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Authorised and notified  
according to Article 29 of the  
Regulation (EU)  
No 305/2011 of the European  
Parliament and of the Council  
of 9 March 2011



## European Technical Assessment ETA-20/1325 of 2021/01/01

### I General Part

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

**Trade name of the construction product:**

HENSOTHERM® M 2000

**Product family to which the above construction product belongs:**

Fire Stopping and Sealing Product:  
• Penetration Seals

**Manufacturer:**

RUDOLF HENSEL GMBH  
Lauenburger Landstr.11  
Börnsen 21039  
Germany

**Manufacturing plant:**

RUDOLF HENSEL GMBH  
Lauenburger Landstr.11  
Börnsen 21039  
Germany

**This European Technical Assessment contains:**

47 pages including 1 annex which form an integral part of the document

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

EAD 350454-00-1104 for Fire stopping and fire sealing products - Penetration seals, September 2017

**This version replaces:**

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**Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.**

**Communication of this European Technical Assessment, including transmission by electronic means, shall be in full [except the confidential Annex(es) referred to above]. However, partial reproduction may be made with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.**

## **SPECIFIC PARTS OF THE EUROPEAN TECHNICAL ASSESSMENT**

### **1 Technical description of the product**

- 1) HENSOTHERM® M 2000 is a mortar/compound seal used alone or in combination with HENSOTHERM® 7 KS Gewebe pipe wraps or HENSOTHERM® RM pipe collars, to form a penetration seal for single or multiple service in combination, to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services.
- 2) HENSOTHERM® 7 KS Gewebe pipe wraps and HENSOTHERM® RM pipe collars are also incorporated into the penetration seal where it is penetrated by combustible pipes and insulated metal pipes.
- 3) HENSOTHERM® M 2000 contains no carcinogenic substances or mutagenic substances, flame retardants or antimicrobiological agents.
- 4) The applicant submitted a written declaration that HENSOTHERM® M 2000 does not contain substances which have to be classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the EGDS - taking into account the installation conditions of the construction product and the release scenarios resulting from there. An emission report has also been provided.

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

- 5) The use category of HENSOTHERM® M 2000 in relation to BWR 3 (Hygiene, health and environment) is IA1, S/W2

**2 Specification of the intended uses of the product in accordance with the applicable European Assessment Document (Hereinafter EAD): EAD 350454-00-1104**

Detailed information and data is given in Annex A.

- 1) The intended use of HENSOTHERM® M 2000 is to reinstate the fire resistance performance of rigid wall and rigid floor constructions where they are penetrated by single or multiple services in combination.
- 2) The specific elements of construction that the system HENSOTHERM® M 2000 may be used to provide a penetration seal in, are as follows:
  - a. Rigid walls: The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.
  - b. Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

- 3) The System HENSOTHERM® M 2000 may be used to provide a penetration seal with single or multiple services in combination (for details see Annex A).
- 4) Services shall be supported at maximum 300 mm from both faces of the wall or the upper face of the floor.
- 5) The provisions made in this European Technical Assessment are based on an assumed working life of the HENSOTHERM® M 2000 of 10 years, provided that the conditions for the packaging/transport/storage/installation/use/repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.
- 6) Type Z<sub>1</sub>: intended for use at internal conditions with high humidity, excluding temperatures below 0°C, Includes lower classes.

**3 Performance of the product and references to the methods used for its assessment**

Product-type: Mortar/Compound Seal	Intended use: Penetration Seal
Essential characteristic	Product performance
<b>BWR 2 Safety in case of fire</b>	
Reaction to fire	Class E
Resistance to fire	Annex A
<b>BWR 3 Hygiene, health and environment</b>	
Air permeability	No performance assessed
Water permeability	No performance assessed
Content, emission and/or release of dangerous substances	Use categories: IA1, S/W2 Declaration of manufacturer
<b>BWR 4 Safety in use</b>	
Mechanical resistance and stability	No performance assessed
Resistance to impact/movement	
Adhesion	
Durability	Z <sub>1</sub>
<b>BWR 5 Protection against noise</b>	
Airborne sound insulation	No performance assessed
<b>BWR 6 Energy economy and heat retention</b>	
Thermal properties	No performance assessed
Water vapour permeability	No performance assessed

**4 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (HEREINAFTER AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE**

According to the decision 1999/454/EC – Commission Decision of date 22nd June 1999 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, published in the Official Journal of the European Union (OJEU) L178/52 of 14/07/1999, see <https://eur-lex.europa.eu/oj/direct-access.html> of the European Commission<sup>1</sup>, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table(s) applies (apply).

Product(s)	Intended use(s)	Level(s) or class(es)	System(s)
Fire stopping and Fire Sealing Products	For fire compartmentation and/or fire protection or fire performance	Any	1

**5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark A/S prior to CE marking

Issued in Copenhagen on 2021-01-01 by



Thomas Bruun

Managing Director, ETA-Danmark

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<sup>1</sup> Official Journal of the European Communities L178/52 of 14/7/1999

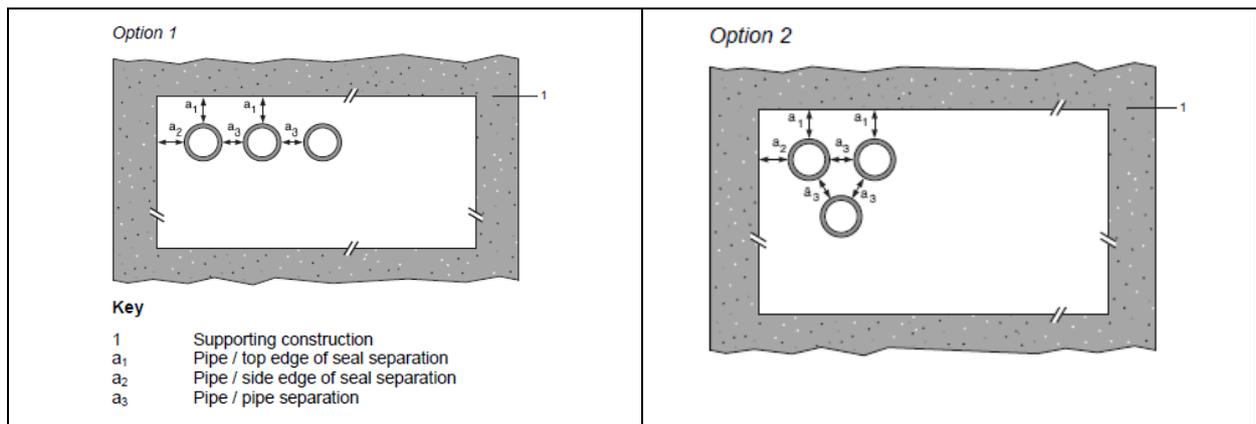
## ANNEX A – Resistance to Fire Classification – HENSOTHERM® M 2000

### A.1 Rigid wall constructions with wall thickness of minimum 100 mm

#### A.1.1 Service Types

Services	Types
Services with HENSOTHERM® 7 KS Gewebe	<ul style="list-style-type: none"> <li>• Würth Flexen Twin Solar pipe</li> <li>• Isoante K-Flex Twin Solar pipe</li> <li>• Armaflex Duo Solar pipe</li> <li>• Hydraulic Hose Hansaflex HD200-2SN</li> </ul>
Combustible pipes with HENSOTHERM® RM	<ul style="list-style-type: none"> <li>• Raupiano Plus</li> <li>• Polokal XS</li> <li>• Polokal NG</li> <li>• Uponor Uni</li> <li>• Geberit Silent PP</li> <li>• Alpex F50</li> <li>• Geberit Mepla</li> </ul>
Electro installation pipes with HENSOTHERM® RM	<ul style="list-style-type: none"> <li>• 125 mm diameter</li> </ul>
Metal pipes with pipe insulation	<ul style="list-style-type: none"> <li>• Copper</li> <li>• Mild &amp; stainless steel</li> <li>• Cast Iron</li> </ul>
Cables and trays	<ul style="list-style-type: none"> <li>• Electrical up to 80 mm diameter</li> <li>• Telecoms</li> </ul>
Wichmann Box	<ul style="list-style-type: none"> <li>• Cable box with cables</li> </ul>

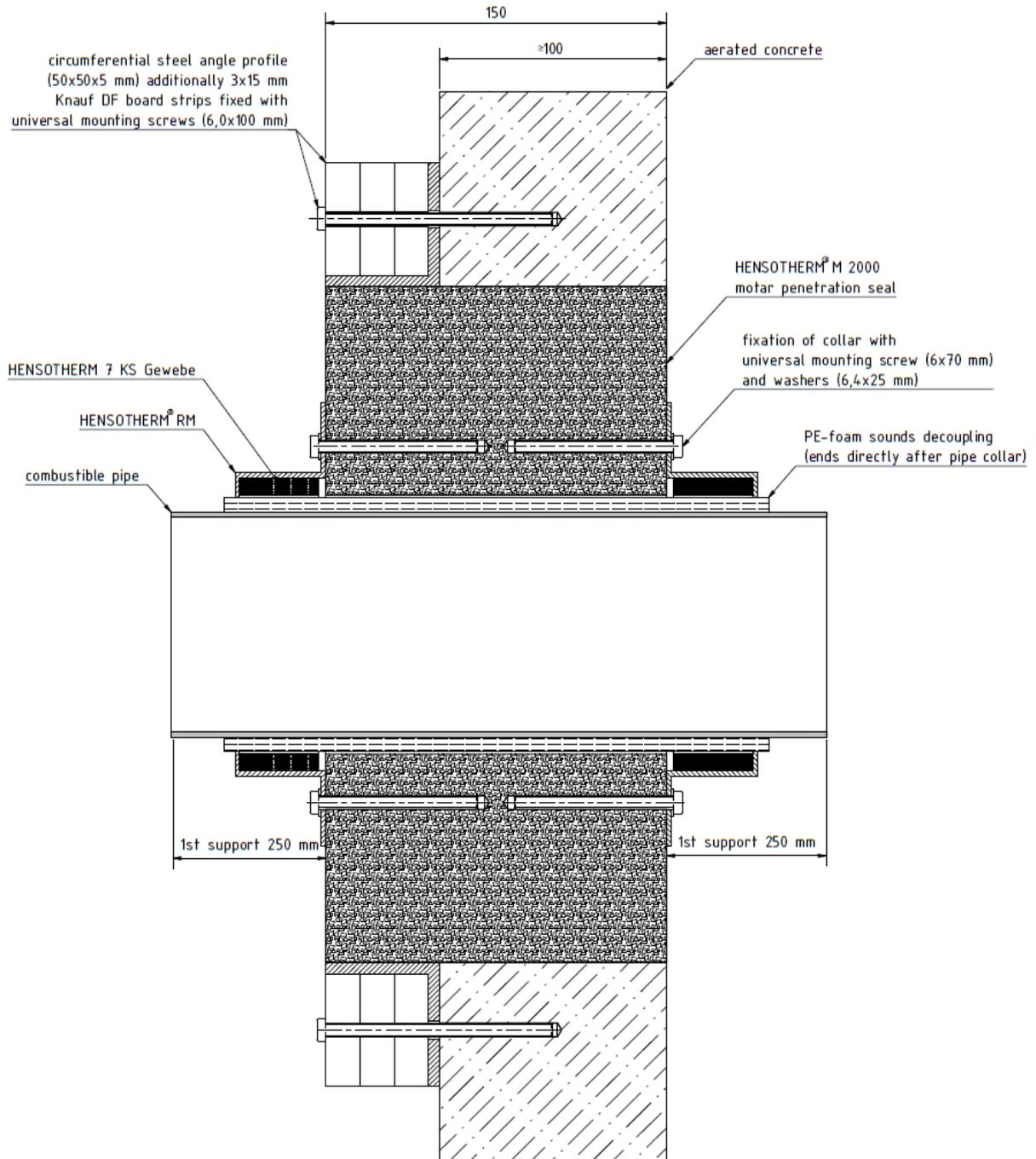
#### A.1.2 Permitted Distances – See specific service/seal combinations



### A.1.3 Combustible pipes fitted with HENSOTHERM® RM pipe collars

**Penetration Seal:** Combustible pipes fitted with HENSOTHERM® RM pipe collars to both faces of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 30 mm and to the edges of the aperture (a1) nominally 49 mm and (a2) nominally 49 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



**A.1.3.1 Combustible pipes with sound decoupling insulation****Geberit Silent PP pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Geberit Silent PP	≤50	2.0	30	PE/4-5	LS 210 mm	EI 180 U/U
	>50 ≤110	3.6	30	PE/4-5	LS 210 mm	EI 180 U/U
	125	4.2	50	PE/4-5	LS 250 mm	EI 180 U/U
	160	5.2	50	PE/4-5	LS 250 mm	EI 180 U/U

**Polokal NG pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Polokal NG	≤50	2.0	30	PE/4-5	LS 210 mm	EI 180 U/U
	>50 ≤110	3.4	30	PE/4-5	LS 210 mm	EI 180 U/U
	125	3.9	50	PE/4-5	LS 250 mm	EI 180 U/U
	160	4.9	50	PE/4-5	LS 250 mm	EI 180 U/U
	200	6.8	50	PE/4-5	LS 250 mm	EI 180 U/U

**Polokal XS pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Polokal XS	≤50	2.0	30	PE/4-5	LS 210 mm	EI 180 U/U
	>50 ≤110	3.4	30	PE/4-5	LS 210 mm	EI 180 U/U

**Raupiano Plus pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Raupiano Plus	≤50	1.8	30	PE/4-5	LS 210 mm	EI 180 U/U
	>50 ≤110	2.8	30	PE/4-5	LS 210 mm	EI 180 U/U
	125	3.1	50	PE/4-5	LS 250 mm	EI 180 U/U
	160	6.2	50	PE/4-5	LS 250 mm	EI 180 U/U

**Uponor Uni Pipe pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Uponor Uni Pipe	≤32	3.0	50	PE/4-5	LS 250 mm	EI 180 U/C
	>32 ≤63	6.0	50	PE/4-5	LS 250 mm	EI 180 U/C

**Alpex F50 pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Alpex F50	≤32	3.0	50	PE/4-5	LS 250 mm	EI 120 U/C
	>32 ≤63	4.5	50	PE/4-5	LS 250 mm	EI 120 U/C

**Geberit Mepla pipes**

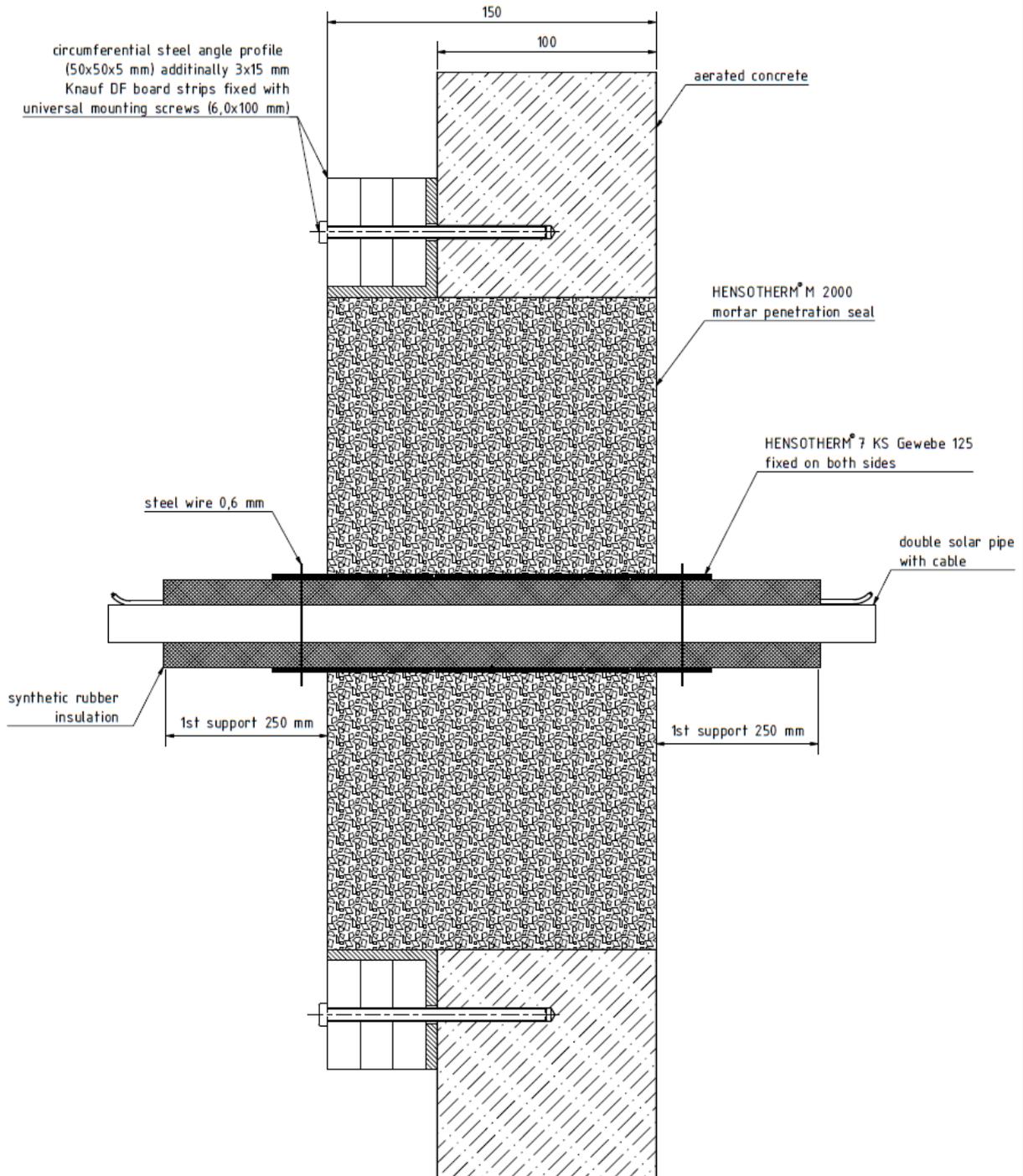
Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Geberit Mepla (a)	16 (2x)	2.25	50	PE/4-5	LS 250 mm	EI 180 U/C
	26 (2x)	3.0	50	PE/4-5	LS 250 mm	EI 180 U/C

(a) Two pipes zero distance installed in one pipe collar

### A.1.4 Solar pipes fitted with HENSOTHERM® 7 KS Gewebe

**Penetration Seal:** Solar pipes fitted with two lengths of HENSOTHERM® 7 KS Gewebe 125 joined at mid depth of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 0 mm and to the edges of the aperture (a1) nominally 100 mm and (a2) nominally 100 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



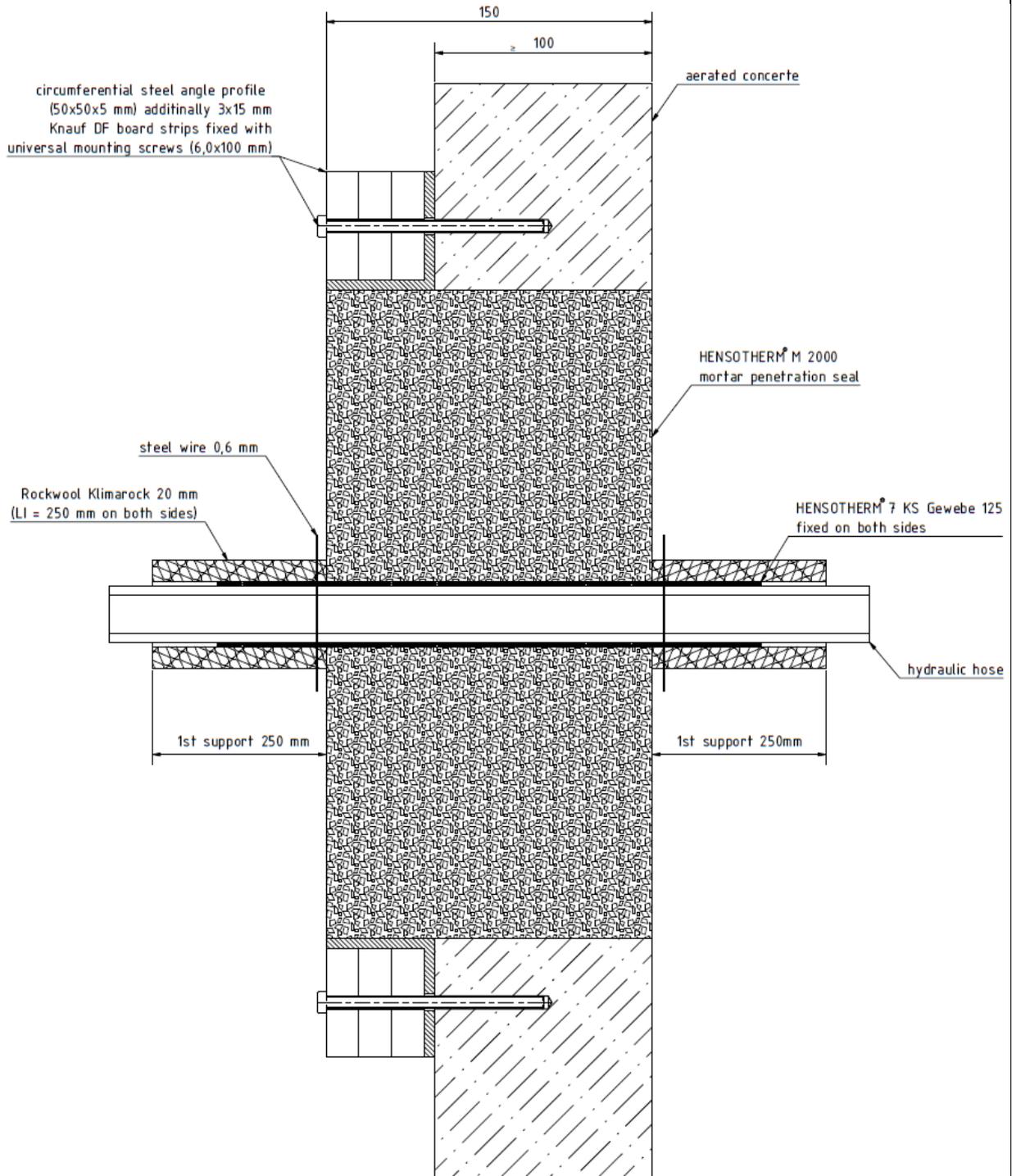
**A.1.4.1 Solar pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Position of pipe collar	Insulation / Thickness mm	Insulation length	Classification
Würth Flexen Twin Solar	16	0.8	2	both sides protruding 50 mm of the seal	Vlies/20	CS	EI 180 C/U
Würth Flexen Twin Solar	25	0.8	2		Vlies/20	CS	EI 180 C/U
Isoante K-Flex Twin Solar Pipe	16	0.8	2		K-Flex Solar HT/20	CS	EI 180 C/U
Isoante K-Flex Twin Solar Pipe	25	0.8	2		K-Flex Solar HT/20	CS	EI 180 C/U
Armaflex Duo Solar Pipe	20	0.8	2		Armaflex HT/20	CS	EI 120 C/U
Armaflex Duo Solar Pipe	25	0.8	2		Armaflex HT/20	CS	EI 180 C/U

### A.1.5 Hydraulic hose fitted with HENSOTHERM® 7 KS Gewebe

**Penetration Seal:** Hydraulic hose fitted with two lengths of HENSOTHERM® 7 KS Gewebe 125 joined at mid depth of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 100 mm and to the edges of the aperture (a1) nominally 100 mm and (a2) nominally 100 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



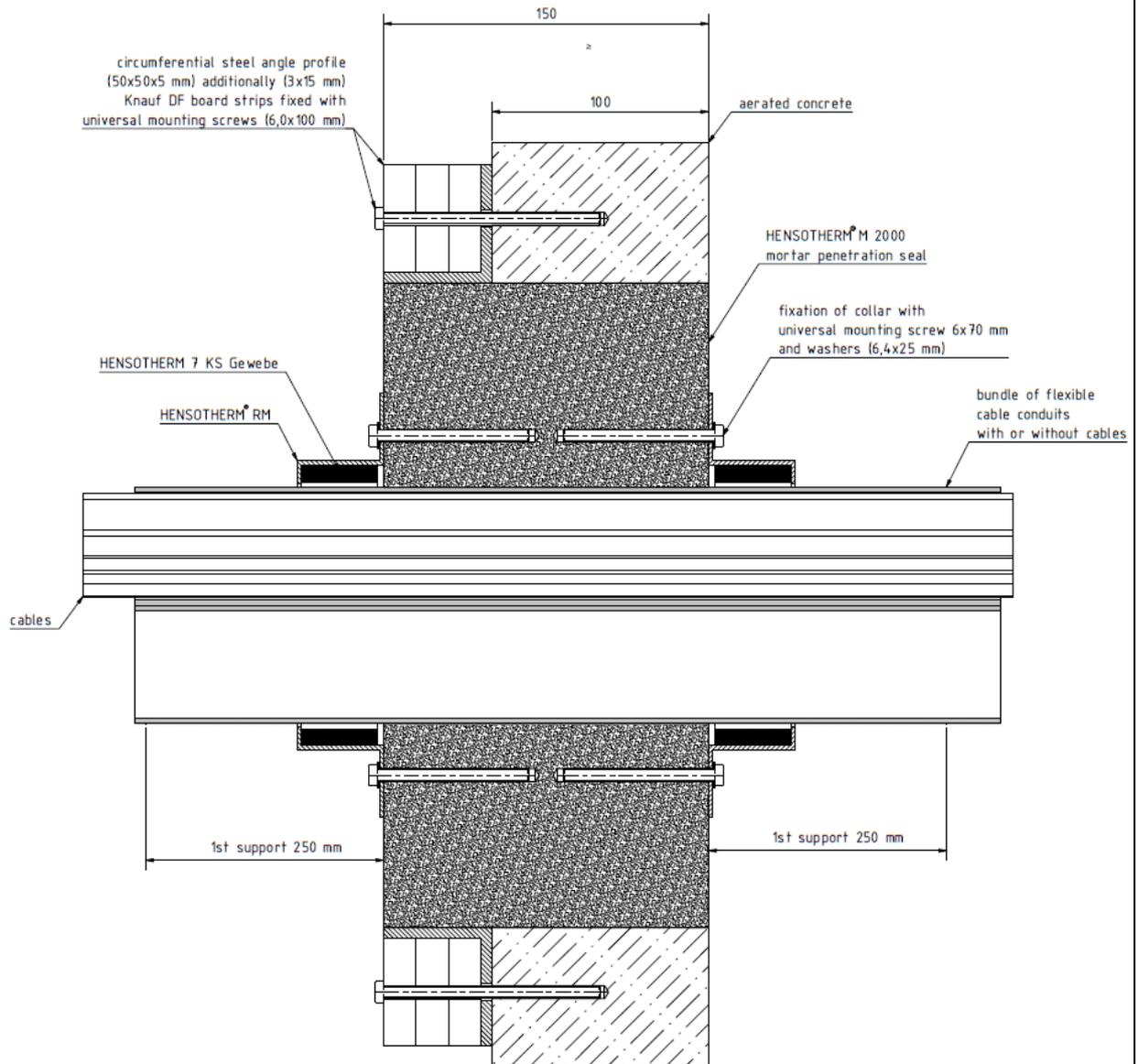
**A.1.5.1 Hydraulic hose**

Hose	Hose diameter mm	Hose wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Position of pipe collar	Insulation / Thickness mm	Insulation length	Classification
Hydraulic Hose Hansaflex HD200-2SN	55.9	9.0	2	both sides protruding 50 mm of the seal	Armaflex NH/25+ Klimarock/20	CS + LI 250 mm	EI 180 U/C

### A.1.6 Electro installation pipes fitted with HENSOTHERM® RM

**Penetration Seal:** Electro installation pipes fitted with HENSOTHERM® RM pipe collars to both faces of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 50 mm and to the edges of the aperture (a1) nominally 50 mm and (a2) nominally 50 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



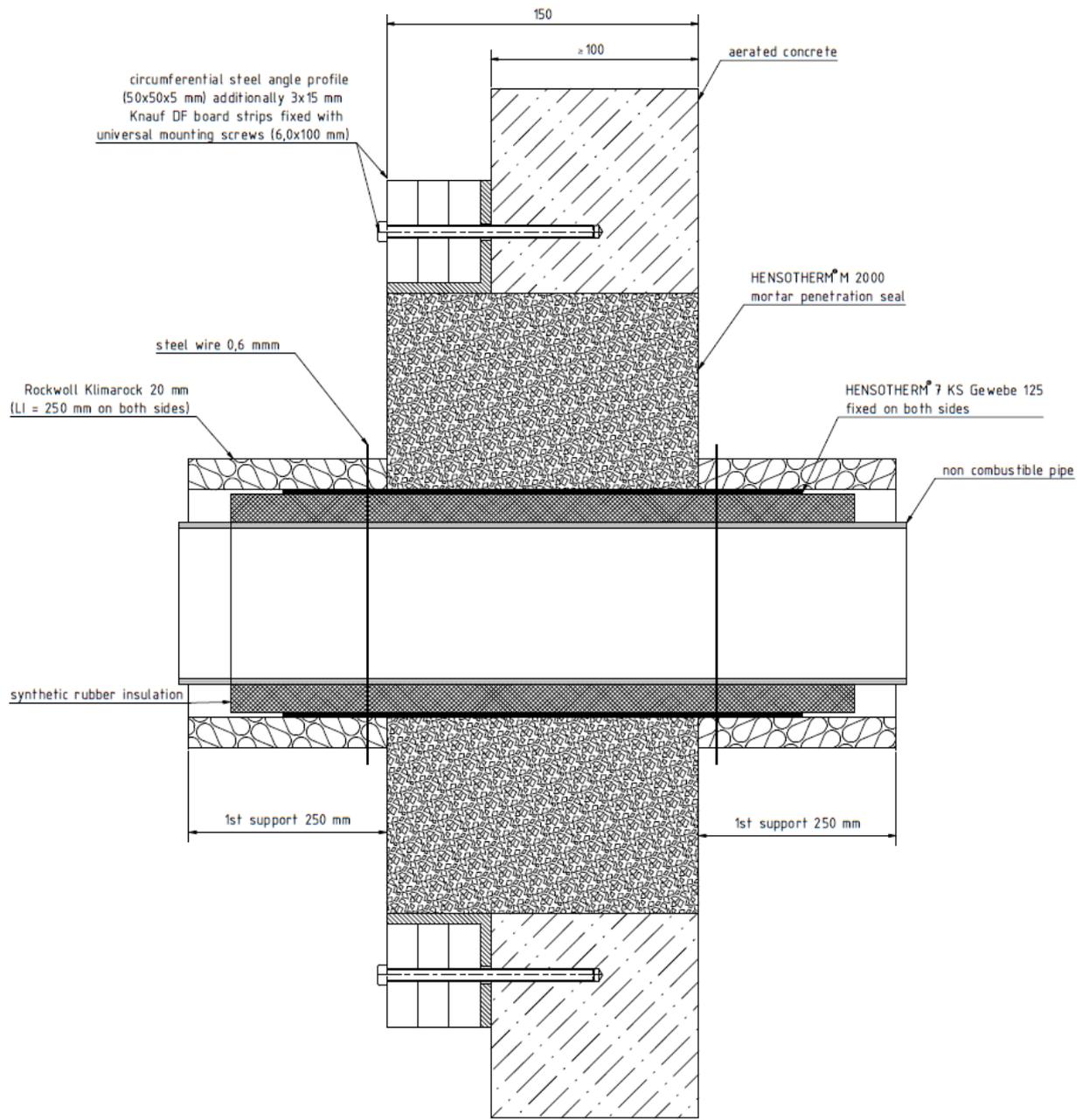
**A.1.6.1 Electro installation pipes**

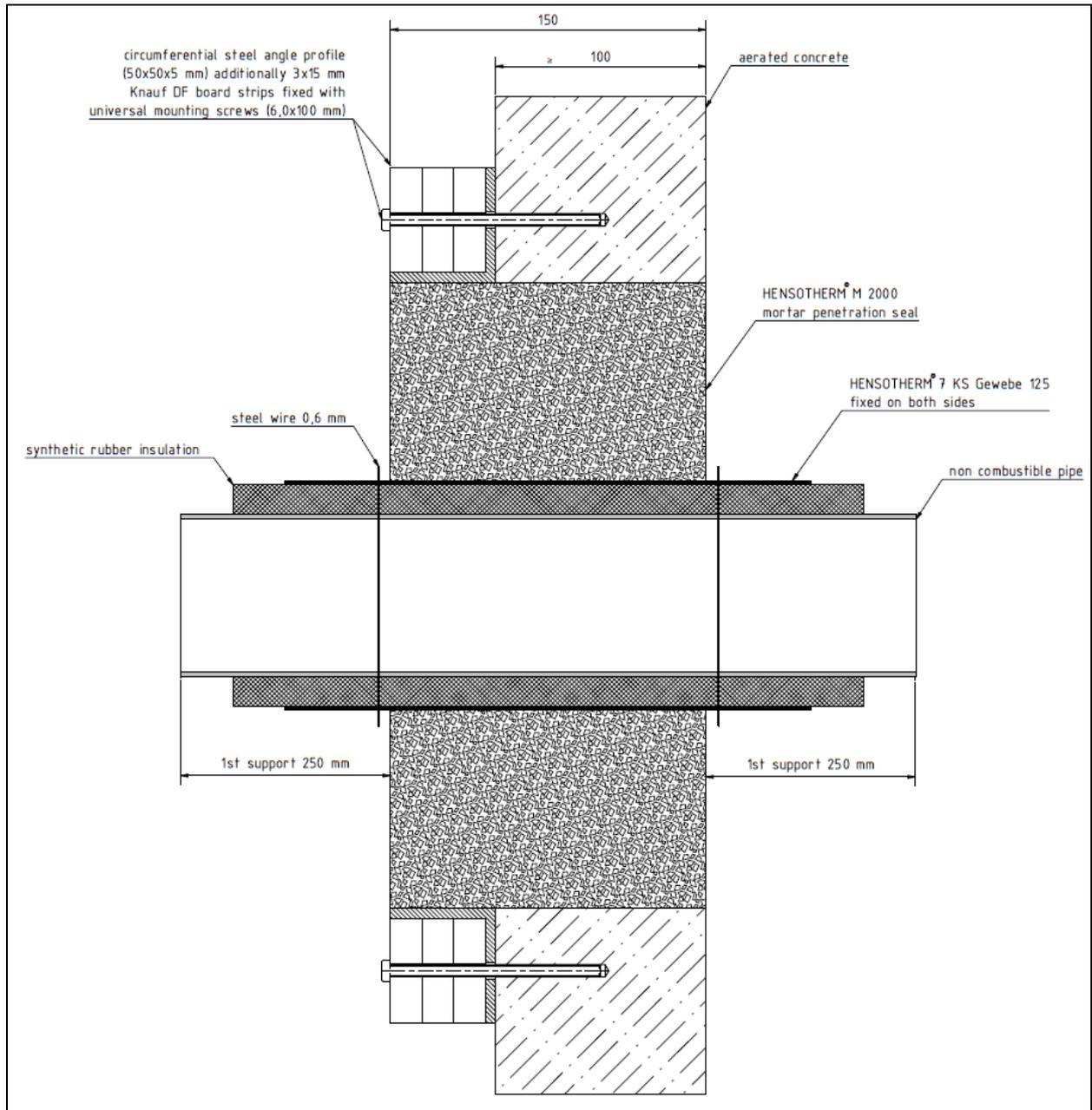
Pipes	Pipe diameter mm	Type of HENSOTHERM® RM	Position of pipe collar	Classification
Bundle of flexible electro installation pipes (single diameter 16 – 63 mm) with cables up to 21 mm and telecommunication cables	125	50	both sides	EI 180 U/C
Bundle of flexible electro installation pipes (single diameter 16 – 63 mm) without cables	125	50	both sides	EI 180 U/C

**A.1.7 Non-combustible pipes fitted with HENSOTHERM® 7 KS Gewebe**

**Penetration Seal:** Non-combustible pipes fitted with two lengths of HENSOTHERM® 7 KS Gewebe 125 joined at mid depth of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 30 mm and to the edges of the aperture (a1) nominally 50 mm and (a2) nominally 50 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:





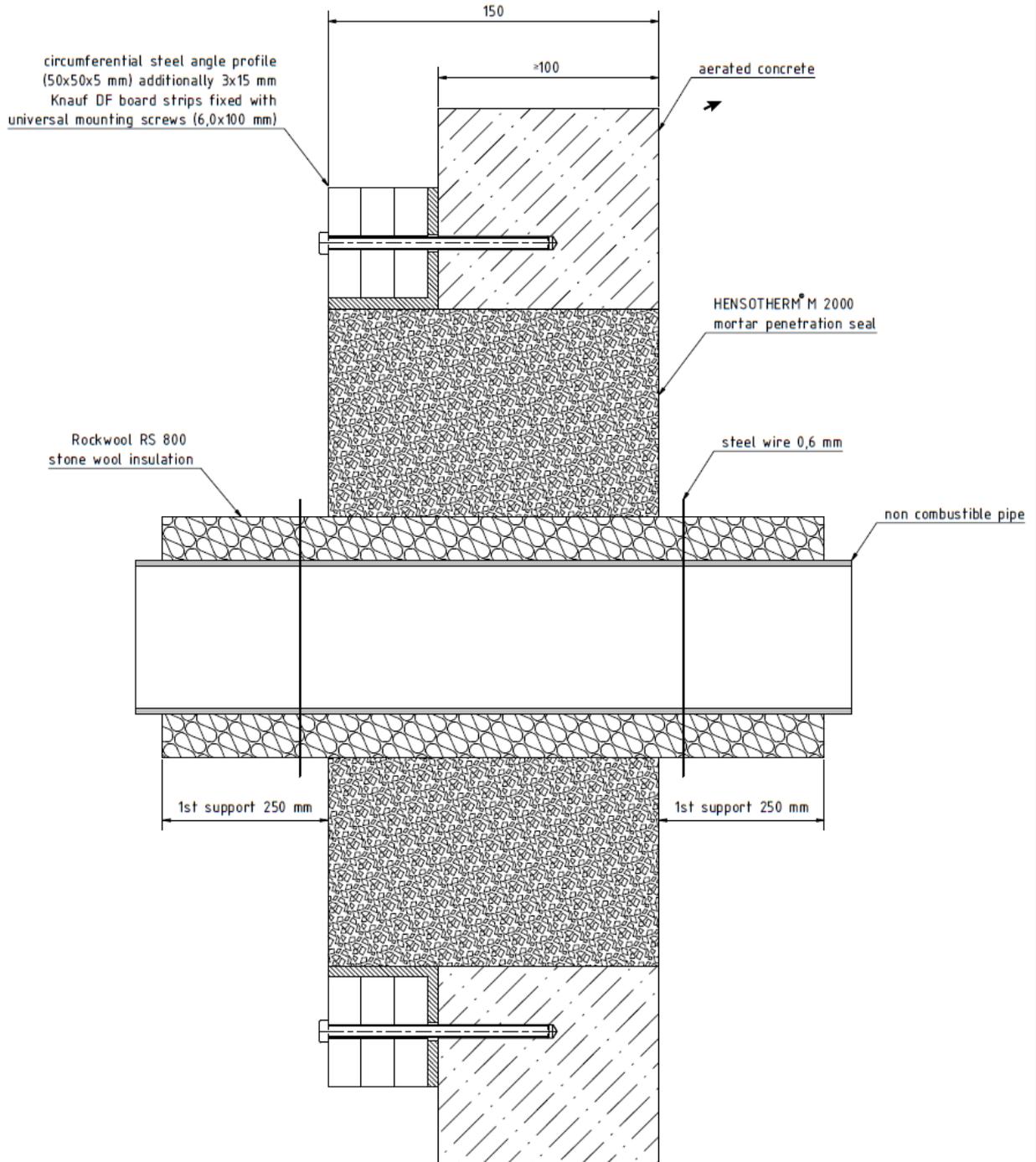
**A.1.7.1 Non-combustible pipes with combustible insulation**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Position of pipe collar	Insulation / Thickness mm	Insulation length	Classification
Copper + Steel	≤15	1.0-7.5	2	Both sides of the seal protruding 50 mm on each side	Armaflex NH/13	CS	EI 180 C/U
Copper + Steel	>15 ≤42	1.2-14.2	2		Armaflex NH/13-19	CS	EI 120 C/U
Copper + Steel	>42 ≤88.9	2.0-14.2	2		Armaflex NH/19-25	CS	EI 90 C/U
Steel	>88.9 ≤168.3	3.6-14.2	2		Armaflex NH/32 + Klimarock/20	CS + LI 250 mm	EI 90 C/U

**A.1.8 Non-combustible pipes fitted with Rockwool RS800 insulation**

**Penetration Seal:** Non-combustible pipes fitted with Rockwool RS800 insulation in 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 30 mm and to the edges of the aperture (a1) nominally 50 mm and (a2) nominally 50 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



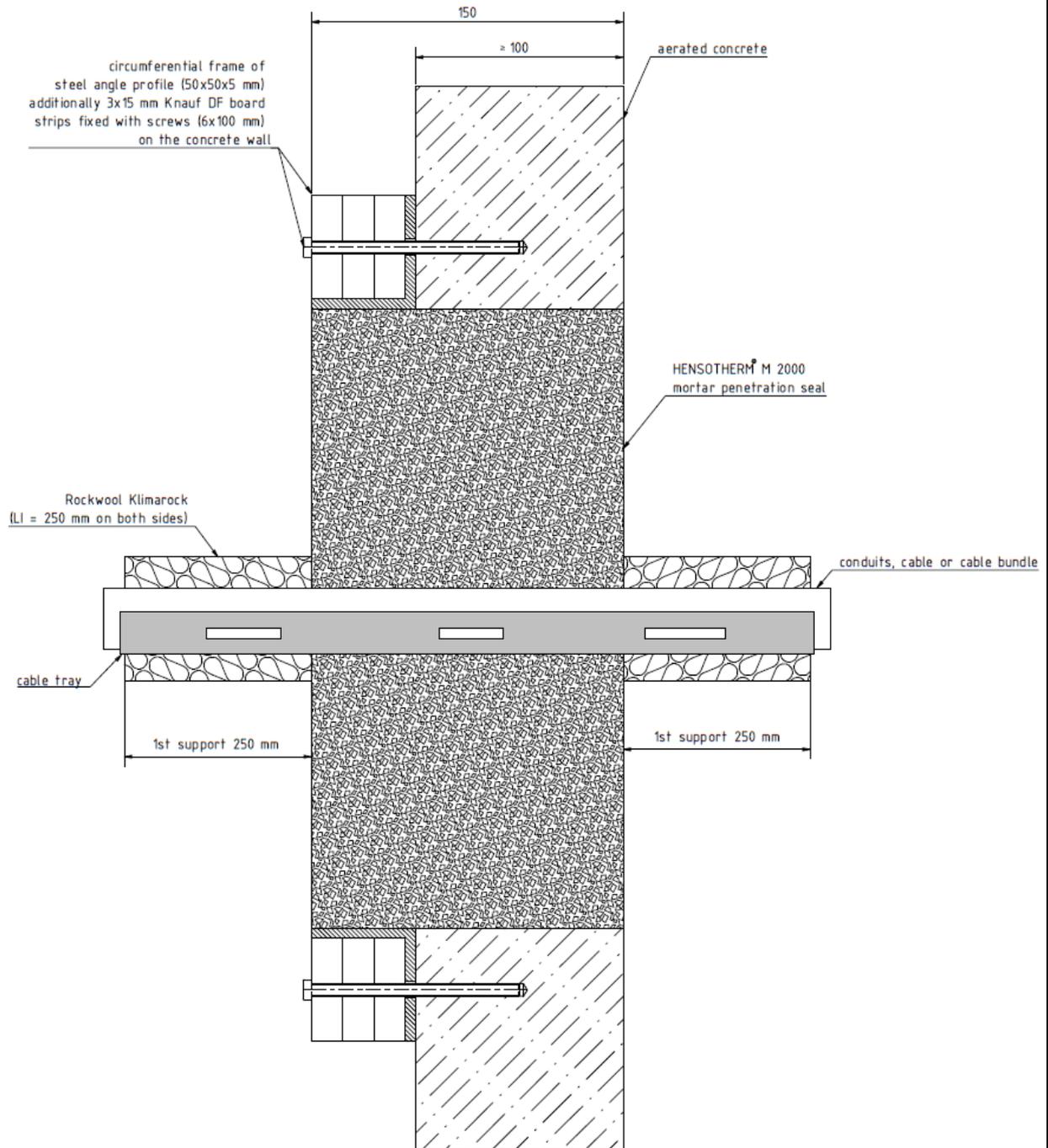
**A.1.8.1 Non-combustible pipes with non-combustible insulation**

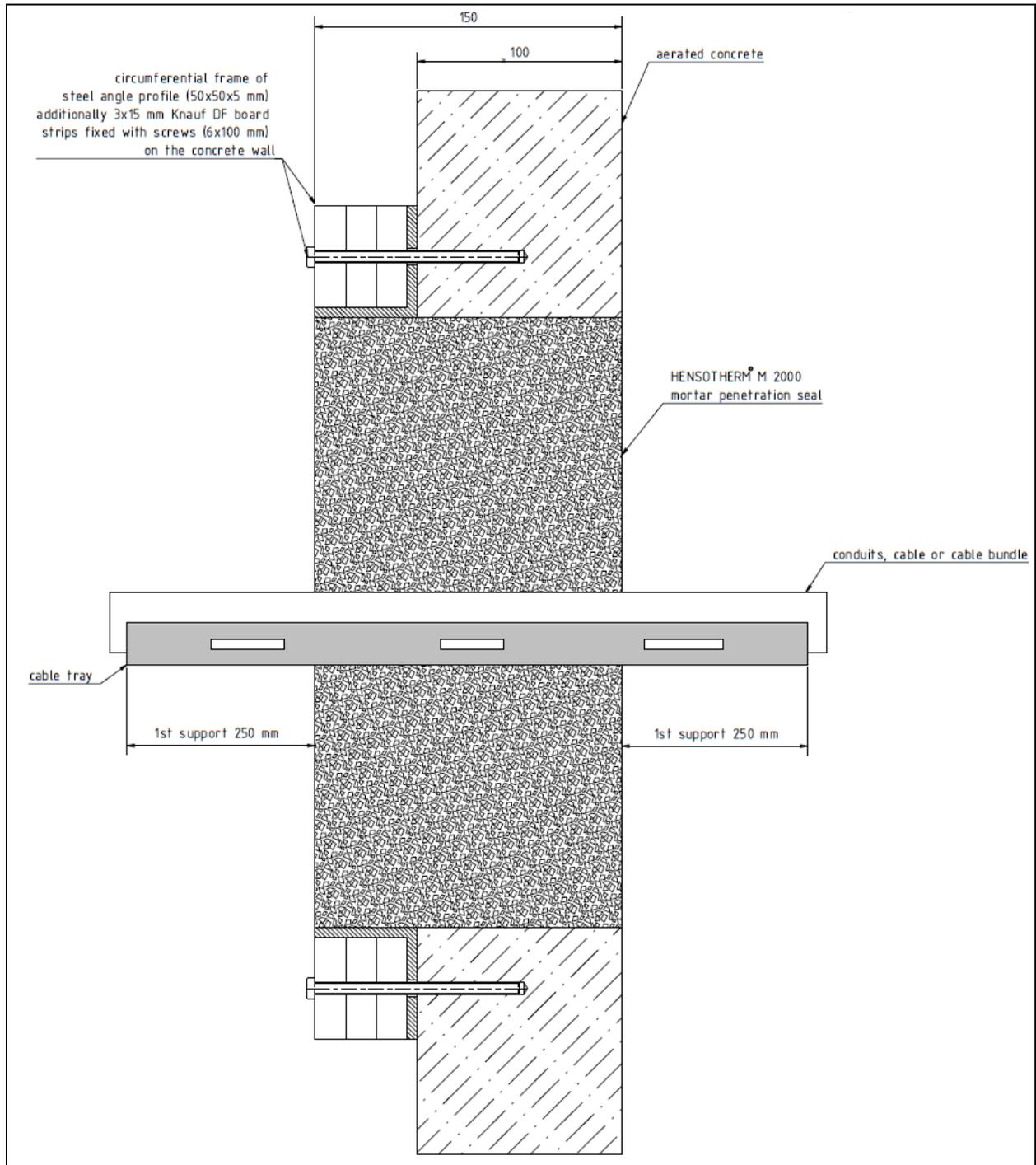
Pipes	Pipe diameter mm	Pipe wall thickness mm	Insulation / Thickness mm	Insulation length	Classification
Copper + Steel	≤15	1.0-7.5	Rockwool RS800/20	LS 1150 mm	EI 180 C/U
Copper + Steel	>15 ≤54	1.5-14.2	Rockwool RS800/20-40	LS 1150 mm	EI 120 C/U
Copper + Steel	>54 ≤89	2.0-14.2	Rockwool RS800/40	LS 1550 mm	EI 120 C/U
Steel	>89 ≤168.3	3.6-14.2	Rockwool RS800/40	LS 1550 mm	EI 120 C/U

### A.1.9 Cables and trays

**Penetration Seal:** Cables and trays with or without Klimarock insulation in 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes ( $a_3$ ) = 0 mm and to the edges of the aperture ( $a_1$ ) nominally 0 mm and ( $a_2$ ) nominally 0 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:





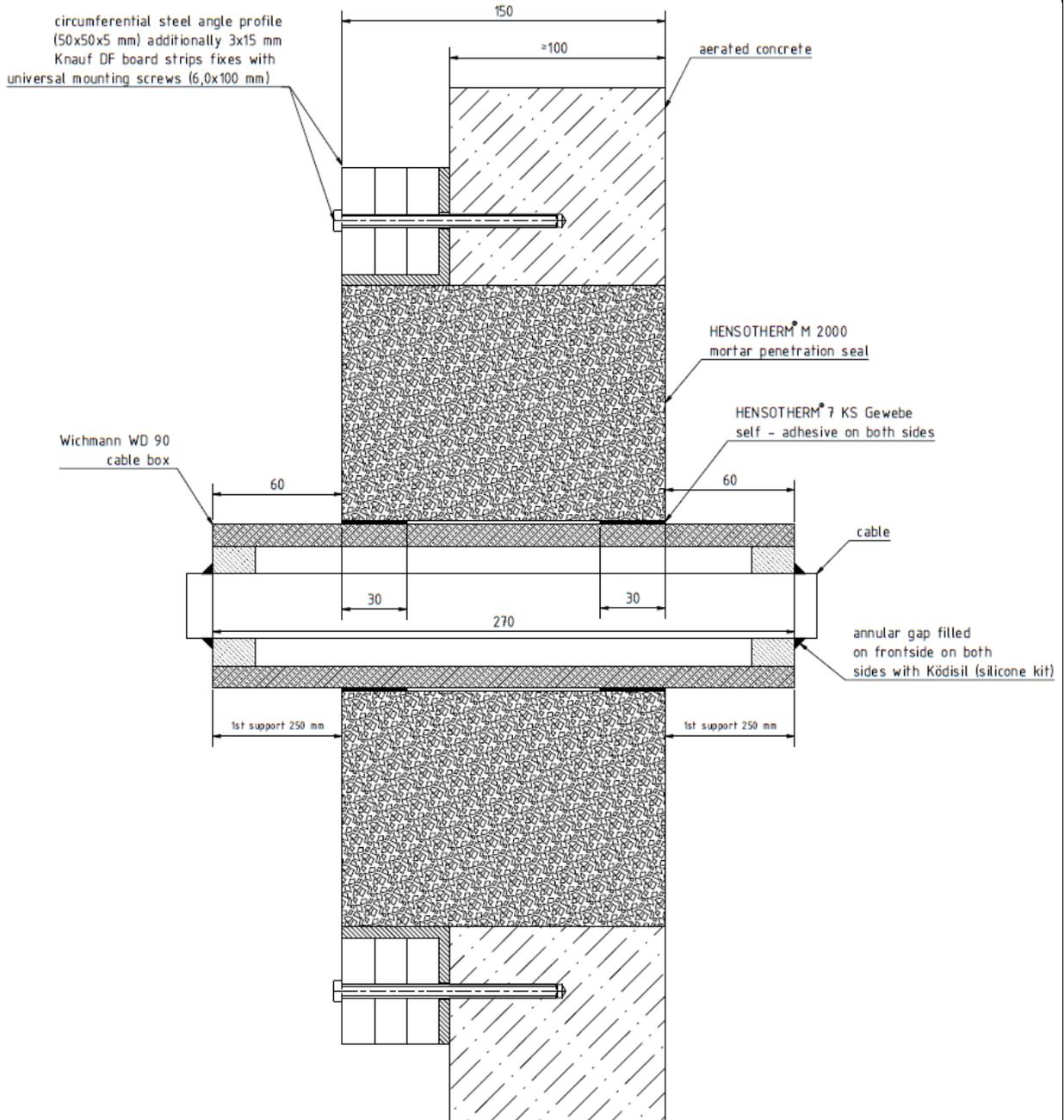
**A.1.9.1 Cables, conduits and trays**

Cable	Diameter mm	Additional insulation	Classification
Cable group small	up to 21	Klimarock 30 mm (LI = 200 mm) both sides	EI 180
Cable group middle	22-50		EI 120
Cable group big	51-80		EI 120
Bundle of telecommunication cables	up to 100		EI 120
Conduits (steel) (H)	up to 16		EI 120 C/U
Conduits (PVC) (I)	up to 16		EI 120 U/C
Cable group small	up to 21	none	EI 60
Cable group middle	22-50		EI 45
Cable group big	51-80		EI 45
Bundle of telecommunication cables	up to 100		EI 120
Conduits (steel) (H)	up to 16		EI 120 C/U
Conduits (PVC) (I)	up to 16		EI 90 U/C
Empty cable tray			EI 180

### A.1.10 Wichmann WD90 Box

**Penetration Seal:** Wichmann WD90 cable box in 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes ( $a_3$ ) = 20 mm and to the edges of the aperture ( $a_1$ ) nominally 40 mm and ( $a_2$ ) nominally 40 mm. Maximum seal size of 2000 mm high by 1200 mm wide. Upto two cable boxes may be fitted together.

#### Construction details:



**A.1.10.1 Wichmann WD90 Box**

Cable	Diameter mm	Wichmann-Box	HENSOTHERM® 7 KS Gewebe self-adhesive 30 mm (thickness =2 mm)	Classification
Cable group small	up to 21	110 mm x 640 mm x 270 mm in middle of seal, protruding 60 mm on both sides of the seal	1 x circumferential both sides, flush with the seal	EI 120
Cable group middle	22-50			EI 90
Cable group big	51-80			EI 90
Bundle of telecommunication cables	up to 100			EI 180
Without cable	-			EI 180
Cable group small	up to 21	60 mm x 90 mm x 270 mm in middle of seal, protruding 60 mm on both sides of the seal	1 x circumferential both sides, flush with the seal	EI 180
Without cable	-	60 mm x 90 mm x 270 mm in middle of seal, protruding 60 mm on both sides of the seal		EI 180

Permitted Wichmann Box dimensions:

Width ≤ 640 mm

Height ≤ 110 mm

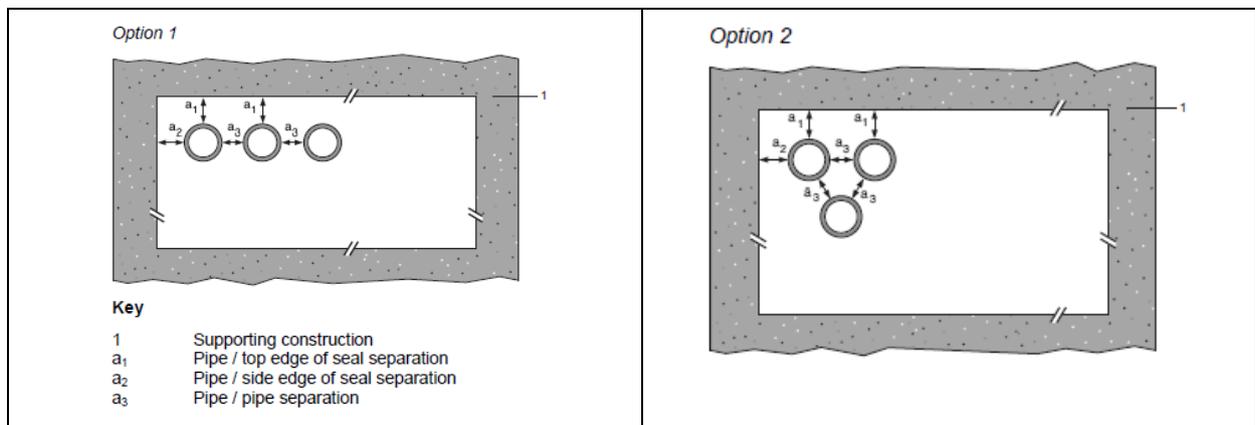
Depth ≤ 270 mm

## A.2 Rigid (concrete) floor constructions with minimum thickness of 150 mm

### A.2.1 Service Types

Services	Types
Services with HENSOTHERM® 7 KS Gewebe	<ul style="list-style-type: none"> <li>• Würth Flexen Twin Solar pipe</li> <li>• Isoante K-Flex Twin Solar pipe</li> <li>• Armaflex Duo Solar pipe</li> <li>• Hydraulic Hose Hansaflex HD200-2SN</li> </ul>
Combustible pipes with HENSOTHERM® RM	<ul style="list-style-type: none"> <li>• Raupiano Plus</li> <li>• Polokal XS</li> <li>• Polokal NG</li> <li>• Uponor Uni</li> <li>• Geberit Silent PP</li> <li>• Alpex F50</li> <li>• Geberit Mepla</li> </ul>
Electro installation pipes with HENSOTHERM® RM	<ul style="list-style-type: none"> <li>• 125 mm diameter</li> </ul>
Metal pipes with pipe insulation	<ul style="list-style-type: none"> <li>• Copper</li> <li>• Mild &amp; stainless steel</li> <li>• Cast Iron</li> </ul>
Cables and trays	<ul style="list-style-type: none"> <li>• Electrical up to 80 mm diameter</li> <li>• Telecoms</li> </ul>
Wichmann Box	<ul style="list-style-type: none"> <li>• Cable box with cables</li> </ul>

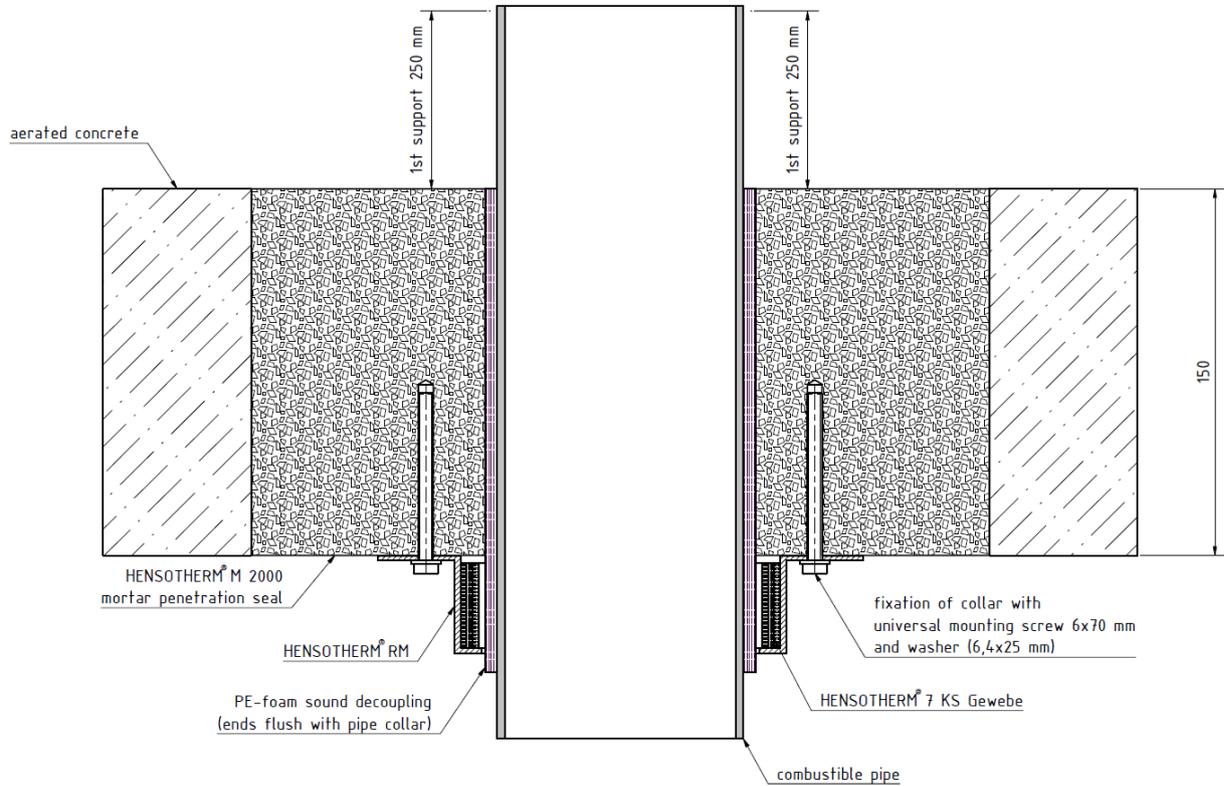
### A.2.2 Permitted Distances – See specific service/seal combinations



### A.2.3 Combustible pipes fitted with HENSOTHERM® RM pipe collars

**Penetration Seal:** Combustible pipes fitted with HENSOTHERM® RM pipe collars to the soffit of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 30 mm and to the edges of the aperture (a1) nominally 49 mm and (a2) nominally 49 mm. Maximum seal size of 2000 mm by 1200 mm.

Construction details:



#### A.2.3.1 Combustible pipes fitted with HENSOTHERM® RM pipe collars

Geberit Silent PP pipes

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Geberit Silent PP	≤50	1.8	30	PE/4-5	LS 180 mm	EI 120 U/U
	>50 ≤110	3.6	30	PE/4-5	LS 180 mm	EI 120 U/U
	125	4.2	50	PE/4-5	LS 200 mm	EI 120 U/U
	160	5.2	50	PE/4-5	LS 200 mm	EI 120 U/U

**Polokal NG pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Polokal NG	≤50	2.0	30	PE/4-5	LS 180 mm	EI 120 U/U
	>50 ≤110	3.4	30	PE/4-5	LS 180 mm	EI 120 U/U
	125	3.9	50	PE/4-5	LS 200 mm	EI 120 U/U
	160	4.9	50	PE/4-5	LS 200 mm	EI 120 U/U
	200	6.8	50	PE/4-5	LS 200 mm	EI 180 U/U

**Polokal XS pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Polokal XS	≤50	2.0	30	PE/4-5	LS 180 mm	EI 180 U/U
	>50 ≤110	3.4	30	PE/4-5	LS 180 mm	EI 180 U/U

**Raupiano Plus pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Raupiano Plus	≤50	1.8	30	PE/4-5	LS 180 mm	EI 120 U/U
	>50 ≤110	2.8	30	PE/4-5	LS 180 mm	EI 120 U/U
	125	3.1	50	PE/4-5	LS 200 mm	EI 120 U/U
	160	6.2	50	PE/4-5	LS 200 mm	EI 90 U/U

**Uponor Uni Pipe pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Uponor Uni Pipe	≤32	3.0	50	PE/4-5	LS 200 mm	EI 120 U/C
	>32 ≤50	4.5	50	PE/4-5	LS 200 mm	EI 90 U/C
	63	6.0	50	PE/4-5	LS 200 mm	EI 45 U/C

**Alpex F50 pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Alpex F50	≤32	3.0	50	PE/4-5	LS 200 mm	EI 120 U/C
	>32 ≤63	4.5	50	PE/4-5	LS 200 mm	EI 90 U/C

**Geberit Mepla pipes**

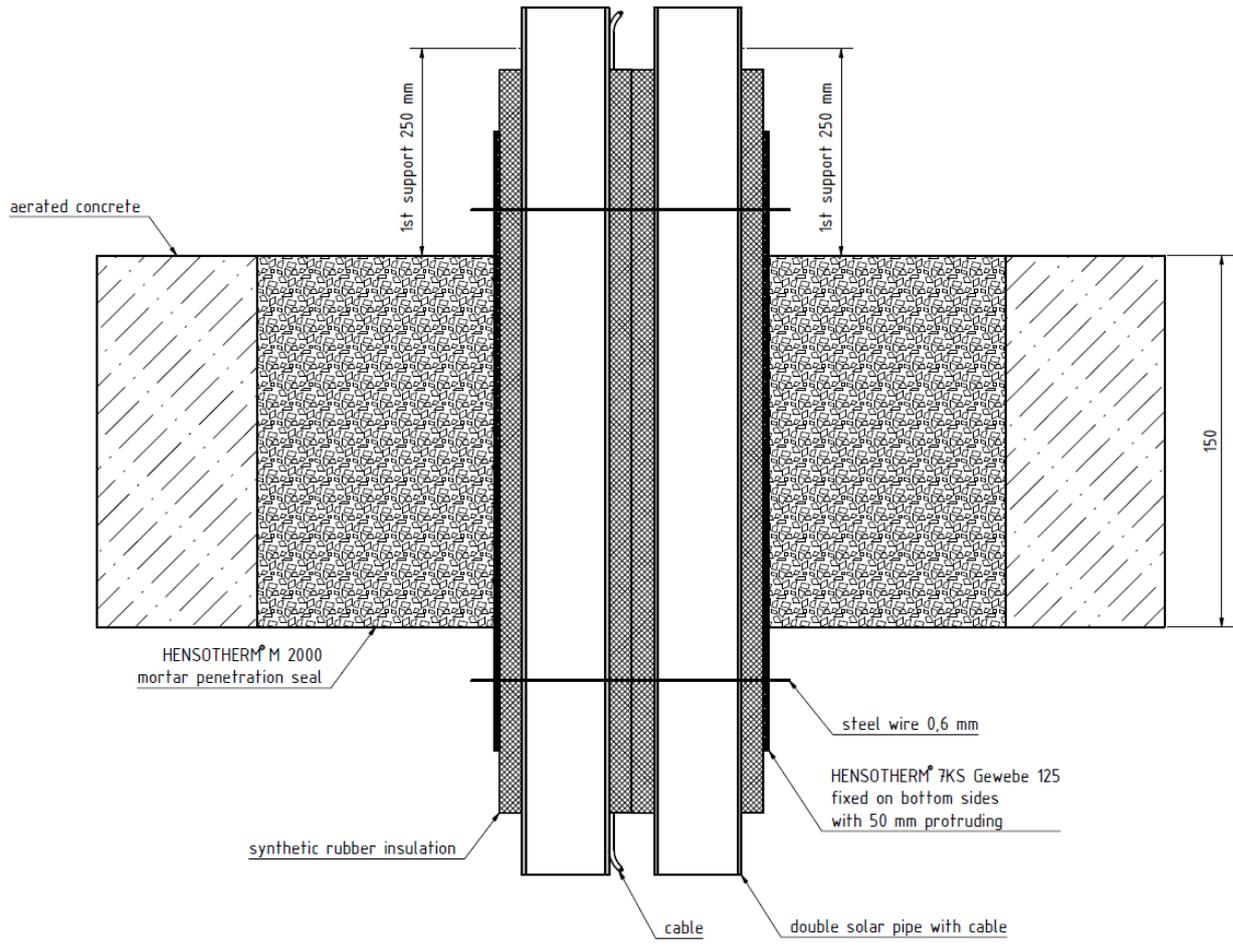
Pipes	Pipe diameter mm	Pipe wall thickness mm	Type of HENSOTHERM® RM	Insulation / Thickness mm	Insulation length mm	Classification
Geberit Mepla (a)	16 (2x)	2.25	50	PE/4-5	LS 200 mm	EI 180 U/C
	26 (2x)	3.0	50	PE/4-5	LS 200 mm	EI 180 U/C

(a) Two pipes zero distance installed in one pipe collar

#### A.2.4 Solar pipes fitted with HENSOTHERM® 7 KS Gewebe

**Penetration Seal:** Solar pipes fitted with a single length of HENSOTHERM® 7 KS Gewebe 125 protruding 50 mm from the bottom of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes ( $a_3$ ) = 0 mm and to the edges of the aperture ( $a_1$ ) nominally 100 mm and ( $a_2$ ) nominally 100 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



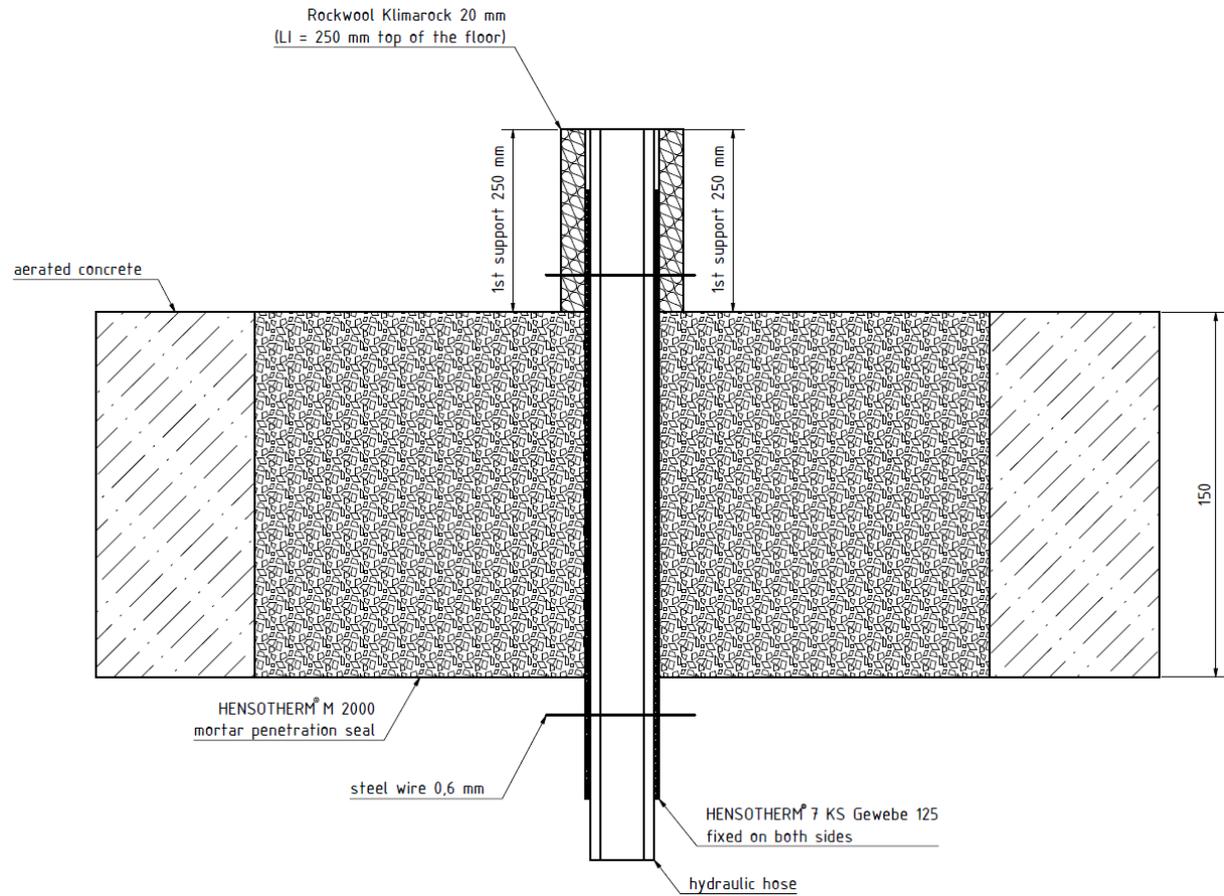
**A.2.4.1 Solar pipes**

Pipes	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Position of pipe collar	Insulation / Thickness mm	Insulation length	Classification
Würth Flexen Twin Solar	16	0.8	2	Bottom side protruding 50 mm of the seal	Vlies/20	CS	EI 120 C/U
Würth Flexen Twin Solar	25	0.8	2		Vlies/20	CS	EI 120 C/U
Isloante K-Flex Twin Solar Pipe	16	0.8	2		K-Flex Solar HT/20	CS	EI 120 C/U
Isloante K-Flex Twin Solar Pipe	25	0.8	2		K-Flex Solar HT/20	CS	EI 120 C/U
Armaflex Duo Solar Pipe	20	0.8	2		Armaflex HT/20	CS	EI 120 C/U
Armaflex Duo Solar Pipe	25	0.8	2		Armaflex HT/20	CS	EI 120 C/U

### A.2.5 Hydraulic hose fitted with HENSOTHERM® 7 KS Gewebe

**Penetration Seal:** Hydraulic hose fitted with two lengths of HENSOTHERM® 7 KS Gewebe 125 joined at mid depth of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 100 mm and to the edges of the aperture (a1) nominally 100 mm and (a2) nominally 100 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



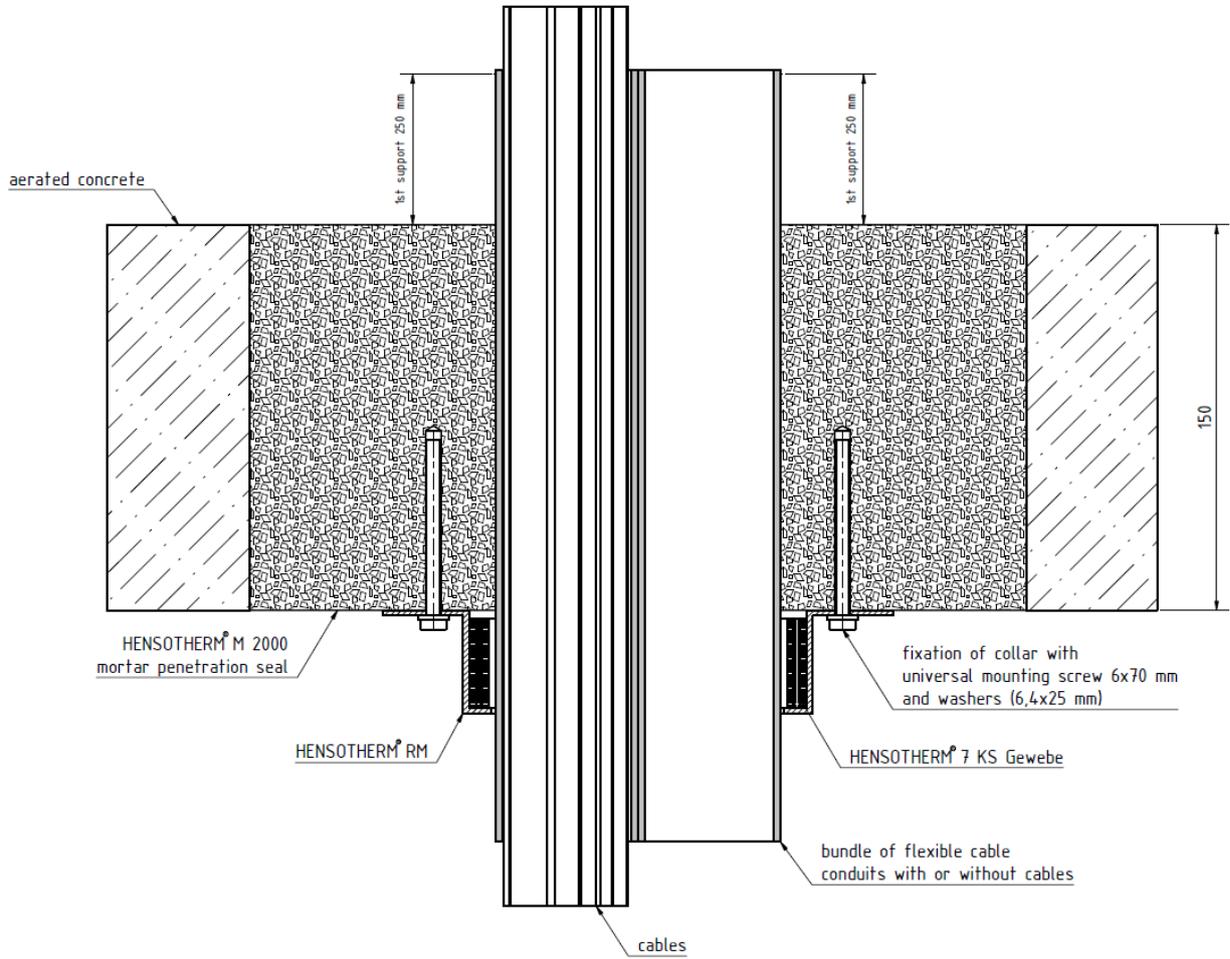
**A.2.5.1 Hydraulic hose**

Hose	Hose diameter mm	Hose wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Position of pipe collar	Insulation / Thickness mm	Insulation length	Classification
Hydraulic Hose Hansaflex HD200-2SN	55.9	9.0	2	Bottom side of the seal, 75 mm inside seal, 50 mm protruding on upper side	Armaflex NH/25+ Klimarock/20	CS + LI 250 mm (upper side of the seal)	EI 120 U/C

### A.2.6 Electro installation pipes fitted with HENSOTHERM® RM

**Penetration Seal:** Electro installation pipes fitted with HENSOTHERM® RM pipe collars to the soffit of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 50 mm and to the edges of the aperture (a1) nominally 50 mm and (a2) nominally 50 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



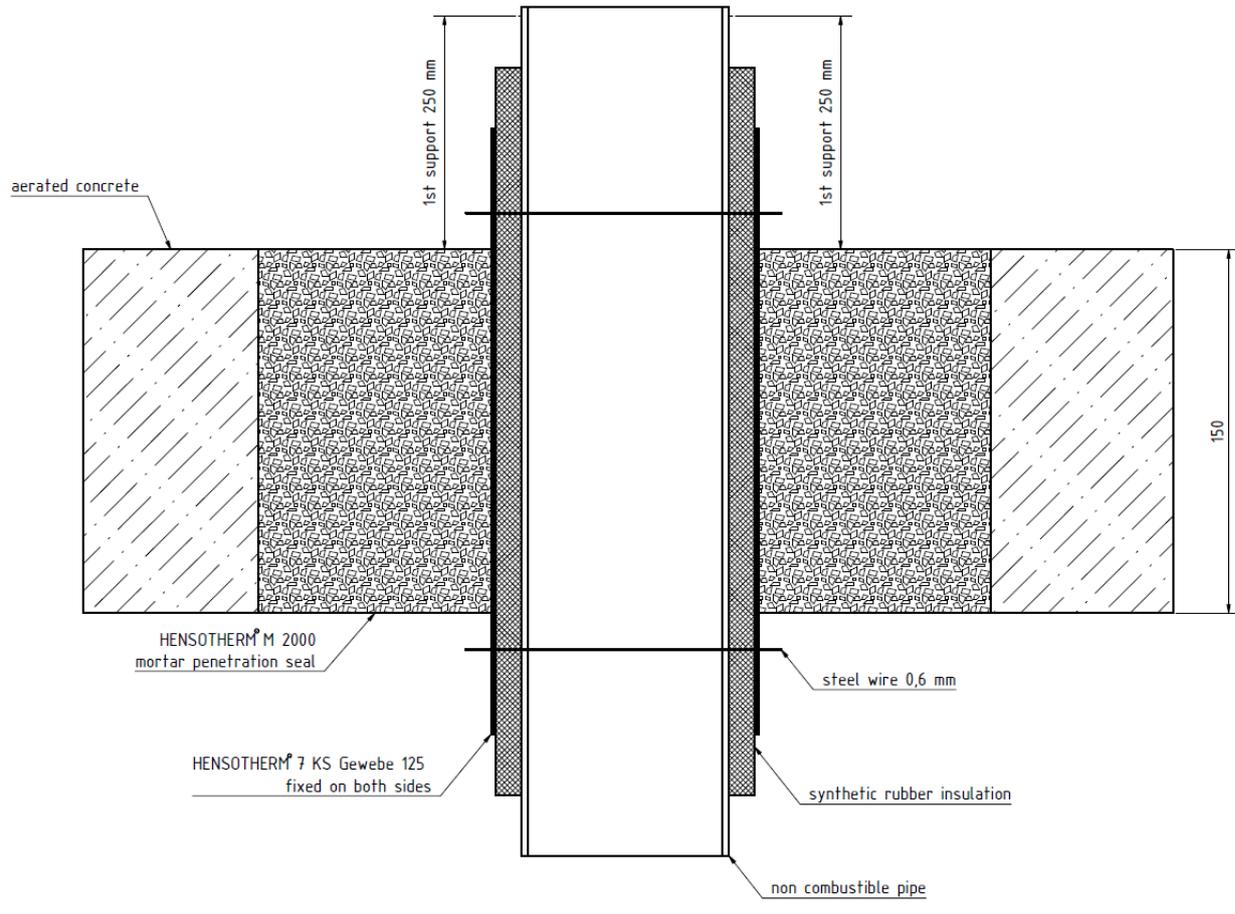
**A.2.6.1 Electro installation pipes**

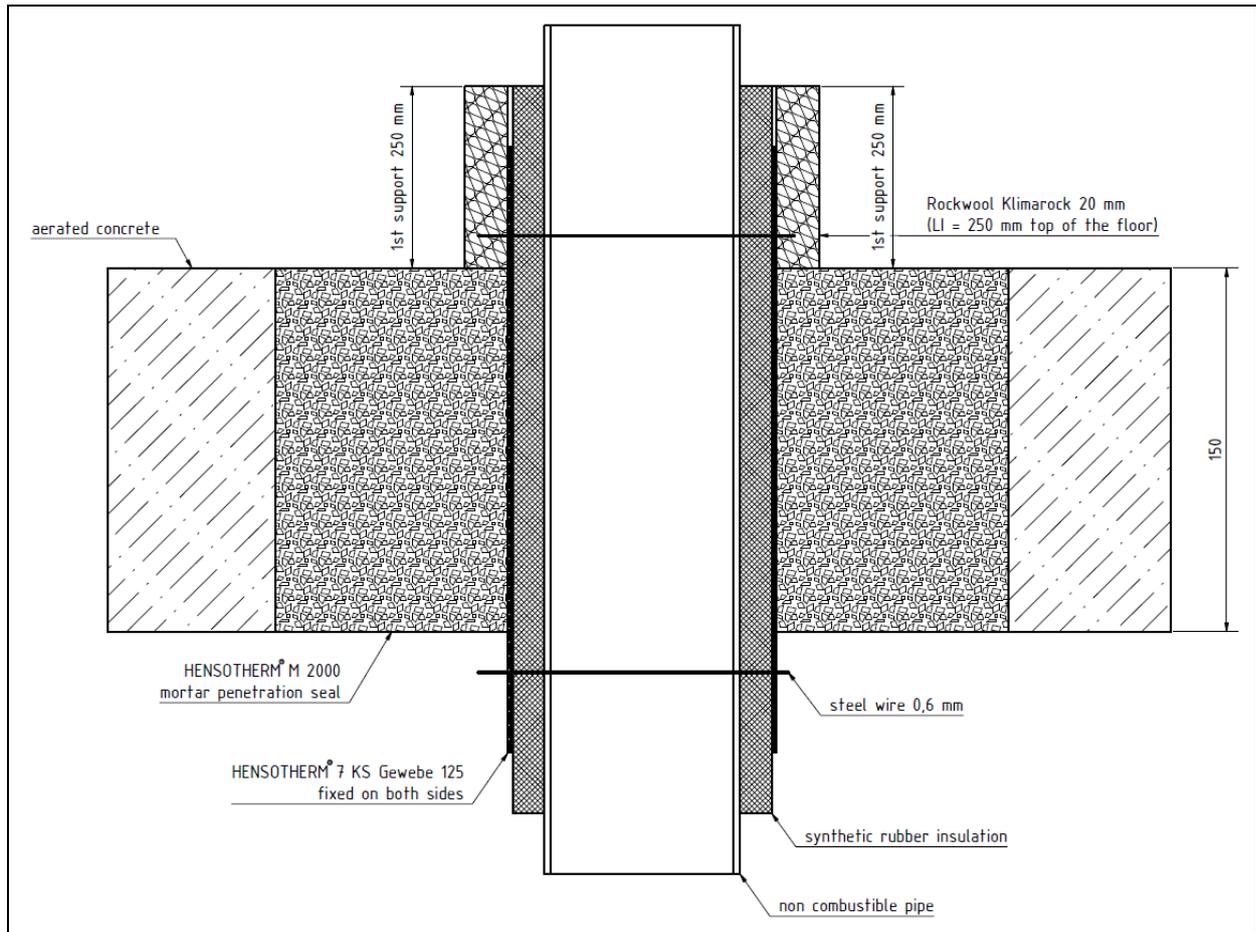
Pipes	Pipe diameter mm	Type of HENSOTHERM® RM	Position of pipe collar	Classification
Bundle of flexible electro installation pipes (single diameter 16 – 63 mm) with cables up to 21 mm and telecommunication cables	125	50	bottom side	EI 120 U/U
Bundle of flexible electro installation pipes (single diameter 16 – 63 mm) without cables	125	50	bottom side	EI 180 U/U

### A.2.7 Non-combustible pipes fitted with HENSOTHERM® 7 KS Gewebe

**Penetration Seal:** Non-combustible pipes fitted with two lengths of HENSOTHERM® 7 KS Gewebe 125 joined at mid depth of the 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 30 mm and to the edges of the aperture (a1) nominally 50 mm and (a2) nominally 50 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:





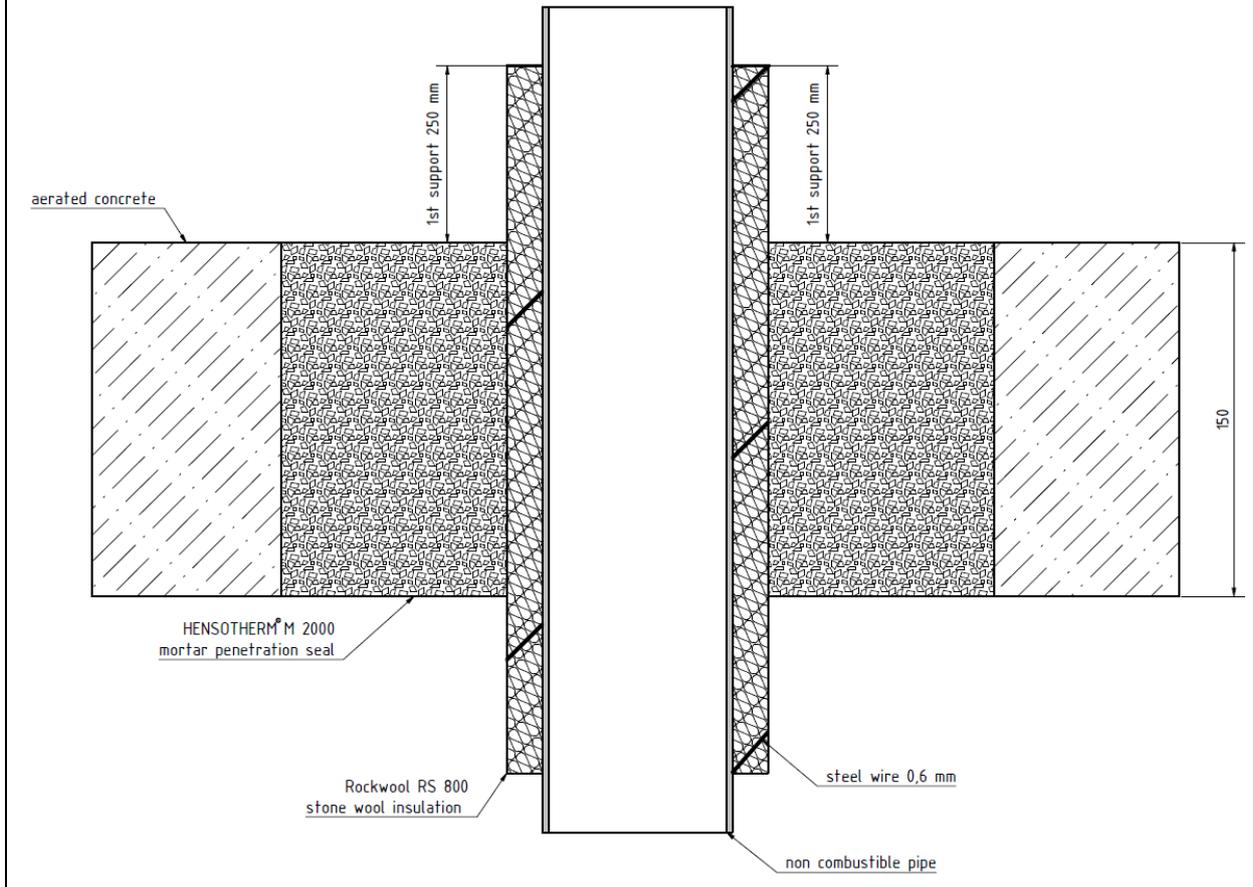
### A.2.7.1 Non-combustible pipes with combustible insulation

Pipes	Pipe diameter mm	Pipe wall thickness mm	Layers of HENSOTHERM® 7 KS Gewebe 125	Position of pipe collar	Insulation / Thickness mm	Insulation lenght	Classification
Copper + Steel	≤15	1.0-7.5	2	Both sides encountered in the middle of the seal, protruding 50 mm outside	Armaflex NH/13	CS	EI 120 C/U
Copper + Steel	>15 ≤42	1.2-14.2	2		Armaflex NH/13-19	CS	EI 90 C/U
Copper + Steel	>42 ≤88.9	2.0-14.2	2		Armaflex NH/19-25	CS	EI 90 C/U
Steel	>88.9 ≤168.3	3.6-14.2	2		Armaflex NH/25	CS	EI 60 C/U
Steel	>88.9 ≤168.3	3.6-14.2	2		Armaflex NH/25 + Klimarock/20	CS + LI 250 mm	EI 90 C/U

### A.2.8 Non-combustible pipes fitted with Rockwool RS800 insulation

**Penetration Seal:** Non-combustible pipes fitted with Rockwool RS800 insulation in 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes (a3) = 30 mm and to the edges of the aperture (a1) nominally 50 mm and (a2) nominally 50 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:



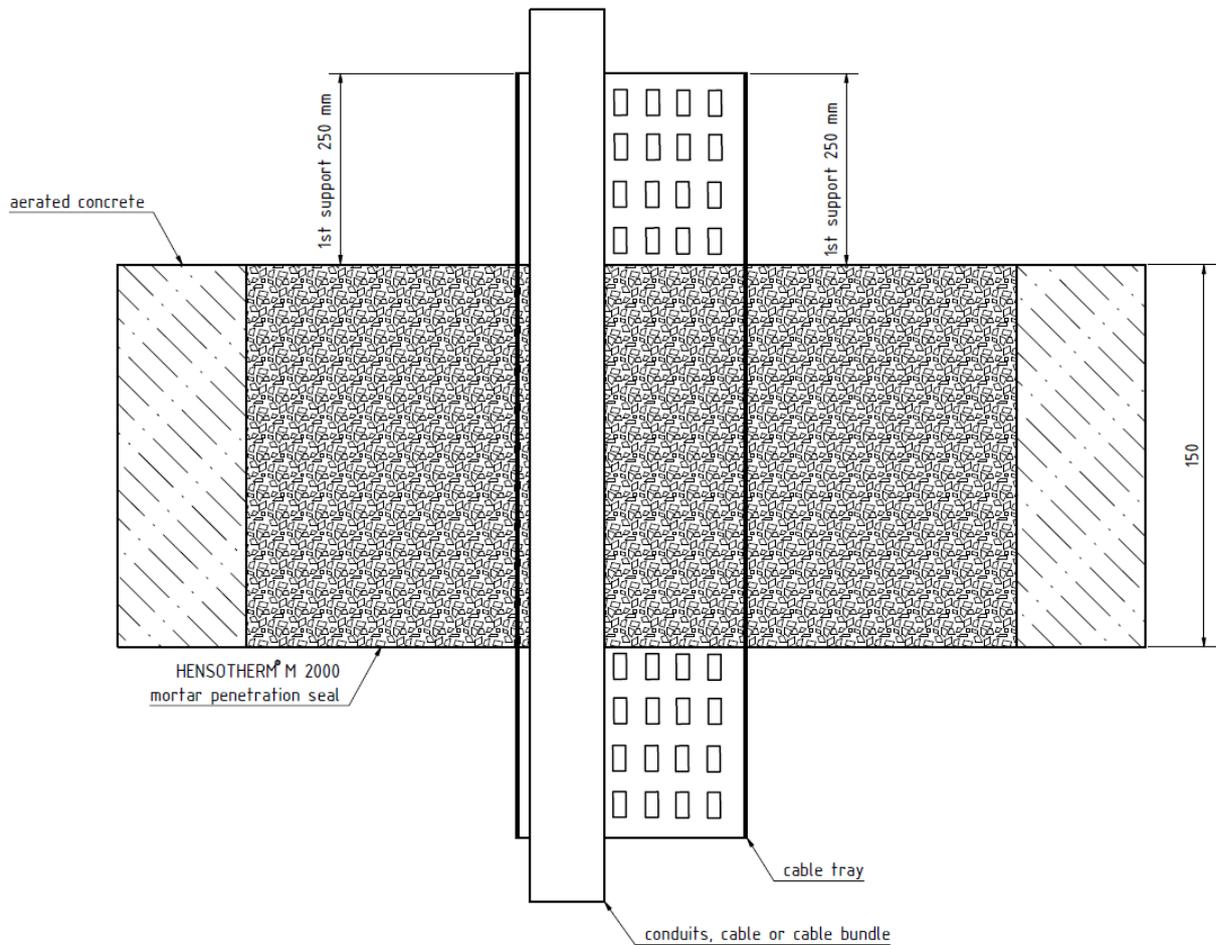
**A.2.8.1 Non-combustible pipes with non-combustible insulation**

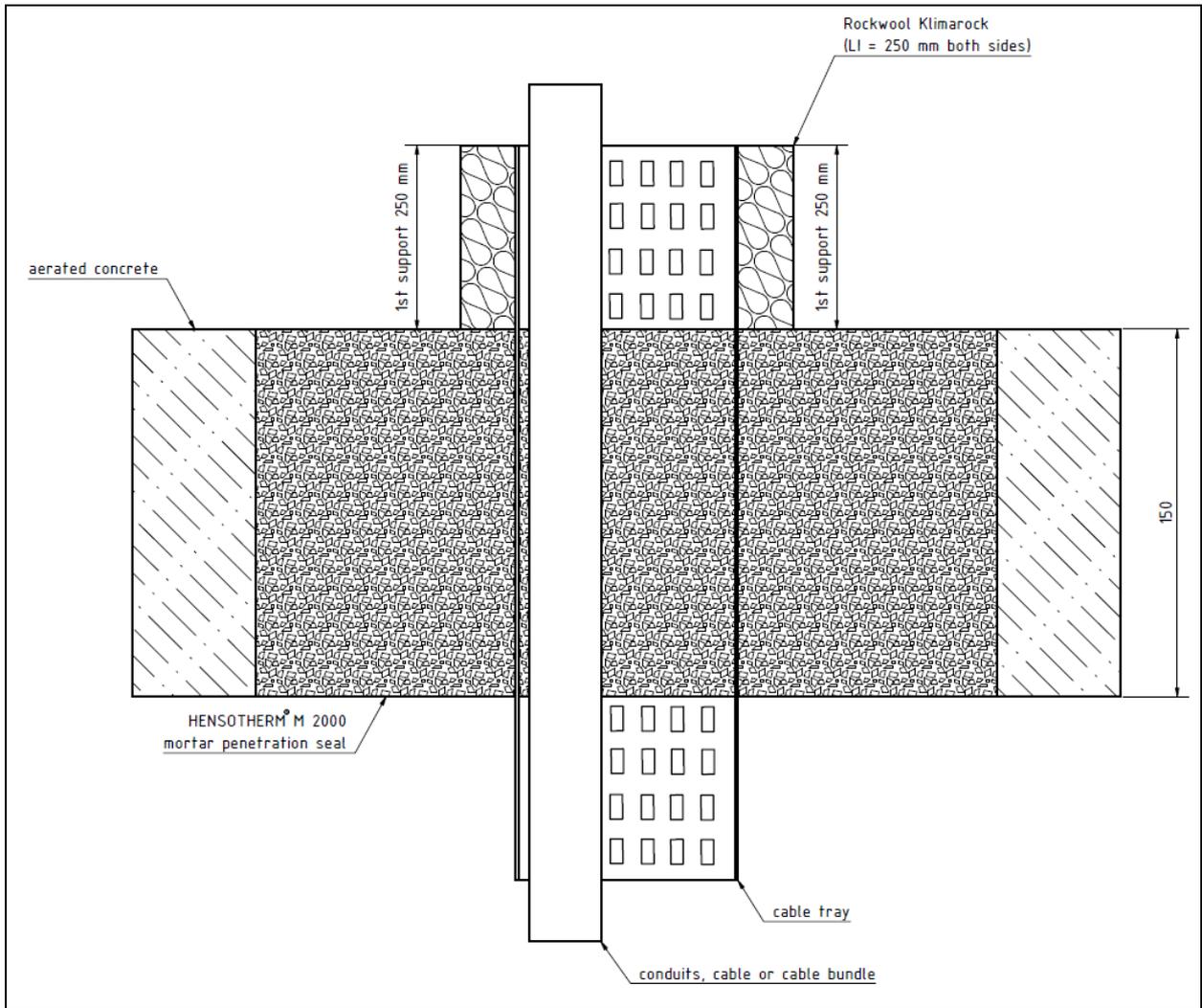
Pipes	Pipe diameter mm	Pipe wall thickness mm	Insulation / Thickness mm	Insulation length	Classification
Copper + Steel	≤15	1.0-7.5	Rockwool RS800/20	LS 1150 mm	EI 120 C/U
Copper + Steel	>15 ≤54	1.5-14.2	Rockwool RS800/20-40	LS 1150 mm	EI 90 C/U
Copper + Steel	>54 ≤89	2.0-14.2	Rockwool RS800/40	LS 1750 mm	EI 60 C/U
Copper + Steel	89	2.0-14.2	Rockwool RS800/40	LS 1750 mm	EI 120 C/U
Steel	>89 ≤168.3	3.6-14.2	Rockwool RS800/40	LS 1750 mm	EI 120 C/U

### A.2.9 Cables and trays

**Penetration Seal:** Cables and trays with or without Klimarock insulation in 150 mm thick HENSOTHERM® M 2000 mortar penetration seal. Min. Separation between pipes ( $a_3$ ) = 0 mm and to the edges of the aperture ( $a_1$ ) nominally 0 mm and ( $a_2$ ) nominally 0 mm. Maximum seal size of 2000 mm high by 1200 mm wide.

Construction details:





**A.2.9.1 Cables and trays**

<b>Cable</b>	<b>Diameter mm</b>	<b>Additional insulation</b>	<b>Classification</b>
Cable group small	up to 21	Klimarock 30 mm (LI = 200 mm) both sides	EI 120
Cable group middle	22-50		EI 90
Cable group big	51-80		EI 90
Bundle of telecommunication cables	up to 100		EI 90
Conduits (steel) (H)	up to 16		EI 90 C/U
Conduits (PVC) (I)	up to 16		EI 90 U/C
Cable group small	up to 21	none	EI 120
Cable group middle	22-50		EI 60
Cable group big	51-80		EI 60
Bundle of telecommunication cables	up to 100		EI 120
Conduits (steel) (H)	up to 16		EI 120 C/U
Conduits (PVC) (I)	up to 16		EI 120 U/C
Empty cable tray			EI 120



**A.2.10.1 Wichmann WD90 Box**

Cable	Diameter mm	Wichmann-Box	HENSOTHERM® 7 KS Gewebe self-adhesive 30 mm (thickness ≈2 mm)	Classifi-cation
Cable group small	up to 21	110 mm x 640 mm x 270 mm flush to bottom side of seal, protruding 120 mm on upper side of seal	1 x circumferential, flush with the seal bottom side	EI 90
Cable group middle	22-50			EI 60
Cable group big	51-80			EI 60
Bundle of telecommunication cables	up to 100			EI 120
Without cable	-			EI 120
Cable group small	up to 21	60 mm x 90 mm x 270 mm flush to the bottom side of the seal, protruding 120 mm on upper side of the seal		EI 120
Without cable	-	60 mm x 90 mm x 270 mm flush to the bottom side of the seal, protruding 120 mm on upper side of the seal		EI 120

Permitted Wichmann Box dimensions:

Width ≤ 640 mm

Height ≤ 110 mm

Depth ≤ 270 mm