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European Technical Assessment

ETA-10/0292
of 31.01.2018

General part

Technical Assessment Body issuing the European Technical Assessment

Österreichisches Institut für Bautechnik (OIB)
Austrian Institute of Construction Engineering

Trade name of the construction product

Hilti Firestop Acrylic Sealant CFS-S ACR

Product family to which the construction product belongs

Fire Stopping and Fire Sealing Products:
Penetration Seals

Manufacturer

Hilti AG
Feldkircherstrasse 100
9494 Schaan
LIECHTENSTEIN

Manufacturing plant

Hilti production plant 4a

This European Technical Assessment contains

23 pages including Annexes A to C which form an integral part of this assessment.

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

European Assessment Document
EAD 350454-00-1104 "Fire stopping and fire sealing products – Penetration seals"

This European Technical Assessment replaces

European technical approval ETA-10/0292 with validity from 31.01.2013 to 30.01.2018

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Specific parts

1 Technical description of the product

“Hilti Firestop Acrylic Sealant CFS-S ACR” is a 1-component sealant used to form a pipe penetration seal based on filling substances and acrylic binder.

For further details on “Hilti Firestop Acrylic Sealant CFS-S ACR” see Annex B.1 of the ETA.

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

2.1 Intended use

“Hilti Firestop Acrylic Sealant CFS-S ACR” is intended to be used as a pipe penetration seal to temporarily or permanently reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they have been penetrated by metal pipes, plastic pipes and composite pipes.

The thickness of the penetration seal in flexible walls has to be minimum 100 mm.

The thickness of the penetration seal in rigid walls has to be minimum 100 mm.

The thickness of the penetration seal in rigid floors has to be minimum 150 mm.

The maximum opening size of the penetration seal has to comply with the dimensions as specified in the following table. For details see Annex C of the ETA.

“Hilti Firestop Acrylic Sealant CFS-S ACR” can only be used as penetration seal for metal pipes, plastic pipes, and composite pipes. Further details are given in Annex C of the ETA. Other parts or service support constructions shall not penetrate the penetration seal.

“Hilti Firestop Acrylic Sealant CFS-S ACR” can be installed only in the types of separating elements as specified in the following table.

Separating element	Construction	Maximum opening size of the penetration seal
Flexible walls	<ul style="list-style-type: none"> > Timber or steel studs lined on both faces with minimum 2 layers of boards (minimum thickness 12,5 mm) with classification A2-s1,d0 or A1 according to EN 13501-1 > For timber stud walls there must be a minimum distance of 100 mm of the penetration seal to any timber stud. The cavity between the penetration seal and the timber stud has to be closed with minimum 100 mm of insulation with classification A1 or A2 according to EN 13501-1 > Minimum thickness 100 mm > Classification according to EN 13501-2: ≥ EI 90 > This European Technical Assessment does not cover sandwich panel constructions and flexible walls where the lining does not cover studs on both sides 	<p style="text-align: center;">Ø 300 mm For details see Annex C of the ETA</p>

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Separating element	Construction	Maximum opening size of the penetration seal
Rigid walls	<ul style="list-style-type: none"> > Aerated concrete, concrete, masonry > Minimum density 650 kg/m³ > Minimum thickness 100 mm > The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period 	<p>Ø 300 mm For details see Annex C of the ETA</p>
Rigid walls	<ul style="list-style-type: none"> > Aerated concrete, concrete, masonry > Minimum density 550 kg/m³ > Minimum thickness 200 mm > The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period 	<p>Ø 300 mm For details see Annex C of the ETA</p>
Rigid walls	<ul style="list-style-type: none"> > Concrete, masonry > Minimum density 2400 kg/m³ > Minimum thickness 150 mm > The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period 	<p>Ø 300 mm For details see Annex C of the ETA</p>
Rigid floors	<ul style="list-style-type: none"> > Aerated concrete, concrete > Minimum density 550 kg/m³ > Minimum thickness 150 mm > The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period 	<p>Ø 300 mm For details see Annex C of the ETA</p>
Rigid floors	<ul style="list-style-type: none"> > Concrete > Minimum density 2400 kg/m³ > Minimum thickness 150 mm > The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period 	<p>Ø 300 mm For details see Annex C of the ETA</p>

2.2 Use condition

“Hilti Firestop Acrylic Sealant CFS-S ACR” is intended for use at temperatures below 0°C, but with no exposure to rain nor UV and can therefore – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type Y₂. Since the requirements for Type Y₂ are met, also the requirements for Type Z₁ and Z₂ are fulfilled.

Although a penetration seal is intended for indoor applications only, the construction process may result in it being subjected to more exposed conditions for a period before the building envelope is closed. For this case provisions shall be made to protect temporarily exposed penetration seals according to the ETA-holder’s installation instructions.

2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of “Hilti Firestop Acrylic Sealant CFS-S ACR” of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.

The indications given on the intended 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 selecting the appropriate product in relation to the expected economically reasonable working life of the works.

The real working life might be, in normal use conditions, considerably longer without major degradation affecting the Basic requirements for construction works.

2.4 General assumptions

2.4.1 It is assumed that

- > damages to the penetration seal are repaired accordingly,
- > the installation of the penetration seal does not affect the stability of the adjacent building element – even in case of fire,
- > the lintel or floor above the penetration seal is designed structurally and in terms of fire protection such that no additional mechanical load (other than its own weight) is imposed on the penetration seal,
- > the installations are fixed to the adjacent building element in accordance with the relevant regulations in such a way that, in case of fire, no additional mechanical load is imposed to the penetration seal,
- > the support of the installations is maintained for the required period of fire resistance and
- > pneumatic dispatch systems, compressed air systems, etc. are switched off by additional means in case of fire.

2.4.2 This European Technical Assessment does not address any risks associated with the emission of dangerous liquids or gases caused by failure of the pipe(s) in case of fire nor does it prove the prevention of the transmission of fire through heat transfer via the medium in the pipes.

2.4.3 This European Technical Assessment does not verify the prevention of destruction of adjacent building elements with fire separating function or of the pipes themselves due to distortion forces caused by extreme temperatures. These risks shall be accounted for by taking appropriate measures when designing or installing the pipe work.

The mounting or hanging of the pipes or the layout of the pipe work shall be implemented in such a way that the pipes and the fire resistant building elements shall remain functional within a period of time which corresponds to the fire resistance period required.

2.4.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this European Technical Assessment (see EN 1366-3:2009, clause 1).

2.4.5 The durability assessment does not take account of the possible effect on the penetration seal of substances permeating through the pipe walls.

2.4.6 The assessment does not cover the avoidance of destruction of the penetration seal or of the adjacent building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

2.5 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data / information, deposited with the Österreichisches Institut für Bautechnik, 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 the Österreichisches Institut für Bautechnik before the changes are introduced.

The Österreichisches Institut für Bautechnik will decide whether or not such changes affect the European Technical Assessment and consequently the validity of the CE marking on the basis of the European Technical Assessment and if so whether further assessment or alterations to the European Technical Assessment, shall be necessary.

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 2	Reaction to fire	EN 13501-1:2007+A1:2009	Clause 3.1.1 of the ETA
	Resistance to fire	EN 13501-2:2007+A1:2009	Clause 3.1.2 and Annex C.1 to C.6 of the ETA
BWR 3	Air permeability (material property)	EN 1026:2000	Clause 3.2.1 of the ETA
	Water permeability (material property)	Annex C of EAD 350454-00-1104	Clause 3.2.2 of the ETA
	Content and/or release of dangerous substances	No performance assessed	
BWR 4	Mechanical resistance and stability	No performance assessed	
	Resistance to impact / movement	No performance assessed	
	Adhesion	No performance assessed	
	Durability	EAD 350454-00-1104 clause 2.2.9	Clause 3.3.4 of the ETA
BWR 5	Airborne sound insulation	No performance assessed	
BWR 6	Thermal properties	No performance assessed	
	Water vapour permeability	No performance assessed	

3.1 Safety in case of fire (BWR 2)

3.1.1 Reaction to fire

“Hilti Firestop Acrylic Sealant CFS-S ACR” was assessed according to EAD 350454-00-1104 clause 2.2.1 and classified according to EN 13501-1:2007+A1:2009.

Component	Class according to EN 13501-1:2007+A1:2009
Hilti Firestop Acrylic Sealant CFS-S ACR	D – s1, d0

3.1.2 Resistance to fire

“Hilti Firestop Acrylic Sealant CFS-S ACR” was tested according to EAD 350454-00-1104 clause 2.2.2, EN 1363-1 and EN 1366-3:2009.

Based upon the gained test results and the field of application specified within EN 1363-1 and EN 1366-3:2009 the penetration seal “Hilti Firestop Acrylic Sealant CFS-S ACR” has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex C.1 to C.6 of the ETA.

The maximum fire resistance class of the penetration seal in vertical or horizontal separating elements depends on the fire resistance class of the penetrating elements. The fire resistance class of the penetration seal is reduced to the fire resistance class of the penetrating element with the lowest fire resistance classification.

3.2 Hygiene, health and environment (BWR 3)

3.2.1 Air permeability

The air permeability of “Hilti Firestop Acrylic Sealant CFS-S ACR” with a thickness of 10 mm was assessed as part of gas permeability tests according to EN 1026. The following flow rates per area (q/A) have been achieved for the given air pressure differences (Δp). The flow rate index indicates the type of gas:

ΔP [Pa]	q/A air [m ³ /(h·m ²)]	q/A N ₂ [m ³ /(h·m ²)]	q/A CO ₂ [m ³ /(h·m ²)]	q/A CH ₄ [m ³ /(h·m ²)]
q/A air [m ³ /(h·m ²)]	impermeable	impermeable	impermeable	
50	≤ 1,9E-06	≤ 1,1E-06	≤ 6,4E-06	≤ 4,3E-06
250	≤ 9,7E-06	≤ 5,5E-06	≤ 3,2E-06	≤ 2,1E-06

3.2.2 Water permeability

The water permeability of “Hilti Firestop Acrylic Sealant CFS-S ACR” has been tested according to Annex C of EAD 350454-00-1104. The specimen consisted of 2 mm “Hilti Firestop Acrylic Sealant CFS-S ACR” (dry film thickness) on mineral wool. Test result: Water tight to 1000 mm head of water or 9806 Pa.

3.2.3 Release of dangerous substances

No performance assessed.

3.3 Safety in use (BWR 4)

3.3.1 Mechanical resistance and stability

No performance assessed.

3.3.2 Resistance to impact / movement

No performance assessed.

Provisions shall be taken to prevent a person from stepping onto a horizontal penetration seal or falling against a vertical penetration seal (e.g. by covering with a wire mesh).

3.3.3 Adhesion

No performance assessed.

3.3.4 Durability

All components of “Hilti Firestop Acrylic Sealant CFS-S ACR” fulfil the requirements for the intended use condition.

“Hilti Firestop Acrylic Sealant CFS-S ACR” is therefore appropriate for use at temperatures below 0°C, but with no exposure to rain nor UV and can – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type Y₂. Since the requirements for Type Y₂ are met, also the requirements for Type Z₁ and Z₂ are fulfilled.

3.4 Protection against noise (BWR 5)

3.4.1 Airborne sound insulation
No performance assessed.

3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties
No performance assessed.

3.5.2 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/EC¹, amended by Decision 2001/596/EC² of the European Commission the system(s) of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

Product(s)	Intended use(s)	Level(s) or class(es) (resistance to fire)	System of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	for fire compartmentation and/or fire protection or fire performance	any	1

In addition, according to the Decision 1999/454/EC, amended by Decision 2001/596/EC of the European Commission the system(s) of assessment and verification of constancy of performance, with regard to reaction to fire, is 3.

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	System of assessment and verification of constancy of performance
Fire Stopping and Fire Sealing Products	For uses subject to regulations on reaction to fire	A1*, A2*, B*, C*	1
		A1**, A2**, B**, C**, D, E	3
		(A1 to E)***, F	4
<p>* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material)</p> <p>** Products/materials not covered by footnote (*)</p> <p>*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of class A1 according to Commission Decision 96/603/EC, as amended)</p>			

¹ Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

² Official Journal of the European Communities no. L 209, 2.8.2001, p. 33

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 with the Technical Assessment Body Österreichisches Institut für Bautechnik.

The notified product certification body shall visit the factory at least twice a year for surveillance of the manufacturer.

Issued in Vienna on 31.01.2018
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

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ANNEX A REFERENCE DOCUMENTS and LIST OF ABBREVIATIONS

A.1 References to standards mentioned in the ETA

EN 1026	Windows and doors – Air permeability – Test method
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals
EN 13501-1	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests
EN 13501-2	Fire classification of construction products and building elements – Part 2: Classification using test data from fire resistance tests

A.2 Other reference documents

EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products
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A.3 Abbreviations used in drawings

Abbreviation	Description	Abbreviation	Description
A, A ₁ , A ₂ ,...	Hilti Firestop Acrylic Sealant CFS-S ACR	s ₁ , s ₂	Distances
B	Backfilling material	t _A	Thickness of penetration seal
C, C ₁ , C ₂ ,...	Penetrating services	t _B	Thickness of backfilling material
D	Pipe insulation	t _C	Pipe wall thickness
E, E ₁ , E ₂ ,...	Building element (wall, floor)	t _D	Thickness of insulation
L _D	Length of insulation	t _E	Thickness of the building element
d _c	Pipe diameter	w _A	Width of penetration seal (annular space)
h	Height/length of penetration seal		

ANNEX B

DESCRIPTION OF PRODUCT(S) & PRODUCT LITERATURE

B.1 Hilti Firestop Acrylic Sealant CFS-S ACR

Hilti Firestop Acrylic Sealant CFS-S ACR is a 1-component product and is composed essentially of filling substances and an acrylic binder.

It is available in cartridge 310 ml, foil pack 580 ml, bucket 5 l / 19 l

Suitable dispensers:

Hilti CB 200-P1 (for 310 ml cartridge)

Hilti CS 270-P1 (for 580 ml foil pack)

A detailed specification of the product is contained in document "Identification / Product Specification relating to the European technical assessment ETA – 10/0292 and ETA-10/0389, Hilti Firestop Acrylic Sealant CFS-S ACR" which is a non-public part of this ETA.

The Control Plan is defined in document "Control Plan relating to the European technical approval ETA-10/0292 and ETA 10/0389 – Hilti Firestop Acrylic Sealant CFS-S ACR", which is a non-public part of this ETA.

B.2 Mineral Wool

Mineral wool products suitable for being used as pipe insulation material

Manufacturer	Product designation	Specification
Isover	Protect BSR 90 alu	Product data sheet of manufacturer
Paroc	PAROC Section AluCoat T	Product data sheet of manufacturer
Rockwool	Conlit 150 P	Product data sheet of manufacturer
Rockwool	Klimarock	Product data sheet of manufacturer
Rockwool	Rockwool 800 pipe sections	Product data sheet of manufacturer

B.3 OKTAGON formwork tie rod system ("Schalungsspannstelle")

The formwork tie rod system is made of HDPE and available in different lengths for a wall thickness up to 600 mm. Inner diameter: 22 mm, diameter of protection flange: 60 mm.

Manufacturer: Nevoga GmbH, Freilassing, Germany (www.nevoga.com)



B.4 Formwork distance control pipe ("Abstandsrohr")

The formwork distance control pipe is a weather resistant plastic pipe with enhanced impact resistance. It is available in lengths of 2000 to 2500 mm and cut to the required length on site. Inner diameter: 26 mm, outer diameter 32 mm.

Manufacturer: Nevoga GmbH, Freilassing, Germany (www.nevoga.com)



B.5 Technical product literature

Technical data sheet and instructions for use Hilti Firestop Acrylic Sealant CFS-S ACR.

ANNEX C

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF “HILTI FIRESTOP ACRYLIC SEALANT CFS-S ACR”

C.1 General Information

C.1.1 Wall / floor constructions

a) Flexible wall:

The wall must have a minimum thickness of 100 mm and comprise timber or steel studs lined on both faces with minimum 2 layers of 12.5 mm thick boards according to EN 520 type F.

In steel stud construction the space between linings has not to be completely filled with insulation material, especially in the neighbourhood to the penetration seal. Nevertheless the wall has to be set up according to the requirements.

For timber stud walls there must be a minimum distance of 100 mm of the seal to any stud and the cavity between stud and seal must be closed and a minimum of 50 mm insulation of Class A1 or A2 (in accordance with EN 13501-1) in the cavity between stud and seal is necessary.

b) 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.

c) Rigid walls:

The wall must have a minimum thickness of 200 mm and comprise aerated concrete, concrete or masonry, with a minimum density of 550 kg/m³.

d) Rigid walls:

The wall must have a minimum thickness of 150 mm and comprise concrete or masonry, with a minimum density of 2400 kg/m³.

e) Rigid floors:

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 550 kg/m³.

f) Rigid floors:

The floor must have a minimum thickness of 150 mm and comprise concrete with a minimum density of 2400 kg/m³.

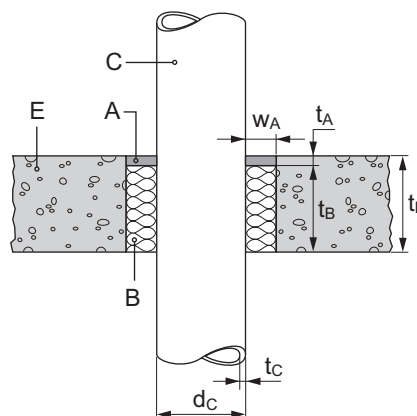
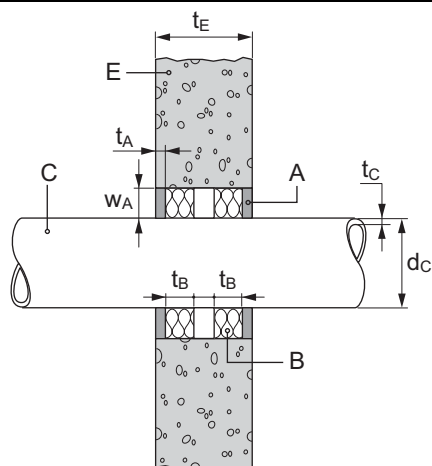
The walls / floors must be classified in accordance with EN 13501-2 for the required fire resistance period or fulfil the requirements of the relevant Eurocode. This ETA does not cover use of the product as a penetration seal in sandwich panel constructions.

C.2 Rigid walls and rigid floors according to Annex C.1.1 d) and f) of the ETA

Penetration seal:

Wall: 15 mm (t_A) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides, stone wool according to Annex B.2 of the ETA as backfilling material (t_B = minimum 50 mm on both sides)

Floor: 15 mm Hilti Firestop Acrylic Sealant CFS-S ACR (A) on the upper side, stone wool according to Annex B.2 of the ETA as backfilling material (t_B = gap filled completely)



Penetrating services

Steel pipes non-insulated (C)

Single penetration

Distance between pipe and seal edge:

Wall (width of annular space, w_A): 10,5 - 35,5 mm;

Floor: Maximum penetration seal diameter: 260 mm (annular space w_A depending on pipe diameter)

Pipe diameter (d_c) between $\varnothing 32$ mm and $\varnothing 159$ mm, with minimum wall thickness (t_c) 1,8 mm and 4,5 mm respectively³, maximum wall thickness 14,2 mm⁴

Classification

E 180-C/U

The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1100°C, e.g. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)

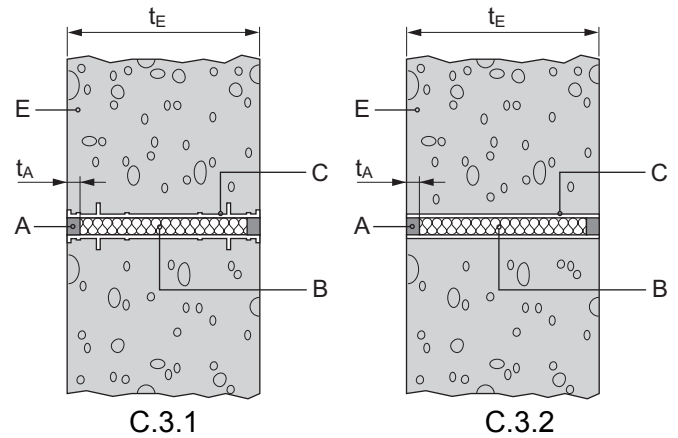
³ Interpolation of minimum pipe wall thickness between 1,8 mm for diameter 32 mm and 4,5 mm for diameter 159 mm for pipe diameters in between.

⁴ 14,2 mm is the maximum value covered by the rules in EN 1366-3. This value may be limited by the particular pipe dimensions available in practice.

C.3 Rigid walls according to Annex C.1.1 c) of the ETA

Penetration seal:

15 mm (t_A) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides of the opening of the formwork tie system / formwork distance pipe (C), loose stone wool (B) as backfilling material (t_B = gap filled completely)



Penetrating services

Classification

C.3.1 OKTAGON formwork tie rod system ("Schalungsspannstelle", "Oktagon-Spreize") - see Annex B.3 of the ETA

EI 120

C.3.2 Formwork distance pipe ("Abstandsrohr", "Distanzrohr") - see Annex B.4 of the ETA

EI 120

C.4 Flexible wall and rigid wall according to Annex C.1.1 of the ETA

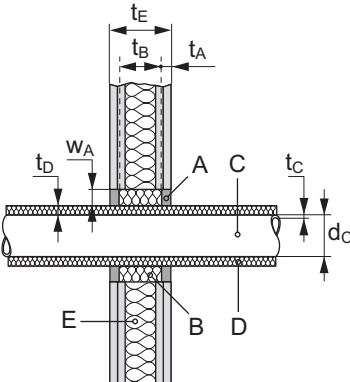
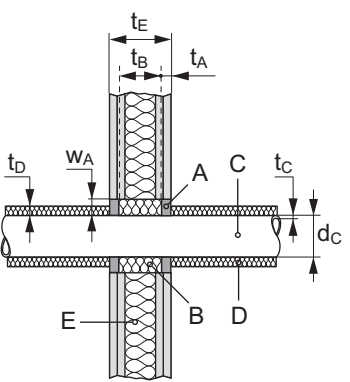
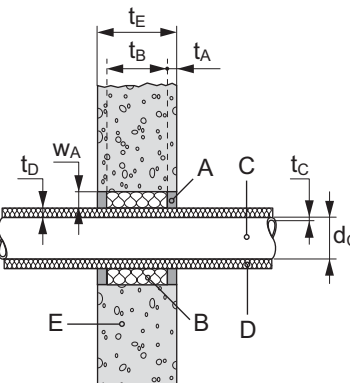
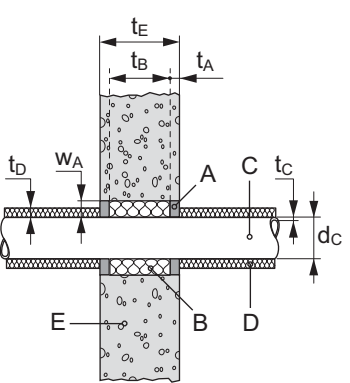
Penetration seal:

10 mm (t_A) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides of the wall, stone wool according to Annex B2 of the ETA as backfilling material ($t_B =$ gap filled completely)

Maximum seal diameter: 300 mm (annular space w_A depending on pipe diameter)

Pipe insulation made of mineral wool according to Annex B.2. of the ETA.

C.4.1 Continued pipe insulation

Sustained insulation	Interrupted insulation
	
	

Penetrating services	Classification
Steel pipes (C) with continued insulation (D) – sustained	
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 48,3 mm, with minimum wall thickness (t_C) 1,4 mm and 1,6 mm respectively ⁵ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 168,3 mm, with minimum wall thickness (t_C) 1,4 mm and 2,6 mm respectively ⁶ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Steel pipes (C) with continued insulation (D) – interrupted	
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 48,3 mm, with minimum wall thickness (t_C) 1,4 mm and 1,6 mm respectively ⁵ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 168,3 mm, with minimum wall thickness (t_C) 1,4 mm and 2,6 mm respectively ⁶ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1100°C, e.g. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)	
Copper pipes (C) with continued insulation (D) – sustained	
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) between \varnothing 28 mm and \varnothing 42 mm, with minimum wall thickness (t_C) 1,0 mm and 1,5 mm respectively ⁷ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 42 mm and \varnothing 88,9 mm, with minimum wall thickness (t_C) 1,5 mm and 2,0 mm respectively ⁸ , maximum wall thickness 14,2 mm ⁴	EI 90-C/U
Copper pipes (C) with continued insulation (D) – interrupted	
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) between \varnothing 28 mm and \varnothing 42 mm, with minimum wall thickness (t_C) 1,0 mm and 1,5 mm respectively ⁷ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 42 mm and \varnothing 88,9 mm, with minimum wall thickness (t_C) 1,5 mm and 2,0 mm respectively ⁸ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U

⁵ Interpolation of minimum pipe wall thickness between 1,4 mm for diameter 26,9 mm and 1,6 mm for diameter 48,3 mm for pipe diameters in between.

⁶ Interpolation of minimum pipe wall thickness between 1,4 mm for diameter 26,9 mm and 2,6 mm for diameter 168,3 mm for pipe diameters in between.

⁷ Interpolation of minimum pipe wall thickness between 1,0 mm for diameter 28 mm and 1,5 mm for diameter 42 mm for pipe diameters in between.

⁸ Interpolation of minimum pipe wall thickness between 1,5 mm for diameter 42 mm and 2,0 mm for diameter 88,9 mm for pipe diameters in between.

The field of application given above is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.

Geberit Mepla pipes (C) with continued insulation (D) – sustained

Produced by Geberit Int., Jona, CH

Insulation thickness (t_D) \geq 20 mm:

Pipe dimensions (d_C , t_C):

Ø 16 x 2,25 mm

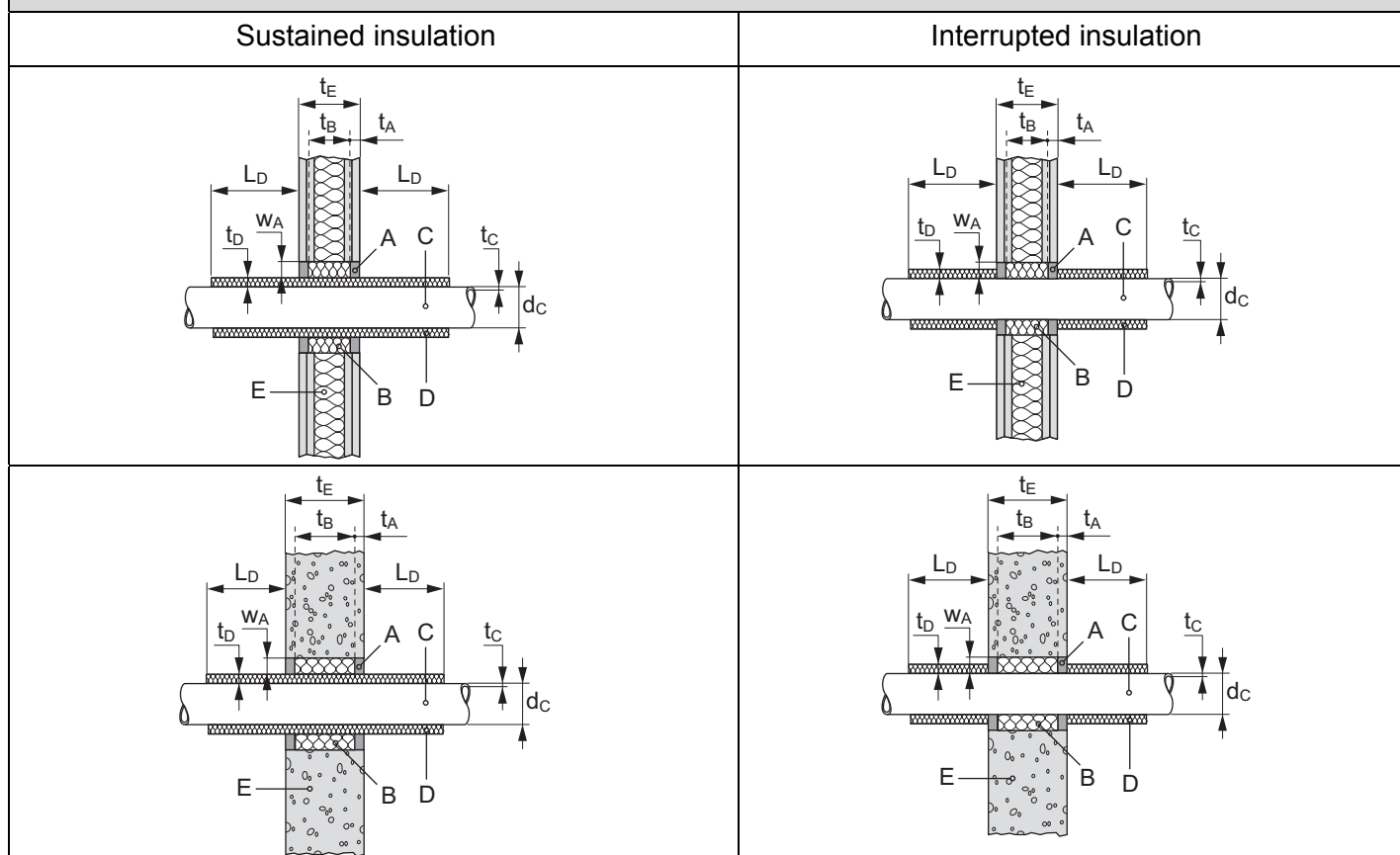
Ø 20 x 2,5 mm

Ø 26 x 3,0 mm

Ø 32 x 3,5 mm

EI 120-U/C

C.4.2 Local pipe insulation



Steel pipes (C) with local insulation (D) – sustained

Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	\geq 450	26,9 – 48,3	1,4 / 1,6 ⁹ – 14,2 ⁴	EI 120-C/U
20 - 40	\geq 500	48,3	1,6 – 14,2 ⁴	EI 120-C/U
40	\geq 450	48,3 – 168,3	1,6 / 2,6 ⁹ – 14,2 ⁴	EI 90-C/U
40	\geq 700	48,3 – 168,3	1,6 / 2,6 ⁹ – 14,2 ⁴	EI 120-C/U

⁹ Interpolation of minimum pipe wall thickness between 1,6 mm for diameter 48,3 mm and 2,6 mm for diameter 168,3 mm for pipe diameters in between.

Steel pipes (C) with local insulation (D) – interrupted				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	≥ 500	26,9 – 48,3	1,4 – 14,2 ⁴	EI 120-C/U
40	≥ 500	168,3	2,6 – 4,5	EI 90-C/U
40	≥ 500	168,3	4,5 – 14,2 ⁴	EI 120-C/U
40	≥ 700	168,3	2,6 – 14,2 ⁴	EI 120-C/U
40	≥ 700	48,3 – 168,3	1,6 / 2,6 ⁹ – 14,2 ⁴	EI 90-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1100°C, e.g. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)				
Copper pipes (C) with local insulation (D) – sustained				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	≥ 450	28 – 42	1,0 / 1,5 ⁷ – 14,2 ⁴	EI 120-C/U
20 - 40	≥ 500	42	1,5 – 14,2 ⁴	EI 120-C/U
40	≥ 500	42 – 88,9	1,5 / 2,0 ⁸ – 14,2 ⁴	EI 90-C/U
40	≥ 700	88,9	2,0 – 14,2 ⁴	EI 120-C/U
Copper pipes (C) with local insulation (D) – interrupted				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	≥ 500	28 – 42	1,0 / 1,5 ⁷ – 14,2 ⁴	EI 120-C/U
20 - 40	≥ 500	42	1,5 – 14,2 ⁴	EI 120-C/U
40	≥ 500	42 – 88,9	1,5 / 2,0 ⁸ – 14,2 ⁴	EI 120-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.				
Geberit Mepla pipes (C) with local insulation (D) – sustained				Classification
Insulation thickness (t_D) 20 mm, insulation length (L_D) ≥ 500 mm: Pipe dimensions (d_C , t_C): Ø 16 x 2,25 mm Ø 20 x 2,5 mm Ø 26 x 3,0 mm Ø 32 x 3,5 mm				EI 120-C/U

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C.5 Rigid floor according to Annex C.1.1 e) of the ETA

Penetration seal:

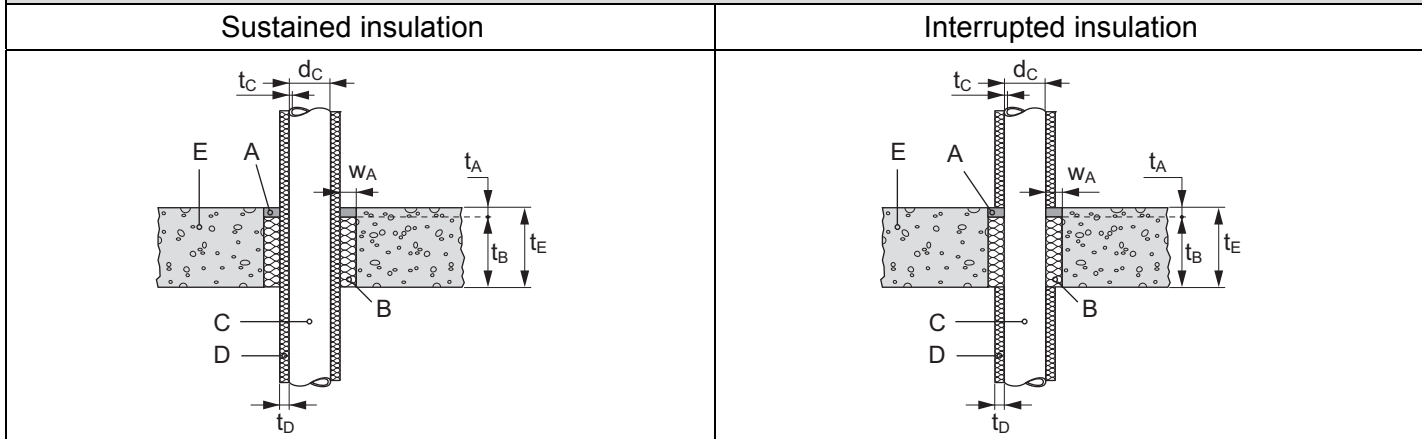
10 mm (t_A) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on the top side of the floor construction, stone wool according to Annex B.2 of the ETA as backfilling material (t_B = gap filled completely)

For classifications EI 90-C/U and EI 120-C/U: Maximum penetration seal diameter: 300 mm (annular space w_A depending on pipe diameter)

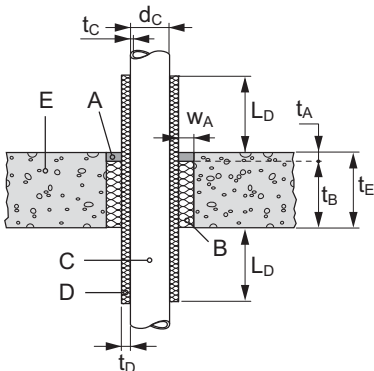
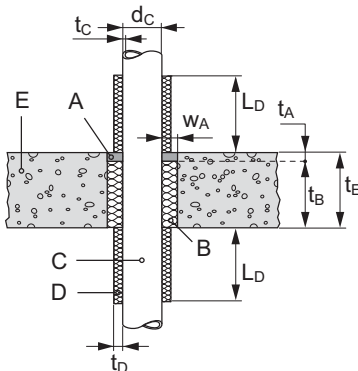
For classifications EI 180-C/U: Distance between pipe and seal edge in floor constructions (width of annular space, w_A): 13 - 48 mm

Pipe insulation made of mineral wool according to Annex B.2 of the ETA.

C.5.1 Continued pipe insulation



Steel pipes (C) with continued insulation (D) – sustained	Classification
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 48,3 mm, with minimum wall thickness (t_C) 1,4 mm and 1,6 mm respectively ⁵ , maximum wall thickness 14,2 mm ⁴	EI 180-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 168,3 mm, with minimum wall thickness (t_C) 1,4 mm and 2,6 mm respectively ⁶ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Steel pipes (C) with continued insulation (D) – interrupted	
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 48,3 mm, with minimum wall thickness (t_C) 1,4 mm and 1,6 mm respectively ⁵ , maximum wall thickness 14,2 mm ⁴	EI 180-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 26,9 mm and \varnothing 168,3 mm, with minimum wall thickness (t_C) 1,4 mm and 2,6 mm respectively ⁶ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1100°C, e.g. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)	

Copper pipes (C) with continued insulation (D) – sustained				Classification
Insulation thickness (t_D) ≥ 20 mm: Pipe diameter (d_C) $\varnothing 42$ mm, with minimum wall thickness (t_C) 1,5 mm and maximum wall thickness 14,2 mm ⁴				EI 120-C/U
Insulation thickness (t_D) ≥ 40 mm: Pipe diameter (d_C) between $\varnothing 42$ mm and $\varnothing 88,9$ mm, with minimum wall thickness (t_C) 1,5 mm and 2,0 mm respectively ⁸ , maximum wall thickness 14,2 mm ⁴				EI 90-C/U
Copper pipes (C) with continued insulation (D) – interrupted				
Insulation thickness (t_D) ≥ 20 mm: Pipe diameter (d_C) between $\varnothing 28$ mm and $\varnothing 42$ mm, with minimum wall thickness (t_C) 1,0 mm and 1,5 mm respectively ⁷ , maximum wall thickness 14,2 mm ⁴				EI 120-C/U
Insulation thickness (t_D) ≥ 40 mm: Pipe diameter (d_C) $\varnothing 42$ mm, with minimum wall thickness (t_C) 1,5 mm, maximum wall thickness 14,2 mm ⁴				EI 120-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1100°C, e.g. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)				
Geberit Mepla pipes (C) with continued insulation (D) – sustained				Classification
Insulation thickness (t_D) ≥ 20 mm: Pipe dimensions (d_C, t_C): $\varnothing 16 \times 2,25$ mm $\varnothing 20 \times 2,5$ mm $\varnothing 26 \times 3,0$ mm $\varnothing 32 \times 3,5$ mm				EI 90-U/C
C.5.2 Local pipe insulation				
Sustained insulation			Interrupted insulation	
				
Steel pipes (C) with local insulation (D) – sustained				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	≥ 450	26,9 – 48,3	1,4 / 1,6 ⁵ – 14,2 ⁴	EI 180-C/U
40	≥ 500	168,3	2,6 – 14,2 ⁴	EI 90-C/U
40	≥ 700	168,3	2,6 – 14,2 ⁴	EI 120-C/U

Steel pipes (C) with local insulation (D) – interrupted				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	≥ 500	26,9 – 48,3	1,4 / 1,6 ⁵ – 14,2 ⁴	EI 180-C/U
40	≥ 500	168,3	2,6 – 14,2 ⁴	EI 120-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1100°C, e.g. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)				
Copper pipes (C) with local insulation (D) – sustained				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	≥ 450	42	1,5 – 14,2 ⁴	EI 120-C/U
20 - 40	≥ 700	42	1,5 – 14,2 ⁴	EI 120-C/U
40	≥ 700	42 – 88,9	1,5 / 2,0 ⁸ – 14,2 ⁴	EI 120-C/U
40	≥ 500	88,9	2,0 – 14,2 ⁴	EI 90-C/U
40	≥ 700	88,9	2,0 – 14,2 ⁴	EI 180-C/U
Copper pipes (C) with local insulation (D) – interrupted				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20 - 40	≥ 600	28 – 42	1,0 / 1,5 ⁷ – 14,2 ⁴	EI 120-C/U
40	≥ 500	28 – 42	1,0 / 1,5 ⁷ – 14,2 ⁴	EI 120-C/U
20 - 40	≥ 500	42	1,5 – 14,2 ⁴	EI 120-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.				
Geberit Mepla pipes (C) with local insulation (D) – sustained				Classification
Insulation thickness (t_D) 20 mm, insulation length (L_D) ≥ 500 mm: Pipe dimensions (d_C , t_C): Ø 16 x 2,25 mm Ø 20 x 2,5 mm Ø 26 x 3,0 mm Ø 32 x 3,5 mm				EI 90-U/C

C.6 Rigid floor according to Annex C.1.1 f) of the ETA	
Penetration seal: See Annex C.5 of the ETA, except that the maximum penetration seal diameter for classifications EI 180-C/U is 260 mm with the annular space (w_A) depending on the pipe diameter.	
C.6.1 Continued pipe insulation	
Steel pipes (C) with continued insulation (D) – sustained	Classification
	See Annex C.5 of the ETA
Steel pipes (C) with continued insulation (D) – interrupted	Classification
	See Annex C.5 of the ETA
Copper pipes (C) with continued insulation (D) – sustained	Classification
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) \varnothing 28 mm, with minimum wall thickness (t_C) 1,0 mm and maximum wall thickness 14,2 mm ⁴	EI 180-C/U
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) \varnothing between \varnothing 28 mm and \varnothing 42 mm, with minimum wall thickness (t_C) 1,0 mm and 1,5 mm respectively ⁸ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 42 mm and \varnothing 88,9 mm, with minimum wall thickness (t_C) 1,5 mm and 2,0 mm respectively ⁸ , maximum wall thickness 14,2 mm ⁴	EI 90-C/U
Copper pipes (C) with continued insulation (D) – interrupted	Classification
Insulation thickness (t_D) \geq 20 mm: Pipe diameter (d_C) between \varnothing 28 mm and \varnothing 42 mm, with minimum wall thickness (t_C) 1,0 mm and 1,5 mm respectively ⁷ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) between \varnothing 42 mm and \varnothing 88,9 mm, with minimum wall thickness (t_C) 1,5 mm and 2,0 mm respectively ⁸ , maximum wall thickness 14,2 mm ⁴	EI 120-C/U
Insulation thickness (t_D) \geq 40 mm: Pipe diameter (d_C) \varnothing 88,9 mm, with minimum wall thickness (t_C) 2,0 mm, maximum wall thickness 14,2 mm ⁴	EI 180-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.	
Geberit Mepla pipes (C) with continued insulation (D) – sustained	Classification
	See Annex C.5 of the ETA

C.6.2 Local pipe insulation				
Steel pipes (C) with local insulation (D) – sustained				Classification
				See Annex C.5 of the ETA
Steel pipes (C) with local insulation (D) – interrupted				Classification
				See Annex C.5 of the ETA
Copper pipes (C) with local insulation (D) – sustained				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20	≥ 425	28	1,0 – 14,2 ⁴	EI 180-C/U
20	≥ 450	28 - 42	1,0 / 1,5 ⁷ – 14,2 ⁴	EI 120-C/U
20 - 40	≥ 700	42	1,5 – 14,2 ⁴	EI 120-C/U
40	≥ 700	42 – 88,9	1,5 / 2,0 ⁸ – 14,2 ⁴	EI 120-C/U
40	≥ 500	88,9	2,0 – 14,2 ⁴	EI 90-C/U
40	≥ 700	88,9	2,0 – 14,2 ⁴	EI 180-C/U
Copper pipes (C) with local insulation (D) – interrupted				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
20 - 40	≥ 500	28 – 42	1,0 / 1,5 ⁷ – 14,2 ⁴	EI 120-C/U
40	≥ 500	42 – 88,9	1,5 / 2,0 ⁸ – 14,2 ⁴	EI 120-C/U
40	≥ 500	88,9	2,0 – 14,2 ⁴	EI 180-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.				
Geberit Mepla pipes (C) with local insulation (D) – sustained				Classification
				See Annex C.5 of the ETA