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

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

MEMBER OF EOTA

European Technical Assessment ETA-22/0654 of 2022/10/21

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 66 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	HENSOMASTIK® Acrylic for Single Penetrations
Product family to which the above construction product belongs:	Fire stopping product – penetration seals.
Manufacturer:	Rudolf Hensel GmbH Lauenburger Landstraße 11 DE-21039 Börnsen Telephone: +49 40 72106210 www.rudolf-hensel.de
Manufacturing plant:	Rudolf Hensel GmbH Lauenburger Landstraße 11 DE-21039 Börnsen
This European Technical Assessment contains:	43 pages including 3 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, based on:	European Assessment Document (EAD) No. 350454-00-1104: Fire Stopping and fire sealing products – Penetration seals
This version replaces:	-

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 (excepted 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 must be identified as such.

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product.

The HENSOMASTIK® Acrylic for Single Penetrations is an acrylic penetrations sealant with ablative fillers used to form a penetration seal around combustible- and metal pipes to reinstate the fire resistance performance of a separating element: Flexible or rigid wall of min. 100 mm thickness, rigid walls of min. 150 mm thickness or rigid floors of minimum 150 mm thickness, temporarily or permanently where they have been provided with apertures, which are penetrated by various services such like cable or pipe penetration.

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

The construction product HENSOMASTIK® Acrylic for Single Penetrations is assessed on the basis of EAD 35054-00-1104, as a fire stopping product, penetration seal.

The construction product HENSOMASTIK® Acrylic for Single Penetrations is intended for use as a component with a fire protection effect in building elements, assembled systems or constructions that are subject to requirements related to fire protection. Their reactive effect prevents heat transmission and fire spreading in the event of fire.

More information in table 3: “Performance of the product and references to the methods used for its assessment”.

The fire sealing products are to be installed according to the manufacturer’s installation manual.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the HENSOMASTIK® Acrylic for Single Penetrations of 10 years, provided the manufacturers conditions laid down in the manufacturers data sheet for the packaging, transport, storage, installation, use, maintenance and repair are met.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by the Technical Assessment Body issuing an ETA based on the EAD No. 350454-00-1104 but are regarded only as means for expressing the expected economically reasonable working life of the product.

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

Characteristic	Assessment of characteristic
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The product is classified as **E** in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364
Resistance to fire	The product is classified according to EN 13501-2, information can be found in annex A-C
3.3 Hygiene, health and the environment (BWR3)	
Air permeability (material property)	**No performance assessed**
Water Permeability (material property)	**No performance assessed**
Content, emission and/or release of dangerous substances*	**Release scenario: IA2** **After 3 days** [µg/m^3] / **After 28 days** [µg/m^3] **SVOC**: **< 5** / **< 5** **VOC**: **< 150** / **< 20**
3.4 Safety in use (BWR4)	
Mechanical resistance and stability	**No performance assessed**
Resistance to impact/movement	**No performance assessed**
Adhesion	**No performance assessed**
Durability	**Use condition: Y_1** Effects of over-painting with epoxy resin, polyurethane acrylic, alkyd resin, or plastic dispersion is assessed to have no direct influence on the surface hardness of the test specimen.
3.5 Protection against noise (BWR5)	
Airborne sound insulation	**$R_{s,w}$ (C; C_{tr})= 63 (-1;-3) dB**
3.6 Energy Economy and heat retention (BWR6)	
Thermal properties	**No performance assessed**
Water vapour permeability	**No performance assessed**

See additional information in section 3.9 – 3.10.

*) 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.

3.9 Methods of verification

The characteristic values of the joint sealing system are based on the EAD 350454-00-1104.

3.10 General aspects related to the fitness for use of the product.

The verification of durability is part of testing the essential characteristics. HENSOMASTIK® Acrylic for Single Penetrations may be used in end-use applications according to the provisions for use category Y_1 (intended for use at temperatures below 0 °C with exposure to UV but no exposure to rain) without expecting significant changes of the characteristics relevant for fire protection. Products that meet the requirements for type Y_1 also meet the requirement for type Y_2, Z_1 and Z_2.

The European Technical Assessment is issued for the product based on agreed data/information, deposited with ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide if such changes affect the ETA and consequently the validity of the CE marking based on the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

HENSOMASTIK® Acrylic for Single Penetrations is manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base.

4.1 AVCP system

According to the decision 1999/454/EC of the European Commission, as amended, the system(s) of assessment and verification of constancy of performance is system 1 (see Annex V to Regulation (EU) No 305/2011).

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

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

Issued in Copenhagen on 2022-10-21 by

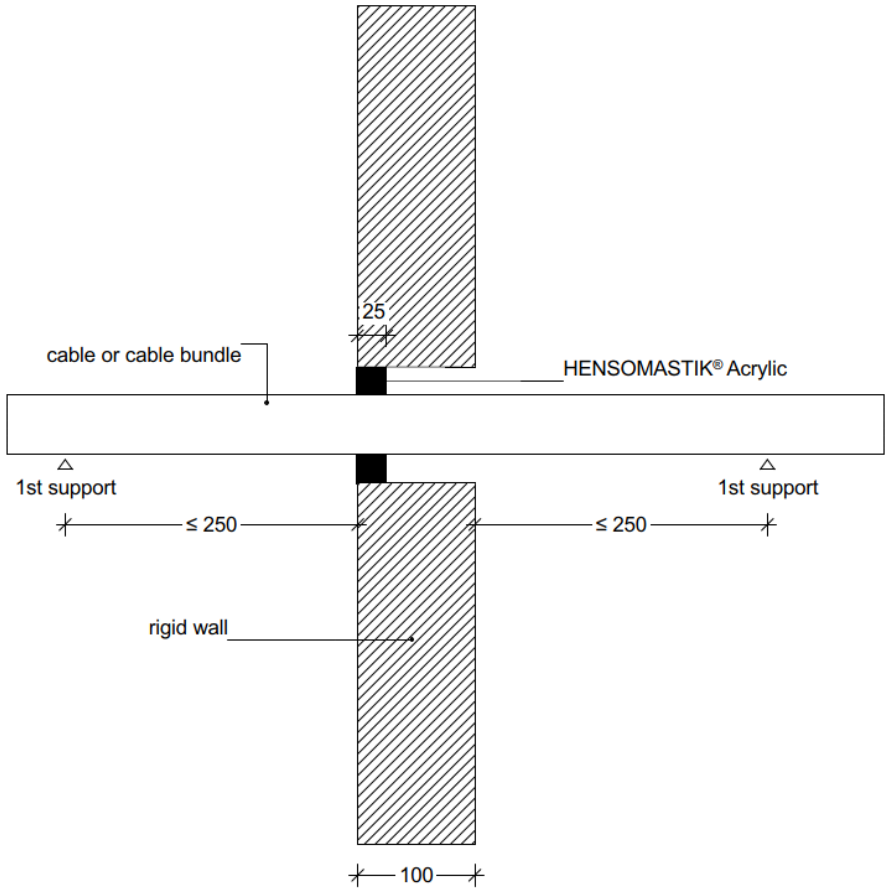
Thomas Bruun
Managing Director, ETA-Danmark

A.1. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Single cables or cable bundles sealed on either one side of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the face of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.1.1. Single cables or cable bundles, sealed on one side

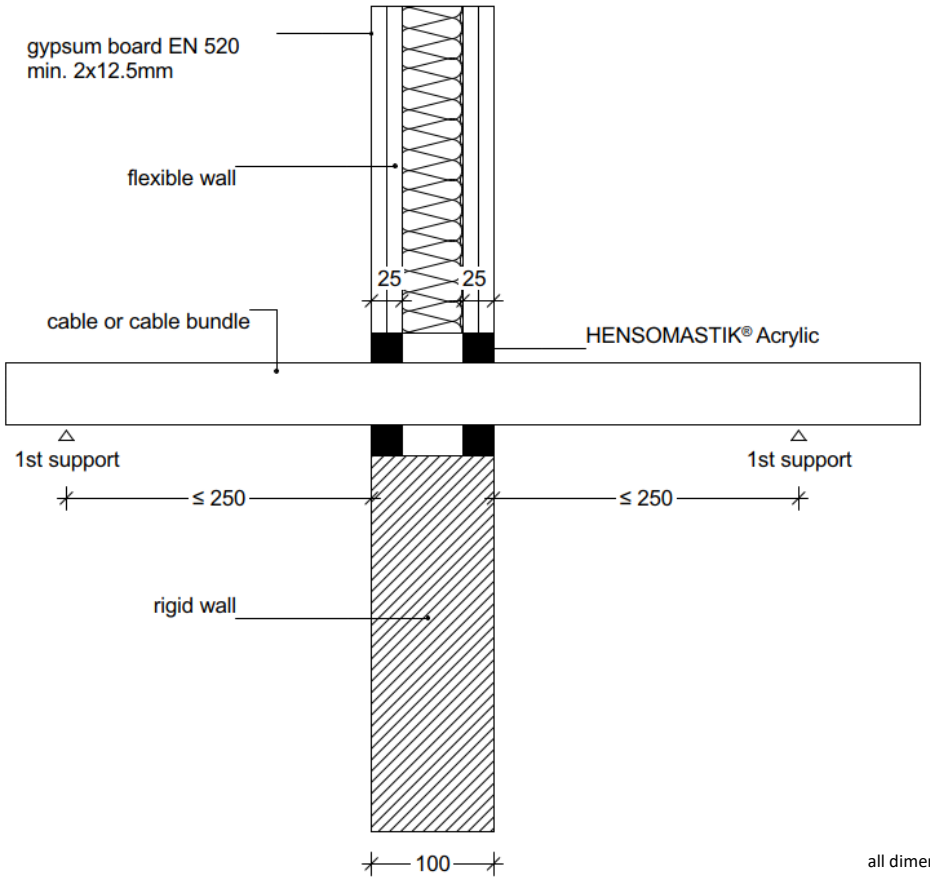
Conduit	Max. diameter bundle [mm]	Max. diameter single cable [mm]	Annular space [mm]	Classification
Aluminium cable type NAYY4x16RE, single	-	23	10-20	EI 90
Sheathed cables of all types, single	-	21	10-20	EI 60
Cable bundle 3xA1, 3xA2, 3xA3 and B	50	21	10-20	EI 60

A.2. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Flexible walls: The wall must have a minimum thickness of 100 mm and consist of a wooden or steel stud structure lined on both faces with at least two layers of 12.5 mm thick boards. A minimum distance of 100 mm must be maintained between the seal and the studs, and the gap between the stud and the seal must be closed with at least 100 mm of insulation material of class A1 or A2 according to EN 13501-1.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Single cables or cable bundles sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the walls. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.2.1. Single cables or cable bundles, sealed on both sides

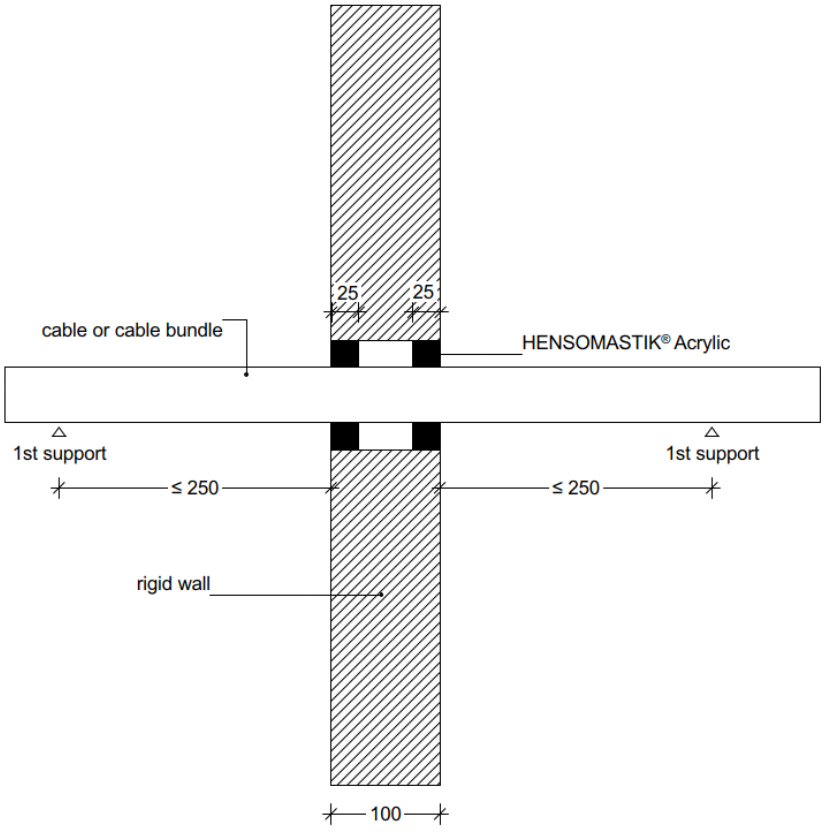
Conduit	Max. diameter bundle [mm]	Max. diameter single cable [mm]	Annular space [mm]	Classification
Aluminium cable type NAYY4x16RE, single	-	23	10-20	EI 120
Sheathed cables of all types, single	-	21	10-20	EI 120
Cable bundle 3xA1, 3xA2, 3xA3 and B	50	21	10-20	EI 120

A.3. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Single cables or cable bundles sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the walls. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.3.1. Single cables or cable bundles, sealed on both sides

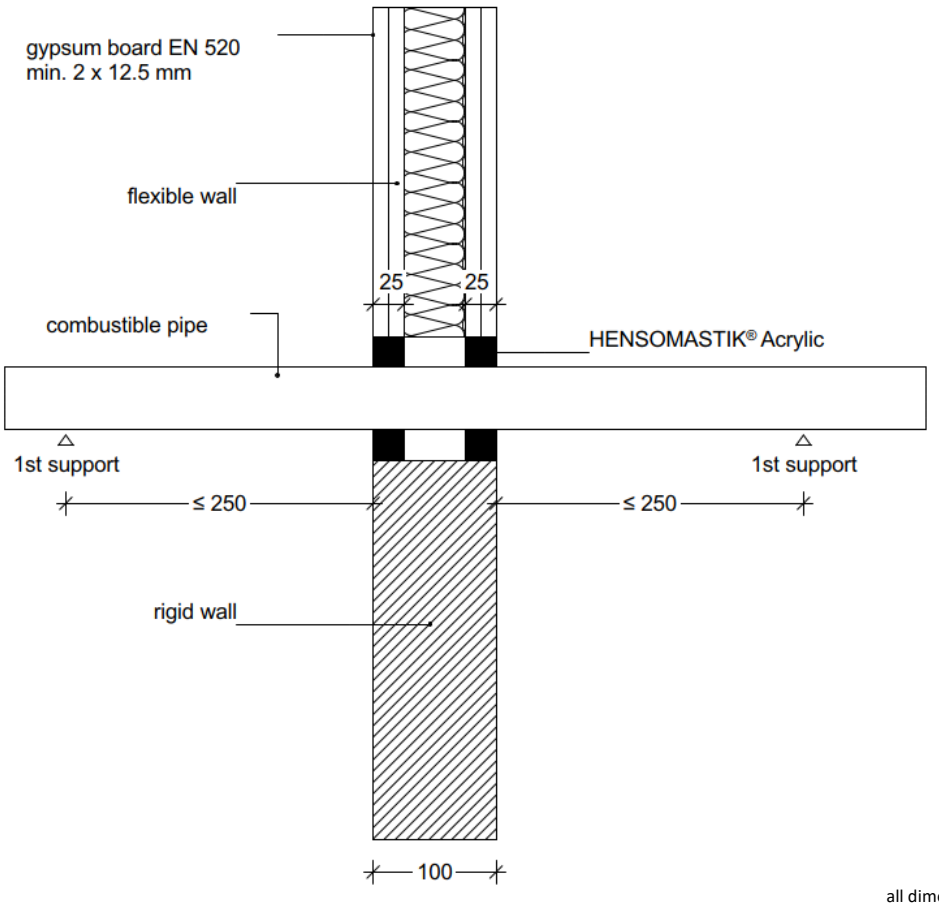
Conduit	Max. diameter bundle [mm]	Max. diameter single cable [mm]	Annular space [mm]	Classification
Sheathed cables of all types, single or in a bundle	100	21	10-20	EI 60
Telecommunications F-cables, single or in a bundle	100	21	10-20	EI 60
Aluminium cable type NAYY4x16RE, single	-	23	10-20	EI 120
C1 cable, single	-	50	10-20	EI 30
C2 cable, single	-	50	10-20	EI 60
D1 cable, single	-	80	10-20	EI 90
D2 cable, single	-	80	10-20	EI 90
D3 cable, single	-	80	10-20	EI 45
E cable, single	-	80	10-20	EI 60

A.4. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Flexible walls: The wall must have a minimum thickness of 100 mm and consist of a wooden or steel stud structure lined on both faces with at least two layers of 12.5 mm thick boards. A minimum distance of 100 mm must be maintained between the seal and the studs, and the gap between the stud and the seal must be closed with at least 100 mm of insulation material of class A1 or A2 according to EN 13501-1.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible plastic pipes without insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.4.1. Combustible plastic pipes without insulation, sealed on both sides

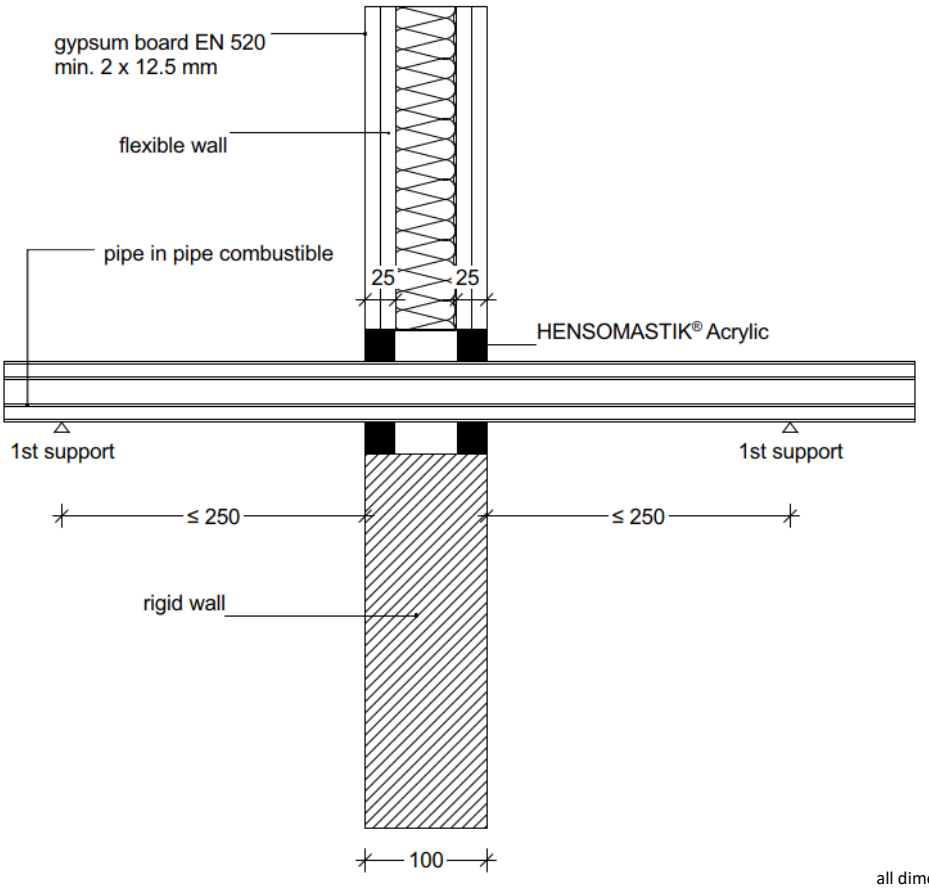
Conduit	Diameter [mm]	Wall thickness [mm]	Annular space [mm]	Classification
PVC-U	32	1.9	10-20	EI 60 U/C
PE 100, PE-HD	20-32	2.0	10-20	EI 60 U/C
PP-H	32	2.9	10-20	EI 90 U/C

A.5. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Flexible walls: The wall must have a minimum thickness of 100 mm and consist of a wooden or steel stud structure lined on both faces with at least two layers of 12.5 mm thick boards. A minimum distance of 100 mm must be maintained between the seal and the studs, and the gap between the stud and the seal must be closed with at least 100 mm of insulation material of class A1 or A2 according to EN 13501-1.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible pipe-in-pipe-system without insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.5.1. Combustible pipe-in-pipe-system without insulation, sealed on both sides

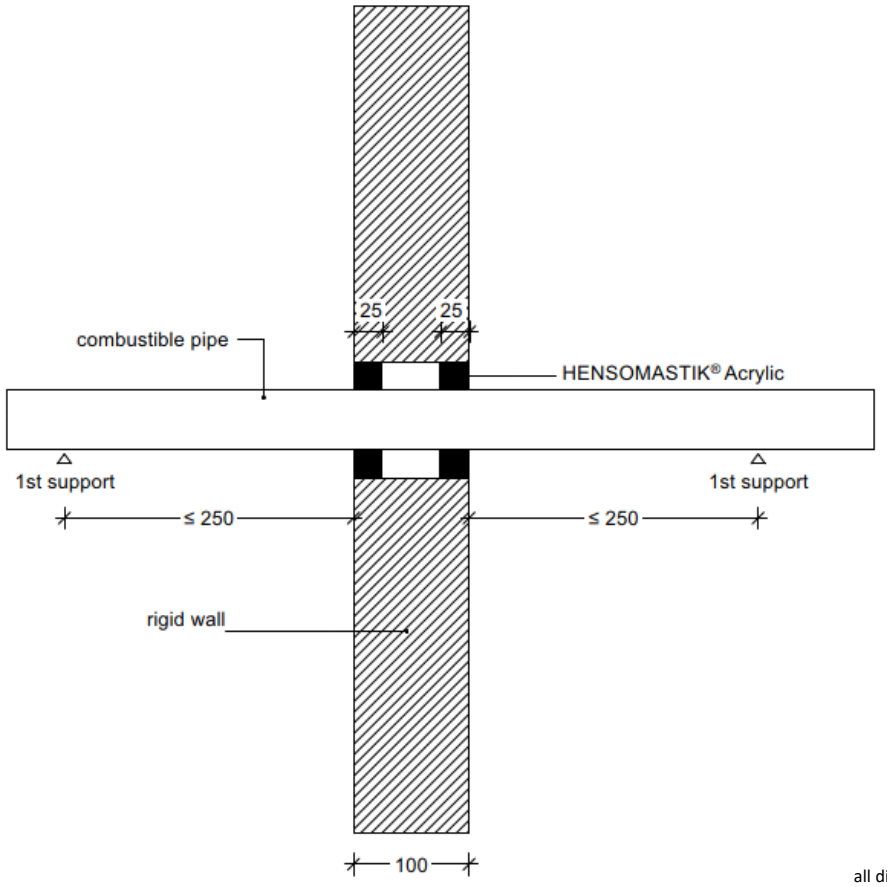
Conduit	Diameter outer pipe [mm]	Diameter inner pipe [mm]	Wall thickness inner pipe [mm]	Annular space [mm]	Classification
JRG Sanipex MT in PE pipe-in-pipe-system	35	25	3.5	10-20	EI 90 U/C

A.6. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible plastic pipes without insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.6.1. Combustible plastic pipes without insulation, sealed on both sides

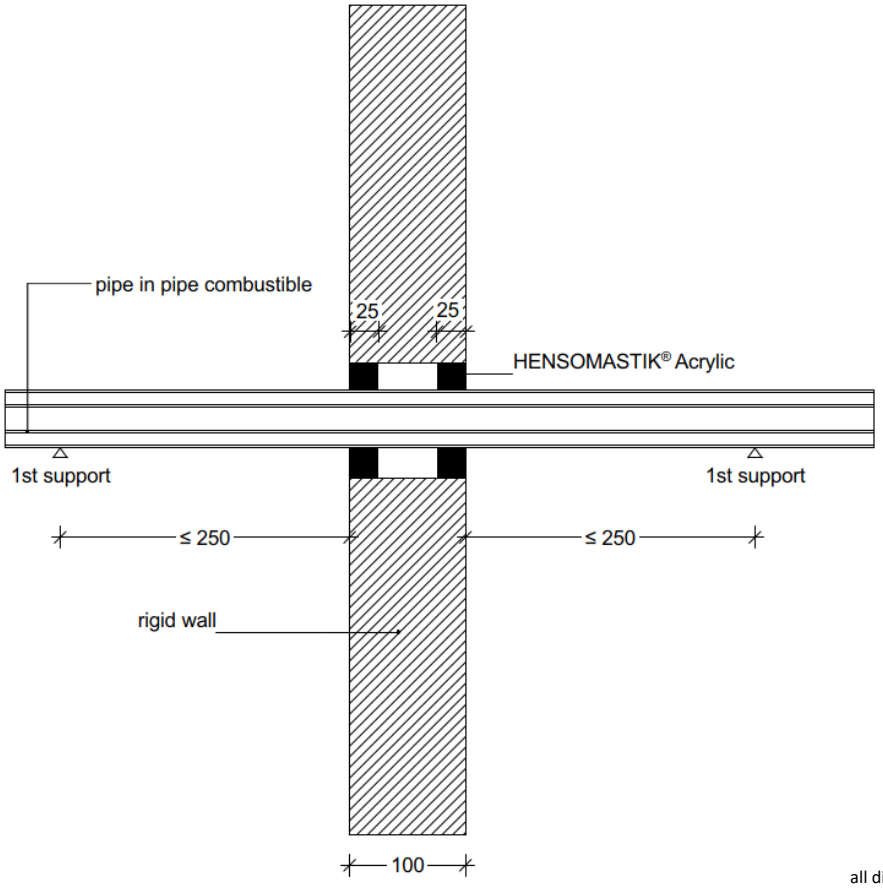
Conduit	Diameter [mm]	Wall thickness [mm]	Annular space [mm]	Classification
PE, PE 100, PE-HD	20-32	2.0-3.0	10-20	EI 120 U/C
PE, PE 100, PE-HD	50	3.0-4.6	10-20	EI 90 U/C
PE, PE 100, PE-HD	110	6.6-10.0	10-20	EI 30 U/C
PE, PE 100, PE-HD	110	10.0	10-20	EI 45 U/C
PP	32	2.9	10-20	EI 120 U/C
PVC-U	32	1.9	10-20	EI 120 U/C
PVC-U	50	2.4-5.6	10-20	EI 90 U/C
PVC-U	110	3.2-8.1	10-20	EI 45 U/C
PVC-U	110	8.1	10-20	EI 90 U/C

A.7. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible pipe-in-pipe-system without insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.7.1. Combustible pipe-in-pipe-system without insulation, sealed on both sides

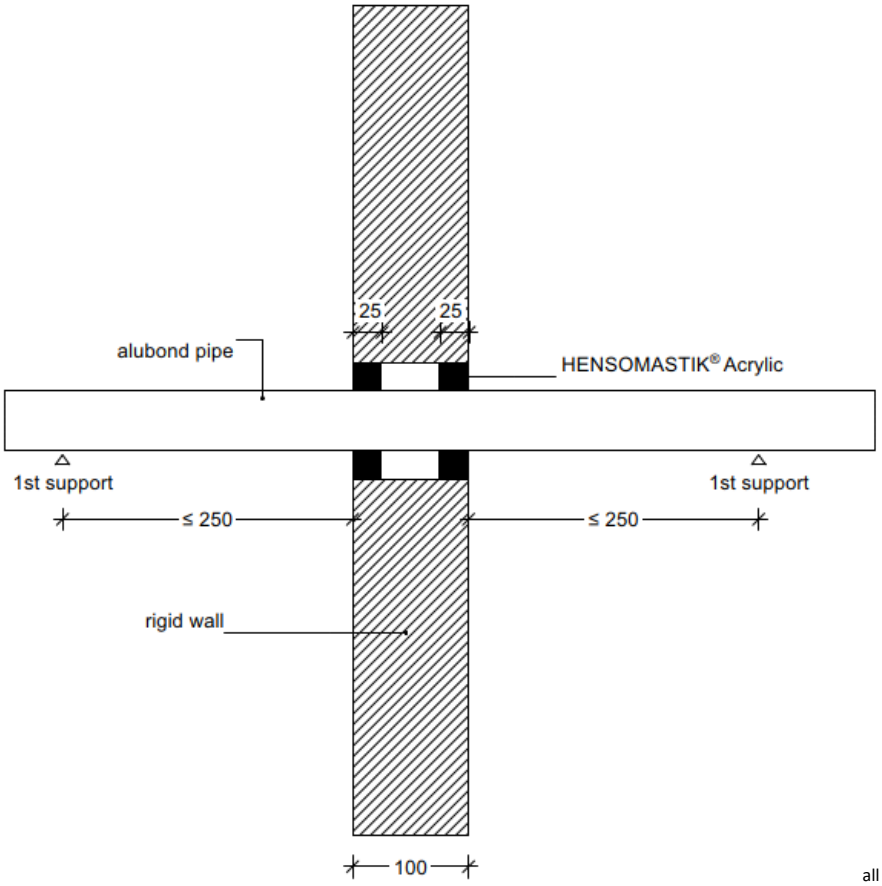
Conduit	Diameter outer pipe [mm]	Diameter inner pipe [mm]	Wall thickness inner pipe [mm]	Annular space [mm]	Classification
JRG Sanipex MT in PE pipe-in-pipe-system	18	12	1.8	10-20	EI 90 U/C
JRG Sanipex MT in PE pipe-in-pipe-system	35	25	3.5	10-20	EI 90 U/C

A.8. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible multilayer aluminium-composite pipes without insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.8.1. Aluminium-composite pipes without insulation, sealed on both sides

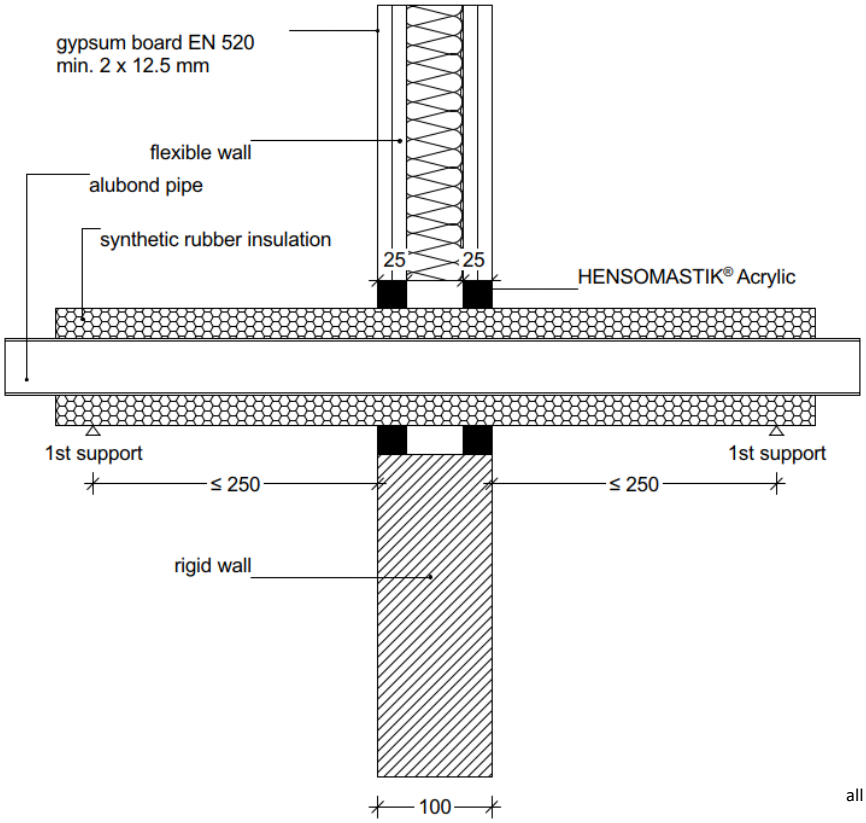
Conduit	Diameter [mm]	Wall thickness [mm]	Annular space [mm]	Classification
Uponor MLC	50	4.5	10-20	EI 60 U/C

A.9. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Flexible walls: The wall must have a minimum thickness of 100 mm and consist of a wooden or steel stud structure lined on both faces with at least two layers of 12.5 mm thick boards. A minimum distance of 100 mm must be maintained between the seal and the studs, and the gap between the stud and the seal must be closed with at least 100 mm of insulation material of class A1 or A2 according to EN 13501-1.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible multilayer aluminium-composite pipes with continuous sustained (CS) flexible elastomeric foam (FEF) or synthetic rubber insulation with a building material class rated equal to or better than B,s3-d0 according to DIN EN 13501-1, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.9.1. Aluminium-composite pipes with FEF-insulation, sealed on both sides

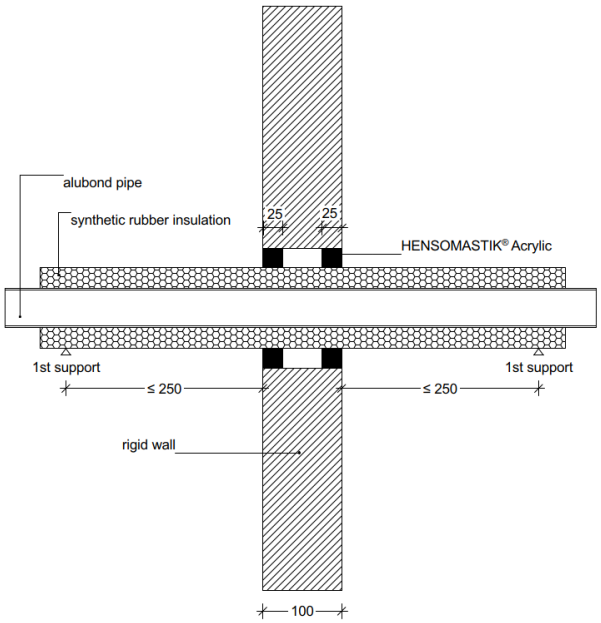
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classification
Geberit Mepla	16	2.25	≤ B,s3-d0	8.0	CS	10-20	EI 120 U/C
Geberit Mepla	40	3.5	≤ B,s3-d0	9.0	CS	10-20	EI 120 U/C
Geberit Mepla	40	3.5	≤ B,s3-d0	9.0-19.5	CS	10-20	EI 90 U/C
Geberit Mepla	75	4.7	≤ B,s3-d0	9.5-22.0	CS	10-20	EI 60 U/C

A.10. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible multilayer aluminium-composite pipes with continuous sustained flexible elastomeric foam (FEF) or synthetic rubber insulation with a building material class rated equal to or better than B,s3-d0, according to DIN EN 13501-1, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



A.10.1. Aluminium-composite pipes with FEF-insulation, sealed on both sides

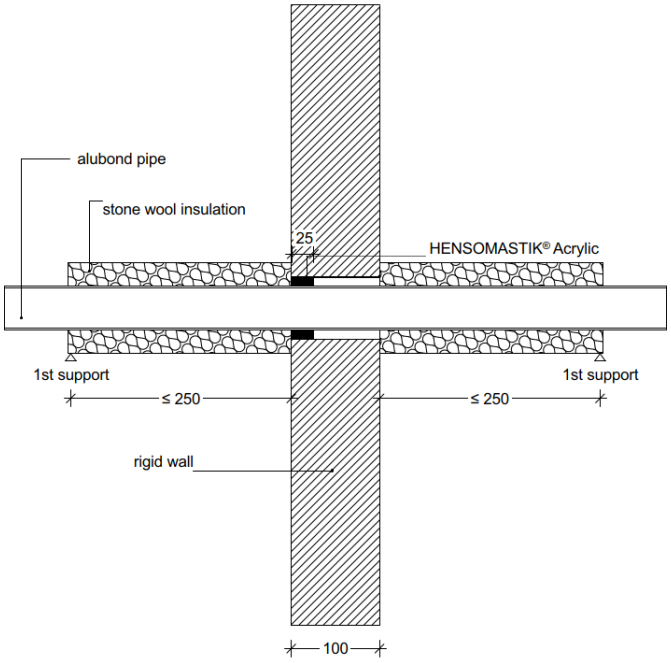
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	≤ B,s3-d0	8.0	CS	10-20	EI 120 U/C
Geberit Mepla	40	3.5	≤ B,s3-d0	8.0-19.5	CS	10-20	EI 120 U/C
Geberit Mepla	75	4.7	≤ B,s3-d0	9.5	CS	10-20	EI 120 U/C
Geberit Mepla	75	4.7	≤ B,s3-d0	9.5-22.0	CS	10-20	EI 90 U/C
JRG Sanipex MT	16	2.25	≤ B,s3-d0	8.0	CS	10-20	EI 90 U/C
JRG Sanipex MT	40	3.5	≤ B,s3-d0	9.0-19.5	CS	10-20	EI 90 U/C
JRG Sanipex MT	63	4.5	≤ B,s3-d0	9.0	CS	10-20	EI 90 U/C
JRG Sanipex MT	63	4.5	≤ B,s3-d0	9.0-21.5	CS	10-20	EI 60 U/C
Wavin Tigris	16	2.0	≤ B,s3-d0	8.0	CS	10-20	EI 90 U/C
Wavin Tigris	40	4.0	≤ B,s3-d0	9.0-19.5	CS	10-20	EI 90 U/C
Wavin Tigris	75	7.5	≤ B,s3-d0	9.0-22.0	CS	10-20	EI 90 U/C

A.11. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible multilayer aluminium-composite pipes with min. 2 x 250 mm long local interrupted (LI) stone wool insulation 80 kg/m³ or higher, sealed on either one side of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the face of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



A.11.1. Aluminium-composite pipes with stone wool insulation, sealed on one side

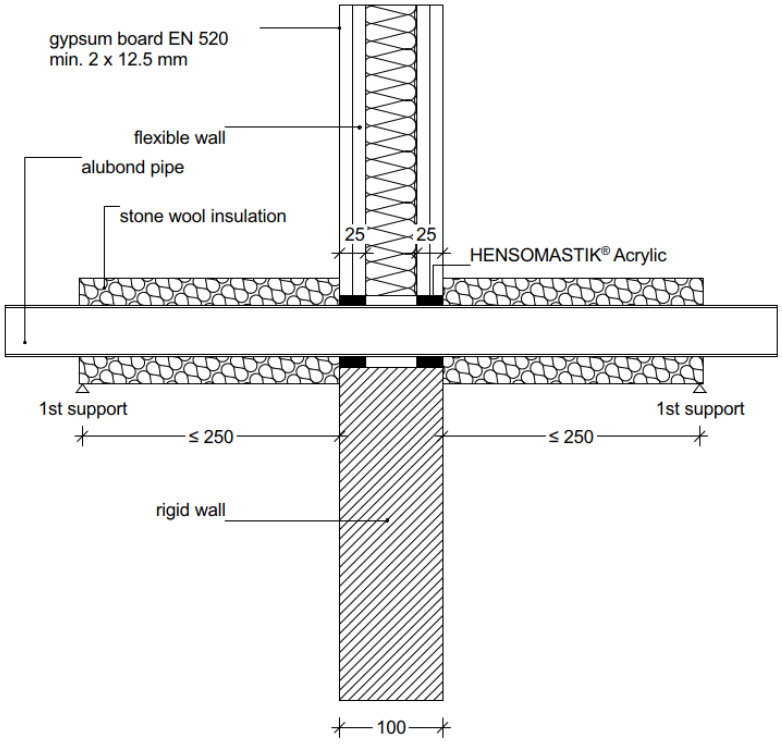
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
Geberit Mepla	75	4.7	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 90 U/C
JRG Sanipex MT	16	2.25	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
JRG Sanipex MT	40	3.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
JRG Sanipex MT	63	4.5	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 90 U/C
Wavin Tigris	16	2.0	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
Wavin Tigris	40	4.0	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
Wavin Tigris	75	7.5	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 90 U/C

A.12. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Flexible walls: The wall must have a minimum thickness of 100 mm and consist of a wooden or steel stud structure lined on both faces with at least two layers of 12.5 mm thick boards. A minimum distance of 100 mm must be maintained between the seal and the studs, and the gap between the stud and the seal must be closed with at least 100 mm of insulation material of class A1 or A2 according to EN 13501-1.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible multilayer aluminium-composite pipes with min. 2 x 250 mm long local interrupted (LI) stone wool insulation 80 kg/m^3 or higher, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



A.12.1. Aluminium-composite pipes with stone wool insulation, sealed on both sides

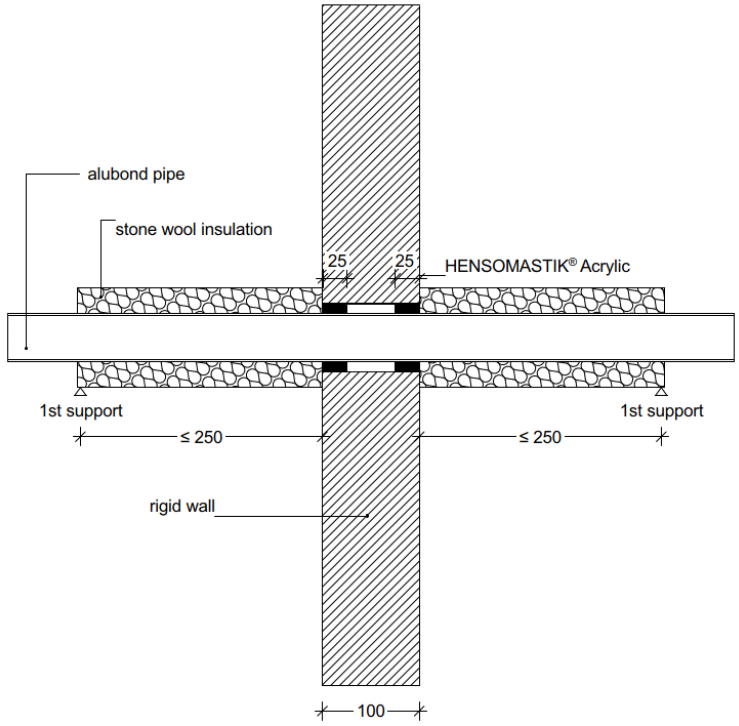
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	Stone wool ≥ 80 kg/m^3	20	2 x LI 250	10-20	EI 120 U/C
Geberit Mepla	40	3.5	Stone wool ≥ 80 kg/m^3	20	2 x LI 250	10-20	EI 60 U/C
Geberit Mepla	75	4.7	Stone wool ≥ 80 kg/m^3	30	2 x LI 250	10-20	EI 120 U/C

A.13. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible multilayer aluminium-composite pipes with min. 2 x 250 mm long local interrupted (LI) stone wool insulation 80 kg/m³ or higher, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



A.13.1. Aluminium-composite pipes with stone wool insulation, sealed on both sides

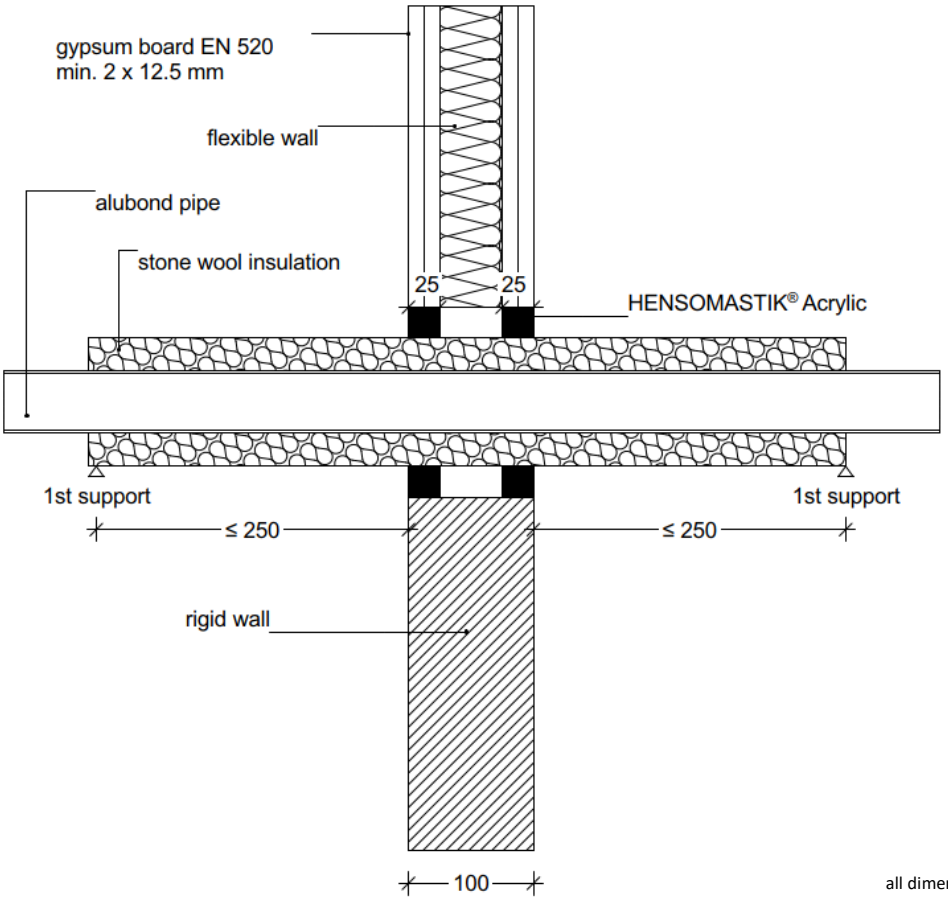
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Geberit Mepla	40	3.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 60 U/C
Geberit Mepla	75	4.7	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 120 U/C

A.14. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Flexible walls: The wall must have a minimum thickness of 100 mm and consist of a wooden or steel stud structure lined on both faces with at least two layers of 12.5 mm thick boards. A minimum distance of 100 mm must be maintained between the seal and the studs, and the gap between the stud and the seal must be closed with at least 100 mm of insulation material of class A1 or A2 according to EN 13501-1.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible multilayer aluminium-composite pipes with min. 500 mm long local or continuous sustained stone wool 80 kg/m³ or higher insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



A.14.1. Aluminium-composite pipes with stone wool insulation, sealed on both sides

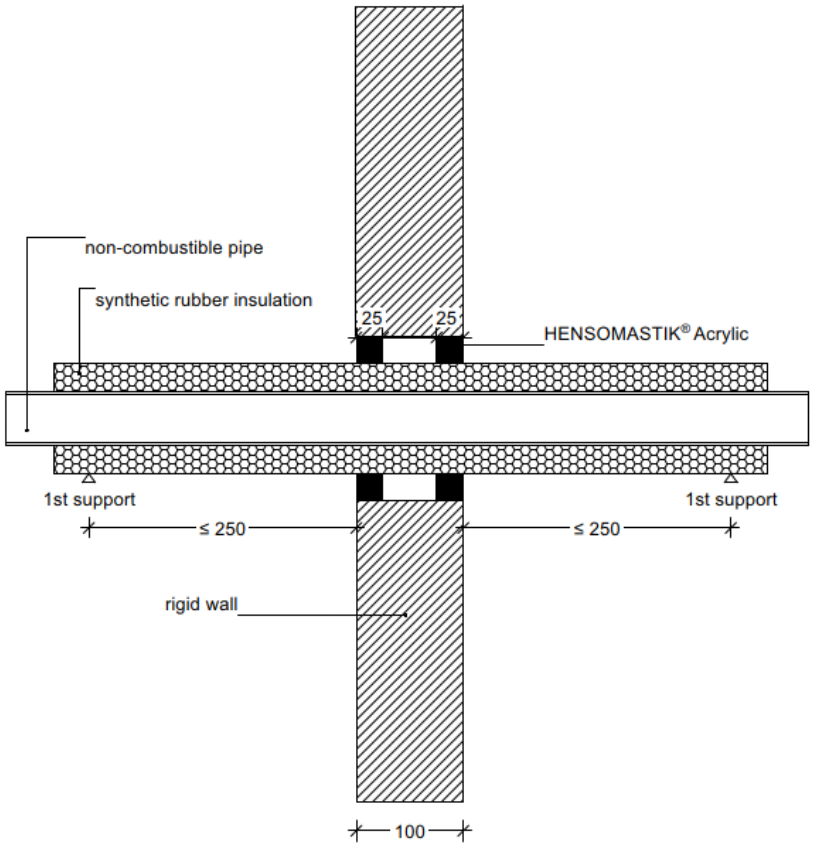
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	Stone wool ≥ 80 kg/m³	20	CS, LS 500	10-20	EI 120 U/C
Geberit Mepla	40	3.5	Stone wool ≥ 80 kg/m³	20	CS, LS 500	10-20	EI 120 U/C
Geberit Mepla	75	4.7	Stone wool ≥ 80 kg/m³	30	CS, LS 500	10-20	EI 120 U/C

A.15. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) flexible elastomeric foam (FEF) or synthetic rubber insulation with a building material class rated equal to or better than B,s3-d0 according to DIN EN 13501-1, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



A.15.1. Non-combustible metal pipes with FEF-insulation, sealed on both sides

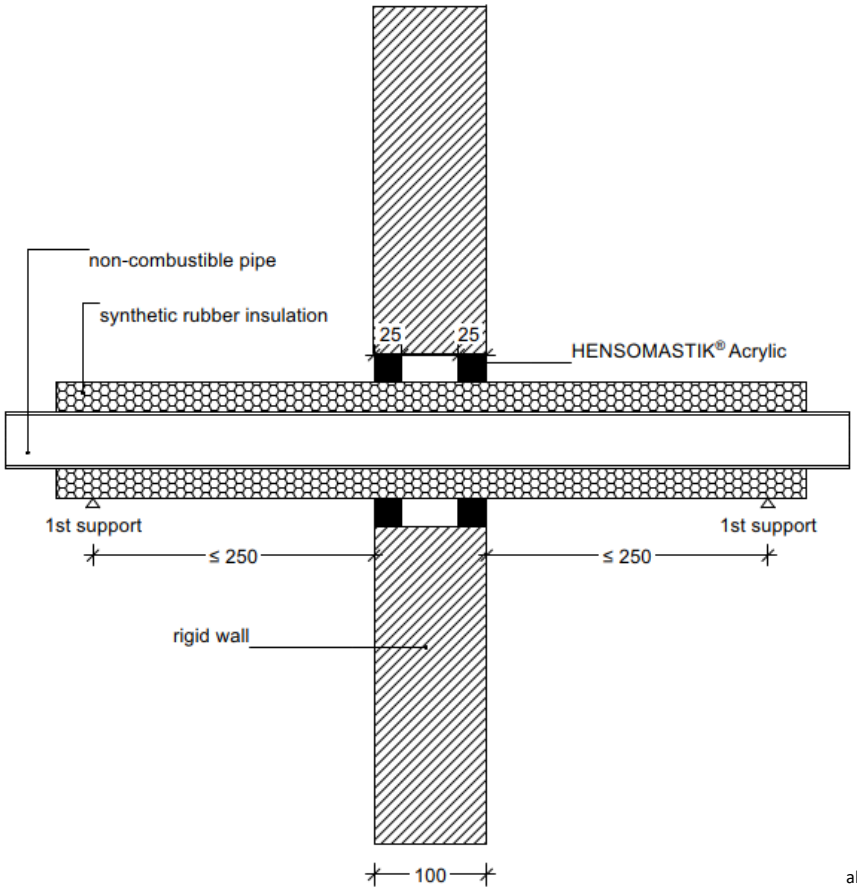
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤15	1.0	≤ B,s3-d0	11.5	CS	10-20	EI 90 C/U
Steel	≤21.3	2.0	≤ B,s3-d0	12.0	CS	10-20	EI 120 C/U
Copper, steel	≤42	1.2-14.2	≤ B,s3-d0	13.5	CS	10-20	EI 90 C/U
Copper, steel	≤42	1.2-14.2	≤ B,s3-d0	13.5-36.5	CS	10-20	EI 60 C/U
Copper, steel	>42 ≤54	2.0-14.2	≤ B,s3-d0	13.5-38.0	CS	10-20	EI 45 C/U

A.16. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) flexible elastomeric foam (FEF) HT/ArmaFlex insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



A.16.1. Non-combustible metal pipes with FEF-insulation, sealed on both sides

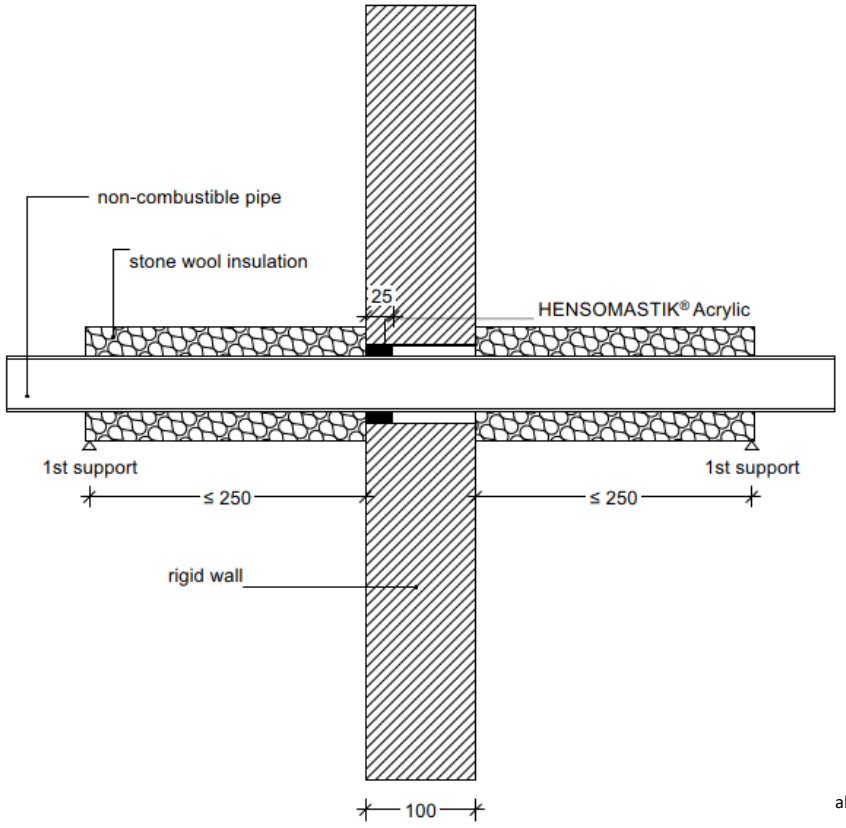
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤15	1.0	HT/ArmaFlex	11.5	CS, LS 1000	10-20	EI 60 C/U
Copper, steel	≤54	1.5-14.2	HT/ArmaFlex	13.0-25.0	CS, LS 1000	10-20	EI 30 C/U
Copper, steel	>54 ≤139,7	2.0-14.2	HT/ArmaFlex	13.0	CS, LS 1000	10-20	EI 45 C/U
Copper, steel	>54 ≤139,7	2.0-14.2	HT/ArmaFlex	13.0-25.0	CS, LS 1000	10-20	EI 30 C/U

A.17. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Non-combustible metal pipes with local interrupted (LI) stone wool insulation 80 kg/m³ or higher, sealed on either one side of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the face of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The classification applies to all penetration angles between 90 and 45 degrees. The length of the local insulation may be increased but not reduced.



A.17.1. Non-combustible metal pipes with stone wool insulation, sealed on one side

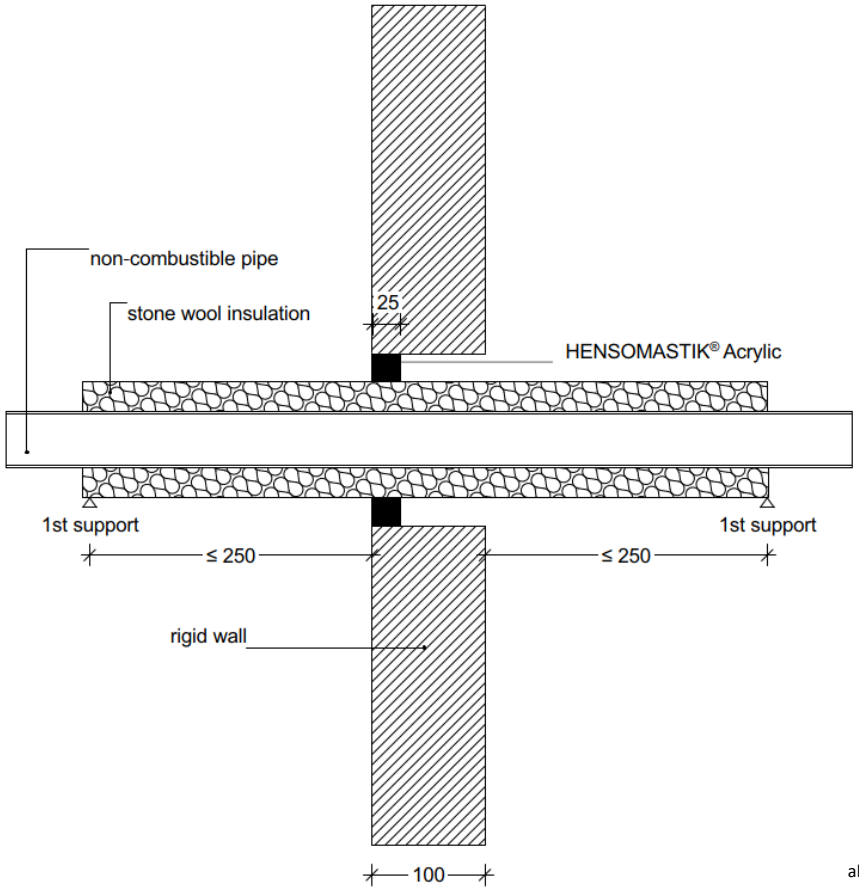
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤15	1.0-11.0	Stone wool ≥ 80 kg/m³	20	2x LI 500	10-20	EI 120 C/U
Copper, steel	≤54	1.5-14.2	Stone wool ≥ 80 kg/m³	20	2x LI 500	10-20	EI 120 C/U
Steel	42.4	2.0-14.2	Stone wool ≥ 80 kg/m³	20	2x LI 500	10-20	EI 90 C/U
Steel	>54 ≤219.1	4.0-14.2	Stone wool ≥ 80 kg/m³	30-80	2x LI 500	10-20	EI 90 C/U

A.18. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) stone wool 80 kg/m³ or higher insulation, sealed on either one side of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the face of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The classification applies to all penetration angles between 90 and 45 degrees. The length of the local insulation may be increased but not reduced.



A.18.1. Non-combustible metal pipes with stone wool insulation, sealed on one side

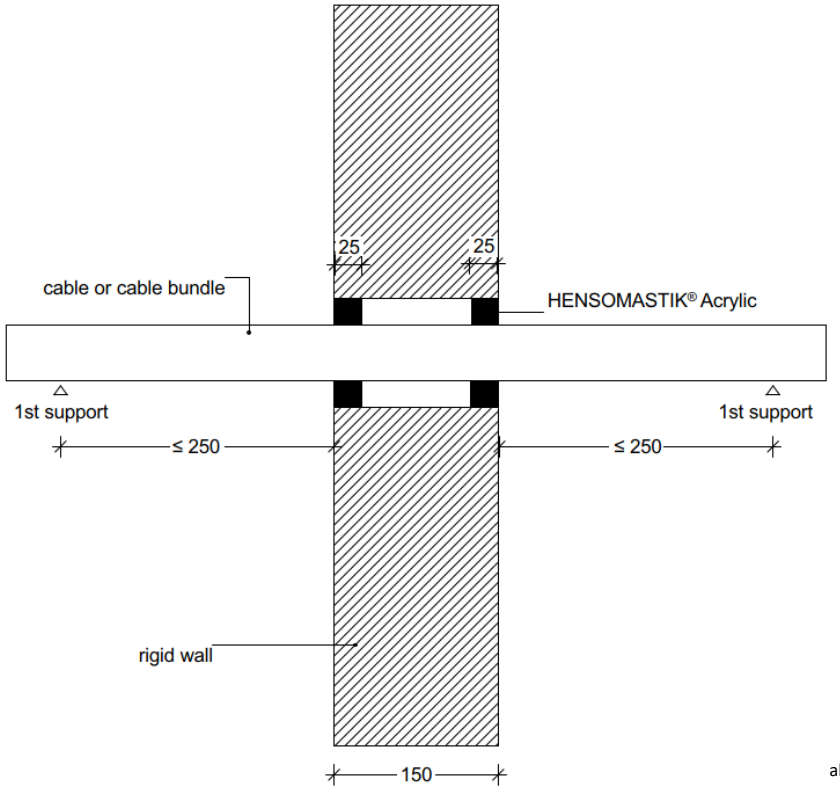
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤15	1.0-11.0	Stone wool ≥ 80 kg/m³	20	CS, LS 1000	10-20	EI 90 C/U
Copper, steel	≤54	1.2-14.2	Stone wool ≥ 80 kg/m³	20	CS, LS 1000	10-20	EI 90 C/U
Copper, steel	>54 ≤88.9	1.2-14.2	Stone wool ≥ 80 kg/m³	30	CS, LS 1000	10-20	EI 90 C/U
Steel	>88,9 ≤219.1	2.0-14.2	Stone wool ≥ 80 kg/m³	30	CS, LS 1000	10-20	EI 45 C/U

B.1. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Single cables or cable bundles sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the walls. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



B.1.1. Single cables or cable bundles, sealed on both sides

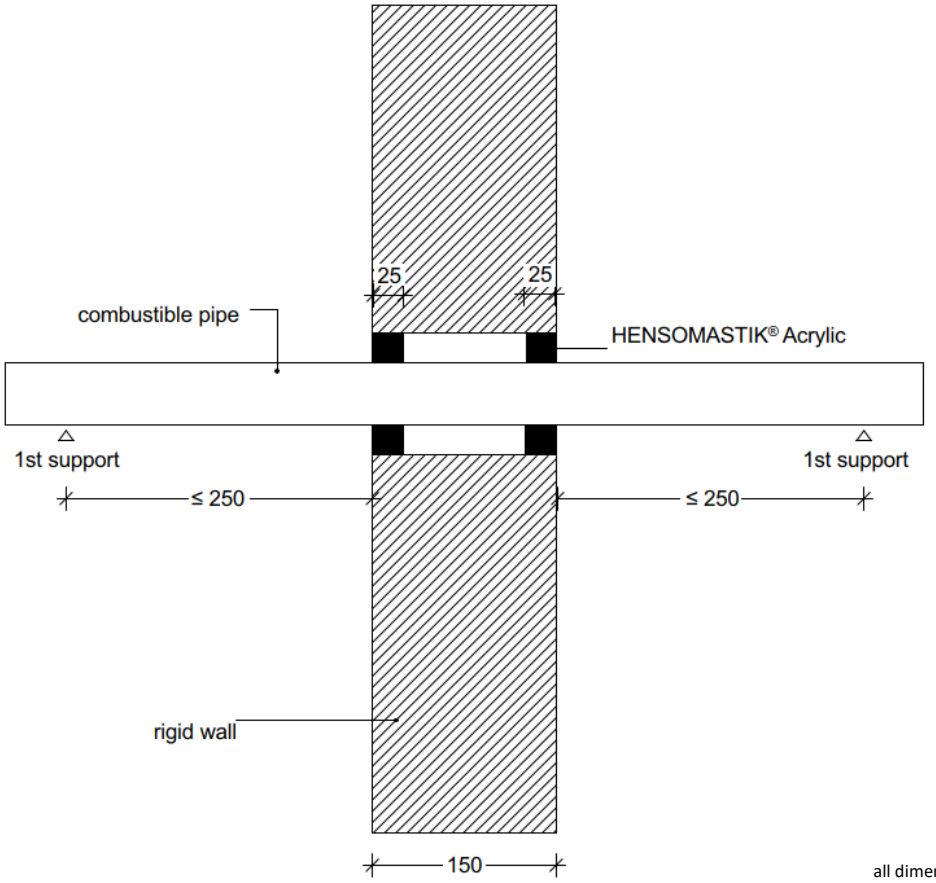
Conduit	Max. diameter bundle [mm]	Max. diameter single cable [mm]	Annular space [mm]	Classification
Sheathed cables of all types, single or in a bundle	100	21	10-20	EI 60
Telecommunications F-cables, single or in a bundle	100	21	10-20	EI 60
Aluminium cable type NAYY4x16RE, single	-	23	10-20	EI 120
C1 cable, single	-	50	10-20	EI 60
C2 cable, single	-	50	10-20	EI 120
C3 cable, single	-	50	10-20	EI 60
D1 cable, single	-	80	10-20	EI 45
D2 cable, single	-	80	10-20	EI 120
D3 cable, single	-	80	10-20	EI 60
E cable, single	-	80	10-20	EI 90

B.2. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Combustible plastic pipes without insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



B.2.1. Combustible plastic pipes without insulation, sealed on both sides

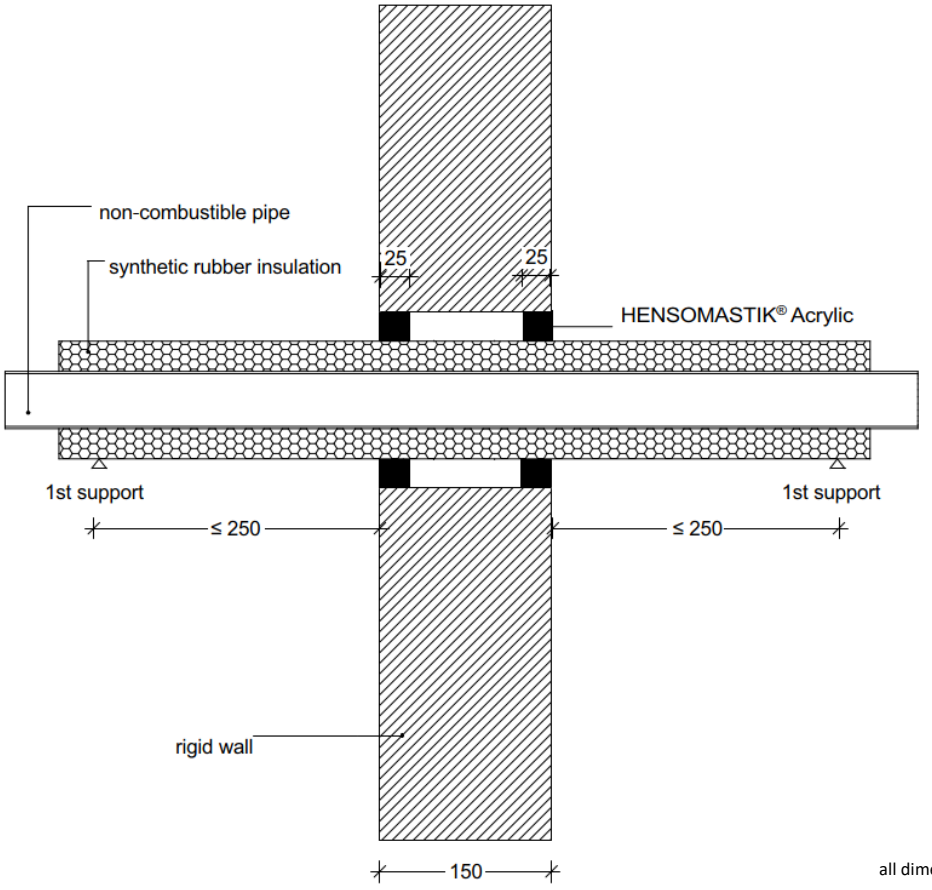
Conduit	Diameter [mm]	Wall thickness [mm]	Annular space [mm]	Classification
PE 100, PE-HD	110	6.6	10-20	EI 45 U/C
PVC-U	110	3.2	10-20	EI 60 U/C

B.3. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) flexible elastomeric foam (FEF) HT/ArmaFlex insulation, sealed on both sides of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



B.3.1. Non-combustible metal pipes with FEF-insulation, sealed on both sides

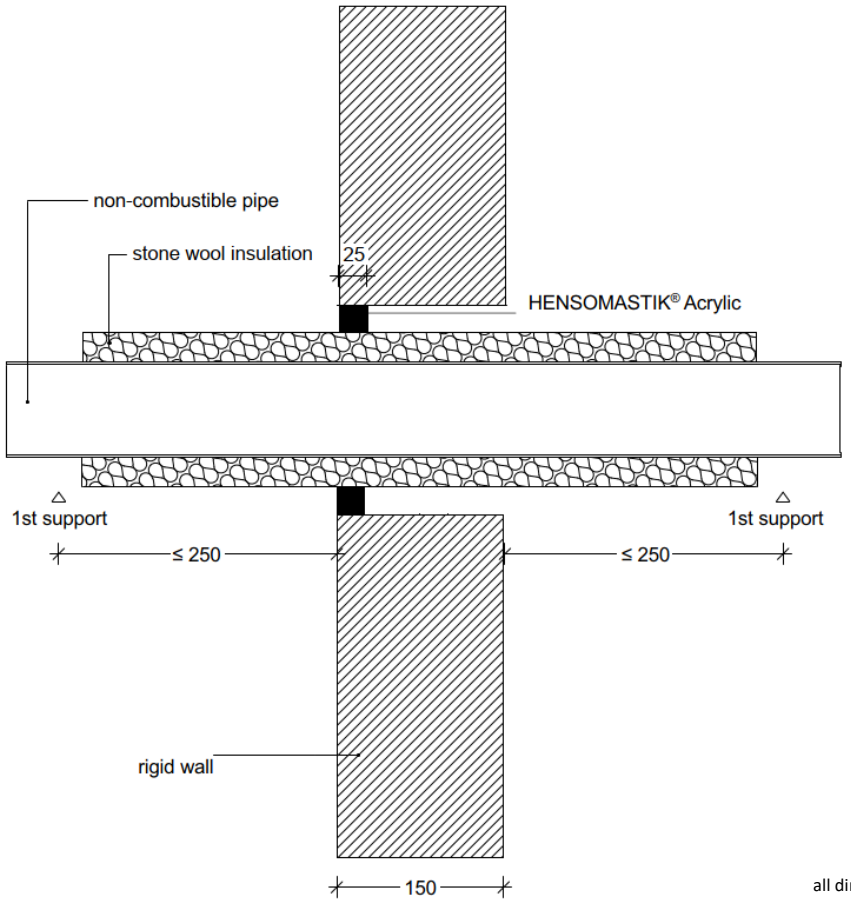
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	54	1.5-14.2	HT/ArmaFlex	25.0	CS, LS 1100	10-20	EI 45 C/U
Steel	>54 ≤139,7	1.5-14.2	HT/ArmaFlex	13.0-25.0	CS, LS 1100	10-20	EI 30 C/U
Steel	>54 ≤139,7	1.5-14.2	HT/ArmaFlex	25.0	CS, LS 1100	10-20	EI 45 C/U

B.4. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from both faces of the wall.

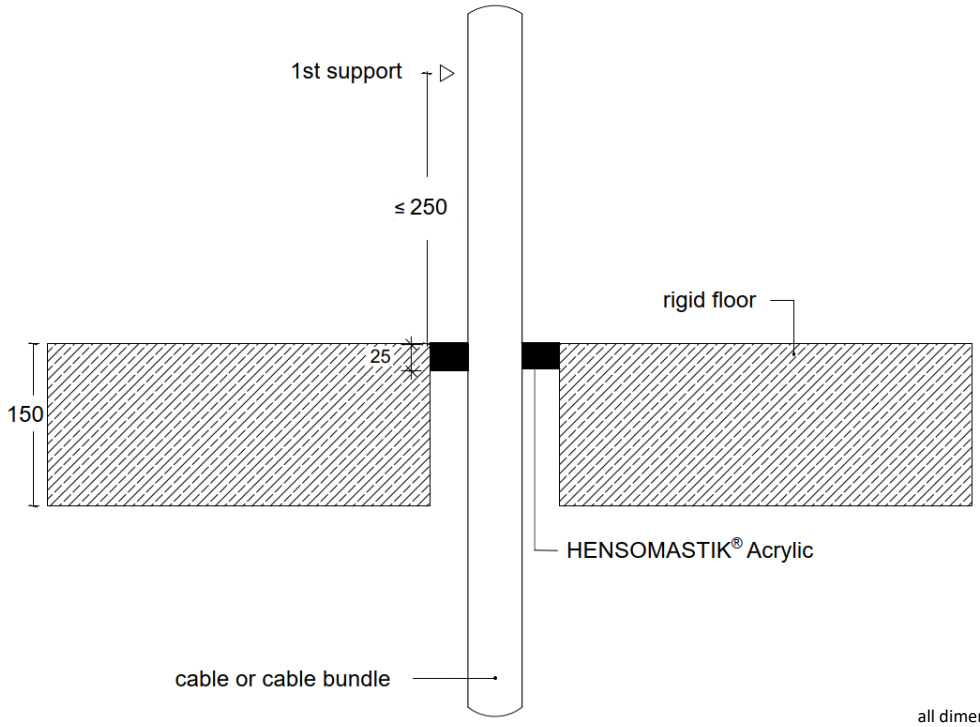
Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) stone wool 80 kg/m^3 or higher insulation, sealed on either one side of the wall with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the face of the wall. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The classification applies to all penetration angles between 90 and 45 degrees. The length of the local insulation may be increased but not reduced.



B.4.1. Non-combustible metal pipes with stone wool insulation, sealed on one side

Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Steel	219.1	6.3	Stone wool ≥ 80 kg/m^3	30	CS, LS 1000	10-20	EI 90 C/U

C.1. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period. **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^3.
Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.
Penetration Seal: Single cables or cable bundles sealed on the top of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the top of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.


C.1.1. Single cables or cable bundles, sealed on top

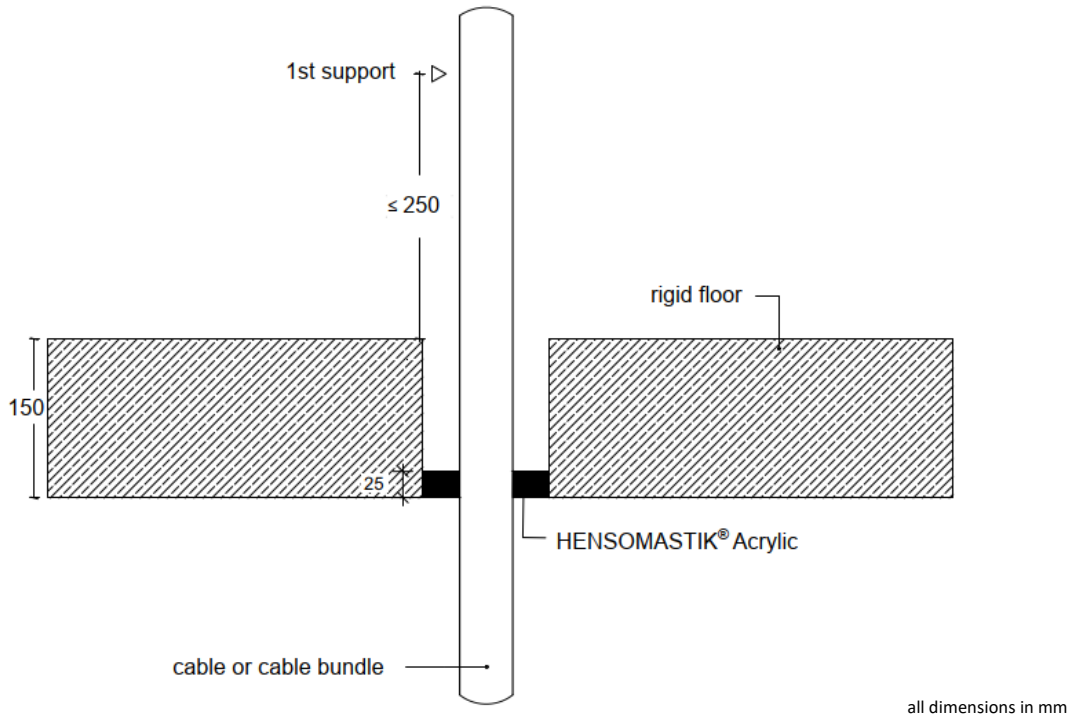
Conduit	Max. diameter bundle [mm]	Max. diameter single cable [mm]	Annular space [mm]	Classification
Aluminium cable type NAYY4x16RE, single	-	23	10-20	EI 120
Sheathed cables of all types, single	-	21	10-20	EI 90
Cable bundle 3xA1, 3xA2, 3xA3 and B	50	21	10-20	EI 90

C.2. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Single cables or cable bundles sealed on the bottom of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the bottom of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



C.2.1. Single cables or cable bundles, sealed on bottom

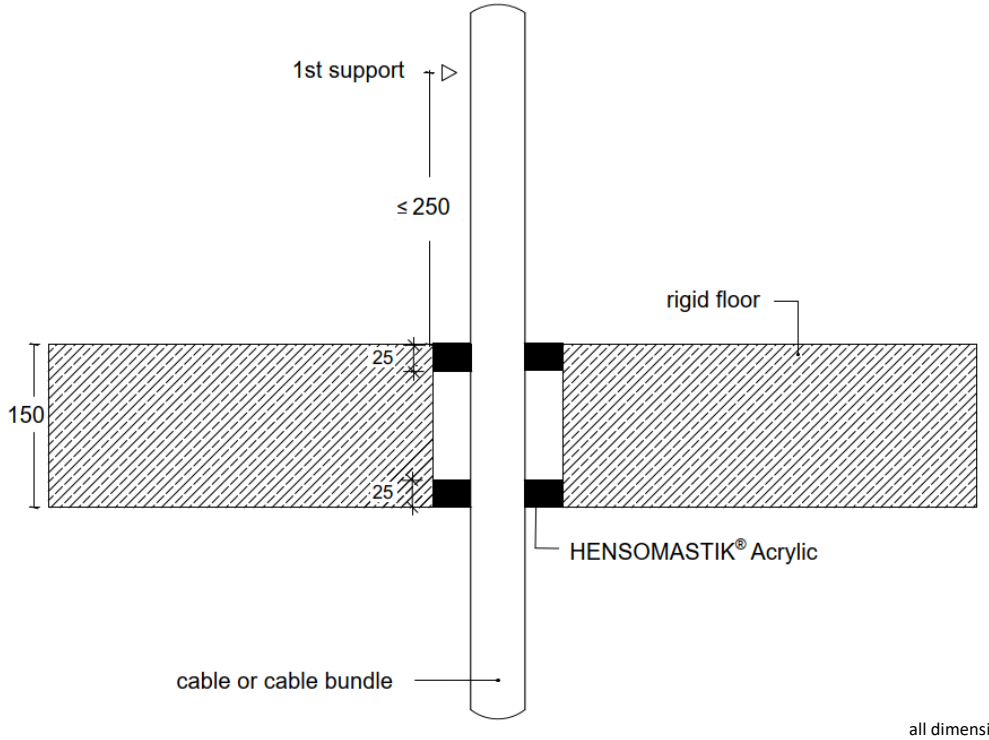
Conduit	Max. diameter bundle [mm]	Max. diameter single cable [mm]	Annular space [mm]	Classification
Aluminium cable type NAYY4x16RE, single	-	23	10-20	EI 120
Sheathed cables of all types, single	-	21	10-20	EI 60
Cable bundle 3xA1, 3xA2, 3xA3 and B	50	21	10-20	EI 60

C.3. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Single cables or cable bundles sealed on both top and bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



C.3.1. Single cables or cable bundles, sealed on both sides

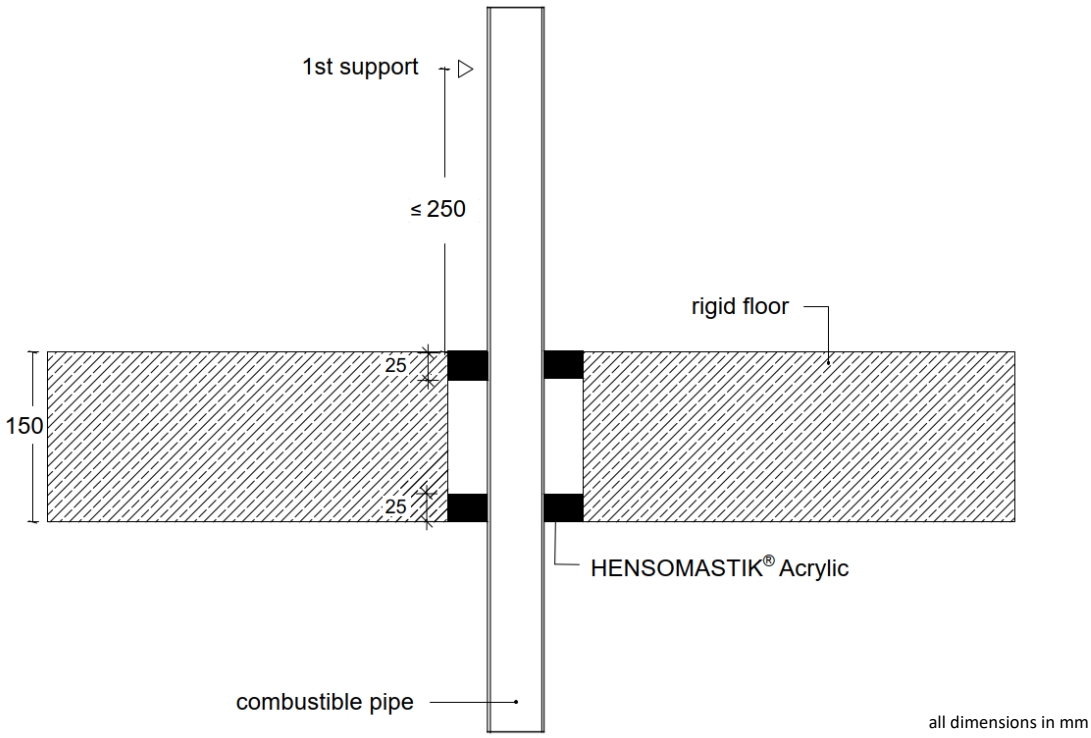
Conduit	Max. diameter bundle [mm]	Max. diameter single cable [mm]	Annular space [mm]	Classification
Sheathed cables of all types, single or in a bundle	100	21	10-20	EI 120
Telecommunications F-cables, single or in a bundle	100	21	10-20	EI 120
C1 cable, single	-	50	10-20	EI 90
C2 or C3 cable, single	-	50	10-20	EI 120
D1, D2 or D3 cable, single	-	80	10-20	EI 120
E cable, single	-	80	10-20	EI 120
Aluminium cable type NAYY4x16RE, single	-	23	10-20	EI 120

C.4. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Combustible plastic pipes without insulation, sealed on both top and bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the floor. Annular space width (a1) 10-20 mm, maximum seal size defined by conduit diameter and allowed max annular space.



C.4.1. Combustible plastic pipes without insulation, sealed on both sides

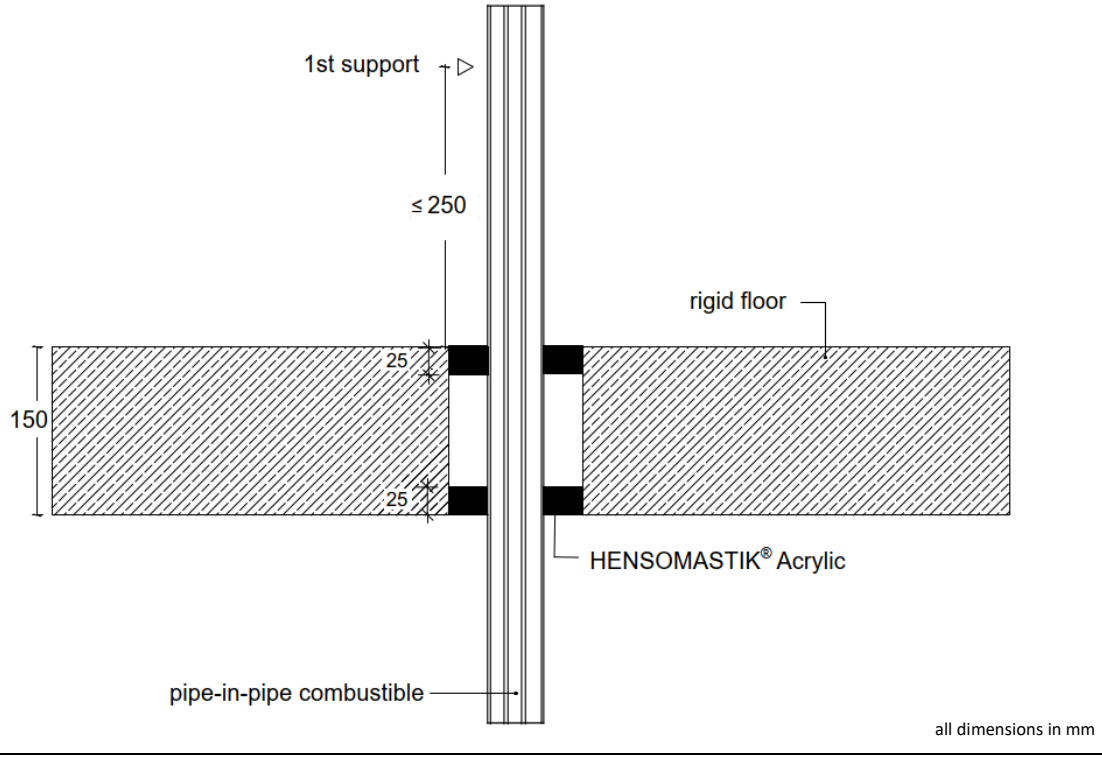
Conduit	Diameter [mm]	Wall thickness [mm]	Annular space [mm]	Classification
PE, PE 100, PE-HD	20-32	2.0-3.0	10-20	EI 120 U/C
PE, PE 100, PE-HD	50	3.0-4.6	10-20	EI 90 U/C
PE, PE 100, PE-HD	50-110	3.0-6.6	10-20	EI 60 U/C
PP, PP-H	32	2.9	10-20	EI 120 U/C
PP, PP-H	50	2.9-4.6	10-20	EI 60 U/C
PP, PP-H	50	4.6	10-20	EI 90 U/C
PP, PP-H	50-110	2.9-10.0	10-20	EI 45 U/C
PP, PP-H	110	10.0	10-20	EI 60 U/C
PVC-U	32-50	1.9-2.4	10-20	EI 120 U/C
PVC-U	50	2.4-5.6	10-20	EI 90 U/C
PVC-U	50-110	3.2-8.1	10-20	EI 60 U/C

C.5. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

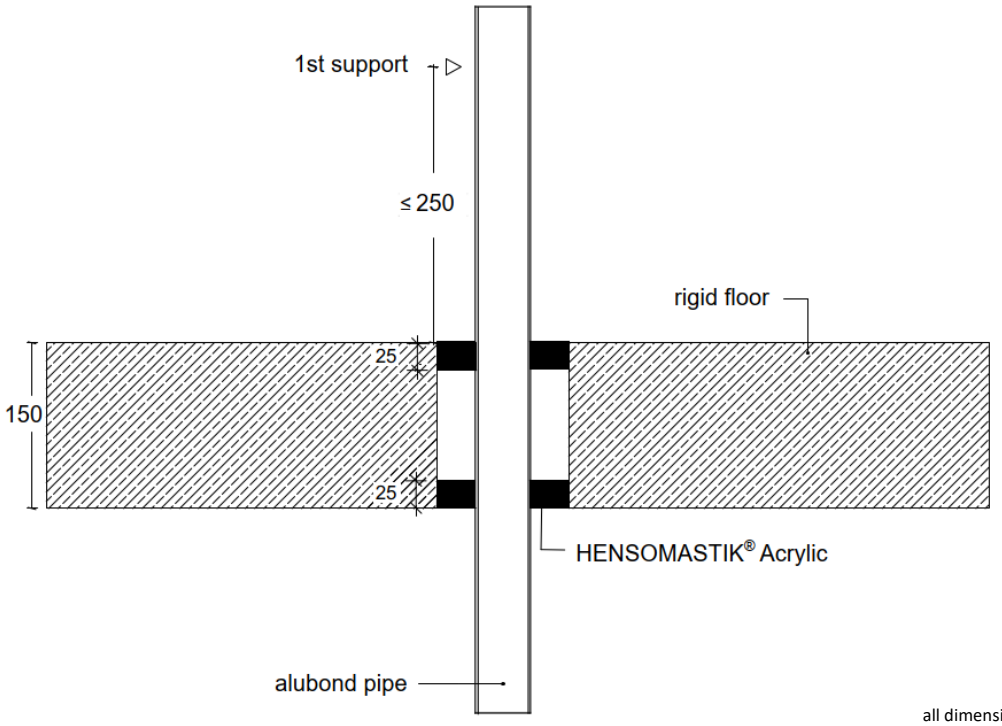
Penetration Seal: Combustible pipe-in-pipe-system without insulation, sealed on both top and bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to both faces of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



C.5.1. Combustible pipe-in-pipe-system without insulation, sealed on both sides

Conduit	Diameter outer pipe [mm]	Diameter inner pipe [mm]	Wall thickness inner pipe [mm]	Annular space [mm]	Classification
JRG Sanipex MT in PE pipe-in-pipe-system	18	12	1.8	10-20	EI 120 U/C
JRG Sanipex MT in PE pipe-in-pipe-system	35	25	3.5	10-20	EI 120 U/C

C.6. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period. **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^3.
Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.
Penetration Seal: Combustible multilayer aluminium-composite pipes without insulation, sealed on both top and bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the faces of the floor. Annular space width (a1) 10-20 mm, maximum seal size defined by conduit diameter and allowed max annular space.


C.6.1. Aluminium-composite pipes without insulation, sealed on both sides

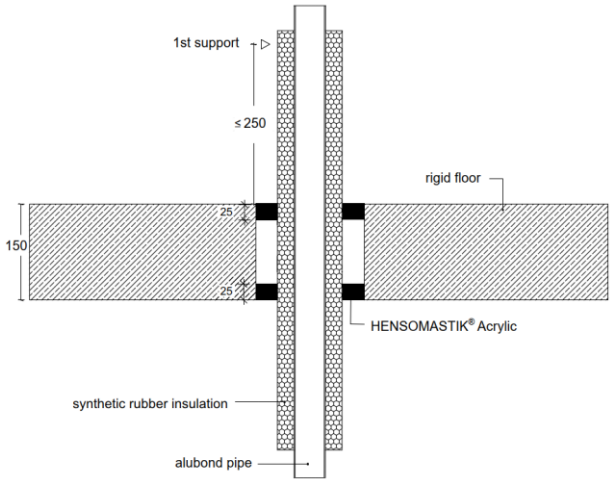
Conduit	Diameter [mm]	Wall thickness [mm]	Annular space [mm]	Classification
Uponor MLC	50	4.5	10-20	EI 90 U/C

C.7. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Combustible multilayer aluminium-composite pipes with continuous sustained flexible elastomeric foam (FEF) or synthetic rubber insulation with a building material class rated equal to or better than B,s3-d0, according to DIN EN 13501-1, sealed on both top and bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to both faces of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



C.7.1. Aluminium-composite pipes with FEF-insulation, sealed on both sides

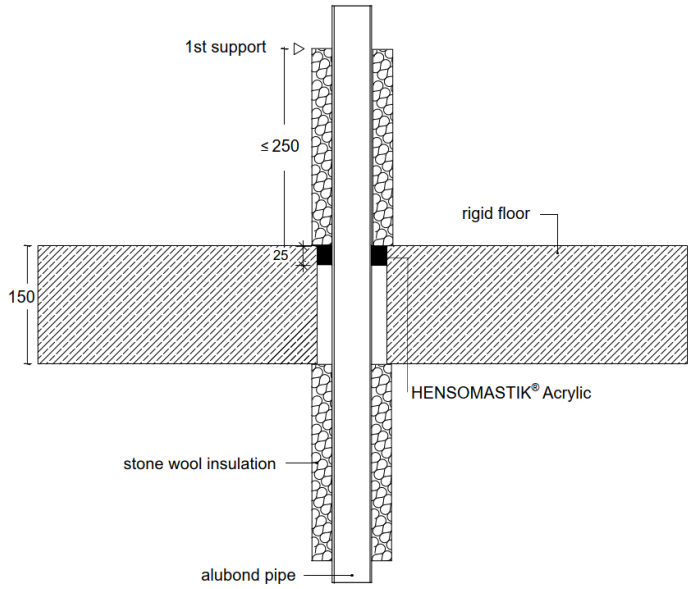
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	≤ B,s3-d0	8.0	CS	10-20	EI 120 U/C
Geberit Mepla	40	3.5	≤ B,s3-d0	8.0-19.5	CS	10-20	EI 120 U/C
Geberit Mepla	75	4.7	≤ B,s3-d0	9.5-22.0	CS	10-20	EI 90 U/C
JRG Sanipex MT	16	2.25	≤ B,s3-d0	8.0	CS	10-20	EI 120 U/C
JRG Sanipex MT	40	3.5	≤ B,s3-d0	9.0-19.5	CS	10-20	EI 120 U/C
JRG Sanipex MT	63	4.5	≤ B,s3-d0	9.0	CS	10-20	EI 120 U/C
JRG Sanipex MT	63	4.5	≤ B,s3-d0	9.0-21.5	CS	10-20	EI 60 U/C
Wavin Tigris	16	2.0	≤ B,s3-d0	8.0	CS	10-20	EI 120 U/C
Wavin Tigris	40	4.0	≤ B,s3-d0	9.0-19.5	CS	10-20	EI 120 U/C
Wavin Tigris	75	7.5	≤ B,s3-d0	9.0-22.0	CS	10-20	EI 90 U/C

C.8. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Combustible multilayer aluminium-composite pipes with local interrupted (LI) stone wool insulation 80 kg/m³ or higher, sealed on the top of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the top face of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



C.8.1. Aluminium-composite pipes with stone wool insulation, sealed on top

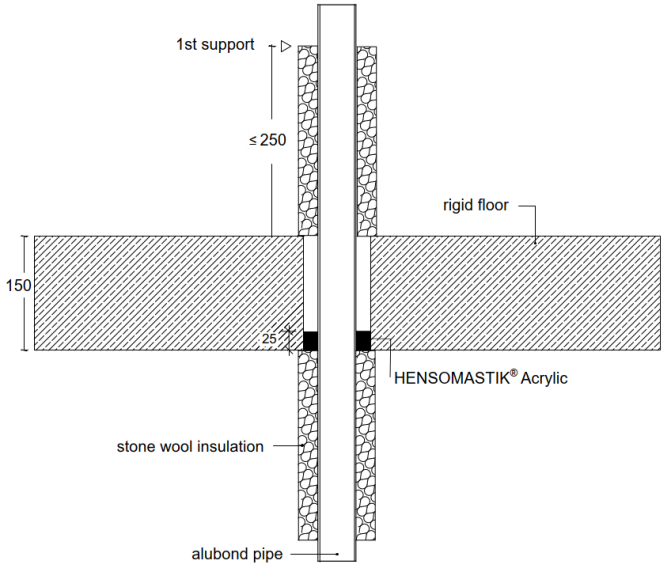
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Geberit Mepla	40	3.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Geberit Mepla	75	4.7	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 90 U/C
JRG Sanipex MT	16	2.25	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
JRG Sanipex MT	40	3.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
JRG Sanipex MT	63	4.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Wavin Tigris	16	2.0	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Wavin Tigris	40	4.0	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Wavin Tigris	75	7.5	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 120 U/C

C.9. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Combustible multilayer aluminium-composite pipes with local interrupted (LI) stone wool insulation 80 kg/m³ or higher, sealed on the bottom of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the top face of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



C.9.1. Aluminium-composite pipes with stone wool insulation, sealed on bottom

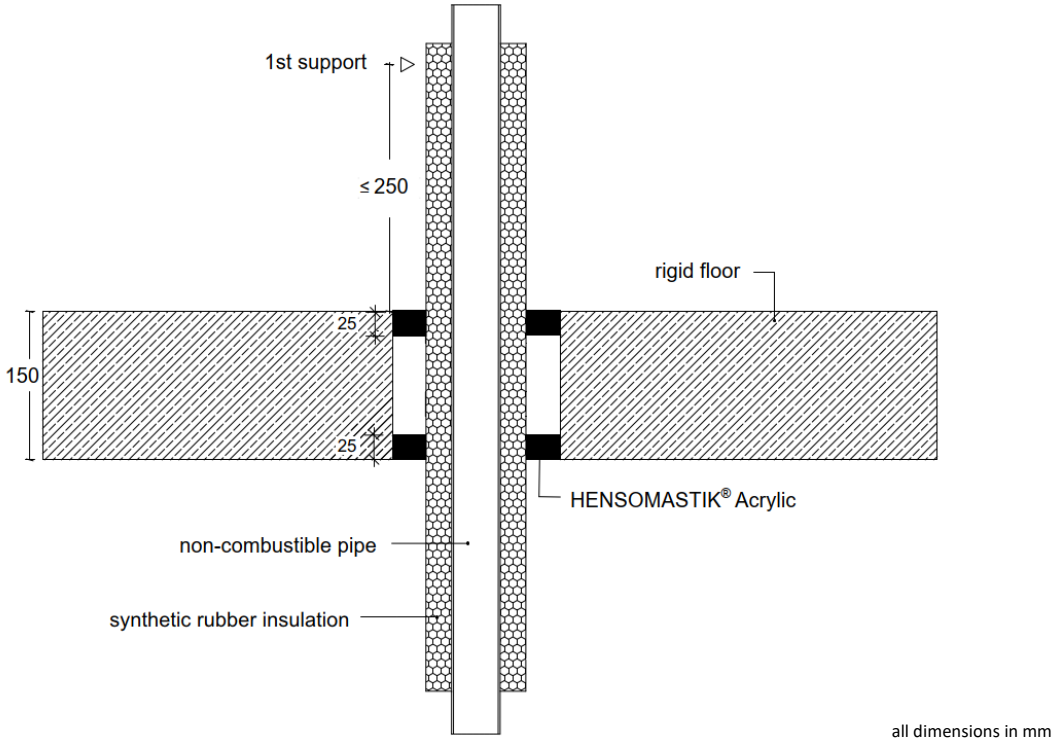
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Geberit Mepla	16	2.25	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Geberit Mepla	40	3.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Geberit Mepla	75	4.7	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 90 U/C
JRG Sanipex MT	16	2.25	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
JRG Sanipex MT	40	3.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
JRG Sanipex MT	63	4.5	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 60 U/C
Wavin Tigris	16	2.0	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 90 U/C
Wavin Tigris	40	4.0	Stone wool ≥ 80 kg/m³	20	2 x LI 250	10-20	EI 120 U/C
Wavin Tigris	75	7.5	Stone wool ≥ 80 kg/m³	30	2 x LI 250	10-20	EI 120 U/C

C.10. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) flexible elastomeric foam (FEF) or synthetic rubber insulation with a building material class rated equal to or better than B,s3-d0 according to DIN EN 13501-1, sealed both on both top and bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to both faces of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space.



C.10.1. Non-combustible metal pipes with FEF-insulation, sealed on both sides

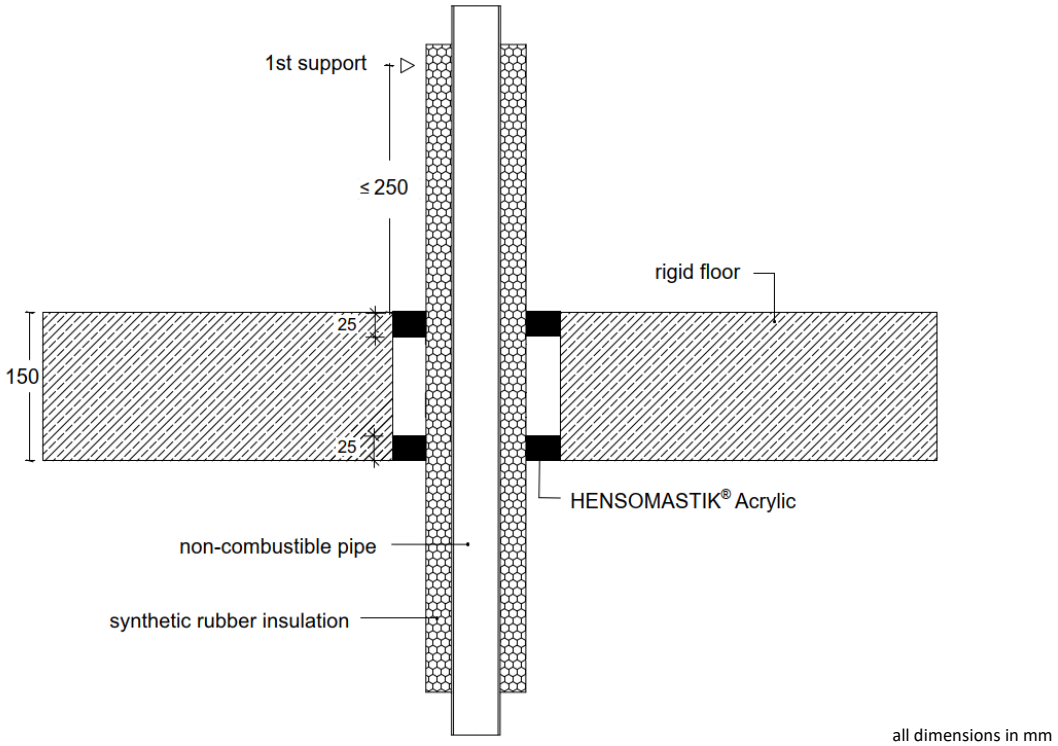
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤15	1.0-11.0	≤ B,s3-d0	11.5	CS	10-20	EI 120 C/U
Copper, steel	≤42	1.2-14.2	≤ B,s3-d0	13.5-36.5	CS	10-20	EI 90 C/U
Copper, steel	42	1.2-14.2	≤ B,s3-d0	13.5	CS	10-20	EI 120 C/U
Copper, steel	>42 ≤54	1.5-14.2	≤ B,s3-d0	13.5-38	CS	10-20	EI 90 C/U

C.11. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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^3.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) flexible elastomeric foam (FEF) HT/ArmaFlex insulation, sealed both on both top and bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to both faces of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The length of the local insulation may be increased but not reduced.



C.11.1. Non-combustible metal pipes with FEF-insulation, sealed on both sides

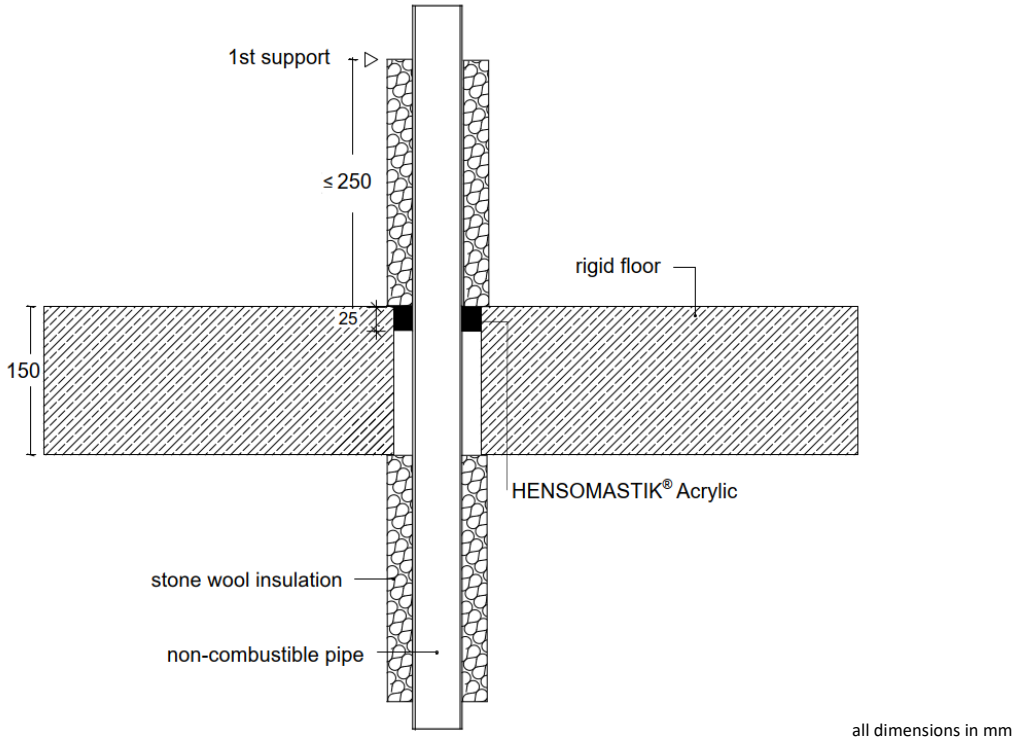
Conduit	Diameter [mm]	Wall thickness [mm]	FEF-Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤15	1.0-11.0	HT/ArmaFlex	13	CS, LS 1000	10-20	EI 90 C/U
Copper, steel	>15 ≤54	1.5-14.2	HT/ArmaFlex	13-25	CS, LS 1000	10-20	EI 30 C/U
Steel	>54 ≤139.7	4.0-14.2	HT/ArmaFlex	13-25	CS, LS 1000	10-20	EI 30 C/U
Steel	139.7	4.0	HT/ArmaFlex	13	CS, LS 1000	10-20	EI 45 C/U

C.12. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Non-combustible metal pipes with local interrupted (LI) stone wool insulation 80 kg/m³ or higher, sealed on the top side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the top face of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The classification applies to all penetration angles between 90 and 45 degrees. The length of the local insulation may be increased but not reduced.



C.12.1. Non-combustible metal pipes with stone wool insulation, sealed on top

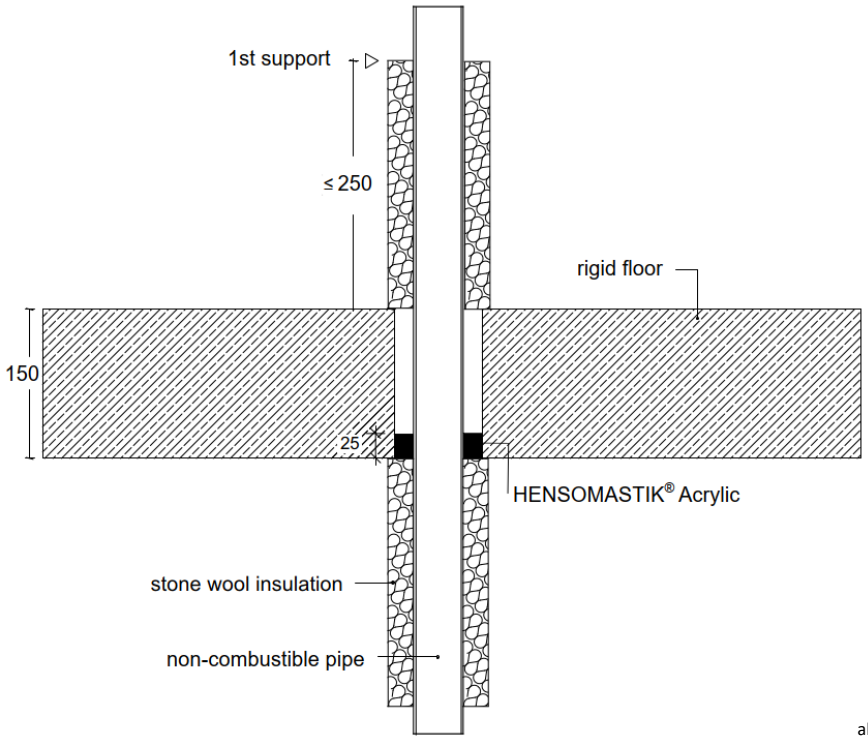
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤54	1.0-14.2	Stone wool ≥ 80 kg/m³	20	2 x LI 500	10-20	EI 120 C/U
Steel	>54 ≤139.7	2.0-14.2	Stone wool ≥ 80 kg/m³	30-80	2 x LI 500	10-20	EI 120 C/U
Steel	>139.7 ≤219.1	4.0-14.2	Stone wool ≥ 80 kg/m³	30	2 x LI 500	10-20	EI 120 C/U
Steel	>139.7 ≤219.1	4.0-14.2	Stone wool ≥ 80 kg/m³	30-80	2 x LI 500	10-20	EI 90 C/U

C.13. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Non-combustible metal pipes with local interrupted (LI) stone wool insulation 80 kg/m³ or higher, sealed on the bottom of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the bottom face of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The classification applies to all penetration angles between 90 and 45 degrees. The length of the local insulation may be increased but not reduced.



C.13.1. Non-combustible metal pipes with stone wool insulation, sealed on bottom

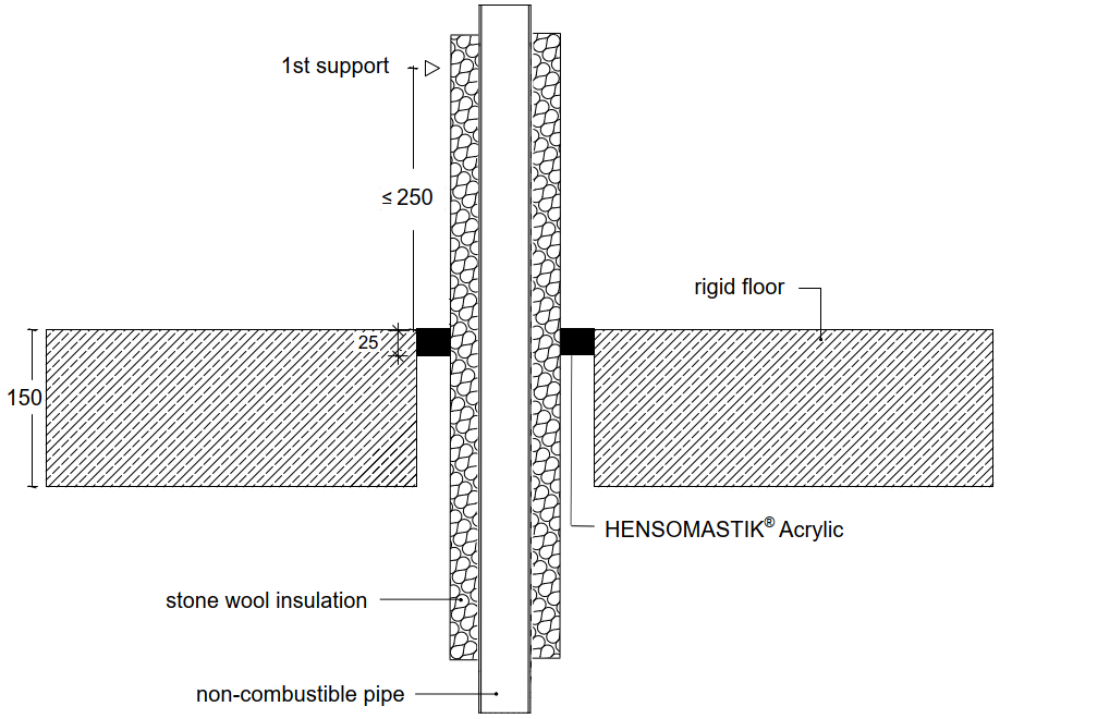
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	≤15	1.0-14.2	Stone wool ≥ 80 kg/m³	20	2 x LI 500	10-20	EI 120 C/U
Copper, steel	≤54	1.5-14.2	Stone wool ≥ 80 kg/m³	20	2 x LI 500	10-20	EI 90 C/U
Steel	≤42.4	1.0-14.2	Stone wool ≥ 80 kg/m³	20	2 x LI 500	10-20	EI 120 C/U
Steel	>42.4 ≤139.7	2.0-14.2	Stone wool ≥ 80 kg/m³	30-80	2 x LI 500	10-20	EI 120 C/U
Steel	>139.7 ≤219.1	4.0-14.2	Stone wool ≥ 80 kg/m³	30-80	2 x LI 500	10-20	EI 60 C/U
Steel	>139.7 ≤219.1	4.0-14.2	Stone wool ≥ 80 kg/m³	80	2 x LI 500	10-20	EI 90 C/U

C.14. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) stone wool insulation 80 kg/m³ or higher, sealed on the top side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the top face of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The classification applies to all penetration angles between 90 and 45 degrees. The length of the local insulation may be increased but not reduced.



C.14.1. Non-combustible metal pipes with stone wool insulation, sealed on top

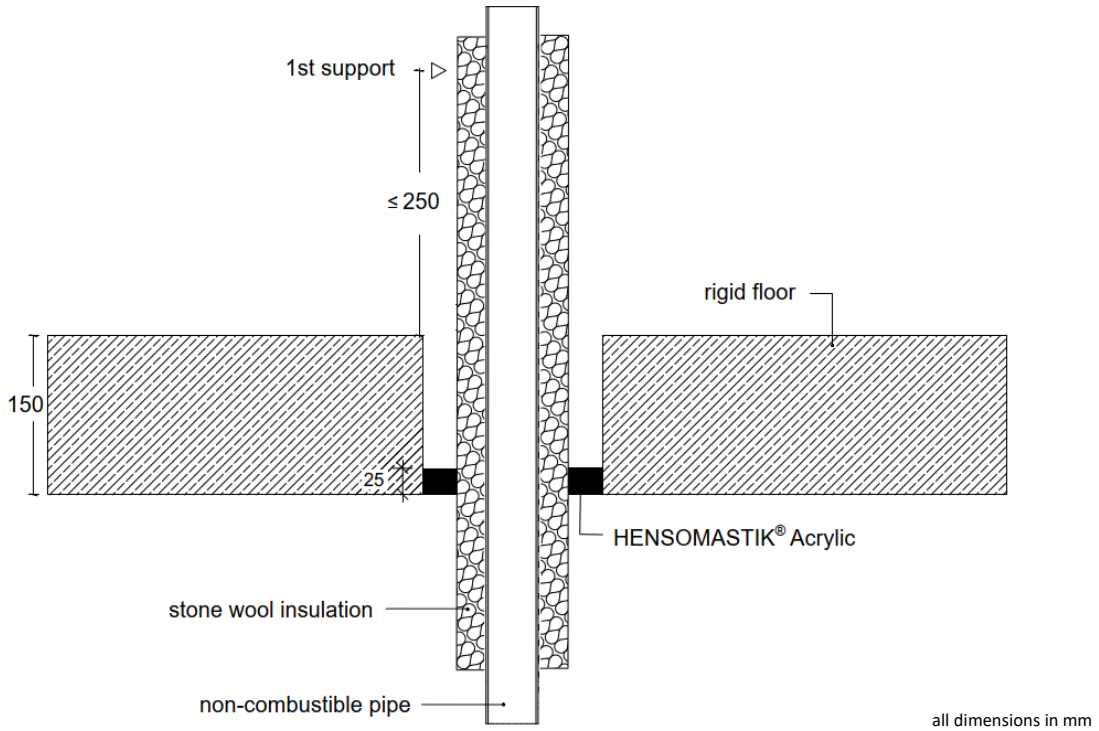
Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classifi-cation
Copper, steel	<54	1.0-14.2	Stone wool ≥ 80 kg/m³	20	CS, LS 1000	10-20	EI 60 C/U
Copper, steel	54	1.5-14.2	Stone wool ≥ 80 kg/m³	20	CS, LS 1000	10-20	EI 90 C/U
Copper, steel	≥54 ≤88.9	1.5-14.2	Stone wool ≥ 80 kg/m³	30	CS, LS 1000	10-20	EI 60 C/U
Steel	>42.4 ≤219.1	2.0-14.2	Stone wool ≥ 80 kg/m³	20-30	CS, LS 1000	10-20	EI 60 C/U
Steel	219.1	2.0-14.2	Stone wool ≥ 80 kg/m³	30	CS, LS 1000	10-20	EI 90 C/U

C.15. Construction details

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.
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/m³.

Permitted distances: Other penetration seals: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 400 mm x 400 mm, otherwise ≥ 100 mm. Other openings or installations: ≥ 200 mm, provided that one or both of the adjacent openings is larger than 200 mm x 200 mm, otherwise ≥ 100 mm. Services shall be supported at maximum 250 mm from the top side of the floor.

Penetration Seal: Non-combustible metal pipes with continuous sustained (CS) or local sustained (LS) stone wool insulation 80 kg/m³ or higher, sealed on the bottom side of the floor with HENSOMASTIK® Acrylic, min. 25 mm deep and positioned flush to the bottom face of the floor. Annular space width (a1) 10-20 mm, and maximum seal size defined by conduit diameter and allowed max annular space. The classification applies to all penetration angles between 90 and 45 degrees. The length of the local insulation may be increased but not reduced.



C.15.1. Non-combustible metal pipes with stone wool insulation, sealed on bottom

Conduit	Diameter [mm]	Wall thickness [mm]	Insulation	Insulation thickness [mm]	Insulation length [mm]	Annular space [mm]	Classification
Copper, steel	≤15	1.0-14.2	Stone wool ≥ 80 kg/m³	20	CS, LS 1000	10-20	EI 90 C/U
Copper, steel	>15 ≤54	1.0-14.2	Stone wool ≥ 80 kg/m³	20	CS, LS 1000	10-20	EI 90 C/U
Copper, steel	≥54 ≤88.9	1.5-14.2	Stone wool ≥ 80 kg/m³	30	CS, LS 1000	10-20	EI 90 C/U
Steel	>42.4 ≤219.1	2.0-14.2	Stone wool ≥ 80 kg/m³	20-30	CS, LS 1000	10-20	EI 90 C/U