protect your values

PYRO-SAFE Flammotect – single layer

Installation instructions

Mixed penetration sealing system made of one mineral-fibre board (60 mm) and an ablative coating for electrical cables of any type, and for combustible and non-combustible pipes.
Fire resistance class maximum EI 90 compliant with EN 13501-2 in accordance with ETA-14/0418.

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PYRO-SAFE Flammotect – single layer

Table of contents

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1. Preliminary remarks / Overview

1.1 Target group

• The installation instructions are intended solely for personnel trained in fire protection.

1.1 Use of the instructions

• Read through these installation in their entirety before beginning work. Pay particular attention to the following safety instructions.

• The authorisation holder assumes no liability for damage caused by failure to comply with these instructions.

• Figures appear as examples only. Your installation results may differ in appearance.

1.1 Safety instructions

Refer to the safety data sheets when processing the fire protection compounds

Personal protective equipment:

In case of short-term or low-level exposure: P2 particle filter.
In case of intensive or long-term exposure: use self-contained breathing apparatus.
Only use respirators that comply with international/national standards.

Hand protection
Use chemicals-resistant protective gloves.
Recommended material: butyl rubber, nitrile rubber, fluoro rubber, PVC

Eye protection
Use protective goggles, wrap-around glasses.

Body protection
Wear industrial protective clothing and non-slip shoes.

Safety instructions for the installation of floor penetration seals:

• The area below the floor penetration seal must be cordoned off while work on the penetration seal is underway (warning tape, or sign: danger - falling objects; keep off this area; sealing work underway in the floor above!

• The company that is commissioned to install the floor penetration seals shall provide the client with written information (to be passed on to the owner or his authorised representative), pointing out that fire-resistant penetration seals in floors must be provided on site with adequate protection (e.g. barriers), or covered with grating to prevent them from being walked on after installation.

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PYRO-SAFE Flammotect – single layer

1.2 Scope

The PYRO-SAFE Flammotect - single layer mixed penetration sealing system in wall and floor openings is assessed and evaluated in accordance with ETAG 026-2 regarding the features „Reaction to fire“, „fire resistance“, „release of dangerous substances“ and „durability and serviceability“ .

Reaction to fire

The ablative „PYRO-SAFE FLAMMOTECT-A“ component is classified as E in accordance with EN 13501-1; the intumescent „PYRO-SAFE DG-CR“ material is classified as B-s1,d0 in accordance with EN 13501-1; the mineral-fibre boards are classified as A1 and the mineral-fibre mats are classified as A2-s1,d0 in accordance with EN 13501-1.

Fire resistance

PYRO-SAFE Flammotect - single layer complies with requirements of max class EI 90 (extension -U/U for plastic pipes; extension -C/U for metal pipes) in accordance with EN 13501-2.
The fire resistance class for plastic pipes EI 90 -U/U also covers all other possible endings in accordance with EN 13501-2. The fire resistance class EI 90 -C/U for metal pipes also covers the class for the same fire resistance time with extension -C/C.
When installed in walls/floors with a lower fire resistance time, the fire resistance time of the penetration seal is also reduced to the fire resistance class of the wall or floor.

Release of dangerous substances

The ablative “PYRO-SAFE FLAMMOTECT-A“ component and the intumescent “PYRO-SAFE DG-CR“ fabric do not contain any substances identified as dangerous in the list of the European Commission.
The mineral-fibre board; the mineral-fibre mat and the loose mineral-fibre wool do not contain any dangerous substances listed in Directive 67/548/EC or Regulation (EC) No. 1272/2008 or the Indicative List on Dangerous Substances.

Durability and serviceability

The ablative „PYRO-SAFE FLAMMOTECT-A“ component and the intumescent „PYRO-SAFE DG-CR“ fulfills the type X in accordance with EOTA TR 024.
PYRO-SAFE Flammotect - single layer system can be subjected to the conditions of inside rooms with and without exposure to moisture or atmospheric conditions, without substanial changes to the fire protection characteristics being expected.

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PYRO-SAFE Flammotect – single layer

1.2 Structural elements

Plasterboard walls with steel frame

In studworks and double-sided lining with at least
2 layers of 12.5 mm thick cement or gypsum-based building slabs with a fire performance of Class A1 or A2 in accordance with EN 13501-1.
The wall structure shall be complemented by additional wall struts and bars to form the edge of the opening.

The walls must be classified with the required fire resistance rating in accordance with EN 13501-2.

Plasterboard walls with wood frame

In studworks and double-sided lining with at least 2 layers of 12.5 mm thick cement or gypsum-based building slabs with a fire performance of Class A1 or A2 in accordance with EN 13501-1.

The distance from the opening to the struts and bars shall be ≥ 100 mm and the hollow spaces between the linings of the wall, the struts and bars as well as the opening edge shall be stuffed down to a depth of ≥ 100 mm with mineral-wool, fire resistance Class A1 or A2 in accordance with EN 13501 -1.
The walls shall be classified with the required fire resistance rating in accordance with EN 13501-2.

Solid walls

made of masonry, concrete, reinforced concrete, aerated concrete, ceramic bricks, cellular bricks or honeycomb bricks with a density ≥ 450 kg/m³.
The walls shall be classified for the desired fire resistance time in accordance with EN 13501-2.

Solid floors

made of concrete, reinforced concrete, with a density ≥ 2.200 (±500) kg/m³. The floors shall be classified for the required fire resistance time in accordance with EN 13501-2.

Lining of opening edge for plasterboard

Alongside the opening edge, there shall be at least a 12.5 mm thick layer of concrete or gypsum based slabs with a fire reaction class A1 or A2 according to EN 13501-1.

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PYRO-SAFE Flammotect – single layer

1.3 Fire resistance classes

Fire resistance classes					
	Measures	Wall		Floor	
		Fire resistance class	Source*	Fire resistance class	Source*
Cables, cable bundles and cable trays with coating „PYRO-SAFE FLAMMOTECT-A“					
Cables Ø ≤ 21 mm without cable tray through drill holes	≥ 100 mm x ≥ 0.75 mm dry film thickness	-		EI 90	2
Cables Ø ≤ 21 mm	≥ 100 mm x ≥ 0.75 mm dry film thickness	EI 60 / E 90	1, 2	EI 60 / E 90	2
Cables Ø > 21 mm to ≤ 50 mm	≥ 150 mm x ≥ 1.00 mm dry film thickness	EI 60 / E 90	1, 2	EI 60 / E 90	2
Cables Ø > 50 mm to ≤ 80 mm	≥ 150 mm x ≥ 1.00 mm dry film thickness	EI 60 / E 90	1, 2	EI 60 / E 90	2
Cable bundles Ø ≤ 100 mm	≥ 100 mm x ≥ 0.75 mm dry film thickness	EI 60 / E 90	1, 2	EI 60 / E 90	2
Cable bundles Ø ≤ 100 mm	≥ 150 mm x ≥ 1.00 mm dry film thickness	EI 90	1, 2	EI 60	1
Cables, cable bundles and cable trays with fire protection wrap „PYRO-SAFE DG-CR 1.5“ – Wrap width = 125 mm					
Cables Ø ≤ 21 mm without cable tray through drill holes	2 x 1-layer, ≥ 45 mm overlapping	EI 90	2	EI 90	2
Cables Ø ≤ 21 mm	2 x 1-layer, ≥ 45 mm overlapping	EI 60 / E 90	1, 2	EI 60 / E 90	2
Cables Ø > 21 mm to ≤ 50 mm	2 x 1-layer, ≥ 45 mm overlapping	EI 60 / E 90	1, 2	EI 60 / E 90	2
Cables Ø > 50 mm to ≤ 80 mm	2 x 1-layer, ≥ 45 mm overlapping	EI 60 / E 90	1, 2	EI 60 / E 90	2
Cable bundles Ø ≤ 100 mm	2 x 1-layer, ≥ 45 mm overlapping	EI 60 / E 90	1, 2	EI 60 / E 90	2
Electrical installation conduits (conduits) with fire protection wrap „PYRO-SAFE DG-CR 1.5“ – Wrap width = 125 mm					
made of plastic Ø ≤ 32 mm single or bundled up to Ø ≤ 100 mm, with or w/o cables (Ø ≤ 21 mm)	2 x 2-layer	EI 60 / E 90 U/U	2	EI 90 U/U	2
„speed pipe“ bundled or single pipes, with or w/o glass fibre or micro cables; with fire protection wrap „PYRO-SAFE DG-CR 1.5“ – Wrap width = 125 mm					
max. 24 pcs. outside pipe-Ø ≤ 7 max. 7 pcs. outside pipe-Ø ≤ 10 max. 5 pcs. outside pipe-Ø ≤ 12	Wall: 2 x 1-layer, 125 mm Floor: 1 x 2-layer, 125 mm	EI 60 / E 90 U/U	1	EI 60 U/U	1
Combustible pipes made of PVC-U, PVC-C in accordance with EN ISO 15493, EN ISO 1452 and DIN 8061/8062 with intumescent wrap “PYRO-SAFE DG-CR BS” – Wrap width = 100 mm					
Outside pipe-Ø ≤ 50.0 mm	1 x 1-layer	EI 90 U/U	2	EI 90 U/U	2
Outside pipe-Ø ≤ 70.0 mm	1 x 2-layer	EI 60 / E 90 U/U	2	EI 45 / E 90 U/U	2
Outside pipe-Ø ≤ 90.0 mm	1 x 3-layer	EI 60 / E 90 U/U	2	EI 45 / E 90 U/U	2
Outside pipe-Ø ≤ 110.0 mm	1 x 4-layer	EI 60 / E 90 U/U	2	EI 45 / E 90 U/U	2
Combustible pipes made of PE-100 with intumescent wrap “PYRO-SAFE DG-CR BS” – Wrap width = 100 mm					
Outside pipe-Ø ≤ 50.0 mm	1 x 1-layer	EI 90 U/U	2	EI 90 U/U	2
Outside pipe-Ø ≤ 70.0 mm	1 x 2-layer	EI 60 / E 90 U/U	2	EI 60 / E 90 U/U	2
Outside pipe-Ø ≤ 90.0 mm	1 x 3-layer	EI 60 / E 90 U/U	2	EI 60 / E 90 U/U	2
Outside pipe-Ø ≤ 110.0 mm	1 x 4-layer	EI 60 / E 90 U/U	2	EI 60 / E 90 U/U	2
Combustible pipes made of PP-H with intumescent wrap “PYRO-SAFE DG-CR BS” – Wrap width = 100 mm					
Outside pipe-Ø ≤ 50.0 mm	1 x 1-layer	EI 90 U/U	2	EI 90 U/U	2
Outside pipe-Ø ≤ 70.0 mm	1 x 2-layer	EI 60 / E 90 U/U	2	EI 90 U/U	2
Outside pipe-Ø ≤ 90.0 mm	1 x 3-layer	EI 60 / E 90 U/U	2	EI 90 U/U	2
Outside pipe-Ø ≤ 110.0 mm	1 x 4-layer	EI 60 / E 90 U/U	2	EI 90 U/U	2

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PYRO-SAFE Flammotect – single layer

Fire resistance classes

	Measures	Wall		Floor	
		Fire resistance class	Source*	Fire resistance class	Source*
Multi-layer composite pipes „Henco-Pipes“ with non-combustible insulation made of mineral-fibre „lamella mat“					
Outside pipe-Ø ≤ 12.0 mm, wall thickn. ≥ 1.6 mm	≥ 250 mm x ≥ 20 mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Outside pipe-Ø ≤ 32.0 mm, wall thickn. ≥ 3.0 mm	≥ 250 mm x ≥ 20 mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Outside pipe-Ø ≤ 63.0 mm, wall thickn. ≥ 4.5 mm	≥ 250 mm x ≥ 30 mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Multi-layer composite pipes „Henco-Pipes“ with combustible insulation made of FEF „Armaflex Protect“					
Outside pipe-Ø ≤ 12.0 mm, wall thickn. ≥ 1.6 mm	≥ 240 mm x 13 mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Outside pipe-Ø ≤ 32.0 mm, wall thickn. ≥ 3.0 mm	≥ 240 mm x 13 mm	**EI 90 U/C**	2	**EI 90 U/C**	2
Outside pipe-Ø ≤ 63.0 mm, wall thickn. ≥ 4.5 mm	≥ 240 mm x 26 (2 x 13) mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Multi-layer composite pipes „Henco-Pipes“ with PE-foam insulation and intumescent wrap “PYRO-SAFE DG-CR BS” – Wrap width = 100 mm					
Outside pipe-Ø ≤ 14.0 mm, 6 mm PE-foam, wall thickn. ≥ 2.0 mm	1 x 1-layer, ≥ 25 mm overlapping + Lamella mat ≥ 250 mm x ≥ 20 mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Outside pipe-Ø ≤ 26.0 mm, 6 - 13 mm PE-foam, wall thickn. ≥ 3.0 mm	1 x 1-layer, ≥ 25 mm overlapping + lamella mat ≥ 250 mm x ≥ 20 mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Outside pipe-Ø ≤ 32.0 mm, 6 - 10 mm PE-foam wall thickn. ≥ 3.0 mm	1 x 1-layer, ≥ 25 mm overlapping + lamella mat ≥ 250 mm x ≥ 20 mm	**EI 30 U/C**	2	**EI 90 U/C**	2
Multi-layer composite pipes „Uponor MLC pipe white S“					
Outside pipe-Ø ≤ 110.0 mm, wall thickn. = 10.0 mm	Lamella mat ≥ 250 mm x ≥ 30 mm	-		**EI 60 / E 90 U/C**	2
	Armaflex Protect ≥ 240 mm x 26 mm	-		**EI 60 U/C**	2
Non-combustible pipes made of copper, steel, stainless steel or cast iron with non-combustible insulation made of mineral-fibre „lamella mat“					
Outside pipe-Ø ≤ 15.0 mm, wall thickn. ≥ 0.8	≥ 250 mm x ≥ 20 mm	**EI 60 / E 90 C/U**	1	**EI 60 C/U**	1
Outside pipe-Ø ≤ 22.0 mm, wall thickn. ≥ 1.0	≥ 250 mm x ≥ 60 mm	**EI 60 / E 90 C/U**	1	**EI 60 C/U**	1
Outside pipe-Ø ≤ 22.0 mm, wall thickn. ≥ 1.0	≥ 500 mm x ≥ 20 mm	**EI 60 / E 90 C/U**	1	**EI 60 C/U**	1
Outside pipe-Ø ≤ 54.0 mm, wall thickn. ≥ 1.5	≥ 500 mm x ≥ 30 mm	**EI 60 / E 90 C/U**	1	**EI 60 C/U**	1
Outside pipe-Ø ≤ 88.9 mm, wall thickn. ≥ 2.0	≥ 800 mm x ≥ 40 mm	**EI 60 / E 90 C/U**	1	**EI 60 C/U**	1
Non-combustible pipes made of steel, stainless steel or cast iron with non-combustible insulation made of mineral-fibre „lamella mat“					
Outside pipe-Ø ≤ 88.9 mm, wall thickn. ≥ 2.0	≥ 800 mm x ≥ 40 mm	**EI 90 C/U**	1	**EI 60 C/U**	1
Outside pipe-Ø ≤ 114.3 mm, wall thickn. ≥ 3.6	≥ 500 mm x ≥ 40 mm	**EI 60 / E 90 C/U**	1	**EI 60 C/U**	1
Outside pipe-Ø ≤ 170.0 mm, wall thickn. ≥ 3.0	≥ 800 mm x ≥ 60 mm + ≥ 500 mm x ≥ 30 mm	**EI 60 C/U**	1	**EI 60 C/U**	
Outside pipe-Ø ≤ 219.1 mm, wall thickn. ≥ 5.0	≥ 800 mm x ≥ 60 mm + ≥ 500 mm x ≥ 30 mm	**EI 60 / E 90 C/U**	1	**EI 60 C/U**	1

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PYRO-SAFE Flammotect – single layer

Fire resistance classes

	Measures	Wall		Floor	
		Fire resistance class	Source*	Fire resistance class	Source*
Non-combustible pipes made of copper, steel, stainless steel or cast iron with combustible insulation „NH/Armaflex“ and fire protection wrap „PYRO-SAFE DG-CR 1.5“ – Wrap width = 125 mm					
Outside pipe-Ø ≤ 15.0 mm; wall thickness ≥ 0.8 mm					
Insulation thickness 13 - 24 mm	2 x 2-layer	**EI 60 / E 90 C/U**	2	-	
Insulation thickness 25 mm	2 x 2-layer	**EI 90 C/U**	2	-	
Insulation thickness 13 - 19 mm	2 x 2-layer	-		**EI 90 C/U**	2
Insulation thickness 19 - 25 mm	1 x 2-layer	-		**EI 60 / E 90 C/U**	2
Outside pipe-Ø ≤ 28.0 mm; wall thickness ≥ 1.0 mm					
Insulation thickness 19 - 24 mm	2 x 2-layer	**EI 60 / E 90 C/U**	2	-	
Insulation thickness 25 mm	2 x 2-layer	**EI 90 C/U**	2	-	
Insulation thickness 13 - 30 mm	2 x 1-layer, + lamella mat ≥ 250 mm x ≥ 20 mm	**EI 90 C/U**	2	-	
Insulation thickness 19 - 25 mm	2 x 2-layer	-		**EI 90 C/U**	2
Insulation thickness 25 mm	1 x 2-layer	-		**EI 60 / E 90 C/U**	2
Outside pipe-Ø ≤ 42.0 mm; wall thickness ≥ 1.2 mm					
Insulation thickness 25 - 43 mm	2 x 2-layer	**EI 60 / E 90 C/U**	2	-	
Insulation thickness 44 mm	2 x 2-layer	**EI 90 C/U**	2	-	
Insulation thickness 25 mm	2 x 2-layer	-		**EI 90 C/U**	2
Insulation thickness 25 - 44 mm	1 x 2-layer	-		**EI 60 / E 90 C/U**	2
Outside pipe-Ø ≤ 54.0 mm; wall thickness ≥ 1.5 mm					
Insulation thickness 29 - 57 mm	2 x 1-layer, + lamella mat ≥ 500 mm x ≥ 30 mm	**EI 90 C/U**	2	-	
Insulation thickness 28 - 57 mm	1 x 1-layer, + lamella mat ≥ 500 mm x ≥ 30 mm	-		**EI 90 C/U**	2
Outside pipe-Ø ≤ 88.9 mm; wall thickness ≥ 2.0 mm					
Insulation thickness 25 - 89 mm	2 x 2-layer, + lamella mat ≥ 500 mm x ≥ 30 mm	**EI 90 C/U**	2	-	
Insulation thickness 25 - 88 mm	1 x 2-layer, + lamella mat ≥ 500 mm x ≥ 40 mm	-		**EI 90 C/U**	2
Insulation thickness 89 mm	1 x 2-layer, + lamella mat ≥ 500 mm x ≥ 30 mm	-		**EI 90 C/U**	2
Outside pipe-Ø ≤ 108.0 mm; wall thickness ≥ 2.5 mm					
Insulation thickness 57 mm	2 x 2-layer, + lamella mat ≥ 750 mm x ≥ 40 mm	**EI 90 C/U**	2	-	
Insulation thickness 57 mm	1 x 2-layer, + lamella mat ≥ 1000 mm x ≥ 40 mm	-		**EI 90 C/U**	2
Insulation thickness 58 - 89 mm	1 x 2-layer, + lamella mat ≥ 1000 mm x ≥ 40 mm	-		**EI 60 C/U**	2
Non-combustible pipes made of steel, stainless steel or cast iron with combustible insulation „NH/Armaflex“ and fire protection wrap „PYRO-SAFE DG-CR 1.5“ – Wrap width = 125 mm					
Outside pipe-Ø ≤ 170.0 mm, RWD ≥ 2.9 mm					
Insulation thickness 25 mm	2 x 2-layer, + lamella mat ≥ 750 mm x ≥ 40 mm	**EI 60 / E 90 C/U**	2	-	
Insulation thickness 25 mm	1 x 2-layer, + lamella mat ≥ 1000 mm x ≥ 40 mm	-		**EI 90 C/U**	2
Insulation thickness 26 - 85 mm	1 x 2-layer, + lamella mat ≥ 1000 mm x ≥ 40 mm	-		**EI 60 C/U**	2

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1 → 1913.2/13/Z00NP 2 → KB 00924.1/15/Z00NP/e

Test case LS walll:
≥ 500 / ≥ 500 – Outside pipe-Ø ≤ 28.0 mm
≥ 750 / ≥ 750 – Outside pipe-Ø ≤ 42.0 mm
≥ 1000 / ≥ 1000 – Outside pipe-Ø > 42.0 mm

Test case LS floor:
≥ 350 / ≥ 1000 – Outside pipe-Ø ≤ 88.9 mm
≥ 1000 / ≥ 1000 – Outside pipe-Ø > 88.9 mm

Insulation length per side, in floors insulation length under/above parition.

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PYRO-SAFE Flammotect – single layer

Fire resistance classes

	Measures	Wall		Floor	
		Fire resistance class	Source*	Fire resistance class	Source*
Non-combustible pipes made of copper, steel, stainless steel or cast iron with combustible insulation „Armaflex Protect“					
Outside pipe-Ø ≤ 88.9 mm, wall thickn. ≥ 0.8 mm	-	**EI 60 / E 90 C/U**	1	**EI 60 / E 90 C/U**	1
Non-combustible pipes made of steel, stainless steel or cast iron with combustible insulation„Armaflex Protect“					
Outside pipe-Ø ≤ 170.0 mm, wall thickn. ≥ 3.0 mm	-	**EI 90 C/U**	1	**EI 60 / E 90 C/U**	1
HVAC split line combinations with fire protection wrap “PYRO-SAFE DG-CR 1.5“– Wrap width = 125 mm					
Pipe-Ø 6/10 mm or Ø 6-10, 9 mm PE-foam, 1 pipe PVC-U Ø ≤ 25.0 mm, Wall thickn. 1.8-3.5 mm, 2 cables Ø ≤ 14.0 mm	2 x 2-layer	**EI 60 / E 90**	1	**EI 45 / E 60**	1
Pipe-Ø 22/22 mm or Ø 6-22, 9 mm PE-foam, 1 pipe PVC-U Ø ≤ 25.0 mm, Wall thickn. 1.8 mm, 4 cables Ø ≤ 21.0 mm	1 x 2-layer + lamella mat ≥ 250 mm x ≥ 30 mm	**EI 30**	2	**EI 90**	2
Double solar pipes „NanoSUN²“ with fire protection wrap „PYRO-SAFE DG-CR 1.5“– Wrap width = 125 mm					
DN16	2 x 1-layer, ≥ 25 mm overlapping	**EI 90 U/U**	1	**EI 60 U/U**	1
DN40	2 x 1-layer, ≥ 25 mm overlapping	**EI 30 / E 90 U/U**	1	**EI 60 U/U**	1

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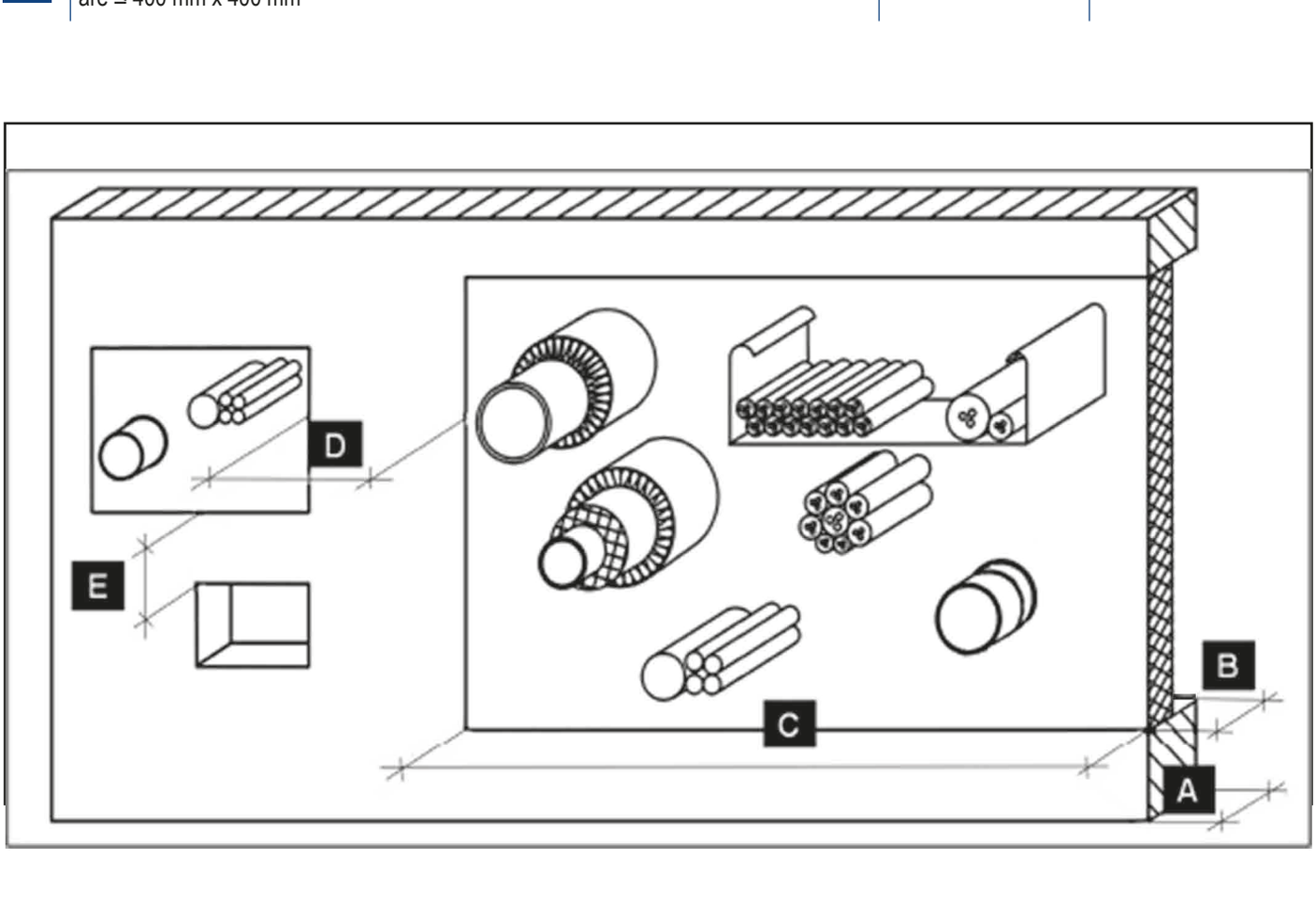
1.4 Field of application (Dimensions)

Dimensions			
Pos.	**Legend**	**Wall [mm]**	**Floor [mm]**
A	Thickness of structural element	≥ 100	≥ 125
B	Thickness of penetration seal	60	60
C	Maximum dimensions of the opening (width x height)	1.175 x 1.200	1.200 x 2.400 or 800 x ∞
D	Distance from other openings or installations	≥ 200	≥ 200
E	Reduced distance from neighbouring openings for penetration seals, if both openings are ≤ 400 mm x 400 mm	≥ 100	≥ 100



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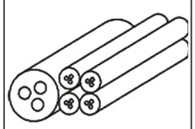
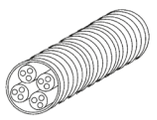
PYRO-SAFE Flammotect – single layer

2. Allowed services

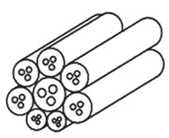
2.1 Allowed services – cables



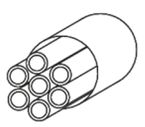
Electrical cables and lines of all types (including optical fibre cables)
overall cross-section of individual cable up to Ø ≤ 80 mm



Electrical installation conduits (conduits)
made of plastic single (Ø ≤ 32 mm) or bundled up to Ø ≤ 100 mm, with or w/o cables (Ø ≤ 21 mm).

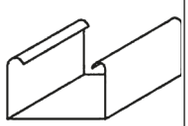


Cable bundles
up to Ø ≤ 100 mm with cable up to Ø ≤ 21 mm. No filling needed for tightly compressed and tied bundles.



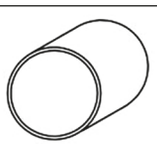
PE lines“speed pipes” (for glass fibre cables and micro-cables)
Single cables or bundles with or w/o glass fibre cable by Gabocom Systemtechnik GmbH.

Outside pipe-Ø [mm]	Max. qty. [pcs.]	Thickness of pipe wall [mm]
≤ 7	24	≤ 1.5
≤ 10	7	≤ 2.0
≤ 12	5	≤ 2.0



Cable supports
Cable ducts and trays made of steel, with organic coating if applicable, as long as the fire reaction class complies at least with class A2 according to EN 13501-1.

2.2 Allowed services – combustible pipes



Combustible pipes
with fire protection wrap PYRO-SAFE DG-CR BS up to an outside-Ø ≤ 110 mm

Ventilated sewer pipes and closed piping systems. Circulation of non-combustible liquids and gases allowed (except ventilation lines).

PVC-U, PVC-C		PP-H		PE 100	
Norms: EN 1329-1, EN 1453-1, EN 1542-1, EN 15493, DIN 8061/8062, EN 1566-1		Norms: EN 1555-2, EN 12201-2+A1, DIN 8074/8075, EN 15874, DIN 8077/8078		Norms: EN 1555-2, EN 12201-2+A1 and DIN 8074/8075	
Outside pipe-Ø [mm]	Wall thickness [mm]	Outside pipe-Ø [mm]	Wall thickness [mm]	Outside pipe-Ø [mm]	Wall thickness [mm]
≤ 50	1.8 - 3.7	≤ 50	1.8 - 4.6	≤ 50	1.8 - 4.6
> 50 - ≤ 70	1.9/2.0 - 5.2	> 50 - ≤ 70	2.0/2.1 - 5.2	> 50 - ≤ 70	2.0/2.1 - 6.4
> 70 - ≤ 90	2.0/2.1 - 6.7	> 70 - ≤ 90	2.3/2.4 - 5.8	> 70 - ≤ 90	2.3/2.4 - 8.2
> 90 - ≤ 110	2.2 - 8.2	> 90 - ≤ 110	2.6/2.7 - 6.3	> 90 - ≤ 110	2.6/2.7 - 10.0

Multi-layer composite pipes „HENCO Pipes“

Pipes in a multilayered network and crosslinked PE (PE-Xc/Al/PE Xc) by HENCO with an outside-Ø ≤ 63.0 mm

Outside pipe-Ø [mm]	Wall thickness [mm]
≤ 12	1.6
≤ 14	2.0
≤ 32	3.0
≤ 63	4.5

Multi-layer composite pipes „Uponor MLC Pipe White S“

Pipes in a multilayered network of aluminium and PE-RT (PE-RT/Al/PE-RT) by Uponor with an outside-Ø ≤ 110.0 mm, wall thickness 10.0

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2.2 Allowed services – non-combustible pipes

- The penetration seal may also be used for pipes from other materials, whose heat transfer rate is lower than that of steel or copper with a melting point ≥ 946°C.
- Non-combustible pipes with an insulation made of mineral-fibre mats can be installed in an angle of 45° to 90° to the penetration sealing surface.

Non-combustible pipes
Pipes made of copper, steel, stainless steel or cast iron

Pipe material / insulation	Outside-Ø [mm]
Copper with non-combustible pipe insulation made of mineral-fibre e.g. „lamella mat“	≤ 88.9
Steel, stainless steel or cast iron with non-combustible pipe insulation made of mineral-fibre e.g. „lamella mat“	≤ 219.1
Copper with combustible pipe insulation „NH/Armaflex“	≤ 108.0
Steel, stainless steel, cast iron with combustible pipe insulation „NH/Armaflex“	≤ 170.0
Copper with combustible pipe insulation „Armaflex Protect“	≤ 88.9
Steel, stainless steel, cast iron with combustible pipe insulation „Armaflex Protect“	≤ 170.0

Pipe material	Outside pipe-Ø [mm]	Wall thickness [mm]
Copper, steel, stainless steel, cast iron	Ø ≤ 15.0	≥ 0.8
	Ø ≤ 22.0	≥ 1.0
	Ø ≤ 42.0	≥ 1.2
	Ø ≤ 54.0	≥ 1.5
	Ø ≤ 88.9	≥ 2.0
Steel, stainless steel, cast iron	Ø ≤ 114.3	≥ 3.6
	Ø ≤ 170.0	≥ 2.9
	Ø ≤ 219.1	≥ 5.0

2.3 Further allowed services

HVAC split line combinations
E.g. “Tubolit DuoSplit” or “Tubolit Split” by Armacell or any other manufacturer with same characteristics.
Double or single copper pipe and 9 mm thick insulation made of PE foam according to EN 14313 with an accessory line (1.5 mm thick plastic pipe (U/U) made of PVC-U, outside Ø 25 mm, according to EN 1453-1 or EN 1452-1 and to DIN 8061/DIN 8062 and up to 2 sheath cables with max. 5 wires with a surface ≤ 1.5 mm², Ø ≤ 14 mm, resp. 4 sheath cables Ø ≤ 21 mm) without spacing.

Double solar pipes „NanoSUN²“
Pipes for solar thermal applications made of corrugated stainless steel with insulation, an accessory line integrated in the insulation and a PVC sheath by Aktarus Group Srl according to DN 16 to DN 40.

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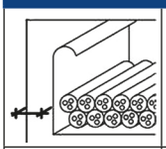
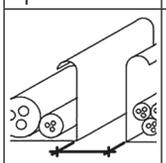
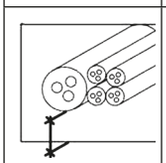
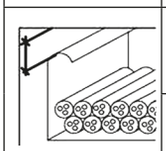
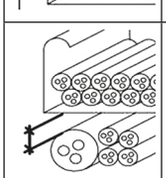
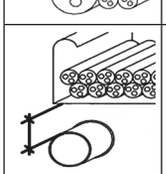
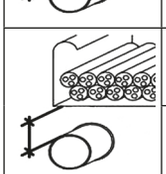
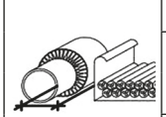
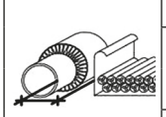
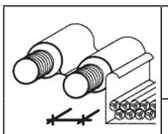
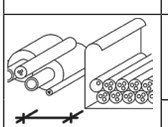
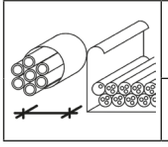
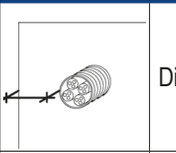
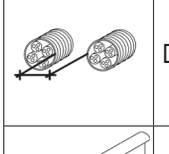
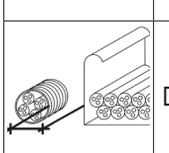
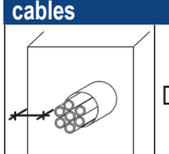
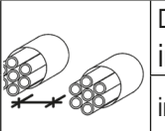
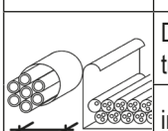
3. Spacing requirements

3.1 Spacing requirements solid walls, plasterboards and floors – cables, conduits, speed pipes

Cables / cablebundles / cable trays			[mm]
	Distance to the side edge		≥ 0
	Distance between cable trays		≥ 0
	Distance to the lower/back edge		≥ 0
	Distance to the upper/front edge		≥ 10
	in floors		≥ 5
	Distance from each other placed above each other		≥ 50
	Distance to combustible pipes		≥ 50
	Distance to multi-layer composite pipes in walls		≥ 10
	in floors		≥ 20
	Distance to non-combustible pipes with insulation made of mineral-fibre		
	with wrap	Wall	≥ 70
		Floor	≥ 50
	with coating	Wall	≥ 50
		Floor	≥ 50
	Distance to non-combustible pipes with insulation made of FEF		
	with wrap	Wall	≥ 25
		Floor	≥ 50
	with coating	Wall	≥ 25
		Floor	≥ 25

	Distance to double solar pipes „NanoSUN²“ in walls	≥ 25
	in floors	≥ 10
	Distance to HVAC split line combinations in walls	≥ 25
	in floors	≥ 50
	Distance to PE-lines „speed pipe“ in walls	≥ 25
	in floors	≥ 20

Electrical installation conduits (conduits)		[mm]
	Distance to the edge	≥ 25
	Distance from each other	≥ 0
	Distance to cables ≤ 21 mm	≥ 0

PE-lines „speed pipe“ for glass fibre cables and micro cables		[mm]
	Distance to the side edge	≥ 0
	Distance from each other in walls	≥ 50
	in floors	≥ 20
	Distance to cables / cable bundles / cable trays in walls	≥ 25
	in floors	≥ 20

Distances not listed ≥ 100 mm

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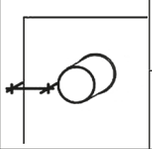
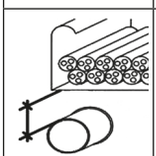
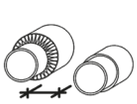
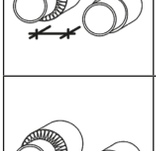
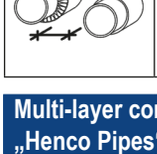
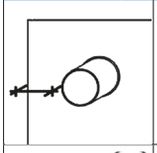
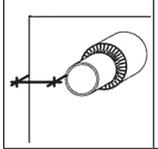
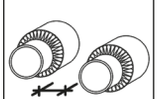
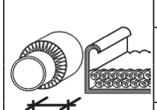
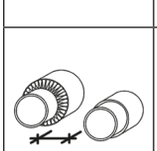
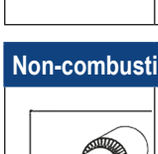
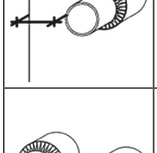
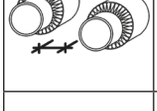
3.2 Spacing requirements solid walls, plasterboards and floors – Pipes

Combustible pipes		[mm]
	Distance to the side edge	≥ 25
	Distance to the upper/lower edge	≥ 50
	Distance from each other	≥ 25
	Distance to cables / cable bundles / cable trays	≥ 50
	Distance to non-combustible pipes with insulation made of mineral-fibre	≥ 25
	Distance to non-combustible pipes with insulation made of FEF	≥ 50

Multi-layer composite pipes „Henco Pipes“ or „Uponor Pipe White S“		[mm]
	Distance to the side/upper/lower edge	≥ 0
	Distance from each other	≥ 0
	Distance to cables ≤ 21 mm	≥ 0
	Distance to cables / cable bundles / cable trays in walls	≥ 10
	in floors	≥ 20

Non-combustible pipes with insulation made of mineral-fibre			[mm]
	Distance to the side/upper/lower edge		≥ 0
	Distance from each other		≥ 0
	Distance to cables / cable bundles / cable trays		
	with wrap	Wall	≥ 50
		Floor	≥ 50
	with coating	Wall	≥ 70
		Floor	≥ 50
	Distance to combustible pipes		≥ 25

Non-combustible pipes with insulation made of FEF			[mm]
	Distance to the side/upper/lower edge		≥ 0
	Distance from each other		≥ 0
	Distance to cables / cable bundles / cable trays		
	with wrap	Wall	≥ 25
		Floor	≥ 50
	with coating	Wall	≥ 25
		Floor	≥ 25
	Distance to combustible pipes in walls		≥ 50
	in floors		≥ 56

Distances not listed ≥ 100 mm

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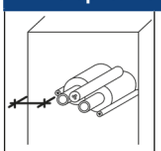
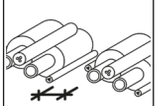
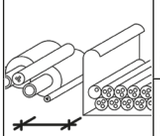
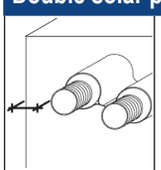
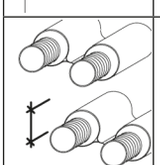
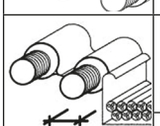
3.3 Spacing requirements solid walls, plasterboards and floors HVAC split line combinations, double solar pipes „NanoSUN²“

HVAC split line combinations		[mm]
	Distance to the side edge	≥ 0
	Distance from each other	≥ 0
	Distance to cables / cable bundles / cable trays in walls	≥ 25
	in floors	≥ 50

Double solar pipes „NanoSUN²“		[mm]
	Distance to the side edge	≥ 0
	Distance from each other	≥ 0
	Distance to cables / cable bundles / cable trays in walls	≥ 25
	in floors	≥ 10

Distances not listed ≥ 100 mm

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PYRO-SAFE Flammotect – single layer

4. Used products

PYRO-SAFE FLAMMOTECT- A
Coating

in accordance with ETA-14/0418

12.5 kg pail - product no. 01155101

PYRO-SAFE FLAMMOTECT- A
Solid emulsion

in accordance with ETA-14/0418

12.5 kg pail - product no. 01155106

PYRO-SAFE FLAMMOTECT- A
Filler

in accordance with ETA-14/0418

12.5 kg pail - product no. 01155104

PYRO-SAFE FLAMMOTECT- A
Filler

in accordance with ETA-14/0418

310 ml cartridge - product no. 01155115

PYRO-SAFE DG-CR 1.5

in accordance with ETA-13/0100 and ETA-16/0268

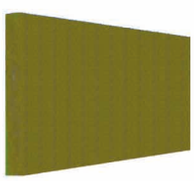
Intumescent material for wrapping cables and pipes.

Roll à 10 m - product no. 01261125

PYRO-SAFE DG-CR BS
Fire protection wrap

in accordance with ETA-16/0268
Fire protection wrap for combustible pipes, consisting of glas filament fabric with intumescent coating on both sides.

Roll à 10 m - product no. 01264100



Mineral-fibre board in accordance with DIN EN 13162

Criterias:
Density≥ 150 kg/m³
Reaction to fire class A1 according to EN 13501:1
Melting point ≥ 1000°C.
(TR10) tensile strength perpendicular to the board surface
≥ 10 kPa according to EN1607
Thickness ≥ 60 mm

Mineral-fibre board

coated with PYRO-SAFE FLAMMOTECT-A on both sides
Dimensions 1000 x 600 x 60 mm

product no. 01182160

Mineral-fibre wool A1

Reaction to fire class according to EN 13501-1: A1
Melting point ≥ 1000 °C

10 kg bag - product no. 01183000

Lamella mat „KLIMAROCK“
in accordance with DIN EN 14303 and DoP DE0628011501 dated 06.08.2015
Reaction to fire class according to EN 13501-1: Class A2-s1 d0
Dimensions 610 x 50 cm
Thickness 30 mm
Roll à 3.05 m² - product no. 01187100

It is allowed to apply any lamella mats/ mineral
fibre mats/ mineral-fibre pipe shells if they match the following requirements:
EN 14303
density ≥ 40 kg/g³
Reaction to fire class according to EN 13501-1: Class A2-s1 d0 or better A1 in accordance with EN 13501-1
Thickness = minimum 30 mm

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4. Used products

Section- and protection insulation

made of flexible elastomeric foam (FEF) in accordance with DIN EN 14304

Name	DIN/ abZ/abP
NH/Armaflex	DIN EN 14304
Armaflex Protect	DIN EN 14304

Label

1 piece - product no. 01229000

Recommended tools

- Filler, brush, masking tape
- Mineral-wool knife and saw
- If required: plastic film, folding ladder
- Lock wire pliers, steel wire (galvanized)

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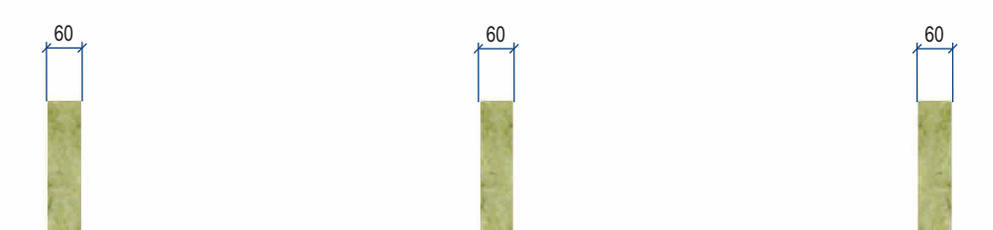
PYRO-SAFE Flammotect – single layer

5. Regulations and variants

- The combination penetration seal may be used for closing openings without installations (so-called reserve penetration seal).
- Penetration seal in floors shall be protected on site by client with suitable barriers or covered with grating, in order to prevent them from being load or walked on.
- The interior surface of openings in light-weight partitions must be provided with an all-around protection.
- **The penetration seal surface made of mineral-fibre boards and their edges, must be provided with an at least 0.75-mm thick (dry coat thickness) PYRO-SAFE FLAMMOTECT-A coating; this coating must also be applied as a 20-mm all-around protection on the interior surface of the opening in the structural element/on the structural element plane.**
- Annular gaps ≤ 5 mm around cables, cable bundles, cable trays as well as speed pipes, double solar pipes and HVAC split line combinations have to be coated with PYRO-SAFE Flammotect-A inside the penetration / > 5 mm through filling with loose mineral-fibre wool and coating. Annular gaps ≤ 5 mm around combustible/non-combustible pipes have to be filled with loose mineral-fibre wool

Variants in plasterboards and solid walls



Plasterboard or solid wall

Dimension specifications in mm

Variants in solid floors

Dimension specifications in mm

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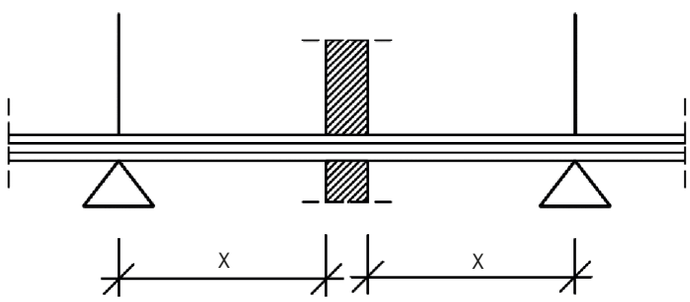
PYRO-SAFE Flammotect – single layer

5.1 Rules over the first cable/pipe support

• The first supports before the installation shall be made of non-combustible material (fire resistance class A1 or A2 in accordance with EN 13501-1); the supports shall be placed at a distance according to the table below.



First holder (support) of the installations in front of the wall partition made of steel or equivalent!

First cable/pipe support	
Cables, cable bundles, cable trays	≤ 200 mm (Wall)
	≤ 400 mm (Floor)
Combustible pipes	≤ 400 mm (Wall) ≤ 1000 mm (Floor)
Multi-layer composite pipes „Henco Pipes“	≤ 550 mm (Wall) ≤ 800 mm (Floor)
Multi-layer composite pipes „Uponor MLC Pipe White S“	≤ 865 mm (Floor)
Non-combustible pipes - section insulation made of mineral-fibre mats or shells	≤ 850 mm
Non-combustible pipes made of copper - section insulation made of NH/Armaflex (without protection insulation)	≤ 800 mm (Wall) ≤ 1000 mm (Floor)
Non-combustible pipes - section insulation made of NH/Armaflex (with protection insulation)	≤ 1000 mm (Wall) ≤ 1600 mm (Floor)
Non-combustible pipes made of copper - section insulation made of Armaflex Protect	≤ 600 mm
Non-combustible pipes made of steel, stainless steel, cast iron - section insulation made of Armaflex Protect	≤ 1100 mm
Double solar pipes „NanoSUN²“	*
„speed pipes“ for glass fibre cables and micro cables	*
HVAC split line combinations	≤ 500 mm

* The manufacturers installation instructions are applied

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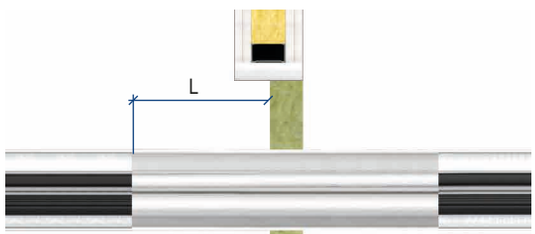
PYRO-SAFE Flammotect – single layer

6. Fire protection measures

6.1 Cables / cable bundles / cable trays

- The feed-through of cables or cable bundles is allowed with or without cable trays.
- Cable bundles can be installed unopened through the penetration sealing. If they consist of parallel-running cables that are densely packed and permanently bound, stitched or welded together they don´t have to be filled inside with filler material.
- The support structures of the cable trays shall be formed so that, in case of fire, no additional mechanical loading of the penetration sealing can occur.
- For cable support structures made of sheet steel or hollow aluminium profiles, the spars must be drilled and filled with the ablative coating PYRO-SAFE FLAMMOTECT-A in the penetration area (on-site agreement of the measures required).

Measures for sealing in walls and floors



Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

		Dimensions [mm]	Fire protection coating PYRO-SAFE FLAMMOTECT-A			Fire resistance class	
			Dry film thickness [mm]	Inside seal [mm]	Outside seal L [mm]	Wall	Floor
Wall / Floor	Cables	Ø ≤ 21 (without cable tray through drill holes)	0.75	60	100	-	EI 90
		Ø ≤ 21	0.75		100	EI 60 / E 90	EI 60 / E 90
		Ø > 21 to ≤ 50	1.00		150		
		Ø > 50 to ≤ 80	1.00		150		
	Cable bundles	Ø ≤ 100	0.75		100		
		Ø ≤ 100	1.00		150	EI 90	-

		Dimensions [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Fire resistance class	
			Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Wall	Floor
Wall / Floor	Cables	Ø ≤ 21 (without cable tray through drill holes)	125	2	1	≥ 45	0	125	EI 90	EI 90
		Ø ≤ 21							EI 60 / E 90	EI 60 / E 90
		Ø > 21 to ≤ 50								
		Ø > 50 to ≤ 80								
	Cable bundles	Ø ≤ 100								

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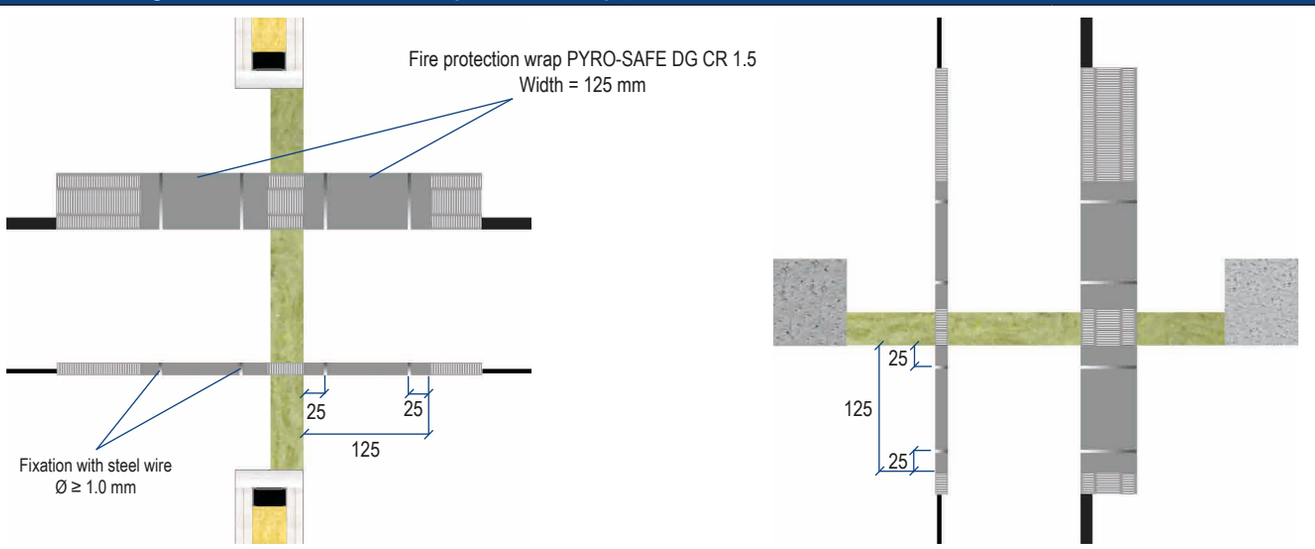
6.1.1 Electrical installation conduits (conduits)

- The feed-through is allowed for single plastic conduits (max. Ø ≤ 32 mm) or bundled conduits (up to Ø ≤ 100 mm with single conduits Ø ≤ 32 mm) with or without cables Ø ≤ 21 mm.
- Conduits must be wrapped on both sides with the PYRO-SAFE DG-CR 1.5 fire protection wrap (width 125 mm, thickness 1.5 mm).
- The PYRO-SAFE DG-CR 1.5 fire protection wrap is coated and covered with a protective film on one side. Before installation the protective film shall be removed, the coated side have to be inside. Fixation of the wrap with steel wires.

Measures for sealing in walls and floors with fire protection wrap „PYRO-SAFE DG-CR 1.5“



Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

		Dimensions [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Fire resistance class	
			Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Wall	Floor
Wall / Floor	Conduit made of plastic single	Ø ≤ 32 (with or w/o cables Ø ≤ 21)	125	2	2	0	0	125	EI 60 / E 90 U/U	EI 90 U/U
	Conduit made of plastic bundled	Ø ≤ 100 (single conduits Ø ≤ 32, with w/o cables Ø ≤ 21 mm)								

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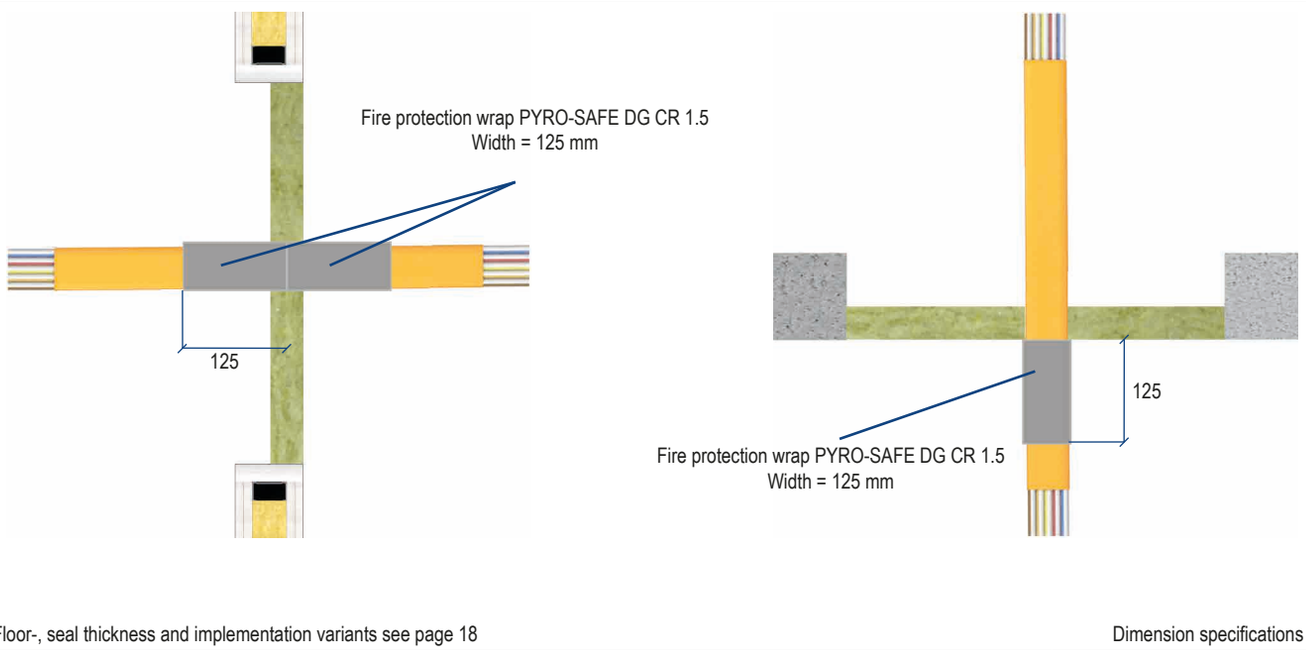
6.1.2 PE lines „speed pipe“ (for glass fibre cables and micro cables)

- The PE lines “speed pipe” shall be arranged vertical to the component´s surface. Pipe end configuration (U/U).
- If built in walls, the PE lines “speed pipe” must be wrapped on both sides with the PYRO-SAFE DG-CR 1.5 fire protection wrap (width 125 mm, thickness 1.5 mm) in floors, only one wrap below the sealing is necessary.
- The PYRO-SAFE DG-CR 1.5 fire protection wrap is coated and covered with a protective film on one side. Before installation the protective film shall be removed, the coated side have to be inside. Fixation of the wrap with steel wires.

Measures for sealing in walls and floors



Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

	set-up speed pipes	Wall thickness s [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Fire resistance class
			Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	
Wall	Ø 7.0 mm x 24 pcs.	≥ 1.5	125	2	1	0	30	95	EI 60 / E 90 U/U
	Ø 10.0 mm x 7 pcs.	≥ 2.0							
	Ø 12.0 mm x 5 pcs.	≥ 2.0							
Floor	Ø 7.0 mm x 24 pcs.	≥ 1.5		1	2	0	0	125	EI 60 U/U
	Ø 10.0 mm x 7 pcs.	≥ 2.0							
	Ø 12.0 mm x 5 pcs.	≥ 2.0							

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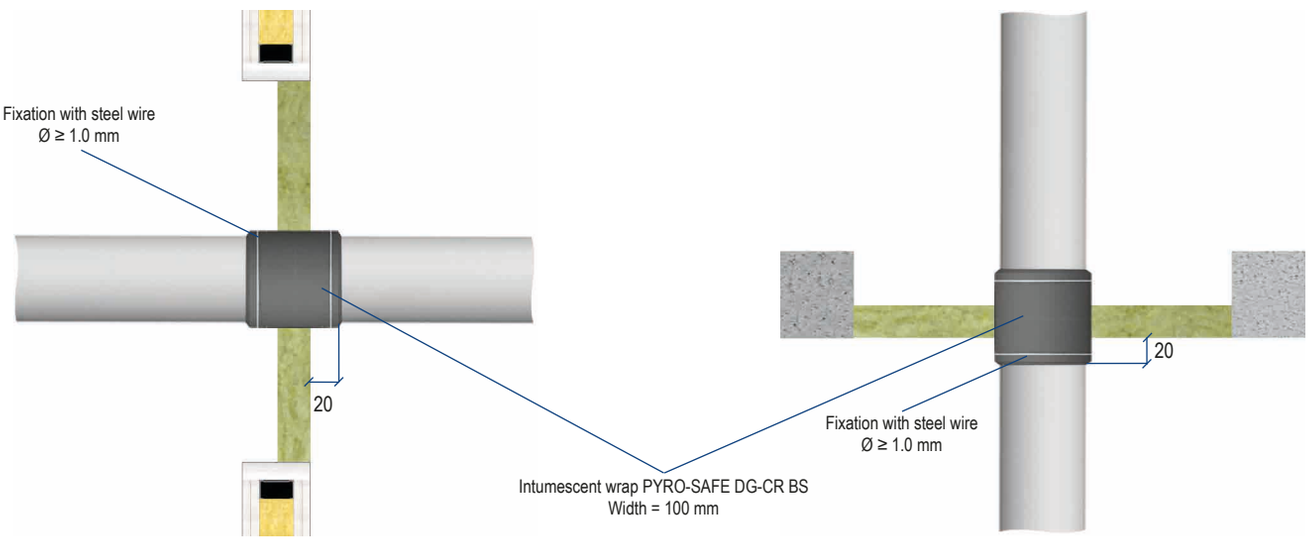
6.2. Combustible pipes made of PVC-U, PVC-C, PE-100 or PP-H

- Combustible pipes shall be arranged vertical to the component´s surface.
- Combustible pipes have to be wrapped with the intumescent wrap „PYRO-SAFE DG-CR BS“ (Width = 100 mm).
- The penetration sealing may be used on pneumatic conveyors, compressed air lines and so on if the pipeline system is switched off in the event of a fire.

Measures for sealing in walls and floors with intumescent wrap „PYRO-SAFE DG-CR BS“



Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

Combustible pipes made of PVC-U, PVC-C in accordance with EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Wall / Floor	Dimensions [mm]	Intumescent wrap PYRO-SAFE DG-CR BS						Fire resistance class	
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Wall	Floor
	≤ Ø 50	100	1	1	0	60	40 (20 per side)	EI 90 U/U	EI 90 U/U
	≤ Ø 70			2				EI 60 / E 90 U/U	EI 45 / E 90 U/U
	≤ Ø 90			3					
	≤ Ø 110			4					

Combustible pipes made of PE-100

Wall / Floor	Dimensions [mm]	Intumescent wrap PYRO-SAFE DG-CR BS						Fire resistance class	
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Wall	Floor
	≤ Ø 50	100	1	1	0	60	40 (20 per side)	EI 90 U/U	EI 90 U/U
	≤ Ø 70			2				EI 60 / E 90 U/U	EI 60 / E 90 U/U
	≤ Ø 90			3					
	≤ Ø 110			4					

Combustible pipes made of PP-H

Wall / Floor	Dimensions [mm]	Intumescent wrap PYRO-SAFE DG-CR BS						Fire resistance class	
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Wall	Floor
	≤ Ø 50	100	1	1	0	60	40 (20 per side)	EI 90 U/U	EI 90 U/U
	≤ Ø 70			2				EI 60 / E 90 U/U	
	≤ Ø 90			3					
	≤ Ø 110			4					

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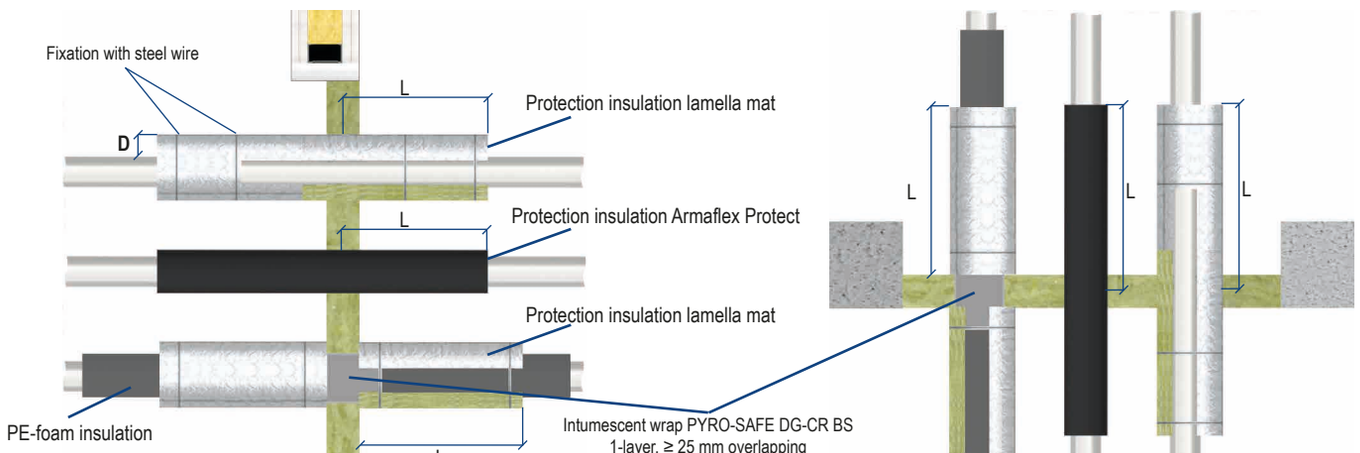
6.3 Multi-layer composite pipes „HENCO Pipes“ and „Uponor MLC Pipes white S“

Measures for sealing in walls and floors



Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

	Intumescent wrap PYRO-SAFE DG-CR BS						Protection insulation		Fire resistance class	
Outside-Ø [mm]	Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Length L [mm]	Thickness D [mm]	Wall	Floor
Multi-layer composite pipes „HENCO STANDARD“							**„Lamella mat“**			
≤ 12 mm	-						≥ 250	≥ 20	EI 30 U/C	EI 90 U/C
≤ 32 mm										
≤ 63 mm								≥ 30		
Multi-layer composite pipes „HENCO STANDARD“							**„Armaflex Protect“**			
≤ 12 mm	-						≥ 240	13	EI 30 U/C	EI 90 U/C
≤ 32 mm									EI 90 U/C	
≤ 63 mm								26	EI 30 U/C	
Multi-layer composite pipes „HENCO STANDARD“ with PE-foam insulation							**„Lamella mat“**			
≤ 14 mm	100	1	1	≥ 25	60	40 (20 per side)	≥ 250	≥ 20	EI 30 U/C	EI 90 U/C
≤ 26 mm										
≤ 32 mm										
Multi-layer composite pipes „Uponor MLC pipe white S“							**„Lamella mat“**			
≤ 110	-						≥ 250	≥ 30	-	EI 60 / E 90 U/C
							„Armaflex Protect“			
							≥ 240	≥ 26	-	EI 60 U/C

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6.4 Non-combustible pipes – section insulation made of mineral-fibre lamella mat

- Insulation made of mineral-fibre mats, for example, must be applied on non-combustible pipes. Depending on the pipe´s wallthickness and outside diameter, an additional protection insulation made of mineral-fibre mats can be necessary.
- The Insulation must be fixed on the pipe with straps or wire.
- In floor installations, the insulation “lamella mat” shall be secured from slipping with additional wire mesh hooks.
- Non-combustible pipes with insulation made of mineral-fibre mats can be installed in an angle of 45°- 90° in relation to the components surface.

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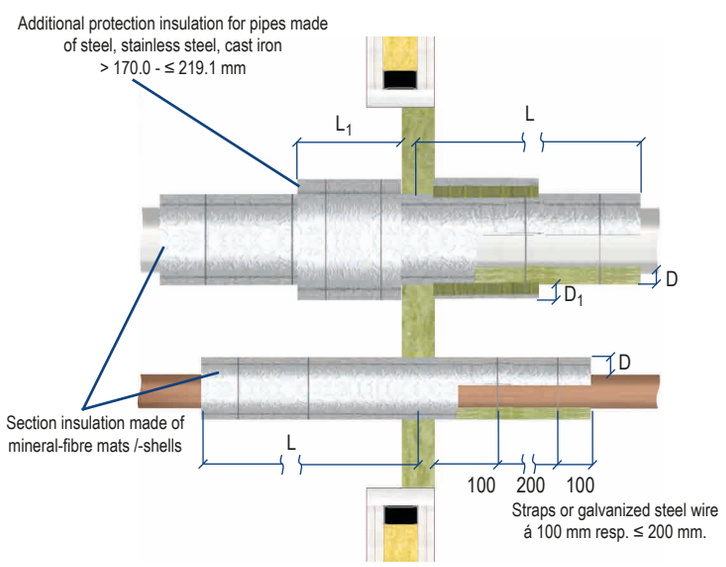
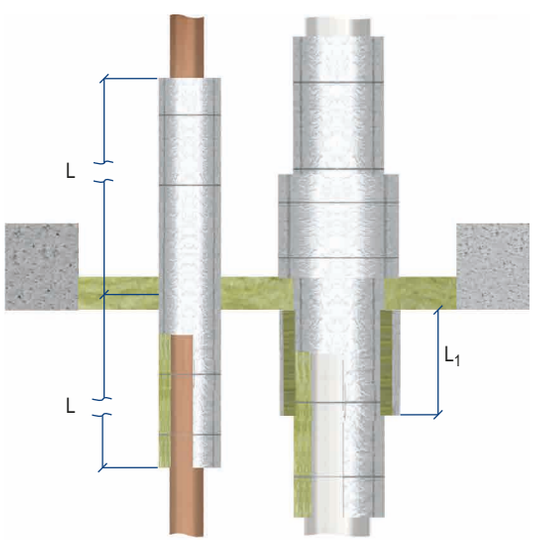
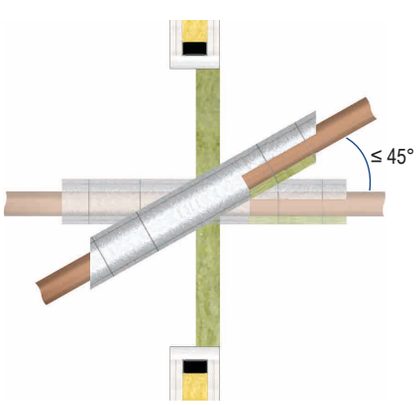
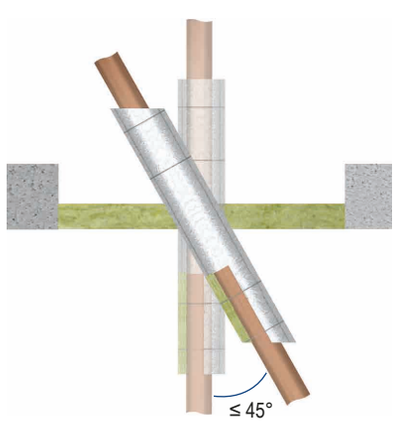
Measures for sealing in walls and floors









Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

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6.4 Non-combustible pipes – section insulation made of mineral-fibre lamella mat

Measures for penetraion seals with lamella mat

	Pipe material	Outside pipe-Ø [mm]	Pipe wall thickness [mm]	Insulation length L [mm]	Insulation thickness D [mm]	Fire resistance class	
						Wall	Floor
Wall / Floor	Copper, steel, stainless steel, cast iron	Ø ≤ 15.0	≥ 0.8	≥ 250	≥ 20	EI 60 / E 90 C/U	EI 60 C/U
		Ø ≤ 22.0	≥ 1.0	≥ 250	≥ 60		
				≥ 500	≥ 20		
		Ø ≤ 54.0	≥ 1.5	≥ 500	≥ 30		
		Ø ≤ 88.9	≥ 2.0	≥ 800	≥ 40		
	Steel, stainless steel, cast iron	Ø ≤ 88.9	≥ 2.0	≥ 800	≥ 40	EI 90 C/U	
		Ø ≤ 114.3	≥ 3.6	≥ 500	≥ 40	EI 60 / E 90 C/U	
		Ø ≤ 170.0	≥ 3.0	≥ 800*	≥ 60	EI 60 C/U	
		Ø ≤ 219.1	≥ 5.0	≥ 800*	≥ 60	EI 60 / E 90 C/U	

* Additional protection insulation made of mineral-fibre mat (L_1 ≥ 500 mm x D_1 ≥ 30 mm)

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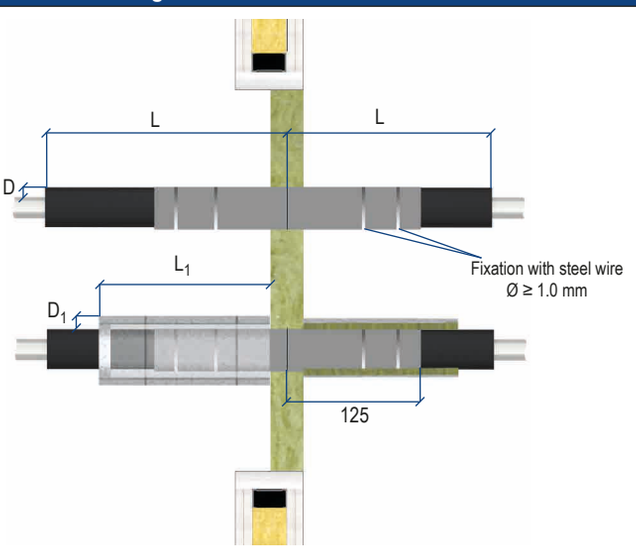
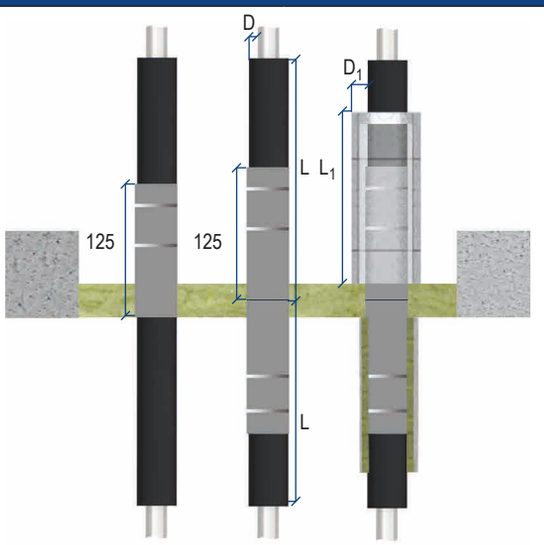
6.5 Non-combustible pipes – section insulation made of FEF „NH/Armaflex“

- Non-combustible pipes with section insulation made of FEF „NH/Armaflex“ have to be wrapped with the PYRO-SAFE DG-CR 1.5 fire protection wrap (Width 125 mm, thickness 1.5 mm).
- The PYRO-SAFE DG-CR 1.5 fire protection wrap is coated and covered with a protective film on one side. Before installation the protective film shall be removed, the coated side have to be inside. Fixation of the wrap with steel wires.
- Non-combustible pipes with insulation made of FEF „NH/Armaflex“ possibly have to set up with an additional protection insulation made of mineral-fibre mats, depending on the pipe´s wallthickness and outside diameter.
- The protection insulation must be fixed on the pipe with straps or wires.
- In floor installations, the protection insulation shall be secured from slipping with additional wire mesh hooks.

Measures for sealing in walls and floors with section insulation made of FEF „NH/Armaflex“





Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

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6.5 Non-combustible pipes – Section insulation made of FEF „NH/Armaflex“ – Walls

Measures for non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation „NH/Armaflex“ in walls

Type of insulation	Insulation thickness D [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Protection insulation (L_1 x D_1)	Fire resistance class
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]		
Outside pipe-Ø ≤ 15.0 mm									
NH/Armaflex	13 - 24	125	2	2	0	30	95	-	EI 60 / E 90 C/U
	25								EI 90 C/U
Outside pipe-Ø ≤ 28.0 mm									
NH/Armaflex	13 - 30	125	2	1	0	30	95	Lamella mat ≥ 250 mm x ≥ 20 mm	EI 60 / E 90 C/U
	19 - 24			2				-	EI 90 C/U
	25								
Outside pipe-Ø ≤ 42.0 mm									
NH/Armaflex	25 - 43	125	2	2	0	30	95	-	EI 60 / E 90 C/U
	44								EI 90 C/U
Outside pipe-Ø ≤ 54.0 mm									
NH/Armaflex	29 - 57	125	2	2	0	30	95	Lamella mat ≥ 500 mm x ≥ 30 mm	EI 90 C/U
Outside pipe-Ø ≤ 88.9 mm									
NH/Armaflex	25 - 89	125	2	2	0	30	95	Lamella mat ≥ 500 mm x ≥ 30 mm	EI 90 C/U
Outside pipe-Ø ≤ 108.0 mm									
NH/Armaflex	57	125	2	2	0	30	95	Lamella mat ≥ 750 mm x ≥ 40 mm	EI 90 C/U

Measures for non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation „NH/Armaflex“ in walls

Type of insulation	Insulation thickness D [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Protection insulation (L_1 x D_1)	Fire resistance class
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]		
Outside pipe-Ø ≤ 170.0 mm									
NH/Armaflex	25	125	2	2	0	30	95	Lamella mat ≥ 750 mm x ≥ 40 mm	EI 60 / E 90 C/U

Insulation made of NH/Armaflex
Test case LS wall:
≥ 500 / ≥ 500 – Outside pipe-Ø ≤ 28.0 mm
≥ 750 / ≥ 750 – Outside pipe-Ø ≤ 42.0 mm
≥ 1000 / ≥ 1000 – Outside pipe-Ø > 42.0 mm
Insulation length L in mm per side.

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6.5 Non-combustible pipes – Section insulation made of FEF „NH/Armaflex“ – Floors

Measures for non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation „NH/Armaflex“ in floors									
Type of insulation	Insulation thickness D [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Protection insulation (L_1 x D_1)	Fire resistance class
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]		
Outside pipe-Ø ≤ 15.0 mm									
NH/Armaflex	13 - 19	125	2	2	0	30	95	-	EI 90 C/U
	19 - 25		1			60	65 (above)		EI 60 / E 90 C/U
Outside pipe-Ø ≤ 28.0 mm									
NH/Armaflex	19 - 25	125	2	2	0	30	95	-	EI 90 C/U
	25		1			60	65 (above)	-	EI 60 / E 90 C/U
Outside pipe-Ø ≤ 42.0 mm									
NH/Armaflex	25	125	2	2	0	30	95	-	EI 90 C/U
	25 - 44		1			60	65 (above)		EI 60 / E 90 C/U
Outside pipe-Ø ≤ 54.0 mm									
NH/Armaflex	28 - 57	125	1	1	0	60	65 (above)	-	EI 90 C/U
Outside pipe-Ø ≤ 88.9 mm									
NH/Armaflex	25 - 88	125	1	2	0	60	65 (above)	Lamella mat ≥ 500 mm x ≥ 40 mm	EI 90 C/U
	89							Lamella mat ≥ 500 mm x ≥ 30 mm	
Outside pipe-Ø ≤ 108.0 mm									
NH/Armaflex	57	125	1	2	0	60	65 (above)	Lamella mat ≥ 1000 mm x ≥ 40 mm	EI 90 C/U
	58 - 89								EI 60 C/U

Measures for non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation „NH/Armaflex“ in floors									
Type of insulation	Insulation thickness D [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Protection insulation (L_1 x D_1)	Fire resistance class
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]		
Outside pipe-Ø ≤ 170.0 mm									
NH/Armaflex	25	125	1	2	0	60	65 (above)	Lamella mat ≥ 1000 mm x ≥ 40 mm	EI 60 / E 90 C/U
	26 - 85								EI 90 C/U

Insulation made of NH/Armaflex
Test case LS floor:
≥ 350 / ≥ 1000 – Outside pipe-Ø ≤ 88.9 mm
≥ 1000 / ≥ 1000 – Outside pipe-Ø > 88.9 mm

Insulation length L in mm under/above partition.

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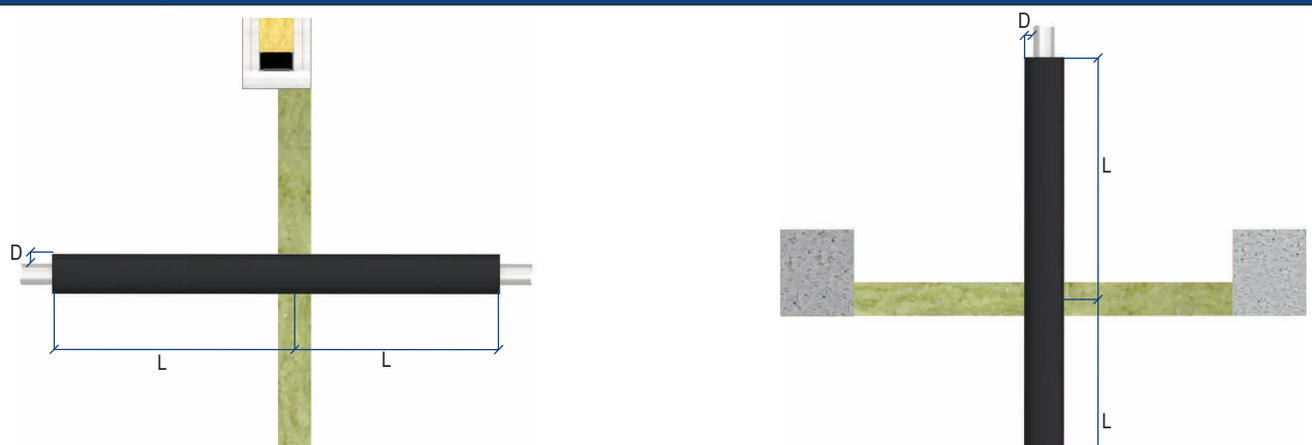
6.6 Non-combustible pipes – Section insulation made of FEF „Armaflex Protect“

Measures for sealing in walls and floors with section insulation made of „Armaflex Protect“



Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

	Pipe material	Type of insulation	Insulation thickness D [mm]	Fire resistance class
Wall / Floor	Copper, steel, stainless steel, cast iron	**Outside pipe-Ø ≤ 15.0 mm**		EI 60 / E 90 C/U
		Armaflex Protect	19	
			20	
			25 - 51	
		Outside pipe-Ø ≤ 22.0 mm		
		Armaflex Protect	20	
			25 - 51	
		Outside pipe-Ø ≤ 54.0 mm		
		Armaflex Protect	25 - 51	
		Outside pipe-Ø ≤ 88.9 mm		
		Armaflex Protect	25 - 51	
	Steel, stainless steel, cast iron	**Outside pipe-Ø ≤ 170.0 mm**		EI 90 C/U (Wall) EI 60 / E 90 C/U (Floor)
		Armaflex Protect	26 - 52	

Insulation made of Armaflex Protect
Test case LS wall and floor:
≥ 500 / ≥ 500 – Outside pipe-Ø ≤ 88.9 mm
≥ 1000 / ≥ 1000 – Outside pipe-Ø > 88.9 mm
Insulation length L in mm per side. In floors, insulation length under/above the partition.

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6.7 Further allowed services – HVAC split line combinations

- HVAC split line combinations „Tubolit Duo Split“ (Copper pipes with PE-Insulation, one pipe made of PE and up to 4 additional cables) shall be arranged vertical to the component´s surface.
- HVAC split line combinations have to be wrapped with the PYRO-SAFE DG-CR 1.5 fire protection wrap (Width 125 mm, thickness 1.5 mm).
- The PYRO-SAFE DG-CR 1.5 fire protection wrap is coated and covered with a protective film on one side. Before installation the protective film shall be removed, the coated side have to be inside. Fixation of the wrap with steel wires.
- Possibly an additional protection insulation in necessary. The protection insulation must be installed in a way that it ends at the components surface and shall be fixed on the pipe with straps or wires.

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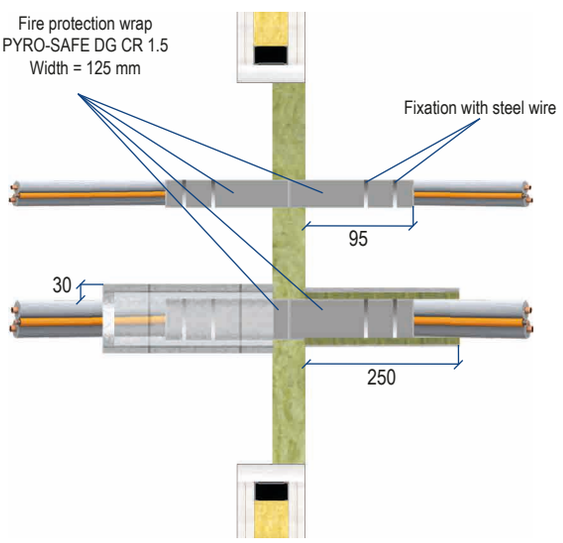
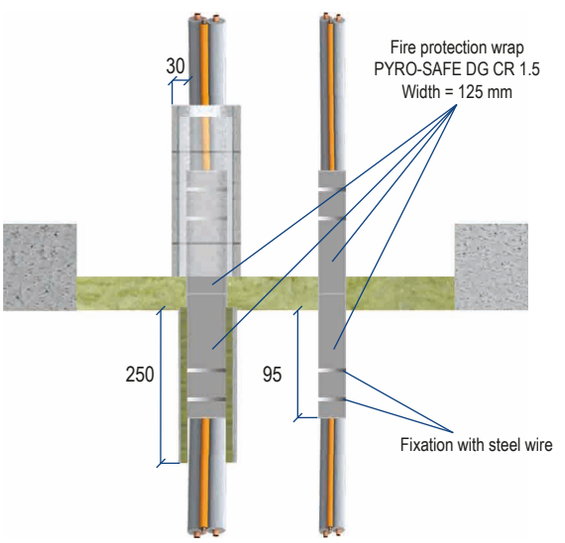
Measures for sealing in walls and floors





Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

	HVAC split line combination						Fire protection wrap PYRO-SAFE DG-CR 1.5						Fire resistance class	
Wall / Floor	Pipe material	Outside-Ø [mm]	+ Qty. add. cables [n]	Insulation [Type]	Insulation thickness D [mm]	PE-pipe Ø [mm]	Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Wall	Floor
	Copper	6/10	2 (Ø ≤ 14 mm)	PEF**	≤ 9.0	≤ 25 wall thickn. 1.8 - 3.5	125	2	2	≥ 25	30	95	EI 60 / E 90	EI 45 / E 60
		22/22*	4 (Ø ≤ 21 mm)			≤ 25 wall thickn. 1.8		2	1	0	30	95	EI 30	EI 90

*Additional protection insulation made of mineral-fibre mat (L_1 ≥ 250 mm x D_1 ≥ 30 mm)
**PEF = Polyethylen foam

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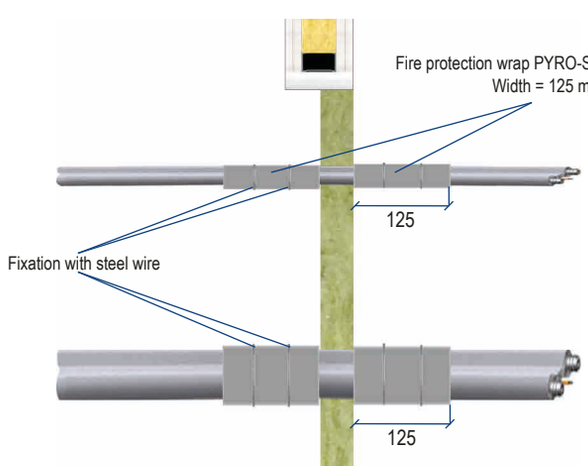
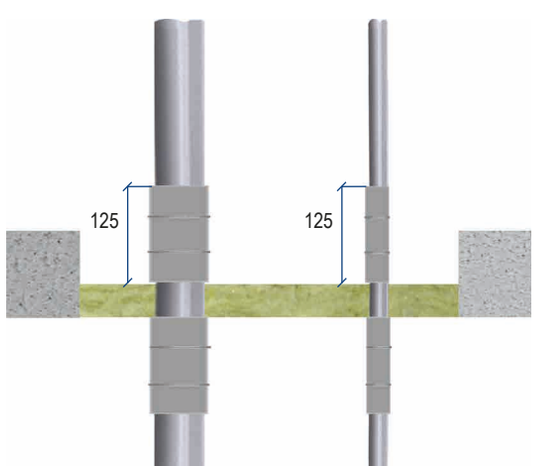
6.8 Further allowed services – Double solar pipes „NanoSUN²“

- The double solar pipes “NanoSUN²” shall be arranged vertical to the component´s surface. Pipe end configuration (U/U).
- Double solar pipes have to be wrapped with the PYRO-SAFE DG-CR 1.5 fire protection wrap (Width 125 mm, thickness 1.5 mm) on both sides.
- The PYRO-SAFE DG-CR 1.5 fire protection wrap is coated and covered with a protective film on one side. Before installation the protective film shall be removed, the coated side have to be inside. Fixation of the wrap with steel wires.

Measures for sealing in walls and floors





Wall-/Floor-, seal thickness and implementation variants see page 18

Dimension specifications in mm

	Outside pipe-Ø [mm]	Fire protection wrap PYRO-SAFE DG-CR 1.5						Fire resistance class	
		Wrap width [mm]	Qty. wraps [n]	Qty. layer [n]	Overlapping [mm]	Inside seal [mm]	Outside seal [mm]	Wall	Floor
Wall / Floor	DN 16	125	2	1	≥ 25	0	125	EI 90 U/U	EI 60 U/U
	DN 40	125	2	1	≥ 25	0	125	EI 30 / E 90 U/U	EI 60 U/U

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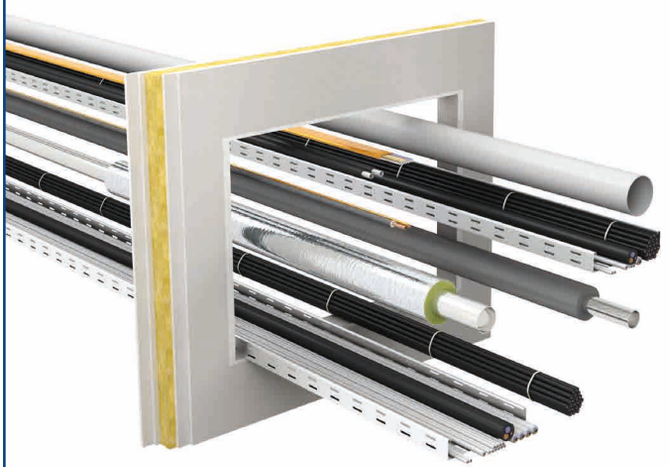
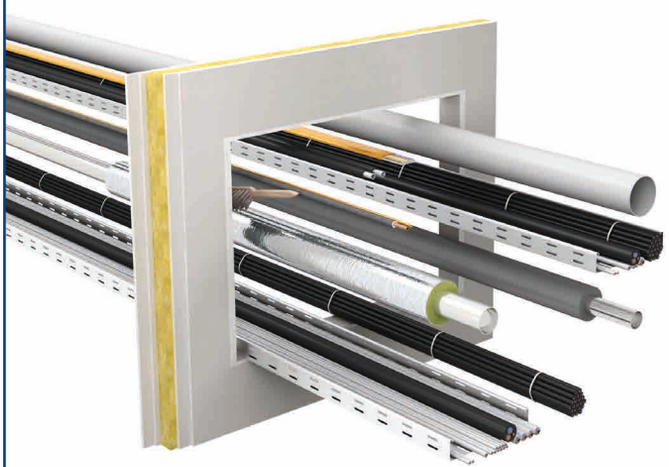
7. Installation steps

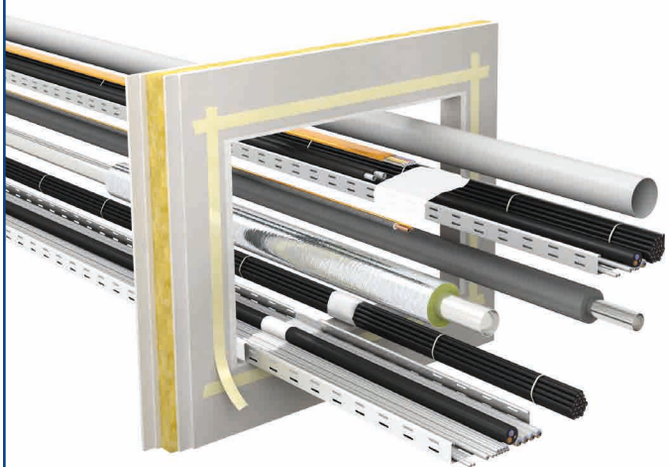
1.Opening with installations passed through it



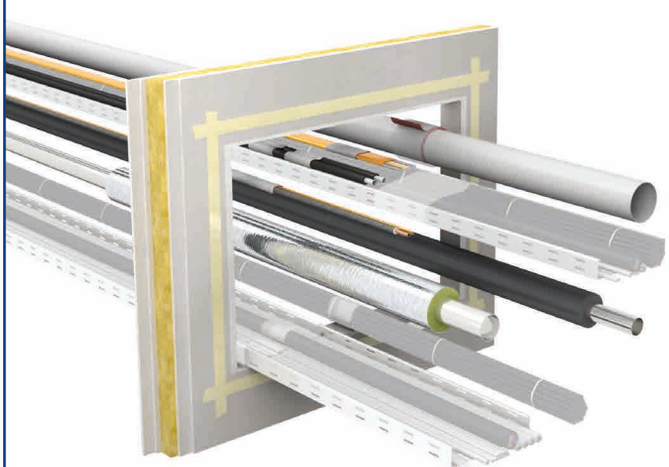
2. Clean the inside edges (edge planking is not supplied by the manufacturer)



3. Place the masking tape around the opening at a distance of 20 mm to the edge. Coat the cables with PYRO-SAFE FLAMMOTECT-A in correspondence to the opening.
(Details p. 20)



4. Wrap combustible pipes with PYRO-SAFE DG-CR BS. Wrap PE-lines, multi-layer composite pipes, non-combustible pipes with FEF-insulation and HVAC split line combination with PYRO-SAFE DG-CR 1.5.
(Details p. 22 - 31)



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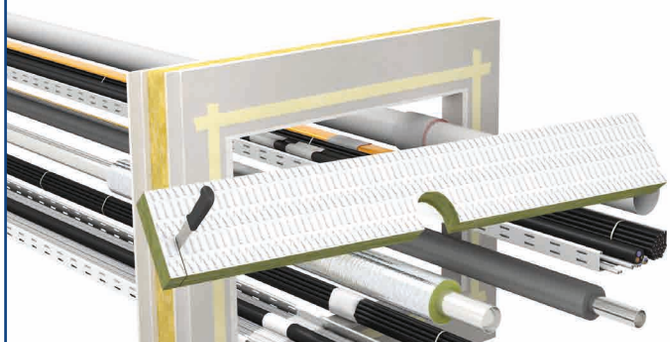
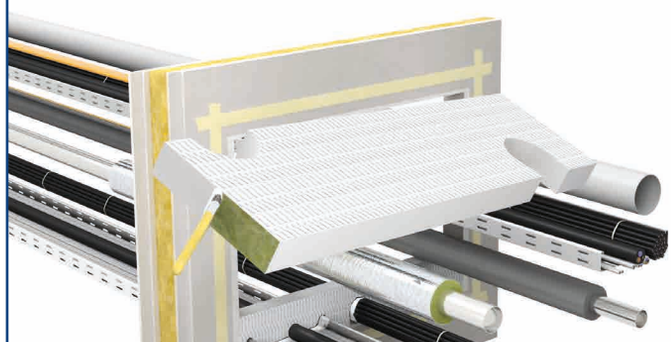
7. Installation steps

5. Cut mineral-fibre boards to size (provide openings for cables, cable trays and pipes).



6. Apply PYRO-SAFE FLAMMOTECT-A to the cut faces of the mineral-fibre board and insert flush and tightly the board into the opening.



7. Fill remaining gaps with mineral-fibre wool or seal with PYRO-SAFE FLAMMOTECT-A filler (Details p. 18)

8. Coat the cables with PYRO-SAFE FLAMMOTECT-A. (L ≥ 100 / 150 mm, dry film thickness 0.75 / 1.0 mm). (Details p. 20)

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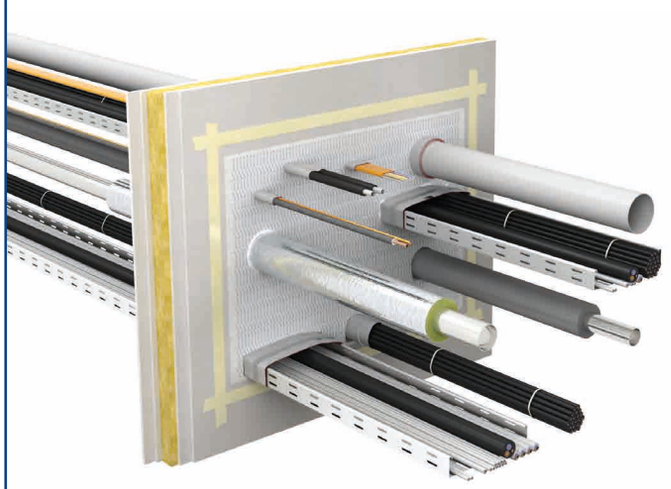
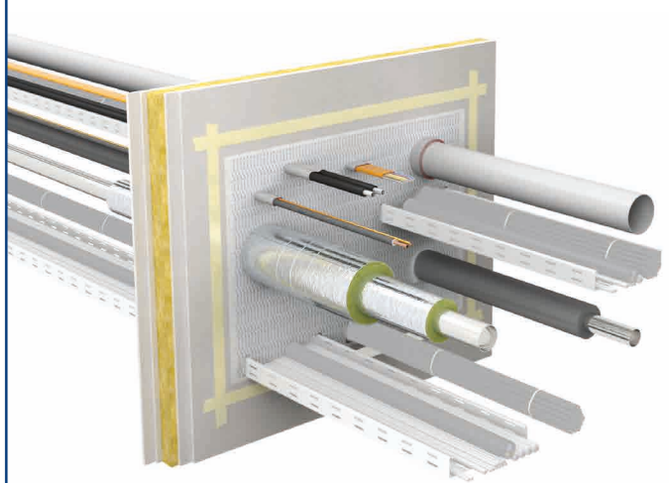
7. Installation steps

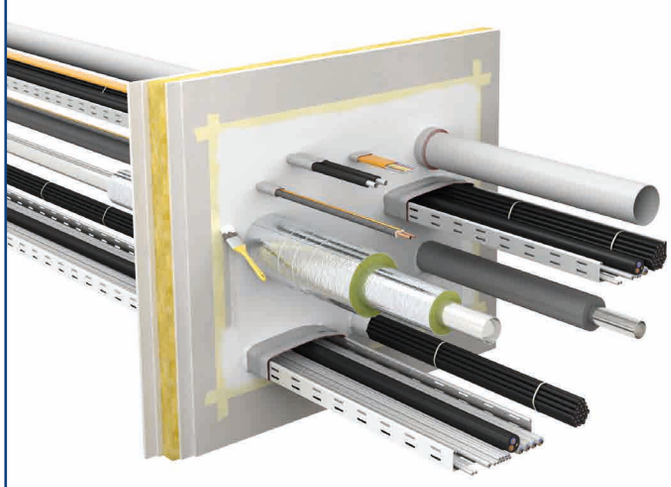
8a. *Alternative to step 8. Wrap cables, cable bundles, cable trays with PYRO-SAFE DG-CR 1.5* (Details p. 20)



9. Wrap conduits and double solar pipes with PYRO-SAFE DG-CR 1.5. Non-combustible pipes, multi-layer pipes and HVAC split line combinations possibly need a protection insulation. (Details p. 21 - 31)



10. Apply final coating with PYRO-SAFE FLAMMOTECT-A (dry film thickness 0.75 mm)



11. If required or mandatory, fill the identification label and apply it next to / above (not on!) the penetration seal for permanent marking.

Subject to errors, misprints and modifications. All information corresponds to state-of-the-art technology and the version of standards applicable at the time of printing (06.2017).
On request, we would be happy to inform you about the legal and technical framework or the manufacturer's specifications applicable in your individual case. © Copyright svt Group, Seevetal
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Declaration of Performance
N° 01155-PYRO-SAFE-FLAMMOTECT-A
PYRO-SAFE FLAMMOTECT-A

Unique identification code of the product type
PYRO-SAFE FLAMMOTECT-A

Intended use:
Ablative fire stopping product used in penetration seals

Producer
svt Brandschutz Vertriebsgesellschaft mbH International
Gluesinger Strasse 86
D - 21217 Seevetal
Germany

System for assessing and verifying constancy of performance
System 1

European Assessment Document
ETAG 026-2:2011-10-14

European Technical Assessment
ETA-14/0418 of 04.12.2014

Technical Assessment Body
Deutsches Institut für Bautechnik (DIBt), Berlin

The notified body
Materialprüfanstalt für das Bauwesen Braunschweig, code number 0761

Declared performance

Essential characteristics	Performance	Harmonised technical specification
Reaction to fire	**Class E**	EN 13501-1
Fire resistance	**Class EI 30** of a penetration seal (with mineral wool; see Annexes 1 and 17-22 of ETA-14/0418 for details)	EN 13501-2
	Class EI 60 of a penetration seal (with mineral fibre board single-layer; see Annexes 1 and 2-6 of ETA-14/0418 for details)	
	Class EI 60 of a penetration seal (with mineral wool; see Annexes 1 and 23-27 of ETA-14/0418 for details)	
	Class EI 90 of a penetration seal (with mineral wool; see Annexes 1 and 28-32 of ETA-14/0418 for details)	
	Class EI 90 of a penetration seal (without mineral wool; see Annexes 1 and 33 of ETA-14/0418 for details)	
	Class EI 120 of a penetration seal (with mineral fibre boards double-layer; see Annexes 1 and 7-11 of ETA-14/0418 for details)	
	Class EI 240 of a penetration seal (with mineral fibre boards quadruple-layer; see Annexes 1 and 12-16 of ETA-14/0418 for details)	
Emission of dangerous substances	no dangerous substances	ETAG 026-2
Durability and serviceability	Use category type X	EOTA TR 024

The performance of the product identified above is in conformity with the set of declared performances. This declaration of performance is issued, in accordance with Regulation (EU) No. 305/2011, under the sole responsibility of the manufacturer identified above
DoP online available at www.svt.de.
Signed for and on behalf of the manufacturer by:

i.V. Christian Meyer-Korte
Head of Product Management

i.V. Andree Schober
Head of chemical department