40 kg/m<sup>3</sup> stone wool insulation.

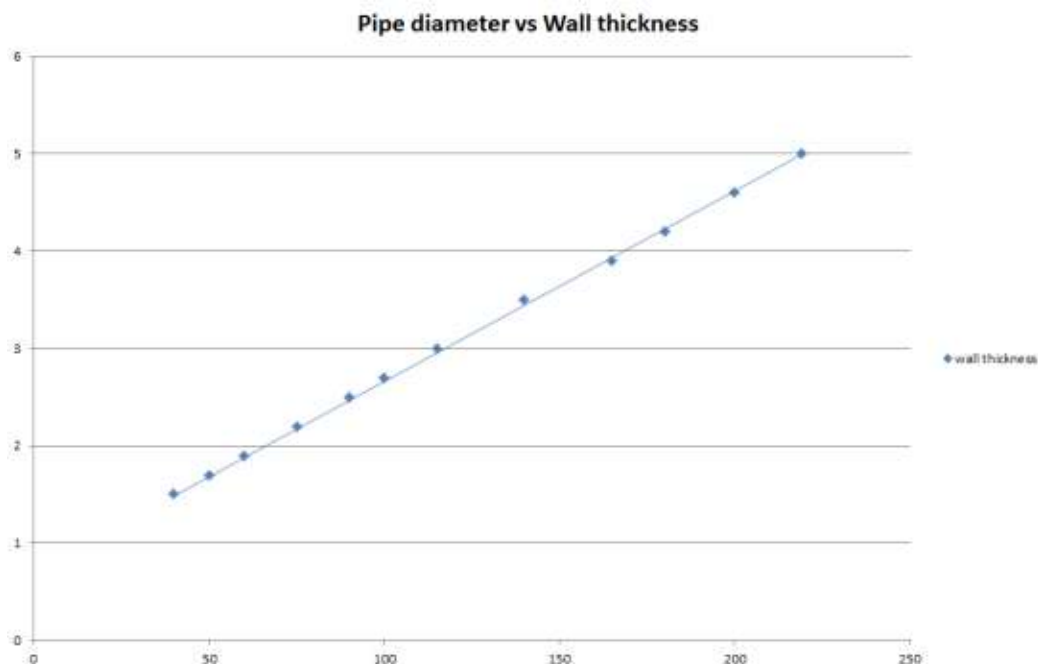
Construction details:



### B.1.4.1

Services	Seal width around pipe	Insulation	Classification
Mild or stainless steel pipe			
40 mm diameter/1.5-14.2 mm wall*	6-18 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1.5-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240, EI 120 C/U
50 mm diameter/1.7-14.2 mm wall*			
60 mm diameter/1.9-14.2 mm wall*			
75 mm diameter/2.2-14.2 mm wall*			
90 mm diameter/2.5-14.2 mm wall*			
100 mm diameter/2.7-14.2 mm wall*			
115 mm diameter/3-14.2 mm wall*			
140 mm diameter/3.5-14.2 mm wall*			
165 mm diameter/ 3.9-14.2 mm wall*			
180 mm diameter/ 4.2-14.2 mm wall*			
200 mm diameter/ 4.6-14.2 mm wall*			
219 mm diameter/ 5.0-14.2 mm wall*			

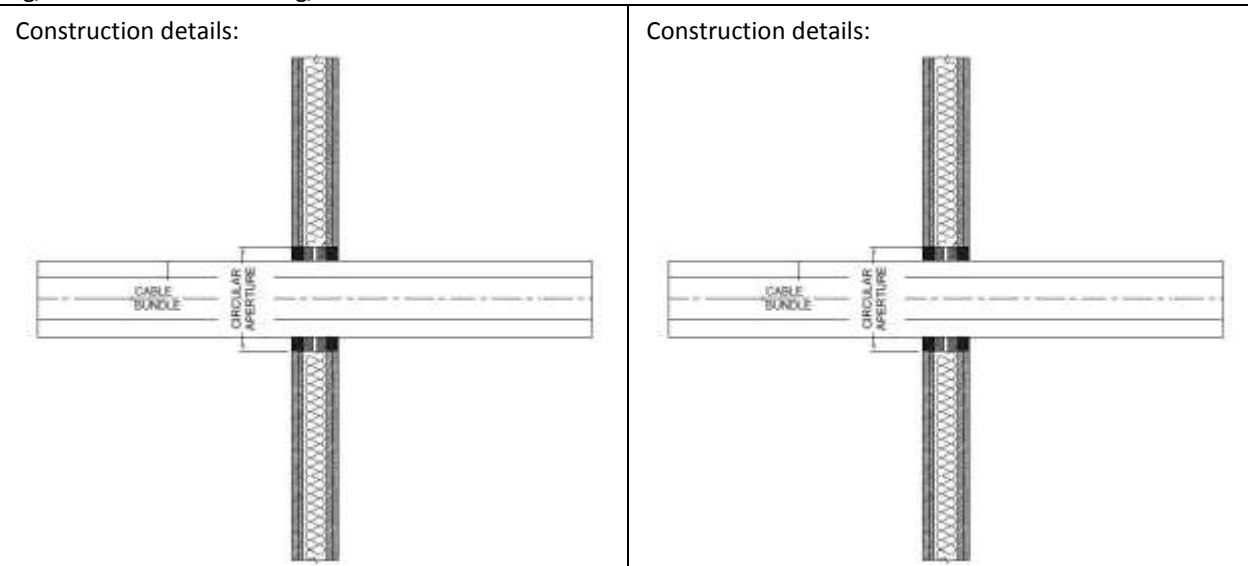
\* Typical pipe diameters shown, see below graph for intermediate sizes



## B.2 Flexible wall constructions according to 1.2.1 with wall thickness of minimum 100 mm

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

**Penetration Seal:** Cables (single or bundles up to 100 mm  $\varnothing$ ) fitted at any position within the aperture, with Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the wall, backed with stone wool insulation 40kg/m<sup>3</sup>, 140 kg/m<sup>3</sup> or 'AES Fibre  $\geq$  128kg/m<sup>3</sup>'.



#### B.2.1.1

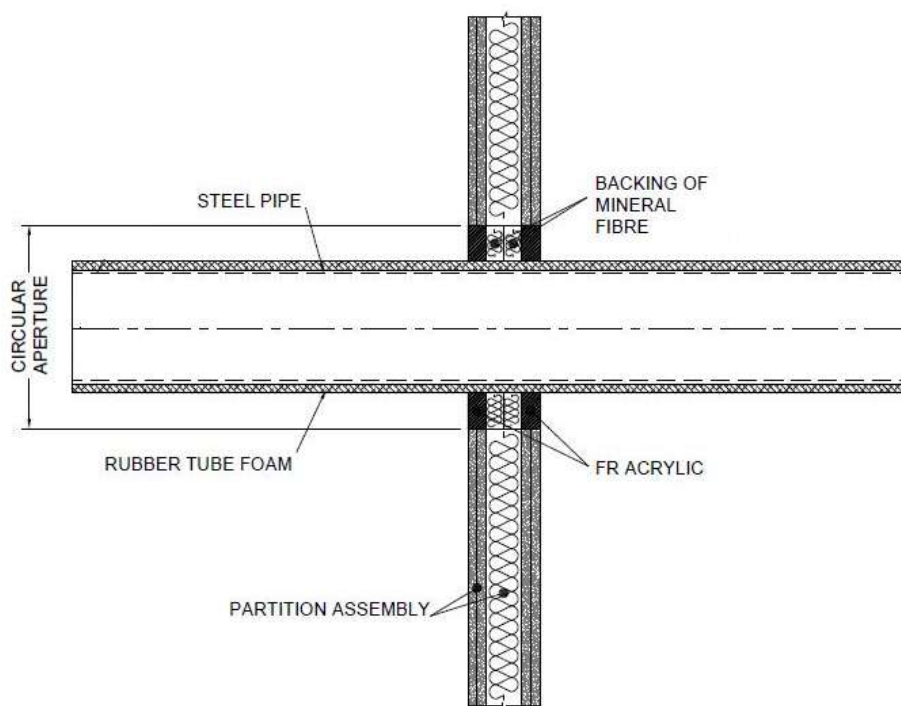
Services	Sealant depth	Backing	Maximum aperture $\varnothing$	Classification
None (blank)	12.5 mm	Stone wool 20 mm deep 140 kg/m <sup>3</sup>	170 mm*	EI 120
Electrical cables up to 21 mm $\varnothing$	25 mm	Stone wool 20 mm deep 40 kg/m <sup>3</sup>		EI 120
Electrical cables up to 80 mm $\varnothing$		AES Fibre $\geq$ 128kg/m <sup>3</sup>		E 120, EI 60
Telecommunication cables up to 21 mm $\varnothing$		Stone wool 20 mm deep 40 kg/m <sup>3</sup>		EI120
Single 'E cable' - 1 x 185 mm <sup>2</sup> core HD603.3 electrical cable with PVC insulation, PVC sheath and 23-27 mm diameter	12.5 mm	Stone wool 20 mm deep/140 kg/m <sup>3</sup>		E 120, EI 60

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

### B.2.2 Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted central within the aperture, with Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the wall, 10-30 mm seal width around service, backed with stone wool insulation or 'AES Fibre  $\geq 128\text{kg/m}^3$ '.

Construction details:



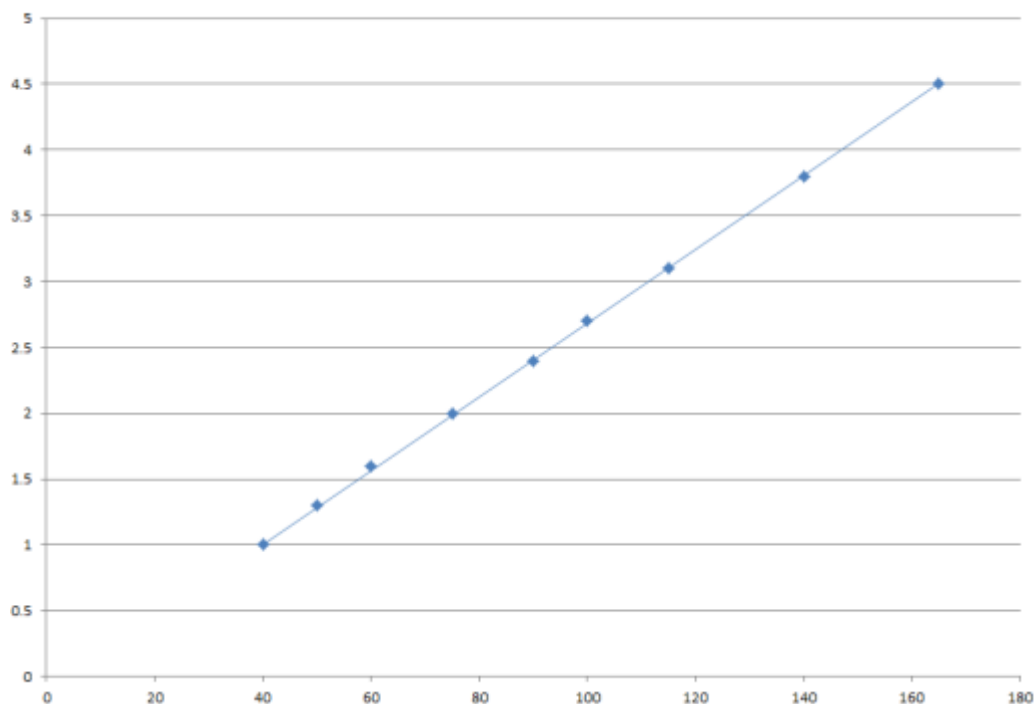


**B.2.2.1**

Services	Sealant depth	Backing	Insulation	Classification
Mild or stainless steel pipe				
40 mm diameter/1-14.2 mm wall	12.5 mm	20 mm Stone wool 40 kg/m <sup>3</sup>	13 -19 mm Kaiflex ST insulation	EI 120
40 mm diameter/1-14.2 mm wall*	25 mm	25 mm AES Fibre ≥ 128kg/m <sup>3</sup>		E 120, 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

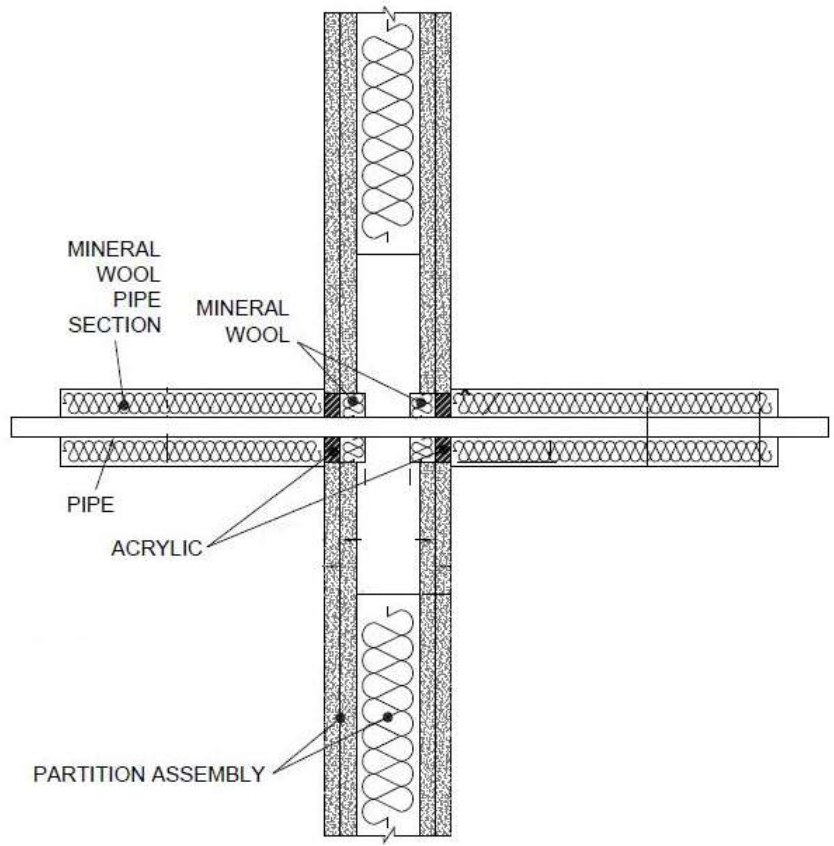
**Pipe diameter vs Wall thickness**



### B.2.3 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 central within the aperture, with Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the wall, min. 10 mm seal width around service, backed with stone wool insulation or 'AES Fibre  $\geq 128\text{kg/m}^3$ '.

Construction details:



#### B.2.3.1

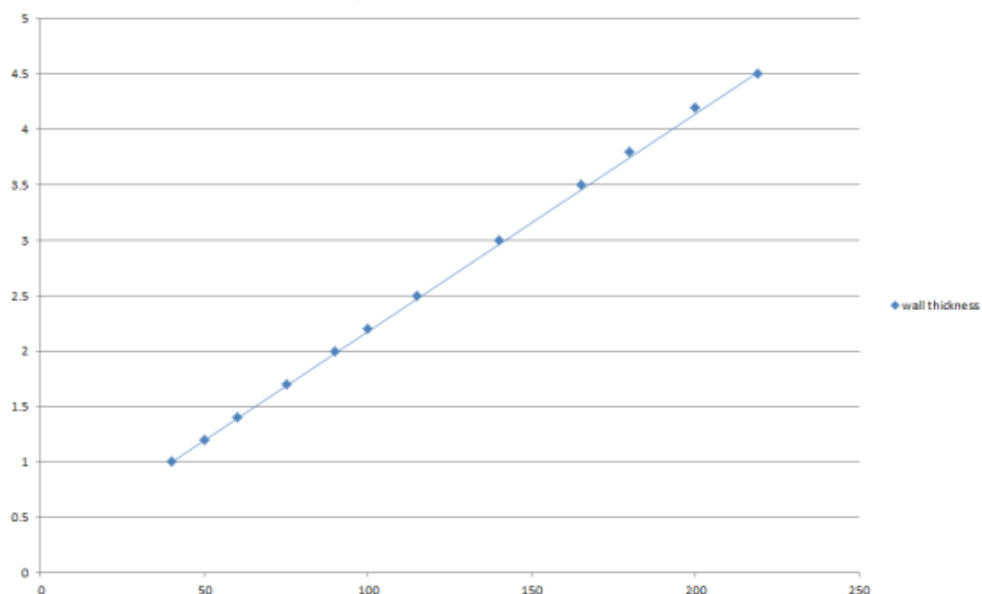
Services	Sealant depth	Backing	Insulation	Classification
<b>Maximum aperture size 170 mm <math>\varnothing</math></b>				
Copper pipe up to 54 mm diameter/1-14.2 mm wall	12.5 mm	20 mm Stone wool 40 $\text{kg/m}^3$	500 mm length of 20 mm stone wool, 80 $\text{kg/m}^3$	<b>EI 120 C/U</b>
Alupex composite pipe 75 mm diameter/7.5 mm wall		20 mm Stone wool 140 $\text{kg/m}^3$	600 mm length of 25 mm AES Fibre $\geq 128\text{kg/m}^3$	<b>EI 60 C/U</b>



Services	Sealant depth	Backing	Insulation	Classification
Mild or stainless steel pipe				
<b>Maximum aperture size 170 mm Ø</b>				
40 mm diameter/1-14.2 mm wall	12.5 mm	20mm Stone wool 40 kg/m <sup>3</sup>	500 mm length of 20 mm stone wool 80 kg/m <sup>3</sup>	<b>EI 120 C/U</b>
40 mm diameter/1-14.2 mm wall*			500 mm length of 30 mm stone wool 80 kg/m <sup>3</sup>	
50 mm diameter/1.2-14.2 mm wall*				
60 mm diameter/1.4-14.2 mm wall*				
75 mm diameter/1.7-14.2 mm wall*				
90 mm diameter/2-14.2 mm wall*				
100 mm diameter/2.2-14.2 mm wall*				
115 mm diameter/2.5-14.2 mm wall*				
140 mm diameter/3-14.2 mm wall*				
<b>Aperture size = pipe diameter + 20 mm</b>				
165 mm diameter/3.5-14.2 mm wall*	12.5 mm	20mm Stone wool 40 kg/m <sup>3</sup>	500 mm length of 30 mm stone wool 80 kg/m <sup>3</sup>	<b>E 120, EI 90 C/U</b>
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**

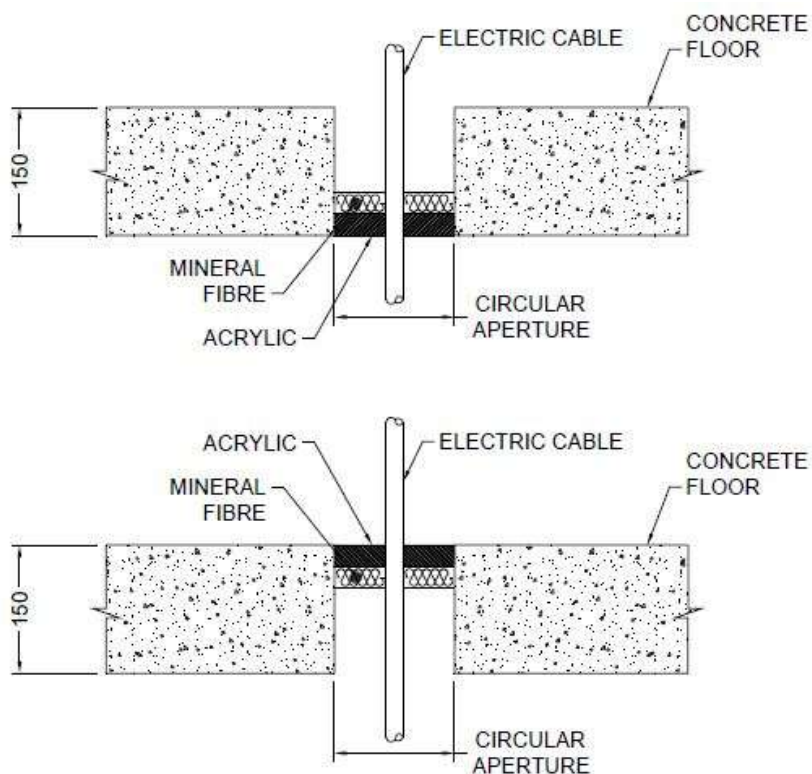


### B.3 Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm

#### B.3.1 Single side penetration seal with cables

**Penetration Seal:** Cables (single) fitted centrally within circular apertures or min. 30 mm from the edges of rectilinear apertures, with Fire Resistant Acrylic Joint Sealant - ACR 240 to either side of the floor (or at any position in between), backed with 'AES Fibre  $\geq 128\text{kg/m}^3$ '.

Construction details:



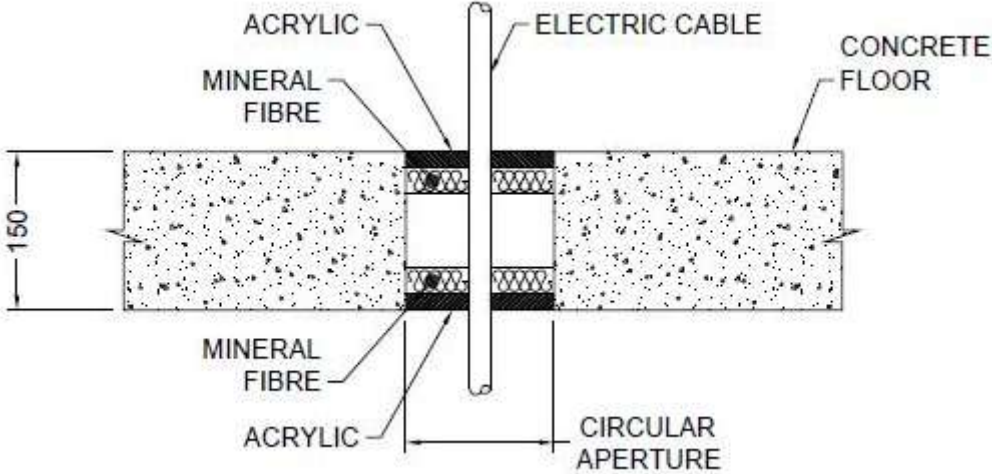
##### B.3.1.1

Services	Sealant depth	Backing	Aperture	Classification
Single electrical cables up to 21 mm $\varnothing$	25 mm	AES Fibre $\geq 128\text{kg/m}^3$ 25 mm deep	82 mm $\varnothing$ or max. 100 x 1000 mm	<b>E 120, EI 60</b>

### B.3.2 Double side penetration seal with cables

**Penetration Seal:** Cables (single) fitted circular apertures or min. 7 mm from the edges of rectilinear apertures, with Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the floor, backed with stone wool insulation 35kg/m<sup>3</sup>.

Construction details:



The diagram illustrates a cross-section of a concrete floor with a circular aperture. An electric cable passes through the aperture. The sealant assembly consists of acrylic sealant applied to both sides of the floor, backed with mineral fibre insulation. A dimension line indicates a depth of 150 mm for the sealant and backing assembly.

#### B.3.2.1

Services	Sealant depth	Backing	Aperture	Classification
Single electrical cables up to 21 mm $\varnothing$	15 mm	Stone wool 25 mm deep	36-82 mm $\varnothing$	EI 120

### B.3.3 Single side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted central within the aperture, with 15 mm deep Fire Resistant Acrylic Joint Sealant - ACR 240 to either side of the floor (or at any position between), backed with 20 mm deep 40 kg/m<sup>3</sup> stone wool insulation\*.

Construction details:

#### B.3.3.1

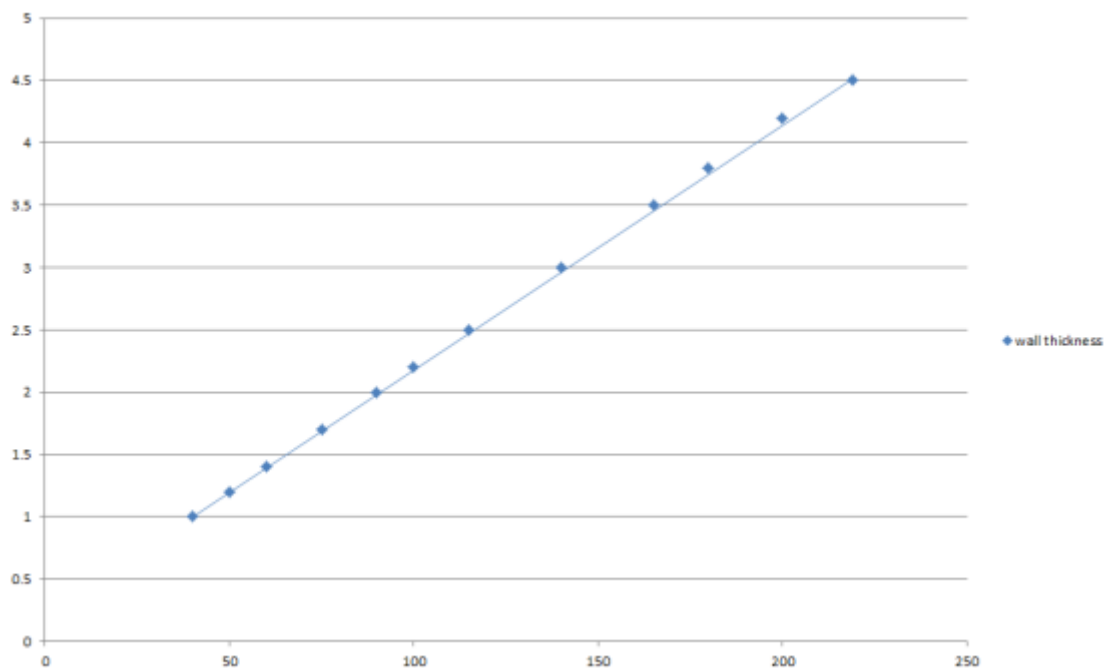
Services	Seal width around pipe	Insulation	Classification
Copper pipe up to 54 mm diameter/0.9-14.2 mm wall	10 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240 C/U, EI 180 C/U
Copper pipe up to 12 mm diameter/0.9-5 mm wall			EI 240 C/U



Services	Seal width around pipe	Insulation	Classification
Mild or stainless steel pipe			
40 mm diameter/1-14.2 mm wall	10 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240, 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

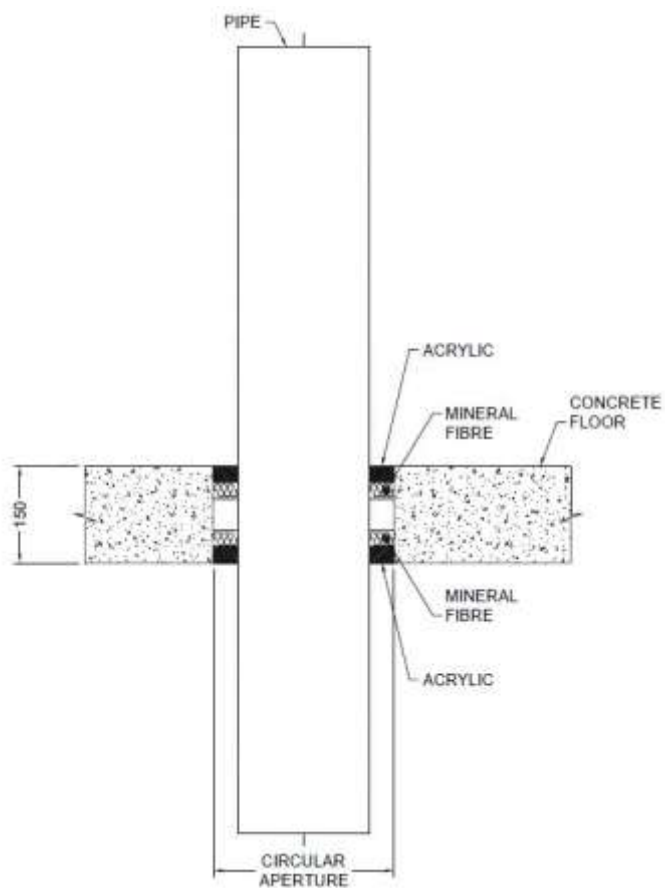
Pipe diameter vs Wall thickness



### B.3.4 Double side penetration seal with metallic pipes

**Penetration Seal:** Non-insulated metallic pipes (single) fitted central within the aperture, with 25 mm deep Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the floor, backed with 25 mm deep 140 kg/m<sup>3</sup> stone wool insulation.

Construction details:



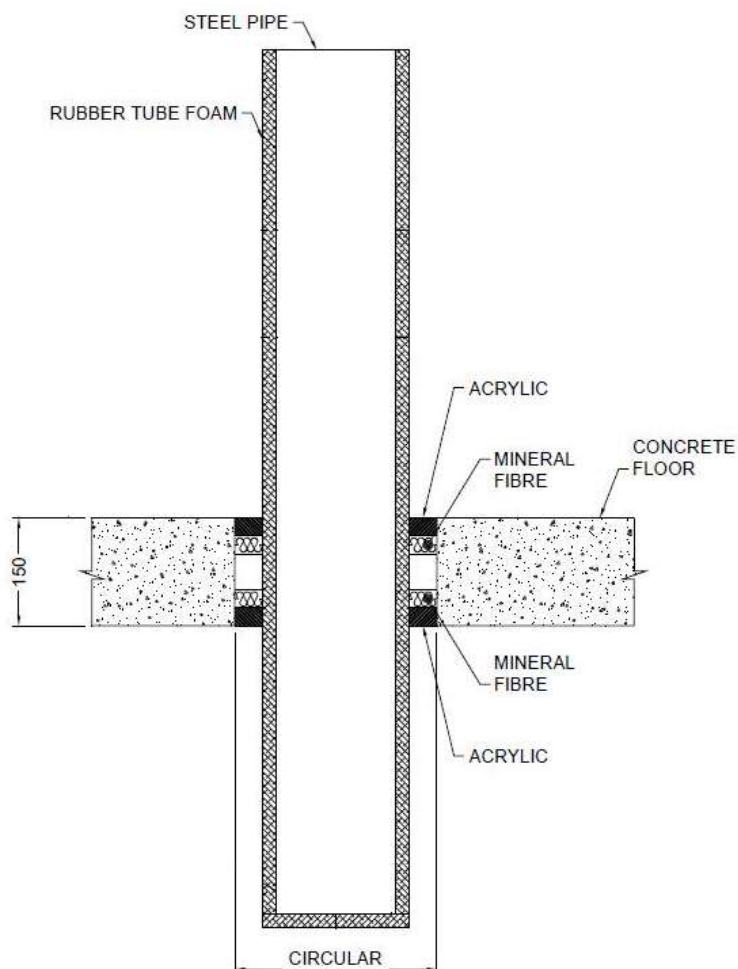
#### B.3.4.1

Services	Seal width around pipe	Insulation	Classification
Copper pipe 54 mm diameter/2-14.2 mm wall	30 mm	None	E 120 C/U, EI 20 C/U
Mild steel pipe 16 mm diameter/1.5-7.5 mm wall	34 mm		EI 240 C/U

### B.3.5 Double side penetration seal with metallic pipes

**Penetration Seal:** CS (Continuous Sustained) insulated metallic pipes (single) fitted central within the aperture, with Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the wall, 10-30 mm seal width around service, backed with stone wool insulation or 'AES Fibre  $\geq 128\text{kg/m}^3$ '.

Construction details:

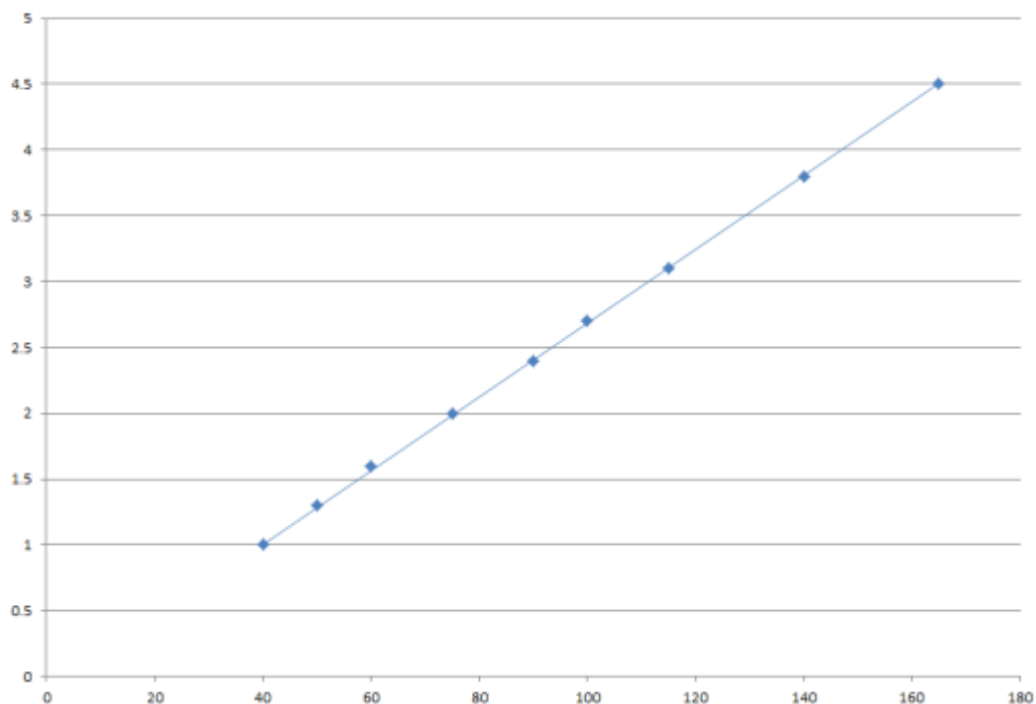


### B.3.5.1

Services	Sealant depth	Backing	Insulation	Classification
Mild or stainless steel pipe				
40 mm diameter/1-14.2 mm wall	25 mm	20 mm Stone wool 40 kg/m <sup>3</sup>		EI 180
40 mm diameter/1-14.2 mm wall*	25 mm	25 mm AES Fibre ≥ 128kg/m <sup>3</sup>	13 -19 mm Kaiflex ST insulation	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

Pipe diameter vs Wall thickness

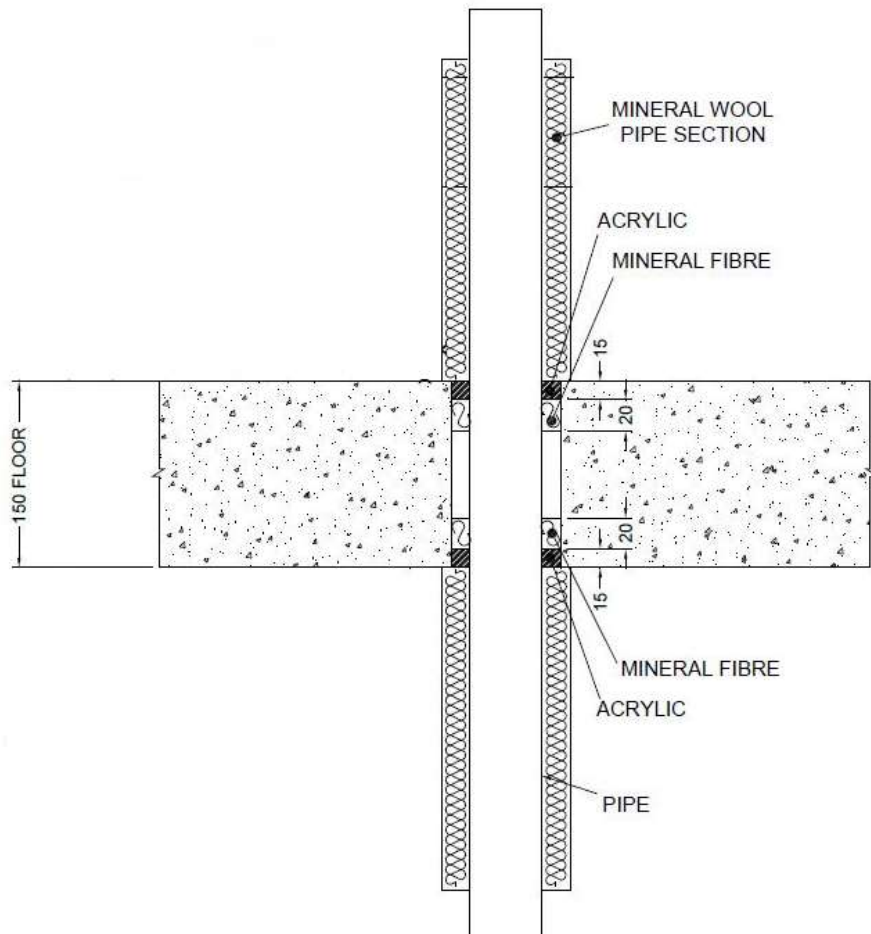




### B.3.6 Double side penetration seal with metallic pipes

**Penetration Seal:** 1000 mm (min.) LI (Local Interrupted) or CI (Continuous Interrupted) insulated metallic pipes (single) fitted central within the aperture, with 15 mm deep Fire Resistant Acrylic Joint Sealant - ACR 240 to both sides of the floor (or at any position between), backed with 20 mm deep 40 kg/m<sup>3</sup> stone wool insulation\*.

Construction details:



### B.3.6.1

Services	Seal width around pipe	Insulation	Classification
Mild or stainless steel pipe			
40 mm diameter/1-14.2 mm wall	10 mm	20 mm Stone wool insulation 80 kg/m <sup>3</sup>	EI 240 C/U
40 mm diameter/1-14.2 mm wall*		30 mm Stone wool insulation 80 kg/m <sup>3</sup>	E 240, 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

Pipe diameter vs Wall thickness

