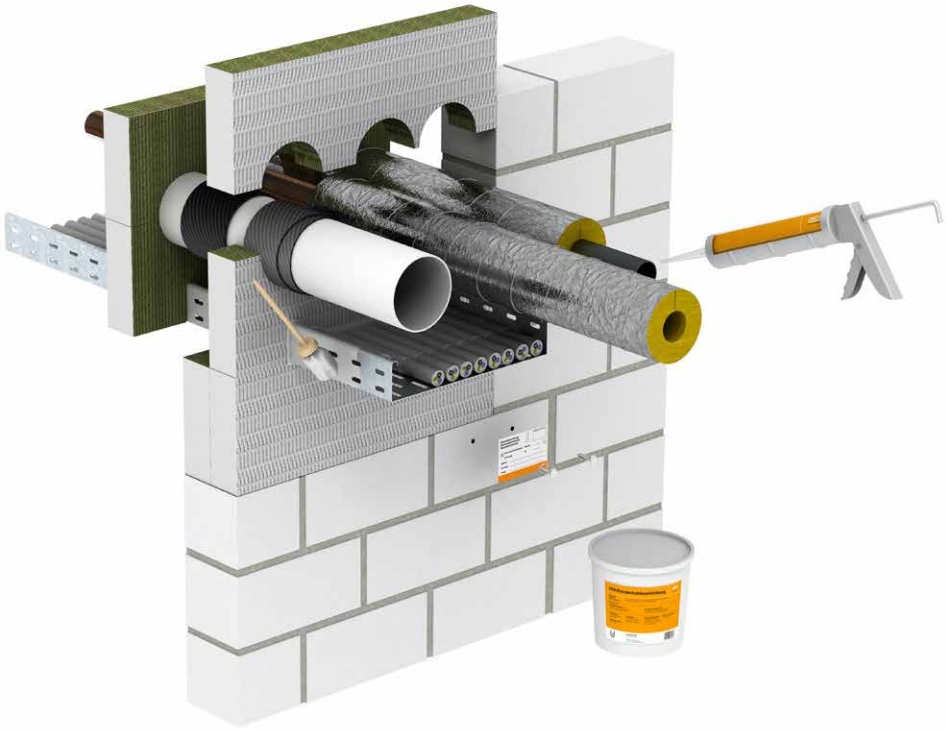
PYROPLATE® Fibre system
Combination insulation made of mineral fibres

Mounting instructions



Building Connections

01/2019 EN

PYROPLATE® Fibre system, combination insulation made of mineral fibre plates

Mounting instructions

The PYROPLATE® Fibre system is a registered brand of OBO Bettermann GmbH & Co. KG

Table of contents

1 About these instructions

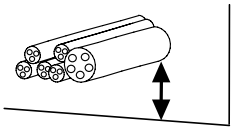
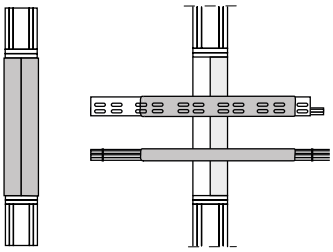
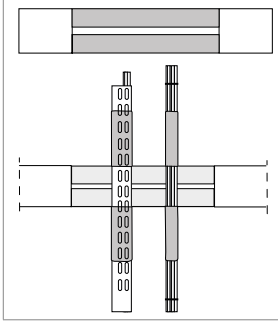
1.1 Target group

These instructions are aimed at installation engineers trained in fire protection.

1.2 Relevance of these instructions

- These instructions are based on the standards valid at the time of compilation (January 2019).
- All the documents supplied with the product must be stored in an easily accessible location, so as to be available when information is required.
- We will not accept any warranty claims for damage caused through non-observance of these instructions.
- Any images are intended merely as examples. Mounting results may look different.
- In these instructions, cables and lines are referred to simply as cables.
- To find out more about planning and mounting the product, we recommend a comprehensive training course.

1.3 Representation types in the document

Representation	Function
✓	Achievement of the fire resistance class is possible.
✗	Achievement of the fire resistance class is not possible.
(1) (A)	Item numbers: List of components with reference to the text
	Schematic representation of installations and their distances between each other and the component layer
	Side view, insulation in wall without and with installations
	Side view, insulation in ceiling without and with installations

1.4 Types of warning information

WARNING

Type of risk!
Shows a possibly risky situation. If the situation is not avoided, then death or serious injury may result.

CAUTION

Type of risk!
Shows a possibly risky situation. If the situation is not avoided, then light or minor injury and property damage may result.

Note! *Indicates important information or assistance*

1.5 Correct use

PYROPLATE® Fibre is an insulation system for building interiors. It closes openings in fire-resistant walls or ceilings, through which cables, cable support systems, electrical installation pipes or pipes are run. The PYROPLATE® Fibre insulation system prevents the spread of fire and smoke in the area of the penetration. It can have a fire resistance period of 30 to 240 minutes, depending on the component opening, the installations and the installation method. The insulation system can be created as cable or combination insulation.

The insulation system is not designed for any other purpose than the one described here. If the system is installed and used for another purpose, any liability, warranty or damage claims shall be rendered null and void.

1.6 Applicable documents

- Declaration of performance 2018/05-CPR/004-…
- European Technical Evaluation ETA-17/0364
- Safety data sheet PYROPLATE® Fibre
- Safety data sheet ASX ablation coating
- Classification report No. KB 3.2/12-107-2 (two-layer insulation)
- Classification report No. 02417/14/Z00NP (two-layer insulation)
- Classification report No. 1858.1/12/Z00NP (four-layer insulation)
- Classification report No. 2163/11/Z00NP (four-layer insulation)

1.7 Basic standards and regulations

- EN 1366 Part 3
- EN 13501 Parts 1 and 2
- EN 1363
- EU BauPVO (CPR)

1.8 Basic safety information

The following basic safety information on handling PYROPLATE® Fibre must be observed:

- The PYROPLATE® Fibre soft insulation is not suitable for improving the stability of a wall or ceiling. Ensure that the wall or ceiling is sufficiently stable, despite the opening, without the application of fire insulation.
- The installation of the fire insulation may not compromise the stability of the adjacent elements – even in the event of a fire. Consult the proof of application of the component.
- All the appropriate regulations and technical regulations of other units,

in particular those for electrical engineering, must be complied with.
– Observe the safety data sheets of the products, which can be obtained online at www.obo-bettermann.com.
– Comply with all the technical specifications of the approvals, such as the permitted insulation size, wall/ceiling types, fire resistance classes, installations and their first support, working areas, etc.
– Insulation areas in ceilings must be secured against walking.

1.9 Personal protective equipment

Breathing protection

Use particle filter P2 for short-term or low load.
In cases of intensive or longer exposition, use a breathing protection device which works independently of the ambient air. Only use breathing protection according to international/national standards.

Hand protection

Wear chemical-resistant protective gloves.
Recommended material: Butylene rubber, nitrile rubber, fluorine rubber, PVC.

Eye protection

Wear protective glasses, frame goggles.

Physical protection

Wear protective clothing and non-slip shoes.

2 Product description PYROPLATE® Fibre

2.1 Basic principles

Fire insulation maintains the fire sections, thus limiting the spread of fire and smoke, and simplifying rescue and extinguishing work.

The PYROPLATE® Fibre insulation system is designed for fire insulation in wall and ceiling openings and offers the following characteristics:

– Soft insulation made of mineral fibre plate and ablation coating
– Creation of combination or cable insulation for solid walls, solid ceilings and light-duty partitions
– Fire insulation of electrical cables, cable bundles, cable support systems and combustible and non-combustible pipes
– Prevention of the spread of fire and smoke gas over a period of 30 to 240 minutes (fire resistance class EI 30-240), depending on the design of the insulation.
– Depending on the desired fire resistance class and installation to be performed, the insulation can be created with the PSX-P60 mineral fibre plate of the PYROPLATE® Fibre insulation system with one, two or four layers.

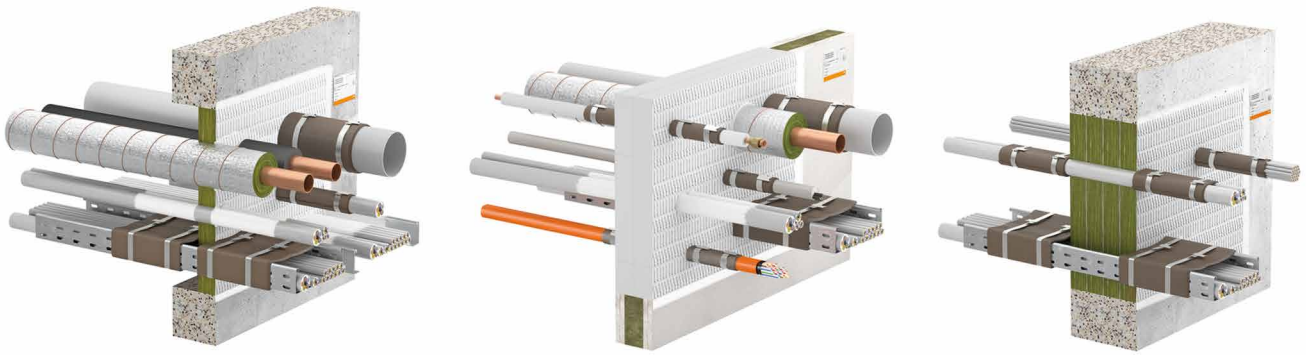


Fig. 1: PYROPLATE® Fibre single-layer, two-layer, four-layer

Insulation design	Installation location	Fire resistance class
Single-layer mineral fibre plate PSX-P60	Solid walls and ceilings, light-duty partition walls with steel or wooden sub-construction	EI 90
Two-layer mineral fibre plate PSX-P60	Solid walls and ceilings, light-duty partition walls with steel or wooden sub-construction	EI 120
Four-layer mineral fibre plate PSX-P60	Solid walls and ceilings	EI 240

Table 1: Fire resistance classes of different insulation designs

2.2 System components

The PYROPLATE® Fibre insulation system consists of the following system components:

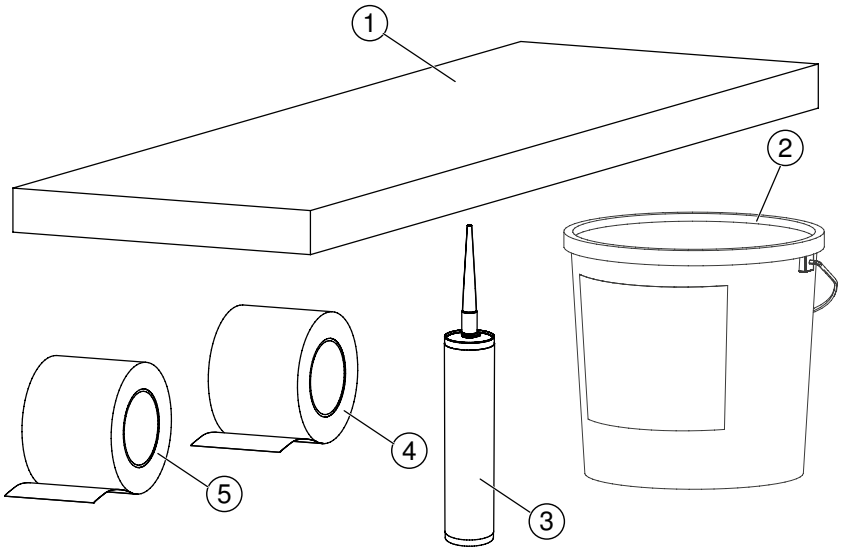


Fig. 2: System components

Figure no.	Designation	Article number	Packing unit
1	Mineral fibre plate PSX-P60, 1,000 x 600 x 60 mm	7202 29 7	4 units
2	Ablation coating ASX-E in a bucket, 5 kg	7202 31 2	1 unit
3	Ablation coating ASX-K in a cartridge, 310 ml	7202 31 0	1 unit
4	Fire protection bandage FSB-WB 1.5	7203 16 3	1 unit
5	Fire protection bandage FSB-WB BS	7203 16 5	1 unit

Table 2: System components

2.3 Accessories

The PYROPLATE® Fibre insulation system is processed and installed with the following accessories:

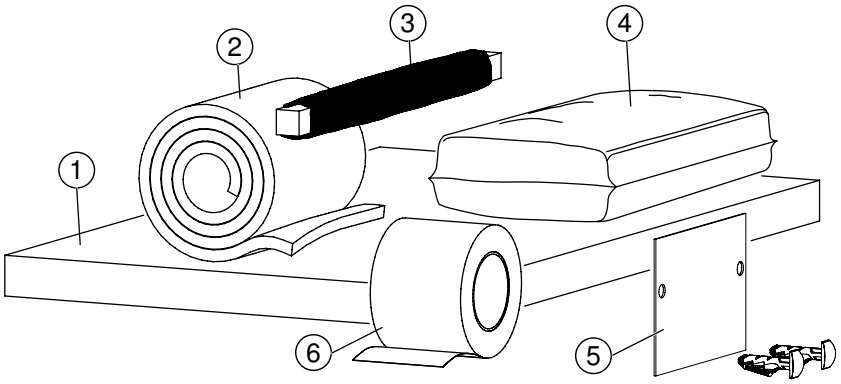


Fig. 3: Accessories

Figure no.	Designation	Article number	Packaging unit
1	Calcium silicate plate KSI	7202 28 3 7202 90 4 7202 91 2	1 unit
2	Sectional insulation for metal pipes MIW-MA	7202 30 8	1 unit
3	Winding wire for path insulation MIW-TD	7202 30 9	1 unit
4	Mineral wool MIW-S	7202 30 6	1 unit
5	Identification plate KS-S DE, SE, ES, IT, EN	7205 42 5, 6, 7, 8, 9	1 unit
	FR, NL, HR, RO	7205 43 0, 1, 8, 9	
6	Aluminium adhesive tape for path insulation MIW-AT	7202 30 5	1 unit

Table 3: Accessories

2.4 Recommended tools

For the mounting of the PYROPLATE® Fibre insulating system, the following tools and aids are recommended: Trowel, brush, masking tape, saw, film, folding ladder, wire pliers, galvanised steel wire.

3 Installation conditions PYROPLATE® Fibre

To ensure the functionality of the PYROPLATE® Fibre insulation system, installations and installation locations must fulfil technical and structural requirements.

3.1 Basic preconditions

– The thickness of the insulation must be at least 60 mm with single-layer insulation in walls, or at least 120 mm in two-layer insulation and at least 240 mm in four-layer insulation. In ceilings, the insulation in single-layer insulation must be at least 60 mm thick, in two-layer insulation it must be at least 150 mm and, in four-layer insulation, at least 240 mm. The length and width of the insulation are aligned to the installation location and the installations.
– The cables, cable bundles and electrical installation pipes must be fastened on the cable trays and ladders in support structures according to the technical rules.
– The cable support systems, cable trays and ladders and their supports and fastenings must be made of steel. They must be fastened in such a way on both sides of the fire insulation that, in case of fire, no additional mechanical load can impact on the fire insulation for the length of the required fire resistance class. The technical regulations and specifications of the manufacturer of the cable support system and the fastening system must be complied with.
– Pipes and pipe bundles must be arranged vertically to the component surface if there are no other specifications.
– The total cross-sectional area of the installations, relative to the insulation area, may not be more than 60%.
– If uninsulated metal pipes are installed, then a straight expansion of ≥ 10 mm/m must be expected in case of fire.

3.2 Approved installation location with approved insulation design

The PYROPLATE® Fibre insulation system can be installed with one, two or four layers in the following components:

Components	Component thickness in mm	Classification of the component	Fire resistance of the component	Insulation version	Insulation thickness in mm	Maximum insulation dimension, width x height in mm
Solid walls						
Masonry, concrete, reinforced concrete, porous concrete, ceramic tiles, hollow brick or air bricks with a density ≥ 450 kg/m³	≥ 100	EN 13501-2 DIN 4102-2	90 minutes	Single-layer	60	1,175 x 1,200
Masonry, concrete, reinforced concrete or porous concrete with a density ≥ 450 kg/m³	≥ 100		120 minutes	Two-layer	≥ 120	1,400 x 2,000
Masonry, concrete, reinforced concrete, porous concrete, ceramic tiles, hollow bricks or air bricks with a density ≥ 600 kg/m³	≥ 240		240 minutes	Four-layer	240	600 x 600

Components	Component thickness in mm	Classification of the component	Fire resistance of the component	Insulation version	Insulation thickness in mm	Maximum insulation dimension, width x height in mm
Light-duty partition wall with steel sub-construction						
Stand-off method, with planking on both sides of at least two layers of 12.5 mm-thick cement or plasterboard plates, with a fire behaviour of class A1 or A2 according to EN 13501-1. The component opening layer must be formed from additional wall supports and bolts.	≥ 100	EN 13501-2 DIN 4102-2	90 minutes	Single-layer	60	1,175 x 1,200
	≥ 100		120 minutes	Two-layer	≥ 120	1,400 x 2,000
Light-duty partition walls with wooden sub-construction						
Stand-off method, with planking on both sides of at least two layers of 12.5 mm-thick cement or plasterboard plates, with a fire behaviour of class A1 or A2 according to EN 13501-1. The distance between the opening and the stands and bolts must be ≥ 100 mm. The cavities between the wall planking, the stands and bolts as well as the opening layer must be tightly plugged to a depth of ≥ 100 mm with mineral wool MIW-S of fire behaviour class A1 or A2 in accordance with EN 13501-1.	≥ 100	EN 13501-2 DIN 4102-2	90 minutes	Single-layer	60	1,175 x 1,200
	≥ 100		120 minutes	Two-layer	≥ 120	1,400 x 2,000
Solid ceilings						
Concrete, reinforced concrete with a density ≥ 2,200 (± 500) kg/m³	≥ 125	EN 13501-2 DIN 4102-2	90 minutes	Single-layer	60	1,200 x 2,400 800 x unlimited length
Concrete, reinforced concrete or porous concrete with a density ≥ 550 kg/m³	≥ 150		120 minutes	Two-layer	≥ 150	1,400 x 2,000
Concrete	≥ 200		240 minutes	Four-layer	240	600 x unlimited length

Table 4: Overview of approved installation locations

The minimum component thicknesses for insulation must also be maintained in installation in components with a lower fire resistance class. The insulation must then be labelled with the lower fire resistance class.

3.3 Insulation distances to other component openings

When installing the PYROPLATE® Fibre insulation system, the insulation must have the following spacings to other components or component openings:

	Distance in walls mm	Distance in ceilings mm
Single-layer/two-layer insulation		
One/both opening(s) > 400 x 400 mm	≥ 200	≥ 200
Both openings ≤ 400 x 400 mm	≥ 100	≥ 100
Four-layer insulation	≥ 200	≥ 200

Table 5: Insulation distances to other components or component openings

4 Creating fire insulation

4.1 Creating cable or combination insulation

The same mounting steps are required to create single, two or four-layer insulation in the wall or ceiling with the PYROPLATE® Fibre insulation system. However, only certain installations may be performed, depending on the insulation design. The installations are insulated and/or coated in a different manner. The details are described in the chapters "Single-layer insulation design", "Two-layer insulation design" and "Four-layer insulation design". When creating fire insulation, the details must be observed.

WARNING

Risk of falling!
Fire insulation in ceilings can give way if subjected to loads or walked upon. Breakage and/or falls can lead to serious or even fatal injuries. Cover the insulation with a grid or apply reinforcements.

Note! *Layers in light-duty partitions must be covered with 12.5 mm-thick cement or plasterboard plates which have a fire behaviour of class A1 or A2 according to EN 13501-1.*

Note! *Pipes must always be arranged vertically to the insulation surface.*

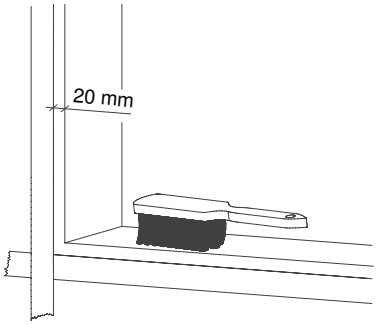


Fig. 4: Cleaning the layer

1) Clean the layer.
2) Mask the perimeter of the component opening with masking tape at a distance of 20 mm to the layer edge.

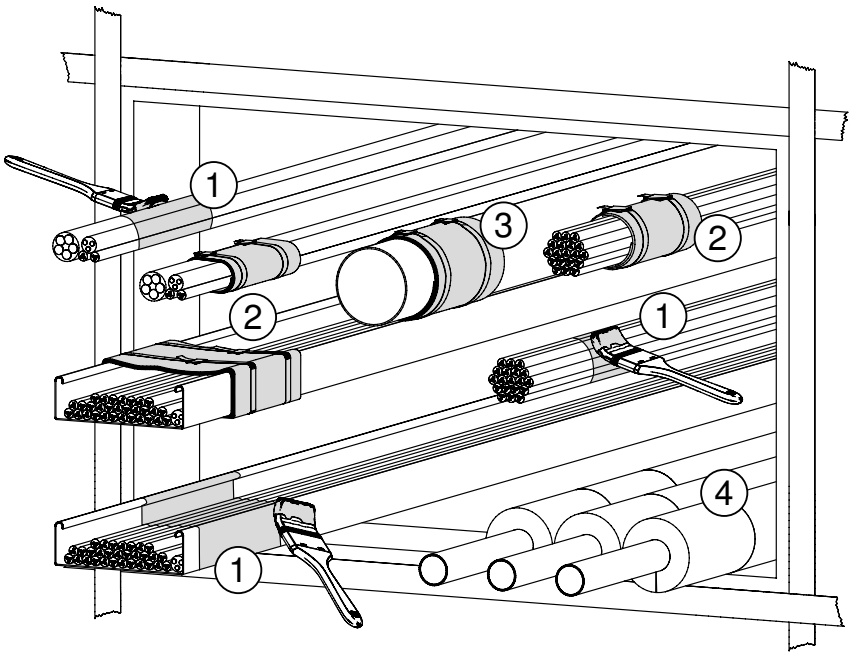


Fig. 5: Ablation coating or Fire protection bandage

3) Coat cables, cable bundles and cable support systems with paintable ASX ablation coating ① or wind with the Fire protection bandage FSB-WB 1.5 ② (see "Measures on installations" in Chapter 6, 7 or 8, depending on the insulation version).
4) Wind combustible pipes with the Fire protection bandage FSB-WB BS ③ (see "Measures on installations" in Chapter 6, 7 or 8, depending on the insulation version).
5) If necessary, insulate non-combustible pipes with MIW-MA path insulation④ (see "Measures on installations" in Chapters 6, 7 or 8, depending on the insulation version).

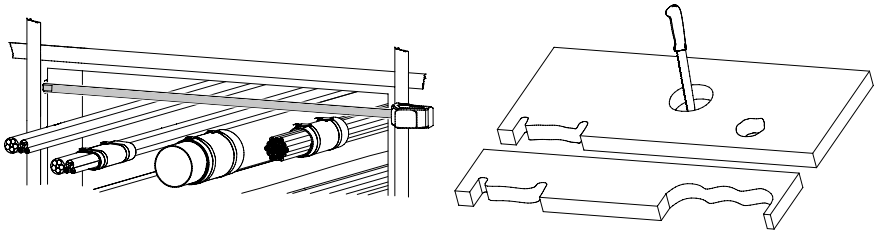


Fig. 6: Measurement of insulation, cutting of mineral fibre plate

6) Measure the component opening.
7) Cut the PSX-P60 mineral fibre plates to size.
8) Cut out recesses for installations.

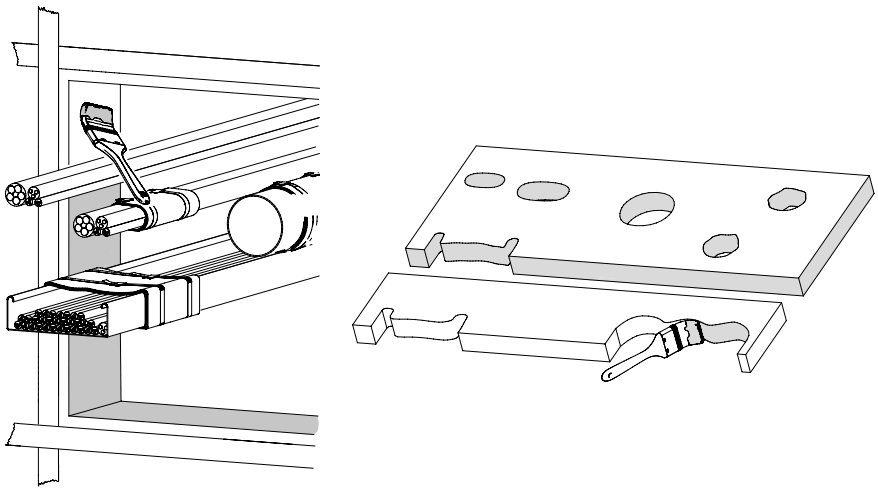


Fig. 7: Coating of light-duty partitions layer and edges of the mineral fibre plate

9) With light-duty partitions, coat the layer of the component opening with paintable ASX ablation coating.
10) Paint the edges of the PSX-P60 mineral fibre plate with paintable ASX ablation coating.

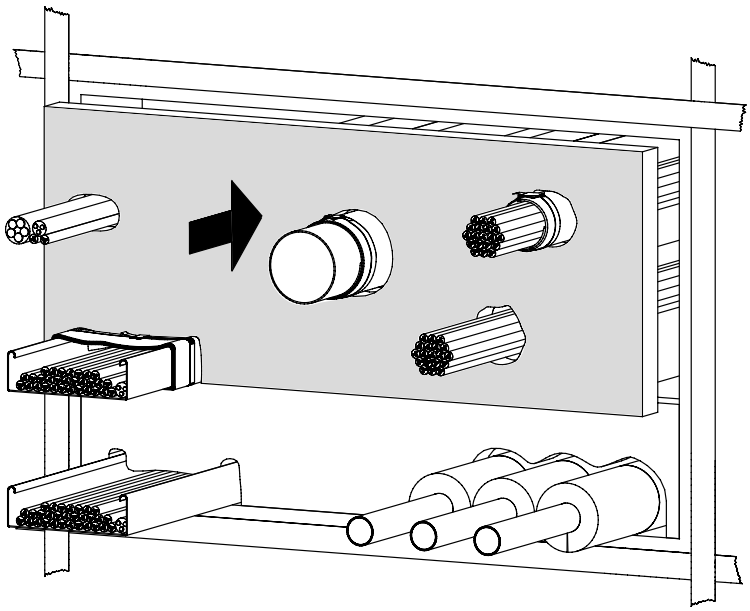


Fig. 8: Location of the mineral fibre plate

11) Directly after coating, insert the PSX-P60 mineral fibre plate tightly into the component opening.

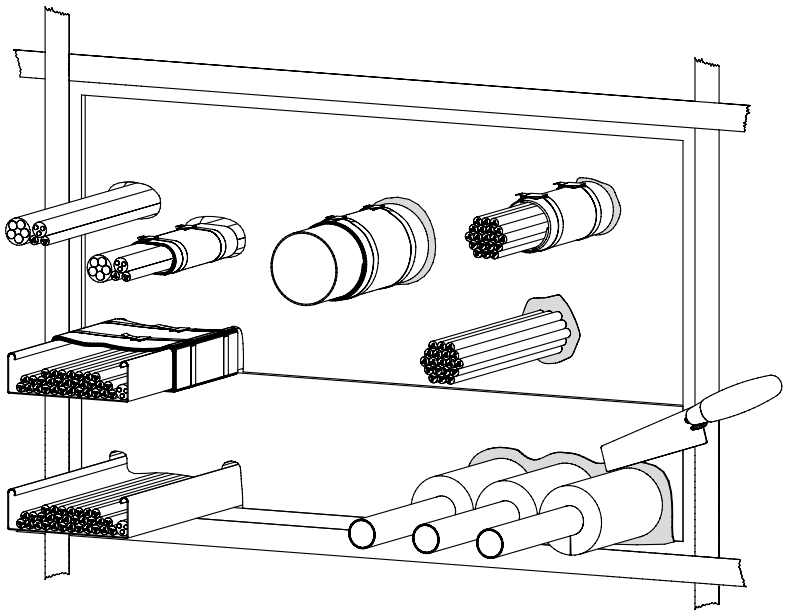


Fig. 9: Closing the ring gaps and joints

12) Fill the ring gaps and joints with MIW-S mineral wool and seal with workable ASX ablation coating.

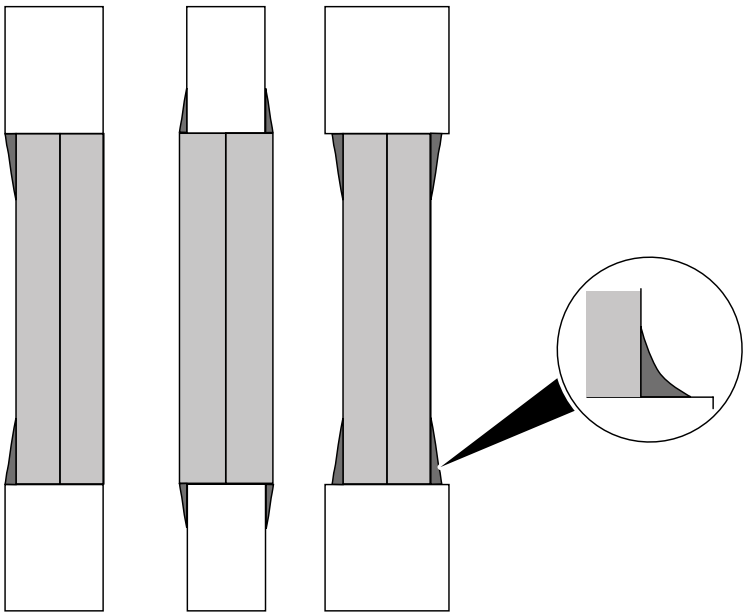


Fig. 10: Round joint for different insulation arrangements (apply for one, two and four-layer insulation in walls and ceilings)

13) Create a round joint between the insulation surface and layer using workable ASX ablation coating.

14) If necessary, apply additional protective insulation to non-combustible pipes (see "Measures on installations" in Chapters 6, 7 or 8, depending on the insulation version).

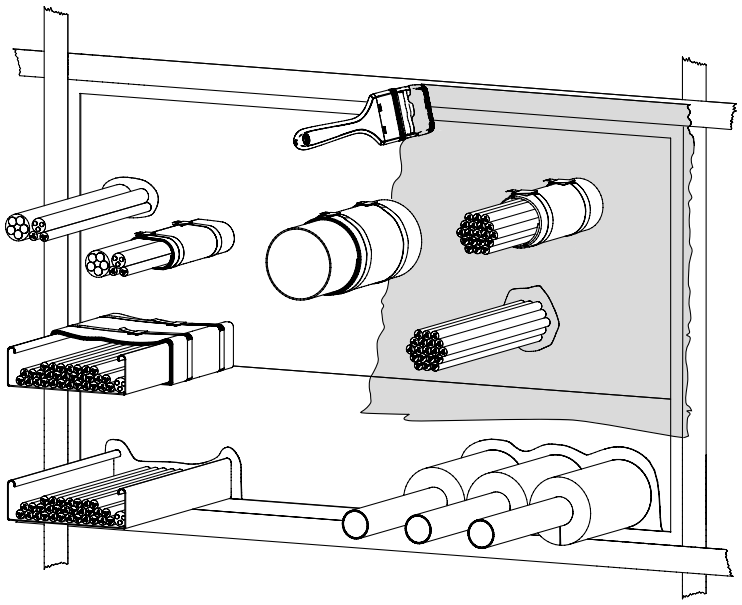


Fig. 11: Coating the insulation surface

15) Coat the entire insulation surface with paintable ASX ablation coating with a 20 mm distance to the component opening/layer edge all around (dry layer thickness in single-layer insulation ≥ 0.75 mm, in two-layer insulation ≥ 1 mm, in four-layer insulation ≥ 2 mm).

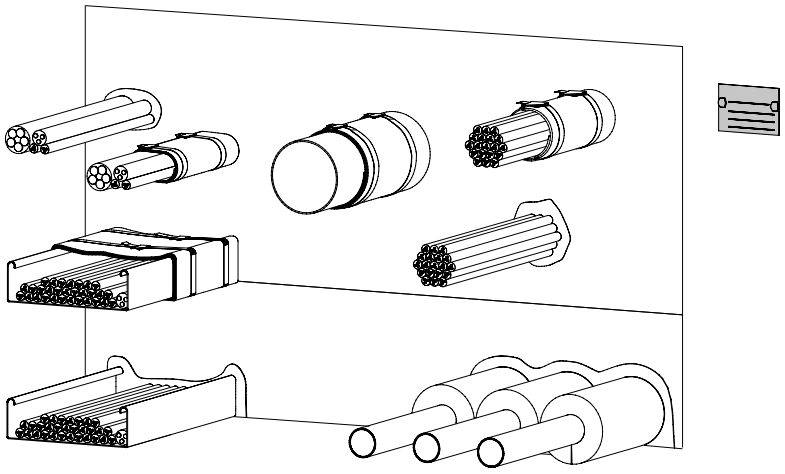


Fig. 12: Insulation labelling

16) Complete the identification plate and mount it next to (not on) the insulation.

17) Remove the masking tape.

4.2 Creating empty insulation

The work steps for creating empty insulation are the same as the work steps for creating cable and combination insulation with installations (see Chapter 4.1 Creating cable or combination insulation on page 13).

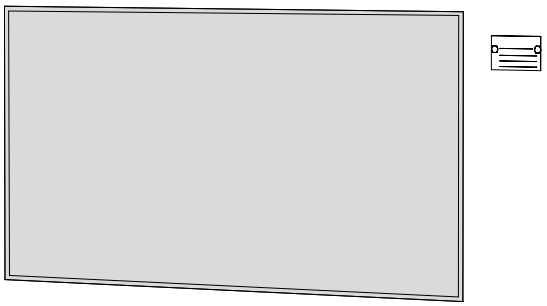


Fig. 13: Empty insulation

1) Clean the layer.
2) Mask the perimeter of the component opening with masking tape at a distance of 20 mm to the layer edge.
3) Measure the component opening.
4) Cut the PSX-P60 mineral fibre plates to size.
5) With light-duty partitions, coat the layer of the component opening with paintable ASX ablation coating.
6) Paint the edges of the PSX-P60 mineral fibre plate with paintable ASX ablation coating.
7) Directly after coating, insert the PSX-P60 mineral fibre plate tightly into the component opening.
8) Fill any joints with MIW-S mineral wool and seal with workable ASX ablation coating.
9) Coat the entire insulation surface with paintable ASX ablation coating with a 20 mm distance to the component opening/layer edge all around (dry layer thickness in single-layer insulation ≥ 0.75 mm, in two-layer insulation ≥ 1 mm, in four-layer insulation ≥ 2 mm).
10) With solid walls and ceilings, coat a 20 mm-wide strip around the component opening with paintable ASX ablation coating.
11) Complete the identification plate and mount it next to (not on) the insulation.
12) Remove the masking tape.

4.3 Filling insulation at a later date

If insulation is filled at a later date, the contents of these mounting instructions must be taken into account.

The work steps for filling the insulation at a later date are the same as the work steps for creating cable and combination insulation with installations (see Chapter 4.1 Creating cable or combination insulation on page 13).

1) Remove the mineral fibre plate.
2) Perform the installations.
3) Insulate the installations as necessary.
4) Coat cables, cable bundles and cable support systems with paintable ASX ablation coating or wind with Fire protection bandages.
5) Cut the PSX-P60 mineral fibre plates to size.
6) Cut out recesses for installations.
7) With light-duty partitions, coat the layer of the component opening with paintable ASX ablation coating.

8) Paint the edges of the PSX-P60 mineral fibre plate with paintable ASX ablation coating.
9) Directly after coating, insert the PSX-P60 mineral fibre plate tightly into the component opening.
10) Ring gaps and joints must be filled with MIW-S mineral wool or ablation coating. Fill with MIW-S mineral wool and seal with workable ASX ablation coating.
11) Coat the cable, cable bundle or cable support system with paintable ASX ablation coating or wind with Fire protection bandages FSB-WB 1.5.
12) Additionally, apply protective insulation to non-combustible pipes.
13) Coat the entire insulation surface with paintable ASX ablation coating with a 20 mm distance to the component opening/layer edge all around (dry layer thickness in single-layer insulation ≥ 0.75 mm, in two-layer insulation ≥ 1 mm, in four-layer insulation ≥ 2 mm).
14) If necessary, complete a new identification plate and mount it next to (not on) the insulation.

5 National requirements

Note! *When mounting the system outside Germany or Austria, comply with other country-specific requirements that exist in addition to the national construction law.*

Germany/Austria

– The insulation system must be permanently labelled with a sign next to the insulation.
– The technically correct creation of combination insulation must be learned on a training course. Proof of training can be obtained through successfully participating in a training course at OBO Bettermann.
– After work has been completed, the client must be presented with a written declaration of conformity (see Chapter 12 Appendix – declaration of conformity (sample) on page 81).

6 Single-layer insulation design

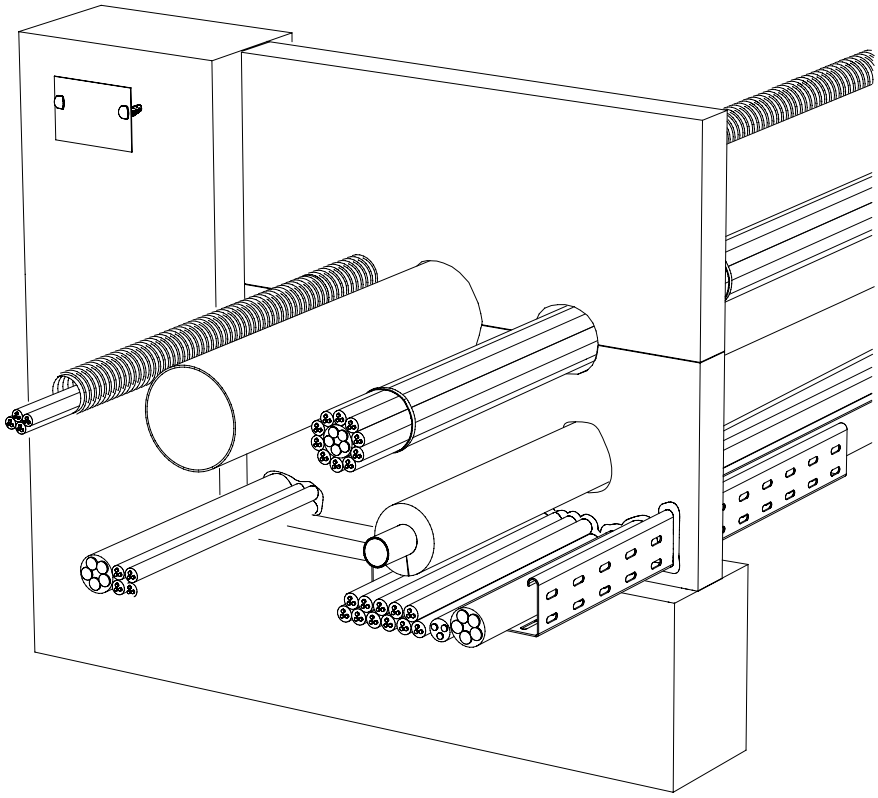
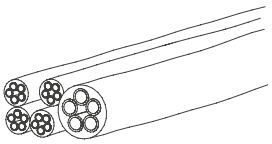
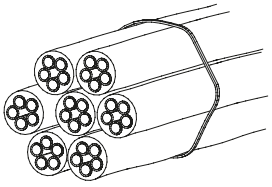


Fig. 14: Installation in single-layer insulation

6.1 Approved installations

The following installations are approved in the single-layer design of the PYROPLATE® Fibre insulation system.

6.1.1 Cables and cable support systems

Cables	
	All kinds of electrical cables except for fibre optic cables, total conductor diameter of the individual cables ≤ 80 mm
Cable bundle	
	Total bundle diameter ≤ 100 mm made up of individual cables of external diameter ≤ 21 mm No spandrel filling is required for tightly packed, tied cable bundles

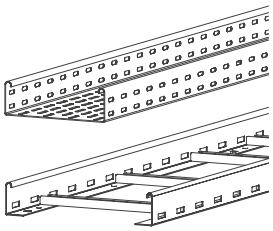
Cable support systems	
	Cable trays and cable ladders made of steel, with organic coatings if the fire behaviour corresponds to at least A2 according to EN 13501-1

Fig. 15: Approved cables and cable support systems in single-layer insulation

6.1.2 Combustible pipes

Pipes must be arranged vertically to the insulation surface.

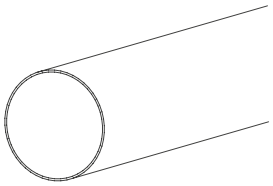
Combustible pipes	
	Vented wastewater pipes and closed pipe systems. Non-combustible liquids and non-combustible gases may be run in the pipes (with the exception of ventilation lines).

Table 6: Approved combustible pipes in single-layer insulation

Types of combustible pipes						
	Solid wall or light-duty partition			Solid ceiling		
Pipe materials/dimensions in mm	External pipe diameter	Pipe wall thickness		External pipe diameter	Pipe wall thickness	
		Minimum	Maximum		Minimum	Maximum
Pipes made from PVC-U according to EN 1329-1, EN 1453-1, EN 1542-1, EN 15493 and DIN 8061/8062 or PVC-C according to EN 1566-1	≤ 50	1.8	3.7	≤ 50	1.8	3.7
	> 50–≤ 110	2.3	2.3	-	-	-
PP-H, which correspond to both EN 15874 and DIN 8077/8078	≤ 50	1.8	4.6	≤ 50	1.8	4.6
	> 50–≤ 80	2.7	7.3	> 50–≤ 80	2.7	7.3
	> 80–≤ 110	2.7	10	> 80–≤ 110	2.7	10
PE-HD, which correspond to both EN 1519-1 and DIN 8074/8075	≤ 50	1.8	4.6	≤ 50	1.8	4.6
	> 50–≤ 80	2.7	7.3	> 50–≤ 80	2.7	7.3
	> 80–≤ 110	2.7	10	> 80–≤ 110	2.7	10

Table 7: Types of approved combustible pipes

6.1.3 Non-combustible pipes

The pipes may be run through the insulation at a slanting angle of 45° to 90°.

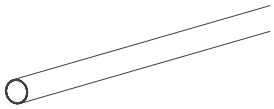
Non-combustible pipes		
	Pipe materials	External diameter in mm
	Steel, stainless steel, case with non-combustible pipe insulation made of "Klimarock" mineral fibres	≤ 219.1
	Copper	≤ 88.9
	Steel, stainless, cast with "Armaflex Protect" combustible insulation	≤ 170.0
	Copper with "Armaflex Protect" combustible insulation	≤ 88.9

Table 8: Approved non-combustible pipes in single-layer insulation

Pipes of other metals may be installed, whose heat transmission is lower than steel or copper and whose melting point is ≥ 946 °C.

Non-combustible pipes without insulation must be insulated with path insulation and, depending on the installation, with additional protection insulation. The following materials and versions are permitted:

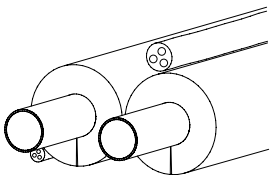
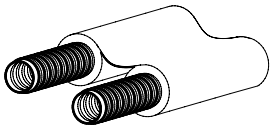
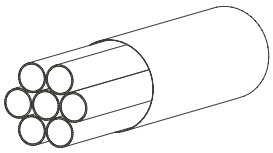
Design, path and protective insulation on non-combustible pipes						
Non-combustible pipes/dimensions in mm			Insulation for MIW-MA metal pipes or mineral fibre pipe shell ≥ 40 kg/m³ **Path insulation**		Insulation for MIW-MA metal pipes or mineral fibre pipe shell with average pipe density ≥ 40 kg/m³ **Protective insulation**	
Material	External diameter	Wall thickness	Insulation length	Insulation thickness	Length	Thickness
Copper, steel, stainless, cast	≤ 15	≥ 0.8	≥ 250	≥ 20	-	
	≤ 22.0	≥ 1.0 ≥ 1.0	≥ 250 ≥ 500	≥ 60 (2 x 30) ≥ 20		
	≤ 54.0	≥ 1.5	≥ 500	≥ 30		
	≤ 88.9	≥ 2.0	≥ 800	≥ 40 (2 x 20)		
Steel, stainless, cast	≥ 88.9–≤ 114.9	≥ 3.6	≥ 500	≥ 40 (2 x 20)	-	
	≥ 88.9–≤ 114.9	≥ 3.0	≥ 800	≥ 40 (2 x 20)	≥ 500	≥ 30
	≤ 177.8	≥ 5.0	≥ 800	≥ 60 (2 x 30)	≥ 500	≥ 30
	≤ 193.7	≥ 5.6	≥ 800	≥ 60 (2 x 30)	≥ 500	≥ 30
	≥ 170–≤ 219.1	≥ 6.3	≥ 800	≥ 60 (2 x 30)	≥ 500	≥ 30

Table 9: Non-combustible pipes with path and protection insulation

Combustible insulation "Armaflex Protect" on non-combustible pipes				
Non-combustible pipes/dimensions in mm			Combustible insulation	
			"Armaflex Protect"	
Material	External diameter	Wall thickness	Insulation length	Insulation thickness
Copper, steel, stainless, cast	≤ 15	≥ 0.8	≥ 500	19
	≤ 15	≥ 1.0	≥ 500	20
	≤ 15	≥ 1.5	≥ 500	25–51
	> 15–≤ 22	≥ 1.0	≥ 800	20
	> 15–≤ 22	≥ 1.5	≥ 500	25–51
	> 22–≤ 54.0	≥ 1.5	≥ 500	25–51
	> 54.0–≤ 88.9	≥ 2.0	≥ 500	25–51
Steel, stainless, cast	> 88.9–≤ 170	≥ 3.0	≥ 1,000	26–52

Table 10: Non-combustible pipes with "Armaflex Protection" insulation

6.1.4 Other approved installations

Other installations	
	**HVAC split line combinations** e.g. "Tubolit DuoSplit" or "Tubolit Split" of Armacell or types with the same parameters. Double or single copper pipe and pipe insulation of 9 mm-thick PE foam according to EN 14313 with optional accompanying cables at zero distance (one plastic pipe (U/U) made of PVC-U, external diameter 25 mm and pipe wall thickness 1.5 mm, according to EN1453-1 or EN1452-1 and DIN 8061/DIN 8062 and up to 2 jacketed cables with max. 5 wires, each of ≤ 1.5 mm², Ø ≤ 14 mm)
	**Double solar pipes "NanoSUN²"** Pipes made of rippled stainless steel with insulation, an accompanying cable integrated in the insulation and a PVC protective jacket of make Aktarus Group Srl for solar thermal applications, DN 16 to DN 40 (DN 40 only for ceiling)
	**"speed pipe" PE cables** (for fibre optic cables) and microcables of make Gabocom Systemtechnik GmbH, bundled or individually, with or without fibre optic cables

External pipe diameter in mm	Maximum quantity	Pipe wall thickness in mm
≤ 7	24	≤ 1.5
≤ 10	7	≤ 2.0
≤ 12	5	≤ 2.0

Table 11: Other approved pipes in single-layer insulation

6.2 Fire resistance classes

Various fire resistance classes can be achieved with the single-layer insulation. The possible fire resistance classes are aligned according to the installation and the component. Installation may only be performed in light-duty partitions or solid walls of a thickness ≥ 100 mm or solid walls with a thickness ≥ 125 mm.

Fire resistance classes in walls and ceilings												
Installations	Component											
	Solid walls or light-duty partitions ≥ 100 mm						Solid ceilings ≥ 125 mm					
	EI 30	EI 45	EI 60	EI 90	E 60	E 90	EI 30	EI 45	EI 60	EI 90	E 60	E 90
Cables on cable routes or without cable routes with ASX ablation coating												
Cables, Ø ≤ 21 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗
Cable bundles, Ø ≤ 100 mm Made of cables Ø ≤ 21 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗
Cables, Ø > 21 mm to ≤ 80 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗
Cables on cable routes or without cable routes with Fire protection bandage FSB-WB 1.5												
Cables, Ø ≤ 21 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗
Cable bundles, Ø ≤ 100 mm Made of cables Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗
Cables, Ø > 21 mm to ≤ 80 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with non-combustible path insulation MIW-MA												
Pipe, Ø exterior ≤ 15 mm to ≤ 88.9 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with non-combustible path insulation MIW-MA												
Pipe, Ø exterior ≥ 88.9 mm to ≤ 219.1 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "Armaflex Protect"												
Pipe, Ø exterior ≤ 15 mm to ≤ 88.9 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with combustible insulation "Armaflex Protect"												
Pipe, Ø exterior ≥ 88.9 mm to ≤ 170 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓
Plastic pipelines with Fire protection bandage FSB-WB BS												
PVC-U, PVC-C, PP-H Pipe, Ø exterior ≤ 50 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗
PVC-U, PVC-C, PP-H Pipe, Ø exterior > 50 mm to ≤ 110 mm	✓	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗
PVC-U, PVC-C, PP-H Pipe, Ø exterior > 110 mm to ≤ 125 mm	✓	✗	✗	✗	✓	✓	✓	✗	✗	✗	✓	✗

Fire resistance classes in walls and ceilings												
Installations	Component											
HVAC split line combinations* with Fire protection bandage FSB-WB 1.5												
Pipe 1/Pipe 2 Ø external 6 mm/10 mm	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✓	✗
Pipe 1/Pipe 2 Ø external 6–10 mm/10–18 mm	✓	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗
"NanoSUN²" (u/u) with Fire protection bandage FSB-WB 1.5												
DN16	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✓	✗
DN16 - DN40	✓	✗	✗	✗	✓	✓	✓	✓	✗	✗	✓	✗
"speed pipe" bundled or individually, with or without fibre optic cables, with Fire protection bandage FSB-WB 1.5												
max. 24 units, pipe, Ø external ≤ 7 max. 7 units, pipe, Ø external ≤ 10 max. 5 units, pipe, Ø external ≤ 12	✓	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗
* HVAC split line combinations with double or single copper pipe and pipe insulation of 9 mm thickness made of PE foam according to EN 14313 and optionally with additional accompanying cables at zero distance.												

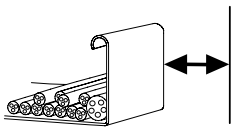
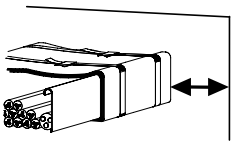
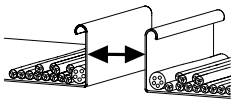
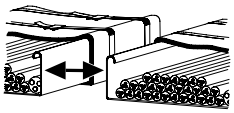
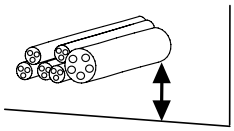
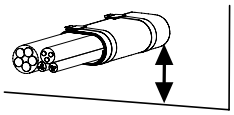
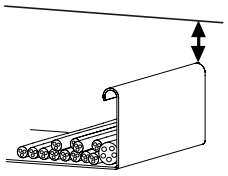
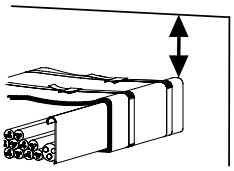
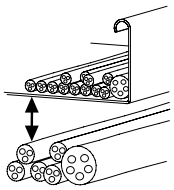
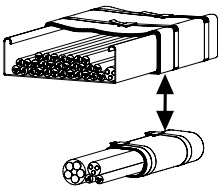
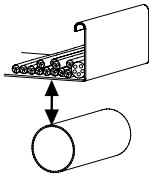
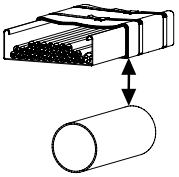
Table 12: Fire resistance classes with single-layer insulation design

6.3 Minimum distances between installations

To guarantee the functionality of the PYROPLATE® Fibre insulation system, minimum distances between installations in solid walls and ceilings and light-duty partitions must be taken into account.

Cables, cable bundles or cable support systems

Cables, cable bundles or cable support systems can selectively be coated with ablation coating and be wound with a Fire protection bandage. Depending on whether the cables, cable bundles or cable support systems are coated or wound, the distances between the installations to be complied with vary.

Cables/cable bundles/ cable support systems with ASX-E/K ablation coating		mm		Cables / cable bundles / cable support systems with Fire protection bandage FSB-WB 1.5		mm
	Side distance to component layer	≥ 0			Side distance to component layer	≥ 0
	Distance between adjacent cable support systems	≥ 0			Distance between adjacent cable support systems	≥ 0
	Lower/rear distance to component layer	≥ 0			Lower/rear distance to component layer	≥ 0
	Top/front spacing to component layer in walls	≥ 20			Top/front spacing to component layer in walls	≥ 0
	In ceilings	≥ 0				
	Distance	≥ 50			Distance	≥ 50
	Distance to combustible pipes	≥ 50			Distance to combustible pipes in walls	≥ 40
					In ceilings	≥ 50

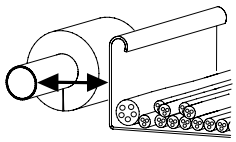
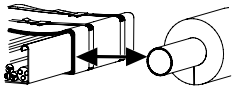
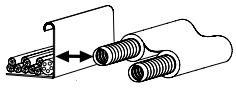
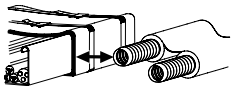
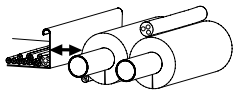
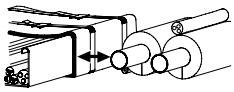
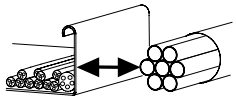
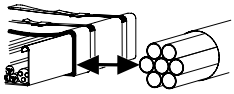
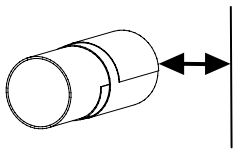
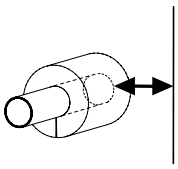
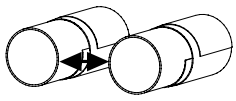
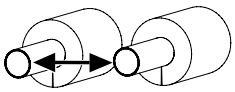
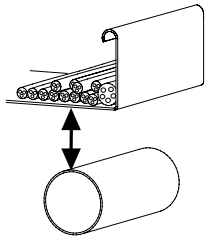
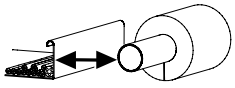
Cables/cable bundles/ cable support systems with ASX-E/K ablation coating		mm		Cables / cable bundles / cable support systems with Fire protection bandage FSB-WB 1.5		mm
	Distance to non-combustible pipes in walls	≥ 70			Distance to non-combustible pipes	≥ 50
	In ceilings	≥ 50				
	Distance to double solar pipes "NanoSUN²" in walls	≥ 25			Distance to double solar pipes "Nano-SUN" in walls	≥ 25
					In ceilings	≥ 10
	In ceilings	≥ 10				
	Distance to HVAC split line combinations in walls	≥ 25			Distance to HVAC split line combinations in walls	≥ 25
	In ceilings	≥ 50			In ceilings	≥ 50
	Distance to "speed pipe" PE cables in walls	≥ 25			Distance to "speed pipe" PE cables in walls	≥ 25
	In ceilings	≥ 20			In ceilings	≥ 20

Table 13: Distances of cables, cable bundles, cable support systems

Combustible and non-combustible pipes

Combustible pipes		mm		Non-combustible pipes		mm
	Distance to component layer	≥ 0			Distance to component layer	≥ 0
	Distance (measured between Fire protection bandages FSB-WB BS)	≥ 25			Distance (measured between pipe insulations)	≥ 0
	Distance to cables/cable bundles/cable support systems	≥ 50			Distance to cables/cable bundles/cable support systems with ASX ablation coating in walls	≥ 70
					In ceilings	≥ 50

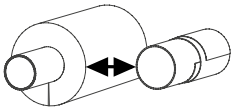
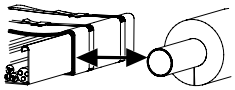
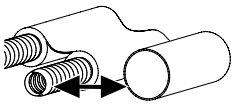
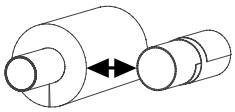
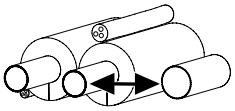
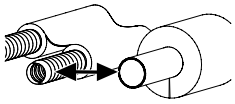
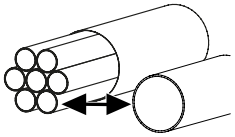
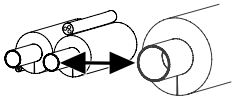
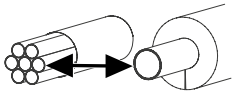
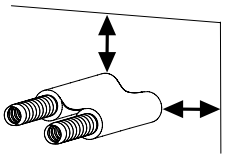
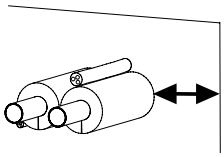
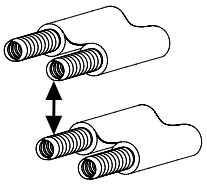
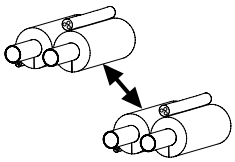
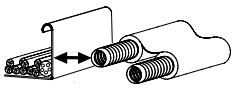
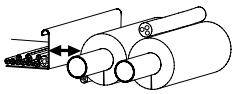
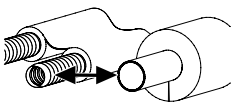
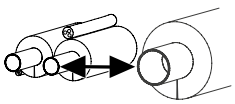
Combustible pipes		mm	Non-combustible pipes		mm
	Distance to non-combustible pipes (measured from the pipe insulation of the metal pipes)	≥ 0		Distance to cables/cable bundles/cable support systems with Fire protection bandage FSB-WB 1.5	≥ 50
	Distance to double solar pipes "NanoSUN²"	≥ 100		Distance to combustible pipes (measured from the pipe insulation of the metal pipes)	≥ 0
	Distance to HVAC split line combinations	≥ 100		Distance to double solar pipes "NanoSUN²"	≥ 100
	Distance to "speed pipe" PE cables	≥ 100		Distance to HVAC split line combinations	≥ 100
				Distance to "speed pipe" PE cables	≥ 100

Table 14: Distances of combustible and non-combustible pipes

Other installations

Double solar pipe "NanoSUN²"		mm	HVAC split line combinations		mm
	Distance to component layer	≥ 0		Distance to component layer	≥ 0
	Spacing	≥ 0		Spacing	≥ 25
	Distance to cables/cable bundles/cable support systems in walls	≥ 25		Distance to cables/cable bundles/cable support systems in walls	≥ 25
	In ceilings	≥ 10		In ceilings	≥ 50
	Distance to non-combustible pipes	≥ 100		Distance to non-combustible pipes	≥ 100

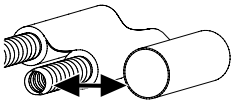
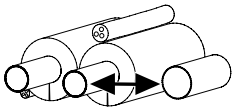
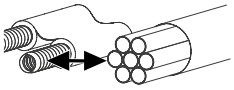
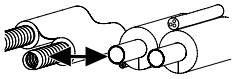
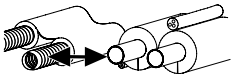
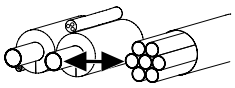
Double solar pipe "NanoSUN²"		mm		HVAC split line combinations		mm
	Distance to combustible pipes	≥ 100			Distance to combustible pipes	≥ 100
	Distance to "speed pipe" PE cables	≥ 100			Distance to double solar pipes "NanoSUN²"	≥ 100
	Distance to HVAC split line combinations	≥ 100			Distance to "speed pipe" PE cables	≥ 100

Table 15: Distance of HVAC split line combinations and double solar pipes "NanoSUN²"

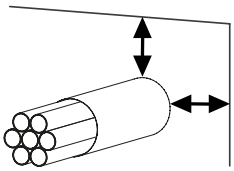
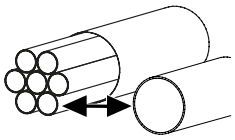
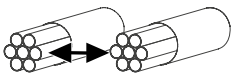
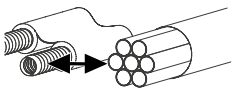
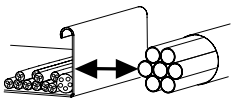
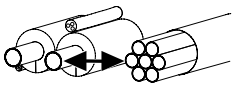
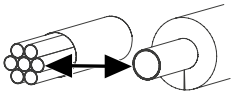
"speed pipe" PE cables for fibre optic cables and microcables		mm		"speed pipe" PE cables for fibre optic cables and microcables		mm
	Distance to component layer	≥ 0			Distance to combustible pipes	≥ 100
	Distance ("speed pipe" PE cables) in walls	≥ 50			Distance to double solar pipes "NanoSUN²"	≥ 100
	In ceilings	≥ 20				
	Distance to cables/cable bundles/cable support systems in walls	≥ 25			Distance to HVAC split line combinations	≥ 100
	In ceilings	≥ 20				
	Distance to non-combustible pipes	≥ 100				

Table 16: Distances of "speed pipe" PE cables for fibre optic cables and microcables in solid walls

6.4 First support in walls

Installations must be supported in order to avoid overloading the insulation in case of fire.

The supports of the installation must be non-combustible (material class DIN 4102-A).

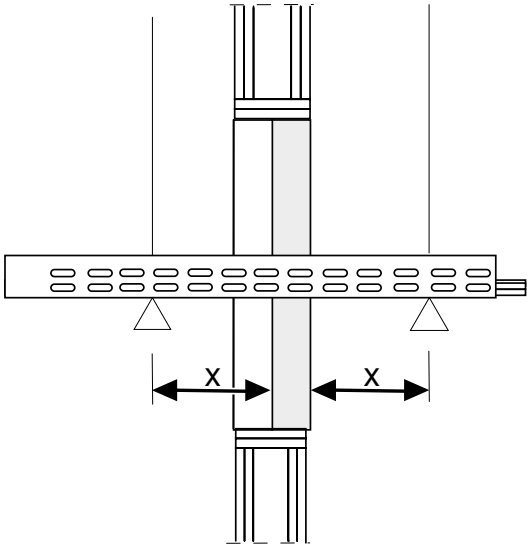


Fig. 16: Maximum distance for supports

First support of:	Maximum distance x in mm from the insulation surface
Cables, cable bundles, cable support systems	≤ 200
Combustible pipes	≤ 400
Non-combustible pipes with "Armaflex Protection"	≤ 1,000
Non-combustible pipes with path insulation MIW-WA	≤ 850
"NanoSUN²" double solar pipes	*
HVAC split line combinations	*
"speed pipes" for fibre optic cables and microcables	*
* Distance according to manufacturer's specifications	

Table 17: Distances for supports

6.5 Arrangement of the insulation

To ensure the functionality of the PYROPLATE® Fibre insulation system, the PSX-P60 mineral fibre plates must be arranged as following in the single-layer insulation:

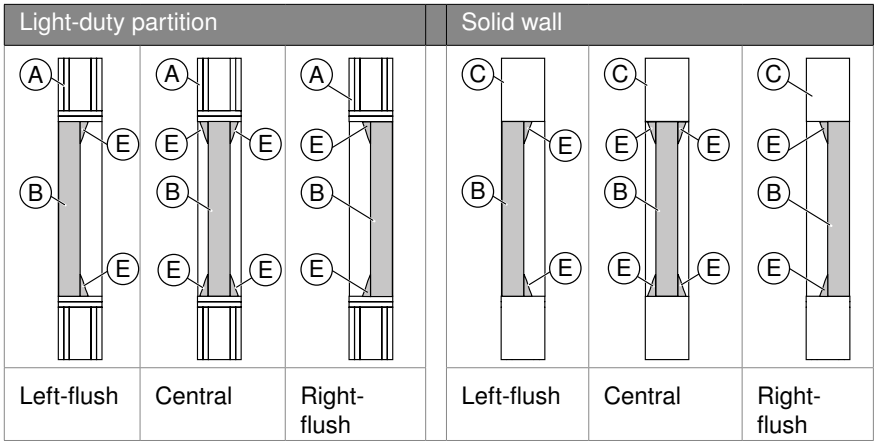


Fig. 17: Insulation arrangement, light-duty partition and solid wall

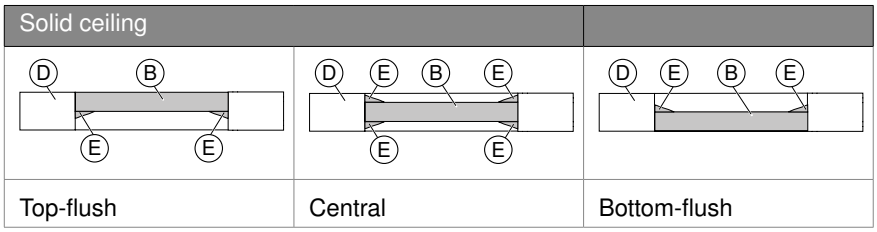


Fig. 18: Solid ceiling insulation arrangement

Ⓐ Light-duty partition
Ⓑ Mineral fibre plate PSX-P60
Ⓒ Solid wall
Ⓓ Solid ceiling
Ⓔ Round joint

If the insulation does not end flush with the layer, then a round joint must be created between the insulation surface and the layer using workable ASX ablation coating.

6.6 Measures on installations in walls and ceilings

To ensure the functionality of the PYROPLATE® Fibre insulation system, the installations in the single-layer insulation must be coated or wound and/or insulated.

6.6.1 Measures on cables, cable bundles, cable support systems

Cables, cable bundles and cable support systems must either be coated with ASX ablation coating or be wound with the Fire protection bandage FSB-WB 1.5 in and on both sides of the insulation. Ring gaps and joints must be closed off with mineral wool or ablation coating. For exact dimensions, see Table 18: Measures on cables, cable bundles, cable support systems on page 33.

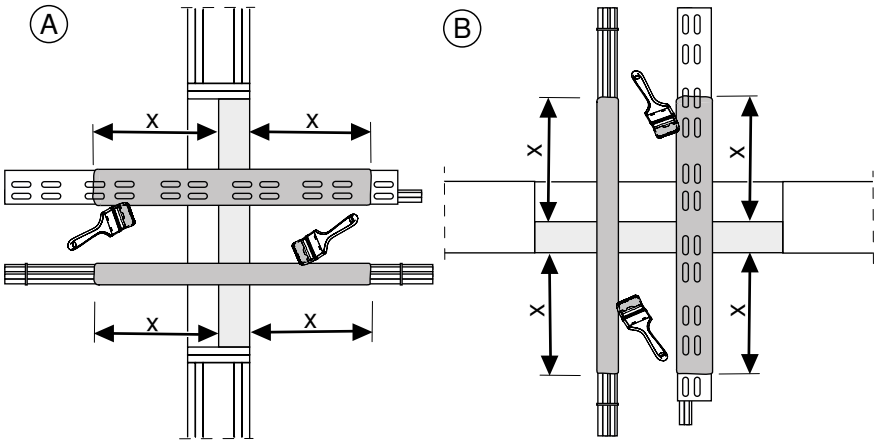


Fig. 19: Ablation coating on cables in wall Ⓐ and ceiling Ⓑ

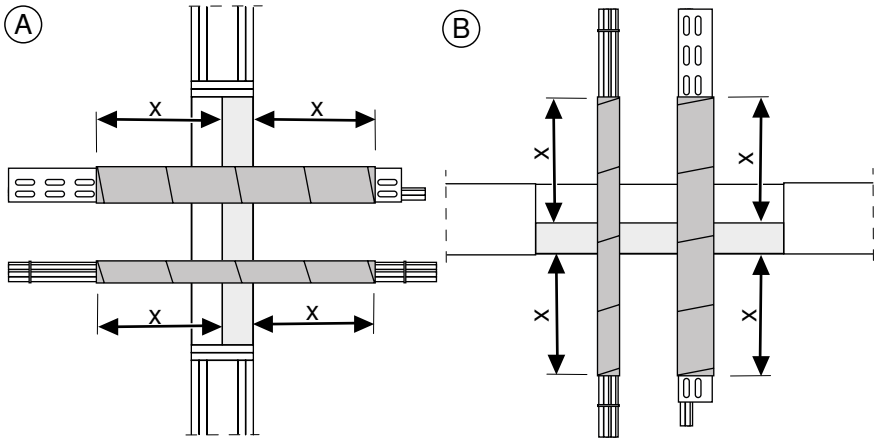


Fig. 20: Fire protection bandage FSB-WB 1.5 on cables on wall Ⓐ and ceiling Ⓑ

Close joints with MIW-S mineral wool (fire behaviour class A1 or A2 in accordance with EN 13501-1) and coat with workable ASX ablation coating; close ring gap ≤ 5 mm with workable ASX ablation coating.

Measures on cables, cable bundles, cable support systems						
Dimensions in mm	Measure	Dry layer thick-ness/ coil width	Length in the insulation/ x = length in front of the insulation surface	Number of layers	Overlap	Quanti-ty Fixings with steel wire
Cables, cable bundles, cable support systems						
Cable diameter ≤ 21	Coating with paintable ablation coating ASX	0.75	Continuous in the insulation/ x ≥ 100 mm in front of both sides of the insulation			
Cable bundle Ø ≤ 100 with Cable diameter ≤ 21						
Cable support systems						
Cable diameter > 21–≤ 80		1	Continuous in the insulation/ x ≥ 150 mm in front of both sides of the insulation			
Alternatively						
Cable diameter ≤ 21	Winding with Fire protection bandage FSB-WB 1.5	125	Continuous in the insulation/ x ≥ 125 mm in front of both sides of the insulation	1	≥ 45 (walls) 45–60 (cei-lings)	1 (walls) 2 (ceiling)
Cable bundle diameter ≤ 100 mm with cable diameter ≤ 21						
Cable support systems						
Cable diameter > 21–≤ 80						

Ring gap and joint closure		
Ring gap ≤ 5	Closure with workable ablation coating ASX	Continuous in the insulation
Ring gap > 5	Closure with mineral wool MIW-S and workable ablation coating ASX	

Table 18: Measures on cables, cable bundles, cable support systems

6.6.2 Measures on combustible pipes

Combustible pipes must be wound in and on both sides of the insulation with a Fire protection bandage FSB-WB BS. Ring gaps and joints must be closed off with mineral wool or ablation coating.

The Fire protection bandage must be attached in the centre of the insulation, the number of layers is dependent on the pipe diameter. For exact dimensions, see Table 19: Measures on combustible pipes on page 34.

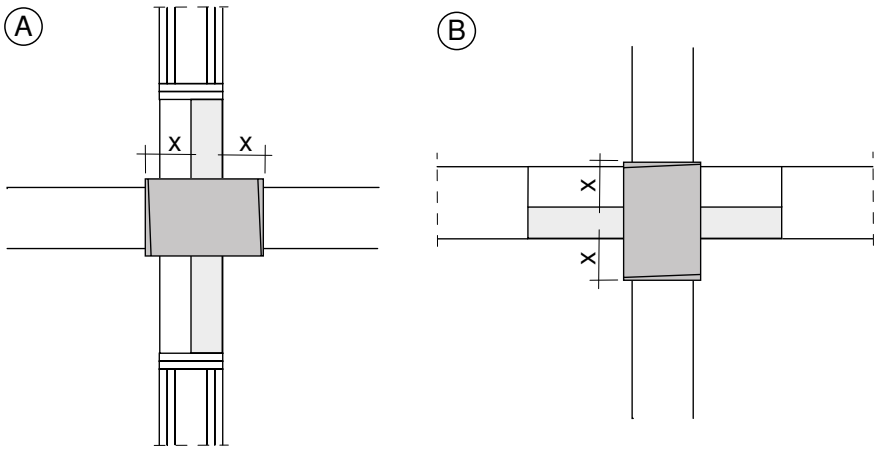


Fig. 21: Fire protection bandage on non-combustible pipes in wall and ceiling

Measures on combustible pipes in walls and ceilings						
Dimensions in mm	Measure	Dry layer thick-ness/ coil width	Length in the insulation/ x = length in front of the insulation surface	Number of layers	Overlap	Quanti-ty Fixings Steel wire
Combustible pipes made of PVC-U, PVC-C, PE-HD and PP-H						
External diameter ≤ 50	Winding with Fire protecti-on bandage FSB-WB BS	150	Continuous in the insulation/ x ≥ 45 mm in front of both sides of the insulation	1	-	-
External diameter > 50–≤ 80				2		
External diameter > 80–≤ 110				3		
External diameter > 110–≤ 125				4		

Ring gap and joint closure		
Ring gap ≤ 5	Closure with mineral wool MIW-S	Continuous in the insulation

Table 19: Measures on combustible pipes

6.6.3 Measures on non-combustible pipes

Non-combustible pipes must also be insulated on both sides of the insulation with protective insulation from the MIW-MA path insulation when the mineral fibre plate has been inserted. Ring gaps and joints must be closed off with mineral wool or ablation coating. For exact dimensions, see Table 20: Measures on non-combustible pipes on page 36.

Non-combustible pipes with combustible "Armaflex Protection" insulation do not require further insulation.

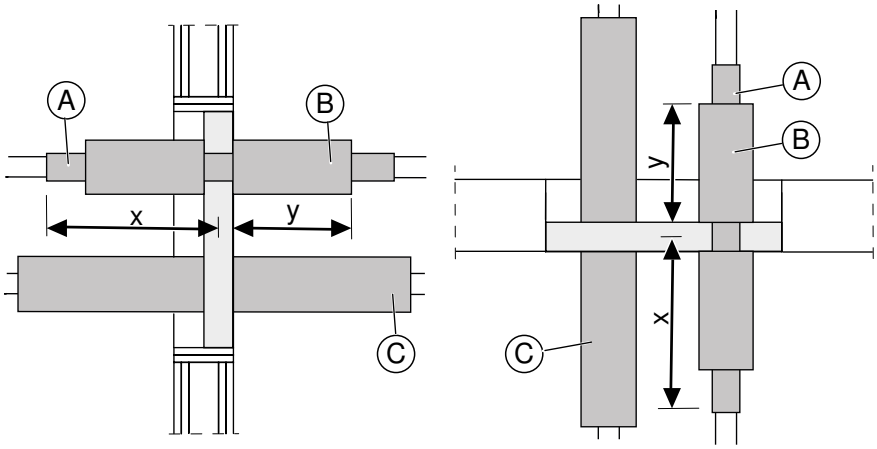


Fig. 22: Path and protective insulation on non-combustible pipes in the wall and ceiling

Ⓐ Path insulation
Ⓑ Protective insulation
Ⓒ Combustible insulation "Armaflex Protect"

Measures on non-combustible pipes in walls and solid ceilings on both sides of the insulation							
Dimensions in mm		Path insulation			Protective insulation		
External pipe diameter	Pipe wall thickness	Measure	Insulation thickness	Insulation length x from insulation centre	Measure	Insulation thickness	Insulation length y from insulation surface
Non-combustible pipes made of copper, steel, stainless, cast							
≤ 15	≥ 0.8	Insulation with path insulation MIW-MA	≥ 20	x ≥ 250	-	-	-
≥ 15 to ≤ 22	≥ 1.0		≥ 60 (2 x 30)				
≥ 15 to ≤ 22	≥ 1.0		≥ 20	x ≥ 500			
≥ 22 to ≤ 54	≥ 1.5		≥ 30				
≥ 54 to ≤ 88.9	≥ 2.0		≥ 40 (2 x 20)	x ≥ 800			

Measures on non-combustible pipes in walls and solid ceilings on both sides of the insulation								
Non-combustible pipes made of steel, stainless, cast								
≥ 88.9 to ≤ 114.9	≥ 3.6	Insulation with path insulation MIW-MA	≥ 40 (2 x 20)	x ≥ 500		Insulation with path insulation MIW-MA	-	-
≥ 54 to ≤ 170	≥ 3.0			x ≥ 800			≥ 30	y ≥ 500
177.8	≥ 5.0		≥ 60 (2 x 30)					
193.7	≥ 5.6							
≥ 170 to ≤ 219.1	≥ 6.3							
Non-combustible pipes made of copper, steel, stainless, cast								
≤ 15	≥ 0.8	„Armaflex Protect“	19	x ≥ 500		-		
	≥ 1.0		20					
	≥ 1.5		25–51					
≤ 22	≥ 1.0		20					
	≥ 1.5		25–51					
≤ 54	≥ 1.5							
≤ 88.9	≥ 2.0							
Non-combustible pipes made of steel, stainless, cast								
≥ 88.9 to ≤ 170	≥ 3.0	„Armaflex Protect“	26–52	x ≥ 1,000				

Ring gap and joint closure		
Ring gap ≤ 5	Closure with mineral wool MIW-S	Continuous in the insulation

Table 20: Measures on non-combustible pipes

6.6.4 Measures on other pipes

Double solar pipes "NanoSUN²", HVAC split line combinations and "speed pipe" PE cables must be wound in and/or on both sides of the insulation with a Fire protection bandage FSB-WB 1.5. Ring gaps and joints must be closed off with mineral wool or ablation coating. For exact dimensions, see Table 21: Measures on other pipes on page 37.

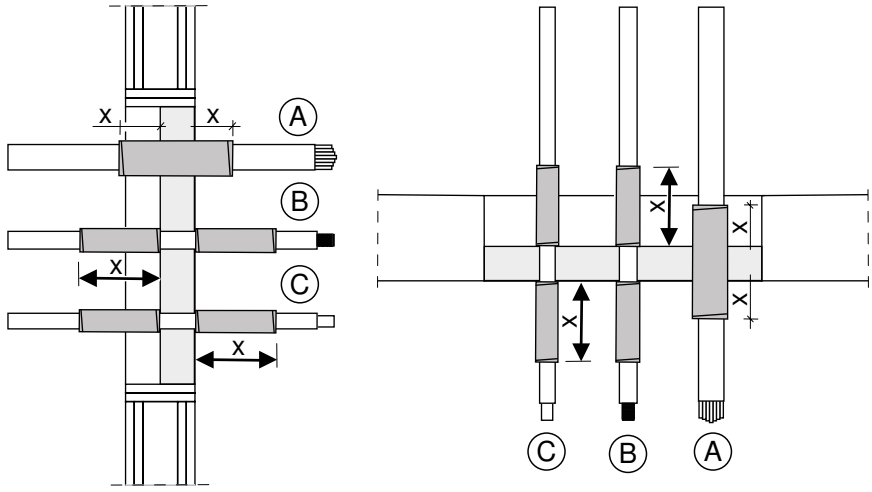


Fig. 23: Fire protection bandage on other pipes

Ⓐ PE cables "speed pipe"
Ⓑ Double solar pipes "NanoSUN²"
Ⓒ HVAC split line combinations

Measures on double solar pipes "NanoSUN²", HVAC split line combinations and "speed pipe" PE cables in walls and ceilings on both sides of the insulation							
Dimensions in mm	Measure	Dry layer thick-ness/ coil width	Length in the insulation/ x = length in front of the insulation surface		Number of layers	Overlap	Quanti-ty Fixings Steel wire
			In	In front of			
Ⓐ **"speed pipe" PE cables for fibre optic cables and microcables**							
Max. 24 units, external pipe diameter ≤ 7 Max. 7 units, external pipe diameter ≤ 10 Max. 5 units, external pipe diameter ≤ 12	Winding with Fire protecti-on bandage FSB-WB 1.5	150	Continuous in the insulation/ x ≥ 45 mm in front of both sides of the insulation		1	-	1
Ⓑ **Double solar pipes "NanoSUN²"**							
DN 16 - DN 40	Winding with Fire protecti-on bandage FSB-WB 1.5	125	-	x = 125	1	≥ 25	1
Ⓒ **HVAC split line combinations**							
Pipe 1/Pipe 2 External diameter 6–10/10–18	Winding with Fire protecti-on bandage FSB-WB 1.5	125	Continuous in the insulation/ x ≥ 95 mm in front of both sides of the insulation		2	-	1

Ring gap and joint closure		
Ring gap ≤ 5	Coating with paintable ablation coating ASX	Continuous in the insulation
Ring gap > 5	Closure with mineral wool MIW-S and workable ablation coating ASX	

Table 21: Measures on other pipes

7 Two-layer insulation design

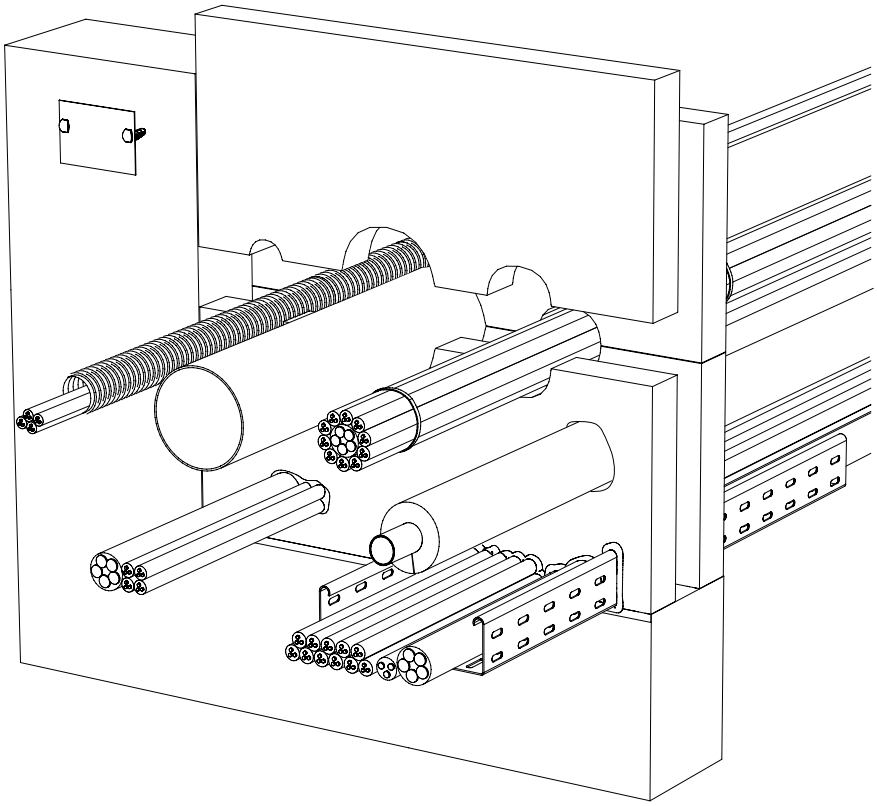
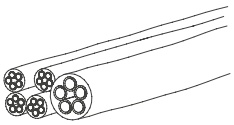
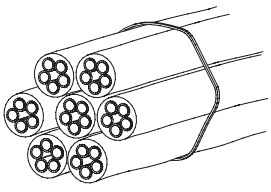
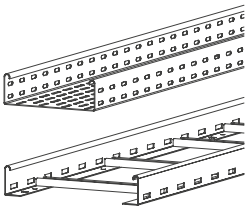


Fig. 24: Installation in two-layer insulation

7.1 Approved installations

The following installations are approved in the two-layer design of the PYROPLATE® Fibre insulation system.

7.1.1 Cables and cable support systems

Cables	
	All kinds of electrical cables except for fibre optic conductors, total conductor diameter of the individual cables ≤ 80 mm
Cable bundle	
	Total bundle diameter ≤ 100 mm made up of individual cables of external diameter ≤ 21 mm No spandrel filling is required for tightly packed, tied cable bundles
Cable support systems	
	Cable trays and cable ladders made of steel, with organic coatings if the fire behaviour corresponds to at least A2 according to EN 13501-1

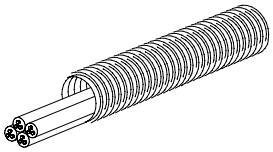
Electrical installation pipes	
	With the classification 223222 according to EN 61386-22 individually or as a bundle with external diameter ≤ 100 mm, flexible and made from PE-HD, flame-resistant up to external diameter ≤ 32 mm, with and without cable assignment, single cable diameter ≤ 21 mm

Fig. 25: Approved cables in two-layer insulation

7.1.2 Combustible pipes

Pipes must be arranged vertically to the component surface.

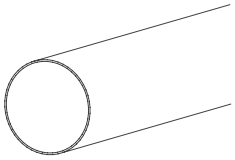
Combustible pipes	
	Vented wastewater pipes and closed pipe systems. Non-combustible liquids and non-combustible gases may be run in the pipes (with the exception of ventilation lines).

Table 22: Approved combustible pipes in two-layer insulation

Types of combustible pipes		
Pipe materials/dimensions in mm	External pipe diameter	Pipe wall thickness
Pipes made from PVC-U according to EN 1329-1, EN 1453-1, EN 1542-1, EN 15493 and DIN 8061/8062 or PVC-C according to EN 1566-1	≤ 50	1.8–3.7
	> 50–≤ 80	1.9–6.0
	> 80–≤ 110	2.1–8.2
	> 110–≤160	2.4–11.9
Pipes made of PE 100 corresponding to both EN ISO 1555-2:2010, EN 12201-2:2011+A1:2013 and DIN 8074:2011 and DIN 8075:2011.	≤ 50	1.8–4.6
	> 50–≤ 80	2.0–7.3
	> 80–≤ 110	2.4–10.0
	> 110–≤160	3.0–9.5
Pipes made of PP-H corresponding to both EN ISO 15874:2013 and DIN 8077:2007 and DIN 8078:2007.	≤ 50	1.8–4.6
	> 50–≤ 80	2.0–7.3
	> 80–≤ 110	2.4–10.0
	> 110–≤160	3.0–9.1
Multi-layer composite pipe "HENCO STANDARD" made of PE-Xc/AL/PE-Xc without PE foam insulation, corresponding to EN 14313.	≤ 12	1.6
	≤ 32	3.0
	63	4.5
Multi-layer composite pipe "HENCO STANDARD" made of PE-Xc/AL/PE-Xc with PE foam insulation, corresponding to EN 14313.	≤ 14	2.0
	≤ 32	3.0

Table 23: Types of approved combustible pipes

7.1.3 Non-combustible pipes

The pipes must be run vertically through the insulation.

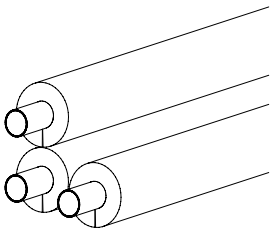
Non-combustible pipes	
	Steel, stainless, cast, copper with combustible and non-combustible insulation

Table 24: Approved non-combustible pipes in two-layer insulation

Types of non-combustible pipes	
Pipe materials/insulation	External diameter in mm
Steel, stainless steel, cast with non-combustible pipe insulation made of "ProRox PS 960" mineral fibre pipe shell	≤ 170.0
Copper with non-combustible pipe insulation made of "ProRox PS 960" mineral fibre pipe shell	≤ 88.9
Steel, stainless, cast, copper with combustible "Kaiflex ST" combustible insulation	≤ 88.9
Steel, stainless, cast, copper with combustible "Armaflex Protect" combustible insulation	≤ 35.0
Copper with non-combustible insulation "slat mat"	≤ 108.0
Steel, stainless steel or cast iron with non-combustible insulation "slat mat" Wall Ceiling	 ≤ 170.0 ≤ 332.9
Copper with combustible insulation "NH/Armaflex"	≤ 88.9
Steel, stainless steel or cast iron with combustible insulation "NH/Armaflex"	≤ 170.0

Table 25: Types of approved non-combustible pipes in two-layer insulation

7.1.4 Other approved installations

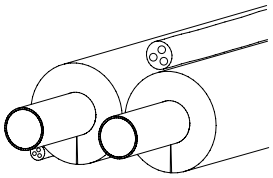
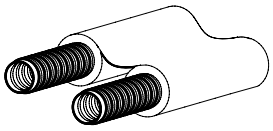
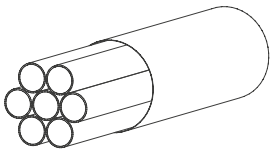
<table>
<tr><th colspan="4">Other installations</th></tr>
<tr><td>  </td><td colspan="3">HVAC split line combinations
e.g. "Tubolit DuoSplit" or "Tubolit Split" of Armacell or types with the same parameters. Double or single copper pipe (diameter 6–10 mm/6–18 mm or 6–22 mm) and pipe insulation of 9 mm-thick PE foam according to EN 14313 with optional accompanying cables (one plastic pipe (U/U) made of PVC-U, external diameter 25 mm and pipe wall thickness 1.8 mm–3.5 mm, according to EN1453-1 or EN1452-1 and DIN 8061/DIN 8062 and up to 2 jacketed cables with max. 5 wires, each of ≤ 1.5 mm², diameter ≤ 14 mm) at zero distance</td></tr>
<tr><td>  </td><td colspan="3">Double solar pipes "NanoSUN²"
Pipes made of rippled stainless steel with insulation, an accompanying cable integrated in the insulation and a PVC protective jacket of make Aktarus Group Srl for solar thermal applications, DN 16 to DN 40</td></tr>
<tr><td>  </td><td colspan="3">"speed pipe" PE cables
(for fibre optic cables) and microcables of make Gabocom Systemtechnik GmbH, bundled or individually, with or without fibre optic cables</td></tr>
<tr><td></td><td>External pipe diameter in mm</td><td>Maximum quantity</td><td>Pipe wall thickness in mm</td></tr>
<tr><td></td><td>≤ 7</td><td>24</td><td>≤ 1.5</td></tr>
<tr><td></td><td>≤ 10</td><td>7</td><td>≤ 2.0</td></tr>
<tr><td></td><td>≤ 12</td><td>5</td><td>≤ 2.0</td></tr>
</table>

Table 26: Other approved pipes in two-layer insulation

7.2 Fire resistance classes

Various fire resistance classes can be achieved with the two-layer insulation according to classification reports nos. KB 3.2/12-107-2 and 02417/14/Z00NP. The possible fire resistance classes are aligned according to the installation and the component. Installation may only be performed in light-duty partitions or solid walls of a thickness ≥ 100 mm or solid walls with a thickness ≥ 150 mm.

Solid walls or light-duty partition walls

Fire resistance classes in walls								
Installations	Component							
	Solid walls or light-duty partitions ≥ 100 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
Cables, cable bundles, cable support systems in walls								
Cables, cable bundles with ASX ablation coating (coating length min. 100 mm, thickness min 1.0 mm) alternatively with Fire protection bandage FSB-WB 1.5								
Cables, Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓
Cable bundles, Ø ≤ 100 mm made of cable Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓
Cables, cable bundles, cable support systems with ASX ablation coating (coating length min. 200 mm, thickness min 2.0 mm) alternatively with Fire protection bandage FSB-WB 1.5								
Cables, Ø > 21 mm–Ø ≤ 80 mm	✓	✓	✓	✓	✓	✓	✓	✓
Cable support systems	✓	✓	✓	✓	✓	✓	✓	✓
Electrical installation pipes (EIR) made of PE-HD with Fire protection bandage FSB-WB 1.5 (U/U)								
Electrical installation pipes, Ø ≤ 32 mm or electrical installation pipe bundle, Ø ≤ 100 mm made up of electrical installation pipes, Ø ≤ 32 mm, with or without cables Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipes in walls								
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "Kaiflex ST" (C/U)								
External Ø ≤ 8.0 mm, thickness of the insulation 9 mm or 18 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 88.9 mm, thickness of the insulation 32 mm	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with combustible insulation "Kaiflex ST" (C/U)								
External Ø ≤ 170.0 mm, thickness of the insulation 10 mm or 32 mm	✓	✓	✓	✗	✓	✓	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with non-combustible insulation "ProRox PS 960" (C/U)								
External Ø ≤ 22.0 mm, thickness of the insulation 30 mm -	✓	✓	✓	✗	✓	✓	✓	✓
External Ø ≤ 54.0 mm, thickness of the insulation 40 mm	✓	✓	✓	✗	✓	✓	✓	✓
External Ø ≤ 88.9 mm, thickness of the insulation 40 mm	✓	✓	✗	✗	✓	✓	✓	✓

Fire resistance classes in walls								
Installations	Component							
	Solid walls or light-duty partitions ≥ 100 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
Non-combustible pipelines made of steel, stainless steel or cast iron with non-combustible insulation "ProRox PS 960" (C/U)								
External Ø ≤ 170.0 mm, thickness of the insulation 40 mm	✓	✓	✗	✗	✓	✓	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "Armaflex Protect" (C/U)								
External Ø ≤ 8.0 mm, thickness of the insulation 16 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 8.0 mm–≤ 15.0 mm, thickness of the insulation 19 mm	✓	✓	✓	✗	✓	✓	✓	✓
External Ø > 15 mm–≤ 22.0 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 22 mm–≤ 28.0 mm, thickness of the insulation 25 mm	✓	✓	✗	✗	✓	✓	✓	✓
External Ø > 35.0 mm–≤ 54.0 mm, thickness of the insulation 25 mm	✓	✓	✓	✗	✓	✓	✓	✓
External Ø > 54 mm–≤ 88.9 mm, thickness of the insulation 25 mm	✓	✓	✗	✗	✓	✓	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with combustible insulation "Armaflex Protect" (C/U)								
External Ø > 88.9 mm–≤ 170.0 mm, thickness of the insulation 26 mm (2 x 13 mm)	✓	✓	✓	✗	✓	✓	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with non-combustible path insulation for MIW-MA metal pipes (C/U)								
External Ø ≤ 28.0 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 28.0 mm–≤ 42.0 mm, thickness of the insulation 30 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 42.0 mm–≤ 54.0 mm, thickness of the insulation 30 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with non-combustible path insulation for MIW-MA metal pipes (C/U)								
External Ø > 54.0 mm–≤ 88.9 mm, thickness of the insulation 40 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 88.9 mm–≤ 108.0 mm, thickness of the insulation 30 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with non-combustible path insulation for MIW-MA metal pipes (C/U)								
External Ø > 108.0 mm–≤ 170.0 mm, thickness of the insulation 40 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "NH/ Armaflex" (C/U) with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA metal pipes in various lengths and thicknesses								
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 0.8 mm, Thickness of the insulation 9–25 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 1.2 mm, Thickness of the insulation 10–50 mm	✓	✓	✓	✓	✓	✓	✓	✓

Fire resistance classes in walls								
Installations	Component							
	Solid walls or light-duty partitions ≥ 100 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 2.0 mm, Thickness of the insulation 89 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 28.0 mm, pipe wall thickness ≥ 1.0 mm, thickness of the insulation 25 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 28.0 mm, pipe wall thickness ≥ 1.2 mm, thickness of the insulation 10–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 28.0 mm, pipe wall thickness ≥ 1.5 mm, thickness of the insulation 51–88 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø 15.0 mm–≤ 28.0 mm, pipe wall thickness ≥ 2.0 mm, thickness of the insulation 89 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 28.0 mm–≤ 42.0 mm, pipe wall thickness ≥ 1.2–14.2 mm, thickness of the insulation 10–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 28.0 mm–≤ 42.0 mm, pipe wall thickness ≥ 1.5–14.2 mm, thickness of the insulation 51–88 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 28.0 mm–≤ 42.0 mm, pipe wall thickness ≥ 2.0–14.2 mm, thickness of the insulation 89 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 42.0 mm–≤ 54.0 mm, pipe wall thickness ≥ 1.5–14.2 mm, thickness of the insulation 25 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 42.0 mm–≤ 54.0 mm, pipe wall thickness ≥ 1.5–14.2 mm, thickness of the insulation 26–88 mm	✓	✓	✗	✗	✓	✓	✗	✗
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "NH/Armaflex" (C/U) with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA metal pipes in various lengths and thicknesses								
External Ø > 42.0 mm–≤ 54.0 mm, pipe wall thickness ≥ 2.0–14.2 mm, thickness of the insulation 50–89 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 54.0 mm–≤ 88.9 mm, pipe wall thickness ≥ 2.0–14.2 mm, thickness of the insulation 25–88 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 54.0 mm–≤ 88.9 mm, pipe wall thickness ≥ 2.9–14.2 mm, thickness of the insulation 50–89 mm	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with combustible insulation "NH/Armaflex" (C/U) with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA metal pipes in various lengths and thicknesses								
External Ø ≤ 170.0 mm, pipe wall thickness ≥ 2.9–14.2 mm, thickness of the insulation 50–89 mm	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of copper with combustible insulation "NH/Armaflex" (C/U) with Fire protection bandage FSB-WB 1.5 and additionally with "Armaflex Protect" in various lengths and thicknesses								
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 0.8 mm, thickness of the insulation 9–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 42.0 mm, pipe wall thickness ≥ 1.2 mm, thickness of the insulation 10–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
Combustible pipes in walls								

Fire resistance classes in walls								
Installations	Component							
	Solid walls or light-duty partitions ≥ 100 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
Combustible pipes made of PVC-U with Fire protection bandage FSB-WB 1.5 in various lengths								
External Ø ≤ 50.0 mm, (U/U), pipe wall thickness 1.8–3.7 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 50.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 1.9–8.2 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 110.0 mm–≤ 160.0 mm, (U/C), pipe wall thickness 2.4–11.9 mm	✓	✓	✓	✓	✓	✓	✓	✓
Combustible pipes made of PE 100, PP-H with Fire protection bandage FSB-WB 1.5 in various lengths								
External Ø ≤ 50.0 mm, (U/U), pipe wall thickness 1.8–4.6 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 50.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 2.0–10.0 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 110.0 mm–≤ 160.0 mm, (U/C), pipe wall thickness 3.0–9.5 mm (3.0–9.1 mm PP-H)	✓	✓	✓	✓	✓	✓	✓	✓
Multi-layer composite pipes with non-combustible section insulation for metal pipes MIW-MA (U/C)								
External Ø ≤ 12.0 mm, pipe wall thickness ≥ 1.6 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 12 mm–≤ 32.0 mm, pipe wall thickness ≥ 3.0 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 32 mm–≤ 63.0 mm, pipe wall thickness ≥ 4.5 mm, thickness of the insulation 30 mm	✓	✓	✓	✓	✓	✓	✓	✓
Multi-layer composite pipes with combustible section insulation "Armaflex Protect" (U/C)								
External Ø ≤ 12.0 mm, pipe wall thickness ≥ 1.6 mm Thickness of the insulation 13 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 12 mm–≤ 32.0 mm, pipe wall thickness ≥ 3.0 mm, thickness of the insulation 26 mm (2 x 13 mm)	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 32 mm–≤ 63.0 mm, pipe wall thickness ≥ 4.5 mm, thickness of the insulation 26 mm (2 x 13 mm)	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of pre-mounted PE-FOAM insulation (U/C) with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA metal pipes in various lengths and thicknesses								
External Ø ≤ 14.0 mm, pipe wall thickness ≥ 2.0 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 32.0 mm, pipe wall thickness ≥ 3.0 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
Other installations in walls								
Klimasplit cables with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA metal pipes								
Double or single copper pipe, plastic pipe and accompanying cables	✓	✓	✓	✓	✓	✓	✓	✓
"NanoSUN²" with Fire protection bandage FSB-WB 1.5								
DN16 / DN 25 (C/U)	✓	✓	✓	✓	✓	✓	✓	✓
≤ DN 40 (U/U)	✓	✓	✗	✗	✓	✓	✓	✓

Fire resistance classes in walls								
Installations	Component							
	Solid walls or light-duty partitions ≥ 100 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
≤ DN 40 additionally with "slat mat" (U/U)	✓	✓	✓	✓	✓	✓	✓	✓
"speed pipe" bundled or individually, with or without fibre optic cables (U/C) with Fire protection bandage FSB-WB 1.5 in various lengths								
max. 24 units external pipe Ø ≤ 7 max. 7 units external pipe Ø ≤ 10 max. 5 units external pipe Ø ≤ 12	✓	✓	✓	✓	✓	✓	✓	✓

Table 27: Fire resistance classes in walls with two-layer insulation design

Solid ceilings

Fire resistance classes in ceilings								
Installations	Component							
	Solid ceilings ≥ 150 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
Cables, cable bundles, cable support systems in solid ceilings								
Cables, cable bundles with ASX ablation coating (coating length min. 250 mm, thickness min 1.0 mm) alternatively with Fire protection bandage FSB-WB 1.5								
Cables, Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓
Cable bundles, Ø ≤ 100 mm made of cable Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓
Cables, cable bundles, cable support systems with ASX ablation coating (coating length min. 250 mm, thickness min 2.0 mm) alternatively with Fire protection bandage FSB-WB 1.5								
Cables, Ø > 21 mm–Ø ≤ 80 mm	✓	✓	✓	✓	✓	✓	✓	✓
Cable support systems	✓	✓	✓	✓	✓	✓	✓	✓
Rigid electrical installation pipe made of PVC-U according to EN 61386-21 with Fire protection bandage FSB-WB 1.5 (U/U)								
External Ø ≤ 16 mm	✓	✓	✓	✓	✓	✓	✓	✓
Electrical installation pipes (EIR) made of PE-HD with Fire protection bandage FSB-WB 1.5 (U/U)								
Ø ≤ 32 mm or electrical installation pipe bundle with Ø ≤ 100 mm made up of electrical installation pipes Ø ≤ 32 mm with or without cables, Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipes in solid ceilings								
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "Kaiflex ST" (C/U)								
External Ø ≤ 8.0 mm, thickness of the insulation 9 mm or 18 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 8–< 22.0 mm, thickness of the insulation 9 mm–32 mm	✓	✓	✗	✗	✓	✓	✓	✓
External Ø > 22.0 mm–≤ 88.9 mm, thickness of the insulation 9 mm–32 mm, additionally with path insulation MIW-MA	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with combustible insulation "Kaiflex ST" (C/U)								
External Ø > 88.9 mm–≤ 170.0 mm, thickness of the insulation 10 mm–32 mm, additionally with path insulation MIW-MA	✓	✓	✓	✗	✓	✓	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with non-combustible insulation "ProRox PS 960" (C/U)								
External Ø ≤ 22.0 mm, thickness of the insulation 30 mm -	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 54.0 mm, thickness of the insulation 40 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 88.9 mm, thickness of the insulation 40 mm	✓	✓	✓	✓	✓	✓	✓	✓

Fire resistance classes in ceilings								
Installations	Component							
	Solid ceilings ≥ 150 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
Non-combustible pipelines made of steel, stainless steel or cast iron with non-combustible insulation "ProRox PS 960" (C/U)								
External Ø 22.0 mm–≤ 170.0 mm	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "Armaflex Protect" (C/U)								
External Ø > 8.0 mm–≤ 35.0 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 35.0 mm–≤ 54.0 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 54 mm–≤ 88.9 mm	✓	✓	✗	✗	✓	✓	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with combustible insulation "Armaflex Protect" (C/U)								
External Ø > 88.9 mm–≤ 170.0 mm	✓	✓	✓	✗	✓	✓	✓	✗
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with non-combustible path insulation for MIW-MA metal pipes (C/U)								
External Ø ≤ 15.0 mm, insulation thickness 20 mm, pipe wall thickness 0.8–0.9 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø ≤ 15.0 mm, insulation thickness 20 mm, pipe wall thickness ≥ 0.8–0.9 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 15.0 mm, thickness of the insulation 20 mm Pipe wall thickness ≥ 1.0 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 21.5 mm, insulation thickness 20 mm, pipe wall thickness 0.9 mm	✓	✓	✓	✗	✓	✓	✓	✗
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with non-combustible path insulation for MIW-MA metal pipes (C/U)								
External Ø > 15.0 mm–≤ 21.5 mm, insulation thickness 20 mm, pipe wall thickness 0.9 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 28.0 mm, insulation thickness 20 mm, pipe wall thickness ≥ 1.0 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø 28.0 mm–≤ 42.0 mm, thickness of the insulation 30 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 42.0 mm–≤ 54.0 mm, thickness of the insulation 30 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 54.0 mm–≤ 88.9 mm, thickness of the insulation 40 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 88.9 mm–≤ 108.0 mm, thickness of the insulation 30 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of steel, stainless steel or cast iron with non-combustible path insulation for MIW-MA metal pipes (C/U)								
External Ø > 108.0 mm–≤ 170.0 mm, thickness of the insulation 60 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 170.0 mm–≤ 332.9 mm, thickness of the insulation 60 mm with additional insulation	✓	✓	✓	✓	✓	✓	✓	✓

Fire resistance classes in ceilings								
Installations	Component							
	Solid ceilings ≥ 150 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
Non-combustible pipelines made of copper, steel, stainless steel or cast iron with combustible insulation "NH/Armaflex" (C/U) with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA metal pipes in various lengths and thicknesses								
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 0.8 mm, Thickness of the insulation 9–25 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 1.2 mm, Thickness of the insulation 26–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 1.5 mm, Thickness of the insulation 51–89 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 15.0 mm–≤ 28.0 mm, pipe wall thickness ≥ 1.0 mm, thickness of the insulation 9–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 28.0 mm, pipe wall thickness ≥ 1.5 mm, thickness of the insulation 51–89 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 28.0 mm–≤ 42.0 mm, pipe wall thickness ≥ 1.2–14.2 mm, thickness of the insulation 10–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 28.0 mm–≤ 42.0 mm, pipe wall thickness ≥ 1.5–14.2 mm, thickness of the insulation 51–88 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 42.0 mm–≤ 54.0 mm, pipe wall thickness ≥ 1.5–14.2 mm, thickness of the insulation 25 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 42.0 mm–≤ 54.0 mm, pipe wall thickness ≥ 1.5–14.2 mm, thickness of the insulation 26–88 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 54.0 mm–≤ 88.9 mm, pipe wall thickness ≥ 1.6–14.2 mm, thickness of the insulation 25–89 mm	✓	✓	✓	✗	✓	✓	✓	✗
Non-combustible pipelines made of steel, stainless steel or cast iron with combustible insulation "NH/Armaflex" (C/U) with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA metal pipes in various lengths and thicknesses								
External Ø > 88.9 mm–≤ 170.0 mm, pipe wall thickness ≥ 2.1–14.2 mm, thickness of the insulation 25–89 mm	✓	✓	✓	✗	✓	✓	✓	✗
Non-combustible pipelines made of copper with combustible insulation "NH/Armaflex" (C/U) with Fire protection bandage FSB-WB 1.5 and additionally with "Armaflex Protect" in various lengths and thicknesses								
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 0.8 mm, thickness of the insulation 9–19 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 15.0 mm, pipe wall thickness ≥ 1.2 mm, thickness of the insulation 20–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 15.0 mm–≤ 42.0 mm, pipe wall thickness ≥ 1.2 mm, thickness of the insulation 10–50 mm	✓	✓	✓	✓	✓	✓	✓	✓
Combustible pipes in solid ceilings								
Combustible pipes made of PVC-U with Fire protection bandage FSB-WB BS in various lengths								
External Ø ≤ 50.0 mm, (U/U), pipe wall thickness 1.8–3.7 mm	✓	✓	✓	✓	✓	✓	✓	✓

Fire resistance classes in ceilings								
Installations	Component							
	Solid ceilings ≥ 150 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
External Ø > 50.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 1.9–8.2 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 110.0 mm–≤ 160.0 mm, (U/C), pipe wall thickness 2.4–11.9 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 110.0 mm–≤ 160.0 mm, (U/C), pipe wall thickness 3.2 mm	✓	✓	✓	✓	✓	✓	✓	✓
Combustible pipes made of PE 100 with Fire protection bandage FSB-WB BS in various lengths								
External Ø ≤ 50.0 mm, (U/U), pipe wall thickness 1.8–4.6 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 50.0 mm–≤ 90.0 mm, (U/U), pipe wall thickness 2.0–2.7 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 50.0 mm–≤ 90.0 mm, (U/U), pipe wall thickness 2.8–7.3 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 90.0 mm–≤ 100.0 mm, (U/U), pipe wall thickness 2.6–2.7 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 90.0 mm–≤ 100.0 mm, (U/U), pipe wall thickness 2.8–10.0 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 100.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 2.7 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 100.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 2.8–10.0 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 110.0 mm–≤ 120.0 mm, (U/C), pipe wall thickness 3.0–4.1 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 110.0 mm–≤ 120.0 mm, (U/C), pipe wall thickness 4.2–9.5 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 120.0 mm–≤ 130.0 mm, (U/C), pipe wall thickness 3.2–5.4 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 120.0 mm–≤ 130.0 mm, (U/C), pipe wall thickness 5.5–9.5 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 130.0 mm–≤ 140.0 mm, (U/C), pipe wall thickness 3.5–6.8 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 130.0 mm–≤ 140.0 mm, (U/C), pipe wall thickness 6.9–9.5 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 140.0 mm–≤ 150.0 mm, (U/C), pipe wall thickness 3.7–8.1 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 140.0 mm–≤ 150.0 mm, (U/C), pipe wall thickness 8.2–9.5 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 150.0 mm–≤ 160.0 mm, (U/C), pipe wall thickness 4.0–9.4 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 145.0 mm–≤ 150.0 mm, (U/C), pipe wall thickness 9.5 mm	✓	✓	✓	✗	✓	✓	✓	✗
Combustible pipes made of PP-H with Fire protection bandage FSB-WB BS in various lengths								
External Ø ≤ 50.0 mm, (U/U); pipe wall thickness 1.8–4.6 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 50.0 mm–≤ 60.0 mm, (U/U), pipe wall thickness 2.0–2.4 mm	✓	✓	✗	✗	✓	✓	✗	✗

Fire resistance classes in ceilings								
Installations	Component							
	Solid ceilings ≥ 150 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
External Ø > 50.0 mm–≤ 60.0 mm, (U/U), pipe wall thickness 2.5–4.9 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 50.0 mm–≤ 60.0 mm, (U/U), pipe wall thickness 5.0–7.3 mm	✓	✗	✗	✗	✓	✗	✗	✗
External Ø > 60.0 mm–≤ 70.0 mm, (U/U), pipe wall thickness 2.1; 5.4–7.3 mm	✓	✗	✗	✗	✓	✗	✗	✗
Combustible pipes made of PP-H with Fire protection bandage FSB-WB BS in various lengths								
External Ø > 60.0 mm–≤ 70.0 mm, (U/U), pipe wall thickness 2.2–3.0 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 60.0 mm–≤ 70.0 mm, (U/U), pipe wall thickness 3.1–5.3 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 70.0 mm–≤ 80.0 mm, (U/U), pipe wall thickness 2.3; 5.8–7.3 mm	✓	✗	✗	✗	✓	✗	✗	✗
External Ø > 70.0 mm–≤ 80.0 mm, (U/U), pipe wall thickness 2.4–3.7 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 70.0 mm–≤ 80.0 mm, (U/U), pipe wall thickness 3.8–5.7 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 80.0 mm–≤ 90.0 mm, (U/U), pipe wall thickness 2.4–2.5 mm; 6.2–10 mm	✓	✗	✗	✗	✓	✗	✗	✗
External Ø > 80.0 mm–≤ 90.0 mm, (U/U), pipe wall thickness 2.6–4.4 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 80.0 mm–≤ 90.0 mm, (U/U), pipe wall thickness 4.5–6.1 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 90.0 mm–≤ 100.0 mm, (U/U), pipe wall thickness 2.6–2.7 mm; 6.6–10.0 mm	✓	✗	✗	✗	✓	✗	✗	✗
External Ø > 90.0 mm–≤ 100.0 mm, (U/U), pipe wall thickness 4.2–9.5 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 90.0 mm–≤ 100.0 mm, (U/U), pipe wall thickness 2.8–5.0 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 100.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 2.7–2.9 mm; 7.1–10.0 mm	✓	✗	✗	✗	✓	✗	✗	✗
External Ø > 100.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 3.0–5.7 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 100.0 mm–≤ 110.0 mm, (U/U), pipe wall thickness 5.8–7.0 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 110.0 mm–≤ 120.0 mm, (U/C), pipe wall thickness 3.2–6.3 mm; 7.5–9.0 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 110.0 mm–≤ 120.0 mm, (U/C), pipe wall thickness 6.4–7.4 mm; 9.1 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 120.0 mm–≤ 130.0 mm, (U/C), pipe wall thickness 3.4–7.0 mm; 7.9–9.0 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 120.0 mm–≤ 130.0 mm, (U/C), pipe wall thickness 7.1–7.8 mm; 9.1 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 130.0 mm–≤ 140.0 mm, (U/C), pipe wall thickness 3.6–7.7 mm; 8.3–9.0 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 130.0 mm–≤ 140.0 mm, (U/C), pipe wall thickness 7.8–8.2 mm; 9.1 mm	✓	✓	✓	✗	✓	✓	✓	✗

Fire resistance classes in ceilings								
Installations	Component							
	Solid ceilings ≥ 150 mm							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
External Ø > 140.0 mm–≤ 150.0 mm, (U/C), pipe wall thickness 3.8–8.3 mm; 8.7–9.0	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 140.0 mm–≤ 150.0 mm, (U/C), pipe wall thickness 8.4–8.6 mm; 9.1 mm	✓	✓	✓	✗	✓	✓	✓	✗
External Ø > 150.0 mm–≤ 160.0 mm, (U/C), pipe wall thickness 4.0–9.0 mm	✓	✓	✗	✗	✓	✓	✗	✗
External Ø > 150.0 mm–≤ 160.0 mm, (U/C), pipe wall thickness 9.1 mm	✓	✓	✓	✗	✓	✓	✓	✗
Multi-layer composite pipes with non-combustible section insulation for metal pipes MIW-MA (U/C)								
External Ø ≤ 12.0 mm, pipe wall thickness ≥ 1.6 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 12 mm–≤ 32.0 mm, pipe wall thickness ≥ 3.0 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø > 32 mm–≤ 63.0 mm, pipe wall thickness ≥ 4.5 mm, thickness of the insulation 30 mm	✓	✓	✓	✓	✓	✓	✓	✓
Multi-layer composite pipes with combustible section insulation "Armaflex Protect" (U/C)								
External Ø ≤ 12.0 mm, pipe wall thickness ≥ 1.6 mm, thickness of the insulation 13 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 32.0 mm, pipe wall thickness ≥ 3.0 mm, thickness of the insulation 26 mm (2 x 13 mm)	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 63.0 mm, pipe wall thickness ≥ 4.5 mm, thickness of the insulation 26 mm (2 x 13 mm)	✓	✓	✓	✓	✓	✓	✓	✓
Non-combustible pipelines made of pre-mounted PE-FOAM insulation (U/C) with Fire protection bandage FSB-WB 1.5 and additionally with non-combustible path insulation for MIW-MA								
External Ø ≤ 14.0 mm, pipe wall thickness ≥ 2.0 mm, thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
External Ø ≤ 32.0 mm, pipe wall thickness ≥ 3.0 mm Thickness of the insulation 20 mm	✓	✓	✓	✓	✓	✓	✓	✓
Other installations in solid ceilings								
"NanoSUN²" with Fire protection bandage FSB-WB 1.5								
DN16 / DN 25 /40	✓	✓	✓	✓	✓	✓	✓	✓

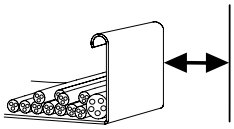
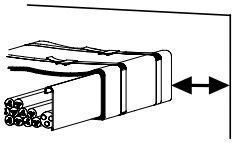
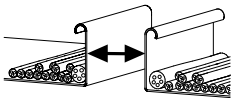
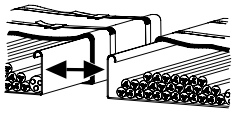
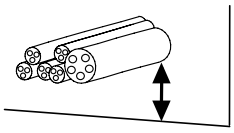
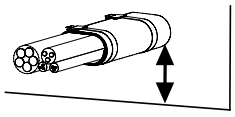
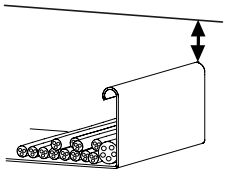
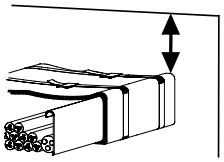
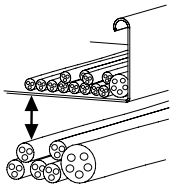
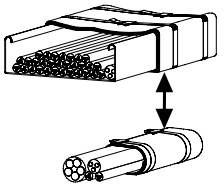
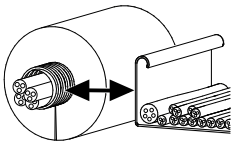
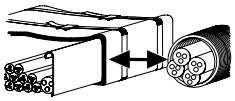
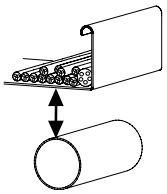
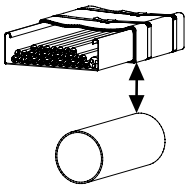
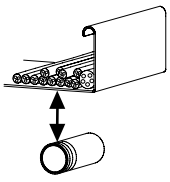
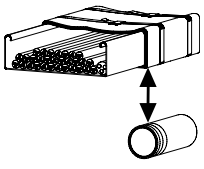
Table 28: Fire resistance classes in ceilings with two-layer insulation design

7.3 Minimum distances between installations

To guarantee the functionality of the PYROPLATE® Fibre insulation system, minimum distances between installations in solid walls and ceilings and light-duty partitions must be taken into account.

Cables, cable bundles or cable support systems

Cables, cable bundles or cable support systems can selectively be coated with ablation coating and be wound with a Fire protection bandage. Depending on whether the cables, cable bundles or cable support systems are coated or wound, the distances between the installations to be complied with vary.

Cables/cable bundles/cable support systems with ASX-E/K ablation coating		Distance mm	Cables/cable bundles/cable support systems with Fire protection bandage FSB-WB 1.5		Distance mm
	Side distance to component layer	≥ 0		Side distance to component layer	≥ 0
	Distance between adjacent cable support systems	≥ 0		Distance between adjacent cable support systems	≥ 0
	Lower/rear distance to component layer	≥ 0		Lower/rear distance to component layer	≥ 0
	Top/front distance to component layer	≥ 0		Top/front distance to component layer in walls	≥ 0
	Distance	≥ 0		Distance	≥ 0
	Distance to electrical installation pipes	≥ 25		Distance to electrical installation pipes	≥ 25
	Distance to combustible pipes	≥ 25		Distance to combustible pipes	≥ 25
	Distance to multi-layer composite pipes in walls	≥ 20		Distance to multi-layer composite pipes in walls	≥ 20
	In ceilings	≥ 0		In ceilings	≥ 0

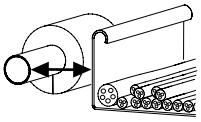
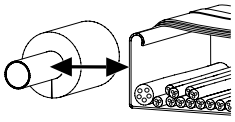
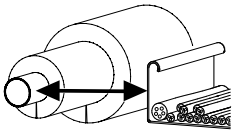
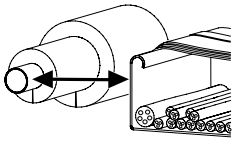
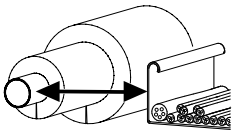
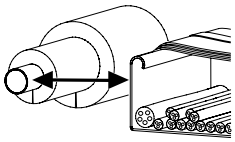
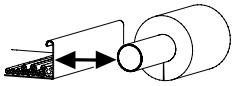
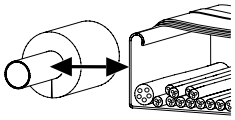
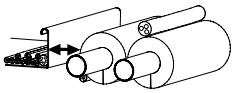
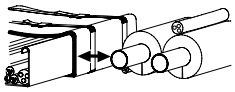
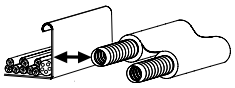
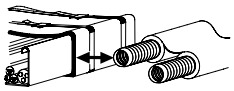
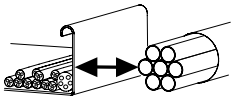
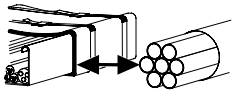
Cables/cable bundles/cable support systems with ASX-E/K ablation coating		Distance mm	Cables/cable bundles/cable support systems with Fire protection bandage FSB-WB 1.5		Distance mm
	Distance to non-combustible pipes	≥ 100		Distance to non-combustible pipes	≥ 100
	Distance to non-combustible pipes with "Armaflex NH" and additional MIW-MA path insulation in walls	≥ 75		Distance to non-combustible pipes with "Armaflex NH" and additional MIW-MA path insulation	≥ 0
	In ceilings	≥ 0			
	Distance to non-combustible pipes with "Armaflex NH" and additional "Armaflex Protection" insulation in walls	≥ 100		Distance to non-combustible pipes with "Armaflex NH" and additional "Armaflex Protection" insulation in walls	≥ 100
	In ceilings	≥ 0		In ceilings	≥ 0
	Distance to non-combustible pipes with MIW-MA path insulation in walls	≥ 0		Distance to non-combustible pipes with MIW-MA path insulation in walls	≥ 0
	In ceilings	≥ 50		In ceilings	≥ 50
	Distance to HVAC split line combinations	≥ 0		Distance to HVAC split line combinations	≥ 0
	Distance to double solar pipes "NanoSUN²"	≥ 30		Distance to double solar pipes "NanoSUN²"	≥ 30
	Distance to bundles of "speed pipe" PE cables	≥ 25		Distance to bundles of "speed pipe" PE cables	≥ 25

Table 29: Distances of cables, cable bundles, cable support systems in solid walls, light-duty partitions and solid ceilings

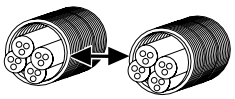
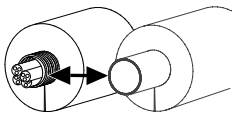
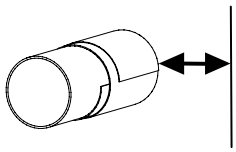
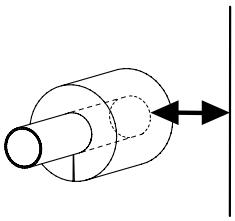
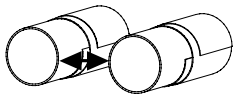
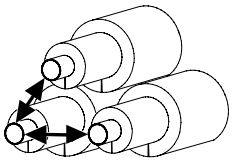
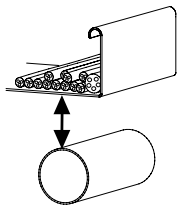
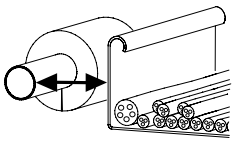
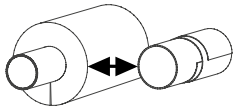
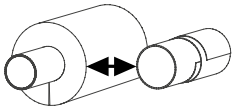
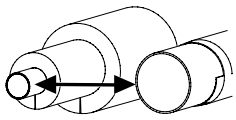
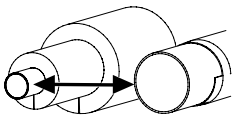
Electrical installation pipes		Distance mm	Electrical installation pipes		Distance mm
	Spacing	≥ 25		Distance to non-combustible pipes with MIW-MA path insulation	≥ 60

Table 30: Distances of electrical installation pipes

Combustible and non-combustible pipes

Combustible pipes		Dis-tance mm	Non-combustible pipes		Dis-tance mm
	Distance to component layer	≥ 0		Side distance to component layer	≥ 50
				with MIW-MA path insulation	≥ 0
				with "Armaflex NH" and additional MIW-MA path insulation or "Armaflex Protect" insulation	
	Spacing	≥ 25		Distance between non-combustible pipes with various pipe jacketing	≥ 100
	Distance to cables/cable bundles/cable support systems	≥ 25		Distance to cables/cable bundles/cable support systems	≥ 100
	Distance to non-combustible pipes (measured from the pipe insulation of the metal pipes)	≥ 100		Distance to combustible pipes	≥ 100
	Distance to non-combustible pipes with "Armaflex NH" and additional MIW-MA path insulation in walls	≥ 40		Distance of non-combustible pipes with "Armaflex NH" and additional MIW-MA path insulation to combustible pipes	≥ 40
	In ceilings	≥ 50			

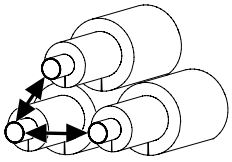
Combustible pipes	Distance mm		Non-combustible pipes		Distance mm
				Distance between pipes with insulation made of "Kaiflex ST" without protective insulation	≥ 60
				For design with protecti-ve insulation	≥ 0
				Distance between pipes with MIW-MA path insulation	
				Distance between pipes with "Armaflex NH" and additional MIW-MA path insulation	
				Distance between pipes with "Armaflex NH" and additional "Armaflex Protection" insulation in walls	
				Distance between pipes with mineral fibres Pipe shells "ProRox PS 960“ (RS 880)"	≥ 60
				Distance between pipes with "Armaflex NH" insulation	≥ 0
				Distance between pipes with "Armaflex NH" and additional "Armaflex Protect" insulation and pipes with "Armaflex NH" and additional MIW-MW path insulation	≥ 25
				Distance between pipes with "Armaflex NH" and additional "Armaflex Protect" insulation and pipes with MIW-MW path insulation	≥ 100

Table 31: Distances of combustible and non-combustible pipes

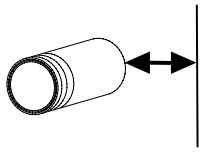
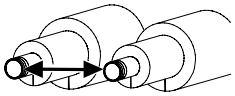
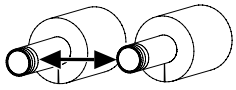
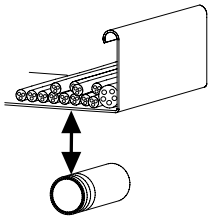
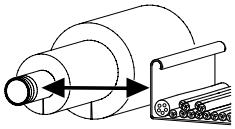
Multi-layer composite pipes		Dis-tance mm		Multi-layer composite pipes		Dis-tance mm
	Side distance to component layer with protective insulation made of MIW-MA path insulation	≥ 0			Distance between pipes with PE foam insulation and protective insulation made of MIW-MA path insulation	≥ 0
	with "Armaflex Protect" protective insulation				Distance between pipes with PE foam insulation and "slat mat" protective insulation to pipes with PE foam insulation and "Armaflex Protect" protective insulation	≥ 100
	with PE foam insulation and protective insulation made of MIW-MA path insulation					
	Distance to each other with protective insulation made of MIW-MA path insulation	≥ 0			Distance to cables/cable bundles/cable support systems in walls	≥ 20
	with "Armaflex Protect"-Protective insulation					
	Distance between pipes with protective insulation made of MIW-MA path insulation and pipes with "Armaflex Protect" protective insulation	≥ 50			In ceilings	≥ 0
					with PE foam insulation and "slat mat" protective insulation, distance to cables/cable bundles/ cable support systems in ceilings	≥ 25

Table 32: Distances of multi-layer composite pipes

Other installations

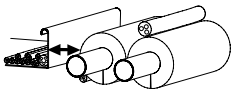
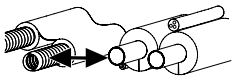
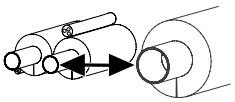
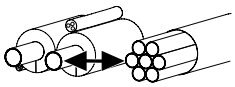
HVAC split line combinations		Distance mm		HVAC split line combinations		Distance mm
	Distance to cables/cable bundles/cable support systems in walls	≥ 0			Distance to NanoSUN²	≥ 25
	Distance to non-combustible pipes with MIW-MA path insulation	≥ 0			Distance to "speed pipe" PE cables	≥ 100

Table 33: Klimasplit cable combination distances

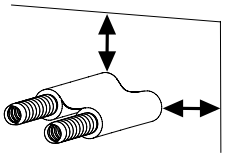
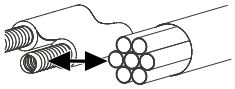
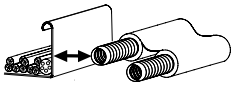
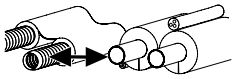
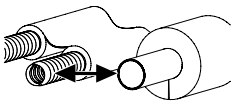
Double solar pipes "NanoSUN²"		Distance mm		Double solar pipes "NanoSUN²"		Distance mm
	Side distance to component layer	≥ 100			Distance to "speed pipe" PE cables	≥ 100
	Distance to cables/cable bundles/cable support systems in walls	≥ 30			Distance to Klimasplit	≥ 25
	Distance to non-combustible pipes with MIW-MA path insulation	≥ 50				

Table 34: Double solar pipes "NanoSUN²" distances

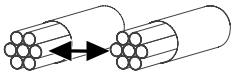
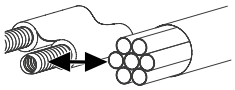
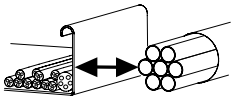
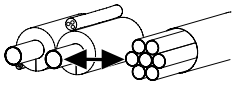
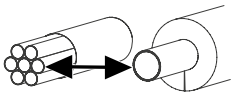
"speed pipe" PE cables for fibre optic cables and microcables		Distance mm		"speed pipe" PE cables for fibre optic cables and microcables		Distance mm
	Spacing	≥ 0			Distance to double solar pipes "NanoSUN²"	≥ 100
	Distance to cables/cable bundles/cable support systems	≥ 0			Distance to HVAC split line combinations	≥ 100
	Distance to non-combustible pipes with MIW-MA path insulation	≥ 100				

Table 35: "speed pipe" PE cable distances for fibre optic cables and microcables

7.4 First support in walls

Installations must be supported in order to avoid overloading the insulation in case of fire.

The supports of the installation must be non-combustible (material class DIN 4102-A).

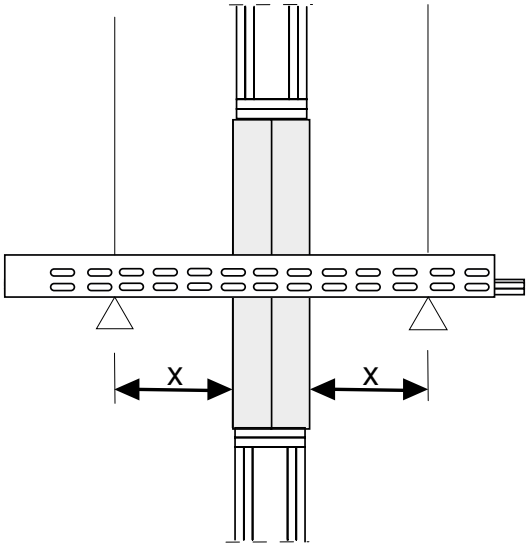


Fig. 26: Maximum distance for supports

First support of:	Maximum distance x in mm from the insulation surface
Cables, cable bundles, cable support systems	Wall ≤ 500
	Ceiling ≤ 250
Electrical installation pipes	≤ 500
Combustible pipes	≤ 400
Non-combustible pipes with path insulation MIW-WA, "Armaflex Protect", "Armaflex NH"	≤ 1,000
Non-combustible pipes with "Armaflex NH" + "Armaflex Protect"	≤ 800
Multi-layer composite pipes "HENCO STANDARD"	≤ 550
"NanoSUN²" double solar pipes	≤ 500
HVAC split line combinations	≤ 500
"speed pipes" for fibre optic cables and microcables	*
* Distance according to manufacturer's specifications	

Table 36: Distances for supports

7.5 Arrangement of the insulation

To ensure the functionality of the PYROPLATE® Fibre insulation system, the PSX-P60 mineral fibre plates must be arranged as following in the two-layer insulation:

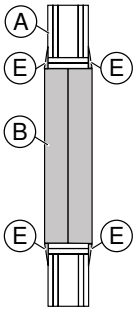
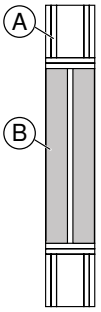
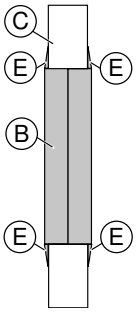
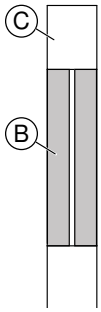
Light-duty partition		Solid wall	
			
Wall ≥ 100–≤ 120 mm, central with rounded edge on both sides	Wall ≥ 120 mm, flush with layer on both sides	Wall ≥ 100–≤ 120 mm, central with rounded edge on both sides	Wall ≥ 120 mm, flush with layer on both sides

Table 37: Insulation arrangement, light-duty partition and solid wall

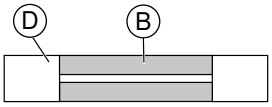
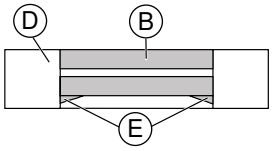
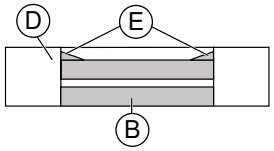
Solid ceiling		
		
Ceiling 150 mm, flush on both sides	Ceiling > 150 mm, flush at top	Ceiling > 150 mm, flush at bottom

Fig. 27: Solid ceiling insulation arrangement

Ⓐ Light-duty partition
Ⓑ Mineral fibre plate PSX-P60
Ⓒ Solid wall
Ⓓ Solid ceiling
Ⓔ Round joint

If the insulation does not end flush with the layer, then a round joint must be created between the insulation surface and the layer using workable ASX ablation coating.

7.6 Measures on installations in walls and ceilings

To ensure the functionality of the PYROPLATE® Fibre insulation system, the installations in the two-layer insulation must be coated and/or wound and/or insulated.

7.6.1 Measures on cables, cable bundles, cable support systems

Cables, cable bundles and cable support systems must either be coated on both sides of the insulation with ablation coating or be wound with the Fire protection bandage FSB-WB 1.5 or FSB-WB BS. Ring gaps and joints must be closed off with mineral wool or ablation coating.

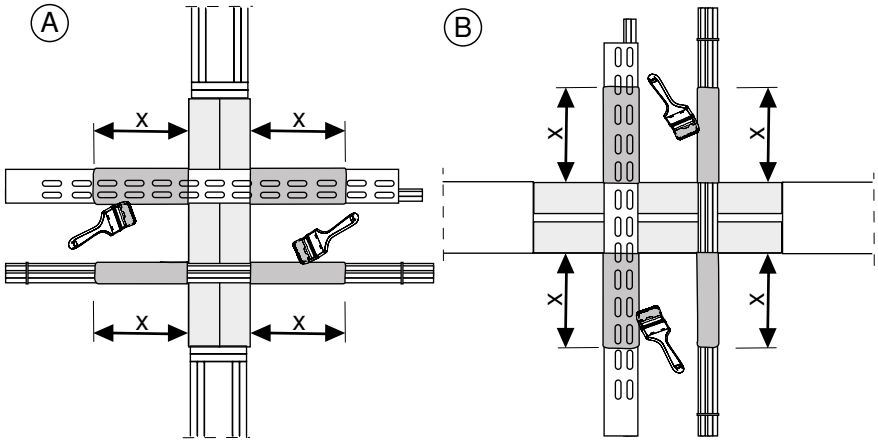


Fig. 28: Ablation coating on cables in wall Ⓐ and ceiling Ⓑ

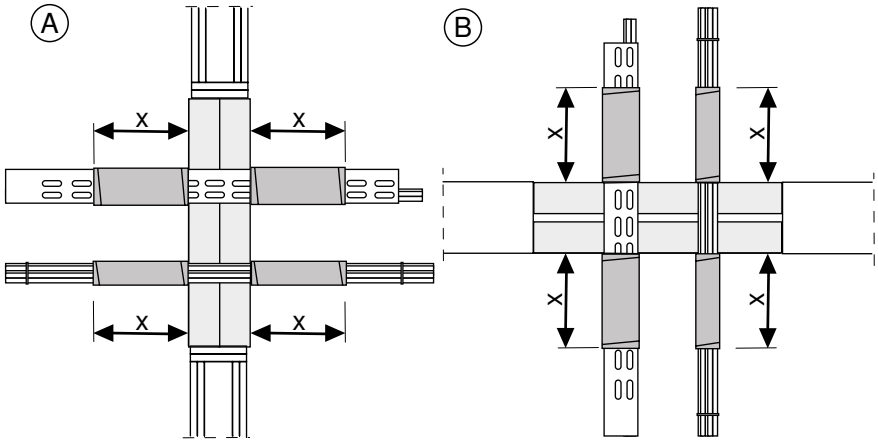


Fig. 29: Fire protection bandage FSB-WB 1.5 on cables on wall and ceiling

Close joints with MIW-S mineral wool (fire behaviour class A1 or A2 in accordance with EN 13501-1) and coat with workable ASX ablation coating; ring gap ≤ 5 mm, close with workable ASX ablation coating. For exact dimensions, see Table 38: Measures on cables, cable bundles, cable support systems on page 62.

Measures on cables, cable bundles, cable support systems in **walls and ceilings**							
Dimensions in mm	Measure	Dry layer thick-ness/ Coil width	Length in the insulation/ x = in front of the insulation surface		Number of layers	Overlap	Quanti-ty Fixings with steel wire
			In	In front of			

Measures on cables, cable bundles, cable support systems in **walls and ceilings**							
Cables, cable bundles, cable support systems							
Cables, Ø ≤ 21 mm	Coating with paintable ablation coating ASX	1.0	-	x ≥ 100 (wall) x ≥ 250 (ceiling)			
Cable bundle Ø ≤ 100 with cables Ø ≤ 21							
Cable support systems		2.0		x ≥ 200 (wall) x ≥ 250 (ceiling)			
Cables, Ø > 21–≤ 80							
Alternatively							
cables, Ø ≤ 21	Winding with Fire protection bandage FSB-WB 1.5	200	-	x = 200	1 (wall) 2 (ceiling)	≥ 60	2
Cable bundles, Ø ≤ 100 mm made of cable with Ø ≤ 21 mm							
Cable support systems					2		
Cables, Ø > 21–≤ 80							
Electrical installation pipes, Ø ≤ 32 mm or bundles of electrical installation pipes with Ø ≤ 100		125	50	x = 75	3	-	1
Single cables, Ø ≤ 21 mm, Bandage only on upper and lower side of the ceiling, individual cables can also be passed through at a slant		125 (only ceiling)	-	x = 125 (Only ceiling)	1 (Only ceiling)	≥ 10 (Only ceiling)	2 (Only ceiling)

Ring gap and joint closure		
Ring gap ≤ 4	Closure with workable ablation coating ASX	≥ 60, continuous in the insulation
Ring gap > 2–50	Closure with mineral wool MIW-S	

Table 38: Measures on cables, cable bundles, cable support systems

7.6.2 Measures on combustible pipes

Combustible pipes, double solar pipes "NanoSUN²", HVAC split line combinations and "speed pipe" PE cables must be wound in and on both sides of the insulation with a Fire protection bandage. Ring gaps and joints must be closed off with mineral wool or ablation coating. For exact dimensions, see Table 39: Measures on combustible pipes on page 63.

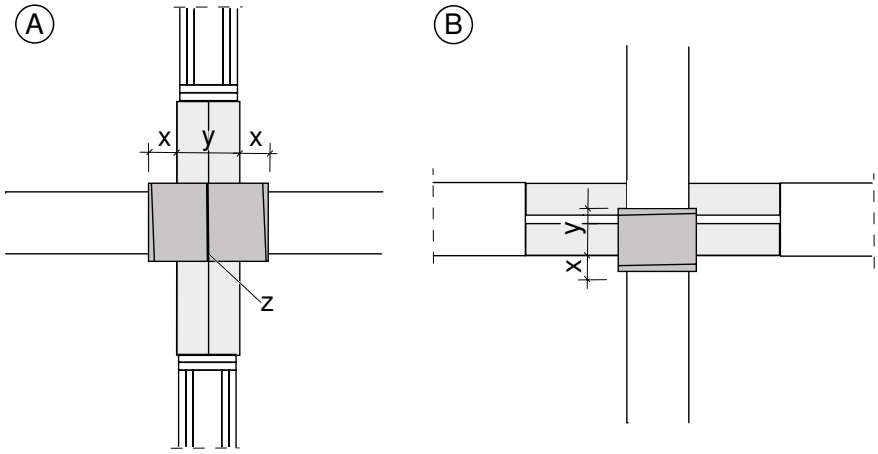


Fig. 30: Fire protection bandage to combustible pipes in wall Ⓐ and ceiling Ⓑ

Measures on combustible pipes in **walls and ceilings**							
Dimensions in mm	Measure	Dry layer thick-ness/ coil width	y = length in the insulation/ x = length in front of the insulation surface		Number of layers	Overlap	Quanti-ty Fixings (z) Steel wire
			in (y)	in front of (x)			
Combustible pipes made of PVC-U, PE 100 and PP-H							
External diameter ≤ 50	Winding with Fire protecti-on bandage FSB-WB BS	100	y = 60 (walls) y = 75 (cei-lings)	x = 40 (walls) x = 25 (cei-lings)	1	-	1
External diameter > 50–≤ 80					2		
External diameter > 80–≤ 110					3		
External diameter > 110–≤ 125					4		

Ring gap and joint closure		
Ring gap ≤ 4	Closure with workable ablation coating ASX	60 mm in the insulation (30 mm on either sides, measu-red from the insulation surface)
Ring gap > 2–50	Closure with mineral wool MIW-S	

Table 39: Measures on combustible pipes

7.6.3 Measures on non-combustible pipes

Non-combustible pipes and multi-layer composite pipes in walls

Some non-combustible pipes and multi-layer composite pipes must be insulated with continuous path insulation and additionally insulated on both sides of the insulation with protective insulation. Ring gaps and joints must be closed off with mineral wool or ablation coating. For exact di-mensions, see Table 40: Measures on non-combustible pipes in walls on page 67, Table 41: Measures on multi-layer composite pipes in walls on page 67 and Table 42: Ring gap and joint closure on non-combustible

pipes in walls on page 67.

Non-combustible pipes with combustible "Armaflex Protection" insulation do not require further insulation.

Non-combustible pipes in walls

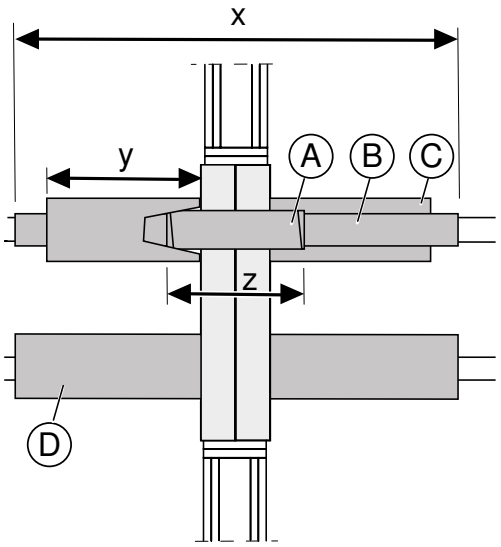


Fig. 31: Coil, path and protective insulation on non-combustible pipes in the walls

Ⓐ Fire protection bandage
Ⓑ Path insulation
Ⓒ Protective insulation
Ⓓ Combustible insulation "Armaflex Protect"

Measures on non-combustible pipes in **walls** on both sides of the insulation Various path insulation items, MIW-MA protective insulation								
Non-combustible pipes			Path insulation made of mineral fibre pipe shell/ Combustible insulation		Protective insulation MIW-MA		Fire protection bandage FSB-WB 1.5	
Material type/ dimensions in mm	External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Insulation length y	Insulation thickness	Width z	Number of layers
Copper, steel, stainless, cast	**"Kaiflex ST" path insulation**							
	≤ 8.0	≥ 1.0–≤ 4.0	x ≥ 2,000	9–18	-	-	z = 125 (50 in the insulation / 75 in front of the insulation)	1
	> 8.0–≤ 22.0	≥ 1.0–≤ 11.0		9–32				2
	> 22.0–≤ 88.9	≥ 1.5–≤ 14.2		9–32	y ≥ 500	≥ 30		
Steel, stainless, cast	> 88.9–≤ 170.0	≥ 3.0–≤ 14.2		10–32				

Measures on non-combustible pipes in **walls** on both sides of the insulation Various path insulation items, MIW-MA protective insulation								
Copper, steel, stainless, cast	**Path insulation "Armaflex Protect"**							
	≤ 8.0	≥ 1.0–≤ 4.0	x ≥ 2,000	16	-	-	-	-
	> 8.0–≤ 15.0	≥ 1.0–≤ 7.5		19				
	> 15.0–≤ 22.0	≥ 1.5–≤ 11.0		20				
	> 22.0–≤ 88.9	≥ 2.0–≤ 14.2		25				
Steel, stainless, cast	> 88.9 ≤ 170.0	≥ 3.0–≤ 14.2		26 (2 x 13)				
Copper, steel, stainless, cast	**Path insulation MIW-MA***							
	≤ 15.0	0.8–≤ 0.9	x ≥ 250	≥ 20	-	-	-	-
	> 15.0–≤ 28.0	≥ 0.9–≤ 1.0	x ≥ 500					
	> 28.0–≤ 42.0	≥ 1.1–≤ 14.2		≥ 30				
	> 42.0–≤ 54.0	≥ 1.3–≤ 14.2	x ≥ 750		y ≥ 500	≥ 30	-	-
	> 54.0–≤ 88.9	≥ 1.6–≤ 14.2		≥ 40				
	> 88.9–≤ 108.0	≥ 2.1–≤ 14.2	x ≥ 1,000	≥ 30				
Steel, stainless, cast	> 108.0–≤ 114.3	≥ 2.6–≤ 3.5		≥ 40		≥ 60		
	> 108.0–≤ 114.3	≥ 3.6–≤ 14.2		≥ 30		≥ 30		
	> 114.3–≤ 170.0	≥ 2.6–≤ 14.2		≥ 40		≥ 60		
* Insulation thicknesses and lengths are minimum sizes. Mineral fibre pipe shells and/or mineral fibre mats with equal or higher values may be used.								

Measures on non-combustible pipes in **walls** on both sides of the insulation Path insulation NH/Armaflex, protective insulation Armaflex Protect								
Non-combustible pipes			Path insulation made of mineral fibre pipe shell/ Combustible insulation		**Protective insulation Armaflex Protect**		**Fire protection bandage FSB-WB 1.5**	
Material type/ dimensions in mm	External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Insulation length y	Insulation thickness	Width z	Number of layers
Copper	**Path insulation "NH/Armaflex"**							
	≤ 15.0	2.9	x ≥ 1,000	9–19	y = 250	13	-	-
				20–50		26 (2 x 13)	z =125 (50 in the insulation/ 75 in front of the insulation)	1
	> 15.0–≤ 42.0			10–50				

Measures on non-combustible pipes in **walls** on both sides of the insulation Path insulation NH/Armaflex, protective insulation MIW-MA								
Non-combustible pipes			Path insulation made of mineral fibre pipe shell/ combustible insulation		Protective insulation MIW-MA*		Fire protection bandage FSB-WB 1.5	
Material type/ dimensions in mm	External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Insulation length y	Insulation thickness	Width z	Number of layers
Copper, steel, stainless, cast	**Path insulation "NH/Armaflex"**							
	≤ 15.0	≥ 0.8	Continuous	9–25	y ≥ 250	≥ 20	z = 125 (50 in the insulation/ 75 in front of the insulation)	1
		≥ 1.2	x ≥ 750	10–50				
		≥ 2.0	Continuous	89	y ≥ 500	≥ 40		
	> 15.0–≤ 28.0	≥ 1.0	Continuous	25	y ≥ 250	≥ 20		
		≥ 1.2	x ≥ 750	10–50				
		≥ 1.5	x ≥ 1,000	51–57				
		≥ 2.0	Continuous	58–88	y ≥ 500	≥ 40		
				89				
	> 28.0–≤ 42.0	≥ 1.2–≤ 14.2	x ≥ 750	10–50	y ≥ 250	≥ 20		
		≥ 1.5–≤ 14.2	x ≥ 1,000	51–57				
		≥ 2.0–≤ 14.2	Continuous	58–88	y ≥ 500	≥ 40		
				89				
	> 42.0–≤ 54.0	≥ 1.5–≤ 14.2	Continuous	25	y ≥ 250	≥ 20		
			x ≥ 1,000	26–57				
		≥ 2.0–≤ 14.2		58–88	y ≥ 500	≥ 40		
				89				
		≥ 2.9	Continuous	50–89	y ≥ 750	≥ 60		
	> 54.0–≤ 88.9	≥ 2.0–≤ 14.2	x ≥ 1,000	25–88				
		≥ 2.9	Continuous	50–89				
Steel, stainless, cast	> 88.9–≤ 170.0	≥ 2.9	Continuous	50–89	≥ 750	≥ 60	125 (50 in the insulation/ 75 in front of the insulation)	1

Measures on non-combustible pipes in **walls** on both sides of the insulation Path insulation NH/Armaflex, protective insulation MIW-MA								
Copper, Steel, stainless, cast	**Path insulation "ProRox PS 960" (RS 880)**							
	≤ 22.0	≥ 1.0–≤ 11.0	x ≥ 2,000	≥ 30	-	-	-	-
	> 22.0–≤ 54.0	≥ 1.5–≤ 14.2		≥ 40				
	> 54.0–≤ 88.9	≥ 2.0–≤ 14.2						
Steel, stainless, cast	> 88.9–≤ 170.0	≥ 3.0–≤ 14.2						

Table 40: Measures on non-combustible pipes in walls

Measures on multi-layer composite pipes in **walls** on both sides of the insulation						
Dimensions in mm		Protective insulation		Fire protection bandage		
External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Width	Number of layers	
Multi-layer composite pipes "HENCO STANDARD"		Insulation MIW-MA*		-		
≤ 12 mm	1.6	x ≥ 250	≥ 20			
≤ 32 mm	3.0					
≤ 63 mm	4.5		≥ 30			
Multi-layer composite pipes "HENCO STANDARD"		"Armaflex Protect"				
≤ 12 mm	1.6	x = 240	13			
≤ 32 mm	3.0		26 (2 x 13)			
≤ 63 mm	4.5					
Multi-layer composite pipes "HENCO STANDARD" with PE foam insulation		Insulation MIW-MA*		Fire protection bandage FSB-WB BS		
≤ 14 mm	2.0	x ≥ 250	≥ 20	z = 100 (50 in the insulation/50 in front of the insulation)	1 + 25 mm overlap	
≤ 32 mm	3.0					
*Insulation thicknesses and lengths are minimum sizes. Mineral fibre pipe shells and/or mineral fibre mats with equal or higher values may be used.						

Table 41: Measures on multi-layer composite pipes in walls

Ring gap and joint closure on non-combustible pipes and multi-layer composite pipes		
Ring gap ≤ 4	Closure with workable ablation coating ASX	60 in the insulation (30 on either side, measured from the insulation surface)
Ring gap > 2–50	Closure with mineral wool MIW-S	

Table 42: Ring gap and joint closure on non-combustible pipes in walls

Non-combustible pipes and multi-layer composite pipes in solid ceilings

Non-combustible pipes and multi-layer composite pipes in ceilings

Some non-combustible pipes and multi-layer composite pipes must be insulated with continuous path insulation and additionally insulated on both sides of the insulation with protective insulation. Ring gaps and joints must be closed off with mineral wool or ablation coating. For exact dimensions, see Table 43: Measures on non-combustible pipes in ceilings with MIW-MA protective insulation on page 70, Table 46: Measures on multi-layer composite pipes in ceilings on page 71 and Table 47: Ring gap and joint closure on multi-layer composite pipes in ceilings on page 72.

Non-combustible pipes with combustible "Armaflex Protection" insulation do not require further insulation.

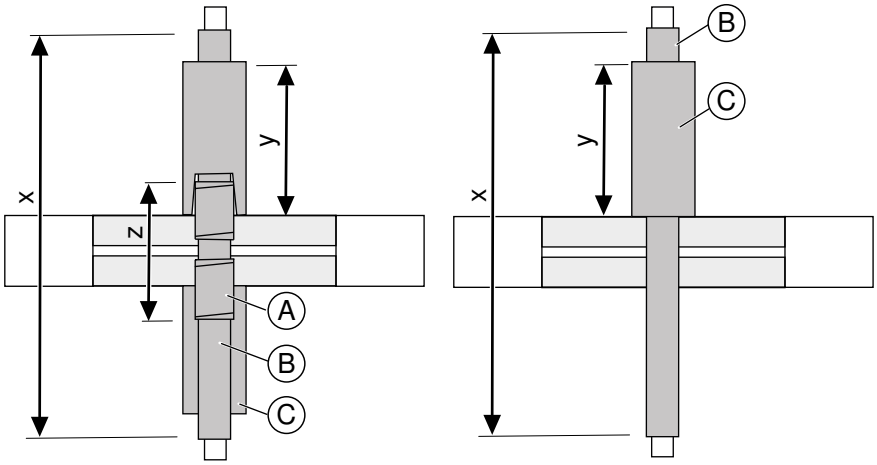


Fig. 32: Path and protective insulation on non-combustible pipes in the ceilings

Ⓐ Fire protection bandage
Ⓑ Path insulation
Ⓒ Protective insulation

Measures on non-combustible pipes in **ceilings** on both sides of the insulation Various path insulation items, MIW-MA protective insulation								
Non-combustible pipes			Mineral fibre pipe shell/combustible insulation		Protective insulation with MIW-MA insulation		Fire protection bandage FSB-WB 1.5	
Material type/ dimensions in mm	External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Insulation length y	Insulation thickness	Width z	Number of layers
"Kaiflex ST" path insulation								
Copper, steel, stainless, cast	≤ 8.0	≥ 1.0–≤ 4.0	x ≥ 2,000	9–18	-	-	z = 125 (50 in the insulation/75 in front of the insulation)	1
	> 8.0–≤ 88.9	≥ 1.0–≤ 14.2		9–32	y ≥ 500	≥ 30		2
Steel, stainless, cast	> 88.9–≤ 170.0	≥ 3.0–≤ 14.2		32				

Measures on non-combustible pipes in **ceilings** on both sides of the insulation Various path insulation items, MIW-MA protective insulation								
Path insulation "Armaflex Protect"								
Copper, steel, stainless, cast	≤ 8.0	≥ 1.0–≤ 4.0	x ≥ 2,000	16	-	-	-	-
	> 8.0–≤ 15.0	≥ 1.0–≤ 7.5		19				
	> 15.0–≤ 22.0	≥ 1.0–≤ 11.0		20				
	> 22.0–≤ 88.9	≥ 1.0–≤ 14.2		25				
Steel, stainless, cast	> 88.9 ≤ 170.0	≥ 3.0–≤ 14.2		26 (2 x 13)				

Measures on non-combustible pipes in **ceilings** on both sides of the insulation Various path insulation items, MIW-MA protective insulation								
Non-combustible pipes			Mineral fibre pipe shell/combustible insulation		Protective insulation with MIW-MA insulation		Fire protection bandage FSB-WB 1.5	
Material type/ dimensions in mm	External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Insulation length y	Insulation thickness	Width z	Number of layers
Path insulation MIW-MA*								
Copper, steel, stainless, cast	≤ 15.0	0.8–≤ 0.9	x ≥ 500	≥ 20	-	-	-	-
					y = 500**	30		
		≥ 1.0			-	-		
	> 15.0–≤ 21.5	≥ 0.9			-	-		
					y = 500**	30		
		≥ 1.0			-	-		
	> 21.5–≤ 28.0	≥ 1.1–≤ 14.2						
	> 28.0–≤ 42.0			30				
	> 42.0–≤ 54.0	≥ 1.3–≤ 14.2	x ≥ 750		y ≥ 500	≥ 30		
	> 54.0–≤ 88.9	≥ 1.6–≤ 14.2		40				
	> 88.9–≤ 108.0	≥ 2.1–≤ 14.2	x ≥ 1,000	30				
Steel, stainless, cast	> 108.0–≤ 114.3	≥ 2.6–≤ 3.5		40		≥ 60		
	> 108.0–≤ 114.3	≥ 3.6–≤ 14.2		30		≥ 30		
	> 114.3–≤ 170.0	≥ 2.6–≤ 14.2		40		≥ 60		
	> 170.0–≤ 329.0	≥ 3.0–≤ 14.2	x ≥ 1,250	60	y ≥ 1,000			

<table>
<tr><th colspan="9">Measures on non-combustible pipes in ceilings on both sides of the insulation
Various path insulation items, MIW-MA protective insulation</th></tr>
<tr><td colspan="9">Path insulation "NH/Armaflex"</td></tr>
<tr><td rowspan="10">Copper, steel, stainless, cast</td><td rowspan="4">≤ 15.0</td><td>≥ 0.8</td><td>x ≥ 500</td><td>9–25</td><td rowspan="3">y ≥ 250</td><td rowspan="3">≥ 20</td><td rowspan="10">z = 125 (50 in the insulation/ 75 in front of the insulation)</td><td rowspan="10">1</td></tr>
<tr><td>≥ 1.2</td><td>x ≥ 750</td><td>26–50</td></tr>
<tr><td>≥ 1.2</td><td rowspan="2">x ≥ 1,000</td><td>51–57</td></tr>
<tr><td>≥ 2.0</td><td>58–89</td><td>y ≥ 500</td><td>≥ 40</td></tr>
<tr><td rowspan="3">> 15.0–≤ 28.0</td><td>≥ 1.0</td><td rowspan="2">x ≥ 750</td><td>9–25</td><td rowspan="3">y ≥ 250</td><td rowspan="3">≥ 20</td></tr>
<tr><td>≥ 1.2</td><td>26–50</td></tr>
<tr><td>≥ 1.5</td><td rowspan="2">x ≥ 1,000</td><td>51–57</td></tr>
<tr><td rowspan="3">> 28.0–≤ 42.0</td><td>≥ 2.0</td><td>58–89</td><td>y ≥ 500</td><td>≥ 40</td></tr>
<tr><td>≥ 1.2–≤ 14.2</td><td>x ≥ 750</td><td>10–50</td><td rowspan="2">y ≥ 250</td><td rowspan="2">≥ 20</td></tr>
<tr><td>≥ 1.5–≤ 14.2</td><td rowspan="2">x ≥ 1,000</td><td>51–57</td></tr>
<tr><td>≥ 2.0–≤ 14.2</td><td>58–89</td><td>y ≥ 500</td><td>≥ 40</td></tr>
<tr><td colspan="3">Non-combustible pipes</td><td colspan="2">Mineral fibre pipe shell/combustible insulation</td><td colspan="2">Protective insulation with MIW-MA insulation</td><td colspan="2">Fire protection bandage FSB-WB 1.5</td></tr>
<tr><td>Material type/ dimensions in mm</td><td>External pipe diameter</td><td>Pipe wall thickness</td><td>Insulation length x</td><td>Insulation thickness</td><td>Insulation length y</td><td>Insulation thickness</td><td>Width z</td><td>Number of layers</td></tr>
<tr><td colspan="9">Path insulation "NH/Armaflex"</td></tr>
<tr><td rowspan="4">Copper, steel, stainless, cast</td><td rowspan="2">> 42.0–≤ 54.0</td><td rowspan="2">≥ 1.5–≤ 14.2</td><td rowspan="5">x ≥ 1,000</td><td>25</td><td rowspan="2">y ≥ 250</td><td rowspan="2">≥ 20</td><td rowspan="5">z = 125 (50 in the insulation/ 75 in front of the insulation)</td><td rowspan="5">1</td></tr>
<tr><td>26–57</td></tr>
<tr><td>≥ 2.0–≤ 14.2</td><td>58–89</td><td rowspan="2">y ≥ 500</td><td rowspan="2">≥ 40</td></tr>
<tr><td>> 54.0–≤ 88.9</td><td>≥ 1.6–≤ 14.2</td><td>25–89</td></tr>
<tr><td>Steel, stainless, cast</td><td>> 88.9–≤ 170.0</td><td>≥ 1.6–≤ 14.2</td><td>50–89</td><td>y ≥ 750</td><td>≥ 60</td></tr>
<tr><td colspan="9">Path insulation "ProRox PS 960" (RS 880)</td></tr>
<tr><td rowspan="3">Copper, Steel, stainless, cast</td><td>≤ 22.0</td><td>≥ 1.0–≤ 11.0</td><td rowspan="4">x ≥ 2,000</td><td>≥ 30</td><td rowspan="4">y ≥ 500</td><td rowspan="4">≥ 30</td><td rowspan="4">-</td><td rowspan="4">-</td></tr>
<tr><td>> 22.0–≤ 54.0</td><td>≥ 1.5–≤ 14.2</td><td rowspan="3">≥ 40</td></tr>
<tr><td>> 54.0–≤ 88.9</td><td>≥ 2.0–≤ 14.2</td></tr>
<tr><td>Steel, stainless, cast</td><td>> 88.9–≤ 170.0</td><td>≥ 3.0–≤ 14.2</td></tr>
<tr><td colspan="9">*Insulation thicknesses and lengths are minimum sizes.
Mineral fibre pipe shells and/or mineral fibre mats with equal or higher values may be used.
** With protective insulation EI 120</td></tr>
</table>

Table 43: Measures on non-combustible pipes in ceilings with MIW-MA protective insulation

Measures on non-combustible pipes in **ceilings** on both sides of the insulation Various path insulation items, Armaflex Protect protective insulation								
Non-combustible pipes			Mineral fibre pipe shell/combustible insulation		Armaflex Protect protective insulation		Fire protection bandage FSB-WB 1.5	
Material type/ dimensions in mm	External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Insulation length y	Insulation thickness	Width z	Number of layers
Path insulation "NH/Armaflex"								
Copper	> 15.0	≥ 0.8	x ≥ 1,000	9–19	y = 250	13	-	-
		≥ 1.2		20–50		26 (2 x 13)	z = 125 (50 in the insulation/ 75 in front of the insulation)	1 + 25 mm overlap
	> 15.0–≤ 42.0			10–50				

Table 44: Measures on non-combustible pipes in ceilings with Armaflex Protect protective insulation

Ring gap and joint closure on non-combustible pipes		
Ring gap ≤ 4	Closure with workable ablation coating ASX	60 in the insulation (30 on either side, measured from the insulation surface)
Ring gap > 2–50	Closure with mineral wool MIW-S	

Table 45: Ring gap and joint closure on non-combustible pipes in ceilings

Measures on multi-layer composite pipes in **ceilings** on both sides of the insulation					
Dimensions in mm		Path insulation		Fire protection bandage	
External pipe diameter	Pipe wall thickness	Insulation length x	Insulation thickness	Width	Number of layers
Multi-layer composite pipes "HENCO STANDARD"		Path insulation for metal pipes MIW-MA*		-	
≤ 12 mm	1.6	x ≥ 250	≥ 20		
≤ 32 mm	3.0				
≤ 63 mm	4.5		≥ 30		
Multi-layer composite pipes "HENCO STANDARD"		"Armaflex Protect"			
≤ 12 mm	1.6	x 240	13		
≤ 32 mm	3.0		26 (2 x 13)		
≤ 63 mm	4.5				
Multi-layer composite pipes "HENCO STANDARD" with PE foam insulation		Path insulation for metal pipes MIW-MA*		Fire protection bandage FSB-WB BS	
≤ 14 mm	2.0	x ≥ 250	≥ 20	z = 100 (50 in the insulation/50 in front of the insulation)	1 + 25 mm overlap
≤ 32 mm	3.0				
* Insulation thicknesses and lengths are minimum sizes. Mineral fibre pipe shells and/or mineral fibre mats with equal or higher values may be used.					

Table 46: Measures on multi-layer composite pipes in ceilings

Ring gap and joint closure on multi-layer composite pipes		
Ring gap ≤ 4	Closure with workable ablation coating ASX	60 in the insulation (30 on either side, measured from the insulation surface)
Ring gap > 2–50	Closure with mineral wool MIW-S	

Table 47: Ring gap and joint closure on multi-layer composite pipes in ceilings

7.6.4 Measures on other pipes

Double solar pipes "NanoSUN²", HVAC split line combinations and "speed pipe" PE cables must be wound in and/or on both sides of the insulation with a Fire protection bandage. Ring gaps and joints must be closed off with mineral wool or ablation coating.

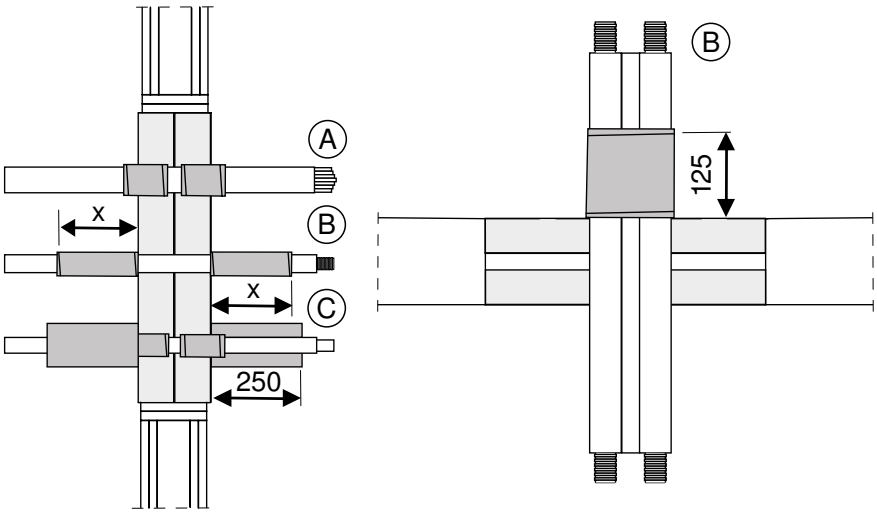


Fig. 33: Fire protection bandage on other pipes in walls and ceilings

Ⓐ PE cables "speed pipe"
Ⓑ Double solar pipes "NanoSUN²"
Ⓒ HVAC split line combinations

Measures on double solar pipes "NanoSUN²", HVAC split line combinations and "speed pipe" PE cables in **walls and ceilings** on both sides of the insulation					
Dimensions in mm	Protective insulation		Fire protection bandage		
External pipe diameter	Insulation length	Insulation thickness	Width	Number of layers	
"speed pipe" bundled or individually	**Only in walls**				
	-		FSB-WB 1.5		
Max. 24 units Ø ≤ 7			75 (50 in the insulation/ 25 in front of the insulation)	1	
Max. 7 units Ø ≤ 10					
Max. 5 units Ø ≤ 12					
"NanoSUN²"	**in walls**				
	Insulation MIW-MA*		FSB-WB 1.5		
DN 16 / DN 25	-		125 (125 in front of the insulation)	1 + 25 mm overlap	
DN 40 (EI 60)					
DN 40 (EI 120)	250	30			
"NanoSUN²"	**Ceilings, only top side**				
	Insulation MIW-MA*		FSB-WB 1.5		
≤ DN 40	-	-	In front of the insulation 125 mm	1 + 25 mm overlap	2 x fixing with steel wire

Measures on double solar pipes "NanoSUN²", HVAC split line combinations and "speed pipe" PE cables in **walls and ceilings** on both sides of the insulation				
HVAC split line combinations	**Only in walls**			
	Insulation MIW-MA*		FSB-WB 1.5	
6.0 mm–22.0 mm	250	30	75 (50 in the insulation/ 25 in front of the insulation)	1
* Insulation thicknesses and lengths are minimum sizes. Mineral fibre pipe shells and/or mineral fibre mats with equal or higher values may be used.				

Table 48: Measures on other pipes in walls and ceilings

8 Four-layer insulation design

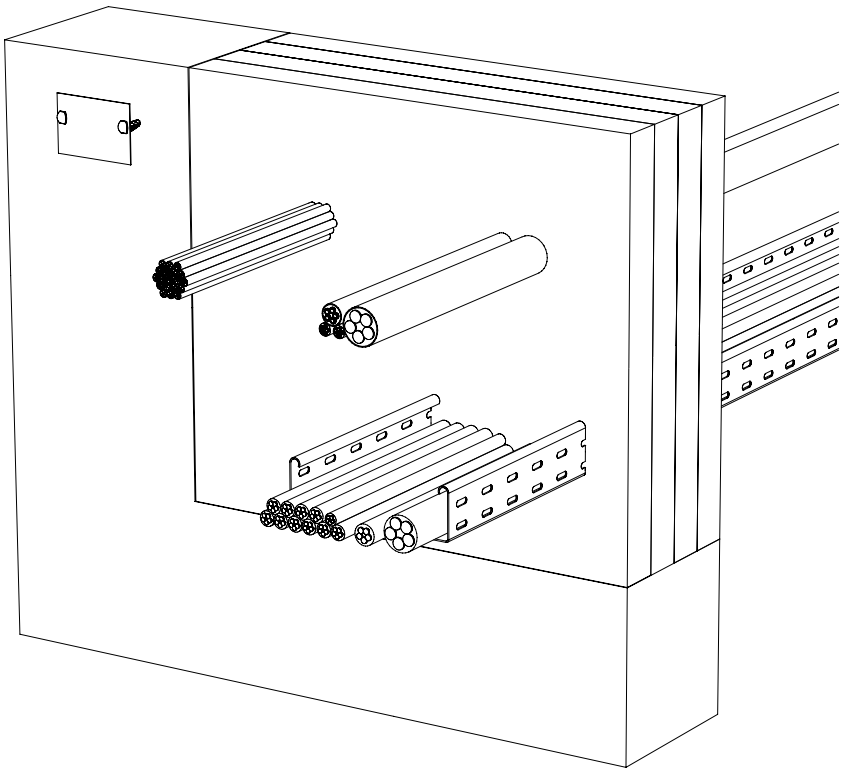


Fig. 34: Installation in four-layer insulation

8.1 Approved installations

The following installations are approved in the four-layer design of the PYROPLATE® Fibre insulation system.

8.1.1 Cables and cable support systems

Note! *The total cross-sectional area of the installations, relative to the insulation area, may not be more than 60%.*

Cables

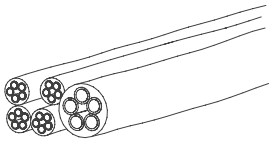
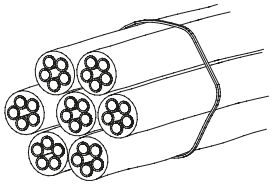
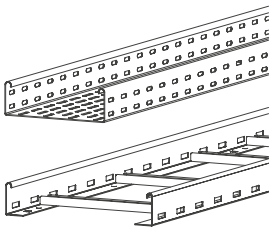
	All kinds of electrical cables except for fibre optic conductors, total conductor diameter of the individual cables ≤ 80 mm
Cable bundle	
	Total bundle diameter ≤ 100 mm made up of individual cables of external diameter ≤ 21 mm No spandrel filling is required for tightly packed, tied cable bundles
Cable support systems	
	Cable trays and cable ladders made of steel, with organic coatings if the fire behaviour corresponds to at least A2 according to EN 13501-1

Fig. 35: Approved cables in four-layer insulation

8.2 Fire resistance classes

Various fire resistance classes can be achieved with the four-layer insulation from the PYROPLATE® Fibre insulation system according to classification reports nos. 1858.1/12/Z00NP and 2163/11/Z00NP. The possible fire resistance classes are aligned according to the installation and the component. Installation may only be performed in solid walls of a thickness ≥ 240 mm or solid walls with a thickness ≥ 200 mm.

Fire resistance classes in walls and ceilings														
Installations	Component													
	Solid walls ≥ 240 mm							Solid ceilings ≥ 200 mm						
	EI 30	EI 45	EI 60	EI 90	EI 120	EI 240	E 240	EI 30	EI 45	EI 60	EI 90	EI 120	EI 240	E 240
Cables on cable routes or without cable routes with Fire protection bandage FSB-WB 1.5														
Cables, Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cable bundles, Ø ≤ 100 mm Made of cables Ø ≤ 21 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cable support systems	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cables, Ø > 21 mm to ≤ 80 mm	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 49: Fire resistance classes with four-layer insulation design

8.3 Minimum distances between installations

To guarantee the functionality of the PYROPLATE® Fibre insulation system, minimum distances between installations in solid walls and ceilings installations in solid walls and ceilings must be taken into account.

Cables, cable bundles or cable support systems

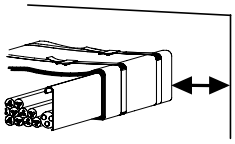
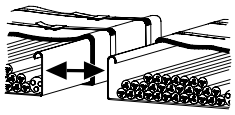
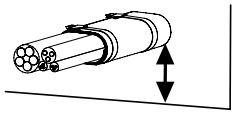
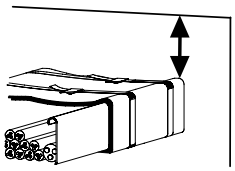
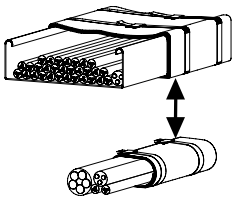
Cables/cable bundles/cable support systems with Fire protection bandage FSB-WB 1.5		mm
	Side distance to component layer	≥ 20
	Distance between adjacent cable support systems	≥ 10
	Lower/rear distance to component layer	≥ 0
	Top/front distance to component layer	≥ 20
	Distance in walls	≥ 80
	In ceilings	≥ 40

Table 50: Distances of cables, cable bundles, cable support systems in solid walls and ceilings

8.4 First support in walls

Installations must be supported in order to avoid overloading the insulation in case of fire.

The supports of the cables, cable bundles and cable support systems must be non-combustible (material class DIN 4102-A).

The distance x may be a maximum of 100 mm to the insulation surface.

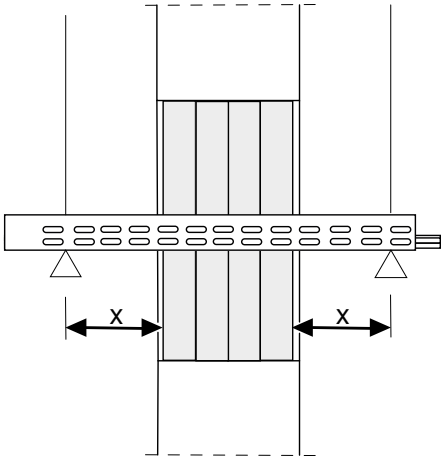


Fig. 36: Maximum distance for supports

8.5 Arrangement of the insulation

To ensure the functionality of the PYROPLATE® Fibre insulation system, the PSX-P60 mineral fibre plates must be arranged as following in the four-layer insulation:

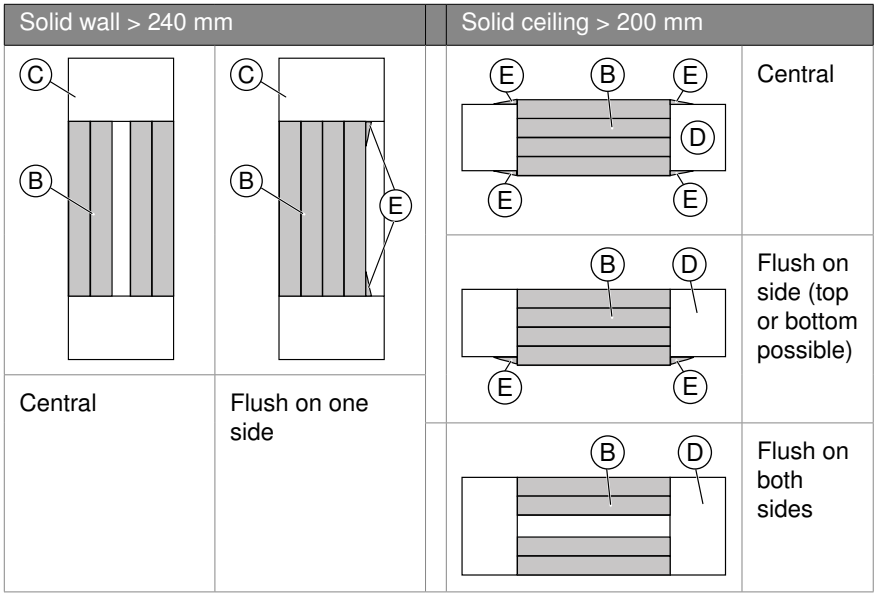


Fig. 37: Insulation arrangement, solid wall and solid ceiling (cut-away diagram)

Ⓑ Mineral fibre plate PSX-P60
Ⓒ Solid wall
Ⓓ Solid ceiling
Ⓔ Round joint

If the insulation does not end flush with the layer, then a round joint must be created between the insulation surface and the layer using workable ASX ablation coating.

8.6 Measures on installations

To ensure the functionality of the PYROPLATE® Fibre insulation system, the installations in the four-layer insulation must be wound and coated. Ring gaps and joints must be closed off with mineral wool or ablation coating.

8.6.1 Measures on cables, cable bundles, cable support systems in walls and ceilings

Cables, cable bundles and cable support systems must be wound on both sides of the insulation with the Fire protection bandage FSB-WB 1.5 and coated with ablation coating. The Fire protection bandage must be fixed before coating.

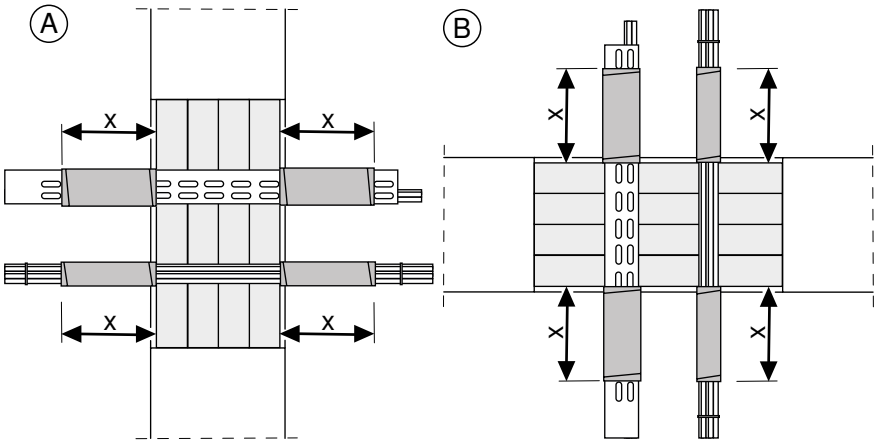


Fig. 38: Fire protection bandage on cables in wall Ⓐ and ceiling Ⓑ

Measures on cables, cable bundles, cable support systems in **walls and ceilings**						
Dimensions in mm	Measure	Coil width	x = length in front of the insulation surface	Number of layers	Overlap	Quanti-ty Fixings with steel wire
Cables, cable bundles, cable support systems						
Cable diameter ≤ 21	Winding with Fire protecti-on bandage FSB-WB 1.5	500	x = 500	2	2 At 150 mm and 300 mm measured from the insulation surface	
Cable bundle Ø ≤ 100 with Cable diameter ≤ 21						
Cable support systems						
Cable diameter > 21–≤ 80						

Table 51: Measures on cables, cable bundles, cable support systems

9 Maintenance

The PYROPLATE® Fibre soft insulation is maintenance-free. Nonetheless, we recommend carrying out a visual inspection of the insulation at regular intervals, as part of the inspection of the electrical systems.

– Check that all the component parts of the insulation are tightly sealed.
– Reseal any joints or gaps with spreadable ASX ablation coating.

10 Disposal

National laws and regulations must be observed for disposal.

Disposal during mounting

– Residual material and packaging of the PYROPLATE® Fibre system components must be disposed of mixed construction waste.

Disposal during building demolition

– Installed PYROPLATE® Fibre materials must be disposed of as a mixed construction waste.

Disposal after a fire

CAUTION

Caution: Irritant effect!
If there is a fire, burning cable insulation can create corrosive gases, which have an irritant and corrosive effect. When disposing of duct sections which have been subjected to a fire, wear breathing protection and protective clothing.

If the components of the PYROPLATE® Fibre system or other parts of the fire insulation have been subjected to fire damage, then the complete insulation must be removed and disposed of. We recommend obtaining the advice of the local fire damage restorer during disposal.

11 Appendix

11.1 Tested ETA products

OBO product	Product properties
Mineral fibre plate PSX-P60	Density ≥ 150 kg / m³ Fire behaviour class A1 acc. to EN 13501:1 Melting point ≥ 1,000 °C. (TR10) Tensile strength, vertical to plate level ≥ 10 kPa according to EN1607 Thickness = 60 mm
Ablation coating ASX-E (bucket)	Class of fire behaviour according to EN 13501-1: Class E
Ablation coating ASX-K (cartridge)	Class of fire behaviour according to EN 13501-1: Class E
Fire protection bandage FSB-WB 1.5	Class of fire behaviour according to EN 13501-1: Class E Insulation forming material for winding cables and pipes
Fire protection bandage FSB-WB BS	Class of fire behaviour according to EN 13501-1: Class E Insulation forming material for winding cables and pipes
Path insulation for metal pipes MIW-MA	Class of fire behaviour according to EN 13501-1: A1 Melting point ≥ 1,000 °C
Mineral wool MIW-S	Class of fire behaviour according to EN 13501-1: A1 Melting point ≥ 1,000 °C

Table 52: Usable OBO products

12 Appendix – declaration of conformity (sample)

Insulation system according to DIN EN 1366 Part 3

Name and address of the company which erected the cable insulation

Building site or building with address

Required fire resistance class

Date of erection

This is confirmation that

– The cable/combination insulation "PYROPLATE® Fibre mineral fibre plate", fire resistance classes to EI 120 according to EN 1366-3, European Approval Number of the OIB: ETA-17/0364 for installation in walls and ceilings up to a fire resistance class of 120 minutes was correctly created and installed as well as labelled according to all the individual requirements and in compliance with all the requirements of the named proof of usability and

– The building products used to produce the object of the approval (e.g. insulation compounds, mineral fibre plates, frames, etc.) were labelled according to the requirements of the proof of usability.

Place, date Stamp and signature

This confirmation must be given to the builder for forwarding, if necessary, to the responsible construction supervisory board.

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