Hilti CFS-B Firestop Bandage

Submission Folder

Hilti (HK) | askHilti 工程師技術支援平台 ask.hilti.com.hk | 香港客戶熱線 +852 8228 8118 澳門客戶熱線(免費) 00800 8228 8118 | 香港門市：大角咀洋松街1號形品星寓地下2號舖 澳門門市：澳門布魯塞爾街70號建興龍廣場地下W座地舖 | 電郵：hksales@hilti.com 傳真：+852 2954 1751

Firestop bandage CFS-B

APPLICATIONS

- Firestopping around insulated (hot/cold) non-flammable pipes
- Pipe materials: Insulated pipes including copper, steel and other metals with heat conductivity lower than that of copper (e.g.cast iron, stainless steel etc.)
- Various insulation materials
- Suitable for use in openings in concrete, masonry block or drywall

ADVANTAGES

- Highly versatile - one product for a variety of insulation materials, pipe materials and pipe diameters
- Quick and easy to install - no drilling or additional tools needed
- No need to interrupt the pipe insulation material within the wall/ floor penetration
- Minimal thickness for easy installation in narrow gaps
- Good elasticity for optimum flexibility
- Very good acoustic insulation properties

Smoke Siesmic Low VOC Mould & Mildew

Technical data	
Base materials	Concrete, Masonry, Drywall
Expansion temperature (approx.)	210 °C
Expansion ratio (unrestricted, up to)	1:14
Storage and transportation temperature range	-5 - 50 °C
Length	10 m
Colour	Grey
Thickness	2 mm
Width	125 mm

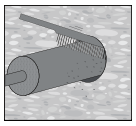
Application table

CFS-B (Firestop Bandage - 2 mm thick)

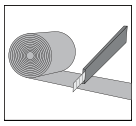
Pipe diameter (mm)	Insulation Thickness (mm)	No. Layers	Reference Wrap length (mm)	No. of penetrations with a 10m roll	Recommened drill hole X (mm)
25	40	2	720	14	121
32	40	2	770	13	128
40	40	2	820	12	136
50	40	2	880	11	146
65	50	2	1100	9	181
80	50	2	1190	8	196
100	50	2	1320	8	216
125	50	2	1480	7	241
150	50	2	1630	6	266
200	50	3	2920	3	319
250	50	3	3390	3	369
300	65	3	4150	2	449
400	65	3	5090	2	549
400	75	3	5280	1.9	569

* Please consult Hilti representatives for application detail of different type of piping units

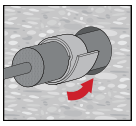
Application Procedure



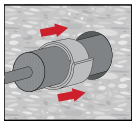
1. Clean the opening. The material around the opening must be dry, in sound condition and free from dust or grease.



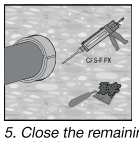
2. Cut Hilti Firestop Bandage CFS-B to fit the outside diameter of the insulation. Ensure 2 layers and an overlap.



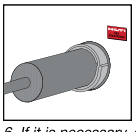
3. Wrap Hilti Firestop Bandage CFS-B around the insulation. Secure the bandage with steel bands or wire (≥ 0.7 mm).



4. Install Hilti Firestop Bandage CFS-B on both sides of the open-ing to a depth of 62.5 mm (see marking on bandage).



5. Close the remaining gap with the recommend gap filler. Refer to each base material for the correct filler.



6. If it is necessary, an additional insulation over the bandage has to be installed. Mount the installation identification plate beside the correctly sealed opening, if required.

Order Now Watch Video

Ordering designation	Sales pack quantity	Item number
CFS-B	1 pc	**429557**

Please visit Hilti website for the latest item numbers and related products

bg
Много гъвкава, един продукт за различни типове изобирани метални тръби
- Бърз и лесен монтаж, малко необходимо пръстеновидно пространство

et
Väga painduv, üks toode eri tüüpi isoleeritud metalltorudele.
- Kiirelt ja lihtsalt paigaldatav, võtab vähe ruumi.

lt
Ypač lankstus vienas gaminys, skirtas izoliuoti įvairių tipų metalinius vamzdžius
- Spartu ir paprasta montuoti, pakanka nedidelio žiedinio tarpo

sl
Visoko prilagodljiv, en izdelek za različne tipe izoliranih kovinskih cevi
- Hitra in enostavna montaža, zahtevan majhen okrogel prostor

vi
Rất linh hoạt trong sử dụng, một sản phẩm chung cho các ống kim loại có lớp phủ cách nhiệt
- Lắp ráp nhanh chóng, dễ dàng, chỉ cần một không gian nhỏ quanh ống

cs
Velmi flexibilní, jeden produkt pro různé druhy izolovaných kovových trubek
- Rychlá a snadná instalace, vyžaduje malý kruhový prostor

hr
Vrlo elastičan, jedan proizvod za različite vrste izoliranih metalnih cijevi
- Brz i jednostavan za postavljanje, zahtijeva samo mali kružni proctor

lv
Ļoti elastīga, viens produkts der dažādiem izolētu metāla cauruļu tipiem.
- Ātri un viegli uzstādāma, nepieciešama neliela gredzenveida telpa.

sk
Vysokoflexibilný, jeden výrobok na rôzne typy izolovaných kovových trubiek
- Rýchla a jednoduchá inštalácia, potrebný malý kruhový priestor

zh
高度灵活，一种产品可以应用于不同型号的保温金属管道
- 安装工作简易，只需很小的环状空间

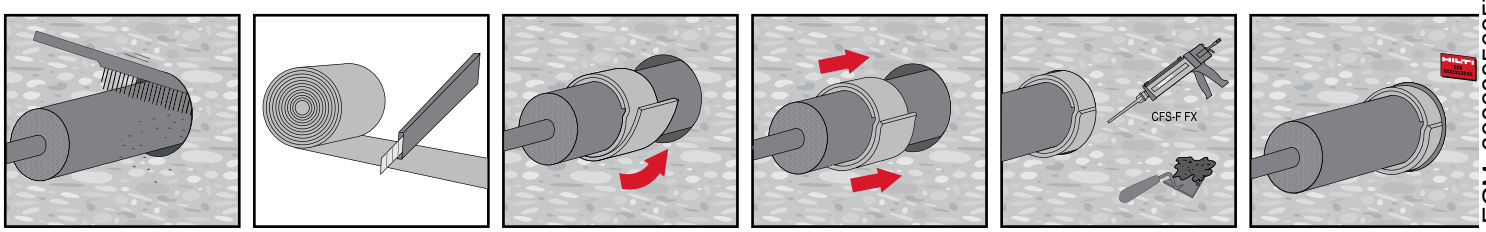
el
Ιδιαίτερα εύφλεκτο, ένα προϊόν για διαφορετικούς τύπους μονομένων μεταλλικών σωλήνων
- Γρήγορο και εύκολο ως προς την εγκατάσταση, απαιτείται μικρός δακτυλιώδης χώρος

hu
Nagy rugalmasságú; egy termék megfelel több fajta szigetelt fémcsőhöz.
- Kis helyen is gyorsan és egyszerűen felszerelhető

ru
Высокая гибкость, один продукта для разных типов изолированных металлических труб
- Быстрая и простая установка, малая потребность в месте для хранения

tr
Farklı türden yalıtılmış madeni borular için son derece esnek bir ürün.
- Çabuk ve kolay takılır, çepeçevre küçük bir boşluk gerekir.

ro
Flexibilitate ridicată, un singur produs pentru diferite conducte metalice izolate.
- Uşor şi rapid de montat, necesită spaţiu mic de instalare.



bg
1. Почистете отвора
2. Отрежете Hilti Противопожарният бандаж до външния диаметър на изолацията. Имайте предвид двата слоя.
3. Увийте Противопожарният бандаж около изолацията. Фиксирайте бандажа със стоманени ленти или тел (≧0,7 мм).
4. Монтирайте FS Бандажът от двете странив отвора на дълбочина от 62,5 мм.
5. Затворете оставащата фуга с гипс или Противопожарна пяна Hilti.
6. Ако е необходимо, върху бандажа трябва да бъде монтирана допълнителна изолация.

et
1. Puhastage ava.
2. Lõigake Hilti tuletõkkeside isolatsiooni välisläbimõõdu järgi. Arvestage kahe kihiga.
3. Mähkige tuletõkkeside isolatsiooni ümber. Kinnitage side terasest kinnitusklambrite või Traadiga (≧0,7 mm).
4. Paigaldage tuletõkkeside ava mõlemale küljele 62,5 mm paksuselt.
5. Tihendage vahe kipsi või Hilti tuletõkkevahuga.
6. Vajaduse korral tuleb sideme peale paigaldada lisaisolatsioonikiht.

lt
1. Išvalykite ertmę
2. Atpjaukite „Hilti“ juostos „Firestop“ gabalą, atitinkantį išorinį izoliacijos skersmenį. Atsižvelkite į tai, kad prireiks dviejų sluoksnių.
3. Apvyniokite izoliaciją juosta „Firestop“. Pritvirtinkite juostą viela (≧ 0,7 mm).
4. Juostą „Firestop“ įtaisykite 62,5 mm gylyje abiejose ertmės pusėse.
5. Užtaisykite likusį tarpą gipsu arba „Hilti“ putomis „Firestop“.
6. Jei būtina, juostą reikia padengti papildomu izoliacijos sluoksniu.

sl
1. Očistite odprtino
2. Hilti protipožarni trak izrežite na zunanji Premer izolacije. Upoštevajte število 2 plasti.
3. Protipožarni trak ovijte okoli izolacije. Trak Zavarujte z jeklenimi trakovi ali žico (≧0,7 mm).
4. Namestite protipožarni trak na obeh straneh Znotraj odprtine v globini 62,5 mm.
5. Zaprite preostalo odprtino z gipsom ali Hilti protipožarno peno.
6. Če je potrebno, je potrebno čez trak namestiti dodatno izolacijo.

vi
1. Làm sạch lỗ ở tường
2. Cắt băng chống cháy Hilti theo đường kính ngoài của lớp cách nhiệt. Chú ý chiều dày của hai lớp
3. Quấn băng chống cháy xung quanh lớp cách nhiệt.
4. Cố định lớp băng đã quấn bằng các dải thép hoặc bằng dây (≧0.7 mm)
5. Quấn băng chống cháy từ cả hai phía của lỗ tường sâu vào trong đến 62,5 mm
6. Bít kín các khe hở còn lại bằng thạch cao hoặc bọt chống cháy Hilti. Nếu thấy cần thiết có thể bọc thêm một lớp phủ cách nhiệt lên trên băng chống cháy

cs
1. Vyčistěte otvor
2. Vyřízněte protipožární bandáž Hilti podle vnějšího průměru izolace. Zohledněte dvěvrstvy.
3. Protipožární bandáž omotejte kolem izolace. Upevněte ji pomocí ocelových pásků nebo Drátem (≧ 0,7 mm).
4. Protipožární bandáž na obou stranách instalujte v otvoru v hloubce 62,5 mm.
5. Zbývající prostor uzavřete sádrou nebo protipožární pěnou Hilti.
6. V případě potřeby musí být přes bandáž položena další izolace.

hr
1. Očistite otvor
2. Izrežite Hilti vatrootpornu oblogu prema Vanjskom promjeru izolacije. Uzmite u obzir broj od 2 sloja.
3. Zamotajte Vatrootpornu oblogu oko izolacije. Osigurajte povez čeličnim vrpcama ili žicom (≧0,7 mm).
4. Postavite Vatrootpornu oblogu na obje strane unutar otvora u dubini od 62,5 mm.
5. Zatvorite preostali otvor gipsom ili Hilti vatrootpornom pjenom.
6. Ako je potrebno, preko zavoja treba postaviti dodatnu izolaciju.

lv
1. Notīriet atveri.
2. Nogrieziet Hilti pretaizdegšanās lentu atbilstoši izolācijas ārējam diametram. Ņemiet vērā, ka būs vajadzīgas divas kārtas.
3. Aptiniet pretaizdegšanās lentu ap izolāciju. Nostipriniet tinumu ar metāla lentu vai stiepli (≧0,7 mm).
4. Uzstādiet pretaizdegšanās lentu atveres abās pusēs 62,5 mm dziļumā.
5. Atlikušo vietu aizpildiet ar ģipsi vai Hilti pretaizdegšanās putām.
6.Ja vajadzīgs, virs tinuma jāuzstāda papildu izolācija

sk
1. Vyčistite otvor
2. Odrežte protipožiarnu bandáž Hilti podľa Vonkajšieho priemeru izolácie. Počítajte s 2 vrstvami.
3. Protipožiarnu bandáž obmotajte okolo izolácie. Bandáž zabezpečte oceľovou páskou alebo drôtom (≧ 0,7 mm).
4. Protipožiarnu bandáž nainštalujte na obidve strany s otvorom s hĺbkou 62,5 mm.
5. Zostávajúci medzeru uzatvorte sadrou alebo protipožiarnou penou Hilti.
6. Ak je to potrebné, nainštalujte cez bandáž doplňujúcu izoláciu.

zh
1. 清洁开口
2. 根据封堵的外径裁切喜利得防火带。注意使用2层。
3. 沿着保温层包绕防火带。用钢丝固定防火带（≧0.7mm）。
4. 在两侧的开口中安装防火带，安装深度为 62.5 mm。
5. 用石膏或者喜利得防火泡沫封闭残余间隙。
6. 在必要时，在防火带上面另外加装保温层。

el
1. Καθαρίστε το άνοιγμα
2. Κόψτε την Ταινία Πυρόσβεσης Hilti βάσει της Εξωτερικής διαμέτρου της μόνωσης. Λάβετε υπόψη σας τον αριθμό των 2 στρώσεων.
3. Τυλίξτε την Ταινία Πυρόσβεσης Hilti γύρω από την μόνωση. Ασφαλίστε την ταινία με ατσάλινες λωρίδες ή σύρμα (≧0,7 mm)
4. Τοποθετήστε την Ταινία FS και στις δύο πλευρές εντός του ανοίγματος σε βάθος 62,5 mm.
5. Κλείστε το κενό που υπάρχει με γύψο ή με Αφρό Πυρόσβεσης Hilti.
6. Εάν είναι απαραίτητο, πρέπει να τοποθετηθεί μια επιπρόσθετη μόνωση στην ταινία.

hu
1. Tisztítsa ki a nyílást
2. Vágja a Hilti Tűzvédelmi kötést a szigetelés Külső átmérőjének megfelelő méretűre. Két réteggel számoljon.
3. Tekerje körbe a Tűzvédelmi kötést a szigetelésen. Biztosítsa a kötést acélszalaggal vagy dróttal (≧0,7 mm).
4. Helyezzen fel Tűzvédelmi kötést a nyílás mindkét oldalára 62,5 mm-es mélységben.
5. Hilti Tűzvédelmi hab vagy gipsz használatával zárja le a fennmaradó nyílást.
6. Szükség esetén helyezzen további szigetelést a kötés felé.

ru
1. Прочистить отверстие.
2. Отрезать противопожарную ленту Hilti по размеру наружного диаметра изоляции с расчетом укладки ленты в 2 слоя.
3. Обмотать противопожарную ленту вокруг изоляции. Закрепить ленту стальными полосами или проволокой (≧0,7 мм).
4. Установить противопожарную ленту на обеих сторонах отверстия на глубину 62,5 мм.
5. Заделать стык гипсом или противопожарной пеной Hilti.
6. При необходимости установить поверх ленты дополнительный слой изоляции.

tr
1. Açıklığı temizleyiniz
2. Hilti Yangın Durdurucu Bandajı yalıtımın dış çapına göre kesiniz.2 tabaka bulunduğunu dikkate alınız.
3. Yangın Durdurucu Bandajı yalıtımın etrafına sarınız. Bandajı çelik tel şeritlerle (≧0,7 mm) sağlama alınız.
4. Yangın Durdurucu Bandajı açıklığın içinde her iki tarafta 62,3 mm derinliğe kadar takınız.
5. Kalan boşluğu alçıyla veya Hilti Yangın Durdurucu Köpükle kapatınız.
6. Gerekirse bandajın üzerine ilaveten yalıtıcı konulabilir.

da
1. Rengør åbningen
2. Skær Hilti Brandstop Båndet til den udvendige diameter af isoleringen så der er til 2 lag.
3. Fastgør Brandstop Båndet rundt om isoleringen med ståltråd (≧0.7 mm).
4. Påsæt Brandstop Bånd på begge sider i åbningen, i en dybde på 62,5 mm.
5. Forsegl det resterende hulrum med gips eller Hilti CFS-F FX
6. Hvis nødvendigt, kan et ekstra lag isolering sættes over båndet.

2044968 A1-07.2012

檢測報告

No. 2019-FRT274

試件名稱： Hilti Firestop Bandage CFS-B

報告發送致送檢單位：

送檢單位： Hilti (Hong Kong) Limited

報告日期： 2020 年 01 月 15 日
複檢日期： 2023 年 01 月 15 日

檢測報告

1. 根據澳門發展及質量研究所發出的檢測報告編號：TEED-2019-FRT-274，澳門發展及質量研究所於 2019 年 12 月 15 日依據 BS 476-20：1987《建築材料及構件防火性能試驗第 20 部分：建築材料耐火測定(一般原則)》，對 Hilti (Hong Kong) Limited 送檢的防火填充物料進行耐火性能檢測，經檢測後，該防火填充物料檢測結果：

   耐火隔熱性達到 201 分鐘，耐火完整性達到 240 分鐘。

2. 試件資料如下：

試件名稱	Hilti Firestop Bandage CFS-B
送檢單位名稱	Hilti (Hong Kong) Limited
試件製造商	Hilti
試件產地	德國
檢測日期	2019 年 12 月 15 日

審核，

譚立武教授
澳門大學機電工程系教授
澳門發展及質量研究所理事會理事長

澳 門 發 展 及 質 量 研 究 所
Instituto para o Desenvolvimento e Qualidade, Macau
Institute for the Development and Quality, Macau

檢測報告

TEED-2019-FRT-274

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報告發送致送檢單位：

送檢單位： Hilti (Hong Kong) Limited

701-704A & 708A&B, 7/F, Tower A,
Kwun Tong, Hong Kong

報告日期： 2020 年 01 月 15 日

澳門發展及質量研究所

澳門 氹仔 徐日昇寅公馬路 澳門發展及質量研究所
Instituto para o Desenvolvimento e Qualidade, Macau, Avenida Padre Tomás Pereira, S.N., Taipa, Macau
電話 / Tel: (853) 2837 1008 傳真 / Fax: (853) 2835 6162

關注事項

1. 檢測報告未加蓋檢測單位"檢測專用章"無效；
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3. 報告塗改無效；
4. 未經本實驗室書面同意，不得部分複製檢測報告（完整複製除外）；
5. 複印檢測報告未重新加蓋 "檢測專用章"無效；
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7. 對檢測報告若有異議，應於收到報告之日起十五日內向本實驗室提出。
8. 有關試件的相關信息由送檢單位提供，本實驗室並沒有求證相關信息及並不負責。

地址：澳門氹仔徐日昇寅公馬路澳門發展及質量研究所
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送檢單位名稱	Hilti (Hong Kong) Limited		
收樣編號	FS-191215-01		
試件特徵描述	試件外觀：防火填充物料，外觀完好 試件數量：1 件		
試件型號規格	防火填充物料： Hilti Firestop Bandage CFS-B 尺寸：125 mm (W) 厚度：2mm 顏色：灰色 材質：Polymer-bonded intumescent material 遇熱膨脹防火繃帶膨脹率 (不受限，可達)：1:14 膨脹溫度 (大約)： 210°C 儲存及運輸溫度：-5°C~50°C		
試件製造商	Hilti	試件產地	德國
送樣日期	2019 年 12 月 11 日		
檢測項目	防火填充物料耐火性能		
檢測依據	BS 476- 20：1987《建築材料及構件防火性能試驗第 20 部分：建築材料耐火測定(一般原則)》		
檢測日期	2019 年 12 月 15 日		
檢測結論	依據 BS 476- 20：1987《建築材料及構件防火性能試驗第 20 部分：建築材料耐火測定(一般原則)》，經檢測，該防火填充物料系統檢測結果：耐火隔熱性達到 201 分鐘，耐火完整性達到 240 分鐘。但本試件只適用於填充的用途，而不可作為一整幅間隔牆體使用。 簽發日期：2020 年 01 月 15 日		
備註	1. 送檢單位附上試件圖紙 (見附錄 A 參考圖 1-圖 3) 2. 主要檢測設備：立式耐火測試爐體 (TEED-FE-002)		

報告編寫員： 孫翔 審核： 林振雄

批准：

黃傑勇(授權簽字人)

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1 檢測目的

1.1 根據英國標準 BS 476- 20：1987《建築材料及構件防火性能試驗第 20 部分：建築材料耐火測定(一般原則)》，檢測 1 件防火填充物料之耐火性能。

2 引言

2.1 根據送檢單位的要求，防火填充物料之耐火性能檢測需滿足英國標準 BS 476- 20：1987《建築材料及構件防火性能試驗第 20 部分：建築材料耐火測定(一般原則)》之要求。

2.2 試件由送檢單位在本實驗室於 2019 年 12 月 11 日安裝， 並於 2019 年 12 月 15 日進行檢測。

2.3 試件之向火面及背火面由送檢單位指定。

3 試件構造

3.1 測試試件主要由防火填充物料(Hilti Firestop Bandage CFS-B)、鍍鋅管道、保溫棉及 CP606 等組成，試件由 600mm (直徑) × 600mm (L) × 12mm (Thk.) 的鍍鋅管道，管道外層包有 4 層 20mm(厚)的 Armaflex Insulation 保溫棉，其外層再包有 3 層 Hilti Firestop Bandage CFS-B；管道與牆身之間的縫隙以 CP606 填充所組成。試件之外觀及組成部份可參考送檢單位所提供之圖 1 至圖 3。詳細圖則及試件組成部份可參照附錄 A。

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3.2 本報告所繪製之圖則及組成部份是根據送檢單位所提供的資料而作。試件之厚度、外觀及組成部件已由本實驗室檢測員檢查。

3.3 試件由送檢單位送樣及安裝於檢測框上進行測試，該檢測框由本實驗室提供。

3.4 試件在檢測前數天內安裝完畢。

4 測試設備及程序

4.1 測試設備按照英國標準 BS476 第 20 部份：1987 的要求設置。

4.2 爐體內部之平均溫度值由 9 個平均分佈於爐內的熱電偶取得，根據英國標準 BS476：第 20 部分：1987 所指定之溫度時間關係而操控升溫。溫度時間記錄圖見附錄 B 之圖 6。

4.3 爐體內設有壓力計以監察爐體壓力。壓力時間記錄圖見附錄 B 之圖 8。

4.4 試件背火面設有 12 個熱電偶以作監察溫度之用，熱電偶分佈位置見附錄 A 之圖 4 及圖 5。試件背火面所有熱電偶均用作判斷試件的耐火隔熱性。

4.5 測試過程中，棉墊及縫隙測量探棒用作評估試件的耐火完整性。

4.6 測試過程中，應記錄試件的變形情況和試件出現全部或部分毀壞時的時間。試件背火面如有火焰並持續 10 秒或以上，以及有煙散發出的情況也應記錄。

4.7 試件背火面及試件向火面於測試前後需拍照記錄。測試過程中，需拍照及用攝錄機記錄試件背火面情況以作日後評估之用。

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5 測試數據及資料

5.1 測試過程所記錄之數據可參考附錄 B，記錄內容如下：

5.1.1 實際爐溫按照英國標準 BS476：第 20 部分：1987 所指定溫度時間關係圖。

5.1.2 由熱電偶所記錄試件背火面的溫度。

5.2 在測試過程中，試件的實驗狀況已詳細記錄於附錄 C 中以供參考。

5.3 有關試件圖片見附錄 D。

5.4 試件檢測開始時周圍環境溫度為 22°C。

5.5 在送檢單位的同意下在 240 分鐘終止本試件整個測試。

6 耐火極限之評定條件

6.1 按英國標準 BS476 第 20 部份：1987 之標準，試件之耐火性能將會根據以下之條件作評定：

6.1.1 耐火完整性 – 當測試過程中，i) 在試件之背火面進行棉墊點燃測試；ii) 如試件背火面出現較大的裂縫，用 6mm 及 25mm 直徑之量測棒來量測裂縫之寬和深度；iii) 試件背火面出現持續的火焰。如棉墊沒有被試件背火面之高溫點燃、試件背火面未出現能讓量測棒插入貫通之裂縫、試件背火面未有出現達到 10s 或以上持續的火焰，試件之耐火完整性才被判斷為合格。

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6.1.2 耐火隔熱性 – 當測試過程中，試件發生以下任一限定情況，均判斷試件失去耐火隔熱性，i) 試件背火面最高平均溫度升幅超過試件背火面初始溫度 140°C；ii) 試件背火面最高單點溫度升幅超過試件背火面初始溫度 180°C；iii) 試件之耐火完整性失效。

7 結論

7.1 根據英國標準 BS476 第 20 部分：1987 的準則 – 耐火完整性及耐火隔熱性，評估試件的耐火性能測試結果如下：

耐火隔熱性	**201 分鐘**
耐火完整性	**240 分鐘**

8 限制說明

8.1 本測試結果僅反映特定測試條件下，建築構件之試驗情況。此測試結果並非判斷試件在實際應用時防火特性的唯一標準，同時亦不反映試件在實際火場上所能表現的防火性能。

8.2 本試驗結果只反映與報告相同之物料、結構、厚度及安裝方法之系統，如將此試驗結果應用於試件組合型式不同的情況時，應按照實際設計而作出相應之評估。

8.3 檢測報告僅對送檢試件負責。

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附錄 A

試件構造說明及附圖

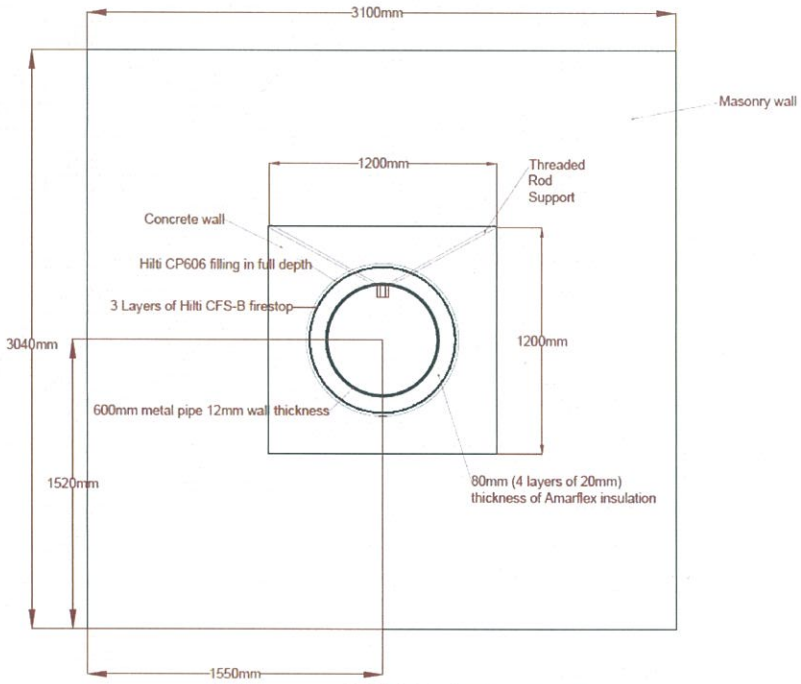

圖 1　測試試件之向火面圖

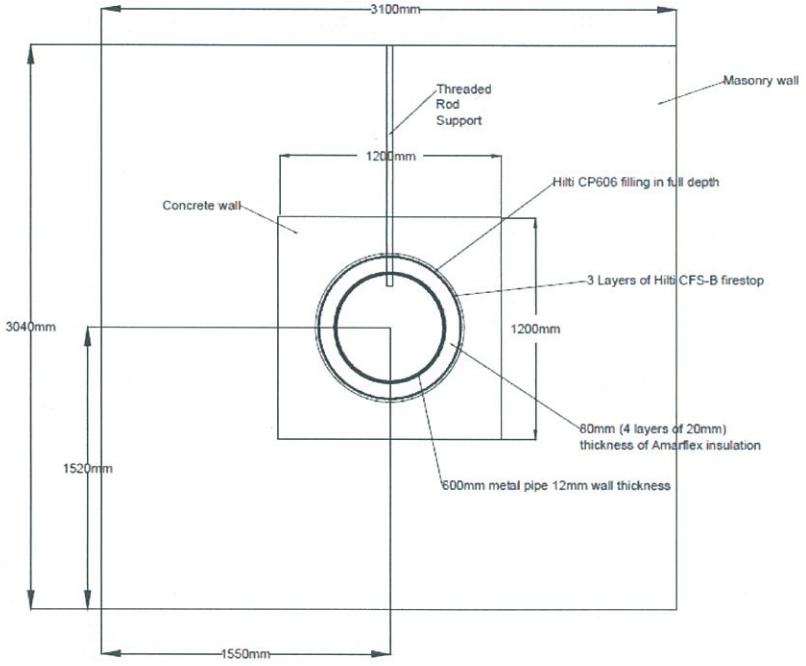

圖 2　測試試件之背火面圖

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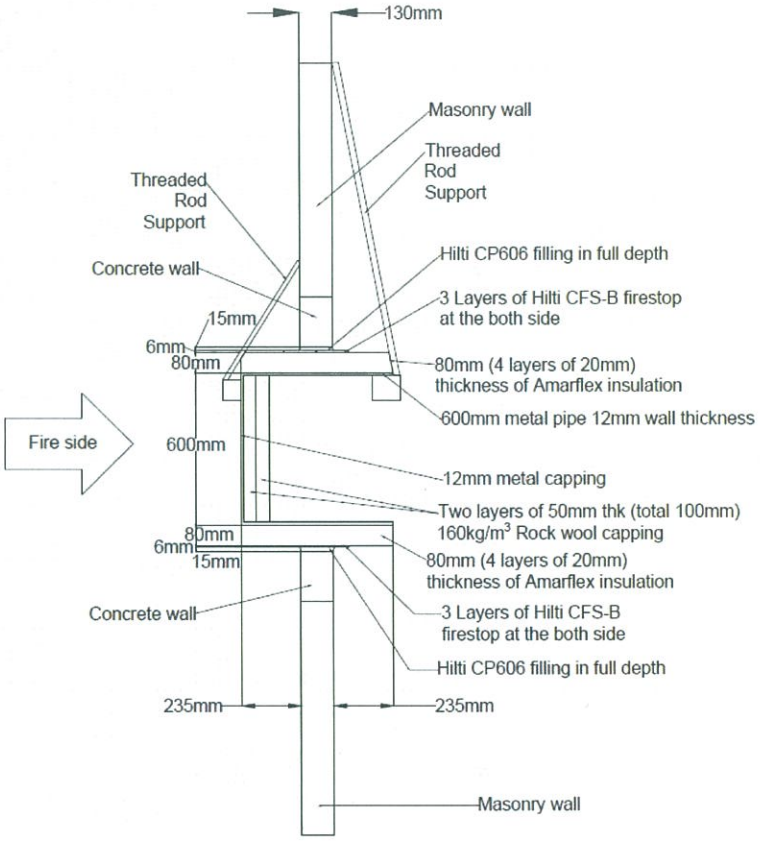

圖 3　測試試件之側視圖

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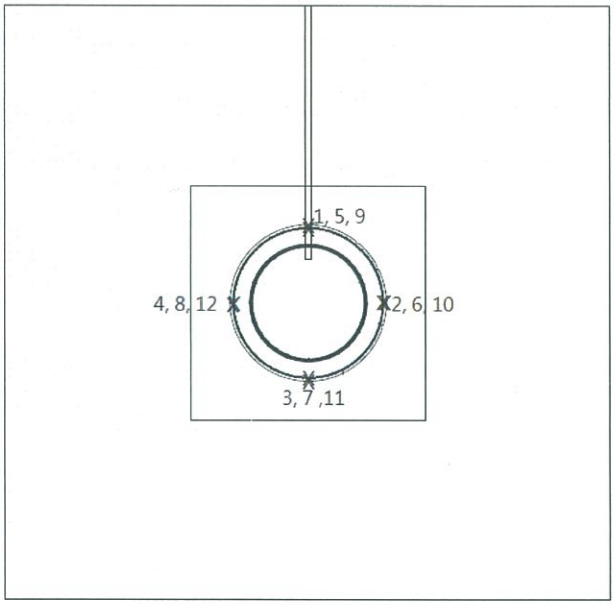
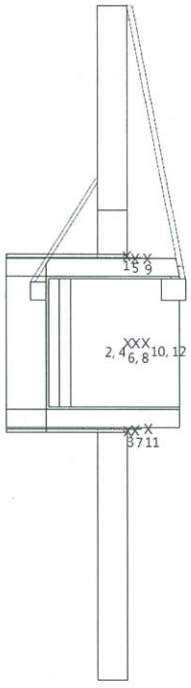


X: 熱電偶

圖 4　測試試件之熱電偶位置圖一



X: 熱電偶

圖 5　測試試件之熱電偶位置圖二

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試件組件資料

(參照附錄 A 之圖 1 到圖 3)

(除非有特別指定，否則全部數值都為理論值)

(全部資料和數值由送檢單位 Hilti (Hong Kong) Limited 提供，本實驗室並沒有求證有關數值)

表 1　試件組件資料列表

項目	組件	描述
1.	Firestop Bandage	品牌：Hilti 型號：CFS-B 產地：德國 尺寸：125mm (W) 厚度：2mm 顏色：灰色 材質：Polymer-bonded intumescent material 遇熱膨脹防火繃帶膨脹率 (不受限，可達)：1:14 膨脹溫度 (大約)： 210°C 儲存及運輸溫度：-5°C~50°C
2.	Fire Sealant	品牌：Hilti 型號：CP606
3.	G.I. Pipe	尺寸：600mm (直徑) × 600mm (L) 厚度：12mm 材質：Galvanized steel
4.	Armaflex Insulation	品牌：Armacell 型號：C1-20150CS Class 1 厚度：20mm 材質：Flexible Closed Cell Elastomeric Insulation - Armaflex

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5.	Mineral wool	品牌：ROCKWOOL 厚度：50mm 密度：160kg/m^3 材質：Rock Wool
6.	Threaded Rod Support	尺寸：ϕ12mm 材質：Galvanized Steel

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附錄 B

測試數據

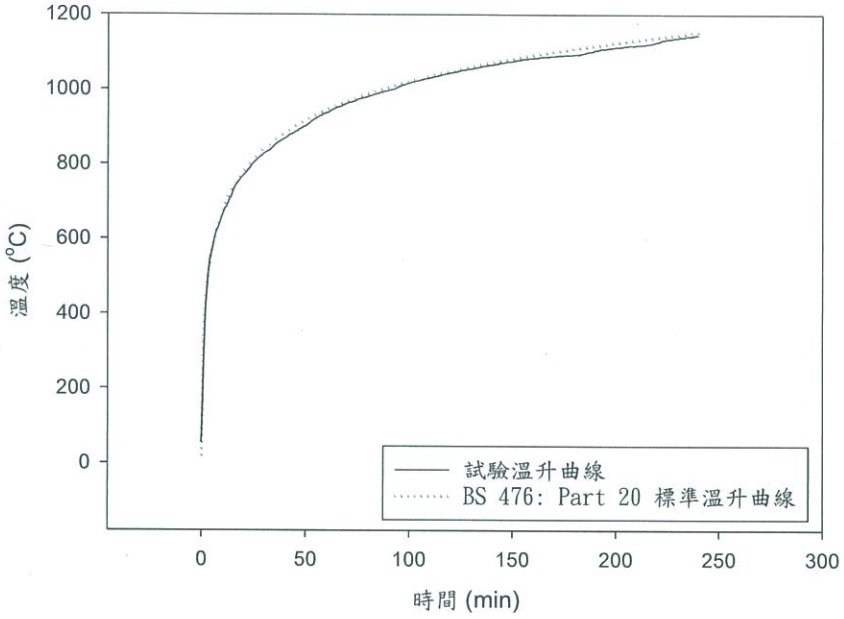

圖 6　平均爐溫與標準(溫度/時間)曲線圖

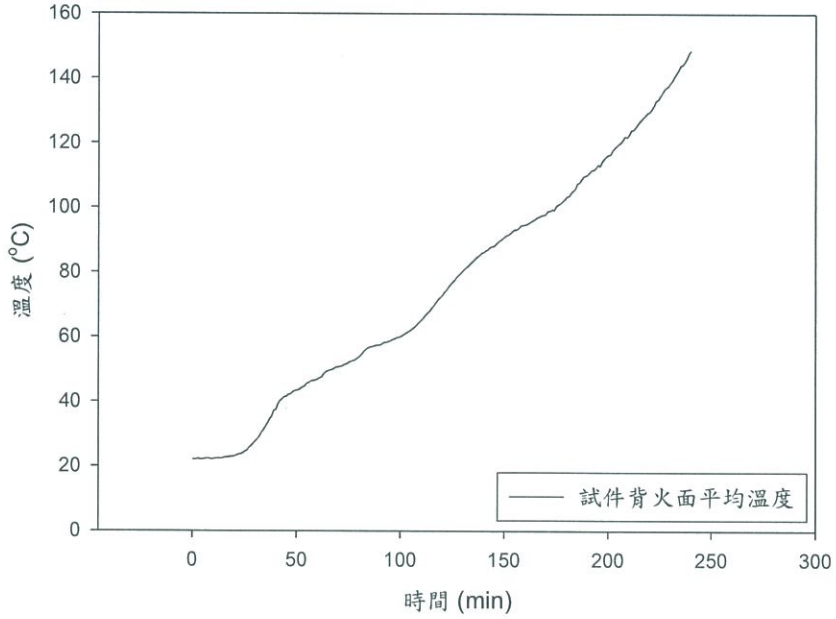

圖 7　試件背火面平均溫度/時間曲線圖

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表 2　平均爐溫與標準溫度之比較

時間 (min)	標準爐內溫度(°C)	爐內平均溫度(°C)	標準允許公差 (%)	實際允差 (%)
0	20.00	53.57		
1	349.21	269.26		
2	444.50	420.81		
3	502.29	502.13		
4	543.89	546.90		
5	576.41	572.09		
6	603.12	599.80		
7	625.78	619.61		
8	645.46	631.82		
9	662.85	647.92		
10	678.43	665.54	±15	-2.17
12	705.44	686.68		
14	728.31	712.81		
16	748.15	739.21		
18	765.67	755.67		
20	781.35	769.42		
22	795.55	781.73		
24	808.52	797.37		
26	820.45	808.49		
28	831.50	819.31		
30	841.80	828.14	±10	-1.76
35	864.80	868.43		
40	884.74	885.83		
45	902.34	901.23		
50	918.08	921.92		
55	932.33	936.41		
60	945.34	951.00		
65	957.31	962.74		
70	968.39	972.44		
75	978.71	980.40		
80	988.37	989.20		
85	997.44	996.47		
90	1005.99	1007.68		
95	1014.08	1016.88		
100	1021.75	1024.07		
105	1029.05	1031.08		
110	1036.02	1037.63		
115	1042.67	1042.17		
120	1049.04	1044.19		

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表 2　平均爐溫與標準溫度之比較 (續)

時間 (min)	標準爐內溫度(°C)	爐內平均溫度(°C)	標準允許公差 (%)	實際允差 (%)
130	1061.02	1054.80		
140	1072.11	1065.48		
150	1082.44	1074.72		
160	1092.10	1083.08		
170	1101.18	1088.39		
180	1109.74	1093.56		
190	1117.83	1105.57		
200	1125.52	1113.24		
210	1132.82	1118.20		
220	1139.79	1126.72		
230	1146.44	1137.47		
240	1152.82	1144.52	±5	-1.02

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表 3　試件背火面單點溫度及平均溫度

時間 (min)	單點熱電偶溫度(°C)												平均溫度 (°C)
	1	2	3	4	5	6	7	8	9	10	11	12	
0	22.2	22.1	22.5	21.9	22.2	22.1	22.1	22.1	22.1	21.9	22.5	22.0	22.1
5	22.1	22.3	22.6	22.0	22.2	22.3	22.4	21.9	22.1	22.0	22.3	22.0	22.2
10	22.2	22.3	23.0	22.0	22.2	22.2	22.3	21.9	22.1	22.0	22.7	21.9	22.2
15	22.4	22.6	24.7	22.3	22.5	22.5	22.9	22.2	22.3	22.3	23.1	22.1	22.7
20	22.4	22.8	28.2	22.4	22.5	22.6	23.3	22.3	22.4	22.3	22.2	22.3	23.0
25	22.9	23.7	34.5	23.4	22.9	23.4	26.2	23.2	22.8	23.2	24.6	23.2	24.5
30	23.9	25.5	42.8	26.3	23.5	25.5	30.5	27.3	23.4	24.8	29.3	27.8	27.5
35	25.3	29.1	51.9	30.9	25.1	29.5	37.7	31.9	24.9	29.2	36.8	34.3	32.2
40	27.7	34.1	61.7	37.0	27.3	34.9	43.7	38.1	27.5	34.1	43.1	40.0	37.4
45	30.0	40.4	68.4	41.4	29.4	41.9	47.8	42.3	29.3	39.0	44.8	42.5	41.4
50	32.5	43.2	73.4	44.7	31.4	44.1	50.3	43.9	29.3	40.6	45.8	42.5	43.5
55	35.0	45.4	77.5	47.8	33.4	46.6	53.4	45.7	29.9	41.3	47.3	43.7	45.6
60	37.1	47.3	81.8	48.7	35.4	48.4	56.9	45.4	30.1	42.4	46.1	42.9	46.9
65	39.5	49.7	85.8	50.5	37.7	50.1	69.1	46.5	32.8	42.1	46.0	42.8	49.4
70	41.6	50.7	89.0	50.7	39.9	49.6	75.0	47.4	33.5	40.6	46.7	43.0	50.6
75	44.0	51.9	91.9	52.1	42.4	49.9	79.9	48.4	34.1	39.0	47.5	43.2	52.0
80	46.8	53.1	94.1	55.1	44.9	50.5	84.4	48.8	36.0	39.2	47.9	43.7	53.7
85	49.5	55.1	97.2	58.1	47.7	52.4	101.2	48.9	37.8	41.3	49.3	43.2	56.8
90	52.0	56.8	98.4	60.4	50.0	51.6	95.7	49.5	39.0	41.1	51.3	44.0	57.5
95	54.6	58.4	98.8	64.0	52.5	52.0	94.0	50.2	40.8	40.9	54.3	44.8	58.8
100	57.4	60.5	99.9	66.5	55.4	54.6	90.9	51.1	42.7	41.3	56.8	45.0	60.2
105	60.5	63.2	99.9	69.0	58.8	58.5	90.7	52.1	45.2	43.2	59.8	44.8	62.1
110	64.4	66.4	100.3	71.7	62.9	64.4	92.7	56.2	47.2	44.3	60.5	50.1	65.1
115	68.9	70.3	101.5	76.3	67.9	71.4	92.8	63.0	49.6	47.6	63.0	54.1	68.9
120	74.6	74.4	102.3	80.2	74.4	76.7	94.0	71.0	52.4	51.5	64.4	57.0	72.7
130	85.7	81.1	106.5	86.8	88.2	83.7	96.5	85.9	58.9	59.6	69.4	63.0	80.4
140	91.3	85.3	115.2	91.6	95.4	---*	98.9	93.0	66.0	69.2	73.2	68.5	86.1
150	95.9	88.9	128.9	93.2	97.5	---	100.2	94.4	70.0	83.1	77.2	69.7	90.8
160	98.5	91.8	144.0	95.9	99.7	---	100.4	96.9	72.2	87.2	79.5	75.4	94.7
170	98.3	95.2	159.5	98.7	101.2	---	101.1	98.3	72.8	90.8	83.6	79.0	98.0
180	98.9	98.3	174.4	100.2	106.0	---	111.2	95.3	81.1	---*	89.8	79.4	103.5

*** 試件背火面熱電偶掉落**

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表 3　試件背火面單點溫度及平均溫度 (續)

時間 (min)	單點熱電偶溫度(°C)												平均溫度 (°C)
	1	2	3	4	5	6	7	8	9	10	11	12	
190	99.7	99.1	189.1	101.6	112.6	---	124.7	---*	89.2	---	94.9	81.7	110.3
200	104.1	100.4	198.3	107.4	122.4	---	139.0	---	92.6	---	99.6	83.4	116.4
202	102.7	101.0	**202.8***	107.8	124.2	---	143.1	---	93.2	---	101.6	84.0	117.8
210	104.3	102.1	214.3	109.5	132.2	---	155.0	---	95.9	---	106.3	84.4	122.7
220	109.8	103.5	227.9	114.1	145.0	---	171.6	---	98.6	---	108.3	88.1	129.7
230	117.1	107.2	242.1	124.2	159.6	---	185.6	---	107.0	---	111.2	93.4	138.6
240	127.0	120.2	250.6	138.9	177.9	---	199.3	---	111.7	---	116.9	95.4	148.7

*** 試件背火面熱電偶掉落**
**** 試件背火面熱電偶單點溫度超溫**

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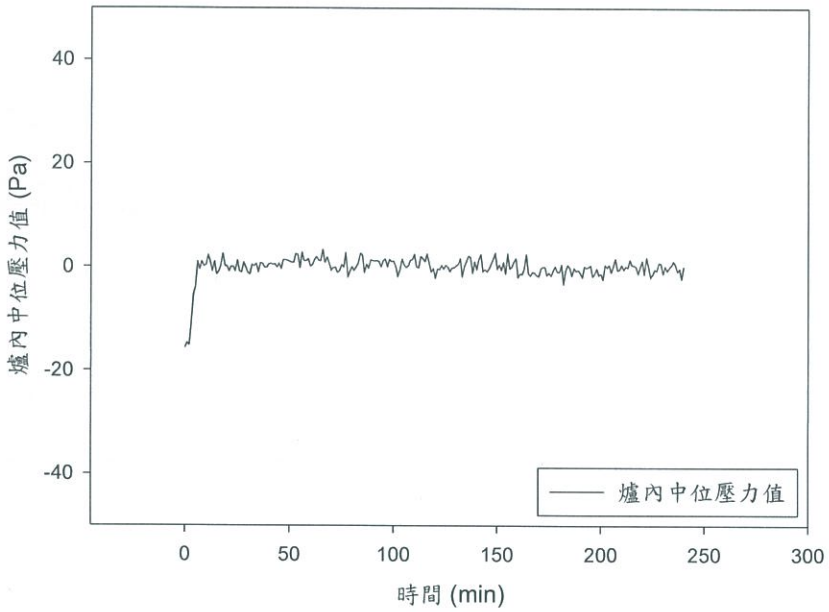

圖 8　爐內中位值壓力(壓力/時間)曲線圖

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附錄 C
觀察情況

表 4　測試過程中，觀察本試件情況如下

時間 (小時:分鐘)	事件
-0:01	攝錄機、監察和操控儀器啓動。
0:00	開啓石油氣閥，測試開始。周圍環境溫度為 22°C。
0:15	試件背火面開始滲水。
0:30	試件背火面白色防火膠膨脹及開始滲出。
0:45	試件背火面沒有明顯變化。
1:00	試件背火面外層黑色保溫膠向前移位。 試件之耐火完整性及耐火隔熱性仍能符合標準。
1:15	試件背火面沒有明顯變化。
1:30	試件背火面圓管頂部位置開始冒煙，黑色保溫膠膨脹。
1:45	試件背火面沒有明顯變化。
2:00	試件背火面沒有明顯變化。 試件之耐火完整性及耐火隔熱性仍能符合標準。
2:15	試件背火面頂部過牆位置的防火膠開始變黑及冒煙量開始增大。
2:18	試件背火面膨脹變形導致熱電偶 TC6 掉落。
2:30	試件背火面頂部位置持續冒煙。
2:45	試件背火面沒有明顯變化。
2:59	試件背火面膨脹變形導致熱電偶 TC10 掉落。
3:00	試件背火面沒有明顯變化。 試件之耐火完整性及耐火隔熱性仍能符合標準。
3:06	試件背火面膨脹變形導致熱電偶 TC8 掉落。
3:15	試件背火面沒有明顯變化。

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表 4　測試過程中，觀察本試件情況如下 (續)

時間 (小時:分鐘)	事件
3:22	**試件背火面熱電偶 TC3 單點溫度達到 202.8°C，試件之耐火隔熱性失效。**
3:30	試件背火面冒煙量增大。
3:45	試件背火面持續冒煙。
4:00	試件背火面沒有明顯變化，在送檢單位同意情況下，測試結束。 試件之耐火完整性仍能符合標準。
備註	*背火面結構仍完整(見圖 26)*

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附錄 D

圖片

圖 9　測試前試件向火面

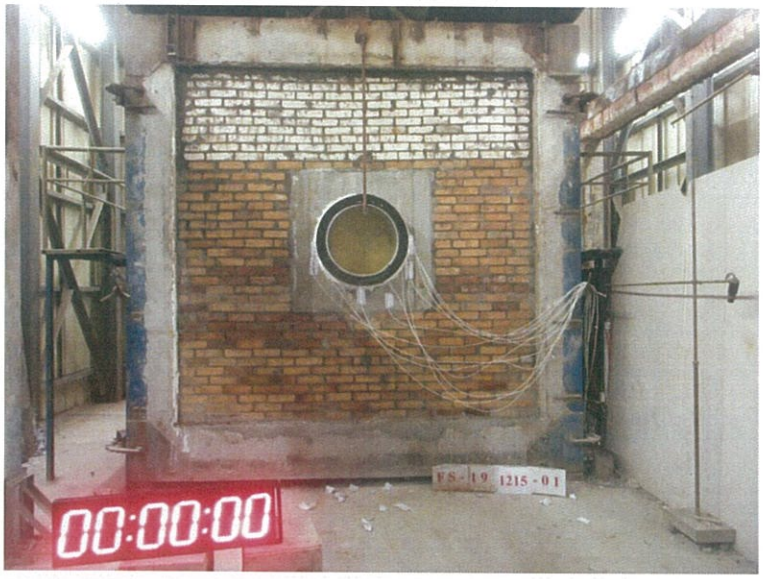

圖 10　測試前試件背火面

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圖 11　測試 15min 後試件背火面

圖 12　測試 30min 後試件背火面

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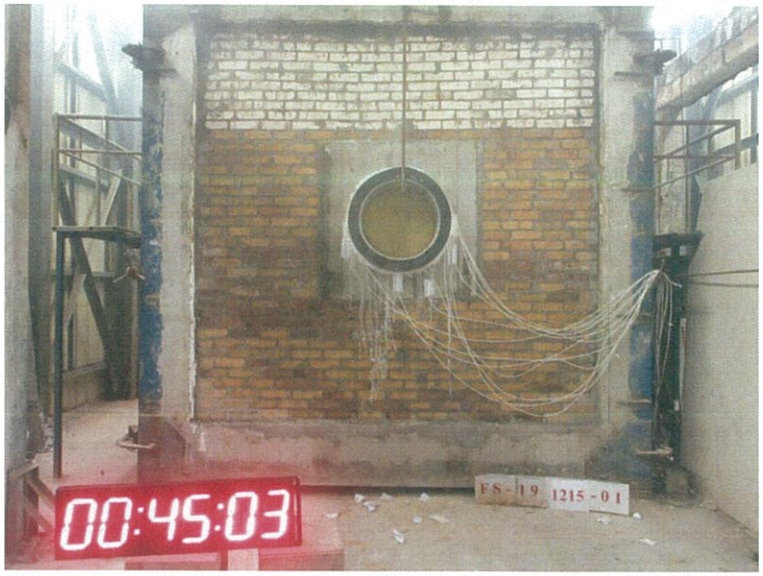

圖 13　測試 45min 後試件背火面

圖 14　測試 60min 後試件背火面

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圖 15　測試 75min 後試件背火面

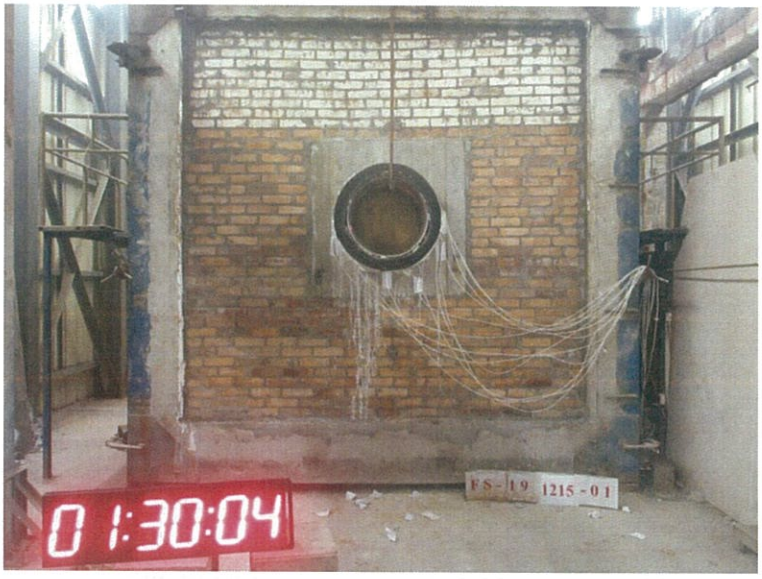

圖 16　測試 90min 後試件背火面

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圖 17　測試 105min 後試件背火面

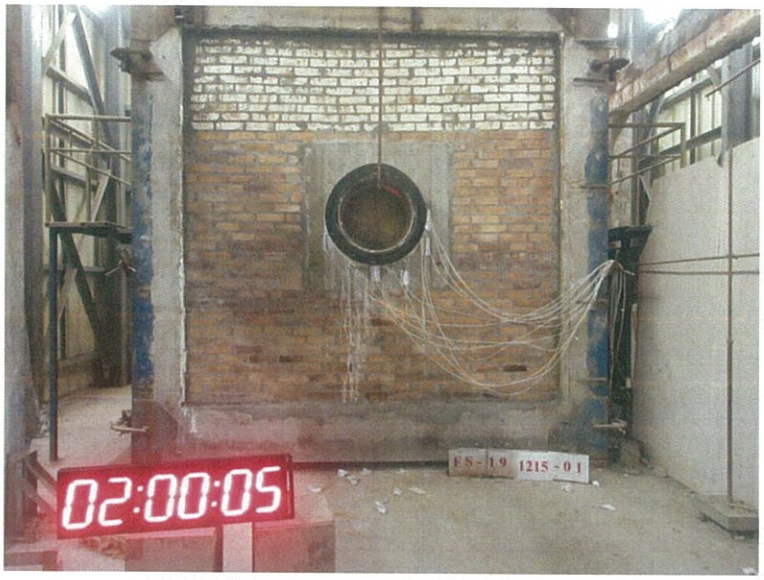

圖 18　測試 120min 後試件背火面

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圖 19　測試 135min 後試件背火面

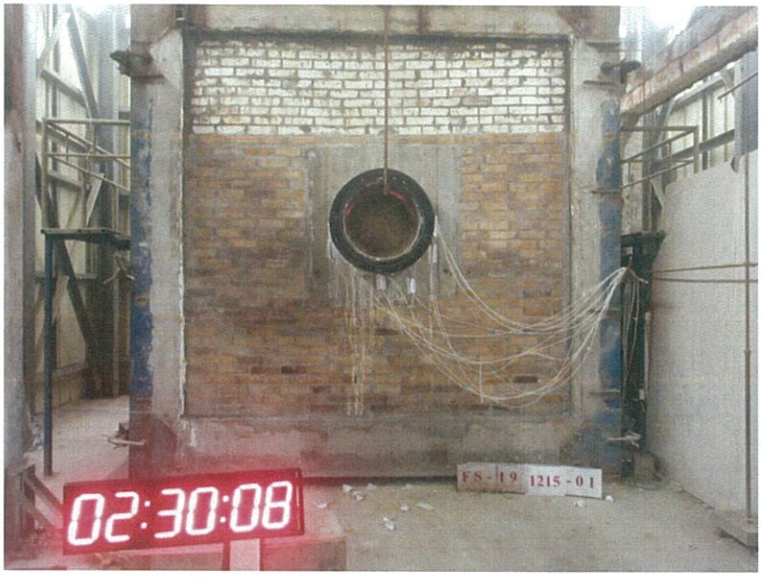

圖 20　測試 150min 後試件背火面

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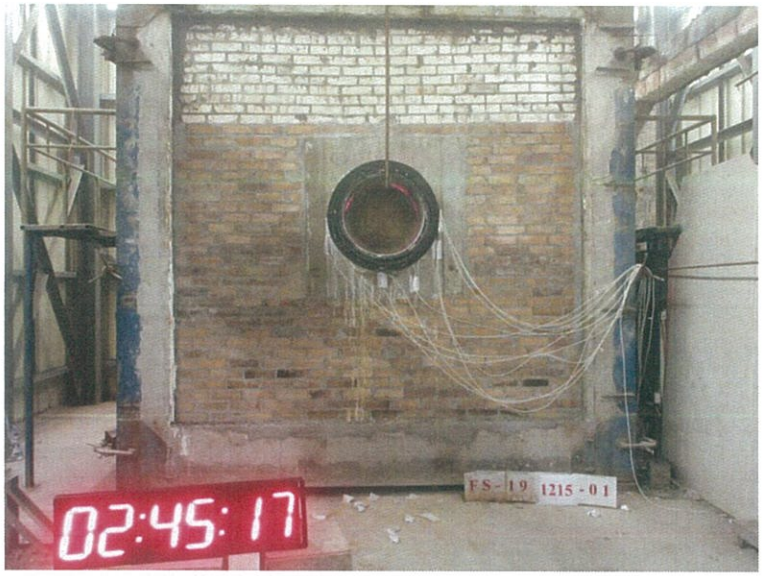

圖 21　測試 165min 後試件背火面

圖 22　測試 180min 後試件背火面

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圖 23　測試 195min 後試件背火面

圖 24　測試 210min 後試件背火面

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圖 25　測試 225min 後試件背火面

圖 26　測試 240min 後試件背火面

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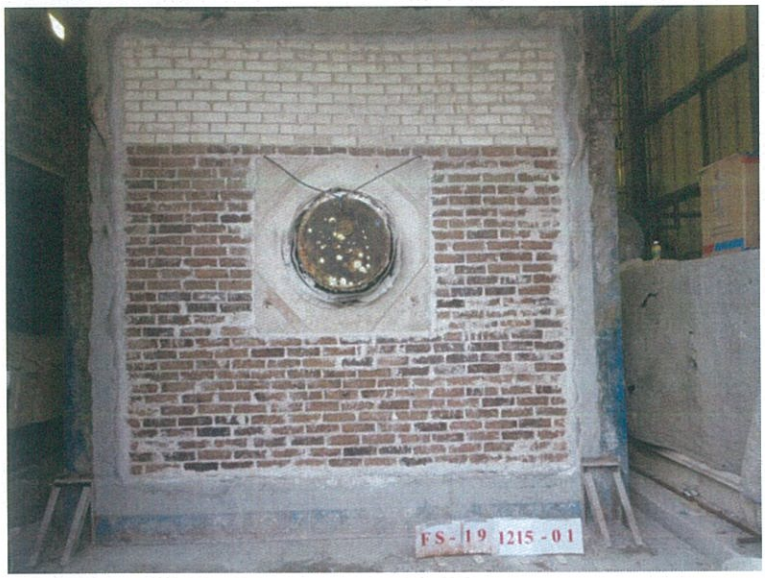

圖 27　測試後試件向火面

----------報告結束----------

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European Technical Assessment

ETA 10/0212 of 06/05/14

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011:	
Trade name of the construction product	**Hilti Firestop Bandage CFS-B**
Product family to which the construction product belongs	Fire Stopping and Sealing Product Penetration Seals
Manufacturer	**Hilt Corporation** Feldkircherstrasse 100 9494 Schaan Liechtenstein
Manufacturing plant(s)	Werk 5a
This European Technical Assessment contains	44 pages including 4 Annex(es) which form an integral part of this assessment.
	Annex(es) A - D Contain(s) confidential information and is/are not included in the European Technical Assessment when that assessment is publicly available.
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	ETAG 026, edition 2011, used as European Assessment Document (EAD)

General Comments

1. This European Technical Assessment is issued by Warrington Certification Limited on the basis of ETAG 026 Fire Protective Products Part 1: General June 2013, and Part 2: Fire Stopping and Fire Sealing Products Aug 2011, Used as European Assessment Document.

2. This European Technical Assessment 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.

1 SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical Description of the Product

(Detailed information and data are given in Annexes)

1) Hilti Firestop Bandage CFS-B is a graphite based pipe wrap used to reinstate the fire resistance performance of wall or floor constructions where they have been provided with apertures for the penetration of single or multiple services.

2) The Hilti Firestop Bandage CFS-B is supplied in roll form, with binding wire used to wrap around pipes and pipe insulation to form a penetration seal. The bandage is cut to a length which suits the overall diameter of pipe or pipe and insulation and wrapped around the penetration twice.

3) Hilti Firestop Bandage CFS-B is supplied in 125 mm width, 2 mm thick and 10 m length.

4) Hilti Firestop Bandage CFS-B is used in conjunction with Hilti Firestop Acrylic CFS-S ACR to seal annular spaces up to 15 mm. Hilti Firestop Acrylic CFS-S ACR is subject to a separate ETA referenced 10/0292 & 10/0389.

5) Hilti Firestop Bandage CFS-B is used in conjunction with mortar and gypsum to seal annular spaces up to 50 mm. The mortar should be EN998-2 – class M10.

Internal use- ETAG 026-2 (used as European Assessment Document EAD) Type Z_2.

2 Specification Of The Intended Use In Accordance With The Relevant EAD

2.1 Intended Use

The intended use of Hilti Firestop Bandage CFS-B is to reinstate the fire resistance performance of rigid and flexible wall constructions where they are penetrated by various insulated plastic, aluminium composite and metallic pipes.

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

Rigid walls:	The wall must have a minimum thickness 100 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 550 kg/m^3.
Rigid Floors	The floors must have a minimum thickness of 150 mm and comprise concrete, aerated concrete or masonry, with a minimum density of 550 kg/m^3.
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, 'Type F' Gypsum boards according to EN 520. In timber stud walls, no part of the penetration shall be closer than 100 mm to a stud, the cavity must be closed between the penetration seal and the stud and minimum 100 mm of insulation of class A1 or A2 according to EN 13501-1, is provided within the cavity between the penetration seal and the stud.

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 insulated plastic, aluminium composite and metallic pipes

3) There is no minimum separation between adjacent seals

4) Services in walls shall be supported at maximum 450mm from the face of the separating element for walls, and 330mm above the surface of the floor.

5) The provisions made in this European technical approval are based on an assumed working life of the firestop product of 10 years, provided the conditions laid down in clauses 4 and 5 relating to manufacturing, installation, use and repair, are met.
The indications given on the intended working life cannot be interpreted as a guarantee given by the producer or the approval body, but are to be used as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works. The real working life might be, in normal use conditions, considerably longer without major degradation affecting the essential requirements.

2.2 Use Category

Type Z_2: Intended for use at internal conditions with humidity classes other than Z_1, excluding temperatures below 0°C.

3 Performance Of The Product And References To The Methods Used For Its Assessment

The assessment of fitness for use has been made in accordance with EOTA ETAG 026 Part 2: 2011-08-08 (used as European Assessment Document, EAD)

ETAG Clause No.	ETA Clause No.	Characteristic	Assessment of characteristic
		Mechanical resistance and stability	Not relevant
		Safety in case of fire	**See Clause 2.1**
2.4.1	3.1	Reaction to fire	**Class E according to EN 13501-1**
2.4.2	3.2	Resistance to fire	**See clause 2.2 & Annex C**
		Hygiene, Health and the Environment	
2.4.3	3.3	Air permeability	No performance determined
2.4.4	3.4	Water permeability	No performance determined
2.4.5	3.5	Dangerous substances	**See clause 2.5**
		Safety in use	
2.4.6	3.6	Mechanical resistance and stability	No performance determined
2.4.7	3.7	Resistance to impact/movement	No performance determined
2.4.8	3.8	Adhesion	No performance determined
		Protection against noise	No performance determined
2.4.9	3.9	Airborne sound insulation	No performance determined
		Energy, Economy and Heat Retention	
2.4.10	3.10	Thermal properties	No performance determined
2.4.11	3.11	Water vapour permeability	No performance determined
		General aspects relating to fitness for use	
2.4.12	3.12	Durability and serviceability	**Z_2**

3.1 Reaction to fire

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

3.2 Resistance to fire

System Hilti Firestop Bandage CFS-B has been tested in accordance with EN 1366-3: 2009 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.

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

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 classifications relate to C/U (capped inside the furnace/uncapped outside) for metal pipes and U/C (capped outside/uncapped inside the furnace) for plastic and composite pipes. For further information refer to national regulations.

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

3.3 Air permeability

No performance determined

3.4 Water permeability

No performance determined

3.5 Dangerous substances

The applicant is required to submit a written declaration stating whether or not the fire stopping and fire sealing product contains dangerous substances according to European and national regulations, when and where relevant in the Member States of destination, and shall list these substances.

Hilti Corporation declare that product Hilti Firestop Bandage CFS-B is in compliance with Council Directive 76/769/EEC of 27th 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 ≥ 1.0 % w/w as well as all toxic, carcinogenic, toxic for reproduction and mutagenic chemical substances ≥ 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 the Hilti Firestop Bandage CFS-B material safety data sheets (according to 91/155/EEC including amendments) and have been considered for the classification of the products according to the directive1999/45/EG (classification of preparations, including amendments).

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

3.6 Mechanical resistance and stability

No performance determined.

3.7 Resistance to impact/movement

No performance determined.

3.8 Adhesion

Not relevant.

3.9 Airborne sound insulation

No performance determined

3.10 Thermal Properties

No performance determined.

3.11 Water vapour permeability

No performance determined.

3.12 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_2 use category specified in ETAG 026-2 (used as European Assessment Document, EAD), and the results of the tests have demonstrated suitability for penetration seals intended for use in internal conditions with humidity lower than 85% RH excluding temperatures below 0°C, without exposure to rain or UV.

4 Assessment And Verification Of Constancy Of Performance (Hereinafter AVCP) System Applied, With References To Its Legal base

According to the decision 1999/454/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V to the Regulation (EU) No 305/2011) given in the following table apply:

Products	Intended uses	Level or Class	System
Fire stopping and fire sealing products	For fire compartmentation and / or fire protection or fire performance	Any	System 1

5. Technical Details Necessary For The Implementation Of The AVCP System, As Provided For In The Applicable EAD.

Tasks for the Manufacturer

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 Assessment.

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

The factory production control shall be in accordance with the Control Plan of 17/3/10 relating to the European technical assessment ETA 10/0212 which is part of the technical documentation of this European technical assessment. 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.

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.

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 17/3/10 relating to the European Technical Assessment 10/0212.

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 assessment.

In cases where the provisions of the European technical assessment 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.

Signatories

Responsible Officer

C. Abbott* - Principal Certification Engineer

Approved

A. Kearns* - Technical Manager

* For and on behalf of Warrington Certification Limited.

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
EN 1366-3	Fire resistance tests for service installations - Part 3: Penetration seals

Other reference documents:

EOTA TR 024	Characterisation, Aspects of Durability and Factory Production Control for Reactive Materials, Components and Products
ETAG No. 026: Part 2	Guideline For European Technical Approval of Fire Stopping and Fire Sealing Products, Part 3: Penetration Seals(used as European Assessment Document, EAD)

Annex B

Description of Product and Product Literature

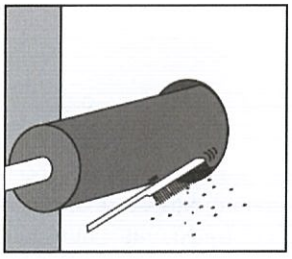
Hilti Firestop Bandage CFS-B

A detailed specification of the product is contained in document "Evaluation Report" relating to the European Technical Approval ETA – 10/0212 issued on 07/04/14, of Hilti Firestop Bandage CFS-B which is a non-public part of this ETA.

1 Installation

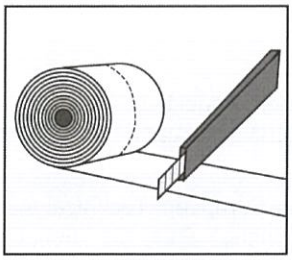
Installation of system Firestop Bandage CFS-B shall be conducted as follows:

1



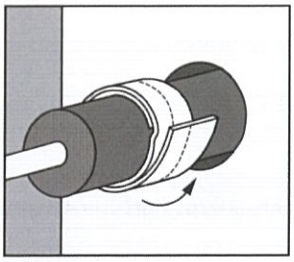
Clean opening.

2



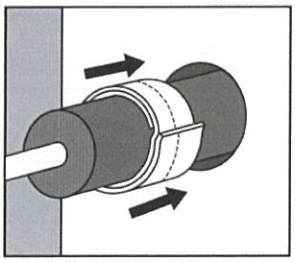
Cut Hilti Firestop Bandage CFS-B to fit the outside diameter of the insulation. Consider the number of 2 layers.

3



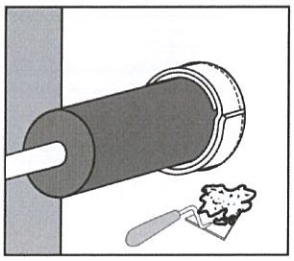
Wrap Hilti Firestop Bandage CFS-B around the insulation. Secure the bandage with steel bands or wire (≥ 0.7mm)

4



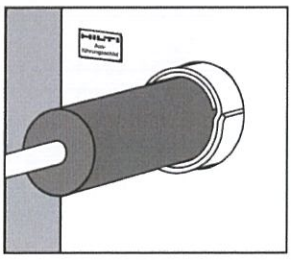
Install Hilti Firestop Bandage CFS-B on both sides within the opening in a depth of 62.5 mm.

5



Close the remaining gap with mortar or gypsum.

6



If it is necessary, an additional insulation over the bandage has to be installed.

Two layers of bandage are required around the pipe/insulation.

2 Indications to the manufacturer

2.1 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

2.2 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 C

RESISTANCE TO FIRE CLASSIFICATION OF PENETRATION SEALS MADE OF HILTI FIRESTOP BANDAGE CFS-B

Intended use of pipes and reference to relevant section.

Typical Application	Pipe Material	Pipe standard	Flexible and rigid wall ≥ 100 mm	Rigid wall ≥ 200 mm	Floor ≥ 150mm
Heating	Copper		see 2.1.2	see 2.2.2	see 2.3.2
	Steel		see 2.1.3	see 2.2.3	see 2.3.3
	Alu Composite Pipes	EN ISO 21003	see 2.1.4	see 2.2.4	see 2.3.4
	PE-Xa	EN ISO 15875	see 2.1.5	-	see 2.3.5
Potable Water	Stainless Steel		see 2.1.3	see 2.2.3	see 2.3.3
	Alu Composite Pipes	EN ISO 21003	see 2.1.4	see 2.2.4	see 2.3.4
	PE-Xa	EN ISO 15875	see 2.1.5	-	see 2.3.5
Cooling	Copper		see 2.1.2	see 2.2.2	see 2.3.2
	Steel / Stainless Steel		see 2.1.3	see 2.2.3	see 2.3.3
	Alu Composite Pipes	EN ISO 21003	see 2.1.4	see 2.2.4	see 2.3.4
	PE-HD	EN 12201-2	see 2.1.5		see 2.3.5
Various	Copper		see 2.1.2	see 2.2.2	see 2.3.2
	Steel		see 2.1.3	see 2.2.3	see 2.3.3
	Alu Composite Pipes	EN ISO 21003	see 2.1.4	see 2.2.4	see 2.3.4

1 General Information Hilti Firestop Bandage CFS-B

1.1 Penetration seal and bandage installation

Pipes insulated with elastomeric combustible insulation (see Annex D) fire-stopped by wrapping the Hilti Firestop Bandage CFS-B twice around the insulation material.

Steel wire is utilised to hold the Hilti Firestop Bandage CFS-B together, positioned approximately in the first quarter measured from the flank.

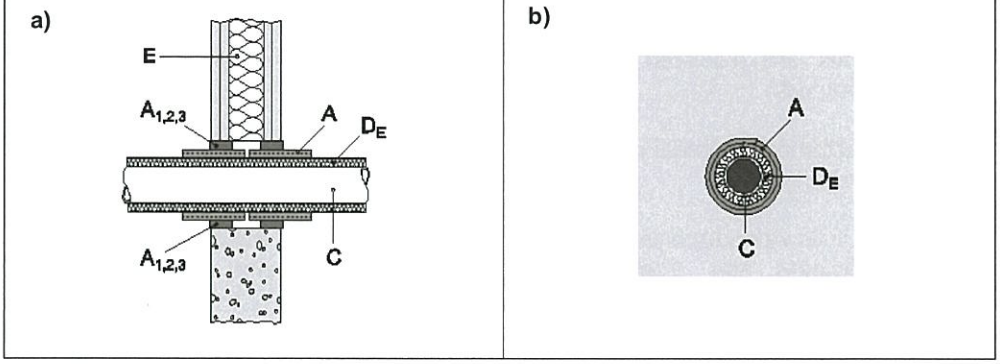
The Hilti Firestop Bandage CFS-B is mounted on both side of the penetration.

The Hilti Firestop Bandage CFS-B is then pushed into the penetration in line with the designated marking shown on midsize of the Hilti Firestop Bandage CFS-B or at 100 mm thick walls the Hilti Firestop Bandage CFS-B was placed with a distance of approximately 5 mm from each other.

1.1.1 Single penetration seal

Single insulated pipes running through the penetration are sealed utilising two layers of Hilti Firestop Bandage CFS-B.

Installation scheme of bandage
a) side view b) front view



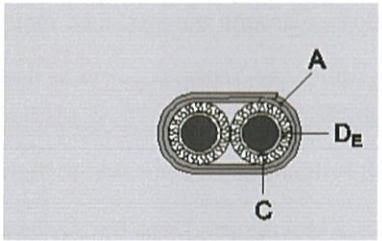
1.1.2 Bundled penetration

Small aluminium composite pipes (≤Ø 16mm) can be wrapped together in a double penetration with the Hilti Firestop Bandage CFS-B.

Hilti Firestop Bandage CFS-B is wrapped over both insulated pipes. Fixing and positioning of the bandage is installed as described above.

Installation and Hilti Firestop Bandage CFS-B is as described above

Installation sceme of bandage
Front view of two pipes wrapped together with bandage



1.2 Pipe insulation with combustible and mineral wool insulation

Specific insulation thickness with corresponding classification class is shown at each section below.

1.2.1 Elastomeric combustible insulation

Pipes are insulated with elastomeric combustible insulation material of varying thickness'.

Elastomeric material ranges from 7,7 mm up to 45 mm in configuration (CS) Continued Sustained.

Results were displayed considering E.2.7.5.2 and E.2.7.8.2 allowing interpolation of wall thickness and diameter between tested specimens and insulation thickness, respectively.

Metallic pipes from diameter 323.9mm on were insulated by a fixed thickness of 25mm elastomeric combustible insulation.

Metallic pipes were tested in C/U configuration, plastic and aluminum composite pipes in U/C configuration

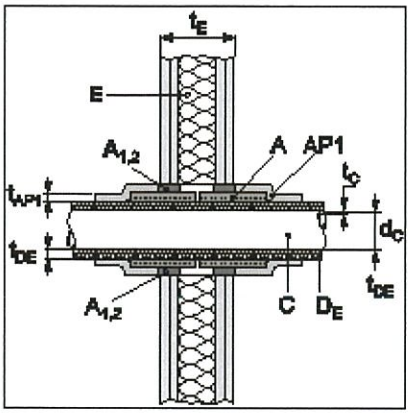
1.2.2 Mineral wool insulation

For mineral wool insulation Rockwool conlit shells /Rockwool 800 or Rockwool KlimaRock / Rockwool RS 800 (40mm, approx. 40kg/m³; (LI) Local Interrupted was utilised.

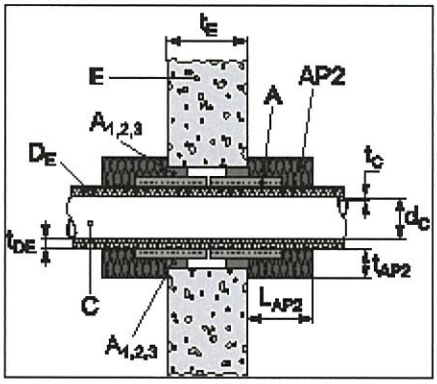
1.3 Additional Protection

Additional insulation material (AP) is utilised for some applications and comprises of the following:

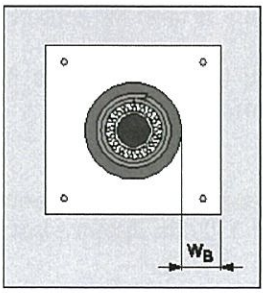
AP1: Armaflex AF elastomeric material for thermal insulation, 19 mm thick and 250 mm in length (LI) Local Interrupted



AP2: Mineral wool, Rockwool Klimarock, 40mm thick, 250 mm in length; density approximately40kg/m³ (LI) Local Interrupted

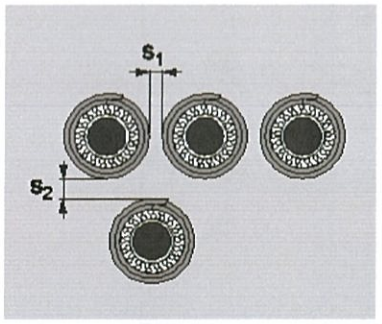


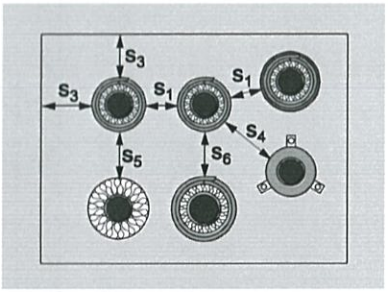
AP3: Beading / Outside Framing
Beading for flexible wall (100 mm) is applied by adding boards on both sides in two layers (2x12,5 mm Type F board) fixed with drywall screws. The resulting strips around the pipe whole are at least 50 mm in width. Final penetration seal thickness is 150 mm.



1.4 Clearance to insulated pipes and other fire-stopped services

Clearance of services to each other – references see below 1.4.1 to 1.4.5
These clearance are valid for flexible, rigid wall and floor.





1.4.1 Clearance to pipes firestopped by bandage in linear configuraton - S_1

Clearance is ≥ 0 mm to each other for insulated pipes wrapped by bandage CFS-B and in some cases to additional protection according classification.

1.4.2 Clearance to pipes firestopped by bandage in cluster configuraton – S_2

Clearance is ≥ 0 mm to each other for insulated pipes wrapped by bandage CFS-B and in some cases to additional protection according classification.

1.4.3 Distances to seal edge - S_3

In round openings distance to seal edge are up to 50mm. In case where no gap is left between construction and bandage, smoke tightness has been secured.

1.4.4 Clearance to Hilti Firestop Collar CFS-C EL - S_4

Clearance to Hilti Firestop Collar is shown to be zero. Please refer for detailed results the corresponding ETA 14/0085.

1.4.5 Clearance to Conlit shell and Klimarock - S_5

Insulated pipes fire-stopped with Hilti Firestop Bandage CFS-B are tested to have a clearance to bandage or respectively to additional protection of zero.

1.4.6 Distance to PE-HD / PE-Xa pipes- S_6

Minimum distance to plastic pipes (PE-HD / PE-Xa) is in Wall ≥65 mm, in floor ≥0 mm.

1.5 Annular Gap

In flexible and rigid wall Hilti Acrylic Firestop CFS-S ACR and gypsum is used to fill annular space. Mortar and gypsum is used in rigid walls and floors.
Hilti Acrylic Firestop CFS-S ACR is used for gaps of 0 mm -15 mm

Mortar and gypsum is used in rigid walls and floors, annular space is allowed from approximately 3 up to 50 mm.

1.6 Pipe Support

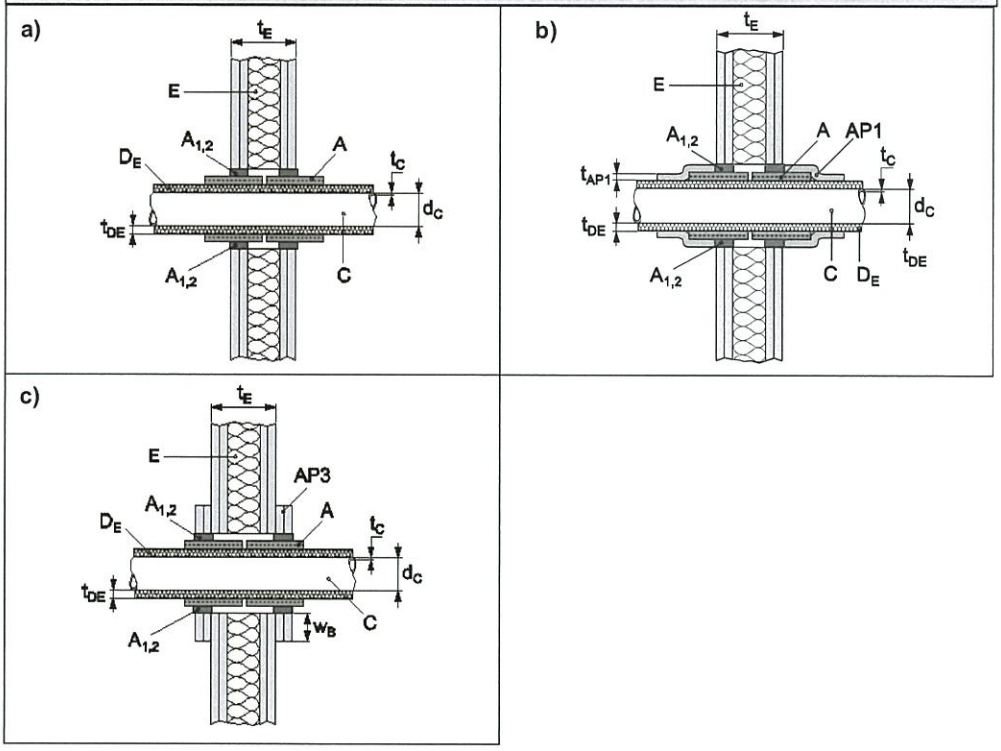
Pipes are supported in wall application at a distance of 450 mm.
In floors first support was in 330 mm distance installed from surface.

2 Testing of fire resistance in different constructions

2.1 Flexible wall (≥100 mm)

2.1.1 Installation variations of insulated pipes protected by Hilti Firestop Bandage CFS-B

Installation examples:
a) Standard installation
b) Installation with additional protection AP1
c) Installation with additional protection beading/outside framing (AP3)

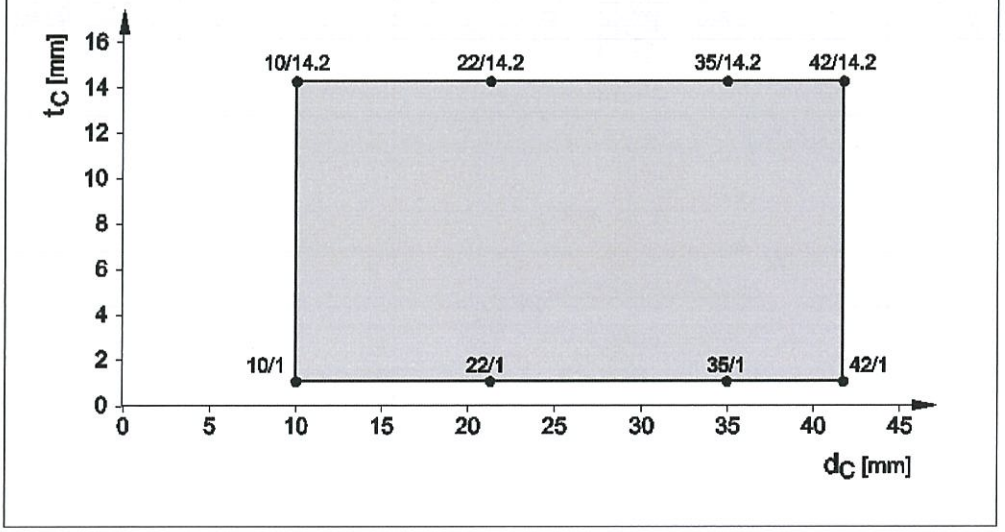


2.1.2 Copper pipes

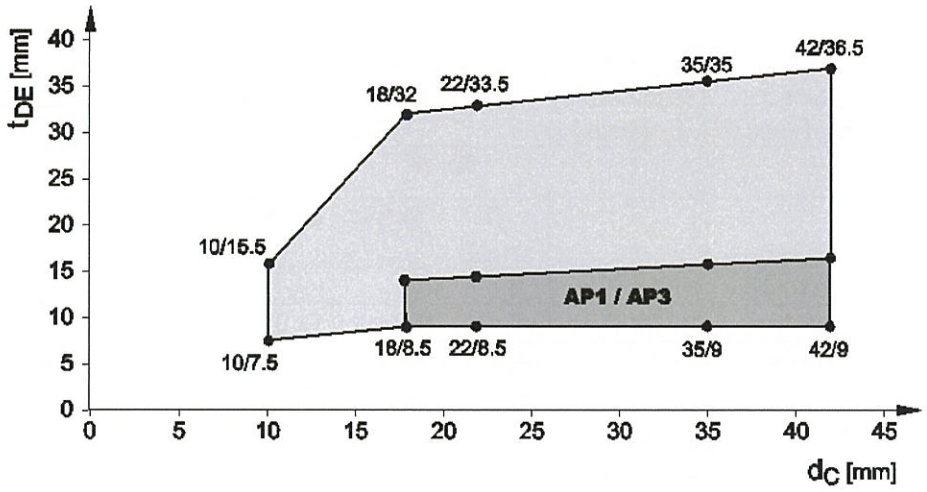
Copper pipes are insulated with elastomeric combustible insulation ranging in thickness [mm] from 7,5mm till up to 36,5mm.

Service	Pipe diameter d_C [mm]	Pipe wall thickness t_C [mm]	Insulation thickness t_{DE} [mm]				Classification		
			from		to			addition. protection	
			Ø small	Ø big	Ø small	Ø big	-	AP 1	AP 3
Copper	10 to 18	1 - 14,2	7,5	8,0	15,4	32,0	EI 90	-	-
Copper	18 to 42	1 - 14,2	8,0	9,0	33,5	36,5	EI 60	EI 90	-
Copper	18 to 42	1 - 14,2	14,5	16,5	33,5	36,5	EI 90		-
Copper	18 to 42	1 - 14,2	8,0	9,0	33,5	36,5			EI 90
Copper	10 to 35	1 - 14,2	7,5	9,0	15,4	35,0			EI 120

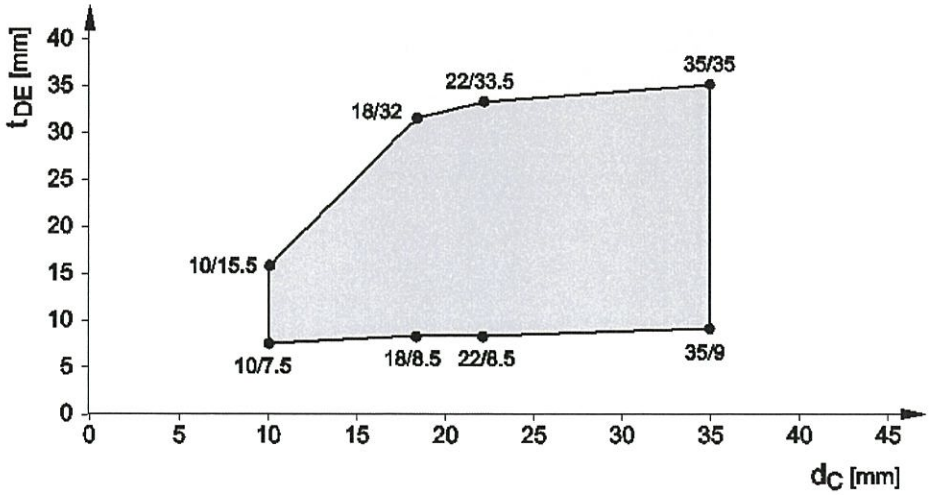
Copper pipe – relation wall thickness towards pipe diameter
Graph shows pipe wall thickness (II) towards pipe diameter (Ø dC)



Copper pipes, C/U, flexible wall ≥100 mm – EI 90
Thin insulation thickness aquires at higher pipe diameter additional protection (AP1 or AP3; dark area)
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø dC)



Copper pipes, C/U, flexible wall ≥100 mm – EI 120
Additional protection AP3 – penetration seal thickness 150 mm
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø dC)

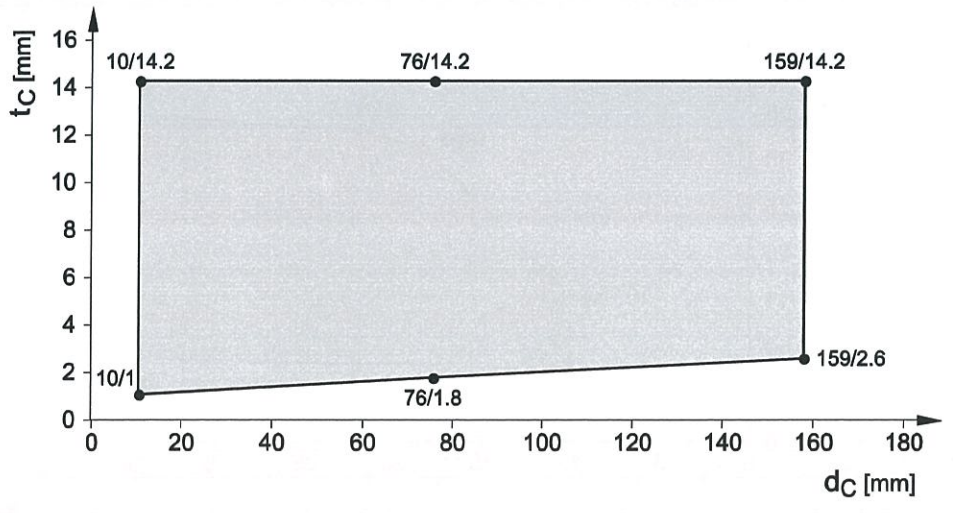


2.1.3 Steel Pipes

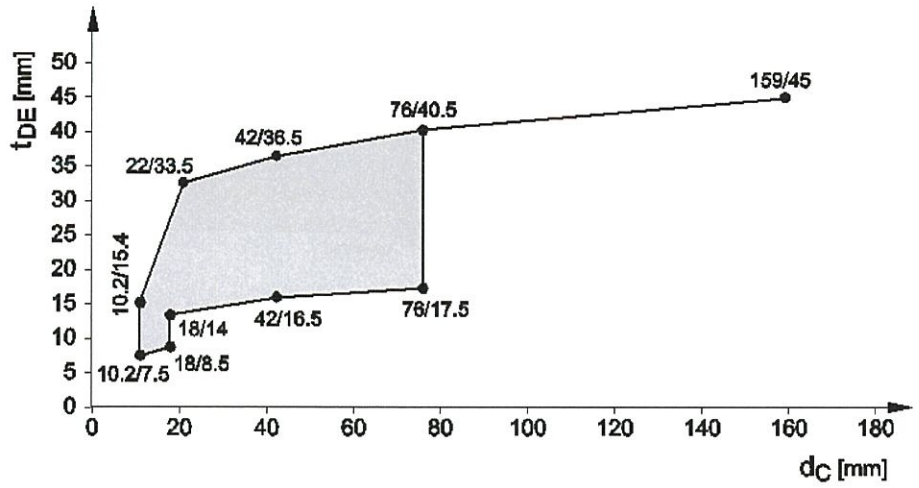
Applying Annex E1.3.2 of DIN EN 1366-3:2009 the field of application given above for copper pipes is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steel, Ni alloys (NiCu, NiCr, NiMo alloys) and Ni.

Service	Pipe diameter d_C [mm]	Pipe wall thickness t_C [mm]	Insulation thickness t_{DE} [mm]				Classification		
			from		to			addition. protection	
			Ø small	Ø big	Ø small	Ø big	-	AP 1	AP 3
Steel	10,2 to 18	1 - 14,2	7,5	8,5	15,4	33,5	EI 90		
Steel	18 to 42	1 - 14,2	8,5	9,0	32,0	36,5	EI 60	EI 90	
Steel	18 to 42	1 - 14,2	14,0	16,5	32,0	36,5	EI 90		
Steel	42,4 to 76	1,4 - 14,2	16,5	17,5	36,5	40,5	EI 90		
Steel	10,2 to 76	1 - 14,2	7,5	9,5	15,4	40,5		EI 90	
Steel	76 to 159	1,8 - 14,2	40,5	45	40,5	45	EI 90		
Steel	10,2 - 60	1 - 14,2	7,5	9,0	15,4	39			EI 120

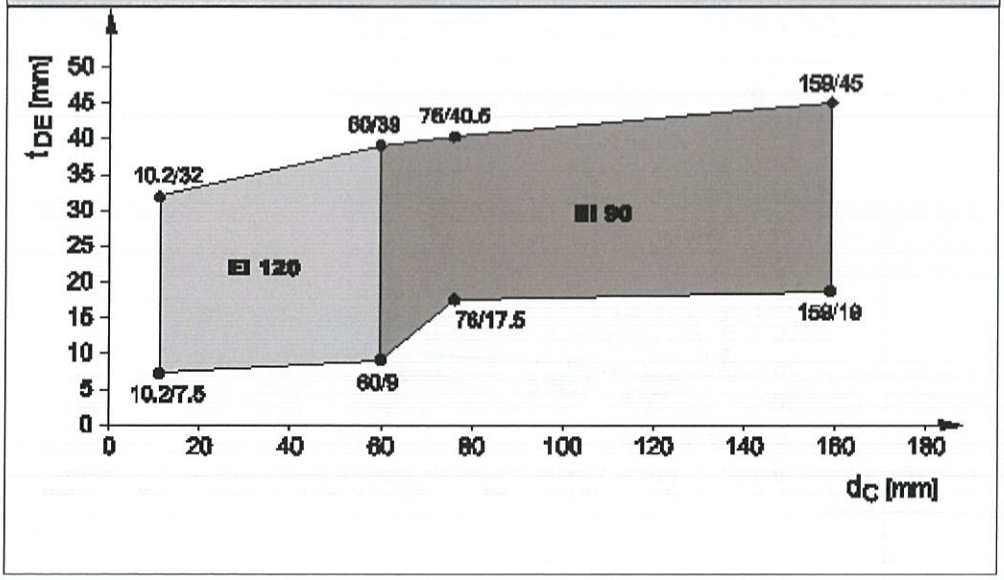
Steel pipe, flexible wall ≥100 mm – relation wall thickness towards pipe diameter
Graph shows pipe wall thickness (tc) towards pipe diameter (Ø dC)



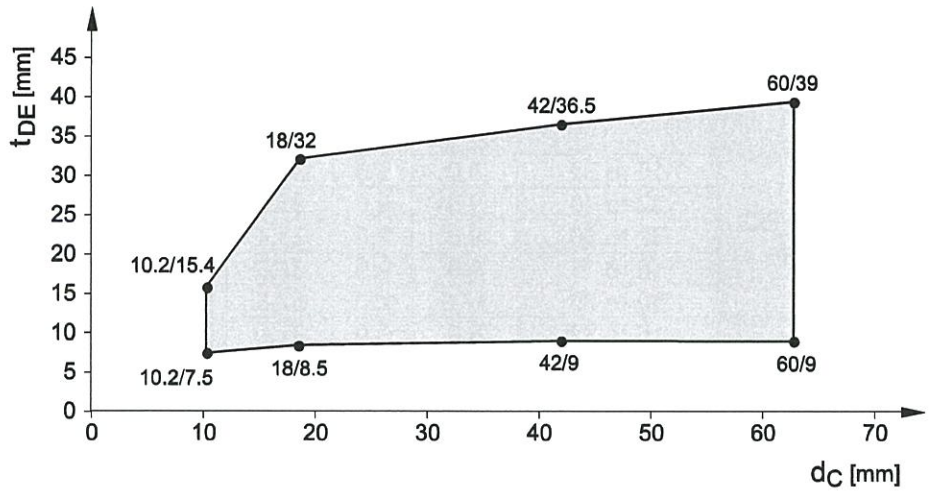
Steel pipes, C/U, flexible wall ≥100 mm – EI 90
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø dC)



Steel pipes, C/U, flexible wall ≥100 mm – EI 60 or EI 90 + AP1
Additional protection AP1 is required to reach EI 90
From pipe Ø 76 to Ø 159 mm classification is EI 120 at high insulation thickness (40.5/45 mm; see dotted line in graph below)
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



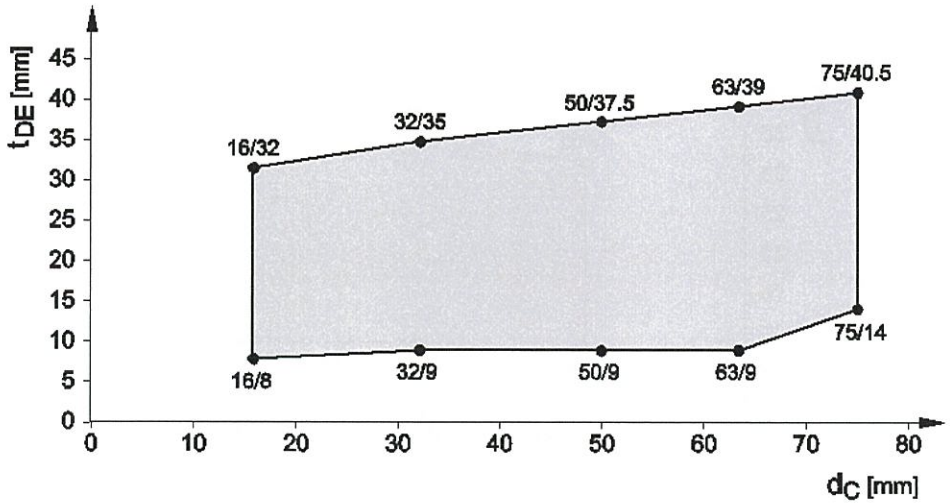
Steel pipes, C/U, flexible wall ≥100 mm – EI 120 with beading (AP3)
Additional protection AP3, thickness of penetration seal 150 mm
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



2.1.4 Aluminium Composite Pipes

Manu-facturer	Product name	Pipe diameter dc (mm)	Insulation thickness (mm)				Classification	
			from		to			Additional Protection
			Ø small	Ø big	Ø small	Ø big		AP3
Fränkische Rohrwerke	Alpex F50 Profi	16 to 32	8,0	9,0	32,0	35,0	EI 90	
		32 to 40	9,0	9,0	35,0	36,5	EI 60	
		32 to 50	9,0	9,0	35,1	37,5		EI 120
		50 to 75	9,0	9,0	37,5	40,5	EI 60	
		50 to 75	37,5	40,5	37,5	40,5	EI 120	
Geberit	Mepla	16 to 32	8,0	9,0	32,0	35,0	EI 90	
		32 to 40	9,0	9,0	35,0	36,5	EI 60	
		32 to 50	9,0	9,0	35,1	37,5		EI 120
		50 to 75	9,0	9,0	37,5	40,5	EI 60	
		50 to 75	37,5	40,5	37,5	40,5	EI 120	
Georg Fischer	Sanipex	16 to 32	8,0	9,0	32,0	35,0	EI 90	
		32 to 40	9,0	9,0	35,0	36,5	EI 60	
		32 to 50	9,0	9,0	35,1	37,5		EI 120
		50 to 63	9,0	9,0	37,5	39	EI 60	
		40 to 63	9,0	9,0	36,5	39	EI 120	
IVT	PRINETO Stabilrohr	17 to 52	8,0	9,0	32,0	37,5	EI 90	
		52 to 63	9,0	9,0	37,5	39	EI 60	
		17 to 63	32	39	32	39	EI 120	
KeKelit	KELOX KM 110	16 to 75	8,0	14,0	32,0	40,5	EI 90	
		16 to 73	32	40,5	32	40,5	EI 120	
Rehau	Rautitan stabil	16 to 40	8,0	9,0	32,0	38,5	EI 90	
		16 to 40	32,0	38,5	32,0	38,5	EI 120	
TECE	TECEflex Verbundrohr	16 to 50	8,0	9,0	32,0	37,5	EI 90	
		63	9,0	9,0	29	29	EI 60	
		16 to 63	32	40,5	32	40,5	EI 120	
Uponor	Unipipe MLC	16 to 32	8,0	9,0	32,0	35,0	EI 120	
Viega	SANIFIX Fosta-Rohr	16 to 32	8,0	9,0	32,0	35,0	EI 120	
		32 to 63	9,0	9,0	36,5	39	EI 60	
		32 to 50	9,0	9,0	35,1	37,5		EI 120
		16 to 63	32	39	32	39	EI 120	

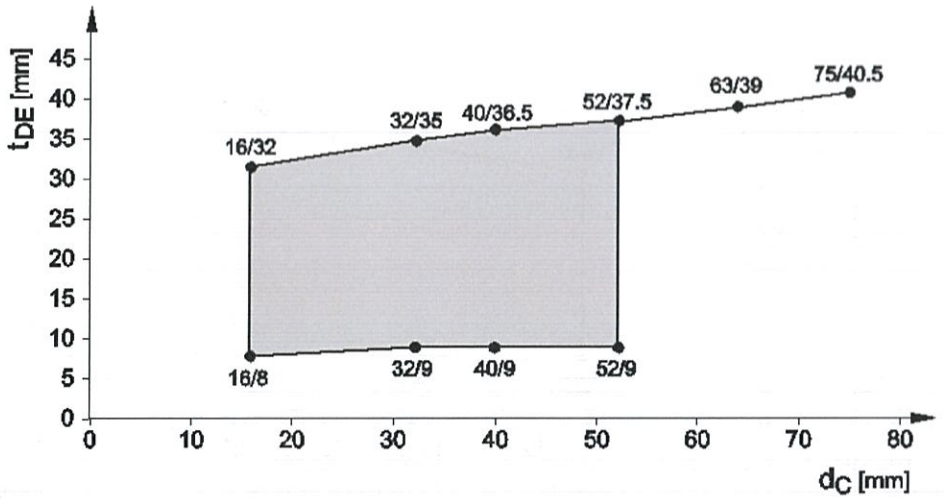
Aluminium Composite Pipes, U/C, flexible wall ≥ 100 mm - EI 60
All specimens listed
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



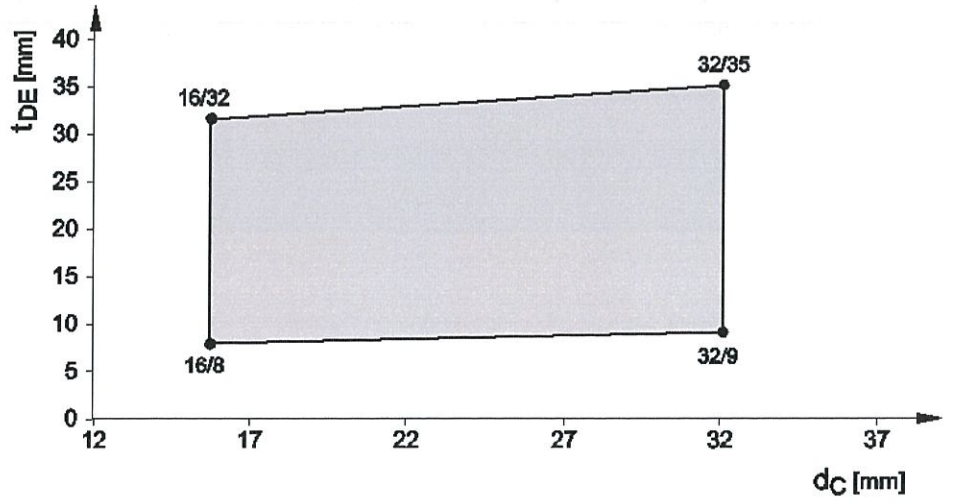
list_1 of composite pipes – Brand (Type):
Kekelit (Kelox), IVT (Prineto Stabil Rohr), Rehau (Rautitan stabil), TECEflex (Verbundrohr)

list_2 of composite pipes - Brand (Type):
Fränkische Rohrwerke (Alpex System), Geberit (Mepla), Georg Fischer (Sanipex) Viega (Sanifix Fosta), Uponor (Unipipe MLC – pipe Ø range from 16 to 32 mm, only)

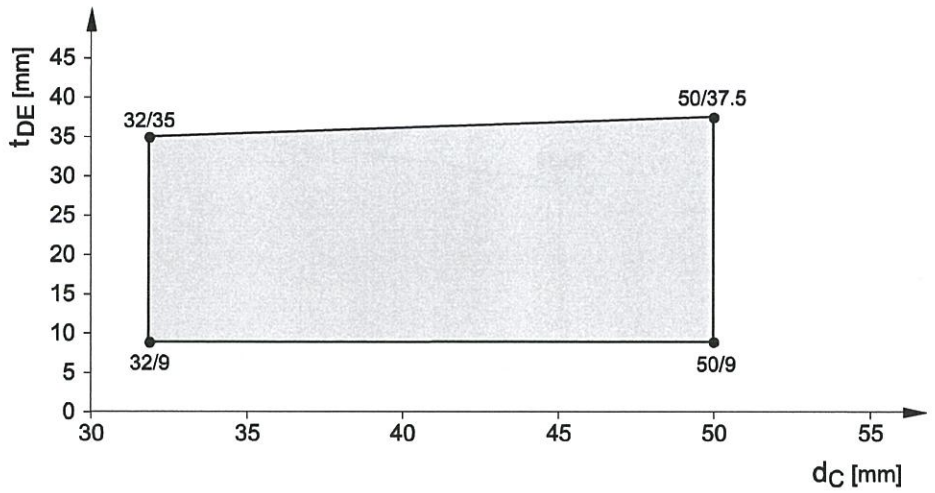
Aluminium Composite Pipes, U/C, flexible wall ≥ 100 mm - EI 90
All specimens list_1
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



Aluminium Composite Pipes, U/C, flexible wall ≥ 100 mm - EI 90
All specimens list_2
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



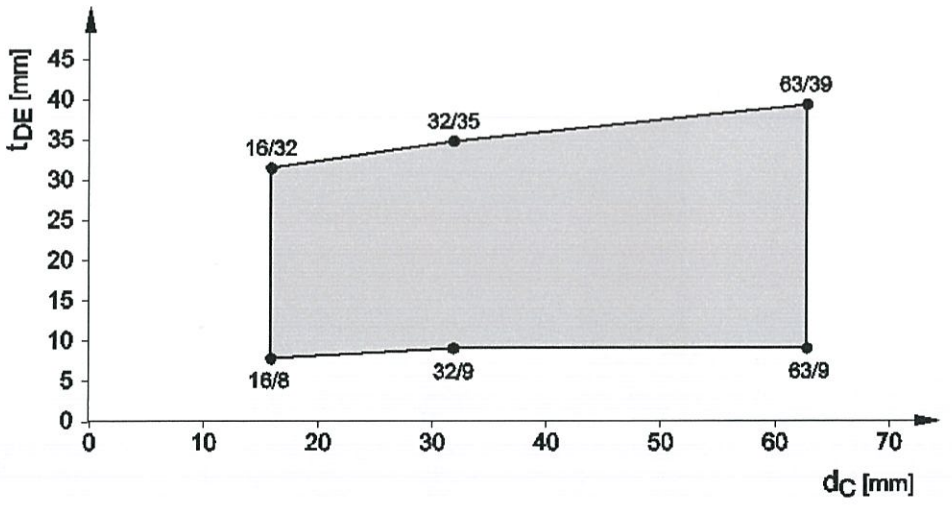
Aluminium Composite Pipes, U/C, flexible wall ≥ 100 mm - EI 120 with beading
All specimens list_2 but without Uponor
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



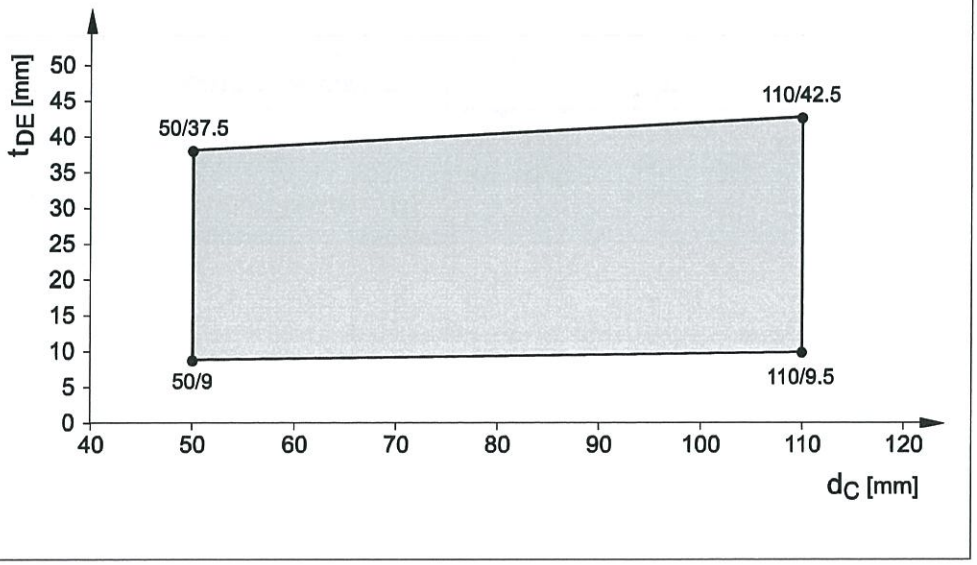
2.1.5 Plastic pipes made of PE-Xa (EN ISO 15875) and PE HD (EN 12201-2)

Service	Pipe diameter d_C [mm]	Pipe wall thickness t_C [mm]	Insulation thickness t_{DE} [mm]				Classification
			from		to		
			Ø small	Ø big	Ø small	Ø big	-
PE-Xa	16 to 63	2,2 to 8,6	8	9,0	32	39	EI 120
PE HD 100	50 to 110	4,6 to 10	9	9,5	37,5	42,5	EI 120

Plastic pipes PE-X according EN ISO 15875, U/C, flexible wall ≥ 100 mm - EI 120
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



Plastic pipes PE-HD according EN 12201-2, U/C, flexible wall ≥ 100 mm - EI 120
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



120

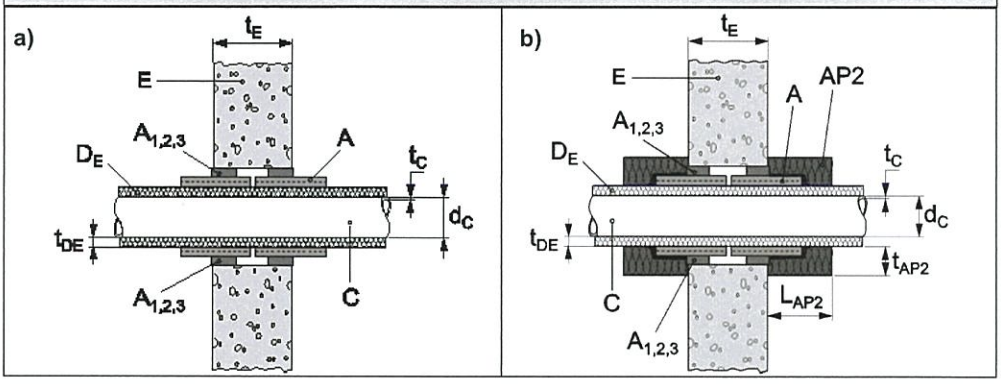
2.2 Rigid Wall

2.2.1 Set-up of rigid wall (200 mm)

The wall must have a minimum thickness of 200 mm and comprise of concrete, aerated concrete or masonry, with a minimum density of 550 kg/m^3

Installation variants of insulated pipes protected by Hilti Firestop Bandage CFS-B

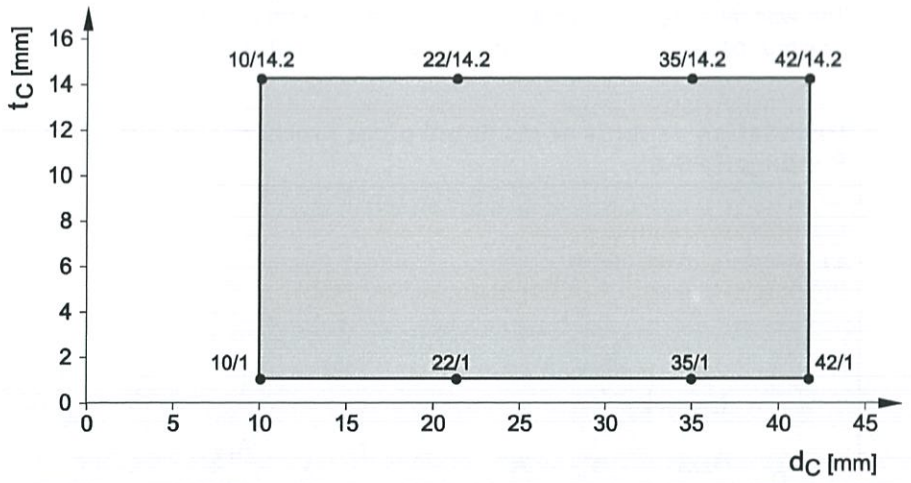
Installation examples:
a) Standard installation
b) Installation with additional protection AP2



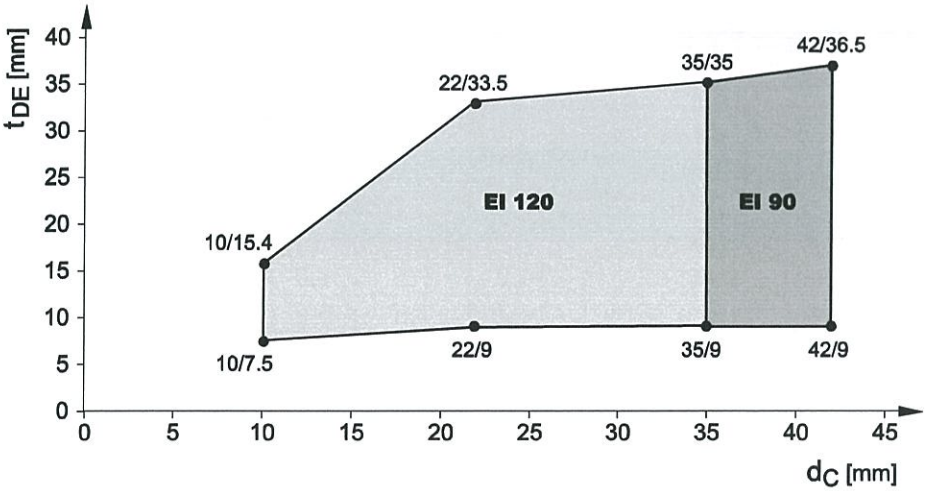
2.2.2 Copper Pipes

Service	Pipe diameter d_C [mm]	Pipe wall thickness t_C [mm]	Insulation thickness t_{DE} [mm]				Classification
			from		to		
			Ø small	Ø big	Ø small	Ø big	-
Copper	10 to 42	1 - 14,2	7,5	9,0	15,4	36,5	EI 90
Copper	10 to 35	1 - 14,2	7,5	9,0	15,4	35,0	EI 120

Copper pipe, rigid wall ≥200 mm – relation wall thickness towards pipe diameter
Graph shows pipe wall thickness (tc) towards pipe diameter (Ø d_C)



Copper pipes, C/U, rigid wall ≥200 mm – EI 120 / EI 90
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



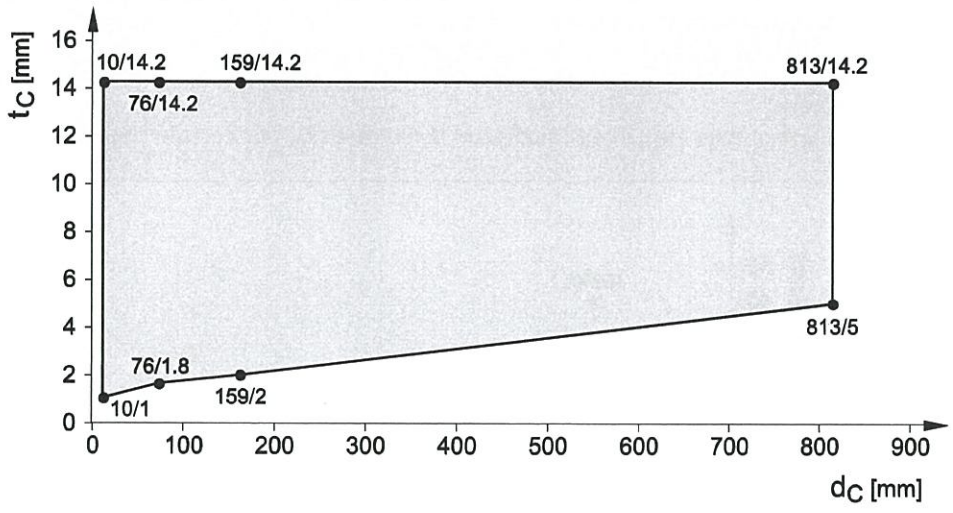
2.2.3 Steel Pipes

Applying Annex E1.3.2 of DIN EN 1366-3:2009 the field of application given in 2.2.2 for copper pipes is also valid for other metal pipes with lower heat conductivity than copper and a melting point of minimum 1050°C, e.g. unalloyed steel, low alloyed steel, cast iron, stainless steel, Ni alloys (NiCu, NiCr, NiMo alloys) and Ni.

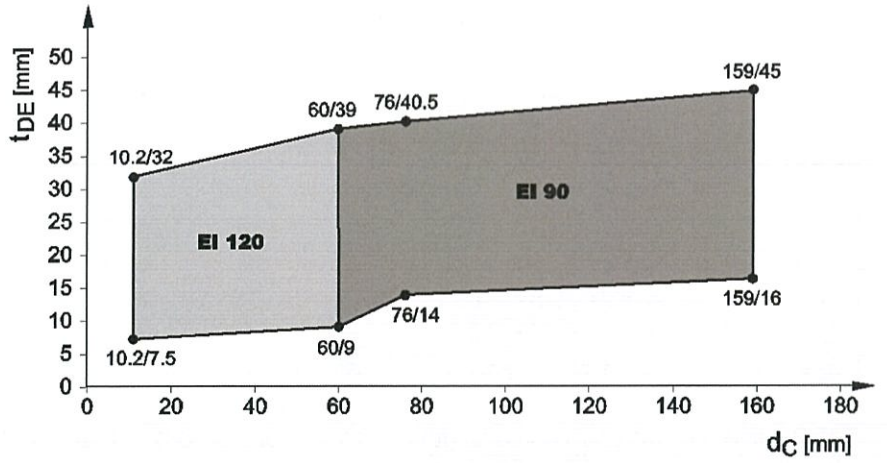
Service	Pipe diameter d_C [mm]	Pipe wall thickness t_C [mm]	Insulation thickness t_{DE} [mm]				Classification	
			from		to			
			Ø small	Ø big	Ø small	Ø big	-	AP 2
Steel	10,2 to 60	1 to 14,2	7,5	9	32,0	39	EI120	
Steel	76 to 159	1,8 to 14,2	17,5	19	40,5	45	EI 90	
Steel	159	2 to 14,2	45	45	45	45	EI 120	
Steel	159 to 813	2 to 14,2	16	25	45	25		EI 120

AP 2 insulation was applied in a length of 500 mm for pipe Ø813. Therefore this is valid for pipe range from Ø159 to Ø813 mm.

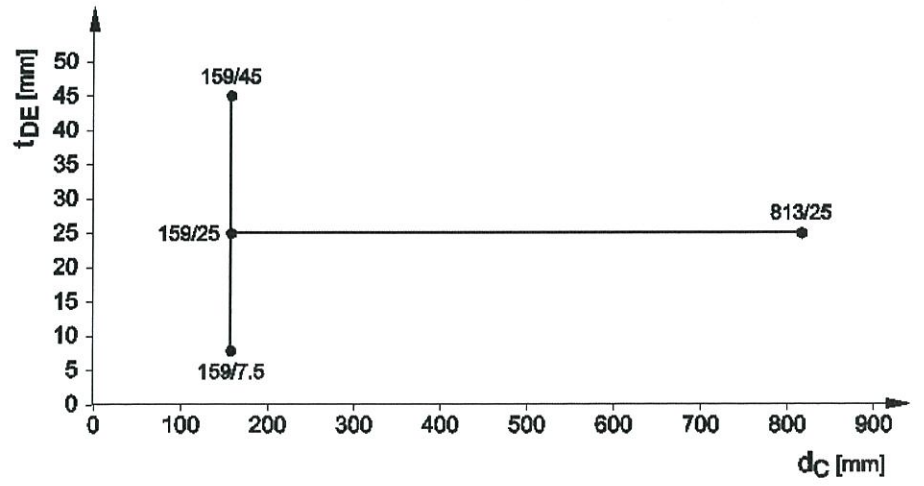
Steel pipe, rigid wall ≥200 mm – relation wall thickness towards pipe diameter
Graph shows pipe wall thickness (tc) towards pipe diameter (Ø d_C)



Steel pipes, C/U, rigid wall ≥200 mm – EI 120 /90
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



Steel pipes, C/U, rigid wall ≥200 mm – EI 120
Insulated large pipes from Ø 159 up to 813 mm
Elastomeric insulation plus additional protection mineralwool (AP2, Klimarock 40mm)
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)

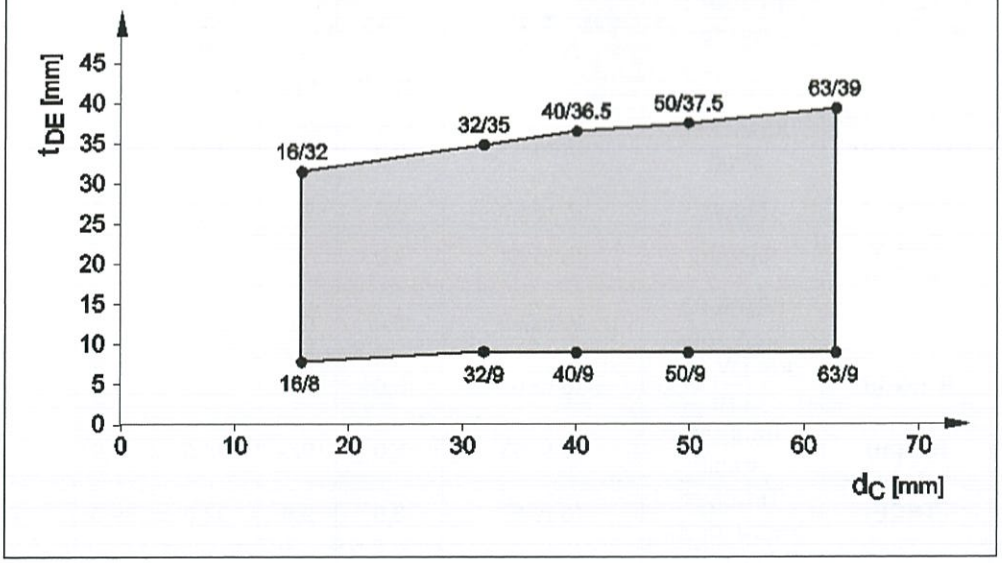


2.2.4 Aluminium Composite Pipes

Manu-facturer	Product name	Pipe diameter dc (mm)	Insulation thickness (mm)				Classification
			from		to		
			Ø small	Ø big	Ø small	Ø big	
Fränkische Rohrwerke	Alpex F50 Profi	16 to 63	8,0	9,0	32,0	39,0	EI 120
Geberit	Mepla	16 to 63	8,0	9,0	32,0	39,0	EI 120
Georg Fischer	Sanipex	16 to 63	8,0	9,0	32,0	39,0	EI 120
IVT	PRINETO Stabilrohr	16 to 63	8,0	9,0	32,0	39,0	EI 120
KeKelit	KELOX KM 110	16 to 63	8,0	9,0	32,0	39,0	EI 120
Rehau	Rautitan stabil	16 to 63	8,0	9,0	32,0	39,0	EI 120
TECE	TECEflex Verbundrohr	16 to 63	8,0	9,0	32,0	39,0	EI 120
Viega	SANIFIX Fosta-Rohr	16 to 63	8,0	9,0	32,0	39,0	EI 120

Result is valid for composite pipes list_1 and List_2 with exception Uponor (see 2.4; note[2,3])

Aluminium Composite Pipes, U/C, rigid wall ≥ 200 mm - EI 90
All specimens list_1 and list_2 (not proven for Uponor)
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



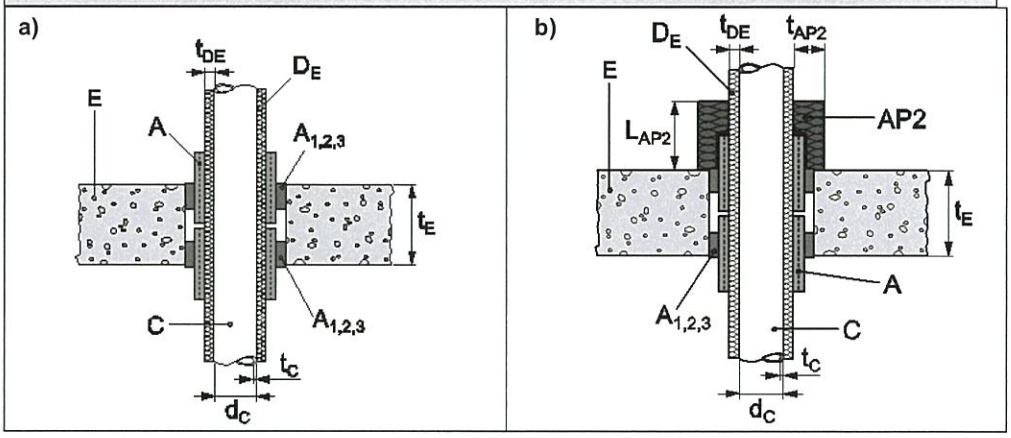
2.3 Floor

2.3.1 Set-up of floor

The supporting construction is build according EN 1355-3:2009 of at least lightweight concrete slabs of a thickness of 150 mm and a density of 550 kg/m³.

Installation variants of insulated pipes protected by Hilti Firestop Bandage CFS-B

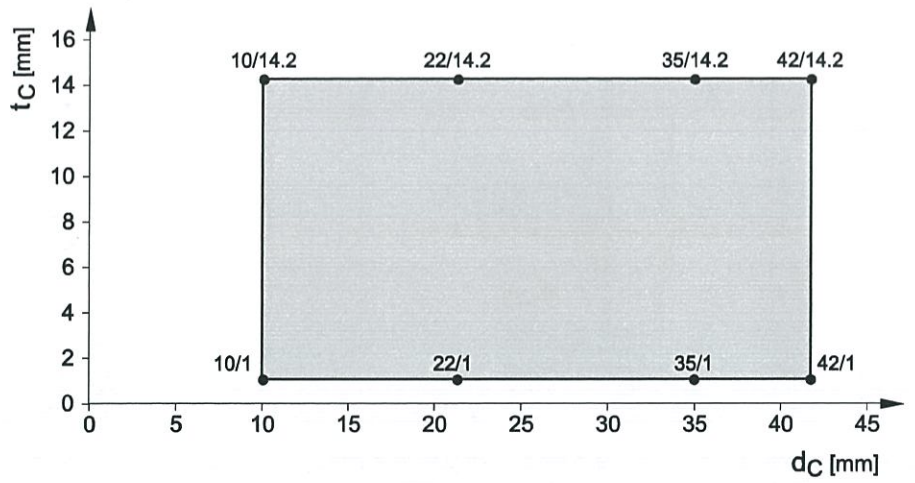
Installation examples:
a) Standard installation
b) Installation with additional protection AP2



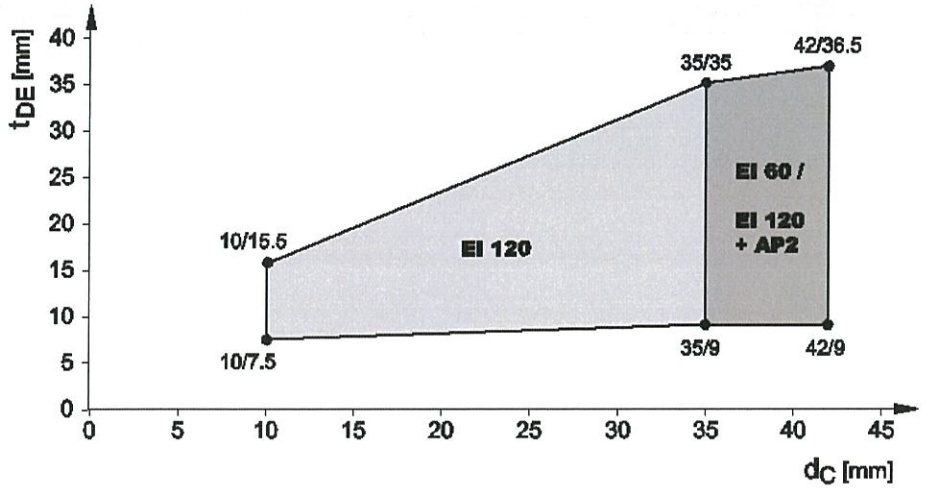
2.3.2 Copper Pipes

Service	Pipe diameter d_C [mm]	Pipe wall thickness t_C [mm]	Insulation thickness t_{DE} [mm]				Classification		
			from		to				
			Ø small	Ø big	Ø small	Ø big	-	AP 1	AP 2
Copper	10 to 35	1 - 14,2	7,5	9,0	15,5	35,0	EI 120	-	-
Copper	35 to 42	1 - 14,2	9,0	9,0	35,0	36,5	EI 60		EI 120

Copper pipe, rigid wall ≥200 mm – relation wall thickness towards pipe diameter
Graph shows pipe wall thickness (tc) towards pipe diameter (Ø d_C)



Copper pipes, C/U, floor ≥150 mm – EI 120 / EI 60 / EI 120 plus AP2
Additional protection AP2 (mineral wool) is required from Ø 35 to 42 mm to reach
EI 120
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)

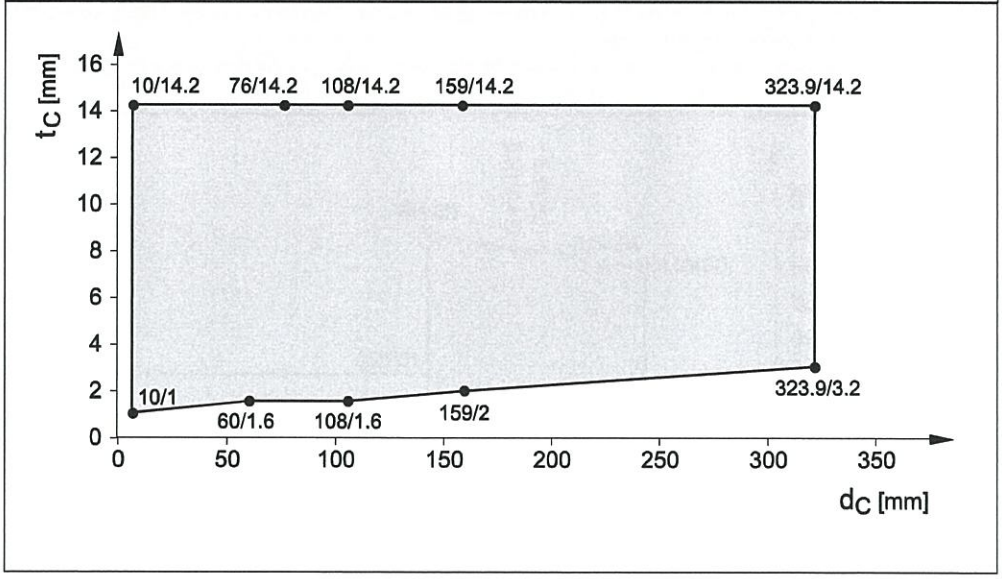


2.3.3 Steel Pipes

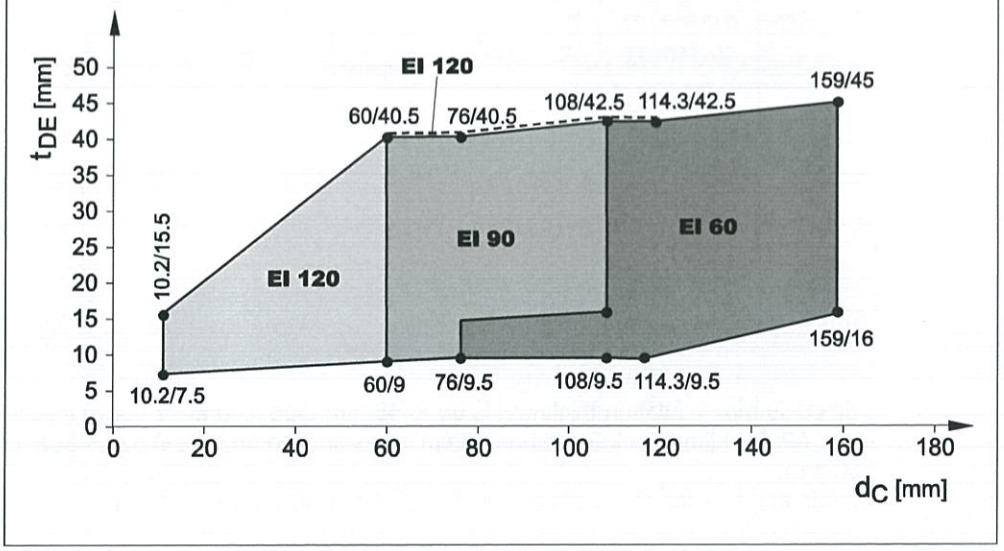
Service	Pipe diameter d_c [mm]	Pipe wall thickness t_c [mm]	Insulation thickness t_{DE} [mm]				Classification	
			from		to			
			Ø small	Ø big	Ø small	Ø big	-	AP 2
Steel	10,2 to 60	1 to 14,2	7,5	9,0	15,5	39,0	EI120	
Steel	60 to 76	1 to 14,2	9,0	9,5	39,0	40,5	EI 90	EI 120
Steel	76 to 108	1,8 to 14,2	14,0	14,5	39,0	42,5	EI 90	
Steel	10,2 to 114,3	1 to 14,2	15,5	42,5	15,5	42,5	EI 120	
Steel	76 to 323,9	1,8 to 14,2	9,5	25	39,0	25		EI 120
Steel	76 to 159	1,6 to 14,2	9,0	16,0[2]	39,0	45	EI 60	

[1] till Ø159 mm insulation thickness is up to 45mm; pipe diameters above insulation is 25 mm. AP 2 – Klima Rock Insulation 40mm - was applied on pipe Ø 323,9 at a length of 500 mm.
[2] minimal insulation thickness above Ø114,3 mm is increased to 16 mm

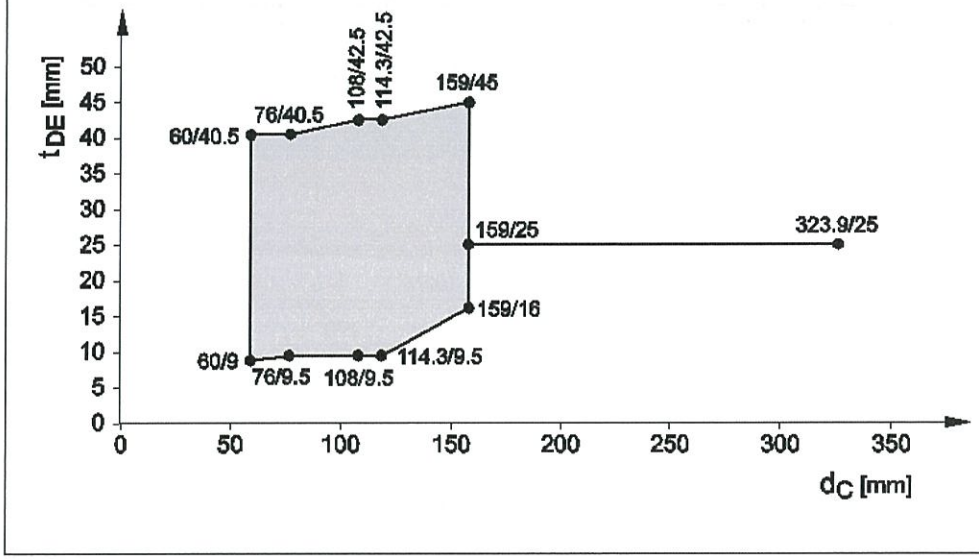
Steel pipe, floor ≥150 mm – relation wall thickness towards pipe diameter
Graph shows pipe wall thickness (tc) towards pipe diameter (Ø d_c)



Steel pipes, C/U, floor ≥150 mm – EI 120 / EI 90 / EI 60
Different insulation thickness results in distinct classifications
EI 120 classification is valid for highest insulation thickness up to Ø 114 mm (dotted line)
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



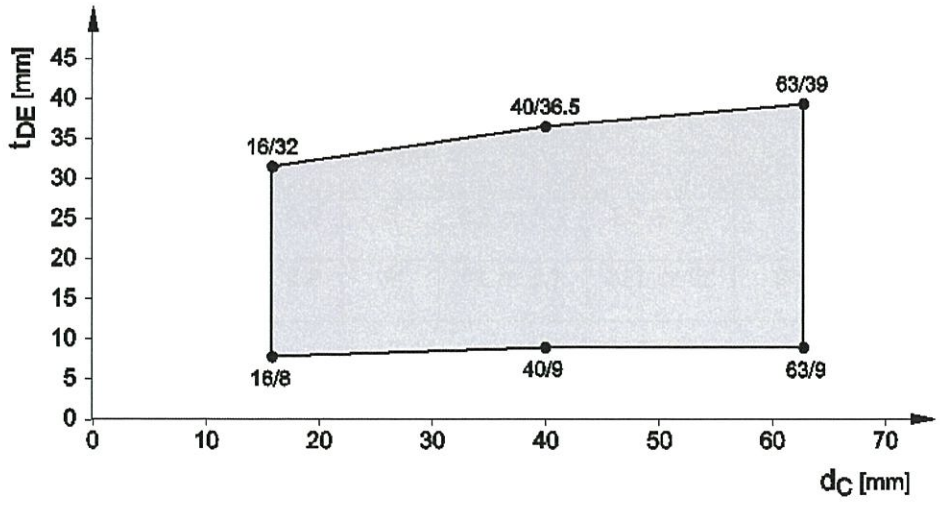
Steel pipes, C/U, floor ≥150 mm – EI 180 plus AP2
Pipes insulated with elastic combustible insulation are additional protected by AP2 (Klimarock 40 mm)
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



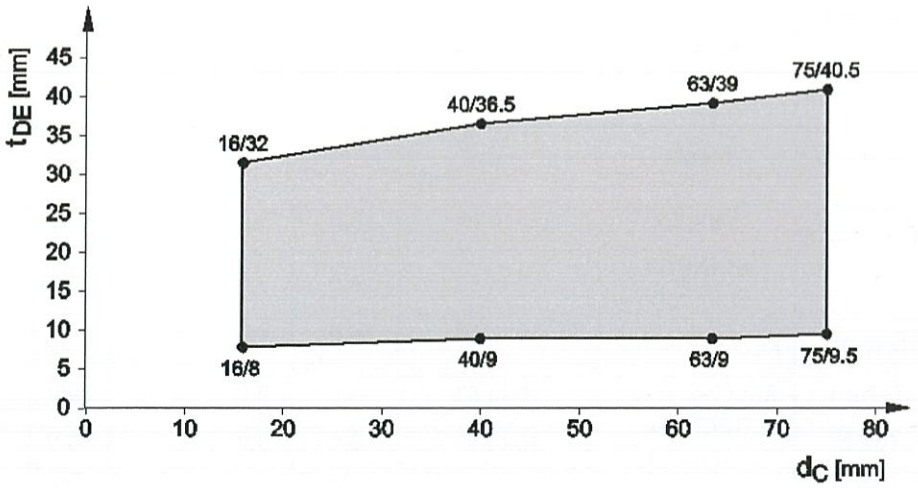
2.3.4 Aluminium Composite Pipes

Manu-facturer	Product name	Pipe diameter dc (mm)	Insulation thickness (mm)				Classification
			from		to		
			Ø small	Ø big	Ø small	Ø big	
Fränkische Rohrwerke	Alpex F50 Profi	16 to 40	8,0	9,0	32,0	36,5	EI 120
		40 to 75	9,0	9,0	36,5	40,5	EI 90
		75	40,5		40,5		EI 180
Geberit	Mepla	16 to 75	8,0	9,0	32,0	39,0	EI 120
		75	40,5		40,5		EI 180
Georg Fischer	Sanipex	16 to 63	8,0	9,0	32,0	39,0	EI 120
IVT	PRINETO Stabilrohr	17 to 63	8,0	9,0	32,0	39,0	EI 120
KeKelit	KELOX KM 110	16 to 63	8,0	9,0	32,0	39,0	EI 120
		75	9,5		40,5		EI 180
Rehau	Rautitan stabil	16 to 63	8,0	9,0	32,0	39,0	EI 120
TECE	TECEflex Verbundrohr	16 to 63	8,0	9,0	32,0	39,0	EI 120
Uponor	Unipipe MLC	16 to 32	8,0	9,0	32,0	35,0	EI 180
Viega	SANIFIX Fosta-Rohr	16 to 63	8,0	9,0	32,0	39,0	EI 120

Aluminium Composite Pipes, U/C, floor ≥ 150 mm - EI 120
All specimens listed
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



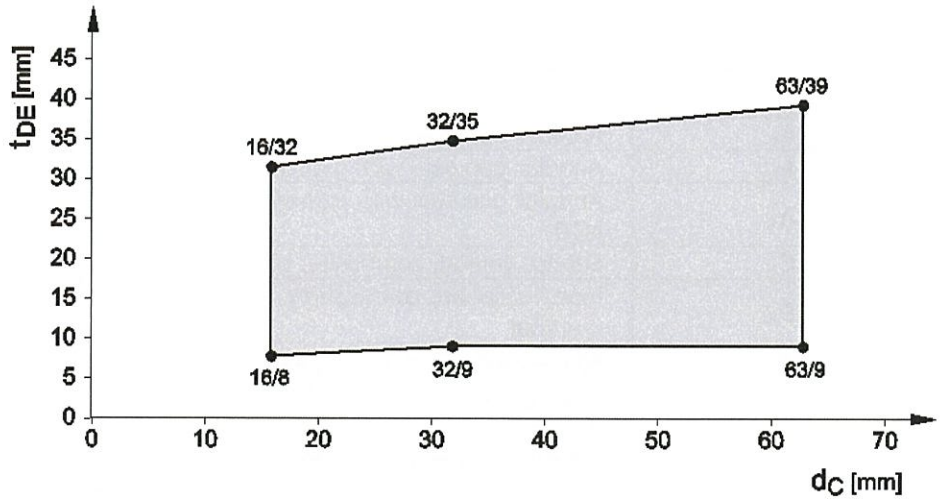
Aluminium Composite Pipes, "Fränkische Rohrwerke", U/C, floor ≥ 150 mm- EI 90
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



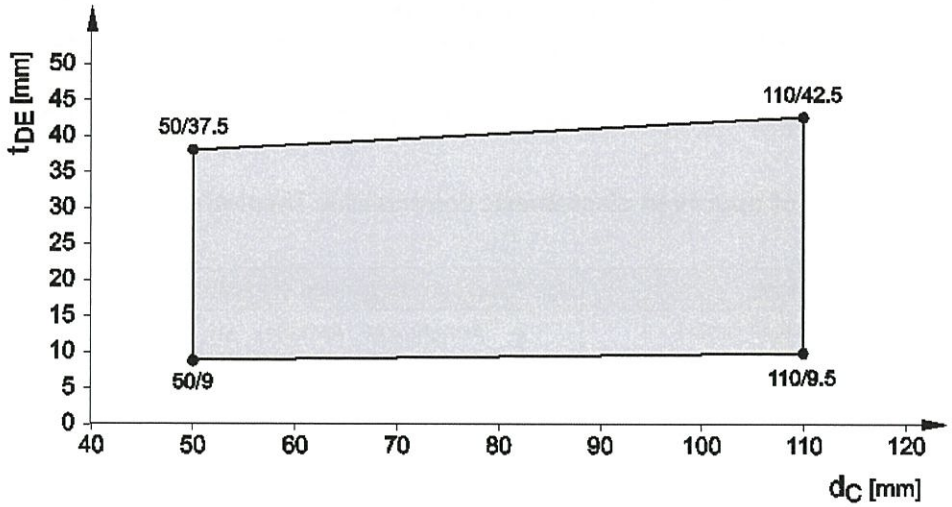
2.3.5 Plastic pipes made of PE-Xa (EN ISO 15875) and PE HD (EN 12201-2)

Service	Pipe diameter d_C [mm]	Pipe wall thickness t_C [mm]	Insulation thickness t_{DE} [mm]				Classification
			from		to		
			Ø small	Ø big	Ø small	Ø big	-
PE-Xa	16 to 63	2,2 to 8,6	8	9,0	32	39	EI 180
PE HD 100	50 to 110	4,6 to 10	9	9,5	37,5	42,5	EI 180

Plastic pipes PE-X according EN ISO 15875, U/C, floor ≥ 150 mm - EI 180
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



Plastic pipes PE-HD according EN 12201-2, U/C, floor ≥ 150 mm - EI 180
Graph shows approved insulation thickness (t_{DE}) at certain pipe diameter (Ø d_C)



Annex D

Abbreviations used in drawings

Abbreviation	Description
A	Hilti Firestop Bandage CFS-B
A_1	Annular gap seal with Hilti Firestop Acrylic Sealant CFS-S ACR
A_2	Annular gap seal with gypsum plaster
A_3	Annular gap seal with cementious mortar acc. EN 998-2, group M10
C	Service (metal, composite, plastic pipes)
D_E	Pipe insulation, combustible, butyl based elastomeric foamed material
d_C	Pipe diameter (nominal outside diameter)
E	Building element (wall, floor)
s_1	Minimum distance between single insulated pipes
s_2	Minimum distance between clustered pipes
s_3	Minimum distance between penetrating pipe and building element
S_4	Minimum distance between single insulated pipes and Collar CFS-C SL
S_5	Minimum distance between single insulated pipes and Conlit shell or Klimarock
t_C	Pipe wall thickness
t_{DE}	Insulation thickness
t_E	Thickness of the building element
L_D	Length of Insulation
AP1	Additional protection by elastomeric, combastible insulation
AP2	Additional protection by mineralwool (Klimarock)
AP3	Additional protection by beading / outside framing

List of approved elastomeric combustible Insulations:

Producer	Approved Type of foamed elastomeric thermal isolation
Armacell GmbH	• Armaflex AF, Armaflex SH, Armaflex Ultima, Armaflex HT
NMC Group	• Insul-Tube (nmc), Insul-Tube H-Plus (nmc),
Kaimann GmbH	• Kaiflex KK plus, Kaiflex KK,
L'Isolante K-Flex	• l'Isolante K-Flex HT, l'Isolante K-Flex ECO, l'Isolante K-Flex ST, l'Isolante K-Flex H, l'Isolante K-Flex ST Plus

LEGEND
Technical Services, Inc.
www.legend-group.com
88 Empire Drive • St. Paul, Minnesota • 55103
(651) 642-1150 • fax (651) 642-1239

VOC Content Test Certificate

October 23, 2009

Supplier: Hilti Entwicklungsgesellschaft mbH
BU Chemicals
Hiltistrasse 6
86916 Kaufering
GERMANY

Sample Description: Hilti CP 646

Date tested: July 20, 2009

Test Method: SCAQMD method 304-91 Determination of Volatile Organic Compounds (VOC) in various materials as referenced by South Coast Air Quality Management District (SCAQMD) rule 1168. The values also comply with the requirements of EPA test method #24.

Test Data: Legend Project Number 0903311

Specification	Product
LEED 2009 (LEED 3.0) **LEED 2.2** IEQ-4.1: Low-Emitting Materials – Firestop Materials	**Hilti** **CP 646**
Green Building Council of Australia Green Star Office Design 3.0, IEQ-13 Green Star Office Design 2.0, IEQ-13 Green Star Office Interiors 1.1, IEQ-11	
Multipurpose Construction Materials; VOC Limit: 70 g/L	**Product contains: 9.2 g/L of VOC**

William Welbes
Vice President of Laboratory Operations

Allen Noreen, Ph.D.
Technical Director

Ref. no : 199/FP/DY/23
Date : 08 Dec 2023

Subject : **Naming of Hilti CFS-B Firestop Bandage**

To whom it may concern,

I am writing to confirm that ‘’CP646’’ which shown in VOC Content Test Certificate is equivalent to ‘’Firestop bandage CFS-B’’ which shown in product catalogue.

Should you have further questions, please do not hesitate to contact our Technical Representatives, Customer Service Hotline at 8228-8118, or email us at hksales@hilti.com.

Yours faithfully,

Dennis Yeung
Head of Product Leadership Strategy, F&P
Hilti (Hong Kong) Ltd.

澳門特別行政區政府
Governo da Região Administrativa Especial de Macau
消防局
Corpo de Bombeiros

核閱
Visto
於 Em 18/02/2020
防火廳代廳長
O Chefe do D.P.I. Substº

意見書

事　　由：申請審批防火物料
參件編號：--

於 20/01/2020 收到喜利得(香港)有限公司文書及其附錄文件，本局之意見如下：

Ø1. 產品列表：

項目	產品名稱	製造商
1.	Hilti Firestop Bandage CFS-B	Hilti

1.1 材料列表：

防火填充物料：Hilti Firestop Bandage CFS-B
尺寸：125mm(W)
厚度：2mm
顏色：灰色
材質：Polymer-bonded intumescent material
遇熱膨脹防火繃帶膨脹率(不受限，可達)：1:14
膨脹溫度(大約)：210°C
儲存及運輸溫度：-5°C~50°C

項目	組件	描述
1.	Firestop Bandage	品牌：Hilti 型號：CFS-B 產地：德國 尺寸：125mm(W) 厚度：2mm 顏色：灰色 材質：Polymer-bonded intumescent material 遇熱膨脹防火繃帶膨脹率(不受限，可達)：1:14 膨脹溫度(大約)：210°C 儲存及運輸溫度：-5°C~50°C
2.	Fire Sealant	品牌：Hilti 型號：CP606
3.	G.I. Pipe	尺寸：600mm(直徑) x 600mm(L) 厚度：12mm 材質：Galvanized steel
4.	Armaflex Insulation	品牌：Armacell 型號：C1-20150CS Class 1 厚度：20mm 材質：Flexible Closed Cell Elastomeric Insulation - Armaflex

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5.	Mineral wool	品牌：ROCKWOOL 厚度：50mm 密度：160kg/m^3 材質：Rock Wool
6.	Threaded Rod Support	尺寸：Ø12mm 材質：Galvanized steel

1.2 根據遞交的資料有以下分析結果：

1.2.1〝Hilti Firestop Bandage CFS-B〞，製造商：Hilti，經 BS476:Part20 檢驗，此防火填充物料系統的耐火隔熱性達到 201 分鐘，耐火完整性達到 240 分鐘；

1.2.2 上述結果只反映與 1.1 點相同之物料、結構、厚度及安裝方法之系統。

1.3 根據 1.2 點分析結果，本局對〝Hilti Firestop Bandage CFS-B〞，製造商：Hilti，此防火填充物料系統的耐火隔熱性達到 201 分鐘，耐火完整性達到 240 分鐘沒有異議，然而，上述產品並不具備獨立之耐火能力；因此，如將此組件應用於不同組合型式使用時，應按照實際用途而作出相應評估；但最終決定仍須徵詢權限部門(土地工務運輸局)之意見。

吳卓斌
首席消防員

CB896_DPI897_C-0058

Attn. : To whom it may concern

Date : 26 September 2023
Ref. : 095/FP/DY/23

Subject : Country of Origin- Hilti CFS-B Firestop Bandage

Dear Sir / Madam,

Enclosed please find the information of Hilti CFS-B Firestop Bandage.

Brand Name : Hilti

Model Name : Hilti CFS-B Firestop Bandage

Manufacturer : Hilti Corporation

Address of Manufacturer : FL-9494, Principality of Liechtenstein.

Manufacturer Contact Person : Dennis Yeung

Supplier : Hilti (Hong Kong) Ltd

Address of Supplier : 701-704, 7/F, Tower A, Manulife Financial Centre,
223 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong

Supplier Contact Person : Dennis Yeung (+852 9723 4621)

Country of Origin : Germany

Should you have further questions, please do not hesitate to contact our Technical Representatives, Customer Service Hotline at 8228-8118, or email us at hksales@hilti.com.

Yours faithfully,

Dennis Yeung
Head of Product Leadership Strategy, F&P

Hilti (Hong Kong) Ltd.
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www.hilti.com.hk

To whom it may concern

Date:13th Mar 2018

Dear Sir / Madam,

Subject: Hilti Firestop Products non-CFC and Ozone Confirmation

Referring to your enquiry about the captioned subject, please be advised that:

Hilti firestop products, CFS-B Firestop Bandage is free of CFC, HCFC nor other ozone depletion elements.

CFC, HCFC and ozone depletion elements were not used during the product process neither.

Should you have further questions, please do not hesitate to contact our Technical Representatives or Customer Service Hotline at 8228-8118.

Yours sincerely,

Dorothy Wai
Product Manger

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Material Information Statement

Articles

According to Regulation (EC) 1907/2006, Article 32
Revision: 07.04.2020 Version: 18

1 Identification of the articles and of the company undertaking

1.1 Product identifier

Trade name:

- Firestop Bandage CFS-B / CP 646
- Firestop Back Pan Strip CFS-BPS
- Firestop Block CFS-BL / CFS-BL P
- Firestop Board CP 675
- Firestop Boot CFS-BO
- Firestop Box Insert
- Firestop Cable Collar CFS-CC / CFS-RCC / CFS-RCC EXT
- Firestop Cable Module CFS-T
- Firestop Cast-in device CP 680 / CP 681 / CFS-CID /
- CFS-CID MD P/M
- Firestop Coated Board CFS-CT B / CP670 / CP673 / CP676
- Firestop Collar CFS-C / CFS-C P
- Firestop Collar CP 643 / CP 644
- Firestop Composite Sheet CFS-COS
- Firestop Cord CFS-CO
- Firestop Cushion CP 651N
- Firestop Drop-In Device CFS-DID
- Firestop Edge of Slab QuickSeal CFS-EOS QS
- Firestop Endless Collar CFS-C EL
- Firestop Filler Module CFS-T FB
- Firestop Gangplate CFS-SL GP
- Firestop Module Box CFS-MB / CP 657
- Firestop Plug CFS-PL / CP 658
- Firestop Plug Seal CFS-T RR / CFS-T RRS
- Firestop Retrofit Sleeve CFS-SL RK
- Firestop Sleeve CP 645
- Firestop Sleeve Kit CFS-SL SK
- Firestop Speed Sleeve CFS-SL / CFS-SL GA / CP 653
- Firestop Top Track Seal CFS-TTS
- Firestop Top Track Seal CFS-TTS MD
- Firestop Top Track Cover CFS-TTS MD
- Firestop Top Track Plug CFS-TTS MD
- Firestop Top Track Seal CFS-TTS 212
- Firestop Top Track Seal CFS-TTS R
- Firestop Wedge Seal CFS-T WD120
- Firestop Wrap Strip CFS-W EL / SG / P / CP 648
- Foil Tapes CS-FT
- Intumescent façade cavity closer CP674
- Joint Sealing Tapes CS-JST
- Mineral Wool
- Mineral Wool Boards
- Multifunctional Tapes CS-MFT
- Pre-coated Mineral Wool Boards
- Smoke & Acoustic Track Seal CS-TTS SA
- Speed Plug CP 777
- Speed Strip CP 767

1.2 Application of the listed articles

Construction industry.

Refer to Hilti product literature, technical data sheets, 3rd party published listings and national approvals for specific application information. For more details, please contact your local Hilti organization through http://www.hilti.group

1.3 Manufacturer / Supplier

Hilti AG
Feldkircherstr. 100
FL-9494 Schaan
Liechtenstein

Customer Service
Phone +423 (0)844 84 84 85
Fax +423 (0)844 84 84 86

2 Other information

A Safety Data Sheet is not required due to the classification of these products as “articles” according to Regulation (EC) No. 1907/2006 of 18 December 2006 (EU) / 29CFR 1910.1200 (U.S.A.). Consequently, these products are exempted from CLP / OSHA Labeling and SDS requirements.

These data are based on our present knowledge. However, they shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Informing department:
chemicals.hse@hilti.com

Hilti CFS-B Firestop Bandage Job Reference

Year	Project Name	Customer Name	Project type
2020	239-243 JAFFE RD	SHINRYO (HONG KONG) LIMITED	Hospitality
2020	EX-CENTRAL MARKET A&A	GETWICK ENGINEERS LIMITED	Retail
2020	7 MUK TAI ST, KAI TAK 1K3 (6565)	EVER GAIN AIR CONDITION ENGINEERING	Residential
2020	8 MUK TAI ST, KAI TAK 1L3 (6562)	EVER GAIN AIR CONDITION ENGINEERING	Residential
2020	TMCLK C4 NORTH CONNECT TUNNEL BLDGS	GAMMON CONSTRUCTION LIMITED	Office
2020	New - Transport - Northeast of Hong Kong International Airp	GAMMON CONSTRUCTION LIMITED	Transport
2020	TKO LOHAS PARK PH9 (SITE J)	TECHNICON ENGINEERING LIMITED	Residential
2020	TKO LOHAS PARK PH8 (SITE H)	YOUNG'S ENGINEERING COMPANY LIMITED	Residential
2020	YUEN LONG STATION YLTL 510	SHUN TUNG ENGINEERING CO LTD	Residential
2020	HKIA AIRPORT SKYCITY REGAL HOTEL	LEUNG YIU KEE	Hospitality
2021	HING WAH ST WEST LOT 6550 HOTEL	CONCORD AIR-CONDITIONING &	Hospitality
2021	1-11 AU PUI WAN ST, FO TAN	KEUNG FAT ENGINEERING CO LTD	Residential
2021	LO FAI RD (EAST) TPTL 223 & 229	CHIT TAT ELECTRICAL ENGINEERING LTD	Residential
2021	SCL 1123 EXHIBITION STATION	LUEN SHING ENGINEERING COMPANY	Infrastructure
2021	TKO LOHAS PARK PH9 (SITE J)	TECHNICON ENGINEERING LIMITED	Residential
2021	WONG CHUK HANG STATION PH1 (SITE A)	LUEN FAT (UNI) AIR-CONDITIONING	Residential
2021	166 CASTLE PEAK RD - TAI LAM, TMTL 523	PAK MING ENGINEERING CO	Residential
2021	7 MUK TAI ST, KAI TAK 1K3 (6565)	EVER GAIN AIR CONDITION ENGINEERING	Residential
2022	KAI TAK SPORTS PARK	MAJESTIC ENGINEERING CO LTD	Sport & Recreation
2022	QUEEN MARY HOSPITAL PH1 (SS F501)	SHUN CHEONG BUILDING SERVICES	Health
2022	HING WAH ST WEST LOT 6550 HOTEL	CONCORD AIR-CONDITIONING &	Hospitality
2022	YAU MA TEI- KWONG WAH HOSPITAL PHASE 1	WING FUNG ENGINEERING (H.K.) LTD	Health