



ETA-Danmark A/S
Göteborg Plads 1
DK-2150 Nordhavn
Tel. +45 72 24 59 00
Internet www.etadanmark.dk

Authorised and notified
according to Article 29 of the
Regulation (EU)
No 305/2011 of the European
Parliament and of the Council
of 9 March 2011

MEMBER OF EOTA



European Technical Assessment ETA-20/1234 of 2024/02/19

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

Hilti Firestop Sleeve CFS-SL GA

Product family to which the above construction product belongs:

Penetration Seals

Manufacturer:

Hilti AG
Feldkircherstraße 100
DE-9494 Schaan
Liechtenstein
Telephone +49 423 234 21 11
Internet: www.hilti.group

Manufacturing plant:

Hilti Plant 4a
Hilti Plant 14

This European Technical Assessment contains:

51 pages including 5 annexes which form an integral part of the document

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

EAD 350454-00-1104 Fire stopping and fire sealing products, Penetration Seals

This version replaces:

The previous ETA with the same number and issued on 2023-02-16

List of Content

1	Technical description of the product.....	5
2	Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD).....	5
3	Performance of the product and references to the methods used for its assessment.....	6
3.2	Safety in case of fire (BWR 2).....	6
3.3	Hygiene, health and the environment (BWR 3).....	6
3.4	Safety and accessibility in use (BWR 4).....	6
3.5	Protection against noise (BWR 5).....	6
3.6	Energy economy and heat retention (BWR 6).....	6
3.7	Methods of verification.....	7
3.8	General aspects related to the fitness for use of the product.....	7
4	Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base.....	8
5	Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD.....	8
A	Annex - Reference documents/standards.....	9
A.1	Reference to standards mentioned in the ETA.....	9
A.2	Other reference documents.....	9
B	Annex - Description of the product and ancillary products.....	10
B.1	Description of the product.....	10
B.1.1	List of acronyms.....	10
B.1.2	Device.....	10
B.2	Gasket.....	11
B.3	Flange.....	11
B.4	Ancillary products & additional protection.....	12
B.4.1	Hilti Firestop Gang plate CFS-SL GP 40 and CFS-SL GP 60.....	12
B.4.2	Hilti Firestop Gangplate CAP CFS-SL GP CAP.....	12
B.4.3	Hilti Firestop Acrylic sealant CFS-S ACR (ETA-10/0292).....	12
B.4.4	Hilti Firestop Putty Roll CP 619 T & Putty Pad CP 617.....	12
B.4.5	Hilti Firestop Putty Bandage CFS-P BA (ETA-13/0704).....	12
B.4.6	Hilti Firestop Plug CFS-PL 132 (ETA-13/0125).....	12
C	Annex – Resistance to fire.....	13
C.1	Intended use of joints and reference to relevant sections application.....	13
C.1.1	Application in flexible and rigid wall.....	13
C.1.2	Application in sandwich panel.....	13
C.1.3	Application in cross laminated timber: Binderholz wall.....	13
C.1.4	Application in rigid floor.....	13
C.1.5	Application in cross laminated timber: Binderholz floor.....	14
C.1.6	Application in cross laminated timber: Lignatur floor.....	14
C.1.7	Application in cross laminated timber: Lignotrend floor.....	14
C.2	General Information.....	15
C.2.1	Seal types.....	15
C.2.2	Assembling and mounting specifics.....	16
C.2.2.1	Seal type 1.....	16
C.2.2.2	Seal type 1a.....	16

C.2.2.3	Seal type 1b.....	17
C.2.2.4	Seal type 2.....	17
C.2.2.5	Seal type 2a.....	18
C.2.3	Construction Group.....	19
C.2.4	Fixation and Positioning.....	19
C.2.4.1	Fixation and positioning of seal type 1.....	19
C.2.4.2	Fixation and positioning of seal type 2.....	19
C.2.5	Minimum/Maximum opening size.....	19
C.2.6	First support.....	20
C.2.7	Distances.....	20
C.2.8	Orientation of penetrants.....	21
C.2.9	Penetrants.....	21
C.2.9.1	Cables.....	21
C.2.9.2	Conduits.....	22
C.3	Resistance to fire classification CFS-SL GA.....	23
C.3.1	Flexible and rigid wall.....	23
C.3.2	Sandwich panel.....	29
C.3.2.1	Specifics of sandwich panel.....	29
C.3.2.2	Application specifics of CFS-SL GA in sandwich panel (t_E).....	29
C.3.2.3	Resistance to fire of CFS-SL GA in sandwich panel ($t_E \geq 100$ mm).....	30
C.3.2.4	Resistance to fire of CFS-SL GA in sandwich panel ($t_E \geq 150$ mm).....	31
C.3.3	Cross laminated timber: Binderholz BBS walls.....	32
C.3.3.1	Specifics of Binderholz wall.....	32
C.3.3.2	Distances to other openings of CFS-SL GA.....	32
C.3.3.3	Application specifics of CFS-SL GA in Binderholz BBS wall.....	33
C.3.3.4	Resistance to fire of CFS-SL GA in Binderholz BBS wall ($t_E \geq 80$ mm).....	34
C.3.3.5	Resistance to fire of CFS-SL GA in Binderholz BBS wall ($t_E \geq 100$ mm).....	35
C.3.4	Rigid floor ($t_E \geq 150$ mm).....	36
C.3.4.1	Specifics of rigid floor.....	36
C.3.4.2	Application specifics of CFS-SL GA in rigid floor.....	36
C.3.4.3	Resistance to fire of CFS-SL GA in rigid floor.....	36
C.3.5	Cross laminated timber: Binderholz BBS floors.....	39
C.3.5.1	Specifics of Binderholz floors.....	39
C.3.5.2	Application specifics of CFS-SL GA in Binderholz BBS XL floor.....	39
C.3.5.3	Distances to other openings for CFS-SL GA.....	39
C.3.5.4	Resistance to fire of CFS-SL GA in Binderholz BBS XL floor ($t_E \geq 80$ mm).....	40
C.3.5.5	Resistance to fire of CFS-SL GA in Binderholz BBS floor ($t_E \geq 140$ mm).....	42
C.3.6	Skin panels: Lignatur floor.....	44
C.3.6.1	Specifics of Lignatur floor ($t_E \geq 160$ mm).....	44
C.3.6.2	Application specifics of CFS-SL GA in Lignatur floor.....	45
C.3.7	Cross laminated timber: Lignotrend.....	47
C.3.7.1	Specifics of Lignotrend.....	47
C.3.7.2	Application specifics of CFS-SL GA in Lignotrend floor.....	47
C.3.7.3	Resistance to fire of CFS-SL GA in Lignotrend floor ($t_E \geq 169$ mm).....	48
C.3.7.4	Resistance to fire of CFS-SL GA in Lignotrend floor ($t_E \geq 196$ mm).....	49
D	Annex – Instruction for use/product literature.....	50
E	Annex – Abbreviation used in drawings.....	51

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full. However, partial reproduction may be made, with the written consent of the issuing Technical Assessment Body. Any partial reproduction has to be identified as such.

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

A detailed specification of the products listed below is given in annex B of this ETA.

For Fire Resistance Classifications, see Annex C.

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

Detailed information and data are given in Annex A and Annex B.

The intended use of Hilti Firestop Sleeve CFS-SL GA (and ancillary products) is to reinstate the fire resistance performance of flexible or rigid wall, sandwich panel, rigid floors and timber walls and floors (solid and engineered), Lignatur and Lignotrend floors, where they are penetrated by services.

Construction elements for use of CFS-SL GA to provide a penetration seal in, are detailed in Annex B, C.1.

The provisions made in this European Technical Assessment are based on an assumed working life of the Hilti Firestop Sleeve CFS-SL GA of 25 years, provided that the conditions laid down in the manufacturers datasheet and instructions for the packaging/ transport/ storage/ installation/ use/ repair are met. The indications given on the 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 choosing the right products in relation to the expected economically reasonable working life of the works.

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

Characteristic	Assessment of characteristic																
3.2 Safety in case of fire (BWR 2)																	
Reaction to fire	Classified in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364 as Class E																
Resistance to fire	Classified in accordance with EN 13501-2, see Annex C																
3.3 Hygiene, health and the environment (BWR 3)																	
Air permeability	<table border="1"> <thead> <tr> <th>Pressure [Pa]</th> <th>Leakage [m³/(h)]</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>0.24</td> </tr> <tr> <td>50</td> <td>0.83</td> </tr> <tr> <td>100</td> <td>1.38</td> </tr> <tr> <td>150</td> <td>1.83</td> </tr> <tr> <td>200</td> <td>2.21</td> </tr> <tr> <td>250</td> <td>2.59</td> </tr> <tr> <td>300</td> <td>2.95</td> </tr> </tbody> </table>	Pressure [Pa]	Leakage [m ³ /(h)]	10	0.24	50	0.83	100	1.38	150	1.83	200	2.21	250	2.59	300	2.95
Pressure [Pa]	Leakage [m ³ /(h)]																
10	0.24																
50	0.83																
100	1.38																
150	1.83																
200	2.21																
250	2.59																
300	2.95																
Water permeability	No performance assessed																
Content, emission and/or release of dangerous substances*	<table border="1"> <thead> <tr> <th></th> <th>Concentration after 3 days [mg/m³]</th> <th>Concentration after 28 days [mg/m³]</th> </tr> </thead> <tbody> <tr> <td>Sum of VOC</td> <td><0,005</td> <td><0,005</td> </tr> <tr> <td>Sum of SVOC</td> <td>0,018</td> <td><0,005</td> </tr> </tbody> </table>		Concentration after 3 days [mg/m ³]	Concentration after 28 days [mg/m ³]	Sum of VOC	<0,005	<0,005	Sum of SVOC	0,018	<0,005							
	Concentration after 3 days [mg/m ³]	Concentration after 28 days [mg/m ³]															
Sum of VOC	<0,005	<0,005															
Sum of SVOC	0,018	<0,005															
3.4 Safety and accessibility in use (BWR 4)																	
Mechanical resistance and stability	No performance assessed																
Resistance to impact/movement	No performance assessed																
Adhesion	No performance assessed																
Durability	Use conditions Z ₂																
3.5 Protection against noise (BWR 5)																	
Airborne sound insulation	No performance assessed																
3.6 Energy economy hand heat retention (BWR 6)																	
Thermal properties	No performance assessed																
Water vapour permeability	No performance assessed																

See additional information in section 3.7 – 3.8.

*) In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g., transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply

3.7 Methods of verification

The characteristic values of the firestop sleeve system are based on the EAD 350454-00-1104, assessed as a “Collar” according to the description in chapter 1.1.

3.8 General aspects related to the fitness for use of the product.

The verification of durability is part of testing the essential characteristics. Hilti Firestop Sleeve CFS-SL GA may be used in end-use applications according to the provisions for use category Z₂ (intended for uses in internal conditions with humidity lower than 85% RH excluding temperatures below 0°C without exposure to rain or UV), without expecting significant changes of the characteristics relevant for fire protection.

The European Technical Assessment is issued for the product based on agreed data/information, deposited with ETA-Danmark, 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 ETA-Danmark before the changes are introduced. ETA-Danmark will decide if such changes affect the ETA and consequently the validity of the CE marking based on the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

Hilti Firestop Sleeve CFS-SL GA is manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body.

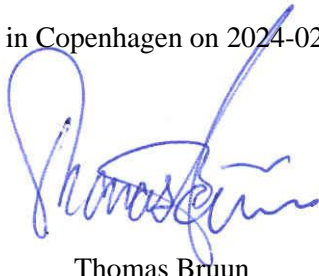
4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base.

According to the Decision 1999/454/EC, amended by Decision 2001/596/EC of the European Commission, as amended, the system(s) of assessment and verification of constancy of performance AVCP (see Annex V of Regulation (EU) No 305/2011) is 1.

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 at ETA-Danmark A/S prior to CE marking

Issued in Copenhagen on 2024-02-19 by



Thomas Bruun

Managing Director, ETA-Danmark

A Annex - Reference documents/standards

Reference documents

A.1 Reference to standards mentioned in the ETA

EN 1026	Windows and doors – Air permeability – Test method
EN 1366-3	Fire resistance tests for service installations – Part 3: Penetration seals
EN 13501-1	Fire classification of construction products and building elements – Part 1: classification using test data from reaction to fire tests
EN 13501-2	Fire classification of construction products and building elements – Part 2: classification using test data from fire resistance tests
EN 16516	Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air
EN ISO 717-1	Acoustics – Rating of sound insulation of buildings and of building elements – Part 1: Airborne sound insulation
EN ISO 10140	Acoustics – Laboratory measurement of sound insulation of building elements Part 2: Measurement of airborne sound insulation Part 3: Measurement of impact sound insulation
EN 300	Oriented Strand Boards (OSB) - Definitions, classification and specifications
EN 338	Structural timber - Strength classes
EN 520	Gypsum plasterboards - Definitions, requirements and test methods
EN 16351	Timber structures - Cross laminated timber - Requirements
EN 13986	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking

A.2 Other reference documents

EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products
ETA-06/0009	Binderholz Brettsperrholz BBS (cross laminated timber - Binderholz Bausysteme GmbH)
ETA-21/0360	Lignotrend ETA- (cross laminated timber - LIGNOTREND GmbH & Co. KG)
ETA-11/0137	LIGNATUR-box element (LKE), -surface element (LFE) and -shell element (LSE) (prefabricated wood-based loadbearing stressed skin panels - Lignatur AG)

B Annex - Description of the product and ancillary products

B.1 Description of the product

See also www.hilti.group and choose your local country

B.1.1 List of acronyms

Acronym	Full Name	description
GA	CFS-SL GA	HILTI Firestop Sleeve CFS-SL with Rubber Gasket
S	CFS-SL GA S	Small diameter device
M/L	CFS-SL GA M/L	Medium and long device
ILS	CFS SL GA M/L ILS	Medium and long device with locking mechanism at one end
GP 40	CFS-SL GP 40	The 400 mm gangplate with 3 openings
GP 60	CFS-SL GP 60	The 600 mm gangplate with 4 openings
GP CAP	CFS-SL GP CAP	The gangplate CAP for “blank” gangplate openings

B.1.2 Device

The CFS-SL M/L “sleeve” portion consists of a corrugated steel tube that houses a pair of plastic parts (“tabs”), foam membrane and intumescent wraps at each end. Inside the steel tube is a twistable inner fabric smoke seal. Pressing the tabs allows twisting the fabric smoke seal to close the seal. The CFS-SL GA S is built up equivalent to the M/L device but without a foam membrane.



B.2 Gasket

Two rubber gaskets composed of EPDM, are provided with each sleeve, and are placed on both sides of the sleeve - flush to wall/floor surface - to seal the annular gap between edge of opening and perimeter of sleeve.

B.3 Flange

The two steel flanges are used to mount the sleeve to the wall or floor (one flange on each side). Flanges are turned clockwise on the threading of the metal housing till tight against rubber gasket and wall/floor surface.

B.4 Ancillary products & additional protection

B.4.1 Hilti Firestop gangplate CFS-SL GP 40 and CFS-SL GP 60

Both gangplate variants consist of a sandwich type construction of steel plates, ceramic paper, EPDM rubber seal and EPDM foam sealing strips. gangplates are used only with the medium and long diameter sleeve variants - CFS-SL GA M/L (flanges and rubber gaskets not required.) gangplates are surface mounted over pre-formed openings, direct to surface of flexible/rigid wall or sandwich panel by screws. For detailed information refer to C.2.2 (seal type 2)

B.4.2 Hilti Firestop Gangplate CAP CFS-SL GP CAP

The gangplate CAP consists of a zinc coated, steel plate used for “blank” openings in a gangplate (openings without sleeves installed.) The CAPs are installed inside the gangplate openings on both sides of the wall. For detailed information refer to C.2.2 (seal type 2a)

B.4.3 Hilti Firestop Acrylic sealant CFS-S ACR (ETA-10/0292)

For higher fire ratings of the single application CFS-S ACR can be used as annular gap filler instead of the rubber gasket. For detailed information refer to C.2.2 (seal type 1a).

B.4.4 Hilti Firestop Putty Roll CP 619 T & Putty Pad CP 617

For higher fire ratings of the single application in sandwich panel Hilti Putty Roll CP 619 T or Putty Pad CP 617 as are attached around the opening as annular gap sealing in addition to the rubber gasket. For detailed information refer to C.2.2 (seal type 1b)

B.4.5 Hilti Firestop Putty Bandage CFS-P BA (ETA-13/0704)

For higher fire ratings of the single application in sandwich panel Hilti Putty Bandage CFS-P BA can be wrapped around the cables as additional protection. For detailed information refer to C.2.2 (seal type 1b)

B.4.6 Hilti Firestop Plug CFS-PL 132 (ETA-13/0125)

For blank openings in gangplates Hilti CFS-SL GP CAP & CFS-PL 132 are required. For detailed information refer to C.2.2 (seal type 2a)

C Annex – Resistance to fire

C.1 Intended use of joints and reference to relevant sections application

C.1.1 Application in flexible and rigid wall

application	section
blank	C.3.1.3.1
cable	C.3.1.3.2
tied cable bundle	C.3.1.3.3
conduit	C.3.1.3.4
conduit bundle	C.3.1.3.5

C.1.2 Application in sandwich panel

application	section	
	sandwich panel ($t_E \geq 100$ mm)	sandwich panel ($t_E \geq 150$ mm)
blank	C.3.2.3.1	C.3.2.4.1
cable	C.3.2.3.2	C.3.2.4.2

C.1.3 Application in cross laminated timber: Binderholz wall

application	section	
	Binderholz BBS CLT wall ($t_E \geq 80$ mm)	Binderholz BBS CLT wall ($t_E \geq 100$ mm)
blank	C.3.3.4.1	C.3.3.5.2
cable	C.3.3.4.2	C.3.3.5.3
tied cable bundle	C.3.3.4.3	C.3.3.5.4

C.1.4 Application in rigid floor

application	section
blank	C.3.4.3.1
cable	C.3.4.3.2
tied cable bundle	C.3.4.3.3
conduit	C.3.4.3.4
conduit bundle	C.3.4.3.5

C.1.5 Application in cross laminated timber: Binderholz floor

application	section	
	Binderholz BBS CLT floor ($t_E \geq 80$ mm)	Binderholz BBS CLT floor ($t_E \geq 140$ mm)
blank	C.3.5.4.1	C.3.5.5.2
cable	C.3.5.4.2	C.3.5.5.3
tied cable bundle	C.3.5.4.3	C.3.5.5.4

C.1.6 Application in cross laminated timber: Lignatur floor

application	section
blank	C.3.6.2.1
cable	C.3.6.2.2
tied cable bundle	C.3.6.2.3

C.1.7 Application in cross laminated timber: Lignotrend floor

application	section	
	cross laminated rib ceiling ($t_E \geq 169$ mm)	cross laminated rib ceiling ($t_E \geq 196$ mm)
blank	C.3.7.3.1	C.3.7.4.1
cable	C.3.7.3.2	C.3.7.4.2

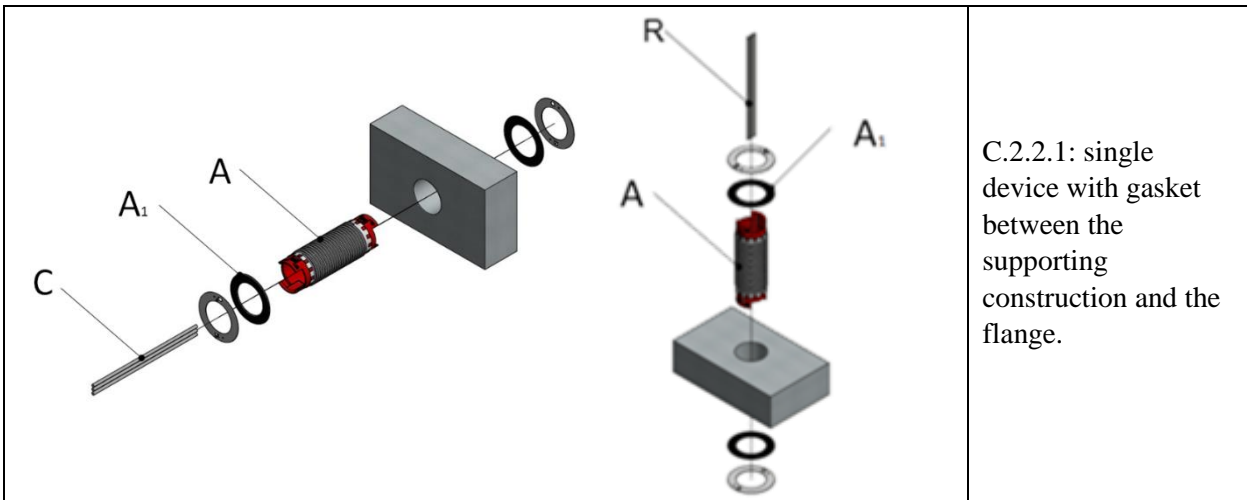
C.2 General Information

C.2.1 Seal types

Seal type	Ancillary product	Supporting construction
seal type 1: single device CFS-SL GA S/M/L	N/A	<ul style="list-style-type: none"> flexible/rigid wall sandwich panel Binderholz walls and floors rigid floor Lignatur floor Lignotrend floor
seal type 1a: single device CFS-SL GA S/M/L	CFS-S ACR	<ul style="list-style-type: none"> flexible/rigid wall rigid floor Lignotrend floor Binderholz walls and floors
seal type 1b: single device CFS-SL GA S/M/L	CP 619 T or CP 617&CFS-P BA	<ul style="list-style-type: none"> sandwich panel
seal type 2: ganged device	CFS-SL GP 40 or 60	<ul style="list-style-type: none"> flexible/rigid wall sandwich panel
seal type 2a: ganged device	<ul style="list-style-type: none"> CFS-SL GP 40 or 60 CFS-SL GP CAP CFS-PL 132 	<ul style="list-style-type: none"> flexible/rigid wall sandwich panel

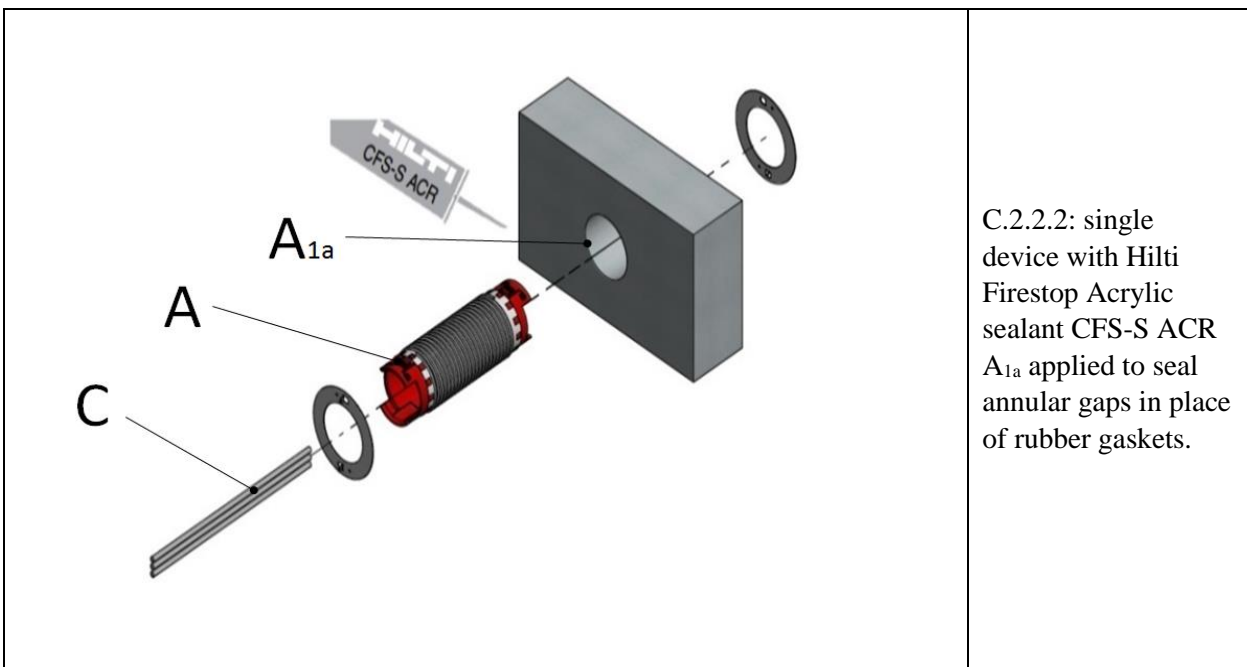
C.2.2 Assembling and mounting specifics

C.2.2.1 Seal type 1



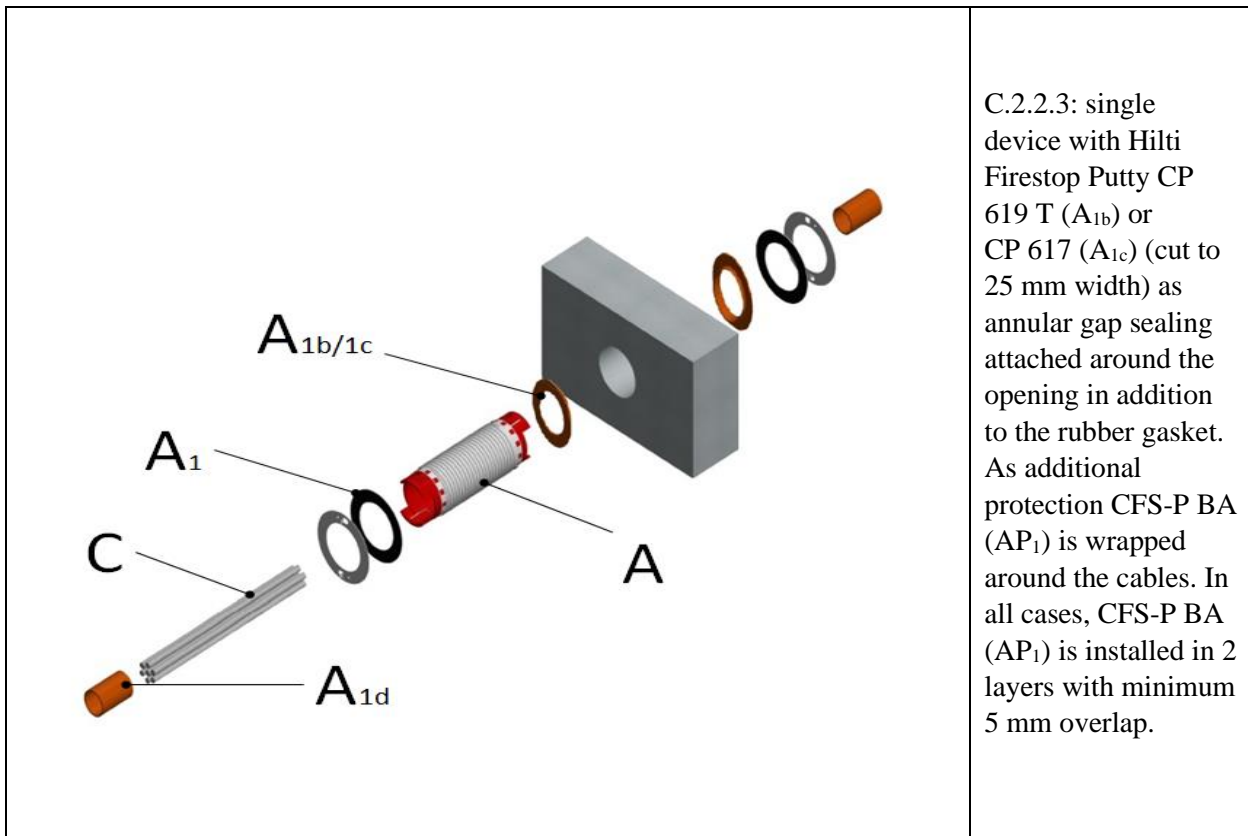
C.2.2.1: single device with gasket between the supporting construction and the flange.

C.2.2.2 Seal type 1a

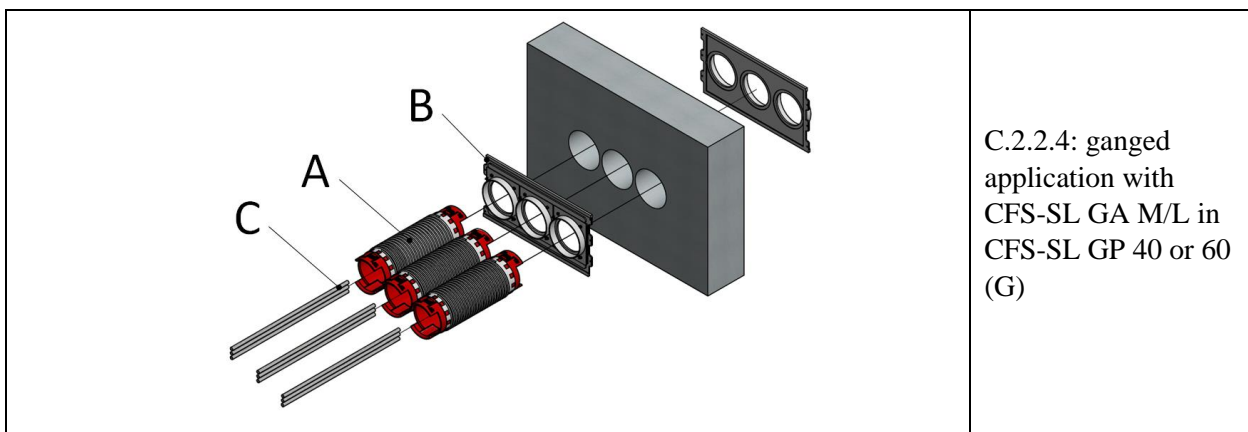


C.2.2.2: single device with Hilti Firestop Acrylic sealant CFS-S ACR A_{1a} applied to seal annular gaps in place of rubber gaskets.

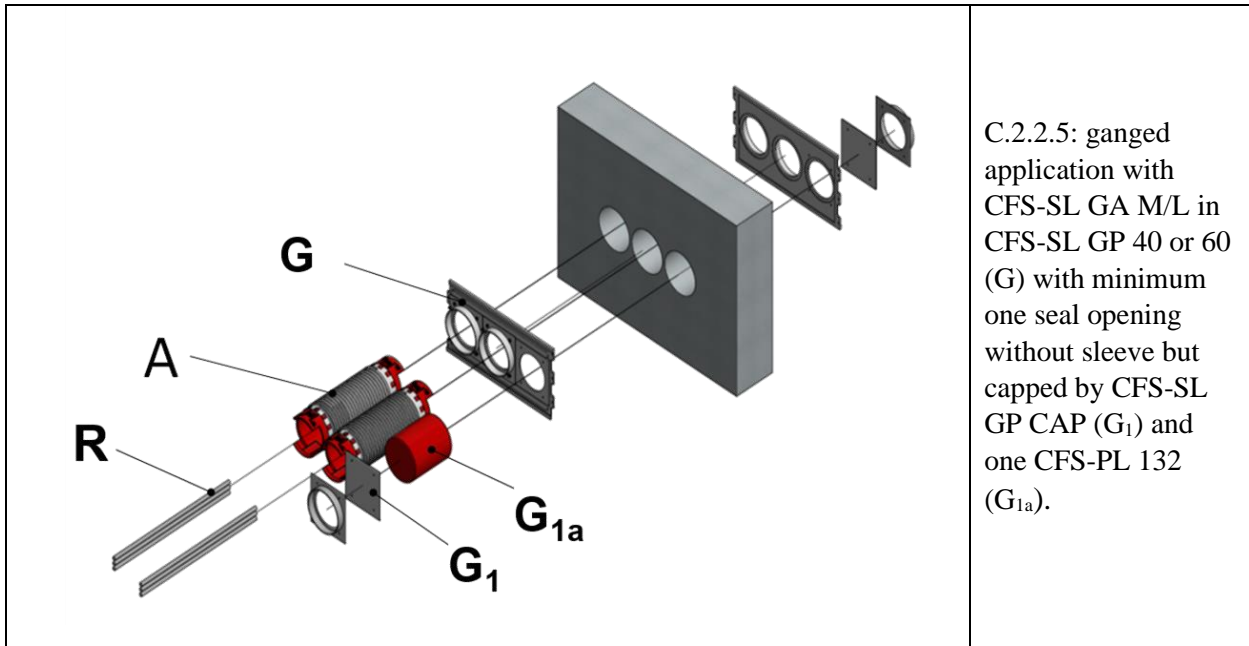
C.2.2.3 Seal type 1b



C.2.2.4 Seal type 2



C.2.2.5 Seal type 2a



C.2.2.5: ganged application with CFS-SL GA M/L in CFS-SL GP 40 or 60 (G) with minimum one seal opening without sleeve but capped by CFS-SL GP CAP (G₁) and one CFS-PL 132 (G_{1a}).

C.2.3 Construction Group

The construction group corresponds to the size of the device.

Construction Group	device
1	CFS-SL GA S
2	CFS-SL GA M/L

C.2.4 Fixation and Positioning

C.2.4.1 Fixation and positioning of seal type 1

seal type 1 is fixed to the supporting construction by turning the flanges clockwise on the threading of the metal housing till tight against rubber gasket and wall/floor surface.

C.2.4.2 Fixation and positioning of seal type 2

The following table shows a guideline for fixing the gangplate of seal type 2.

anchoring solution	anchor indication	drywall	aerated concrete wall	sandwich panel	concrete
drywall screws:	diameter: 3.5 mm length: ≥ 35 mm	x	x		
self-drilling screws:	diameter: 3.5 mm length: ≥ 19 mm			x	
screw Anchor (Hilti HUS3-PS 6)	diameter: 6 mm length: ≥ 40 mm				x*

*Minimum 4 anchors required.

Total quantity of fixations

CFS-SL GP 40	CFS-SL GP 60
12	14

C.2.5 Minimum/Maximum opening size

For specific information for each supporting construction refer to the corresponding chapter in C.3.

seal type	seal detail	device	opening \varnothing^*	opening shape
1, 1a & 1b	single devices	CFS-SL GA S CFS-SL GA M/L	63 – 73 mm 113 – 122 mm	round
2 & 2a	ganged devices	CFS-SL GP 40 or 60	113 – 122 mm	round

C.2.6 First support

For specific information for each supporting construction refer to the corresponding chapter in C.3.

C.2.7 Distances

	<p>C.2.7a: distances for seal types 1, 1a & 1b: ≥ 200 mm horizontal/vertical distance between openings in wall and floor. (For Lignotrend ≥ 100 mm C.3.7)</p>
	<p>C.2.7b: distances for seal types 1, 1a & 1b: zero horizontal/vertical distance between flanges (clustered) in wall and floor.</p>
	<p>C.2.7c: distances for seal types 1, 1a & 1b: zero horizontal/vertical distance between flanges (linear) in wall and floor.</p>

	<p>C.2.7d: distances for seal types 2 & 2a: 200 mm from opening to opening. For single to any number of installations in wall.</p>
	<p>C.2.7e: distances for seal types 2 & 2a: zero distance between two gangplate (touching) in a wall.</p>
	<p>C.2.7f: distances for seal types 2 & 2a: zero distance between three and more gangplate (touching) in a wall.</p>

Note: dimensions above relate to Ø122 mm (CFS-SL GA M/L) – For CFS-SL GA S – use diameter Ø63-73 mm as in C.2.5

C.2.8 Orientation of penetrants

in perpendicular matter (90 °) only.

C.2.9 Penetrants

C.2.9.1 Cables

Cable supports are not allowed to run through the seal. All fire classifications in C.3 allow sleeves to be left blank or filled with cables up to 60% of the total sleeve cross section/area. Higher fills are indicated where possible.

penetrating services	description	device
small cables $\varnothing \leq 21$ mm:	all cable types currently and commonly used in building practice in Europe (e.g., power, control, signal, telecommunication, data, optical fibre cables) with a diameter $\varnothing \leq 21$ mm.	CFS-SL GA S/M/L
medium cables $\varnothing \leq 50$ mm:	all cable types currently and commonly used in building practice in Europe (e.g., power, control, signal, telecommunication, data, optical fibre cables) with a diameter up to $\varnothing \leq 50$ mm.	CFS-SL GA M/L
large cables $\varnothing \leq 80$ mm:	all cable types currently and commonly used in building practice in Europe (e.g., power, control, signal, telecommunication, data, optical fibre cables) with a diameter up to $\varnothing \leq 80$ mm.	CFS-SL GA M/L

C.2.9.2 Conduits

penetrating services	description	device
single conduits $\varnothing \leq 25$ mm	rigid, flexible and pliable plastic conduits and metal conduits with a diameter $\varnothing \leq 25$ mm with or without cables.	CFS-SL GA S
single conduits $\varnothing \leq 63$ mm	rigid, flexible and pliable plastic conduits and metal conduits with a diameter $\varnothing \leq 63$ mm with or without cables.	CFS-SL GA M/L
conduit bundle	plastic conduits with a max. single conduit diameter $\varnothing \leq 25$ mm with or without cables can be bundled to a diameter $\varnothing \leq 48$ mm .	CFS-SL GA S
conduit bundle	plastic conduits with a max. single conduit diameter $\varnothing \leq 63$ mm with or without cables can be bundled to a diameter $\varnothing \leq 92$ mm .	CFS-SL GA M/L

C.3 Resistance to fire classification CFS-SL GA

C.3.1 Flexible and rigid wall

C.3.1.1 Specifics of flexible and rigid wall

- minimum thickness of ($t_E \geq 100$ mm)
- comprise timber or steel studs
- lined on both faces of minimum 12,5 mm thick gypsum plasterboards acc. EN 520 Type F
- wall construction must be set up according to requirements given in EN 1366-3

additionally for flexible wall with timber studs:

- minimum distance of 100 mm between seal to any stud
- there must be a cavity between studs
- minimum 100 mm insulation of class A1 or A2 (acc. EN 13501-1) must remain in the cavity between stud and seal.

additionally for flexible wall with metal studs:

- space between linings has not to be filled completely with insulation material.

general:

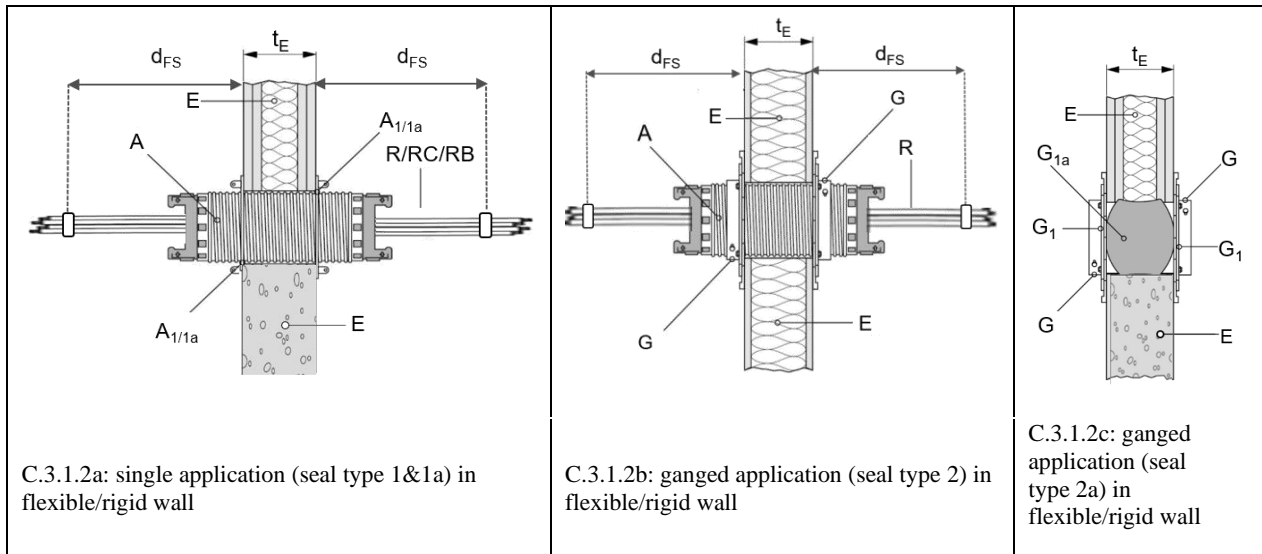
- a higher number of board layers is accepted if the overall board layer thickness is equal or greater than tested
- a higher overall board layer thickness is accepted, if the number of board layers is equal or greater than tested
- gypsum plasterboards according to EN 520 type F or according to the specification of the tested and approved flexible wall construction system according to EN 13501-2

a flexible wall can be substituted by a rigid wall:

- must comprise concrete, aerated concrete, brickwork, or masonry
- minimum density of 350 kg/m³

For minimum/maximum thickness refer to C.3.1.2.

C.3.1.2 Applications of CFS-SL GA in flexible and rigid wall (E)



device (A)	thickness of supporting construction t_E /mm	distance to first support d_{FS} /mm	maximum opening size \varnothing /mm
CFS-SL GA S	100-200	≤ 250	73
CFS-SL GA M	100-180 for seal type 2/2a		122
CFS-SL GA L	200-300 200-280 for seal type 2/2a		
seal type specifics (For further detail refer to C.2.1 and C.2.2)			
seal types	ancillary products	gap filler A_x	
1	N/A	A_1	
1a	CFS-S ACR	A_{1a}	
2	CFS-SL GP 40 or 60 (G)	N/A	
2a	CFS-SL GP 40 or 60 (G) CFS-SL GP CAP (G_1) CFS-PL 132 (G_{1a})	N/A	

C.3.1.3 Resistance to fire of CFS-SL GA in flexible and rigid wall ($t_E \geq 100$ mm)

C.3.1.3.1 Blank seal

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1: (C.2.2.1)	≥ 200 mm between openings (C.2.7a)	penetrant: no services	EI 120	EI 120
	zero distance between flanges (C.2.7b&c)		EI 120	EI 90
seal type 2: (C.2.2.4)	≥ 200 mm between openings (C.2.7a)		-	EI 120
	zero distance between two gangplate (C.2.7e)		-	EI 90 E 120
	zero distance between three and more gangplate (C.2.7f)		-	EI 60 E 120
seal type 2a: (C.2.2.5)	≥ 200 mm between openings (C.2.7a)		no sleeve, opening capped	-
	zero distance between two gangplate (C.2.7e)	-		EI 90 E 120
	zero distance between three more gangplate (C.2.7f)	-		EI 60 E 120

C.3.1.3.2 Cable

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1: (C.2.2.1)	≥ 200 mm between openings (C.2.7a)	cables $\varnothing \leq 21$ mm ($\leq 60\%$ fill)	EI 90 E 120	EI 90
		cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	EI 60 E 120	EI 90 E 120
		cables $\varnothing \leq 50$ mm ($\leq 100\%$ fill)	-	EI 90 E 120
		cables $\varnothing \leq 80$ mm ($\leq 100\%$ fill)	-	EI 60 E 120
	zero distance between flanges (C.2.7b&c)	cables $\varnothing \leq 21$ mm ($\leq 60\%$ fill)	-	EI 90 E 120
		cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	EI 60 E 120	EI 60 E 120
		cables $\varnothing \leq 50$ mm ($\leq 100\%$ fill)	-	EI 60 E 120
		cables $\varnothing \leq 80$ mm ($\leq 100\%$ fill)	-	EI 60 E 120

seal type 1a: (C.2.2.2)	≥ 200 mm between openings (C.2.7a)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	EI 90	EI 90 E 120
		cables $\varnothing \leq 50$ mm ($\leq 100\%$ fill)	-	EI 90 E 120
seal type 2 (C.2.2.4)	≥ 200 mm between openings (C.2.7a)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)		EI 120
	zero distance between two gangplate (C.2.7e)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 90 E 120
	zero distance between three or more gangplate (C.2.7f)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 60 E 120

For detailed information on penetrant types refer to C.2.9

C.3.1.3.3 Tied cable bundle

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1: (C.2.2.1)	≥ 200 mm between openings (C.2.7a)	all sheathed cables ≤ 21 mm: cable bundles ≤ 36 mm	EI 90	-
		all sheathed cables ≤ 21 mm: cable bundles ≤ 86 mm	-	EI 90
	zero distance between flanges (C.2.7b&c)	all sheathed cables ≤ 21 mm: cable bundles ≤ 36 mm	EI 90	-
		all sheathed cables ≤ 21 mm: cable bundles ≤ 86 mm	-	EI 60

For detailed information on penetrant types refer to C.2.9

C.3.1.3.4 Conduit

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1: (C.2.2.1)	≥ 200 mm between openings (C.2.7a)	conduits $\varnothing \leq 25$ mm	EI 120	EI 90 E 120
		conduits $\varnothing \leq 63$ mm	-	EI 90 E 120
	zero distance between flanges (C.2.7b&c)	conduits $\varnothing \leq 25$ mm	EI 90 E 120	EI 60
		conduits $\varnothing \leq 63$ mm	-	EI 60
seal type 1a: (C.2.2.2)	≥ 200 mm between openings (C.2.7a)	conduits $\varnothing \leq 63$ mm	-	EI 90 E 120
	zero distance between flanges (C.2.7b&c)	conduits $\varnothing \leq 25$ mm	EI 120	EI 120
		conduits $\varnothing \leq 63$ mm		EI 120

For detailed information on penetrant types refer to C.2.9

C.3.1.3.5 Conduit bundle

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1: (C.2.2.1)	≥ 200 mm between openings (C.2.7a)	conduits $\varnothing \leq 25$ mm conduit bundles $\varnothing \leq 48$ mm	EI 120	EI 90 E 120
		conduits $\varnothing \leq 63$ mm conduit bundles $\varnothing \leq 92$ mm	-	EI 90 E 120
	zero distance between flanges (C.2.7b&c)	conduits $\varnothing \leq 25$ mm conduit bundles $\varnothing \leq 48$ mm	EI 90 E 120	EI 60
		conduits $\varnothing \leq 63$ mm conduit bundles $\varnothing \leq 92$ mm	-	EI 60
seal type 1a: (C.2.2.2)	≥ 200 mm between openings (C.2.7a)	conduits $\varnothing \leq 63$ mm conduit bundles $\varnothing \leq 92$ mm	-	EI 90 E 120
	zero distance between flanges (C.2.7b&c)	conduits $\varnothing \leq 25$ mm conduit bundles $\varnothing \leq 48$ mm	EI 120	EI 120
		conduits $\varnothing \leq 63$ mm		EI 120

For detailed information on penetrant types refer to C.2.9

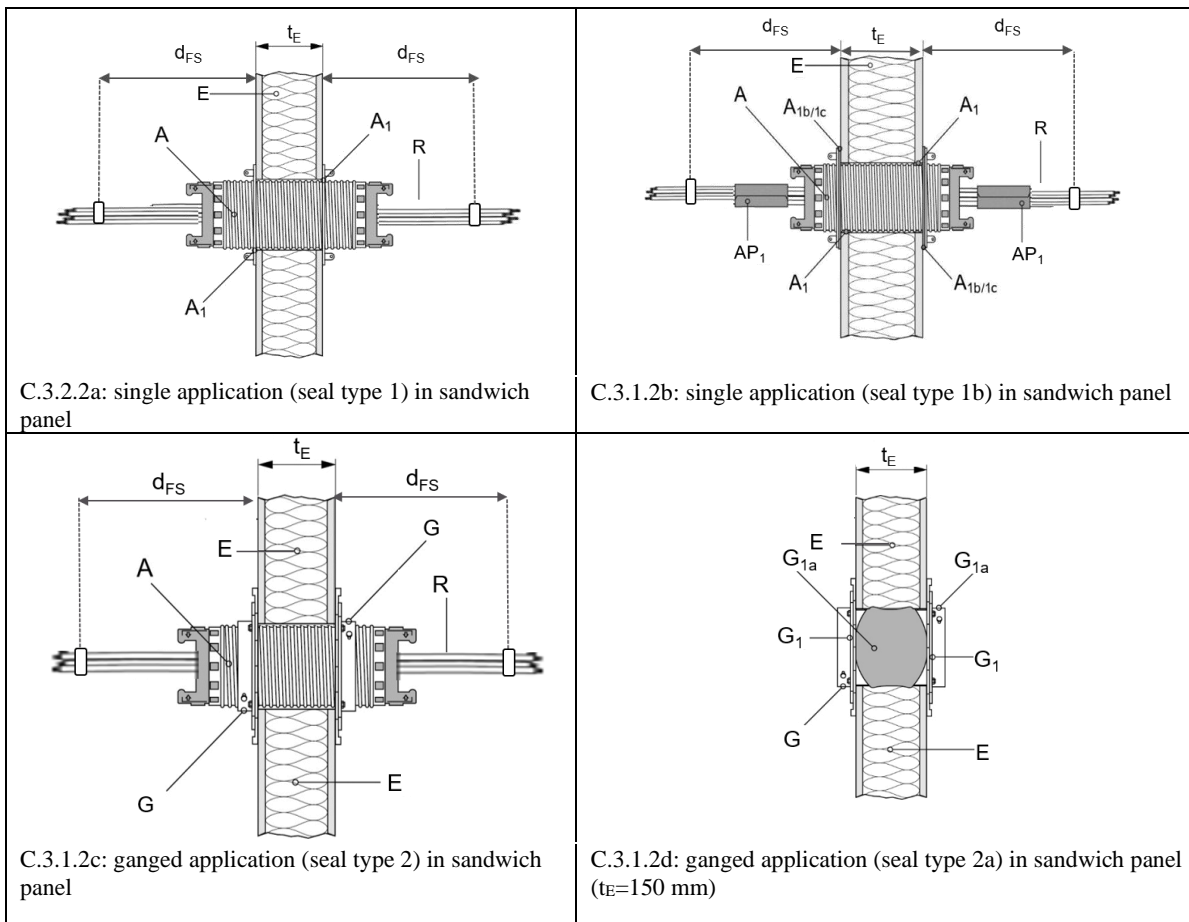
C.3.2 Sandwich panel

C.3.2.1 Specifics of sandwich panel

sandwich panel acc. (EN 14509:2013, e.g. type Paroc):

- structural stone wool core of density between 100 kg/m³ and 150kg/m³
- reaction to fire of panel: Euroclass A2-s1,d0
- steel faced with exposed and unexposed sides between 0.50 mm and 1 mm.
- flat or light profile type
- polyurethane based adhesive
- valid for vertically and horizontally installed panels
- PVDF (external) and SP (Internal) steel coating
- width of panel 0 m-1.44 m.

C.3.2.2 Application specifics of CFS-SL GA in sandwich panel (E)



device (A)	thickness of supporting construction t _E /mm	distance to first support d _{FS} /mm	maximum opening size Ø/mm
CFS-SL GA S	100-200	≤ 250	73
CFS-SL GA M	100-180 for seal type 2 150-180 for seal type 2a		122
CFS-SL GA L	200-300 200-280 for seal type 2/2a		

seal type specifics (For further detail refer to C.2.1 and C.2.2)		
seal types	ancillary products	gap filler A _x
1	N/A	A ₁
1b	CP 619 T or CP 617 (A _{1b/1c}), CFS-P BA (AP ₁)	A _{1b} or A _{1c}
2	CFS-SL GP 40 or 60 (G)	N/A
2a	CFS-SL GP 40 or 60 (G), CFS-SL GP CAP (G ₁), CFS-PL 132 (G _{1a})	N/A

C.3.2.3 Resistance to fire of CFS-SL GA in sandwich panel ($t_E \geq 100$ mm)

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1: (C.2.2.1)	zero distance between flanges (C.2.7b&c)	penetrant: no services	EI 45 E 120	EI 90 E 120
seal type 2: (C.2.2.4)	zero distance between two gangplates (C.2.7e)		-	EI 60 E 120
seal type 2a: (C.2.2.5)	zero distance between two gangplates (C.2.7e)	no sleeve, opening capped	-	EI 60 E 120
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1: (C.2.2.1)	zero distance between flanges (C.2.7b)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	EI 45 E 120	EI 90 E 120
		cables $\varnothing \leq 50$ mm ($\leq 100\%$ fill)	-	EI 60 EI 120
seal type 2: (C.2.2.4)	zero distance between two gangplates (C.2.7e)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 60 E 120

For detailed information on penetrant types refer to C.2.9

C.3.2.4 Resistance to fire of CFS-SL GA in sandwich panel ($t_E \geq 150$ mm)

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	≥ 200 mm between openings (C.2.7a)	penetrant: no services	EI 90 E 120	EI 90 E 120
seal type 1b (C.2.2.3)			-	EI 120
seal type 2 (C.2.2.4)			-	EI 120
seal type 2a (C.2.2.5)		no sleeve, opening capped	-	EI 120
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	≥ 200 mm between openings (C.2.7a)	cables $\varnothing \leq 21$ mm (\leq 60% fill)	-	EI 90 EI 120
		cables $\varnothing \leq 50$ mm (\leq 60% fill)	-	EI 90 E 120
		cables $\varnothing \leq 21$ mm (\leq 100% fill)	EI 60 E 120	EI 60 E 120
		cables $\varnothing \leq 50$ mm (\leq 100% fill)	-	EI 60 E 120
seal type 1b (C.2.2.3)	≥ 200 mm between openings (C.2.7a)	cables $\varnothing \leq 21$ mm (\leq 100% fill)	-	EI 120
seal type 2 (C.2.2.4)		cables $\varnothing \leq 21$ mm (\leq 100% fill)	-	EI 120

For detailed information on penetrant types refer to C.2.9

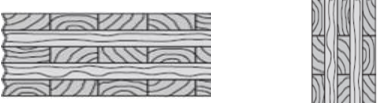

C.3.3 Cross laminated timber: Binderholz BBS walls

C.3.3.1 Specifics of Binderholz wall

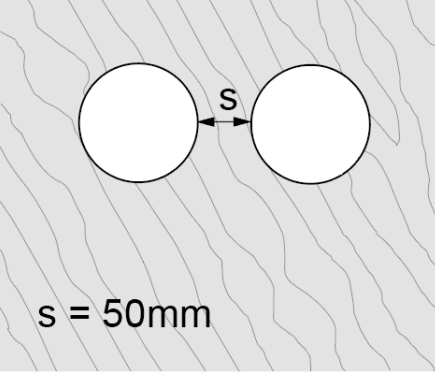
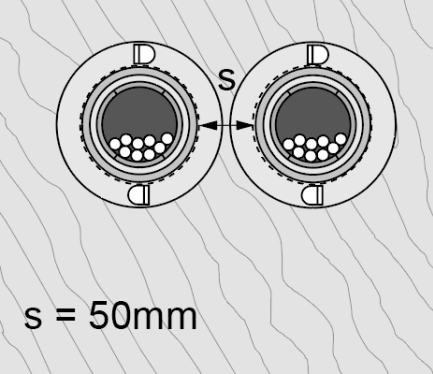
- Binderholz BBS cross laminated timber acc. ETA-09/0006
- or CLT types classified according EN 16351
- number of cross-laminated timber layers: ≥ 3 (for wall thickness $t_E \geq 80$ mm)
- number of cross-laminated timber layers: ≥ 5 (for wall thickness $t_E \geq 100$ mm)
- PU / MUF adhesives permitted.
- edge glue not required.
- minimum layer thickness 20 mm
- valid only for softwood CLT types such as: spruce/fir, pine, larch, stone pine

cross laminated timber walls do have a symmetrical construction set-up related to a vertical running axis of symmetry. Individual thickness of layers may vary or be identical (see table below).

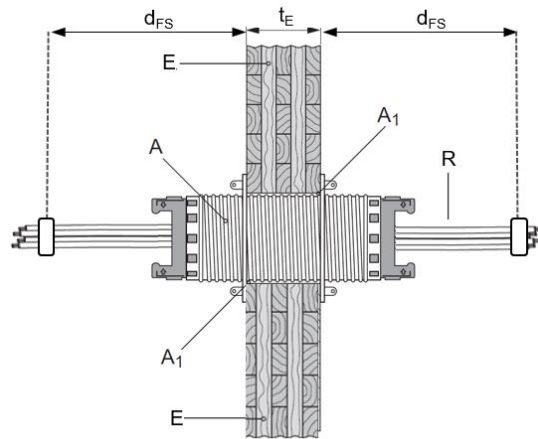
For minimum/maximum element thickness refer to C.3.3.3.

	<p>C.3.3.1a: engineered timber floor/wall with equal thickness of single layers</p>
	<p>C.3.3.1b: engineered timber floor with different thickness of single layers</p>

C.3.3.2 Distances to other openings of CFS-SL GA

	
<p>distances between itself in Binderholz BBS CLT wall ≥ 80 mm: <u>$s \geq 50$ mm</u></p>	

C.3.3.3 Application specifics of CFS-SL GA in Binderholz BBS wall



C.3.3.3a: single application (seal type 1) in “Binderholz BBS” CLT walls

device (A)	thickness of supporting construction t_E / mm	distance to first support d_{FS} / mm	maximum opening size \varnothing / mm
CFS-SL GA M	80-200	≤ 450	115
CFS-SL GA L	200-300		
seal type specifics (For further detail refer to C.2.1 and C.2.2)			
seal types	ancillary products		gap filler A_x
1	N/A		A_1

C.3.3.4 Resistance to fire of CFS-SL GA in Binderholz BBS wall ($t_E \geq 80$ mm)

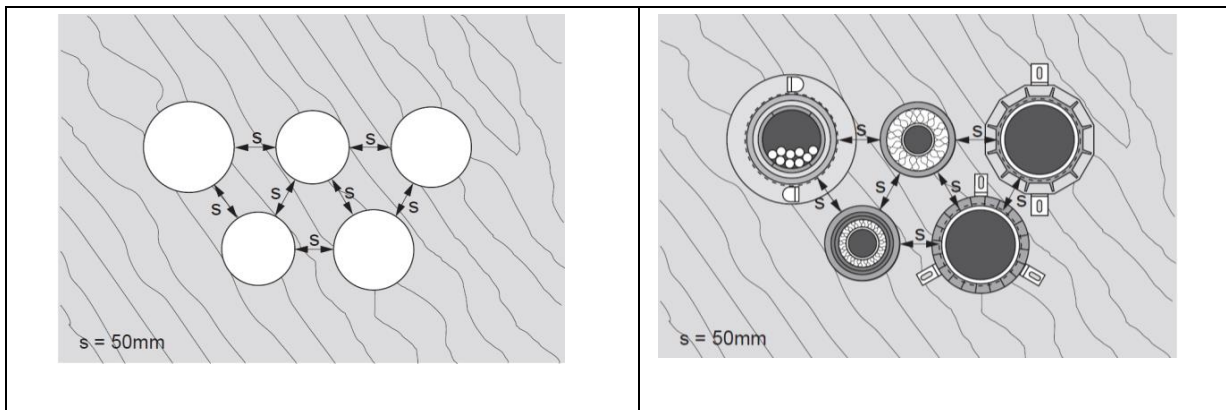
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.3.2)	penetrant: no service	-	EI 60
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.3.2)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 60

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.3.2)	all sheathed cables ≤ 21 mm: cable bundles up to 100% fill	-	EI 60

For detailed information on penetrant types refer to C.2.9

C.3.3.5 Resistance to fire of CFS-SL GA in Binderholz BBS wall ($t_E \geq 100$ mm)



distances between specific penetration seals (CFS-B, CFS-S ACR, CFS-C EL, CFS-CC) in Binderholz BBS CLT - ≥ 100 mm CLT wall, max classification target EI 90:

$s \geq 50$ mm

limitation wall: CFS-B on copper only valid for the classification up to EI 60

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.3.2)	penetrant: no services	-	EI 90
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.3.2)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 90

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.3.2)	all sheathed cables ≤ 21 mm: cable bundles up to 100% fill	-	EI 90

For detailed information on penetrant types refer to C.2.9

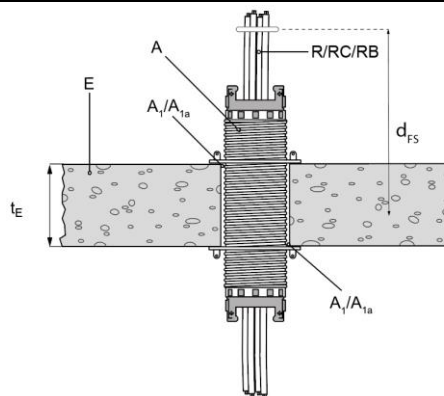
C.3.4 Rigid floor ($t_E \geq 150$ mm)

C.3.4.1 Specifics of rigid floor

- concrete, aerated concrete or masonry
- minimum density of 550 kg/m³

For minimum/maximum thickness refer to C.3.4.2.

C.3.4.2 Application specifics of CFS-SL GA in rigid floor



C.3.1.2a: single application (seal type 1&1a) in rigid floor (E5).

device (A)	thickness of supporting construction t_E /mm	distance to first support d_{FS} /mm	maximum opening size \varnothing /mm
CFS-SL GA S	150-200	≤ 250	73
CFS-SL GA M			122
CFS-SL GA L	200-300		
seal type specifics (For further detail refer to C.2.1 and C.2.2)			
seal types	ancillary products		gap filler A_x
1			A_1
1a	CFS-S ACR		A_{1a}

C.3.4.3 Resistance to fire of CFS-SL GA in rigid floor

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges (C.2.7b&c)	penetrant: no services	EI 180	EI 180

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
type 1 (C.2.2.1)	zero distance between flanges (C.2.7b&c)	cables $\varnothing \leq 21$ mm ($\leq 60\%$ fill)	EI 180	EI 180
		cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	EI 120	EI 120
		cables $\varnothing \leq 50$ mm ($\leq 100\%$ fill)	-	EI 120
		cables $\varnothing \leq 80$ mm ($\leq 100\%$ fill)	.	EI 60 E 120
seal type 1a (C.2.2.2)		cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 180
		all sheathed cables ≤ 50 mm ($\leq 100\%$ fill)	-	EI 180

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges (C.2.7b&c)	all sheathed cables ≤ 21 mm: cable bundles ≤ 36 mm	EI 180	-
		all sheathed cables ≤ 21 mm: cable bundles ≤ 86 mm	-	EI 120

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges (C.2.7b&c)	conduits $\varnothing \leq 25$ mm	EI 120	EI 60 E 120
		conduits $\varnothing \leq 63$ mm	-	EI 60 E 120
seal type 1a (C.2.2.2)		conduits $\varnothing \leq 63$ mm	-	EI 90 E 120

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges (C.2.7b&c)	conduits $\varnothing \leq 25$ mm conduit bundles $\varnothing \leq 48$ mm	EI 120	EI 60 E 120
		conduits $\varnothing \leq 63$ mm conduit bundles $\varnothing \leq 92$ mm	-	EI 60 E 120
seal type 1a (C.2.2.2)		conduits $\varnothing \leq 63$ mm conduit bundles $\varnothing \leq 92$ mm	-	EI 90 E 120

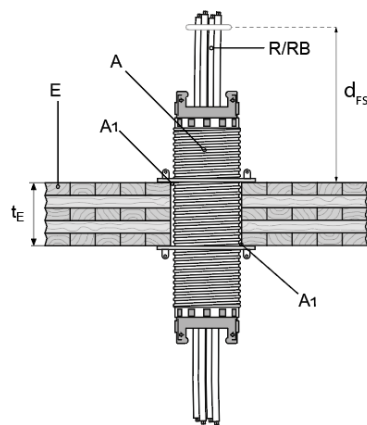
For detailed information on penetrant types refer to C.2.9

C.3.5 Cross laminated timber: Binderholz BBS floors

C.3.5.1 Specifics of Binderholz floors

- Binderholz BBS cross laminated timber acc. ETA-09/0006
- or CLT types classified according EN 16351
- number of cross-laminated timber layers: ≥ 3 (for wall thickness $t_E \geq 80$ mm)
- number of cross-laminated timber layers: ≥ 5 (for wall thickness $t_E \geq 100$ mm)
- PU / MUF adhesives permitted.
- edge glue not required.
- minimum layer thickness 20 mm
- valid only for softwood CLT types such as: spruce/fir, pine, larch, stone pine

C.3.5.2 Application specifics of CFS-SL GA in Binderholz BBS XL floor



C.3.3.3: single application (seal type 1) in “Binderholz BBS XL” CLT floors

device (A)	thickness of supporting construction t_E / mm	distance to first support d_{FS} / mm	maximum opening size \varnothing / mm
CFS-SL GA M	80-200	≤ 450	115
CFS-SL GA L	200-300		
seal type specifics (For further detail refer to C.2.1 and C.2.2)			
seal types	ancillary products		gap filler A_x
1	N/A		A_1

C.3.5.3 Distances to other openings for CFS-SL GA

$s = 50\text{mm}$

$s = 50\text{mm}$

distances between itself in Binderholz BBS XL CLT wall ≥ 80 mm: $s \geq 50$ mm

C.3.5.4 Resistance to fire of CFS-SL GA in Binderholz BBS XL floor ($t_E \geq 80$ mm)

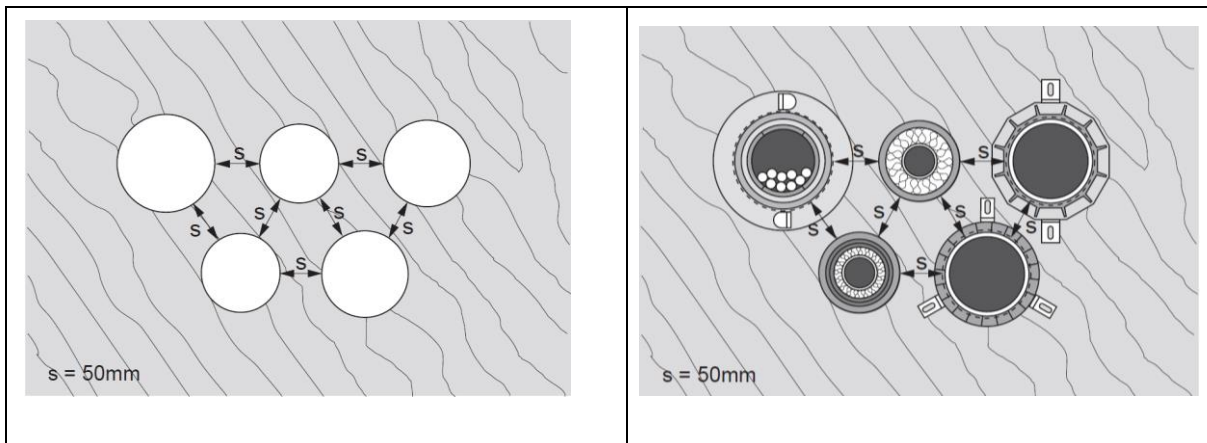
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.5.3)	penetrant: no services	-	EI 60
	zero distance between flanges; clustered installation (C.3.5.3)		-	EI 60
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.5.3)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 60
	zero distance between flanges; clustered installation (C.3.5.3)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 60

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.5.3)	all sheathed cables ≤ 21 mm: cable bundles up to 100% fill	-	EI 60
	zero distance between flanges; clustered installation (C.3.5.3)	all sheathed cables ≤ 21 mm: cable bundles up to 100% fill	-	EI 60

For detailed information on penetrant types refer to C.2.9

C.3.5.5 Resistance to fire of CFS-SL GA in Binderholz BBS floor ($t_E \geq 140$ mm)



distances between specific penetration seals (CFS-B, CFS-S ACR, CFS-C EL, CFS-CC) in Binderholz BBS CLT ≥ 140 mm CLT floor, max classification target EI 90:

$s \geq 50$ mm

Limitation floor: CFS-B on copper only with min. 16 - 36,5 mm synthetic rubber insulation

CFS-SL GA (DE) only in linear arrangement

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.5.3)	penetrant: no services	-	EI 90
	zero distance between flanges; clustered installation (C.3.5.3)		-	EI 90
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.5.3)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 90
	zero distance between flanges; clustered installation (C.3.5.3)		-	EI 90

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges; linear installation (C.3.5.3)	all sheathed cables \leq 21 mm: cable bundles up to 100% fill.	-	EI 90
	zero distance between flanges; clustered installation (C.3.5.3)		-	EI 90

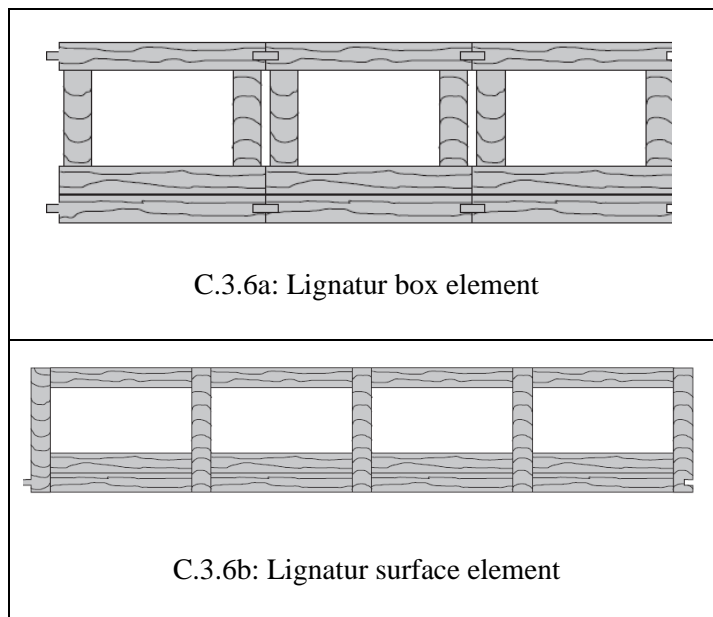
For detailed information on penetrant types refer to C.2.9

C.3.6 Skin panels: Lignatur floor

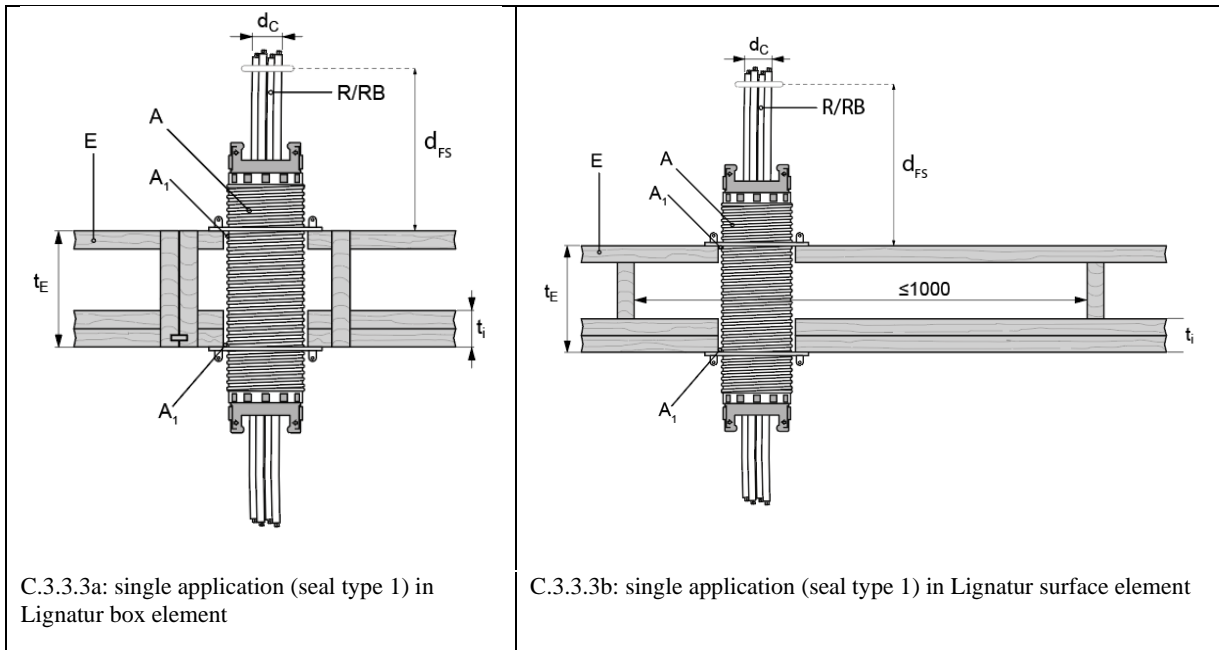
C.3.6.1 Specifics of Lignatur floor ($t_E \geq 160$ mm)

- Lignatur ETA-11/0137
- prefabricated wood-based loadbearing stressed skin panels.
- two horizontally running planks.
- vertical ribs spaced at equal distances.
- bottom plank consists of two layers $t_i \geq 64$ mm.
- top plank consists of one layer.

For minimum/maximum thickness refer to C.3.6.2. The following two types of Lignatur elements are applicable to the CFS-SL GA M (see table below).



C.3.6.2 Application specifics of CFS-SL GA in Lignatur floor



device (A)	thickness of supporting construction t_E [mm]	minimum layer thickness, t_i [mm]	distance to first support in mm top side only [mm]	maximum opening size \varnothing [mm]
CFS-SL GA M	160-200	$t_i \geq 64$	≤ 350	115
CFS-SL GA L	160-300			
seal type specifics (For further detail refer to C.2.1 and C.2.2)				
seal type	ancillary products	gap filler A_x		
1	N/A	A_1		

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges (C.3.5.3)	penetrant: no services	-	EI 60
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges (C.3.5.3)	cables $\varnothing \leq 21$ mm (\leq 100% fill)	-	EI 60

For detailed information on penetrant types refer to C.2.9

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1 (C.2.2.1)	zero distance between flanges (C.3.5.3)	all sheathed cables ≤ 21 mm: cable bundles up to 100% fill	-	EI 60

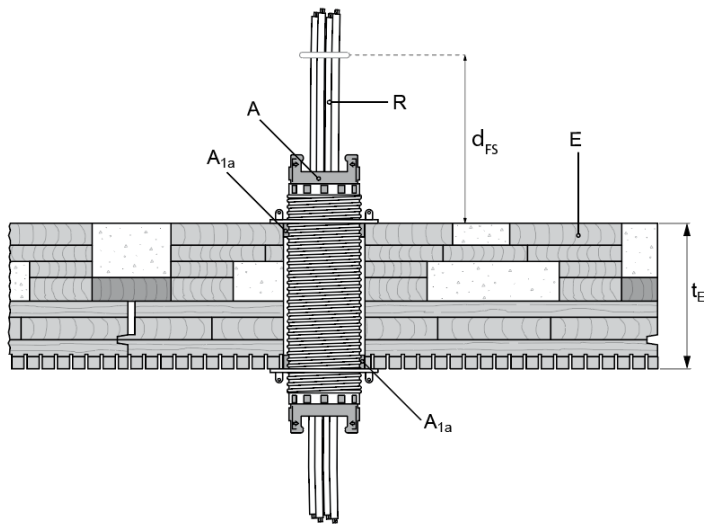
For detailed information on penetrant types refer to C.2.9

C.3.7 Cross laminated timber: Lignotrend

C.3.7.1 Specifics of Lignotrend

- Lignotrend ETA-21/0360
- LIGNO Rib – EI90, floor thickness $t_E \geq 196$ mm
- LIGNO Rib – EI60, floor thickness $t_E \geq 169$ mm

C.3.7.2 Application specifics of CFS-SL GA in Lignotrend floor



C.3.3.3a: single application (seal type 1a) in Lignotrend rip element (E)

device (A)	thickness of supporting construction t_E [mm]	distance to first support d_{FS} [mm]	maximum opening size \varnothing [mm]
CFS-SL GA L	169-196	≤ 350	110
seal type specifics (For further detail refer to C.2.1 and C.2.2)			
seal types	ancillary products	gap filler A_x	gap filler maximum depth/ mm
1a	CFS-S ACR	A_{1a}	20

C.3.7.3 Resistance to fire of CFS-SL GA in Lignotrend floor ($t_E \geq 169$ mm)

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1a (C.2.2.2)	≥ 100 mm between openings (C.2.7a)	penetrant: no services	-	EI 90
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1a (C.2.2.2)	≥ 100 mm between openings (C.2.7a)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 30

For detailed information on penetrant types refer to C.2.9

C.3.7.4 Resistance to fire of CFS-SL GA in Lignotrend floor ($t_E \geq 196$ mm)

seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1a (C.2.2.2)	≥ 100 mm between openings (C.2.7a)	penetrant: no services	-	EI 90
seal type	distances	description	classification (CFS-SL GA S)	classification (CFS-SL GA M/L)
seal type 1a (C.2.2.2)	≥ 100 mm between openings (C.2.7a)	cables $\varnothing \leq 21$ mm ($\leq 100\%$ fill)	-	EI 90

For detailed information on penetrant types refer to C.2.9

D Annex – Instruction for use/product literature

The application (appropriate installation) of Hilti Firestop Sleeve CFS-SL GA is described and illustrated in chapter C.1 – Annex C.

The folder *Instruction for use* is available at Hilti's website: www.hilti.goup

For safe handling the provisions of the Material Safety Data Sheet for the product shall be followed.

E Annex – Abbreviation used in drawings

Abbreviation	Description
A	Hilti Firestop Sleeve CFS-SL GA
A ₁	Rubber gasket
A _{1a}	Hilti Firestop Acrylic sealant CFS-S ACR
A _{1b}	Hilti Firestop Putty Roll CP 619 T
A _{1c}	Hilti Firestop Putty Pad CP 617
AP ₁	Firestop Putty Bandage CFS-P BA
E	Building element (wall, floor)
G	Hilti Firestop Gangplate: CFS-SL GP 40 or 60
G ₁	Hilti Firestop Gangplate CAP: CFS-SL GP CAP
G _{1a}	Hilti Firestop Plug: CFS-PL 132
h	height
R	electric cables, optical cables
RC	conduit for electric/optical cables
RB	bundle of electric/optical cables
RCB	bundle of conduits electric/optical cables
t _E	thickness of the building element
w	width
d _{FS}	distance first support