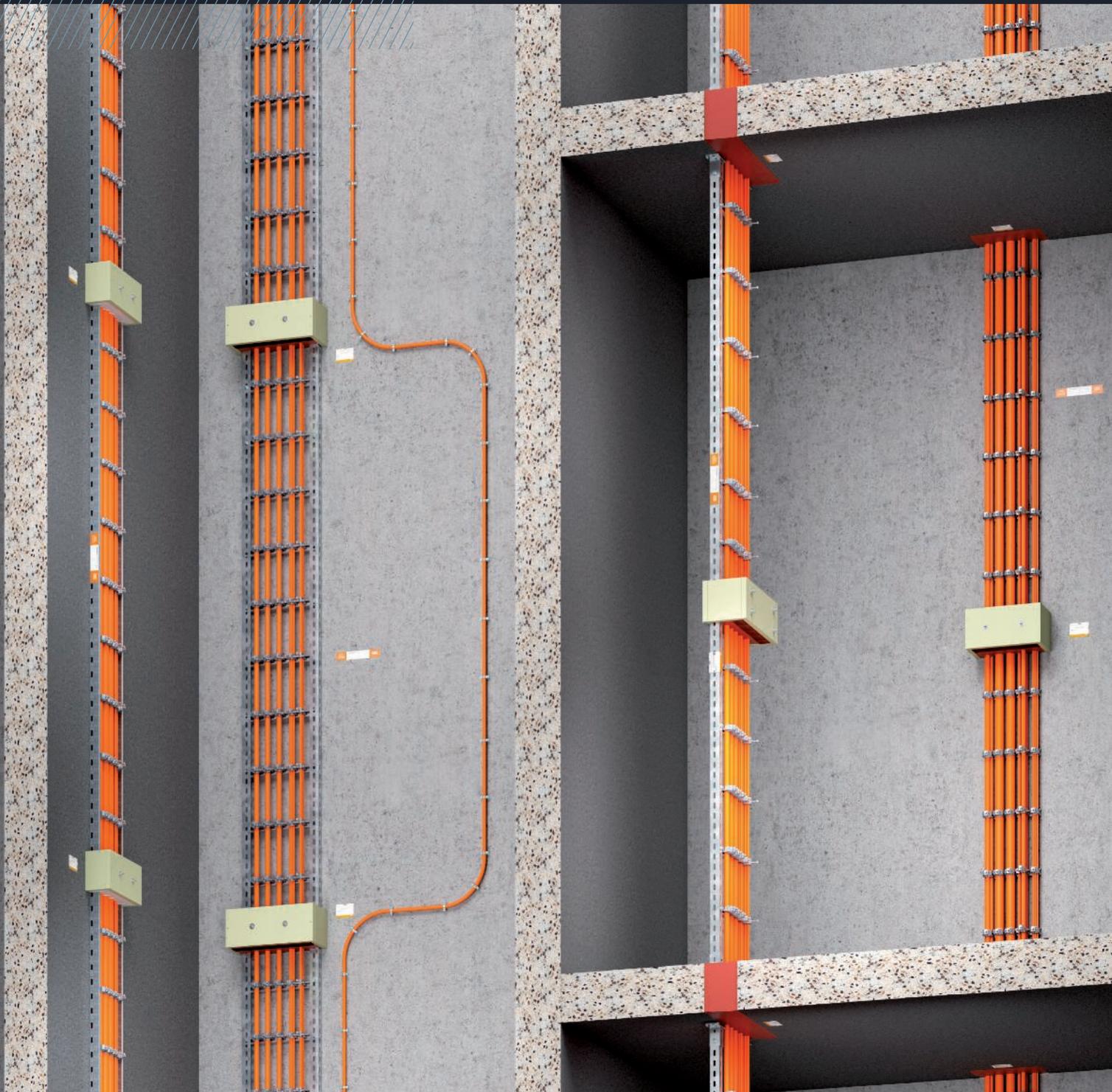


ZSE90 strain relief

Effective support of vertical ladder systems with integrated maintenance of electrical function according to DIN 4102-12

Maintenance of electrical function for safety-relevant electrical systems

Specifics of the vertical installation



E30**E60****E90**

The maintenance of electrical function is required in any structure in which large numbers of people congregate, for example, hospitals, hotels, underground railway systems or tunnels. Maintenance of the electrical function exists when the current flow is not interrupted during a fire. This allows, for example, emergency lighting, ventilation and fire alarm systems to continue working and emergency and escape routes to remain usable. The longer these technical systems work, the greater the chances of rescue.

If cables that maintain the electrical function are laid vertically throughout, additional measures are required in order to prevent the circuit being interrupted during a fire. The measures which need to be taken in such cases is described in the following.

Maintenance of electrical function for evacuation and rescue

The first minutes after the start of a fire play an important role in the evacuation of a building. During this period*, OBO systems for the maintenance of electrical function to E30 maintain the flow of energy for:

- Safety lighting systems
- Lifts with fire control
- Fire alarm systems
- Alarm systems and systems for issuing instructions
- Natural smoke extraction systems

Maintenance of electrical function for firefighting

To support firefighting operations, it is imperative that certain technical equipment is supplied with power over a sufficient length of time* after a fire breaks out. For example, OBO systems for the maintenance of electrical function E60 and E90 ensure:

- Pressure increase systems for fire water supply
- Mechanical smoke extraction systems
- Smoke protection pressure systems
- Fire brigade lifts
- Safety power supply

* Requirements regarding the length of the maintenance of electrical function are dependent on the local construction regulations.

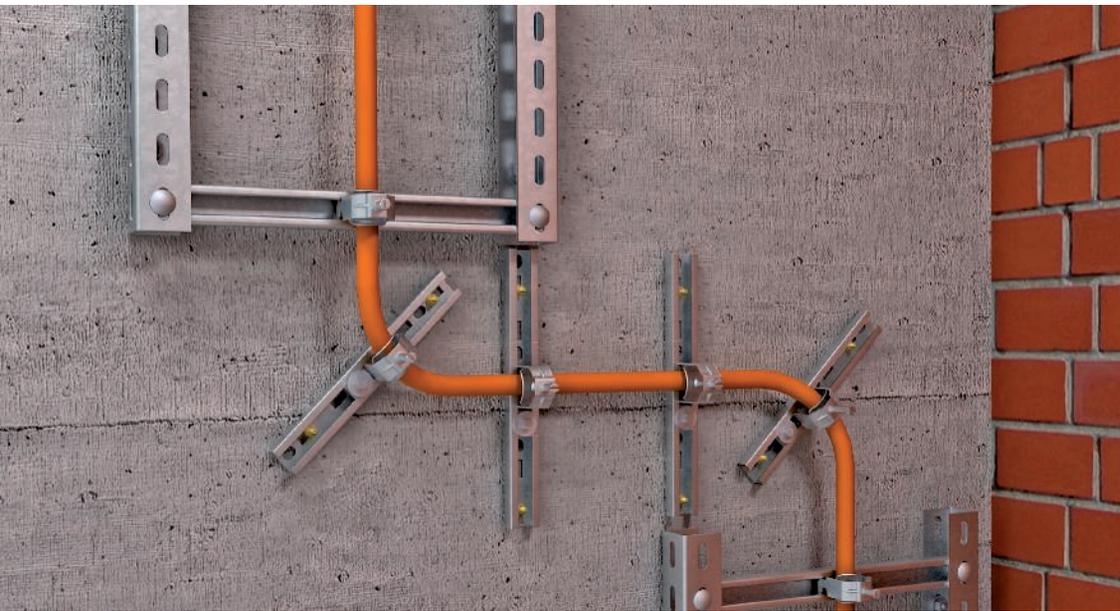
Broschüre: Einbauelemente für Kabeltrassen / en / 2021/01/26 10:04:30 10:04:30 (LLExpert_02837) / 2021/01/26 10:04:45 10:04:45

Vertical installation of fireproof cable systems

Options for the effective support

When cables that maintain the electrical function are laid vertically, a direct fire load in the area of the clamps would mean that the cables aren't clamped properly anymore and could tear due to their dead weight, which would cause an interruption in the power supply.

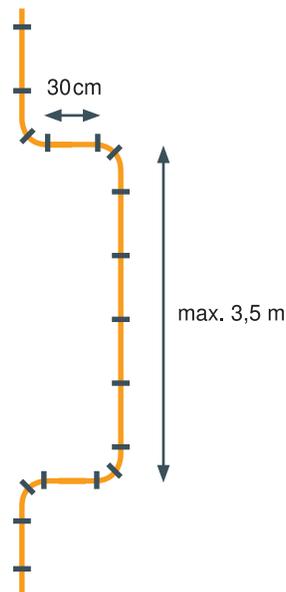
In order to prevent this happening and to maintain secure functioning of the electrical supply, norm DIN 4102 Part 12 requires an effective support of the cables at a maximum distance of 3.5 m. Basically, there are three options to ensure effective support:



1

Strain relief through loops

With this variant according to DIN 4102 Part 12, the cables are laid in loops. If there is a fire, the cables drop onto the ceramic insulation in the clip elements. This prevents tearing through the weight of the copper. Due to the requirement for a large amount of room to the sides and also due to the complicated laying of the cables as a result of adhering to the bending radii, this variant is hardly feasible in real-life conditions such as, for example, a fully assigned rising shaft.

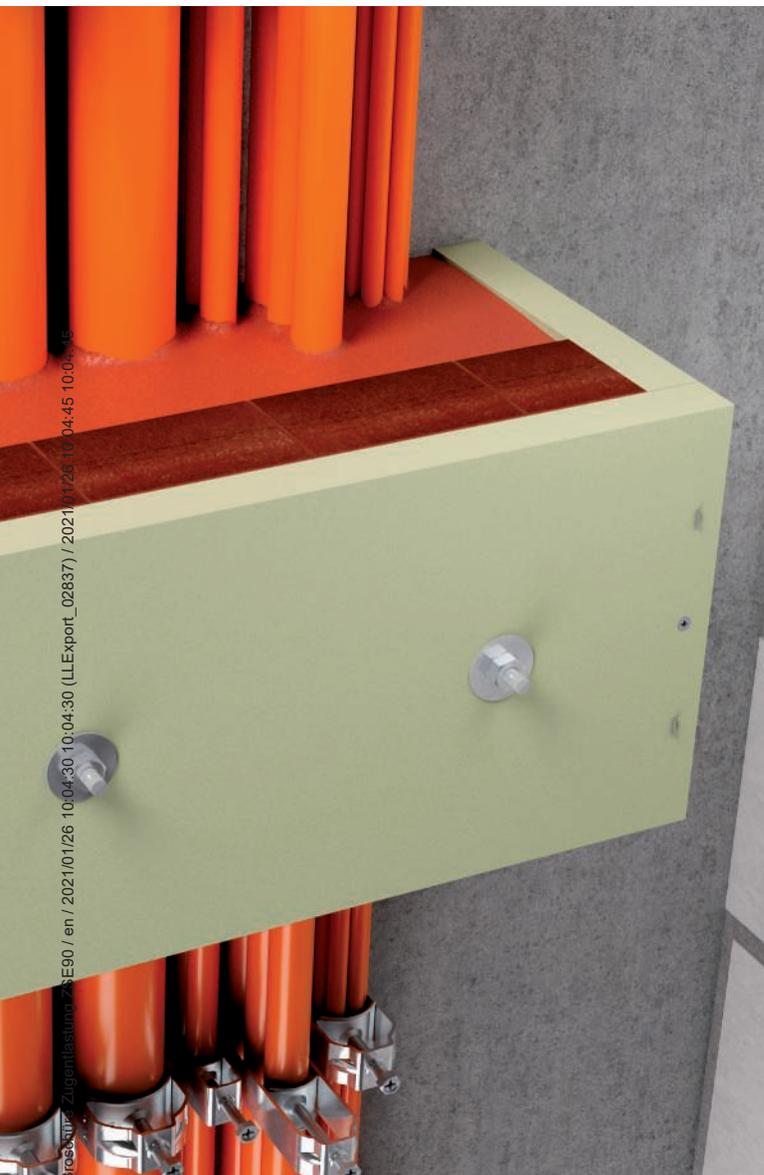
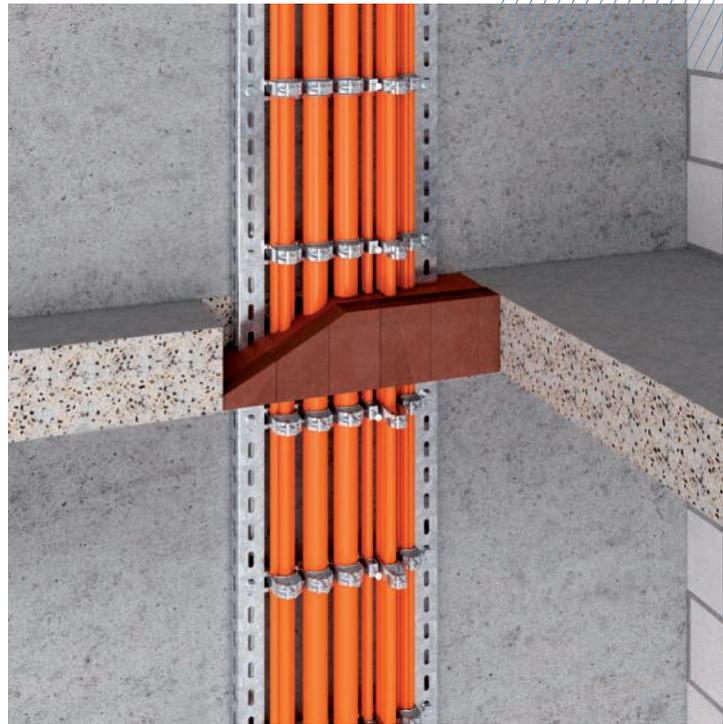


Support through side jump or loops

2

Strain relief through cable insulation

An additional strain relief option is the installation of approved cable insulations in the ceiling openings. In achieving this, the fire resistance length of the insulation system must correspond to the maintenance of electrical function class of the installed cable system. In such cases, the storey height may not exceed 3.5 m. If there is a fire, the copper weight is caught by the series of clips located directly above the floor, as this remains cold due to the function of the insulation.



3

Housings made of non-combustible material with an integrated seal that are mounted directly over a clip series have proven to be a suitable solution. This means that even at a storey height of more than 3.5 m elaborate loops can be prevented. The action principle is similar to that of the cable insulation in the storey ceiling: If there is a fire, the series of clips in the housing remains relatively cold and the cables remain clamped, effectively preventing breaking.

A DIN-conformant and effective support of the vertically installed cables that maintain the electrical supply can be achieved in a way which is extremely economical and space-saving.

The OBO strain relief solutions

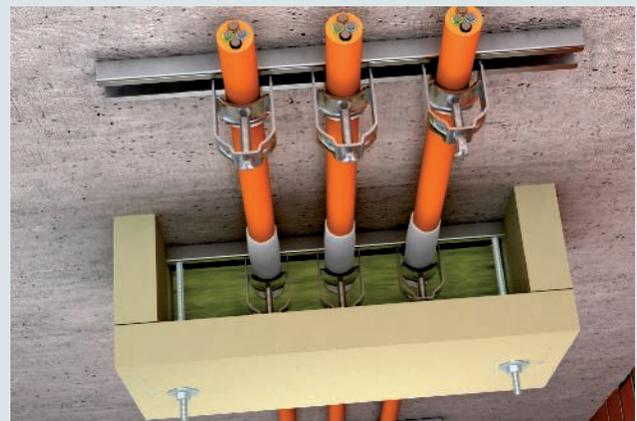
The housing of ZSE90

The housings of the ZSE90 strain reliefs, in conjunction with the appropriate seal, prevent a direct fire load at the clips in the event of a fire. With various housing variants, the ZSE90 strain reliefs offer the right solution for any installation.

The housings are delivered pre-mounted in the appropriate widths, heights and depths. For installations in small places they can, of course, also be adapted and shortened individually on-site.



Mounting in combination with cable and pipe spacer clips

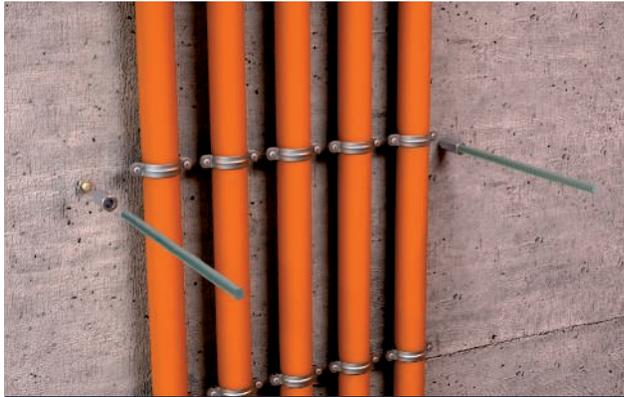


Mounting in combination with profile rails



Mounting in combination with cable ladders

The strain reliefs can be used for all widths of rising ladders, for vertical single clip installations as well as cable installations on profile rails.



Fastening next to the cables directly on the wall



Fastening with threaded rods and slide nuts in the rungs

The mounting sets included in the delivery allow for 2 different types of fastenings: directly on the wall or on the rung.

3 types of the ZSE90 for the safe maintenance of the electrical supply



Flexible: for direct wall mounting with foam filling



Extraordinary: for mounting on suspended rising routes with foam filling



Tried and tested: for direct mounting with mineral wool filling

Approved for all cables ensuring the maintenance of electrical function classes E30 to E90 in combination with standard support structures. The surveyor's report is always valid in conjunction with a valid general construction test certificate from the cable manufacturer.

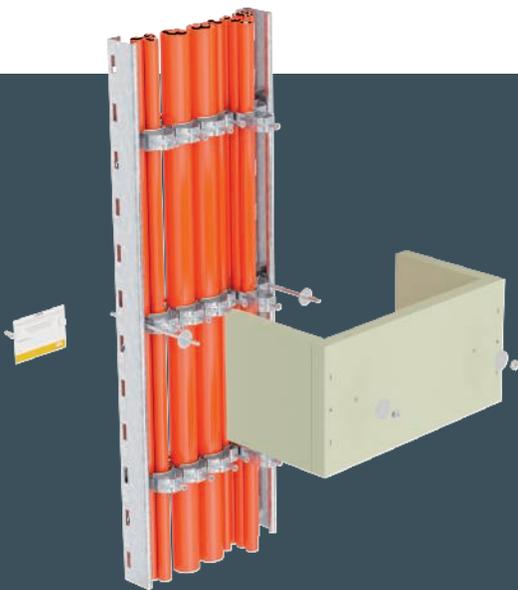
Flexible

ZSE90 for direct wall mounting with foam filling

With this variant of the ZSE90 strain relief the non-combustible three-sided housing is filled with foam insulation. Areas that are without cables are filled with PYROPLUG® Block foam blocks. All spaces next to, between and behind the cables are filled with the PYROSIT® NG fire protection foam. Thanks to the filling tip of the PYROSIT® NG cartridge, the smallest gaps can be reached easily. The exact amount needed to completely fill the housing is dependent on the specific number of cables laid. This is why you can determine yourself how much of which type of filling material you need for your installation – entirely flexible and individual.

At a glance

- Guidance lines on the housing for mounting
- Flexible choice of the required filling material
- Easy filling of small gaps even behind the cables
- Particularly suited to vertical ladders with full cable assignment
- Ideal for refitting
- Mounting set included



Pre-mounted housing including mounting set and identification plate



Finished filled strain relief

Installation principle



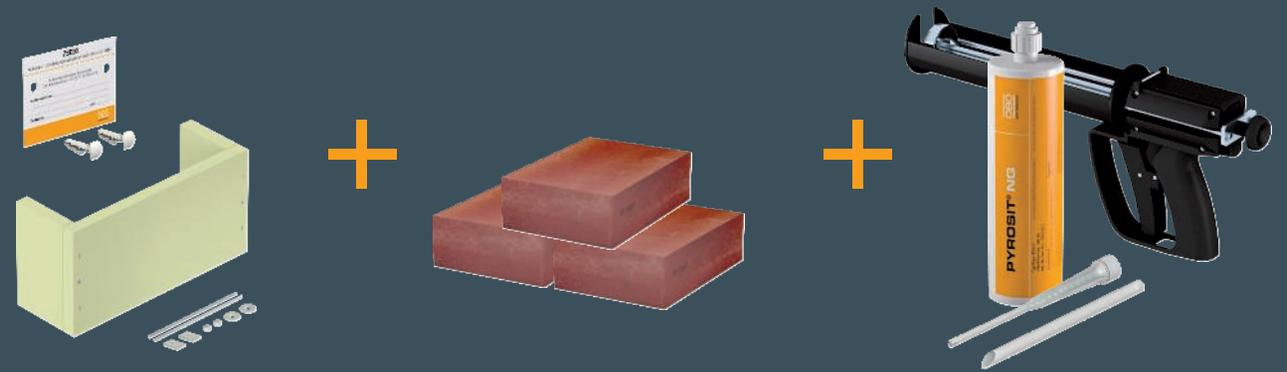
Creating a casing for the secure filling of the housing



Filling with PYROPLUG® Block foam block and filling the gaps between cables with the PYROSIT® NG fire protection foam



Filling of the entire housing with the PYROSIT® NG fire protection foam when using a large number of cables



The filling material is not included in the delivery and must be ordered separately.

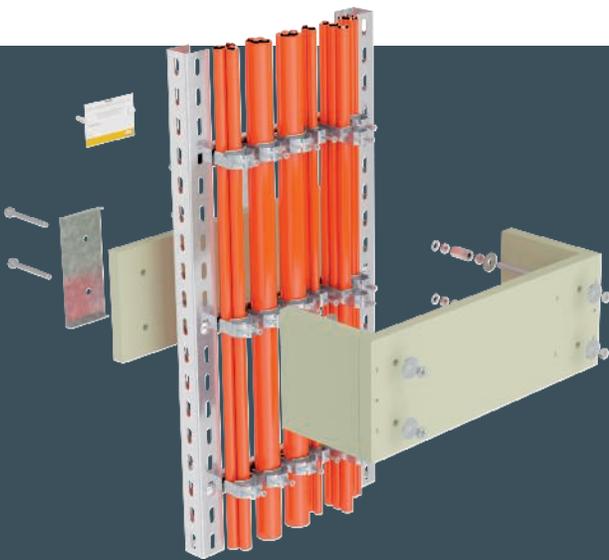
Extraordinary

ZSE90 for mounting on suspended vertical ladders with foam filling

It is now possible to erect vertical ladders with a gap to the wall in systems that maintain the electrical function to DIN 4102 Part 12. The protective measure to prevent the cable tearing in a fire still has to be conducted. This is where a further option that conforms to standards can be used – the strain relief as a four-side variant. The strain relief consists of a U-shaped housing, a matching counter plate made from the same non-combustible material and a mounting set for the installation on vertical ladders consisting of U profiles. Filling is also done with PYROPLUG® Block foam blocks and PYROSIT® NG fire protection foam.

At a glance

- Housing and counter plate pre-drilled
- Flexible choice of the required filling material
- Simple filling of small gaps
- Particularly suited to vertical ladders with full cable assignment
- Ideal for refitting
- Mounting set included

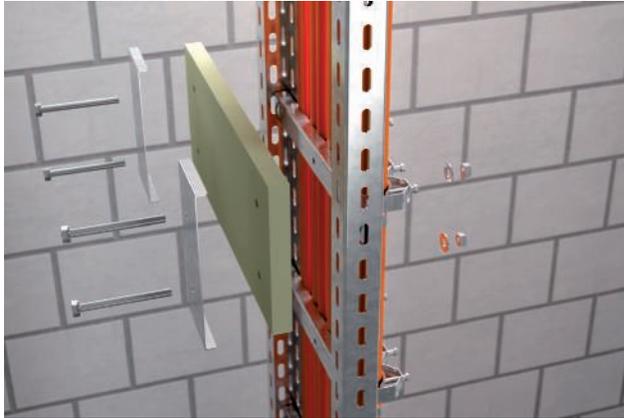


Housing with counter plate for mounting on suspended vertical ladders



Finished filled strain relief

Installation principle



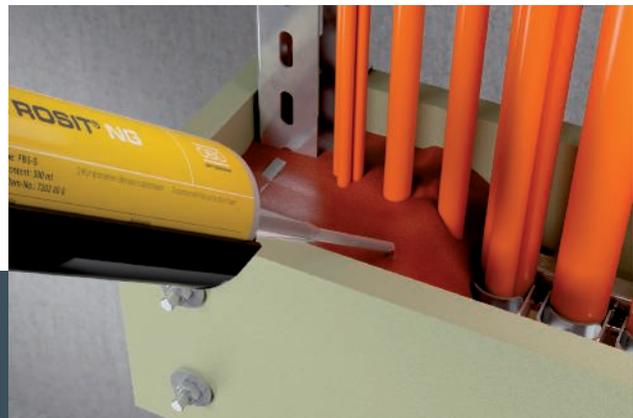
Mounting of the counter plate with hexagonal bolts on the suspended vertical ladder



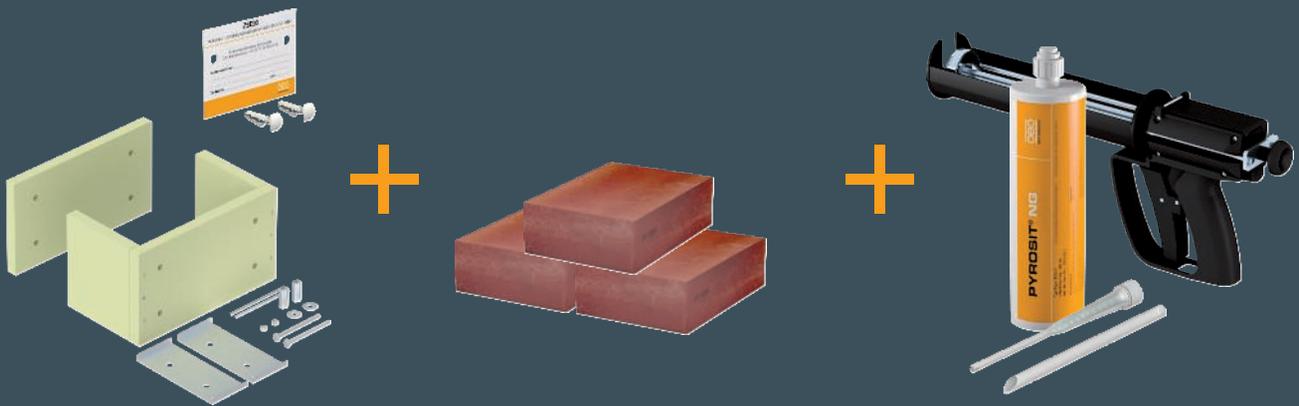
Mounting of threaded rods, locknuts and washers for fastening the housing



Filling of the mounted housing with PYROPLUG® Block foam blocks



Filling of the gaps between cables with PYROSIT® NG fire protection foam



The filling material is not included in the delivery and must be ordered separately.

Tried and tested

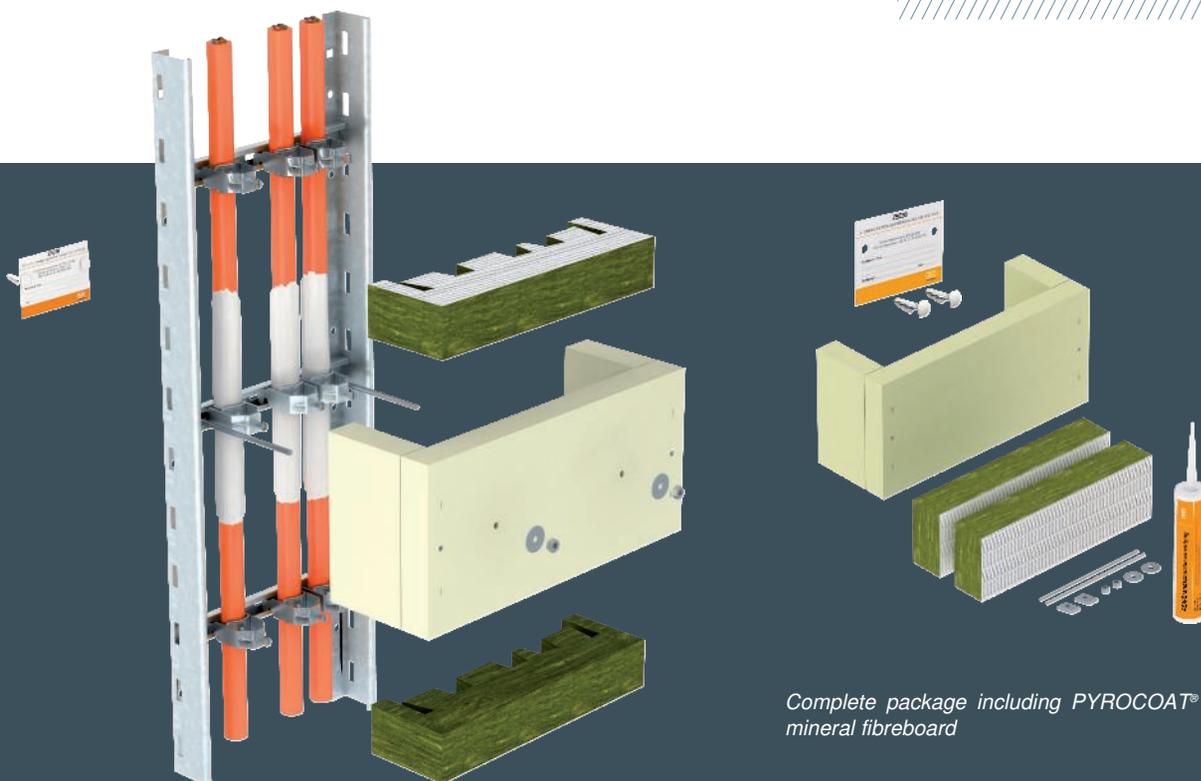
ZSE90 for direct wall mounting with mineral filling

With this solution, the housing is filled with mineral fibre-boards and mineral wool with a melting point of over 1,000 °C. Before the housing is mounted, the cables must be coated with the thermally insulating ablation coating PYROCOAT® ASX at least at the height of the housing.

After the housing has been put into place the mineral fibre-boards are adapted to the existing installation, i.e. cut out and clamped into the housing. Then the remaining joints around the cables are also filled with PYROCOAT® ASX and the surfaces of the boards are sealed at the top and bottom in the housing. In order to achieve a secure function, the dry layer thickness must be 1 mm.

At a glance

- Filling and sealing material included
- Particularly suited for small cable assignment
- No casing during mounting necessary
- Mounting set included



Complete package including PYROCOAT® ASX and mineral fibreboard

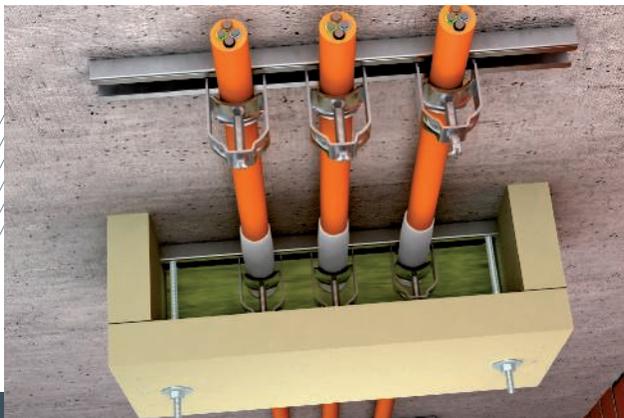
Installation principle



Coating of the cables in the area of the strain relief



Bringing in the lower mineral fibreboard



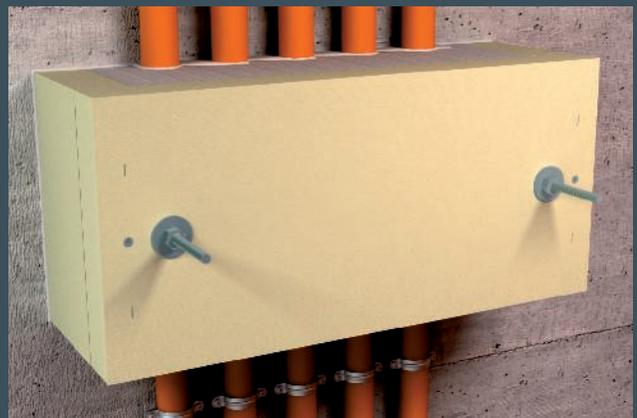
Filling with mineral wool above the mineral fibreboard



Bringing in the second mineral fibreboard above the mineral wool



Closing of all remaining joints and sealing of the boards with PYROCOAT® ASX



Fully fitted strain relief with mineral wool filling

ZSE90 strain relief

Direct wall mounting

Proof

Routing type	Standard support structure according to DIN 4102 Part 12 Effective support for vertical routing as a direct mounting
Proof	Version with foam filling: Surveyor's report no. GA-2020/049-Nau Version with mineral wool filling: Surveyor's report no. GS 3.2/17-361-1-r1
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

Note:

The surveyor's report is only valid in conjunction with valid general construction test certificates from a testing office for the appropriate installed cable type.

Mounting parameters

Fastening spacing	Max. 5.0 m
Application area	Laying of cables with single clips Laying of cables with clamp clips on profile rails Laying of cables in vertical ladders
Fastening options	With threaded rods directly on the wall With threaded rods on profile rails With threaded rods on the rungs of the vertical ladders
Housing width (interior)	250–650 mm
Housing height (interior)	115 mm/175 mm
Individual cable diameter	Unlimited

Strain relief Type	Cable routing with individual clips	Cable routing on profile rails	Vertical ladder Type LG	Vertical ladder Type SLM	Vertical ladder Type SLS
ZSE90-25-11 L	✓	✓	✓	✓	✗
ZSE90-35-11 L	✓	✓	✓	✓	✗
ZSE90-45-11 L	✓	✓	✓	✓	✓
ZSE90-25-17 L	✓	✓	✓	✓	✗
ZSE90-35-17 L	✓	✓	✓	✓	✗
ZSE90-45-17 L	✓	✓	✓	✓	✓
ZSE90-55-17 L	✓	✓	✗	✓	✓
ZSE90-65-17 L	✓	✓	✗	✓	✓

Version with mineral wool filling:

Strain relief Type	Cable routing with individual clips	Cable routing on profile rails	Vertical ladder Type LG	Vertical ladder Type SLM	Vertical ladder Type SLS
ZSE90-25-11	✓	✓	✓	✓	✗
ZSE90-35-11	✓	✓	✓	✓	✗
ZSE90-45-11	✓	✓	✓	✓	✓
ZSE90-25-17	✓	✓	✓	✓	✗
ZSE90-35-17	✓	✓	✓	✓	✗
ZSE90-45-17	✓	✓	✓	✓	✓
ZSE90-55-17	✓	✓	✗	✓	✓
ZSE90-65-17	✓	✓	✗	✓	✓

ZSE90 strain relief

Mounting on suspended vertical ladders

Proof

Routing type	Standard support structure according to DIN 4120 Part 12 Effective support for vertical routing as a suspended installation
Proof	Version with foam filling: surveyor's report no. GA-2020/049-Nau
Maintenance of electrical function classes	E30 to E90
Testing standard	DIN 4102 Part 12

Note:

The surveyor's report is only valid in conjunction with valid general construction test certificates from a testing office for the appropriate installed cable type.

Mounting parameters

Fastening spacing	Max. 5.0 m
Application area	Laying cables in vertical ladders
Fastening options	With a mounting set on the vertical ladder
Housing width (interior)	210–610 mm
Housing height (interior)	175 mm
Individual cable diameter	Unlimited

Strain relief Type	Vertical ladder Type LG	Vertical ladder Type SLM	Vertical ladder Type SLS
ZSE90-21-17 LH	✘	✔	✘
ZSE90-31-17 LH	✘	✔	✘
ZSE90-41-17 LH	✘	✔	✘
ZSE90-51-17 LH	✘	✔	✘
ZSE90-61-17 LH	✘	✔	✘

Strain relief on three sides, empty housing, internal height 115 mm

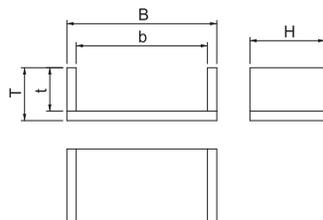
Calcium silicate



Type	Dimension		Dimension		Dimension T	Pack Piece	Weight kg/100 pc.	Item no.
	b mm	t mm	H mm	B mm				
ZSE90-25-11 L	250	115	200	300	140	1	320.000	7215760
ZSE90-35-11 L	350	115	200	400	140	1	390.000	7215762
ZSE90-45-11 L	450	115	200	500	140	1	410.000	7215764

Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12. Approved for all cable types and all vertical routing systems, which are mounted directly on solid walls. Maintenance of electrical function classes E30 to E90. Empty housing for individual filling with the PYROSIT® NG fire protection foam and/or PYROPLUG® Block insulation systems, incl. mounting set and labelling panel.

Dimensions



Material requirements

Type	Contents empty [l]	Blocks	Cartridges
ZSE90-25-11 L	5.8	2	1.0
ZSE90-35-11 L	8.1	3	1.2
ZSE90-45-11 L	10.4	4	1.4

Assumed 25% assignment

Strain relief on three sides, empty housing, internal height 175 mm

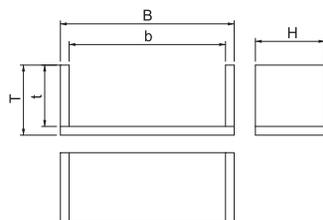
Calcium silicate



Type	Dimension		Dimension		Dimension T	Pack Piece	Weight kg/100 pc.	Item no.
	b mm	t mm	H mm	B mm				
ZSE90-25-17 L	250	175	200	300	200	1	380.000	7215766
ZSE90-35-17 L	350	175	200	400	200	1	430.000	7215768
ZSE90-45-17 L	450	175	200	500	200	1	475.000	7215770
ZSE90-55-17 L	550	175	200	600	200	1	530.000	7215772
ZSE90-65-17 L	650	175	200	700	200	1	575.000	7215774

Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12. Approved for all cable types and all vertical routing systems, which are mounted directly on solid walls. Maintenance of electrical function classes E30 to E90. Empty housing for individual filling with the PYROSIT® NG fire protection foam and/or PYROPLUG® Block insulation systems, incl. mounting set and labelling panel.

Dimensions



Material requirements

Type	Contents empty [l]	Blocks	Cartridges
ZSE90-25-17 L	8.8	3	1.5
ZSE90-35-17 L	12.3	4	2.2
ZSE90-45-17 L	15.8	6	2.2
ZSE90-55-17 L	19.3	8	2.3
ZSE90-65-17 L	22.8	8	3.7

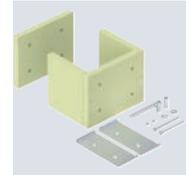
Assumed 25% assignment

Calcium silicate

Strain relief on four sides, empty housing, internal height 175 mm

Type	Dimension b mm	Dimension t mm	Dimension H mm	Dimension B mm	Dimension T mm	Pack Piece	Weight kg/100 pc.	Item no.
ZSE90-21-17 LH	210	175	200	260	225	1	595.000	7215780
ZSE90-31-17 LH	310	175	200	360	225	1	690.000	7215782
ZSE90-41-17 LH	410	175	200	460	225	1	785.000	7215784
ZSE90-51-17 LH	510	175	200	560	225	1	875.000	7215786
ZSE90-61-17 LH	610	175	200	660	225	1	975.000	7215788

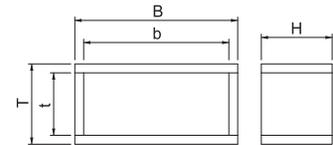
Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 Part 12. Approved for all cable types and vertical ladders, created as suspended mounting. Maintenance of electrical function classes E30 to E90. Empty housing for individual filling with the PYROSIT® NG fire protection foam and/or PYROPLUG® Block insulation systems, incl. mounting set and labelling panel.



Material requirements				
Type	Contents empty [l]	Blocks	Cartridges	
ZSE90-21-17 LH	7.4	2	1.6	
ZSE90-31-17 LH	10.9	3	2.4	
ZSE90-41-17 LH	14.4	4	3.1	
ZSE90-51-17 LH	17.9	6	3.1	
ZSE90-61-17 LH	21.4	8	3.1	

Assumed 25% assignment

Dimensions



2-component fire protection foam PYROSIT® NG



Type	Contents		Pack	Weight		Item no.
	ml		Piece	kg/100	pc.	
FBS-S	380		1	64.600		7203800

/pc.

PYROSIT® NG 2-component fire protection foam in a cartridge, including 2 mixing tubes.
To create cable and combination insulation; always process with the cartridge pistols FBS-PH or FBS-PA.
In dry, frost-free rooms, the cartridge can be stored closed and standing upright at temperatures from +5 °C to +30 °C for up to 12 months.

Mixer pipe set



Type	Pack	Weight		Item no.
	PU	kg/100	PUs	
FBS-M	1	10.000		7203803

price/pack

10 mixing tubes and 5 extension tubes in the set for PYROSIT® NG fire protection foam.

Professional cartridge pistol



Type	Pack	Weight		Item no.
	Piece	kg/100	pc.	
FBS-PH	1	120.000		7203806

/pc.

High-quality 2-component cartridge pistol for use with the PYROSIT® NG fire protection foam. The parallel movement of the outlet to the holding grip ensures easy working.

PYROPLUG® Block foam block

Permanently elastic, closed-pore foam



Type	Dimension mm	Pack	Weight		Item no.
		Piece	kg/100	pc.	
FBA-B200-14	200x144x60	4	44.800		7202505

/pc.

Soft, permanently elastic foam block for cable and combination insulation. Vertical and transverse installation to achieve different fire resistance classes. Can be combined with the two-component fire protection foam PYROSIT® NG. Can be used in solid ceilings and walls and in light-duty partitions and is approved for many installations. CE-labelled construction product according to ETA-15/0803 for applications with fire resistance periods of up to 120 minutes.

Details on the applications can be found in the approval documents.

Protect the surface of the insulation with foams against water in order to guarantee safe expansion in the case of fire. Coating with standard silicone is approved.

PYROPLUG® screed filler

Intumescent material



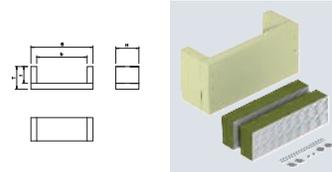
Type	Contents		Pack	Weight		Item no.
	ml		Piece	kg/100	pc.	
FBA-SP	310		1	46.000		7202322

/pc.

Fire protection filler in a cartridge.
Usable as small insulation and as joint closing compound in all insulation of the PYROPLUG® series.
In dry, frost-free rooms, the fire protection filler can be stored for up to 12 months at a temperature of +5 °C to +30 °C.

Strain relief on three sides, with mineral wool, internal height 115 mm

Type	Dimension b		Dimension H	Dimension B T		Pack Piece	Weight kg/100 pc.	Item no.
	mm	mm		mm	mm			
ZSE90-25-11	250	115	140	340	160	1	376.000	7215702
ZSE90-35-11	350	115	140	440	160	1	466.000	7215706
ZSE90-45-11	450	115	140	540	160	1	506.000	7215709

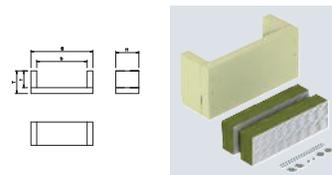


/pc.

Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 part 12, approved for all cable types and all vertical routing systems. Maintenance of electrical function classes E30 to E90. Housing including mineral fibre panels, fastening material, ASX fire protection coating in cartridge and identification plate.

Strain relief on three sides, with mineral wool, internal height 175 mm

Type	Dimension b		Dimension H	Dimension B T		Pack Piece	Weight kg/100 pc.	Item no.
	mm	mm		mm	mm			
ZSE90-25-17	250	175	160	340	220	1	484.000	7215713
ZSE90-35-17	350	175	160	440	220	1	600.000	7215716
ZSE90-45-17	450	175	160	540	220	1	700.000	7215719
ZSE90-55-17	550	175	160	640	220	1	770.000	7215726
ZSE90-65-17	650	175	160	740	220	1	822.000	7215730



/pc.

Strain relief as an effective support measure for vertical cable routing, according to DIN 4102 part 12, approved for all cable types and all vertical routing systems. Maintenance of electrical function classes E30 to E90. Housing including mineral fibre panels, fastening material, ASX fire protection coating in cartridge and identification plate.

Intumescent material

Ablation coating PYROCOAT® in a cartridge

Type	Contents ml	Pack Piece	Weight kg/100 pc.	Item no.
ASX-K	310	1	50.000	7202310

/pc.

Combined, endothermic and weatherproof coating for internal and external areas. Universal protection coating for cable and cable support structures. Use as direct filler, and as paint when stirred.
Material class DIN 4102 - B2, normally flammable.
In dry, frost-free rooms, the coating can be stored at temperatures from +5 °C to +25 °C for up to 18 months in closed, upright original containers.



OBO Bettermann Holding GmbH & Co.KG
Hüingser Ring 52
58710 Menden

Customer Service
Tel.: +49 23 73 89 - 17 00
Fax: +49 23 73 89 - 12 38
export@obo.de

www.obo-bettermann.com

Building Connections

