

## PYRO-SAFE Flammotect - double-layer

### Installation instructions

Combined penetration sealing system made of a mineral fibre board (MFB) and ablative coating for electric cables and wires of all kinds and for combustible and non-combustible pipes.

Fire resistance classes EI 30, EI 45, EI 60, EI 90 and EI 120 according to EN 13501-2 in accordance with ETA-14/0418 with Classification Report No. KB 3.2/12-157-2, Classification Report No. KB 3.2/12-107-2 and with Classification Report No. 02417/14/Z00NP as well as technical opinion No. 01699/16/Z00NZP



## PYRO-SAFE Flammotect - double-layer

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## PYRO-SAFE Flammotect - double-layer

### 1. Preliminary remarks/ Overview

#### 1.1 Target group

- The installation instructions are aimed exclusively at personnel trained in fire protection.

#### 1.1 Use of the manual

- Read these installation instructions completely before starting work. Observe the following safety instructions.
- The approval holder assumes no liability for damage caused by non-observance of these instructions.
- The pictures are only examples. The installation may differ visually.

#### 1.1 Safety information



Read the safety data sheets when working with the penetration seal components.

##### 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 in compliance with international/national standards.



Hand protection  
Use chemical-resistant gloves.  
Recommended material: butyl rubber, nitrile rubber, fluorinated rubber, PVC.



Eye protection  
Wear protective goggles, safety glasses



Body protection  
Wear protective clothing and non-slip shoes



Safety information for installation of floor penetration seals:

- The area below the floor penetration seal must be cordoned during the installation (warning tape, or sign: danger - falling objects; keep off this area; sealing work underway in the floor above!
- The installer shall inform the client in writing (to be forwarded to the building owners or their agents) that, after the installation, the penetration seal shall be secured against any loading with suitable measures, in particular the access shall be inhibited (e.g. with safety fence or grating).

## PYRO-SAFE Flammotect - double-layer

### 1.2 Scope

The usefulness of the PYRO-SAFE Flammotect - doubled-layer combined penetration seal was determined according to ETAG 026-2 regarding the features "fire performance", "fire resistance", "release of dangerous substances" and "durability and fitness for use".

#### Reaction to fire

The ablative "PYRO-SAFE FLAMMOTECT-A" components comply with reaction to fire performance class E of EN 13501-1; the intumescent "PYRO-SAFE DG-CR" material and „PYRO-SAFE DG-CR BS“ material complies with reaction to fire performance class E of EN 13501-1; the mineral fibre boards comply with reaction to fire performance class A1 and the mineral-fibre mats comply with reaction to fire performance class A2-s1,d0, respectively, of EN 13501-1.

#### Fire resistance

The highest requirements that the PYRO-SAFE Flammotect double-layer system complies with are those of class EI 120 (extension -U/U for plastic pipes; extension -C/U for metal pipes) in accordance with EN 13501-2.

Fire resistance class EI 120-U/U for plastic pipes covers also all other possible ends of pipe in accordance with EN 13501-2. The specified EI-60-C/U fire resistance class for metal pipes covers also the class for the same fire resistance time with extension -C/C.

If 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" and „PYRO-SAFE DG-CR BS“ fabric do not contain any substances identified as dangerous in the list of the European Commission.

The mineral fibre board; the mineral-fibre mat „Klimarock“ 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 fitness for use

The ablative "PYRO-SAFE FLAMMOTECT-A" component and the intumescent "PYRO-SAFE DG-CR" fabric comply with use category X in accordance with EOTA TR 024.

The fire safety characteristics of the PYRO-SAFE Flammotect double-layer system is not affected in any significant way if exposed to indoor (moisture conditions) or outdoor atmospheric agents.

## PYRO-SAFE Flammotect - double-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 floor structure shall be complemented by additional wall struts and bars to form the edge of the opening.

The walls shall 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  $\geq 100$  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  $\geq 100$  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.

#### Massive walls

made of stone, concrete, reinforced concrete or aerated concrete with a density  $\geq 450$  kg/m<sup>3</sup>.

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

#### Massive floors

made of concrete, reinforced concrete or aerated concrete with a density  $\geq 550$  kg/m<sup>3</sup>.

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

#### Lining of opening edge for plasterboard

Alongside the opening edge, there shall be at least 2 x 12.5 mm thick layer of concrete or gypsum based slabs with a fire reaction class A1 or A2 according to EN 13501-1.

#### Applicability of DIN 4102

The classifications according to DIN 4102-2 and according to DIN EN 13501-2, DIN EN 13501-3 and DIN EN 13501-5 are used alternatively for evidence of the required fire resistance rating of a component. (Building Regulations List A Part 1 - Appendix 0.1)

# PYRO-SAFE Flammotect - double-layer

## 1.3 Fire resistance classes in walls

in accordance with Classification Report No. KB 3.2/12-107-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Walls ≥ 100 mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Cables/cable bundles/cable support structures with PYRO-SAFE FLAMMOTECT-A</b> (min. 100 mm length and min. 1.0 mm dry layer thickness); alternatively with wrap PYRO-SAFE DG-CR 1.5								
Cable Ø ≤ 21 mm	●	●	●	●	●	●	●	●
Cable bundles Ø ≤ 100 mm with Cable Ø ≤ 21 mm	●	●	●	●	●	●	●	●
<b>Cables/cable bundles/cable support structures with PYRO-SAFE FLAMMOTECT-A</b> (min. 200 mm length and min. 2.0 mm dry layer thickness); alternatively with wrap PYRO-SAFE DG-CR 1.5								
Cable Ø > 21 mm - Ø ≤ 80 mm	●	●	●	●	●	●	●	●
Cable support structures	●	●	●	●	●	●	●	●
<b>Electrical installation pipes (EIP) made of PE-HD with wrap PYRO-SAFE DG-CR 1.5 (U/U)</b>								
EIP Ø ≤ 32 mm or EIP bundles Ø ≤ 100 mm with EIP Ø ≤ 32 mm, with or without Cable Ø ≤ 21 mm	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation "Kaiflex ST" (C/U)</b>								
Outside Ø = 8.0 mm, insulation thickness 9 mm resp. 18 mm	●	●	●	●	●	●	●	●
Outside Ø ≤ 88.9 mm, insulation thickness 32 mm	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation "Kaiflex ST" (C/U)</b>								
Outside Ø ≤ 170.0 mm, insulation thickness 10 mm resp. 32 mm	●	●	●	-	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with non-combustible "ProRox PS 960" pipe insulation (C/U)</b>								
Outside Ø ≤ 22.0 mm, insulation thickness 30 mm	●	●	●	-	●	●	●	●
Outside Ø ≤ 54.0 mm, insulation thickness 40 mm	●	●	●	-	●	●	●	●
Outside Ø ≤ 88.9 mm, insulation thickness 40 mm	●	●	-	-	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with non-combustible "ProRox PS 960" pipe insulation (C/U)</b>								
Outside Ø ≤ 170.0 mm insulation thickness 40 mm	●	●	-	-	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation "Armaflex Protect" (C/U)</b>								
Outside Ø ≤ 8.0 mm, insulation thickness 16 mm	●	●	●	●	●	●	●	●
Outside Ø > 8.0 mm - ≤ 15.0 mm, insulation thickness 19 mm	●	●	●	-	●	●	●	●
Outside Ø > 15 mm - ≤ 22.0 mm, insulation thickness 20 mm	●	●	●	●	●	●	●	●
Outside Ø > 22 mm - ≤ 28.0 mm, insulation thickness 25 mm	●	●	-	-	●	●	●	●
Outside Ø > 35.0 mm - ≤ 54.0 mm, insulation thickness 25 mm	●	●	●	-	●	●	●	●
Outside Ø > 54 mm - ≤ 88.9 mm, insulation thickness 25 mm	●	●	-	-	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation "Armaflex Protect" (C/U)</b>								
Outside Ø > 88.9 mm - ≤ 170.0 mm, insulation thickness 26 mm (2 x 13 mm)	●	●	●	-	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with non-combustible insulation „lamella mat“ (C/U)</b>								
Outside Ø ≤ 28.0 mm, insulation thickness 20 mm	●	●	●	●	●	●	●	●
Outside Ø > 28.0 mm - ≤ 42.0 mm, insulation thickness 30 mm	●	●	●	●	●	●	●	●
Outside Ø > 42.0 mm - ≤ 54.0 mm, insulation thickness 30 mm*	●	●	●	●	●	●	●	●

\* with additional insulation

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 (11/2016). 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. PYRO-SAFE is a registered trademark of the svt Group, Seevetal.



# PYRO-SAFE Flammotect - double-layer

## 1.3 Fire resistance classes in walls

in accordance with Classification Report No. KB 3.2/12-107-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Walls $\geq 100$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with non-combustible insulation "lamella mat" (C/U)</b>								
Outside $\varnothing > 54.0$ mm - $\leq 88.9$ mm, insulation thickness 40 mm*	●	●	●	●	●	●	●	●
Outside $\varnothing > 88.9$ mm - $\leq 108.0$ mm, insulation thickness 30 mm*	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with non-combustible insulation "lamella mat" (C/U)</b>								
Outside $\varnothing > 108.0$ mm - $\leq 170.0$ mm, insulation thickness 40 mm*	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation "N/H Armaflex" (C/U) with wrap PYRO-SAFE DG-CR 1.5 and additionally „lamella mat“ insulation of various length and thickness</b>								
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 0.8$ mm insulation thickness 9 - 25 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 1.2$ mm insulation thickness 10 - 50 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 2.0$ mm insulation thickness 89 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 28.0$ mm, pipe wall thickness $\geq 1.0$ mm insulation thickness 25 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 28.0$ mm, pipe wall thickness $\geq 1.2$ mm insulation thickness 10 - 50 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 28.0$ mm, pipe wall thickness $\geq 1.5$ mm insulation thickness 51 - 88 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 15.0$ mm - $\leq 28.0$ mm, pipe wall thickness $\geq 2.0$ mm insulation thickness 89 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 28.0$ mm - $\leq 42.0$ mm, pipe wall thickness $\geq 1.2$ - 14.2 mm insulation thickness 10 - 50 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 28.0$ mm - $\leq 42.0$ mm, pipe wall thickness $\geq 1.5$ - 14.2 mm insulation thickness 51 - 88 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 28.0$ mm - $\leq 42.0$ mm, pipe wall thickness $\geq 2.0$ - 14.2 mm insulation thickness 89 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 42.0$ mm - $\leq 54.0$ mm, pipe wall thickness $\geq 1.5$ - 14.2 mm insulation thickness 25 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 42.0$ mm - $\leq 54.0$ mm, pipe wall thickness $\geq 1.5$ - 14.2 mm insulation thickness 26 - 88 mm	●	●	-	-	●	●	-	-

\* with additional insulation

# PYRO-SAFE Flammotect - double-layer

## 1.3 Fire resistance classes in walls

in accordance with Classification Report No. KB 3.2/12-107-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Walls $\geq 100$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation "N/H Armaflex" (C/U)</b> <i>with wrap PYRO-SAFE DG-CR 1.5 and additionally „lamella mat“ insulation of various length and thickness</i>								
Outside $\varnothing > 42.0$ mm - $\leq 54.0$ mm, pipe wall thickness $\geq 2.9$ - 14.2 mm insulation thickness 50 - 89 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 54.0$ mm - $\leq 88.9$ mm, pipe wall thickness $\geq 2.0$ - 14.2 mm insulation thickness 25 - 88 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 54.0$ mm - $\leq 88.9$ mm, pipe wall thickness $\geq 2.9$ - 14.2 mm insulation thickness 50 - 89 mm	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation "N/H Armaflex" (C/U)</b> <i>with wrap PYRO-SAFE DG-CR 1.5 and additionally „lamella mat“ insulation of various length and thickness</i>								
Outside $\varnothing \leq 170.0$ mm pipe wall thickness $\geq 2.9$ - 14.2 mm, insulation thickness 50 - 89 mm	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of copper with combustible insulation "N/H Armaflex" (C/U)</b> <i>with wrap PYRO-SAFE DG-CR 1.5 and additionally „Armaflex Protect“ insulation of various length and thickness</i>								
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 0.8$ mm insulation thickness 9 - 50 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 42.0$ mm, thickness $\geq 1.2$ mm insulation thickness 10 - 50 mm	●	●	●	●	●	●	●	●
<b>Combustible pipes made of PVC-U</b> <i>with wrap PYRO-SAFE DG-CR BS of various length</i>								
Outside $\varnothing \leq 50.0$ mm, (U/U) pipe wall thickness 1.8 - 3.7 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 50.0$ mm - $\leq 110.0$ mm, (U/U) pipe wall thickness 1.9 - 8.2 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 110.0$ mm - $\leq 160.0$ mm, (U/C) pipe wall thickness 2.4 - 11.9 mm	●	●	●	●	●	●	●	●
<b>Combustible pipes made of PE 100, PP-H</b> <i>with wrap PYRO-SAFE DG-CR BS of various length</i>								
Outside $\varnothing \leq 50.0$ mm, (U/U) pipe wall thickness 1.8 - 4.6 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 50.0$ mm - $\leq 110.0$ mm, (U/U) pipe wall thickness 2.0 - 10.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 110.0$ mm - $\leq 160.0$ mm, (U/C) pipe wall thickness 3.0 - 9.5 mm (3.0 - 9.1 mm PP-H)	●	●	●	●	●	●	●	●



# PYRO-SAFE Flammotect - double-layer

## 1.3 Fire resistance classes in walls

in accordance with Classification Report No. KB 3.2/12-107-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Walls $\geq 100$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Multilayer pipes with non-combustible insulation "lamella mat" (U/C)</b>								
Outside $\varnothing \leq 12.0$ mm, pipe wall thickness $\geq 1.6$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 12$ mm - $\leq 32.0$ mm, pipe wall thickness $\leq 3.0$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 32$ mm $\leq 63.0$ mm, pipe wall thickness $\geq 4.5$ mm insulation thickness 30.0 mm	●	●	●	●	●	●	●	●
<b>Multilayer pipes with combustible insulation "Armaflex Protect" (U/C)</b>								
Outside $\varnothing \leq 12.0$ mm, pipe wall thickness $\geq 1.6$ mm insulation thickness 13.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 12.0$ mm - $\leq 32.0$ mm, pipe wall thickness $\geq 3.0$ mm insulation thickness 26.0 mm (2 x 13 mm)	●	●	●	●	●	●	●	●
Outside $\varnothing > 32.0$ mm - $\leq 63.0$ mm, pipe wall thickness $\geq 4.5$ mm insulation thickness 26.0 mm (2 x 13 mm)	●	●	●	●	●	●	●	●
<b>Multilayer pipes with pre-assembled extruded PE-FOAM insulation (U/C)</b> <i>with wrap PYRO-SAFE DG-CR BS and additionally „lamella mat“ insulation of various length and thickness</i>								
Outside $\varnothing \leq 14.0$ mm, pipe wall thickness $\geq 2.0$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 32.0$ mm, pipe wall thickness $\geq 3.0$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
<b>HVAC split line combinations</b> <i>with wrap PYRO-SAFE DG-CR 1.5 and additionally „lamella mat“ insulation</i>								
Double or single pipe made of copper, plastic pipe and accessory line	●	●	●	●	●	●	●	●
<b>„NanoSUN<sup>2</sup>“ with intumescent wrap "PYRO-SAFE DG-CR 1.5"</b>								
DN16 / DN 25 (C/U)	●	●	●	●	●	●	●	●
$\leq$ DN 40 (U/U)	●	●	-	-	●	●	●	●
$\leq$ DN 40 <i>additionally with „lamella mat“ (U/U)</i>	●	●	●	●	●	●	●	●
<b>„speed pipe“ bundled or single pipes, with or w/o glass fibre or micro cables (U/C)</b> <i>with wrap PYRO-SAFE DG-CR 1.5 of various length</i>								
max. 24 No. Outside $\varnothing \leq 7$ max. 7 No. Outside $\varnothing \leq 10$ max. 5 No. Outside $\varnothing \leq 12$	●	●	●	●	●	●	●	●

# PYRO-SAFE Flammotect - double-layer

## 1.4 Fire resistance classes in floors

in accordance with Classification Report No. KB 3.2/12-157-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Floors $\geq 150$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Cables/cable bundles/cable support structures with PYRO-SAFE FLAMMOTECT-A</b> (min. 250 mm length and min. 1.0 mm dry layer thickness); alternatively with wrap PYRO-SAFE DG-CR 1.5								
Cable $\varnothing \leq 21$ mm	●	●	●	●	●	●	●	●
Cable bundle $\varnothing \leq 100$ mm with cable $\varnothing \leq 21$ mm	●	●	●	●	●	●	●	●
<b>Cables/cable bundles/cable support structures with PYRO-SAFE FLAMMOTECT-A</b> (min. 250 mm length and min. 2.0 mm dry layer thickness); alternatively with wrap PYRO-SAFE DG-CR 1.5								
Cable $\varnothing > 21$ mm - $\varnothing \leq 80$ mm	●	●	●	●	●	●	●	●
Cable support structures	●	●	●	●	●	●	●	●
<b>Rigid electrical installation pipe made of PVC-U with wrap PYRO-SAFE DG-CR 1.5 according to EN 61386-21 (U/U)</b>								
Outside $\varnothing \leq 16$ mm	●	●	●	●	●	●	●	●
<b>Flexible electrical installation conduit (conduit) made of PE-HD (U/U)</b>								
Conduit $\varnothing \leq 32$ mm or conduit bundle $\varnothing \leq 100$ mm with conduit $\varnothing \leq 32$ mm each with/without Cable $\varnothing \leq 21$ mm	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation "Kaiflex ST" (C/U)</b>								
Outside $\varnothing \leq 8.0$ mm, insulation thickness 9 mm - 18 mm	●	●	●	●	●	●	●	●
Outside $> 8.0$ mm - $\varnothing < 22.0$ mm, insulation thickness 9 mm - 32 mm	●	●	-	-	●	●	●	●
Outside $\varnothing > 22.0$ mm - $\leq 88.9$ mm, insulation thickness 9 mm - 32 mm additionally with "lamella mat"	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation "Kaiflex ST" (C/U)</b>								
Outside $\varnothing > 88.9$ mm - $\leq 170.0$ mm, insulation thickness 10 mm - 32 mm additionally with "lamella mat"	●	●	●	-	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with non-combustible "ProRox PS 960" pipe insulation (C/U)</b>								
Outside $\varnothing \leq 22.0$ mm, insulation thickness 30 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 54.0$ mm, insulation thickness 40 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 88.9$ mm, insulation thickness 40 mm	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with non-combustible "ProRox PS 960" pipe insulation (C/U)</b>								
Outside $\varnothing \leq 22.0$ mm up to Outside $\varnothing \leq 170.0$ mm	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation "Armaflex Protect" (C/U)</b>								
Outside $\varnothing \geq 8.0$ mm up to Outside $\varnothing < 35$ mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 35$ mm - $\leq 54.0$ mm	●	●	●	-	●	●	●	●
Outside $\varnothing > 54$ mm - $\leq 88.9$ mm	●	●	-	-	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation "Armaflex Protect" (C/U)</b>								
Outside $\varnothing > 88.9$ mm - $\leq 170.0$ mm	●	●	●	-	●	●	●	-
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with non-combustible insulation "lamella mat" (C/U)</b>								
Outside $\varnothing > 15.0$ mm, pipe wall thickness 0.8 - 0.9 mm insulation thickness 20.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 15.0$ mm, pipe wall thickness $\geq 0.8 - 0.9$ mm* insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm, pipe wall thickness $\geq 1.0$ mm* insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 21.5$ mm, pipe wall thickness 0.9 mm insulation thickness 20.0 mm	●	●	●	-	●	●	●	-

\* with additional insulation

# PYRO-SAFE Flammotect - double-layer

## 1.4 Fire resistance classes in floors

in accordance with Classification Report No. KB 3.2/12-157-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Floors $\geq 150$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with non-combustible insulation "lamella mat" (C/U)</b>								
Outside $\varnothing > 15.0$ mm - $\leq 21.5$ mm, pipe wall thickness 0.9 mm* insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 28.0$ mm, pipe wall thickness $\geq 1.0$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 28.0$ mm - $\leq 42.0$ mm, insulation thickness 30.0 mm*	●	●	●	●	●	●	●	●
Outside $\varnothing > 42.0$ mm - $\leq 54.0$ mm, insulation thickness 30.0 mm*	●	●	●	●	●	●	●	●
Outside $\varnothing > 54.0$ mm - $\leq 88.9$ mm, insulation thickness 40.0 mm*	●	●	●	●	●	●	●	●
Outside $\varnothing > 88.9$ mm - $\leq 108.0$ mm, insulation thickness 30.0 mm*	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of steel, stainless steel, cast iron with non-combustible insulation "lamella mat" (C/U)</b>								
Outside $\varnothing > 108.0$ mm - $\leq 170.0$ mm, insulation thickness 60.0 mm*	●	●	●	●	●	●	●	●
Outside $\varnothing > 170.0$ mm - $\leq 332.9$ mm, insulation thickness 60.0 mm*	●	●	●	●	●	●	●	●
<b>Non-combustible pipes made of copper, steel, stainless steel, cast iron with combustible insulation "N/H Armaflex" (C/U) with wrap PYRO-SAFE DG-CR 1.5 and additionally „lamella mat“ insulation of various length and thickness</b>								
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 0.8$ mm insulation thickness 9.0 - 25.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 1.2$ mm insulation thickness 26.0 - 50.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 1.5$ mm insulation thickness 51.0 - 89.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 15.0$ mm - $\leq 28.0$ mm, pipe wall thickness $\geq 1.0$ mm insulation thickness 9.0 - 50.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 28.0$ mm, pipe wall thickness $\geq 1.5$ mm insulation thickness 51.0 - 89.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 28.0$ mm - $\leq 42.0$ mm, pipe wall thickness $\geq 1.2$ mm - 14.2 mm, insulation thickness 10.0 - 50.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 28.0$ mm - $\leq 42.0$ mm, pipe wall thickness $\geq 1.5$ mm - 14.2 mm, insulation thickness 51.0 - 89.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 42.0$ mm - $\leq 54.0$ mm, pipe wall thickness $\geq 1.5$ mm - 14.2 mm, insulation thickness 25.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 42.0$ mm - $\leq 54.0$ mm, pipe wall thickness $\geq 1.5$ mm - 14.2 mm, insulation thickness 26.0 - 89.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 54.0$ mm - $\leq 89.0$ mm, pipe wall thickness $\geq 1.6$ mm - 14.2 mm, insulation thickness 25.0 - 89.0 mm	●	●	●	-	●	●	●	-
<b>Non-combustible pipes made of steel, stainless steel, cast iron with combustible insulation "N/H Armaflex" (C/U) with wrap PYRO-SAFE DG-CR 1.5 and additionally „lamella mat“ insulation of various length and thickness</b>								
Outside $\varnothing > 89.0$ mm - $\leq 170.0$ mm, pipe wall thickness $\geq 2.1$ mm - 14.2 mm, insulation thickness 25.0 - 89.0 mm	●	●	●	-	●	●	●	-

\* with additional insulation

## 1.4 Fire resistance classes in floors

in accordance with Classification Report No. KB 3.2/12-157-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Floors $\geq 150$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Non-combustible pipes made of copper with combustible insulation "N/H Armaflex" (C/U)</b> <i>with wrap PYRO-SAFE DG-CR 1.5 and additionally „lamella mat“ insulation of various length and thickness</i>								
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 0.8$ mm, insulation thickness 9.0 - 19.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 15.0$ mm, pipe wall thickness $\geq 1.2$ mm, insulation thickness 20.0 - 50.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 15.0$ mm - $\leq 42.0$ mm, pipe wall thickness $\geq 1.2$ mm, insulation thickness 10.0 - 50.0 mm	●	●	●	●	●	●	●	●
<b>Combustible pipes made of PVC-U</b> <i>with wrap PYRO-SAFE DG-CR BS of various length</i>								
Outside $\varnothing \leq 50.0$ mm (U/U) pipe wall thickness 1.8 mm - 3.7 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 50.0$ mm - $\leq 110.0$ (U/U) pipe wall thickness 1.9 mm - 8.2 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 110.0$ mm - $\leq 160.0$ (U/C) pipe wall thickness 2.4 mm - 11.9 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 110.0$ mm - $\leq 160.0$ (U/C) pipe wall thickness 3.2 mm	●	●	●	●	●	●	●	●
<b>Combustible pipes made of PE-100</b> <i>with wrap PYRO-SAFE DG-CR BS of various length</i>								
Outside $\varnothing \leq 50.0$ mm (U/U) pipe wall thickness 1.8 mm - 4.6 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 50.0$ mm - $\leq 90.0$ mm (U/U) pipe wall thickness 2.0 mm - 2.7 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 50.0$ mm - $\leq 90.0$ mm (U/U) pipe wall thickness 2.8 mm - 7.3 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 90.0$ mm - $\leq 100.0$ mm (U/U) pipe wall thickness 2.6 mm - 2.7 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 90.0$ mm - $\leq 100.0$ mm (U/U) pipe wall thickness 2.8 mm - 10.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 100.0$ mm - $\leq 110.0$ mm (U/U) pipe wall thickness 2.7 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 100.0$ mm - $\leq 110.0$ mm (U/U) pipe wall thickness 2.8 mm - 10.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing > 110.0$ mm - $\leq 120.0$ mm (U/C) pipe wall thickness 3.0 mm - 4.1 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 110.0$ mm - $\leq 120.0$ mm (U/C) pipe wall thickness 4.2 mm - 9.5 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 120.0$ mm - $\leq 130.0$ mm (U/C) pipe wall thickness 3.2 mm - 5.4 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 120.0$ mm - $\leq 130.0$ mm (U/C) pipe wall thickness 5.5 mm - 9.5 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 130.0$ mm - $\leq 140.0$ mm (U/C) pipe wall thickness 3.5 mm - 6.8 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 130.0$ mm - $\leq 140.0$ mm (U/C) pipe wall thickness 6.9 mm - 9.5 mm	●	●	●	-	●	●	●	-

# PYRO-SAFE Flammotect - double-layer

## 1.4 Fire resistance classes in floors

in accordance with Classification Report No. KB 3.2/12-157-2 and with Classification Report No. 02417/14/Z00NP

Fire rating								
	Floors $\geq 150$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Combustible pipes made of PE-100</b>								
<i>with wrap PYRO-SAFE DG-CR BS of various length</i>								
Outside $\varnothing > 140.0$ mm - $\leq 150.0$ mm (U/C) pipe wall thickness 3.7 mm - 8.1 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 140.0$ mm - $\leq 150.0$ mm (U/C) pipe wall thickness 8.2 mm - 9.5 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 150.0$ mm - $\leq 160.0$ mm (U/C) pipe wall thickness 4.0 mm - 9.4 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 145.0$ mm - $\leq 150.0$ mm (U/C) pipe wall thickness 9.5 mm	●	●	●	-	●	●	●	-
<b>Combustible pipes made of PP-H with wrap PYRO-SAFE DG-CR BS of various length</b>								
Outside $\varnothing \leq 50.0$ mm (U/U); pipe wall thickness 1.8 mm - 4.6 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 50.0$ mm - $\leq 60.0$ mm (U/U) pipe wall thickness 2.0 mm - 2.4 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 50.0$ mm - $\leq 60.0$ mm (U/U) pipe wall thickness 2.5 mm - 4.9 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 50.0$ mm - $\leq 60.0$ mm (U/U) pipe wall thickness 5.0 mm - 7.3 mm	●	-	-	-	●	-	-	-
Outside $\varnothing > 60.0$ mm - $\leq 70.0$ mm (U/U) pipe wall thickness 2.1 mm; 5.4 mm - 7.3 mm	●	-	-	-	●	-	-	-
Outside $\varnothing > 60.0$ mm - $\leq 70.0$ mm (U/U) pipe wall thickness 2.2 mm - 3.0 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 60.0$ mm - $\leq 70.0$ mm (U/U) pipe wall thickness 3.1 mm - 5.3 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 70.0$ mm - $\leq 80.0$ mm (U/U) pipe wall thickness 2.3 mm; 5.8 mm - 7.3 mm	●	-	-	-	●	-	-	-
Outside $\varnothing > 70.0$ mm - $\leq 80.0$ mm (U/U) pipe wall thickness 2.4 mm - 3.7 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 70.0$ mm - $\leq 80.0$ mm (U/U) pipe wall thickness 3.8 mm - 5.7 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 80.0$ mm - $\leq 90.0$ mm (U/U) pipe wall thickness 2.4 mm - 2.5 mm; 6.2 mm - 10.0 mm	●	-	-	-	●	-	-	-
Outside $\varnothing > 80.0$ mm - $\leq 90.0$ mm (U/U) pipe wall thickness 2.6 mm - 4.4 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 80.0$ mm - $\leq 90.0$ mm (U/U) pipe wall thickness 4.5 mm - 6.1 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 90.0$ mm - $\leq 100.0$ mm (U/U) pipe wall thickness 2.6 mm - 2.7 mm; 6.6 mm - 10.0 mm	●	-	-	-	●	-	-	-
Outside $\varnothing > 90.0$ mm - $\leq 100.0$ mm (U/U) pipe wall thickness 4.2 mm - 9.5 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 90.0$ mm - $\leq 100.0$ mm (U/U) pipe wall thickness 2.8 mm - 5.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 100.0$ mm - $\leq 110.0$ mm (U/U) pipe wall thickness 2.7 mm - 2.9 mm; 7.1 mm - 10.0 mm	●	-	-	-	●	-	-	-
Outside $\varnothing > 100.0$ mm - $\leq 110.0$ mm (U/U) pipe wall thickness 3.0 mm - 5.7 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 100.0$ mm - $\leq 110.0$ mm (U/U) pipe wall thickness 5.8 mm - 7.0 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 110.0$ mm - $\leq 120.0$ mm (U/C) pipe wall thickness 3.2 mm - 6.3 mm; 7.5 mm - 9.0 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 110.0$ mm - $\leq 120.0$ mm (U/C) pipe wall thickness 6.4 mm - 7.4 mm; 9.1 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 120.0$ mm - $\leq 130.0$ mm (U/C) pipe wall thickness 3.4 mm - 7.0 mm; 7.9 mm - 9.0 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 120.0$ mm - $\leq 130.0$ mm (U/C) pipe wall thickness 7.1 mm - 7.8 mm; 9.1 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 130.0$ mm - $\leq 140.0$ mm (U/C) pipe wall thickness 3.6 mm - 7.7 mm; 8.3 mm - 9.0 mm	●	●	-	-	●	●	-	-



## PYRO-SAFE Flammotect - double-layer

### 1.4 Fire resistance classes in floors

in accordance with Classification Report No. KB 3.2/12-157-2 and with Classification Report No. 02417/14/Z00NP

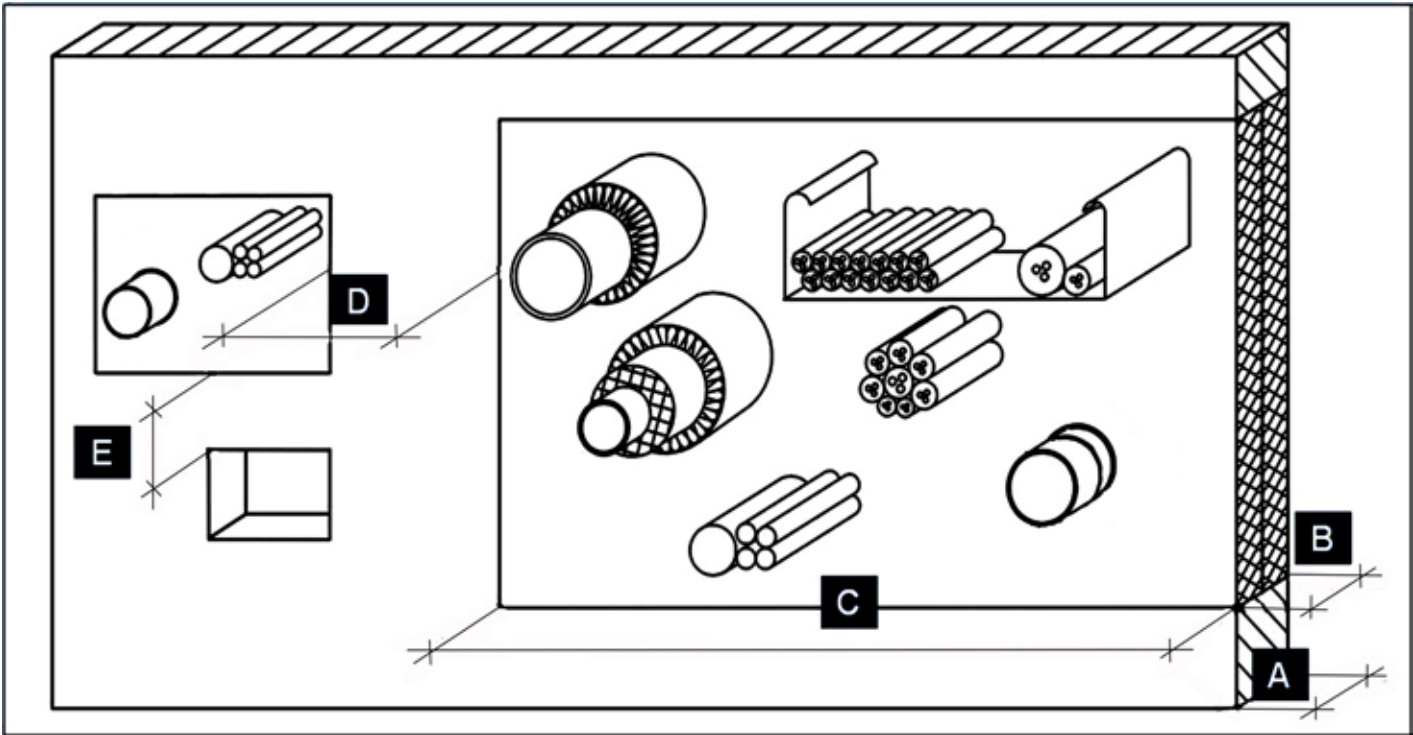
Fire rating								
	Floors $\geq 150$ mm							
	Fire resistance classes							
	EI 45	EI 60	EI 90	EI 120	E 45	E 60	E 90	E 120
<b>Combustible pipes made of PP-H with wrap PYRO-SAFE DG-CR BS of various length</b>								
Outside $\varnothing > 130.0$ mm - $\leq 140.0$ mm (U/C) pipe wall thickness 7.8 mm - 8.2 mm; 9.1 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 140.0$ mm - $\leq 150.0$ mm (U/C) pipe wall thickness 3.8 mm - 8.3 mm; 8.7 mm - 9.0 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 140.0$ mm - $\leq 150.0$ mm (U/C) pipe wall thickness 8.4 mm - 8.6 mm; 9.1 mm	●	●	●	-	●	●	●	-
Outside $\varnothing > 150.0$ mm - $\leq 160.0$ mm (U/C) pipe wall thickness 4.0 mm - 9.0 mm	●	●	-	-	●	●	-	-
Outside $\varnothing > 150.0$ mm - $\leq 160.0$ mm (U/C) pipe wall thickness 9.1 mm	●	●	●	-	●	●	●	-
<b>Multilayer pipes with non-combustible insulation "lamella mat" (U/C)</b>								
Outside $\varnothing \leq 12.0$ mm, pipe wall thickness $\geq 1.6$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 32$ mm, pipe wall thickness $\geq 3.0$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 63.0$ mm, pipe wall thickness $\geq 4.5$ mm insulation thickness 30.0 mm	●	●	●	●	●	●	●	●
<b>Multilayer pipes with combustible insulation "Armaflex Protect" (U/C)</b>								
Outside $\varnothing \leq 12.0$ mm, pipe wall thickness $\geq 1.6$ mm insulation thickness 13.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 32$ mm, pipe wall thickness $\geq 3.0$ mm insulation thickness 26.0 mm (2 x 13 mm)	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 63.0$ mm, pipe wall thickness $\geq 4.5$ mm insulation thickness 26.0 mm (2 x 13 mm)	●	●	●	●	●	●	●	●
<b>Multilayer pipes with pre-assembled extruded PE-FOAM insulation (U/C) with wrap PYRO-SAFE DG-CR BS and additionally „lamella mat“ insulation of various length and thickness</b>								
Outside $\varnothing \leq 14.0$ mm, pipe wall thickness $\geq 2.0$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
Outside $\varnothing \leq 32.0$ mm, pipe wall thickness $\geq 3.0$ mm insulation thickness 20.0 mm	●	●	●	●	●	●	●	●
<b>"NanoSUN" (C/U) with intumescent wrap "PYRO-SAFE DG-CR 1.5"</b>								
DN16 / DN 25 /40	●	●	●	●	●	●	●	●



PYRO-SAFE Flammotect - double-layer

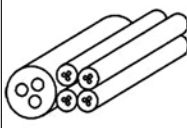
1.5 Scope

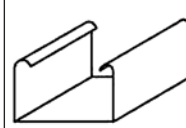
Dimensions			
Item	Designation	Wall [mm]	Ceiling [mm]
A	Structural element thickness	≥ 100	≥ 150
B	Partition thickness	≥ 120	≥ 150
C	Maximum dimensions of the component opening (width x height)	1400 x 2000	1400 x 2000
D	Distance to other openings or installations	≥ 200	≥ 200
E	Reduced distance to adjacent structural openings for partitions in accordance with ETA-13/0903 if both openings ≤ 400 mm x 400 mm	≥ 100	≥ 100

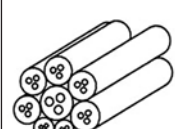



## PYRO-SAFE Flammotect - double-layer

### 2.1 Allowed services of cables

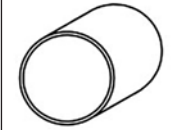
	<b>Electric cables and lines of all types (including optical fibre cables)</b> Single cable $\varnothing \leq 80$ mm
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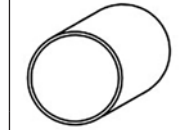
	<b>Cable supports</b> Perforated and non-perforated cable ducts and ladders made of steel, with organic coating if applicable, as long as the fire reaction class complies at least with class A2 according to EN 13501-1.
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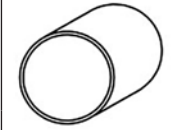
	<b>Cable bundles</b> $\varnothing \leq 100$ mm, single cable $\varnothing \leq 21$ mm. No filling needed for tightly compressed and tied bundles
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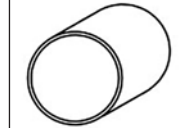
	<b>Electrical conduits</b> Flexible flame-retardant single conduit, outside $\varnothing \leq 32$ mm, or bundle, outside $\varnothing \leq 100$ mm, made of PE-HD, with or without cable service (single cable $\varnothing \leq 21$ mm), with the classification 223222 and according to EN 61386-22
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### 2.2 Allowed services of combustible pipes

	<b>Combustible pipes</b> pipes made of <b>PVC-U</b> , in accordance with EN ISO 15493:2003, EN ISO 1452-1:2009, DIN 8061:2009 and DIN 8062:2009 or PVC-C acc. to EN 1566-1	
	outside $\varnothing$ [mm]	pipe wall thickness [mm]
	$\leq 50$	1.8 – 3.7
	$> 50 - \leq 80$	1.9 - 6.0
	$> 80 - \leq 110$	2.1 - 8.2
	$> 110 - \leq 160$	2.4 - 11.9


	<b>Combustible pipes</b> pipes made of <b>PP-H</b> in accordance with EN ISO 15874:2013, DIN 8077:2007 and DIN 8078:2007.	
	outside $\varnothing$ [mm]	pipe wall thickness [mm]
	$\leq 50$	1.8 – 4.6
	$> 50 - \leq 80$	2.0 - 7.3
	$> 80 - \leq 110$	2.4 - 10.0
	$> 110 - \leq 160$	3.0 - 9.1

	<b>Combustible pipes</b> pipes made of <b>PE 100</b> in accordance with EN ISO 1555-2:2010, EN 12201-2:2011+A1:2013, DIN 8074:2011 and DIN 8075:2011.	
	outside $\varnothing$ [mm]	pipe wall thickness [mm]
	$\leq 50$	1.8 – 4.6
	$> 50 - \leq 80$	2.0 - 7.3
	$> 80 - \leq 110$	2.4 - 10.0
	$> 110 - \leq 160$	3.0 - 9.5

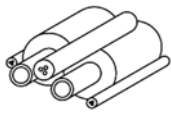
	<b>Combustible pipes</b> Multilayer pipe „Henco STANDARD“ pipes made of <b>PE-Xc/AL/PE-Xc without insulation made of PE foam</b> according with EN 14313.	
	outside $\varnothing$ [mm]	pipe wall thickness [mm]
	$\leq 12$	1.6
	$\leq 32$	3.0
	$\leq 63$	4.5
	Multilayer pipe „Henco STANDARD“ made of <b>PE-Xc/AL/PE-Xc with insulation made of PE foam</b> in accordance with EN 14313.	
	$\leq 14$	2.0
	$\leq 32$	3.0

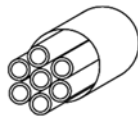
# PYRO-SAFE Flammotect - double-layer

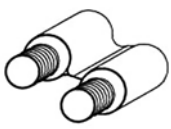
## 2.2 Allowed services of non-combustible pipes

	<b>Non-combustible pipes</b> Pipes arranged perpendicular to the partition surface made of steel, stainless steel, cast steel or copper	
	Pipe materials / insulation	Outside Ø [mm]
	Steel, stainless steel, cast iron with „ProRox PS 960“ non-combustible pipe insulation made of mineral fibre pipe shell	≤ 170.0
	Copper with non-combustible „ProRox PS 960“ pipe insulation made of mineral fibre pipe shell	≤ 88.9
	Steel, stainless steel, cast iron, copper with „Kaiflex ST“ combustible insulation	≤ 88.9
	Steel, stainless steel, cast iron, copper with „Armaflex Protect“ combustible insulation	≤ 35.0
	Copper with „lamella mat“ non-combustible insulation	≤ 108.0
	Steel, stainless steel, cast iron with „lamella mat“ non-combustible insulation	≤ 170.0
	Wall	≤ 332.9
	Floor	≤ 332.9
	Copper with „NH/Armaflex“ combustible insulation	≤ 88.9
	Steel, stainless steel, cast iron with „NH/Armaflex“ combustible insulation	≤ 170.0

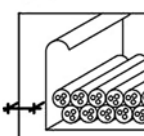
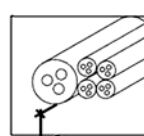
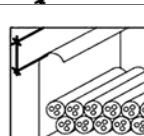
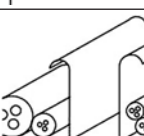
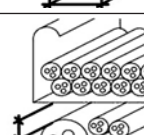
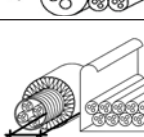
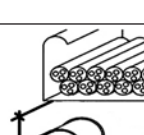
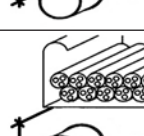
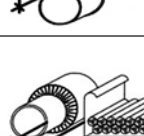
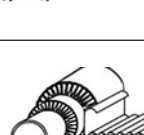
## 2.3 Further allowed services


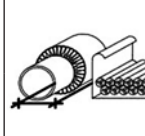
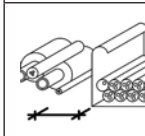
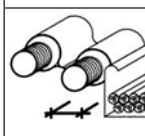
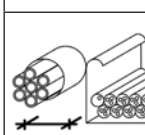
	<b>HVAC split line combinations</b> E.g. „Tubolit DuoSplit“ or „Tubolit Split“ by Armacell or any other manufacture with same characteristics. Double or single copper pipe (Ø 6 - 10 mm/ Ø 6 - 18 mm or Ø 6 - 22 mm) and 9 mm thick insulation made of PE foam according to EN14313 with an accessory line (1.8 mm - 3.5 mm thick plastic pipe (U/U) made of PVC-U, outside Ø 25 mm, according to EN1453-1 or EN1452-1 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) without spacing.
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	<b>PE „speed pipe“ lines (for glass fibre cables) and micro-cables</b> Single cables or bundles with or w/o glass fibre cable by Firma 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

	<b>"NanoSUN" double solar pipes</b> 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 (DN 40 only for floors).
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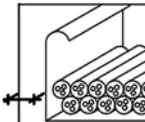
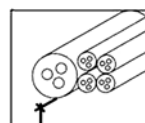
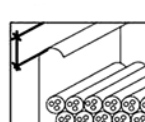
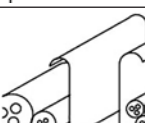
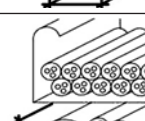
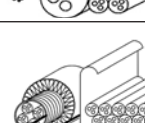
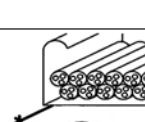
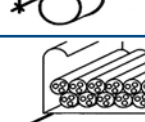
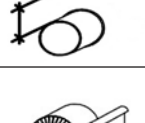
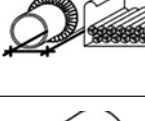
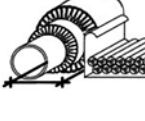
### 3. Spacing requirements for massive wall, plasterboard and floor

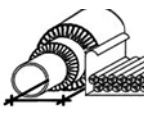
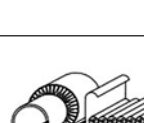
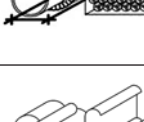
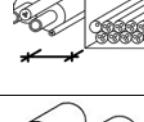

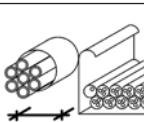

Cables / cable bundles / cable support structure with PYRO-SAFE FLAMMOTECT-A coating		[mm]
	Distance to the side edge	≥ 0
	Distance to the lower edge	≥ 0
	Distance to the upper edge	≥ 0
	Distance between support structures	≥ 0
	Distance from each other	≥ 0
	Distance to electrical installation pipes (EIP)	≥ 25
	Distance to combustible pipes	≥ 25
	Distance to multilayer pipes in walls	≥ 20
	in floors	≥ 0
	Distance to non-combustible pipes	≥ 100
	Distance to non-combustible pipes with additional „Armaflex NH“ and additional insulation „lamella mat“ in walls	≥ 75
	in floors	≥ 0


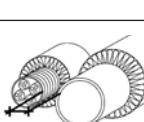
Cables / cable bundles / cable support structure with PYRO-SAFE FLAMMOTECT-A coating		[mm]
	Distance to non-combustible pipes with „Armaflex NH“ and additional insulation „Armaflex Protect“ in walls	≥ 100
	in floors	≥ 0
	Distance to non-combustible pipes with insulation „lamella mat“ in walls	≥ 0
	in floors	≥ 50
	Distance to HVAC split line combination	≥ 0
	Distance to „NanoSUN“ <sup>2</sup> - double solar pipes	≥ 30
	Distance to speed pipe bundles	≥ 25

## PYRO-SAFE Flammotect - double-layer

### 3. Spacing requirements for massive wall, plasterboard and floor

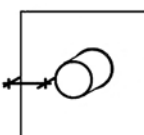
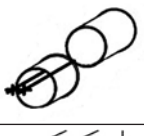
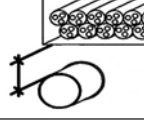
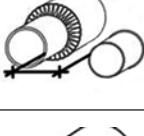
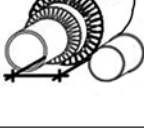
Cables / cable bundles / cable support structure with wrap PYRO-SAFE DG-CR 1.5		[mm]
	Distance to the side edge	$\geq 0$
	Distance to the lower edge	$\geq 0$
	Distance to the upper edge	$\geq 0$
	Distance between support structures	$\geq 0$
	Distance from each other	$\geq 0$
	Distance to electrical installation pipes (EIP)	$\geq 25$
	Distance to combustible pipes	$\geq 25$
	Distance to multilayer pipes in walls	$\geq 20$
	in floors	$\geq 0$
	Distance to non-combustible pipes	$\geq 100$
	Distance to non-combustible pipes with „Armaflex NH“ and additional insulation „lamella mat“	$\geq 0$

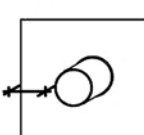


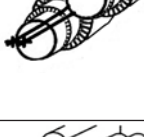
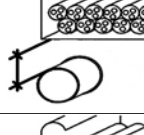
Cables / cable bundles / cable support structure with wrap PYRO-SAFE DG-CR 1.5		[mm]
	Distance to non-combustible pipes with „Armaflex NH“ and additional insulation „Armaflex Protect“ in walls	$\geq 100$
	in floors	$\geq 0$
	Distance to non-combustible pipes with „lamella mat“ insulation in walls	$\geq 0$
	in floors	$\geq 50$
	Distance to HVAC split line combination	$\geq 0$
	Distance to „NanoSUN“ <sup>2</sup> - double solar pipes	$\geq 30$
	Distance to speed pipe bundles	$\geq 25$

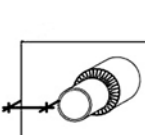
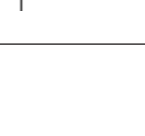




Electrical installation pipes (EIP)		[mm]
	Distance to each other	$\geq 25$
	Distance to non-combustible pipes with insulation „lamella mat“	$\geq 60$



### 3. Spacing requirements for massive wall, plasterboard and floor

Combustible pipes		[mm]
	Distance to the side edge	≥ 0
	Distance to each other	≥ 25
	Distance to cable / cable bundles / support structures	≥ 25
	Distance to non combustible pipes	≥ 100
	Distance to non-combustible pipes „Armaflex NH“ and additional insulation „lamella mat“ in walls	≥ 40
	in floors	≥ 50

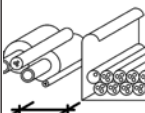
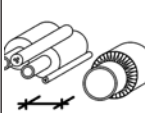
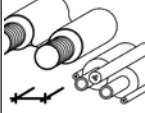
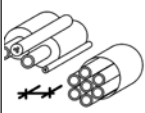
Multilayer pipes		[mm]
	Distance to the side edge with protective insulation „lamella mat“	≥ 0
	with protective insulation „Armaflex Protect“	
	with insulation PE foam and insulation „lamella mat“	
	Distance to each other with protective insulation „lamella mat“	≥ 0
	with protective insulation „Armaflex Protect“	
	Distance between pipes with „lamella mat“- and pipes with protective insulation „Armaflex Protect“	≥ 50
	Distance between pipes with insulation PE foam and protective insulation „lamella mat“	≥ 0
	Distance between pipes with insulation PE foam and protective insulation „lamella mat“ to pipes with insulation with PE foam and protective insulation „Armaflex Protect“	≥ 100
	Distance to cables/ cable bundles/ cable structures in walls	≥ 20
	in floors	≥ 0
	with insulation PE foam and protective insulation „lamella mat“ distance to cables/ cable bundles/ cable structures in walls	≥ 25

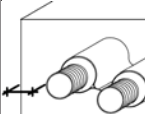
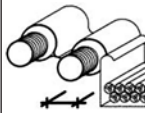


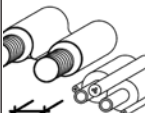
Non-combustible pipes		[mm]
	Distance to the side edge	≥ 50
	with insulation „lamella mat“	≥ 0
	with „Armaflex NH“ and additional insulation „lamella mat“ or additional insulation „Armaflex Protect“	
	Distance between pipes with insulation made of „Kaiflex ST“ without protective insulation	≥ 60
	with protective insulation	≥ 0
	Distance between pipes with insulation „lamella mat“	
	Distance between pipes with „Armaflex NH“ and additional insulation „lamella mat“	
	Distance between pipes with „Armaflex NH“ and additional insulation „Armaflex Protect“	≥ 60
	Distance between pipes with mineral fibre pipe shells „ProRox PS 960“ (RS 880)“	
	Distance between pipes with insulation „Armaflex Protect“	≥ 0
	Distance between pipes with „Armaflex NH“ and additional insulation „Armaflex Protect“ and pipes with „Armaflex NH“ and additional insulation „lamella mat“	≥ 25
	Distance between pipes with „Armaflex NH“ and additional insulation „Armaflex Protect“ and pipes with insulation „lamella mat“	≥ 100
	Distance between non-combustible pipes with different pipe sheaths	≥ 100
	Distance to cables/ cable bundles/ support structures	≥ 100
	Distance to combustible pipes	≥ 100
	Distance between non-combustible pipes with „Armaflex NH“ and additional insulation „Klimarock“ to combustible pipes	≥ 40

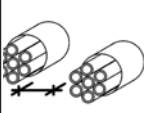
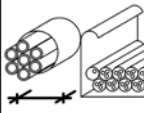
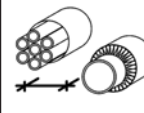
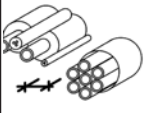
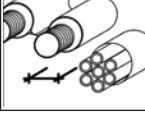


## PYRO-SAFE Flammotect - double-layer

### 3. Spacing requirements for massive wall, plasterboard and floor


HVAC split line combination	[mm]
 Distance to cables / cable bundles / support structures in walls	≥ 0
 Distance to non-combustible pipes with insulation „Klimarock“	≥ 0
 Distance to NanoSun²- double solar pipes	≥ 25
 Distance to speed pipes	≥ 100


„NanoSUN²“ - double solar pipes	[mm]
 Distance to the side edge	≥ 100
 Distance to cable / cable bundles / support structures in walls	≥ 30
 Distance to non-combustible pipes with insulation „Klimarock“	≥ 50
 Distance to speed pipes	≥ 100
 Distance to HVAC split line combination	≥ 25


„speed pipe“ PE lines for glass fibre cable and microcables	[mm]
 Distance to each other	≥ 0
 Distance to cable/ cable bundles/ support structures	≥ 0
 Distance to non-combustible pipes with insulation „Klimarock“	≥ 100
 Distance to HVAC split line combination	≥ 100
 Distance to NanoSun²- double solar pipes	≥ 100


not listed spacings ≥ 100

## 4. Used products


	<p><b>PYRO-SAFE FLAMMOTECT- A Coating</b></p> <p>Reaction to fire class according to EN 13501-1: Class E 12.5 kg pail - Part No. 01155101</p>
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	<p><b>PYRO-SAFE FLAMMOTECT- A Solid emulsion</b></p> <p>Reaction to fire class according to EN 13501-1: Class E 12.5 kg pail - Part No. 01155106</p>
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	<p><b>PYRO-SAFE FLAMMOTECT- A Filler</b></p> <p>Reaction to fire class according to EN 13501-1: Class E 12.5 kg pail - Part No. 01155104</p>
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	<p><b>PYRO-SAFE FLAMMOTECT- A Filler</b></p> <p>Reaction to fire class according to EN 13501-1: Class E 310 ml cartridge - Part No. 01155115</p>
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	<p><b>PYRO-SAFE DG-CR 1.5</b></p> <p>Wrap for cables, conduits and pipes according to ETA-13/0100</p> <p>Reaction to fire class according to EN 13501-1: Class E Intumescent material for wrapping cables and pipes of various widths</p>
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	<p><b>PYRO-SAFE DG-CR BS</b></p> <p>Wrap for combustible pipes</p> <p>Reaction to fire class according to EN 13501-1: Class E Intumescent material for wrapping combustible pipes - Art.-Nr. 01264100</p>
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	<p><b>Mineral fibre board (MFB) in accordance with DIN EN 13162</b></p> <p>"Hardrock 040"</p> <p>Reaction to fire class according to EN 13501-1: Class A1 size 1000 x 600 x 60 mm</p> <p>It is allowed to apply any mineral fibre boards if they match the following requirements: density <math>\geq 150 \text{ kg / m}^3</math> Reaction to fire class A1 in accordance with EN 13501-1 Melting point <math>\geq 1000^\circ\text{C}</math>. Thickness = 60 mm</p>
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	<p><b>Mineral fibre board (MFB)</b></p> <p>Pre-coated on one side with PYRO-SAFE FLAMMOTECT - A size 1000 x 600 x 60 mm Part No. 01181160</p>
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	<p><b>Mineral wool</b></p> <p>in accordance with abZ Z-23.15-1468 Reaction to fire class according to EN 13501-1: A1 Melting point <math>\geq 1000^\circ\text{C}</math> 10 kg bag - Part No. 01183000</p>
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	<p><b>"KLIMAROCK" lamella mat</b></p> <p>in accordance with abZ Z-23.14-1115 Reaction to fire class according to EN 13501-1: Class A2-s1 d0 Dimensions <math>\geq 800 \times 50 \text{ cm}</math> Thickness 30 mm 4 m<sup>2</sup> roll - Part No. 01187100</p> <p>It is allowed to apply any lamella mats/ mineral fibre mats/ mineral fibre pipe shell if they match the following requirements: density = <math>40 \text{ kg/g}^3</math> 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</p>
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	<p><b>Label</b></p> <p>1 piece - Part No. 01229000</p>
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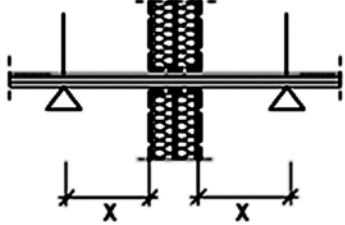
# PYRO-SAFE Flammotect - double-layer

## 5. Regulations and variants

- The combined penetration seal may be used to seal openings without installations (so-called reserve partition).
- 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.
- If installing in plasterboard, the inside edge shall be completely lined.
- In floor installations, the protection insulation "lamella mat" shall be secured from slipping with additional wire mesh hooks.
- The penetration seal mineral fibre surface and 20 mm around on the wall/floor edges shall be coated with a layer of PYRO-SAFE FLAMMOTECT-A with a dry film thickness  $\geq 1.0$  mm.
- The fire protection measures are shown on the following pages and apply also for post-installations.

### 5.1 Rules over the first cable/pipe supports

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

First supports for wall installations		X [mm]
	Cables/cable bundles/cable support structures	Walls $\leq 500$
		Floors $\leq 250$
	electrical installation pipes (EIP)	$\leq 500$
	Combustible pipes	$\leq 400$
	Non-combustible pipes with „lamella mat“, „Armaflex Protect“, „Armaflex NH“	$\leq 1000$
	Non-combustible pipes with „Armaflex N/H“ + „Armaflex Protect“	$\leq 800$
	Multilayer pipes „Henco STANDARD“	$\leq 550$
	„NANOSUN 2“ double solar pipes	$\leq 500$
	HVAC split line combination	$\leq 550$
	„speed pipes“ PE lines for glass fibre cables and microcables	*

\* The manufacturer's installation instructions are applied.

## PYRO-SAFE Flammotect - double-layer

### 6.1 Cables in walls

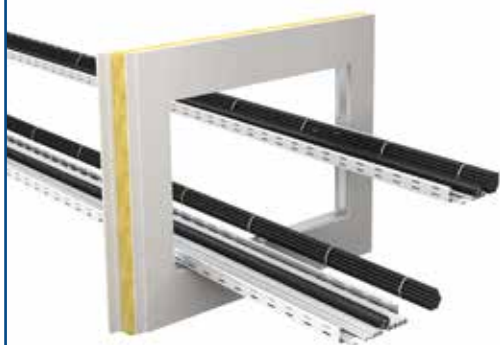
Suitable positions of the mineral fibre board (MFB) Wall  $\geq 100$  mm



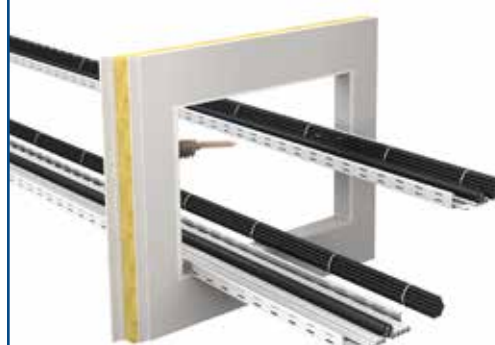
Suitable positions of the mineral fibre board (MFB) Wall  $\geq 120$  mm



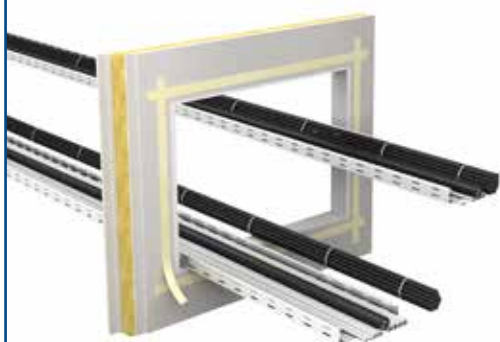
1. Opening with penetrations



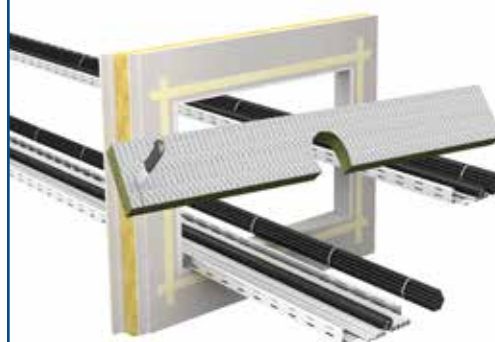
2. Clean the inside edge (edge planking is not supplied by the manufacturer)



3. Place the masking tape around the opening at a distance of 20 mm to the edge



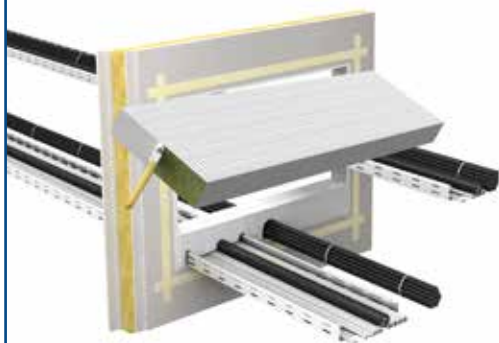
4. Cut mineral fibre boards to the needed size (provide openings for cables and cable ducts)



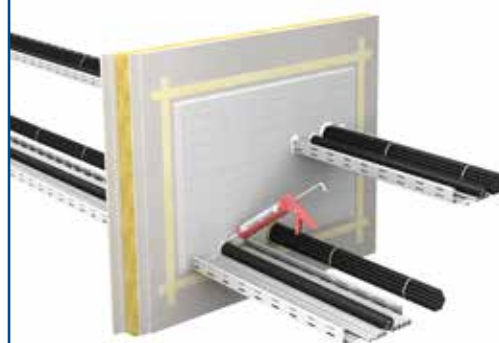
## PYRO-SAFE Flammotect - double-layer

### 6.1 Cables in walls

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



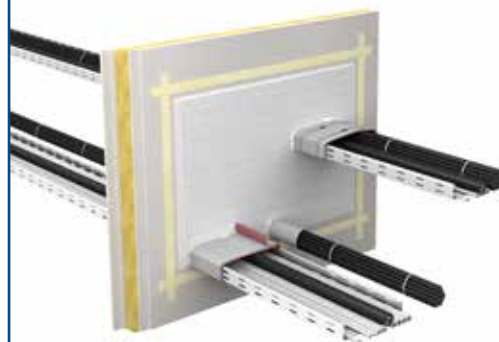
6. Fill remaining gaps with mineral fibre wool or seal with PYRO-SAFE FLAMMOTECT-A.



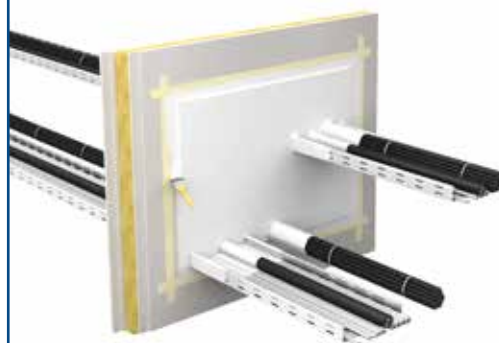
7a. Coat the cables with PYRO-SAFE FLAMMOTECT-A (for details see p.26) for a length of 100-200 mm (dry film thickness of 1-2 mm)



7b. Alternatively to step 2., wind cables, cable bundles and cable support structures with PYRO-SAFE DG-CR 1.5 (For details see p.26)



8. Apply a final PYRO-SAFE FLAMMOTECT-A coating.

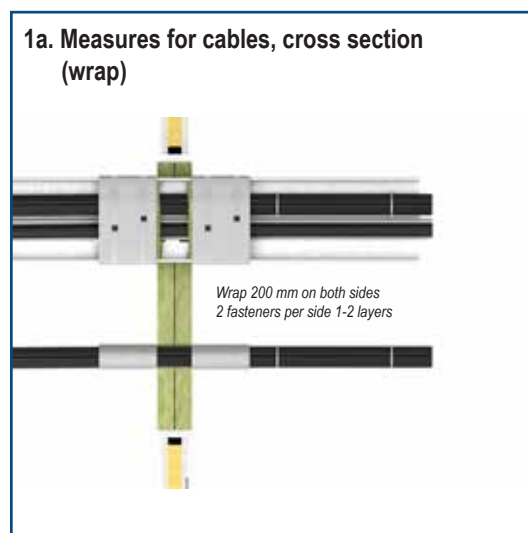
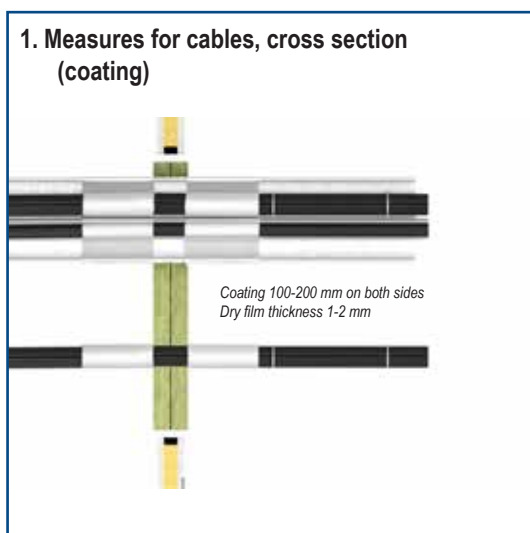


9. If required or mandatory, fill the identification label and apply on the side or above (not below!) the installation.



# PYRO-SAFE Flammotect - double-layer

## 6.1 Cables in walls



Measures for wall penetration seals (per side)							
	Type	Dry film thickness/ wrap width [mm]	Length inside/ outside partition surface [mm]		Amount of layers	Overlap [mm]	Amount of steel wire fasteners
Annular gap and joint sealing							
Annular gap ≤ 4 mm	Filler/ Coating	-	60	-	-	-	-
Annular gap > 2 mm - 50 mm	Loose wool						
Cables, cable bundles, cable support structures							
Cables Ø ≤ 21 mm	PYRO-SAFE FLAMMOTECT-A coating	1.0	-	≥ 100	-		
Cable bundles Ø ≤ 100 mm mit Cables Ø ≤ 21 mm							
cables Ø > 21 mm - Ø ≤ 80 mm		2.0	-	≥ 200	-		
cable support structures							
Fire protection wrap as an alternative to fire protection coating							
cables Ø ≤ 21 mm	PYRO-SAFE DG- CR 1.5 wrap	200	-	200	1	≥ 60	2
cable bundles Ø ≤ 100 mm with cables Ø ≤ 21 mm				-			
cables Ø > 21 mm - Ø ≤ 80 mm				-	2		
cable support structures							
Conduit Ø ≤ 32 mm or conduit bundle Ø ≤ 100 mm		125	50	75	3	-	1



## PYRO-SAFE Flammotect - double-layer

### 6.2 Pipes in walls

Suitable positions of the mineral fibre board (MFB) Wall  $\geq 100$  mm



Suitable positions of the mineral fibre board (MFB) Wall  $\geq 120$  mm



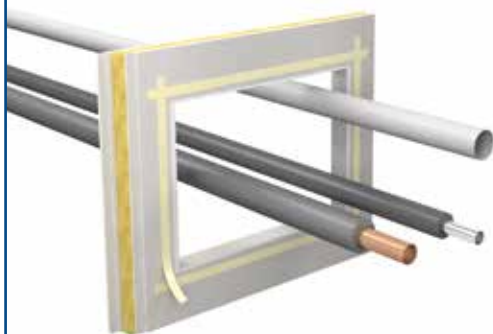
1. Opening with penetrations



2. Clean the inside edge (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.

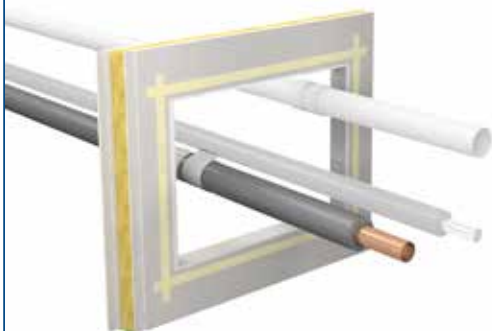


4. Wrap combustible pipes with PYRO-SAFE DG-CR BS (For details see p. 29)

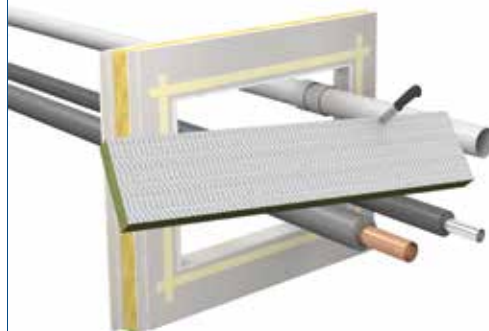


## 6.2 Pipes in walls

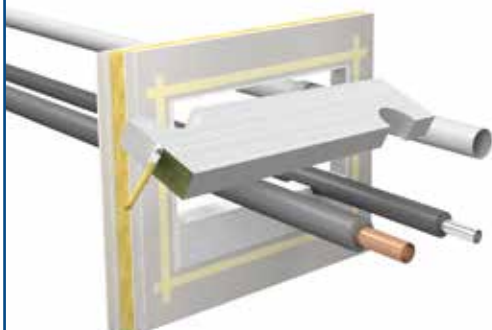
**4a. Non-combustible pipes with combustible insulation must be wrapped with PYRO-SAFE DG-CR 1.5 (For details see p. 30/31)**



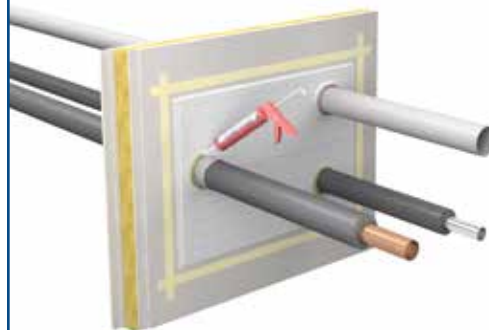
**5. Cut mineral fibre boards to the needed size (provide openings for cables, cable ducts and, if applicable, for pipes).**



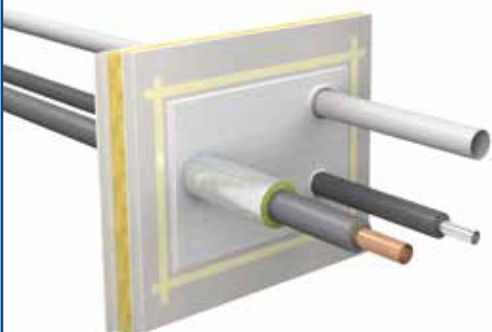
**6. Apply PYRO-SAFE FLAMMOTECT-A to the cut faces of the mineral fibre board and insert flush and tightly the board into the opening.**



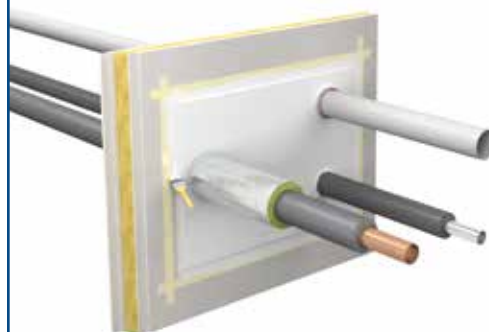
**7. Fill remaining gaps with mineral fibre wool or seal with PYRO-SAFE FLAMMOTECT-A.**



**8. Supply non-combustible pipes with combustible insulation and additionally with "lamella mat" insulation (For details see p.30/31)**



**9. Apply a final PYRO-SAFE FLAMMOTECT-A coating.**



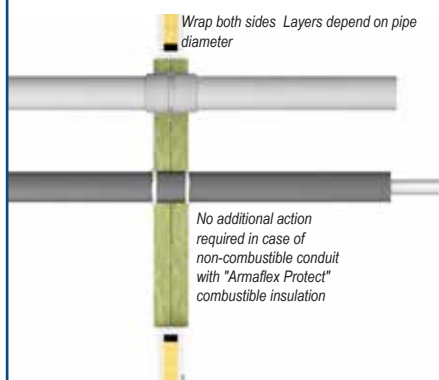
# PYRO-SAFE Flammotect - double-layer

## 6.2 Pipes in walls

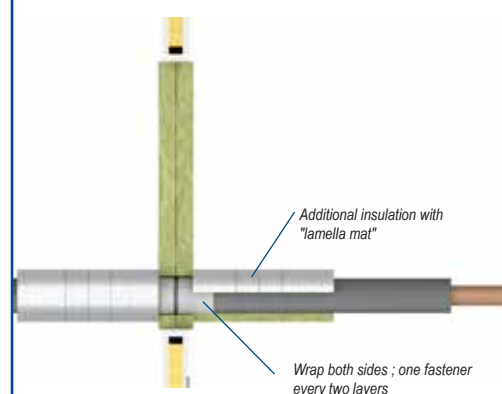
10. If required or mandatory, fill the identification label and apply on the side or below (not over!) the installation.



2. Measures for pipes, cross section (wrap)



2a. Measures for pipes, cross section (wrap)



### Measures for wall penetration seals (per side)

	Type	Dry film thickness/ wrap width [mm]	Length inside/ outside partition surface [mm]		Amount of layers	Overlap [mm]	Amount of steel wire fasteners
			inside	outside			
Annular gap and joint sealing							
Annular gap ≤ 4 mm	Filler/ Coating	-	60	-	-	-	-
Annular gap > 2 mm - 50 mm	Loose Wool						
Combustible pipes made of PVC-U, PE 100 and PP-H							
Outside-Ø ≤ 50 mm	PYRO-SAFE DG-CR BS wrap	100	60	40	1	-	1
Outside-Ø > 50 mm - Ø ≤ 80 mm					2		
Outside-Ø > 80 mm - Ø ≤ 110 mm					3		
Outside-Ø > 110 mm - Ø ≤ 160 mm					4		

## PYRO-SAFE Flammotect - double-layer

### 6.2 Pipes in walls

#### Measures for wall penetration seals (per side)

		protection insulation		Fire protection wrap	
Outside Ø [mm]	Wall thickness [mm]	length [mm]	thickness [mm]	Width [mm]	Amount of layers
Multilayer pipes „HENCO STANDARD“		„lamella mat“**		-	
≤ 12 mm	1.6	≥ 250	≥ 20		
≤ 32 mm	3.0		≥ 30		
≤ 63 mm	4.5				
Multilayer pipes „HENCO STANDARD“		„Armaflex Protect“			
≤ 12 mm	1.6	240	13		
≤ 32 mm	3.0		26 (2 x 13)		
≤ 63 mm	4.5				
Multilayer pipes „HENCO STANDARD“ with insulation PE foam		„lamella mat“**		PYRO-SAFE DG-CR BS	
≤ 14 mm	2.0	≥ 250	≥ 20	100	1 + 25
≤ 32 mm	3.0			(50 mm in the partition/ 50 mm before the partition)	

#### Measures for wall penetration seals (per side)

non-combustible pipes			Mineral fibre pipe shell/ combustible insulation		protection insulati- on „lamella mat“*		Fire protection wrap PYRO-SAFE DG-CR 1.5		
Material	Outside Ø [mm]	Wall thickness [mm]	Insulation length [mm]	Insulation thickness [mm]	length [mm]	thickness [mm]	Width [mm]	Amount of layers	
Copper, steel, stainless steel, cast iron	„Kaiflex ST“								
	≤ 8.0	≥ 1.0 - ≤ 4.0	≥ 2000	9 - 18	-	-	125 <i>(50 mm in the partition/ 75 mm before the partition)</i>	1	
	> 8.0 - ≤ 22.0	≥ 1.0 - ≤ 11.0		9 - 32	≥ 500	≥ 30		2	
	> 22.0 - ≤ 88.9	≥ 1.5 - ≤ 14.2		9 - 32					
	> 88.9 - ≤ 170.0	≥ 3.0 - ≤ 14.2		10 - 32					
steel, stainless steel, cast iron									
Copper, steel, stainless steel, cast iron	„Armaflex Protect“								
	≤ 8.0	≥ 1.0 - ≤ 4.0	≥ 2000	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 steel, cast iron	> 88.9 - ≤ 170.0	≥ 3.0 - ≤ 14.2	26 (2 x 13)						
Copper, steel, stainless steel, cast iron	„lamella mat“**								
	≤ 15.0	0.8 - ≤ 0.9	≥ 250	≥ 20	-	-	-	-	
	> 15.0 - ≤ 28.0	≥ 0.9 - ≤ 1.0	≥ 500						
	> 28.0 - ≤ 42.0	≥ 1.1 - ≤ 14.2	≥ 750						
	> 42.0 - ≤ 54.0	≥ 1.3 - ≤ 14.2	≥ 750	≥ 30	≥ 500	≥ 30	-	-	
	> 54.0 - ≤ 88.9	≥ 1.6 - ≤ 14.2		≥ 40					
	> 88.9 - ≤ 108.0	≥ 2.1 - ≤ 14.2		≥ 30					
	steel, stainless steel, cast iron	> 108.0 - ≤ 114.3	≥ 2.6 - ≤ 3.5	≥ 1000		≥ 40			≥ 60
		> 108.0 - ≤ 114.3	≥ 3.6 - ≤ 14.2			≥ 30			≥ 30
		> 114.3 - ≤ 170.0	≥ 2.6 - ≤ 14.2			≥ 40			≥ 60

#### Measures for wall penetration seals (per side)

non-combustible pipes			Mineral fibre pipe shell/ combustible insulation		protection insulation Armaflex Protect		Fire protection wrap PYRO-SAFE DG-CR 1.5	
Material	Outside Ø [mm]	Wall thickness [mm]	Insulation length [mm]	Insulation thickness [mm]	length [mm]	thickness [mm]	Width [mm]	Amount of layers
Copper	„NH/Armaflex“							
	≤ 15.0	2.9	≥ 1000	9 - 19	250	13	-	-
	> 15.0 - ≤ 42.0			20 - 50		26 (2 x 13)	125 (50 mm in the partition/ 75 mm before the partition)	1 x 1.5
				10 - 50				

\*Insulation thickness and insulation length are minimum size.

It is allowed to apply any mineral fibre pipe shell or lamella mats if they match the requirements.

Installation instructions

Last updated: 11/2016

Page 30

# PYRO-SAFE Flammotect - double-layer

## 6.2 Pipes in walls

### Measures for wall penetration seals (per side)

non-combustible pipes			Mineral fibre pipe shell/ combustible insulation		protection insulation „lamella mat“*		Fire protection wrap PYRO-SAFE DG-CR 1.5	
Material	Outside Ø [mm]	Wall thickness [mm]	Insulation length [mm]	Insulation thickness [mm]	length [mm]	thickness [mm]	length [mm]	thickness [mm]
Copper, steel, stainless steel, cast iron	„NH/Armaflex“							
	≤ 15.0	≥ 0.8	continous	9 - 25	≥ 250	≥ 20	125 <i>(50 mm in the partition/ 75 mm before the partition)</i>	1 x 1.5
		≥ 1.2	≥ 750	10 - 50				
		≥ 2.0	continous	89				
	> 15.0 - ≤ 28.0	≥ 1.0	continous	25	≥ 250	≥ 20		
		≥ 1.2	≥ 750	10 - 50				
		≥ 1.5	≥ 1000	51 - 57				
				58 - 88				
		≥ 2.0	continous	89	≥ 500	≥ 40		
	> 28.0 - ≤ 42.0	≥ 1.2 - ≤ 14.2	≥ 750	10 - 50	≥ 250	≥ 20		
		≥ 1.5 - ≤ 14.2	≥ 1000	51 - 57				
		≥ 2.0 - ≤ 14.2		58 - 88	≥ 500	≥ 40		
		> 42.0 - ≤ 54.0	≥ 1.5 - ≤ 14.2	continous	89	≥ 250		
	continous			25				
	≥ 2.0 - ≤ 14.2		≥ 1000	26 - 57	≥ 500	≥ 40		
				58 - 88				
	89							
	> 54.0 - ≤ 88.9	≥ 2.9	continous	50 - 89	≥ 750	≥ 60		
		≥ 2.0 - ≤ 14.2	≥ 1000	25 - 88				
≥ 2.9		continous	50 - 89					
steel, stainless steel, cast iron	> 88.9 - ≤ 170.0	≥ 2.9	continous	50 - 89	≥ 750	≥ 60	125 <i>(50 mm in the partition/ 75 mm before the partition)</i>	1 x 1.5
	„ProRox PS 960“ (RS 880)							
Copper, steel, stainless steel, cast iron	≤ 22.0	≥ 1.0 - ≤ 11.0	≥ 2000	≥ 30	-	-	-	-
	> 22.0 - ≤ 54.0	≥ 1.5 - ≤ 14.2						
	> 54.0 - ≤ 88.9	≥ 2.0 - ≤ 14.2						
steel, stainless steel, cast iron	> 88.9 - ≤ 170.0	≥ 3.0 - ≤ 14.2		≥ 40				

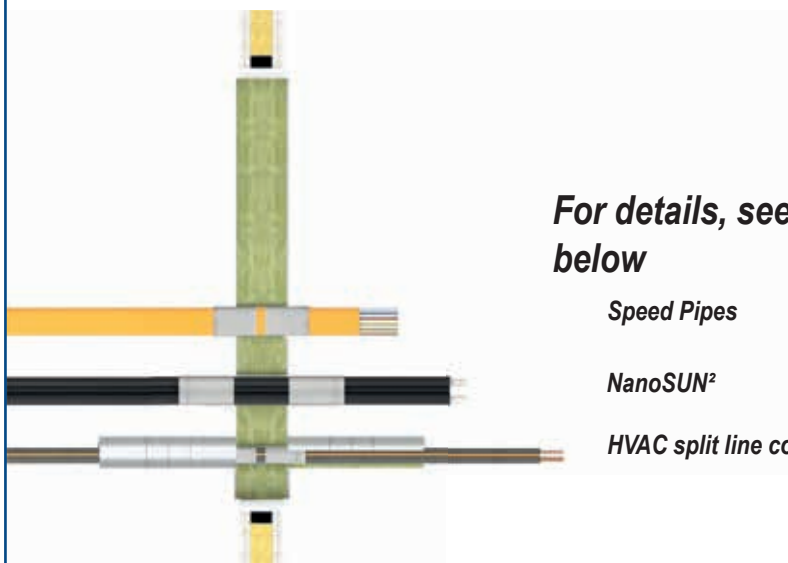
\*Insulation thickness and insulation lenght are minimum size.

It is allowed to apply any mineral fibre pipe shell or lamella mats if they match the requirements.

## PYRO-SAFE Flammotect - double-layer

### 6.3 HVAC split line combinations, „NanoSUN<sup>2</sup>“- double solar pipes and „speed pipes“ PE-lines in walls

Measures for „NanoSUN<sup>2</sup>“ double solar pipes, HVAC split line combinations, „speed pipes“ PE-lines



**For details, see table below**

*Speed Pipes*

*NanoSUN<sup>2</sup>*

*HVAC split line combination*

#### Measures for wall penetration seals (per side)

Outside Ø [mm]	protection insulation		Fire protection wrap	
	length [mm]	thickness [mm]	Width [mm]	Amount of layers
<b>HVAC split line combination</b>	<b>„lamella mat“*</b>		<b>PYRO-SAFE DG-CR 1.5</b>	
6.0 mm - 22.0 mm	250	30	75 (50 mm in the partition/ 25 mm before the partition)	1
<b>„NanoSUN<sup>2</sup>“</b>	<b>„lamella mat“*</b>		<b>PYRO-SAFE DG-CR 1.5</b>	
DN 16 / DN 25	-		125 (125 mm before the partition)	1 + 25 mm
DN 40 (EI 60)				
DN 40 (EI 120)	250	30		
<b>„speed pipe“ bundled or single</b>	-		<b>PYRO-SAFE DG-CR 1.5</b>	
max. 24 pcs. Ø ≤ 7			75 (50 mm in the partition/ 25 mm before the partition)	2
max. 7 pcs. Ø ≤ 10				
max. 5 pcs. Ø ≤ 12				

\*Insulation thickness and insulation length are minimum size.

It is allowed to apply any mineral fibre pipe shell or lamella mats if they match the requirements.



## PYRO-SAFE Flammotect - double-layer

### 6.4 Installation procedure for mixed partions in walls

Suitable positions of the mineral fibre board (MFB) Wall  $\geq 100$  mm



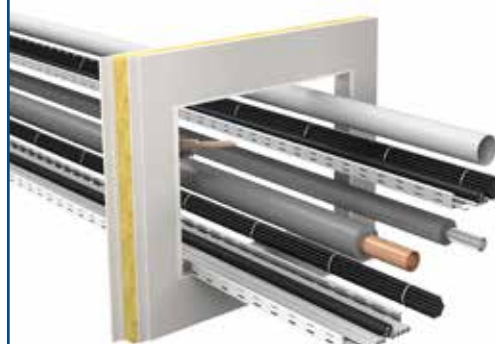
Suitable positions of the mineral fibre board (MFB) Wall  $\geq 120$  mm



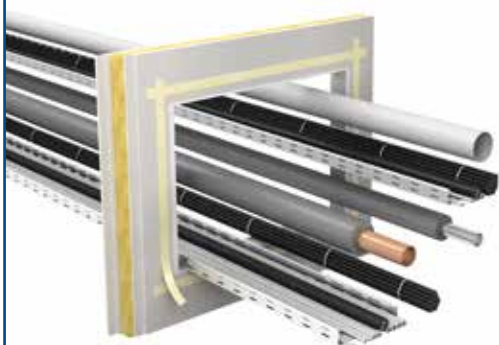
1. Opening with penetrations



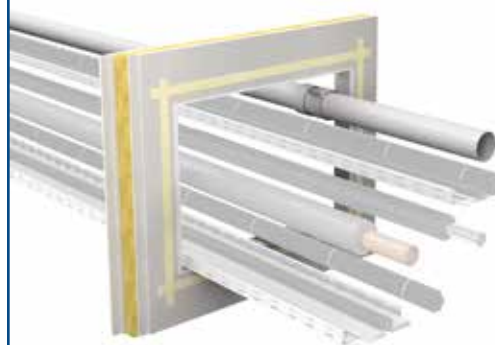
2. Clean the inside edges (edge planking is not supplied by the manufacturer)



3. Place the masking tape around the opening at a distance of 20 mm to the edge.



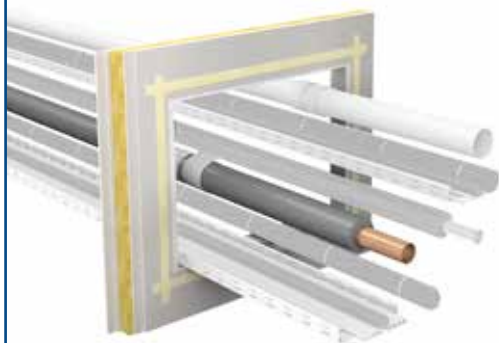
4. Wrap combustible pipes with PYRO-SAFE DG-CR BS (For details see p.29)



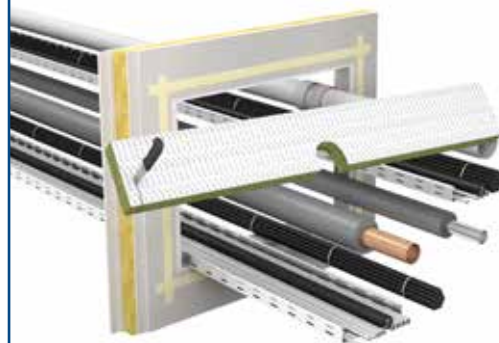
## PYRO-SAFE Flammotect - double-layer

### 6.4 Installation procedure for mixed partions in walls

4a. Wrap non-combustible pipes with combustible insulation with PYRO-SAFE DG-CR 1.5 (For details see p.30/31)



5. Cut mineral fibre boards to the needed size (provide openings for cables, cable ducts and, if applicable, for pipes).



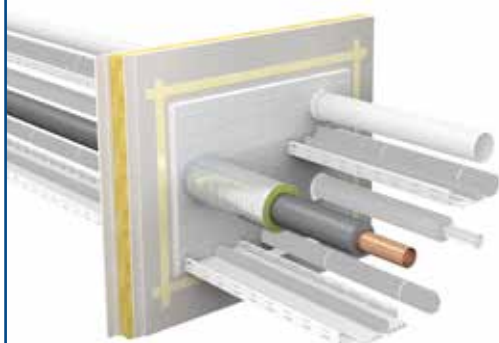
6. Apply PYRO-SAFE FLAMMOTECT-A to the cut faces of the mineral fibre board and insert flush and tightly the board into the opening.



7. Fill remaining gaps with mineral fibre wool or seal with PYRO-SAFE FLAMMOTECT-A



8. Supply non-combustible pipes with combustible insulation and additionally with "lamella mat" (For details see p.30/31)



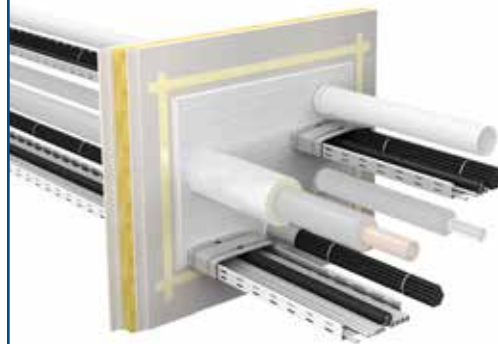
## PYRO-SAFE Flammotect - double-layer

### 6.4 Installation procedure for mixed partitions in walls

9. Coat the cables with PYRO-SAFE FLAMMOTECT-A for a length of 100-200 mm (dry film thickness of 1-2 mm) (For details see p.26).



10. Alternatively to step 2., wrap cables, cable bundles and cable support structures with PYRO-SAFE DG-CR 1.5 (For details see p.26)



11. Apply a final PYRO-SAFE FLAMMOTECT-A coating.



12. If required or mandatory, fill the identification label and apply on the side or below (not over!) the installation.



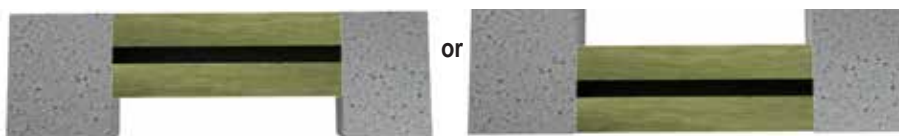
## PYRO-SAFE Flammotect - double-layer

### 6.5 Installation procedure - floor

Suitable positions of the mineral fibre board (MFB) Floor  $\geq 150$  mm



Suitable positions of the mineral fibre board (MFB) Floor  $> 150$  mm



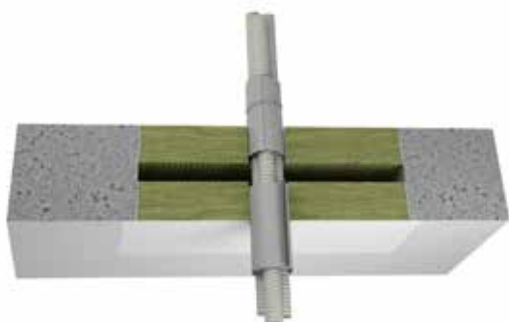
#### 6.5.1 Cables in floors

##### 1. Measures for cables - cross section



applicable only to single cables  $\varnothing \leq 21$  mm

##### 1a. Measures for cables - cross section Electrical installation pipes



**For details see table  
next page**

## PYRO-SAFE Flammotect - double-layer

### 6.5.1 Cables in floors

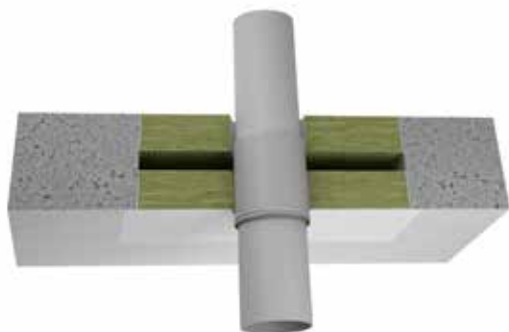
Measures for floor penetration seals (per side)							
	Type	Dry film thickness/ wrap width [mm]	Length inside/ outside partition surface [mm]		Amount of layers	Overlap [mm]	Amount of steel wire fasteners
			inside	outside			
Annular gap and joint sealing							
Annular gap ≤ 4 mm	Coating	-	60	-	-	-	-
Annular gap > 2 mm - 50 mm	Loose wool						
Cables/ cable bundles/ cable support structures							
Cables Ø ≤ 21 mm	PYRO-SAFE FLAMMOTECT-A coating	1.0	-	≥ 250	-		
Cables Ø > 21 mm - Ø ≤ 80 mm		2.0					
Cable support structures							
Cable bundles Ø ≤ 100 mm with cables Ø ≤ 21 mm		1.0					
Alternative							
Cables Ø ≤ 21 mm	PYRO-SAFE DG-CR 1.5 wrap	200	-	200	2	≥ 60	2
Cables Ø > 21 mm - Ø ≤ 80 mm							
Cable support structures							
Cable bundles Ø ≤ 100 mm with cables Ø ≤ 21 mm							
Single Cable Ø ≤ 21 mm, Wrap only on one side		125 one side only		125	1	≥ 10	2

Measures for floor penetration seals (per side)							
	Type	Dry film thickness/ wrap width [mm]	Length inside/ outside partition surface [mm]		Amount of layers	Overlap [mm]	Amount of steel wire fasteners
			inside	outside			
Electrical installation pipes $\varnothing \leq 32$ mm oder EIP bundle $\varnothing \leq 100$	PYRO-SAFE DG CR 1.5 wrap	125	50	75	3	-	1

## PYRO-SAFE Flammotect - double-layer

### 6.5.2 Pipes in floors

1. Wrap combustible pipes with PYRO-SAFE DG-CR BS  $\geq$  on the lower side of the floor for a length of 100 mm (75 mm in the partition and 25 mm before the partition).



*For details see table  
next page*

2. Non-combustible pipes in combustible insulation.



3. Wrap non-combustible pipes with non-combustible insulation e.g. with "lamella mat" and additionally insulation „lamella mat“





## PYRO-SAFE Flammotect - double-layer

### 6.5.2 Pipes in floors

Measures for floor penetration seals (per side)							
	Type	Dry film thick- ness/ wrap width [mm]	Length inside/ outside partition surface [mm]		Amount of layers	Overlap [mm]	Amount of steel wire fasteners
			inside	outside			
Annular gap and joint sealing							
Annular gap ≤ 4 mm	Coating	-	60	-	-	-	-
Annular gap > 2 mm - 50 mm	Loose wool						
Combustible pipes made of PVC-U, PE 100 und PP-H							
Outside Ø ≤ 50 mm	PYRO-SAFE DG-CR BS wrap lower surface only	100	75	25	1	-	1
Outside Ø > 50 mm - Ø ≤ 80 mm					2		
Outside Ø > 80 mm - Ø ≤ 110 mm					3		
Outside Ø > 110 mm - Ø ≤ 160 mm					4		

Measures for floor penetration seals (per side)						
		protection insulation		fire protection insulation		
Outside Ø [mm]	Wall thickness [mm]	length [mm]	thickness [mm]	Width [mm]	Amount of layers	
Multilayer pipes „HENCO STANDARD“		„lamella mat“**		-		
≤ 12 mm	1.6	≥ 250	≥ 20			
≤ 32 mm	3.0		≥ 30			
≤ 63 mm	4.5					
Multilayer pipes „HENCO STANDARD“		„Armaflex Protect“				
≤ 12 mm	1.6	240	13			
≤ 32 mm	3.0		26 (2 x 13)			
≤ 63 mm	4.5					
Multilayer pipes „HENCO STANDARD“ with insulation PE foam		„lamella mat“**		PYRO-SAFE DG-CR BS		
≤ 14 mm	2.0	≥ 250	≥ 20	100 (50 mm in the partition/ 50 mm before the partition)	1 x 1.5	
≤ 32 mm	3.0					

Measures for floor penetration seals (per side)								
non-combustible pipes			Mineral fibre pipe shell/ combustible insulation		Protection insulation Armaflex Protect		fire protection wrap PYRO-SAFE DG-CR 1.5	
Material	Outside Ø [mm]	Wall thickness [mm]	Insulation length [mm]	Insulation thickness [mm]	length [mm]	thickness [mm]	Width [mm]	Amount of layers
Copper	„NH/Armaflex“							
	≤ 15.0	≥ 0.8	≥ 1000	9 - 19	250	13	-	-
	> 15.0 - ≤ 42.0	≥ 1.2		20 - 50		26 (2 x 13)	125 <i>(50 mm in the partition/ 75 mm before the partition)</i>	1 x 1.5
				10 - 50				

\*Insulation thickness and insulation length are minimum size.

It is allowed to apply any mineral fibre pipe shell or lamella mats if they match the requirements.

## PYRO-SAFE Flammotect - double-layer

### 6.5.2 Pipes in floors

Measures for floor penetration seals (per side)								
non-combustible pipes			Mineral fibre pipe shell/ combustible insulation		protection insulation „lamella mat“***		fire protection insulation PYRO-SAFE DG-CR 1.5	
Material	Outside Ø [mm]	Wall thickness [mm]	Insulation length [mm]	Insulation thickness [mm]	length [mm]	thickness [mm]	Width [mm]	Amount of layers [mm]
Copper, steel, stainless steel, cast iron	„Kaiflex ST“							
	≤ 8.0	≥ 1.0 - ≤ 4.0	≥ 2000	9 - 18	-	-	125 <i>(50 mm in the partition/ 75 mm before the partition)</i>	1
	> 8.0 - ≤ 88.9	≥ 1.0 - ≤ 14.2		9 - 32				2
steel, stainless steel, cast iron	> 88.9 - ≤ 170.0	≥ 3.0 - ≤ 14.2		32	≥ 500	≥ 30		
Copper, steel, stainless steel, cast iron	„Armaflex Protect“							
	≤ 8.0	≥ 1.0 - ≤ 4.0	≥ 2000	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 steel, cast iron	> 88.9 - ≤ 170.0	≥ 3.0 - ≤ 14.2	26 (2 x 13)					
Copper, steel, stainless steel, cast iron	„lamella mat“***							
	≤ 15.0	0.8 - ≤ 0.9	≥ 500	≥ 20	-	-	-	-
		≥ 1.0			500*	30		
	> 15.0 - ≤ 21.5	≥ 0.9			-	-		
		≥ 1.0			500*	30		
		≥ 1.1 - ≤ 14.2			-	-		
	> 21.5 - ≤ 28.0	≥ 1.3 - ≤ 14.2	≥ 750	30	≥ 500	≥ 30		
	> 28.0 - ≤ 42.0			40				
	> 42.0 - ≤ 54.0			30				
	> 54.0 - ≤ 88.9			40				
	> 88.9 - ≤ 108.9	≥ 2.6 - ≤ 3.5	≥ 1000	30		≥ 60		
	> 108.0 - ≤ 114.3	≥ 3.6 - ≤ 14.2		30		≥ 30		
	> 108.0 - ≤ 114.3	≥ 2.6 - ≤ 14.2		40		≥ 60		
	> 114.3 - ≤ 170.0	≥ 3.0 - ≤ 14.2		60	≥ 1000			
steel, stainless steel, cast iron	> 170.0 - ≤ 329.0	≥ 3.0 - ≤ 14.2	≥ 1250					
„ProRox PS 960“ (RS 880)								
Copper, steel, stainless steel, cast iron	≤ 22.0	≥ 1.0 - ≤ 11.0	≥ 2000	≥ 30	≥ 500	≥ 30	-	-
	> 22.0 - ≤ 54.0	≥ 1.5 - ≤ 14.2		≥ 40				
	> 54.0 - ≤ 88.9	≥ 2.0 - ≤ 14.2						
steel, stainless steel, cast iron	> 88.9 - ≤ 170.0	≥ 3.0 - ≤ 14.2						

\* with protection insulation EI 120

\*\*Insulation thickness and insulation length are minimum size.

It is allowed to apply any mineral fibre pipe shell or lamella mats if they match the requirements.

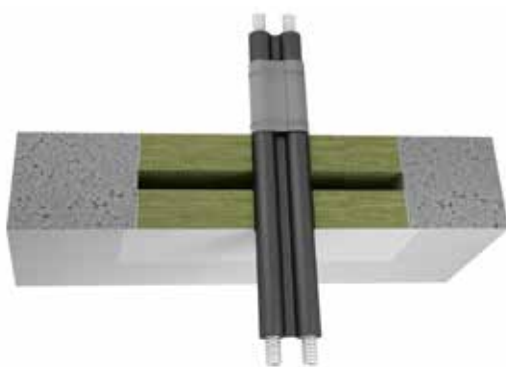
## PYRO-SAFE Flammotect - double-layer

### 6.5.2 Pipes in floors

Measures for floor penetration seals (per side)								
non-combustible pipes			Mineral fibre pipe shell/ combustible insulation		protection insulation „lamella mat“*		fire protection wrap PYRO-SAFE DG-CR 1.5	
Material	Outside Ø [mm]	Wall thickness [mm]	Insulation length [mm]	Insulation thickness [mm]	length [mm]	thickness [mm]	width [mm]	Amount of layers
Copper, steel, stainless steel, cast iron	„NH/Armaflex“							
	≤ 15.0	≥ 0.8	≥ 500	9 - 25	≥ 250	≥ 20	125 <i>(50 mm in the partition/ 75 mm before the partition)</i>	1
		≥ 1.2	≥ 750	26 - 50				
		≥ 1.2	≥ 1000	51 - 57	≥ 500	≥ 40		
		≥ 2.0		58 - 89				
	> 15.0 - ≤ 28.0	≥ 1.0	≥ 750	9 - 25	≥ 250	≥ 20		
		≥ 1.2		26 - 50				
		≥ 1.5	≥ 1000	51 - 57	≥ 500	≥ 40		
		≥ 2.0		58 - 89				
	> 28.0 - ≤ 42.0	≥ 1.2 - ≤ 14.2	≥ 750	10 - 50	≥ 250	≥ 20		
		≥ 1.5 - ≤ 14.2	≥ 1000	51 - 57				
		≥ 2.0 - ≤ 14.2		58 - 89	≥ 500	≥ 40		
	> 42.0 - ≤ 54.0	≥ 1.5 - ≤ 14.2		25	≥ 250	≥ 20		
		≥ 2.0 - ≤ 14.2		26 - 57				
		≥ 2.0 - ≤ 14.2		58 - 89	≥ 500	≥ 40		
	> 54.0 - ≤ 88.9	≥ 1.6 - ≤ 14.2	25 - 89					
	steel, stainless steel, cast iron	> 88.9 - ≤ 170.0	≥ 1.6 - ≤ 14.2		50 - 89	≥ 750		

### 6.5.3 „NanoSUN<sup>2</sup>“ double solar pipes

Wrap „NanoSUN<sup>2</sup>“ double solar pipes with  
PYRO-SAFE DG-CR 1.5.



Measures for floor penetration seals (per side)							
	Type	wrap width [mm]	Length inside/ outside partition surface [mm]		Amount of layers	Overlap [mm]	Amount of steel wire fasteners
			inside	outside			
„NanoSUN <sup>24</sup>							
≤ DN 40	PYRO-SAFE DG-CR 1.5 wrap upper surface only	125	-	125	1	≥ 25	2

\*Insulation thickness and insulation length are minimum size.

It is allowed to apply any mineral fibre pipe shell or lamella mats if they match the requirements.

# Declaration of Performance

## N° 01155-PYRO-SAFE-FLAMMOTECT-A

### PYRO-SAFE FLAMMOTECT-A

Date: 27.01.2015  
Rev. 02  
Page 1 of 1

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	<b>Class E</b>	EN 13501-1
Fire resistance	<b>Class EI 30</b> of a penetration seal (with mineral wool; see Annexes 1 and 17-22 of ETA-14/0418 for details)	EN 13501-2
	<b>Class EI 60</b> of a penetration seal (with mineral fibre board single-layer; see Annexes 1 and 2-6 of ETA-14/0418 for details)	
	<b>Class EI 60</b> of a penetration seal (with mineral wool; see Annexes 1 and 23-27 of ETA-14/0418 for details)	
	<b>Class EI 90</b> of a penetration seal (with mineral wool; see Annexes 1 and 28-32 of ETA-14/0418 for details)	
	<b>Class EI 90</b> of a penetration seal (without mineral wool; see Annexes 1 and 33 of ETA-14/0418 for details)	
	<b>Class EI 120</b> of a penetration seal (with mineral fibre boards double-layer; see Annexes 1 and 7-11 of ETA-14/0418 for details)	
	<b>Class EI 240</b> 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](http://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