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European Technical Assessment

ETA-13/0125
of 16.04.2018

General part

Technical Assessment Body issuing the European Technical Assessment

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

Trade name of the construction product

Hilti Firestop Plug CFS-PL

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

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

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

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

This European Technical Assessment replaces

European technical approval ETA-13/0125 with validity from 15.04.2013 to 14.04.2018

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Specific parts

1 Technical description of the product

“Hilti Firestop Plug CFS-PL” is used as a mixed penetration seal together with “Hilti Firestop Filler CFS-FIL” and in some cases with “Hilti Firestop Putty Bandage CFS-P BA”.

Components	Characteristics
Hilti Firestop Plug CFS-PL	Plug-shaped product based on a pre-cured, pre-formed PU-based firestop material according to Annex B.1 of the ETA.
Hilti Firestop Filler CFS-FIL	Acrylic based firestop filler mastic according to Annex B.2 of the ETA.
Hilti Firestop Putty Bandage CFS-P BA	Graphite based pipe wrap according to Annex B.3 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 Plug CFS-PL” 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 and rigid floor constructions where they have been provided with apertures which are penetrated by various cables, conduits and plastic pipes.

The maximum opening size of the penetration seal in wall and floor constructions is Ø 250 mm. For more details see Annex C of the ETA.

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

“Hilti Firestop Plug CFS-PL” can be installed only in types of separating elements as specified in the following table. For further details see Annex C of the ETA.

Separating element	Construction	Maximum opening size of the penetration seal (diameter)
Flexible walls	<ul style="list-style-type: none"> > 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 	<p>Ø 250 mm</p> <p>For details see Annex C of the ETA</p>

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Rigid walls	<ul style="list-style-type: none">> Aerated concrete, concrete, masonry> Minimum density 600 kg/m³> Minimum thickness 100 mm> The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period	Ø 250 mm For details see Annex C of the ETA
Rigid floors	<ul style="list-style-type: none">> Aerated concrete, concrete> Minimum density 600 kg/m³> Minimum thickness 150 mm> The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period	Ø 250 mm For details see Annex C of the ETA

2.2 Use condition

“Hilti Firestop Plug CFS-PL is intended for use at temperatures below 0°C with exposure to UV, but with no exposure to rain and can therefore – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type Y₁. Since the requirements for Type Y₁ are met, also the requirements for Type Y₂, 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 Plug CFS-PL” of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.

The indications given on the intended working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body, but are to be regarded only as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

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

2.4 General assumptions

It is assumed that

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

2.5 Manufacturing

The European Technical Assessment is issued for the product on the basis of agreed data / information, deposited with the Österreichisches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data / information being incorrect, should be notified to the Österreichisches Institut für Bautechnik before the changes are introduced.

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

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

Basic requirements for construction works	Essential characteristic	Method of verification	Performance
BWR 2	Reaction to fire	EN 13501-1: 2007+A1:2009	Clause 3.1.1 of the ETA
	Resistance to fire	EN 13501-2: 2007+A1:2009	Clause 3.1.2 and Annex C.1 to C.3 of the ETA
BWR 3	Air permeability	No performance assessed	
	Water permeability	No performance assessed	
	Content, emission and/or release of dangerous substances	No performance assessed	
BWR 4	Mechanical resistance and stability	No performance assessed	
	Resistance to impact / movement	No performance assessed	
	Adhesion	No performance assessed	
	Durability	EAD 350454-00-1104 clause 2.2.9	Clause 3.3.4 of the ETA
BWR 5	Airborne sound insulation	EN ISO 10140-1 and EN ISO 10140-2, EN ISO 717-1	Clause 3.4.1 of the ETA
BWR 6	Thermal properties	EN 12667:2001	Clause 3.5.1 of the ETA
	Water vapour permeability	No performance assessed	

3.1 Safety in case of fire (BWR 2)

3.1.1 Reaction to fire

The components of "Hilti Firestop Plug CFS-PL" were 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
Hilti Firestop Plug CFS-PL	E
Hilti Firestop Filler CFS-FIL	E
Hilti Firestop Putty Bandage CFS-P BA	E

3.1.2 Resistance to fire

"Hilti Firestop Plug CFS-PL" 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 Plug CFS-PL" has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex C.1 to C.3 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

No performance assessed.

3.2.2 Water permeability

No performance assessed.

3.2.3 Content, emission and/or release of dangerous substances

No performance assessed.

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 Plug CFS-PL" fulfil the requirements for the intended use condition.

“Hilti Firestop Plug CFS-PL” is therefore appropriate for use at temperatures below 0°C with exposure to UV, but with no exposure to rain and can therefore – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type Y₁. Since the requirements for Type Y₁ are met, also the requirements for Type Y₂, 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 Plug CFS-PL” 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 flexible wall element. The wall element was constructed from 92 mm wide metal (0,36 mm thick galvanised steel) studs spaced at 610 mm centres. The wall was clad on each side with a double layer of 16 mm thick gypsum wallboard and filled with 100 mm thick “Thermafiber” mineral wool insulation. The wall element had an area of 6,8 m². “Hilti Firestop Plug CFS-PL” was tested as a blank seal without services.

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

Component	R (C; Ctr)
Hilti Firestop Plug CFS-PL	54 (0; -6)

3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties

The thermal properties of “Hilti Firestop Plug CFS-PL” were tested according to EN 12667:2001.

Component	λ ₁₀ in W/(m.K)
Hilti Firestop Plug CFS-PL	0,089

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

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

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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 16.04.2018
by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits
Managing Director

ANNEX A REFERENCE DOCUMENTS and LIST OF ABBREVIATIONS

A.1 References to standards mentioned in the ETA

EN 1026	Windows and doors – Air permeability – Test method
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals
EN 12667	Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance
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 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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A.3 Abbreviations used in drawings

Abbreviation	Description
A, A ₁ , A ₂ ,...	Hilti firestop products
C, C ₁ , C ₂ ,...	Penetrating services
E, E ₁ , E ₂ ,...	Separating elements (wall, floor)
w	Diameter of penetration seal
S ₁ , S ₂ , S _n	Distances
t _A	Thickness of penetration seal
t _E	Thickness of the separating element

ANNEX B

DESCRIPTION OF PRODUCT(S) & PRODUCT LITERATURE

B.1 Hilti Firestop Plug CFS-PL

Plug-shaped product based on a pre-cured, pre-formed PU-based firestop material, available in different diameters. The Control Plan is defined in document "Control Plan relating to the European technical approval ETA-13/0125 – Hilti Firestop Plug CFS-PL", which is a non-public part of this ETA.

B.2 Hilti Firestop Filler CFS-FIL

"Hilti Firestop Filler CFS-FIL" is available as a cartridge of 310 ml or as a foil pack of 580 ml. The Control Plan is defined in document "Control Plan relating to the European Technical Assessment ETA-13/0099 – Hilti Firestop Block CFS-BL", which is a non-public part of the ETA. Suitable dispensers:

"Hilti CFS-DISP / CS 201-P1" (for 310 ml cartridge)

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

B.3 Hilti Firestop Putty Bandage CFS-P BA

"Hilti Firestop Putty Bandage CFS-P BA" is delivered 100 mm in width, 3 mm in height and 5 m in length on a roll. The Control Plan is defined in document "Control Plan relating to the European technical approval ETA-13/0125 – Hilti Firestop Plug CFS-PL", which is a non-public part of this ETA.

B.4 technical product literature

Technical data sheet "Hilti Firestop Plug CFS-PL" (including all ancillary products).

ANNEX C

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP PLUG CFS-PL

C.1 General Information

C.1.1 Wall/floor constructions

a) Flexible wall:

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

For timber stud wall constructions there must be a minimum distance of 100 mm of the penetration seal to any stud. The cavity between stud and penetration seal must be closed and a minimum of 100 mm insulation (classification A1 or A2 in accordance with EN 13501-1).

b) Rigid wall:

The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 600 kg/m³.

c) Rigid floor:

The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 600 kg/m³.

The walls / floors must be classified in accordance with EN 13501-2 for the required fire resistance period or fulfil the requirements of the relevant Eurocode.

This ETA does not cover use of the product as a penetration seal in sandwich panel constructions.

Maximum distance of the first service support: 250 mm

C.1.2 Beading

The penetration seal depth is minimum 150 mm (figure 1a, tA) independent of the thickness of the wall or floor. In case of walls or floors with a thickness of less than 150 mm a beading has to be used.

Beading: square plates made of gypsum or calcium silicate boards at a size of 2x W_A (100 mm) plus W (figure 1c, diameter of plug), are installed around the opening with the necessary number of layers. Two frames of the same height on both sides of a wall (figure 1a) have to be installed.

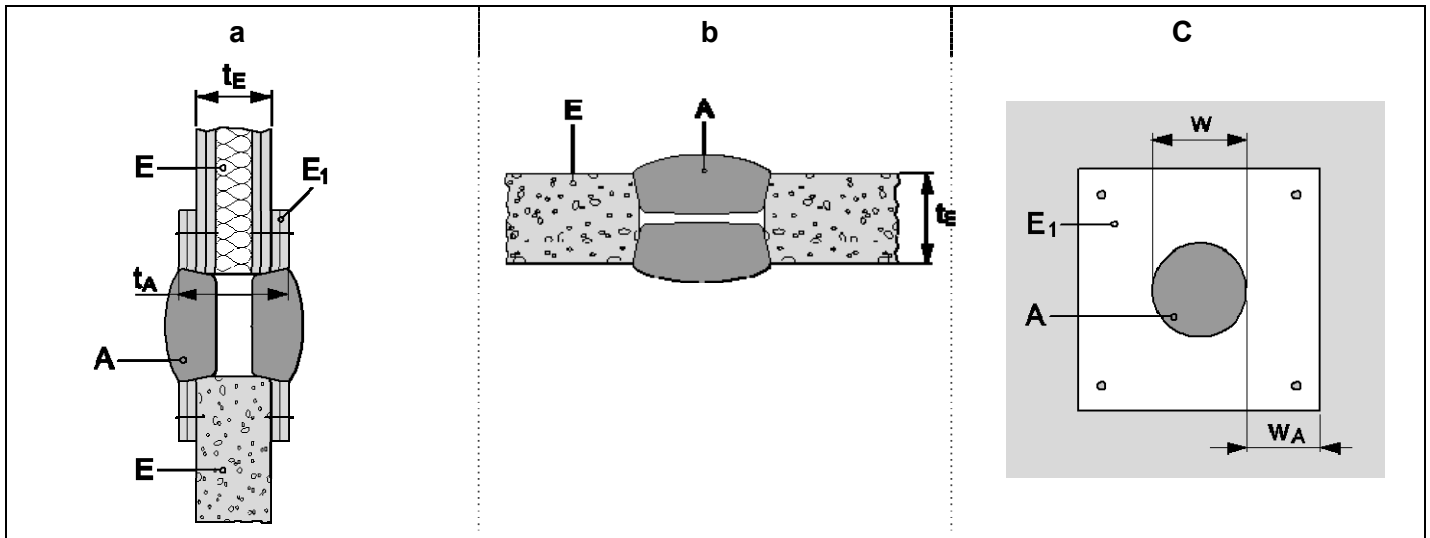


Figure 1: beading and position of the seal in walls / floors

<p>A Hilti Firestop Plug CFS-PL</p> <p>E Separating element (rigid or flexible wall construction, floor)</p> <p>E1 Beading</p> <p>t_A Thickness of the penetration seal</p>	<p>t_E Thickness of the separating element</p> <p>w Diameter of the penetration seal</p> <p>w_A Width of the beading frame, 100 mm</p>
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C.1.3 Penetration seal types

C.1.3.1 Penetration seal type: Filler

- Gaps between services and Hilti Firestop Plug CFS-PL (A) are filled with Hilti Firestop Filler CFS-FIL (A₁), depth 20 mm.

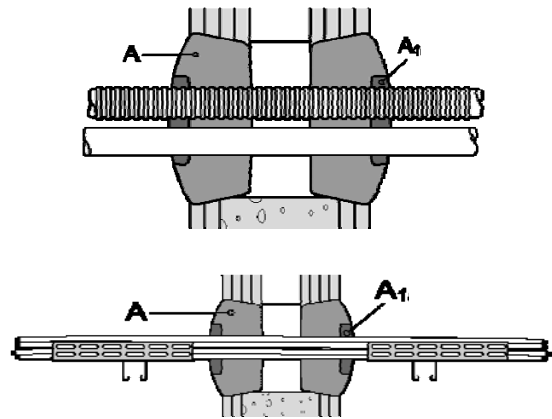


Figure 2: penetration seal type A1

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C.1.3.2 Penetration seal type: Filler plus 2 layers putty bandage

- Gaps between services and Hilti Firestop Plug CFS-PL (A) are filled with Hilti Firestop Filler CFS-FIL (A1), depth 20 mm.
- Two layers of Hilti Firestop Putty Bandage CFS-P BA (A2) are wrapped around the services or group of services.

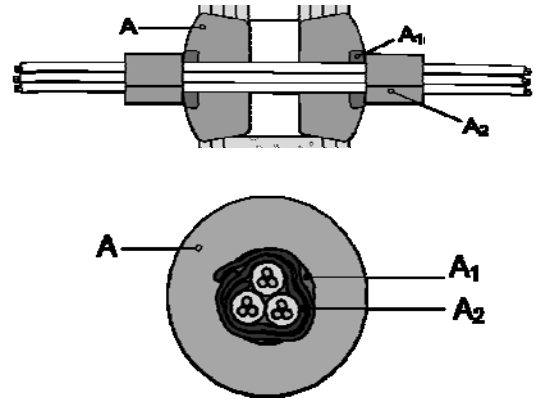


Figure 3: filler (A₁) plus 2 layers of putty bandage (A₂)

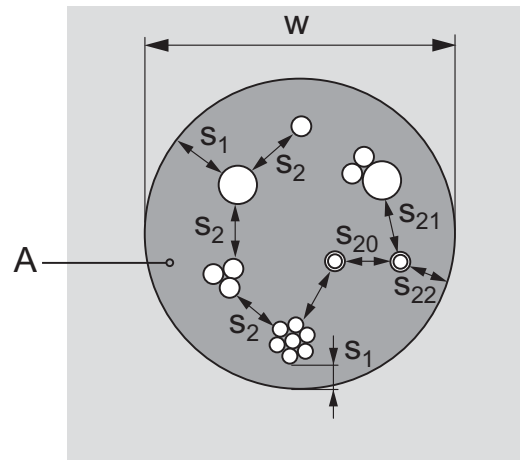
Hilti Firestop Putty Bandage CFS-P BA must be installed with the mesh outside/upside.
For floor applications, Hilti Firestop Putty Bandage CFS-P BA is required on the top side, only.

C.1.4 Distance Requirements

Distances valid for installations of services in wall and floor penetrations.

Minimum distances in mm (see illustration):

- $s_1 = 0$ (distance between cables and seal edge)
- $s_2 = 0$ (distance between cables)
- $s_{20,21,22} = 0$ $\varnothing \leq 16$ mm
- $s_{20} = 0$ $\varnothing > 16$ mm
(distance between conduits to each other)
- $s_{21,22} = 20$ $\varnothing > 16$ mm
(distance between conduits and other services or seal edges)



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C.2 Flexible or rigid walls according to Annex C.1.1 of the ETA - minimum wall thickness 100 mm

C.2.1 Blank seal (no services) *	
<p>Construction details (for symbols and abbreviations see figure 1 and Annex A.3 of the ETA):</p> <p>Hilti Firestop Plug CFS-PL (A) of seal thickness $t_A \geq 150$ mm, centered regarding the thickness of the wall (E); beading (E1) according to Annex C.1.2 of the ETA.</p> <p>Hilti Firestop Plug CFS-PL can be installed in the round opening directly or alternatively in a fitted plastic sleeve (PVC, 2 mm wall thickness, 150mm length, flush to wall).</p>	<p>Figure 4: blank seal</p>
Classification	
Seal size diameter: 52 to 250 mm	EI 120
* If services are added later on in a blank seal, only the services that fulfill the required classification, listed in the tables below, may be added.	

C.2.2 Penetrating services in walls		
<ul style="list-style-type: none"> Seal size diameter: 52 to 250 mm Hilti Firestop Plug CFS-PL (A), thickness $t_A \geq 150$ mm; centered regarding the thickness of the wall (E); beading (E1) according to Annex C.1.2 of the ETA. <p>Maximum distance of first service support ≤ 250 mm (measured from the beading).</p>		
Abbreviation	Description	<p>Figure 5: wall penetration</p>
A, A ₁ , A ₂ , ...	<p>Firestop products:</p> <p>A Hilti Firestop Plug CFS-PL</p> <p>A₁ Hilti Firestop Filler CFS-FIL</p> <p>A₂ Hilti Firestop Putty Bandage CFS-P BA</p>	
C ₁ , C ₂ , C ₃	<p>C₁ Conduits</p> <p>C₂ Single cables</p> <p>C₃ Cable bundle</p>	
E, E ₁ , E ₂ , ...	Separating elements	
t _E	Thickness of the separating element	

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C.2.2.a) Cables		
Construction according to Annex C.2.2 of the ETA Penetrating services C ₂ , C ₃ according to Annex C.2.2 of the ETA For cable penetrations the following penetration seal types apply: <ul style="list-style-type: none"> • Filler (A₁) according to Annex C.1.3.1 of the ETA • Filler plus 2 layers putty bandage Putty (A₂) according to Annex C.1.3.2 of the ETA 		
All 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)		
Penetration seal type:	Filler	Filler + 2x Putty Bandage
Sheathed cables:	Classification	
∅ ≤ 21 mm	EI 120	---
Tied cable bundle ≤ ∅ 100 mm; ∅ single cable ≤ 21 mm	EI 120	---
21 < ∅ ≤ 50 mm	EI 90	EI 120
50 < ∅ ≤ 80 mm	EI 90 / E 120	---
Non-sheathed cables (wires): ∅ ≤ 24 mm	EI 60 / E 120	---
C.2.2.b) Small conduits and tubes		
Construction according to Annex C.2.2 of the ETA Penetrating services C ₁ according to Annex C.2.2 of the ETA Penetration seal type: <ul style="list-style-type: none"> • Filler (A₁) according to Annex C.1.3.1 of the ETA 		
Penetration seal type:	Filler	Filler + 2x Putty Bandage
∅ ≤ 16 mm, wall thickness ≥ 1 mm, arranged linear, with or without cables, with or without cable supports, minimum distance to each other = 0 mm	Classification	
Plastic conduits and tubes	EI 120 U/U	---
Steel conduits and tubes	EI 120 C/U	---

C.2.2.c) Conduits

Construction according to Annex C.2.2 of the ETA
 Penetrating services C₁ according to Annex C.2.2 of the ETA, with and without cables
 Penetration seal type:

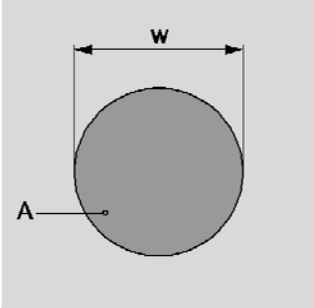
- Filler (A₁) according to Annex C.1.3.1 of the ETA

Penetration seal type:		Filler	Filler + 2x Putty Bandage
	Diameter (mm)		Classification
	*PO	*PVC	
Flexible conduits	16 - 40	16 - 32	EI 120 U/U
Rigid conduits <ul style="list-style-type: none"> • Wall thickness: PO:1,55 to 2,30 mm PVC:1,90 to 2,80 mm 	16 - 40	16 - 40	
Bundle of rigid or flexible conduits, single conduits: Ø ≤ 20 mm	≤ 100		

*PO: Polyolefin (PE, PP, PPE, PPO); *PVC: Polyvinylchloride

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C.3 Rigid floor according to Annex C.1.1 of the ETA - minimum floor thickness 150 mm

C.3.1 Blank seal (no services) *	
<p>Construction details (for symbols and abbreviations see figure 1 and Annex A.3 of the ETA):</p> <p>Hilti Firestop Plug CFS-PL (A) of seal thickness $t_A \geq 150$ mm, centered regarding the thickness of the floor (E); beading (E1) according to Annex C.1.2 of the ETA.</p>	 <p>Figure 6: blank seal in floors</p>
	Classification
Seal size \varnothing : 52 to 250 mm	EI 120
* If services are added later on in a blank seal only the services listed in the tables below may be added that fulfill the required classification.	

C.3.2 Penetrating services in floors

- Seal size diameter: 52 to 250 mm
- Hilti Firestop Plug CFS-PL (A), thickness $t_A \geq 150$ mm;
- centered regarding the thickness of the floor;
- beading (E₁) according to Annex C.1.2 of the ETA.

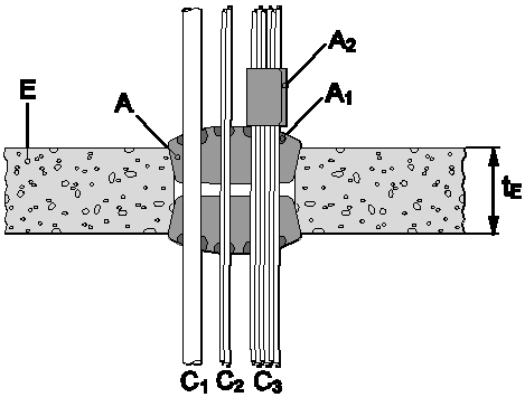
Abbreviation	Description	
A, A ₁ , A ₂ ,...	Firestop products: A Hilti Firestop Plug CFS-PL A ₁ Hilti Firestop Filler CFS-FIL A ₂ Hilti Firestop Putty Bandage CFS-P BA	
C ₁ , C ₂ , C ₃	C ₁ Conduits C ₂ Single cables C ₃ Cable bundle	
E, E ₁ , E ₂ ,...	Separating elements	
t _E	Thickness of the separating element	

Figure 7: floor penetration

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C.3.2.a) Cables		
Construction according to Annex C.3.2 of the ETA Penetrating services C ₂ , C ₃ according to Annex C.3.2 of the ETA For cable penetrations the following penetration seal types apply: <ul style="list-style-type: none"> • Filler (A₁) according to Annex C.1.3.1 of the ETA • Filler plus 2 layers putty bandage Putty (A₂) according to Annex C.1.3.2 of the ETA 		
All 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)		
Penetration seal type:	Filler	Filler + 2x Putty Bandage
Sheathed cables:	Classification	
∅ ≤ 21 mm	EI 120	---
Tied cable bundle ≤ ∅ 100 mm; ∅ single cable ≤ 21 mm	EI 120	---
21 < ∅ ≤ 50 mm	EI 120	---
50 < ∅ ≤ 80 mm	EI 90 / E 120	---
Non-sheathed cables (wires): ∅ ≤ 24 mm	EI 30 / E 120	EI 30 / E 120
C.3.2.b) Small conduits and tubes		
Construction according to Annex C.3.2 of the ETA Penetrating services C ₁ according to Annex C.3.2 of the ETA Penetration seal type: <ul style="list-style-type: none"> • Filler (A₁) according to Annex C.1.3.1 of the ETA 		
Penetration seal type:	Filler	Filler + 2x Putty Bandage
∅ ≤ 16 mm, wall thickness ≥ 1 mm, arranged linear, with or without cables, with or without cable supports, minimum distance to each other = 0 mm	Classification	
Plastic conduits and tubes	EI 120 U/U	---
Steel conduits and tubes	EI 120 C/U	---

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C.3.2.c) Conduits				
Construction according to Annex C.3.2 of the ETA				
Penetrating services C ₁ according to Annex C.3.2 of the ETA, with and without cables				
Penetration seal type:				
<ul style="list-style-type: none"> • Filler (A₁) according to Annex C.1.3.1 of the ETA 				
Penetration seal type:			Filler	Filler + 2x Putty Bandage
	Diameter (mm)		Classification	
	*PO	*PVC		
Flexible conduits	16 - 40	16 - 32	EI 120 U/U	----
Rigid conduits <ul style="list-style-type: none"> • Wall thickness: PO:1,55 to 2,30 mm PVC:1,90 to 2,80 mm 	16 - 40	16 - 40		
Bundle of rigid or flexible conduits, single conduits: Ø ≤ 20 mm	≤ 100			
*PO: Polyolefin (PE, PP, PPE, PPO); *PVC: Polyvinylchloride				