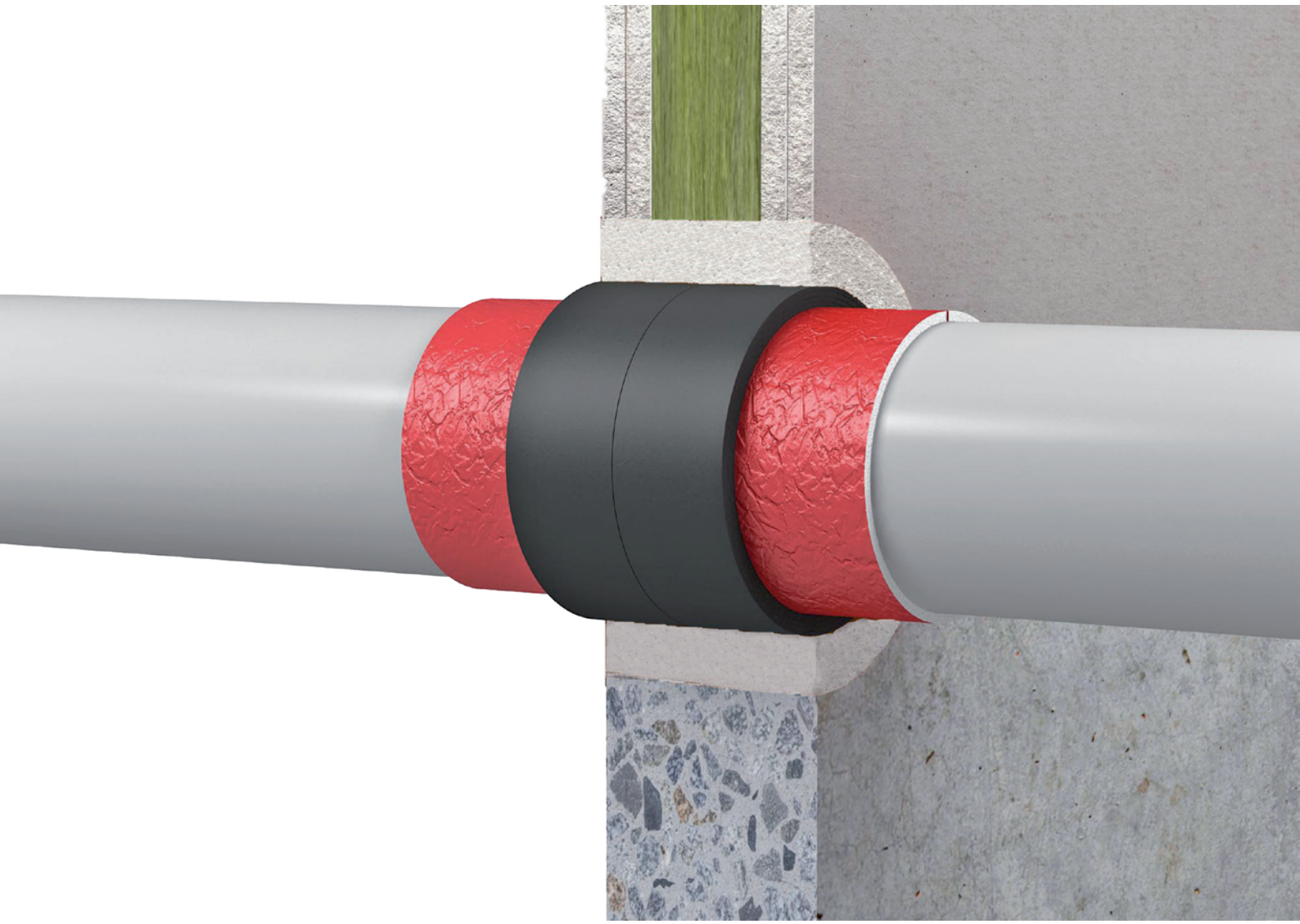
# System KSL-W

## Pipe sealing system

Fire-resistant sealing system for plastic pipes in connection with soundproofing tubes, FEF and PEF insulation.

Fire resistance class max. EI 180 in acc. with EN 13501-2 as per ETA 18/0885, KB 319061402-A, Rev. 2 and KB MA 39-22-02052.



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# System KSL-W

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## 1. Preliminary remarks / overview

### 1.1 Target group

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

### 1.2 Use of the instructions

Before starting work, read through these installation instructions completely once. Pay particular attention to the following safety instructions.
The authorisation holder assumes no liability for damage caused by failure to comply with these instructions.
Pictorial representations serve as examples only. Installation results may differ in appearance.
Unless stated otherwise, all lengths are specified in mm.
All information in this document represents the state of the art at the time of writing or the current version of the standard.
Upon request, flamro will be pleased to provide the relevant legal and technical framework and manufacturer specifications for each individual case.

#### 1.2.1 Safety instructions

Consult the respective safety information for the individual penetration seal components.
Personal protective equipment:

| | |
|---|---|
|  | Wear protective clothing and non-slip shoes. |

| | |
|---|---|
|  | Use safety goggles, safety glasses. |

Safety instructions for the installation of floor penetration seals

| | |
|---|---|
|  | The area below the floor penetration seal must be cordoned off against entry during penetration seal work (barrier tape and warning sign: warning of possible falling objects, do not enter the area, penetration seal work in floor openings). |

| | |
|---|---|
|  | The contractor for the production of floor penetration seals must inform the client in writing (for forwarding to the client or appointed representative) that after the production of the fire penetration seals in floors, these must be secured on site against loads, in particular against being stepped on, by suitable measures (e.g. by fencing or by covering with grating). |

# System KSL-W

## 1.3 Building elements

**Plasterboard walls with steel substructure**

In stud design and double-sided cladding with at least 2 layers of 12.5 mm cement or gypsum-bound building boards with a reaction to fire of class A1 or A2 in accordance with EN 13501-1.
The stud construction must be complemented by additional stems and transoms in such a way that they frame the aperture.
The walls must be classified with the required fire resistance rating in accordance with EN 13501-2.

**Plasterboard walls with wood substructure**

In stud design and double-sided cladding with at least 2 layers of 12.5 mm cement or gypsum-bound building boards with a reaction to fire of class A1 or A2 in accordance with EN 13501-1.
The distance between the opening and the studs and transoms must be ≥ 100 mm and the hollow spaces between the cladding of the wall, studs and transoms and the aperture must be tightly sealed to a depth of ≥ 100 mm with mineral wool, reaction to fire class A1 or A2 in accordance with EN 13501-
The walls must be classified for the required fire resistance rating in accordance with EN 13501-2.

**Solid walls**

Made of concrete or aerated concrete with a density of ≥ 2200 (± 500) kg/m³.
The walls must be classified for the required fire resistance rating in accordance with EN 13501-2.

**Solid floors**

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

**Shaft walls**

In stud design with metal substructure with single-sided cladding with at least 2 layers of 20 mm building boards.

# System KSL-W

## 2. Allowed services

For specific fire resistance classes and pipe end configurations depending on measurements and fire protection measures see the respective chapters on design variants starting on page 12.

### 2.1 Combustible pipes

| Standard pipes | | | |
|---|---|---|---|
| **Pipe material** | **in acc. with standard** | **Diameter [mm]** | **Pipe wall thickness [mm]** |
| PVC-U, PVC-C | EN 1329-1, EN 1452-2, EN 1453-1, EN ISO 15493, | 32–110 | 1.8–12.3 |
| PE-HD, ABS, SAN-PVC | EN 1519-1, EN 12201-2, EN ISO 15494, EN 12666-1, | 32–110 | 1.8–10.0 |
| PP-H | EN 1451-1, EN ISO 15874, EN ISO 15494 | 32–110 | 1.8–10.0 |

| Non-standard pipes | |
|---|---|
| **Type of pipe** | **Diameter [mm]** |
| REHAU RAUPIANO LIGHT | ≤ 160 |
| REHAU RAUPIANO PLUS | ≤ 110 |
| REHAU RAUSILENTO | ≤ 160 |
| CONEL DRAIN | ≤ 110 |
| Geberit Silent-db20 | ≤ 160 |
| Geberit Silent-PP | ≤ 125 |
| Geberit Silent-Pro | ≤ 110 |
| POLO-KAL NG / POLO-KAL XS | ≤ 110 |
| Wavin AS | ≤ 110 |
| Wavin SiTech+ | ≤ 110 |
| GF Silenta Premium | ≤ 135 |
| Pipelife MASTER 3 | ≤ 110 |
| Pipelife MASTER 3+ | ≤ 110 |
| KE KELIT PHONEX AS | ≤ 110 |
| Ostendorf Skolan dB | ≤ 135 |

# System KSL-W

## 2.2 Multilayer pipes

| Type of pipe | Diameter [mm] |
|---|---|
| Henco | ≤ 32 |
| Geberit Mepla | ≤ 75 |
| Geberit FlowFit | ≤ 75 |
| REHAU RAUTITAN stabil | ≤ 40 |
| KE KELIT KELOX | ≤ 75 |

# System KSL-W

## 3. Thicknesses, sizes and spacing

| Dimensions | | | |
|---|---|---|---|
| | Plasterboard wall, solid wall [mm] | Solid floor [mm] | Shaft wall [mm] |
| Thickness of building element | ≥ 100 | ≥ 150 | ≥ 40 |
| Thickness of penetration seal | ≥ 100 | ≥ 150 | ≥ 100 |
| Distance to other penetration seals | ≥ 100 | ≥ 100 | ≥ 100 |
| Distance to other apertures or installations | ≥ 200 | ≥ 200 | ≥ 200 |

## 4. Initial supports

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

| Initial supports | Plasterboard wall, solid wall [mm] | Solid floor [mm] | Shaft wall [mm] |
|---|---|---|---|
| Combustible pipes | ≤ 400 | ≤ 500 | ≤ 600 |
| Multilayer pipes | ≤ 400 | ≤ 500 | – |

## 5. Spacing requirements for services

Services must be installed with at least 50 mm distance to each other and to other penetrating services, measured from the outer edge of the seal.

# System KSL-W

## 6. Included products

**KSL-W**
**Fire protection wrap**

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

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

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

**BML**
**Fire stop compound**
5 kg pail – Art. no. 40050
12.5 kg pail – Art. no. 40125

**BMS**
**Fire stop filler**
5 kg pail – Art. no. 10500
12.5 kg pail – Art. no. 10125

**DG-SC**

Cartridge, 310 ml – Art. no. 01157100

**NOVASIT BM**
**Fire protection mortar**
20 kg bag – Art. no. 01161000
10 kg pail – Art. no. 01161010

**GFM**
**Fire protection mortar**
Fibre-free ready-mix dry mortar M20 / MG III in accordance with EN 998-2
25 kg bag – Art. no. 01167000

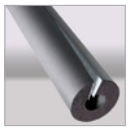
**General sealing material**

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

**Label**

1 piece – Art. no. 14003

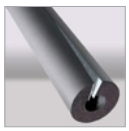
# System KSL-W



**Section insulations made of flexible elastomeric foam (FEF)**
in accordance with EN 14304
Reaction to fire in acc. with EN 13501-1: B-s3, d0 bzw. D-s1,d0

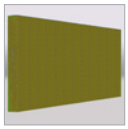
| Name | Declaration of Performance |
|---|---|
| Armalok 50 | No. 067-CPR-2021-104 in connection with ETA-20/0653 of 25.11.2020 |
| Armalok 100 | |
| ArmaFlex SE | 0543-CPR-2022-111 |
| ArmaFlex XG | 0543-CPR-2013-002 |
| AF/ArmaFlex | 0543-CPR-2016-001 |
| AF/ArmaFlex Evo | 0543-CPR-2020-101 |
| SH/ArmaFlex | 0543-CPR-2013-013 |
| NH/ArmaFlex | 0543-CPR-2013-015 |
| NH/ArmaFlex Smart | 0543-CPR-2020-102 |
| HT/ArmaFlex | 0543-CPR-2013-019 |
| ArmaFlex Ultima | 0543-CPR-2016-017 |
| Kaiflex HT s2 | DoP HT s2 01032021001 |
| Kaiflex KK | Kaiflex KK |
| Kaiflex KKplus s2 | DoP KKplus s2 01092021001 |
| Kaiflex KKplus s3 | DoP KKplus s3 PL092021001 |
| FLEXEN Heizungskautschuk s2 | LE_5258006015_00_M_flexen®_Heizungskautschuk_Plus |
| FLEXEN Kältekautschuk Plus s2 | LE_5258501006_00_S_flexen®_Kältekautschuk_Plus |
| isopren Plus | Isopren Plus 07052013001 |
| isopren Polar Plus | Isopren Polar Plus 07052013001 |
| K-FLEX ST | 01010104201-CPR-13, 01050104201-CPR-16, 01100104201-CPR-16, 01040104201-CPR-16 |
| K-FLEX ST PLUS | 02010104201-CPR-16, 02010304201-CPR-13, 02050104201-CPR-16, 02040104201-CPR-13 |
| K-FLEX ECO | 05010105201-CPR-13, 04050105201-CPR-13; 04100104201-CPR-18, 04040104201-CPR-18, 04060102201-CPR-18 |
| K-FLEX H | 04010105201-CPR-13, 04050105201-CPR-13, 04100104201-CPR-18, 04040104201-CPR-18, 04060102201-CPR-18 |
| Eurobatex | 01/20190610 |
| Eurobatex SC | 35/20220202 |
| Eurobatex High Technology | 19/20220914 |
| Eurobatex H | 06/20180903 |
| Eurobatex H Super | 09/20171201 |
| Eurobatex Glastec | 18/20200702 |

# System KSL-W



**Section insulations made of PEF**
in acc. with EN 14313
Reaction to fire in acc. with EN 13501-1: E

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



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

Reaction to fire class A1 in acc. with EN 13501:1
Melting point ≥ 1000 °C.
Nominal bulk density ≥ 150 kg/m$^3$
Thickness ≥ 50 mm

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

**Mineral wool**

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

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

## 6.1 Declarations of Performance

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

# System KSL-W

## 7. Design

### 7.1 Fire resistance classes

System KSL-W meets the requirements of max. class EI 180 in acc. with EN 13501-2.
The fire resistance class of the sealing system is reduced to the fire resistance class of the installed service with the lowest fire resistance rating.
The fire resistance class of the sealing system is reduced to the maximum fire resistance class of the surrounding building element.

| Building element | Fire resistance class |
|---|---|
| Plasterboard wall | max. EI 120 |
| Solid wall | max. EI 120 |
| Solid floor | max. EI 180 |

### 7.2 Pipe end configurations

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

### 7.3 Annular gap

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

| Dimensions | | | |
|---|---|---|---|
| | Wall [mm] | Floor [mm] | Shaft wall [mm] |
| Annular gap width | ≤ 50 | ≤ 50 | ≤ 50 |
| Filling depth on each side | ≥ 25 | ≥ 25 | ≥ 20 |

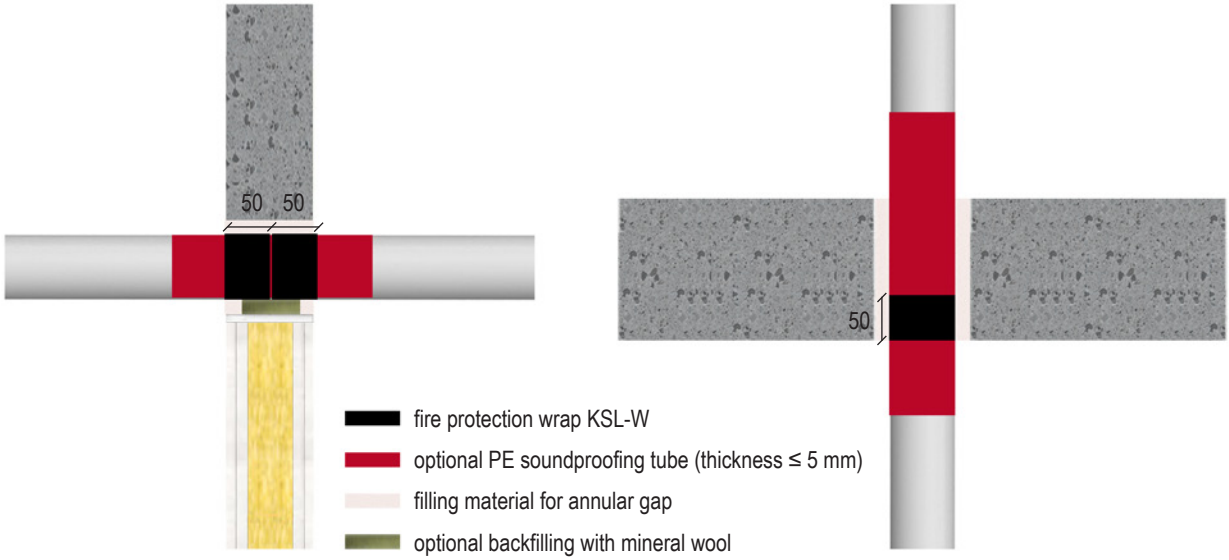
# System KSL-W

8. Fire protection measures

8.1 Combustible pipes

8.1.1 Design with fire protection wrap KSL-W

**Design for wall and floor penetration seals**




For building element and seal thicknesses see page 7. For filling the annular gap see page 11.

All specifications in mm

| Standard pipes | | | | | |
|---|---|---|---|---|---|
| Pipe outer Ø [mm] | Pipe wall thickness [mm] | Fire protection wrap KSL-W Number of wraps and layers | | Fire resistance class | |
| | | Wall | Floor | Wall | Floor |
| **PVC-U, PVC-C** | | | | | |
| 32–50 | 1,8–5,6 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 120 U/U** |
| 63–110 | 1,8–12,3 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 90 U/U** |
| **PE-HD, ABS, SAN+PVC** | | | | | |
| 32–50 | 1,8–4,6 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| 63–110 | 1,8–10,0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **PP** | | | | | |
| 32–50 | 1,8–4,6 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 120 U/U** |
| 63–110 | 1,8–10,0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 120 U/U** |

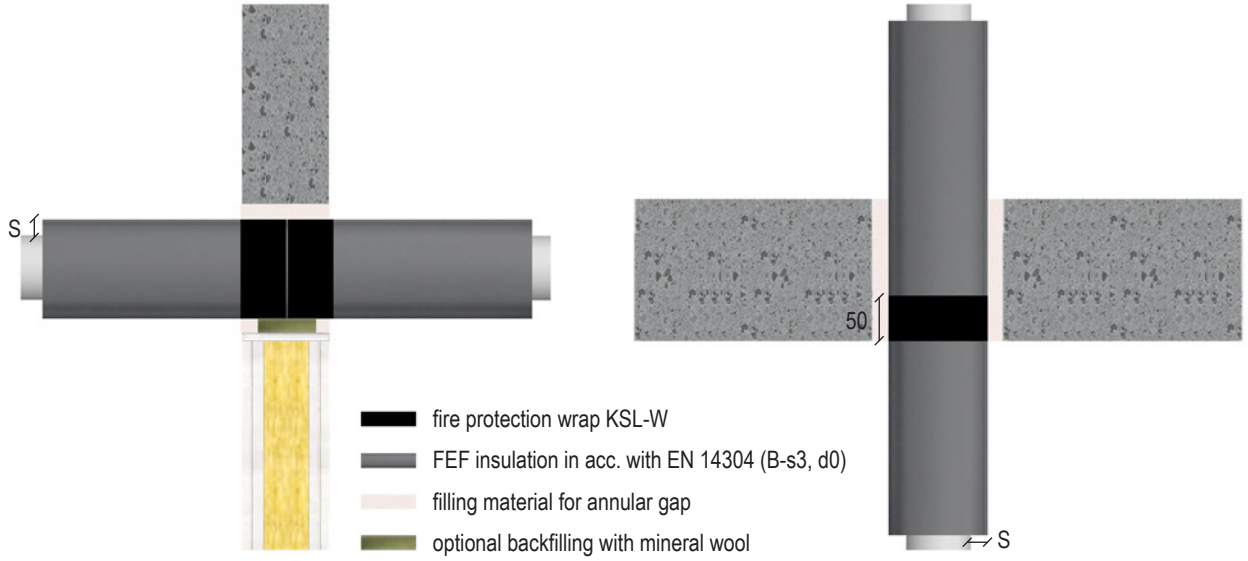
# System KSL-W

| Non-standard pipes | | | | |
|---|---|---|---|---|
| Pipe outer Ø [mm] | Fire protection wrap KSL-W<br>Number of wraps and layers | | Fire resistance class | |
| | Wall | Floor | Wall | Floor |
| **Geberit Silent-PP** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 120 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **Geberit Silent-Pro** | | | | |
| ≤ 75.0 | 2 × 3 layers | 1 × 3 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **Geberit Silent-db20** | | | | |
| ≤ 56.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **KE KELIT PHONEX AS** | | | | |
| ≤ 56.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **Pipelife MASTER 3** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 90 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **POLO-KAL NG / POLO-KAL XS** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **REHAU RAUPIANO LIGHT** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **REHAU RAUPIANO PLUS** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 60 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **REHAU RAUSILENTO** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **CONEL DRAIN** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |
| **Wavin SiTech+** | | | | |
| ≤ 50.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 180 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 120 U/U** |
| **GF Silenta Premium** | | | | |
| ≤ 58.0 | 2 × 2 layers | 1 × 2 layers | **EI 120 U/U** | **EI 90 U/U** |
| ≤ 110.0 | 2 × 4 layers | 1 × 4 layers | **EI 120 U/U** | **EI 180 U/U** |

# System KSL-W

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

**Design for wall and floor penetration seals**




For building element and seal thicknesses see page 7. For filling the annular gap see page 11.

All specifications in mm

**Standard pipes**

| Pipe outer Ø [mm] | Pipe wall thickness [mm] | FEF insulation Thickness S [mm] | Fire protection wrap KSL-W Number of wraps and layers | | Fire resistance class | |
|---|---|---|---|---|---|---|
| | | | Wall | Floor | Wall | Floor |
| **PP-H** | | | | | | |
| 40–75 | 1.8–8.2 | 9.0–22.0 | 2 × 3 layers | – | **EI 90 U/U*** | **–** |

* Source: KB 319061402-A, Rev. 2

**Non-standard pipes**

| Pipe outer Ø [mm] | FEF insulation Thickness S [mm] | Fire protection wrap KSL-W Number of wraps and layers | | Fire resistance class | |
|---|---|---|---|---|---|
| | | Wall | Floor | Wall | Floor |
| **Geberit Silent-PP** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | **–** | **EI 180 U/U** |
| > 100 – ≤ 125 | 18.5 | – | 1 × 5 layers | **–** | **EI 120 U/U** |
| **Geberit Silent-Pro** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | **–** | **EI 180 U/U** |
| > 75 – ≤ 110 | 18.0 | – | 1 × 4 layers | **–** | **EI 180 U/U** |
| **Geberit Silent-db20** | | | | | |
| ≤ 56 | 17.0 | – | 1 × 2 layers | **–** | **EI 180 U/U** |
| > 56 – ≤ 110 | 18.0 | – | 1 × 4 layers | **–** | **EI 90 U/U** |
| > 110 – ≤ 135 | 18.5 | – | 1 × 5 layers | **–** | **EI 180 U/U** |
| > 135 – ≤ 160 | 19.0 | – | 1 × 6 layers | **–** | **EI 180 U/U** |

# System KSL-W

| Non-standard pipes | | | | | |
|---|---|---|---|---|---|
| Pipe outer Ø [mm] | FEF insulation Thickness S [mm] | Fire protection wrap KSL-W Number of wraps and layers | | Fire resistance class | |
| | | Wall | Floor | Wall | Floor |
| **Pipelife MASTER 3** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 50 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 120 U/U** |
| **POLO-KAL NG / POLO-KAL XS** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 50 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 180 U/U** |
| **REHAU RAUPIANO LIGHT** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 50 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 180 U/U** |
| > 110 – ≤ 125 | 18.5 | – | 1 × 5 layers | – | **EI 180 U/U** |
| > 125 – ≤ 160 | 19.0 | – | 1 × 6 layers | – | **EI 90 U/U** |
| **REHAU RAUPIANO PLUS*** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| **CONEL DRAIN** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 50 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 180 U/U** |
| **Wavin SiTech** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 50 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 180 U/U** |
| **Wavin SiTech+** | | | | | |
| ≤ 50 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 50 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 180 U/U** |
| **Wavin AS** | | | | | |
| ≤ 58 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 58 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 180 U/U** |
| **GF Silenta Premium** | | | | | |
| ≤ 58 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 58 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 180 U/U** |
| > 110 – ≤ 135 | 18.5 | – | 1 × 5 layers | – | **EI 120 U/U** |
| **Ostendorf Skolan dB** | | | | | |
| ≤ 58 | 17.0 | – | 1 × 2 layers | – | **EI 180 U/U** |
| > 58 – ≤ 110 | 18.0 | – | 1 × 4 layers | – | **EI 60 U/U** |
| > 110 – ≤ 135 | 18.5 | – | 1 × 5 layers | – | **EI 120 U/U** |

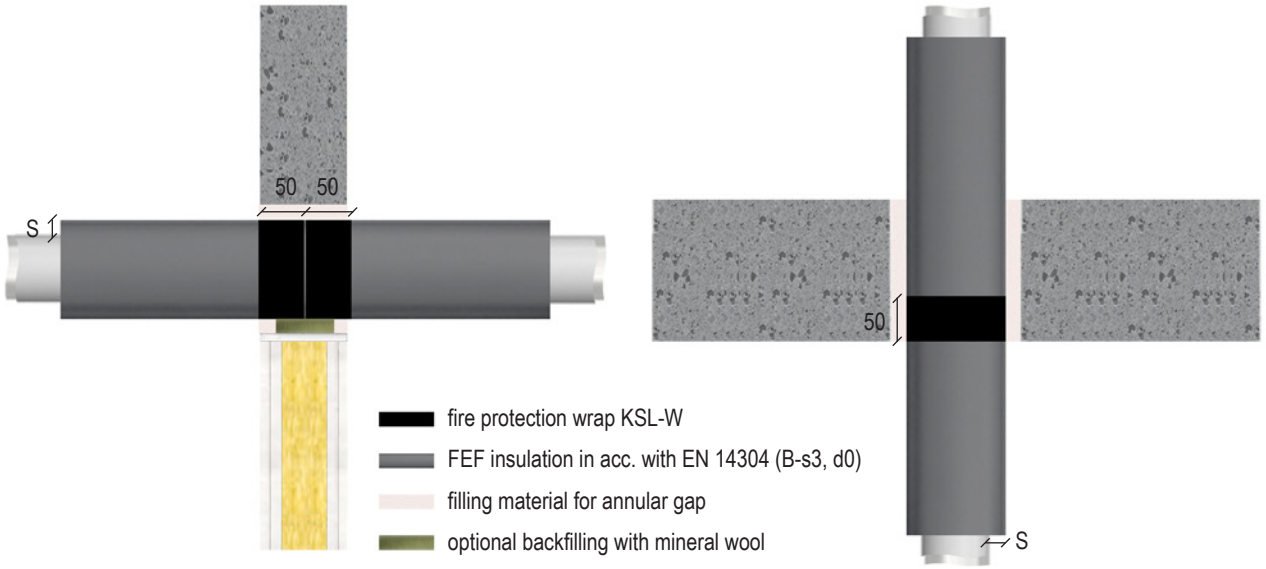
* equivalent to REHAU RAUPIANO LIGHT

# System KSL-W

8.2 Multilayer pipes

8.2.1 Design with fire protection wrap KSL-W and FEF insulation

**Design for wall and floor penetration seals**




For building element and seal thicknesses see page 7. For filling the annular gap see page 11.

All specifications in mm

| Wall | | | |
|---|---|---|---|
| Pipe outer Ø [mm] | FEF insulation<br>Thickness S [mm] | Fire protection wrap KSL-W<br>Number of wraps and layers | Fire resistance class |
| **Geberit Mepla** | | | |
| 16 | 8.0–32.0 | 2 × 1 layer | **EI 120 U/C** |
| 20 | 8.0–32.0 | | **EI 120 U/C** |
| 26 | 8.5–35.0 | | **EI 120 U/C** |
| 32 | 9.0–35.0 | | **EI 120 U/C** |
| 40 | 9.0–35.0 | 2 × 2 layers | **EI 120 U/C** |
| 50 | 9.0–35.0 | | **EI 120 U/C** |
| 63 | 9.0–39.0 | | **EI 120 U/C** |
| 75 | 9.5 | | **EI 90 U/C** |
| | > 9.5 – 40.5 | | **EI 120 U/C** |
| **REHAU RAUTITAN stabil** | | | |
| 16 | 8.0–32.0 | 2 × 1 layer | **EI 120 U/C** |
| 20 | 8.0–32.0 | | **EI 120 U/C** |
| 25 | 8.5–35.0 | | **EI 120 U/C** |
| 32 | 9.0–35.0 | | **EI 120 U/C** |
| 40 | 9.0–35.0 | 2 × 2 layers | **EI 120 U/C** |

# System KSL-W

| Wall | | | |
|---|---|---|---|
| Pipe outer Ø [mm] | FEF insulation Thickness S [mm] | Fire protection wrap KSL-W Number of wraps and layers | Fire resistance class |
| **KE KELIT KELOX** | | | |
| 16 | 8.0–32.0 | 2 × 1 layer | **EI 120 U/C** |
| 18 | | | **EI 120 U/C** |
| 20 | | | **EI 120 U/C** |
| 25 | 8.5–35.0 | | **EI 120 U/C** |
| 32 | 9.0–35.0 | | **EI 120 U/C** |
| 40 | 9.0–35.0 | 2 × 2 layers | **EI 120 U/C** |
| 50 | | | **EI 120 U/C** |
| 63 | 9.0–39.0 | | **EI 120 U/C** |
| 75 | 9.5–40.5 | | **EI 120 U/C** |
| **Henco** | | | |
| 20 | 8.0–32.0 | 2 × 1 layer | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |
| **Geberit FlowFit** | | | |
| 16–32 | 8.5–33.5 | 2 × 1 layers | **EI 90 U/C** |

| Floor | | | |
|---|---|---|---|
| Pipe outer Ø [mm] | FEF insulation Thickness S [mm] | Fire protection wrap KSL-W Number of wraps and layers | Fire resistance class |
| **Geberit Mepla** | | | |
| 16 | 8.0–32.0 | 1 × 1 layer | **EI 180 U/C** |
| 20 | 8.0 | | **EI 120 U/C** |
| | > 8.0–32.0 | | **EI 180 U/C** |
| 26 | 8.5–35.0 | | **EI 180 U/C** |
| 32 | 9.0 | | **EI 180 U/C** |
| | > 9.0–35.0 | | **EI 120 U/C** |
| 40 | 9.0 | 1 × 2 layers | **EI 180 U/C** |
| | > 9.0–35.0 | | **EI 120 U/C** |
| 50 | 9.0–37.5 | | **EI 120 U/C** |
| 63 | 9.0 | | **EI 180 U/C** |
| | > 9.0–39.0 | | **EI 120 U/C** |
| 75 | 9.5 | | **EI 90 U/C** |
| | > 9.5 – 40.5 | | **EI 120 U/C** |
| **REHAU RAUTITAN stabil** | | | |
| 16 | 8.0–32.0 | 1 × 1 layer | **EI 180 U/C** |
| 20 | 8.0–32.0 | | **EI 180 U/C** |
| 25 | 8.5–35.0 | | **EI 180 U/C** |
| 32 | 9.0 | | **EI 120 U/C** |
| | > 9.0–35.0 | | **EI 180 U/C** |
| 40 | 9.0–35.0 | 1 × 2 layers | **EI 180 U/C** |

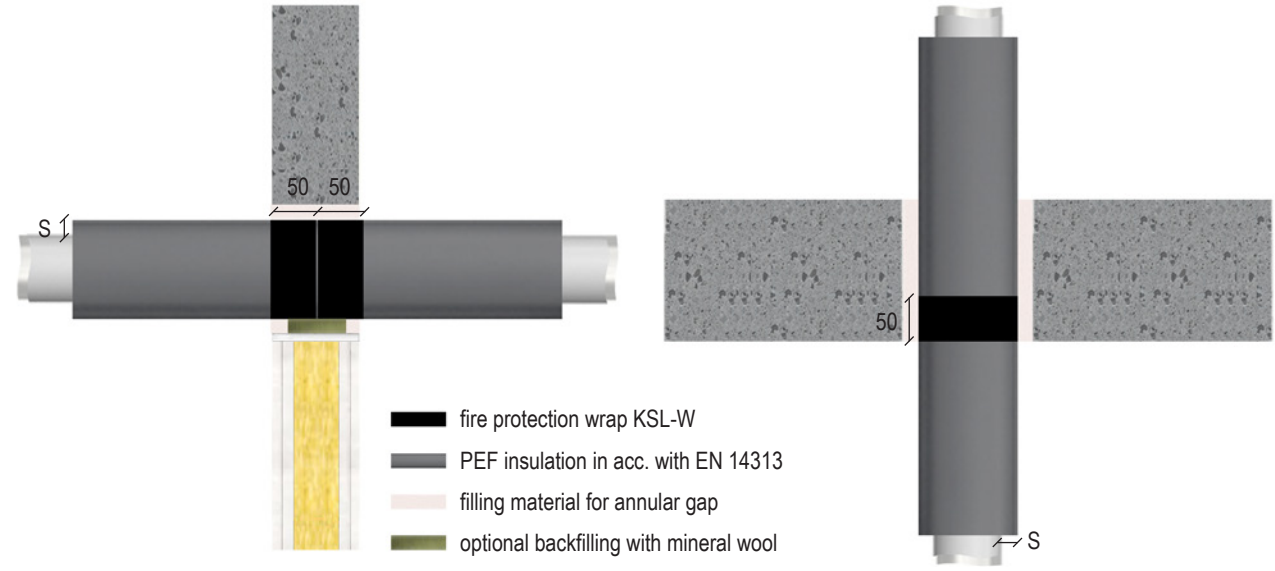
# System KSL-W

| Floor | | | |
|---|---|---|---|
| Pipe outer Ø [mm] | FEF insulation | Fire protection wrap KSL-W | Fire resistance class |
| | Thickness S [mm] | Number of wraps and layers | |
| **KE KELIT KELOX** | | | |
| 16 | 8.0–32.0 | 1 × 1 layer | **EI 180 U/C** |
| 18 | | | **EI 180 U/C** |
| 20 | | | **EI 180 U/C** |
| 25 | 8.5–35.0 | | **EI 180 U/C** |
| 32 | 9.0–35.0 | | **EI 180 U/C** |
| 40 | 9.0–35.0 | 1 × 2 layers | **EI 180 U/C** |
| 50 | | | **EI 180 U/C** |
| 63 | 9.0–39.0 | | **EI 180 U/C** |
| 75 | 9.5–40.5 | | **EI 180 U/C** |
| **Geberit FlowFit** | | | |
| 16–32 | 8.5–35.0 | 1 × 1 layer | **EI 90 U/C** |
| 40–75 | 20.5–40.5 | 1 × 2 layers | **EI 90 U/C** |

# System KSL-W

## 8.2.2 Design with fire protection wrap KSL-W and PEF insulation

**Design for wall and floor penetration seals**




For building element and seal thicknesses see page 7. For filling the annular gap see page 11.

All specifications in mm

| Wall | | | |
|---|---|---|---|
| Pipe outer Ø [mm] | PEF insulation<br>Thickness S [mm] | Fire protection wrap KSL-W<br>Number of wraps and layers | Fire resistance class |
| **Geberit Mepla** | | | |
| 16 | 6.0–13.0 | 2 × 1 layer | **EI 120 U/C** |
| 20 | | | **EI 120 U/C** |
| 26 | | | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |
| **REHAU RAUTITAN stabil** | | | |
| 16 | 4.0–26.0 | 2 × 1 layer | **EI 120 U/C** |
| 20 | | | **EI 120 U/C** |
| 25 | | | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |

# System KSL-W

| Wall | | | |
|---|---|---|---|
| Pipe outer Ø [mm] | PEF insulation Thickness S [mm] | Fire protection wrap KSL-W Number of wraps and layers | Fire resistance class |
| **KE KELIT KELOX** | | | |
| 18 | 4.0–13.0 | 2 × 1 layer | **EI 120 U/C** |
| 20 | | | **EI 120 U/C** |
| 25 | | | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |
| **Henco** | | | |
| 20 | 6.0–13.0 | 2 × 1 layer | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |
| **Geberit FlowFit** | | | |
| 16 | 13.0–26.0 | 2 × 1 layer | **EI 90 U/C** |
| 20–25 | 26.0 | | **EI 90 U/C** |

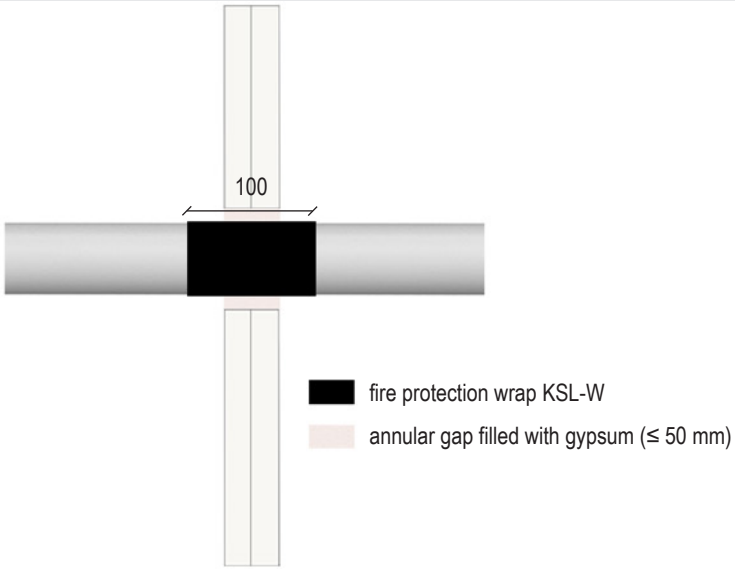
| Floor | | | |
|---|---|---|---|
| Pipe outer Ø [mm] | PEF insulation Thickness S [mm] | Fire protection wrap KSL-W Number of wraps and layers | Fire resistance class |
| **Geberit Mepla** | | | |
| 16 | 6.0–13.0 | 1 × 1 layer | **EI 120 U/C** |
| 20 | | | **EI 120 U/C** |
| 26 | | | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |
| **REHAU RAUTITAN stabil** | | | |
| 16 | 4.0–26.0 | 1 × 1 layer | **EI 120 U/C** |
| 20 | | | **EI 120 U/C** |
| 25 | 26.0 | | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |
| **KE KELIT KELOX** | | | |
| 18 | 4.0–13.0 | 1 × 1 layer | **EI 120 U/C** |
| 20 | | | **EI 120 U/C** |
| 25 | | | **EI 120 U/C** |
| 32 | | | **EI 120 U/C** |
| **Henco** | | | |
| 20 | 6.0–13.0 | 1 × 1 layer | **EI 120 U/C** |
| 32 | 13.0 | | **EI 120 U/C** |
| **Geberit FlowFit** | | | |
| 16–25 | 6.0–26.0 | 1 × 1 layer | **EI 90 U/C** |

# System KSL-W

8.3 Design for shaft walls ≥ 40 mm

8.3.1 Design for combustible pipes with fire protection wrap KSL-W (width 100 mm)

**Design for shaft walls**



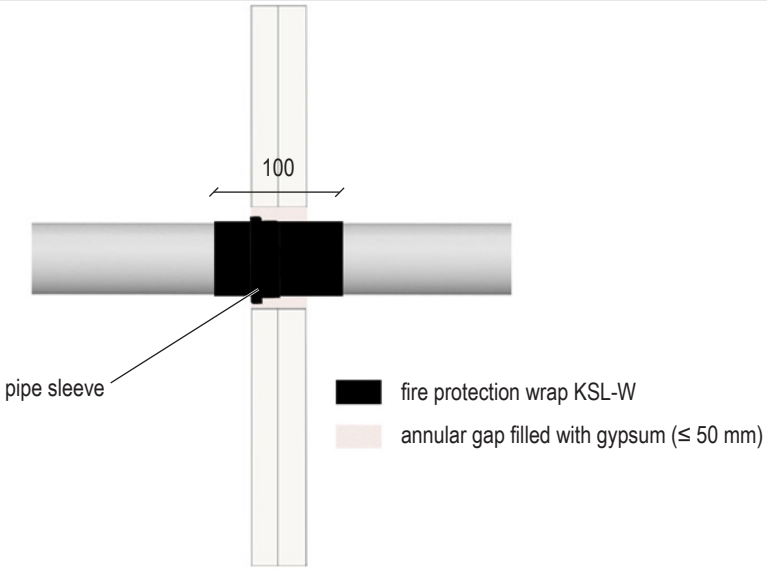

For building element and seal thicknesses see page 7. For filling the annular gap see page 11. All specifications in mm

| Pipe outer Ø [mm] | Pipe wall thickness [mm] | Fire protection wrap KSL-W (100 mm) Number of wraps and layers | Fire resistance class |
|---|---|---|---|
| **PE-HD** | | | |
| ≤ 110 | 5.5 | 1 × 6 layers | **EI 90 U/U*** |
| **Pipelife MASTER 3+** | | | |
| ≤ 50 | 2.0 | 1 × 3 layers | **EI 90 U/U** |
| ≤ 110 | 3.6 | 1 × 6 layers | **EI 90 U/U** |

* Source: KB MA 39-22-02052

# System KSL-W

**Design for shaft walls with pipe sleeve**




For building element and seal thicknesses see page 7. For filling the annular gap see page 11.

All specifications in mm

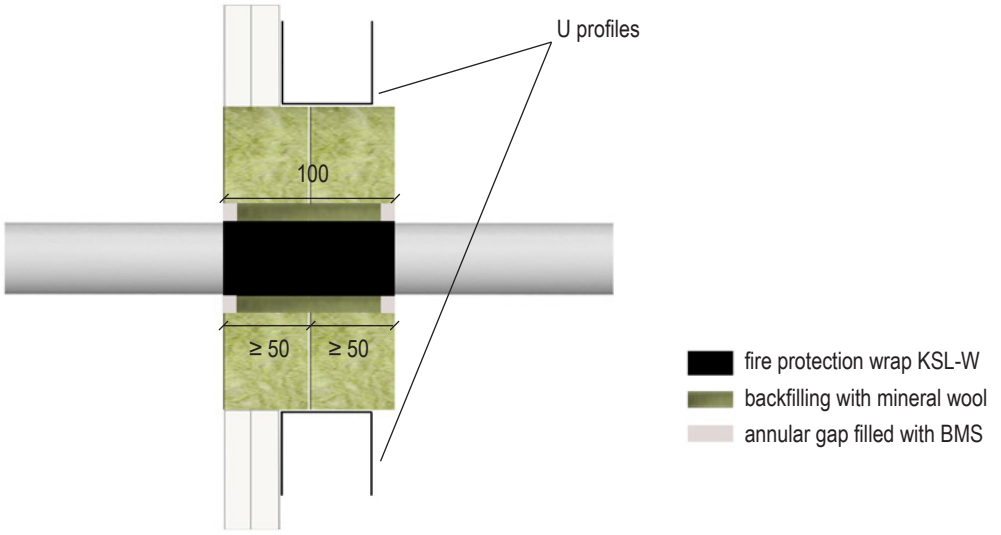
| Pipe outer Ø [mm] | Pipe wall thickness [mm] | Fire protection wrap KSL-W<br>Number of wraps and layers | Fire resistance class |
|---|---|---|---|
| **Pipelife MASTER 3+** | | | |
| ≤ 50 | 2.0 | 1 × 3 layers | **EI 90 U/U*** |
| > 50 – ≤ 110 | 3.6 | 1 × 6 layers | **EI 90 U/U*** |

* Source: KB MA 39-22-02052

# System KSL-W

## 8.3.2 Design for combustible pipes with mineral fibre boards and fire protection wrap KSL-W (width 100 mm)

**Design for shaft walls**

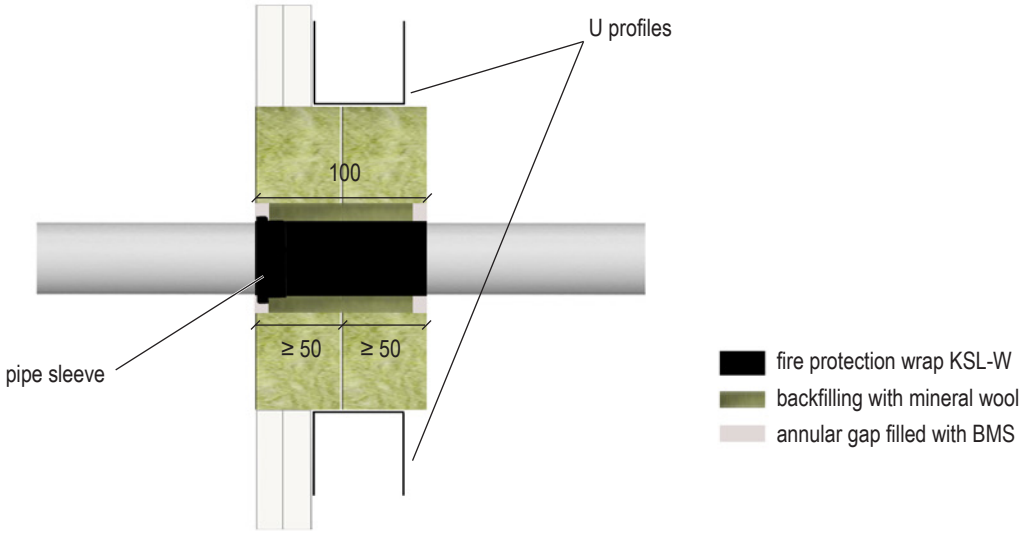



For building element and seal thicknesses see page 7. For filling the annular gap see page 11. All specifications in mm

| Pipe outer Ø [mm] | Pipe wall thickness [mm] | Fire protection wrap KSL-W<br>Number of wraps and layers | Fire resistance class |
|---|---|---|---|
| **PE-HD, ABS, SAN+PVC** | | | |
| ≤ 110 | 5.5 | 1 × 4 layers | **EI 90 U/U** |

# System KSL-W

**Design for shaft walls with pipe sleeve**




For building element and seal thicknesses see page 7. For filling the annular gap see page 11. All specifications in mm

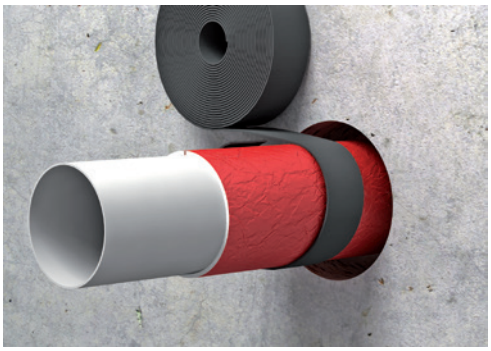
| Pipe outer Ø [mm] | Pipe wall thickness [mm] | Fire protection wrap KSL-W<br>Number of wraps and layers | Fire resistance class |
|---|---|---|---|
| **PE-HD** | | | |
| ≤ 110 | 5.5 | 1 × 4 layers | **EI 90 U/U*** |
| **PP-H** | | | |
| ≤ 110 | 4.7 | 1 × 4 layers | **EI 90 U/U*** |
| **PVC-U** | | | |
| ≤ 110 | 2.7 | 1 × 4 layers | **EI 90 U/U*** |

* Source: KB MA 39-22-02052

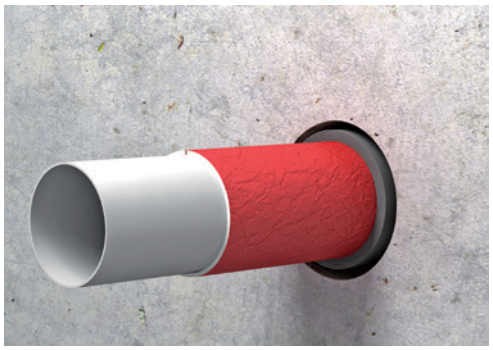
# System KSL-W

## 9. Installation steps

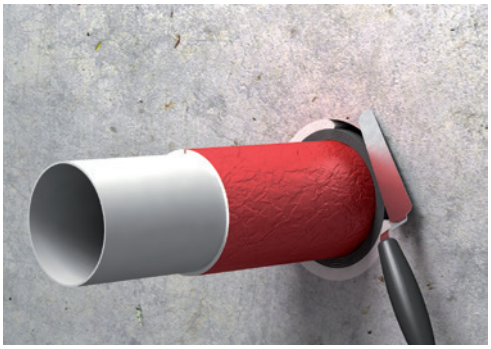
1. Wrap as many layers around the pipe as the pipe diameter and the design variant require. Cut the wrap to length accordingly.



2. Glue the layers to each other by removing the protective foil. When using the non-self-adhesive variant, secure the last layer with duct tape. Then insert the wrap into the building element.



3. Finally fill the annular gap around the pipe with gypsum or equivalent sealing material.



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