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European Technical Assessment

ETA-10/0406
of 10.05.2021

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 Intumescent Sealant CFS-IS

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

29 pages including Annexes A to E 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 Assessment ETA-10/0406
from 28.06.2018

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Specific parts

1 Technical description of the product

“Hilti Firestop Intumescent Sealant CFS-IS” is a 1-component product used as a cable and/or pipe penetration seal.

Sealant	Characteristics
Hilti Firestop Intumescent Sealant CFS-IS	Water-based 1-component acrylic sealant with intumescent fire protection additives and binder according to Annex C.1 of the ETA.
Additional component	Characteristics
Mineral wool backfilling material	Loose mineral wool products suitable as backfilling material according to Annex B.2 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 Intumescent Sealant CFS-IS” is intended to be used as a mixed penetration seal to temporarily or permanently reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions or rigid floor constructions where they have been provided with apertures which are penetrated by various cables, conduits, metal pipes and / or plastic pipes. For more details see Annex C of the ETA.

The maximum opening size of the penetration seal is $w \times h = 150 \text{ mm} \times 150 \text{ mm}$ or circular openings of an equivalent maximum area in walls and floors.

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

Separating element	Construction
Flexible walls	> Steel studs or timber studs lined on both faces with minimum 2 layers of boards (minimum thickness 12,5 mm) according to EN 520 type F > For steel stud walls the space between lining must not be completely filled with insulation material, especially in the adjacent area of the penetration seal > For timber studs 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 stud has to be closed with minimum of 100 mm of insulation with classification A1 or A2 according to EN 13501-1 > Minimum thickness 100 mm
Rigid walls	> Aerated concrete, concrete, masonry > Minimum density 550 kg/m³ > Minimum thickness 100 mm > The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period

Rigid floors	> Aerated concrete, concrete > Minimum density 650 kg/m³ > Minimum thickness 150 mm > The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period
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The first support of the cables / conduits shall be located at maximum 250 mm away from both faces of wall constructions and maximum 250 mm from the upper face of floor constructions.

Other parts or service support constructions shall not penetrate the penetration seal. This European Technical Assessment does not cover sandwich panel constructions.

2.2 Use condition

“Hilti Firestop Intumescent Sealant CFS-IS” 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.

2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of “Hilti Firestop Intumescent Sealant CFS-IS” of 25 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

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 thermal movement in the pipe work will be accommodated in such way that it does not impose a load 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.

2.5 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 of the ETA
BWR 3	Air permeability	EN 1026:2000	Clause 3.2.1 of the ETA
	Water permeability	No performance assessed	
	Content, emission and/or release of dangerous substances	EN 16516:2018	Clause 3.2.3 of the ETA
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	EN ISO 10140-1 and EN ISO 10140-2, EN ISO 717-1	Clause 3.4.1 of the ETA
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 Intumescent Sealant CFS-IS" 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 Intumescent Sealant CFS-IS	E

3.1.2 Resistance to fire

"Hilti Firestop Intumescent Sealant CFS-IS" 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 Intumescent Sealant CFS-IS" has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex C.1 to C.5 of the ETA.

The maximum fire resistance class of the penetration seal in vertical or horizontal separating element 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.

The classifications are not valid for sandwich panel constructions.

3.2 Hygiene, health and the environment (BWR 3)

3.2.1 Air permeability

The air permeability of "Hilti Firestop Intumescent Sealant CFS-IS" with a thickness of 50 mm and a Ø 96 mm was tested as blank penetration seal according to EAD 350454-00-1104 clause 2.2.3 under application of the test principles of EN 1026. Any other components were not included in these tests.

Pressure [Pa]	50	250
q/A air [m³/(h·m²)]	impermeable	impermeable

3.2.2 Water permeability

No performance assessed.

3.2.3 Content, emission and/or release of dangerous substances

The content of semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) in "Hilti Firestop Intumescent Sealing CFS-IS" is assessed according to EN 16516. The loading factor for emission testing was 0,007m²/m³ according to EAD 350454-00-1104.

The concentration of SVOC has been below 0,005 mg/m³ after 3 and 28 days. The concentration of total emission of VOC after 3 days was 0,079 mg/m³, after 28 days the concentration was 0,011 mg/m³.

3.3 Safety and accessibility 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 Intumescent Sealant CFS-IS" fulfil the requirements for the intended use category.

"Hilti Firestop Intumescent Sealant CFS-IS" is therefore appropriate 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.

3.4 Protection against noise (BWR 5)

3.4.1 Airborne sound insulation

The airborne sound insulation of "Hilti Firestop Intumescent Sealant CFS-IS" was tested according to EN ISO 10140-1 and EN ISO 10140-2. The rating of the sound insulation properties has been calculated in accordance with EN ISO 717-1.

The acoustic testing was performed in a joint configuration, 1200 mm long, 25 mm wide and 100 mm deep. The joint was backfilled with mineral wool and closed on both sides with Intumescent "Hilti Firestop Intumescent Sealant CFS-IS" to a thickness of 25 mm. The joint was constructed in accordance with EN 10140-1:2016, Annex J. "Hilti Firestop Intumescent Sealant CFS-IS" was tested as a blank seal without services.

The reached values for the airborne sound insulation in accordance with EN ISO 717-1:2013 are as follows:

Component	R _{s,w} (C; C _{tr}) in dB	R _w (C; C _{tr}) in dB
Hilti Firestop Intumescent Sealant CFS-IS	64 (-2; -5)	61 (-2; -5) referring to test surface S = 1,88 m ²

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 given in the following table.

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
* 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) ** Products/materials not covered by footnote (*) *** 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)			

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 10.05.2021
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

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

ANNEX A - REFERENCE DOCUMENTS

A.1 References to standards mentioned in the ETA

EN 1026	Windows and doors – Air permeability – Test method
EN 1363-1	Fire resistance tests – Part 1: General Requirements
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals
EN 1451-1	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) - Part 1: Specifications for pipes, fittings and the system
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
EN 16516	Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air
EN ISO 10140-1	Acoustics; Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
EN ISO 10140-2	Acoustics; Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation
EN ISO 717-1	Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

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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ANNEX B - DESCRIPTION OF PRODUCT(S) & PRODUCT LITERATURE

B.1 Hilti Firestop Intumescent Sealant CFS-IS

“Hilti Firestop Intumescent Sealant CFS-IS” is a 1-component product and is composed essentially of filling substances, intumescent components and binder (acrylic).

A detailed specification of the product is contained in document “Identification / Product Specification relating to the European technical assessment ETA-10/0406, Hilti Firestop Intumescent Sealant CFS-IS” which is a non-public part of this ETA.

The Control Plan is defined in document “Control Plan relating to the European Technical Assessment ETA-10/0406, Hilti Firestop Intumescent Sealant CFS-IS”, which is a non-public part of this ETA.

B.2 Mineral Wool

Loose mineral wool products suitable for being used as backfilling material

Product	Manufacturer	Specification
Heralan LS	Knauf Insulation GmbH	Product data sheet of manufacturer
Isover loose wool SL	Saint-Gobain ISOVER	Product data sheet of manufacturer
Isover Universal-Stopfwolle	Saint-Gobain ISOVER	Product data sheet of manufacturer
Rockwool RL	Rockwool	Product data sheet of manufacturer
Paroc Pro Loose Wool	Paroc OY AB	Product data sheet of manufacturer

Mineral wool products suitable for being used as pipe insulation material

Product	Manufacturer	Specification
Rockwool 800 pipe sections	Rockwool	Product data sheet of manufacturer

B.3 Foamed elastomeric insulation products for pipe insulation

Product	Manufacturer	Specification
Armaflex AF	Armacell International GmbH	Product data sheet of manufacturer

B.4 Technical product literature

Technical data sheet and instructions for use “Hilti Firestop Intumescent Sealant CFS-IS”, see Annex E of the ETA.

ANNEX C - RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF "HILTI FIRESTOP INTUMESCENT SEALANT CFS-IS"

C.1 General Information

C.1.1 flexible, rigid wall constructions $t_E \geq 100$ mm, according to clause 2.1 of the ETA

Seal typ 1: The annular sealant CFS-IS applied between the service(s) and the aperture edge, with a layer thickness of 25 mm on both sides of the wall with stone wool backfilling in between.

C.1.2 rigid wall constructions $t_E \geq 150$ mm, according to clause 2.1 of the ETA

Seal typ 1: The annular sealant CFS-IS applied between the service(s) and the aperture edge, with a layer thickness of 25 mm on both sides of the wall with stone wool backfilling in between.

Seal typ 2: Like the seal type 1 but with additional protection formed around the service(s) by CFS-IS over a length of 50 mm, thickness 10 mm (both sides)

Seal typ 3: Like the seal type 1 but with additional protection formed around the service(s) by CFS-IS over a length of 100 mm, thickness 10 mm (both sides)

C.1.3 rigid floor $t_E \geq 150$ mm, according to clause 2.1 of the ETA

Seal typ 4a: The annular sealant CFS-IS applied between the service(s) and the aperture edge, with a layer thickness of 25mm in the top side only, backfilled with mineral wool of minimum 125 mm thickness.

Seal typ 4b: The annular pipe sealant CFS-IS applied between the service(s) and the aperture edge with a layer thickness of 25 mm on both sides of the floor with mineral wool backfilling in between.

Seal typ 5 ($L_A \geq 50$ mm): Like seal type 4a but additional protection formed around the services by CFS-IS over a length of 50mm, thickness 10mm (top side only).

Seal typ 6 ($L_A \geq 100$ mm): Like seal type 4a but additional protection formed around the services by CFS-IS over a length of 100mm, thickness 10mm (top side only).

Seal typ 7 ($L_A \geq 50$ mm): Like seal type 4b but additional protection formed around the services by CFS-IS over a length of 50mm, thickness 10mm (both sides).

Seal typ 8 ($L_A \geq 100$ mm): Like seal type 4b but additional protection formed around the services by CFS-IS over a length of 50mm, thickness 10mm (both sides).

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.

It is necessary to interpolate the minimum pipe wall thickness or pipe insulation thickness within pipe diameter range.

For the metal pipes applies the largest pipe wall thickness is restricted to 14,2 mm.

C.2 Flexible or rigid walls, $t_E \geq 100$ mm

according to Annex C.1.1 of the ETA

Penetration seal:

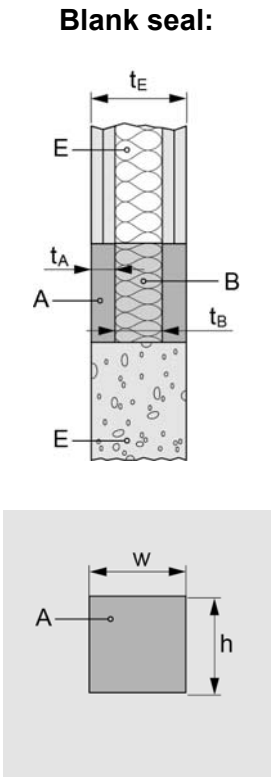
Hilti Firestop Intumescent Sealant CFS-IS (A) on both sides, thickness (t_A) 25 mm, mineral wool (B) tightly compressed as backfilling material, thickness (t_B) ≥ 50 mm (gap filled completely).
For suitable products for mineral wool backfilling material see Annex B of the ETA.
Maximum seal size: 150 x 150 mm or circular openings of equivalent area.

Minimum distances between services (mm):

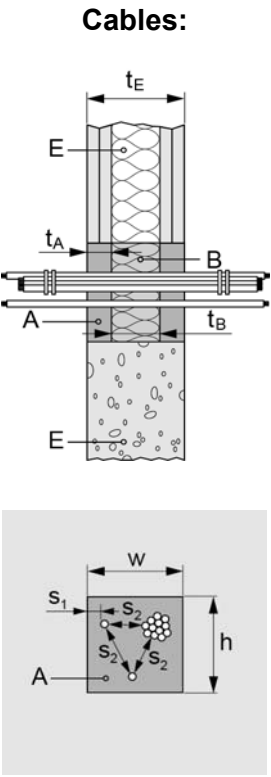
Cables to edge of seal	$s_1 =$	0
Cable to other cables/ small conduits	$s_2 =$	0
Tied cable bundle to seal edge	$s_1 =$	10
Tied cable bundle to other small conduits	$s_2 =$	0
Conduits $\varnothing \leq 16$ mm to edge of seal	$s_1 =$	10
Conduits $\varnothing \leq 16$ mm to other conduits $\varnothing \leq 16$ mm	$s_2 =$	0
Conduits $16 \leq \varnothing \leq 32$ mm to edge of seal	$s_1 =$	10
Conduit bundle to other conduit bundle (conduits from 16 to 32 mm)	$s_2 =$	10

C.2.1 Construction details seal type 1:

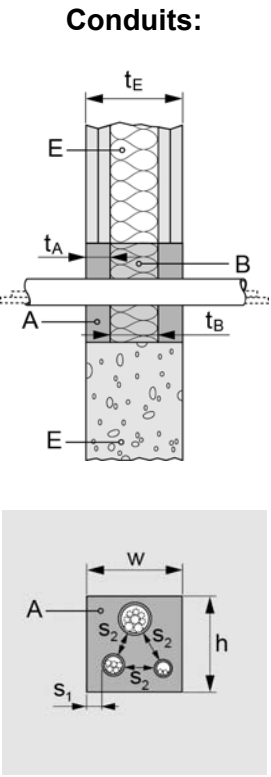
Blank seal:



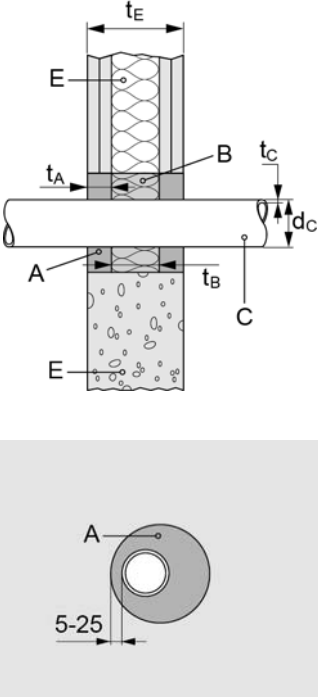
Cables:



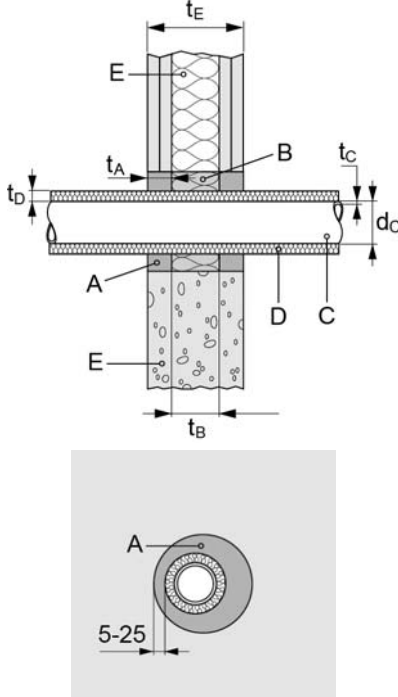
Conduits:



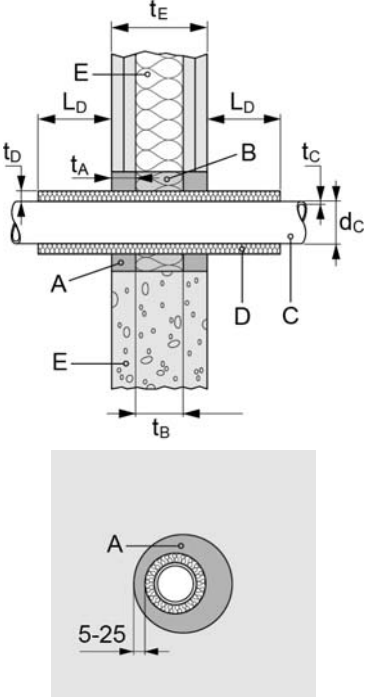
Single pipes without insulation:



Single pipes continuous sustained insulation:



Single pipes with local sustained insulation:



For abbreviations see the related text and Annex A of the ETA.

C.2.2 Blank seal	Classification
	EI 120
C.2.3 Cables	
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables)	
All sheathed cables:	Classification
Maximum Ø 21 mm	EI 120
$21 \leq \text{Ø} \leq 80 \text{ mm}$	EI 60 E 120
Tied cable bundle ³ , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	EI 90 E 120
C.2.4 multiple conduits	Classification
	Small steel conduits and tubes, diameter $\leq 16 \text{ mm}$, arranged linear
	Small plastic conduits and tubes, diameter $\leq 16 \text{ mm}$, arranged linear
	Plastic conduits, diameter $16 \leq \text{Ø} \leq 32 \text{ mm}$, wall thickness 1 – 3 mm, arranged linear or in a cluster
EI 120-C/U EI 120-U/C EI 120-U/C	

C.2.5 Single conduit and pipe penetrations

The width of the annular gap is between 5 and 25 mm

– PVC pipes (EN 1451-1), not insulated		Classification
diameter (d_c) [mm]	wall thickness (t_c) [mm]	
$\geq 16 - 20$	1,8 - 2,2	EI 120 U/U
32	1,8 - 3,6	EI 60 U/U E 120 U/U
$\geq 32 - 40$	1,9 - 3,6	EI 90 U/U
$\geq 40 - 50$	1,8 - 3,7	EI 90 U/C E 120 U/C

– Geberit Mepla, Aluminium composite pipes PE-XD/Al/PE-HD, not or local insulated with Armaflex AF pipe insulation LS* or CS				
Pipe		Insulation		Classification
diameter (d_c) [mm]	wall thickness (t_c) [mm]	thickness (t_D) [mm]	length (L_D) [mm]	
$\geq 16 - 50$	2,25 - 4,0	-	-	EI 60 U/C E 120 U/C
$\geq 16 - 50$	2,25 - 4,0	8 - 21	* ≥ 250	EI 90 U/C

– Geberit Silent, PP pipes PP-C/PP-MD/PP-C, not insulated		
Pipe		Classification
diameter (d_c) [mm]	wall thickness (t_c) [mm]	
$\geq 32 - 40$	2,0	EI 90 U/U
50	2,0	EI 90 U/C E 120 U/C

– Kekelit Kelox, Aluminium composite pipes PE-XB/Al/PE-XB, not or local insulated with Armaflex AF pipe insulation LS* or CS				
Pipe		Insulation		Classification
diameter (d_c) [mm]	wall thickness (t_c) [mm]	thickness (t_D) [mm]	length (L_D) [mm]	
16	2,0	-	-	EI 120 U/C
16	2,0	8 - 17	* ≥ 250	EI 120 U/C
$\geq 16 - 50$	2,0 - 4,0	-	-	EI 90 U/C E 120 U/C
$\geq 16 - 50$	2,0 - 4,0	8 - 21	* ≥ 250	EI 90 U/C E 120 U/C

– LK Schweden, Aluminium composite pipes PE-RT/Al/PE-RT, not or local insulated with Armaflex AF pipe insulation LS* or CS				
Pipe		Insulation		Classification
diameter (d _C) [mm]	wall thickness (t _C) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 40	2,0 - 3,5	-	-	EI 60 U/C E 90 U/C
≥ 16 - 40	2,0 - 3,5	8 - 21	*≥ 250	EI 90 U/C

– LK Schweden, PEXa pipes, not insulated		
Pipe		Classification
diameter (d _C) [mm]	wall thickness (t _C) [mm]	
≥ 16 - 32	2,2 - 4,0	EI 90 U/C

– LK Schweden, Aluminium composite pipes PE-RT/Al/PE-RT, inside PVC corrugated pipe LS*				
Pipe		PVC corrugated pipe (t _C) 1 mm		Classification
diameter (d _C) [mm]	wall thickness (t _C) [mm]	diameter [mm]	length (L _D) [mm]	
≥ 16 - 32	2,0 - 4,0	25 - 44	*≥ 250	EI 90 U/C E 120 U/C

– LK Schweden, PEXa pipes, inside PVC corrugated pipe LS*				
Pipe		PVC corrugated pipe (t _C) 1 mm		Classification
diameter (d _C) [mm]	wall thickness (t _C) [mm]	diameter [mm]	length (L _D) [mm]	
≥ 16 - 25	2,2 - 3,5	25 - 34	*≥ 250	EI 120 U/C

– PP Life Master 3, PP pipes PP-CO/PP-MV/PP-CO (EN 1451-1), not insulated		
Pipe		Classification
diameter (d _C) [mm]	wall thickness (t _C) [mm]	
≥ 32 - 40	1,8	EI 120 U/U
50	1,8	EI 90 U/C

– Uponor Uni Pipe Plus, Aluminium composite pipes PE-RT/Al/PE-RT, not or local insulated with Armaflex AF pipe insulation *LS or CS				
Pipe		Insulation		Classification
diameter (d _C) [mm]	wall thickness (t _C) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 32	2,0 - 3,5	-	-	EI 60 U/C E 120 U/C
≥ 16 - 32	2,0 - 3,5	8 - 19,5	*≥ 250	EI 90 U/C E 120 U/C

C.3 Flexible or rigid wall constructions, $t_E \geq 110$ mm

according to Annex C.1.1 of the ETA, for construction details see Annex C.2.1

C.3.1 Single conduit and pipe penetrations.

The width of the annular sealant is between 5 and 25 mm.

Copper/steel pipes, locally insulated (LS) with Rockwool RS 800

Pipe		Insulation		Classification
diameter (d_c) [mm]	wall thickness (t_c) [mm]	thickness (t_D) [mm]	length (L_D) [mm]	
$\geq 10 - 42$	1,0 / 1,2 - 14,2	20	≥ 700	EI 120 C/U
$\geq 42 - 89$	1,2 / 2,0 - 14,2	40	≥ 925	EI 120 C/U

Copper/steel pipes, continuously insulated (CS) with Armaflex AF Insulation

Pipe		Insulation		Classification
diameter (d_c) [mm]	wall thickness (t_c) [mm]	thickness (t_D) [mm]	length (L_D) [mm]	
$\geq 10 - 42$	1,0 / 1,2 - 14,2	7,5 - 20,5	-	EI 120 C/U
$\geq 42 - 89$	1,2 / 2,0 - 14,2	14,5 - 22,5	-	EI 60 C/U E 120 C/U

– Rigid, flexible and pliable plastic conduits

		Classification
Rigid, flexible and pliable plastic conduit up to $\varnothing 40$ mm with or without cables and conduits used pairwise up to $\varnothing 80$ mm; Flexible PVC conduit or PO conduit, waveheight 4,5 mm		EI 120 U/U
Rigid, flexible and pliable plastic conduit up to $\varnothing 40$ mm with or without cables and conduits used pairwise up to $\varnothing 80$ mm		EI 120 U/U

C.4 Rigid wall constructions, $t_E \geq 150$ mm

according to Annex C.1.2 of the ETA

Penetration seal:

Seal type 1: Hilti Firestop Intumescent Sealant CFS-IS (A) on both sides, thickness (t_A , t_{1A}) 25 mm, mineral wool (B) tightly compressed as backfilling material, thickness (t_B) ≥ 100 mm (gap filled completely), for construction detail see Annex C.2.1 of the ETA.

Seal type 2: additional Hilti Firestop Intumescent Sealant CFS-IS ($t_{2A} \geq 10$ mm, $L_A \geq 50$ mm) on both sides.

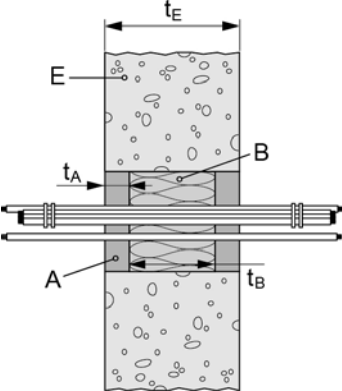
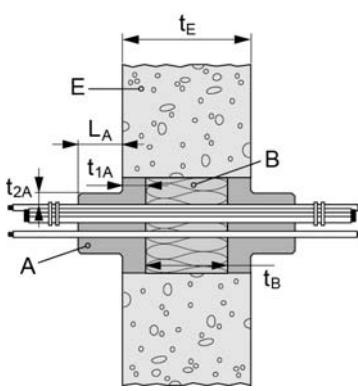
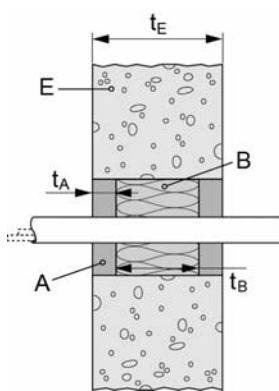
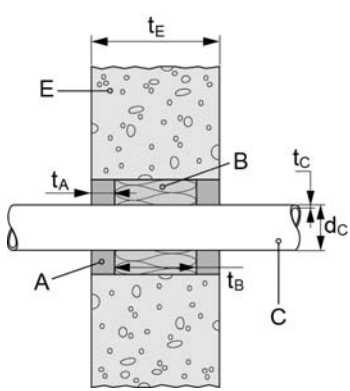
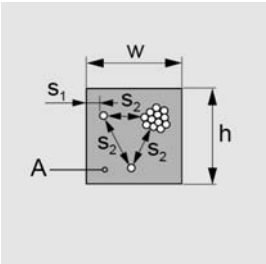
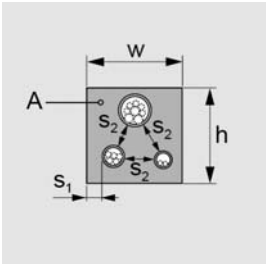
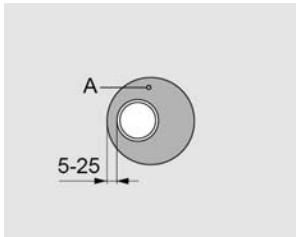
Seal type 3: additional Hilti Firestop Intumescent Sealant CFS-IS ($t_{2A} \geq 10$ mm, $L_A \geq 100$ mm) on both sides.

For suitable products for mineral wool backfilling material see Annex B.2 of the ETA.

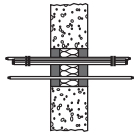
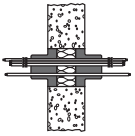
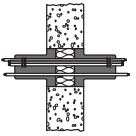
Maximum seal size: 150 x 150 mm or circular openings of equivalent area.

Minimum distances (mm):

Cables to edge of seal	$s_1 =$	0
Cable to other cables/ small conduits	$s_2 =$	0
Tied cable bundle to seal edge	$s_1 =$	10
Tied cable bundle to other small conduits	$s_2 =$	0
conduits $\varnothing \leq 16$ mm to edge of seal	$s_1 =$	10
conduits $\varnothing \leq 16$ mm to other conduits $\varnothing \leq 16$ mm	$s_2 =$	0
Conduits $16 \leq \varnothing \leq 32$ mm to edge of seal	$s_1 =$	10
Conduit bundle to other conduit bundle (conduits from 16 to 32 mm)	$s_2 =$	10

C.4.1 Construction details:			
Cables and conduits ≤ 16 mm		Conduits 16 ≤ Ø ≤ 32 mm	Pipes 32 ≤ Ø ≤ 50 mm
Seal type 1 	Seal type 2 (L_A ≥ 50 mm) Seal type 3 (L_A ≥ 100 mm) 	Seal type 1 	Seal type 1 
			
For abbreviations see the related text and Annex D of the ETA.			

C.4.2 Blank seal	Classification
	EI 120

C.4.3 Cables			
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables) with a diameter of:	Classification		
	Seal type 1	Seal type 2	Seal type 3
			
Maximum Ø 21 mm	see C.2.3	EI 120	EI 120
21 ≤ Ø ≤ 80 mm	see C.2.3	EI 120	EI 120
Tied cable bundle ⁴ , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	see C.2.3	EI 120	EI 120

⁴ Several cables running in the same direction and bound closely together by mechanical means

C.4.4 Single cable penetration

The opening has maximum dimensions Ø100 mm. The wall must comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³

All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables) with a diameter of maximum Ø 13,8 mm	EI 180	---	---
with a diameter of maximum Ø 58 mm	EI 90 E 180	---	---

C.4.5 Conduits

Small steel conduits and tubes, diameter ≤ 16 mm, arranged linear, with or without cables	see C.2.4	EI 120 C/U	EI 120 C/U
Small plastic conduits and tubes, diameter ≤ 16 mm, arranged linear, with or without cables	see C.2.4	EI 120 U/C	EI 120 U/C
Plastic conduits, diameter 16 ≤ Ø ≤ 32 mm, wall thickness 1 - 3 mm, arranged linear or in a cluster, with or without cables	see C.2.4	EI 120 U/C	EI 120 U/C

C.4.6 Single pipe penetrations (seal type 1)

The opening has maximum dimensions Ø100 mm. The wall must comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³. The width of the annular gap is between 5 and 25 mm

PVC pipes (EN 1451-1), not insulated

Pipe		Classification
diameter (d _C) [mm]	wall thickness (t _C) [mm]	
≥ 32 - 50	1,8 / 2,2 - 6,4	EI 180 U/U

C.5 Rigid floor constructions, $t_E \geq 150$ mm

according to Annex C.1.3 of the ETA

Penetration seal:

Seal type 4a: Hilti Firestop Intumescent Sealant CFS-IS (A) on top side, thickness (t_A) 25 mm, mineral wool (B) tightly compressed as backfilling material, thickness (t_B) ≥ 125 mm
Seal type 4b: Hilti Firestop Intumescent Sealant CFS-IS (A) on both sides of the floor, thickness (t_A) 25 mm, mineral wool (B) tightly compressed as backfilling material, thickness (t_B) ≥ 100 mm
additional Hilti Firestop Intumescent Sealant CFS-IS for Seal type 5 - 8 see Annex C.1.3.
For suitable products for mineral wool backfilling material see Annex B of the ETA.
Maximum seal size: 150 x 150 mm or circular openings of equivalent area.

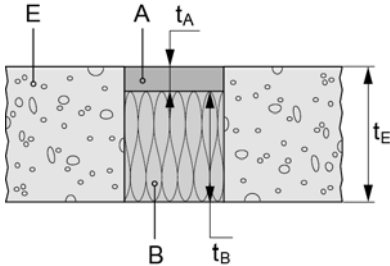
Minimum distances (mm):

Cables to edge of seal	$S_1 =$	0
Cable to other cables/ small conduits	$S_2 =$	0
Tied cable bundle to seal edge	$S_1 =$	10
Tied cable bundle to other small conduits	$S_2 =$	0
conduits $\varnothing \leq 16$ mm to edge of seal	$S_1 =$	20
conduits $\varnothing \leq 16$ mm to other conduits $\varnothing \leq 16$ mm	$S_2 =$	0
Conduits $16 \leq \varnothing \leq 32$ mm to edge of seal	$S_1 =$	10
Conduit bundle to other conduit bundle (conduits from 16 to 32 mm)	$S_2 =$	10

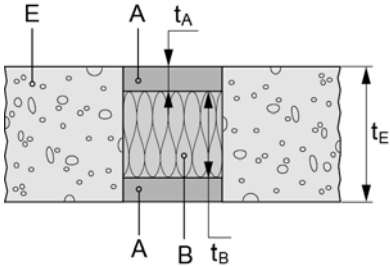
C.5.1 Construction details:

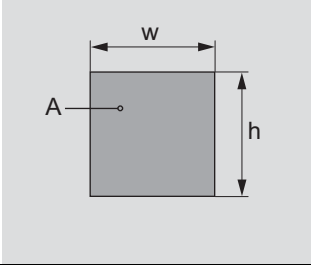
Blank seal

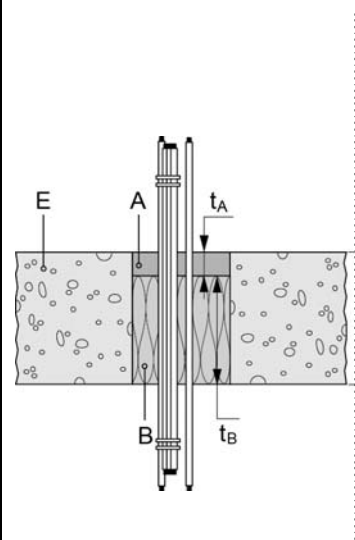
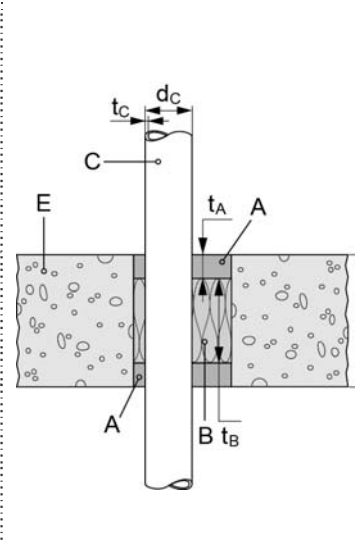
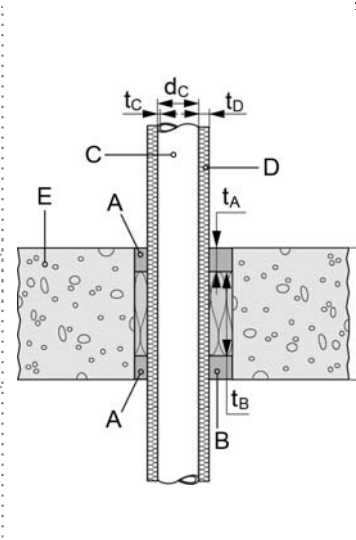
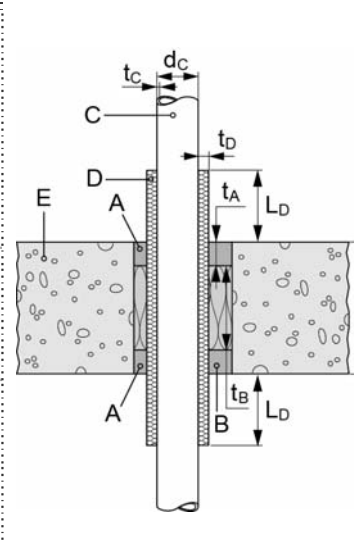
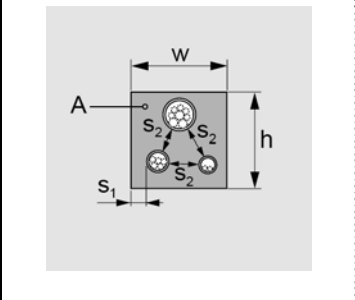
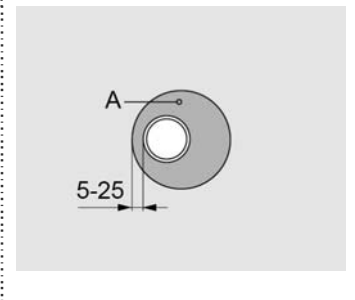
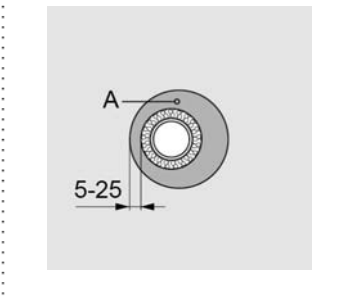
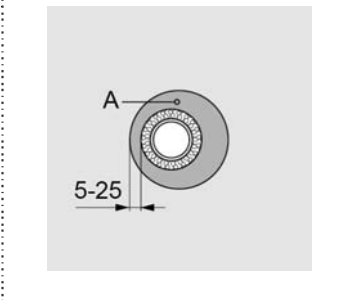
Seal type 4a

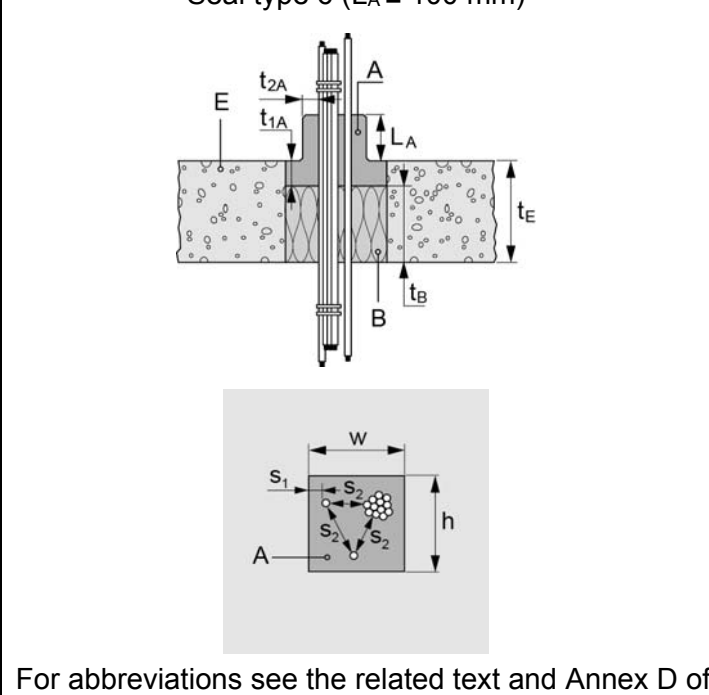
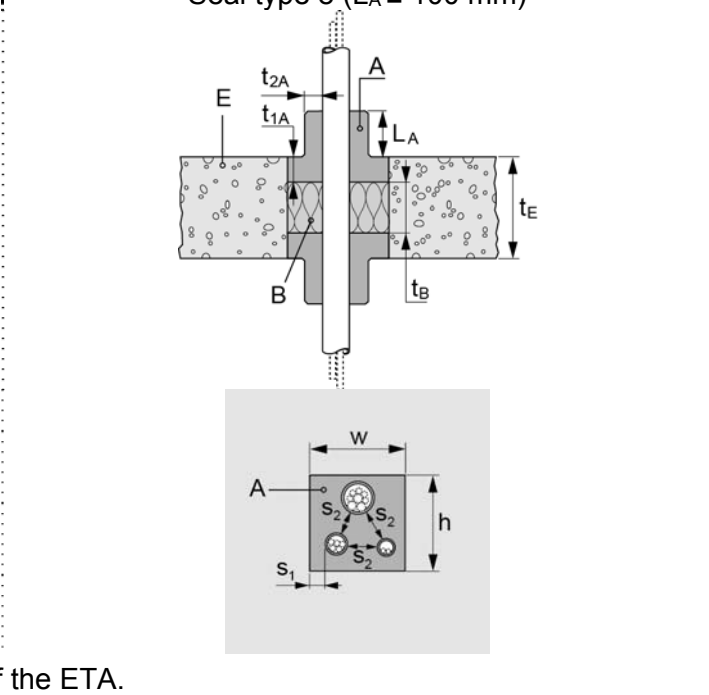


Seal type 4b



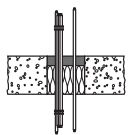
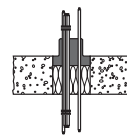
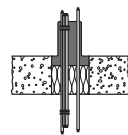


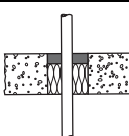
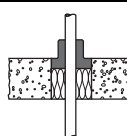
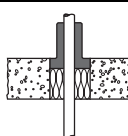
Cables and conduits ≤ 16 mm	Single conduits/pipes	Single pipes with continuous sustained insulation	Single pipes with local sustained insulation
Seal type 4a	Seal type 4b	Seal type 4b	Seal type 4b
			
			

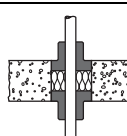
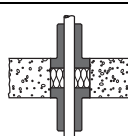
Cables and conduits ≤ 16 mm	Conduits $16 \leq \varnothing \leq 32$ mm
Seal type 5 ($L_A \geq 50$ mm) Seal type 6 ($L_A \geq 100$ mm)	Seal type 7 ($L_A \geq 50$ mm) Seal type 8 ($L_A \geq 100$ mm)
	

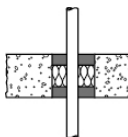
For abbreviations see the related text and Annex D of the ETA.

C.5.2 Blank seal (seal type 4a or 4b)	Classification
	EI 120

C.5.3 Cables			
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables) with a diameter of:	Classification		
	Seal type 4a	Seal type 5	Seal type 6
			
Maximum Ø 21 mm	EI 120	EI 120	EI 120
$21 \leq \varnothing \leq 80$ mm	EI 90 E 120	EI 90 E 120	EI 120
Tied cable bundle ⁵ , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	EI 90 E 120	EI 120	EI 120

C.5.4 Conduits	Classification		
	Seal type 4a	Seal type 5	Seal type 6
			
Small steel conduits and tubes, diameter ≤ 16 mm, arranged linear, with or without cables	EI 90-C/U	EI 120-C/U	EI 120-C/U
Small plastic conduits and tubes, diameter ≤ 16 mm, arranged linear, with or without cables	EI 90-U/C	EI 120-U/C	EI 120-U/C

	Seal type 7	Seal type 8
		
Plastic conduits, diameter $16 \leq \varnothing \leq 32$ mm, wall thickness 1 – 3 mm, arranged linear or in a cluster, with or without cables	EI 120-U/C	EI 120-U/C

C.5.5 Single conduit and pipe penetrations	Seal type 4b
	
The width of the annular gap is between 5 and 25 mm	

⁵ Several cables running in the same direction and bound closely together by mechanical means

– PVC pipes (EN 1451-1), not insulated		
Pipe		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	
≥ 16 - 20	1,8 - 2,3	EI 120 U/U
32	1,8 - 3,6	EI 60 U/U E 120 U/U
≥ 32 - 40	2,0 - 3,0	EI 60 U/U E 120 U/U
≥ 40 - 50	1,8 - 3,7	EI 120 U/C

– Geberit Mepla, Aluminium composite pipes PE-Xd/Al/PE-HD, not or local insulated with Armaflex AF pipe insulation LS* or CS				
Pipe		Insulation		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 50	2,25 - 4,0	-	-	EI 120 U/C
≥ 16 - 50	2,25 - 4,0	8 - 21	*250	EI 120 U/C

– Geberit Silent, PP pipes PP-C/PP-MD/PP-C, not insulated		
Pipe		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	
≥ 32 - 40	2	EI 120 U/U
50	2	EI 120 U/C

– Kekelit Kelox, Aluminium composite pipes PE-XB/Al/PE-XB (EN ISO 21003), not or local insulated with Armaflex AF pipe insulation LS* or CS				
Pipe		Insulation		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 50	2,0 - 4,0	-	-	EI 120 U/C
≥ 16 - 50	2,0 - 4,0	8 - 21	*≥ 250	EI 120-U/C

– LK Schweden, Aluminium composite pipes PE-RT/Al/PE-RT, not or local insulated with Armaflex AF pipe insulation LS* or CS				
Pipe		Insulation		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 40	2,0 - 3,5	-	-	EI 120 U/C
≥ 16 - 40	2,0 - 3,5	8 - 21	*≥ 250	EI 120 U/C

– LK Schweden, PEXa pipes, not insulated		
Pipe		Classification
diameter [mm]	wall thickness (t _c) [mm]	
≥ 16 - 32	2,2 - 4,0	EI 120 U/C

– LK Schweden, Aluminium composite pipes PE-RT/Al/PE-RT, inside PVC corrugated pipe LS* or CS				
Pipe		PVC corrugated pipe (t _c) 1 mm		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 32	2,0 - 4,0	25 - 44	*≥ 250	EI 120 U/C

– LK Schweden, PEXa pipes, inside PVC corrugated pipe LS* or CS				
Pipe		PVC corrugated pipe (t _c) 1 mm		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 25	2,2 - 3,5	25 - 34	*≥ 250	EI 120 U/C

– LK Schweden, PEXa pipes, inside PVC corrugated pipe LS* or CS				
Pipe		PVC corrugated pipe		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 25	2,2 - 3,5	25 - 34 x 1,0	*≥ 250	EI 120 U/C

– PP Life Master 3, PP pipes PP-CO/PP-MV/PP-CO (EN 1451-1), not insulated				
Pipe			Classification	
diameter (d _c) [mm]		wall thickness (t _c) [mm]		
≥ 32 - 40		1,8		EI 90 U/U
50		1,8		EI 120 U/U

– Uponor Uni Pipe Plus, Aluminium composite pipes PE-RT/Al/PE-RT, not or local insulated with Armaflex AF pipe insulation LS* or CS				
Pipe		Insulation		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 16 - 32	2,0 - 3,5	-	-	EI 120 U/C
≥ 16 - 32	2,0 - 3,5	8 - 19,5	*≥ 250	EI 120 U/C

– Copper/steel pipes, locally insulated with Rockwool RS 800 LS* or CS				
Pipe		Insulation		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 10 - 42	1,0 / 1,2 - 14,2	20	*≥ 700	EI 120 C/U
≥ 42 - 89	1,2 / 2,0 - 14,2	40	*≥ 925	EI 120 C/U

– Copper/steel pipes, continuously insulated with Armaflex AF pipe insulation				
Pipe		Insulation		Classification
diameter (d _c) [mm]	wall thickness (t _c) [mm]	thickness (t _D) [mm]	length (L _D) [mm]	
≥ 10 - 42	1,0 / 1,2 - 14,2	7,5 - 20,5	CS	EI 120 C/U
≥ 42 - 89	1,2 / 2,0 - 14,2	14,5 - 22,5	CS	EI 60 C/U E 120 C/U

– Rigid, flexible and pliable plastic conduit up to Ø 40 mm with or without cables and conduit bundles up to Ø 80 mm	
	Classification
Flexible PVC conduit, waveheight 4,5 mm	EI 120 U/U
Flexible PO conduit, waveheight 4,5 mm	EI 90 U/U

– Rigid, flexible and pliable plastic conduits	
	Classification
Rigid, flexible and pliable plastic conduit up to Ø 40 mm with or without cables and conduit bundles up to Ø 80 mm	EI 120 U/U

ANNEX D - ABBREVIATIONS USED IN DRAWINGS

Abbreviation	Description drawings
A	Hilti Firestop Intumescent Sealant CFS-IS
B	Backfilling material mineral wool
E	Building element (wall, floor)
C	Services
D	Pipe Insulation
h	Height/length of penetration seal
L _A	Length of additional "Hilti Firestop Intumescent Sealant CFS-IS" in front of the wall/floor
s ₁ , s ₂	Distances
t _A , t _{1A}	Thickness (depth) of penetration seal
t _{2A}	Thickness of additional "Hilti Firestop Intumescent Sealant CFS-IS" in front of the wall/floor
t _B	Thickness (depth) of backfilling material
t _E	Thickness of the building element
w	Width of penetration seal
d _C	Pipe diameter (nominal outside diameter) for pipes
t _C	Pipe wall thickness
L _D	Length of insulation
t _D	thickness of insulation



CFS-IS

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