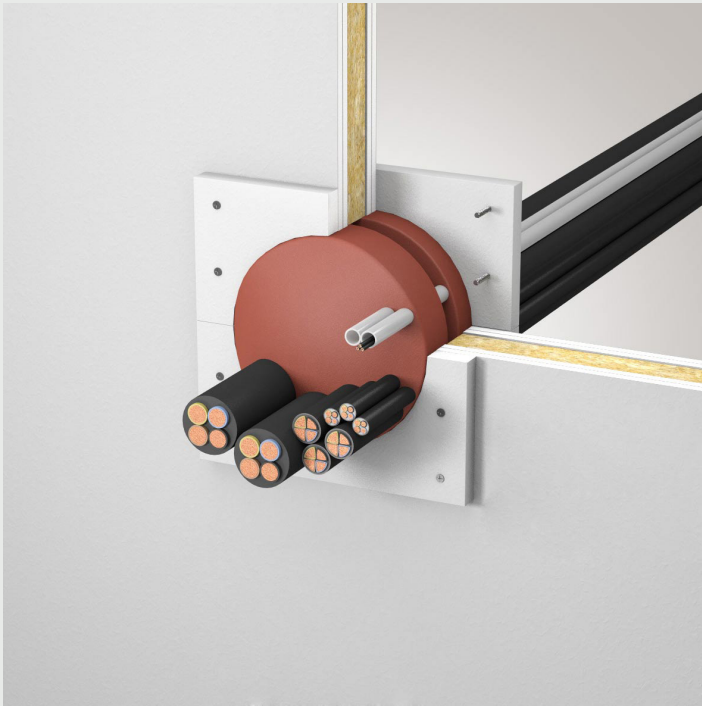




ZULASSUNG KABELABSCHOTTUNG

ISIFOAM NE BRANDSCHUTZSTOPFEN
„SYSTEM ZZ® C10“ ETA-12/0088



Austrian Institute of Construction Engineering
Schenkenstrasse 4 | T+43 1 533 65 50
1010 Vienna | Austria | F+43 1 533 64 23
www.oib.or.at | mail@oib.or.at



European Technical Assessment

ETA-12/0088
of 07.07.2017

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

ZZ C10

Product family to which the construction product belongs

Fire Stopping and Fire Sealing Products:
Penetration Seals

Manufacturer

Karl Zimmermann
Miltzstraße 29
51061 Köln
GERMANY

Manufacturing plant

Karl Zimmermann GmbH
Marconistraße 7-9
50769 Köln
GERMANY

This European Technical Assessment contains

21 pages including Annexes A-1 to D-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

Guideline for European technical approval for
“Fire Stopping and Fire Sealing Products”, ETAG
026 Part 2: “Penetration Seals”, edition August
2011, used as European Assessment Document
(EAD)

This European Technical Assessment replaces

European technical approval ETA-12/0088 with
validity from 09.07.2012 to 08.07.2017

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Specific parts

1 Technical description of the product

“ZZ C10” is a kit to be used as cable penetration seal based on the following components.

Components of “ZZ C10”	Characteristics
ZZ 130	Plug-shaped intumescent elastic product on the basis of polyurethane with intumescent fire protection additives (fire protection plug)
ZZ 333	Intumescent pasty, brushable mastic on the basis of acrylate with intumescent fire protection additives (fire protection sealant)
ZZ 451	Intumescent wrap on the basis of butyl rubber with intumescent fire protection additives and glass fabric reinforcement (fire protection wrap)

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

2.1 Intended use

“ZZ C10” is intended to be used as a 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 and cable support constructions (perforated or non-perforated steel cable trays and steel ladders).

The nominal thickness of the penetration seal – according to the dimensions of “ZZ 130” – has to be minimum 170 mm or 200 mm (depending on the fire resistance classification; see Annex D-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.

“ZZ C10” can be installed only in the types of separating elements as specified in the following table.

Separating element	Construction	a) Maximum opening size b) Minimum thickness of the cable penetration seal
Flexible walls	> Steel studs or timber studs lined on both faces with minimum 2 layer of boards (minimum thickness 12,5 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: $\geq EI 90$ > 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	a) $\varnothing$ 250 mm b) 170 mm / 200 mm
Rigid walls	> Aerated concrete, concrete, masonry > Minimum density 450 kg/m³ > Minimum thickness 100 mm > The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period	a) $\varnothing$ 250 mm b) 170 mm / 200 mm
Rigid floors	> Aerated concrete, concrete > Minimum density 450 kg/m³ > Minimum thickness 150 mm > The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period	a) $\varnothing$ 250 mm b) 170 mm / 200 mm

“ZZ C10” 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 “ZZ C10” in flexible walls, rigid walls and rigid floors
Cables	> 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 $\leq$ 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 $\leq$ 21 mm > Non-sheathed electrical cables with a diameter $\leq$ 24 mm

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

Penetrating element	Construction characteristics of the penetrating element in "ZZ C10" in flexible walls, rigid walls and rigid floors
Conduits / Tubes	> Steel conduits / tubes up to $\varnothing \leq 16$ mm (with / without cables): steel conduits according to EN 61386-21 and / or EN 10305-4 or -6 > Plastic conduits / tubes up to $\varnothing \leq 16$ mm (with / without cables) according to EN 61386-21
Cable support constructions	> Steel cable trays (perforated or non-perforated) > Steel ladders > Steel cable trays (perforated or non-perforated) and steel ladders with organic coatings shall at least be classified A2-s1,d0 according to EN 13501-1

2.2 Use category

"ZZ C10" is intended for internal use with high humidity, excluding temperatures below 0 °C, and can therefore – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Z₁. Since the requirements for Type Z₁ are met, also the requirements for Type Z₂ are fulfilled.

Although a penetration seal is intended for indoor applications only, the construction process may result in it being subjected to more exposed conditions for a period before the building envelope is closed. For this case provisions shall be made to protect temporarily exposed penetration seals according to the ETA-holder's installation instructions.

2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of "ZZ C10" of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.

The indications given on the intended working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

The real working life might be, in normal use conditions, considerably longer without major degradation affecting the Basic requirements for construction works.

2.4 General assumptions

2.4.1 It is assumed that

- > damages to the penetration seal are repaired accordingly,
- > the installation of the penetration seal does not affect the stability of the adjacent building element – even in case of fire,
- > the lintel or floor above the penetration seal is designed structurally and in terms of fire protection such that no additional mechanical load (other than its own weight) is imposed on the penetration seal,
- > the installations are fixed to the adjacent building element in accordance with the relevant regulations in such a way that, in case of fire, no additional mechanical load is imposed to the penetration seal,
- > the support of the installations is maintained for the required period of fire resistance and
- > pneumatic dispatch systems, compressed air systems, etc. are switched off by additional means in case of fire.

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 13501-1:2007+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 D-1 of the ETA
BWR 3	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
BWR 4	Mechanical resistance and stability	No performance assessed	
	Resistance to impact / movement	No performance assessed	
	Adhesion	No performance assessed	
BWR 5	Airborne sound insulation	EN ISO 10140-1:2010	Clause 3.4.1 of the ETA
BWR 6	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 “ZZ C10” 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
ZZ 130	E
ZZ 333	E
ZZ 451	E

3.1.2 Resistance to fire

“ZZ C10” 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 the cable penetration seal “ZZ C10” has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex D-1 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 D-1 of the ETA is only valid if “ZZ C10” is installed according to Annex A-1 to A-4 of the ETA.

3.2 Hygiene, health and environment (BWR 3)

3.2.1 Air permeability

The air permeability of “ZZ C10” with a thickness of 150 mm was tested according to EN 1026:2016 in a flexible wall with a thickness of 100 mm. The diameter of the opening was 240 mm.

“ZZ C10” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.3. The components “ZZ 333” and “ZZ 451” were not included in these tests.

Up to a pressure difference of 600 Pa no air permeability was measured. The measurement accuracy was 0,01 m³/h. The air permeability at $\Delta p = 600$ Pa is less than 0,2 m³/(h·m²).

3.2.2 Water permeability

No performance assessed.

3.2.3 Release of dangerous substances

According to the manufacturer's declaration the components of "ZZ C10" 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 "ZZ C10" was tested according to EN ISO 10140-2:2010 in a flexible wall with a thickness of 200 mm. The diameter of the opening was 240 mm.

"ZZ C10" was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.9. The components "ZZ 333" and "ZZ 451" 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	-2	-7	47	-2	-7

3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties

The thermal properties of “ZZ 130” were tested according to EN 12667:2001.

Component	$\lambda_{10,23/50}$ in W/(m*K)
ZZ 130	0,103

3.5.2 Water vapour permeability

No performance assessed.

3.6 General aspects relating to fitness for use

All components of “ZZ C10” fulfil the requirements for the intended use category.

“ZZ C10” is therefore appropriate for internal use with high humidity, excluding temperatures below 0 °C, and can – according to ETAG 026-Part 2 clause 2.4.12.1.3.3 – be categorized as Type Z₁. Since the requirements for Type Z₁ are met, also the requirements for Type Z₂ are fulfilled.

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

According to the Decision 1999/454/EC³, amended by Decision 2001/596/EC⁴ 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.

³ Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

⁴ Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

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.

Issued in Vienna on 07.07.2017
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

1 General

- > “ZZ C10” 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 and cable support constructions according to clause 2.1 of the ETA is allowed.
- > The total cross section of the installations (including cable support constructions) must not be more than 60 % of the opening size of the penetration seal.

1.1 Pipe end configuration

- > Plastic conduits / tubes were tested U/U.
- > Steel conduits / tubes were tested U/U.

1.2 Orientation of the penetrating elements

- > Conduits / tubes have to be installed perpendicular to the surface of the penetration seal.

1.3 Service support constructions

- > All types of cables and conduits / tubes – in flexible walls and rigid walls – have to be supported on both sides 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 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 and conduits / tubes – 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 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 separating element resp. the board frame).
- > All types of cables and conduits / tubes have to be fixed according to the ETA-holder’s installation instructions to the service support construction.

ZZ C10

- Details for installation -

ANNEX A-1

2 Details for installation of “ZZ C10” (see Annex B-1 to C-1 of the ETA) > “ZZ C10” has to be installed according to the ETA-holder’s installation instructions. > “ZZ C10” will be formed by fitting “ZZ 130” tightly in the opening of the separating element so that all interstices and voids are carefully sealed. > The gap between the two plugs “ZZ 130” in vertical separating elements and horizontal separating elements has to be minimum 30 mm or 60 mm (depending on the minimum thickness of the penetration seal; see Annex B-1 to C-1 of the ETA). > Open joints and joints between the cables, conduits / tubes, cable support constructions and the penetration seal have to be filled according to the ETA-holder’s installation instructions with “ZZ 333” to a depth of minimum 20 mm. > For tied cable bundles (see clause 2.1 of the ETA) the space between the cables needs not be filled with “ZZ 333”. > For some fire resistance classifications it is required to wrap “ZZ 451” 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 C-1 and Annex D-1 of the ETA). 2.1 Details for installation in flexible wall constructions (see Annex B-1 of the ETA) > The thickness of the wall has to be increased to at least 170 mm or 200 mm (depending on the fire resistance classification; see Annex D-1 of the ETA) by fitting a board frame, minimum 50 mm wide, around the opening (see Annex B-1 of the ETA). Minimum 1 layer of ≥ 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/m³ can be used. The overall thickness of the board frame and the lining of the wall has to be minimum 60 mm on both sides. The board frame has to be installed and fixed according to the ETA-holder’s installation instructions. > Joints between the aperture framing and the aperture have to be filled with “ZZ 333”, plaster or mineral mortar 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 of the ETA)

- > For walls thinner than the minimum thickness of the penetration seal (170 mm or 200 mm; depending on the fire resistance classification; see Annex D-1 of the ETA) the thickness of the wall has to be increased by fitting a board frame, minimum 50 mm wide, around the opening (see Annex B-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.

2.3 Details for installation in rigid floors (see Annex B-4 to B-5 of the ETA)

- > For floors thinner than the minimum thickness of the penetration seal (170 mm or 200 mm; depending on the fire resistance classification; see Annex D-1 of the ETA) the thickness of the floor has to be increased by fitting a board frame, minimum 50 mm wide, around the opening (see Annex B-5 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.
- > It is possible to use "ZZ C10" in permanent formwork made of PE-HD pipes according to EN 1519-1 (see Annex B-4 of the ETA).

3 Minimum working clearances

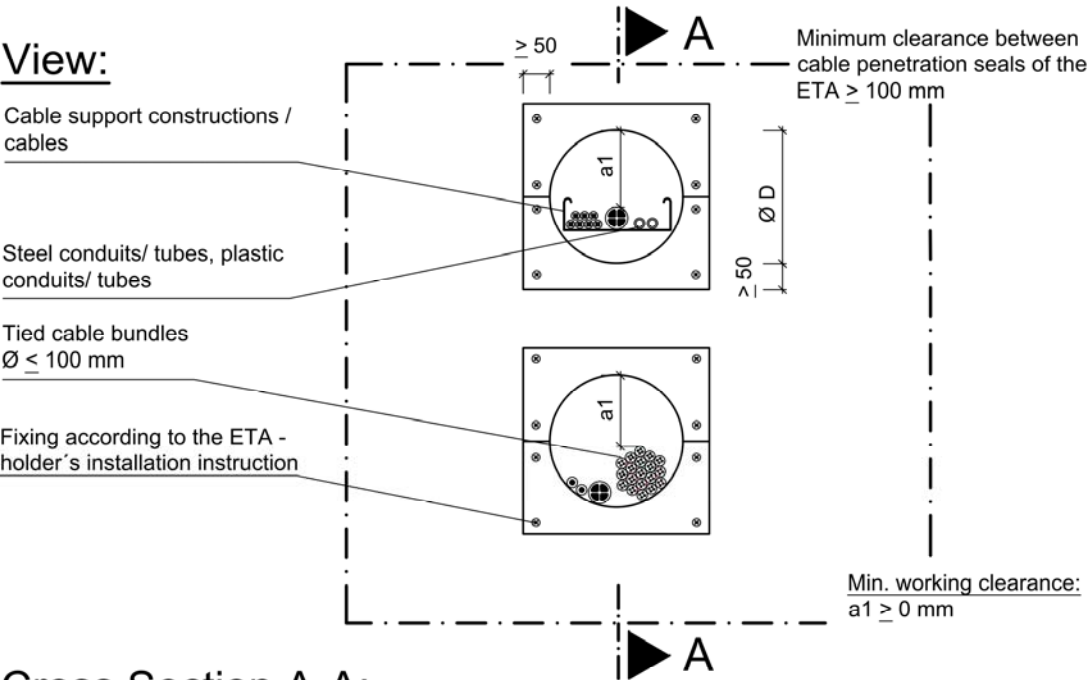
- > The minimum working clearance (a1) and the minimum clearance between the penetration seals are specified in Annex B-1 to B-5 of the ETA.

ZZ C10

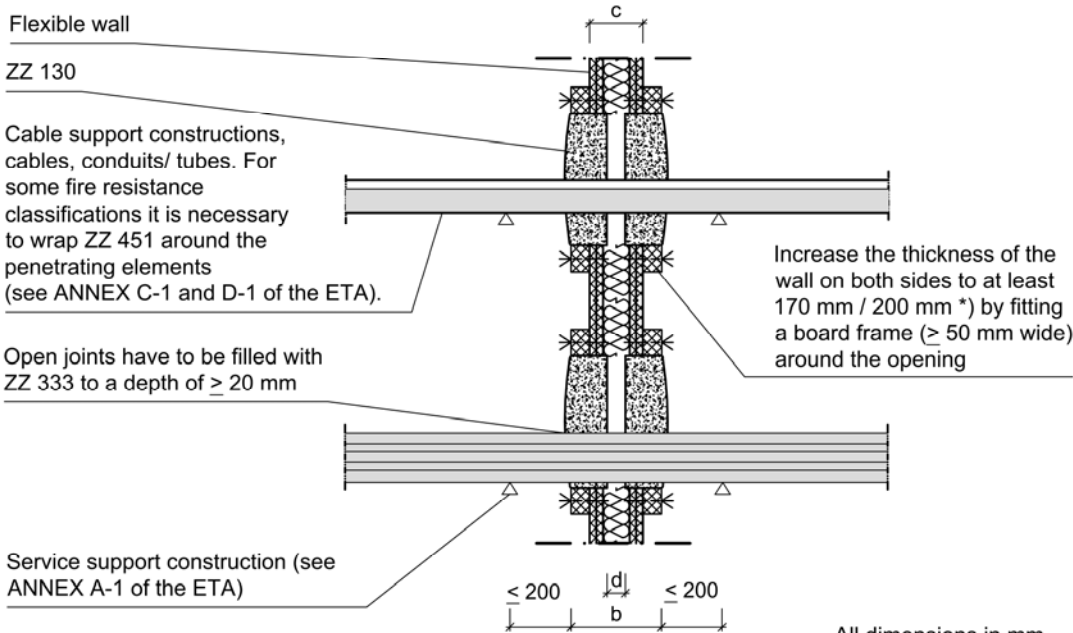
- Details for installation -

ANNEX A-3

4 Subsequent addition (retrofitting) and removal > Subsequent addition (retrofitting) and removal of cables, conduits / tubes and cable support constructions according to the ETA holder's installation instructions is allowed. > Retrofitting 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 and cable support constructions the hole has to be closed according to the ETA-holder's installation instructions with a fitting piece of "ZZ 130" and the joint has to be filled with "ZZ 333" to a depth of 10 mm to 15 mm. 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.	
ZZ C10 - Details for installation -	ANNEX A-4



Cross Section A-A:



Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size $\varnothing D$ [mm]	Thickness of the penetration seal b [mm] / d [mm]
Flexible wall	see ANNEX D-1 of the ETA	≥ 94	≤ 250	$b \geq 170 / \geq 200^*)$ $d \geq 30 / \geq 60^*)$

^{*)} See ANNEX D-1 of the ETA. Minimum thickness of the penetration seal b and gap d depend on the penetrating elements and fire resistance classification.

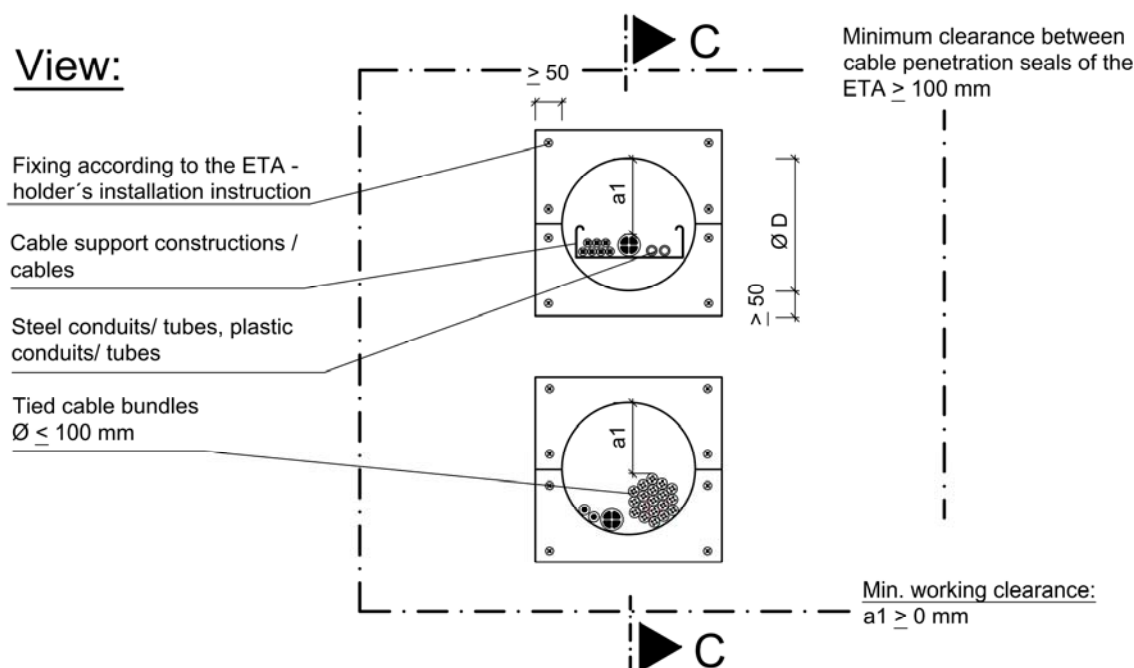
ZZ C10

- Installation in flexible wall $c \geq 94 \text{ mm}$ -

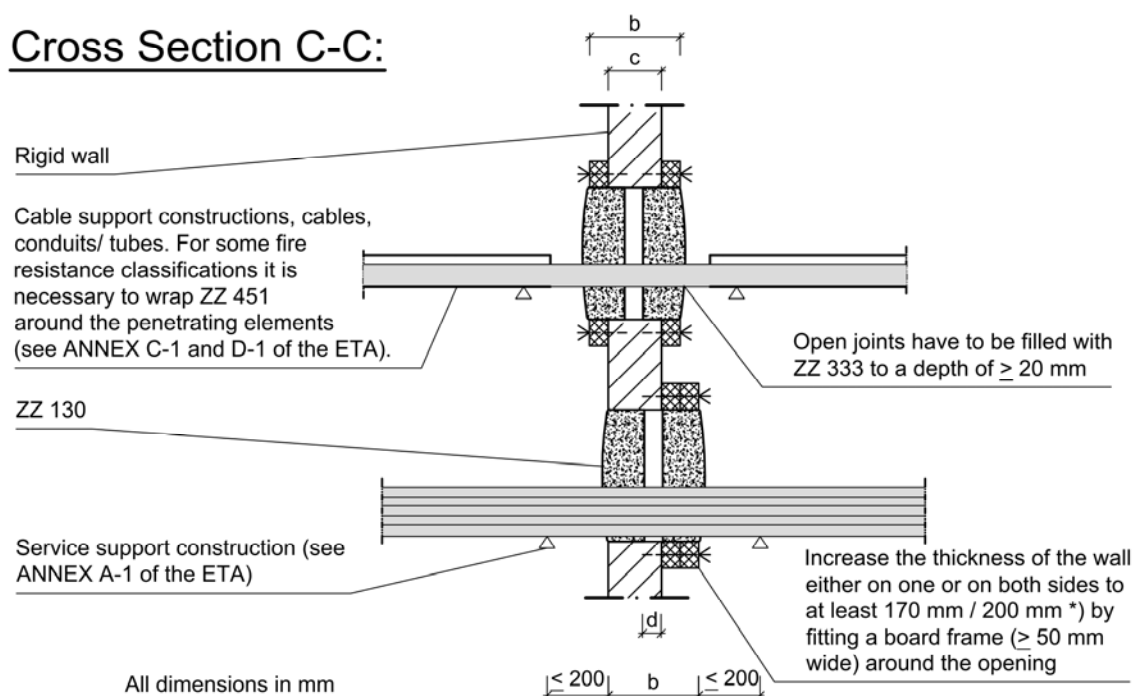
ANNEX B-1

OIB-205-011/17-035

View:



Cross Section C-C:



All dimensions in mm

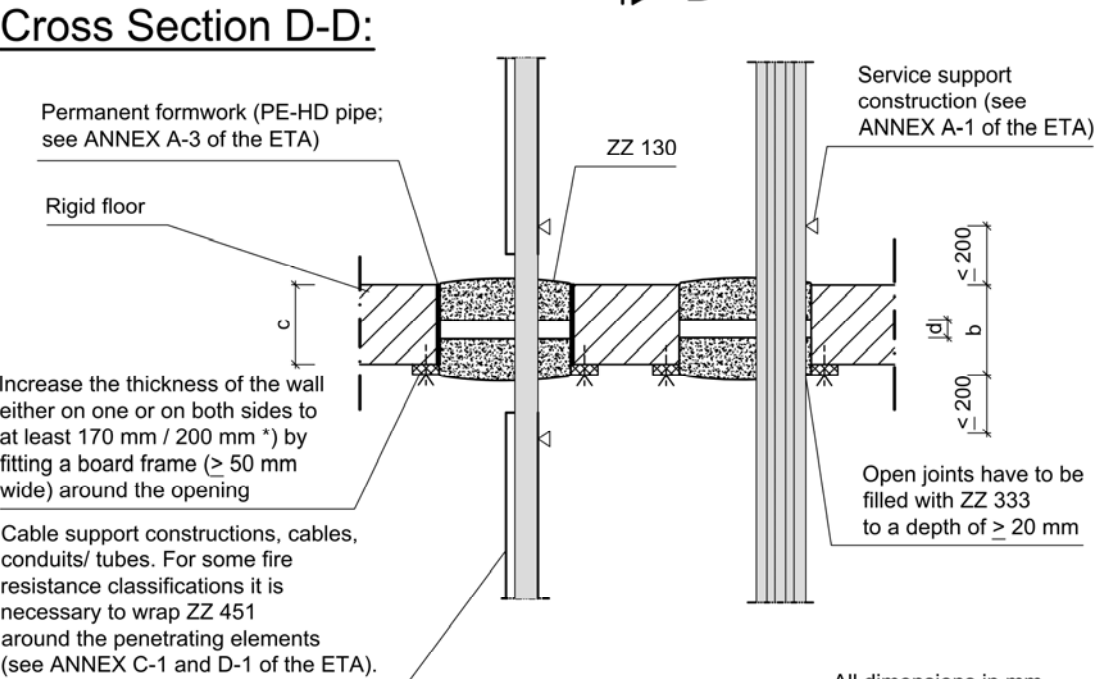
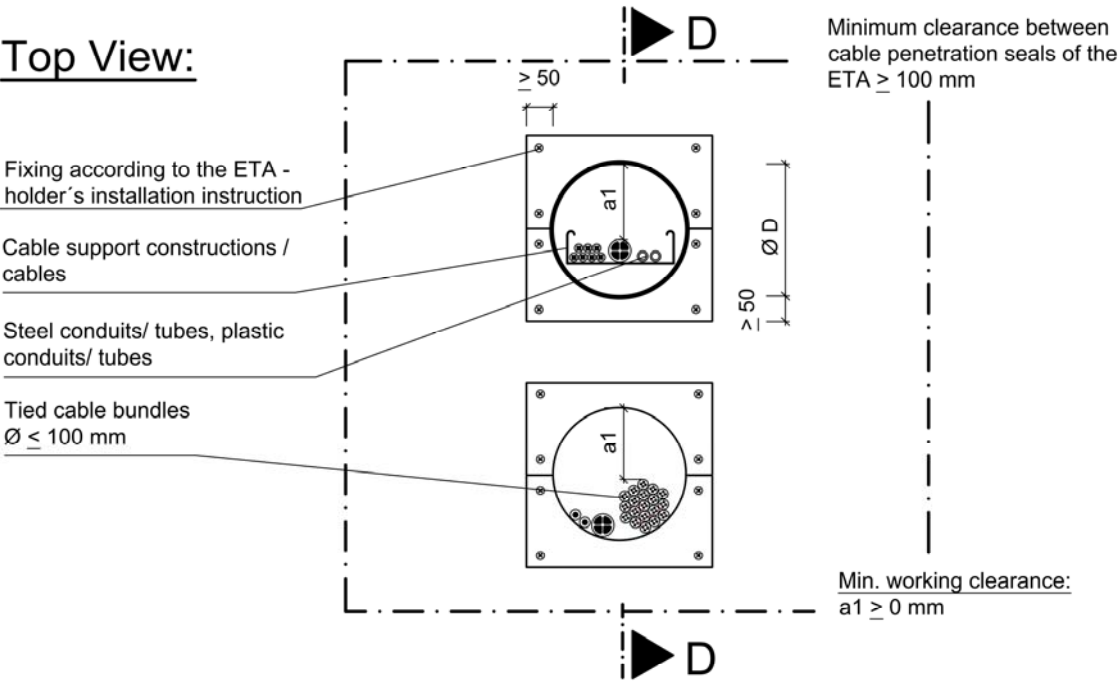
Separating element	Fire resistance classification	Wall thickness c [mm]	Max. opening size Ø D [mm]	Thickness of the penetration seal b [mm] / d [mm]
Rigid wall	see ANNEX D-1 of the ETA	$100 \leq c \leq 170$	≤ 250	$b \geq 170 / \geq 200$ *) $d \geq 30 / \geq 60$ *)

*) See ANNEX D-1 of the ETA. Minimum thickness of the penetration seal b and gap d depend on the penetrating elements and fire resistance classification.

ZZ C10

- Installation in rigid wall $100 \text{ mm} \leq c < 170 \text{ mm}$ -

ANNEX B-3



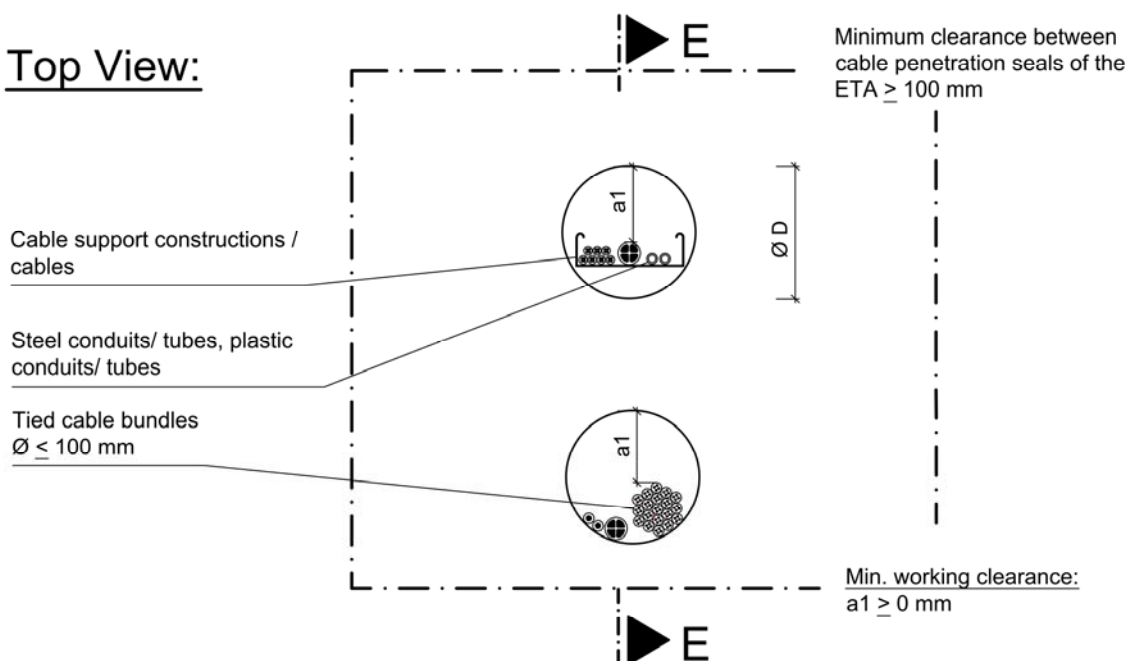
All dimensions in mm

Separating element	Fire resistance classification	Floor thickness c [mm]	Max. opening size Ø D [mm]	Thickness of the penetration seal b [mm] / d [mm]
Rigid floor	see ANNEX D-1 of the ETA	$150 \leq c \leq 170$	≤ 250	$b > 170 / \geq 200$ *) $d > 30 / \geq 60$ *)

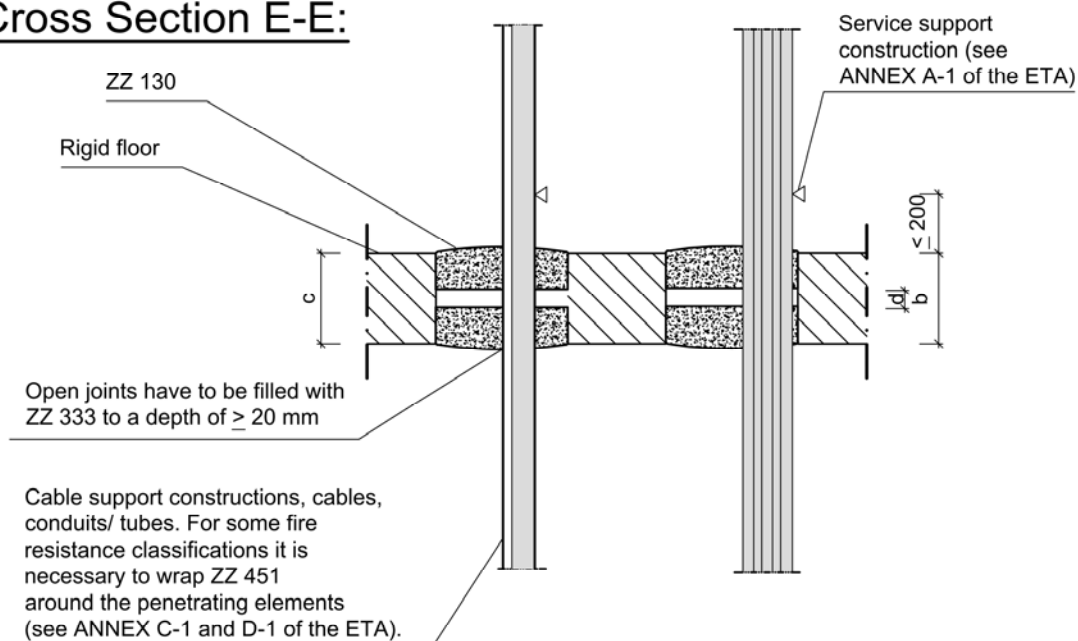
*) See ANNEX D-1 of the ETA. Minimum thickness of the penetration seal b and gap d depend on the penetrating elements and fire resistance classification.

ZZ C10 - Installation in rigid floor $150 \text{ mm} \leq c < 170 \text{ mm}$ -	ANNEX B-4
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Top View:



Cross Section E-E:



All dimensions in mm

Separating element	Fire resistance classification	Floor thickness c [mm]	Max. opening size $\varnothing D$ [mm]	Thickness of the penetration seal b [mm] / d [mm]
Rigid floor	see ANNEX D-1 of the ETA	≥ 170	≤ 250	$b \geq 170 / \geq 200$ *) $d \geq 30 / \geq 60$ *)

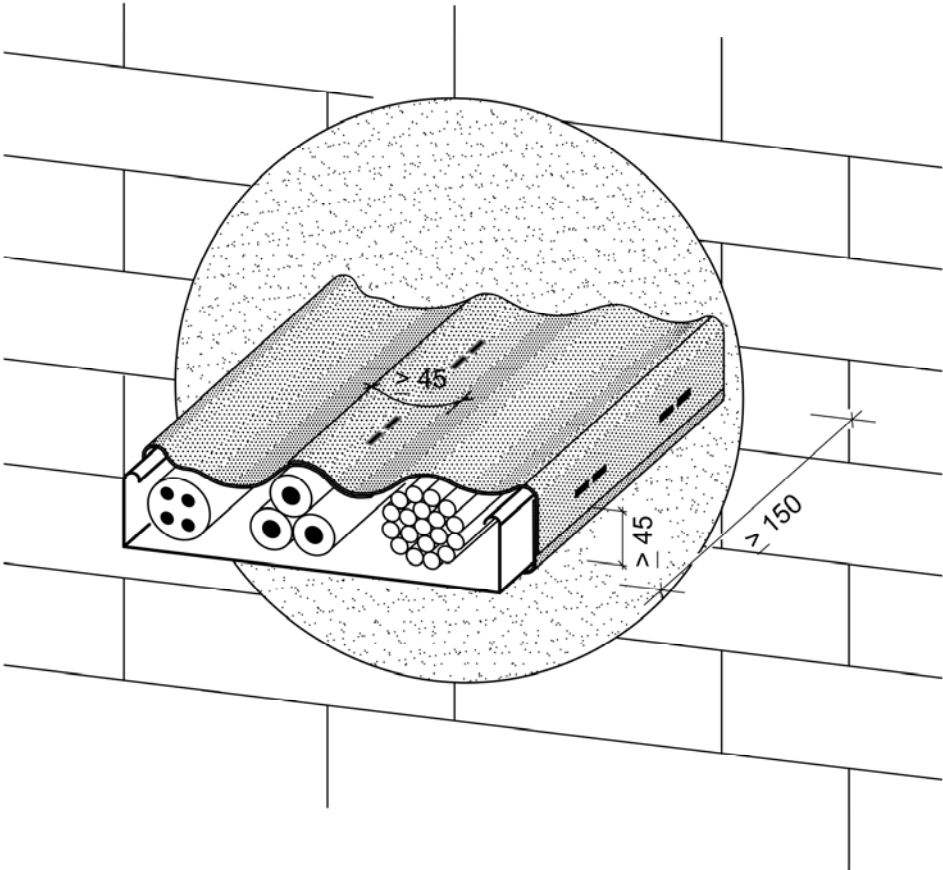
*) See ANNEX D-1 of the ETA. Minimum thickness of the penetration seal b and gap d depend on the penetrating elements and fire resistance classification.

ZZ C10

- Installation in rigid floor $c \geq 170$ mm -

ANNEX B-5

Arrangement of ZZ 451:



For some fire resistance classifications (see ANNEX D-1 of the ETA) it is necessary to wrap strips of ZZ 451 of at least 150 mm width on both sides around cables or cable trays.
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

ZZ C10
- Arrangement of "ZZ 451" -

ANNEX C-1

Fire resistance classification:

Installation in flexible walls of at least 94 mm, rigid walls of at least 100 mm or rigid floors of at least 150 mm thickness

<u>Penetrating element</u>	<u>Min. thickness of cable penetration seal</u>	
	$170 \text{ mm} \leq b < 200 \text{ mm}$	$b \geq 200 \text{ mm}$
Sheathed electrical / telecommunication / optical fibre cables up to a maximum diameter of 21 mm	E 120 Wall: EI 90 resp. EI 120 ¹⁾ Floor: EI 120	E 120 Wall: EI 90 resp. EI 120 ¹⁾ Floor: EI 120
Sheathed electrical / telecommunication / optical fibre cables with diameter $21 \text{ mm} < D \leq 50 \text{ mm}$	E 120 Wall: EI 90 Floor: EI 90 resp. EI 120 ¹⁾	E 120 EI 90 resp. EI 120 ¹⁾
Sheathed electrical / telecommunication / optical fibre cables with diameter $50 \text{ mm} < D \leq 80 \text{ mm}$	E 120 Wall: EI 60 resp. EI 90 ¹⁾ Floor: EI 60	E 120 Wall: EI 90 Floor: EI 90 resp. EI 120 ¹⁾
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 90	E 120 EI 90
Non-sheathed cables up to a maximum outer diameter 17 mm	E 120 EI 90	E 120 EI 90
Non-sheathed cables up to a maximum outer diameter 24 mm	E 120 Wall: EI 60 Floor: EI 90	E 120 Wall: EI 60 Floor: EI 90
Steel conduits/ tubes up to Ø 16 mm with/ without cables	E 120 Wall: EI 120 Floor: EI 90	E 120 Wall: EI 120 Floor: EI 90
Plastic conduits/ tubes up to Ø 16 mm with/ without cables	E 120 EI 120	E 120 EI 120

1) ZZ 451 (see ANNEX C-1 of the ETA) has to be wrapped around the penetrating elements on both sides of the penetration seal.

ZZ C10

- Fire resistance classification -

ANNEX D-1

HBT HOCHBAU-BRANDSCHUTZ-TECHNIK GmbH

Neue Bahnhofstraße 46
34621 Frielendorf
Deutschland

Telefon: +49 (0) 5684 9988 0
Fax: +49 (0) 5684 9988 88
E-Mail: info@hbt-brandschutz.de

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