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European Technical Assessment

ETA-21/0718
of 29.07.2021

General part

Technical Assessment Body issuing the European Technical Assessment

Österreichisches Institut für Bautechnik (OIB)
Austrian Institute of Construction Engineering

Trade name of the construction product

SikaSeal®-699 Fire System

Product family to which the construction product belongs

Fire Stopping and Fire Sealing Products:
Penetration Seals

Manufacturer

Sika Services AG
Tüffenwies 16
8048 Zürich
SWITZERLAND

Manufacturing plant

Sika Factory 1677

This European Technical Assessment contains

44 pages including Annexes A-1 to J-1 which form an integral part of this assessment

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of

European Assessment Document
EAD 350454-00-1104 "Fire stopping and fire sealing products – Penetration seals"

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Specific parts

1 Technical description of the product

“SikaSeal®-699 Fire System” is a kit to be used as a mixed penetration seal or cable penetration seal based on the following components and additional insulations.

Components of “SikaSeal®-699 Fire System”	Characteristics
SikaSeal®-635 Fire Foam	Intumescent fire protection foam in cartridges on the basis of polyurethane. After application it reacts and increases its volume
SikaSeal®-637 Fire Wrap	Intumescent fire protection wrap on the basis of butyl rubber and glass fabric reinforcement with a nominal width of 150 mm and a nominal thickness of 3 mm
SikaSeal®-636 Fire Brick	Intumescent fire protection block (can be vacuum-packed) on the basis of polyurethane
SikaSeal®-630 Fire Collar	Pipe collar according to Annex E-6 of the ETA with sheet steel housing and an inlay made of intumescent material

Insulations (additional components)	Characteristics
Prefabricated pipe shells	Prefabricated pipe shells according to EN 14303 made from stone wool with classification A2 _L -s1,d0 or A1 _L according to EN 13501-1, a minimum density of 90 kg/m ³ and a melting point > 1000 °C according to DIN 4102-17 (e.g. “Rockwool 800” from manufacturer “DEUTSCHE ROCKWOOL GmbH & Co. KG”)
AF/Armaflex	Closed cell, flexible elastomeric foam (FEF) insulation in form of (slotted) tubes (can be provided with a self-adhesive device) with classification B _L -s3,d0 – including “Armaflex 520” – according to EN 13501-1 from manufacturer “Armacell GmbH”
AF/Armaflex Band selbstklebend (AF/Armaflex self-adhesive tape)	Closed cell, flexible elastomeric foam (FEF) insulation in form of tapes with a self-adhesive device with classification B-s3,d0 according to EN 13501-1 from manufacturer “Armacell GmbH”
Armaflex 520	Polychlorene-based adhesive, free from aromatic compounds (special adhesive for processing of all flexible Armaflex insulating material – except “HT/Armaflex”) from manufacturer “Armacell GmbH”

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

2.1 Intended use

“SikaSeal®-699 Fire System” is intended to be used as a mixed penetration seal or cable penetration seal to temporarily or permanently reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they have been provided with apertures which are penetrated by various cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions (perforated or non-perforated steel cable trays and steel ladders).

The thickness of the penetration seal has to be minimum 144 mm or 200 mm (mixed penetration seal; depending on the fire resistance classification; see Annex F-1 of the ETA) and minimum 100 mm, 144 mm, 200 mm or 250 mm (cable penetration seal; depending on the fire resistance classification; see Annex J-1 of the ETA).

The maximum opening size of the penetration seal has to comply with the dimensions as specified in the following table.

Blank penetration seals with maximum opening sizes as specified in the following table have been tested.

“SikaSeal®-699 Fire System” can be installed only in the types of separating elements as specified in the following table.

Separating element	Construction	a) Maximum opening size of the penetration seal (width x height) b) Minimum thickness of the penetration seal
Flexible walls	<ul style="list-style-type: none"> > Steel studs or timber studs lined on both faces with minimum 2 layer of boards (minimum thickness 12,5 mm), or minimum one layer of boards (minimum thickness 25 mm) with classification A2-s1,d0 or A1 according to EN 13501-1 > For timber stud walls there shall be a minimum distance of 100 mm of the penetration seal to any timber stud. The cavity between the penetration seal and the timber stud has to be closed with minimum 100 mm of insulation with classification A1 or A2 according to EN 13501-1 > Minimum thickness 94 mm > Classification according to EN 13501-2: ≥ EI 60 > This European Technical Assessment does not cover sandwich panel constructions and flexible walls where the lining does not cover studs on both sides. Penetrations in such constructions shall be tested on a case by case basis 	<p><u>Mixed penetration seal (see Annex B-1 of the ETA):</u> a) 450 x 500 [mm] b) 144 mm / 200 mm</p> <p><u>Cable penetration seal (see Annex G-1 of the ETA):</u> a) 270 x 270 [mm] / Ø 300 mm b) 100 mm / 144 mm / 200 mm / 250 mm</p>

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“SikaSeal®-699 Fire System” can only be configured as specified in the following tables. Other parts or service support constructions shall not penetrate the penetration seal.

Penetrating element	Construction characteristics of the penetrating element in “SikaSeal®-699 Fire System” in flexible walls, rigid walls and rigid floors
Cables	<ul style="list-style-type: none"> > All types of sheathed cables¹ (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 80 mm > Tied bundles² up to 100 mm overall diameter containing sheathed cables (except waveguides) currently and commonly used in building practice in Europe (e.g. electrical / telecommunication / data / optical fibre cables) with a diameter ≤ 21 mm > Non-sheathed electrical cables with a diameter ≤ 24 mm
Conduits / Tubes	<ul style="list-style-type: none"> > Steel conduits / tubes, Ø ≤ 16 mm, wall thickness minimum 1,5 mm (with / without cables): steel conduits according to EN 61386-21 > Plastic conduits, Ø ≤ 16 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Plastic conduits, Ø ≤ 40 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Plastic conduits, Ø ≤ 63 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Bundles with a maximum Ø of 80 mm consisting of plastic conduits, Ø ≤ 40 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > Bundles with a maximum Ø of 100 mm consisting of plastic conduits, Ø ≤ 63 mm, wall thickness 1,0 mm to 3,0 mm (with / without cables) according to EN 61386-21 or EN 61386-22 > “speed:pipe®” from manufacturer “gabo Systemtechnik GmbH” of dimension (diameter x wall thickness) 7 mm x 0,75 mm, 10 mm x 1,0 mm, 12 mm x 1,1 mm, 7 mm x 1,5 mm, 10 mm x 2,0 mm and 12 mm x 2,0 mm (with / without optical fibre cables) > Bundles with a maximum Ø of 80 mm consisting of “speed:pipe®” from manufacturer “gabo Systemtechnik GmbH” of dimension (diameter x wall thickness) 7 mm x 0,75 mm, 10 mm x 1,0 mm, 12 mm x 1,1 mm, 7 mm x 1,5 mm, 10 mm x 2,0 mm and 12 mm x 2,0 mm (with / without optical fibre cables)

¹ Single or multicore cable with individual insulation of the cores and an additional protective covering of the assembly

² Several cables running in the same direction, densely packed and bound tightly together by mechanical means

2.4.3 This European Technical Assessment does not verify the prevention of destruction of adjacent building elements with fire separating function or of the pipes themselves due to distortion forces caused by extreme temperatures. These risks shall be accounted for by taking appropriate measures when designing or installing the pipe work.

The mounting or hanging of the pipes or the layout of the pipe work shall be implemented in such a way that the pipes and the fire resistant building elements shall remain functional within a period of time which corresponds to the fire resistance period required.

2.4.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this European Technical Assessment (see EN 1366-3:2009, clause 1).

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

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

2.5 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data / information, deposited with the Österreichisches Institut für Bautechnik, 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 the Österreichisches Institut für Bautechnik before the changes are introduced.

The Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment and consequently the validity of the CE marking on the basis of the European Technical Assessment and if so whether further assessment or alterations to the European Technical Assessment, shall be necessary.

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 2	Reaction to fire	EN 13501-1: 2018	Clause 3.1.1 of the ETA
	Resistance to fire	EN 13501-2: 2007+A1:2009 and EN 13501-2: 2016	Clause 3.1.2 of the ETA and Annex F-1 and Annex J-1 of the ETA
BWR 3	Air permeability	EN 1026:2016	Clause 3.2.1 of the ETA
	Water permeability	No performance assessed	
	Content, emission and/or release of dangerous substances	EAD 350454-00-1104 clause 2.2.5	Clause 3.2.3 of the ETA

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 4	Mechanical resistance and stability	No performance assessed	
	Resistance to impact / movement	No performance assessed	
	Adhesion	No performance assessed	
	Durability	EAD 350454-00-1104 clause 2.2.9	Clause 3.3.4 of the ETA
BWR 5	Airborne sound insulation	EN ISO 10140-2:2010	Clause 3.4.1 of the ETA
BWR 6	Thermal properties	EN 12667:2001 and EN 12664:2001	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 “SikaSeal®-699 Fire System” were assessed according to EAD 350454-00-1104 clause 2.2.1 and classified according to EN 13501-1:2018.

Component	Class according to EN 13501-1:2018
SikaSeal®-635 Fire Foam	E
SikaSeal®-637 Fire Wrap	E
SikaSeal®-636 Fire Brick	E
Intumescent inlay of SikaSeal®-630 Fire Collar	E
Sheet steel housing of SikaSeal®-630 Fire Collar	A1

3.1.2 Resistance to fire

“SikaSeal®-699 Fire System” was tested according to EAD 350454-00-1104 clause 2.2.2, prEN 1366-3.2:N185:2007-07 and EN 1366-3:2009 in conjunction with EN 1363-1:1999 and EN 1363-1:2012.

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 “SikaSeal®-699 Fire System” has been classified according to EN 13501-2:2007+A1:2009 and EN 13501-2:2016. 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 “SikaSeal®-699 Fire System” is installed according to Annex A-1 to A-6 of the ETA.

3.2 Hygiene, health and the environment (BWR 3)

3.2.1 Air permeability

The air permeability of “SikaSeal®-635 Fire Foam” 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 ≥ 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 m².

“SikaSeal®-699 Fire System” was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components “SikaSeal®-637 Fire Wrap”, “SikaSeal®-636 Fire Brick” and “SikaSeal®-630 Fire Collar” were not included in these tests. The measurement accuracy was 0,01 m³/h.

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

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

The air permeability of “SikaSeal®-635 Fire Foam” 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 ≥ 20 mm thick 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 m².

“SikaSeal®-699 Fire System” was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components “SikaSeal®-637 Fire Wrap”, “SikaSeal®-636 Fire Brick” and “SikaSeal®-630 Fire Collar” 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 m³/h, so that the air permeability at $\Delta p = 600$ Pa is less than 0,08 m³/(h*m²).

The air permeability of “SikaSeal®-636 Fire Brick” 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 ≥ 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 m².

“SikaSeal®-699 Fire System” was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components “SikaSeal®-637 Fire Wrap”, “SikaSeal®-635 Fire Foam” and “SikaSeal®-630 Fire Collar” were not included in these tests. The measurement accuracy was 0,01 m³/h.

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

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

The air permeability of “SikaSeal®-636 Fire Brick” 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 ≥ 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 m².

“SikaSeal®-699 Fire System” was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3.

The components “SikaSeal®-637 Fire Wrap”, “SikaSeal®-635 Fire Foam” and “SikaSeal®-630 Fire Collar” were not included in these tests. The measurement accuracy was 0,01 m³/h.

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

Δp in Pa	50	100	150	200	250	300	450	600
q/A in m ³ /(h*m ²)	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 Content, emission and/or release of dangerous substances

The release of semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) has been determined for “SikaSeal®-635 Fire Foam”, “SikaSeal®-637 Fire Wrap” and “SikaSeal®-636 Fire Brick” according to EAD 350454-00-1104 clause 2.2.5.1 and prEN 16516:2015. The loading factor used for emission testing was 0,007 m²/m³.

Component	Total emission of SVOC after 3 days in mg/m ³	Total emission of SVOC after 28 days in mg/m ³
SikaSeal®-635 Fire Foam	0,024	0,011
SikaSeal®-637 Fire Wrap	0,060	0,020
SikaSeal®-636 Fire Brick	< 0,005	< 0,005

Component	Total emission of VOC after 3 days in mg/m ³	Total emission of VOC after 28 days in mg/m ³
SikaSeal®-635 Fire Foam	0,027	< 0,005
SikaSeal®-637 Fire Wrap	< 0,005	< 0,005
SikaSeal®-636 Fire Brick	0,008	0,006

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

D_{n,e,w} in dB	C in dB	C_{tr} in dB	R_w in dB	C in dB	C_{tr} in dB
66	-1	-6	47	-1	-6

The airborne sound insulation of “SikaSeal®-636 Fire Brick” with a thickness of 144 mm 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 ≥ 25 mm thick calcium silicate boards (classification A1 according to EN 13501-1) with a width of 144 mm. The opening size was 350 mm x 350 mm (width x height), resp. 0,123 m².

“SikaSeal®-699 Fire System” was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.10. The components “SikaSeal®-637 Fire Wrap”, “SikaSeal®-635 Fire Foam” and “SikaSeal®-630 Fire Collar” 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.

D_{n,e,w} in dB	C in dB	C_{tr} in dB	R_w in dB	C in dB	C_{tr} in dB
64	-1	-6	44	-1	-6

The airborne sound insulation of “SikaSeal®-636 Fire Brick” with a thickness of 200 mm 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 ≥ 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 m².

“SikaSeal®-699 Fire System” was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.10. The components “SikaSeal®-637 Fire Wrap”, “SikaSeal®-635 Fire Foam” and “SikaSeal®-630 Fire Collar” 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.

D_{n,e,w} in dB	C in dB	C_{tr} in dB	R_w in dB	C in dB	C_{tr} in dB
68	-4	-11	49	-4	-11

3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties

The thermal properties of “SikaSeal®-635 Fire Foam” and “SikaSeal®-636 Fire Brick” were tested according to EN 12667:2001.

Component	$\lambda_{10,23/50}$ in W/(m*K)
SikaSeal®-635 Fire Foam	0,088
SikaSeal®-636 Fire Brick	0,103

The thermal properties of “SikaSeal®-637 Fire Wrap” were tested according to EN 12664:2001.

Component	λ_{10} in W/(m*K)
SikaSeal®-637 Fire Wrap	0,396

3.5.2 Water vapour permeability

No performance assessed.

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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/EC⁶, amended by Decision 2001/596/EC⁷ 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.

Product(s)	Intended use(s)	Level(s) or class(es) (resistance to fire)	System 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
<p>* 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)</p> <p>** Products/materials not covered by footnote (*)</p> <p>*** 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)</p>			

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 twice a year for surveillance of the manufacturer.

Issued in Vienna on 29.07.2021
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

⁶ Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

⁷ Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

- > 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.
- > In some cases (see Annex J-1 of the ETA) – for fire resistance class EI 120 of cable penetration seals – "SikaSeal®-637 Fire Wrap" has to be wrapped on both sides of the penetration seal according to the ETA-holder's installation instructions around the cables, and cable support constructions (see Annex I-1 of the ETA).
- > "WICU® Eco" pipes have to be wrapped with "SikaSeal®-637 Fire Wrap" on both sides of the penetration seal according to the ETA-holder's installation instructions (see Annex E-4 of the ETA).
- > "WICU® Flex", "WICU® Frio" and "WICU® Clim" pipes in vertical separating elements have to be wrapped with "SikaSeal®-637 Fire Wrap" on both sides of the penetration seal according to the ETA-holder's installation instructions (see Annex E-4 of the ETA).
- > "WICU® Flex", "WICU® Frio" and "WICU® Clim" pipes in horizontal separating elements have to be wrapped with "SikaSeal®-637 Fire Wrap" on the top side of the penetration seal according to the ETA-holder's installation instructions (see Annex E-4 of the ETA).
- > PVC-U pipes and PE-HD pipes with a diameter > 50 mm in vertical separating elements have to be equipped with "SikaSeal®-630 Fire Collar" on both sides of the penetration seal according to the ETA-holder's installation instructions (see Annex E-7 of the ETA).
- > PVC-U pipes and PE-HD pipes with a diameter > 50 mm in horizontal separating elements have to be equipped with "SikaSeal®-630 Fire Collar" on the bottom side of the penetration seal according to the ETA-holder's installation instructions (see Annex E-7 of the ETA).
- > The smallest pipe collar corresponding to the relevant outer diameter of the pipe to be sealed off has to be used (see Annex E-6 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 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.

SikaSeal®-699 Fire System
- Details for installation -

ANNEX A-3

- > 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 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 the thickness of penetration seal) 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 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 "SikaSeal®-635 Fire Foam" 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 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.

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- Details for installation -

ANNEX A-4

- > 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 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 "SikaSeal®-635 Fire Foam", 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 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 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 "SikaSeal®-635 Fire Foam", 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.

SikaSeal®-699 Fire System
- Details for installation -

ANNEX A-5

View:

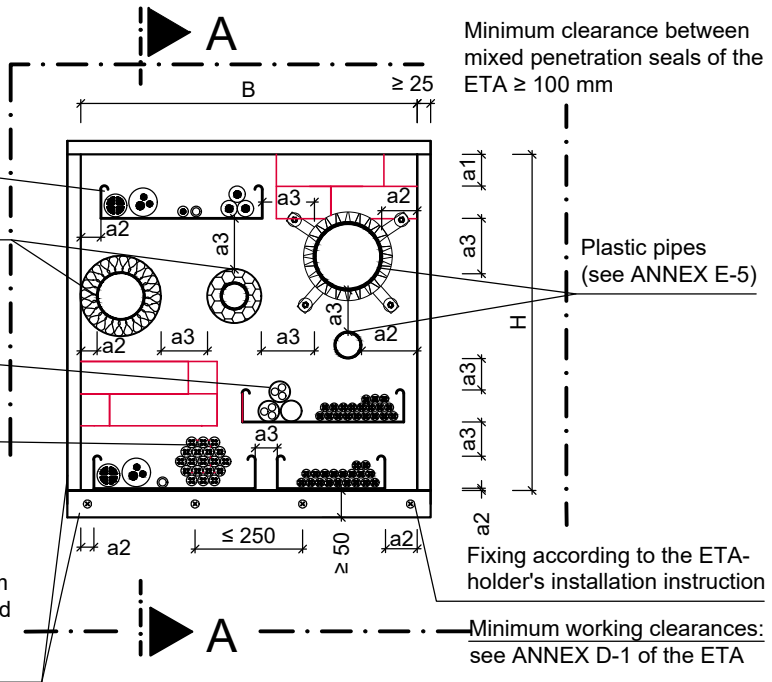
Cable support constructions / cables / steel conduits / plastic conduits / speed•pipe®

Insulated metal pipes (see ANNEX E-1 to E-3 of the ETA)

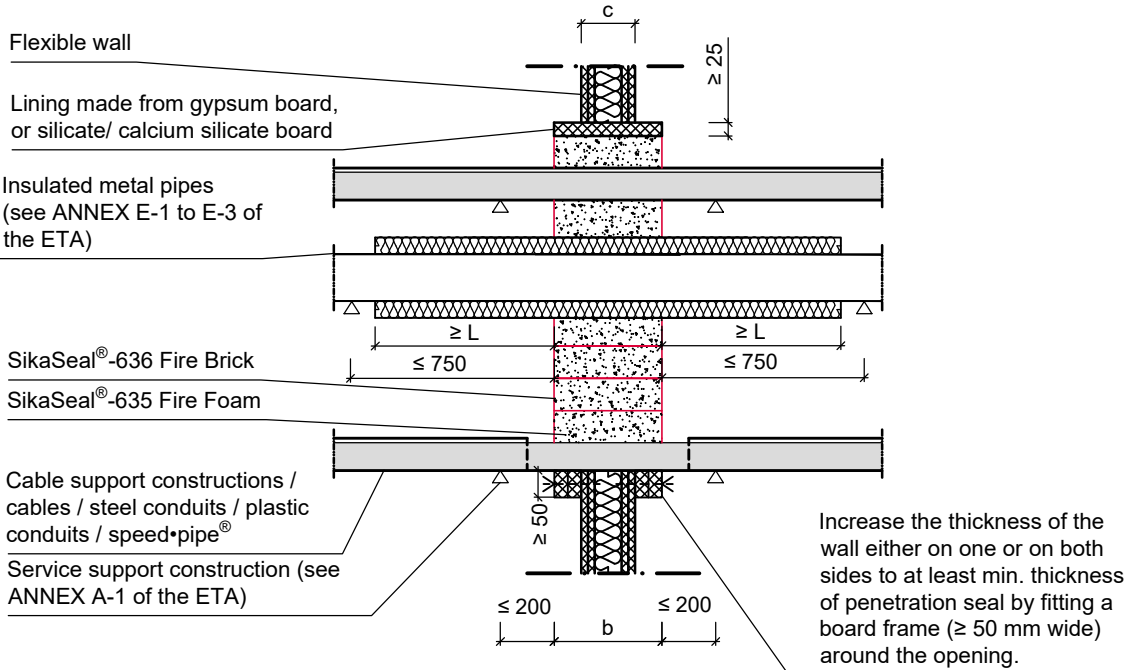
Bundles $\varnothing \leq 100$ mm consisting of plastic conduits ($\varnothing \leq 63$ mm)

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 ≥ 25 mm), alternatively frame made from gypsum board or silicate/ calcium silicate board ≥ 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		Thickness of penetration seal (b)
			H [mm]	B [mm]	
Flexible wall	see ANNEX F-1 of the ETA	≥ 94	≤ 500	≤ 450	see ANNEX F-1 of the ETA

SikaSeal®-699 Fire System

- mixed penetration seal

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

ANNEX B-1

View:

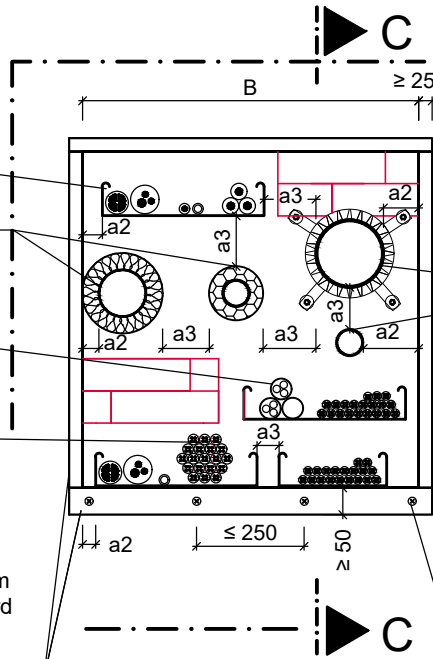
Cable support constructions / cables / steel conduits / plastic conduits / speed•pipe®

Insulated metal pipes (see ANNEX E-1 to E-3 of the ETA)

Bundles $\varnothing \leq 100$ mm consisting of plastic conduits ($\varnothing \leq 63$ mm)

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 ≥ 25 mm), alternatively frame made from gypsum board or silicate/ calcium silicate board ≥ 50 mm width around the opening (see ANNEX A-4 of the ETA)



Minimum clearance between mixed penetration seals of the ETA ≥ 100 mm

Plastic pipes (see ANNEX E-5 of the ETA)

Fixing according to the ETA-holder's installation instruction

Minimum working clearances: see ANNEX D-1 of the ETA

Cross Section C-C:

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

SikaSeal®-636 Fire Brick

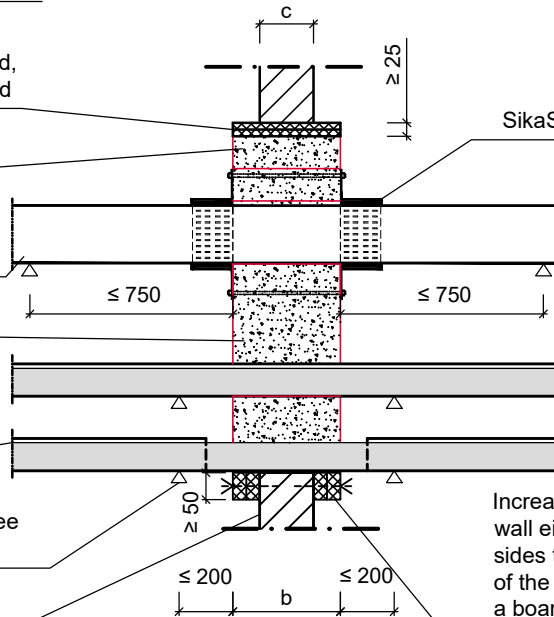
Plastic pipes (see ANNEX E-5 of the ETA)

SikaSeal®-635 Fire Foam

Cable support constructions / cables / steel conduits / plastic conduits / speed•pipe®

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

Rigid wall



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

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	$100 \leq c < b$	≤ 500	≤ 450	see ANNEX F-1 of the ETA

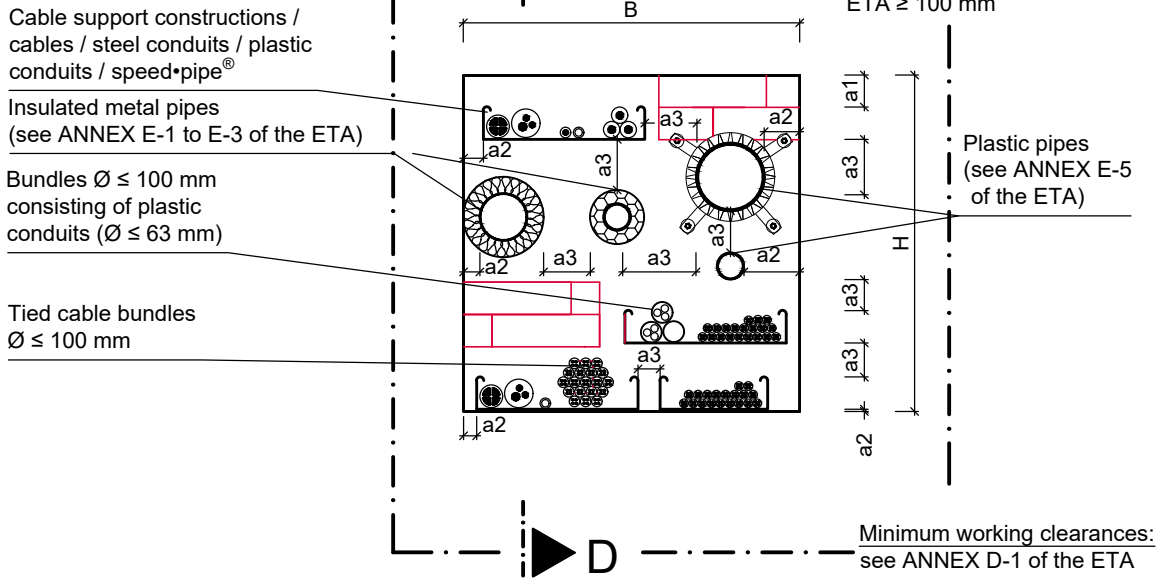
SikaSeal®-699 Fire System

- mixed penetration seal

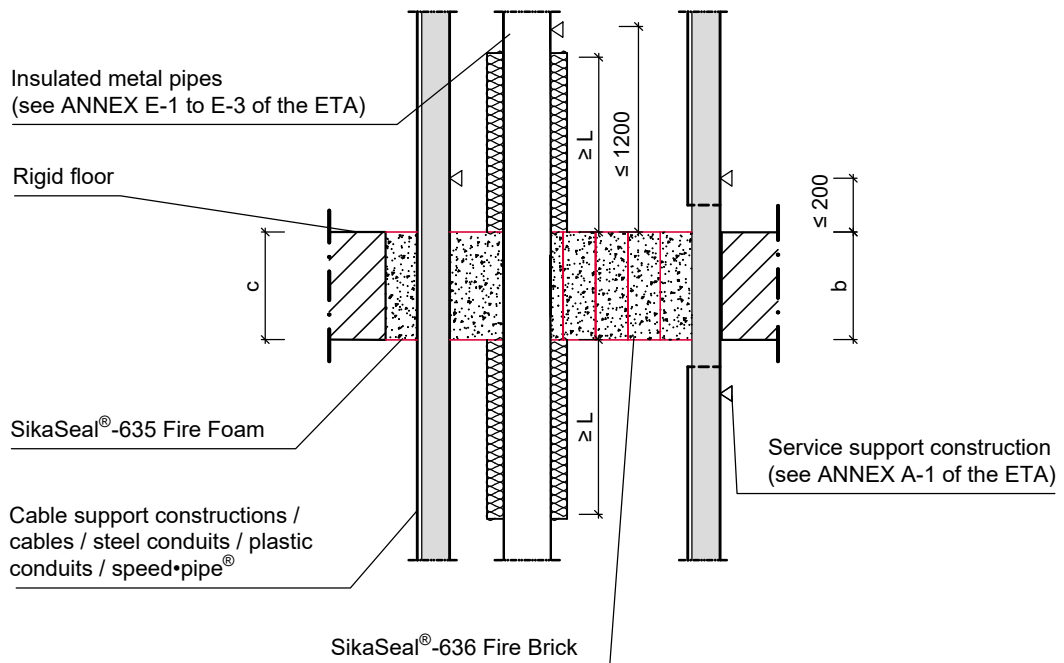
- Installation in rigid wall, thickness $100 \text{ mm} \leq c < b$ -

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		Thickness of penetration seal (b)
			H [mm]	B [mm]	
Rigid Floor	see ANNEX F-1 of the ETA	≥ b (min. 150 mm)	≤ 450	≤ 450	see ANNEX F-1 of the ETA

SikaSeal®-699 Fire System

- mixed penetration seal

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

ANNEX C-1

Top View:

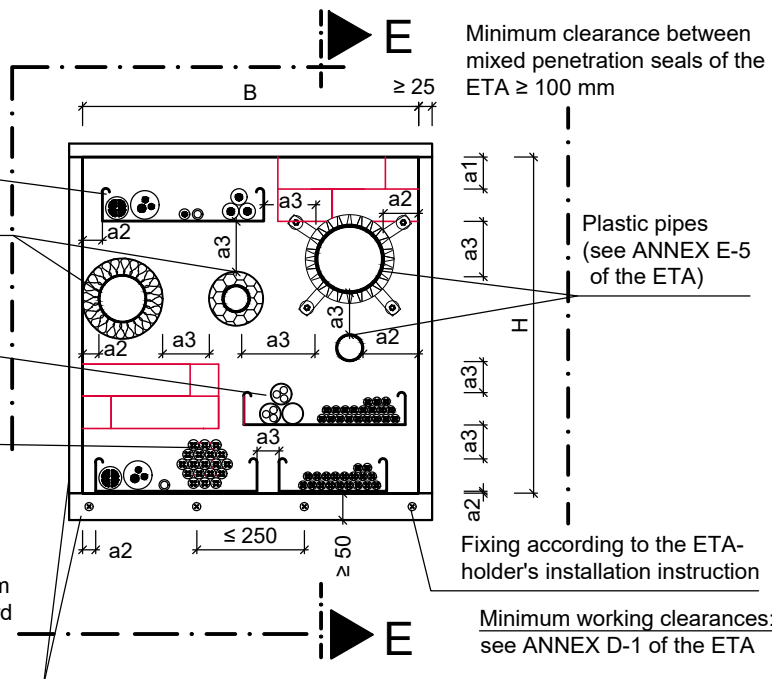
Cable support constructions / cables / steel conduits / plastic conduits / speed•pipe®

Insulated metal pipes (see ANNEX E-1 to E-3 of the ETA)

Bundles $\varnothing \leq 100$ mm consisting of plastic conduits ($\varnothing \leq 63$ mm)

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 ≥ 25 mm), alternatively frame made from gypsum board or silicate/ calcium silicate board ≥ 50 mm width around the opening (see clause ANNEX A-5 of the ETA)



Minimum clearance between mixed penetration seals of the ETA ≥ 100 mm

Plastic pipes (see ANNEX E-5 of the ETA)

Fixing according to the ETA-holder's installation instruction

Minimum working clearances: see ANNEX D-1 of the ETA

Cross Section E-E:

Plastic pipes (see ANNEX E-5 of the ETA)

Rigid floor

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

SikaSeal®-636 Fire Brick

SikaSeal®-630 Fire Collar

SikaSeal®-635 Fire Foam

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 the penetration seal by fitting a board frame (≥ 50 mm wide) around the opening.

Cable support constructions / cables / steel conduits / plastic conduits / speed•pipe®

All dimensions in mm

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

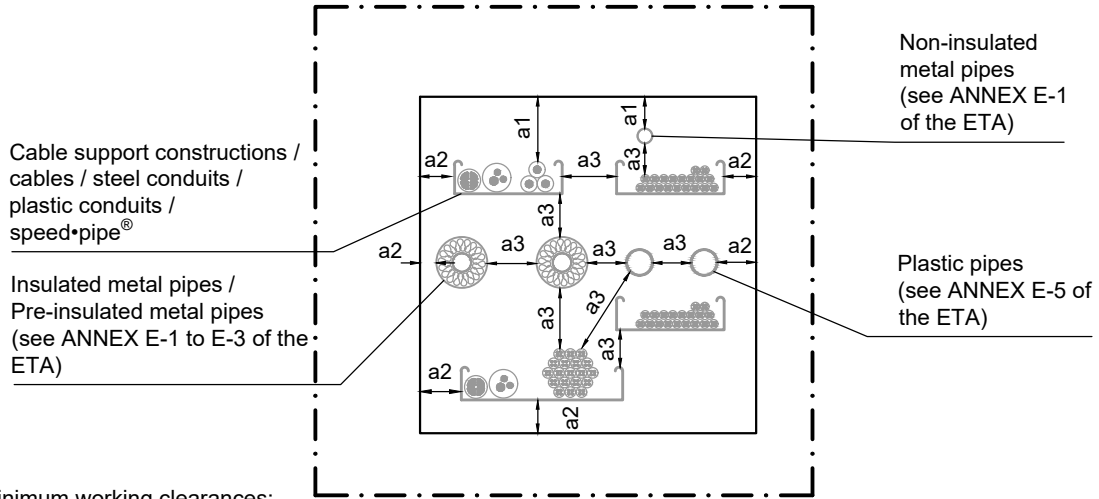
SikaSeal®-699 Fire System

- 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

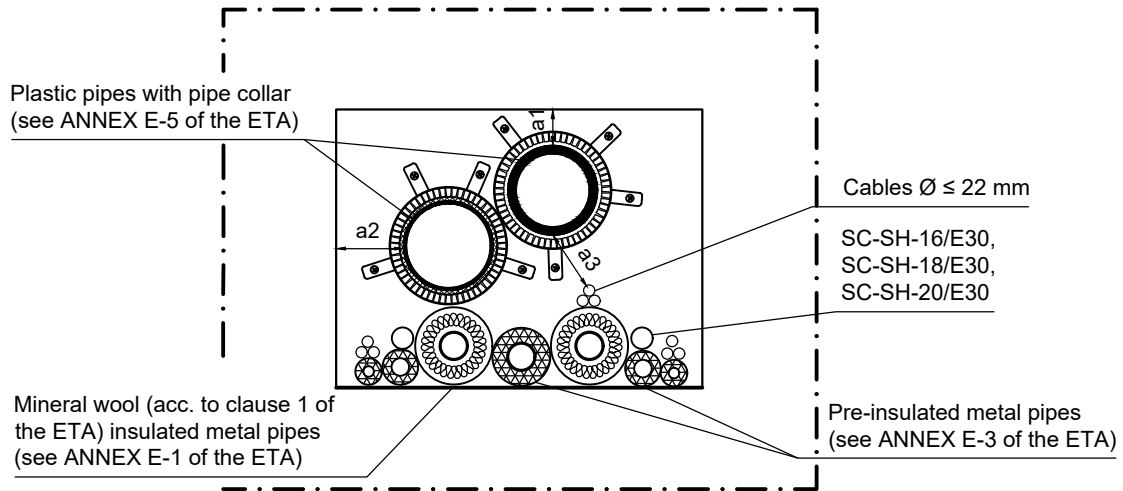
<u>Minimum working clearances</u>			
Penetrating element	a1	a2	a3
Cables/ Cable trays/ Conduits (incl. speed•pipe®)	50 mm (speed•pipe® = 0 mm)	0 mm	<ul style="list-style-type: none"> • Cables/ Cable trays/ Conduits 0 mm • Cable trays (vertical) 50 mm • Non-insulated metal pipes 60 mm • Other penetrating elements 50 mm
Mineral wool (see clause 1 of the ETA) insulated metal pipes	0 mm	0 mm	<ul style="list-style-type: none"> • Mineral wool insulated metal pipes 0 mm • Plastic pipes with pipe collar 0 mm • Non-insulated metal pipes 60 mm • Other penetrating elements 50 mm
AF/Armaflex insulated metal pipes	35 mm	35 mm	<ul style="list-style-type: none"> • AF/Armaflex (thickness > 9 mm) insulated metal pipes 35 mm • AF/Armaflex (thickness 9 mm) insulated metal pipes 50 mm • Non-insulated metal pipes 60 mm • Other penetrating elements 50 mm
Non-insulated metal pipes	35 mm	35 mm	<ul style="list-style-type: none"> • Non-insulated metal pipes 60 mm • Other penetrating elements 60 mm
Pre-insulated metal pipes	0 mm	0 mm	<ul style="list-style-type: none"> • Pre-insulated metal pipes 0 mm • Non-insulated metal pipes 60 mm • Other penetrating elements 50 mm
Plastic pipes (without pipe collar)	50 mm	50 mm	<ul style="list-style-type: none"> • Plastic pipes (without pipe collar) 50 mm • Non-insulated metal pipes 60 mm • Other penetrating elements 50 mm
Plastic pipes (with pipe collar)	50 mm*	0 mm*	<ul style="list-style-type: none"> • Plastic pipes (with pipe collar) 0 mm • Mineral wool insulated metal pipes 0 mm • Non-insulated metal pipes 60 mm • Other penetrating elements 50 mm

*Measured from the surface of the pipe

SikaSeal®-699 Fire System
- mixed penetration seal
- Minimum working clearances -

ANNEX D-1

View: Penetrating elements in a distance of 0 mm



Min. 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 clearances			
Penetrating element	a1	a2	a3
Cables $\varnothing \leq 22$ mm	50 mm	0 mm	<ul style="list-style-type: none"> • Cables $\varnothing \leq 22$ mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements
Mineral wool (see clause 1 of the ETA) insulated metal pipes	0 mm	0 mm	<ul style="list-style-type: none"> • Cables $\varnothing \leq 22$ mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements
SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 (Drain hose)	50 mm	0 mm	<ul style="list-style-type: none"> • Cables $\varnothing \leq 22$ mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements
Pre-insulated metal pipes	0 mm	0 mm	<ul style="list-style-type: none"> • Cables $\varnothing \leq 22$ mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements
Plastic pipes (with pipe collar)	50 mm*	0 mm*	<ul style="list-style-type: none"> • Cables $\varnothing \leq 22$ mm • Mineral wool insulated metal pipes • Pre-insulated metal pipes • Plastic pipes with pipe collar • SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 • Other penetrating elements

*Measured from the surface of the pipe

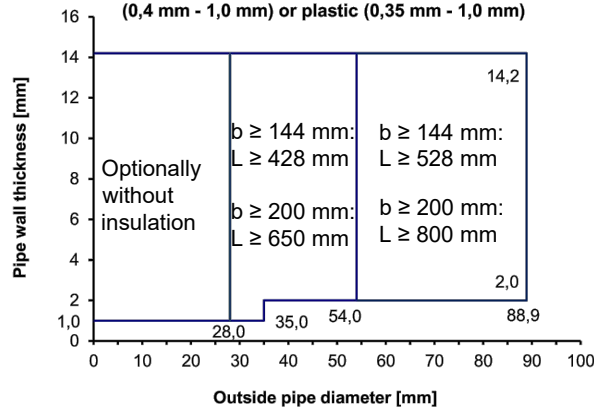
SikaSeal®-699 Fire System
- mixed penetration seal
- Minimum working clearances -

ANNEX D-2

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)

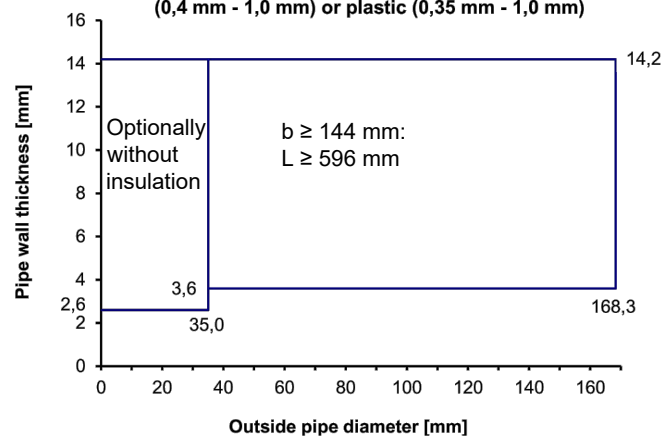
Metal pipes made of copper, steel, stainless steel, cast iron insulated with mineral wool, insulation optional sustained (LS, CS) or interrupted (LI, CI), optional clad with sheet steel (0,4 mm - 1,0 mm) or plastic (0,35 mm - 1,0 mm)



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)	≥ 90 kg/m ³	30 mm
LS (local-sustained)		30 mm
CI (continued-interrupted)		≥ 30 mm
CS (continued-sustained)		≥ 30 mm

Metal pipes made of 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)	≥ 90 kg/m ³	50 mm
LS (local-sustained)		50 mm
CI (continued-interrupted)		≥ 50 mm
CS (continued-sustained)		≥ 50 mm

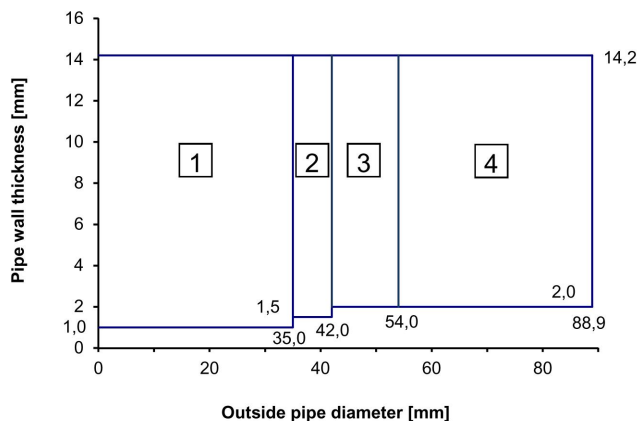
Interpolation between pipe diameters and wall thicknesses for metal pipes according to clause 2.1 of the ETA in flexible walls, rigid walls and rigid floors - mixed penetration seal

ANNEX E-1

Field of application of metal pipes

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

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

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-2

Field of application of metal pipes

Pre-insulated (CS) metal pipes used for air conditioning, heating and sanitary systems (C/U) and (C/C)

Penetrating element*	Outer diameter of the pipe (mm)	Pipe wall thickness (mm)	Insulation type	Insulation thickness (mm)	Additional precaution: SikaSeal®-637 Fire Wrap
WICU® Eco	12,0	1,0	PUR	11,0	one layer on both sides of the penetration seal (length** ≥ 150 mm, nominal thickness 3 mm)
	15,0	1,0		11,5	
	18,0	1,0		12,0	
	22,0	1,0		12,5	
	28,0	1,5		17,5	
	35,0	1,5		18,0	
	42,0	1,5		24,0	
	54,0	2,0		27,5	
WICU® Flex	12,0	1,0	PE	6	wall: one layer on both sides of the penetration seal (length** ≥ 150 mm, nominal thickness 3 mm) floor: one layer on the top side of the penetration seal (length** ≥ 150 mm, nominal thickness 3 mm)
	15,0	1,0		6	
	18,0	1,0		6	
	22,0	1,0		6	
WICU® Frio	6,0	1,0	PE	8	
	10,0	1,0		10	
	12,0	1,0		10	
	14,0	1,0		10	
	15,0	1,0		10	
	16,0	1,0		10	
	18,0	1,0		10	
	22,0	1,0		10	
WICU® Clim	6,35	0,762	PE	6	
	9,52	0,813		8	
	12,70	0,813		10	
	15,87	0,889		10	
	19,05	0,889		10	
	22,22	0,889		10	
Tubolit® Split / Tubolit® DuoSplit	6,35	0,8	PE	9	no additional precaution
	9,52	0,8		9	
	12,70	0,8		9	
	15,88	1,0		9	
	19,05	1,0		9	
	22,22	1,0		9	

* copper pipes

** measured from the surface of the penetration seal

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

ANNEX E-3

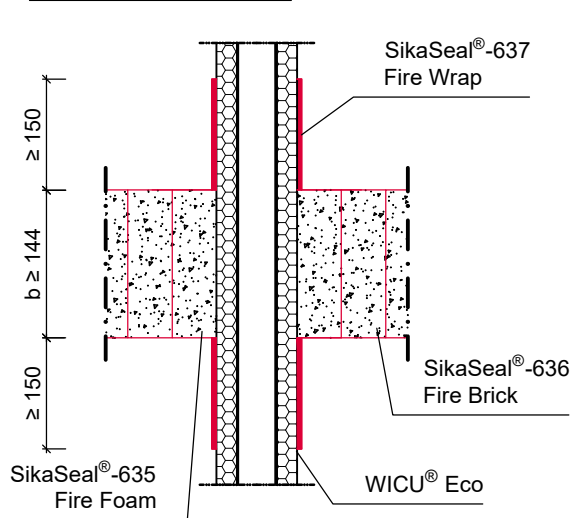
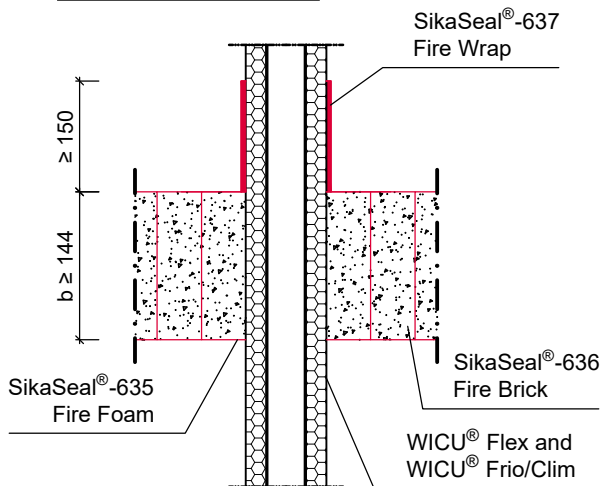
Arrangement of SikaSeal®-637 Fire Wrap for pre-insulated (CS) metal pipes used for air conditioning, heating and sanitary systems (C/U) and (C/C) (see ANNEX F-1 of the ETA):

Additional precaution for WICU® Flex and WICU® Frio/Clim

Additional precaution for WICU® Eco

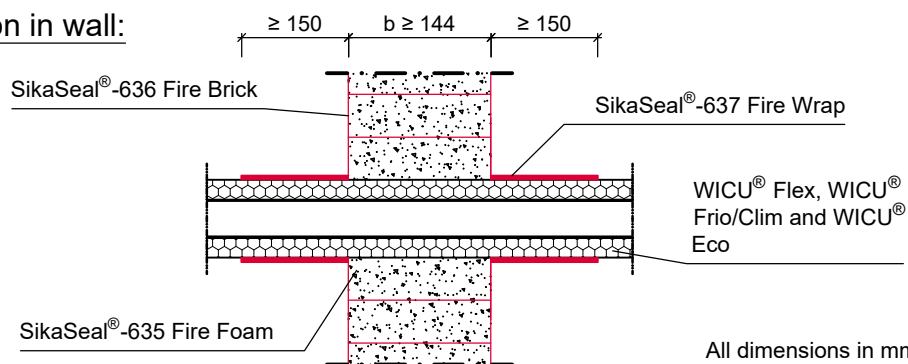
Installation in floor:

Installation in floor:



Additional precaution for WICU® Flex, WICU® Frio/Clim and WICU® Eco

Installation in wall:



The pre-insulated metal pipes have to be wrapped with strips of SikaSeal®-637 Fire Wrap of at least 150 mm width. 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. Two pre-insulated metal pipes of type WICU® Flex and WICU® Frio/Clim in a distance of 0 mm can be wrapped with one concerted SikaSeal®-637 Fire Wrap.

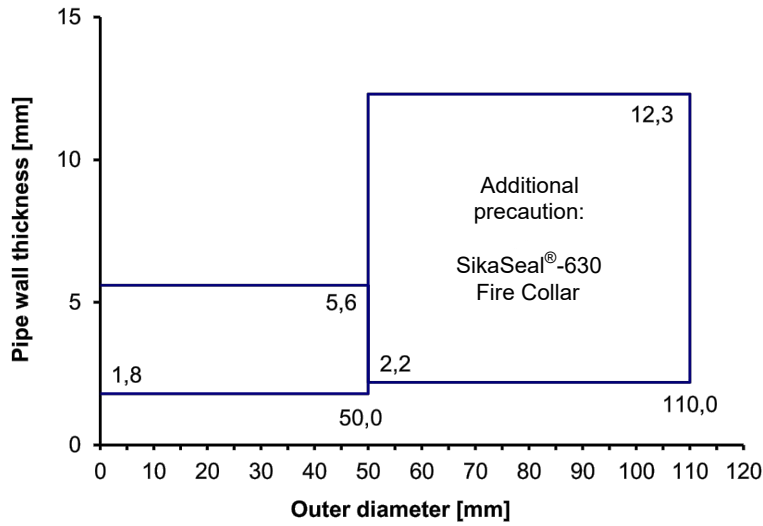
SikaSeal®-699 Fire System

- mixed penetration seal - Arrangement of "SikaSeal®-637 Fire Wrap" for pre-insulated metal pipes -

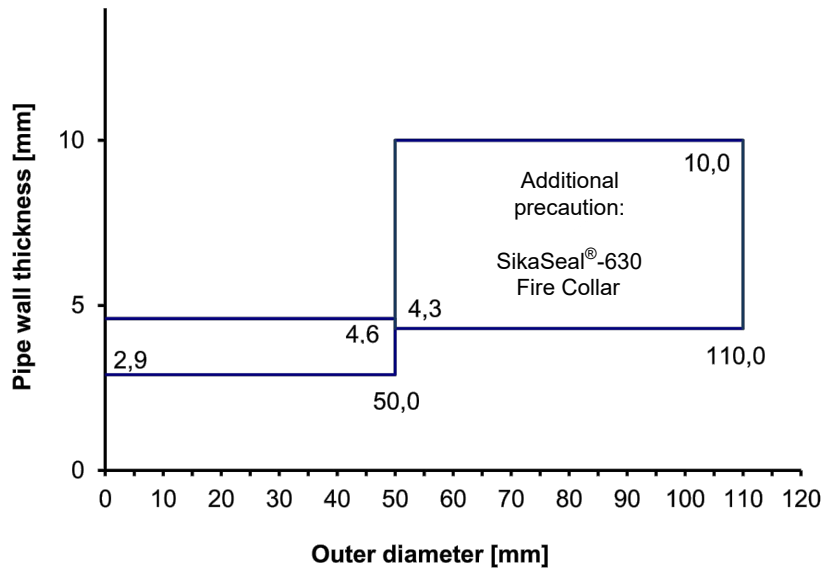
ANNEX E-4

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

**Plastic pipes made of PVC-U
acc. to clause 2.1 of the ETA**



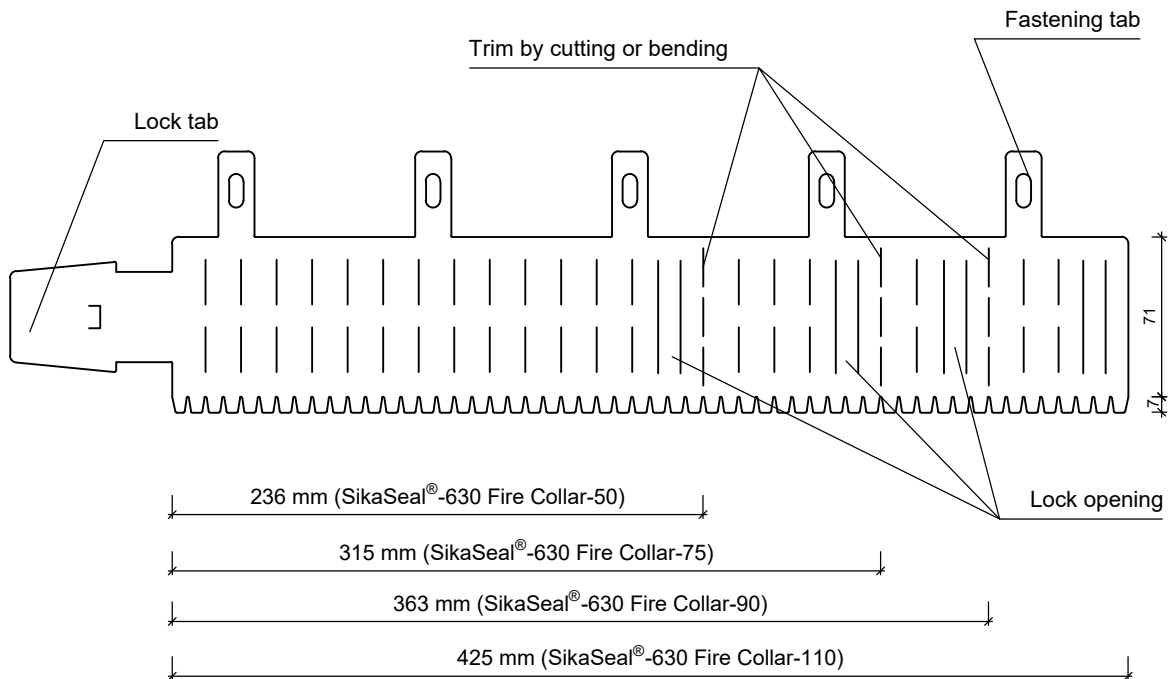
**Plastic pipes made of PE-HD
acc. to clause 2.1 of the ETA**



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-5

Material: stainless steel (1.4301) acc. to EN 10088
Sheet thickness: 0,6 mm +/- 0,1 mm



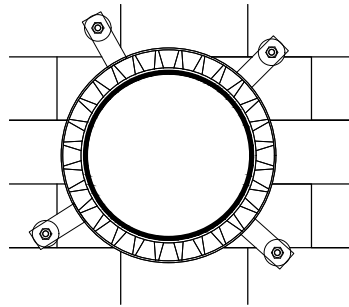
All dimensions in mm

Pipe outer diameter [mm]	Size of SikaSeal®-630 Fire Collar	Thickness of intumescent inlay [mm]	Width of intumescent inlay [mm]	Minimum number of fixing lugs to be fastened [pcs]
50	SikaSeal®-630 Fire Collar-50	7	70	3
75	SikaSeal®-630 Fire Collar-75	7	70	3
90	SikaSeal®-630 Fire Collar-90	7	70	3
110	SikaSeal®-630 Fire Collar-110	7	70	4

SikaSeal®-699 Fire System
Description of "SikaSeal®-630 Fire Collar"
- mixed penetration seal -

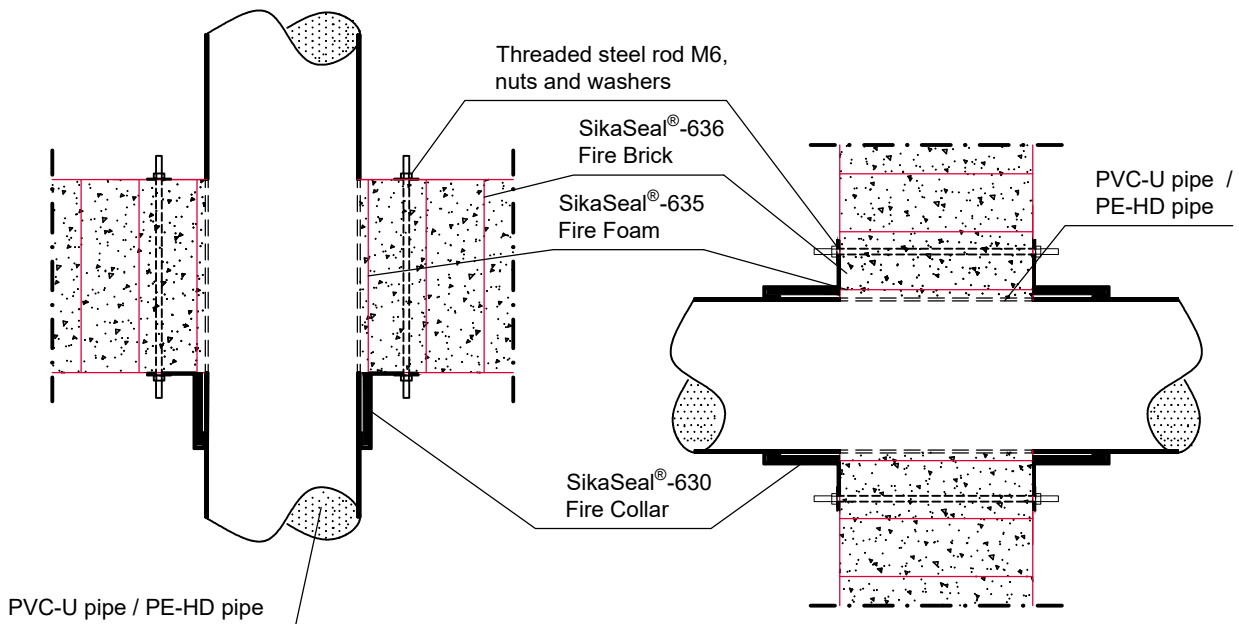
ANNEX E-6

Installation of SikaSeal®-630 Fire Collar for plastic pipes acc. to clause 2.1 of the ETA with a diameter of > 50 mm (see ANNEX F-1 of the ETA):



Installation in floor:

Installation in wall:



All dimensions in mm

The threaded steel rods (thread size M6; length \geq thickness of the penetration seal) can be pushed through SikaSeal®-635 Fire Foam / SikaSeal®-636 Fire Brick and have to be fixed on both sides of the penetration seal with washers and nuts (corresponding to the outer diameter of the threaded steel rods).

SikaSeal®-699 Fire System

**- mixed penetration seal - Installation of "SikaSeal®-630 Fire Collar"
for plastic pipes with a diameter > 50 mm -**

ANNEX E-7

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
Cables	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 up to a max. outer diameter of 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
Conduits / tubes	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 Ø 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
	Plastic conduits up to Ø 63 mm and bundles up to Ø 100 mm consisting of plastic conduits (Ø ≤ 63 mm) with/ without cables	wall: E 120-U/C / EI 120-U/C floor: E 60-U/C / EI 60-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C
	speed+pipe® up to Ø 12 mm and bundles up to Ø 80 mm consisting of speed+pipe® (Ø ≤ 12 mm) with/ without optical fibre cables	wall: E 120-U/C / EI 120-U/C floor: E 60-U/C / EI 60-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C
Non-insulated metal pipes	Copper 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
	Steel pipes up to a max. outer diameter of 35 mm*	wall: E 120-C/U / EI 90-C/U floor: E 60-C/U / EI 60-C/U	wall: E 120-C/U / EI 90-C/U floor: E 90-C/U / EI 90-C/U
Pre-insulated metal pipes	WICU® Frio pipes up to a max. outer diameter of 22 mm*	wall: E 120-C/U ¹⁾ / EI 90-C/U ¹⁾ floor: E 60-C/U ¹⁾ / EI 60-C/U ¹⁾	wall and floor: E 120-C/U ¹⁾ / EI 90-C/U ¹⁾
	WICU® Clim pipes up to a max. outer diameter of 22,22 mm*	wall: E 120-C/U ¹⁾ / EI 90-C/U ¹⁾ floor: E 60-C/U ¹⁾ / EI 60-C/U ¹⁾	wall and floor: E 120-C/U ¹⁾ / EI 90-C/U ¹⁾
	WICU® Flex pipes up to a max. outer diameter of 22 mm*	wall: E 120-C/U ¹⁾ / EI 90-C/U ¹⁾ floor: E 60-C/U ¹⁾ / EI 60-C/U ¹⁾	wall and floor: E 120-C/U ¹⁾ / EI 90-C/U ¹⁾
	WICU® Eco pipes up to a max. outer diameter of 35 mm*	wall: E 120-C/U ²⁾ / EI 60-C/U ²⁾ floor: E 60-C/U ²⁾ / EI 60-C/U ²⁾	wall: E 120-C/U ²⁾ / EI 60-C/U ²⁾ floor: E 90-C/U ²⁾ / EI 90-C/U ²⁾
	Tubolit® Split / Duosplit pipes up to a max. outer diameter of 12,7 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 120-C/U
Insulated metal pipes	Tubolit® Split / Duosplit pipes up to a max. outer diameter of 22,22 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
	Mineral wool 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: E 120-C/U / EI 90-C/U floor: E 120-C/U / EI 120-C/U
	Mineral wool insulated steel pipes up to a max. outer diameter of 168,3 mm*	wall: E 120-C/U / EI 120-C/U floor: E 60-C/U / EI 60-C/U	wall: E 120-C/U / EI 120-C/U floor: E 90-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
Plastic pipes / - tubes	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
	SC-SH-16/E30, SC-SH-18/E30 and SC-SH-20/E30 (drain hose) up to a max. outer diameter of 28 mm	wall: E 120-U/U / EI 60-U/U floor: E 60-U/U / EI 60-U/U	wall: E 120-U/U / EI 60-U/U floor: E 90-U/U / EI 90-U/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
	Plastic pipes up to a max. outer diameter of 110 mm*	wall: E 120-U/U ³⁾ / EI 120-U/U ³⁾ floor: E 60-U/U ³⁾ / EI 60-U/U ³⁾	wall: E 120-U/U ³⁾ / EI 120-U/U ³⁾ floor: E 90-U/U ³⁾ / EI 90-U/U ³⁾

- *) For permitted pipe wall thickness and insulation see ANNEX E-1 to E-3 and E-5 of the ETA
- 1) SikaSeal®-637 Fire Wrap has to be applied on both surfaces of wall or top surface of floor (For details see ANNEX E-4 of the ETA)
 - 2) SikaSeal®-637 Fire Wrap has to be applied on both surfaces of wall or floor (For details see ANNEX E-4 of the ETA)
 - 3) SikaSeal®-630 Fire Collar has to be applied on both surfaces of wall or bottom surface of floor (For details see ANNEX E-7 of the ETA)

SikaSeal®-699 Fire System
- mixed penetration seal
- Fire resistance classification -

ANNEX F-1

View:

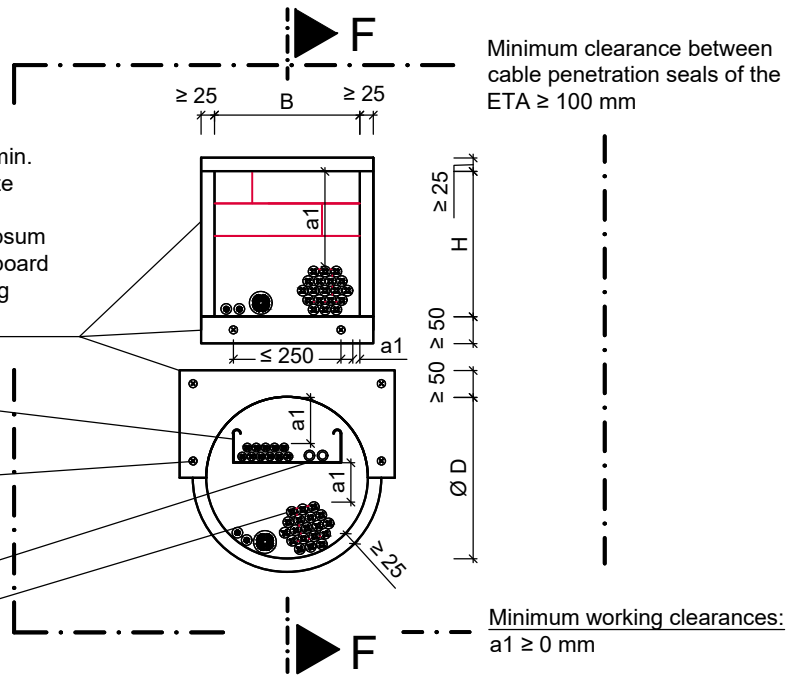
Lining (min. two layers of gypsum board of thickness $\geq 12,5$ mm or min. one layer of silicate/calcium silicate board of thickness ≥ 25 mm), alternatively frame made from gypsum board or silicate/ calcium silicate board ≥ 50 mm width around the opening (see ANNEX A-3 of the ETA)

Cable support constructions / cables

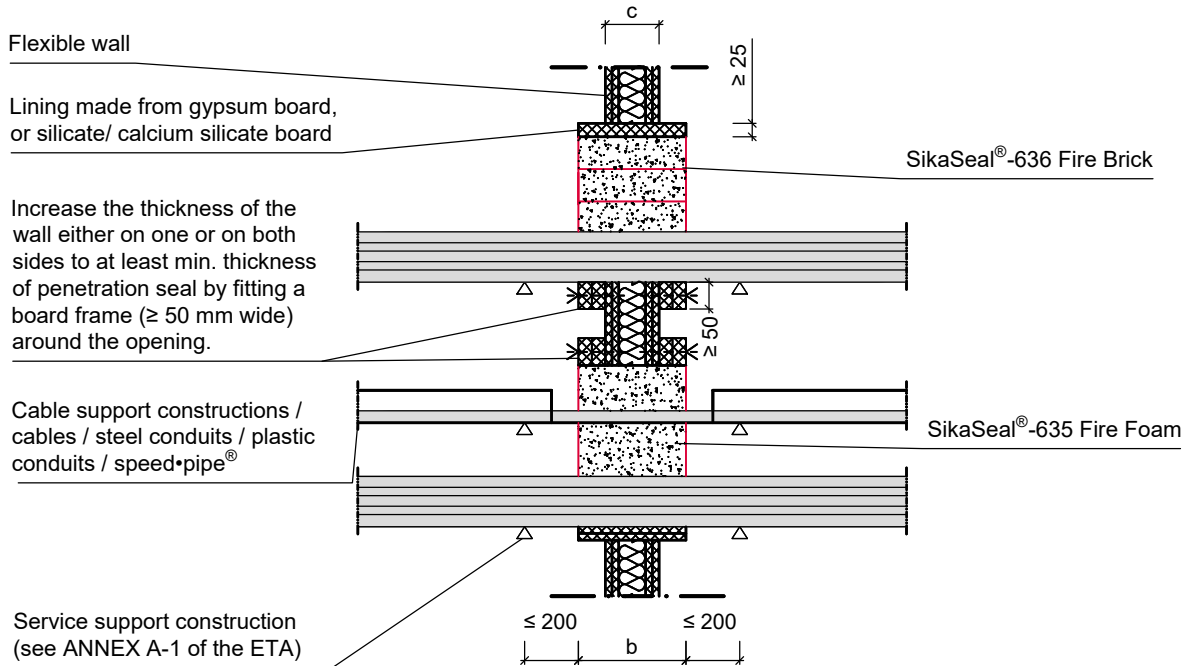
Fixing according to the ETA-holder's installation instruction

Steel conduits/ tubes, plastic conduits/ tubes, speed•pipe®

Tied cable bundles
 $\varnothing \leq 100$ mm



Cross Section F-F:



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)
Flexible wall	see ANNEX J-1 of the ETA	≥ 94	$\leq 270 \times 270$ / $\varnothing \leq 300$	see ANNEX J-1 of the ETA

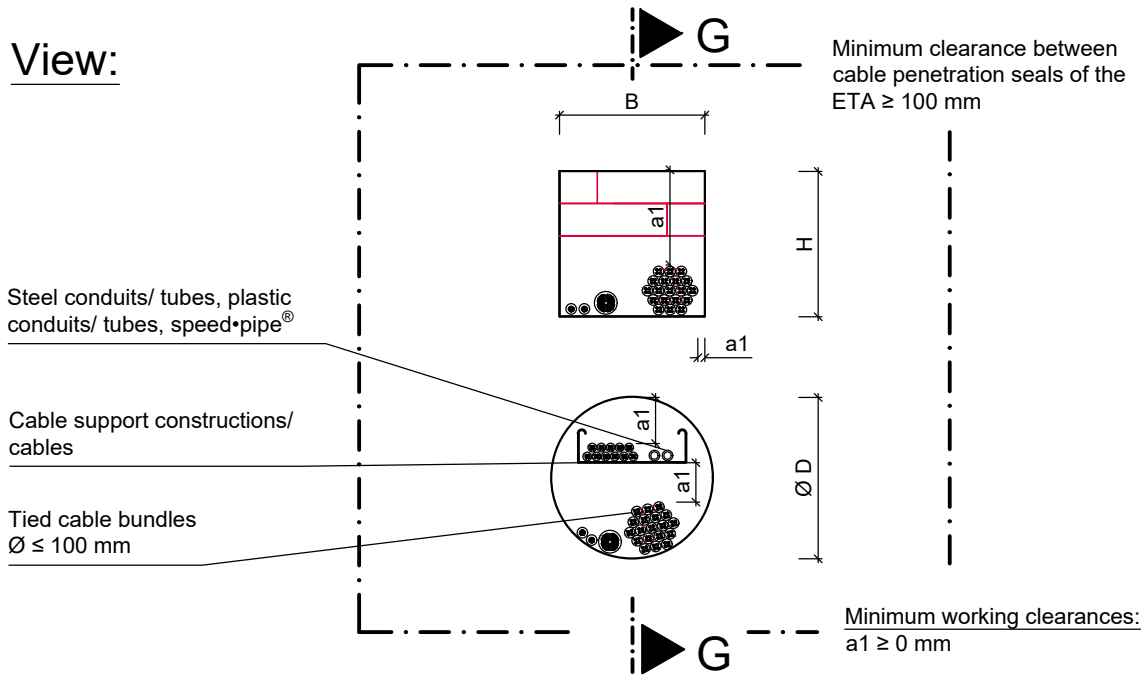
SikaSeal®-699 Fire System

- cable penetration seal

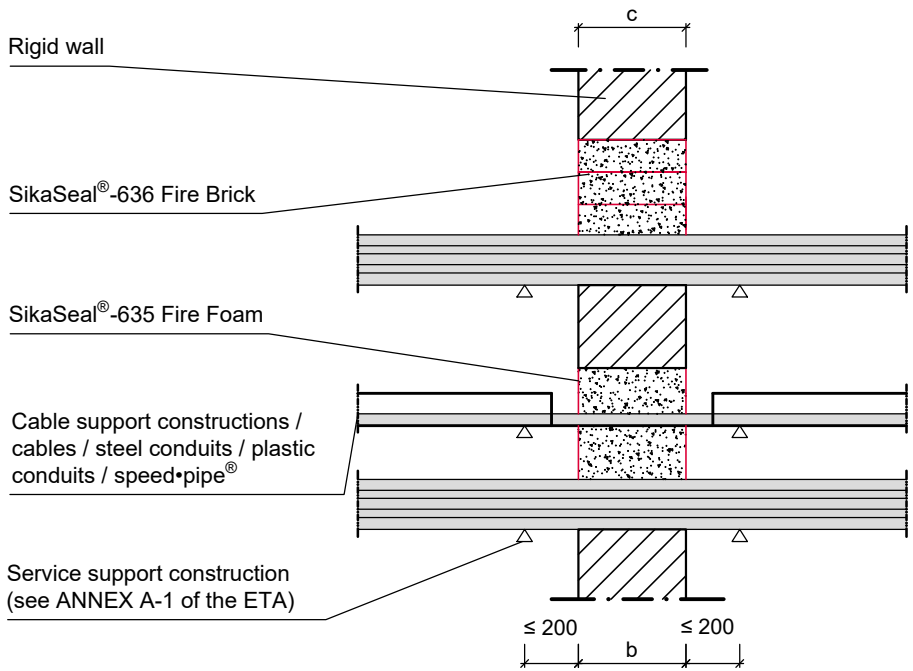
- Installation in flexible wall, thickness c ≥ 94 mm -

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] / Ø D [mm]	Thickness of penetration seal (b)
Rigid wall	see ANNEX J-1 of the ETA	≥ b	≤ 270 x 270 / Ø ≤ 300	see ANNEX J-1 of the ETA

SikaSeal®-699 Fire System
- cable penetration seal
- Installation in rigid wall, thickness $c \geq b$ -

ANNEX G-2

View:

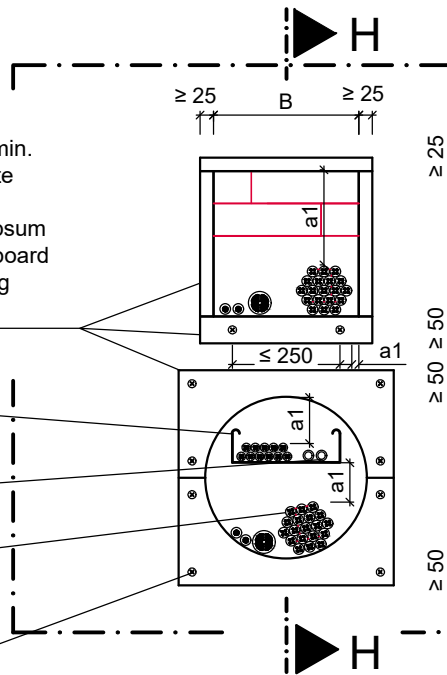
Lining (min. two layers of gypsum board of thickness $\geq 12,5$ mm or min. one layer of silicate/calcium silicate board of thickness ≥ 25 mm), alternatively frame made from gypsum board or silicate/ calcium silicate board ≥ 50 mm width around the opening (see ANNEX A-4 of the ETA)

Cable support constructions/ cables

Steel conduits/ tubes, plastic conduits/ tubes, speed•pipe®

Tied cable bundles $\varnothing \leq 100$ mm

Fixing according to the ETA-holder's installation instruction



Minimum clearance between cable penetration seals of the ETA ≥ 100 mm

Minimum working clearances:
 $a1 \geq 0$ mm

Cross Section H-H:

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

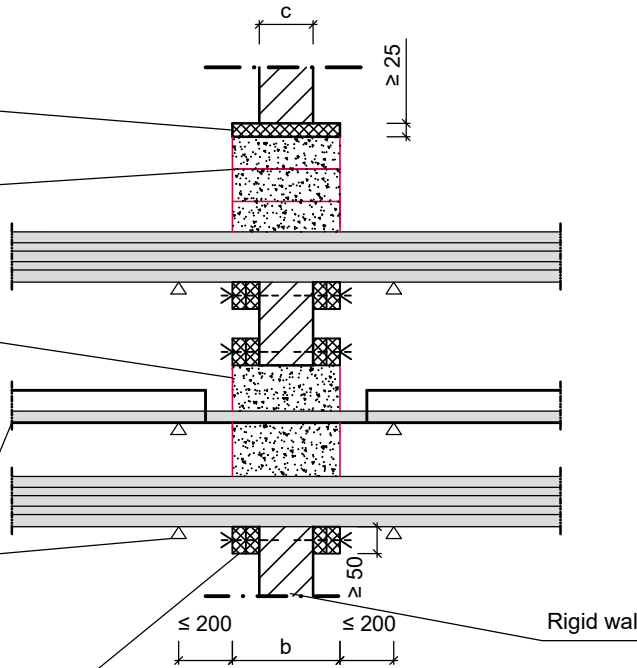
SikaSeal®-636 Fire Brick

SikaSeal®-635 Fire Foam

Cable support constructions / cables / steel conduits / plastic conduits / speed•pipe®

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 (≥ 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] / Ø 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

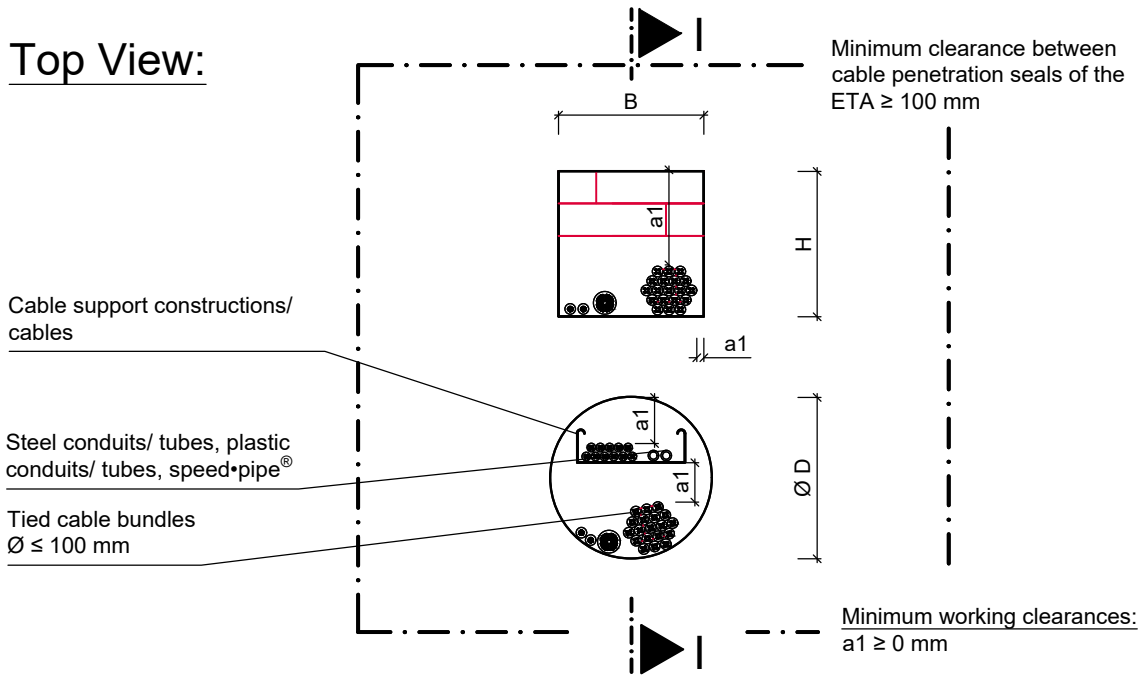
SikaSeal®-699 Fire System

- cable penetration seal

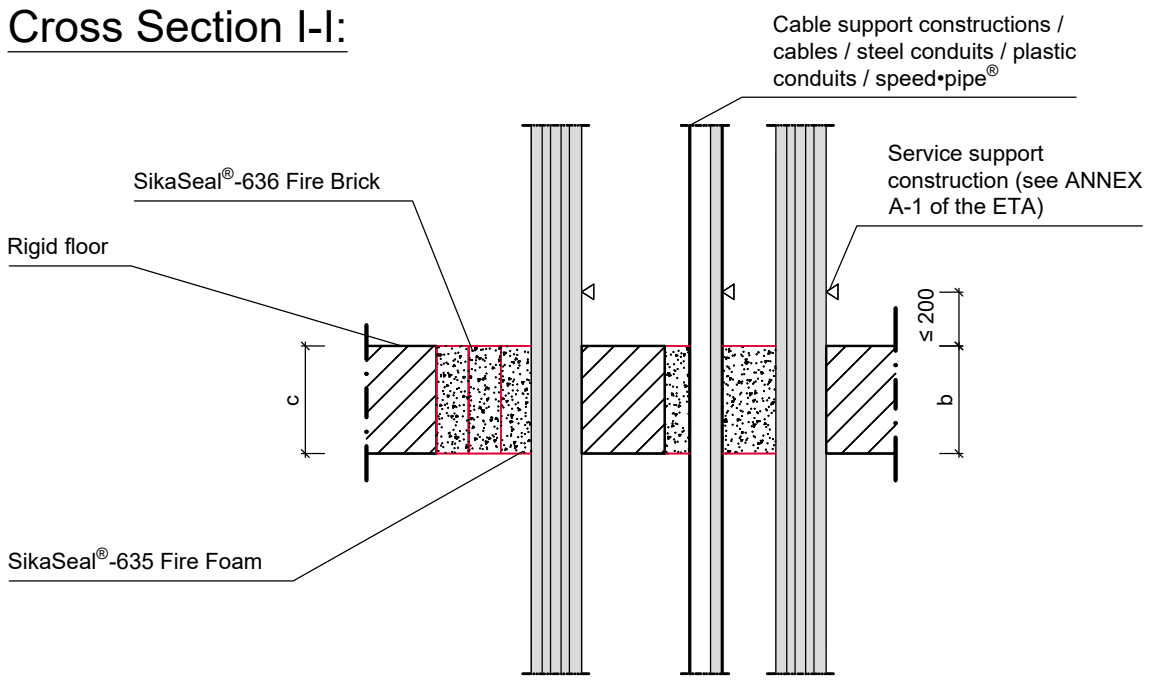
- Installation in rigid wall, thickness $100 \text{ mm} \leq c < b$ -

ANNEX G-3

Top View:



Cross Section I-I:



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 floor	see ANNEX J-1 of the ETA	$\geq b$ (min. 150 mm)	$\leq 270 \times 270$ / $\varnothing \leq 300$	see ANNEX J-1 of the ETA

SikaSeal®-699 Fire System
- cable penetration seal
- Installation in rigid floor, thickness $c \geq b$ -

ANNEX H-1

Top View:

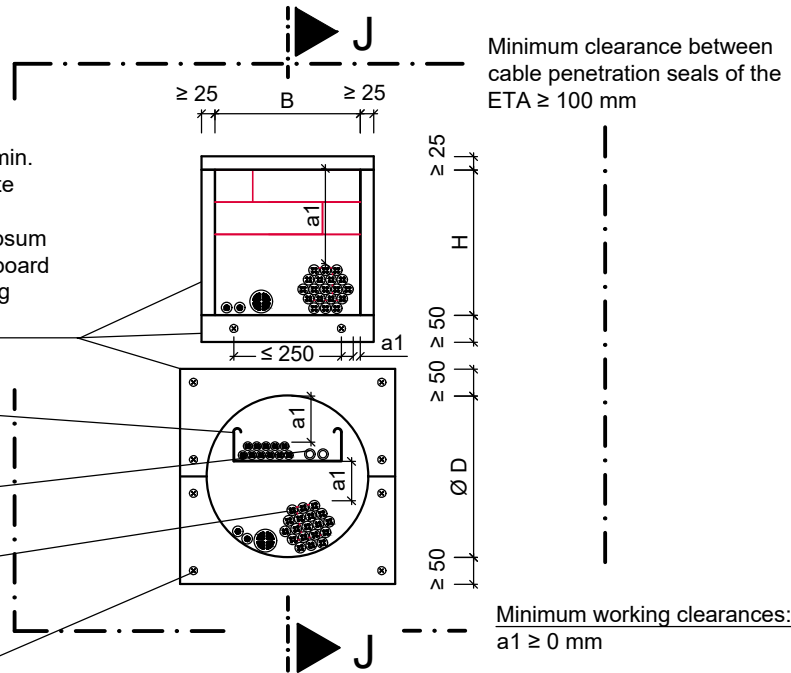
Lining (min. two layers of gypsum board of thickness $\geq 12,5$ mm or min. one layer of silicate/calcium silicate board of thickness ≥ 25 mm), alternatively frame made from gypsum board or silicate/ calcium silicate board ≥ 50 mm width around the opening (see ANNEX A-5 of the ETA)

Cable support constructions/ cables

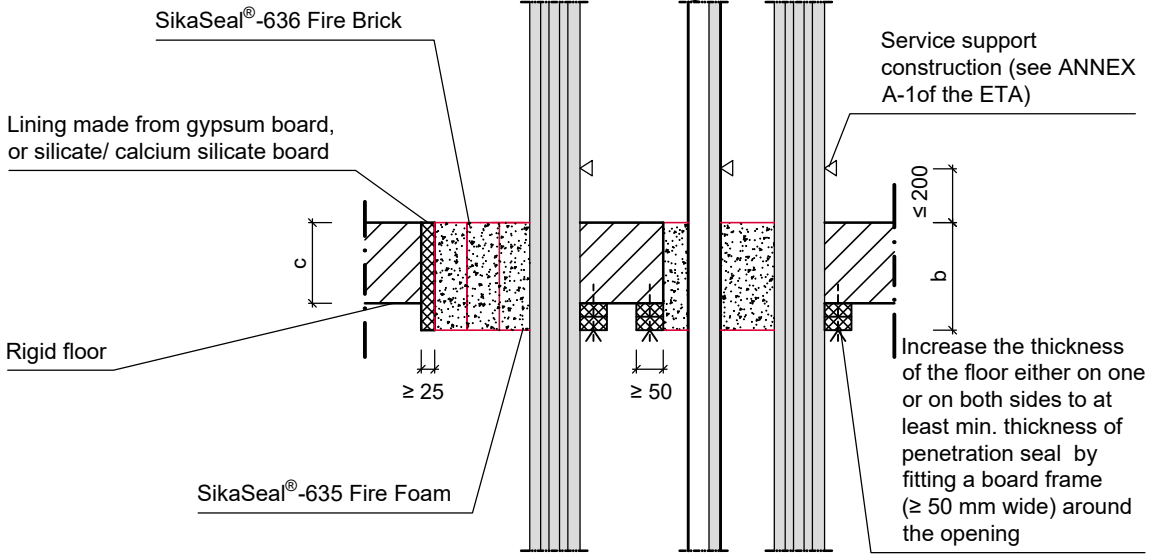
Steel conduits/ tubes, plastic conduits/ tubes, speed•pipe®

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] / \varnothing 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

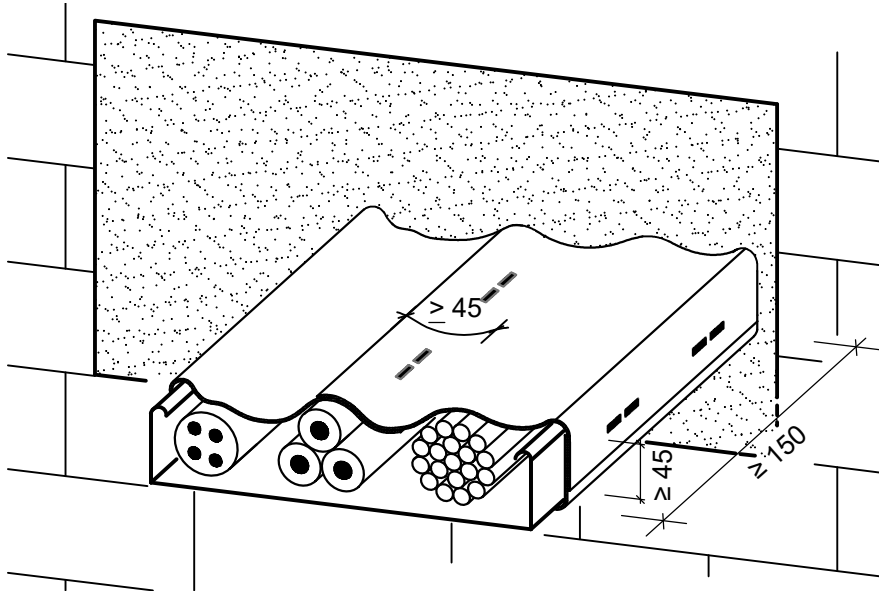
SikaSeal®-699 Fire System

- cable penetration seal

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

ANNEX H-2

Arrangement of SikaSeal[®]-637 Fire Wrap
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 SikaSeal[®]-637 Fire Wrap 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

SikaSeal[®]-699 Fire System
- cable penetration seal
- Arrangement of "SikaSeal[®]-637 Fire Wrap" -

ANNEX I-1

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	wall: E 120 / EI 120 floor: E 120 / EI 90	E 120 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 ¹⁾	E 120 EI 60	E 120 EI 90 / EI 120 ²⁾	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 ²⁾	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 ²⁾	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 Ø 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
Plastic conduits up to Ø 63 mm and bundles up to Ø 100 mm consisting of plastic conduits (Ø ≤ 63 mm) with/ without cables	--	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C
speed•pipe® up to Ø 12 mm and bundles up to Ø 80 mm consisting of speed•pipe® (Ø ≤ 12 mm) with/ without optical fibre cables	--	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C	wall: E 120-U/C / EI 120-U/C floor: E 90-U/C / EI 90-U/C

- 1) A bead of SikaSeal®-635 Fire Foam with min. dimension of 30 mm x 20 mm (length x thickness) has to be applied around the penetrating element on both sides of the penetration seal.
- 2) SikaSeal®-637 Fire Wrap (see ANNEX I-1 of the ETA) has to be wrapped around the penetrating element on both sides of the penetration seal.

SikaSeal®-699 Fire System
- cable penetration seal
- Fire resistance classification -

ANNEX J-1