



Hilti CP648-E Firestop Endless Wrap Strips

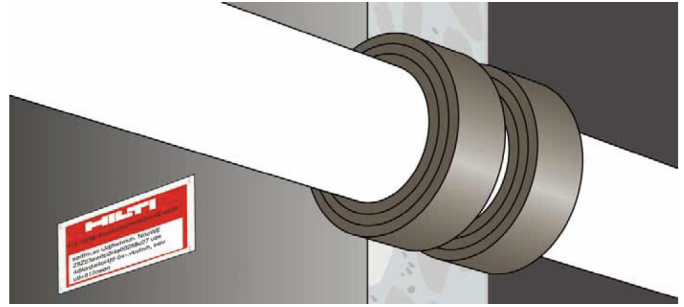
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Firestop wrap strip CP 648-E



APPLICATIONS

- Combustible pipe penetrations

ADVANTAGES

- Quick and easy closure without tools
- Easy to cut
- Fast installation
- Highest flexibility



Acoustic



Siesmic



Low VOC



Mould & Mildew

Technical data

Base materials	Concrete, Masonry, Drywall
Expansion temperature (approx.)	210 °C
Expansion ratio (unrestricted, up to)	1:19
Storage and transportation temperature range	-5 - 50 °C
Length	10 m
Colour	Grey, printed foil
Dimensions (LxWxH)	10000 x 45 x 5 mm

Application table

CP 648-E (Firestop Endless Wrap - 4.5 mm thick)

Pipe dimension (mm)	No. layers	Reference wrap length (cm) ^{^^}	No. of penetrations with a 10 m roll	Recommended drill hole X (mm)
20	1	7	142	37 [^]
50	1	17	58	67 [^]
63	1	21	47	77 [^]
75	1	25	40	92 [^]
90	2	64	15	112 [^]
110	2	75.5	13	132 [^]
125	2	85.5	11	152 [^]
160	3	166	6	202 [^]

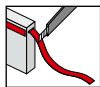
[^] or bigger ^{^^} The wrap length should



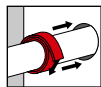
Application Procedure



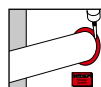
1. Clean the plastic pipe.



2. Cut CP 648-E to the correct length (see measurement table on product packaging for help).

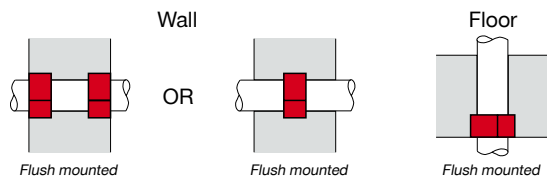


3. Wrap the CP 648-E around the pipe, fasten it with a adhesive tape and push it into the annular space



4. Close remaining gap to ensure smoke and gas tight seal. Fasten installation plate if required.

Fixing Method



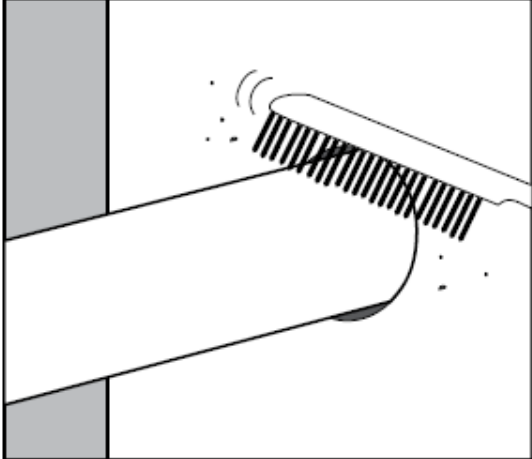
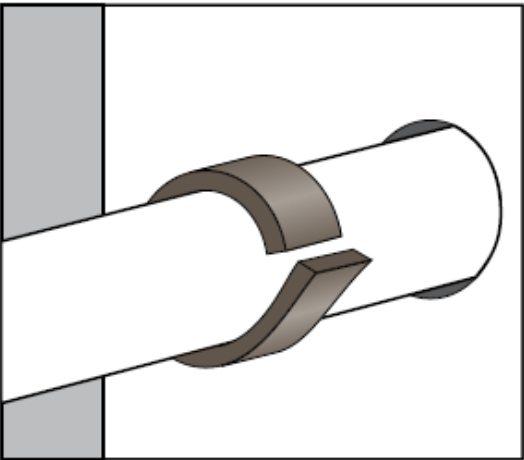
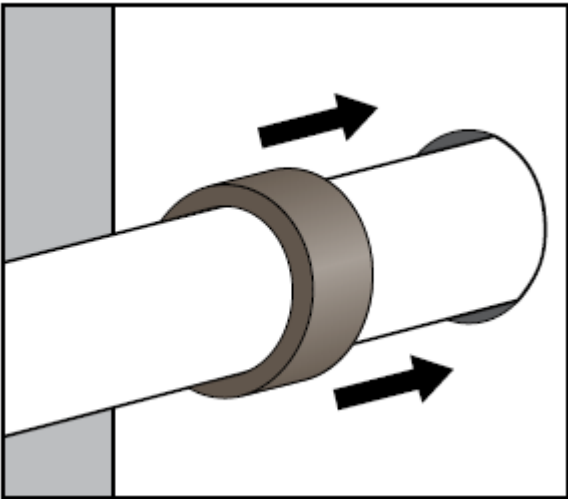
Order Now

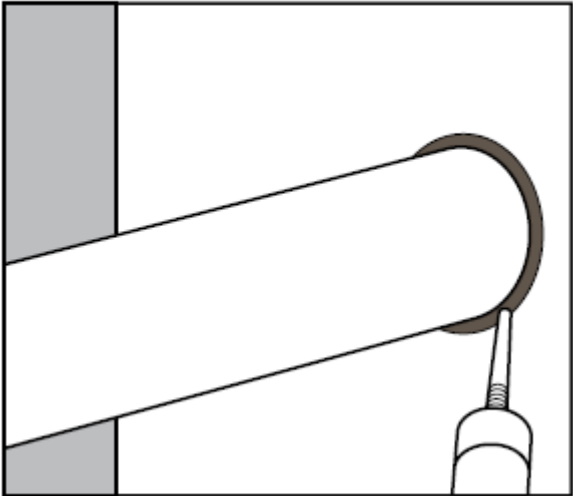
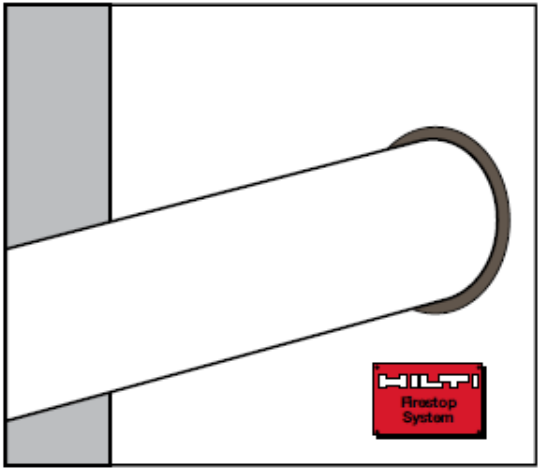


Ordering designation	Sales pack quantity	Item number
CP 648-E-W45/1.8"	1 pc	304310

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

Subject: Method Statement of CP 648.
Material: CP 648-S or CP 648-E firestop wrap strip and CP606 / CP601S firestop sealant
Accessory: Nil

Setting Operation		
1	<p>Clean the plastic or insulated pipe penetration. Expansion of the intumescent material during a fire closes the plastic pipe. Very dirty pipes (i.e. pipes with the remains of mortar) may lead to a delay in the closing action. Soiled plastic or insulated pipes should, therefore, be cleaned in the area where the CP 648-S / CP 648-E Firestop Wrap Strip is to be installed.</p>	
2	<p>Install the Wrap Strip. Use the CP 648-S / CP 648-E Firestop Wrap Strip corresponding to the diameter of the pipe to be installed. Wrap the CP 648-S / CP 648-E strip around the pipe and fasten it tightly using the integrated adhesive strip.</p>	
3	<p>Push the CP 648-S / CP 648-E Firestop Wrap Strip into the annular space.</p>	

4	Seal against smoke and gas. Seal the remaining gap with Hilti CP 606 / CP 601S sealant.	 A technical diagram showing a cross-section of a pipe being installed through a wall. The pipe is white, and the wall is grey. A gap remains between the pipe and the wall. A white sealant cartridge with a nozzle is shown applying sealant into this gap.
5	For maintenance reasons, a penetration seal can be permanently marked with an identification plate and fastened in a visible position next to the seal.	 A technical diagram showing the same pipe installation as in the previous step. The gap is now filled with sealant. A red identification plate with the HILTI logo and the text 'Firestop System' is fastened to the wall next to the sealant.

Safety precautions:

- Never use in highly corrosive surroundings or in outdoors.
- Keep out of reach of children
- Avoid prolonged and repeated contact with the skin
- Do not rub the eyes after contact with the hands

17/F., Tower 6,
China Hong Kong City,
33 Canton Road,
T.S.T.
Hong Kong.

TO WHOM IT MAY CONCERN

Date : 26 Mar 2004
Ref : LE/TC/114/04

RE: Hilti CP648-E & CP648-S Firestop Wrap System

This is to confirm that CP648-E Firestop Endless Wrap and CP648-S Firestop Single Wrap are made of same material with same width. CP648-S is pre-cut into a specific length and CP648-E is designed to cut by the end user. So, CP648-E and CP648-S will perform same function if the thicknesses of both the products are the same.

Yours faithfully,
For and on behalf of
HILTI (HONG KONG) LTD.



Thomas Choy
Marketing Manager

ASSESSMENT REPORT

The Fire Resistance Performance of Hilti Pipe Penetration Sealing Systems

Report No.: R23A14-2A Issue 1

Issue Date: 21 June, 2024

Date of Review: 18 June, 2027

Report Sponsor

Hilti (Hong Kong) Limited

701-704 & 708B, Tower A Manulife Finance Centre,
223 Wai Yip Street, Kwun Tong, Kowloon, HK

This report only relates to the specimen(s) tested and may only be reproduced by the sponsor in full, without comment, abridgement and modifications.

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REVISION HISTORY

Issue date (DD/MM/YYYY)	Issue number	Remark
19/06/2024	0	Initial version
21/6/2024	1	Update of supporting evidence

THE FIRE RESISTANCE PERFORMANCE OF PIPE PENETRATION SYSTEMS

1 INTRODUCTION

This assessment report presents an appraisal for the use of the Hilti “CP648”, “CP643N/644”, “CFS-C EL”, “CFS-B” and “CFS-CID” for pipe penetration sealing purpose in either floor mounted or wall mounted situation. The appraisal will be based on the test evidence as shown in section 3 of this report. This report is prepared for Hilti (Hong Kong) Limited of 701-704 & 708B, Tower A, Manulife Finance Centre, 223 Wai Yip Street, Kwun Tong, Kowloon, HK.

The proposed sealing for the pipe penetration system are required to provide a fire resistance performance of up to 240 minutes integrity and insulation with respect to BS 476: Part 20: 1987.

2 ASSUMPTIONS

The proposed systems are assumed to be installed in a similar manner to that of the previously tested system by competent installers. It is assumed that the modified systems will be constructed in a similar manner from materials and components of the same manufacture and equivalent quality as tested with supporting test evidence or otherwise appraised by RED. Further assumptions related to the specific modifications will be stated in the report.

It is also assumed that the supporting structures to which the perimeter of the systems will be fixed are capable of supporting the proposed structure effectively.

Assuming that the issue of the original test report is valid, the current testing standard or testing experience has not been changed and the procedures adopted for the original report have been re-examined and reviewed that there have been no changes to the specification of the construction considered in the original report. If contradictory data or any related evidence becomes available to RED, the assessment will be unconditionally withdrawn and the sponsor will be notified. This report is based on the given information, in which is declared by report sponsor that no contradictory data has become available.

3 SUPPORTING DATA

3.1 Summary of Supporting Test Evidence

Report no.	Sections	Description
Primary Test Evidence		
WARRES report no. 128944/A and B	4.2	Supporting test evidence for the use of the Hilt 'CP648-E' firestop wrap strip for plastic pipe penetration system through floor supporting construction.
WARRES report no. 128948	4.2	Supporting test evidence for the use of the Hilt 'CP648-E' firestop wrap strip for plastic pipe penetration system through wall and floor supporting construction.
WARRES report no. 132995 Issue 2	4.2	Supporting test evidence for the use of the Hilt 'CP648-E' firestop wrap strip for plastic pipe penetration system through wall and floor supporting construction.
WARRES report no. 146725 Issue 2	4.2	Supporting evidence for the use of Hilti 'CP648-E' firestop wrap strip for plastic pipe penetration system through floor supporting construction.
RED report no. R16L28-1A	4.2	Supporting test evidence for the use of various Hilti firestop sealant products penetrating wall application.
WARRES report no. 128947/A Issue 2	4.3	Supporting test evidence for the use of the Hilt 'CP643N' firestop jacket for plastic pipe penetration system through floor supporting construction.
WARRES report no. 128947/B	4.3	Supporting test evidence for the use of the Hilt 'CP644' firestop jacket for plastic pipe penetration system through floor supporting construction.
WARRES report no. 128949/A	4.3	Supporting test evidence for the use of the Hilt 'CP643N' firestop jacket for plastic pipe penetration system through floor supporting construction.

WARRES no. 131014/A	4.3	Supporting test evidence for the use of the Hilt 'CP643N' firestop jacket for plastic pipe penetration system through floor supporting construction.
WARRES no. 137929/A	4.3	Supporting test evidence for the use of the Hilt 'CP643N' firestop jacket for plastic pipe penetration system through floor supporting construction.
CSIRO report no. FSV1026	4.3	Supporting test evidence for the use of the Hilt 'CP648-E' and 'CP643N' firestop jacket for plastic pipe penetration system through floor supporting construction.

3.2 Primary Test Evidence

3.2.1 WARRES Test Report No. 128944/A and 128944/B*

An ad-hoc fire resistance test on total eighteen specimens of various plastic pipe penetration sealing system mounted within an aerated concrete floor assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 10th April, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

The test assemblies comprised an aerated concrete floor construction of overall dimensions 2,700 mm wide by 4,000 mm high by 150 mm thick. The floor was provided with various circular apertures of various dimensions, through which various diameter plastic pipes passed. Each pipe was fitted with an intumescent wrap on each face of the wall referenced "CP648-E" or "CP648-S" collars. The specimens were referenced as '1' to '18' and are detailed in the table below. The intumescent wrap was fitted within flush with the underside of the floor. Above the intumescent wrap the gaps were filled with either CP606 or mortar. For the pipe diameter of 32 mm and 75 mm, one layer of 4.5 mm thick "CP648-E" was fitted, for pipe diameter 110 mm and 125 mm, two layers of 4.5 mm thick "CP648-E" was fitted, for pipe diameter of 160 mm, three layers of 4.5 mm thick "CP648-E" was fitted. "CP648-S" was 13.5 mm thick used for pipe diameter of 160 mm only in the test.

The temperature rise of which was controlled using plate thermometers so that its means temperature complied with the requirements of BS EN 1363-1: 1999, the performance criteria in terms of integrity and insulation were assessed against BS 476: Part 20: 1987, the results were expressed as follow:

Specimen ref.	Item description	Integrity (mins)	Insulation (mins)
1	PP Pipe, 32 mm diameter by 2.1 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	241
2	PP Pipe, 75 mm diameter by 4.6 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	157 ^{Note}
3	PP Pipe, 110 mm diameter by 6.3 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	231	157 ^{Note}
4	PP Pipe, 125 mm diameter by 7.4 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	235	157 ^{Note}
5	PP Pipe, 160 mm diameter by 9.6 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	241

6	PP Pipe, 160 mm diameter by 9.4 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	241	241
7	ABS Pipe, 32 mm diameter by 2.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	241
8	ABS Pipe, 75 mm diameter by 4.8 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	241
9	ABS Pipe, 110 mm diameter by 7.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	241
10	ABS Pipe, 160 mm diameter by 10.0 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	241
11	ABS Pipe, 160 mm diameter by 10.0 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	241	229
12	PVC Pipe, 160 mm diameter by 12.5 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	226	222
13	PVC Pipe, 160 mm diameter by 12.5 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	241	241
14	PE Pipe, 160 mm diameter by 15.3 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	233
15	PE Pipe, 160 mm diameter by 15.3 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	241	241
16	PP Pipe, 32 mm diameter by 2.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	157 ^{Note}
17	ABS Pipe, 110 mm diameter by 7.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	241	241
18	PVC Pipe, 160 mm diameter by 12.6 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	158	158

Note: Insulation readings unable to be taken after this time due to collapse of end floor slab and subsequent thermocouple malfunction.

Specimens 1 to 15 were reported under the test evidence WARRES No. 128944/A, in this test, the gaps between the pipe and the wall aperture above the intumescent wrap were filled using mortar. Specimens 16 to 18 were filled using CP606.

The test was terminated at 241 minutes (See WARRES report no. 128944/A and 128944/B for full details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.2 WARRES Test Report No. 128948*

An ad-hoc fire resistance test on eighteen specimens of various plastic pipe penetration sealing system mounted within an aerated concrete wall assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 9th April, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

The test assemblies comprised a blockwork assembly formed from light weight concrete blocks of overall dimensions 3,035 mm wide by 3,050 mm high by 100 mm thick. The wall was provided with eighteen circular apertures of various dimensions, through which various diameter plastic pipes passed. Each pipe was fitted with an intumescent wrap on each face of the wall referenced "CP648-E" or "CP648-S". The specimens were referenced as '1' to '18' and are detailed in the table below. For the pipe diameter of 32 mm and 75 mm, one layer of 4.5 mm thick "CP648-E" was fitted, for pipe diameter 110 mm and 125 mm, two layers of 4.5 mm thick "CP648-E" was fitted, for pipe diameter of 160 mm, three layers of 4.5 mm thick "CP648-E" was fitted. "CP648-S" was 13.5 mm thick used for pipe diameter of 160 mm only in the test.

The temperature rise of which was controlled using plate thermometers so that its means temperature complied with the requirements of BS EN 1363-1: 1999, the performance criteria in terms of integrity and insulation were assessed against BS 476: Part 20: 1987, the results were expressed as follow:

Specimen ref.	Item description	Integrity (mins)	Insulation (mins)
1	PP Pipe, 32 mm diameter by 2.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	240	240
2	PP Pipe, 75 mm diameter by 5.0 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	240	240
3	PP Pipe, 110 mm diameter by 6.6 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	240	222
4	PP Pipe, 125 mm diameter by 7.6 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	219	181
5	PP Pipe, 160 mm diameter by 9.4 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	213	176
6	PP Pipe, 160 mm diameter by 9.4 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	219	161
7	ABS Pipe, 32 mm diameter by 2.2 mm wall thickness passing	240	220

	through an endless 'CP648-E' pipe wrap.		
8	ABS Pipe, 75 mm diameter by 4.8 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	240	240
9	ABS Pipe, 110 mm diameter by 7.0 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	240	240
10	ABS Pipe, 160 mm diameter by 10.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	219	157
11	ABS Pipe, 160 mm diameter by 10.2 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	213	190
12	PVC Pipe, 160 mm diameter by 10.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	199	161
13	PVC Pipe, 160 mm diameter by 12.2 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	217	176
14	PE Pipe, 160 mm diameter by 15.6 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	240	204
15	PE Pipe, 160 mm diameter by 15.6 mm wall thickness passing through an endless 'CP648-S' pipe wrap.	240	240
16	PE Pipe, 32 mm diameter by 2.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	219	219
17	ABS Pipe, 110 mm diameter by 7.0 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	219	159
18	PVC Pipe, 160 mm diameter by 12.2 mm wall thickness passing through an endless 'CP648-E' pipe wrap.	219	219

For specimens 1 to 15, gaps between the wrap and the wall aperture were filled using CP606 gap filler. Specimens 16 to 18 were filled using mortar.

The integrity failure of Specimen 11 at 213 minutes was caused by the spread of flames from the adjacent specimen, Specimen 5.

The result given for specimens 4, 6, 10, 16, 17 and 18 are the maximum times that can be quoted for these specimens. The specimens were affected at that time by a water spray used to extinguish severe flaming on adjacent specimens. The use of the water spray was with the sponsor's consent and deemed necessary to allow continuation of the test for other specimens.

The test was terminated at 240 minutes (See WARRES report no. 128948 for full details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.3 WARRES Test Report No. 132995 Issue 2*

A fire resistance test on ten specimens of PVC pipe penetration sealing system mounted within an aerated concrete floor and wall assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 10th July, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

The test assemblies comprised a floor assembly formed from aerated concrete of overall dimensions 1,000 mm wide by 1,000 mm long by 150 mm thick, and a wall assembly formed from autoclaved blocks of overall 1,000 mm wide by 1,000 mm high by 100 mm thick. The floor and wall were both provided with five circular apertures of various dimensions, through which various diameter PVC pipes passed. Each pipe was fitted with an intumescent wrap referenced "CP648-E".

The assemblies formed the upper horizontal face and the front vertical face of a one metre cubed gas fired furnace chamber, the temperature rise of which was controlled using plate thermometers so that its means temperature complied with the requirements of BS EN 1363-1: 1999, the results were expressed as follow:

Specimen Ref:	Supporting Construction	Actual Pipe Size Diameter x wall thickness	Integrity (Min)	Insulation (Min)
1	Wall	160 mm x 8.1 mm	240	166
2	Wall	125 mm x 6.3 mm	240	240
3	Wall	90 mm x 4.3 mm	240	240
4	Wall	75 mm x 3.9 mm	240	240
5	Wall	32 mm x 2.1 mm	240	223
6	Floor	160 mm x 8.1 mm	121	121
7	Floor	125 mm x 6.3 mm	161	158
8	Floor	90 mm x 4.3 mm	240	240
9	Floor	75 mm x 3.9 mm	240	240
10	Floor	32 mm x 2.1 mm	240	240

The test was discontinued after a period of 240 minutes (See WARRES 132995 Issue 2 for full details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.4 WARRES Test Report No. 146725 Issue 2*

A fire resistance test stated to be in accordance with BS EN 1363-1: 1999 and in conjunction with the EN 1366-3: 2004 on ten (10) specimens of PVC pipe penetration sealing systems mounted within an autoclaved blockwork wall assembly was performed at the Warringtonfire Laboratory on 8 June 2005. The test sponsor was Hilti (Great Britain) Limited, who had given permission to use this data.

In this test report, eight of the penetration sealing systems incorporated Hilti 'CP 648' Firestop Wrap Strip. The specimens were referenced as 1, 12, 13, 14, 15, 16, 17 and 18 as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Integrity	Insulation
1	ABS	160 mm	11.4 mm	33 mins	33 mins
12	PVC	160 mm	12.6 mm	241 mins	241 mins
13	PP	160 mm	15.1 mm	232 mins	205 mins
14	HDPE	160 mm	15.1 mm	112 mins	112 mins
15	PP	50 mm	5.4 mm	241 mins	241 mins
16	HDPE	50 mm	5.2 mm	241 mins	241 mins
17	ABS	50 mm	3.5 mm	241 mins	241 mins
18	PVC	50 mm	3.9 mm	241 mins	241 mins

The test was discontinued after a heating period of 241 minutes (See WF no. 146725 Issue 2 for details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.5 RED Test Report No. R16L28-1A#

A fire resistance test on twenty-seven specimens penetration systems, namely specimens '1a' to '27', had been subjected to a test in accordance with BS 476: Part 20: 1987 was performed at the RED testing laboratory on 20th January, 2017. The test sponsor was Hilti (Hong Kong) Limited. In this test report, only pipe systems, namely specimens '11', '12', '13', '14', '15' and '16', were considered. As requested by the test sponsor, the specimens were mounted within concrete line specimen holder. The specimens were symmetrical and only one side of specimen was tested, which was determined by test sponsor.

Specimen '11' was comprised of an opening with sizes of 220 mm wide by 130 mm high incorporated with 2 nos. of pipes. The left and right pipe consisted of a copper pipe with sizes of 19 mm diameter and 6.4 mm diameter respectively by 4 mm thick by 1,400 mm long. Both copper pipes were wrapped with a

layer of nominal 40 mm thick by 1,200 mm long insulation 'Armaflex' with density of 40 kg/m³. The opening was filled by a layer of nominal 100 mm thick 'CFS-F FX' foam.

Specimen '12' had overall dimensions of 135 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 25 mm internal diameter by 4 mm thick, wrapped with a layer of nominal 50 mm thick by 1,200 mm long insulation 'Armaflex' with density of 40 kg/m³.

Specimen '13' had overall dimensions of 190 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 50 mm internal diameter by 5 mm thick, wrapped with a layer of nominal 65 mm thick by 1,200 mm long insulation 'Armaflex' with density of 40 kg/m³.

Specimen '14' had overall dimensions of 135 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 25 mm internal diameter by 4 mm thick, wrapped with a layer of nominal 50 mm thick by 1,200 mm long insulation 'Phenolic Foam' with density of 40 kg/m³.

Specimen '15' had overall dimensions of 190 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 50 mm internal diameter by 5 mm thick, wrapped with 2 layers of nominal 32 mm thick (total 64 mm thick) by 1,200 mm long insulation 'Phenolic Foam' with density of 40 kg/m³.

Specimen '16' had overall dimensions of 390 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 250 mm internal diameter by 5 mm thick, wrapped with a layer of nominal 40 mm thick and a layer of nominal 25 mm thick (total 65 mm thick) by 1,200 mm long insulation 'Phenolic Foam' with density of 40 kg/m³.

All specimens were penetrated through a nominal 200 mm thick concrete wall. The gaps between specimen '11' and concrete wall were applied with a layer of 'CFS-B' bandage. The gaps between specimens '12', '13', '14', '15' and concrete wall were applied with a layer of 'CFS-B' bandage, mineral wool with density of 100 kg/m³ and 'CP606' sealant, while the gap between specimen '16' and concrete wall was applied with 2 layers of 'CFS-B' bandage, mineral wool with density of 100 kg/m³ and 'CP606' sealant. Each end of the G.I. pipes of specimens '12', '13', '14', '15' and '16' at the exposed side was covered by a nominal 3 mm thick steel plate.

The copper pipes of specimen '11' and the G.I. pipes of specimens '12', '13', '14', '15' and '16' was fixed to 42 mm by 20 mm by 3 mm thick steel channels, located at 500 mm from the concrete wall, by nominal 3 mm thick pipe rings on both sides. The steel channels were supported by an external steel framework constructed by 50 mm by 50 mm by 3 mm steel L-angles which in turn fixed to the concrete lining of test rig by 2 nos. of M10 anchor bolts.

The specimens satisfied the performance requirements specified in BS 476: Part 20: 1987 for the following periods:

	Integrity	Insulation
Specimen '11'	121 Minutes (No failure)	N/A
Specimen '12'	121 Minutes (No failure)	N/A
Specimen '13'	121 Minutes (No failure)	N/A
Specimen '14'	121 Minutes (No failure)	N/A
Specimen '15'	121 Minutes (No failure)	N/A
Specimen '16'	121 Minutes (No failure)	N/A

The test was discontinued after a heating period of 121 minutes (See RED test report no. R16L28-1A for full details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS 476: Part 20: 1987 and found it suitable for this assessment.*

3.2.6 WARRES Test Report No. 128947/A Issue 2*

A fire resistance test on total twelve specimens of various plastic pipe penetration sealing system mounted within a blockwork wall assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 13th March, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

In this test report, each pipe was fitted with an intumescent collar on each face of the wall which was referenced 'CP643'. The specimens were referenced as E,F,G,H,I,J,K,L,M,N,Q,R and S as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Opening Size	Collar Reference	Integrity	Insulation
E	PE	50 mm	2.0 mm	82 mm	CP643/50	245 mins	245 mins
F	PVC	50 mm	2.4 mm	82 mm	CP643/50	245 mins	245 mins
G	PVC	40 mm	1.9 mm	82 mm	CP643/50	245 mins	245 mins
H	ABS	110 mm	7.1 mm	132 mm	CP643/110	245 mins	241 mins

I	PE	160 mm	4.6 mm	182 mm	CP643/160	245 mins	245 mins
J	PE	110 mm	3.0 mm	132 mm	CP643/110	245 mins	245 mins
K	PVC	110 mm	3.7 mm	132 mm	CP643/110	245 mins	245 mins
L	PE	110 mm	2.7 mm	150 mm	CP643/110	245 mins	242 mins
M	ABS	160 mm	11.0 mm	182 mm	CP643/160	123 mins	122 mins
Q	PE	160 mm	4.0 mm	250 mm	CP643/160	245 mins	245 mins
R	PVC	160 mm	4.7 mm	250 mm	CP643/160	245 mins	245 mins
S	PVC	160 mm	4.7 mm	182 mm	CP643/160	245 mins	245 mins

The test was discontinued after a heating period of 245 minutes (See WARRES no. 128947/A Issue 2 for details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.7 WARRES Test Report No. 128949/A*

A fire resistance test on total seven specimens of various plastic pipe penetration sealing system mounted within a blockwork wall assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 10th April, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

In this test report, each pipe was fitted with an intumescent collar on each face of the wall which was referenced 'CP643'. The specimens were referenced as A, B, C, H, I, O and P as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Opening Size	Collar Reference	Integrity	Insulation
A	PVC	160 mm	11 mm	182 mm	CP 643/160	115 mins	115 mins
B	ABS	110 mm	7 mm	132 mm	CP 643/110	180 mins	170 mins
C	PVC	40 mm	2.2 mm	82 mm	CP 643/50	180 mins	180 mins
H	PE	160 mm	4 mm	182 mm	CP 643/160	180 mins	180 mins
I	PE	110 mm	3.1 mm	132 mm	CP 643/110	180 mins	180 mins
O	PVC	160 mm	4.7 mm	182 mm	CP 643/160	180 mins	180 mins
P	PVC	110 mm	3.2 mm	132 mm	CP 643/110	180 mins	180 mins

The test was discontinued after a heating period of 180 minutes (See WARRES no. 128949/A for details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.8 WARRES Test Report No. 131014/A*

An ad-hoc fire resistance test stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 on thirteen (13) specimens of pipe penetration sealing systems mounted within an aerated concrete floor assembly was performed at the Warringtonfire Research Centre Laboratory on 14th August 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

In this test report, each pipe was fitted with an intumescent collar on the lower face of the floor only, which was referenced 'CP643'. The specimens were referenced as A, B, C, H, I, O and P as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Opening Size	Collar Reference	Integrity	Insulation
M	PE	110 mm	2.7 mm	132 mm	CP 643/110	245 mins	245 mins
N	ABS	110 mm	6.6 mm	132 mm	CP 643/110	215 mins	213 mins
O	PVC	160 mm	10.45 mm	182 mm	CP 643/160	245 mins	245 mins
P	PVC	160 mm	4.7 mm	250 mm	CP 643/160	214 mins	190 mins
Q	PVC	110 mm	3.2 mm	150 mm	CP 643/110	245 mins	245 mins
R	PVC	50 mm	2.4 mm	82 mm	CP 643/50	245 mins	245 mins
S	PVC	50 mm	2.4 mm	62 mm	CP 643/50	245 mins	245 mins
T	PE	160 mm	4.0 mm	182 mm	CP 643/160	245 mins	245 mins
U	PE	160 mm	4.0 mm	250 mm	CP 643/160	64 mins	64 mins
V	PE	110 mm	2.7 mm	150 mm	CP 643/110	245 mins	245 mins
W	PE	50 mm	2.9 mm	82 mm	CP 643/50	245 mins	245 mins
X	PE	50 mm	2.9 mm	62 mm	CP 643/50	245 mins	245 mins
Y	ABS	160 mm	10.45 mm	182 mm	CP 643/160	245 mins	245 mins

The test was discontinued after a heating period of 245 minutes (See WARRES no. 131014/A for details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.9 WARRES Test Report No. 137929/A*

A fire resistance test on total nine specimens of various plastic pipe penetration sealing system mounted within a plasterboard partition wall assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 10th April, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

In this test report, each pipe was fitted with an intumescent collar on each face of the 100 mm thick wall which was referenced 'CP643N'. The specimens were referenced '1' to '9' as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Opening Size	Collar Reference	Integrity	Insulation
1	PE	50 mm	2.9 mm	55 mm	CP643/50	135	135
2	PE	160 mm	14.6 mm	165 mm	CP643/160	135	135
3	PE	160 mm	4.0 mm	165 mm	CP643/160	135	135
4	PVC	50 mm	1.8 mm	55 mm	CP643/50	135	135
5	PVC	160 mm	11.9 mm	165 mm	CP643/160	135	135
6	PVC	160 mm	3.2 mm	165 mm	CP643/160	135	135
7	ABS	160 mm	10.45 mm	165 mm	CP643/160	135	135
8	PP	160 mm	3.9 mm	165 mm	CP643/160	135	135
9	PE	75 mm	5.2 mm	80 mm	CP643/90	135	135

The test was discontinued after a heating period of 135 minutes (See WARRES test report no. 137929/A for details)

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.10 CSIRO Test Report No. FSV1026#

A fire resistance test stated to be in accordance with BS 476: Part 20: 1987 on a total of eighteen (18) specimens of pipe penetration sealing systems mounted within the plaster board partition wall system was performed at the CSIRO Laboratory on 18th December 2003. The test sponsor was Hilti (Aust.) Pty Ltd., who had given permission to use this data.

In this test report, each pipe was fitted with an intumescent collar on each face of the wall, which was referenced 'CP643'. The specimens were referenced as 1 to 18 as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Opening Size	Collar Reference	Integrity	Insulation
1	PVC	40 mm	2 mm	55 mm	CP643/50	120	114
2	PVC	50 mm	2.2 mm	65 mm	CP643/63	120	120
3	PVC	65 mm	2.7 mm	80 mm	CP643/75	120	115
4	PVC	80 mm	2.9 mm	95 mm	CP643/90	120	120
5	PVC	100 mm	3.2 mm	112 mm	CP643/110	118	108
6	PVC	150 mm	4.5 mm	175 mm	CP643/160	120	120
7	HDPE	50 mm	3 mm	55 mm	CP643/50	120	120
8	HDPE	56 mm	3 mm	65 mm	CP643/63	120	120
9	HDPE (Silent)	56 mm	3.2 mm	65 mm	CP643/63	120	120
10	HDPE	75 mm	3 mm	80 mm	CP643/75	120	106
11	HDPE	90 mm	3.5 mm	95 mm	CP643/90	120	97
12	HDPE	110 mm	4.3 mm	125 mm	CP643/110	120	116
13	HDPE	160 mm	6.2 mm	175 mm	CP643/160	120	120
14	PVC	40 mm	2 mm	55 mm	CP648-E (1 layers)	120	120
15	PVC	65 mm	2.7 mm	80 mm	CP648-E (1 layers)	111	111
16	PVC	80 mm	2.9 mm	105 mm	CP648-E (2 layers)	120	120
17	PVC	110 mm	3.2 mm	132 mm	CP648-E (2 layers)	7	7
18	PVC	160 mm	4.5 mm	202 mm	CP648-E (3 layers)	6	6

The test was discontinued after a heating period of 120 minutes (See CSIRO test report no. FSV1026 for details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS 476: Part 20: 1987 and found it suitable for this assessment.*

3.2.11 WARRES Test Report No. 128947/B*

A fire resistance test on total seven specimens of various plastic pipe penetration sealing system mounted within a blockwork wall assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 13th March, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

In this test report, each pipe was fitted with an intumescent collar on each face of the wall which was referenced 'CP644'. The specimens were referenced as A, B, C, D, N, O and P as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Opening Size	Collar Reference	Integrity	Insulation
A	PE	250 mm	8.0 mm	300 mm	CP644/250	245 mins	245 mins
B	PVC	250 mm	11.9 mm	300 mm	CP644/250	245 mins	161 mins
C	PE	50 mm	2.9 mm	82 mm	CP644/50	245 mins	245 mins
D	PVC	50 mm	2.0 mm	82 mm	CP644/50	245 mins	245 mins
N	PE	250 mm	24.0 mm	300 mm	CP644/250	245 mins	93 mins
O	PVC	250 mm	5.9 mm	300 mm	CP644/250	245 mins	245 mins
P	ABS	160 mm	10.5 mm	182 mm	CP644/160	120 mins	119 mins

The test was discontinued after a heating period of 245 minutes (See WARRES no. 128947/B for details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

3.2.12 WARRES Test Report No. 131014/B*

An ad-hoc fire resistance test stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 on twelve (12) specimens of pipe penetration sealing systems mounted within an aerated concrete floor assembly was performed at the Warringtonfire Research Centre Laboratory on 14th August 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

In this test report, each pipe was fitted with an intumescent collar on the lower face of the floor only, which was referenced 'CP643'. The specimens were referenced as A, B, C, D, E, F, G, H, I, J, K and L as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Opening Size	Collar Reference	Integrity	Insulation
A	PVC	250 mm	11.9 mm	300 mm	CP644/250	213 mins	101 mins
B	PP	160 mm	3.9 mm	182 mm	CP644/160	169 mins	101 mins
C	PVC	50 mm	1.8 mm	62 mm	CP644/50	245 mins	101 mins
D	PVC	160 mm	11.9 mm	250 mm	CP644/160	100 mins	91 mins
E	PE	250 mm	22.8 mm	300 mm	CP644/250	64 mins	64 mins
F	PVC	250 mm	4.9 mm	300 mm	CP644/250	245 mins	245 mins
G	PVC	160 mm	3.2 mm	182 mm	CP644/160	190 mins	190 mins
H	PE	50 mm	2.9 mm	62 mm	CP644/50	245 mins	245 mins
I	ABS	160 mm	10.0 mm	182 mm	CP644/160	138 mins	120 mins
J	PE	250 mm	7.8 mm	300 mm	CP644/250	212 mins	212 mins
K	PE	160 mm	14.6 mm	250 mm	CP644/160	164 mins	164 mins
L	PE	160 mm	4.0 mm	250 mm	CP644/160	133 mins	128 mins

The test was discontinued after a heating period of 245 minutes (See WARRES no. 131014/B for details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

4 PROPOSAL & DISCUSSION

4.1 *The use of test evidence, which were tested in accordance with BS EN 1363-1: 1999, for the assessment of linear joint sealing system to BS 476: Part 20: 1987*

Proposal

It is proposed that the test evidence of WF report no. 146725 Issue 2 for the linear joint seal system, which were tested in accordance with BS EN 1363-1: 1999, is suitable for use in the assessment against BS 476: Part 20: 1987.

Discussion

The fire test on the linear joint seal systems as tested and described in the above test evidence were carried out in accordance with BS EN 1363-1: 1999. In reviewing the tests, we have considered the design and installation of the specimens, the surrounding construction, the initial furnace temperature, the pressure in the furnace, the changes in the integrity criteria and the behaviour of the fire tests, it is expected that if these fire tests had been conducted in accordance with BS 476: Part 20: 1987 very similar results would have been achieved.

Fire tests to BS EN 1363-1: 1999 and BS 476: Part 20: 1987 have the same furnace temperature-time curve, i.e., the standard ISO temperature time curve represented by $T = 345 \log_{10}(8t + 1) + 20$, where T is the furnace temperature rise and t is the time of heating conditions. However, a more severe overpressure requirement of 5 Pa required by BS EN 1363-1: 1999 was used, which was normally deemed to be more onerous. The passing criteria for the standards of BS EN 1363-1: 1999 and BS 476: Part 20: 1987 are summarised as follows:

Integrity. Monitor the unexposed face of the specimen for evaluation of integrity. A failure of the test construction to maintain integrity occurs when collapse or sustained flaming on the unexposed face occurs or impermeability is exceeded.

Insulation. Failure occurs when (a) the mean unexposed face temperature increases by more than 140 °C above its initial value; or (b) the temperature recorded at any position on the unexposed face is in excess of 180 °C above its initial value; or (c) when integrity failure occurs.

Having stated these criteria, there is no significant difference between the tests to BS EN and British standards. Since the integrity and insulation criteria of BS EN 1363-1: 1999 are basically the same, we can conservatively conclude that the linear joint sealing system as tested and described in WF report no. 146725 Issue 2 will achieve fire resistance performance not worse than tested if test to BS 476: Part 20: 1987.

4.2 The fire resistance performance of plastic pipe penetration system using the Hilti “CP648-E” with respect to BS 476: Part 20: 1987.

Proposal

It is proposed that Hilti ‘CP648E’ may be used for the purpose of plastic pipe penetration sealing under either the wall mounted or floor mounted situation referenced to the test evidence WARRES 128944/A, 128948 and 132995 Issue 2. purpose of sealing the penetration annular gap in between the plastic pipe and the surrounding masonry supporting construction when the pipe penetrating through. The ‘CP648-E’ was endless intumescent wrap of 4.5 mm thick. Depends on the pipe materials, one, two or three layers of “CP 648-E” shall be used to wrap the pipe materials and fill the annular gap.

(a) The application of Hilti “CP648-E” for floor mounted situation with the intumescent wrap fitted within and flush with the underside of the floor. The floor construction shall be masonry type with minimum 150 mm thick, and it is assumed that the floor shall carry at least up to the same fire resistance performance in terms of both integrity and insulation as the proposed scenario. The gap in between the pipe and the floor aperture above the intumescent shall be fully fitted with cement sand mortar, and the annular gap shall be in nominal width of the overall thickness of “CP648-E” to be applied.

Tables below shows the conditions for the pipe penetration protection:

PE pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
140	15.3	3 layers of 4.5	240	180
160	15.3	3 layers of 4.5	240	180
PVC Pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
32	2.1	1 layer of 4.5	240	240
32	3.9	1 layer of 4.5	240	180
50	3.9	1 layer of 4.5	240	240
56	3.9	1 layer of 4.5	240	240
63	3.9	1 layer of 4.5	240	240
75	3.9	1 layer of 4.5	240	240
90	4.3	2 layers of 4.5	240	240
110	6.3	2 layers of 4.5	240	240
125	6.3	2 layers of 4.5	120	120
140	12.5	3 layers of 4.5	180	180
160	12.6	3 layers of 4.5	180 (mortar 120(CP606)	120 (mortar) 120 (CP606)

PP pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
32	2.1	1 layer of 4.5	240	240
50	4.6	1 layer of 4.5	240	120
56	4.6	1 layer of 4.5	240	120
63	4.6	1 layer of 4.5	240	120
75	4.6	1 layer of 4.5	240	120
90	4.3	2 layers of 4.5	180	120
110	6.3	2 layers of 4.5	180	120
125	7.4	2 layers of 4.5	180	120
140	9.6	3 layers of 4.5	240	240
160	9.6	3 layers of 4.5	240	240
ABS pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
32	2.2	1 layer of 4.5	240	240
50	4.8	1 layer of 4.5	240	240
56	4.8	1 layer of 4.5	240	240
63	4.8	1 layer of 4.5	240	240
75	4.8	1 layer of 4.5	240	240
90	7.2	2 layers of 4.5	240	240
110	7.2	2 layers of 4.5	240	240
125	10.0	3 layers of 4.5	240	240
140	9.6	3 layers of 4.5	240	240
160	9.6	3 layers of 4.5	240	240

(b) The application of Hilti “CP648-E” for wall mounted situation with the intumescent wrap fitted within and on each end of the wall. The wall construction shall be masonry type with minimum 100 mm thick, and it is assumed that the wall shall carry at least up to the same fire resistance performance in terms of both integrity and insulation as the proposed scenario. The gap in between the pipe and the wall aperture shall be sealed up with either mortar or CP 606, and the annular gap shall be in nominal width of the overall thickness of “CP648-E” to be applied. Tables below shows the conditions for the pipe penetration protection:

PE pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
140	15.6	3 layers of 4.5	240	180
160	15.6	3 layers of 4.5	240	180
PVC Pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
32	2.1	1 layer of 4.5	240	180
50	3.9	1 layer of 4.5	240	240
56	3.9	1 layer of 4.5	240	240
63	3.9	1 layer of 4.5	240	240
75	3.9	1 layer of 4.5	240	240
90	4.3	2 layers of 4.5	240	240
110	6.3	2 layers of 4.5	240	240
125	6.3	2 layers of 4.5	240	240
140	8.1	3 layers of 4.5	180	180
140	12.5	3 layers of 4.5	240	180
160	8.1	3 layers of 4.5	180	180
160	12.5	3 layers of 4.5	240	180
PP pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
32	2.2	1 layer of 4.5	240	240
50	5	1 layer of 4.5	240	240
56	5	1 layer of 4.5	240	240
63	5	1 layer of 4.5	240	240
75	5	1 layer of 4.5	240	240
90	6.6	2 layers of 4.5	240	240
110	6.6	2 layers of 4.5	240	240
125	7.4	2 layers of 4.5	240	180
140	9.4	3 layers of 4.5	180	120
160	9.4	3 layers of 4.5	180	120

ABS pipes				
Pipe Diameter (mm)	Max pipe wall thickness (mm)	CP 648-E thickness (mm)	Integrity (mins)	Insulation (mins)
32	2.2	1 layer of 4.5	240	180
50	4.8	1 layer of 4.5	240	240
56	4.8	1 layer of 4.5	240	240
63	4.8	1 layer of 4.5	240	240
75	4.8	1 layer of 4.5	240	240
90	7.0	2 layers of 4.5	240	240
110	7.0	2 layers of 4.5	240	240
125	10.2	3 layers of 4.5	240	180
140	10.2	3 layers of 4.5	240	180
160	10.2	3 layers of 4.5	240	180

(c) The application of Hilti “CP648-E” for wall mounted situation with the intumescent wrap fitted centrally recessed within the wall and the voids were filled with sand cement mortar. The wall construction shall be masonry type with minimum 100 mm thick, and it is assumed that the wall shall carry at least up to the same fire resistance performance in terms of both integrity and insulation as the proposed scenario. The annular gap shall be in nominal width of the overall thickness of “CP648-E” to be applied. Tables below shows the conditions for the pipe penetration protection:

Pipe material	Min. Pipe Dia (mm)	Max. Pipe Dia (mm)	Max. pipe wall thickness (mm)	Ratio of pipe area to CP 648 cross sectional area (Ap/Aa)	Minimum wrap thickness (mm)	Integrity (mins)	Insulation (mins)
PVC	50	160	12.6	5.47:1	4	240	240
HDPE	50	50	5.2	2.89:1	4	240	240
HDPE	110	110	15.1	3.69:1	7	120	120
HDPE	50	160	15.1	5.47:1	4	60	60
ABS	50	50	3.5	2.89:1	4	240	240
ABS	50	160	11.4	5.47:1	4	30	30
PP	50	50	5.4	2.89:1	4	240	240
PP	110	110	15.1	3.69:1	7	240	180
PP	50	160	15.1	5.47:1	4	180	180

Discussion

The intumescent wrap Hilti 'CP648-E' had been substantially tested in various test evidence that used for plastic pipe penetration of PVC, PE, PP and ABS materials, of various pipe diameter and various pipe wall thickness. For the sealing of the plastic pipe penetration through masonry wall, since the pipe may melt under the heating condition, the sealing materials will need to expand and seal up the whole aperture after the plastic pipe collapsed. Therefore, the key issue will be whether the intumescent materials are good enough to seal up the aperture during the heating conditions

- (a) The scope of the application of 'CP648-E' as proposed in the table was basically referenced to the tested scenarios in the previous tested evidence. Some of the smaller pipe diameter application is projected from the tested larger pipe diameter. Since the smaller pipe diameter with the same wall thickness and same application thickness of the 'CP648-E' intumescent wrap is considered as a less onerous situation. In the floor application, the intumescent wrap shall be applied within the wall and flush with the underside of the annular gap. The proposed overall thickness of the intumescent wrap was referenced to the test evidence as well.

- (b) The scope of the application of 'CP648-E' as proposed in the table was basically referenced to the tested scenarios in the previous tested evidence. Some of the smaller pipe diameter application is projected from the tested larger pipe diameter. Since the smaller pipe diameter with the same wall thickness and same application thickness of the 'CP648-E' intumescent wrap is considered as a less onerous situation. In the wall application, the intumescent wrap shall be applied within on each end of the annular gap. The proposed overall thickness of the intumescent wrap was referenced to the test evidence as well.

- (c) The test evidence WARRES no. 146725 Issue 2 described the test of the use of Hilti CP648 for different types of pipe materials, pipe wall thickness and the pipe diameter, whilst the report R16L28-1A provides an updated test evidence for the similar materials tested to BS 476: Part 20: 1987.

Based on the ratio of the overall cross-sectional area of the pipe to the annular area (A_p/A_a) of the "CP 648" would be the critical parameter in this consideration.

The table below presents the result from different specimens:

Pipe material	Pipe Dia. (mm)	Pipe wall thickness (mm)	Pipe cross sectional area	CP 648 Thickness (mm)	CP648 annular area (m ²)	(A_p/A_a) Ratio	Integrity (min)	Insulation (min)
PVC	50	3.9	0.001963	4	0.00068	2.89	240	240
PVC	160	12.6	0.020106	7	0.00367	5.47	240	240
HDPE	50	5.2	0.001963	4	0.00068	2.89	240	240

HDPE	160	15.1	0.020106	7	0.00367	5.47	60	60
ABS	50	3.5	0.001963	4	0.00068	2.89	240	240
ABS	160	11.4	0.020106	7	0.00367	5.47	30	30
PP	50	5.4	0.001963	4	0.00068	2.89	240	240
PP	160	15.1	0.020106	7	0.00367	5.47	180	180

From the test results, the CP 648 applied to different materials with different pipe diameters and wall thicknesses will have different performance.

For PVC piping

For the specimens of PVC piping with diameters of 50 mm and 160 mm and wall thickness of 3.9 mm and 12.6 mm, both cases satisfied 240 minutes integrity and insulation performance. In terms of fire protection, the case with larger pipe diameter and thicker pipe wall is considered as a more onerous situation. And in the test of PVC pipe penetration, the (A_p/A_a) ratio for 50 mm piping is 2.89:1 while for the 160 mm piping is 5.47:1. Since, both cases had achieved 240 minutes integrity and insulation, it is reasonable to use the minimum ratio to 5.47:1 for all the application range, subjected to the minimum thickness of 4 mm.

For HDPE piping

For the specimens of High Density Polyethylene (HDPE) piping, using the same justification above, the worked out (A_p/A_a) ratio is again 2.89:1 for 50 mm pipe and 5.47:1 for 160 mm pipe, respectively. However, in the case of HDPE piping, for larger diameter pipe with the ratio of 5.47:1, the achieved fire resistance performance was 112 minutes integrity and insulation only. From the test results, it can be generally concluded that pipe with smaller diameter is a less onerous situation. Therefore, it is reasonable to assume that pipes with a smaller diameter shall have a better performance. Therefore, for pipe diameter of 110 mm, which is approximately the middle between the tested pipe diameters, a more favourable ratio of 3.69:1 and with minimum thickness of 7 mm may provide confidence for the enhancement of performance to up to 120 minutes integrity and insulation.

For ABS piping

In the test to ABS piping, the test results for small pipe sizes 50 mm and larger pipe sizes 160 mm were quite extreme. In such case, the appraised result can only be conservatively concluded that for pipe diameter up to 50 mm and wall thickness up to 3.5 mm, the use of 4 mm thick CP 648, can provide the fire resistance performance of up to 240 minutes integrity and insulation. While for the pipe diameter up to 160mm and wall thickness up to 11.4 mm, the (A_p/A_a) ratio of 5.47:1 with the minimum thickness of 4 mm, is considered as an acceptable application range for the system to maintain the fire resistance performance of 30 minutes integrity and insulation.

For the Polypropylene (PP) piping

The test results to Polypropylene piping were similar to that in HDPE, but in this case, the smaller pipe diameter with the (Ap/Aa) ratio of 2.89:1 achieved the fire resistance performance of 241 minutes integrity and insulation performance while the larger pipe diameter with the (Ap/Aa) ratio of 5.47:1 achieved the fire resistance performance of 232 minutes integrity and insulation performance.

From the test results, it can be generally concluded that pipe with smaller diameter is a less onerous situation. Therefore, it is reasonable to assume that pipes with a smaller diameter shall have a better performance. Therefore, for pipe diameter of 110 mm, which is approximately the middle between the tested pipe diameters, a more favourable ratio of 3.69:1 and with minimum thickness of 7 mm may provide confidence for the enhancement of performance to up to 240 minutes integrity and 180 minutes insulation.

Apart from the thickness of the CP 648 to be applied, the use of the sand cement mortar seal, and the annular gap width shall repeat the same as that tested.

In summary, the proposed application conditions of the Hilti "CP648-E" as stated above are generally referenced to the tested condition, with some of them are appraised with a conservative approach.

4.3 The fire resistance performance of plastic pipe penetration system using the Hilti “CP643N” and “CP644” with respect to BS 476: Part 20: 1987.

Proposal

It is proposed that Hilti ‘CP643N’ may be used for the purpose of plastic pipe penetration sealing through either the masonry wall, masonry flooring or the gypsum type drywall partition referenced to the test evidence WARRES 128947/A Issue 2, 128947/B, 128949/A, 131014/A and CSIRO FSV1026. The ‘CP643N’ were intumescent wrap with metal collar casing with various length for protection of specific pipe diameter. The CP643N, are of various model, 643/50 consists of 1 layer of 6 mm thick intumescent wrap, 643/110 consists of 1 layer of 10 mm thick intumescent wrap, 643/160 consists of 2 layers of 12 mm thick intumescent wrap.

It is assumed that the wall or floor system of the surrounding supporting construction shall carry at least up to the same fire resistance performance in terms of both integrity and insulation as the proposed scenario.

- (a) In the situation that the pipe penetration through the masonry wall system the test evidence WARRES no. 128947/A Issue 2 are referenced. The wall shall be of minimum 150 mm thick, the annular gap may be up to 45 mm wide for the PVC and PE pipes and up to 20 mm wide for the ABS pipes. The Hilti ‘CP643N’ shall be mounted on each side of the wall and the clearance in between the pipe and the apertures shall be filled with mortar. The cross sectional area of the pipe to the annular area of the intumescent wrap (A_p/A_a ratio) gives the necessary thickness of the intumescent wrap for various pipe diameter. The summary of the application is given in the table below:

Material	Pipe Dia. (mm)	Pipe wall thickness (mm)	(A_p/A_a) Ratio	Insulation (mins)	Integrity (mins)
PVC	40 – 160	1.9 – 4.7	1.45	240	240
PE	50-160	2.0-4.6	1.45	240	240
ABS	110	7.1	1.45	240	240
ABS	160	11.0	1.45	120	120

- (b) In the situation that the pipe penetration through the masonry floor system the test evidence WARRES no. 131014/A are referenced. The floor shall be of minimum 150 mm thick, the annular gap may be up to 20 mm wide for the PVC and PE pipes and up to 20 mm wide for the ABS pipes. The cross sectional area of the pipe to the annular area of the intumescent wrap (A_p/A_a ratio) gives the necessary thickness of the intumescent wrap for various pipe diameter. The summary of the application is given in the table below:

Material	Pipe Dia. (mm)	Pipe wall thickness (mm)	(A_p/A_a) Ratio	Insulation (mins)	Integrity (mins)
PVC	50 – 160	1.9 – 10.45	1.45	240	240
PE	50-160	2.7-4.0	1.45	240	240

ABS	110	6.6	1.45	180	180
ABS	160	10.45	1.45	240	240

(c) In the situation that the pipe penetration through the gypsum type partition wall system, the test evidence WARRES no. 137929/A and CSIRO FSV1026 are referenced. The partition wall shall be of minimum 115 mm thick, the annular gap may be up to 15 mm wide for all the plastic pipes of concern. The cross sectional area of the pipe to the annular area of the intumescent wrap (Ap/Aa ratio) gives the necessary thickness of the intumescent wrap for various pipe diameter. The summary of the application is given in the table below:

Material	Pipe. Dia. (mm)	Pipe wall thickness (mm)	(Ap/Aa) Ratio	Insulation (mins)	Integrity (mins)
PVC	50 – 160	1.8 – 11.9	1.12	120	120
PE	50 – 160	2.9 – 14.6	1.12	120	120
PP	160	3.9	1.12	120	120
ABS	160	10.45	1.12	120	120
HDPE	50 – 160	3 – 6.2	2.27	120	60

It is proposed that for the pipe diameter larger than 160 mm up to 260 mm for the PVC and PE pipe penetration, the ‘CP644’ will be used for the sealing purpose. The application of CP644 is basically referenced to the test evidence WARRES 128947/B and 131014/B. The Hilti ‘CP644’ were intumescent wrap with metal collar casing which is very similar to the ‘CP643N’ but is proposed to use with larger pipe diameter from 160 mm to 260 mm. One layer of 15 mm thick CP‘644’ will be used in this case. For wall application the CP 644 shall be applied on both ends of the wall, while for the flooring application, the Hilti ‘CP644’ shall be applied to the underside of the floor.

(d) In the situation that the pipe penetration through the masonry wall system, the test evidence WARRES no. 128947/B are referenced. The wall shall be of minimum 150 mm thick, the annular gap may be up to 25 mm wide for all the plastic pipes of concern. In all cases below, the CP644 (composed of 1 mm thick steel casing and 1 layer of 15 mm thick intumescent strip) will be applied on both ends of the wall. The summary of the application is given in the table below:

Material	Pipe. Dia. (mm)	Pipe wall thickness (mm)	(Ap/Aa) Ratio	Insulation (mins)	Integrity (mins)
PVC	160-260 ^{Note1}	1.8 -5.9	3.93	240	240
PVC	160-260 ^{Note1}	6.0-11.9	3.93	240	120
PE	160-260 ^{Note1}	2.9 – 8.0	3.93	240	240
PE	160-260 ^{Note1}	8.1 – 24.0	3.93	240	60

Note 1: See discussion below.

- (e) In the situation that the pipe penetration through the masonry floor system, the test evidence WARRES no. 131014/B are referenced. The floor shall be of minimum 150mm thick, the annular gap may be up to 25 mm wide for all the plastic pipes of concern. In all cases below, the CP644 (composed of 1 mm thick steel casing and 1 layer of 15 mm thick intumescent strip) will be applied to the underside of the wall (exposed face). The summary of the application is given in the table below:

Material	Pipe. Dia. (mm)	Pipe wall thickness (mm)	(Ap/Aa) Ratio	Insulation (mins)	Integrity (mins)
PVC	160-260 ^{Note2}	1.8 -4.9	3.93	240	240
PVC	160-260 ^{Note2}	5.0-11.9	3.93	180	60
PE	160-260 ^{Note2}	2.9 – 7.8	3.93	180	180
PE	160-260 ^{Note2}	7.9-22.8	3.93	60	60

Note1: See discussion below

Discussion

For the application of the Hilti 'CP643N'

The intumescent wrap Hilti 'CP643N' had been substantially tested in various test evidence that used for plastic pipe penetration of PVC, PE, PP, ABS and HDPE materials, of various pipe diameter and various pipe wall thickness. For the sealing of the plastic pipe penetration through masonry wall, since the pipe may melt under the heating condition, the sealing materials will need to expand and seal up the whole aperture after the plastic pipe collapsed. Therefore, the key issue will be whether the intumescent materials are good enough to seal up the aperture during the heating condition.

- (a) The scope of the application of 'CP643N' as proposed in the table was basically referenced to the tested scenarios in the previous tested evidence. Some of the smaller pipe diameter application is projected from the tested larger pipe diameter. Since the smaller pipe diameter with the same wall thickness and same application thickness of the 'CP643N' intumescent wrap is considered as a less onerous situation. The intumescent wrap shall be applied same as that tested, i.e. each side of the wall is fitted with the CP 643N and the thickness of the intumescent wrap depends on the pipe diameter. The opening sizes of the penetration is also discovered as one of the critical factor that affect the fire resistance performance. The annular gap of maximum 45 mm for PVC and PE pipes and the 20 mm wide for the ABS pipe is considered as supported by direct test evidence.
- (b) The scope of the application of 'CP643N' as proposed in the table was basically referenced to the tested scenarios in the previous tested evidence. Some of the smaller pipe diameter application is projected from the tested larger pipe diameter. Since the smaller pipe diameter with the same wall thickness and same application thickness of the 'CP643N' intumescent wrap is considered as a less onerous situation. In the floor application, the intumescent wrap shall be applied within and flush with the underside of the floor. The clearance in between the pipe and

the aperture shall be fully filled with the mortar. The proposed overall thickness of the intumescent wrap was referenced to the test evidence as well.

- (c) The scope of the application of 'CP643N' as proposed in the table when penetrating through partition wall was basically referenced to the tested scenarios in the previous tested evidence. In this test evidence, the partition wall was built by the 50 mm x 34 mm 0.6 mm G.M.S. channels faced with two layers of 12.5 mm thick gypsum boards on each side without infill. The overall thickness of the partition is 115 mm. The circular apertures left on the wall were penetrated by the plastic pipe sections. In the proposed scope, some of the smaller pipe diameter application is projected from the tested larger pipe diameter. Since the smaller pipe diameter with the same wall thickness and same application thickness of the 'CP643N' intumescent wrap is considered as a less onerous situation. The intumescent wrap shall be applied same as that tested, i.e. each side of the wall is fitted with the CP 643N and the thickness of the intumescent wrap depends on the pipe diameter. The opening sizes of the penetration is also discovered as one of the critical factor that affect the fire resistance performance. The annular gap of maximum 15 mm for all types of pipe is considered as supported by direct test evidence.

For the application of the Hilti 'CP644'

- (d) The scope of the application of 'CP644' for use with pipe penetration through masonry wall as proposed in the table was basically referenced to the tested scenarios in the previous tested evidence. The test evidence only presents the result of the use of 'CP644' with PVC and PE pipes, so the application is confined to these two materials. Some of the smaller pipe diameter application is projected from the tested larger pipe diameter. Since the smaller pipe diameter with the same wall thickness and same application thickness of the 'CP644' intumescent wrap is considered as a less onerous situation. It is as declared by the client that the CP644 is applicable to the pipe diameter range up to 260 mm. The slight increase in 10 mm in diameter of the pipe shall not significant deteriorate the achieved fire resistance performance, it is therefore considered acceptable. The intumescent wrap shall be applied same as that tested, i.e. each side of the wall is fitted with the "CP644" and the thickness of the intumescent wrap depends on the pipe diameter. The opening sizes of the penetration is also discovered as one of the critical factor that affect the fire resistance performance. The annular gap of maximum 25 mm for PVC and PE pipes is considered as supported by direct test evidence.
- (e) The scope of the application of 'CP644' as proposed in the table was basically referenced to the tested scenarios in the previous tested evidence. Some of the smaller pipe diameter application is projected from the tested larger pipe diameter. Since the smaller pipe diameter with the same wall thickness and same application thickness of the 'CP644' intumescent wrap is considered as a less onerous situation. It is as declared by the client that the CP644 is applicable to the pipe

diameter range up to 260 mm. The slight increase in 10 mm in diameter of the pipe shall not significantly deteriorate the achieved fire resistance performance, it is therefore considered acceptable. In the floor application, the intumescent wrap shall be applied within and flush with the underside of the floor. The clearance in between the pipe and the aperture shall be fully filled with the mortar. The proposed overall thickness of the intumescent wrap was referenced to the test evidence as well.

5 CONCLUSION

The proposed use of Hilti pipe penetration sealing systems in both floor mounted and wall mounted as discussed in Section 4 of this report, are capable to maintain the fire resistance performance of up to 240 minutes integrity and various insulation performance with respect to BS 476: Part 20: 1987.

6 DECLARATION BY APPLICANT

We, Hilti (Hong Kong) Limited, confirm that the material, component or element of structure, which is the subject of the test report being reviewed, has not to our knowledge been subjected to another test to the standard against which the assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of another test to the standard against which the assessment is being made.

We are not aware of any information that could affect the conclusions of this assessment.

If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

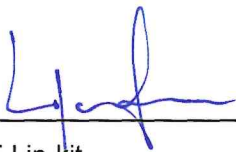
7 VALIDITY

This assessment is based on test data, experience and the information supplied. The assessment will be invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. Any changes in the specification of product will invalidate this assessment. This assessment relates only to the specimen assessed and does not by itself infer that the product is approved under any other endorsements, approval or certification scheme. Since the appraisal method is under development, the laboratory reserved the right to supersede this assessment in case the appraisal method had been changed.

This report only relates to the specimen(s) tested and may only be reproduced by the sponsor in full, without comment, abridgement and modifications.

8 SIGNATORIES

Assessment by:



Dr. SZE Lip-kit

Test Consultant

Research Engineering Development

Façade Consultants Limited

Reviewed by:



Ir Dr. YUEN Sai-wing, MHKIE (Fire)

Authorized Signature

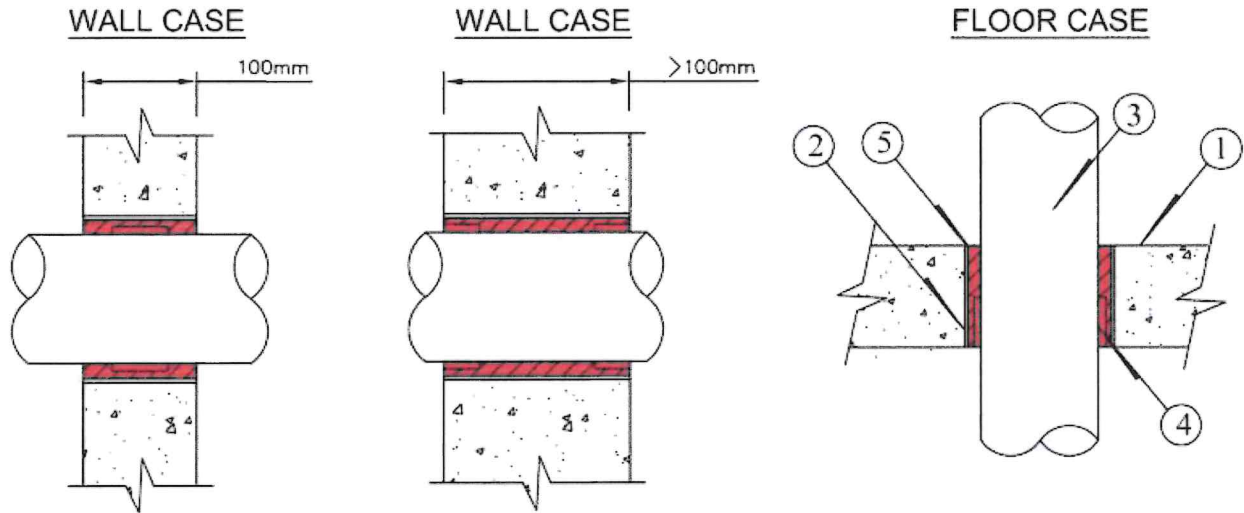
Research Engineering Development

Façade Consultants Limited

APPENDIX – DRAWINGS PROVIDED BY THE CLIENT

Drawing refers to Section 4.2 on plastic pipe penetration system by using CP648-E

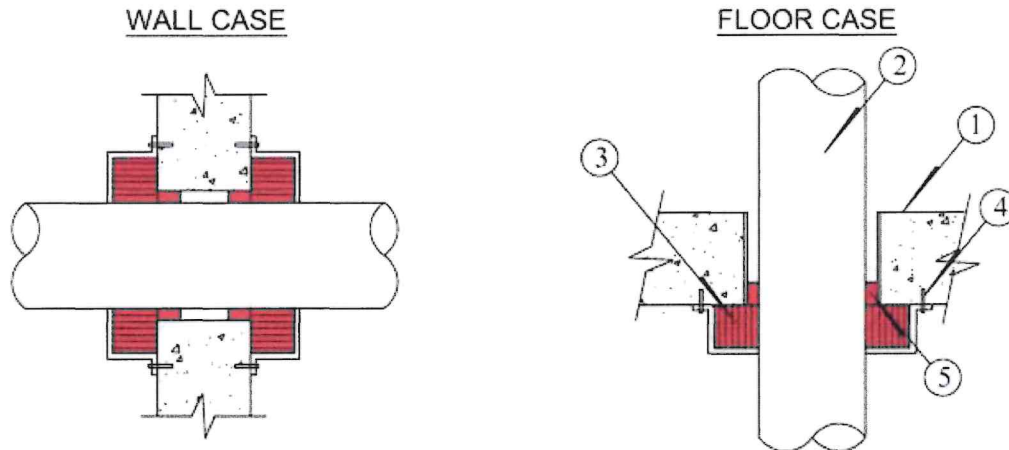
FIRE RESISTANCE RATING: UP TO -/240/240



1. CONCRETE FLOOR OR WALL ASSEMBLY:
 - A. CONCRETE WALL OR FIRE-RATED BLOCKWALL.
 - B. CONCRETE FLOOR.
2. OPTIONAL: METAL SLEEVE (CIRCULAR / RECTANGULAR)
3. PENETRATING ITEM TO BE ONE OR SEVERAL OF THE FOLLOWING:
 - PLASTIC PIPE (MAX 160mm O.D. EACH)
4. **CP 648-E FIRESTOP WRAP STRIP** CONTINUOUSLY WRAPPED AROUND THE OUTER CIRCUMFERENCE OF THE INSULATION. (SEE NOTES 1 & 3)
 - FOR O.D. ≤ 75mm, --- 4.5mm THK CP648-E x 1 LAYER;
 - FOR 75mm < O.D. ≤ 125mm, --- 4.5mm THK CP648-E x 2 LAYER;
 - FOR 125mm < O.D. ≤ 160mm, --- 4.5mm THK CP648-E x 3 LAYER;
5. FOR ANNULAR SPACE ≤ 30mm, FULL THE VOID UP BY MINERAL WOOL WITH **CP 648-E FIRESTOP WRAP STRIPS** ON BOTH SIDES OF THE FLOOR/WALL ASSEMBLY. OTHERWISE, VOIDS TO BE FILLED BY **CP636 FIRESTOP MORTAR**. (SEE NOTES 2)

Drawing refers to Section 4.3 on plastic pipe penetration system by using CP643N/CP644

FIRE RESISTANCE RATING: UP TO -/240/240



1. CONCRETE WALL OR WALL ASSEMBLY:
-LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE FLOOR OR WALL
2. MAX. 260MM OUTER-DIAMETER PLASTIC PIPE.(SEE TABLE BELOW).
3. CP643 N / CP644 FIRESTOP COLLAR WITH ANCHOR HOOK.(SEE NOTE 1 & 3)
4. SLEEVE ANCHOR HAS-R M6.
5. HILTI CP 606 FIRESTOP ACRYLIC SEALANT.

Application Detail:

Pipe O.D (mm)	Product(s)	No. of Hooks
20-51	CP643-50/1.5" N or CP643-50/1.5" N (A2 S.S)	2
52-64	CP643-63/2" N or CP643-63/2" N (A2 S.S)	2
65-78	CP643-75/2.5" N or CP643-72/2.5" N (A2 S.S)	3
79-91	CP643-90/3" N or CP643-90/3" N (A2 S.S)	3
92-115	CP643-110/4" N or CP643-110/4" N (A2 S.S)	3
116-125	CP643-125/5" N or CP643-125/5" N (A2 S.S)	4
126-170	CP643-160/6" N or CP643-160/6" N (A2 S.S)	4
171-180	CP644-180/7"	8
181-210	CP644-200/8"	8
211-240	CP644-225/9"	10
241-260	CP644-250/10"	12

- End of Report -

ASSESSMENT REPORT

The Use of Hilti 'CP648-E' Firestop Wrap Strip for Pipe Penetration Sealing Systems

Report No.: R22G06-1A
Issue Date: 2 August, 2022
Date of Review: 1 August, 2025

Report Sponsor

Hilti (Hong Kong) Limited
701-704 & 708B, Tower A Manulife Finance Centre,
223 Wai Yip Street, Kwun Tong, Kowloon, HK

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REVISION HISTORY

Issue date (DD/MM/YYYY)	Issue number	Remark
02/08/2022	0	Initial version

THE USE OF HILTI 'CP648-E' FIRESTOP WRAP STRIP FOR PIPE PENETRATION SEALING SYSTEMS

1 INTRODUCTION

This assessment report presents an appraisal for the use of the Hilti 'CP648-E' firestop stop wrap strip for plastic pipe penetration sealing systems through masonry wall or floor supporting construction. This appraisal is based on the test evidence WARRES no. 132995 Issue 2. This report is prepared for Hilti (Hong Kong) Limited of 701-704 & 708B, Tower A, Manulife Finance Centre, 223 Wai Yip Street, Kwun Tong, Kowloon, HK.

The proposed gap sealing systems used for the doorsets are required to provide a fire resistance performance of up to 120 minutes integrity and insulation with respect to BS 476: Part 20: 1987.

2 ASSUMPTIONS

The proposed doorsets are assumed to be installed in a similar manner to that of the previously tested system by competent installers. It is assumed that the modified doorsets will be constructed in a similar manner from materials and components of the same manufacture and equivalent quality as tested with supporting test evidence or otherwise appraised by RED. Further assumptions related to the specific modifications will be stated in the report.

It is also assumed that the supporting structures to which the perimeter of the doorsets will be fixed are capable of supporting the proposed structure effectively.

Assuming that the issue of the original test report is valid, the current testing standard or testing experience has not been changed and the procedures adopted for the original report have been re-examined and reviewed that there have been no changes to the specification of the construction considered in the original report. If contradictory data or any related evidence becomes available to RED, the assessment will be unconditionally withdrawn and the sponsor will be notified. This report is based on the given information, in which is declared by report sponsor that no contradictory data has become available.

3 SUPPORTING DATA

3.1 Summary of Supporting Test Evidence

Report no.	Sections	Description
Primary Test Evidence		
WARRES report no. 132995 Issue 2	4.1	Supporting test evidence for the use of the Hilt 'CP648-E' firestop wrap strip for plastic pipe penetration system through wall and floor supporting construction.

3.2 Primary Test Evidence

3.2.1 WARRES Test Report No. 132995 Issue 2*

A fire resistance test on ten specimens of PVC pipe penetration sealing system mounted within an aerated concrete floor and wall assembly stated to be using heating condition and general principles of BS EN 1363-1: 1999, the performance criteria in BS 476: Part 20: 1987, and additional guideline taken from the latest draft of prEN 1366-3: 2002 was performed at the WARRES (former Warringtonfire) laboratory on 10th July, 2003. The test sponsor was Hilti Entwicklungsgesellschaft mbH, who had given permission to use this data.

The test assemblies comprised a floor assembly formed from aerated concrete of overall dimensions 1,000 mm wide by 1,000 mm long by 150 mm thick, and a wall assembly formed from autoclaved blocks of overall 1,000 mm wide by 1,000 mm high by 100 mm thick. The floor and wall were both provided with five circular apertures of various dimensions, through which various diameter PVC pipes passed. Each pipe was fitted with an intumescent wrap referenced "CP648-E".

The assemblies formed the upper horizontal face and the front vertical face of a one metre cubed gas fired furnace chamber, the temperature rise of which was controlled using plate thermometers so that its means temperature complied with the requirements of BS EN 1363-1: 1999, the results were expressed as follow:

Specimen Ref:	Supporting Construction	Actual Pipe Size Diameter x wall thickness	Integrity (Min)	Insulation (Min)
1	Wall	160 mm x 8.1 mm	240	166
2	Wall	125 mm x 6.3 mm	240	240
3	Wall	90 mm x 4.3 mm	240	240
4	Wall	75 mm x 3.9 mm	240	240
5	Wall	32 mm x 2.1 mm	240	223
6	Floor	160 mm x 8.1 mm	121	121
7	Floor	125 mm x 6.3 mm	161	158
8	Floor	90 mm x 4.3 mm	240	240
9	Floor	75 mm x 3.9 mm	240	240
10	Floor	32 mm x 2.1 mm	240	240

The test was discontinued after a period of 240 minutes (See WARRES 132995 Issue 2 for full details).

**Note: the test data is more than five years old; we have reviewed this data against the current test procedures as per BS EN 1363-1: 1999 and found it suitable for this assessment.*

4 PROPOSAL & DISCUSSION

4.1 The use of Hilti 'CP648-E' firestop wrap strip for plastic pipe penetration systems

Proposal

The application range of the Hilti "CP648-E" firestop wrap strip is referenced to the test evidence WARRES report no. 132995 Issue 2. It is proposed that the Hilti 'CP648-E' firestop wrap strip may be used for plastic pipe penetration sealing through wall and floor supporting construction with the range of application as proposed below:

- (a) The use of the Hilti "CP648-E" for plastic pipe penetration sealing shall satisfy the same fire resistance performance with respect to BS 476: Part 20: 1987;
- (b) The plastic pipe penetration through wall construction with minimum thickness of 100 mm thick. The wall shall be fire-rated with the required fire resistance performance supported by separate test evidence. Table 4.1.1 below described the required application condition of Hilti "CP648-E" for various pipe diameters; and

Table 4.1.1: Proposed use of Hilti 'CP648-E' firestop wrap strip for different scenarios in wall application

For wall application (minimum 100 mm thick)				
Pipe diameter (mm)	Max aperture sizes	Application of CP648-E	Integrity (min)	Insulation (min)
126 - 160	pipe diameter + 30 mm	3 layers at both exposed and unexposed side sealed with CP606	240	120
76-125	pipe diameter + 20 mm	2 layers at both exposed and unexposed side sealed with CP606	240	240
32-75	pipe diameter + 10 mm	1 layer at both exposed and unexposed side sealed with CP606	240	240
<32	pipe diameter + 10 mm	1 layer of thick at both exposed and unexposed side sealed with CP606	240	180

- (c) The plastic pipe penetration through floor construction with minimum thickness of 150 mm thick. The floor shall be fire-rated with the required fire resistance performance supported by separate test evidence. The Table 4.1.2 below described the required application condition of CP 648-E for various pipe diameters.

Table 4.1.2: Proposed use of Hilti 'CP648-E' firestop wrap strip for different scenarios in floor application

For floor application (minimum 150 mm thick)				
Pipe diameter (mm)	Aperture sizes	Application of CP648-E	Integrity (min)	Insulation (min)
126 - 160	pipe diameter + 30 mm	3 layers flushed with exposed face and sealed with CP606, unexposed side filled with sand cement mortar	120	120
91-125	pipe diameter + 20 mm	2 layers flushed with exposed face and sealed with CP606, unexposed side filled with sand cement mortar	120	120
76-90	pipe diameter + 20 mm	2 layers flushed with exposed face and sealed with CP606, unexposed side filled with sand cement mortar	240	240
<32-75	pipe diameter + 10 mm	1 layer flushed with exposed face and sealed with CP606, unexposed side filled with sand cement mortar	240	240

The application of the Hilti "CP648-E" shall maintain the required fire resistance performance of the plastic pipe penetration for up to 240 minutes integrity and insulation with respect to BS EN 1363-1: 1999 or BS 476: Part 20: 1987. The maximum aperture sizes for accommodate the plastic pipe shall be marginally fitted.

Discussion

The test evidence WARRES report no. 132995 Issue 2 described the use of the Hilti "CP648-E" firestop wrap strip for the PVC pipe penetration sealing. The Hilti "CP648-E" was an intumescent wrap strip with overall sizes of 45 mm wide by 4.5 mm thick. A total of ten specimens, five for the sealing through wall construction and other five for the sealing through floor construction were tested. The diameters of the PVC pipes are 32 mm, 75 mm, 90 mm, 125 mm and 160 mm, respectively for both the wall and floor situation. For the specimens of wall application, the Hilti "CP648-E" was wrapped on the pipe outer surface flush with the wall surface. Depend on the pipe diameter, the Hilti "CP648-E" would be applied in one, two or three layers on both the exposed and unexposed side of the pipe and then sealed up with Hilti "CP606" sealant. In the floor application, the Hilti "CP648-E" was wrapped on the outer surface of the pipe flush with exposed side of the floor. Again, the applied layers of the CP 648-E depends on the pipe diameter. The exposed side of the specimen was sealed with the CP606, while the unexposed side of the specimen was fully filled with cement sand grouting.

- a) Since the BS EN 1363-1: 1999 is the general principle of fire test for the latest BS EN series of fire resistance test. In reviewing the tests, we have considered the design and installation of the specimen, the surrounding construction, the initial furnace temperature, the pressure in the furnace, the changes in integrity and insulation criteria and the behaviour of the fire test, it is expected that if these fire tests had been conducted in accordance with BS 476: Part 20: 1987 very similar results would have been achieved.

Fire test to BS EN 1363-1: 1999 and BS 476: Part 20: 1987 have the same furnace temperature-time curve, i.e., the standard ISO temperature time curve represented by $T = 345 \log_{10}(8t + 1) + 20$, where T is the furnace temperature rise and t is the time of heating conditions. However, a more severe overpressure requirement of 5 Pa required by BS EN 1363-1: 1999 was used, which was normally deemed to be more onerous. The passing criteria for the standards was stated to be adopting the BS 476: Part 20: 1987 as mentioned in the report WARRES no. 132995 Issue 2 and extracted as below:

Integrity. Monitor the unexposed face of the specimen for evaluation of integrity. A failure of the test construction to maintain integrity occurs when collapse or sustained flaming on the unexposed face occurs or impermeability is exceeded:

Insulation. Failure occurs when (a) the mean unexposed face temperature increases by more than 140 °C above its initial value; or (b) the temperature recorded at any position on the unexposed face is in excess of 180 °C above its initial value; or (c) when integrity failure occurs.

Since the integrity and insulation criteria was directly adopting that in BS 476: Part 20: 1987, we can conservatively conclude that the insulated partition systems as tested and described in the test evidence will achieve similar results. Therefore, the use of the result from the BS EN 1363-1: 1999 for the assessment against BS 476: Part 20: 1987 is considered acceptable.

- b) In the test evidence WARRES Test Report No. 132995 Issue 2, the test was performed on a total of ten (10) specimens, referenced "1" to "10". The specimen nos. "1" to "5" were the use of Hilti "CP648-E" firestop wrap strip for the plastic pipe penetration sealing for wall. Based on the diameter of the pipe, the layers of Hilti "CP648-E" to be applied around the pipe were varied. The application range of the CP648-E as given in Table 4.1.1 are directly adopting the tested configuration. The "CP648-E" will be applied on both sides of the pipe within the supporting construction and flushed with the surface and the clearance will be sealed up with the use of Hilti "CP606" sealant. The layers of the "CP648-E" to be applied were depends on the pipe diameter. For pipe diameter smaller or equal to 75 mm, one layer of "CP648-E" should be used, while for the diameter in between 76 mm to 125 mm, two layers of "CP648-E" is used, and for the pipe diameter from 126 mm to 160 mm, three layers should be used.

- c) While in the same test evidence, the specimen nos. "6" to "10" were the use of Hilti "CP648-E" firestop wrap strip for the plastic pipe penetration sealing for floor. Based on the diameter of the pipe, the layers of Hilti "CP648-E" to be applied around the pipe were varied. The application range of the CP648-E as given in Table 4.1.1 are directly adopting the tested configuration. The "CP648-E" will be applied on exposed side flushed with the surface and the clearance will be sealed up with the use of Hilti "CP606" sealant. The unexposed side is backed with sand cement mortar of 100 mm thick. The layers of the "CP648-E" to be applied were depends on the pipe diameter. For pipe diameter smaller or equal to 75 mm, one layer of "CP648-E" should be used, while for the diameter in between 76 mm to 125 mm, two layers of "CP648-E" is used, and for the pipe diameter from 126 mm to 160 mm, three layers should be used.

The proposal for use of the Hilti "CP 648-E" for the wall or floor plastic pipe penetration sealing are directly adopting the tested configuration, summarized in Tables 4.1.1 and 4.1.2.

5 CONCLUSION

The proposed use of Hilti 'CP648-E' for plastic pipe penetration sealing in wall or floor, as described in section 4 of this report, may provide the fire resistance performance of up to 240 minutes integrity and insulation with respect to BS 476: Part 20/22: 1987.

6 DECLARATION BY APPLICANT

We, Hilti (Hong Kong) Limited, confirm that the material, component or element of structure, which is the subject of the test report being reviewed, has not to our knowledge been subjected to another test to the standard against which the assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of another test to the standard against which the assessment is being made.

We are not aware of any information that could affect the conclusions of this assessment.

If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

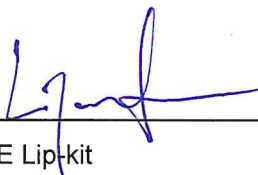
7 VALIDITY

This assessment is based on test data, experience and the information supplied. The assessment will be invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. Any changes in the specification of product will invalidate this assessment. This assessment relates only to the specimen assessed and does not by itself infer that the product is approved under any other endorsements, approval or certification scheme. Since the appraisal method is under development, the laboratory reserved the right to supersede this assessment in case the appraisal method had been changed.

This report only relates to the specimen(s) tested and may only be reproduced by the sponsor in full, without comment, abridgement and modifications.

8 SIGNATORIES

Assessment by:



Dr. SZE Lip-kit

Authorized Signature

Research Engineering Development

Façade Consultants Limited

Reviewed by:



Ir Dr. YUEN Sai-wing, MHKIE (Fire)

Authorized Signature

Research Engineering Development

Façade Consultants Limited

- End of Report -

ASSESSMENT REPORT

Fire Resistance Performance of Hilti CP648 Firestop Wrap Strip

Report No.: R20J22-1A
Issue Date: 5 October, 2020
Date of Review: 4 October, 2025

Report Sponsor

Hilti (Hong Kong) Limited
701-704 & 708B, Tower A Manulife Finance Centre,
223 Wai Yip Street, Kwun Tong, Kowloon, HK

This report only relates to the specimen(s) tested and may only be reproduced by the sponsor in full, without comment, abridgement and modifications.

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REVISION HISTORY

Issue date (DD/MM/YYYY)	Issue number	Remark
05/10/2020	0	Initial version

FIRE RESISTANCE PERFORMANCE OF HILTI “CP 648” FIRESTOP WRAP STRIP

1 INTRODUCTION

This assessment report presents an appraisal for the fire resistance performance of Hilti “CP 648” firestop wrap strip that was tested under the reference WARRES No. 146725 Issue 2 issued by Warringtonfire and secondary referenced to a similar product as tested under R16L28-1A issued by Research Engineering Development Façade Consultants Limited. It is prepared for Hilti (Hong Kong) Limited of 701-704 & 708B, Tower A, Manulife Finance Centre, 223 Wai Yip Street, Kwun Tong, Kowloon, HK.

The proposed centrally recessed “CP 648” firestop wrap strips are required to provide a fire resistance performance of up to 240 minutes integrity and insulation with respect to BS 476: Part 20: 1987.

2 ASSUMPTIONS

The proposed systems are assumed to be installed in a similar manner to that of the previously tested system by competent installers. It is assumed that the modified systems will be constructed in a similar manner from materials and components of the same manufacture and equivalent quality as tested with supporting test evidence or otherwise appraised by RED. Further assumptions related to the specific modifications will be stated in the report.

It is also assumed that the supporting structures to which the perimeter of the systems will be fixed are capable of supporting the proposed structure effectively.

Assuming that the issue of the original test report is valid, the current testing standard or testing experience has not been changed and the procedures adopted for the original report have been re-examined and reviewed that there have been no changes to the specification of the construction considered in the original report. If contradictory data or any related evidence becomes available to RED, the assessment will be unconditionally withdrawn and the sponsor will be notified. This report is based on the given information, in which is declared by report sponsor that no contradictory data has become available.

3 SUPPORTING DATA

3.1 Summary of Supporting Test Evidences

Report no.	Sections	Description
Primary Test Evidence		
WARRES No. 146725 Issue 2	4.1	Supporting test evidence for the use of the Hilti 'CP 648' firestop wrap strip for penetration sealing systems for fire resistance performance up to 240 minutes integrity and insulation.
Secondary Test Evidence		
R16L28-1A	4.1	Supporting test evidence for the use of the Hilti "CFS-B" which is as similar product as Hilti 'CP 648' for the fire resistance performance up to 120 minutes integrity.

3.2 Primary Test Evidences

3.2.1 WARRES Test Report No. 146725 Issue 2

A fire resistance test stated to be in accordance with BS EN 1363-1: 1999 and in conjunction with the EN 1366-3: 2004 on ten (10) specimens of PVC pipe penetration sealing systems mounted within an autoclaved blockwork wall assembly was performed at the Warringtonfire Laboratory on 8 June 2005. The test sponsor was Hilti (Great Britain) Limited, who had given permission to use this data.

In this test report, eight of the penetration sealing systems incorporated Hilti 'CP 648' Firestop Wrap Strip. The specimens were referenced as 1, 12, 13, 14, 15, 16, 17 and 18 as shown in the table below. The specimen was assessed against the criteria for integrity and insulation (max. temperature rise only) specified in BS 476: Part 20: 1987 as shown in the table below as well.

Specimen	Pipe Material	Diameter	Wall Thickness	Integrity	Insulation
1	ABS	160 mm	11.4 mm	33 mins	33 mins
12	PVC	160 mm	12.6 mm	241 mins	241 mins
13	PP	160 mm	15.1 mm	232 mins	205 mins
14	HDPE	160 mm	15.1 mm	112 mins	112 mins
15	PP	50 mm	5.4 mm	241 mins	241 mins
16	HDPE	50 mm	5.2 mm	241 mins	241 mins
17	ABS	50 mm	3.5 mm	241 mins	241 mins
18	PVC	50 mm	3.9 mm	241 mins	241 mins

The test was discontinued after a heating period of 241 minutes (See WF no. 146725 Issue 2 for details).

3.3 Secondary Test Evidences

3.3.1 RED Test Report No. R16L28-1A

A fire resistance test in accordance with BS 476: Part 20: 1987 on specimens of pipe penetration sealing systems was performed on 20 January, 2017. The test sponsor was Hilti (Hong Kong) Limited. In this test report, only pipe systems, namely specimens '11', '12', '13', '14', '15' and '16', were considered. As requested by the test sponsor, the specimens were mounted within concrete line specimen holder as shown in the test sponsor's drawings. The specimens were symmetrical and only one side of specimen was tested, which was determined by test sponsor.

Specimen '11' was comprised of an opening with sizes of 220 mm wide by 130 mm high incorporated with 2 nos. of pipes. The left and right pipe consisted of a copper pipe with sizes of 19 mm diameter and 6.4 mm diameter respectively by 4 mm thick by 1,400 mm long. Both copper pipes were wrapped with a layer of nominal 40 mm thick by 1,200 mm long insulation 'Armaflex' with density of 40 kg/m³. The opening was filled by a layer of nominal 100 mm thick 'CFS-F FX' foam.

Specimen '12' had overall dimensions of 135 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 25 mm internal diameter by 4 mm thick, wrapped with a layer of nominal 50 mm thick by 1,200 mm long insulation 'Armaflex' with density of 40 kg/m³.

Specimen '13' had overall dimensions of 190 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 50 mm internal diameter by 5 mm thick, wrapped with a layer of nominal 65 mm thick by 1,200 mm long insulation 'Armaflex' with density of 40 kg/m³.

Specimen '14' had overall dimensions of 135 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 25 mm internal diameter by 4 mm thick, wrapped with a layer of nominal 50 mm thick by 1,200 mm long insulation 'Phenolic Foam' with density of 40 kg/m³.

Specimen '15' had overall dimensions of 190 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 50 mm internal diameter by 5 mm thick, wrapped with 2 layers of nominal 32 mm thick (total 64 mm thick) by 1,200 mm long insulation 'Phenolic Foam' with density of 40 kg/m³.

Specimen '16' had overall dimensions of 390 mm diameter by 1,400 mm long. It was comprised of a G.I. pipe with sizes of 250 mm internal diameter by 5 mm thick, wrapped with a layer of nominal 40 mm thick and a layer of nominal 25 mm thick (total 65 mm thick) by 1,200 mm long insulation 'Phenolic Foam' with density of 40 kg/m³.

All specimens were penetrated through a nominal 200 mm thick concrete wall. The gaps between specimen '11' and concrete wall were applied with a layer of 'CFS-B' bandage. The gaps between

specimens '12', '13', '14', '15' and concrete wall were applied with a layer of 'CFS-B' bandage, mineral wool with density of 100 kg/m³ and 'CP606' sealant, while the gap between specimen '16' and concrete wall was applied with 2 layers of 'CFS-B' bandage, mineral wool with density of 100 kg/m³ and 'CP606' sealant. Each end of the G.I. pipes of specimens '12', '13', '14', '15' and '16' at the exposed side was covered by a nominal 3 mm thick steel plate.

The copper pipes of specimen '11' and the G.I. pipes of specimens '12', '13', '14', '15' and '16' was fixed to 42 mm by 20 mm by 3 mm thick steel channels, located at 500 mm from the concrete wall, by nominal 3 mm thick pipe rings on both sides. The steel channels were supported by an external steel framework constructed by 50 mm by 50 mm by 3 mm steel L-angles which in turn fixed to the concrete lining of test rig by 2 nos. of M10 anchor bolts.

The specimens satisfied the performance requirements specified in BS 476: Part 20: 1987 for the following periods:

	Integrity	Insulation
Specimen '11'	121 Minutes (No failure)	N/A
Specimen '12'	121 Minutes (No failure)	N/A
Specimen '13'	121 Minutes (No failure)	N/A
Specimen '14'	121 Minutes (No failure)	N/A
Specimen '15'	121 Minutes (No failure)	N/A
Specimen '16'	121 Minutes (No failure)	N/A

The test was discontinued after a heating period of 121 minutes (See test report no. R16L28-1A for details).

4 PROPOSAL & DISCUSSION

4.1 Fire Resistance Performance of Hilti CP 648 Firestop Wrap Strip

Proposal

It is proposed that the Hilti "CP 648" centrally recessed firestop wrap strips with the sand cement mortar seal is used to protect the annular gap in between the penetrating plastic pipe through the blockwork or masonry wall shall be capable to maintain the integrity and insulation performance. The product Hilti "CP648" had been tested and described in WARRES report no. 146725 Issue 2, and the similar product Hilti "CFS-B", it is as declared that the materials that use in "CP 648" and the "CFS-B" are the same. The Hilti "CFS-B" was tested and described in R16L28-1A, which provides an updated reference for the material tested under the reference BS 476: Part 20: 1987.

The blockwork or masonry wall shall be of 100 mm thick and is capable to provide the required fire resistance performance as proven by the separate test evidence.

The application of the Hilti "CP 648" for different types of plastic pipes shall be as referenced to the table below:

Pipe material	Min. Pipe Dia (mm)	Max. Pipe Dia (mm)	Max. pipe wall thickness (mm)	Ratio of pipe area to CP 648 cross sectional area	Minimum wrap thickness (mm)	Integrity (mins)	Insulation (mins)
PVC	50	160	12.6	5.47:1	4	240	240
HDPE	50	50	5.2	2.89:1	4	240	240
HDPE	110	110	15.1	3.69:1	7	120	120
HDPE	50	160	15.1	5.47:1	4	60	60
ABS	50	50	3.5	2.89:1	4	240	240
ABS	50	160	11.4	5.47:1	4	30	30
PP	50	50	5.4	2.89:1	4	240	240
PP	110	110	15.1	3.69:1	7	240	180
PP	50	160	15.1	5.47:1	4	180	180

The Hilti CP 648 pipe enclosure system shall be capable to maintain the integrity and insulation performance of the system as shown in the table above up to 240 minutes when subjected to a test in accordance with BS 476: Part 20: 1987.

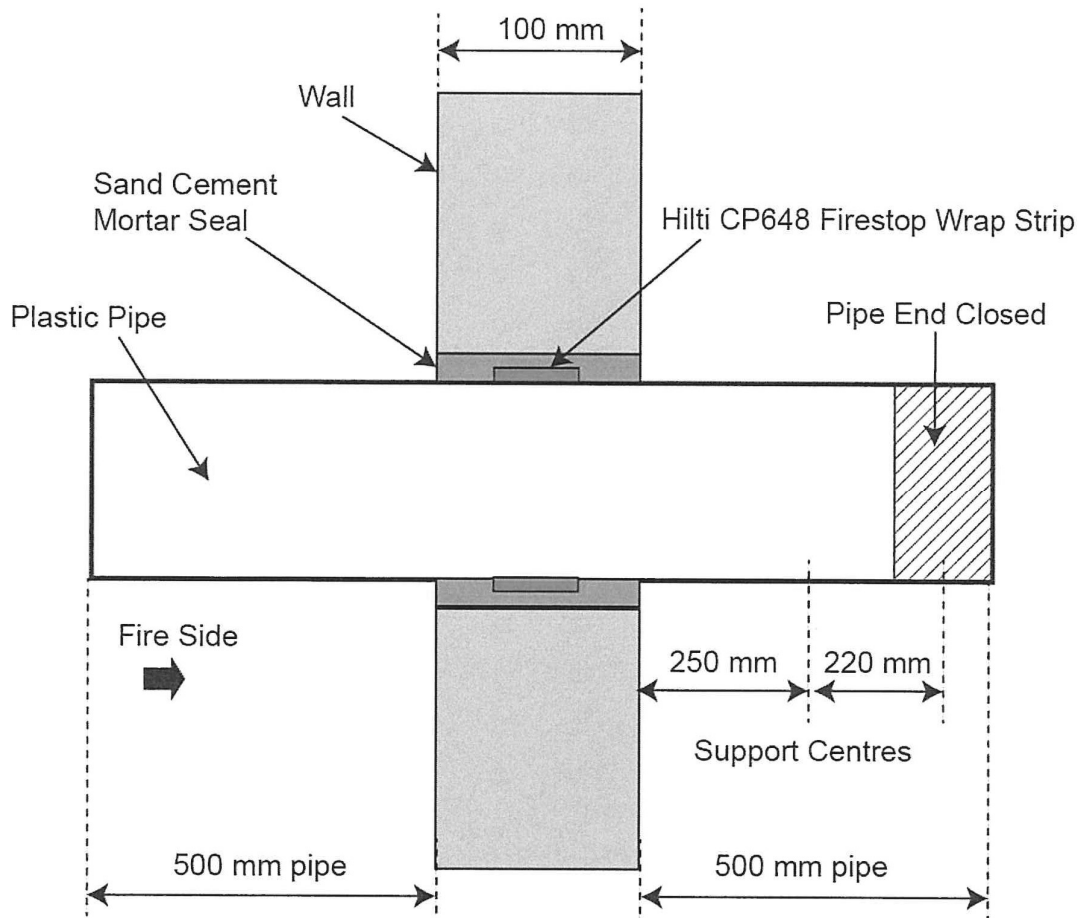


Figure 1: Illustration of the use of Hilti "CP648" Firestop Wrap Strip

Discussion

The test evidence WARRES no. 146725 Issue 2 described the test of the use of Hilti CP648 for different types of pipe materials, pipe wall thickness and the pipe diameter, whilst the report R16L28-1A provides an updated test evidence for the similar materials tested to BS 476: Part 20: 1987.

For the sealing of the plastic pipe penetration through masonry wall, since the pipe may melt under the heating condition, the sealing materials will need to expand and seal up the whole aperture after the plastic pipe collapsed. Therefore, the key issue will be whether the intumescent materials are good enough to seal up the aperture during the heating conditions. Based on this concept, the ratio of the overall cross-sectional area of the pipe to the annular area (A_p/A_a) of the "CP 648" would be the critical parameter in this consideration.

The table below presents the result from different specimens:

Material	Pipe Dia.	Pipe wall thickness	Pipe cross sectional area	CP 648 Thickness	CP648 annular area	(A _p /A _a) Ratio	Insulation	Integrity
PVC	50	3.9	0.001963	4	0.00068	2.89	241	241
PVC	160	12.6	0.020106	7	0.00367	5.47	241	241
HDPE	50	5.2	0.001963	4	0.00068	2.89	241	241
HDPE	160	15.1	0.020106	7	0.00367	5.47	112	112
ABS	50	3.5	0.001963	4	0.00068	2.89	241	241
ABS	160	11.4	0.020106	7	0.00367	5.47	33	33
PP	50	5.4	0.001963	4	0.00068	2.89	241	241
PP	160	15.1	0.020106	7	0.00367	5.47	205	232

From the test results, the CP 648 applied to different materials with different pipe diameters and wall thicknesses will have different performance.

For PVC piping

For the specimens of PVC piping with diameters of 50 mm and 160 mm and wall thickness of 3.9 mm and 12.6 mm, both cases satisfied 240 minutes integrity and insulation performance. In terms of fire protection, the case with larger pipe diameter and thicker pipe wall is considered as a more onerous situation. And in the test of PVC pipe penetration, the (A_p/A_a) ratio for 50 mm piping is 2.89:1 while for the 160 mm piping is 5.47:1. Since, both cases had achieved 240 minutes integrity and insulation, it is reasonable to use the minimum ratio to 5.47:1 for all the application range, subjected to the minimum thickness of 4 mm.

For HDPE piping

For the specimens of High Density Polyethylene (HDPE) piping, using the same justification above, the worked out (A_p/A_a) ratio is again 2.89:1 for 50 mm pipe and 5.47:1 for 160 mm pipe, respectively. However, in the case of HDPE piping, for larger diameter pipe with the ratio of 5.47:1, the achieved fire resistance performance was 112 minutes integrity and insulation only.

From the test results, it can be generally concluded that pipe with smaller diameter is a less onerous situation. Therefore, it is reasonable to assume that pipes with a smaller diameter shall have a better performance. Therefore, for pipe diameter of 110 mm, which is approximately the middle between the tested pipe diameters, a more favourable ratio of 3.69:1 and with minimum thickness of 7 mm may provide confidence for the enhancement of performance to up to 120 minutes integrity and insulation.

For ABS piping

In the test to ABS piping, the test results for small pipe sizes 50 mm and larger pipe sizes 160 mm were quite extreme. In such case, the appraised result can only be conservatively concluded that for pipe diameter up to 50 mm and wall thickness up to 3.5 mm, the use of 4 mm thick CP 648, can provide the fire resistance performance of up to 240 minutes integrity and insulation.

While for the pipe diameter up to 160mm and wall thickness up to 11.4 mm, the (A_p/A_a) ratio of 5.47:1 with the minimum thickness of 4 mm, is considered as an acceptable application range for the system to maintain the fire resistance performance of 30 minutes integrity and insulation.

For the Polypropylene piping

The test results to Polypropylene piping were similar to that in HDPE, but in this case, the smaller pipe diameter with the (A_p/A_a) ratio of 2.89:1 achieved the fire resistance performance of 241 minutes integrity and insulation performance while the larger pipe diameter with the (A_p/A_a) ratio of 5.47:1 achieved the fire resistance performance of 232 minutes integrity and insulation performance.

From the test results, it can be generally concluded that pipe with smaller diameter is a less onerous situation. Therefore, it is reasonable to assume that pipes with a smaller diameter shall have a better performance. Therefore, for pipe diameter of 110 mm, which is approximately the middle between the tested pipe diameters, a more favourable ratio of 3.69:1 and with minimum thickness of 7 mm may provide confidence for the enhancement of performance to up to 240 minutes integrity and 180 minutes insulation.

Apart from the thickness of the CP 648 to be applied, the use of the sand cement mortar seal, and the annular gap width shall repeat the same as that tested.

5 CONCLUSION

The proposed use of Hilti “CP 648” firestop wrap strip similar to that tested under WARRES report no. 146725 Issue 2 and modified as discussed in Section 4 of this report, is capable to maintain the fire resistance performance of up to 240 minutes integrity and insulation performance with respect to BS 476: Part 20: 1987.

6 DECLARATION BY APPLICANT

We, Hilti (Hong Kong) Limited, confirm that the material, component or element of structure, which is the subject of the test report being reviewed, has not to our knowledge been subjected to another test to the standard against which the assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of another test to the standard against which the assessment is being made.

We are not aware of any information that could affect the conclusions of this assessment.

If we subsequently become aware of any such information we agree to ask the assessing authority to withdraw the assessment.

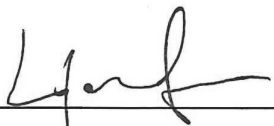
7 VALIDITY

This assessment is based on test data, experience and the information supplied. The assessment will be invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. Any changes in the specification of product will invalidate this assessment. This assessment relates only to the specimen assessed and does not by itself infer that the product is approved under any other endorsements, approval or certification scheme. Since the appraisal method is under development, the laboratory reserved the right to supersede this assessment in case the appraisal method had been changed.

This report only relates to the specimen(s) tested and may only be reproduced by the sponsor in full, without comment, abridgement and modifications.

8 SIGNATORIES

Assessment by:



Dr. SZE Lip-kit

Test Consultant

Research Engineering Development

Façade Consultants Limited

Reviewed by:



Ir Dr. YUEN Sai-wing, MHKIE (Fire)

Authorized Signature

Research Engineering Development

Façade Consultants Limited

- End of Report -



88 Empire Drive • St. Paul, Minnesota • 55103
 (651) 642-1150 • fax (651) 642-1239

VOC Content Test Certificate

April 12, 2011

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

Sample Description: Hilti CP648 Sealant Strip

Date Tested: April 4, 2011

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:

Specification	Product
LEED 2009 (LEED 3.0) LEED 2.2 IEQ-4.1: Low-Emitting Materials – Adhesives and Sealants	Hilti CP648 Sealant Strip
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	
Architectural Sealant; VOC Limit: 250 g/L	Product contains: 3.1 g/L of VOC

William Welbes
 Vice President of Laboratory Operations

Tom Barrett
 Senior Chemist

Hilti (Hong Kong) Ltd.
Unit 3 5/F Harbour Centre Tower 2
8 Hok Cheung Street Hung Hom
Kowloon

26 May 1994
ST
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Dear Sirs,

Fire Resisting Penetration Sealing System
As Supplied By Hilti (GB) Ltd.

Thank you for your letters dated 4.3.94 and 27.4.94 and the accompanying test/assessment reports on the above. You are asking for comments on the acceptability of the fire resisting product in the context of relevant provisions of the Buildings Ordinance, Chapter 123 of the Law of Hong Kong and its subsidiary legislation.

Under the Buildings Ordinance, "authorized persons" (i.e. architects, engineers or surveyors registered with the Building Authority) are required to supervise building works including the selection and installation of fire resisting products and to certify compliance with the Buildings Ordinance upon completion of works. Authorized persons are therefore responsible for ensuring the safety requirements inter alia of fire resisting products in the building projects which they have been appointed by the developer to coordinate and supervise.

In establishing the acceptability of fire resisting products, reference may be made to the performance standards laid down in Building (Construction) Regulation 90, the current Code of Practice for Fire Resisting Construction issued by the Building Authority and British Standard 476: Parts 20 to 24. Reliance may also be placed on the test/assessment report prepared by a recognized laboratory or an equivalent establishment.

The Buildings Department has a list of recognized laboratories. This is available for reference at our office :

Technical Administration (Building) Unit
Buildings Department
11/F Murray Building
Garden Road Hong Kong

Before fire resisting products are installed in a building project, the authorized person appointed for the project should be approached for advice and guidance.

Your test/assessment reports are returned herewith. In this respect, please note that paragraph 3 of my letter dated 25 January 1994 is no longer applicable. The delay in replying is regretted.

Yours faithfully,



(Patrick H. Tsui)
Technical Secretary/Building
for Director of Buildings

消防處
防火組
香港九龍尖沙咀東部康莊道1號
消防總部大廈



FIRE SERVICES DEPARTMENT,
FIRE PROTECTION BUREAU,
FIRE SERVICES HEADQUARTERS BUILDING,
No. 1 Hong Chong Road,
Tsim Sha Tsui, East, Kowloon,
Hong Kong.

本處檔號 Our Ref.: FPB 207/0005
來函檔號 Your Ref.: L026/92HK
電訊掛號 Telex: 39607 HKFSD HX } (24 小時 Hours)
圖文傳真 Fax: 852-3110066 }
852-3689744 }
電話 Tel. No.: 733 7596

29 April 1992

Hilti (Hong Kong) Ltd.,
Unit 3, 5/F, Harbour Centre,
Tower 2,
8 Hok Cheung Street,
Hungghom, Kowloon.

Dear Sirs,

"HILTI" Fire Prevention System

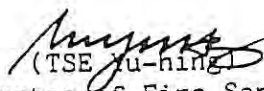
I refer to your letter of 30.3.92 and the enclosures attached thereto.

Based on the information contained in your letter under reference and the given test report, I understand that the captioned product is a building material which should be approved by the Director of Buildings and Lands. As such, I am not in a position to process your application and you are advised to refer your enquiry to the Director of Buildings and Lands, whose address is listed hereunder :-

The Director of Buildings and Lands,
(Attn.: Technical Secretary/Building, B.O.O.)
Murray Building,
Garden Road,
Central,
Hong Kong.

Please feel free to contact us should you have any other question in this matter.

Yours faithfully,


(TSE Yu-hing)
for Director of Fire Services

TYH/jt



ARCHITECTURAL SERVICES DEPARTMENT 建築署

QUEENSWAY GOVERNMENT OFFICES, 66 QUEENSWAY, HONG KONG. 香港金鐘道六十六號金鐘道政府合署
FAX 852-2869 0289

Our Ref : ASD 16/92101/AML/APP
Your Ref. : -----
Tel. No. : 2867 3631
Fax No. : 2877 0594

06 June 1997

Hilti (HK) Ltd
17/F, Tower 6, China HK City,
33 Canton Rd., TST

Dear Sirs,

**Architectural Services Department
List of Acceptable Materials
Hilti Firestop Products
Ref. no. 0001P**

I am pleased to inform you that approval has been given to include the above product/material in this Department's List of Acceptable Materials. Initially, this listing is for a probationary status and this will be reviewed after the submission of satisfactory performance reports on completion of projects undertaken by this Department where your product has been used.

The Architectural Services Department List of Acceptable Materials is a restricted internal document. This letter should not be used for commercial or marketing purposes and failure to comply with this may result in the removal of the product from the List.

Yours faithfully,

(W.M. TANG)
Technical Secretary/2
for Chief Architect/ Central Management Branch
Architectural Services Department

Attn. : To whom it may concern

Date : 26 September 2023

Ref. : 083/FP/DY/23

Subject : Country of Origin- Hilti CP648-E Firestop Endless Wrap

Dear Sir / Madam,

Enclosed please find the information of Hilti CP648-E Firestop Endless Wrap

Brand Name : Hilti

Model Name : Hilti CP648-E Firestop Endless Wrap

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



July 30, 2014

To Whom It May Concern:

Re: Hilti CP 648 E & S Firestop Wrap Strips – LEED Info.

- The Hilti CP 648 E & S Firestop Wrap Strips is manufactured in Germany.
- The package of Hilti CP 648 E & S Firestop Wrap Strips can be completely recycled.
- There is no recycled content in Hilti CP 648 E & S Firestop Wrap Strips and it cannot be recycled.
- The Hilti CP 648 E & S Firestop Wrap Strips does not share any rapidly renewable materials.
- The VOC content of Hilti CP 648 E & S Firestop Wrap Strips is 3.1 g/l.

If you would like to know more about Hilti solutions for LEED buildings or should you have any further question please feel free to contact me at my email or mobile number as shown below.

Sincerely,

Andrew Lau

Product Manager - Firestop

Hilti (Hong Kong) Limited

Email: andrew.lau@hilti.com

Mobile: (852) 9843-6291

Hilti (Hong Kong) Ltd.
701-704 | Tower A | Manulife Financial Centre
223 Wai Yip Street | Kwun Tong

Kowloon | Hong Kong

P +852-8228 8118 | **F** +852-2954 1751

www.hilti.com.hk

To whom it may concern

Date: 1st 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, CP648-E Firestop Endless Wrap & CP648-S Firestop Single Wrap (Insulated Pipe Penetration) are 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

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 CP 648-E Firestop Endless Wrap Strips Job Reference

Year	Project Name	Customer Name	Project type
2022	SIU HONG, AREA 54 DD 132 TMTL 483	RIDGID PLUMBING LIMITED	Residential
2022	HING WAH ST WEST LOT 6550 HOTEL	MING KEE ENGINEERING CO	Hospitality
2022	KAI TAK AREA 4B, SITE 2, NKIL 6575	CHITSON CONSTRUCTION ENGINEERING	Residential
2022	KAI TAK AREA 4B, SITE 1, NKIL 6576	YUEN CHEONG ENGINEERING CO LTD	Residential
2022	KAI TAK AREA 1F SITE 2, NKIL 6556	ATAL BUILDING SERVICES ENGINEERING	Office
2022	SIN FAT RD, KWUN TONG NKIL 6584	MAJESTIC PLUMBING ENGINEERS LTD	Residential
2022	KAI TAK AREA 4C, SITE 2, NKIL 6552	CHIT TAT ELECTRICAL ENGINEERING LTD	Residential
2022	KWUN CHUI RD, AREA 56, TMTL 520	AIRES ENGINEERING COMPANY LIMITED	Residential
2022	91 KING LAM ST, NKIL 6505	WING FAT PLUMBING LIMITED	Office
2022	TKO LOHAS PARK PH11 (SITE C2)	CHUN LEE ENGINEERING CO LTD	Residential
2023	KAI TAK AREA 4C, SITE 1, NKIL 6553	CHIT TAT ELECTRICAL ENGINEERING LTD	Residential
2023	KAI TAK AREA 4A, SITE 1, NKIL 6577	EVER GAIN AIR CONDITION ENGINEERING	Residential
2023	WONG CHUK HANG STATION PH4 (SITE D)	PYROFOE ENGINEERS LTD	Residential
2023	WONG CHUK HANG STATION PH3 (SITE C)	YUEN CHEONG ENGINEERING CO LTD	Residential
2023	KAM SHEUNG RD STATION PH1, LOT 1040 DD 103	PYROFOE ENGINEERS LTD	Residential
2023	TKO LOHAS PARK PH11 (SITE C2)	CHUN LEE ENGINEERING CO LTD	Residential
2023	KAI TAK AREA 4A, SITE 2, NKIL 6554	MAJESTIC ENGINEERING CO LTD	Residential
2023	LUNG CHEUNG RD, NKIL 6579	PAK SHING PLUMBING & ENGINEERING	Residential
2023	HO MAN TIN STATION RES PACKAGE 1	MAJESTIC ENGINEERING CO LTD	Residential
2023	KAI TAK AREA 4C, SITE 2, NKIL 6552	MAJESTIC ENGINEERING CO LTD	Residential
2024	KAM SHEUNG RD STATION PH1, LOT 1040 DD 103	PYROFOE ENGINEERS LTD	Residential
2024	WONG CHUK HANG STATION PH3 (SITE C)	YUEN CHEONG ENGINEERING CO LTD	Residential
2024	KAI TAK AREA 4A, SITE 1, NKIL 6577	MAJESTIC ENGINEERING CO LTD	Residential
2024	HO MAN TIN STATION RES PACKAGE 1	MAJESTIC ENGINEERING CO LTD	Residential
2024	TKO LOHAS PARK PH11 (SITE C2)	PYROFOE ENGINEERS LTD	Residential
2024	WAN CHAI HOPEWELL CENTRE 2	INNOTEC ENGINEERING LIMITED	Hospitality
2024	HONG KONG-SHENZHEN INNOVATION & TECHNOLOG	CHITSON CONSTRUCTION ENGINEERING	Office
2024	KAI TAK AREA 1F1 (6568) ELDERLY	MAN TUNG AIR-CONDITIONING	Residential
2024	TAI WAI STATION NW RES	SHUN TUNG ENGINEERING CO LTD	Residential
2024	HO MAN TIN STATION RES (PACKAGE 2)	WING SHING AIR-CONDITION	Residential