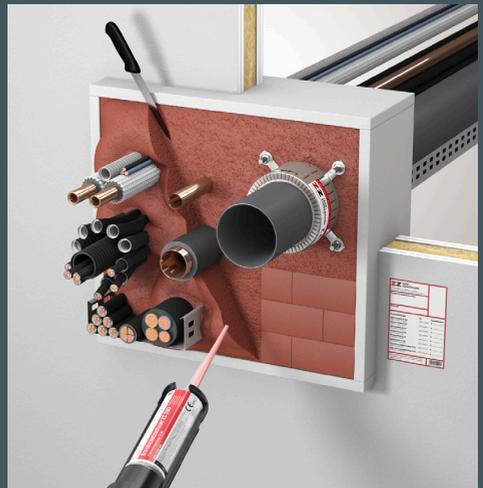


Mixed penetration seal ZZ M30

ETA-11/0206

INSTALLATION MANUAL | en



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Mixed penetration seal ZZ M30

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Mixed penetration seal for maintaining fire resistance of flexible walls, rigid walls and rigid floor constructions penetrated by cables, electrical conduits, metal pipes, plastic pipes and cable support systems.



Fig. 1: Installation in rigid wall



Fig. 2: Installation in flexible wall

Areas of application

- / Fast and easy method of sealing component openings
- / Especially suitable for fire penetration seals with multiple penetrating elements
- / Ideal for hard to reach and irregular openings

Fundamentals

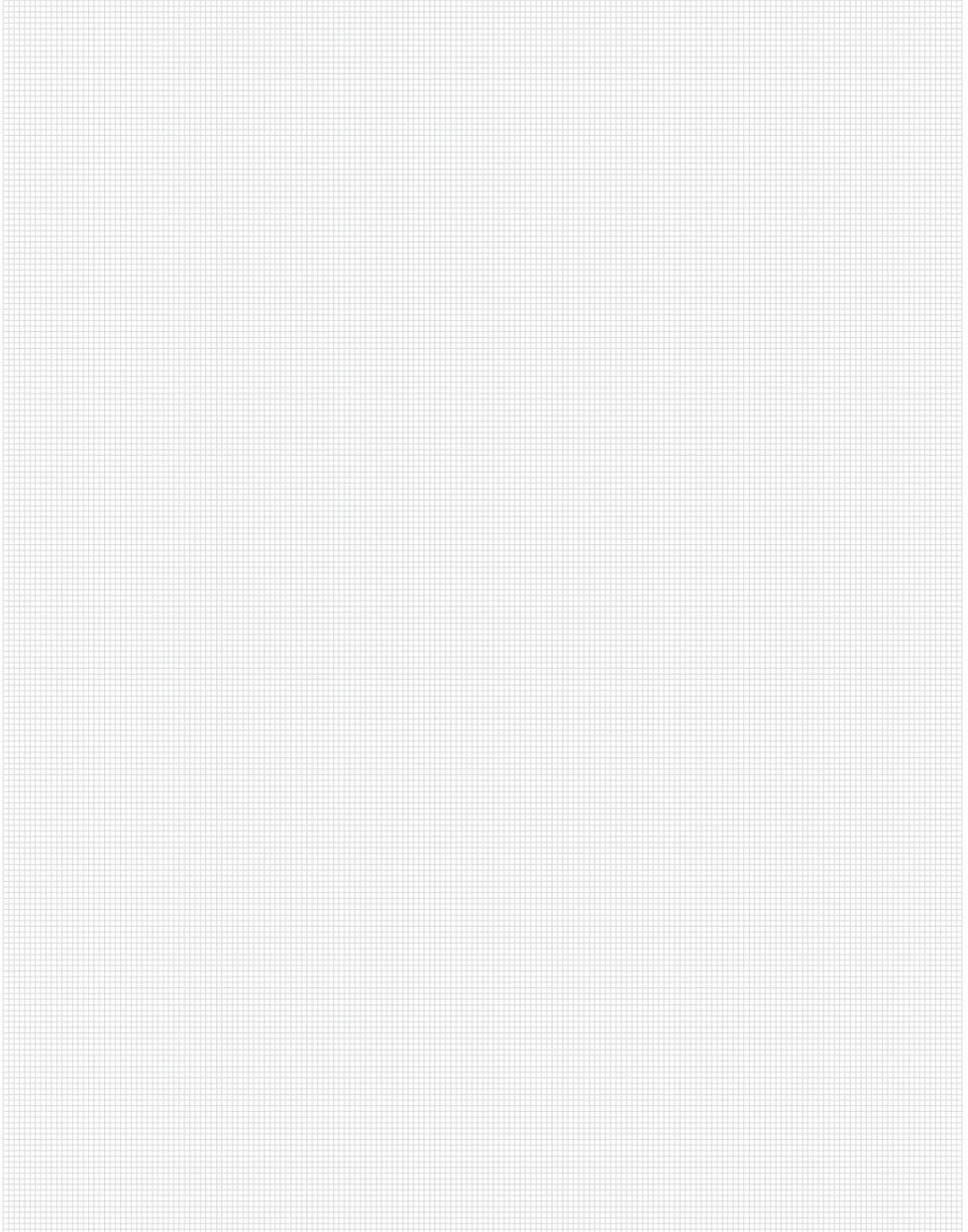
- / The European Technical Assessment ETA-11/0206 of the Austrian Institute for Building Technology (OIB) is definitive for the execution of the fire penetration seal.
- / All technical specifications, such as maximum opening size, wall/floor types, fire resistance classes, penetrating elements and their first support, working spaces, etc. are provided in the European Technical Assessment ETA-11/0206.
- / It must be ensured that the stability of the adjacent component is not impaired by installation of the fire penetration seal, even in the event of fire. The information specified in the usability certification must be complied with.
- / All applicable directives and technical rules of other trades, particularly with respect to electrical engineering and building services (sanitary, heating and air conditioning) must be complied with.
- / Fire penetration seals in floors must be safeguarded against loads, in particular also against being walked on, by means of suitable measures (e.g. enclosure or covering with a grate).
- / In accordance with the European Technical Assessment ETA-11/0206 the fire protection seal must conform to category of use Z_1 (see Technical data, permissible ambient conditions). Since the requirements for type Z_1 are fulfilled, the requirements for type Z_2 are also fulfilled.
- / The total cross section area of the penetrating elements based on the area of the fire penetration seal must not exceed 60%.
- / Comply with the instructions on the safety data sheets for the products.

Products

Figure	Designation	Art. no.	PU
	Fire protection foam ZZ 330, 380 ml <i>2 mixing nozzles included</i>	B15V01-0001	1
	Starter kit fire protection foam ZZ 330, 380 ml <i>1 cartridge fire protection foam ZZ 330, 2 mixing nozzles, 1 identification plate, 1 EasyMax dispensing gun</i>	B16N00-0125	1
	Fire protection foam ZZ 330, 380 ml, 6 pc. set <i>6 cartridges fire protection foam ZZ 330, mixing nozzles, 6 pairs of gloves, 1 roll of duct tape</i>	B15N01-0106	1
	Fire protection foam ZZ 330, 380 ml, 6 pc. set <i>6 cartridges fire protection foam ZZ 330, mixing nozzles, 6 pairs of gloves, 1 roll of duct tape</i>	B15VP1-0106	60
	Fire protection block ZZ 230 <i>200 x 144 x 60 [mm]</i>	B01V01-0004	1
		B01V04-0003	4
		B01V18-0001	18
		B01VP1-0045	450
	Fire protection bandage ZZ 451 <i>Width 150 mm, 5 m on roll</i>	B04N00-0004	1
	Fire protection collar ZZ 430 <i>50–110 [mm] including sound insulation</i>	B16N01-0003	1
	Identification plate for ETA systems <i>for ZZ systems with European Technical Assessment</i>	B16H00-0051	1

Mixed penetration seal ZZ M30 ETA-11/0206
Accessories

Figure	Description	Art. no.	PU
	Knife with serration, narrow	B16H00-0042	1
	Knife with serration, wide	B16H00-0043	1
	Duct tape <i>Width 50 mm, 20 m on roll</i>	B99V01-0008	1
	EasyMax dispensing gun <i>for 380 ml cartridges (5:1)</i>	B16N00-0124	1
	HandyMax dispensing gun <i>for 380 ml cartridges (5:1)</i>	B16H00-0044	1
	PowerMax cordless dispensing gun (2K) <i>for 380 ml cartridges (5:1)</i> <i>in plastic case with battery and charger</i>	B16H00-0060	1
	Mixing nozzle, 12 pc. set <i>for 380 ml cartridges (5:1)</i>	B99H00-0112	1
	Extension for mixing nozzle, 12 pc. set <i>for mixer nozzle, length 20 cm</i>	B99H00-0172	1
	OTTOPUR Cleaner, 500 ml <i>for easy removal of fresh, non-hardened PUR foams</i>	B99H00-0165	1
	Dometic tempering box <i>with digital temperature display, temperature regulator fixed at 20 °C and voltage monitor</i>	B99H00-0163	1
	Document set mixed penetration seal ZZ M30 <i>contains the documents for an approval-compliant penetration seal</i>	B16H01-0010	1



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Permissible installation locations

Mixed penetration seal (cable and pipes)

The sealing component must be classified for the desired fire resistance duration in accordance with EN 13501-2, at least EI 60.

Components	Minimum thickness	Minimum seal thickness *	Maximum opening size [Width x height]
Rigid wall: Aerated concrete, concrete, reinforced concrete, masonry	100 mm	144 mm 200 mm	450 x 500 mm
Flexible wall: Steel stud or timber construction, on each side with at least 2 layers of panels (minimum thickness 12.5 mm) or at least 1 layer of panels (minimum thickness 25 mm)	94 mm	144 mm 200 mm	450 x 500 mm
Rigid floor: Aerated concrete, concrete, reinforced concrete	150 mm	144 mm 200 mm	450 x 450 mm

* The required seal thickness depending on the fire resistance class and the penetrating element is specified in the fire resistance classification tables.

Cable penetration seal

The seal thickness for small fire penetration seals used only for cables is smaller. The component must be classified for the required fire resistance duration in accordance with EN 13501-2 and EI 60.

Components	Minimum thickness	Minimum seal thickness *	Maximum opening size [Width x height]
Rigid wall: Aerated concrete, concrete, reinforced concrete, masonry	100 mm	100 mm 144 mm 200 mm 250 mm	270 x 270 mm Ø 300 mm
Flexible wall: Steel stud or timber construction, on each side with at least 2 layers of panels (minimum thickness 12.5 mm) or at least 1 layer of panels (minimum thickness 25 mm)	94 mm	100 mm 144 mm 200 mm 250 mm	
Rigid floor: Aerated concrete, concrete, reinforced concrete	150 mm	100 mm 144 mm 200 mm 250 mm	

* The required seal thickness depending on the fire resistance class and the penetrating element is specified in the fire resistance classification tables.

Permissible penetrating elements – cables

Cables

- / All types of sheathed cables (with the exception of hollow-core conductors) that are currently in common use in European construction (e.g. electrical cables/telecommunication cables/data cables/fibre optic cables), with an outer diameter ≤ 80 mm
- / Tied cable bundles up to a total outer diameter of 100 mm consisting of sheathed cables (with the exception of hollow-core conductors) that are currently in common use in European construction (e.g. electrical cables/telecommunication cables/data cables/fibre optic cables), with an outer diameter ≤ 21 mm
- / Single-conductor cables with an outer diameter ≤ 24 mm
- / In cable penetration seals that require a fire resistance classification of EI 120, ZZ 451 fire protection bandages must be fastened on both sides of cables, electrical conduits and cable support systems.
- / “speed.pipe®” from “gabo Systemtechnik GmbH” with a maximum outer diameter of 12 mm (with/without fibre optic cables)
- / Bundle with a maximum outer diameter of 80 mm, consisting of “speed.pipe®” from “gabo Systemtechnik GmbH” with a maximum outer diameter of 12 mm (with/without fibre optic cables)
- / Bundles of electrical conduits must be fastened or tied together on both sides of the fire penetration seal with a winding of steel wire (minimum diameter 1 mm), at a maximum distance of 200 mm (measured from the surface of the fire penetration seal).
- / Electrical conduits must be routed through at a right angle to the surface of the fire penetration seal. The ends must be plugged with mineral wool or sealed with ZZ 330 fire protection foam so they are smoke gas tight.

Electrical conduits

- / Electrical conduits of steel, outer diameter ≤ 16 mm, minimum wall thickness 1.5 mm (with/without cables): electrical conduits of steel acc. to EN 61386-21
- / Electrical conduits of plastic, outer diameter ≤ 63 mm, wall thickness 1.0 mm to 3.0 mm (with/without cables) acc. to EN 61386-21 or EN 61386-22
- / Bundle with a maximum outer diameter of 100 mm, consisting of electrical conduits of plastic, outer diameter ≤ 63 mm, wall thickness 1.0 mm to 3.0 mm (with/without cables) acc. to EN 61386-21 or EN 61386-22

Cable support systems

- / Cable trays of steel (perforated or non-perforated)
- / Cable ladders of steel
- / Cable support systems with a flammable coating must be classified at least as A2-s1,d0 according to 13501-1.
- / Cable trays and ladders (without a cover) may optionally be routed through the fire penetration seal.

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Permissible penetrating elements – metal pipes

/ Metal pipes without insulation or with insulation of mineral fibre products can be routed through at an angle between 90° and 45° to the surface of the fire penetration seal. All other metal pipes must be installed at a right angle to the surface of the fire penetration seal.

Metal pipes with mineral wool insulation (e.g. Rockwool 800)

/ Permissible are pipes of steel, stainless steel, cast iron and copper up to an outer diameter of 88.9 mm acc. to diagram 1 and mineral wool insulations acc. to table 1.

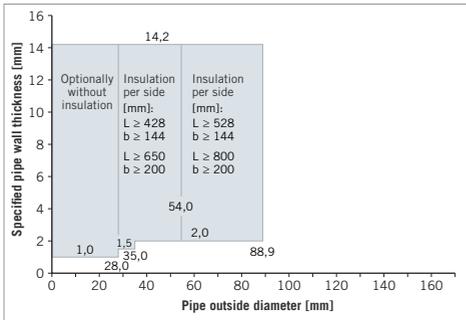


Diagram 1: Pipes of steel, stainless steel, cast iron and copper (mineral wool insulation acc. to table 1)

b = Minimum seal thickness
L = Insulation length (measured from the surface of the seal)

Insulation type	Density of the mineral wool	Insulation thickness
LI	≥ 90 kg/m ³	30 mm
LS		30 mm
CI		≥ 30 mm
CS		≥ 30 mm

Table 1: Insulation configuration for metal pipes acc. to diagram 1

/ Permissible are pipes of steel, stainless steel, cast iron and copper up to an outer diameter of 168.3 mm acc. to diagram 2 and mineral wool insulations acc. to table 2.

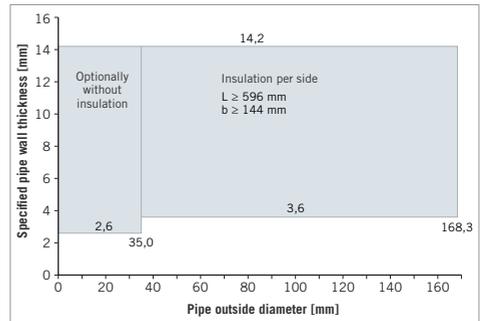


Diagram 2: Pipes of steel, stainless steel, cast iron and copper (mineral wool insulation acc. to table 2)

Minimum seal thickness
L = insulation length (measured from the surface of the seal)

Insulation type	Density of the mineral wool	Insulation thickness
LI	≥ 90 kg/m ³	50 mm
LS		50 mm
CI		≥ 50 mm
CS		≥ 50 mm

Table 2: Insulation configuration for metal pipes acc. to diagram 2

Legend for table 1 and 2

- LI** – Local insulation, interrupted in the fire penetration seal
- LS** – Local insulation, continuing through the fire penetration seal
- CI** – Section insulation over the entire pipe length, interrupted in the fire penetration seal
- CS** – Section insulation over the entire pipe length, continuing through the fire penetration seal

/ The mineral wool insulation must be secured with steel wire (diameter approx. 0.8 mm, 6 winds per running m).

/ Optionally the mineral wool insulation may be provided with a jacket of sheet steel (thickness 0.4 mm mm to 1.0 mm) or plastic foil (thickness 0.35 mm to 1.0 mm).

**Metal pipes with AF/Armaflex insulation
(manufacturer: Armacell GmbH)**

/ Permissible are pipes of steel, stainless steel, cast iron and copper up to an outer diameter of 88.9 mm acc. to diagram 3 and AF/Armaflex insulations.

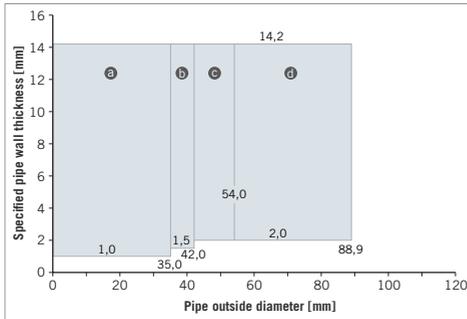


Diagram 3: Pipes of steel, stainless steel, cast iron and copper with AF/Armaflex insulation

Legend

- a Insulation thickness 9.0 mm to 35.0 mm, L ≥ 500 mm
- b Insulation thickness 9.0 mm to 36.5 mm, L ≥ 500 mm
- c Insulation thickness 9.0 mm to 38.0 mm, L ≥ 500 mm
- d Insulation thickness 41.5 mm, L ≥ 500 mm (L measured from the surface of the seal)

Execution with AF/Armaflex insulation is possible only as **LS** (local insulation, continuing through the fire penetration seal) or **CS** (section insulation over the entire pipe length, continuing through the fire penetration seal).

/ The cut edges of the pipe insulations must be glued with a suitable adhesive. In addition, a suitable adhesive tape (self-adhesive strip made of insulating material) with a width of ≥ 50 mm and a thickness of about 3 mm must be applied on the longitudinal joint.

Pre-insulated metal pipes for air conditioners, heating and sanitary systems (see also Annex E-3 of the ETA)

Pre-insulated metal pipes may be used with the insulation configuration **CS** (section insulation over the entire pipe length, continuing through the fire penetration seal).

(Manufacturer: KME Germany GmbH & Co. KG or Wieland-Werke AG)

- / "WICU® Flex" and "WICU® Frio" up to an outer diameter of 22.0 mm.
 - / "WICU® Clim" up to an outer diameter of 22.2 mm.
 - / "WICU® Eco" up to an outer diameter of 54.0 mm.
 - / All WICU® pipes must be wrapped with ZZ 451 fire protection bandage in a length of 150 mm on both sides of the fire penetration seal (see also "Processing of the ZZ 451 fire protection bandage").
 - / For WICU® Flex/Frio and Clim pipes the fire protection bandage on the bottom side is not necessary.
- (Manufacturer: Armacell GmbH)
- / "Tubolit® Split" and "Tubolit® DuoSplit" up to an outer diameter of 22.2 mm.

Permissible penetrating elements – plastic pipes

/ Plastic pipes and plastic hoses must be routed through at a right angle to the surface of the fire penetration seal.

Plastic pipes

/ Permissible are unplasticised polyvinyl chloride (PVC-U) pipes acc. to EN ISO 1452-1 and DIN 8061/DIN 8062 acc. to diagram 4.

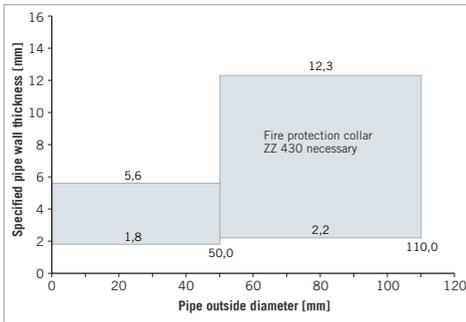


Diagram 4: Pipes of PVC-U

/ Permissible are polyethylene (PE-HD) pipes acc. to EN ISO 1519-1 and DIN 8074/DIN 8075 acc. to diagram 5.

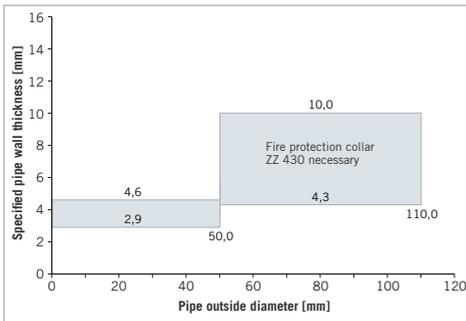
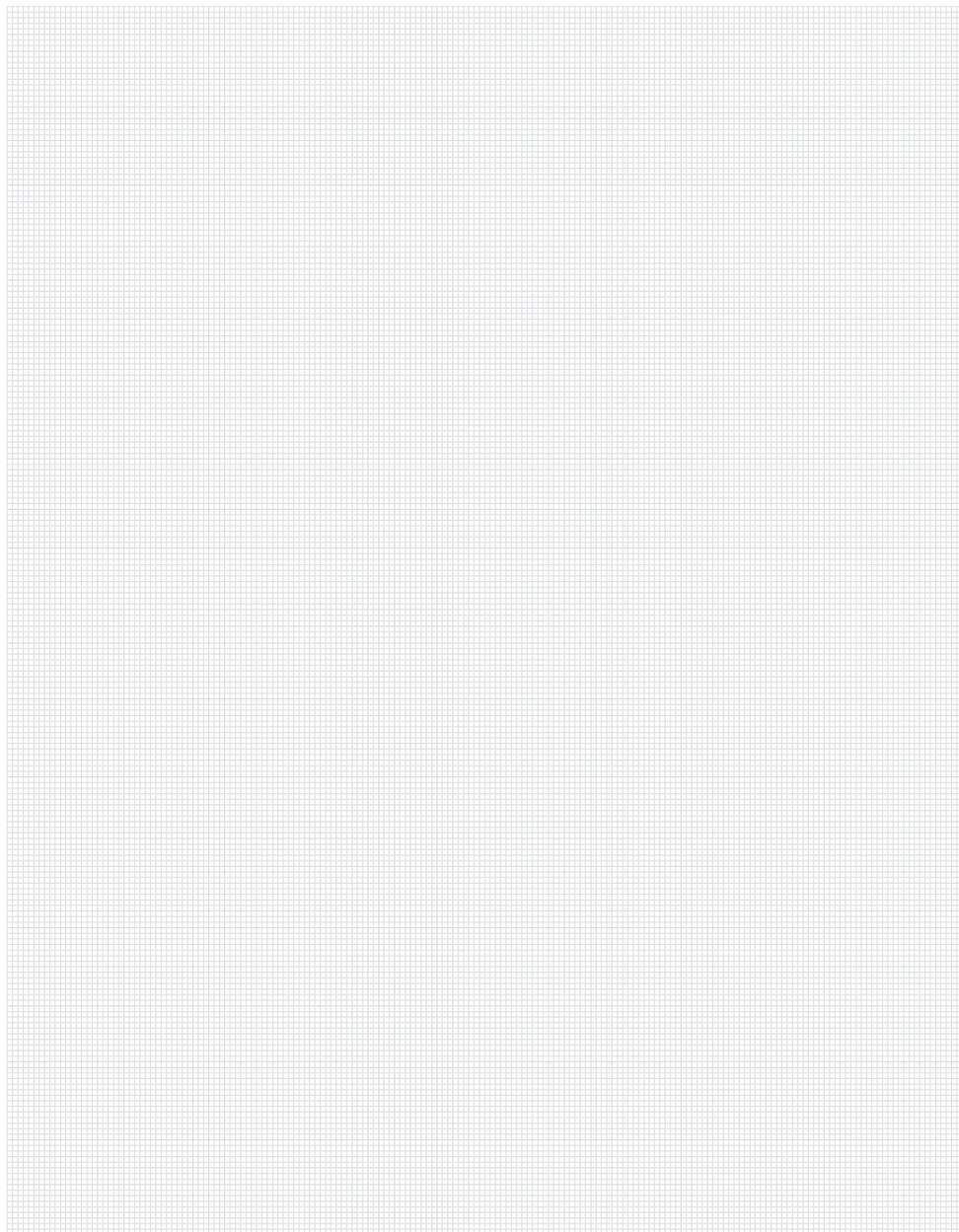


Diagram 5: Pipes of PE-HD

/ Depending on the outer diameter of the plastic pipe to be sealed, the smallest possible size of ZZ 430 fire protection collar must be used.

Plastic hoses (condensate hoses)

/ Plastic hoses (condensate hoses) SC-SH-16/E30, SC-SH-18/E30 and SC-SH-20/E30 (manufacturer: Armacell GmbH) with a maximum outer diameter of 28 mm and a maximum pipe wall thickness of 4 mm.



Support of the pipe and cable support systems

- / The cables, control lines, or conduits must be fastened on the cable ladders and cable ladders or in support devices in accordance with the technical rules.
- / The pipe support and cable support constructions (cable trays and ladders) and the associated supports or fastenings must be of steel and fastened on both sides of the fire penetration seal in such a manner that in the event of fire, no additional mechanical stress can act on the fire penetration seal over the duration of the required fire resistance class. In this regard the technical rules and specifications provided by the manufacturer of the support system and of the fastening system must be complied with.

- / The first support of the cables, cable trays or ladders and of the conduits must be mounted no more than 200 mm in front of the fire penetration seal for wall and floor installation (maximum distance in floors is required only on the top side).
- / The first support of the pipes must be mounted no more than 750 mm in front of the fire penetration seal for wall installation and 1200 mm for floor installation (maximum distance in floors is required only on the top side).

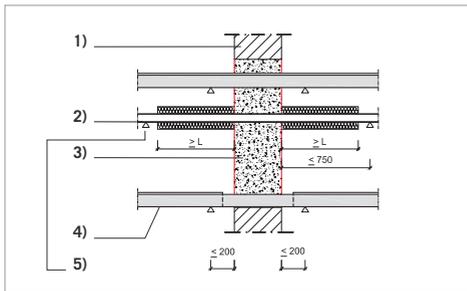


Fig. 1: Support of pipes and cables/cable support systems in walls

Legend

- 1) Rigid wall
- 2) Pipes
- 3) Fire protection foam ZZ 330
- 4) Cables/cable support systems, electrical conduits
- 5) First support of cables/cable support systems, electrical conduits, pipes

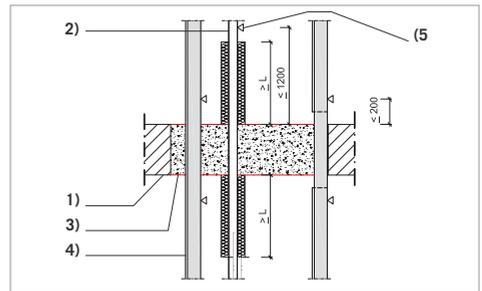
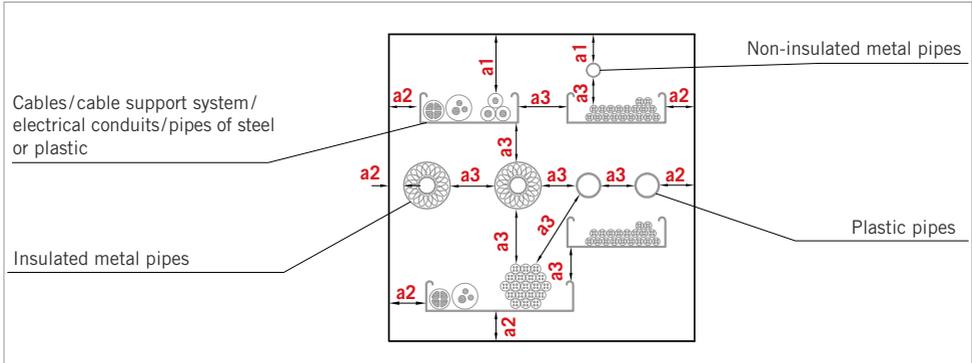


Fig. 2: Support of cables/cable support systems in floors

Legend

- 1) Rigid floor
- 2) Pipes
- 3) Fire protection foam ZZ 330
- 4) Cables/cable support systems, electrical conduits
- 5) First support of the cables/cable support systems, conduits, pipes

Minimum working clearances for mixed penetration seal



Legend

- a1: Penetrating element – upper component opening of the fire penetration seal
- a2: Penetrating element – lower or lateral edge of fire penetration seal
- a3: Penetrating element – penetrating element

Penetrating elements	a1	a2	a3	
Cables/cable support systems and electrical conduits	50 mm (speed pipe® = 0 mm)	0 mm	Cables/cable support systems/electrical conduits	0 mm
			Cable support systems (vertical)	50 mm
			Non-insulated metal pipes	60 mm
			Other elements routed through	50 mm
Metal pipes insulated with mineral wool	0 mm	0 mm	Metal pipes insulated with mineral wool	0 mm
			Plastic pipes with fire protection collar	0 mm
			Non-insulated metal pipes	60 mm
			Other elements routed through	50 mm
Metal pipes insulated with AF/Armaflex	35 mm	35 mm	Metal pipes insulated with AF/Armaflex (insulation thickness > 9 mm)	35 mm
			Metal pipes insulated with AF/Armaflex (insulation thickness = 9 mm)	50 mm
			Non-insulated metal pipes	60 mm
			Other elements routed through	50 mm
Non-insulated metal pipes	35 mm	35 mm	Non-insulated metal pipes	60 mm
			Other elements routed through	60 mm
Pre-insulated metal pipes	0 mm	0 mm	Pre-insulated metal pipes	0 mm
			Non-insulated metal pipes	60 mm
			Other elements routed through	50 mm

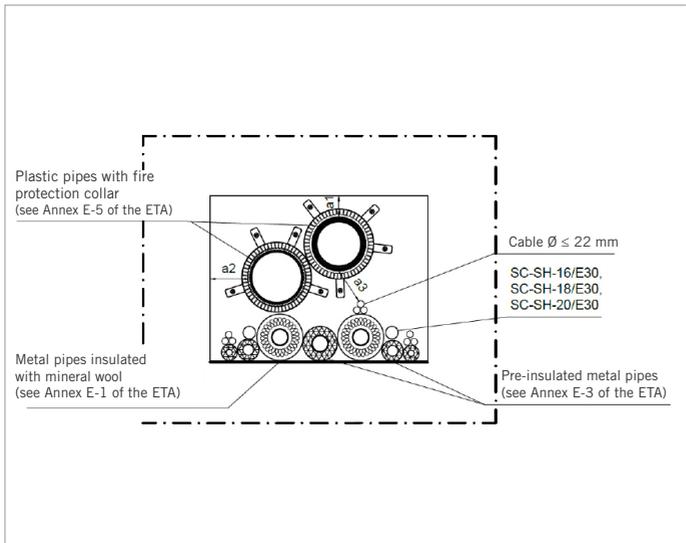
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Penetrating elements	a1	a2	a3	
Plastic pipes (without fire protection collar)	50 mm	50 mm	Plastic pipes (without fire protection collar)	50 mm
			Non-insulated metal pipes	60 mm
			Other elements routed through	50 mm
Plastic pipes (with fire protection collar)	50 mm *	0 mm *	Plastic pipes (with fire protection collar)	0 mm
			Metal pipes insulated with mineral wool	0 mm
			Non-insulated metal pipes	60 mm
			Other elements routed through	50 mm

* Measured from outer edge of pipe

Minimum working clearances – special application “Service shaft”

For special applications (e.g. service shafts) the minimum working clearances between the penetrating elements are smaller. For all other penetrating elements the minimum working clearances for mixed penetration seals apply (see above).



- Legend**
- a1: Penetrating element – upper component opening of the fire penetration seal
 - a2: Penetrating element – lower or lateral edge of fire penetration seal
 - a3: Penetrating element – penetrating element

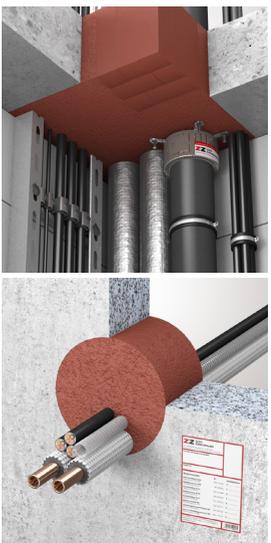


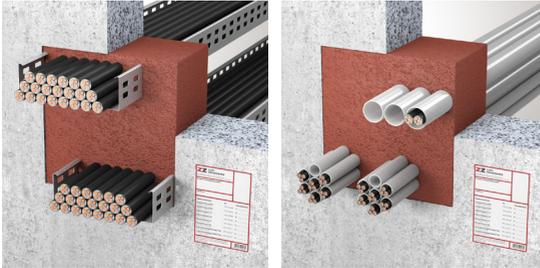
Fig. 3: Application examples with zero clearances

Penetrating elements	a1	a2	a3	
Cable $\varnothing \leq 22$ mm	50 mm	0 mm	Cable $\varnothing \leq 22$ mm	0 mm
			Metal pipes insulated with mineral wool	0 mm
			Pre-insulated metal pipes	0 mm
			Plastic pipes with fire protection collar	0 mm
			SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30	0 mm
			Other elements routed through	50 mm
Metal pipes insulated with mineral wool	0 mm	0 mm	Cable $\varnothing \leq 22$ mm	0 mm
			Metal pipes insulated with mineral wool	0 mm
			Pre-insulated metal pipes	0 mm
			Plastic pipes with fire protection collar	0 mm
			SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30	0 mm
			Other elements routed through	50 mm
SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30 (condensate hose)	50 mm	0 mm	Cable $\varnothing \leq 22$ mm	0 mm
			Metal pipes insulated with mineral wool	0 mm
			Pre-insulated metal pipes	0 mm
			Plastic pipes with fire protection collar	0 mm
			SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30	0 mm
			Other elements routed through	50 mm
Pre-insulated metal pipes	0 mm	0 mm	Cable $\varnothing \leq 22$ mm	0 mm
			Metal pipes insulated with mineral wool	0 mm
			Pre-insulated metal pipes	0 mm
			Plastic pipes with fire protection collar	0 mm
			SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30	0 mm
			Other elements routed through	50 mm
Plastic pipes (with fire protection collar)	50 mm *	0 mm *	Cable $\varnothing \leq 22$ mm	0 mm
			Metal pipes insulated with mineral wool	0 mm
			Pre-insulated metal pipes	0 mm
			Plastic pipes with fire protection collar	0 mm
			SC-SH-16/E30, SC-SH-18/E30, SC-SH-20/E30	0 mm
			Other elements routed through	50 mm

* Measured from outer edge of pipe

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Minimum working clearances – special application “Small cable penetration seals”



For special applications (small openings up to 270 mm x 270 mm or Ø 300 mm with cables only) the minimum working clearances are smaller and the fire resistance classes are higher.

Penetrating elements	a1	a2	a3	
Cables/cable support systems and electrical conduits	0 mm	0 mm	Cables/cable support systems/ electrical conduits	0 mm

Distances between two fire penetration seals in this European Technical Assessment

Distance between two fire penetration seals in this European Technical Assessment: **100 mm**

Fire resistance classifications – mixed penetration seal and special application “Service shafts”

	Penetrating elements	Minimum seal thickness of the mixed penetration seal	
		b ≥ 144 mm	b ≥ 200 mm
Cables	Sheathed electrical cables, telecommunication cables, fibre optic 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 cable bundles up to a max. outer diameter of 100 mm consisting of sheathed electrical cables, telecommunication cables, fibre optic cables with a maximum outer diameter of 21 mm	Wall: E 120/EI 60 Floor: E 60/EI 60	Wall and floor: E 120/EI 90
	Single-conductor 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
Electrical conduits/ pipes of plastic or steel	Conduits/pipes of steel up to a maximum outer diameter of 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
	Conduits of plastic up to a maximum outer diameter of 16 mm with or 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
	Electrical conduits of plastic up to a maximum outer diameter of 40 mm and bundles up to 80 mm consisting of plastic electrical 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
	Electrical conduits of plastic up to a maximum outer diameter of 63 mm and bundles up to 100 mm consisting of plastic electrical 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 a maximum outer diameter of 12 mm and bundles up to 80 mm consisting of speed-pipe® (Ø ≤ 12 mm) with/without fibre optic 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 maximum 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 maximum 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

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Penetrating elements		Minimum seal thickness of the mixed penetration seal	
		b ≥ 144 mm	b ≥ 200 mm
Pre-insulated metal pipes	WICU® Frio pipes up to a maximum 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 maximum 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 maximum 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 maximum 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 maximum 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
	Tubolit® Split/DuoSplit pipes up to a maximum 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
Insulated metal pipes	Metal pipes insulated with mineral wool up to a maximum 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
	Metal pipes insulated with mineral wool up to a maximum 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
	Steel pipes insulated with mineral wool up to a maximum 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
	Metal pipes insulated with AF/Armaflex (insulation thickness 9 mm) with a maximum 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
	Metal pipes insulated with AF/Armaflex (insulation thickness > 9 mm) with a maximum outer diameter of 88.9 mm *	Wall: E 120-C/U/EI 90-C/U Floor: E 60-C/U/EI 60-C/U	Wall and floor: E 120-C/U EI 120-C/U
Plastic pipes / plastic hoses	SC-SH-16/E30, SC-SH-18/E30 and SC-SH-20/E30 (condensate 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 to maximum 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 to maximum 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⁾

* The permissible pipe wall thicknesses and insulations can be found in the diagrams.

- ZZ 451 must be applied around the penetrating elements on both sides of the walls or the top side of the floor.
- ZZ 451 must be applied around the penetrating elements on both sides of the fire protection seal.
- ZZ 430 must be applied around the penetrating elements on both sides of the walls or the bottom side of the floor.

Fire resistance classifications – special application “Small cable penetration seals”

Penetrating elements	Minimum seal thickness of the cable penetration seal			
	b ≥ 100 mm	b ≥ 144 mm	b ≥ 200 mm	b ≥ 250 mm
Sheathed electrical cables, telecommunication cables, fibre optic 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 cables, telecommunication cables or fibre optic cables up to a maximum outer diameter of 21 mm < \varnothing ≤ 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 cables, telecommunication cables or fibre optic cables up to a maximum outer diameter of 50 mm < \varnothing ≤ 80 mm	---	E 120 EI 60	E 120 EI 90/EI 120 ²⁾	E 120 EI 90
Tied cable bundles up to a maximum outer diameter of 100 mm, consisting of sheathed electrical cables, telecommunication cables, fibre optic cables with a maximum outer diameter of 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
Single-conductor 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
Conduits/pipes of steel up to a maximum outer diameter of 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
Conduits of plastic up to a maximum outer diameter of 16 mm with or 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
Electrical conduits of plastic up to a maximum outer diameter of 40 mm and bundles up to 80 mm consisting of plastic electrical conduits (\varnothing ≤ 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
Electrical conduits of plastic up to a maximum outer diameter of 63 mm and bundles up to 100 mm consisting of plastic electrical conduits (\varnothing ≤ 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 a maximum outer diameter of 12 mm and bundles up to 80 mm consisting of speed-pipe® (\varnothing ≤ 12 mm) with/without fibre optic 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 ZZ 330 with a minimum size of 30 mm x 20 mm (length x thickness) must be applied on both sides of the fire penetration seal around the penetrating elements.

2) ZZ 451 must be applied around the penetrating elements on both sides of the fire protection seal.

Mixed penetration seal ZZ M30 ETA-11/0206**Board frames/linings for installation in rigid walls/rigid floor and flexible walls**

- / If the wall/floor in the area of the fire penetration seal does not have the required minimum thickness, either a lining (see Fig. 6) or a board frame (see Fig. 4 and 5) of non-flammable structural boards (Type F drywall acc. to EN 520 (Class A2-s1,d0 acc. to EN 13501-1) or silicate or calcium silicate boards of Class A2-s1, d0 or A1 acc. to EN 13501-1) must be provided around the opening of the fire penetration seal, so that the Fire protection foam ZZ 330 is in contact with the frame or the of the wall/floor over the entire thickness of the fire seal.
- / The individual lining elements (at least 2x 12.5 mm and at least 25 mm thick) interlock in the centre of the opening. The joint between the wall/floor and lining must be sealed with Fire protection foam ZZ 330 or plaster filler. In walls, fastening with screws can be dispensed with.
- / The board frame (min. 50 mm wide and max. 50 mm thick) or the lining in the floor must be fastened with screws and metal anchors or screw anchors that are sufficiently large/long and suitable for the substrate. In aerated concrete dry-wall screws or chipboard screws without dowels must be used. At least two screws per board must be used, the distance between screws must be a maximum of 250 mm.

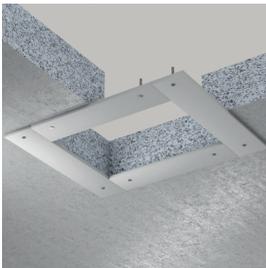


Fig. 4: Board frame for rigid floor
(either on one side or both sides)



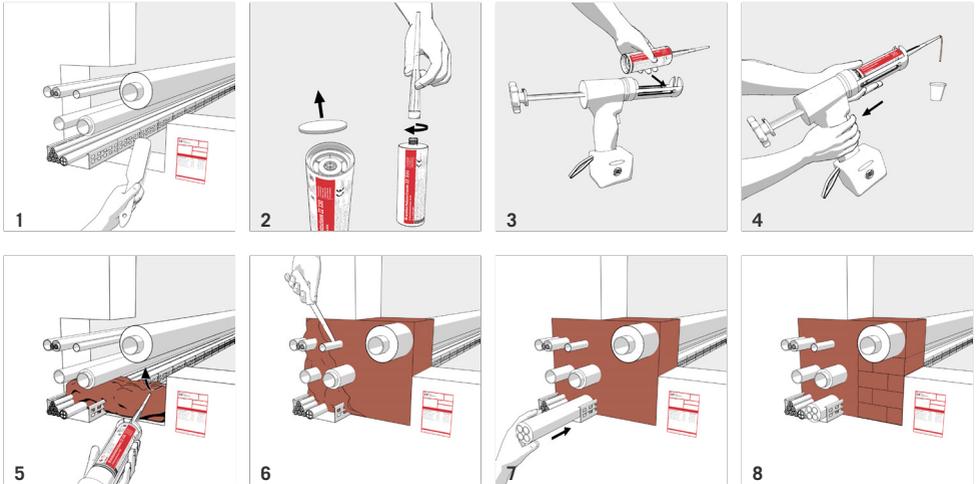
Fig. 5: Board frame for rigid wall and flexible wall
(either on one side or both sides)



Fig. 6: Lining for flexible wall and rigid wall (centred in both cases)
and also for rigid floor (either flush on one side or centred)

Formation of openings in flexible walls

- / For openings to a size of 320 mm x 320 mm it is not necessary to reinforce the aperture with steel profiles/transitions. For larger openings, it suffices to slide two horizontal steel profiles (UW metal profile acc. to EN 14195) with a thickness of at least 0.6 mm above and below the opening in the wall and to fasten them with the wall planking as specified. A positive fit connection is not necessary on the vertical wall studs.
- / If a lining is not used, the cavity between the boards of the flexible wall must be plugged with mineral wool (melting point ≥ 1000 °C, minimum density 40 kg/m³) at least 10 cm sealed around the perimeter.
- / For timber stud walls, at least a distance of 100 mm between the fire penetration seal and timber studs must be present, and the cavity between must be plugged with mineral wool (classification A2-s1, d0 or A1 in accordance with EN 13501-1).

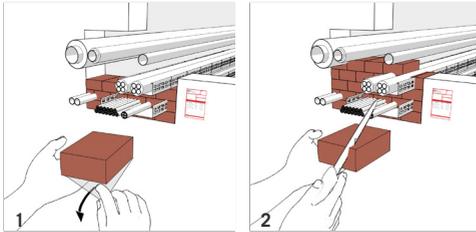
Processing the Fire protection foam ZZ 330

Wear suitable protective gloves, safety goggles and protective clothing for the work.

If the mixer is clogged, never use force to press out the cartridge. This could result in damage to the cartridge or the dispensing gun!

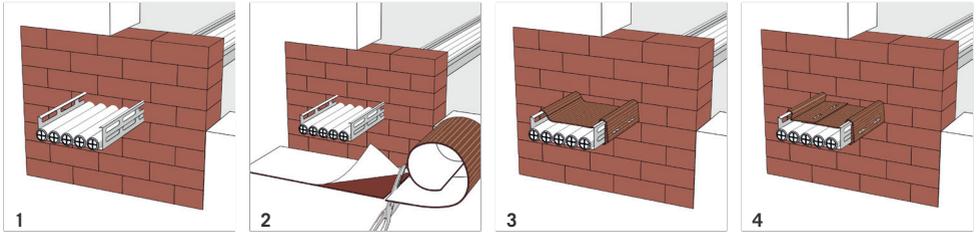
1. Clean component aperture. Cardboard, plastic foil or duct tape can be used as formwork and it can remain on the surface.
2. Hold the cartridge vertically with the tip pointing upward, remove the lower protective cap, unscrew the sealing cap and screw on the mixer provided.
3. Insert the cartridge into the dispensing gun.
4. Start pressing out and discard non-uniform initial material.
5. Fill the opening from back to front. In this process build up the foam from bottom to top, always guide the tip of the mixing nozzle above the foam so that the material does not stick or clog. If work is interrupted for more than 50 seconds the foam will harden in the mixer.
6. After approx. 2 minutes projecting foam residues can be cut off with a suitable knife in compliance with the necessary protective measures and safety regulations.
7. Cables or pipes that will be installed retroactively can be routed through the existing foam. Refill gaps left by removal of cables or pipes with Fire protection foam ZZ 330.
8. Large exposed area can be filled with ZZ 230 fire protection block (see Processing of ZZ 230 fire protection block).

Processing the ZZ 230 fire protection block



Areas of the fire penetration seal without penetrating elements can be filled with fire protection block ZZ 230.

1. Remove the protective foil on the **ZZ 230 fire protection block** and install it so that the minimum seal thickness of the fire penetration seal is maintained (see “Fire resistance classes” tables).
2. Cut the **ZZ 230 fire protection block** to the size of the exposed area. Then the remaining opening must be sealed with ZZ 330 fire protection foam in accordance with instructions.

Processing the ZZ 451 fire protection bandage

The installation of ZZ 451 fire protection bandage is sometimes required around cables, cable support systems or pre-insulated metal pipes (see “Fire resistance classifications” tables).

1. Remove dust and dirt from the surface of the penetrating elements.
2. Cut off a sufficiently long piece of ZZ 451 fire protection bandage and remove the white protective foil. Wrap one layer of ZZ 451 fire protection bandage (150 mm wide) around the penetrating elements on both sides. The adhesive side must be in contact with the penetrating elements. The glass fabric that serves as protection is on the outside.
3. The beginning and end of the ZZ 451 fire protection bandage must be connected with at least two steel clips or steel wire (\varnothing 1 mm). The length of overlap must be at least 45 mm.
4. Multiple strips can also be arranged one after the other with an overlap of at least 45 mm. The butt joints must also be connected with steel clips or steel wire.

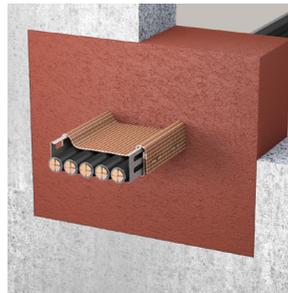
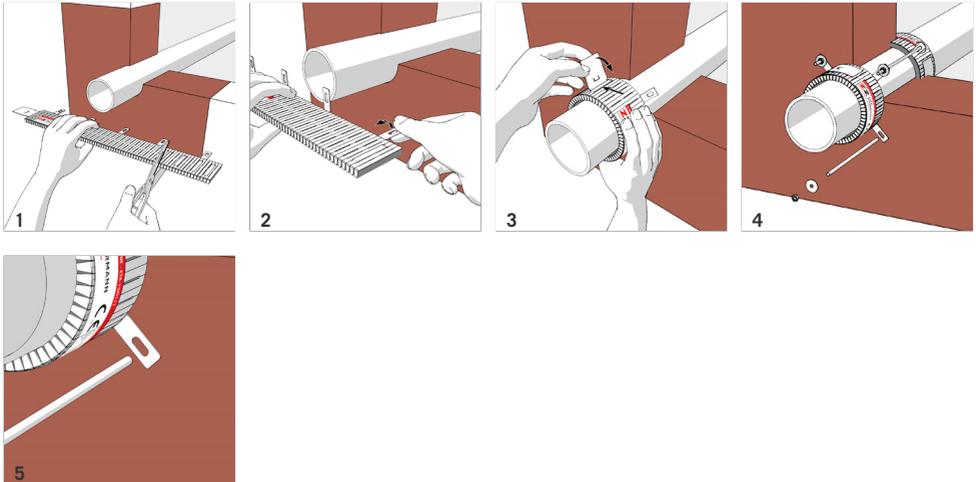


Fig. 7: Fire protection bandage ZZ 451

Processing the ZZ 430 fire protection collar



For some plastic pipes it is necessary to install ZZ 430 fire protection collars. For additional information see the section “Permissible penetrating elements – (plastic pipes)”. In fire penetration seals in floors a ZZ 430 fire protection collar must be installed on the bottom side; in fire penetration seals in walls, one collar must be installed on each side of the wall.

1. Select the suitable collar size for the pipe or cut the ZZ 430 fire protection collar to size.
2. Bend all fastening tabs outward at a right angle.
3. Place the ZZ 430 fire protection collar around the pipe. Fasten the fire protection collar by pulling the locking tab through the opening and bending the tab 180°.
4. Push the ZZ 430 fire protection collar tightly to the seal surface and fasten the ZZ 430 fire protection collar in each fastening tab with \varnothing 6 mm threaded rods, washers and nuts by using through-hole mounting.
5. The threaded rods can be pushed through the ZZ 330 fire protection foam without first drilling holes.

Mixed penetration seal ZZ M30 ETA-11/0206

Retroactive-installation of cables and pipes

- / New penetrating elements can be routed through the existing fire penetration seal. Use a suitable cutting or drilling tool to make sufficiently large openings in the penetration seal, in compliance with the necessary safety measures and safety regulations.
- / Hollow spaces or gaps between the fire penetration seal and newly installed penetrating elements or as a result of the removal of cables or pipes must be filled with Fire protection foam ZZ 330 or ZZ 230 fire protection foam.
- / The newly installed penetrating elements must conform to all requirements of the European Technical Assessment ETA-11/0206 (e.g. first support, installation of ZZ 451 fire protection bandage, etc.)

Tips

- / We recommend the knife with the wide or narrow serrated blade for optimal cutting of the ZZ fire protection products (see accessories).
- / One-man installation is also possible for penetration seals in floors.
- / The penetration seal can be painted over with off-the-shelf dispersion paint.

Product data

For additional information, please refer to the Technical Data Sheets.

Fire protection foam ZZ 330

Description	2-component polyurethane foam system stored in a cartridge, with halogen-free fire safety additives; intumescent
Classification of fire behaviour	Class E (DIN EN 13501-1)
Use category	Use category Y ₁ , (-20/+70) °C Product for use at temperatures from -20 °C to 70 °C and under UV exposure, effect of rain is to be eliminated (EOTA Technical Report TR24)
Content, emission and/or release of hazardous substances	Total emission [mg/m ³] <ul style="list-style-type: none"> • SVOC after 3 days: 0.024 • SVOC after 28 days: 0.011 • VOC after 3 days: 0.027 • VOC after 28 days: < 0.005 (prEN 16516:2015)
Air permeability	$Q_{600} \leq 0.08 \text{ m}^3/(\text{h}\cdot\text{m}^2)$ (no air permeability was measurable at a differential pressure of 600 Pa and a measurement accuracy of 0.01 m ³ /h, with dimensions of 350 x 350 x 200 [mm], and no penetrating elements installed) $Q_{50} = 0.39 \text{ m}^3/(\text{h}\cdot\text{m}^2)/Q_{600} = 4.09 \text{ m}^3/(\text{h}\cdot\text{m}^2)$ (Dimensions 360 x 360 x 144 [mm], without penetrating elements) (EN 1026)
Resistance to static differential pressure	$P_{\max} = 10000 \text{ Pa}$ (Dimensions 350 x 350 x 200 [mm], without penetrating elements) $P_{\max} = 8800 \text{ Pa}$ (Dimensions 360 x 360 x 144 [mm], without penetrating elements) (EN 12211)
Thermal conductivity	$\lambda_{10.23/50} = 0.088 \text{ W}/(\text{m}\cdot\text{K})$ (DIN EN 12667:2001)
Airborne sound insulation	$D_{n,e,w}(C;Ctr) = 66 \text{ (-1; -6) dB}$ $R_w(C;Ctr) = 47 \text{ (-1; -6) dB}$ (Dimensions 360 x 360 x 200 [mm], without penetrating elements) (EN ISO 717-1) $D_{n,e,w}(C;Ctr) = 62 \text{ (-1; -5) dB}$ $R_w(C;Ctr) = 42 \text{ (-1; -5) dB}$ (Dimensions 350 x 350 x 144 [mm], without penetrating elements)
Surface resistance	$R_0 = 1.25 \times 10^9 \Omega$ ZZ 330, earthed is suitable for explosion group I, IIA, IIB, IIC and III with restriction of area of use (Zone 0, 1, 2). (DIN EN 60079-0:2013-04, IEC 60079-0:2011, EN 60079-0:2012, EN 80079-36:2016, TRGS 727:2016-07-29)

Mixed penetration seal ZZ M30 ETA-11/0206

Fire protection block ZZ 230

Description	Rectangular moulded component consisting of polyurethane foam, with halogen-free fire safety additives; intumescent
Classification of fire behaviour	Class E (DIN EN 13501-1)
Use category	Use category Y ₁ , (-20/+70) °C Product for use at temperatures from -20 °C to 70 °C and under UV exposure, effect of rain is to be eliminated (EOTA Technical Report TR24)
Content, emission and/or release of hazardous substances	Total emission [mg/m ³] <ul style="list-style-type: none"> • SVOC after 3 days: < 0.005 • SVOC after 28 days: < 0.005 • VOC after 3 days: 0.008 • VOC after 28 days: 0.006 (prEN 16516:2015)
Air permeability	Q ₅₀ = 0.82 m ³ /(h·m ²)/Q ₆₀₀ = 6.61 m ³ /(h·m ²) (Dimensions 550 x 355 x 200 [mm], without penetrating elements) Q ₅₀ = 1.12 m ³ /(h·m ²)/Q ₆₀₀ = 7.65 m ³ /(h·m ²) (Dimensions 560 x 360 x 144 [mm], without penetrating elements) (EN 1026)
Resistance to static differential pressure	P _{max} = 3700 Pa (Dimensions 550 x 355 x 200 [mm], without penetrating elements) P _{max} = 2100 Pa (Dimensions 560 x 360 x 144 [mm], without penetrating elements) (EN 12211)
Thermal conductivity	λ _{10.23/50} = 0.103 W/(m·K) (DIN EN 12667:2001)
Airborne sound insulation	D _{n,e,w} (C;Ctr) = 68 (-4; -11) dB R _w (C;Ctr) = 49 (-4; -11) dB (Dimensions 360 x 360 x 200 [mm], without penetrating elements) (EN ISO 717-1) D _{n,e,w} (C;Ctr) = 64 (-1; -6) dB R _w (C;Ctr) = 44 (-1; -6) dB (Dimensions 350 x 350 x 144 [mm], without penetrating elements)
Surface resistance	R ₀ = 2.39 x 10 ⁹ Ω ZZ 230, earthed is suitable for explosion group I, IIA, IIB, IIC and III with restriction of area of use (Zone 0, 1, 2). (DIN EN 60079-0:2013-04, IEC 60079-0:2011, EN 60079-0:2012, EN 80079-36:2016, TRGS 727:2016-07-29)

Fire protection bandage ZZ 451

Description	Non-shrinking, solvent-free, plastic, fibreglass-reinforced butyl rubber, with halogen-free fire safety additives; intumescent.
Classification of fire behaviour	Class E (DIN EN 13501-1)
Use category	Use category Y ₁ , (-20/+70) °C Product for use at temperatures from -20 °C to 70 °C and under UV exposure, effect of rain is to be eliminated (EOTA Technical Report TR24)
Content, emission and/or release of hazardous substances	Total emission [mg/m ³] <ul style="list-style-type: none"> • SVOC after 3 days: 0.060 • SVOC after 28 days: 0.020 • VOC after 3 days: < 0.005 • VOC after 28 days: < 0.005 (prEN 16516:2015)
Thermal conductivity	$\lambda_{10} = 0.396 \text{ W/(m}\cdot\text{K)}$ (DIN EN 12664:2001)
Surface resistance	$R_0 \gg 10^{12} \Omega$ ZZ 451, earthed is suitable for explosion group I, IIA, IIB, IIC and III with restriction of area of use (Zone 0, 1, 2). (DIN EN 60079-0:2013-04, IEC 60079-0:2011, EN 60079-0:2012, EN 80079-36:2016, TRGS 727:2016-07-29)

Fire protection collar ZZ 430

Description	Collar consisting of a sheet steel case and a fire protection element of halogen-free polyurethane that forms an insulating layer
Classification of fire behaviour	Class E (DIN EN 13501-1)
Use category	Use category Y ₁ , (-20/+70) °C Product for use at temperatures from -20 °C to 70 °C and under UV exposure, effect of rain is to be eliminated (EOTA Technical Report TR24)

Declarations of performance

The declarations of performance for the products

- / Fire protection foam ZZ 330
- / Fire protection block ZZ 230
- / Fire protection bandage ZZ 451
- / Fire protection collar ZZ 430

are available at www.z-z.de/downloads

www.z-z.eu

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