



ETA-Danmark A/S  
Göteborg Plads 1  
DK-2150 Nordhavn  
Tel. +45 72 24 59 00  
Internet [www.etadanmark.dk](http://www.etadanmark.dk)

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- 25/0503 of 2025/05/30

### I General Part

#### Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the  
construction product:

FireFree Brandlukningssystem

Product family to which the  
above construction product  
belongs:

Ablative fire stopping product used in penetration seals

Manufacturer:

Scandi Supply A/S  
Energivej 2,  
DK-5492 Vissenbjerg,  
Internet [www.scandisupply.dk](http://www.scandisupply.dk)

Manufacturing plant:

Plant LEI

This European Technical  
Assessment contains:

186 pages including 178 annexes which form an  
integral part of the document

This European Technical  
Assessment is issued in  
accordance with Regulation  
(EU) No 305/2011, on the  
basis of:

EAD 350454-00-1104:  
Fire stopping and fire sealing products - Penetration  
seals

This version replaces:

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## II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

### 1 Technical description of product

The construction product FireFree Brandlukningssystem is an ablative coating material. It is delivered as a filler of white colour and form on the surfaces to be protected layers which, when exposed to fire, consume energy or release matter through chemical or physical processes. In the process, they remain sufficiently stable and prevent the passage of heat, flame and/or smoke.

Detailed specifications for identification and performance criteria relevant for fire safety with regard to the construction products are given in the annexes.

#### NOTE:

The characteristics listed can serve both for identifying the construction products as well as for performing the manufacturer's factory production control.

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

The construction products FireFree Brandlukningssystem is intended for use as components with a fire protection effect in building elements, assembled systems or constructions that are subject to requirements related to fire protection. Their reactive effect prevents heat transmission and fire spreading in the event of fire.

Within the scope of this ETA, the fire resistance was demonstrated for mixed or cable penetration seals which consisted of the components listed in table 1. Mixed or cable penetration seals are used to seal off openings in fire resistant walls or floors, which are penetrated by cables and/or pipes, and serves to preserve the walls' or floors' fire resistance in the area of the penetrations.

| Product type        | Trade name                                                                                                                                                                  |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ablative coating    | FireFree Brandlukningssystem                                                                                                                                                |
| Mineral fibreboards | Mineral fibre board in accordance with EN 13162 thickness $\geq 50$ mm density $150 \text{ kg/m}^3$ Reaction to fire classification in accordance with EN 13501-1: Class A1 |

| Product type                   | Trade name                                                                                                                                                                                                                                                                                     |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mineral fibre mats             | Mineral fibre lamella mat in accordance with EN 14303<br>Reaction to fire class acc. to EN 13501-1: A2-s1, d0 or A1<br>Bulk density: $\geq 35 \text{ kg/m}^3$<br>Melting point: $\geq 1000^\circ\text{C}$                                                                                      |
| Mineral fibre pipe shells      | pipe shell of concentrically wrapped rockwool – unbacked in accordance with EN 14303<br>density: $100 \text{ kg/m}^3 - 120 \text{ kg/m}^3$<br>Reaction to fire class acc. to EN 13501-1: A2-s1, d0 or A1<br>Bulk density: $\geq 80 \text{ kg/m}^3$<br>Melting point: $\geq 1000^\circ\text{C}$ |
| FEF-Insulation                 | Insulation made of flexible elastomeric foam (FEF) in accordance with EN 14304<br>Reaction to fire class acc. to EN 13501-1: B-s3, d0                                                                                                                                                          |
| Mineral wool, loose stone wool | rockwool with grid strengthened and aluminium foil according to the general building supervisory board approval Z-23.14-1115 density: $40 \text{ kg/m}^3 - 50 \text{ kg/m}^3$<br>Reaction to fire class acc. to EN 13501-1: A1<br>Melting point: $\geq 1000^\circ\text{C}$                     |

Table 1 – components of the verified penetration seals

Detailed information and data on the verified penetration seals are given in the annexes. The performances given in Section 3 exclusively relate to this penetration seals (e.g. with respect to the design and arrangement of the components of the penetration seals and the type and position of the services).

The provisions made in this European Technical Assessment are based on an assumed working life of the FireFree Brandlukningssystem of at least 10 years, provided that the installation systems products are subject to appropriate installation.

The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer or the 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                                                                                  |
|----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <b>3.2 Safety in case of fire (BWR 2)</b>                |                                                                                                               |
| Reaction to fire                                         | The product classified as <b>Euroclass E</b> in accordance with EN 13501-1 and delegated regulation 2016/364. |
| Resistance to fire                                       | Classified in accordance with EN 13501-2, <b>see annexes 1 – 177 for details</b>                              |
| <b>3.3 Hygiene, health and the environment (BWR 3)</b>   |                                                                                                               |
| Air permeability                                         | <b>No performance assessed</b>                                                                                |
| Water permeability                                       | <b>No performance assessed</b>                                                                                |
| Content, emission and/or release of dangerous substances | <b>No performance assessed</b>                                                                                |
| <b>3.4 Safety and accessibility in use (BWR 4)</b>       |                                                                                                               |
| Mechanical resistance and stability                      | <b>No performance assessed</b>                                                                                |
| Resistance to impact/movement                            | <b>No performance assessed</b>                                                                                |
| Adhesion                                                 | <b>No performance assessed</b>                                                                                |
| Durability                                               | <b>Use category X</b>                                                                                         |
| <b>3.5 Protection against noise (BWR 5)</b>              |                                                                                                               |
| Airborne sound insulation                                | <b>No performance assessed</b>                                                                                |
| <b>3.6 Energy economy and heat retention (BWR 6)</b>     |                                                                                                               |
| Thermal properties                                       | <b>No performance assessed</b>                                                                                |
| Water vapour permeability                                | <b>No performance assessed</b>                                                                                |

See additional information in Chapter 3.7-3.8

### **3.7 Methods of verification**

The assessment of the performance of FireFree Brandlukningssystem is in relation to the applicable BWR's has been made in accordance with the European Assessment Document (EAD) no. EAD 350454-00-1104: Fire stopping and fire sealing products - Penetration seals, as an ablative coating.

### **3.8 General aspects related to the fitness for use of the product.**

The verification of durability is part of testing the essential characteristics. The ablative coating FireFree Brandlukningssystem may be used in end-use applications according to the provisions for use category X (external use) without expecting significant changes of the characteristics relevant for fire protection. Products that meet requirements for type X, meet the requirement for all other types.

If the ablative coating according to this ETA is to be exposed to specific stresses, further tests are necessary.

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.

The FireFree Brandlukningssystem 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 Assessment 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 as amended by 2001/596/EC, the system(s) of assessment and verification of constancy of performance (see Annex III to Regulation (EU) No 305/2011) is **1**.

#### **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 2025-05-30 by



Thomas Bruun  
Managing Director, ETA-Danmark

Penetration sealing system made of mineral wool and ablative filler (≥ 3,0 mm dft)

Empty seal

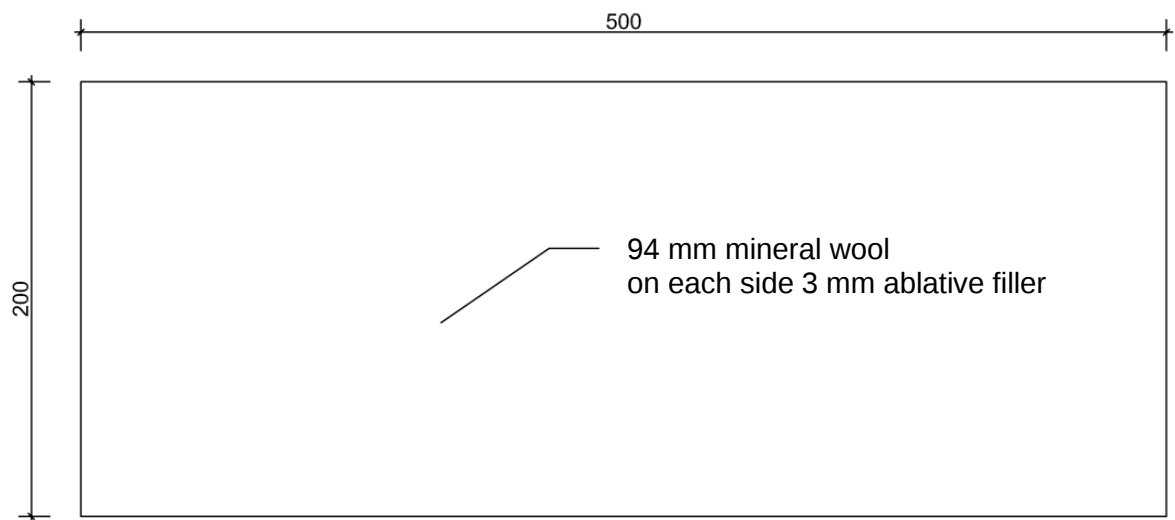
Mixed penetration seal “ES”

lightweight partition wall, thickness 100 mm

rectangular penetration seal w x h = 500 mm x 200 mm, no aperture framing, seal depth 100 mm

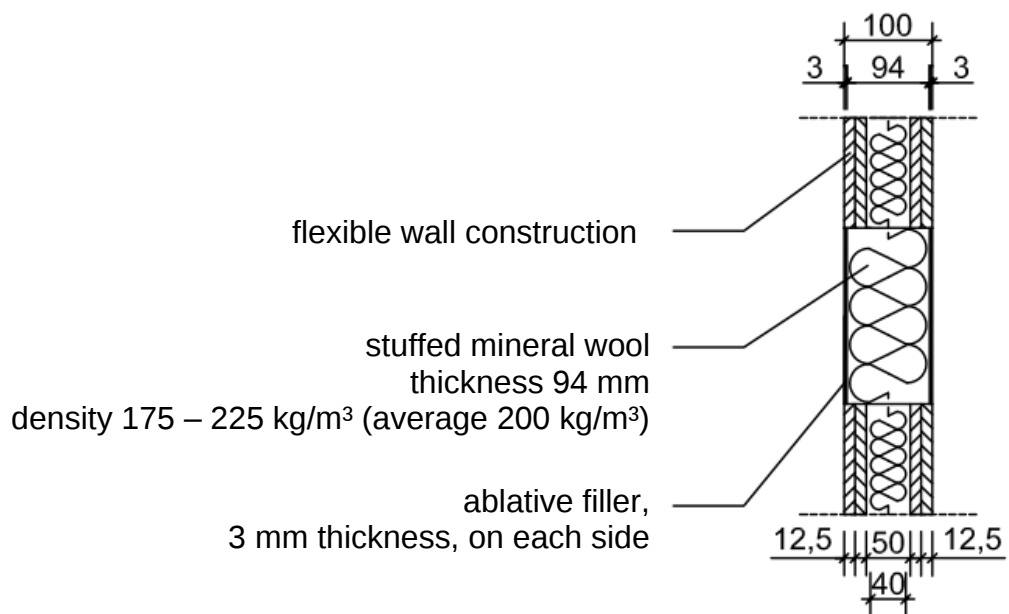
View penetration seal ES No. 1

blank penetration seal



Section view penetration seal ES No. 1

Blank penetration seal



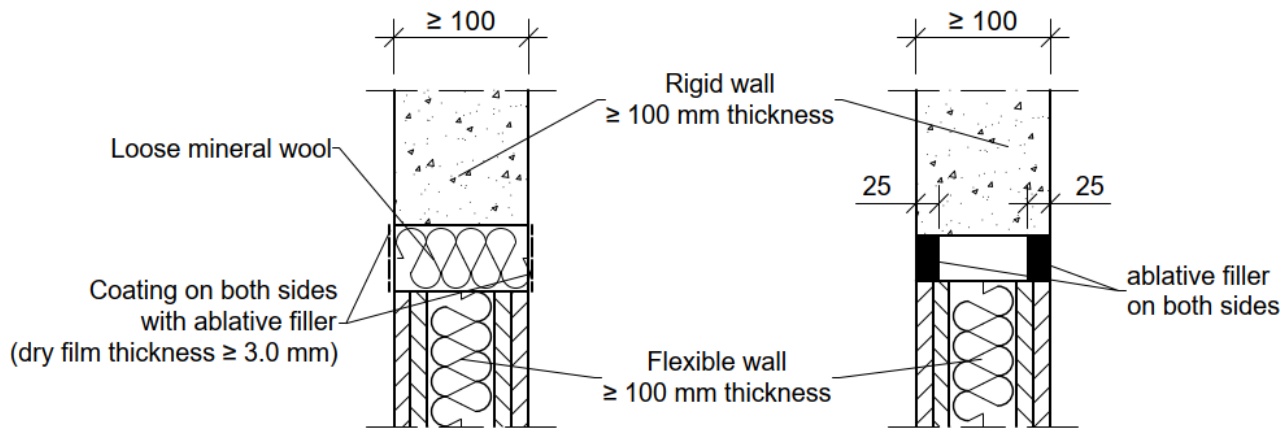
Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| FireFree Brandlukningssystem                                                            | Annex 1 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

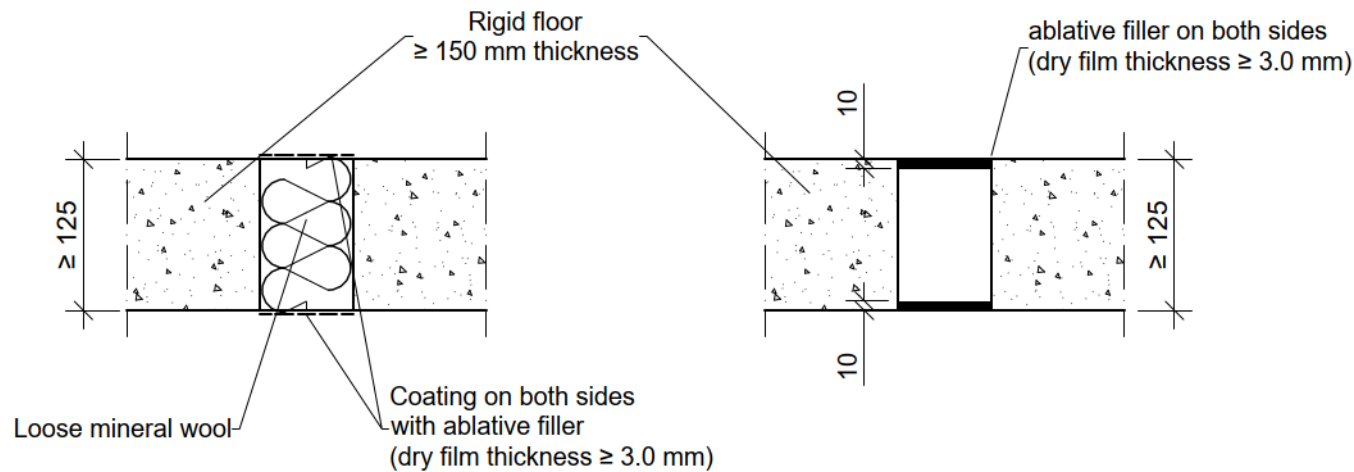
Penetration sealing system made of mineral wool and ablative filler (≥ 3,0 mm dft)

Design variants

Wall

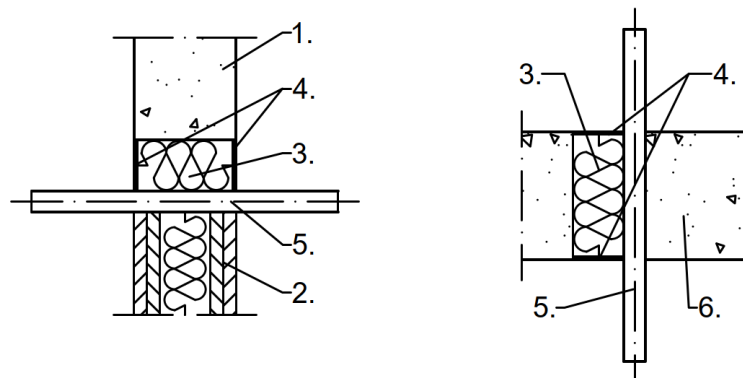


Floor

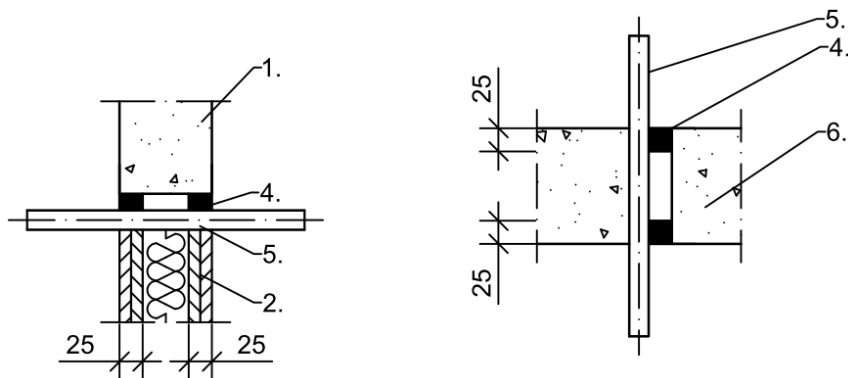


Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| FireFree Brandlukningssystem                                                            | Annex 2 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)****Cables  $\varnothing \leq 21$  mm or cable bundles  $\varnothing \leq 100$  mm with cables  $\leq 21$  mm without measures**

| Fire resistance classes                                          |          |                               |                                |
|------------------------------------------------------------------|----------|-------------------------------|--------------------------------|
| Service                                                          | Measures | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles</b>                                     |          |                               |                                |
| Cables $\varnothing \leq 21$ mm                                  | -        | EI 90                         | EI 90                          |
| Cable bundles $\varnothing \leq 100$ mm with cables $\leq 21$ mm | -        | EI 90                         | EI 90                          |

**Cables****Single penetration without backfilling material, cables  $\varnothing \leq 21$  mm, with ablative filler**

| Fire resistance classes         |                                   |                               |                                |
|---------------------------------|-----------------------------------|-------------------------------|--------------------------------|
| Service                         | Measures                          | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables</b>                   |                                   |                               |                                |
| Cables $\varnothing \leq 21$ mm | Ablative filler, dft $\geq 25$ mm | EI 90                         | EI 90                          |
|                                 | Ablative filler, dft $\geq 3$ mm  | -                             | EI 90                          |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Loose mineral wool

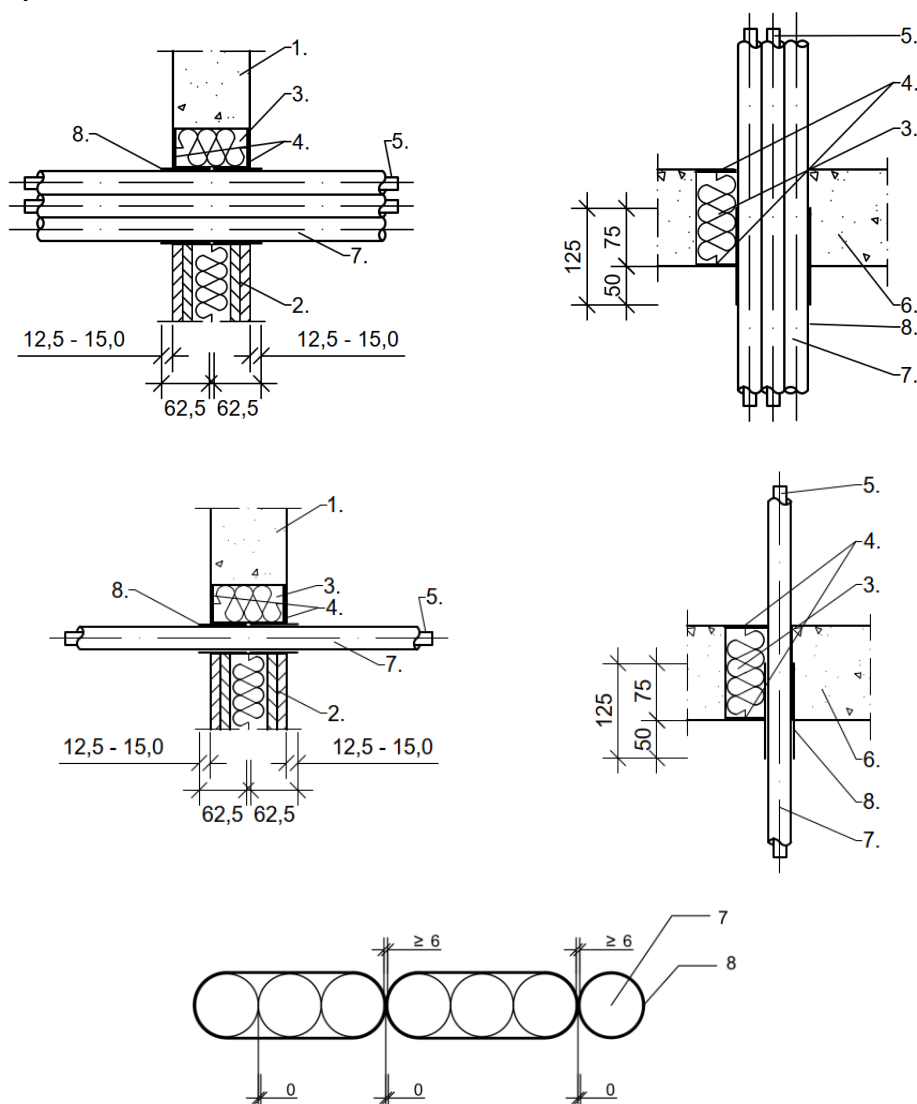
4. Ablative filler  $\geq 3$  mm resp.  $\geq 25$  mm
5. Cable
6. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 3 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)**

**Plastic conduits  $\varnothing \leq 32$  mm or bundles  $\varnothing \leq 100$  mm of conduits  $\varnothing \leq 32$  mm with or without cables  $\leq 21$  mm with intumescent wrap**



| Fire resistance classes                         |               |                                                       |                               |                                |
|-------------------------------------------------|---------------|-------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                         | Cable         | Measures                                              | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Electrical installation conduits (EIC)</b>   |               |                                                       |                               |                                |
| EIC made of plastic $\varnothing \leq 32$       | with/ without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 layer  | EI 120 U/U                    | EI 120 U/U                     |
| EIC made plastic bundle $\varnothing \leq 100$  | with/ without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers | EI 120 U/U                    | EI 120 U/U                     |
| Linear arrangement of plastic EIC $\leq 3$ pcs. | with/ without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 layer  | EI 120 U/U                    | EI 120 U/U                     |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Loose mineral wool
4. Ablative filler  $\geq 3$  mm

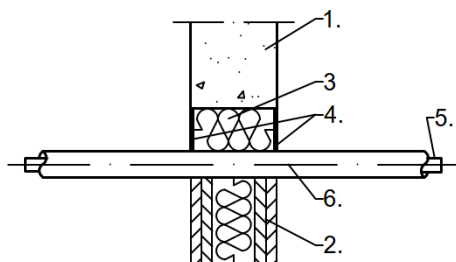
5. Cable
6. Rigid floor  $\geq 150$  mm thickness
7. Electric installation conduits
8. Intumescent wrap

Dimensions in mm

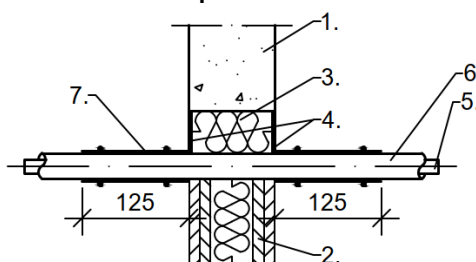
|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| <b>FireFree Brandlückungssystem</b>                                                     | Annex 4 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)**

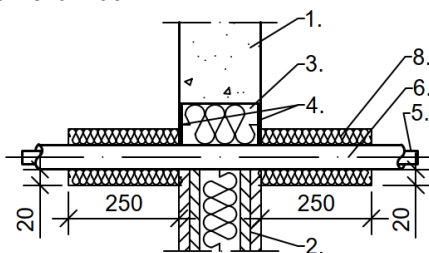
**Metal conduits  $\varnothing \leq 16$  mm -  $\varnothing \leq 32$  mm, rigid, with or without cables  $\leq 14$  mm or  $\varnothing 32$  mm -  $\leq 50$  mm with or without cables  $\varnothing \leq 21$  mm - no measures**



**Metal conduits  $\leq 16$  mm, rigid, with or without cables  $\leq 14$  mm or  $> \varnothing 32$  mm -  $\leq 50$  mm with or without cables  $\varnothing \leq 21$  mm - with intumescent wrap**



**Metal conduits  $\varnothing \leq 32$  mm, rigid, with or without cables  $\leq 14$  mm or  $> \varnothing 32$  mm -  $\leq 50$  mm with or without cables  $\varnothing \leq 21$  mm - with lamella mat**



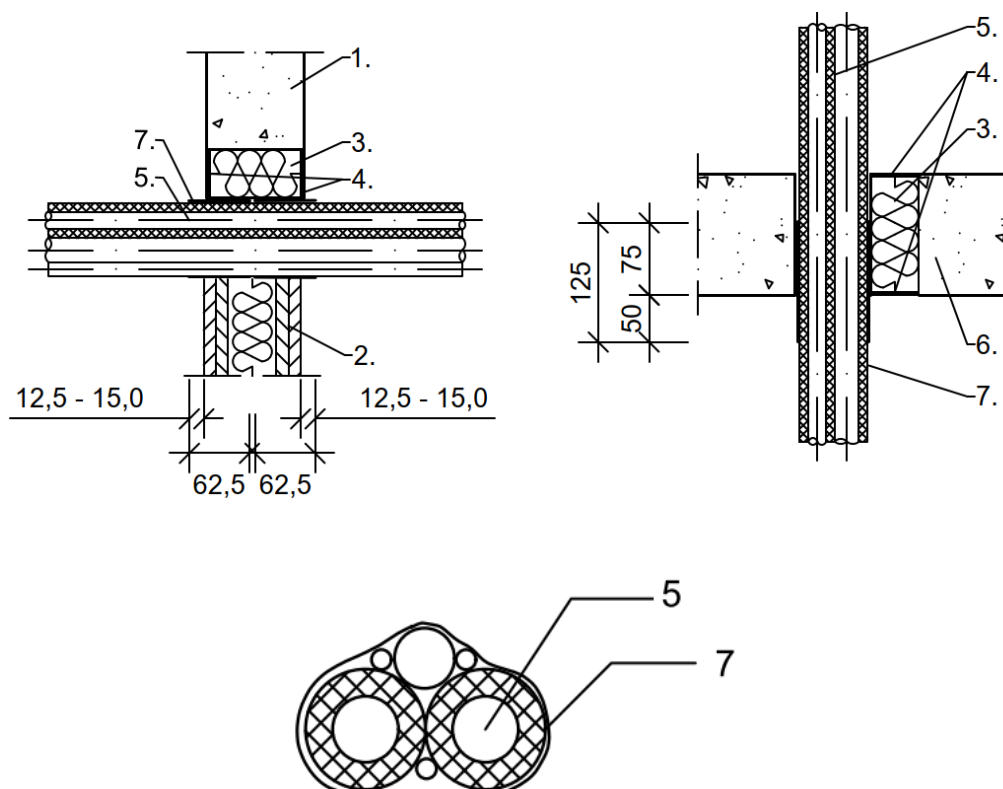
| Fire resistance classes                |               |                    |                                                          |                               |                                |
|----------------------------------------|---------------|--------------------|----------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                |               | Cable              | Measures                                                 | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Electrical installation conduits (EIC) |               |                    |                                                          |                               |                                |
| EIC made of metal                      | Ø ≤ 16        | with/ without ≤ 14 | -                                                        | EI 120 U/C                    | -                              |
|                                        | Ø > 16 - ≤ 32 | with/ without ≤ 14 | -                                                        | EI 30 / E 120 U/C             | -                              |
|                                        | Ø > 32 - ≤ 50 | with/ without ≤ 21 | -                                                        | EI 30 / E 120 U/C             | -                              |
|                                        | Ø ≤ 16        | with/ without ≤ 14 | Intumescent wrap<br>(2 x 62,5 / 1 x 125 mm) 2 x 2 layers | EI 120 U/C                    | -                              |
|                                        | Ø > 16 - ≤ 32 | with/ without ≤ 14 | Intumescent wrap<br>(2 x 62,5 / 1 x 125 mm) 2 x 2 layers | EI 120 U/C                    | -                              |
|                                        | Ø > 32 - ≤ 50 | with/ without ≤ 21 | Intumescent wrap<br>(2 x 62,5 / 1 x 125 mm) 2 x 2 layers | EI 120 U/C                    | -                              |
|                                        | Ø ≤ 32        | with/ without ≤ 14 | Lamella mat                                              | EI 120 U/C                    | EI 120 U/C                     |
|                                        | Ø > 32 - ≤ 50 | with/ without ≤ 21 | Lamella mat                                              | EI 120 U/C                    | -                              |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Loose mineral wool
4. Ablative filler  $\geq 3$  mm

5. Cable
6. Electric installation conduits
7. Intumescent wrap
8. Lamella mat

Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 5 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)****HVAC-split line combinations**

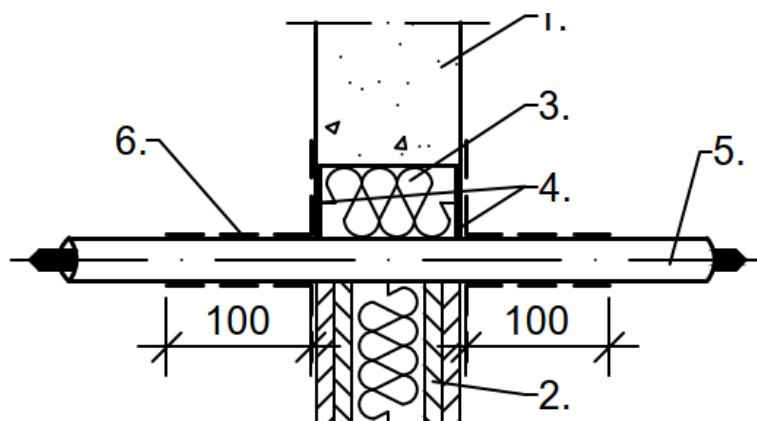
| Fire resistance classes                                                                                                                                                             |                                                                   |                               |                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                                                                             | Measures                                                          | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>HVAC split line combinations</b>                                                                                                                                                 |                                                                   |                               |                                |
| Copper pipe $\leq 2 \times \varnothing \leq 18$<br>+ PE-Foam 9 mm<br>+ 1x PVC-U/PVC-C pipe $\varnothing \leq 25 \times 1,5$ mm<br>+ $\leq 3 \times$ cables $\varnothing \leq 14$ mm | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>2 layers | EI 120                        | EI 120                         |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Loose mineral wool
4. Ablative filler  $\geq 3$  mm

5. HVAC split line combination
6. Rigid floor  $\geq 150$  mm thickness
7. Intumescent wrap

Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 6 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)****Coaxial cables and waveguides**

| Fire resistance classes                     |                                                  |                               |
|---------------------------------------------|--------------------------------------------------|-------------------------------|
| Service                                     | Measures                                         | Wall<br>Fire resistance class |
| <b>Coaxial cable/waveguides</b>             |                                                  |                               |
| CommScope Heliax $\varnothing \leq 51,1$ mm | Ablative coating $\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    |
| RFS Cellflex $\varnothing \leq 50,3$ mm     | Ablative coating $\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    |
| RFS Radiaflex $\varnothing \leq 48,2$ mm    | Ablative coating $\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Loose mineral wool

4. Ablative filler  $\geq 3$  mm
5. Coaxial cables or waveguides
6. Ablative coating  $\geq 1$  mm

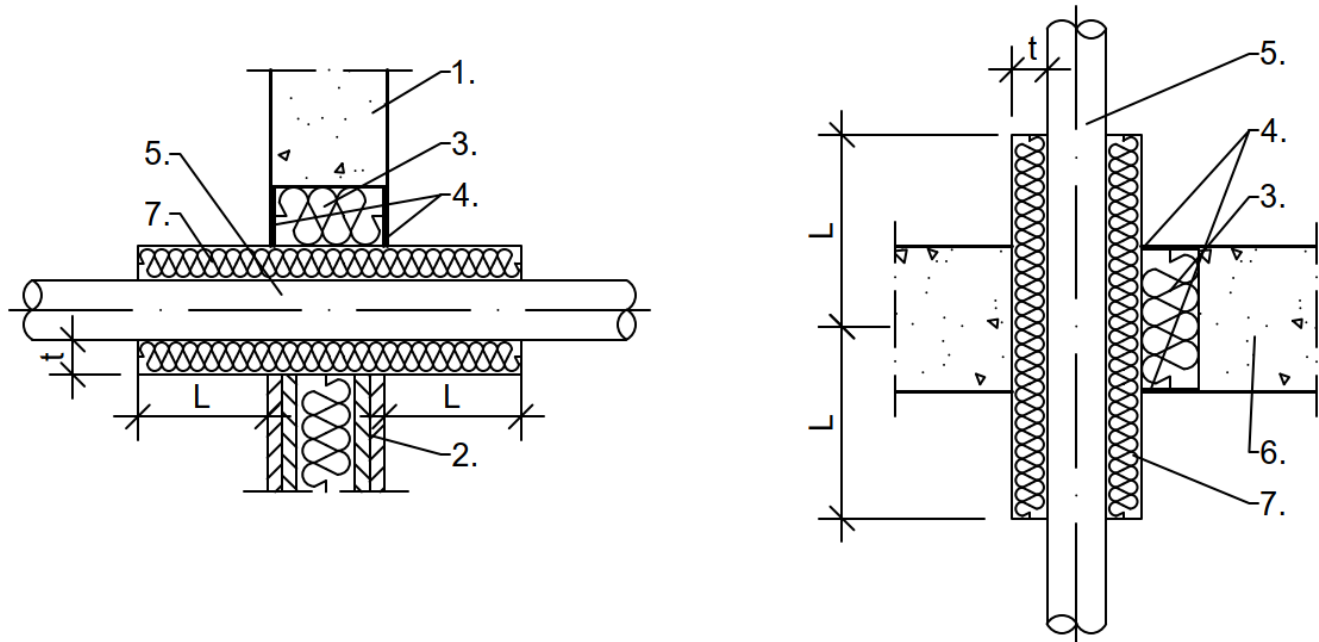
Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 7 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

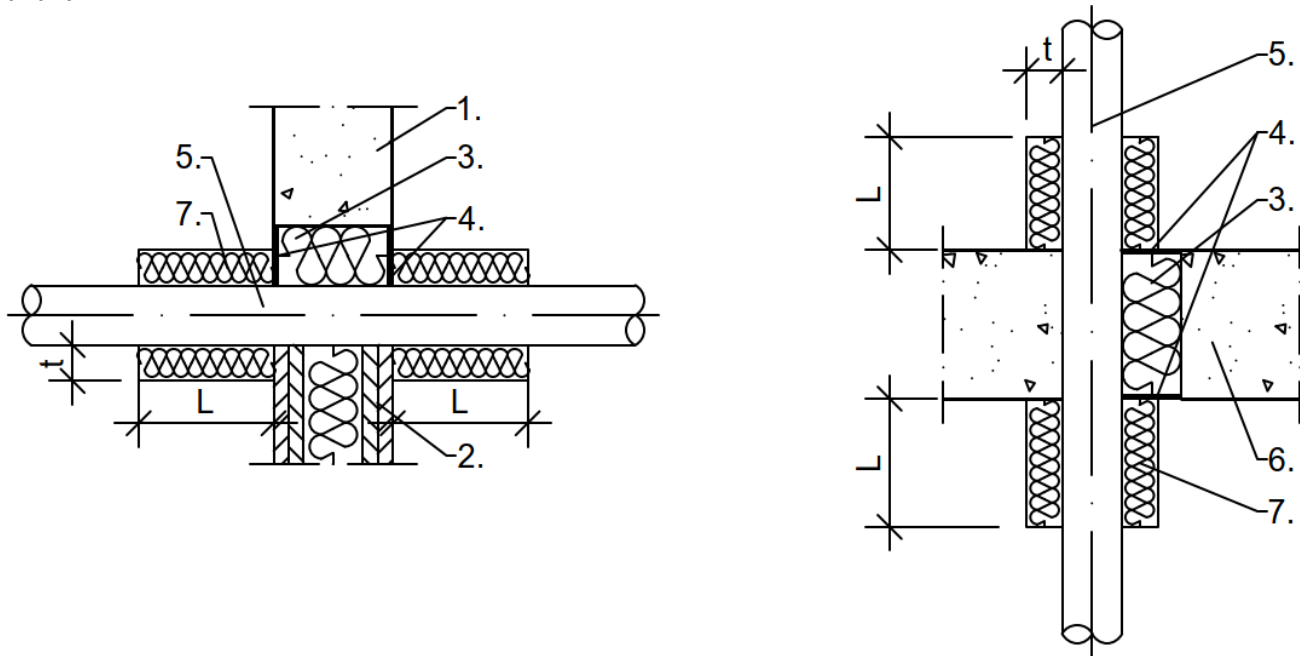
Penetration sealing system made of mineral wool and ablative filler (≥ 3,0 mm dft)

Non-combustible pipes of copper, steel, stainless steel or cast iron with non-combustible insulation made of mineral fibre

Variant LS



Variant LI



- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1. Rigid wall ≥ 100 mm thickness    | 5. Non-combustible pipe           |
| 2. Flexible wall ≥ 100 mm thickness | 6. Rigid floor ≥ 150 mm thickness |
| 3. Loose mineral wool               | 7. Mineral fibre mat              |
| 4. Ablative filler ≥ 3 mm           |                                   |

Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| FireFree Brandlukningssystem                                                            | Annex 8 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)****Non-combustible pipes of copper, steel, stainless steel or cast iron with non-combustible insulation made of mineral fibre**

| Fire resistance classes - Wall                              |                        |                     |                                                         |                            |
|-------------------------------------------------------------|------------------------|---------------------|---------------------------------------------------------|----------------------------|
| Service                                                     | Outside Ø              | Pipe wall thickness | Measures                                                | Wall Fire resistance class |
| Non-combustible pipes with insulation made of mineral fibre |                        |                     |                                                         |                            |
| Copper, steel, stainless steel, cast iron                   | $\leq 22$              | 0,6 - 14,2          | Lamella mat<br>Both sides $\geq 450 \times 20$ -100 mm  | EI 120 U/C                 |
|                                                             | $> 22 - \leq 60$       |                     | Lamella mat<br>Both sides $\geq 200 \times 30$ -100 mm  | EI 120 U/C                 |
|                                                             | $> 60 - \leq 88,9$     |                     | Lamella mat<br>Both sides $\geq 450 \times 30$ -100 mm  | EI 120 U/C                 |
| Steel, stainless steel, cast iron                           | $\leq 42$              | 1,8 - 14,2          | Lamella mat<br>Both sides $\geq 200 \times 30$ -100 mm  | EI 120 U/C                 |
|                                                             | $> 42 - \leq 114,3$    | 1,8/3,2 - 14,2      | Lamella mat<br>Both sides $\geq 450 \times 30$ -100 mm  | EI 120 U/C                 |
|                                                             | $> 114,3 - \leq 159$   | 3,2/4,0 - 14,2      | Lamella mat<br>Both sides $\geq 1200 \times 100$ mm     | EI 120 U/C                 |
|                                                             | $> 114,3 - \leq 219,1$ | 3,2/4,5 - 14,2      | Lamella mat<br>Both sides $\geq 1200 \times 30$ -100 mm | EI 90 U/C                  |

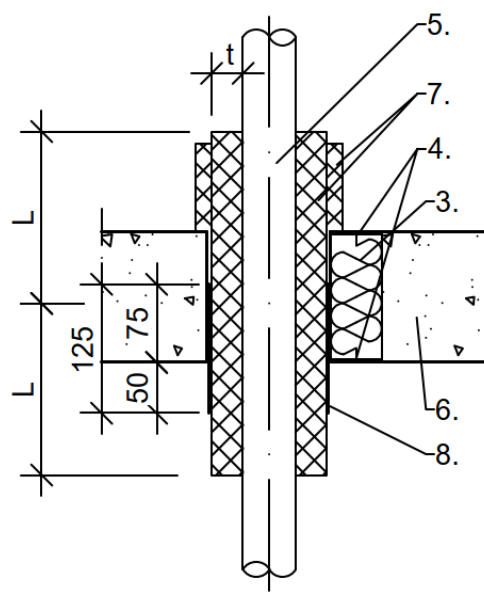
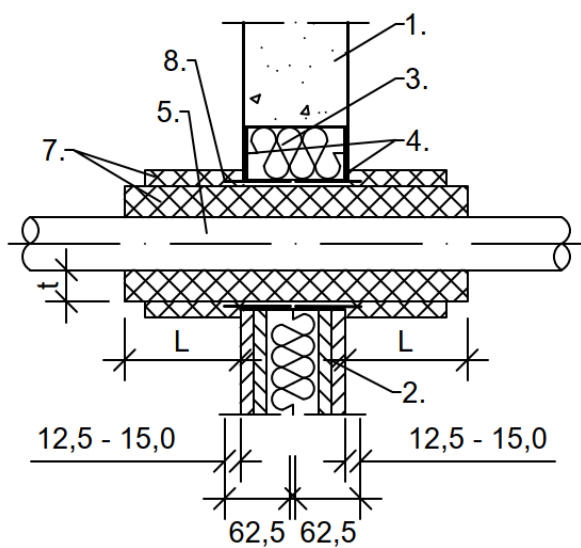
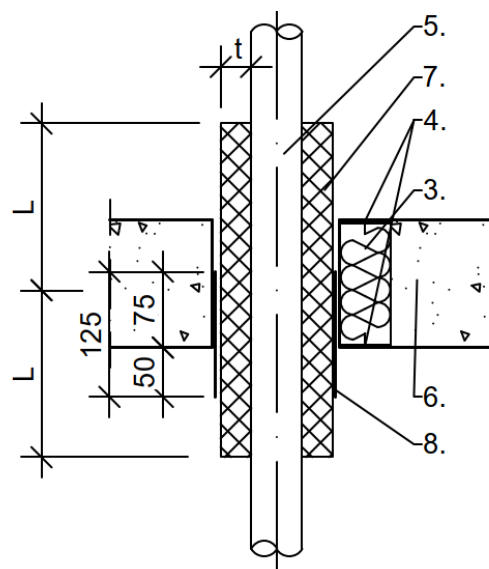
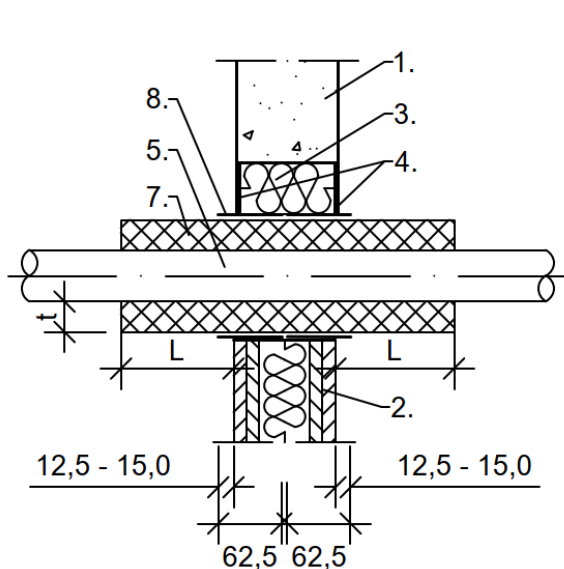
| Fire resistance classes - Floor                             |                        |                     |                                                         |                             |
|-------------------------------------------------------------|------------------------|---------------------|---------------------------------------------------------|-----------------------------|
| Service                                                     | Outside Ø              | Pipe wall thickness | Measures                                                | Floor Fire resistance class |
| Non-combustible pipes with insulation made of mineral fibre |                        |                     |                                                         |                             |
| Copper, steel, stainless steel, cast iron                   | $\leq 22$              | 0,6 - 14,2          | Lamella mat<br>Both sides $\geq 425 \times 20$ -100 mm  | EI 120 U/C                  |
|                                                             |                        |                     | Lamella mat<br>Both sides $\geq 175 \times 30$ -100 mm  | EI 120 U/C                  |
|                                                             | $> 22 - \leq 42$       |                     | Lamella mat<br>Both sides $\geq 425 \times 30$ -100 mm  | EI 120 U/C                  |
|                                                             | $> 42 - \leq 88,9$     |                     | Lamella mat<br>Both sides $\geq 675 \times 30$ -100 mm  | EI 90 U/C                   |
| Steel, stainless steel, cast iron                           | $\leq 42$              | 1,8 - 14,2          | Lamella mat<br>Both sides $\geq 125 \times 30$ -100 mm  | EI 120 U/C                  |
|                                                             | $> 42 - \leq 114,3$    | 1,8/3,2 - 14,2      | Lamella mat<br>Both sides $\geq 425 \times 30$ -100 mm  | EI 120 U/C                  |
|                                                             | $> 114,3 - \leq 159$   | 3,2/4,0 - 14,2      | Lamella mat<br>Both sides $\geq 1175 \times 30$ -100 mm | EI 120 U/C                  |
|                                                             | $> 114,3 - \leq 219,1$ | 3,2/4,5 - 14,2      | Lamella mat<br>Both sides $\geq 1175 \times 30$ mm      | EI 120 U/C                  |
|                                                             |                        |                     | Lamella mat<br>Both sides $\geq 1175 \times 30$ -100 mm | EI 90 U/C                   |

Dimensions in mm

|                                                                                         |         |
|-----------------------------------------------------------------------------------------|---------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 9 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |         |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)**

**Non-combustible pipes of copper, steel, stainless steel or cast iron with insulation made of FEF**



1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Loose mineral wool
4. Ablative filler  $\geq 3$  mm

5. Non-combustible pipe
6. Rigid floor  $\geq 150$  mm thickness
7. Insulation made of FEF
8. Intumescent wrap

Dimensions in mm

|                                                                                         |          |
|-----------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 10 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |          |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)****Non-combustible pipes of copper, steel, stainless steel or cast iron with insulation made of FEF**

| Fire resistance classes - Wall                                  |                                                        |                     |                                                                                           |                            |
|-----------------------------------------------------------------|--------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|----------------------------|
| Service                                                         | Outside Ø                                              | Pipe wall thickness | Measures                                                                                  | Wall Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                                                        |                     |                                                                                           |                            |
| Copper, steel, stainless steel, cast iron                       | ≤ 15 mm<br>Insulation thickness 10 mm                  | 0,8 - 14,2          | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 1 layer                                        | EI 120 U/C                 |
|                                                                 | > 15 - ≤ 54 mm<br>Insulation thickness 19 - 38 mm      |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 120 U/C                 |
|                                                                 | > 54 - ≤ 88,9 mm<br>Insulation thickness 25 mm         |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 120 U/C                 |
|                                                                 | ≤ 42 mm<br>Insulation thickness 10 mm                  |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 1 layer                                        | EI 90 U/C                  |
|                                                                 | > 42 - ≤ 88,9 mm<br>Insulation thickness 19 - 38 mm    |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 90 U/C                  |
| Steel, stainless steel, cast iron                               | ≤ 15 mm<br>Insulation thickness 10 - 38 mm             |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 120 U/C                 |
|                                                                 | > 15 - ≤ 88,9 mm<br>Insulation thickness 19 - 38 mm    |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 120 U/C                 |
|                                                                 | > 88,9 - ≤ 114,3 mm<br>Insulation thickness 19 - 38 mm |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers<br>+ Protective insulation FEF 250x19 | EI 120 U/C                 |
|                                                                 | > 114,3 - ≤ 159 mm<br>Insulation thickness 25 - 38 mm  |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers<br>+ Protective insulation FEF 250x19 | EI 120 U/C                 |
|                                                                 | > 159 - ≤ 219,1 mm<br>Insulation thickness 25 - 38 mm  |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers<br>+ Protective insulation FEF 600x38 | EI 120 U/C                 |

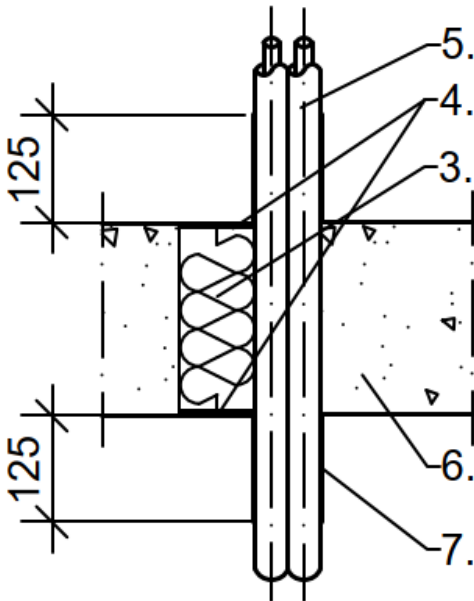
| Fire resistance classes - Floor                                 |                                                       |                     |                                                                                           |                             |
|-----------------------------------------------------------------|-------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|-----------------------------|
| Service                                                         | Outside Ø                                             | Pipe wall thickness | Measures                                                                                  | Floor Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                                                       |                     |                                                                                           |                             |
| Copper, steel, stainless steel, cast iron                       | ≤ 60 mm<br>Insulation thickness 13 - 40 mm            | 0,6 - 14,2          | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 120 U/C                  |
|                                                                 | > 60 - ≤ 88,9 mm<br>Insulation thickness 25 mm        |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 120 U/C                  |
|                                                                 | ≤ 42 mm<br>Insulation thickness 10 mm                 |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 1 layer                                        | EI 90 U/C                   |
|                                                                 | ≤ 42 mm<br>Insulation thickness 9 - 40 mm             |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 90 U/C                   |
|                                                                 | > 42 - ≤ 60 mm<br>Insulation thickness 13 - 40 mm     |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 90 U/C                   |
|                                                                 | > 60 - ≤ 88,9 mm<br>Insulation thickness 19 - 38 mm   |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers                                       | EI 90 U/C                   |
| Steel, stainless steel, cast iron                               | ≤ 159 mm<br>Insulation thickness 25 - 38 mm           |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers<br>+ Protective insulation FEF 250x25 | EI 90 U/C                   |
|                                                                 | > 159 - ≤ 219,1 mm<br>Insulation thickness 25 - 38 mm |                     | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm; 2 layers<br>+ Protective insulation FEF 250x38 | EI 90 U/C                   |

Dimensions in mm

|                                                                                         |          |
|-----------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 11 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |          |

Penetration sealing system made of mineral wool and ablative filler (≥ 3,0 mm dft)

Solar pipes NanoSUN<sup>2</sup> (installation only in floors) with intumescent wrap



| Fire resistance classes - Floor           |                                            |                                |
|-------------------------------------------|--------------------------------------------|--------------------------------|
| Service                                   | Measures                                   | Floor<br>Fire resistance class |
| NanoSUN <sup>2</sup> - double solar pipes |                                            |                                |
| DN 16                                     | Intumescent wrap<br>2 x 125 mm<br>2 layers | EI 90 U/U                      |
| DN 40                                     | Intumescent wrap<br>2 x 125 mm<br>2 layers | EI 30 / E 90 U/U               |

- 3. Loose mineral wool
- 4. Ablative filler ≥ 3 mm
- 5. Solar pipes

- 6. Rigid floor ≥ 150 mm thickness
- 7. Intumescent wrap

Dimensions in mm

|                                                                                         |          |
|-----------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                            | Annex 12 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |          |

**Penetration sealing system made of mineral wool and ablative filler ( $\geq 3,0$  mm dft)**

| Minimum Distances                         |        |               |                |                |                  |            |                                          |                                           |           |
|-------------------------------------------|--------|---------------|----------------|----------------|------------------|------------|------------------------------------------|-------------------------------------------|-----------|
|                                           | Cables | Cable bundles | Coaxial cables | Steel conduits | Plastic conduits | HVAC lines | Non-combustible pipes with mineral fibre | Non-combustible pipes with FEF-insulation | Seal edge |
| Cables                                    | 0      | 0             | 100            | 75             | 100              | 100        | 0                                        | 0                                         | 0         |
| Cable bundles                             | 0      | 0             | 100            | 75             | 100              | 100        | 0                                        | 0                                         | 0         |
| Coaxial cables                            | 100    | 100           | 50             | 100            | 100              | 100        | 100                                      | 100                                       | 25        |
| Steel conduits                            | 75     | 75            | 100            | 0              | 100              | 100        | 100                                      | 100                                       | 25        |
| Plastic conduits                          | 75     | 75            | 100            | 100            | 100              | 100        | 100                                      | 100                                       | 25        |
| HVAC lines                                | 100    | 100           | 100            | 100            | 100              | 50         | 100                                      | 100                                       | 25        |
| Non-combustible pipes with mineral fibre  | 0      | 0             | 100            | 100            | 100              | 100        | 0                                        | 100                                       | 25        |
| Non-combustible pipes with FEF-insulation | 0      | 0             | 100            | 100            | 100              | 100        | 100                                      | 0                                         | 25        |

Dimensions in mm

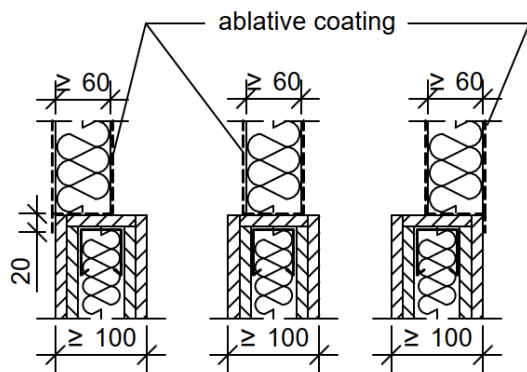
|                                                                                         |          |
|-----------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                     | Annex 13 |
| Penetration sealing system made of mineral wool and ablative filler in walls and floors |          |

# Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$ mm dft)

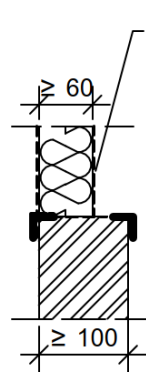
## Design variants

### Wall

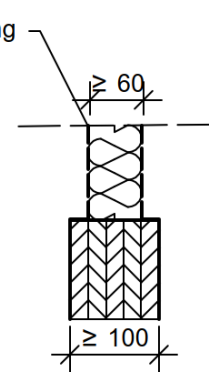
#### Light Partition Wall



#### Sandwich Wall

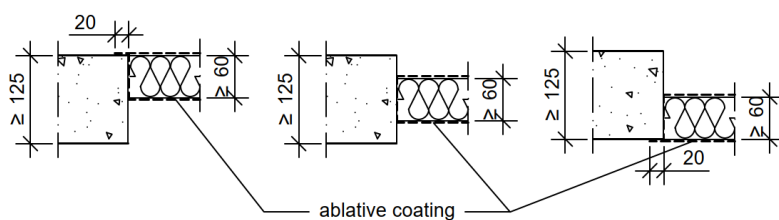


#### CLT Wall

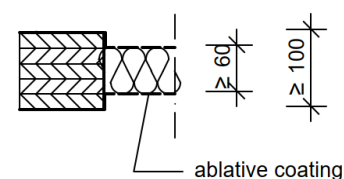


### Floor

#### Solid Floor



#### CLT Floor



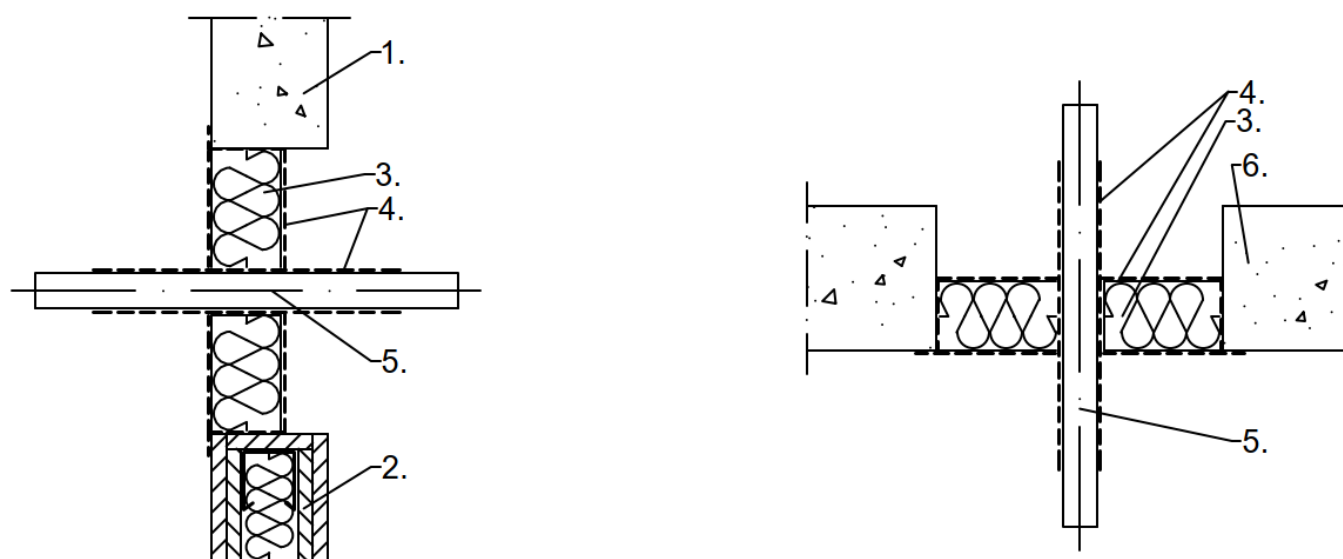
| Fire resistance classes |                                                 |                       |
|-------------------------|-------------------------------------------------|-----------------------|
| Max. Sealing size       | Measure                                         | Fire resistance class |
| 2000 x 1224 mm          | Light Partition Wall<br>Solid Wall              | EI 90                 |
| 10,000 x 1000 mm        | Solid Floor                                     | EI 90                 |
| 1000 x 1000 mm          | Sandwich Wall PAROC AST-S (100 mm)              | EI 60                 |
| 800 x 600 mm            | CLT Wall Stora Enso CLT 100 C5S NVI WW C24 SAN  | EI 60                 |
| 800 x 600 mm            | CLT Floor Stora Enso CLT 100 L5S NVI WW C24 SAN | EI 60                 |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                                | Annex 14 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Cables  $\varnothing \leq 21$  mm up to  $\leq \varnothing 80$  mm or cable bundles  $\varnothing \leq 100$  mm with cables  $\leq 21$  mm - with ablative coating



| Fire resistance classes                                               |                                                                          |                               |                                |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                               | Measures                                                                 | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b>                          |                                                                          |                               |                                |
| Cables $\varnothing \leq 21$ mm without cable tray trough drill holes | Ablative coating<br>$\geq 100$ mm x $\geq 0,75$ mm<br>dry film thickness | -                             | EI 90                          |
| Cables $\varnothing \leq 21$ mm                                       | Ablative coating<br>$\geq 100$ mm x $\geq 0,75$ mm<br>dry film thickness | EI 60 / E 90                  | EI 60 / E 90                   |
| Cables $\varnothing > 21$ mm to $\varnothing \leq 50$ mm              | Ablative coating<br>$\geq 100$ mm x $\geq 0,75$ mm<br>dry film thickness | EI 60 / E 90                  | EI 60 / E 90                   |
| Cables $\varnothing > 50$ mm to $\varnothing \leq 80$ mm              | Ablative coating<br>$\geq 100$ mm x $\geq 0,75$ mm dry<br>film thickness | EI 60 / E 90                  | EI 60 / E 90                   |
| Cable bundles $\varnothing \leq 100$ mm                               | Ablative coating<br>$\geq 100$ mm x $\geq 0,75$ mm<br>dry film thickness | EI 60 / E 90                  | EI 60 / E 90                   |
|                                                                       | Ablative coating<br>$\geq 150$ mm x $\geq 1$ mm dry<br>film thickness    | EI 90                         | EI 60 / E 90                   |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board

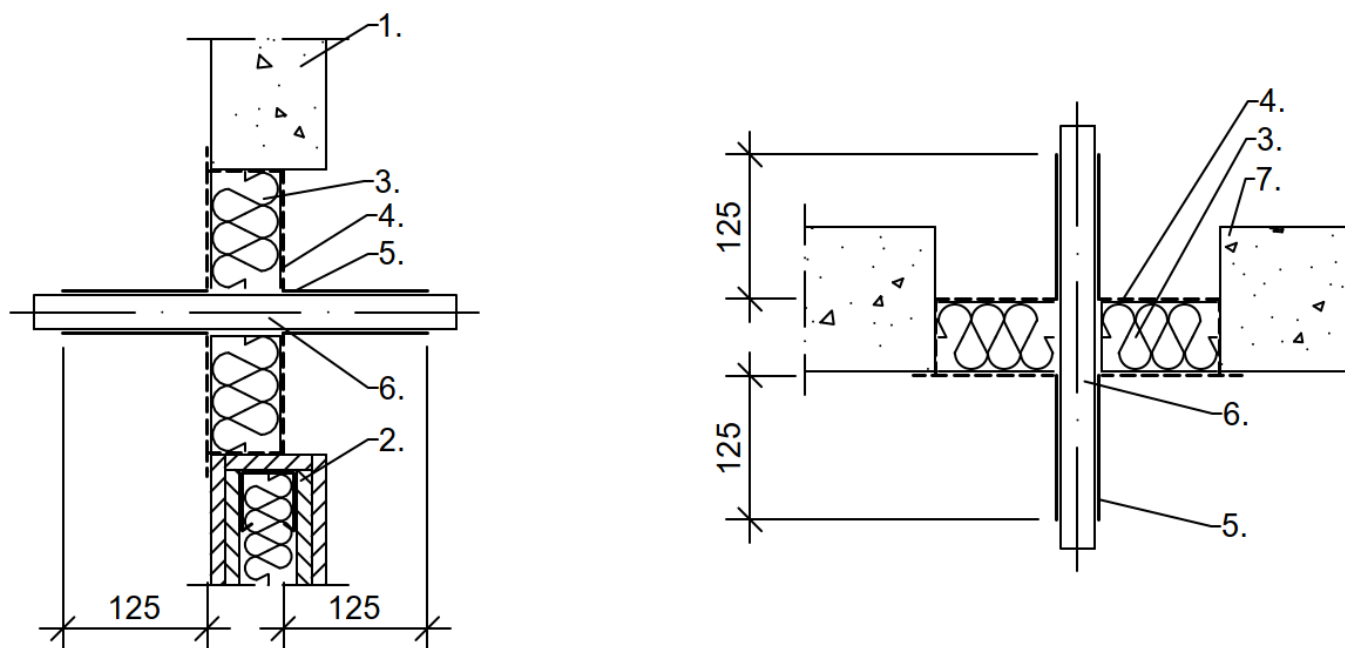
4. Ablative Coating
5. Cable
6. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 15 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Cables  $\varnothing \leq 21$  mm up to  $\leq \varnothing 80$  mm or cable bundles  $\varnothing \leq 100$  mm with cables  $\leq 21$  mm - with intumescent wrap



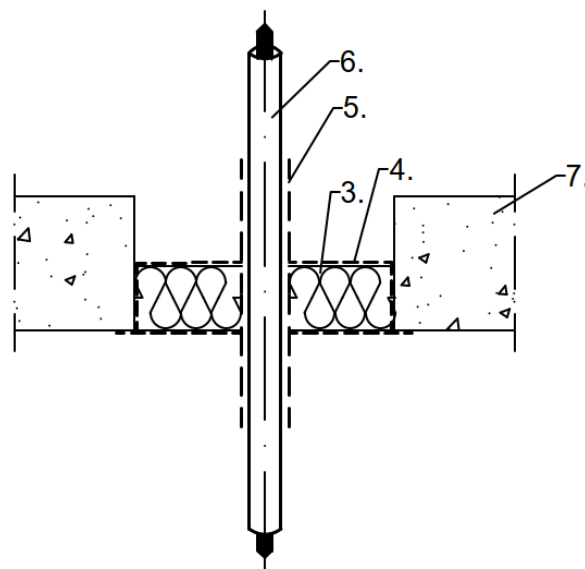
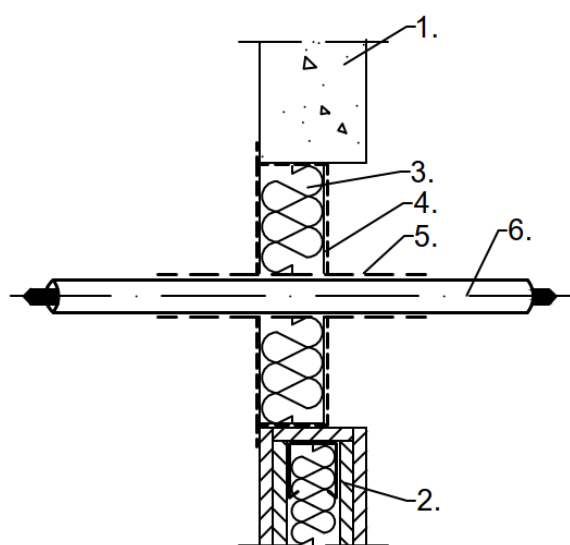
| Fire resistance classes                                               |                                                                              |                               |                                |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                               | Measures                                                                     | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b>                          |                                                                              |                               |                                |
| Cables $\varnothing \leq 21$ mm without cable tray trough drill holes | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer + 45 mm overlapping | EI 90                         | EI 90                          |
| Cables $\varnothing \leq 21$ mm                                       | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer + 45 mm overlapping | EI 60 / E 90                  | EI 60 / E 90                   |
| Cables $\varnothing > 21$ mm to $\varnothing \leq 50$ mm              | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer + 45 mm overlapping | EI 60 / E 90                  | EI 60 / E 90                   |
| Cables $\varnothing > 50$ mm to $\varnothing \leq 80$ mm              | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer + 45 mm overlapping | EI 60 / E 90                  | EI 60 / E 90                   |
| Cable bundles $\varnothing > 100$ mm                                  | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer + 45 mm overlapping | EI 60 / E 90                  | EI 60 / E 90                   |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. Cable
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 16 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Coaxial cables and waveguides with ablative coating**

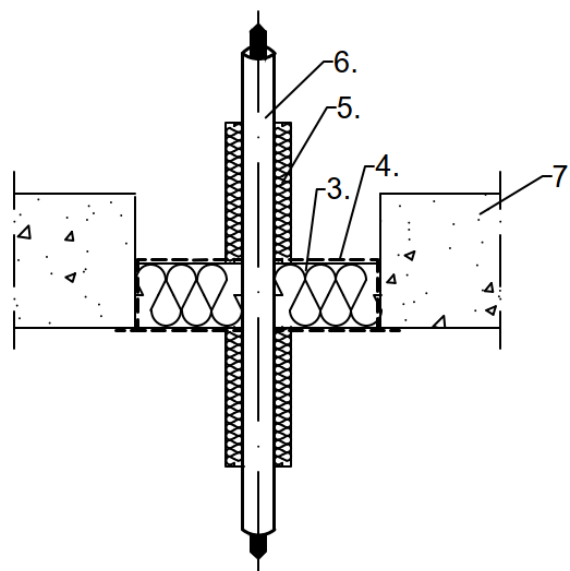
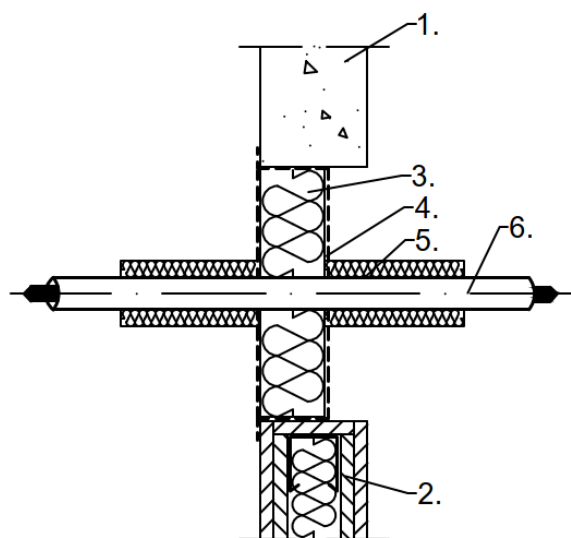
| Fire resistance classes                     |                                                     |                               |                                |
|---------------------------------------------|-----------------------------------------------------|-------------------------------|--------------------------------|
| Service                                     | Measures                                            | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Coaxial cable/waveguides</b>             |                                                     |                               |                                |
| CommScope Heliac $\varnothing \leq 51,1$ mm | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm dft | EI 45 U/C<br>E 90 U/C         | EI 45 U/C<br>E 90 U/C          |
| RFS Cellflex $\varnothing \leq 50,3$ mm     | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm dft | EI 60 U/C<br>E 90 U/C         | EI 45 U/C<br>E 90 U/C          |
| RFS Radiaflex $\varnothing \leq 48,2$ mm    | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm dft | EI 60 U/C<br>E 90 U/C         | EI 60 U/C<br>E 90 U/C          |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board

4. Ablative Coating
5. Ablative Coating
6. Coaxial cables / waveguides
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 17 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Coaxial cables and waveguides with lamella mat**

| Fire resistance classes                     |                                             |                               |                                |
|---------------------------------------------|---------------------------------------------|-------------------------------|--------------------------------|
| Service                                     | Measures                                    | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Coaxial cable/waveguides</b>             |                                             |                               |                                |
| CommScope Heliac $\varnothing \leq 51,1$ mm | Lamella mat<br>$\geq 250$ mm x $\geq 30$ mm | EI 60 U/C<br>E 90 U/C         | EI 60 U/C<br>E 90 U/C          |
| RFS Cellflex $\varnothing \leq 50,3$ mm     | Lamella mat<br>$\geq 250$ mm x $\geq 30$ mm | EI 45 U/C<br>E 90 U/C         | EI 60 U/C<br>E 90 U/C          |
| RFS Cellflex $\varnothing 28$ mm            | Lamella mat<br>$\geq 250$ mm x $\geq 30$ mm | EI 60 U/C<br>E 90 U/C         | EI 60 U/C<br>E 90 U/C          |
| RFS Radiaflex $\varnothing \leq 48,2$ mm    | Lamella mat<br>$\geq 250$ mm x $\geq 30$ mm | EI 60 U/C<br>E 90 U/C         | EI 90 U/C                      |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

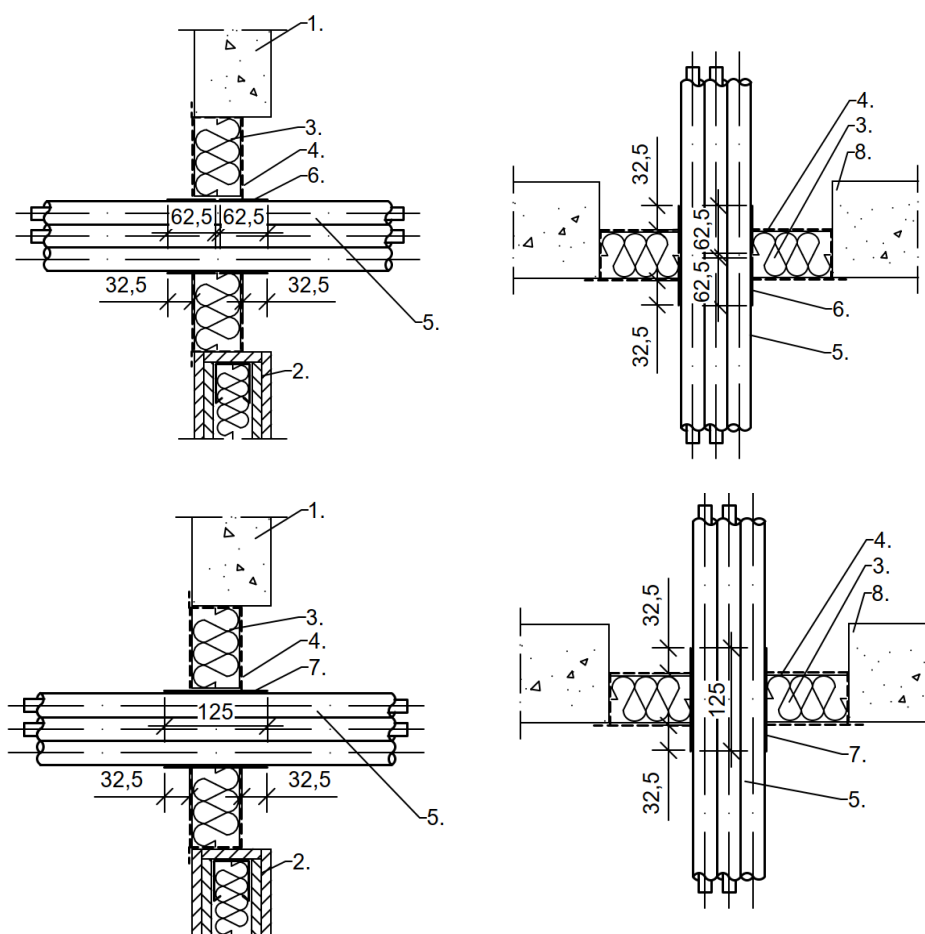
5. Lamella mat
6. Coaxial cables / waveguides
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 18 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)**

**Electrical installation conduits  $\varnothing \leq 32$  mm or bundles  $\varnothing \leq 100$  mm made of conduits  $\varnothing \leq 32$  mm with or without cables  $\leq 21$  mm - with intumescent wrap**



| Fire resistance classes                           |              |                                                       |                               |                                |
|---------------------------------------------------|--------------|-------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                           | Cable        | Measures                                              | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Electrical Installation conduits (EIC)</b>     |              |                                                       |                               |                                |
| EIC made of plastic $\varnothing \leq 32$         | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers | EI 60 U/U<br>E 90 U/U         | EI 90 U/U                      |
| EIC made of plastic bundle $\varnothing \leq 70$  | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers | EI 60 U/U<br>E 90 U/U         | EI 90 U/U                      |
| EIC made of plastic bundle $\varnothing \leq 80$  | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers | EI 60 U/U<br>E 90 U/U         | EI 60 U/U                      |
| EIC made of plastic bundle $\varnothing \leq 100$ | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers | EI 60 U/U<br>E 90 U/U         | EI 45 U/U<br>E 90 U/U          |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

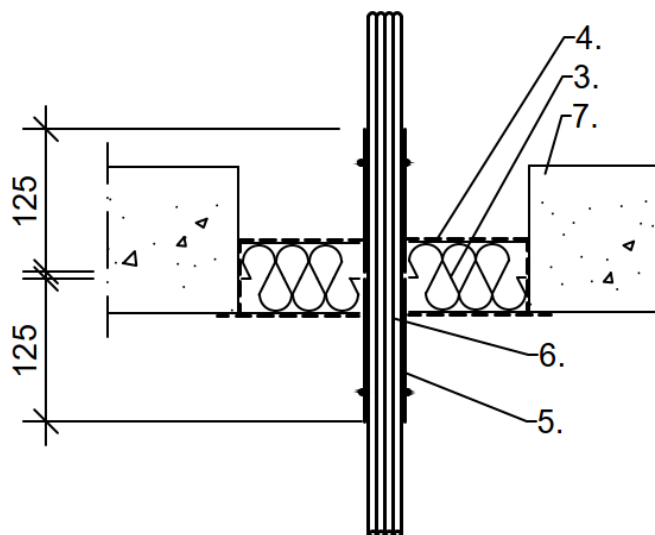
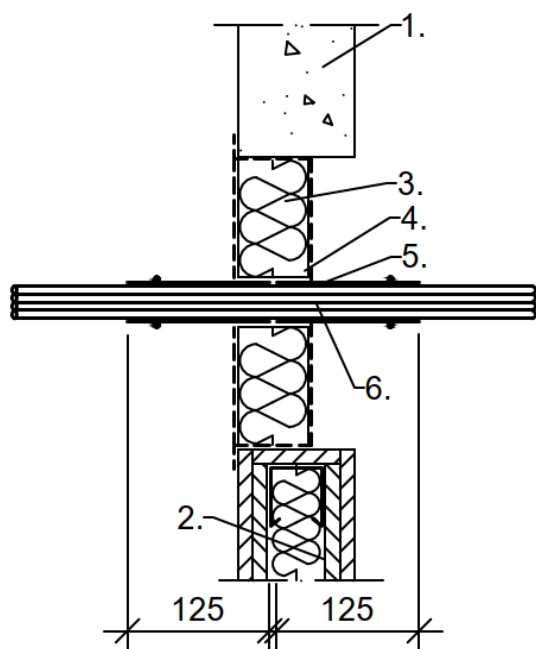
5. Electrical installation conduit
6. Intumescent wrap 2 x 62,5 mm
7. Intumescent wrap 1 x 125 mm
8. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 19 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Speed-pipe, bundled or single pipes, with or without glass fibre or micro cables - with intumescent wrap



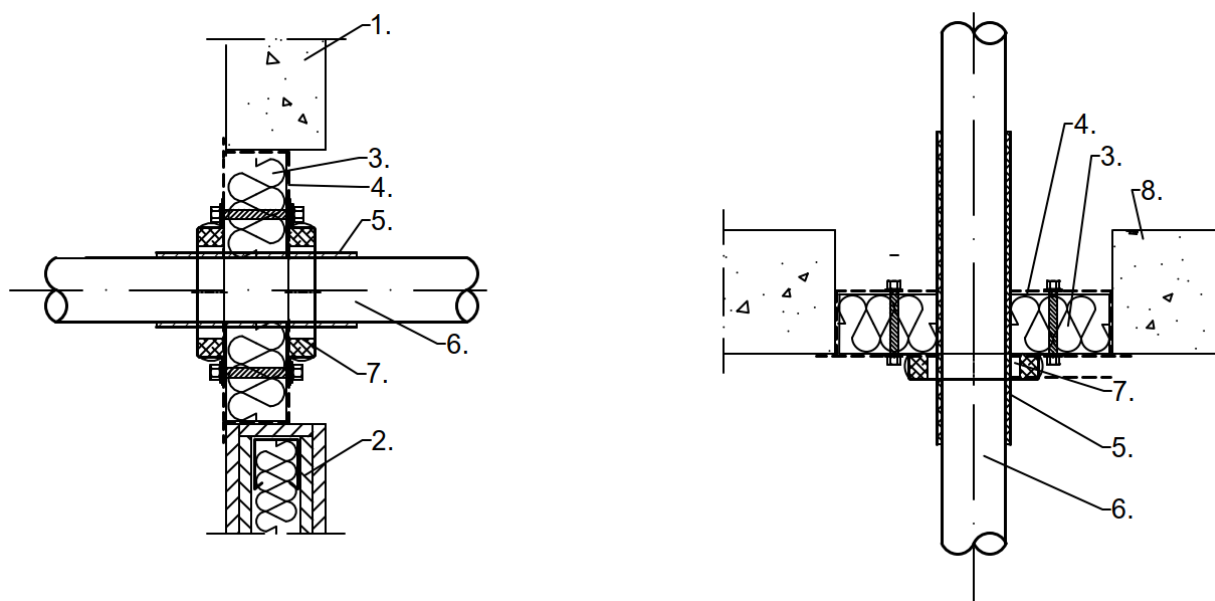
| Fire resistance classes                                                                  |                                                      |                               |                                |
|------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                  | Measures                                             | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Speed pipes, bundles or single pipes, with or without glass fibre or micro cables</b> |                                                      |                               |                                |
| Bundle- $\varnothing \leq 40$<br>Single- $\varnothing \leq 14$                           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 layer | EI 60 U/U<br>E 90 U/U         | EI 90 U/U                      |
| Bundle- $\varnothing \leq 40$<br>Single- $\varnothing \leq 7$                            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 layer | EI 90 U/U                     | EI 90 U/U                      |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. Speed pipe
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 20 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| PVC-U, PVC-C                   |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,5 – 5,6 mm        | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 1,6 – 6,6 mm        |                                                   | EI 90 U/U                     |
| Ø 90 – 110 mm                  | 1,8 – 8,1 mm        |                                                   | EI 90 U/U                     |
| Ø 125 – 160 mm                 | 3,2 – 11,8 mm       |                                                   | EI 90 U/U                     |
| PE-HD, ABS, SAN+PVC            |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 2,2 – 6,6 mm        |                                                   | EI 60 U/U / E 90 U/U          |
|                                | 5,1 – 6,6 mm        |                                                   | EI 90 U/U                     |
| Ø 90 – 110 mm                  | 2,7 – 10,0 mm       |                                                   | EI 60 U/U / E 90 U/U          |
|                                | 10,0 mm             |                                                   | EI 90 U/U                     |
| Ø 125 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 90 U/U                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. PE noise protection
6. Combustible pipe
7. Fire protection collar
8. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 21 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| PP-H                           |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 2,2 – 6,6 mm        |                                                   | EI 90 U/U                     |
| Ø 90 – 110 mm                  | 2,7 – 10,0 mm       |                                                   | EI 90 U/U                     |
| Ø 125 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 60 U/U / E 90 U/U          |
|                                | 4,0 mm              |                                                   | EI 90 U/U                     |
| Rehau Raupiano light           |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 90 U/U                     |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 60 U/U / E 90 U/U          |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 90 U/U                     |
| Conel DRAIN                    |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 90 U/U                     |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 60 U/U / E 90 U/U          |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 90 U/U                     |
| Ø 40 mm                        | 1,8 mm              |                                                   | EI 90 U/U                     |
| Geberit Silent dB20            |                     |                                                   |                               |
| Ø 56 mm                        | 3,2 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 mm                        | 3,2 mm              |                                                   | EI 90 U/U                     |
| Ø 75 mm                        | 3,6 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 5,5 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 6,0 mm              |                                                   | EI 90 U/U                     |
| Ø 135 mm                       | 6,0 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 7,0 mm              |                                                   | EI 90 U/U                     |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 22 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Geberit Silent PP              |                     |                                                   |                               |
| Ø 32 mm                        | 2,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 40 mm                        | 2,0 mm              |                                                   | EI 90 U/U                     |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 90 U/U                     |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 3,1 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 3,6 mm              |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 4,2 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 5,2 mm              |                                                   | EI 90 U/U                     |
| Geberit Silent Pro             |                     |                                                   |                               |
| Ø 50 mm                        | 3,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 75 mm                        | 3,8 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 4,3 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 5,0 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 6,0 mm              |                                                   | EI 90 U/U                     |
| POLO-KAL NG / POLO-KAL XS      |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 90 U/U                     |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 3,0 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 3,4 mm              |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 3,9 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 4,9 mm              |                                                   | EI 90 U/U                     |
| Rehau Raupiano Plus            |                     |                                                   |                               |
| Ø 50 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 75 mm                        | 2,0 mm              |                                                   | EI 60 U/U / E 90 U/U          |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 3,9 mm              |                                                   | EI 90 U/U                     |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 23 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Wavin AS+                      |                     |                                                   |                               |
| Ø 50 mm                        | 3,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 75 mm                        | 3,5 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 4,6 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 5,6 mm              |                                                   | EI 90 U/U                     |
| POLO-KAL 3S                    |                     |                                                   |                               |
| Ø 75 mm                        | 3,8 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 90 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 4,8 mm              |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 7,5 mm              |                                                   | EI 90 U/U                     |

| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| PVC-U, PVC-C                    |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,5 mm              | Fire protection collar<br>Installed on bottom side | EI 60 U/U / E 90 U/U           |
|                                 | 1,5 – 5,6 mm        |                                                    | EI 45 U/U / E 90 U/U           |
| Ø 63 – 75 mm                    | 1,6 – 4,2 mm        |                                                    | EI 60 U/U / E 90 U/U           |
|                                 | 1,6 – 6,6 mm        |                                                    | EI 45 U/U / E 90 U/U           |
| Ø 90 – 110 mm                   | 1,8 – 8,1 mm        |                                                    | EI 60 U/U / E 90 U/U           |
| Ø 125 mm                        | 2,5 – 9,2 mm        |                                                    | EI 60 U/U / E 90 U/U           |
| Ø 140 – 160 mm                  | 3,2 – 11,8 mm       |                                                    | EI 60 U/U / E 90 U/U           |
| PE-HD, ABS, SAN+PVC             |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on bottom side | EI 60 U/U                      |
| Ø 63 – 75 mm                    | 2,2 – 6,6 mm        |                                                    | EI 30 U/U                      |
|                                 | 5,1 – 6,6 mm        |                                                    | EI 60 U/U                      |
| Ø 90 – 110 mm                   | 2,7 – 10,0 mm       |                                                    | EI 30 U/U                      |
|                                 | 10,0 mm             |                                                    | EI 60 U/U                      |
| Ø 125 – 160 mm                  | 4,0 – 14,6 mm       |                                                    | EI 60 U/U                      |

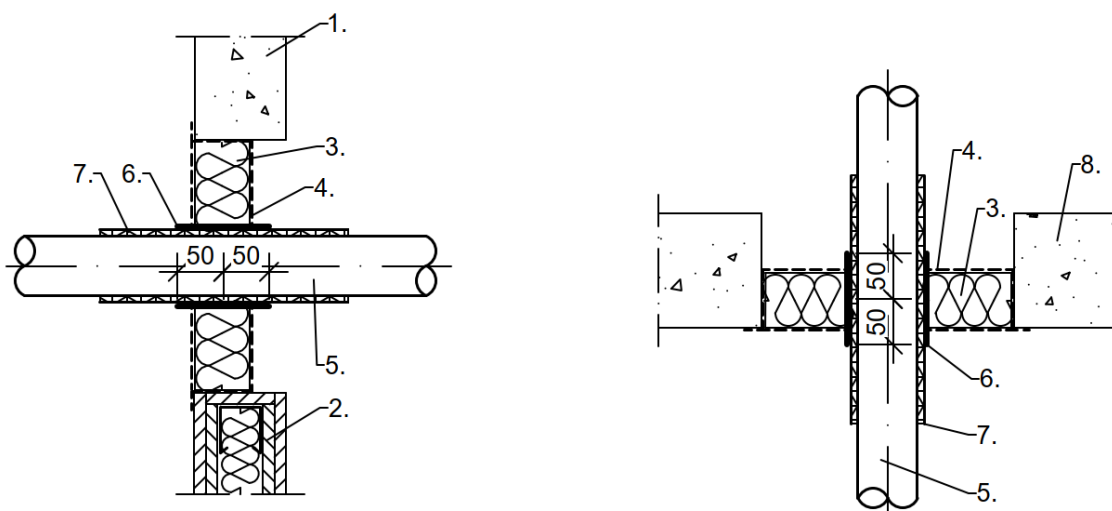
| FireFree Brandlukningssystem                                                                                |  | Annex 24 |
|-------------------------------------------------------------------------------------------------------------|--|----------|
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |  |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with fire protection collar**

| PP-H                |               |                                                    |           |
|---------------------|---------------|----------------------------------------------------|-----------|
| Ø 32 – 50 mm        | 1,8 – 4,6 mm  | Fire protection collar<br>Installed on bottom side | EI 60 U/U |
| Ø 125 – 160 mm      | 4,0 – 14,6 mm |                                                    | EI 60 U/U |
| Geberit Silent Pro  |               |                                                    |           |
| Ø 50 mm             | 3,0 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U |
| Ø 75 mm             | 3,8 mm        |                                                    | EI 90 U/U |
| Ø 90 mm             | 4,3 mm        |                                                    | EI 90 U/U |
| Ø 110 mm            | 4,5 mm        |                                                    | EI 90 U/U |
| Ø 125 mm            | 5,0 mm        |                                                    | EI 60 U/U |
| Ø 160 mm            | 6,0 mm        |                                                    | EI 60 U/U |
| Geberit Silent PP   |               |                                                    |           |
| Ø 32 mm             | 2,0 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U |
| Ø 40 mm             | 2,0 mm        |                                                    | EI 90 U/U |
| Ø 50 mm             | 2,0 mm        |                                                    | EI 90 U/U |
| Ø 75 mm             | 2,6 mm        |                                                    | EI 90 U/U |
| Ø 90 mm             | 3,1 mm        |                                                    | EI 90 U/U |
| Ø 110 mm            | 3,2 mm        |                                                    | EI 90 U/U |
| Ø 160 mm            | 5,2 mm        |                                                    | EI 90 U/U |
| Geberit Silent dB20 |               |                                                    |           |
| Ø 56 mm             | 3,2 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U |
| Ø 75 mm             | 3,6 mm        |                                                    | EI 90 U/U |
| Ø 90 mm             | 5,5 mm        |                                                    | EI 90 U/U |
| Ø 110 mm            | 6,0 mm        |                                                    | EI 90 U/U |
| Ø 160 mm            | 7,0 mm        |                                                    | EI 90 U/U |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 25 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with intumescent wrap**

| Fire resistance classes - Wall  |                      |                                         |                            |
|---------------------------------|----------------------|-----------------------------------------|----------------------------|
| Service                         | Pipe wall thickness  | Measures                                | Wall Fire resistance class |
| <b>PVC-U, PVC-C</b>             |                      |                                         |                            |
| $\varnothing 40 - \leq 50$ mm   | 1,5 – 5,6 mm         | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U    |
| $\varnothing 63 - \leq 75$ mm   | 2,8 – 4,6 mm         | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U                  |
| $\varnothing > 50 - \leq 90$ mm | 1,5/1,8 – 6,7 mm     | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 45 U/U /<br>E 90 U/U    |
| $\varnothing 90$ mm             | 3,0 – 4,0 mm         | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U                  |
| $\varnothing 110$ mm            | 3,2 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U                  |
| <b>PP-H</b>                     |                      |                                         |                            |
| $\varnothing 40 - \leq 50$ mm   | 2,0 – 6,9 mm         | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                  |
| $\varnothing 63 - \leq 75$ mm   | 2,6 – 5,5 mm         | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 90 U/U                  |
|                                 | 2,2 – 8,1 mm         | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U                  |
| $\varnothing > 50 - \leq 90$ mm | 1,8/2,2 – 4,6/8,2 mm | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U /<br>E 90 U/U    |
| $\varnothing 90 - \leq 110$ mm  | 2,7 – 10,0 mm        | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U                  |
| $\varnothing 110$ mm            | 3,4 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                  |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Combustible pipe
6. Intumescent wrap
7. PE sound insulation
8. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 26 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with intumescent wrap**

| Fire resistance classes - Wall                                                                              |                      |                                         |                               |
|-------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------|-------------------------------|
| Service                                                                                                     | Pipe wall thickness  | Measures                                | Wall<br>Fire resistance class |
| PE-HD, ABS, SAN+PVC                                                                                         |                      |                                         |                               |
| Ø 40 – 50 mm                                                                                                | 1,8 – 4,8 mm         | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U       |
| Ø 63 – ≤ 75 mm                                                                                              | 2,2 – 5,4 mm         | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U                     |
| Ø > 50 – ≤ 90 mm                                                                                            | 1,8/2,2 – 4,8/8,2 mm | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 45 U/U /<br>E 90 U/U       |
| 90 mm                                                                                                       | 8,2 mm               | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U /<br>E 90 U/U       |
| Ø 90 – ≤ 110 mm                                                                                             | 2,7 – 6,6 mm         | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U                     |
|                                                                                                             | 2,7 – 10,0 mm        | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 30 U/U                     |
| Geberit Silent dB20                                                                                         |                      |                                         |                               |
| Ø 56 mm                                                                                                     | 3,2 mm               | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                     |
| Ø 110 mm                                                                                                    | 6,0 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                     |
| Geberit Silent PP                                                                                           |                      |                                         |                               |
| Ø 50 mm                                                                                                     | 2,0 mm               | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U       |
| Ø 110 mm                                                                                                    | 3,6 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U       |
| Geberit Silent Pro                                                                                          |                      |                                         |                               |
| Ø 50 mm                                                                                                     | 3,0 mm               | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U       |
| Ø 110 mm                                                                                                    | 4,5 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U       |
| POLO-KAL 3S                                                                                                 |                      |                                         |                               |
| Ø 75 mm                                                                                                     | 3,8 mm               | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U /<br>E 90 U/U       |
| Ø 90 mm                                                                                                     | 4,5 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U       |
| Ø 110 mm                                                                                                    | 4,8 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U       |
| POLO-KAL NG / POLO-KAL XS                                                                                   |                      |                                         |                               |
| Ø 50 mm                                                                                                     | 2,0 mm               | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                     |
| Ø 110 mm                                                                                                    | 3,4 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                     |
| Rehau Raupiano light                                                                                        |                      |                                         |                               |
| Ø 50 mm                                                                                                     | 1,8 mm               | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                     |
| Ø 110 mm                                                                                                    | 2,7 mm               | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                     |
| FireFree Brandlukningssystem                                                                                |                      |                                         | Annex 27                      |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |                      |                                         |                               |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with intumescent wrap**

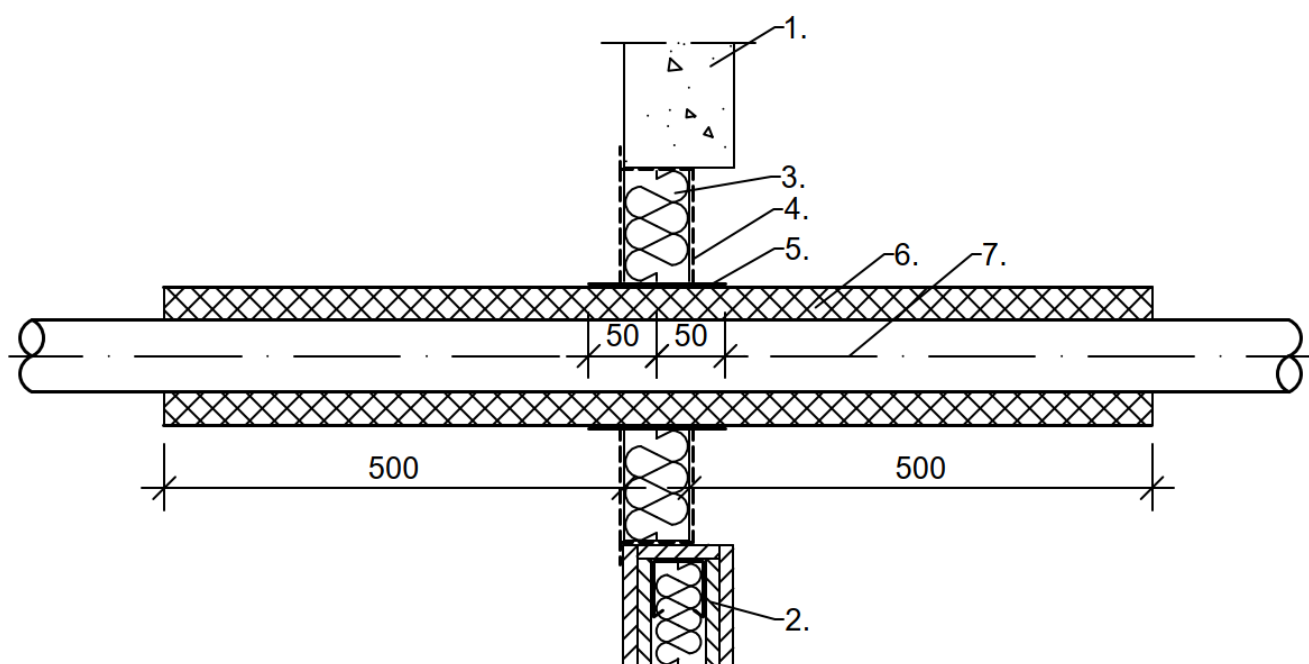
| Fire resistance classes - Wall |                     |                                         |                               |
|--------------------------------|---------------------|-----------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                | Wall<br>Fire resistance class |
| <b>Conel DRAIN</b>             |                     |                                         |                               |
| Ø 50 mm                        | 1,8 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                     |
| <b>Rehau Raupiano Plus</b>     |                     |                                         |                               |
| Ø 50 mm                        | 1,8 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                     |
| <b>Wavin AS+</b>               |                     |                                         |                               |
| Ø 50 mm                        | 3,0 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                     |
| Ø 110 mm                       | 5,3 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                     |

| Fire resistance classes - Floor |                     |                                         |                                |
|---------------------------------|---------------------|-----------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                | Floor<br>Fire resistance class |
| <b>PVC-U, PVC-C</b>             |                     |                                         |                                |
| Ø 32 – ≤ 50 mm                  | 2,4 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U        |
|                                 | 2,4 – 3,7 mm        | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 30 U/U                      |
| Ø 63 – ≤ 75 mm                  | 4,8 – 5,5 mm        | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 30 U/U                      |
| Ø 110 mm                        | 8,1 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 30 U/U                      |
| <b>PP-H</b>                     |                     |                                         |                                |
| Ø 32 – ≤ 50 mm                  | 6,9 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                      |
|                                 | 2,0 – 6,9 mm        | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U        |
| Ø 63 – ≤ 75 mm                  | 5,1 – 6,7 mm        | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 90 U/U                      |
|                                 | 2,3 – 8,1 mm        | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U /<br>E 90 U/U        |
| Ø 90 – ≤ 110 mm                 | 2,7 – 6,3 mm        | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                      |
|                                 | 2,7 – 10,0 mm       | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U        |
| <b>PE-HD, ABS, SAN+PVC</b>      |                     |                                         |                                |
| Ø 32 – 50 mm                    | 1,8 – 4,6 mm        | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                      |
| Ø 63 – ≤ 75 mm                  | 2,2 – 6,9 mm        | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 90 U/U                      |
| Ø 90 – ≤ 110 mm                 | 2,7 – 10,0 mm       | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                      |

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 28 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated and non-regulated pipes with intumescent wrap**

| Fire resistance classes - Floor  |                     |                                         |                             |
|----------------------------------|---------------------|-----------------------------------------|-----------------------------|
| Service                          | Pipe wall thickness | Measures                                | Floor Fire resistance class |
| <b>Geberit Silent dB20</b>       |                     |                                         |                             |
| Ø 56 mm                          | 3,2 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                   |
| Ø 110 mm                         | 6,0 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                   |
| <b>Geberit Silent PP</b>         |                     |                                         |                             |
| Ø 50 mm                          | 2,0 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U     |
| Ø 110 mm                         | 3,6 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U     |
| <b>Geberit Silent Pro</b>        |                     |                                         |                             |
| Ø 50 mm                          | 3,0 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                   |
| Ø 110 mm                         | 4,5 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U//U                  |
| <b>POLO-KAL 3S</b>               |                     |                                         |                             |
| Ø 75 mm                          | 3,8 mm              | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 60 U/U /<br>E 90 U/U     |
| Ø 90 mm                          | 4,5 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U     |
| Ø 110 mm                         | 4,8 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U /<br>E 90 U/U     |
| <b>POLO-KAL NG / POLO-KAL XS</b> |                     |                                         |                             |
| Ø 50 mm                          | 2,0 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U                   |
| Ø 110 mm                         | 3,4 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 60 U/U                   |
| <b>Rehau Raupiano light</b>      |                     |                                         |                             |
| Ø 50 mm                          | 1,8 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U     |
| <b>Conel DRAIN</b>               |                     |                                         |                             |
| Ø 50 mm                          | 1,8 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U /<br>E 90 U/U     |
| <b>Rehau Raupiano Plus</b>       |                     |                                         |                             |
| Ø 50 mm                          | 1,8 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                   |
| <b>Wavin AS+</b>                 |                     |                                         |                             |
| Ø 50 mm                          | 3,0 mm              | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 90 U/U                   |
| Ø 110 mm                         | 5,3 mm              | Intumescent wrap<br>50 mm, 2 x 4 layers | EI 90 U/U                   |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Combustible pipes - Regulated pipes with FEF-Insulation and intumescent wrap**

| Fire resistance classes - Wall |                     |                                  |                                         |                            |
|--------------------------------|---------------------|----------------------------------|-----------------------------------------|----------------------------|
| Service                        | Pipe wall thickness | Insulation                       | Measures                                | Wall Fire resistance class |
| <b>PP-H</b>                    |                     |                                  |                                         |                            |
| Ø 40 – 50 mm                   | 1,8 – 4,6 mm        | FEF acc. EN 14304<br>9 – 20,5 mm | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U / E 90 U/U       |
|                                |                     |                                  | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 90 U/U                  |
| Ø 50 – 75 mm                   | 1,9 – 8,2 mm        | FEF acc. EN 14304<br>9 – 22 mm   | Intumescent wrap<br>50 mm, 2 x 2 layers | EI 60 U/U / E 90 U/U       |
|                                |                     |                                  | Intumescent wrap<br>50 mm, 2 x 3 layers | EI 90 U/U                  |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

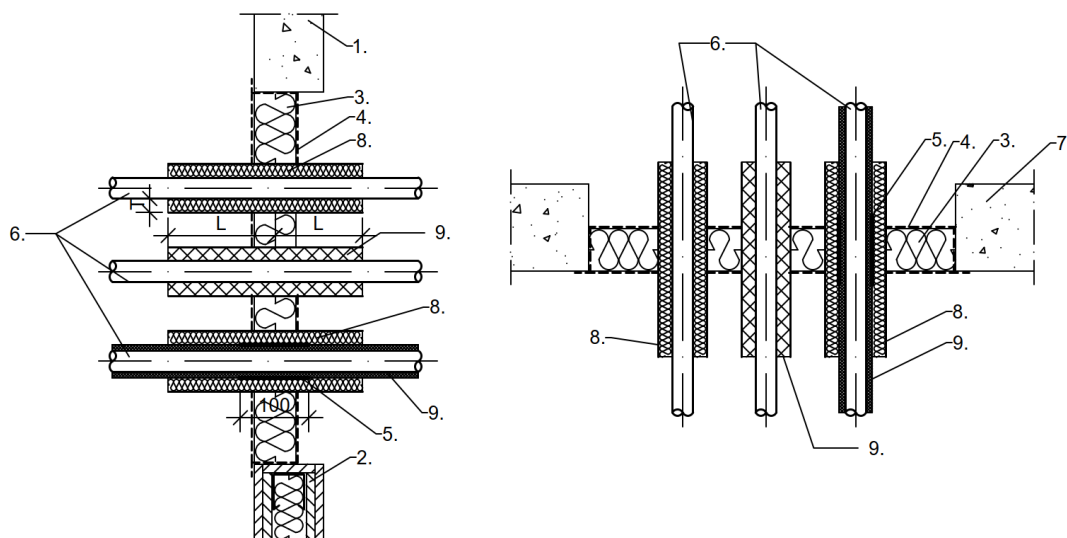
5. Fire protection wrap
6. FEF-Insulation
7. Combustible pipe

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 30 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)**

**Multilayer composite pipes - HENCO pipes with protective insulation of lamella mat or FEF**



| Fire resistance classes                                                                |                                                               |                               |                                |
|----------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                | Measures                                                      | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Multilayer composite pipes HENCO-pipes</b>                                          |                                                               |                               |                                |
| Outside pipe- $\varnothing \leq 12$ mm<br>wall thickness $\geq 1,6$ mm                 | Lamella mat<br>$\geq 250$ mm x $\geq 20$ mm                   | EI 30 U/C                     | EI 90 U/C                      |
| Outside pipe- $\varnothing \leq 32$ mm<br>wall thickness $\geq 3$ mm                   | Lamella mat<br>$\geq 250$ mm x $\geq 20$ mm                   | EI 30 U/C                     | EI 90 U/C                      |
| Outside pipe- $\varnothing \leq 63$ mm<br>wall thickness $\geq 4,5$ mm                 | Lamella mat<br>$\geq 250$ mm x $\geq 30$ mm                   | EI 30 U/C                     | EI 90 U/C                      |
| Outside pipe- $\varnothing \leq 12$ mm<br>wall thickness $\geq 1,6$ mm                 | FEF Armaflex Protect<br>$\geq 240$ mm x $\geq 13$ mm          | EI 30 U/C                     | EI 90 U/C                      |
| Outside pipe- $\varnothing \leq 32$ mm<br>wall thickness $\geq 3$ mm                   | FEF Armaflex Protect<br>$\geq 240$ mm x $\geq 13$ mm          | EI 90 U/C                     | EI 90 U/C                      |
| Outside pipe- $\varnothing \leq 63$ mm<br>wall thickness $\geq 4,5$ mm                 | FEF Armaflex Protect<br>$\geq 240$ mm x $\geq 26$ (2 x 13) mm | EI 30 U/C                     | EI 90 U/C                      |
| <b>Uponor MLC pipe white S with protective insulation of lamella mat or FEF</b>        |                                                               |                               |                                |
| Uponor MLC pipe white S<br>Outside pipe- $\varnothing$ 110 mm, wall<br>thickness=10 mm | lamella mat $\geq 250$ mm x $\geq 20$ mm                      | -                             | EI 60 / E 90 U/C               |
|                                                                                        | Armaflex Protect $\geq 240$ mm x $\geq 26$ mm                 | -                             | EI 60 U/C                      |

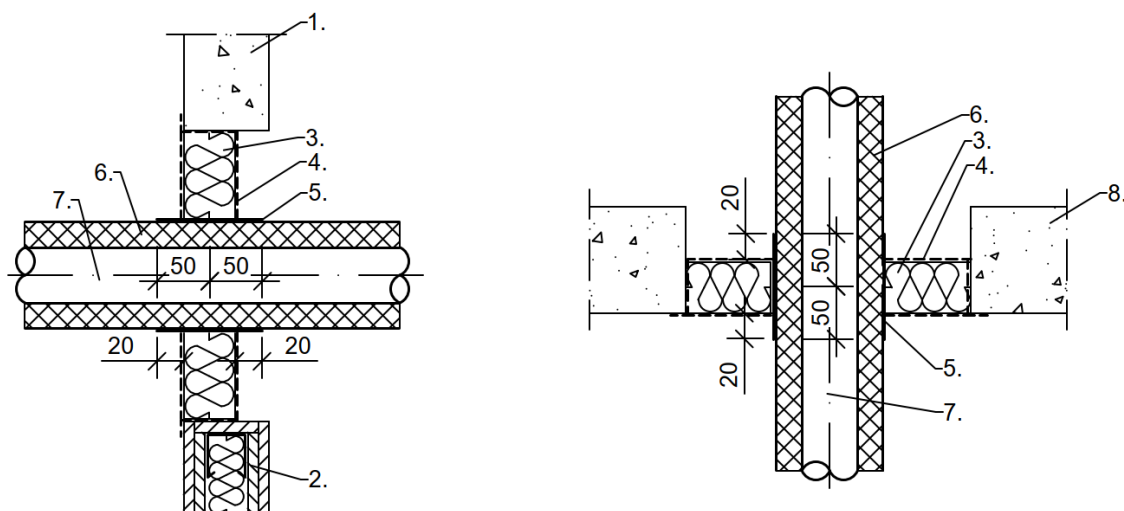
1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating
5. Intumescent wrap

6. Multilayer composite pipe
7. Rigid floor  $\geq 125$  mm thickness
8. Lamella mat
9. FEF insulation

Dimensions in mm

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Multilayer composite pipes - with insulation of FEF or PEF and intumescent wrap



| Fire resistance classes - Wall |                     |                                   |                      |                                          |                            |
|--------------------------------|---------------------|-----------------------------------|----------------------|------------------------------------------|----------------------------|
| Service                        | Pipe wall thickness | Insulation type                   | Insulation thickness | Measures                                 | Wall Fire resistance class |
| <b>Geberit Mepla</b>           |                     |                                   |                      |                                          |                            |
| Ø 16 mm                        | 2,25 mm             | FEF<br>acc. EN 14304<br>(B-s3,d0) | 8 – 35 mm            | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 60 U/C / E 90 U/C       |
| Ø 20 mm                        | 2,5 mm              |                                   | 16 – 35 mm           |                                          | EI 60 U/C / E 90 U/C       |
| Ø 26 mm                        | 3,0 mm              |                                   | 16 – 35 mm           |                                          | EI 60 U/C / E 90 U/C       |
| Ø 32 mm                        | 3,0 mm              |                                   | 16 – 35 mm           |                                          | EI 60 U/C / E 90 U/C       |
| Ø 40 mm                        | 3,5 mm              | CS                                | 14,0 – 39 mm         | Intumescent wrap<br>50 mm<br>2 x 2 layer | EI 60 U/C / E 90 U/C       |
| Ø 50 mm                        | 4,5 mm              |                                   | 14,0 – 39 mm         |                                          | EI 60 U/C / E 90 U/C       |
| Ø 63 mm                        | 4,5 mm              |                                   | 14,0 – 40,5 mm       |                                          | EI 60 U/C / E 90 U/C       |
| Ø 75 mm                        | 4,7 mm              |                                   | 14,0 – 40,5 mm       |                                          | EI 60 U/C / E 90 U/C       |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Fire protection wrap
6. FEF insulation
7. Multilayer composite pipe
8. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                         | Annex 32 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Multilayer composite pipes - with insulation of FEF or PEF and intumescent wrap**

| Fire resistance classes - Wall              |                     |                                   |                                     |                                          |                                   |                      |
|---------------------------------------------|---------------------|-----------------------------------|-------------------------------------|------------------------------------------|-----------------------------------|----------------------|
| Service                                     | Pipe wall thickness | Insulation type                   | Insulation thickness                | Measures                                 | Wall<br>Fire resistance class     |                      |
| Geberit FlowFit                             |                     |                                   |                                     |                                          |                                   |                      |
| Ø 16 mm                                     | 2,0 mm              | FEF<br>acc. EN 14304<br>(B-s3,d0) | ≥ 470 mm per site<br>8,5 – 33,5 mm  | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 90 U/C                         |                      |
|                                             |                     |                                   | ≥ 470 mm per site<br>8,5 – 35 mm    |                                          | EI 60 U/C / E 90 U/C              |                      |
| Ø 20 mm                                     | 2,0 mm              |                                   | ≥ 470 mm per site<br>13,0 mm        |                                          | EI 90 U/C                         |                      |
|                                             |                     |                                   | ≥ 470 mm per site<br>13,0 – 35 mm   |                                          | EI 60 U/C / E 90 U/C              |                      |
| Ø 25 mm                                     | 2,5 mm              |                                   | ≥ 470 mm per site<br>13,0 mm        |                                          | EI 90 U/C                         |                      |
|                                             |                     |                                   | ≥ 470 mm per site<br>13,0 – 35 mm   |                                          | EI 60 U/C / E 90 U/C              |                      |
| Ø 32 mm                                     | 2,8 mm              |                                   | LS / CS                             |                                          | ≥ 470 mm per site<br>13,0 mm      | EI 90 U/C            |
|                                             |                     |                                   |                                     |                                          | ≥ 470 mm per site<br>13,0 – 35 mm | EI 60 U/C / E 90 U/C |
| Ø 40 mm                                     | 3,0 mm              |                                   |                                     | ≥ 720 mm per site<br>16,5 – 40,5 mm      | EI 60 U/C / E 90 U/C              |                      |
| Ø 50 mm                                     | 3,8 mm              |                                   |                                     | ≥ 720 mm per site<br>17,0 – 40,5 mm      | EI 60 U/C / E 90 U/C              |                      |
| Ø 63 mm                                     | 4,0 mm              |                                   | ≥ 720 mm per site<br>17,0 – 40,5 mm | EI 60 U/C / E 90 U/C                     |                                   |                      |
| Ø 75 mm                                     | 4,6 mm              |                                   | ≥ 720 mm per site<br>17,5 – 40,5 mm | EI 60 U/C / E 90 U/C                     |                                   |                      |
| KeKelit KELOX KM 100 / KeKelit KELOX KM 110 |                     |                                   |                                     |                                          |                                   |                      |
| Ø 16 mm                                     | 2,0 mm              | FEF<br>acc. EN 14304<br>(B-s3,d0) | ≥ 220 mm per site<br>8,0 – 35 mm    | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 60 U/C / E 90 U/C              |                      |
|                                             |                     |                                   | ≥ 220 mm per site<br>10,0 – 35 mm   |                                          | EI 90 U/C                         |                      |
| Ø 18 mm                                     | 2,0 mm              |                                   | ≥ 220 mm per site<br>8,0 – 35 mm    |                                          | EI 60 U/C / E 90 U/C              |                      |
|                                             |                     |                                   | ≥ 220 mm per site<br>35 mm          |                                          | EI 90 U/C                         |                      |
| Ø 20 mm                                     | 2,25 mm             |                                   | ≥ 220 mm per site<br>8,5 – 35 mm    |                                          | EI 60 U/C / E 90 U/C              |                      |
|                                             |                     |                                   | ≥ 220 mm per site<br>35 mm          |                                          | EI 90 U/C                         |                      |
| Ø 25 mm                                     | 2,5 mm              |                                   | ≥ 220 mm per site<br>8,5 – 35 mm    |                                          | EI 60 U/C / E 90 U/C              |                      |
|                                             |                     |                                   | ≥ 220 mm per site<br>35 mm          |                                          | EI 90 U/C                         |                      |
| Ø 32 mm                                     | 3,0 mm              |                                   | LS / CS                             | ≥ 220 mm per site<br>9,0 – 35 mm         | EI 60 U/C / E 90 U/C              |                      |
|                                             |                     |                                   |                                     | ≥ 220 mm per site<br>35 mm               | EI 90 U/C                         |                      |
| Ø 40 mm                                     | 4,0 mm              |                                   |                                     | ≥ 470 mm per site<br>13,0 – 40,5 mm      | EI 60 U/C / E 90 U/C              |                      |
| Ø 50 mm                                     | 4,5 mm              |                                   |                                     | ≥ 470 mm per site<br>13,0 – 40,5 mm      | EI 60 U/C / E 90 U/C              |                      |
| Ø 63 mm                                     | 6,0 mm              |                                   |                                     | ≥ 470 mm per site<br>13,0 – 40,5 mm      | EI 60 U/C / E 90 U/C              |                      |
| Ø 75 mm                                     | 7,5 mm              |                                   |                                     | ≥ 470 mm per site<br>13,0 – 40,5 mm      | EI 60 U/C / E 90 U/C              |                      |

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 33 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Multilayer composite pipes - with insulation of FEF or PEF and intumescent wrap**

| Fire resistance classes - Wall              |                     |                                   |                      |                                          |                               |
|---------------------------------------------|---------------------|-----------------------------------|----------------------|------------------------------------------|-------------------------------|
| Service                                     | Pipe wall thickness | Insulation type                   | Insulation thickness | Measures                                 | Wall<br>Fire resistance class |
| Geberit Mepla                               |                     |                                   |                      |                                          |                               |
| Ø 16 mm                                     | 2,25 mm             | PEF<br>acc. EN 14313<br>(Class E) | 6 – 26 mm            | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 60 U/C / E 90 U/C          |
| Ø 20 mm                                     | 2,5 mm              |                                   | 6 – 26 mm            |                                          | EI 60 U/C / E 90 U/C          |
| Ø 26 mm                                     | 3,0 mm              | CS                                | 6 – 13 mm            |                                          | EI 60 U/C / E 90 U/C          |
|                                             |                     |                                   | 6 – 26 mm            |                                          | EI 45 U/C / E 90 U/C          |
| Geberit FlowFit                             |                     |                                   |                      |                                          |                               |
| Ø 16 mm                                     | 2,0 mm              | PEF<br>acc. EN 14313<br>(Class E) | 6 – 26 mm            | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 60 U/C / E 90 U/C          |
| Ø 20 mm                                     | 2,0 mm              |                                   | 6 – 26 mm            |                                          | EI 60 U/C / E 90 U/C          |
| Ø 25 mm                                     | 2,5 mm              | CS                                | 6 – 26 mm            |                                          | EI 60 U/C / E 90 U/C          |
| KeKelit KELOX KM 100 / KeKelit KELOX KM 110 |                     |                                   |                      |                                          |                               |
| Ø 16 mm                                     | 2,0 mm              | PEF<br>acc. EN 14313<br>(Class E) | 4 – 13 mm            | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 60 U/C / E 90 U/C          |
| Ø 18 mm                                     | 2,0 mm              |                                   | 4 – 13 mm            |                                          | EI 60 U/C / E 90 U/C          |
| Ø 20 mm                                     | 2,25 mm             |                                   | 4 – 13 mm            |                                          | EI 60 U/C / E 90 U/C          |
| Ø 25 mm                                     | 2,5 mm              |                                   | 4 – 13 mm            |                                          | EI 60 U/C / E 90 U/C          |
| Ø 32 mm                                     | 3,0 mm              | CS                                | 9 – 13 mm            |                                          | EI 60 U/C / E 90 U/C          |
|                                             |                     |                                   | 4 – 13 mm            |                                          | EI 45 U/C / E 90 U/C          |

| Fire resistance classes - Floor |                     |                                              |                      |                                           |                                |
|---------------------------------|---------------------|----------------------------------------------|----------------------|-------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation type                              | Insulation thickness | Measures                                  | Floor<br>Fire resistance class |
| Geberit Mepla                   |                     |                                              |                      |                                           |                                |
| Ø 16 mm                         | 2,25 mm             | FEF<br>acc. EN 14304<br>(B-s3, d0)<br><br>CS | 8 – 35 mm            | Intumescent wrap<br>50 mm<br>2 x 1 layer  | EI 60 U/C / E 90 U/C           |
| Ø 20 mm                         | 2,5 mm              |                                              | 8 – 35 mm            |                                           | EI 60 U/C / E 90 U/C           |
| Ø 26 mm                         | 3,0 mm              |                                              | 8 – 35 mm            |                                           | EI 60 U/C / E 90 U/C           |
| Ø 32 mm                         | 3,0 mm              |                                              | 8 – 35 mm            |                                           | EI 60 U/C / E 90 U/C           |
| Ø 40 mm                         | 3,5 mm              |                                              | 9 – 40,5 mm          | Intumescent wrap<br>50 mm<br>2 x 2 layers | EI 60 U/C / E 90 U/C           |
| Ø 50 mm                         | 4,5 mm              |                                              | 35 – 39 mm           |                                           | EI 90 U/C                      |
|                                 |                     |                                              | 9 – 39 mm            |                                           | EI 45 U/C / E 90 U/C           |
|                                 |                     |                                              | 14,0 – 40,5 mm       |                                           | EI 60 U/C / E 90 U/C           |
|                                 |                     | 39 mm                                        | EI 90 U/C            |                                           |                                |

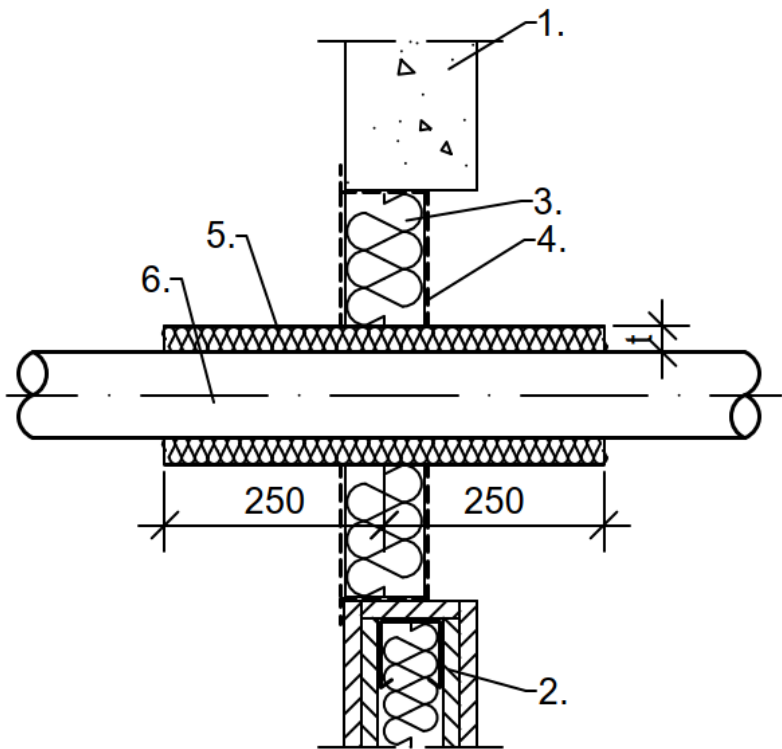
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| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 34 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Multilayer composite pipes - with insulation of FEF or PEF and intumescent wrap**

| Fire resistance classes - Floor |                     |                                                  |                                     |                                          |                                |
|---------------------------------|---------------------|--------------------------------------------------|-------------------------------------|------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation type                                  | Insulation thickness                | Measures                                 | Floor<br>Fire resistance class |
| Geberit Mepla                   |                     |                                                  |                                     |                                          |                                |
| Ø 63 mm                         | 4,5 mm              |                                                  | 9 – 40,5 mm                         |                                          | EI 45 U/C / E 90 U/C           |
|                                 |                     |                                                  | 39 mm                               |                                          | EI 90 U/C                      |
|                                 |                     |                                                  | 14,0 – 40,5 mm                      |                                          | EI 60 U/C / E 90 U/C           |
| Ø 75 mm                         | 4,7 mm              |                                                  | 9,5 – 40,5 mm                       | EI 45 U/C / E 90 U/C                     |                                |
|                                 |                     |                                                  | 17,0 - 40,5 mm                      | EI 60 U/C / E 90 U/C                     |                                |
| Geberit FlowFit                 |                     |                                                  |                                     |                                          |                                |
| Ø 16 mm                         | 2,0 mm              | FEF<br>acc. EN 14304<br>(B-s3,d0)<br><br>LS / CS | ≥ 220 mm per site<br>8,5 – 35 mm    | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 90 U/C                      |
| Ø 20 mm                         | 2,0 mm              |                                                  | ≥ 220 mm per site<br>8,5 – 35 mm    |                                          | EI 90 U/C                      |
| Ø 26 mm                         | 2,5 mm              |                                                  | ≥ 220 mm per site<br>13,0 – 35 mm   |                                          | EI 90 U/C                      |
| Ø 32 mm                         | 2,8 mm              |                                                  | ≥ 220 mm per site<br>13,0 – 35 mm   |                                          | EI 90 U/C                      |
| Ø 40 mm                         | 3,0 mm              |                                                  | ≥ 470 mm per site<br>20,5 – 40,5 mm | Intumescent wrap<br>50 mm<br>2 x 2 layer | EI 90 U/C                      |
| Ø 50 mm                         | 3,8 mm              |                                                  | ≥ 470 mm per site<br>16,5 – 40,5 mm |                                          | EI 60 U/C / E 90 U/C           |
|                                 |                     |                                                  | ≥ 470 mm per site<br>40,5 mm        |                                          | EI 90 U/C                      |
| Ø 63 mm                         | 4,0 mm              |                                                  | ≥ 470 mm per site<br>17,0 – 40,5 mm |                                          | EI 60 U/C / E 90 U/C           |
|                                 |                     |                                                  | ≥ 470 mm per site<br>40,5 mm        |                                          | EI 90 U/C                      |
| Ø 75 mm                         | 4,6 mm              |                                                  | ≥ 470 mm per site<br>17,0 – 40,5 mm |                                          | EI 60 U/C / E 90 U/C           |
|                                 |                     |                                                  | ≥ 470 mm per site<br>40,5 mm        |                                          | EI 90 U/C                      |
|                                 |                     |                                                  | ≥ 470 mm per site<br>17,5 – 40,5 mm |                                          | EI 60 U/C / E 90 U/C           |
| Geberit Mepla                   |                     |                                                  |                                     |                                          |                                |
| Ø 16 mm                         | 2,25 mm             | PEF<br>acc. EN 14313<br>(Class E)                | 6 – 26 mm                           | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 90 U/C                      |
| Ø 20 mm                         | 2,5 mm              |                                                  | 6 – 26 mm                           |                                          | EI 90 U/C                      |
| Ø 26 mm                         | 3,0 mm              | CS                                               | 6 – 26 mm                           |                                          | EI 90 U/C                      |
| Geberit FlowFit                 |                     |                                                  |                                     |                                          |                                |
| Ø 16 mm                         | 2,0 mm              | PEF<br>acc. EN 14313<br>(Class E)                | 6 – 26 mm                           | Intumescent wrap<br>50 mm<br>2 x 1 layer | EI 90 U/C                      |
| Ø 20 mm                         | 2,0 mm              |                                                  | 6 – 26 mm                           |                                          | EI 90 U/C                      |
| Ø 25 mm                         | 2,5 mm              | CS                                               | 6 – 26 mm                           |                                          | EI 90 U/C                      |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating (≥ 0,75 mm dft)

Geberit Mepla Systempipe ML with insulation of mineral fibre pipe shell



| Fire resistance classes - Wall |                     |                                           |                               |
|--------------------------------|---------------------|-------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                  | Wall<br>Fire resistance class |
| Geberit Mepla Systempipe ML    |                     |                                           |                               |
| ≤ 63 mm                        | 2,25 – 4,5 mm       | Pipe shell<br>Both sides ≥ 250 x 20-30 mm | EI 60 U/C /<br>E 90 U/C       |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board
4. Ablative Coating

5. Pipe shell

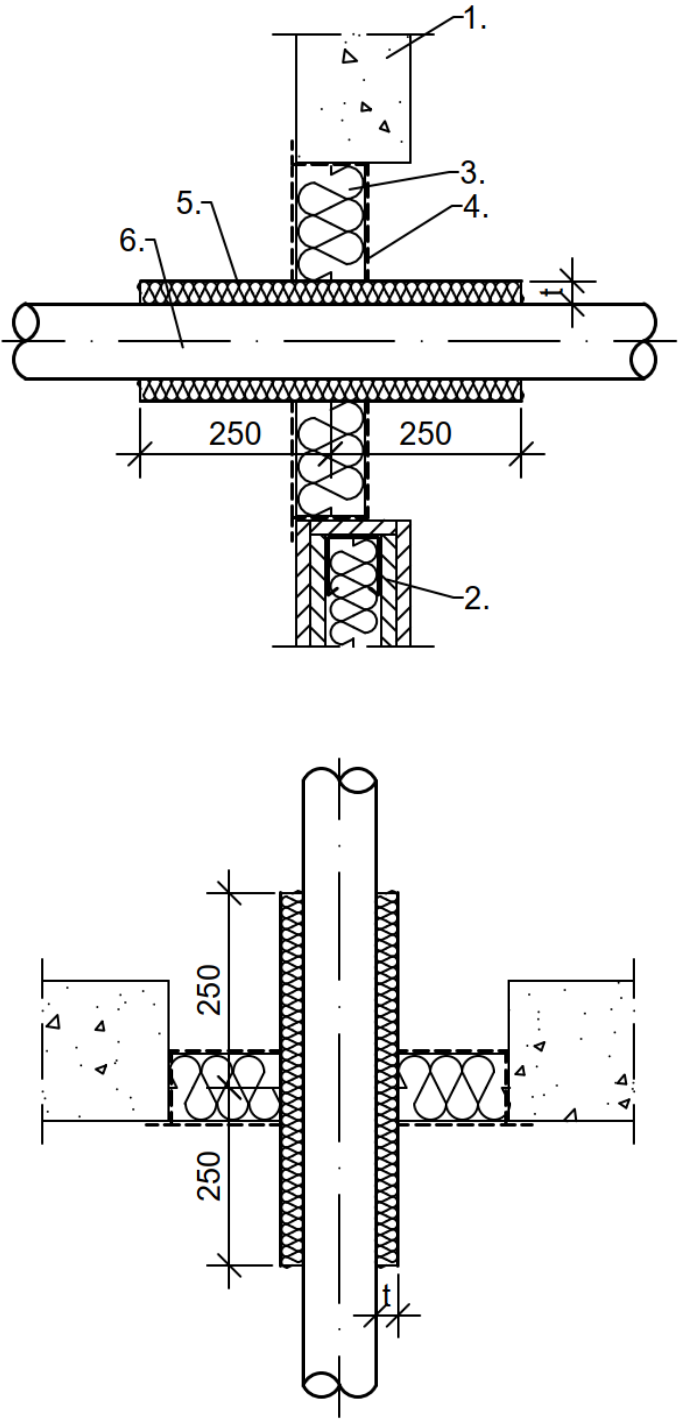
6. Geberit Mepla Systempipe ML

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                                | Annex 36 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Multilayer pipes with insulation of mineral fibre lamella mat



- |                                          |                                |
|------------------------------------------|--------------------------------|
| 1. Rigid wall $\geq 100$ thickness       | 5. Intumescent wrap            |
| 2. Flexible wall $\geq 100$ mm thickness | 6. Lamella mat                 |
| 3. Mineral fibre board                   | 7. Geberit Mepla Systempipe ML |
| 4. Ablative Coating                      |                                |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                                | Annex 37 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Multilayer pipes with insulation of mineral fibre lamella mat**

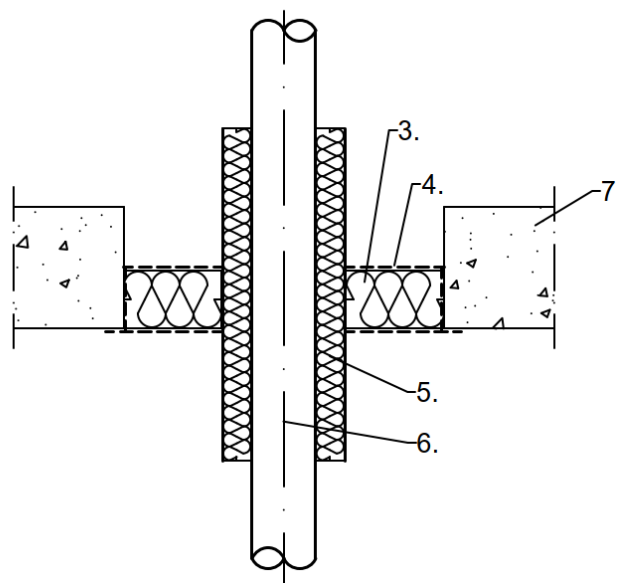
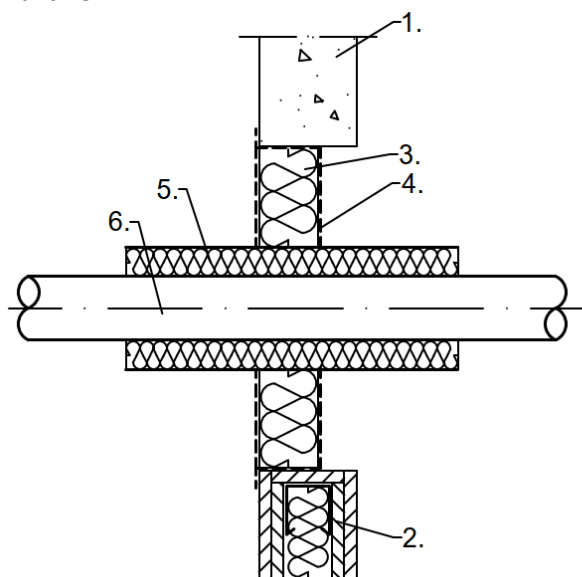
| Fire resistance classes - Wall                     |                     |                      |          |                               |
|----------------------------------------------------|---------------------|----------------------|----------|-------------------------------|
| Service                                            | Pipe wall thickness | Insulation thickness | Measures | Wall<br>Fire resistance class |
| <b>Geberit Mepla</b>                               |                     |                      |          |                               |
| Ø 16 mm                                            | 2,25 mm             | 20 – 60 mm           | -        | EI 90 U/C                     |
| Ø 16 – 75 mm                                       | 2,25 – 4,7 mm       | 30 – 60 mm           | -        | EI 90 U/C                     |
| <b>Geberit FlowFit</b>                             |                     |                      |          |                               |
| Ø 16 – 75 mm                                       | 2,0 – 4,6 mm        | 30 – 60 mm           | -        | EI 90 U/C                     |
| Ø 16 – 40 mm                                       | 2,0 – 3,0 mm        | 20 – 60 mm           | -        | EI 60 U/C /<br>E 90 U/C       |
| <b>KeKelit KELOX KM 100 / KeKelit KELOX KM 110</b> |                     |                      |          |                               |
| Ø 16 – 32 mm                                       | 2,0 – 3,0 mm        | 20 – 80 mm           | -        | EI 90 U/C                     |
| Ø 32 – 75 mm                                       | 3,0 – 7,5 mm        | 30 – 80 mm           | -        | EI 90 U/C                     |

| Fire resistance classes - Floor |                     |                      |          |                                |
|---------------------------------|---------------------|----------------------|----------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation thickness | Measures | Floor<br>Fire resistance class |
| <b>Geberit Mepla</b>            |                     |                      |          |                                |
| Ø 16 mm                         | 2,25 mm             | 20 – 60 mm           | -        | EI 90 U/C                      |
| Ø 16 – 75 mm                    | 2,25 – 4,7 mm       | 30 – 60 mm           | -        | EI 90 U/C                      |
| <b>Geberit FlowFit</b>          |                     |                      |          |                                |
| Ø 16 – 20 mm                    | 2,0 mm              | 20 – 60 mm           | -        | EI 90 U/C                      |
| Ø 20 – 75 mm                    | 2,0 – 4,6 mm        | 30 – 60 mm           | -        | EI 60 U/C /<br>E 90 U/C        |

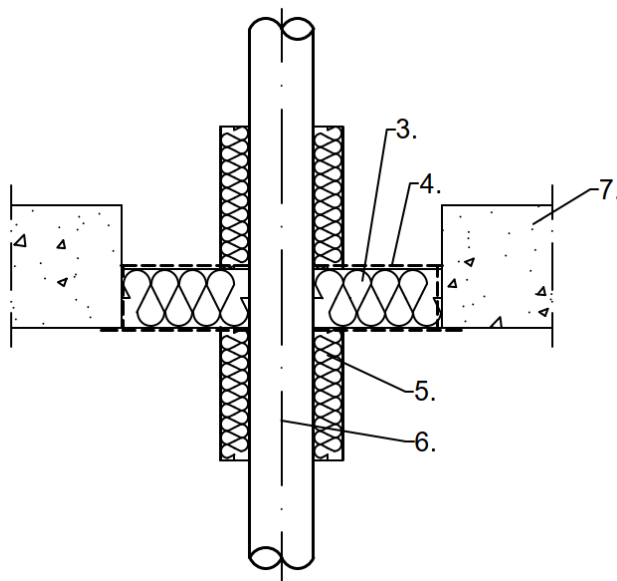
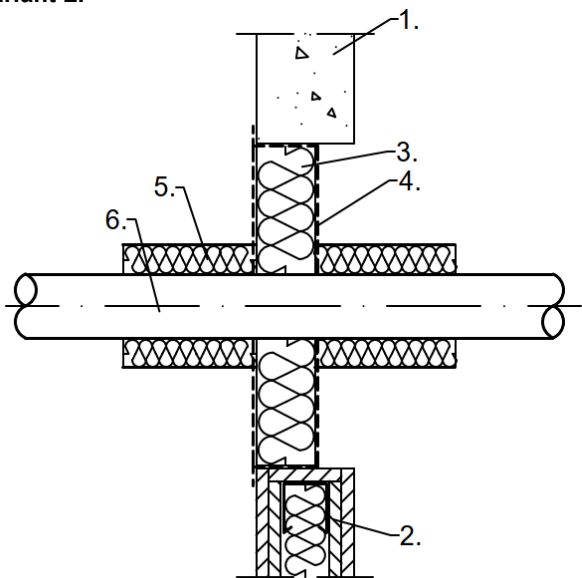
**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)**

**Non-combustible pipes - single metal pipes with insulation made of mineral-fibre lamella mat**

**Variant LS**



**Variant LI**



**All angles between 90° and 45° are permissible**

- |                                          |                                        |
|------------------------------------------|----------------------------------------|
| 1. Rigid wall $\geq 100$ thickness       | 5. Lamella mat                         |
| 2. Flexible wall $\geq 100$ mm thickness | 6. Non-combustible pipe                |
| 3. Mineral fibre board                   | 7. Rigid floor $\geq 125$ mm thickness |
| 4. Ablative Coating                      |                                        |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 39 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Non-combustible pipes - Single metal pipes with insulation made of mineral-fibre lamella mat**

| Fire resistance classes - Wall                              |                           |                     |                                                        |                               |
|-------------------------------------------------------------|---------------------------|---------------------|--------------------------------------------------------|-------------------------------|
| Service                                                     | Outside-Ø                 | Pipe wall thickness | Measures                                               | Wall<br>Fire resistance class |
| Non-combustible pipes with insulation made of mineral fibre |                           |                     |                                                        |                               |
| Copper, steel, stainless steel, cast iron                   | $\leq 60$ mm              | 0,6 – 14,2 mm       | Lamella mat<br>Both sides $\geq 470 \times 30$ -100 mm | EI 60 U/C / E 90 U/C          |
|                                                             | $> 60 - \leq 88,9$ mm     | 0,6/2,0 – 14,2 mm   | Lamella mat<br>Both sides $\geq 720 \times 30$ -100 mm | EI 60 U/C / E 90 U/C          |
| Steel, stainless steel, cast iron                           | $> 60 - \leq 114,3$ mm    | 0,6/2,8 – 14,2 mm   | Lamella mat<br>Both sides $\geq 470 \times 30$ -100 mm | EI 60 U/C / E 90 U/C          |
|                                                             | $> 114,3 - \leq 219,1$ mm | 2,8/4,5 – 14,2 mm   | Lamella mat<br>Both sides $\geq 970 \times 30$ -100 mm | EI 60 U/C / E 90 U/C          |

| Fire resistance classes - Floor                             |                          |                     |                                                        |                                |
|-------------------------------------------------------------|--------------------------|---------------------|--------------------------------------------------------|--------------------------------|
| Service                                                     | Outside-Ø                | Pipe wall thickness | Measures                                               | Floor<br>Fire resistance class |
| Non-combustible pipes with insulation made of mineral fibre |                          |                     |                                                        |                                |
| Copper, steel, stainless steel, cast iron                   | $\leq 15$ mm             | 0,8 – 14,2 mm       | Lamella mat<br>Both sides $\geq 220 \times 30$ -100 mm | EI 60 U/C / E 90 U/C           |
|                                                             | $> 15 - \leq 42$ mm      | 0,8/1,0 – 14,2 mm   | Lamella mat<br>Both sides $\geq 470 \times 30$ -100 mm | EI 60 U/C / E 90 U/C           |
|                                                             | $\leq 42$ mm             | 1,0 – 14,2 mm       | Lamella mat<br>Both sides $\geq 470 \times 30$ mm      | EI 90 U/C                      |
|                                                             | $> 42 - \leq 88,9$ mm    | 1,0/2,0 – 14,2 mm   | Lamella mat<br>Both sides $\geq 970 \times 30$ -100 mm | EI 60 U/C / E 90 U/C           |
|                                                             |                          |                     | Lamella mat<br>Both sides $\geq 970 \times 30$ mm      | EI 90 U/C                      |
| Steel, stainless steel, cast iron                           | $\leq 63,5$ mm           | 0,8/2,3 – 14,2 mm   | Lamella mat<br>Both sides $\geq 220 \times 30$ -100 mm | EI 90 U/C                      |
|                                                             | $> 63,5 - \leq 114,3$ mm | 2,3/3,2 – 14,2 mm   | Lamella mat<br>Both sides $\geq 470 \times 30$ -100 mm | EI 90 U/C                      |
|                                                             | $> 114,3 - \leq 159$ mm  | 3,2/3,6 – 14,2 mm   | Lamella mat<br>Both sides $\geq 970 \times 30$ -100 mm | EI 90 U/C                      |
|                                                             | $> 159 - \leq 219,1$ mm  | 3,6/4,0 – 14,2 mm   | Lamella mat<br>Both sides $\geq 970 \times 30$ -100 mm | EI 60 U/C / E 90 U/C           |

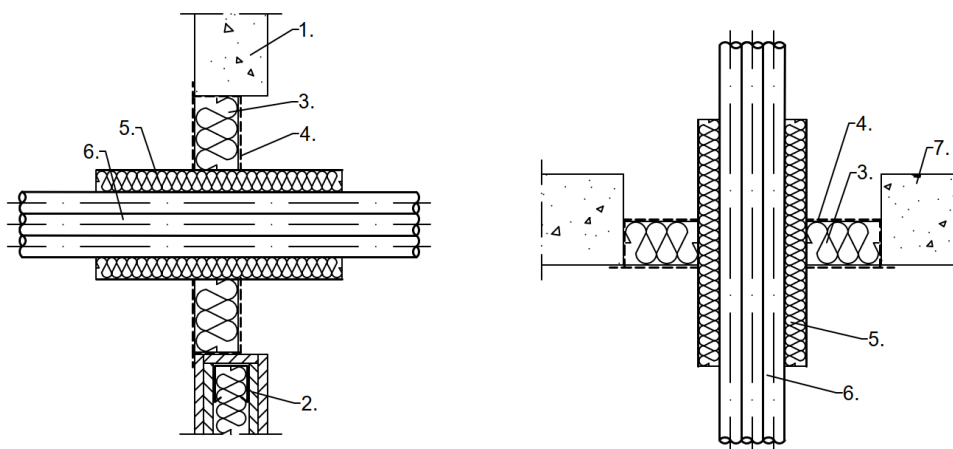
Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 40 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

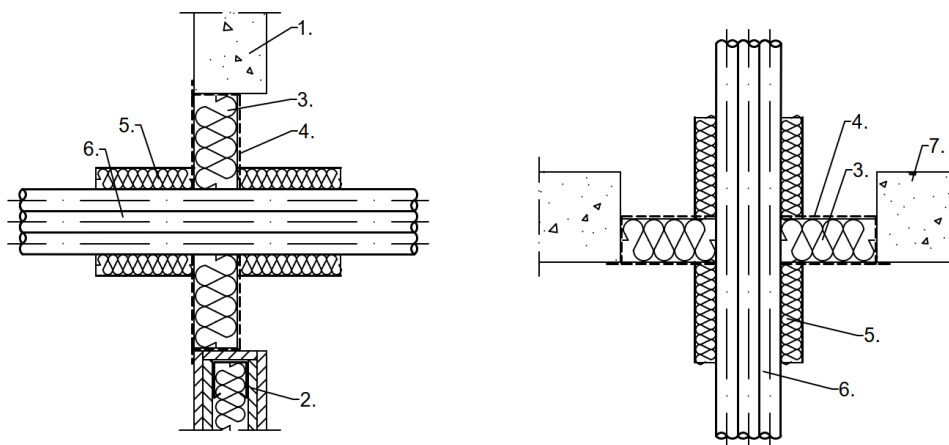
Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Non-combustible pipes - Multiple metal pipes with section insulation made of mineral-fibre lamella mat

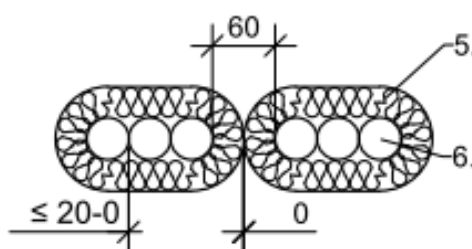
#### Variant LS



#### Variant LI



Detail, Distance to each other:



| Fire resistance classes                   |                      |                     |                                         |                               |                                |
|-------------------------------------------|----------------------|---------------------|-----------------------------------------|-------------------------------|--------------------------------|
| Service                                   | Outside-Ø            | Pipe wall thickness | Measures                                | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Copper, steel, stainless steel, cast iron | Max. 3x<br>Ø ≤ 22 mm | 1,0 – 14,2 mm       | Lamella mat<br>Both sides ≥ 470 x 30 mm | EI 60 U/C / E 90 U/C          | EI 45 U/C / E 90 U/C           |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

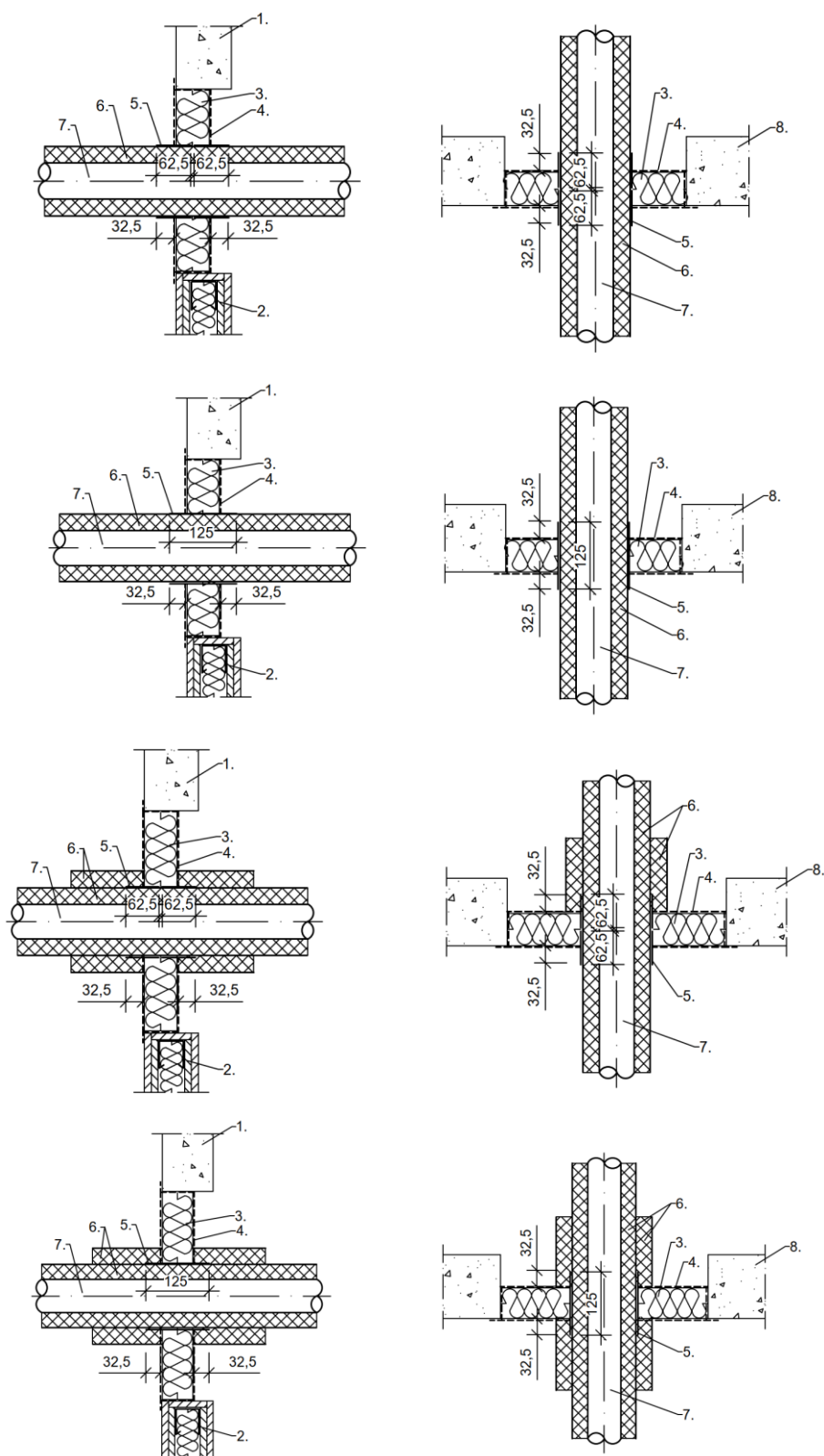
5. Mineral fibre lamella mat
6. Multiple metal pipes
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 41 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)**

**Non-combustible pipes - Metal pipes with insulation made of FEF and intumescent wrap**



1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. FEF-Insulation
7. Non-combustible pipe
8. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 42 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Non-combustible pipes - Metal pipes with insulation made of FEF and intumescent wrap**

| Fire resistance classes - Wall                                  |                     |                     |                        |                      |                                                                                                         |                            |
|-----------------------------------------------------------------|---------------------|---------------------|------------------------|----------------------|---------------------------------------------------------------------------------------------------------|----------------------------|
| Service                                                         | Outside-Ø           | Pipe wall thickness | Insulation Type        | Insulation Thickness | Measures                                                                                                | Wall Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                     |                     |                        |                      |                                                                                                         |                            |
| Copper, steel, stainless steel, cast iron                       | ≤ 15 mm             | 0,6 – 14,2 mm       | FEF acc. EN 14304 (CS) | 10 – 26 mm           | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers                                                 | EI 90 U/C                  |
|                                                                 | > 15 - ≤ 42 mm      |                     |                        | 10 – 38 mm           |                                                                                                         | EI 60 U/C / E 90 U/C       |
|                                                                 |                     |                     |                        | 16,5 – 26 mm         |                                                                                                         | EI 90 U/C                  |
|                                                                 |                     |                     |                        | 12 – 38 mm           |                                                                                                         | EI 60 U/C / E 90 U/C       |
|                                                                 |                     |                     |                        | 10 – 38 mm           |                                                                                                         | EI 30 U/C                  |
|                                                                 |                     |                     |                        | 19 mm                |                                                                                                         | EI 90 U/C                  |
|                                                                 | > 42 - ≤ 60 mm      |                     |                        | 19 – 38 mm           |                                                                                                         | EI 60 U/C / E 90 U/C       |
|                                                                 |                     |                     |                        | 22,5 – 38 mm         |                                                                                                         | EI 60 U/C / E 90 U/C       |
|                                                                 | > 60 - ≤ 88,9 mm    |                     |                        | 18 – 38 mm           |                                                                                                         | EI 30 U/C                  |
| Steel, stainless steel, cast iron                               | ≤ 88,9 mm           | 0,6/2,6 – 14,2 mm   | FEF acc. EN 14304 (CS) | 18 mm                | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers                                                 | EI 90 U/C                  |
|                                                                 | > 88,9 - ≤ 114,3 mm | 2,6/3,2 – 14,2 mm   |                        | 15,5 – 38 mm         |                                                                                                         | EI 60 U/C                  |
|                                                                 |                     |                     |                        | 19 – 38 mm           |                                                                                                         | EI 60 U/C                  |
|                                                                 | > 114,3 - ≤ 159 mm  | 3,2/3,6 – 14,2 mm   |                        | 25 – 38 mm           | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers<br>+ Protective Insulation<br>FEF ≥ 250 x 19 mm | EI 60 U/C / E 90 U/C       |
|                                                                 | > 159 - ≤ 219,1 mm  | 3,6/4,5 – 14,2 mm   |                        |                      | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers<br>+ Protective Insulation<br>FEF ≥ 250 x 38 mm | EI 60 U/C / E 90 U/C       |
|                                                                 |                     |                     |                        |                      |                                                                                                         |                            |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                         | Annex 43 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)****Non-combustible pipes - Metal pipes with insulation made of FEF and intumescent wrap**

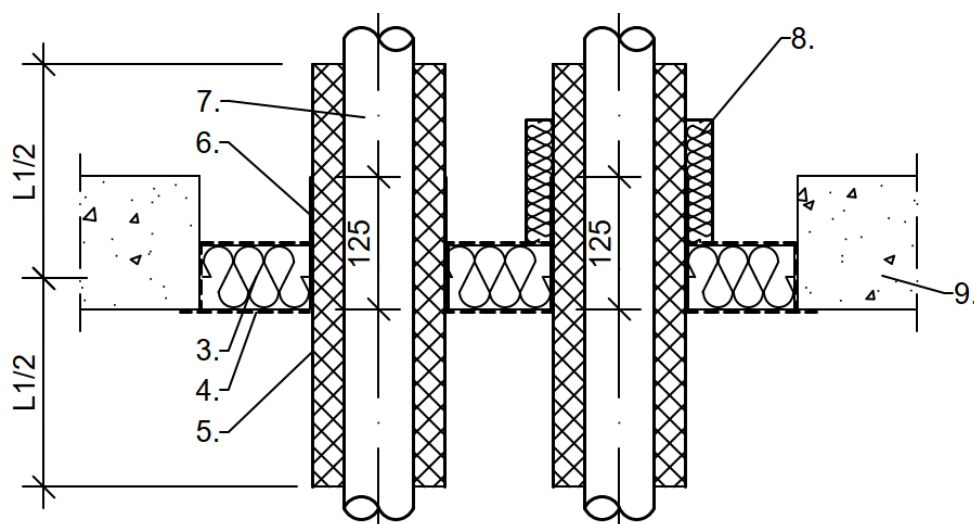
| Fire resistance classes - Floor                                 |                     |                     |                   |                      |                                                                                                         |                             |
|-----------------------------------------------------------------|---------------------|---------------------|-------------------|----------------------|---------------------------------------------------------------------------------------------------------|-----------------------------|
| Service                                                         | Outside-Ø           | Pipe wall thickness | Insulation Type   | Insulation Thickness | Measures                                                                                                | Floor Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                     |                     |                   |                      |                                                                                                         |                             |
| Copper, steel, stainless steel, cast iron                       | ≤ 15 mm             | 0,6 – 14,2 mm       | FEF acc. EN 14304 | 38 mm                | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers                                                 | EI 90 U/C                   |
|                                                                 |                     |                     |                   | 10 – 38 mm           |                                                                                                         | EI 60 U/C / E 90 U/C        |
|                                                                 | > 15 - ≤ 42 mm      |                     |                   | 38 mm                |                                                                                                         | EI 90 U/C                   |
|                                                                 |                     |                     |                   | 12 – 38 mm           |                                                                                                         | EI 60 U/C / E 90 U/C        |
|                                                                 |                     |                     |                   | 10 – 38 mm           |                                                                                                         | EI 30 U/C                   |
|                                                                 | > 42 - ≤ 88,9 mm    |                     |                   | 38 mm                |                                                                                                         | EI 90 U/C                   |
|                                                                 |                     |                     |                   | 19 – 38 mm           |                                                                                                         | EI 60 U/C / E 90 U/C        |
| Steel, stainless steel, cast iron                               | ≤ 88,9 mm           | 0,6– 14,2 mm        | (CS)              | 18,5 – 38 mm         | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers                                                 | EI 60 U/C                   |
|                                                                 | > 88,9 - ≤ 114,3 mm | 0,6/3,2 – 14,2 mm   |                   | 18,5 – 38 mm         |                                                                                                         | EI 60 U/C                   |
|                                                                 | > 114,3 - ≤ 159 mm  | 3,2/3,6 – 14,2 mm   |                   | 25 – 38 mm           | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers<br>+ Protective Insulation<br>FEF ≥ 250 x 19 mm | EI 60 U/C / E 90 U/C        |
|                                                                 | > 159 - ≤ 219,1 mm  | 3,6/4,5 – 14,2 mm   |                   |                      | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers<br>+ Protective Insulation<br>FEF ≥ 250 x 38 mm | EI 60 U/C / E 90 U/C        |

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 44 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Non-combustible pipes - Metal pipes with insulation made of FEF and intumescent wrap



| Fire resistance classes - Floor                                 |                                   |                     |                        |                      |                                                                                           |                                                         |
|-----------------------------------------------------------------|-----------------------------------|---------------------|------------------------|----------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Service                                                         | Outside-Ø                         | Pipe wall thickness | Insulation Type        | Insulation Thickness | Measures                                                                                  | Floor Fire resistance class                             |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                                   |                     |                        |                      |                                                                                           |                                                         |
| Copper, steel, stainless steel, cast iron                       | ≤ 42 mm                           | 1,2 – 14,2 mm       | FEF acc. EN 14304 (CS) | 25 - 44 mm           | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers                                   | EI 60 C/U                                               |
|                                                                 | ≤ 54 mm                           | 1,5 – 14,2 mm       |                        | 28 – 57 mm           | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers + Lamella Mat ≥ 500 mm x 30 mm    | EI 90 C/U                                               |
|                                                                 | ≤ 88.9 mm                         | 2,0 – 14,2 mm       |                        | 25 – 89 mm           | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers<br>+ Lamella Mat ≥ 500 mm x 40 mm | EI 60 C/U                                               |
|                                                                 | ≤ 108 mm                          | 2,5 – 14,2 mm       |                        | 57 mm                | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers                                   | EI 90 C/U                                               |
|                                                                 |                                   |                     |                        | 57 – 89 mm           | + Lamella Mat ≥ 1000 mm x 40 mm                                                           | EI 60 C/U                                               |
|                                                                 | Steel, stainless steel, cast iron | ≤ 170 mm            |                        | 2,9– 14,2 mm         | 57 mm                                                                                     | Intumescent wrap<br>2 x 62,5/1 x 125 mm<br>1 x 2 layers |
| 57 – 89 mm                                                      |                                   |                     |                        |                      | + Lamella Mat ≥ 1000 mm x 40 mm                                                           | EI 60 C/U                                               |

- 3. Mineral fibre board
- 4. Ablative Coating
- 5. Intumescent wrap
- 6. Lamella mat

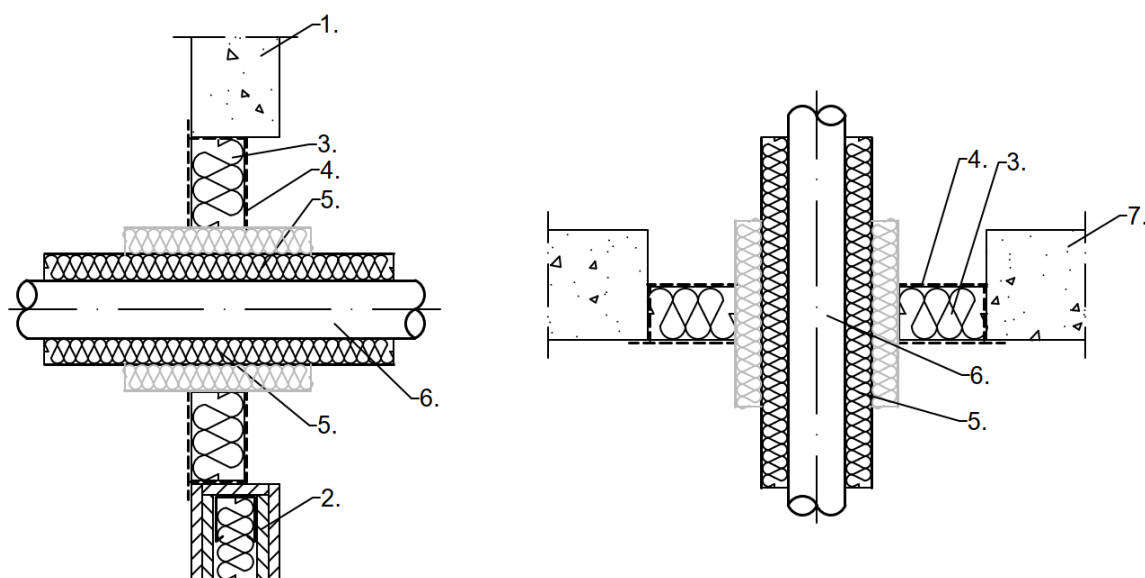
- 7. Multilayer composite pipe
- 8. FEF insulation
- 9. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 45 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)**

**Non-combustible pipes with insulation made of mineral-fibre lamella mat and with protective insulation of lamella mat depending on pipe outer- $\varnothing$**



| Fire resistance classes                                                                                                                            |                                                                 |                               |                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                                            | Measures                                                        | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Non-combustible pipes made of copper, steel, stainless steel or cast iron with non-combustible insulation made of mineral fibre lamella mat</b> |                                                                 |                               |                                |
| Pipe outer- $\varnothing \leq 15$ mm,<br>wall thickness $\geq 0,8$ mm                                                                              | $\geq 250$ mm x $\geq 20$ mm                                    | EI 60 / E90 C/U               | EI 60 C/U                      |
| Pipe outer- $\varnothing \leq 22$ mm,<br>wall thickness $\geq 1$ mm                                                                                | $\geq 250$ mm x $\geq 60$ mm                                    | EI 60 / E90 C/U               | EI 60 C/U                      |
| Pipe outer- $\varnothing \leq 22$ mm,<br>wall thickness $\geq 1$ mm                                                                                | $\geq 500$ mm x $\geq 20$ mm                                    | EI 60 / E90 C/U               | EI 60 C/U                      |
| Pipe outer- $\varnothing \leq 54$ mm,<br>wall thickness $\geq 1,5$ mm                                                                              | $\geq 500$ mm x $\geq 30$ mm                                    | EI 60 / E90 C/U               | EI 60 C/U                      |
| Pipe outer- $\varnothing \leq 88,9$ mm,<br>wall thickness $\geq 2$ mm                                                                              | $\geq 800$ mm x $\geq 40$ mm                                    | EI 60 / E90 C/U               | EI 60 C/U                      |
| <b>Non-combustible pipes made of steel, stainless steel or cast iron with non-combustible insulation made of mineral fibre lamella mat</b>         |                                                                 |                               |                                |
| Pipe outer- $\varnothing \leq 88,9$ mm,<br>wall thickness $\geq 2$ mm                                                                              | $\geq 800$ mm x $\geq 40$ mm                                    | EI 90 C/U                     | EI 60 C/U                      |
| Pipe outer- $\varnothing \leq 114,3$ mm,<br>wall thickness $\geq 3,6$ mm                                                                           | $\geq 500$ mm x $\geq 40$ mm                                    | EI 60 / E 90 C/U              | EI 60 C/U                      |
| Pipe outer- $\varnothing \leq 170$ mm,<br>wall thickness $\geq 3$ mm                                                                               | $\geq 800$ mm x $\geq 60$ mm<br>+ $\geq 500$ mm x $\geq 30$ mm* | EI 60 C/U                     | EI 60 C/U                      |
| Pipe outer- $\varnothing \leq 219,1$ mm,<br>wall thickness $\geq 5$ mm                                                                             | $\geq 800$ mm x $\geq 60$ mm<br>+ $\geq 500$ mm x $\geq 30$ mm* | EI 60 / E 90 C/U              | EI 60 C/U                      |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

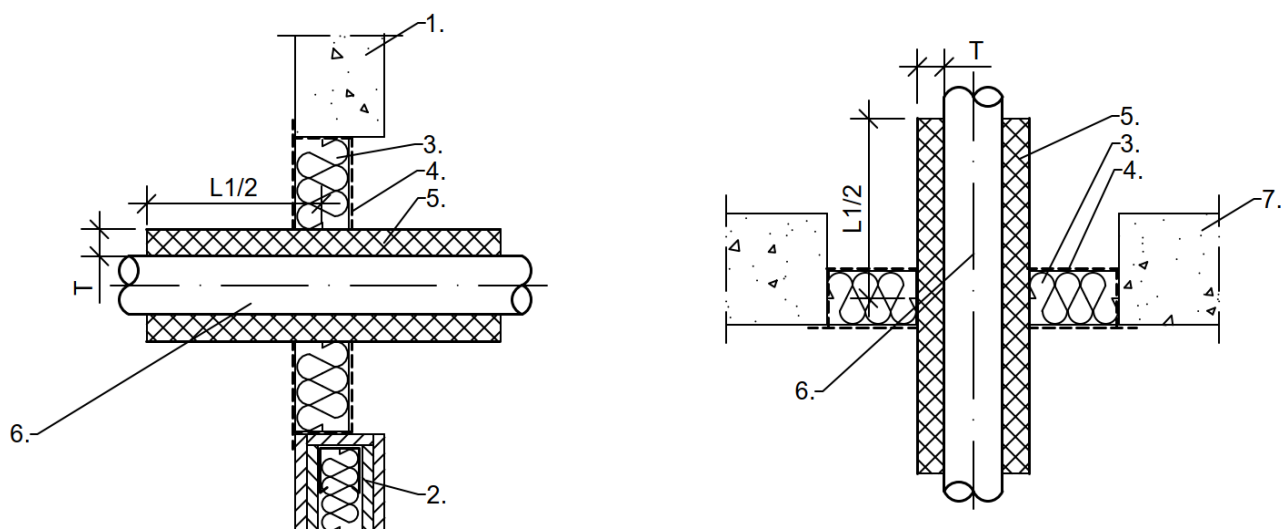
5. Lamella mat
6. Non-combustible pipe
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 46 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Non-combustible pipes section insulation made of FEF "Armaflex Protect"



| Fire resistance classes                                                                                                       |                                 |                               |                                |
|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                       | Measures<br>Insulation L1/2 X T | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Non-combustible pipes made of copper, steel, stainless steel or cast iron with combustible insulation Armaflex Protect</b> |                                 |                               |                                |
| Pipe outer- $\varnothing \leq 88,9$ mm,<br>wall thickness $\geq 0,8$ mm                                                       | $\geq 500$ mm x 25 - 51 mm      | EI 60 / E90 C/U               | EI 60 / E 90 C/U               |
| <b>Non-combustible pipes made of steel, stainless steel or cast iron with combustible insulation Armaflex Protect</b>         |                                 |                               |                                |
| Pipe outer- $\varnothing \leq 170$ mm,<br>wall thickness $\geq 3$ mm                                                          | $\geq 1000$ mm x 26 - 52 mm     | EI 90 C/U                     | EI 60 / E 90 C/U               |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

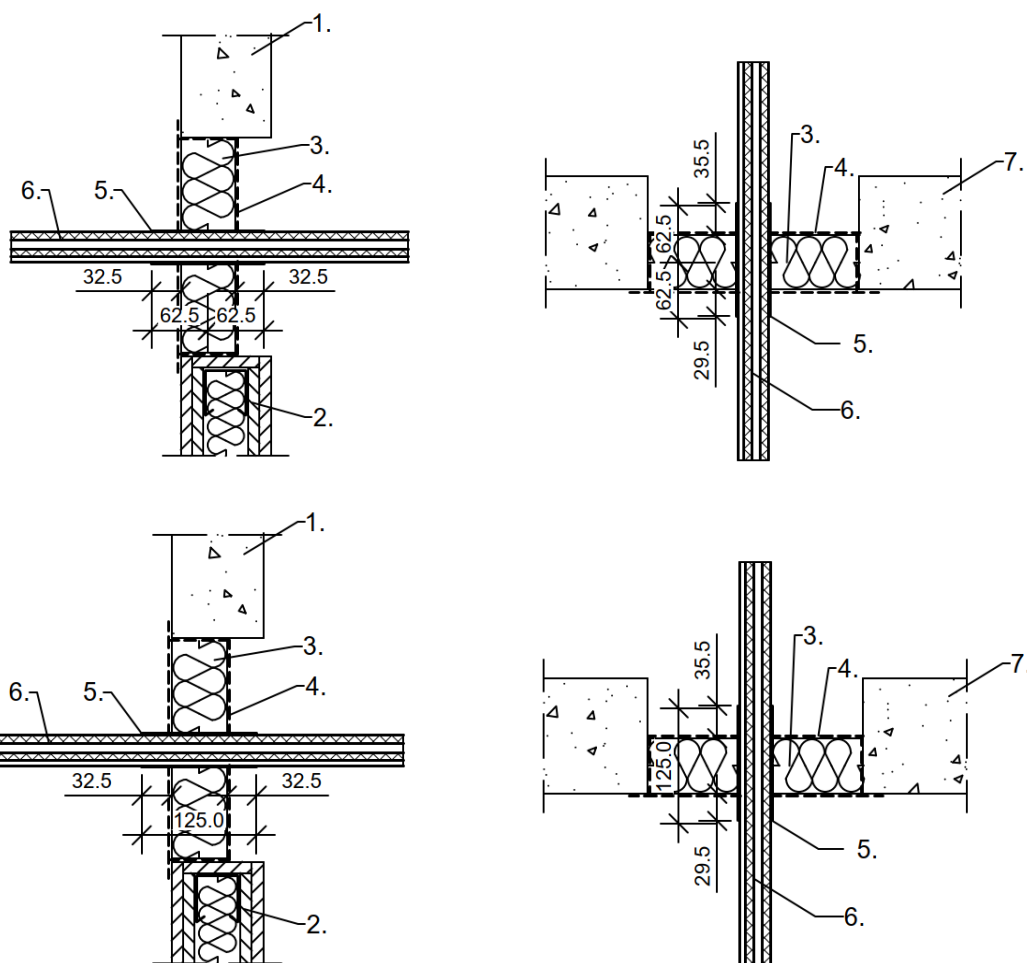
5. Armaflex Protect
6. Non-combustible pipe
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

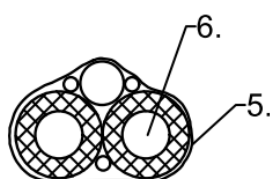
|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 47 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

HVAC split line combination with intumescent wrap and additional protective insulation of mineral-fibre mat depending on copper-pipe Ø



Detail view:



| Fire resistance classes                                                                                                                                                |                                                                       |                               |                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                                                                | Measures                                                              | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>HVAC split line combinations</b>                                                                                                                                    |                                                                       |                               |                                |
| Copper pipe $\leq 2 \times \text{Ø} \leq 18$<br>+ PE-Foam 9 mm<br>+ 1 x PVC-U/PVC-C pipe $\text{Ø} \leq 25 \times 1,5$ mm<br>+ $\leq 3$ x cables $\text{Ø} \leq 14$ mm | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>1 x 2 layers | EI 60                         | EI 60                          |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

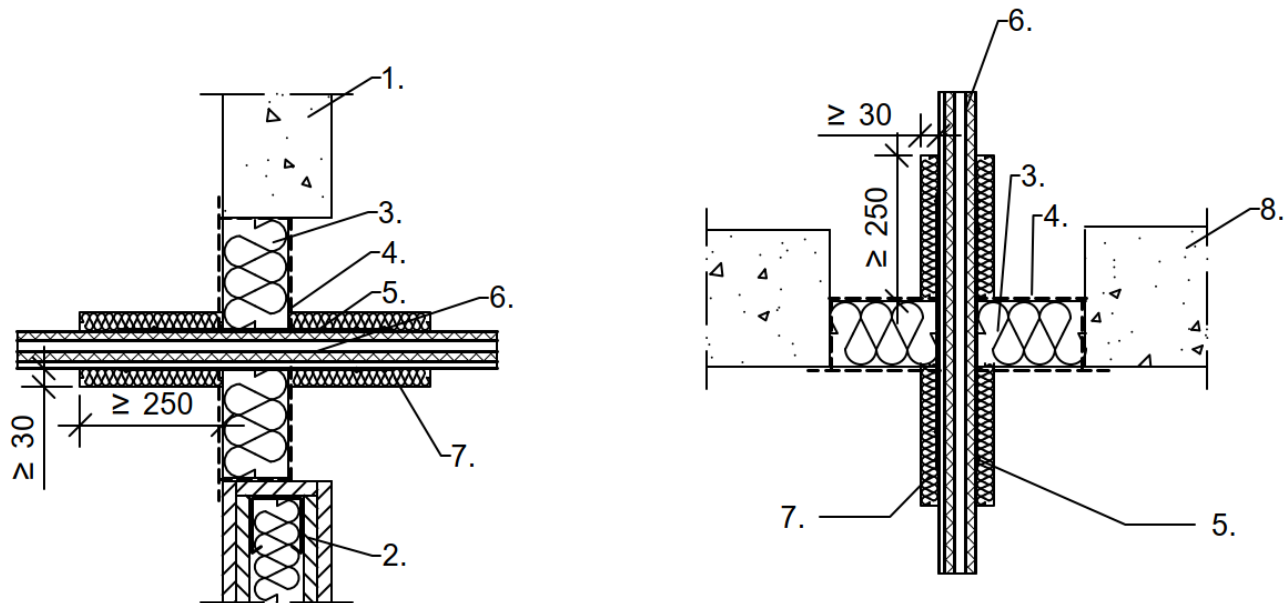
5. Intumescent wrap
6. HVAC split line combination
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 48 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

HVAC split line combination with intumescent wrap and additional protective insulation of mineral-fibre mat depending on copper-pipe Ø



| Fire resistance classes                                                                                          |                                                                                           |                               |                                |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                          | Measures                                                                                  | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| HVAC split line combinations                                                                                     |                                                                                           |                               |                                |
| Pipe-Ø 22/22 mm or Ø 6 - 22 mm<br>with 9 mm PE-foam<br>+ PVC-U pipe ≤ Ø 25 mm<br>+ 2 accompanying cables ≤ 21 mm | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ lamella mat ≥ 250 x ≥30 mm | EI 30                         | EI 90                          |

1. Rigid wall  $\geq 100$  thickness

2. Flexible wall  $\geq 100$  mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Intumescent wrap

6. HVAC split line combination

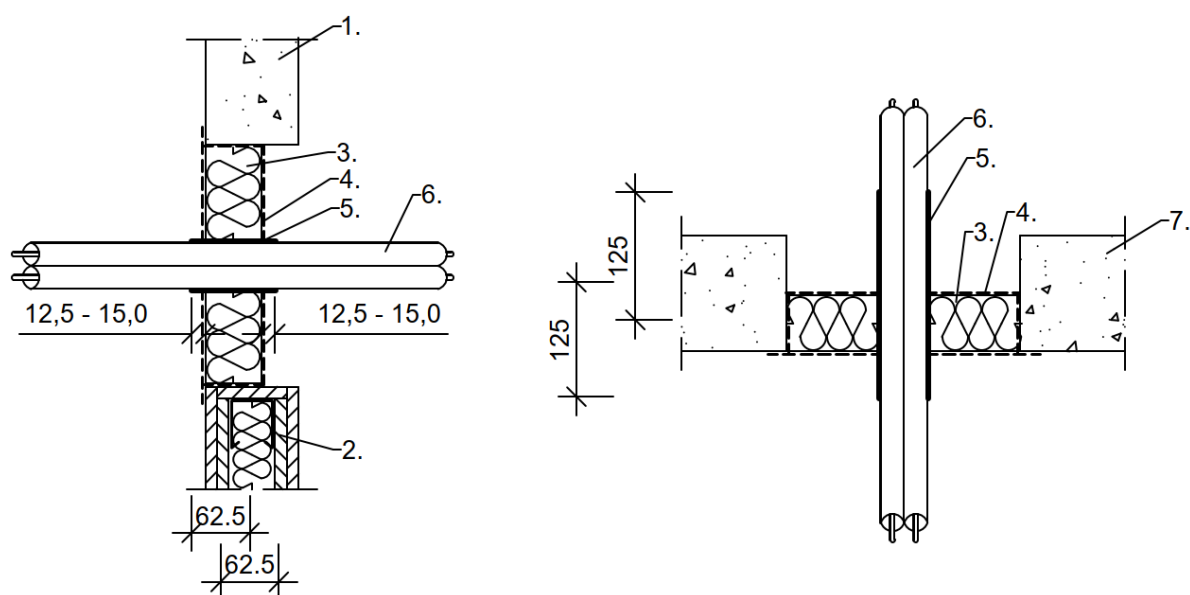
7. Mineral fibre mat

8. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)

Solar pipes NanoSUN<sup>2</sup> with intumescent wrap



| Fire resistance classes                         |                                                                                 |                               |                                |
|-------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                         | Measures                                                                        | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>NanoSUN<sup>2</sup> - double solar pipes</b> |                                                                                 |                               |                                |
| DN 16                                           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ 25 mm overlapping | EI 90 U/U                     | EI 60 U/U                      |
| DN 40                                           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ 25 mm overlapping | EI 30 / E 90 U/U              | EI 60 U/U                      |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. Solar pipes
7. Rigid floor  $\geq 125$  mm thickness

Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                         | Annex 50 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (1 x 60 mm) with ablative coating ( $\geq 0,75$  mm dft)**

| Minimum Distances in wall and floor                |           |               |                                                         |                              |            |                                     |                   |                                           |                                                    |                  |                              |                        |
|----------------------------------------------------|-----------|---------------|---------------------------------------------------------|------------------------------|------------|-------------------------------------|-------------------|-------------------------------------------|----------------------------------------------------|------------------|------------------------------|------------------------|
|                                                    | Cables    | Cable bundles | Cable trays                                             | Wave guides / coaxial cables | speedpipes | EIC, single/bundled made of plastic | Combustible pipes | Non-combustible pipes with FEF insulation | Non-combustible pipes with mineral wool insulation | Multilayer pipes | HVAC split line combinations | Seal Edge              |
|                                                    |           |               |                                                         |                              |            |                                     |                   |                                           |                                                    |                  |                              | Upper<br>Lower<br>Side |
| Cables                                             | $\geq 0$  | $\geq 0$      | $\geq 0$                                                | $\geq 40$                    | $\geq 25$  | $\geq 0$                            | $\geq 50$         | $\geq 25$                                 | $\geq 70$                                          | $\geq 10$        | $\geq 25$                    | ( $\geq 100$ )*        |
| Cable bundles                                      | $\geq 0$  | $\geq 0$      | $\geq 0$                                                | $\geq 40$                    | $\geq 25$  | $\geq 0$                            | $\geq 50$         | $\geq 25$                                 | $\geq 70$                                          | $\geq 10$        | $\geq 25$                    | ( $\geq 100$ )*        |
| Cable trays                                        | $\geq 0$  | $\geq 0$      | $\geq 0$<br>(horizontally)<br>$\geq 50$<br>(vertically) | $\geq 40$                    | $\geq 25$  | $\geq 0$                            | $\geq 50$         | $\geq 25$                                 | $\geq 70$                                          | $\geq 10$        | $\geq 25$                    | ( $\geq 100$ )*        |
| Wave guides / coaxial cables                       | $\geq 40$ | $\geq 40$     | $\geq 40$                                               | $\geq 25$                    | $\geq 100$ | $\geq 100$                          | $\geq 100$        | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | ( $\geq 100$ )*        |
| speed pipes                                        | $\geq 25$ | $\geq 25$     | $\geq 25$                                               | $\geq 100$                   | $\geq 0$   | $\geq 100$                          | $\geq 100$        | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | ( $\geq 100$ )*        |
| EIC, single/bundled made of plastic                | $\geq 0$  | $\geq 0$      | $\geq 0$                                                | $\geq 100$                   | $\geq 100$ | $\geq 0$                            | $\geq 100$        | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | ( $\geq 100$ )*        |
| Combustible pipes                                  | $\geq 50$ | $\geq 50$     | $\geq 50$                                               | $\geq 100$                   | $\geq 100$ | $\geq 100$                          | $\geq 50$         | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | ( $\geq 100$ )*        |
| Non-combustible pipes with FEF insulation          | $\geq 25$ | $\geq 25$     | $\geq 25$                                               | $\geq 100$                   | $\geq 100$ | $\geq 100$                          | $\geq 100$        | $\geq 50$                                 | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | ( $\geq 100$ )*        |
| Non-combustible pipes with mineral wool insulation | $\geq 70$ | $\geq 70$     | $\geq 70$                                               | $\geq 100$                   | $\geq 100$ | $\geq 100$                          | $\geq 100$        | $\geq 100$                                | $\geq 25$                                          | $\geq 100$       | $\geq 100$                   | ( $\geq 100$ )*        |
| Multilayer pipes                                   | $\geq 10$ | $\geq 10$     | $\geq 10$                                               | $\geq 100$                   | $\geq 100$ | $\geq 100$                          | $\geq 100$        | $\geq 100$                                | $\geq 100$                                         | $\geq 50$        | $\geq 100$                   | ( $\geq 100$ )*        |
| HVAC split line combinations                       | $\geq 25$ | $\geq 25$     | $\geq 25$                                               | $\geq 100$                   | $\geq 100$ | $\geq 100$                          | $\geq 100$        | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 50$                    | ( $\geq 100$ )*        |

\* valid only for CLT and sandwich wall as well as CLT Floor

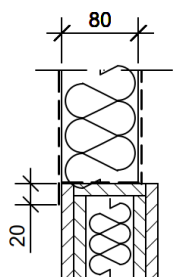
Dimensions in mm

|                                                                                                             |          |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                         | Annex 51 |
| Mixed penetration seal made of one mineral fibre board (1 x 60 mm) and ablative coating in walls and floors |          |

## Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating ( $\geq 1,0$ mm dft)

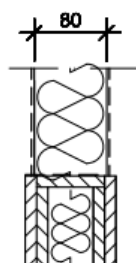
### Design variants

#### Wall



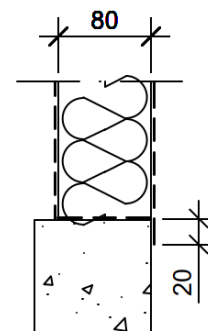
Flexible wall  
 $\geq 100$  mm thickness

Soffit planking minimum one layer,  
 $\geq 1 \times 12,5$  mm thickness

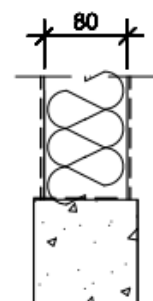


Flexible wall  
 $\geq 100$  mm thickness

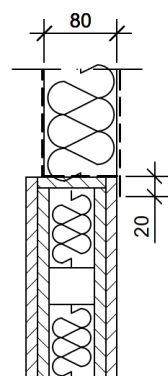
Soffit planking minimum one layer,  
 $\geq 1 \times 12,5$  mm thickness



Rigid wall  
 $\geq 100$  mm thickness

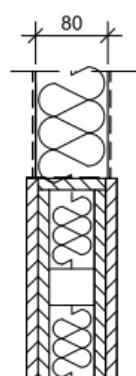


Rigid wall  
 $\geq 100$  mm thickness



Wooden framework  
 $\geq 100$  mm thickness

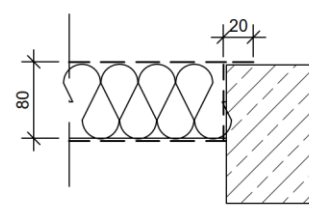
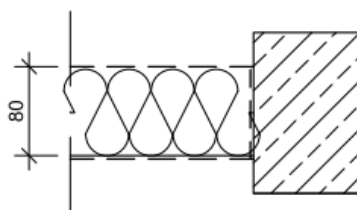
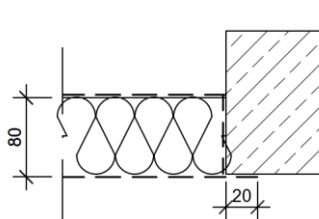
Soffit planking minimum one layer,  
 $\geq 1 \times 12,5$  mm thickness



Wooden framework  
 $\geq 100$  mm thickness

Soffit planking minimum one layer,  
 $\geq 1 \times 12,5$  mm thickness

#### Floor



Rigid Floor  $\geq 150$  mm thickness

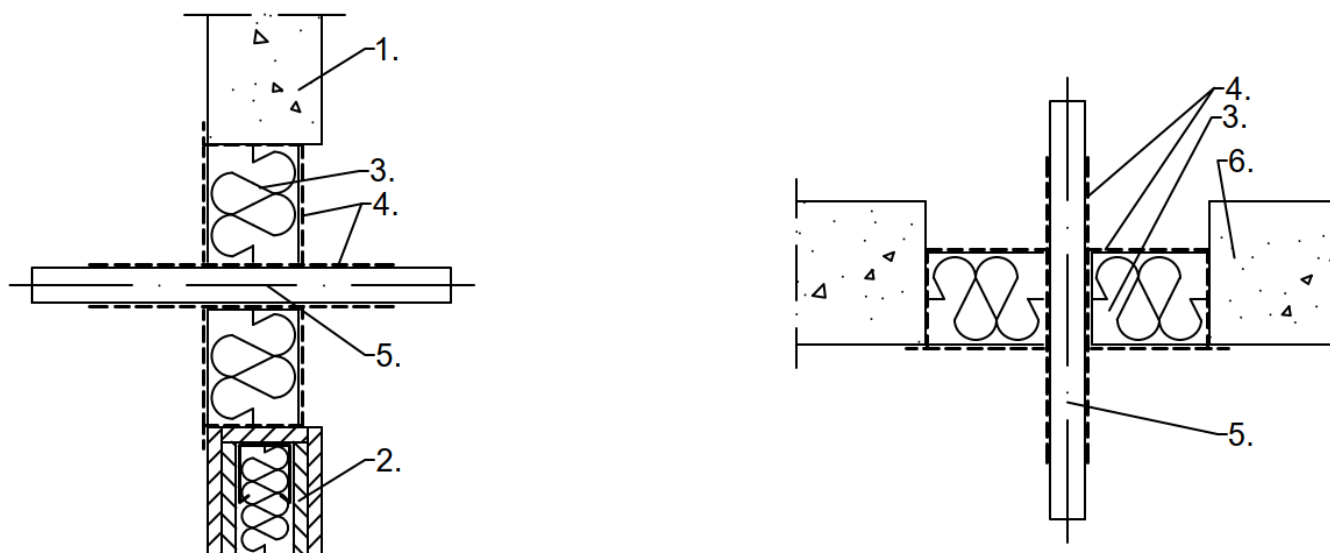
| Fire resistance classes         |                                    |                       |
|---------------------------------|------------------------------------|-----------------------|
| Max. Sealing size               | Measure                            | Fire resistance class |
| 2000 x 600 mm                   | Light Partition Wall<br>Solid Wall | EI 120                |
| 2000 x 600 mm / 10,000 x 490 mm | Solid Floor                        | EI 120                |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                             | Annex 52 |
| Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**Cables  $\varnothing \leq 80$  mm or cable bundles  $\varnothing \leq 100$  mm with cables  $\leq 21$  mm with ablative coating**



| Fire resistance classes                                                      |                                                     |                               |                                |
|------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                      | Measures                                            | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b>                                 |                                                     |                               |                                |
| Cables $\varnothing \leq 21$ mm                                              | Ablative coating<br>$\geq 200$ mm x $\geq 1$ mm dft | EI 90 / E 120                 | EI 90 / E 120                  |
| Cables $\varnothing > 21$ mm - $\leq 50$ mm                                  |                                                     | EI 90 / E 120                 | EI 90 / E 120                  |
| Cables $\varnothing \leq 50$ mm - $\leq 80$ mm                               |                                                     | EI 90 / E 120                 | EI 90 / E 120                  |
| Cable bundles $\varnothing \leq 100$ mm with cables $\varnothing \leq 21$ mm |                                                     | EI 90 / E 120                 | EI 90 / E 120                  |
| Conduits made of steel $\varnothing \leq 16$ mm                              |                                                     | EI 90 U/C /<br>E 120 U/C      | -                              |
| Conduits made of plastic $\varnothing \leq 16$ mm                            |                                                     | EI 120 U/U                    | EI 120 U/U                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board

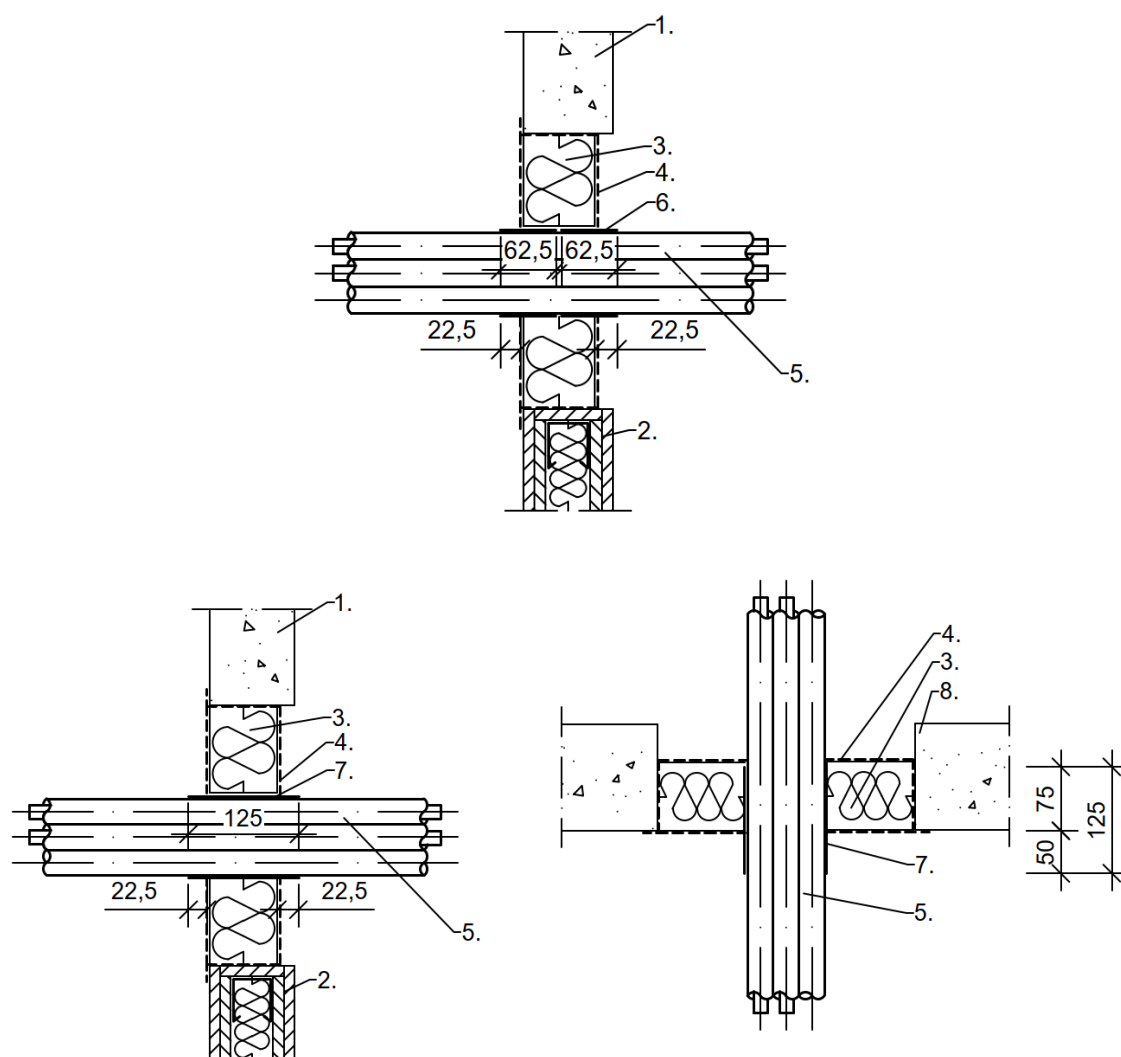
4. Ablative Coating
5. Cable
6. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 53 |
| Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating ( $\geq 1,0$  mm dft)

Plastic conduits bundled up to  $\varnothing 100$  mm made of single conduits up to outer  $\varnothing 25$  mm with or without cables  $\leq 21$  mm with intumescent wrap



| Fire resistance classes                        |              |                                                           |                               |                                |
|------------------------------------------------|--------------|-----------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                        | Cable        | Measures                                                  | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Electrical Installation conduits (EIC)</b>  |              |                                                           |                               |                                |
| EIC made plastic $\varnothing \leq 63$         | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers | EI 120 U/U                    | EI 90 U/U<br>E 120 U/U         |
| EIC made plastic bundle $\varnothing \leq 100$ | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers | EI 90 U/U<br>E 120 U/U        | EI 90 U/U<br>E 120 U/U         |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative coating

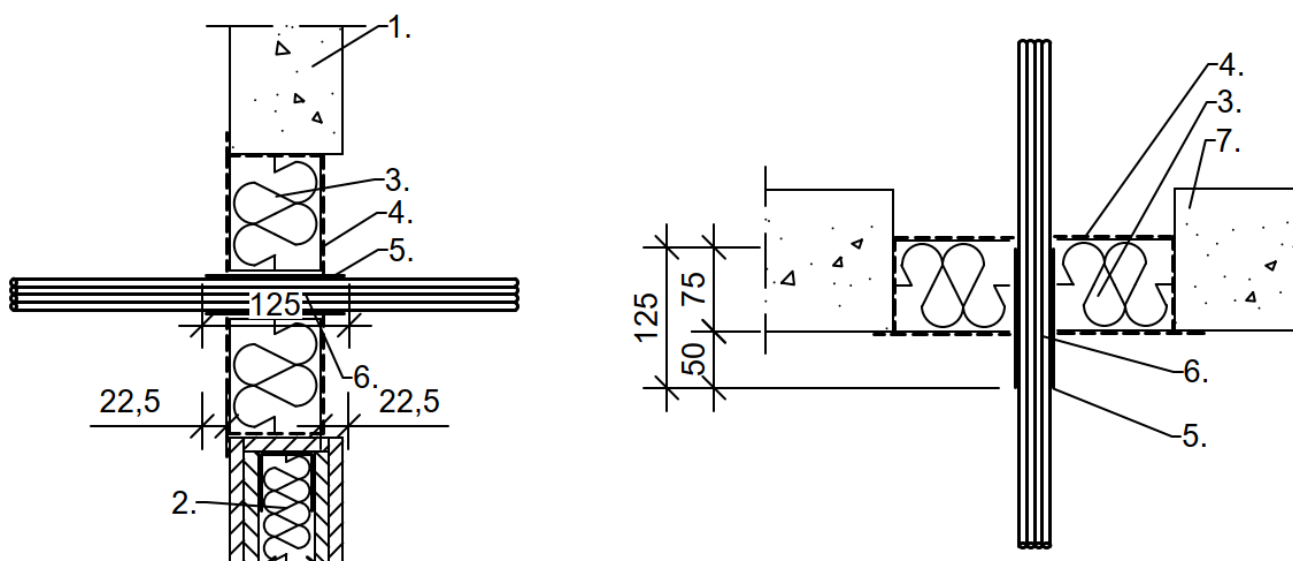
5. Electrical installation conduit
6. Intumescent wrap 2 x 62,5 mm
7. Intumescent wrap 1 x 125 mm
8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 54 |
| Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating ( $\geq 1,0$  mm dft)

Speedpipe, bundled or single pipes, with or without glass fibre or micro cables - with intumescent wrap



| Fire resistance classes |                                                                |                                                          |                               |                                |
|-------------------------|----------------------------------------------------------------|----------------------------------------------------------|-------------------------------|--------------------------------|
| Service                 |                                                                | Measures                                                 | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Speedpipe</b>        |                                                                |                                                          |                               |                                |
| Speedpipe               | Bundle- $\varnothing \leq 50$<br>Single- $\varnothing \leq 14$ | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer | EI 120 U/U                    | EI 120 U/U                     |

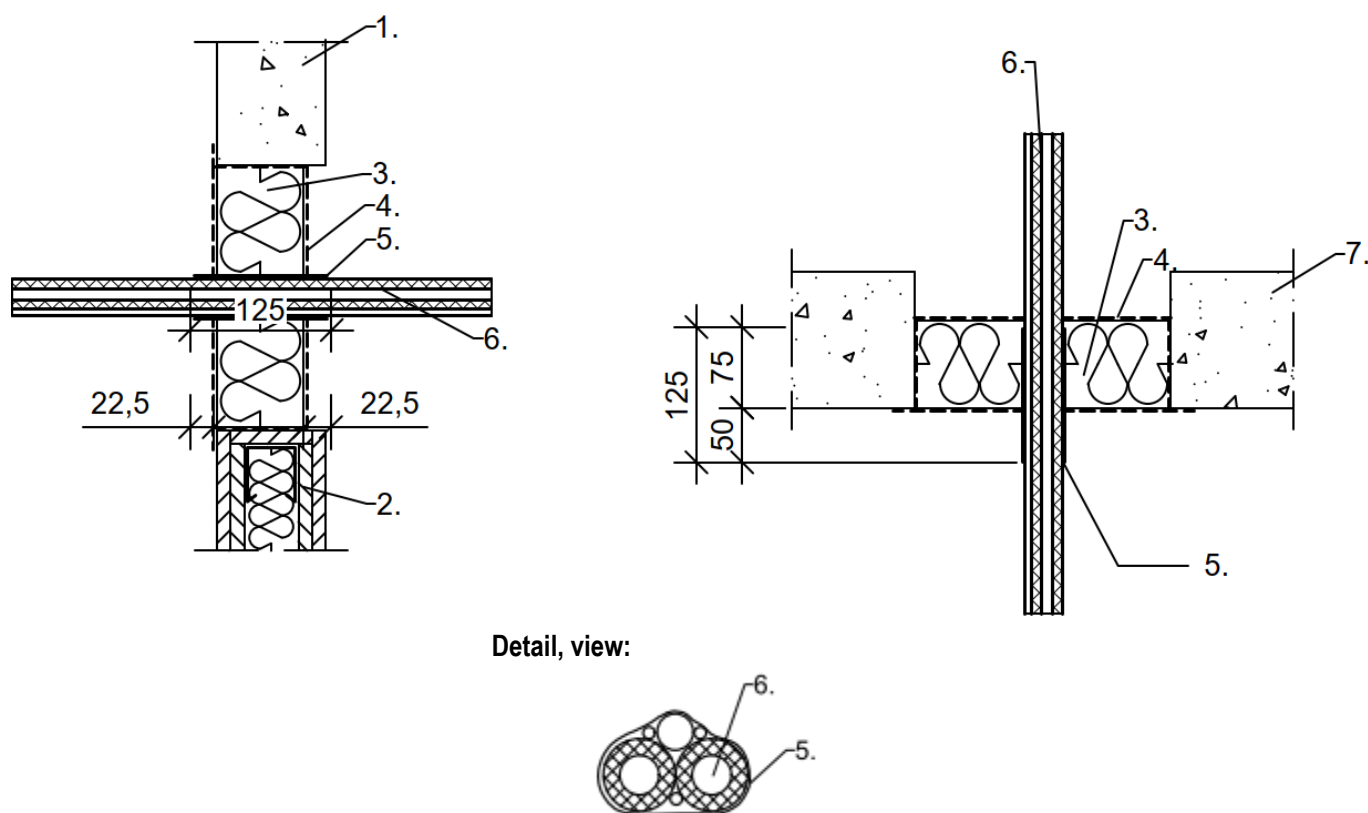
- |                                          |                                        |
|------------------------------------------|----------------------------------------|
| 1. Rigid wall $\geq 100$ thickness       | 5. Intumescent wrap                    |
| 2. Flexible wall $\geq 100$ mm thickness | 6. Speed pipe                          |
| 3. Mineral fibre board                   | 7. Rigid floor $\geq 150$ mm thickness |
| 4. Ablative coating                      |                                        |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 55 |
| Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating ( $\geq 1,0$  mm dft)

HVAC split line combination with intumescent wrap



Detail, view:

| Fire resistance classes                                                                                                                                                        |                                                                       |                               |                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                                                                        | Measures                                                              | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>HVAC-split line combinations</b>                                                                                                                                            |                                                                       |                               |                                |
| Copper pipe $\leq 2 \times \varnothing \leq 18$<br>+ PE-Foam 9 mm<br>+ 1x PVC-U/PVC-C pipe $\varnothing \leq 25 \times 1,5$ mm<br>+ $\leq 3$ x cables $\varnothing \leq 14$ mm | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>1 x 2 layers | EI 90 /<br>E 120              | EI 90 /<br>E 120               |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative coating

5. Intumescent wrap
6. HVAC split line combination
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

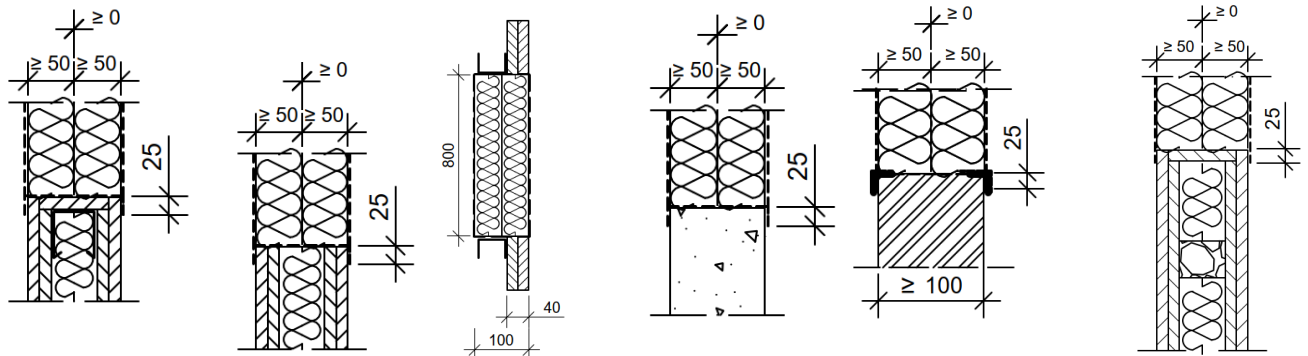
|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 56 |
| Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating ( $\geq 1,0$  mm dft)**

| Minimum Distances in wall and floor       |            |               |                                                          |            |                                        |                              |                        |
|-------------------------------------------|------------|---------------|----------------------------------------------------------|------------|----------------------------------------|------------------------------|------------------------|
|                                           | Cables     | Cable bundles | Cable trays                                              | speedpipes | EIC, single/bundled<br>made of plastic | HVAC split line combinations | Seal Edge              |
|                                           |            |               |                                                          |            |                                        |                              | Upper<br>Lower<br>Side |
| Cables                                    | $\geq 0$   | $\geq 0$      | $\geq 0$                                                 | $\geq 100$ | $\geq 100$                             | $\geq 100$                   | $\geq 0$               |
| Cable bundles                             | $\geq 0$   | $\geq 0$      | $\geq 0$                                                 | $\geq 100$ | $\geq 100$                             | $\geq 100$                   | $\geq 0$               |
| Cable trays                               | $\geq 0$   | $\geq 0$      | $\geq 0$<br>(horizontally)<br>$\geq 100$<br>(vertically) | $\geq 100$ | $\geq 100$                             | $\geq 100$                   | $\geq 0$               |
| speedpipes                                | $\geq 100$ | $\geq 100$    | $\geq 100$                                               | $\geq 100$ | $\geq 100$                             | $\geq 100$                   | $\geq 20$              |
| EIC,<br>single/bundled<br>made of plastic | $\geq 100$ | $\geq 100$    | $\geq 100$                                               | $\geq 100$ | $\geq 100$                             | $\geq 100$                   | $\geq 25$              |
| HVAC split line<br>combinations           | $\geq 100$ | $\geq 100$    | $\geq 100$                                               | $\geq 100$ | $\geq 100$                             | $\geq 100$                   | $\geq 25$              |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 57 |
| Mixed penetration seal made of one mineral fibre board (80 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Design variants**

Flexible wall  $\geq 100$  mm thickness  
Soffit planking minimum one layer,  $\geq 1 \times 12,5$  mm thickness

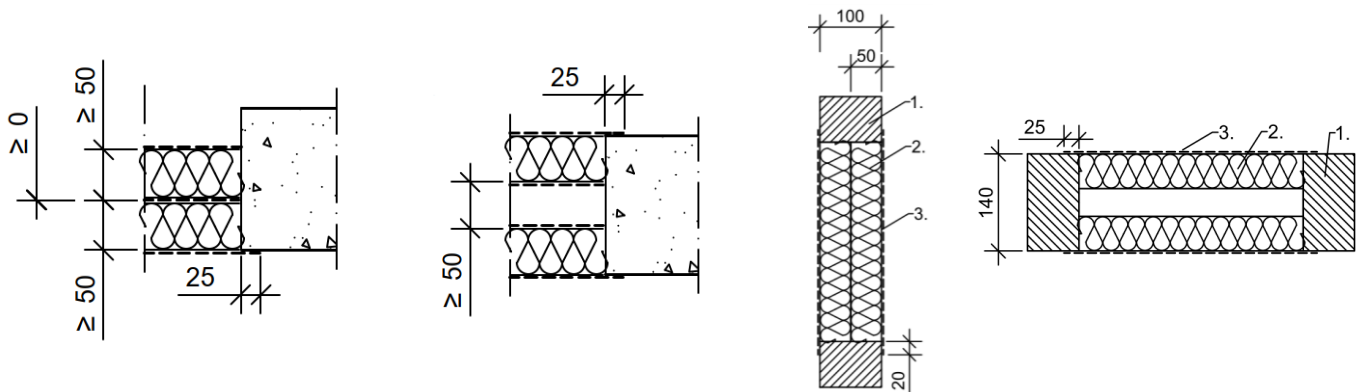
Flexible wall  $\geq 100$  mm thickness  
Without soffit planking / Shaft wall  $\geq 40$  mm thickness  
Maximum dimensions of the seal 600 mm x 800 mm or 800 mm x 600 mm

Rigid wall  $\geq 100$  mm thickness

Sandwich wall  
Maximum dimensions of the seal 800 x 600 mm

Wooden framework  $\geq 100$  mm thickness  
Optional without soffit planking  
Maximum dimensions of the seal 600 mm x 800 mm or 800 mm x 600 mm

In elements with a thickness  $> 100$  mm the two layers of mineral wool boards can be installed flushed to the surface of the separating element, centered within the separating element or in all positions in between.



Rigid Floor  $\geq 150$  mm thickness  
Maximum dimensions of the seal 1200 x 1100 mm

Rigid Floor  $\geq 150$  mm thickness

1. cross laminated timber wall / floor  
2. Ablative coating  
3. Mineral wool  
CLT Wood Wall / Floor: Minimum distances between media lines and seal edge in CLT wood construction  $\geq 100$  mm

**Light partition / solid wall and solid floor: Circumferential edge coating  $\geq 20$  mm thick may optionally be omitted**

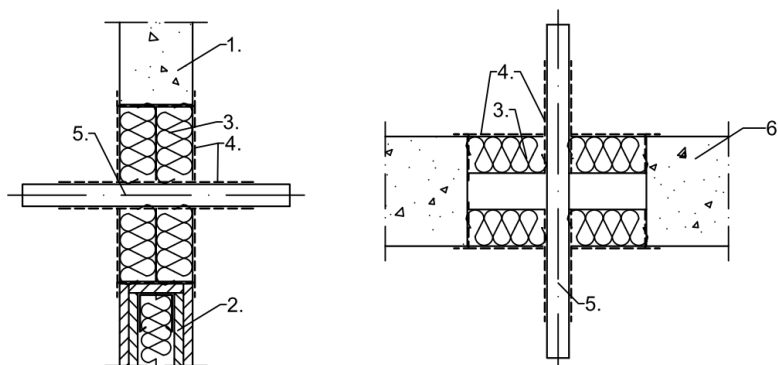
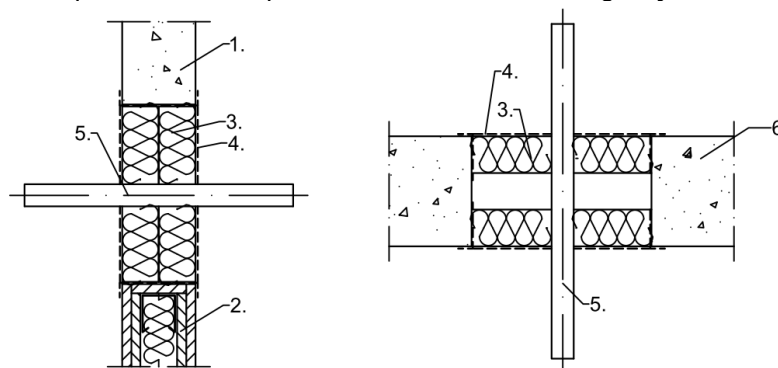
| Fire resistance classes            |                                                                                                |                       |
|------------------------------------|------------------------------------------------------------------------------------------------|-----------------------|
| Max. Sealing size                  | Measure                                                                                        | Fire resistance class |
| 2200 x 1100 mm / 1100 x 2200 mm    | Light Partition Wall<br>Solid Wall                                                             | EI 120                |
| 800 x 600 mm / 600 x 800 mm        | Light Partition Wall without reveal cladding                                                   | EI 90                 |
|                                    | Shaft wall                                                                                     | EI 90                 |
| 2600 x 1000 mm / $\infty$ x 800 mm | Solid Floor                                                                                    | EI 120                |
| 1000 x 600 mm / 600 x 1000 mm      | CLT Wall<br>STORA ENSO CLT 100 C3S NVI WW C24 SAN<br>Thickn. 100 mm; 3 layers: 30/40/30        | EI 90                 |
| 1000 x 600 mm / 10.000 x 400 mm    | CLT Floor<br>STORA ENSO CLT 140 L5S NVI WW C24 SAN<br>Thickn. 140 mm; 5 layers: 40/20/20/20/40 | EI 90                 |
| 800 x 600 mm                       | Sandwich Wall Paroc AST-F (120 mm)                                                             | EI 120                |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 58 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**Cables  $\varnothing \leq 21$  mm up to  $\leq \varnothing 80$  mm or cable bundles  $\varnothing \leq 100$  mm with cables  $\varnothing \leq 21$  mm and conduits made of plastic or steel  $\varnothing \leq 16$  mm - with ablative coating**

**Post installation: Single Cables (sheathed cables)  $\varnothing \leq 21$  mm – ablative coating may be omitted**

| Fire resistance classes                                                    |                                                     |                               |                                |
|----------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                    | Measures                                            | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b>                               |                                                     |                               |                                |
| Cables $\varnothing \leq 21$ mm                                            | -                                                   | EI 120                        | EI 120                         |
|                                                                            | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 50$ mm                                            | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 90 / E 120                 | EI 90                          |
|                                                                            | Ablative coating<br>$\geq 150$ mm x $\geq 1$ mm DFT | -                             | EI 120                         |
| Cables $\varnothing \leq 80$ mm                                            | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 90 / E 120                 | EI 90                          |
|                                                                            | Ablative coating<br>$\geq 150$ mm x $\geq 1$ mm DFT | -                             | EI 120                         |
| Cable bundles $\varnothing 100$ mm<br>with cables $\varnothing \leq 21$ mm | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120                        | EI 120                         |
| Conduits made of steel $\varnothing \leq 16$ mm                            | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | EI 120 U/C                     |
| Conduits made of plastic $\varnothing \leq 16$ mm                          | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/U                    | EI 120 U/U                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board

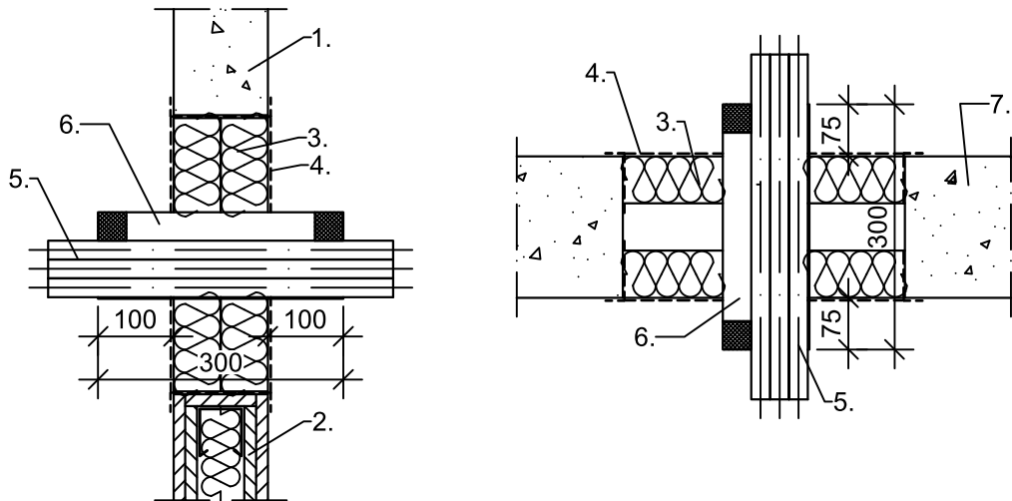
4. Ablative Coating
5. Cable, cable bundles, conduits, sheathed cables
6. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 59 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Cables Ø ≤ 21 mm or cable bundles Ø ≤ 100 mm with cables Ø ≤ 21 mm  
with FireFree 125 Installationsrør (length 300 mm, Ø ≤ 116,4 mm)



| Fire resistance classes                         |          |                               |                                |
|-------------------------------------------------|----------|-------------------------------|--------------------------------|
| Service                                         | Measures | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Cables, cable bundles                           |          |                               |                                |
| Cables Ø ≤ 21 mm                                | -        | EI 90                         | EI 120                         |
| Cable bundles Ø 100 mm<br>with cables Ø ≤ 21 mm | -        | EI 90                         | EI 120                         |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

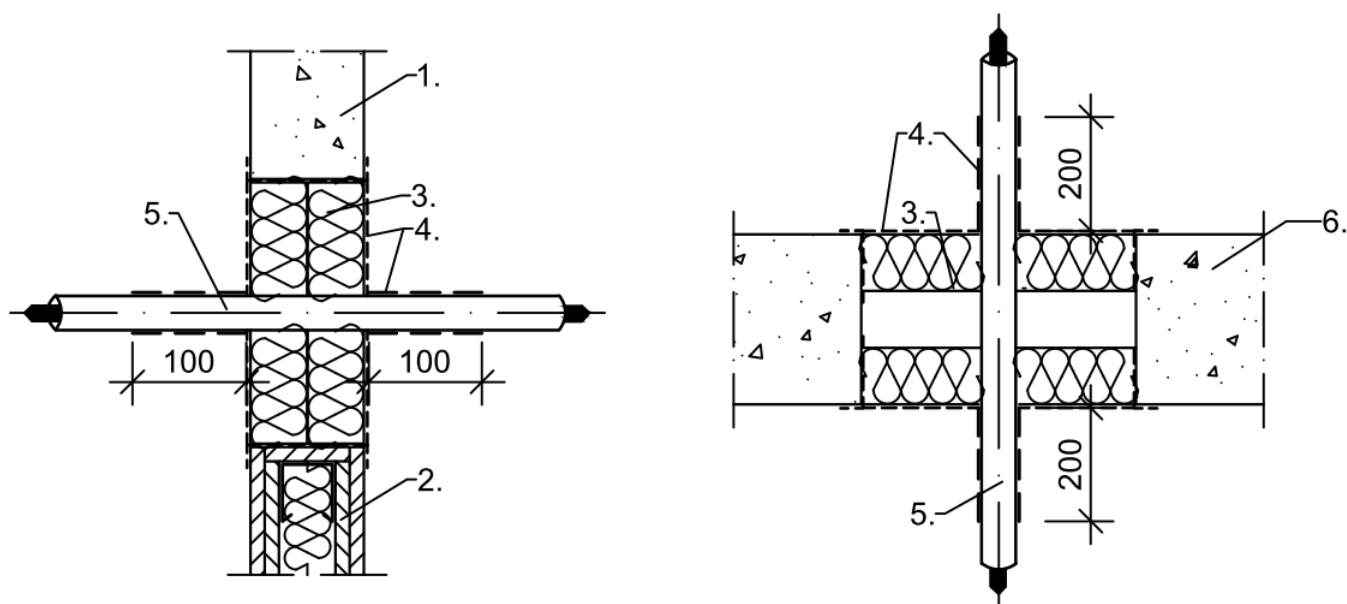
4. Ablative Coating
5. Cable, cable bundles

6. FireFree 125 Installationsrør

7. Rigid floor ≥ 150 mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                             | Annex 60 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Coaxial cables and waveguides with ablative coating**

| Fire resistance classes                     |                                                     |                               |                                |
|---------------------------------------------|-----------------------------------------------------|-------------------------------|--------------------------------|
| Service                                     | Measures                                            | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Coaxial cable/waveguides</b>             |                                                     |                               |                                |
| CommScope Heliac $\varnothing \leq 51,1$ mm | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | -                              |
|                                             | Ablative coating<br>$\geq 200$ mm x $\geq 1$ mm DFT | -                             | EI 120 U/C                     |
| RFS Cellflex $\varnothing \leq 50,3$ mm     | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | -                              |
|                                             | Ablative coating<br>$\geq 200$ mm x $\geq 1$ mm DFT | -                             | EI 120 U/C                     |
| RFS Radiaflex $\varnothing \leq 48,2$ mm    | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | -                              |
| RFS Radiaflex $\varnothing \leq 28,5$ mm    | Ablative coating<br>$\geq 200$ mm x $\geq 1$ mm DFT | -                             | EI 120 U/C                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board

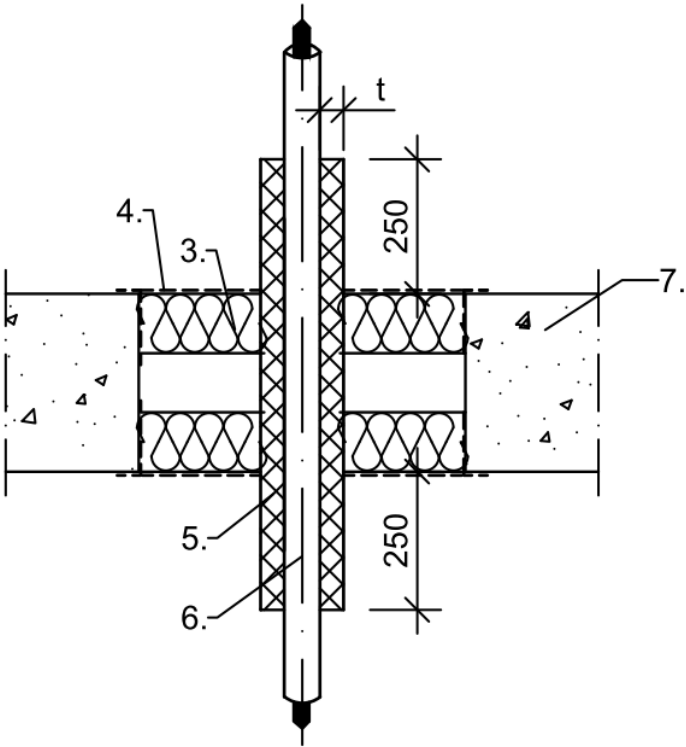
4. Ablative Coating
5. Coaxial cable / Waveguide
6. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 61 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Coaxial cables and waveguides with mineral fibre lamella mat



| Fire resistance classes      |                                                    |                               |                                |
|------------------------------|----------------------------------------------------|-------------------------------|--------------------------------|
| Service                      | Measures                                           | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Coaxial cable/waveguides     |                                                    |                               |                                |
| CommScope Heliax Ø ≤ 51,1 mm | Lamella mat both sides (LS)<br>≥ 250 mm 20 - 30 mm | -                             | EI 120 U/C                     |
| RFS Cellflex Ø ≤ 50,3 mm     | Lamella mat both sides (LS)<br>≥ 250 mm 20 - 30 mm | -                             | EI 120 U/C                     |
| RFS Radiaflex Ø ≤ 28,5 mm    | Lamella mat both sides (LS)<br>≥ 250 mm 20 - 30 mm | -                             | EI 120 U/C                     |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Mineral fibre lamella mat

6. Coaxial cable / Waveguide

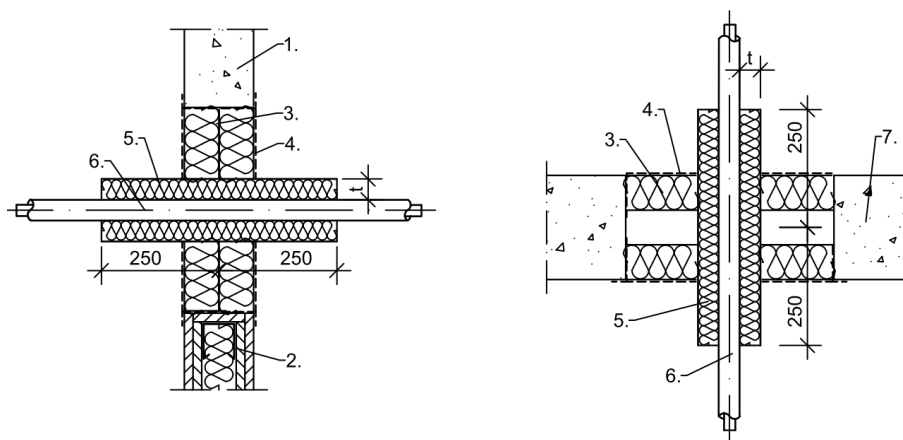
7. Rigid floor ≥ 150 mm thickness

Dimensions in mm

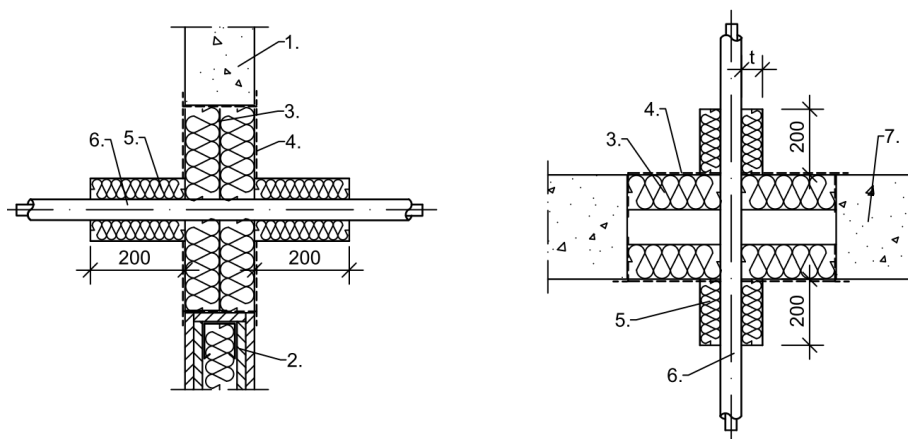
Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)

Metal conduits with or without cables  $\leq 21$  mm, with mineral fibre lamella mat LI or LS

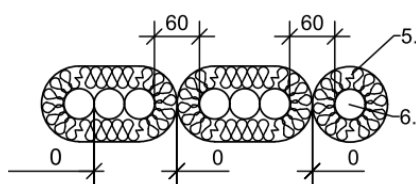
#### Variant LS



#### Variant LI



Detail, distances to each other:



| Fire resistance classes                |              |              |                                                                   |                               |                                |
|----------------------------------------|--------------|--------------|-------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                |              | Cable        | Measures                                                          | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Electrical Installation conduits (EIC) |              |              |                                                                   |                               |                                |
| EIC made of steel                      | Ø ≤ 32       | With/without | Lamella mat<br>Both sides ≥ 250 x 30 mm (LS) / ≥ 200 x 30 mm (LI) | EI 120 U/C                    | EI 120 U/C                     |
|                                        | ≤ 3 x Ø ≤ 32 | With/without |                                                                   | EI 90 / E 120 U/C             | EI 120 U/C                     |

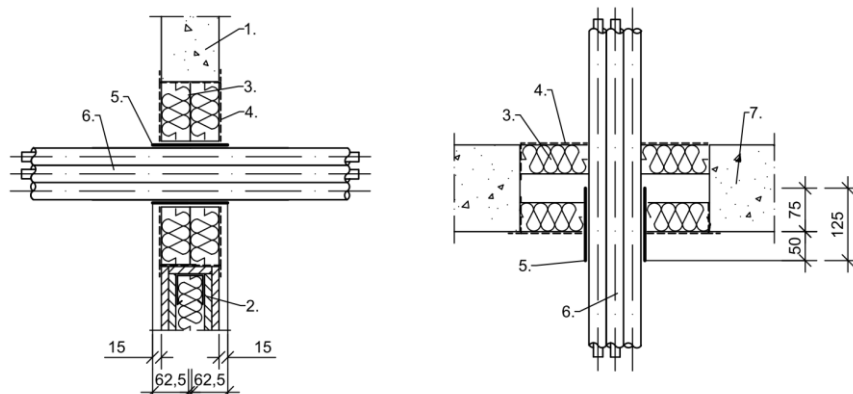
- |                                          |                                        |
|------------------------------------------|----------------------------------------|
| 1. Rigid wall $\geq 100$ thickness       | 5. Mineral fibre lamella mat           |
| 2. Flexible wall $\geq 100$ mm thickness | 6. Metal conduit                       |
| 3. Mineral fibre board                   | 7. Rigid floor $\geq 150$ mm thickness |
| 4. Ablative Coating                      |                                        |

Dimensions in mm

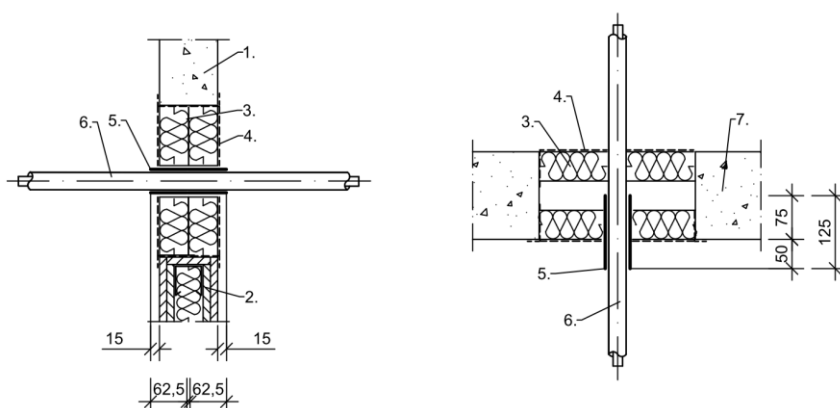
|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 63 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Plastic conduits with intumescent wrap**

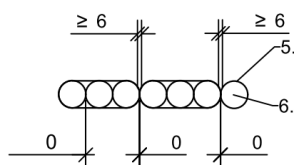
- Flexible plastic conduits bundled up to  $\varnothing 100$  mm made of single conduits up to outer  $\varnothing 32$  mm with or without cables  $\leq 21$  mm



- Inflexible plastic conduits  $\varnothing \geq 63$  mm, with or without cables  $\leq 21$  mm



- Detail, distances to each other



| Fire resistance classes                |          |              |                                                        |                               |                                |
|----------------------------------------|----------|--------------|--------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                |          | Cable        | Measures                                               | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Electrical Installation conduits (EIC) |          |              |                                                        |                               |                                |
| EIC made of plastic                    | Ø ≤ 32   | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm, 1 x 1 layer | EI 120 U/U                    | EI 120 U/U                     |
|                                        | Ø ≤ 63   | With/without | Intumescent wrap<br>2x 62,5 / 1x 125 mm, 1 x 2 layers  | EI 120 U/U                    | EI 90 U/U<br>E 120 U/U         |
| EIC made of plastic bundle             | Ø ≤ 100  | With/without | Intumescent wrap<br>2x 62,5 / 1x 125 mm, 1 x 2 layers  | EI 120 U/U                    | EI 120 U/U                     |
| Linear arrangement of plastic EIC      | ≤ 3 pcs. | With/without | Intumescent wrap<br>2x 62,5 / 1x 125 mm, 1 x 1 layer   | EI 120 U/U                    | EI 120 U/U                     |

- Rigid wall  $\geq 100$  thickness
- Flexible wall  $\geq 100$  mm thickness
- Mineral fibre board
- Ablative Coating

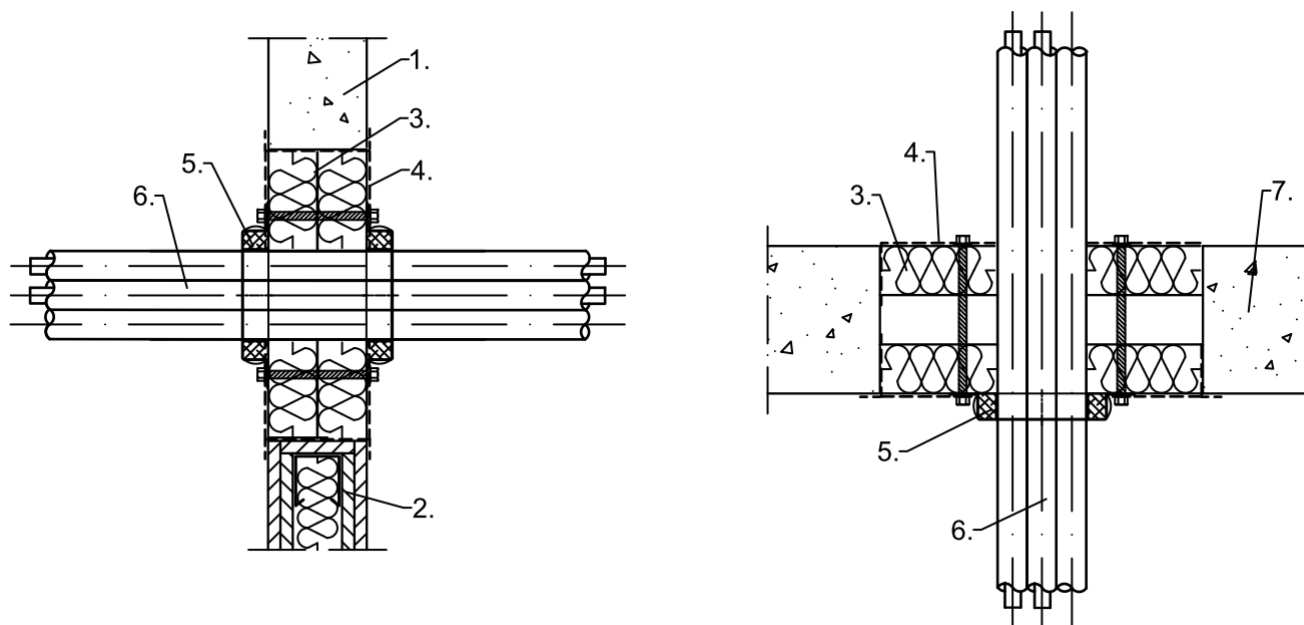
- Intumescent wrap
- Plastic conduit
- Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 64 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)

Plastic conduits bundled up to  $\varnothing 125$  mm made of single conduits up to outer  $\varnothing 63$  mm with or without cables  $\leq 21$  mm with fire protection collar



| Fire resistance classes                |                                                                 |                                                                                            |                               |                                |
|----------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                |                                                                 | Measures                                                                                   | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Electrical Installation conduits (EIC) |                                                                 |                                                                                            |                               |                                |
| EIC made of plastic                    | $\varnothing \leq 32$                                           | Fire protection collar<br>Wall: Installed on both sides<br>Floor: Installed on bottom side | EI 120 U/U                    | EI 120 U/U                     |
|                                        | $\varnothing \leq 63$                                           | Fire protection collar<br>Wall: Installed on both sides<br>Floor: Installed on bottom side | EI 90 U/C                     | EI 90 U/C                      |
| EIC made of plastic bundle             | $\varnothing \leq 125$ with single<br>EIC $\varnothing \leq 63$ | Fire protection collar<br>Wall: Installed on both sides<br>Floor: Installed on bottom side | EI 90 U/C                     | EI 90 U/C                      |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

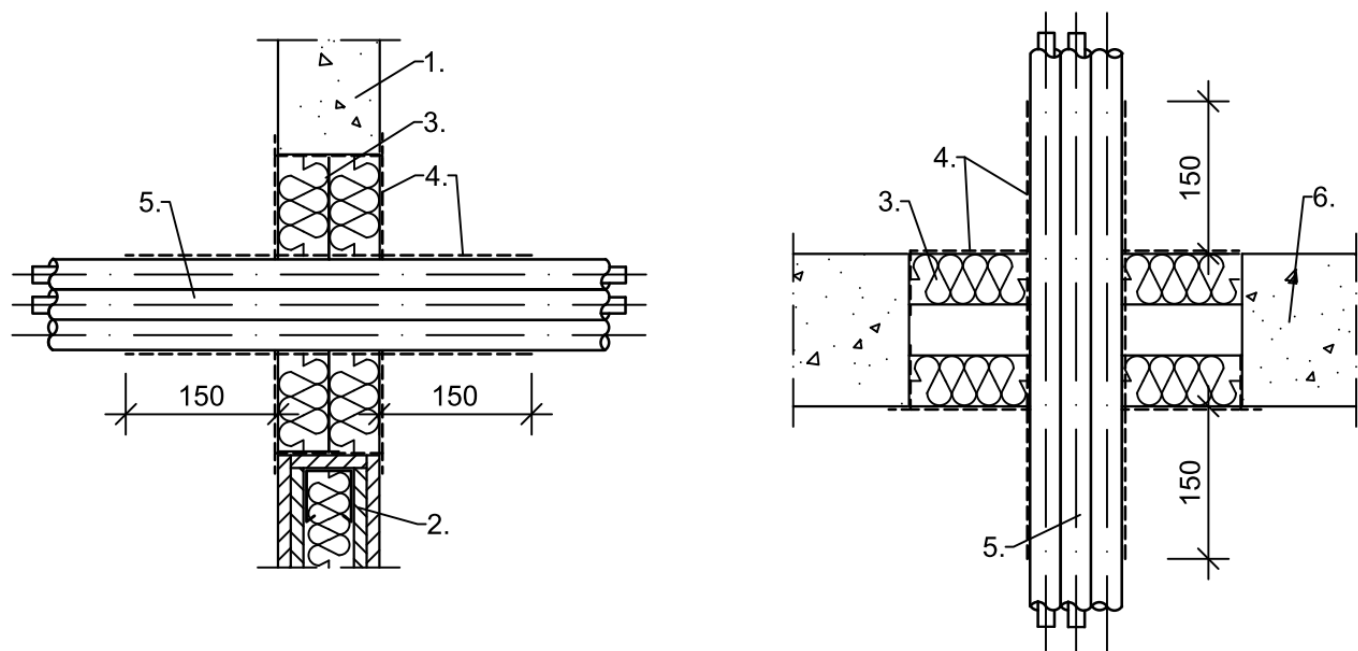
5. Fire protection collar
6. Plastic conduit
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 65 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Plastic conduits Ø ≤ 32 mm with fire protection coating



| Fire resistance classes                     |        |                                           |                               |                                |
|---------------------------------------------|--------|-------------------------------------------|-------------------------------|--------------------------------|
| Service                                     |        | Measures                                  | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Electrical installation conduits (EIC)      |        |                                           |                               |                                |
| EIC made of plastic with and without cables | Ø ≤ 32 | Ablative coating<br>≥ 150 mm x ≥ 1 mm dft | EI 90 U/C                     | EI 90 U/C                      |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board
4. Ablative Coating

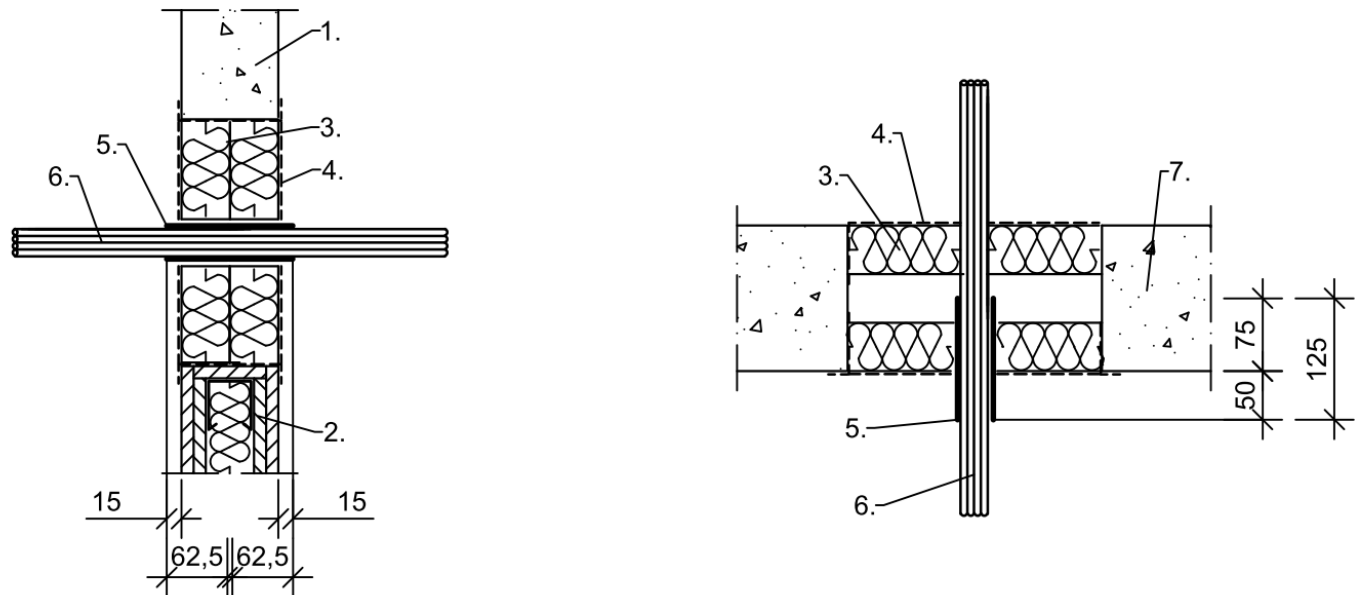
5. Plastic conduit

6. Rigid floor ≥ 150 mm thickness

Dimensions in mm

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Speed pipes bundled up to Ø ≤ 50 mm made of PE pipes up to outer Ø ≤ 14 mm with fire protection wrap



| Fire resistance classes |                                 |                                                          |                               |                                |
|-------------------------|---------------------------------|----------------------------------------------------------|-------------------------------|--------------------------------|
| Service                 |                                 | Measures                                                 | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Speed pipes             |                                 |                                                          |                               |                                |
| Speed pipes             | Bundle-Ø ≤ 50<br>Single- Ø ≤ 14 | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer | EI 120 U/U                    | EI 120 U/U                     |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

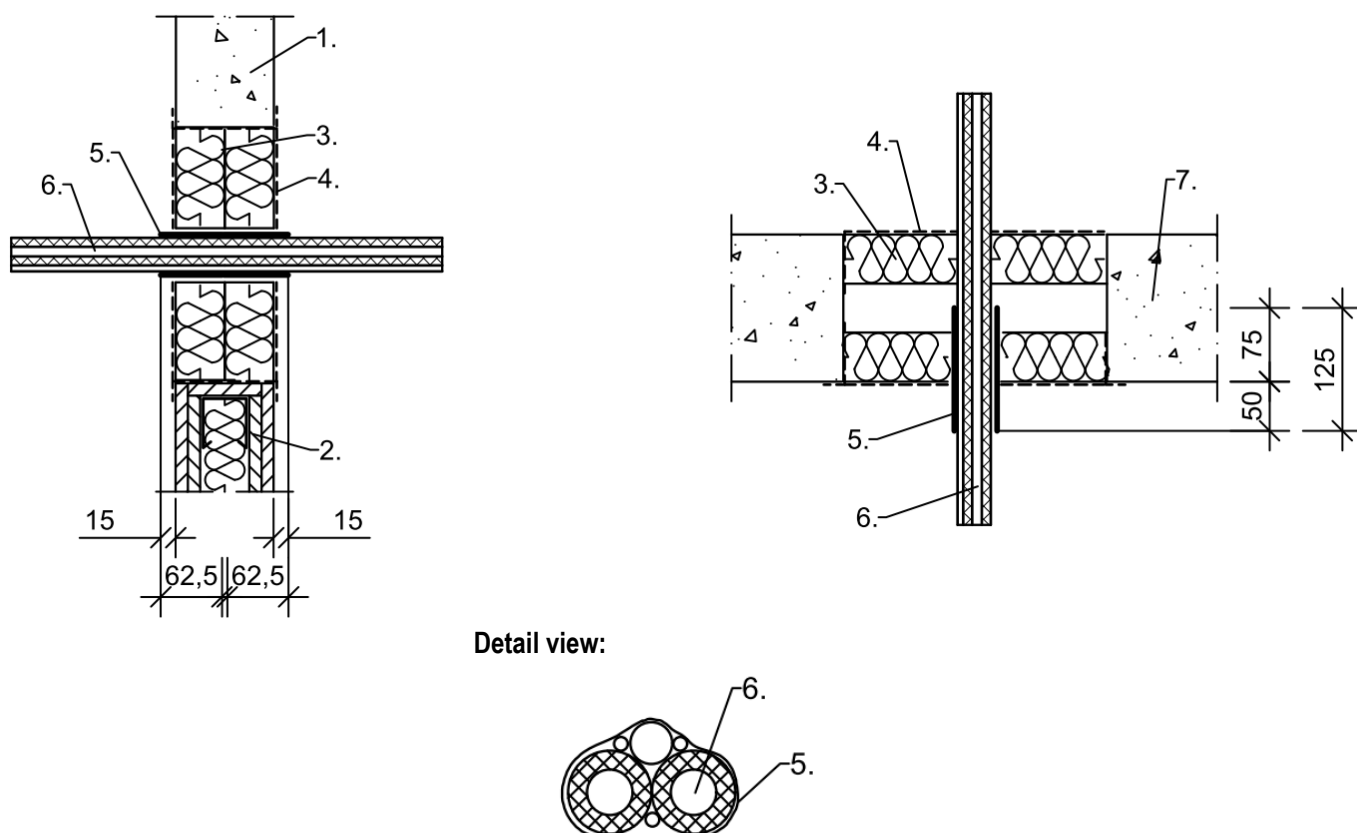
4. Ablative Coating
5. Fire protection wrap

6. Speed pipe

7. Rigid floor ≥ 150 mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                             | Annex 67 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****HVAC split line combinations with fire protection wrap****Detail view:**

| Fire resistance classes                                                                                                                                                              |                                                           |                               |                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                                                                              | Measures                                                  | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>HVAC-split line combinations</b>                                                                                                                                                  |                                                           |                               |                                |
| Copper pipe $\leq 2 \times \varnothing \leq 18$<br>+ PE-Foam 9 mm<br>+ 1 x PVC-U/PVC-C pipe $\varnothing \leq 25 \times 1,5$ mm<br>+ $\leq 3 \times$ cables $\varnothing \leq 14$ mm | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers | EI 120                        | EI 120                         |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

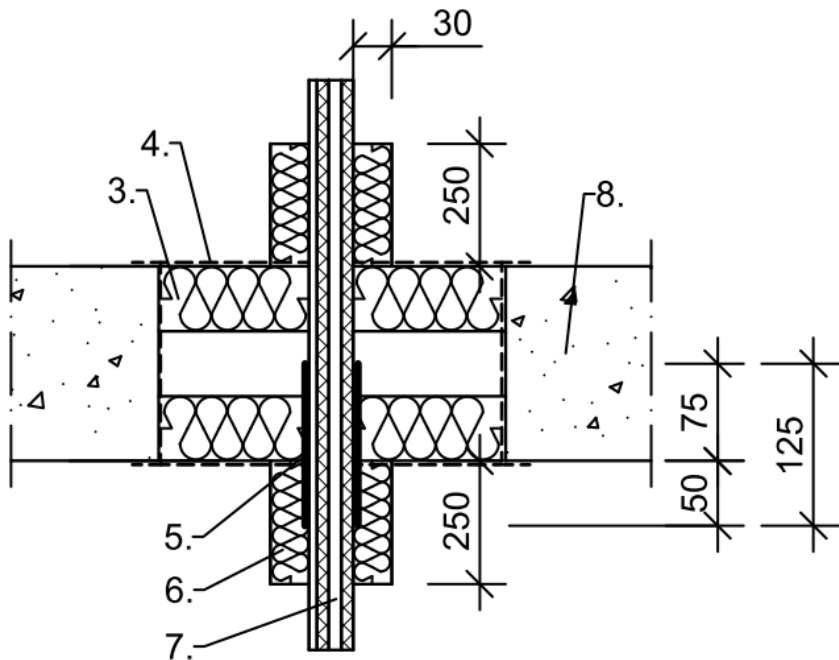
5. Fire protection wrap
6. HVAC split line combination
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

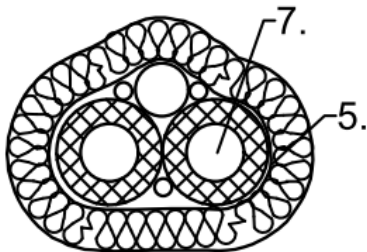
|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 68 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

HVAC split line combinations with mineral fibre lamella mat



Detail view:



| Fire resistance classes                                                                             |                                                                                            |                               |                                |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                             | Measures                                                                                   | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| HVAC-split line combinations                                                                        |                                                                                            |                               |                                |
| Copper pipe ≤ 2 x Ø ≤22<br>+ PE-Foam 9 mm<br>+ 1 x PVC-U pipe Ø ≤ 25 mm<br>+ ≤ 2 x cables Ø ≤ 21 mm | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ lamella mat ≥ 250 x ≥ 30 mm | -                             | EI 90                          |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Fire protection wrap

6. Mineral fibre lamella mat

7. HVAC split line combination

8. Rigid floor ≥ 150 mm thickness

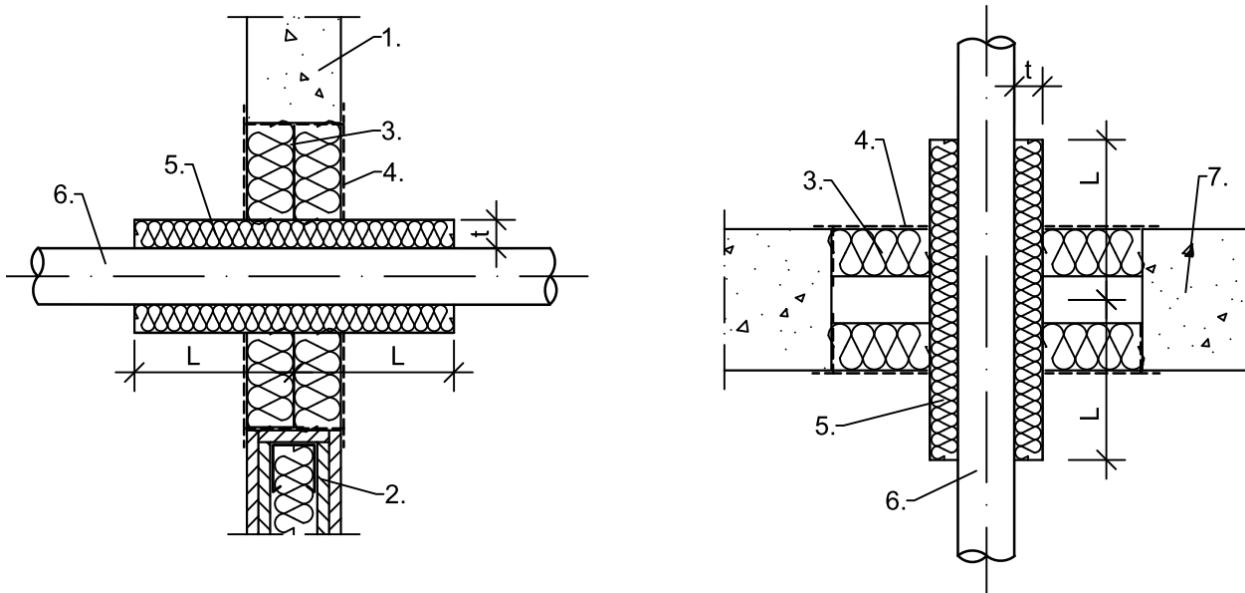
Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                             | Annex 69 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

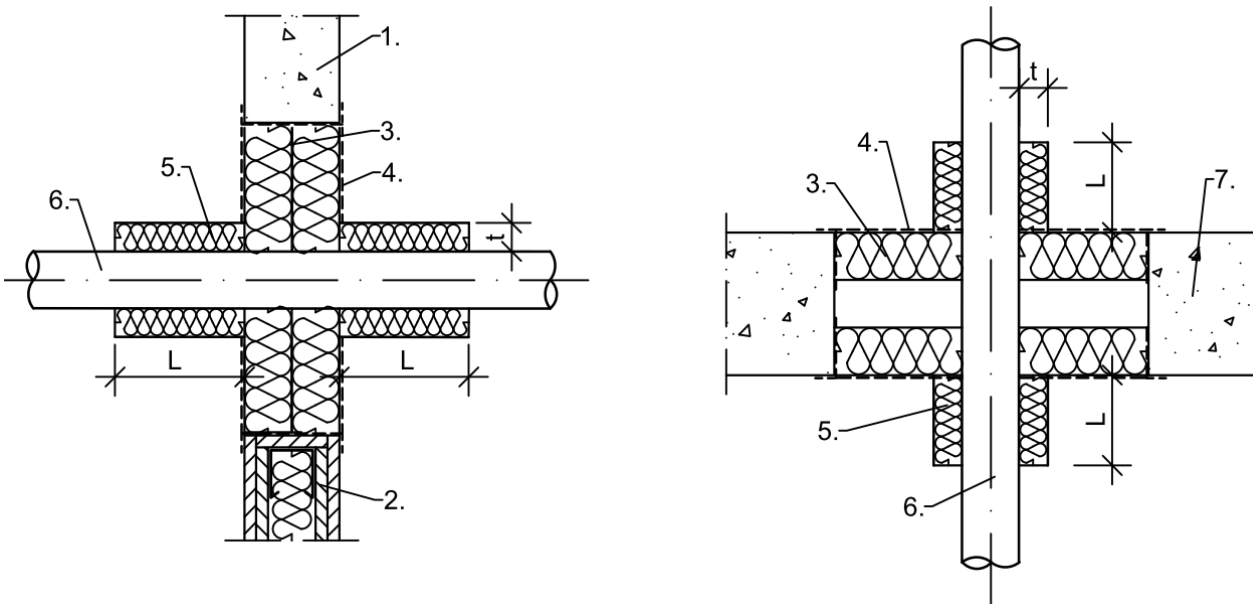
Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Non-combustible pipes with insulation made of mineral fibre

Variant LS



Variant LI



All angles between 90° and 45° are permissible

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1. Rigid wall ≥ 100 thickness       | 5. Mineral fibre lamella mat      |
| 2. Flexible wall ≥ 100 mm thickness | 6. Non-combustible pipe           |
| 3. Mineral fibre board              | 7. Rigid floor ≥ 150 mm thickness |
| 4. Ablative Coating                 |                                   |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                             | Annex 70 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of mineral fibre**

| Fire resistance classes - Wall                              |                        |                     |                                                        |                            |
|-------------------------------------------------------------|------------------------|---------------------|--------------------------------------------------------|----------------------------|
| Service                                                     | Outside-Ø              | Pipe wall thickness | Measures                                               | Wall Fire resistance class |
| Non-combustible pipes with insulation made of mineral fibre |                        |                     |                                                        |                            |
| Copper, steel, stainless steel, cast iron                   | $\leq 22$              | 0,6 - 14,2          | Lamella mat<br>Both sides $\geq 450 \times 20-100$ mm  | EI 120 U/C                 |
|                                                             | $> 22 - \leq 60$       |                     | Lamella mat<br>Both sides $\geq 200 \times 30-100$ mm  | EI 120 U/C                 |
|                                                             | $> 60 - \leq 88,9$     |                     | Lamella mat<br>Both sides $\geq 450 \times 30-100$ mm  | EI 120 U/C                 |
| Steel, stainless steel, cast iron                           | $\leq 42$              | 1,8 - 14,2          | Lamella mat<br>Both sides $\geq 200 \times 30-100$ mm  | EI 120 U/C                 |
|                                                             | $> 42 - \leq 114,3$    | 1,8/3,2 - 14,2      | Lamella mat<br>Both sides $\geq 450 \times 30-100$ mm  | EI 120 U/C                 |
|                                                             | $> 114,3 - \leq 159$   | 3,2/4,0 - 14,2      | Lamella mat<br>Both sides $\geq 1200 \times 100$ mm    | EI 120 U/C                 |
|                                                             | $> 114,3 - \leq 219,1$ | 3,2/4,5 - 14,2      | Lamella mat<br>Both sides $\geq 1200 \times 30-100$ mm | EI 90 U/C                  |

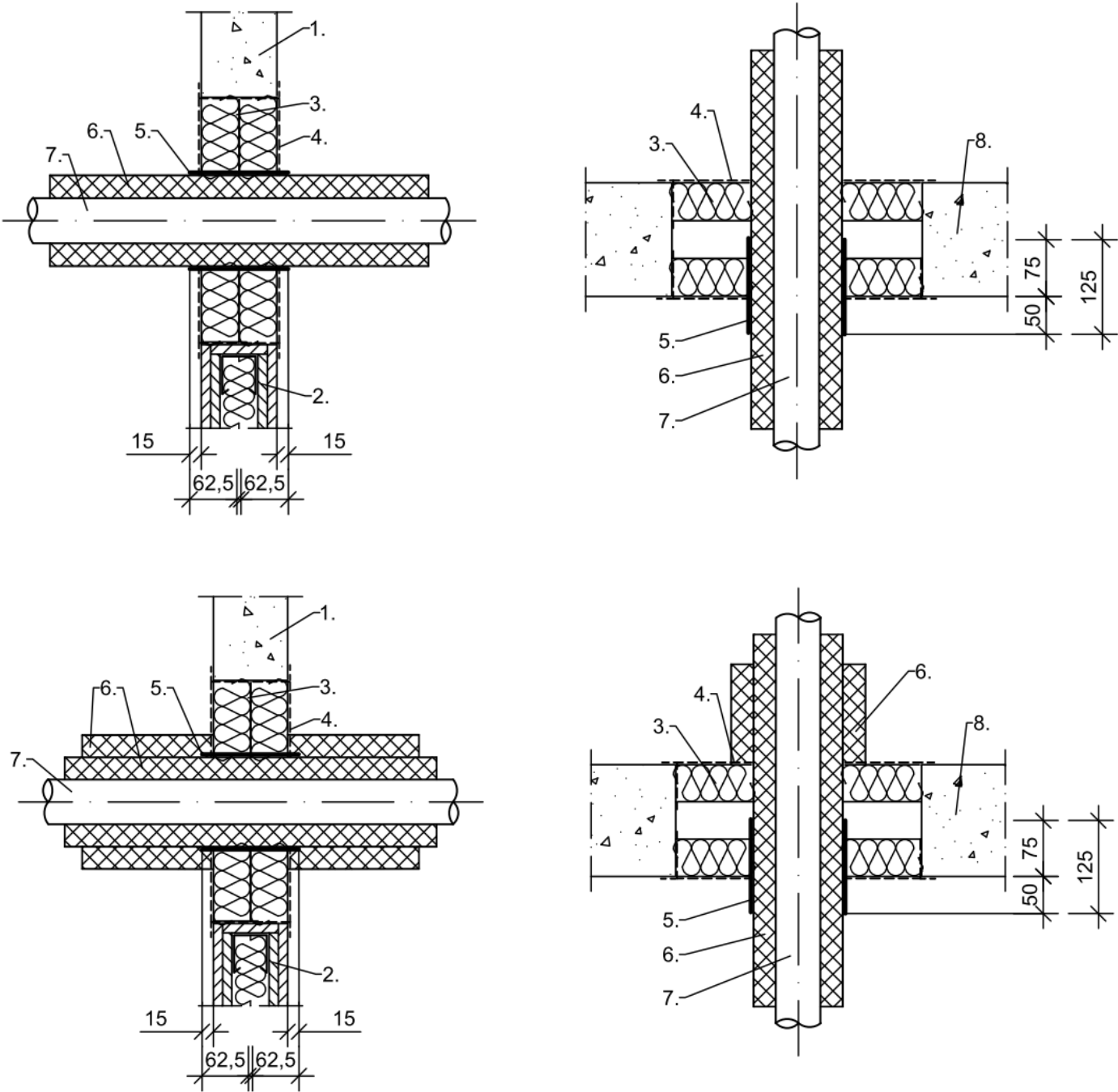
| Fire resistance classes - Floor                             |                        |                     |                                                        |                             |
|-------------------------------------------------------------|------------------------|---------------------|--------------------------------------------------------|-----------------------------|
| Service                                                     | Outside-Ø              | Pipe wall thickness | Measures                                               | Floor Fire resistance class |
| Non-combustible pipes with insulation made of mineral fibre |                        |                     |                                                        |                             |
| Copper, steel, stainless steel, cast iron                   | $\leq 22$              | 0,6 - 14,2          | Lamella mat<br>Both sides $\geq 425 \times 20-100$ mm  | EI 120 U/C                  |
|                                                             |                        |                     | Lamella mat<br>Both sides $\geq 175 \times 30-100$ mm  | EI 120 U/C                  |
|                                                             | $> 22 - \leq 42$       |                     | Lamella mat<br>Both sides $\geq 425 \times 30-100$ mm  | EI 120 U/C                  |
|                                                             | $> 42 - \leq 88,9$     |                     | Lamella mat<br>Both sides $\geq 675 \times 30-100$ mm  | EI 90 U/C                   |
| Steel, stainless steel, cast iron                           | $\leq 42$              | 1,8 - 14,2          | Lamella mat<br>Both sides $\geq 125 \times 30-100$ mm  | EI 120 U/C                  |
|                                                             | $> 42 - \leq 114,3$    | 1,8/3,2 - 14,2      | Lamella mat<br>Both sides $\geq 425 \times 30-100$ mm  | EI 120 U/C                  |
|                                                             | $> 114,3 - \leq 159$   | 3,2/4,0 - 14,2      | Lamella mat<br>Both sides $\geq 1175 \times 30-100$ mm | EI 120 U/C                  |
|                                                             | $> 114,3 - \leq 219,1$ | 3,2/4,5 - 14,2      | Lamella mat<br>Both sides $\geq 1175 \times 30$ mm     | EI 120 U/C                  |
|                                                             |                        |                     | Lamella mat<br>Both sides $\geq 1175 \times 30-100$ mm | EI 90 U/C                   |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 73 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Non-combustible pipes with insulation made of FEF



1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Fire protection wrap

6. Insulation made of FEF

7. Non-combustible pipe

8. Rigid floor ≥ 150 mm thickness

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of FEF**

| Fire resistance classes - Wall                                  |                          |                     |                      |                                                                                                 |                            |
|-----------------------------------------------------------------|--------------------------|---------------------|----------------------|-------------------------------------------------------------------------------------------------|----------------------------|
| Service                                                         | Outside-Ø                | Pipe wall thickness | Insulation thickness | Measures                                                                                        | Wall Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                          |                     |                      |                                                                                                 |                            |
| Copper, steel, stainless steel, cast iron                       | $\leq 15$ mm             | 0,8 - 14,2          | 10 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer                                        | EI 120 U/C                 |
|                                                                 | $> 15 - \leq 54$ mm      |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 120 U/C                 |
|                                                                 | $> 54 - \leq 88,9$ mm    |                     | 25 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 120 U/C                 |
|                                                                 | $\leq 42$ mm             |                     | 10 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer                                        | EI 90 U/C                  |
|                                                                 | $> 42 - \leq 88,9$ mm    |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 90 U/C                  |
| Steel, stainless steel, cast iron                               | $\leq 15$ mm             |                     | 10 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 120 U/C                 |
|                                                                 | $> 15 - \leq 88,9$ mm    |                     | 19 - 38 mm           | Intumescent wrap<br>2x 62,5 / 1x 125 mm<br>1 x 2 layers                                         | EI 120 U/C                 |
|                                                                 | $> 88,9 - \leq 114,3$ mm |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x19 | EI 120 U/C                 |
|                                                                 | $> 114,3 - \leq 159$ mm  |                     | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x19 | EI 120 U/C                 |
|                                                                 | $> 159 - \leq 219,1$ mm  |                     | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 600x38 | EI 120 U/C                 |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 72 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of FEF**

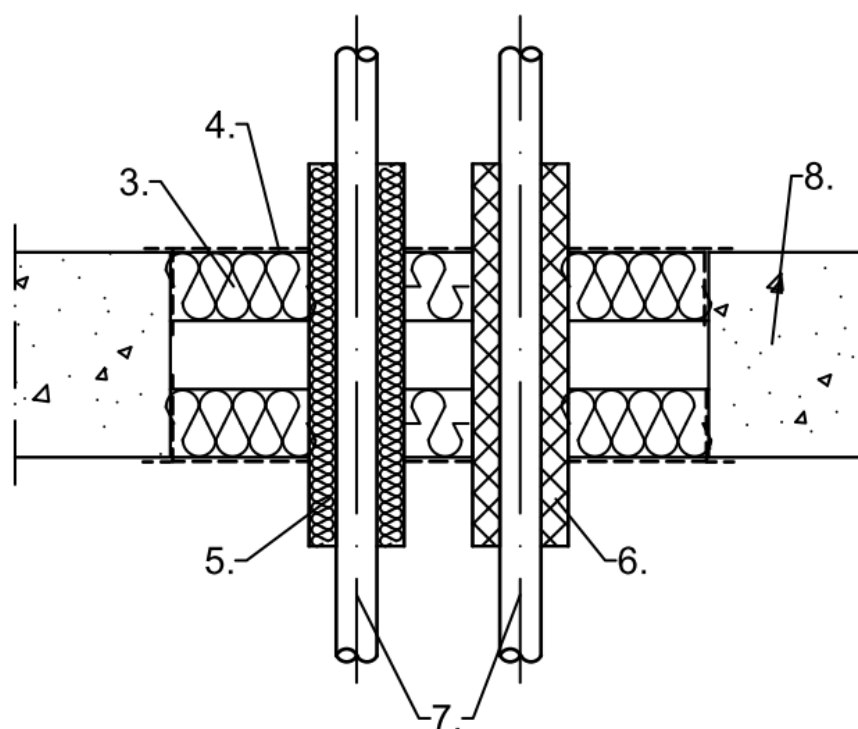
| Fire resistance classes - Floor                                 |                         |                     |                      |                                                                                                 |                                |
|-----------------------------------------------------------------|-------------------------|---------------------|----------------------|-------------------------------------------------------------------------------------------------|--------------------------------|
| Service                                                         | Outside-Ø               | Pipe wall thickness | Insulation Thickness | Measures                                                                                        | Floor<br>Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                         |                     |                      |                                                                                                 |                                |
| Copper, steel, stainless steel, cast iron                       | $\leq 60$ mm            | 0,6 - 14,2          | 13 - 40 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 120 U/C                     |
|                                                                 | $> 60 - \leq 88,9$ mm   |                     | 25 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 120 U/C                     |
|                                                                 | $\leq 42$ mm            |                     | 10 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer                                        | EI 90 U/C                      |
|                                                                 | $\leq 42$ mm            |                     | 9 - 40 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 90 U/C                      |
|                                                                 | $> 42 - \leq 60$ mm     |                     | 13 - 40 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                       | EI 90 U/C                      |
|                                                                 | $> 60 - \leq 88,9$ mm   |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers                                           | EI 90 U/C                      |
| Steel, stainless steel, cast iron                               | $\leq 159$ mm           | 0,6 - 14,2          | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x25 | EI 90 U/C                      |
|                                                                 | $> 159 - \leq 219,1$ mm |                     | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x38 | EI 90 U/C                      |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 73 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)

Multi-layer composite pipes insulated with lamella mat or FEF



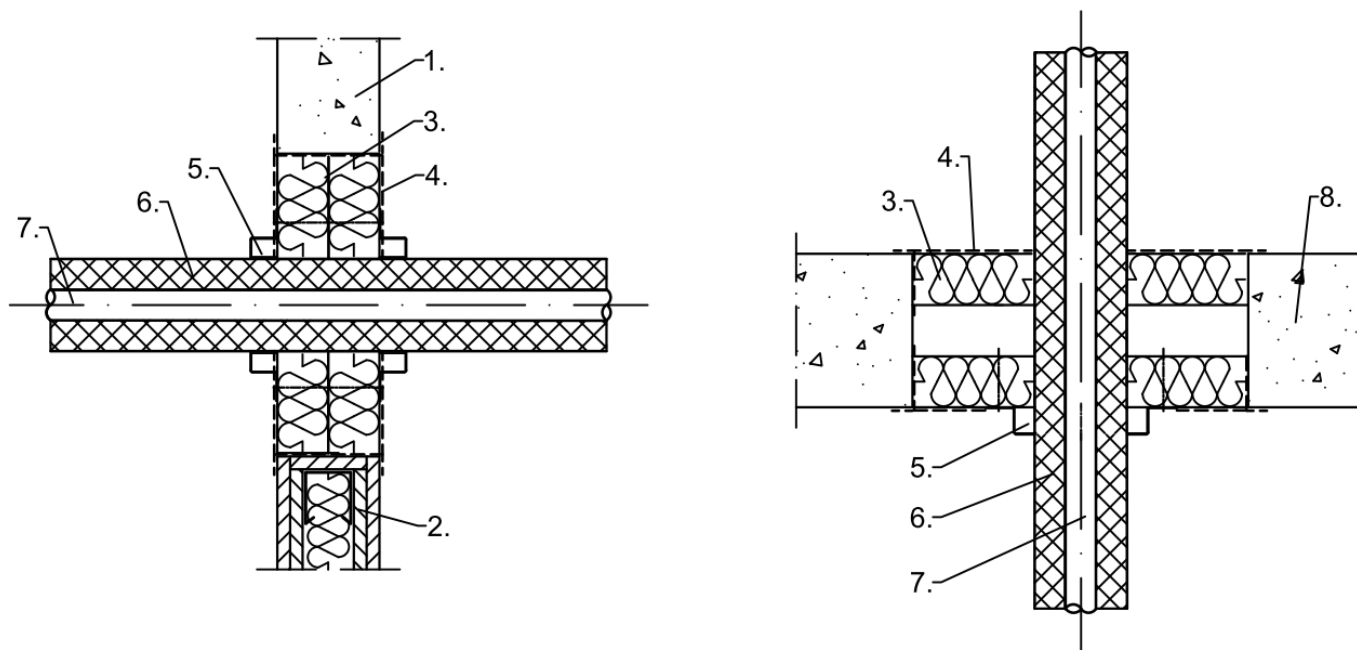
| Fire resistance classes                 |                     |                                                                |                               |                                |
|-----------------------------------------|---------------------|----------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                 | Pipe wall thickness | Measures                                                       | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Multi-layer composite pipes HENCO pipes |                     |                                                                |                               |                                |
| $\varnothing \leq 12$ mm                | $\geq 1,6$ mm       | Lamella mat [L x T] $\geq 250$ mm x $\geq 20$ mm               | -                             | EI 90 U/C                      |
| $\varnothing \leq 32$ mm                | $\geq 3,0$ mm       | Lamella mat [L x T] $\geq 250$ mm x $\geq 20$ mm               | -                             | EI 90 U/C                      |
| $\varnothing \leq 63$ mm                | $\geq 4,5$ mm       | Lamella mat [L x T] $\geq 250$ mm x $\geq 30$ mm               | -                             | EI 90 U/C                      |
| $\varnothing \leq 12$ mm                | $\geq 1,6$ mm       | FEF acc. EN 14304 [L x T] $\geq 240$ mm x $\geq 13$ mm         | -                             | EI 90 U/C                      |
| $\varnothing \leq 32$ mm                | $\geq 3,0$ mm       | FEF acc. EN 14304 [L x T] $\geq 240$ mm x $\geq 13$ mm         | -                             | EI 90 U/C                      |
| $\varnothing \leq 63$ mm                | $\geq 4,5$ mm       | FEF acc. EN 14304 [L x T] $\geq 240$ mm x $\geq 26$ (2x 13) mm | -                             | EI 90 U/C                      |

- 3. Mineral fibre board
- 4. Ablative Coating
- 5. Mineral fibre lamella mat

- 6. Insulation made of FEF
- 7. Multi-layer pipe
- 8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 74 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes insulated with FEF and Endless Collar**

The fire protection endless collar may be attached with coarse thread screws

**Permitted screws:**

|       |                 |         |
|-------|-----------------|---------|
| Würth | ASSY D          | 8x70 mm |
| Heco  | HECO-TOPIX-plus | 8x80 mm |
| SPAX  | T-STAR plus     | 8x80 mm |

| Pipe outer diameter | Fastening hooks / insulation thickness |              |              |
|---------------------|----------------------------------------|--------------|--------------|
|                     | 2                                      | 3            | 4            |
| 16 mm               | $\leq 17$ mm                           | 17,5 – 38 mm | -            |
| 20 mm               | $\leq 15$ mm                           | 15,5 – 38 mm | -            |
| 26 mm               | $\leq 12$ mm                           | 12,5 – 38 mm | -            |
| 32 mm               | $\leq 9$ mm                            | 9,5 – 38 mm  | -            |
| 40 mm               | -                                      | 8 – 35 mm    | 35,5 – 38 mm |
| 50 mm               | -                                      | 8 – 30 mm    | 30,5 – 38 mm |
| 63 mm               | -                                      | 8 – 23,5 mm  | 24 – 38 mm   |
| 75 mm               | -                                      | 8 – 17,5 mm  | 18 – 38 mm   |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Endless Collar
6. Insulation made of FEF
7. Multi-layer pipe
8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 75 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes insulated with FEF and Endless Collar**

| Fire resistance classes - Wall                                       |                     |                                    |                      |                                                       |                            |
|----------------------------------------------------------------------|---------------------|------------------------------------|----------------------|-------------------------------------------------------|----------------------------|
| Service                                                              | Pipe wall thickness | Insulation type                    | Insulation thickness | Measures                                              | Wall Fire resistance class |
| Multi-layer composite pipes Fränkische Alpex L, Fränkische Alpex F50 |                     |                                    |                      |                                                       |                            |
| Ø 16 mm                                                              | 2 mm                | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8 – 30 mm            | Endless Collar<br>2-layers<br>Installed on both sides | EI 120 U/C                 |
| Ø 20 mm                                                              |                     |                                    | 9 – 11.5 mm          |                                                       | EI 120 U/C                 |

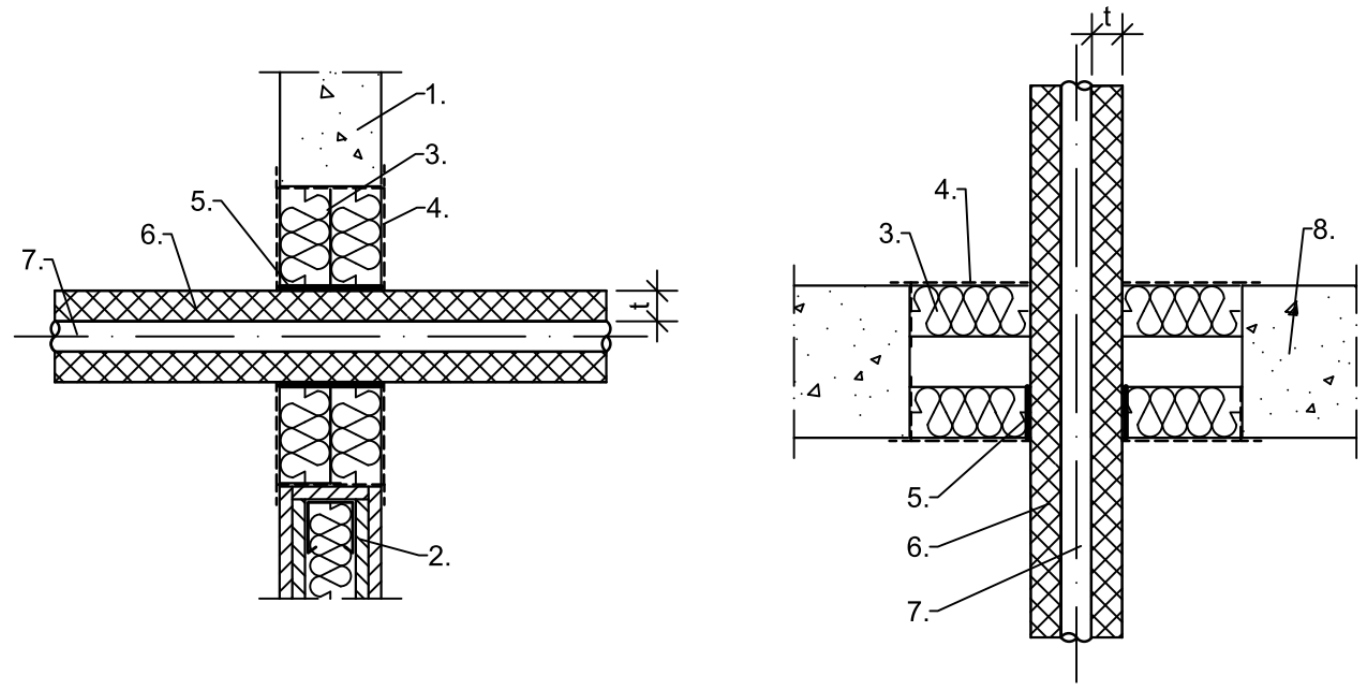
| Fire resistance classes - Floor                                      |                     |                                    |                      |                                                        |                                |
|----------------------------------------------------------------------|---------------------|------------------------------------|----------------------|--------------------------------------------------------|--------------------------------|
| Service                                                              | Pipe wall thickness | Insulation type                    | Insulation thickness | Measures                                               | Floor<br>Fire resistance class |
| Multi-layer composite pipes Fränkische Alpex L, Fränkische Alpex F50 |                     |                                    |                      |                                                        |                                |
| Ø 16 mm                                                              | 2 mm                | FEF<br>acc. EN 14304<br>(B-s3, d0) | 9 – 38 mm            | Endless Collar<br>2-layers<br>Installed on bottom side | EI 90 U/C                      |
| Ø 20 mm                                                              |                     |                                    |                      |                                                        | EI 90 U/C                      |
| Ø 26 mm                                                              | 3 mm                |                                    | 10 – 38 mm           |                                                        | EI 90 U/C                      |
| Ø 32 mm                                                              |                     |                                    |                      |                                                        | EI 90 U/C                      |
| Ø 40 mm                                                              | 3.5 mm              |                                    |                      |                                                        | EI 90 U/C                      |
| Ø 50 mm                                                              | 4 mm                |                                    |                      |                                                        | EI 90 U/C                      |
| Ø 63 mm                                                              | 4.5 mm              |                                    | 20 – 38 mm           |                                                        | EI 90 U/C                      |
| Ø 75 mm                                                              | 5 mm                |                                    |                      |                                                        | EI 90 U/C                      |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 76 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)

Multi-layer composite pipes insulated with FEF and intumescent wrap



1. Rigid wall  $\geq 100$  thickness

2. Flexible wall  $\geq 100$  mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Intumescent wrap

6. Insulation made of FEF

7. Multi-layer pipe

8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| FireFree Brandlukningssystem                                                                             | Annex 77 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes insulated with FEF and intumescent wrap**

| Fire resistance classes - Wall                    |                     |                                    |                                          |                                          |                               |
|---------------------------------------------------|---------------------|------------------------------------|------------------------------------------|------------------------------------------|-------------------------------|
| Service                                           | Pipe wall thickness | Insulation type                    | Insulation thickness                     | Measures                                 | Wall<br>Fire resistance class |
| Multi-layer composite pipes Geberit Mepla         |                     |                                    |                                          |                                          |                               |
| Ø 16 mm                                           | 2,25 mm             | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm                              | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2,5 mm              |                                    |                                          |                                          | EI 120 U/C                    |
| Ø 26 mm                                           | 3 mm                |                                    | 8,5 – 35 mm                              |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                                    | 9,0 – 35 mm                              |                                          | EI 120 U/C                    |
| Ø 40 mm                                           | 3,5 mm              |                                    |                                          | EI 120 U/C                               |                               |
| Ø 50 mm                                           | 4 mm                |                                    | Intumescent wrap<br>50 mm<br>2 x 2-layer | EI 120 U/C                               |                               |
| Ø 63 mm                                           | 4,5 mm              |                                    |                                          | EI 90 U/C                                |                               |
| Ø 75 mm                                           | 4,7 mm              |                                    |                                          | >9,5 – 40,5 mm                           | EI 120 U/C                    |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                                    |                                          |                                          |                               |
| Ø 16 mm                                           | 2,6 mm              | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm                              | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2,9 mm              |                                    |                                          |                                          | EI 120 U/C                    |
| Ø 25 mm                                           | 3,7 mm              |                                    | 8,5 – 35 mm                              |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 4,7 mm              |                                    | 9,0 – 35 mm                              | EI 120 U/C                               |                               |
| Ø 40 mm                                           | 6,0 mm              |                                    |                                          | Intumescent wrap<br>50 mm<br>2 x 2-layer | EI 120 U/C                    |
| Multi-layer composite pipes Kekelit Kelox         |                     |                                    |                                          |                                          |                               |
| Ø 16 mm                                           | 2 mm                | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm                              | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 18 mm                                           | 2 mm                |                                    |                                          |                                          | EI 120 U/C                    |
| Ø 20 mm                                           | 2,25 mm             |                                    | 8,5 – 35 mm                              |                                          | EI 120 U/C                    |
| Ø 25 mm                                           | 2,5 mm              |                                    |                                          |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                                    | 9,0 – 35 mm                              | Intumescent wrap<br>50 mm<br>2 x 2-layer | EI 120 U/C                    |
| Ø 40 mm                                           | 4 mm                |                                    |                                          |                                          | EI 120 U/C                    |
| Ø 50 mm                                           | 4,5 mm              |                                    | 9,0 – 39 mm                              |                                          | EI 120 U/C                    |
| Ø 63 mm                                           | 6 mm                |                                    | 9,5 – 40,5 mm                            |                                          | EI 120 U/C                    |
| Ø 75 mm                                           | 7,5 mm              |                                    |                                          |                                          | EI 120 U/C                    |
| Multi-layer composite pipes HENCO pipes           |                     |                                    |                                          |                                          |                               |
| Ø 20 mm                                           | 2-3 mm              | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm                              | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                                    |                                          |                                          | EI 120 U/C                    |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 78 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes insulated with FEF and intumescent wrap**

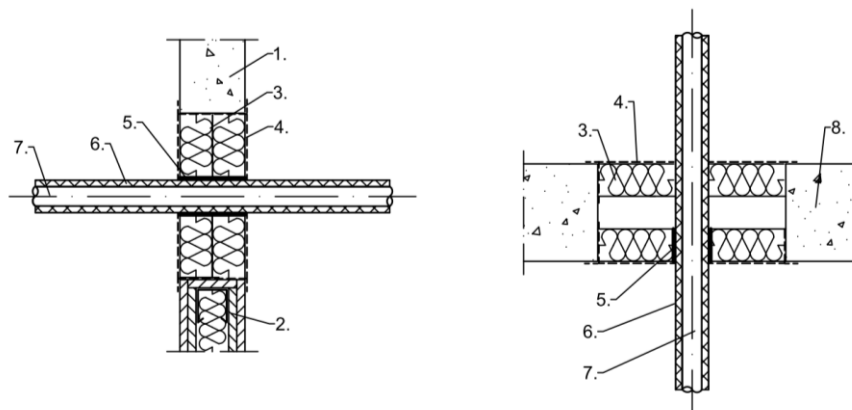
| Fire resistance classes - Floor                   |                     |                                    |                                           |                                           |                                |
|---------------------------------------------------|---------------------|------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------|
| Service                                           | Pipe wall thickness | Insulation type                    | Insulation thickness                      | Measures                                  | Floor<br>Fire resistance class |
| Multi-layer composite pipes Geberit Mepla         |                     |                                    |                                           |                                           |                                |
| Ø 16 mm                                           | 2,25 mm             | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm                               | Intumescent wrap<br>50 mm<br>1 x 1-layer  | EI 120 U/C                     |
| Ø 20 mm                                           | 2,5 mm              |                                    |                                           |                                           | EI 120 U/C                     |
| Ø 26 mm                                           | 3 mm                |                                    | 8,5 – 35 mm                               |                                           | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                                    | 9,0 – 35 mm                               |                                           | EI 120 U/C                     |
| Ø 40 mm                                           | 3,5 mm              |                                    |                                           | EI 120 U/C                                |                                |
| Ø 50 mm                                           | 4 mm                |                                    | Intumescent wrap<br>50 mm<br>1 x 2-layers | EI 120 U/C                                |                                |
| Ø 63 mm                                           | 4,5 mm              |                                    |                                           | EI 120 U/C                                |                                |
| Ø 75 mm                                           | 4,7 mm              |                                    |                                           | EI 90 U/C                                 |                                |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                                    |                                           |                                           |                                |
| Ø 16 mm                                           | 2,6 mm              | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm                               | Intumescent wrap<br>50 mm<br>1 x 1-layer  | EI 120 U/C                     |
| Ø 20 mm                                           | 2,9 mm              |                                    |                                           |                                           | EI 120 U/C                     |
| Ø 25 mm                                           | 3,7 mm              |                                    | 8,5 – 35 mm                               |                                           | EI 120 U/C                     |
| Ø 32 mm                                           | 4,7 mm              |                                    | 9,0 – 35 mm                               |                                           | EI 120 U/C                     |
| Ø 40 mm                                           | 6,0 mm              |                                    |                                           | Intumescent wrap<br>50 mm<br>1 x 2-layers | EI 120 U/C                     |
| Multi-layer composite pipes Kekelit Kelox         |                     |                                    |                                           |                                           |                                |
| Ø 16 mm                                           | 2 mm                | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm                               | Intumescent wrap<br>50 mm<br>1 x 1-layer  | EI 120 U/C                     |
| Ø 18 mm                                           | 2 mm                |                                    |                                           |                                           | EI 120 U/C                     |
| Ø 20 mm                                           | 2,25 mm             |                                    | 8,5 – 35 mm                               |                                           | EI 120 U/C                     |
| Ø 25 mm                                           | 2,5 mm              |                                    |                                           |                                           | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                                    | 9,0 – 35 mm                               | Intumescent wrap<br>50 mm<br>1 x 2-layers | EI 120 U/C                     |
| Ø 40 mm                                           | 4 mm                |                                    |                                           |                                           | EI 120 U/C                     |
| Ø 50 mm                                           | 4,5 mm              |                                    | EI 120 U/C                                |                                           |                                |
| Ø 63 mm                                           | 6 mm                |                                    | 9,0 – 39 mm                               |                                           | EI 120 U/C                     |
| Ø 75 mm                                           | 7,5 mm              |                                    | 9,5 – 40,5 mm                             |                                           | EI 120 U/C                     |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 79 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**Multi-layer composite pipes insulated with PE-Foam and intumescent wrap**



| Fire resistance classes - Wall                    |                     |                 |                      |                                          |                               |
|---------------------------------------------------|---------------------|-----------------|----------------------|------------------------------------------|-------------------------------|
| Service                                           | Pipe wall thickness | Insulation type | Insulation thickness | Measures                                 | Wall<br>Fire resistance class |
| Multi-layer composite pipes HENCO pipes           |                     |                 |                      |                                          |                               |
| Ø 20 mm                                           | 2.0 – 3.0 mm        | PEF             | 6 – 13 mm            | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Multi-layer composite pipes Kekelit Kelox         |                     |                 |                      |                                          |                               |
| Ø 18 mm                                           | 2 mm                | PEF             | 4 – 13 mm            | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2.25 mm             |                 |                      |                                          | EI 120 U/C                    |
| Ø 25 mm                                           | 2.5 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Multi-layer composite pipes Geberit Mepla         |                     |                 |                      |                                          |                               |
| Ø 16 mm                                           | 2.25 mm             | PEF             | 6 – 13 mm            | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2.5 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 26 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                 |                      |                                          |                               |
| Ø 16 mm                                           | 2,6 mm              | PEF             | 4 – 26 mm            | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2,9 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 25 mm                                           | 3,7 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 4,7 mm              |                 |                      |                                          | EI 120 U/C                    |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. PE-Foam
7. Multilayer pipe
8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

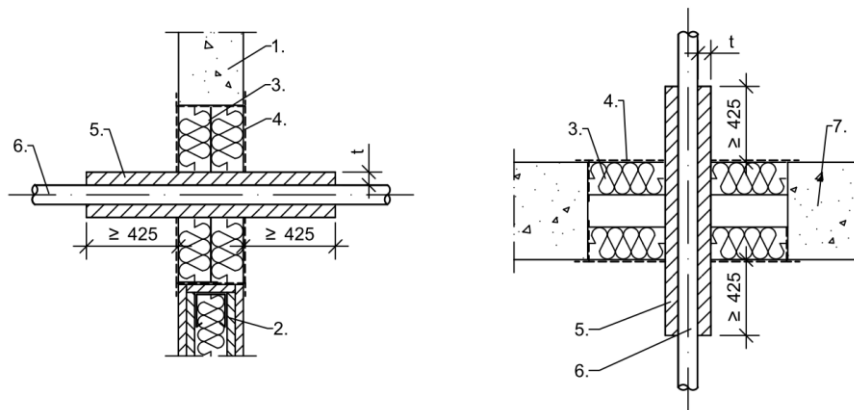
|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 80 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes insulated with PE-Foam and intumescent wrap**

| Fire resistance classes - Floor                   |                     |                 |                      |                                            |                                |
|---------------------------------------------------|---------------------|-----------------|----------------------|--------------------------------------------|--------------------------------|
| Service                                           | Pipe wall thickness | Insulation type | Insulation thickness | Measures                                   | Floor<br>Fire resistance class |
| Multi-layer composite pipes HENCO pipes           |                     |                 |                      |                                            |                                |
| Ø 20 mm                                           | 2.0 – 3.0 mm        | PEF             | 6 – 13 mm            | Intumescent wrap<br>50 mm<br>1 x 1-layer   | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                 | 13 mm                |                                            | EI 120 U/C                     |
| Multi-layer composite pipes Kekelit Kelox         |                     |                 |                      |                                            |                                |
| Ø 18 mm                                           | 2 mm                | PEF             | 4 – 13 mm            | R Intumescent wrap<br>50 mm<br>1 x 1-layer | EI 120 U/C                     |
| Ø 20 mm                                           | 2.25 mm             |                 |                      |                                            | EI 120 U/C                     |
| Ø 25 mm                                           | 2.5 mm              |                 |                      |                                            | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                            | EI 120 U/C                     |
| Multi-layer composite pipes Geberit Mepla         |                     |                 |                      |                                            |                                |
| Ø 16 mm                                           | 2.25 mm             | PEF             | 6 – 13 mm            | Intumescent wrap<br>50 mm<br>1 x 1-layer   | EI 120 U/C                     |
| Ø 20 mm                                           | 2.5 mm              |                 |                      |                                            | EI 120 U/C                     |
| Ø 26 mm                                           | 3 mm                |                 |                      |                                            | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                            | EI 120 U/C                     |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                 |                      |                                            |                                |
| Ø 16 mm                                           | 2,6 mm              | PEF             | 4 – 26 mm            | Intumescent wrap<br>50 mm<br>1 x 1-layer   | EI 120 U/C                     |
| Ø 20 mm                                           | 2,9 mm              |                 | 26 mm                |                                            | EI 120 U/C                     |
| Ø 25 mm                                           | 3,7 mm              |                 |                      |                                            | EI 120 U/C                     |
| Ø 32 mm                                           | 4,7 mm              |                 |                      |                                            | EI 120 U/C                     |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 81 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes insulated with mineral fibre pipes shells**

| Fire resistance classes - Wall                   |                     |                                         |                      |          |                            |
|--------------------------------------------------|---------------------|-----------------------------------------|----------------------|----------|----------------------------|
| Service                                          | Pipe wall thickness | Insulation type                         | Insulation thickness | Measures | Wall Fire resistance class |
| <b>Multi-layer composite pipes Geberit Mepla</b> |                     |                                         |                      |          |                            |
| Ø 16 mm                                          | 2.25 mm             | Mineral fibre pipe shells acc. EN 14303 | 20 – 30 mm           | -        | EI 120 U/C                 |
| Ø 20 mm                                          | 2.5 mm              |                                         |                      |          | EI 120 U/C                 |
| Ø 26 mm                                          | 3 mm                |                                         | 20 – 40 mm           |          | EI 120 U/C                 |
| Ø 32 mm                                          | 3 mm                |                                         |                      |          | EI 120 U/C                 |
| Ø 40 mm                                          | 3.5 mm              |                                         | 20 – 50 mm           | -        | EI 120 U/C                 |
| Ø 50 mm                                          | 4 mm                |                                         |                      |          | EI 120 U/C                 |
| Ø 63 mm                                          | 4.5 mm              |                                         | 20 – 60 mm           |          | EI 120 U/C                 |
| Ø 75 mm                                          | 4.7 mm              |                                         | 20 – 80 mm           |          | EI 120 U/C                 |

| Fire resistance classes - Floor                  |                     |                                         |                      |          |                             |
|--------------------------------------------------|---------------------|-----------------------------------------|----------------------|----------|-----------------------------|
| Service                                          | Pipe wall thickness | Insulation type                         | Insulation thickness | Measures | Floor Fire resistance class |
| <b>Multi-layer composite pipes Geberit Mepla</b> |                     |                                         |                      |          |                             |
| Ø 16 mm                                          | 2,25 mm             | Mineral fibre pipe shells acc. EN 14303 | 20 – 30 mm           | -        | EI 120 U/C                  |
| Ø 20 mm                                          | 2,5 mm              |                                         |                      |          | EI 120 U/C                  |
| Ø 26 mm                                          | 3 mm                |                                         | 20 – 40 mm           |          | EI 120 U/C                  |
| Ø 32 mm                                          | 3 mm                |                                         |                      |          | EI 120 U/C                  |
| Ø 40 mm                                          | 3,5 mm              |                                         | 20 – 50 mm           | -        | EI 120 U/C                  |
| Ø 50 mm                                          | 4 mm                |                                         |                      |          | EI 120 U/C                  |
| Ø 63 mm                                          | 4,5 mm              |                                         | 20 – 60 mm           |          | EI 120 U/C                  |
| Ø 75 mm                                          | 4,7 mm              |                                         | 20 – 80 mm           |          | EI 120 U/C                  |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

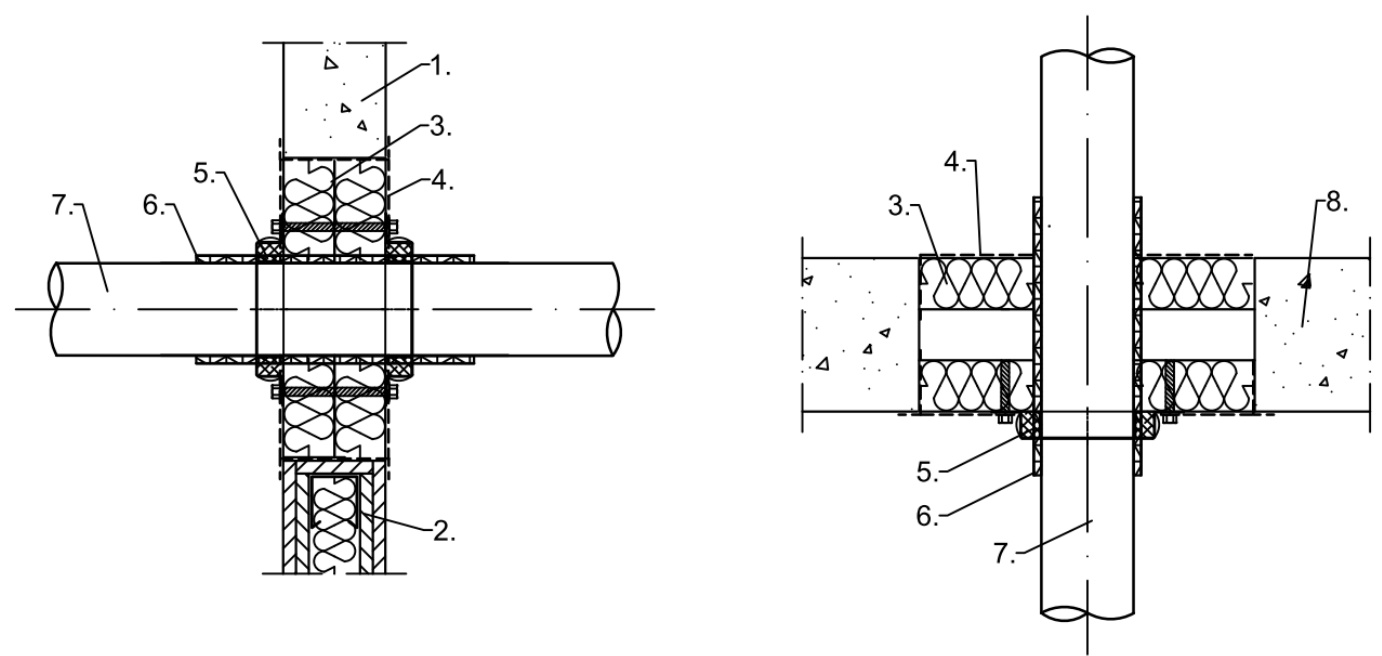
5. Pipe shell
6. Multi-layer pipe
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 82 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Combustible pipes with and without PE sound insulation and fire protection collar



| The fire protection endless collar may be attached with coarse thread screws |                 |         |
|------------------------------------------------------------------------------|-----------------|---------|
| Permitted screws:                                                            |                 |         |
| Würth                                                                        | ASSY D          | 8x70 mm |
| Heco                                                                         | HECO-TOPIX-plus | 8x80 mm |
| SPAX                                                                         | T-STAR plus     | 8x80 mm |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Fire protection collar

6. PE sound insulation

7. Multi-layer pipe

8. Rigid floor ≥ 150 mm thickness

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| PVC-U, PVC-C                   |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 – 5,6 mm        | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 1,8 – 8,4 mm        |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 1,8 – 10,0 mm       |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 1,8 – 12,3 mm       |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 2,5 – 9,3 mm        |                                                   | EI 120 U/U                    |
| Ø 140 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 90 U/U                     |
| PE-HD, ABS, SAN+PVC            |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
|                                | 4,6 mm              |                                                   | EI 120 U/U                    |
| Ø 63 – 75 mm                   | 2,2 – 6,9 mm        |                                                   | EI 90 U/U                     |
| Ø 75 mm                        | 3,8 – 4,5 mm        |                                                   | EI 120 U/U                    |
| Ø 90 - 110 mm                  | 2,7 – 4,3 mm        |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,4 – 8,2 mm        |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 – 10,0 mm       |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 3,1 – 4,2 mm        |                                                   | EI 120 U/U                    |
| Ø 140 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 90 U/U                     |
|                                | 4,0 mm              |                                                   | EI 120 U/U                    |
| PP                             |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 2,2 – 5,2 mm        |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 2,4 – 7,3 mm        |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 – 10,0 mm       |                                                   | EI 90 U/U                     |
|                                | 10,0 mm             |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 90 U/U                     |
| Ø 140 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 90 U/U                     |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 84 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Rehau Raupiano light           |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |
| Conel DRAIN                    |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |
| Rehau RAUSILENTO               |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 85 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Geberit Silent dB20            |                     |                                                   |                               |
| Ø 56 mm                        | 3,2 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 63 mm                        | 3,2 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 3,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 5,5 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 6,0 mm              |                                                   | EI 120 U/U                    |
| Ø 135 mm                       | 6,0 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 7,0 mm              |                                                   | EI 90 U/U                     |
| Geberit Silent Pro             |                     |                                                   |                               |
| Ø 50 mm                        | 3,0 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 75 mm                        | 3,8 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 4,3 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 4,5 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 5,0 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 6,0 mm              |                                                   | EI 120 U/U                    |
| POLO-KAL NG / POLO-KAL XS      |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,0 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,4 mm              |                                                   | EI 120 U/U                    |
| POLO-KAL 3S                    |                     |                                                   |                               |
| Ø 90 mm                        | 4,5 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 110 mm                       | 4,8 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 86 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Rehau Raupiano Plus            |                     |                                                   |                               |
| Ø 50 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 75 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |
| Wavin AS                       |                     |                                                   |                               |
| Ø 58 mm                        | 4,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 78 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| GF Silenta Premium             |                     |                                                   |                               |
| Ø 58 mm                        | 4,1 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 78 mm                        | 4,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 4,7 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 87 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Hakan Silenta Premium          |                     |                                                   |                               |
| Ø 58 mm                        | 4,1 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 78 mm                        | 4,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 4,7 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Wavin SiTECH+                  |                     |                                                   |                               |
| Ø 32 mm                        | 2,0 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 2,1 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,4 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 4,0 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,0 mm              |                                                   | EI 120 U/U                    |
| Valsir Triplus                 |                     |                                                   |                               |
| Ø 32 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,5 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,4 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 4,9 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 88 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Pipelife Master 3 PLUS         |                     |                                                   |                               |
| Ø 32 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,1 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,5 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,0 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,5 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 4,4 mm              |                                                   | EI 120 U/U                    |
| Kekelit PHON EX AS             |                     |                                                   |                               |
| Ø 58 mm                        | 4,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 78 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Geberit Silent PP              |                     |                                                   |                               |
| Ø 32 mm                        | 2,0 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,6 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 4,2 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,2 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 89 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| PVC-U, PVC-C                    |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,8 – 5,6 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 63 – 75 mm                    | 1,8 – 8,4 mm        |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 1,8 – 10,0 mm       |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 1,8 – 12,3 mm       |                                                    | EI 90 U/U                      |
|                                 | 1,8 mm              |                                                    | EI 120 U/U                     |
| Ø 125 mm                        | 2,5 mm              |                                                    | EI 120 U/U                     |
| Ø 140 – 160 mm                  | 3,2 – 11,9 mm       |                                                    | EI 90 U/U                      |
|                                 | 3,2 mm              |                                                    | EI 120 U/U                     |
| PE-HD, ABS, SAN+PVC             |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 63 – 75 mm                    | 2,2 – 6,9 mm        |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,4 – 8,2 mm        |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 – 10,0 mm       |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 140 – 160 mm                  | 4,0 – 14,6 mm       |                                                    | EI 90 U/U                      |
| PP                              |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
|                                 | 1,8 mm              |                                                    | EI 120 U/U                     |
| Ø 63 – 75 mm                    | 2,2 – 6,9 mm        |                                                    | EI 90 U/U                      |
|                                 | 2,2 mm              |                                                    | EI 120 U/U                     |
| Ø 90 mm                         | 2,4 – 8,2 mm        |                                                    | EI 90 U/U                      |
|                                 | 2,4 mm              |                                                    | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 – 10,0 mm       |                                                    | EI 90 U/U                      |
|                                 | 2,7 mm              |                                                    | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 – 11,4 mm       |                                                    | EI 90 U/U                      |
|                                 | 3,1 mm              |                                                    | EI 120 U/U                     |
| Ø 140 – 160 mm                  | 4,0 – 14,6 mm       |                                                    | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 90 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| Rehau Raupiano light            |                     |                                                    |                                |
| Ø 50 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 1,9 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,2 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 mm              |                                                    | EI 90 U/U                      |
| Conel DRAIN                     |                     |                                                    |                                |
| Ø 50 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 1,9 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,2 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 mm              |                                                    | EI 90 U/U                      |
| Rehau RAUSILENTO                |                     |                                                    |                                |
| Ø 50 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 1,9 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,2 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 mm              |                                                    | EI 90 U/U                      |
| Geberit Silent PP               |                     |                                                    |                                |
| Ø 32 mm                         | 2,0 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 40 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 50 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,6 mm              |                                                    | EI 90 U/U                      |
| Geberit Silent Pro              |                     |                                                    |                                |
| Ø 50 mm                         | 3,0 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 3,8 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 4,3 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 4,5 mm              |                                                    | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 91 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| POLO-KAL NG / POLO-KAL XS       |                     |                                                    |                                |
| Ø 40 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 50 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,0 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,4 mm              |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 3,9 mm              |                                                    | EI 90 U/U                      |
| Ø 160 mm                        | 4,9 mm              |                                                    | EI 90 U/U                      |
| GF Silenta Premium              |                     |                                                    |                                |
| Ø 58 mm                         | 4,1 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 78 mm                         | 4,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 4,7 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 5,3 mm              |                                                    | EI 90 U/U                      |
| Hakan Silenta Premium           |                     |                                                    |                                |
| Ø 58 mm                         | 4,1 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 78 mm                         | 4,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 4,7 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 5,3 mm              |                                                    | EI 90 U/U                      |
| Wavin SiTECH+                   |                     |                                                    |                                |
| Ø 32 mm                         | 2,0 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 40 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 50 mm                         | 2,1 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,4 mm              |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 4,0 mm              |                                                    | EI 90 U/U                      |
| Ø 160 mm                        | 5,0 mm              |                                                    | EI 90 U/U                      |

Dimensions in mm

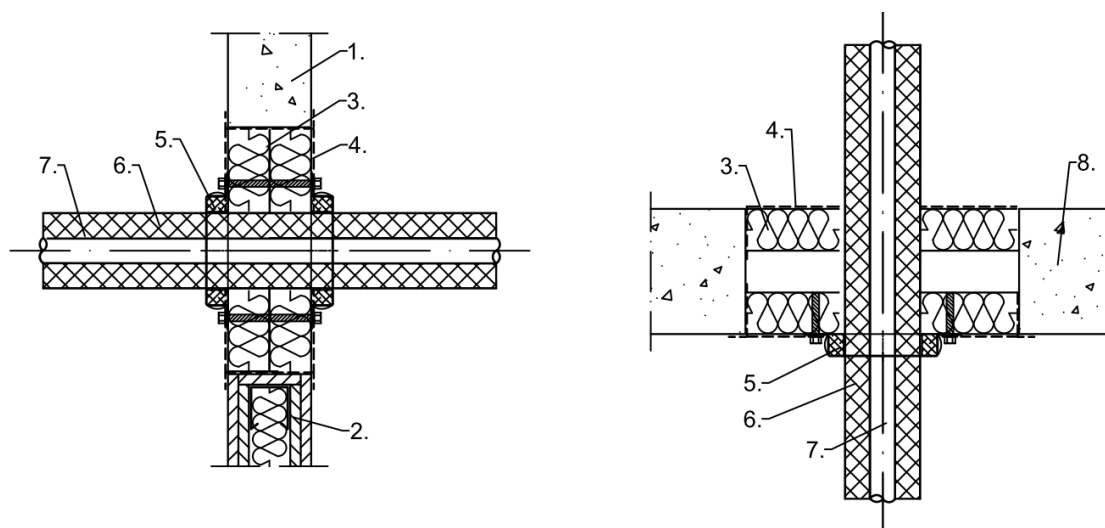
|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 92 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| <b>Valsir Triplus</b>           |                     |                                                    |                                |
| Ø 32 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 40 mm                         | 1,8 mm              |                                                    | EI 90 U/U                      |
| Ø 50 mm                         | 1,8 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,5 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,4 mm              |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 3,9 mm              |                                                    | EI 90 U/U                      |
| Ø 160 mm                        | 4,9 mm              |                                                    | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 93 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with FEF insulation and fire protection collar**

The fire protection endless collar may be attached with coarse thread screws

**Permitted screws:**

|       |                 |         |
|-------|-----------------|---------|
| Würth | ASSY D          | 8x70 mm |
| Heco  | HECO-TOPIX-plus | 8x80 mm |
| SPAX  | T-STAR plus     | 8x80 mm |

**Fire resistance classes - Wall**

| Service       | Pipe wall thickness | Insulation        | Pipe wall thickness | Measures                                       | Wall Fire resistance class |
|---------------|---------------------|-------------------|---------------------|------------------------------------------------|----------------------------|
| <b>PP</b>     |                     |                   |                     |                                                |                            |
| Ø 32 – 50 mm  | 1,8 – 4,6 mm        | FEF acc. EN 14304 | 6 – 32 mm           | Fire protection collar Installed on both sides | EI 120 U/U                 |
| Ø 63 – 75 mm  | 2,2 – 6,8 mm        |                   |                     |                                                | EI 120 U/U                 |
| Ø 90 – 110 mm | 2,7 – 10,0 mm       |                   |                     |                                                | EI 120 U/U                 |

**Fire resistance classes - Floor**

| Service       | Pipe wall thickness | Insulation           | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
|---------------|---------------------|----------------------|---------------------|----------------------------------------------------|--------------------------------|
| PP            |                     |                      |                     |                                                    |                                |
| Ø 32 – 50 mm  | 1,8 mm              | FEF<br>acc. EN 14304 | 6 – 32 mm           | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
|               |                     |                      | 6 mm                |                                                    | EI 120 U/U                     |
| Ø 63 – 75 mm  | 2,2 mm              |                      | 6 – 32 mm           |                                                    | EI 90 U/U                      |
|               |                     |                      | 6 mm                |                                                    | EI 120 U/U                     |
| Ø 90 – 110 mm | 2,7 mm              |                      | 6 – 32 mm           |                                                    | EI 120 U/U                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

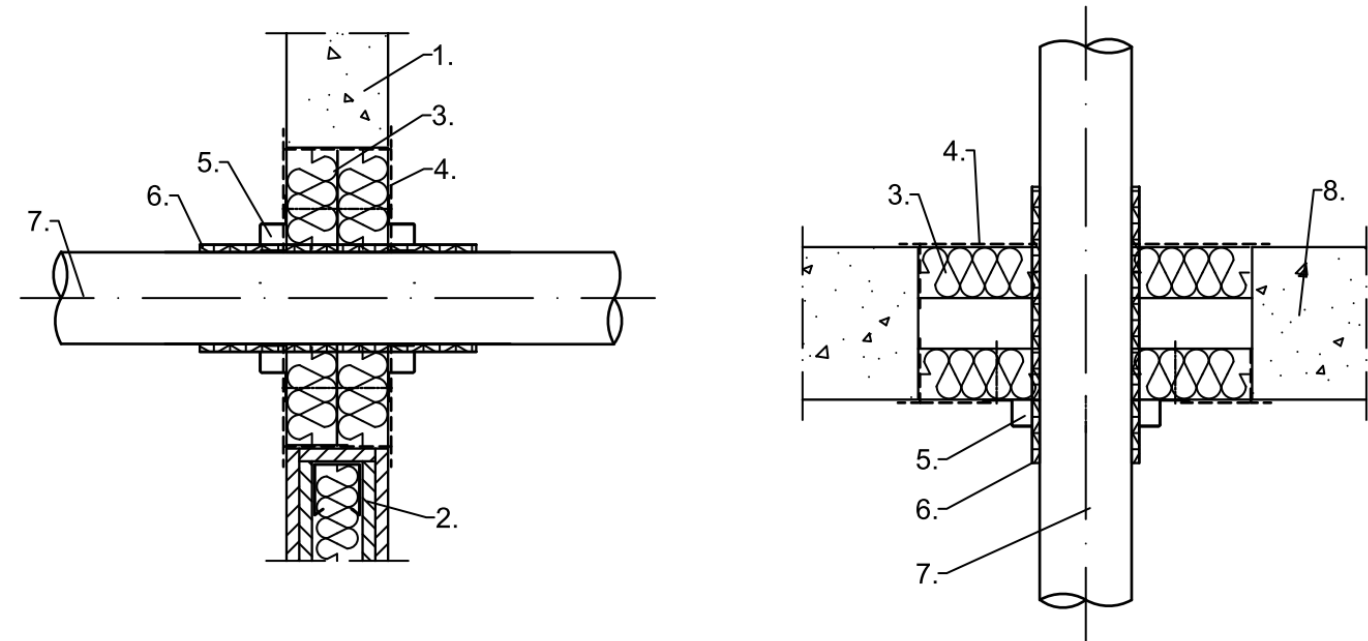
5. Fire protection collar
6. FEF insulation
7. Combustible pipe
8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 94 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)

Combustible pipes with and without PE sound insulation and fire protection endless collar



| The fire protection endless collar may be attached with coarse thread screws |                 |         |
|------------------------------------------------------------------------------|-----------------|---------|
| Permitted screws:                                                            |                 |         |
| Würth                                                                        | ASSY D          | 8x70 mm |
| Heco                                                                         | HECO-TOPIX-plus | 8x80 mm |
| SPAX                                                                         | T-STAR plus     | 8x80 mm |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Fire protection endless collar

6. PE sound insulation

7. Combustible pipes

8. Rigid floor ≥ 150 mm thickness

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)****Combustible pipes with and without PE sound insulation and fire protection endless collar**

| Fire resistance classes - Wall |                     |                                           |                               |
|--------------------------------|---------------------|-------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                  | Wall<br>Fire resistance class |
| PVC-U, PVC-C                   |                     |                                           |                               |
| Ø 40 – 50 mm                   | 2,0 – 5,6 mm        | Endless Collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 1,9 – 7,0 mm        |                                           | EI 90 U/U                     |
| Ø 90 – 110 mm                  | 1,8 – 9,0 mm        |                                           | EI 90 U/U                     |
| Ø 125 mm                       | 2,3 – 9,8 mm        |                                           | EI 90 U/U                     |
| Ø 140 – 160 mm                 | 3,2 – 11,9 mm       |                                           | EI 90 U/U                     |
| PE-HD, ABS, SAN+PVC            |                     |                                           |                               |
| Ø 40 – 50 mm                   | 1,8 – 4,6 mm        | Endless Collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 63 – 75 mm                   | 2,2 – 3,8 mm        |                                           | EI 90 U/U                     |
| Ø 90 mm                        | 2,4 – 3,3 mm        |                                           | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 mm              |                                           | EI 90 U/U                     |
| PP                             |                     |                                           |                               |
| Ø 90 – 110 mm                  | 2,7 mm              | Endless Collar<br>Installed on both sides | EI 120 U/U                    |
| POLO-KAL NG / POLO-KAL XS      |                     |                                           |                               |
| Ø 90 mm                        | 3,0 mm              | Endless Collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 110 mm                       | 3,4 mm              |                                           | EI 90 U/U                     |
| Rehau Raupiano plus            |                     |                                           |                               |
| Ø 75 mm                        | 1,9 mm              | Endless Collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 90 mm                        | 2,2 mm              |                                           | EI 90 U/U                     |
| Geberit Silent PP              |                     |                                           |                               |
| Ø 90 mm                        | 3,1 mm              | Endless Collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 110 mm                       | 3,6 mm              |                                           | EI 90 U/U                     |
| Wavin SiTech+                  |                     |                                           |                               |
| Ø 32 mm                        | 2,0 mm              | Endless Collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 50 mm                        | 2,1 mm              |                                           | EI 90 U/U                     |
| Ø 75 mm                        | 2,6 mm              |                                           | EI 90 U/U                     |
| Ø 90 mm                        | 3,1 mm              |                                           | EI 90 U/U                     |
| Ø 110 mm                       | 3,6 mm              |                                           | EI 90 U/U                     |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 96 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

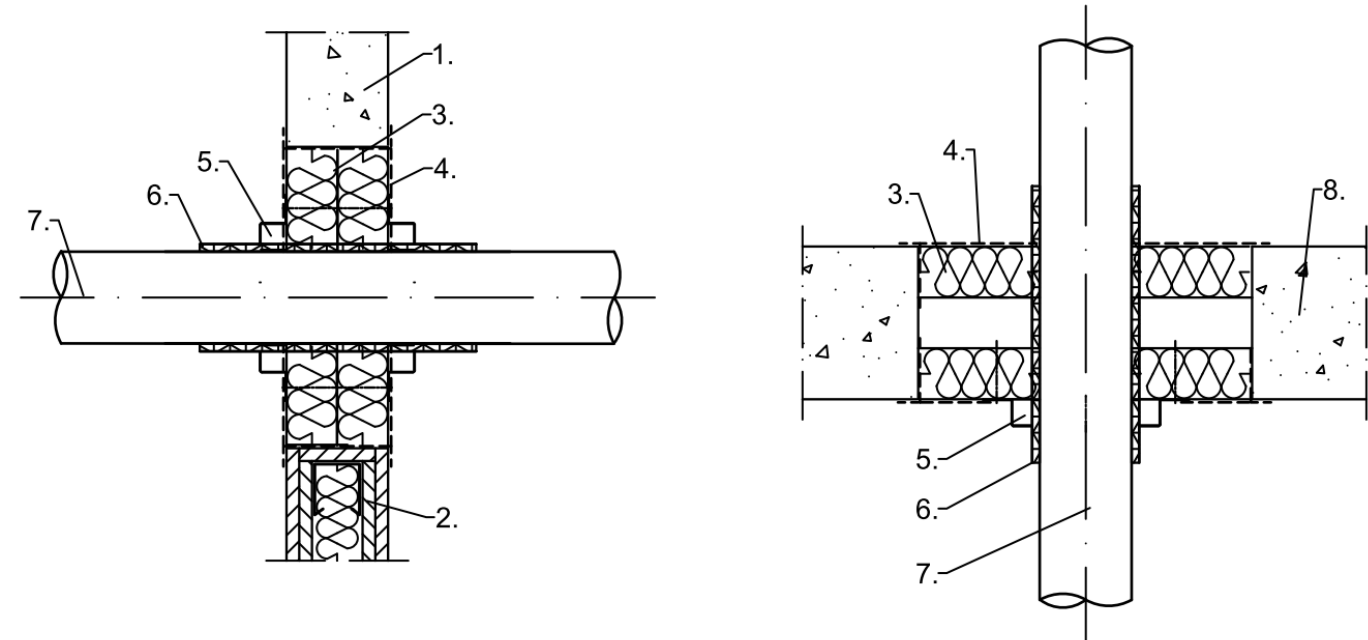
**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)****Combustible pipes with and without PE sound insulation and fire protection endless collar**

| Fire resistance classes - Floor |                     |                                            |                                |
|---------------------------------|---------------------|--------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                   | Floor<br>Fire resistance class |
| PVC-U, PVC-C                    |                     |                                            |                                |
| Ø 40 – 50 mm                    | 1,8 – 5,6 mm        | Endless Collar<br>Installed on bottom side | EI 120 U/U                     |
| Ø 63 – 75 mm                    | 2,1 – 5,1 mm        |                                            | EI 120 U/U                     |
| Ø 90 – 110 mm                   | 2,6 – 4,3 mm        |                                            | EI 120 U/U                     |
| Ø 125 mm                        | 2,8 – 4,0 mm        |                                            | EI 120 U/U                     |
| Ø 140 mm                        | 3,0 – 3,6 mm        |                                            | EI 120 U/U                     |
| Ø 160 mm                        | 3,2 mm              |                                            | EI 120 U/U                     |
| PE-HD, ABS, SAN+PVC             |                     |                                            |                                |
| Ø 40 – 50 mm                    | 4,6 mm              | Endless Collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 63 – 75 mm                    | 3,8 mm              |                                            | EI 90 U/U                      |
| Ø 90 mm                         | 2,7 – 3,4 mm        |                                            | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 mm              |                                            | EI 90 U/U                      |
| PP                              |                     |                                            |                                |
| Ø 40 - 50 mm                    | 1,8 – 4,6 mm        | Endless Collar<br>Installed on bottom side | EI 120 U/U                     |
| Ø 63 – 75 mm                    | 2,2 – 6,8 mm        |                                            | EI 90 U/U                      |
| Ø 63 mm                         | 3,8 – 6,8 mm        |                                            | EI 120 U/U                     |
| Ø 75 mm                         | 5,2 – 6,8 mm        |                                            | EI 120 U/U                     |
| Ø 90 – 110 mm                   | 2,7 – 10,0 mm       |                                            | EI 90 U/U                      |
| Ø 90 mm                         | 7,3 – 10,0 mm       |                                            | EI 120 U/U                     |
| Ø 110 mm                        | 10,0 mm             |                                            | EI 120 U/U                     |
| Rehau Raupiano plus             |                     |                                            |                                |
| Ø 75 mm                         | 1,9 mm              | Endless Collar<br>Installed on bottom side | EI 120 U/U                     |
| Ø 90 mm                         | 2,2 mm              |                                            | EI 120 U/U                     |
| Geberit Silent PP               |                     |                                            |                                |
| Ø 32 mm                         | 2,0 mm              | Endless Collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 50 mm                         | 2,0 mm              |                                            | EI 90 U/U                      |
| Wavin SiTech+                   |                     |                                            |                                |
| Ø 32 mm                         | 2,0 mm              | Endless Collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 50 mm                         | 2,1 mm              |                                            | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 97 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)  
Nonregulated combustible pipes with and without PE sound insulation and fire protection endless collar



| The fire protection endless collar may be attached with coarse thread screws |                   |       |
|------------------------------------------------------------------------------|-------------------|-------|
| Permitted screws:                                                            |                   |       |
| Rockwool                                                                     | Conlit Screw      | 65 mm |
| Bohl                                                                         | Fireprotect Screw | 60 mm |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Fire protection endless collar

6. PE sound insulation

7. Non-combustible pipe

8. Rigid floor ≥ 150 mm thickness

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Nonregulated combustible pipes with and without PE sound insulation and fire protection endless collar**

| Fire resistance classes - Wall |                     |                                           |                               |
|--------------------------------|---------------------|-------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                  | Wall<br>Fire resistance class |
| POLO-KAL NG / POLO-KAL XS      |                     |                                           |                               |
| Ø 90 mm                        | 3,0 mm              | Endless Collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 110 mm                       | 3,4 mm              |                                           | EI 120 U/U                    |
| Ø 125 mm                       | 3,9 mm              |                                           | EI 120 U/U                    |
| Ø 160 mm                       | 4,9 mm              |                                           | EI 120 U/U                    |
| Rehau Raupiano plus            |                     |                                           |                               |
| Ø 90 mm                        | 2,2 mm              | Endless Collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                           | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                           | EI 120 U/U                    |
| Ø 160 mm                       | 3,9 mm              |                                           | EI 120 U/U                    |
| Geberit Silent PP              |                     |                                           |                               |
| Ø 32 mm                        | 2,0 mm              | Endless Collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 2,0 mm              |                                           | EI 120 U/U                    |
| Ø 75 mm                        | 2,6 mm              |                                           | EI 120 U/U                    |
| Ø 90 mm                        | 3,1 mm              |                                           | EI 120 U/U                    |
| Ø 110 mm                       | 3,6 mm              |                                           | EI 120 U/U                    |
| Wavin SiTech+                  |                     |                                           |                               |
| Ø 32 mm                        | 2,0 mm              | Endless Collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 2,1 mm              |                                           | EI 120 U/U                    |

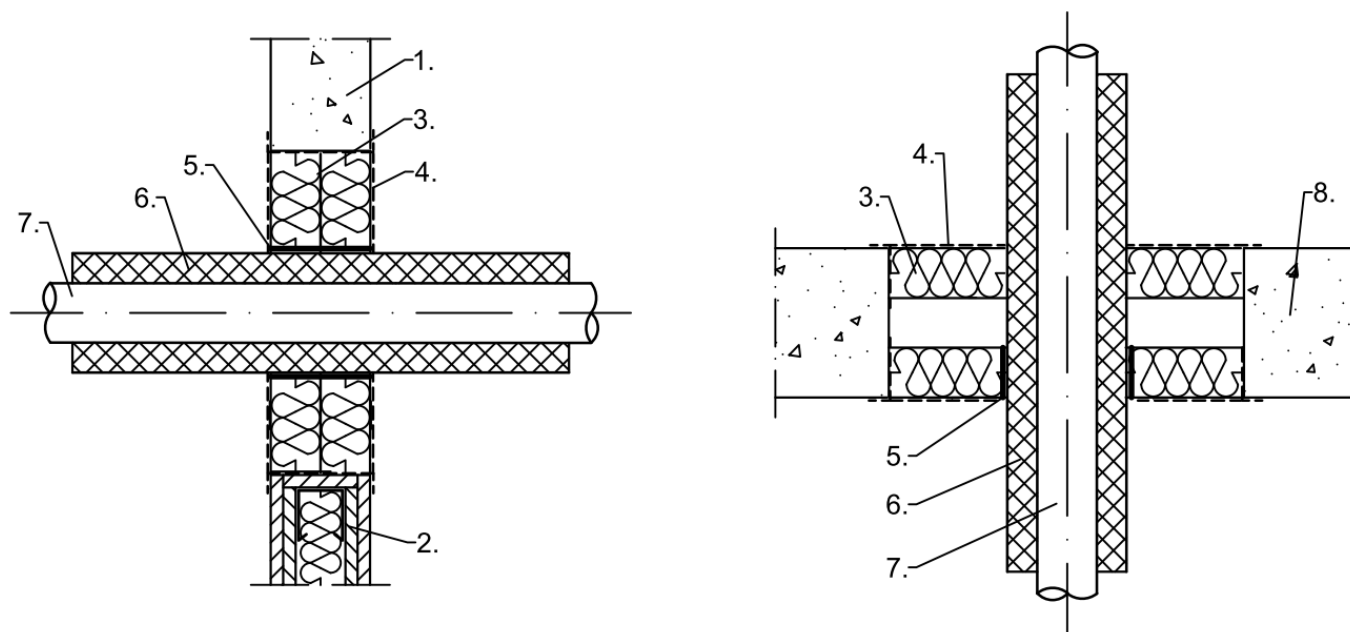
| Fire resistance classes - Floor |                     |                                            |                                |
|---------------------------------|---------------------|--------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                   | Floor<br>Fire resistance class |
| Geberit Silent PP               |                     |                                            |                                |
| Ø 32 mm                         | 2,0 mm              | Endless Collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 50 mm                         | 2,0 mm              |                                            | EI 90 U/U                      |
| Wavin SiTech+                   |                     |                                            |                                |
| Ø 32 mm                         | 2,0 mm              | Endless Collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 50 mm                         | 2,1 mm              |                                            | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |          |
|----------------------------------------------------------------------------------------------------------|----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 90 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |          |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)**

**Combustible pipes with FEF insulation and fire protection wrap**



| Fire resistance classes - Wall |                     |                              |                      |                                     |                            |
|--------------------------------|---------------------|------------------------------|----------------------|-------------------------------------|----------------------------|
| Service                        | Pipe wall thickness | Insulation                   | Insulation thickness | Measures                            | Wall Fire resistance class |
| <b>PP-H</b>                    |                     |                              |                      |                                     |                            |
| Ø 40 – 50 mm                   | 1,8 – 4,6 mm        | FEF acc. EN 14304 (B-s3, d0) | 9 – 20,5 mm          | Intumescent Wrap 50 mm 1 x 3 layers | EI 90 U/U                  |
| Ø 50 – 75 mm                   | 1,9 – 8,2 mm        | FEF acc. EN 14304 (B-s3, d0) | 9 – 22 mm            | Intumescent Wrap 50 mm 1 x 3 layers | EI 90 U/U                  |

1. Rigid wall ≥ 100 thickness
2. Flexible wall ≥ 100 mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Fire protection wrap
6. FEF insulation
7. Combustible pipe
8. Rigid floor ≥ 150 mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 100 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)****Combustible pipes with FEF insulation and fire protection wrap**

| Fire resistance classes - Floor |                     |                                 |                      |                                           |                                |
|---------------------------------|---------------------|---------------------------------|----------------------|-------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation                      | Insulation Thickness | Measures                                  | Floor<br>Fire resistance class |
| Geberit Silent dB20             |                     |                                 |                      |                                           |                                |
| Ø 56 mm                         | 3,2 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 63 mm                         | 3,2 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 90 U/U                      |
| Ø 75 mm                         | 3,6 mm              |                                 | 18 mm                |                                           | EI 90 U/U                      |
| Ø 90 mm                         | 5,5 mm              |                                 | 18 mm                |                                           | EI 90 U/U                      |
| Ø 110 mm                        | 6,0 mm              |                                 | 18 mm                |                                           | EI 90 U/U                      |
| Ø 135 mm                        | 6,0 mm              |                                 | 18.5 mm              | Intumescent wrap<br>50 mm<br>1 x 5 layers | EI 120 U/U                     |
| Ø 160 mm                        | 7,0 mm              |                                 | 19 mm                | Intumescent wrap<br>50 mm<br>1 x 6 layers | EI 120 U/U                     |
| Geberit Silent PP               |                     |                                 |                      |                                           |                                |
| Ø 32 mm                         | 2,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 40 mm                         | 2,0 mm              |                                 | 17 mm                |                                           | EI 120 U/U                     |
| Ø 50 mm                         | 2,0 mm              |                                 | 17 mm                |                                           | EI 120 U/U                     |
| Ø 75 mm                         | 2,6 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 3,1 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 3,6 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 125 mm                        | 4,2 mm              |                                 | 18.5 mm              | Intumescent wrap<br>50 mm<br>1 x 5 layers | EI 120 U/U                     |
| Geberit Silent Pro              |                     |                                 |                      |                                           |                                |
| Ø 50 mm                         | 3,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 3,8 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 4,3 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 4,5 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Pipelife Master 3 PLUS          |                     |                                 |                      |                                           |                                |
| Ø 32 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 40 mm                         | 1,8 mm              |                                 | 17 mm                |                                           | EI 120 U/U                     |
| Ø 50 mm                         | 2,0 mm              |                                 | 17 mm                |                                           | EI 120 U/U                     |
| Ø 75 mm                         | 2,1 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,5 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 3,0 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 101 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes with FEF insulation and fire protection wrap**

| Fire resistance classes - Floor |                     |                                 |                      |                                           |                                |
|---------------------------------|---------------------|---------------------------------|----------------------|-------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation                      | Insulation Thickness | Measures                                  | Floor<br>Fire resistance class |
| POLO-KAL NG / POLO-KAL XS       |                     |                                 |                      |                                           |                                |
| Ø 40 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 50 mm                         | 2,0 mm              |                                 | 17 mm                |                                           | EI 120 U/U                     |
| Ø 75 mm                         | 2,6 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 3,0 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 3,4 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Rehau Raupiano Plus             |                     |                                 |                      |                                           |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Rehau Raupiano light            |                     |                                 |                      |                                           |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 1,9 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,2 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 mm              |                                 | 18.5 mm              | EI 120 U/U                                |                                |
| Ø 160 mm                        | 3,9 mm              |                                 | 19 mm                | Intumescent wrap<br>50 mm<br>1 x 6 layers | EI 90 U/U                      |
| Rehau RAUSILENTO                |                     |                                 |                      |                                           |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 1,9 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,2 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 mm              |                                 | 18.5 mm              | EI 120 U/U                                |                                |
| Ø 160 mm                        | 3,9 mm              |                                 | 19 mm                | Intumescent wrap<br>50 mm<br>1 x 6 layers | EI 90 U/U                      |
| Conel Drain                     |                     |                                 |                      |                                           |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1x 2 layers  | EI 120 U/U                     |
| Ø 75 mm                         | 1,9 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,2 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 mm              |                                 | 18.5 mm              | EI 120 U/U                                |                                |
| Ø 160 mm                        | 3,9 mm              |                                 | 19 mm                | Intumescent wrap<br>50 mm<br>1 x 6 layers | EI 90 U/U                      |

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 102 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating (≥ 1,0 mm dft)****Combustible pipes with FEF insulation and fire protection wrap**

| Fire resistance classes - Floor |                     |                                 |                      |                                           |                                |
|---------------------------------|---------------------|---------------------------------|----------------------|-------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation                      | Insulation Thickness | Measures                                  | Floor<br>Fire resistance class |
| Wavin SiTECH                    |                     |                                 |                      |                                           |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 2,3/2,6 mm          |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,8/3,1 mm          |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 3,4 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Wavin SiTECH+                   |                     |                                 |                      |                                           |                                |
| Ø 32 mm                         | 2,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 40 mm                         | 2,0 mm              |                                 | 17 mm                |                                           | EI 120 U/U                     |
| Ø 50 mm                         | 2,1 mm              |                                 | 17 mm                |                                           | EI 120 U/U                     |
| Ø 75 mm                         | 2,6 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 3,1 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 3,4 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Wavin AS+                       |                     |                                 |                      |                                           |                                |
| Ø 50 mm                         | 3,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 3,5 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 4,6 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 5,3 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Hakan Silenta Premium           |                     |                                 |                      |                                           |                                |
| Ø 58 mm                         | 4,1 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 78 mm                         | 4,6 mm              |                                 | 18 mm                | Intumescent wrap<br>50 mm<br>1 x 4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 4,7 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 110 mm                        | 5,3 mm              |                                 | 18 mm                |                                           | EI 120 U/U                     |
| Ø 135 mm                        | 5,3 mm              |                                 | 18.5 mm              | Intumescent wrap<br>50 mm<br>1 x 5 layers | EI 120 U/U                     |
| Ostendorf Skolan dB             |                     |                                 |                      |                                           |                                |
| Ø 58 mm                         | 4,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap<br>50 mm<br>1 x 2 layers | EI 120 U/U                     |
| Ø 135 mm                        | 5,3 mm              |                                 | 18.5 mm              | Intumescent wrap<br>50 mm<br>1 x 5 layers | EI 120 U/U                     |

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 103 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating ( $\geq 1,0$  mm dft)**

|                                                    | Cables              | Cable bundles | Cable trays                        | Wave guides / coaxial cables | speed pipes | EIC, single/bundle made of plastic |             | EIC made of steel | Combustible pipes |                     |            | Non-combustible pipes with FEF insulation | Non-combustible pipes with mineral wool insulation | Multilayer pipes | HVAC split line combinations | Cable Tube | Seal Edge  |       |      |
|----------------------------------------------------|---------------------|---------------|------------------------------------|------------------------------|-------------|------------------------------------|-------------|-------------------|-------------------|---------------------|------------|-------------------------------------------|----------------------------------------------------|------------------|------------------------------|------------|------------|-------|------|
|                                                    |                     |               |                                    |                              |             | With Wrap                          | With Collar |                   | With Collar       | With Endless Collar | With Wrap  |                                           |                                                    |                  |                              |            | Upper      | Lower | Side |
| Cables                                             | $\geq 0$            | $\geq 0$      | $\geq 0$                           | $\geq 100$                   | $\geq 25$   | $\geq 75$                          | $\geq 100$  | $\geq 75$         | $\geq 20$         | $\geq 100$          | $\geq 100$ | $\geq 50$                                 | $\geq 50$                                          | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 0$   |       |      |
| Cable bundles                                      | $\geq 0$            | $\geq 0$      | $\geq 0$                           | $\geq 100$                   | $\geq 25$   | $\geq 75$                          | $\geq 100$  | $\geq 75$         | $\geq 20$         | $\geq 100$          | $\geq 100$ | $\geq 50$                                 | $\geq 50$                                          | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 0$   |       |      |
| Cable trays                                        | $\geq 0$            | $\geq 0$      | $\geq 0$ / $\geq 100$ (next/above) | $\geq 100$                   | $\geq 25$   | $\geq 75$                          | $\geq 100$  | $\geq 75$         | $\geq 20$         | $\geq 100$          | $\geq 100$ | $\geq 50$                                 | $\geq 50$                                          | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 0$   |       |      |
| Wave guides / coaxial cables                       | $\geq 100$          | $\geq 100$    | $\geq 100$                         | $\geq 50$                    | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
| speed pipes                                        | $\geq 25$           | $\geq 25$     | $\geq 25$                          | $\geq 100$                   | $\geq 0$    | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
| EIC, single/bundle made of plastic                 | With Wrap           | $\geq 75$     | $\geq 75$                          | $\geq 75$                    | $\geq 100$  | $\geq 100$                         | $\geq 0$    | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
|                                                    | With Collar         | $\geq 100$    | $\geq 100$                         | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 0$    | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
| EIC made of steel                                  | $\geq 75$           | $\geq 75$     | $\geq 75$                          | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 0$          | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 75$  | $\geq 0$   |       |      |
| Combustible pipes                                  | With Collar         | $\geq 20$     | $\geq 20$                          | $\geq 20$                    | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 0$          | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
|                                                    | With Endless Collar | $\geq 100$    | $\geq 100$                         | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 75$   | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
|                                                    | With Wrap           | $\geq 100$    | $\geq 100$                         | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 100$ |       |      |
| Non-combustible pipes with FEF insulation          | $\geq 0$            | $\geq 0$      | $\geq 0$                           | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 0$                                  | $\geq 0$                                           | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
| Non-combustible pipes with mineral wool insulation | $\geq 0$            | $\geq 0$      | $\geq 0$                           | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 0$                                  | $\geq 0$                                           | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
| Multilayer pipes                                   | $\geq 100$          | $\geq 100$    | $\geq 100$                         | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 0$                                  | $\geq 0$                                           | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 25$  |       |      |
| HVAC split line combinations                       | $\geq 100$          | $\geq 100$    | $\geq 100$                         | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 100$        | $\geq 100$        | $\geq 100$          | $\geq 100$ | $\geq 0$                                  | $\geq 0$                                           | $\geq 100$       | $\geq 50$                    | $\geq 100$ | $\geq 25$  |       |      |
| Cable Tube                                         | $\geq 100$          | $\geq 100$    | $\geq 100$                         | $\geq 100$                   | $\geq 100$  | $\geq 100$                         | $\geq 100$  | $\geq 75$         | $\geq 50$         | $\geq 50$           | $\geq 100$ | $\geq 100$                                | $\geq 100$                                         | $\geq 100$       | $\geq 100$                   | $\geq 100$ | $\geq 10$  |       |      |

# Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$ mm dft)

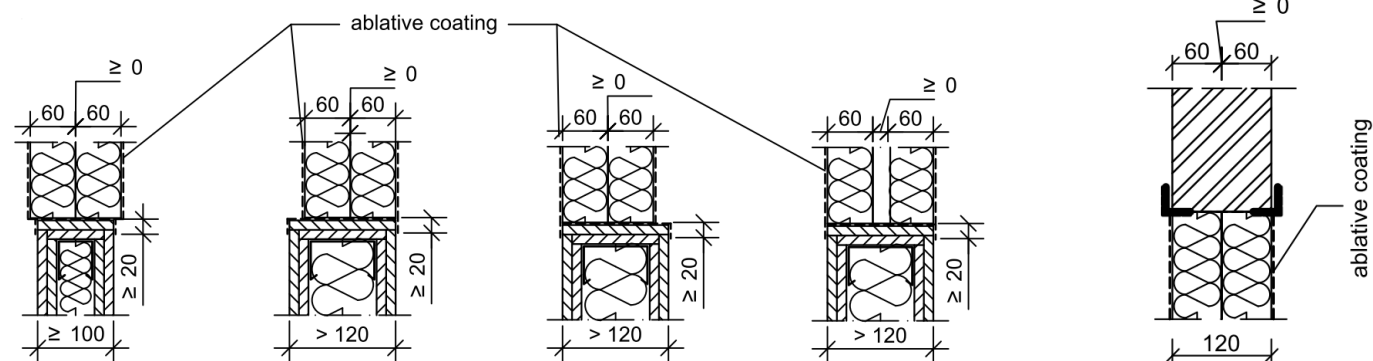
## Design variants

### Wall

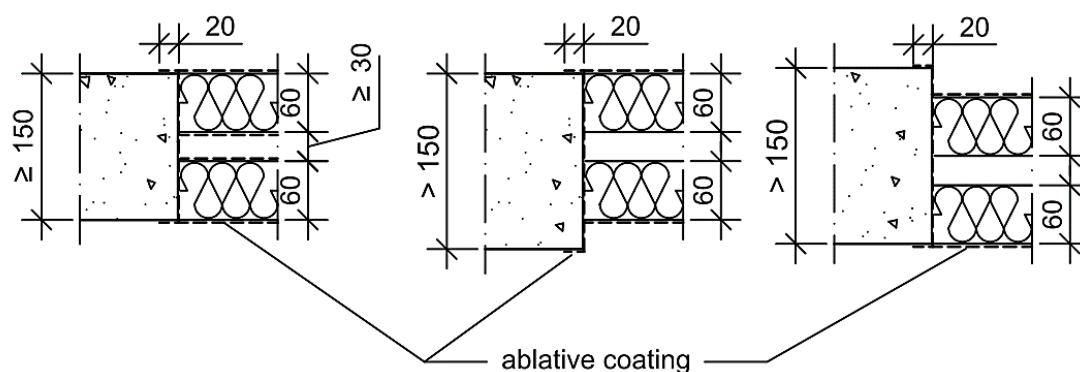
#### Light Partition Wall

#### Solid Wall

#### Sandwich Wall



### Floor



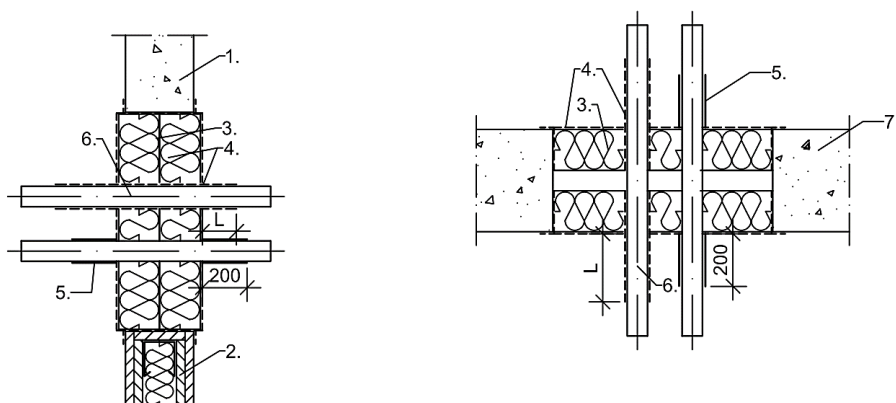
| Fire resistance classes         |                                       |                       |
|---------------------------------|---------------------------------------|-----------------------|
| Max. Sealing size               | Measure                               | Fire resistance class |
| 1400 x 2000 mm / 2000 x 1400 mm | Light Partition Wall<br>Solid Wall    | EI 120                |
| 1400 x 2000 mm / 2000 x 1400 mm | Solid Floor                           | EI 120                |
| 1000 x 1000 mm                  | Sandwich Wall<br>PAROC AST-F (120 mm) | EI 120                |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| FireFree Brandlukningssystem                                                                             | Annex 105 |
| Mixed penetration seal made of mineral fibre board (2 x 50 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**Cables  $\varnothing \leq 21$  mm up to  $\leq \varnothing 80$  mm or cable bundles  $\varnothing \leq 100$  mm with cables  $\leq 21$  mm with ablative coating or with intumescent wrap**



| Fire resistance classes                                                      |                                                     |                               |                                |
|------------------------------------------------------------------------------|-----------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                      | Measures                                            | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles</b>                                                 |                                                     |                               |                                |
| Cables $\varnothing \leq 21$ mm                                              | -                                                   | EI 120                        | EI 120                         |
|                                                                              | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 50$ mm                                              | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 90 / E 120                 | EI 90                          |
|                                                                              | Ablative coating<br>$\geq 150$ mm x $\geq 1$ mm DFT | -                             | EI 120                         |
|                                                                              | Ablative coating<br>$\geq 200$ mm x $\geq 2$ mm DFT | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 80$ mm                                              | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 90 / E 120                 | EI 90                          |
|                                                                              | Ablative coating<br>$\geq 150$ mm x $\geq 1$ mm DFT | -                             | EI 120                         |
|                                                                              | Ablative coating<br>$\geq 200$ mm x $\geq 2$ mm DFT | EI 120                        | EI 120                         |
| Cable bundles $\varnothing \leq 100$ mm with cables $\varnothing \leq 21$ mm | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120                        | EI 120                         |
| Conduits made of steel $\varnothing \leq 16$ mm                              | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | EI 120 U/C                     |
| Conduits made of plastic $\varnothing \leq 16$ mm                            | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/U                    | EI 120 U/U                     |

| Fire resistance classes                                                      |                                                                                               |                               |                                |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                      | Measures                                                                                      | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles</b>                                                 |                                                                                               |                               |                                |
| Cables $\varnothing \leq 21$ mm                                              | Intumescent wrap<br>125 mm / 4 x 2 layer<br>Longitudinal overlap 25 mm<br>Cross overlap 45 mm | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 50$ mm                                              |                                                                                               | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 80$ mm                                              |                                                                                               | EI 120                        | EI 120                         |
| Cable bundles $\leq \varnothing 100$ mm with cables $\varnothing \leq 21$ mm |                                                                                               | EI 120                        | EI 120                         |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

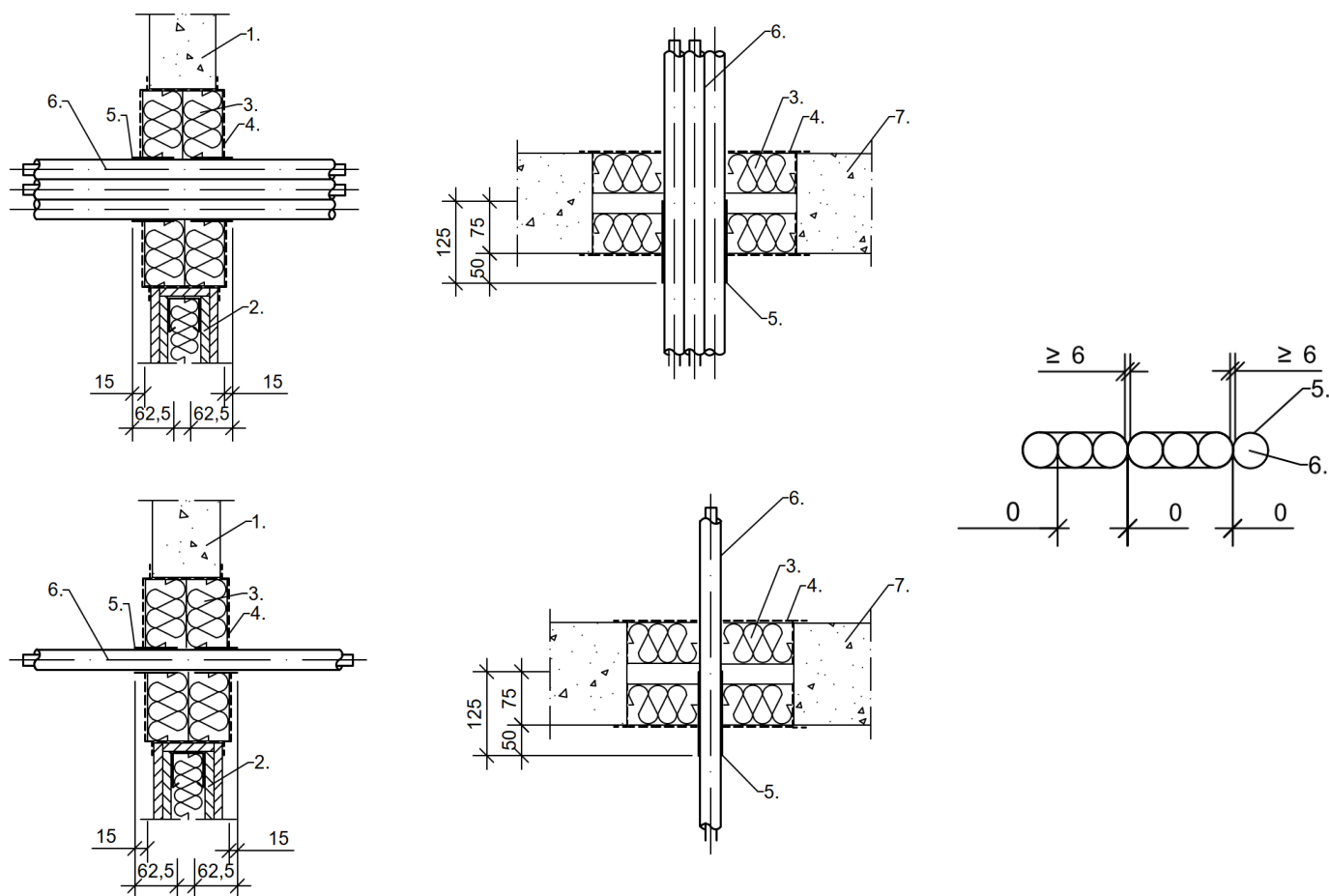
5. Intumescent wrap
6. Cable
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 106 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**Electrical installation conduits  $\varnothing \leq 32$  mm or bundles  $\varnothing \leq 100$  mm of conduits  $\varnothing \leq 32$  mm with or without cables  $\leq 21$  mm with intumescent wrap**



| Fire resistance classes                      |                        |              |                                                    |                               |                                |
|----------------------------------------------|------------------------|--------------|----------------------------------------------------|-------------------------------|--------------------------------|
| Service                                      |                        | Cable        | Measures                                           | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Electrical installation conduit (EIC)</b> |                        |              |                                                    |                               |                                |
| EIC made of plastic                          | $\varnothing \leq 32$  | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm 1 layer  | EI 120 U/U                    | EI 120 U/U                     |
|                                              | $\varnothing \leq 63$  | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm 2 layers | EI 120 U/U                    | EI 90 U/U<br>E 120 U/U         |
| EIC made of plastic bundle                   | $\varnothing \leq 100$ | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm 2 layers | EI 120 U/U                    | EI 120 U/U                     |
| Linear arrangement of plastic EIC            | $\leq 3$ pcs.          | With/without | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm 1 layer  | EI 120 U/U                    | EI 120 U/U                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. Electrical installation conduit
7. Rigid floor  $\geq 150$  mm thickness

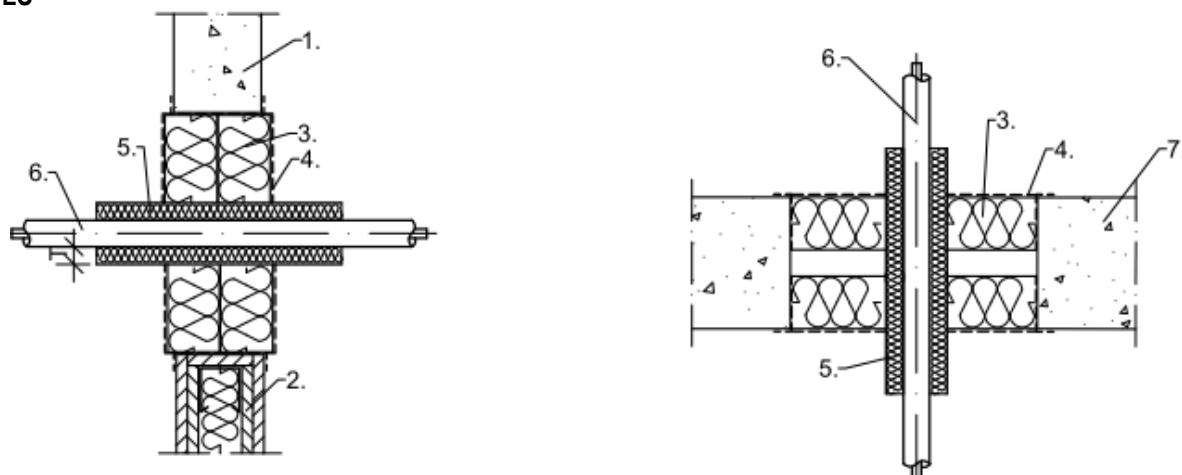
Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 107 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

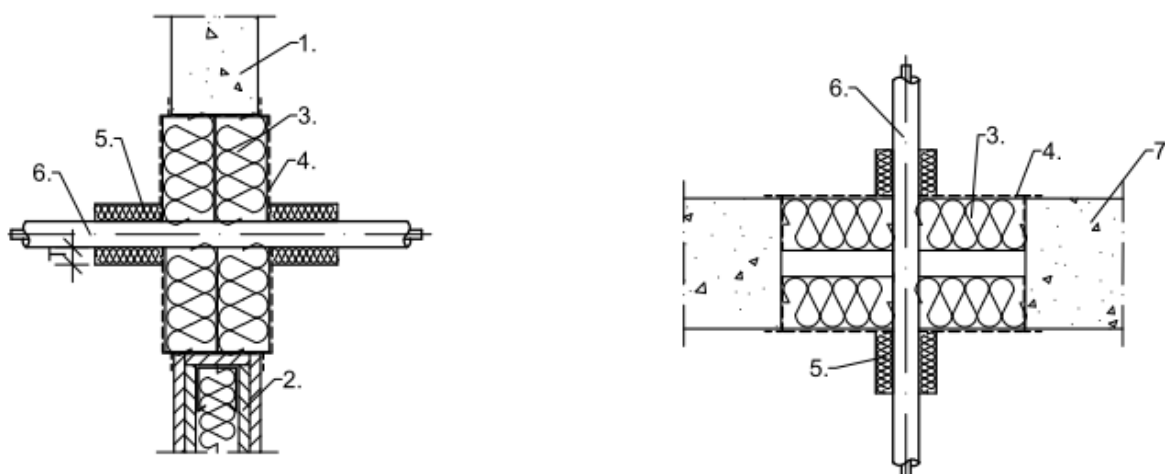
Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)

Metal conduits  $\varnothing \leq 32$  mm with or without cables  $\leq 21$  mm with mineral fibre lamella mat

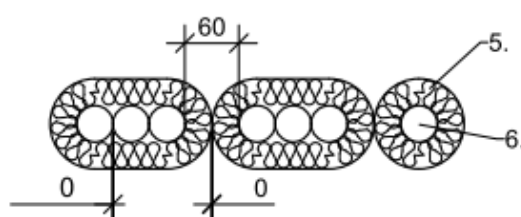
#### Variant LS



#### Variant LI



Detail: Distances to each other:



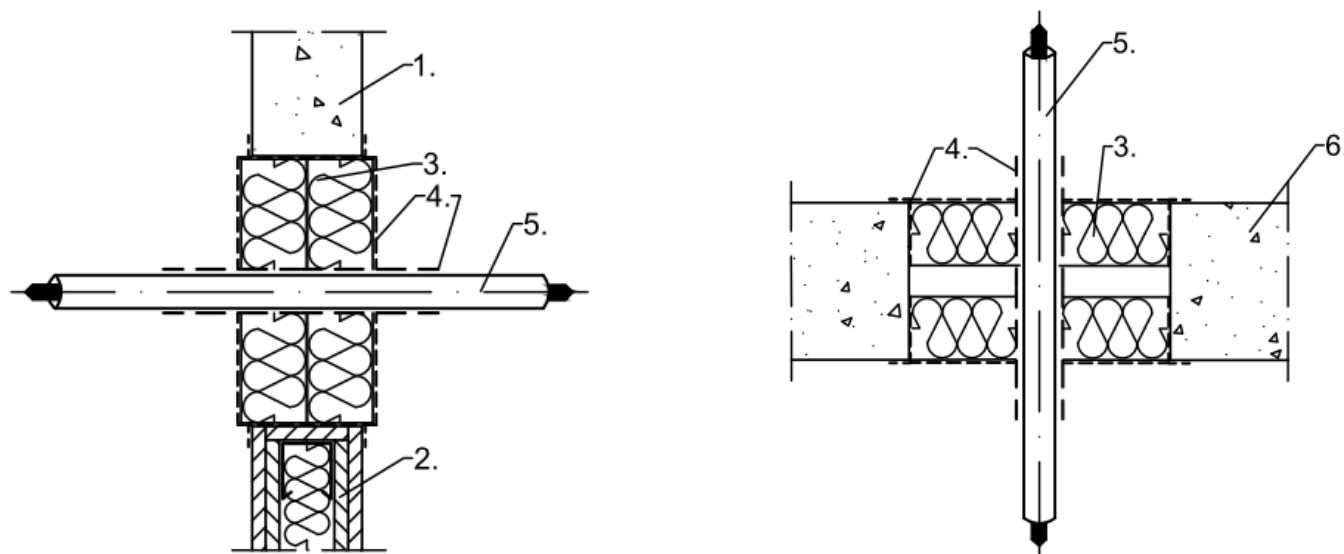
| Fire resistance classes |             |              |                                                                   |                               |                                |
|-------------------------|-------------|--------------|-------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                 |             | Cable        | Measures                                                          | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Metal conduits          |             |              |                                                                   |                               |                                |
| EIC made of steel       | Ø ≤ 32      | with/without | Lamella mat<br>Both sides ≥ 250 x 30 mm (LS) / ≥ 200 x 30 mm (LI) | EI 120 U/C                    | EI 120 U/C                     |
|                         | ≤ 3x Ø ≤ 32 | with/without |                                                                   | EI 90 / E 120 U/C             | EI 120 U/C                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Mineral fibre lamella mat
6. Electrical installation conduit
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 108 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Coaxial cables and waveguides with ablative coating**

| Fire resistance classes                     |                                                     |                               |                                |
|---------------------------------------------|-----------------------------------------------------|-------------------------------|--------------------------------|
| Service                                     | Measures                                            | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Coaxial cables / waveguides</b>          |                                                     |                               |                                |
| CommScope Heliac $\varnothing \leq 51,1$ mm | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | -                              |
|                                             | Ablative coating<br>$\geq 200$ mm x $\geq 1$ mm DFT | -                             | EI 120 U/C                     |
| RFS Cellflex $\varnothing \leq 50,3$ mm     | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | -                              |
|                                             | Ablative coating<br>$\geq 200$ mm x $\geq 1$ mm DFT | -                             | EI 120 U/C                     |
| RFS Radiaflex $\varnothing \leq 48,2$ mm    | Ablative coating<br>$\geq 100$ mm x $\geq 1$ mm DFT | EI 120 U/C                    | -                              |
| RFS Radiaflex $\varnothing \leq 28,5$ mm    | Ablative coating<br>$\geq 200$ mm x $\geq 1$ mm DFT | -                             | EI 120 U/C                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board

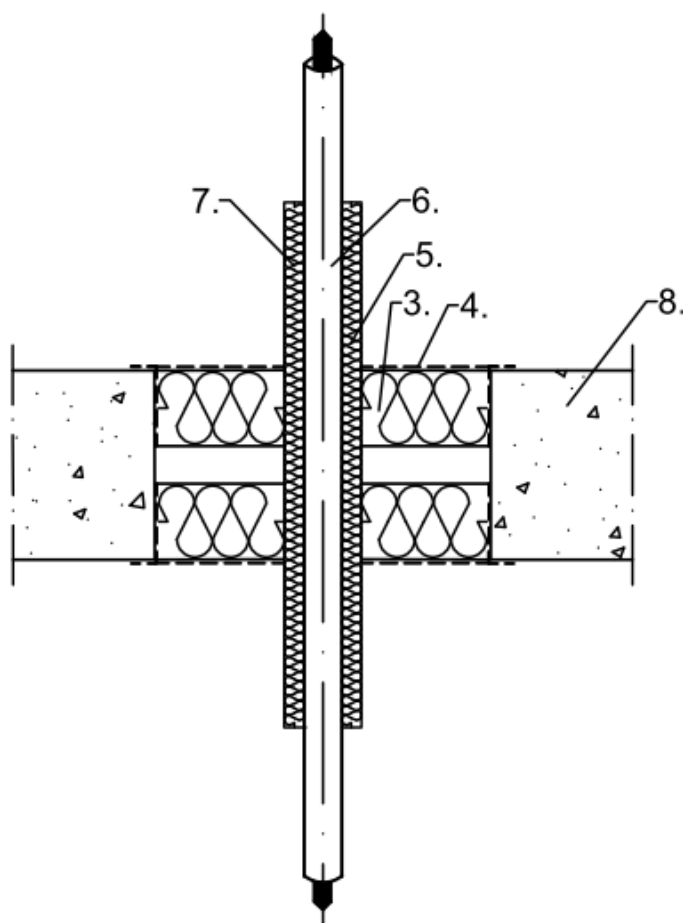
4. Ablative coating
5. Electrical installation conduit
6. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 109 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**Coaxial cables and waveguides with mineral fibre lamella mat**



| Fire resistance classes                     |                                                         |                               |                                |
|---------------------------------------------|---------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                     | Measures                                                | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Coaxial cables / waveguides</b>          |                                                         |                               |                                |
| CommScope Heliac $\varnothing \leq 51,1$ mm | Lamella mat both sides (LS)<br>$\geq 250$ mm 20 - 30 mm | -                             | EI 120 U/C                     |
| RFS Cellflex $\varnothing \leq 50,3$ mm     | Lamella mat both sides (LS)<br>$\geq 250$ mm 20 - 30 mm | -                             | EI 120 U/C                     |
| RFS Radiaflex $\varnothing \leq 28,5$ mm    | Lamella mat both sides (LS)<br>$\geq 250$ mm 20 - 30 mm | -                             | EI 120 U/C                     |

- 3. Mineral fibre board
- 4. Ablative Coating

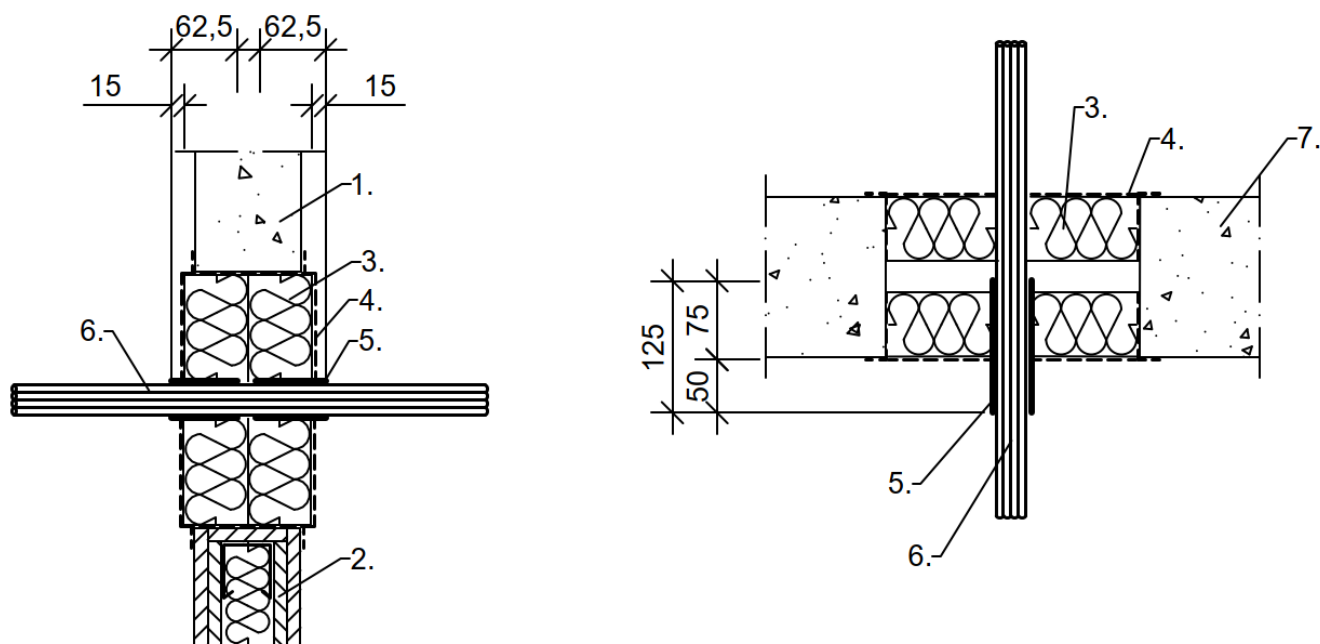
- 5. Lamella mat
- 6. Electrical installation conduit
- 7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 110 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)

Speed-pipe, bundled or single pipes, with or without glass fibre or micro cables with intumescent wrap



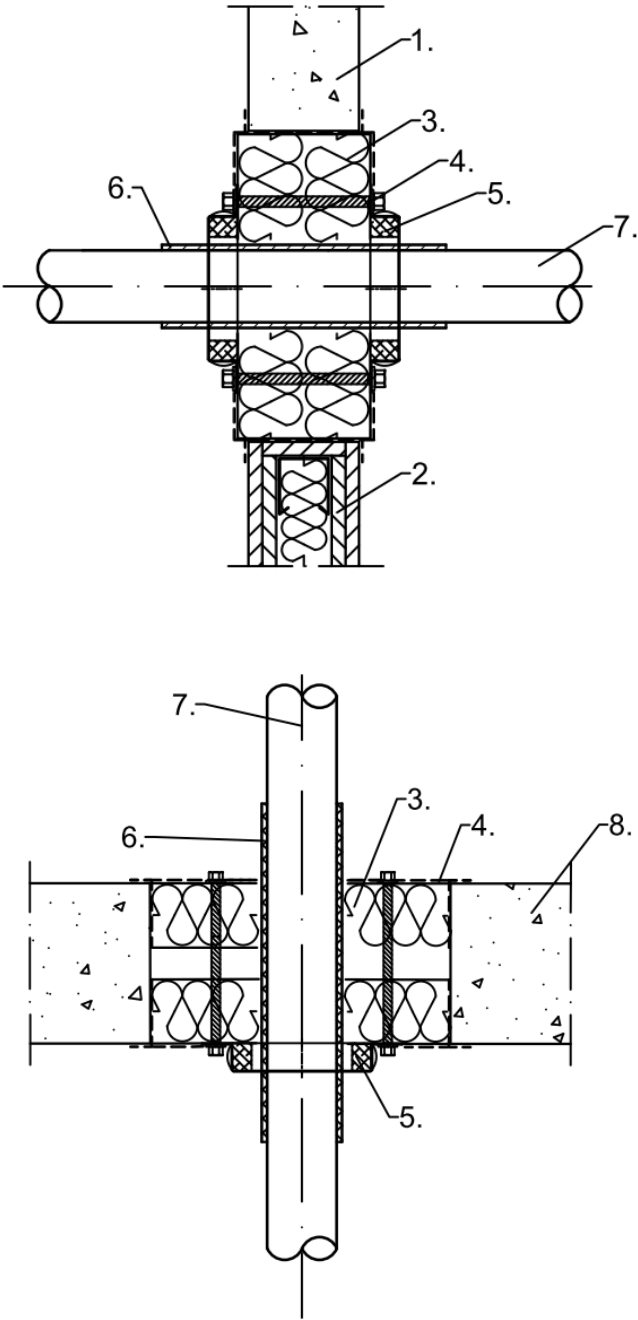
| Fire resistance classes                                                           |                                                      |                               |                                |
|-----------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                           | Measures                                             | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Speed pipes, bundles or single pipes, with or without glass fibre or micro cables |                                                      |                               |                                |
| Speedpipes<br>Bundle- $\varnothing \leq 50$<br>Single- $\varnothing \leq 14$      | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 layer | EI 120 U/U                    | EI 120 U/U                     |

- |                                          |                                        |
|------------------------------------------|----------------------------------------|
| 1. Rigid wall $\geq 100$ thickness       | 5. Intumescent wrap                    |
| 2. Flexible wall $\geq 100$ mm thickness | 6. Speed pipe                          |
| 3. Mineral fibre board                   | 7. Rigid floor $\geq 150$ mm thickness |
| 4. Ablative Coating                      |                                        |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 111 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)  
Combustible pipes Ø ≤ 32 mm - Ø ≤ 160 mm with and without PE sound insulation and fire protection collar



| The fire protection endless collar may be attached with coarse thread screws |                 |         |
|------------------------------------------------------------------------------|-----------------|---------|
| Permitted screws:                                                            |                 |         |
| Würth                                                                        | ASSY D          | 8x70 mm |
| Heco                                                                         | HECO-TOPIX-plus | 8x80 mm |
| SPAX                                                                         | T-STAR plus     | 8x80 mm |

1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Fire protection collar

6. PE sound insulation

7. Combustible pipe

8. Rigid floor ≥ 150 mm thickness

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| PVC-U, PVC-C                   |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 – 5,6 mm        | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 1,8 – 8,4 mm        |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 1,8 – 10,0 mm       |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 1,8 – 12,3 mm       |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 2,5 – 9,3 mm        |                                                   | EI 120 U/U                    |
| Ø 140 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 90 U/U                     |
| PE-HD, ABS, SAN+PVC            |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
|                                | 4,6 mm              |                                                   | EI 120 U/U                    |
| Ø 63 – 75 mm                   | 2,2 – 6,9 mm        |                                                   | EI 90 U/U                     |
| Ø 75 mm                        | 3,8 – 4,5 mm        |                                                   | EI 120 U/U                    |
| Ø 90 - 110 mm                  | 2,7 – 4,3 mm        |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,4 – 8,2 mm        |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 – 10,0 mm       |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 3,1 – 4,2 mm        |                                                   | EI 120 U/U                    |
| Ø 140 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 90 U/U                     |
|                                | 4,0 mm              |                                                   | EI 120 U/U                    |
| PP                             |                     |                                                   |                               |
| Ø 32 – 50 mm                   | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 63 – 75 mm                   | 2,2 – 5,2 mm        |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 2,4 – 7,3 mm        |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 2,7 – 10,0 mm       |                                                   | EI 90 U/U                     |
|                                | 10,0 mm             |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 90 U/U                     |
| Ø 140 – 160 mm                 | 4,0 – 14,6 mm       |                                                   | EI 90 U/U                     |
| Rehau Raupiano light           |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |
| Conel DRAIN                    |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 113 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Rehau RAUSILENTO               |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 1,9 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |
| Geberit Silent dB20            |                     |                                                   |                               |
| Ø 56 mm                        | 3,2 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 63 mm                        | 3,2 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 3,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 5,5 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 6,0 mm              |                                                   | EI 120 U/U                    |
| Ø 135 mm                       | 6,0 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 7,0 mm              |                                                   | EI 90 U/U                     |
| Geberit Silent PP              |                     |                                                   |                               |
| Ø 32 mm                        | 2,0 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,6 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 4,2 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,2 mm              |                                                   | EI 120 U/U                    |
| Geberit Silent Pro             |                     |                                                   |                               |
| Ø 50 mm                        | 3,0 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 75 mm                        | 3,8 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 4,3 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 4,5 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 5,0 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 6,0 mm              |                                                   | EI 120 U/U                    |
| POLO-KAL NG / POLO-KAL XS      |                     |                                                   |                               |
| Ø 40 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,0 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,4 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 114 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| POLO-KAL 3S                    |                     |                                                   |                               |
| Ø 90 mm                        | 4,5 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 110 mm                       | 4,8 mm              |                                                   | EI 120 U/U                    |
| Rehau Raupiano Plus            |                     |                                                   |                               |
| Ø 50 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 75 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,2 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 2,7 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |
| Wavin AS                       |                     |                                                   |                               |
| Ø 58 mm                        | 4,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 78 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Wavin AS+                      |                     |                                                   |                               |
| Ø 50 mm                        | 3,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 75 mm                        | 3,5 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 4,6 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 125 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 5,6 mm              |                                                   | EI 90 U/U                     |
| GF Silenta Premium             |                     |                                                   |                               |
| Ø 58 mm                        | 4,1 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 78 mm                        | 4,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 4,7 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Hakan Silenta Premium          |                     |                                                   |                               |
| Ø 58 mm                        | 4,1 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 78 mm                        | 4,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 4,7 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 115 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Wall |                     |                                                   |                               |
|--------------------------------|---------------------|---------------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                          | Wall<br>Fire resistance class |
| Wavin SiTECH+                  |                     |                                                   |                               |
| Ø 32 mm                        | 2,0 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 2,1 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,6 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,4 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 4,0 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 5,0 mm              |                                                   | EI 120 U/U                    |
| Valsir Triplus                 |                     |                                                   |                               |
| Ø 32 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,5 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 3,1 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,4 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,9 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 4,9 mm              |                                                   | EI 120 U/U                    |
| Pipelife Master 3 PLUS         |                     |                                                   |                               |
| Ø 32 mm                        | 1,8 mm              | Fire protection collar<br>Installed on both sides | EI 120 U/U                    |
| Ø 40 mm                        | 1,8 mm              |                                                   | EI 120 U/U                    |
| Ø 50 mm                        | 2,0 mm              |                                                   | EI 120 U/U                    |
| Ø 75 mm                        | 2,1 mm              |                                                   | EI 120 U/U                    |
| Ø 90 mm                        | 2,5 mm              |                                                   | EI 120 U/U                    |
| Ø 110 mm                       | 3,0 mm              |                                                   | EI 120 U/U                    |
| Ø 125 mm                       | 3,5 mm              |                                                   | EI 120 U/U                    |
| Ø 160 mm                       | 4,4 mm              |                                                   | EI 120 U/U                    |
| Kekelit PHON EX AS             |                     |                                                   |                               |
| Ø 58 mm                        | 4,0 mm              | Fire protection collar<br>Installed on both sides | EI 90 U/U                     |
| Ø 78 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 90 mm                        | 4,5 mm              |                                                   | EI 90 U/U                     |
| Ø 110 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 135 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |
| Ø 160 mm                       | 5,3 mm              |                                                   | EI 90 U/U                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 116 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| PVC-U, PVC-C                    |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,8 – 5,6 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 63 – 75 mm                    | 1,8 – 8,4 mm        |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 1,8 – 10,0 mm       |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 1,8 – 12,3 mm       |                                                    | EI 90 U/U                      |
|                                 | 1,8 mm              |                                                    | EI 120 U/U                     |
| Ø 125 mm                        | 2,5 mm              |                                                    | EI 120 U/U                     |
| Ø 140 – 160 mm                  | 3,2 – 11,9 mm       |                                                    | EI 90 U/U                      |
|                                 | 3,2 mm              |                                                    | EI 120 U/U                     |
| PE-HD, ABS, SAN+PVC             |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 63 – 75 mm                    | 2,2 – 6,9 mm        |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,4 – 8,2 mm        |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 – 10,0 mm       |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 140 – 160 mm                  | 4,0 – 14,6 mm       |                                                    | EI 90 U/U                      |
| PP                              |                     |                                                    |                                |
| Ø 32 – 50 mm                    | 1,8 – 4,6 mm        | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
|                                 | 1,8 mm              |                                                    | EI 120 U/U                     |
| Ø 63 – 75 mm                    | 2,2 – 6,9 mm        |                                                    | EI 90 U/U                      |
|                                 | 2,2 mm              |                                                    | EI 120 U/U                     |
| Ø 90 mm                         | 2,4 – 8,2 mm        |                                                    | EI 90 U/U                      |
|                                 | 2,4 mm              |                                                    | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 – 10,0 mm       |                                                    | EI 90 U/U                      |
|                                 | 2,7 mm              |                                                    | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 – 11,4 mm       |                                                    | EI 90 U/U                      |
|                                 | 3,1 mm              |                                                    | EI 120 U/U                     |
| Ø 140 – 160 mm                  | 4,0 – 14,6 mm       |                                                    | EI 90 U/U                      |
| Rehau Raupiano light            |                     |                                                    |                                |
| Ø 50 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 1,9 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,2 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 mm              |                                                    | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 117 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection collar**

| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| Conel DRAIN                     |                     |                                                    |                                |
| Ø 50 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 1,9 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,2 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 mm              |                                                    | EI 90 U/U                      |
| Rehau RAUSILENTO                |                     |                                                    |                                |
| Ø 50 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 1,9 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 2,2 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 2,7 mm              |                                                    | EI 90 U/U                      |
| Geberit Silent PP               |                     |                                                    |                                |
| Ø 32 mm                         | 2,0 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 40 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 50 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,6 mm              |                                                    | EI 90 U/U                      |
| Geberit Silent Pro              |                     |                                                    |                                |
| Ø 50 mm                         | 3,0 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 75 mm                         | 3,8 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 4,3 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 4,5 mm              |                                                    | EI 90 U/U                      |
| POLO-KAL NG / POLO-KAL XS       |                     |                                                    |                                |
| Ø 40 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 50 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,0 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,4 mm              |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 3,9 mm              |                                                    | EI 90 U/U                      |
| Ø 160 mm                        | 4,9 mm              |                                                    | EI 90 U/U                      |
| GF Silenta Premium              |                     |                                                    |                                |
| Ø 58 mm                         | 4,1 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 78 mm                         | 4,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 4,7 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 5,3 mm              |                                                    | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 118 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)

Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection collar

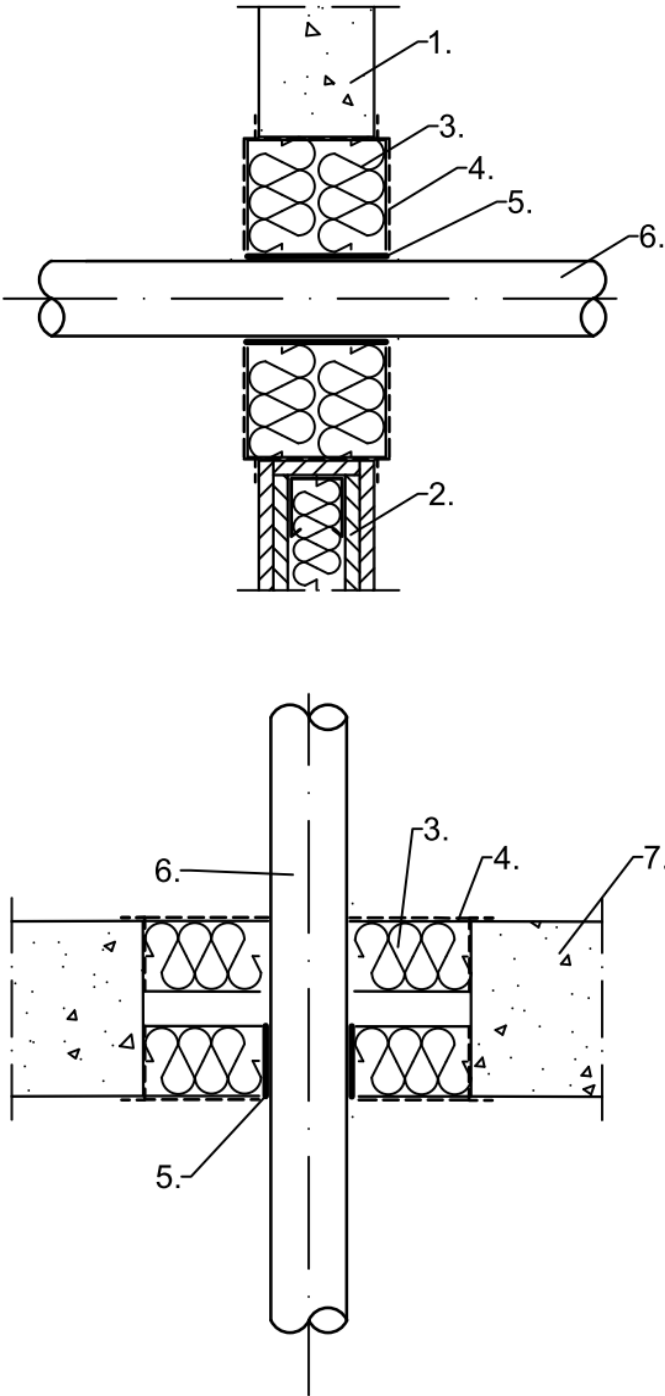
| Fire resistance classes - Floor |                     |                                                    |                                |
|---------------------------------|---------------------|----------------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                           | Floor<br>Fire resistance class |
| Hakan Silenta Premium           |                     |                                                    |                                |
| Ø 58 mm                         | 4,1 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 78 mm                         | 4,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 4,7 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 5,3 mm              |                                                    | EI 90 U/U                      |
| Wavin SiTECH+                   |                     |                                                    |                                |
| Ø 32 mm                         | 2,0 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 40 mm                         | 2,0 mm              |                                                    | EI 90 U/U                      |
| Ø 50 mm                         | 2,1 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,6 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,4 mm              |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 4,0 mm              |                                                    | EI 90 U/U                      |
| Ø 160 mm                        | 5,0 mm              |                                                    | EI 90 U/U                      |
| Valsir Triplus                  |                     |                                                    |                                |
| Ø 32 mm                         | 1,8 mm              | Fire protection collar<br>Installed on bottom side | EI 90 U/U                      |
| Ø 40 mm                         | 1,8 mm              |                                                    | EI 90 U/U                      |
| Ø 50 mm                         | 1,8 mm              |                                                    | EI 90 U/U                      |
| Ø 75 mm                         | 2,5 mm              |                                                    | EI 90 U/U                      |
| Ø 90 mm                         | 3,1 mm              |                                                    | EI 90 U/U                      |
| Ø 110 mm                        | 3,4 mm              |                                                    | EI 90 U/U                      |
| Ø 125 mm                        | 3,9 mm              |                                                    | EI 90 U/U                      |
| Ø 160 mm                        | 4,9 mm              |                                                    | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 119 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)

Combustible pipes Ø ≤ 50 mm - Ø ≤ 160 mm with and without PE sound insulation and fire protection wrap



1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Fire protection wrap

6. Combustible pipe

7. Rigid floor ≥ 150 mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| FireFree Brandlukningssystem                                                                             | Annex 120 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 50$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection wrap**

| Fire resistance classes - Wall |                     |                                           |                               |
|--------------------------------|---------------------|-------------------------------------------|-------------------------------|
| Service                        | Pipe wall thickness | Measures                                  | Wall<br>Fire resistance class |
| <b>PVC-U, PVC-C</b>            |                     |                                           |                               |
| $\varnothing 32 - 50$ mm       | 1,8 – 5,6 mm        | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing 63 - 110$ mm      | 1,8 – 12,3 mm       | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>PE-HD, ABS, SAN+PVC</b>     |                     |                                           |                               |
| $\varnothing 32 - 50$ mm       | 1,8 – 4,6 mm        | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing 63 - 110$ mm      | 1,8 – 10,0 mm       | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>PP</b>                      |                     |                                           |                               |
| $\varnothing 32 - 50$ mm       | 1,8 – 4,6 mm        | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing 63 - 110$ mm      | 1,8 – 10,0 mm       | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Geberit Silent PP</b>       |                     |                                           |                               |
| $\varnothing \leq 50$ mm       |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm      |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Geberit Silent Pro</b>      |                     |                                           |                               |
| $\varnothing \leq 75$ mm       |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm      |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Kekelit Phon EX AS</b>      |                     |                                           |                               |
| $\varnothing \leq 56$ mm       |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm      |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Pipelife Master 3</b>       |                     |                                           |                               |
| $\varnothing \leq 50$ mm       |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm      |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 121 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 50$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection wrap**

| Fire resistance classes - Wall   |                     |                                           |                               |
|----------------------------------|---------------------|-------------------------------------------|-------------------------------|
| Service                          | Pipe wall thickness | Measures                                  | Wall<br>Fire resistance class |
| <b>POLO-KAL NG / POLO KAL XS</b> |                     |                                           |                               |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Rehau Raupiano light</b>      |                     |                                           |                               |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Rehau RAUSILENTO</b>          |                     |                                           |                               |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Conel DRAIN</b>               |                     |                                           |                               |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Geberit Silent dB20</b>       |                     |                                           |                               |
| $\varnothing \leq 56$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Wavin SiTech+</b>             |                     |                                           |                               |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Rehau Raupiano plus</b>       |                     |                                           |                               |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |
| <b>Silenta Premium</b>           |                     |                                           |                               |
| $\varnothing \leq 58$ mm         |                     | Intumescent Wrap<br>2 x 50 mm<br>2 layers | EI 120 U/U                    |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>2 x 50 mm<br>4 layers | EI 120 U/U                    |

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 122 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 50$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection wrap**

| Fire resistance classes - Floor  |                     |                                           |                                |
|----------------------------------|---------------------|-------------------------------------------|--------------------------------|
| Service                          | Pipe wall thickness | Measures                                  | Floor<br>Fire resistance class |
| <b>PVC-U, PVC-C</b>              |                     |                                           |                                |
| $\varnothing 32 - 50$ mm         | 1,8 – 5,6 mm        | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing 63 - 110$ mm        | 1,8 – 12,3 mm       | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>PE-HD, ABS, SAN+PVC</b>       |                     |                                           |                                |
| $\varnothing 32 - 50$ mm         | 1,8 – 4,6 mm        | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing 63 - 110$ mm        | 1,8 – 10,0 mm       | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>PP</b>                        |                     |                                           |                                |
| $\varnothing 32 - 50$ mm         | 1,8 – 4,6 mm        | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing 63 - 110$ mm        | 1,8 – 10,0 mm       | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Geberit Silent PP</b>         |                     |                                           |                                |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Geberit Silent Pro</b>        |                     |                                           |                                |
| $\varnothing \leq 75$ mm         |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Kekelit Phon EX AS</b>        |                     |                                           |                                |
| $\varnothing \leq 56$ mm         |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Pipelife Master 3</b>         |                     |                                           |                                |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 90 U/U                      |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>POLO-KAL NG / POLO KAL XS</b> |                     |                                           |                                |
| $\varnothing \leq 50$ mm         |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 123 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 50$  mm -  $\varnothing \leq 160$  mm with and without PE sound insulation and fire protection wrap**

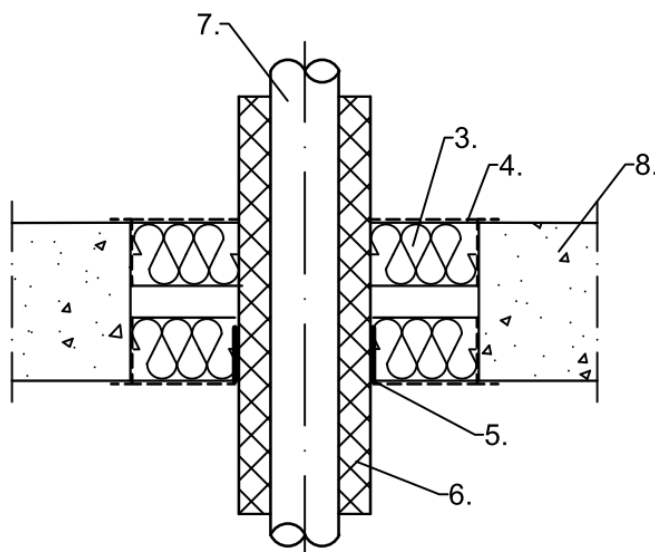
| Fire resistance classes - Floor |                     |                                           |                                |
|---------------------------------|---------------------|-------------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Measures                                  | Floor<br>Fire resistance class |
| <b>Rehau Raupiano light</b>     |                     |                                           |                                |
| $\varnothing \leq 50$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm       |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Rehau RAUSILENTO</b>         |                     |                                           |                                |
| $\varnothing \leq 50$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm       |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Conel DRAIN</b>              |                     |                                           |                                |
| $\varnothing \leq 50$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm       |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Geberit Silent dB20</b>      |                     |                                           |                                |
| $\varnothing \leq 56$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm       |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Wavin SiTech+</b>            |                     |                                           |                                |
| $\varnothing \leq 50$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 120 U/U                     |
| $\varnothing \leq 110$ mm       |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Rehau Raupiano plus</b>      |                     |                                           |                                |
| $\varnothing \leq 110$ mm       |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |
| <b>Silenta Premium</b>          |                     |                                           |                                |
| $\varnothing \leq 58$ mm        |                     | Intumescent Wrap<br>1 x 50 mm<br>2 layers | EI 90 U/U                      |
| $\varnothing \leq 110$ mm       |                     | Intumescent Wrap<br>1 x 50 mm<br>4 layers | EI 120 U/U                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlückungssystem</b>                                                                      | Annex 124 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)

Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with FEF insulation and fire protection wrap



| Fire resistance classes - Floor |                     |                                 |                      |                                        |                                        |
|---------------------------------|---------------------|---------------------------------|----------------------|----------------------------------------|----------------------------------------|
| Service                         | Pipe wall thickness | Insulation Type                 | Insulation Thickness | Measures                               | Floor<br>Fire resistance class         |
| Geberit Silent dB20             |                     |                                 |                      |                                        |                                        |
| Ø 56 mm                         | 3,2 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                             |
| Ø 63 mm                         | 3,2 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 90 U/U                              |
| Ø 75 mm                         | 3,6 mm              |                                 | 18 mm                |                                        | EI 90 U/U                              |
| Ø 90 mm                         | 5,5 mm              |                                 | 18 mm                |                                        | EI 90 U/U                              |
| Ø 110 mm                        | 6,0 mm              |                                 | 18 mm                |                                        | EI 90 U/U                              |
| Ø 135 mm                        | 6,0 mm              |                                 | 18.5 mm              | Intumescent wrap 1 x 50 mm<br>5 layers | EI 120 U/U                             |
| Ø 160 mm                        | 7,0 mm              |                                 | 19 mm                | Intumescent wrap 1 x 50 mm<br>6 layers | EI 120 U/U                             |
| Geberit Silent PP               |                     |                                 |                      |                                        |                                        |
| Ø 32 mm                         | 2,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                             |
| Ø 40 mm                         | 2,0 mm              |                                 | 17 mm                |                                        | EI 120 U/U                             |
| Ø 50 mm                         | 2,0 mm              |                                 | 17 mm                |                                        | EI 120 U/U                             |
| Ø 75 mm                         | 2,6 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                             |
| Ø 90 mm                         | 3,1 mm              |                                 | 18 mm                |                                        | EI 120 U/U                             |
| Ø 110 mm                        | 3,6 mm              |                                 | 18 mm                |                                        | EI 120 U/U                             |
| Ø 125 mm                        | 4,2 mm              |                                 | 18.5 mm              |                                        | Intumescent wrap 1 x 50 mm<br>5 layers |

3. Mineral fibre board  
4. Ablative Coating

5. Fire protection wrap  
6. Combustible pipe  
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 125 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with FEF insulation and fire protection wrap**

| Fire resistance classes - Floor |                     |                                 |                      |                                        |                                |
|---------------------------------|---------------------|---------------------------------|----------------------|----------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation Type                 | Insulation Thickness | Measures                               | Floor<br>Fire resistance class |
| Geberit Silent Pro              |                     |                                 |                      |                                        |                                |
| Ø 50 mm                         | 3,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 3,8 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 4,3 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 4,5 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Pipelife Master 3 PLUS          |                     |                                 |                      |                                        |                                |
| Ø 32 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 40 mm                         | 1,8 mm              |                                 | 17 mm                |                                        | EI 120 U/U                     |
| Ø 50 mm                         | 2,0 mm              |                                 | 17 mm                |                                        | EI 120 U/U                     |
| Ø 75 mm                         | 2,1 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,5 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 3,0 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| POLO-KAL NG / POLO-KAL XS       |                     |                                 |                      |                                        |                                |
| Ø 40 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 50 mm                         | 2,0 mm              |                                 | 17 mm                |                                        | EI 120 U/U                     |
| Ø 75 mm                         | 2,6 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 3,0 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 3,4 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Rehau Raupiano Plus             |                     |                                 |                      |                                        |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Rehau Raupiano light            |                     |                                 |                      |                                        |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 1,9 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,2 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 mm              |                                 | 18.5 mm              |                                        | EI 120 U/U                     |
| Ø 160 mm                        | 3,9 mm              |                                 | 19 mm                | Intumescent wrap 1 x 50 mm<br>6 layers | EI 90 U/U                      |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 126 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with FEF insulation and fire protection wrap**

| Fire resistance classes - Floor |                     |                                 |                      |                                        |                                |
|---------------------------------|---------------------|---------------------------------|----------------------|----------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation Type                 | Insulation Thickness | Measures                               | Floor<br>Fire resistance class |
| Rehau RAUSILENTO                |                     |                                 |                      |                                        |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 1,9 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,2 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 mm              |                                 | 18.5 mm              |                                        | EI 120 U/U                     |
| Ø 160 mm                        | 3,9 mm              |                                 | 19 mm                | Intumescent wrap 1x 50 mm<br>6 layers  | EI 90 U/U                      |
| Conel Drain                     |                     |                                 |                      |                                        |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 1,9 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,2 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 2,7 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 125 mm                        | 3,1 mm              |                                 | 18.5 mm              |                                        | EI 120 U/U                     |
| Ø 160 mm                        | 3,9 mm              |                                 | 19 mm                | Intumescent wrap 1 x 50 mm<br>6 layers | EI 90 U/U                      |
| Wavin SiTECH                    |                     |                                 |                      |                                        |                                |
| Ø 50 mm                         | 1,8 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 2,3/2,6 mm          |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 2,8/3,1 mm          |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 3,4 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Wavin SiTECH+                   |                     |                                 |                      |                                        |                                |
| Ø 32 mm                         | 2,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 40 mm                         | 2,0 mm              |                                 | 17 mm                |                                        | EI 120 U/U                     |
| Ø 50 mm                         | 2,1 mm              |                                 | 17 mm                |                                        | EI 120 U/U                     |
| Ø 75 mm                         | 2,6 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 3,1 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 3,4 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 127 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Combustible pipes  $\varnothing \leq 32$  mm -  $\varnothing \leq 160$  mm with FEF insulation and fire protection wrap**

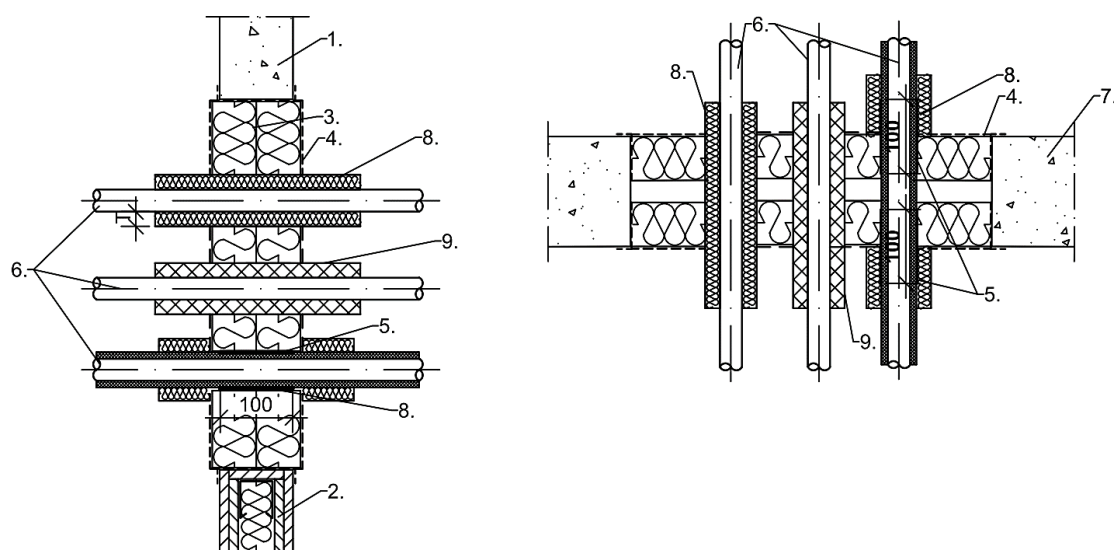
| Fire resistance classes - Floor |                     |                                 |                      |                                        |                                |
|---------------------------------|---------------------|---------------------------------|----------------------|----------------------------------------|--------------------------------|
| Service                         | Pipe wall thickness | Insulation Type                 | Insulation Thickness | Measures                               | Floor<br>Fire resistance class |
| Wavin AS+                       |                     |                                 |                      |                                        |                                |
| Ø 50 mm                         | 3,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 75 mm                         | 3,5 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 4,6 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 5,3 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Hakan Silenta Premium           |                     |                                 |                      |                                        |                                |
| Ø 58 mm                         | 4,1 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 78 mm                         | 4,6 mm              |                                 | 18 mm                | Intumescent wrap 1 x 50 mm<br>4 layers | EI 120 U/U                     |
| Ø 90 mm                         | 4,7 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 110 mm                        | 5,3 mm              |                                 | 18 mm                |                                        | EI 120 U/U                     |
| Ø 135 mm                        | 5,3 mm              |                                 | 18.5 mm              | Intumescent wrap 1 x 50 mm<br>5 layers | EI 120 U/U                     |
| Ostendorf Skolan dB             |                     |                                 |                      |                                        |                                |
| Ø 58 mm                         | 4,0 mm              | FEF acc. EN 14304<br>(B-s3, d0) | 17 mm                | Intumescent wrap 1 x 50 mm<br>2 layers | EI 120 U/U                     |
| Ø 135 mm                        | 5,3 mm              |                                 | 18.5 mm              | Intumescent wrap 1 x 50 mm<br>5 layers | EI 120 U/U                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 128 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**Multi-layer composite pipes, with non-combustible insulation; with FEF-insulation Armaflex Protect**



| Fire resistance classes                                                |                                                                         |                               |                                |
|------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                | Measures                                                                | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Multilayer composite pipes HENCO-pipes</b>                          |                                                                         |                               |                                |
| Outside pipe- $\varnothing \leq 32$ mm<br>wall thickness $\geq 3$ mm   | Lamella mat [ L X T ]<br>$\geq 250$ mm x $\geq 20$ mm                   | EI 120 U/U                    | -                              |
| Outside pipe- $\varnothing \leq 32$ mm<br>wall thickness $\geq 3$ mm   | Lamella mat [ L X T ]<br>$\geq 500$ mm x $\geq 20$ mm                   | -                             | EI 120 U/U                     |
| Outside pipe- $\varnothing \leq 63$ mm<br>wall thickness $\geq 4,5$ mm | Lamella mat [ L X T ]<br>$\geq 250$ mm x $\geq 30$ mm                   | EI 120 U/U                    | -                              |
| Outside pipe- $\varnothing \leq 63$ mm<br>wall thickness $\geq 4,5$ mm | Lamella mat [ L X T ]<br>$\geq 500$ mm x $\geq 30$ mm                   | -                             | EI 120 U/U                     |
| Outside pipe- $\varnothing \leq 12$ mm<br>wall thickness $\geq 1,6$ mm | FEF Armaflex Protect [ L X T ]<br>$\geq 240$ mm x $\geq 13$ mm          | EI 120 U/U                    | EI 120 U/U                     |
| Outside pipe- $\varnothing \leq 63$ mm<br>wall thickness $\geq 4,5$ mm | FEF Armaflex Protect [ L X T ]<br>$\geq 240$ mm x $\geq 26$ (2 x 13) mm | EI 120 U/U                    | EI 120 U/U                     |

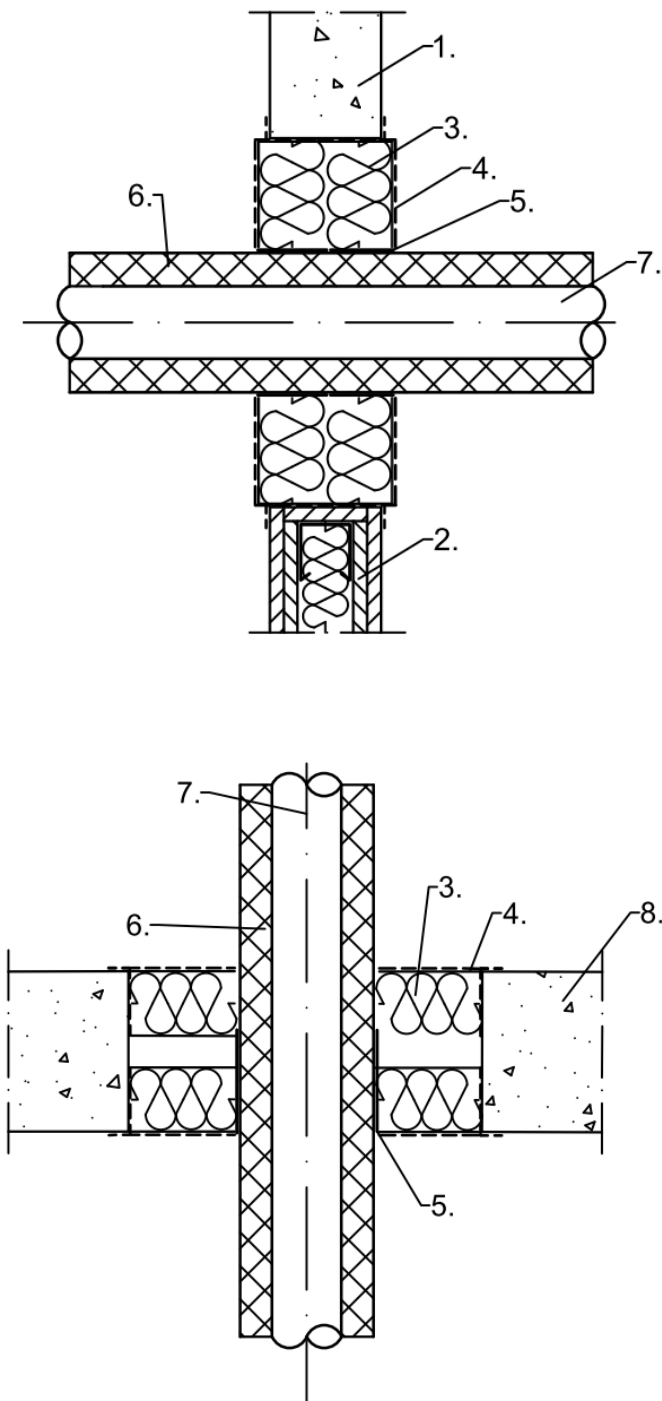
1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating
5. Intumescent wrap

6. Multilayer composite pipe
7. Rigid floor  $\geq 150$  mm thickness
8. Lamella mat
9. FEF insulation

Dimensions in mm

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)

Multi-layer composite pipes with FEF-insulation and fire protection wrap



1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Intumescent wrap

6. FEF insulation

7. Multilayer composite pipe

8. Rigid floor ≥ 150 mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| FireFree Brandlukningssystem                                                                             | Annex 130 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes with FEF-insulation and fire protection wrap**

| Fire resistance classes - Wall                    |                     |                                    |                      |                                          |                               |            |
|---------------------------------------------------|---------------------|------------------------------------|----------------------|------------------------------------------|-------------------------------|------------|
| Service                                           | Pipe wall thickness | Insulation Type                    | Insulation Thickness | Measures                                 | Wall<br>Fire resistance class |            |
| Multi-layer composite pipes Geberit Mepla         |                     |                                    |                      |                                          |                               |            |
| Ø 16 mm                                           | 2,25 mm             | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm          | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |            |
| Ø 20 mm                                           | 2,5 mm              |                                    |                      |                                          | EI 120 U/C                    |            |
| Ø 26 mm                                           | 3 mm                |                                    | 8,5 – 35 mm          |                                          | EI 120 U/C                    |            |
| Ø 32 mm                                           | 3 mm                |                                    | 9,0 – 35 mm          |                                          | EI 120 U/C                    |            |
| Ø 40 mm                                           | 3,5 mm              |                                    |                      | Intumescent wrap<br>50 mm<br>2 x 2-layer | EI 120 U/C                    |            |
| Ø 50 mm                                           | 4 mm                |                                    |                      |                                          | EI 120 U/C                    |            |
| Ø 63 mm                                           | 4,5 mm              |                                    | 9,0 – 39 mm          |                                          | EI 120 U/C                    |            |
| Ø 75 mm                                           | 4,7 mm              |                                    | 9,5 mm               |                                          | EI 90 U/C                     |            |
|                                                   |                     |                                    | >9,5 – 40,5 mm       |                                          | EI 120 U/C                    |            |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                                    |                      |                                          |                               |            |
| Ø 16 mm                                           | 2,6 mm              | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm          | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |            |
| Ø 20 mm                                           | 2,9 mm              |                                    |                      |                                          | EI 120 U/C                    |            |
| Ø 25 mm                                           | 3,7 mm              |                                    | 8,5 – 35 mm          |                                          | EI 120 U/C                    |            |
| Ø 32 mm                                           | 4,7 mm              |                                    |                      | EI 120 U/C                               |                               |            |
| Ø 40 mm                                           | 6,0 mm              |                                    | 9,0 – 35 mm          | Intumescent wrap<br>50 mm<br>2 x 2-layer | EI 120 U/C                    |            |
| Multi-layer composite pipes Kekelit Kelox         |                     |                                    |                      |                                          |                               |            |
| Ø 16 mm                                           | 2 mm                | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm          | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |            |
| Ø 18 mm                                           | 2 mm                |                                    |                      |                                          | EI 120 U/C                    |            |
| Ø 20 mm                                           | 2,25 mm             |                                    |                      |                                          | 8,5 – 35 mm                   | EI 120 U/C |
| Ø 25 mm                                           | 2,5 mm              |                                    |                      |                                          |                               | EI 120 U/C |
| Ø 32 mm                                           | 3 mm                |                                    | 9,0 – 35 mm          | Intumescent wrap<br>50 mm<br>2 x 2-layer | EI 120 U/C                    |            |
| Ø 40 mm                                           | 4 mm                |                                    |                      |                                          | EI 120 U/C                    |            |
| Ø 50 mm                                           | 4,5 mm              |                                    | 9,0 – 39 mm          |                                          | EI 120 U/C                    |            |
| Ø 63 mm                                           | 6 mm                |                                    |                      |                                          | EI 120 U/C                    |            |
| Ø 75 mm                                           | 7,5 mm              |                                    |                      |                                          | 9,5 – 40,5 mm                 | EI 120 U/C |
| Multi-layer composite pipes HENCO pipes           |                     |                                    |                      |                                          |                               |            |
| Ø 20 mm                                           | 2-3 mm              | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm          | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |            |
| Ø 32 mm                                           | 3 mm                |                                    |                      |                                          | EI 120 U/C                    |            |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 131 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes with FEF-insulation and fire protection wrap**

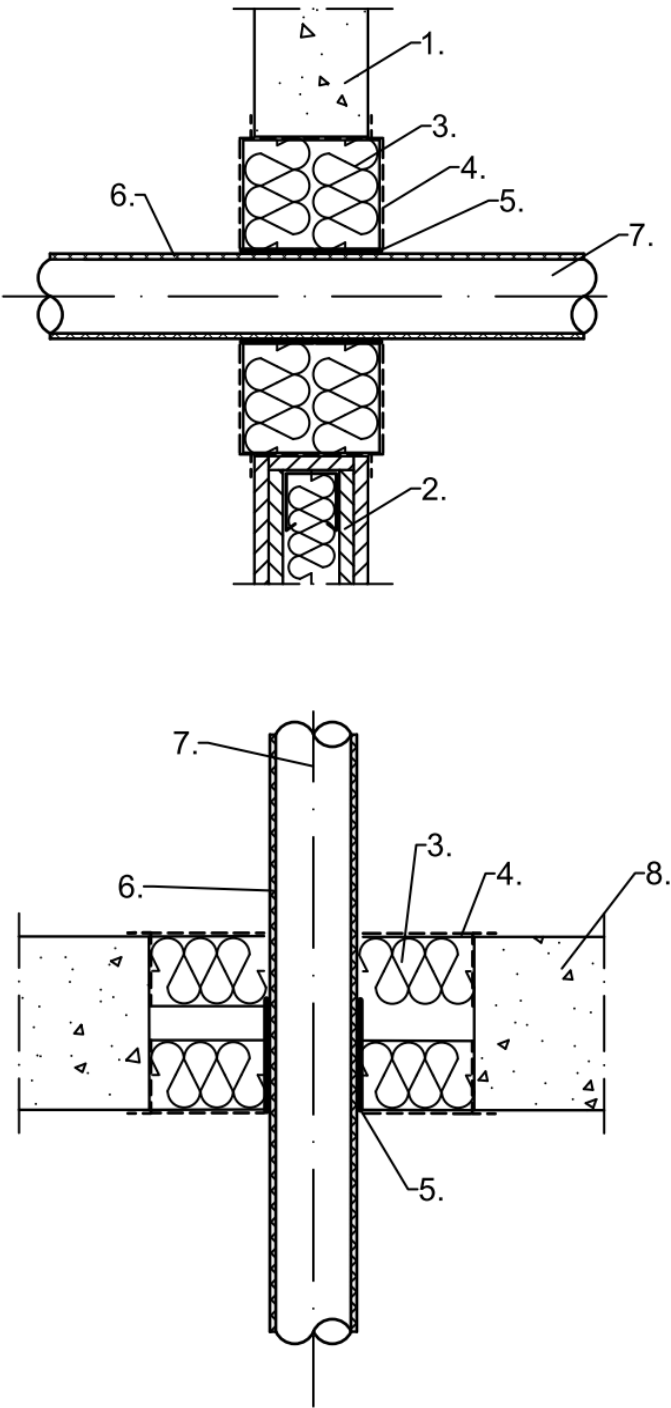
| Fire resistance classes - Floor                   |                     |                                    |                      |                                           |                                |
|---------------------------------------------------|---------------------|------------------------------------|----------------------|-------------------------------------------|--------------------------------|
| Service                                           | Pipe wall thickness | Insulation Type                    | Insulation Thickness | Measures                                  | Floor<br>Fire resistance class |
| Multi-layer composite pipes Geberit Mepla         |                     |                                    |                      |                                           |                                |
| Ø 16 mm                                           | 2,25 mm             | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm          | Intumescent wrap<br>50 mm<br>1 x 1-layer  | EI 120 U/C                     |
| Ø 20 mm                                           | 2,5 mm              |                                    |                      |                                           | EI 120 U/C                     |
| Ø 26 mm                                           | 3 mm                |                                    |                      |                                           | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                                    | EI 120 U/C           |                                           |                                |
| Ø 40 mm                                           | 3,5 mm              |                                    | 9,0 – 35 mm          | Intumescent wrap<br>50 mm<br>1 x 2-layers | EI 120 U/C                     |
| Ø 50 mm                                           | 4 mm                |                                    |                      |                                           | EI 120 U/C                     |
| Ø 63 mm                                           | 4,5 mm              |                                    | 9,0 – 39 mm          |                                           | EI 120 U/C                     |
| Ø 75 mm                                           | 4,7 mm              |                                    | 9,5 mm               |                                           | EI 90 U/C                      |
|                                                   |                     |                                    | > 9,5 – 40,5 mm      |                                           | EI 120 U/C                     |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                                    |                      |                                           |                                |
| Ø 16 mm                                           | 2,6 mm              | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm          | Intumescent wrap<br>50 mm<br>1 x 1-layer  | EI 120 U/C                     |
| Ø 20 mm                                           | 2,9 mm              |                                    |                      |                                           | EI 120 U/C                     |
| Ø 25 mm                                           | 3,7 mm              |                                    |                      |                                           | EI 120 U/C                     |
| Ø 32 mm                                           | 4,7 mm              |                                    | EI 120 U/C           |                                           |                                |
| Ø 40 mm                                           | 6,0 mm              |                                    | 9,0 – 35 mm          | Intumescent wrap<br>50 mm<br>1 x 2-layers | EI 120 U/C                     |
| Multi-layer composite pipes Kekelit Kelox         |                     |                                    |                      |                                           |                                |
| Ø 16 mm                                           | 2 mm                | FEF<br>acc. EN 14304<br>(B-s3, d0) | 8,0 – 32 mm          | Intumescent wrap<br>50 mm<br>1 x 1-layer  | EI 120 U/C                     |
| Ø 18 mm                                           | 2 mm                |                                    |                      |                                           | EI 120 U/C                     |
| Ø 20 mm                                           | 2,25 mm             |                                    |                      |                                           | EI 120 U/C                     |
| Ø 25 mm                                           | 2,5 mm              |                                    |                      |                                           | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                                    | 9,0 – 35 mm          | Intumescent wrap<br>50 mm<br>1 x 2-layers | EI 120 U/C                     |
| Ø 40 mm                                           | 4 mm                |                                    |                      |                                           | EI 120 U/C                     |
| Ø 50 mm                                           | 4,5 mm              |                                    | EI 120 U/C           |                                           |                                |
| Ø 63 mm                                           | 6 mm                |                                    | 9,0 – 39 mm          |                                           | EI 120 U/C                     |
| Ø 75 mm                                           | 7,5 mm              |                                    | 9,5 – 40,5 mm        |                                           | EI 120 U/C                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 132 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)

Multi-layer composite pipes with FEF-insulation and fire protection wrap



- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1. Rigid wall ≥ 100 thickness       | 5. Intumescent wrap               |
| 2. Flexible wall ≥ 100 mm thickness | 6. PEF Insulation                 |
| 3. Mineral fibre board              | 7. Multilayer composite pipe      |
| 4. Ablative Coating                 | 8. Rigid floor ≥ 150 mm thickness |

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes with PEF-insulation and fire protection wrap**

| Fire resistance classes - Wall                    |                     |                 |                      |                                          |                               |
|---------------------------------------------------|---------------------|-----------------|----------------------|------------------------------------------|-------------------------------|
| Service                                           | Pipe wall thickness | Insulation Type | Insulation Thickness | Measures                                 | Wall<br>Fire resistance class |
| Multi-layer composite pipes HENCO pipes           |                     |                 |                      |                                          |                               |
| Ø 20 mm                                           | 2,0 – 3,0 mm        | PEF             | 6 – 13 mm            | Intumescent wrap 50 mm<br>2 x 1-layer    | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Multi-layer composite pipes Kekelit Kelox         |                     |                 |                      |                                          |                               |
| Ø 18 mm                                           | 2 mm                | PEF             | 4 – 13 mm            | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2,25 mm             |                 |                      |                                          | EI 120 U/C                    |
| Ø 25 mm                                           | 2,5 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Multi-layer composite pipes Geberit Mepla         |                     |                 |                      |                                          |                               |
| Ø 16 mm                                           | 2,25 mm             | PEF             | 6 – 13 mm            | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2,5 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 26 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                    |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                 |                      |                                          |                               |
| Ø 16 mm                                           | 2,6 mm              | PEF             | 4 – 26 mm            | Intumescent wrap<br>50 mm<br>2 x 1-layer | EI 120 U/C                    |
| Ø 20 mm                                           | 2,9 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 25 mm                                           | 3,7 mm              |                 |                      |                                          | EI 120 U/C                    |
| Ø 32 mm                                           | 4,7 mm              |                 |                      |                                          | EI 120 U/C                    |

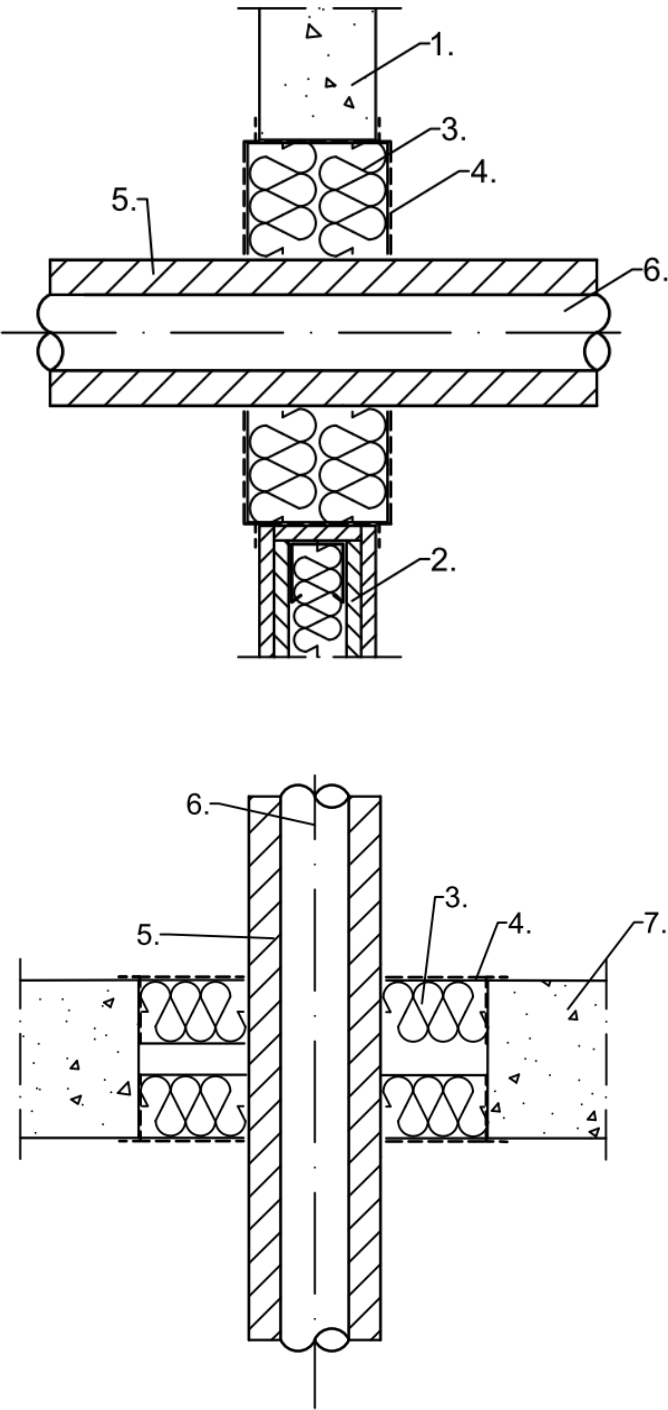
| Fire resistance classes - Floor                   |                     |                 |                      |                                          |                                |
|---------------------------------------------------|---------------------|-----------------|----------------------|------------------------------------------|--------------------------------|
| Service                                           | Pipe wall thickness | Insulation Type | Insulation Thickness | Measures                                 | Floor<br>Fire resistance class |
| Multi-layer composite pipes HENCO pipes           |                     |                 |                      |                                          |                                |
| Ø 20 mm                                           | 2,0 – 3,0 mm        | PEF             | 6 – 13 mm            | Intumescent wrap 50 mm<br>1x 1-layer     | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                 | 13 mm                |                                          | EI 120 U/C                     |
| Multi-layer composite pipes Kekelit Kelox         |                     |                 |                      |                                          |                                |
| Ø 18 mm                                           | 2 mm                | PEF             | 4 – 13 mm            | Intumescent wrap<br>50 mm<br>1 x 1-layer | EI 120 U/C                     |
| Ø 20 mm                                           | 2,25 mm             |                 |                      |                                          | EI 120 U/C                     |
| Ø 25 mm                                           | 2,5 mm              |                 |                      |                                          | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                     |
| Multi-layer composite pipes Geberit Mepla         |                     |                 |                      |                                          |                                |
| Ø 16 mm                                           | 2,25 mm             | PEF             | 6 – 13 mm            | Intumescent wrap<br>50 mm<br>1 x 1-layer | EI 120 U/C                     |
| Ø 20 mm                                           | 2,5 mm              |                 |                      |                                          | EI 120 U/C                     |
| Ø 26 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                     |
| Ø 32 mm                                           | 3 mm                |                 |                      |                                          | EI 120 U/C                     |
| Multi-layer composite pipes Rehau Rautitan stabil |                     |                 |                      |                                          |                                |
| Ø 16 mm                                           | 2,6 mm              | PEF             | 4 – 26 mm            | Intumescent wrap<br>50 mm<br>1 x 1-layer | EI 120 U/C                     |
| Ø 20 mm                                           | 2,9 mm              |                 | 26 mm                |                                          | EI 120 U/C                     |
| Ø 25 mm                                           | 3,7 mm              |                 |                      |                                          | EI 120 U/C                     |
| Ø 32 mm                                           | 4,7 mm              |                 |                      |                                          | EI 120 U/C                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 134 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)

Multi-layer composite pipes insulated with mineral fibre pipe shells



- |                                          |                                        |
|------------------------------------------|----------------------------------------|
| 1. Rigid wall $\geq 100$ thickness       | 5. Mineral fibre pipe shell            |
| 2. Flexible wall $\geq 100$ mm thickness | 6. Multilayer composite pipe           |
| 3. Mineral fibre board                   | 7. Rigid floor $\geq 150$ mm thickness |
| 4. Ablative Coating                      |                                        |

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Multi-layer composite pipes insulated with mineral fibre pipe shells**

| Fire resistance classes - Wall            |                     |                                            |                      |          |                               |
|-------------------------------------------|---------------------|--------------------------------------------|----------------------|----------|-------------------------------|
| Service                                   | Pipe wall thickness | Insulation Type                            | Insulation Thickness | Measures | Wall<br>Fire resistance class |
| Multi-layer composite pipes Geberit Mepla |                     |                                            |                      |          |                               |
| Ø 16 mm                                   | 2,25 mm             | Mineral fibre pipe shells<br>acc. EN 14303 | 20 – 30 mm           | -        | EI 120 U/C                    |
| Ø 20 mm                                   | 2,5 mm              |                                            |                      |          | EI 120 U/C                    |
| Ø 26 mm                                   | 3 mm                |                                            | 20 – 40 mm           |          | EI 120 U/C                    |
| Ø 32 mm                                   | 3 mm                |                                            |                      |          | EI 120 U/C                    |
| Ø 40 mm                                   | 3,5 mm              |                                            | 20 – 50 mm           | -        | EI 120 U/C                    |
| Ø 50 mm                                   | 4 mm                |                                            |                      |          | EI 120 U/C                    |
| Ø 63 mm                                   | 4,5 mm              |                                            | 20 – 60 mm           |          | EI 120 U/C                    |
| Ø 75 mm                                   | 4,7 mm              |                                            | 20 – 80 mm           |          | EI 120 U/C                    |

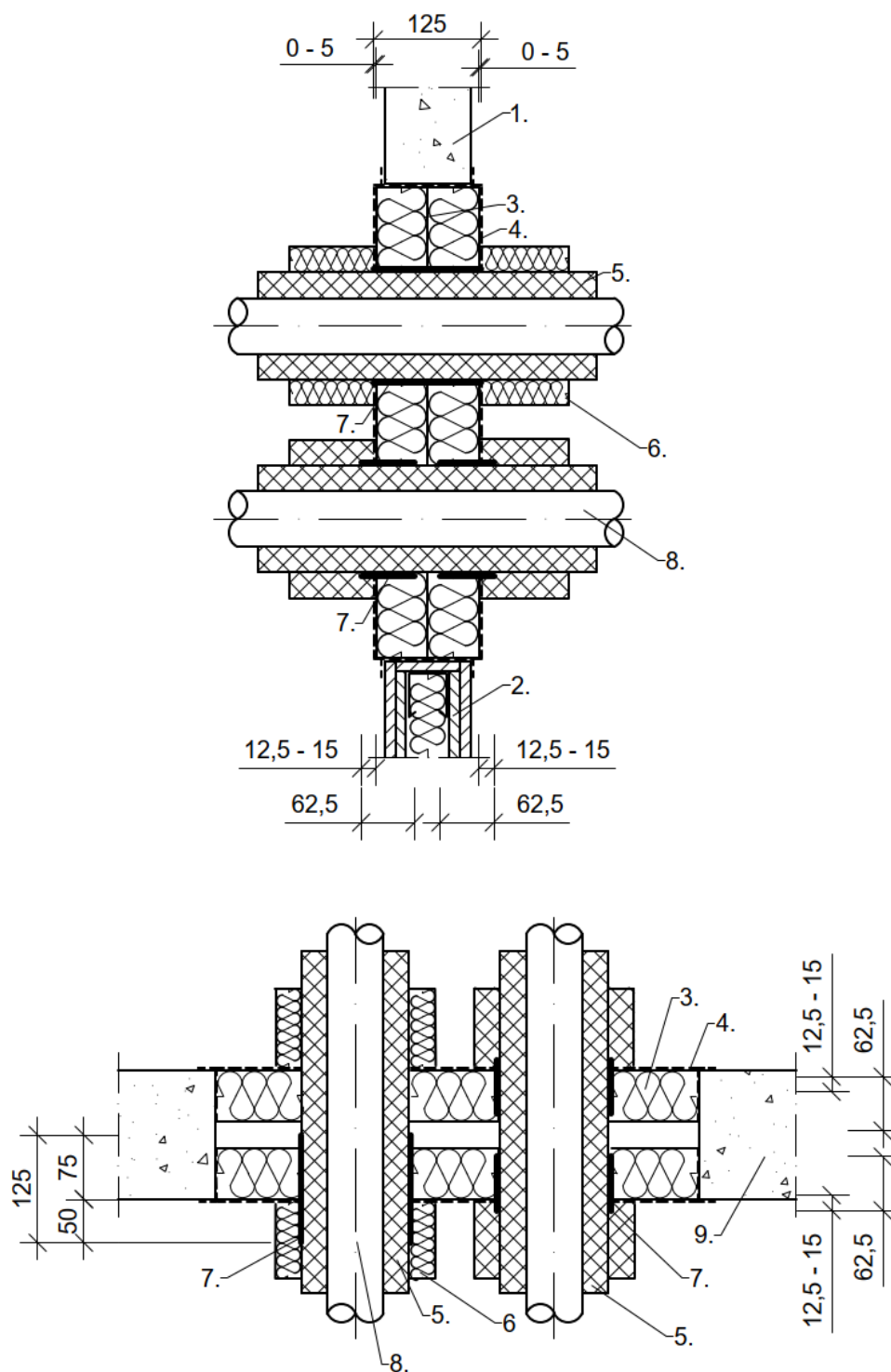
| Fire resistance classes - Floor           |                     |                                            |                      |          |                                |
|-------------------------------------------|---------------------|--------------------------------------------|----------------------|----------|--------------------------------|
| Service                                   | Pipe wall thickness | Insulation Type                            | Insulation Thickness | Measures | Floor<br>Fire resistance class |
| Multi-layer composite pipes Geberit Mepla |                     |                                            |                      |          |                                |
| Ø 16 mm                                   | 2,25 mm             | Mineral fibre pipe shells<br>acc. EN 14303 | 20 – 30 mm           | -        | EI 120 U/C                     |
| Ø 20 mm                                   | 2,5 mm              |                                            |                      |          | EI 120 U/C                     |
| Ø 26 mm                                   | 3 mm                |                                            | 20 – 40 mm           |          | EI 120 U/C                     |
| Ø 32 mm                                   | 3 mm                |                                            |                      |          | EI 120 U/C                     |
| Ø 40 mm                                   | 3,5 mm              |                                            | 20 – 50 mm           | -        | EI 120 U/C                     |
| Ø 50 mm                                   | 4 mm                |                                            |                      |          | EI 120 U/C                     |
| Ø 63 mm                                   | 4,5 mm              |                                            | 20 – 60 mm           |          | EI 120 U/C                     |
| Ø 75 mm                                   | 4,7 mm              |                                            | 20 – 80 mm           |          | EI 120 U/C                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 136 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)

Non-combustible pipes with insulation made of FEF, with intumescent wrap and with protective insulation of lamella mat depending on pipe outer-Ø



- |                                          |                                        |
|------------------------------------------|----------------------------------------|
| 1. Rigid wall $\geq 100$ thickness       | 6. Lamella mat                         |
| 2. Flexible wall $\geq 100$ mm thickness | 7. Intumescent wrap                    |
| 3. Mineral fibre board                   | 8. Non-combustible pipe                |
| 4. Ablative Coating                      | 9. Rigid floor $\geq 150$ mm thickness |
| 5. FEF insulation                        |                                        |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 137 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)****Non-combustible pipes with insulation made of FEF**

| Fire resistance classes - Wall                                  |                  |                     |                      |                                                                                                                   |                            |
|-----------------------------------------------------------------|------------------|---------------------|----------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------|
| Service                                                         | Outside-Ø        | Pipe wall thickness | Insulation thickness | Measures                                                                                                          | Wall Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                  |                     |                      |                                                                                                                   |                            |
| Copper, steel, stainless steel, cast iron                       | ≤ 15 mm          | 0,8 - 14,2          | 10 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer                                                          | EI 120 U/C                 |
|                                                                 | ≤ 15 mm          |                     | 9 – 50 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat ≥ 250 mm x ≥ 20 mm                      | EI 120 U/C                 |
|                                                                 | ≤ 42 mm          |                     | 10 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer                                                          | EI 90 U/C                  |
|                                                                 | ≤ 42 mm          |                     | 10 – 50 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat ≥ 250 mm x ≥ 20 mm                      | EI 120 U/C                 |
|                                                                 | ≤ 42 mm          |                     | 10 – 50 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ Protective insulation<br>FEF ≥ 250 mm x ≥ 2 x 13 mm | EI 120 U/C                 |
|                                                                 | ≤ 42 mm          |                     | 89 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat ≥ 500 mm x ≥ 40 mm                      | EI 120 U/C                 |
|                                                                 | > 15 - ≤ 54 mm   |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                                         | EI 120 U/C                 |
|                                                                 | ≤ 54 mm          |                     | 29 – 57 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat ≥ 500 mm x ≥ 40 mm                      | EI 90 U/C                  |
|                                                                 | > 54 - ≤ 88,9 mm |                     | 25 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                                         | EI 120 U/C                 |
|                                                                 | ≤ 88,9 mm        |                     | 89 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat ≥ 500 mm x ≥ 40 mm                      | EI 120 U/C                 |
|                                                                 | > 42 - ≤ 88,9 mm |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                                         | EI 90 U/C                  |
|                                                                 | ≤ 88,9 mm        |                     | 29 – 89 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat ≥ 500 mm x ≥ 30 mm                      | EI 90 U/C                  |
|                                                                 | ≤ 108 mm         |                     | 57 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 2 layer<br>+ lamella mat ≥ 750 mm x ≥ 40 mm                      | EI 90 U/C                  |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 138 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of FEF**

| Fire resistance classes - Wall                                  |                          |                     |                      |                                                                                                        |                            |
|-----------------------------------------------------------------|--------------------------|---------------------|----------------------|--------------------------------------------------------------------------------------------------------|----------------------------|
| Service                                                         | Outside-Ø                | Pipe wall thickness | Insulation thickness | Measures                                                                                               | Wall Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                          |                     |                      |                                                                                                        |                            |
| Steel, stainless steel, cast iron                               | $\leq 15$ mm             | 0,8 - 14,2          | 10 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                              | EI 120 U/C                 |
|                                                                 | $> 15 - \leq 88,9$ mm    |                     | 19 - 38 mm           | Intumescent wrap<br>2x 62,5 / 1x 125 mm<br>1 x 2 layers                                                | EI 120 U/C                 |
|                                                                 | $> 88,9 - \leq 114,3$ mm |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x19        | EI 120 U/C                 |
|                                                                 | $> 114,3 - \leq 159$ mm  |                     | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x19        | EI 120 U/C                 |
|                                                                 | $\leq 170$ mm            |                     | 50 – 89 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 500$ mm x $\geq 60$ mm | EI 120 U/C                 |
|                                                                 | $> 159 - \leq 219,1$ mm  |                     | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 600x38        | EI 120 U/C                 |

| Fire resistance classes - Floor                                 |                       |                     |                      |                                                                                                                          |                             |
|-----------------------------------------------------------------|-----------------------|---------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Service                                                         | Outside-Ø             | Pipe wall thickness | Insulation Thickness | Measures                                                                                                                 | Floor Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                       |                     |                      |                                                                                                                          |                             |
| Copper, steel, stainless steel, cast iron                       | $\leq 60$ mm          | 0,6 - 14,2          | 13 - 40 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                                                | EI 120 U/C                  |
|                                                                 | $> 60 - \leq 88,9$ mm |                     | 25 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                                                | EI 120 U/C                  |
|                                                                 | $\leq 88,9$ mm        |                     | 9 – 32 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 2 layer<br>+ lamella mat $\geq 500$ mm x $\geq 30$ mm                   | EI 120 U/C                  |
|                                                                 | $\leq 10$ mm          |                     | 9 – 19 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 250$ mm x $\geq 20$ mm                   | EI 120 U/C                  |
|                                                                 | $\leq 15$ mm          |                     | 9 – 25 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 250$ mm x $\geq 20$ mm                   | EI 120 U/C                  |
|                                                                 | $\leq 15$ mm          |                     | 9 – 19 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ Protective insulation FEF $\geq 250$ mm x $\geq 2$ x 13 mm | EI 120 U/C                  |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 139 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of FEF**

| Fire resistance classes - Floor                                 |                         |                     |                      |                                                                                                                             |                             |
|-----------------------------------------------------------------|-------------------------|---------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Service                                                         | Outside-Ø               | Pipe wall thickness | Insulation Thickness | Measures                                                                                                                    | Floor Fire resistance class |
| Non-combustible pipes with insulation made of FEF acc. EN 14304 |                         |                     |                      |                                                                                                                             |                             |
| Copper, steel, stainless steel, cast iron                       | $\leq 15$ mm            | 0,6 - 14,2          | 9 – 25 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 250$ mm x $\geq 20$ mm                      | EI 120 U/C                  |
|                                                                 | $\leq 15$ mm            |                     | 9 – 19 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ Protective insulation<br>FEF $\geq 250$ mm x $\geq 2$ x 13 mm | EI 120 U/C                  |
|                                                                 | $\leq 42$ mm            |                     | 10 – 19 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 250$ mm x $\geq 20$ mm                      | EI 120 U/C                  |
|                                                                 | $\leq 42$ mm            |                     | 10 – 19 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ Protective insulation<br>FEF $\geq 250$ mm x $\geq 2$ x 13 mm | EI 120 U/C                  |
|                                                                 | $\leq 42$ mm            |                     | 10 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 1 layer                                                                    | EI 90 U/C                   |
|                                                                 | $\leq 42$ mm            |                     | 9 - 40 mm            | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                                                   | EI 90 U/C                   |
|                                                                 | $> 42 - \leq 60$ mm     |                     | 13 - 40 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers                                                                   | EI 90 U/C                   |
|                                                                 | $> 60 - \leq 88,9$ mm   |                     | 19 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers                                                                       | EI 90 U/C                   |
|                                                                 | $\leq 88,9$ mm          |                     | 89 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 250$ mm x $\geq 40$ mm                      | EI 90 U/C                   |
|                                                                 | $\leq 108$ mm           |                     | 57 mm                | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 1000$ mm x $\geq 40$ mm                     | EI 90 U/C                   |
| Steel, stainless steel, cast iron                               | $\leq 159$ mm           |                     | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x25                             | EI 90 U/C                   |
|                                                                 | $\leq 170$ mm           |                     | 10 - 32 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 2 layer<br>+ lamella mat $\geq 500$ mm x $\geq 30$ mm                      | EI 90 U/C                   |
|                                                                 | $\leq 170$ mm           |                     | 50 – 89 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer<br>+ lamella mat $\geq 500$ mm x $\geq 60$ mm                      | EI 90 U/C                   |
|                                                                 | $> 159 - \leq 219,1$ mm |                     | 25 - 38 mm           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers<br>+ Protective insulation FEF 250x38                             | EI 90 U/C                   |

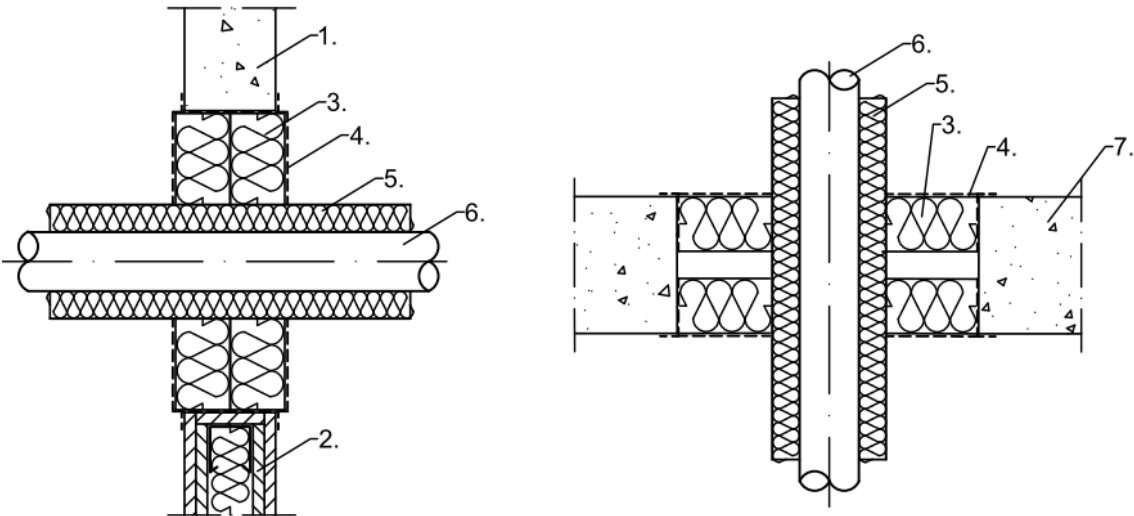
Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 140 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

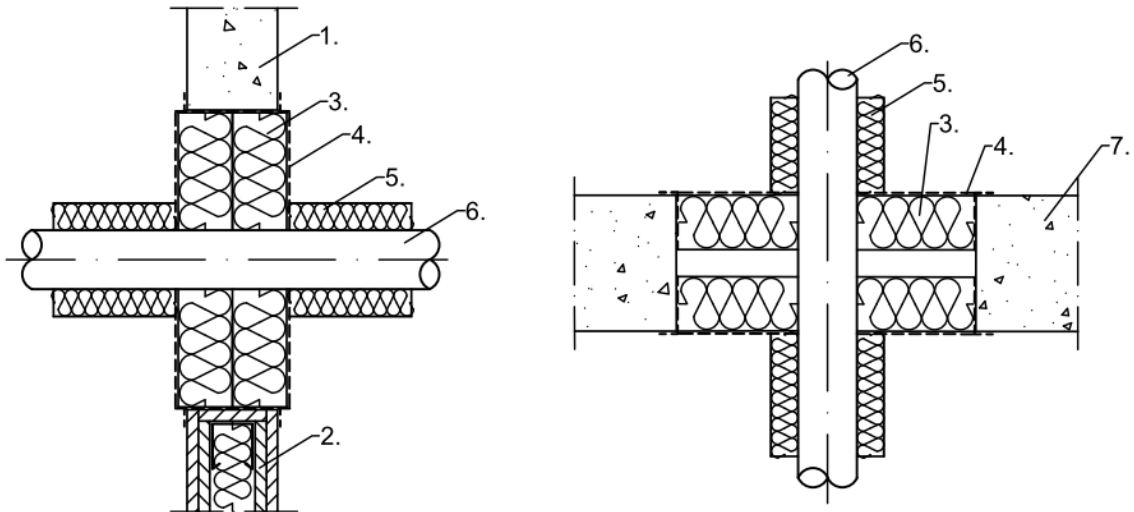
Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)

Non-combustible pipes with insulation made of mineral fibre

Variant LS



Variant LI



1. Rigid wall ≥ 100 thickness

2. Flexible wall ≥ 100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Mineral fibre lamella mat

6. Non-combustible pipe

7. Rigid floor ≥ 150 mm thickness

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of mineral fibre**

| Fire resistance classes - Wall                              |                        |                     |                                                                                             |                            |
|-------------------------------------------------------------|------------------------|---------------------|---------------------------------------------------------------------------------------------|----------------------------|
| Service                                                     | Outside-Ø              | Pipe wall thickness | Measures                                                                                    | Wall Fire resistance class |
| Non-combustible pipes with insulation made of mineral fibre |                        |                     |                                                                                             |                            |
| Copper, steel, stainless steel, cast iron                   | $\leq 15$              | 0,8 - 14,2          | Lamella mat<br>Both sides $\geq 250 \times 20$ mm                                           | EI 120 C/U                 |
|                                                             | $\leq 22$              | 0,6 - 14,2          | Lamella mat<br>Both sides $\geq 450 \times 20-100$ mm                                       | EI 120 U/C                 |
|                                                             | $> 22 - \leq 60$       |                     | Lamella mat<br>Both sides $\geq 200 \times 30-100$ mm                                       | EI 120 U/C                 |
|                                                             | $> 60 - \leq 88,9$     |                     | Lamella mat<br>Both sides $\geq 450 \times 30-100$ mm                                       | EI 120 U/C                 |
|                                                             | $\leq 108$             | 2,1/2,5 – 14,2      | Lamella mat<br>Both sides $\geq 1000 \times 30$ mm<br>+ Lamella mat $\geq 500 \times 30$ mm | EI 120 C/U                 |
| Steel, stainless steel, cast iron                           | $\leq 42$              | 1,8 - 14,2          | Lamella mat<br>Both sides $\geq 200 \times 30-100$ mm                                       | EI 120 U/C                 |
|                                                             | $> 42 - \leq 114,3$    | 1,8/3,2 - 14,2      | Lamella mat<br>Both sides $\geq 450 \times 30-100$ mm                                       | EI 120 U/C                 |
|                                                             | $> 114,3 - \leq 159$   | 3,2/4,0 - 14,2      | Lamella mat<br>Both sides $\geq 1200 \times 100$ mm                                         | EI 120 U/C                 |
|                                                             | $> 114,3 - \leq 170$   | 2,6/2,9 – 14,2      | Lamella mat<br>Both sides $\geq 1000 \times 40$ mm<br>+ Lamella mat $\geq 500 \times 60$ mm | EI 120 C/U                 |
|                                                             |                        |                     | Lamella mat<br>Both sides $\geq 1000 \times 60$ mm<br>+ Lamella mat $\geq 500 \times 30$ mm | EI 120 C/U                 |
|                                                             | $> 114,3 - \leq 219,1$ | 3,2/4,5 - 14,2      | Lamella mat<br>Both sides $\geq 1200 \times 30-100$ mm                                      | EI 90 U/C                  |

Dimensions in mm

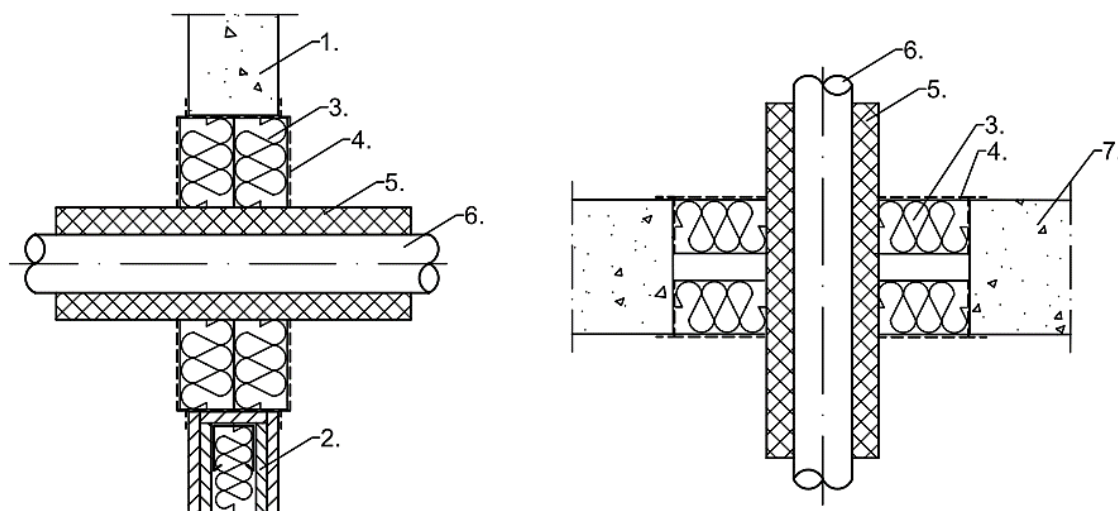
|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 142 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of mineral fibre**

| Fire resistance classes - Floor                                    |                        |                     |                                                                                              |                                |
|--------------------------------------------------------------------|------------------------|---------------------|----------------------------------------------------------------------------------------------|--------------------------------|
| Service                                                            | Outside-Ø              | Pipe wall thickness | Measures                                                                                     | Floor<br>Fire resistance class |
| <b>Non-combustible pipes with insulation made of mineral fibre</b> |                        |                     |                                                                                              |                                |
| Copper, steel, stainless steel, cast iron                          | $\leq 22$              | 0,6 - 14,2          | Lamella mat<br>Both sides $\geq 425 \times 20$ -100 mm                                       | EI 120 U/C                     |
|                                                                    |                        |                     | Lamella mat<br>Both sides $\geq 175 \times 30$ -100 mm                                       | EI 120 U/C                     |
|                                                                    | $> 22 - \leq 42$       |                     | Lamella mat<br>Both sides $\geq 425 \times 30$ -100 mm                                       | EI 120 U/C                     |
|                                                                    | $> 42 - \leq 54$       | 1,3/1,5 – 14,2      | Lamella mat<br>Both sides $\geq 750 \times 30$ mm<br>+ Lamella mat $\geq 500 \times 30$ mm   | EI 120 C/U                     |
|                                                                    | $> 42 - \leq 88,9$     | 0,6 - 14,2          | Lamella mat<br>Both sides $\geq 675 \times 30$ -100 mm                                       | EI 90 U/C                      |
|                                                                    | $> 54 - \leq 108$      | 1,6/2,5 – 14,2      | Lamella mat<br>Both sides $\geq 1000 \times 30$ mm<br>+ Lamella mat $\geq 500 \times 30$ mm  | EI 120 C/U                     |
| Steel, stainless steel, cast iron                                  | $\leq 42$              | 1,8 - 14,2          | Lamella mat<br>Both sides $\geq 125 \times 30$ -100 mm                                       | EI 120 U/C                     |
|                                                                    | $> 42 - \leq 114,3$    | 1,8/3,2 - 14,2      | Lamella mat<br>Both sides $\geq 425 \times 30$ -100 mm                                       | EI 120 U/C                     |
|                                                                    | $> 114,3 - \leq 159$   | 3,2/4,0 - 14,2      | Lamella mat<br>Both sides $\geq 1175 \times 30$ -100 mm                                      | EI 120 U/C                     |
|                                                                    | $> 159 - \leq 170$     | 2,9 – 14,2          | Lamella mat<br>Both sides $\geq 1000 \times 40$ mm<br>+ Lamella mat $\geq 500 \times 60$ mm  | EI 120 C/U                     |
|                                                                    | $> 114,3 - \leq 219,1$ | 3,2/4,5 - 14,2      | Lamella mat<br>Both sides $\geq 1175 \times 30$ mm                                           | EI 120 U/C                     |
|                                                                    |                        |                     | Lamella mat<br>Both sides $\geq 1175 \times 30$ -100 mm                                      | EI 90 U/C                      |
|                                                                    | $> 170 - \leq 323,9$   | 2,9/7,5 – 14,2      | Lamella mat<br>Both sides $\geq 1250 \times 60$ mm<br>+ Lamella mat $\geq 1000 \times 60$ mm | EI 120 C/U                     |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 143 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of ArmaFlex Protect**

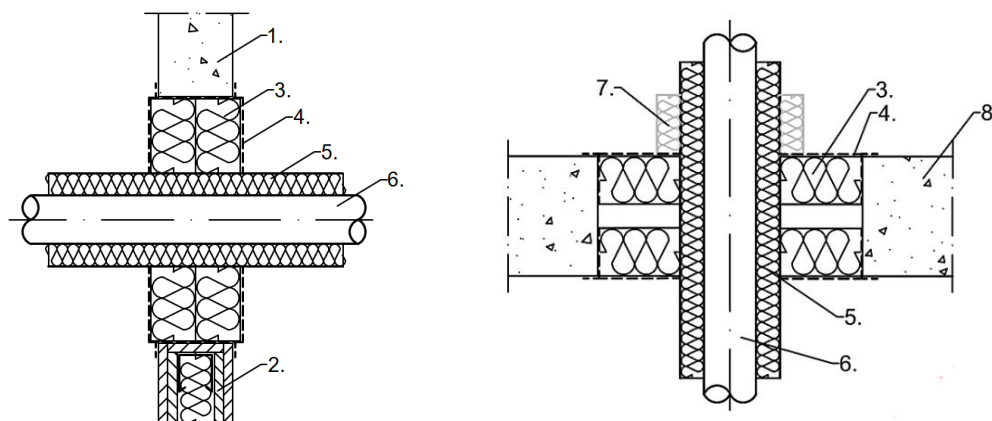
| Fire resistance classes                                                                                                       |                                    |                               |                                |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                       | Measures<br>Insulation [L X T]     | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Non-combustible pipes made of copper, steel, stainless steel or cast iron with combustible insulation Armaflex Protect</b> |                                    |                               |                                |
| Pipe outer- $\varnothing \leq 8$ mm                                                                                           | $\geq 1000$ mm x 16 mm             | -                             | EI 120 C/U                     |
| Pipe outer- $\varnothing \leq 10$ mm                                                                                          | $\geq 1000$ mm x 16 mm             | EI 120 C/U                    | -                              |
| Pipe outer- $\varnothing \leq 15$ mm                                                                                          | $\geq 1000$ mm x 19 mm             | EI 90 / E 120 C/U             | EI 120 C/U                     |
| Pipe outer- $\varnothing \leq 22$ mm                                                                                          | $\geq 1000$ mm x 20 mm             | EI120                         | EI 120 C/U                     |
| Pipe outer- $\varnothing \leq 28$ mm                                                                                          | $\geq 1000$ mm x 25 mm             | EI 60/ E 120 C/U              | EI 120 C/U                     |
| Pipe outer- $\varnothing \leq 35$ mm                                                                                          | $\geq 1000$ mm x 25 mm             | EI 90 / E 120 C/U             | EI 90 / E 120 C/U              |
| Pipe outer- $\varnothing \leq 54$ mm                                                                                          | $\geq 1000$ mm x 25 mm             | EI 90 / E 120 C/U             | EI 90 / E 120 C/U              |
| Pipe outer- $\varnothing \leq 88,9$ mm                                                                                        | $\geq 1000$ mm x 25 mm             | EI 60/ E 120 C/U              | EI 60/ E 120 C/U               |
| <b>Non-combustible pipes made of steel, stainless steel or cast iron with combustible insulation Armaflex Protect</b>         |                                    |                               |                                |
| Pipe outer- $\varnothing \leq 170$ mm                                                                                         | $\geq 1000$ mm x 26 mm (2 x 13 mm) | EI 90 / E 120 C/U             | EI 90 / E 120 C/U              |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. FEF-insulation
6. Non-combustible pipe
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 144 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of mineral fibre pipe shells**

| Fire resistance classes - Wall                                                                                                             |             |                     |                                           |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|-------------------------------------------|----------------------------|
| Service                                                                                                                                    | Outside-Ø   | Pipe wall thickness | Measures                                  | Wall Fire resistance class |
| <b>Non-combustible pipes with insulation made of mineral fibre pipe shells</b>                                                             |             |                     |                                           |                            |
| Copper, steel, stainless steel, cast iron                                                                                                  | $\leq 15$   | 0,8 – 14,2          | Mineral fibre pipe shell<br>CS x 20-30 mm | EI 120 C/U                 |
|                                                                                                                                            | $\leq 28$   | 1,0 – 14,2          |                                           | EI 120 C/U                 |
|                                                                                                                                            | $\leq 42$   | 1,2 – 14,2          |                                           | EI 120 C/U                 |
|                                                                                                                                            | $\leq 54$   | 1,5 – 14,2          |                                           | EI 120 C/U                 |
|                                                                                                                                            | $\leq 88,9$ | 2,0 – 14,2          |                                           | EI 120 C/U                 |
|                                                                                                                                            | $\leq 108$  | 2,5 – 14,2          | Mineral fibre pipe shell<br>CS x 30-40 mm | EI 120 C/U                 |
| <b>Non-combustible pipes made of steel, stainless steel or cast iron with non-combustible insulation made of mineral fibre lamella mat</b> |             |                     |                                           |                            |
| Steel, stainless steel, cast iron                                                                                                          | $\leq 170$  | 3,0 – 14,2          | Mineral fibre pipe shell<br>CS x 40 mm    | EI 60 / E 120 C/U          |

| Fire resistance classes - Floor                                                                                                            |             |                     |                                                                                |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------|--------------------------------------------------------------------------------|-----------------------------|
| Service                                                                                                                                    | Outside-Ø   | Pipe wall thickness | Measures                                                                       | Floor Fire resistance class |
| <b>Non-combustible pipes with insulation made of mineral fibre pipe shells</b>                                                             |             |                     |                                                                                |                             |
| Copper, steel, stainless steel, cast iron                                                                                                  | $\leq 15$   | 0,8 – 14,2          | Mineral fibre pipe shell<br>CS x 20-40 mm                                      | EI 120 C/U                  |
|                                                                                                                                            | $\leq 28$   | 1,0 – 14,2          |                                                                                | EI 120 C/U                  |
|                                                                                                                                            | $\leq 42$   | 1,2 – 14,2          |                                                                                | EI 120 C/U                  |
|                                                                                                                                            | $\leq 54$   | 1,5 – 14,2          |                                                                                | EI 120 C/U                  |
|                                                                                                                                            | $\leq 88,9$ | 2,0 – 14,2          |                                                                                | EI 120 C/U                  |
|                                                                                                                                            | $\leq 108$  | 2,5 – 14,2          | Mineral fibre pipe shell<br>CS x 30-40 mm                                      | EI 120 C/U                  |
| <b>Non-combustible pipes made of steel, stainless steel or cast iron with non-combustible insulation made of mineral fibre lamella mat</b> |             |                     |                                                                                |                             |
| Steel, stainless steel, cast iron                                                                                                          | $\leq 170$  | 3,0 – 14,2          | Mineral fibre pipe shell CS x 40 mm<br>+ lamella mat $> 500$ mm x $\geq 30$ mm | EI 120 C/U                  |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

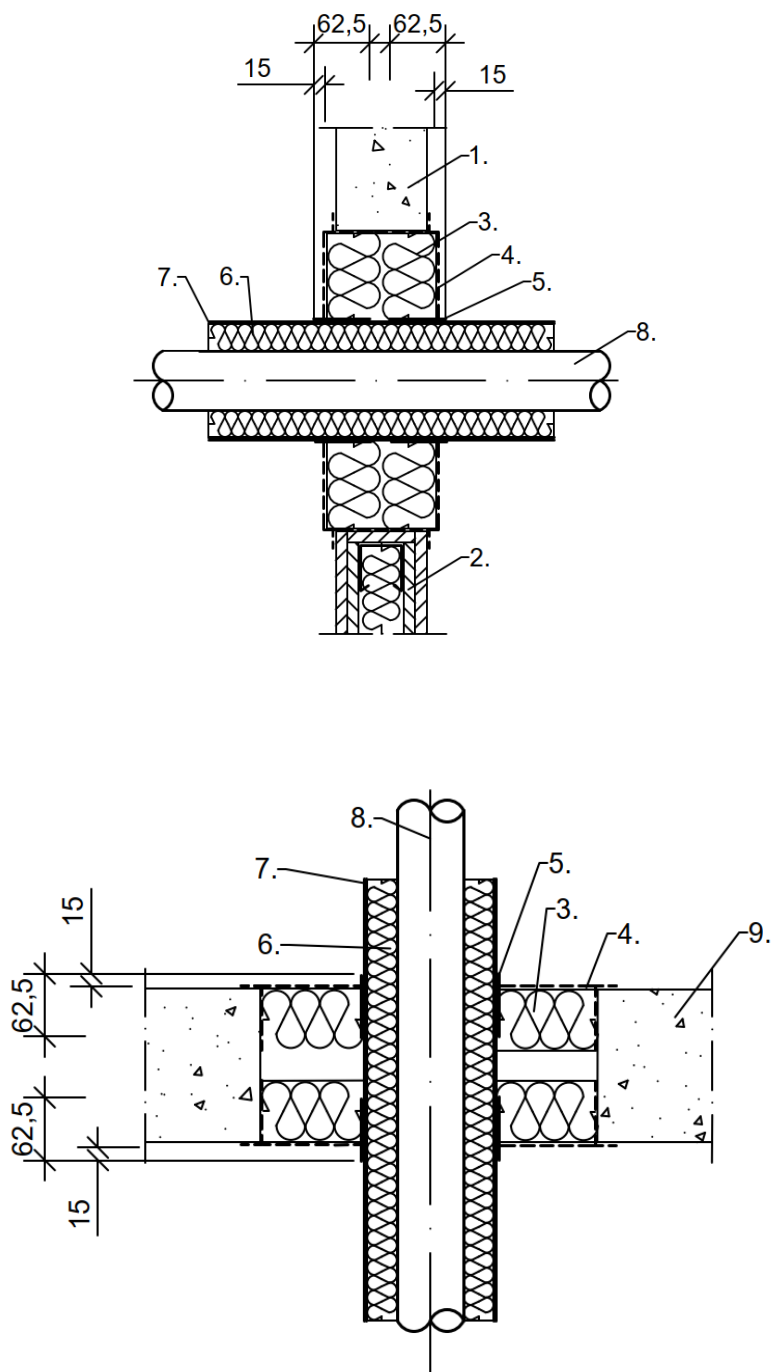
5. Mineral fibre pipe shells
6. Non-combustible pipe
7. Lamella mat
8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 145 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)

Non-combustible pipes with insulation made of PIR



- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1. Rigid wall ≥ 100 thickness       | 5. Intumescent wrap               |
| 2. Flexible wall ≥ 100 mm thickness | 6. PIR Insulation                 |
| 3. Mineral fibre board              | 7. PVC protective shell           |
| 4. Ablative Coating                 | 8. Non-combustible pipe           |
|                                     | 9. Rigid floor ≥ 150 mm thickness |

Dimensions in mm

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of PIR**

| Fire resistance classes - Wall                                                                                                  |              |                     |                            |                                             |                            |
|---------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|----------------------------|---------------------------------------------|----------------------------|
| Service                                                                                                                         | Outside-Ø    | Pipe wall thickness | Insulation                 | Measures                                    | Wall Fire resistance class |
| Non-combustible pipes with insulation made of PIR (swisspor AG, acc. DoP No. LE-013.1.0-HT-15.2, density 32 kg/m <sup>3</sup> ) |              |                     |                            |                                             |                            |
| Copper, steel, stainless steel, cast iron                                                                                       | $\leq 28$    | 1,0 – 14,2          | PIR-ALU-PVC<br>CS x 20 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 50 mm  | Intumescent wrap<br>2 x 62,5 mm<br>3 layers | EI 120 C/U                 |
|                                                                                                                                 | $\leq 42$    | 1,2 – 14,2          | PIR-ALU-PVC<br>CS x 20 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 60 mm  | Intumescent wrap<br>2 x 62,5 mm<br>3 layers | EI 120 C/U                 |
|                                                                                                                                 | $\leq 54$    | 1,5 – 14,2          | PIR-ALU<br>CS x 20 mm      | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU<br>CS x 80 mm      | Intumescent wrap<br>2x 62,5 mm<br>4 layers  | EI 120 C/U                 |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 20 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 80 mm  | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 60 C/U                  |
|                                                                                                                                 | $\leq 88,9$  | 2,0 – 14,2          | PIR-ALU-PVC<br>CS x 40 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 120 C/U                 |
| Steel, stainless steel, cast iron                                                                                               | $\leq 88,9$  | 2,9 – 14,2          | PIR-ALU-PVC<br>CS x 20 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2x 62,5 mm<br>4 layers  | EI 120 C/U                 |
|                                                                                                                                 | $\leq 133,0$ | 3,6 – 14,2          | PIR-ALU-PVC<br>CS x 30 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 60 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 40 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 60 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 90 C/U                  |
|                                                                                                                                 | $\leq 219,1$ | 4,5 – 14,2          | PIR-ALU-PVC<br>CS x 40 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                  |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 60 mm  | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 120 C/U                 |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 120 C/U                 |

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 147 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)****Non-combustible pipes with insulation made of PIR**

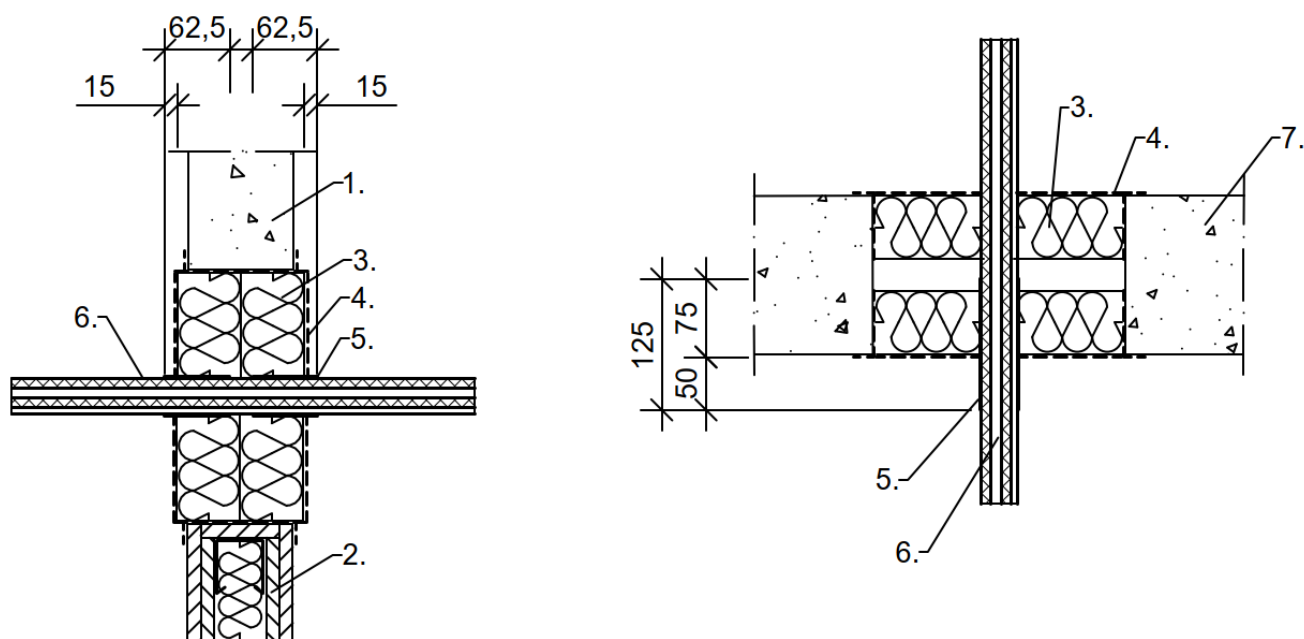
| Fire resistance classes - Floor                                                                                                 |              |                     |                            |                                             |                                |
|---------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|----------------------------|---------------------------------------------|--------------------------------|
| Service                                                                                                                         | Outside-Ø    | Pipe wall thickness | Insulation                 | Measures                                    | Floor<br>Fire resistance class |
| Non-combustible pipes with insulation made of PIR (swisspor AG, acc. DoP No. LE-013.1.0-HT-15.2, density 32 kg/m <sup>3</sup> ) |              |                     |                            |                                             |                                |
| Copper, steel, stainless steel, cast iron                                                                                       | $\leq 28$    | 1,0 – 14,2          | PIR-ALU-PVC<br>CS x 30 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 120 C/U                     |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 50 mm  | Intumescent wrap<br>2 x 62,5 mm<br>3 layers | EI 120 C/U                     |
|                                                                                                                                 | $\leq 42$    | 1,2 – 14,2          | PIR-ALU-PVC<br>CS x 30 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 120 C/U                     |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 60 mm  | Intumescent wrap<br>2 x 62,5 mm<br>3 layers | EI 120 C/U                     |
|                                                                                                                                 | $\leq 54$    | 1,5 – 14,2          | PIR-ALU-PVC<br>CS x 30 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 120 C/U                     |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 80 mm  | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 120 C/U                     |
|                                                                                                                                 | $\leq 88,9$  | 2,0 – 14,2          | PIR-ALU-PVC<br>CS x 40 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 120 C/U                     |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 50 mm  | Intumescent wrap<br>2 x 62,5 mm<br>3 layers | EI 120 C/U                     |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 90 C/U                      |
| Steel, stainless steel, cast iron                                                                                               | $\leq 88,9$  | 2,9 – 14,2          | PIR-ALU-PVC<br>CS x 30 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                      |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 120 C/U                     |
|                                                                                                                                 | $\leq 133,0$ | 3,6 – 14,2          | PIR-ALU-PVC<br>CS x 40 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                      |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 120 C/U                     |
|                                                                                                                                 | $\leq 219,1$ | 4,5 – 14,2          | PIR-ALU-PVC<br>CS x 40 mm  | Intumescent wrap<br>2 x 62,5 mm<br>2 layers | EI 90 C/U                      |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 60 mm  | Intumescent wrap<br>2 x 62,5 mm<br>3 layers | EI 120 C/U                     |
|                                                                                                                                 |              |                     | PIR-ALU-PVC<br>CS x 100 mm | Intumescent wrap<br>2 x 62,5 mm<br>4 layers | EI 120 C/U                     |

Dimensions in mm

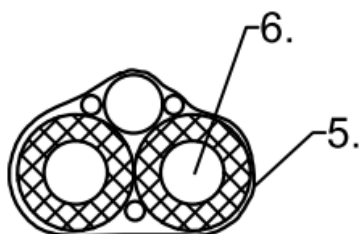
|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 148 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)**

**HVAC split line combination with intumescent wrap**



Detail view:



| Fire resistance classes                                                                                                                                                         |                                                       |                               |                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                                                                                                                                                         | Measures                                              | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>HVAC split line combinations</b>                                                                                                                                             |                                                       |                               |                                |
| Copper pipe $\leq 2 \times \varnothing \leq 18$<br>+ PE-Foam 9 mm<br>+ 1 x PVC-U/PVC-C pipe $\varnothing \leq 25 \times 1,5$ mm<br>+ $\leq 3$ x cables $\varnothing \leq 14$ mm | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 layers | EI 120                        | EI 120                         |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

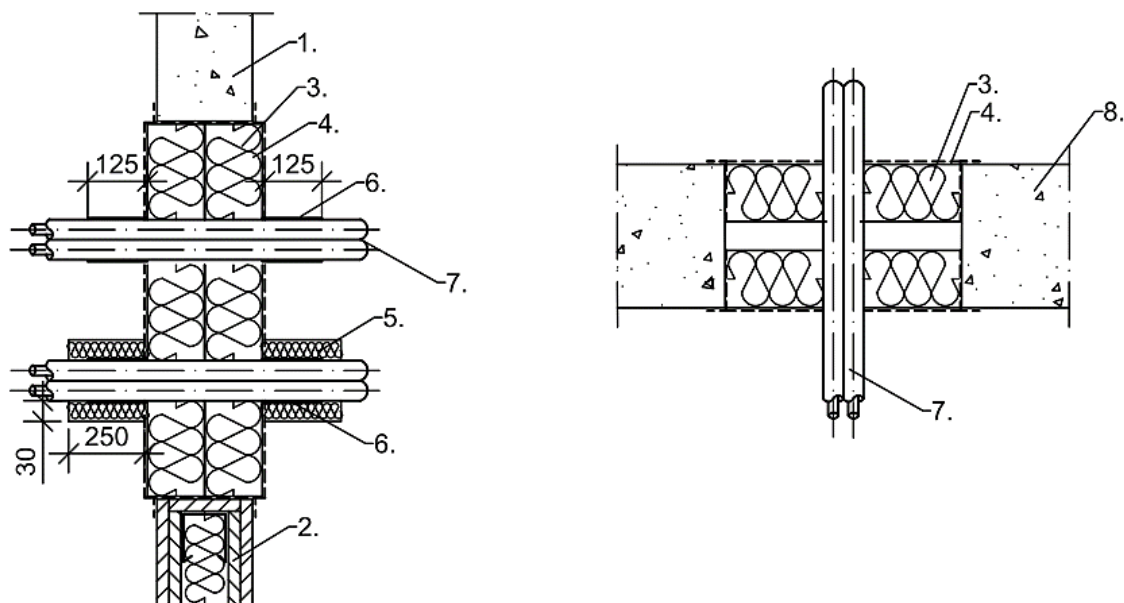
5. Intumescent wrap
6. HVCA split line combinations
7. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 149 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating ( $\geq 1,0$  mm dft)

Double solar pipes NanoSUN with intumescent wrap (wall)



| Fire resistance classes                         |                                                                                                                           |                               |                                |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                         | Measures                                                                                                                  | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>NanoSUN<sup>2</sup> - double solar pipes</b> |                                                                                                                           |                               |                                |
| DN 25                                           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer                                                                  | EI 120 C/U                    | -                              |
|                                                 | -                                                                                                                         | -                             | EI 120 C/U                     |
| DN 40                                           | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer + 25 mm overlapping                                              | EI 60 / E 120 U/U             | -                              |
|                                                 | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>2 x 1 layer + 25 mm overlapping<br>+ lamella mat $\geq 250$ mm x $\geq 30$ m | EI 120 U/U                    | -                              |
|                                                 | -                                                                                                                         | -                             | EI 120 U/U                     |

1. Rigid wall  $\geq 100$  thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Lamella mat
6. Intumescent wrap
7. Solar pipe
8. Rigid floor  $\geq 150$  mm thickness

Dimensions in mm

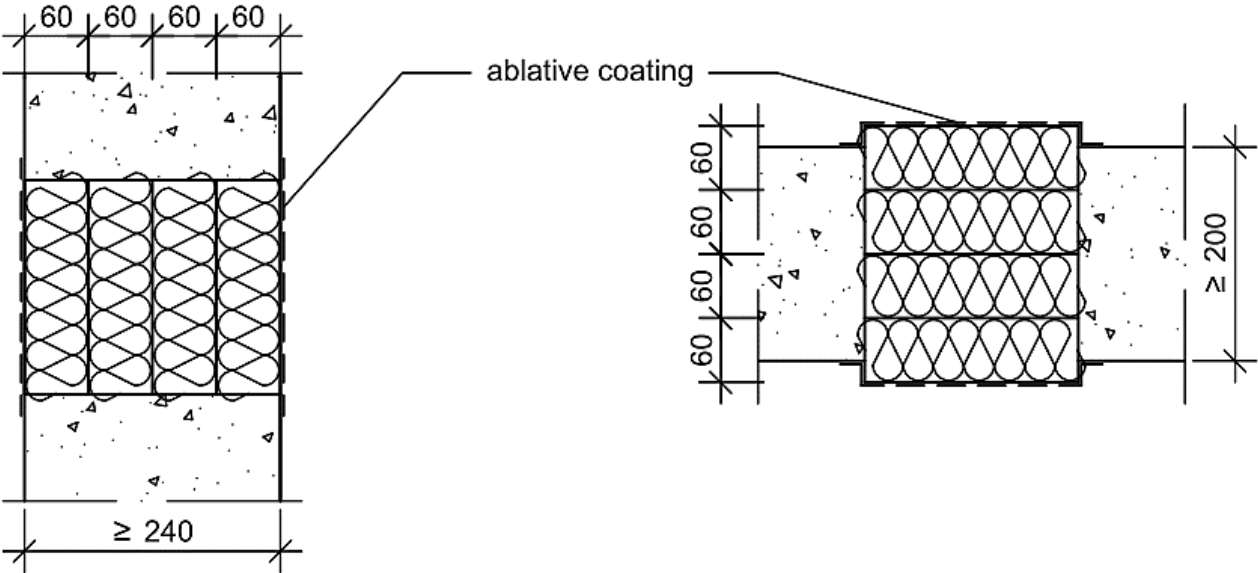
|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 150 |
| Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (2 x 60 mm) with ablative coating (≥ 1,0 mm dft)**

|                                                    | Cables              | Cable bundles | Cable trays              | Wave guides / coaxial cables | speed pipes | EIC, single/bundle made of plastic |             | EIC made of steel | Combustible pipes |                     | Non-combustible pipes with FEF insulation | Non-combustible pipes with mineral wool insulation | Multilayer pipes | HVAC split line combinations | Cable Tube | Seal Edge |       |      |
|----------------------------------------------------|---------------------|---------------|--------------------------|------------------------------|-------------|------------------------------------|-------------|-------------------|-------------------|---------------------|-------------------------------------------|----------------------------------------------------|------------------|------------------------------|------------|-----------|-------|------|
|                                                    |                     |               |                          |                              |             | With Wrap                          | With Collar |                   | With Collar       | With Endless Collar |                                           |                                                    |                  |                              |            | Upper     | Lower | Side |
| Cables                                             | ≥ 0                 | ≥ 0           | ≥ 0                      | ≥ 100                        | ≥ 25        | ≥ 75                               | ≥ 100       | ≥ 75              | ≥ 20              | ≥ 100               | ≥ 50                                      | ≥ 50                                               | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 0       |       |      |
| Cable bundles                                      | ≥ 0                 | ≥ 0           | ≥ 0                      | ≥ 100                        | ≥ 25        | ≥ 75                               | ≥ 100       | ≥ 75              | ≥ 20              | ≥ 100               | ≥ 50                                      | ≥ 50                                               | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 0       |       |      |
| Cable trays                                        | ≥ 0                 | ≥ 0           | ≥ 0 / ≥ 100 (next/above) | ≥ 100                        | ≥ 25        | ≥ 75                               | ≥ 100       | ≥ 75              | ≥ 20              | ≥ 100               | ≥ 50                                      | ≥ 50                                               | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 0       |       |      |
| Wave guides / coaxial cables                       | ≥ 100               | ≥ 100         | ≥ 100                    | ≥ 50                         | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
| speed pipes                                        | ≥ 25                | ≥ 25          | ≥ 25                     | ≥ 100                        | ≥ 0         | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
| EIC, single/bundle made of plastic                 | With Wrap           | ≥ 75          | ≥ 75                     | ≥ 75                         | ≥ 100       | ≥ 100                              | ≥ 0         | ≥ 100             | ≥ 100             | ≥ 75                | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
|                                                    | With Collar         | ≥ 100         | ≥ 100                    | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 0         | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
| EIC made of steel                                  | ≥ 75                | ≥ 75          | ≥ 75                     | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 0               | ≥ 100             | ≥ 100               | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 0       |       |      |
| Combustible pipes                                  | With Collar         | ≥ 20          | ≥ 20                     | ≥ 20                         | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 50              | ≥ 100               | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
|                                                    | With Endless Collar | ≥ 100         | ≥ 100                    | ≥ 100                        | ≥ 100       | ≥ 75                               | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 50                | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
|                                                    | With Wrap           | ≥ 100         | ≥ 100                    | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 100     |       |      |
| Non-combustible pipes with FEF insulation          | ≥ 0                 | ≥ 0           | ≥ 0                      | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 0                                       | ≥ 0                                                | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
| Non-combustible pipes with mineral wool insulation | ≥ 0                 | ≥ 0           | ≥ 0                      | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 0                                       | ≥ 0                                                | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
| Multilayer pipes                                   | ≥ 100               | ≥ 100         | ≥ 100                    | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 0                                       | ≥ 0                                                | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 25      |       |      |
| HVAC split line combinations                       | ≥ 100               | ≥ 100         | ≥ 100                    | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 100             | ≥ 100             | ≥ 100               | ≥ 0                                       | ≥ 0                                                | ≥ 100            | ≥ 50                         | ≥ 100      | ≥ 25      |       |      |
| Cable Tube                                         | ≥ 100               | ≥ 100         | ≥ 100                    | ≥ 100                        | ≥ 100       | ≥ 100                              | ≥ 100       | ≥ 75              | ≥ 50              | ≥ 50                | ≥ 100                                     | ≥ 100                                              | ≥ 100            | ≥ 100                        | ≥ 100      | ≥ 10      |       |      |

Mixed penetration seal made of mineral fibre board (4 x 60 mm) with ablative coating (≥ 2,0 mm dft)

Wall

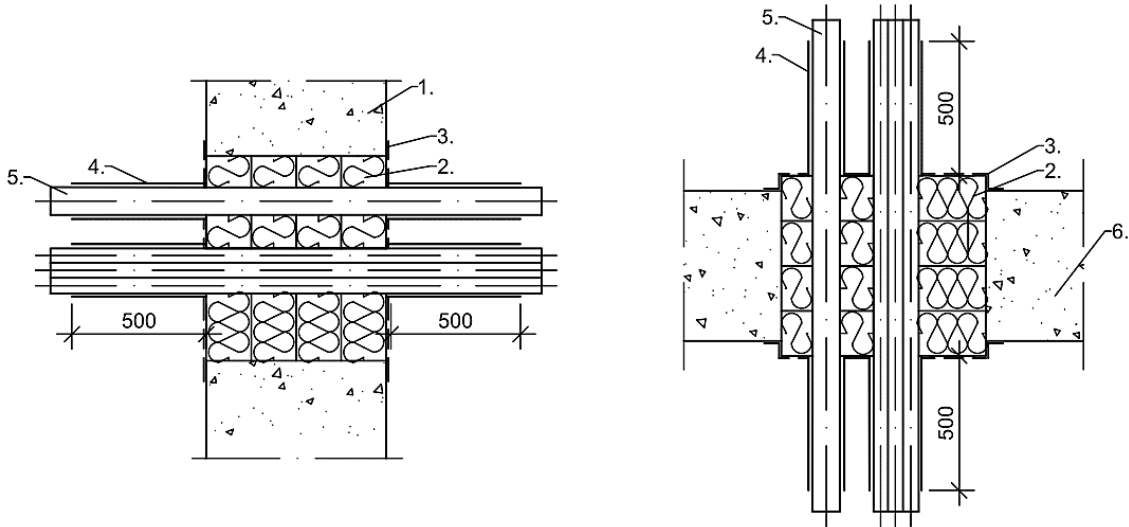


| Fire resistance classes |             |                       |
|-------------------------|-------------|-----------------------|
| Max. Sealing size       | Measure     | Fire resistance class |
| 600 x 600 mm            | Solid Wall  | EI 240                |
| 600 x 1000 mm           | Solid Floor | EI 240                |

Dimensions in mm

Mixed penetration seal made of mineral fibre board (4 x 60 mm) with ablative coating (≥ 2,0 mm dft)

Cables Ø ≤ Ø 80 mm or cable bundles Ø ≤ 100 mm with cables ≤ 21 mm with ablative coating and with intumescent wrap



| Fire resistance classes               |                                                                           |                               |                                |
|---------------------------------------|---------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                               | Measures                                                                  | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Cables, cable bundles and cable trays |                                                                           |                               |                                |
| Cables Ø ≤ 80 mm                      | Intumescent wrap<br>5 x 2 layer á 125 mm each side with 25 mm overlapping | EI 240                        | EI 240                         |
| Cable bundles Ø ≤ 100 mm              | Intumescent wrap<br>5 x 2 layer á 125 mm each side with 25 mm overlapping | EI 240                        | EI 240                         |

1. Rigid wall ≥ 240 thickness

2. Mineral fibre board

3. Ablative Coating
4. Intumescent wrap

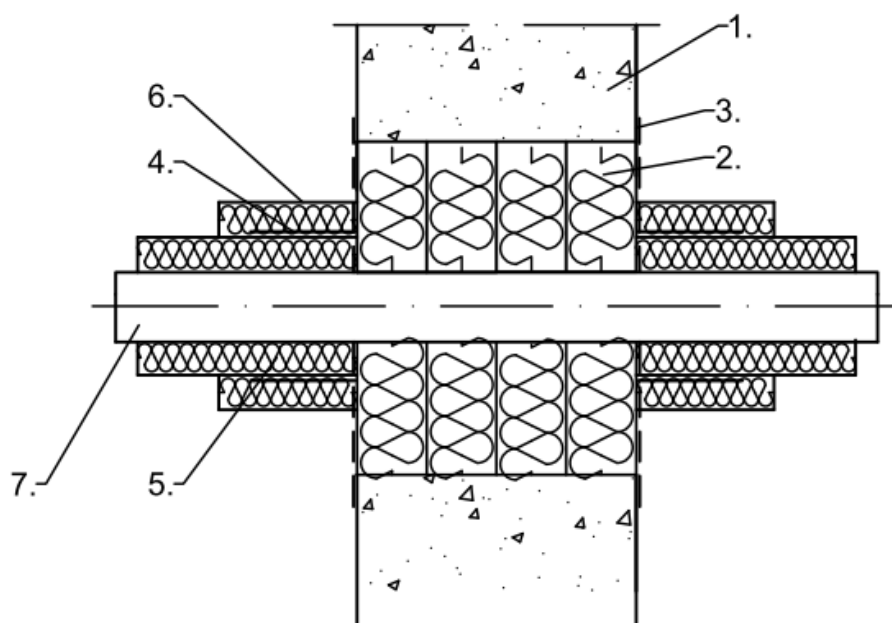
5. Cable

6. Rigid floor ≥ 200 mm thickness

Dimensions in mm

Mixed penetration seal made of mineral fibre board (4 x 60 mm) with ablative coating ( $\geq 2,0$  mm dft)

Non-combustible pipes with mineral fibre pipe shells with protective insulation of lamella mat with intumescent wrap



| Fire resistance classes - Wall                                                                                                             |                               |                               |                          |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|--------------------------|----------------------------|
| Service                                                                                                                                    | Measure pipe shell ProRox 960 | Measure lamella mat Klimarock | Measure Intumescent wrap | Wall Fire resistance class |
| <b>Non-combustible pipes made of steel, stainless steel or cast iron with non-combustible insulation made of mineral fibre lamella mat</b> |                               |                               |                          |                            |
| Pipe outer- $\varnothing \leq 42,4$ mm                                                                                                     | $\geq 750$ mm x $\geq 50$ mm  | $\geq 500$ mm x $\geq 30$ mm  | 500                      | EI 240 C/U                 |
| Pipe outer- $\varnothing \leq 88,9$ mm                                                                                                     | $\geq 1000$ mm x $\geq 60$ mm | $\geq 500$ mm x $\geq 50$ mm  | 500                      | EI 240 C/U                 |
| Pipe outer- $\varnothing \leq 168,3$ mm                                                                                                    | $\geq 1250$ mm x $\geq 70$ mm | $\geq 750$ mm x $\geq 30$ mm  | 500                      | EI 240 C/U                 |
| Pipe outer- $\varnothing \leq 219,1$ mm                                                                                                    | $\geq 1500$ mm x $\geq 80$ mm | $\geq 1000$ mm x $\geq 30$ mm | 1000                     | EI 240 C/U                 |
| Pipe outer- $\varnothing \leq 323,9$ mm                                                                                                    | $\geq 1750$ mm x $\geq 90$ mm | $\geq 1250$ mm x $\geq 30$ mm | 1000                     | EI 240 C/U                 |

1. Rigid wall  $\geq 240$  thickness
2. Mineral fibre board
3. Ablative Coating
4. Intumescent wrap

5. Pipe shell
6. Lamella mat
7. Non-combustible pipe

Dimensions in mm

|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 154 |
| Mixed penetration seal made of mineral fibre board (4 x 60 mm) with ablative coating in walls and floors |           |

**Mixed penetration seal made of mineral fibre board (4 x 60 mm) with ablative coating ( $\geq 2,0$  mm dft)**

| Minimum Distances in wall |                                     |                                     |                                     |                       |           |           |           |
|---------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|-----------|-----------|-----------|
|                           | Cables                              | Cable bundles                       | Cable trays                         | Non-combustible pipes | Seal Edge |           |           |
|                           |                                     |                                     |                                     |                       | Upper     | Lower     | Side      |
| Cables                    | $\geq 10 / \geq 80$<br>(next/above) | $\geq 10 / \geq 80$<br>(next/above) | $\geq 10 / \geq 80$<br>(next/above) | $\geq 100$            | $\geq 20$ | $\geq 0$  | $\geq 20$ |
| Cable bundles             | $\geq 10 / \geq 80$<br>(next/above) | $\geq 10 / \geq 80$<br>(next/above) | $\geq 10 / \geq 80$<br>(next/above) | $\geq 100$            | $\geq 20$ | $\geq 0$  | $\geq 20$ |
| Cable trays               | $\geq 10 / \geq 80$<br>(next/above) | $\geq 10 / \geq 80$<br>(next/above) | $\geq 10 / \geq 80$<br>(next/above) | $\geq 100$            | $\geq 20$ | $\geq 0$  | $\geq 20$ |
| Non-combustible pipes     | $\geq 100$                          | $\geq 100$                          | $\geq 100$                          | $\geq 100$            | $\geq 40$ | $\geq 40$ | $\geq 40$ |

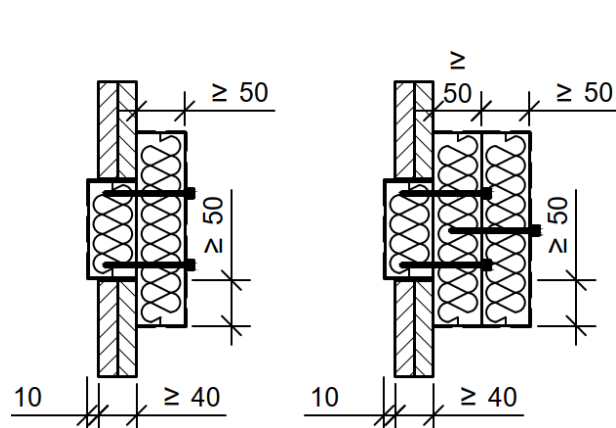
| Minimum Distances in floor |                                     |                                     |                                     |           |          |           |
|----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------|----------|-----------|
|                            | Cables                              | Cable bundles                       | Cable trays                         | Seal Edge |          |           |
|                            |                                     |                                     |                                     | Upper     | Lower    | Side      |
| Cables                     | $\geq 10 / \geq 40$<br>(next/above) | $\geq 10 / \geq 40$<br>(next/above) | $\geq 10 / \geq 40$<br>(next/above) | $\geq 20$ | $\geq 0$ | $\geq 20$ |
| Cable bundles              | $\geq 10 / \geq 40$<br>(next/above) | $\geq 10 / \geq 40$<br>(next/above) | $\geq 10 / \geq 40$<br>(next/above) | $\geq 20$ | $\geq 0$ | $\geq 20$ |
| Cable trays                | $\geq 10 / \geq 40$<br>(next/above) | $\geq 10 / \geq 40$<br>(next/above) | $\geq 10 / \geq 40$<br>(next/above) | $\geq 20$ | $\geq 0$ | $\geq 20$ |

Dimensions in mm

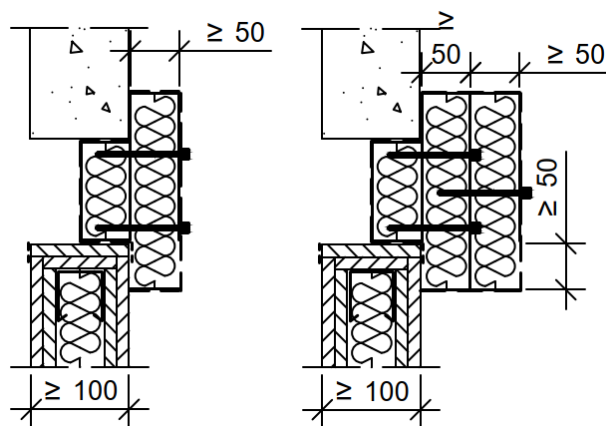
|                                                                                                          |           |
|----------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                      | Annex 155 |
| Mixed penetration seal made of mineral fibre board (4 x 60 mm) with ablative coating in walls and floors |           |

# Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$ mm dft) for one-sided installation in shaft wall, walls and floors

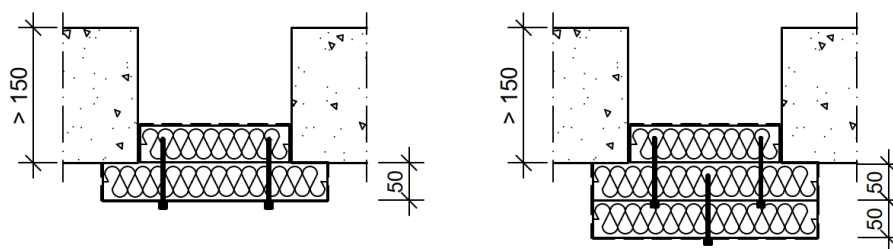
## Variants in shaft walls



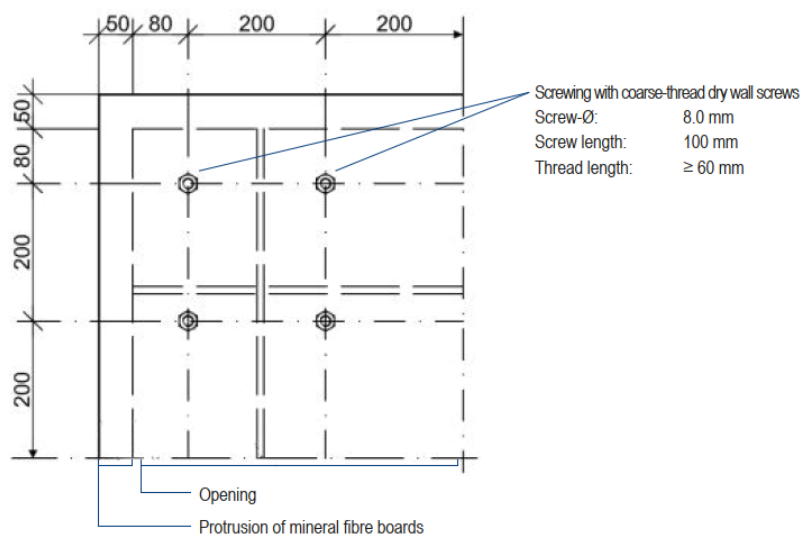
## Variants in walls



## Variants in floors



## Screw-in grid

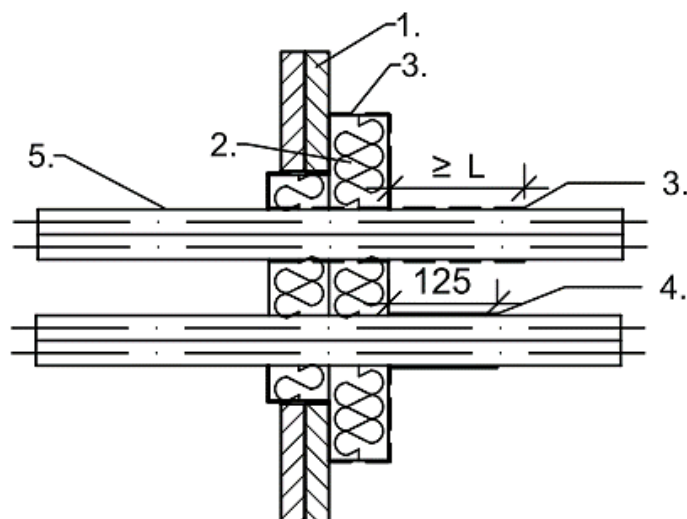


Dimensions in mm

**Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors**

**Installation in shaft walls, 2-layer**

**Cables, cable bundles and cable trays with ablative coating or with intumescent wrap**



| Fire resistance classes - Wall               |                                                                         |                               |
|----------------------------------------------|-------------------------------------------------------------------------|-------------------------------|
| Service                                      | Measures                                                                | Wall<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b> |                                                                         |                               |
| Cables $\varnothing \leq 21$ mm              | Ablative coating<br>$L \geq 150$ mm x $\geq 1$ mm<br>dry film thickness | EI 90/ E 120                  |
| Cables $\varnothing \leq 21$ mm              | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>40 - 60 mm overlap         | EI 120                        |
| Cable bundles $\varnothing \leq 100$ mm      | Ablative coating<br>$L \geq 150$ mm x $\geq 1$ mm<br>dry film thickness | EI 120                        |
| Cable bundles $\varnothing \leq 100$ mm      | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>40 - 60 mm overlap         | EI 90/ E 120                  |

1. Shaft wall  $\geq 40$  thickness
2. Mineral fibre board
3. Ablative Coating

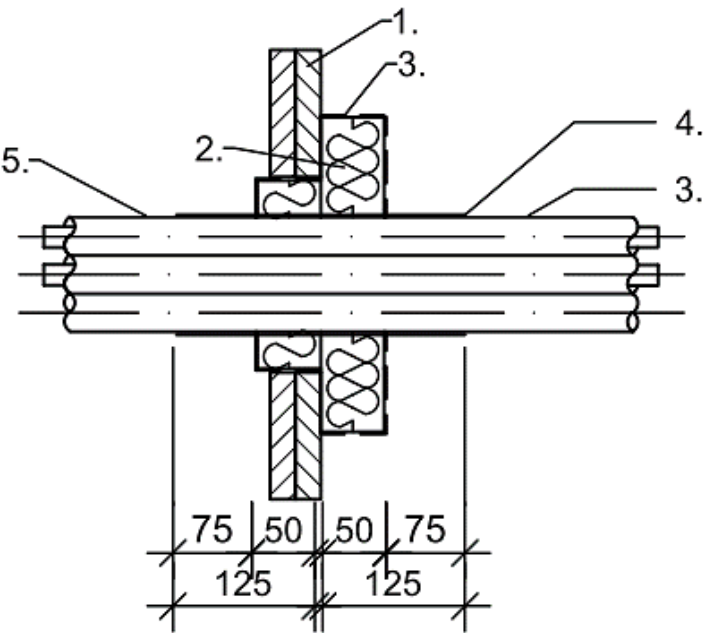
4. Intumescent wrap
5. Cable

Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 157 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

Mixed penetration seal made of mineral fibre boards with ablative coating (≥ 0,75 mm dft) for one-sided installation in shaft wall, walls and floors

Installation in shaft walls, 2-layer  
Electrical installation conduits (EIC), single or bundled- with intumescent wrap



| Fire resistance classes - Wall        |                                           |                               |
|---------------------------------------|-------------------------------------------|-------------------------------|
| Service                               | Measures                                  | Wall<br>Fire resistance class |
| Electrical installation conduit (EIC) |                                           |                               |
| EIC single Ø ≤ 21 mm                  | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 90/ E 120                  |
| EIC bundled Ø ≤ 100 mm                | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 120                        |

1. Shaft wall ≥ 40 thickness

2. Mineral fibre board

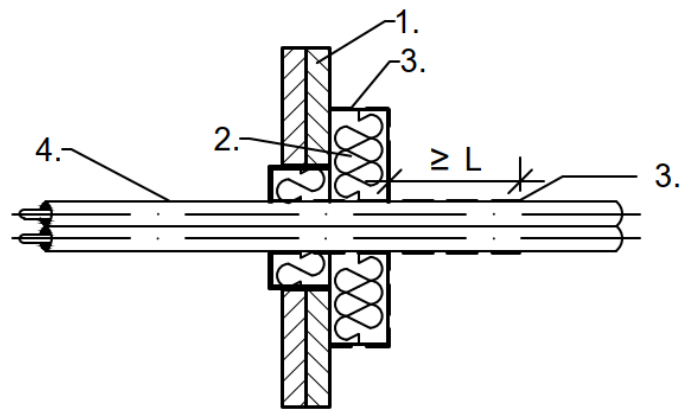
3. Ablative Coating
4. Intumescent wrap

5. Electrical installation conduit

Dimensions in mm

Mixed penetration seal made of mineral fibre boards with ablative coating (≥ 0,75 mm dft) for one-sided installation in shaft wall, walls and floors

Installation in shaft walls, 2-layer  
Special-duo-coax bundle with ablative coating



| Fire resistance classes - Wall                |                                                               |                               |
|-----------------------------------------------|---------------------------------------------------------------|-------------------------------|
| Service                                       | Measures                                                      | Wall<br>Fire resistance class |
| Special-duo-coax bundle with ablative coating |                                                               |                               |
| Bundle Ø ≤ 21 mm / cable Ø ≤ 14 mm            | Ablative coating<br>L ≥ 150 mm x ≥ 1 mm<br>dry film thickness | EI 120 U/U                    |

1. Shaft wall ≥ 40 thickness

2. Mineral fibre board
3. Ablative Coating

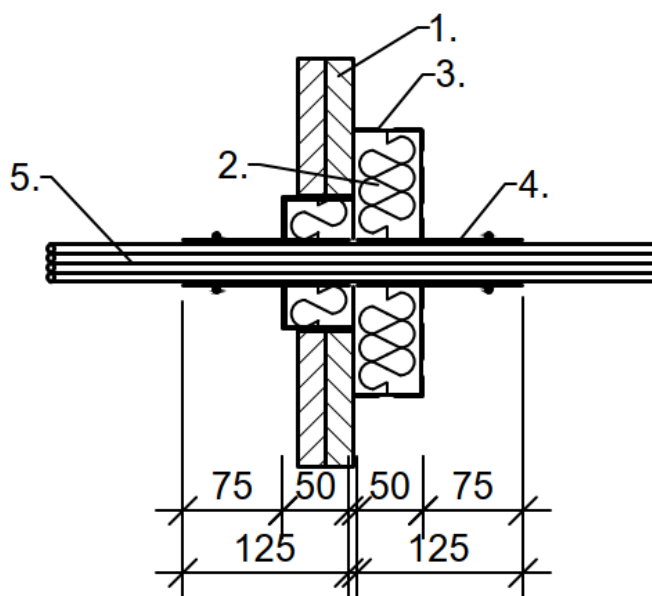
4. Special-duo-coax-bundle

Dimensions in mm

**Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors**

**Installation in shaft walls, 2-layer**

**Speed pipes, bundled or single, with or without glas fibre cable with intumescent wrap**



| Fire resistance classes - Wall                                                           |                                           |                               |
|------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------|
| Service                                                                                  | Measures                                  | Wall<br>Fire resistance class |
| <b>Speed pipes, bundles or single pipes, with or without glass fibre or micro cables</b> |                                           |                               |
| max. 24 pcs. outside pipe- $\varnothing \leq 7$ mm                                       | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 120 U/U                    |
| max. 7 pcs. outside pipe- $\varnothing \leq 10$ mm                                       | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 120 U/U                    |
| max. 5 pcs. outside pipe- $\varnothing \leq 12$ mm                                       | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 120 U/U                    |

1. Shaft wall  $\geq 40$  thickness
2. Mineral fibre board
3. Ablative Coating

4. Intumescent wrap
5. Speed pipe

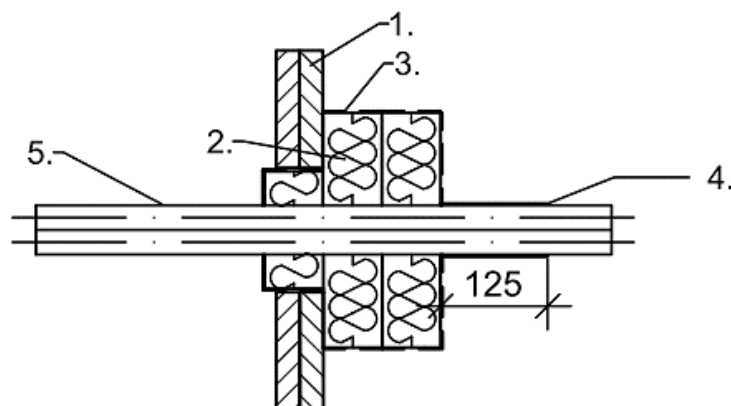
Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 160 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

**Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors**

**Installation in shaft walls, 3-layer**

**Cables, cable bundles and cable trays with intumescent wrap**



| Fire resistance classes - Wall               |                                                                 |                               |
|----------------------------------------------|-----------------------------------------------------------------|-------------------------------|
| Service                                      | Measures                                                        | Wall<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b> |                                                                 |                               |
| Cables $\varnothing \leq 21$ mm              | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>40 - 60 mm overlap | EI 120                        |
| Cables $\varnothing \leq 50$ mm              | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>40 - 60 mm overlap | EI 90 / E 120                 |
| Cables $\varnothing \leq 80$ mm              | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>40 - 60 mm overlap | EI 90 / E 120                 |
| Cable bundles $\varnothing \leq 100$ mm      | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>40 - 60 mm overlap | EI 120                        |

1. Shaft wall  $\geq 40$  thickness
2. Mineral fibre board
3. Ablative Coating

4. Intumescent wrap
5. Cable

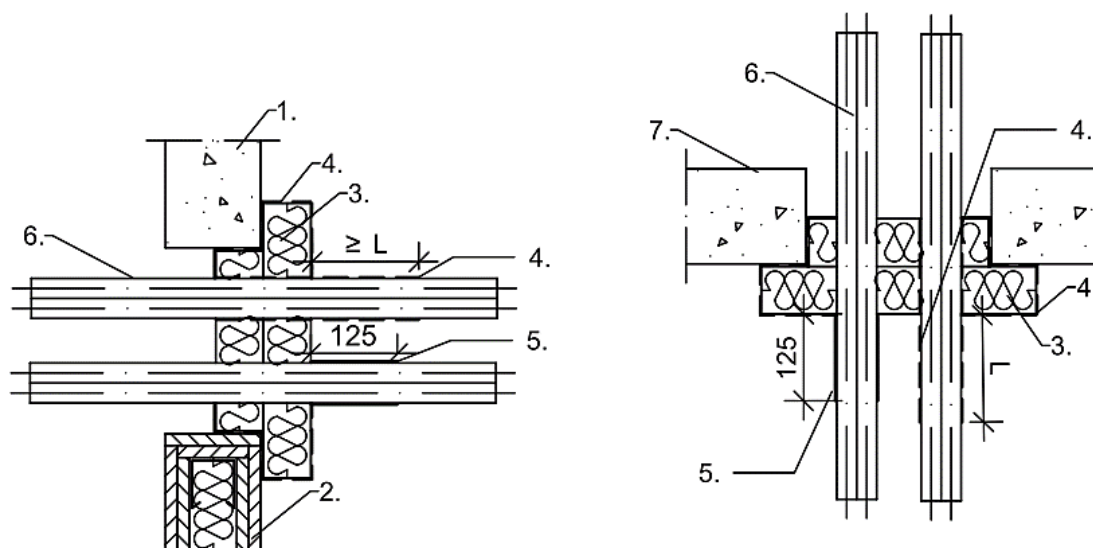
Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 161 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

# Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$ mm dft) for one-sided installation in shaft wall, walls and floors

## Installation in walls and floors, 2-layer

### Cables, cable bundles and cable trays with ablative coating with intumescent wrap



| Fire resistance classes                      |                                                                             |                               |                                |
|----------------------------------------------|-----------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                      | Measures                                                                    | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b> |                                                                             |                               |                                |
| Cables $\varnothing \leq 21$ mm              | Ablative coating<br>$L \geq 150$ mm $x \geq 1$ mm<br>dry film thickness     | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 21$ mm              | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>40 - 60 mm overlap | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 50$ mm              | Ablative coating<br>$L \geq 150$ mm $x \geq 1$ mm<br>dry film thickness     | -                             | EI 120                         |
| Cables $\varnothing \leq 80$ mm              | Ablative coating<br>$L \geq 150$ mm $x \geq 1$ mm<br>dry film thickness     | -                             | EI 120                         |
| Cable bundles $\varnothing \leq 100$ mm      | Ablative coating<br>$L \geq 150$ mm $x \geq 1$ mm<br>dry film thickness     | EI 120                        | EI 120                         |
| Cable bundles $\varnothing \leq 100$ mm      | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>40 - 60 mm overlap | EI 90 / E 120                 | EI 120                         |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. Cable
7. Floor  $\geq 150$  mm thickness

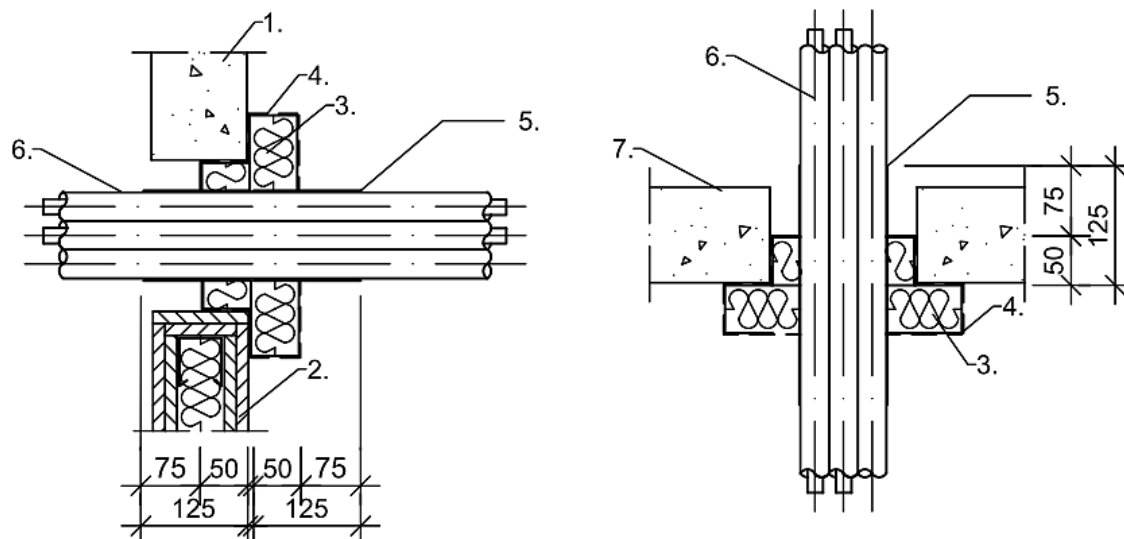
Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 162 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

**Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors**

**Installation in walls and floors, 2-layer**

**Electrical installation conduits (EIC), single or bundled with intumescent wrap**



| Fire resistance classes                      |                                                                                 |                               |                                |
|----------------------------------------------|---------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                      | Measures                                                                        | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Electrical installation conduit (EIC)</b> |                                                                                 |                               |                                |
| EIC single $\varnothing \leq 21$ mm          | Intumescent wrap<br>Wall: 4 x 62,5 / 2 x 125 mm<br>Floor: 2 x 62,5 / 1 x 125 mm | EI 120 U/U                    | EI 120 U/U                     |
| EIC bundled $\varnothing \leq 100$ mm        | Intumescent wrap<br>Wall: 4 x 62,5 / 2 x 125 mm<br>Floor: 2 x 62,5 / 1 x 125 mm | EI 120 U/U                    | EI 120 U/U                     |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board
4. Ablative Coating

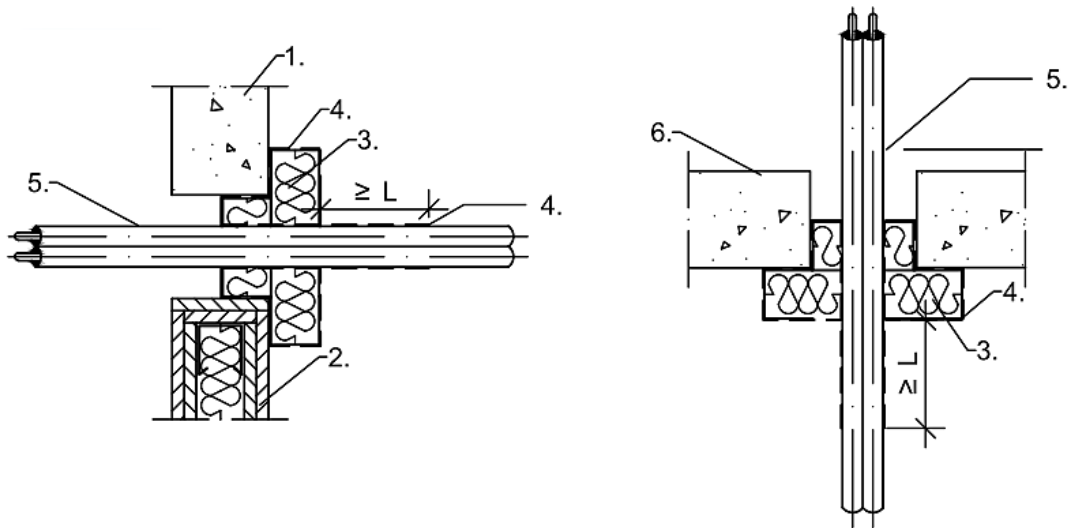
5. Intumescent wrap
6. Electrical installation conduit
7. Floor  $\geq 150$  mm thickness

Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 163 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

Mixed penetration seal made of mineral fibre boards with ablative coating (≥ 0,75 mm dft) for one-sided installation in shaft wall, walls and floors

Installation in walls and floors, 2-layer  
Special-duo-coax bundle with ablative coating



| Fire resistance classes                       |                                                            |                               |                                |
|-----------------------------------------------|------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                       | Measures                                                   | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Special-duo-coax bundle with ablative coating |                                                            |                               |                                |
| Bundle Ø ≤ 90 mm / cable Ø ≤ 14 mm            | ablative coating<br>L ≥ 150 mm x ≥ 1 mm dry film thickness | EI 120 U/U                    | EI 120 U/U                     |

1. Rigid wall ≥ 100 mm thickness

2. Flexible wall ≥100 mm thickness

3. Mineral fibre board
4. Ablative Coating

5. Special-duo-coax cable

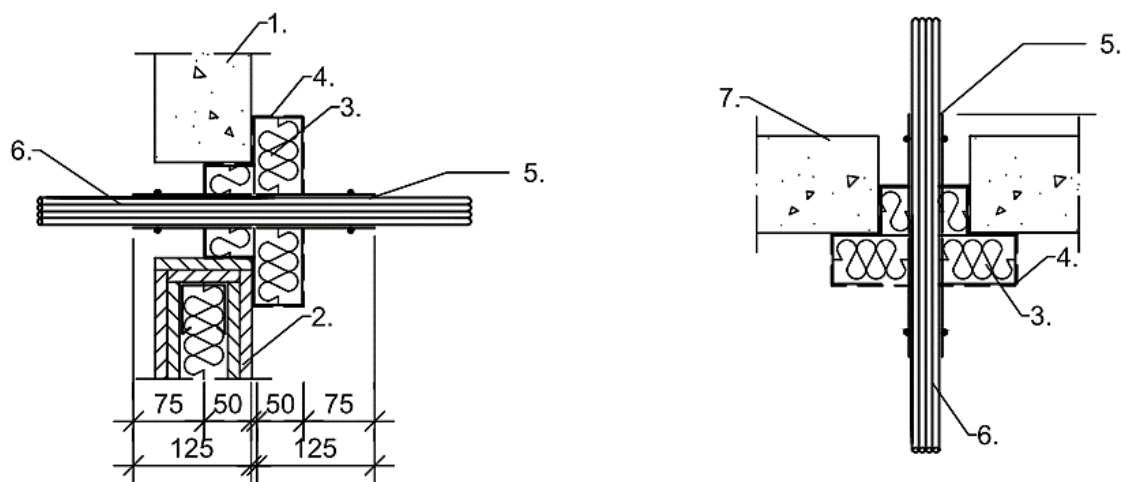
6. Floor ≥ 150 mm thickness

Dimensions in mm

**Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors**

**Installation in shaft walls, 2-layer**

**Speed pipes, bundled or single, with or without glas fibre cable with intumescent wrap**



| Fire resistance classes - Wall                                                           |                                           |                               |
|------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------|
| Service                                                                                  | Measures                                  | Wall<br>Fire resistance class |
| <b>Speed pipes, bundles or single pipes, with or without glass fibre or micro cables</b> |                                           |                               |
| max. 24 pcs. outside pipe- $\varnothing \leq 7$ mm                                       | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 120 U/U                    |
| max. 7 pcs. outside pipe- $\varnothing \leq 10$ mm                                       | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 120 U/U                    |
| max. 5 pcs. outside pipe- $\varnothing \leq 12$ mm                                       | Intumescent wrap<br>4 x 62,5 / 2 x 125 mm | EI 120 U/U                    |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall 100 mm thickness
3. Mineral fibre board
4. Ablative Coating

5. Intumescent wrap
6. Speed pipes
7. Floor  $\geq 150$  mm thickness

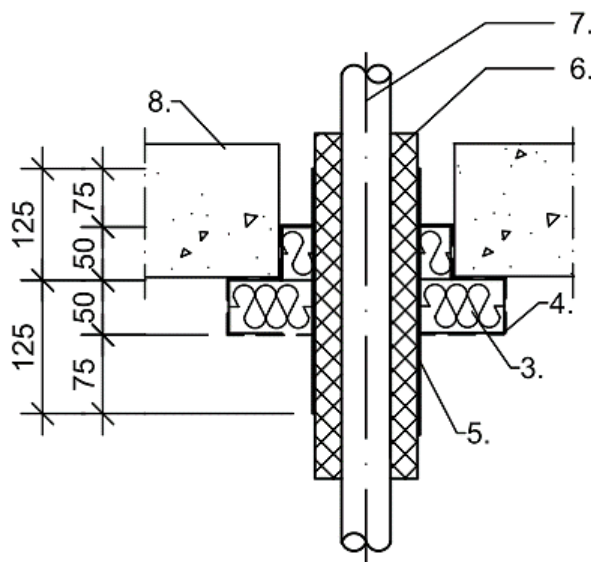
Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 165 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

**Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors**

**Installation in floors, 2-layer**

**Non-combustible pipes made of copper, steel stainless steel or cast iron with combustible insulation made of FEF with intumescent wrap**



| Fire resistance classes - Floor        |                                                                                                              |                                |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------|
| Service                                | Measures                                                                                                     | Floor<br>Fire resistance class |
| <b>Non-combustible pipe</b>            |                                                                                                              |                                |
| Outside pipe- $\varnothing \leq 15$ mm | $\geq 400 / 750$ mm (bottom top) x 25 mm<br>+ intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers      | EI 90 C/U / E 120              |
| Outside pipe- $\varnothing \leq 15$ mm | $\geq 400 / 750$ mm (bottom top) x 13 - 24 mm<br>+ intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers | EI 120 C/U                     |
| Outside pipe- $\varnothing \leq 28$ mm | $\geq 400 / 750$ mm (bottom top) x 19 - 25 mm<br>+ intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers | EI 120 C/U                     |
| Outside pipe- $\varnothing \leq 42$ mm | $\geq 400 / 750$ mm (bottom top) 19 x 24 mm<br>+ intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers   | EI 90 / E 120 C/U              |
| Outside pipe- $\varnothing \leq 42$ mm | $\geq 400 / 750$ mm (bottom top) 25 mm<br>+ intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>1 x 2 layers        | EI 120 C/U                     |

- 3. Mineral fibre board
- 4. Ablative Coating
- 5. Intumescent wrap

- 6. FEF
- 7. Non-combustible pipe
- 8. Floor  $\geq 150$  mm thickness

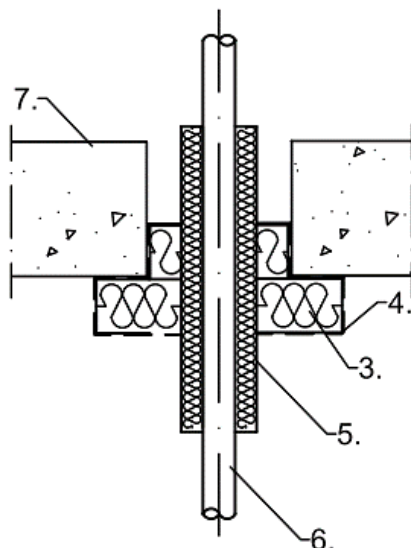
Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 166 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors

Installation in floors, 2-layer

Multilayer composite pipes HENCO pipes with lamella mat



| Fire resistance classes - Floor                                        |                                                       |                                |
|------------------------------------------------------------------------|-------------------------------------------------------|--------------------------------|
| Service                                                                | Measures                                              | Floor<br>Fire resistance class |
| <b>Multilayer composite pipes HENCO-pipes</b>                          |                                                       |                                |
| Outside pipe- $\varnothing \leq 12$ mm<br>wall thickness $\geq 1,6$ mm | Lamella mat [ L X T ]<br>$\geq 500$ mm x $\geq 20$ mm | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 63$ mm<br>wall thickness $\geq 4,5$ mm | Lamella mat [ L X T ]<br>$\geq 500$ mm x $\geq 30$ mm | EI 120 U/C                     |

- 3. Mineral fibre board
- 4. Ablative Coating
- 5. Lamella mat

- 6. Multilayer composite pipe
- 7. Floor  $\geq 150$  mm thickness

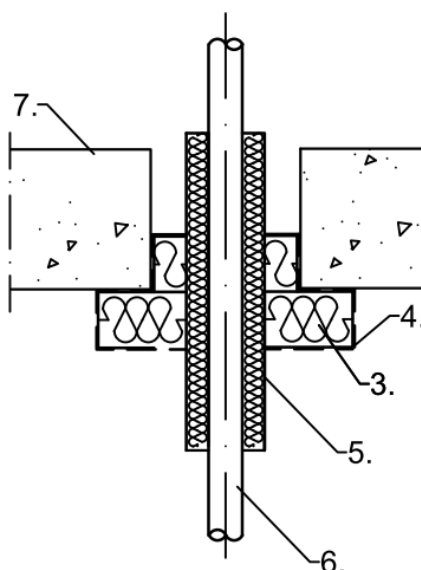
Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 167 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

**Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$  mm dft) for one-sided installation in shaft wall, walls and floors**

**Installation in floors, 2-layer**

**Non-combustible pipes made of copper, steel, stainless steel or cast iron with lamella mat**



| Fire resistance classes - Floor                                                  |                                                                                                                                                                 |                                |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Service                                                                          | Measures                                                                                                                                                        | Floor<br>Fire resistance class |
| <b>Non-combustible pipes made of copper, steel, stainless steel or cast iron</b> |                                                                                                                                                                 |                                |
| Outside pipe- $\varnothing \leq 28$ mm                                           | Lamella mat (top/bottom)<br>$\geq 500$ mm x $\geq 500$ mm x $\geq 30$ mm                                                                                        | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 42$ mm                                           | Lamella mat (top/bottom)<br>$\geq 500$ mm x $\geq 500$ mm x $\geq 40$ mm                                                                                        | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 54$ mm                                           | Lamella mat (top/bottom)<br>$\infty \geq 950$ mm x $\geq 40$ mm                                                                                                 | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 54$ mm                                           | Lamella mat (top/bottom)<br>$\geq 500$ m / $1000$ mm x $\geq 30$ mm<br>+ Lamella mat $\geq 950$ mm x $\geq 30$ mm<br>+ Lamella mat $\geq 500$ mm x $\geq 30$ mm | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 88,9$ mm                                         | Lamella mat (top/bottom)<br>$\infty \geq 950$ mm x $\geq 50$ mm                                                                                                 | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 88,9$ mm                                         | Lamella mat (top/bottom)<br>$\geq 500$ / $1000$ mm x $\geq 50$ mm<br>+ lamella mat $\geq 500$ mm x $\geq 50$ mm                                                 | EI 120 U/C                     |
| <b>Non-combustible pipes made of steel, stainless steel or cast iron</b>         |                                                                                                                                                                 |                                |
| Outside pipe- $\varnothing \leq 63,5$ mm                                         | Lamella mat (top/bottom)<br>$\infty \geq 950$ mm x $\geq 300$ mm                                                                                                | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 63,5$ mm                                         | Lamella mat (top/bottom)<br>$\geq 500$ / $1000$ mm x $\geq 30$ mm<br>+ lamella mat $\geq 500$ mm x $\geq 30$ m                                                  | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 114,3$ mm                                        | Lamella mat (top/bottom)<br>$\infty \geq 950$ mm x $\geq 50$ mm                                                                                                 | EI 120 U/C                     |
| Outside pipe- $\varnothing \leq 114,3$ mm                                        | Lamella mat (top/bottom)<br>$\geq 500$ / $1000$ mm x $\geq 50$ mm<br>+ lamella mat $\geq 950$ mm x $\geq 30$ m                                                  | EI 120 U/C                     |

3. Mineral fibre board  
4. Ablative Coating  
5. Lamella mat

6. Non-combustible pipe  
7. Floor  $\geq 150$  mm thickness

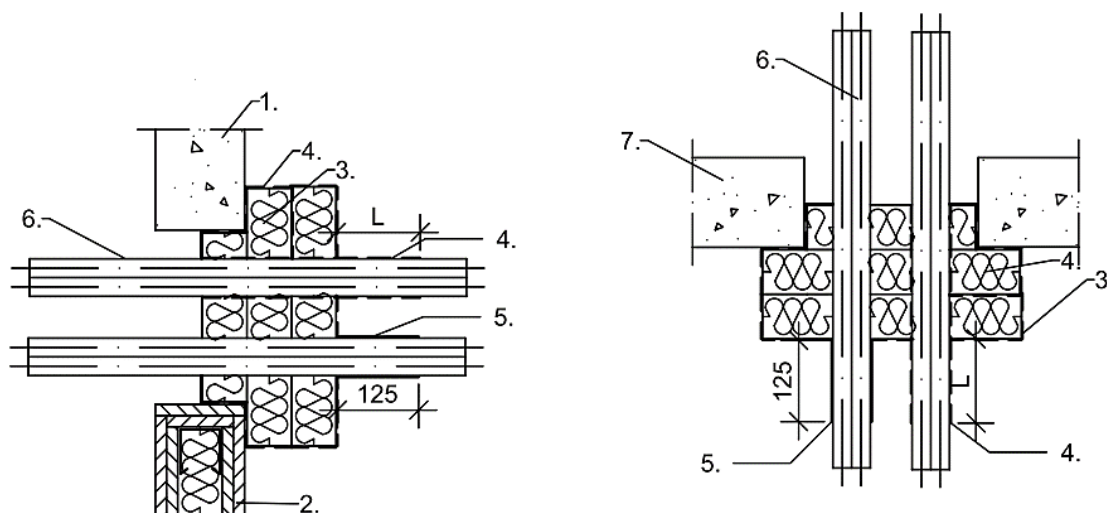
Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 168 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

# Mixed penetration seal made of mineral fibre boards with ablative coating ( $\geq 0,75$ mm dft) for one-sided installation in shaft wall, walls and floors

## Installation in walls and floors, 3-layer

### Cables, cable bundles and cable trays with ablative coating or with intumescent wrap



| Fire resistance classes                      |                                                                              |                               |                                |
|----------------------------------------------|------------------------------------------------------------------------------|-------------------------------|--------------------------------|
| Service                                      | Measures                                                                     | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| <b>Cables, cable bundles and cable trays</b> |                                                                              |                               |                                |
| Cables $\varnothing \leq 21$ mm              | Ablative coating<br>$L \geq 150$ mm $\times \geq 1$ mm<br>dry film thickness | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 21$ mm              | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>+ 45 mm overlapping | EI 120                        | EI 120                         |
| Cables $\varnothing \leq 50$ mm              | Ablative coating<br>$L \geq 150$ mm $\times \geq 1$ mm<br>dry film thickness | EI 90/ E 120                  | EI 90                          |
| Cables $\varnothing \leq 50$ mm              | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>+ 45 mm overlapping | EI 90/ E 120                  | EI 90                          |
| Cables $\varnothing \leq 80$ mm              | Ablative coating<br>$L \geq 150$ mm $\times \geq 1$ mm<br>dry film thickness | EI 90/ E 120                  | EI 90                          |
| Cables $\varnothing \leq 80$ mm              | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>+ 45 mm overlapping | EI 90/ E 120                  | EI 90                          |
| Cable bundles $\varnothing > 100$ mm         | Ablative coating<br>$L \geq 150$ mm $\times \geq 1$ mm<br>dry film thickness | EI 120                        | EI 120                         |
| Cable bundles $\varnothing > 100$ mm         | Intumescent wrap<br>$2 \times 62,5 / 1 \times 125$ mm<br>+ 45 mm overlapping | EI 120                        | EI 120                         |

1. Rigid wall  $\geq 100$  mm thickness
2. Flexible wall  $\geq 100$  mm thickness
3. Mineral fibre board

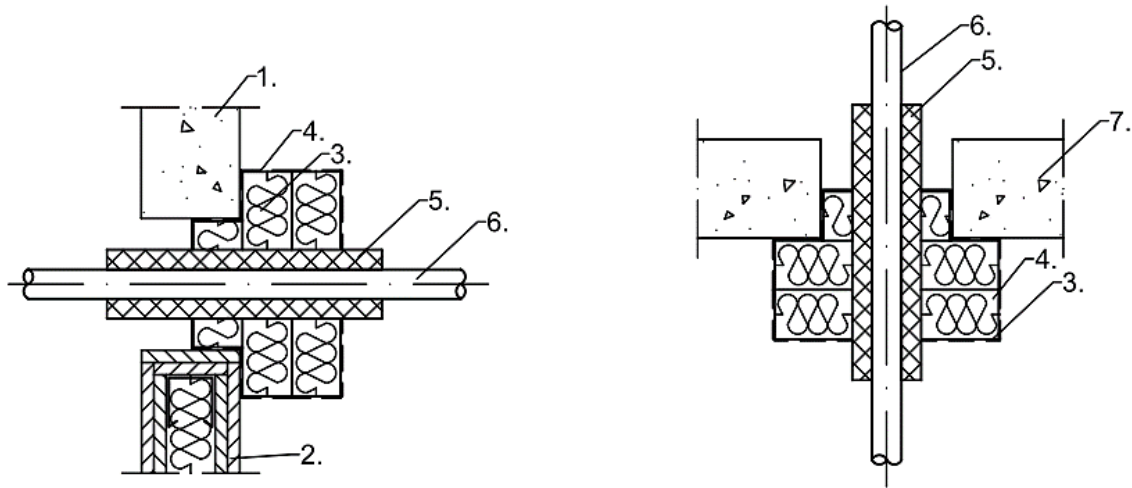
4. Ablative Coating
5. intumescent wrap
6. Cable

Dimensions in mm

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>FireFree Brandlukningssystem</b>                                                                                                  | Annex 169 |
| Mixed penetration seal made of mineral fibre boards with ablative coating for one-sided installation in shaft wall, walls and floors |           |

Mixed penetration seal made of mineral fibre boards with ablative coating (≥ 0,75 mm dft) for one-sided installation in shaft wall, walls and floors

Installation in walls and floors, 3-layer  
Multilayer composite pipes "Henco pipes" with combustible insulation "Armaflex Protect"



| Fire resistance classes                           |                                                  |                               |                                |
|---------------------------------------------------|--------------------------------------------------|-------------------------------|--------------------------------|
| Service                                           | Measures                                         | Wall<br>Fire resistance class | Floor<br>Fire resistance class |
| Multilayer composite pipes Henco-pipes            |                                                  |                               |                                |
| Outside pipe-Ø ≤ 12 mm<br>wall thickness ≥1,6 mm  | Armaflex Protect [ L X T ]<br>≥ 480 mm x ≥ 19 mm | EI 120 U/C                    | EI 90 U/C                      |
| Outside pipe-Ø ≤ 63 mm<br>wall thickness ≥ 4,5 mm | Armaflex Protect [ L X T ]<br>≥ 480 mm x ≥ 25 mm | EI 120 U/C                    | EI 90 U/C                      |

1. Rigid wall ≥ 100 mm thickness

2. Flexible wall ≥100 mm thickness

3. Mineral fibre board

4. Ablative Coating
5. Armaflex Protect

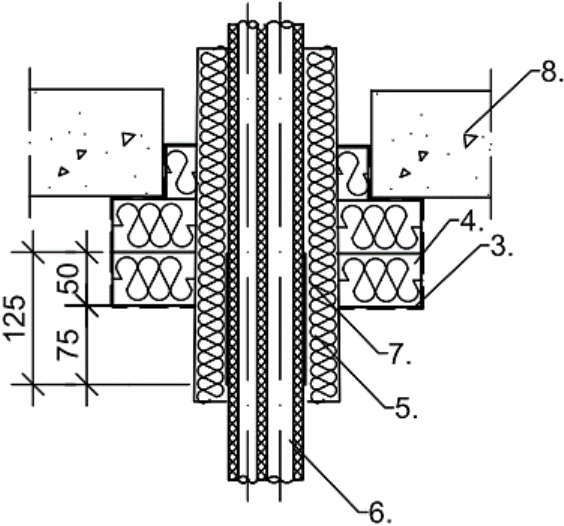
6. Multilayer composite pipe

7. Floor ≥ 150 mm thickness

Dimensions in mm

Mixed penetration seal made of mineral fibre boards with ablative coating (≥ 0,75 mm dft) for one-sided installation in shaft wall, walls and floors

Installation in floors, 3-layer  
HVAC-split lines with intumescent wrap



| Fire resistance classes - Floor                                                                                                                               |                                                                                                       |                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------|
| Service                                                                                                                                                       | Measures                                                                                              | Floor<br>Fire resistance class |
| HVAC split line combinations                                                                                                                                  |                                                                                                       |                                |
| Double pipe (6-22/ 8-22 mm) or<br>single copper pipe (6-22 mm).<br>PEF-insulation 9 mm thickness<br>+ PVC-U pipe ≤ Ø 25 mm<br>+ 4 accompanying cables ≤ 21 mm | Intumescent wrap<br>2 x 62,5 / 1 x 125 mm<br>+ lamella mat<br>≥ 250/ 500 mm<br>(top/bottom) x ≥ 30 mm | EI 90 U/U                      |

3. Mineral fibre board

4. Ablative Coating

5. Lamella mat
6. Non-combustible pipe

7. Lamella mat

8. Floor ≥ 150 mm thickness

Dimensions in mm

**Description of possible additional components of the penetration seal**

| Description of possible additional components of the penetration seal     |                                                                                                                                          |                                                                                                                                                                                                  |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                               | Performance                                                                                                                              | Sample Product                                                                                                                                                                                   |
| Ablative Coating                                                          | Class of Fire behavior in accordance with DIN EN 13501-1: Class E                                                                        | FireFree 101 Brandfiller in accordance to DoP No. 12000                                                                                                                                          |
| Intumescent wrap<br>2 x 62,5 mm / 1 x 125 mm                              | Class of Fire behavior in accordance with DIN EN 13501-1: Class B-s1,d0                                                                  | FireFree 101 Brandfiller in accordance to DoP No. 12200                                                                                                                                          |
| Intumescent wrap<br>50 mm                                                 | Class of Fire behavior in accordance with DIN EN 13501-1: Class E                                                                        | FireFree 101 Brandfiller in accordance to DoP No. 12200                                                                                                                                          |
| Fire protection collar                                                    | Class of Fire behavior in accordance with DIN EN 13501-1: Class E                                                                        | FireFree 320 Brandbøsning in accordance to DoP 12300                                                                                                                                             |
| Fire protection Endless collar                                            | Class of Fire behavior in accordance with DIN EN 13501-1: Class E                                                                        | FireFree 330 Flexbosning in accordance to DoP 12300                                                                                                                                              |
| Loose mineral wool in accordance with EN 14303                            | Reaction to fire class acc. to EN 13501-1: A1<br>Melting point: $\geq 1000$ °C                                                           | Knauf Insulation LW;<br>Rockwool "ProRox LF 970"                                                                                                                                                 |
| Mineral fibre board in accordance with DIN EN 13162                       | Reaction to fire class acc. to EN 13501-1: A1<br>Nominal Density: $\geq 150$ kg/m <sup>3</sup><br>Melting point: $\geq 1000$ °C          | Rockwool "Hardrock 040"<br>Paroc Pyrotech Slab 160<br>Rockwool "RP-GF 70"                                                                                                                        |
| Mineral fibre lamella mat in accordance with EN 14303                     | Reaction to fire class acc. to EN 13501-1: A2-s1, d0 or A1<br>Bulk density: $\geq 35$ kg/m <sup>3</sup><br>Melting point: $\geq 1000$ °C | Rockwool lamella mat "KLIMAROCK";<br>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<br>Bulk density: $\geq 80$ kg/m <sup>3</sup><br>Melting point: $\geq 1000$ °C | Isover U Protect Pipe Section Alu 2 ;<br>Rockwool ProRox PS 960<br>Rockwool 800<br>Rockwool ProRox WM 950<br>Rockwool ProRox WM 960<br>Rockwool Conlit 150 U<br>ISODAEM STEINWOLL-ROHRSCHALE Alu |

**Description of possible additional components of the penetration seal**

| Description of possible additional components of the penetration seal                                                                                 |                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                                                                                                                                           | Performance                                                                                                                        | Sample Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Insulation made of flexible elastomeric foam (FEF) in accordance with EN 14304                                                                        | Reaction to fire class acc. to EN 13501-1: B-s3, d0                                                                                | Armalok 50<br>Armalok 100<br>ArmaFlex SE<br>ArmaFlex XG<br>AF/ArmaFlex<br>AF/ArmaFlex Evo<br>SH/ArmaFlex<br>NH/ArmaFlex<br>HT/ArmaFlex<br>ArmaFlex Ultima<br>Kaiflex HT s2<br>Kaiflex KK<br>Kaiflex KKplus s2<br>Kaiflex KKplus s3<br>FLEXEN Heizungskautschuk s2<br>FLEXEN Kältekautschuk Plus s2<br>isopren Plus<br>isopren Polar Plus<br>K-FLEX ST<br>K-FLEX ST PLUS<br>K-FLEX ECO<br>K-FLEX H<br>Eurobatex SC<br>Eurobatex High Technology<br>Eurobatex H<br>Eurobatex H Super |
| Insulation made of PUR/PIR in accordance with EN 14308                                                                                                | Reaction to fire class acc. to EN 13501-1: D-s2, d0                                                                                | Regisol REGOPIR HF<br>Regisol REGOPIR HF ALU Glatt                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Black closed-cell flexible elastomeric foam (FEF) in accordance EN 14304                                                                              | Reaction to fire class acc. to EN 13501-1:<br>Tubes: B <sub>L</sub> -s2,d0<br>Sheets: B-s3,d0<br>Sheets 60 mm: E<br>Tapes: B-s2,d0 | Eurobatex                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Black closed-cell flexible elastomeric foam (FEF) coupled with mineral fibre material with a black coloured exterior finishing in accordance EN 14304 | Reaction to fire class acc. to EN 13501-1:<br>Tubes: B <sub>L</sub> -s1,d0<br>Sheets: B-s2,d0                                      | Eurobatex Glastec                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |