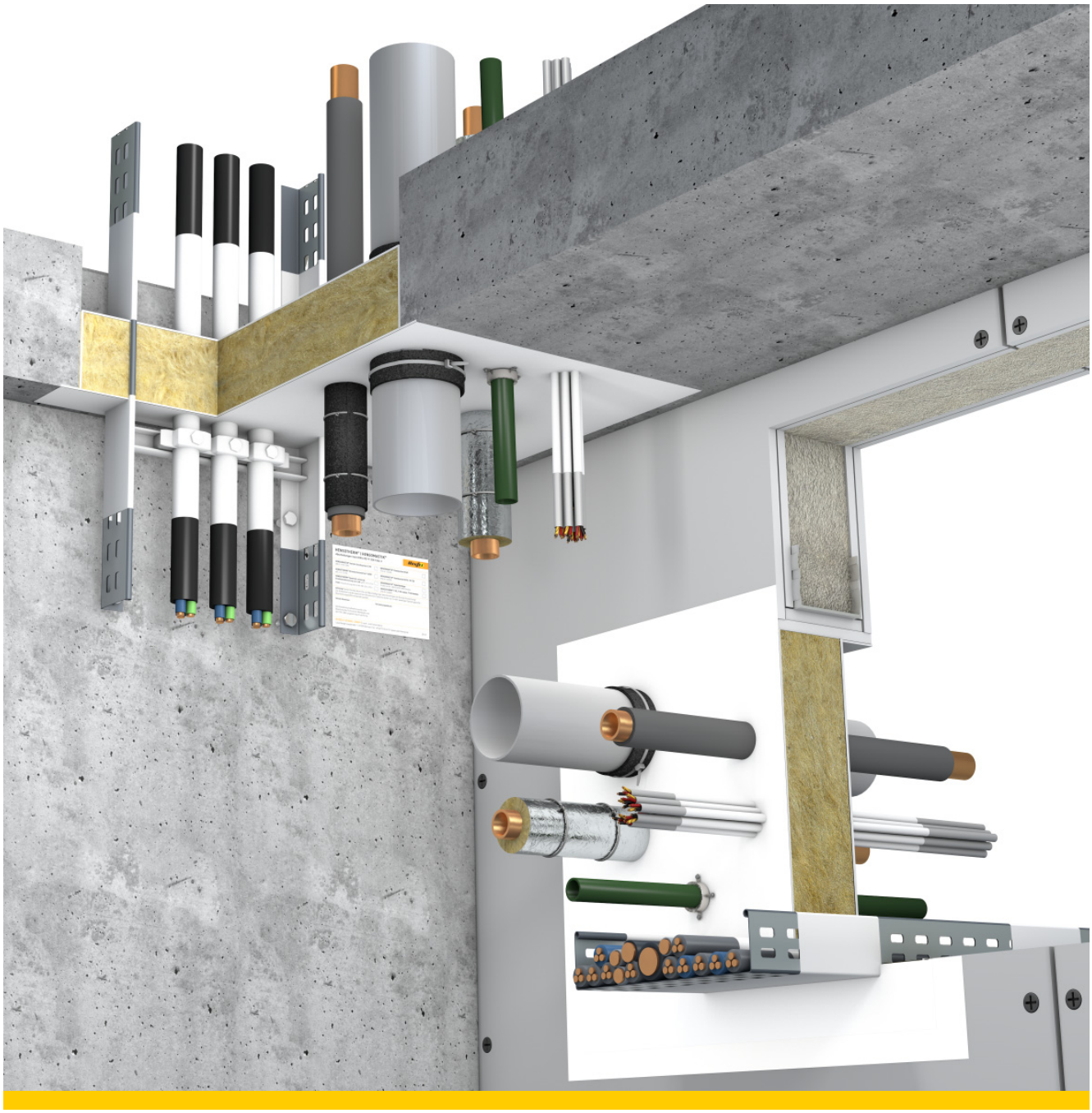
HENSOMASTIK®
Mixed Penetration Seal EI 60

According to the European Technical Assessment
ETA 15/0294 of 28/03/2019

Technical data sheet and assembly instructions
HENSOMASTIK® Mixed Penetration Seal EI 60



1. Technical description HENSOMASTIK® Mixed Penetration Seal 60

HENSOMASTIK® Mixed Penetration Seal EI 60 is a system consisting of a 60 mm thick mineral fibre board coated on both sides with **HENSOMASTIK® 5 KS Farbe / viskos** and designed as a seal for metal pipes, plastic pipes, and electric cables serving to restore the fire safety of lightweight and solid wall structures and solid floor structures carrying the various metal supply lines with insulation, plastic pipes, composite pipes, and electric cables.

HENSOMASTIK® Mixed Penetration Seal EI 60 does not contain any dangerous substances as defined in Directive 67/548/EEC and (EC) Directive No. 1272/2008 or on the EGDS Indicative List of Regulated Dangerous Substances with respect to the assembly conditions for the construction product and the resulting release scenarios.

The applicable usage category of **HENSOMASTIK® Mixed Penetration Seal EI 60** with respect to BWR 3 (hygiene, health, and environment) is IA/1, S/W3.

The resistance to wind load (over- and underpressure) of the
HENSOMASTIK® Mixed Penetration Seal EI 60 is positively tested in accordance to DIN EN 12211.
Test report No. 311002506/1/2017 / HFB Engineering GmbH, Leipzig

2. Technical data of the penetration seal system components

2.1 HENSOMASTIK® 5 KS Farbe, HENSOMASTIK® 5 KS viskos, HENSOMASTIK® 5 KS SP (filler)

HENSOMASTIK® 5 KS is an ablative, medium-viscosity, and non-hygroscopic, water-based fire protection coating in the versions **"Farbe", "viskos",** and **"SP"**. This is a dispersion coating we manufacture ourselves with organic binders, water, mineral fillers, pigments, and additives.

The fire protection coating **HENSOMASTIK® 5 KS** is part of the **Green Product** line at Rudolf Hensel GmbH, classified as "low emission", and it does not contain any solvents, borates, plasticisers, halogens, formaldehydes, or alkylphenol ethoxylates (APEs).

Product characteristics HENSOMASTIK® 5 KS
- Contains no solvents, APEO, no VOC emissions
- Free of halogens, borates and plasticisers
- Mechanically durable
- Water-impermeable in accordance with DIN 1048
- Resistant to oil and petrol
- Weatherproof and resistant to UV in accordance with DIN 53 384
- Resistant to ageing
- Flexible when dry, even when thick layers have been applied

Environment
- Environmental product declaration No. EPD-RHG-20140204-IAA1-DE
- Registered in the DGNB Navigator: CDDWRA
- AgBB-tested, VOC emission class A+

Work safety: Processing **HENSOMASTIK® 5 KS** must comply with the regulations for work safety and environmental protection. **GISCODE: M-DF01**
Before using **HENSOMASTIK® 5 KS Farbe / viskos / SP**, please consult its safety data sheet available as a PDF download from **www.rudolf-hensel.de**

Storage: The storage and transport temperatures must lie within + 5 °C bis max. + 30 °C (free of frost!). **HENSOMASTIK® 5 KS Farbe / viskos / SP** can be stored for up to twelve months in the original packaging. Carefully seal opened packaging after use!

Technical data and properties

Product versions	HENSOMASTIK® 5 KS Farbe	HENSOMASTIK® 5 KS viskos	HENSOMASTIK® 5 KS SP
Colour	White	White	White
Consistency	Liquid	Viscous	Viscous
Apparent density	1.28 – 1.42 g/cm³	1.27 – 1.41 g/cm³	1.28 – 1.45 g/cm³
Usage category with respect to weathering effects	Typ X: Also designed for use outdoors	Typ X: Also designed for use outdoors	Typ X: Also designed for use outdoors
Fire properties as defined in DIN EN 13501-1	Class E	Class E	Class E
VOC content	< 1 g/l	< 1 g/l	< 1 g/l
Classified and approved according to	ETAG 026-2	ETAG 026-2	ETAG 026-2
Application	• Material, surface and ambient air temperatures > +5 °C, relative humidity < 80 % • Before application stir up thoroughly with slow speed! • Application by brush, roller or airless spraying • Airless spraying: delivery capacity > 5.5 l/min; hose length max. 15 m; material pressure min. 200 bar • Remove filters from airless pump and spraying gun • Remove suction hose from airless pump • Nozzle size for airless spraying: 0.023" – 0.027" • Coverage rate: approx. 1.4 mm wet = 1.0 mm dry = approx. 1.8 kg/m² • Thinning with max. 3 % water	• Material, surface and ambient air temperatures > +5 °C, relative humidity < 80 % • Before application stir up thoroughly with slow speed! • Application by brush, roller or airless spraying • Airless spraying: delivery capacity > 5.5 l/min; hose length max. 15 m; material pressure min. 200 bar • Remove filters from airless pump and spraying gun • Remove suction hose from airless pump • Nozzle size for airless spraying: 0.025" – 0.031" • Coverage rate: approx. 1.4 mm wet = 1.0 mm dry = approx. 1.8 kg/m² • Thinning with max. 3 % water	• Material, surface and ambient air temperatures > +8 °C to max. +30 °C • Recommended material temperature > +15 °C • Application by trowel or out of the cartridge
	Check surface for appropriate adhesion! Free from dust, dirt, grease or other separating layers.		
	Clean working tools immediately after use with water!		
Work Safety	Use HENSOMASTIK® 5 KS Farbe, viskos and SP in accordance with all applicable local and national regulations.		
Giscode	M-DF01		
Environment, Health and Safety	As regulations are often revised please request for the actual safety data sheet before using the product.		
Storage and transport	Storage and transport at min. ≥ +5 °C to max. +30 °C.		
	Free from frost!		
	Opened containers must be sealed carefully after use!		
Best before	At least 12 months in unopened containers.		

2.2 **Mineral fibre boards**
The tested and approved Hardrock 040 mineral fibre boards (complying with DIN EN 13162) in the **HENSOMASTIK® Mixed Penetration Seal EI 60** exhibit an apparent density of about 150 kg/m³ and a melting point > 1000 °C and comply with the EN 13501-1 construction material class A1 (non-combustible). Board thickness of the **HENSOMASTIK® single-board Mixed Penetration Seal** = 1 x ≥ 60 mm

2.3 **Pipe collars / pipe wraps**
HENSOTHERM® 7 KS Gewebe 50 / 100 / 125, ETA 16/0396, intumescent endless pipe wrap for combustible and non-combustible pipes in flexible walls, solid walls and solid floors
Air Fire Tech Rorcol V30, ETA 13/0758
AWM II, ETA 11/0208

2.4 **Sectional insulations for non-combustible pipes**

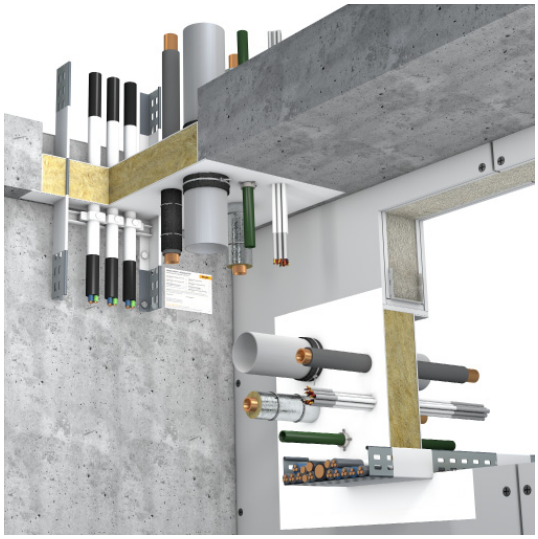
2.4.1 **ROCKWOOL RS 800:** with a melting point > 1,000 °C, non-combustible $A2_L$-s1, d0 according to EN 13501-1
ROCKWOOL Klimarock: non-combustible, A1

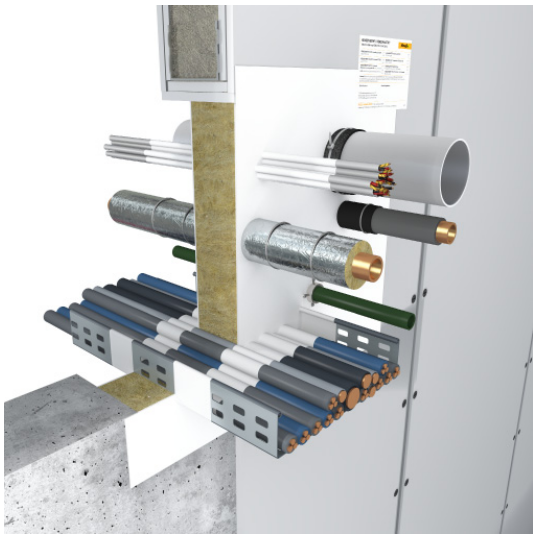
2.4.2 **Sectional insulations wrapped with HENSOTHERM® 7 KS Gewebe 125 / 100 / 50**
Construction material approval ETA 16/0369, indoor and protected outdoor applications, usage categories: Y/Z1/Z2, highly flexible fabric, secure with straps or galvanised wire
Armaflex AF: Euroclass B/BL-s3,d0 according to EN 13501-1
Kaiflex ST: Euroclass BL-s3,d0 according to EN 13501-1
- **Armaflex Ultima:** Euroclass BL-s1, d0
- **Armaflex LS:** BL-s2, d0
- **Kaiflex KK plus:** BL-s2, d0
- **Armaflex Protect R90**
- **Eurobatex HF:** Euroclass DL-s2-d0 according to EN 13501-1
- **Armaflex NH:** Euroclass DL-s2,d0 according to EN 13501-1

Due to the fire index number Armaflex AF and Kaiflex ST may only be installed if a specification for the respective assembly situation of the planning department exist. Because of the existing fire index number these insulations may generally be used in Switzerland.

Product versions	**HENSOTHERM® 7 KS Gewebe**	
	100 Measurement 100: 10.000 x 100 x 1 mm (LxWxH)	**50 / 125** Measurement 50: 15.000 x 50 x 2 mm (LxWxH) Measurement 125: 10.000 x 125 x 1 mm (LxWxH)
Application	• Application on combustible pipes • Wrapping with the required number of layers • Fixing of the finished wrappings with duct tape and plastic cable ties • For more details, please consult the respective assembly instruction.	• Application on metal pipes with synthetic rubber • Wrapping with the required number of layers • Fixing of the finished wrappings as shown in the assembly instruction. • For more details, please consult the respective assembly instruction.
	HENSOTHERM® 7 KS Gewebe 50 / 100 and 125 can easily be cut by knife or scissors.	
	HENSOTHERM® 7 KS Gewebe 50 / 100 and 125 should not be overcoated!	
Work Safety	**Use HENSOTHERM® 7 KS Gewebe 50 / 100 and 125** in accordance with all applicable local and national regulations.	
Giscode	Inapplicable	
Environment, Health and Safety	As regulations are often revised please request for the actual safety data sheet before using the product.	
Storage and transport	In dry conditions	
Best before	At least 24 months	

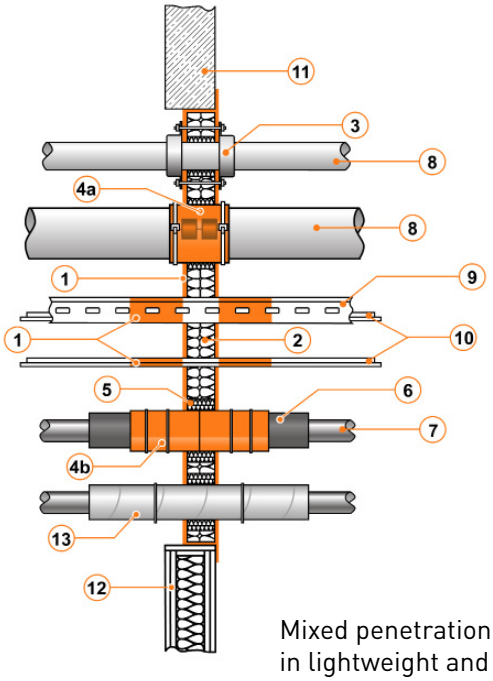
3. Overview of HENSOMASTIK® Mixed Penetration Seal EI 60



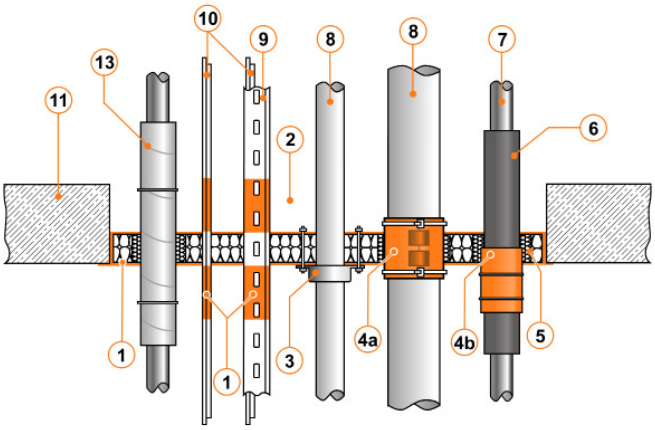


HENSOMASTIK® Mixed Penetration Seal systems are used to seal metal pipes, combustible pipes, and electric cables, thereby restoring the fire safety of wall and floor structures provided with openings for supply lines.

HENSOMASTIK® Mixed Penetration Seal EI 60 in flexible, solid walls and solid floors	
1	HENSOMASTIK® 5 KS Farbe or HENSOMASTIK® 5 KS viskos
2	Mineral fibre board ≥ 60 mm
3	Air Fire Tech Rorcol V 30 or AWM II
4a	HENSOTHERM® 7 KS Gewebe 50 / 100
4b	HENSOTHERM® 7 KS Gewebe 125
5	HENSOMASTIK® 5 KS SP
6	Sectional insulation
7	Non-combustible pipes
8	Combustible pipes
9	Cable tray
10	Electric cables
11	Solid wall / solid floor
12	Lightweight wall
13	ROCKWOOL RS 800 / Klimarock
14	Labelling plate



Mixed penetration seal
in lightweight and solid wall



Mixed penetration seal
in solid floor

4. Applications of HENSOMASTIK® Mixed Penetration Seal EI 60

Flexible walls

The wall must be at least 100 mm thick and consist of a wood or steel strut frame* lined on both sides with at least two layers of 12.5 mm thick boards.

* There must be a minimum distance of 100 mm between the seal and the supports, and this gap must be filled with at least 100 mm of Class A1 or A2 insulating material (as defined in EN 13501-1). The supporting structure must have been classified for the required fire resistance period as defined in EN 13501-2.

Solid walls

The wall must be at least 100 mm thick and be of concrete, aerated concrete, or masonry with a minimum density of 650 kg / m³.

HENSOMASTIK® Mixed Penetration Seal in lightweight and solid walls

Installation situation	Thickness of Hardrock 040 mineral fibre board for EI 60	Max sealant size in m² H x W
Lightweight wall ≥ 100 mm	≥ 60 mm	2.16 m² (1800 mm x 1200 mm)
Solid wall ≥ 100 mm	≥ 60 mm	2.16 m² (1800 mm x 1200 mm)

Solid floors

The floor must be at least 150 mm thick and be of concrete, aerated concrete, or masonry with a minimum density of 650 kg / m³.

HENSOMASTIK® Mixed Penetration Seal in solid floors

Installation situation	Thickness of Hardrock 040 mineral fibre board for EI 60	Max sealant size in m² H x W
Solid wall ≥ 150 mm	≥ 60 mm	1.8 m² (1800 mm x 1000 mm)

Note: It may be deviated from the dimensions, however, the penetration seal surface of 1.8 m² in solid floors or 2.16 m² in walls may not be exceeded!

HENSOMASTIK® Mixed Penetration Seal systems EI 60 can be used as sealant in conjunction with insulated metal pipes, combustible pipes, and electric cables, single or bundled.

Note: The maximum configuration of the sealing area may not exceed 60 %!
Also an empty seal can be installed. **Distances of the 1st support: Wall:** for all media ≤ 250 mm / **Floor:** for cables / cable support constructions ≤ 220 mm and for tubes ≤ 250 mm

LS = local insulation continuous in the sealing area | **LI** = local insulation interrupted in the sealing area

Pipe end configuration	Test condition		
	U/U	C/U	U/C
In the furnace	Open	Closed	Open
On the outside	Open	Open	Closed

NOTE: These assembly instructions are for your consultation. They do not serve in lieu of the details in the underlying European Technical Assessment **ETA 15/0294.** The complete ETA 15/0294 must be printed out and made available at the installation site.

5. Assembly instruction for HENSOTHERM® 7 KS Gewebe 100

HENSOTHERM® 7 KS Gewebe 100 intumescent pipe wrap for pipe penetration in the HENSOMASTIK® Mixed Penetration Seal EI 60

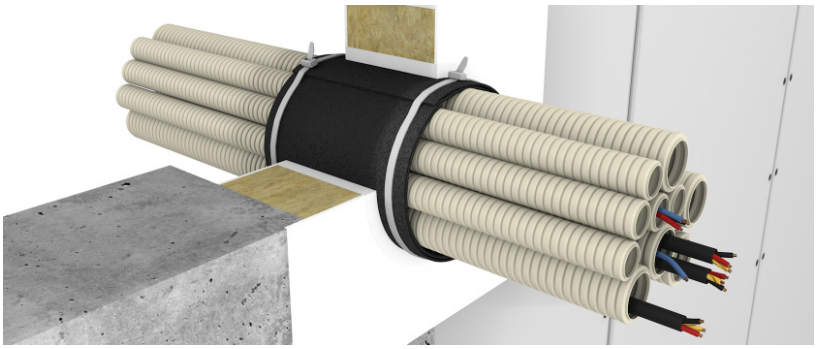
- Intumescent pipe wrap for sealing plastic pipes **up to Ø 110 mm** and cable tubes **up to Ø 125 mm** in flexible walls, solid walls and solid floors
- Flexible; easy and fast installation
- Low space requirement due to low installation height
- Measurements of the pipe wrap 100 mm width, 1 mm thick and 10 m long
- **The following combustible pipes are certified:** PVC-U, PE-HD, Geberit Silent-db20, Geberit Silent-PP, POLO-KAL NG, Flex-Schlauch, Uponor MLC, Viega Raxofix, Rehau Rautitan
- **ETA 16/0369** and **ETA 15/0294**

Installation in lightweight and solid walls EI 60

Pipes	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 100 (1 mm)	Classification
Geberit Silent dB20	≤56	3.2	3	EI 60 U/U
	≤90	5.5	4	
	≤110	6.0	6	
Geberit Silent PP	≤50	1.8	3	EI 90 U/U
	≤90	2.9	4	
	≤110	3.6	6	EI 60 U/U
PE-HD	≤56	3.0	3	EI 90 U/U
	≤90	3.5	4	
	≤110	4.3	6	
Polokal NG	≤50	2.0	3	EI 90 U/U
	≤90	3.0	4	
	≤110	3.4	6	EI 60 U/U
PVC-U	≤50	1.8 – 5.6	3	EI 60 U/U
	≤50	1.8	3	EI 90 U/U
	>50 ≤90	1.8 – 6.7	4	EI 60 U/U
	>90 ≤110	2.2 – 8.1	6	EI 60 U/U
	110	8.1	6	EI 90 U/U

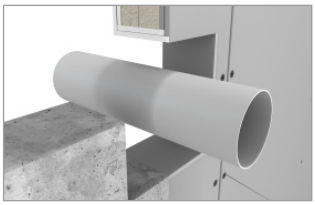
Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Isulation Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 100 (1 mm)	Classification
Geberit Mepla Armaflex NH (LS 500 mm)	16	2.0	9	1	EI 90 U/C
	40	3.5	9 – 19	1	EI 60 U/C
	63	4.5	13 – 19	2	
Uponor MLC Armaflex NH (LS 500 mm)	14	2.0	9	1	EI 90 U/C
	40	4.0	9 – 19	1	EI 60 U/C
	40	4.0	19	1	EI 90 U/C
	63	6.0	13 – 19	2	EI 60 U/C
Viega Raxofix Armaflex NH (LS 500 mm)	16	2.2	9	1	EI 90 U/C
	40	3.5	9 – 19	1	
	63	4.5	13 – 19	2	EI 60 U/C
Rehau Rautitan Armaflex NH (LS 500 mm)	16	2.6	9	1	EI 90 U/C
	40	6.0	9	1	
	40	6.0	9 – 19	1	EI 60 U/C

5. Assembly instruction for HENSOTHERM® 7 KS Gewebe 100



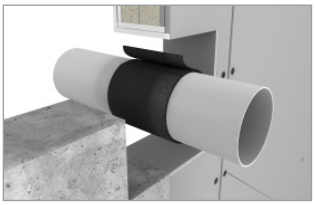
Conduit	Bundle Diameter [mm]	Cable types	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
25 – 32 mm with or without cables	125	NHXH-J 3 x 1.5 mm² and NHXH-J 5 x 1.5 mm²	6	EI 60 C/C

Assembly instructions:

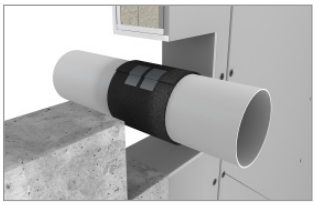


Clean reveals and rough opening

Cut **HENSOTHERM® 7 KS Gewebe 100** to size acc. to the requirements

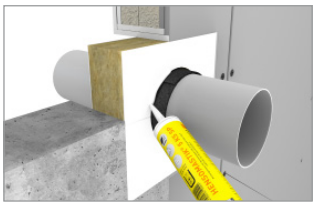


Wrapping of both sides of the combustible pipe fl ush with the surface of the penetration seal

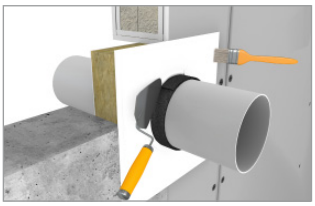


Fixing of the fi nished wrappings with duct tape

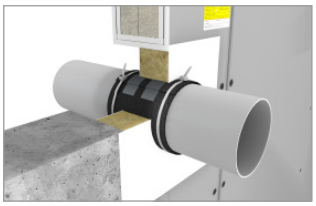
Professional installation of the **HENSOMASTIK® Mixed Penetration Seal**



Sealing of the ring gap with **HENSOMASTIK® 5 KS SP**



Smoothening of the surface with a spatula

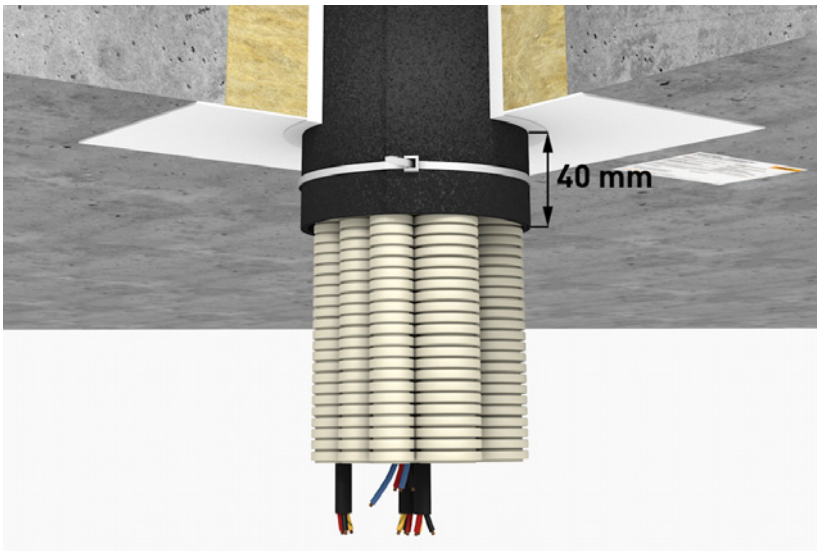


Marking of the **HENSOMASTIK® Mixed Penetration Seal**

Installation in rigid floors EI 60

Pipes	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Geberit Silent dB20	≤ 56	3.2	3	EI 60 U/U
	≤ 90	5.5	4	
	≤ 110	6.0	6	
Geberit Silent PP	≤ 50	2.0	3	EI 90 U/U
	≤ 110	3.6	6	EI 30 U/U
PE-HD	≤ 56	3.0	3	EI 60 U/U
	≤ 90	3.5	4	
	≤ 110	4.3	6	
Polokal NG	≤ 50	2.0	3	EI 60 U/U
	≤ 90	3.0	4	
	≤ 110	3.4	6	
PVC-U	≤ 50	1.8 – 5.6	3	EI 60 U/U
	≤ 90	1.8 – 6.7	4	
	≤ 110	2.2 – 8.1	6	

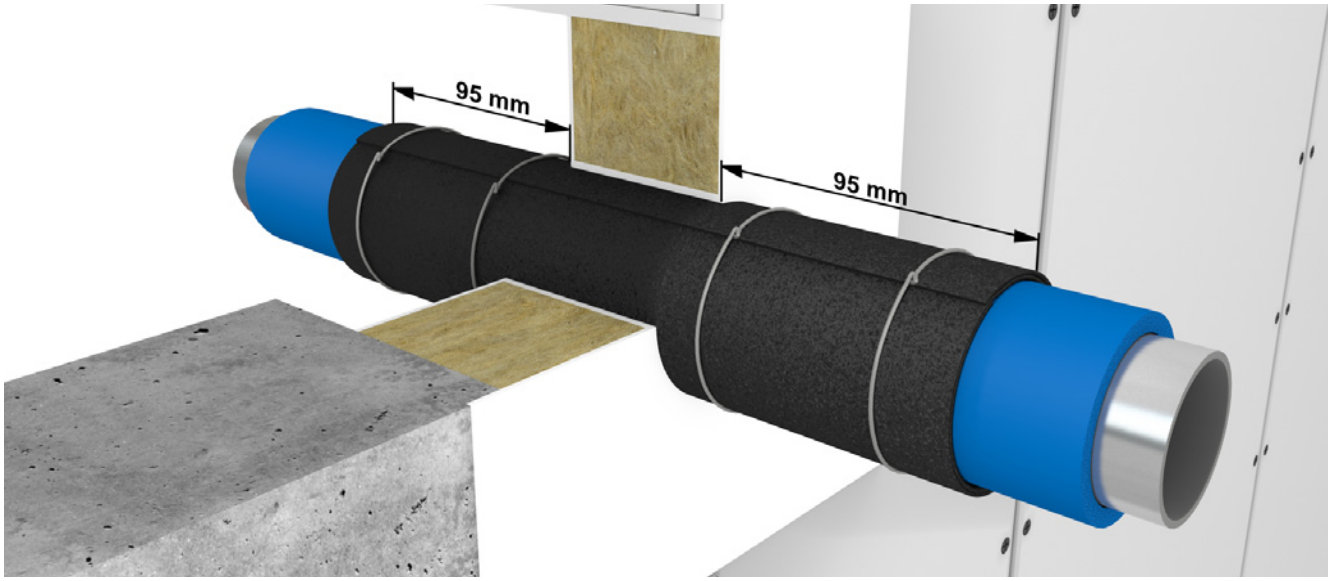
Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Isulation Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 100 (1 mm)	Classification
Geberit Mepla Armaflex NH (LS 500 mm)	16	2.0	9 – 19	1	EI 60 U/C
	40	3.5	9 – 19	1	
	63	4.5	13 – 19	2	
Uponor MLC Armaflex NH (LS 500 mm)	14	2.0	9 – 19	1	EI 60 U/C
	40	4.0	9 – 19	1	
	63	6.0	13 – 19	2	
Viega Raxofix Armaflex NH (LS 500 mm)	16	2.2	9 – 19	1	EI 60 U/C
	40	3.5	9 – 19	1	
	63	4.5	13 – 19	2	
Rehau Rautitan Armaflex NH (LS 500 mm)	16	2.6	9 – 19	1	EI 60 U/C
	40	6.0	9 – 19	1	



Conduit	Bundle Diameter [mm]	Cable Types	Layers of HENSOTHERM® 7KS Gewebe 100 (1 mm)	Classification
25 – 32 mm with cables	125	NHXH-J 3 x 1.5 mm^2 and NHXH-J 5 x 1.5 mm^2	6	EI 60 C/C
25 – 32 mm without cables		None		EI 15 C/C

6. Assembly instruction for HENSOTHERM® 7 KS Gewebe 125

HENSOTHERM® 7 KS Gewebe 125 intumescent pipe wrap for non-combustible pipes / composite pipes in the HENSOMASTIK® Mixed Penetration Seal EI 60

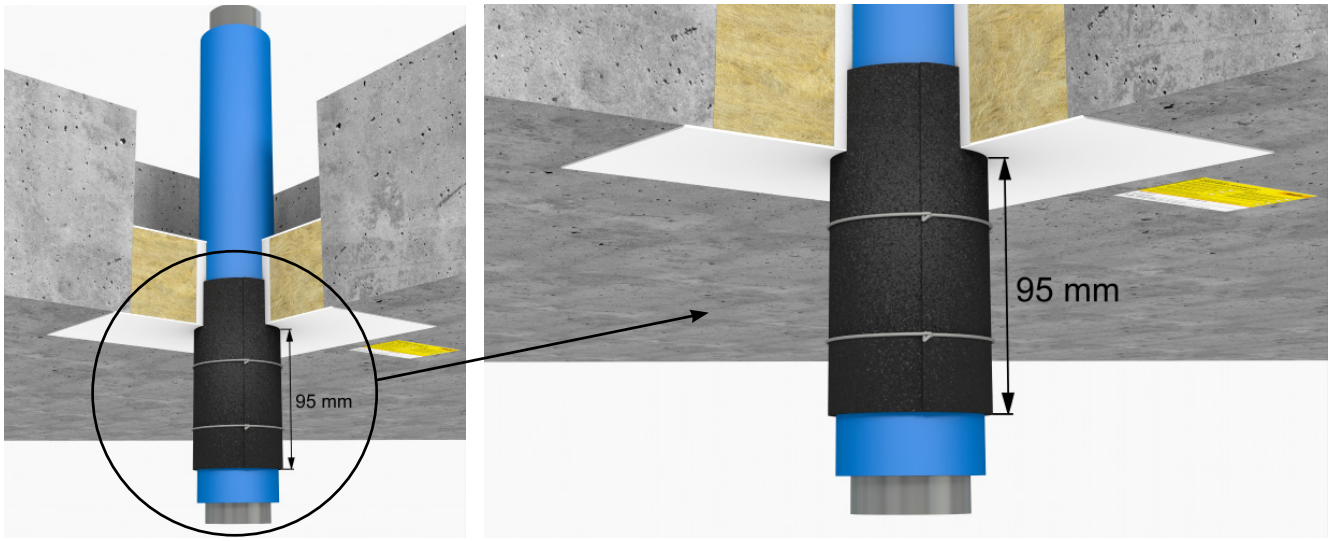


Installation in lightweight and solid walls EI 60

Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 125	Isulation Thickness [mm]	Insulation Length [mm]	Classification
Copper with Armaflex AF	≤ 10	1.0 – 5.0	1	11	LS 1000 mm	EI 90 C/U
	11 – 22	1.0 – 11.0	1	18	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	21	LS 1000 mm	
Steel and Cast iron with Armaflex AF	≤ 10	1.0 – 5.0	1	11	LS 1000 mm	EI 60 C/U
	11 – 22	1.0 – 11.0	1	18	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	21	LS 1000 mm	
	≤ 60.3	2.9 – 14.2	1	29	LS 1000 mm	
	60.4 – 88.9	3.2 – 14.2	1	30.5	LS 1000 mm	
	≤ 10	1.0 – 5.0	1	11	LS 1000 mm	EI 90 C/U
	11 – 54	1.5 – 14.2	1	21	LS 1000 mm	
	55 – 60.3	2.9 – 14.2	1	29	LS 1000 mm	
Copper with Armaflex LS	≤ 15	1.0 – 7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm / CS	
Steel and Cast iron with Armaflex LS	≤ 15	1.0 – 7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm / CS	
	55 – 89	3.2 – 14.2	1	25.0	LS 1000 mm / CS	
Copper with Armaflex Ultima	≤ 15	1.0 – 7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm / CS	
Steel and Cast iron with Armaflex Ultima	≤ 15	1.0 – 7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm / CS	
	55 – 89	3.2 – 14.2	1	25.0	LS 1000 mm / CS	

Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 125	Isulation Thickness [mm]	Insulation Length [mm]	Classification
Copper with Kaiflex ST	≤ 10	1.0 – 5.0	1	9	LS 1000 mm	EI 60 C/U
	11 – 22	1.0 – 11.0	1	9	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	19	LS 1000 mm	
Steel and Cast iron with Kaiflex ST	≤ 10	1.0 – 5.0	1	9	LS 1000 mm	EI 60 C/U
	11 – 22	1.0 – 11.0	1	9	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	19	LS 1000 mm	
	55 – 60.3	2.9 – 14.2	1	5	LS 1000 mm	
Copper with Kaiflex KK plus	≤ 15	1.0 – 7.5	1	11.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	21.0	LS 1000 mm / CS	
Steel and Cast iron with Kaiflex KK plus	≤ 15	1.0 – 7.5	1	11.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	21.0	LS 1000 mm / CS	
	55 – 89	3.2 – 14.2	1	28.5	LS 1000 mm / CS	

6.1 Assembly instruction for HENSOTHERM® 7 KS Gewebe 125



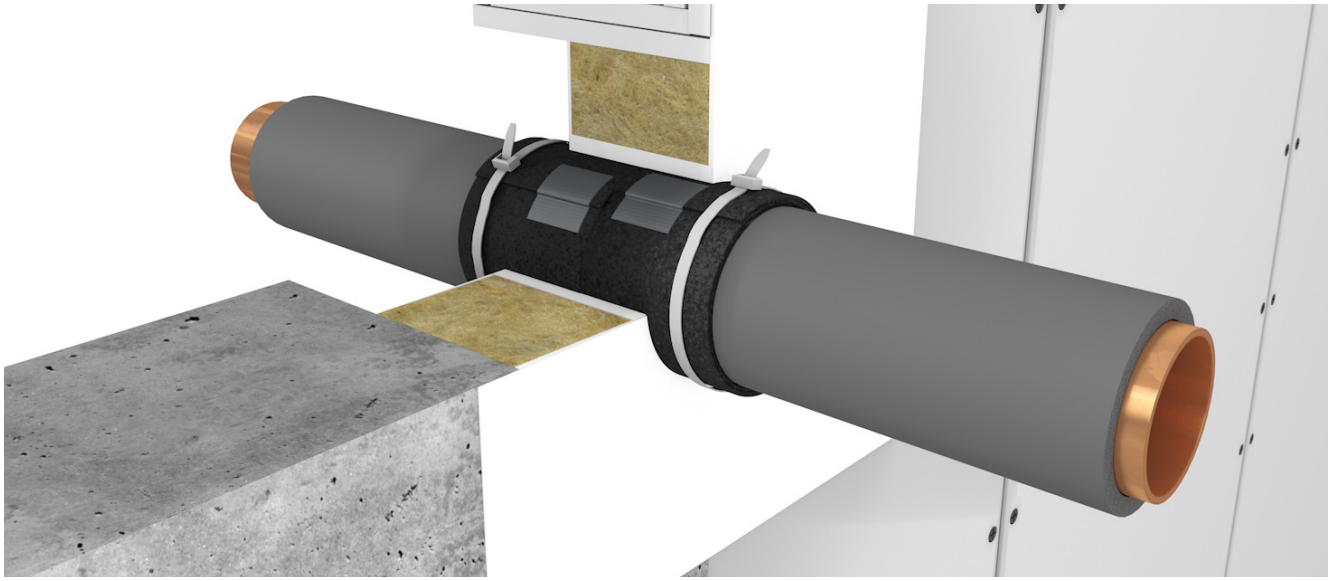
Installation in solid floors EI 60

Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 125	Isulation Thickness [mm]	Insulation Length [mm]	Classification
Copper with Armaflex AF	≤10	1.0 – 5.0	1	11	LS 1000 mm	EI 60 C/U
	11 – 22	1.0 – 11.0	1	18	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	21	LS 1000 mm	
Steel and Cast iron with Armaflex AF	≤10	1.0 – 5.0	1	11	LS 1000 mm	EI 60 C/U
	11 – 22	1.0 – 11.0	1	18	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	21	LS 1000 mm	
	55 – 60.3	2.9 – 14.2	1	29	LS 1000 mm	
	61 – 88.9	3.2 – 14.2	1	30.5	LS 1000 mm	EI 45 C/U
Copper with Armaflex LS	≤15	1.0 – 7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm / CS	
Steel and Cast iron with Armaflex LS	≤15	1.0 – 7.5	1	13.0	LS 1000 mm / CS	
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm / CS	
	55 – 89	3.2 – 14.2	1	25.0	LS 1000 mm / CS	
Copper with Armaflex Ultima	≤15	1.0 – 7.5	1	13.0	LS 1000 mm	EI 60 U/C
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm	
	≤15	1.0 – 7.5	1	13.0	CS	
	16 – 54	1.5 – 14.2	1	25.0	CS	EI 30 U/C
Steel and Cast iron with Armaflex Ultima	≤15	1.0 – 7.5	1	13.0	LS 1000 mm	EI 60 U/C
	16 – 54	1.5 – 14.2	1	25.0	LS 1000 mm	
	55 – 89	3.2 – 14.2	1	25.0	LS 1000 mm	
	≤15	1.0 – 7.5	1	13.0	CS	
	16 – 54	1.5 – 14.2	1	25.0	CS	EI 30 U/C
	55 – 89	3.2 – 14.2	1	25.0	CS	EI 60 U/C

Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 125	Isulation Thickness [mm]	Insulation Length [mm]	Classification
Copper with Kaiflex ST	≤ 10	1.0 – 5.0	1	9	LS 1000 mm	EI 60 C/U
	11 – 22	1.0 – 11.0	1	9	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	19	LS 1000 mm	
Steel and Cast iron with Kaiflex ST	≤ 10	1.0 – 5.0	1	9	LS 1000 mm	EI 60 C/U
	11 – 22	1.0 – 11.0	1	9	LS 1000 mm	
	23 – 54	1.5 – 14.2	1	19	LS 1000 mm	
	55 – 60.3	2.9 – 14.2	1	25	LS 1000 mm	
	61 – 89	3.2 – 14.2	1	30.5	LS 1000 mm	
Copper with Kaiflex KK plus	≤ 15	1.0 – 7.5	1	11.0	LS 1000 mm / CS	EI 60 U/C
	16 – 54	1.5 – 14.2	1	21.0	LS 1000 mm / CS	
Steel and Cast iron with Kaiflex KK plus	≤ 15	1.0 – 7.5	1	11.0	LS 1000 mm / CS	
	16 – 54	1.5 – 14.2	1	21.0	LS 1000 mm / CS	
	55 – 89	3.2 – 14.2	1	28.5	LS 1000 mm / CS	

6.2 Assembly instruction for HENSOTHERM® 7 KS Gewebe 50

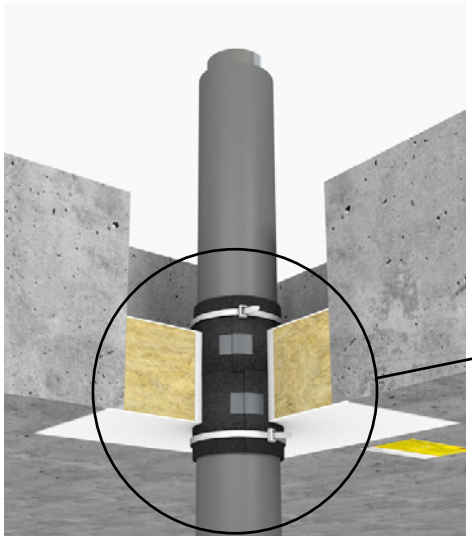
HENSOTHERM® 7 KS Gewebe 50 intumescent pipe wrap for non-combustible pipes / composite pipes in the HENSOMASTIK® Mixed Penetration Seal EI 60

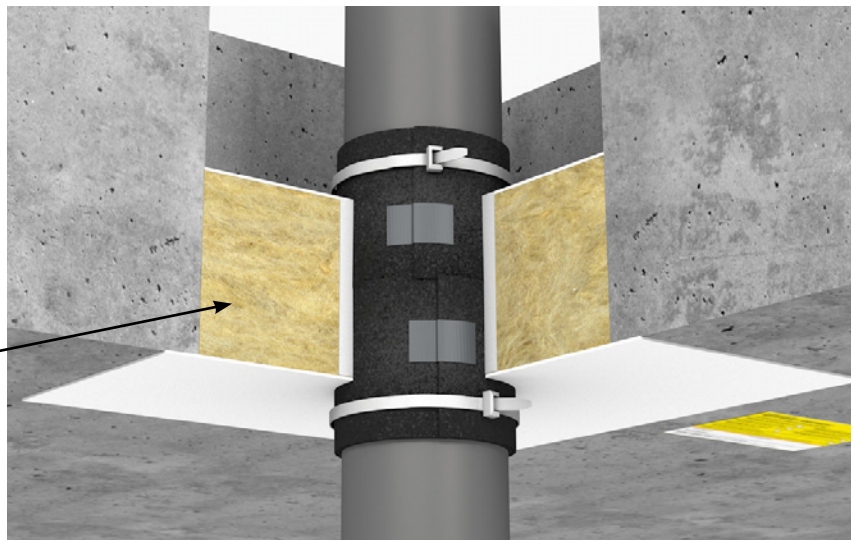


Installation in lightweight and solid walls EI 60

Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Lagen des HENSOTHERM® 7KS Gewebe 50 2 x 50 mm (2 mm)	Isulation Thickness [mm]	Insulation Length [mm]	Classification
Copper and Steel with Armaflex R 90 Protect	≤ 15	1.0 – 7.5	1	19 – 25	LS 1000 mm	EI 90 C/U
	16 – 42	1.2 – 14.2	1	25	LS 1000 mm	
	43 – 54	1.5 – 14.2	1	25	LS 1000 mm	
	55 – 89	2.0 – 14.2	1	25	LS 1000 mm	EI 60 C/U
Copper and Steel with Armaflex NH	≤ 15	1.0 – 7.5	1	9	CS	EI 90 C/U
	16 – 42	1.2 – 14.2	2	13 – 25	CS	EI 60 C/U
	16 – 42	1.2 – 14.2	2	13	CS	EI 90 C/U
	43 – 54	1.5 – 14.2	2	13 – 25	CS	EI 30 C/U
	54	1.5 – 14.2	2	25	CS	EI 90 C/U
	55 – 89	2.0 – 14.2	2	19 – 25	CS	EI 30 C/U
Steel with Armaflex NH	90 – 114.3	4.5 – 14.2	2	19 – 25	CS	EI 30 C/U
Copper and Steel with Armaflex Ultima	≤ 15	1.0 – 7.5	1	9	CS	EI 90 C/U
	16 – 42	1.2 – 14.2	2	13 – 25	CS	EI 60 C/U
	43 – 89	2.0 – 14.2	2	19 – 25	CS	
Copper and Steel with Eurobatex HF	≤ 15	1.0 – 7.5	1	9	CS	EI 90 C/U
	16 – 42	1.2 – 14.2	2	13 – 25	CS	EI 60 C/U
	43 – 54	1.5 – 14.2	2	13 – 25	CS	EI 30 C/U
	55 – 89	2.0 – 14.2	2	19 – 25	CS	EI 15 C/U
	55 – 89	2.0 – 14.2	2	25	CS	EI 30 C/U
Steel with Eurobatex HF	> 89 ≤ 114	4.5 – 14.2	2	25 – 32	CS	EI 30 C/U
	114	4.5 – 14.2	2	19 – 32	CS	EI 60 C/U

6.3 Assembly instruction for HENSOTHERM® 7 KS Gewebe 50





Installation solid floors EI 60

Pipes / Insulation	Maximum Pipe Diameter [mm]	Pipe Wall Thickness [mm]	Layers of HENSOTHERM® 7KS Gewebe 50 2 x 50 mm (2 mm)	Isulation Thickness [mm]	Insulation Length [mm]	Classification
Copper and Steel with Armaflex R 90 Protect	≤ 15	1.0 – 7.5	1	19 – 25	LS 1000 mm	EI 90 C/U
	16 – 42	1.2 – 14.2	1	25	LS 1000 mm	
	43 – 54	1.5 – 14.2	1	25	LS 1000 mm	
	55 – 89	2.0 – 14.2	1	25	LS 1000 mm	EI 60 C/U
Copper and Steel with Armaflex NH	≤ 15	1.0 – 7.5	1	9	CS	EI 90 C/U
	16 – 42	1.2 – 14.2	2	13 – 25	CS	EI 60 C/U
	16 – 42	1.2 – 14.2	2	25	CS	EI 90 C/U
	43 – 54	1.5 – 14.2	2	13 – 25	CS	EI 60 C/U
	55 – 89	2.0 – 14.2	2	19 – 25	CS	EI 60 C/U
Steel with Armaflex NH	90 – 114.3	4.5 – 14.2	2	19	CS	EI 60 C/U
	90 – 114.3	4.5 – 14.2	2	19 – 25	CS	EI 30 C/U
Copper and Steel with Armaflex Ultima	≤ 15	1.0 – 7.5	1	9	CS	EI 60 C/U
	16 – 42	1.2 – 14.2	2	13 – 25	CS	EI 60 C/U
	16 – 42	1.2 – 14.2	2	25	CS	EI 90 C/U
	43 – 89	2.0 – 14.2	2	19 – 25	CS	EI 30 C/U
	43 – 89	2.0 – 14.2	2	25	CS	EI 60 C/U
Copper and Steel with Eurobatex HF	≤ 15	1.0 – 7.5	1	9	CS	EI 90 C/U
	16 – 42	1.2 – 14.2	2	13 – 25	CS	EI 60 C/U
	43 – 54	1.5 – 14.2	2	13 – 25	CS	EI 30 C/U
	43 – 54	1.5 – 14.2	2	25	CS	EI 60 C/U
	55 – 89	2.0 – 14.2	2	19 – 25	CS	EI 30 C/U
Steel with Eurobatex HF	90 – 114.3	4.5 – 14.2	2	19 – 32	CS	EI 30 C/U
	114.3	4.5 – 14.2	1	32	CS	EI 60 C/U

*** IMPORTANT!** The thick coated side of the **HENSOTHERM® 7 KS Gewebe 50** must be wrapped on the outer wall of the pipe!

7. Assembly instructions for HENSOMASTIK® Mixed Penetration Seal EI 60 in flexible and solid walls with a wall thickness of minimum 100 mm

HENSOMASTIK® Mixed Penetration Seals may be applied by trained and qualified personnel only.
The Mixed Penetration Seal system may not be processed at material, substrate, or air temperatures below +5 °C or at air humidities exceeding 80 %. Before installation, the reveals and the rough opening of the structural element must be cleaned and all loose parts removed!
Up to 60 % of **HENSOMASTIK® Mixed Penetration Seal** can be covered with supply lines. Retrofits on **HENSOMASTIK® Mixed Penetration Seal** are possible when 60 % of the area has not yet been covered.

Step 1: Transfer the measurements of the rough opening of the structural element (length × width) to the boards, and cut these to size.
These must be used to cut out the individual pieces that must be custom-fitted in all openings between the lines and between these and the reveal.

TIP: A contour gauge (template) can be used to transfer electric cables, pipes, and cable runs to the fire protection board.

Step 2: The outsides of the cut mineral wool boards are coated with a fire protection coating at least 1 mm thick in the dried state.

TIP: This can be obtained in only the one operation with **HENSOMASTIK® 5 KS viskos** as the most cost-effective solution after the cut pieces have been fitted.

Alternatively, prefabricated or ready-coated mineral fibre boards can be used as the cut pieces.

Step 3: Before installation, the reveal and the cut edges of the mineral fibre boards must be coated with **HENSOMASTIK® 5 KS Farbe, HENSOMASTIK® 5 KS viskos,** or **HENSOMASTIK® 5 KS SP**. Not until afterwards may the cut pieces be installed in the carcase opening.

Step 4: Gaps, joins, and gussets are filled completely with **HENSOMASTIK® 5 KS SP**. Gaps, joins, or gussets wider than 10 mm are first filled with loose mineral fibre material towards the centre of the Mixed Penetration Seal and then filled with **HENSOMASTIK® 5 KS SP**.
Bear in mind that the circumferential gap around pipes may not be wider than 10 mm!

Step 5: Tape off the circumference of the opening **2 cm** above the rough opening of the structural element. This will allow you to coat the circumferences of the transitions/join between the mineral fibre boards and the wall or the ceiling at least **2 cm** beyond the mineral fibre board with at least **1 mm** (dry film thickness) of **HENSOMASTIK® 5 KS Farbe** or **HENSOMASTIK® 5 KS viskos**.

For **wall installations**, cables and cable runs must be coated **20 cm** as measured from the wall/sealant with at least 1 mm (dry film thickness) of **HENSOMASTIK® 5 KS Farbe** or **HENSOMASTIK® 5 KS viskos**.

For **ceiling installations**, cables and cable trays must be coated **10 cm** as measured from the ceiling/sealant with at least **1 mm** (dry film thickness) of **HENSOMASTIK® 5 KS Farbe** or **HENSOMASTIK® 5 KS viskos**.

IMPORTANT! Ceiling sealant must be protected additionally against access!

Finally, the ready **HENSOMASTIK® Mixed Penetration Seal** is fitted visibly and permanently with a **labelling plate** containing all the details and provided for this purpose.
This labelling plate is available from Rudolf Hensel GmbH.

Top coat for the **HENSOMASTIK® Mixed Pentration Seal** – if requested it is possible to design the surface of the penetration seal with the HENSOTOP WB (water-based) and HENSOTOP SB (solvent-based) top coats (50 – 100 µm dry film thickness) in RAL- or NCS color shades. Individual color shades on request.

NOTE: These assembly instructions are for your consultation. They do not serve in lieu of the details in the underlying European Technical Assessment **ETA 15/0294**. The complete ETA 15/0294 must be printed out and made available at the installation site.

ANNEX A – Resistance to Fire Classification – HENSOMASTIK® Mixed Penetration Seal EI60

A.1 Flexible and rigid wall constructions according to 1.2.1 with wall thickness of minimum 100 mm

A.1.1 Overview and dimensions

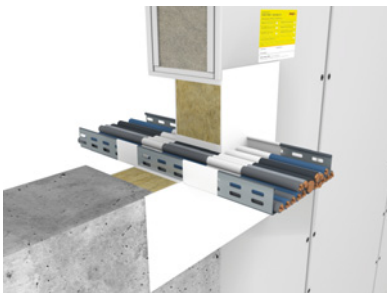
Maximum seal size: 1800 mm high x 1200 mm wide

a_1: between cable/cable trays and metal pipes ≥ 30 mm
a_2: between cable/cable trays and plastic pipes ≥ 30 mm
a_3: between metal pipes and plastic pipes ≥ 25 mm
a_4: between plastic pipes ≥ 0 mm
a_5: between metal pipes ≥ 25 mm
a_6: between cable trays ≥ 30 mm
b_1: between cable/cable trays and the upper seal edge ≥ 25 mm
b_2: between cable/cable trays and the side seal edge ≥ 25 mm
b_3: between cable/cable trays and the lower seal edge ≥ 25 mm
b_4: between metal pipes and the side seal edge ≥ 25 mm
b_5: between plastic pipes and the side seal edge ≥ 0 mm

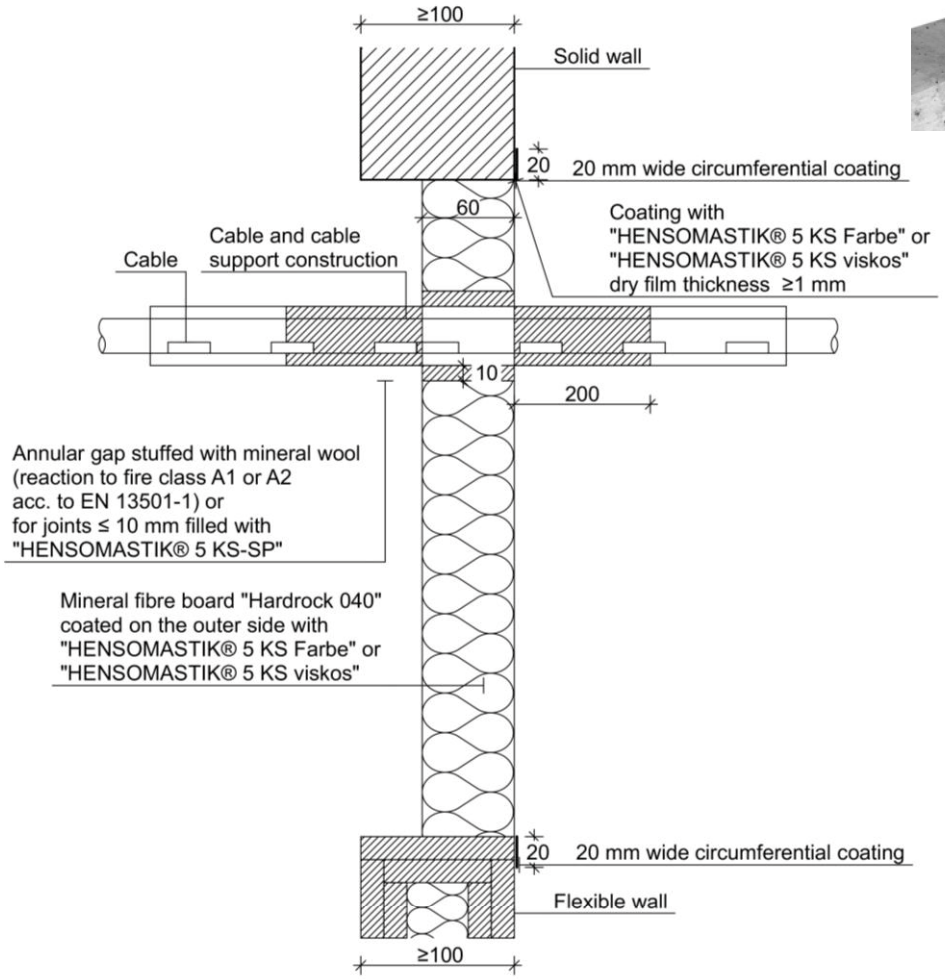
Distance 1st support service ≤ 250 mm

Services	Types
Cables	• Sheathed electrical cables up to 80 mm diameter • Telecom cables up to 21 mm diameter
Cable bundles	• Bundles of the above up to 100 mm in diameter
Cable bundles with HENSOTHERM® 7 KS Gewebe	• Bundles of the above up to 125 mm in diameter
Cable supports	• Perforated and unperforated steel cable trays and ladders
Plastic pipes with AWM II pipe collars	• PE pipes in accordance with EN 1519-1, EN 12666-1, EN12201-2 • Friaphon (by FRIATEC) pipes
Plastic pipes with Air Fire Tech Rorcol V30 pipe collars	• PVC-U pipes in accordance with EN 1329-1, EN 1453-1, EN 1452-1 • PE pipes in accordance with EN 1519-1, EN 12666-1, EN12201-2 • PP pipes in accordance with EN 1451-1
Plastic pipes with HENSOTHERM® 7 KS Gewebe 100	• PVC-U pipes in accordance with EN 1329-1, EN 1453-1, EN 1452-1 • PE pipes in accordance with EN 1519-1, EN 12666-1, EN12201-2 • Geberit Silent dB20 pipes • Geberit Silent PP pipes • Polokal NG pipes
Composite pipes with HENSOTHERM® 7 KS Gewebe 100	• Geberit Mepla pipes with Armaflex NH (LS) insulation • Uponor MLC pipes with Armaflex NH (LS) insulation • Viega Raxofix pipes with Armaflex NH (LS) insulation • Rehau Rautitan pipes with Armaflex NH (LS) insulation
Metal pipes with non-combustible insulation	Copper, mild & stainless steel and cast iron pipes with • Rockwool RS800 (LI) insulation, 1000 mm long • Rockwool RS 800 (LS) insulation, 1000 mm long • Metal pipes with Klimarock (CS) insulation
Metal pipes with combustible insulation and HENSOTHERM® 7 KS Gewebe 125	Copper, mild & stainless steel and cast iron pipes with • Armaflex AF insulation • Armaflex LS insulation • Armaflex Ultima insulation • Kaiflex ST insulation • Kaiflex KK plus insulation
Metal pipes with combustible insulation and HENSOTHERM® 7 KS Gewebe 50	Copper, mild & stainless steel and cast iron pipes with • Armaflex R90 Protect insulation • Armaflex NH insulation • Armaflex Ultima insulation • Eurobatex HF insulation

A.1.2 Cables and Trays

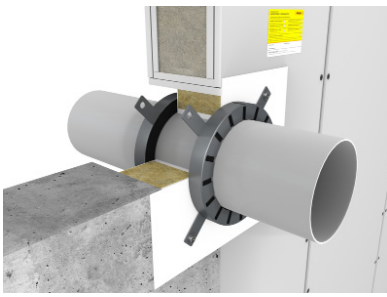


Construction details:

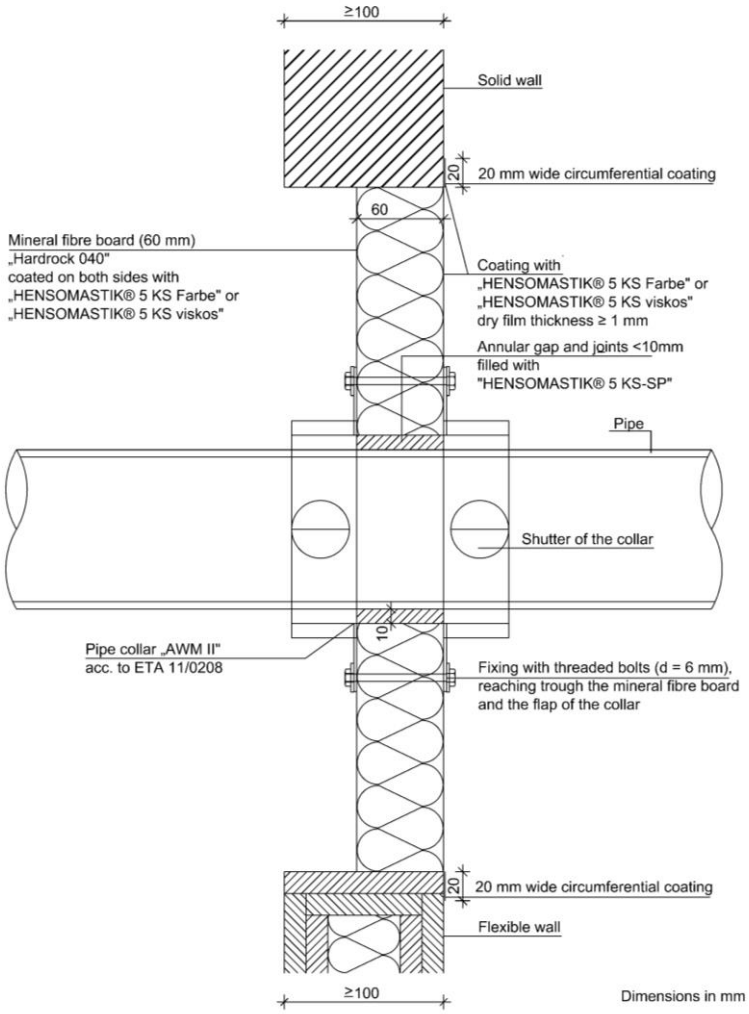


Services	Insulation/Coating	Classification
Sheathed cables up to 80 mm diameter	1 mm DFT HENSOMASTIK® 5 KS Farbe and HENSOMASTIK® 5 KS viskos extending 200 mm from both faces of the seal	**EI 60**
Telecoms cables up to 21 mm diameter		
Bundles of above cables up to 100 mm diameter		
Cable supports		

A.1.3 Plastic pipes with AWM II pipe collars

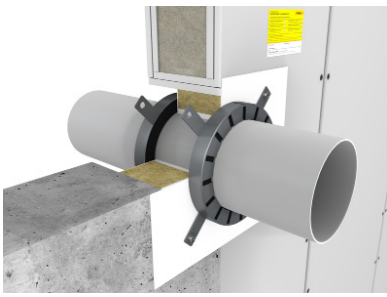


Construction details:

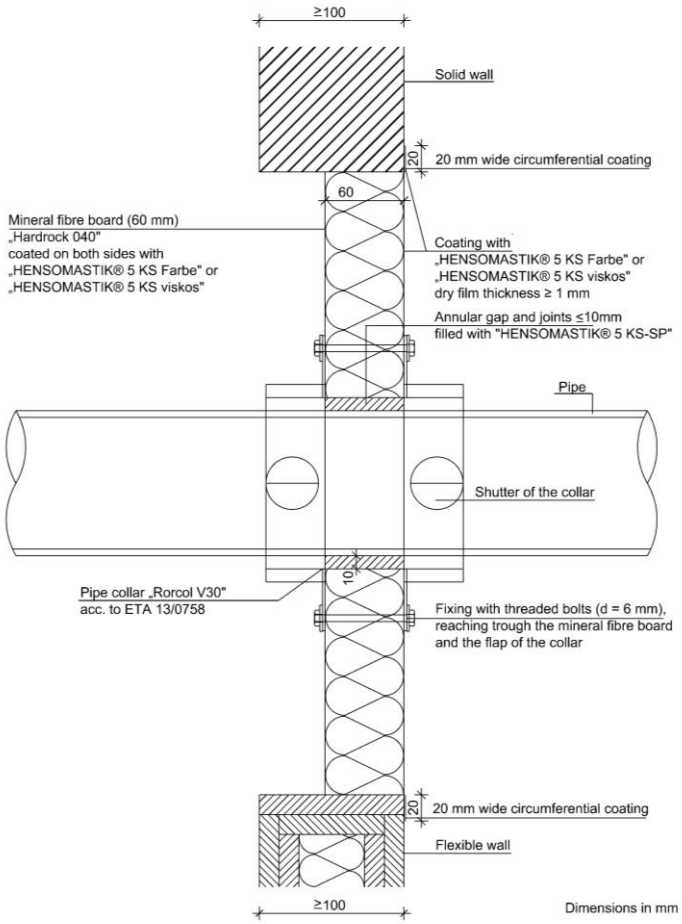


Services	Pipe diameter mm	Pipe wall thickness mm	Classification
PE pipe	40	3	**EI 60 U/U**
	50	3	
	56	3	
	75	3	
	90	3.5	
	110	4.3	
	125	4.9	
Friaphon pipe	52	2.8	
	78	4.9	
	110	5.3	
	135	5.6	

A.1.4 Plastic pipes with Air Fire Tech Rorcol V30 pipe collars



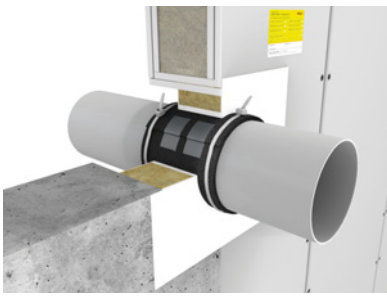
Construction details:



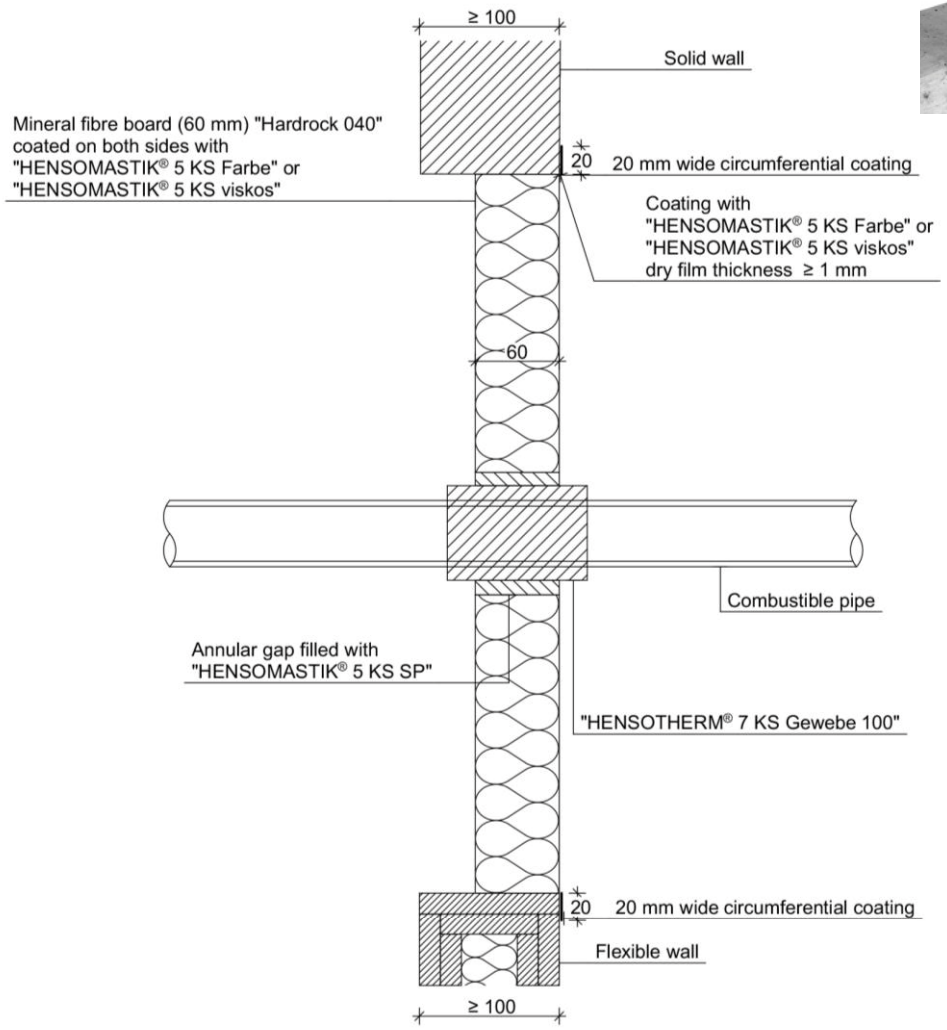
Services	Pipe diameter mm	Pipe wall thickness mm	Classification
PVC-U pipe	50	1.8-9.2	**EI 90 U/U ***
	70	2.0-9.2	
	90	2.2-9.2	
	125	2.5-9.2	
PE pipe	50	1.8-11.4	
	70	2.0-11.4	
	90	2.5-11.4	
	125	3.1-11.4	
PP pipe	50	1.8-11.4	
	70	2.0-11.4	
	90	2.5-11.4	
	125	3.1-11.4	

* U/C, C/U and C/C classifications are also applicable

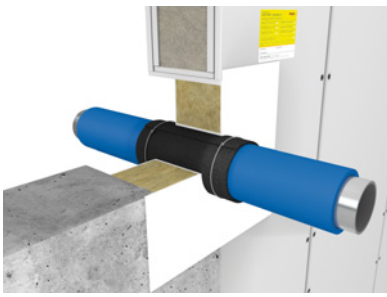
A.1.5 Plastic pipes, composite pipes and flexible conduits with HENSOTHERM® 7 KS Gewebe 100

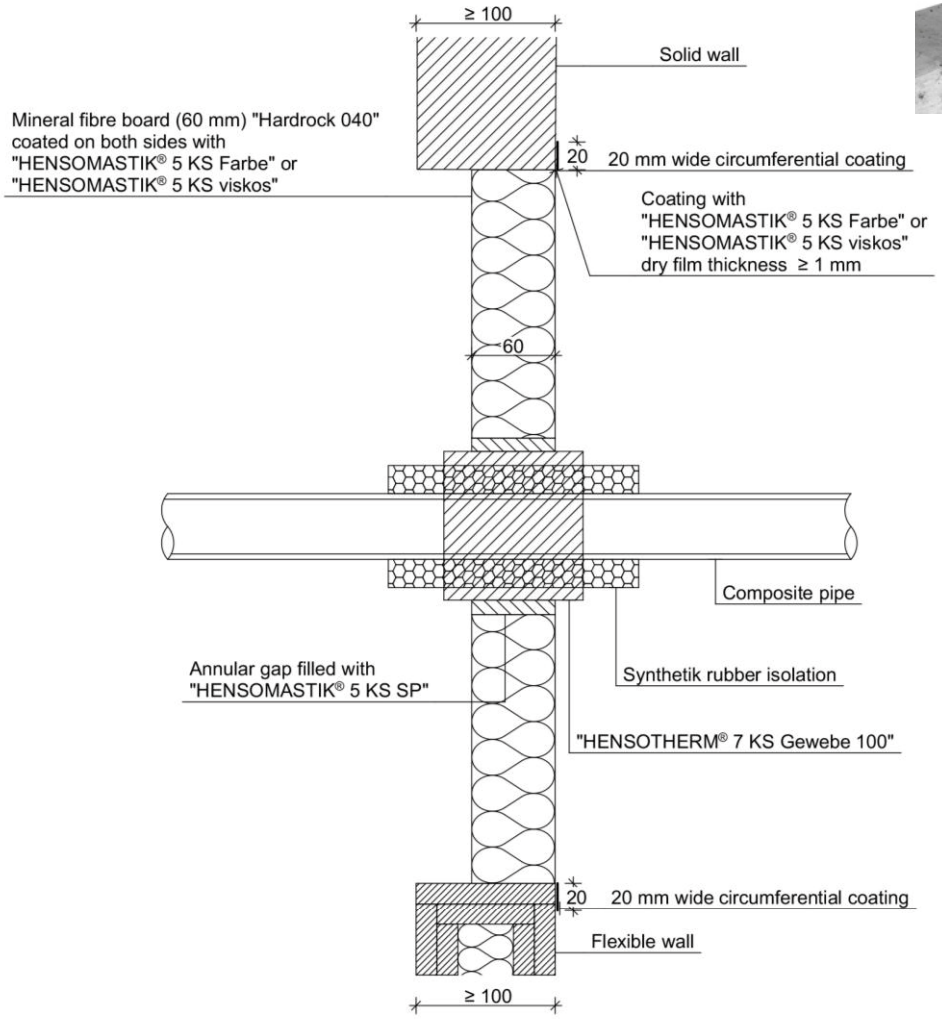


Construction details:



Dimensions in mm





Dimensions in mm

A.1.5.1 Geberit Silent dB20

Pipes	Maximum Pipe diameter mm	Pipe wall thickness Mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Geberit Silent dB20	≤56	3.2	3	**EI 60 U/U**
	≤90	5.5	4	
	≤110	6.0	6	

A.1.5.2 Geberit Silent PP

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Geberit Silent PP	≤50	1.8	3	**EI 90 U/U**
	≤90	2.9	4	
	≤110	3.6	6	**EI 60 U/U**

A.1.5.3 PE-HD

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
PE-HD	≤56	3.0	3	**EI 90 U/U**
	≤90	3.5	4	
	≤110	4.3	6	

A.1.5.4 Polokal NG

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Polokal NG	≤50	2.0	3	**EI 90 U/U**
	≤90	3.0	4	
	≤110	3.4	6	**EI 60 U/U**

A.1.5.5 PVC-U

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
PVC-U	≤50	1.8-5.6	3	**EI 60 U/U**
	≤50	1.8	3	**EI 90 U/U**
	>50 ≤90	1.8-6.7	4	**EI 60 U/U**
	>90 ≤110	2.2-8.1	6	**EI 60 U/U**
	110	8.1	6	**EI 90 U/U**

A.1.5.6 Geberit Mepla

Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Geberit Mepla Armaflex NH (LS 500mm)	16	2.0	9	1	**EI 90 U/C**
	40	3.5	9-19	1	**EI 60 U/C**
	63	4.5	13-19	2	

A.1.5.7 Uponor MLC

Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Uponor MLC Armaflex NH (LS 500mm)	14	2.0	9	1	**EI 90 U/C**
	40	4.0	9-19	1	**EI 60 U/C**
	40	4.0	19	1	**EI 90 U/C**
	63	6.0	13-19	2	**EI 60 U/C**

A.1.5.8 Viega Raxofix

Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Viega Raxofix Armaflex NH (LS 500mm)	16	2.2	9	1	**EI 90 U/C**
	40	3.5	9-19	1	
	63	4.5	13-19	2	**EI 60 U/C**

A.1.5.9 Rehau Rautitan

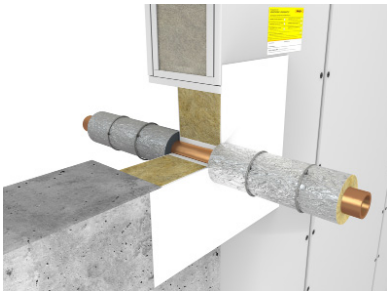
Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Rehau Rautitan Armaflex NH (LS 500mm)	16	2.6	9	1	**EI 90 U/C**
	40	6.0	9	1	
	40	6.0	9-19	1	**EI 60 U/C**

A.1.5.10 Bundle of flexible cable conduits

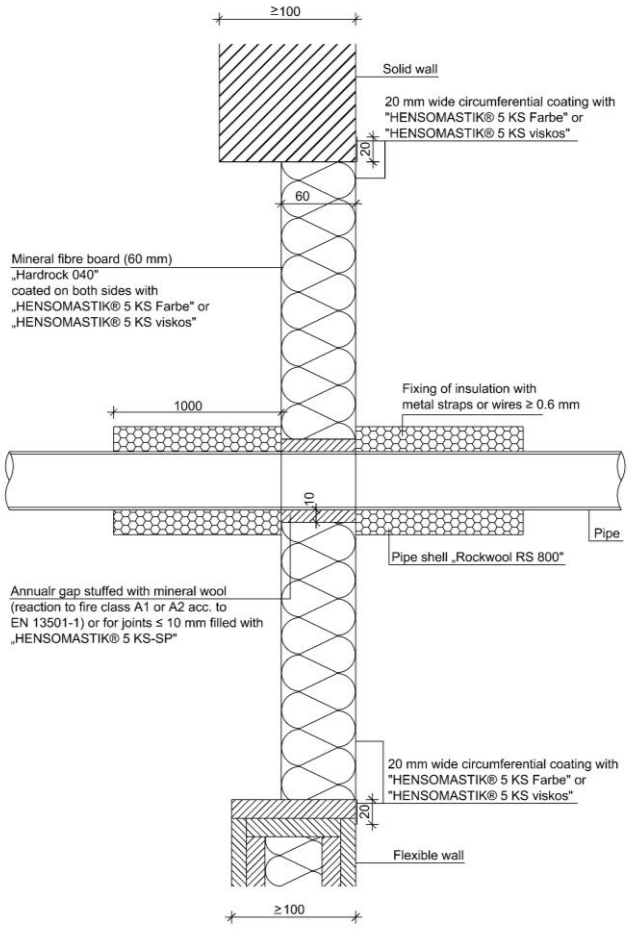
Conduit	Bundle diameter mm	Cable types	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
25-32 mm with or without cables	125	NHXH-J 3 x 1.5 mm^2 and NHXH-J 5 x 1.5 mm^2	6	**EI 60 C/C**

A.1.6 Metal pipes with non-combustible insulation

A.1.6.1 Metal pipes with Rockwool RS800 (LI) insulation, 1000 mm long



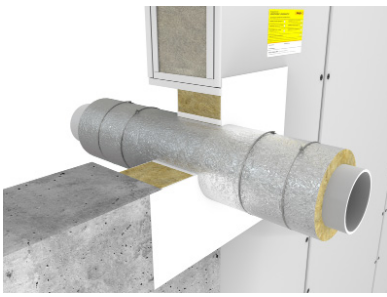
Construction details:



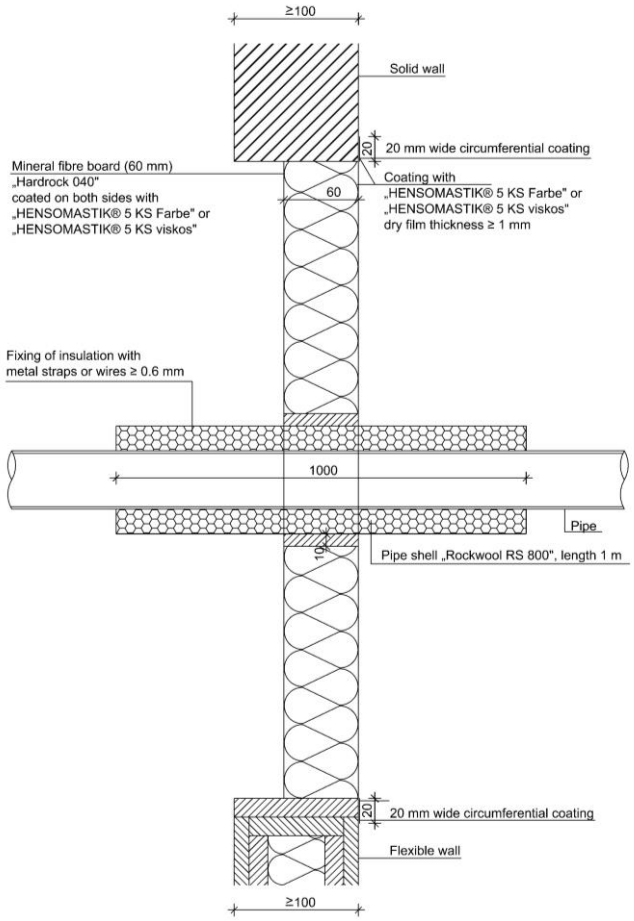
The length of the local insulation may be increased but not reduced. Dimensions in mm

Services	Pipe diameter mm	Pipe wall thickness mm	Insulation thickness mm	Classification
Copper pipe	≤ 22	1.0-11	20 (min.)	**EI 60 U/C**
	23 - 42	1.5-14.2	20 (min.)	
	43 - 88.9	2.0-14.2	30 (min.)	
Steel or cast iron pipe	≤ 22	1.0-11	20 (min.)	**EI 60 U/C**
	23 - 48.3	2.6-14.2	20 (min.)	
	49 - 139.7	4.0-14.2	30 (min.)	

A.1.6.2 Metal pipes with Rockwool RS800 (LS) insulation, 1000 mm long

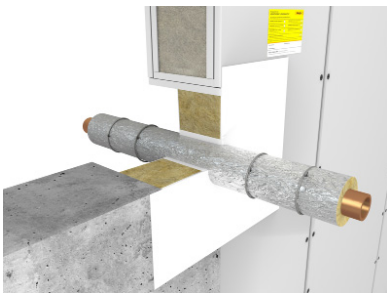


Construction details:



Services	Pipe diameter mm	Pipe wall thickness mm	Insulation thickness mm	Classification
Copper pipe	≤ 15	1.0-7.5	20	**EI 90 C/U**
	16 - 54	1.5-14.2	20	
Steel or cast iron pipe	≤ 15	1.0-7.5	20	**EI 90 C/U**
	16 - 54	1.5-14.2	20	
	55 - 139.7	4.0-14.2	30	

A.1.6.3 Metal pipes with Klimarock (CS)



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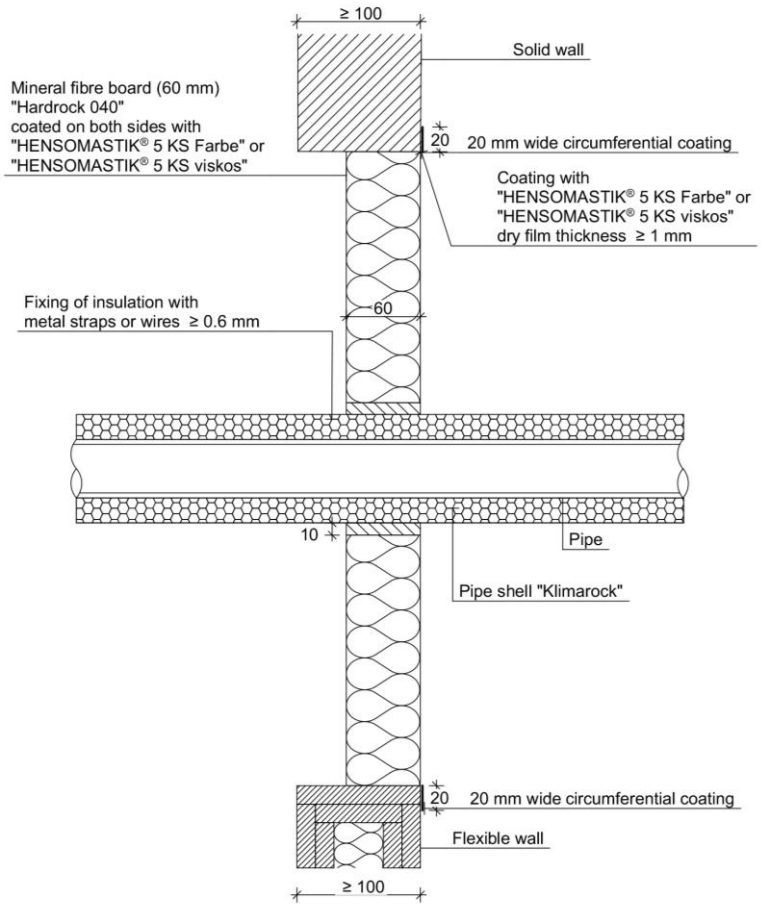
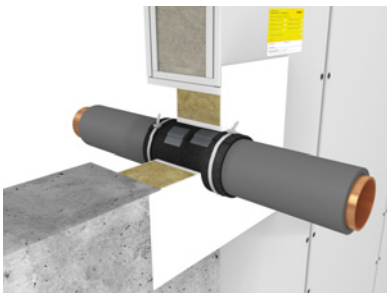


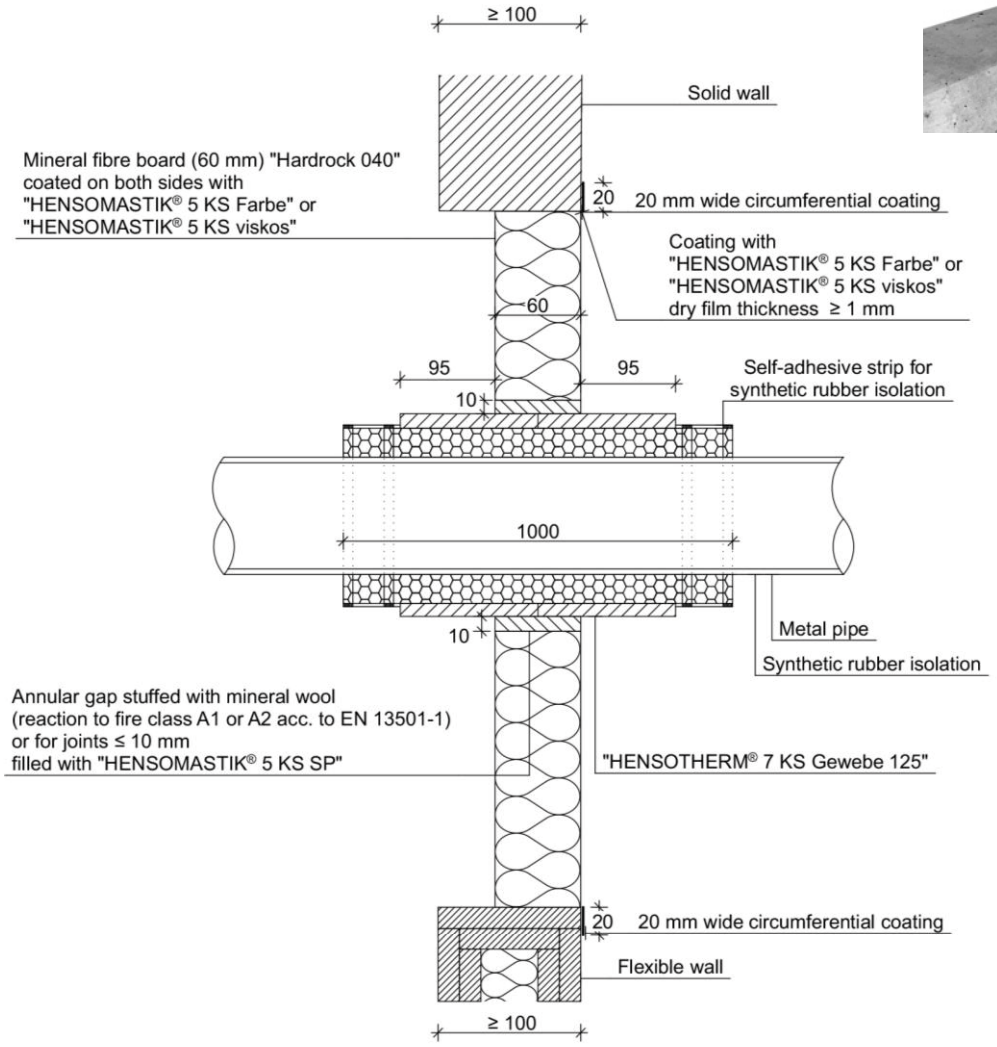
Dimensions in mm

Services	Pipe diameter mm	Pipe wall thickness mm	Insulation thickness mm	Classification
Copper pipe	≤ 15	1.0-7.5	20	**EI 60 U/C**
	16 - 54	1.5-14.2	20	
Steel or cast iron pipe	≤ 15	1.0-7.5	20	**EI 60 U/C**
	16 - 54	1.5-14.2	20	
	55 - 89	3.2-14.2	20	

A.1.7 Metal pipes with combustible insulation and HENSOTHERM® 7 KS Gewebe 125



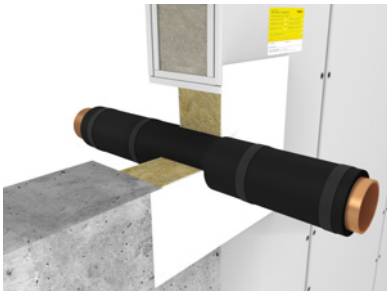
Construction details:

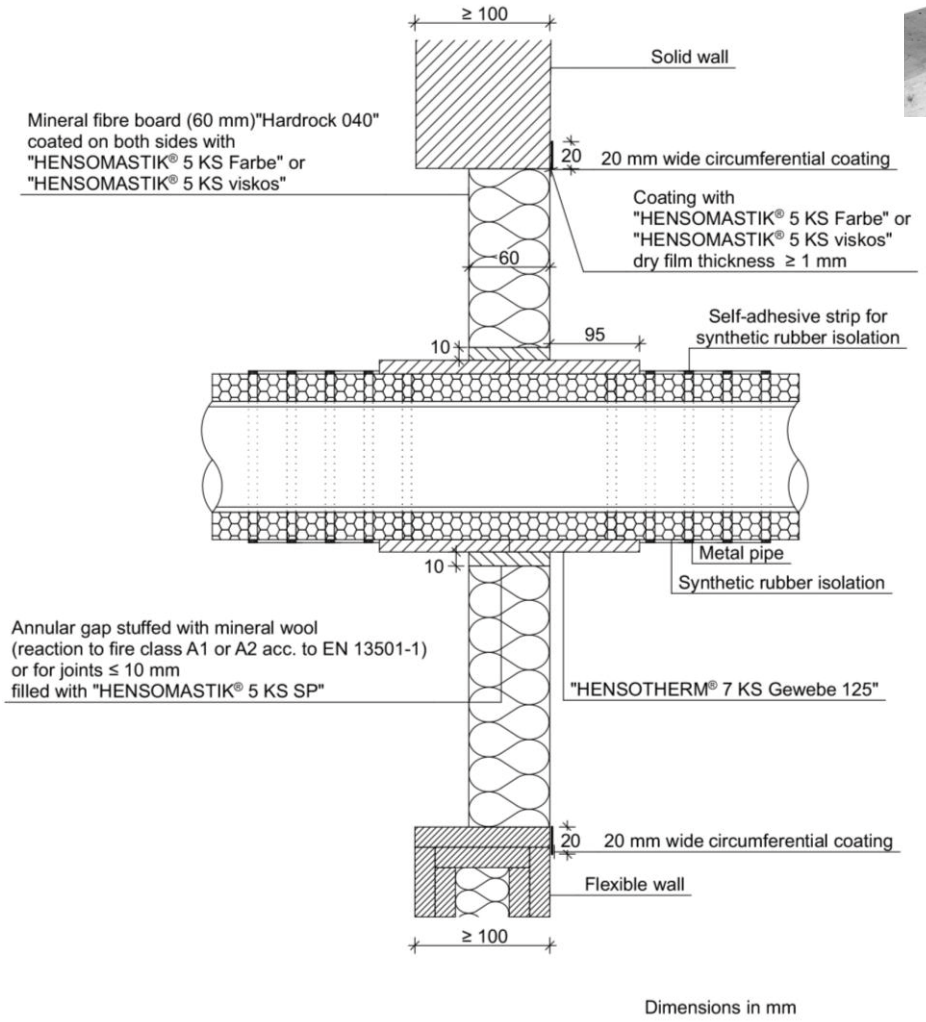


The length of the local insulation may be increased but not reduced.

Dimensions in mm

Construction details:





A.1.7.1 Metal pipes with Armaflex AF and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipe	≤ 10	1.0-5.0	1	11	LS 1000 mm	**EI 90 C/U**
	11 - 22	1.0-11.0	1	18	LS 1000 mm	
	23 - 54	1.5-14.2	1	21	LS 1000 mm	
Steel or cast iron pipe	≤ 10	1.0-5.0	1	11	LS 1000 mm	**EI 60 C/U**
	11 - 22	1.0-11.0	1	18	LS 1000 mm	
	23 - 54	1.5-14.2	1	21	LS 1000 mm	
	≤ 60.3	2.9-14.2	1	29	LS 1000 mm	
	60.4-88.9	3.2-14.2	1	30.5	LS 1000 mm	
	≤ 10	1.0-5.0	1	11	LS 1000 mm	**EI 90 C/U**
	11 - 54	1.5-14.2	1	21	LS 1000 mm	
	55 - 60.3	2.9-14.2	1	29	LS 1000 mm	

A.1.7.2 Metal pipes with Armaflex LS and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipe	≤ 15	1.0-7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm / CS	
Steel or cast iron pipe	≤ 15	1.0-7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm / CS	
	55 - 89	3.2-14.2	1	25.0	LS 1000 mm / CS	

A.1.7.3 Metal pipes with Armaflex Ultima and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipe	≤ 15	1.0-7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm / CS	
Steel or cast iron pipe	≤ 15	1.0-7.5	1	13.0	LS 1000 mm / CS	EI 60 U/C
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm / CS	
	55 - 89	3.2-14.2	1	25.0	LS 1000 mm / CS	

A.1.7.4 Metal pipes with Kaiflex ST and HENSOTHERM® 7 KS Gewebe 125

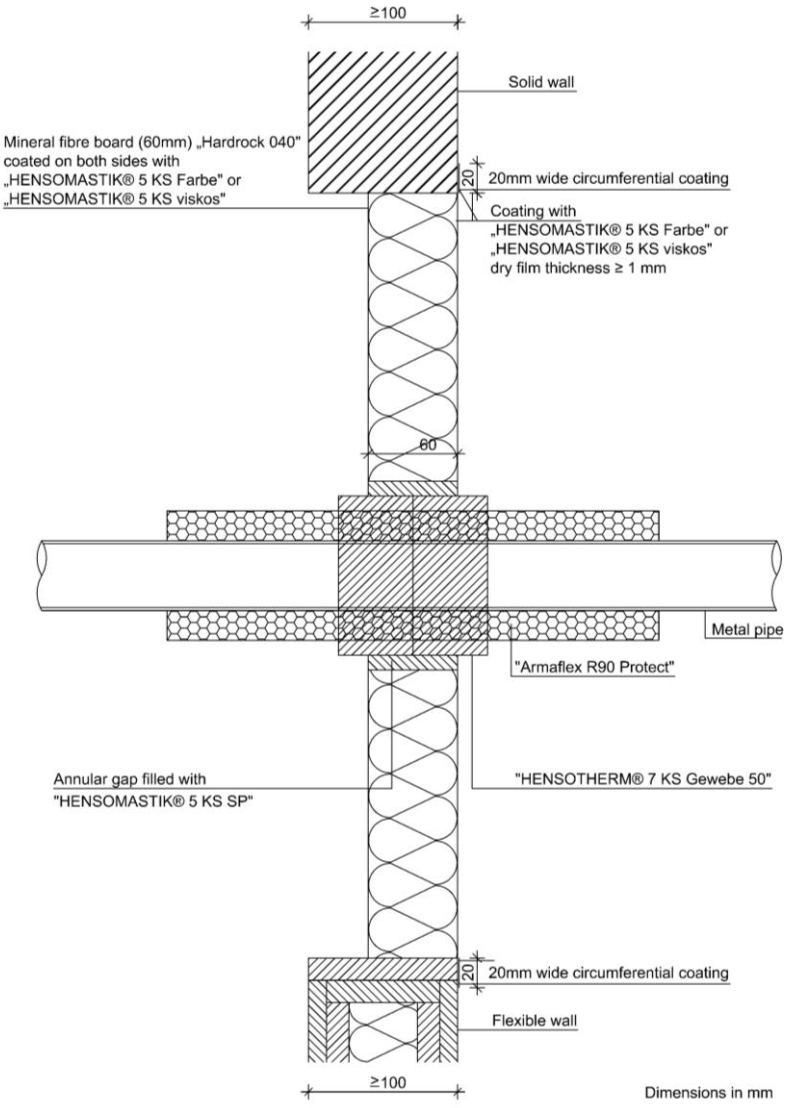
Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipe	≤ 10	1.0-5.0	1	9	LS 1000 mm	EI 60 C/U
	11 - 22	1.0-11.0	1	9	LS 1000 mm	
	23 - 54	1.5-14.2	1	19	LS 1000 mm	
Steel or cast iron pipe	≤ 10	1.0-5.0	1	9	LS 1000 mm	EI 60 C/U
	11 - 22	1.0-11.0	1	9	LS 1000 mm	
	23 - 54	1.5-14.2	1	19	LS 1000 mm	
	55 - 60.3	2.9-14.2	1	5	LS 1000 mm	

A.1.7.5 Metal pipes with Kaiflex KK plus and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipe	≤ 15	1.0-7.5	1	11.0	LS 1000 mm / CS	EI 60 U/C
	16 - 54	1.5-14.2	1	21.0	LS 1000 mm / CS	
Steel or cast iron pipe	≤ 15	1.0-7.5	1	11.0	LS 1000 mm / CS	EI 60 U/C
	16 - 54	1.5-14.2	1	21.0	LS 1000 mm / CS	
	55 - 89	3.2-14.2	1	28.5	LS 1000 mm / CS	

A.1.8 Metal pipes with combustible insulation and HENSOTHERM® 7 KS Gewebe 50

Construction details:



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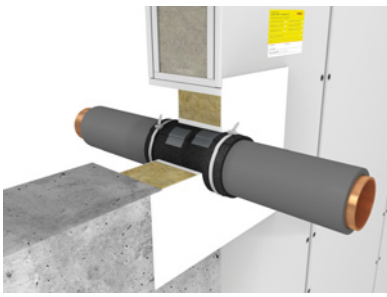
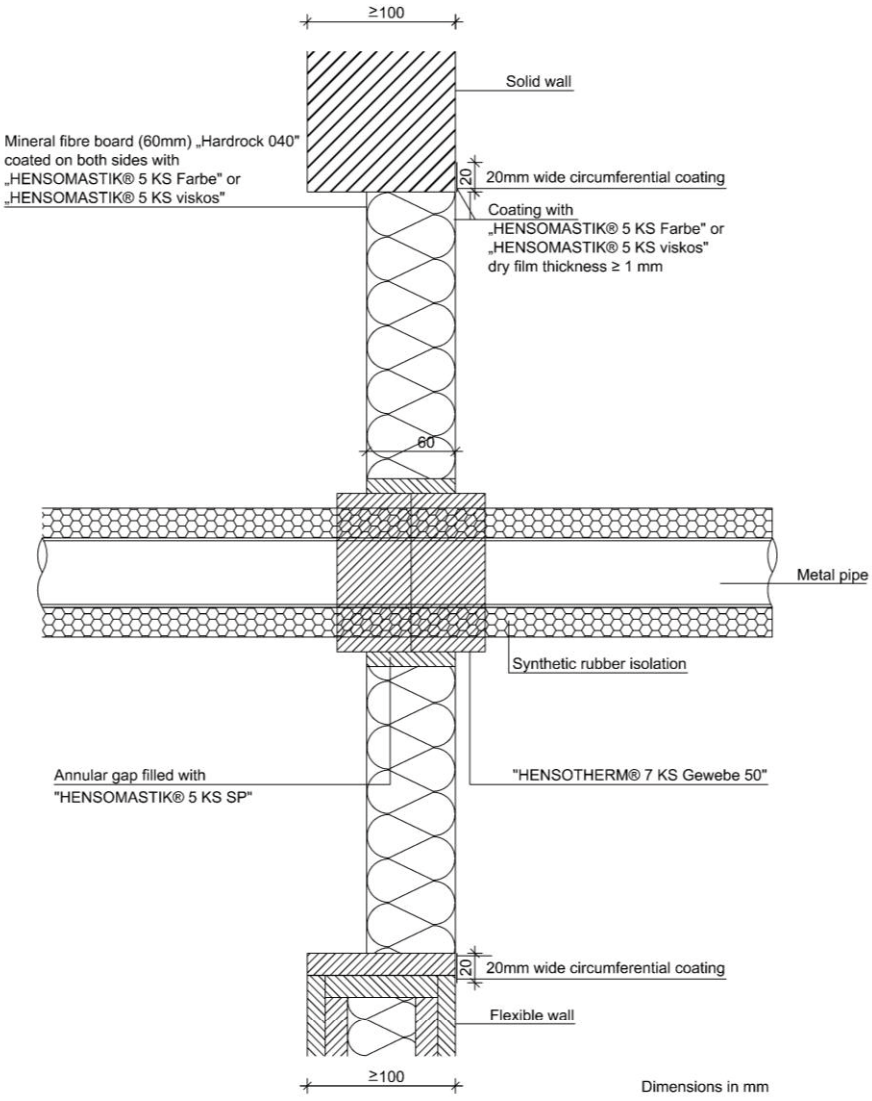




A.1.8.1 Metal pipes with Armaflex R90 Protect and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤15	1.0-7.5	1	19-25	LS 1000 mm	**EI 90 C/U**
	16-42	1.2-14.2	1	25	LS 1000 mm	
	43-54	1.5-14.2	1	25	LS 1000 mm	
	55-89	2-14.2	1	25	LS 1000 mm	**EI 60 C/U**

A.1.8.2 Metal pipes with Armaflex NH and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤15	1.0-7.5	1	9	CS	**EI 90 C/U**
	16-42	1.2-14.2	2	13-25	CS	**EI 60 C/U**
	16-42	1.2-14.2	2	13	CS	**EI 90 C/U**
	43-54	1.5-14.2	2	13-25	CS	**EI 30 C/U**
	54	1.5-14.2	2	25	CS	**EI90 C/U**
	55-89	2-14.2	2	19-25	CS	**EI30 C/U**
Steel pipe	90-114.3	4.5-14.2	2	19-25	CS	**EI 30 C/U**

A.1.8.3 Metal pipes with Armaflex Ultima and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤15	1.0-7.5	1	9	CS	**EI 90 C/U**
	16-42	1.2-14.2	2	13-25	CS	**EI 60 C/U**
	43-89	2-14.2	2	19-25	CS	

A.1.8.4 Metal pipes with Eurobatex HF and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤15	1.0-7.5	1	9	CS	**EI 90 C/U**
	16-42	1.2-14.2	2	13-25	CS	**EI 60 C/U**
	43-54	1.5-14.2	2	13-25	CS	**EI 30 C/U**
	55-89	2-14.2	2	19-25	CS	**EI 15 C/U**
	55-89	2-14.2	2	25	CS	**EI 30 C/U**
Steel pipe	>89 <114	4.5-14.2	2	25-32	CS	**EI 30 C/U**
	114	4.5-14.2	2	19-32	CS	**EI 60 C/U**

A.2 Rigid floor constructions according to 1.2.1 with floor thickness of minimum 150 mm

A.2.1 Overview and dimensions

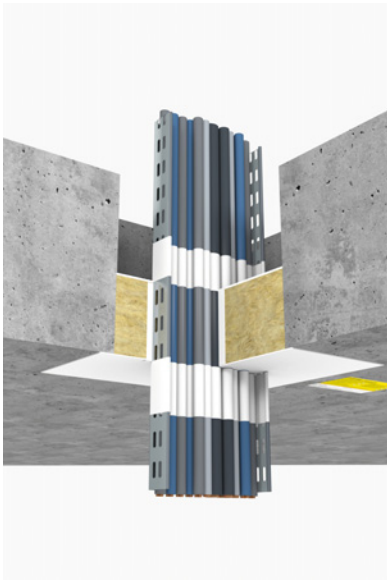
Maximum seal size: 1800 mm x 1000 mm

a_1: between cable/cable trays and metal pipes ≥ 20 mm
a_2: between cable/cable trays and plastic pipes ≥ 25 mm
a_3: between metal pipes and plastic pipes ≥ 25 mm
a_4: between plastic pipes ≥ 15 mm
a_5: between metal pipes ≥ 25 mm
a_6: between cable trays ≥ 20 mm
b_1: between cable/cable trays and the upper seal edge ≥ 25 mm
b_2: between cable/cable trays and the side seal edge ≥ 25 mm
b_3: between cable/cable trays and the lower seal edge ≥ 25 mm
b_4: between metal pipes and the side seal edge ≥ 25 mm
b_5: between plastic pipes and the side seal edge ≥ 25 mm

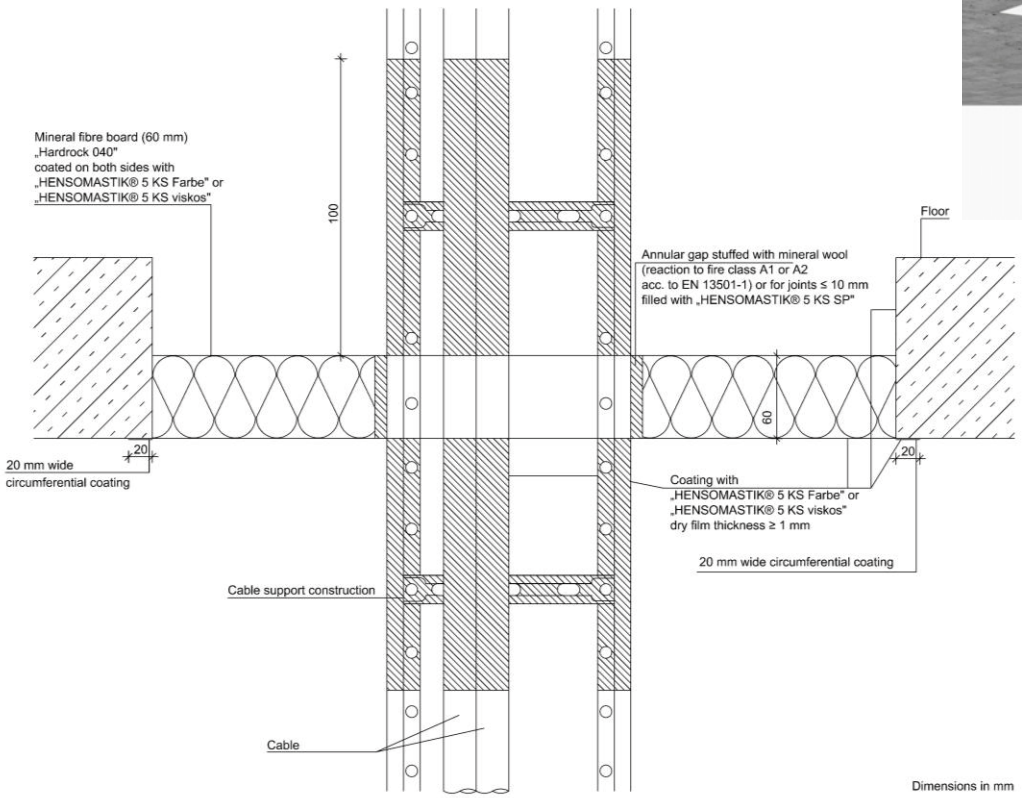
Distance 1st support service ≤ 250 mm
Distance 1st support cable/cable trays ≤ 220 mm

Services	Types
Cables	• Sheathed electrical cables up to 80 mm diameter • Telecom cables up to 21 mm diameter
Cable bundles	• Bundles of the above up to 100 mm in diameter
Cable bundles with HENSOTHERM® 7 KS Gewebe	• Bundles of the above up to 125 mm in diameter
Cable supports	• Perforated and unperforated steel cable trays and ladders
Plastic pipes with AWM II pipe collars	• PE pipes in accordance with EN 1519-1, EN 12666-1, EN12201-2 • Friaphon (by FRIATEC) pipes
Plastic pipes with Air Fire Tech Rorcol V30 pipe collars	• PVC-U pipes in accordance with EN 1329-1, EN 1453-1, EN 1452-1 • PE pipes in accordance with EN 1519-1, EN 12666-1, EN12201-2 • PP pipes in accordance with EN 1451-1
Plastic pipes with HENSOTHERM® 7 KS Gewebe 100	• PVC-U pipes in accordance with EN 1329-1, EN 1453-1, EN 1452-1 • PE pipes in accordance with EN 1519-1, EN 12666-1, EN12201-2 • Geberit Silent dB20 pipes • Geberit Silent PP pipes • Polokal NG pipes
Composite pipes with HENSOTHERM® 7 KS Gewebe 100	• Geberit Mepla pipes with Armaflex NH (LS) insulation • Uponor MLC pipes with Armaflex NH (LS) insulation • Viega Raxofix pipes with Armaflex NH (LS) insulation • Rehau Rautitan pipes with Armaflex NH (LS) insulation
Metal pipes with non-combustible insulation	Copper, mild & stainless steel and cast iron pipes with • Rockwool RS800 (LI) insulation, 1000 mm long • Rockwool RS 800 (LS) insulation, 1000 mm long
Metal pipes with combustible insulation and HENSOTHERM® 7 KS Gewebe 125	Copper, mild & stainless steel and cast iron pipes with • Armaflex AF insulation • Armaflex LS insulation • Armaflex Ultima insulation • Kaiflex ST insulation • Kaiflex KK plus insulation
Metal pipes with combustible insulation and HENSOTHERM® 7 KS Gewebe 50	Copper, mild & stainless steel and cast iron pipes with • Armaflex R90 Protect insulation • Armaflex NH insulation • Armaflex Ultima insulation • Eurobatex HF insulation

A.2.2 Cables and Trays

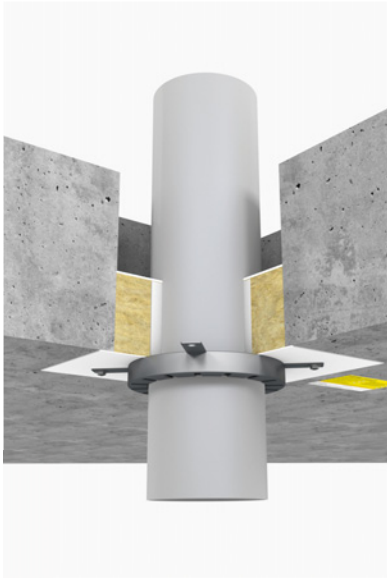


Construction details:



Services	Insulation/Coating	Classification
Sheathed cables up to 21 mm diameter	1 mm DFT HENSOMASTIK® 5 KS Farbe and HENSOMASTIK® 5 KS viskos extending 100 mm from both faces of the seal	**EI 60**
Telecoms cables up to 21 mm diameter		
Bundles of above cables up to 100 mm diameter		
Cable supports		

A.2.3 Plastic pipes with AWM II pipe collars



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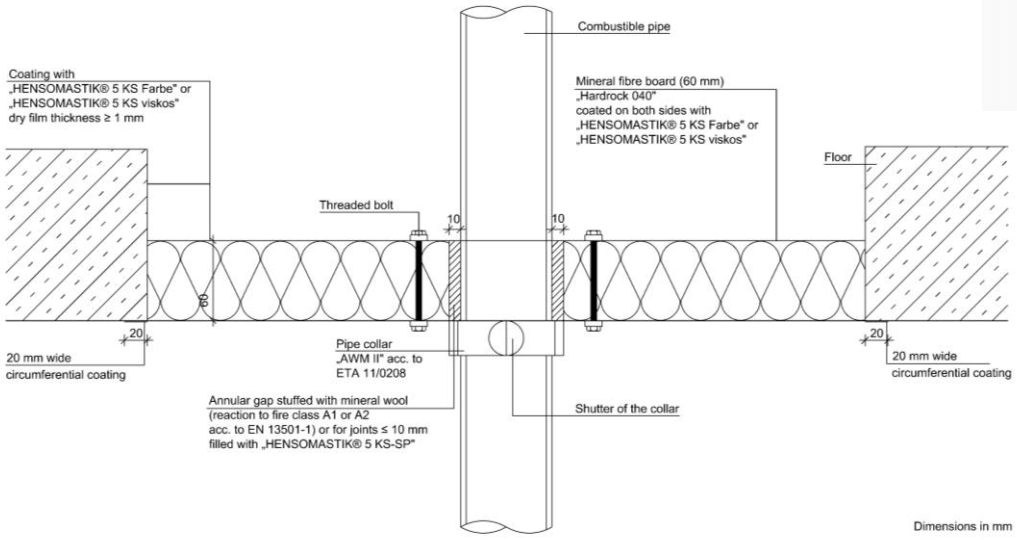
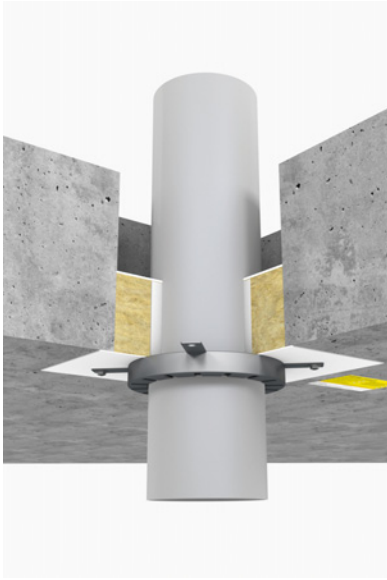


Services	Pipe diameter mm	Pipe wall thickness mm	Classification
PE pipe	40	3	**EI 60 U/U***
	50	3	
	56	3	
	75	3	
	90	3.5	
	110	4.3	
	125	4.9	
Friaphon pipe	52	2.8	
	78	4.9	
	110	5.3	
	135	5.6	

* U/C, C/U and C/C classifications are also applicable

A.2.4 Plastic pipes with Air Fire Tech Rorcol V30 pipe collars



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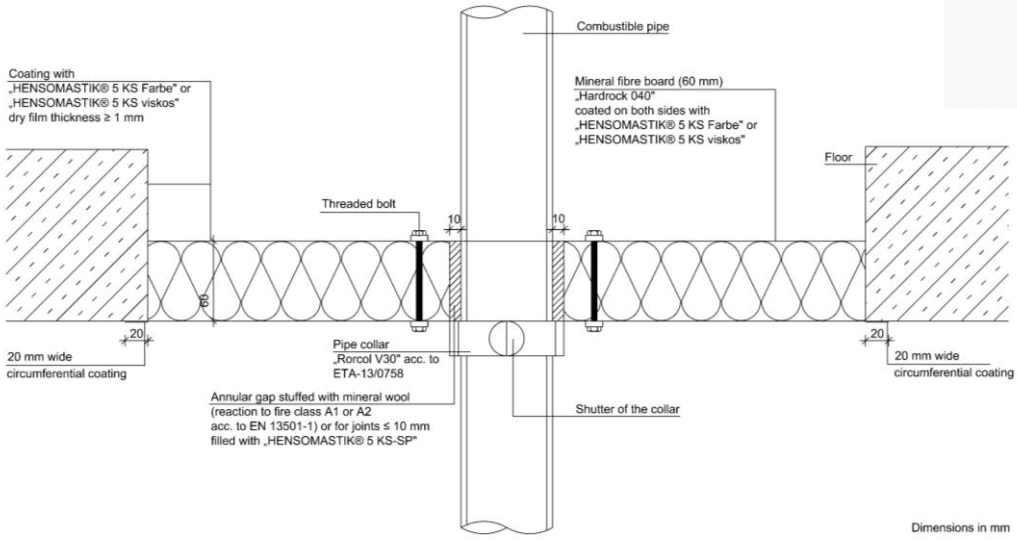
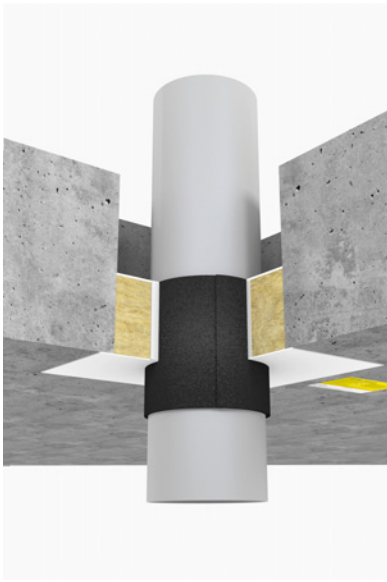


Services	Pipe diameter mm	Pipe wall thickness mm	Classification
PVC-U pipe	50	1.8-9.2	**EI 60 U/U***
	70	2.0-9.2	
	90	2.2-9.2	
	125	2.5-9.2	
PE pipe	50	1.8-11.4	
	70	2.0-11.4	
	90	2.5-11.4	
	125	3.1-11.4	
PP pipe	50	1.8-11.4	
	70	2.0-11.4	
	90	2.5-11.4	
	125	3.1	
	125	11.4	**EI 30 U/U***

* U/C, C/U and C/C classifications are also applicable

A.2.5 Plastic pipes, composite pipes and flexible conduits with HENSOTHERM® 7 KS Gewebe 100



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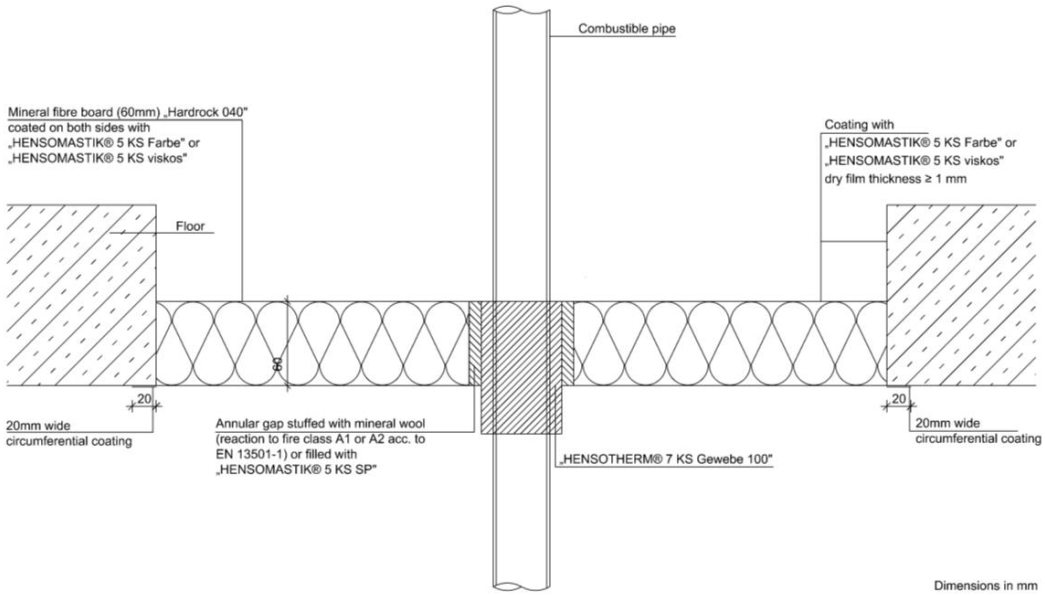

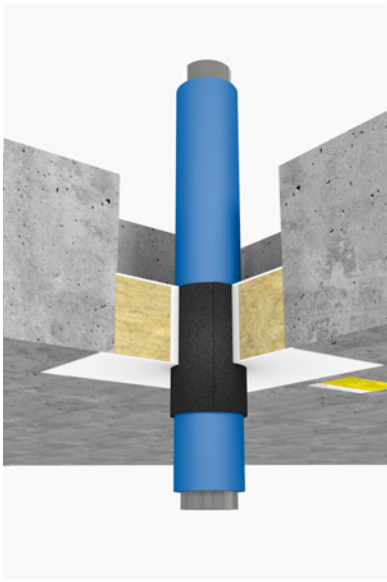

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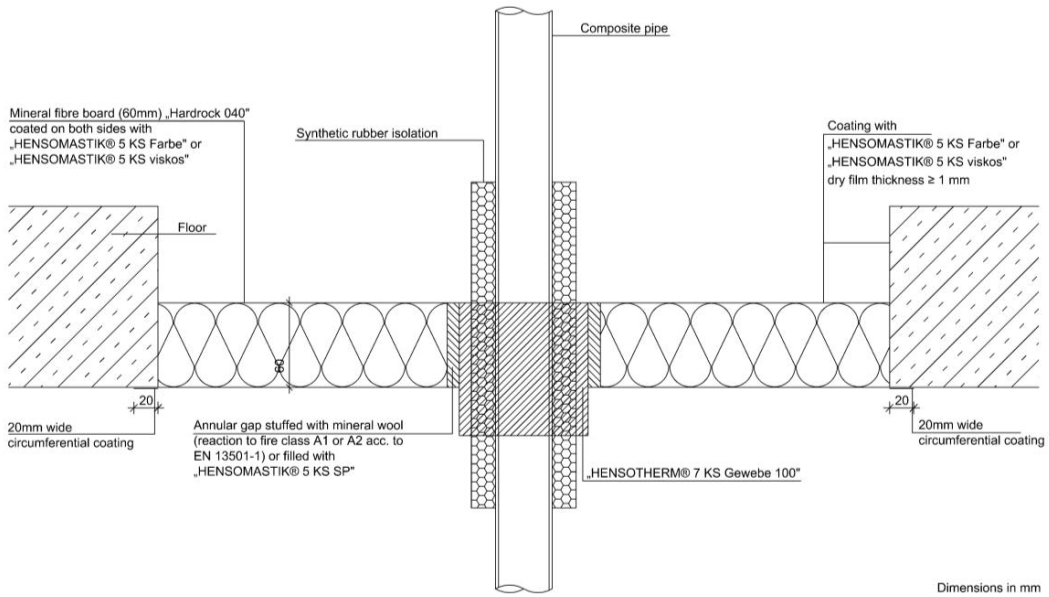


A.2.5.1 Geberit Silent dB20

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Geberit Silent dB20	≤56	3.2	3	**EI 60 U/U**
	≤90	5.5	4	
	≤110	6.0	6	

A.2.5.2 Geberit Silent PP

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Geberit Silent PP	≤50	2.0	3	**EI 90 U/U**
	≤110	3.6	6	**EI 30 U/U**

A.2.5.3 PE-HD

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
PE-HD	≤56	3.0	3	**EI 60 U/U**
	≤90	3.5	4	
	≤110	4.3	6	

A.2.5.4 Polokal NG

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Polokal NG	≤50	2.0	3	**EI 60 U/U**
	≤90	3.0	4	
	≤110	3.4	6	

A.2.5.5 PVC-U

Pipes	Maximum Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
PVC-U	≤50	1.8-5.6	3	**EI 60 U/U**
	≤90	1.8-6.7	4	
	≤110	2.2-8.1	6	

A.2.5.6 Geberit Mepla

Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Geberit Mepla Armaflex NH (LS 500mm)	16	2.0	9-19	1	EI 60 U/C
	40	3.5	9-19	1	
	63	4.5	13-19	2	

A.2.5.7 Uponor MLC

Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Uponor MLC Armaflex NH (LS 500mm)	14	2.0	9-19	1	EI 60 U/C
	40	4.0	9-19	1	
	63	6.0	13-19	2	

A.2.5.8 Viega Raxofix

Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Viega Raxofix Armaflex NH (LS 500mm)	16	2.2	9-19	1	EI 60 U/C
	40	3.5	9-19	1	
	63	4.5	13-19	2	

A.2.5.9 Rehau Rautitan

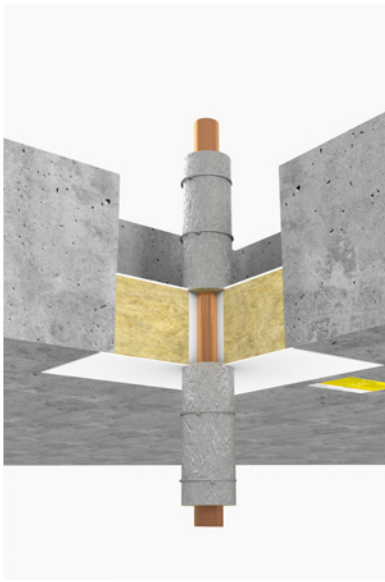
Pipe/Insulation	Pipe diameter mm	Pipe wall thickness mm	Pipe insulation thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
Rehau Rautitan Armaflex NH (LS 500mm)	16	2.6	9-19	1	EI 60 U/C
	40	6.0	9-19	1	

A.2.5.10 Bundle of flexible cable conduits

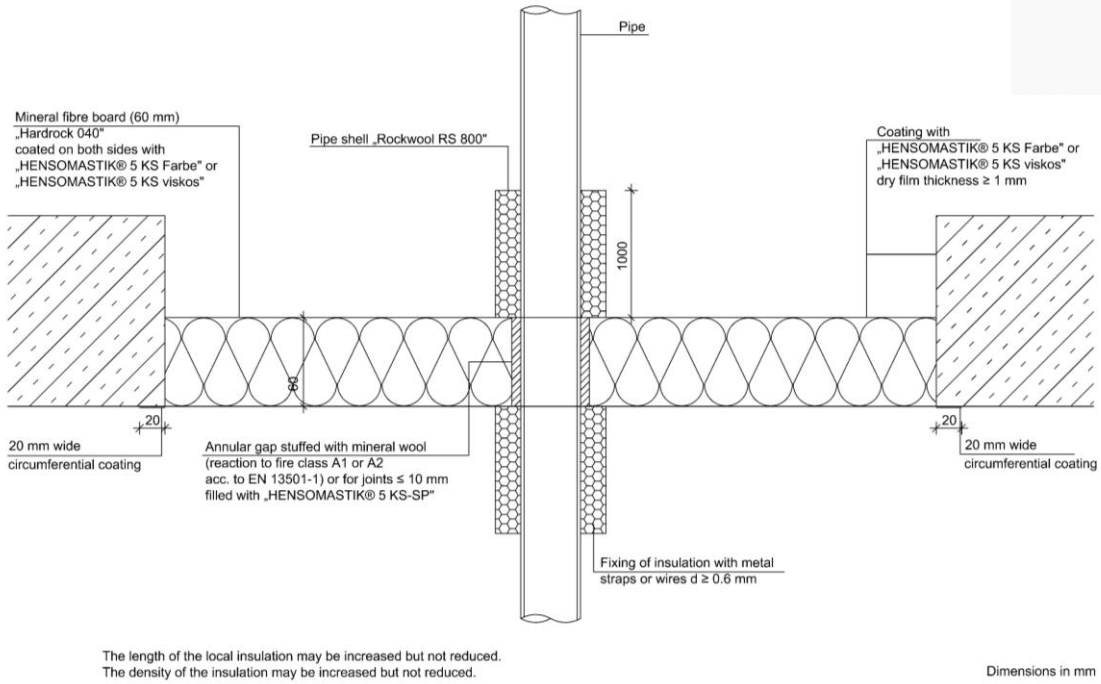
Conduit	Bundle diameter mm	Cable types	Layers of HENSOTHERM® 7 KS Gewebe 100 (1 mm)	Classification
25-32 mm with cables	125	NHXH-J 3 x 1.5 mm^2 and NHXH-J 5 x 1.5 mm^2	6	EI 60 C/C
25-32 mm empty		None		EI 15 C/C

A.2.6 Metal pipes with non-combustible insulation

A.2.6.1 Metal pipes with Rockwool RS800 (LI) insulation, 1000 mm long

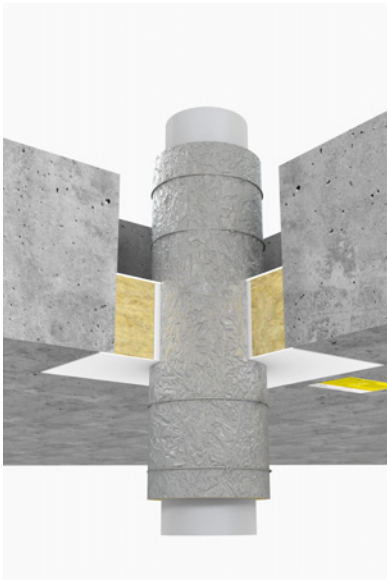


Construction details:

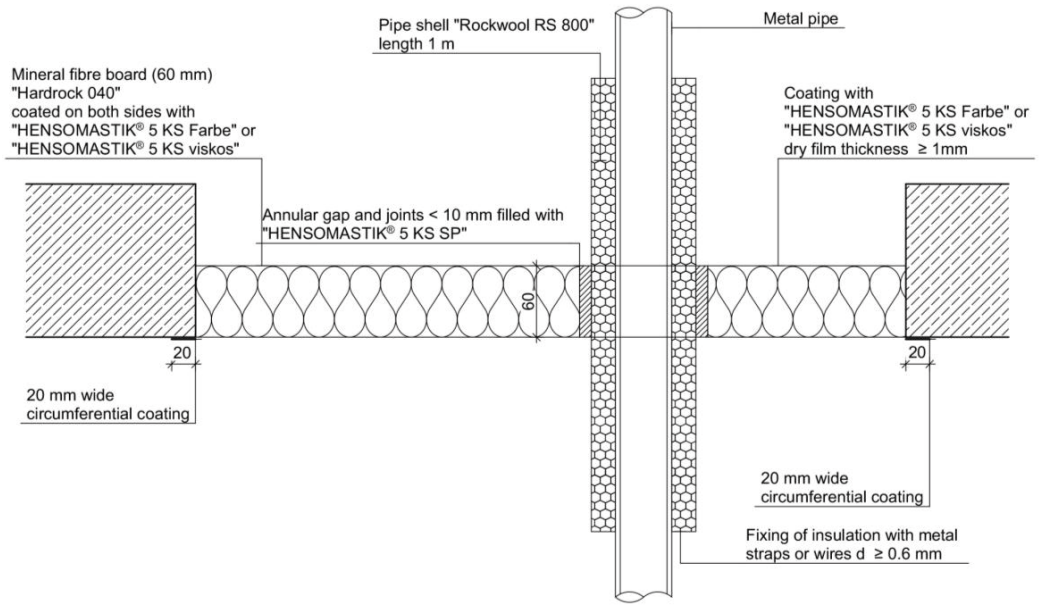


Services	Pipe diameter mm	Pipe wall thickness mm	Insulation thickness mm	Classification
Copper pipe	≤ 22	1.0-11	20 (min.)	**EI 60 U/C**
	23 - 42	1.5-14.2	20 (min.)	
	43 - 88.9	2.0-14.2	30 (min.)	
Steel or cast iron pipe	≤ 22	1.0-11	20 (min.)	**EI 60 U/C**
	23 - 48.3	2.6-14.2	20 (min.)	
	49 - 139.7	4.0-14.2	30 (min.)	

A.2.6.2 Metal pipes with Rockwool RS800 (LS) insulation, 1000 mm long



Construction details:

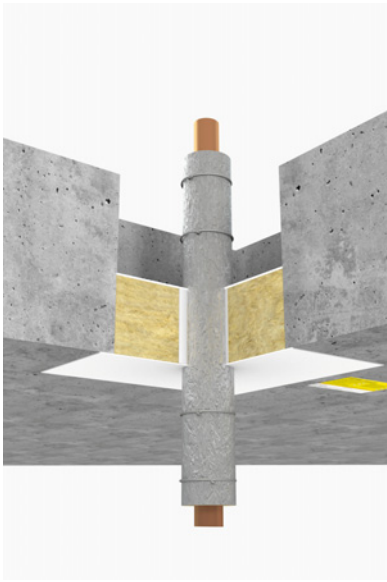


The length of the local insulation may be increased but not reduced.

Dimensions in mm

Services	Pipe diameter mm	Pipe wall thickness mm	Insulation thickness mm	Classification
Copper pipe	≤ 15	1.0-7.5	20	**EI 60 C/U**
	16 - 54	1.5-14.2	20	
Steel or cast iron pipe	≤ 15	1.0-7.5	20	**EI 60 C/U**
	16 - 54	1.5-14.2	20	
	55 - 139.7	4.0-14.2	30	

A.2.6.3 Metal pipes with Klimarock (CS) insulation



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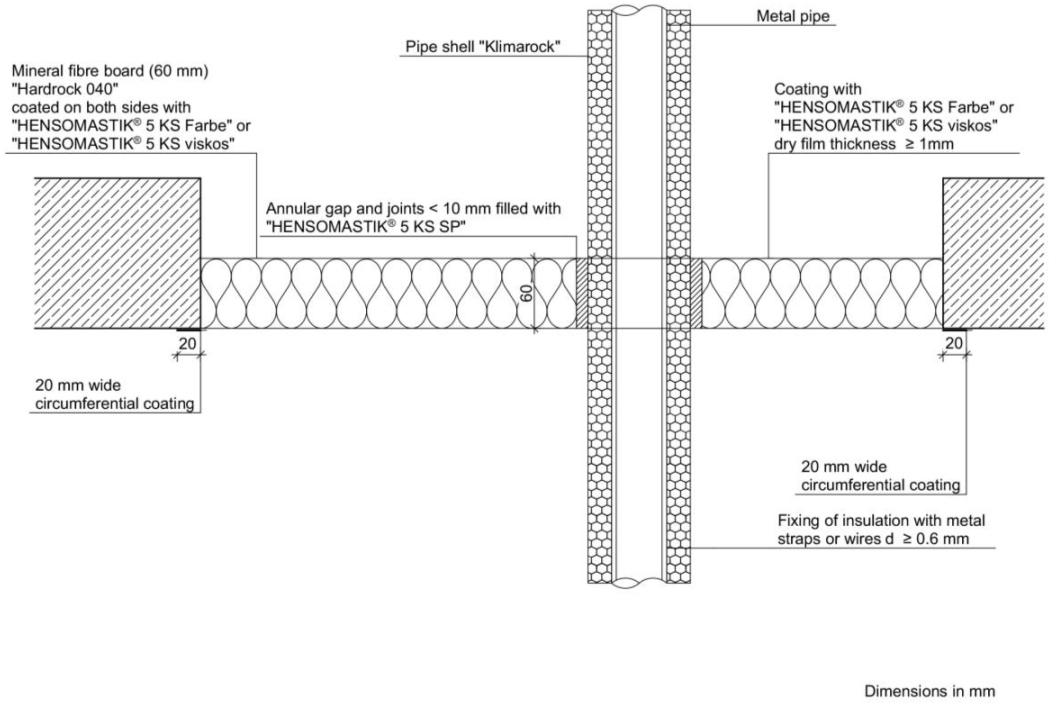
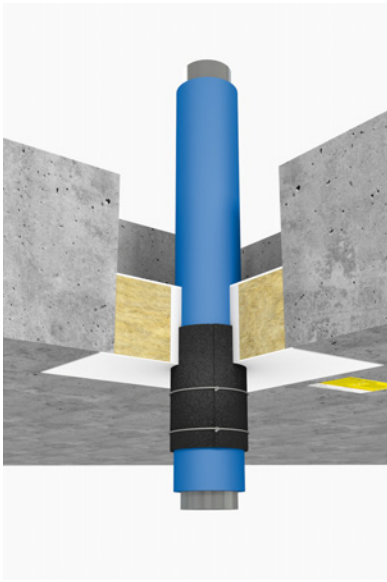


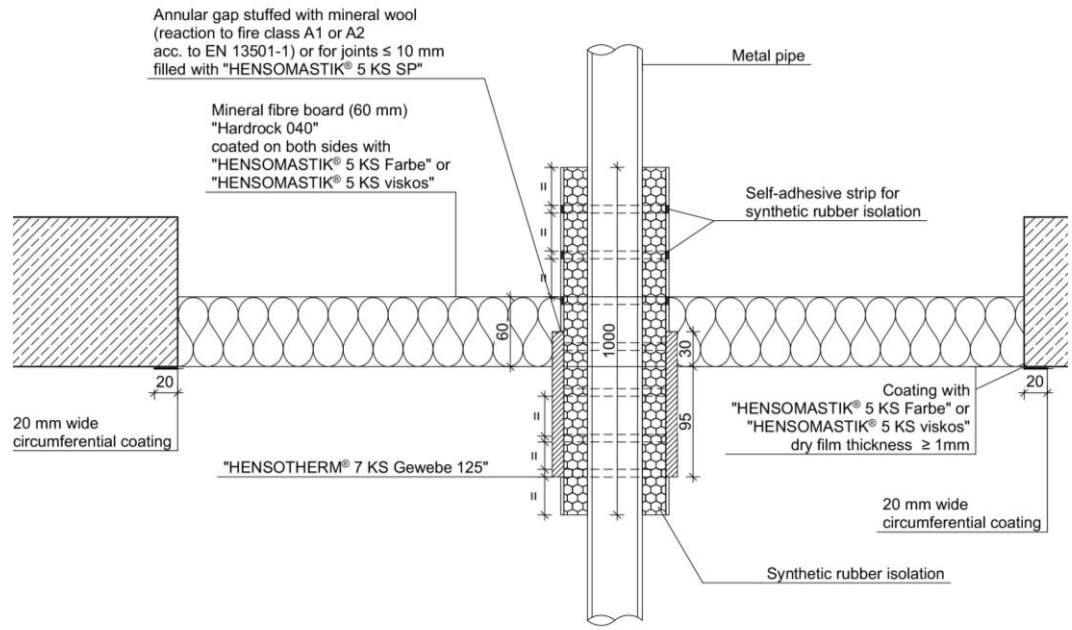
Dimensions in mm

Services	Pipe diameter mm	Pipe wall thickness mm	Insulation thickness mm	Classification
Copper pipe	≤ 15	1.0-7.5	20	**EI 60 U/C**
	16 - 54	1.5-14.2	20	
Steel or cast iron pipe	≤ 15	1.0-7.5	20	**EI 60 U/C**
	16 - 54	1.5-14.2	20	
	55 - 89	3.2-14.2	20	

A.2.7 Metal pipes with combustible insulation

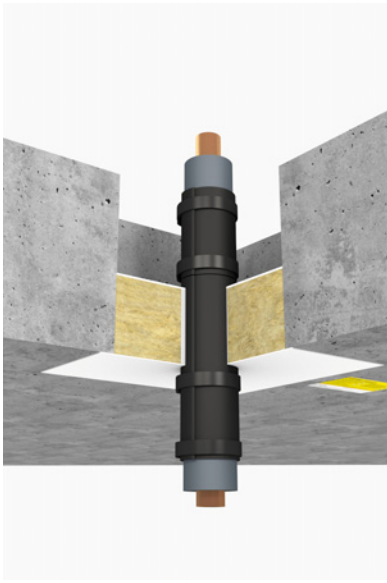
Construction details:

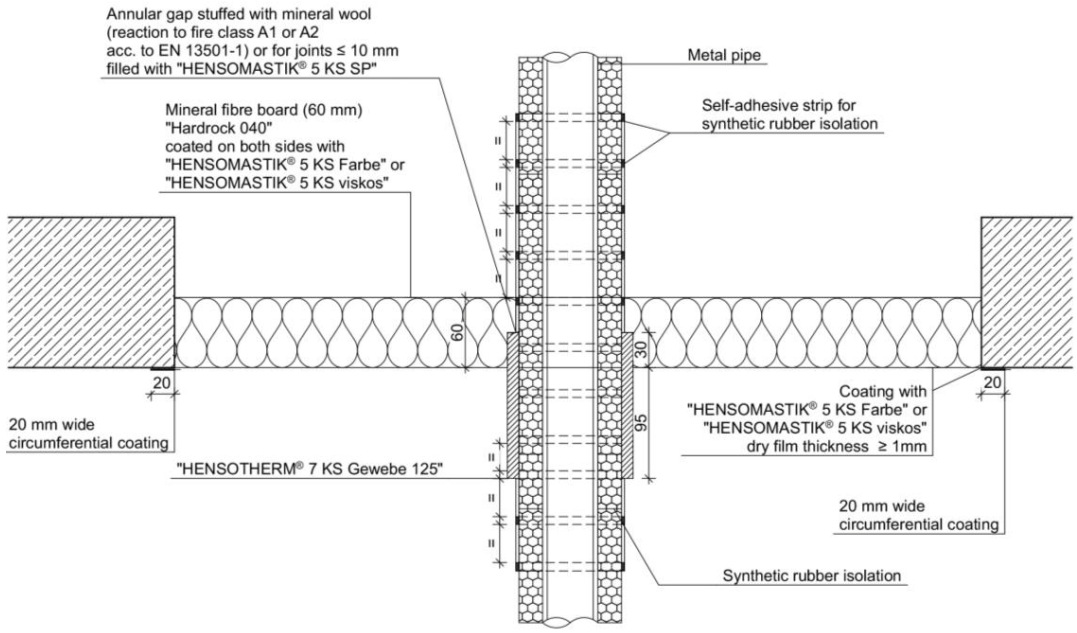




Dimensions in mm

Construction details:





Dimensions in mm

A.2.7.1 Metal pipes with Armaflex AF insulation and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipes	≤ 10	1.0-5.0	1	11	LS 1000 mm	**EI 60 C/U**
	11 - 22	1.0-11	1	18	LS 1000 mm	
	23 - 54	1.5-14.2	1	21	LS 1000 mm	
Steel or cast iron pipe	≤ 10	1.0-5.0	1	11	LS 1000 mm	**EI 60 C/U**
	11 - 22	1.0-11	1	18	LS 1000 mm	
	23 - 54	1.5-14.2	1	21	LS 1000 mm	
	55 - 60.3	2.9-14.2	1	29	LS 1000 mm	
	61 - 88.9	3.2-14.2	1	30.5	LS 1000 mm	**EI 45 C/U**

A.2.7.2 Metal pipes with Armaflex LS insulation and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipes	≤ 15	1.0-7.5	1	13.0	LS 1000 mm / CS	**EI 60 U/C**
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm / CS	
Steel or cast iron pipe	≤ 15	1.0-7.5	1	13.0	LS 1000 mm / CS	
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm / CS	
	55 - 89	3.2-14.2	1	25.0	LS 1000 mm / CS	

A.2.7.3 Metal pipes with Armaflex Ultima insulation and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipes	≤ 15	1.0-7.5	1	13.0	LS 1000 mm	**EI 60 U/C**
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm	
	≤ 15	1.0-7.5	1	13.0	CS	
	16 - 54	1.5-14.2	1	25.0	CS	**EI 30 U/C**
Steel and cast iron pipe	≤ 15	1.0-7.5	1	13.0	LS 1000 mm	**EI 60 U/C**
	16 - 54	1.5-14.2	1	25.0	LS 1000 mm	
	55 - 89	3.2-14.2	1	25.0	LS 1000 mm	
	≤ 15	1.0-7.5	1	13.0	CS	
	16 - 54	1.5-14.2	1	25.0	CS	**EI 30 U/C**
	55 - 89	3.2-14.2	1	25.0	CS	**EI 60 U/C**

A.2.7.4 Metal pipes with Kaiflex ST insulation and HENSOTHERM® 7 KS Gewebe 125

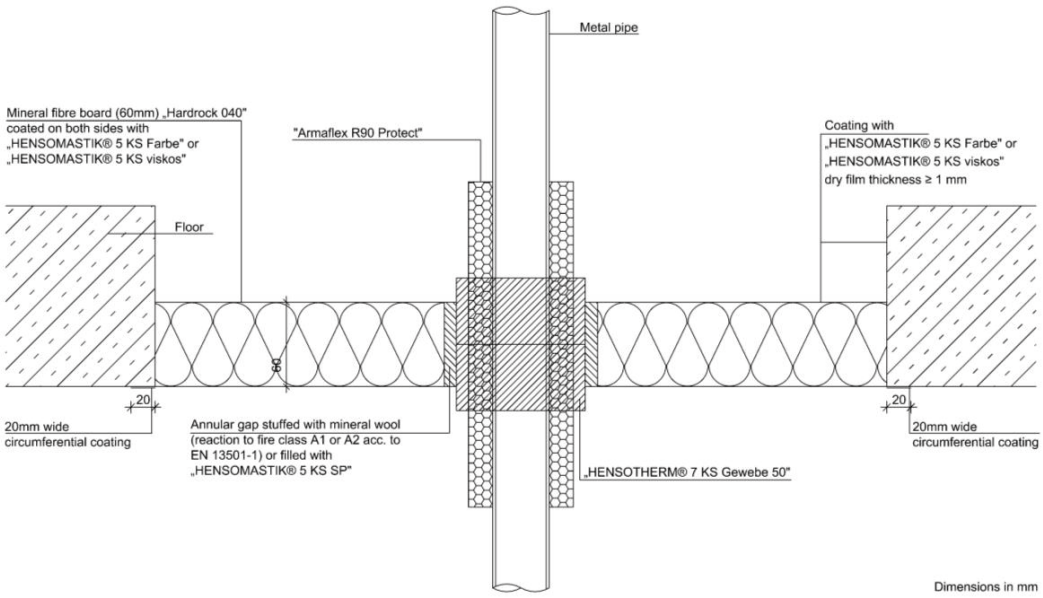
Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipes	≤ 10	1.0-5.0	1	9	LS 1000 mm	**EI 60 C/U**
	11 - 22	1.0-11	1	9	LS 1000 mm	
	23 - 54	1.5-14.2	1	19	LS 1000 mm	
Steel or cast iron pipe	≤ 10	1.0-5.0	1	9	LS 1000 mm	**EI 60 C/U**
	11 - 22	1.0-11	1	9	LS 1000 mm	
	23 - 54	1.5-14.2	1	19	LS 1000 mm	
	55 - 60.3	2.9-14.2	1	25	LS 1000 mm	
	61 - 88.9	3.2-14.2	1	30.5	LS 1000 mm	

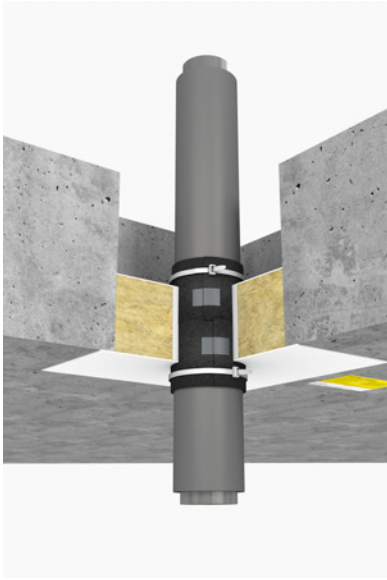
A.2.7.5 Metal pipes with Kaiflex KK plus insulation and HENSOTHERM® 7 KS Gewebe 125

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Insulation thickness mm	Insulation length mm	Classification
Copper pipes	≤ 15	1.0-7.5	1	11.0	LS 1000 mm / CS	**EI 60 U/C**
	16 - 54	1.5-14.2	1	21.0	LS 1000 mm / CS	
Steel or cast iron pipe	≤ 15	1.0-7.5	1	11.0	LS 1000 mm / CS	
	16 - 54	1.5-14.2	1	21.0	LS 1000 mm / CS	
	55 - 89	3.2-14.2	1	28.5	LS 1000 mm / CS	

A.2.8 Metal pipes with combustible insulation and HENSOTHERM® 7 KS Gewebe 50

Construction details:





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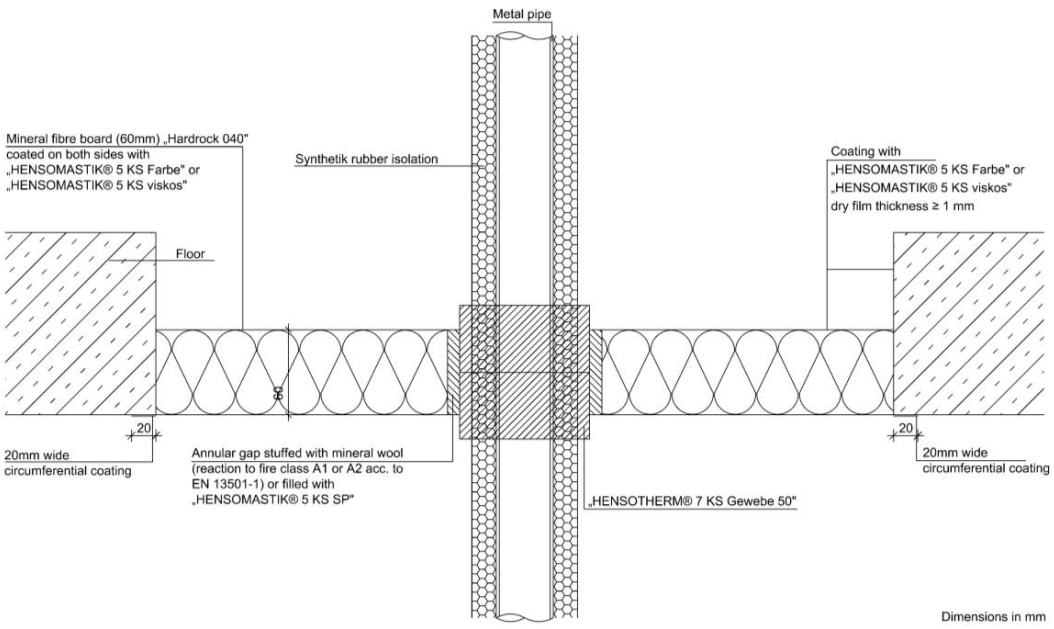

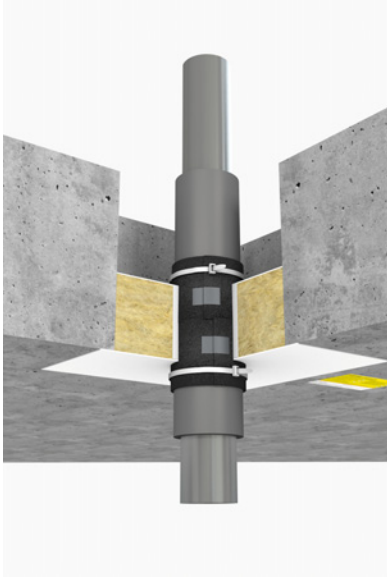

A.2.8.1 Metal pipes with Armaflex R90 Protect and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤15	1.0-7.5	1	19-25	LS 1000 mm	EI 90 C/U
	16-42	1.2-14.2	1	25	LS 1000 mm	
	43-54	1.5-14.2	1	25	LS 1000 mm	
	55-89	2-14.2	1	25	LS 1000 mm	EI 60 C/U

A.2.8.2 Metal pipes with Armaflex NH and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤ 15	1.0-7.5	1	9	CS	EI 90 C/U
	16-42	1.2-14.2	2	13-25	CS	EI 60 C/U
	16-42	1.2-14.2	2	25	CS	EI 90 C/U
	43-54	1.5-14.2	2	13-25	CS	EI 60 C/U
	55-89	2-14.2	2	19-25	CS	EI 60 C/U
Steel pipe	90-114.3	4.5-14.2	2	19	CS	EI 60 C/U
	90-114.3	4.5-14.2	2	19-25	CS	EI 30 C/U

A.2.8.3 Metal pipes with Armaflex Ultima and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤15	1.0-7.5	1	9	CS	EI 60 C/U
	16-42	1.2-14.2	2	13-25	CS	EI 60 C/U
	16-42	1.2-14.2	2	25	CS	EI 90 C/U
	43-89	2-14.2	2	19-25	CS	EI 30 C/U
	43-89	2-14.2	2	25	CS	EI 60 C/U

A.2.8.4 Metal pipes with Eurobatex HF and HENSOTHERM® 7 KS Gewebe 50

Services	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 2 x 50 (2 mm)	Insulation thickness mm	Insulation length mm	Classification
Copper or steel pipe	≤ 15	1.0-7.5	1	9	CS	EI 90 C/U
	16-42	1.2-14.2	2	13-25	CS	EI 60 C/U
	43-54	1.5-14.2	2	13-25	CS	EI 30 C/U
	43-54	1.5-14.2	2	25	CS	EI 60 C/U
	55-89	2-14.2	2	19-25	CS	EI 30 C/U
Steel pipe	90-114.3	4.5-14.2	2	19-32	CS	EI 30 C/U
	114.3	4.5-14.2	1	32	CS	EI 60 C/U

Notes

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