

## System Flammotect 2 × 60 mm

### Ablative mineral fibre board seal

Mixed penetration sealing system made of mineral fibre boards and an ablative coating for electrical installations of all types as well as for electrical installation conduits, combustible/non-combustible pipes and further services.

Fire resistance class EI 90 (max. EI 120) in accordance with EN 13501-2 as per ETA-22/0052.



# System Flammotect 2 × 60 mm

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# System Flammotect 2 × 60 mm

## 1. Preliminary remarks / overview

### 1.1 Target group

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

### 1.2 Use of the instructions

Before starting work, read through these installation instructions completely once. Pay particular attention to the following safety instructions.

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

Pictorial representations serve as examples only. Installation results may differ in appearance.

Unless stated otherwise, all lengths are specified in mm.





All information in this document represents the state of the art at the time of writing or the current version of the standard.

Upon request, flamro will be pleased to provide the relevant legal and technical framework and manufacturer specifications for each individual case.



#### 1.2.1 Safety instructions

Consult the respective safety information for the individual penetration seal components.

Personal protective equipment:

	Wear protective clothing and non-slip shoes.
	Use safety goggles, safety glasses.
	P2 particle filter in case of short-term or low level exposure. For intensive or prolonged exposure use a breathing apparatus with independent air supply. Use breathing protection in compliance with international/national standards.
	Use chemically resistant gloves. Recommended materials: butyl rubber, nitrile rubber, fluorinated rubber, PVC.

#### Safety instructions for the installation of floor penetration seals

	The area below the floor penetration seal must be cordoned off against entry during penetration seal work (barrier tape and warning sign: warning of possible falling objects, do not enter the area, penetration seal work in floor openings).
	The contractor for the production of floor penetration seals must inform the client in writing (for forwarding to the client or appointed representative) that after the production of the fire penetration seals in floors, these must be secured on site against loads, in particular against being stepped on, by suitable measures (e.g. by fencing or by covering with grating).

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### 1.3 Building elements

#### Cladding of the aperture edge in plasterboard walls

Alongside the opening edge, corresponding to the wall panelling, with 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.

#### Plasterboard walls

Plasterboard walls must have a minimum thickness of  $\geq 100$  mm.

The cladding of the aperture edge must consist of at least one layer with a thickness of  $\geq 12.5$  mm. When installing without cladding the seal size may not be larger than  $800 \times 600$  mm or  $600 \times 800$  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  $\geq 100$  mm. The gap between seal and stud 7 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.

Standard plasterboard wall construction is not applicable for construction on the basis of sandwich panels or for plasterboard walls with one-sided cladding (shaft walls).

The supporting structure must have the required fire resistance rating according to EN 13501-2.

#### Solid walls

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

The walls must be classified for the desired fire resistance duration according to EN 13501-2.

#### Solid floors

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

The floors must be classified for the desired fire resistance duration according to EN 13501-2.

#### Timber walls and floors

Made of cross laminated timber (CLT) by the manufacturer STORA ENSO.

Wall: thickness 100 mm / layers: 30/40/30

Floor: thickness 140 mm / layers: 40/20/20/20/40

A wall or floor of cross laminated timber can be regarded as equivalent to the tested wall and floor if the following requirements are met.

- The construction of the wall/floor is identical.
- The fire resistance class of the wall/floor is identical or higher.
- The construction is certified as per EN 13501-2.
- The construction is based on the same solid wood panels as tested.
- The solid wood panels are of the same building material category as tested or of a better category.
- The strength class of the solid wood panels as per EN 338 is equivalent to the class of the tested panels or a higher class.
- The mass burning rate of the solid wood panels as per EN 1995-1-2 is equivalent to the class of the tested panels or a higher class.
- The thickness of the solid wood panel is at least equivalent to that of the tested panel.

Since particularly critical walls and floors were tested with this construction, we are also able to offer our sealing systems for timber components by other manufacturers, such as KLH, Mayr-Melnhof, Binderholz et al. Our technical service will be glad to assist you with any enquiry.

#### Sandwich panel walls








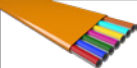
Sandwich panel walls PAROC AST-S/F with a thickness of  $\geq 120$  mm.

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### 2. Allowed services

For specific fire resistance classes and pipe end configurations depending on measurements and fire protection measures see the respective chapters on design variants starting on page 18.


#### 2.1 Cables / electrical installation conduits / wave guides / speedpipes

Service		Max. diameter [mm]	
	Cables	≤ 80	
	Cable bundles	≤ 100, cable Ø ≤ 21	
	Cable trays	✓	
	Single conduits	made of plastic	≤ 16
		made of steel	≤ 16
	Electrical installation conduits made of plastic, flexible or rigid	single	≤ 63 with or without cables
		bundled	≤ 100, conduit Ø ≤ 32, with or without cables
	Electrical installation conduits made of steel	single	≤ 32
	Coaxial cables and wave guides	CommScope HELIAX®	≤ 51.1
		RFS CELLFLEX®	≤ 50.3
		RFS RADIAFLEX®	≤ 48.2
	speedpipes	≤ 50, single Ø ≤ 14	

#### 2.2 Combustible pipes

Standard pipes			
Pipe material	in acc. with standard	Diameter [mm]	Pipe wall thickness
PVC-U, PVC-C	EN 1329-1, EN 1452-2, EN 1453-1, EN ISO 15493,	≤ 160	1.8–14.6
PE-HD, ABS, SAN + PVC	EN 1519-1, EN 12201-2, EN ISO 15494, EN 12666-1, EN 1455-1, EN ISO 15493, EN 1565-1	≤ 160	1.8–14.6
PP	EN 1451-1, EN ISO 15874, EN ISO 15494	≤ 160	1.8–14.6

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Non-standard pipes	
Type of pipe	Diameter [mm]
REHAU RAUPIANO LIGHT	≤ 160
REHAU RAUPIANO PLUS	≤ 160
REHAU RAUSILENTO	≤ 160
CONEL DRAIN	≤ 160
Geberit Silent-db20	≤ 160
Geberit Silent-PP	≤ 160
Geberit Silent-Pro	≤ 160
POLO-KAL NG / POLO-KAL XS	≤ 160
POLO-KAL 3S	≤ 110
Wavin AS	≤ 160
Wavin AS+	≤ 160
Wavin SiTech	≤ 110
Wavin SiTech+	≤ 160
GF Silenta Premium	≤ 160
Hakan Silenta Premium	≤ 160
Valsir Triplus	≤ 160
Pipelife MASTER 3	≤ 110
Pipelife MASTER 3 PLUS	≤ 160
KE KELIT PHONEX AS	≤ 160
Ostendorf Skolan dB	≤ 135

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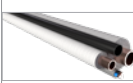

### 2.3 Multilayer pipes

Type of pipe	Diameter [mm]
Henco	≤ 63
Geberit Mepla	≤ 75
REHAU RAUTITAN stabil	≤ 40
KE KELIT KELOX	≤ 75

### 2.4 Non-combustible pipes

Pipe material	Diameter [mm]
Copper, steel, stainless steel, cast iron	≤ 108.0
Steel, stainless steel, cast iron	≤ 323.9

### 2.5 Other services

Service	Dimensions
 HVAC split line combinations	Copper pipe ≤ 2 × Ø 18 mm, + 9 mm PE foam, + 1 pipe PVC-U Ø ≤ 25.0 × 1.5 mm, + ≤ 3 × cable Ø ≤ 14.0 mm
 Double solar pipes NanoSun <sup>2</sup>	DN 40



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### 3. Thicknesses, sizes and spacing

Dimensions					
	Plasterboard wall, solid wall [mm]	Solid floor [mm]	Timber wall [mm]	Timber floor [mm]	Sandwich panel wall [mm]
Thickness of building element	≥ 100	≥ 150	≥ 100	≥ 150	≥ 120
Thickness of penetration seal	≥ 120	≥ 150	≥ 100	≥ 150	≥ 120
Maximum dimensions of the aperture (width × height)	1400 × 2000 / 2000 × 1400, without cladded aperture edge: 600 × 800 / 800 × 600	1400 × 2000 / 910 × 8700	600 × 1000 / 1000 × 600	600 × 1000 / 420 × 3500	1000 × 1000
Distance to other penetration seals	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100
Distance to other apertures or installations	≥ 200	≥ 200	≥ 200	≥ 200	≥ 200

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

### 4. Initial supports

Penetrating services must be supported at the distances specified in the table below. In wall constructions support is necessary on both sides. In floor constructions support is necessary on the upper side of the floor. Essentials parts of the supports must be non-combustible.

Initial supports	Wall/floor
Cables, cable bundles, cable support structures, single conduits	≤ 650 mm
Coaxial cables and wave guides	≤ 250 mm
Electrical installation conduits	≤ 250 mm
Combustible pipes	≤ 500 mm
Multilayer pipes Henco	≤ 650 mm
Non-combustible pipes with section insulation made of mineral fibre mats or shells	≤ 650 mm
Non-combustible pipes with section insulation made of FEF	≤ 500 mm
Non-combustible pipes with section insulation made of PIR	≤ 500 mm
Double solar pipes NanoSun <sup>2</sup>	≤ 500 mm
speedpipes for glass fibre cables and micro cables	≤ 250 mm
HVAC split line combinations	≤ 250 mm

## 5. Spacing requirements for services



### NOTE:

In timber components and sandwich panel walls, services must be installed at a distance of  $\geq 100$  mm to the aperture edge.

### Spacing requirements in walls and floors

																Aperture edge				
		Single cables	Cable bundles	Cable support systems	Coaxial cables and wave guides	speedpipes	with fire protection wrap	with fire protection collar	Electrical installation conduits made of steel	with fire protection collar	with fire protection wrap	Multilayer pipes	Non-combustible pipes with FEF insulation	Non-combustible pipes with lamella mat insulation	Nichtbrennbare Röhre; Isolierung aus PIR	Non-combustible pipes with PIR insulation	Double solar pipes NanoSun²	Upper	Lower	Side
	Single cables		$\geq 0$		$\geq 100$	$\geq 25$	$\geq 75$	$\geq 100$	$\geq 75$	$\geq 20$	$\geq 100$	$\geq 100$	$\geq 50$	$\geq 50$	$\geq 100$	$\geq 100$	$\geq 30$			$\geq 0$
	Cable bundles		$\geq 0$		$\geq 100$	$\geq 25$	$\geq 75$	$\geq 100$	$\geq 75$	$\geq 20$	$\geq 100$	$\geq 100$	$\geq 50$	$\geq 50$	$\geq 100$	$\geq 100$	$\geq 30$			$\geq 0$
	Cable support systems		$\geq 0$	$\geq 0$ (horizontally) $\geq 100$ (vertically)	$\geq 100$	$\geq 25$	$\geq 75$	$\geq 100$	$\geq 75$	$\geq 20$	$\geq 100$	$\geq 100$	$\geq 50$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 30$			$\geq 0$
	Coaxial cables and wave guides		$\geq 100$		$\geq 50$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$			$\geq 25$
	speedpipes		$\geq 25$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$			$\geq 25$
	Electrical installation conduits made of plastic, single/bundled	with fire protection wrap	$\geq 75$		$\geq 100$	$\geq 100$	$\geq 0$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$			$\geq 25$
		with fire protection collar	$\geq 100$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 0$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$		
	Electrical installation conduits made of steel		$\geq 75$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 0$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$			$\geq 0$
	Combustible pipes	with fire protection collar	$\geq 20$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 50$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$			$\geq 25$
		with fire protection wrap	$\geq 100$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$		
	Multilayer pipes		$\geq 100$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 0$	$\geq 0$	$\geq 100$	$\geq 100$	$\geq 100$			$\geq 25$
	Non-combustible pipes with FEF insulation		$\geq 0$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 0$	$\geq 0$	$\geq 100$	$\geq 100$	$\geq 100$			$\geq 25$
	Non-combustible pipes with lamella mat insulation		$\geq 0$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 0$	$\geq 0$	$\geq 100$	$\geq 100$	$\geq 50$			$\geq 25$
	Non-combustible pipes with PIR insulation		$\geq 100$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 36$	$\geq 100$	$\geq 100$			$\geq 100$
	HVAC split line combinations		$\geq 100$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 0$	$\geq 0$	$\geq 100$	$\geq 50$	$\geq 25$			$\geq 25$
	Double solar pipes NanoSun²		$\geq 30$		$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 100$	$\geq 50$	$\geq 100$	$\geq 25$	$\geq 100$			$\geq 100$

All specifications in mm. All specifications refer to distances between the respective insulations and additional measures if applicable.

## System Flammotect 2 × 60 mm

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### 6. Included products



**FLAMMOTECT-A  
Coating**

12.5 kg pail – Art. no. 01155131

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**FLAMMOTECT-A  
Solid emulsion**

12.5 kg pail – Art. no. 01155136

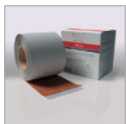
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**FLAMMOTECT-A  
Filler**

12.5 kg pail – Art. no. 01155134  
310 ml cartridge – Art. no. 01155115

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**NBR-plus  
Fire protection wrap**

Roll, 10 m × 125 mm  
(separable into 2 × 62.5 mm)  
– Art. no. 01261941

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**KSL-W  
Fire protection wrap**

Roll, 10 m × 50 mm self-adhesive  
– Art. no. 15510  
Roll, 20 m × 50 mm self-adhesive  
– Art. no. 15520  
Roll, 10 m × 100 mm self-adhesive  
– Art. no. 15530

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**Mineral wool A1**

Reaction to fire class in acc. with  
EN 13501-1: A1  
Melting point ≥ 1000 °C  
10 kg bag – Art. no. 01183000

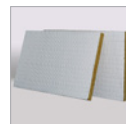
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**Mineral fibre board  
in acc. with EN 13162**

Criteria: density ≥ 150 kg/m<sup>3</sup>  
Reaction to fire class A1 in acc. with  
EN 13501:1  
Melting point ≥ 1000 °C.  
(TR10) tensile strength vertical to board  
surface ≥ 10 kPa according to EN 1607  
Thickness ≥ 60 mm

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**Mineral fibre boards**

pre-coated on one side with  
FLAMMOTECT-A  
Dimensions 1000 × 600 × 60 mm  
Box with 4 pcs. – Art. no. 01182165

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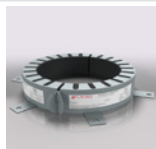


**Label**

1 piece – Art. no. 14003

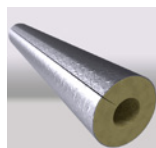
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## System Flammotect 2 × 60 mm



**AWM II fire protection collar**  
Ø 32 mm – Ø 160 mm

Dimensions [mm]	Inner Ø collar [mm]	Outer Ø collar [mm]	Overall height [mm]	Number of tabs [n]	Art. no.
32	36–40	50–54	26.0	2	01142032
40	44–48	58–62	26.0	2	01142040
50	54–57	68–71	26.0	2	01142050
63	67–70	94–97	26.0	4	01142063
75	79–83	106–110	26.0	4	01142075
90	94–100	132–138	26.6	4	01142090
110	114–120	155–161	26.6	4	01142110
125	129–135	172–178	40.0	4	01142125
140	144–152	200–206	40.0	6	01142140
160	164–169	220–225	40.0	6	01142160



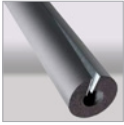
**Lamella mat or pipe shells made of mineral fibres**

Classification: A2-S1, d0 or A1 in acc. with EN 13501-1  
Minimum bulk density: 35 kg/m<sup>3</sup>  
Melting point ≥ 1000 °C

for example:

Name	Nominal bulk density [kg/m <sup>3</sup> ]	abP/DoP
Rockwool lamella mat Klimarock Roll, 3.05 m <sup>2</sup> – Art. no. 01187100	40–50	DE0628031801 of 14.03.2018
Rockwool ProRox PS 960 (formerly ROCKWOOL Lapimus pipe shell 880)	95–150	PROPS960NL-03
Rockwool 800	90–115	DE0721011801 of 15.01.2018
Rockwool ProRox WM 950 (formerly WM 80/RTD-2)	85	PROWM950D-03 of 04.05.2017
Rockwool ProRox WM WM 960 (formerly WM 100/ RBM)	100	PROWM960D-03 of 04.05.2017
Rockwool Conlit 150 U	150	P-NDS04-417
Isover Schalen Protect 1000 S, Isover Schalen Protect 1000 S Alu	70–90	DE0002-Pipe_Sections 001 of 10.06.2013
Isover mineral fibre mat MD2 and MD2/A	80	DE0002-Protect_EN14303 002 of 09.02.2015
Isover mineral fibre mat MDD and MDD/A	115	
PAROC Hvac Section AluCoat T	85–120	40361
PAROC Pro Section 100	100	40080
PAROC Hvac Lamella Mat AluCoat Fix	50	40236

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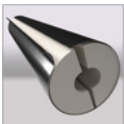


### Section and protective insulations

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

for example:

Name	abP/DoP
ArmaFlex Protect	(0543-CPR-2016-001, 01.04.2015)
AF/ArmaFlex	0543-CPR-2016-001, 01.04.2015
AF/ArmaFlex Evo	0543-CPR-2020-101
SH/ArmaFlex	0543-CPR-2013-013, 01.01.2015
NH/ArmaFlex	0552-CPR-2013-015, 08.08.2018
NH/ArmaFlex Smart	0543-CPR-2020-102
ArmaFlex LS	0551-CPR-2016-066
ArmaFlex Ultima	0543-CPR-2016-017
FEF Kaiflex KKplus s1	DoP KKplus s1 01032018001, 01.03.2018
FEF Kaiflex HTplus	DoP HTplus s1 01032018001 01.03.2018
K-Flex R90	P-2300/871/16-MPA BS, 04.10.2016
flexen Heizungskautschuk	LE_5258006015_00_M_flexen_Heizungskautschuk, 30.06.2013
flexen Kältekautschuk	LE_0869806006_00_M_flexen_Kältekautschuk, 30.06.2013
EUROBATEX	01/20190610
EUROBATEX HF	03/20171201



### PIR pipe shells

made of polyisocyanurate

<b>Manufacturer</b>	swisspor AG, CH-6312 Steinhausen
<b>Bulk density</b>	~32 kg/m <sup>3</sup>
<b>DoP</b>	LE-013.1.0-HT-15.2
oder PIR pipe shells with equivalent parameters	

### 6.1 Declarations of Performance

The Declarations of Performance for the featured products are available for download on our website:

<https://svt-global.com/downloads>

## System Flammotect 2 × 60 mm

### 7. Design

#### 7.1 Fire resistance classes

System Flammotect 2 × 60 mm meets the requirements of max. class EI 120 in acc. with EN 13501-2.

The fire resistance class of the sealing system is reduced to the fire resistance class of the installed service with the lowest fire resistance rating.

The fire resistance class of the sealing system is reduced to the maximum fire resistance class of the surrounding building element.

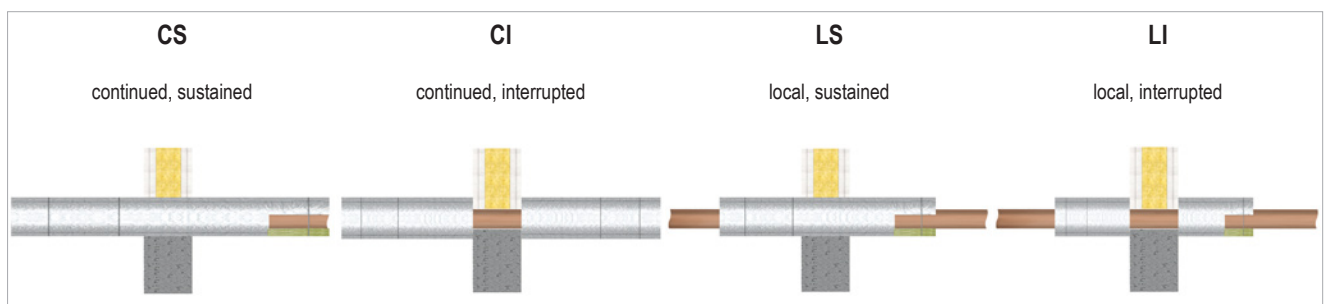
Building element	Fire resistance class
Plasterboard wall	max. EI 120
Plasterboard wall (without cladded aperture edge)	max. EI 90
Solid wall	max. EI 120
Solid floor	max. EI 120
Timber wall (CLT)	max. EI 90
Timber floor (CLT)	max. EI 90
Sandwich panel wall	max. EI 120

#### 7.2 Pipe end configurations

Non-combustible pipes				
tested	included configurations			
	U/U	U/C	C/U	C/C
U/U	✓	✓	✓	✓
U/C	–	✓	✓	✓
C/U	–	–	✓	✓
C/C	–	–	–	✓

Combustible pipes				
tested	included configurations			
	U/U	U/C	C/U	C/C
U/U	✓	✓	✓	✓
U/C	–	✓	–	✓
C/U	–	✓	✓	✓
C/C	–	–	–	✓

#### 7.3 Pipe insulation configurations



Results for LS insulation are also applicable to CS insulation.  
Results for LI insulation are also applicable to CI insulation.

## System Flammotect 2 × 60 mm

### 8. Design variants

The sealing system may be used to close apertures without installations (reserve penetration for subsequent configurations).

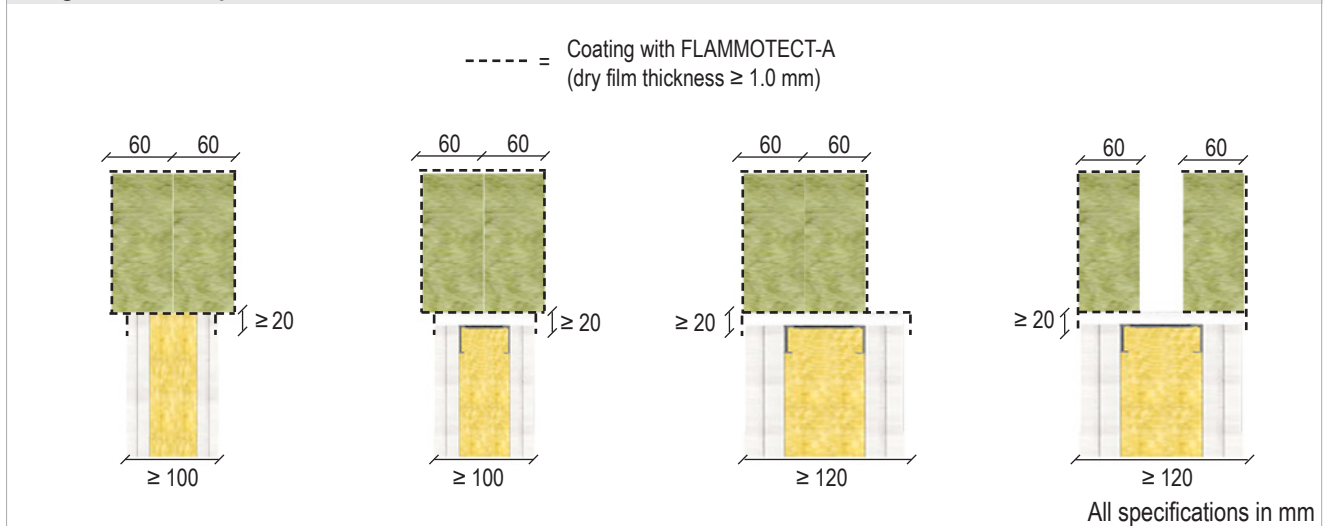
It is not necessary to clad the aperture opening in plasterboard walls. The maximum seal size is then reduced to 600 × 800 mm or 800 × 600 mm (see chapter “Thicknesses, sizes and spacing” on page 9).

Pieces of the mineral fibre boards must be coated with FLAMMOTECT-A so that they are glued together. The edges of the mineral fibre boards and/or the aperture edge must be coated with FLAMMOTECT-A so that the boards are glued to the building element.

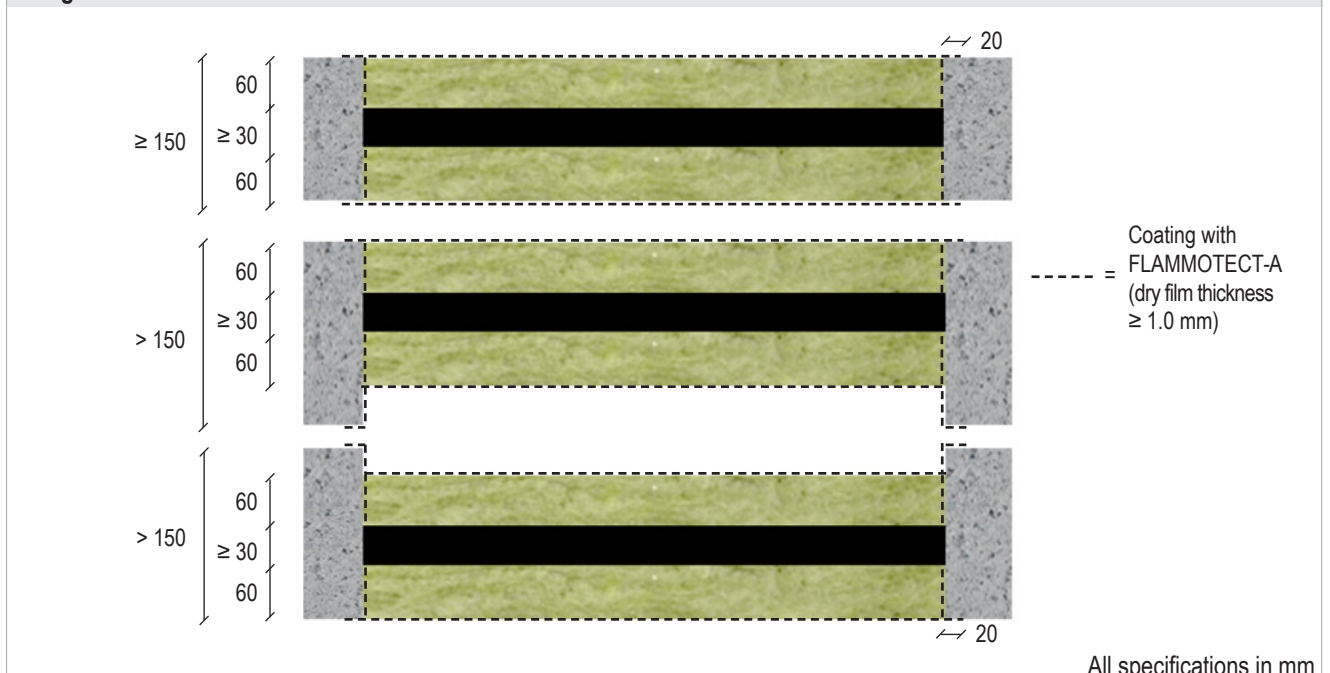
Final coating of the outer board surface and a surrounding area of ≥ 20 mm with FLAMMOTECT-A (dry film thickness 1.0 mm). It is not necessary to glue the board layers together.

Sealing of annular gap: ≤ 5 mm by filling the entire depth with FLAMMOTECT-A, > 5 mm by filling with loose mineral wool and coating with FLAMMOTECT-A (dry film thickness ≥ 1 mm).

#### Design variants for plasterboard walls and solid walls



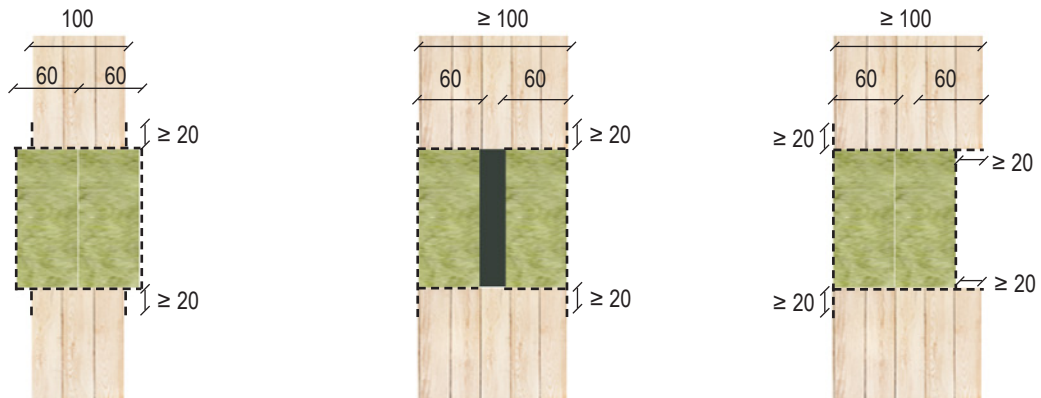
#### Design variants for solid floors



## System Flammotect 2 × 60 mm

In timber walls and floors, the spacing distance between applied services and aperture edge must always be at least 100 mm (see chapter 5, Spacing requirements for services).

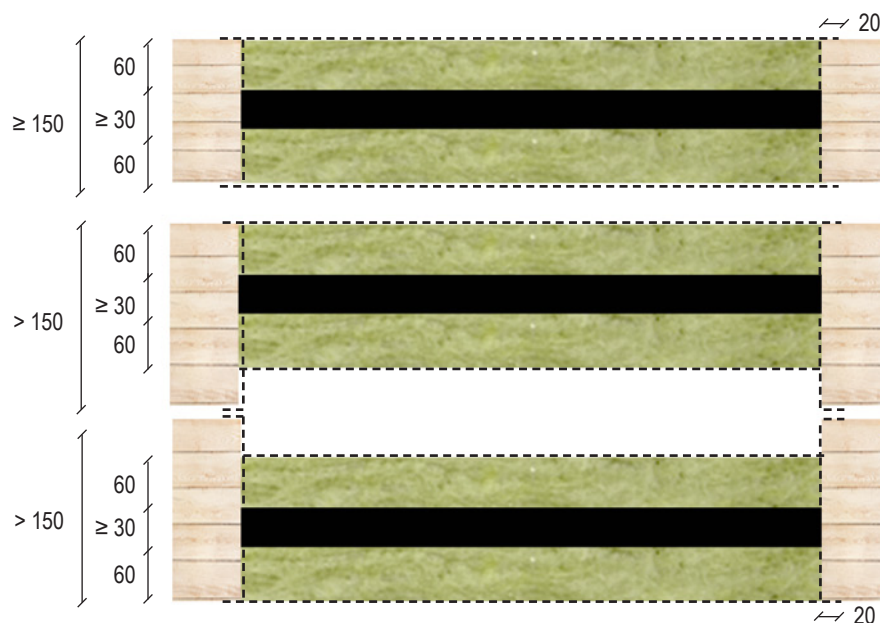
### Design variants in timber walls



----- = Coating with FLAMMOTECT-A (dry film thickness  $\geq 1.0$  mm)

All specifications in mm

### Design variants in timber floors



----- = Coating with FLAMMOTECT-A (dry film thickness  $\geq 1.0$  mm)

All specifications in mm

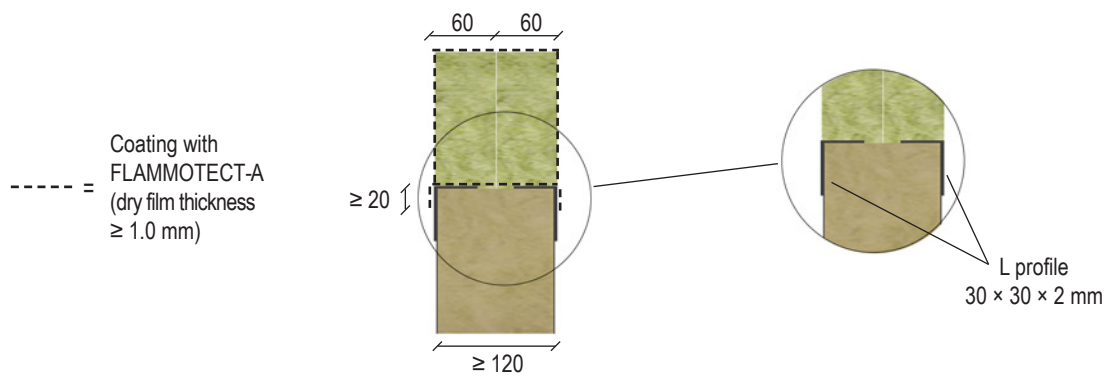


## System Flammotect 2 × 60 mm

On both sides of the seal, L profiles with the dimensions 30 × 30 × 2 mm must be attached alongside the aperture edge.

In sandwich panel walls, the spacing distance between applied services and aperture edge must always be at least 100 mm (see chapter 5, Spacing requirements for services).

### Design variants in sandwich panel walls



All specifications in mm

## System Flammotect 2 × 60 mm

### 9. Fire protection measures

#### 9.1 Cables / cable bundles / cable support systems

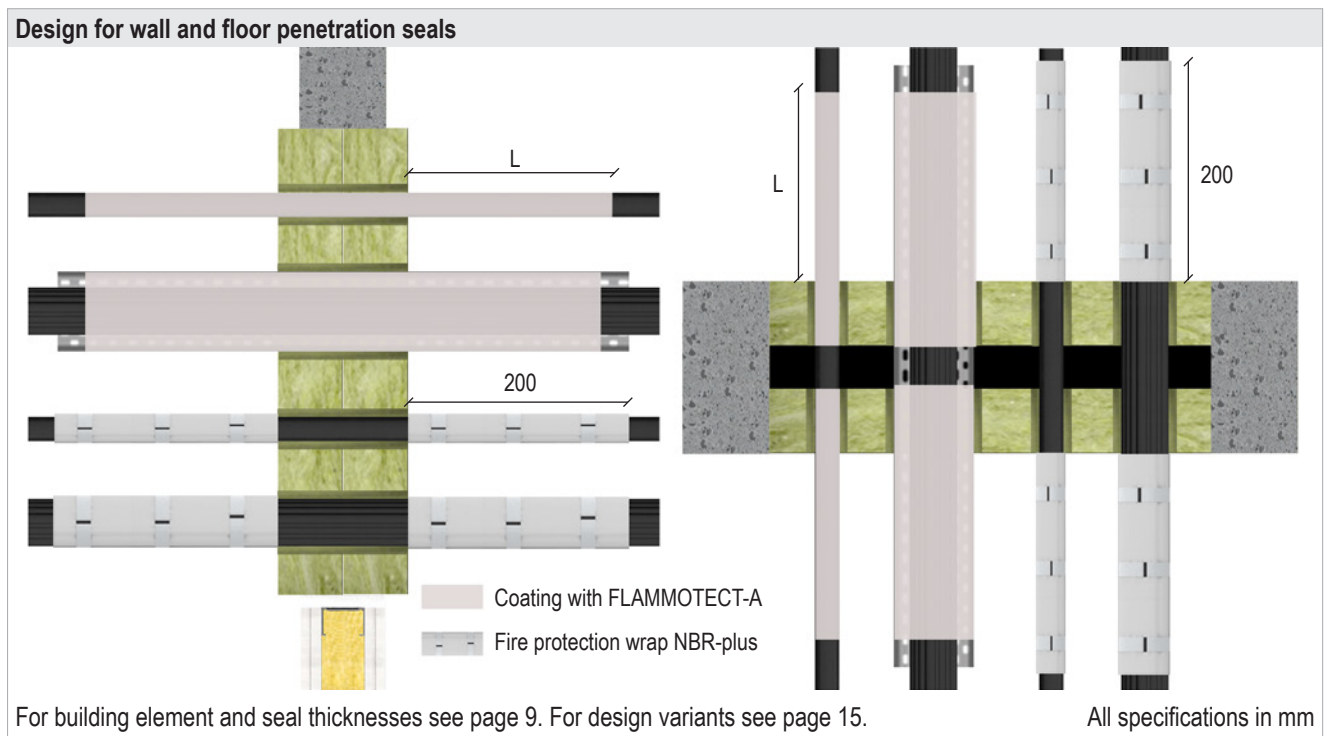
Cables and cable bundles may be installed with or without cable trays.

Cable bundles may be installed unopened in the seal. It is not necessary to fill the interstices if the bundles consist of parallel-running cables that are tightly packed, tied, stitched or welded together.

In the penetrated area (inside the mineral fibre boards), all cables must be coated with FLAMMOTECT-A (dry film thickness  $\geq 1.0$  mm). It is not necessary to coat single cables  $\varnothing \leq 21$  mm.

Alternatively to coating, the fire protection wrap NBR-plus may also be applied to services.

The fire protection wrap NBR-plus is coated on one side and equipped with a protective film. The film must be removed before applying the wrap. The wrap is applied with the coated side facing inwards and fastened with steel wires.



## System Flammotect 2 × 60 mm

Service	Diameter [mm]	Fire protection coating FLAMMOTECT-A		Fire resistance class		
		Dry film thickness [mm]	Length of coating in front of seal L [mm]	Wall	Floor	
Single cables	≤ 21	–	–	EI 120	EI 120	
		≥ 1	≥ 100	EI 120	EI 120	
	≤ 50	≥ 1	≥ 100	EI 90 / E 120	EI 90	
		≥ 1	≥ 150	–	EI 120	
		≥ 2	≥ 200	EI 120	EI 120	
	≤ 80	≥ 1	≥ 100	EI 90 / E 120	EI 90	
		≥ 1	≥ 150	–	EI 120	
≥ 2		≥ 200	EI 120	EI 120		
Cable bundles with cables $\varnothing \leq 21$ mm		≤ 100	≥ 1	≥ 100	EI 120	EI 120
Single conduits	made of steel	≤ 16	≥ 1	≥ 100	EI 120 U/C	EI 120 U/C
	made of plastic	≤ 16	≥ 1	≥ 100	EI 120 U/U	EI 120 U/U

Service	Diameter	Fire protection wrap NBR-plus	Fire resistance class	
			Wall	Floor
Cables	≤ 21	2 × 125 mm on both sides (25 mm lateral overlap), 2 layers with 45 mm overlap	EI 120 U/U	
	≤ 50		EI 120 U/U	
	≤ 80		EI 120 U/U	
Cable bundles with cables $\varnothing \leq 21$ mm	≤ 100		EI 120 U/U	

# System Flammotect 2 × 60 mm

## 9.2 Electrical installation conduits

### 9.2.1 Conduits made of plastic

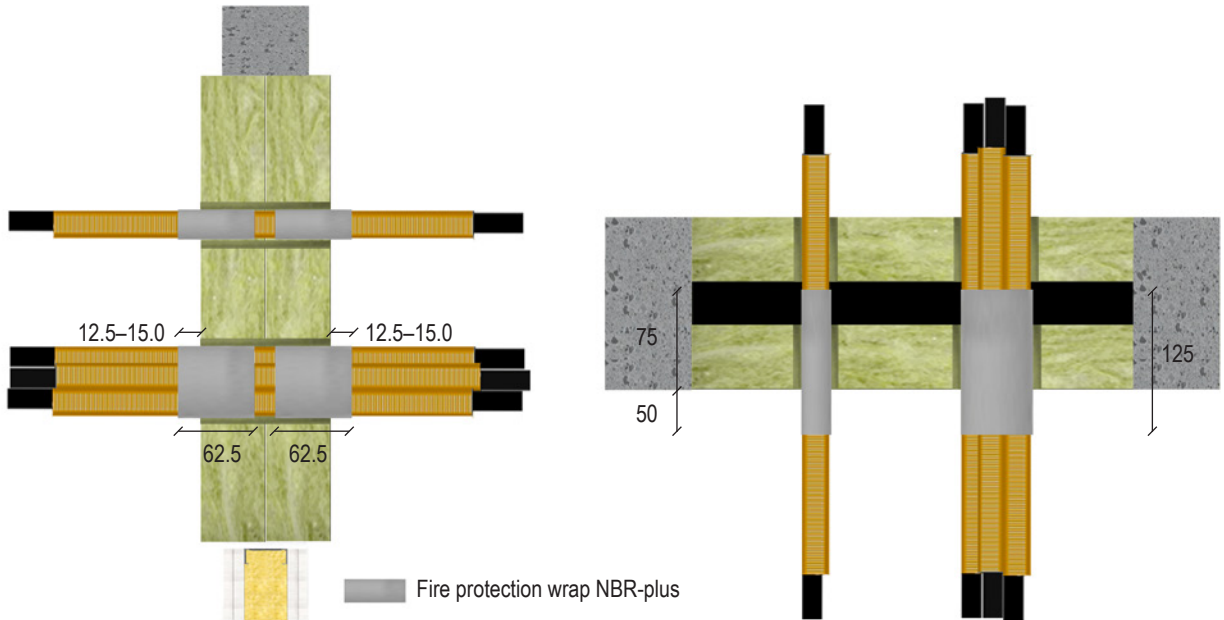
Electrical installation conduits made of plastic must protrude at least 200 mm from the seal.

Electrical installation conduits must be wrapped with the fire protection wrap NBR-plus.

The fire protection wrap NBR-plus is coated on one side and equipped with a protective film. The film must be removed before applying the wrap with the coated side facing inwards.

For easier installation the wrap can be secured against falling out with duct tape or winding wire.

#### Design for wall and floor penetration seals



For building element and seal thicknesses see page 9. For design variants see page 15.

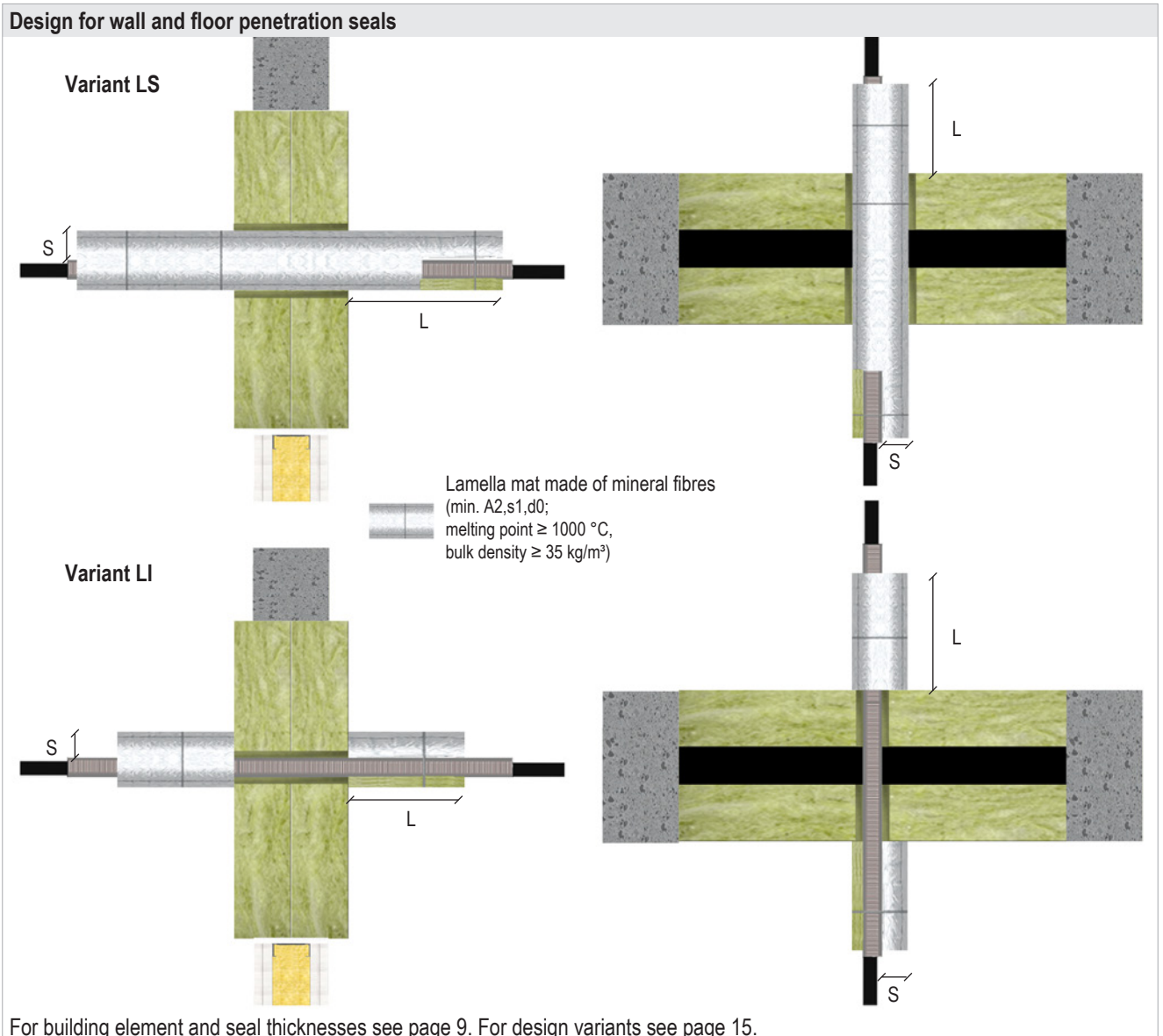
All specifications in mm

Service	Dimensions	Fire protection wrap NBR-plus		Fire resistance class	
		Number of wraps × width [mm]	Number of layers [n]	Wall	Floor
Conduits made of plastic, flexible or rigid – single	Ø ≤ 32 with/without cables (Ø ≤ 21)	1 × 125 oder 2 × 62.5	1	EI 120 U/U	EI 120 U/U
	Ø ≤ 63 with/without cables (Ø ≤ 21)		2	EI 120 U/U	EI 90 U/U / E 120 U/U
Conduits made of plastic, flexible or rigid – bundled	Ø ≤ 32 bundled Ø ≤ 100 with/without cables (Ø ≤ 21)		2	EI 120 U/U	EI 120 U/U
Conduits made of plastic, flexible or rigid – multiple penetration in linear arrangement	≤ 3 EIR Ø ≤ 32 with/without cables (Ø ≤ 21)		1	EI 120 U/U	EI 120 U/U

# System Flammotect 2 × 60 mm

## 9.2.2 Conduits made of steel

Conduits made of steel must be sealed on both sides in walls and on the lower side in floors at a depth of 15 mm with mineral wool and FLAMMOTECT-A. Conduits made of steel must protrude at least 350 mm from the seal. The lamella mat must be secured with winding wire against falling out.



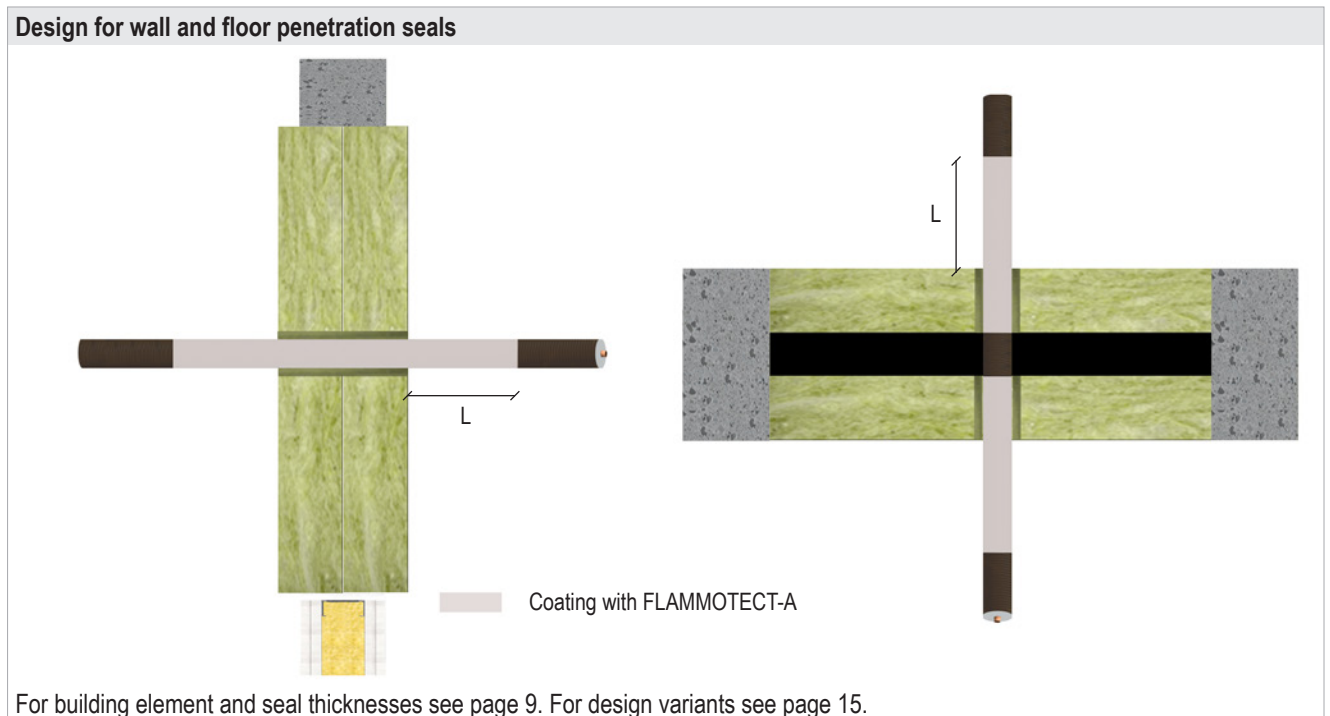
Service	Dimensions	Lamella mat		Fire resistance class	
		Length in front of seal L [mm]	Thickness S [mm]	Wall	Floor
EIR made of steel – single	$\varnothing \leq 32$ with/without cables ( $\varnothing \leq 21$ )	$\geq 200$ (variant LS), $\geq 250$ (variant LI)	30	EI 120 U/C	EI 120 U/C
EIR made of steel – multiple penetration in linear arrangement	$\leq 3$ EIR $\varnothing \leq 32$ with/without cables ( $\varnothing \leq 21$ )			EI 90 / E 120 U/C	EI 120 U/C

## System Flammotect 2 × 60 mm

### 9.3 Coaxial cables and wave guides

#### 9.3.1 Design with fire protection coating

In the penetrated area (inside the mineral fibre boards), all coaxial cables and wave guides must be coated with FLAMMOTECT-A (dry film thickness  $\geq 1.0$  mm).



Service	Fire protection coating FLAMMOTECT-A		Fire resistance class	
	Dry film thickness [mm]	Length of coating in front of seal L [mm]	Wall	Floor
CommScope Heliax $\varnothing \leq 51.1$ mm	$\geq 1.0$	$\geq 100$	EI 120 U/C	-
		$\geq 200$	-	EI 120 U/C
RFS Cellflex $\varnothing \leq 50.3$ mm		$\geq 100$	EI 120 U/C	-
		$\geq 200$	-	EI 120 U/C
RFS Radiaflex $\varnothing \leq 28.5$ mm		$\geq 200$	-	EI 120 U/C
RFS Radiaflex $\varnothing \leq 48.2$ mm		$\geq 100$	EI 120 U/C	-

## System Flammotect 2 × 60 mm

### 9.3.2 Design with lamella mat

The lamella mat must be secured with winding wire against falling out.

**Design for floor penetration seals**

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

≥ 250

20-30

For building element and seal thicknesses see page 9. For design variants see page 15. All specifications in mm

Service	Sectional insulation made of lamella mat		Fire resistance class	
	Length [mm]	Thickness [mm]	Wall	Floor
CommScope Heliac Ø ≤ 51.1 mm	≥ 250	20-30	-	EI 120 U/C
RFS Cellflex Ø ≤ 50.3 mm			-	EI 120 U/C
RFS Radiaflex Ø ≤ 28.5 mm			-	EI 120 U/C

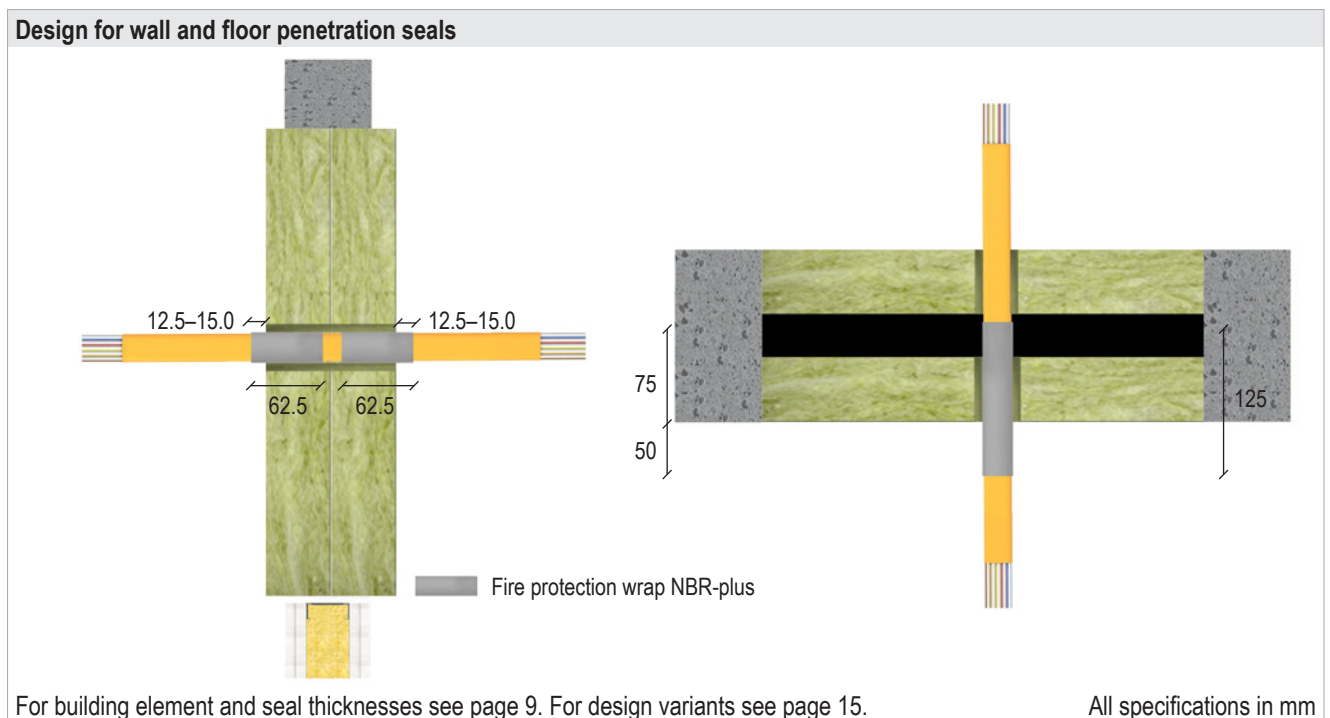
## System Flammotect 2 × 60 mm

### 9.4 speedpipes

speedpipes must be wrapped with the fire protection wrap NBR-plus.

The fire protection wrap NBR-plus is coated on one side and equipped with a protective film. The film must be removed before applying the wrap with the coated side facing inwards.

For easier installation the wrap can be secured against falling out with duct tape or winding wire.



Arrangement	Fire protection wrap NBR-plus	Fire resistance class	
		Wall	Floor
Bundle $\varnothing \leq 50$ mm Single $\varnothing \leq 14$ mm	1 × 125 or 2 × 62.5, 1 layer	EI 120 U/U	EI 120 U/U



## System Flammotect 2 × 60 mm

### 9.5 Combustible pipes

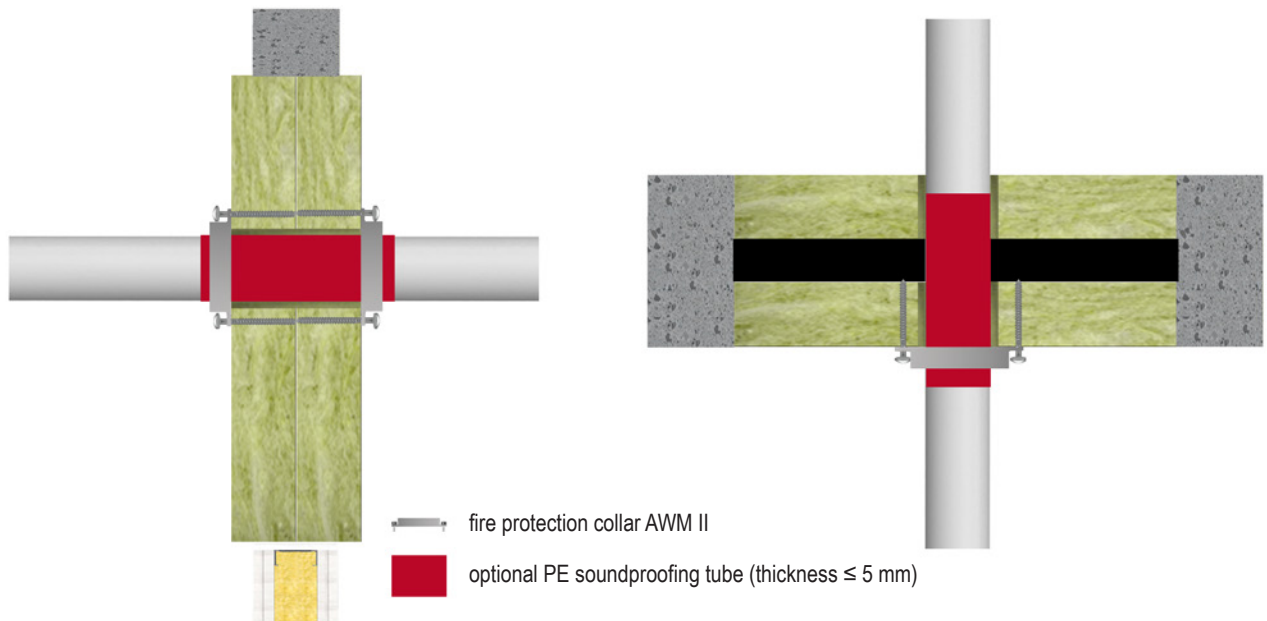
#### 9.5.1 Design with fire protection collar AWM II

The fire protection collar must be attached on both sides in walls and on the lower side in floors. Always use the smallest fitting collar.

The collars must be fastened to the seal with the following coarse thread screws:

- Würth ASSY D (8 × 70 mm)
  - HECO-TOPIX-plus (8 × 80 mm)
  - SPAX T-STAR plus (8 × 80 mm)
- or equivalent.

#### Design for wall and floor penetration seals



For building element and seal thicknesses see page 9. For design variants see page 15.

## System Flammotect 2 × 60 mm

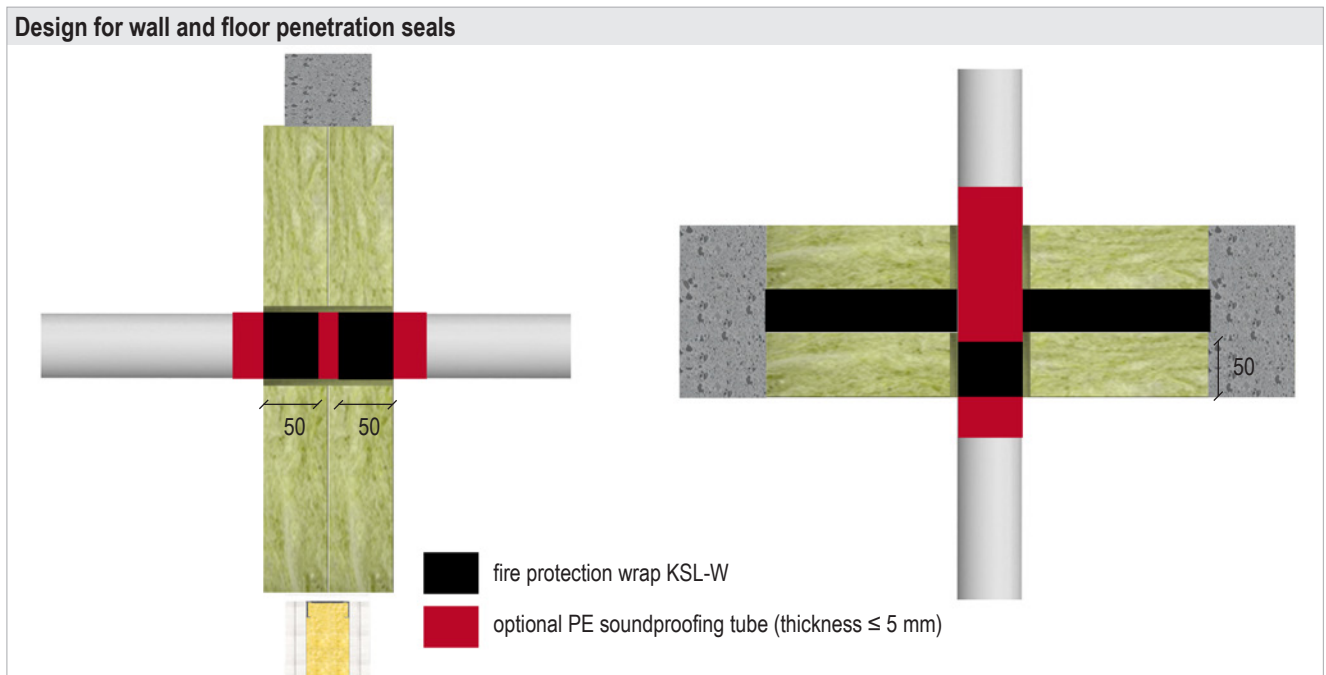
Pipe material / type	Pipe outer Ø [mm]	Pipe wall thickness [mm]	Fire protection collar AWM II	Fire resistance class	
				Wall	Floor
PVC-U, PVC-C	32.0–50.0	1.8–5.6	on both sides in walls, on the lower side in floors	EI 90 U/U	EI 90 U/U
		63.0–75.0		1.8–8.4	EI 90 U/U
	90.0	1.8–10.0		EI 90 U/U	EI 90 U/U
	110.0	1.8–12.3		EI 90 U/U	EI 90 U/U
		1.8		EI 90 U/U	EI 120 U/U
	125.0	2.5		EI 120 U/U	EI 120 U/U
		2.5–9.3		EI 120 U/U	–
	140.0–160.0	3.2–11.9		–	EI 90 U/U
		3.2		–	EI 120 U/U
		4.0–14.6		EI 90 U/U	–
PE-HD, ABS, SAN+PVC	32.0–50.0	1.8–4.6	on both sides in walls, on the lower side in floors	EI 90 U/U	EI 90 U/U
		4.6		EI 120 U/U	EI 90 U/U
	63.0–75.0	2.2–6.9		EI 90 U/U	EI 90 U/U
	75.0	3.8–4.5		EI 120 U/U	EI 90 U/U
	90.0–110.0	2.7–4.3		EI 120 U/U	EI 90 U/U
	90.0	2.4–8.2		EI 90 U/U	EI 90 U/U
	110.0	2.7–10.0		EI 90 U/U	EI 90 U/U
		3.1		EI 120 U/U	EI 90 U/U
	125.0	3.1–4.2		EI 120 U/U	EI 90 U/U
		4.0–14.6		EI 90 U/U	EI 90 U/U
140.0–160.0	4.0	EI 120 U/U	EI 90 U/U		
PP	32.0–50.0	1.8–4.6	on both sides in walls, on the lower side in floors	–	EI 90 U/U
		1.8		EI 90 U/U	EI 120 U/U
	63.0–75.0	2.2–5.2		EI 90 U/U	EI 90 U/U
		2.2–6.9		–	EI 90 U/U
		2.2		EI 90 U/U	EI 120 U/U
	90.0	2.4–7.3		EI 90 U/U	EI 90 U/U
		2.4–8.2		–	EI 90 U/U
		2.4		EI 90 U/U	EI 120 U/U
	110.0	2.7–10.0		EI 90 U/U	EI 90 U/U
		10.0		EI 120 U/U	EI 120 U/U
	125.0	3.1–11.4		–	EI 90 U/U
		3.1		EI 90 U/U	EI 120 U/U
	140.0–160.0	4.0–14.6		EI 90 U/U	EI 90 U/U

## System Flammotect 2 × 60 mm

Pipe material / type	Pipe outer Ø [mm]	Fire protection collar AWM II	Fire resistance class	
			Wall	Floor
REHAU RAUPIANO LIGHT	≤ 110.0	on both sides in walls, on the lower side in floors	EI 120 U/U	EI 90 U/U
	≤ 160.0		EI 120 U/U	–
REHAU RAUSILENTO	≤ 110.0		EI 120 U/U	EI 90 U/U
	≤ 160.0		EI 120 U/U	–
REHAU RAUPIANO PLUS	≤ 160.0		EI 120 U/U	–
CONEL DRAIN	≤ 110.0		EI 120 U/U	EI 90 U/U
Geberit Silent-db20	≤ 110.0		EI 120 U/U	–
	≤ 160.0		EI 90 U/U	–
Geberit Silent-Pro	≤ 110.0		EI 120 U/U	EI 90 U/U
	≤ 160.0		EI 120 U/U	–
Geberit Silent-PP	≤ 110.0		EI 120 U/U	EI 90 U/U
	≤ 160.0		EI 120 U/U	–
POLO-KAL NG / POLO-KAL XS	≤ 110.0		EI 120 U/U	EI 90 U/U
	≤ 160.0		EI 120 U/U	–
POLO-KAL 3S	≤ 110.0		EI 120 U/U	–
Wavin AS	≤ 160.0		EI 90 U/U	–
Wavin AS+	≤ 160.0		EI 90 U/U	–
Wavin SiTech+	≤ 160.0		EI 120 U/U	EI 90 U/U
GF Silenta Premium	≤ 110.0		EI 120 U/U	EI 90 U/U
	≤ 160.0		EI 120 U/U	–
Hakan Silenta Premium	≤ 110.0	EI 120 U/U	EI 90 U/U	
	≤ 160.0	EI 120 U/U	–	
Valsir Triplus	≤ 160.0	EI 120 U/U	EI 90 U/U	
Pipelife MASTER 3 PLUS	≤ 160.0	EI 120 U/U	–	
KE KELIT PHONEX AS	≤ 160.0	EI 90 U/U	–	

## System Flammotect 2 × 60 mm

### 9.5.2 Design with fire protection wrap KSL-W



For building element and seal thicknesses see page 9. For design variants see page 15.

All specifications in mm

Pipe outer Ø [mm]	Pipe wall thickness [mm]	Fire protection wrap KSL-W		Fire resistance class	
		Number of wraps × layers		Wall	Floor
		Wall	Floor		
<b>PVC-U, PVC-C</b>					
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 120 U/U
<b>PE-HD, ABS, SAN+PVC</b>					
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
<b>PP</b>					
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

## System Flammotect 2 × 60 mm

Pipe outer Ø [mm]	Fire protection wrap KSL-W		Fire resistance class	
	Number of wraps × layers		Wall	Floor
	Wall	Floor		
<b>Geberit Silent-PP</b>				
≤ 50.0	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
<b>Geberit Silent-Pro</b>				
≤ 75.0	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
<b>Geberit Silent-db20</b>				
≤ 56.0	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
<b>KE KELIT PHONEX AS</b>				
≤ 56.0	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
<b>Pipelife MASTER 3</b>				
≤ 50.0	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
<b>POLO-KAL NG / POLO-KAL XS</b>				
≤ 50.0	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
<b>REHAU RAUPIANO LIGHT</b>				
≤ 50.0	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
<b>REHAU RAUPIANO PLUS</b>				
≤ 50.0	2 × 2 layers	–	EI 120 U/U	–
≤ 110.0	2 × 4 layers	1 × 4 layers	EI 120 U/U	EI 120 U/U
<b>REHAU RAUSILENTO</b>				
≤ 50.0	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
<b>CONEL DRAIN</b>				
≤ 50.0	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
<b>Wavin SiTech+</b>				
≤ 50.0	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
<b>GF Silenta Premium</b>				
≤ 58.0	2 × 2 layers	1 × 2 layers	EI 120 U/U	EI 90 U/U
≤ 110.0	2 × 4 layers	1 × 4 layers	EI 120 U/U	EI 120 U/U
<b>Hakan Silenta Premium</b>				
≤ 58.0	2 × 2 layers	1 × 2 layers	EI 120 U/U	EI 90 U/U
≤ 110.0	2 × 4 layers	1 × 4 layers	EI 120 U/U	EI 120 U/U

## System Flammotect 2 × 60 mm

### 9.5.3 Design with FEF insulation and fire protection wrap KSL-W

**Design for floor penetration seals**

Fire protection wrap KSL-W  
 FEF insulation in acc. with EN 14304 (B-s3, d0) – CS

For building element and seal thicknesses see page 9. For design variants see page 15. All specifications in mm

Installation in floors			
Dimensions	FEF insulation	Fire protection wrap KSL-W	Fire resistance class
Pipe outer Ø [mm]	Thickness [mm]	Number of wraps × layers	
<b>Geberit Silent-db20</b>			
56.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 90 U/U
135.0	18.5	1 × 5 layers	EI 120 U/U
160.0	19.0	1 × 6 layers	EI 120 U/U
<b>Geberit Silent-PP</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
≤ 125.0	18.5	1 × 5 layers	EI 120 U/U
<b>Geberit Silent-Pro</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
<b>Ostendorf Skolan dB</b>			
≤ 58.0	17.0	1 × 2 layers	EI 120 U/U
≤ 135.0	18.5	1 × 5 layers	EI 120 U/U

## System Flammotect 2 × 60 mm

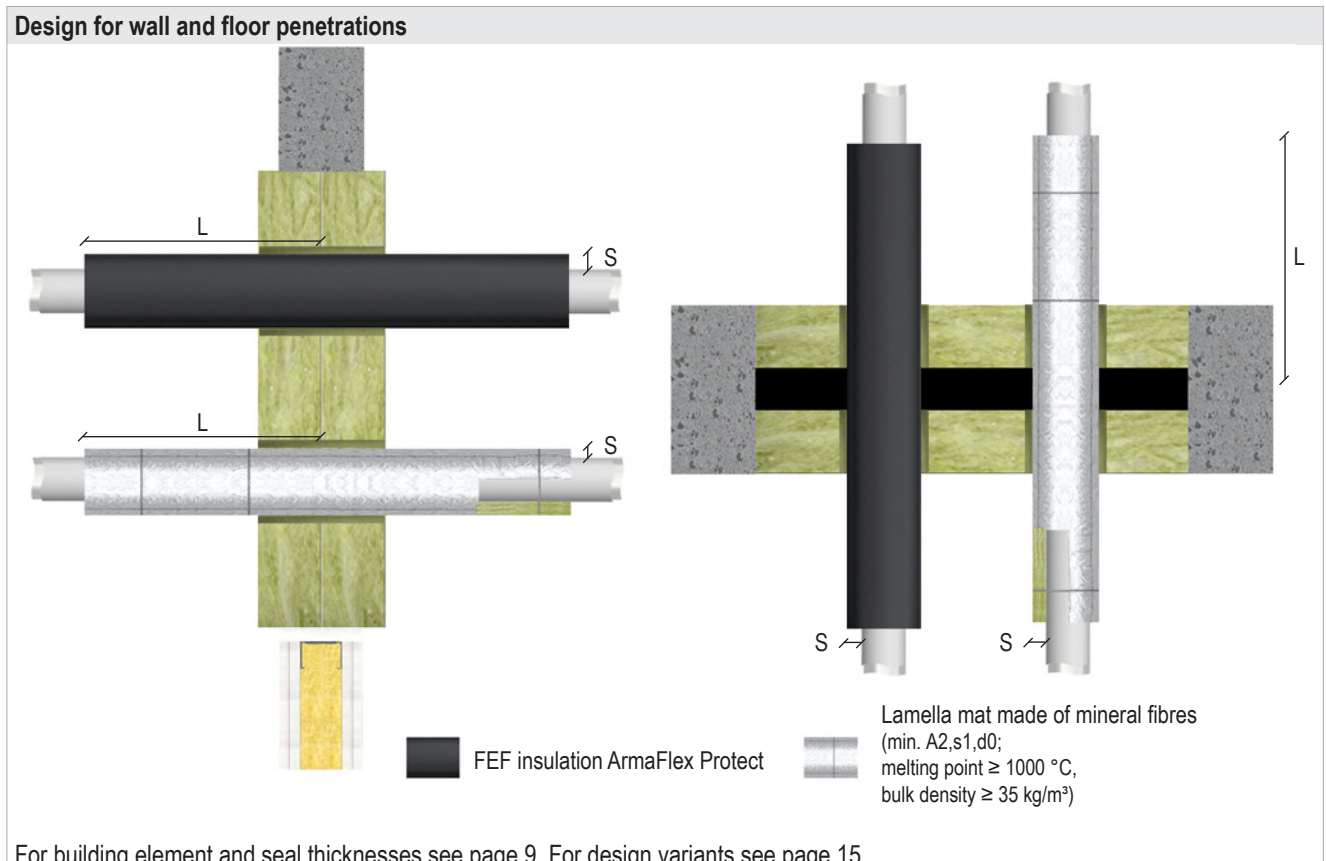
Installation in floors			
Dimensions	FEF insulation	Fire protection wrap KSL-W	Fire resistance class
Pipe outer Ø [mm]	Thickness [mm]	Number of wraps × layers	
<b>Pipelife MASTER 3 PLUS</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
<b>POLO-KAL NG / POLO-KAL XS</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
<b>REHAU RAUPIANO PLUS</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
<b>REHAU RAUPIANO LIGHT</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
≤ 125.0	18.5	1 × 4 layers	EI 120 U/U
≤ 160.0	19.0	1 × 6 layers	EI 90 U/U
<b>REHAU RAUSILENTO</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
≤ 125.0	18.5	1 × 4 layers	EI 120 U/U
≤ 160.0	19.0	1 × 6 layers	EI 90 U/U
<b>CONEL DRAIN</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
≤ 125.0	18.5	1 × 4 layers	EI 120 U/U
≤ 160.0	19.0	1 × 6 layers	EI 90 U/U
<b>Wavin SiTech</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
<b>Wavin SiTech+</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
<b>Wavin AS+</b>			
≤ 50.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
<b>Hakan Silenta Premium</b>			
≤ 58.0	17.0	1 × 2 layers	EI 120 U/U
≤ 110.0	18.0	1 × 4 layers	EI 120 U/U
≤ 135.0	18.5	1 × 5 layers	EI 120 U/U

## System Flammotect 2 × 60 mm

### 9.6 Multilayer pipes

#### 9.6.1 Design with FEF insulation ArmaFlex Protect or lamella mat

The lamella mat must be secured with winding wire against falling out.



Service		Insulation			Fire resistance class	
Pipe outer Ø [mm]	Pipe wall thickness [mm]	Type	Length L [mm]	Thickness S [mm]	Wall	Floor
<b>Henco</b>						
≤ 12	≥ 1.6	ArmaFlex Protect	≥ 240	≥ 13	EI 120 U/U	EI 120 U/U
≤ 32	≥ 3.0	lamella mat	≥ 250	≥ 20	EI 120 U/U	–
			≥ 500	≥ 20	–	EI 120 U/U
≤ 63	≥ 4.5	lamella mat	≥ 250	≥ 30	EI 120 U/U	–
		lamella mat	≥ 500	≥ 30	–	EI 120 U/U
		ArmaFlex Protect	≥ 240	≥ 26 (2 × 13)	EI 120 U/U	EI 120 U/U



# System Flammotect 2 × 60 mm

## 9.6.2 Design with PEF or FEF insulation

**Design for wall and floor penetrations**

For building element and seal thicknesses see page 9. For design variants see page 15. All specifications in mm

**Installation with FEF insulation in acc. with EN 14304 (B-s3, d0)**

Pipe outer Ø [mm]	Pipe wall thickness [mm]	FEF insulation Thickness [mm]	Fire protection wrap KSL-W		Fire resistance class	
			Number of wraps × layers		Wall	Floor
			Wall	Floor		
<b>Geberit Mepla</b>						
16	2.25	8.0–32.0	2 × 1 layer	1 × 1 layer	EI 120 U/C	EI 120 U/C
20	2.50	8.0–32.0			EI 120 U/C	EI 120 U/C
26	3.00	8.5–35.0			EI 120 U/C	EI 120 U/C
32	3.00	9.0–35.0			EI 120 U/C	EI 120 U/C
40	3.50	9.0–35.0	2 × 2 layers	1 × 2 layers	EI 120 U/C	EI 120 U/C
50	4.00	9.0–35.0			EI 120 U/C	EI 120 U/C
63	4.50	9.0–39.0			EI 120 U/C	EI 120 U/C
75	4.70	9.5			EI 90 U/C	EI 90 U/C
		> 9.5 – 40.5			EI 120 U/C	EI 120 U/C
<b>REHAU RAUTITAN stabil</b>						
16	2.60	8.0–32.0	2 × 1 layer	1 × 1 layer	EI 120 U/C	EI 120 U/C
20	2.90	8.0–32.0			EI 120 U/C	EI 120 U/C
25	3.70	8.5–35.0			EI 120 U/C	EI 120 U/C
32	4.70	9.0–35.0	2 × 1 layer	1 × 2 layers	EI 120 U/C	EI 120 U/C
40	6.00	9.0–35.0	2 × 2 layers		EI 120 U/C	EI 120 U/C

## System Flammotect 2 × 60 mm

Installation with FEF insulation in acc. with EN 14304 (B-s3, d0)						
Pipe outer Ø [mm]	Pipe wall thickness [mm]	FEF insulation Thickness [mm]	Fire protection wrap KSL-W		Fire resistance class	
			Number of wraps × layers		Wall	Floor
		Wall	Floor			
<b>KE KELIT KELOX</b>						
16	2.00	8.0–32.0	2 × 1 layer	1 × 1 layer	EI 120 U/C	EI 120 U/C
18	2.00				EI 120 U/C	EI 120 U/C
20	2.25				EI 120 U/C	EI 120 U/C
25	2.50				EI 120 U/C	EI 120 U/C
32	3.00	9.5–35.0	2 × 2 layers	1 × 2 layers	EI 120 U/C	EI 120 U/C
40	4.00	9.5–35.0			EI 120 U/C	EI 120 U/C
50	4.50				EI 120 U/C	EI 120 U/C
63	6.00	9.0–39.0			EI 120 U/C	EI 120 U/C
75	7.50	9.0–40.5	EI 120 U/C	EI 120 U/C		
<b>Henco</b>						
20	2.0–3.0	8.0–32.0	2 × 1 layer	–	EI 120 U/C	–
32	3.0	8.0–32.0		–	EI 120 U/C	–

Installation with PEF insulation						
Pipe outer Ø [mm]	Pipe wall thickness [mm]	FEF insulation Thickness [mm]	Fire protection wrap KSL-W		Fire resistance class	
			Number of wraps × layers		Wall	Floor
		Wall	Floor			
<b>Geberit Mepla</b>						
16	2.25	6.0–13.0	2 × 1 layer	1 × 1 layer	EI 120 U/C	EI 120 U/C
20	2.50	6.0–13.0			EI 120 U/C	EI 120 U/C
26	3.00	6.0–13.0			EI 120 U/C	EI 120 U/C
32	3.00	6.0–13.0			EI 120 U/C	EI 120 U/C
<b>REHAU RAUTITAN stabil</b>						
16	2.60	4.0–26.0	2 × 1 layer	1 × 1 layer	EI 120 U/C	EI 120 U/C
20	2.90	4.0–26.0			EI 120 U/C	EI 120 U/C
25	3.70	4.0–26.0			EI 120 U/C	–
		26.0			–	EI 120 U/C
32	4.70	4.0–26.0	2 × 1 layer	EI 120 U/C	–	
		26.0		–	EI 120 U/C	
<b>KE KELIT KELOX</b>						
18	2.00	4.0–13.0	2 × 1 layer	1 × 1 layer	EI 120 U/C	EI 120 U/C
20	2.25	4.0–13.0			EI 120 U/C	EI 120 U/C
25	2.50	4.0–13.0			EI 120 U/C	EI 120 U/C
32	3.00	4.0–13.0			EI 120 U/C	EI 120 U/C
<b>Henco</b>						
20	2.0–3.0	6.0–13.0	2 × 1 layer	1 × 1 layer	EI 120 U/C	EI 120 U/C
32	3.0	6.0–13.0		–	EI 120 U/C	–
		13.0		1 × 1 layer	–	EI 120 U/C

## System Flammotect 2 × 60 mm

### 9.6.3 Design with pipe shells made of mineral fibres

**Design for wall and floor penetrations**

Pipe shell made of mineral fibres (CS)  
min. A2-s1,d0,  
melting point ≥ 1000 °C,  
bulk density ≥ 80 kg/m<sup>3</sup>

For building element and seal thicknesses see page 9. For design variants see page 15. All specifications in mm

Pipe outer Ø [mm]	Insulation thickness [mm]	Fire resistance class	
		Wall	Floor
<b>Geberit Mepla</b>			
16	20–30	EI 120 U/C	EI 120 U/C
20		EI 120 U/C	EI 120 U/C
26	20–40	EI 120 U/C	EI 120 U/C
32	20–50	EI 120 U/C	EI 120 U/C
40		EI 120 U/C	EI 120 U/C
50		EI 120 U/C	EI 120 U/C
63	20–60	EI 120 U/C	EI 120 U/C
75	20–80	EI 120 U/C	EI 120 U/C

## System Flammotect 2 × 60 mm

### 9.7 Non-combustible pipes

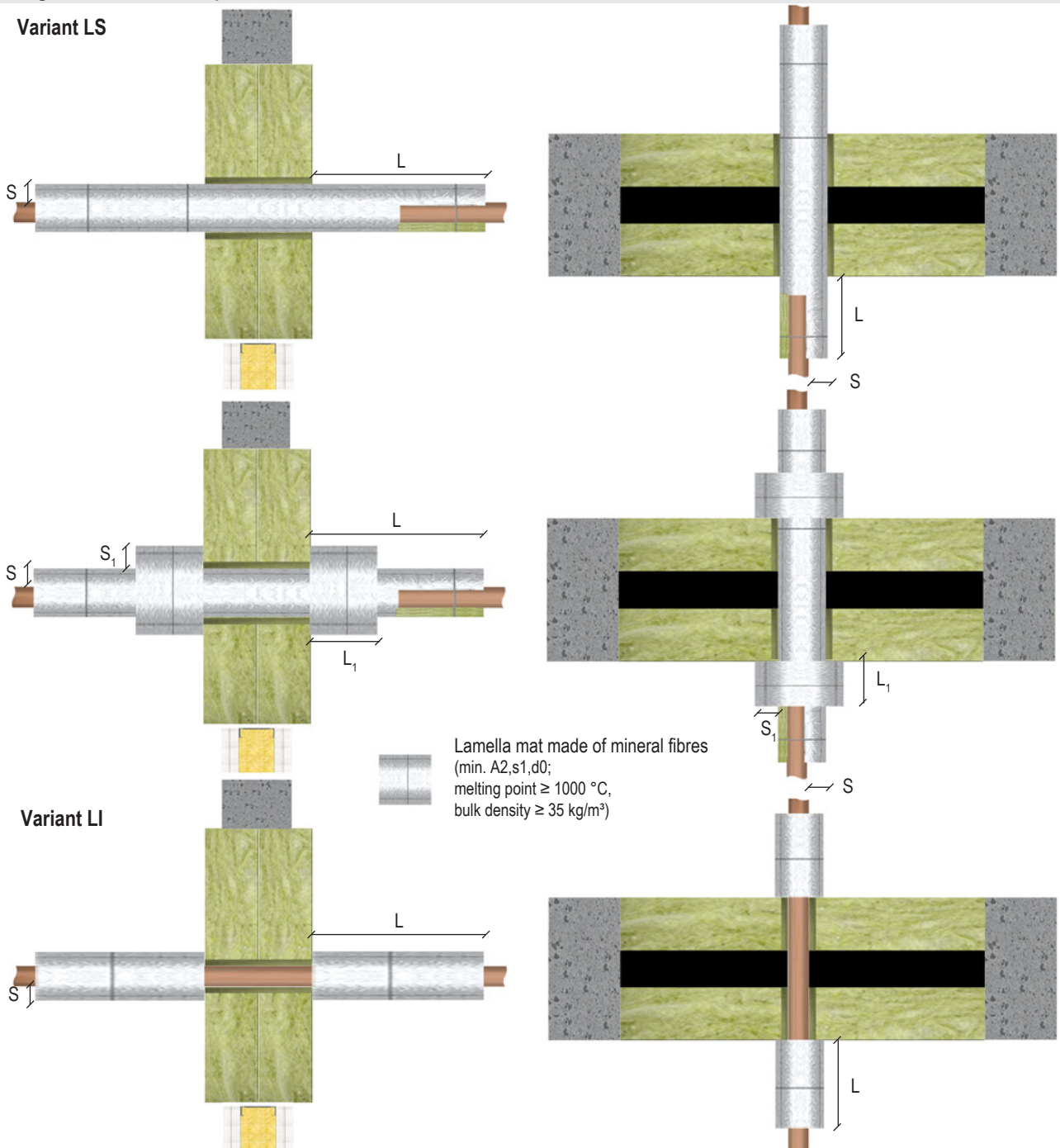
#### 9.7.1 Design with lamella mat

Pipes may be arranged at all angles between 45° and 90°.

The lamella mat must be secured with winding wire against falling out.

#### Design for wall and floor penetrations

##### Variant LS



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

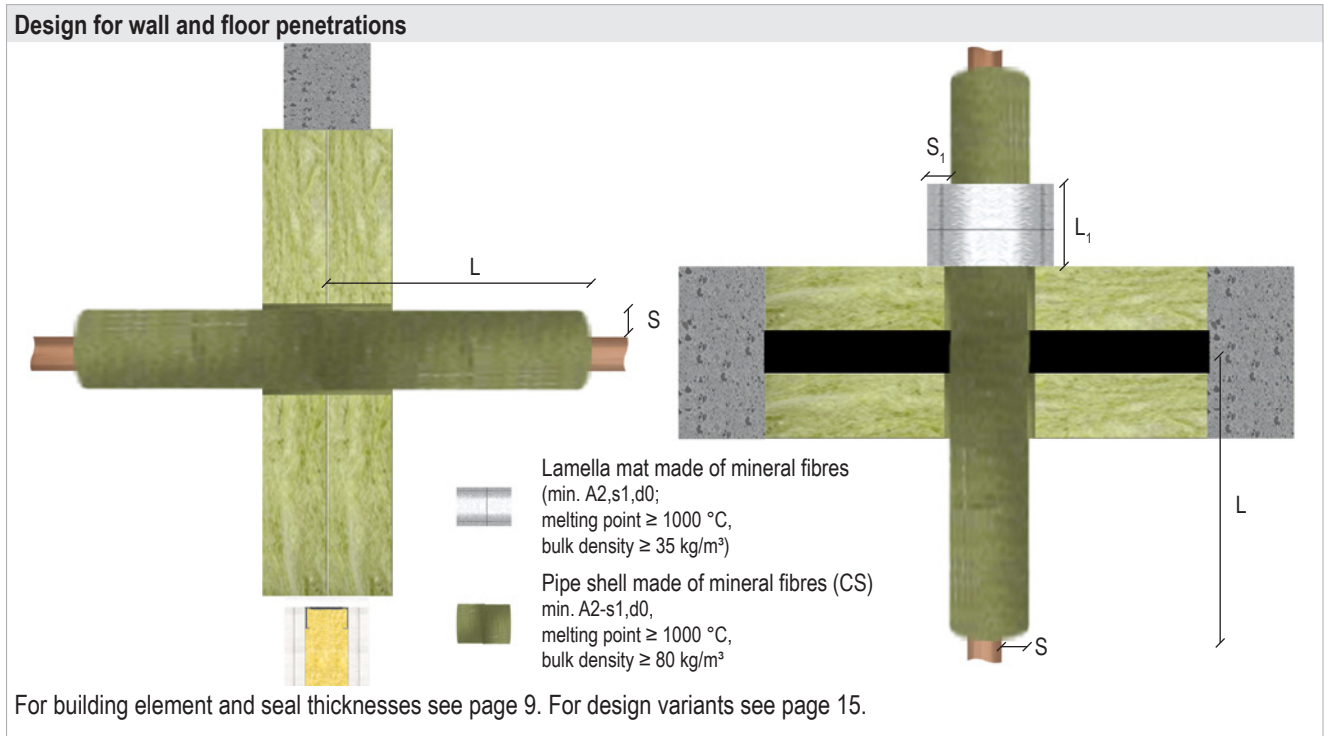
For building element and seal thicknesses see page 9. For design variants see page 15.

## System Flammotect 2 × 60 mm

Installation in walls						
Pipe outer Ø [mm]	Pipe wall thickness [mm]	Section insulation made of lamella mat		Protective insulation made of lamella mat		Fire resistance class
		Length L [mm]	Thickness S [mm]	Length L <sub>1</sub> [mm]	Thickness S <sub>1</sub> [mm]	
<b>Copper, steel, stainless steel, cast iron</b>						
≤ 15.0	0.8–14.2	≥ 250	20	–	–	EI 120 C/U
≤ 22.0	0.6–14.2	≥ 450	20–100	–	–	EI 120 U/C
> 22.0 – ≤ 60.0		≥ 200	30–100	–	–	EI 120 U/C
> 60.0 – ≤ 88.9		≥ 450	30–100	–	–	EI 120 U/C
≤ 108.0	2.1/2.5–14.2	≥ 1000	30	≥ 500	30	EI 120 C/U
<b>Steel, stainless steel, cast iron</b>						
≤ 42.0	1.8–14.2	≥ 200	30–100	–	–	EI 120 U/C
> 42.0 – ≤ 114.3	1.8/3.2–14.2	≥ 450	30–100	–	–	EI 120 U/C
> 114.3 – ≤ 159.0	3.2/4.0–14.2	≥ 1200	100	–	–	EI 120 U/C
> 114.3 – ≤ 170.0	2.6/2.9–14.2	≥ 1000	40	≥ 500	60	EI 120 C/U
		≥ 1000	60	≥ 500	30	EI 120 C/U
> 114.3 – ≤ 219.1	3.2/4.5–14.2	≥ 1200	30–100	–	–	EI 90 U/C
<b>Installation in floors</b>						
Pipe outer Ø [mm]	Pipe wall thickness [mm]	Section insulation made of lamella mat		Protective insulation made of lamella mat		Fire resistance class
		Length L [mm]	Thickness S [mm]	Length L <sub>1</sub> [mm]	Thickness S <sub>1</sub> [mm]	
<b>Copper, steel, stainless steel, cast iron</b>						
≤ 22.0	0.6–14.2	≥ 425	20–100	–	–	EI 120 U/C
		≥ 175	30–100	–	–	EI 120 U/C
		≥ 425	30–100	–	–	EI 120 U/C
> 22.0 – ≤ 42.0	1.3/1.5–14.2	≥ 750	30	≥ 500	30	EI 120 C/U
> 42.0 – ≤ 88.9	0.6–14.2	≥ 675	30–100	–	–	EI 90 U/C
> 54.0 – ≤ 108.0	1.6/2.5–14.2	≥ 1000	30	≥ 500	30	EI 120 C/U
<b>Steel, stainless steel, cast iron</b>						
≤ 42.0	1.8–14.2	≥ 125	30–100	–	–	EI 120 U/C
> 42.0 – ≤ 114.3	1.8/3.2–14.2	≥ 425	30–100	–	–	EI 120 U/C
> 114.3 – ≤ 159.0	3.2/4.0–14.2	≥ 1175	30–100	–	–	EI 120 U/C
> 159.0 – ≤ 170.0	2.9–14.2	≥ 1000	40	≥ 500	60	EI 120 C/U
> 114.3 – ≤ 219.1	3.2/4.5–14.2	≥ 1175	30	–	–	EI 120 U/C
		≥ 1175	30–100	–	–	EI 90 U/C
> 170.0 – ≤ 323.9	2.9/7.5–14.2	≥ 1250	60	≥ 1000	60	EI 120 C/U

# System Flammotect 2 × 60 mm

## 9.7.2 Design with pipe shells made of mineral fibres



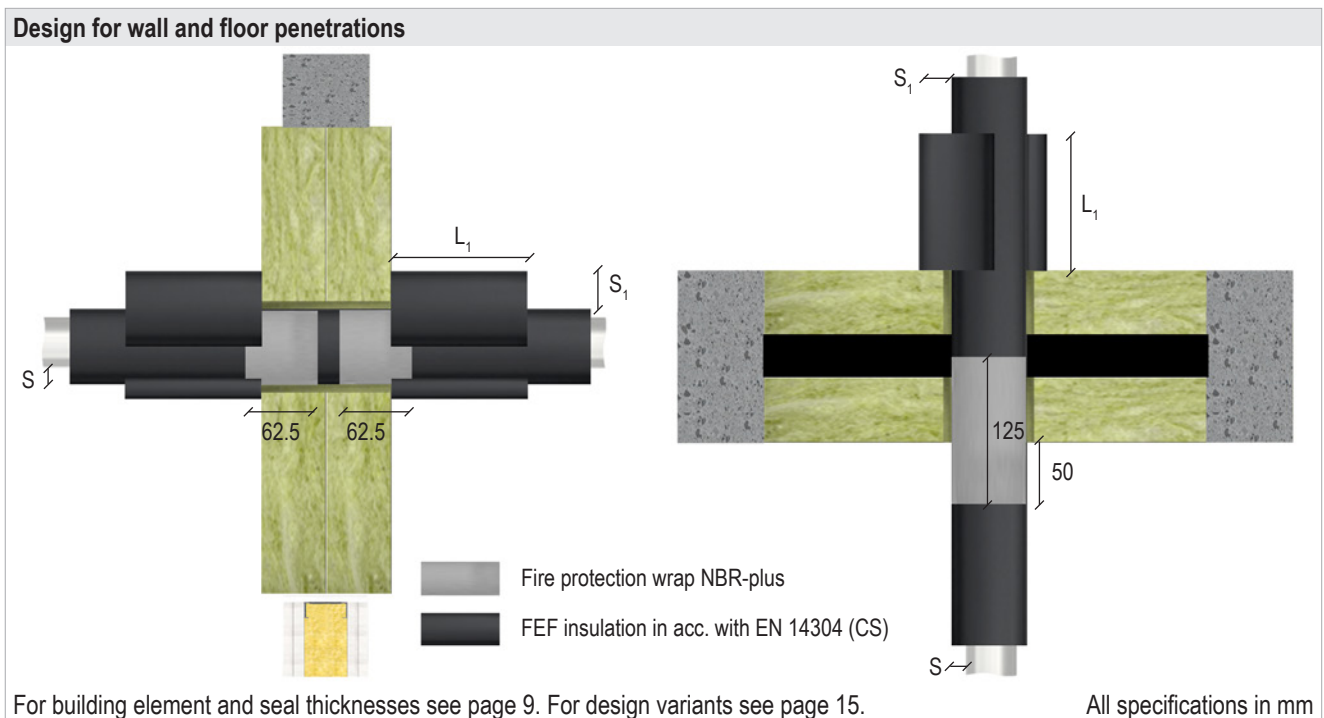
Pipe outer Ø [mm]	Pipe wall thickness [mm]	Pipe shell	Protective lamella mat insulation		Fire resistance class	
		Thickness S [mm]	Length L <sub>1</sub> [mm]	Thickness S <sub>1</sub> [mm]	Wall	Floor
<b>Copper, steel, stainless steel, cast iron</b>						
≤ 15.0	0.8–14.2	20–30	–	–	EI 120 C/U	EI 120 C/U
		20–40	–	–	–	EI 120 C/U
≤ 28.0	1.0–14.2	20–30	–	–	EI 120 C/U	EI 120 C/U
		20–40	–	–	–	EI 120 C/U
≤ 42.0	1.2–14.2	20–30	–	–	EI 120 C/U	EI 120 C/U
		20–40	–	–	–	EI 120 C/U
≤ 54.0	1.5–14.2	20–30	–	–	EI 120 C/U	EI 120 C/U
		20–40	–	–	–	EI 120 C/U
≤ 88.9	2.0–14.2	20–30	–	–	EI 120 C/U	EI 120 C/U
		20–40	–	–	–	EI 120 C/U
≤ 108.0	2.5–14.2	30–40	–	–	EI 120 C/U	EI 120 C/U
<b>Steel, stainless steel, cast iron</b>						
≤ 170.0	3.0–14.2	≥ 40	≥ 500	≥ 30	–	EI 120 C/U

# System Flammotect 2 × 60 mm

## 9.7.3 Design with FEF insulation in acc. with EN 14304

The fire protection wrap NBR-plus is coated on one side and equipped with a protective film. The film must be removed before applying the wrap with the coated side facing inwards.

For easier installation the wrap can be secured against falling out with duct tape or winding wire.



Installation in walls							
Pipe outer Ø [mm]	Pipe wall thickness [mm]	Section insulation made of FEF	Protective insulation made of FEF		Fire protection wrap NBR-plus		Fire resistance class
		Thickness S [mm]	Length L <sub>1</sub> [mm]	Thickness S <sub>1</sub> [mm]	Number of wraps × width [mm]	Number of layers [n]	
<b>Copper, steel, stainless steel, cast iron</b>							
≤ 15.0	0.8–14.2	10	–	–	2 × 62.5	1	EI 120 U/C
> 15.0 – ≤ 54.0		19–38	–	–		2	EI 120 U/C
≤ 42.0		10	–	–		1	EI 90 U/C
> 42.0 – ≤ 88.9		19–38	–	–		2	EI 90 U/C
> 54.0 – ≤ 88.9		25	–	–		2	EI 120 U/C
<b>Steel, stainless steel, cast iron</b>							
≤ 15.0	0.8–14.2	10–38	–	–	2 × 62.5	2	EI 120 U/C
> 15.0 – ≤ 88.9		19–38	–	–		2	EI 120 U/C
> 88.9 – ≤ 114.3		19–38	250	19		2	EI 120 U/C
> 114.3 – ≤ 159.0		25–38	250	19		2	EI 120 U/C
> 159.0 – ≤ 219.1		25–38	600	38		2	EI 120 U/C

## System Flammotect 2 × 60 mm

Installation in floors							
Pipe outer Ø [mm]	Pipe wall thickness [mm]	Section insulation made of FEF	Protective insulation made of FEF		Fire protection wrap NBR-plus		Fire resistance class
		Thickness S [mm]	Length L <sub>1</sub> [mm]	Thickness S <sub>1</sub> [mm]	Number of wraps × width [mm]	Number of layers [n]	
<b>Copper, steel, stainless steel, cast iron</b>							
≤ 42.0	0.6–14.2	9–40	–	–	1 × 125	2	EI 90 U/C
		10	–	–		1	EI 90 U/C
≤ 60.0		13–40	–	–		2	EI 120 U/C
> 60.0 – ≤ 88.9		19–38	–	–		2	EI 90 U/C
		25	–	–		2	EI 120 U/C
≤ 88.9		9–32	500	30		2	EI 120 U/C
<b>Steel, stainless steel, cast iron</b>							
≤ 159.0	0.6–14.2	25–38	250	25	1 × 125	2	EI 90 U/C
> 159.0 – ≤ 219.1		25–38	250	38		2	EI 90 U/C



# System Flammotect 2 × 60 mm

## 9.7.4 Design with FEF insulation ArmaFlex Protect



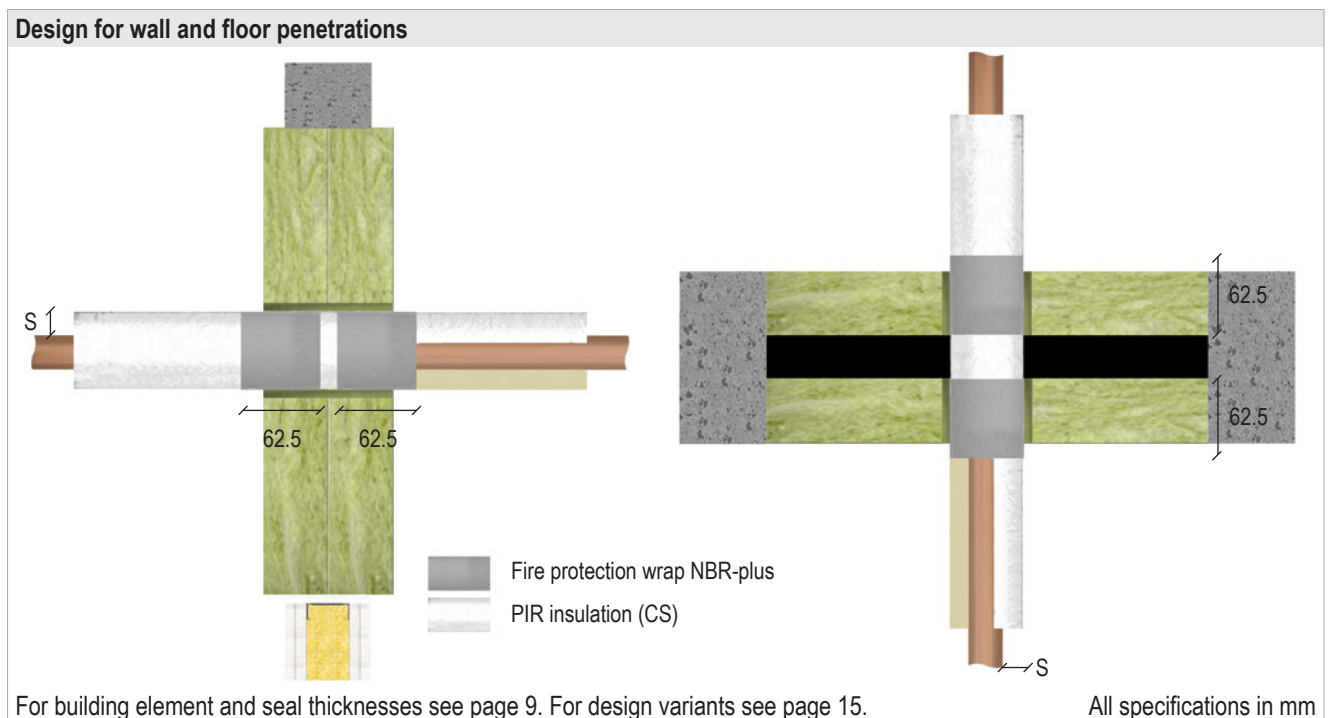
Pipe outer Ø [mm]	FEF insulation ArmaFlex Protect		Fire resistance class	
	Length L [mm]	Thickness S [mm]	Wall	Floor
<b>Copper, steel, stainless steel, cast iron</b>				
≤ 8.0	≥ 1000	16	EI 120 C/U	EI 120 C/U
≤ 10.0	≥ 1000	16	EI 120 C/U	-
≤ 15.0	≥ 1000	19	EI 90 / E 120 C/U	EI 120 C/U
≤ 22.0	≥ 1000	20	EI 120 C/U	EI 120 C/U
≤ 28.0	≥ 1000	25	EI 60 / E 120 C/U	EI 120 C/U
≤ 35.0	≥ 1000	25	EI 90 / E 120 C/U	EI 90 / E 120 C/U
≤ 54.0	≥ 1000	25	EI 90 / E 120 C/U	EI 90 / E 120 C/U
≤ 88.9	≥ 1000	25	EI 60 / E 120 C/U	EI 60 / E 120 C/U
<b>Steel, stainless steel, cast iron</b>				
≤ 170.0	≥ 1000	26 (2 × 13)	EI 90 / E 120 C/U	EI 90 / E 120 C/U

## System Flammotect 2 × 60 mm

### 9.7.5 Design with PIR insulation

The fire protection wrap NBR-plus is coated on one side and equipped with a protective film. The film must be removed before applying the wrap with the coated side facing inwards.

For easier installation the wrap can be secured against falling out with duct tape or winding wire.



## System Flammotect 2 × 60 mm

Installation in walls						
Pipe outer Ø [mm]	Pipe wall thickness [mm]	PIR insulation Thickness S [mm]	Fire protection wrap NBR-plus		Fire resistance class	
			Number of wraps × width [mm]	Number of layers [n]		
<b>Copper, steel, stainless steel, cast iron</b>						
≤ 28	1.0–14.2	20	2 × 62.5	2	EI 90 C/U	
		50		3	EI 120 C/U	
≤ 42	1.2–14.2	20		2	EI 90 C/U	
		60		3	EI 120 C/U	
≤ 54	1.5–14.2	20		2	EI 90 C/U	
		80		4	EI 60 C/U	
≤ 88.9	2.0–14.2	40		2	EI 90 C/U	
		100		4	EI 120 C/U	
<b>Steel, stainless steel, cast iron</b>						
≤ 88.9	2.9–14.2	20		2 × 62.5	2	EI 90 C/U
		100	4		EI 120 C/U	
≤ 133.0	3.6–14.2	30	2		EI 60 C/U	
		40	2		EI 60 C/U	
		100	4		EI 90 C/U	
≤ 219.1	4.5–14.2	40	2		EI 90 C/U	
		60	4		EI 120 C/U	
		100	4		EI 120 C/U	
<b>Installation in floors</b>						
Pipe outer Ø [mm]	Pipe wall thickness [mm]	PIR insulation Thickness S [mm]	Fire protection wrap NBR-plus		Fire resistance class	
			Number of wraps × width [mm]	Number of layers [n]		
<b>Copper, steel, stainless steel, cast iron</b>						
≤ 28	1.0–14.2	30	2 × 62.5	2	EI 120 C/U	
		50		3	EI 120 C/U	
≤ 42	1.2–14.2	30		2	EI 120 C/U	
		60		3	EI 120 C/U	
≤ 54	1.5–14.2	30		2	EI 120 C/U	
		80		4	EI 120 C/U	
≤ 88.9	2.0–14.2	40		2	EI 120 C/U	
		50		3	EI 120 C/U	
		100		4	EI 90 C/U	
<b>Steel, stainless steel, cast iron</b>						
≤ 88.9	2.9–14.2	30	2 × 62.5	2	EI 90 C/U	
		100		4	EI 120 C/U	
≤ 133.0	3.6–14.2	40		2	EI 90 C/U	
		100		4	EI 120 C/U	
≤ 219.1	4.5–14.2	40		2	EI 90 C/U	
		60		3	EI 120 C/U	
		100		4	EI 120 C/U	

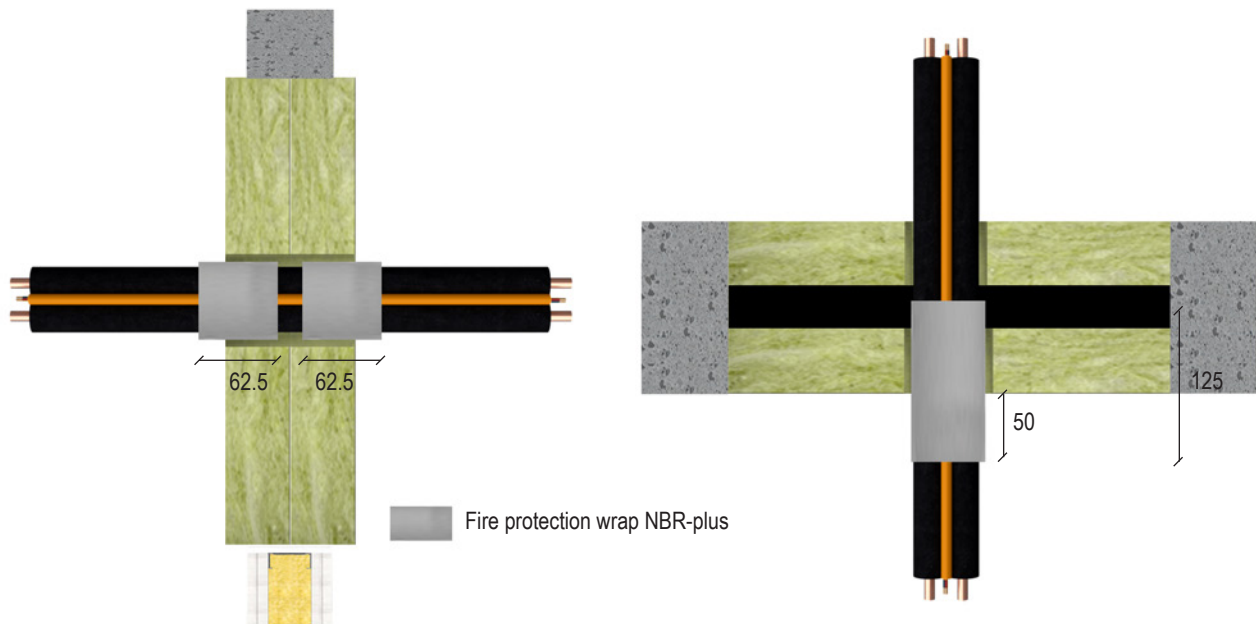
## System Flammotect 2 × 60 mm

### 9.8 HVAC split line combinations

The fire protection wrap NBR-plus is coated on one side and equipped with a protective film. The film must be removed before applying the wrap with the coated side facing inwards.

For easier installation the wrap can be secured against falling out with duct tape or winding wire.

#### Design for wall and floor penetrations



For building element and seal thicknesses see page 9. For design variants see page 15.

All specifications in mm

Combination	Fire protection wrap NBR-plus		Fire resistance class
	Number of wraps × width [mm]	Number of layers [n]	
Copper pipe ≤ 2 × Ø 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 × 62.5 (wall), 1 × 125 (floor)	2	EI 120

## System Flammotect 2 × 60 mm

### 9.9 Double solar pipes NanoSun<sup>2</sup>

**Design for wall and floor penetrations**

For building element and seal thicknesses see page 9. For design variants see page 15. All specifications in mm

Dimensions	Fire protection wrap NBR-plus		Lamella mat		Fire resistance class	
	Number of wraps and layers		Length L [mm]	Thickness S [mm]	Wall	Floor
DN 40	125 mm on each side, 1 layer with 25 mm overlap		≥ 250	≥ 30	EI 120 U/U	-
	-	-	-	-	-	EI 120 U/U

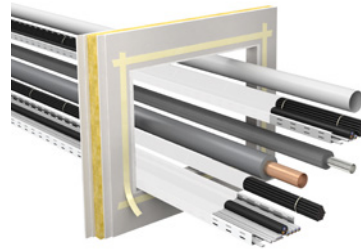
## System Flammotect 2 × 60 mm

### 10. Installation steps

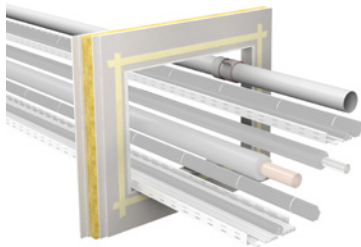
1. Clean the aperture edge. When installing in sandwich panel walls, attach L profiles with the dimensions 30 × 30 × 2 mm alongside the aperture edge on both sides of the seal.



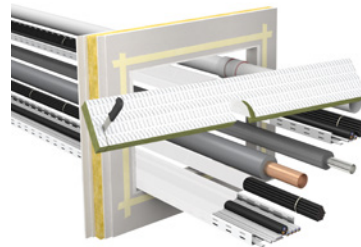
2. Mask the aperture with crepe tape on all sides, keeping 20 mm distance to the edge. Coat the cables with FLAMMOTECT-A; alternatively apply fire protection wrap.



3. Apply fire protection wraps to services, if necessary.



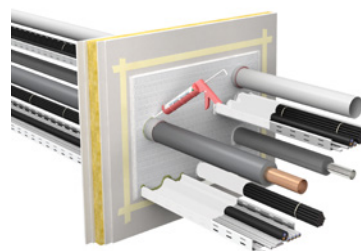
4. Cut mineral fibre boards to size (make cut-outs for the installations).



5. Coat the edges of the mineral fibre boards with FLAMMOTECT-A and firmly place boards in position.



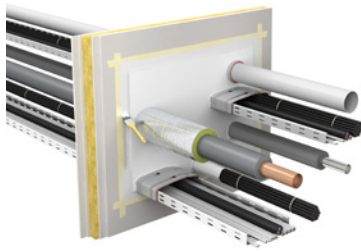
6. Seal the remaining opening/joints with mineral fibre or fill them with FLAMMOTECT-A.



## System Flammotect 2 × 60 mm

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7. Final coating with FLAMMOTECT-A. Install pipe collars if necessary.



8. If required, label the penetration seal. Fill out the label neatly and attach it firmly next to/above (not on) the penetration seal.

