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Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

MEMBER OF EOTA

European Technical Assessment ETA-22/0051 of 2025/11/26

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 66 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	System Novasit
Product family to which the above construction product belongs:	Fire stopping product – penetration seals.
Manufacturer:	Flamro Brandschutz-Systeme GmbH Am Sportplatz 2 DE-56291 Leiningen Tel.: 0049 4105 4090 0 Internet: www.flamro.de
Manufacturing plant:	Plant 10 and Plant 20
This European Technical Assessment contains:	47 pages including 13 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, based on:	European Assessment Document (EAD) No. 350454-00-1104 Fire Stopping and fire sealing products – Penetration seals
This version replaces:	The ETA with the same number issued on 2024-07-02

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product

The construction product " NOVASIT BM" is a mortar which is intended to be used in penetration seals. It is supplied in powder form in bags, in cement grey colour.

A detailed technical description and the fire-safety-related performance criteria of the construction products are given in Annex 1.

2 Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

The construction product "NOVASIT BM" is intended to be used as a component with a fire protection effect in building elements or parts there of or constructions that are subject to fire-protection requirements. Heat transmission and spread of fire are restricted in the event of fire.

The construction product " NOVASIT BM" is intended for use in penetration seals. Construction products for penetration seals are used to seal openings in fire-resistant walls or floors, which are penetrated by services. Penetration seals are used to maintain the fire resistance of the wall or floor in the area of these penetrations.

Within the scope of this ETA, a set of test specimens were subjected to a fire test. A fire resistance of EI 240 was demonstrated for individual designs of cable penetration seals and a fire resistance of EI 120 was demonstrated for individual designs of pipe penetration seals - manufactured using the construction product " NOVASIT BM".

The provisions made in this European Technical Assessment are based on an assumed intended working life of the "System Novasit" of 10 years, provided the manufacturers conditions for the packaging, transport, storage, installation, use, maintenance and repair are met.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

Characteristic	Assessment of characteristic
3.2 Safety in case of fire (BWR2)	
Reaction to fire	Classification in accordance with EN13501-1, and the EC Delegated regulation 2016/364/EU: **See Annex 1**
Resistance to fire	Classification according to EN 13501-2: **See Annex 1**
3.3 Hygiene, health, and the environment (BWR3)	
Content, emission and/or release of dangerous substances*	see table below
Air permeability (material property)	No performance assessed
Water Permeability (material property)	No performance assessed
3.4 Safety and accessibility in use (BWR4)	
Mechanical resistance and stability	No performance assessed
Resistance to impact/movement	No performance assessed
Adhesion	No performance assessed
Durability	Use category: **Type Z_1**
3.5 Protection against noise (BWR5)	
Airborne sound insulation	No performance assessed
3.6 Energy Economy and heat retention (BWR6)	
Thermal properties	No performance assessed
Water vapour permeability	No performance assessed

Release scenario	**IA1: Product with direct contact to indoor air.**	
	3 days [mg/m^3]	28 days [mg/m^3]
SVOC	**< 0,005**	**< 0,005**
VOC	**< 0,005**	**< 0,005**

See additional information in section 3.8 – 3.9.

*) In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g., transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.8 Methods of verification

The characteristic values of the joint sealing system are based on the EAD 350454-00-1104 Firestopping and fire sealing products, Penetration Seals, assessed as a mortar, according to table 1.1 of the EAD.

3.9 General aspects related to the fitness for use of the product

The verification of durability is part of testing the essential characteristics. “NOVASIT -BM” may be used in end-use applications according to the provisions for use category Z_1 (intended for use at temperatures below 0°C with exposure to UV but no exposure to rain) without expecting significant changes of the characteristics relevant for fire protection. Products that meet the requirements for type Z_1 also meet the requirement for type Z_2.

The European Technical Assessment is issued for the product based on agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide if such changes affect the ETA and consequently the validity of the CE marking based on the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

" NOVASIT BM" is manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation.

4 Attestation and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

4.1 AVCP system

According to the decision 1999/454/EC of the European Commission, as amended, the system(s) of assessment and verification of constancy of performance is system **1** (see Annex V to Regulation (EU) No 305/2011).

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2025-11-26 by

Thomas Bruun
Managing Director, ETA-Danmark

Annexes

Table of content

1. Properties of the construction product "System Novasit" and the performance of penetration seals, comprising "NOVASIT BM"

Property	Performance criterion
Fire behaviour	Classification of fire behaviour according to EN 13501-1: A1
Compressive strength	M 2,5
Density	P ≥ 900kg/m³
Initial shear strength	0,15 N/mm² (table value)
Contents of chlorides	≤ 0,10 M.-%
Water vapour permeability μ	5/20 (table value)
Thermal conductivity λ 10, dry, mat	≤ 0,25 W/(m*K) as P = 50% (table value) ≤ 0,27 W/(m*K) as P = 90%

The properties listed can be used both for the identification of the construction product and for the implementation of the factory production control of the manufacturer.

Implementation details for the factory production control are included in the inspection plan.

2. General Properties of System Novasit
2.1 Building elements

Plasterboard walls
Plasterboard walls must have a minimum thickness of ≥ 100 mm.
Plasterboard walls with timber studs must be declared and installed with at least the same number of layers as tested. The distance between the opening and the studs and transoms must be ≥ 100 mm. The gap between seal and stud / timber girt is sealed with an insulation of at least 100 mm, reaction to fire class A1 or A2 according to EN 13501-1.
If one or more studs must be cut to install the seal, horizontal girts must be installed.
The cladding of the aperture edge must consist of all sides of at least two layers of 12.5 mm cement or gypsum-bound building boards with a reaction to fire of class A1 or A2 according to EN 13501-1, corresponding to the respective wall cladding.
Standard plasterboard wall construction is not applicable for construction based on sandwich panels or for plasterboard walls with one-sided cladding (shaft walls).
The supporting structure must have the required fire resistance rating in accordance with EN 13501-2.

Rigid Walls
Made of masonry, concrete, reinforced concrete or aerated concrete with a density of ≥ 450 kg/m³.
The walls must be classified for the desired fire resistance duration in accordance with EN 13501-2.

Rigid floors
Made of concrete, reinforced concrete or aerated concrete with a density of ≥ 550 kg/m³.
The floors must be classified for the desired fire resistance duration in accordance with EN 13501-2.

2.2 Thickness, sizes and spacing

Dimensions			
	Plasterboard wall / solid wall [mm]	Rigid wall [mm]	Rigid floor [mm]
Thickness of building element	≥ 100	≥ 150	≥ 150
Thickness of penetration seal	≥ 100	≥ 150	≥ 150
Maximum dimensions of opening (w × h) or equivalent area	550 × 600	1200 × 2000	1200 × 2000
Distance to other penetration seals	≥ 100	≥ 100	≥ 100
Distance to other apertures or installations	≥ 200	≥ 200	≥ 200

The total allowable cross section of the installations (outer dimensions) is ≤ 60% of the construction aperture.

2.3 Initial supports

Service	Wall and floor
HVAC split line combination	≤ 700
Cables, cable bundles, cable trays, control cable	≤ 500
Electrical installation conduites	
combustible pipes	
non-combustible pipes	
Double solar pipes "NanoSUN"	
Hydraulic hoses with wire braid inlay "HANSA-FLEX"	
Multilayer composite pipes	≤ 400
Cable Tube CT	≤ 300
PE cables speedpipes for fiber optic cables and micro cables	≤ 250

2.4 Reduced spacing requirements of services

<table>
<tr><th>Services</th><th>Distances to</th><th>Plasterboard Wall / solid wall (≥100 mm)</th><th>Solid Wall (≥ 150 mm)</th><th>Solid Floor (≥ 150 mm)</th></tr>
<tr><td rowspan="11">Cables, cable bundles, cable trays</td><td>Cables, cable bundles, cable trays</td><td rowspan="2">5 (horizontally)
50 (vertically)</td><td colspan="2">10 (horizontally) 50 (vertically)</td></tr>
<tr><td>Electrical installation conduits</td><td colspan="2">0 (Cable Ø ≤ 21)</td></tr>
<tr><td>Speedpipes</td><td colspan="2">25</td><td>40</td></tr>
<tr><td>Combustible pipes with collar</td><td colspan="3">25</td></tr>
<tr><td>Combustible pipes with wrap</td><td colspan="3">50</td></tr>
<tr><td>Multilayer pipes</td><td></td><td colspan="2">0 (Cable Ø ≤ 21)</td></tr>
<tr><td>Non-combustible pipes</td><td>50*</td><td>50</td><td>25</td></tr>
<tr><td>HVAC split line combinations</td><td>40</td><td>40</td><td></td></tr>
<tr><td>Hydraulic hoses HANSA-FLEX</td><td>x</td><td>45</td><td>85</td></tr>
<tr><td>Cable Tube CT</td><td>50</td><td colspan="2">65</td></tr>
<tr><td>Aperture edge</td><td>50 (upper), 0 (lower), 5 (side)</td><td>30 (upper), 0 (lower), 0 (side)</td><td>30 (upper), 0 (lower), 10 (side)</td></tr>
<tr><td rowspan="5">Electrical installation conduits</td><td>Cables, cable bundles, cable trays</td><td rowspan="2">5 (horizontally)
50 (vertically)</td><td colspan="2">0 (Cable Ø ≤ 21)</td></tr>
<tr><td>Electrical installation conduits</td><td colspan="2">0</td></tr>
<tr><td>Non-combustible pipes</td><td>80*</td><td colspan="2">80</td></tr>
<tr><td>Cable Tube CT</td><td>50</td><td></td><td></td></tr>
<tr><td>Aperture edge</td><td>50 (upper), 0 (lower), 5 (side)</td><td colspan="2">0</td></tr>
<tr><td rowspan="4">PE-lines Speedpipes</td><td>Cables, cable bundles, cable trays</td><td>5 (horizontally)
50 (vertically)</td><td>25</td><td>40</td></tr>
<tr><td>Speedpipes</td><td colspan="3">25</td></tr>
<tr><td>Non-combustible pipes</td><td>20*</td><td>20</td><td></td></tr>
<tr><td>Aperture edge</td><td>50 (upper), 0 (lower), 5 (side)</td><td>0</td><td>30</td></tr>
<tr><td rowspan="4">Cable Tube CT</td><td>Cables, cable bundles, cable trays</td><td>50</td><td colspan="2">65</td></tr>
<tr><td>Electrical installation conduits</td><td>50</td><td></td><td></td></tr>
<tr><td>Cable Tube CT</td><td>10</td><td>3</td><td>10</td></tr>
<tr><td>Aperture edge</td><td>5</td><td colspan="2">15</td></tr>
<tr><td rowspan="4">Combustible pipes with fire protection collar</td><td>Cables, cable bundles, cable trays</td><td colspan="3">25</td></tr>
<tr><td>Combustible pipes with collar</td><td colspan="3">0</td></tr>
<tr><td>HVAC split line combinations</td><td colspan="2">50</td><td></td></tr>
<tr><td>Aperture edge</td><td colspan="3">0</td></tr>
<tr><td rowspan="5">Combustible pipes with fire protection wrap</td><td>Cables, cable bundles, cable trays</td><td colspan="3">50</td></tr>
<tr><td>Combustible pipes with wrap</td><td colspan="2">0</td><td>25</td></tr>
<tr><td>Non-combustible pipes</td><td>0*</td><td colspan="2">0</td></tr>
<tr><td>HVAC split line combinations</td><td colspan="2">50</td><td>x</td></tr>
<tr><td>Aperture edge</td><td colspan="3">0</td></tr>
</table>

2.4 Reduced spacing requirements of services (continued)

<table>
<tr><th>Services</th><th>Distances to</th><th>Plasterboard Wall / solid wall (≥100 mm)</th><th>Solid Wall (≥ 150 mm)</th><th>Solid Floor (≥ 150 mm)</th></tr>
<tr><td rowspan="3">**Multilayer pipes**</td><td>Cables, cable bundles, cable trays</td><td>x</td><td colspan="2">0 (cable Ø ≤ 21)</td></tr>
<tr><td>Multilayer pipes</td><td colspan="3">0</td></tr>
<tr><td>Aperture edge</td><td colspan="3">0</td></tr>
<tr><td rowspan="7">**Non-combustible pipes**</td><td>Cables, cable bundles, cable trays</td><td colspan="2">50</td><td>25</td></tr>
<tr><td>Electrical installation conduits</td><td colspan="3">80</td></tr>
<tr><td>Speedpipes</td><td colspan="2">20</td><td></td></tr>
<tr><td>Combustible pipes with wrap</td><td colspan="3">0</td></tr>
<tr><td>Non-combustible pipes</td><td>0*</td><td colspan="2">0</td></tr>
<tr><td>HVAC split line combinations</td><td colspan="2">50</td><td>60</td></tr>
<tr><td>Aperture edge</td><td colspan="3">0</td></tr>
<tr><td rowspan="7">**HVAC split line combinations**</td><td>Cables, cable bundles, cable trays</td><td colspan="2">40</td><td></td></tr>
<tr><td>Combustible pipes with collar</td><td colspan="2">50</td><td></td></tr>
<tr><td>Combustible pipes with wrap</td><td colspan="2">50</td><td></td></tr>
<tr><td>Non-combustible pipes</td><td>50*</td><td>50</td><td>60</td></tr>
<tr><td>HVAC split line combinations</td><td colspan="2">25</td><td>50</td></tr>
<tr><td>Double solar pipes NanoSun²</td><td>x</td><td>85</td><td></td></tr>
<tr><td>Aperture edge</td><td colspan="2">0</td><td></td></tr>
<tr><td rowspan="3">**Double solar pipes NanoSun²**</td><td>Cables, cable bundles, cable trays</td><td>x</td><td>85</td><td></td></tr>
<tr><td>Hydraulic hoses HANSA-FLEX</td><td>x</td><td>85</td><td>80</td></tr>
<tr><td>Bauteillaibung</td><td>x</td><td>0</td><td>30</td></tr>
<tr><td rowspan="3">**Hydraulic hoses HANSA-FLEX**</td><td>Cables, cable bundles, cable trays</td><td>x</td><td>45</td><td>85</td></tr>
<tr><td>Double solar pipes NanoSun²</td><td>x</td><td>85</td><td>80</td></tr>
<tr><td>Aperture edge</td><td>x</td><td>80</td><td>35</td></tr>
</table>

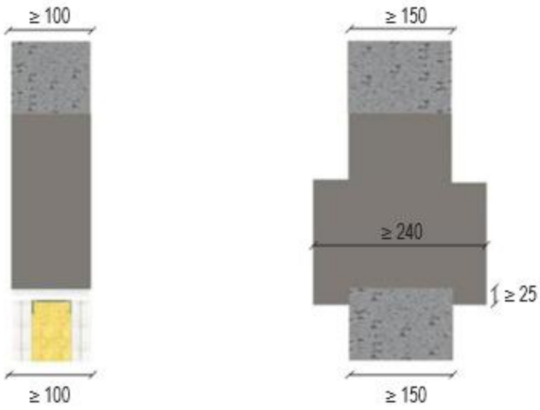
* only non-combustible pipes with FEF insulation

All dimensions in mm

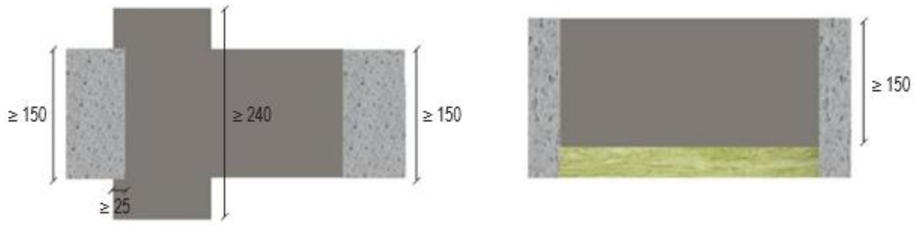
All specifications refer to distances between the respective insulations and additional measures if applicable.
All other distances must be at least 100 mm.

3. Design variants

3.1 Design variants for walls

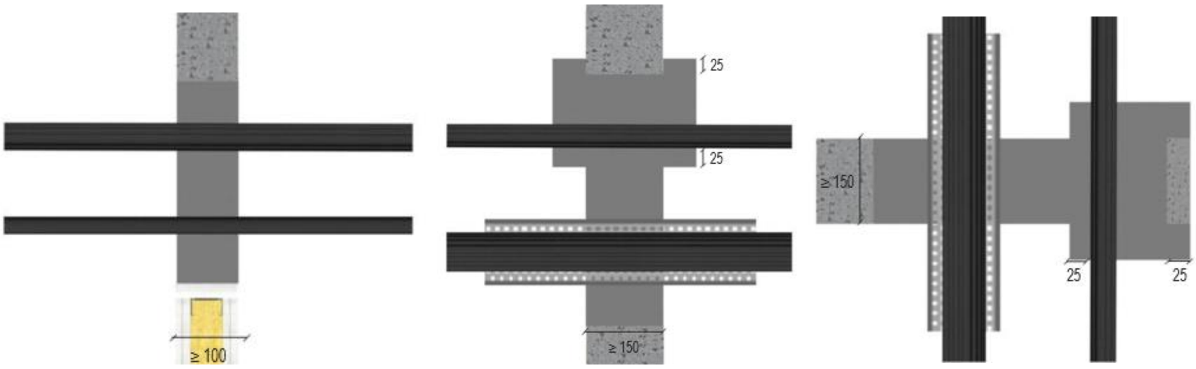


3.2 Design variants for floors



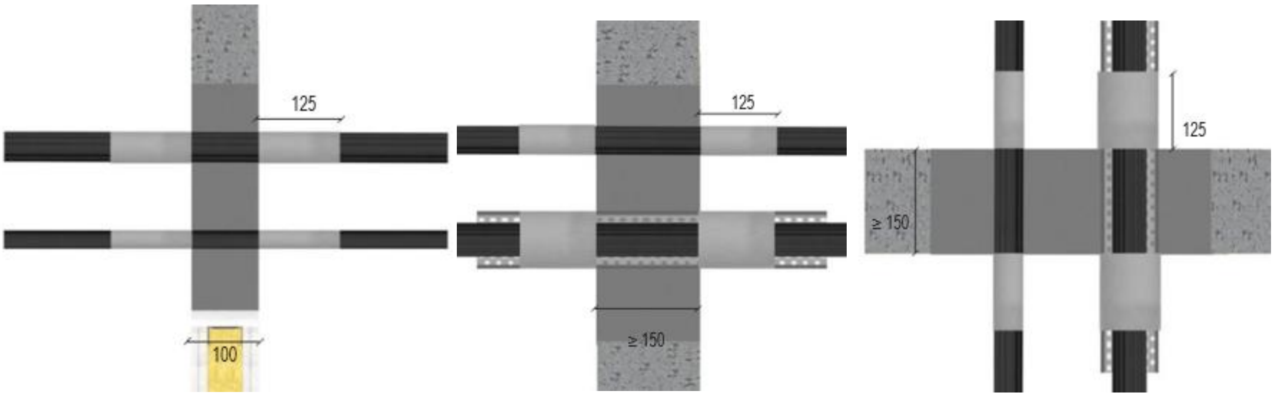
4. Fire resistance classes of penetrating electrical installations

4.1 Fire resistance classes for cables and/or cable bundles with or without cable trays without further measures



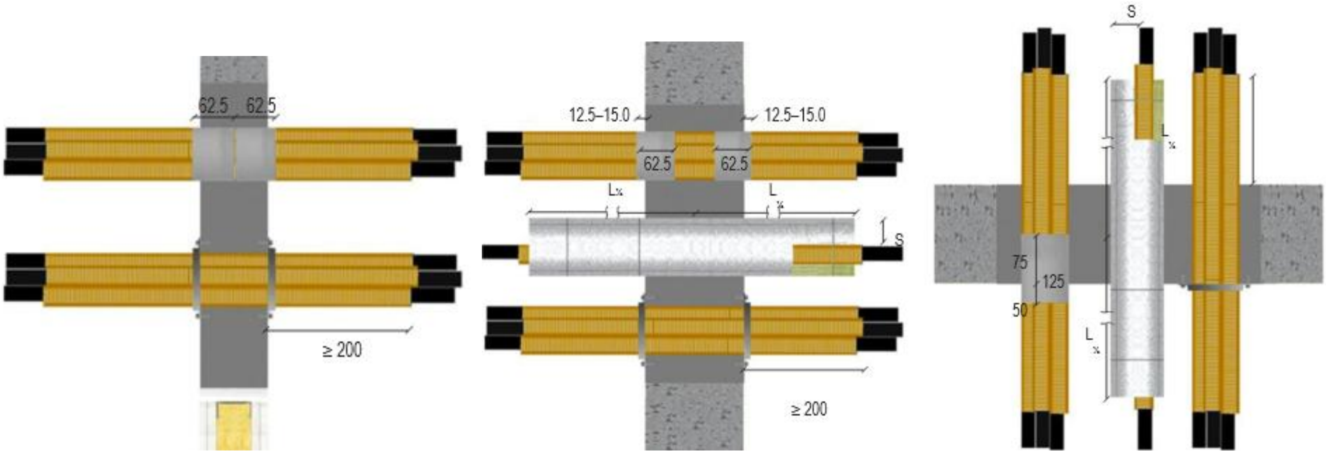
Services	Dimensions [mm]	Sealing thickness [mm]	Fire resistance class		
			Plasterboard Wall / solid wall (≥100 mm)	Solid Wall (≥ 150 mm)	Solid Floor (≥ 150 mm)
Cables	Ø ≤ 21	100	EI 90	-	-
	Ø ≤ 32	150	-	EI 120	EI 120
	Ø ≤ 50		-	-	EI 60
		240	-	EI 120	EI 90 / E 120
	Ø ≤ 80		-	EI 90 / E 120	EI 90
Single-core non-sheathed cables	Ø wires ≤ 24	150	-	EI 120	EI 120
cable bundles	Ø ≤ 60	100	EI 90	-	-
		150	-	EI 120	EI 120
	Ø ≤ 100		-	EI 90 / E 120	EI 90 / E 120
		240	-	EI 120	EI 120

4.2 Fire resistance classes for cables and/or cable bundles with or without cable trays with intumescent wrap



Services	Dimensions [mm]	Intumescent wrap			Fire resistance class		
		Number of wraps [n]	Number of layers [n]	Overlap [mm]	Plasterboard Wall / solid wall (≥100 mm)	Solid Wall (≥ 150 mm)	Solid Floor (≥ 150 mm)
Cables	Ø ≤ 50	2 x 125	2	-	EI 90 / E120	-	-
				45	-	EI 120	EI 120
	Ø ≤ 80			-	EI 90 / E120	-	-
				45	-	EI 90 / E 120	EI 90
		2 × 125 + 2 × 62.5 (37.5 mm lateral overlap)			-	EI 120	EI 120
Cable bundles	Ø ≤ 150	2 x 125	1	-	EI 120	EI 120	EI 120

4.3 Fire resistance classes for electrical installation conduits (EIC) with intumescent wrap, collar or lamella mat



Fire protection wrap

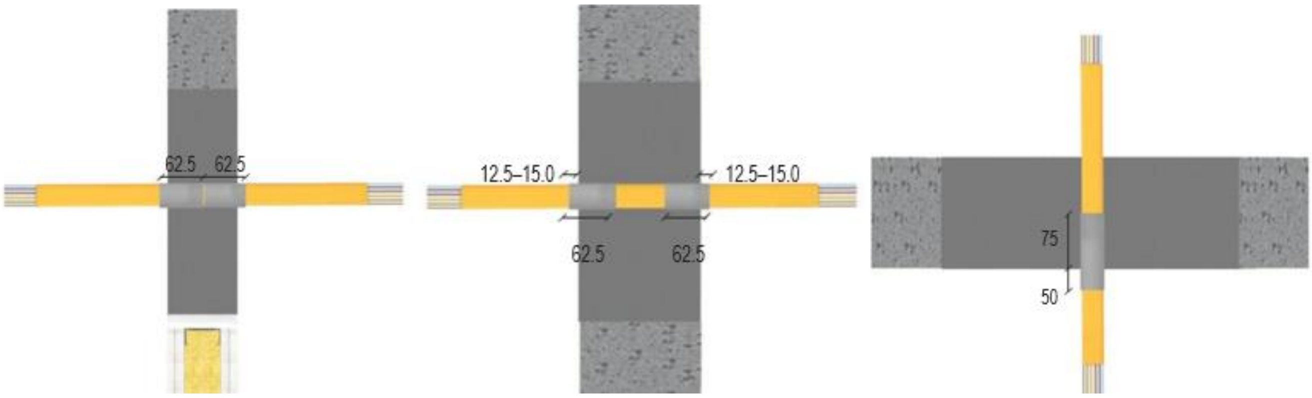
Lamella mat made of mineral fibres (min. A2 s1,d0; melting point ≥ 1000 °C, bulk density ≥ 35 kg/m³)

Fire protection collar

Services	Dimensions [mm]	Measure	Fire resistance class		
			Plasterboard Wall / solid wall (≥100 mm)	Solid Wall (≥ 150 mm)	Solid Floor (≥ 150 mm)
Conduits made of plastic (flexible or rigid), single	Conduit Ø ≤ 32 with/without cables Ø ≤ 21	Intumescent wrap 1 × 125 mm or 2 × 62.5 mm, 1 layer	EI 120 U/U	EI 120 U/U	EI 120 U/U
	Conduit Ø ≤ 63 with/without cables Ø ≤ 21	Intumescent wrap 1 × 125 mm or 2 × 62.5 mm, 2 layers	EI 120 U/U	EI 120 U/U	EI 120 U/U
		Lamella mat S ≥ 30 mm x L½ ≥ 500mm	-	EI 120 U/C	EI 120 U/C
		Fire protection collar 2 x in wall, 1 x in floor	EI 120 C/C	EI 120 C/C	EI 120 C/C
	Conduit Ø ≤ 100 with/without cables Ø ≤ 50*	Intumescent wrap 1 × 125 mm or 2 × 62.5 mm, 3 layers	-	-	EI 120 U/U
Conduits made of plastic (flexible or rigid), bundled	Conduit Ø ≤ 32, bundled up to Ø ≤ 100 with/without cables Ø ≤ 21	Intumescent wrap 1 × 125 mm or 2 × 62.5 mm, 2 layers	EI 120 U/U	EI 120 U/U	EI 120 U/U
	Conduit Ø ≤ 63, bundled up to Ø ≤ 125 with/without cables Ø ≤ 21	Fire protection collar 2 x in wall, 1 x in floor	-	EI 120 C/C	EI 120 C/C
Conduits made of plastic (flexible), multiple linear penetration	≤ 3 conduits Ø ≤ 32 with/without cables Ø ≤ 21	Intumescent wrap 1 × 125 mm or 2 × 62.5 mm, 1 layer	EI 120 U/U	EI 120 U/U	EI 120 U/U

*With additional protective insulation made of mineral fibre mat (L_1 ≥ 500 mm × D_1 ≥ 30 mm).

4.4 Fire resistance classes for speedpipes with intumescent wrap

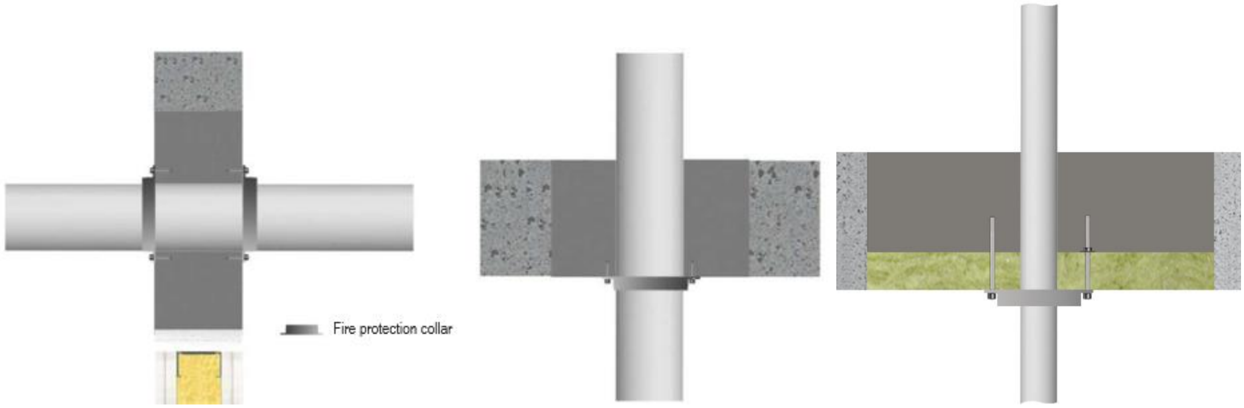


Services	Dimensions [mm]	Intumescent wrap			Fire resistance class		
		Number of wraps [n]	Number of layers [n]	Overlap [mm]	Plasterboard Wall / solid wall (≥100 mm)	Solid Wall (≥ 150 mm)	Solid Floor (≥ 150 mm)
Speedpipes	bundle Ø ≤ 50 single Ø ≤ 50	1 × 125 mm or 2 × 62.5 mm	1	-	EI 120 U/U	EI 120 U/U	EI 120 U/U

5. Fire resistance classes for combustible pipes

5.1 Fire resistance classes for combustible pipes with fire protection collar

In walls, fire protection collars must be installed on both sides. In floors, one collar must be installed on the lower side.
Pipes must always be installed perpendicularly to the surface of the building element, unless other installation possibilities are explicitly mentioned.
The penetration sealing may only be used on pneumatic conveyors, compressed air lines etc. if the pipeline system is switched off in the event of a fire.



5.1.1 Fire resistance classes for standard pipes with fire protection collar - installation in walls

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class	
				Type	Thickness [mm]	Plasterboard Wall / solid wall (≥ 100 mm)	Solid Wall (Seal ≥ 150 mm)
PVC-U	32–50	1.8–5.6	straight	–	–	EI 120-U/U	EI 120-U/U
	32–160	2.7–4.6		PE	5.0	EI 120-U/U	EI 120-U/U
	50–160	1.8–12.3		–	–	EI 90-U/U	EI 90-U/U
	90–160	1.8–3.2		PE	5.0	EI 60-U/U	EI 60-U/U
	110	1.8	45° diagonal	–	–	EI 120-U/C	EI 120-U/C
		10.0	straight	PE	5.0	EI 120-U/U	EI 120-U/U
	180–200	4.0–9.6		–	–	–	EI 120-U/C
PE-HD	32–110	1.8–10.0	straight	–	–	EI 120-U/C	EI 120-U/C
	≤ 50	1.8–4.6		–	–	EI 120-U/U	EI 120-U/U
	50	4.6	45° diagonal	–	–	EI 120-U/C	EI 120-U/C
	50–160	1.9–14.6	straight	–	–	EI 90-U/U	EI 90-U/U
	110	2.7		–	–	EI 120-U/U	EI 120-U/U
	110	2.7	45° diagonal	–	–	EI 120-U/C	EI 120-U/C
	125–160	4.0–14.6	straight	–	–	EI 120-U/C	EI 120-U/C
	180–200	4.9–11.4		–	–	–	EI 120-U/C
PP-H	32–110	1.8–10.0		–	–	EI 120-U/C	EI 120-U/C
	≤ 50	1.8–4.6		–	–	EI 120-U/U	EI 120-U/U
	50–160	1.9–14.6		–	–	EI 90-U/U	EI 90-U/U
	110	2.7		–	–	EI 120-U/U	EI 120-U/U
	125–160	4.0–14.6		–	–	EI 120-U/C	EI 120-U/C
	180–200	4.9–18.2		–	–	–	EI 120-U/C

5.1.2 Fire resistance classes for non-standard pipes with fire protection collar - installation in walls

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class	
				Type	Thickness [mm]	Plasterboard Wall / solid wall (≥ 100 mm)	Solid Wall (Seal ≥ 150 mm)
POLO-KAL 3S	75	3.8	straight	–	–	EI 60-U/C	EI 60-U/C
			45° diagonal	PE	4.0	–	EI 120-U/C
	125	5.3	straight	–	–	EI 60-U/C	EI 60-U/C
	110	4.8		PE	4.0	EI 60-U/C	EI 60-U/C
	110	4.8	straight with pipe sleeve	PE	4.0	EI 60-U/C	EI 60-U/C
	125	5.3	straight	PE	4.0	EI 90-U/C	EI 90-U/C
			45° diagonal	PE	4.0	–	EI 120-U/C
	160	7.5	straight	PE	4.0	EI 60-U/C	EI 60-U/C
POLO-KAL NG	40–110	1.8–3.4	straight	PE	5.0	EI 120-U/U	EI 120-U/U
	50–110	2.0–3.4	straight with pipe sleeve	PE	4.0	EI 120-U/U	EI 120-U/U
POLO-KAL XS	40–110	1.8–3.4	straight	PE	5.0	EI 120-U/U	EI 120-U/U
	50–110	2.0–3.4	straight with pipe sleeve	PE	4.0	EI 120-U/U	EI 120-U/U
Geberit Silent PP	32–160	2.0–5.2	straight	PE	5.0	EI 120-U/U	EI 120-U/U
	50–90	2.0–3.1	45° diagonal	PE	4.0	EI 90-U/C	EI 90-U/C
	50–110	2.0–3.6	straight with pipe sleeve	PE	4.0	EI 120-U/C	EI 120-U/C
	50–110	2.0–3.6	2 × 45°, bends	PE	4.0	EI 120-U/C	EI 120-U/C
	110	3.6	45° diagonal	PE	4.0	EI 120-U/C	EI 120-U/C
	125–160	4.2–5.2	straight, zero clearance	PE	4.0	EI 90-U/C	EI 90-U/C
Geberit Silent Pro	50–110	2.6–4.1	straight with pipe sleeve	PE	5.0	EI 120-U/U	EI 120-U/U
	50–160	3.0–6.0	straight	PE	5.0	EI 120-U/U	EI 120-U/U
Geberit Silent dB 20	56–110	3.2–6.0	straight	PE	5.0	EI 120-U/U	EI 120-U/U
	56–160	3.2–7.0	straight	PE	5.0	EI 90-U/U	EI 90-U/U
GF Silenta Premium	58	4.0	45° diagonal	PE	4.0	EI 120-U/U	EI 120-U/U
	58–110	4.0–5.3	straight with pipe sleeve	PE	4.0	EI 120-U/U	EI 120-U/U
	58–160	4.0–5.3	straight	PE	4.0	EI 120-U/U	EI 120-U/U
	78–110	4.6–5.3	45° diagonal	PE	4.0	EI 90-U/U	EI 90-U/U
	110–135	5.3	straight, zero clearance	PE	4.0	EI 120-U/U	EI 120-U/U
coes Blue Power	50	1.8	straight	PE	4.0	EI 120-U/C	EI 120-U/C
	50–90	1.8–3.4	straight with pipe sleeve	PE	4.0	EI 120-U/C	EI 120-U/C
	110	3.4	straight with pipe sleeve	PE	4.0	EI 90-U/C	EI 90-U/C
Wavin SiTech+	32–75	1.8–2.6	straight with pipe sleeve	PE	4.0	EI 120-U/C	EI 120-U/C
	32–125	1.8–3.9	straight	FEF	9.0–40.0	EI 120-U/C	EI 120-U/C
	32–160	1.8–5.0	straight	PE	5.0	EI 120-U/U	EI 120-U/U
REHAU RAUPIANO LIGHT	40–160	1.8–3.9	straight	PE	5.0	EI 120-U/U	EI 120-U/U
CONEL DRAIN	40–160	1.8–3.9	straight	PE	5.0	EI 120-U/U	EI 120-U/U
REHAU RAUPIANO PLUS	50–160	1.8–3.9	straight	PE	5.0	EI 120-U/U	EI 120-U/U
Pipelife MASTER 3 Plus	40–160	1.8–4.4	straight	PE	5.0	EI 120-U/U	EI 120-U/U
KE KELIT PHONEX AS	58–160	4.0–5.3	straight	PE	5.0	EI 120-U/U	EI 120-U/U
Wavin AS	58–160	4.0–5.3	straight	PE	5.0	EI 120-U/U	EI 120-U/U
Valsir Triplus®	32–160	1.8–4.9	straight	PE	5.0	EI 120-U/U	EI 120-U/U
GF Cool-Fit 2.0 / 2.0F	32/75 – 140/200	–	straight	–	–	EI 120-U/C	EI 120-U/C
GF Cool-Fit 4.0	110/180	–	straight	–	–	EI 120-U/C	EI 120-U/C

5.1.2. Fire resistance classes for non-standard pipes with fire protection collar - installation in walls

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class	
				Type	Thickness [mm]	Plasterboard Wall / solid wall (≥ 100 mm)	Solid Wall (Seal ≥ 150 mm)
GF Cool-Fit 4.0F	63/110	–	straight	–	–	EI 120-U/C	EI 120-U/C
Pellet hose PVC-Cu	60	–	straight	–	–	EI 120-U/C	EI 120-U/C
Pellet hose PUR-Cu	60	–	straight	–	–	EI 120-U/C	EI 120-U/C
aquatherm blue pipe SDR 9 MF RP	32	3.6	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
aquatherm blue pipe SDR 11 MF RP	40	3.7	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	50	4.6	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	63	5.8	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	75	6.8	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	90	8.2	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	110	10.0	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	19.0	EI 120-U/C	EI 120-U/C
	125	11.4	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	19.0	EI 120-U/C	EI 120-U/C
	160	14.6	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	19.0	EI 120-U/C	EI 120-U/C
	200	18.2	straight	PE	5.0	–	EI 120-U/C
aquatherm green pipe SDR 6 S	32	5.4	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	18.0–39.5	EI 120-U/C	EI 120-U/C
	40	6.7	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	50	8.3	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	63	10.5	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	75	12.5	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–50.0	EI 120-U/C	EI 120-U/C
	90	15.0	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.5–50.0	EI 120-U/C	EI 120-U/C
	110	18.3	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	19.0	EI 120-U/C	EI 120-U/C
aquatherm green pipe SDR 7.4 S	32	4.4	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	18.0–39.5	EI 120-U/C	EI 120-U/C
	40	5.5	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	50	6.9	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	63	8.6	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C

5.1.2 Fire resistance classes for non-standard pipes with fire protection collar - installation in walls

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class	
				Type	Thickness [mm]	Plasterboard Wall / solid wall (≥ 100 mm)	Solid Wall (Seal ≥ 150 mm)
aquatherm green pipe SDR 11 S	32	2.9	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	18.0–39.5	EI 120-U/C	EI 120-U/C
	40	3.7	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	50	4.6	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	63	5.8	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C	EI 120-U/C
	75	6.8	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.0–50.0	EI 120-U/C	EI 120-U/C
	90	8.2	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	22.5–50.0	EI 120-U/C	EI 120-U/C
	110	10.0	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	19.0	EI 120-U/C	EI 120-U/C
	125	11.4	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	19.0	EI 120-U/C	EI 120-U/C
	160	14.6	straight	PE	5.0	EI 120-U/C	EI 120-U/C
				FEF	19.0	EI 120-U/C	EI 120-U/C
	200	18.2	straight	PE	5.0	–	EI 120-U/C

5.1.3 Fire resistance classes for standard pipes with fire protection collar - installation in floors

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class
				Type	Thickness [mm]	Solid floor (≥ 150 mm)
PVC-U	32–50	1.8–5.6	straight	–	–	EI 120-U/U
	> 50 – ≤ 160	1.8–12.3	straight	–	–	EI 90-U/U
	63–75	2.2–8.4	straight	–	–	EI 120-U/C
	≤ 75	1.8	straight	–	–	EI 120-U/U
	90–110	2.2–12.3	straight	–	–	EI 120-U/C
	110	8.2	45° diagonal	PE	4.0	EI 120-U/C
	125–160	3.2–11.8	straight	–	–	EI 120-U/C
	180–200	4.0–9.6	straight	–	–	EI 120-U/C
PE-HD	32–50	1.8–4.6	straight	–	–	EI 120-U/U
	50–110	4.6–10.0	45° diagonal	PE	4.0	EI 120-U/C
	50–125	1.8–14.6	straight	–	–	EI 120-U/U
	63–75	2.7–6.9	straight	–	–	EI 120-U/C
	90–110	2.7–10.0	straight	–	–	EI 120-U/C
	125–160	4.0–14.6	straight	–	–	EI 120-U/C
	125–160	4.0–14.6	straight	–	–	EI 60-U/U
	160	4.0	straight	PE	5.0	EI 90-U/U
	180–200	4.9–18.2	straight	–	–	EI 120-U/C
PP-H	≤ 50	1.8–4.6	straight	–	–	EI 120-U/U
	63–75	2.7–6.9	straight	–	–	EI 120-U/C
	≤ 75	1.9 – < 10.0	straight	–	–	EI 90-U/U
	≤ 75	10.0	straight	–	–	EI 120-U/U
	90–110	2.7–10.0	straight	–	–	EI 120-U/C
	≤ 110	2.7 – < 10.0	straight	–	–	EI 90-U/U
	110	2.7	straight	–	–	EI 120-U/U
	110	10.0	straight	–	–	EI 120-U/U
	≤ 125	3.1 – < 11.4	straight	–	–	EI 90-U/U
	≤ 125	11.4	straight	–	–	EI 120-U/U
	125–160	4.0–14.6	straight	–	–	EI 120-U/C
	≤ 160	4.0–14.6	straight	–	–	EI 120-U/U
	180–200	4.9–11.4	straight	–	–	EI 120-U/C

5.1.4 Fire resistance classes for non-standard pipes with fire protection collar - installation in floors

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class
				Type	Thickness [mm]	Solid floor (≥ 150 mm)
POLO-KAL 3S	75–110	3.8–4.8	straight	–	–	EI 90-U/C
			straight with pipe sleeve	PE	4.0	EI 90-U/C
			45° diagonal	PE	4.0	EI 90-U/C
	125	5.3	45° diagonal	–	–	EI 90-U/C
			35°	PE	4.0	EI 120-U/C
			2 × 45°, bends	PE	4.0	EI 120-U/C
POLO-KAL NG	40–160	1.8–4.9	straight	PE	5.0	EI 60-U/U
	90–160	3.0–4.9	straight	PE	5.0	EI 90-U/U
POLO-KAL XS	40–160	1.8–4.9	straight	PE	5.0	EI 60-U/U
	50–110	1.8–3.4	straight with pipe sleeve	PE	4.0	EI 120-U/U
			2 × 45°, bends	PE	4.0	EI 120-U/U
	90–160	3.0–4.9	straight	PE	5.0	EI 90-U/U
Geberit Silent PP	40–110	2.0–3.6	straight	PE	5.0	EI 90-U/U
	40–160	2.0–5.2	straight	PE	5.0	EI 60-U/U
	50–110	1.8–3.4	straight with pipe sleeve	PE	4.0	EI 120-U/C
			45° diagonal	PE	4.0	EI 120-U/C
			2 × 45°, bends	PE	4.0	EI 120-U/C
	50–160	1.8–4.9	straight	PE	4.0	EI 120-U/C
	125–160	3.9–4.9	straight, zero clearance	PE	4.0	EI 120-U/C
Geberit Silent Pro	50–90	2.6–3.9	straight with pipe sleeve	PE	5.0	EI 120-U/U
	50–110	2.6–4.1	straight, pipe collar in building element	PE	5.0	EI 120-U/U
			2 × 45°, bends	PE	5.0	EI 120-U/U
	50–160	2.6–5.6	straight	PE	5.0	EI 120-U/U
				FEF	9.0–25.0	EI 120-U/U
	125	4.6	2 × 45°, bends	PE	5.0	EI 90-U/U
GF Silenta Premium	58–110	4.0–5.3	straight with pipe sleeve	PE	4.0	EI 120-U/U
			2 × 45°, bends	PE	4.0	EI 120-U/U
	58–160	4.0–5.3	straight	PE	4.0	EI 120-U/U
	110–135	5.3	straight, zero clearance	PE	4.0	EI 120-U/U
Wavin SiTech	110	3.4	straight	PE	4.0	EI 120-U/C
REHAU RAUPIANO PLUS	110	2.7	straight	PE	4.0	EI 120-U/C
Ostendorf Skolan dB	110	5.3	straight	PE	4.0	EI 120-U/C
CONEL DRAIN	40–110	1.8–2.7	straight	PE	5.0	EI 60 U/U
	50–110	1.8–2.7	straight	PE	4.0	EI 120-U/C
			straight with pipe sleeve	PE	4.0	EI 120-U/C
			2 × 45°, bends	PE	4.0	EI 120-U/C
	75–110	1.9–2.7	straight	PE	5.0	EI 90 U/U
REHAU RAUPIANO LIGHT	40–110	1.8–2.7	straight	PE	5.0	EI 60 U/U
	75–110	1.9–2.7	straight	PE	5.0	EI 90 U/U

5.1.4 Fire resistance classes for non-standard pipes with fire protection collar - installation in floors

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class
				Type	Thickness [mm]	Solid floor (≥ 150 mm)
Wavin SiTECH+	32–75	1.8–2.6	straight	PE	4.0	EI 120-U/C
	32, 75–160	1.8, 2.6–5.0	straight	PE	5.0	EI 90 U/U
	58–110	4.1–5.3	straight	PE	5.0	EI 60 U/U
	50–160	1.8–4.9	straight	PE	4.0	EI 120-U/C
				FEF	9.0–34.0	EI 120-U/C
	50+125	1.8+3.9	2 × 45°, bends	PE	4.0	EI 120-U/C
Valsir Triplus®	32–50	1.8	straight	PE	5.0	EI 90 U/U
GF Cool-Fit 2.0 / 2.0F	32/75–110/160	–	straight	–	–	EI 120-U/C
	140/200	–	straight	–	–	EI 90-U/C
GF Cool-Fit 4.0	110/180-160/250	–	straight	–	–	EI 90-U/C
GF Cool-Fit 4.0F	63/125	–	straight	–	–	EI 120-U/C
	75/140–160	–	straight	–	–	EI 90-U/C
Pellet hose PVC-Cu	60	–	straight	–	–	EI 120-U/C
Pellet hose PUR-Cu	60	–	straight	–	–	EI 120-U/C
aquatherm blue pipe SDR 9 MF RP	32	3.6	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
aquatherm blue pipe SDR 11 MF RP	40	3.7	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	50	4.6	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	63	5.8	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	75	6.8	straight	PE	5.0	EI 120-U/C
				FEF	22.0–50.0	EI 120-U/C
	90	8.2	straight	PE	5.0	EI 120-U/C
				FEF	22.5–50.0	EI 120-U/C
	110	10.0	straight	PE	5.0	EI 120-U/C
	125	11.4	straight	PE	5.0	EI 120-U/C
	160	14.6	straight	PE	5.0	EI 120-U/C
	200	18.2	straight	PE	5.0	EI 120-U/C
aquatherm blue pipe SDR 17.6 MF RP	125	7.1	straight	PE	5.0	EI 120-U/C
				FEF	19.0	EI 120-U/C
	160	9.1	straight	PE	5.0	EI 120-U/C
				FEF	19.0	EI 120-U/C
	200	11.4	straight	PE	5.0	EI 120-U/C

5.1.4 Fire resistance classes for non-standard pipes with fire protection collar - installation in floors

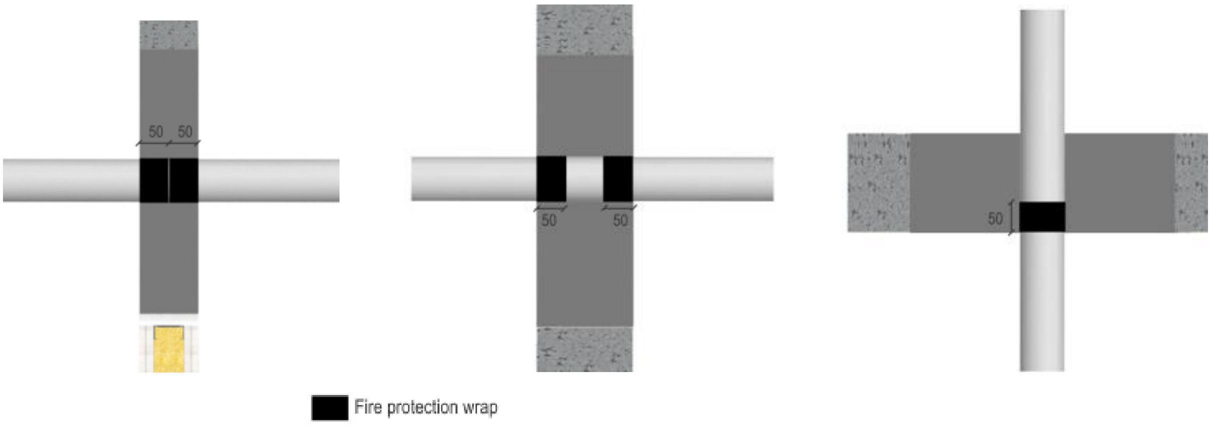
Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class
				Type	Thickness [mm]	Solid floor (≥ 150 mm)
aquatherm blue pipe SDR 9 MF RP OT	32	3.6	straight	PE	5.0	EI 120-U/C
	40	3.7	straight	PE	5.0	EI 120-U/C
	50	4.6	straight	PE	5.0	EI 120-U/C
	63	5.8	straight	PE	5.0	EI 120-U/C
	75	6.8	straight	PE	5.0	EI 120-U/C
	90	8.2	straight	PE	5.0	EI 120-U/C
	110	10.0	straight	PE	5.0	EI 120-U/C
	125	11.4	straight	PE	5.0	EI 120-U/C
	160	14.6	straight	PE	5.0	EI 120-U/C
	200	18.2	straight	PE	5.0	EI 120-U/C
aquatherm green pipe SDR 9 MF RP	32	3.6	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	40	4.5	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	50	5.6	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	63	7.1	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	75	8.4	straight	PE	5.0	EI 120-U/C
				FEF	22.0–50.0	EI 120-U/C
	90	10.0	straight	PE	5.0	EI 120-U/C
				FEF	22.5–50.0	EI 120-U/C
	110	12.3	straight	PE	5.0	EI 120-U/C
				FEF	22.5	EI 120-U/C
	125	14.0	straight	PE	5.0	EI 120-U/C
				FEF	19.0	EI 120-U/C
	160	17.9	straight	PE	5.0	EI 120-U/C
				FEF	19.0	EI 120-U/C
	200	22.4	straight	PE	5.0	EI 120-U/C
aquatherm green pipe SDR 6 S	32	5.4	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	40	6.7	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	50	8.3	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	63	10.5	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	75	12.5	straight	PE	5.0	EI 120-U/C
				FEF	22.0–50.0	EI 120-U/C
	90	15.0	straight	PE	5.0	EI 120-U/C
				FEF	22.5–50.0	EI 120-U/C
	110	18.3	straight	PE	5.0	EI 120-U/C
				FEF	22.5	EI 120-U/C

5.1.4 Fire resistance classes for non-standard pipes with fire protection collar - installation in floors

Pipe material	Max. outer Ø [mm]	Pipe wall thickness [mm]	Design variant	Insulation		Fire resistance class
				Type	Thickness [mm]	Solid floor (≥ 150 mm)
aquatherm green pipe SDR 7.4 S	32	4.4	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	40	5.5	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	50	6.9	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	63	8.6	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
aquatherm green pipe SDR 11 S	32	2.9	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	40	3.7	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	50	4.6	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	63	5.8	straight	PE	5.0	EI 120-U/C
				FEF	22.0–39.5	EI 120-U/C
	75	6.8	straight	PE	5.0	EI 120-U/C
				FEF	22.0–50.0	EI 120-U/C
	90	8.2	straight	PE	5.0	EI 120-U/C
				FEF	22.5–50.0	EI 120-U/C
	110	10.0	straight	PE	5.0	EI 120-U/C
				FEF	22.5	EI 120-U/C
	125	11.4	straight	PE	5.0	EI 120-U/C
				FEF	19.0	EI 120-U/C
	160	14.6	straight	PE	5.0	EI 120-U/C
				FEF	19.0	EI 120-U/C
	200	18.2	straight	PE	5.0	EI 120-U/C

5.2 Fire resistance classes for combustible pipes with fire protection wrap (50 mm)

In walls, fire protection wraps must be installed on both sides. In floors, one wrap must be installed on the lower side.
Pipes must always be installed perpendicularly to the surface of the building element.
The penetration sealing may only be used on pneumatic conveyors, compressed air lines etc. if the pipeline system is switched off in the event of a fire.



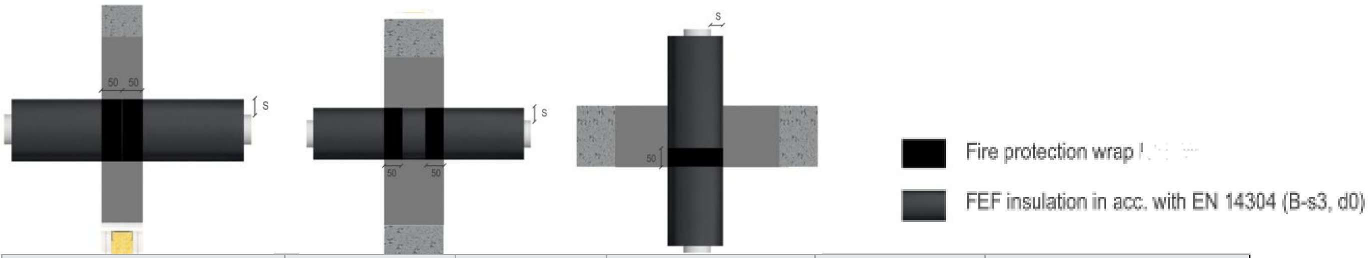
5.2.1 Fire resistance classes for standard pipes with fire protection wrap

Pipe material	Pipe outer Ø [mm]	Pipe wall thickness [mm]	Number of wraps and layers		Fire resistance class	
			Wall	Floor	Plasterboard Wall / solid wall (≥ 100 mm)	Solid floor (≥ 150 mm)
PVC-U, PVC-C	32–50	1.8–5.6	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	63–110	1.8–12.3	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 90 U/U**
PE-HD, ABS, SAN+PVC	32–50	1.8–4.6	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	63–110	1.8–10.0	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
PP	32–50	1.8–4.6	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	63–110	1.8–10.0	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**

5.2.2 Fire resistance classes for non-standard pipes with fire protection wrap

Pipe material	Pipe outer Ø [mm]	Pipe wall thickness [mm]	Number of wraps and layers		Fire resistance class	
			Wall	Floor	Plasterboard Wall / solid wall (≥ 100 mm)	Solid floor (≥ 150 mm)
Geberit Silent-PP	≤ 50.0	2.0–3.6	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0		2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
Geberit Silent-Pro	≤ 75.0	3.8–4.5	2 × 3 layers	1 × 3 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0		2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
Geberit Silent-db20	≤ 56.0	3.2	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0	5.5–6.0	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
KE KELIT PHONEX AS	≤ 56.0	4.0	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0	5.3	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
Pipelife MASTER 3	≤ 50.0	1.8–2.0	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 90 U/U**
	≤ 110.0	2.1–3.0	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
POLO-KAL NG / POLO-KAL XS	≤ 50.0	1.8–2.0	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0	2.6–3.4	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
REHAU RAUPIANO LIGHT	≤ 50.0	1.8–2.7	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0		2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
REHAU RAUPIANO PLUS	≤ 50.0	1.8	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 60 U/U**
	≤ 110.0	1.9–2.7	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
REHAU RAUSILENTO	≤ 50.0	1.8–2.7	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0		2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
CONEL DRAIN	≤ 50.0	1.8–2.7	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0		2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
Wavin SiTech+	≤ 50.0	2.0–2.1	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 120 U/U**
	≤ 110.0	2.6–3.4	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**
GF Silenta Premium	≤ 50.0	4.1	2 × 2 layers	1 × 2 layers	**EI 120 U/U**	**EI 90 U/U**
	≤ 110.0	4.6–5.3	2 × 4 layers	1 × 4 layers	**EI 120 U/U**	**EI 120 U/U**

5.2.3 Fire resistance classes for combustible pipes with fire protection wrap (50 mm) and FEF insulation

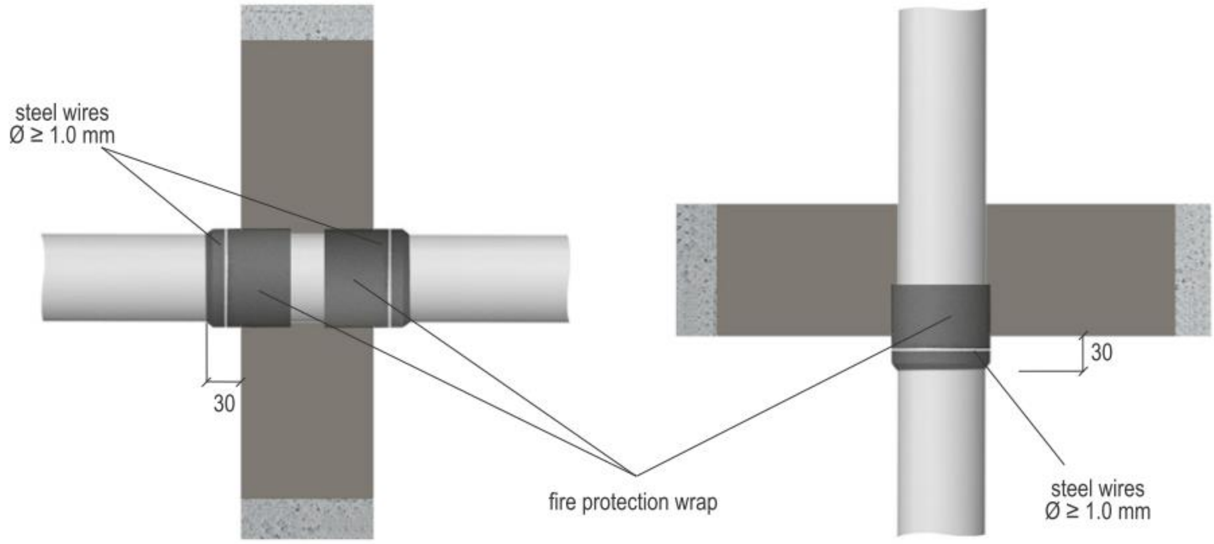


Type of pipe	Pipe outer Ø [mm]	Pipe wall thickness [mm]	FEF insulation Thickness S [mm]	Number of wraps and layers	Fire resistance class Plasterboard Wall / solid wall (≥ 100 mm)
PP-H	40 - 75	1,8-8,2	9,0-22,0	2 × 3 layers	EI 90 U/U
Type of pipe	**Pipe outer Ø [mm]**	**Pipe wall thickness [mm]**	**FEF insulation Thickness S [mm]**	**Number of wraps and layers**	**Fire resistance class Solid floor (≥ 150 mm)**
Geberit Silent-PP	≤ 50	2.0	17.0	1 × 2 layers	EI 120 U/U
	> 100 – ≤ 125	3.6–4.2	18.5	1 × 5 layers	EI 120 U/U
Geberit Silent-Pro	≤ 50	3.0	17.0	1 × 2 layers	EI 120 U/U
	> 75 – ≤ 110	3.8–4.5	18.0	1 × 4 layers	EI 120 U/U
Geberit Silent-db20	≤ 56	3.2	17.0	1 × 2 layers	EI 120 U/U
	> 56 – ≤ 110	3.2–6.0	18.0	1 × 4 layers	EI 90 U/U
	> 110 – ≤ 135	6.0	18.5	1 × 5 layers	EI 120 U/U
	> 135 – ≤ 160	6.0–7.0	19.0	1 × 6 layers	EI 120 U/U
Pipelife MASTER 3	≤ 50	1.8–2.0	17.0	1 × 2 layers	EI 120 U/U
	> 50 – ≤ 110	2.0–3.0	18.0	1 × 4 layers	EI 120 U/U
POLO-KAL NG / POLO-KAL XS	≤ 50	1.8–2.0	17.0	1 × 2 layers	EI 120 U/U
	> 50 – ≤ 110	2.0–3.0	18.0	1 × 4 layers	EI 120 U/U
REHAU RAUPIANO LIGHT	≤ 50	1.8	17.0	1 × 2 layers	EI 120 U/U
	> 50 – ≤ 110	1.8–2.7	18.0	1 × 4 layers	EI 120 U/U
	> 110 – ≤ 125	2.7–3.1	18.5	1 × 5 layers	EI 120 U/U
	> 125 – ≤ 160	3.1–3.9	19.0	1 × 6 layers	EI 90 U/U
REHAU RAUPIANO PLUS*	≤ 50	1.8	17.0	1 × 2 layers	EI 120 U/U
CONEL DRAIN	≤ 50	1.8–2.7	17.0	1 × 2 layers	EI 120 U/U
Wavin SiTech	≤ 50	2.0–2.1	17.0	1 × 2 layers	EI 120 U/U
	> 50 – ≤ 110	2.6–3.4	18.0	1 × 4 layers	EI 120 U/U
Wavin SiTech+	≤ 50	2.0–2.1	17.0	1 × 2 layers	EI 120 U/U
	> 50 – ≤ 110	2.6–3.4	18.0	1 × 4 layers	EI 120 U/U
Wavin AS	≤ 58	4.0	17.0	1 × 2 layers	EI 120 U/U
	> 58 – ≤ 110	5.3	18.0	1 × 4 layers	EI 120 U/U
GF Silenta Premium	≤ 58	4.1	17.0	1 × 2 layers	EI 120 U/U
	> 58 – ≤ 110	4.1–5.3	18.0	1 × 4 layers	EI 120 U/U
	> 110 – ≤ 135	5.3	18.5	1 × 5 layers	EI 120 U/U
Ostendorf Skolan dB	≤ 58	4.0	17.0	1 × 2 layers	EI 120 U/U
	> 58 – ≤ 110	4.0–5.3	18.0	1 × 4 layers	EI 60 U/U
	> 110 – ≤ 135	5.3	18.5	1 × 5 layers	EI 120 U/U

* Equivalent to REHAU RAUPIANO LIGHT

5.3 Fire resistance classes for combustible pipes with fire protection wrap (100 mm)

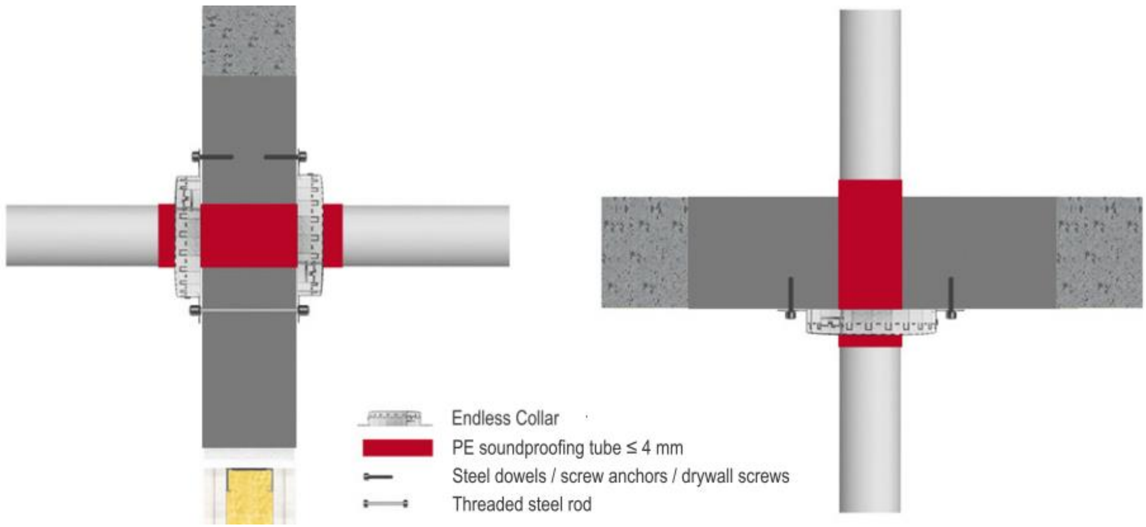
In walls, fire protection wraps must be installed on both sides. In floors, one wrap must be installed on the lower side.
Pipes must always be installed perpendicularly to the surface of the building element.
The penetration sealing may only be used on pneumatic conveyors, compressed air lines etc. if the pipeline system is switched off in the event of a fire.



Wall								
Pipe material	Dimensions [mm]	Fire protection wrap						Fire resistance class
		Wrap width [mm]	Number of wraps [n]	Number of layers [n]	Overlap [mm]	Inside seal [mm]	Outside seal [mm]	
PVC-U, PVC-C, PP-H, PE 100	≤ Ø 50	100	2	1	0	70	30	EI 120 U/U
	> Ø 50–80			2				
	> Ø 80–110			3				
	> Ø 110–135			4				EI 120 U/C
	> Ø 135–160			5				

Floor								
Pipe material	Dimensions [mm]	Fire protection wrap						Fire resistance class
		Wrap width [mm]	Number of wraps [n]	Number of layers [n]	Overlap [mm]	Inside seal [mm]	Outside seal [mm]	
PVC-U, PVC-C, PP-H, PE 100	≤ Ø 50	100	1	1	0	70	30	EI 120 U/U
	> Ø 50–80			2				
	> Ø 80–110			3				
	> Ø 110–135			4				EI 120 U/C
	> Ø 135–160			5				

5.4 Fire resistance classes for combustible pipes with fire protection endless collar



5.4.1 Fire resistance classes for standard pipes with fire protection endless collar

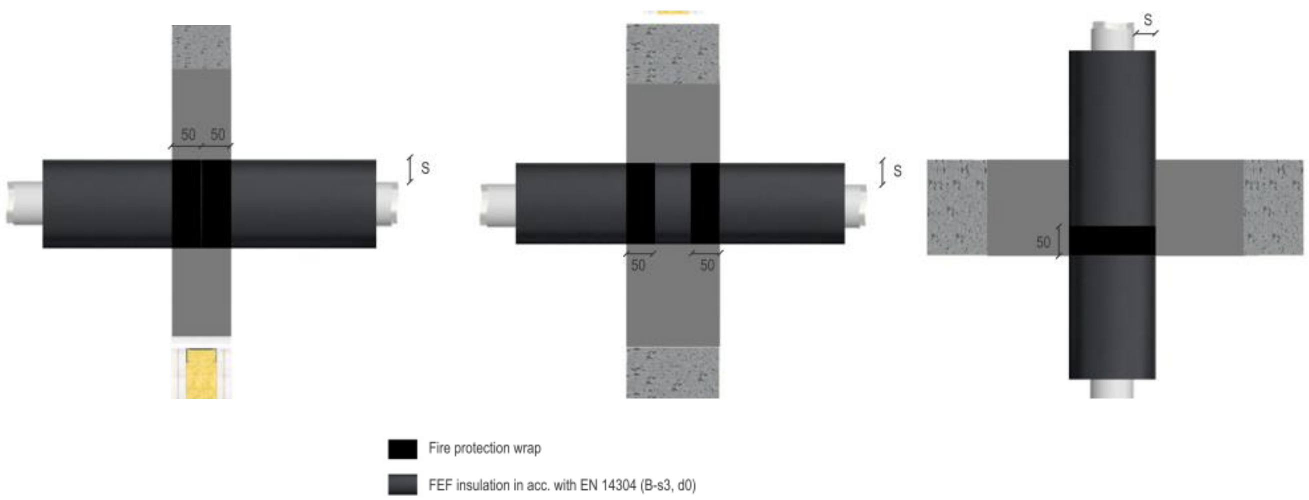
Pipe			Endless Collar	Fire resistance class	
Pipe material	Pipe outer Ø [mm]	Pipe wall thickness [mm]	Number of layers	Plasterboard Wall / solid wall (≥ 100 mm)	Solid floor (≥ 150 mm)
PVC-U	≤ 50	1.8 – 5.6	2	EI 120 U/U	–
	> 50 – ≤ 75	1.8 – 8.4	3	EI 90 U/U	
	> 75 – ≤ 110	1.8 – 11.9	4		
	> 110 – ≤ 125	3.2 – 11.9	5		
	> 125 – ≤ 160		6	EI 120 U/U	
PE-HD	≤ 50	1.8 – 4.6	2		EI 120 U/C
	> 50 – ≤ 75	2.7	3		
	> 75 – ≤ 110		4		
	> 110 – ≤ 160	4.0	6	EI 120 U/C	–
PP	≤ 50	1.8 – 4.6	2	EI 120 U/U	
	> 50 – ≤ 75	1.8 – 2.7	3		
	> 75 – ≤ 110	2.7	4		

5.4.2 Fire resistance classes for non-standard pipes with fire protection endless collar

Pipe			Endless Collar	Fire resistance class	
Pipe material	Pipe outer Ø [mm]	Pipe wall thickness [mm]	Number of layers	Plasterboard Wall / solid wall (≥ 100 mm)	Solid floor (≥ 150 mm)
Wavin SiTech+ REHAU RAUPIANO PLUS	≤ 50	2.0	2	EI 120 U/U	EI 120 U/U
	≤ 75	2.6	3		
	≤ 110	3.6	4		
	≤ 125	4.2	5	-	
	≤ 160	5.2	6	-	
Geberit Silent-PP POLO-KAL NG	≤ 50	2.0	2	EI 120 U/U	
	≤ 75	2.6	3		
	≤ 110	3.6	4		
	≤ 125	4.2	5		
	≤ 160	5.2	6		

6 Fire resistance classes for multilayer pipes

6.1 Fire resistance classes for multilayer pipes with fire protection wrap and FEF insulation



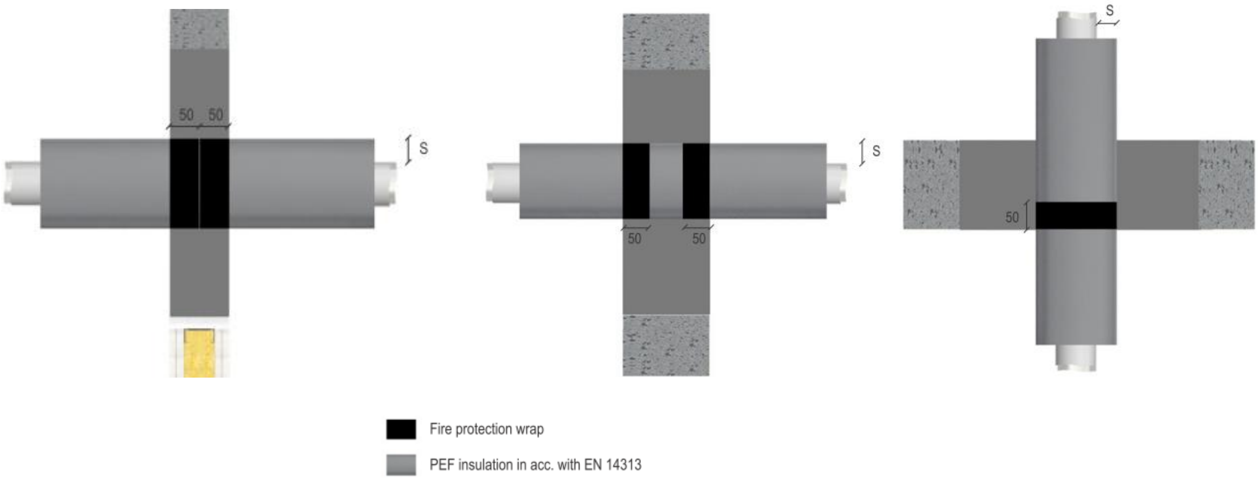
6.1.1 Fire resistance classes for multilayer pipes with fire protection wrap and FEF insulation – installations in walls

Type of pipe	Pipe outer Ø [mm]	Pipe wall thickness [mm]	FEF insulation	Fire protection wrap	Fire resistance class
			Thickness S [mm]	Number of wraps and layers	Plasterboard Wall / solid wall (≥ 100 mm)
Geberit Mepla	16	2.25 – 3.0	8.0–32.0	2 × 1 layer	EI 120 U/C
	20				EI 120 U/C
	26		8.5–35.0		EI 120 U/C
	32		9.0–35.0		EI 120 U/C
	40	3.5 – 4.7		2 × 2 layers	EI 120 U/C
	50				EI 120 U/C
	63		9.0–39.0		EI 120 U/C
	75		9.5		EI 90 U/C
			> 9.5 – 40.5		EI 120 U/C
REHAU RAUTITAN stabil	16	2.6 – 4.7	8.0–32.0	2 × 1 layer	EI 120 U/C
	20				EI 120 U/C
	25		8.5–35.0		EI 120 U/C
	32		9.0–35.0		EI 120 U/C
	40	6		2 × 2 layers	EI 120 U/C
KE KELIT KELOX	16	2.0 – 3.0	8.0–32.0	2 × 1 layer	EI 120 U/C
	18				EI 120 U/C
	20				EI 120 U/C
	25		8.5–35.0		EI 120 U/C
	32		9.0–35.0		EI 120 U/C
	40	4.0 – 7.5		2 × 2 layers	EI 120 U/C
	50				EI 120 U/C
	63		9.0–39.0		EI 120 U/C
	75		9.5–40.5		EI 120 U/C
Henco	20	2.0 – 3.0	8.0–32.0	2 × 1 layer	EI 120 U/C
	32				EI 120 U/C
Geberit FlowFit	16–32	2.0 – 2.8	8.5–33.5	2 × 1 layer	EI 90 U/C

6.1.2 Fire resistance classes for multilayer pipes with fire protection wrap and FEF insulation – installations in floors

Type of pipe	Pipe outer Ø [mm]	Pipe wall thickness [mm]	FEF insulation	Fire protection wrap	Fire resistance class
			Thickness S [mm]	Number of wraps and layers	Solid floor (≥ 150 mm)
Geberit Mepla	16	2.25 – 4.7	8.0 – 32.0	1 × 1 layer	EI 120 U/C
	20				EI 120 U/C
	26		8.5–35.0		EI 120 U/C
	32		9.0 – 35.0		EI 120 U/C
	40			1 × 2 layers	EI 120 U/C
	50		9.0–37.5		EI 120 U/C
	63		9.0–39.0		EI 120 U/C
	75		9.5 – 40.5		EI 120 U/C
REHAU RAUTITAN stabil	16	2.6 – 4.7	8.0–32.0	1 × 1 layer	EI 120 U/C
	20				EI 120 U/C
	25		8.5–35.0		EI 120 U/C
	32		9.0 – 35.0		EI 120 U/C
	40	6		1 × 2 layers	EI 120 U/C
KE KELIT KELOX	16	2.6 – 4.0	8.0–32.0	1 × 1 layer	EI 120 U/C
	18				EI 120 U/C
	20				EI 120 U/C
	25		8.5–35.0		EI 120 U/C
	32		9.0–35.0		EI 120 U/C
	40	4.0 – 7.5		1 × 2 layers	EI 120 U/C
	50				EI 120 U/C
	63		9.0–39.0		EI 120 U/C
	75		9.5–40.5		EI 120 U/C
Geberit FlowFit	16–32	2.0 – 4.7	8.5–35.0	1 × 1 layer	EI 90 U/C
	40–75		20.5–40.5	1 × 2 layers	EI 90 U/C

6.2 Fire resistance classes for multilayer pipes with fire protection wrap and PEF insulation



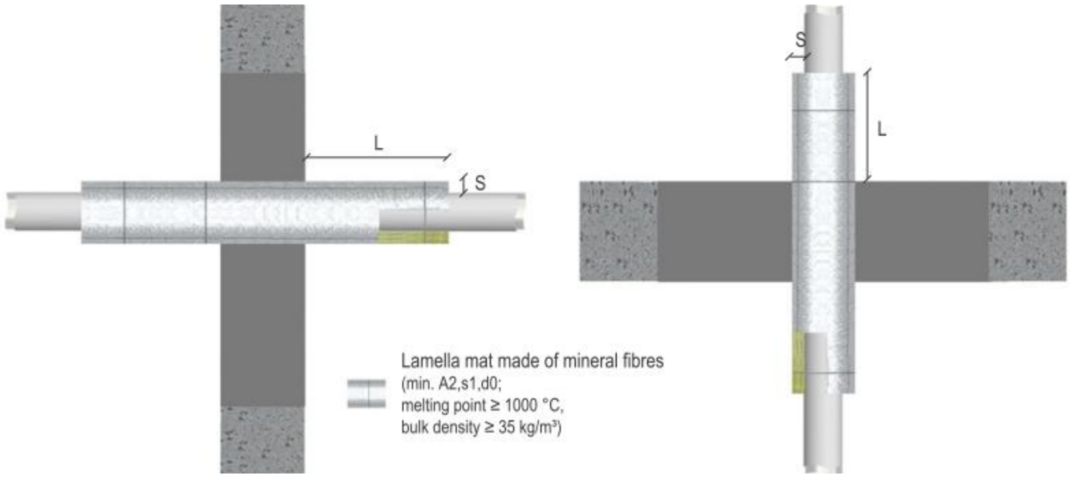
6.2.1 Fire resistance classes for multilayer pipes with fire protection wrap and PEF insulation – installations in walls

Type of pipe	Pipe outer Ø [mm]	Pipe wall thickness [mm]	PEF insulation	Fire protection wrap	Fire resistance class
			Thickness S [mm]	Number of wraps and layers	Plasterboard Wall / solid wall (≥ 100 mm)
Geberit Mepla	16–32	2.25 – 3.0	6.0–13.0	2 × 1 layer	EI 120 U/C
REHAU RAUTITAN stabil	16–32	2.6 – 4.7	4.0–26.0		EI 120 U/C
KE KELIT KELOX	18–32	2.0 – 3.0	4.0–13.0		EI 120 U/C
Henco	20–32	2.0 – 3.0	6.0–13.0		EI 120 U/C
Geberit FlowFit	16	2.0 – 2.5	13.0–26.0		EI 90 U/C
	20–25		26.0		EI 90 U/C

6.2.2 Fire resistance classes for multilayer pipes with fire protection wrap and PEF insulation – installations in floors

Type of pipe	Pipe outer Ø [mm]	Pipe wall thickness [mm]	PEF insulation	Fire protection wrap	Fire resistance class
			Thickness S [mm]	Number of wraps and layers	Solid floor (≥ 150 mm)
Geberit Mepla	16–32	2.25 – 3.0	6.0–13.0	1 × 1 layer	EI 120 U/C
REHAU RAUTITAN stabil	16–32	2.6 – 4.7	4.0–26.0		EI 120 U/C
KE KELIT KELOX	18–32	2.0 – 3.0	4.0–13.0		EI 120 U/C
Henco	20–32	2.0 – 3.0	6.0–13.0		EI 120 U/C
Geberit FlowFit	16–25	2.0 – 2.5	6.0–26.0		EI 90 U/C

6.3 Fire resistance classes for multilayer pipes with lamella mat

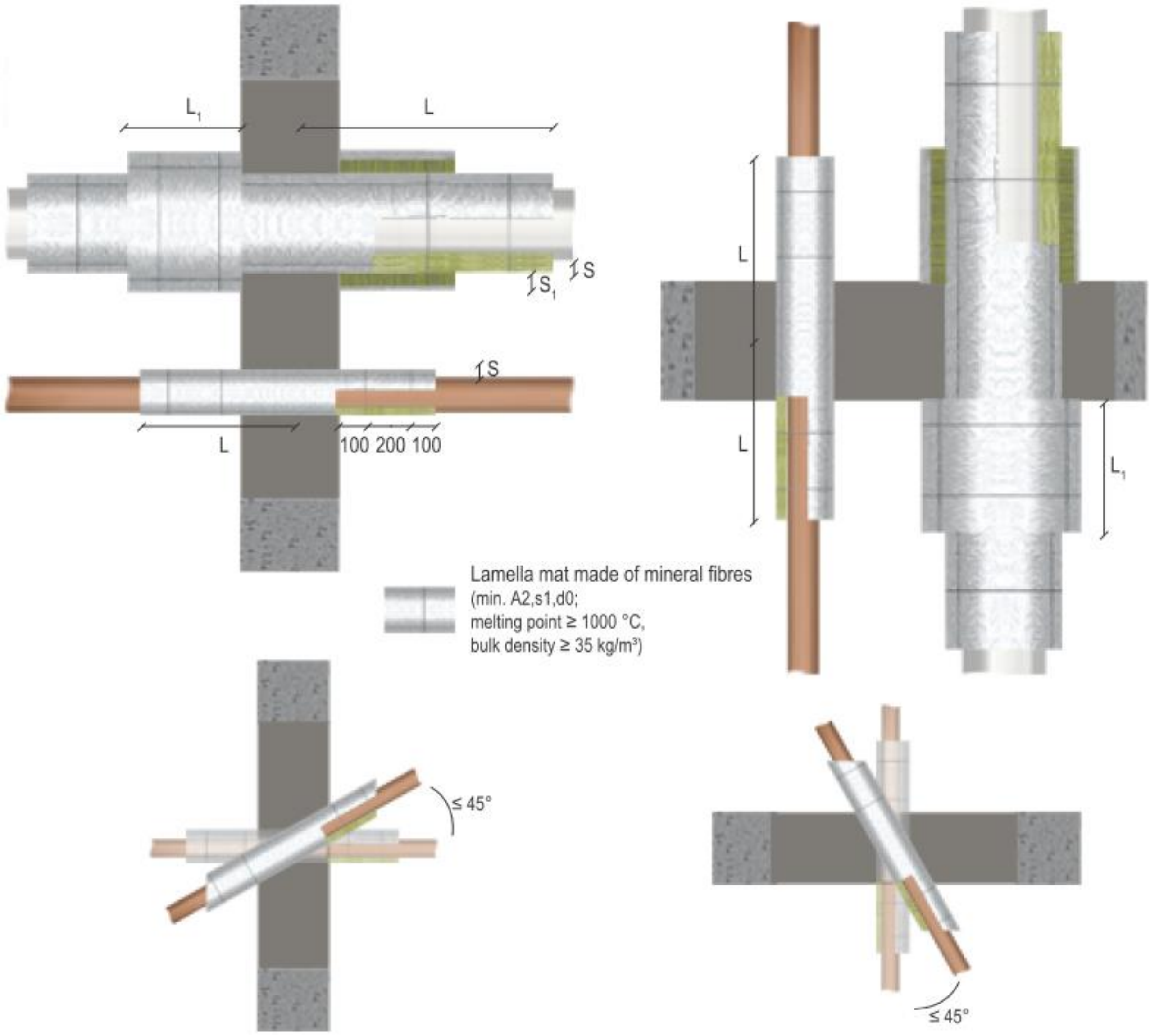


Type of pipe	Outer Ø [mm]	Wall thickness [mm]	Insulation length L [mm]	Insulation thickness S [mm]	Fire resistance class	
					Wall	Floor
Henco	≤ 12	1.6	≥ 250	≥ 20	**EI 120 U/C**	**EI 120 U/C**
	≤ 32	3.0				
	≤ 63	4.5		≥ 30		

7. Non-combustible pipes

7.1 Fire resistance classes for non-combustible pipes with lamella mat or mineral fibre shells

The section insulation must be fastened to the pipes using tension bands or wire (with a spacing of 100 mm or ≤ 200 mm). When installing in floors, appropriate measures must be applied to secure the section insulation against falling out.
Pipes may be installed at 45°–90° angles to the surface of the building element.
Depending on pipe wall thickness and the outer diameter of the pipe, an additional protective insulation made of mineral fibre mats may be necessary.



7.1.1 Fire resistance classes for non-combustible pipes with lamella mat

<table>
<tr><th rowspan="2">Pipe material</th><th rowspan="2">Outside pipe Ø
[mm]</th><th rowspan="2">Length L
[mm]</th><th rowspan="2">Thickness D
[mm]</th><th colspan="2">Fire resistance class</th></tr>
<tr><th>Solid wall
(≥ 150 mm)</th><th>Solid floor
(≥ 150 mm)</th></tr>
<tr><td rowspan="6">Copper</td><td>≤ 15,0</td><td>≥ 250</td><td>≥ 20</td><td rowspan="12">EI 120 C/U</td><td rowspan="12">EI 120 C/U</td></tr>
<tr><td>> 15,0 - ≤ 28,0</td><td rowspan="3">≥ 500</td><td>≥ 20</td></tr>
<tr><td>> 28,0 - ≤ 42,0</td><td>≥ 30</td></tr>
<tr><td>> 42,0 - ≤ 54,0</td><td>≥ 40</td></tr>
<tr><td>> 54,0 - ≤ 88,9</td><td>≥ 750</td><td>≥ 60</td></tr>
<tr><td>> 88,9 - ≤ 108,0*</td><td>≥ 1000</td><td>≥ 30</td></tr>
<tr><td rowspan="6">Steel, stainless steel, cast iron</td><td>≤ 15,0</td><td>≥ 250</td><td rowspan="2">≥ 20</td></tr>
<tr><td>> 15,0 - ≤ 28,0</td><td rowspan="3">≥ 500</td></tr>
<tr><td>> 28,0 - ≤ 42,0</td><td>≥ 30</td></tr>
<tr><td>> 42,0 - ≤ 114,3</td><td rowspan="3">≥ 40</td></tr>
<tr><td>> 114,3 - ≤ 168,3</td><td rowspan="2">≥ 1000</td></tr>
<tr><td>> 168,3 - ≤ 323,9*</td></tr>
</table>

*Additional protective insulation made of mineral fibre mat (L1 ≥ 500 mm x D1 ≥ 30 mm)

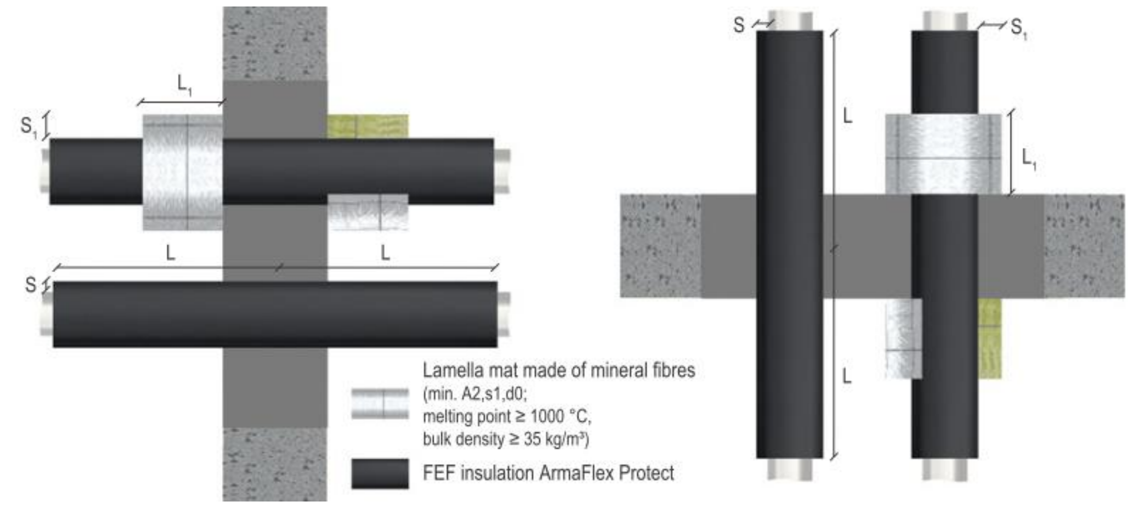
7.1.2 Fire resistance classes for non-combustible pipes with mineral fibre shells “Conlit 150U”

<table>
<tr><th rowspan="2">Pipe material</th><th rowspan="2">Outside pipe Ø
[mm]</th><th rowspan="2">Length L
[mm]</th><th rowspan="2">Thickness D
[mm]</th><th colspan="2">Fire resistance class</th></tr>
<tr><th>Solid wall
(≥ 150 mm)</th><th>Solid floor
(≥ 150 mm)</th></tr>
<tr><td rowspan="5">Copper</td><td>≤ 15,0</td><td>≥ 250</td><td>≥ 22,5</td><td rowspan="2">EI 120 C/U</td><td>EI 120 C/U</td></tr>
<tr><td>> 15,0 - ≤ 28,0</td><td rowspan="3">≥ 500</td><td>≥ 26</td><td>-</td></tr>
<tr><td>> 15,0 - ≤ 42,0</td><td>≥ 19</td><td>-</td><td rowspan="9">EI 120 C/U</td></tr>
<tr><td>> 28,0 - ≤ 54,0</td><td>≥ 38</td><td rowspan="4">EI 120 C/U</td></tr>
<tr><td>> 54,0 - ≤ 108,0</td><td>≥ 1000</td><td>≥ 38</td></tr>
<tr><td rowspan="7">Steel, stainless steel, cast iron</td><td>≤ 15,0</td><td>≥ 250</td><td>≥ 22,5</td></tr>
<tr><td>> 15,0 - ≤ 28,0</td><td rowspan="3">≥ 500</td><td>≥ 26</td></tr>
<tr><td>> 15,0 - ≤ 42,0</td><td>≥ 19</td><td>-</td></tr>
<tr><td>> 28,0 - ≤ 54,0</td><td>≥ 38</td><td rowspan="4">EI 120 C/U</td></tr>
<tr><td>> 54,0 - ≤ 114,3</td><td>≥ 750</td><td>≥ 33</td></tr>
<tr><td>> 114,3 - ≤ 168,3</td><td rowspan="2">≥ 1000</td><td rowspan="2">≥ 40</td></tr>
<tr><td>> 168,3 - ≤ 323,9*</td><td>EI 90 / E 120 C/U</td></tr>
</table>

*Additional protective insulation made of mineral fibre mat (L1 ≥ 500 mm x D1 ≥ 40 mm)

7.2 Non-combustible pipes with FEF insulation

7.2.1 Fire resistance classes for non-combustible pipes with FEF insulation “ArmaFlex Protect”

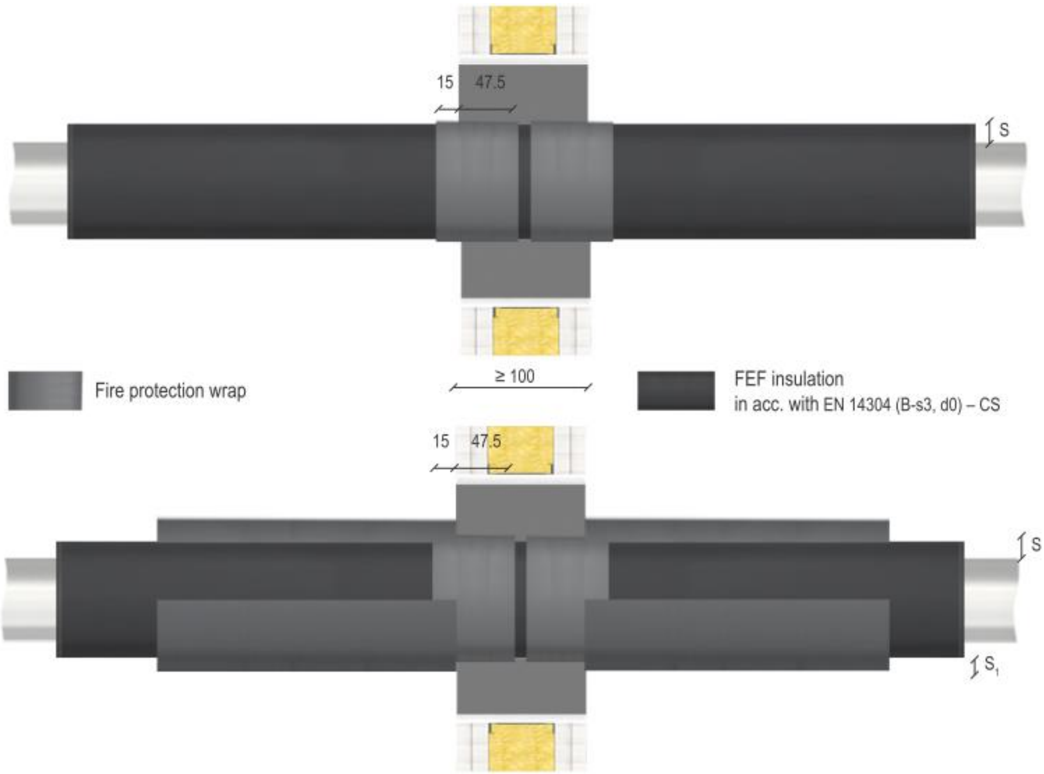


<table>
<tr><th rowspan="2">Pipe material</th><th rowspan="2">Outside pipe Ø
[mm]</th><th rowspan="2">Length L
[mm]</th><th rowspan="2">Thickness D
[mm]</th><th colspan="2">Fire resistance class</th></tr>
<tr><th>Solid wall
(≥ 150 mm)</th><th>Solid floor
(≥ 150 mm)</th></tr>
<tr><td rowspan="5">Copper</td><td>≤ 28,0</td><td>≥ 250</td><td>25</td><td rowspan="11">EI 120 C/U</td><td rowspan="9">EI 120 C/U</td></tr>
<tr><td>≤ 28,0</td><td rowspan="2">≥ 500</td><td>26 - 51</td></tr>
<tr><td>> 28,0 - ≤ 88,9</td><td>25</td></tr>
<tr><td>> 28,0 - ≤ 88,9</td><td rowspan="2">≥ 100</td><td>26 - 51</td></tr>
<tr><td>> 88,9 - ≤ 108,0*</td><td>26 - 52</td></tr>
<tr><td rowspan="6">Steel, stainless steel, cast iron</td><td>≤ 28,0</td><td>≥ 250</td><td>25</td></tr>
<tr><td>≤ 28,0</td><td rowspan="2">≥ 500</td><td>26 - 51</td></tr>
<tr><td>> 28,0 - ≤ 88,9</td><td>25</td></tr>
<tr><td>> 28,0 - ≤ 88,9</td><td rowspan="3">≥ 100</td><td>26 - 51</td></tr>
<tr><td>> 88,9 - ≤ 170,0*</td><td>52</td><td>-</td></tr>
<tr><td>> 88,9 - ≤ 170,0</td><td>26 - 52</td><td>EI 120 C/U</td></tr>
</table>

*Additional protective insulation made of mineral fibre mat (L1 ≥ 500 mm x D1 ≥ 40 mm)

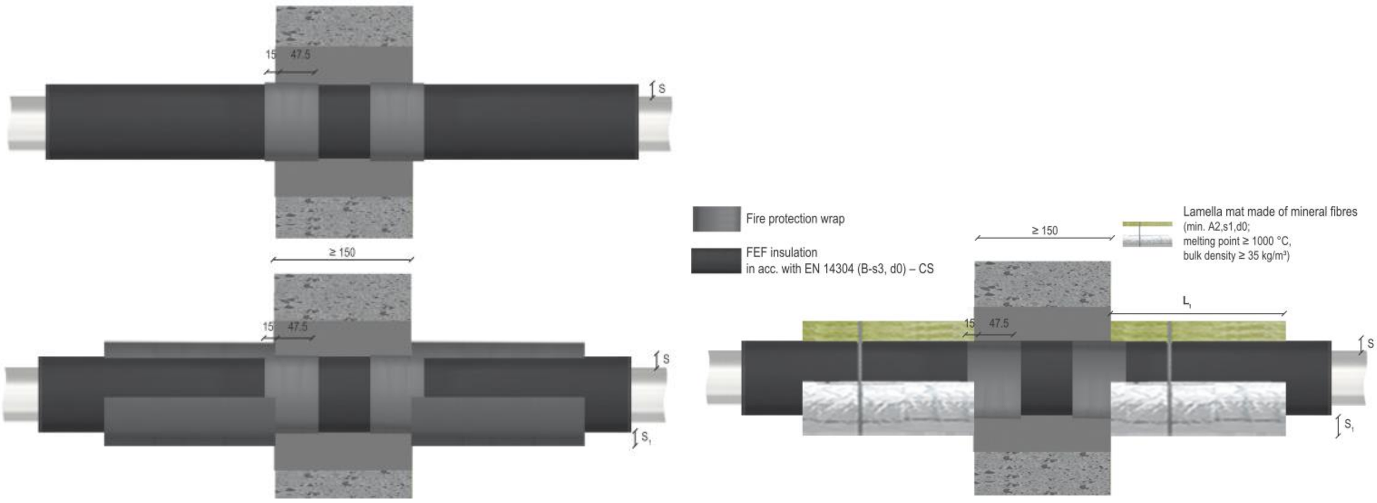
7.3 Non-combustible pipes with FEF insulation and fire protection wrap (125 mm = 2 x 62.5 mm)

7.3.1 Fire resistance classes for non-combustible pipes with FEF insulation and wrap – Installation in plasterboard walls



Pipe			FEF insulation	Protective insulation			Fire protection wrap	Fire resistance class
Material	**Outer Ø [mm]**	**Wall thickness [mm]**	**Thickness S [mm]**	**Type**	**Length L_1 [mm]**	**Thickness S_1 [mm]**	**Number of layers**	**Plasterboard Wall / solid wall (≥ 100 mm)**
Copper, steel, stainless steel, cast iron	≤ 15.0	0.8–14.2	10.0	–	–	–	1	EI 120 C/U
			10.0–38.0				2	
	> 15.0 – ≤ 42.0		10.0				1	EI 90 C/U
	> 15.0 – ≤ 54.0		19.0–38.0				2	EI 120 C/U
	> 42.0 – ≤ 88.9	1.2–14.2					2	EI 90 C/U
	> 54.0 – ≤ 88.9	1.5–14.2	25.0				2	EI 120 C/U
Steel, stain-less steel, cast iron	> 15.0 – ≤ 88.9	0.8–14.2	19.0–38.0				2	
	> 88.9 – ≤ 114.3	2.0–14.2		FEF	250	19	2	
	> 114.3 – ≤ 159.0	3.2–14.2	25.0–38.0				2	
	> 159.0 – ≤ 219.1	4.0–14.2				38	2	

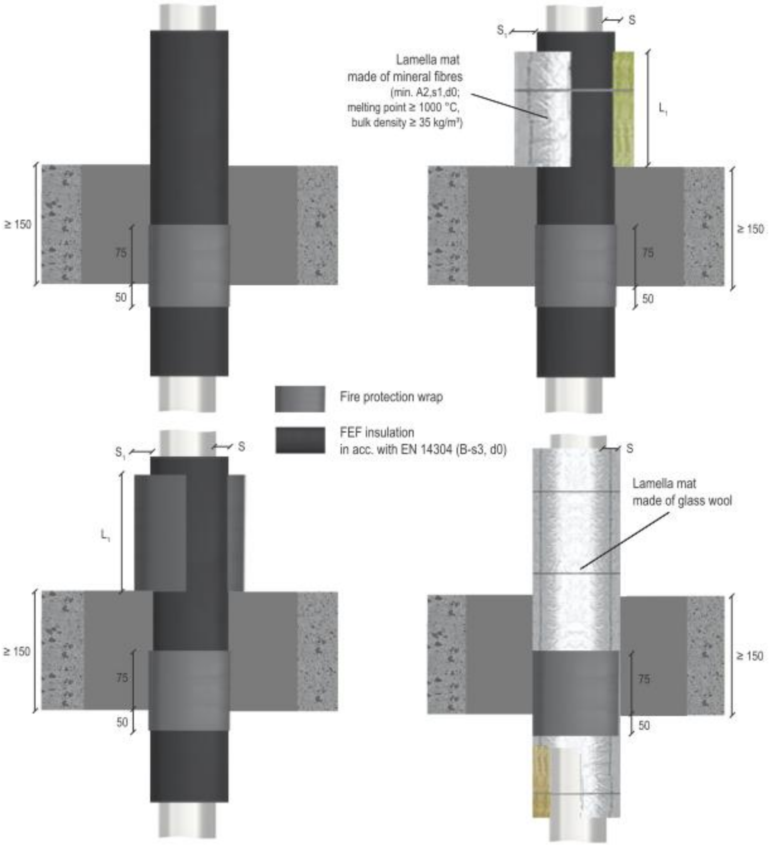
7.3.2 Fire resistance classes for non-combustible pipes with FEF insulation and wrap – Installation in solid walls



Pipe			FEF insulation	Protective insulation			Fire protection wrap	Fire resistance class
Material	Outer Ø [mm]	Wall thickness [mm]	Thickness S [mm]	Type	Length L_1 mm]	Thickness S_1 [mm]	Number of layers	solid wall (≥ 150 mm)
Copper, steel, stainless steel, cast iron	≤ 15.0	0.8–14.2	10.0	–	–	–	1	EI 120 C/U
			10.0–38.0				2	
	> 15.0 – ≤ 42.0		10.0				1	EI 90 C/U
	> 15.0 – ≤ 54.0		19.0–38.0				2	EI 120 C/U
	> 42.0 – ≤ 88.9	1.2–14.2					2	EI 90 C/U
	> 54.0 – ≤ 88.9	1.5–14.2	25.0				2	EI 120 C/U
	≤ 108.0	2.0–14.2	–	Lamella mat	750	40	2*	
Steel, stain-less steel, cast iron	> 15.0 – ≤ 88.9	0.8–14.2	19.0–38.0	–	–	–	2	
	> 88.9 – ≤ 114.3	2.0–14.2		FEF	250	19	2	
	≤ 114.3	3.2–14.2	19.0				2	EI 90 C/U
			19.0–25.0				2	EI 60 C/U
	> 114.3 – ≤ 159.0	3.2–14.2	25.0–38.0				2	EI 120 C/U
	> 159.0 – ≤ 219.1	4.0–14.2				38	2	
	≤ 168.3	4.0–14.2	25.0	–	–	–	2	EI 60 C/U
			50.0				3	
	> 219.1 – ≤ 323.9	4.0–14.2	39.0–48.0	Lamella mat	500	30	2	EI 60 C/U
	≤ 323.9	5.6–14.2	25.0	FEF	750	60	2	EI 120 C/U
			25.0–50.0				3	EI 120 C/U
			50.0				3	EI 120 C/U
				Lamella mat			3	EI 120 C/U

* Two fire protection wraps with a length of 125 mm each; installation on both sides with 50 mm inside the seal and 75 in front of the seal.

7.3.3 Fire resistance classes for non-combustible pipes with FEF insulation and wrap – Installation in solid floors

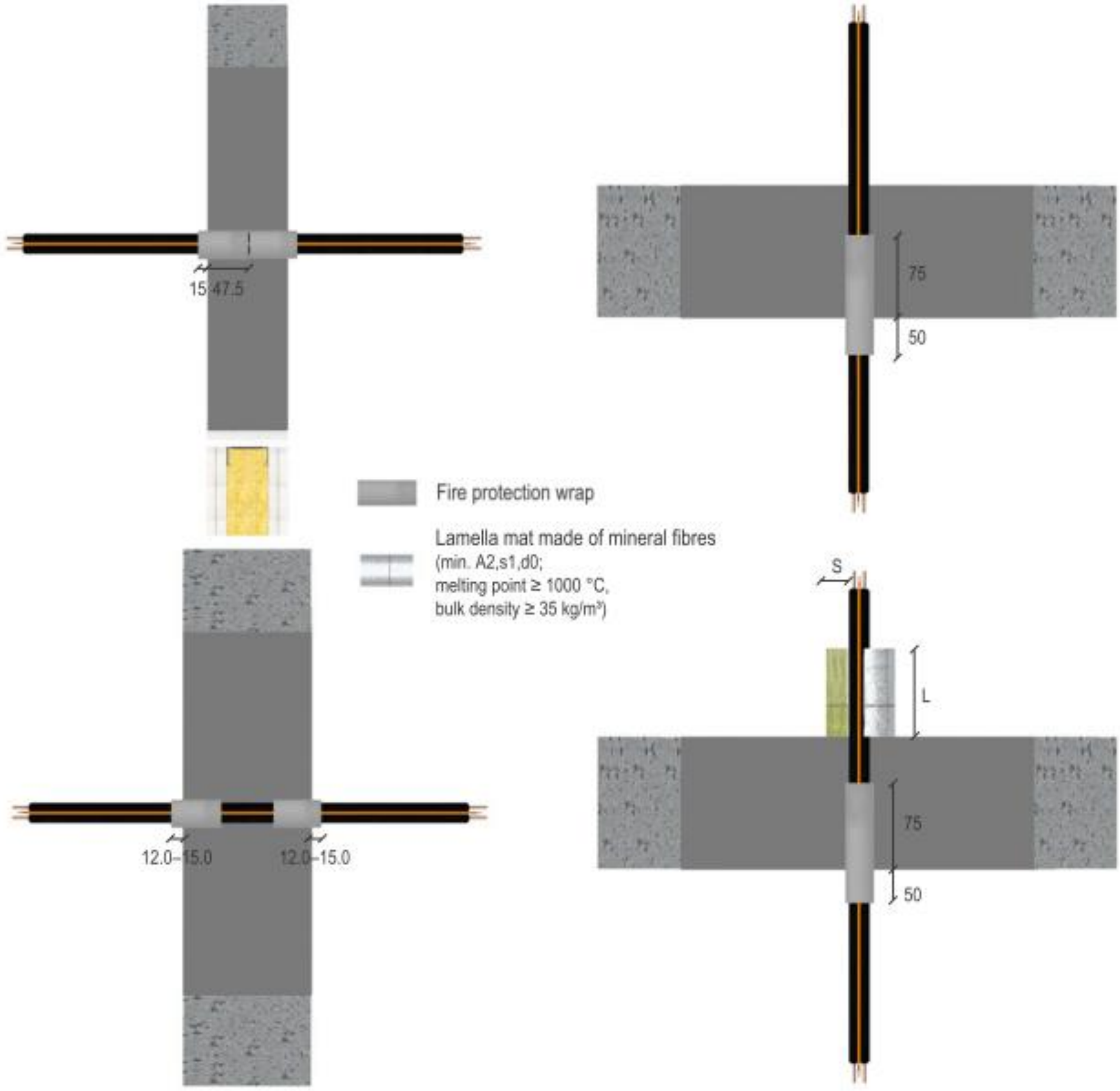


Pipe			Insulation		Protective insulation			Fire protection wrap	Fire resistance class
Material	Outer Ø [mm]	Wall thickness [mm]	Type	Thickness S [mm]	Type	Length L_1 mm]	Thickness S_1 [mm]	Number of layers	solid floor (≥ 150 mm)
Copper, steel, stainless steel, cast iron	≤ 42.0	0.6–14.2	FEF	10.0	–	–	–	1	EI 90 C/U
				9.0–40.0	–	–	–	2	
	> 42.0 – ≤ 60.0	1.2–14.2		13.0–40.0	–	–	–	2	
	≤ 60.0	0.6–14.2		13.0–40.0	–	–	–	2	EI 120 C/U
	> 60.0 – ≤ 88.9	1.5–14.2		19.0–38.0	–	–	–	2	EI 90 C/U
				25.0	–	–	–	2	EI 120 C/U
	≤ 54.0		glass wool	20.0–50.0	–	–	–	2	
	≤ 88.9	2.0–14.2		40.0	–	–	–	2	
				80.0	–	–	–	3	
				100.0	–	–	–	4	
	≤108.0	2.0–14.2	FEF	25,0–50,0	Lamella mat	750	40	2*	
Steel, stainless steel, cast iron	≤ 108.0	2.0–14.2		19.0–39.0	–	–	–	2	
	≤ 114.3	3.2–14.2		13.0–40.0	–	–	–	2	EI 90 C/U
	≤ 159.0	0.6–14.2		25.0–38.0	FEF	250	25	2	
	> 159.0 – ≤ 219.1	4.0–14.2				250	38	2	
	≤ 219.1	4.5–14.2		19.0–26.0	lamella mat	500	60	2	EI 120 C/U
			glass wool	60.0		–	–	–	EI 90 C/U
	≤ 273.0	5.0–14.2	FEF	25.0–26.0		750	60	2	EI 120 C/U
	≤ 323.9	5.6–14.2		25.0	FEF			2	
				25.0–50.0				3	
			glass wool	100.0	–	–	–	4	EI 90 C/U

* Two fire protection wraps with a length of 125 mm each; installation on both sides with 50 mm inside the seal and 75 in front of the seal.

8. HVAC split line combinations

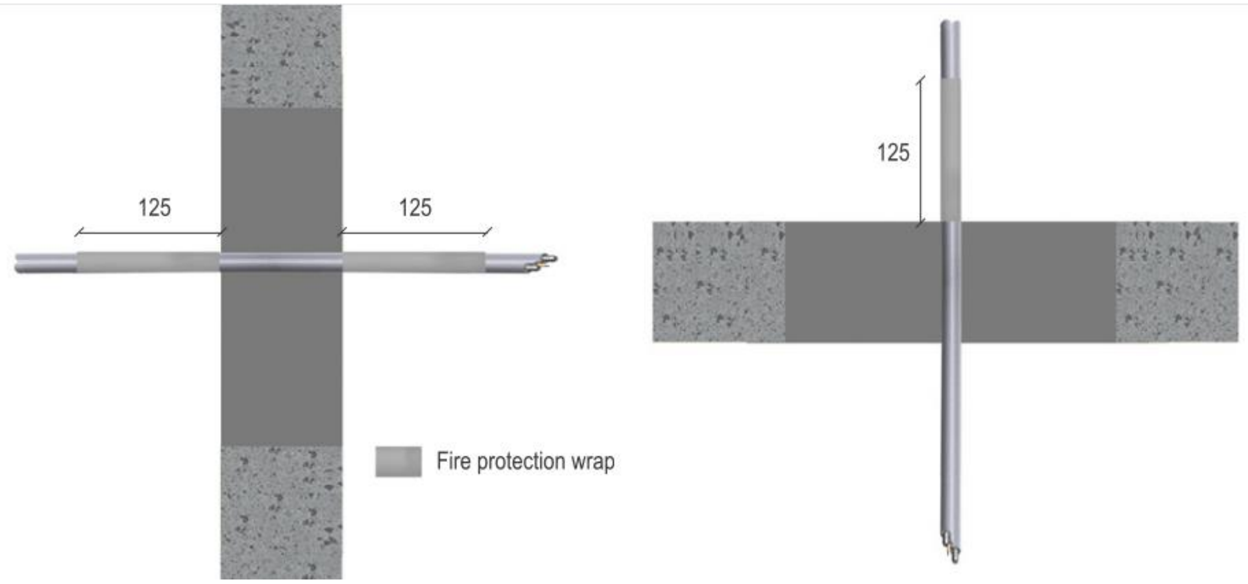
8.1 Fire resistance classes for HVAC split line combinations with fire protection wrap (125 mm = 2 x 62.5 mm)



Services	Fire protection wrap	Protective insulation made of lamella mat		Fire resistance class		
	Number of layers	Length L [mm]	Thickness S [mm]	Plasterboard Wall / solid wall (≥ 100 mm)	Solid wall (≥ 150 mm)	Solid floor (≥ 150 mm)
Copper pipe Ø 2 × 18 mm + 9 mm PE foam + 1 pipe PVC-U/PVC-C Ø ≤ 25.0 × 1.5 mm + ≤ 3 cables Ø ≤ 14.0 mm	2	–	–	EI 120	EI 120	EI 120
Copper pipe Ø 2 × 22 mm + 9 mm PE foam + 1 pipe PVC-U Ø ≤ 25.0 + ≤ 2 cables Ø ≤ 21.0 mm	2	250	30	–	–	EI 90

9. Double solar pipes NanoSun²

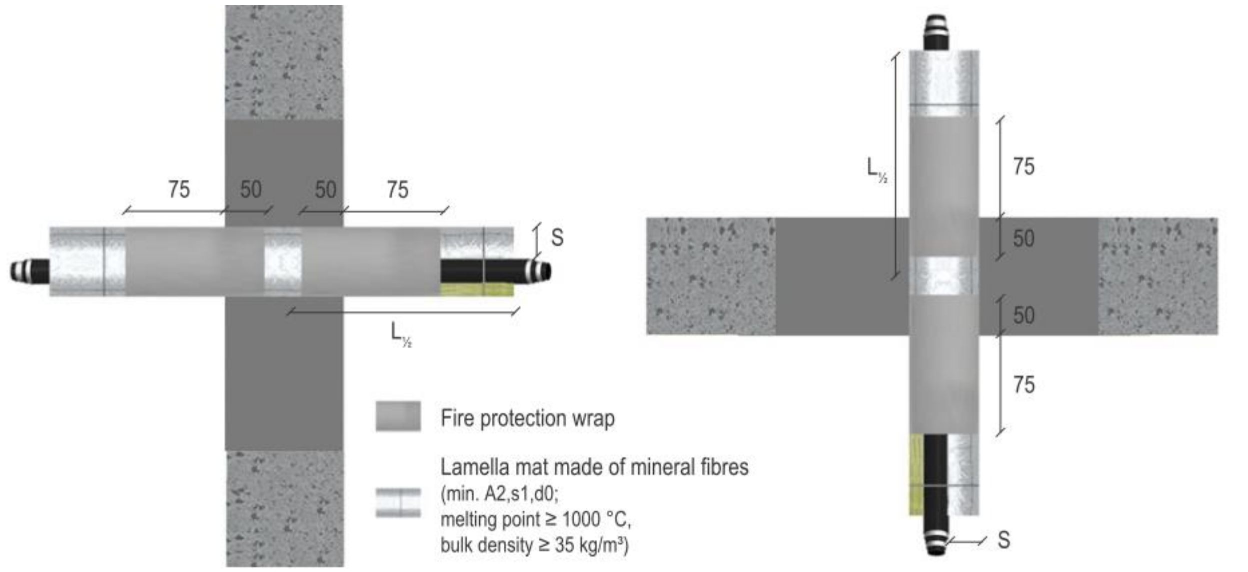
9.1 Fire resistance classes for double solar pipes NanoSun² with fire protection wrap (125 mm = 2 x 62.5 mm)



Pipe outer Ø [mm]	Fire protection wrap		Fire resistance class	
	Number of wraps and layers	Overlap	Solid wall (≥ 150 mm)	Solid floor (≥ 150 mm)
DN 16 – DN 25	**in walls:** 2 × 1 layer (on both sides) **in floors:** 1 × 1 layer (on upper side of floor)	≥ 40	EI 120 C/U	EI 120 C/U

10. HANSA-FLEX AG wire braided hydraulic hoses

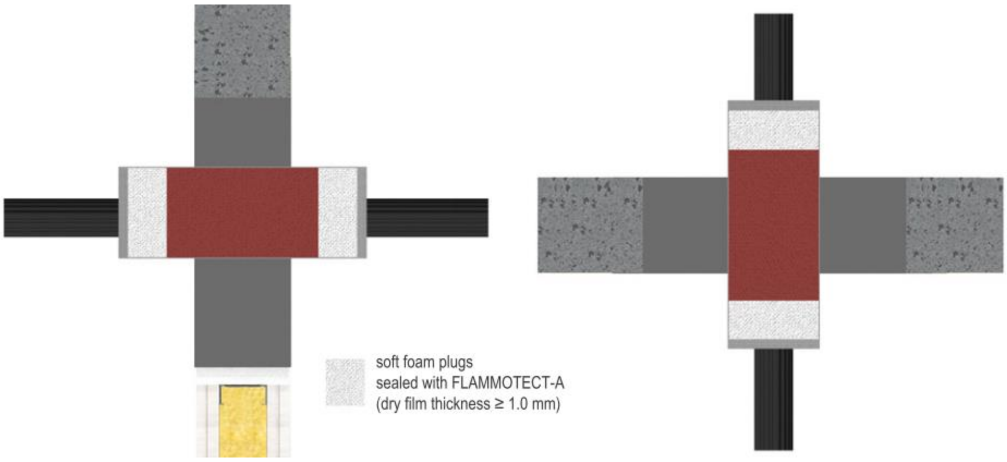
10.1 Fire resistance classes for HANSA-FLEX AG wire braided hydraulic hoses with wrap (125 mm = 2 x 62.5 mm)



Pipe outer Ø [mm]	Fire protection wrap	Protective insulation made of lamella mat		Fire resistance class	
	Number of wraps and layers	Length L½ [mm]	Thickness S [mm]	Solid wall (≥ 150 mm)	Solid floor (≥ 150 mm)
≤ 55.9	2 × 1 layer	≥ 250 mm	≥ 20 mm	EI 120	EI 120

11. Cable Tube CT

Depending on the installed services, Cable Tubes with lengths of 150, 200 and 300 mm may be used.
Cables, cable bundles and electrical installation conduits may be installed directly adjacent to each other and to the inner Cable Tube wall.
The Cable Tube may be used to seal openings without installations (blank seals).
For subsequent installations, the sealed soft foam plugs must be removed from the Cable Tube.
The remaining openings between the services and the Cable Tube as well as between the services themselves must be sealed completely with the 40 mm soft foam plugs. Afterwards the plugs must be sealed with the ablative filler FLAMMOTECT-A.
In floors with a thickness of ≥ 200 mm, two 150 mm Cable Tubes can be combined (using duct tape) to a 300 mm Cable Tube



11.1 Cable Tube CT – Installations in plasterboard wall / solid wall (≥ 100 mm)

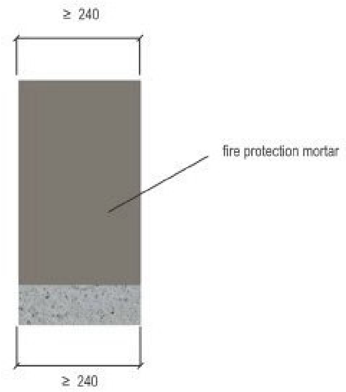
Service	Additional measure	Fire resistance class Length of CT [mm]		
		150	200	300
Cables Ø ≤ 21 mm	–	EI 90 / E 120	EI 120	EI 120
Cables Ø ≤ 50 mm	–	–	–	EI 90 / E 120
Cables Ø ≤ 80 mm	Solid wall	–	–	EI 90 / E 120
Cable bundles Ø ≤ 100 % of single cables Ø ≤ 21 mm	–	EI 90 / E 120	EI 120	EI 120
CommScope HELIAX LDF (low density foam), Ø ≤ 16.002 mm	–	–	–	EI 120 U/C
CommScope 50Ω braided CNT, Ø ≤ 15.0 mm	–	–	–	EI 120 U/C
CommScope HELIAX AVA, Ø ≤ 28 mm	–	–	–	E 120 U/C / EI 90 U/C
CommScope HELIAX FSJ (super flexible), Ø ≤ 13.5 mm	–	–	–	E 120 U/C / EI 90 U/C
RFS RADIAFLEX RLK, Ø ≤ 28.5 mm	–	–	–	EI 120 U/C
RFS CELLFLEX LCF, Ø ≤ 27.8 mm	–	–	–	EI 120 U/C
Electrical installation conduits made of plastic, flexible Ø ≤ 40 mm single, with/without cable Ø ≤ 21 mm	–	EI 90 U/U / E 120 U/U	EI 120 U/U	EI 120 U/U
Electrical installation conduits made of plastic, bundled with/without cable Ø ≤ 90 mm,flexible Ø 40 mm with/without cables Ø 21 mm		EI 90 U/U / E 120 U/U	EI 120 U/U	EI 120 U/U
Electrical installation conduits made of plastic, bundled Ø 100%, flexible Ø 32 mm with/without cable up to Ø 21 mm	–	–	EI 120 U/U	EI 120 U/U
HVAC split line combination Pipe 1 / pipe 2 outer Ø 6–10 mm / 10–18 mm + 9 mm insulation made of PE foam; plastic pipe PVC-U, outer Ø up to 25 mm, s 1.5 mm + max. 3 cables up to Ø 14 mm with zero clearance	–	EI 90 U/U	EI 90 U/U	EI 90 U/U
speedpipes, bundled or single, with/without glass fibre cables 7 mm ≤ Ø ≤ 14 mm bundled ≤ 100%	–	EI 120 U/U	EI 120 U/U	EI 120 U/U
Combustible pipes made of PVC-U Outer Ø 20 mm, s = 1.5 mm ≤ outer Ø 32 mm, s = 2.4 mm	–	–	–	EI 120 U/U

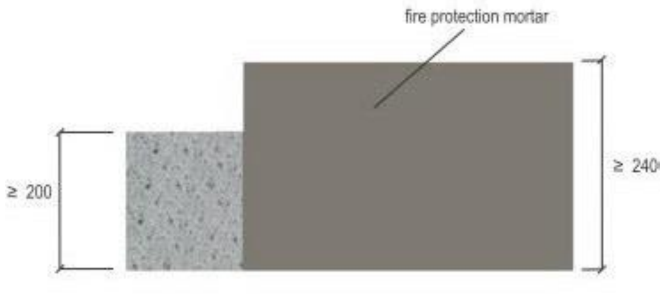
11.2 Cable Tube CT – Installations in solid floors (≥ 150 mm)

Service	Additional measure	Fire resistance class Length of CT [mm]		
		150	200	300
Cables Ø ≤ 21 mm	–	EI 120	EI 120	EI 120
Cables Ø ≤ 50 mm	–	–	–	EI 60 / E 120
	only when serviced at 100%	EI 90 / E 90	EI 90 / E 90	EI 90 / E 90
	lamella mat ≥ 250 mm × ≥ 30 mm + fire protection wrap, 1 layer, upper side	–	–	EI 120
Cables Ø ≤ 80 mm	–	–	–	EI 60 / E 120
Cable bundles Ø ≤ 100% of single cables Ø ≤ 14 mm		EI 90	EI 120	
Cable bundles Ø ≤ 100% of single cables Ø ≤ 21 mm	–	EI 60 / E 90	EI 60 / E 90	EI 120
	Fire protection wrap, 1 layer, 50 mm overlap upper or underside	EI 120	EI 120	–
Max. 3 × electrical installation conduits made of plastic, flexible Ø 32 mm single with/without cables Ø ≤ 14 mm	–	EI 90 U/U	EI 90 U/U	–
Electrical installation conduits made of plastic, flexible Ø 63 mm with/without cables Ø 21 mm	–	–	–	EI 120
Electrical installation conduits made of plastic, flexible Ø ≤ 32 mm single or bundled up to Ø 100%, with/without cables up to Ø ≤ 21 mm	–	–	–	EI 120 U/U*
HVAC split line combination Pipe 1/ pipe 2 outer Ø 6–10 mm / 10–18 mm + 9 mm insulation made of PE foam; plastic pipe PE-100, outer Ø up to 25 mm, s 1.5 mm + max. 3 cables up to Ø 14 mm in zero clearance		EI 90 U/U	EI 90 U/U	EI 90 U/U
HVAC split line combination Pipe 1/ pipe 2 outer Ø 6–22 mm / 6–22 mm + 9 mm insulation made of PE foam; plastic pipe PE-100, outer Ø up to 25 mm, s 1.5 mm + max. 3 cables up to Ø 14 mm with zero clearance	lamella mat ≥ 250 mm × ≥ 30 mm upper side	EI 120 U/U	EI 120 U/U	EI 120 U/U
speedpipes, bundled or single, with/without glass fibre cables max. 24 pcs. pipe outer Ø up to 7 mm max. 7 pcs. pipe outer Ø up to 10 mm max. 5 pcs. pipe outer Ø up to 12 mm	–	EI 120 U/U	EI 120 U/U	EI 120 U/U

12. System Novasit EI 240

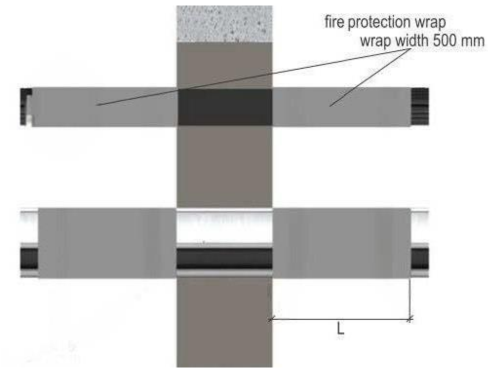
12.1 System Novasit EI 240 – Design variants in walls and floors

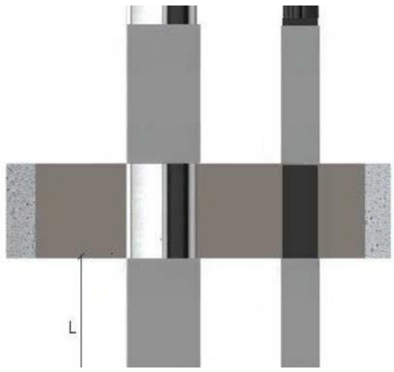




2

12.2 Fire resistance classes for cables and/or cable bundles with or without cable trays with intumescent wrap





Dimensions in mm

Fire resistance classes			
Service	Measures	Wall	Floor
		Fire resistance class	Fire resistance class
Cables, cable bundles and cable trays with fire protection wrap (wrap width 500 mm)			
Cables Ø ≤ 80 mm	Intumescent wrap 5 x 2 layers of 125 mm each side with 25 mm overlapping	EI 240	EI 240
Cable bundles Ø ≤ 100 mm with cables ≤ 21 mm	Intumescent wrap 5 x 2 layers of 125 mm each side with 25 mm overlapping	EI 240	EI 240

Distances wall / floor						
	Cables	Cable bundles	Cable trays	Seal edge		
				Upper	Under	Side
Cables	≥ 10 (next to each other) ≥ 40 (above each other)			≥ 30	≥ 20	≥ 20
Cable bundles	≥ 10 (next to each other) ≥ 40 (above each other)			≥ 30	≥ 20	≥ 20
Cable trays	≥ 10 (next to each other) ≥ 40 (above each other)			≥ 30	≥ 20	≥ 20

13. Description of possible additional components of the penetration seal

Description	Performance	Sample Product
Intumescent wrap 2 x 62,5 mm / 1 x 125 mm	Class of Fire behaviour in accordance with DIN EN 13501-1: Class B-s1, d0	NBR-plus in accordance with ETA-21/0461
Intumescent wrap 50 mm	Class of Fire behaviour in accordance with DIN EN 13501-1: Class E	KSL-W in accordance with ETA-18/0885
Fire protection collar	Class of Fire behaviour in accordance with DIN EN 13501-1: Class E	AWM II in accordance with ETA-17/0753
Fire protection endless collar	Class of Fire behaviour in accordance with DIN EN 13501-1: Class E	EC endless collar in accordance with ETA-22/0054
Ablative coating	Class of Fire behaviour in accordance with DIN EN 13501-1: Class E	FLAMMOTECT-A in accordance with ETA-22/0052
Cable Tube	Class of Fire behaviour in accordance with DIN EN 13501-1: Class E	CT Cable Tube in accordance with ETA-22/0053
Loose mineral wool in accordance with EN 14303	Reaction to fire class acc. to EN 13501-1: A1 Melting Point ≥ 1000°C	Knauf Insulation LW; Rockwool "Pro Rox LF 970"
Mineral fibre board	Reaction to fire class acc. to EN 13501-1: A1 Nominal density ≥ 35 kg/m³ Melting Point ≥ 1000°C	Rockwool "Hardrock 040" Paroc Pyrotech Stab 160 Rockwool "RP-GF 70"
Mineral fibre lamella mat in accordance with EN 14303	Reaction to fire class acc. to EN 13501-1: Aa-s1, d0 or A1 Bulk density ≥ 35 kg/m³ Melting point ≥ 1000°C	Rockwool lamella mat "Klimarock" PAROC HVAC Lamella mat AluCoat
Pipe Shell of concentrically wrapped rockwool in accordance with EN 14303	Reaction to fire class acc. to EN 13501-1: A2-s1, d0 or A1 Bulk density ≥ 80 kg/m³ Melting point ≥ 1000°C	Isover U Protect Pipe Section Alu 2 Rockwool ProRox PS 960 Rockwool 800 Rockwool ProRox WM 950 Rockwool ProRox WM 960 Rockwool Conlit 150 U ISODAEM STEINWOLL-ROHRSCHALE Alu ISODAEM STEINWOLL-ROHRSCHALE Alu-T
Insulation made of flexible elastomeric foam (FEF) in accordance with EN 14303	Reaction to fire class acc. to EN 13501-1: B-s3, d0 resp. D-s1, d0	Armalok 50 Armalok 100 ArmaFlex SE ArmaFlex XG AF/ArmaFlex AF/ArmaFlex Evo SH/ArmaFlex NH/ArmaFlex NH/ArmaFlex Smart HT/ArmaFlex ArmaFlex Ultima Kaiflex HT s2 Kaiflex KK Kaiflex KKplus s2 Kaiflex KKplus s3 FLEXEN Heizungskautschuk s2 FLEXEN Kältekautschuk Plus s2 isoprene Plus isoprene Polar Plus K-FLEX ST K-FLEX ST PLUS K-FLEX ECO K-FLEX H Eurobatex Eurobatex SC Eurobatex High Technology Eurobatex H Eurobatex H Super Eurobatex Glastec
Insulation made of polyethylene foam (PEF) in accordance with EN 14313	Reaction to fire class acc. to EN 13501-1: E	KeKelit Lexel Würth FLEXEN PE Würth FLEXEN Schallschutz Steinbacher Steinoflex 440 (Geberit)