

European Technical Approval

ETA-10/xxxx

Draft

Handelsbezeichnung:
Trade name:

Hilti Firestop Acrylic Sealant CFS-S ACR

Zulassungsinhaber:
Holder of approval:

**Hilti AG
Feldkircherstrasse 100
9494 Schaan
Liechtenstein**

Zulassungsgegenstand
und Verwendungszweck:

Abschottungen

*Generic type and use of
construction product:*

Penetration Seals

Geltungsdauer vom:
Validity from:
bis:
to:

xx.yy.20xx

xx.yy.20xx

Herstellwerk:
Manufacturing plant:

**Hilti Werk CP 606
Hilti Werk 4a**

Diese Europäische
technische Zulassung umfasst:
*This European Technical
Approval contains:*

2019 Seiten inklusive **3** Anhängen

2019 pages including **3** Annexes

- 1 This European Technical Approval is issued by Österreichisches Institut für Bautechnik in accordance with:
 - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products ¹ modified by Council Directive 93/68/EEC ² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council ³;
 - Bauproduktengesetz. LGBl. V Nr. 33/1994;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC⁴;
 - Guideline for European Technical Approval of Fire Stopping and Fire Sealing Products: Part 2: Penetration Seals.
- 2 The Österreichisches Institut für Bautechnik is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant(s). Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.
- 3 This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.
- 4 This European Technical Approval may be withdrawn by Österreichisches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
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- 6 The European Technical Approval is issued by the approval body in English. This version corresponds fully to the version circulated in EOTA. Translations into other languages have to be designated as such.

¹ Official Journal of the European Communities N° L 40, 11.2.1989, p. 12

² Official Journal of the European Communities N° L 220, 30.8.1993, p. 1

³ Official Journal of the European Union N° L 284, 31.10.2003, p.1

⁴ Official Journal of the European Communities N° L 17, 20.1.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product(s) and intended use

1.1 Definition of the construction product

Hilti Firestop Acrylic Sealant CFS-S ACR is a sealant installed around metal pipes or pipe insulation to form a penetration seal to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services. It is used in conjunction with mineral wool as backfilling material. For specification of suitable mineral wool see Annex C.

Hilti Firestop Acrylic Sealant CFS-S ACR is a 1-component product and is composed essentially of filling substances and an acrylic binder. It is delivered in various colours.

Hilti Firestop Acrylic Sealant CFS-S ACR is supplied in 310 ml cartridges, 580 ml foil packs, 5 Liter buckets and 19 Liter buckets. The sealant is installed in the annular space formed by the service and the edge of the opening in the building element, normally together with a backfilling material.

Installation of Hilti Firestop Acrylic Sealant CFS-S ACR – see 4.2.

1.2 Intended use and use category

1.2.1 Intended use

The intended use of Hilti Firestop Acrylic Sealant CFS-S ACR is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by services.

(1) The specific elements of construction that Hilti Firestop Acrylic Sealant CFS-S ACR may be used to provide a penetration seal in, are as follows (for details see Annex C):

- a) Flexible walls: 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. 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 minimum 100 mm insulation of Class A1 or A2 (in accordance with EN 13501-1) in the cavity between stud and seal.
- b) Rigid walls: The wall must have a minimum thickness of 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m³.
- c) Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete or masonry, with a minimum density of 2400 kg/m³.
- d) Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 2400 kg/m³.

The supporting construction must be classified in accordance with EN 13501-2 for the required fire resistance period.

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

(2) Hilti Firestop Acrylic Sealant CFS-S ACR may be used to provide a penetration seal with the following specific services, single only:

Metal pipes Services as given in Annex C

- (3) Apertures for the penetration of pipes require a minimum separation of 200 mm.
- (4) Pipes shall be supported at maximum 320 mm away from both faces of wall constructions and at maximum 255 mm from the upper face of floor constructions.

1.2.2 Working life

The provisions made in this European Technical Approval are based on an assumed working life of Hilti Firestop Acrylic Sealant CFS-S ACR of 10 years, provided that the conditions laid down in sections 4.2/5.1/5.2 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, 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.

1.2.3 Use Category

The use category of Hilti Firestop Acrylic Sealant CFS-S ACR is Type Y₂, (-5/+70)°C. Since the requirements for type Y₂ are met, also the requirements for type Z₁ and Z₂ are fulfilled.

Type Y₂: Products intended for use at temperatures between -5 °C and + 70°C, but with no exposure to rain nor UV.

Type Z₁: Products intended for use at internal conditions with high humidity, excluding temperatures below 0°C.⁵

Type Z₂: Products intended for uses at internal conditions with humidity classes other than Z₁, excluding temperatures below 0°C.

2 Characteristics of the product and methods of verification

The identification tests and the assessment of the fitness for use according to the Essential Requirements were carried out in compliance with the “ETA Guidance no. 026-Part 2” concerning Penetration Seals – edition January 2008 (called ETAG 026-2 in this ETA) and with the “EOTA Technical Report no. 024” concerning Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products – edition November 2006 (called EOTA TR 024 in this ETA).

ETAG Clause No.	ETA Clause No.	Characteristic	Assessment of characteristic
Mechanical resistance and stability			
		None	Not relevant
Safety in case of fire			
2.4.1	2.1	Reaction to fire	Class D-s1 d0 according to EN 13501-1:2007
2.4.2	2.2	Resistance to fire	see clause 2.2 and Annex C
Hygiene, health and environment			
2.4.3	2.3	Air permeability (material property)	Flow rate per area

⁵ These uses apply for internal humidity class 5 in accordance with EN ISO 13788

2.4.4	2.4	Water permeability (material property)	Water tight to 1000 mm head of water
2.4.5	2.4	Release of dangerous substances	Declaration of manufacturer
Safety in use			
2.4.6	2.6	Mechanical resistance and stability	No performance determined
2.4.7	2.7	Resistance to impact/movement	No performance determined
2.4.8	2.8	Adhesion	No performance determined
Protection against noise			
2.4.9	2.9	Airborne sound insulation	$R_{w(C;Ctr)}$, $D_{n,e,w}$
Energy economy and heat retention			
2.4.10	2.10	Thermal properties	No performance determined
2.4.11	2.11	Water vapour permeability	No performance determined
General aspects relating to fitness for use			
2.4.12	2.12	Durability and serviceability	$Y_2, (-5/+70)^{\circ}C$ Volume and surface resistivity

2.1 Reaction to fire

The reaction to fire classification for Hilti Firestop Acrylic Sealant CFS-S ACR is class 'D - s1 d0' in accordance with EN 13501-1.

2.2 Resistance to fire

Hilti Firestop Acrylic Sealant CFS-S ACR has been tested in accordance with EN 1366-3:2004, installed within apertures in rigid walls and floors (non-insulated steel pipes) and in accordance with EN 1366-3:2009, installed in flexible walls (drywalls), rigid walls and concrete floors.

The seals were penetrated by steel and copper pipes, including pipes with mineral wool insulation.

Based upon these test results and the field of direct application specified within EN 1366-3:2009, Hilti Firestop Acrylic Sealant CFS-S ACR has been classified in accordance with EN 13501-2, as shown in Annex C.

The seals may only be penetrated by the services described in Annex C. Other parts or support constructions must not penetrate the seal.

For details of suitable wall and floor constructions for penetration seals see 1.2.1.

The service support construction must be fixed to the building element containing the penetration seal or a suitable adjacent building element, on both sides of the penetration in such a manner that in the case of fire, no additional load is imposed on the seal. Furthermore it is assumed that this support is maintained on the unexposed side, for the required period of fire resistance.

Specific considerations:

- Pipes must be perpendicular to the seal surface.
- It is assumed that compressed air systems are switched off by other means in the case of fire.
- The function of the pipe seal in case of pneumatic dispatch systems, pressurised air systems etc. is guaranteed only when the systems are shut off in case of fire.

- The approval does not address any risks associated with leakage of dangerous liquids or gases caused by failure of the pipe(s) in case of fire.
- The durability assessment does not take account of the possible effect of substances permeating through the pipe on the penetration seal.
- The classifications relate to C/U (capped inside the furnace/uncapped outside). For further information refer to national regulations.

2.3 Air permeability

The gas permeability regarding the gases air, nitrogen (N₂), carbon dioxide (CO₂) and CH₄ (methane) has been tested according to the principles of EN 1026 for an Acrylic Sealant thickness of 10 mm. The following flow rates per area (q/A) have been achieved for the given air pressure differences (Δp). The flow rate index indicates the type of gas:

Gas permeability of Hilti Firestop Acrylic Sealant CFS-S ACR

Δp [Pa]	q/A air [m ³ /(h·m ²)]	q/A N ₂ [m ³ /(h·m ²)]	q/A CO ₂ [m ³ /(h·m ²)]	q/A CH ₄ [m ³ /(h·m ²)]
50	≤ 1,9E-06	≤ 1,1E-06	≤ 6,4E-05	≤ 4,3E-05
250	≤ 9,7E-06	≤ 5,5E-06	≤ 3,2E-04	≤ 2,1E-04

The declared values refer to a body of pure Hilti Firestop Acrylic Sealant CFS-S ACR without any penetrating installation.

2.4 Water permeability

The water permeability has been tested according to Annex C of ETAG 026-2. The specimen consisted of 2 mm Hilti Firestop Acrylic Sealant CFS-S ACR (dry film thickness) on mineral wool. Test result: Water tight to 1000 mm head of water or 9806 Pa.

2.5 Dangerous substances*

Hilti AG have presented a Material Safety Data Sheet according to Regulation 1907/2006/EC, article 31 and a declaration that Hilti Firestop Acrylic Sealant CFS-S ACR is in compliance with Regulation 1907/2006/EC concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), .

Confirmation has further been declared that toxic, carcinogenic, toxic for reproduction and mutagenic chemical substances of category 1 and 2 ≥ 0.1 % w/w (Status: Regulation 790/2009/EC - 1st ATP of the Regulation 1272/2008/EC) are not used for Hilti Firestop Acrylic Sealant CFS-S ACR and that all other dangerous chemical substances have been considered for the classification of the products according to the Regulation 1272/2008/EC (classification, labelling and packaging of substances and mixtures, including amendments).

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, 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 Directive, these requirements need also to be complied with, when and where they apply.

2.6 Mechanical resistance and stability

Due to the small size of penetration seals, made from Hilti Firestop Acrylic Sealant CFS-S ACR, impact tests and a classification according to EOTA TR 001 are not required.

2.7 Resistance to impact/movement

See 2.6

2.8 Adhesion

See 2.6

2.9 Airborne sound insulation

Test reports from noise reduction according to EN ISO 140-3, EN ISO 20140-10 and EN ISO 717-1 have been provided.

The acoustic tests were performed in a flexible wall and in a rigid wall. Hilti Firestop Acrylic Sealant CFS-S ACR was tested as seal around a steel pipe, filled with concrete. The seal was 50 mm wide (annular space) and consisted of 160 mm mineral wool, covered by 20 mm Hilti Firestop Acrylic Sealant CFS-S ACR on both sides (rigid wall) and 50 mm mineral wool covered by 25 mm on both sides (flexible wall). This set up simulates a linear joint as well as a single penetration seal. The area of Hilti Firestop Acrylic Sealant CFS-S ACR was 0,0236 m². The acoustic characteristics of the walls itself have not been measured. According to these tests reports the single number ratings are:

Flexible wall:

Weighted element-normalized level difference: $D_{n,w} = 60$ dB

From this $D_{n,w}$ the weighted sound reduction index calculates to: $R_w = 53$ dB

Structure of the flexible wall: 2 x 12,5 mm plasterboard on both sides of a 50 mm metal stud frame. The void was filled with a 50 mm mineral wool slab.

Rigid wall:

Weighted element-normalized level difference: $D_{n,w} = 58$ dB

From this $D_{n,w}$ the weighted sound reduction index calculates to: $R_w = 51$ dB

Structure of the rigid wall: 200 mm thick concrete wall with a density of 2000 kg/m³ which was plastered on both sides.

It should be noticed that both above mentioned results apply to the total wall construction of the size $S = 1,25$ m x $1,50$ m (= 1,88 m²), i.e. the given wall with 0,0236 m² Hilti Firestop Acrylic Sealant CFS-S ACR.

2.10 Thermal properties

No performance determined.

2.11 Water vapour permeability

No performance determined.

2.12 Durability and serviceability

2.12.1 Durability

Hilti Firestop Acrylic Sealant CFS-S ACR has been tested in accordance with EOTA TR 024, Table 4.2 for the Y₂ use category specified in EOTA ETAG 026-2 and the results of the test have demonstrated suitability for penetration seals intended for use at temperatures between -5°C and +70°C but with no exposure to rain nor UV (Y₂, (-5/+70)°C).

2.12.2 Serviceability

2.12.2.1 Electrical properties

- Volume resistivity (according to DIN IEC 93 (VDE 0303 Part 30):1993-12):
113E+10 ± 36E+10 Ω.cm.
- Surface resistivity (according to DIN IEC 93 (VDE 0303 Part 30):1993-12):
848E+06 ± 243E+06 Ω.

3 Evaluation of Conformity and CE marking

3.1 Attestation of Conformity system

According to the decision 1999/454/EC of the European Commission⁶ the system 1 of attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by a notified certification body on the basis of:

- (a) Tasks for the manufacturer:
 - (1) factory production control;
 - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;
- (b) Tasks for the notified body
 - (3) initial type-testing of the product;
 - (4) initial inspection of factory and of factory production control;
 - (5) continuous surveillance, assessment and approval of factory production control.

3.2 Responsibilities

3.2.1 Tasks of the Manufacturer

3.2.1.1 Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European Technical Approval.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control that applies. The documentation to be carried out by the manufacturer and the applicable procedures shall be appropriate to the product and manufacturing process. The factory production control shall ensure the conformity of the product to an appropriate level. This involves:

- a) the preparation of documented procedures and instructions relating to factory production control operations.
- b) the effective implementation of these procedures and instructions.
- c) the recording of these procedures and their results.
- d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the factory production control to rectify the cause of non-conformity.
- e) a procedure to ensure that both the Approval Body and the Notified (Certification) Bodies are advised before any significant change to the product, its components or manufacturing process, is made.
- f) a procedure to ensure that personnel involved in the production processes and the

⁶ Official Journal of the European Communities N° L 178, 14.7.1999, p. 52

quality control procedures are qualified and adequately trained to carry out their required tasks.

- g) that all testing and measuring equipment is maintained and up to date calibration records are documented.
- h) maintenance of records to ensure every batch produced is clearly labelled with the batch number, which allows traceability to its production to be identified.

The manufacturer may only use components stated in the technical documentation of this European Technical Approval.

For the components which the ETA-holder does not manufacture by himself, he shall make sure that factory production control carried out by the other manufacturers gives the guaranty of the components compliance with the European Technical Approval.

The factory production control and the provisions taken by the ETA-holder for components not produced by himself shall be in accordance with the control plan⁷ relating to this European Technical Approval which is part of the technical documentation of this European Technical Approval. The "Control Plan" is laid down in the context of the factory production control system operated by the manufacturer and deposited at the Österreichisches Institut für Bautechnik.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

3.2.1.2 Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body (bodies) which is (are) approved for the tasks referred to in section 3.1 in the field of penetration seals in order to undertake the actions laid down in section 3.3. For this purpose, the "control plan" referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body or bodies involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European Technical Approval.

3.2.2 Tasks of Notified Bodies

The Notified Body (Bodies) shall perform the

- initial type-testing of the product (for system 1),
The results of the tests performed as part of the assessment for the European Technical Approval may be used unless there are changes in the production line or plant. In such cases, the necessary initial type testing has to be agreed between the Österreichisches Institut für Bautechnik and the Notified Bodies involved.
- initial inspection of factory and of factory production control,
The Notified Body (Bodies) shall ascertain that, in accordance with the control plan, the factory (in particular the employees and the equipment) and the factory production control are suitable to ensure continuous and orderly manufacturing of the components according to the specifications mentioned in clause 2 of this ETA.
- continuous surveillance, assessment and approval of factory production control,
The Notified Body (Bodies) shall visit the factory at least twice a year or once a year for surveillance of this manufacturer having a FPC system complying with a quality management system covering the manufacturing of the approval product components. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking into account the control plan.

⁷ The control plan is a confidential part of the European Technical Approval and only handed over to the Notified Body or Bodies involved in the procedure of conformity.

These tasks shall be performed in accordance with the provisions laid down in the control plan of this European Technical Approval.

The Notified Body (Bodies) shall retain the essential points of its (their) actions referred to above and state the results obtained and conclusions drawn in a written report.

The Notified Body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European Technical Approval.

In cases where the provisions of the European Technical Approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform the Österreichisches Institut für Bautechnik without delay.

3.3 CE marking

The CE marking shall be affixed on the product itself, on a label attached to it, on its packaging or on the commercial documents accompanying the components of the product. The letters „CE“ shall be followed by the identification number of the Notified Body involved and be accompanied by the following additional information:

- the name or identifying mark and address of the ETA holder,
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European Technical Approval,
- the number of the ETAG (ETAG N° 026 part 2)
- the designation of the product (trade name)
- the use category in accordance with the ETA section 1 and 2
- “see ETA XXX/XXXX for other relevant characteristics”

4 Assumptions under which the fitness of the product(s) for the intended use was favourably assessed

4.1 Manufacturing

The European technical approval is issued for the product on the basis of agreed data/information, deposited with 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 Österreichisches Institut für Bautechnik before the changes are introduced. Österreichisches Institut für Bautechnik will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

4.2 Installation

Installation of the Hilti Firestop Acrylic Sealant CFS-S ACR should be conducted as follows:

- Clean opening. Surfaces to which Hilti Firestop Acrylic Sealant CFS-S ACR will be applied should be cleaned of loose debris, dirt, oil, wax and grease.
- Hilti Firestop Acrylic Sealant CFS-S ACR adheres to most substrates (concrete, masonry, drywall, plaster, etc.) without using a primer. For very porous substrates, a prior coating of Hilti Firestop Acrylic Sealant CFS-S ACR diluted with water is recommended as a primer. Other primers are not necessary.
- Insert backfilling material. Leave sufficient gap depth for application of the Acrylic Sealant.
- Apply Hilti Firestop Acrylic Sealant CFS-S ACR using a manual dispenser (for 310 ml cartridges Hilti CB 200-P1, for 580 ml foil packs Hilti CS 270-P1).

- Smoothen the Acrylic Sealant. Use either a diluted liquid soap or smoothing agent and carefully smooth using a finger or narrow spatula.
- Application temperature: +5°C to +40°C.

5 Indications to the manufacturer

5.1 Packaging, transport and storage

In the accompanying document and/or on the packaging the manufacturer shall give information as to transport and storage.

At least the following shall be indicated: storing temperature, type of storage, maximum duration of storage and required data related to minimum temperature for transport and storage.

5.2 Use, maintenance, repair

The Hilti Firestop Intumescent Sealant CFS-IS should be installed and used as described earlier in this document.

The assessment of the fitness for use is based on the assumption that damage, for example caused by accidental impact, is repaired. The relevant manufacturer instructions shall be followed.

On behalf of Österreichisches Institut für Bautechnik

Rainer Mikulits
Managing Director

ANNEX A
REFERENCE DOCUMENTS and LIST OF ABBREVIATIONS

References to standards mentioned in the ETA:

EN 1026	Windows and doors – Air permeability – Test method
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals
EN 13501-1	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests
EN 13501-2	Fire classification of construction products and building elements – Part 2: Classification using test data from fire resistance tests
EN ISO 140-3	Acoustics – Measurement of sound insulation in buildings and of building elements – Part 3: Laboratory measurements of airborne sound insulation of building elements
EN ISO 140-10	Acoustics – Measurements of sound insulation in buildings and of building elements – Part 10: Laboratory measurement of airborne sound insulation of small building elements
EN ISO 717-1	Acoustics – Rating of sound insulation of buildings and of building elements – Part 1: Airborne sound insulation

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
ISO 11600	Building construction — Jointing products — Classification and requirements for sealants
DIN IEC 60093 (VDE 0303 Part 30)	Methods of test for insulating materials for electrical purposes: Volume resistivity and surface resistivity of solid electrical insulating materials Safety Data Sheet according to 1907/2006/EC, Article 31, for Hilti Firestop Acrylic Sealant CFS-S ACR

Abbreviations used in drawings

Abbreviation	Description	Abbreviation	Description
A, A ₁ , A ₂ ,...	Firestop product	S ₁ , S ₂	Distances
B	Backfilling material	t _A	Thickness of penetration seal
C, C ₁ , C ₂ ,...	Penetrating services	t _B	Thickness of backfilling material
D	Pipe insulation	t _c	Pipe wall thickness
E, E ₁ , E ₂ ,...	Building element (wall, floor)	t _D	Thickness of insulation
L _D	Length of insulation	t _E	Thickness of the building element
d _c	Pipe diameter	w _A	Width of penetration seal (annular space)
h	Height/length of penetration seal		

ANNEX B

DESCRIPTION OF PRODUCT(S) & PRODUCT LITERATURE

Hilti Firestop Acrylic Sealant CFS-S ACR

Cartridge 310 ml, Foil pack 580 ml, Bucket 5 l / 19 l

Suitable dispensers:

Hilti CB 200-P1 (for 310 ml cartridge)

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

A detailed specification of the product is contained in document "Identification / Product Specification and Control Plan of 19.05.2010 relating to the European Technical Approval ETA -10/xxx issued on .. (date) Hilti Firestop Acrylic Sealant CFS-S ACR" which is a non-public part of this ETA.

Technical product literature:

- Technical Datasheet and Instructions for Use Hilti Firestop Acrylic Sealant CFS-S ACR

ANNEX C

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE FROM HILTI FIRESTOP ACRYLIC SEALANT CFS-S ACR

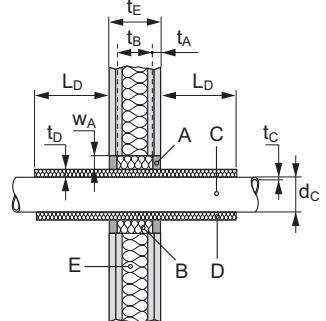
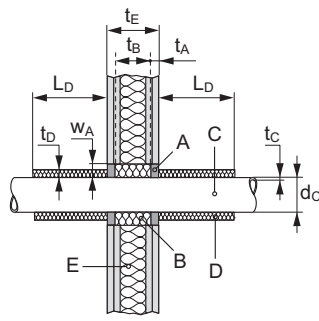
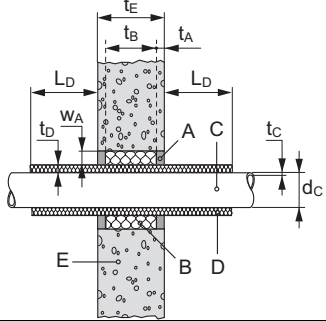
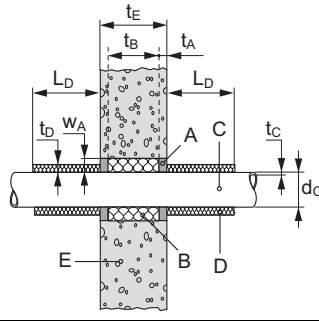
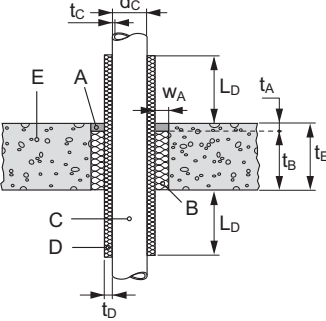
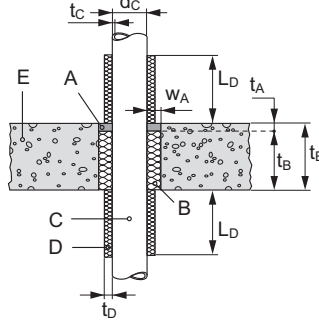
<p>C.1 Rigid walls and rigid floors according to 1.2.1 c) and d)</p> <p>Penetration seal: Wall: 15 mm Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides, stone wool of minimum density 45 Kg/m³ (B) as backfilling material (t_B = minimum 50 mm on both sides) Floor: 15 mm Hilti Firestop Acrylic Sealant CFS-S ACR (A) on the upper side, stone wool of minimum density 45 Kg/m³ (B) as backfilling material (t_B = gap filled completely)</p>	
<p>Penetrating services</p>	<p>Classification</p>
<p>Steel pipes non-insulated (C) Single penetration Distance between pipe and seal edge in wall (width of annular space, w_A): 10,5 - 35,5 mm; Distance between pipe and seal edge in floor (width of annular space, w_A): 19,0 - 35,5 mm; Pipe diameter (d_c) between Ø32 mm and Ø159 mm, with minimum wall thickness (t_c) 1,8 mm and 4,5 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm</p>	
<p>The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys).</p>	

C.2 Flexible wall, rigid wall and rigid floor according to 1.2.1 a), b) and d)						
Penetration seal: 10 mm Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides (wall constructions) or on top side (floor constructions), stone wool of minimum density 45 Kg/m ³ (B) as backfilling material (t_B = gap filled completely)						
Continued pipe insulation						
Sustained insulation		Interrupted insulation				
Penetrating services		Classification				
		<table border="1"> <thead> <tr> <th>Wall</th> <th>Floor</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Wall	Floor		
Wall	Floor					
<p>Steel pipes (C) with continued insulation (D) – sustained or interrupted, made from mineral wool according to Table C.3; Maximum seal diameter in wall constructions: 300 mm (annular space w_A depending on pipe diameter) Distance between pipe and seal edge in floor constructions (width of annular space, w_A): 30 - 45 mm</p>						

Insulation thickness (t_b) \geq 20 mm: Pipe diameter (d_c) \varnothing 33,7 mm and minimum wall thickness (t_c) 2,6 mm, maximum wall thickness 14,2 mm		
Sustained insulation	EI 120-C/U	EI 180-C/U
Interrupted insulation	EI 120-C/U	EI 180-C/U
Insulation thickness (t_b) \geq 40 mm: Pipe diameter (d_c) between \varnothing 33,7 mm and \varnothing 168,3 mm, with minimum wall thickness (t_c) 2,6 mm and 34,65 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm		
Sustained insulation	EI 120-C/U	EI 180-C/U
Interrupted insulation	EI 120-C/U	EI 120-C/U E 180-C/U
Penetrating services	Classification	
	Wall	Floor
Copper pipes (C) with continued insulation (D) – sustained or interrupted, made from mineral wool according to Table C.3; Maximum seal diameter: 300 mm (annular space w_A depending on pipe diameter) Distance between pipe and seal edge in floor constructions (width of annular space, w_A): 30 - 40 mm		
Insulation thickness (t_b) \geq 20 mm: Pipe diameter (d_c) \varnothing 28 mm, with minimum wall thickness (t_c) 1 mm; maximum wall thickness 14,2 mm		
Sustained insulation	EI 120-C/U	EI 180-C/U
Interrupted insulation	EI 120-C/U	EI 120-C/U E 180-C/U
Insulation thickness (t_b) \geq 40 mm: Pipe diameter (d_c) \varnothing 89 mm, with minimum wall thickness (t_c) 2 mm, maximum wall thickness 14,2 mm		
Sustained insulation	EI 120-C/U	EI 180-C/U
Interrupted insulation	EI 120-C/U	EI 180-C/U
Insulation thickness (t_b) \geq 40 mm: Pipe diameter (d_c) between \varnothing 28 mm and \varnothing 89 mm, with minimum wall thickness (t_c) 1 mm and 2 mm respectively, interpolation of minimum thickness between these diameters, maximum wall thickness 14,2 mm		
Sustained insulation	EI 120-C/U	EI 180-C/U
Interrupted insulation	EI 120-C/U	EI 120-C/U E 180-C/U

Formatiert: Schriftart:
(Standard) Arial

Formatiert: Schriftart:
(Standard) Arial

Local pipe insulation: Minimum length of local insulation L_D : Sustained: 450 mm (wall), 425 mm (floor) Interrupted: 500 mm		
Sustained insulation	Interrupted insulation	
		
		
		
Penetrating services	Classification	
Steel pipes (C) with local insulation (D) - sustained or interrupted, made from mineral wool according to Table C.3; Minimum length of local insulation L_D : Sustained: 450 mm (wall), 425 mm (floor) Interrupted: 500 mm Maximum seal diameter: 300 mm (annular space w_A depending on pipe diameter) Distance between pipe and seal edge in floor constructions (width of annular space, w_A): 30 - 45 mm	Wall	Floor

Insulation thickness (t_D) 20 mm: Pipe diameter (d_C) \varnothing 33,7 mm and minimum wall thickness (t_C) 2,6 mm, maximum wall thickness 14,2 mm		
Sustained insulation	EI 120-C/U	EI 180-C/U
Interrupted insulation	EI 120-C/U	EI 180-C/U
Insulation thickness (t_D) 40 mm: Pipe diameter (d_C) \varnothing 168,3 mm, with minimum wall thickness (t_C) 34,65 mm; maximum wall thickness 14,2 mm		
Sustained insulation	EI 90-C/U E 120-CU	EI 120-C/U E 180-C/U
Interrupted insulation	EI 120-C/U	EI 120-C/U E 180-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1100°C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)		
Penetrating services	Classification	
	Wall	Floor
Copper pipes (C) with local insulation (D) – sustained or interrupted, made from mineral wool according to Table C.3; Minimum length of local insulation L_D : Sustained: 450 mm (wall), 425 mm (floor) Interrupted: 500 mm Maximum seal diameter: 300 mm (annular space w_A depending on pipe diameter) Distance between pipe and seal edge in floor constructions (width of annular space, w_A): 30 - 40 mm		
Insulation thickness (t_D) 20 mm: Pipe diameter (d_C) \varnothing 28 mm, with minimum wall thickness (t_C) 1 mm; maximum wall thickness 14,2 mm		
Sustained insulation	EI 120-C/U	EI 180-C/U
Interrupted insulation	EI 120-C/U	EI 120-C/U E 180-C/U
Local insulation thickness (t_D) 40 mm – or – continued insulation thickness (t_D) 40 mm: Pipe diameter (d_C) \varnothing 89 mm, with minimum wall thickness (t_C) 2 mm, maximum wall thickness 14,2 mm		
Sustained insulation	EI 60-C/U E 120-C/U	EI 120-C/U E 180-C/U
Interrupted insulation	EI 120-C/U	EI 180-C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1100°C, e.g. cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.		

C.3 Mineral wool products suitable for being used as pipe insulation	
Manufacturer	Product designation
Isover	Protect BSR 90 alu
Paroc	PAROC Section AluCoat T
Rockwool	Conlit 150 P
Rockwool	Klimarock
Rockwool	Rockwool 800 pipe sections