

DECLARACIÓN DE PRESTACIONES

Según el Anexo III de la Norma Europea n.º 305/2011 (Reglamento Europeo de Productos de Construcción)

Mortero cortafuego CFS-M RG de Hilti N.º Hilti CFS-M RG "0761-CPD-210"

1. Código de identificación único del tipo de producto:

Mortero cortafuego CFS-M RG de Hilti

2. Usos previstos:

Producto intumescente y de sellado para atravesamientos, véase la ETA-12/0101 (30-04-2017)

Atravesamientos de cables	Cables, mazos de cables, bandejas de cables, conductos
Inserciones de tuberías	Tuberías de plástico y de metal
Atravesamientos mixtos	Cables, bandejas de cables, tuberías de metal y de plástico

3. Fabricante:

HILTI Corporation, Feldkircherstrasse 100, 9494 Schaan, Principado de Liechtenstein

4. Sistemas de evaluación y verificación de la constancia de las prestaciones (EVCP):

Sistema 1

5. Documento de evaluación europeo:

EAD 350454-00-1104 "Productos intumescente y de sellado para atravesamientos"

Evaluación técnica europea:

ETA-12/0101 (30-04-2017)

Organismo de Evaluación Técnica:

Austrian Institute of Construction Engineering (OIB, Instituto Austriaco de Ingeniería Civil)

Organismos notificados: MPA Braunschweig, N.º 0761

6. Prestaciones declaradas:

Características básicas	Prestaciones declaradas/especificación técnica armonizada
Reacción en caso de incendio	Clase A1 conforme a la norma EN 13501-1
Resistencia en caso de incendio	Prestaciones de resistencia al fuego y campo de aplicación de conformidad con la norma EN 13501-2. Consulte el Anexo
Permeabilidad al aire	Pruebas realizadas según la norma EN 1026. Consulte el anexo.
Sustancias peligrosas	Consulte el Anexo.
Resistencia a impactos/movimiento	Pruebas realizadas según el Informe Técnico EOTA - TR001. Consulte el Anexo.
Protección acústica	Pruebas realizadas según la norma EN ISO 717-1 y EN ISO 20140-10. Consulte el Anexo.
Propiedades térmicas	Pruebas realizadas según la norma EN12667. Consulte el Anexo.
Durabilidad y operatividad	Y ₁ , (-5/+70) °C de conformidad con el Informe Técnico EOTA - TR024.

Las prestaciones del producto identificado anteriormente son conformes con el conjunto de prestaciones declaradas. La presente declaración de prestaciones se emite, de conformidad con el Reglamento (UE) n.º 305/2011, bajo la responsabilidad del fabricante arriba identificado.

Firmado en nombre del fabricante por:



Dr. Christoph Aubauer
Jefe de producto global
Unidad empresarial de Protección contra incendios
Hilti Corporation



Martin Althof
Presidente de Calidad
Unidad empresarial de Protección contra incendios
Hilti Corporation

Intended use

“Hilti Firestop Mortar CFS-M RG” is intended to be used as a mixed penetration seal to temporarily or permanently reinstate the fire resistance performance of rigid wall constructions and rigid floor constructions where they have been provided with apertures which are penetrated by various cables, conduits / tubes, metal pipes, plastic pipes and cable support constructions (perforated or non-perforated steel cable trays and steel ladders).

The maximum opening size of the penetration seal in walls is 1200 mm x 2000 mm (width x height). For more details and details regarding the maximum opening size in floor applications, and details regarding blank seals, see Annex C of the ETA.

The installation of a blank penetration seal with the dimensions as specified in Annex C of the ETA is allowed.

“Hilti Firestop Mortar CFS-M RG” can be installed only in separating elements as follows:

Rigid walls type A: The wall must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 550 kg/m³.

Rigid walls type B: The wall must have a minimum thickness of 175 mm and comprise concrete or masonry (e.g. hollow brick), with a minimum density of 1100 kg/m³.

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

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

Rigid floors type C: The floor must have a minimum thickness of 175 mm and comprise concrete with a minimum density of 2400 kg/m³.

This European Technical Assessment does not cover sandwich panel constructions.

“Hilti Firestop Mortar CFS-M RG” can only be used as penetration seal for cables, metal pipes, plastic pipes or for mixed penetration (combination). Further details are given in Annex C of the ETA. Other parts or support constructions shall not penetrate the penetration seal.

The first support of the cables, conduits and pipes shall be located at maximum 260 mm away from both faces of wall constructions and maximum 300 mm from the upper face of floor constructions, for details see Annex C of the ETA.

Air permeability

The air permeability of “Hilti Firestop Mortar CFS-M RG” with a thickness of 150 mm was tested according to EN 1026:2000 in a reinforced concrete wall with a thickness of 150 mm. The size of the opening was 1000 mm x 500 mm.

“Hilti Firestop Mortar CFS-M RG” was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.3. Any other components were not included in these tests.

Pressure [Pa]	150 to 900	1050	2100
q/A air [m ³ /(h·m ²)]	<0,0009	0,0012	0,0014

Pressure [Pa]	3750 to 4350	4500	4650	4800	4950
q/A air [m ³ /(h·m ²)]	<0,0009	0,0012	0,0011	0,0018	0,0022

Release of dangerous substances

According to the manufacturer’s declaration the components of “Hilti Firestop Mortar CFS-M RG” do not contain dangerous substances detailed in Council Directive 67/548/EEC and Regulation (EC) no 1272/2008 as well as EOTA TR 034 (General ER 3 Checklist for ETAGs/CUAPs/ETAs- Content and/or release of dangerous substances in products/kits), edition October 2015 above the acceptable limits.

A written declaration in this respect was submitted by the ETA-holder.

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.

Mechanical resistance and stability

In impact tests according to EOTA TR001 the requirements for the highest risk zone type (Type IV) have been fulfilled as defined for internal walls in EOTA TR 001 A.1 and for floors in EOTA TR 001 A.4 for safety in use (600 Nm soft body impact, 10 Nm hard body impact) as well as serviceability (120 Nm soft body impact, 6 Nm hard body impact).

Resistance to impact / movement

See clause 3.3.1 of the ETA

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).

Airborne sound insulation

The airborne sound insulation of "Hilti Firestop Mortar CFS-M RG" was tested according to EN ISO 20140-2:2010 and EN ISO 717-1.

The acoustic tests were performed in a rigid wall. Hilti Firestop Mortar CFS-M RG was tested as a blank mortar seal without penetrating elements. The seal was 500 mm wide and 600 mm high with a thickness of 175 mm. The area of Hilti Firestop Mortar CFS-M RG was 0,3 m².

"Hilti Firestop Mortar CFS-M RG" was tested as blank penetration seal according to ETAG 026-Part 2 clause 2.4.9. Any other components were not included in these tests.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:1996+A1:2006 are:

Weighted element-normalized level difference: $D_{n,w} = 59$ dB

From this $D_{n,w}$ the weighted sound reduction index calculates to: $R_w = 52$ dB

Thermal properties

The thermal properties of "Hilti Firestop Mortar CFS-M RG" were tested according to EN 12667:2001.

Component	λ_{10} in W/(m*K)
Hilti Firestop Mortar CFS-M RG	0,232

Abbreviations used in drawings

Abbreviation	Description
A ₁	Hilti Firestop Mortar CFS-M RG according to Annex B.1 of the ETA
A ₂	Hilti Firestop Bandage CFS-B according to Annex B.6 of the ETA
A ₃	Hilti Firestop Collar CFS-C P or CFS-C according to Annex B.2 and B.3 of the ETA
A ₄	Hilti Firestop Wrap CFS-W according to Annex B.5 of the ETA
AP	Additional protection according to clause 1.1.2 of the ETA
C, C ₁ , C ₂ , C ₃	Penetrating Elements
D	Pipe insulation
d _A	Overlap of mortar (seal type 2)
d _c	Pipe diameter
E	Building element (wall, floor)
h	Height of penetration seal
l	Length of the penetration seal
L _D	Length of local pipe insulation
L _{AP}	Length of the additional protection AP
S ₁ to S ₁₄	Distances
t _{A1}	Thickness of the mortar seal
t _{AP}	Thickness of the additional protection AP
t _c	Wall thickness of the pipe
t _D	Thickness of the pipe insulation
t _E	Thickness of the building element (wall, floor)
w	Width of penetration seal

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP MORTAR CFS-M RG

C.1 Rigid wall type A according to clause 1.2.1 of the ETA (density $\geq 550 \text{ kg/m}^3$), minimum thickness 150 mm

Penetration seal

Hilti Firestop Mortar CFS-M RG (A_1), thickness (t_{A1}) $\geq 150 \text{ mm}$ (opening depth t_E filled completely).

Maximum distance to first service support construction: 260 mm subject to deviating values given in the tables below.

Maximum seal size: $w \times h = 1200 \times 2000 \text{ mm}$

Minimum distances in mm (see illustration below):

$s_1 = 0$ (distance between cables/cable supports and seal edge)

$s_2 = 0$ (distance between cable supports)

$s_3 = 0$ (distance between cables and upper seal edge)

$s_4 = 0$ (distance between cable supports and bottom seal edge)

$s_6 = 0$ (distance between metal pipes and seal edge)

$s_8 = 0$ (distance between metal pipes) in case of mineral wool insulation and linear arrangement; in case of cluster arrangement $s_8 = 100 \text{ mm}$

$s_8 = 10$ (distance between metal pipes) in case of Armaflex insulation and linear arrangement; in case of cluster arrangement $s_8 = 100 \text{ mm}$

$s_9 = 117$ (distance between plastic pipes/pipe closure devices and seal edge)

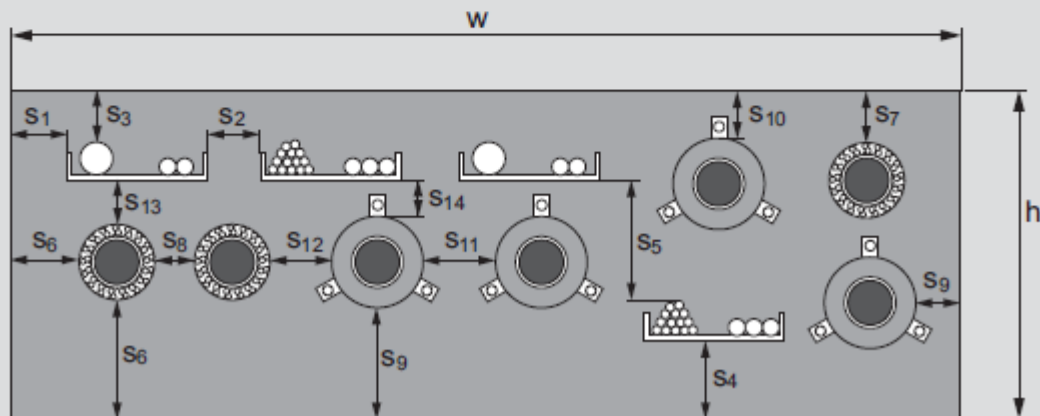
$s_{11} = 0$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collar CFS-C P and linear arrangement; in case of cluster arrangement $s_{11} = 100 \text{ mm}$

$s_{11} = 50$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collar CFS-C and linear arrangement; in case of cluster arrangement $s_{11} = 100 \text{ mm}$

$s_{12} = 0$ (distance between metal pipes and plastic pipes/pipe closure devices)

$s_{13} = 0$ (distance between cables/cable supports and metal pipes)

$s_{14} = 0$ (distance between cables/cable supports and plastic pipes/pipe closure devices)

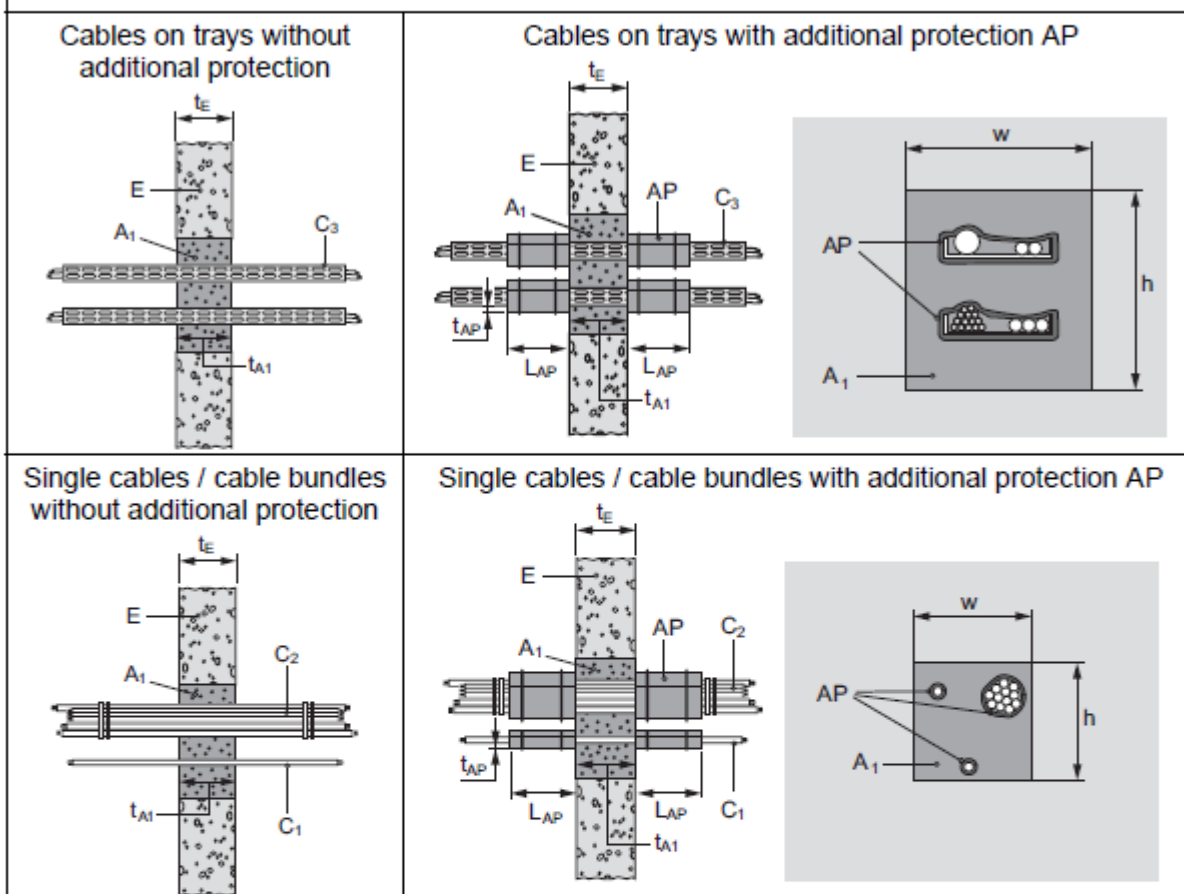


Penetrating elements (single, multiple or mixed):

C.1.1 Cables

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

Additional protection AP according to clause 1.1.2 of the ETA may be used as illustrated below.



	Classification	
Additional protection according to clause 1.1.2 of the ETA:	without	with
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables, with or without cable supports, with a diameter of:		
Maximum \varnothing 21 mm	EI 120	EI 120
$21 \leq \varnothing \leq 50$ mm	EI 90	EI 120
$50 \leq \varnothing \leq 80$ mm	EI 90	EI 120
Non-sheathed cables (wires) currently and commonly used in building practice in Europe, with or without cable supports, with a diameter of:		
Maximum \varnothing 17 mm	EI 30	EI 120
Maximum \varnothing 24 mm	EI 30	EI 120
Tied cable bundle ³ , maximum diameter of single cable 21 mm, with or without cable support. For tied cable bundles the space between the cables needs not be sealed.		
Maximum \varnothing 100 mm	EI 120	EI 120

³ Several cables running in the same direction and bound closely together by mechanical means

C.1.2 Small conduits and tubes

Construction details: see Annex C.1.1 of the ETA

In case a conduit is installed with open ends on both sides of the wall (case U/U) both ends of the conduit must be closed using an acrylic sealant, e.g. Hilti Firestop Sealant CFS-S ACR.

	Classification
$\varnothing \leq 16$ mm, arranged linear, with or without cables, with or without cable supports	
Plastic conduits and tubes	EI 180-U/C
Steel conduits and tubes	EI 180-C/U

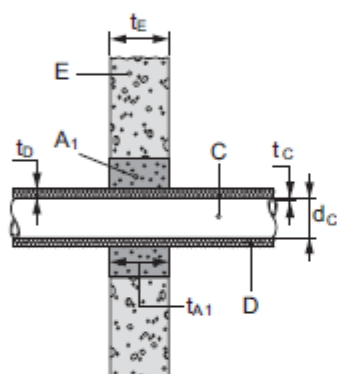
C.1.3 Metal pipes

C.1.3.1 Metal pipes with mineral wool insulation according to Table C.2 of the ETA

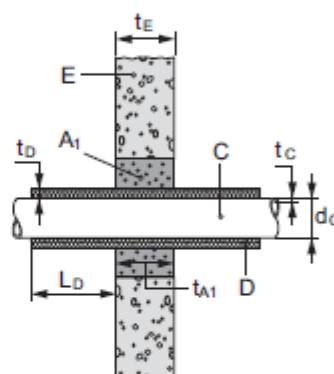
Pipes arranged linear

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

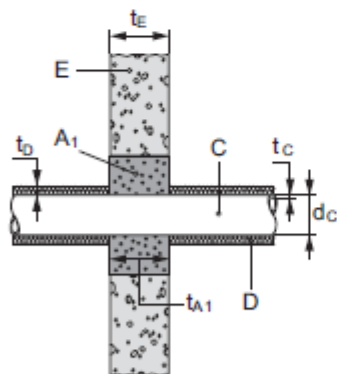
Continued insulation, sustained (CS)



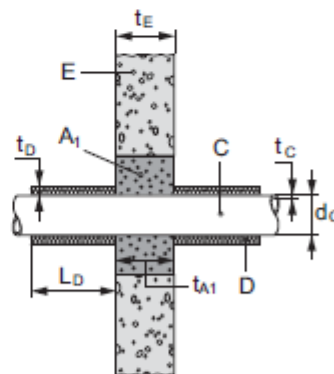
Local insulation, sustained (LS)



Continued insulation, interrupted (CI)



Local insulation, interrupted (LI)



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

Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
≥ 20	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 120-C/U
≥ 40	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 120-C/U

⁴ Interpolation of minimum pipe wall thickness between 2,2 mm for diameter 26,7 mm and 2,9 mm for diameter 76 mm for pipe diameters in between.

⁵ 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.

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	≥ 500	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 120-C/U
40	≥ 500	76,0	2,9 – 14,2 ⁵	EI 120-C/U
40	≥ 500	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 90-C/U
Steel pipes (C) with continued insulation (D) – interrupted				
Maximum distance of 1st support from mortar seal: 200 mm				
Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification	
≥ 40	114,3	3,7 – 14,2 ⁵	EI 120-C/U	
Steel pipes (C) with local insulation (D) – interrupted				
Maximum distance of 1st support from mortar seal: 200 mm				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
40	≥ 800	114,3	3,7 – 14,2 ⁵	EI 120-C/U
The field of application given above for steel pipes is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050 °C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)				
Copper pipes (C) with continued insulation (D) – sustained				
Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification	
≥ 20	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 120-C/U	
≥ 40	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U	
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	≥ 500	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 120-C/U
40	≥ 500	54	1,5 – 14,2 ⁵	EI 120-C/U
40	≥ 800	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U
The field of application given above for copper pipes is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100 °C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.				

⁶ Interpolation of minimum pipe wall thickness between 2,9 mm for diameter 76 mm and 3,6 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 54 mm for pipe diameters in between.

⁸ Interpolation of minimum pipe wall thickness between 1,5 mm for diameter 54 mm and 2,0 mm for diameter 89 mm for pipe diameters in between.

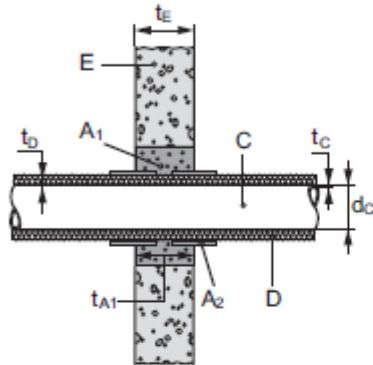
C.1.3.2 Metal pipes with Armaflex AF insulation and Hilti Firestop Bandage CFS-B

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

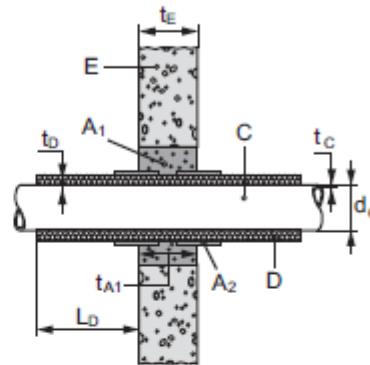
For specification of Armaflex AF see Annex D Table D.3 of the ETA.

Two layers of Firestop Bandage CFS-B (A_2) wrapped around the pipe insulation, on each side of the seal. The bandage is positioned with half of its width (62.5 mm) within the seal (central marking line at the surface of the seal) and outside the seal fastened with wire.

Continued insulation, sustained (CS)



Local insulation, sustained (LS)



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

Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
19	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 120-C/U
19 - 41	76,0	2,9 – 14,2 ⁵	EI 120-C/U
41	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 120-C/U

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]	
19	≥ 500	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 120-C/U
19 - 41	≥ 500	76,0	2,9 – 14,2 ⁵	EI 120-C/U
41	≥ 500	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 60-C/U

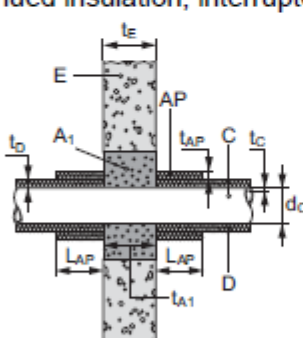
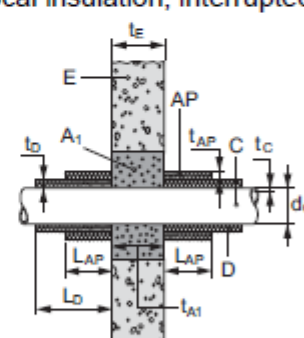
The field of application given above for steel pipes is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050 °C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)

Copper pipes (C) with continued insulation (D) – sustained

Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
19	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 120-C/U
19 - 41	54	1,5 – 14,2 ⁵	EI 120-C/U
41	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U

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]	
19	≥ 500	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 120-C/U
19 - 41	≥ 500	54	1,5 – 14,2 ⁵	EI 120-C/U
41	≥ 800	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U

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

C.1.3.3 Metal pipes with Armaflex AF insulation	
Construction details (for symbols and abbreviations see Annex A.3 of the ETA): Additional protection with Armaflex AF, thickness 25 mm over a length of 200 mm from the seal on both sides. For specification of Armaflex AF see Annex D Table D.3 of the ETA. Maximum distance to first service support construction from mortar seal: 200 mm	
Continued insulation, interrupted (CI)	Local insulation, interrupted (LI)
	

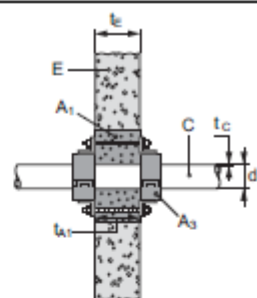
Steel pipes (C) with continued insulation (D) – interrupted			
Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
≥ 25	114,3	7,1 – 14,2 ⁵	EI 120-C/U

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]	
25	≥ 780	114,3	7,1 – 14,2 ⁵	EI 120-C/U

C.1.4 Plastic pipes with Hilti Firestop Collar CFS-C P

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

Hilti Firestop Collars CFS-C P (A_3) are installed on both sides of the mortar seal, fastened together by threaded rods, washers and nuts as specified in Annex B.4 of the ETA.



C.1.4.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Collar size (A_1)	No. of hooks	Classification
50	2,4 – 5,6	CFS-C P 50/1.5"	2	EI 120-U/U
63	3,0 – 4,7	CFS-C P 63/2"	2	EI 120-U/U
75	2,2 – 3,6	CFS-C P 75/2.5"	3	EI 180-U/U
90	2,7 – 4,3	CFS-C P 90/3"	3	EI 120-U/U
110	2,2 – 8,1	CFS-C P 110/4"	4	EI 120-U/U
110	8,1	CFS-C P 110/4"	4	EI 180-U/U
125	3,7 – 6,0	CFS-C P 125/5"	4	EI 120-U/U
160	2,5 – 11,8	CFS-C P 160/6"	6	EI 120-U/U
160	11,8	CFS-C P 160/6"	6	EI 180-U/U

C.1.4.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Collar size (A_1)	No. of hooks	Classification
50	2,9	CFS-C P 50/1.5"	2	EI 180-U/U
50	2,9 – 4,6	CFS-C P 50/1.5"	2	EI 120-U/U
63	1,8 – 5,8	CFS-C P 63/2"	2	EI 90-U/U
63	3,6 – 5,8	CFS-C P 63/2"	2	EI 120-U/U
75	1,9 – 6,8	CFS-C P 75/2.5"	3	EI 120-U/U
90	2,2 – 8,2	CFS-C P 90/3"	3	EI 120-U/U
110	2,7 – 10,0	CFS-C P 110/4"	4	EI 120-U/U
125	3,1 – 7,1	CFS-C P 125/5"	4	EI 120-U/U
160	4,0 – 9,1	CFS-C P 160/6"	6	EI 120-U/U
160	9,1	CFS-C P 160/6"	6	EI 180-U/U

C.1.4.3 PE pipes according to EN 1519-1⁹

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Collar size (A_1)	No. of hooks	Classification
50	3,0	CFS-C P 50/1.5"	2	EI 120-U/U
63	3,0	CFS-C P 63/2"	2	EI 180-U/U
75	3,0	CFS-C P 75/2.5"	3	EI 120-U/U
90	3,5	CFS-C P 90/3"	3	EI 180-U/U
110	4,2	CFS-C P 110/4"	4	EI 120-U/U
125	4,8	CFS-C P 125/5"	4	EI 120-U/U
160	6,2	CFS-C P 160/6"	6	EI 120-U/U

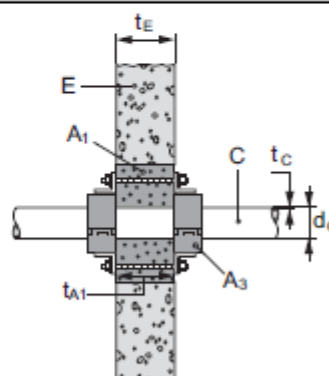
C.1.5 Plastic pipes with Hilti Firestop Collar CFS-C

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

Hilti Firestop Collars CFS-C (A_3) are installed on both sides of the mortar seal, fastened together by threaded rods, washers and nuts as specified in Annex B.8 of the ETA.

Maximum distance of 1st support from mortar seal: 200 mm

Restrictions by national building regulations to use seals with classification extension U/C have to be considered.

**C.1.5.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062**

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Collar size (A_1)	No. of hooks	Classification
50	2,2	CFS-C 50/1.5"	2	EI 180-U/C
110	3,7 – 12,8	CFS-C 110/4"	3	EI 180-U/C

C.2 Rigid wall type B according to clause 1.2.1 of the ETA (density $\geq 1100 \text{ kg/m}^3$), minimum thickness 175 mm

Penetration seal

Hilti Firestop Mortar CFS-M RG (A_1), thickness (t_{A1}) $\geq 150 \text{ mm}$ (opening depth t_E filled completely).

Maximum distance to first service support construction: 230 mm.

Maximum seal size: $w \times h = 1000 \times 1500 \text{ mm}$

Minimum distances in mm (for illustration see Annex C.1 of the ETA):

$s_9 = 210$ (distance between plastic pipes/pipe closure devices and seal edge)

$s_{11} = 100$ (distance between plastic pipes/pipe closure devices

$s_1 = 0$ (distance between cables/cable supports and seal edge)

$s_2 = 0$ (distance between cable supports)

$s_3 = 0$ (distance between cables and upper seal edge)

$s_4 = 0$ (distance between cable supports and bottom seal edge)

$s_6 = 0$ (distance between metal pipes and seal edge)

$s_8 = 0$ (distance between metal pipes) in case of mineral wool insulation and linear arrangement; in case of cluster arrangement $s_8 = 100 \text{ mm}$

$s_8 = 10$ (distance between metal pipes) in case of Armaflex insulation and linear arrangement; in case of cluster arrangement $s_8 = 100 \text{ mm}$

$s_9 = 117$ (distance between plastic pipes/pipe closure devices and seal edge)

$s_{11} = 0$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collar CFS-C P and linear arrangement; in case of cluster arrangement $s_{11} = 100 \text{ mm}$

$s_{11} = 50$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collar CFS-C and linear arrangement; in case of cluster arrangement $s_{11} = 100 \text{ mm}$

$s_{11} = 100$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Wrap CFS-W

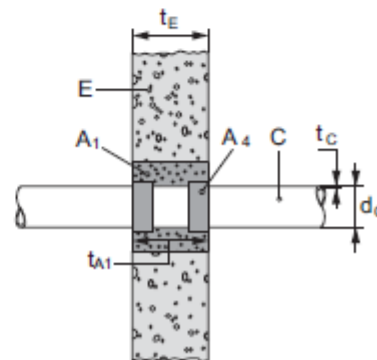
$s_{12} = 0$ (distance between metal pipes and plastic pipes/pipe closure devices)

$s_{13} = 0$ (distance between cables/cable supports and metal pipes)

$s_{14} = 0$ (distance between cables/cable supports and plastic pipes/pipe closure devices)

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

Hilti Firestop Wrap CFS-W (A_4) on both sides of the mortar seal, flush with the surface of the seal



Penetrating elements: in addition to the elements as in Annex C.1 of the ETA (single, multiple or mixed):

C.2.1 Plastic pipes with Hilti Firestop Wrap CFS-W

C.2.1.1 PVC pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Type of CFS-W (A_1)	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
≤ 32	1,8	CFS-W EL	1	EI 240-U/C
90	3,2	CFS- W SG	90/3"	EI 240-U/C
110	3,2	CFS- W SG	110/4"	EI 240-U/C
> 75 ≤ 110	3,2	CFS-W EL	2	EI 240-U/C
160	3,2 – 13,0	CFS- W SG	160/6"	EI 240-U/C
> 125 ≤ 160	3,2 – 13,0	CFS-W EL	3	EI 240-U/C

C.2.1.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Type of CFS-W (A_1)	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
≤ 32	1,8	CFS-W EL	1	EI 240-U/C
90	2,7	CFS- W SG	90/3"	EI 240-U/C
110	2,7	CFS- W SG	110/4"	EI 240-U/C
> 75 ≤ 110	2,7	CFS-W EL	2	EI 240-U/C
160	4,0 – 14,6	CFS- W SG	160/6"	EI 240-U/C
> 125 ≤ 160	4,0 – 14,6	CFS-W EL	3	EI 240-U/C

C.2.1.3 PE pipes according to EN 1519-1⁹

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Type of CFS-W (A_1)	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
160	6.2	CFS-W SG	160/6"	EI 180-U/C
> 125 ≤ 160	6.2	CFS-W EL	3	EI 180-U/C

C.3 Rigid floor type A according to clause 1.2.1 of the ETA (density $\geq 550 \text{ kg/m}^3$), minimum thickness 150 mm

Penetration seal

Type 1: Hilti Firestop Mortar CFS-M RG (A_1), thickness (t_{A1}) $\geq 150 \text{ mm}$ (opening depth t_E filled completely).

Type 2: Hilti Firestop Mortar CFS-M RG (A_1), thickness (t_{A1}) $\geq 200 \text{ mm}$ (opening depth t_E filled completely), with an overlap of the mortar seal of 50 mm over the top side of the floor on all sides of the opening.

Maximum distance to first service support construction: 300 mm.

Maximum seal size: see figure below

Minimum distances in mm (for illustration see below):

$s_1 = 0$ (distance between cables/cable supports and seal edge)

$s_2 = 0$ (distance between cable supports)

$s_3 = 0$ (distance between cables and upper seal edge)

$s_4 = 0$ (distance between cable supports and bottom seal edge)

$s_6 = 0$ (distance between metal pipes and seal edge)

$s_8 = 0$ (distance between metal pipes) in case of mineral wool insulation and linear arrangement; in case of cluster arrangement $s_8 = 100 \text{ mm}$

$s_8 = 12$ (distance between metal pipes) in case of Armaflex insulation and linear arrangement; in case of cluster arrangement $s_8 = 100 \text{ mm}$

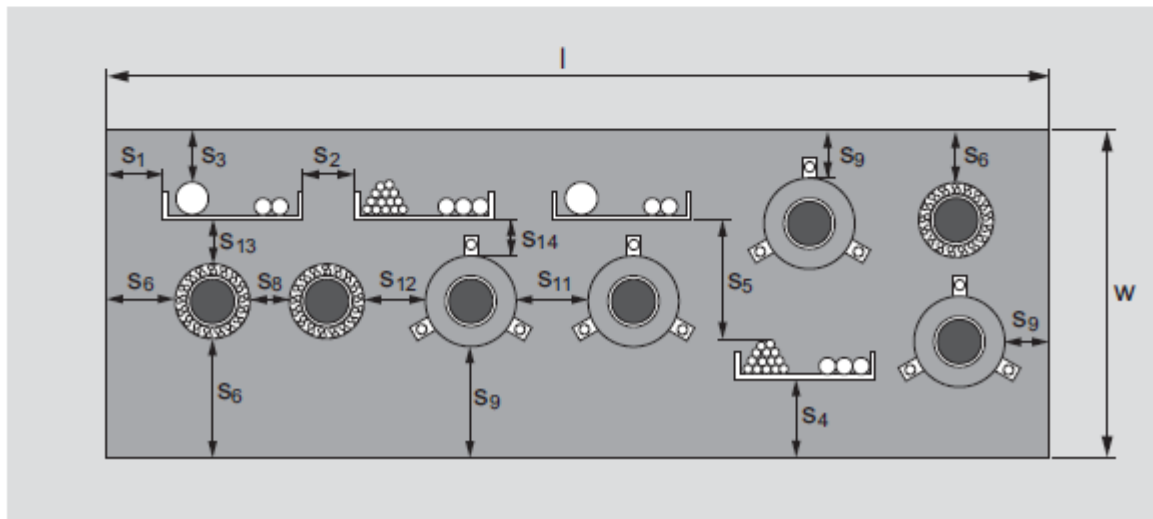
$s_9 = 0$ (distance between plastic pipes/pipe closure devices and seal edge)

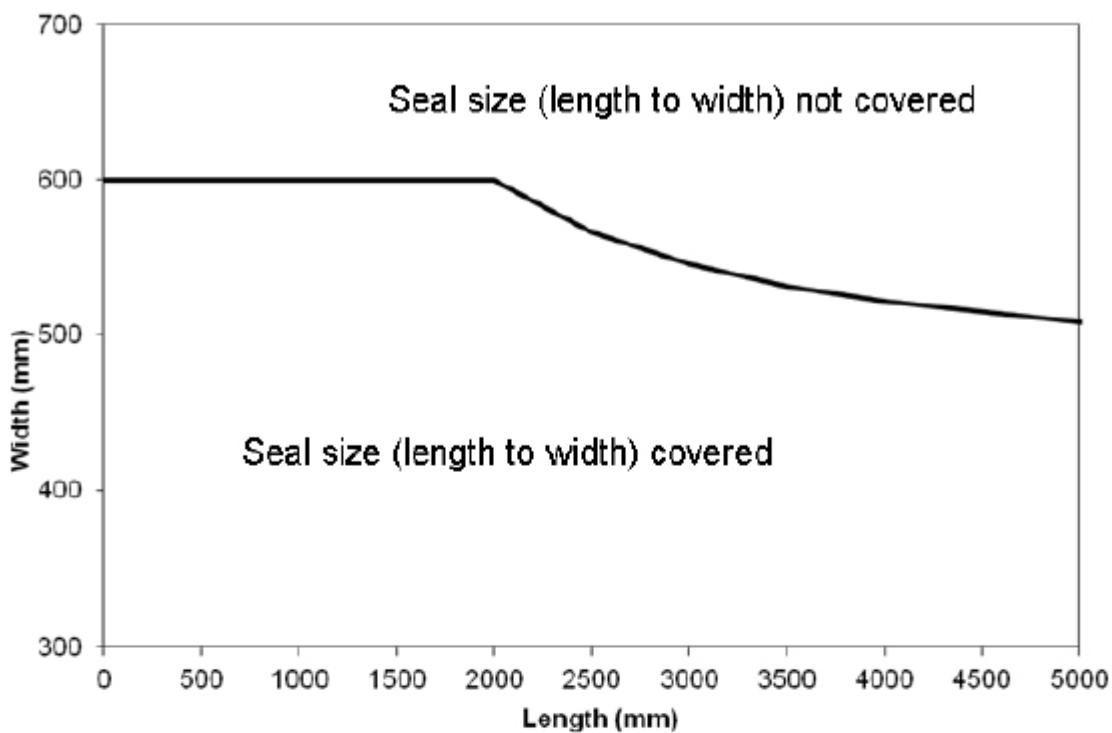
$s_{11} = 0$ (distance between plastic pipes/pipe closure devices) and linear arrangement; in case of cluster arrangement $s_{11} = 100 \text{ mm}$

$s_{12} = 30$ (distance between metal pipes and plastic pipes/pipe closure devices)

$s_{13} = 30$ (distance between cables/cable supports and metal pipes)

$s_{14} = 18$ (distance between cables/cable supports and plastic pipes/pipe closure devices)





Seal sizes covered in floor type A application (length x width)

Penetrating elements (single, multiple or mixed):

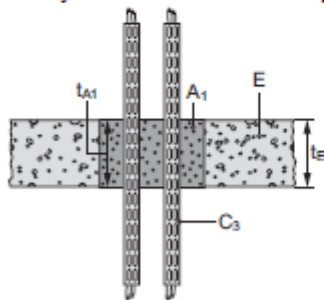
C.3.1 Cables

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

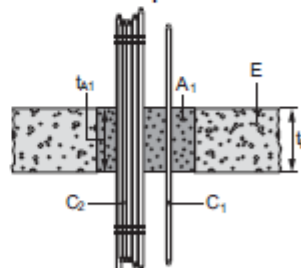
Additional protection AP according to clause 1.1.2 of the ETA as illustrated below depending on the required classification.

Seal type 1

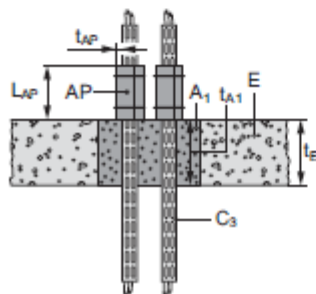
Cables on trays without additional protection



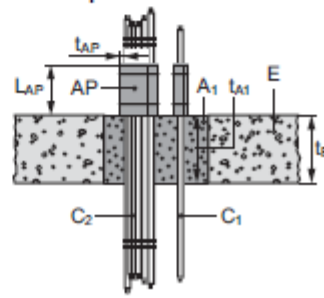
Single cables / cable bundles without additional protection

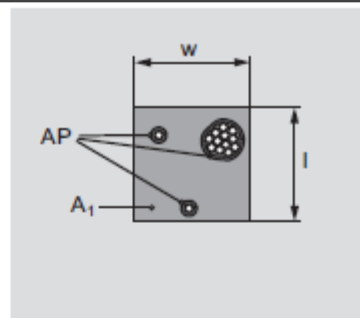
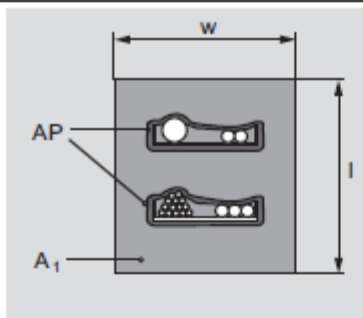


Cables on trays with additional protection AP



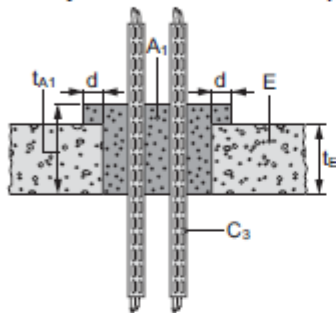
Single cables / cable bundles with additional protection AP



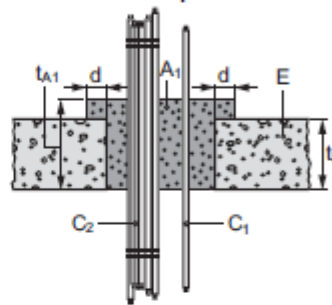


Seal type 2

Cables on trays without additional protection



Single cables / cable bundles without additional protection



Classification

	200 (Type 2)	150 (Type 1)	150 (Type 1)
Seal thickness (mm)	200 (Type 2)	150 (Type 1)	150 (Type 1)
Additional protection according to clause 1.1.2 of the ETA:	without	without	with
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables, with cable supports, with a diameter of:			
Maximum \varnothing 21 mm	EI 90	EI 90	EI 90
$21 \leq \varnothing \leq 50$ mm	EI 90	EI 60	EI 90
$50 \leq \varnothing \leq 80$ mm	EI 90	EI 60	EI 90
Non-sheathed cables (wires) currently and commonly used in building practice in Europe, with or without cable supports, with a diameter of:			
Maximum \varnothing 17 mm	EI 90	EI 45	EI 90
Maximum \varnothing 24 mm	EI 45	EI 45	EI 60
Tied cable bundle ¹⁰ , maximum diameter of single cable 21 mm, with or without cable supports. For tied cable bundles the space between the cables needs not be sealed.			
Maximum \varnothing 100 mm	EI 90	EI 90	EI 90

¹⁰ Several cables running in the same direction and bound closely together by mechanical means

C.3.2 Small conduits and tubes

Construction details: see Annex C.1.1 of the ETA

In case a conduit is installed with open ends on both sides of the floor (case U/U) the ends of the conduit must be closed using an acrylic sealant, e.g. Hilti Firestop Sealant CFS-S ACR: for metal conduits the end below the floor, for plastic conduits both ends.

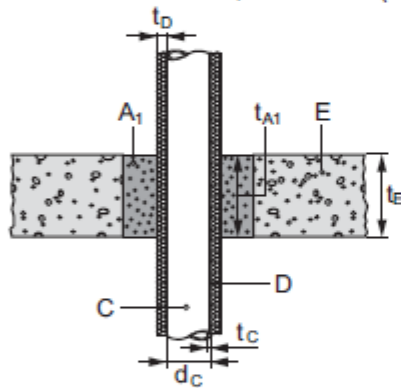
		Classification	
Seal thickness (mm)	200 (Type 2)	150 (Type 1)	150 (Type 1)
$\varnothing \leq 16$ mm, arranged linear, with or without cables, with or without cable supports			
Additional protection according to clause 1.1.2 of the ETA:	without	without	with
Plastic conduits and tubes	EI 120-U/C	EI 90-U/C	EI 90-U/C
Steel conduits and tubes	EI 120-C/U	EI 90-C/U	EI 90-C/U

C.3.3 Metal pipes

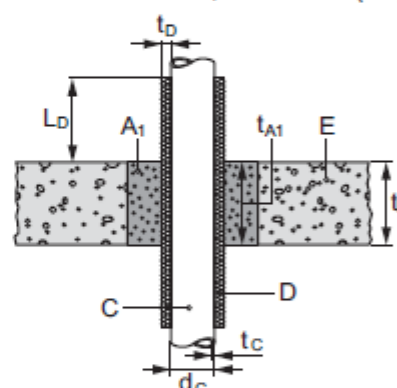
C.3.3.1 Metal pipes with mineral wool insulation according to Table C.2 of the ETA

Construction details (for symbols and abbreviations see Annex A.3 of the ETA): Seal type 1 (see Annex C.2 of the ETA)

Continued insulation, sustained (CS)



Local insulation, sustained (LS)



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

Insulation thickness (t_D) [mm]	Pipe diameter (d_c) [mm]	Pipe wall thickness (t_c) [mm]	Classification
≥ 20	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 120-C/U
≥ 40	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 120-C/U

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	≥ 500	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 120-C/U
40	≥ 500	76,0	2,9 – 14,2 ⁵	EI 120-C/U
40	≥ 700	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 120-C/U

The field of application given above for steel pipes is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050 °C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)

Copper pipes (C) with continued insulation (D) – sustained			
Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
≥ 20	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 120-C/U
≥ 40	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U

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	≥ 500	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 120-C/U
40	≥ 500	54	1,5 – 14,2 ⁵	EI 120-C/U
40	≥ 800	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U

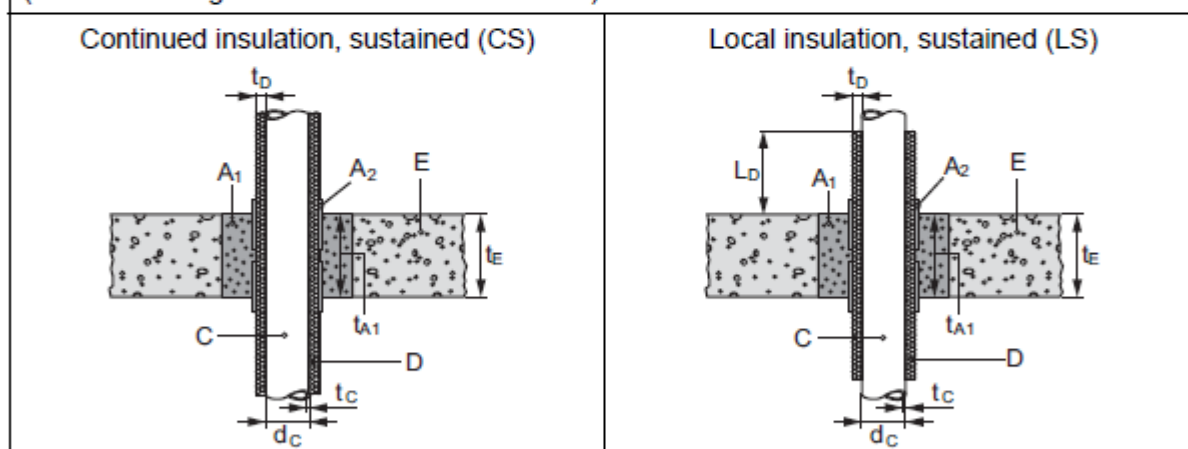
The field of application given above for copper pipes is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100 °C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.

C.3.3.2 Metal pipes with Armaflex AF insulation and Hilti Firestop Bandage CFS-B

Construction details (for symbols and abbreviations see Annex A.3 of the ETA): Seal type 1 (see Annex C.2 of the ETA)

For specification of Armaflex AF see Annex D Table D.3 of the ETA.

Two layers of of Firestop Bandage CFS-B (A_2) wrapped around the pipe insulation, on each side of the seal. The bandage is positioned with half of its width (62.5 mm) within the seal (central marking line at the surface of the seal) and outside the seal fastened with wire.



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

Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
19	26,7	2,2 – 14,2 ⁵	EI 120-C/U
19	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 90-C/U
19 – 41	76,0	2,9 – 14,2 ⁵	EI 90-C/U
41	76,0	2,9 – 14,2 ⁵	EI 120-C/U
41	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 90-C/U

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]	
19	≥ 500	26,7	2,2 – 14,2 ⁵	EI 120-C/U
19	≥ 500	26,7 – 76,0	2,2 / 2,9 ⁴ – 14,2 ⁵	EI 90-C/U
19 - 41	≥ 500	76,0	2,9 – 14,2 ⁵	EI 90-C/U
41	≥ 500	76,0	2,9 – 14,2 ⁵	EI 120-C/U
41	≥ 700	76,0 – 168,3	2,9 / 3,6 ⁶ – 14,2 ⁵	EI 90-C/U

The field of application given above for steel pipes is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050 °C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)

Copper pipes (C) with continued insulation (D) – sustained

Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
19	28	1,0 – 14,2 ⁵	EI 120-C/U
19	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 90-C/U
19 - 41	54	1,5 – 14,2 ⁵	EI 90-C/U
41	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U

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]	
19	≥ 500	28	1,0 – 14,2 ⁵	EI 120-C/U
19	≥ 500	28 - 54	1,0 / 1,5 ⁷ – 14,2 ⁵	EI 90-C/U
19 - 41	≥ 500	54	1,5 – 14,2 ⁵	EI 90-C/U
41	≥ 500	54	1,5 – 14,2 ⁵	EI 120-C/U
41	≥ 800	54 - 89	1,5 / 2,0 ⁸ – 14,2 ⁵	EI 120-C/U

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

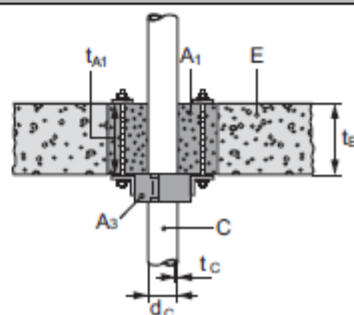
C.3.4 Plastic pipes with Hilti Firestop Collar CFS-C P

Construction details

(for symbols and abbreviations see Annex A.3 of the ETA):

Seal type 1 (see Annex C.2 of the ETA)

Hilti Firestop Collars CFS-C P (A_3) are installed on the bottom side of the mortar seal, fastened by threaded rods through the mortar seal, washers and nuts as specified in Annex B.8 of the ETA.



C.3.4.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Collar size (A_1)	No. of hooks	Classification
50	2,4 – 5,6	CFS-C P 50/1.5"	2	EI 120-U/U
63	3,0 – 4,7	CFS-C P 63/2"	2	EI 120-U/U
75	2,2 – 3,6	CFS-C P 75/2.5"	3	EI 120-U/U
90	2,7 – 4,3	CFS-C P 90/3"	3	EI 120-U/U
110	1,8 – 8,1	CFS-C P 110/4"	4	EI 120-U/U
125	3,7 – 6,0	CFS-C P 125/5"	4	EI 120-U/U
160	2,5 – 11,8	CFS-C P 160/6"	6	EI 120-U/U

C.3.4.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Collar size (A_1)	No. of hooks	Classification
50	2,9 – 4,6	CFS-C P 50/1.5"	2	EI 120-U/U
63	1,8 – 5,8	CFS-C P 63/2"	2	EI 120-U/U
75	1,9 – 6,8	CFS-C P 75/2.5"	3	EI 120-U/U
90	2,2 – 8,2	CFS-C P 90/3"	3	EI 120-U/U
110	2,7 – 10,0	CFS-C P 110/4"	4	EI 120-U/U
125	3,1 – 7,1	CFS-C P 125/5"	4	EI 120-U/U
160	4,0 – 9,1	CFS-C P 160/6"	6	EI 120-U/U

C.3.4.3 PE pipes according to EN 1519-1⁹

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Collar size (A_1)	No. of hooks	Classification
50	3,0	CFS-C P 50/1.5"	2	EI 120-U/U
63	3,0	CFS-C P 63/2"	2	EI 120-U/U
75	3,0	CFS-C P 75/2.5"	3	EI 120-U/U
90	3,5	CFS-C P 90/3"	3	EI 120-U/U
110	4,2	CFS-C P 110/4"	4	EI 120-U/U
125	4,8	CFS-C P 125/5"	4	EI 120-U/U
160	6,2	CFS-C P 160/6"	6	EI 120-U/U

C.4 Rigid floor type B according to clause 1.2.1 of the ETA (density $\geq 2400 \text{ kg/m}^3$, minimum thickness 150 mm)

Penetration seal

Hilti Firestop Mortar CFS-M RG (A_1), thickness (t_{A1}) $\geq 150 \text{ mm}$ (opening depth t_E filled completely).

Maximum distance to first service support construction: 200 mm.

Maximum seal size: 1200 x 700 mm (l x w); for higher lengths see figure below

Minimum distances in mm (for illustration see Annex C.3 of the ETA):

$s_1 = 20$ (distance between cables/cable supports and seal edge)

$s_2 = 0$ (distance between cable supports)

$s_3 = 8$ (distance between cables and upper seal edge)

$s_4 = 0$ (distance between cable supports and bottom seal edge)

$s_5 = 50$ (distance between cables and cables support above)

$s_6 = 30$ (distance between metal pipes and seal edge)

$s_8 = 100$ (distance between metal pipes)

$s_9 = 40$ (distance between plastic pipes/pipe closure devices and seal edge)

$s_{11} = 0$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collars CFS-C P and linear arrangement

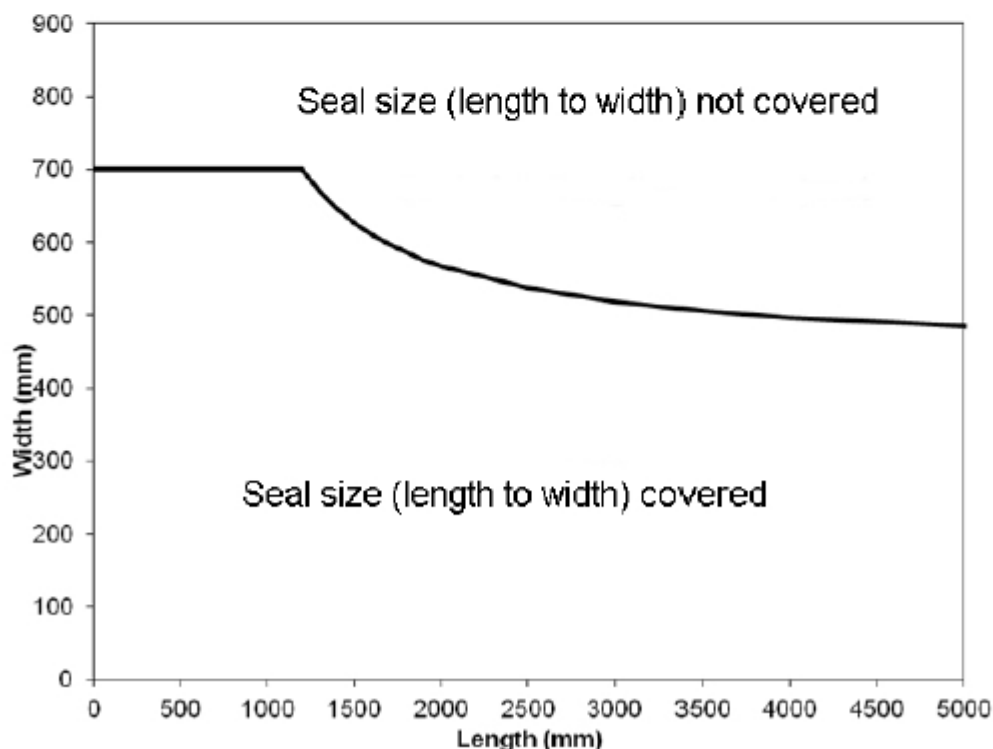
$s_{11} = 50$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collars CFS-C and linear arrangement

$s_{11} = 100$ (distance between plastic pipes/pipe closure devices) in all cases of cluster arrangement

$s_{12} = 40$ (distance between metal pipes and plastic pipes/pipe closure devices)

$s_{13} = 20$ (distance between cables/cable supports and metal pipes)

$s_{14} = 40$ (distance between cables/cable supports and plastic pipes/pipe closure devices)



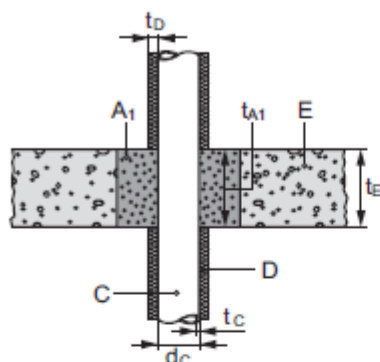
Seal sizes covered in floor type B application (length x width)

Penetrating elements: in addition to the e as in Annex C.3 of the ETA (single, multiple or mixed):

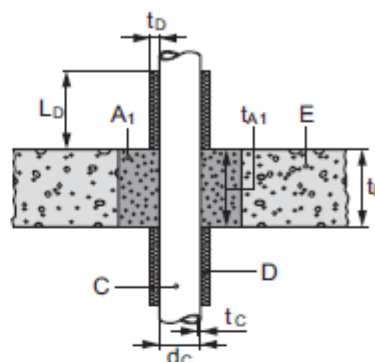
C.4.1 Metal pipes with mineral wool insulation according to Table C.2 of the ETA

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

Continued insulation, interrupted (CI)



Local insulation, interrupted (LI)



Steel pipes (C) with continued insulation (D) – interrupted

Maximum distance of 1st support from mortar seal: 200 mm

Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
≥ 40	114,3	3,7 – 14,2 ⁵	EI 120-C/U

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

Maximum distance of 1st support from mortar seal: 200 mm

Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
40	≥ 800	114,3	3,7 – 14,2 ⁵	EI 120-C/U

The field of application given above for steel pipes is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050 °C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)

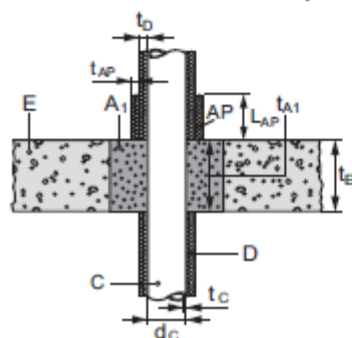
C.4.2 Metal pipes with Armaflex AF insulation

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

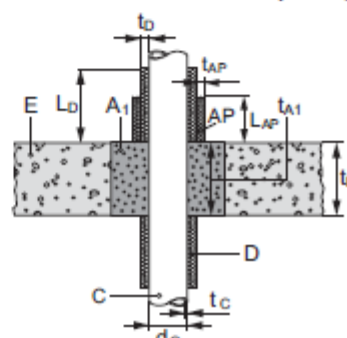
For specification of Armaflex AF see Annex D Table D.3 of the ETA.

Additional protection with Armaflex AF, thickness 25 mm over a length of $L_{AP} = 200$ mm from the seal on the top side of the floor.

Continued insulation, interrupted (CI)



Local insulation, interrupted (LI)



Steel pipes (C) with continued insulation (D) – interrupted			
Insulation thickness (t_D) [mm]	Pipe diameter (d_C) [mm]	Pipe wall thickness (t_C) [mm]	Classification
≥ 25	114,3	7,1 – 14,2 ⁵	EI 180-C/U

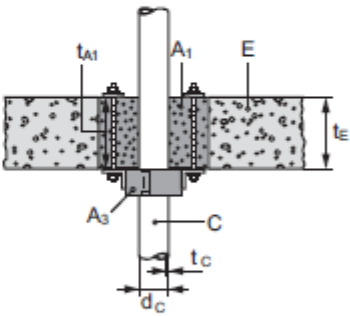
Steel pipes (C) with local insulation (D) – interrupted				
Insulation		Pipe		Classification
thickness (t_D) [mm]	length (L_D) [mm]	diameter (d_C) [mm]	wall thickness (t_C) [mm]	
25	≥ 800	114,3	7,1 – 14,2 ⁵	EI 180-C/U

C.4.3 Plastic pipes with Hilti Firestop Collar CFS-C

Construction details
(for symbols and abbreviations see Annex A.3 of the ETA):

Hilti Firestop Collars CFS-C (A_3) are installed on the bottom side of the mortar seal, fastened by threaded rods through the mortar seal, washers and nuts as specified in Annex B.8 of the ETA.

Restrictions by national building regulations to use seals with classification extension U/C have to be considered.



C.4.3.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Pipe diameter d_C (mm)	Pipe wall thickness t_C (mm)	Collar size (A_1)	No. of hooks	Classification
50	2,0	CFS-C 50/1.5"	2	EI 180-U/C
110	2,7 – 12,3	CFS-C 110/4"	3	EI 180-U/C

The results are also valid for PVC-C pipes according to EN 1566-1 and PVC-U pipes according EN 1329-1 and EN 1453-1.

C.5 Rigid floor type C according to clause 1.2.1 of the ETA (density $\geq 2400 \text{ kg/m}^3$), minimum floor thickness 175 mm

Penetration seal

Hilti Firestop Mortar CFS-M RG (A₁), thickness (t_{A1}) ≥ 175 mm (opening depth t_E filled completely).

Maximum distance to first service support construction: 200 mm.

Maximum seal size: 1500 x1000 mm (l x w); for higher lengths see figure below

Minimum distances in mm (for illustration see Annex C.3 of the ETA):

$s_9 = 52$ (distance between plastic pipes/pipe closure devices and seal edge)

$s_{11} = 100$ (distance between plastic pipes/pipe closure devices)

$s_1 = 20$ (distance between cables/cable supports and seal edge)

$s_2 = 0$ (distance between cable supports)

$s_3 = 8$ (distance between cables and upper seal edge)

$s_4 = 0$ (distance between cable supports and bottom seal edge)

$s_5 = 50$ (distance between cables and cables support above)

$s_6 = 30$ (distance between metal pipes and seal edge)

$s_8 = 100$ (distance between metal pipes)

$s_9 = 52$ (distance between plastic pipes/pipe closure devices and seal edge)

$s_{11} = 0$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collars CFS-C P and linear arrangement

$s_{11} = 50$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Collars CFS-C and linear arrangement

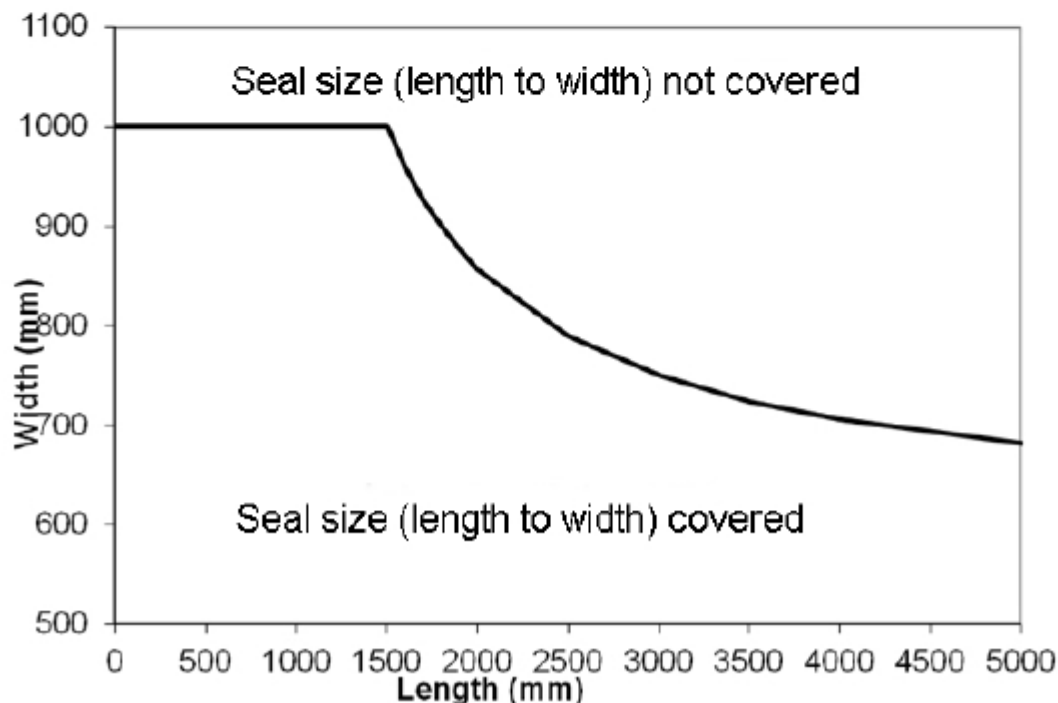
$s_{11} = 100$ (distance between plastic pipes/pipe closure devices) in case of Hilti Firestop Wraps CFS-W and linear arrangement

$s_{11} = 100$ (distance between plastic pipes/pipe closure devices) in all cases of cluster arrangement

$s_{12} = 40$ (distance between metal pipes and plastic pipes/pipe closure devices)

$s_{13} = 20$ (distance between cables/cable supports and metal pipes)

$s_{14} = 40$ (distance between cables/cable supports and plastic pipes/pipe closure devices)



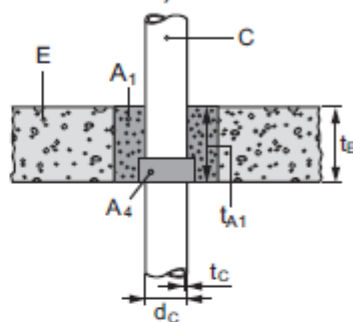
Seal sizes covered in floor application (length x width)

Penetrating elements: in addition to the elements as in Annex C.3 and C.4 of the ETA (single, multiple or mixed):

C.5.1 Plastic pipes with Hilti Firestop Wrap CFS-W

Construction details (for symbols and abbreviations see Annex A.3 of the ETA):

Hilti Firestop Wrap CFS-W (A_4) on the underside of the mortar seal flush with the lower surface of the mortar seal.



C.5.1.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Type of CFS-W (A_1)	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
≤ 32	1,8	CFS-W EL	1	EI 120-U/C
50	2,2 – 3,6	CFS-W SG	50/1.5"	EI 120-U/C
63	2,2 – 3,6	CFS- W SG	63/2"	EI 120-U/C
75	2,2 – 3,6	CFS- W SG	75/2.5"	EI 120-U/C
$> 32 \leq 75$	2,2 – 3,6	CFS-W EL	1	EI 120-U/C
90	3,2 – 6,0	CFS- W SG	90/3"	EI 120-U/C
110	3,2 – 6,0	CFS- W SG	110/4"	EI 120-U/C
$> 75 \leq 110$	3,2 – 6,0	CFS-W EL	2	EI 120-U/C
125	3,7 – 6,0	CFS- W SG	125/5"	EI 120-U/C
$>110 \leq 125$	3,7 – 6,0	CFS-W EL	2	EI 120-U/C
160	2,5 – 3,2	CFS- W SG	160/6"	EI 60-U/C
$> 125 \leq 160$	2,5 – 3,2	CFS-W EL	3	EI 60-U/C
160	3,2 – 13,0	CFS- W SG	160/6"	EI 120-U/C
$> 125 \leq 160$	3,2 – 13,0	CFS-W EL	3	EI 120-U/C

C.5.1.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Type of CFS-W (A_1)	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
≤ 32	1,8	CFS-W EL	1	EI 120-U/C
50	1,9 – 6,8	CFS-W SG	50/1.5"	EI 120-U/C
63	1,9 – 6,8	CFS- W SG	63/2"	EI 120-U/C
75	1,9 – 6,8	CFS- W SG	75/2.5"	EI 120-U/C
$> 32 \leq 75$	1,9 – 6,8	CFS-W EL	1	EI 120-U/C
90	2,7 – 7,1	CFS- W SG	90/3"	EI 120-U/C
110	2,7 – 7,1	CFS- W SG	110/4"	EI 120-U/C
$> 75 \leq 110$	2,7 – 7,1	CFS-W EL	2	EI 120-U/C
125	3,2 – 7,1	CFS- W SG	125/5"	EI 120-U/C
$>110 \leq 125$	3,2 – 7,1	CFS-W EL	2	EI 120-U/C
160	4,0 – 14,6	CFS- W SG	160/6"	EI 120-U/C
$> 125 \leq 160$	4,0 – 14,6	CFS-W EL	3	EI 120-U/C

C.5.1.3 PE pipes according to EN 1519-1⁹

Pipe diameter d_c (mm)	Pipe wall thickness t_c (mm)	Type of CFS-W (A_1)	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
50	3,0	CFS-W SG	50/1.5"	EI 120-U/C
63	3,0	CFS- W SG	63/2"	EI 120-U/C
75	3,0	CFS- W SG	75/2.5"	EI 120-U/C
≤ 75	3,0	CFS-W EL	1	EI 120-U/C
90	4,8	CFS- W SG	90/3"	EI 120-U/C
110	4,8	CFS- W SG	110/4"	EI 120-U/C
125	4,8	CFS- W SG	125/5"	EI 120-U/C
$>75 \leq 125$	4,8	CFS-W EL	2	EI 120-U/C
160	6,2	CFS- W SG	160/6"	EI 120-U/C
$> 125 \leq 160$	6,2	CFS-W EL	3	EI 120-U/C