# System NBR-plus

## Pipe sealing system

Fire-resistant sealing system for non-combustible pipes, HVAC split line combinations and electrical installation conduits in connection with FEF and glass wool insulation.

Fire resistance class max. EI 120 in acc. with EN 13501-2 as per ETA-21/0461

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# System NBR-plus

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# System NBR-plus

## 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.

Subject to errors, misprints and changes. All information contained in this brochure reflects the state of the art or, if applicable, the requirements of the pertinent standard at the time of printing (07/2024).
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. |

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). |

# System NBR-plus

## 1.3 Building elements

**Plasterboard walls with steel substructure**

In stud design and double-sided cladding with at least 2 layers of 12.5 mm cement or gypsum-bound building boards with a reaction to fire of class A1 or A2 in accordance with EN 13501-1.

The stud construction must be complemented by additional stems and transoms in such a way that they frame the aperture.

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

**Plasterboard walls with wood substructure**

In stud design and double-sided cladding with at least 2 layers of 12.5 mm cement or gypsum-bound building boards with a reaction to fire of class A1 or A2 in accordance with EN 13501-1.

The distance between the opening and the studs and transoms must be ≥ 100 mm and the hollow spaces between the cladding of the wall, studs and transoms and the aperture must be tightly sealed to a depth of ≥ 100 mm with mineral wool, reaction to fire class A1 or A2 in accordance with EN 13501-1.

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

**Solid walls**

Made of concrete, reinforced concrete or aerated concrete with a density of ≥ 350 kg/m³.

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

**Solid floors**

Made of concrete, reinforced concrete or aerated concrete with a density of ≥ 500–550 kg/m³.

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

**Timber walls**

Made of cross-laminated timber (CLT).

The strength of the single laminated timber layers must at least conform to EN 338. The mass burning rate of the solid timber layers must at least conform to EN 1995-2.

The wall must be constructed in layers of at least the following thicknesses:

EI 90 ≥ 100 mm (3 layers: 30/40/30 mm)

EI 60 ≥ 100 mm (5 layers: 20/20/20/20/20 mm)

**Timber floors**

Made of cross-laminated timber (CLT).

The strength of the single laminated timber layers must at least conform to EN 338. The mass burning rate of the solid timber layers must at least conform to EN 1995-2.

The floor must be constructed in layers of at least the following thicknesses:

EI 90 ≥ 140 mm (5 layers 40/20/20/20/40 mm)

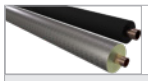
EI 60 ≥ 100 mm (5 layers 20/20/20/20/20 mm)

# System NBR-plus

## 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 10.

### 2.1 Non-combustible pipes



| Pipe material | Outer diameter [mm] | Pipe wall thickness [mm] |
|---|---|---|
| Copper, steel, stainless steel, cast iron | ≤ 88.9 | ≥ 0.6 |
| Steel, stainless steel, cast iron | ≤ 323.9 | ≥ 0.6 |

### 2.2 Electrical installation conduits

| Material | Configuration | Maximum diameter [mm] |
|---|---|---|
| Plastic | single | ≤ 32 / ≤ 63 with or without cables |
| | bundled | ≤ 100, conduit Ø ≤ 32 with or without cables |
| | multiple penetration | ≤ 3 pcs., conduit Ø ≤ 32 with or without cables |

### 2.3 speedpipes

| Configuration | Maximum diameter [mm] |
|---|---|
| single | ≤ 14.0 |
| bundled | ≤ 50.0 |

### 2.4 HVAC split line combinations

| Configuration |
|---|
| Copper pipe Ø 2 × 18 mm<br>+ 9 mm PE foam<br>+ 1 pipe PVC-U/PVC-C Ø ≤ 25.0 × 1.5 mm<br>+ ≤ 3 cables Ø ≤ 14.0 mm |
| Copper pipe Ø 2 × 22 mm<br>+ 9 mm PE foam<br>+ 1 pipe PVC-U Ø ≤ 25.0<br>+ ≤ 2 cables Ø ≤ 21.0 mm |

# System NBR-plus

## 2.5 Thicknesses, sizes and spacing

| Dimensions | | | | |
|---|---|---|---|---|
| | Plasterboard wall and solid wall [mm] | Solid floor [mm] | CLT wall [mm] | CLT floor [mm] |
| Thickness of building element | ≥ 100 | ≥ 150 | ≥ 100 | ≥ 140 |
| Thickness of penetration seal | ≥ 100 | ≥ 150 | ≥ 100 | ≥ 140 |
| Distance to other penetration seals | ≥ 100 | ≥ 100 | ≥ 100 | ≥ 100 |
| Distance to other apertures or installations | ≥ 200 | ≥ 200 | ≥ 200 | ≥ 200 |

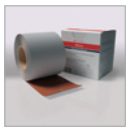
## 2.6 Initial supports

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

| Initial supports | Plasterboard wall, solid wall | Solid floor | CLT wall | CLT floor |
|---|---|---|---|---|
| Non-combustible pipes | ≤ 500 | ≤ 500 | ≤ 700 | ≤ 500 |
| Electrical installation conduits | ≤ 250 | ≤ 250 | – | – |
| speedpipes | ≤ 250 | ≤ 250 | – | – |
| HVAC split line combinations | ≤ 700 | ≤ 820 | – | – |
| | | | | All specifications in mm |

# System NBR-plus

## 3. Included products



**NBR-plus**
**fire protection wrap**

Roll, 5 m × 125 mm
(separable into 2 × 62.5 mm)
– Art. no. 0760150133
Roll, 10 m × 125 mm
(separable into 2 × 62.5 mm)
– Art. no. 01261941

**FLAMMOTECT-A**
**Filler**

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

**NOVASIT BM**
**Fire protection mortar**

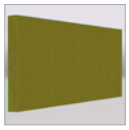
20 kg bag – Art. no. 01161000
10 kg pail – Art. no. 01161010

**GFM**
**Fire protection mortar**

25 kg bag – Art. no. 01167030

**DG-SC**

310 ml cartridge – Art. no. 01157100



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

Class of reaction to fire A1 in acc. with
EN 13501:1
Melting point ≥ 1000 °C
Thickness ≥ 50 mm

| Recommended products |
|---|
| Rockwool Hardrock® 040 |
| Rockwool RP-GF 70 |
| PAROC Pyrotech Slab 160 |

**Mineral wool**

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

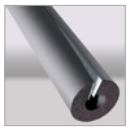
| Further recommended products |
|---|
| Knauf Insulation Power-teK LW STD |
| Rockwool ProRox LF 970 |

**General sealing material**

Dimensionally stable, non-combustible (class A1 or A2-s1,d0 in acc. with EN 13501-1) material such as concrete, cement mortar, gypsum mortar

**Lamella mat Klimarock**
in acc. with DIN EN 14303 and LE DE0628071802 of 13.07.2018
Class of fire behaviour in acc. with EN 13501-1: Class A1
Dimensions 610 × 50 cm, Thickness 30 mm
Roll, 3.05 m² – Art. no. 01187100
Other lamella mats, mineral fibre mats or pipe shells may be installed if they meet the following criteria:
EN 14303 bulk density ≥ 40 kg/m³
Fire behaviour class A1 in acc. with EN 13501-1
Thickness ≥ 30 mm

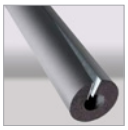
# System NBR-plus



**Section insulations made of flexible elastomeric foam (FEF)**
in acc. with EN 14304
Fire behaviour in acc. with EN 13501-1: B-s3, d0 or D-s1,d0

| Name | Declaration of Performance |
|---|---|
| Armalok 50 | Nr. 067-CPR-2021-104 in connection with ETA-20/0653 of 25.11.2020 |
| Armalok 100 | |
| ArmaFlex SE | 0543-CPR-2022-111 |
| ArmaFlex XG | 0543-CPR-2013-002 |
| AF/ArmaFlex | 0543-CPR-2016-001 |
| AF/ArmaFlex Evo | 0543-CPR-2020-101 |
| SH/ArmaFlex | 0543-CPR-2013-013 |
| NH/ArmaFlex | 0543-CPR-2013-015 |
| NH/ArmaFlex Smart | 0543-CPR-2020-102 |
| HT/ArmaFlex | 0543-CPR-2013-019 |
| ArmaFlex Ultima | 0543-CPR-2016-017 |
| Kaiflex HT s2 | DoP HT s2 01032021001 |
| Kaiflex KK | Kaiflex KK |
| Kaiflex KKplus s2 | DoP KKplus s2 01092021001 |
| Kaiflex KKplus s3 | DoP KKplus s3 PL092021001 |
| FLEXEN Heizungskautschuk s2 | LE_5258006015_00_M_flexen®_Heizungskautschuk_Plus |
| FLEXEN Kältekautschuk Plus s2 | LE_5258501006_00_S_flexen®_Kältekautschuk_Plus |
| isopren Plus | Isopren Plus 07052013001 |
| isopren Polar Plus | Isopren Polar Plus 07052013001 |
| K-FLEX ST | 01010104201-CPR-13, 01050104201-CPR-16, 01100104201-CPR-16, 01040104201-CPR-16 |
| K-FLEX ST PLUS | 02010104201-CPR-16, 02010304201-CPR-13, 02050104201-CPR-16, 02040104201-CPR-13 |
| K-FLEX ECO | 05010105201-CPR-13, 04050105201-CPR-13; 04100104201-CPR-18, 04040104201-CPR-18, 04060102201-CPR-18 |

| Name | Declaration of Performance |
|---|---|
| K-FLEX H | 04010105201-CPR-13, 04050105201-CPR-13, 04100104201-CPR-18, 04040104201-CPR-18, 04060102201-CPR-18 |
| Eurobatex | 01/20190610 |
| Eurobatex SC | 35/20220202 |
| Eurobatex High Technology | 19/20220914 |
| Eurobatex H | 06/20180903 |
| Eurobatex H Super | 09/20171201 |
| Eurobatex Glastec | 18/20200702 |



**Section insulations made of PEF**
in acc. with EN 14313
Fire behaviour in acc. with EN 13501-1: E

| Name | Declaration of Performance |
|---|---|
| KE KELIT LEXEL | DoP 001-113 |
| Würth FLEXEN PE | LE_0870609015_00_M_flexen®_PE-Stabil |
| Steinbacher Steinoflex 400 | DoP 140-04-02-0010-289.2 |
| Steinbacher Steinoflex 410 | DoP 140-04-02-0011-010.6 |

## 3.1 Declarations of Performance

The Declarations of Performance for the featured products are available for download on our website:
https://flamro.com/eu/downloads/

# System NBR-plus

## 4. Design

### 4.1 Fire resistance classes

System NBR-plus 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 |
| Solid wall | max. EI 120 |
| Solid floor | max. EI 120 |
| Timber wall (CLT) | max. EI 90 |
| Timber floor (CLT) | max. EI 90 |

### 4.2 Pipe end configurations

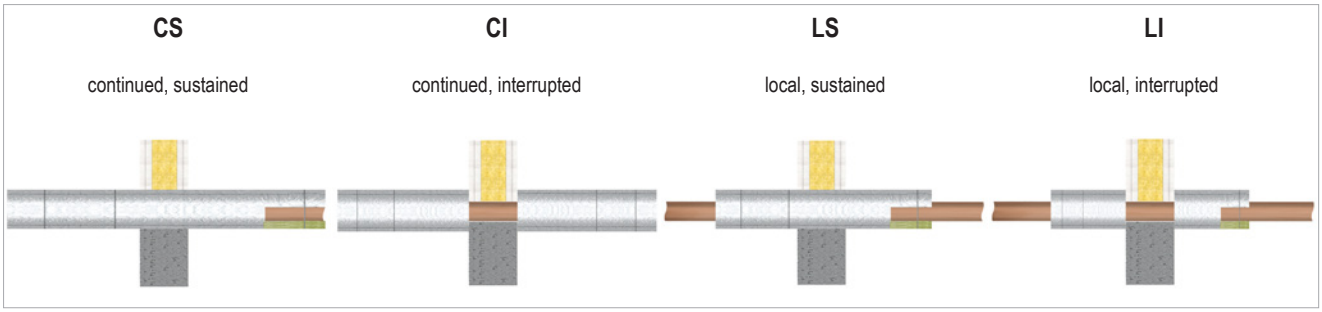
| Non-combustible pipes | | | | |
|---|---|---|---|---|
| tested | included configurations | | | |
| | U/U | U/C | C/U | C/C |
| U/U | ✓ | ✓ | ✓ | ✓ |
| U/C | – | ✓ | ✓ | ✓ |
| C/U | – | – | ✓ | ✓ |
| C/C | – | – | – | ✓ |

### 4.3 Annular gap

The annular gap is filled with FLAMMOTECT-A, DG-SC or general non-combustible sealing material such as concrete, cement mortar or gypsum mortar (Class A1 or A2-s1,d0 in acc. with EN 13501-1). Optionally the annular gap can be backfilled with loose mineral wool.

| Dimensions | | | | |
|---|---|---|---|---|
| | Plasterboard and solid wall [mm] | Solid floor [mm] | CLT wall [mm] | CLT floor [mm] |
| Annular gap width | ≤ 50 | ≤ 50 | ≤ 25 | ≤ 25 |
| Filling depth on each side | ≥ 25 | ≥ 25 | ≥ 20 | ≥ 20 |

### 4.4 Pipe insulation configurations

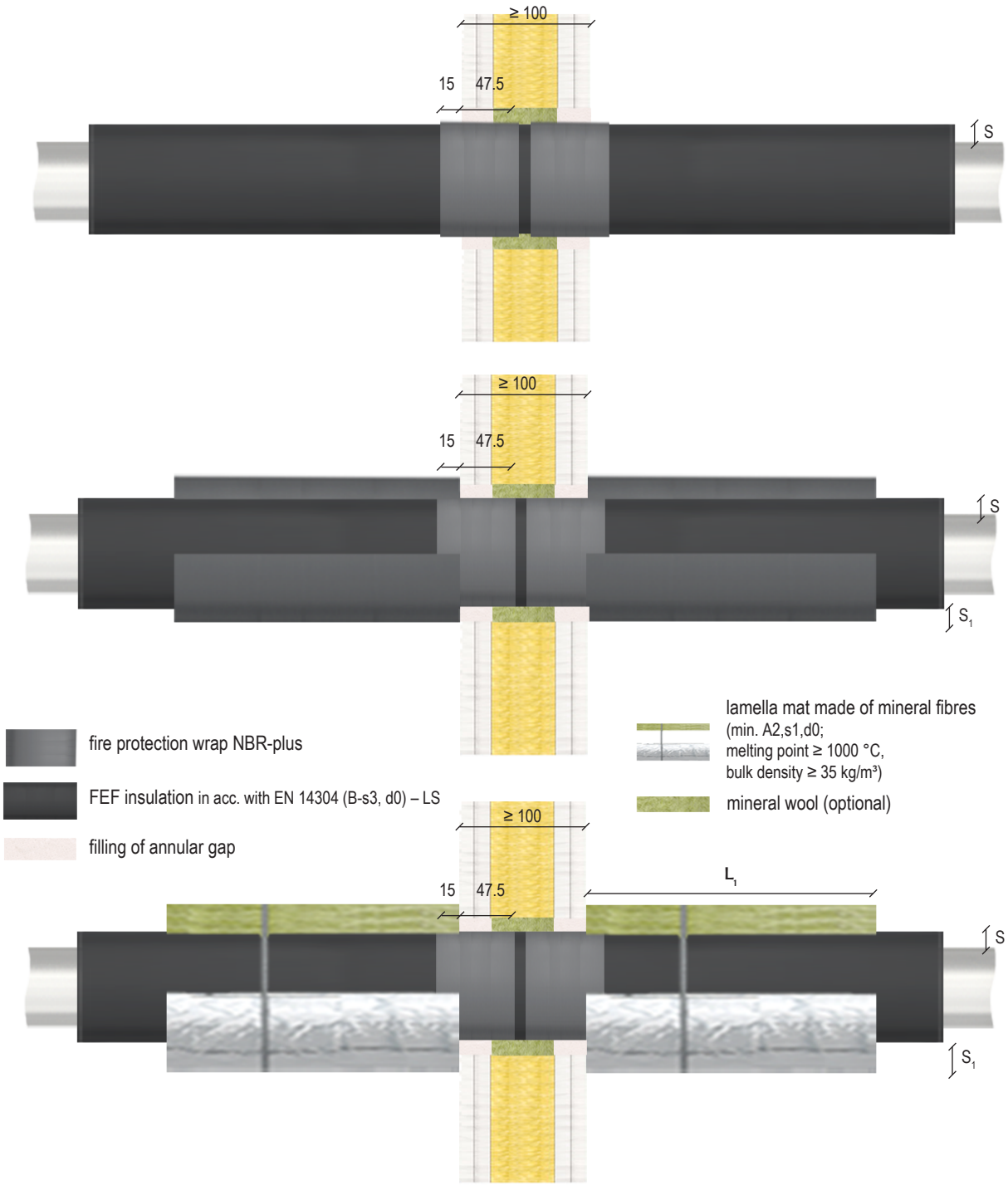



Results for LS insulation are also applicable to CS insulation.
Results for LI insulation are also applicable to CI insulation.

# System NBR-plus

5. Fire protection measures
5.1 Non-combustible pipes
5.1.1 Single penetrations in plasterboard walls

**Design with pipe insulation**




For building element and seal thicknesses see page 6. For filling the annular gap see page 9.

All specifications in mm

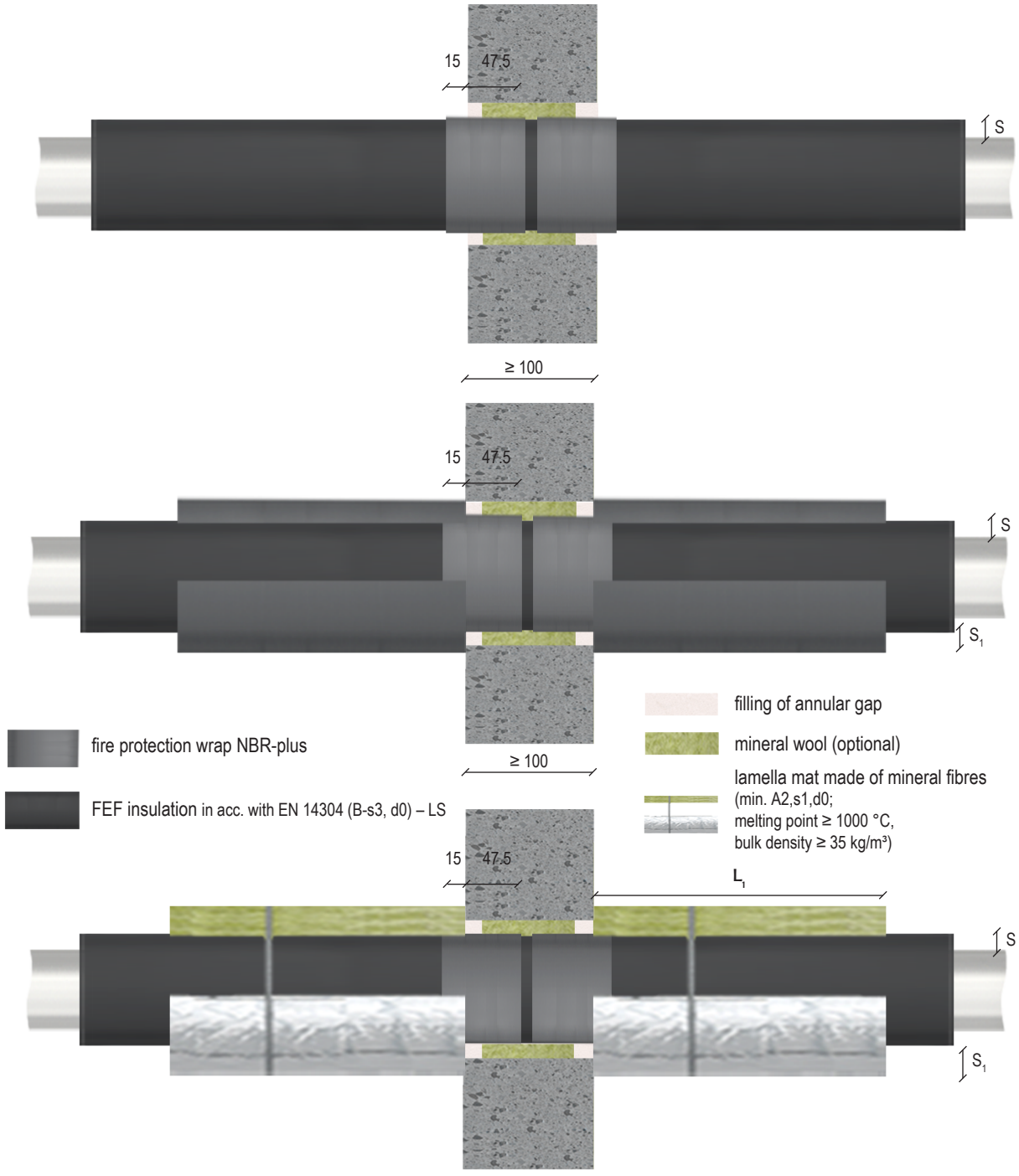
# System NBR-plus

| Pipe | | | FEF section insulation | Protective insulation | | | Fire protection wrap NBR-plus | Fire resistance class |
|---|---|---|---|---|---|---|---|---|
| Material | Outer diameter [mm] | Wall thickness [mm] | Insulation thickness S [mm] | Type | Insulation length $L_1$ [mm] | Insulation thickness $S_1$ [mm] | Number of layers | |
| 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 – ≤ 54.0 | | 19.0–38.0 | | | | 2 | |
| | > 54.0 – ≤ 88.9 | 1.5–14.2 | 25.0 | | | | 2 | |
| Steel, stainless 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 | |
| Copper, steel, stainless steel, cast iron | ≤ 42.0 | 0.8–14.2 | 10.0 | – | – | – | 1 | EI 90 C/U |
| | > 42.0 – ≤ 88.9 | 1.2–14.2 | 19.0–38.0 | | | | 2 | |
| Steel, stainless steel, cast iron | > 219.1 – ≤ 323.9 | 4.0–14.2 | 39.0–48.0 | lamella mat | 500 | 30 | 2 | EI 60 C/U |

# System NBR-plus

## 5.1.2 Single penetrations in solid walls

**Design with pipe insulation**




For building element and seal thicknesses see page 6. For filling the annular gap see page 9.

All specifications in mm

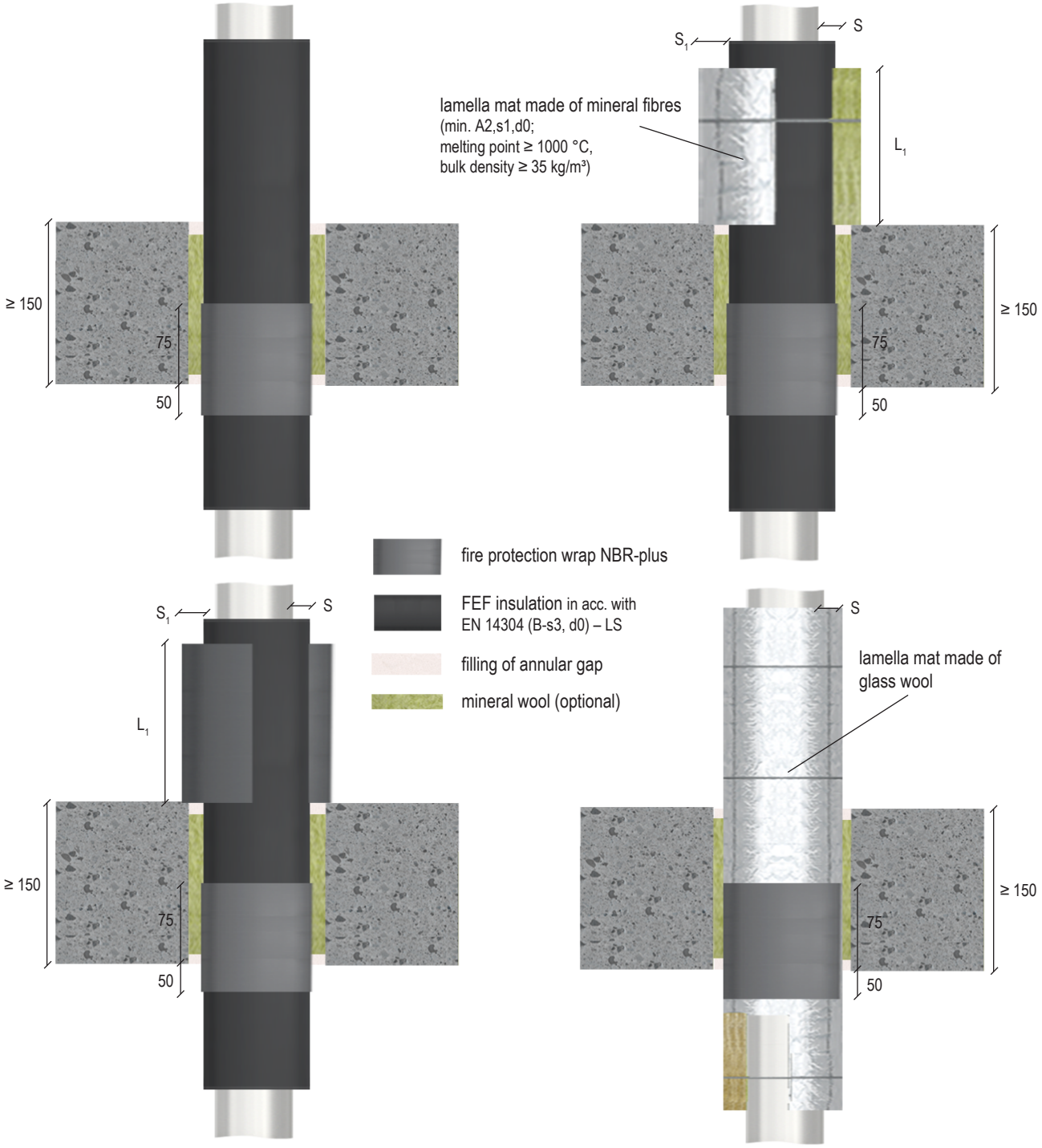
# System NBR-plus

| Pipe | | | FEF section insulation | Protective insulation | | | Fire protection wrap NBR-plus | Fire resistance class |
|---|---|---|---|---|---|---|---|---|
| Material | Outer diameter [mm] | Wall thickness [mm] | Insulation thickness S [mm] | Type | Insulation length $L_1$ [mm] | Insulation thickness $S_1$ [mm] | Number of layers | |
| Steel, stainless steel, cast iron | ≤ 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** |
| | ≤ 114.3 | 3.2–14.2 | 19.0 | – | – | – | 2 | **EI 90 C/U** |
| | ≤ 114.3 | 3.2–14.2 | 19.0–25.0 | | | | 2 | **EI 60 C/U** |
| | ≤ 168.3 | 4.0–14.2 | 25.0 | | | | 2 | **EI 60 C/U** |
| | | | 50.0 | | | | 3 | **EI 60 C/U** |

# System NBR-plus

## 5.1.3 Single penetrations in solid floors

**Design with pipe insulation**




For building element and seal thicknesses see page 6. For filling the annular gap see page 9.

All specifications in mm

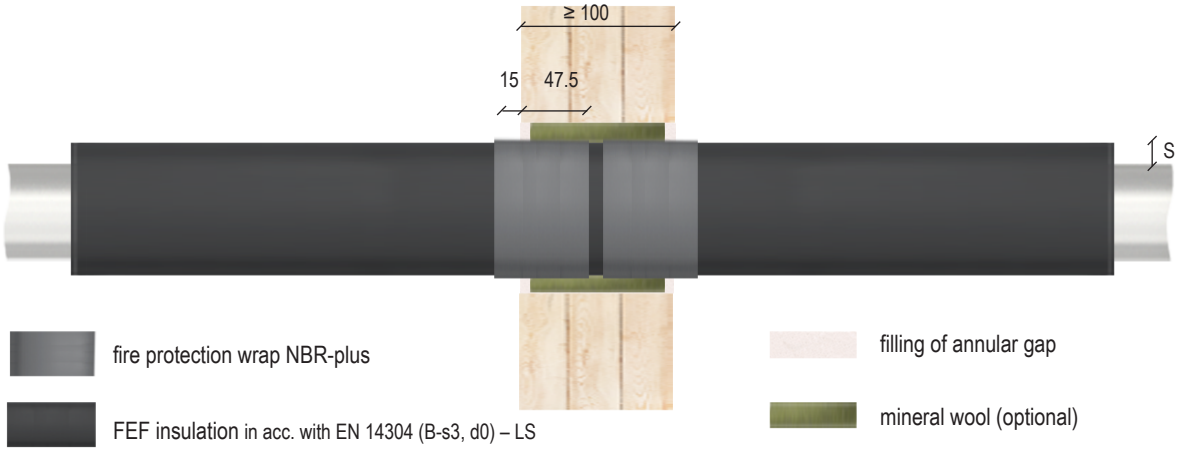
# System NBR-plus

| Pipe | | | Section insulation | | Protective insulation | | | Fire protection wrap NBR-plus | Fire resistance class |
|---|---|---|---|---|---|---|---|---|---|
| Material | Outer diameter [mm] | Wall thickness [mm] | Type | Insulation thickness S [mm] | Type | Insulation length $L_1$ [mm] | Insulation thickness $S_1$ [mm] | Number of layers | |
| Copper, steel, stainless steel, cast iron | ≤ 60 | 0.6–14.2 | FEF | 13.0–40.0 | – | – | – | 2 | EI 120 C/U |
| | > 60.0 – ≤ 88.9 | 1.5–14.2 | | 25.0 | – | – | – | 2 | |
| | ≤ 54.0 | | glass wool | 20.0–50.0 | – | – | – | 2 | |
| | ≤ 88.9 | 2.0–14.2 | | 40.0 | – | – | – | 2 | |
| | | | | 80.0 | – | – | – | 3 | |
| | | | | 100.0 | – | – | – | 4 | |
| Steel, stainless steel, cast iron | ≤ 108.0 | 2.0–14.2 | FEF | 19.0–39.0 | – | – | – | 2 | |
| | ≤ 219.1 | 4.5–14.2 | | 19.0–26.0 | lamella mat | 500 | 60 | 2 | |
| | ≤ 273.0 | 5.0–14.2 | | 25.0–26.0 | | 750 | 60 | 2 | |
| | ≤ 323.9 | 5.6–14.2 | | 25.0 | FEF | 750 | 60 | 2 | |
| | | | | 25.0–50.0 | | | | 3 | |
| 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 – ≤ 88.9 | 1.5–14.2 | | 19.0–38.0 | – | – | – | 2 | |
| Steel, stainless steel, cast iron | ≤ 114.3 | 3.2–14.2 | | 13.0–40.0 | – | – | – | 2 | |
| | ≤ 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 | 4.5–15.2 | glass wool | 60.0 | – | – | – | 3 | |
| | ≤ 323.9 | 5.6–14.2 | | 100.0 | – | – | – | 4 | |

# System NBR-plus

## 5.1.4 Single penetrations in timber walls

**Design with pipe insulation**




For building element and seal thicknesses see page 6. For filling the annular gap see page 9. All specifications in mm

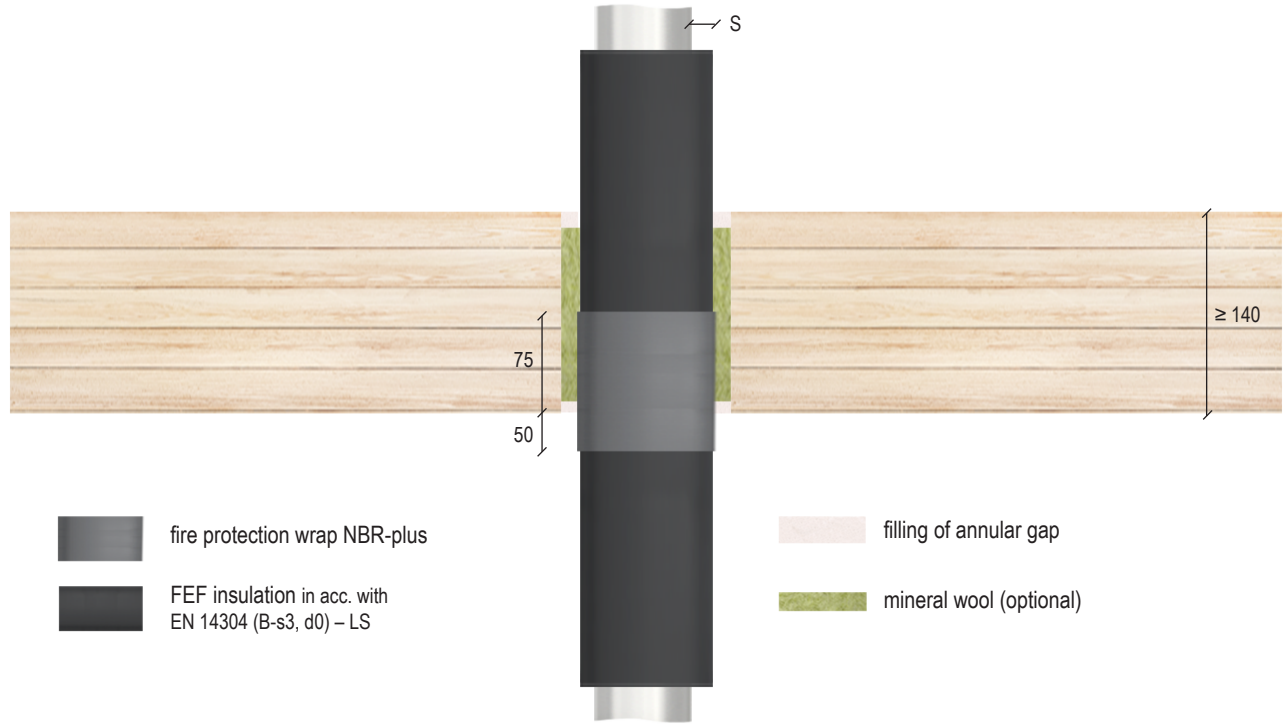
**Non-combustible pipes with section insulation made of FEF**

| Pipe | | | Section insulation | Fire protection wrap NBR-plus | Fire resistance class |
|---|---|---|---|---|---|
| Material | Outer diameter [mm] | Wall thickness [mm] | Insulation thickness S [mm] | Number of layers | |
| Copper, steel, stainless steel, cast iron | ≤ 28.0 | 1.0–14.2 | 9.0–19.0 | 2 | **EI 90 C/U** |
| | ≤ 60.0 | 0.6–14.2 | 9.0–21.0 | 2 | **EI 60 C/U** |
| Steel, stainless steel, cast iron | ≤ 110.0 | 1.0–14.2 | 9.0–23.0 | 2 | |

# System NBR-plus

## 5.1.5 Single penetrations in timber floors

**Design with pipe insulation**




For building element and seal thicknesses see page 6. For filling the annular gap see page 9.

All specifications in mm

**Non-combustible pipes with section insulation made of FEF**

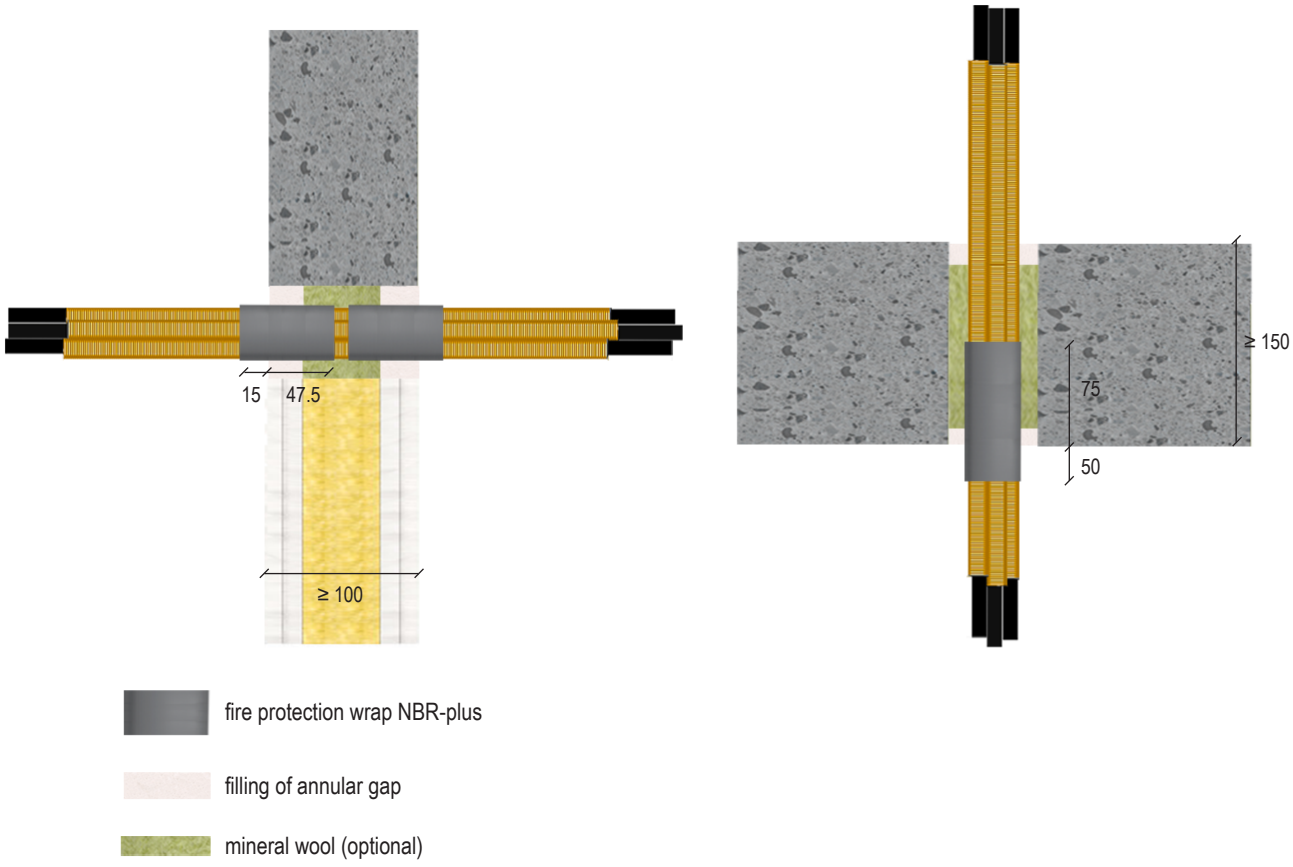
| Pipe | | | Section insulation | Fire protection wrap NBR-plus | Fire resistance class |
|---|---|---|---|---|---|
| Material | Outer diameter [mm] | Wall thickness [mm] | Insulation thickness S [mm] | Number of layers | |
| Copper, steel, stainless steel, cast iron | ≤ 54.0 | 1.0–14.2 | 9.0–21.0 | 2 | **EI 90 C/U** |
| Steel, stainless steel, cast iron | > 54.0 – ≤ 110.0 | | 23.0 | 2 | **EI 90 C/U** |
| | ≤ 110.0 | | 9.0–23.0 | 2 | **EI 60 C/U** |

# System NBR-plus

## 5.2 Electrical installation conduits

Electrical installation conduits can be installed with or without cables (cable Ø ≤ 21 mm).

**Design for wall and floor penetration seals**




For building element and seal thicknesses see page 6. For filling the annular gap see page 9. All specifications in mm

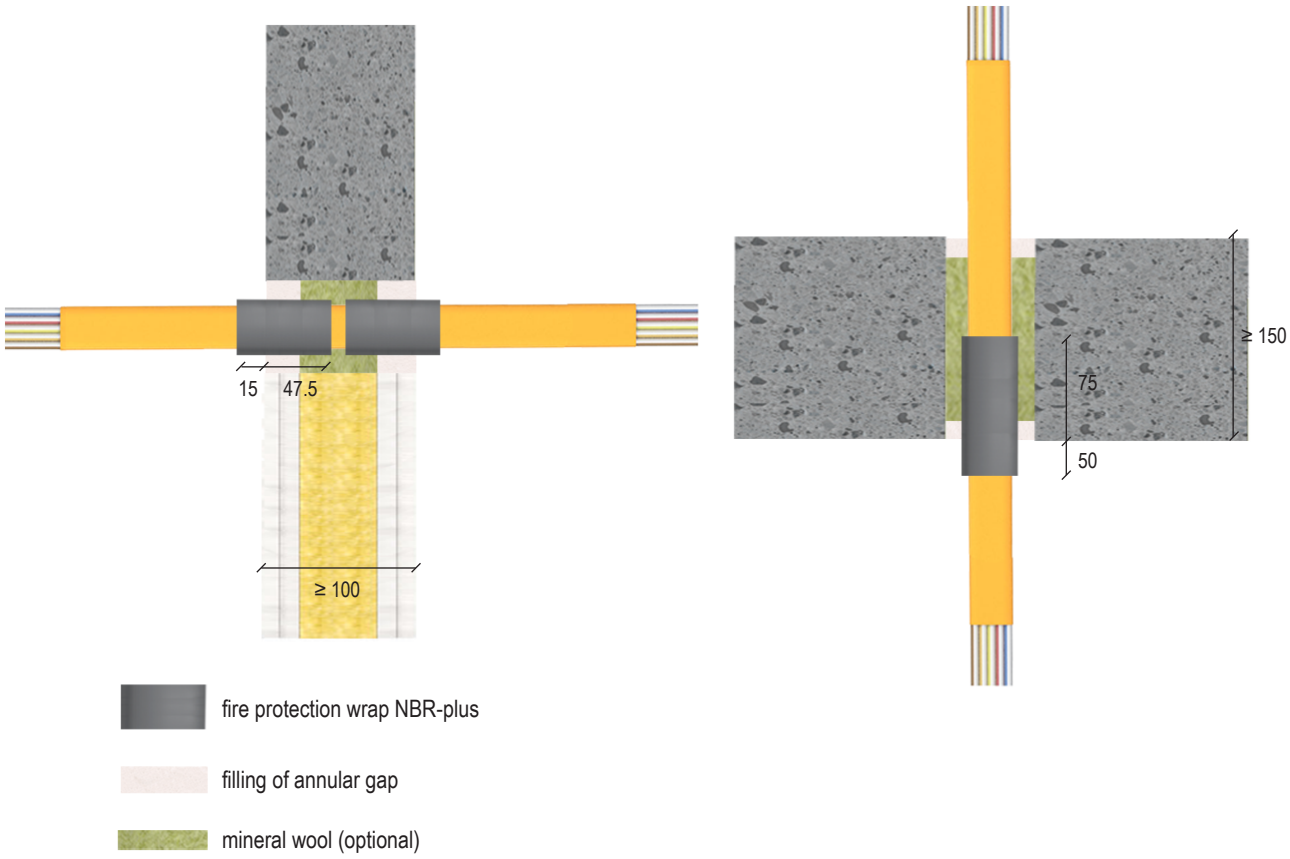
**Electrical installation conduits made of plastic**

| Configuration | Outer diameter [mm] | Fire protection wrap NBR-plus | Fire resistance class | |
|---|---|---|---|---|
| | | Number of layers | Wall | Floor |
| Single | ≤ 32.0 | 1 | **EI 120 U/U** | **EI 120 U/U** |
| | ≤ 63.0 | 2 | | |
| Bundled (single Ø ≤ 32 mm) | ≤ 100.0 | 2 | | |
| Multiple linear penetration | ≤ 3 × ≤ 32 | 1 | | |

# System NBR-plus

## 5.3 speedpipes

**Design for wall and floor penetration seals**




For building element and seal thicknesses see page 6. For filling the annular gap see page 9. All specifications in mm

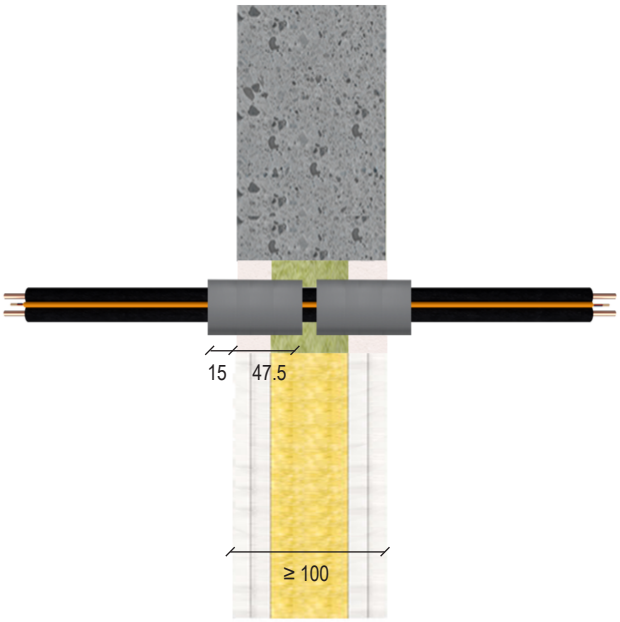
**speedpipes**

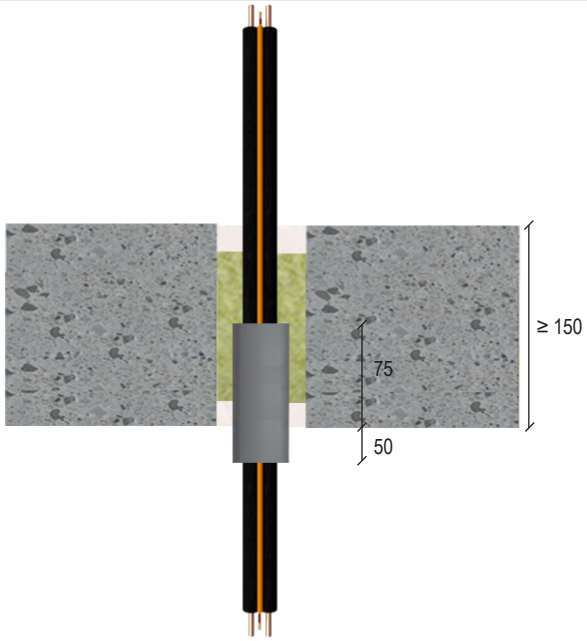
| Configuration | Outer diameter [mm] | Fire protection wrap NBR-plus | Fire resistance class | |
|---|---|---|---|---|
| | | Number of layers | Wall | Floor |
| Single | ≤ 14.0 | 1 | EI 120 U/U | EI 120 U/U |
| Bundled | ≤ 50.0 | 1 | | |

# System NBR-plus

## 5.4 HVAC split line combinations

**Design for wall and floor penetration seals**



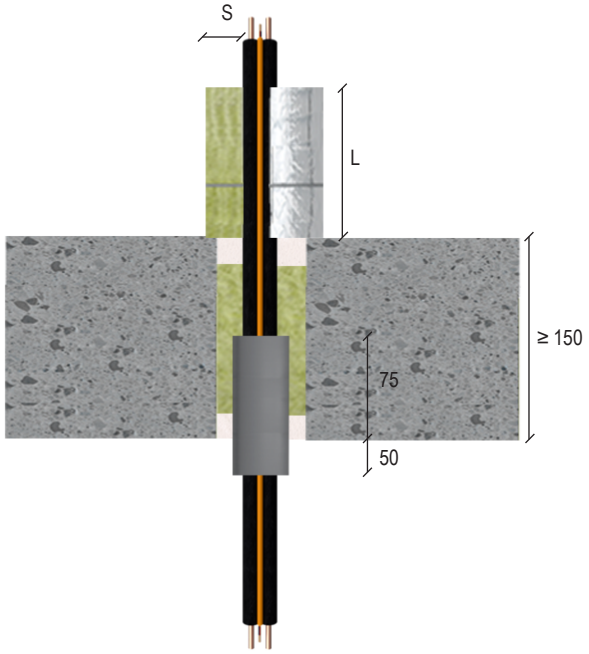

fire protection wrap NBR-plus



filling of annular gap

mineral wool (optional)

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 6. For filling the annular gap see pag 9.

All specifications in mm

# System NBR-plus

| HVAC split line combinations | | | | | |
|---|---|---|---|---|---|
| Configuration | Fire protection wrap NBR-plus | Protective insulation made of lamella mat | | Fire resistance class | |
| | Number of layers | Length L [mm] | Thickness S [mm] | Wall | Floor |
| Copper pipe Ø 2 × 18 mm<br>+ 9 mm PE foam<br>+ 1 pipe PVC-U/PVC-C Ø ≤ 25.0 × 1.5 mm<br>+ ≤ 3 cables Ø ≤ 14.0 mm | 2 | – | – | **EI 120** | **EI 120** |
| Copper pipe Ø 2 × 22 mm<br>+ 9 mm PE foam<br>+ 1 pipe PVC-U Ø ≤ 25.0<br>+ ≤ 2 cables Ø ≤ 21.0 mm | 2 | 250 | 30 | **–** | **EI 90** |

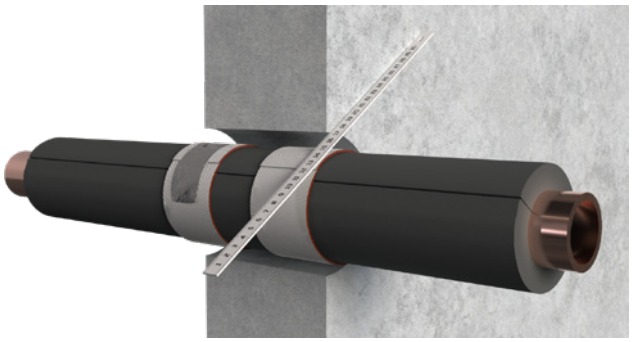
# System NBR-plus

## 6. Installation steps

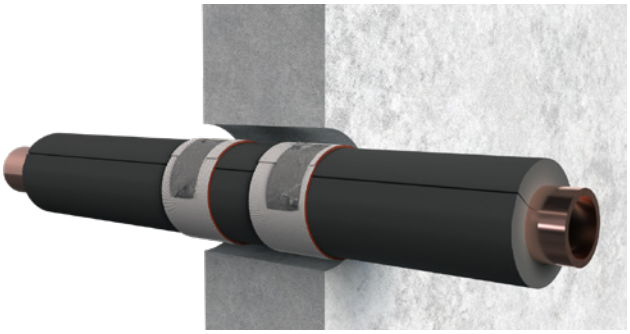
### 6.1 Wall installation

1. The fire protection wrap is pre-slit lengthwise. Cut wrap to length and separate it with a cutter knife or scissors along the pre-cut line in the middle.

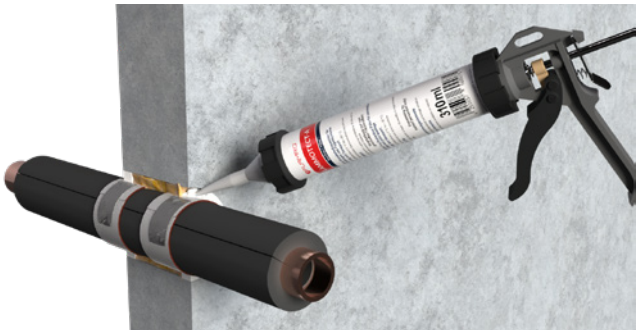
2. Insert the wrap halves on each side of the wall in such a way that 15 mm (rule width) protrude from the building element.



3. Fasten the wrap with adhesive tape.



4. Seal the annular gap, for example with:
   – GFM Brandschutzmörtel, NOVASIT BM, concrete, cement mortar or gypsum
   – mineral wool + FLAMMOTECT-A or DG-SC.



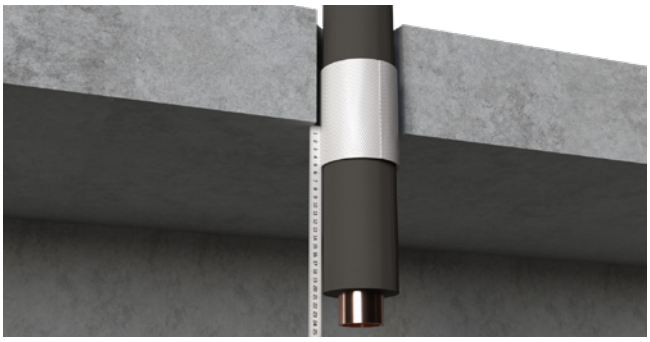
5. If required, label the penetration seal. Fill out the label neatly and attach it firmly next to/above (not on) the penetration seal.

# System NBR-plus

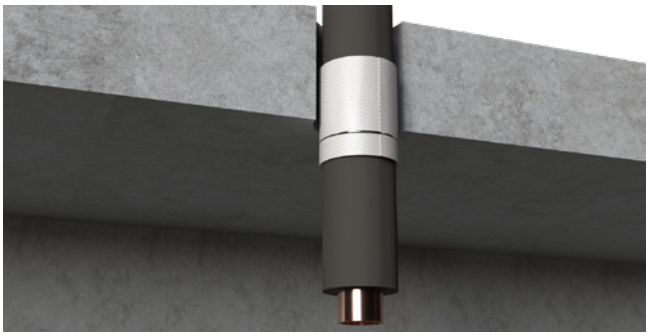
## 6.2 Floor installation

1. When installing in floors, do not separate the wrap.

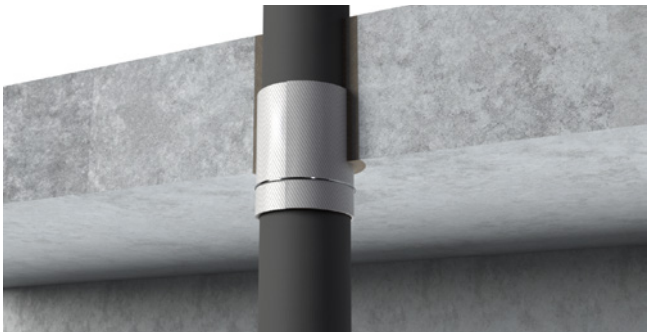
2. Install one full width wrap on the underside of the floor in such a way that 50 mm protrude from the building element.
It is not necessary to install a wrap on the upper side of the floor.



3. Fasten the wrap with at least one piece of winding wire (s ≥ 0.6 mm) below the floor.



4. Seal the annular gap, for example with:
– GFM fire protection mortar, NOVASIT BM, FLAMMOTECT-A, DG-SC, concrete, cement mortar or gypsum.



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