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### European Technical Assessment



General part

Technical Assessment Body issuing the European Technical Assessment

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This European Technical Assessment contains

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

This European Technical Assessment replaces

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

Hilti Firestop Wrap CFS-W

Fire Stopping and Fire Sealing Products: Penetration Seals

Hilti AG Feldkircherstrasse 100 9494 Schaan LIECHTENSTEIN

Hilti production plant 7a

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

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

European technical approval ETA-10/0405 with validity from 28.06.2013 to 27.06.2018



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### Specific parts

### Technical description of the product

"Hilti Firestop Wrap CFS-W" is an intumescent wrap used as penetration seal for plastic pipes.

Additional components	Characteristics
Hilti Firestop Acrylic Sealant CFS-S ACR	Water-based acrylic dispersion, according Annex B.2 of the ETA
Mineral wool	Backfilling material of Hilti Firestop Acrylic Sealant CFS-S ACR, according Annex B.3 of the ETA
Cementitious mortar	Any cementitious mortar suitable for use with the intended type of rigid walls or floors may be used, according Annex B.4 of the ETA

"Hilti Firestop Wrap CFS-W" is available as endless wrap ("CFS-W EL") on a roll with a thickness of 4,5 mm and a width of 45 mm, or as single wraps ("CFS-W SG"), pre-cut to specific to a specific length and width, see table below:

Wrap size	For pipes with nominal outside diameters (mm)	Thickness of wrap (mm)	Recommended aperture diameter (mm)
CFS-W SG 50/1.5"	50	4,5	67
CFS-W SG 63/2"	63	4,5	77
CFS-W SG 75/2.5"	75	4,5	92
CFS-W SG 90/3"	90	9,0	112
CFS-W SG 110/4"	110	9,0	132
CFS-W SG 125/5"	125	9,0	152
CFS-W SG 160/6"	160	13,5	202

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

### 2.1 Intended use

"Hilti Firestop Wrap CFS-W" is intended to be used as a pipe penetration seal around plastic pipes to temporarily or permanently reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of plastic pipes.

The maximum opening size of the penetration seal is related to a maximum pipe diameter of 160 mm with an annular gap of up to 9,5 mm. For more details regarding the maximum opening size, see Annex C of the ETA.

"Hilti Firestop Wrap CFS-W" can be installed only in the types of separating elements as specified in the following table.

1



Separating element	Construction
Flexible walls	<ul> <li>Steel studs or timber studs lined on both faces with minimum 2 layers of boards (minimum thickness 12,5 mm) according to EN 520 type F</li> <li>For steel stud walls the space between lining must not be completely filled with insulation material, especially in the adjacent area of the penetration seal</li> <li>For timber studs walls there must be a minimum distance of 100 mm of the penetration seal to any timber stud. The cavity between the penetration seal and stud has to be closed with minimum of 100 mm of insulation with classification A1 or A2 according to EN 13501-1</li> <li>Minimum thickness 100 mm</li> </ul>
Rigid walls	<ul> <li>&gt; Aerated concrete, concrete, masonry</li> <li>&gt; Minimum density 650 kg/m<sup>3</sup> (wall type A)</li> <li>&gt; Minimum thickness dependent on specific application according to Annex C of the ETA</li> <li>&gt; The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period</li> </ul>
Rigid walls	<ul> <li>Concrete, concrete, masonry</li> <li>Minimum density 1100 kg/m<sup>3</sup> (wall type B)</li> <li>Minimum thickness dependent on specific application according to Annex C of the ETA</li> <li>The rigid wall shall be classified in accordance with EN 13501-2 for the required fire resistance period</li> </ul>
Rigid floors	<ul> <li>Concrete</li> <li>Minimum density 2400 kg/m³ (floor type A) or 550 kg/m³ (floor type B)</li> <li>Minimum thickness dependent on specific application according to Annex C of the ETA</li> <li>The rigid floor shall be classified in accordance with EN 13501-2 for the required fire resistance period</li> </ul>

This European Technical Assessment does not cover sandwich panel constructions.

"Hilti Firestop Wrap CFS-W" can only be used as penetration seal for single plastic pipes. Further details are given in Annex C of the ETA. Other parts or service support constructions shall not penetrate the penetration seal.

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

#### 2.2 Use condition

"Hilti Firestop Wrap CFS-W" is intended for use at temperatures below 0°C, but with no exposure to rain nor UV and can therefore – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type  $Y_2$ . Since the requirements for Type  $Y_2$  are met, also the requirements for Type  $Z_1$  and  $Z_2$  are fulfilled.

#### 2.3 Working life

The provisions made in this European Technical Assessment are based on an assumed working life of "Hilti Firestop Wrap CFS-W" of 10 years, provided the conditions laid down in the technical literature of the manufacturer relating to packaging, transport, storage, installation, use and repair are met.



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

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

#### 2.4 General assumptions

- 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.
- 2.4.2 This European Technical Assessment does not address any risks associated with the emission of dangerous liquids or gases caused by failure of the pipe(s) in case of fire nor does it prove the prevention of the transmission of fire through heat transfer via the medium in the pipes.
- 2.4.3 This European Technical Assessment does not verify the prevention of destruction of adjacent building elements with fire separating function or of the pipes themselves due to distortion forces caused by extreme temperatures. These risks shall be accounted for by taking appropriate measures when designing or installing the pipe work.

The mounting or hanging of the pipes or the layout of the pipe work shall be implemented in such a way that the pipes and the fire resistant building elements shall remain functional within a period of time which corresponds to the fire resistance period required.

- 2.4.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this European Technical Assessment (see EN 1366-3:2009, clause 1).
- 2.4.5 The durability assessment does not take account of the possible effect on the penetration seal of substances permeating through the pipe walls.
- 2.4.6 The assessment does not cover the avoidance of destruction of the penetration seal or of the adjacent building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

#### 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.

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

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

#### 3.1 Safety in case of fire (BWR 2)

#### 3.1.1 Reaction to fire

"Hilti Firestop Wrap CFS-W" was assessed according to EAD 350454-00-1104 clause 2.2.1 and classified according to EN 13501-1:2007+A1:2009.

Component	Class according to EN 13501-1:2007+A1:2009	
Hilti Firestop Wrap CFS-W	E	

#### 3.1.2 Resistance to fire

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

The maximum fire resistance class of the penetration seal in vertical or horizontal separating element depends on the fire resistance class of the penetrating elements. The fire resistance class of the penetration seal is reduced to the fire resistance class of the penetrating element with the lowest fire resistance classification.

The classifications are not valid for sandwich panel constructions.

#### 3.2 Hygiene, health and the environment (BWR 3)

3.2.1 Air permeability

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No performance assessed.

3.2.2 Water permeability

No performance assessed.

### 3.2.3 Content, emission and/or release of dangerous substances

No performance assessed.

#### 3.3 Safety and accessibility in use (BWR 4)

- 3.3.1 Mechanical resistance and stability No performance assessed.
- 3.3.2 Resistance to impact / movement

No performance assessed.

3.3.3 Adhesion

No performance assessed.

#### 3.3.4 Durability

"Hilti Firestop Wrap CFS-W" fulfils the requirements for the intended use condition.

"Hilti Firestop Wrap CFS-W" is therefore appropriate for the use at temperatures below 0°C, but with no exposure to rain nor UV and can – according to EAD 350454-00-1104 clause 2.2.9.3.1 – be categorized as Type  $Y_2$ . Since the requirements for Type  $Y_2$  are met, also the requirements for Type  $Z_1$  and  $Z_2$  are fulfilled.

#### 3.4 Protection against noise (BWR 5)

3.4.1 Airborne sound insulation

No performance assessed.

#### 3.5 Energy economy and heat retention (BWR 6)

3.5.1 Thermal properties

No performance assessed.

- 3.5.2 Water vapour permeability
  - No performance assessed.



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

According to the Decision  $1999/454/EC^1$ , amended by Decision  $2001/596/EC^2$  of the European Commission the system(s) of assessment and verification of constancy of performance (see Annex V of Regulation (EU) No 305/2011) is given in the following table.

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

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

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	System of assessment and verification of constancy of performance		
Fire Stepping and	For uses subject to regulations on reaction to fire	A1*, A2*, B*, C*	1		
Fire Stopping and Fire Sealing Products		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					

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)

## 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 28.06.2018 by Österreichisches Institut für Bautechnik

The original document is signed by:

Rainer Mikulits Managing Director

Official Journal of the European Communities no. L 178, 14.7.1999, p. 52

Official Journal of the European Communities no. L 209, 2.8.2001, p. 33



#### ANNEX A LIST OF ABBREVIATIONS

#### A.1 Abbreviations used in drawings

Abbreviation	Description		
A <sub>1</sub>	Hilti Firestop Wrap CFS-W		
A <sub>2</sub>	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR		
A <sub>3</sub>	Annular gap seal with cementitious mortar		
В	Backfilling material (mineral wool)		
С	Plastic Pipe		
d <sub>c</sub>	Pipe diameter (nominal outside diameter)		
E	Building element (wall, floor)		
S <sub>1</sub>	Minimum distance between single penetration seals		
t <sub>A2</sub>	Thickness of Hilti Firestop Acrylic Sealant CFS-S ACR		
tc	Pipe wall thickness		
t <sub>E</sub>	Thickness of the building element		



#### ANNEX B

#### DESCRIPTION OF PRODUCT(S) & PRODUCT LITERATURE

#### B.1 Hilti Firestop Wrap CFS-W

A detailed specification of the product is contained in document "Identification / Product Specification relating to the European technical approval ETA-10/0405 - Hilti Firestop Wrap CFS-W" which is a non-public part of this ETA.

The Control Plan is defined in document "Control Plan relating to the European Technical Assessment ETA-10/0405 - Hilti Firestop Wrap CFS-W" which is a non-public part of this ETA.

#### B.2 Hilti Firestop Acrylic Sealant CFS-S ACR

See ETA-10/0292 and ETA-10/0389

#### B.3 Mineral wool

Loose mineral wool products suitable for being used as backfilling material of Hilti Firestop Acrylic Sealant CFS-S ACR

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

#### **B.4** Cementitious mortar

Any cementitious mortar suitable for use with the intended type of rigid walls or floors may be used.

#### B.5 Sound decoupling means

Any sound decupling means based on PE (foam) may be used with a maximum thickness of 5 mm.



#### ANNEX C

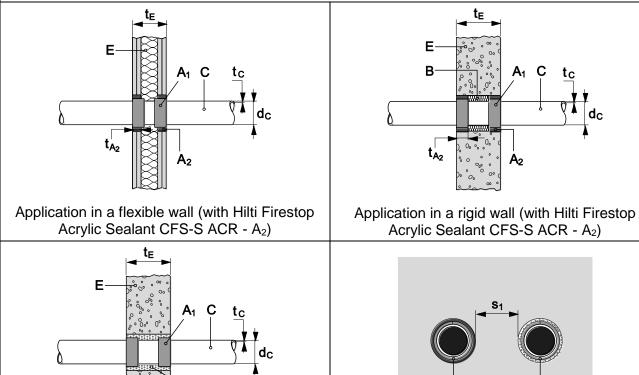
#### RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP WRAP CFS-W

C.1 Flexible walls and rigid walls type A according to clause 2.1 of the ETA, minimum wall thickness 100 mm

#### Penetration seal - Single penetration:

- Hilti Firestop Wrap CFS-W on both sides  $(A_1)$ , outer edge of the wrap flush with the surface of the wall.
- Annular gap filled within:
  - Flexible walls (see construction details below): Hilti Firestop Acrylic Sealant CFS-S ACR (A<sub>2</sub>) on both sides with a depth (t<sub>A2</sub>) of minimum 25 mm from the surface of the wall supported by mineral wool of minimum 100 kg/m<sup>3</sup> density in the gap between the wall lining around the opening with a depth of minimum 100 mm;
  - Rigid walls (see construction details below): Cementitious mortar (A<sub>3</sub>) over the entire thickness of the wall or Hilti Firestop Acrylic Sealant CFS-S ACR (A<sub>2</sub>) on both sides with a depth (t<sub>A2</sub>) of minimum 15 mm from the surface of the wall. The sealant may be backfilled with mineral wool (for suitable mineral wool products see Annex B.3 of the ETA).
- The maximum annular gap width is given in the tables below;
- Minimum distance between single penetration seals (s1): 200 mm.

### **Construction details:**



Aз

Application in a rigid wall (with cementitious mortar - A<sub>3</sub>)

С

tc

dc



#### **Penetrating services**

### C.1.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Distance between wrap and penetration seal edge in wall (width of annular gap):  $\leq$  9,5 mm.

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
50	2,2 - 3,6	CFS-W SG	50/1.5"	EI 120-U/C
63	2,2-3,6	CFS-W SG	63/2"	EI 120-U/C
75	2,2-3,6	CFS-W SG	75/2.5"	EI 120-U/C
≤ 75	2,2-3,6	CFS-W EL	1	EI 120-U/C
90	3,7 - 6,0	CFS-W SG	90/3"	EI 90-U/C
110	3,7 - 6,0	CFS-W SG	110/4"	EI 90-U/C
125	3,7 - 6,0	CFS-W SG	125/5"	EI 90-U/C
>75 ≤ 125	3,7 - 6,0	CFS-W EL	2	EI 90-U/C
160	2,5 – 11,8	CFS-W SG	160/6"	EI 60-U/C
> 125 ≤ 160	2,5 – 11,8	CFS-W EL	3	EI 60-U/C
160	11,8	CFS-W SG	160/6"	EI 90-U/C
160	11,8	CFS-W EL	3	EI 90-U/C

The results are also valid for PVC-C pipes according to EN 1566-1<sup>3</sup> and PVC-U pipes according EN 1329-1<sup>4</sup> and EN 1453-1<sup>4</sup>.

#### C.1.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Distance between wrap and penetration seal edge in wall (width of annular gap):  $\leq$  9,5 mm.

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Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
50	1,9 – 6,8	CFS-W SG	50/1.5"	EI 120-U/C
63	1,9 – 6,8	CFS-W SG	63/2"	EI 120-U/C
75	1,9 – 6,8	CFS-W SG	75/2.5"	EI 120-U/C
≤ 75	1,9 – 6,8	CFS-W EL	1	EI 120-U/C
90	3,2 - 7,1	CFS-W SG	90/3"	EI 120-U/C
110	3,2 – 7,1	CFS-W SG	110/4"	EI 120-U/C
125	3,2 - 7,1	CFS-W SG	125/5"	EI 120-U/C
>75 ≤ 125	3,2 - 7,1	CFS-W EL	2	EI 120-U/C
160	4,0 - 9,1	CFS-W SG	160/6"	EI 60-U/C
> 125 ≤ 160	4,0 - 9,1	CFS-W EL	3	EI 60-U/C
160	9,1	CFS-W SG	160/6"	EI 90-U/C
160	9,1	CFS-W EL	3	EI 90-U/C

3

4

In Germany the pipes have additionally to comply with DIN 19531-10

It is recommended only to use gypsum plaster or cementitious mortar as annular gap seal for PVC-C pipes together with sound decoupling according to Annex B.5 of the ETA



#### C.1.3 PE pipes according to EN 1519-1<sup>5</sup> Distance between wrap and penetration seal edge in wall (width of annular gap): $\leq$ 4,5 mm. Size (CFS-W SG) / Pipe wall Pipe diameter d<sub>c</sub> Type of CFS-W thickness t<sub>c</sub> No. of layers Classification (mm) $(A_1)$ (mm)(CFS-W EL) 50 3.0 CFS-W SG 50/1.5" EI 120-U/C 63 3.0 CFS-W SG 63/2" EI 120-U/C 75 75/2.5" 3.0 CFS-W SG EI 120-U/C 1 ≤ 75 3.0 CFS-W EL EI 120-U/C 90/3" 90 4,9 CFS-W SG EI 120-U/C 110 110/4" 4.9 CFS-W SG EI 120-U/C 125 CFS-W SG 125/5" EI 120-U/C 4,9 >75 ≤ 125 4,9 CFS-W EL 2 EI 120-U/C The results are also valid for PE pipes according to EN 12201-2 and EN 12666-1.

#### C.2 Rigid walls according to clause 2.1 of the ETA

#### Penetration seal - Single penetration:

- Hilti Firestop Wrap CFS-W on both sides (A<sub>1</sub>)
- Annular gap filled either with cementitious mortar (A<sub>3</sub>) over the entire thickness of the wall or with Hilti Firestop Acrylic Sealant CFS-S ACR (A<sub>2</sub>) with a depth of minimum 15 mm from the surface of the wall. The sealant may be backfilled with mineral wool (for suitable mineral wool products see Annex B.3 of the ETA). The maximum annular gap width is given in the tables below;
- Minimum distance between single penetration seals (s1): 200 mm;
- For further construction details see Annex C.1 of the ETA.

# C.2.1 Rigid walls type A according to clause 2.1 of the ETA (density $\geq$ 650 kg/m<sup>3</sup>), minimum wall thickness 150 mm

#### Penetrating services

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

Distance between wrap and penetration seal edge in wall (width of annular gap): ≤ 7,5 mm

		-		
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
160	2,5 – 11,8	CFS-W SG	160/6"	EI 180-U/C
> 125 ≤ 160	2,5 – 11,8	CFS-W EL	3	EI 180-U/C
The results are also valid for PVC-C pipes according to EN 1566-1 <sup>3</sup> and PVC-U pipes according				

The results are also valid for PVC-C pipes according to EN 1566-1<sup>3</sup> and PVC-U pipes according EN 1329-1<sup>4</sup> and EN 1453-1<sup>4</sup>.



<ul><li>C.2.1.2 PE pipes according to EN ISO 15494 and DIN 8074/8075</li><li>Distance between wrap and seal edge in wall (width of annular gap): ≤ 7,5 mm</li></ul>				
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
160	4,0-9,1	CFS-W SG	160/6"	EI 180-U/C
> 125 ≤ 160	4,0-9,1	CFS-W EL	3	EI 180-U/C
	s according to wrap and penet		wall (width of annular gap	): ≤ 7,5 mm
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
160	6,2	CFS-W SG	160/6"	EI 180-U/C
> 125 ≤ 160	6,2	CFS-W EL	3	EI 180-U/C

The results are also valid for PE pipes according to EN 12201-2 and EN 12666-1.

# C.2.2 Rigid walls type B according to clause 2.1 of the ETA (density $\geq$ 1100 kg/m<sup>3</sup>), minimum wall thickness 175 mm

#### **Penetrating services**

#### **C.2.2.1 PVC pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062** Distance between wrap and penetration seal edge in wall (width of annular gap): $\leq 8.5$ mm

Distance between wap and penetration sear edge in war (waar of annuar gap) o,o min					
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification	
≤ 32	1,8	CFS-W EL	1	EI 240-U/C	
90	3,2	CFS-W SG	90/3"	EI 240-U/C	
110	3,2	CFS-W SG	110/4"	EI 240-U/C	
> 75 ≤ 110	3,2	CFS-W EL	2	EI 240-U/C	
160	3,2 – 13,0	CFS-W SG	160/6"	EI 240-U/C	
> 125 ≤ 160	3,2 – 13,0	CFS-W EL	3	EI 240-U/C	
The results are als	The results are also valid for PVC-C pipes according to EN 1566-1 <sup>3</sup> and PVC-U pipes according				

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EN 1329-14 and EN 1453-14.



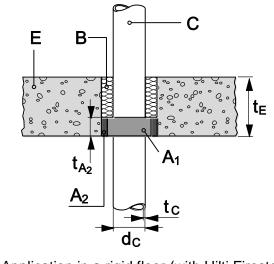
<b>C.2.2. PE pipes according to EN ISO 15494 and DIN 8074/8075</b> Distance between wrap and penetration seal edge in wall (width of annular gap): ≤ 8,5 mm				
Distance between v		liation seal euge in		<i>)</i> ). ≤ 0,5 mm
Pipe diameter d <sub>c</sub>	Pipe wall	Type of CFS-W	Size (CFS-W SG) /	
(mm)	thickness t <sub>c</sub>	(A <sub>1</sub> )	No. of layers	Classification
( )	(mm)	(* * 1)	(CFS-W EL)	
≤ 32	1,8	CFS-W EL	1	EI 240-U/C
90	2,7	CFS-W SG	90/3"	EI 240-U/C
110	2,7	CFS-W SG	110/4"	EI 240-U/C
> 75 ≤ 110	2,7	CFS-W EL	2	EI 240-U/C
160	4,0 - 14,6	CFS-W SG	160/6"	EI 240-U/C
> 125 ≤ 160	4,0 - 14,6	CFS-W EL	3	EI 240-U/C

### C.3 Rigid floors according to clause 2.1 of the ETA

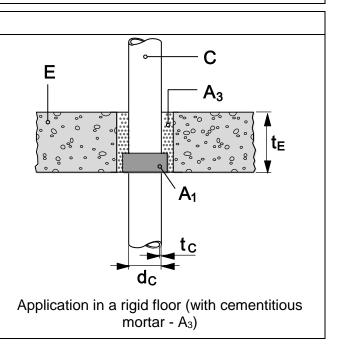
#### Penetration seal - Single penetration:

- Hilti Firestop Wrap CFS-W (A1) on the underside of the floor;
- Annular gap filled either with cementitious mortar (A<sub>3</sub>) over the entire thickness of the floor or;
- with Hilti Firestop Acrylic Sealant CFS-S ACR (A<sub>2</sub>) with a depth (t<sub>A2</sub>) of minimum 15 mm from the surface of the floor. The gap behind the sealant is to be backfilled with mineral wool compressed to achieve minimum 60 kg/m<sup>3</sup> density. The maximum annular gap width is given in the tables below;
- Minimum distance between single penetration seals (s<sub>1</sub>): 200 mm (see figure in Annex C.1 of the ETA).

#### **Construction details:**



Application in a rigid floor (with Hilti Firestop Acrylic Sealant CFS-S ACR - A<sub>2</sub>)



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# C.3.1 Rigid floor type A according to clause 2.1 of the ETA (density $\geq$ 2400 kg/m<sup>3</sup>), minimum floor thickness 150 mm

#### Penetrating services

#### C.3.1.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062

Distance between wrap and penetration seal edge in floor (width of annular gap):  $\leq$  9,5 mm (Ø 90 – 125 mm)

Distance between wrap and penetration seal edge in floor (width of annular gap):  $\leq$  1,5 mm (Ø > 125 mm)

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
90	3,7 - 6,0	CFS-W SG	90/3"	EI 120-U/C
110	3,7 - 6,0	CFS-W SG	110/4"	EI 120-U/C
125	3,7 - 6,0	CFS-W SG	125/5"	EI 120-U/C
> 75 ≤ 125	3,7 - 6,0	CFS-W EL	2	EI 120-U/C
160	3,2-4,0	CFS-W SG	160/6"	EI 120-U/C
> 125 ≤ 160	3,2-4,0	CFS-W EL	3	EI 120-U/C

The results are also valid for PVC-C pipes according to EN 1566-1<sup>3</sup> and PVC-U pipes according EN 1329-1<sup>4</sup> and EN 1453-1<sup>4</sup>.

#### C.3.1.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Distance between wrap and seal edge in floor (width of annular gap):  $\leq$  9,5 mm

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
90	7,1	CFS-W SG	90/3"	EI 120-U/C
110	7,1	CFS-W SG	110/4"	EI 120-U/C
125	7,1	CFS-W SG	125/5"	EI 120-U/C
> 75 ≤ 125	7,1	CFS-W EL	2	EI 120-U/C



C.3.1.3 PE pipes according to EN 1519-1 <sup>5</sup>				
Distance between wrap and penetration seal edge in floor (width of annular gap): ≤ 3,5 mm				
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
50	3,0	CFS-W SG	50/1.5"	EI 120-U/C
63	3,0	CFS-W SG	63/2"	EI 120-U/C
75	3,0	CFS-W SG	75/2.5"	EI 120-U/C
≤ 75	3,0	CFS-W EL	1	EI 120-U/C
90	4,8	CFS-W SG	90/3"	EI 120-U/C
110	4,8	CFS-W SG	110/4"	EI 120-U/C
125	4,8	CFS-W SG	125/5"	EI 120-U/C
> 75 ≤ 125	4,8	CFS-W EL	2	EI 120-U/C
160	6,2	CFS-W SG	160/6"	EI 120-U/C
> 125 ≤ 160	6,2	CFS-W EL	3	EI 120-U/C
The results are also	o valid for PE p	ipes according to E	N 12201-2 and EN 1266	6-1.

C.3.2 Rigid floor type A according to clause 2.1 of the ETA (density  $\ge$  2400 kg/m<sup>3</sup>), minimum floor thickness 200 mm

#### **Penetrating services**

#### **C.3.2.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062** Distance between wrap and seal edge in floor (width of annular gap): $\leq$ 7,5 mm

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
≤ 32	1,8	CFS-W EL	1	EI 240-U/C
50	2,2 – 3,6	CFS-W SG	50/1.5"	EI 180-U/C
63	2,2 - 3,6	CFS-W SG	63/2"	EI 180-U/C
75	2,2 - 3,6	CFS-W SG	75/2.5"	EI 180-U/C
≤ 75	2,2 - 3,6	CFS-W EL	1	EI 180-U/C
90	3,2	CFS-W SG	90/3"	EI 240-U/C
90	3,2 - 6,0	CFS-W SG	90/3"	EI 180-U/C
110	3,2	CFS-W SG	110/4"	EI 240-U/C
110	3,2 - 6,0	CFS-W SG	110/4"	EI 180-U/C
> 75 ≤ 110	3,2	CFS-W EL	2	EI 240-U/C
125	3,7 - 6,0	CFS-W SG	125/5"	EI 180-U/C
> 75 ≤ 125	3,7 - 6,0	CFS-W EL	2	EI 180-U/C
160	2,5 – 3,2	CFS-W SG	160/6"	EI 60-U/C
> 125 ≤ 160	2,5 - 3,2	CFS-W EL	3	EI 60-U/C
160	3,2 – 11,8	CFS-W SG	160/6"	EI 120-U/C
> 125 ≤ 160	3,2 – 11,8	CFS-W EL	3	EI 120-U/C



160	11,8	CFS-W SG	160/6"	EI 180-U/C
> 125 ≤ 160	11,8	CFS-W EL	3	EI 180-U/C
160	11,8 – 13,0	CFS-W SG	160/6"	EI 120-U/C
> 125 ≤ 160	11,8 – 13,0	CFS-W EL	3	EI 120-U/C

The results are also valid for PVC-C pipes according to EN 1566-1<sup>3</sup> and PVC-U pipes according EN 1329-1<sup>4</sup> and EN 1453-1<sup>4</sup>.

#### C.3.2.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Distance between wrap and seal edge in floor (width of annular gap):  $\leq$  7,5 mm

Distance between wrap and sear edge in noor (width of annular gap). $\leq 7,5$ mm					
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification	
≤ 32	1,8	CFS-W EL	1	EI 240-U/C	
50	1,9 – 6,8	CFS-W SG	50/1.5"	EI 180-U/C	
63	1,9-6,8	CFS-W SG	63/2"	EI 180-U/C	
75	1,9-6,8	CFS-W SG	75/2.5"	EI 180-U/C	
≤ 75	1,9-6,8	CFS-W EL	1	EI 180-U/C	
90	2,7	CFS-W SG	90/3"	EI 240-U/C	
90	2,7 – 7,1	CFS-W SG	90/3"	EI 180-U/C	
110	2,7	CFS-W SG	110/4"	EI 240-U/C	
> 75 ≤ 110	2,7	CFS-W EL	2	EI 240-U/C	
110	2,7 - 7,1	CFS-W SG	110/4"	EI 180-U/C	
125	3,2-7,1	CFS-W SG	125/5"	EI 180-U/C	
> 75 ≤ 125	3,2-7,1	CFS-W EL	2	EI 180-U/C	
125	7,1	CFS-W SG	125/5"	EI 180-U/C	
125	7,1	CFS-W EL	2	EI 180-U/C	
160	4,0 - 14,6	CFS-W SG	160/6"	EI 180-U/C	
> 125 ≤ 160	4,0 - 14,6	CFS-W EL	3	EI 180-U/C	
160	14,6	CFS-W SG	160/6"	EI 240-U/C	
> 125 ≤ 160	14,6	CFS-W EL	3	EI 240-U/C	

# C.3.3 Rigid floor type B according to clause 2.1 of the ETA (density $\geq$ 550 kg/m<sup>3</sup>), minimum floor thickness 150 mm

#### **Penetrating services**

C.3.3.1 PVC-U pipes according to EN ISO 15493, EN ISO 1452 and DIN 8061/8062 Distance between wrap and seal edge in floor (width of annular gap): ≤ 9,5 mm

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
90	3,7-6,0	CFS-W SG	90/3"	EI 120-U/C
110	3,7 - 6,0	CFS-W SG	110/4"	EI 120-U/C
125	3,7 - 6,0	CFS-W SG	125/5"	EI 120-U/C
>75 ≤ 125	3,7-6,0	CFS-W EL	2	EI 120-U/C



160	4,0	CFS-W SG	160/6"	EI 120-U/C
>125 ≤ 160	4,0	CFS-W EL	3	EI 120-U/C

The results are also valid for PVC-C pipes according to EN 1566-1<sup>3</sup> and PVC-U pipes according EN 1329-1<sup>4</sup> and EN 1453-1<sup>4</sup>.

#### C.3.3.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Distance between wrap and penetration seal edge in floor (width of annular gap):  $\leq$  9,5 mm

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Type of CFS-W (A <sub>1</sub> )	Size (CFS-W SG) / No. of layers (CFS-W EL)	Classification
90	7,1	CFS-W SG	90/3"	EI 120-U/C
110	7,1	CFS-W SG	110/4"	EI 120-U/C
125	7,1	CFS-W SG	125/5"	EI 120-U/C
> 75 ≤ 125	7,1	CFS-W EL	2	EI 120-U/C