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European Technical Assessment

ETA-13/0704
of 04.01.2022

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 Cable Collar CFS-CC

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 5b

This European Technical Assessment contains

30 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-13/0704 of 28.06.2018

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Specific parts

1 Technical description of the product

“Hilti Firestop Cable Collar CFS-CC” is a kit to be used as a penetration seal based on intumescent material in a metal housing and additional components.

Cable collar	Characteristics
Hilti Firestop Cable Collar CFS-CC	Cable collar according to Annex C.1 of the ETA with steel sheet housing and an inlay made of intumescent material (plug shaped, divided in two parts).

Additional components	Characteristics
Hilti Firestop Filler CFS-FIL	Acrylic based firestop filler mastic, see Annex C.1.4.1 of the ETA
Hilti Firestop Putty Bandage CFS-P BA	A graphite based pipe wrap, see Annex C.1.4.3 of the ETA
Cementitious mortar	Any cementitious mortar according EN 998-2 - class M10 - suitable for use with the intended type of rigid walls or floors - may be used, see Annex C.1.4.4 of the ETA
Fixing components	See Annex B.4 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 Cable Collar CFS-CC” is intended to form a penetration seal to temporarily or permanently reinstate the fire resistance performance of a separating element (wall or floor) where they have been provided with apertures, which are penetrated by various services.

The maximum opening size of the penetration seal is Ø 108 mm, providing that the distances from the outer edge of the penetration seal are no lower than 20 mm. For more details see Annex C of the ETA.

“Hilti Firestop Cable Collar CFS-CC” 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 service support constructions shall not penetrate the penetration seal.

“Hilti Firestop Cable Collar CFS-CC” can be installed only in the types of separating elements as specified in the following table.

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

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

2.4 **General assumptions**

2.4.1 It is assumed that

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

2.5 **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.5 of the ETA
BWR 3	Air permeability (material property)	No performance assessed	
	Water permeability (material property)	No performance assessed	
	Content, emission and/or release of dangerous substances	EN 16516:2020	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	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 Cable Collar CFS-CC” 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 13501-1:2007+A1:2009
Hilti Firestop Cable Collar CFS-CC	E

3.1.2 Resistance to fire

“Hilti Firestop Cable Collar CFS-CC” 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 Cable Collar CFS-CC” has been classified according to EN 13501-2:2007+A1:2009. The individual fire resistance classes are listed in Annex C.1 to C.4 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.

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

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

The concentration of SVOC has been below 0,005 mg/m³ after 3 and after 28 days. The concentration of total emission of VOC after 3 days was 0,013 mg/m³, after 28 days the concentration was 0,012 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 Cable Collar CFS-CC" fulfil the requirements for the intended use category.

"Hilti Firestop Cable Collar CFS-CC" is therefore appropriate for use at internal conditions without high humidity, excluding temperatures below 0 °C and can— according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type Z₂.

3.4 Protection against noise (BWR 5)

3.4.1 Airborne sound insulation

The airborne sound insulation of "Hilti Firestop Cable Collar CFS-CC" 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 tests for airborne sound insulation were 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 75 mm thick "Thermafiber" mineral wool insulation. The wall element had an area of 6,8 m². "Hilti Firestop Cable Collar CFS-CC" was penetrated with a Ø 50 mm cable bundle located in a 100 mm pipe.

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

Flexible wall with “Hilti Firestop Cable Collar CFS-CC” on both sides; with steel pipe and cable bundle:

R _w in dB	C in dB	C _{tr} in dB
56	-2	-8

Flexible wall with “Hilti Firestop Cable Collar CFS-CC” on both sides; with steel pipe:

R _w in dB	C in dB	C _{tr} in dB
59	-3	-9

3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties

The thermal properties of the inlay of “Hilti Firestop Cable Collar CFS-CC” were tested according to EN 12667:2001.

Component	λ ₁₀ in W/(m*K)
Hilti Firestop Cable Collar	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

4.1 AVCP system

According to the Decision 1999/454/EC¹, amended by Decision 2001/596/EC² of the European Commission the system(s) of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

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

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

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

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 04.01.2022
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 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 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
EN 998-2	Specification for mortar for masonry - Part 2: Masonry mortar

A.2 Other reference documents

EOTA TR 001	Determination of impact resistance of panels and panel assemblies
EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products

ANNEX B
DESCRIPTION OF PRODUCT(S) & PRODUCT LITERATURE

B.1 Hilti Firestop Filler CFS-FIL

The filler 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 approval ETA-13/0099 – Hilti Firestop Block KIT", 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.2 Hilti Firestop Putty Bandage CFS-P BA

The putty 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 Assessment ETA-13/0704 – Hilti Firestop Putty Bandage CFS-P BA", which is a non-public part of this ETA.

B.3 Cementitious Mortar

Hilti Firestop Mortar CP 633 or any mortar classified according EN 998-2 and with strength class equal or higher than M10 can be used.

B.4 Fixing components

Fixing components		Drywall	Rigid wall	Floor
Screw anchors:	HUS3-H 6	x	x	x
	HUS3-P 6	x	x	x
Expansion anchor:	HSA3 M6		x	x
	HST3 M6		x	x
Undercut anchor:	HPD M6		x	x
Internally threaded anchor:	HKD M8/30		x	x
Hollow core:	HTBS / HTB	x		
	HHD M6	x		
Others:	DBZ 6/4,5		x	x
	HHD-S M6 25x64		x	x
	Screws with washer (M6 or larger)	x		
	Threaded rods with nuts and washer (M6 or larger)	x		

ANNEX C

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP CABLE COLLAR CFS-CC

C.1 General Information

C.1.1 Wall / floor constructions

a) Flexible wall:

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

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

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

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 550 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 European Technical Assessment does not cover sandwich panel constructions.

C.1.2 Aperture frame / Board frame

The penetration seal depth is approximately 200 mm (t_A) in walls and 250 mm (t_A) in floors, comprising by at least a wall of 100 mm (t_E) or a floor of 150 mm (t_E) and two times the thickness of the cable collar. An aperture frame is not necessary.

In some cases a board frame is used to thicken a 100 mm wall to 150 mm by two 12,5 mm boards on each side of the penetration seal. The remaining edges must have a minimum width of about 50 mm (W_A).

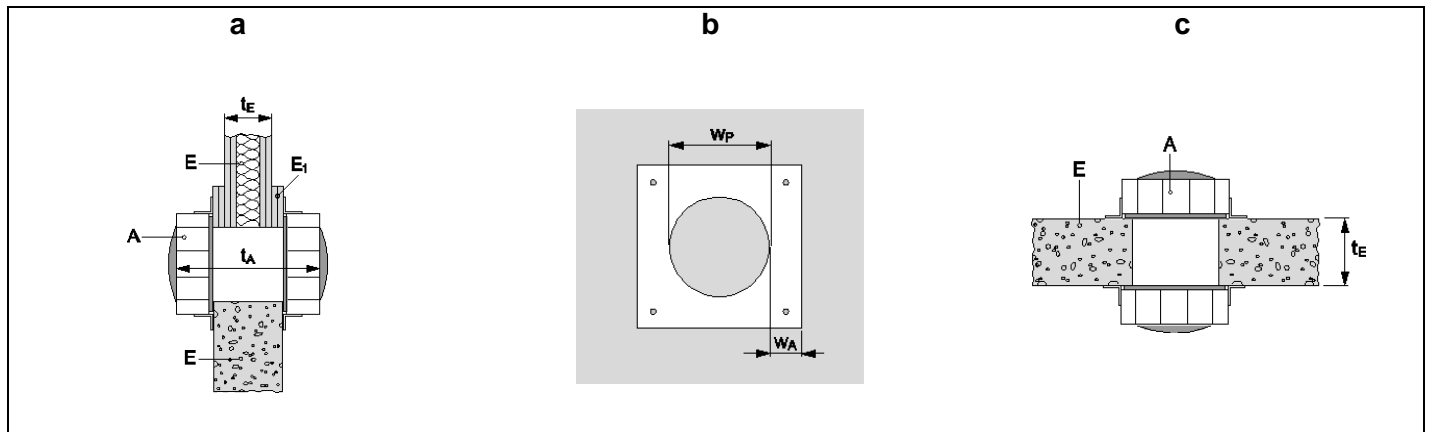


Figure 1: board frame (a, b) and position of the penetration seal in walls / floors (a,c)

<p>A Hilti Firestop Cable Collar CFS-CC</p> <p>E Separating element (flexible wall, rigid wall, rigid floor)</p> <p>E₁ Board frame</p> <p>t_A Thickness of the penetration seal</p>	<p>t_E Thickness of separating element</p> <p>W_P Diameter of the aperture</p> <p>W_A Width of the frame around the aperture</p>
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C.1.3 Maximum Seal Size

- Cable collar inlay has to be cut to fit on penetrating cables
- Maximum diameter of cut out part is approximately 108 mm (convex core, w), so a boundary stripe of approximately 20 mm inlay is left on the edge of the collar (Ø 150 mm).

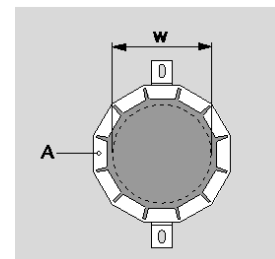
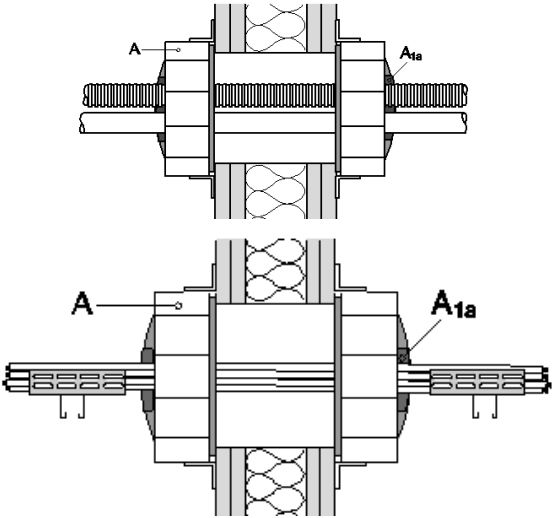
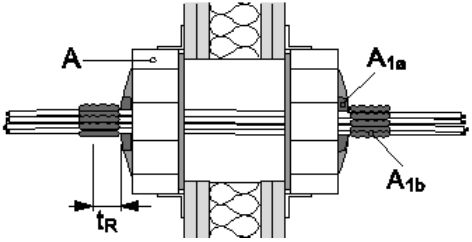
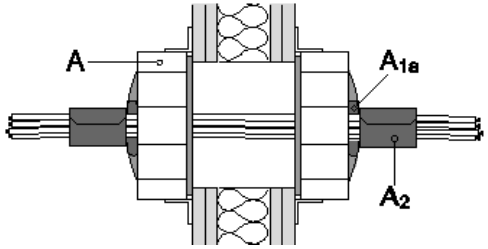
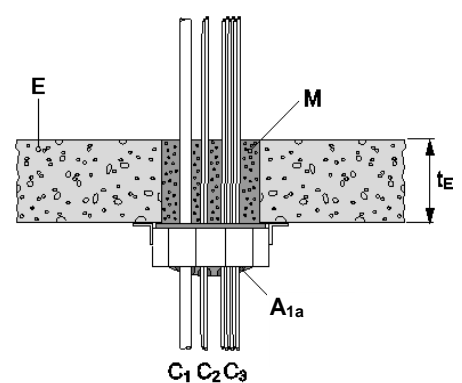


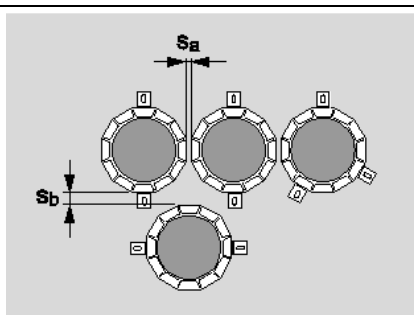
Figure 2: maximum seal size (w)

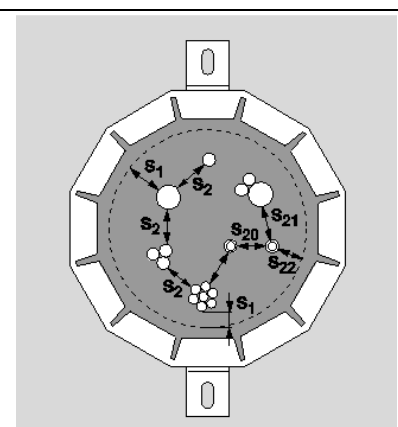
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C.1.4 Penetration seal	
C.1.4.1 Basic sealing with Hilti Firestop Filler CFS-FIL (A_{1a})	
<ul style="list-style-type: none"> Gaps between services and Hilti Firestop Cable Collar CFS-CC (A) are filled with Hilti Firestop Filler CFS-FIL (A_{1a}), depth 20 mm. 	 <p>Figure 3: Filler (A_{1a})</p>
C.1.4.2 Additional protection: Filler coating (A_{1b})	
<ul style="list-style-type: none"> Gaps between penetrating elements and Hilti Firestop Cable Collar CFS-CC (A) are filled with Hilti Firestop Filler CFS-FIL (A_{1a}), depth 20 mm. Cables covered by Hilti Firestop Filler CFS-FIL at 50 mm in length (t_R) and approximately 5 mm in thickness (A_{1b}). 	 <p>Figure 4: Filler Coating (A_{1b}):</p>
C.1.4.3 Additional protection: Hilti Firestop Putty Bandage CFS-P BA (A₂)	
<ul style="list-style-type: none"> Gaps between penetrating elements and Hilti Firestop Cable Collar CFS-CC (A) filled with Hilti Firestop Filler CFS-FIL (A_{1a}), depth 20 mm. Two layers of Hilti Firestop Putty Bandage CFS-P BA (A₂) wrapped on each side around the services or group of services. 	 <p>Figure 5: Filler (A_{1a}) plus 2 layers of putty (A₂)</p>
<p>Hilti Firestop Putty Bandage CFS-P BA must be installed with the mesh outside/upside: The overlap of the putty wrapping must be at least 20 mm and is recommended to position on top or on the side. For floor applications, the use of Hilti Firestop Putty Bandage CFS-P BA is required on the top side only.</p>	

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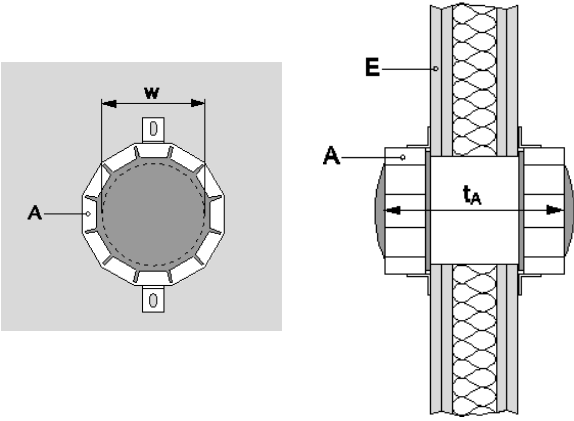
<p>C.1.4.4 Additional sealing: mortar (floors only)</p> <ul style="list-style-type: none"> Annular space between penetrating elements and floor edges filled with cementitious mortar. Gaps between penetrating elements and Hilti Firestop Cable Collar CFS-CC (A) filled with Hilti Firestop Filler CFS-FIL (A_{1a}), depth 20 mm. Thickness of the penetration seal is about 200 mm (150 + 50 mm) 	 <p>Figure 6: Mortar as gap filler (M)</p>
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<p>C.1.5 Cluster arrangement</p> <p>Minimum distances in mm (see illustration):</p> <p>$s_a = 0$ (distance between cable collars linear)</p> <p>$s_b = 0$ (distance between cable collars in cluster arrangement)</p>	 <p>Figure 7</p>
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<p>C.1.6 Distance Rule: Distances valid for wall and floor installations</p> <p>Minimum distances in mm (see illustration):</p> <p>$s_1 = 0$ (distance between cables and seal edge)</p> <p>$s_2 = 0$ (distance between cables or bundles)</p> <p>$s_{20,21,22} = 0$ (conduits $\varnothing \leq 16$ mm)</p> <p>$s_{20} = 0$ (conduits $\varnothing > 16$ mm; distance between conduits to each other)</p> <p>$s_{21,22} = 15$ (conduits $\varnothing > 16$ mm distance of conduits to other services or seal border)</p>	 <p>Figure 8</p>
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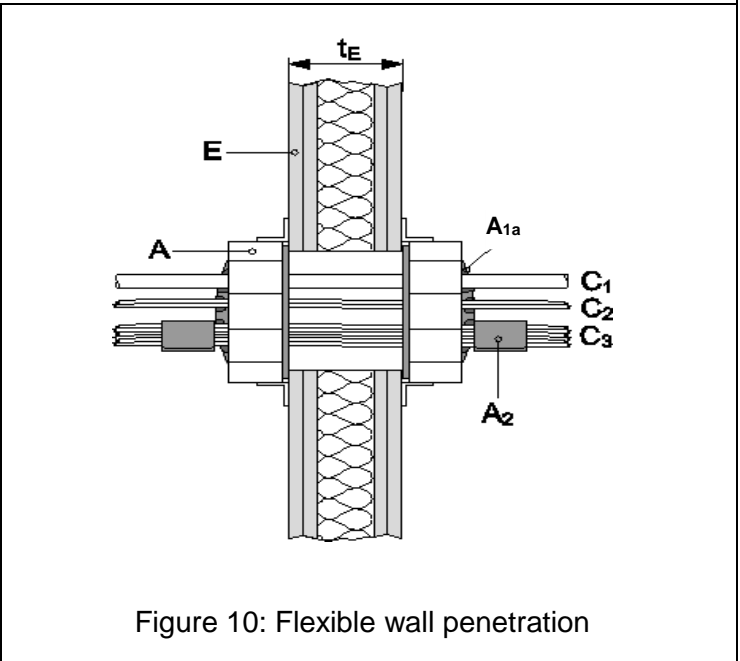
C.2 Flexible or rigid walls according to Annex C.1.1 of the ETA - minimum wall thickness 100 mm

C.2.1 Blank seal (no services)	
<p>Construction details (for symbols and abbreviations see Annex A.3 of the ETA)</p> <ul style="list-style-type: none"> With two Hilti Firestop Cable Collars CFS-CC (A) a penetration seal with a thickness (t_A) of approximately 200 mm is formed, centered to wall (E) w: \varnothing of penetration, seal size <p>If services will be added later on in a blank seal only the services listed in the tables below may be added to fulfil the required classification</p>	 <p style="text-align: center;">Figure 9: Blank seal</p>
Classification	
Seal Size \varnothing : 108 mm	EI 120

C.2.2 Penetrating elements

Services have to be supported at ≤ 300 mm from both faces of wall.
 Hilti Firestop Cable Collars CFS-CC are mounted on the surface by the use of 2 to 3 fixing hooks evenly spaced around the penetration seal.

Abbreviation	Description
A, A ₁ , A ₂ ,...	Firestop products: A: Cable Collar A _{1a} : Filler A ₂ : Putty bandage
C, C ₁ , C ₂ ,...	Penetrating elements
E, E ₁ , E ₂ ,...	Building elements
t_E	Thickness of the building element



C.2.2.a) Cables

Construction Details:

- Hilti Firestop Cable Collar CFS-CC (A), thickness of penetration seal (t_A) \leq 200 mm
- Board frame (E1) according to Annex C.1.2. of the ETA
- Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA
- Filler coating with a length of 50 mm and a thickness of 5 mm (A_{1b}), see Annex C.1.4.2 of the ETA
- Hilti Firestop Putty Bandage CFS-P BA, two layers on each side (A_2), see Annex C.1.4.3 of the ETA
- For abbreviations see Annex A.3 of the ETA

For cable types (e.g. power, control, signal, telecommunication, data, optical fibre cables, with or without service support constructions) see the following classifications.

Additional protection	Classification			
	None	Filler Coating	Putty 2x	Board Frame
Wall thickness at penetration seal	100 mm			150 mm (100 + 2x25)
<u>All sheathed cable:</u>				
$\varnothing \leq 21$ mm ($\varnothing 108$ mm can be filled 100% with cable of this diameter)	EI 90/ E 120	-	EI 120	EI 120
$21 \leq \varnothing \leq 50$ mm	EI 60/ E 120	EI 90/ E 120	EI 90/ E 120	EI 90/ E 120
Tied cable bundle $\leq \varnothing 100$ mm; \varnothing single cable ≤ 21 mm	EI 90/ E 120	-	EI 120	EI 120
Non-sheathed cables (wires) $\varnothing \leq 24$ mm	EI 30/ E 120		EI 60/ E 120	

C.2.2.b) Small conduits and tubes

Construction details:

- Hilti Firestop Cable Collar CFS-CC (A), thickness of penetration seal (t_A) \leq 200 mm
- Penetrating elements (C_1) - see illustration Figure 10 in Annex C.2.2 of the ETA
- Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA
- For abbreviations see Annex A.3 of the ETA

$\varnothing \leq 16$ mm, wall thickness of conduit/tube ≥ 1 mm, arranged linear or clustered, with or without cables, with or without service support construction, 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 details:

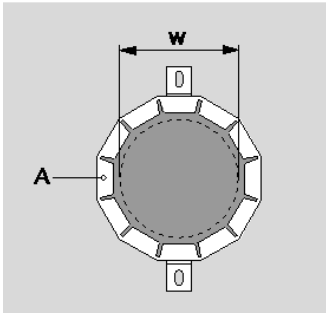
- Hilti Firestop Cable Collar CFS-CC (A), thickness of penetration seal (t_A) \leq 200 mm
- Penetrating elements (C_1) - see illustration Figure 10 in Annex C.2.2 of the ETA
- Wall thickness of conduits: - PO: 1.2 to 2.30 mm - Polyolefin (PE, PP, PPE, PPO, ...)
- PVC: 1.80 to 2 mm - Polyvinylchloride
- Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA
- For abbreviations see Annex A.3 of the ETA

		Diameter [mm]		Classification
		PO	PVC	
Flexible and rigid conduits: <i>Dietzel FXPYF/2232</i> <i>Dietzel FXOM/23341</i> <i>Fränkische-Kupla PFKu-EM-F-LS0H</i> <i>Marlay/Flex/2221</i> <i>Hegler HP-EPKMH 25</i> <i>Dietzel HFIRM 2242</i>	with and without cable	16 - 32	16 - 32	EI 120 U/U
Bundle of rigid or flexible conduits, \varnothing of single conduits ≤ 32 mm	with cable	≤ 80		EI 120 U/U
	without cable			EI 90 / E 120 U/U

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C.2.2.d) Waveguides (coaxial)	
Construction details: <ul style="list-style-type: none"> • Hilti Firestop Cable Collar CFS-CC (A), thickness of penetration seal (t_A) \leq 200 mm • Penetrating elements (C_1) - see illustration Figure 10 in Annex C.2.2 of the ETA • Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA • For abbreviations see Annex A.3 of the ETA 	
Waveguides (coaxial):	Classification
<i>RFS Cellflex LCF 78-50 JA \varnothing 27.8 mm</i> <i>RFS Cellflex LCF 214-50 J \varnothing 59.9 mm</i> <i>RFS Heliflex HCA 78-50 JFNA \varnothing 28.0 mm</i> <i>RFS Heliflex HCA 158J \varnothing 59.9 mm</i>	EI 90/ E 120 U/C
<i>RFS Radialflex RLKW 78-50 \varnothing 28.5 mm</i> <i>RFS Radialflex RLKU 158-50 JFLA \varnothing 48.2 mm</i>	EI 120 U/C

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)	
Construction details (for symbols and abbreviations see Annex A.3 of the ETA) <ul style="list-style-type: none"> • Hilti Firestop Cable Collar CFS-CC (A) is mounted on each side of the floor • With two Hilti Firestop Cable Collars CFS-CC (A) a penetration seal with a thickness (t_A) of approximately 250 mm is formed • w: \varnothing of penetration, seal size <p>If services will be added later on in a blank seal only the services listed in the tables below may be added to fulfil the required classification</p>	 <p>Figure 11: blank seal floor</p>
	Classification
Seal Size (w) \varnothing : 108 mm	EI 120

C.3.2 Penetrating elements – floor application - 150 mm

Services have to be supported at ≤ 300 mm.

Hilti Firestop Cable Collars CFS-CC are fixed on the surface by 2 or 3 fixing hooks. Hooks have to be spaced at sufficient distance to each other. The maximum seal size is $\varnothing 108$ mm.

Abbreviation	Description
A, A ₁ , A ₂	Firestop products: A: Cable Collar A ₁ : Filler A ₂ : Putty bandage
C, C ₁ , C ₂	Penetrating elements
E, E ₁ , E ₂	Building elements
t _E	Thickness of the building element
M	Mortar

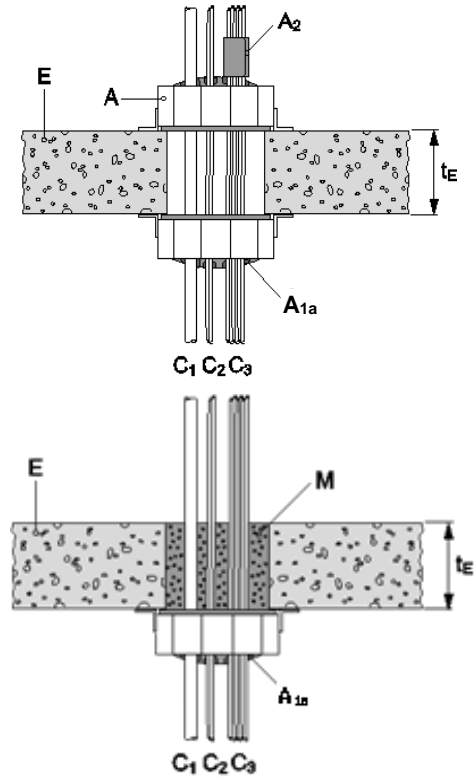


Figure 12: Floor penetration

C.3.2.a) Cables

Construction Details:

- Hilti Firestop Cable Collar CFS-CC (A), thickness of penetration seal (t_A) ≤ 250 mm
- Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA
- Annular space between penetrating elements and floor edges filled with cementitious mortar, see Annex C.1.4.4 of the ETA
- Hilti Firestop Putty Bandage CFS-P BA, on upper side of floor only (A₂), see Annex C.1.4.3 of the ETA
- Depending on the intended use, it is possible to use only one Hilti Firestop Cable Collar CFS-CC (A) on the bottom side of the floor, see the following classifications
- For abbreviations see Annex A.3 of the ETA

For cable types (e.g. power, control, signal, telecommunication, data, optical fibre cables, with or without service support constructions) see the following classifications.

Additional protection:	Classification	
	Gap Filler	Gap Filler + 2x Putty
<u>All sheathed cable:</u>		
$\varnothing \leq 21$ mm	EI 90 / E 120	EI 120
$\varnothing \leq 21$ mm (100% of cross section filled)	EI 120	EI 120
$21 \leq \varnothing \leq 50$ mm	EI 90 / E 120	EI 120
Tied cable bundle $\leq \varnothing 80$ mm; \varnothing single cable ≤ 21 mm	EI 120	EI 120
Non-sheathed cables (wires) $\varnothing \leq 24$ mm	EI 30 / E 120	EI 120

Hilti Firestop Cable Collar CFS-CC on bottom side of floor only, the annular space between penetration seal and floor edges filled with cementitious mortar according to Annex C.1.4.4 of the ETA.		
Additional protection:	Classification	
	Gap Filler + Mortar 1x Cable Collar	Gap Filler +Mortar 1x Cable collar 2x Putty
<u>All sheathed cable:</u>		
$\varnothing \leq 21$ mm	EI 120	EI 120
$\varnothing \leq 21$ mm (100% of cross section filled)	EI 120	EI 90 / E 120
$21 \leq \varnothing \leq 50$ mm	EI 60 / E 120	EI 120
Non-sheathed cables (wires) $\varnothing \leq 24$ mm	EI 90 / E 120	EI 120

C.3.2.b) Small conduits and tubes

Construction details:

- Hilti Firestop Cable Collar CFS-CC (A) on both sides of the floor, thickness of penetration seal (t_A) ≤ 250 mm
- Penetrating elements (C_1) - see illustration Figure 12 in Annex C.3.2 of the ETA
- Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA
- For abbreviations see Annex A.3 of the ETA

$\varnothing \leq 16$ mm, wall thickness of conduit/tube ≥ 1 mm, arranged linear, with or without cables, minimum distance to each other = 0 mm	Classification
Plastic conduits and tubes	EI 120 U/U
Steel conduits and tubes	EI 120 C/U
Tied bundle of conduits up to $\varnothing 80$ mm	EI 120 U/U

C.3.2.c) Conduits

Construction details:

- Hilti Firestop Cable Collar CFS-CC (A) on both sides of the floor, thickness of penetration seal (t_A) ≤ 250 mm
- Penetrating elements (C_1) - see illustration Figure 12 in Annex C.3.2 of the ETA
- Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA
- For abbreviations see Annex A.3 of the ETA

		Diameter [mm]	Classification
Flexible conduits: <i>Dietzel FXPYF/2232</i> <i>Dietzel FXOM/23341</i>	with and without cable	$16 \leq \varnothing \leq 32$	EI 120 U/U
Rigid conduits: <i>Fränkische-Kupla FPKu-EM-F-LS0H</i> <i>Fränkische-Isifix-EL-F</i>	with and without cable	$25 \leq \varnothing \leq 32$	EI 120 U/U
Rigid conduits: <i>Fränkische-Isifix-EL-F</i> <i>Hegler HP-EPKMH 25</i>	with and without cable	25	EI 120 U/U
Hilti Firestop Cable Collar CFS-CC on bottom side of floor only, the annular space between penetration seal and floor edges filled with cementitious mortar according to Annex C.1.4.4 of the ETA.			
		Diameter [mm]	Classification
Rigid and flexible conduits: <i>Fränkische-Isifix-EL-F</i> <i>Hegler HP-EPKMH 25</i>	with and without cable	25	EI 120 U/U

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C.3.2.d) Waveguides (coaxial)	
Construction details: <ul style="list-style-type: none"> • Hilti Firestop Cable Collar CFS-CC (A) on both sides of the floor, thickness of penetration seal (t_A) ≤ 250 mm • Penetrating elements (C_1) - see illustration Figure 12 in Annex C.3.2 of the ETA • Hilti Firestop Filler CFS-FIL (A_{1a}) according to Annex C.1.4.1 of the ETA • For abbreviations see Annex A.3 of the ETA 	
Waveguides (coaxial):	Classification
<i>RFS Heliflex HCA 78-50J D Ø 28,0 mm</i> <i>RFS Heliflex HCA 158J Ø 50,4 mm</i>	EI 90 / E 120 - U/C
<i>RFS Cellflex LCF 78-50JA Ø 27,8 mm</i> <i>RFS Cellflex LCF 214-50J Ø 59,9 mm</i> <i>RFS Radialflex RLKW 78-50 JFNA Ø 28,5 mm</i> <i>RFS Radialflex RLKU 158-50 JFLA Ø 48,2 mm</i>	EI 120 - U/C

C.4 Additional Application

Following additional applications are tested and proved to reach classification as stated above for both wall or floor installations. Deviations from before mentioned conditions or classifications are described.

C.4.1 Protection of the edge of Hilti Firestop Cable Collar CFS-CC

In cases where damage of a cable might occur a rubber protection strip can be used on the inner edges of the metal cage

C.4.2 Installation of a part of the Hilti Firestop Cable Collar CFS-CC	
To fit Hilti Firestop Cable Collar CFS-CC to corner of wall / wall/ floor or wall/wall or wall/floor edges	<ul style="list-style-type: none"> • Up to 6 metal segments of the Hilti Firestop Cable Collar CFS-CC can be taken out (half size of the metal cage) • Hilti Firestop Cable Collar CFS-CC is mounted with compression against the corner by pushing the tailored foam inlay. The inlay may comprise of two parts. • At least two fixing hooks have to be used at sufficient distance to each other.
Perpendicular out-bending of cables	<ul style="list-style-type: none"> • Cables of size $\varnothing \leq 21$ mm can be phased out in a perpendicular manner through Hilti Firestop Cable Collar CFS-CC along wall/floor. In parallel, additional cables might run straight through as in standard configuration. • In this case up to 3 metal segments can be taken out to open space for cable penetration. • Three fixing hooks have to be used for the fixation of Hilti Firestop Cable Collar CFS-CC • For wall and floor application the classification is EI 120

C.4.3 Special smoke guide pipe application

The penetration of chemical high resistant smoke guide pipes made of ABS plastic (EN ISO 15493) with Ø 25 mm and a wall thickness of 2,3 mm, sealed with Hilti Firestop Cable Collar CFS-CC is assessed with a classification of EI 120 U/U

C.4.4 Classification of split-type air conditioner services

The penetration of insulated copper pipes including plastic condenser tubes of split-type air conditioner, sealed with Hilti Firestop Cable Collar CFS-CC is assessed with following classification:

- EI 120 C/U (Copper Pipe)
- EI 120 U/U (Condensation Pipe)
- EI 120 (cables)

Application:

- Sangi twin copper pipe 12/6 mm x 1,0 mm, insulated with PEP insulation of 9 mm thickness (Ø 30 or 24 mm)
- plastic condenser tube Ø 24 mm x 4,3 mm (Rehau Raufilam-E, flex PVC)
- electrical cables: two cables, each 5 x 1,5 mm²
- all services are bundled together with no distance in between

C.4.5 Protection of isolated copper pipe Ø 22 mm

The penetration of copper pipes, isolated with RS 800 Rockwool mineral wool (LS), protruding at a length of 200 mm on each side, sealed with Hilti Firestop Cable Collar CFS-CC is assessed with following classifications:

- Wall EI 90 / E 120 C/U
- Floor EI 120 C/U

ANNEX D

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP CABLE COLLAR CFS-CC IN WOOD CONSTRUCTIONS

D.1 General Information

D.1.1 Wall / floor constructions

Timber: “Binderholz BBS XL” CLT Walls & Floors

CLT Types classified according to: EN 16351:2015.

Field of application:

- Minimum element thickness 80 mm, maximum thickness 140 mm
- Minimum layer thickness: 20mm
- Minimum number of layers: 3
- Shall comprise Polyurethane and MUF based adhesives
- Valid only for Softwood CLT types such as: spruce/fir, pine, larch, stone pine

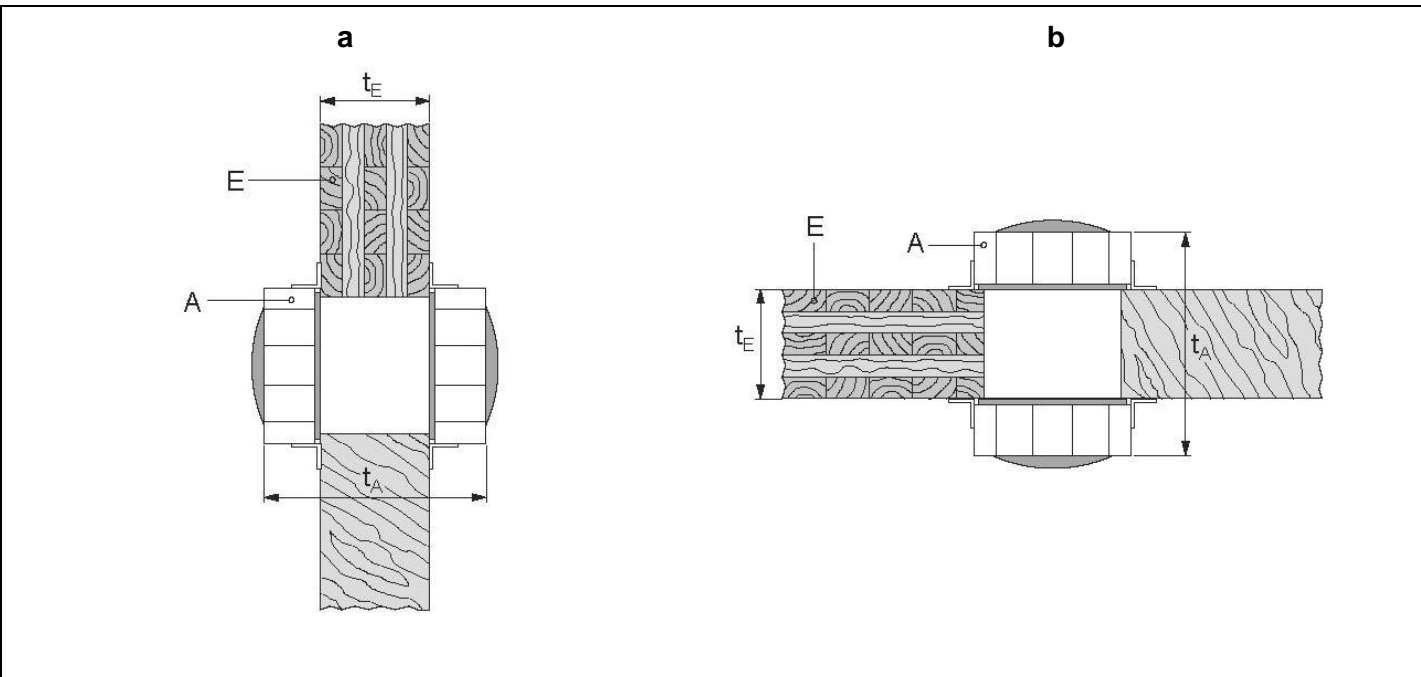


Figure 23: Position of the penetration seal in timber walls / floors (a,b)

A	Hilti Firestop Cable Collar CFS-CC	t _E	Thickness of separating element
E	Separating element	t _A	Thickness of the penetration seal

D.1.3 Maximum Seal Size

- Cable collar inlay has to be cut to fit on penetrating cables
- Maximum diameter of cut out part is approximately 108 mm (convex core, w), so a boundary stripe of approximately 19 mm inlay is left on the edge of the collar (Ø 150 mm).

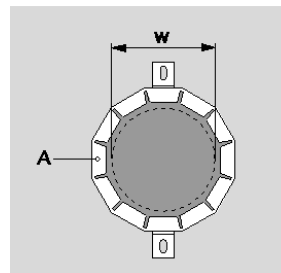


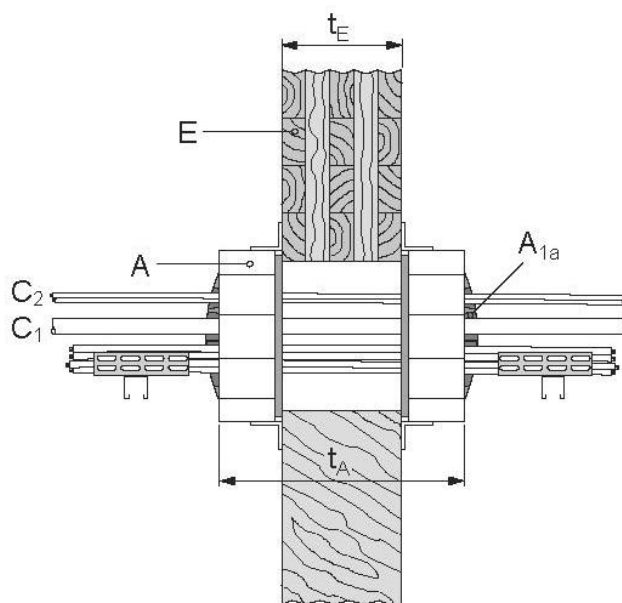
Figure 2: maximum seal size (w)

D.1.4 Penetrating elements in wall application

Services have to be supported at ≤ 350 mm from both faces of wall.

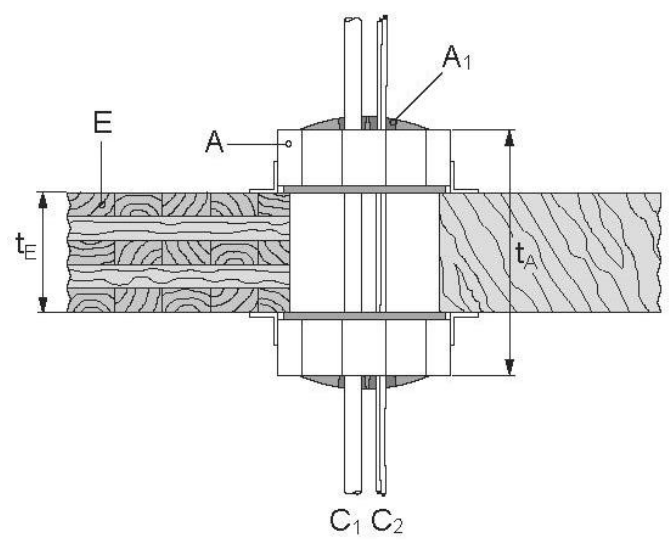
Hilti Firestop Cable Collars CFS-CC are mounted on the surface using 2 to 3 fixing hooks evenly spaced around the penetration seal.

Abbreviation	Description
A, A ₁	Firestop products: A: Cable Collar A _{1a} : Filler
C, C ₁ , C ₂	Penetrating elements
E	Building elements
t _E	Thickness of the building element
t _A	Thickness of the seal



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D.1.5 Penetrating elements – floor application	
Services have to be supported at ≤ 350 mm.	
Hilti Firestop Cable Collars CFS-CC are fixed on the surface by 2 or 3 fixing hooks. Hooks have to be spaced at sufficient distance to each other. The maximum seal size is $\varnothing 108$ mm.	
Abbreviation	Description
A, A ₁	Firestop products: A: Cable Collar A ₁ : Filler
C ₁ , C ₂	Penetrating elements
E	Building elements
t _E	Thickness of the building element
t _A	Thickness of the seal



D.2.1 Cross laminated timber wall	≥ 80 mm	
The wall must be ≥ 80 mm thick and must have at least 3 layers of wood, whereby the outer layer must have a thickness of ≥ 20 mm. Both PU and MUF glues permitted. Edge gluing is not necessary.		
<u>All sheathed cable:</u>		
Single cables	$\varnothing \leq 21$ mm	EI 60
Cable bundle (cable size $\varnothing \leq 21$ mm)	$\varnothing \leq 100$ mm	EI 60

D.2.2 Cross laminated timber wall	≥ 100 mm	
The wall must be ≥ 100 mm thick and must have at least 3 layers of wood, whereby the outer layer must have a thickness of ≥ 20 mm. Both PU and MUF glues permitted. Edge gluing is not necessary.		
<u>All sheathed cable:</u>		
Single cables	$\varnothing \leq 21$ mm	EI 90
Cable bundle (cable size $\varnothing \leq 21$ mm)	$\varnothing \leq 100$ mm	EI 90

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D.3.1 Cross laminated timber floor	≥ 80 mm	
The floor must be ≥ 80 mm thick and must have at least 3 layers of wood, whereby the outer layer must have a thickness of ≥ 20 mm. Both PU and MUF glues permitted. Edge gluing is not necessary.		
<u>All sheathed cable:</u>		
Single cables	$\varnothing \leq 21 \text{ mm}$	EI 60
Cable bundle (cable size $\varnothing \leq 21 \text{ mm}$)	$\varnothing \leq 100 \text{ mm}$	EI 60
D.3.2 Cross laminated timber floor	≥ 100 mm	
The floor must be ≥ 100 mm thick and must have at least 5 layers of wood, whereby the outer layer must have a thickness of ≥ 20 mm. Both PU and MUF glues permitted. Edge gluing is not necessary.		
<u>All sheathed cable:</u>		
Single cables	$\varnothing \leq 32 \text{ mm}$	EI 90 – U/C
Cable bundle (cable size $\varnothing \leq 21 \text{ mm}$)	$\varnothing \leq 32 \text{ mm}$	EI 90 – U/C
<u>All conduits with and without cables:</u>		
Conduits (rigid)	$\varnothing \leq 32 \text{ mm}$	EI 90 – U/C
Conduits (flexible)	$\varnothing \leq 32 \text{ mm}$	EI 90 – U/C
D.3.3 Cross laminated timber floor	≥ 140 mm	
The floor must be ≥ 140 mm thick and must have at least 3 layers of wood, whereby the outer layer must have a thickness of ≥ 40 mm. Both PU and MUF glues permitted. Edge gluing is not necessary.		
<u>All sheathed cable:</u>		
Single cables	$\varnothing \leq 21 \text{ mm}$	EI 120
Cable bundle (cable size max. $\varnothing \leq 21 \text{ mm}$)	$\varnothing \leq 100 \text{ mm}$	EI 120

D.4.1 linear or / and Cluster arrangement

Minimum distances in mm:

s_a = 15 (distance between cable collars linear)

s_b = 15 (distance between cable collars in cluster arrangement)

Note: all other penetrations (distance) \leq 200 mm

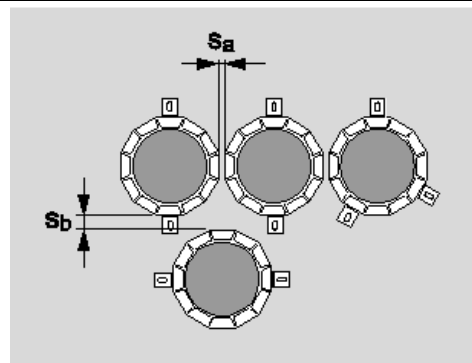


Figure 7

D.4.2 Fixing components

All CLT wall and all CLT floor

	All CLT wall and all CLT floor				
	Wall		Floor		
	80mm	100mm	80mm	100mm	140mm
HILTI HUS3 H6x60	x		x		
Hilti S-WS 11Y x 75	x		x		
6kt. Holzschrauben 6x60	x		x		
HILTI HUS3 H6x80		x		x	
Hilti S-WS 11Y x 85		x		x	x
6kt. Holzschrauben 6x80		x		x	
Hilti S-WS 11Z x 85		x		x	x
HILTI HUS3 H6x100					x
6kt. Holzschrauben 6x100					x

