



Behandeld door [redacted]  
Doorkiesnummer [redacted]  
E-mail [redacted]  
Bijlage(n) 1 set gewaarmerkte stukken  
Leges [redacted]

Geachte [redacted]



Datum 12 december 2018  
Ons kenmerk HZ\_WABO-18-05722  
Onderwerp Besluit omgevingsvergunning

Verzonden **13 DEC. 2018**  
Bij antwoord datum, kenmerk en onderwerp vermelden

U heeft een aanvraag voor een omgevingsvergunning ingediend voor een perceel gelegen aan de Helling 3 en Helling 5 te Utrecht. Deze aanvraag hebben wij op 16 februari 2018 ontvangen en is geregistreerd onder kenmerk HZ\_WABO-18-05722. Ons besluit over uw aanvraag voor het bouwen van een hotel heeft betrekking op de volgende activiteiten in het kader van de Wet algemene bepalingen omgevingsrecht (Wabo):

- Bouw (artikel 2.1 lid 1 sub a van de Wabo)

### Besluit

Wij besluiten de gevraagde omgevingsvergunning te verlenen. Hieronder vermelden wij de procedure waarop dit besluit is gebaseerd.

Bij deze omgevingsvergunning hoort een aanhangsel. Hierin vindt u de overwegingen en besluiten, de voorschriften en de aandachtspunten van uw vergunning. Verder hebben wij gewaarmerkte stukken als bijlage toegevoegd. Deze zijn ook onderdeel van uw vergunning.

### Procedureel

Tijdens de behandeling van uw aanvraag hebben wij de voorgeschreven procedure uit de Wabo, de Ministeriële regeling omgevingsrecht (Mor) en het Besluit omgevingsrecht (Bor) doorlopen.

### Publicatie

Gedurende zes weken heeft de aanvraag samen met het conceptbesluit en bij behorende stukken ter inzage gelegen. Een ieder heeft in deze periode de mogelijkheid gehad om zienswijzen in te dienen. In het aanhangsel bij deze vergunning leest u hoe wij deze zienswijzen bij dit besluit hebben betrokken.

### Inwerkingtreding

Na het verstrijken van de beroepstermijn (van zes weken) treedt dit besluit in werking. De beroepstermijn begint te lopen één dag nadat dit besluit is gepubliceerd. In deze periode kunnen belanghebbenden beroep aantekenen bij de bestuursrechtbank en daarnaast de voorzieningenrechter vragen een voorlopige uitspraak te doen. U mag pas gebruik maken van deze vergunning nadat de beroepstermijn ongebruikt is verstreken of nadat de rechter over een eventueel verzoek om voorlopige

voorziening heeft beslist. Hiermee wordt voorkomen dat de vergunde werkzaamheden al zijn uitgevoerd voordat de rechter uitspraak heeft kunnen doen. Indien het beroep gegrond wordt verklaard dan is het mogelijk dat wij het besluit moeten herroepen en een nieuw besluit moeten nemen, wat een wijziging of weigering van uw aanvraag kan betekenen. Bij de griffie van de rechtbank Midden Nederland kunt u informatie verkrijgen over eventueel ingediende beroepsschriften.

#### **Beroep aantekenen tegen dit besluit**

Tegen dit besluit kan beroep worden aangetekend bij de sector bestuursrecht van de rechtbank Midden-Nederland. Voor het al dan niet digitaal indienen van beroepsschriften verwijzen wij naar de webpagina: [www.rechtspraak.nl](http://www.rechtspraak.nl)

Wij wijzen u op het feit dat beroepsschriften binnen zes weken door de rechtbank moeten zijn ontvangen. De termijn van zes weken vangt aan één dag na de publicatie van dit besluit. Het tijdig indienen van het beroep voorkomt dat de rechtbank moet besluiten om een beroepsschrift niet in behandeling te nemen.

Een beroepsschrift moet ten minste het volgende bevatten:

- de naam en het adres van de indiener, bij voorkeur ook een telefoonnummer dat overdag te bereiken is;
- de datum en handtekening;
- een omschrijving van het besluit waartegen het beroepsschrift is gericht; hierbij moeten de verzenddatum en het kenmerk van het besluit worden vermeld of een kopie van dit besluit worden meegestuurd;
- de gronden van het beroep.

#### **Registratie werkzaamheden**

Wij wijzen u op de verplichting voor het tijdig melden van de start van de werkzaamheden zoals dit in het aanhangsel wordt genoemd. Deze melding kan digitaal worden ingediend via een link op de pagina: [www.utrecht.nl/bouwtoezicht](http://www.utrecht.nl/bouwtoezicht)

Daarnaast moeten de werkzaamheden gereed worden gemeld. Hiervoor kunt u contact opnemen met de inspecteur van Toezicht en Handhaving Bebouwde Omgeving, [REDACTED], telefoonnummer: [REDACTED]

#### **Betaling leges**

U bent voor de verrichte werkzaamheden leges verschuldigd.

De hoogte van dit bedrag is [REDACTED]. Hiervoor ontvangt u apart een rekening.

#### **Heeft u vragen?**

Voor meer informatie over de inhoud van deze brief kunt u terecht bij De [REDACTED], [REDACTED]

Hoogachtend,  
Namens burgemeester en wethouders,



M. Prijs  
Hoofd Vergunningen



### Aanhangsel

De volgende voorschriften en overwegingen zijn onderdeel van de omgevingsvergunning, verleend op 26 april 2018 aan Vastint Hospitality B.V. voor het project het bouwen van een hotel op het adres Helling 3 en Helling 5 te Utrecht.

De onderdelen van deze omgevingsvergunning zijn gebaseerd op de volgende artikelen:

- Artikel 2.1 lid 1 sub a van de Wabo, het bouwen.

### Beoordeling zienswijzen

- De reacties en conclusies op de zienswijzen zijn opgenomen in het vaststellingsrapport van september 2018 behorende bij het bestemmingsplan Hotel Helling 3, Rotsoord Tolsteeg.

### Activiteit Bouw

#### Constateringen

- Uw aanvraag is in overeenstemming met het bestemmingsplan "Hotel Helling 3, Rotsoord Tolsteeg".

#### Overwegingen

- Uit artikel 2.10 van de Wabo en de vermelde constateringen volgt dat uw aanvraag voor een omgevingsvergunning verleend moet worden aangezien geen grond aanwezig is om de vergunning te weigeren. In deze situatie kunnen wij privaatrechtelijke belangen niet in de besluitvorming betrekken.
- Het bureau van de Commissie Welstand en Monumenten heeft uw aanvraag aan het welstandsbeleid getoetst. Uw aanvraag voldoet aan de betreffende criteria.

#### Besluit en motivering

Het volgende is besloten:

- De omgevingsvergunning te verlenen onder voorwaarden genoemd onder de Voorschriften. Wij verlenen de gevraagde vergunning aangezien het aannemelijk is dat uw aanvraag voldoet aan de relevante toetsingskaders.

### Voorschriften

#### Algemene Voorschriften

- De bouwwerkzaamheden moeten overeenkomstig deze vergunning, het bouwbesluit en de bouwverordening worden uitgevoerd. Indien in afwijking hiervan wordt gebouwd zal handhavend worden opgetreden.
- Vloerafscheidingen moeten voldoen aan afdeling 2.3 van het Bouwbesluit. Een of meer van de vloerafscheidingen van vloeren die hoger dan 13 m liggen, is/zijn lager dan 1,2 m. Het betreft de volgende vloerafscheidingen (voor zover van tekening af te lezen):
  - balustrade trapgat 4e verdieping trap tussen stramienen D en E;
  - balustrade trapgat bovenste verdieping trap tussen stramienen O en N.Deze vloerafscheidingen dienen aangepast te worden opdat ze voldoen aan afdeling 2.3 van het Bouwbesluit.
- U moet de start van de bouwwerkzaamheden (inclusief ontgraaf- en funderingswerkzaamheden) tenminste zeven dagen voor de aanvang melden via de webpagina: [www.utrecht.nl/bouwtoezicht](http://www.utrecht.nl/bouwtoezicht).
- Daarnaast moet u het storten van beton tenminste één dag van tevoren melden bij de eerder genoemde inspecteur van Toezicht & Handhaving.

- Te verstrekken gegevens ten aanzien van de constructie. Uiterlijk 3 weken voor de uitvoering van de betreffende bouwwerkzaamheden moeten deze gegevens worden ingediend.  
In het aanhangsel treft u een overzicht aan van de nog in te dienen constructieve gegevens.
- Van bouwproducten met verplichte prestatie/kwaliteitsverklaring moeten de attesten op de bouwplaats aanwezig zijn.
- Uiterlijk drie weken voor aanvang van de bouwwerkzaamheden moeten de volgende gegevens ter beoordeling worden ingediend.
  - o een bouwveiligheidsplan met betrekking tot de veiligheid van derden (geen Arbowet).
  - o een tekening van de inrichting van het bouwterrein. Uiterlijk op de dag van beëindiging van de bouwwerkzaamheden moet het werk worden gereed gemeld bij de genoemde Inspecteur van de afdeling Toezicht & Handhaving. Voorafgaand aan deze melding mag het bouwwerk niet in gebruik worden genomen.

#### *Voorschriften brandveiligheid*

De Veiligheidsregio Utrecht heeft de bouwaanvraag getoetst aan de regelgeving met betrekking tot (brand)veiligheid van het Bouwbesluit 2012, de Regeling Bouwbesluit 2012 en de gemeentelijke bouwverordening. Verder is beoordeeld of de ingediende gegevens in overeenstemming zijn met het *Handboek Brandbeveiligingsinstallaties* en de *Handreiking Bluswatervoorziening en Bereikbaarheid* van Brandweer Nederland.

Bij de toetsing van de aanvraag is uitgegaan van:

- Logiesfunctie in een logiesgebouw met 24-uursbewaking

Verder is bij de toetsing uitgegaan van:

- Nieuwbouw niveau

De aanvraag kan voldoen onder voorwaarden.

Het geplande bouwwerk, zoals dat is weergegeven in de aanvraag, voldoet niet geheel aan de genoemde regelgeving met betrekking tot brandveiligheid. Onze inschatting is dat de aanvrager deze strijdigheden zal kunnen wegnemen zonder het ontwerp op essentiële punten te wijzigen. Wij adviseren daarom

om de omgevingsvergunning te verlenen en daaraan nadere voorschriften te verbinden die inhouden dat de aanvrager de strijdigheden met de regelgeving alsnog corrigeert.

Indien in onderstaande voorschriften onder 'maatregel' wordt aangegeven dat gegevens en berekeningen aangeleverd moeten worden, moet deze informatie, in aanvulling op de WABO-aanvraag, worden ingediend bij het omgevingsloket.

De productspecificaties, zoals genoemd onder maatregel, kunnen op basis van de MOR artikel 2.7 lid 3 tot drie weken vóór uitvoering van het betreffende onderdeel worden aangeleverd.

De genoemde maatregel is één mogelijkheid om de strijdigheid op te heffen. Andere gelijkwaardige oplossingen kunnen ook voorgedragen worden. Deze moeten besproken worden met de Veiligheidsregio Utrecht.

#### **Advies**

Naast onze conclusie is een advies opgenomen om de (brand)veiligheid van het bouwwerk te verbeteren.



### **Gelijkwaardigheidsbepaling (art. 1.3)**

Constatering: Op basis van artikel 1.3 van het Bouwbesluit 2012 is gebruik gemaakt van de mogelijkheid om door middel van een rapportage gelijkwaardige brandveiligheid aan te tonen. Het rapport is opgesteld door LBP Sight met het kenmerk R035030aa.17G009F.rsh d.d. 10 april 2018. Het betreft hier het aanbrengen van een automatische sprinkler installatie. De automatische sprinkler installatie wordt aangebracht op wens van de gebruiker en is in de basis een aanvulling op de regulerende brandveiligheidsvoorzieningen.

De automatische sprinkler installatie wordt in dit kader feitelijk enkel ingezet als gelijkwaardige oplossing voor het vergroten van brandcompartimenten. De gebruiksoppervlakte van de verdiepingen is groter als maximaal toegestaan 500m<sup>2</sup>. Met het aanbrengen van een automatische sprinklerinstallatie worden de verdiepingen (ongeveer 1000m<sup>2</sup>) uitgevoerd als een zelfstandig brandcompartiment.

Voorschrift: Artikel 1.3 van het Bouwbesluit 2012. (Gelijkwaardigheidsbepaling)

Maatregel: Aanbrengen Automatische sprinklerinstallatie – brandcompartimenteringsklasse B, Gedeeltelijke beveiliging op basis van een UPD welke is opgesteld door LBP Sight met kenmerk R035030aa.17GSJZD.gvo versie 03\_001 d.d. 10 april 2018.

Als vergunningsvoorwaarde moet worden opgenomen dat het UPD formeel moet worden goedgekeurd door een type A gecertificeerde inspectie-instelling. Als het UPD de goedkeuring heeft van de inspectie-instelling moet dit alsnog ter goedkeuring worden voorgelegd aan het bevoegd gezag. De rapportage brandveiligheid welke eveneens is opgesteld door LBP Sight met het kenmerk R035030aa.17G009F.rsh d.d. 10 april 2018 maakt ook deel uit van deze omgevingsvergunning.

### **WBDBO (art. 2.84 en 2.94)**

Constatering: In de rapportage brandveiligheid wordt aangegeven (art. 2.2.1.) dat de benodigde brandkleppen prefab worden aangeleverd met de scheidingswanden.

Op de WTB tekeningen van Ingenieursbureau Linssen met kenmerk 1738 zijn deze brandkleppen echter niet terug te vinden.

Voorschrift: Artikel 2.84 en 2.94 van het Bouwbesluit 2012. (Weerstand tegen branddoorslag en brandoverslag).

Maatregel: Om misverstanden in het vervolgtraject te voorkomen adviseer ik de brandkleppen aan te laten geven op de WTB tekeningen.

### **Droge blusleiding (art. 6.29)**

De droge blusleiding wordt niet vereist op basis van het Bouwbesluit maar wanneer blusleidingen alsnog worden aangebracht moeten deze worden uitgevoerd conform de NEN 1594.

### **Brandmeld- en ontruimingsinstallatie installatie (art. 6.20 en 6.23)**

Constatering: Bij de documenten behorende bij deze aanvraag is het UPD brandmeld- en ontruimingsalarminstallatie ingediend. Dit UPD is inhoudelijk beoordeeld en akkoord.

Voorschrift: Artikel 6.20 lid 1 (Brandmeldinstallatie) en art. 6.23 lid 1 (ontruimingsalarminstallatie) van het Bouwbesluit 2012.

## OVERIGE VOORWAARDEN

- De brandweer moet uitgenodigd worden bij het bespreken van de vergunning vóór uitvoering van de bouw, voor een toelichting op het advies;
- De brandweer moet uitgenodigd worden vóór de oplevering van het bouwwerk en de installaties.
- **Voor de ingebruikname van het gebouw dient te worden beschikt over een actuele melding brandveilig gebruik (beoordeeld en geaccordeerd door Brandweer Utrecht/Veiligheidsregio Utrecht – info.VRU.nl) alvorens gebouw in gebruik kan worden genomen.**

## Aandachtspunten

- Door bouwwerkzaamheden en het aan- en afvoeren van bouw materiaal kan schade aan de openbare weg, straatmeubilair, openbaar groen, straatverlichting en dergelijke ontstaan. Herstelwerkzaamheden en/of aanpassingen ten gevolge daarvan worden door Stadsbedrijven op kosten van de aanvrager uitgevoerd. U dient voor deze werkzaamheden tijdig contact op te nemen met de gebiedsbeheerder van de desbetreffende wijk (bereikbaar via het Klantcontact Centrum van de gemeente Utrecht, telefoon: 14 030).
- Deze vergunning wordt verleend behoudens rechten van derden. Dit betekent dat privaatrechtelijke zaken de uitvoering van de werkzaamheden geheel of gedeeltelijk kunnen verhinderen.
- De omgevingsvergunning kan geheel of gedeeltelijk worden ingetrokken indien:
  - a) blijkt dat de vergunning is verstrekt op grond van onjuiste gegevens bij de aanvraag;
  - b) de aan de vergunning verbonden voorschriften niet zijn of worden nagekomen;
  - c) van de vergunning geen gebruik wordt gemaakt binnen 26 weken na bekendmaking;
  - d) de werkzaamheden met meer dan 26 weken zijn stilgelegd;
  - e) de vergunninghouder dit verzoekt.

## Activiteit Bouw (leidingplan riolering en hemelwaterafvoeren BB 6.15 t/m 6.18)

De aanvraag is, voor zover het gaat over het leidingplan voor de afvoer van huishoudelijk afvalwater, eventueel bedrijfsafvalwater en de afvoer of verwerking van hemelwater, beoordeeld aan de hand van de installatietechnische eisen zoals gesteld in afdeling 6.4, artikel 6.15 t/m 6.18 van het Bouwbesluit en voor zover aansluiting van die leidingsystemen op openbare voorzieningen voor afvalwater is toegelaten.

In de nabijheid van het bouwwerk en perceel is een openbaar vuilwaterriool aanwezig waarop afvoeren van huishoudelijk afvalwater en onder milieu hygiënische voorschriften van het Activiteitenbesluit Milieubeheer bedrijfsafvalwater aangesloten kunnen worden.

Voor de afvoer of verwerking van hemelwater gelden specifieke en nader omschreven voorschriften.

Voor het indienen van een afzonderlijk verzoek om nieuwe of gewijzigde aanleg van- en aansluiting op 1 of meerdere perceel aansluitleidingen van de openbare riolering wordt verwezen naar de instructies onder *Realisatie van nieuwe (perceel) aansluitingen op de openbare riolering*.

## Voorschriften riolering en hemelwater nieuwbouwwerk tot en met de grens van het erf:

### 1.1 Riolering t.o.v. bestaande situatie en sloop:

In de bestaande situatie is sprake van openbare riolering gelegen in de Helling en in de nabijheid van de "plot" van het nieuwbouwwerk.

Het betreft een openbaar vuilwaterriool 300 mm voorzien van een "relining" en is gelegen op een diepte van ca. 1.30 meter onder maaiveld (bovenkant buis.)

Tijdens de sloop- of bouwwerkzaamheden mag geen schade ontstaan aan de openbare riolering.



Voor zover nodig dienen beschermende maatregelen te worden getroffen in de laad- en loszone en in/onder de opstelplaats van de torenkraan.

Eventuele schade aan de (openbare) riolering, aantoonbaar ontstaan door de sloop- of bouwwerkzaamheden kan worden verhaald op de veroorzaker of perceeleigenaar.

Perceel aansluitleiding(en) van te slopen bouwwerken en/of (openbare) riolering moet(en), voor zover daar sprake van is, door en/of op aanwijs van de gemeente Utrecht voor rekening van de bouwontwikkeling worden verwijderd tenzij door de bouwontwikkeling en de gemeente Utrecht anders is overeengekomen.

Neem hiervoor tijdig contact op met de gemeente Utrecht, afdeling Stadsbedrijven.

Tekeningen van openbare riolering zijn desgewenst op te vragen bij [www.utrecht.nl/digitaal\\_loket](http://www.utrecht.nl/digitaal_loket)

#### *2.1 Algemene voorschriften riolering "binnen het eigen perceel" (Bouwbesluit):*

Ontwerp en aanleg van nieuw leidingwerk volgens NEN 3215/NTR 3216.

De leidingsystemen voor huishoudelijk afvalwater en hemelwater moeten gescheiden van elkaar zijn uitgevoerd tot buiten de grens van het erf of perceel.

Zettingsconstructies ter plaatse van de gevellijn zoals bedoeld in Bouwbesluit art. 6.18 lid 2 uitvoeren volgens het principe NTR 3216-2012 tabel 12.4 door middel van 1 of meerdere dubbele flexibele steekmoffen met het vermogen om hoekverdraaiingen op te vangen. ("Pendelstuk", rekening houden met een maximale zakking van < 100mm)

Het gebruik van flexibele aansluitstukken en/of polderexpansiestukken in, of nabij de openbare ruimte is niet toegestaan, tenzij door de gemeente geplaatst.

Indien er sprake is van lozingstoestellen beneden straatniveau (ter hoogte van as PQ-2?) moeten voorzieningen worden getroffen zoals bedoeld in NEN 3215 artikel 4.1.4 (rioolwaterpomp en/of terugstuwbeveiliging) en NTR 3216 artikel 3.4.2 (overstromingsgevoelige aansluitpunten)

Afzonderlijke gebouwuittrede persleiding van rioolwaterpomp:

Bij het toepassen van drukriolering zoals bedoeld in NEN 3215 artikel 4.1.4 (rioolwaterpomp) en NTR 3216 artikel 3.4.2 moet afvalwater uit pompunit(s), drukloos en door een afzonderlijke perceel aansluitleiding op de openbare riolering lozen. Drukriolering door middel van een ontvangstput type PE 315 (of gelijkwaardig daaraan) drukloos maken van waaruit afvalwater onder vrij verval af kan stromen naar de openbare riolering. De ontvangstput "nagelvast" tegen het bouwwerk plaatsen. (= gebouwriolering), voorzien van een passend deksel op ca. 30 cm onder maaiveld en op een hart-op-hart afstand van ca. 75 cm ten opzichte van overige gebouwuittreden van het leidingwerk voor huishoudelijk afvalwater.

Uitgaande leidingdiameter vanuit de ontvangstput ten minste 125 mm, ten hoogste 160 mm.

Directe injectiepunten van drukriolering (persleidingen) op de openbare riolering zijn niet toegestaan.

#### *Voorschriften als bedoeld in Bouwbesluit artikel 6.18 lid 4, sub.a (huishoudelijk afvalwater):*

- Plaats: aan de zijde van de openbare weg genaamd *De Helling*, betreft uitsluitend aan de oostgevel van het bouwwerk. Aanbrengen tot op 50 cm uit de grens van het erf.
- Aanlegdiepte: ten miste 60 cm, ten hoogste 65 cm onder maaiveld (bovenkant buis) ter plaatse van de grens van het erf/grens openbare ruimte,
- Diameter: ten minste 125 mm en ten hoogste 160 mm op, en ter plaatse van de grens van het erf,
- Materiaal: PVC klasse SN8, kleur roodbruin RAL 8023.



De hart-op-hart afstand (h.o.h.) tussen leidingen ter plaatse van de (kadastrale) grens van het terrein of erf dient ten minste 500 mm te bedragen.

Vergunninghouder beperkt zich tot het op 50 cm uit de grens van het erf aanbieden van leidingwerk voor de afvoer van "vuilwater" volgens genoemde voorschriften op grond van art 6.18 lid 4 sub. a van het Bouwbesluit 2012. (waaronder een toe te passen maximale buisdiameter, die in het voorgenomen leidingplan ontbreken)

Of, en zo ja hoe leidingwerk buiten de grens van het erf wordt "gecombineerd" (zoals op het voorgenomen leidingplan "gestippeld" is weergegeven (tekening Werktuigkundige installaties W-01\_OV wijzigingsdatum 5-4-2018) is een aangelegenheid van de gemeente als beheerder van de openbare ruimte. Vergunninghouder voegt geen leidingwerk buiten het bouwwerk samen in een "verzamelleiding".

De gemeente Utrecht (in deze vertegenwoordigd door de afdeling Beheer Openbare Ruimte en Gebouwen-BORG) behoudt zich het recht voor om wijzigingen/aanvullingen op plaats, aanlegdiepte en diameter van riolering en hemelwaterafvoeren ter plaatse van de grens van het erf, zoals bedoeld in het Bouwbesluit door te voeren indien zij dit, bijvoorbeeld door lokale omstandigheden, noodzakelijk en/of redelijk acht. Hiervan wordt u tijdig in kennis gesteld.

*Voorschriften aan bijzondere voorzieningen als bedoeld in Bouwbesluit artikel 6.18 lid 4 sub c:*

- Wanneer de gevellijn gelijk is aan de (toekomstige) eigendomsgrens, dan op 50 cm uit de gevellijn een ontstoppingsstuk van het type klemdeksel toepassen (geen schroefdeksel toepassen)

***Bijzondere voorschriften voor de afvoer of verwerking van hemelwater:***

Juridisch kader riolering en hemelwater (beknopt samengevat):

- de voorkeursvolgorde voor (hemelwater)lozingen, zoals gesteld in artikel 10.29a van de Wet Milieubeheer,
- de algemene regels voor (hemelwater)lozingen volgens de daarop van toepassing zijnde algemene maatregelen van bestuur (Lozingsbesluiten),
- het Bestemmingplan/Omgevingsplan
- artikel 6.18 lid 4, sub b van het Bouwbesluit

Het waterbeleid<sup>1</sup> van het Rijk, de provincie Utrecht, de gemeente Utrecht en het waterschap HDSR is gericht op een duurzaam en robuust waterbeheer en kent een aantal doelstellingen waaronder:

- de waterkwaliteitstrits 'gescheiden inzamelen-gescheiden afvoeren-gescheiden verwerken'
- de waterkwantiteitstrits 'water vasthouden-bergen-vertraagd afvoeren'

Het uitgangspunt van deze toetsingscriteria is dat (niet- verontreinigd) hemelwater via de kortst mogelijke lozingsroute terug in het milieu moet worden gebracht voor zover redelijkerwijs van perceeleigenaar kan worden gevergd.

<sup>1</sup> In de deltabeslissing Ruimtelijke adaptatie heeft het Deltaprogramma voorstellen opgenomen om de ruimtelijke inrichting van Nederland klimaatbestendig en waterrobuust te maken. Alle overheden en marktpartijen zijn daar samen verantwoordelijk voor.



In artikel 6.18 lid 4, sub b van het Bouwbesluit 2012 staat:

*... indien voor de afvoer van hemelwater een openbaar hemelwaterstelsel of vuilwaterriool aanwezig is waarop aangesloten kan worden en hemelwater op dat stelsel of riool mag worden gebracht...*

Essentieel hierin is "mag worden gebracht", de gemeente Utrecht als het daartoe bevoegd gezag bepaald wat er met het hemelwater moet gebeuren. De gemeente Utrecht hoeft de lozing van hemelwater in een vuilwaterriool of (gemengd) stelsel niet toe te staan indien er redelijkerwijs mogelijkheden bestaan om hemelwater via de kortst mogelijke route in het milieu terug te brengen.

Het nieuwbouwwerk is gelegen in de directe nabijheid van een oppervlaktewater genaamd: Vaartsche Rijn.

Voor de afvoer of verwerking van hemelwater van het nieuwbouwwerk geldt daarom:

Hemelwater van daken en/of terreinen binnen het erf moet op andere wijze lozen dan door of via een (ondergrondse) leiding in de openbare ruimte, dan wel aansluiting op de openbare riolering. Het verwerken of lozen van hemelwater door middel van een directe (al dan niet vertraagde) lozing in een oppervlaktewater genaamd Vaartsche Rijn ligt hierbij het meest voor de hand.

Op deze wijze wordt hemelwater via de kortst mogelijke en eenvoudige route teruggebracht in het milieu zoals bedoeld in artikel 10.29a van de Wet Milieubeheer.

Het aan (laten) sluiten van hemelwaterafvoeren en/of drainage op de openbare riolering in de tijdelijke en/of permanente situatie is niet toegestaan.

*UV HWA systeem:*

De stroomsnelheid van hemelwater bij gebruik van gesloten stroming systemen (UV – Umpi Virtaus) overeenkomstig NEN 3215 art 6.2.2.1.5 (maximaal 2,5 m/s) bij het uittredepunt.

Het toepassen van ontlastvoorzieningen voor hemelwater in een UV systeem is verplicht op grond van het Bouwbesluit.

De uitstroomsnelheid in het oppervlaktewater volgens nadere opgave van het bevoegd gezag in het kader van de Waterwet en Keur. Dit is aan vergunninghouder zelf om na te gaan.

#### **Aandachtspunten riolering en hemelwater:**

*Aanleg van- en aansluiting op openbare voorzieningen voor de inzameling, transport of verwerking van afvalwater:*

De aansluiting(en) op de openbare riolering mag u niet zelf maken, tenzij de gemeente anders beslist. Dit geldt ook voor wijzigingen aan bestaande perceel aansluitleidingen.

Voor de aanleg van, en aansluiting op perceel aansluitleidingen van de openbare riolering moet minstens 10 weken voor aanvang van de werkzaamheden een aanvraag bij de gemeente Utrecht worden ingediend.

U vraagt 1 of meerdere rioolaansluitingen aan op het **Online loket** van de gemeente Utrecht:

**[www.utrecht.nl/rioolaansluiting/](http://www.utrecht.nl/rioolaansluiting/)**

Meer informatie en Algemene voorwaarden voor rioolaansluitingen zijn te vinden op:

**[www.utrecht.nl/water](http://www.utrecht.nl/water)**

De wijze waarop leidingwerk in de openbare ruimte wordt aangebracht t.b.v. het nieuwbouwwerk wordt door de gemeente Utrecht bepaald op grond het Handboek Openbare Ruimte.

**LET OP:** de termijn voor indiening van het verzoek tot aanleg en aansluiting wijkt af van de binnen de gemeente Utrecht gebruikelijke termijn van 6 weken. Dit in verband met de nodige voorbereidingen,

aard en omvang van de werkzaamheden voor aanleg en aansluiting van riolering in de openbare ruimte en om te voorkomen dat een tijdige oplevering en ingebruikname van de bouwwerken in gevaar komt.

Wordt aan de voorschriften niet voldaan, dan kan of mag er niet op openbare voorzieningen voor afvalwater aangesloten worden.

#### *Kosten voor aanleg en aansluiting riolering:*

De kosten voor aanleg en aansluiting komen voor rekening van rechthebbende aanvrager van de aansluiting(en).

Bij (grootschalige) nieuwbouwprojecten worden in exploitatieovereenkomsten of in gronduitgifte- en koopovereenkomsten de kosten van de aanleg van riolering en van riool aansluitleidingen verhaald op de exploitant dan wel de erfpachter/koper.

U overlegt een afschrift van deze overeenkomst bij de aanvraag Rioolaansluiting indien de kosten voor aanleg en aansluiting in deze overeenkomst zijn vastgelegd.

Wanneer er geen sprake is van een exploitatie-, gronduitgifte of koopovereenkomst waarin de kosten voor aanleg en aansluiting zijn opgenomen dan sluit de gemeente met u een individuele overeenkomst af waarin de kosten voor de aanleg en aansluiting staan. Voor het sluiten van de overeenkomst krijgt u een offerte. Nadat de aanleg en aansluiting zijn uitgevoerd ontvangt u een factuur.

#### *Waterwet en Keur*

Voor het lozen van hemelwater in een oppervlaktewater en voor werkzaamheden in of rond een oppervlaktewaterlichaam is op grond van de Waterwet en Keur een afzonderlijke toestemming (Watervergunning) van het daartoe bevoegd gezag noodzakelijk. Soms kan volstaan worden met een melding.

Meer informatie is te vinden op [www.omgevingsloket.nl](http://www.omgevingsloket.nl)

#### *Bedrijfsafvalwaterlozingen:*

Op afvalwaterlozingen vanuit inrichtingen is het Activiteitenbesluit Milieubeheer van toepassing.

Voor afvalwater zoals bedoeld in het Activiteitenbesluit Milieubeheer afdeling 3.6( bereiden van voedingsmiddelen) geldt dat dit bedrijfsafvalwater dat voorafgaand aan de vermenging met ander afvalwater c.q. lozing op een openbaar vuilwaterriool dient te worden geleid door een vetafscheider die voldoet aan en wordt gebruikt conform NEN-EN 1825-1 en 2.

#### *Vetafscheider in openbare ruimte:*

Het plaatsen en hebben van een vetafscheider anders dan in de inrichting (binnen het bouwwerk of perceel) is niet toegestaan, tenzij het in de openbare ruimte plaatsen, hebben, beheren en onderhouden daarvan in een afzonderlijke schriftelijke overeenkomst tussen de gemeente Utrecht en rechthebbende is vastgelegd.

#### *Tijdelijk lozen van grondwater:*

Het lozen van grondwater tijdens de bouwfase (lozen van grondwater bij ontwatering) op de openbare (vuilwater-) riolering is niet toegestaan, tenzij het lozen door de gemeente op grond van het Besluit lozen Buiten Inrichtingen en/of met een maatwerkvoorschrift kan worden toegestaan. Meer informatie is te vinden op [www.omgevingsloket.nl](http://www.omgevingsloket.nl).



### Later te verstrekken constructieve gegevens en bescheiden:

#### Funderingsconstructie:

##### Geotechnisch rapport.

Een geotechnisch rapport met een beschouwing van de volgende onderdelen:

- bodemonderzoek tenminste bestaande uit voldoende sonderingen (NEN 9997-1)
- advies ter onderbouwing van het gekozen funderingstype
- berekening van het draagvermogen van de ondergrond (stroken, druk- en trekpalen)
- berekeningen van de horizontale gronddrukken op palen en/of funderingsconstructies
- uitgangspunten voor de grond- en waterkerende constructies van het bouwwerk zelf

##### Palenplan

Een tekening betreffende het definitieve palenplan (schaal 1:100) voorzien van:

- de maatvoering en de noordpijl
- de aanduiding van het paaltype
- het inheinniveau in meters t.o.v. N.A.P.
- paalbelastingen (rekenwaarden)
- detail af te hakken paalkop (steklengte)
- de plaats van de sonderingen
- de belendende bouwwerken
- de palenstaat (met vermelding van afmetingen en wapening).

Berekeningen van de belasting (verticaal en horizontaal) op de palen.

##### Bouwkranen

Tekeningen en berekeningen van de fundering van de (mobiele) bouwkraan en de in te storten bevestigingsmiddelen waaruit blijkt dat deze voldoen aan de in het Bouwbesluit gestelde eisen op het gebied van constructieve veiligheid.

##### Bouwconstructies van de bovenbouw:

##### Tekeningen

Tekeningen betreffende de detaillering van de constructies van de bovenbouw (vloeren, liggers, wanden, kolommen) uitgevoerd in beton, prefab, staal, aluminium, hout, glas, kunststof enz. voorzien van (voor zover van toepassing):

- de afmetingen van de onderdelen;
- de wapening van de (prefab) betonconstructies;
- de verbindingdetails;
- de gevelbekleding (elementen) met bevestiging;
- de trappen, bordessen, balkons, galerijen, vloerafscheidingen e.d.;
- de balklagen, lateien, geveldragere e.d.;
- de bescherming van de onderdelen tegen aantasting (tbv duurzame veiligheid)

##### Berekeningen

Berekeningen waaruit blijkt dat alle (te wijzigen) constructieve delen van het bouwwerk, de constructieve samenhang van de delen alsmede de constructie van het bouwwerk als geheel voldoet aan de in het Bouwbesluit gestelde eisen op het gebied van constructieve veiligheid.

Berekeningen waaruit blijkt dat alle (te wijzigen) constructieve delen van het bouwwerk alsmede het bouwwerk als geheel voldoet aan de in het Bouwbesluit gestelde eisen op het gebied van brandveiligheid, aanrijding en overige bijzondere belastingen.

Overige bescheiden

Kwaliteitsverklaringen, CE-markeringen en gegevens en bescheiden ten behoeve van een beroep op de gelijkwaardigheid.

Wijze van aanleveren van gegevens en bescheiden

- De tekeningen en berekeningen moeten voldoen aan hoofdstuk 1 en 2 van de ministeriële regeling omgevingsrecht (Mor) gestelde eisen.
- Moeilijk inzichtelijke computerberekeningen moeten zijn voorzien van een handberekening.
- Tekeningen en berekeningen moeten zijn ondertekend of gewaarmerkt door de (coördinerend) constructeur.
- Tekeningen en berekeningen van onderdelen die een functie hebben in de Samenhang van de constructiedelen moeten zijn ondertekend door een door de aanvrager aangewezen coördinerend constructeur.



Formulierversie  
2017.02

# Aanvraaggegevens

Publiceerbare aanvraag/melding

Aanvraagnummer	3485533
Aanvraagnaam	Aanvraag Nieuwbouw Moxy Hotel Helling 3-5
Uw referentiecode	-

Ingediend op	16-02-2018
Soort procedure	Reguliere procedure

Projectomschrijving	Nieuwbouw van een Moxy Hotel met 172 kamers door middel van modulaire bouwwijze in hout. De aanvraag wordt gecoördineerd met een wijziging van het Bestemmingsplan, welke door Vastint Hospitality BV is aangevraagd op 24 november 2017
---------------------	--

Opmerking	Aanvraag Omgevingsvergunning dient te worden gecoördineerd met aanvraag Wijziging Bestemmingsplan, welke door Vastint Hospitality is ingediend op 24 november 2017.
-----------	---

Gefaseerd	Nee
-----------	-----

Blokkerende onderdelen weglaten	Ja
---------------------------------	----

Kosten openbaar maken	Nee
-----------------------	-----

Bijlagen die later komen	Gelijkwaardigheid Kwaliteitsverklaringen Gezondheid complexere bouwwerken Constructieve berekeningen en tekeningen
--------------------------	---

Bijlagen n.v.t. of al bekend	Gegevens tunnelveiligheid
------------------------------	---------------------------

## Bevoegd gezag

Naam:	Gemeente Utrecht
Bezoekadres:	<div>Meer informatie over bouwen, wonen en ondernemen vindt u op onderstaand genoemde website.</div>
Postadres:	Vergunningen, Toezicht en Handhaving Afdeling Vergunningen Postbus 8406 3503 RK Utrecht
Telefoonnummer:	030-286 0000
Contactformulier:	<a href="http://www.utrecht.nl/baliebwo">www.utrecht.nl/baliebwo</a>
Website:	<a href="http://www.utrecht.nl/baliebwo">www.utrecht.nl/baliebwo</a>
Contactpersoon:	VTH Vergunningen

## Overzicht bijgevoegde modulebladen

Aanvraaggegevens

Locatie van de werkzaamheden

Werkzaamheden en onderdelen

Overig bouwwerk bouwen

- Bouwen

Reclame plaatsen

- Reclame

Bijlagen



Formuliertersie  
2017.02

# Locatie

## 1 Adres

Postcode 3523CB

Huisnummer 3

Huisletter -

Huisnummertoevoeging -

Straatnaam Helling

Plaatsnaam Utrecht

Gelden de werkzaamheden in deze  
aanvraag/melding voor meerdere  
adressen of percelen?

☒ Ja

☐ Nee

Specificatie locatie

Het volledige adres van de locatie luidt Helling 3-5, 3523 CB  
Utrecht

# Bouwen

## Overig bouwwerk bouwen

### 1 De bouwwerkzaamheden

Wat is er op het bouwwerk van toepassing?

- ☐ Het wordt geheel vervangen  
☐ Het wordt gedeeltelijk vervangen  
☒ Het wordt nieuw geplaatst

Eventuele toelichting

-

Hebt u voor deze bouwwerkzaamheden al eerder een vergunning aangevraagd?

- ☐ Ja  
☒ Nee

### 2 Plaats van het bouwwerk

Waar gaat u bouwen?

Terrein

### 3 Bruto vloeroppervlakte bouwwerk

Verandert de bruto vloeroppervlakte van het bouwwerk door de bouwwerkzaamheden?

- ☒ Ja  
☐ Nee

Wat is de bruto vloeroppervlakte van het bouwwerk in m<sup>2</sup> voor uitvoering van de bouwwerkzaamheden?

0

Wat is de bruto vloeroppervlakte van het bouwwerk in m<sup>2</sup> na uitvoering van de bouwwerkzaamheden?

6443

### 4 Bruto inhoud bouwwerk

Verandert de bruto inhoud van het bouwwerk door de bouwwerkzaamheden?

- ☒ Ja  
☐ Nee

Wat is de bruto inhoud van het bouwwerk in m<sup>3</sup> voor uitvoering van de bouwwerkzaamheden?

0

Wat is de bruto inhoud van het bouwwerk in m<sup>3</sup> na uitvoering van de bouwwerkzaamheden?

21332

### 5 Oppervlakte bebouwd terrein

Verandert de bebouwde oppervlakte van het terrein na uitvoering van de bouwwerkzaamheden?

- ☒ Ja  
☐ Nee



Wat is de bebouwde oppervlakte van het terrein in m2 voor uitvoering van de bouwwerkzaamheden? 0

Wat is de bebouwde oppervlakte van het terrein in m2 na uitvoering van de bouwwerkzaamheden? 1048

#### 6 Seizoensgebonden en tijdelijke bouwwerken

Gaat het om een seizoengebonden bouwwerk? ☐ Ja ☒ Nee

Gaat het om een tijdelijk bouwwerk? ☐ Ja ☒ Nee

#### 7 Gebruik

Waar gebruikt u het bouwwerk en/of terrein momenteel voor? ☐ Wonen ☒ Overige gebruiksfuncties

Geef aan waar u het bouwwerk en/of terrein momenteel voor gebruikt. Op dit moment staat op het perceel een voormalig garagepand (Auto Boll / Citroën), dat tijdelijk in gebruik is als Kringloopwinkel. Dit pand zal per medio maart 2018 worden gesloopt door de huidige eigenaren en erfpachters (dhr. Verkerk en dhr. Van Wandelen), waarna het terrein geheel braak zal liggen.

Waar gaat u het bouwwerk voor gebruiken? ☐ Wonen ☒ Overige gebruiksfuncties

Geef aan waar u het bouwwerk voor gaat gebruiken. Hotel met 172 kamers en een publieke ruimte (lobby).

#### 8 Gebruiksfuncties

In onderstaande tabel staan in de eerste kolom mogelijke gebruiksfuncties die in een bouwwerk kunnen voorkomen. Vul voor alle gebruiksfuncties die voor u van toepassing zijn het aantal personen, de totale gebruiksoppervlakte en de totale vloeroppervlakte van het verblijfsgebied in m2 in hele getallen in.

Gebruiksfunctie	Aantal personen	Gebruiksoppervlakte (m2)	Verblijfsoppervlakte (m2)
Bijeenkomst	189	702	552
Cel			
Gezondheidszorg			
Industrie			
Kantoor			
Logies	344	3484	1815
Onderwijs			
Sport			
Winkel			
Overige gebruiksfuncties	20	667	241

#### 9 Uiterlijk bouwwerk/welstand

Beschrijf van de onderstaande onderdelen de materialen en kleuren die u voor het bouwwerk gebruikt. U mag het veld leeg laten als u materialen en kleuren in de bijlagen vermeldt

Onderdelen	Materiaal	Kleur
Gevels		
- Plint gebouw	Staal	Grijs (verzinkt)
- Gevelbekleding	Aluminium	Grijs
- Borstweringen	Aluminium	Grijs
- Voegwerk	n.v.t.	n.v.t.
Kozijnen		
- Ramen	Aluminium	Grijs
- Deuren	Aluminium	Grijs
- Luiken	Aluminium	Grijs
Dakgoten en boeidelen	Aluminium	Grijs
Dakbedekking	PVC	Wit

Vul hier overige onderdelen en  
bijbehorende materialen en kleuren  
in.

#### 10 Mondeling toelichten

Ik wil mijn bouwplan  
mondeling toelichten voor  
de welstandscommissie/  
stadsbouwmeester.

- ☒ Ja  
☐ Nee



# Reclame

## Reclame plaatsen

### 1 Reclame plaatsen

Wat wilt u precies gaan doen?

- ☒ Een nieuwe handelsreclame plaatsen  
☐ Een bestaande handelsreclame wijzigen  
☐ Een bestaande handelsreclame vervangen  
☐ Anders

Waar gaat u de reclame plaatsen?

Hoofdgebouw

Is de reclame tijdelijk of permanent?

- ☒ Permanent  
☐ Tijdelijk

Geef eventueel een toelichting op uw werkzaamheden

-

### 2 Details reclame

Hoeveel reclameobjecten betreft het?

5

Wat is de afmeting van de reclame?

2x ca. 7,0 x 2,5 meter  
3x ca. 2,5 x 1,0 meter

Wat is de hoogte van de reclame gemeten vanaf het maaiveld tot aan de onderkant van de reclame?

2x ca. 23,0 meter  
3x ca. 3,0 meter

Geef een omschrijving van het uiterlijk, materiaalgebruik en verlichting.

Logo als lichtletters bevestigd aan de gevel. De letters worden uitgevoerd in aluminium met perspex voorzijde in de kleur paars. Het perspex wordt van binnenuit aangelicht d.m.v. LED-strips

Wat is de tekst van de reclame?

Moxy

Wie maakt of voert reclame op of bij de onroerende zaak?

- ☐ Eigenaar  
☐ Beperkt zakelijk gerechtigde  
☒ Gebruiker  
☐ Anders

### 3 Gemeentespecifieke vragen

Heeft u een situatietekening bijgevoegd?

- ☒ Ja  
☐ Nee

Zijn de benodigde foto's bijgevoegd?

- ☒ Ja  
☐ Nee
- Behoort bij besluit van  
Burgemeester en Wethouders  
van Utrecht

d.d.

13 DEC. 2018

Nr.

HZ WABO-18-05722

Namens Burgemeester en Wethouders  
Hoofd Vergunningen



## Moxy hotel Rotsoord in Utrecht

Brandveiligheid aanvraag omgevingsvergunning

Opdrachtgever  
Vastint Hospitality B.V.  
Contactpersoon



Kenmerk  
R035030aa.17G009F.rsh

Versie  
02\_001

Datum  
10 april 2018

Auteur



Behoort bij besluit van  
Burgemeester en Wethouders  
van Utrecht

d.d.

Nr.

13 DEC. 2018  
HZ WABO-18 - 05722

Voor namens Burgemeester en Wethouders  
Hoofd Vergunningen



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## Bijlagen

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Bijlage II	Berekening capaciteit vluchtroutes begane grond
Bijlage III	Verslag overleg brandweer
Bijlage IV	Gegevens Tivoli De Helling
Bijlage V	Documenten van het bouwsysteem

## **1 Inleiding**

Het definitief ontwerp (DO) van het Moxy Hotel Utrecht is getoetst aan de relevante brandveiligheidseisen. Dit betreft de eisen volgens de Nederlandse regelgeving (Bouwbesluit 2012) en de aanvullende eisen volgens de Marriott Standards (Module 14).

Het project betreft de nieuwbouw van een hotel met zeven bouwlagen. Op de begane grond worden diverse algemene ruimten opgenomen zoals de receptie, lobby en het restaurant. Vanaf de eerste verdieping tot aan de zesde verdieping bevinden zich de hotelkamers. De bruto vloeroppervlakte van de eerste verdieping tot aan de vierde verdieping is circa 955 m<sup>2</sup>. Op de vijfde en zesde verdieping is het bruto vloeroppervlak circa 402 m<sup>2</sup>. Op de zevende verdieping komen technische installaties (deze staan buiten).

Het gebouw is vrijstaand. Het perceel grenst aan twee zijden aan een openbare weg. Aan de andere zijden grenst het aan een ander perceel en aan het openbare water.

Bijzonder aan het gebouw is dat het modulair wordt opgebouwd. De begane grond bestaat uit een betonconstructie. De verdiepingen bestaan uit houten modules die elders worden geproduceerd en die op de locatie worden geplaatst. De beide kernen bestaan uit beton en zorgen voor de stabiliteit. In paragraaf 1.3 hebben we het bouwsysteem nader toegelicht.

Het ontwerp is reeds besproken met de Veiligheidsregio Utrecht. Een verslag van dit overleg is bijgevoegd in bijlage III.

### **1.1 Toetsingskader**

Het ontwerp van het hotel moet in de basis voldoen aan de nieuwbouw eisen van de Nederlandse bouwregelgeving (Bouwbesluit 2012). Aanvullend op de eisen van het Bouwbesluit zijn door Marriott aanvullende eisen gesteld. Het betreft de eisen als opgenomen in Module 14 van de Marriott Standards.

### **1.2 Uitgangspunten**

We hebben gebruikgemaakt van de volgende documenten:

- Bouwkundige tekeningen van JHK architecten, projectnummer 15969 van 26 januari 2018.
- Marriott Standards, module 14, van Juni 2016.

#### **Aantal personen**

Voor de bezetting zijn we uitgegaan van de volgende waarden:

- Twee personen per hotelkamer.
- Een persoon per 0,65 m<sup>2</sup> voor de vergaderruimten.
- Een persoon per 1,4 m<sup>2</sup> voor het restaurant en de bar.
- 189 personen op de begane grond.

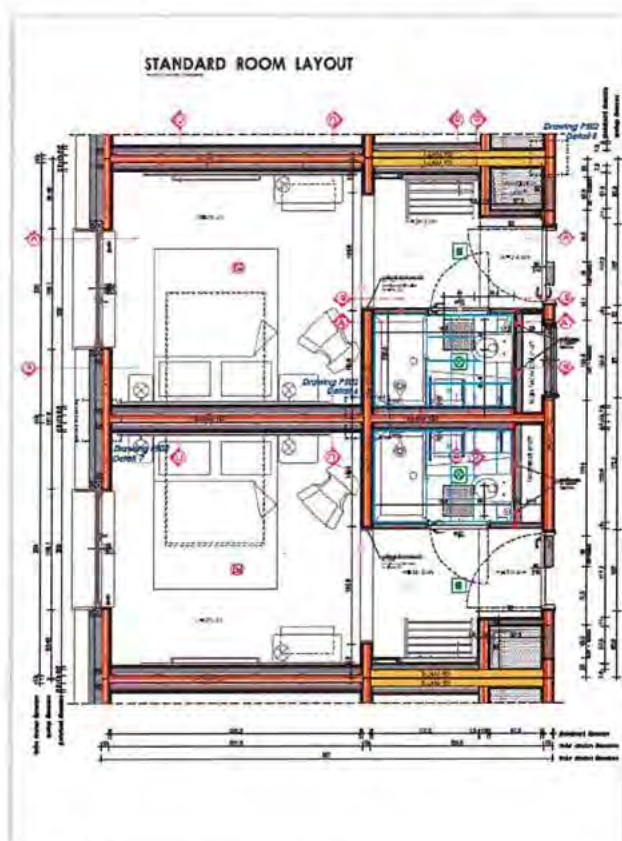


## 1.3 Globale beschrijving houten bouwsysteem

Het toegepaste bouwsysteem bestaat uit hout dat wordt beschermd met minerale wol en gips-beplating. De kern bestaat uit gelamineerd hout (cross laminated timber) met een dikte van 100 mm. Aan weerszijden van deze kern worden 40 mm minerale wol en twee lagen gips (15 mm RF-beplating) aangebracht. Met deze opbouw wordt een brandwerendheid van minimaal 90 minuten gerealiseerd (REI90).

In figuur 1.1 hebben we een plattegrond van twee hotelkamers weergegeven. In hoofdlijnen is de opbouw hiervan als volgt:

1. De zogenaamde 'wet-box'. Deze bestaat uit twee tegen elkaar gelegen badkamers, een gemeenschappelijke schacht en de entreehalletjes van de kamers.
2. de afzonderlijke wanden, gevels en vloer/plafond.



**Figuur 1.1**  
Plattegrond van twee hotelkamers.

De wet-box, de wanden, vloeren en gevels worden gefabriceerd in een fabriek in Italië. Voor zover mogelijk worden alle voorzieningen al in de fabriek aangebracht. Dit is inclusief brandkleppen, brandwerende doorvoeringen, etc. Na transport naar de bouwplaats worden de wet-boxen op elkaar gestapeld en worden de wanden, gevels en plafonds geplaatst en aan elkaar bevestigd. Vervolgens wordt de binnenzijde gestuct en geschilderd.

## 2 Brandcompartimenten en wdbbo

### 2.1 Brandcompartimenten

Het gebouw wordt in beginsel ingedeeld in brandcompartimenten en beschermde subbrandcompartimenten. De indeling is in hoofdlijnen als volgt:

- elke bouwlaag vormt een brandcompartiment;
- de techniekruimten vormen afzonderlijke brandcompartimenten;
- elke hotelkamer vormt een beschermd subbrandcompartiment;
- de linnenkamers op de verdiepingen vormen aparte brandcompartimenten;
- de vluchtrappenhuizen vormen extra beschermde vluchtroutes.

Aanvullend hierop wordt het gebouw voorzien van een sprinklerinstallatie. Deze wordt aangebracht op wens van de gebruiker.

De vloeroppervlakte van de hotelverdiepingen op de eerste t/m vierde verdieping is groter dan de grenswaarde van 500 m<sup>2</sup> die het Bouwbesluit stelt. Naar mening van LBP|SIGHT kan dit op basis van gelijkwaardigheid worden geaccepteerd door de gemeente. De aanwezigheid van de sprinklerinstallatie zorgt er namelijk voor dat een brand in omvang wordt beperkt. De andere brandcompartimenten zijn allemaal kleiner dan de grenswaarden die het Bouwbesluit stelt zodat hiervoor geen beroep op gelijkwaardigheid noodzakelijk is.

### 2.2 Vereiste weerstand tegen branddoorslag en brandoverslag (wdbbo)

Er gelden de volgende eisen ten aanzien van de wdbbo:

- tussen brandcompartimenten onderling: ten minste 60 minuten;
- tussen brandcompartimenten en extra beschermde vluchtroutes: ten minste 60 minuten;
- rond beschermde subbrandcompartimenten: ten minste 30 minuten.

Aanvullend hierop geldt tussen de hotelkamers en de gangzones dat de wanden (exclusief deuren) minimaal 60 minuten brandwerend moeten zijn. Dit volgt uit Module 14.

#### 2.2.1 Weerstand tegen branddoorslag

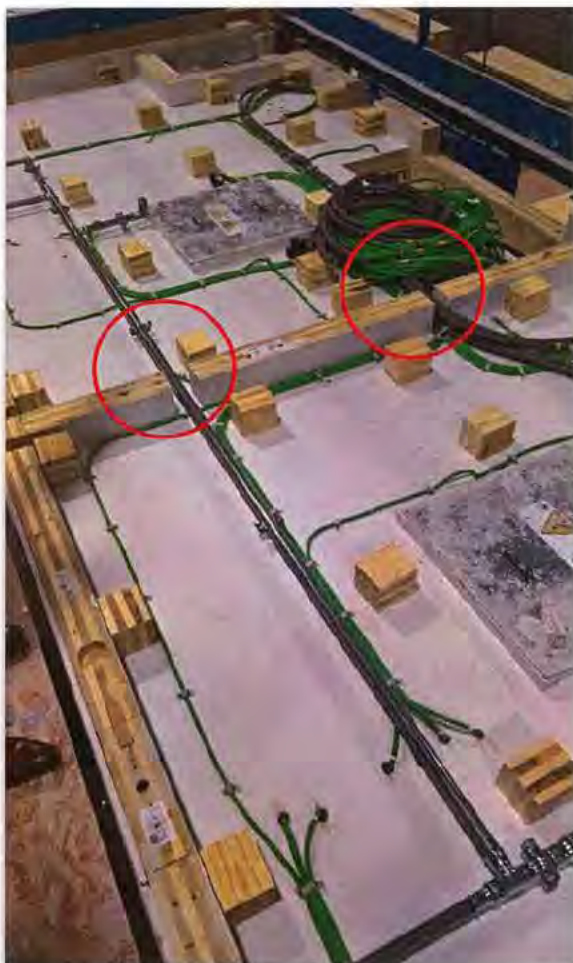
De hierboven beschreven vereiste wdbbo wordt gerealiseerd door het brandwerend uitvoeren van de verschillende wanden en vloeren. Deze is op de tekeningen van de architect aangegeven.

Voor de houten units gelden de volgende bijzonderheden/aandachtspunten:

- De in paragraaf 1.3 beschreven opbouw van de wanden en vloeren is zodanig dat deze voldoet aan 60 minuten brandwerendheid met betrekking tot de scheidende functie (EI60).
- De gemeenschappelijke schachten behoren bij het beschermde subbrandcompartiment van de kamers. De schachten worden ter plaatse van de plafonds brandwerend afgedicht. De hiervoor benodigde voorzieningen, zoals brandkleppen, manchetten e.d. worden in de fabriek al aangebracht. Tussen de schachten en de gangen wordt een brandwerendheid van 60 minuten (deur 30 minuten) gerealiseerd.
- De niet-gemeenschappelijke schachten worden rondom 60 minuten brandwerend uitgevoerd. Ter plaatse van de vloeren zijn geen brandwerende voorzieningen nodig.
- De brandwerendheid in de wet-box wordt gerealiseerd ter plaatse van het plafond boven het halletje en de badkamer. In dit plafond wordt een brandwerend inspectieluik geplaatst.



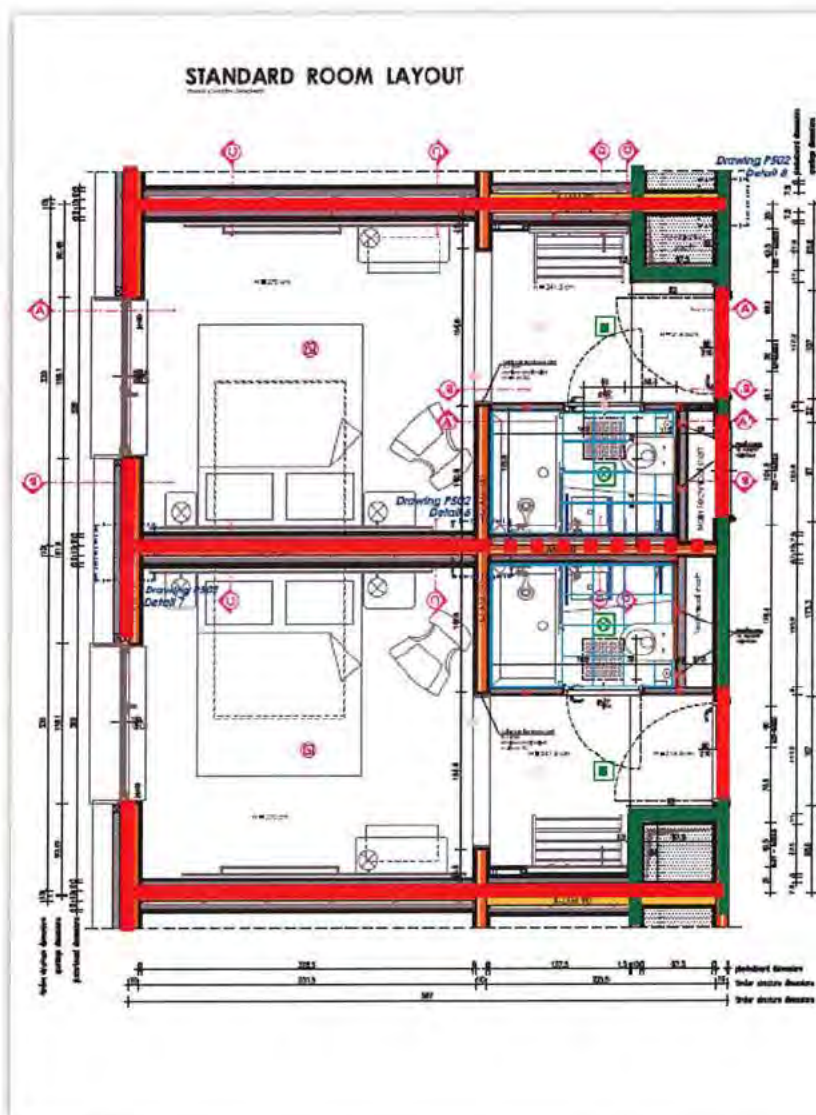
- Boven dit plafond is een plenum aanwezig. Dit plenum is niet brandwerend gescheiden van de schachten van de erboven gelegen schachten. In dit plenum zijn alleen leidingen en installaties aanwezig. In het plenum is een sprinklerkop aanwezig.
- Er is geen brandscheiding aanwezig tussen de beide kamers in het plenum. Dit is zichtbaar in figuur 2.1. Daar waar een sprinklerleiding en de elektraleidingen de kamerscheiding passeren zijn er sparingen aanwezig. Doordat deze ruimte na het plaatsen van de units niet meer goed bereikbaar is, is het niet mogelijk om hier een adequate brandwerende scheiding te realiseren. Het risico op branduitbreiding via dit plenum is naar onze mening echter laag. Het plafond onder het plenum is wel brandwerend zodat het enige traject waarop branduitbreiding kan plaatsvinden tussen de kamers onderling de route via de vloer is. Een brand in een kamer moet dan dus binnen 30 minuten via een vloer naar beneden het plenum in en vervolgens via de vloer naar de aangrenzende kamer uitbreiden. De vloer zelf bestaat hier ook uit 100 mm dik hout en is dus wel brandwerend. Alleen de doorvoeringen zijn hier niet brandwerend. Het enige risico is er dus dat er branduitbreiding van boven naar beneden via de doorvoeringen plaats vindt. Met de Veiligheidsregio Utrecht is afgesproken dat deze sparingen worden afgedicht met minerale wol zodat wordt voorkomen dat rook zich verspreidt tussen de beide hotelkamers. Dit resulteert in een voldoende veilige situatie.



**Figuur 2.1**

Weergave van het plenum boven de wet-box. Ter plaatse van de rode cirkels is een opening aanwezig tussen de beide kamers. Deze worden gevuld met minerale wol.

In figuur 2.2 hebben we het verloop van de brandscheidingen ter plaatse van de kamers weergegeven.



**Figuur 2.2**

Plattegrond twee hotelkamers. De rode lijnen geven 30 minuten brandwerende scheidingen aan, de groene lijnen 60 minuten brandwerende scheidingen. De stippellijn geeft aan dat er een opening aanwezig is tussen de beide kamers in het plenum boven de badkamer. Deze opening wordt afgedicht met steenwol.

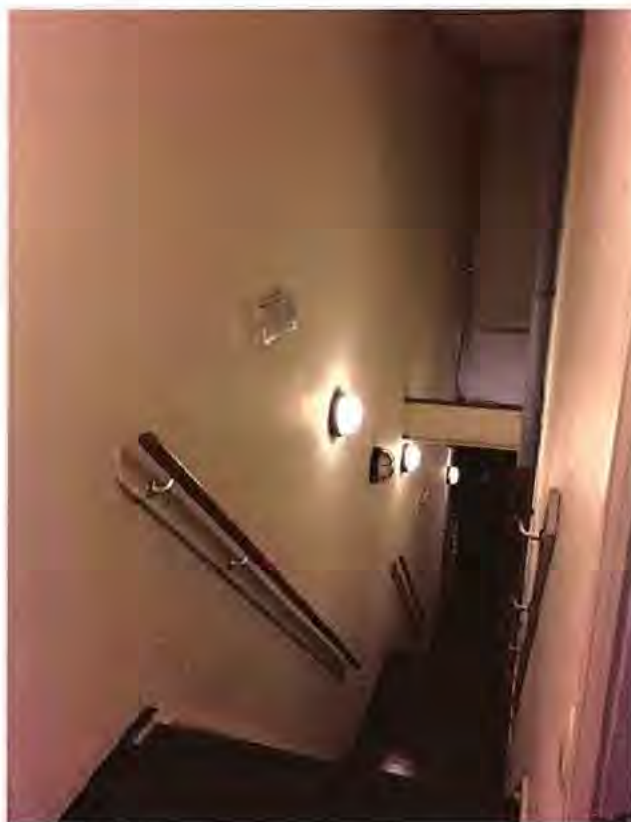
## 2.2.2 Weerstand tegen brandoverslag

De afstand tussen het gebouw en de perceelgrenzen is dermate groot dat brandoverslag van en naar een ander perceel in voldoende mate wordt beperkt. Wel moet tussen de aangrenzende bebouwing (Tivoli de Helling) en het hotel een 60 minuten brandwerende scheiding worden gerealiseerd. De buitengevel voldoet hier aan.



Om aan brandcompartimentsklasse B volgens Technisch Bulletin 65 te voldoen, zou ook een deel van de langsgevel 30 minuten brandwerend moeten zijn. In overleg met de Veiligheidsregio Utrecht is afgesproken dat wordt uitgegaan van de werkelijke situatie. Dit betekent dat de buitengevel van Tivoli de Helling minimaal 60 minuten brandwerend moet zijn om brandoverslag naar het hotel te voorkomen. Hiermee kan aan compartimentsklasse B worden voldaan.

De uitvoering van de gevel van Tivoli is onderzocht op locatie. De gevel (momenteel nog wand omdat er een garage tegen de toekomstige gevel aan staat) bestaat uit steenachtige materialen. Er zijn geen sparingen, doorvoeringen of andere openingen zichtbaar. Onderstaande foto's geven een beeld van de huidige situatie. De wand is gekoppeld aan een staalconstructie. Deze is voorzien te zijn van een brandwerende coating. Op de bouwkundige tekeningen staat aangegeven dat de staalconstructie 90 minuten brandwerend is uitgevoerd. Deze tekeningen zijn opgenomen in bijlage IV.



**Figuur 2.3**

Weergave scheiding aan de zijde van Tivoli (het betreft de wand aan de linkerkant van de trap)

Vanwege de aanwezigheid van een sprinklerinstallatie wordt het risico op brandoverslag tussen de verschillende (sub)brandcompartimenten in het gebouw naar onze mening in voldoende mate beperkt. Toch is er voor de zekerheid voor een hotelkamer een berekening volgens de NEN 6068 gemaakt om te beoordelen of ook zonder de sprinklerinstallatie wordt voldaan aan de gestelde eisen. In bijlage I zijn de berekende verticale brandoverslagtrajecten weergegeven. Uit de resultaten blijkt dat het risico op brandoverslag voldoende klein is. Er zijn daarom geen aanvullende brandwerende voorzieningen in de gevel noodzakelijk.

## 2.3 Eisen aan brandscheidingen

Een brandscheiding is voldoende brandwerend, als deze scheiding gedurende de in het Bouwbesluit gestelde tijd voldoende brandwerend is volgens de NEN 6069. De brandwerendheid van een scheiding wordt bepaald aan de hand van verschillende criteria. Afhankelijk van het type brandscheiding zijn één of meerdere criteria van toepassing. De criteria zijn:

- bezwijken (R)
- vlamdichtheid (E)
- isolatie (I)
- warmtestraling (W)

Aan welke criteria in een situatie wordt voldaan is vastgelegd in de NEN 6069. Tabel 2.1 geeft aan welke eisen worden gesteld aan de in de geprojecteerde situatie aanwezige brandscheidingen.

De eis voor brandwerendheid met betrekking tot bezwijken (R) geldt alleen indien de scheiding belastingen moet dragen en onderdeel uitmaakt van de bouwconstructie.

**Tabel 2.1**

Vereiste brandwerendheidscriteria voor de brandscheidingen in de geprojecteerde situatie.

Type brandscheiding	Vereist criterium
Tussen hotelkamers onderling	EW30
Tussen hotelkamers en schachten Tussen hotelkamers en gemeenschappelijke verkeersruimten	EW 60
De deuren in de gangen op de hotelverdiepingen	E30
Tussen brandcompartimenten onderling	EI60
Rond de vluchtrappenhuizen	(R)EW60 + (R)EI15
Delen van een scheidingsconstructie boven een verhoogd plafond of onder een verhoogde vloer (inclusief doorvoeren)	EI
Alle doorvoeren, naden, schachtwanden en schachtvloeren met een brandwerende functie	EI

Voor brandwerende puiken en deurconstructies tussen brandcompartimenten onderling en tussen brandcompartimenten en extra beschermde vluchtroutes gelden afwijkende regels. Deze regels zijn weergegeven in tabel 2.2.

**Tabel 2.2**

Vereiste brandwerendheidscriteria voor de brandscheidingen in de geprojecteerde situatie.

Type brandscheiding	Vereist criterium
Voor deurconstructies (inclusief zij- en bovenlichten)	EW
Deurconstructies met een breedte van meer dan 6 meter	EI
Glaspanelen in zijlichten met een breedte van meer dan 1,5 meter	Eis gelijk aan eis wand
Ramen en puiken zonder deuren in brandscheidingen	Eis gelijk aan eis wand

Deuren in brandscheidingen dienen zelfsluitend uitgevoerd te worden. Desgewenst kunnen deuren worden vastgezet met een kleefmagneet die is aangestuurd door de brandmeldinstallatie.



## 2.3.1 Aanwezige certificaten

De verschillende onderdelen van de constructie zijn getest volgens de Europese testmethoden. In tabel 2.3 is voor de verschillende onderdelen samengevat welke brandwerendheid wordt behaald en welk testcertificaat van toepassing is. In het vervolg van dit rapport gaan we nader in op de details van de verschillende certificaten. Voor de details verwijzen we naar de certificaten zelf. Deze zijn bijgevoegd in bijlage V.

**Tabel 2.3**

Overzicht geteste onderdelen

Onderdeel van constructie	Brandwerendheid	Rapportage
Buitengevel	REI90, bepaald van buiten naar binnen	MFPA Leipzig, Nr. GS 3.2/16-389-1A van 23 december 2016
Dragende wanden	REI90	MFPA Leipzig, NR P-SAC-02/III-707 van 1 oktober 2014
Dragende vloeren (met brandwerende beplating)	REI90	MFPA Leipzig, NR. P-SAC-02/III-708 van 1 oktober 2014
Dragende vloeren (zonder brandwerende beplating)	REI90	MFPA Leipzig, NR. P-SAC-02/III-709 van 1 oktober 2014
Brandwerende kit t.b.v. kabeldoorvoeringen Hilti Firestop intumescent sealant CFS-IS	EI60 tot EI 120, afhankelijk van toepassing.	Productblad Hilti, ETA Nr. 10/0406
Brandwerende kit t.b.v. voegen Hilti Firestop acrylic sealant CFS-S ACR	EI60 tot EI 180, afhankelijk van toepassing.	Productblad Hilti, ETA Nr. 10/0389 ETA nr. 10/0292
Brandmanchet Hilti Firestop collar CFS-C P	EI 90 tot EI 120, afhankelijk van toepassing	Productblad Hilti, ETA Nr. 10/0404
Opschuimende band rond kunststof leidingen Hilti fire stop CFS-W-SG / EL	EI60 tot EI 180, afhankelijk van toepassing.	Productblad Hilti, ETA Nr. 10/0405
Brandwerende band voor rond metalen leidingen Hilti fire stop bandage CFS-B	EI60 tot EI 120, afhankelijk van toepassing.	Productblad Hilti, ETA Nr. 10/0212
Brandwerend schuim voor kabeldoorvoeringen Hilti fire stop CFS-F FX	EI60 tot EI 120, afhankelijk van toepassing.	Productblad Hilti, ETA Nr. 10/109
Brandwerende vlinderklep Aldes, CF1 of CF2	EI60	Fires, Certificate of Conformity, 1396-CPD-0055

### Buitengevel

De brandwerendheid van de buitengevel is bepaald van buiten naar binnen. Van buitenaf gezien is de opbouw van de geteste gevel als volgt:

- folie
- 80 mm steenwol (volumieke massa > 40 kg/m<sup>3</sup>)
- 80 mm glaswol, volumieke massa > 28 kg /m<sup>3</sup>)
- 100 mm CLT
- afwerking aan de binnenzijde conform de dragende wanden. Deze afwerking heeft geen invloed meer.

De minerale wol is met staalstrips bevestigd.

Bij deze opbouw voldoet de gevel aan een brandwerendheid van ten minste 90 minuten bepaald van buiten naar binnen volgens de criteria REI 90. Voor de brandwerendheid van binnen naar buiten verwijzen we naar de opbouw van de wanden in de volgende paragraaf. De opbouw aan de binnenzijde is namelijk gelijk.

## **Dragende wanden en vloeren**

De opbouw van de wanden en plafonds is in hoofdlijnen gelijk. Deze is in de basis als volgt:

- 2 x 15 mm Rigips RF gipsbeplating
- 90 mm of 100 mm CLT
- afwerking aan de andere zijde (bij wanden dezelfde opbouw)

Ter plaatse van de kamerscheidende wanden is tussen de gipsbeplating en het CLT nog 50 mm minerale wol en een luchtsponw aanwezig.

De constructie van CLT van 90 of 100 mm dikte en 2x15 mm Rigips gipsbeplating is minimaal 90 minuten brandwerend volgens de criteria REI90.

## **Doorvoeringen**

Wanneer in de gipsbeplating openingen worden aangebracht ten behoeve van bijvoorbeeld een kabeldoorvoeringen, dan worden deze openingen brandwerend afgedicht. Hiervoor wordt gebruik gemaakt van de producten die zijn opgenomen in tabel 2.3. Het brandwerend afwerken van een inbouwdoos voor elektra is niet noodzakelijk volgens de rapportage voor dragende wanden. De minerale wol achter de inbouwdoos biedt namelijk voldoende bescherming.

## **Brandkleppen**

Ter plaatse van de schacht wordt een brandklep aangebracht. Dit is een vlinderklep die minimaal 90 minuten brandwerend is.

## **Inspectieluik**

In het plafond van de badkamer wordt een inspectieluik aangebracht, zodat de installaties in het plenum boven het plafond bereikbaar zijn voor onderhoud en inspectie. Dit is een 90 minuten brandwerend inspectieluik van Rigips.

## **2.4 Uitvoering sprinklerinstallatie**

De sprinklerinstallatie wordt in beginsel aangebracht als aanvulling op de bouwkundige brandwerende scheidingen. De installatie wordt echter wel ingezet als gelijkwaardige oplossing op de volgende aspecten:

- het toestaan van brandcompartimenten groter dan 500 m<sup>2</sup> ter plaatse van de hotelkamers.
- het toestaan van openingen in het plenum tussen twee hotelkamers (zie paragraaf 2.2.1).
- het reduceren van de brandwerendheid van de hoofdconstructie (zie paragraaf 4.1).

Het gehele gebouw wordt voorzien van een sprinklerinstallatie. In geval van een kleine brand wordt deze installatie geactiveerd. Hierdoor wordt voorkomen dat de brand zich kan ontwikkelen tot een grote brand.



Ten behoeve van de sprinklerinstallatie is een uitgangspuntendocument (UPD) opgesteld. Dit betreft de rapportage met kenmerk R035030aa.17GSJZD.gvo van 31 januari 2018. In dit document worden de eisen en voorwaarden van de sprinklerinstallatie vastgelegd. Dit document vormt de basis voor het inspectiecertificaat dat door een inspectie-instelling zal worden afgegeven.

### **3 Subbrandcompartimenten, loopafstanden en vluchtroutes**

#### **3.1 Loopafstanden binnen een subbrandcompartiment**

##### **Begane grond**

Een brandcompartiment moet worden ingedeeld in één of meerdere subbrandcompartimenten. De maximaal toegestane afmetingen van het subbrandcompartiment worden bepaald door de maximaal toegestane loopafstanden van de vluchtroutes. Deze eisen zijn als volgt:

- De gecorrigeerde loopafstand tussen een punt in een gebruiksgebied en een uitgang van het subbrandcompartiment waarin dit gebruiksgebied ligt, mag niet groter zijn dan 30 meter.
- Bij het bepalen van de gecorrigeerde loopafstand worden niet-dragende constructieonderdelen buiten beschouwing gelaten. Daarnaast wordt de loopafstand voor zover deze door een verblijfsgebied voert met een factor 1,5 vermenigvuldigd.
- Als het gebruiksgebied niet nader wordt ingedeeld of als al sprake is van een indeling in verblijfsruimten, kan worden uitgegaan van de werkelijke loopafstand in plaats van de gecorrigeerde loopafstand. Deze mag dan ook niet groter zijn dan 30 meter.
- Het hoogteverschil tussen een voor personen bestemde vloer in een subbrandcompartiment en de uitgang van het subbrandcompartiment mag op de vluchtroute niet groter zijn dan 4 meter.

Met de op de plattegronden geprojecteerde brandscheidingen en vluchtroutes wordt op de begane grond aan de gestelde eisen voldaan. Vanaf elk punt van een voor personen bestemd gedeelte begint een vluchtroute naar de dichtstbijzijnde uitgang en vandaar naar de openbare weg binnen 30 meter.

##### **Eerste en hoger gelegen verdiepingen**

Elke hotelkamer vormt een beschermd subbrandcompartiment. De loopafstand binnen een hotelkamer tot de deur van de hotelkamer mag net als bij de andere functies niet groter zijn dan 30 meter. Hieraan wordt voldaan.

Er is sprake van korte doodlopende einden vanuit de kamers. De lengte hiervan bedraagt niet meer dan 15 meter. Dit is toegestaan volgens Module 14. Volgens het Bouwbesluit is een doodlopend eind eveneens toegestaan (zelfs tot 20 meter) maar wel onder voorwaarde dat de ruimte waardoor wordt gevlucht als extra beschermde vluchtroute wordt aangemerkt. Dit betekent dat deze delen van de gang minimaal 60 minuten brandwerend moeten worden gescheiden van de kamers. De wanden voldoen hieraan maar de deuren worden 30 minuten brandwerend uitgevoerd. Naar onze mening is echter een combinatie van 30 minuten brandwerendheid in combinatie met een sprinklerinstallatie zeker gelijkwaardig aan een 60 minuten brandwerende deur. Daarnaast voldoen de materialen in de gangen aan dezelfde brandveiligheidseisen als voor extra beschermde vluchtroutes. De Veiligheidsregio deelt deze mening.

#### **3.2 Vluchtroutes**

##### **Begane grond**

Op de begane grond kan rechtstreeks naar buiten worden gevlucht, zodat automatisch wordt voldaan aan de eisen.



## **Eerste en hoger gelegen verdiepingen**

De trappenhuizen worden uitgevoerd als extra beschermde vluchtroute. Dit betekent dat een ten minste 60 minuten brandwerende scheiding noodzakelijk is rond de trappenhuizen. Op elke verdieping kan er via twee onafhankelijke vluchtroutes gevlucht worden door middel van twee trappenhuizen. Beide trappenhuizen overbruggen geen hoogteverschil van meer dan 20 meter. Daarom zijn voorportalen niet noodzakelijk.

## **3.3 Opvang- en doorstroomcapaciteit**

### **Begane grond**

Uitgangspunt is dat volgens het Bouwbesluit alle aanwezigen binnen 1 minuut naar een veilige plek kunnen vluchten. Een veilige plek is een plek achter een brandscheiding of op het aangrenzend terrein. In de geprojecteerde situatie kunnen alle aanwezigen direct naar het aangrenzend terrein vluchten.

Vanuit de begane grond kan direct naar buiten worden gevlucht via vier dubbele deuren en één enkele deur. De capaciteit van al deze buitendeuren is voldoende voor de verwachte bezetting op de begane grond. De bezetting en capaciteit van de vluchtdeuren is weergegeven in bijlage II.

### **Eerste en hoger gelegen verdiepingen**

Voor de eerste verdieping gelden de volgende eisen volgens het Bouwbesluit:

- De opvangcapaciteit van de trappenhuizen dient voldoende te zijn om de aanwezigen per bouwlaag binnen een trappenhuis op te vangen;
- De capaciteit van de trappen dient voldoende groot te zijn om het gebouw binnen 15 minuten te kunnen ontruimen.

Bij het beoordelen van de capaciteit van de vluchtroutes hebben we gekeken naar beide trappenhuizen. Hierbij zijn er uitgegaan van een evenredige verdeling over de beide trappenhuizen. Op basis van twee personen per hotelkamer zijn in totaal 346 personen op de verdiepingen aanwezig. Uitgaande van standaard trappen met een breedte van 1,2 meter bedraagt de doorstroomcapaciteit per trap circa 54 personen per minuut. Per trap vluchten er circa 173 personen. De totale ontruimingstijd bedraagt dan circa 3,5 minuten. Dit is ruim sneller dan de gehanteerde grenswaarde van 15 minuten die het Bouwbesluit stelt.

## **3.4 Draairichting deuren**

Deuren waardoor wordt gevlucht, moeten in de vluchtrichting draaien. Uitzondering hierop zijn deuren die door weinig mensen worden gebruikt (zoals de deuren van de hotelkamers). Deuren van ruimten waarin meer dan 37 personen verblijven, moeten in elk geval in de vluchtrichting draaien. Ook de deuren van de trappenhuizen moeten in de vluchtrichting draaien.

In de geprojecteerde situatie wordt overal aan deze eis voldaan mits de deur van trappenhuis 2 op de vierde verdieping in de vluchtroute wordt gedraaid.

## 4 Overige brandveiligheidsaspecten

### 4.1 Brandwerendheid op bezwijken constructies

De bouwconstructie moet een brandwerendheid met betrekking tot bezwijken van minimaal 120 minuten krijgen. Vanwege de aanwezigheid van de sprinklerinstallatie zijn wij echter van mening dat dit kan worden gereduceerd tot ten minste 90 minuten. De sprinklerinstallatie zorgt er namelijk voor dat de omvang van de brand beperkt blijft, waardoor deze eenvoudiger kan worden geblust en dus de brandduur en de thermische belasting lager is dan in een niet gesprinklerde situatie. De Veiligheidsregio deelt deze mening.

De houten constructie voldoet aan 90 minuten brandwerendheid met betrekking tot bezwijken.

Vloeren waarover vluchtroutes voeren (dus de gangen en de trappen) moeten een brandwerendheid met betrekking tot bezwijken van minimaal 30 minuten hebben.

### 4.2 Materiaalgebruik

Alle afwerkingen van bouwmaterialen moeten voldoen aan de volgende eisen:

#### a. Algemeen:

- brandvoortplanting bepaald volgens NEN-EN 13501-1 brandklasse D of beter;
- vloeren en tredevlakken bepaald volgens NEN-EN 13501-1 brandklasse D<sub>fl</sub>;
- vloeren en tredevlakken in een besloten ruimte bepaald volgens NEN-EN 13501-1 rookklasse s1<sub>fl</sub>, of beter;
- rookproductie in een besloten ruimte volgens NEN-EN 13501-1 NEN rookklasse s2 of beter.

Hierop is een uitzondering toegestaan voor ten hoogste 5% van de totale oppervlakte.

#### b. Aanvullend hierop geldt voor alle extra beschermde vluchtroutes (vluchtrappenhuizen) en de beschermde vluchtroutes (de gangen grenzend aan de hotelkamers):

- brandklasse B of beter, bepaald volgens NEN-EN 13501-1;
- vloeren en tredevlakken brandklasse C<sub>fl</sub>, bepaald volgens NEN-EN 13501-1.

Hierop is een uitzondering toegestaan voor ten hoogste 5% van de totale oppervlakte.

#### c. Alle gesloten buitengeveloppervlakken:

- brandvoortplanting volgens NEN-EN 13501-1 brandklasse B of beter.

Deuren, ramen, kozijnen en daarmee vergelijkbare constructieonderdelen conform NEN-EN 13501-1 brandklasse D of beter.

Met steenachtige materialen (gips) wordt voldaan aan de eisen a, b, en c. Aandachtspunt zijn twee onderdelen van de buitengevel. Hierop gaan we in het vervolg van deze paragraaf nader in.

- d. alle schachten aan de binnenzijde volgens NEN-EN 13501-1 brandklasse A2 of beter. De schachten zijn aan de binnenzijde afgewerkt met 2 x 15 mm RF beplating. Deze voldoet aan de gestelde eis.
- e. rookafvoeren moeten brandveilig zijn volgens NEN 6062, waarbij de materialen waarin een temperatuur van ten minste 90°C kan worden bereikt, onbrandbaar moeten zijn volgens NEN 6064;
- f. dak niet brandgevaarlijk volgens NEN 6063.



In het algemeen wordt met gangbare bouwproducten aan de eisen d, e en f voldaan. Zie voor minder gangbare materiaaltoepassingen de productgegevens van de fabrikant.

Voor specifieke materialen, die niet op tekeningen zijn aangegeven verwijzen we naar de testrapporten van de fabrikant.

In de buitengevel wordt op twee aspecten niet voldaan aan brandklasse B. Dit betreft de volgende onderdelen:

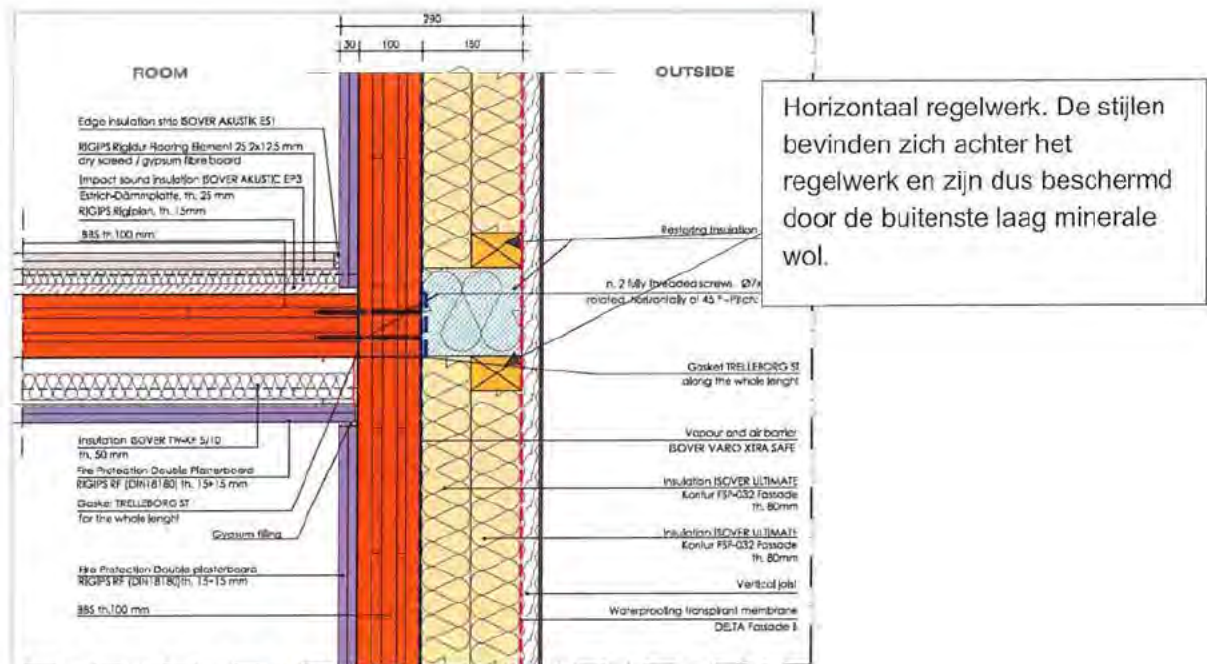
- de waterkerende laag onder de kozijnen.
- het houten stijl en regelwerk tussen de isolatie.

De waterkerende laag onder het kozijn is weergegeven in figuur 4.1. Het houten stijl en regelwerk is weergegeven in figuur 4.2.



**Figuur 4.1**

Waterkerende laag ter plaatse van het kozijn. De betreffende folie is binnen het kader weergegeven. De andere folie voldoet wel aan brandklasse B.



**Figuur 4.2**

Detail van de gevel, met het houten regelwerk.

Beide delen die niet voldoen aan brandklasse B zijn alleen horizontaal aanwezig en lopen niet door over meerdere hotelkamers. De waterkerende laag is alleen aanwezig ter plaatse van de ramen. De houten regels worden ter plaatse van elke kamerscheiding onderbroken door 140 mm minerale wol. Dit betekent dat indien deze onderdelen op één of andere manier in brand raken, dat er geen risico is dat vlammen zich in verticale richting zullen uitbreiden. Dit zal dus niet leiden tot bijvoorbeeld branduitbreiding tussen boven elkaar gelegen hotelkamers. Een eventueel brandend deel van de gevel blijft dus lokaal en kan daardoor voor weinig schade aanrichten. Om deze reden vinden wij deze situatie voldoende veilig. De Veiligheidsregio Utrecht heeft hiermee ingestemd.

### 4.3 Droge blusleiding en brandslanghaspels

In de geprojecteerde situatie bevinden zich geen verblijfsgebieden meer dan 20 meter boven peil. Een droge blusleiding is daarom niet vereist vanuit het Bouwbesluit. In overleg met de Veiligheidsregio is er echter voor gekozen om het gebouw toch te voorzien van twee droge blusleidingen. Elk trappenhuis wordt hiervan voorzien. Vanwege het ontbreken van voorportalen voor de trappenhuisen worden de voedingspunten op de gangen gerealiseerd. Hiermee wordt voorkomen dat rook het trappenhuis in kan stromen.

Het gehele gebouw moet worden voorzien van brandslanghaspels. De haspels moeten zodanig worden gepositioneerd dat de loopafstand tussen een brandslanghaspel en ieder punt van een vloer niet groter is dan de slanglengte +5 meter. Bij het bepalen van de loopafstand moet het deel dat binnen een verblijfsgebied ligt, worden vermenigvuldigd met een factor 1,5. Constructie-onderdelen die niet tot de bouwconstructie behoren en binnen het verblijfsgebied liggen, mogen hierbij buiten beschouwing worden gelaten.



De slanglengte van de brandslanghaspels mag niet groter zijn dan 30 meter. De haspels hebben verder een statische druk van niet minder dan 100 kPa en een capaciteit van 1,3 m<sup>3</sup>/h bij gelijktijdig gebruik van twee brandslanghaspels die zijn aangesloten op dezelfde drinkwatervoorziening. De haspels mogen niet worden aangebracht in een trappenhuis.

Op de vijfde en zesde verdieping wordt hieraan voldaan met één brandslanghaspel die nabij trappenhuis 1 wordt geplaatst. Op de eerste tot en met de vierde verdieping moeten er twee brandslanghaspels toegepast worden. Op de begane grond wordt ook met één brandslanghaspel volstaan. Op de tekeningen van de architect is de positie van de brandslanghaspels per verdieping weergegeven.

#### 4.4 Brandweerlift

In de geprojecteerde situatie bevinden zich geen verblijfsgebieden meer dan 20 meter boven peil. Een brandweerlift is om die reden niet vereist vanuit het Bouwbesluit.

#### 4.5 Noodverlichting

Volgens het Bouwbesluit moeten onder meer de vluchtroutes en verblijfsruimten met meer dan 75 personen worden voorzien van noodverlichting. Deze verlichting moet in geval van brand binnen 10 seconde worden geactiveerd en gedurende minimaal 60 minuten in werking blijven. Ter plaatse van het vloerniveau moet een verlichtingssterkte van minimaal 1 Lux worden gerealiseerd.

In de geprojecteerde situatie moeten alle beschermde vluchtroutes op elke verdieping, beide trappenhuisen en de begane grond voorzien zijn van noodverlichting.

#### 4.6 Brandmeld- en ontruimingsalarminstallatie

Het gebouw moet worden voorzien van een automatische brandmeldinstallatie met volledige bewaking. De installatie moet voldoen aan de NEN 2535.

De brandmeldinstallatie moet worden aangesloten op een ontruimingsalarminstallatie die voldoet aan de NEN 2575. Deze installatie moet worden uitgevoerd als een B-installatie (slow whoop).

In de ontruimingsinstallatie is een vertraging opgenomen. Dit betekent dat bij een brandmelding niet automatisch direct het gehele hotel wordt ontruimd maar dat de BHV organisatie 3 minuten de tijd heeft om vast te stellen of er inderdaad een brand is. Wanneer na 3 minuten de BHV-organisatie de installatie niet heeft hersteld, wordt het hotel wel volledig ontruimd. Voor meer details verwijzen wij naar het UPD van de brandmeld- en ontruimingsinstallatie.

Uiteraard is het belangrijk dat de BHV-organisatie hiervoor geschikt en goed wordt geïnstrueerd om deze vertraging mogelijk te maken. De te volgen procedures moeten daarom ook goed worden vastgelegd in het ontruimingsplan. Dit ontruimingsplan zal voorafgaand aan de ingebruikname van het hotel aan de brandweer worden overlegd.

De brandmeld- en ontruimingsinstallatie moeten worden voorzien van een inspectiecertificaat dat is afgegeven op basis van het CCV inspectieschema Brandbeveiligingsinstallaties. Hiertoe is door ons Uitgangspuntendocument (UPD) opgesteld.

## **4.7 Vluchtrouteaanduidingen**

Een ruimte waardoor een verkeersroute voert en een ruimte voor meer dan 50 personen dienen voorzien te worden van verlichte vluchtrouteaanduiding die voldoet aan NEN 3011 en aan de zichtbaarheidseisen van NEN-EN 1838.

In de geprojecteerde situatie moeten alle vluchtroutes en trappenhuizen voorzien worden van vluchtrouteaanduiding. Mogelijk is op de begane grond in de toekomst meer vluchtrouteaanduiding nodig, wanneer de inrichting bekend is.

## **4.8 Voorzieningen bij vluchtdeuren**

Alle deuren waardoor wordt gevlucht, moeten zonder sleutel of vergelijkbaar voorwerp te openen zijn (in de vluchtrichting). Deuren die door meer dan 100 personen worden gebruikt en in ruimten waarin meer dan 100 personen aanwezig zijn moeten worden voorzien van een paniekbalk (deze laatste eis volgt uit Module 14 van Marriott). Dit betekent dat de buitendeuren op de begane grond die worden gebruikt voor het vluchten moeten worden voorzien van een paniekbalk.

## **4.9 Opstelplaats brandweervoertuig en aanvalsroutes**

Aan de zijkant van het gebouw (aan de straatzijde) wordt een opstelplaats voor de brandweer gerealiseerd. De brandweer kan hier op de openbare weg staan. De brandweeringang wordt ook in deze zijgevel gerealiseerd.

Tegenover deze brandweeringang is een brandhydrant aanwezig. Deze ligt voldoende dicht bij het gebouw en van de aansluitpunten van de droge blusleidingen. De positie van de hydrant is in onderstaande figuur aangegeven.

Het hotel is altijd te betreden (ook in de nachtsituatie). Daarnaast is er altijd iemand aanwezig bij de receptie die de brandweer toegang kan verlenen tot het gebouw.





**Figuur 4.3**

Situatie met de positie van d brandhydrant (rode stip).

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## Bijlage I

### Berekening weerstand tegen brandoverslag

#### Gestelde eisen

De weerstand tegen branddoorslag en brandoverslag (wdbdo) tussen de verschillende (sub)brandcompartimenten van de hotelkamers moet op grond van Bouwbesluit 2012 ten minste 30 minuten bedragen.

Voor brandoverslag komt de gestelde eis erop neer dat, wanneer er brand heerst in een bepaald (sub)brandcompartiment, ter plaatse van de gevelopeningen in een ander (sub)brandcompartiment de warmtestraling niet zo hoog mag oplopen dat brandbare materialen achter de opening kunnen worden ontstoken. Om aan te tonen dat de weerstand tegen brandoverslag (wbo) voldoende hoog is, moet voor het meest bestraalde punt gelden dat de stralingsflux niet groter is dan  $15 \text{ kW/m}^2$ . Het meest bestraalde punt is bepaald door verschillende observatiepunten te berekenen en de stralingsfluxen met elkaar te vergelijken.

#### Uitgangspunten berekeningen

De weerstand tegen brandoverslag is bepaald volgens NEN 6068:2016. Hiervoor is gebruikgemaakt van het computerprogramma Pintegraal, versie V6.1c. Er is voor een maatgevende hotelkamer de horizontale en verticale brandoverslagstraject berekend.

Figuur I.1 geeft de invoer van de beschouwde brandruimten in het rekenprogramma weer. De brandoverslagtrajecten van de begane grond zijn in een aparte berekening ingevoerd.



**Figuur I.1**

Grafische weergave van de ingevoerde woningen en rekenpunten (zwarte kegels)

De puien/kozijnen en deuren in de buitengevels zijn als gevelopeningen beschouwd. Voor gevelopeningen geldt dat deze een brandwerendheid (op het criterium vlamdichtheid) van minder dan 5 minuten moeten bezitten. Hier wordt bij gebruik van normaal (float)glas aan voldaan.

Voor de overige bouwdelen gelden volgens NEN 6068 de volgende voorwaarden:

- geveldelen (met uitzondering van gevelopeningen) moeten een brandwerendheid van ten minste 30 minuten te bezitten;
- er mogen geen geveldelen met een brandvoortplantingsklasse hoger (slechter) dan Euroklasse B worden toegepast;
- het dak mag niet brandgevaarlijk zijn volgens NEN 6063.



Aangezien in de geprojecteerde situatie de hoogste vloer niet hoger ligt dan 20 meter boven het aansluitend terrein, is met de gereduceerde rekenmethode van NEN 6068 gerekend.

## Resultaten

Tabel II.1 geeft de maximaal berekende stralingsflux voor de verschillende trajecten weer, zonder brandwerende voorzieningen.

**Tabel II.1**

Maximaal berekende stralingsflux voor de verschillende trajecten; alleen de rekenpunten waar de stralingsflux het hoogste is, zijn gegeven (maatgevende trajecten).

Traject	Brandcompartiment waar in het rekenprogramma de brand wordt verondersteld	Resultaten			
		Rekenpunt	Maximaal berekende stralingsflux [kW/m <sup>2</sup> ]	Rekenrichting	Voldoet
1.	Hotelkamer	1	6,8	Verticaal	Ja
2.	Hotelkamer	5	0,7	Horizontaal	Ja

Op grond van de bovengenoemde resultaten blijkt zonder brandwerende voorzieningen de kans op brandoverslag in voldoende mate wordt voorkomen.

De details van de berekeningen zijn hierna weergegeven.

## Details berekening hotelkamers

### BRANDSCENARIO'S

Naam	Brand	Opening	Positie	Rechts	Omhoog	Terug	Hoek	Versie	kW/m2	Commentaar
Hotel_BC1	O2		Links onder	0.00	0.00	0.00	0.0	6068_2016	3.9	OK
Hotel_BC1	O2		Midden onder	0.00	0.00	0.00	0.0	6068_2016	6.8	OK
Hotel_BC1	O2		Rechts onder	0.00	0.00	0.00	0.0	6068_2016	3.9	OK
Hotel_BC1	to_0		Links onder	0.85	3.67	-12.92	180.0	6068_2016	0.6	OK
Hotel_BC1	to_0		Links onder	0.85	2.95	-12.92	180.0	6068_2016	0.6	OK
Hotel_BC1	to_0		Links onder	0.85	0.00	-12.92	180.0	6068_2016	0.7	OK

### BRANDRUIMTEN

Naam	Breed	Diep	Hoog	Gereduceerd	Nivo	Industriemodel	WDBO	Plafond	Samen	Blok
Hotel_BC1	3.30	5.64	2.70	Nee	0.00		60	0.25		to_3 to_2 to_1 to_0
Hotel_BC2	5.64	3.30	2.70	Nee	2.95		60	0.25		to_5 to_6 to_7 to_4

### GEVELS

Naam	LO_x	LO_y	RO_x	RO_y	Hoogte	Hoek	Omhoog
to_0	.00	5.64	.00	.00	2.95	90.00	.00
to_1	3.30	5.64	.00	5.64	2.95	90.00	.00
to_2	3.30	.00	3.30	5.64	2.95	90.00	.00
to_3	.00	.00	3.30	.00	2.95	90.00	.00
to_4	.00	.00	3.30	.00	2.95	90.00	2.95
to_5	3.30	.00	3.30	5.64	2.95	90.00	2.95
to_6	3.30	5.64	.00	5.64	2.95	90.00	2.95
to_7	.00	5.64	.00	.00	2.95	90.00	2.95

### OPENINGEN

Naam	Rechts	Omhoog	Breedte	Hoogte	Brandwerend	Balkon/Overstek	Opgaandtype	Geval(s)	Brandruimte
to_0	.75	1.00	1.70	1.44	.00	.00	Opgaand	to_3	Hotel_BC1
O2	.75	3.95	1.70	1.44	.00	.00	Opgaand	to_4	Hotel_BC2

## **Bijlage II**

Berekening capaciteit vluchtroutes begane grond





## **Bijlage III**

### **Verslag overleg brandweer**



## Besprekingsverslag

Vergaderdatum: 18 december 2017      Project: Moxy hotel Rotsoord  
Vergaderlocatie: Utrecht      Locatie: Utrecht  
Ons kenmerk: V035030aa.17I4JDA.bk      Betreft: Overleg brandweer  
Versie: 01\_001

Aanwezig	Namens	Verzendlijst
	Veiligheidsregio Utrecht	ja
	Veiligheidsregio Utrecht	ja
	Vastint	ja
	LBP SIGHT	ja
	LBP SIGHT	ja

Het project betreft de nieuwbouw van een hotel. Bijzonder aan het project is het modulaire houten bouwsysteem dat wordt toegepast. LBP|SIGHT is betrokken bij het project als brandveiligheidsadviseurs. Zij hebben een conceptrapportage opgesteld waarin de brandveiligheid is beschreven. Het ontwerp bevat een aantal gelijkwaardige oplossingen. Doel van dit overleg is het concept toe te lichten en gelijkwaardige oplossingen af te stemmen. De volgende punten zijn besproken:

- Het concept wordt kort toegelicht. Op de begane grond worden de algemene ruimten zoals entree, ontbijtruimte, techniekruimten en back of house gerealiseerd. Daarboven komen de hotelkamers. De hotelkamers bestaan uit een prefab houten constructie die is afgewerkt met twee lagen gipsbeplating.
- De brandwerendheid van de hoofd draagconstructie bedraagt 90 minuten. Dit is 30 minuten lager dan de wettelijk vereiste waarde van 120 minuten. LBP|SIGHT is van mening dat dit acceptabel is omdat het gebouw wordt voorzien van een sprinklerinstallatie. De brandweer is het hiermee eens.
- Op de hotelverdiepingen is er sprake van doodlopende einden met een lengte van maximaal 15 meter. Het Bouwbesluit staat dit toe onder voorwaarde dat de gang wordt uitgevoerd als extra beschermde vluchtroute. Hieraan wordt voldaan, maar wel met een brandwerendheid van 30 minuten in plaats van 60 minuten tussen de kamers en de gangen. LBP|SIGHT is van mening dat de combinatie van 30 minuten brandwerendheid en sprinkler ook voldoende veilig is. De brandweer deelt deze mening. Wel moet de strijkplek brandwerend worden gescheiden van de gang. Dit zal worden aangepast in het ontwerp.
- In het plenum tussen de badkamers van twee hotelkamers is op twee plaatsen een sparing aanwezig. Deze sparing is noodzakelijk voor het verloop van een sprinklerleiding en een elektraleiding. Vanwege de beperkte ruimte in het plenum is het niet mogelijk om deze sparing volledig (volgens certificaat) af te dichten. Tussen de kamer en het plenum is wel een brandwerend plafond aanwezig. Eventuele verspreiding van brand en rook kan daardoor alleen via de vloer plaatsvinden. In het plenum is tevens een sprinklerkop aanwezig. Afsproken is dat de sparing wel wordt afgedicht met minerale wol om te voorkomen dat er rookverspreiding plaatsvindt tussen de kamers. Hiermee wordt een voldoende veilige situatie gerealiseerd.



- Het hotel staat op korte afstand van Tivoli De Helling. Dit gebouw staat op een ander perceel. De kopgevel van het hotel wordt 60 minuten brandwerend. Dit voldoet aan de eisen van het Bouwbesluit. Om aan compartimentsklasse B volgens Technisch Bulletin 65 te voldoen, zou ook een deel van de zijgevel brandwerend moeten worden uitgevoerd. LBP|SIGHT is van mening dat dit niet nodig is omdat het Bouwbesluit dit niet vereist. Dat leidt dan echter tot een C certificaat. De brandweer is het hier niet mee eens. Zij vrezen namelijk dat een C certificaat ertoe leidt dat ook alle andere brandscheidingen niet meer gecontroleerd worden. Zij stellen daarom voor om uit te gaan van de werkelijke situatie en wel een wdbdo van ten minste 60 minuten (B certificaat). Omdat de gevel van Tivoli steenachtig is, is deze waarschijnlijk al voldoende brandwerend. Dit moet wel nader worden onderzocht.
- De hoofdtrap loopt door tot het dak waar techniek wordt opgesteld. Het hoogteverschil dat deze trap overbrugt is hierdoor groter dan 20 meter. Om te voorkomen dat er voorportalen voor de trappen moeten worden gerealiseerd, stelt LBP|SIGHT voor om een extra deur aan te brengen waardoor de trap wordt gesplitst in twee segmenten. De brandweer geeft aan dat dat in dit geval acceptabel is omdat de trap boven in de buitenlucht uitkomt. Het risico is daardoor beperkt.
- Vanuit het hoge deel voert één van de vluchtrappenhuizen naar de vierde verdieping. Vanaf daar kan via de corridor naar de andere vluchtrap aan de kop worden gevlucht. Dit is toegestaan. De brandweer adviseert wel om de branddeur in de gang te verplaatsen. Het liefst zien zij hier twee deuren: één aan elke zijde van het trappenhuis, waardoor het risico op het blokkeren van deze vluchtroute minimaal is.
- De hoogste vloer van een verblijfsgebied ligt niet hoger dan 20 meter boven het meetniveau. Hierdoor zijn een droge blusleiding en een brandweerlift niet nodig. De brandweer vraagt alsnog een droge blusleiding aan te brengen vanwege de inzetdiepte van meer dan 60 meter. De aansluitpunten moeten in de corridor worden aangebracht.
- Er wordt nog gedacht aan het realiseren van een dakterras op de bovenste bouwlaag. De brandweer geeft aan dat in dat geval het gebouw wordt beschouwd alsof de hoogste vloer hoger ligt dan 20 meter. Dat betekent dat er dan een brandweerlift moet worden gerealiseerd.
- In de gevel wordt op twee plaatsen materiaal toegepast dat niet voldoet aan brandklasse B. Dit betreft horizontaal houten regels en een waterkerende laag onder de kozijnen. Deze houten regels zijn per kamer (3,4 meter) onderbroken over een breedte van 140 mm. Tussen deze segmenten wordt minerale wol toegepast. De gevelisolatie bestaat overal uit minerale wol. Omdat er geen sprake is van doorlopende delen, is dit voor de brandweer acceptabel. Wanneer de delen in brand raken, blijft de omvang hiervan namelijk beperkt.
- De deuren van de nooduitgangen op de begane grond moeten aan de buitenzijde worden voorzien van een sticker met de tekst "nooduitgang vrijhouden".
- Bij de aanvraag van de omgevingsvergunning worden de diverse attesten van de toegepaste materialen ingediend. De brandweer kan deze dan beoordelen. Er zal met de buiteninspecteur worden overlegd over hoe wordt omgegaan met controle op de bouwplaats. Een groot deel van de brandwerende afwerking wordt al in de fabriek in Italië aangebracht maar is op de bouwplaats nog wel zichtbaar. Mogelijk kan/wil de gemeente langskomen wanneer de eerste unit is aangekomen in Utrecht.
- Vertraging in de ontruimingsinstallatie is op zich toegestaan. Het is daarbij wel van belang dat de organisatie hierop wordt afgestemd en dat dit wordt uitgewerkt in het PVE van de brandmeldinstallatie en in het ontruimingsplan. Aandachtspunt hierbij is de nachtsituatie waarbij mogelijk weinig personeel aanwezig is. Vanwege de sprinklerinstallatie is er sprake van doormelding naar de brandweer. De BHV-organisatie moet de brandweer opvangen. Deze is waarschijnlijk snel aanwezig omdat de kazerne dicht bij het hotel staat.



Wanneer de BHV-er aan het beoordelen is of een brandmelding terecht is, kan hij de brandweer niet opvangen. Als er niet 24 uur per dag iemand aanwezig is (of niet officieel), dan moet ook de brandmeldinstallatie worden voorzien van doormelding.

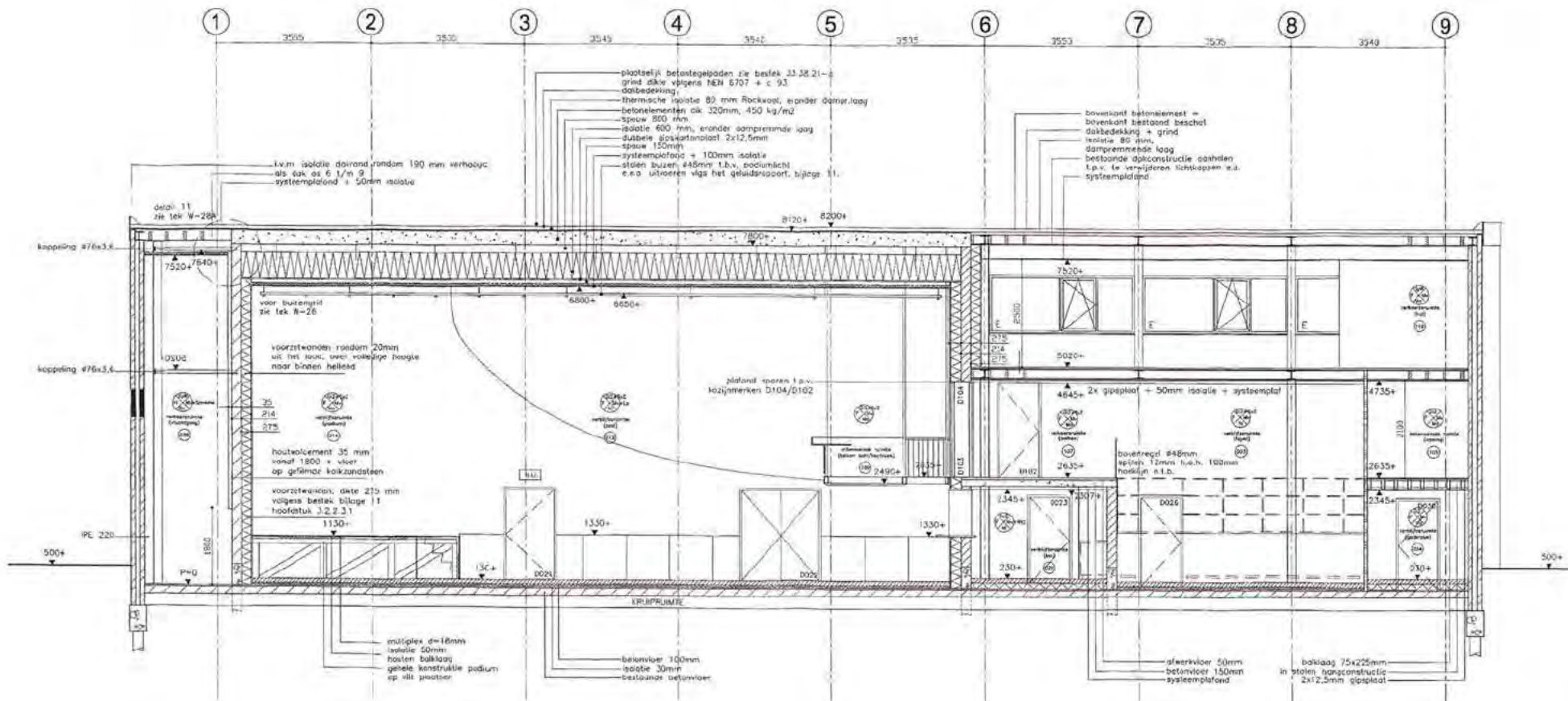
LBP|SIGHT BV



## **Bijlage IV**

### **Gegevens Tivoli De Helling**







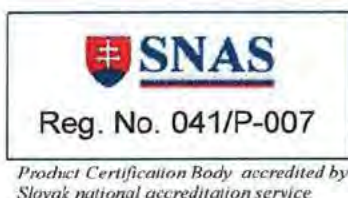




## **Bijlage V**

Documenten van het bouwsysteem





NOTIFIED BODY No. 1396  
Osloboditeľov 282, 059 35 Batizovce, Slovakia  
tel. +421 52 7752298 fax. +421 52 7881412 http://www.fires.sk



## EC – CERTIFICATE OF CONFORMITY

**1396 – CPD – 0055**

In compliance with the Directive 89/106/EEC of the Council of European Communities of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to the Construction Products Directive – (CPD), amended by the Directive 93/68/EEC of the Council of European Communities of 22 July 1993, it has been stated that the construction product

### **Cartridge fire damper CF1, type EI 60 S Cartridge fire damper CF2, type EI 120 S**

is defined as a closure of horizontal or vertical circular air duct preventing passage of fire in the place of duct penetration through the fire separating construction. The fire damper is automatically closed to limit spread of fire, heat and smoke when the ambient temperature reaches defined temperature. Product,

placed on the market by

**Aldes,  
20 Boulevard Joliot Curie, 69200 VENISSIEUX, France**

and produced in the factory

**IMOS, Comp. Reg. No.: 00683868,  
900 43 Kalinkovo 146, Slovak Republic**

is submitted by the manufacturer to a factory production control and to the further testing of samples taken at the factory in accordance with a prescribed test plan and that the notified body - FIRES, s.r.o. - has performed the initial type-testing for the relevant characteristics of the product, the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control.

This certificate attests that all provisions concerning the attestation of conformity and the performances described in the Annex ZA of the standard

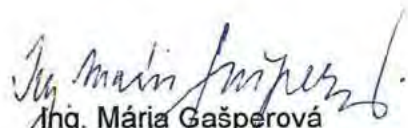
**EN 15650: 2010**

were applied and that the product fulfils all the prescribed requirements.

This certificate was first issued on the 14<sup>th</sup> June 2012 and remains valid as long as the conditions laid down in the harmonised technical specification in reference or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Batizovce, 21<sup>st</sup> August 2012



  
Ing. Mária Gašperová  
Head of Product Certification Body

039297

FIRES 136/C-14/06/2012-E





# MFPA Leipzig GmbH

Prüf-, Überwachungs- und Zertifizierungsstelle für  
Baustoffe, Bauprodukte und Bausysteme

Geschäftsbereich III - Baulicher Brandschutz

Dipl.-Ing. Sebastian Hauswaldt

Arbeitsgruppe 3.2 - Brandverhalten von Bauarten und  
Sonderkonstruktionen

M. Sc. Josephine Ried

Telefon +49 (0) 341-6582-236

ried@mfpa-leipzig.de

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## Gutachterliche Stellungnahme Nr. GS 3.2/16-389-1Ä

Ersatz für: GS 3.2/16-389-1 vom 5. Dezember 2016

vom 23. Dezember 2016

1. Ausfertigung

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Gegenstand: Gutachterliche Stellungnahme hinsichtlich der brandschutztechnischen Einstufung einer Außenwandkonstruktion aus einem Binderholz Brettsperrelement und einer außenseitigen Bekleidung aus einer gedämmten, hinterlüfteten Fassade in die Feuerwiderstandsklasse REI 90 bei einer Brandbeanspruchung von der Wandaußenseite

*Bauvorhaben: Moxy Hotel Frankfurt Gateway Gardens  
Moxy Hotel Munich Messe  
Moxy Hotel Ludwigshafen*

Auftraggeber: Binderholz Bausysteme GmbH  
Zillertalstraße 39  
A-6263 Fügen/Zillertal

Auftragsdatum: 23. November 2016

Bearbeiter: [REDACTED]

Dieses Dokument besteht aus 4 Seiten.

Dieses Dokument ersetzt die gutachterliche Stellungnahme GS 3.2/16-389-1 vom 5. Dezember 2016.

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Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen Leipzig mbH (MFPA Leipzig GmbH)

Sitz:	Hans-Weigel-Str. 2b – 04319 Leipzig/Germany
Geschäftsführer:	Prof. Dr.-Ing. Frank Dehn
Handelsregister:	Amtsgericht Leipzig HRB 17719
USt-Id Nr.:	DE 813200649
Tel.:	+49 (0) 341-6582-0
Fax:	+49 (0) 341-6582-135



## 1 Anlass und Auftrag

Mit dem Schreiben vom 23. November 2016 erteilte die *Binderholz Bausysteme GmbH* der *MFPA Leipzig GmbH* den Auftrag, eine gutachterliche Stellungnahme hinsichtlich der brandschutztechnischen Einstufung einer Außenwandkonstruktion aus einem Binderholz Brettsperrholzelement und einer außenseitigen Bekleidung aus einer gedämmten, hinterlüfteten Fassade in die Feuerwiderstandsklasse REI 90 bei einer Brandbeanspruchung von der Wandaußenseite für Bauvorhaben *Moxy Hotel Frankfurt Gateway Gardens*, *Moxy Hotel Munich Messe* und *Moxy Hotel Ludwigshafen* zu erstellen.

Die gutachterliche Stellungnahme wird notwendig, da für die Außenwandkonstruktion kein unmittelbarer brandschutztechnischer Nachweis (z.B. allgemeines bauaufsichtliches Prüfzeugnis, allgemeine bauaufsichtliche Zulassung) vorliegt.

## 2 Aufbau der Konstruktion

Die Außenwandkonstruktion besteht aus einem 100 mm dicken, tragenden und raumabschließenden Binderholz Brettsperrholzelement 100-5s (BBS) und einer außenseitigen Bekleidung aus einer innenliegenden 80 mm dicken Glaswolledämmung (Rohdichte:  $\geq 28 \text{ kg/m}^3$ , Schmelzpunkt  $< 1000^\circ\text{C}$ ) und einer außenliegenden 80 mm dicken Steinwolledämmung (Rohdichte:  $\geq 40 \text{ kg/m}^3$ , Schmelzpunkt  $> 1000^\circ\text{C}$ ) und einem hinterlüfteten Fassadenelement. Die innenliegende Bekleidung des BBS ist in diesem Fall für die Bewertung einer Brandbeanspruchung von der Wandaußenseite nicht relevant.



Innen

- Innenseitige Bekleidungslagen
- 100 mm BBS
- Winddichtbahn
- 160 mm Dämmebene (80 mm + 80 mm)  
mit gekreuzter Lattung  $b \times h = 40 \text{ mm} \times 80 \text{ mm}$
- Stahlstreifen  $a \leq 300 \text{ mm}$
- Luftschicht
- Alucoil Fassadenplatte

Außen

Abbildung 1 Aufbau Wandkonstruktion

## 3 Bewertung der Konstruktion

Zur brandschutztechnischen Bewertung werden die Ergebnisse des Prüfberichtes Pr-11-2 072-De [4] herangezogen. In dieser Brandprüfung wurde ein 100 mm dickes BBS (Belastung: 80,21 kN/m) mit einer direkten Bekleidung aus 15 mm Gipskarton-Feuerschutzplatte (GKF-Platte) untersucht. Die geprüfte Konstruktion erfüllte die Feuerwiderstandskriterien Tragfähigkeit, Raumabschluss und Wärmedämmung über eine Prüfdauer von 90 Minuten bei einer Brandbeanspruchung von der bekleideten Wandseite.

Bei der zu bewertenden Konstruktion anstatt der 15 mm dicken GKF-Platte eine innenliegende 80 mm dicke Glaswolledämmung (Rohdichte:  $\geq 28 \text{ kg/m}^3$ , Schmelzpunkt  $< 1000^\circ\text{C}$ ) und eine außenliegende 80 mm dicke Steinwolledämmung (Rohdichte:  $\geq 40 \text{ kg/m}^3$ , Schmelzpunkt  $> 1000^\circ\text{C}$ ) verwendet. In diese insgesamt 160 mm dicke Dämmebene wird eine kreuzweise montierte Lattung verlegt. Die 80 mm dicke nichtbrennbare Steinwolledämmung mit einer Rohdichte  $\geq 40 \text{ kg/m}^3$  verhält sich brandschutztechnisch





günstiger als eine 15 mm dicke GKF-Platte, unter dem Aspekt, dass keine Zermürbung der Steinwolledämmung auftritt.

Hinsichtlich der Durchwärmung soll überprüft werden, ob die Steinwolledämmung den gleichen Schutz vor Holzabbrand des dahinterliegenden BBS bietet, wie die GKF Bekleidung. In DIN EN 13501-2: 2010-02 [3] Abschnitt 7.6.4 wird als Leistungskriterium von Bekleidungen eine maximale Temperatur von 270 °C genannt. Auf Grundlage dieses Bewertungskriteriums wird auf der sicheren Seite liegend für diese gutachterliche Stellungnahme eine „Entzündungstemperatur“ von 270 °C für das BBS gewählt. In [1] wurde das Durchwärmungsverhalten von 12,5 mm GKF-Platten und 60 mm Steinwolledämmung bei einseitiger Erwärmung gemäß ETK nach DIN EN 1363-1: 2012-10 [2] untersucht. In diesem Experiment wurden 270 °C hinter einer Lage GKF in der 29. Minute erreicht. Zu diesem Zeitpunkt wurde an der Mineralwolle (Rohdichte: 40 kg/m<sup>3</sup>) eine Temperatur von unter 30 °C gemessen. Damit ist gezeigt, dass eine 60 mm Mineralwolle-Platte mit einer Rohdichte von 40 kg/m<sup>3</sup> besser vor einer Erwärmung auf 270 °C schützt als eine 12,5 mm GKF-Platte. Die 3 mm der dickeren GKF-Platte bei der Brandprüfung werden durch die Verwendung einer 20 mm dickeren Dämmung bei der zu bewertenden Konstruktion kompensiert.

Mit einer zusätzlichen Fixierung der Dämmung gegen Herausfallen durch Stahlstreifen ( $a \leq 300$  mm, Verbindungsmittellänge  $> 75$  mm) ist eine Verklebung der Dämmung nicht notwendig. Sofern die innenliegende, mindestens 80 mm dicke Dämmebene ebenfalls aus Steinwolle (Rohdichte: 40 kg/m<sup>3</sup>, Schmelzpunkt  $> 1000$  °C) besteht, ist der Einsatz der Stahlstreifen zur Sicherung der Dämmung gegen Herausfallen nicht erforderlich.

Es bestehen daher aus brandschutztechnischer Sicht keine Bedenken die Konstruktion mit einer innenliegenden 80 mm dicken Glaswolledämmung (Rohdichte:  $\geq 28$  kg/m<sup>3</sup>, Schmelzpunkt  $< 1000$  °C) und einer außenliegenden 80 mm dicken Steinwolledämmung (Rohdichte:  $\geq 40$  kg/m<sup>3</sup>, Schmelzpunkt  $> 1000$  °C) an statt der 15 mm dicken GKF-Platte auszuführen und eine Feuerwiderstandsfähigkeit von 90 Minuten zu erreichen.

#### 4 Zusammenfassung

Es ist ausreichend sichergestellt, dass die Versagenskriterien nach DIN EN 13501-2: 2010-02 [3] Tragfähigkeit, Raumabschluss und Wärmedämmung im Hinblick auf die geforderte Feuerwiderstandsklasse REI 90, der in Abschnitt 2 bewerteten Konstruktion bei einer einseitigen Brandbeanspruchung von der Wandaußenseite gemäß Einheits-Temperaturzeitkurve nicht überschritten werden.

#### 5 Besondere Hinweise

Die Wandkonstruktion darf mit einer maximalen Wandhöhe von  $\leq 3000$  mm und einer maximalen Belastung von 80,21 kN/m errichtet werden.

Eine brandschutztechnische Bewertung bei einer Brandbeanspruchung von der Wandinnenseite ist nicht Teil dieser gutachterlichen Stellungnahme.

Die brandschutztechnische Beurteilung gilt nur, wenn sichergestellt ist, dass die Konstruktion durch herabstürzende Bauteile nicht negativ beeinträchtigt wird.

Diese gutachterliche Stellungnahme gilt nur aus brandschutztechnischer Sicht, sofern weitergehende, beispielsweise den Wärmeschutz, Schallschutz oder die Statik betreffende Anforderungen gestellt werden, sind zusätzliche Nachweise zu erbringen.

Die getroffenen Aussagen unterstellen die Beibehaltung der materiellen und konstruktiven Ausbildungen der betrachteten Konstruktionen, die im Rahmen dieses Gutachtens beschrieben wurden. Es sei an dieser Stelle darauf hingewiesen, dass Änderungen auch im Detail möglicherweise zu anderen Schlüssen führen könnten. Sonderlösungen oder Abweichungen bedürfen der gesonderten Bewertung.

Diese gutachterliche Stellungnahme gilt nur für das Bauvorhaben *Moxy Hotel Frankfurt Gateway Gardens*, *Moxy Hotel Munich Messe* und *Moxy Hotel Ludwigshafen*.





Dieses Dokument ersetzt keinen Konformitäts- oder Verwendbarkeitsnachweis im Sinne der Bauordnungen (national/ europäisch).

Leipzig, den 23. Dezember 2016



Geschäftsbereichsleiter

Bearbeiterin

## Unterlagen

- [1] Diplomarbeit von Hendrik Müller *"Untersuchung und Vergleich von brandschutztechnisch wirksamen Bekleidungssystemen für Tragkonstruktionen"*
- [2] DIN EN 1995-1-2: 2010-12 *Bemessung und Konstruktion von Holzbauten - Teil 1-2: Allgemeine Regeln - Tragwerksbemessung für den Brandfall*
- [3] DIN EN 13501-2: 2010-02 *Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten; Teil 2: Klassifizierung mit den Ergebnissen aus den Feuerwiderstandsprüfungen, mit Ausnahme von Lüftungsanlagen*
- [4] Pr-11-2.072-De *"Tragende Wand 100 mm BBS - Feuerwiderstandsprüfung für tragende Bauteile"* erstellt von PAVUS am 02. August 2011

**Warrington Certification Limited**

Holmesfield Road,  
Warrington, WA1 2DS  
Tel. +44 (0) 1925-646777  
Fax +44 (0) 1925-646667



Authorised and notified according to Article 10  
of the 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.

**MEMBER OF  
EOTA**

**European Technical Approval ETA-10/0212**

Trade name:	<b>Hilti Firestop Bandage CFS-B</b>
Holder of the approval:	HILTI Corporation Feldkircherstrasse 100 9494 Schaan Liechtenstein
Generic type and use of construction product:	Fire Stopping and Sealing Product. Penetration Seals
Valid	from: 2010-08-24 to: 2015-08-24
Manufacturing plant:	C/006
This European Technical Approval contains:	12 pages and 3 Annexes, 24 pages in total

Issued by:

For and on behalf of Warrington Certification Limited



European Organisation for Technical Approvals  
Europäische Organisation für Technische Zulassungen  
Organisation Européenne pour l'Agrément technique



## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European Technical Approval is issued by Warrington Certification Limited in accordance with:

The 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<sup>1</sup> modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;

UK implementation of CPD Statutory Instruments 1991, No 1620 Building and Buildings The Construction Products Regulations 1991- made 15 July 1991, laid before Parliament 22 July 1991, coming into force 27 December 1991, and amended by The Construction Products (Amendment) Regulations 1994 (Statutory Instruments 1994, No 3051);

Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC<sup>4</sup>;

Guideline for European Technical Approval of Fire Stopping and Fire Sealing Products: ETAG 026 Part 1: "General" and Part 2: "Penetration Seals".

- 2 Warrington Certification Limited is authorised 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 their 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.
- 4 This European Technical Approval may be withdrawn by Warrington Certification Limited, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Warrington Certification Limited. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.
- 6 The European Technical Approval is issued by the approval body in its official language. This version should correspond fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

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<sup>1</sup> Official Journal of the European Communities N° L40, 11.2.1989, p. 12

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.08.1993, p. 1

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

<sup>4</sup> Official Journal of the European Communities N° L17, 20.1.1994, p. 34

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of product and intended use

#### 1.1 Definition of the construction product

- 1) Hilti Firestop Bandage CFS-B is a 'wrap/bandage' used to wrap around pipes and 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 metal pipes services with insulation of class B to E according to EN 13501-1 (hereafter referred to as "combustible insulation").
- 2) Hilti Firestop Bandage CFS-B includes an intumescent component to close any gaps or joints when heated and prevent the passage of fire.
- 3) The Hilti Firestop Bandage CFS-B is supplied in roll form, with binding wire. The bandage is cut to a length to suit the overall diameter of pipe or pipe and insulation and then wrapped around the pipe within the separating element.
- 4) Installation of the system Hilti Firestop Bandage CFS-B – See 4.2

#### 1.2 Intended Use and Use Category

##### 1.2.1 Intended Use

The intended use of system Firestop Bandage CFS-B is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by various metal pipe services with combustible insulation.

- 1) The specific elements of construction that the system Firestop Bandage CFS-B may be used to provide a penetration seal in, are as follows:

Flexible walls: The wall must have a minimum thickness of 125 mm and comprise timber or steel studs lined on both faces with minimum 2 layers of 12.5 mm thick boards. The aperture around the pipe/bandage shall be infilled with gypsum plaster minimum 25 mm thick. 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.

Rigid walls: The wall must have a minimum thickness of 120 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup>.

Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 650 kg/m<sup>3</sup>.

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

- 2) The system Hilti Firestop Bandage CFS-B may be used to provide a penetration seal with specific insulated metal pipes, single only (for details see Annex C).
- 3) Apertures in the separating element shall be maximum 50 mm diameter oversize with respect to the pipe diameter, plus pipe insulation (if applied) and Hilti Firestop Bandage CFS-



B. The remaining annular space/gap shall be infilled with gypsum plaster or cementitious mortar. Apertures for the penetration of pipes do not require separation i.e. may be directly adjoining with annular interaction.

- 4) Pipes shall be supported at maximum 500 mm and 700 mm away from both faces of the wall constructions and from the upper face of floor constructions.

The provisions made in this European Technical Approval are based on an assumed working life of the Hilti Firestop Bandage CFS-B 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.

### 1.2.2 Use Category

Type Z<sub>2</sub>: Intended for use at internal conditions with humidity classes other than Z<sub>1</sub><sup>5</sup>, excluding temperatures below 0°C.

## 2 Characteristics of the product and methods of verification

The assessment of fitness for use has been made in accordance with EOTA ETAG 026 Part 2: 2008-01-01

ETAG Clause No.	ETA Clause No.	Characteristic	Assessment of characteristic
		<b>Mechanical resistance and stability</b>	Not relevant
		<b>Safety in case of fire</b>	
2.4.1	2.1	Reaction to fire	Class E according to EN 13501-1
2.4.2	2.2	Resistance to fire	See clause 2.2
		<b>Hygiene, Health and the Environment</b>	
2.4.3	2.3	Air permeability	No performance determined
2.4.4	2.4	Water permeability	No performance determined
2.4.5	2.5	Dangerous substances	See clause 2.5
		<b>Safety in use</b>	
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
		<b>Protection against noise</b>	
2.4.9	2.9	Airborne sound insulation	No performance determined
		<b>Energy, Economy and Heat Retention</b>	

<sup>5</sup> i.e. humidity class other than class 5 in accordance with EN ISO 13788

2.4.10	2.10	Thermal properties	No performance determined
2.4.11	2.11	Water vapour permeability	No performance determined
<b>General aspects relating to fitness for use</b>			
2.4.12	2.12	Durability and serviceability	Z <sub>2</sub> , see clause 2.12

## 2.1 Reaction to fire

Hilti Firestop Bandage CFS-B is classified 'E' in accordance with EN 13501-1.

## 2.2 Resistance to fire

System Hilti Firestop Bandage CFS-B has been tested in accordance with prEN 1366-3: 2006 & 2007 and based upon the test results and the field of direct application specified within EN 1366-3: 2009, the system Hilti Firestop Bandage CFS-B has been classified in accordance with EN 13501-2, as given 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.

In case of flexible wall constructions mineral wool must be used to provide support for the gypsum or mortar gap filling at the position of the aperture edge (for construction details see Annex C). 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.

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 assessment does not cover the avoidance of destruction of the seal or of the abutting building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

**NOTE** For example, for non-insulated metal pipes the elongation to be considered can be calculated using the relevant temperature from the standard time temperature curve at the fire resistance period required.

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**

No performance determined

### **2.4 Water permeability**

No performance determined

### **2.5 Dangerous substances**

Hilti Corporation has presented a declaration that Hilti Firestop Bandage CFS-B is in compliance with Council Directive 76/769/EEC of 27<sup>th</sup> July 1976 on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations (incl. all amendments and adaptations).

Confirmation has further been declared that all dangerous chemical substances  $\geq 1.0$  % w/w as well as all toxic, carcinogenic, toxic for reproduction and mutagenic chemical substances  $\geq 0.1$  % w/w (Status: 29. adaption – 2004/73/EG – of the EU directive 67/548/EEC – classification, packaging and labelling of dangerous substances) are stated in Hilti safety data sheets (according to 91/155/EEC including amendments) and have been considered for the classification of the products according to the directive 1999/45/EG (classification of preparations, including amendments).

All dangerous chemical substances are below the classification limits of 67/548/EEC.

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**

No performance determined.

### **2.7 Resistance to impact/movement**

No performance determined.

### **2.8 Adhesion**

Not relevant.

### **2.9 Airborne sound insulation**

No performance determined.

### **2.10 Thermal properties**

No performance determined.

### **2.11 Water vapour permeability**

No performance determined.

## 2.12 Durability and serviceability

Hilti Firestop Bandage CFS-B has been tested in accordance with EOTA Technical Report - TR024 – Edition November 2006, for the type Z<sub>2</sub> use category specified in EOTA 026-2, and the results of the tests have demonstrated suitability for penetration seals intended for use at internal conditions with humidity classes other than Z<sub>1</sub>, excluding temperatures below 0°C ("internal dry conditions").

## 3 Evaluation of Conformity and CE marking

### 3.1 Attestation of Conformity system

According to the decision 1999/454/EC of the European Commission 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
  - (1) initial type-testing of the product;
  - (2) initial inspection of factory and of factory production control;
  - (3) continued surveillance, assessment and approval of factory production control.

### 3.2 Responsibilities

#### 3.2.1 Tasks for 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 ensure that the product is in conformity with this European technical approval.

The manufacturer may only use constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the Control Plan of 17<sup>th</sup> March 2010 relating to the European technical approval ETA -(number) issued on ...(date)" 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 Warrington Certification Limited.



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

Additional information

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information:

(a) Technical data sheet:

- Field of application:
  - Building elements for which the penetration seal is suitable, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions – the construction requirements.
  - Services for which the penetration seal is suitable, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. cable trays)
  - Limits in size, minimum thickness etc. of the penetration seal
- Construction of the penetration seal including the necessary components and additional products (e.g. backfilling material) with clear indication whether they are generic or specific.

(b) Installation instruction:

- Steps to be followed
- Procedure in case of retrofitting.

The manufacturer shall, on the basis of a contract, involve a body which is 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 the European technical approval ETA-10/0212 issued on 2010.08.24.

### 3.2.2 Tasks of approved bodies

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the "Control Plan of 17<sup>th</sup> March 2010 relating to the European technical approval ETA-10/0212 issued on 2010.08.24.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification 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 Warrington Certification Limited without delay.

### 3.3 CE-Marking

The CE marking shall be affixed on the Hilti Firestop Bandage CFS-B. The marking "CE" shall be followed by the identification number of the approved certification body and be accompanied by the following additional information:

- identification number of the notified body (as mentioned above)
- the name 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 Guideline for European Technical Approval
- the use category  $Z_2$
- see ETA-10/0212 issued on 2010.08.24 for other relevant characteristics

Example of CE marking and accompanying information:

 1121	<b>'CE'-Marking</b>  Identification number of approved certification body
Hilti AG Feldkircherstrasse 100 FL-9494 Schaan Liechtenstein  09 XXXX-CPD-XXXX	Name and address of the producer (legal entity responsible for the manufacturer)     Two last digits of year of affixing the CE marking Number of EC certificate of conformity
ETA-10/0212 ETAG N° 026 part 2 Penetration Seal 'Hilti Firestop Bandage CFS-B' Use category $Z_2$ see ETA 10/0212 for other relevant characteristics	Number of European technical approval Number of guideline for European technical approval Designation of the product (trade name)  Use category in accordance with the ETA section 1 and 2 Other relevant characteristics see ETA ETA-10/0212 issued on 2010.08.24



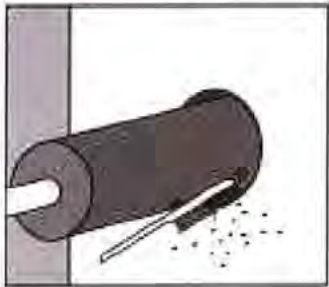
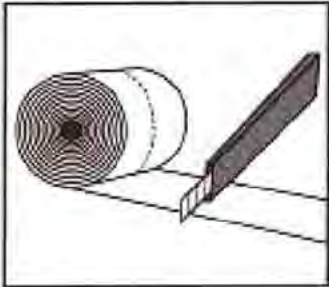
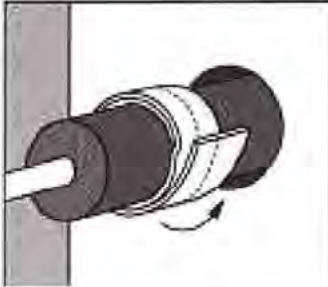
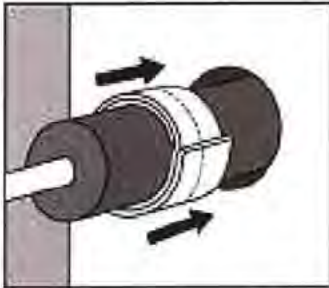
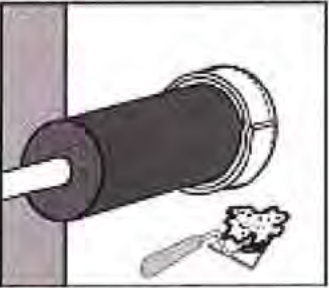
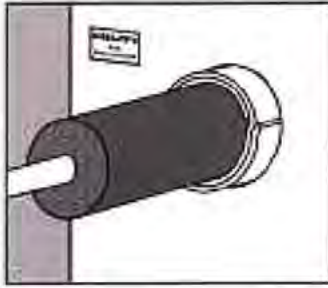
## 4 Assumptions under which the fitness of the product for the intended use was favorably assessed

### 4.1 Manufacturing

The European technical approval is issued for Hilti Firestop Bandage CFS-B on the basis of agreed data/information, deposited with Warrington Certification Limited, 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 Warrington Certification Limited before the changes are introduced. Warrington Certification Limited 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 system Firestop Bandage CFS-B shall be conducted as follows:

<b>1</b> 	<b>2</b> 	<b>3</b> 
<p>Clean opening.</p>	<p>Cut Hilti Firestop Bandage CFS-B to fit the outside diameter of the insulation. Consider the number of 2 layers.</p>	<p>Wrap Hilti Firestop Bandage CFS-B around the insulation. Secure the bandage with steel bands or wire (<math>\geq 0.7\text{mm}</math>)</p>
<b>4</b> 	<b>5</b> 	<b>6</b> 
<p>Install Hilti Firestop Bandage CFS-B on both sides within the opening in a depth of 62.5 mm. Two layers of bandage are required around the pipe/insulation.</p>	<p>Close the remaining gap with mortar or gypsum.</p>	<p>If it is necessary, an additional insulation over the bandage has to be installed.</p>

## **5 Indications to the manufacturer**

### **5.1 Packaging, transport and storage**

The following measures should be adopted with regard to handling and storage of the Hilti Firestop Bandage CFS-B:

- Handling
  - Information for safe handling: No special measures required.
  - Information about protection against explosions and fires: No special measures required.
- Storage
  - Don't store the product under 0 °C and not over +60 °C

### **5.2 Use, maintenance, repair**

The system Hilti Firestop Bandage CFS-B should be installed and used as described earlier in this document.

System Hilti Firestop Bandages CFS-B seals which are damaged should not be used or if damaged after installation, should be removed and replaced with undamaged bandages.

In the area covered by the ETA when the set up recommendation have been followed there is no maintenance protocol to be followed. The product does not need any maintenance in the life time indicated in the ETA.



## Annex A

### Reference Documents and LIST OF ABBREVIATIONS

References to standards mentioned in the ETA:

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

Other reference documents:

EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products
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### Abbreviations used in drawings

Abbreviation	Description
A, A <sub>1</sub> , A <sub>2</sub> ,...	Firestop product
B	Backfilling material
C	Pipe
D <sub>1</sub>	Pipe insulation
D <sub>2</sub>	Additional insulation
E	Building element (wall, floor)
E <sub>B</sub>	Aperture framing made from mineral wool (flexible wall constructions)
d <sub>C</sub>	Pipe diameter
t <sub>C</sub>	Pipe wall thickness
t <sub>D</sub> , t <sub>D1</sub>	Thickness of pipe insulation D, D <sub>1</sub>
t <sub>D2</sub>	Thickness of additional insulation D <sub>2</sub>
t <sub>E</sub>	Thickness of building element (wall, floor)
L <sub>D2</sub>	Minimum length of additional insulation D <sub>2</sub>

## **Annex B**

### **Description of Product and Product Literature**

#### **Hilti Firestop Bandage CFS-B**

A detailed specification of the product is contained in document "Identification / Product Specification and Control Plan of 17.03.2010 relating to the European Technical Approval ETA –10/XXX issued on ...(date) Hilti Firestop Bandage CFS-B" which is a non-public part of this ETA.

#### **Technical product literature:**

- Technical data sheet and instructions for use Hilti Firestop Bandage CFS-B

## Annex C

### Resistance to Fire Classification of Hilti Firestop Bandage CSF-B

#### C.1 Flexible wall constructions and rigid wall constructions according to 1.2.1 with wall thickness $t_E$ of minimum 125 mm

##### C.1.1 Penetration seal with 2 layers of Hilti Firestop Bandage CFS-B and additional insulation

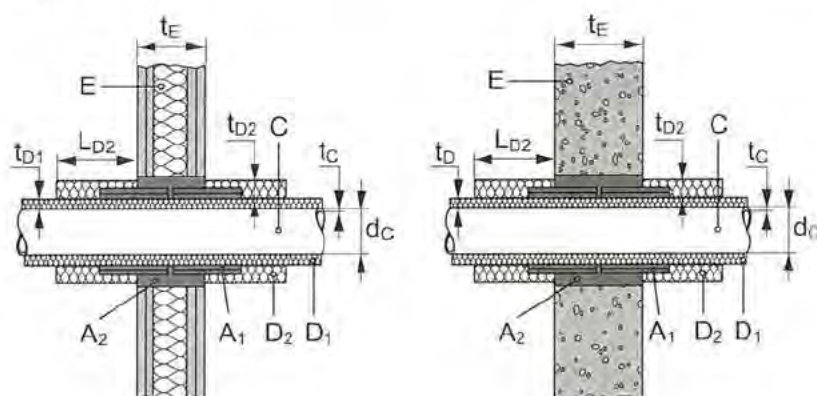
**Penetration Seal:** Services (pipe (C), including pipe insulation\* ( $D_1$ )) covered by two layers of Hilti Firestop Bandage CFS-B ( $A_1$ ) on both sides. The bandage is positioned with its centre line flush to the wall (E) surface. Annular space filled with gypsum plaster or cementitious mortar ( $A_2$ ). Additional insulation ( $D_2$ ) of minimum 300 mm length ( $L_{D2}$ ) from the surface of the wall (E) on both sides in a thickness of 19 mm ( $t_{D2}$ ) made from the same material as the pipe insulation.

In case the flexible wall construction is not filled completely with insulation material the aperture must be framed by installing mineral wool ( $E_B$ ) with a minimum thickness of 50 mm into the gap between the linings of the wall.

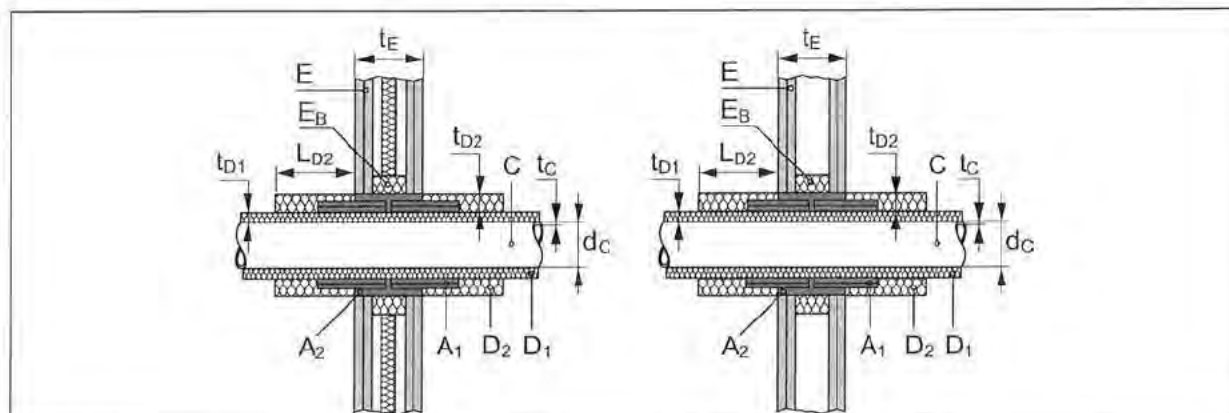
\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (Production status 2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (Production status 2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (Production status 2009 or CE marked according to EN 14303)

Construction details:







#### C.1.1.1 Separation of services minimum 100 mm

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) $\varnothing$ 28 mm, wall thickness ( $t_C$ ) between 1 mm and 10 mm; thickness of insulation ( $t_{D1}$ ) 10 mm	EI 120 - C/U
Diameter ( $d_C$ ) $\varnothing$ 88,9 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm, thickness of insulation ( $t_{D1}$ ) 30 - 100 mm	EI 90 - C/U E 120 - C/U
<b>Steel pipes</b> <sup>7</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) between $\varnothing$ 88.9 mm and $\varnothing$ 159 mm, with minimum wall thickness ( $t_C$ ) 2 mm and 4 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness ( $t_C$ ) 14,2 mm; thickness of insulation ( $t_{D1}$ ) 30-80 mm	EI 90 - C/U E 120 - C/U

#### C.1.1.2 Zero separation of services

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 0 mm.	
Diameter ( $d_C$ ) $\varnothing$ 88,9 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm, thickness of insulation ( $t_{D1}$ ) 30 mm	EI 120 - C/U

<sup>6</sup> The field of application given above is also valid for other metal pipes with lower heat conductivity than copper (ca. 350 W/m.K at 20°C) and a melting point of minimum 1050°C, e.g. unalloyed steels, low alloyed steels, stainless steel, cast iron, Ni and its alloys (NiCu, NiCr and NiMo alloys), CuNi alloys.

<sup>7</sup> 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. low alloyed steels, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys).

**C.1.2 Penetration seal with 2 layers of Hilti Firestop Bandage CFS-B**

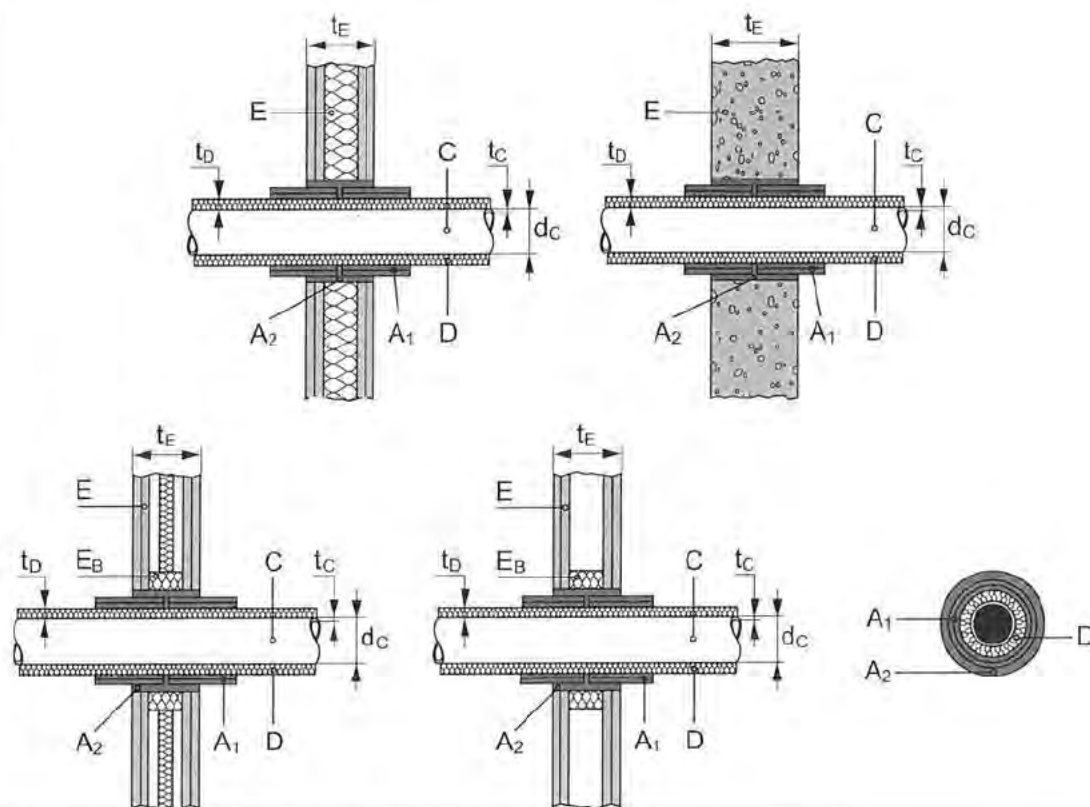
**Penetration Seal:** Services (pipe (C), including pipe insulation\* (D<sub>1</sub>)) covered by two layers of Hilti Firestop Bandage CFS-B (A<sub>1</sub>) on both sides. The bandage is positioned with its centre line flush to the wall (E) surface. Annular space filled with gypsum plaster or cementitious mortar (A<sub>2</sub>).

In case the flexible wall construction is not filled completely with insulation material the aperture must be framed by installing mineral wool (E<sub>B</sub>) with a minimum thickness of 50 mm into the gap between the linings of the wall.

\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (Production status 2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (Production status 2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (Production status 2009 or CE marked according to EN 14303)

Construction details:

**C.1.2.1 Separation of services minimum 100 mm**

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF</b> , <b>Kaiflex KK</b> , <b>Kaiflex KK Plus</b> or <b>Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) between $\varnothing 42$ mm and $\varnothing 54$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm and 2 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness ( $t_C$ ) 14,2 mm; thickness of insulation ( $t_{D1}$ ) 30 mm	EI 90 - C/U E 120 - C/U



## C.2 Flexible wall constructions and rigid wall constructions according to 1.2.1 with wall thickness $t_E$ of minimum 100 mm

### C.2.1 Penetration seal with 2 layers of Hilti Firestop Bandage CFS-B and additional insulation

**Penetration Seal:** Services (pipe (C), including pipe insulation\* ( $D_1$ )) covered by two layers of Hilti Firestop Bandage CFS-B ( $A_1$ ) on both sides. The bandage is positioned with its centre line flush to the wall (E) surface. Annular space filled with gypsum plaster or cementitious mortar ( $A_2$ ). Additional insulation ( $D_2$ ) of minimum 300 mm length ( $L_{D2}$ ) from the surface of the wall (E) on both sides in a thickness of 19 mm ( $t_{D2}$ ) made from the same material as the pipe insulation.

In case the flexible wall construction is not filled completely with insulation material the aperture must be framed by installing mineral wool ( $E_B$ ) with a minimum thickness of 50 mm into the gap between the linings of the wall.

\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (2009 or CE marked according to EN 14303)

Construction details: see C.1.1

#### C.2.1.1 Separation of services minimum 100 mm

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) Ø 28 mm, wall thickness ( $t_C$ ) between 1 mm and 10 mm; thickness of insulation ( $t_{D1}$ ) 10 mm	EI 120 - C/U
Diameter ( $d_C$ ) Ø 88,9 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm, thickness of insulation ( $t_{D1}$ ) 100 mm	EI 120 - C/U
Diameter ( $d_C$ ) Ø 88,9 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm, thickness of insulation ( $t_{D1}$ ) 30-100 mm	EI 90 - C/U E 120 - C/U
The field of application given above is also valid for other metal pipes with lower heat conductivity than copper (ca. 350 W/m.K at 20°C) and a melting point of minimum 1050°C, e.g. unalloyed steels, low alloyed steels, stainless steel, cast iron, Ni and its alloys (NiCu, NiCr and NiMo alloys), CuNi alloys.	
<b>Steel pipes</b> <sup>7</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) between Ø 88.9 mm and Ø 114,3 mm, with minimum wall thickness ( $t_C$ ) 2 mm, interpolation of minimum thickness between these diameters; maximum wall thickness ( $t_C$ ) 14,2 mm; thickness of insulation ( $t_{D1}$ ) 40 mm	EI 90 - C/U E 120 - C/U

#### C.2.1.2 Zero separation of services

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 0 mm.	

Diameter ( $d_c$ ) Ø 88,9 mm, wall thickness ( $t_c$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 30 mm	EI 90 - C/U E 120 - C/U
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### C.2.2 Penetration seal with 2 layers of Hilti Firestop Bandage CFS-B

**Penetration Seal:** Services (pipe (C), including pipe insulation\* ( $D_1$ )) covered by two layers of Hilti Firestop Bandage CFS-B ( $A_1$ ) on both sides. The bandage is positioned with its centre line flush to the wall (E) surface. Annular space filled with gypsum plaster or cementitious mortar ( $A_2$ ).

In case the flexible wall construction is not filled completely with insulation material the aperture must be framed by installing mineral wool ( $E_6$ ) with a minimum thickness of 50 mm into the gap between the linings of the wall.

\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (Production status 2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (Production status 2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (Production status 2009 or CE marked according to EN 14303)

Construction details see C.1.2

#### C.2.2.1 Separation of services minimum 100 mm

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_c$ ) Ø 54 mm, wall thickness ( $t_c$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 30 mm	EI 90 - C/U E 120 - C/U

### C.3 Rigid wall constructions according to 1.2.1 with wall thickness $t_E$ of minimum 150 mm

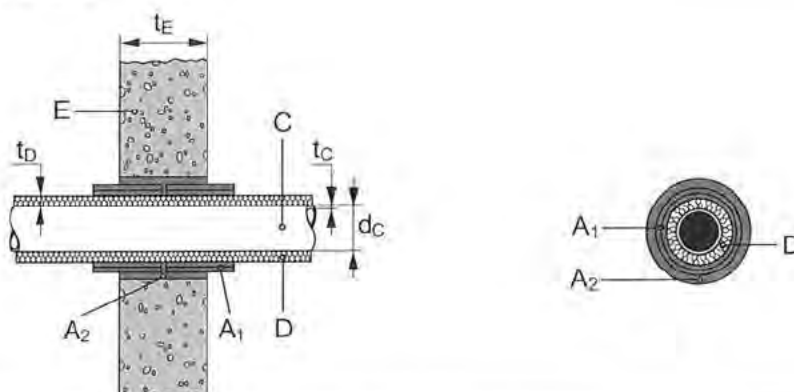
#### C.3.1 Penetration seal with 2 layers of Hilti Firestop Bandage CFS-B

**Penetration Seal:** Services (pipe (C), including pipe insulation\* ( $D_1$ )) covered by two layers of Hilti Firestop Bandage CFS-B ( $A_1$ ) on both sides. The bandage is positioned with its centre line flush to the wall (E) surface. Annular space filled with gypsum plaster or cementitious mortar ( $A_2$ ).

\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (Production status 2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (Production status 2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (Production status 2009 or CE marked according to EN 14303)

Construction details:



#### C.3.1.1 Separation of services minimum 100 mm

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) Ø 28 mm, wall thickness ( $t_C$ ) between 1 mm and 10 mm; thickness of insulation ( $t_{D1}$ ) 10 mm	EI 120 - C/U
Diameter ( $d_C$ ) Ø 54 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 13 mm	EI 90 - C/U E 120 - C/U
Diameter ( $d_C$ ) Ø 88,9 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 19 - 100 mm	EI 90 - C/U
<b>Steel pipes</b> <sup>7</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	



Diameter ( $d_C$ ) between $\varnothing$ 88.9 mm and $\varnothing$ 159 mm, with minimum wall thickness ( $t_C$ ) 2 mm and 4 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness ( $t_C$ ) 14,2 mm; thickness of insulation ( $t_{D1}$ ) 40-80 mm	EI 90 - C/U
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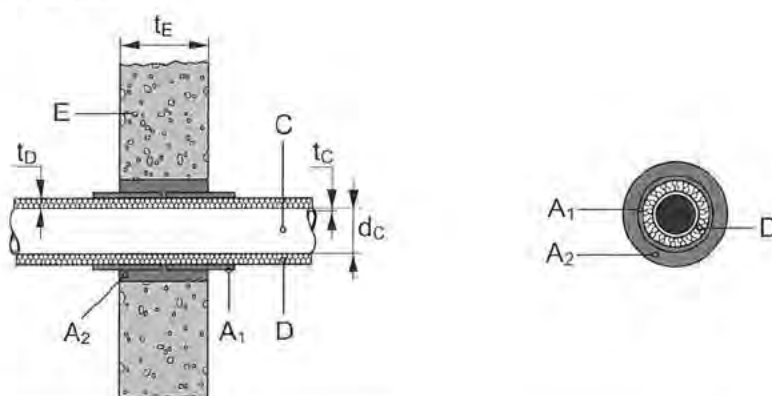
### C.3.2 Penetration seal with 1 layer of Hilti Firestop Bandage CFS-B

**Penetration Seal:** Services (pipe (C), including pipe insulation\* ( $D_1$ )) covered by one layers of Hilti Firestop Bandage CFS-B ( $A_1$ ) on both sides. The bandage is positioned with its centre line flush to the wall (E) surface. Annular space filled with gypsum plaster or cementitious mortar ( $A_2$ ).

\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (Production status 2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (Production status 2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (Production status 2009 or CE marked according to EN 14303)

Construction details:



#### C.3.2.1 Separation of services minimum 100 mm

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) $\varnothing$ 54 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 13 mm	EI 60 - C/U E 90 - C/U
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) $\varnothing$ 88,9 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 19 mm	EI 60 - C/U E 90 - C/U

## C.4 Rigid floor constructions according to 1.2.1 with wall thickness $t_E$ of minimum 150 mm

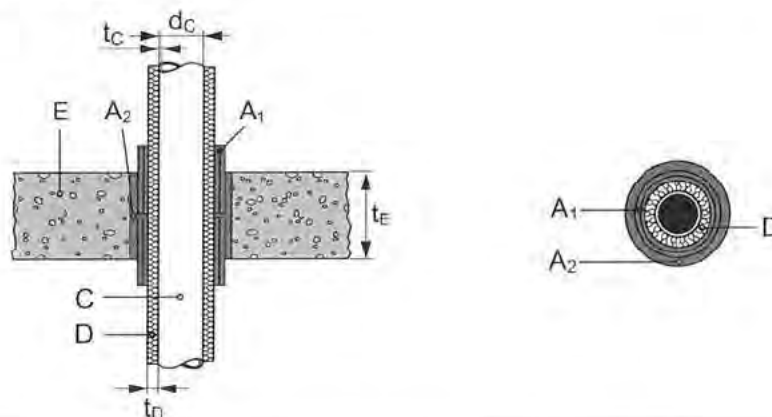
### C.4.1 Penetration seal with 2 layers of Hilti Firestop Bandage CFS-B

**Penetration Seal:** Services (pipe (C), including pipe insulation\* ( $D_1$ )) covered by two layers of Hilti Firestop Bandage CFS-B ( $A_1$ ) on both sides. The bandage is positioned with its centre line flush to the floor (E) surface. Annular space filled with gypsum plaster or cementitious mortar ( $A_2$ ).

\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (Production status 2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (Production status 2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (Production status 2009 or CE marked according to EN 14303)

Construction details:



#### C.4.1.1 Separation distance of services minimum 100 mm

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) Ø 28 mm, wall thickness ( $t_C$ ) between 1 mm and 10 mm; thickness of insulation ( $t_{D1}$ ) 10 mm	EI 120 - C/U
Diameter ( $d_C$ ) Ø 54 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 13 - 40 mm	EI 90 - C/U E 120 - C/U
Diameter ( $d_C$ ) Ø 54 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 40 mm	EI 120 - C/U
Diameter ( $d_C$ ) Ø 88,9 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 19 - 100 mm	EI 90 - C/U E 120 - C/U
<b>Steel pipes</b> <sup>7</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_C$ ) Ø 114,3 mm, wall thickness ( $t_C$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 40 mm	EI 120 - C/U

Diameter ( $d_C$ ) between Ø 88.9 mm and Ø 159 mm, with minimum wall thickness ( $t_C$ ) 2 mm and 4 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness ( $t_C$ ) 14,2 mm; thickness of insulation ( $t_{D1}$ ) 25 - 80 mm	EI 90 - C/U E 120 - C/U
Diameter ( $d_C$ ) between Ø 54 mm and Ø 159 mm, with minimum wall thickness ( $t_C$ ) 2 mm and 4 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness ( $t_C$ ) 14,2 mm; thickness of insulation ( $t_{D1}$ ) 19 mm	EI 60 - C/U E 120 - C/U

#### C.4.1.2 Zero separation of services

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 0 mm.	
Diameter ( $d_C$ ) Ø 28 mm, wall thickness ( $t_C$ ) between 1 mm and 10 mm; thickness of insulation ( $t_{D1}$ ) 10 mm	EI 90 - C/U E 120 - C/U

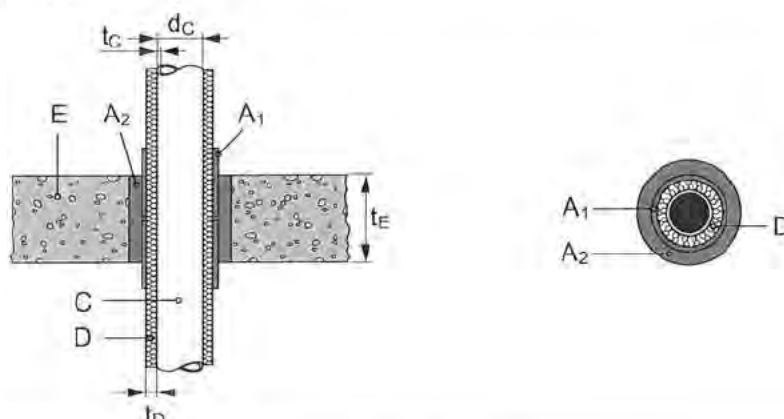
#### C.4.2 Penetration seal with 1 layer of Hilti Firestop Bandage CFS-B

**Penetration Seal:** Services (pipe (C), including pipe insulation\* ( $D_1$ )) covered by one layers of Hilti Firestop Bandage CFS-B ( $A_1$ ) on both sides. The bandage is positioned with its centre line flush to the wall (E) surface. Annular space filled with gypsum plaster or cementitious mortar ( $A_2$ ).

\*Pipe insulation may comprise the following materials:

- Armacell International GmbH – Armaflex AF (Production status 2008 or CE marked according to EN 14304)
- Kaimann GmbH – Kaiflex KK (2006) or Kaiflex KK Plus (Production status 2010 or CE marked according to EN 14304)
- Saint Gobain Isover G+H AG – Isover ML-3 (Production status 2009 or CE marked according to EN 14303)

Construction details:



##### C.4.2.1 Separation of services minimum 100 mm

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear or in a non-linear grouping with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or</b>	



<b>Isover ML-3</b> ; minimum distance 100 mm.	
Diameter ( $d_c$ ) Ø 28 mm, wall thickness ( $t_c$ ) between 1 mm and 10 mm; thickness of insulation ( $t_{D1}$ ) 10 mm	EI 120 - C/U
Diameter ( $d_c$ ) Ø 42 mm, wall thickness ( $t_c$ ) between 1 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 13 mm	EI 120 - C/U
Diameter ( $d_c$ ) Ø 54 mm, wall thickness ( $t_c$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 13 – 40 mm	EI 90 - C/U E 120 - C/U
Diameter ( $d_c$ ) Ø 54 mm, wall thickness ( $t_c$ ) between 2 mm and 14,2 mm; thickness of insulation ( $t_{D1}$ ) 40 mm	EI 120 - C/U

**C.4.2.2 Zero separation of services**

Services	Classification
<b>Copper pipes</b> <sup>6</sup> arranged linear with sustained, continued insulation made from <b>Armaflex AF, Kaiflex KK, Kaiflex KK Plus or Isover ML-3</b> ; minimum distance 0 mm.	
Diameter ( $d_c$ ) Ø 28 mm, wall thickness ( $t_c$ ) between 1 mm and 10 mm; thickness of insulation ( $t_{D1}$ ) 10 mm	EI 90 - C/U E 120 - C/U



Österreichisches Institut für Bautechnik  
Schenkenstrasse 4 | 1010 Vienna | Austria  
T +43 1 533 65 50 | F +43 1 533 64 23  
mail@oib.or.at | www.oib.or.at



## European technical approval

**ETA-10/0404**

(English language translation, the original version is in German language)

Handelsbezeichnung:  
*Trade name:*

**Hilti Firestop Collar CFS-C P**

Zulassungsinhaber:  
*Holder of approval:*

**Hilti AG  
Feldkircherstrasse 100  
9494 Schaan  
Liechtenstein**

Zulassungsgegenstand  
und Verwendungszweck:

**Brandschutzmanschette für die Verwendung in  
Abschottungen**

*Generic type and use of  
construction product:*

**Firestop Collar for Use in Penetration Seals**

Geltungsdauer vom:  
*Validity from:*  
bis:  
*to:*

**31.01.2013**

**30.01.2018**

Herstellwerk:  
*Manufacturing plant:*

**Hilti Werk 5a  
Hilti Werk 5b**

Diese Europäische  
technische Zulassung umfasst:  
*This European technical approval  
contains:*

**40 Seiten inklusive 29 Anhängen**

*40 pages including 29 Annexes*

Diese Europäische  
technische Zulassung ersetzt:  
*This European technical approval  
replaces:*

**ETA-10/0404 mit Geltungsdauer vom 22.02.2011 bis  
21.02.2016**

*ETA-10/0404 with validity from 22.02.2011 to 21.02.2016*



European Organisation for Technical Approvals  
Europäische Organisation für Technische Zulassungen  
Organisation Européenne pour l'Agrément Technique

## **I LEGAL BASES AND GENERAL CONDITIONS**

- 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<sup>1</sup> modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - 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/EC<sup>4</sup>;
  - 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.

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

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

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

<sup>4</sup> 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**

This European technical approval refers to the Hilti Firestop Collar for use in Penetration Seals with the designation Hilti Firestop Collar CFS-C P.

Hilti Firestop Collar CFS-C P is a pipe closure device installed around plastic pipes 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.

Ancillary products referred to in this European technical approval within the framework of evaluating resistance to fire (see Annexes 1 and 2) are not covered by this ETA and cannot be CE-marked on the basis of it.

Type of penetration seal system: Pipe closure device - collar (see ETAG 026-2, clause 1.1, table 1-1). Hilti Firestop Collar CFS-C P consists of a steel housing, an intumescent inlay and fastening hooks.

Hilti Firestop Collar CFS-C P is supplied in several sizes – see table below. The collar is installed underneath floors or on both sides of a wall and fixed by hooks and metal anchors.

<b>Collar size</b>	<b>For pipes with nominal outside diameters (mm)</b>	<b>Recommended opening size (mm)</b>	<b>Required number of fastening hooks</b>
CFS-C P 50/1.5"	50	62	2
CFS-C P 63/2"	63	77	2
CFS-C P 75/2.5"	75	82	3
CFS-C P 90/3"	90	112	3
CFS-C P 110/4"	110	122	4
CFS-C P 125/5"	125	142	4
CFS-C P 160/6"	160	182	6
CFS-C P 180/7"	180	210	8
CFS-C P 200/8"	200	230	8
CFS-C P 225/9"	227	260	10
CFS-C P 250/10"	250	280	12

For the purpose of smoke and draft stop, air or water tightness and airborne sound insulation, the gap between opening edge and pipe or collar has to be sealed off by gypsum plaster, cementitious mortar or a construction sealant, the latter optionally in combination with mineral wool as backfilling material, considering the detailed prescriptions given in Annexes 1 and 2.

In case sound decoupling between the pipe and the wall/floor is required, but sound decoupling means around the pipe are missing it is recommended to use Hilti Firestop Acrylic Sealant CFS-S ACR (ETA-10/0292) as annular gap seal. If gypsum plaster or cementitious mortar is intended to be used it is recommended to install a PE foam strip around the pipe over the entire wall or floor thickness for sound decoupling of the pipe. For details see Annexes 1 and 2.

In case air permeability data according to 2.3 or airborne sound insulation data according to 2.9.1 are intended to be used, Hilti Firestop Acrylic Sealant CFS-S ACR must be used to seal off the annular gap between pipe and opening edge.

For a description of the installation procedure see 4.3.



## 1.2 Intended Use

The Hilti Firestop Collar CFS-C P is intended to form a part of a penetration seal, which is used to maintain the fire resistance of a separating element (flexible wall, rigid wall or rigid floor) when and where services pass through.

Annex 2 gives details of penetration seals for which fire resistance tests were carried out. This ETA covers assemblies installed in accordance with the provisions given in Annex 2.

Hilti Firestop Collar CFS-C P may be used to provide a penetration seal with plastic and composite pipes as single penetrations. For details on diameters, wall thicknesses, pipe materials and pipe standards see Annex 2.

Pipes shall be perpendicular to the seal surface. The pipe penetration seal is intended for plastic pipes in piping systems for non-combustible liquids and fluids, for pneumatic dispatch systems and for pipes in centralised vacuum-cleaning systems.

The assessment does not cover the avoidance of destruction of the seal or of the abutting building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

The Hilti Firestop Collar CFS-C P is intended for environmental conditions as defined by use category Z<sub>2</sub>, internal conditions with humidity lower than 85% RH excluding temperatures below 0°C, without exposure to rain or UV according to EOTA TR 024.

The provisions made in this European technical approval are based on an assumed working life of Hilti Firestop Collar CFS-C P of 10 years provided the conditions laid down in sections 4 and 5 relating to manufacturing, installation, use and 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.

## 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 (called ETAG 026-2 in this ETA).

ETAG Clause No.	ETA clause No.	Characteristic	Assessment of characteristic
		<b>Mechanical resistance and stability</b>	Not relevant
		<b>Safety in case of fire</b>	
2.4.1	2.1	Reaction to fire	Class E according to EN 13501-1:2007
2.4.2	2.2	Resistance to fire	See clause 2.2
		<b>Hygiene, Health and the Environment</b>	
2.4.3	2.3	Air permeability	See clause 2.3
2.4.4	2.4	Water permeability	See clause 2.4
2.4.5	2.5	Dangerous substances	See clause 2.5
		<b>Safety in use</b>	

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
		<b>Protection against noise</b>	
2.4.9	2.9	Airborne sound insulation	See clause 2.9
		<b>Energy, Economy and Heat Retention</b>	
2.4.10	2.10	Thermal properties	No performance determined
2.4.11	2.11	Water vapour permeability	No performance determined
		<b>General aspects relating to fitness for use</b>	
2.4.12	2.12	Durability and serviceability	Z <sub>2</sub>

## 2.1 Reaction to fire

The inlay of the Hilti Firestop Collar CFS-C P fulfils the requirements for reaction to fire class "E" according to EN 13501-1.

Hilti Firestop Acrylic Sealant CFS-S ACR fulfils the requirements for reaction to fire class "D - s1 d0" according to EN 13501-1.

## 2.2 Resistance to fire

The resistance to fire performance according to EN 13501-2 of penetration seals made of Hilti Firestop Collar CFS-C P is given in Annex 2.

Information on ancillary products which were tested within the framework of this European technical approval for evaluating resistance to fire is given in Annex 1.

## 2.3 Air permeability

Air tightness for a single penetration of a plastic pipe, fire stopped with Hilti Firestop Collar CFS-C P can only be achieved when the annular gap is sealed with a sealant, e.g. using Hilti Firestop Acrylic Sealant CFS-S ACR.

For Hilti Firestop Acrylic Sealant CFS-S ACR the gas permeability regarding the gases air, nitrogen (N<sub>2</sub>), carbon dioxide (CO<sub>2</sub>) and CH<sub>4</sub> (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 <sup>3</sup> /(h·m <sup>2</sup> )]	q/A N <sub>2</sub> [m <sup>3</sup> /(h·m <sup>2</sup> )]	q/A CO <sub>2</sub> [m <sup>3</sup> /(h·m <sup>2</sup> )]	q/A CH <sub>4</sub> [m <sup>3</sup> /(h·m <sup>2</sup> )]
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.

For annular gaps sealed with cementitious mortar or gypsum plaster no performance has been determined.



## **2.4 Water permeability**

Water tightness for a single penetration of a plastic pipe, fire stopped with Hilti Firestop Collar CFS-C P can only be achieved when the annular gap is sealed with a sealant, e.g. using Hilti Firestop Acrylic Sealant CFS-S ACR.

The water permeability of Hilti Firestop Acrylic Sealant CFS-S ACR has been tested according to the principles given in 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.

For annular gaps sealed with cementitious mortar or gypsum plaster no performance has been determined.

## **2.5 Dangerous substances**

According to the manufacturer's declaration, the product specification has been compared with the list of dangerous substances of the European Commission to verify that that it does not contain such substances above the acceptable limits.

A written declaration in this respect was submitted by the ETA-holder.

Note: In addition to the specific clauses relating to dangerous substances contained in this ETA, 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 Product Directive, these requirements need also to be complied with, when and where they apply.

## **2.6 Mechanical resistance and stability**

No performance determined.

## **2.7 Resistance to impact/movement**

No performance determined.

## **2.8 Adhesion**

The fixing of the collars (number of hooks, material and dimensions of fasteners) must be done according to the provisions given in 4.3 and Annex 2.

## **2.9 Airborne sound insulation**

Airborne sound insulation for a single penetration of a plastic pipe, fire stopped with Hilti Firestop Collar CFS-C P can only be achieved when the annular gap is sealed. It has to be noted that the values given in 2.9.1 are only valid if the annular gap is sealed using stone wool as backfilling material (which is not necessary in all cases for fire resistance – see Annex 2).

### **2.9.1 Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR**

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 gap) 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 Hilti Firestop Acrylic Sealant CFS-S ACR on both sides (flexible wall). The area of Hilti Firestop Acrylic Sealant CFS-S ACR was 0,0236 m<sup>2</sup>. 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:  $D_{n,e,w}(C; C_{tr}) = 60 (-4; 12)$  dB

From this  $D_{n,e,w}$  the weighted sound reduction index calculates to:  $R_w(C; C_{tr}) = 53 (-4; -12)$  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:  $D_{n,e,w}(C; C_{tr}) = 58 (-2; -5)$  dB

From this  $D_{n,e,w}$  the weighted sound reduction index calculates to:  $R_w(C; C_{tr}) = 51 (-2; -5)$  dB

Structure of the rigid wall: 200 mm thick concrete wall with a density of 2000 kg/m<sup>3</sup> which was plastered on both sides.

It should be noticed that both above mentioned results apply to the total wall construction of the size  $S = 1,25 \text{ m} \times 1,50 \text{ m} (= 1,88 \text{ m}^2)$ , i.e. the given wall with 0,0236 m<sup>2</sup> Hilti Firestop Acrylic Sealant CFS-S ACR.

$D_{n,e,w}$ : weighted element-normalized level difference of small building elements (given with spectrum adaptation terms C and  $C_{tr}$ )

$R_w$ : weighted sound reduction index (given with spectrum adaptation terms C and  $C_{tr}$ )

## **2.9.2 Annular gap seal with cementitious mortar**

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 rigid wall. Results are also applicable of floors of minimum the same thickness. The cementitious mortar was tested as a 500 x 600 x 175 mm block in a wall of 1,25 x 1,50 m. The area of mortar was 0,30 m<sup>2</sup>. The acoustic characteristics of the walls itself have not been measured. According to these tests reports the single number ratings are:

Weighted element-normalized level difference:  $D_{n,e,w} = 59 (-1; -4)$  dB

From this  $D_{n,w}$  the weighted sound reduction index calculates to:  $R_w = 52 (-1; -5)$  dB

Structure of the rigid wall: 175 mm thick blockwork wall with a density of 2000 kg/m<sup>3</sup> which was plastered on both sides.

It should be noticed that both above mentioned results apply to the total wall construction of the size  $S = 1,25 \text{ m} \times 1,50 \text{ m} (= 1,88 \text{ m}^2)$ , i.e. the given wall with 0,30 m<sup>2</sup> cementitious mortar. For smaller mortar seals in a wall of the same size the values will be higher.

$D_{n,e,w}$ : weighted element-normalized level difference of small building elements (given with spectrum adaptation terms C and  $C_{tr}$ )

$R_w$ : weighted sound reduction index (given with spectrum adaptation terms C and  $C_{tr}$ )

## **2.10 Thermal properties**

No performance determined.

## **2.11 Water vapour permeability**

No performance determined.

## **2.12 Durability**

Hilti Firestop Collar CFS-C P fulfils the requirements of use category  $Z_2$  in accordance with ETAG 026-2, Section 1.2.

Type  $Z_2$ : Products intended for uses at internal conditions

### **3 Evaluation and attestation of conformity and CE marking**

#### **3.1 System of attestation of conformity**

According to the decision 1999/454/EC of the European Commission<sup>5</sup> 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 ensure that the product is in conformity with this European technical approval.

The manufacturer may only use initial / raw / constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the Control Plan relating to the valid European technical approval ETA-10/404 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**

###### **Additional information**

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information (as far as relevant):

Technical data sheet:

- Field of application:
  - Building elements in which the product may be installed, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions - the construction requirements.

<sup>5</sup> Official Journal of the European Communities N° L 178, 14.7.1999, p. 52



- Services which may penetrate the building element, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings, separations etc.
- Design of the penetration seal(s) including limits in size, minimum thickness, separations etc. of the penetration seal(s)
- Definition of ancillary products (e.g. backfilling material) with clear indication whether they are generic or specific.
- Environmental conditions covered by the ETA.

Installation instruction:

- Steps to be followed
- Procedure in case of retrofitting
- Stipulations on maintenance, repair and replacement

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of firestopping products in order to allow the manufacturer 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 notified body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European technical approval ETA-10/404.

### 3.2.2 Tasks of Notified Bodies

The notified body shall perform the

- initial type-testing of the product
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the control plan of this European technical approval.

The notified body 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 product certification 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 name and intended use of the product
- “see ETA-10/0404 for relevant characteristics”



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

##### **4.1 General**

4.1.1 For evaluating resistance to fire of the penetration seal using "Hilti Firestop Collar CFS-C P" as specified in Annex 2 it is assumed that

- the installation of the penetration seal does not affect the stability of the adjacent building elements – even in case of fire,
- the installations are fixed to the adjacent building elements (not to the seal) in accordance with the relevant regulations in such a way that, in case of fire, no additional mechanical load is imposed on the seal,
- the support of the installations is maintained for the classification period required and
- pneumatic dispatch systems, compressed air systems, etc. are switched off by additional means in case of fire.

4.1.2 This European technical approval 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.

4.1.3 This European technical approval 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 for at least ... minutes (corresponding to the target period of fire resistance).

4.1.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this ETA (see EN 1366-3: 2009-07, section 1).

4.1.5 The durability assessment does not take account of the possible effect on the penetration seal of substances permeating through pipe walls.

##### **4.2 Manufacturing**

Hilti Firestop Collar CFS-C P shall be produced in accordance with the manufacturing process deposited with Österreichisches Institut für Bautechnik.

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.

##### **4.3 Installation**

The arrangement and installation of Hilti Firestop Collar CFS-C P shall be done in accordance with the details given in Annex 2 and Annex 3 for the penetration seal(s).

## **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.

Storage: Store in a dry place protected from moisture

Storage temperature: -5° up to max. +50°C

### **5.2 Use, maintenance, repair**

The fire resistance of penetration seals executed using Hilti Firestop Collar CFS-C P shall not be negatively affected by future changes to buildings or building elements.

The assessment of the fitness for use is based on the assumption that damaged seals are replaced or repaired. It is also assumed that replacement of components during maintenance/repair will be undertaken using materials specified by the European technical approval.

On behalf of Österreichisches Institut für Bautechnik





## ANNEX 1

### DESCRIPTION OF THE PRODUCT AND ANCILLARY PRODUCT(S)

#### 1.1 Product

##### Hilti Firestop Collar CFS-C P

The housing of the collar consists of electrolytic galvanized steel, the inlay consists of one or more intumescent strips. A detailed specification of the product is contained in document "Identification / Product Specification relating to the European technical approval ETA – 10/0404 Hilti Firestop Collar CFS-C P" which is a non-public part of this ETA.

The Control Plan is defined in document "Control Plan relating to the European technical approval ETA-10/0404 - Hilti Firestop Collar CFS-C P" which is a non-public part of this ETA.

##### Technical product literature:

- Technical Data Sheet Hilti Firestop Collar CFS-C P (including the use of ancillary products according to Annex 1.2).

#### 1.2 Ancillary products

##### 1.2.1 Hilti Firestop Acrylic Sealant CFS-S ACR

A detailed specification of the product is contained in document "Identification / Product Specification relating to the European technical approval ETA-10/0292 and ETA-10/0389 - Hilti Firestop Acrylic Sealant CFS-S ACR" which is a non-public part of the referenced ETAs.

The Control Plan is defined in document "Control Plan relating to the European technical approval ETA-10/0292 and ETA-10/0389 - Hilti Firestop Acrylic Sealant CFS-S ACR" which is a non-public part of the referenced ETAs.

##### 1.2.2 Gypsum plaster

Any gypsum plaster suitable for use with flexible wall constructions or the intended type of rigid walls or floors may be used.

##### 1.2.3 Cementitious mortar

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

##### 1.2.4 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

##### 1.2.5 Sound decoupling means

Any sound decoupling means based on PE (foam) may be used with a maximum thickness as given in Annex 2.

## ANNEX 2

### RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP COLLAR CFS-C P

#### Intended use of pipes<sup>6</sup> and reference to relevant section

Application	Pipe material	Manufacturer, product	Insulation	see section			
				Flexible and rigid wall ≥ 100 mm	Rigid wall ≥ 150 mm	Rigid floor ≥ 550 kg/m <sup>3</sup>	Rigid floor ≥ 2400 kg/m <sup>3</sup>
Heating	Al-Composite	Geberit Mepla	-	-	-	2.4.2.1.1	2.3.2.1.1
			CS	2.1.2.1	2.1.2.1	2.4.2.1.2	2.3.2.1.2
		KeKelit KELOX KM 110	CS	2.1.2.2	2.1.2.2	2.4.2.2	2.3.2.2
		Rehau Rautitan stabil	CS	2.1.2.3	2.1.2.3	2.4.2.3	2.3.2.3
	PE-X	Rehau Rautitan flex	CS	2.1.3.5	2.1.3.5	2.4.3.3	2.3.3.5
Potable water	Al-Composite	Geberit Mepla	-	-	-	2.4.2.1.1	2.3.2.1.1
			CS	2.1.2.1	2.1.2.1	2.4.2.1.2	2.3.2.1.2
		KeKelit KELOX KM 110	CS	2.1.2.2	2.1.2.2	2.4.2.2	2.3.2.2
		Rehau Rautitan stabil	CS	2.1.2.3	2.1.2.3	2.4.2.3	2.3.2.3
	PE	EN 12201-2	-	2.1.3.1	2.1.3.1, 2.2.1	-	2.3.3.1
	PE-HD 100 RC	Wavin TS	-	2.1.3.4.1	2.1.3.4.1	-	2.3.3.4.1
			CS/LS	2.1.3.4.2	2.1.3.4.2	-	2.3.3.4.2
	PE-X	Rehau Rautitan flex	CS	2.1.3.5	2.1.3.5	2.4.3.3.1	2.3.3.5
	PP	EN ISO 15874, DIN 8077/8078	-	2.1.4.1.1, 2.1.4.1.2	2.1.4.1.1, 2.1.4.1.2	2.4.4.1.1, 2.4.4.1.2	2.3.4.1.1, 2.3.4.1.2
			CS/LS	2.1.4.1.3	2.1.4.1.3	2.4.4.1.3	2.3.4.1.3
		Aquatherm fusiotherm	CS/LS	2.1.4.3	2.1.4.3	-	2.3.4.1
		Aquatherm Faserverbundrohr	CS/LS	2.1.4.4	2.1.4.4	-	2.3.4.1
	PVC-C	Friatherm starr	CS/LS	2.1.5.2	2.1.5.2	-	2.3.5.3
Refrige-ration	ABS	+GF+ COOL-FIT	CS	2.1.1	-	2.4.1	2.3.1
Waste water Roof Drainage	PE	EN 1519, EN 12666-1	-	2.1.3.1	2.1.3.1, 2.2.1	-	2.3.3.1
	PE-HD 1000 RC	Wavin TS	-	2.1.3.4.1	2.1.3.4.1	2.4.3.2	2.3.3.4.1
			CS/LS	2.1.3.4.2	2.1.3.4.2	-	2.3.3.4.2
	PE-S2	Geberit Silent db20	-	2.1.3.3	2.1.3.3	-	2.3.3.3
	PP	EN 1451-1	-	2.1.4.5	2.1.4.5	-	2.3.4.2
		Aquatherm climatherm Faserverbundrohr	-	2.1.4.1	2.1.4.1	-	2.3.4.1
		Magnaplast Skolan dB	-	2.1.4.1	2.1.4.1	-	2.3.4.3
		Pipelife Master 3	-	2.1.4.1	2.1.4.1	2.4.4.2	2.3.4.1
		Poloplast Polo Kal NG	-	2.1.4.1	2.1.4.1	2.4.4.3	2.3.4.1
		Poloplast Polo Kal 3S	-	2.1.4.1	2.1.4.1	2.4.4.4	2.3.4.1
		Rehau Raupiano Plus	-	2.1.4.1	2.1.4.1	-	2.3.4.4
		Wavin AS/KeKelit "Phonex AS"	-	2.1.4.1	2.1.4.1	-	2.3.4.5
		Wavin SiTech	-	2.1.4.1	2.1.4.1	-	2.3.4.6
	PVC-C	EN 1566-1	-	2.1.5.1	2.1.5.1	2.4.5.1	2.3.5.1
	PVC-U	EN ISO 1452, EN 1329-1, EN 1453-1	-	2.1.5.1	2.1.5.1	2.4.5.1	2.3.5.1
Pneumatic	Al-composite	Geberit Mepla	-	-	-	2.4.2.1	2.3.2.1.1
	PP	DIN 8077/8078	-	2.1.4.1.1, 2.1.4.1.2	2.1.4.1.1, 2.1.4.1.2	2.4.4.1	2.3.4.1.1
Sprinkler	PP-R	Aquatherm firestop	-	2.1.4.1.1,	2.1.4.1.1,	2.4.4.1	2.3.4.1

<sup>6</sup> According to technical literature of pipe manufacturers



Application	Pipe material	Manufacturer, product	Insulation	see section			
				Flexible and rigid wall ≥ 100 mm	Rigid wall ≥ 150 mm	Rigid floor ≥ 550 kg/m <sup>3</sup>	Rigid floor ≥ 2400 kg/m <sup>3</sup>
				2.1.4.1.2	2.1.4.1.2		
Industry	Al-Composite		-	2.1.2	2.1.2	2.4.2	2.3.2
	PE	EN ISO 15494, DIN 8074/8075	-	2.1.3.2	2.1.3.2, 2.2.2	2.4.3.1	2.3.3.2
	PP	DIN 8077/8078	-	2.1.4.1	2.1.4.1	2.4.4.1	2.3.4.1
		Aquatherm climatherm Faserverbundrohr	-	2.1.4.1	2.1.4.1	2.4.4.1	2.3.4.1
	PVC-U	EN ISO 15493, DIN 8061/8062	-	2.1.5.1	2.1.5.1, 2.2.3	2.4.5.1	2.3.5.1



## 2.1 Flexible and rigid walls, minimum wall thickness 100 mm

### 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.

### Rigid walls:

The wall must have a minimum thickness of 100 mm and minimum density of  $450 \text{ kg/m}^3$  and comprise concrete, aerated concrete or masonry.

### Penetration seal:

Single penetration;

Hilti Firestop Collar CFS-C P ( $A_1$ ) on both sides.

### Annular gap filled with:

Flexible walls:

Gypsum plaster ( $A_3$ ) over the entire thickness of the wall or

Hilti Firestop Acrylic Sealant CFS-S ACR ( $A_2$ ) on both sides with a depth of minimum 25 mm from the surface of the wall.

Rigid walls:

Gypsum plaster ( $A_3$ ) or cementitious mortar over the entire thickness of the wall or

Hilti Firestop Acrylic Sealant CFS-S ACR ( $A_2$ ) on both sides with a depth of minimum 15 mm from the surface of the wall. The sealant may be backfilled with mineral wool.

**Width of annular gap:** The opening diameter should not be larger than the collar outside diameter to allow a safe fixing of the collar to the wall.

### Distance between penetrations:

Minimum distance between collars / annular gap ( $s_1$ ):

Non-insulated pipes: 0 mm

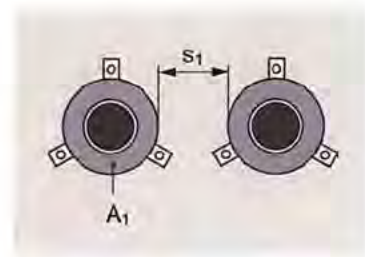
Insulated pipes: 0 mm

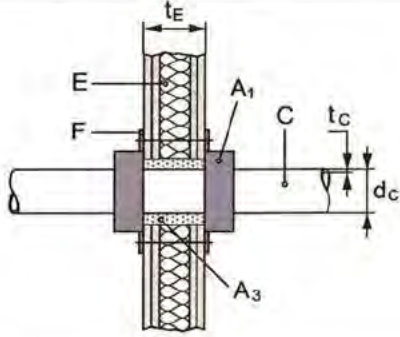
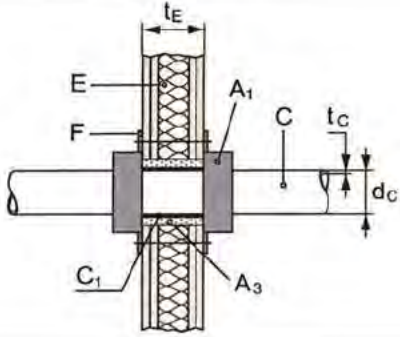
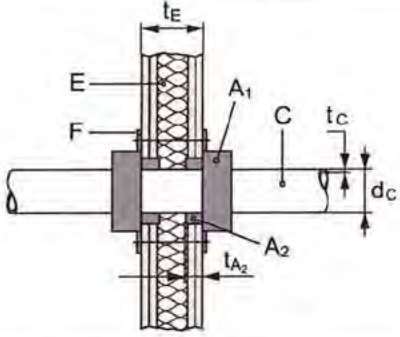
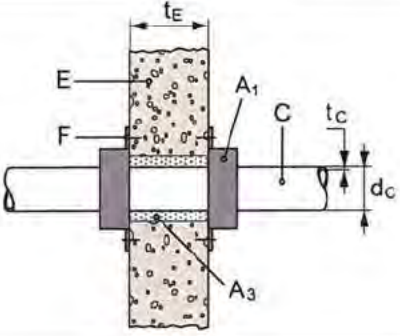
**Collars to be fixed** with hooks (F) and threaded rods M8 through the wall and nuts on both sides of the wall. In high density rigid walls alternatively metal anchors with minimum  $\varnothing 8 \text{ mm}$  may be used.

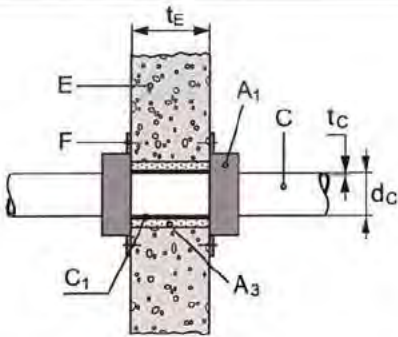
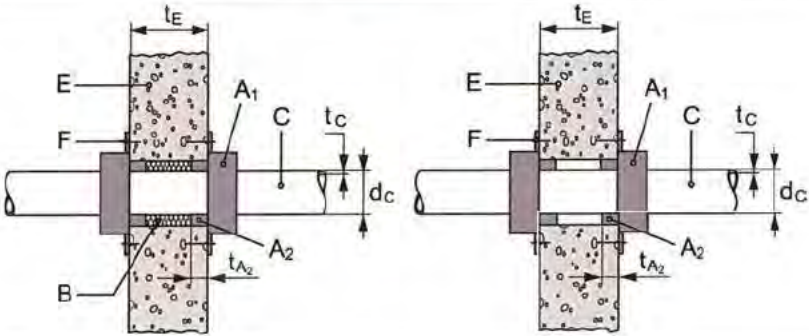
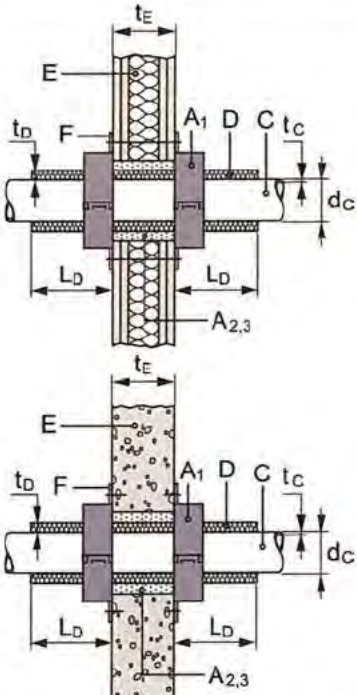
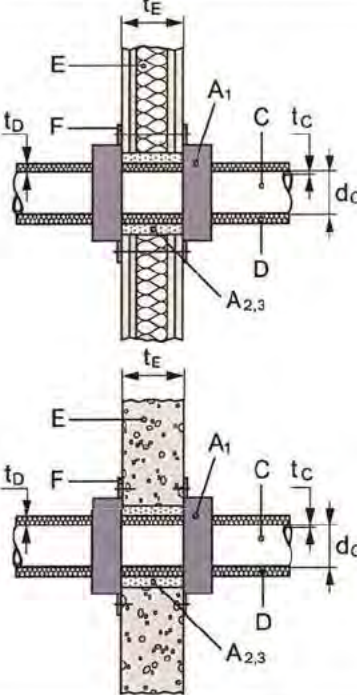
For minimum number of hooks see 1.1.

Pipes shall be supported at maximum 300 mm away from both faces of wall constructions.

**Sound decoupling:** Sound decoupling strips ( $C_1$ ) based on PE foam, used in combination with gypsum plaster or mortar as gap filler. Sound decoupling installed around the pipe within the wall. For maximum thickness see tables below.



Annular gap seal (drawings show non-insulated pipes as example)	
Gypsum plaster ( $A_3$ )	 <p>Diagram showing a cross-section of a pipe joint. The pipe is surrounded by a sealant layer labeled <math>A_3</math>. The sealant is applied in an annular gap. Labels include <math>t_E</math> (thickness of the sealant), <math>E</math> (top flange), <math>F</math> (bottom flange), <math>A_1</math> (top flange seal), <math>C</math> (pipe), <math>t_C</math> (pipe thickness), and <math>d_C</math> (pipe diameter).</p>
Gypsum plaster ( $A_3$ ) together with sound decoupling ( $C_1$ )	 <p>Diagram showing a cross-section of a pipe joint. The pipe is surrounded by a sealant layer labeled <math>A_3</math>. A sound decoupling layer labeled <math>C_1</math> is applied between the pipe and the sealant. Labels include <math>t_E</math> (thickness of the sealant), <math>E</math> (top flange), <math>F</math> (bottom flange), <math>A_1</math> (top flange seal), <math>C</math> (pipe), <math>t_C</math> (pipe thickness), <math>d_C</math> (pipe diameter), and <math>C_1</math> (sound decoupling layer).</p>
Hilti Firestop Acrylic Sealant CFS-S ACR ( $A_2$ )	 <p>Diagram showing a cross-section of a pipe joint. The pipe is surrounded by a sealant layer labeled <math>A_2</math>. The sealant is applied in an annular gap. Labels include <math>t_E</math> (thickness of the sealant), <math>E</math> (top flange), <math>F</math> (bottom flange), <math>A_1</math> (top flange seal), <math>C</math> (pipe), <math>t_C</math> (pipe thickness), <math>d_C</math> (pipe diameter), and <math>t_{A_2}</math> (thickness of the sealant <math>A_2</math>).</p>
Gypsum plaster or cementitious mortar ( $A_3$ )	 <p>Diagram showing a cross-section of a pipe joint. The pipe is surrounded by a sealant layer labeled <math>A_3</math>. The sealant is applied in an annular gap. Labels include <math>t_E</math> (thickness of the sealant), <math>E</math> (top flange), <math>F</math> (bottom flange), <math>A_1</math> (top flange seal), <math>C</math> (pipe), <math>t_C</math> (pipe thickness), and <math>d_C</math> (pipe diameter).</p>

<p>Gypsum plaster or cementitious mortar (<math>A_3</math>) together with sound decoupling (<math>C_1</math>)</p>	
<p>Hilti Firestop Acrylic Sealant CFS-S ACR (<math>A_2</math>)</p>	
<p><b>Pipe insulation</b> (drawings show mortar as an example for the annular gap seal)</p>	
<p>Local/Sustained pipe insulation (LS)</p>	<p>Continued/Sustained pipe insulation (CS)</p>
	



Penetrating services				
2.1.1 ABS pipes +GF+ "COOL-FIT" (ABS/PUR insulation/PE-HD)				
Pipe diameter d <sub>c</sub> (mm)	Inner pipe diameter (mm)	Collar size (A <sub>1</sub> )	Classification	
90	32	CFS-C P 90/3"	EI 120-U/C	
110	40	CFS-C P 110/4"	EI 120-U/C	
110	50	CFS-C P 110/4"	EI 120-U/C	
160	90	CFS-C P 160/6"	EI 120-U/C	
180	110	CFS-C P 180/7"	EI 120-U/C	
225	140	CFS-C P 225/9"	EI 120-U/C	
250	160	CFS-C P 250/10"	EI 60-U/C	
2.1.2 Al-composite pipes				
2.1.2.1 Geberit "Mepla" pipes (PE-Xb/Al/PE-HD)				
Insulation (D): Armaflex AF - arrangement CS				
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Insulation thickness t <sub>D</sub> (mm)	Collar size (A <sub>1</sub> )	Classification
16	2,0	11,5	CFS-C P 50/1.5"	EI 120-U/C
20	2,5	11,5 - 13	CFS-C P 63/2"	EI 120-U/C
26	3,0	11,5 - 13	CFS-C P 63/2"	EI 120-U/C
32	3,0	13	CFS-C P 63/2"	EI 120-U/C
40	3,5	9	CFS-C P 63/2"	EI 120-U/C
50	4,0	9	CFS-C P 63/2"	EI 120-U/C
63	4,5	10	CFS-C P 75/2.5"	EI 60-U/C
75	4,7	10	CFS-C P 90/3"	EI 90-U/C
2.1.2.2 KeKelit "KELOX KM 110" pipes (PE-X/Al/PE-X)				
Insulation (D): Armaflex AF - arrangement CS				
Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Insulation thickness t <sub>D</sub> (mm)	Collar size (A <sub>1</sub> )	Classification
16	2,0	11,5	CFS-C P 50/1.5"	EI 120-U/C
20	2,25	11,5 - 13	CFS-C P 63/2"	EI 120-U/C
25	2,5	11,5 - 13	CFS-C P 63/2"	EI 120-U/C
32	3,0	13	CFS-C P 63/2"	EI 120-U/C
32	3,0	9	CFS-C P 50/1.5"	EI 90-U/C
40	4,0	9	CFS-C P 50/1.5"	EI 90-U/C
50	4,5	9	CFS-C P 63/2"	EI 90-U/C
63	6,0	10	CFS-C P 75/2.5"	EI 90-U/C

### 2.1.2.3 Rehau "Rautitan stabil" pipes (PE-Xb/Al/PE-HD)

Insulation (D): Armaflex AF - arrangement CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
16	2,6	11,5	CFS-C P 50/1.5"	EI 120-U/C
20	2,9	11,5 - 13	CFS-C P 63/2"	EI 120-U/C
25	3,7	11,5 - 13	CFS-C P 63/2"	EI 120-U/C
32	4,7	13	CFS-C P 63/2"	EI 120-U/C
40	6,0	9	CFS-C P 63/2"	EI 120-U/C

### 2.1.3 PE pipes

#### 2.1.3.1 PE pipes according to EN 1519-17

Pipe diameter $d_c$ (mm)	Inner pipe diameter (mm)	Collar size ( $A_1$ )	Classification
50	3,0	CFS-C P 50/1.5"	EI 120-U/U
63	3,0	CFS-C P 63/2"	EI 120-U/U
75	3,0	CFS-C P 75/2.5"	EI 120-U/U
90	3,5	CFS-C P 90/3"	EI 120-U/U
110	4,2	CFS-C P 110/4"	EI 120-U/U
125	4,8	CFS-C P 125/5"	EI 120-U/U
160	6,2	CFS-C P 160/6"	EI 120-U/U

Maximum thickness of sound decoupling: 5 mm

The results of 2.1.2.2 are also valid for PE pipes according to EN 12201-2 and EN 12666-1.

#### 2.1.3.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Pipe diameter $d_c$ (mm)	Inner pipe diameter (mm)	Collar size ( $A_1$ )	Classification
50	2,9 – 4,6	CFS-C P 50/1.5"	EI 120-U/U
63	1,8 – 5,8	CFS-C P 63/2"	EI 90-U/U
63	3,6 – 5,8	CFS-C P 63/2"	EI 120-U/U
75	1,9 – 6,8	CFS-C P 75/2.5"	EI 120-U/U
90	2,2 – 8,2	CFS-C P 90/3"	EI 120-U/U
110	2,7 – 10,0	CFS-C P 110/4"	EI 120-U/U
125	3,1 – 7,1	CFS-C P 125/5"	EI 120-U/U
160	4,0 – 9,1	CFS-C P 160/6"	EI 120-U/U

Maximum thickness of sound decoupling: 5 mm

<sup>7</sup> In Germany the pipes have additionally to comply with DIN 19535-10.



### 2.1.3.3 Geberit "Silent dB20" pipes (PE-S2)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
75	3,6	CFS-C P 75/2.5"	EI 120-U/U
90	5,6	CFS-C P 90/3"	EI 120-U/U

Maximum thickness of sound decoupling: 9 mm

### 2.1.3.4 Wavin "TS" pipes (PE-HD 100 RC)

#### 2.1.3.4.1 Without insulation

Pipe diameter $d_c$ (mm)	Inner pipe diameter (mm)	Collar size ( $A_1$ )	Classification
50	4,6	CFS-C P 50/1.5"	EI 90-U/U
75	6,8	CFS-C P 75/2.5"	EI 120-U/U
90	8,2	CFS-C P 90/3"	EI 120-U/U
110	10,0	CFS-C P 110/4"	EI 120-U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.1.3.4.2 Insulation (D): Armaflex AF - arrangement LS (length of insulation $L_D \geq 250$ mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
50	4,6	9	CFS-C P 63/2"	EI 120-U/C
63	5,8	10	CFS-C P 75/2.5"	EI 120-U/C
75	6,8	10	CFS-C P 90/3"	EI 120-U/C
90	8,2	10	CFS-C P 110/4"	EI 120-U/C
110	10,0	10	CFS-C P 125/5"	EI 120-U/C

### 2.1.3.5 PE-X pipes

#### 2.1.3.5.1 Rehau "Rautitan flex" pipes (PE-Xa)

Insulation (D): Armaflex AF - arrangement LS (length of insulation  $L_D \geq 250$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	5,5	9	CFS-C P 63/2"	EI 120-U/C
50	6,9	9	CFS-C P 63/2"	EI 120-U/C
63	8,6	10	CFS-C P 75/2.5"	EI 120-U/C



## 2.1.4 PP pipes

### 2.1.4.1 PP pipes according to EN ISO 15874<sup>8</sup> and/or DIN 8077/8078

(e.g. Aquatherm climatherm, Aquatherm climatherm Faserverbundrohr, Aquatherm firestop, Aquatherm fusiotherm, Aquatherm fusiotherm Faserverbundrohr, +GF+ PROGEF Standard pipe, +GF+ Dekaprop Industry pipe)

#### 2.1.4.1.1 Without insulation – pipe end configuration U/U

Pipe diameter $d_c$ (mm)	Inner pipe diameter (mm)	Collar size ( $A_1$ )	Classification
50	1,8 - 2,9	CFS-C P 50/1.5"	EI 90-U/U
63	1,8 - 5,8	CFS-C P 63/2"	EI 60-U/U
75	6,8 - 12,5	CFS-C P 75/2.5"	EI 120 U/U
90	8,2 - 15,0	CFS-C P 90/3"	EI 120 U/U

#### 2.1.4.1.2 Without insulation – pipe end configuration U/C

50	4,6 - 8,3	CFS-C P 50/1.5"	EI 90-U/C
63	5,8 - 10,5	CFS-C P 63/2"	EI 60-U/C
63	10,5	CFS-C P 63/2"	EI 120 U/C
75	1,9- 6,8	CFS-C P 75/2.5"	EI 60 U/C
75	6,8	CFS-C P 75/2.5"	EI 120 U/C

Maximum thickness of sound decoupling: 9 mm

#### 2.1.4.1.3 Insulation (D): Armaflex AF - arrangement LS (length of insulation $L_D \geq 250$ mm) or CS

40	3,7 - 5,5	CFS-C P 50/1.5"	EI 120 U/C
50	4,6 - 6,9	CFS-C P 50/1.5"	EI 120 U/C
75	6,8 - 10,3	CFS-C P 75/2.5"	EI 120 U/C
90	10,0 - 15,1	CFS-C P 90/3"	EI 120 U/C

### 2.1.4.3 Aquatherm "fusiotherm" pipes

Pipe series SDR 11; Insulation (D): Armaflex AF - arrangement LS (length of insulation  $L_D \geq 250$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	3,7	9	CFS-C P 50/1.5"	EI 120-U/C
50	4,6	9	CFS-C P 63/2"	EI 120-U/C
75	6,8	10	CFS-C P 90/3"	EI 120-U/C
110	10,0	10	CFS-C P 125/5"	EI 120-U/C

<sup>8</sup> Not all listed wall thicknesses may be available for pipes according to EN ISO 15874

#### 2.1.4.4 Aquatherm "fusiotherm Faserverbundrohr" pipes

Insulation (D): Armaflex AF – arrangement LS (length of insulation  $L_D \geq 250$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	5,5	9	CFS-C P 50/1.5"	EI 120-U/C
50	6,9	9	CFS-C P 63/2"	EI 120-U/C
75	10,3	10	CFS-C P 90/3"	EI 120-U/C
110	15,1	10	CFS-C P 125/5"	EI 120-U/C

#### 2.1.4.5 PP pipes according to EN 1451-1

(e.g. Magnaplast "Skolan-dB", "Phonex AS", Pipelife "Master 3", POLOPLAST "Polo Kal NG", POLOPLAST "Polo Kal 3S", Rehau "Raupiano Plus", Wavin "AS" /KeKelit "Phonex AS", Wavin "SiTech")

Pipe diameter $d_c$ (mm)	Inner pipe diameter (mm)	Collar size ( $A_1$ )	Classification
32	1,8	CFS-C P 50/1.5"	EI 120-U/U
40	1,8	CFS-C P 50/1.5"	EI 120-U/U
50	1,8 - 2,0	CFS-C P 50/1.5"	EI 120-U/U
56	4,0	CFS-C P 63/2"	EI 90-U/C
70	4,5	CFS-C P 75/2.5"	EI 120-U/U
75	1,8 - 3,8	CFS-C P 75/2.5"	EI 120-U/U
90	2,8 - 4,5	CFS-C P 90/3"	EI 120-U/U
110	2,7 - 5,3	CFS-C P 110/4"	EI 120 U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.1.5 PVC pipes

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

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
50	2,4 – 5,6	CFS-C P 50/1.5"	EI 120-U/U
63	3,0 – 4,7	CFS-C P 63/2"	EI 120-U/U
75	2,2 – 3,6	CFS-C P 75/2.5"	EI 120-U/U
90	2,7 – 4,3	CFS-C P 90/3"	EI 120-U/U
110	2,2 – 8,1	CFS-C P 110/4"	EI 120-U/U
125	3,7 – 6,0	CFS-C P 125/5"	EI 120-U/U
160	2,5 – 11,8	CFS-C P 160/6"	EI 120-U/U

Maximum thickness of sound decoupling: 5 mm

The results of 2.1.5.1 are also valid for PVC-C pipes according to EN 1566-1<sup>9</sup> and PVC-U pipes according to EN 1329-1<sup>10</sup> and EN 1453-1<sup>10</sup>.

<sup>9</sup> 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 1.2.5

<sup>10</sup> In Germany the pipes have additionally to comply with DIN 19531-10



### 2.1.5.2 Friatec Friatherm-starr pipes (PVC-C)

Insulation (D): Armaflex AF - arrangement LS (length of insulation  $L_D \geq 200$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
32	3,6	9	CFS-C P 50/1.5"	EI 120-U/C
40	4,5	9	CFS-C P 63/2"	EI 120-U/C
50	5,6	9	CFS-C P 75/2.5"	EI 120-U/C
63	7,1	10	CFS-C P 90/3"	EI 120-U/C

## 2.2 Rigid walls, minimum wall thickness 150 mm

The wall must have a minimum thickness of 150 mm and a minimum density of  $650 \text{ kg/m}^3$  and comprise concrete, aerated concrete or masonry.

### Penetration seal:

Single penetration;

Hilti Firestop Collar CFS-C P ( $A_1$ ) on both sides.

**Annular gap** filled either with gypsum plaster or cementitious mortar ( $A_3$ ) over the entire thickness of the wall or with Hilti Firestop Acrylic Sealant CFS-S ACR ( $A_2$ ) with a depth of minimum 15 mm from the surface of the wall. The sealant may be backfilled with mineral wool.

**Width of annular gap:** The opening diameter should not be larger than the collar outside diameter to allow a safe fixing of the collar to the wall except stated otherwise in the table below.

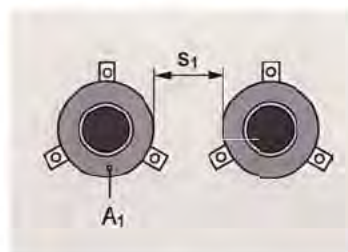
### Distance between penetrations:

Minimum distance between collars / annular gap edge ( $s_1$ ):

Non insulated pipes: 0 mm

Insulated pipes: 0 mm

**Collars to be fixed** with hooks (F) and M8 metal anchors. In high density rigid walls alternatively metal anchors with minimum  $\varnothing 8$  mm may be used. For minimum number of hooks see 1.1.



**Sound decoupling:** Sound decoupling strips ( $C_1$ ) based on PE foam, used in combination with gypsum plaster or mortar as gap filler. Sound decoupling installed around the pipe within the wall. For maximum thickness see tables below.

For further construction details see 2.1.

## Penetrating services

### 2.2.1 PE pipes according to EN 1519-111

Pipe diameter $d_c$ (mm)	Inner pipe diameter (mm)	Collar size ( $A_1$ )	Classification
200	6,2	CFS-C P 200/8"	EI 120 U/U
250	7,8	CFS-C P 250/10"	EI 120 U/U

Maximum thickness of sound decoupling: 5 mm

The results of 2.2.1 are also valid for PE pipes according to EN 12201-2 and EN 12666-1.

<sup>11</sup> In Germany the pipes have additionally to comply with DIN 19535-10.



## 2.2.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

Distance between pipe and seal edge in wall (width of annular gap):  $\leq 17,5$  mm

### 2.2.2.1 Pipe end configuration U/U

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
180	4,4 – 16,4	CFS-C P 180/7"	EI 120-U/U
200	4,9 – 11,4	CFS-C P 200/8"	EI 120-U/U
200	11,4	CFS-C P 200/8"	EI 180-U/U
225	5,5 – 12,8	CFS-C P 225/9"	EI 180-U/U
250	6,2 – 14,2	CFS-C P 250/10"	EI 180-U/U

### 2.2.2.2 Pipe end configuration U/C

50	2,9	CFS-C P 50/1.5"	EI 180-U/C
250	7,8	CFS-C P 250/10"	EI 180-U/C
250	7,8 – 22,7	CFS-C P 250/10"	EI 120-U/C

Maximum thickness of sound decoupling: 5 mm

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

Distance between pipe and seal edge in floor (width of annular gap):  $\leq 17,5$  mm

### 2.2.3.1 Pipe end configuration U/U

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
180	3,6 – 8,6	CFS-C P 180/7"	EI 180 U/U
200	4,0 – 9,6	CFS-C P 200/8"	EI 180 U/U
225	4,5 – 10,8	CFS-C P 225/9"	EI 180 U/U
250	4,9 – 11,9	CFS-C P 250/10"	EI 180 U/U

### 2.2.3.2 Pipe end configuration U/C

50	1,8	CFS-C P 50/1.5"	EI 180-U/C
250	4,9 – 11,9	CFS-C P 250/10"	EI 180-U/C

The results of 2.2.3 are also valid for PVC-C pipes according to EN 1566-1<sup>9</sup> and PVC-U pipes according to EN 1329-1<sup>10</sup> and EN 1453-1<sup>10</sup>.

## 2.3 Rigid floor, minimum density of 2400 kg/m<sup>3</sup>

The floor must have a minimum thickness of 150 mm and comprise concrete with a minimum density of 2400 kg/m<sup>3</sup>.

### Penetration seal:

Single penetration;

Hilti Firestop Collar CFS-C P (A<sub>1</sub>) on the underside of the floor.

**Annular gap** filled either with gypsum plaster or cementitious mortar (A<sub>3</sub>) over the entire thickness of the floor or with mineral wool of minimum density 60 kg/m<sup>3</sup> covered by Hilti Firestop Acrylic Sealant CFS-S ACR (A<sub>2</sub>) on top side (or on both sides) with a depth of minimum 10 mm.

### Width of annular gap:

Classifications EI 120 and lower (opening diameter up to 300 mm), classification EI 180 (opening diameter up to 260 mm): The opening diameter should not be larger than the collar outside diameter to allow a safe fixing of the collar to the floor.

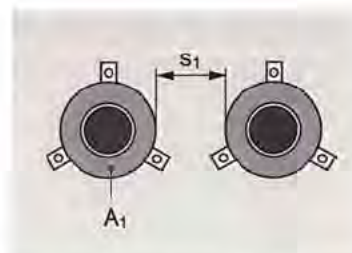
Classification EI 180 (opening diameter > 260 mm): see in tables below.

### Distance between penetrations:

Minimum distance between collars / annular gap edge (s<sub>1</sub>):

Non-insulated pipes: 0 mm

Insulated pipes: 0 mm



**Collars to be fixed** with hooks and metal anchors with minimum Ø 6 mm (up to collar size 110/4") and minimum Ø 10 mm (from collar size 125/5" to 250/10"). For minimum number of hooks see 1.1.

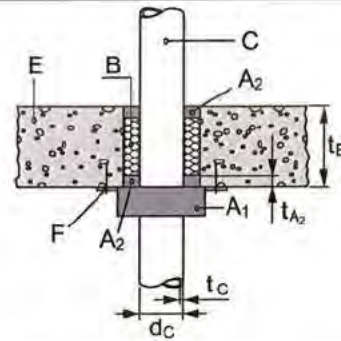
Pipes shall be supported at maximum 200 mm (pipes according to 2.3.1), at maximum 300 mm (all others) away from the upper face of the floor construction.

**Sound decoupling:** Sound decoupling strips (C<sub>1</sub>) based on PE foam, used in combination with gypsum plaster or mortar as gap filler. Sound decoupling installed around the pipe within the floor. For maximum thickness see tables below.

Annular gap seal (drawings show non-insulated pipes as example)	
Gypsum plaster or cementitious mortar (A <sub>3</sub> )	
Cementitious mortar (A <sub>3</sub> ) together with sound decoupling (C <sub>1</sub> )	



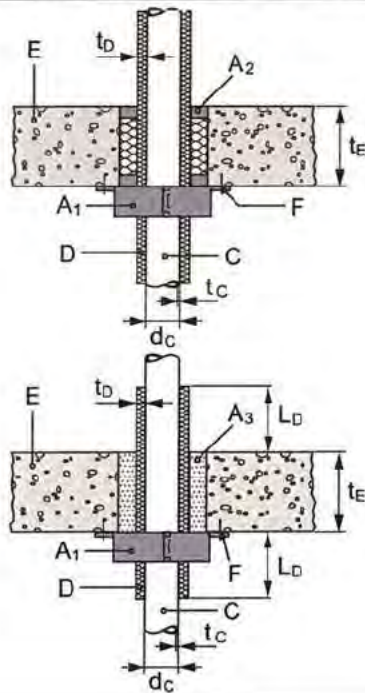
Hilti Firestop Acrylic Sealant CFS-S ACR  
(A<sub>2</sub>)



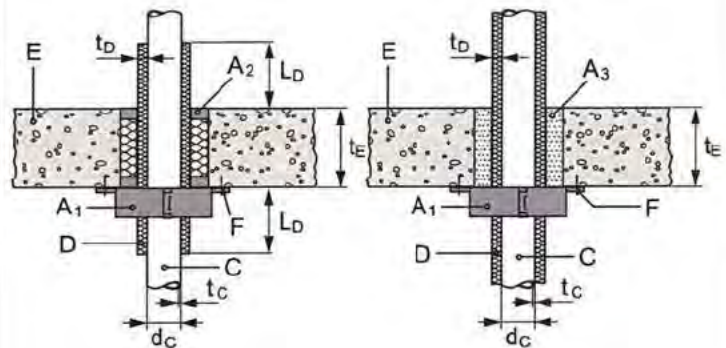
### Pipe insulation

(drawings show mortar as an example for the annular gap seal)

#### Local/Sustained pipe insulation (LS)



#### Continued/Sustained pipe insulation (CS)



### Penetrating services

#### 2.3.1 ABS pipes +GF+ "COOL-FIT" (ABS/PUR insulation/PE-HD)

Pipe diameter d <sub>c</sub> (mm)	Inner pipe diameter (mm)	Collar size (A <sub>1</sub> )	Classification
90	32	CFS-C P 90/3"	EI 120-U/C
110	40	CFS-C P 110/4"	EI 120-U/C
110	50	CFS-C P 110/4"	EI 120-U/C
160	90	CFS-C P 160/6"	EI 120-U/C
180	110	CFS-C P 180/7"	EI 60-U/C
225	140	CFS-C P 225/9"	EI 120-U/C
250	160	CFS-C P 250/10"	EI 120-U/C

## 2.3.2 Al-composite pipes

### 2.3.2.1 Geberit "Mepla" pipes (PE-Xb/Al/PE-HD)

#### 2.3.2.1.1 Without insulation

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
40	3.5	CFS-C P 50/1.5"	EI 90-U/C
50	4.0	CFS-C P 50/1.5"	EI 120-U/C
63	4.5	CFS-C P 63/2"	EI 60-U/C
75	4.7	CFS-C P 75/2.5"	EI 30-U/C

Maximum thickness of sound decoupling: 9 mm

#### 2.3.2.1.2 Insulation (D): Armaflex AF - arrangement LS (length of insulation $L_D \geq 250$ mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	3.5	9	CFS-C P 63/2"	EI 180-U/C
50	4.0	9	CFS-C P 63/2"	EI 180-U/C
63	4.5	9	CFS-C P 75/2.5"	EI 180-U/C
75	4.7	10	CFS-C P 90/3"	EI 180-U/C
40	3.5	9 - 20,5	CFS-C P 63/2" - 75/2.5"	EI 120-U/C
50	4.0	9 - 21	CFS-C P 63/2" - 90/3"	EI 120-U/C
63	4.5	9 - 21,5	CFS-C P 75/2.5" - 110/4"	EI 120-U/C
75	4.7	10 - 22	CFS-C P 90/3" - 125/5"	EI 120-U/C

### 2.3.2.2 KeKelit "KELOX KM 110" pipes (PE-X/Al/PE-X)

#### Insulation (D): Armaflex AF - arrangement CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
32	3.0	9	CFS-C P 50/1.5"	EI 180-U/C
40	4.0	9	CFS-C P 50/1.5"	EI 180-U/C
50	4.5	9	CFS-C P 63/2"	EI 180-U/C
63	6.0	10	CFS-C P 75/2.5"	EI 120-U/C

#### Insulation (D): Armaflex AF - arrangement CS

32	3.0	9 - 19,5	CFS-C P 50/1.5" - 75/2.5"	EI 120-U/C
40	4.0	9 - 20,5	CFS-C P 50/1.5" - 75/2.5"	EI 120-U/C
50	4.5	9 - 21	CFS-C P 63/2" - 90/3"	EI 120-U/C
63	6.0	10 - 21,5	CFS-C P 75/2.5" - 110/4"	EI 120-U/C

#### Insulation (D): Armaflex AF - arrangement LS (length of insulation $L_D \geq 250$ mm)

32	3.0	19,5	CFS-C P 75/2.5"	EI 120-U/C
40	4.0	20,5	CFS-C P 75/2.5"	EI 120-U/C
50	4.5	21	CFS-C P 90/3"	EI 120-U/C
63	6.0	21,5	CFS-C P 110/4"	EI 120-U/C



### 2.3.2.3 Rehau "Rautitan stabil" pipes (PE-Xb/Al/PE-HD)

Insulation (D): Armaflex AF - arrangement LS (length of insulation  $L_D \geq 250$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	6,0	9	CFS-C P 63/2"	EI 180-U/C
40	6,0	9 - 20,5	CFS-C P 63/2" - 75/2.5"	EI 120-U/C

## 2.3.3 PE pipes

### 2.3.3.1 PE pipes according to EN 1519-1 7

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
50	3,0	CFS-C P 50/1.5"	EI 120-U/U
63	3,0	CFS-C P 63/2"	EI 120-U/U
75	3,0	CFS-C P 75/2.5"	EI 120-U/U
90	3,5	CFS-C P 90/3"	EI 120-U/U
110	4,2	CFS-C P 110/4"	EI 120-U/U
125	4,8	CFS-C P 125/5"	EI 120-U/U
160	6,2	CFS-C P 160/6"	EI 120-U/U
200	6,2	CFS-C P 200/8"	EI 120-U/U
250	7,7	CFS-C P 250/10"	EI 120-U/U

Maximum thickness of sound decoupling: 5 mm

The results of 2.3.3.3 are also valid for PE pipes according to EN 12201-2 and EN 12666-1.

### 2.3.3.2 PE pipes according to EN ISO 15494 and DIN 8074/8075

#### 2.3.3.2.1 Pipe end configuration U/U

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
20 *)	1,9 – 2,8	CFS-C P 50/1.5"	EI 90-U/U
20 - 50	1,9 / 2,9 - 2,8 / 4,6 <sup>12</sup>	CFS-C P 50/1.5"	EI 90-U/U
50	2,9 – 4,6	CFS-C P 50/1.5"	EI 120-U/U
63	1,8 – 5,8	CFS-C P 63/2"	EI 120-U/U
75	1,9 – 6,8	CFS-C P 75/2.5"	EI 120-U/U
90	2,2 – 8,2	CFS-C P 90/3"	EI 120-U/U
110	2,7 – 10,0	CFS-C P 110/4"	EI 120-U/U
125	3,1 – 7,1	CFS-C P 125/5"	EI 120-U/U
160	4,0 – 9,1	CFS-C P 160/6"	EI 120-U/U

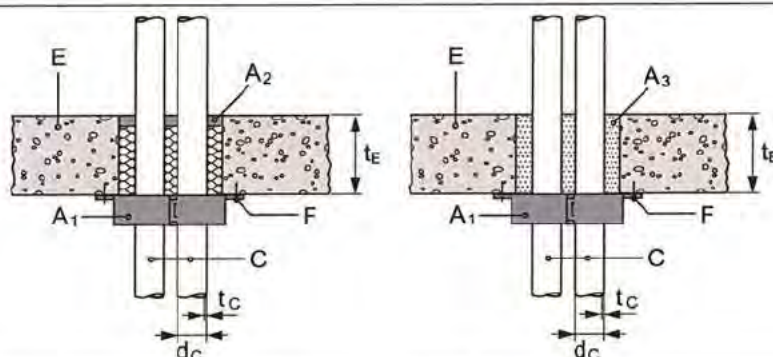
<sup>12</sup> Interpolation of minimum wall thickness between 1,9 mm for diameter 20 mm and 2,9 mm for diameter 50 mm, interpolation of maximum wall thickness between 2,8 mm for diameter 20 mm and 4,6 mm for diameter 50 mm for pipe diameters in between.

### 2.3.3.2.2 Pipe end configuration U/C

180	4,4 – 16,4	CFS-C P 180/7"	EI 120-U/C
200	4,9 – 11,4	CFS-C P 200/8"	EI 120-U/C
225	5,5 – 12,8	CFS-C P 225/9"	EI 120-U/C
250	6,2 – 22,7	CFS-C P 250/10"	EI 120-U/C
50	2,9	CFS-C P 50/1.5"	EI 180-U/C
250	7,8	CFS-C P 250/10"	EI 180-U/C

Maximum thickness of sound decoupling: 5 mm, for pipes indicated with \*): 9 mm

### 2.3.3.2.3 2 Pipes in 1 collar



20	1,9	CFS-C P 50/1.5"	EI 90-U/U
20	2,8		

### 2.3.3.3 Geberit "Silent dB20" pipes (PE-S2)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
75	3,6	CFS-C P 75/2.5"	EI 180-U/U
90	5,5	CFS-C P 90/3"	EI 180-U/U
135	6,0	CFS-C P 160/6"	EI 120-U/U
160	7,0	CFS-C P 160/6"	EI 180-U/U

Maximum thickness of sound decoupling: 9 mm

### 2.3.3.4 Wavin "TS" pipes (PE-HD 100 RC)

#### 2.3.3.4.1 Without insulation

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
50	4,6	CFS-C P 50/1.5"	EI 90-U/U
63	5,8	CFS-C P 63/2"	EI 120-U/U
75	6,8	CFS-C P 75/2.5"	EI 120-U/U
90	8,2	CFS-C P 90/3"	EI 120-U/U
110	10,0	CFS-C P 110/4"	EI 120-U/U

Maximum thickness of sound decoupling: 9 mm



**2.3.3.4.2 Insulation (D): Armaflex AF - arrangement LS (length of insulation LD ≥ 250 mm) or CS**

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Insulation thickness t <sub>D</sub> (mm)	Collar size (A <sub>1</sub> )	Classification
50	4,6	9	CFS-C P 63/2" or 75/2.5"	EI 180-U/C
63	5,8	10	CFS-C P 75/2.5"	EI 180-U/C
75	6,8	10	CFS-C P 90/3"	EI 180-U/C
90	8,2	9,5	CFS-C P 110/4"	EI 180-U/C
110	10,0	9,5	CFS-C P 125/5"	EI 180-U/C

**2.3.3.5 PE-X pipes**

**2.3.3.5.1 Rehau "Rautitan flex" pipes (PE-Xa)**

Insulation (D): Armaflex AF - arrangement LS (length of insulation L<sub>D</sub> ≥ 250 mm) or CS

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Insulation thickness t <sub>D</sub> (mm)	Collar size (A <sub>1</sub> )	Classification
40	6,0	9	CFS-C P 63/2"	EI 180-U/C
50	6,9	9	CFS-C P 75/2.5"	EI 180-U/C
63	8,6	9	CFS-C P 90/3"	EI 180-U/C
40	6,0	9 - 20,5	CFS-C P 63/2" - 75/2.5"	EI 120-U/C
50	6,9	9 - 21	CFS-C P 75/2.5" - 90/3"	EI 120-U/C
63	8,6	9 - 21,5	CFS-C P 90/3" - 110/4"	EI 120-U/C

**2.3.4 PP pipes**

**2.3.4.1 PP pipes according to EN ISO 15874<sup>13</sup> and/or DIN 8077/8078**

(e.g. Aquatherm climatherm, Aquatherm climatherm Faserverbundrohr, Aquatherm firestop, Aquatherm fusiotherm, Aquatherm fusiotherm Faserverbundrohr, +GF+ PROGEF Standard pipe, +GF+ Dekaprop Industry pipe)

**2.3.4.1.1 Without insulation - pipe end configuration U/U**

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Collar size (A <sub>1</sub> )	Classification
20	1,9 - 3,4	CFS-C P 50/1.5"	EI 120-U/U
50	1,8 - 2,9	CFS-C P 50/1.5"	EI 180-U/U
63	1,8 - 5,8	CFS-C P 63/2"	EI 180-U/U
75	1,9 - 6,8	CFS-C P 75/2.5"	EI 180-U/U
90	2,2 - 8,2	CFS-C P 90/3"	EI 180-U/U
110	2,7	CFS-C P 110/4"	EI 180-U/U
125	3,1	CFS-C P 125/5"	EI 180-U/U

<sup>13</sup> Not all listed wall thicknesses may be available for pipes according to EN ISO 15874

#### 2.3.4.1.2 Without insulation - pipe end configuration U/C

40	3,7 - 5,5	CFS-C P 50/1.5"	EI 120-U/C
50	4,6 - 8,3	CFS-C P 50/1.5"	EI 180-U/C
63	5.8 - 10,5	CFS-C P 63/2"	EI 180-U/C
75	6,8	CFS-C P 75/2.5"	EI 180-U/C
75	6,8 - 12,5	CFS-C P 75/2.5"	EI 120-U/C
90	8,2	CFS-C P 90/3"	EI 180-U/C
90	8,2 - 15,0	CFS-C P 90/3"	EI 120-U/C
110	10,0 - 15,1	CFS-C P 110/4"	EI 120-U/C

Maximum thickness of sound decoupling: 9 mm

#### 2.3.4.1.3 Insulation (D): Armaflex AF – arrangement LS (length of insulation LD ≥ 250 mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	3,7 - 5,5	9	CFS-C P 63/2"	EI 180-U/C
50	4,6 - 6,9	9	CFS-C P 75/2.5"	EI 180-U/C
75	6,8 - 10,3	10	CFS-C P 90/3"	EI 180-U/C
90	12,3	22,5	CFS-C P 160/6"	EI 120-U/C
110	10,0 - 15,1	10	CFS-C P 125/5"	EI 180-U/C

#### 2.3.4.2 PP pipes according to EN 1451-1

(e.g. Magnaplast "Skolan-dB", "Phonex AS", Pipelife "Master 3", POLOPLAST "Polo Kal NG", POLOPLAST "Polo Kal 3S", Rehau "Raupiano Plus", Wavin "AS"/KeKelit "Phonex AS", Wavin "SiTech")

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
32	1,2 - 1,8	CFS-C P 50/1.5"	EI 90-U/U
40	1,8	CFS-C P 50/1.5"	EI 90-U/U
50	1,8 - 2,0	CFS-C P 50/1.5"	EI 90-U/U
58	4,0	CFS-C P 63/2"	EI 90-U/U
75	1,9 - 4,5	CFS-C P 75/2.5"	EI 90-U/U
78	4,5	CFS-C P 75/2.5"	EI 90-U/U
90	2,8 - 4,5	CFS-C P 90/3"	EI 90-U/U
110	2,7 - 5,3	CFS-C P 110/4"	EI 90-U/U
125	3,9 - 5,3	CFS-C P 125/5"	EI 90-U/U
135	5,3	CFS-C P 160/6"	EI 90-U/U
160	4,9 - 5,3	CFS-C P 160/6"	EI 90-U/U

Maximum thickness of sound decoupling: 9 mm



#### 2.3.4.3 Magnaplast "Skolan-dB" pipes

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
58	4,0	CFS-C P 90/3"	EI 180-U/U
78	4,5	CFS-C P 75/2.5"	EI 180-U/U
90	4,5	CFS-C P 90/3"	EI 180-U/U
110	5,3	CFS-C P 110/4"	EI 180-U/U
135	5,3	CFS-C P 160/6"	EI 180-U/U
160	5,3	CFS-C P 160/6"	EI 180-U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.3.4.4 Rehau "Raupiano Plus" pipes (PP/PP-MV/PP)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
50	1,8	CFS-C P 50/1.5"	EI 180-U/U
75	1,9	CFS-C P 75/2.5"	EI 180-U/U
110	2,7	CFS-C P 110/4"	EI 180-U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.3.4.5 Wavin "AS" /KeKelit "Phonex AS" pipes

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
70	4,5	CFS-C P 75/2.5"	EI 180-U/U
90	4,5	CFS-C P 90/3"	EI 180-U/U
125	5,3	CFS-C P 125/5"	EI 180-U/U
160	5,3	CFS-C P 160/6"	EI 180-U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.3.4.6 Wavin "SiTech" pipes

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
75	2,3	CFS-C P 75/2.5"	EI 180-U/U
90	2,8	CFS-C P 90/3"	EI 180-U/U
125	3,9	CFS-C P 125/5"	EI 180-U/U
160	4,9	CFS-C P 160/6"	EI 180-U/U

Maximum thickness of sound decoupling: 9 mm

## 2.3.5 PVC pipes

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

#### 2.3.5.1.1 Pipe end configuration U/U

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
20 *)	1,5 – 2,2	CFS-C P 50/1.5"	EI 120-U/U
20 - 50	1,5/2,4 – 2,2/5,6 <sup>14</sup>	CFS-C P 50/1.5"	EI 120-U/U
50	2,4 – 5,6	CFS-C P 50/1.5"	EI 120-U/U
63	3,0 – 4,7	CFS-C P 63/2"	EI 120-U/U
75	2,2 – 3,6	CFS-C P 75/2.5"	EI 120-U/U
90	2,7 – 4,3	CFS-C P 90/3"	EI 120-U/U
110	1,8 – 8,1	CFS-C P 110/4"	EI 120-U/U
125	3,7 – 6,0	CFS-C P 125/5"	EI 120-U/U
160	2,5 – 11,8	CFS-C P 160/6"	EI 120-U/U
180	3,6 – 8,6	CFS-C P 180/7"	EI 120-U/U
200	4,0 – 9,6	CFS-C P 200/8"	EI 120-U/U
225	4,5 – 10,8	CFS-C P 225/9"	EI 120-U/U
250	4,9 – 11,9	CFS-C P 250/10"	EI 120-U/U

Maximum thickness of sound decoupling: 5 mm, for pipes indicated with \*): 9 mm

#### 2.3.5.1.2 Pipe end configuration U/C

50	1,8	CFS-C P 50/1.5"	EI 180-U/C
250	4,0 – 11,9	CFS-C P 250/10"	EI 180-U/C

The results of 2.3.5.1 are also valid for PVC-C pipes according to EN 1566-1 <sup>9</sup> and PVC-U pipes according to EN 1329-1 <sup>10</sup> and EN 1453-1 <sup>10</sup>.

### 2.3.5.2 PVC-C pipes according to EN 1566-1

See 2.3.5.1

### 2.3.5.3 Friatec Friatherm-starr pipes (PVC-C)

Insulation (D): Armaflex AF - arrangement LS (length of insulation  $L_D \geq 200$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
32	3,6	9	CFS-C P 50/1.5"	EI 180-U/C
40	4,5	9	CFS-C P 63/2"	EI 180-U/C
50	5,6	9	CFS-C P 75/2.5"	EI 180-U/C
63	7,1	10	CFS-C P 90/3"	EI 180-U/C

<sup>14</sup> Interpolation of minimum wall thickness between 1,5 mm for diameter 20 mm and 2,4 mm for diameter 50 mm, interpolation of maximum wall thickness between 2,2 mm for diameter 20 mm and 5,6 mm for diameter 50 mm for pipe diameters in between.



## 2.4 Rigid floors with a minimum density of 550 kg/m<sup>3</sup>

The floor must have a minimum thickness of 150 mm and comprise concrete or aerated concrete with a minimum density of 550 kg/m<sup>3</sup>.

For details of the penetration seal design see 2.3.

Pipes shall be supported at maximum 200 mm (pipes according to 2.4.1), at maximum 250 mm (all others) away from the upper face of the floor construction.

### Penetrating services

#### 2.4.1 ABS pipes +GF+ "COOL-FIT" (ABS/PUR insulation/PE-HD)

Pipe diameter d <sub>c</sub> (mm)	Inner pipe diameter (mm)	Collar size (A <sub>1</sub> )	Classification
90	32	CFS-C P 90/3"	EI 120-U/C
110	40	CFS-C P 110/4"	EI 120-U/C
110	50	CFS-C P 110/4"	EI 120-U/C
160	90	CFS-C P 160/6"	EI 120-U/C
180	110	CFS-C P 180/7"	EI 60-U/C
225	140	CFS-C P 225/9"	EI 120-U/C
250	160	CFS-C P 250/10"	EI 120-U/C

#### 2.4.2 Al-composite pipes

##### 2.4.2.1 Geberit "Mepla" pipes (PE-Xb/Al/PE-HD)

###### 2.4.2.1.1 Without insulation

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Collar size (A <sub>1</sub> )	Classification
40	3.5	CFS-C P 50/1.5"	EI 90-U/C
50	4.0	CFS-C P 50/1.5"	EI 120-U/C
63	4.5	CFS-C P 63/2"	EI 60-U/C
75	4.7	CFS-C P 75/2.5"	EI 30-U/C

Maximum thickness of sound decoupling: 9 mm

###### 2.4.2.1.2 Insulation (D): Armaflex AF - arrangement LS (length of insulation ≥ 250 mm) or CS

Pipe diameter d <sub>c</sub> (mm)	Pipe wall thickness t <sub>c</sub> (mm)	Insulation thickness t <sub>D</sub> (mm)	Collar size (A <sub>1</sub> )	Classification
40	3.5	20,5	CFS-C P 63/2" - 75/2.5"	EI 120-U/C
50	4.0	21	CFS-C P 63/2" - 90/3"	EI 120-U/C
63	4.5	21,5	CFS-C P 75/2.5" - 110/4"	EI 120-U/C
75	4.7	22	CFS-C P 90/3" - 125/5"	EI 120-U/C

#### 2.4.2.2 KeKelit "KELOX KM 110" pipes (PE-X/Al/PE-X)

Insulation (D): Armaflex AF - Insulation arrangement LS (length of insulation  $\geq 250$  mm)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
32	3.0	19,5	CFS-C P 75/2.5"	EI 120-U/C
40	4.0	20,5	CFS-C P 75/2.5"	EI 120-U/C
50	4.5	21	CFS-C P 90/3"	EI 120-U/C
63	6.0	21,5	CFS-C P 110/4"	EI 120-U/C

#### 2.4.2.3 Rehau "Rautitan stabil" pipes (PE-Xb/Al/PE-HD)

Insulation (D): Armaflex AF - arrangement LS (length of insulation  $\geq 250$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	6,0	20,5	CFS-C P 63/2" - 75/2.5"	EI 120-U/C

### 2.4.3 PE pipes

#### 2.4.3.1 PE pipes according to EN ISO 15494 and DIN 8074/8075

##### 2.4.3.1.1 Pipe end configuration U/U

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
20 *)	1,9 – 2,8	CFS-C P 50/1.5"	EI 90-U/U
20 - 50	1,9 / 2,9 - 2,8 / 4,6 <sup>15</sup>	CFS-C P 50/1.5"	EI 90-U/U

##### 2.4.3.1.2 2 Pipes in 1 collar

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
20	1,9	CFS-C P 50/1.5"	EI 90-U/U
20	2,8		

The results of 2.4.3.1 are also valid for PE pipes according to EN 12201-2 and EN 12666-1.

#### 2.4.3.2 "Wavin TS" pipes (PE-HD 100 RC)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
50	4,6	CFS-C P 50/1.5"	EI 90-U/U
63	5,8	CFS-C P 63/2"	EI 120-U/U
75	6,8	CFS-C P 75/2.5"	EI 120-U/U
90	8,2	CFS-C P 90/3"	EI 120-U/U
110	10,0	CFS-C P 110/4"	EI 120-U/U

Maximum thickness of sound decoupling: 9 mm

<sup>15</sup> Interpolation of minimum wall thickness between 1,9 mm for diameter 20 mm and 2,9 mm for diameter 50 mm, interpolation of maximum wall thickness between 2,8 mm for diameter 20 mm and 4,6 mm for diameter 50 mm for pipe diameters in between.



### 2.4.3.3 PE-X pipes

#### 2.4.3.3.1 Rehau "Rautitan flex" pipes (PE-Xa)

Insulation (D): Armaflex AF - arrangement LS (length of insulation  $\geq 250$  mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
40	6,0	20,5	CFS-C P 63/2" - 75/2.5"	EI 120-U/C
50	6,9	21	CFS-C P 75/2.5" - 90/3"	EI 120-U/C
63	8,6	21,5	CFS-C P 110/4"	EI 120-U/C

### 2.4.4 PP pipes

#### 2.4.4.1 PP pipes according to EN ISO 15874 and/or DIN 8077/8078

(e.g. Aquatherm climatherm, Aquatherm climatherm Faserverbundrohr, Aquatherm firestop, Aquatherm fusiotherm, Aquatherm fusiotherm Faserverbundrohr, +GF+ PROGEF Standard pipe, +GF+ Dekaprop Industry pipe)

##### 2.4.4.1.1 Without insulation – pipe end configuration U/U

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
20	1,9 - 3,4	CFS-C P 50/1.5"	EI 120-U/U

##### 2.4.4.1.2 Without insulation – pipe end configuration U/C

40	3,7 - 5,5	CFS-C P 50/1.5"	EI 120-U/C
50	4,6 - 6,9	CFS-C P 50/1.5"	EI 120-U/C
75	6,8	CFS-C P 75/2.5"	EI 120-U/C
90	12,3	CFS-C P 90/3"	EI 120-U/C
110	10,0 - 15,1	CFS-C P 110/4"	EI 120-U/C

Maximum thickness of sound decoupling: 9 mm

##### 2.4.4.1.3 Insulation (D): Armaflex AF – arrangement LS (length of insulation $L_D \geq 250$ mm) or CS

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Insulation thickness $t_D$ (mm)	Collar size ( $A_1$ )	Classification
90	12,3	22,5	CFS-C P 160/6"	EI 120-U/C
110	15,1	10	CFS-C P 125/5"	EI 120-U/C

#### 2.4.4.2 Pipelife "Master 3" pipes (PP-CO/PP-MV/PP-CO)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
32	1,2	CFS-C P 50/1.5"	EI 90-U/U
40	1,8	CFS-C P 50/1.5"	EI 90-U/U
50	1,8	CFS-C P 50/1.5"	EI 90-U/U
75	1,8	CFS-C P 75/2.5"	EI 90-U/U
110	1,8	CFS-C P 110/4"	EI 90-U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.4.4.3 POLOPLAST "Polo Kal NG" pipes (PP-CO/PP-MV/PP-CO)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
32	1,8	CFS-C P 50/1.5"	EI 90-U/U
40	1,8	CFS-C P 50/1.5"	EI 90-U/U
50	2,0	CFS-C P 50/1.5"	EI 90-U/U
75	2,6	CFS-C P 75/2.5"	EI 90-U/U
90	3,0	CFS-C P 90/3"	EI 90-U/U
110	3,6	CFS-C P 110/4"	EI 90-U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.4.4.4 POLOPLAST "Polo Kal 3S" pipes (PP/PP-MV/PP)

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
75	3,8	CFS-C P 75/2.5"	EI 90-U/U
90	4,5	CFS-C P 90/3"	EI 90-U/U
110	4,8	CFS-C P 110/4"	EI 90-U/U

Maximum thickness of sound decoupling: 9 mm

#### 2.4.5 PVC pipes

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

Pipe diameter $d_c$ (mm)	Pipe wall thickness $t_c$ (mm)	Collar size ( $A_1$ )	Classification
20 *)	1,5 – 2,2	CFS-C P 50/1.5"	EI 120-U/U
20 – 50	1,5/2,4 – 2,2/5,6 <sup>16</sup>	CFS-C P 50/1.5"	EI 120-U/U

The results of 2.4.5.1 are also valid for PVC-C pipes according to EN 1566-1 <sup>9</sup> and PVC-U pipes according to EN 1329-1 <sup>10</sup> and EN 1453-1 <sup>10</sup>.

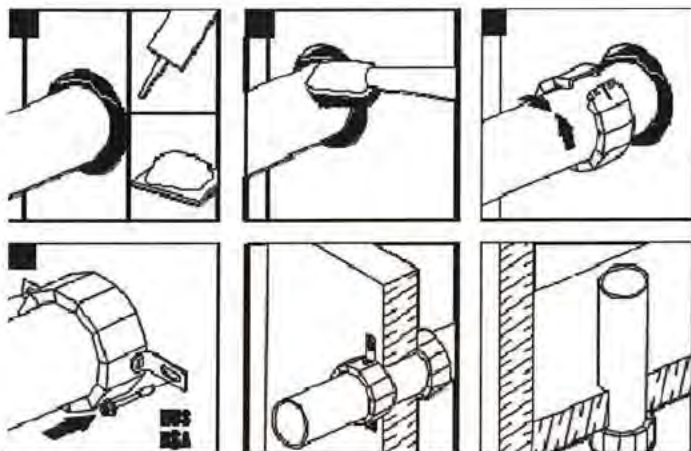
<sup>16</sup> Interpolation of minimum wall thickness between 1,5 mm for diameter 20 mm and 2,4 mm for diameter 50 mm, interpolation of maximum wall thickness between 2,2 mm for diameter 20 mm and 5,6 mm for diameter 50 mm for pipe diameters in between.



### ANNEX 3

#### INSTALLATION OF THE PRODUCT AND ANCILLARY PRODUCT(S)

The arrangement and installation of Hilti Firestop Collar CFS-C P shall be done in accordance with the details given below and in Annex 2 for the penetration seal(s).



## ANNEX 4

### ABBREVIATIONS AND REFERENCE DOCUMENTS

#### 4.1 Abbreviations used in drawings

Abbreviation	Description
A <sub>1</sub>	Hilti Firestop Collar CFS-C P
A <sub>2</sub>	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR
A <sub>3</sub>	Annular gap seal with gypsum plaster or cementitious mortar
B	Backfilling material (mineral wool)
C	Plastic Pipe
C <sub>1</sub>	Sound decoupling
D	Pipe insulation
d <sub>C</sub>	Pipe diameter (nominal outside diameter)
E	Building element (wall, floor)
F	Fixing of the collar
s <sub>1</sub>	Minimum distance between single penetration seals
t <sub>A2</sub>	Thickness of Hilti Firestop Acrylic Sealant CFS-S ACR
t <sub>C</sub>	Pipe wall thickness
t <sub>D</sub>	Insulation thickness
t <sub>E</sub>	Thickness of the building element
L <sub>D</sub>	Length of Insulation

#### 4.2 References to standards mentioned in the ETA:

EN 1026	Windows and doors – Air permeability – Test method
EN 1329-1	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Unplasticized poly(vinyl chloride) (PVC-U)
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals
EN 1451-1	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polypropylene (PP) – Part 1: Specifications for pipes, fittings and the system
EN 1453-1	Plastics piping systems with structured-wall pipes for soil and waste discharge (low and high temperature) inside buildings - Unplasticized poly(vinyl chloride) (PVC-U)
EN 1519-1	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Polyethylene (PE) - Part 1: Specifications for pipes, fittings and the system
EN 1566-1	Plastics piping systems for soil and waste discharge (low and high temperature) within the building structure - Chlorinated poly(vinyl chloride) (PVC-C) - Part 1: Specifications for pipes, fittings and the system
EN 12201-2	Plastics piping systems for water supply, and for drainage and sewerage under pressure - Polyethylene (PE) - Part 2: Pipes
EN 12666-1	Plastics piping systems for non-pressure underground drainage and sewerage – Polyethylene (PE) – Part 1: Specifications for pipes, fittings and the system
EN 13501	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests Part 2: Classification using test data from fire resistance tests, excluding ventilation services



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 <sup>17</sup>
EN ISO 717-1	Acoustics – Rating of sound insulation of buildings and of building elements – Part 1: Airborne sound insulation
EN ISO 1519	Paints and varnishes – Bend test (cylindrical mandrel)
EN ISO 1452	Plastics piping systems for water supply and for buried and above-ground drainage and sewerage under pressure - Unplasticized poly(vinyl chloride) (PVC-U) <sup>18</sup>
EN ISO 15493	Plastics piping systems for industrial applications - Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride) (PVC-U) and chlorinated poly(vinyl chloride) (PVC-C) - Specifications for components and the system; Metric series
EN ISO 15494	Plastics piping systems for industrial applications - Polybutene (PB), polyethylene (PE) and polypropylene (PP) - Specifications for components and the system; Metric series
EN ISO 15874	Plastics piping systems for hot and cold water installations - Polypropylene (PP)
EN ISO 20140-10	Acoustics – Measurements of sound insulation in buildings and of building elements – Part 10: Laboratory measurement of airborne sound insulation of small building elements <sup>17</sup>
DIN 8061	Unplasticized polyvinyl chloride (PVC-U) pipes - General quality requirements and testing
DIN 8062	Unplasticized polyvinyl chloride (PVC-U) pipes - Dimensions
DIN 8074	Polyethylene (PE) - Pipes PE 80, PE 100 - Dimensions
DIN 8075	Polyethylene (PE) pipes - PE 80, PE 100 - General quality requirements, testing
DIN 8077	Polypropylene (PP) pipes - PP-H, PP-B, PP-R, PP-RCT – Dimensions
DIN 8078	Polypropylene (PP) pipes - PP-H, PP-B, PP-R, PP-RCT - General quality requirements and testing
DIN 19531-10	Pipes and fittings made of unplasticized polyvinyl chloride (PVC-U) socket for waste and soil discharge systems inside buildings – Part 10: Fire behaviour, quality control and installation recommendations
DIN 19535-10	High-density polyethylene (PE-HD) pipes and fittings for hot-water resistant waste and soil discharge systems (HT) inside buildings – Part 10: Fire behaviour, quality control and installation recommendations

### 3.3 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

<sup>17</sup> In September 2010 substituted by the EN ISO 10140 series

<sup>18</sup> Successor of EN 1452 since December 2009

**SINTEF Building and Infrastructure**

P.O.Box 124 Blindern

N-0314 Oslo

Tel. 47 22 96 55 55

Fax 47 22 69 54 38



Authorised and notified according to Article 10 of the 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

**MEMBER OF EOTA**

## **European Technical Approval ETA-10/0109**

(Final version 31.05.2010)

Trade name:	Hilti Firestop Foam CFS-F FX
Holder of the approval:	HILTI Corporation Feldkircherstrasse 100 9494 Schaan Liechtenstein
Generic type and use of construction product:	Fire Stopping and Sealing Product. Penetration Seals
Valid from:	2010-05-31
to:	2015-05-31
Manufacturing plant:	HILTI Werk 4a
This European Technical Approval contains:	38 pages including 5 Annexes which form an integral part of the document



**European Organisation for Technical Approvals**  
**Europäische Organisation für Technische Zulassungen**  
**Organisation Européenne pour l'Agrément technique**



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  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex of Commission Decision 94/23/EC<sup>4</sup>
  - ETAG No 026 Fire Stopping and Fire Sealing Products Part 1: "General" and Part 2: "Penetration seals"
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<sup>1</sup> Official Journal of the European Communities N° L40, 11.2.1989, p. 12

<sup>2</sup> Official Journal of the European Communities N° L 220, 30.08.1993, p. 1

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

<sup>4</sup> Official Journal of the European Communities N° L17, 20.1.1994, p. 34

## **II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL**

### **1 Definition of product and intended use**

#### **1.1 Definition of the construction product**

##### **1.1.1 Hilti Firestop Foam CFS-F FX**

Hilti Firestop Foam CFS-F FX is a product to form a penetration seal used to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services.

Hilti Firestop Foam CFS-F FX is a two-component foam composed essentially of expanding substances and binder.

##### **1.1.2 Additional components**

Hilti Firestop Bandage CFS-B is an intumescent wrap used together with Hilti Firestop Foam CFS-F FX in pipe penetration seals including metal pipes insulated with combustible insulation (reaction to fire class B to E according to EN 13501-1) and plastic pipes. Hilti Firestop Bandage CFS-B consists of an intumescent component on a carrier made from fibre glass fabric.

### **1.2 Intended use and use category**

#### **1.2.1 Intended use**

Hilti Firestop Foam CFS-F FX may be used to provide a penetration seal around services running through openings of maximum dimensions  $w \times h = 400 \times 400$  mm in walls and floors with minimum thickness as given in the tables in Annex C and D related to declared fire resistances. Further details on the type of services covered by the declared classifications and other parameters to be considered are also given in Annex C and D.

- (1) The specific structures where Hilti Firestop Foam CFS-F FX may be used to provide a penetration seal are as follows:

Flexible walls: The wall must have a minimum thickness of 112 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 between the seal and any stud, and the cavity must be filled with minimum 100 mm insulation of Class A1 or A2 in accordance with EN 13501-1).

Rigid walls: The wall must have a minimum thickness of 112 mm and comprise concrete, aerated concrete or masonry, with a minimum density of  $650 \text{ kg/m}^3$ .

Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of  $2200 \text{ kg/m}^3$ .



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

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

- (2) Hilti Firestop Foam CFS-F FX may be used to provide a penetration seal with the following specific services, single, multiple or in combination:

Blank seal	As given in Annex C.1
Cables / cable trays	Services as given in Annex C.2
Conduits	Services as given in Annex C.3
Metal pipes	Services as given in Annex C.4 and Annex D
Plastic pipes	Services as given in Annex C.5
Mixed	Services as given in Annex E

- (3) Pipes and cable support constructions shall be supported at maximum 300 mm and 500 mm away from both faces of wall constructions and maximum 250 mm and 415 mm from the upper face of floor constructions.

The provisions made in this European Technical Approval are based on an assumed working life of penetration seals made from Hilti Firestop Foam CFS-F FX 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.

### 1.2.2 Use category

This ETA covers a fire stopping and sealing product intended for use at temperatures below 0°C, but with no exposure to rain nor UV. The environmental condition described by use category according to ETAG 026-2 is type Y<sub>2</sub>, (-20/+70)°C. Since the requirements for type Y<sub>2</sub> are met, also the requirements for type Z<sub>1</sub> and Z<sub>2</sub> are fulfilled.

## 2 Characteristics of products and methods of verification

### 2.0 General

The assessment of fitness for use has been made in accordance with ETAG No 026 - Part 2: 2008-01-01, summarized as follows:

ETAG Clause No.	ETA Clause No.	Characteristic	Assessment of characteristic
		<b>Mechanical resistance and stability</b>	Not relevant
		<b>Safety in case of fire</b>	
2.4.1	2.1	Reaction to fire	Class E according to EN 13501-1
2.4.2	2.2	Resistance to fire	See clause 2.2
		<b>Hygiene, Health and the Environment</b>	
2.4.3	2.3	Air permeability	Flow rate per area
2.4.4	2.4	Water permeability	No performance determined
2.4.5	2.5	Dangerous substances	See clause 2.5
		<b>Safety in use</b>	
2.4.6	2.6	Mechanical resistance and stability	See clause 2.6
2.4.7	2.7	Resistance to impact/movement	Zone type I to IV according to EOTA TR001
2.4.8	2.8	Adhesion	See clause 2.8
		<b>Protection against noise</b>	
2.4.9	2.9	Airborne sound insulation	$R_{w(C;Ctr)}$ , $D_{n,e,w}$
		<b>Energy, Economy and Heat Retention</b>	
2.4.10	2.10	Thermal properties	No performance determined
2.4.11	2.11	Water vapour permeability	No performance determined
		<b>General aspects relating to fitness for use</b>	
2.4.12	2.12	Durability and serviceability	$Y_{2, (-20/+70)^\circ C}$ Compatibility with coatings

### 2.1 Reaction to fire

The reaction to fire classification for Hilti Firestop Foam CFS-F FX in the cured state is class E according to EN 13501-1.

### 2.2 Resistance to fire

The classification of the resistance to fire performance has been carried out in accordance with clause 7.5.8 in EN 13501-2:2007. Penetration seals made from Hilti Firestop Foam CFS-F FX with additional materials and services are classified according to combinations of performance parameters and classes as shown in Annex C, D and E. The classifications are valid for services running through openings of maximum dimensions  $w \times h = 400 \times 400$  mm, in flexible and rigid walls with minimum thickness  $t_E = 112$  mm and 150 mm respectively and concrete floors



with minimum thickness 150 mm. The classifications require that the rules for installation shown in cl. 4.2 are followed.

The classifications are not valid for sandwich panel constructions.

Where the required seal thickness is higher than the wall or floor thickness, a support frame ( $E_1$ ) made from material of class A1 or A2 according to EN 13501-1 (e.g. gypsum board) shall be installed to support the Hilti Firestop Foam CFS-F FX as illustrated in Fig. 1. The frame may be installed inside the opening, its depth being minimum the seal thickness  $t_A$ , in case of a penetration seal in a wall centred in relation to the wall. Alternatively a frame made from gypsum board may be fixed to the wall or floor around the opening (width  $w_A \geq 50$  mm for wall applications,  $w_A \geq 75$  mm for floor applications, total thickness wall plus frame  $\geq$  seal thickness  $t_A$ ). The frame must be fixed by minimum 2 metal screws per side of the frame with a maximum distance of 150 mm between the screws. In case of a penetration seal in a wall the frame shall be installed on both sides so that the penetration seal is centred in relation to the wall.

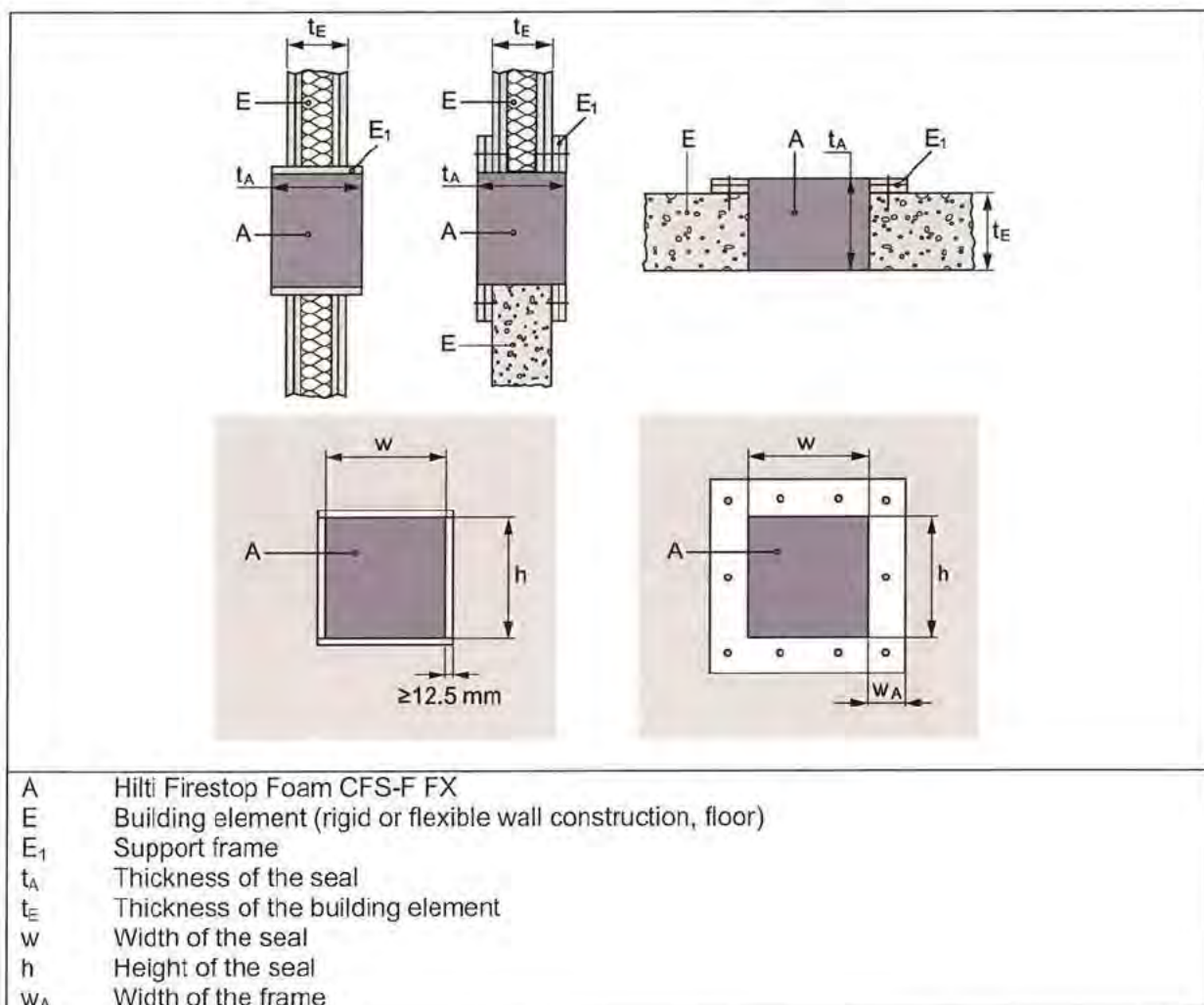


Fig. 1  
Options for support frames (seal thickness higher than wall/floor thickness)

In case of a flexible wall with no insulation between the panels, an insulation that does not fill the space between the linings completely, an insulation of a density of less than  $100 \text{ kg/m}^3$  or an insulation made from glass wool, an aperture framing has to be installed. It has to be made from material used to construct the wall, i.e. studs and boards with a minimum board thickness of 12.5 mm, as illustrated in Figure 2.

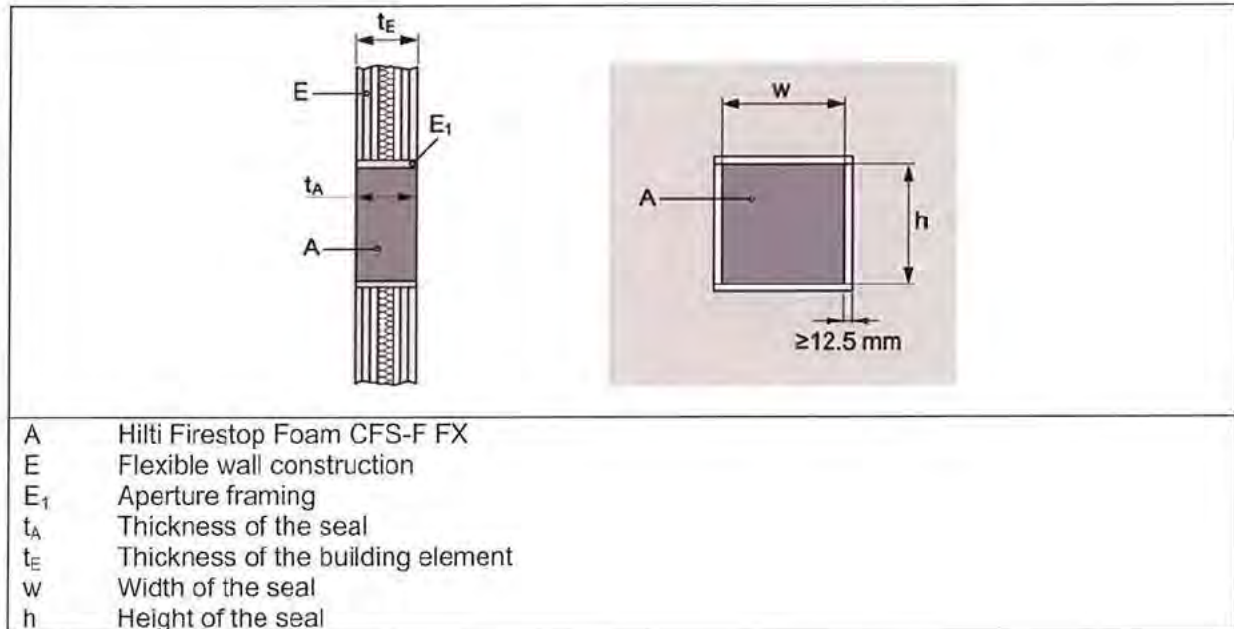


Fig. 2  
Aperture framing



### 2.3 Air permeability, and permeability regarding some other gases

The permeability has been tested according to EN 1026.

The following two flow rates ( $q$ ) per area ( $A$ ) for air permeability were achieved for the given air pressure differences ( $\Delta p$ ):

$\Delta p$ [Pa]	$q / A$ [m <sup>3</sup> /(h·m <sup>2</sup> )]	Layer thickness [mm]
50	0,0007	174
250	0,0033	174

The permeability regarding the gases N<sub>2</sub>, CO<sub>2</sub> and CH<sub>4</sub> (Methane) has been determined as follows for foam layer with thickness 174 mm, and where the flow rate index  $q$  indicates the type of gas:

$\Delta p$ [Pa]	$q_{N_2} / A$ [m <sup>3</sup> /(h·m <sup>2</sup> )]	$q_{CO_2} / A$ [m <sup>3</sup> /(h·m <sup>2</sup> )]	$Q_{CH_4} / A$ [m <sup>3</sup> /(h·m <sup>2</sup> )]
50	0,0006	0,0004	0,0007
250	0,0031	0,0021	0,0035

The declared values refer to a penetration seal made from Hilti Firestop Foam CFS-F FX without any penetrating installation.

### 2.4 Water permeability

No performance determined.

### 2.5 Dangerous substances

According to the DEKRA test report no. 77801/07 with reference to the project no. 55077801, signed and dated 2007-06-06, the resulting air contamination will be kept below any respective occupational exposure limits as far as such limits exist. It is assumed that relevant recommendations given in Hilti's Material Safety Data Sheet according to 1907/2006/EC, Article 31 will be followed.

Hilti AG has presented a Material Safety Data Sheet according to Regulation 1907/2006/EC 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 no toxic, carcinogenic, toxic for reproduction and mutagenic chemical substances of category 1 or 2  $\geq 0.1$  % w/w (Status: Regulation 790/2009/EC - 1st ATP of the Regulation 1272/2008/EC) that would lead to classification T and sentences R45 and/or R46 are used in Hilti Firestop Foam CFS-F FX and that all other dangerous substances have been considered for the classification of the product 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 EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## **2.6 Mechanical resistance and stability**

It is assumed that the impact test shown in cl. 2.7 covers both static and dynamic loads.

## **2.7 Resistance to impact/movement**

A 200 mm thick concrete wall with a penetration seal made from Hilti Firestop Foam CFS-F FX, dimensions 400 mm x 400 mm, without penetrating services, has been tested in accordance with EOTA Technical Report - TR001 - Edition February 2003. The results demonstrate suitability for all the following applications foreseen in EOTA Technical Report - TR001, A.1:

Type I: Zones accessible primarily to those with high incentive to exercise care. Small risk of accidents occurring and of misuse.

Type II: Zones accessible primarily to those with some incentive to exercise care. Some risk of accidents occurring and of misuse.

Type III: Zones readily accessible to public and others with little incentive to exercise care. Risk of accidents occurring and of misuse.

Type IV: Zones and risk as II and III. In case of failure, risk includes the fall to a floor at a lower level.

## **2.8 Adhesion**

It is assumed that verification of adequate adhesion is covered by the impact tests shown in cl. 2.7.

## **2.9 Airborne sound insulation**

Measurements according to EN ISO 140-3 and EN ISO 20140-10 on double metal frame partition wall structure with size 1.25 m x 1.50 m, each leaf with 2 x 12.5 mm gypsum board lining and 50 mineral wool insulation, 5 mm air gap between leaves, and 0.4 m x 0.4 m penetrated centre filled with Hilti Firestop Foam CFS-F FX, showed the following result according EN ISO 717-1:

Weighted sound reduction index:  $R_w(C;Ctr) = 47(-1;-6)$  dB

Weighted element-normalized level difference:  $D_{n,e,w}(C;Ctr) = 54 (-0;-5)$  dB



Regarding the value  $D_{n,e,w}$  (C;Ctr):  $A_o = 10 \text{ m}^2$  (reference area according to EN ISO 20140-10)

## **2.10 Thermal insulation**

No performance determined.

## **2.11 Water vapour permeability**

No performance determined.

## **2.12 Durability and serviceability**

### **2.12.1 Durability**

Hilti Firestop Foam CFS-F FX has been tested in accordance with EOTA Technical Report - TR024 - Edition November 2006, Table 4.1, for the type  $Y_2$  use category specified in EOTA 026-2. The results of the tests have demonstrated suitability for penetration seals intended for use at temperatures between  $-20^\circ\text{C}$  and  $+70^\circ\text{C}$ , but with no exposure to rain nor UV.

### **2.12.2 Serviceability**

Hilti Firestop Foam CFS-F FX has been tested in combination with coatings based on an acrylic dispersion, alkyd resin, polyurethane/acrylic and epoxy resin. The results of the test have demonstrated suitability of penetration seals made from Hilti Firestop Foam CFS-F FX for being painted over by those types of coatings.

## **3 Evaluation and attestation of conformity and CE marking**

### **3.1 System of attestation of conformity**

According to the decision 1999/454/EC of the European Commission<sup>5</sup> 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 an approved 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;

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<sup>5</sup> Official Journal of the European Communities L178/52 of 22 June 1999

- (4) initial inspection of factory and of factory production control;
- (5) continuing 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 may only use constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the Control Plan dated 12.02.2007, 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 SINTEF.

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 provide a technical data sheet and an installation instruction with the following minimum information:

##### Technical data sheet

- Field of application:
  - Building elements for which the penetration seal is suitable, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions - the construction requirements.
  - Services for which the penetration seal is suitable, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. cable trays)
  - Limits in size, minimum thickness etc. of the penetration seal
- Construction of the penetration seal including the necessary components and additional products (e.g. backfilling material) with clear indication whether they are generic or specific.



#### Installation instruction:

- Steps to be followed
- Procedure in case of retrofitting

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 approved bodies**

The approved body (bodies) shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control,

in accordance with the provisions laid down in the Control Plan dated 12.02.2007, relating to this European technical approval.

The approved 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 (reports).

The approved certification 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 SINTEF without delay.

#### **3.3 CE-marking**

The CE marking shall be affixed on the packaging of the HILTI Firestop Foam CFS-FX. The marking „CE“ shall be followed by the identification number of the approved certification body and be accompanied by the following additional information:

- a) the name and address of the producer (legal entity responsible for the manufacturer)
- b) the two last digits of the year in which the CE marking was affixed


d) the number of the EC Certificate of conformity for the product

e) the number of the European technical approval

f) reference to ETAG 026, Part 2

g) indications to clarify the intended use

Example of CE-Marking:

	"CE"-Marking
xxxx	Number of Notified Body
HILTI Corporation Feldkircherstrasse 100 9494 Schaan Liechtenstein	Name and address of the producer (legal entity responsible for placing the product onto the market)
09	Two last digits of year of affixing CE- Marking
1166-CPD-xxxx	Number of EC certificate of conformity (where relevant)
ETA N° 10/109	ETA Number
ETAG 026, Part 2	ETAG Number
Penetration Seal Hilti Firestop Foam CFS-F FX  Use category Y <sub>2</sub> , (-20/+70) °C  See ETA 10/109 for other relevant characteristics	Designation of the product  Use category  Other information

### 3.4 Other marking and/or information

The batch number of the components is shown on the foil bags for each component. The product name and expiry date (MM/YYYY) is printed on the connecting element of the foil pack. See also the instructions for use in Annex F regarding expiry date.



## **4 Assumptions under which the fitness of the product for the intended use was favourably assessed**

### **4.1 Manufacturing**

The European technical approval is issued for Hilti Firestop Foam CFS-F FX on the basis of agreed data/information deposited with SINTEF, 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 SINTEF before the changes are introduced. SINTEF 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 is necessary.

### **4.2 Installation**

#### **4.2.1 General**

The fire stopping and fire sealing product shall be installed according to the manufacturer's instructions. It is the manufacturer's responsibility to provide correct information about the application to the users. See Annex F.

#### **4.2.2 Cable seals**

For tied cable bundles<sup>6</sup> the space between the cables needs not be sealed.

The total cross section of the cables (including cable supporting systems like cable trays etc.) must not be more than 60% of the total seal (opening) size.

#### **4.2.3 Pipe seals**

Pipes must be perpendicular to the seal surface.

Plastic pipes shall be used for non-combustible liquids and fluids only, or for pneumatic dispatch systems and for vacuum cleaning pipes.

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, pressurized air systems etc. is guaranteed only when the systems are shut off in case of fire.

The assessment does not cover the avoidance of destruction of the seal or of the abutting building element(s) by forces caused by temperature changes in case of fire. This has to be considered when designing the piping system.

#### **NOTE**

For example, for non-insulated metal pipes the elongation to be considered can be calculated using the relevant temperature from the standard time temperature curve at the fire resistance period required.

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<sup>6</sup> Several cables running in the same direction and bound closely together by mechanical means

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.

It is assumed that thermal movement in the pipe work will be accommodated in such a way that it does not impose a load on the penetration seal.

#### **4.2.4 Design**

Other parts or support constructions than given in Annex C, D and E must not penetrate the seal. Provisions shall be taken such that floor penetration seals cannot be stepped on or are not subjected to forces higher than the limit taken from the impact tests, e.g. by covering with a wire mesh.

The service support construction must be fixed to the 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 for the required period of fire resistance.

#### **4.2.5 Tool and equipment for application**

Hilti Firestop Foam CFS-F FX may be applied with a Hilti MD 2000 (manual) or ED 3500 dispenser (battery). See also the installation instruction in Annex F.

#### **4.2.6 Applications including Hilti Firestop Bandage CFS-B**

Two layers of Hilti Firestop Bandage CFS-B are tightly wrapped around the pipe or pipe insulation on both sides of the opening. The bandage is positioned so that the line marking at the mid of the bandage is flush with the surface of the penetration seal (special care has to be taken to use the correct position when the required Hilti Firestop Foam CFS-F FX seal thickness is higher than the wall or floor thickness). The bandage is fixed with steel wire and the remaining opening filled with Hilti Firestop Foam CFS-F FX.

### **5 Indications to the manufacturer and supplier**

#### **5.1 Packaging, transport and storage**

The following measures should be adopted with regard to handling and storage of the Hilti Firestop Foam CFS-F FX:

- For safe handling the provisions of the Material Safety Data Sheet for the product shall be followed
- Storage and transport temperatures are 5 °C to 25 °C
- Shelf life is 9 months (at 23 °C and stored in a dry place)

For additional information see also Annex B.



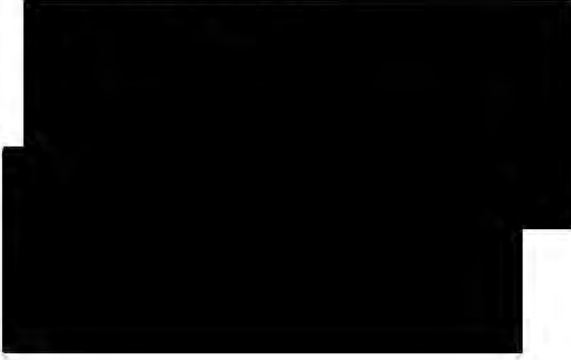
## **5.2 Use, maintenance and repair**

The product does not need any maintenance in the life time indicated in the ETA.

The assessment of the fitness for use is based on the assumption that damage, for example caused by accidental impact, is repaired. The manufacturer's installation instructions and recommendations according to the Material Safety Data Sheet for the product shall be followed.

SINTEF Building and Infrastructure

Oslo, 31.05.2010



## REFERENCE DOCUMENTS and LIST of ABBREVIATIONS

References to standards mentioned in the ETA:

EN 1026	Windows and doors – Air permeability – Test method
prEN 1366-3:2006	Fire resistance tests for service installations - Part 3: Penetration seals
EN 13238	Reaction to fire tests for building products: Conditioning procedures and general rules for selection of substrates
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 13823:2002	Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item
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
EN ISO 11925-2	Reaction to fire tests – Ignitability of building products subjected to direct impingement of flame – Part 2: Single-flame source test
HD 22.4	Cables of rated voltages up to and including 450/750 V and having crosslinked insulation – Part 4: Cords and flexible cables
HD 640.5	0.6/1kV Power cables with special fire performance for use in power stations – Part 5: single core and multicore halogen-free cables

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
Safety Data Sheet according to 1907/2006/EC, Article 31, for Hilti Firestop Foam CFS-F FX	

### Abbreviations used in drawings

Abbreviation	Description	Abbreviation	Description
A, A <sub>1</sub> , A <sub>2</sub> ,...	Firestop product	s <sub>1</sub> , s <sub>2</sub>	Distances
C, C <sub>1</sub> , C <sub>2</sub> ,...	Penetrating services	t <sub>A</sub>	Thickness of penetration seal
D	Pipe insulation	t <sub>c</sub>	Pipe wall thickness
E, E <sub>1</sub> , E <sub>2</sub> ,...	Building element (wall, floor)	t <sub>D</sub>	Thickness of insulation
L <sub>D</sub>	Length of insulation	t <sub>E</sub>	Thickness of the building element
d <sub>c</sub>	Pipe diameter	w	Width of penetration seal
h	Height/length of penetration seal		



## ANNEX A

### DESCRIPTION OF PRODUCT AND PRODUCT LITERATURE

#### Hilti Firestop Foam CFS-F FX

Foil pack 325ml



Mixing nozzle



Dispenser

MD 2000



ED 3500



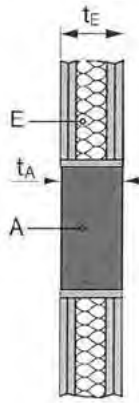
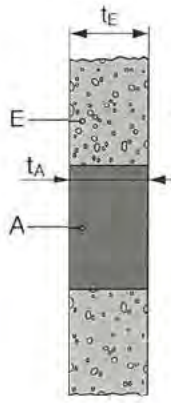
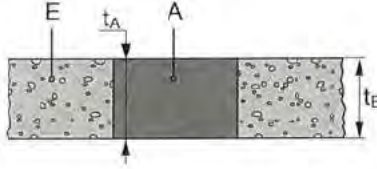
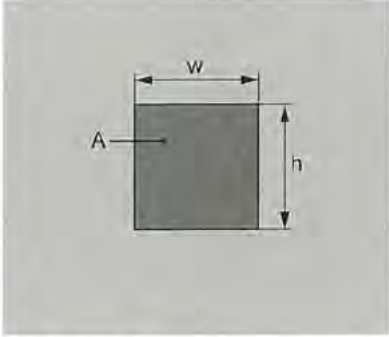
- Technical Datasheet Hilti Firestop Foam CFS-F FX including Instructions for use Hilti Firestop Foam CFS-F FX

#### Hilti Firestop Bandage CFS-B



- Technical Datasheet Hilti Firestop Bandage CFS-B including Instructions for use Hilti Firestop Bandage CFS-B

**ANNEX B****RESISTANCE TO FIRE CLASSIFICATION OF  
HILTI FIRESTOP FOAM CFS-F FX****Blank seal**

Flexible and rigid wall constructions according to 1.2.1	
Penetration seal / Services	Classification
<b>Blank seal</b> – no services; Hilti Firestop Foam CFS-F FX (A) of thickness $t_A \geq 112$ mm centered regarding the thickness of the building element (E)	EI 120
Construction details: <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>	
For explanation of abbreviations see the related text and Annex A	

## Cables

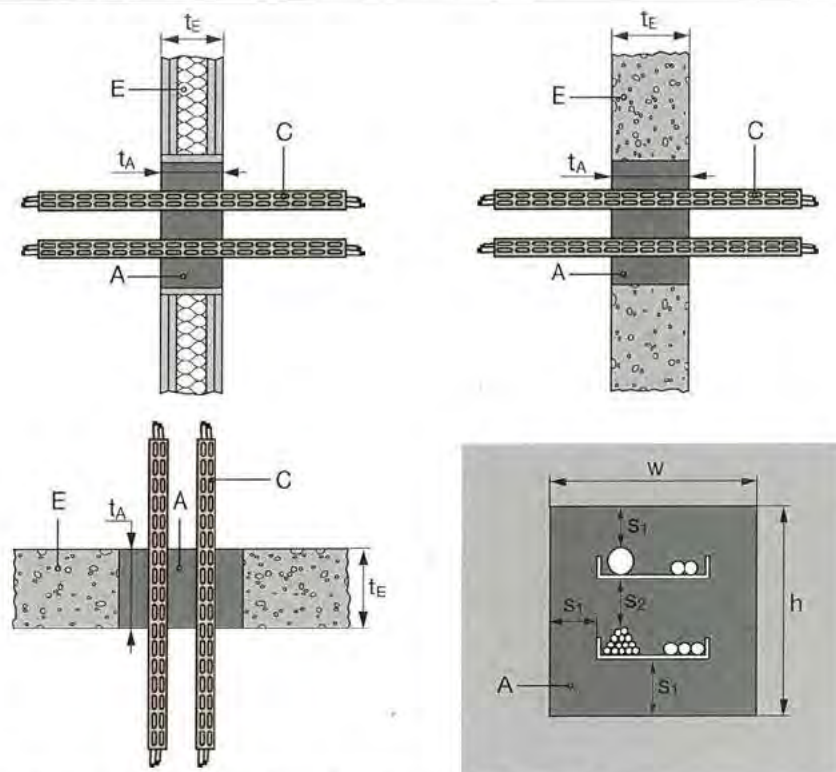
### Flexible and rigid wall constructions according to 1.2.1

Penetration seal / Services	Classification		
<b>Hilti Firestop Foam CFS-F FX (A)</b> of thickness $t_A$ (mm) centered regarding the thickness of the building element (E). All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables with a diameter of:	$112 \leq t_A \leq 150$	$150 \leq t_A \leq 200$	$t_A \geq 200$
Maximum $\varnothing$ 21 mm	EI 60 / E 120	EI 60 / E 120	EI 120
$21 \leq \varnothing \leq 50$ mm	-	EI 60 / E 120	EI 90 / E 120
$50 \leq \varnothing \leq 80$ mm	-	EI 60 / E 120	EI 90 / E 120
All sheathed single core cables up to a diameter of 21 mm	-	EI 120	EI 120
Sheathed multi-core halogen free cables according to HD 604.5 up to a diameter of 50 mm	-	EI 90 / E120	EI 120
Single sheathed multi-core rubber cables according to HD 22.4 up to a diameter of 80 mm	-	EI 120	EI 120
Tied cable bundle <sup>6</sup> , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	EI 60 / E 120	EI 60 / E 120	EI 120
Cable support construction: Perforated metal cable trays with a melting point higher than 1100°C (e.g. galvanised steel, stainless steel). Trays with organic coatings are covered if their overall classification is minimum A2 according to EN 13501-1.			
Minimum distance (mm): Cables/cable tray to seal edge ( $s_1$ ): 0 Cables to cable tray ( $s_2$ ): 50 Cables without tray: Cable to seal edge ( $s_1$ ): 0 Cable to cable ( $s_2$ ): 0 Cable to cable bundle ( $s_2$ ): 33			



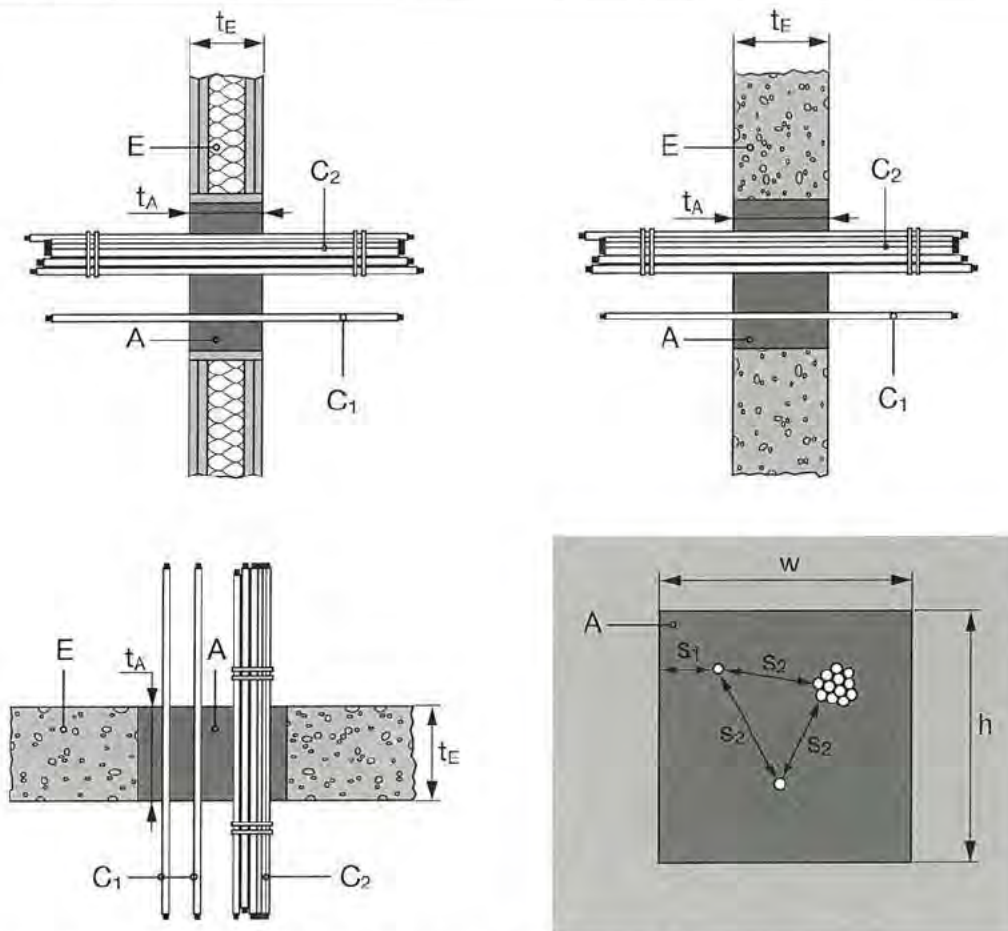
## Construction details

## A) Cables on cable trays:



For explanation of abbreviations see the related text and Annex A

## B) Cables without cable tray:



For explanation of abbreviations see the related text and Annex A

## Rigid floor constructions according to 1.2.1

Penetration seal / Services	Classification	
<b>Hilti Firestop Foam CFS-F FX (A)</b> of thickness $t_A$ (mm) centered regarding the thickness of the building element (E). All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables with a diameter of:	$150 \leq t_A \leq 250$	$t_A \geq 250$
Maximum Ø 21 mm	EI 60 / E 120	EI 120
$21 \leq \varnothing \leq 50$ mm	EI 60 / E 120	EI 120
$50 \leq \varnothing \leq 80$ mm	EI 60 / E 120	EI 120
Tied cable bundle <sup>6</sup> , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	EI 60 / E 120	EI 120
Cable support construction: Perforated metal cable trays with a melting point higher than 1100°C (e.g. galvanised steel, stainless steel). Trays with organic coatings are covered if their overall classification is minimum A2 according to EN 13501-1.		
Minimum distance (mm):		
Cables/cable tray to seal edge ( $s_1$ ):	0	
Cables to cable tray ( $s_2$ ):	50	
Cables without tray:		
Cable to seal edge ( $s_1$ ):	0	

Cable to cable ( $s_2$ ):	0
Cable to cable bundle ( $s_2$ ):	33
Construction details: see C.2.1	

## Conduits/tubes

### Flexible and rigid wall constructions according to 1.2.1

Penetration seal / Services	Classification		
<b>Hilti Firestop Foam CFS-F FX (A)</b> of thickness $t_A$ (mm) centered regarding the thickness of the building element (E).	$112 \leq t_A \leq 150$	$150 \leq t_A \leq 200$	$t_A \geq 200$
Steel conduits and tubes, $\varnothing$ maximum 16 mm	EI 90 U/U E 120 U/U	EI 90 U/U E 120 U/U	EI 120 U/U
The field of application given above is also valid for other metal conduits or tubes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys).			
Plastic conduits and tubes, $\varnothing$ maximum 16 mm	EI 120 U/U	EI 120 U/U	EI 120 U/U

### Rigid floor constructions according to 1.2.1

Penetration seal / Services	Classification
<b>Hilti Firestop Foam CFS-F FX (A)</b> of thickness $t_A \geq 150$ mm centered regarding the thickness of the building element (E).	
Steel conduits and tubes, $\varnothing$ maximum 16 mm	EI 120 U/U
The field of application given above is also valid for other metal conduits or tubes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys).	
Plastic conduits and tubes, $\varnothing$ maximum 16 mm	EI 120 U/U



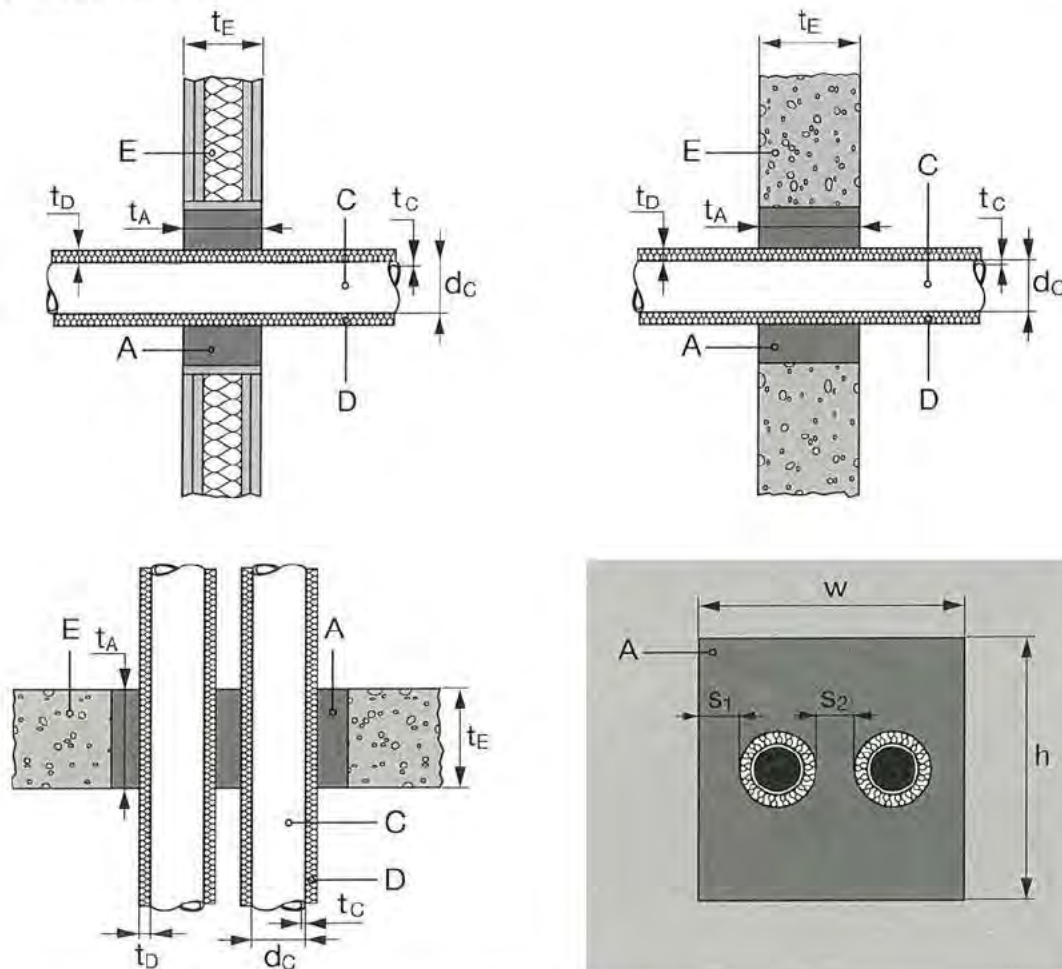
## Metal pipes – Mineral wool insulation

### Flexible wall, rigid wall and rigid floor constructions according to 1.2.1

**Penetration seal:** Hilti Firestop Foam CFS-F FX (A) of thickness  $t_A \geq 150$  mm centered regarding the thickness of the building element (E).

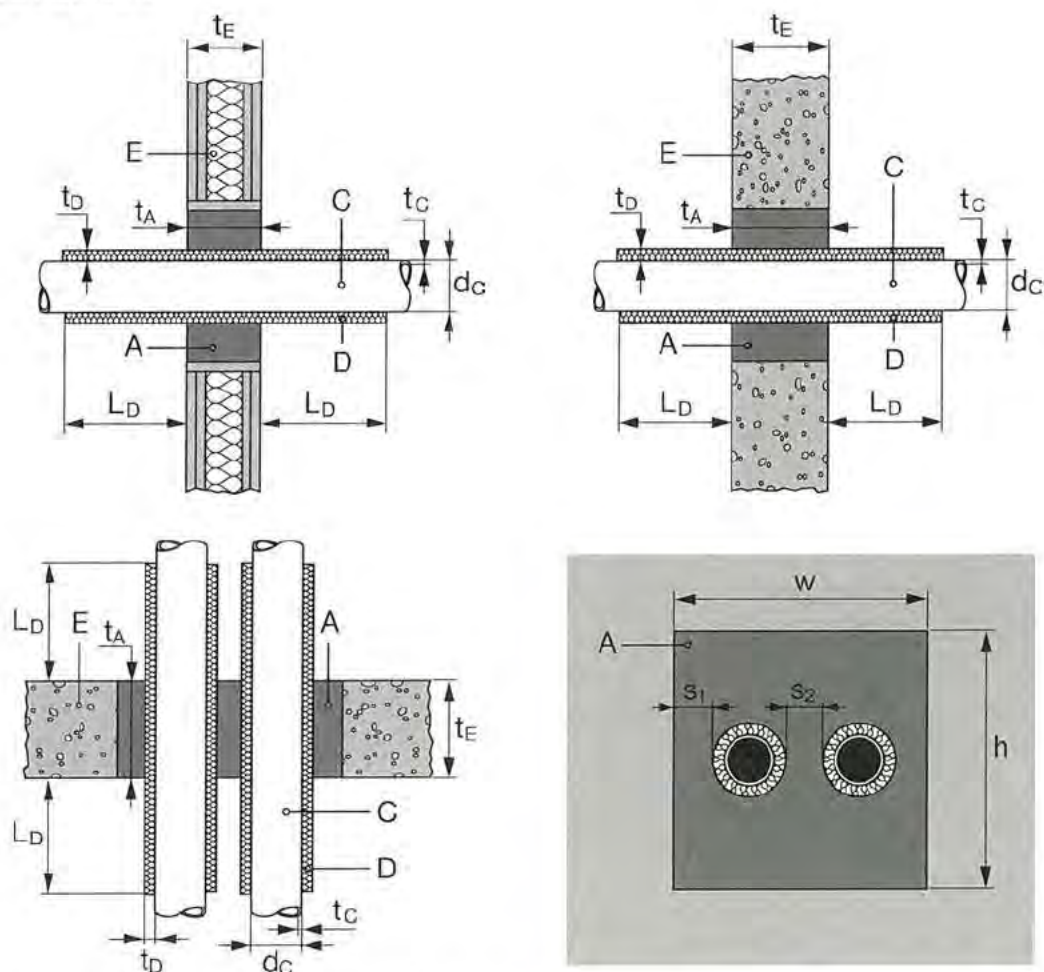
Construction details:

A) Continued insulation



For explanation of abbreviations see the related text and Annex A

## B) Local insulation:



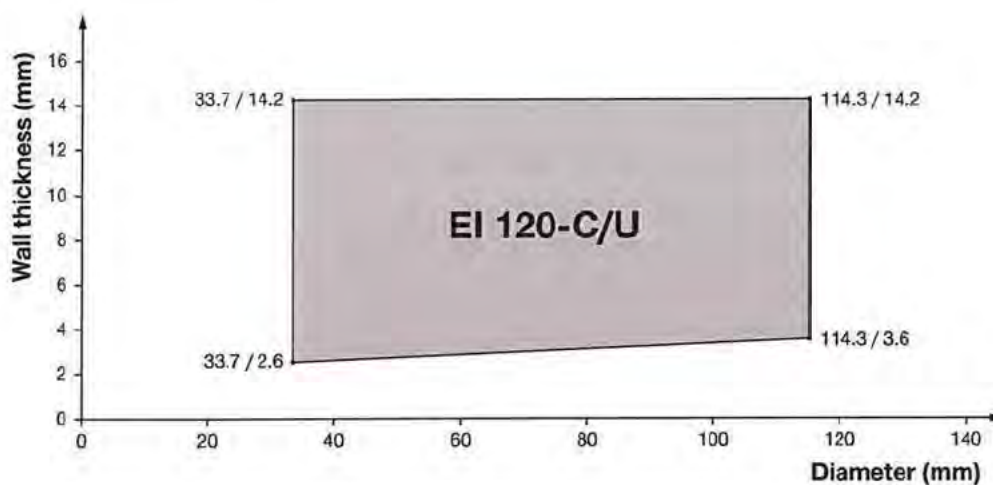
For explanation of abbreviations see the related text and Annex A

Minimum distance (mm):	<u>wall</u>	<u>floor</u>
between pipe and seal edge ( $s_1$ ):	0	20
between pipes ( $s_2$ ):		
— linear arrangement:	0	15
— in a cluster:	40	20

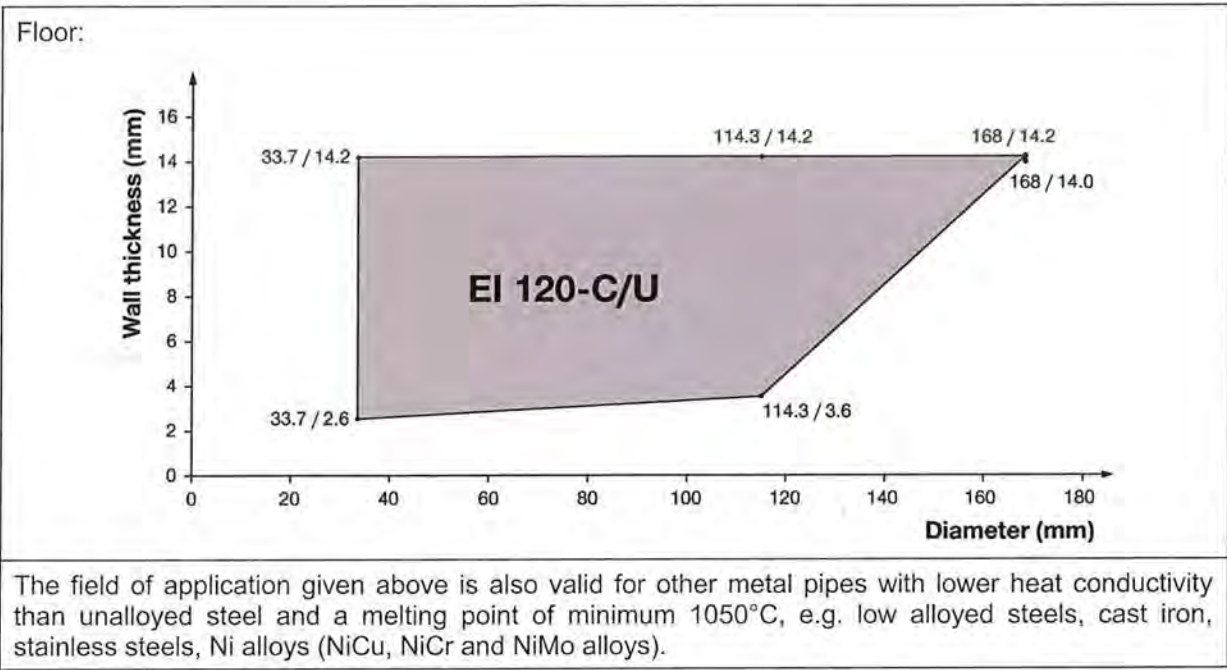
**Steel pipes**

Services	Classification	
	Wall	Floor
<b>Steel pipes (C)</b> arranged linear or in a cluster with sustained insulation (D) made from <b>Rockwool RS800</b> – continued or local (minimum length $L_D$ from seal surface on both sides: 500 mm).		
<b>Insulation thickness <math>t_D = 30</math> mm:</b> Diameter $\varnothing 33,7$ mm and minimum wall thickness 2,6 mm, maximum wall thickness 14,2 mm	EI 120 C/U	EI 120 C/U
<b>Insulation thickness <math>t_D = 40</math> mm:</b> Diameter between $\varnothing 33,7$ mm and $\varnothing 114,3$ mm, with minimum wall thickness 2,6 mm and 3,6 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm	EI 120 C/U	EI 120 C/U
<b>Insulation thickness <math>t_D = 40</math> mm:</b> Diameter between $\varnothing 114,3$ mm and $\varnothing 168$ mm, with minimum wall thickness 3,6 mm and 14 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm	-	EI 120 C/U

Wall:







Copper pipes

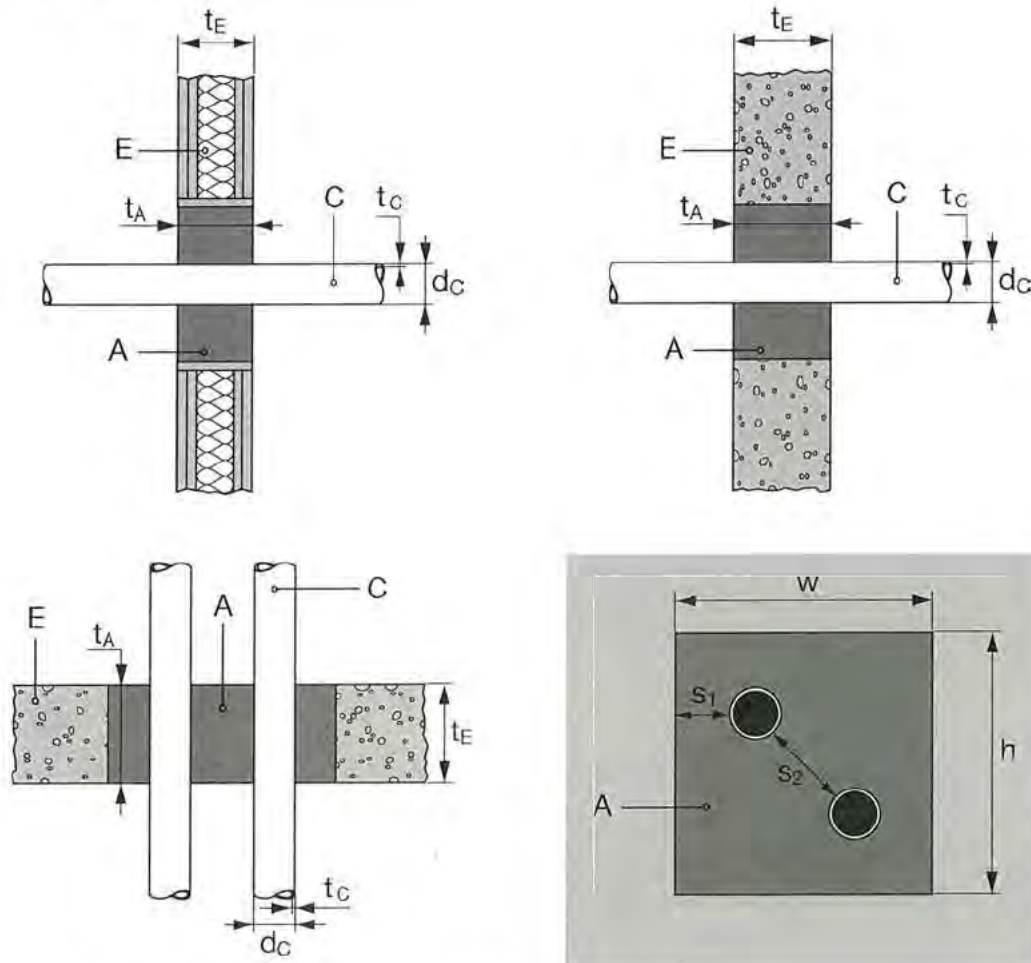
Services	Classification	
	Wall	Floor
Copper pipes arranged linear or in a cluster with sustained insulation made from <b>Rockwool RS800</b> - continued or local (minimum length $L_D$ from seal surface on both sides: 500 mm).		
Diameter between Ø28 mm and Ø88,9 mm, with minimum wall thickness 1 mm and 2 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm	EI 60 C/U E 120 C/U	EI 120 C/U
Diameter Ø88,9 mm with minimum wall thickness 2 mm, maximum wall thickness 14,2 mm	EI 90 C/U E 120 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 1050°C, e.g. unalloyed steels, low alloyed steels, cast iron, stainless steels, Ni and Ni alloys (NiCu, NiCr and NiMo alloys).		

## Plastic pipes

### Flexible wall, rigid wall and rigid floor constructions according to 1.2.1

**Penetration seal: Hilti Firestop Foam CFS-F FX (A)** of thickness  $t_A \geq 150$  mm centered regarding the thickness of the building element (E).

Construction details:



For explanation of abbreviations see the related text and Annex A

Minimum distance (mm):	wall	floor
between pipe and seal edge ( $s_1$ ):	30	50
between pipes ( $s_2$ ):	55	65

Services	Classification	
	Wall	Floor
<b>PE pipes</b> (C) according to EN 1519-1 and DIN 8074/8075 arranged linear, diameter $\varnothing 50$ mm with wall thickness between 2,9 mm and 4,6 mm.	EI 120 U/C	EI 120 U/C
<b>PVC-U pipes</b> (C) according to EN 1452-1 and DIN 8061/8062 arranged linear, diameter $\varnothing 50$ mm with wall thickness between 3,7 mm and 5,6 mm.	EI 120 U/C	EI 120 U/C
<b>PVC-U pipes</b> according to EN 1452-1 and DIN 8061/8062 arranged linear, diameter $\varnothing 50$ mm with wall thickness 3,7 mm.	-	EI 120 U/U

## ANNEX C

## RESISTANCE TO FIRE CLASSIFICATION OF HILTI FIRESTOP FOAM CFS-F FX IN COMBINATION WITH HILTI FIRESTOP BANDAGE CFS-B

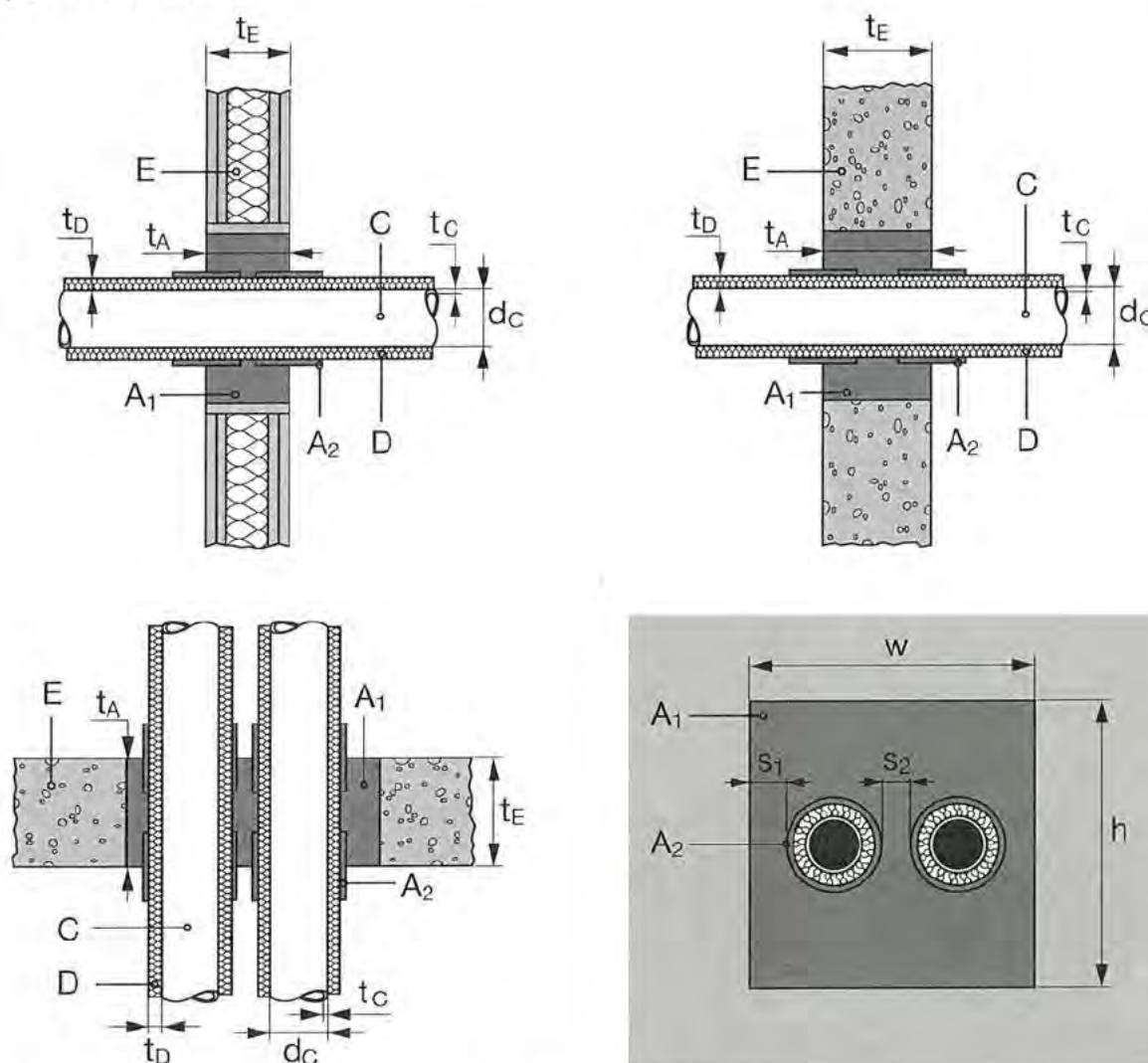
### Metal pipes – Armaflex insulation

Flexible wall, rigid wall and rigid floor constructions according to 1.2.1

**Penetration seal:** Hilti Firestop Foam CFS-F FX (A) of thickness  $t_A \geq 150$  mm centered regarding the thickness of the building element (E). Services covered by two layers of Hilti Firestop Bandage CFS-B on both sides. The bandage is positioned with its centre line flush to the seal surface.

Construction details:

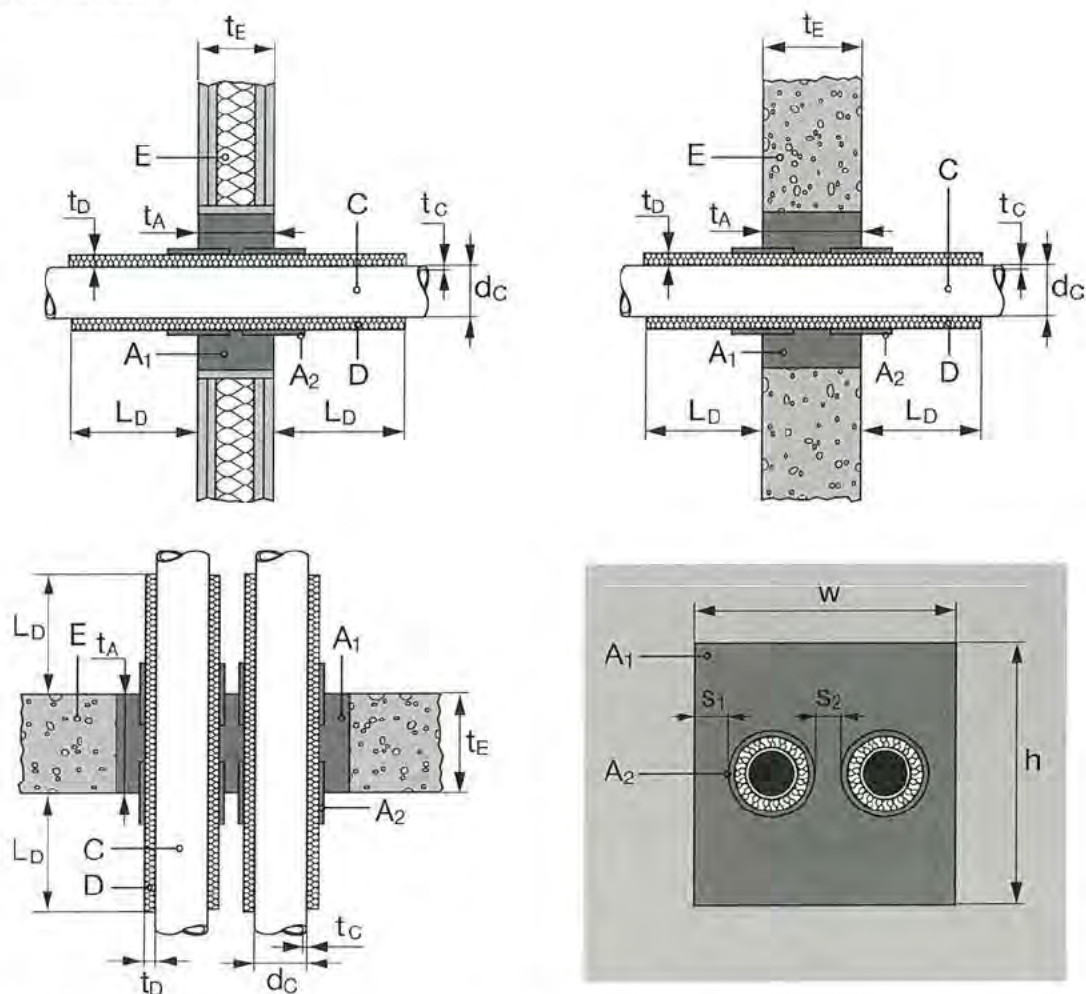
A) Continued insulation



For explanation of abbreviations see the related text and Annex A



## B) Local insulation:

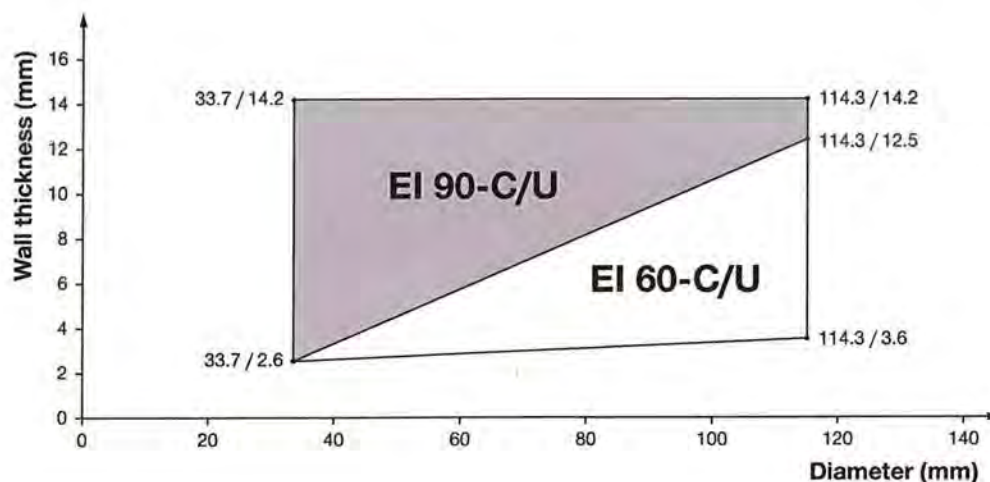


For explanation of abbreviations see the related text and Annex A

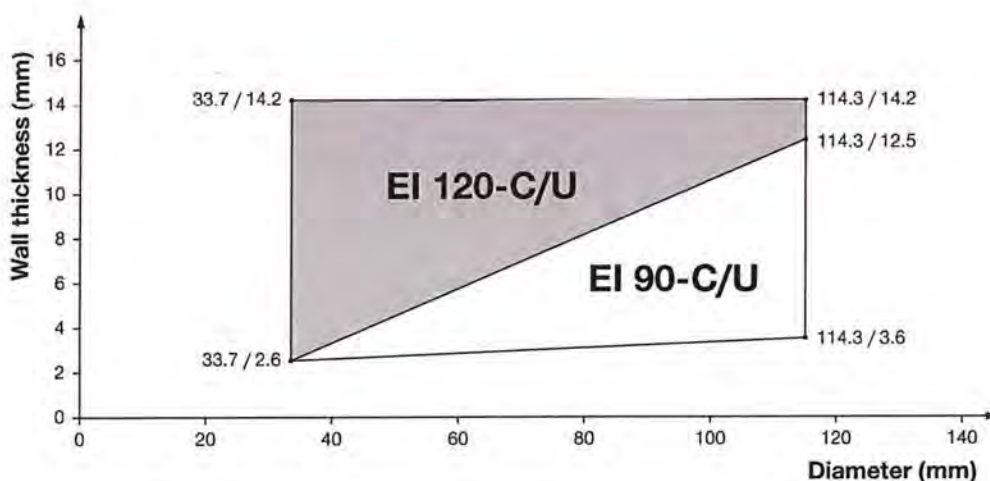
Minimum distance (mm):	wall	floor
between pipe and seal edge ( $s_1$ ):	15	40
between pipes ( $s_2$ ):	60	40

## Steel pipes

Services	Classification	
	Wall	Floor
<b>Steel pipes</b> arranged linear or in a cluster with sustained insulation made from 19 mm <b>Armaflex AF19</b> - continued or local (minimum length $L_D$ from seal surface on both sides: 500 mm)		
Diameter between $\varnothing 33,7$ mm and $\varnothing 114,3$ mm, with minimum wall thickness 2,6 mm and 3,6 mm respectively, interpolation of minimum thickness between these diameters; interpolation of maximum wall thickness between 2,6 and 12,5 mm respectively.	EI 60-C/U E 120-C/U	EI 90-C/U E 120-C/U
Diameter between $\varnothing 33,7$ mm and $\varnothing 114,3$ mm, with minimum wall thickness 2,6 mm and 12,5 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.	EI 90-C/U E 120-C/U	EI 120-C/U
Wall:		



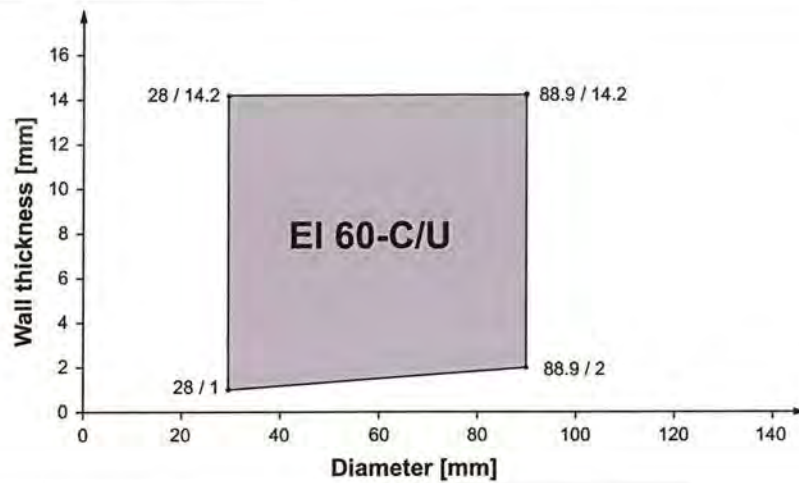
Floor:



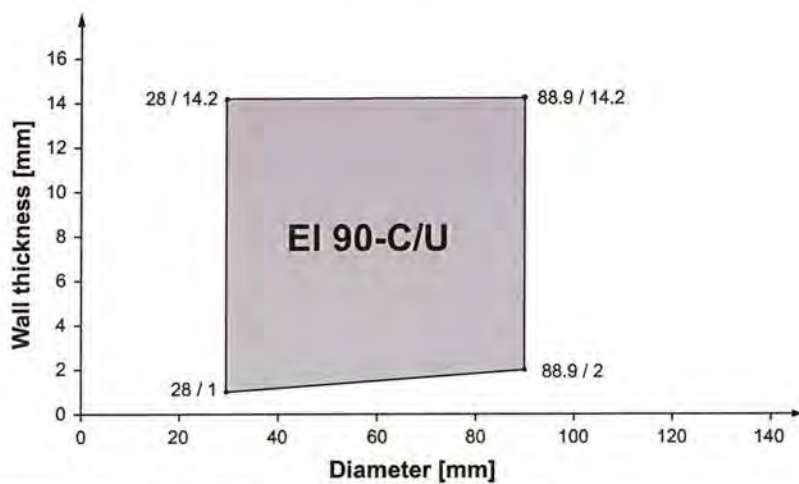
The field of application given above is also valid for other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys).

### Copper pipes

Services	Classification	
	Wall	Floor
<b>Copper pipes</b> arranged linear or in a cluster with sustained insulation made from 19 mm <b>Armaflex AF19</b> - continued or local (minimum length $L_D$ from seal surface on both sides: 500 mm).		
Diameter between Ø28 mm and Ø88,9 mm, with minimum wall thickness 1 mm and 2 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm	EI 60-C/U E 120-C/U	EI 90-C/U E 120-C/U
Diameter Ø28 mm with minimum wall thickness 1 mm, maximum wall thickness 14,2 mm	EI 120-C/U	EI 120-C/U
Wall:		



Floor:



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 1050°C, e.g. unalloyed steels, low alloyed steels, cast iron, stainless steels, Ni and Ni alloys (NiCu, NiCr and NiMo alloys).



## ANNEX D

## RESISTANCE TO FIRE CLASSIFICATION FOR MIXED PENETRATION SEALS

### Combination cables / metal pipes / plastic pipes

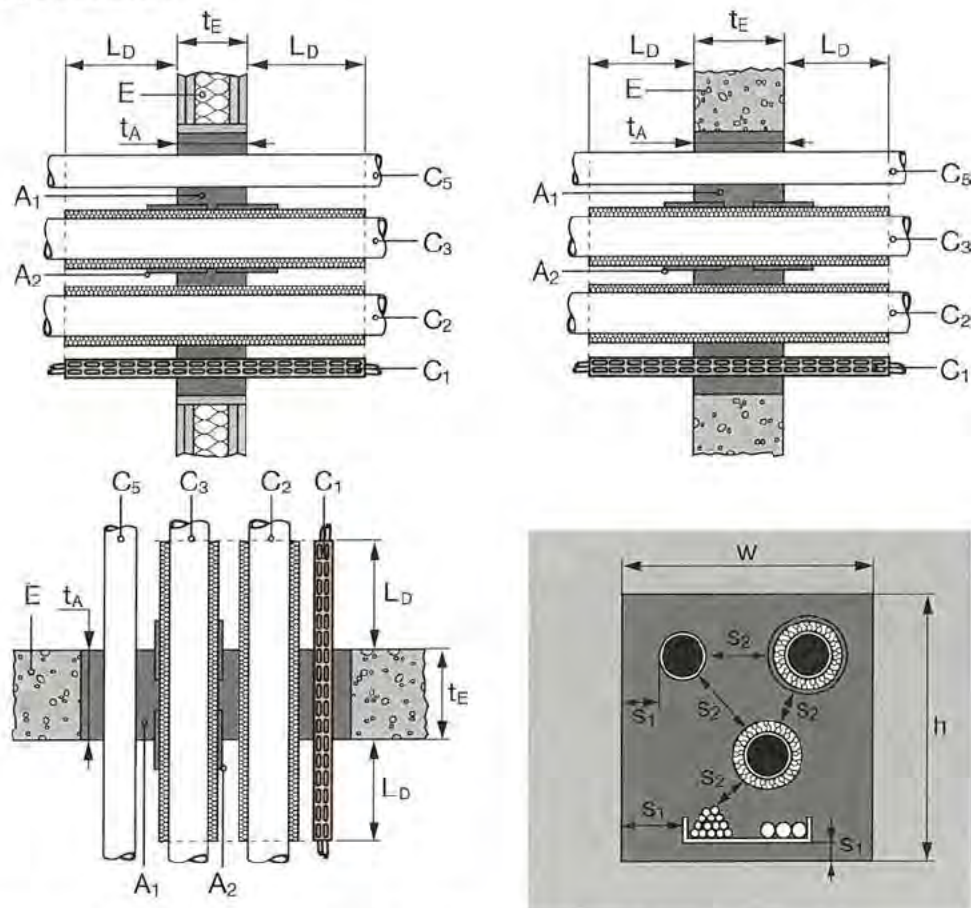
#### Flexible and rigid wall constructions according to 1.2.1

Penetration seal / Services	Classification
<p><b>Hilti Firestop Foam CFS-F FX (A)</b> of thickness <math>t_A</math> (mm) centered regarding the thickness of the building element (E).</p> <p>Metal pipes with Armaflex insulation covered by two layers of <b>Hilti Firestop Bandage CFS-B</b> on both sides. The bandage is positioned with its centre line flush to the seal surface.</p>	$t_A \geq 150$ mm
<p><b>Cables / cable trays / small conduits/tubes:</b></p> <p>All <b>sheathed cable</b> 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 80 mm).</p> <p><b>Tied cable bundle</b> <sup>6)</sup>, maximum diameter of 100 mm, maximum diameter of single cable 21 mm.</p> <p>Cable support construction: Perforated <b>metal cable</b> trays with a melting point higher than 1100°C (e.g. galvanised steel, stainless steel). Trays with organic coatings are covered if their overall classification is minimum A2 according to EN 13501-1.</p> <p>Steel conduits and tubes or other metal conduits or tubes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys), Ø maximum 16 mm.</p>	EI 60 / E 120
<p><b>Metal pipes:</b></p> <p><b>Steel pipes (C)</b> or other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation (D) made from 40 mm thick <b>Rockwool RS800</b> – continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm). Pipe diameter between Ø33,7 mm and Ø114,3 mm, with minimum wall thickness 2,6 mm and 3,6 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p> <p><b>Copper pipes</b> or other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steels, low alloyed steels, cast iron, stainless steels, Ni and Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation made from 40 mm thick <b>Rockwool RS800</b> - continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm). Diameter between Ø28 mm and Ø88,9 mm, with minimum wall thickness 1 mm and 2 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p> <p><b>Steel pipes</b> or other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation made from 19 mm <b>Armaflex AF19</b> - continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm); Diameter between Ø33,7 mm and Ø114,3 mm, with minimum wall thickness 2,6 mm and 3,6 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p>	EI 60 C/U E 120 C/U

<p><b>Copper pipes</b> or other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steels, low alloyed steels, cast iron, stainless steels, Ni and Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation made from 19 mm <b>Armaflex AF19</b> - continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm). Diameter between Ø28 mm and Ø88,9 mm, with minimum wall thickness 1 mm and 2 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p>	<p>EI 60 C/U E 120 C/U</p>														
<p><b>Plastic pipes:</b>  <b>PE pipes</b> (C<sub>4</sub>) according to EN 1519-1 and DIN 8074/8075 arranged linear, diameter Ø50 mm with wall thickness between 2,9 mm and 4,6 mm.  <b>PVC-U pipes</b> (C) according to EN 1452-1 and DIN 8061/8062 arranged linear, diameter Ø50 mm with wall thickness between 3,7 mm and 5,6 mm.</p>	<p>EI 60 U/C E 120 U/C</p>														
<p>Minimum distance (mm):</p> <table> <tr> <td>between cables/cable tray and seal edge (<math>s_1</math>):</td><td>0</td></tr> <tr> <td>between cables and cable tray above / cables and pipes (<math>s_2</math>):</td><td>35</td></tr> <tr> <td>between metal pipes and seal edge (<math>s_1</math>):</td><td>0</td></tr> <tr> <td>between metal pipes - linear arrangement (<math>s_2</math>):</td><td>0</td></tr> <tr> <td>between metal pipes - cluster arrangement (<math>s_2</math>):</td><td>40</td></tr> <tr> <td>between plastic pipes and seal edge (<math>s_1</math>):</td><td>30</td></tr> <tr> <td>between plastic pipes and between metal and plastic pipes (<math>s_2</math>):</td><td>55</td></tr> </table>		between cables/cable tray and seal edge ( $s_1$ ):	0	between cables and cable tray above / cables and pipes ( $s_2$ ):	35	between metal pipes and seal edge ( $s_1$ ):	0	between metal pipes - linear arrangement ( $s_2$ ):	0	between metal pipes - cluster arrangement ( $s_2$ ):	40	between plastic pipes and seal edge ( $s_1$ ):	30	between plastic pipes and between metal and plastic pipes ( $s_2$ ):	55
between cables/cable tray and seal edge ( $s_1$ ):	0														
between cables and cable tray above / cables and pipes ( $s_2$ ):	35														
between metal pipes and seal edge ( $s_1$ ):	0														
between metal pipes - linear arrangement ( $s_2$ ):	0														
between metal pipes - cluster arrangement ( $s_2$ ):	40														
between plastic pipes and seal edge ( $s_1$ ):	30														
between plastic pipes and between metal and plastic pipes ( $s_2$ ):	55														
Construction details:															
A) Continued pipe insulation															
For explanation of abbreviations see the related text and Annex A															



## B) Local pipe insulation:



For explanation of abbreviations see the related text and Annex A

## Rigid floor constructions according to 1.2.1

Penetration seal / Services *	Classification
<p><b>Hilti Firestop Foam CFS-F FX (A)</b> of thickness <math>t_A</math> (mm) centered regarding the thickness of the building element (E).</p> <p>Metal pipes with Armaflex insulation covered by two layers of <b>Hilti Firestop Bandage CFS-B</b> on both sides. The bandage is positioned with its centre line flush to the seal surface.</p>	$t_A \geq 150$ mm
<p><b>Cables / cable trays / small conduits/tubes:</b></p> <p>All <b>sheathed cable</b> 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 80 mm).</p> <p><b>Tied cable bundle</b> <sup>6</sup>, maximum diameter of 100 mm, maximum diameter of single cable 21 mm.</p> <p>Cable support construction: Perforated <b>metal cable</b> trays with a melting point higher than 1100°C (e.g. galvanised steel, stainless steel). Trays with organic coatings are covered if their overall classification is minimum A2 according to EN 13501-1.</p> <p>Steel conduits and tubes or other metal conduits or tubes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys), Ø maximum 16 mm.</p>	EI 60 / E 120



<p><b>Metal pipes:</b></p> <p><b>Steel pipes</b> (C) or other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation (D) made from 40 mm thick <b>Rockwool RS800</b> – continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm). Pipe diameter between Ø33,7 mm and Ø114,3 mm, with minimum wall thickness 2,6 mm and 3,6 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p> <p><b>Copper pipes</b> or other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steels, low alloyed steels, cast iron, stainless steels, Ni and Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation made from 40 mm thick <b>Rockwool RS800</b> - continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm). Diameter between Ø28 mm and Ø88,9 mm, with minimum wall thickness 1 mm and 2 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p> <p><b>Steel pipes</b> or other metal pipes with lower heat conductivity than unalloyed steel and a melting point of minimum 1050°C, e.g. low alloyed steels, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation made from 19 mm <b>Armaflex AF19</b> - continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm); Diameter between Ø33,7 mm and Ø114,3 mm, with minimum wall thickness 2,6 mm and 3,6 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p> <p><b>Copper pipes</b> or other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steels, low alloyed steels, cast iron, stainless steels, Ni and Ni alloys (NiCu, NiCr and NiMo alloys) arranged linear or in a cluster with sustained insulation made from 19 mm <b>Armaflex AF19</b> - continued or local (minimum length <math>L_D</math> from seal surface on both sides: 500 mm). Diameter between Ø28 mm and Ø88,9 mm, with minimum wall thickness 1 mm and 2 mm respectively, interpolation of minimum thickness between these diameters; maximum wall thickness 14,2 mm.</p>	<p>EI 60 C/U E 120 C/U</p>														
<p><b>Plastic pipes:</b></p> <p><b>PE pipes</b> (C<sub>4</sub>) according to EN 1519-1 and DIN 8074/8075 arranged linear, diameter Ø50 mm with wall thickness between 2,9 mm and 4,6 mm.</p> <p><b>PVC-U pipes</b> (C) according to EN 1452-1 and DIN 8061/8062 arranged linear, diameter Ø50 mm with wall thickness between 3,7 mm and 5,6 mm.</p>	<p>EI 60 U/C E 120 U/C</p>														
<p>Minimum distance (mm):</p> <table> <tr> <td>between cables/cable tray and seal edge (<math>s_1</math>):</td><td>0</td></tr> <tr> <td>between cables and cable tray above / cables and pipes (<math>s_2</math>):</td><td>35</td></tr> <tr> <td>between metal pipes and seal edge (<math>s_1</math>):</td><td>0</td></tr> <tr> <td>between metal pipes - linear arrangement (<math>s_2</math>):</td><td>0</td></tr> <tr> <td>between metal pipes - cluster arrangement (<math>s_2</math>):</td><td>40</td></tr> <tr> <td>between plastic pipes and seal edge (<math>s_1</math>):</td><td>30</td></tr> <tr> <td>between plastic pipes and between metal and plastic pipes (<math>s_2</math>):</td><td>55</td></tr> </table>		between cables/cable tray and seal edge ( $s_1$ ):	0	between cables and cable tray above / cables and pipes ( $s_2$ ):	35	between metal pipes and seal edge ( $s_1$ ):	0	between metal pipes - linear arrangement ( $s_2$ ):	0	between metal pipes - cluster arrangement ( $s_2$ ):	40	between plastic pipes and seal edge ( $s_1$ ):	30	between plastic pipes and between metal and plastic pipes ( $s_2$ ):	55
between cables/cable tray and seal edge ( $s_1$ ):	0														
between cables and cable tray above / cables and pipes ( $s_2$ ):	35														
between metal pipes and seal edge ( $s_1$ ):	0														
between metal pipes - linear arrangement ( $s_2$ ):	0														
between metal pipes - cluster arrangement ( $s_2$ ):	40														
between plastic pipes and seal edge ( $s_1$ ):	30														
between plastic pipes and between metal and plastic pipes ( $s_2$ ):	55														
<p>Construction details: see E.1.1</p>															

## ANNEX E

## INSTRUCTION FOR USE

**Instructions for use**

Hilti Firestop Foam CFS-F FX is approved as a **permanent firestop seal for indoor applications**.

The foam can be used to form a firestop seal around cables, cable trays, combustible / non-combustible pipes passing through medium-sized openings in fire compartment walls and ceilings.

**National approval and fire prevention regulations take priority and must be observed.**

**Read these instructions and safety precautions before using the product.**

**Expiry date:** See date printed on the manifold (month/year). Use of the foil pack after this date is not permissible!

**Transport and storage:** Store in a cool, dry, dark place at a temperature of **+5°C to +25°C / +41°F to +77°F**.

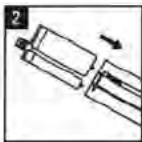
**Foil pack temperature:** Must be between **+10°C and +35°C / +50°F and +97°F** during application.

**Base material temperature:** Must be between **0°C and +40°C / 32°F and +104°F** during application.

**Installation instructions:** The operations to be carried out are illustrated in pictograms 1- 9.



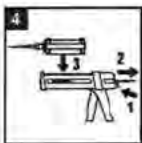
**Clean the opening to be sealed.** The material around the opening must be dry, in sound condition and free from dust or grease.



Check the foil pack holder for damage and ensure that it functions correctly. **Slide the foil pack into the holder. Caution:** Never use damaged foil packs and/or damaged or badly soiled foil pack holders.



Remove the cap. **Screw the mixing nozzle all the way onto the foil pack and tighten it securely.** Check that the black mixing element is in place inside the nozzle! Do not use damaged mixing nozzles. Do not, under any circumstances, modify or tamper with the mixing nozzle. The foil pack should only be used together with the mixing nozzle supplied. A new mixing nozzle must be used with each new foil pack.



**Insert the holder containing the foil pack into the dispenser:** Press the release button on the dispenser, pull the piston rod back as far as it will go and then insert the holder containing the foil pack into the dispenser.



The foil pack opens automatically when dispensing begins. Never pierce a hole in the foil pack! This will cause the system to malfunction.

**Discard the unevenly mixed initial quantity:** The foam dispensed by the first stroke of the dispenser must be discarded, e.g. in the empty outer packaging material.



**Apply the firestop foam in the opening to be sealed.** The mixed components of the foam react and begin to expand approx. 30 seconds after application (at 23°C). Fill the opening completely with firestop foam, including gaps between individual cables, etc.

**- NOTE -**

It is generally best to begin in the middle of the opening, building up the foam by working from bottom to top. In openings with access from only one side, begin at the rear and work toward the front.

The foam will harden in the mixing nozzle during pauses (i.e. > 1 minute at 23°C; > 20 seconds at 35°C). **The mixing nozzle must then be changed.** Release the pressure from the piston rod before changing the mixing nozzle.

Use formwork made from an air-permeable material (e.g. perforated cardboard) when filling openings in ceilings.



The foam can be shaped or smoothed by hand (if necessary) after approx. 5 minutes (at 23°C). **Wear protective gloves!** After approx. 10 minutes (at 23°C) the foam becomes hard and it can then be cut.

**- NOTE -**

After hardening, any projecting foam can be trimmed off to the specified minimum depth. Trimmed-off scraps of hardened foam can be placed in the next opening and fresh foam applied around these.



**Mount the installation identification plate beside the correctly sealed opening.**



**Subsequent installation of cables or pipes**

Additional cables or pipes can be installed in the opening without difficulty.

Do not exceed the approved maximum number and size of cables or pipes.

1. The cable or pipe may be pushed directly through the foam. Where necessary, use a suitable tool (screwdriver or drill bit, etc.) to make a hole in the foam before pushing the cable or pipe through. Do not damage existing cables.

2. Seal any remaining gaps carefully with Hilti Firestop Foam CFS-F FX



# ÖSTERREICHISCHES INSTITUT FÜR BAUTECHNIK

A-1010 Vienna, Schenkenstrasse 4  
Tel.: + 43 (0) 1 - 5 3 3 6 5 5 0  
Fax: + 43 (0) 1 - 5 3 3 6 4 2 3  
E-mail: mail@oib.or.at



Member of EOTA

## European technical approval

ETA-10/0406

(English language translation, the original version is in German language)

Handelsbezeichnung:  
*Trade name:*

**Hilti Firestop Intumescent Sealant CFS-IS**

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:*

**22.02.2011**

**21.02.2016**

Herstellwerk:  
*Manufacturing plant:*

**Hilti Werk 4a**

Diese Europäische  
technische Zulassung umfasst:  
*This European technical  
approval contains:*

**19 Seiten inklusive 3 Anhängen**

**19 pages including 3 Annexes**

## **I LEGAL BASES AND GENERAL CONDITIONS**

- 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<sup>1</sup> modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - 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/EC<sup>4</sup>;
  - 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.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Österreichisches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 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.

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<sup>1</sup> Official Journal of the European Communities N° L 40, 11.2.1989, p. 12  
<sup>2</sup> Official Journal of the European Communities N° L 220, 30.8.1993, p. 1  
<sup>3</sup> Official Journal of the European Union N° L 284, 31.10.2003, p.1  
<sup>4</sup> 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 Intumescent Sealant CFS-IS is a product to form a penetration seal used to reinstate the fire resistance performance of wall and floor constructions, where they have been provided with apertures for the penetration of services.

Hilti Firestop Intumescent Sealant CFS-IS is a 1-component product and is composed essentially of filling substances, intumescent components and binder (acrylic). Colour: anthracite.

Hilti Firestop Intumescent Sealant CFS-IS is supplied in 310 ml cartridges. 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 mineral wool as a backing material. For specification of suitable mineral wool products see Annex B.

#### **1.2 Intended Use and Use Category**

##### **1.2.1 Intended Use**

Hilti Firestop Intumescent Sealant CFS-IS may be used to provide a penetration seal around services running through square or rectangular openings of maximum dimensions  $w \times h = 150 \text{ mm} \times 150 \text{ mm}$  or circular openings of an equivalent maximum area in walls and floors. Further details on the type of services covered by the declared classifications and other parameters to be considered are given in Annex C.

- (1) The specific structures where Hilti Firestop Intumescent Sealant CFS-IS may be used to provide a penetration seal are as follows:

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 between the seal and any stud, and the cavity must be filled with minimum 100 mm insulation of Class A1 or A2 in accordance with EN 13501-1).

Rigid walls: The wall must have a minimum thickness of 100mm and comprise concrete, aerated concrete or masonry, with a minimum density of 550  $\text{Kg/m}^3$ .

Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 550  $\text{Kg/m}^3$ .

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 Intumescent Sealant CFS-IS may be used to provide a penetration seal with the following specific services:

Blank seal	as given in Annex C
Cables / conduits	Services as given in Annex C

- (3) The first support of the cables / conduits shall be located at maximum 250 mm away from both faces of wall constructions and maximum 250 mm from the upper face of floor constructions.



The provisions made in this European technical approval are based on an assumed working life of Hilti Firestop Intumescent Sealant CFS-IS 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.

### 1.2.2 Use Category

The use category of Hilti Firestop Intumescent Sealant CFS-IS is Type Y<sub>2</sub>, (-5/+70)°C. Since the requirements for type Y<sub>2</sub> are met, also the requirements for type Z<sub>1</sub> and Z<sub>2</sub> are fulfilled.

Type Y<sub>2</sub>: Products for penetration seals intended for use at temperatures between -5 °C and + 70°C, but with no exposure to rain nor UV.

Type Z<sub>1</sub>: Products for penetration seals intended for use at internal conditions with high humidity, excluding temperatures below 0°C.<sup>5</sup>

Type Z<sub>2</sub>: Products for penetration seals intended for uses at internal conditions with humidity classes other than Z<sub>1</sub>, 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).

ETAG Clause No.	ETA Clause No.	Characteristic	Assessment of characteristic
		<b>Mechanical resistance and stability</b>	Not relevant
		<b>Safety in case of fire</b>	
2.4.1	2.1	Reaction to fire	Class E according to EN 13501-1
2.4.2	2.2	Resistance to fire	See clause 2.2
		<b>Hygiene, Health and the Environment</b>	
2.4.3	2.3	Air permeability	Air and gas tight
2.4.4	2.4	Water permeability	No performance determined
2.4.5	2.5	Dangerous substances	See clause 2.5
		<b>Safety in use</b>	
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
		<b>Protection against noise</b>	
2.4.9	2.9	Airborne sound insulation	No performance determined

		<b>Energy, Economy and Heat Retention</b>	
2.4.10		Thermal properties	No performance determined
2.4.11		Water vapour permeability	No performance determined
		<b>General aspects relating to fitness for use</b>	
2.4.12		Durability and serviceability	Y <sub>2</sub> , (-5/+70)°C

## 2.1 Reaction to fire

The reaction to fire classification for Hilti Firestop Intumescent Sealant CFS-IS in the cured state is class E according to EN 13501-1.

## 2.2 Resistance to fire

The classification of the resistance to fire performance has been carried out in accordance with clause 7.5.8 in EN 13501-2:2007. Penetration seals made from Hilti Firestop Intumescent Sealant CFS-IS are classified according to combinations of performance parameters and classes as shown in Annex C. The classifications are valid for services running through square or rectangular openings of maximum dimensions  $w \times h = 150 \text{ mm} \times 150 \text{ mm}$  or circular openings of an equivalent maximum area, in flexible and rigid walls with minimum thickness  $t_E = 100 \text{ mm}$  and  $150 \text{ mm}$  respectively and concrete floors with minimum thickness  $150 \text{ mm}$ . The classifications require that the rules for installation shown in cl. 4.2 are followed.

The classifications are not valid for sandwich panel constructions.

## 2.3 Air permeability

The air permeability has been tested according to EN 1026.

Hilti Firestop Intumescent Sealant CFS-IS is impermeable for air, N<sub>2</sub>, CO<sub>2</sub> and CH<sub>4</sub> (Methane).

The permeability regarding the gases listed above has been determined for 50 mm thickness of Hilti Firestop Intumescent Sealant CFS-IS.

The result refers to a body of pure Hilti Firestop Intumescent Sealant CFS-IS without any penetrating installation.

## 2.4 Water permeability

No performance determined

## 2.5 Dangerous substances

According to the manufacturer's declaration, the product specification has been compared with the list of dangerous substances of the European Commission to verify that it does not contain such substances above the acceptable limits.

A written declaration in this respect was submitted by the ETA-holder.

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



## **2.5 Mechanical resistance and stability**

No performance determined.

## **2.6 Resistance to impact/movement**

No performance determined.

## **2.7 Adhesion**

No performance determined.

## **2.8 Airborne sound insulation**

No performance determined.

## **2.9 Thermal properties**

No performance determined.

## **2.10 Water vapour permeability**

No performance determined.

## **2.12 Durability and serviceability**

### **2.12.1 Durability**

Hilti Firestop Intumescent Sealant CFS-IS has been tested in accordance with EOTA technical Report - TR024 - Edition November 2006, Table 4.1, for the type Y<sub>2</sub> use category specified in EOTA 026-2. The results of the tests 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 (Y<sub>2</sub>, (-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): 164E+10 ± 55E+10 Ω.cm.
- Surface resistivity (according to DIN IEC 93 (VDE 0303 Part 30):1993-12): 318E+06 ± 84E+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 Commission<sup>6</sup> 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:

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



- (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 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 of the ETA holder and the provisions taken by the ETA-holder for components not produced by himself shall be in accordance with the control plan<sup>7</sup> 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.

#### **Additional information**

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information:

*technical data sheet:*

- Field of application:
  - Building elements for which the penetration seal is suitable, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions – the construction requirements.
  - Services for which the penetration seal is suitable, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. cable trays)
  - Limits in size, minimum thickness etc. of the penetration seal
- Construction of the penetration seal including the necessary components and additional products (e.g. backfilling material) with clear indication whether they are generic or specific.

*Installation instruction:*

- Steps to be followed
- Procedure in case of retrofitting.

#### 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

<sup>7</sup>

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.



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 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.

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-10/0406 for other relevant characteristics (e.g. resistance to fire)”

## **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**

The ETA is issued under the assumption that the installation of the approval product shall be in accordance with the manufacturer's technical literature.

Installation of the Hilti Firestop Intumescent Sealant CFS-IS must be conducted as follows:

- Clean opening. Surfaces to which Hilti Firestop Intumescent Sealant CFS-IS will be applied should be cleaned of loose debris, dirt, oil, wax and grease.



- Hilti Firestop Intumescent Sealant CFS-IS adheres to most substrates (concrete, masonry, drywall, plaster, etc.) without using a primer. For very brittle and porous substrates, a prior coating of Hilti Firestop Intumescent Sealant CFS-IS diluted with water is recommended as a primer. Other primers are not necessary.
- Insert backfilling material. Leave sufficient depth for application of the sealant.
- As backfilling material loose stone wool must be applied. For suitable products see Annex B. The wool must be tightened thoroughly.
- Apply Hilti Firestop Intumescent Sealant CFS-IS using a manual dispenser (e.g. Hilti CB 200-P1).
- Smooth the sealant. Use either a diluted liquid soap or smoothing agent and carefully smooth using a finger or narrow spatula.
- Repeat installation on the other side of the wall.
- The sealant depth is described in Annex 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.

Storage/transport:

Transport and storage temperature: +5°C to +25°C.

CFS-IS has to be stored dry in its original packaging.

On behalf of Österreichisches Institut für Bautechnik



Managing Director

## ANNEX A

### REFERENCE DOCUMENTS and LIST OF ABBREVIATIONS

#### A.1 References to standards mentioned in the ETA

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
EN 1026	Windows and doors – Air permeability – Test method
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

#### A.2 Other reference documents

EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products
-------------	--

#### A.3 Abbreviations used in drawings

Abbreviation	Description
A	Firestop product
B	Backfilling material
E	Building element (wall, floor)
h	Height/length of penetration seal
L <sub>A</sub>	Length of additional Hilti Firestop Intumescent Sealant CFS-IS in front of the wall/floor
s <sub>1</sub> , s <sub>2</sub>	Distances
t <sub>A</sub> , t <sub>1A</sub>	Thickness (depth) of penetration seal
t <sub>2A</sub>	Thickness of additional Hilti Firestop Intumescent Sealant CFS-IS in front of the wall/floor
t <sub>B</sub>	Thickness (depth) of backfilling material
t <sub>E</sub>	Thickness of the building element
w	Width of penetration seal

## ANNEX B

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

#### B.1 Hilti Firestop Intumescent Sealant CFS-IS

A detailed specification of the product is contained in document "Identification / Product Specification relating to the European technical approval ETA – 10/0406, Hilti Firestop Intumescent Sealant CFS-IS" which is a non-public part of this ETA.

The Control Plan is defined in document "Control Plan relating to the European technical approval ETA-10/0406 - Hilti Firestop Intumescent Sealant CFS-IS" which is a non-public part of this ETA.

##### **Technical product literature:**

- Technical data sheet and instructions for use Hilti Firestop Intumescent Sealant CFS-IS

#### B.2 Mineral Wool

Loose mineral wool products suitable for being used as backfilling material

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



## ANNEX C

### RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE FROM HILTI FIRESTOP INTUMESCENT SEALANT CFS-IS

#### C.1 Flexible wall constructions according to 1.2.1

##### Penetration seal:

Hilti Firestop Intumescent Sealant CFS-IS (A) on both sides, thickness ( $t_A$ ) 25 mm, mineral wool (B) tightly compressed as backfilling material, thickness ( $t_B$ )  $\geq 50$  mm (gap filled completely).

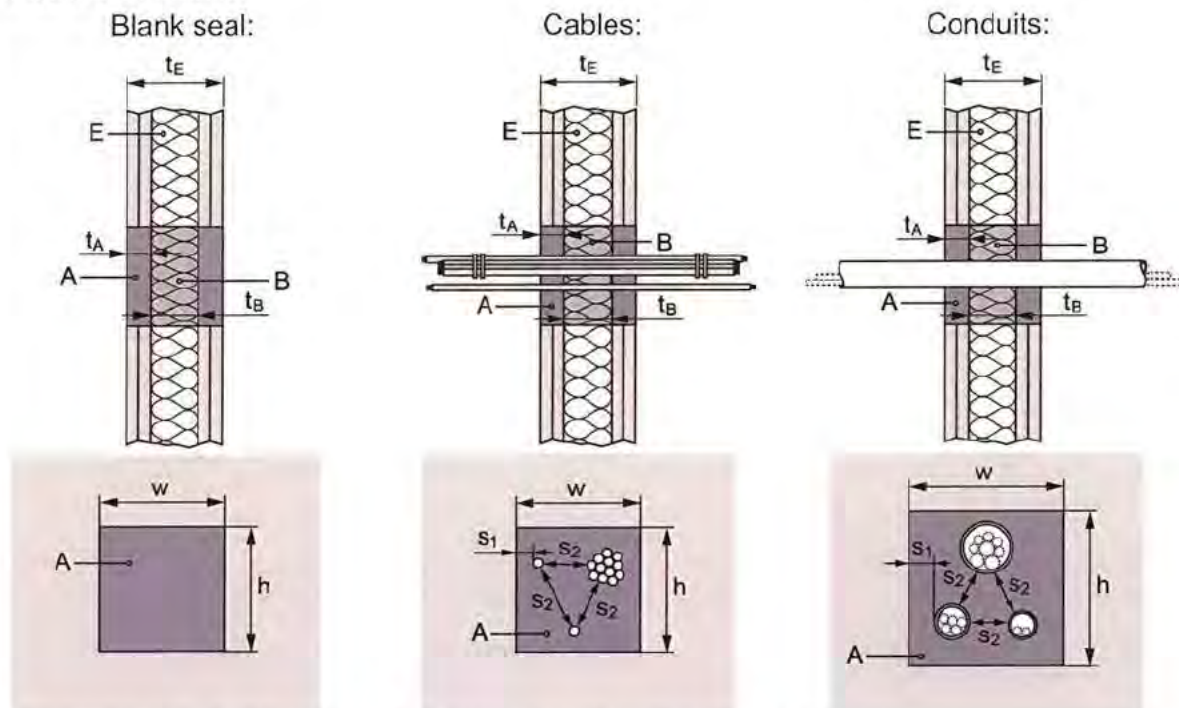
For suitable products for mineral wool backfilling see Annex B.

Maximum seal size: 150 x 150 mm or circular openings of equivalent area.

Minimum distances (mm):

Cables to edge of seal	$s_1 = 0$
Cable to other cables/services	$s_2 = 0$
Tied cable bundle to seal edge	$s_1 = 10$
Tied cable bundle to other services	$s_2 = 0$
Small conduits/tubes to edge of seal	$s_1 = 10$
Small conduits/tubes to other services	$s_2 = 0$
Conduits $16 \leq \varnothing \leq 32$ mm to edge of seal	$s_1 = 10$
Conduits $16 \leq \varnothing \leq 32$ mm to other services	$s_2 = 10$

Construction details:



For explanation of abbreviations see the related text and Annex A

Services	Classification
<b>C.1.1 Blank seal</b>	EI 120 *)
<p>*) If cables are added later on only cables with a diameter &lt; 21 mm, small conduits/tubes according to C.1.3.1 and C.1.3.2 and conduits according to C.1.3.3 may be added if the required classification is EI 120.</p> <p>If the seal is used in a wall with a requirement of EI 90 tied cable bundles according to C.1.2 may be added later on.</p> <p>If the seal is used in a wall with a requirement of EI 60 or EI 30 all types of cables according to C.1.2 may be added later on.</p>	
<b>C.1.2 Cables</b>	<b>Classification</b>
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables) with a diameter of:	
Maximum Ø 21 mm	EI 120
$21 \leq \text{Ø} \leq 80 \text{ mm}$	EI 60
Tied cable bundle <sup>8</sup> , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	EI 90
<b>C.1.3 Conduits</b>	<b>Classification</b>
C.1.3.1 Small steel conduits and tubes, diameter $\leq 16 \text{ mm}$ , arranged linear, with or without cables	EI 120-C/U
C.1.3.2 Small plastic conduits and tubes, diameter $\leq 16 \text{ mm}$ , arranged linear, with or without cables	EI 120-U/C
C.1.3.3 Plastic conduits, diameter $16 \leq \text{Ø} \leq 32 \text{ mm}$ , wall thickness 1 – 3 mm, arranged linear or in a cluster, with or without cables	EI 120-U/C

<sup>8</sup>

Several cables running in the same direction and bound closely together by mechanical means



## C.2 Rigid wall constructions according to 1.2.1

### Penetration seal:

Seal type 1: Hilti Firestop Intumescent Sealant CFS-IS (A) on both sides, thickness ( $t_A$ ,  $t_{1A}$ ) 25 mm, mineral wool (B) tightly compressed as backfilling material, thickness ( $t_B$ )  $\geq 100$  mm (gap filled completely).

Seal type 2: additional sealant CFS-IS ( $t_{2A} \geq 10$  mm,  $L_A \geq 50$  mm) on both sides.

Seal type 3: additional sealant CFS-IS ( $t_{2A} \geq 10$  mm,  $L_A \geq 100$  mm) on both sides.

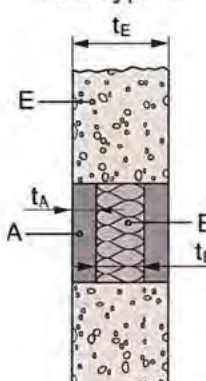
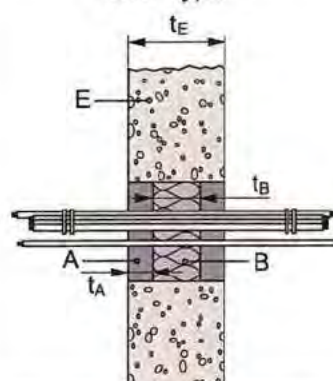
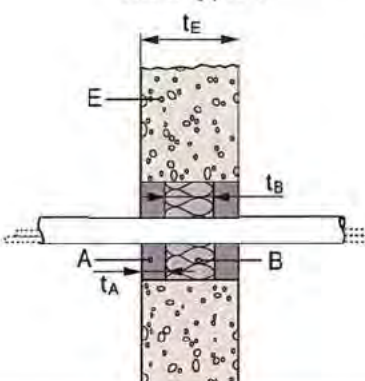
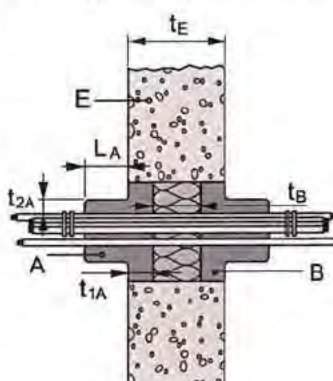
For suitable products for mineral wool backfilling see Annex B.

Maximum seal size: 150 x 150 mm or circular openings of equivalent area.

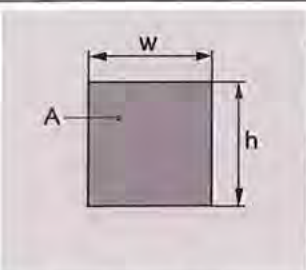
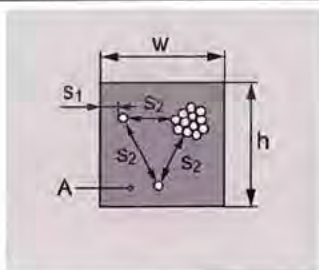
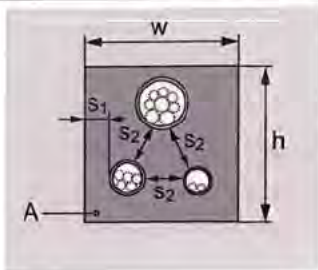



Minimum distances (mm):

Cables to edge of seal	$s_1 = 0$
Cable to other cables/services	$s_2 = 0$
Tied cable bundle to seal edge	$s_1 = 10$
Tied cable bundle to other services	$s_2 = 0$
Small conduits/tubes to edge of seal	$s_1 = 10$
Small conduits/tubes to other services	$s_2 = 0$
Conduits $16 \leq \varnothing \leq 32$ mm to edge of seal	$s_1 = 10$
Conduits $16 \leq \varnothing \leq 32$ mm to other services	$s_2 = 10$

Construction details:

Blank seal	Cables and conduits $\leq 16$ mm	Conduits $16 \leq \varnothing \leq 32$ mm
<p>Seal type 1</p> 	<p>Seal type 1</p> 	<p>Seal type 1</p> 
	<p>Seal type 2 (<math>L_A \geq 50</math> mm) Seal type 3 (<math>L_A \geq 100</math> mm)</p> 	



			
For explanation of abbreviations see the related text and Annex A			
<b>Services</b>	<b>Classification</b>		
<b>C.2.1 Blank seal</b>	EI 120 *)		
*) If cables are added later on only cables with a diameter < 21 mm, tied cable bundles according to C.2.2, small conduits/tubes according to C.2.3.1 and C.2.3.2 and conduits according to C.2.3.3 may be added if the required classification is EI 120. If the seal is used in a wall with a requirement of EI 60 or EI 30 all types of cables according to C.2.2 may be added later on. In case additional Sealant CFS-IS is added with $L_A \geq 50$ mm / $t_{2A} \geq 10$ mm (seal type 2) all cables according to C.2.2 may be added for a requirement of EI 90. In case additional Sealant CFS-IS is added with $L_A \geq 100$ mm / $t_{2A} \geq 10$ mm (seal type 3) all cables according to C.2.2 may be added for a requirement of EI 120.			
<b>C.2.2 Cables</b>	<b>Classification</b>		
	Seal type 1	Seal type 2	Seal type 3
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables) with a diameter of:			
Maximum Ø 21 mm	EI 90	EI 120	EI 120
$21 \leq \text{Ø} \leq 80$ mm	EI 60	EI 120	EI 120
Tied cable bundle <sup>9</sup> , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	EI 90	EI 120	EI 120
<b>C.2.3 Conduits</b>			
C.2.3.1 Small steel conduits and tubes, diameter ≤ 16 mm, arranged linear, with or without cables	EI 120-C/U	EI 120-C/U	EI 120-C/U
C.2.3.2 Small plastic conduits and tubes, diameter ≤ 16 mm, arranged linear, with or without cables	EI 120-U/C	EI 120-U/C	EI 120-U/C
C.2.3.3 Plastic conduits, diameter $16 \leq \text{Ø} \leq 32$ mm, wall thickness 1 – 3 mm, arranged linear or in a cluster, with or without cables	EI 120-U/C	EI 120-U/C	EI 120-U/C

<sup>9</sup>

Several cables running in the same direction and bound closely together by mechanical means

### C.3 Rigid floor constructions according to 1.2.1

#### Penetration seal:

Seal type 4: Hilti Firestop Intumescent Sealant CFS-IS (A) on top side, thickness ( $t_A$ ) 25 mm, mineral wool (B) tightly compressed as backfilling material, thickness ( $t_B$ )  $\geq 125$  mm

Seal type 5: additional Sealant CFS-IS ( $t_{2A} \geq 10$  mm,  $L_A \geq 50$  mm) on top only

Seal type 6: additional Sealant CFS-IS ( $t_{2A} \geq 10$  mm,  $L_A \geq 100$  mm) on top only

Seal type 7: additional Sealant CFS-IS ( $t_{2A} \geq 10$  mm,  $L_A \geq 50$  mm) on both sides.

Seal type 8: additional Sealant CFS-IS ( $t_{2A} \geq 10$  mm,  $L_A \geq 100$  mm) on both sides.

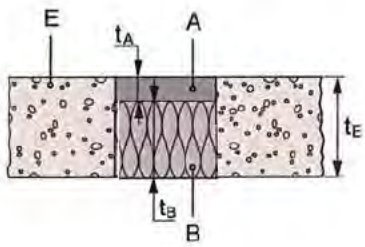
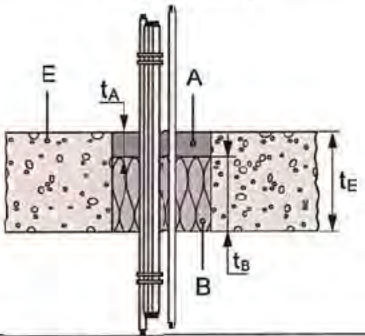
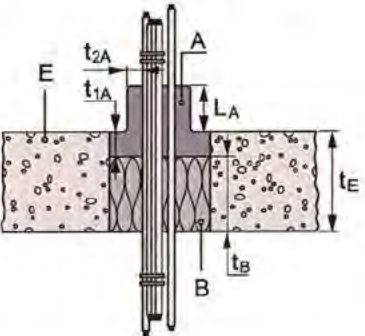
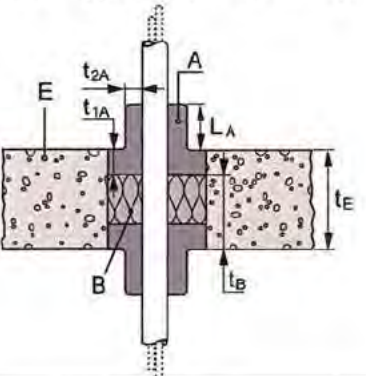
For suitable products for mineral wool backfilling see Annex B.

Maximum seal size: 150 x 150 mm or circular openings of equivalent area.

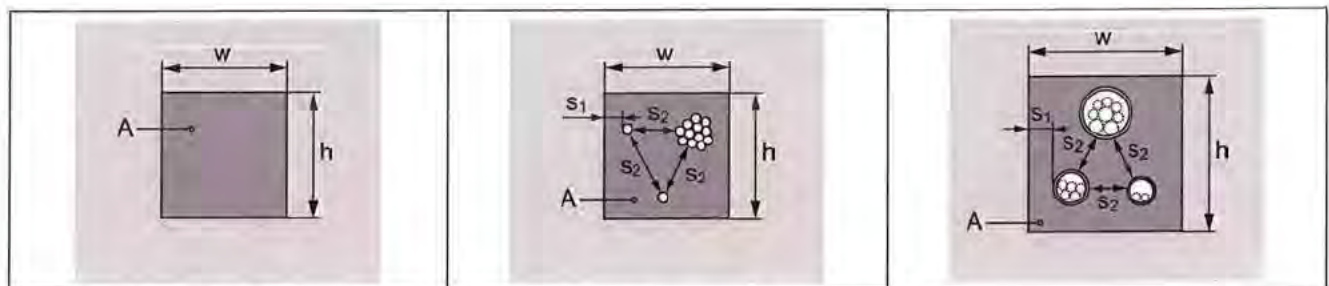
Minimum distances (mm):

Cables to edge of seal	$s_1 = 0$
Cable to other cables/services	$s_2 = 0$
Tied cable bundle to seal edge	$s_1 = 10$
Tied cable bundle to other services	$s_2 = 0$
Small conduits/tubes to edge of seal	$s_1 = 20$
Small conduits/tubes to other services	$s_2 = 0$
Conduits $16 \leq \varnothing \leq 32$ mm to edge of seal	$s_1 = 10$
Conduits $16 \leq \varnothing \leq 32$ mm to other services	$s_2 = 10$

#### Construction details:

Blank seal	Cables and conduits $\leq 16$ mm	Conduits $16 \leq \varnothing \leq 32$ mm
<p>Seal type 4</p> 	<p>Seal type 4</p> 	-
-	<p>Seal type 5 (<math>L_A \geq 50</math> mm) Seal type 6 (<math>L_A \geq 100</math> mm)</p> 	<p>Seal type 7 (<math>L_A \geq 50</math> mm) Seal type 8 (<math>L_A \geq 100</math> mm)</p> 





For explanation of abbreviations see the related text and Annex A




Services	Classification
<b>C.3.1 Blank seal</b>	EI 120 *)

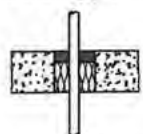
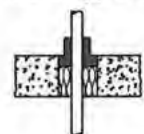
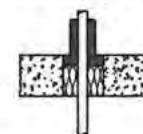
\*) If cables are added later on only cables with a diameter < 21 mm may be added if the required classification is EI 120.

If the seal is used in a floor with a requirement of EI 90 or less all types of cables according to C.3.2, tied cable bundles according to C.3.2 and small conduits/tubes according to C.3.3.1 and C.3.3.2 may be added later on.

In case additional Sealant CFS-IS is added with  $L_A \geq 50$  mm /  $t_{2A} \geq 10$  mm on top and bottom (seal type 7), conduits according to C.3.3.3 may be added for a requirement of EI 120.

In case additional Sealant CFS-IS is added with  $L_A \geq 100$  mm /  $t_{2A} \geq 10$  mm on top only (seal type 6), all cables according to C.3.2 may be added for a requirement of EI 120.

C.3.2 Cables	Classification		
	Seal type 4	Seal type 5	Seal type 6
All sheathed cable types currently and commonly used in building practice in Europe (e.g. power, control, signal, telecommunication, data, optical fibre cables) with a diameter of:			
Maximum $\varnothing$ 21 mm	EI 120	EI 120	EI 120
$21 \leq \varnothing \leq 80$ mm	EI 90	EI 90	EI 120
Tied cable bundle <sup>10</sup> , maximum diameter of 100 mm, maximum diameter of single cable 21 mm	EI 90	EI 120	EI 120

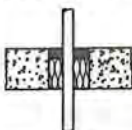


C.3.3 Conduits	Classification		
	Seal type 4	Seal type 5	Seal type 6
			
C.3.3.1 Small steel conduits and tubes, diameter $\leq 16$ mm, arranged linear, with or without cables	EI 90-C/U	EI 120-C/U	EI 120-C/U
C.3.3.2 Small plastic conduits and tubes, diameter $\leq 16$ mm, arranged linear, with or without cables	EI 90-U/C	EI 120-U/C	EI 120-U/C

	Classification
--	----------------

<sup>10</sup>

Several cables running in the same direction and bound closely together by mechanical means



	Seal type 4 	Seal type 7 	Seal type 8 
C.3.3.3 Plastic conduits, diameter $16 \leq \varnothing \leq 32$ mm, wall thickness 1 – 3 mm, arranged linear or in a cluster, with or without cables	-	EI 120-U/C	EI 120-U/C

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Österreichisches Institut für Bautechnik  
Schenkenstrasse 4 | 1010 Vienna | Austria  
T +43 1 533 65 50 | F +43 1 533 64 23  
mail@oib.or.at | www.oib.or.at

**OiB**  
Member of EOTA

## European technical approval

**ETA-10/0292**

(English language translation, the original version is in German language)

Handelsbezeichnung:  
*Trade name:*

**Hilti Firestop Acrylic Sealant CFS-S ACR**

Zulassungsinhaber:  
*Holder of approval:*

**Hilti AG  
Feldkircherstrasse 100  
9494 Schaan  
Liechtenstein**

Zulassungsgegenstand  
und Verwendungszweck:

**Acryl-Brandschutzdichtmasse für die Verwendung in  
Abschottungen**

*Generic type and use of  
construction product:*

**Acrylic Firestop Sealant for use in penetration seals**

Geltungsdauer vom:  
*Validity from:*  
bis:  
*to:*

**31.01.2013**

**30.01.2018**

Herstellwerk:  
*Manufacturing plant:*

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

Diese Europäische  
technische Zulassung umfasst:  
*This European technical approval  
contains:*

**24 Seiten inklusive 14 Anhängen**

*24 pages including 14 Annexes*

Diese Europäische  
technische Zulassung ersetzt:  
*This European technical approval  
replaces:*

**ETA-10/0292 mit Geltungsdauer vom 22.11.2010 bis  
21.11.2015**

*ETA-10/0292 with validity from 22.11.2010 to 21.11.2015*



## **I LEGAL BASES AND GENERAL CONDITIONS**

- 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 <sup>1</sup> modified by Council Directive 93/68/EEC <sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council <sup>3</sup>;
  - 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/EC<sup>4</sup>;
  - 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.
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- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated in EOTA. Translations into other languages have to be designated as such.

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

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

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

<sup>4</sup> 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 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 4.3.

Ancillary products referred to in this European technical approval within the framework of evaluating resistance to fire (see Annexes 1 and 2) are not covered by this ETA and cannot be CE-marked on the basis of it.

#### **1.2 Intended use**

Hilti Firestop Acrylic Sealant CFS-S ACR is intended to form part of a penetration seal, which is used to maintain the fire resistance of a separating element (wall or floor) when and where services pass through. It is used in conjunction with mineral wool as backfilling material. For specification of suitable mineral wool see Annex 1.

The specific separating elements that Hilti Firestop Acrylic Sealant CFS-S ACR may be used to provide a penetration seal in, are as follows:

- 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/m<sup>3</sup>.
- c) Rigid walls: The wall must have a minimum thickness of 200 mm and comprise aerated concrete, concrete or masonry, with a minimum density of 550 kg/m<sup>3</sup>.
- d) Rigid walls: The wall must have a minimum thickness of 150 mm and comprise concrete or masonry, with a minimum density of 2400 kg/m<sup>3</sup>.
- e) Rigid floors: The floor must have a minimum thickness of 150 mm and comprise aerated concrete or concrete with a minimum density of 550 kg/m<sup>3</sup>.
- f) Rigid floors: The floor must have a minimum thickness of 150 mm and comprise concrete with a minimum density of 2400 kg/m<sup>3</sup>.

The separating elements must be classified in accordance with EN 13501-2 for the required fire resistance period or fulfil the requirements of the relevant Eurocode. This ETA does not cover use of this product as a penetration seal in sandwich panel constructions.

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 2

Al-composite pipes Services as given in Annex 2

Annex 2 gives details of penetration seals for which fire resistance tests were carried out. This ETA covers assemblies installed in accordance with the provisions given in 4.3 and Annex 2.



Hilti Firestop Acrylic Sealant CFS-S ACR is intended for environmental conditions as defined by use category Y<sub>2</sub> (intended for use at temperatures between -5 °C and + 70°C, but with no exposure to rain nor UV) according to EOTA TR 024.

Although a penetration seal is intended for indoor applications only, the construction process may result in it being subjected to more exposed conditions for a period before the building envelope is closed. For this case provisions shall be made to protect temporarily exposed penetration seals according to the instructions of the manufacturer.

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 the conditions laid down in sections 4 and 5 relating to manufacturing, installation, use and 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.

## 2 Characteristics of the product and methods of verification

### 2.1 Reaction to fire

Hilti Firestop Acrylic Sealant CFS-S ACR fulfils the requirements for reaction to fire class "D - s1 d0" according to EN 13501-1.

### 2.2 Resistance to fire

The resistance to fire performance according to EN 13501-2 of penetration seals incorporating Hilti Firestop Acrylic Sealant CFS-S ACR with a mineral wool according to Annex 1 as backfilling material is given in Annex 2.

Information on ancillary products (mineral wool backfilling) which were tested within the framework of this European technical approval for evaluating resistance to fire are given in Annex 1.

Any changes in the material, the composition, the dimensions or the properties of the ancillary products shall be notified to Österreichisches Institut für Bautechnik without delay, which will decide whether a new assessment will be necessary.

### 2.3 Air permeability

The gas permeability regarding the gases air, nitrogen (N<sub>2</sub>), carbon dioxide (CO<sub>2</sub>) and CH<sub>4</sub> (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 <sup>3</sup> /(h·m <sup>2</sup> )]	q/A N <sub>2</sub> [m <sup>3</sup> /(h·m <sup>2</sup> )]	q/A CO <sub>2</sub> [m <sup>3</sup> /(h·m <sup>2</sup> )]	q/A CH <sub>4</sub> [m <sup>3</sup> /(h·m <sup>2</sup> )]
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 Emission of dangerous substances or radiation

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  $\geq 0.1$  % 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).

**Note:** 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 of 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 m<sup>2</sup>. 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:  $D_{n,e,w}$  (C; Ctr) = 60 (-4;-12) dB

From this  $D_{n,e,w}$  the weighted sound reduction index calculates to:  $R_w$  (C; Ctr) = 53 (-4;-12) 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:  $D_{n,e,w}$  (C; Ctr) = 58 (-2;-5) dB

From this  $D_{n,e,w}$  the weighted sound reduction index calculates to:  $R_w$  (C; Ctr) = 51 (-2;-5) dB

Structure of the rigid wall: 200 mm thick concrete wall with a density of 2000 kg/m<sup>3</sup> which was plastered on both sides.

It should be noticed that both above mentioned results apply to the total wall construction of the size  $S = 1,25 \text{ m} \times 1,50 \text{ m} (= 1,88 \text{ m}^2)$ , i.e. the given wall with  $0,0236 \text{ m}^2$  Hilti Firestop Acrylic Sealant CFS-S ACR.

$D_{n,e,w}$ : weighted element-normalized level difference of small building elements (given with spectrum adaptation terms C and  $C_{tr}$ )

$R_w$ : weighted sound reduction index (given with spectrum adaptation terms C and  $C_{tr}$ )

## **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 fulfils the requirements of use category  $Y_2$  in accordance with ETAG 026-2, Section 1.2. Since the requirements for type  $Y_2$  are met, also the requirements for type  $Z_1$  and  $Z_2$  are fulfilled.

Type  $Y_2$ : Products intended for use at temperatures between  $-5^\circ\text{C}$  and  $+70^\circ\text{C}$ , but with no exposure to rain nor UV.

Type  $Z_1$ : Products intended for use at internal conditions with high humidity, excluding temperatures below  $0^\circ\text{C}$ .<sup>5</sup>

Type  $Z_2$ : Products intended for uses at internal conditions with humidity classes other than  $Z_1$ , excluding temperatures below  $0^\circ\text{C}$ .

### **2.12.2 Serviceability**

#### **2.12.2.1 Electrical properties**

- Volume resistivity (according to DIN IEC 93 (VDE 0303 Part 30):1993-12):  $113\text{E}+10 \pm 36\text{E}+10 \Omega\cdot\text{cm}$ .
- Surface resistivity (according to DIN IEC 93 (VDE 0303 Part 30):1993-12):  $848\text{E}+06 \pm 243\text{E}+06 \Omega$ .

## **3 Evaluation and attestation of conformity and CE marking**

### **3.1 Attestation of Conformity system**

According to the decision 1999/454/EC of the European Commission<sup>6</sup> 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;

<sup>5</sup> These uses apply for internal humidity class 5 in accordance with EN ISO 13788.

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



(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 ensure that the product is in conformity with this European technical approval.

The manufacturer may only use initial / raw / constituent materials (as relevant) stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the "Control Plan of 27.10.2010 relating to the European technical approvals ETA-10/0292 and ETA-10/0389" which is part of the technical documentation of this European technical approval.<sup>7</sup> 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 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 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.

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 plan relating to this European

<sup>7</sup> 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.



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

#### **Additional information**

The manufacturer shall provide a technical data sheet and an installation instruction with the following minimum information (as far as relevant):

technical data sheet:

- Field of application:
  - Building elements in which the product may be installed, type and properties of the building elements like minimum thickness, density, and - in case of lightweight constructions - the construction requirements.
  - Services which may penetrate the building element, type and properties of the services like material, diameter, thickness etc. in case of pipes including insulation materials; necessary/allowed supports/fixings (e.g. cable trays), separations etc.
  - Design of the penetration seal(s) including limits in size, minimum thickness, separations etc. of the penetration seal(s)
  - Definition of ancillary products (e.g. backfilling material) with clear indication whether they are generic or specific.
  - Environmental conditions covered by the ETA.

Installation instruction:

- Steps to be followed
- Procedure in case of retrofitting.
- Stipulations on maintenance, repair and replacement

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 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 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 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.



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

The notified body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The notified product certification 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 and address of the producer (legal entity responsible for the manufacturer),
- 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 guideline for European technical approval
- the name and intended use of the product
- “see ETA-10/0292 for relevant characteristics”

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

### **4.1 General**

4.1.1 For evaluating resistance to fire of the penetration seal using " Hilti Firestop Acrylic Sealant CFS-S ACR " as specified in Annex 2 it is assumed that

- the installation of the penetration seal does not affect the stability of the adjacent building elements – even in case of fire,
- the installations are fixed to the adjacent building elements (not to the seal) in accordance with the relevant regulations in such a way that, in case of fire, no additional mechanical load is imposed on the seal,
- the support of the installations is maintained for the classification period required and
- pneumatic dispatch systems, compressed air systems, etc. are switched off by additional means in case of fire.

4.1.2 This European technical approval 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.

4.1.3 This European technical approval 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 for at least the time period corresponding to the relevant fire resistance classification given in Annex 2.



4.1.4 The risk of downward spread of fire caused by burning material which drips through a pipe to floors below, is not considered in this ETA (see EN 1366-3: 2009-07, section 1).

4.1.5 The durability assessment does not take account of the possible effect on the penetration seal of substances permeating through pipe walls.

#### **4.2 Manufacturing**

Hilti Firestop Acrylic Sealant CFS-S ACR shall be produced in accordance with the manufacturing process deposited with Österreichisches Institut für Bautechnik.

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.

#### **4.3 Installation**

The arrangement and installation of Hilti Firestop Acrylic Sealant CFS-S ACR shall be done in accordance with the details given in Annex 2 and Annex 3 for the penetration seal(s).

### **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 fire resistance of penetration seals executed using Hilti Firestop Acrylic Sealant CFS-S ACR shall not be negatively affected by future changes to buildings or building elements.

The assessment of the fitness for use is based on the assumption that damaged seals are replaced or repaired. It is also assumed that replacement of components during maintenance/repair will be undertaken using materials specified by this European technical approval.

On behalf of Österreichisches Institut für Bautechnik

Rainer Mikulits  
Managing Director

## ANNEX 1

### DESCRIPTION OF THE PRODUCT AND ANCILLARY PRODUCT(S)

#### 1.1 Product

##### 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 relating to the European technical approval ETA-10/0292 and ETA-10/0389 - Hilti Firestop Acrylic Sealant CFS-S ACR" which is a non-public part of this ETA.

The Control Plan is defined in document "Control plan relating to the European technical approval ETA-10/0292 and ETA-10/0389 - Hilti Firestop Acrylic Sealant CFS-S ACR" which is a non-public part of this ETA.

##### technical product literature:

- "technical Data Sheet Hilti Firestop Acrylic Sealant CFS-S ACR"

#### 1.2 Ancillary Products

##### 1.2.1 Mineral wool products suitable for being used as backfilling material

Loose stone wool or stone wool mats with a minimum density of 45 kg/m<sup>3</sup>.

##### 1.2.2 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

##### 1.2.3 OKTAGON formwork tie rod system ("Schalungsspannstelle")

The formwork tie rod system is made of HDPE and available in different lengths for a wall thickness up to 600 mm. Inner diameter: 22 mm, diameter of protection flange: 60 mm.

Manufacturer: Nevoga GmbH, Freilassing, Germany ([www.nevoga.com](http://www.nevoga.com))

Distributors in:<sup>8</sup>

Austria: Haberkorn GmbH ("Kombispreise Oktagon")  
(<http://shop.haberkorn.com/>), Wolfurt; Ö-BAU Fetter Baumarkt GmbH,  
Korneuburg ([www.fetter.at](http://www.fetter.at))

Czech Republic: KORN, spol. s r.o., Brno; Stavebni Centrum® e-shop

Germany: Kuhne Baugeräte GmbH, Türkheim/Bayern

Switzerland: Cementwaren Kobler GmbH, Widnau



<sup>8</sup> The list is not intended being exhaustive



#### **1.2.4 Formwork distance control pipe ("Abstandsrohr")**

The formwork distance control pipe is a weather resistant plastic pipe with enhanced impact resistance. It is available in lengths of 2000 to 2500 mm and cut to the required length on site. Inner diameter: 26 mm, outer diameter 32 mm.

Manufacturer: Nevoga GmbH, Freilassing, Germany ([www.nevoga.com](http://www.nevoga.com))

Distributors in: <sup>8</sup>

Austria: Haberkorn GmbH ("Haberkorn Distanzrohr")  
(<http://shop.haberkorn.com/>), Wolfurt; Ö-BAU Fetter Baumarkt GmbH,  
Korneuburg ([www.fetter.at](http://www.fetter.at))

Czech Republic: KORN, spol. s r.o., Brno; Stavební Centrum® e-shop

Germany: Kuhne Baugeräte GmbH, Türkheim/Bayern



## ANNEX 2

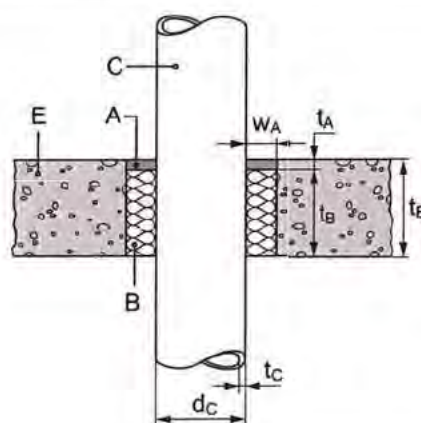
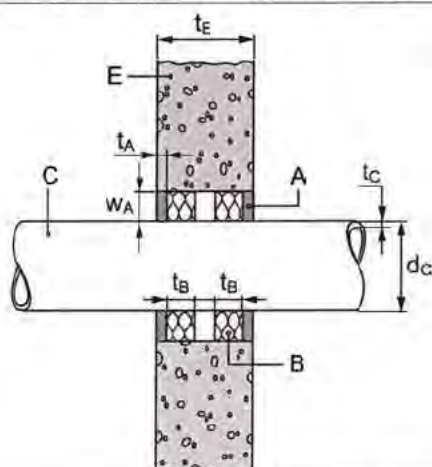
### RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP ACRYLIC SEALANT CFS-S ACR

#### 2.1 Rigid walls and rigid floors according to 1.2.1 d) and f)

##### Penetration seal:

Wall: 15 mm ( $t_A$ ) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides, stone wool according to Annex 1.2.1 (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 according to Annex 1.2.1 (B) as backfilling material ( $t_B$  = gap filled completely)



Penetrating services	Classification
<b>Steel pipes non-insulated (C)</b> Single penetration Distance between pipe and seal edge: Wall (width of annular space, $w_A$ ): 10,5 - 35,5 mm; Floor: Maximum seal diameter: 260 mm (annular space $w_A$ depending on pipe diameter) Pipe diameter ( $d_C$ ) between Ø32 mm and Ø159 mm, with minimum wall thickness ( $t_C$ ) 1,8 mm and 4,5 mm respectively <sup>9</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	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. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)	

<sup>9</sup> Interpolation of minimum pipe wall thickness between 1,8 mm for diameter 32 mm and 4,5 mm for diameter 159 mm for pipe diameters in between.

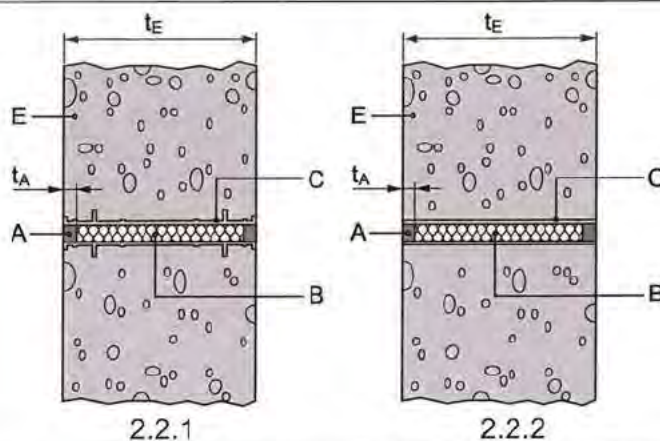
<sup>10</sup> 14,2 mm is the maximum value covered by the rules in EN 1366-3. This value may be limited by the particular pipe dimensions available in practice.



## 2.2 Rigid walls according to 1.2.1 c)

### Penetration seal:

15 mm ( $t_A$ ) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides of the opening of the formwork tie system / formwork distance pipe (C), loose stone wool (B) as backfilling material ( $t_B$  = gap filled completely)



Penetrating services

Classification

**2.2.1 OKTAGON formwork tie rod system ("Schalungsspannstelle", "Oktagon-Spreize")** - see Annex 1.2.3

EI 120

**2.2.2 Formwork distance pipe ("Abstandsrohr", "Distanzrohr")** - see Annex 1.2.4

EI 120

## 2.3 Flexible wall according to 1.2.1 a) and rigid wall according to 1.2.1 b)

### Penetration seal:

10 mm ( $t_A$ ) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on both sides of the wall, stone wool according to Annex 1.2.1 (B) as backfilling material ( $t_B$  = gap filled completely)

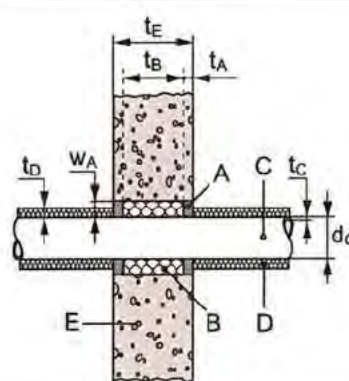
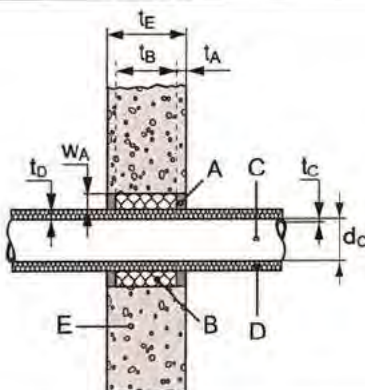
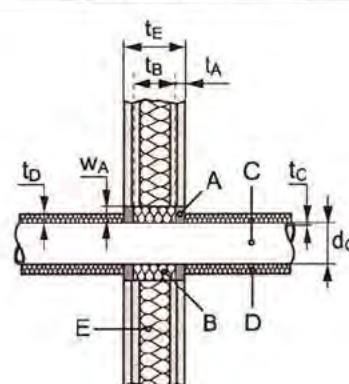
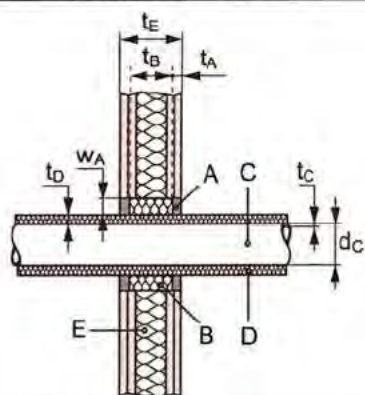
Maximum seal diameter: 300 mm (annular space  $w_A$  depending on pipe diameter)

Pipe insulation made of mineral wool according to Annex 1.2.2.

### 2.3.1 Continued pipe insulation

Sustained insulation

Interrupted insulation





<b>Penetrating services</b>	
<b>Steel pipes (C) with continued insulation (D) – sustained</b>	Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 48,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 1,6 mm respectively <sup>11</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 168,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 2,6 mm respectively <sup>12</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
<b>Steel pipes (C) with continued insulation (D) – interrupted</b>	
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 48,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 1,6 mm respectively <sup>11</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 168,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 2,6 mm respectively <sup>12</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-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. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)	
<b>Copper pipes (C) with continued insulation (D) – sustained</b>	Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 28$ mm and $\varnothing 42$ mm, with minimum wall thickness ( $t_C$ ) 1,0 mm and 1,5 mm respectively <sup>13</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 42$ mm and $\varnothing 88,9$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm and 2,0 mm respectively <sup>14</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 90-C/U
<b>Copper pipes (C) with continued insulation (D) – interrupted</b>	
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 28$ mm and $\varnothing 42$ mm, with minimum wall thickness ( $t_C$ ) 1,0 mm and 1,5 mm respectively <sup>13</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 42$ mm and $\varnothing 88,9$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm and 2,0 mm respectively <sup>14</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-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. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.	

<sup>11</sup> Interpolation of minimum pipe wall thickness between 1,4 mm for diameter 26,9 mm and 1,6 mm for diameter 48,3 mm for pipe diameters in between.

<sup>12</sup> Interpolation of minimum pipe wall thickness between 1,4 mm for diameter 26,9 mm and 2,6 mm for diameter 168,3 mm for pipe diameters in between.

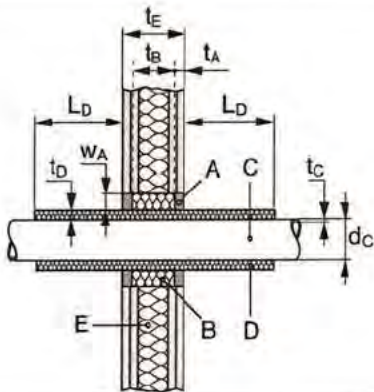
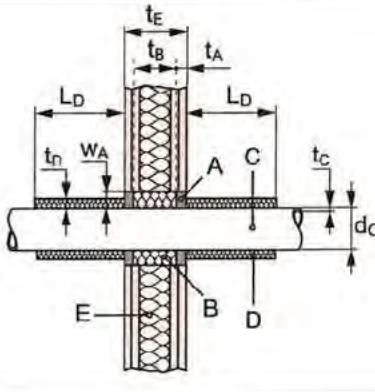
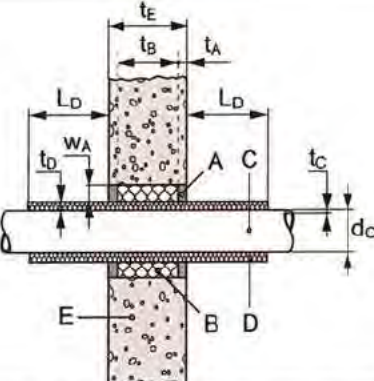
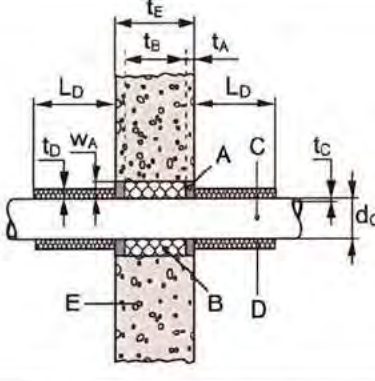
<sup>13</sup> Interpolation of minimum pipe wall thickness between 1,0 mm for diameter 28 mm and 1,5 mm for diameter 42 mm for pipe diameters in between.

<sup>14</sup> Interpolation of minimum pipe wall thickness between 1,5 mm for diameter 42 mm and 2,0 mm for diameter 88,9 mm for pipe diameters in between.



<b>Geberit Mepla pipes (C) with continued insulation (D) – sustained</b> Produced by Geberit Int., Jona, CH	Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe dimensions ( $d_C$ , $t_C$ ): $\varnothing 16 \times 2,25$ mm $\varnothing 20 \times 2,5$ mm $\varnothing 26 \times 3,0$ mm $\varnothing 32 \times 3,5$ mm	EI 120-U/C

### 2.3.2 Local pipe insulation

Sustained insulation	Interrupted insulation
	
	

### Steel pipes (C) with local insulation (D) – sustained

Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 450$	26,9 – 48,3	1,4 / 1,6 <sup>11</sup> – 14,2 <sup>10</sup>	EI 120-C/U
20 - 40	$\geq 500$	48,3	1,6 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 450$	48,3 – 168,3	1,6 / 2,6 <sup>15</sup> – 14,2 <sup>10</sup>	EI 90-C/U
40	$\geq 700$	48,3 – 168,3	1,6 / 2,6 <sup>15</sup> – 14,2 <sup>10</sup>	EI 120-C/U

<sup>15</sup> Interpolation of minimum pipe wall thickness between 1,6 mm for diameter 48,3 mm and 2,6 mm for diameter 168,3 mm for pipe diameters in between.

<b>Steel pipes (C) with local insulation (D) – interrupted</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 500$	26,9 – 48,3	1,4 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	168,3	2,6 – 4,5	EI 90-C/U
40	$\geq 500$	168,3	4,5 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 700$	168,3	2,6 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 700$	48,3 – 168,3	1,6 / 2,6 <sup>15</sup> – 14,2 <sup>10</sup>	EI 90-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. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)				
<b>Copper pipes (C) with local insulation (D) – sustained</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 450$	28 – 42	1,0 / 1,5 <sup>13</sup> – 14,2 <sup>10</sup>	EI 120-C/U
20 - 40	$\geq 500$	42	1,5 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	42 – 88,9	1,5 / 2,0 <sup>14</sup> – 14,2 <sup>10</sup>	EI 90-C/U
40	$\geq 700$	88,9	2,0 – 14,2 <sup>10</sup>	EI 120-C/U
<b>Copper pipes (C) with local insulation (D) – interrupted</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 500$	28 – 42	1,0 / 1,5 <sup>13</sup> – 14,2 <sup>10</sup>	EI 120-C/U
20 - 40	$\geq 500$	42	1,5 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	42 – 88,9	1,5 / 2,0 <sup>14</sup> – 14,2 <sup>10</sup>	EI 120-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. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.				
<b>Geberit Mepla pipes (C) with local insulation (D) – sustained</b>				Classification
Insulation thickness ( $t_D$ ) 20 mm, insulation length ( $L_D$ ) $\geq 500$ mm: Pipe dimensions ( $d_C$ , $t_C$ ): Ø 16 x 2,25 mm Ø 20 x 2,5 mm Ø 26 x 3,0 mm Ø 32 x 3,5 mm				EI 120-C/U



## 2.4 Rigid floor according to 1.2.1 e)

### Penetration seal:

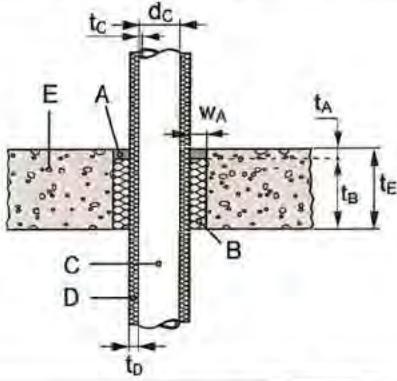
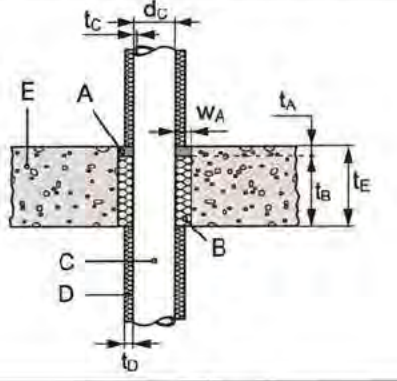
10 mm ( $t_A$ ) Hilti Firestop Acrylic Sealant CFS-S ACR (A) on the top side of the floor construction, stone wool according to Annex 1.2.1 (B) as backfilling material ( $t_B$  = gap filled completely)

For classifications EI 90-C/U and EI 120-C/U: Maximum seal diameter: 300 mm (annular space  $w_A$  depending on pipe diameter)

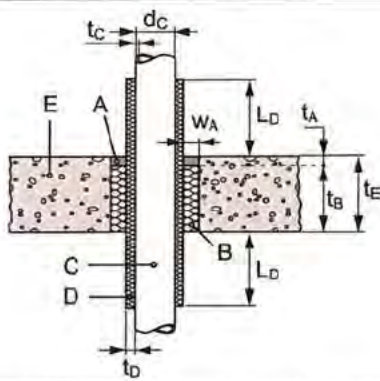
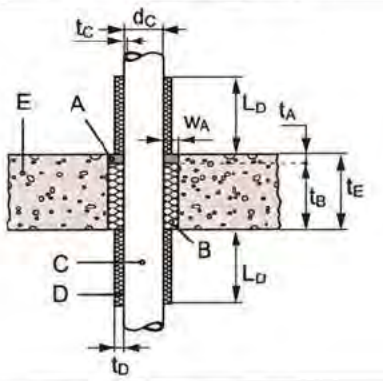
For classifications EI 180-C/U: Distance between pipe and seal edge in floor constructions (width of annular space,  $w_A$ ): 13 - 48 mm

Pipe insulation made of mineral wool according to Annex 1.2.2.

### 2.4.1 Continued pipe insulation

Sustained insulation	Interrupted insulation
	
Penetrating services	
Steel pipes (C) with continued insulation (D) – sustained	Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 48,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 1,6 mm respectively <sup>11</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 180-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 168,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 2,6 mm respectively <sup>12</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Steel pipes (C) with continued insulation (D) – interrupted	
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 48,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 1,6 mm respectively <sup>11</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 180-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 26,9$ mm and $\varnothing 168,3$ mm, with minimum wall thickness ( $t_C$ ) 1,4 mm and 2,6 mm respectively <sup>12</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-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. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)	

<b>Copper pipes (C) with continued insulation (D) – sustained</b>		Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) $\varnothing 42$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm and maximum wall thickness 14,2 mm <sup>10</sup>		EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 42$ mm and $\varnothing 88,9$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm and 2,0 mm respectively <sup>14</sup> , maximum wall thickness 14,2 mm <sup>10</sup>		EI 90-C/U
<b>Copper pipes (C) with continued insulation (D) – interrupted</b>		Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 28$ mm and $\varnothing 42$ mm, with minimum wall thickness ( $t_C$ ) 1,0 mm and 1,5 mm respectively <sup>13</sup> , maximum wall thickness 14,2 mm <sup>10</sup>		EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) $\varnothing 42$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm, maximum wall thickness 14,2 mm <sup>10</sup>		EI 120-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. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.		
<b>Geberit Mepla pipes (C) with continued insulation (D) – sustained</b>		Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe dimensions ( $d_C$ , $t_C$ ): $\varnothing 16 \times 2,25$ mm $\varnothing 20 \times 2,5$ mm $\varnothing 26 \times 3,0$ mm $\varnothing 32 \times 3,5$ mm		EI 90-U/C

2.4.2 Local pipe insulation				
Sustained insulation	Interrupted insulation			
				
Steel pipes (C) with local insulation (D) – sustained				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 450$	26,9 – 48,3	1,4 / 1,6 <sup>11</sup> – 14,2 <sup>10</sup>	EI 180-C/U
40	$\geq 500$	168,3	2,6 – 14,2 <sup>10</sup>	EI 90-C/U
40	$\geq 700$	168,3	2,6 – 14,2 <sup>10</sup>	EI 120-C/U



<b>Steel pipes (C) with local insulation (D) – interrupted</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 500$	26,9 – 48,3	1,4 / 1,6 <sup>11</sup> – 14,2 <sup>10</sup>	EI 180-C/U
40	$\geq 500$	168,3	2,6 – 14,2 <sup>10</sup>	EI 120-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. low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys)				
<b>Copper pipes (C) with local insulation (D) – sustained</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 450$	42	1,5 – 14,2 <sup>10</sup>	EI 120-C/U
20 - 40	$\geq 700$	42	1,5 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 700$	42 – 88,9	1,5 / 2,0 <sup>14</sup> – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	88,9	2,0 – 14,2 <sup>10</sup>	EI 90-C/U
40	$\geq 700$	88,9	2,0 – 14,2 <sup>10</sup>	EI 180-C/U
<b>Copper pipes (C) with local insulation (D) – interrupted</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20 - 40	$\geq 600$	28 – 42	1,0 / 1,5 <sup>13</sup> – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	28 – 42	1,0 / 1,5 <sup>13</sup> – 14,2 <sup>10</sup>	EI 120-C/U
20 - 40	$\geq 500$	42	1,5 – 14,2 <sup>10</sup>	EI 120-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. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.				
<b>Geberit Mepla pipes (C) with local insulation (D) – sustained</b>				Classification
Insulation thickness ( $t_D$ ) 20 mm, insulation length ( $L_D$ ) $\geq 500$ mm: Pipe dimensions ( $d_C$ , $t_C$ ): Ø 16 x 2,25 mm Ø 20 x 2,5 mm Ø 26 x 3,0 mm Ø 32 x 3,5 mm				EI 90-U/C

<b>2.5 Rigid floor according to 1.2.1 f)</b>	
<b>Penetration seal:</b> See Annex 2.4, except that the maximum seal diameter for classifications EI 180-C/U is 260 mm with the annular space ( $w_A$ ) depending on the pipe diameter.	
<b>2.5.1 Continued pipe insulation</b>	
<b>Steel pipes (C) with continued insulation (D) – sustained</b>	Classification
See 2.4	
<b>Steel pipes (C) with continued insulation (D) – interrupted</b>	Classification
See 2.4	
<b>Copper pipes (C) with continued insulation (D) – sustained</b>	Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) $\varnothing 28$ mm, with minimum wall thickness ( $t_C$ ) 1,0 mm and maximum wall thickness 14,2 mm <sup>10</sup>	EI 180-C/U
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) $\varnothing$ between $\varnothing 28$ mm and $\varnothing 42$ mm, with minimum wall thickness ( $t_C$ ) 1,0 mm and 1,5 mm respectively <sup>14</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 42$ mm and $\varnothing 88,9$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm and 2,0 mm respectively <sup>14</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 90-C/U
<b>Copper pipes (C) with continued insulation (D) – interrupted</b>	Classification
Insulation thickness ( $t_D$ ) $\geq 20$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 28$ mm and $\varnothing 42$ mm, with minimum wall thickness ( $t_C$ ) 1,0 mm and 1,5 mm respectively <sup>13</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) between $\varnothing 42$ mm and $\varnothing 88,9$ mm, with minimum wall thickness ( $t_C$ ) 1,5 mm and 2,0 mm respectively <sup>14</sup> , maximum wall thickness 14,2 mm <sup>10</sup>	EI 120-C/U
Insulation thickness ( $t_D$ ) $\geq 40$ mm: Pipe diameter ( $d_C$ ) $\varnothing 88,9$ mm, with minimum wall thickness ( $t_C$ ) 2,0 mm, maximum wall thickness 14,2 mm <sup>10</sup>	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. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.	
<b>Geberit Mepla pipes (C) with continued insulation (D) – sustained</b>	Classification
See 2.4	



<b>2.5.2 Local pipe insulation</b>				
<b>Steel pipes (C) with local insulation (D) – sustained</b>				Classification
See 2.4				
<b>Steel pipes (C) with local insulation (D) – interrupted</b>				Classification
See 2.4				
<b>Copper pipes (C) with local insulation (D) – sustained</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20	$\geq 425$	28	1,0 – 14,2 <sup>10</sup>	EI 180-C/U
20	$\geq 450$	28 – 42	1,0 / 1,5 <sup>13</sup> – 14,2 <sup>10</sup>	EI 120-C/U
20 – 40	$\geq 700$	42	1,5 – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 700$	42 – 88,9	1,5 / 2,0 <sup>14</sup> – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	88,9	2,0 – 14,2 <sup>10</sup>	EI 90-C/U
40	$\geq 700$	88,9	2,0 – 14,2 <sup>10</sup>	EI 180-C/U
<b>Copper pipes (C) with local insulation (D) – interrupted</b>				
Insulation		Pipe		Classification
thickness ( $t_D$ ) [mm]	length ( $L_D$ ) [mm]	diameter ( $d_C$ ) [mm]	wall thickness ( $t_C$ ) [mm]	
20 – 40	$\geq 500$	28 – 42	1,0 / 1,5 <sup>13</sup> – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	42 – 88,9	1,5 / 2,0 <sup>14</sup> – 14,2 <sup>10</sup>	EI 120-C/U
40	$\geq 500$	88,9	2,0 – 14,2 <sup>10</sup>	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. unalloyed steel, low alloyed steel, cast iron, stainless steels, Ni alloys (NiCu, NiCr and NiMo alloys) and Ni.				
<b>Geberit Mepla pipes (C) with local insulation (D) – sustained</b>				Classification
See 2.4				

### ANNEX 3

#### INSTALLATION OF THE PRODUCT AND ANCILLARY PRODUCT(S)

The arrangement and installation of Hilti Firestop Acrylic Sealant CFS-S ACR shall be done in accordance with the details given below and in Annex 2 for the penetration seal(s).



Apertures for the penetration of pipes require a minimum separation of 200 mm.

Pipes shall be supported at maximum 270 mm away from both faces of wall constructions and at maximum 250 mm from the upper face of floor constructions.

Application temperature: +5°C to +40°C.



## ANNEX 4

### ABBREVIATIONS AND REFERENCE DOCUMENTS

#### 4.1 Abbreviations used in drawings

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

#### 4.2 References to standards mentioned in the ETA

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
EN 1026	Windows and doors – Air permeability – Test method
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals
EN 13501	Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests Part 2: Classification using test data from fire resistance tests, excluding ventilation services
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 <sup>16</sup>
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 <sup>16</sup>
EN ISO 717-1	Acoustics – Rating of sound insulation of buildings and of building elements – Part 1: Airborne sound insulation

#### 4.3 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
Safety Data Sheet according to 1907/2006/EC, Article 31, for Hilti Firestop Acrylic Sealant CFS-S ACR	

<sup>16</sup> In September 2010 substituted by the EN ISO 10140 series

# ÖSTERREICHISCHES INSTITUT FÜR BAUTECHNIK

A-1010 Vienna, Schenkenstrasse 4  
Tel.: + 43 (0) 1 - 53 36 55 0  
Fax: + 43 (0) 1 - 53 36 42 3  
E-mail: mail@oib.or.at



Member of EOTA

## European technical approval

**ETA-10/0405**

(English language translation, the original version is in German language)

Handelsbezeichnung:  
*Trade name:*

**Hilti Firestop Wrap CFS-W**

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:*

**22.02.2011**

**21.02.2016**

Herstellwerk:  
*Manufacturing plant:*

**Hilti Werk 5a**

Diese Europäische  
technische Zulassung umfasst:  
*This European technical  
approval contains:*

**23** Seiten inklusive **3** Anhängen

**23** pages including **3** Annexes



European Organisation for Technical Approvals  
Europäische Organisation für Technische Zulassungen  
Organisation Européenne pour l'Agrément technique



## **I LEGAL BASES AND GENERAL CONDITIONS**

- 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<sup>1</sup> modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - 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/EC<sup>4</sup>;
  - 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.
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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.

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<sup>1</sup> Official Journal of the European Communities N° L 40, 11.2.1989, p. 12  
<sup>2</sup> Official Journal of the European Communities N° L 220, 30.8.1993, p. 1  
<sup>3</sup> Official Journal of the European Union N° L 284, 31.10.2003, p.1  
<sup>4</sup> 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 Wrap CFS-W is a pipe closure device installed around plastic pipes 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.

Type of penetration seal system: Pipe closure device - wrap (see ETAG 026-2, clause 1.1, table 1-1). Hilti Firestop Wrap CFS-W consists of an intumescent strip.

Hilti Firestop Wrap CFS-W is available as single wrap (CFS-W SG) or as endless wrap (CFS-W EL).

The single wrap CFS-W SG is delivered in 3 thicknesses and pre-cut to fit particular pipe diameters – see table below. The Firestop Wrap CFS-W SG is generally used in one layer.

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

The endless wrap CFS-W EL is delivered in only 1 thickness (4.5 mm) in rolls of 10 metres and is cut to size for any particular pipe diameter. Depending on the pipe diameter several layers may be necessary – for details see Annex C.

The Hilti Firestop Wrap CFS-W is installed inside the annular gap between pipe and aperture edge so that the outer edge of the wrap is flush with the wall/floor surface. In walls the wrap is installed on both sides, in floors only one wrap on the underside of the floor.

For the purpose of smoke and draft stop, air or water tightness and airborne sound insulation, the gap between opening edge and pipe or collar has to be sealed off by cementitious mortar or a construction sealant, the latter optionally in combination with mineral wool as backfilling material, considering the detailed prescriptions given in Annexes B and C.

In case sound decoupling between the pipe and the wall/floor is required, but sound decoupling means around the pipe are missing it is recommended to use Hilti Firestop Acrylic Sealant CFS-ACR as annular gap seal. If gypsum plaster or cementitious mortar is intended to be used it is recommended to install a PE foam strip around the pipe over the entire wall or floor thickness for sound decoupling of the pipe. For further details see Annex B.

For a description of the installation procedure see 4.2.



## 1.2 Intended Use and Use Category

### 1.2.1 Intended Use

The intended use of Hilti Firestop Wrap CFS-W is to reinstate the fire resistance performance of flexible wall constructions, rigid wall constructions and rigid floor constructions where they are penetrated by plastic pipes.

- (1) The specific elements of construction that Hilti Firestop Wrap CFS-W may be used to provide a penetration seal in, are as follows:

**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.

**Rigid walls:** The wall must have a minimum thickness as given in Annex C and comprise concrete, aerated concrete or masonry, with a minimum density of 650 kg/m<sup>3</sup> (wall type A) or comprise concrete or masonry, with a minimum density of 1100 kg/m<sup>3</sup> (wall type B).

**Rigid floors:** The floor must have a minimum thickness as given in Annex C and comprise concrete with a minimum density of 2400 kg/m<sup>3</sup> (floor type A) or 550 kg/m<sup>3</sup> (floor type B), respectively.

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 Wrap CFS-W may be used to provide a penetration seal with the following specific services, single only:

**PVC pipes:** for details on diameters, wall thickness and pipe standards see Annex C.

**PE pipes:** for details on diameters, wall thickness and pipe standards see Annex C.

- (3) Apertures for the penetration of pipes require separation of minimum 200 mm.
- (4) Pipes shall be supported at maximum 300 mm away from both faces of flexible wall constructions and rigid wall constructions of Type A, maximum 230 mm away from both faces of rigid wall constructions of Type B and maximum 200 mm from the upper face of floor constructions.

The provisions made in this European technical approval are based on an assumed working life of the Hilti Firestop Wrap CFS-W 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.

### 1.2.2 Use Category

The use category of Hilti Firestop Wrap CFS-W is Type Y<sub>2</sub>, (-20/+70)°C.

**Type Y<sub>2</sub>:** Products intended for use at temperatures between -5 °C and + 70°C, but with no exposure to rain nor UV.

Since the requirements for type  $Y_2$  are met, also the requirements for type  $Z_1$  and  $Z_2$  are fulfilled.

Type  $Z_1$ : Products intended for use at internal conditions with high humidity, excluding temperatures below 0°C.<sup>5</sup>

Type  $Z_2$ : Products intended for uses at internal conditions with humidity classes other than  $Z_1$ , 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).

ETAG clause No.	ETA clause No.	Characteristic	Assessment of characteristic
		<b>Mechanical resistance and stability</b>	Not relevant
		<b>Safety in case of fire</b>	
2.4.1	2.1	Reaction to fire	Class E according to EN 13501-1:2007
2.4.2	2.2	Resistance to fire	See clause 2.2
		<b>Hygiene, Health and the Environment</b>	
2.4.3	2.3	Air permeability	No performance determined
2.4.4	2.4	Water permeability	No performance determined
2.4.5	2.5	Dangerous substances	No performance determined
		<b>Safety in use</b>	
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
		<b>Protection against noise</b>	
2.4.9	2.9	Airborne sound insulation	No performance determined
		<b>Energy, Economy and Heat Retention</b>	
2.4.10	2.10	Thermal properties	No performance determined
2.4.11	2.11	Water vapour permeability	No performance determined
		<b>General aspects relating to fitness for use</b>	
2.4.12	2.12	Durability and serviceability	$Y_2$ , (-20/+70)°C

<sup>5</sup>

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



## **2.1 Reaction to fire**

Hilti Firestop Wrap CFS-W is classified 'E' in accordance with EN 13501-1.

## **2.2 Resistance to fire**

Hilti Firestop Wrap CFS-W has been tested in accordance with EN 1366-3:2004 and EN 1366-3:2009, installed within apertures in flexible walls (drywalls), rigid walls (aerated concrete blocks) and high density and low density concrete floors.

For details of classification and plastic pipes covered see Annex C.

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

For details of suitable wall and floor constructions see 1.2.1 and Annex C.

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

**General:** The following conditions apply to seals within any of the above constructions:  
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 U/C (capped outside the furnace/uncapped inside). For further information refer to national regulations.

## **2.3 Air permeability**

No performance determined.

## **2.4 Water permeability**

No performance determined.

## **2.5 Dangerous substances**

According to the manufacturer's declaration, the product specification has been compared with the list of dangerous substances of the European Commission to verify that it does not contain such substances above the acceptable limits.

A written declaration in this respect was submitted by the ETA-holder.

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

## **2.6 Mechanical resistance and stability**

No performance determined.

## **2.7 Resistance to impact/movement**

No performance determined.

## **2.8 Adhesion**

The stiffness of the wrap and/or an annular gap sealing with Hilti Firestop Acrylic Sealant CFS-S ACR or a mortar prevent the wrap from slipping out of the aperture.

## **2.9 Airborne sound insulation**

No performance determined.

## **2.10 Thermal properties**

No performance determined.

## **2.11 Water vapour permeability**

No performance determined.

## **2.12 Durability**

Hilti Firestop Wrap CFS-W has been tested in accordance with ETAG 026-2 for the Y<sub>2</sub> use category specified in ETAG 026-2 and the results of the tests have demonstrated suitability for penetration seals intended for use at temperatures between -20°C and +70°C but with no exposure to rain nor UV (Y<sub>2</sub>, (-20/+70)°C).

# **3 Evaluation of Conformity and CE marking**

## **3.1 Attestation of Conformity system**

According to the decision 1999/454/EC of the European Commission<sup>6</sup> 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.

<sup>6</sup>

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