



## HENSOTHERM® M 2000 FIREPROOF MORTAR

TECHNICAL DATA SHEET / ASSEMBLY INSTRUCTIONS FOR MIXED HARD PENETRATION SEAL SYSTEM FOR CABLES AND PIPES IN WALLS AND FLOORS

- Fire resistance class up to EI 180 / tested in accordance with EN 1366-3
- No fly ash, no fibres, low dust and chromate levels
- For use in solid walls and solid floors
- Plugless collar installation
- ETA 20/1325, VKF No. 32044



# TECHNICAL INFORMATION

## Applications

Cables	max Ø [mm]
 Cables	≤ 80.0
 Bundled cables	≤ 100
 EIR / of steel and plastic	16.0
 EIR / bundled flexible pipes Single pipe 16 – 63 mm	≤ 125
 Cable trays	No restrictions
 Combustible pipes	≤ 200.0
 Composite aluminium pipes	≤ 63.0 ≤ 26.0 (2x) Zero gap
 Non-combustible pipes   Mineral fibre insulation	≤ 168.3 [steel] ≤ 88.9 [copper]
 Non-combustible pipes   Syn- thetic rubber insulation	≤ 168.3 [steel] ≤ 88.9 [copper]
 Corrugated solar pipes with insulation	≤ 25.0
 Hydraulic lines	≤ 55.9

## Measurements

- **Maximum seal size / aperture size** (WxH)  
In solid walls: 120 cm x 200 cm  
In solid floors: 120 cm x 200 cm
- **Minimum component thickness**  
In solid walls: ≥ 10 cm  
In solid floors: ≥ 15 cm
- Seal thickness ≥ 15 cm in wall and floor


## Product details

Building material class:	A 1 / RF 1
Mortar class:	M 2.5 (DIN EN 998-2)
Compressive strength:	≥ 2.5 N/mm <sup>2</sup>
Apparent dry density:	≥ 900 kg/m <sup>3</sup>
Added water:	approx 7.5 – 8.0 l for wall installations, approx 9 – 10 l for floor penetration seals
Yield:	approx 20 l wet mortar
Volume:	approx 20 l after curing
Colour:	grey
Minimum shelf life for unopened bags when stored properly in a cool and dry place: 18 months	

## Properties

- Free of fibres, phenol, and halogen plasticisers
- Single component
- No fly ash, low dust and chromate levels
- Hydraulic curing
- Age resistant
- Suitable for pumping, injecting, and manual application

## Advantages

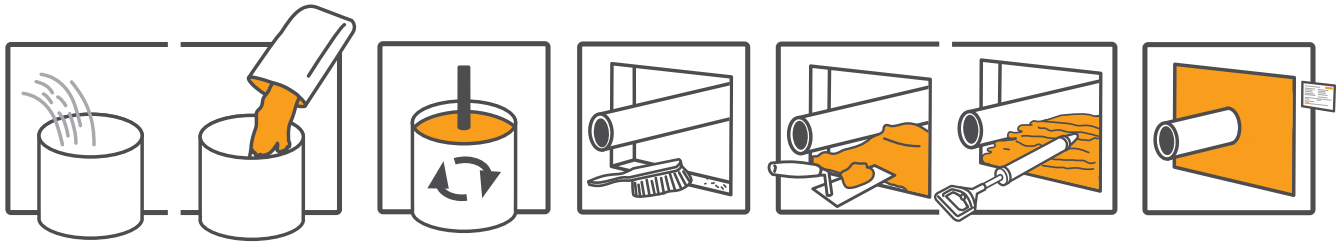
- Cables and pipes installed in the one penetration seal
- Ideal properties for manual and machine applications
- Excellent binding strength
- Easy retrofits
- Minimum curing shrinkage; no flaking under the effects of fire
- Installed with HENSOTHERM® pipe collar RM 30 / RM 50
- Diverse line insulations like e.g. RS 800, also suitable for Klimarock and synthetic rubber
- Fire resistance class up to EI 180
-  RF1 mortar for grouting vent stacks



Product	EAN	Packaging
HENSOTHERM® M 2000	4250153505686	20 kg sack (40x on EUR-pallet)
HENSOTHERM® RM 30 / RM 50	See Technical Data Sheet	See Technical Data Sheet
HENSOTHERM® 7 KS Gewebe 125	4250153511069	Roll 10 m (width 125 mm, thickness 1 mm)

# TECHNICAL INFORMATION

## Applying HENSOTHERM® M 2000



1. For each 20 kg sack, add 7.5–8 litres of water to a bucket
2. Now add HENSOTHERM® M 2000
3. Using a suitable agitator, mix HENSOTHERM® M 2000 and the water to a homogeneous mass.
4. Clean the aperture in the shell, and wet absorbent substrates with water
5. Proceeding from top to bottom, apply the ready mortar to the aperture using a trowel, mortar pump, or by forming the mass into balls
6. A trowel can be used to smooth off the surface for enhanced visual appeal

### Yield

- 7.5–8l water + 20 kg dry mortar yield ≈ 20 litres of ready-to-use wet mortar yield a volume of ≈ 20 litres after curing
- Adding 9–10l water improves the flow characteristics on floor penetration seals.

**NOTE:** The consistency of the mortar must be such that it does not form cavities when injected into the components.

### Application instructions

- Application temperature  $\geq +5^{\circ}\text{C}$  to  $\leq +35^{\circ}\text{C}$
- Final strength after 28 days
- Substrates must be firm and free of all substances and dust compromising the bonding strength
- The consistency of the mortar must be such that it does not form cavities when injected into the components

Manual application	Application with intermittent pump	Application with continuous pump
Add 7.5–8 litres of water to a receptacle	Prepare the machine and wet the hoses	Prepare the machine and wet the hoses
Fill with the material, and mix thoroughly	Add approx 7.5–8 litres of water to a receptacle	Fill with the specified quantity of water, approx two finger widths above the rotor head
After about 4–5 minutes of soaking, again mix thoroughly	At the mixing setting, add the material and mix thoroughly for 4–5 minutes	Fill with material – at the beginning, carefully let it trickle in
	Start up the conveyor Let the remaining water drain off, and check viscosity (if necessary, mix again)	

### Suitable mortar pumps

Pump design	Pump model	Recommended rotor/stator
Intermittent application	Putzmeister Sprayboy P 12	D4 or D5 kurz (short)
	PFT Bolero	
Continuous application	Putzmeister MP25	Values fixed following agreement
	PFT G4	
	PFT Ritmo	
	V.E.P. Baumaschinen type VR1	

## Minimum distances in wall/floor (ETA 20/1325)

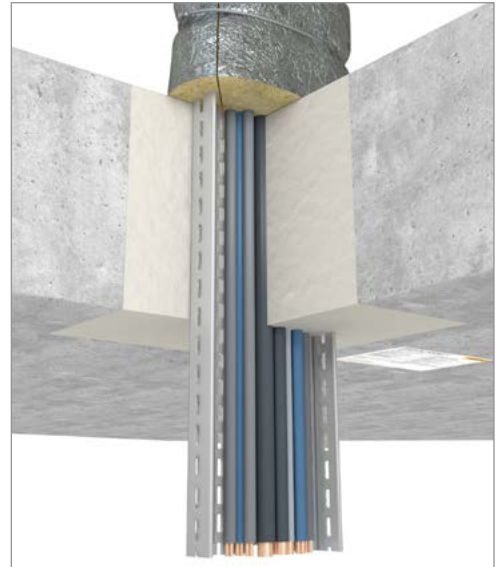
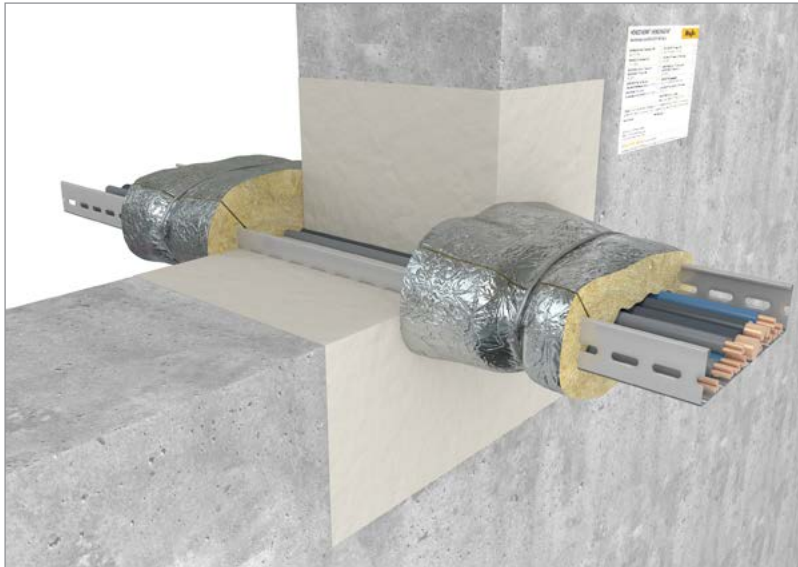
### Permitted distances

a1: Cables/cable trays and metal pipes $\geq 30$ mm	b1: Cables/cable trays and reveal $\geq 0$ mm
a2: Cables/cable trays and plastic pipes $\geq 30$ mm	b2: Pipes, EIR/flexible pipes, and reveal $\geq 50$ mm
a3: Pipes $\geq 30$ mm	b3: Solar, hydraulic lines, and reveal $\geq 100$ mm
a4: Solar, hydraulic lines, and reveal $\geq 100$ mm	b4: Wichmann WD90 and reveal $\geq 40$ mm
a5: Cable trays $\geq 0$ mm	
a6: Wichmann WD90 $\geq 20$ mm	

**NOTE:** Distance of first support  $\leq 250$  mm.

# TECHNICAL INFORMATION

## Cables / cable trays EI 90 / EI 120



### Wall EI 90 / EI 120

Cables	Diameter [mm]	Additional protection	EI
Cable assembly, small	max 21	Klimarock 30 mm (LI = 200 mm) both sides	EI 120
Cable assembly, midsized	22 – 50		EI 120
Cable assembly, large	51 – 80		EI 120
Bundled telecommunication cables	max 100		EI 120
EIR / flexible steel pipes	max 16		EI 120
EIR / flexible PVC pipes	max 16		EI 120

### Floor EI 90 / EI 120

Cables	Diameter [mm]	Additional protection	EI
Cable assembly, small	max 21	Klimarock 30 mm (LI = 200 mm) top side only in floors	EI 120
Cable assembly, midsized	22 – 50		EI 90
Cable assembly, large	51 – 80		EI 90
Bundled telecommunication cables	max 100		EI 90
EIR / flexible steel pipes	max 16		EI 90
EIR / flexible PVC pipes	max 16		EI 90

**NOTE:** All cables, bundled cables, and cable ductwork must be fitted on both sides in walls, and on the top side in floors, with a Klimarock rock wool mat (insulating thickness 30 mm) wound over a length of 200 mm and secured in place with winding wire.



# TECHNICAL INFORMATION

## Cable / cable trays EI 60



### Wall EI 60, without additional Klimarock insulation

#### Cable penetration seal

Cables	Diameter [mm]	Additional protection	EI
Cable assembly, small	max 21	not necessary	EI 60
Cable assembly, midsized	22–50		EI 60

#### Mixed penetration seal

Cables	Diameter [mm]	Additional protection	EI
Cable assembly, small	max 21	not necessary	EI 60
Cable assembly, midsized	22–50		EI 60

### Floor EI 60, without additional Klimarock insulation

#### Cable penetration seal

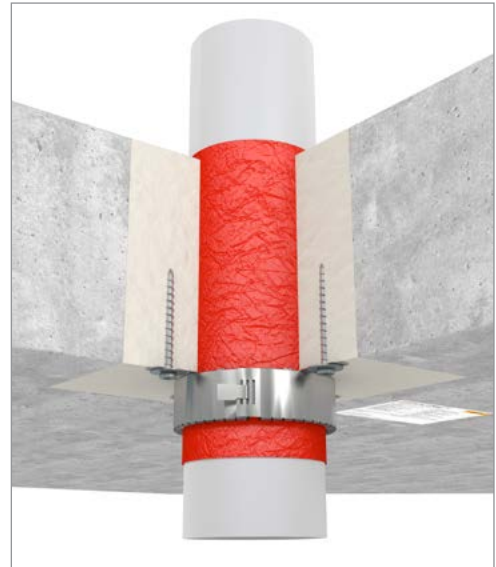
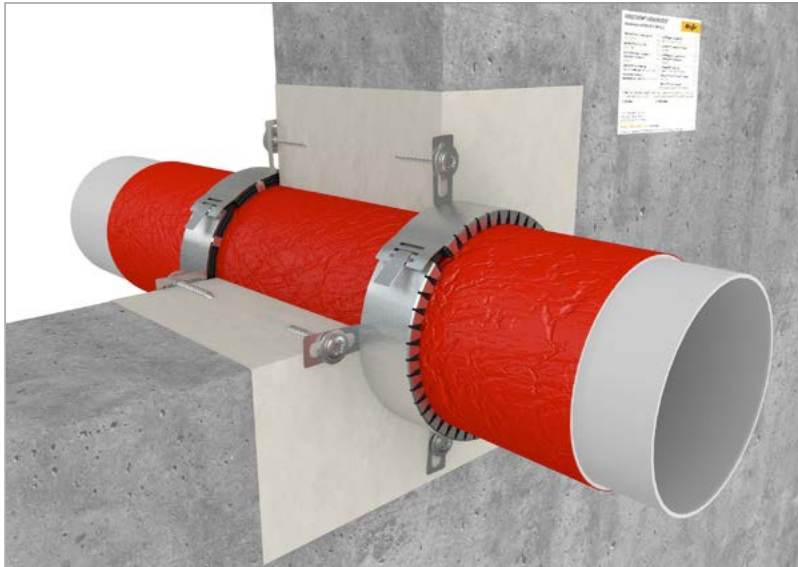
Cables	Diameter [mm]	Additional protection	EI
Cable assembly, small	max 21	not necessary	EI 120
Cable assembly, midsized	22–50		EI 60
Cable assembly, large	51–80		EI 60

#### Mixed penetration seal

Cables	Diameter [mm]	Additional protection	EI
Cable assembly, large	51–80	not necessary	EI 60
Bundled telecommunication cables	max 100		EI 120
EIR steel/PVS	< 16		EI 120 U/C, C/U

# TECHNICAL INFORMATION

## Plastic pipes with HENSOTHERM® RM30 / RM50



### Wall

Pipe	Size	Fire resistance	Collar
Geberit Silent-PP	max 160 mm	EI 180 U/U	max DN125: RM30; above this RM50
POLO-KAL NG	max 200 mm	EI 180 U/U	max DN125: RM30; above this RM50
POLO-KAL XS	max 110 mm	EI 180 U/U	RM30
Rehau RAUPIANO PLUS	max 160 mm	EI 180 U/U	max DN125: RM30; above this RM50
Geberit Mepla (double applications)	max 26 mm	EI 180 U/C	RM50
Uponor Uni Pipe PLUS	max 63 mm	EI 180 U/C	RM50
FRÄNKISCHE alpex F50 PROFI	max 63 mm	EI 120 U/C	RM50
EIR / bundled flexible pipes (single pipe diameter 16–63 mm) with and without cabling ≤ 21 mm	max 125 mm	EI 180 U/C	RM50

The collars selected must be suitable for each of the diameters.

Once the mortar has cured, secure the collar in place by applying to both sides chipboard / wood construction screws, e.g. Würth Assy® 3.0 washer head [6.0x70 mm] + washer 6.5x25 mm, or equivalent.

Alternatively, the screws can be secured in the fresh mortar.

### Floor

Pipe	Size	Fire resistance	Collar
Geberit Silent-PP	max 160 mm	EI 120 U/U	max DN125: RM30; above this RM50
POLO-KAL NG	max 200 mm	to EI 180 U/U	max DN125: RM30; above this RM50
POLO-KAL XS	max 110 mm	EI 180 U/U	RM30
Rehau RAUPIANO PLUS	max 160 mm	EI 90 U/U	max DN125: RM30; above this RM50
Geberit Mepla (double applications)	max 26 mm	EI 180 U/C	RM50
Uponor Uni Pipe PLUS	max 50 mm	EI 120 U/C	RM50
FRÄNKISCHE alpex F50 PROFI	max 63 mm	EI 90 U/C	RM50
EIR / bundled flexible pipes (single pipe diameter 16–63 mm) with and without cabling ≤ 21 mm	max 125 mm	EI 180 U/C	RM50

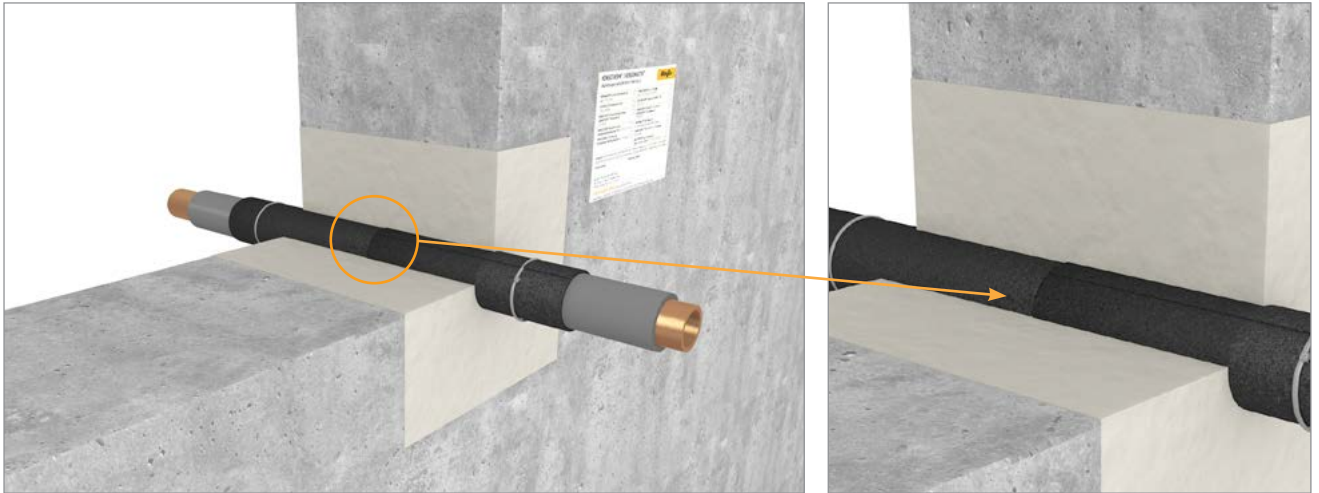
The collars selected must be suitable for each of the diameters.

Once the mortar has cured, secure the collar in place by applying to the bottom side of the floor chipboard / wood construction screws, e.g. Würth Assy® 3.0 washer head [6.0x70 mm] + washer 6.5x25 mm, or equivalent.

Alternatively, the screws can be secured in the fresh mortar.

# TECHNICAL INFORMATION

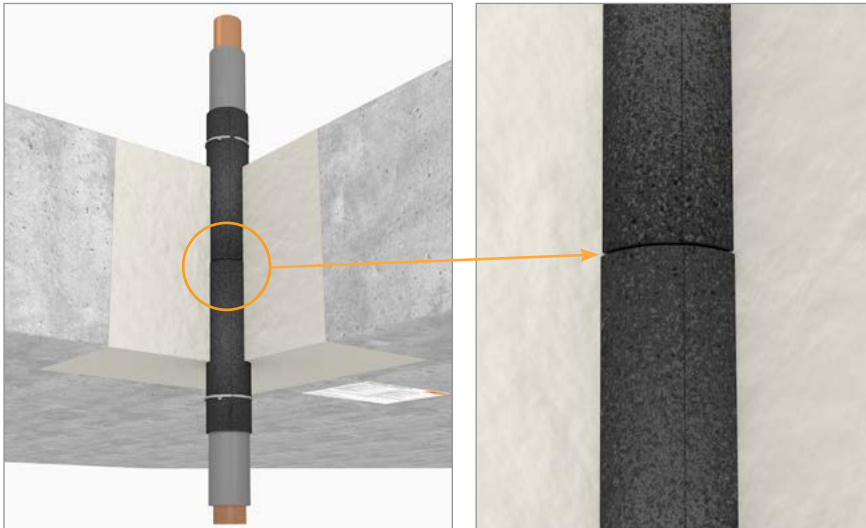
## Non-combustible pipes with combustible insulation with HENSOTHERM® 7 KS Gewebe 125



### Wall

Pipe	Diameter	Wall thickness	EI	Windings 7 KS Gewebe 125	Insulation	Insulation thickness
Copper/steel	≤ 15	1.0–7.5	EI 180 C/U	2	NH/ArmaFlex	13
Copper/steel	> 15 ≤ 42	1.2–14.2	EI 120 C/U	2	NH/ArmaFlex	13–19
Copper/steel	> 42 ≤ 88.9	2.0–14.2	EI 90 C/U	2	NH/ArmaFlex	19–25
Steel	> 88.9 ≤ 168.3	3.6–14.2	EI 90 C/U	2	NH/ArmaFlex + Klimarock 20 mm (LI = 250 mm), both sides	32

**+** Owing to its present fire index number, the named insulation may generally be used in Switzerland.



### Floor

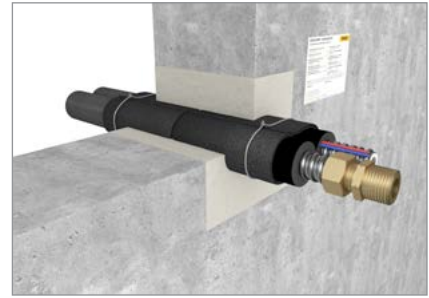
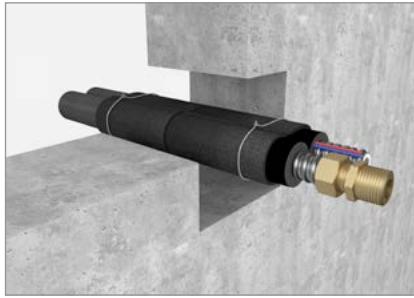
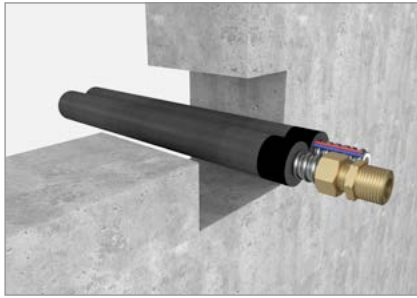
Pipe	Diameter	Wall thickness	EI	Windings 7 KS Gewebe 125	Insulation	Insulation thickness
Copper/steel	≤ 15	1.0–7.5	EI 120 C/U	2	NH/ArmaFlex	13
Copper/steel	> 15 ≤ 42	1.2–14.2	EI 90 C/U	2	NH/ArmaFlex	13–19
Copper/steel	> 42 ≤ 88.9	2.0–14.2	EI 90 C/U	2	NH/ArmaFlex	19–25
Steel	> 88.9 ≤ 168.3	3.6–14.2	EI 120 C/U	2	NH/ArmaFlex + Klimarock 20 mm (LI = 250 mm), top side only in floors	32

**+** Owing to its present fire index number, the named insulation may generally be used in Switzerland.

HENSOTHERM® 7 KS Gewebe 125 is wound the specified number of times around both sides of the pipe in walls and floors. The fabric must be aligned to meet at the centre of the penetration seal so that each side projects by 50 mm from the penetration seal. The fabric must be secured in place with winding wire (steel wire ≥ 0.6 mm).

# TECHNICAL INFORMATION

## Solar pipes with combustibile insulation with HENSOTHERM® 7 KS Gewebe 125



### Wall

Pipe	Diameter	EI	Windings 7 KS Gewebe 125	Insulation	Insulation thick- ness
Würth FLEXEN Twin Solar pipe (stainless steel incl cabling)	16	EI 180 U/C	2	Würth FLEXEN solar fleece	20
Würth FLEXEN Twin Solar pipe (stainless steel incl cabling)	25	EI 180 U/C	2	Würth FLEXEN solar fleece	20
Isolante K-Flex Twin Solar pipe (stainless steel incl cabling)	16	EI 180 C/U	2	K-FLEX SOLAR HT	20
Isolante K-Flex Twin Solar pipe (stainless steel incl cabling)	25	EI 180 U/C	2	K-FLEX SOLAR HT	20
Armaflex Duo Solar pipe (stainless steel incl cabling)	20	EI 120 U/C	2	HT/ArmaFlex	20
Armaflex Duo Solar pipe (stainless steel incl cabling)	20	EI 180 U/C	2	HT/ArmaFlex	20

HENSOTHERM® 7 KS Gewebe 125 is wound the specified number of times around both sides of the solar pipe and, if necessary, secured in place with a strip of adhesive fabric tape.

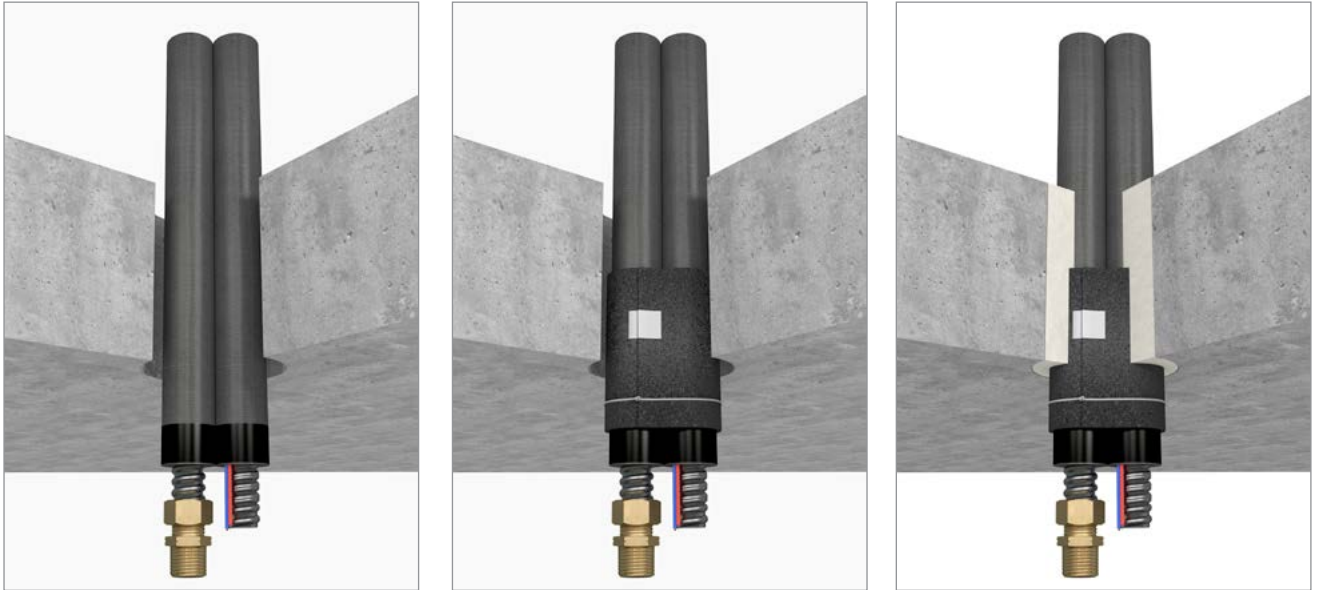
HENSOTHERM® 7 KS Gewebe 125 must be aligned to meet inside the penetration seal at its centre so that it projects by 50 mm from the penetration seal.

HENSOTHERM® 7 KS Gewebe 125 must be secured in place with winding wire (steel wire  $\geq 0.6$  mm) applied externally on both sides.



# TECHNICAL INFORMATION

## Non-combustible pipes with combustible insulation with HENSOTHERM® 7 KS Gewebe 125



### Floor

Pipe	Diameter	EI	Windings 7 KS Gewebe 125	Insulation	Insulation thick- ness
Würth FLEXEN Twin Solar pipe (stainless steel incl cabling)	16	EI 180 U/C	2	Würth FLEXEN solar fleece	20
Würth FLEXEN Twin Solar pipe (stainless steel incl cabling)	25	EI 180 U/C	2	Würth FLEXEN solar fleece	20
Isolante K-Flex Twin Solar pipe (stainless steel incl cabling)	16	EI 180 U/C	2	K-FLEX SOLAR HT	20
Isolante K-Flex Twin Solar pipe (stainless steel incl cabling)	25	EI 180 U/C	2	K-FLEX SOLAR HT	20
Armaflex Duo Solar pipe (stainless steel incl cabling)	20	EI 120 C/U	2	HT/ArmaFlex	20
Armaflex Duo Solar pipe (stainless steel incl cabling)	20	EI 180 U/C	2	HT/ArmaFlex	20

HENSOTHERM® 7 KS Gewebe 125 is wound the specified number of times around the bottom side of the solar pipe and, if necessary, secured in place with a strip of adhesive fabric tape.

HENSOTHERM® 7 KS Gewebe 125 must be aligned to the centre of the penetration seal so that it projects by 50 mm from the bottom side of the penetration seal.

HENSOTHERM® 7 KS Gewebe 125 must be secured in place with winding wire (steel wire  $\geq 0.6$  mm) applied externally.

# TECHNICAL INFORMATION

## Solar pipes with combustibile insulation with HENSOTHERM® 7 KS Gewebe 125



### Wall

Pipe	Diameter	Wall thickness	EI	Windings 7 KS Gewebe 125	Insulation	Insulation thickness
Hydraulic hose Hansaflex HD-200-2SN (rubber reinforced with wire braid)	55.9	9	EI 180 U/C	2	Klimarock 20 mm (LI = 250 mm), both sides	20

### Floor

Pipe	Diameter	Wall thickness	EI	Windings 7 KS Gewebe 125	Insulation	Insulation thickness
Hydraulic hose Hansaflex HD-200-2SN (rubber reinforced with wire braid)	55.9	9	EI 120 U/C	2	Klimarock 20 mm (LI = 250 mm), top side only in floors	20

HENSOTHERM® 7 KS Gewebe 125 is wound the specified number of times around both sides of the hydraulic hose in walls and floors. If necessary, it is secured in place with a strip of adhesive fabric tape.

HENSOTHERM® 7 KS Gewebe 125 must be aligned to meet inside the penetration seal at its centre so that it projects by 50 mm from the penetration seal.

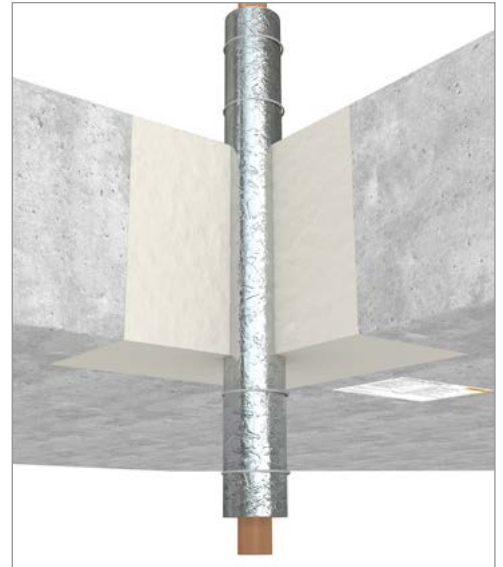
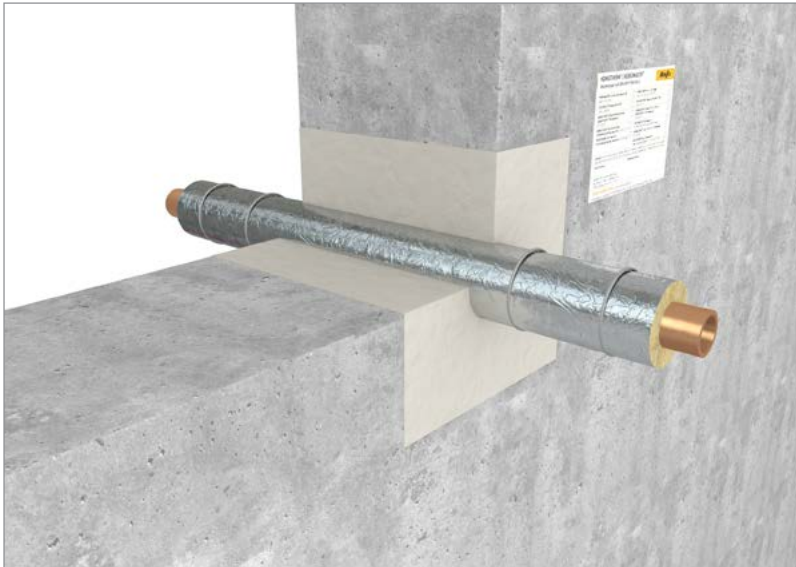
HENSOTHERM® 7 KS Gewebe 125 must be secured in place with winding wire (steel wire  $\geq 0.6$  mm) applied externally on both sides.

### Insulation:

In wall installations, the insulation must be laid / secured in place around both sides of the hydraulic hose and flush with the outside of the penetration seal. In floor installations, the insulation is laid / secured in place only around the top side of the floor and flush with the penetration seal.

# TECHNICAL INFORMATION

## Non-combustible pipes with line insulation



### Wall

Pipe	Diameter	Wall thickness	Insulation	Insulation thickness	Insulation length	Classification
Copper/steel	≤ 15	1.0–7.5	Rockwool RS 800	20 mm	LS 1,150 mm	EI 180 C/U
Copper/steel	> 15 ≤ 54	1.5–14.2	Rockwool RS 800	20–40 mm	LS 1,150 mm	EI 120 C/U
Copper/steel	> 54 ≤ 89	2.0–14.2	Rockwool RS 800	40 mm	LS 1,550 mm	EI 120 C/U
Steel	> 89 ≤ 168.3	3.6–14.2	Rockwool RS 800	40 mm	LS 1,550 mm	EI 120 C/U

The pipe shell must be fitted as a continuous piece and aligned to the centre.  
It is secured in place on both sides with winding wire (steel wire ≥ 0.6 mm).  
Lead-throughs inclined by up to 45° possible.













### Floor

Pipe	Diameter	Wall thickness	Insulation	Insulation thickness	Insulation length	Classification
Copper/steel	≤ 15	1.0–7.5	Rockwool RS 800	20 mm	LS 1,150 mm	EI 120 C/U
Copper/steel	> 15 ≤ 54	1.5–14.2	Rockwool RS 800	20–40 mm	LS 1,150 mm	EI 90 C/U
Copper/steel	> 54 ≤ 89	2.0–14.2	Rockwool RS 800	40 mm	LS 1,750 mm	EI 60 C/U
Copper/steel	89	2.0–14.2	Rockwool RS 800	40 mm	LS 1,750 mm	EI 120 C/U
Steel	> 89 ≤ 168.3	3.6–14.2	Rockwool RS 800	40 mm	LS 1,750 mm	EI 120 C/U







The pipe shell must be fitted as a continuous piece and aligned to the centre.  
It is secured in place on both sides with winding wire (steel wire ≥ 0.6 mm).  
Lead-throughs inclined by up to 45° possible.

# TECHNICAL INFORMATION

HENSOTHERM® M 2000 | Spacing rules for combined penetration seals | Seal thickness ≥ 150 mm | Max size 2,000 mm x 1,200 mm in walls and floors

Solid walls ≥ 100 mm	Solid floors ≥ 150 mm	Minimum spacings Conduit type / reveal / supports [mm]			Combustible pipes with HENSOTHERM® RM pipe sleeves	Composite aluminium pipes with HENSOTHERM® RM pipe sleeves	Solar pipes with HENSOTHERM® 7 KS Gewebe 125
		ETA 20/1325 Section					
A.1.3	A.2.3	Combustible pipes with HENSOTHERM® RM pipe sleeves		≥ 30	≥ 30	≥ 30	
A.1.3	A.2.3	Composite aluminium pipes with HENSOTHERM® RM pipe sleeves		≥ 30	≥ 30	≥ 30	
A.1.4	A.2.4	Solar pipes with HENSOTHERM® 7 KS Gewebe 125		≥ 30	≥ 30	≥ 0	
A.1.5	A.2.5	Hydraulic hose with HENSOTHERM® 7 KS Gewebe 125		≥ 100	≥ 100	≥ 100	
A.1.6	A.2.6	Wiring pipes HENSOTHERM® RM pipe sleeves		≥ 50	≥ 50	≥ 50	
A.1.7	A.2.7	Incombustible pipes with synthetic rubber insulation		≥ 30	≥ 30	≥ 30	
A.1.8	A.2.8	Incombustible pipes with Rockwool RS 800 insulation		≥ 30	≥ 30	≥ 30	
A.1.9	A.2.9	Cables/runs/conduits with or without Rockwool Klimarock insulation		≥ 30	≥ 30	≥ 0	
A.1.10	A.2.10	Wichmann Kabelbox® WD90 square		≥ 30	≥ 30	≥ 20	



Hydraulic hose with HENSOTHERM® 7 KS Gewebe 125	Wiring pipes HENSOTHERM® RM pipe sleeves	Incombustible pipes with synthetic rubber insulation	Incombustible pipes with Rockwool RS 800 insulation	Cables/runs/conduits with or without Rockwool Klimarock insulation	Wichmann Kabelbox® WD90 square	Seal reveals	First support
							
≥ 100	≥ 50	≥ 30	≥ 30	≥ 30	≥ 30	≥ 50	≤ 300
≥ 100	≥ 50	≥ 30	≥ 30	≥ 30	≥ 30	≥ 50	≤ 300
≥ 100	≥ 50	≥ 30	≥ 30	≥ 0	≥ 20	≥ 100	≤ 300
≥ 100	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100	≤ 300
≥ 100	≥ 50	≥ 50	≥ 50	≥ 50	≥ 50	≥ 50	≤ 300
≥ 100	≥ 50	≥ 30	≥ 30	≥ 30	≥ 30	≥ 50	≤ 300
≥ 100	≥ 50	≥ 30	≥ 30	≥ 30	≥ 30	≥ 50	≤ 300
≥ 100	≥ 50	≥ 30	≥ 30	≥ 0	≥ 20	≥ 0	≤ 300
≥ 100	≥ 50	≥ 30	≥ 30	≥ 20	≥ 20	≥ 40	≤ 300

# NOTES

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# TECHNICAL INFORMATION

## Notes

### **Preparing and cleaning the aperture in the component**

The prepared lead-throughs and surfaces must be free of all substances and dust compromising the bonding strength.

### **Labelling (D/CH)**

Following their installation, the sealing systems must be marked with the provided permanent labels affixed to the wall/floor.

### **Retrofits**

If the sealing system is designed for retrofits, note the following:

Following a retrofit, the system must be returned to its intended state.

The specifications in the aBG / ETA / assembly instructions must be observed.

### **Use and inspection**

The sealing system's fire protection properties are safeguarded over the service life only when the system is maintained in proper working condition.

The developer/principal must be referred thereto by the applicator / commissioned company.

### **Disposal**

The materials must be handled like waste paints and varnishes. The applicable national laws and regulations must be observed.

Our technical advisers will be pleased to assist you with your enquiries.  
Further details can be downloaded from: [www.rudolf-hensel.de/M2000](http://www.rudolf-hensel.de/M2000)

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## RUDOLF HENSEL GMBH

### Lack- und Farbenfabrik

Lauenburger Landstraße 11  
21039 Börnsen | Germany

Tel. +49 40 72 10 62-10

Fax +49 40 72 10 62-52

Technical Support / Sales -48

E-mail: [contact-rh@rudolf-hensel.de](mailto:contact-rh@rudolf-hensel.de)

Internet: [www.rudolf-hensel.de](http://www.rudolf-hensel.de)

