



## DECLARATION OF PERFORMANCE



DoP: FS-08-2020  
for fischer FBS Foam Barrier System

### (Fire stopping and fire sealing products: Penetration Seals)

1. Unique identification code of the product-type: **FS-08-2020**
2. Intended use/es: **Maintenance of the fire resistance of a separating element at the position where services pass through, see appendix, and EAD 350454-00-1104 chapter 1.2.1**
3. Manufacturer: **fischerwerke GmbH & Co. KG, Klaus-Fischer-Straße 1, 72178 Waldachtal, Germany**
4. Authorised representative: --
5. System/s of AVCP: 1
6. European Assessment Document

**EAD 350454-00-1104**

European Technical Assessment: ETA-17/0845; 2017-11-20

Technical Assessment Body: **Austrian Institute of Construction Engineering (OIB)**

Notified body/ies: **0761 – Materialprüfanstalt für das Bauwesen (MPA BS)**

### 7. Declared performance/s:

Essential Characteristic	Declared Performance
<b>Basic Works Requirement 2: Safety in case of fire</b>	
Reaction to fire	See appendix, chapter 3.1.1
Resistance to fire	See appendix, annex F and J
<b>Basic Works Requirement 3: Hygiene, health and the environment</b>	
Air permeability	See appendix, chapter 3.2.1
Water permeability	NPD
Content, emission and/or release of dangerous substances	NPD
<b>Basic Works Requirement 4: Safety and accessibility in use</b>	
Mechanical resistance and stability	NPD
Resistance to impact / movement	NPD
Adhesion	NPD
Durability	NPD
<b>Basic Works Requirement 5: Protection against noise</b>	
Airborne sound insulation	See appendix, chapter 3.4.1
<b>Basic Works Requirement 6: Energy economy and heat retention</b>	
Thermal Properties	See appendix, chapter 3.5.1
Water vapour permeability	NPD

### 8. Appropriate Technical Documentation and/or Specific Technical Documentation: ---

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

Constantin Wiegert, M.Sc., B.Eng.  
Tumlingen, 2017-11-27

Marion Leipersberger, B.Eng.

- This DoP has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.
- The Appendix includes voluntary and complementary information in English language exceeding the (language-neutrally specified) legal requirements.

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
<b>BWR 2</b>	Reaction to fire	EN 13501-1: 2007+A1:2009	Clause 3.1.1 of the ETA
	Resistance to fire	EN 13501-2: 2007+A1:2009	Clause 3.1.2 of the ETA and Annex F-1 and Annex J-1 of the ETA
<b>BWR 3</b>	Air permeability (material property)	EN 1026:2016	Clause 3.2.1 of the ETA
	Water permeability (material property)	No performance assessed	
	Content and/or release of dangerous substances	European Council Directive 67/548/EEC and Regulation (EC) No 1272/2008 as well as EOTA TR 034, edition October 2015	Declaration of conformity by the manufacturer
<b>BWR 4</b>	Mechanical resistance and stability	No performance assessed	
	Resistance to impact / movement	No performance assessed	
	Adhesion	No performance assessed	
<b>BWR 5</b>	Airborne sound insulation	EN ISO 10140-2: 2010	Clause 3.4.1 of the ETA
<b>BWR 6</b>	Thermal properties	EN 12667:2001	Clause 3.5.1 of the ETA
	Water vapour permeability	No performance assessed	

### 3.1 Safety in case of fire (BWR 2)

#### 3.1.1 Reaction to fire

The components of “FBS-EN Foam Barrier System” were assessed according to ETAG 026-Part 2 clause 2.4.1 and classified according to EN 13501-1:2007+A1:2009.

Component	Class according to EN 13501-1:2007+A1:2009
FBS-EN Foam Barrier	<b>E</b>
FIB fischer Insulating Bandage	<b>E</b>
FBB-EN Firestop Block	<b>E</b>

### 3.1.2 Resistance to fire

“FBS-EN Foam Barrier System” was tested according to ETAG 026-Part 2 clause 2.4.2, prEN 1366-3.2:N185:2007-07 and EN 1366-3:2009 in conjunction with EN 1363-1:1999.

Based upon the gained test results and the field of application specified within prEN 1366-3.2:N185:2007-07 and EN 1366-3:2009 “FBS-EN Foam Barrier System” has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex F-1 (mixed penetration seal) and Annex J-1 (cable penetration seal) of the ETA.

The maximum fire resistance class of the penetration seal in vertical or horizontal separating element depends on the fire resistance class of the penetrating elements. The fire resistance class of the penetration seal is reduced to the fire resistance class of the penetrating element with the lowest fire resistance classification.

The resistance to fire classification listed in Annex F-1 (mixed penetration seal) and Annex J-1 (cable penetration seal) of the ETA is only valid if “FBS-EN Foam Barrier System” is installed according to Annex A-1 to A-6 of the ETA.

## 3.2 Hygiene, health and environment (BWR 3)

### 3.2.1 Air permeability

The air permeability of “FBS-EN Foam Barrier” with a thickness of 144 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of  $\geq 20$  mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 144 mm. The opening size was 360 mm x 360 mm (width x height), resp. 0,130 m<sup>2</sup>.

“FBS-EN Foam Barrier System” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.3.

The components “FIB fischer Insulating Bandage” and “FBB-EN Firestop Block” were not included in these tests. The measurement accuracy was 0,01 m<sup>3</sup>/h.

The values given in the following table are the mean values from the pressure- and suction tests.

$\Delta p$ in Pa	50	100	150	200	250	300	450	600
$q/A$ in m <sup>3</sup> /(h*m <sup>2</sup> )	0,39	0,73	1,18	1,58	1,89	2,12	3,24	4,09

The air permeability of “FBS-EN Foam Barrier” with a thickness of 200 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of  $\geq 20$  mm thick type calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 350 mm x 350 mm (width x height), resp. 0,123 m<sup>2</sup>.

“FBS-EN Foam Barrier System” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.3.

The components “FIB fischer Insulating Bandage” and “FBB-EN Firestop Block” were not included in these tests.

Up to a pressure difference of 600 Pa no air permeability was measured. The measurement accuracy of the test facility was 0,01 m<sup>3</sup>/h, so that the air permeability at  $\Delta p = 600$  Pa is less than 0,08 m<sup>3</sup>/(h\*m<sup>2</sup>).

The air permeability of “FBB-EN Firestop Block” with a thickness of 144 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of  $\geq 20$  mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 144 mm. The opening size was 560 mm x 360 mm (width x height), resp. 0,202 m<sup>2</sup>.

“FBS-EN Foam Barrier System” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.3.

The components “FIB fischer Insulating Bandage” and “FBS-EN Foam Barrier” were not included in these tests. The measurement accuracy was 0,01 m<sup>3</sup>/h.

The values given in the following table are the mean values from the pressure- and suction tests.

$\Delta p$ in Pa	50	100	150	200	250	300	450	600
q/A in m <sup>3</sup> /(h*m <sup>2</sup> )	1,12	1,79	2,38	2,92	3,79	4,42	5,98	7,65

The air permeability of “FBB-EN Firestop Block” with a thickness of 200 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The aperture was lined with 1 layer of  $\geq 20$  mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 355 mm x 550 mm (width x height), resp. 0,195 m<sup>2</sup>.

“FBS-EN Foam Barrier System” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.3.

The components “FIB fischer Insulating Bandage” and “FBS-EN Foam Barrier” were not included in these tests. The measurement accuracy was 0,01 m<sup>3</sup>/h.

The values given in the following table are the mean values from the pressure- and suction tests.

$\Delta p$ in Pa	50	100	150	200	250	300	450	600
q/A in m <sup>3</sup> /(h*m <sup>2</sup> )	0,82	1,43	1,74	2,28	3,07	3,74	4,97	6,61

### 3.2.2 Water permeability

No performance assessed.

### 3.2.3 Release of dangerous substances

According to the manufacturer’s declaration the products “FBS-EN Foam Barrier”, “FIB fischer Insulating Bandage” and “FBB-EN Firestop Block” do not contain dangerous substances detailed in Council Directive 67/548/EEC and Regulation (EC) no 1272/2008 as well as EOTA TR 034 (General BWR 3 Checklist for EADs/ETAs – Dangerous substances), edition October 2015 above the acceptable limits.

A written declaration in this respect was submitted by the ETA-holder.

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.

### **3.3 Safety in use (BWR 4)**

#### **3.3.1 Mechanical resistance and stability**

No performance assessed.

#### **3.3.2 Resistance to impact / movement**

No performance assessed.

Provisions shall be taken to prevent a person from stepping onto a horizontal penetration seal or falling against a vertical penetration seal (e.g. by covering with a wire mesh).

#### **3.3.3 Adhesion**

No performance assessed.

### **3.4 Protection against noise (BWR 5)**

#### **3.4.1 Airborne sound insulation**

The airborne sound insulation of “FBS-EN Foam Barrier” was tested according to EN ISO 10140-2:2010 in a flexible wall with a thickness of 200 mm. The aperture was lined with 1 layers of  $\geq 20$  mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 360 mm x 360 mm (width x height), resp. 0,130 m<sup>2</sup>.

“FBS-EN Foam Barrier System” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.9. The components “FIB fischer Insulating Bandage” and “FBB-EN Firestop Block” were not included in these tests.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:2013 are given in the following table.

<b>D<sub>n,e,w</sub> in dB</b>	<b>C in dB</b>	<b>C<sub>tr</sub> in dB</b>	<b>R<sub>w</sub> in dB</b>	<b>C in dB</b>	<b>C<sub>tr</sub> in dB</b>
66	-1	-6	47	-1	-6

The airborne sound insulation of “FBB-EN Firestop Block” was tested according to EN ISO 10140-2:2010 in a flexible wall with a thickness of 200 mm. The aperture was lined with 1 layers of  $\geq 20$  mm thick type calcium silicate boards (classification A1 according to EN 13501-1) with a width of 200 mm. The opening size was 360 mm x 360 mm (width x height), resp. 0,130 m<sup>2</sup>.

“FBS-EN Foam Barrier System” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.9. The components “FIB fischer Insulating Bandage” and “FBS-EN Foam Barrier” were not included in these tests.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:2013 are given in the following table.

<b>D<sub>n,e,w</sub> in dB</b>	<b>C in dB</b>	<b>C<sub>tr</sub> in dB</b>	<b>R<sub>w</sub> in dB</b>	<b>C in dB</b>	<b>C<sub>tr</sub> in dB</b>
68	-4	-11	49	-4	-11

### **3.5 Energy economy and heat retention (BWR 6)**

#### **3.5.1 Thermal properties**

The thermal properties of “FBS-EN Foam Barrier” and “FBB-EN Firestop Block” were tested according to EN 12667:2001.

<b>Component</b>	<b><math>\lambda_{10,23/50}</math> in W/(m*K)</b>
FBS-EN Foam Barrier	0,088
FBB-EN Firestop Block	0,103

#### **3.5.2 Water vapour permeability**

No performance assessed.

### **3.6 General aspects relating to fitness for use**

All components of “FBS-EN Foam Barrier System” fulfil the requirements for the intended use category.

“FBS-EN Foam Barrier System” is therefore appropriate for internal use with humidity equal to or higher than 85 % RH, excluding temperatures below 0 °C<sup>4</sup>, without exposure to rain or UV, and can – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Z<sub>1</sub>. Since the requirements for Type Z<sub>1</sub> are met, also the requirements for Type Z<sub>2</sub> are fulfilled.

<sup>4</sup> These uses apply for internal humidity class 5 in accordance with EN ISO 13788

#### 4 **Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base**

##### 4.1 **AVCP system**

According to the Decision 1999/454/EC<sup>5</sup>, amended by Decision 2001/596/EC<sup>6</sup> of the European Commission the system of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

<b>Product(s)</b>	<b>Intended use(s)</b>	<b>Level(s) or class(es)</b> (resistance to fire)	<b>System</b> of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	for fire compartmentation and/or fire protection or fire performance	any	1

In addition, according to the Decision 1999/454/EC, amended by Decision 2001/596/EC of the European Commission the system(s) of assessment and verification of constancy of performance, with regard to reaction to fire, is given in the following table.

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	System of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	for uses subject to regulations on reaction to fire	A1*, A2*, B*, C*	1
		A1**, A2**, B**, C**, D, E	3
		(A1 to E)***, F	4
* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)			
** Products/materials not covered by footnote (*)			
*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of class A1 according to Commission Decision 96/603/EC, as amended)			

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the Technical Assessment Body Österreichisches Institut für Bautechnik.

The notified product certification body shall visit the factory at least once a year for surveillance of the manufacturer.

<sup>5</sup> Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

<sup>6</sup> Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

## **1 General**

- > “FBS-EN Foam Barrier System” can be used in apertures in walls (vertical separating element) and floors (horizontal separating element) according to clause 2.1 of the ETA.
- > The penetration of cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions according to clause 2.1 of the ETA is allowed.
- > The total cross section of the installations (including insulation and cable support constructions) must not be more than 60 % of the opening size of the penetration seal.
- > Metal pipes with an outer diameter > 28 mm have to be insulated with prefabricated pipe shells (e.g. „Rockwool 800”) according to clause 1 of the ETA or „AF/Armaflex”.
- > Metal pipes with an outer diameter ≤ 28 mm can be insulated with prefabricated pipe shells (e.g. „Rockwool 800”) according to clause 1 of the ETA or „AF/Armaflex”.
- > Metal pipes insulated with prefabricated pipe shells (e.g. „Rockwool 800”) according to clause 1 of the ETA can be clad with sheet steel with a thickness of 0,4 mm to 1,0 mm or plastic with a thickness of 0,35 mm to 1,0 mm.

### **1.1 Pipe end configuration**

- > For plastic pipes classified with pipe end configuration U/C the pipe end configuration can be U/C and C/C.
- > For plastic pipes classified with pipe end configuration U/U the pipe end configuration can be U/U, C/U, U/C, C/C.
- > For metal pipes classified with pipe end configuration C/U the pipe end configuration can be C/U and C/C.
- > Plastic conduits were tested U/C resp. U/U.
- > Steel conduits / tubes were tested U/C resp. U/U.

### **1.2 Orientation of the penetrating elements**

- > Conduits / tubes, metal pipes and plastic pipes have to be installed perpendicular to the surface of the penetration seal.
- > Metal pipes insulated with prefabricated pipe shells (e.g. „Rockwool 800”) according to clause 1 of the ETA can be installed in all angles between 90° and 45°.

### **1.3 Service support constructions**

- > All types of cables, conduits / tubes, metal pipes and plastic pipes – in flexible walls and rigid walls – have to be supported on both side of the separating element by steel cable trays (perforated or non-perforated), steel ladders or alternative service support constructions (e.g. pipe hangers) made of metal with a melting or decomposition point greater or equal than 902 °C for EI 45, or 945 °C for EI 60, or 1006 °C for EI 90, or 1049 °C for EI 120 (e.g. stainless steel or galvanized steel) according to the ETA-holder’s installation instructions.



- > All types of cables, conduits / tubes, metal pipes and plastic pipes – in rigid floors – have to be supported at least on the top side of the separating element by steel cable trays (perforated or non-perforated), steel ladders or alternative service support constructions (e.g. pipe hangers) made of metal with a melting or decomposition point greater or equal than 842 °C for EI 30, or 945 °C for EI 60, or 1006 °C for EI 90, or 1049 °C for EI 120 (e.g. stainless steel or galvanized steel) according to the ETA-holder's installation instructions.
- > Steel cable trays (perforated or non-perforated) or steel ladders can pass through or end at the surface of the penetration seal.
- > Lidded cable trays / trunkings must not pass through the penetration seal.
- > The first support (service support construction) for cables and conduits / tubes in flexible walls, rigid walls and rigid floors has to be at maximum 200 mm (measured from the surface of the penetration seal).
- > The first support (service support construction) for plastic pipes and metal pipes in flexible walls and rigid walls has to be at maximum 750 mm (measured from the surface of the penetration seal).
- > The first support (service support construction) for plastic pipes and metal pipes in rigid floors has to be at maximum 1200 mm (measured from the surface of the penetration seal).
- > All types of cables, conduits / tubes, metal pipes and plastic pipes have to be fixed according to the ETA-holder's installation instructions to the service support construction.

## 2 **Details for installation of “FBS-EN Foam Barrier System” (see Annex B-1 to J-1 of the ETA)**

- > “FBS-EN Foam Barrier System” has to be installed according to the ETA-holder's installation instructions.
- > „FBS-EN Foam Barrier System” will be formed by filling „FBS-EN Foam Barrier” in the opening of the separating element so that all interstices and voids are carefully sealed. Alternatively the remaining space around penetrating elements can be closed with “FBB-EN Firestop Block”.
- > It is possible to use formwork for the installation of “FBS-EN Foam Barrier System” in walls and floors. If the formwork consists of cardboard (thickness 3 mm) or adhesive tape, it may remain on the mixed penetration seal / cable penetration seal.
- > For tied cable bundles (see clause 2.1 of the ETA) the space between the cables needs not be filled with “FBS-EN Foam Barrier”.

- > In some cases (see Annex J-1 of the ETA) – for fire resistance class EI 120 of cable penetration seals – “FIB fischer Insulating Bandage” has to be wrapped on both sides of the penetration seal according to the ETA-holder’s installation instructions around the cables, conduits / tubes and cable support constructions (see Annex I-1 of the ETA).

## **2.1 Details for installation in flexible wall constructions (see Annex B-1 and G-1 of the ETA)**

- > For walls thinner than the minimum thickness of the penetration seal (144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA)) the aperture within the wall shall be lined with minimum 2 layers of  $\geq 12,5$  mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of  $450 \text{ kg/m}^3$  and a minimum thickness of 25 mm. The boards shall be at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex B-1 and F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex G-1 and J-1 of the ETA) wide. The boards have to be installed and fixed according to the ETA-holder’s installation instructions.
- > Alternatively the thickness of the wall can be increased to at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) by fitting a board frame, minimum 50 mm wide, around the opening (see Annex B-1 and G-1 of the ETA). Minimum 1 layer of  $\geq 12,5$  mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of  $450 \text{ kg/m}^3$  can be used. The board frame has to be installed and fixed according to the ETA-holder’s installation instructions.
- > When no aperture lining is necessary (in case the thickness of the wall is equal to or greater the thickness of penetration seal ( $\geq 100 \text{ mm}$ )) or a board frame is used, the whole cavity within the wall has to be filled with material wool (stone wool with classification A1 according to EN 13501-1, a minimum apparent density of  $40 \text{ kg/m}^3$  and a melting point  $\geq 1000 \text{ }^\circ\text{C}$  according to DIN 4102-17) minimum 100 mm around the aperture.
- > If the aperture is greater than 320 mm x 320 mm it has to be lined additionally with two horizontal steel studs with a thickness of minimum 0,6 mm (construction and installation according to the ETA-holder’s installation instructions).
- > Joints between the aperture lining and the aperture have to be filled with “FBS-EN Foam Barrier” or gypsum joint filler (non-combustible material with classification A2-s1,d0 or A1 according to EN 13501-1 which is dimensionally stable) on both sides of the penetration seal according to the ETA-holder’s installation instructions.

## **2.2 Details for installation in rigid walls (see Annex B-2 to B-3 and G-2 to G-3 of the ETA)**

- > For walls thinner than the minimum thickness of the penetration seal (144 mm or 200 mm; mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) the aperture within the wall shall be lined with minimum 2 layers of  $\geq 12,5$  mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of  $450 \text{ kg/m}^3$  and a minimum thickness of 25 mm. The boards shall be at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex B-3 and F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex G-3 and J-1 of the ETA) wide. The boards have to be installed and fixed according to the ETA-holder's installation instructions.
- > Alternatively the thickness of the wall can be increased to at least 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) by fitting a board frame, minimum 50 mm wide, around the opening (see Annex B-3 and G-3 of the ETA). Minimum 1 layer of  $\geq 12,5$  mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of  $450 \text{ kg/m}^3$  can be used. The board frame has to be installed and fixed according to the ETA-holder's installation instructions.
- > Joints between the aperture lining and the aperture have to be filled with "FBS-EN Foam Barrier", or gypsum joint filler or mineral mortar (non-combustible material with classification A2-s1,d0 or A1 according to EN 13501-1 which is dimensionally stable) on both sides of the penetration seal according to the ETA-holder's installation instructions.

### **2.3 Details for installation in rigid floors (see Annex C-1 to C-2 and H-1 to H-2 of the ETA)**

- > For floors thinner than the minimum thickness of the penetration seal (200 mm; mixed penetration seal) and 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) the aperture within the floor shall be lined with minimum 2 layers of  $\geq 12,5$  mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of  $450 \text{ kg/m}^3$  and a minimum thickness of 25 mm. The boards shall be at least 200 mm (mixed penetration seal; see Annex C-2 of the ETA) and 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex H-2 and J-1 of the ETA) wide. The boards have to be installed and fixed according to the ETA-holder's installation instructions.
- > Alternatively the thickness of the floor can be increased to at least 200 mm (mixed penetration seal) and 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA) by fitting a board frame, minimum 50 mm wide, around the opening (see Annex C-2 and H-2 of the ETA). Minimum 1 layer of  $\geq 12,5$  mm thick type F gypsum boards according to EN 520 (classification A2-s1,d0 according to EN 13501-1) or silicate- or calcium silicate boards (classification A1 according to EN 13501-1) with a minimum density of  $450 \text{ kg/m}^3$  can be used. The board frame has to be installed and fixed according to the ETA-holder's installation instructions.
- > Joints between the aperture lining and the aperture have to be filled with „FBS-EN Foam Barrier“, or gypsum joint filler or mineral mortar (non-combustible material with classification A2-s1,d0 or A1 according to EN 13501-1 which is dimensionally stable) on both sides of the penetration seal according to the ETA-holder's installation instructions.

### **3 Minimum working clearances**

- > The minimum working clearances ( $a_1$ ,  $a_2$ ,  $a_3$ ; for pipes only linear arrangement is allowed, no clusters) and the minimum clearance between the penetration seals are specified in Annex B-1 to D-1 (mixed penetration seal) and G-1 to H-2 (cable penetration seal) of the ETA.

**4 Subsequent addition (retrofitting) and removal**

- > Subsequent addition (retrofitting) and removal of cables, conduits / tubes, pipes and cable support constructions according to the ETA holder's installation instructions is allowed.
- > Retrofitting and removal without addition of cables, conduits / tubes, pipes and cable support constructions shall be done according to the ETA holder's installation instructions and the regulations of Annex A-2, clause 2 of the ETA.
- > After removal without addition of cables, conduits / tubes, pipes and cable support constructions the remaining opening (hole) has to be closed with „FBS-EN Foam Barrier“ according to the ETA-holder's installation instructions.

**5 Transport and storage**

- > The indications of the manufacturer regarding transport and storage (minimum and maximum storing temperature, maximum duration of storage) have to be followed.

**6 Use, maintenance and repair**

- > The fire resistance of the penetration seal shall not be negatively affected by future changes to buildings or building elements.
- > The assessment of the fitness for use is based on the assumption that necessary maintenance and repair if required is carried out in accordance with the manufacturer's instructions during the assumed intended working life.

## View:

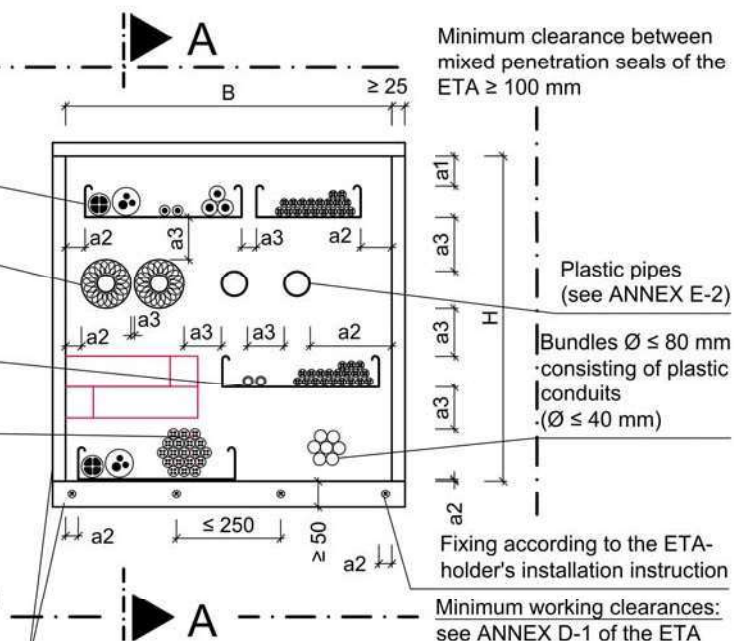
Cable support constructions / cables

Insulated metal pipes  
(see ANNEX E-1 of the ETA)

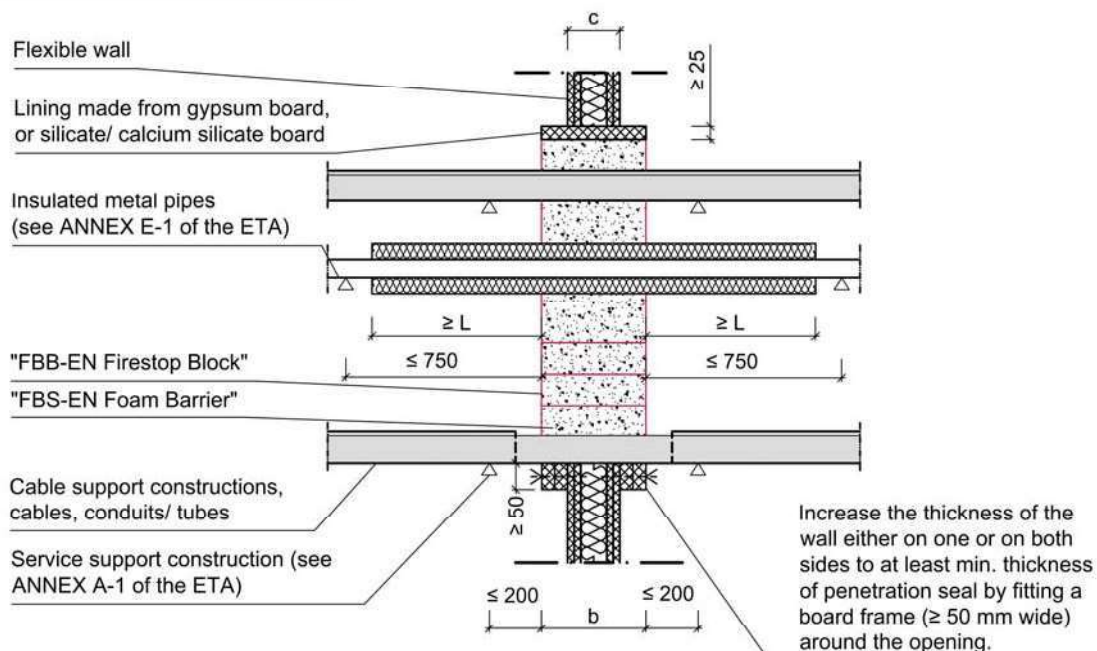
Steel conduits/ tubes, plastic conduits/ tubes

Tied cable bundles  
 $\varnothing \leq 100$  mm

Lining (min. two layers of gypsum board of thickness  $\geq 12,5$  mm or min. one layer of silicate/calcium silicate board of thickness  $\geq 25$  mm), alternatively frame made from gypsum board or silicate/ calcium silicate board  $\geq 50$  mm width around the opening (see ANNEX A-3 of the ETA)



## Cross Section A-A:



All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm]	B [mm]	Thickness of penetration seal (b)
Flexible wall	see ANNEX F-1 of the ETA	$\geq 94$	$\leq 500$	$\leq 450$	see ANNEX F-1 of the ETA

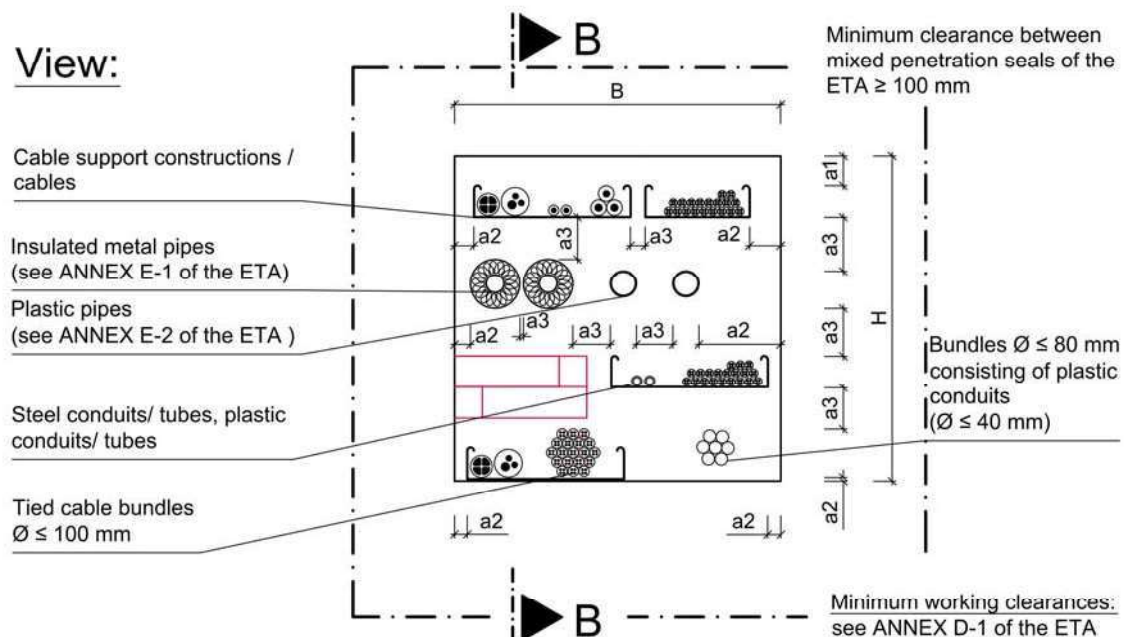
### FBS-EN Foam Barrier System

- mixed penetration seal

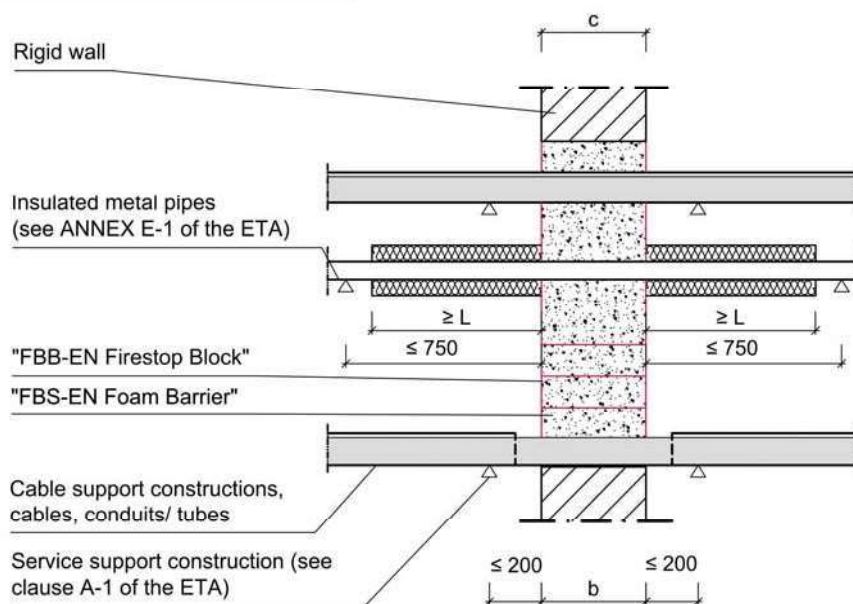
- Installation in flexible wall, thickness  $c \geq 94$  mm -

ANNEX B-1

## View:



## Cross Section B-B:



All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size		Thickness of penetration seal (b)
			H [mm]	B [mm]	
Rigid wall	see ANNEX F-1 of the ETA	$\geq b$	$\leq 500$	$\leq 450$	see ANNEX F-1 of the ETA

### FBS-EN Foam Barrier System

- mixed penetration seal

- Installation in rigid wall, thickness  $c \geq b$  -

ANNEX B-2



## View:

Cable support constructions / cables

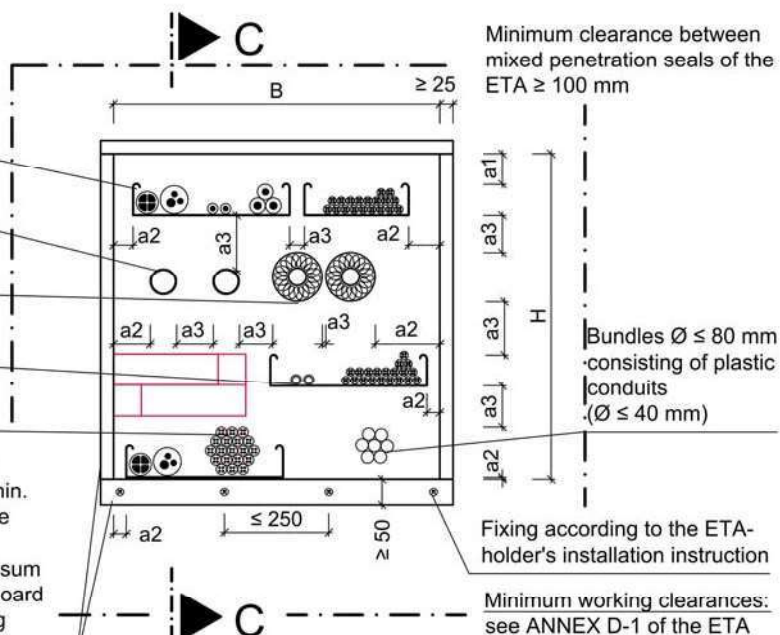
Plastic pipes  
(see ANNEX E-2 of the ETA)

Insulated metal pipes  
(see ANNEX E-1 of the ETA)

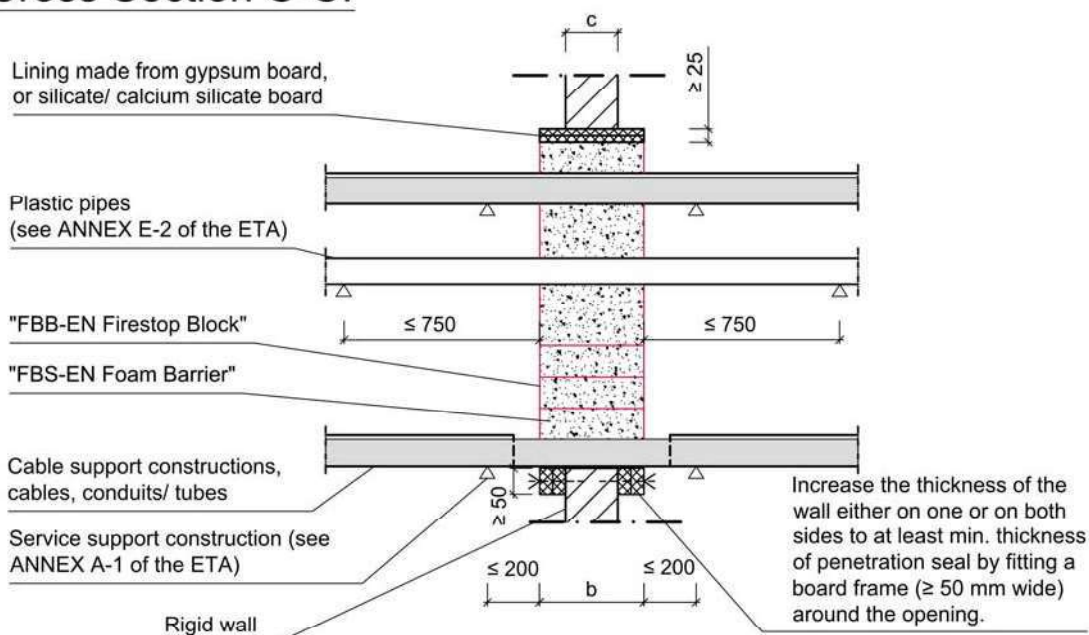
Steel conduits/ tubes, plastic conduits/ tubes

Tied cable bundles  
 $\varnothing \leq 100$  mm

Lining (min. two layers of gypsum board of thickness  $\geq 12,5$  mm or min. one layer of silicate/calcium silicate board of thickness  $\geq 25$  mm), alternatively frame made from gypsum board or silicate/ calcium silicate board  $\geq 50$  mm width around the opening (see ANNEX A-4 of the ETA)



## Cross Section C-C:



All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX F-1 of the ETA	$100 \leq c < b$	$\leq 500$	$\leq 450$	see ANNEX F-1 of the ETA

## FBS-EN Foam Barrier System

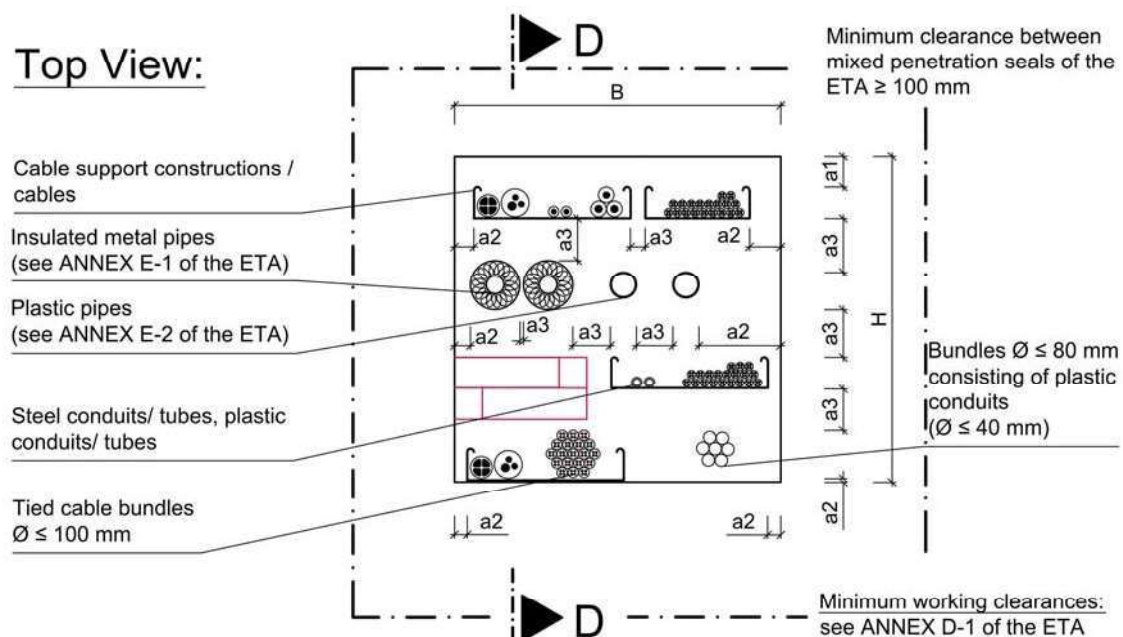
- mixed penetration seal

- Installation in rigid wall, thickness  $100 \text{ mm} \leq c < b$  -

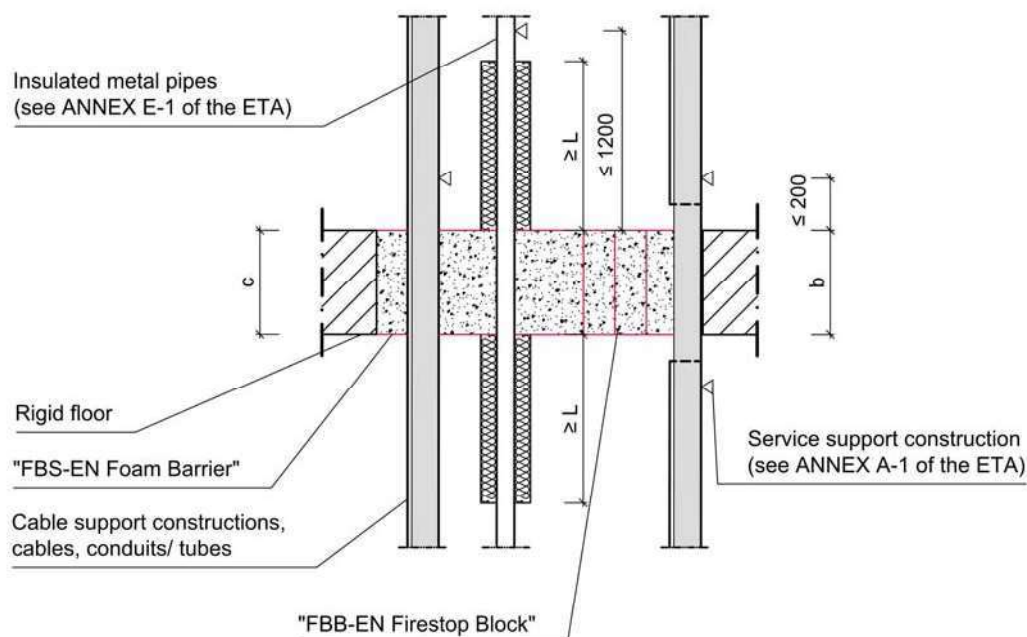
ANNEX B-3



## Top View:



## Cross Section D-D:



All dimensions in mm

Separating element	Fire resistance classification	Floor thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Rigid Floor	see ANNEX F-1 of the ETA	$\geq b$ (min. 150 mm)	$\leq 450$	$\leq 450$	see ANNEX F-1 of the ETA

### FBS-EN Foam Barrier System

- mixed penetration seal

- Installation in rigid floor, thickness  $c \geq b$  -

ANNEX C-1

## Top View:

Cable support constructions / cables

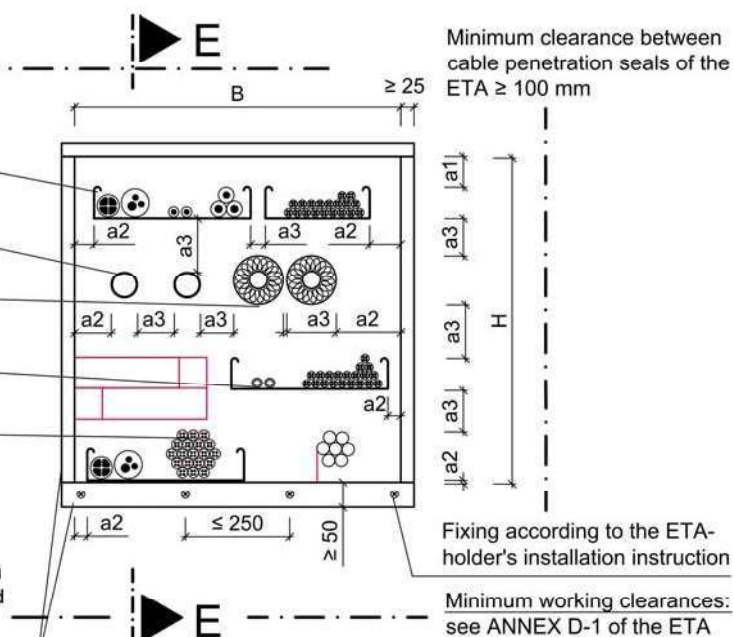
Plastic pipes  
(see ANNEX E-2 of the ETA)

Insulated metal pipes  
(see ANNEX E-1 of the ETA)

Steel conduits/ tubes, plastic conduits/ tubes

Tied cable bundles  
 $\varnothing \leq 100$  mm

Lining (min. two layers of gypsum board of thickness  $\geq 12,5$  mm or min. one layer of silicate/calcium silicate board of thickness  $\geq 25$  mm), alternatively frame made from gypsum board or silicate/ calcium silicate board  $\geq 50$  mm width around the opening (see clause ANNEX A-5 of the ETA)



## Cross Section E-E:

Lining made from gypsum board, or silicate/ calcium silicate board

Rigid floor

"FBS-EN Foam Barrier"

Cable support constructions, cables, conduits/ tubes

"FBB-EN Firestop Block"

Plastic pipes  
(see ANNEX E-2 of the ETA)

Service support construction  
(see ANNEX A-1 of the ETA)

Increase the thickness of the floor either on one or on both sides to at least min. thickness of penetration seal by fitting a board frame ( $\geq 50$  mm wide) around the opening.

All dimensions in mm

Separating element	Fire resistance classification	Floor thickness c [mm]	Max. opening size H [mm]	Max. opening size B [mm]	Thickness of penetration seal (b)
Rigid Floor	see ANNEX F-1 of the ETA	$150 \leq c < b$	$\leq 450$	$\leq 450$	see ANNEX F-1 of the ETA

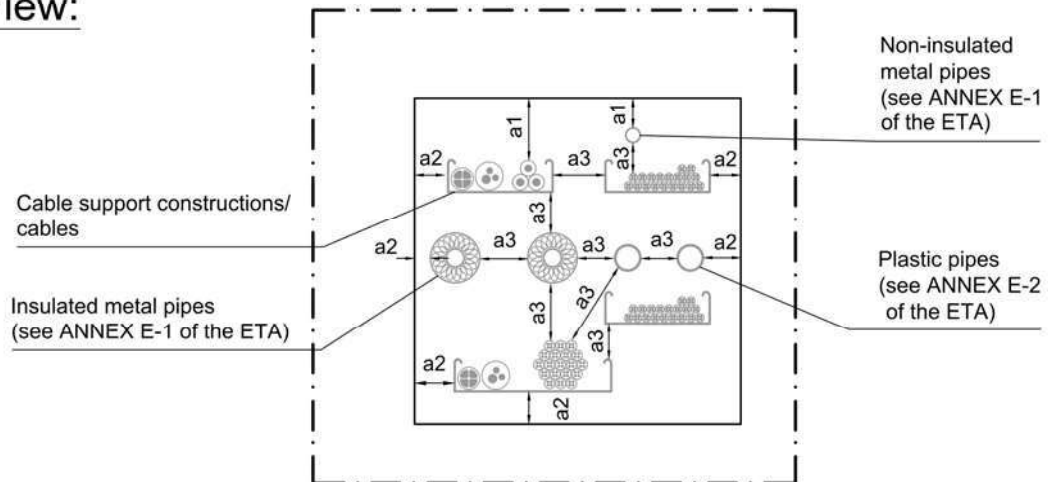
### FBS-EN Foam Barrier System

- mixed penetration seal

- Installation in rigid floor, thickness  $150 \text{ mm} \leq c < b$  -

ANNEX C-2

## View:



### Minimum working clearances:

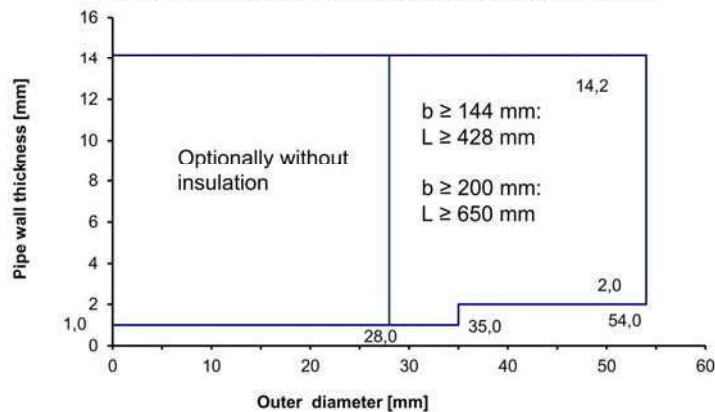
- a1: Penetrating element / top edge of penetration seal  
a2: Penetrating element / side or lower edge of penetration seal  
a3: Penetrating element / Penetrating element

Minimum working clearance			
Penetrating element	a1	a2	a3
Cables/ Cable trays/ Conduits	50 mm	0 mm	<ul style="list-style-type: none"> <li>Cables/ Cable trays/ Conduits, horizontal 0 mm</li> <li>Cables/ Cable trays/ Conduits, vertical 50 mm</li> <li>Non-insulated metal pipes 60 mm</li> <li>Other penetrating elements 50 mm</li> </ul>
Mineral wool (see clause 1 of the ETA) insulated metal pipes	0 mm	0 mm	<ul style="list-style-type: none"> <li>Mineral wool insulated metal pipes 0 mm</li> <li>Non-insulated metal pipes 60 mm</li> <li>Other penetrating elements 50 mm</li> </ul>
AF/Armaflex insulated metal pipes	35 mm	35 mm	<ul style="list-style-type: none"> <li>AF/Armaflex (thickness &gt; 9 mm) insulated metal pipes 35 mm</li> <li>AF/Armaflex (thickness 9 mm) insulated metal pipes 50 mm</li> <li>Non-insulated metal pipes 60 mm</li> <li>Other penetrating elements 50 mm</li> </ul>
Non-insulated metal pipes	35 mm	35 mm	<ul style="list-style-type: none"> <li>Non-insulated metal pipes 60 mm</li> <li>Other penetrating elements 60 mm</li> </ul>
Plastic pipes	50 mm	50 mm	<ul style="list-style-type: none"> <li>Plastic pipes 50 mm</li> <li>Non-insulated metal pipes 60 mm</li> <li>Other penetrating elements 50 mm</li> </ul>

## Field of application of metal pipes

### Mineral wool (acc. to clause 1 of the ETA) insulated metal pipes acc. to clause 2.1 of the ETA (C/U) and (C/C)

Metal pipes made of copper, steel, stainless steel, cast iron insulated with mineral wool, insulation optional sustained (LS, CS) or interrupted (LI, CI), optional clad with sheet steel (0,4 mm - 1,0 mm) or plastic (0,35 mm - 1,0 mm)

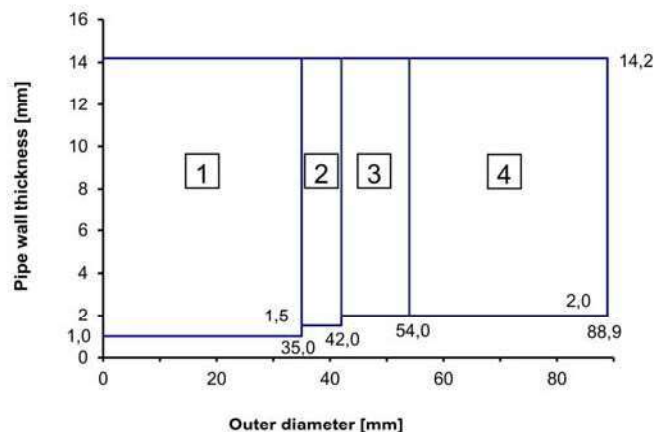


L measured from the surface of the penetration seal (see ANNEX B-1 to C-2 of the ETA).

Case	Density of mineral wool	Thickness of mineral wool
LI (local-interrupted)	$\geq 90 \text{ kg/m}^3$	30 mm
LS (local-sustained)		30 mm
CI (continued-interrupted)		$\geq 30 \text{ mm}$
CS (continued-sustained)		$\geq 30 \text{ mm}$

### AF/Armaflex insulated metal pipes (C/U) and (C/C)

Metal pipes made of copper, steel, stainless steel, cast iron insulated with AF/Armaflex, insulation sustained (LS or CS), minimum length 500 mm on both sides of mixed penetration seal

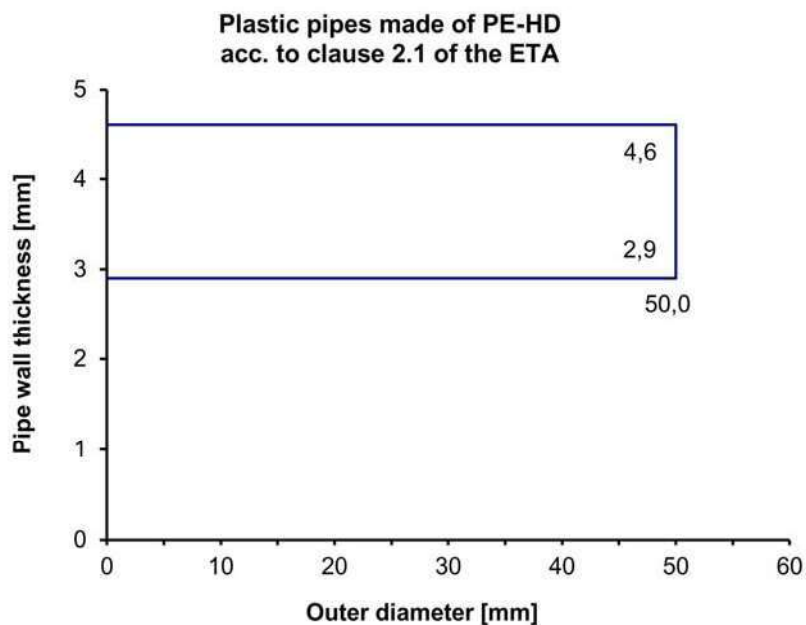
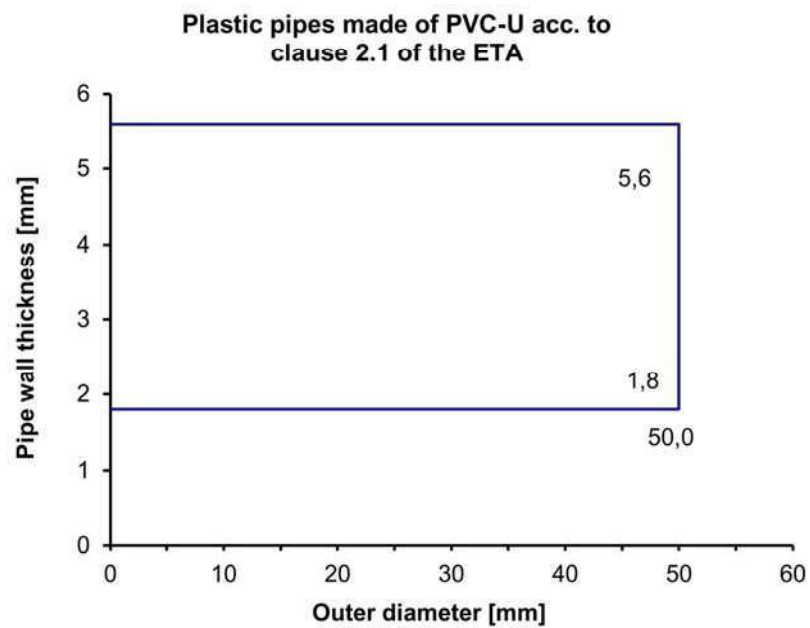


- 1 Insulation thickness 9,0 mm to 35,0 mm,  $L \geq 500 \text{ mm}$
- 2 Insulation thickness 9,0 mm to 36,5 mm,  $L \geq 500 \text{ mm}$
- 3 Insulation thickness 9,0 mm to 38,0 mm,  $L \geq 500 \text{ mm}$
- 4 Insulation thickness 41,5 mm,  $L \geq 500 \text{ mm}$

Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in flexible walls, rigid walls and rigid floors - mixed penetration seal

ANNEX E-1

Field of application of plastic pipes  
(U/U), (C/U), (U/C) and (C/C):



Interpolation between pipe diameters and wall thicknesses for plastic pipes according to clause 2.1 of the ETA in flexible walls, rigid walls and rigid floors - mixed penetration seal

ANNEX E-2

## Fire resistance classification of mixed penetration seals:

Installation in flexible walls of at least 94 mm thickness and rigid walls of at least 100 mm thickness (max. opening size of 450 mm x 500 mm)  
or rigid floors of at least 150 mm thickness (max. opening size of 450 mm x 450 mm)

Penetrating element	Min. thickness of mixed penetration seal	
	b ≥ 144 mm	b ≥ 200 mm
Sheathed electrical/ telecommunication /optical fibre cables up to a maximum outer diameter of 80 mm	wall: E 120 / EI 60 floor: E 60 / EI 60	wall and floor: E 120 / EI 90
Tied bundles up to 100 mm overall diameter containing sheathed electrical/ telecommunication /optical fibre cables of a max.diameter up to 21 mm	wall: E 120 / EI 60 floor: E 60 / EI 60	wall and floor: E 120 / EI 90
Non-sheathed cables up to a maximum outer diameter of 24 mm	wall: E 120 / EI 45 floor: E 60 / EI 30	wall and floor: E 120 / EI 60
Steel conduits/ tubes up to Ø 16 mm with/ without cables	wall: E 120-U/C / EI 60-U/C floor: E 60-U/C / EI 60-U/C	wall and floor: E 120-U/U / EI 90-U/U
Plastic conduits up to Ø 16 mm with/ without cables	wall: E 120-U/C / EI 90-U/C floor: E 60-U/C / EI 60-U/C	wall and floor: E 120-U/U / EI 120-U/U
Plastic conduits up to Ø 40 mm and bundles up to 80 mm consisting of plastic conduits (Ø ≤ 40 mm) with/ without cables	wall: E 120-U/C / EI 90-U/C floor: E 60-U/C / EI 60-U/C	wall: E 120-U/C / EI 120-U/C floor: E 120-U/U / EI 120-U/U
Non-insulated metal pipes up to a max. outer diameter of 28 mm	wall: E 120-C/U / EI 60-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 90-C/U
Mineral wool insulated metal pipes up to a max. outer diameter of 54 mm	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 90-C/U
AF/Armaflex (thickness 9 mm) insulated metal pipes up to a max. outer diameter of 54 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 90-C/U
AF/Armaflex (thickness > 9 mm) insulated metal pipes up to a max. outer diameter of 88,9 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall and floor: E 120-C/U / EI 120-C/U
Plastic pipes up to a max. outer diameter of 50 mm	wall: E 120-U/C / EI 120-U/C floor: E 60-U/C / EI 60-U/C	wall and floor: E 120-U/U / EI 120-U/U

\* For permitted insulation see ANNEX E-1 of the ETA

**FBS-EN Foam Barrier System**

**- mixed penetration seal**

**- Fire resistance classification -**

**ANNEX F-1**



## View:

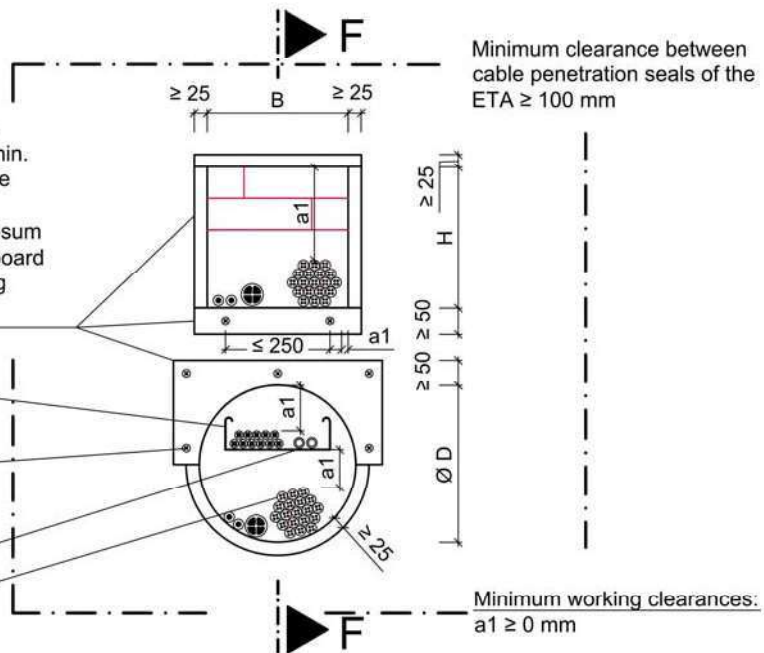
Lining (min. two layers of gypsum board of thickness  $\geq 12,5$  mm or min. one layer of silicate/calcium silicate board of thickness  $\geq 25$  mm), alternatively frame made from gypsum board or silicate/ calcium silicate board  $\geq 50$  mm width around the opening (see ANNEX A-3 of the ETA)

Cable support constructions / cables

Fixing according to the ETA-holder's installation instruction

Steel conduits/ tubes, plastic conduits/ tubes

Tied cable bundles  
 $\varnothing \leq 100$  mm



## Cross Section F-F:

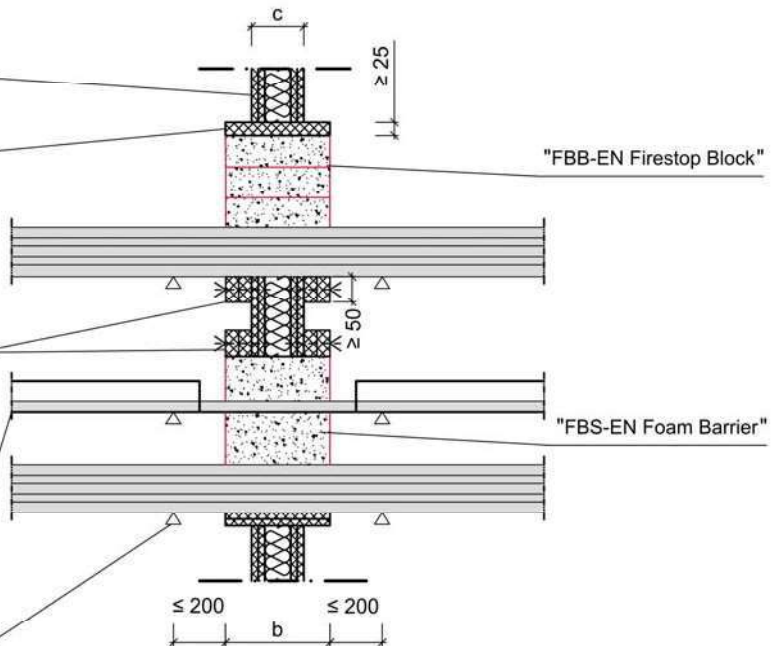
Flexible wall

Lining made from gypsum board, or silicate/ calcium silicate board

Increase the thickness of the wall either on one or on both sides to at least min. thickness of penetration seal by fitting a board frame ( $\geq 50$  mm wide) around the opening.

Cable support constructions, cables, conduits/ tubes

Service support construction (see ANNEX A-1 of the ETA)



All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / $\varnothing$ D [mm]	Thickness of penetration seal (b)
Flexible wall	see ANNEX J-1 of the ETA	$\geq 94$	$\leq 270 \times 270$ / $\varnothing \leq 300$	see ANNEX J-1 of the ETA

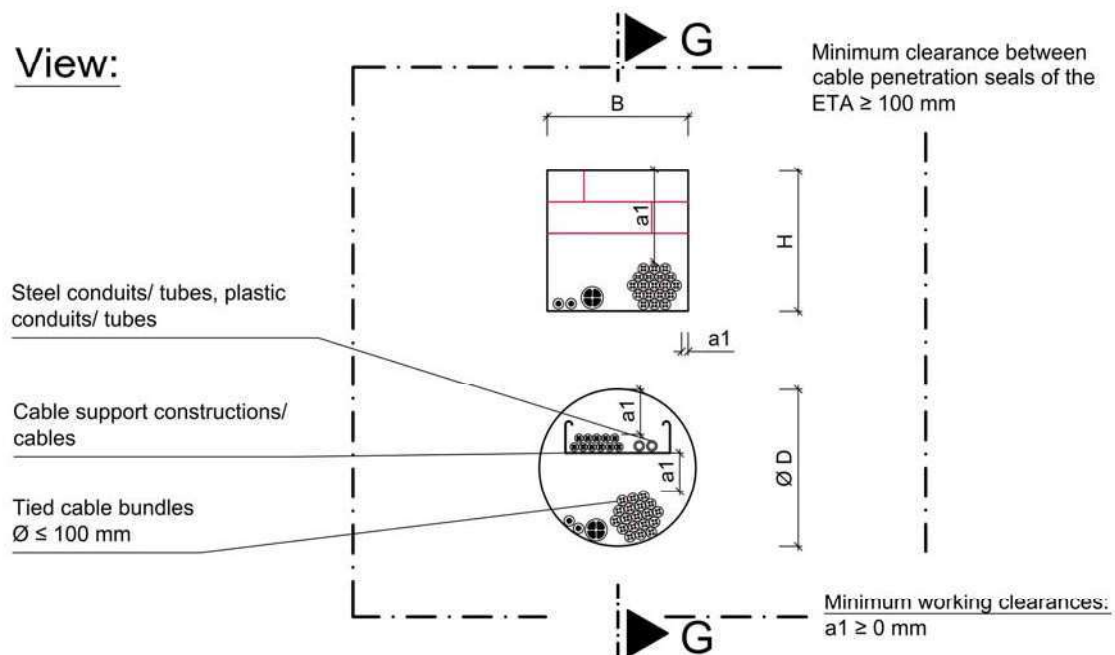
### FBS-EN Foam Barrier System

- cable penetration seal

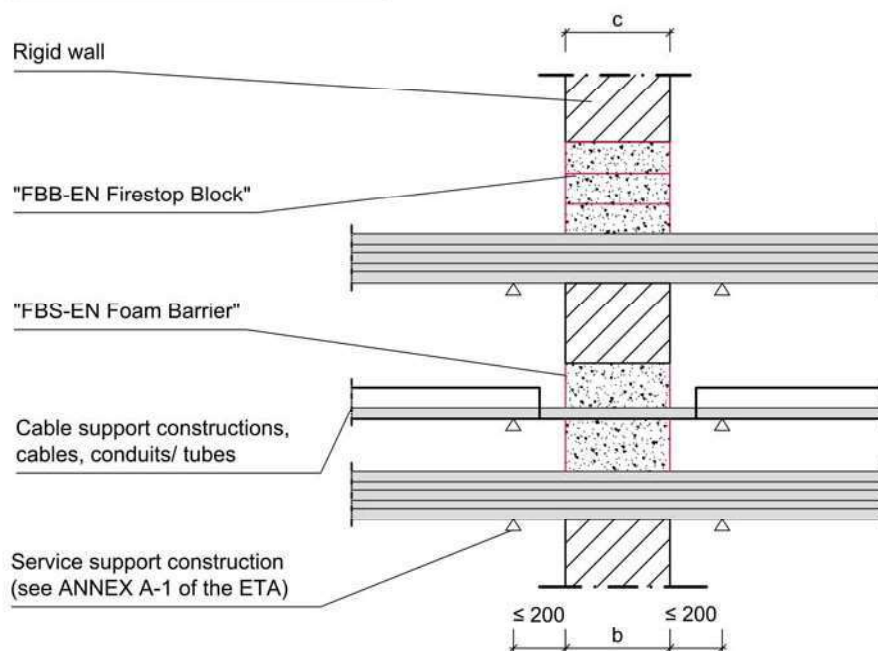
- Installation in flexible wall, thickness  $c \geq 94$  mm -

ANNEX G-1

## View:



## Cross Section G-G:



All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / $\varnothing$ D [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX J-1 of the ETA	$\geq b$	$\leq 270 \times 270 / \varnothing \leq 300$	see ANNEX J-1 of the ETA

### FBS-EN Foam Barrier System

- cable penetration seal

- Installation in rigid wall, thickness  $c \geq b$  -

ANNEX G-2



## View:

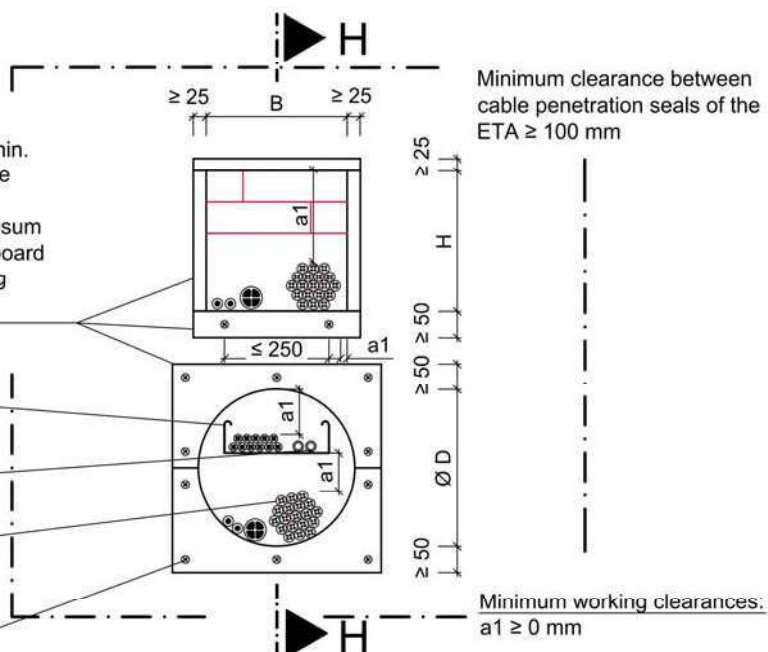
Lining (min. two layers of gypsum board of thickness  $\geq 12,5$  mm or min. one layer of silicate/calcium silicate board of thickness  $\geq 25$  mm), alternatively frame made from gypsum board or silicate/ calcium silicate board  $\geq 50$  mm width around the opening (see ANNEX A-4 of the ETA)

Cable support constructions/ cables

Steel conduits/ tubes, plastic conduits/ tubes

Tied cable bundles  
 $\varnothing \leq 100$  mm

Fixing according to the ETA-holder's installation instruction



## Cross Section H-H:

Lining made from gypsum board, or silicate/ calcium silicate board

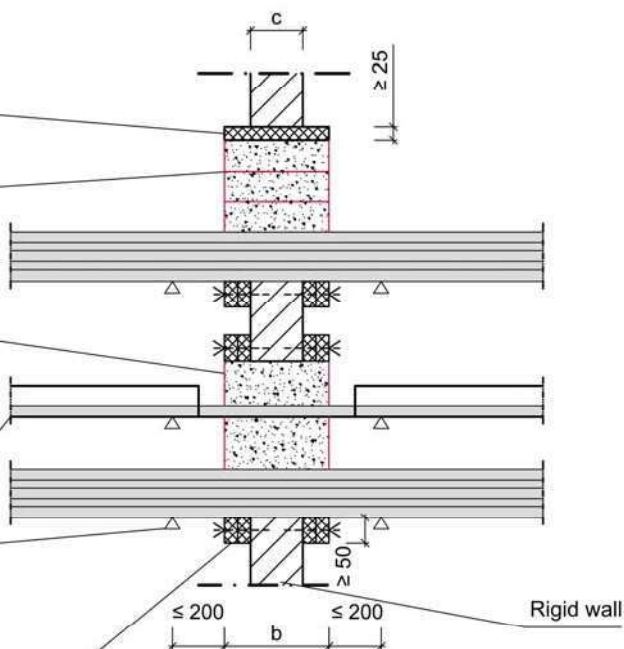
"FBB-EN Firestop Block"

"FBS-EN Foam Barrier"

Cable support constructions, cables, conduits/ tubes

Service support construction (see ANNEX A-1 of the ETA)

Increase the thickness of the wall either on one or on both sides to at least min. thickness of penetration seal by fitting a board frame ( $\geq 50$  mm wide) around the opening



All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / $\varnothing$ D [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX J-1 of the ETA	$100 \leq c < b$	$\leq 270 \times 270$ / $\varnothing \leq 300$	see ANNEX J-1 of the ETA

## FBS-EN Foam Barrier System

- cable penetration seal

- Installation in rigid wall, thickness  $100 \text{ mm} \leq c < b$  -

ANNEX G-3

### Top View:

The diagram illustrates the top view of a cable tray installation. A rectangular cable tray is shown with a width dimension  $B$  and a height dimension  $H$ . Inside the tray, there are cable support constructions, steel conduits/tubes, and tied cable bundles. The distance from the side wall of the tray to the first cable support construction is  $a_1$ . The diameter of the cable tray is  $\varnothing D$ . A circular inset provides a detailed view of the cable support constructions, showing the spacing  $a_1$  between them. The diagram also indicates the minimum clearance between cable penetration seals of the ETA, which is  $\geq 100 \text{ mm}$ . The minimum working clearances are specified as  $a_1 \geq 0 \text{ mm}$ .

Cable support constructions/  
cables

Steel conduits/ tubes, plastic  
conduits/ tubes

Tied cable bundles  
 $\varnothing \leq 100 \text{ mm}$

Minimum clearance between  
cable penetration seals of the  
ETA  $\geq 100 \text{ mm}$

Minimum working clearances:  
 $a_1 \geq 0 \text{ mm}$

### Cross Section I-I:

The diagram illustrates the cross-section of a firestop assembly for cable support constructions. It shows a rigid floor on the left, followed by an "FBB-EN Firestop Block" and an "FBS-EN Foam Barrier". The assembly is designed to seal the gap between the rigid floor and the cable support constructions, cables, conduits/ tubes. The service support construction is shown on the right, with a dimension of  $\leq 200$  mm. The diagram also shows the dimensions of the firestop block and foam barrier, with a width of  $c$  and a height of  $b$ .

"FBB-EN Firestop Block"

Rigid floor

"FBS-EN Foam Barrier"

Cable support constructions, cables, conduits/ tubes

Service support construction (see ANNEX A-1 of the ETA)

$\leq 200$

$c$

$b$

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / Ø D [mm]	Thickness of penetration seal (b)
Rigid floor	see ANNEX J-1 of the ETA	≥ b (min. 150 mm)	≤ 270 x 270 / Ø ≤ 300	see ANNEX J-1 of the ETA

## ANNEX H-1

## Top View:

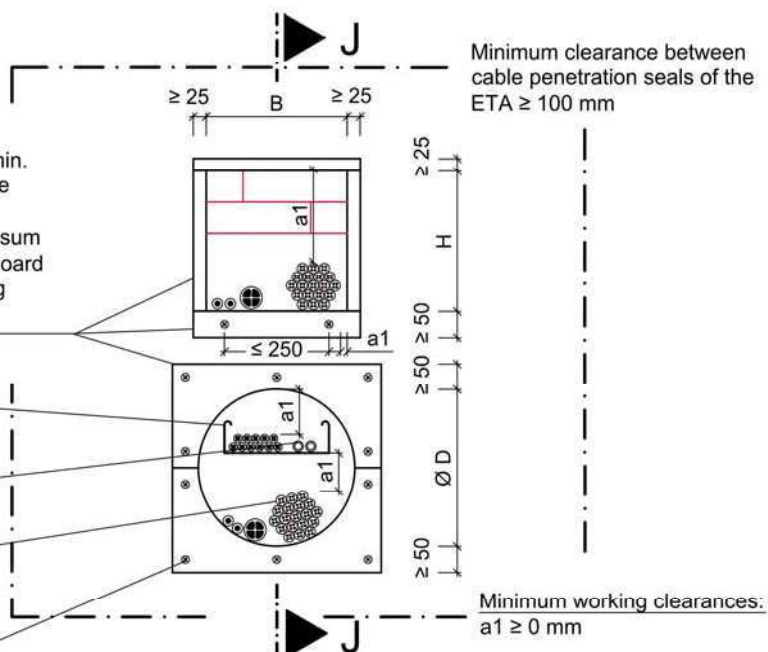
Lining (min. two layers of gypsum board of thickness  $\geq 12.5$  mm or min. one layer of silicate/calcium silicate board of thickness  $\geq 25$  mm), alternatively frame made from gypsum board or silicate/ calcium silicate board  $\geq 50$  mm width around the opening (see ANNEX A-5 of the ETA)

Cable support constructions/ cables

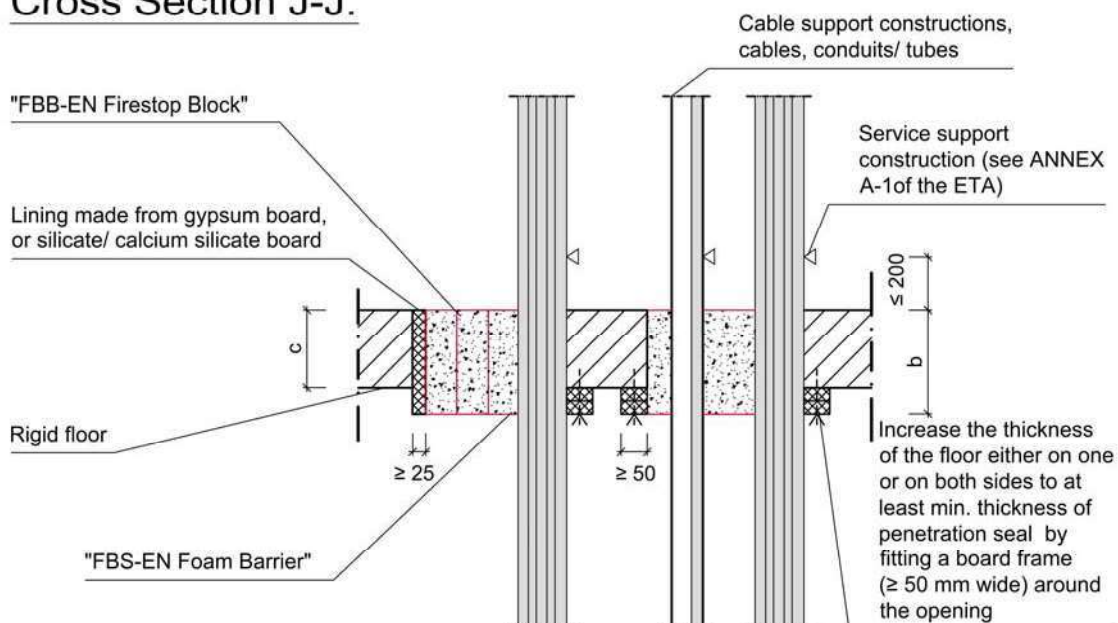
Steel conduits/ tubes, plastic conduits/ tubes

Tied cable bundles  
 $\varnothing \leq 100$  mm

Fixing according to the ETA-holder's installation instruction



## Cross Section J-J:



All dimensions in mm

Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size H [mm] x B [mm] / Ø D [mm]	Thickness of penetration seal (b)
Rigid floor	see ANNEX J-1 of the ETA	$150 \leq c < b$	$\leq 270 \times 270 / \varnothing \leq 300$	see ANNEX J-1 of the ETA

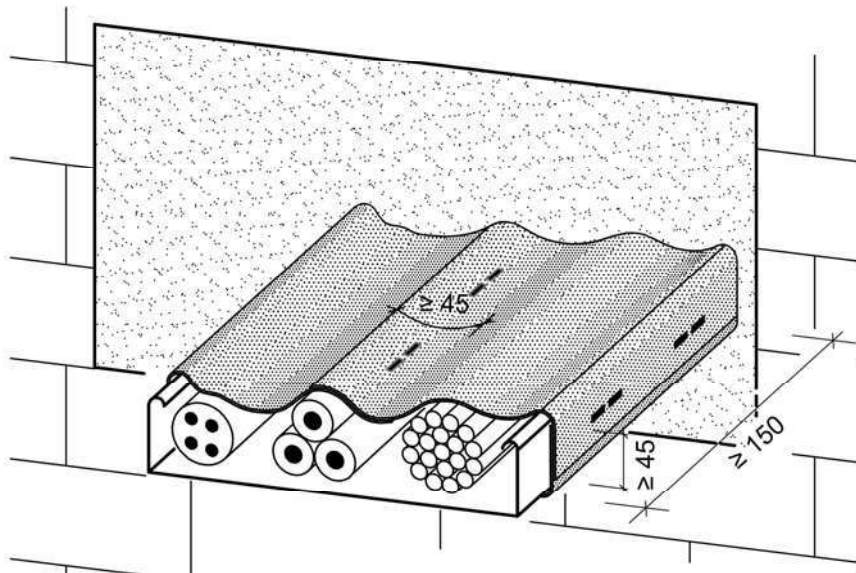
### FBS-EN Foam Barrier System

#### - cable penetration seal

- Installation in rigid floor, thickness  $150 \text{ mm} \leq c < b$  -

ANNEX H-2

Arrangement of "FIB fischer Insulating Bandage"  
for fire resistance classification EI 120  
(see ANNEX J-1 of the ETA):



For fire resistance classification EI120:

The cables or cable trays have to be wrapped with strips of "FIB fischer Insulating Bandage" of at least 150 mm width on both sides. The glass fabric reinforcement fixed to one side of the wrap has to be on the outside. The ends of the wrap have to be fixed with two steel clips or steel wire according to the ETA-holder's installation instruction. Strips have to overlap each other at least 45 mm.

All dimensions in mm

## Fire resistance classification of cable penetration seals:

Installation in flexible walls of at least 94 mm thickness and rigid walls of at least 100 mm thickness or rigid floors of at least 150 mm thickness  
(max. opening size of 270 mm x 270 mm or Ø 300 mm)

Penetrating element	Min. thickness of cable penetration seal			
	b ≥ 100 mm	b ≥ 144 mm	b ≥ 200 mm	b ≥ 250 mm
Sheathed electrical/telecommunication /optical fibre cables up to a maximum outer diameter of 21 mm	E 120 EI 60	E 120 EI 90	E 120 wall: EI 90 / EI 120 <sup>2)</sup> floor: EI 120	E 120 EI 120
Sheathed electrical/telecommunication /optical fibre cables up to a maximum outer diameter of 21 mm < Ø ≤ 50 mm	wall: E 120 / EI 45 / EI 60 <sup>1)</sup>	E 120 EI 60	E 120 EI 90 / EI 120 <sup>2)</sup>	E 120 EI 120
Sheathed electrical/telecommunication /optical fibre cables up to a maximum outer diameter of 50 mm < Ø ≤ 80 mm	---	E 120 EI 60	E 120 EI 90/ EI 120 <sup>2)</sup>	E 120 EI 90
Tied bundles up to 100 mm overall diameter containing sheathed electrical/ telecommunication /optical fibre cables of a max.diameter up to 21 mm	---	E 120 EI 60	E 120 wall: EI 90 floor: EI 90/ EI 120 <sup>2)</sup>	E 120 wall: EI 90 floor: EI 120
Non-sheathed cables up to a maximum outer diameter of 24 mm	---	E 120 wall: EI 45 floor: EI 30	E 120 wall: EI 90 floor: EI 60	E 120 wall: EI 90 floor: EI 60
Steel conduits/ tubes up to Ø 16 mm with/ without cables	---	E 120-U/C EI 60-U/C	E 120-U/U wall: EI 120-U/U floor: EI 90-U/U	E 120-U/U wall: EI 120-U/U floor: EI 120-U/U
Plastic conduits up to Ø 16 mm with/ without cables	---	E 120-U/C EI 120-U/C	E 120-U/U EI 120-U/U	E 120-U/U EI 120-U/U
Plastic conduits up to Ø 40 mm and bundles up to 80 mm consisting of plastic conduits (Ø ≤ 40 mm) with/ without cables	---	E 120-U/C EI 120-U/C	wall: E 120-U/C / EI 120-U/C floor: E 120-U/U / EI 120-U/U	wall: E 120-U/C / EI 120-U/C floor: E 120-U/U / EI 120-U/U

- 1) A bead of "FBS-EN Foam Barrier" with min. dimension of 30 mm x 20mm (length x thickness) has to be applied around the penetrating element on both sides of the penetration seal.
- 2) "FIB fischer Insulating Bandage" (see ANNEX I-1) has to be wrapped around the penetrating element on both sides of the penetration seal.

**FBS-EN Foam Barrier System**

**- cable penetration seal**

**- Fire resistance classification -**

**ANNEX J-1**