



# Hilti CFS-SP WB Firestop Joint Spray

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Firestop joint spray CFS-SP WB



APPLICATIONS

- Sealing openings between the top of walls and concrete or metal floors / ceilings
- Sealing building perimeter gaps between floor slabs or vertical wall and exterior curtain wall facades

ADVANTAGES

- Water-based, low VOC, contains no halogens
- High degree of elasticity - movement capability of up to 50%
- Excellent sprayability and low slump characteristics
- Fast, efficient sealing of wide, difficult-to-access joints



Smoke



Water Tight



Acoustic



Seismic



Low VOC



Mould & Mildew

Technical data

<b>Chemical basis</b>	Water-based acrylic dispersion
<b>Base materials</b>	Concrete, Masonry, Gypsum, Steel, Aluminium, Glass
<b>Movement<sup>1)</sup></b>	Up to 50 %
<b>Approx. tack-free time (ventilated at 77°F, 80% rel. humidity)</b>	180 min
<b>Approx. curing time<sup>2)</sup></b>	3 mm/day
<b>Average volume shrinkage</b>	0,511
<b>Application temperature range</b>	4 - 40 °C
<b>Temperature resistance range</b>	-40 - 80 °C
<b>Storage and transportation temperature range</b>	4 - 25 °C
<b>Shelf life<sup>3)</sup></b>	12 Months

<sup>1)</sup> according to HTC 1250

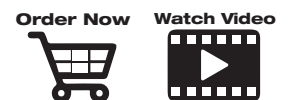
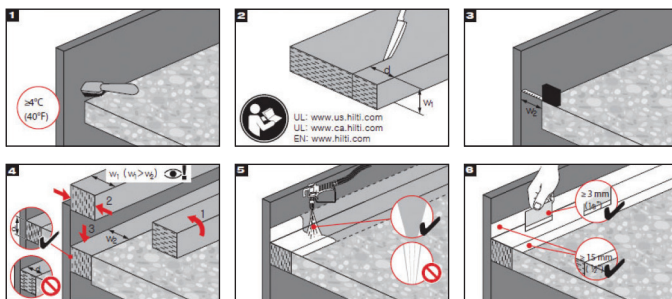
<sup>2)</sup> at 75°F/24°C, 50% relative humidity

<sup>3)</sup> at 77°F/25°C and 50% relative humidity; from date of manufacture

Consumption Guide (per 19000 ml bucket, 3mm wet thickness)

Joint width (mm)	With overlap 15 mm both sides (mm)	Meters per 19 litres pail (meters)
25	55	110
50	80	75
100	130	45
150	180	35
200	230	25

Application Procedure



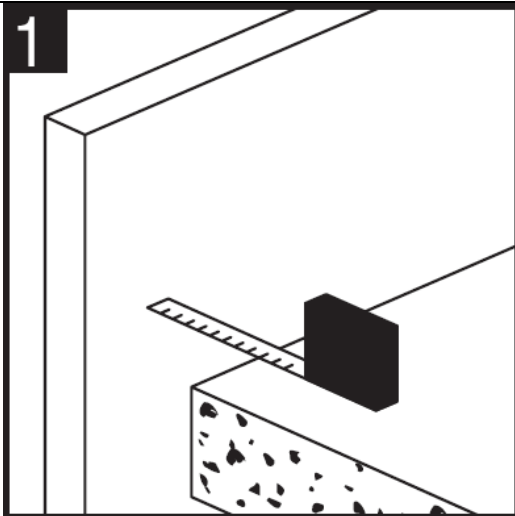
Ordering designation	Colour	Volume per unit	Packaging	Sales pack quantity	Item number
CFS-SP WB red	Red	19000 ml	Bucket	1 pc	430815

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

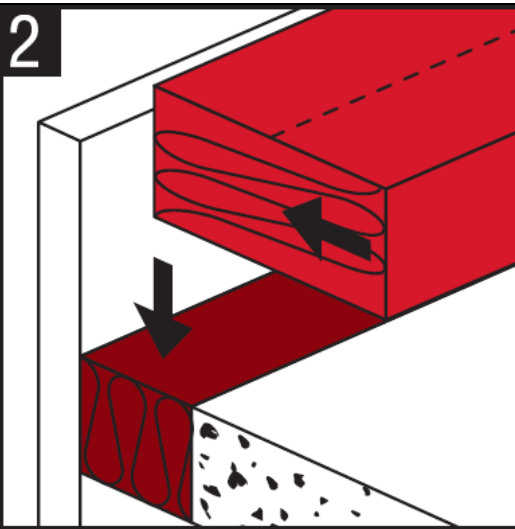
**Subject:** Method Statement of CFS-SP WB  
**Material:** CFS-SP WB Firestop joint spray  
**Accessory:** Nil

**Setting Operation**

1 Clean the opening. Surfaces to which the Firestop Joint Spray will be applied should be cleaned of loose debris, dirt, oil, wax and grease. The surface should be moisture and frost free.



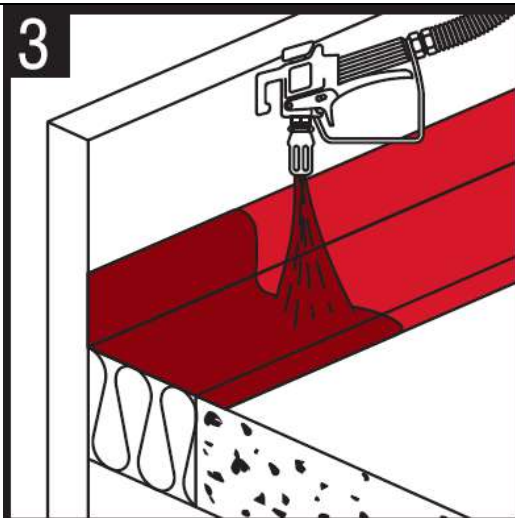
2 Install the prescribed back filling material type and depth to obtain the desired rating.

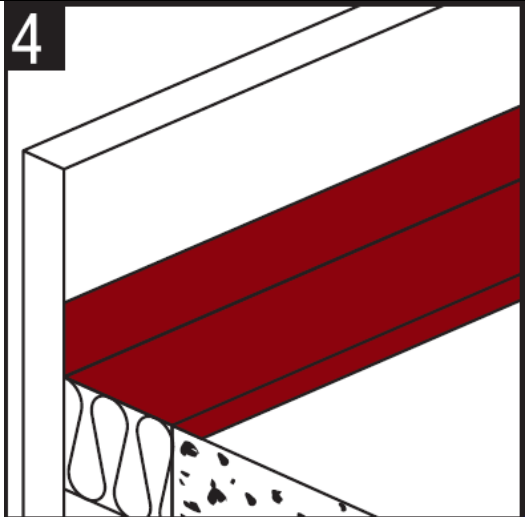
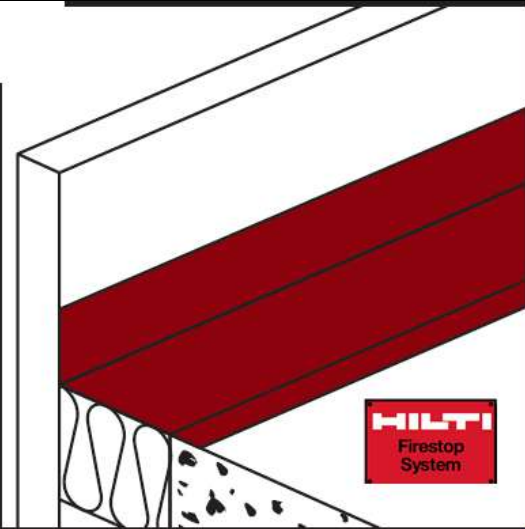


3 Apply the Firestop Joint Spray to the required thickness in order to obtain the desired rating (For wet thick: 3mm; For dry thick: 1.5mm). Make sure the Firestop Joint Spray contacts all surfaces and overlaps beyond all surrounding surfaces (Overlap length min 15mm).

For vertical joint, please apply spray on both side of the joint accordingly.

Titan Sprayers have been successful in applying Firestop Joint Spray. Hilti recommends the use of the Titan 600 (for application temperatures above 50°F / 10°C) or Firestop Joint Spray may also be brushed on with a paint brush.



4	<p>Allow the Firestop Joint Spray to fully cure-- approx. 24 hours for typical application thickness (73°F / 23°C and 50% humidity). Users could use simple measuring tools to measure the thickness, for example: cardboard.</p>	
5	<p>For maintenance reasons, all Firestop Joint Spray applications shall be permanently marked with an identification plate and fastened in a visible position next to the seal.</p>	

**Safety precautions:**

- Store in a cool dry area
- Keep from freezing. Store between 4°C and 25°C.
- Keep out of reach of children
- Use with adequate ventilation. Keep container closed when not in use.
- Do not get into the eyes
- Do not cover the coating with anything during the curing time.
- Avoid prolonged or repeated contact with the skin.
- Never use in areas immersed in water or on hot surface (over 80°C)

## **FIRE RESISTANCE OF BUILDING CONSTRUCTION**

### **FIRE TEST n° 08 - E - 294 indice A**

*According to NF EN 1363-1 and NF EN 1364-4.*

*Concerning :*

**Horizontal Linear Gap Sealing System (Perimeter Seal) for Curtain Walling  
reference: CFS-SP WB (HILTI).**

Fire direction : Internal fire exposure.

*Applicant :*

**HILTI AG  
FURSTENTUM  
LI-9494 SCHAAN LIECHTENSTEIN**

*A test report Nr 08-E-294 exists.*

***This test report includes 33 sheets. Copies of this document are allowed only in full.***  
SASU au capital de 1 512 170€ - SIRET 490 550 712 00023 - RCS Evry B 490 550 712 - TVA FR 61490550712 - APE 7120 B

## 1. SCOPE OF THIS TEST REPORT

Fire resistance test of an horizontal linear gap sealing system, in conformity with the general requirements of standard NF EN 1363-1:1999, the additional or substitute procedures of standard NF EN 1363-2:1999, and the particular requirements of standard NF EN 1364-4 : 2008 : "Fire resistance tests of non-loadbearing elements - Part 4 : Curtain walling – Part configuration".

According the standard NF EN 1364-4: 2008, we have tested the configuration n° 14 represented on table A1.

## 2. TEST LABORATORY

Name : EFACTIS France  
Adresse : Voie Romaine  
F - 57280 MAIZIERES-Lès-METZ

## 3. FIRE RESISTANCE TEST

N° of the test : 08 - E - 294  
Test date : August 29<sup>th</sup> 2008

## 4. REFERENCE AND MANUFATURER OF TEST SPECIMEN

Horizontal linear gap sealing system:  
Designation: CFS-SP WB (HILTI)  
Manufacturer: Hilti AG (FL)

## 5. ADDITIONAL INFORMATIONS FOR CE MARKING

- Sampling locations: HILTI Deutschland GmbH  
Distributionszentrum Oberhausen  
Außenstelle Mülheim
- Sample quantity: 3 buckets of 26 kg.
- Manufacturer's batch number: (10) S333701
- Identification Security Label n°: 3576; 3573; 3575.
- Name of the MPA NRW employee: Mrs.Burow-Strathoff
- MPA NRW notified bodies n°: 0432.

On the 11.08.2008 an employee of the MPA NRW carried out an official sampling of the CFS-SP WB (HILTI) firestop Spray samples and they were sent directly to EFACTIS France.

## 6. DESCRIPTION OF TEST SPECIMEN

### 6.1 GENERAL

**Note :** The test specimen (dimensions, fire direction, supporting frame and assembling) was supplied by the Applicant to the Test Laboratory on his own initiative, in conformity with clause 12 of standard NF EN 1363-1.

See plates n° 1 to 6.

The test specimen was :

- A glazed facade in part configuration ;
- A horizontal linear gap seal system made of CFS-SP WB (HILTI) and mineral wool.

### 6.2 PART LIST

See plate n° 6.

### 6.3 DETAILED DESCRIPTION OF THE SPECIMEN

**Note :** The drawings shown on plates n° 1 to 6 have been provided by the Applicant. They have been checked by the Test Laboratory of EFECTIS France and found in conformity with the test specimen.

#### 6.3.1 Horizontal Linear Gap Seal (Perimeter Seal)

The gap between the supporting floor and the façade was 210 mm. The horizontal seal was made from seven layers of mineral wool board (RPV-40, ROCKWOOL), cut to strips of 200 mm width, with a density of 40 kg/m<sup>3</sup> and a thickness of 60 mm compressed to 50%. The strips were installed vertically (compression in the direction vertical to the surface of the floor slab).

The Mineral wool was covered on top (non-exposed side) with CFS-SP WB (HILTI) with a dry film thickness of 1.5 mm to 2 mm.

The gap face was formed by the standard supporting floor on the one side and three different types of boards on the other side: Gypsum board, Calcium Silicate board and Al-faced mineral wool board. For further details see 6.3.2.2.

#### 6.3.2 Curtain walling

##### 6.3.2.1 Framework

The façade was made of mullions and transoms n° 76.696 (overall section: 80 x 50 mm and thickness 2 mm), from VISS TV range (JANSEN) straight cut and assembled by welding.

The mullions were fixed to the supporting floor, with a system made of:

- One steel piece "T" for the intermediate mullions and one steel piece "L" for the side mullions (dimensions: 170 x 135 x 60 mm for the "T" piece and 225 x 135 x 60 mm for the "L" piece; thickness 10 mm), fixed on the supporting floor by two bolts reference HST M10/30 (HILTI).
- One steel piece (dimensions 150 x 60 x 10 mm) welded on the mullions.

The assembly of these pieces was made by nuts and bolts M10 x 40 mm (HILTI).

The mullions were fixed to the furnace closure, with a system made of two steel L profiles (dimensions 100 x 100 x 5 mm) fixed on the mullions by nuts and bolts M10 x 80 mm (HILTI) and fixed on the furnace closure by bolts HST M10/30 (HILTI). (See plate n°2)

The mullions were associated with a seal reference 455.516 (JANSEN). The transoms were associated with a seal reference 455.536 (JANSEN).

The profiles were associated with pins n° 452.478 and 452.486 (JANSEN).

The mullions were reinforced by 46 x 5 mm (w x th) steel strengthening plate. (See plate n°4)

The backside of the framework was covered by three different panels made of :

1. Aluminium foiled and mineral wool board reference CONLIT 150 U (thickness: 25 mm; density  $\geq 150 \text{ Kg/m}^3$ )
2. Two layers of 15 mm thick Promatect H (PROMAT)
3. Two 15 mm thick Plasterboard.

These panels were fixed to the framework (mullions and transoms) by screws S-MDO 32 (HILTI)  $\varnothing 6,3 \times 50 \text{ mm}$  every 200 mm.

#### 6.3.2.2 Glazing and panels

The framework consisted of 12 openings (6 openings exposed to fire and six openings non-exposed to fire):

Opening exposed to fire

- Three, 34 mm thick Contraflam Lite EW 60 ISO (VSGI) exposed to fire;
- Three, 34 mm thick sandwich panels reference Conrock Q3, nominal density:  $100 \text{ kg/m}^3$ (ROCKWOOL); on fire side, the panels were associated with 25 mm thick Promatect H (PROMAT) fixed on the profiles by screws  $\varnothing 6,3 \times 60 \text{ mm}$  every 200 mm.  
The gap between the mullions and the panels was filled with rock wool density  $90 \text{ kg/m}^3$ .

Openings non-exposed to fire

- Three different panels located in front of and over the supporting floor, between each mullion and fixed on the backside of the profiles (one panel made of a gypsum boards (2 layers, each 15 mm thick); one panel made of aluminium foiled and mineral wool board reference CONLIT 150 U (thickness: 25 mm; density  $\geq 150 \text{ Kg/m}^3$ ) and one panel made of two 15 mm thick Promatect H (PROMAT)
- Three, 34 mm thick sandwich panels reference Conrock Q3, nominal density:  $100 \text{ kg/m}^3$ (ROCKWOOL).

The Contraflam Lite EW60 ISO is composed by:

- 5 mm tempered glass
- 4 mm intumescent layer
- 5 mm tempered glass
- 12 mm spacer filled with air gas
- 6 mm tempered glass

Each glazing and panel was associated with two 15 x 2 mm intumescent strip reference Promaseal LW.

#### 6.3.2.3 Glazing and panels holding system.

Each glazing or panel was packed, in the lower part with two holding system reference 452.486 and 452.478 (JANSEN) associated with two 453.032 setting blocks.

Each glazing or panel was held by stainless steel pressure plate n°400.867 associated with 452.508 and 452.509 CR seal and 407.862 aluminium profiles.

The gap bottom clearance is 5 mm.

The overlap of the glazing is 15 mm.



### 6.3.3 Vertical edges

On each side, the mullions were associated with 32 mm thick Promatect H (PROMAT) and Steel L profile (dimensions 45 x 50 x 2 mm) between the L profile and the supporting construction was filled with Fernoseal (BLOEM) silicone.

On fire side, the vertical seal was made of an L steel profile (dimensions : 70 x 45 x 2 mm) fixed to the mullions by screws Ø 6,3 x 60 every 200 mm. The gap between the mullions, the L steel profile, the Promatect H section and the supporting construction was filled by Rockwool, density 40 kg/m<sup>3</sup>. (see plates n° 4 and 5)

## 7. TEST ASSEMBLY

### 7.1 DEFINITION OF THE TEST SPECIMEN

The choice and the definition of this test specimen were carried out by the Applicant according to paragraph 12 of standard NF-EN 1363-1.

### 7.2 ASSEMBLING OF THE TEST SPECIMEN

The assembly of the element was realised by the Applicant.

For the test configuration, the façade was held on the supporting floor by an additional system made of :

- steel plates dimensions 195 x 60 x 5 mm welded on the mullions,
- L steel profiles dimensions 80 x 40 x 5 mm fixed to the supporting floor by bolts HST M10/30 (HILTI)
- L steel profiles dimensions 40 x 40 x 5 mm, length 950 mm

See plates n° 2 to 5

#### 7.2.1 Supporting structure

##### Supporting floor

A standard supporting floor was used, made from reinforced concrete (density 2200 kg/m<sup>3</sup>; thickness 200 mm), supplied by the Laboratory EFECTIS France. The drying duration of the concrete floor was in excess of 28 days.

##### Furnace closure

The front furnace closure was made from aerated concrete (density 550 kg/m<sup>3</sup>; thickness 200 mm). Dimension of fire exposed part of the curtain walling: 3,100 x 1,000 mm (w x h).

#### 7.2.2 Assembling conditions of the test specimen

The facade element was assembled with its two vertical free edges.

## 8. TEST METHOD

### 8.1 THERMAL PROGRAM

The temperature rise inside the furnace above the ambient temperature was controlled according to the **standard thermal program** represented by the following function :

$$T = 345 \log_{10} (8t+1) + 20$$

where :  $t$  = Time [min]  
 $T$  = Temperature inside the furnace at time  $t$  [°C]

### 8.2 DIRECTION OF FIRE

The fire test was carried out with an internal exposition.  
The mullions and transoms were into the fire.  
Fire on Contraflam Lite side.

## 9. FIRE TEST RESULTS

The locations of the sensors are shown on plate n° 15.  
The readings are recorded in Annex 1 on the plates mentioned hereafter.

### 9.1 TEMPERATURE MEASUREMENTS

#### 9.1.1 Ambient temperature

It was measured according to NF EN 1363-1, by the thermocouple n° 7.  
See plate n°7.

#### 9.1.2 Furnace temperatures

They were measured in conformity with standard NF EN 1363-1 by 6 plate pyrometers positioned according to with their metal face towards the back of the furnace:  
See plates n° 8 and 9.

#### 9.1.3 Temperatures of the element

They were measured by 47 thermocouples according to NF EN 1363-1 and located according NF EN 1364-4 :

Location	n°	Plate
Average temperatures on surface n° 3	8 to 13	10
Maximal temperatures on surface n° 3	14 to 35	11 to 14
Temperatures for information on the mullions	36 and 37	19
Horizontal seal temperatures	38 to 49	15
Temperatures between Rockwool and CFS-SP WB (HILTI) for information	54 to 55	17
Temperature between profile and Rockwool behind the panels for information	56 and 57	18
Temperature on the fixations	58 and 59	16

## 9.2 DISTORSION MEASUREMENTS

In conformity with the requirements of standard NF EN 1364-4, the horizontal bending of the partition was measured and recorded with potentiometric sensors:

See plate n° 20.

## 9.3 PRESSURE MEASUREMENTS

In conformity with the requirements of standard NF EN 1363-1, the pressure inside the furnace was continuously controlled throughout the whole test.

The pressure sensor was positioned according to the standard NF EN 1364-4.

See plate n° 21.

## 10. OBSERVATIONS

### 10.1 DURING THE TEST

TIME [min]	OBSERVATIONS
00	Commencement of test. (Picture A)
3	Reaction of the intumescent layer of the glazing.
5	Cracking and falling down of the first tempered glass on fire side.
14	Smoke release from profiles junctions.
15	Nothing particular to report.
20	Nothing particular to report.
30	Nothing particular to report.
45	Nothing particular to report.
60	Nothing particular to report.
92	The glazing starts to fall down.
<b>103</b>	<b>Sustained lighting for a duration of more than 10 seconds on the upper rail of the glazing 2.</b>
106	Smelting of the glazing in the centre of the element. (See picture B)
110	Set up of a blind panel to replace the glazing.
120	Nothing particular to report
<b>144</b>	<b>Maximal temperature rising higher than 180°C noted by the thermocouple n° 35.</b>
<b>150</b>	<b>Maximal temperature rising higher than 180°C noted by the thermocouple n° 34.</b>
<b>155</b>	<b>Maximal rising temperature higher than 180°C noted by the mobile thermocouple (252°C) on the horizontal seal.</b>
<b>165</b>	<b>Cotton pad test positive on the horizontal seal. (Picture C)</b>
<b>167</b>	<b>End of test. (Picture D)</b>

## 11. FIRE RESISTANCE CRITERIA

In conformity with the standards mentioned in section 1, the times during which the specimen meets the fire resistance criteria may be regarded as follows:

### 11.1 CRITERIA FOR THE INTERNAL EXPOSITION

Surface or horizontal seal	INTEGRITY (E)				INSULATION (I)	
	Cotton Pad	Gap Gauge	Flaming	Falling parts	Average temperature (140°C)	Maximal Temperature (180°C and 500°C for fixings)
S3	-	*	-	*	-	<b>144 min (TC n°35)</b>
Horizontal Gap Seal	<b>165 min</b>	-	-	*	*	<b>155 min (Mobile thermocouple)</b>
Fixing	*	*	*	*	*	-
S2 S5				<b>110 min</b>		

\* According to NF EN 1364-4, these criteria were not evaluated.

- Not failed at the end of the test.

TC = Thermocouple

## 12. FIELD OF DIRECT APPLICATION OF THE TEST RESULTS

The results of a fire test on a specimen exposed to the standard temperature /time curve according to EN 1363-1 are valid for the same specimen exposed to the external fire exposure curve of EN 1363-2.

The test results of the first test are directly applicable to constructions which differ from that tested in one or more of the following respects only

- Decrease in panel width is acceptable provided the details of fixing to the supporting floor remain unchanged.
- Decrease in mullion and transom spacing or increase in mullion size.
- Increase in floor thickness or horizontal linear gap seal thickness measured vertically. (referring paragraph 6.3.1)
- Increase in density of the seal when made of mineral wool (but not the change of the type of seal). (referring paragraph 6.3.1)
- Decrease in distance between fixing centres, vertical and/or horizontal.

The test results of a curtain wall specimen tested in front of a standard floor are valid for other floors of aerated or lightweight or dense concrete provided the thickness as well as the fire resistance with respect to loadbearing capacity of these floors are equal to or greater than that of the standard floor used in the test.

The test results of a curtain wall specimen tested in front of a non-standard floor are valid for other floors of the same type provided the thickness as well as the fire resistance with respect to loadbearing capacity, integrity and insulation of these floors are equal to or greater than that of the non-standard floor used in the test.

The points a) and b) are also valid for test specimens with non-standard floor constructions.

### 13. WARNING

This report gives details about the construction method, the testing conditions and the test results achieved when the specific building element described was tested according to the procedure specified in standard NF EN 1363-1 and, where applicable, in standard NF EN 1363-2.

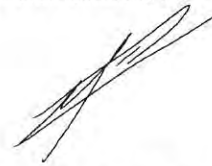
As concerns the dimensions, details, loading, stresses and boundary or end conditions, any significant deviation other than that which is not excluded within the field of direct application of the appropriate test procedure is not covered by this report.

Because of the nature of the fire tests and of the resulting difficulty in quantifying the uncertainty of the fire resistance assessment, it is impossible to establish any level of accuracy of the results.'

Fait à Maizières-lès-Metz, the 10<sup>th</sup> of March 2009  
New version (indice A) :  
Fait à Maizières-lès-Metz, the 17<sup>th</sup> of November 2014

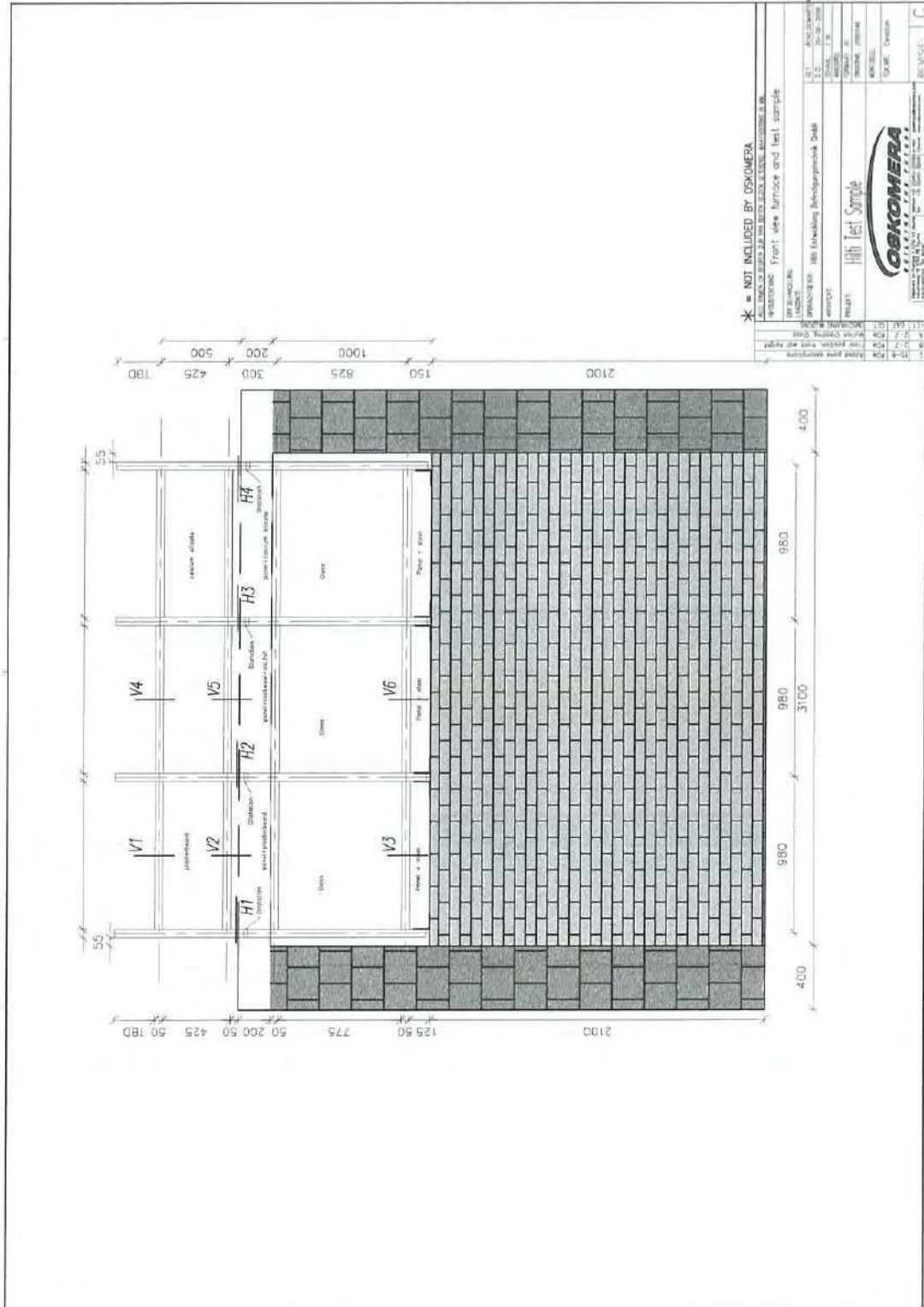


**Olivia D'Halluin**  
Fire Safety Engineer



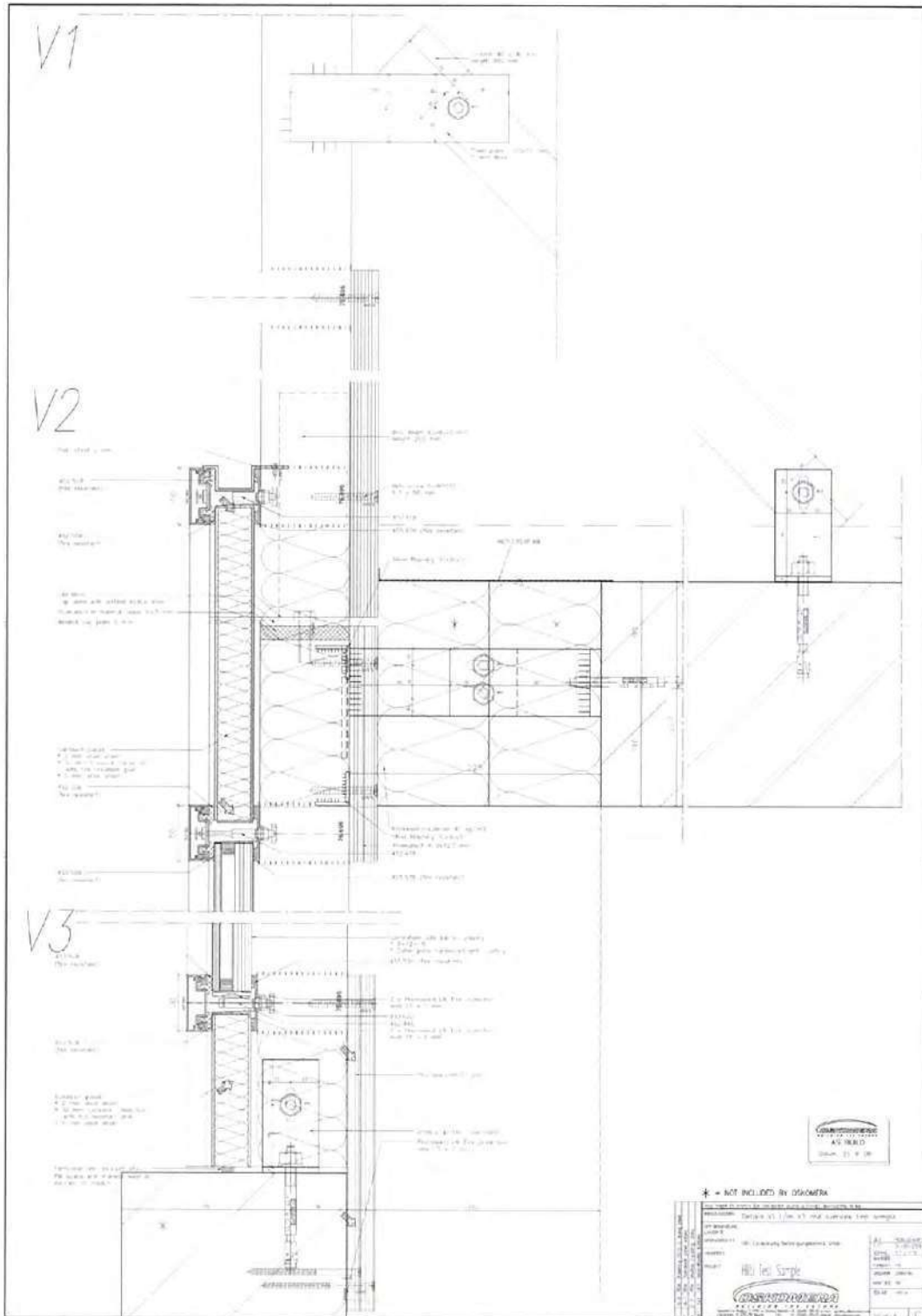
**Hervé RYCKEWAERT**  
Head of Test department

Plate n°1.



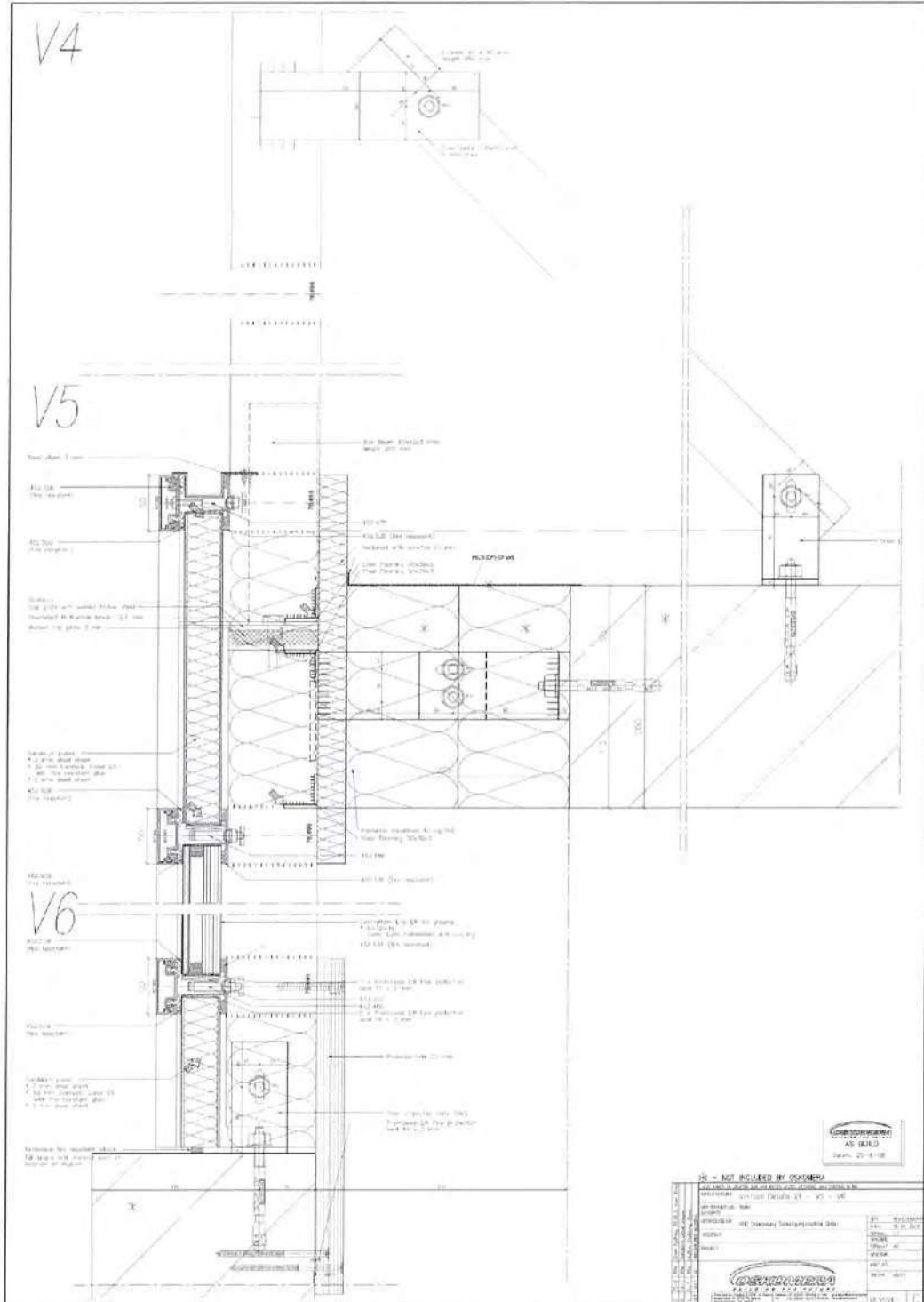
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**Plate n° 2.**



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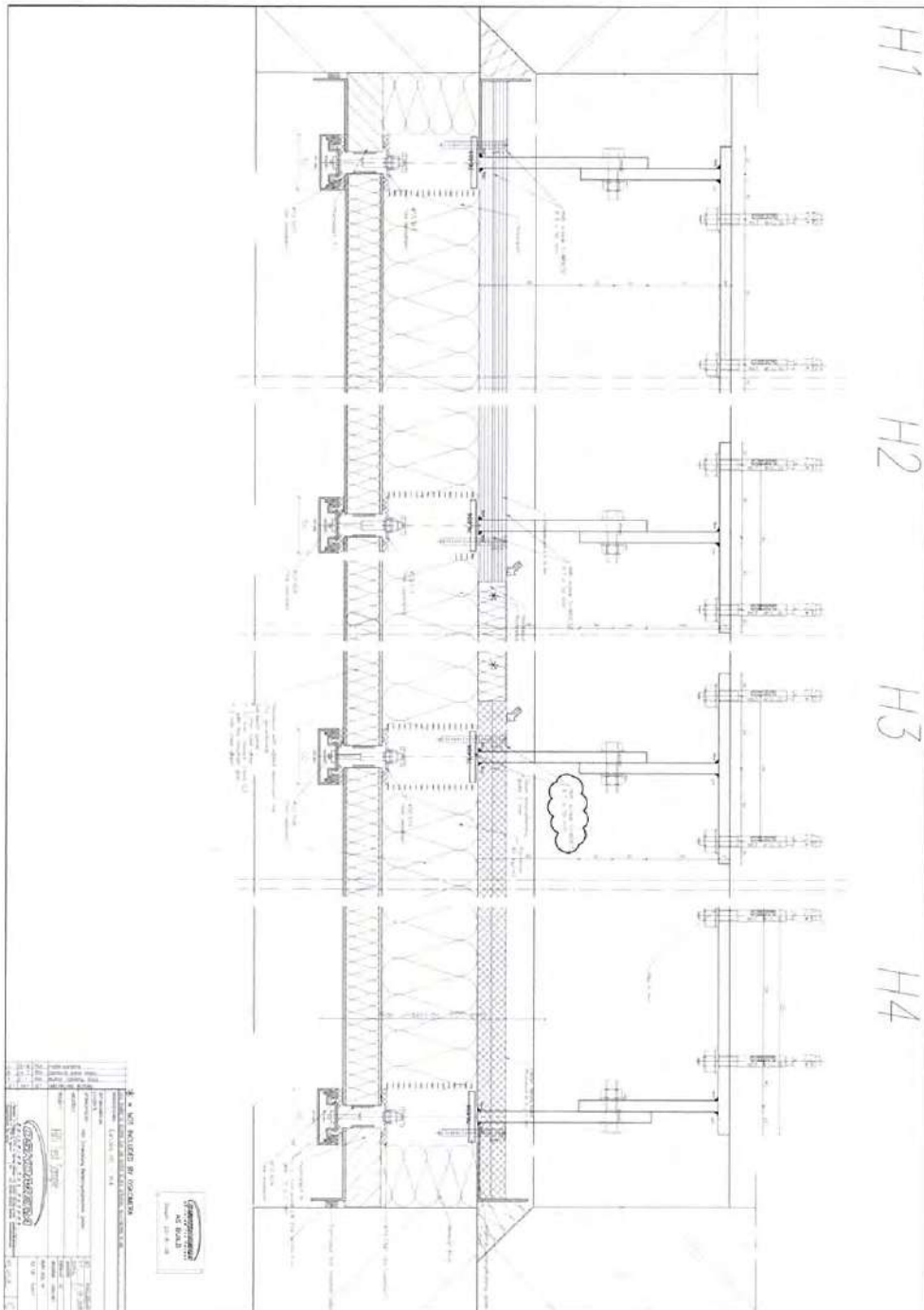
**Plate n° 3.**



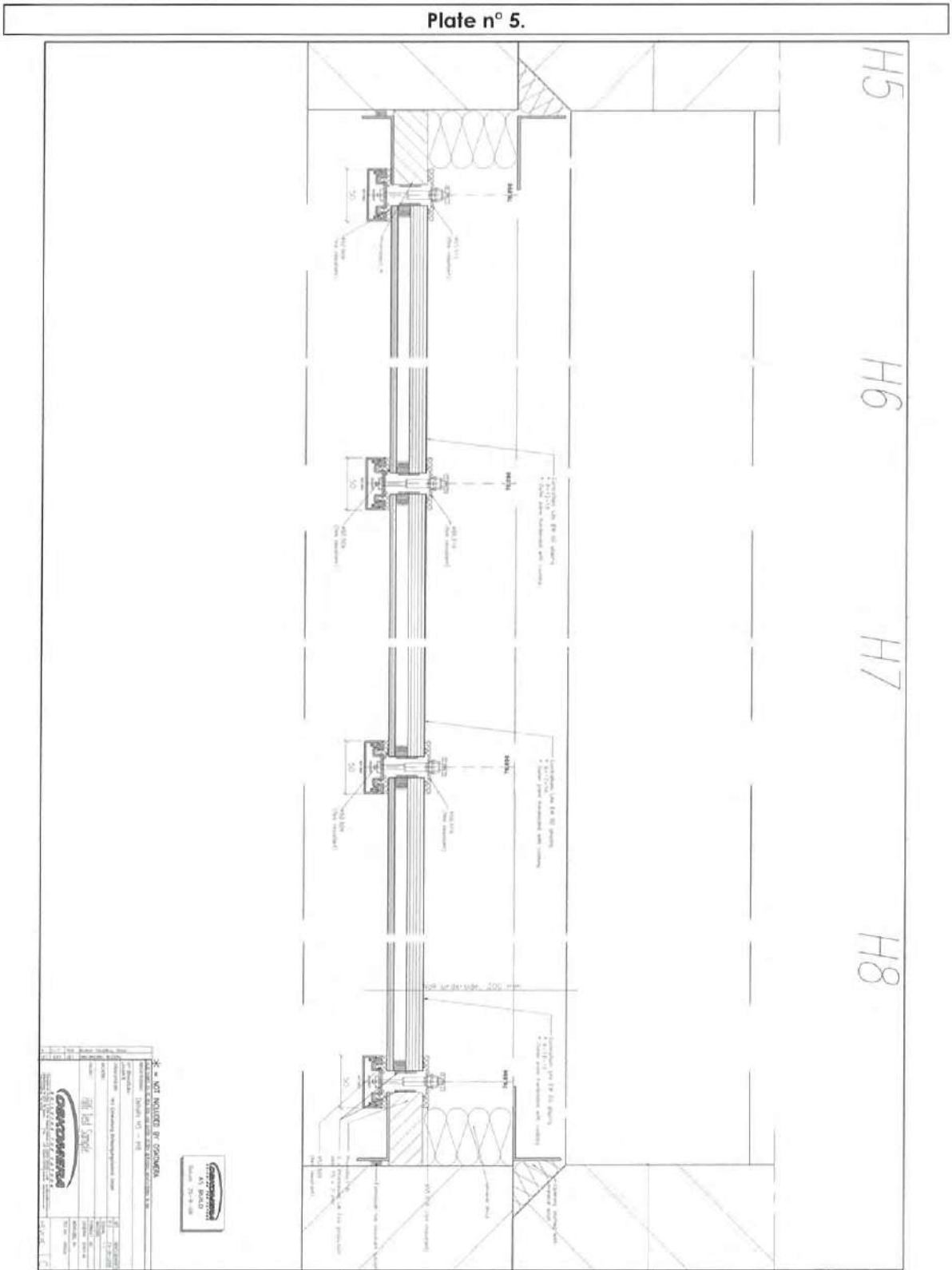
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Plate n° 4.



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**Plate n°6.**

**Materials List Hilti Test Sample**

**Mullions**

Inner Profile	Jansen Viss 76.696	
Pressure Plate	Jansen Viss 400.867	
Glazing Bead	Jansen Viss 407.682	Aluminium
Inner Gasket	Jansen Viss 455.516	Fire Resistant
Outer gaskets	Jansen Viss 452.509	Fire Resistant
Connection Pins	Jansen Viss 452.478	Stainless Steel

**Transoms**

Inner Profile	Jansen Viss 76.696	
Pressure Plate	Jansen Viss 400.867	
Glazing Bead	Jansen Viss 407.682	Aluminium
Inner Gasket	Jansen Viss 455.536	Fire Resistant
Outer gaskets (downside)	Jansen Viss 452.509	Fire Resistant
Outer gaskets (upside)	Jansen Viss 452.508	Fire Resistant
Connection Pins	Jansen Viss 452.478	Stainless Steel
Glass support	Jansen Viss 453.032	Stainless Steel
Dilatation	Custom steel box beam with welded cap	
Thermal break dilatation	Promatect H 12,5 mm	

**Closed Panels**

Conrock Panels	2 mm steel, 30 mm Conrock Q3, 2mm steel
Foaming Band	2 mm x 15 mm Promaseal LW x 2

**Glazing**

Contraflam Lite EW60 6-12-16	
Foaming Band	2 mm x 15 mm Promaseal LW x 2

**Inner Paneling**

Promatect H 15 mm x 2
Plasterboard 15 mm x 2
Rockwool with aluminium foil 30 mm
Hilti Screws S-MD032 6.3 x 50 mm

**Connection Mullion - Brick wall underside**

Steel L-profile 100x100x5 mm	
Bolt	Multi-fix M10
Anchor	Hilti HST M10/30

**Connection Floor - Facade**

Custom Brackets	Steel plate 10 mm
Anchor	Hilti HST M10/30
Bolts	Multi-fix M10

**Side Connection Mullion - Wall**

Custom steel flashing 1 mm, inside and outside	
Sealant	Ferroseal Fire Resistant Silicon
Filling	Promatect H 70 x 30 mm Mineral wool

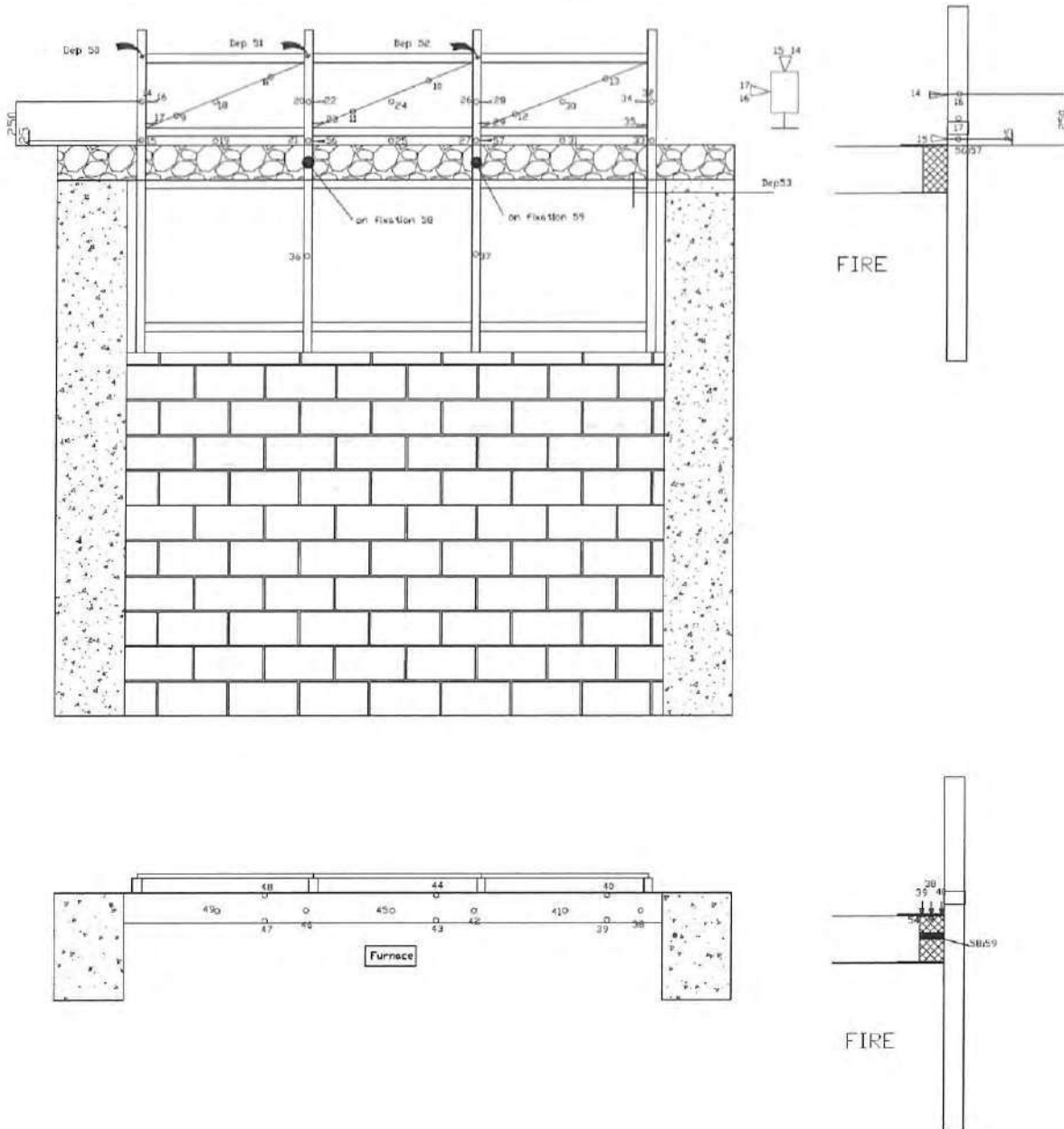
**Fixing Mullions - Top side floor**

Plate 195 x 60 x 10 mm	Steel, welded to mullion
L-profile, 40 x 40 x 4 mm	Steel, 950 mm long
bracket 100 x 100 x 5 mm	Steel
Bolts	Multi-fix M10
Anchor	Hilti HST M10/30

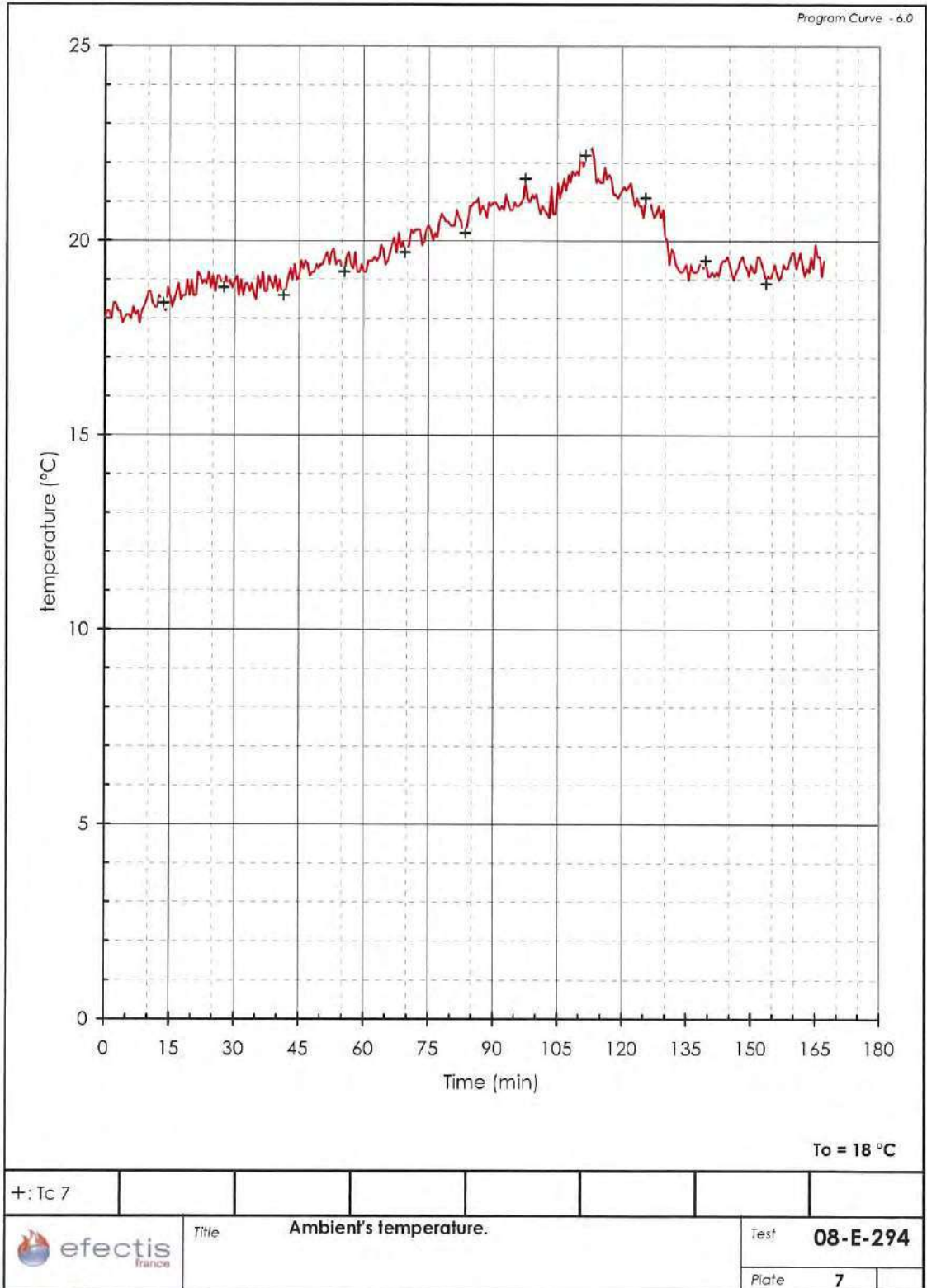
**Closing of top side of upper mullion**

Custom flashing	Steel 2 mm
-----------------	------------

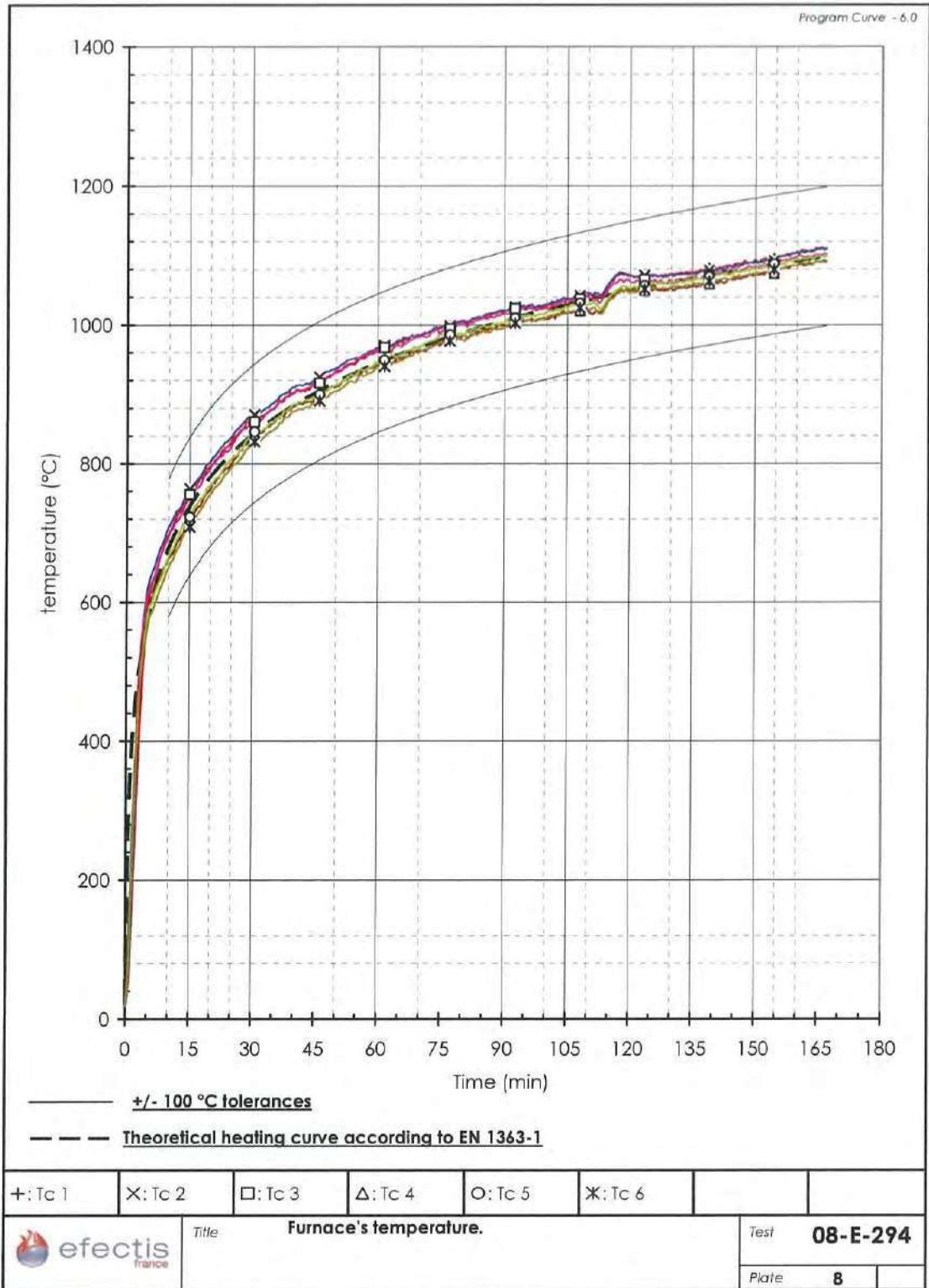
Plate n°6.1.



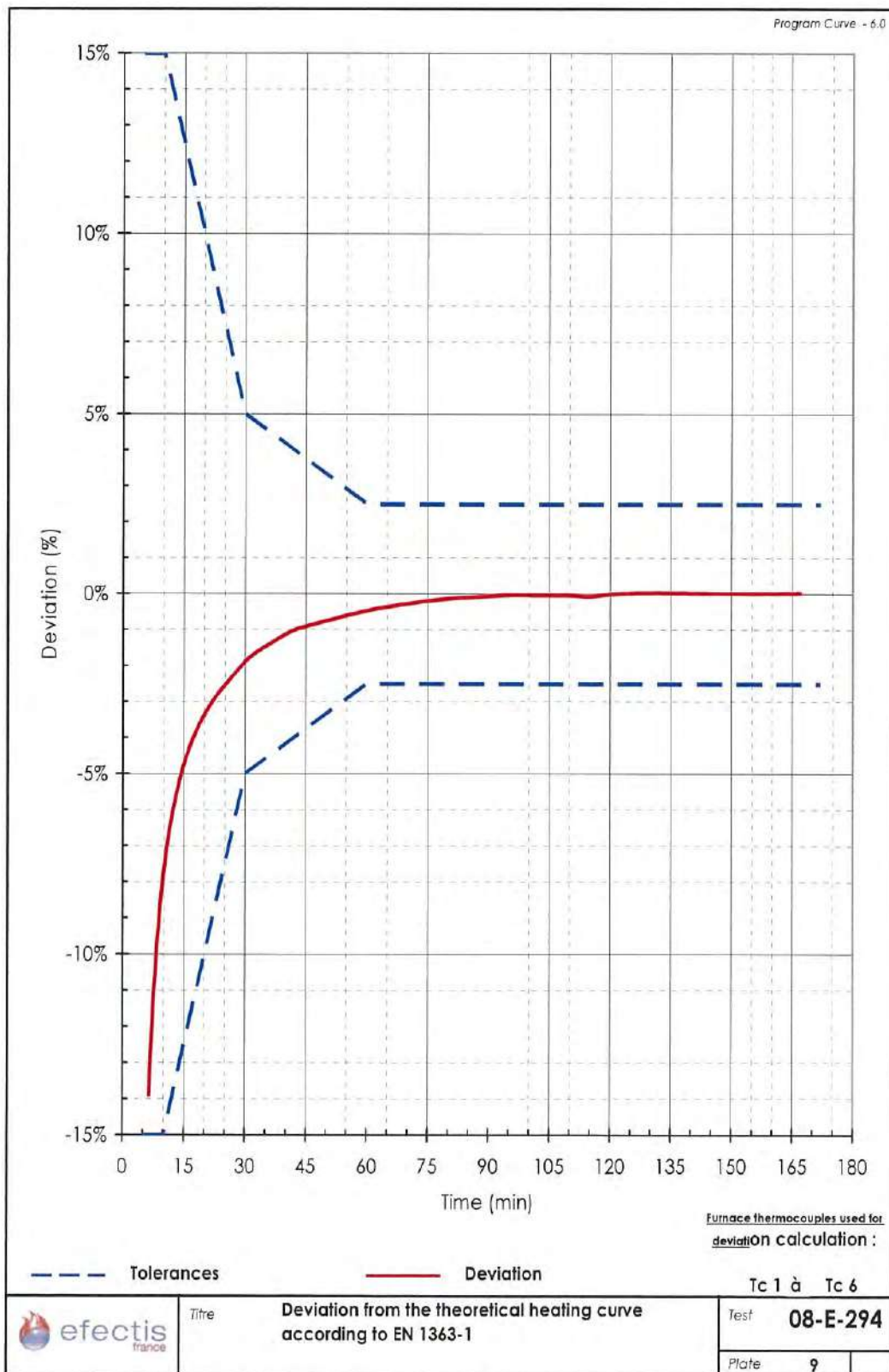
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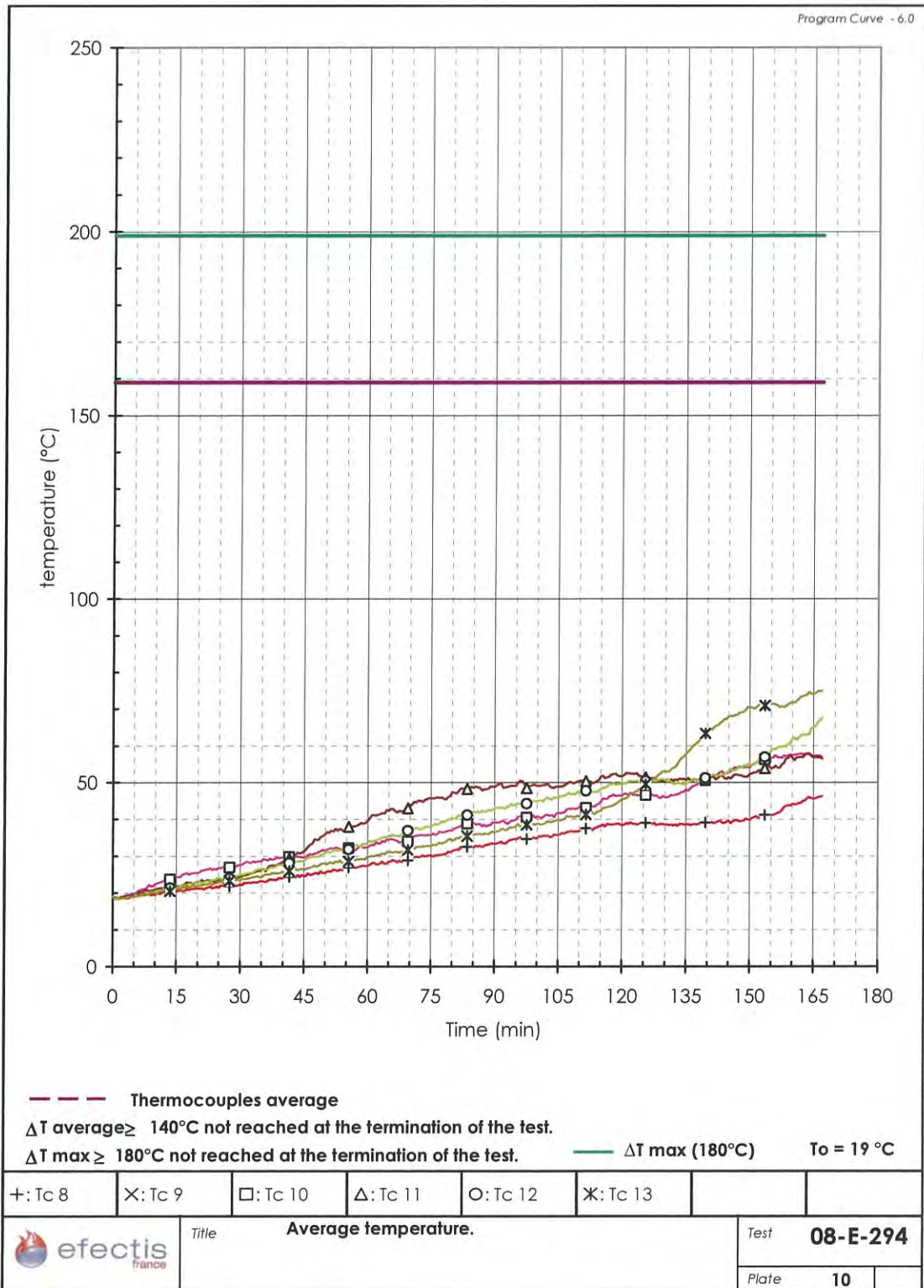
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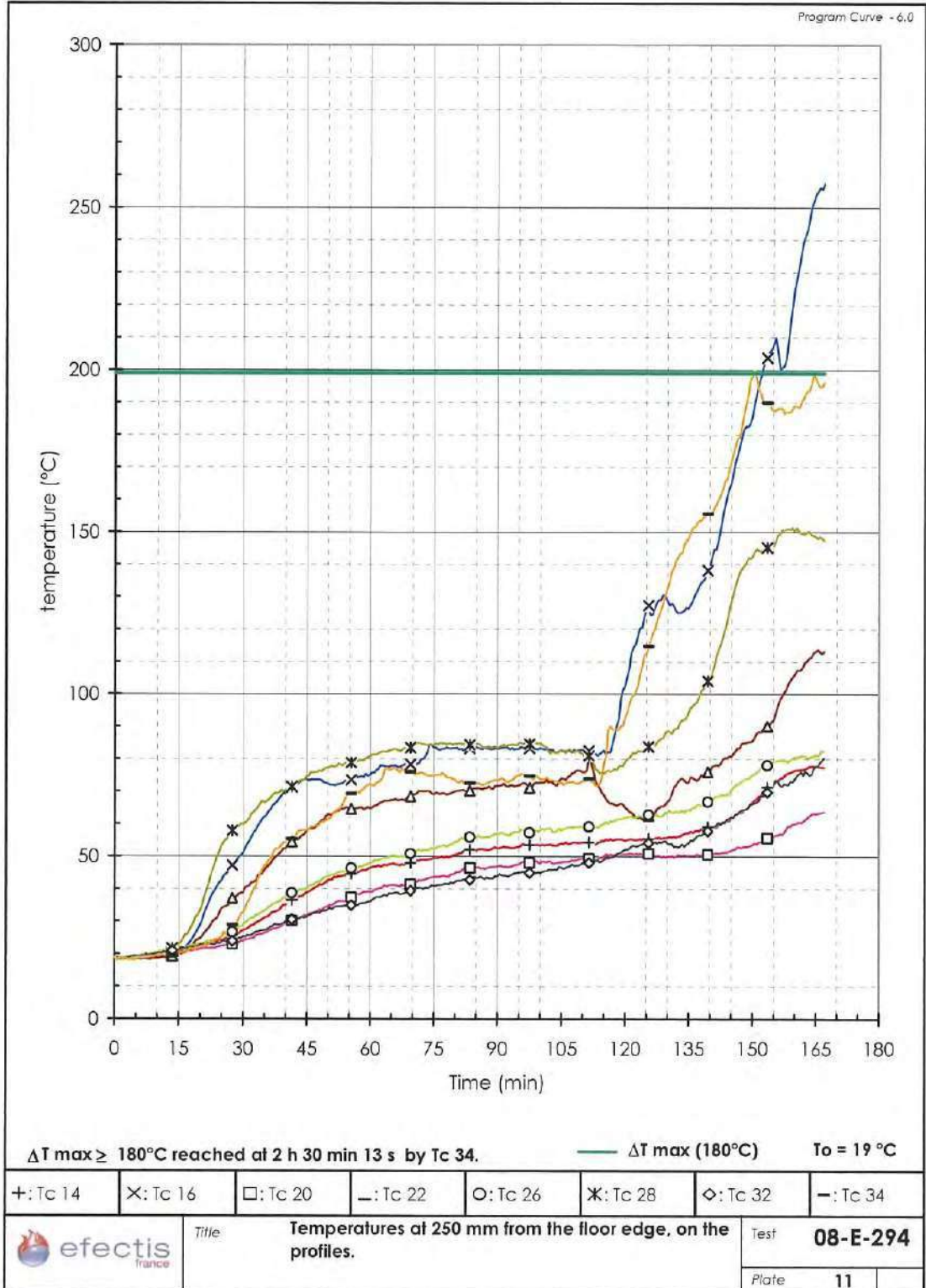
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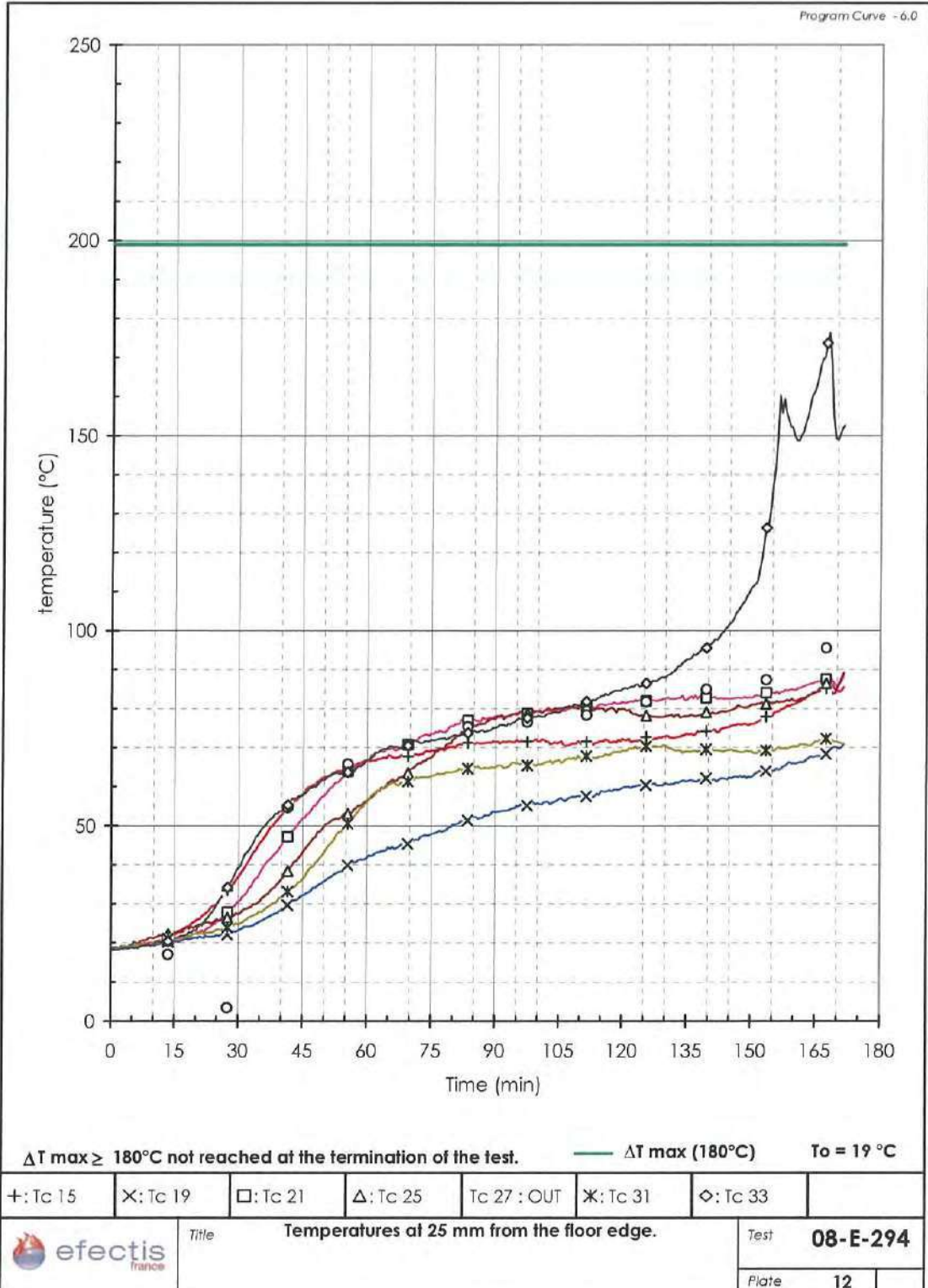
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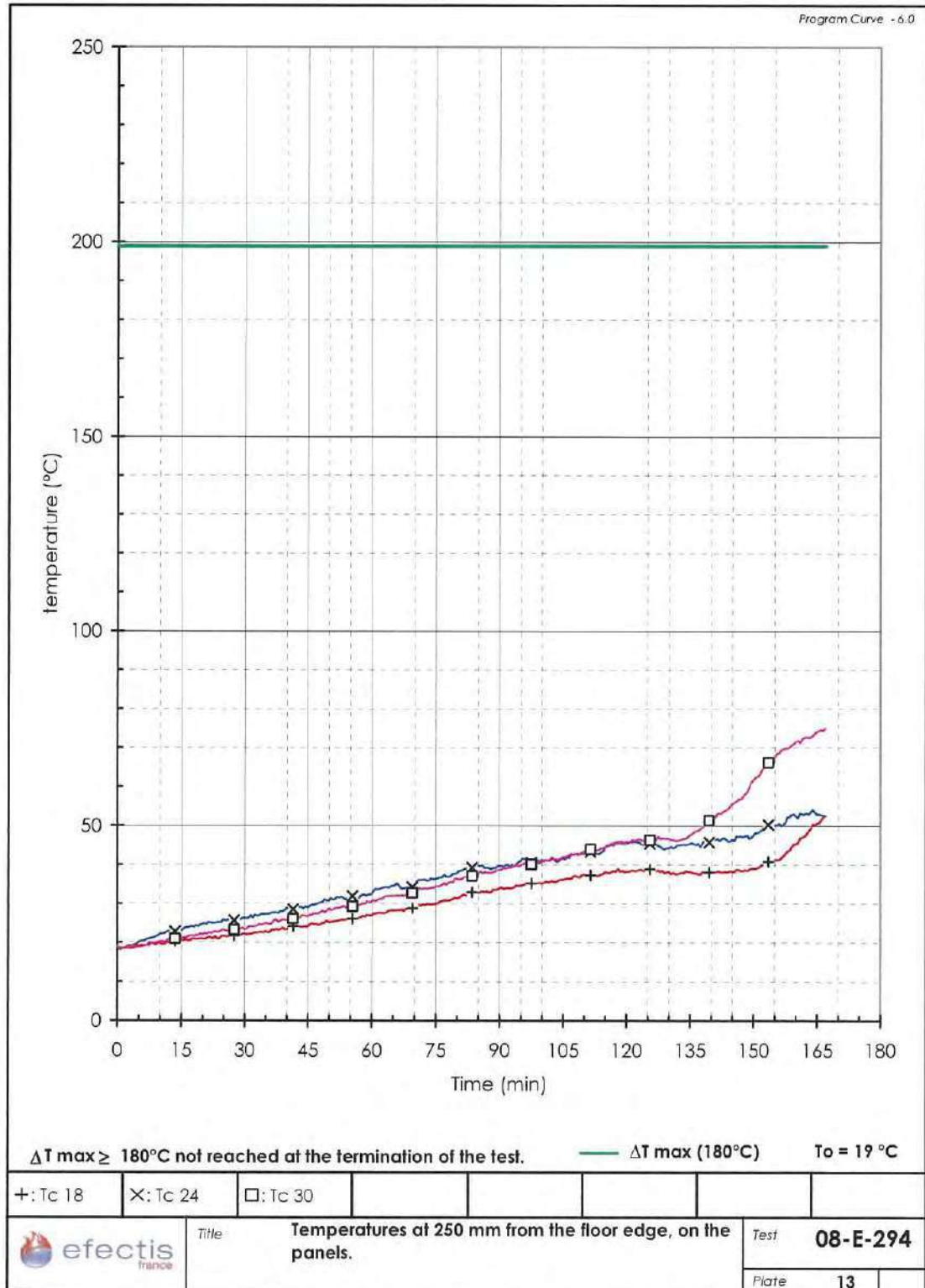


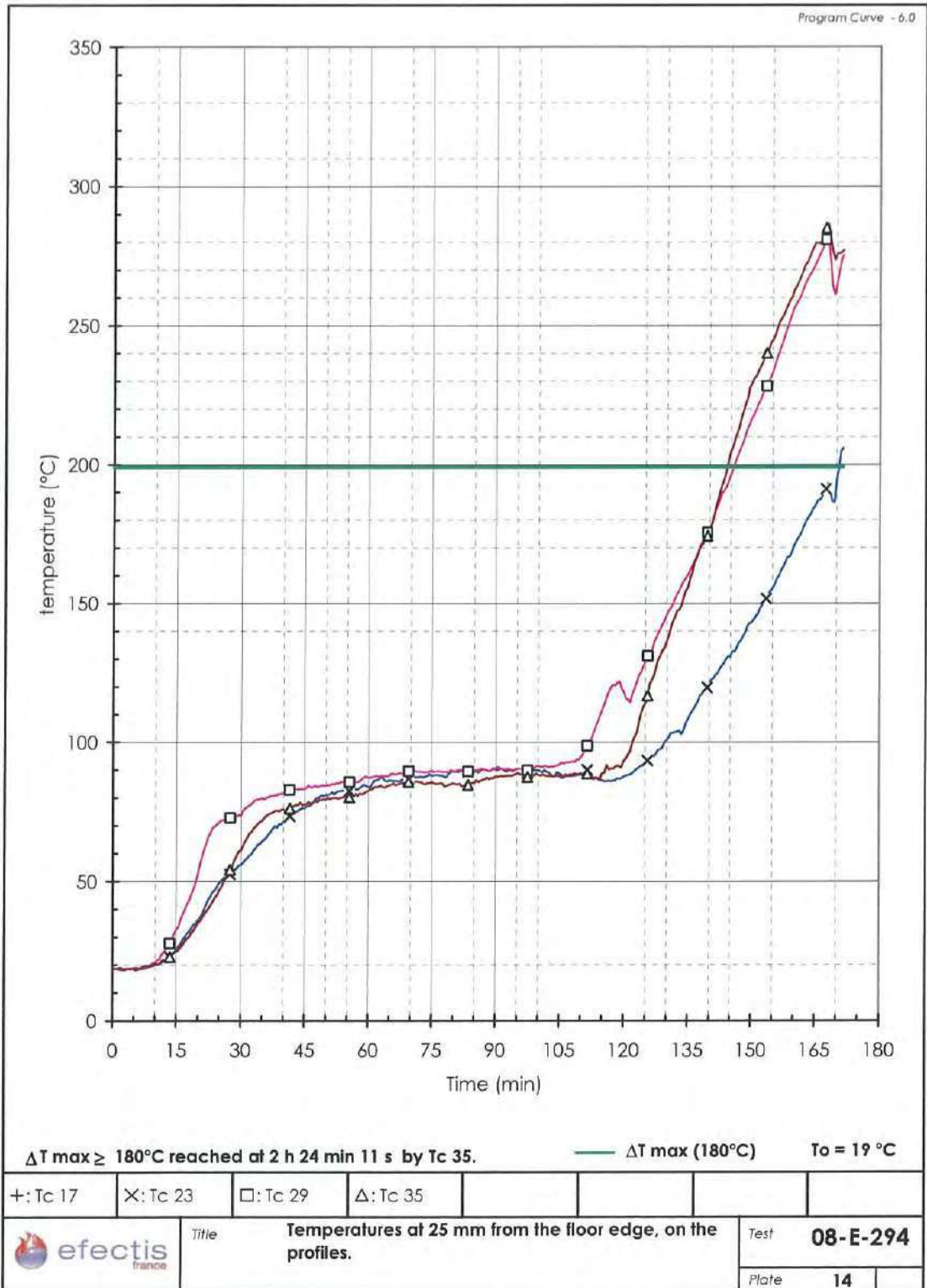




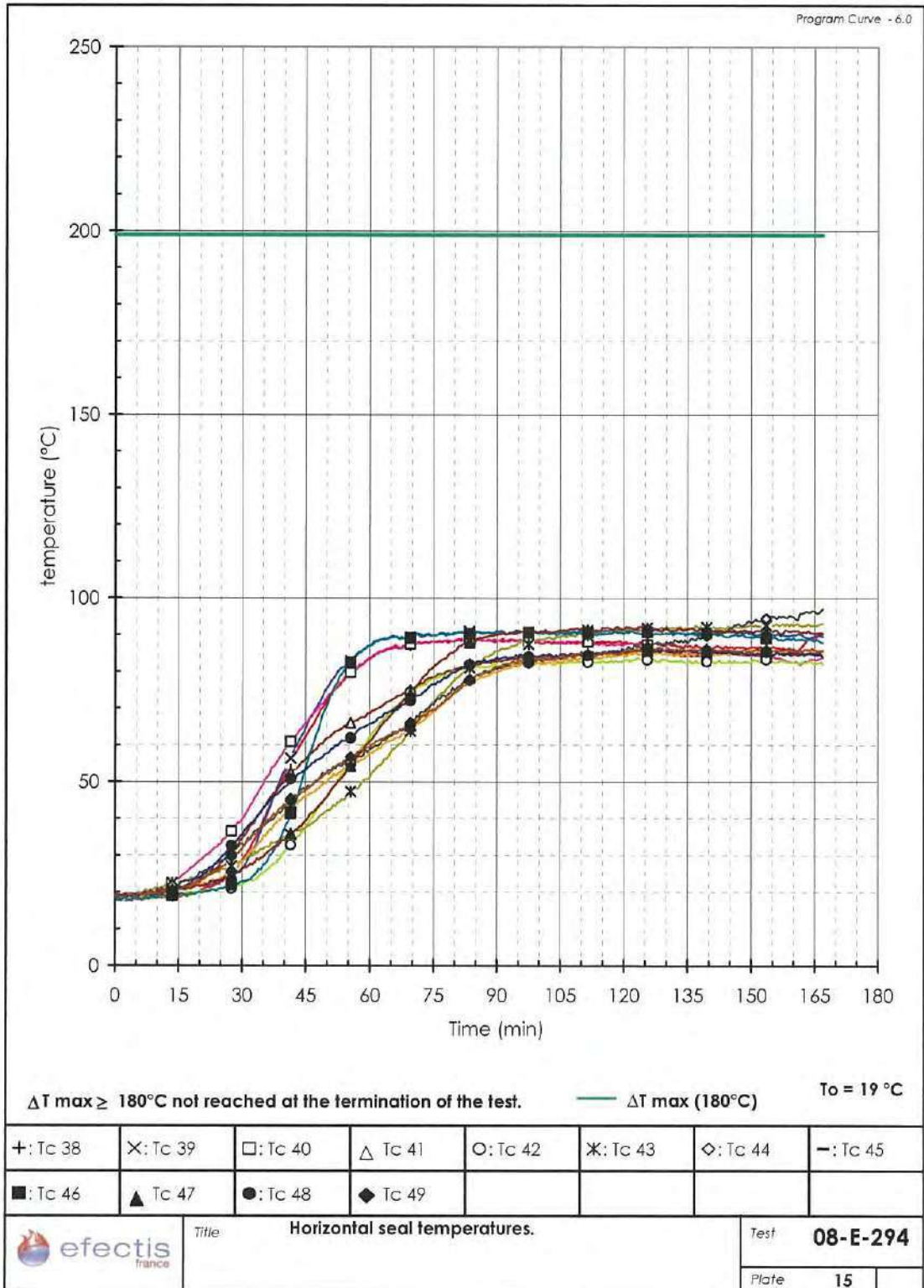
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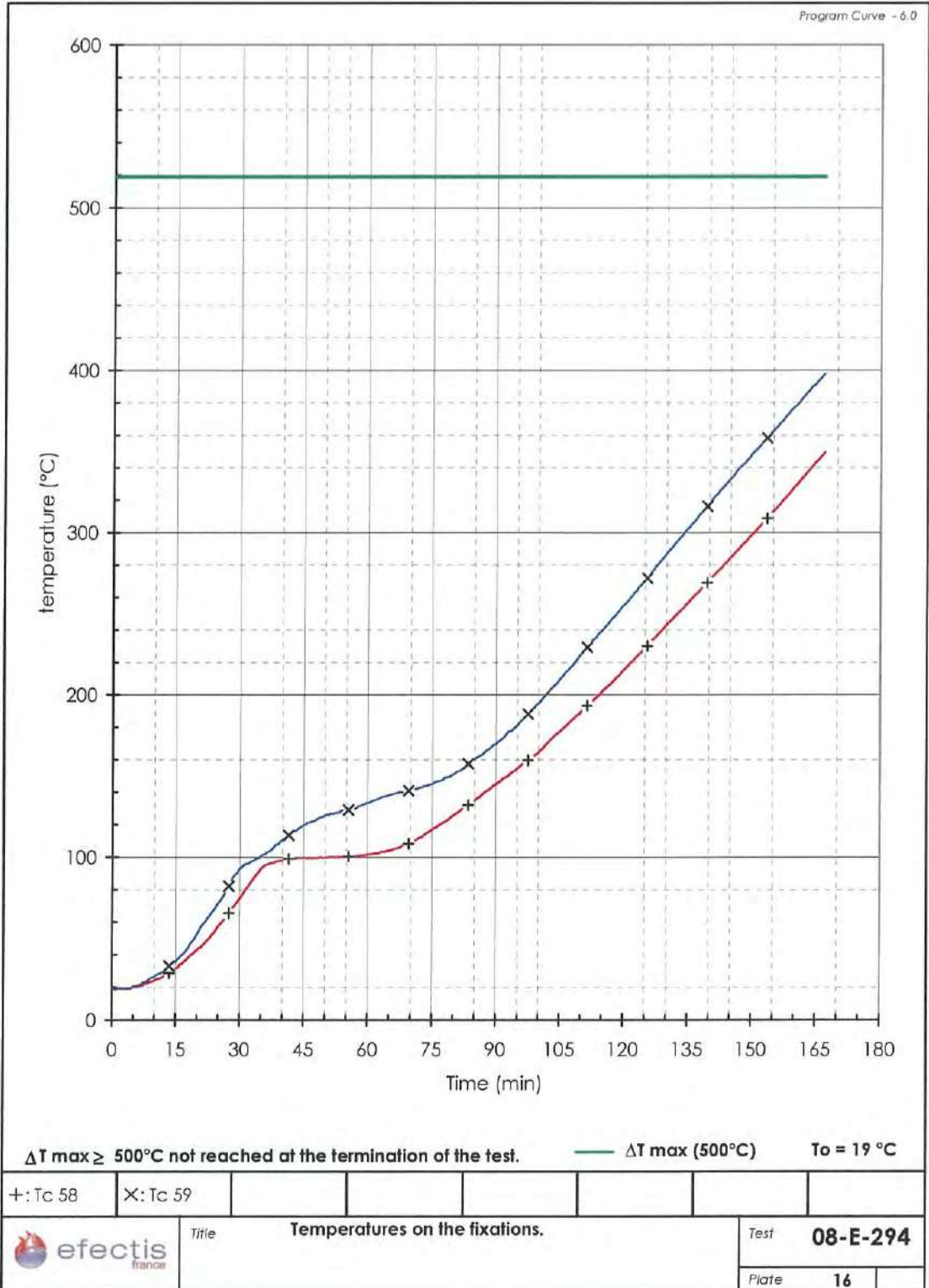




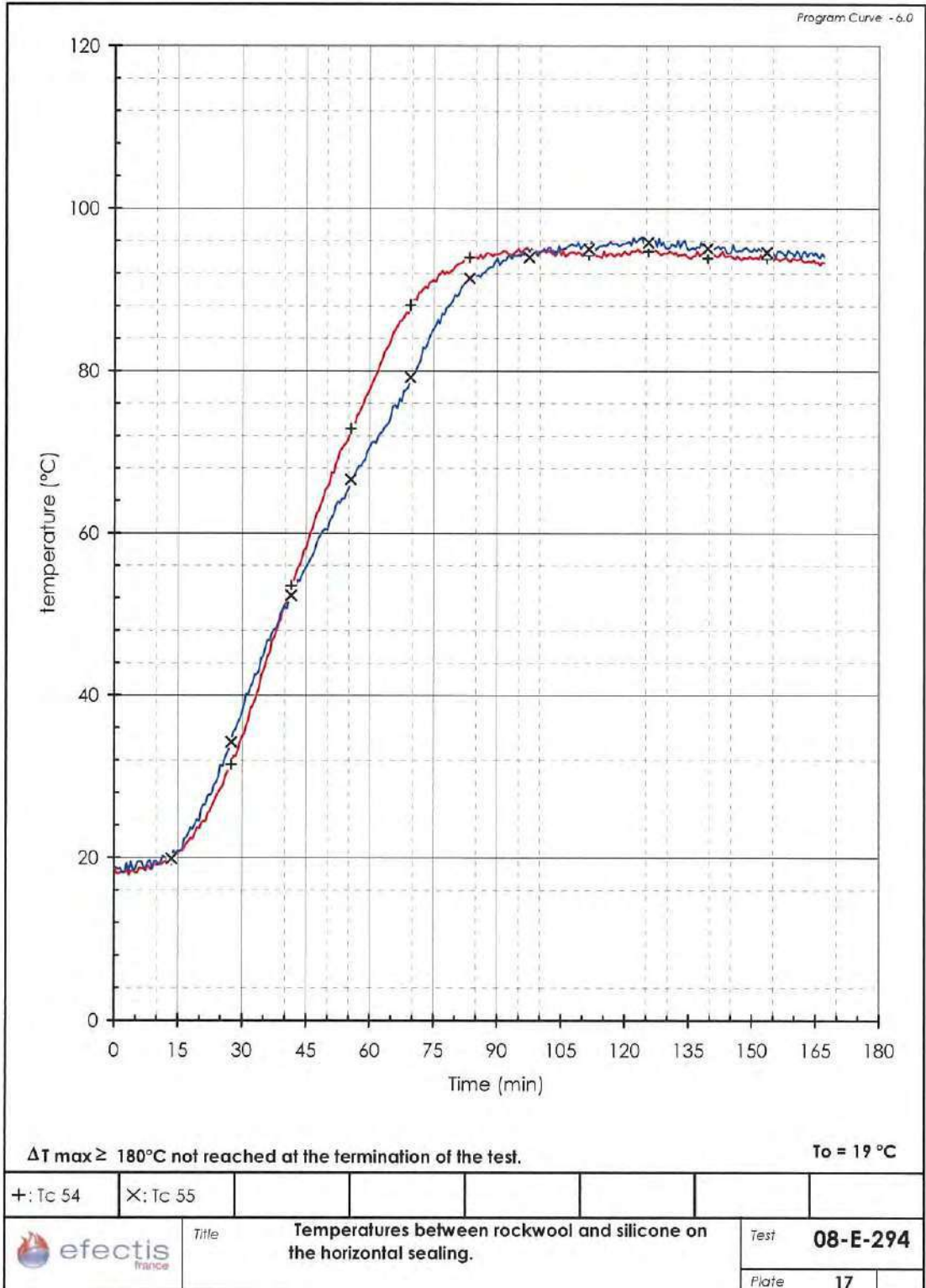


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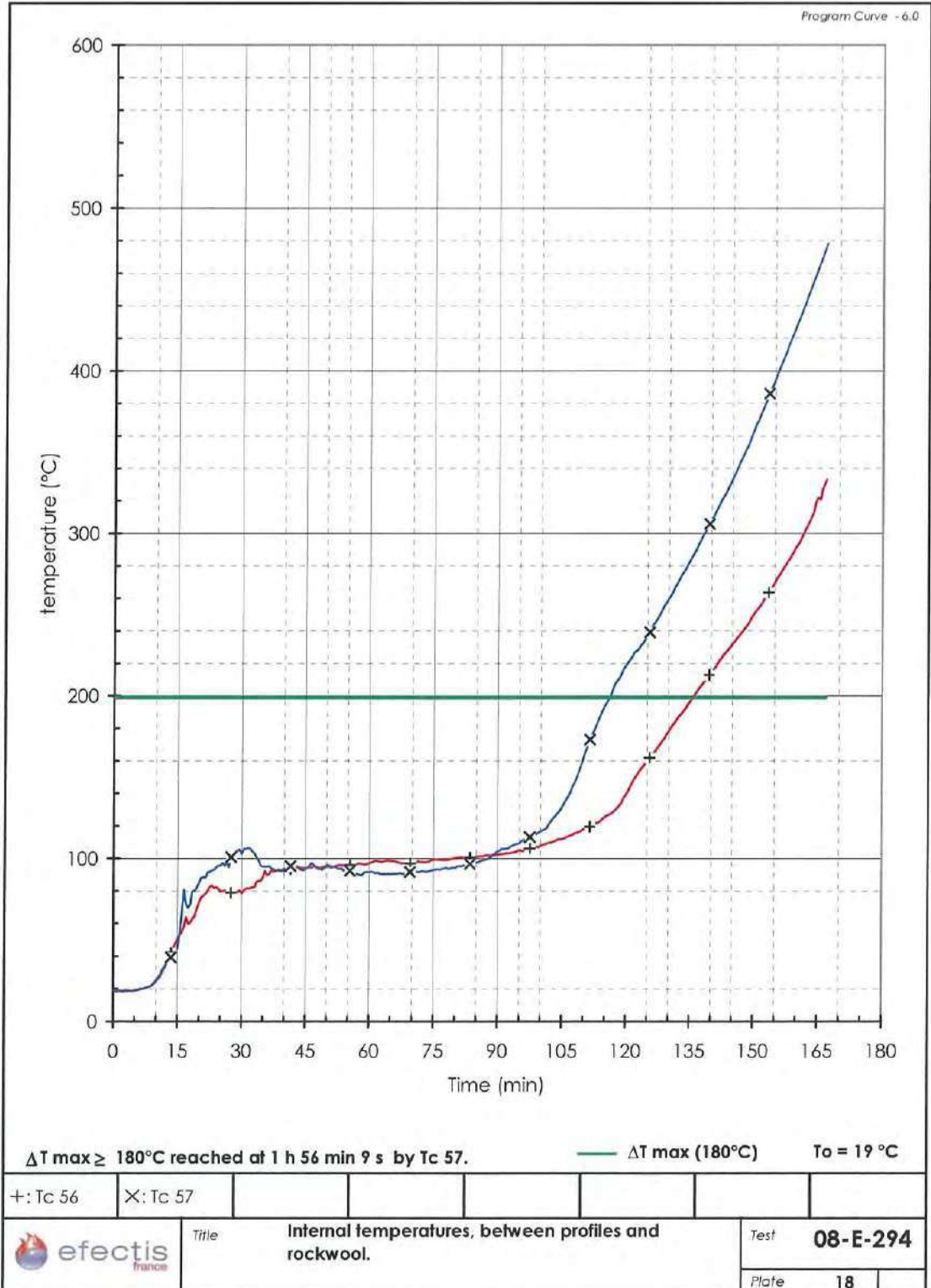




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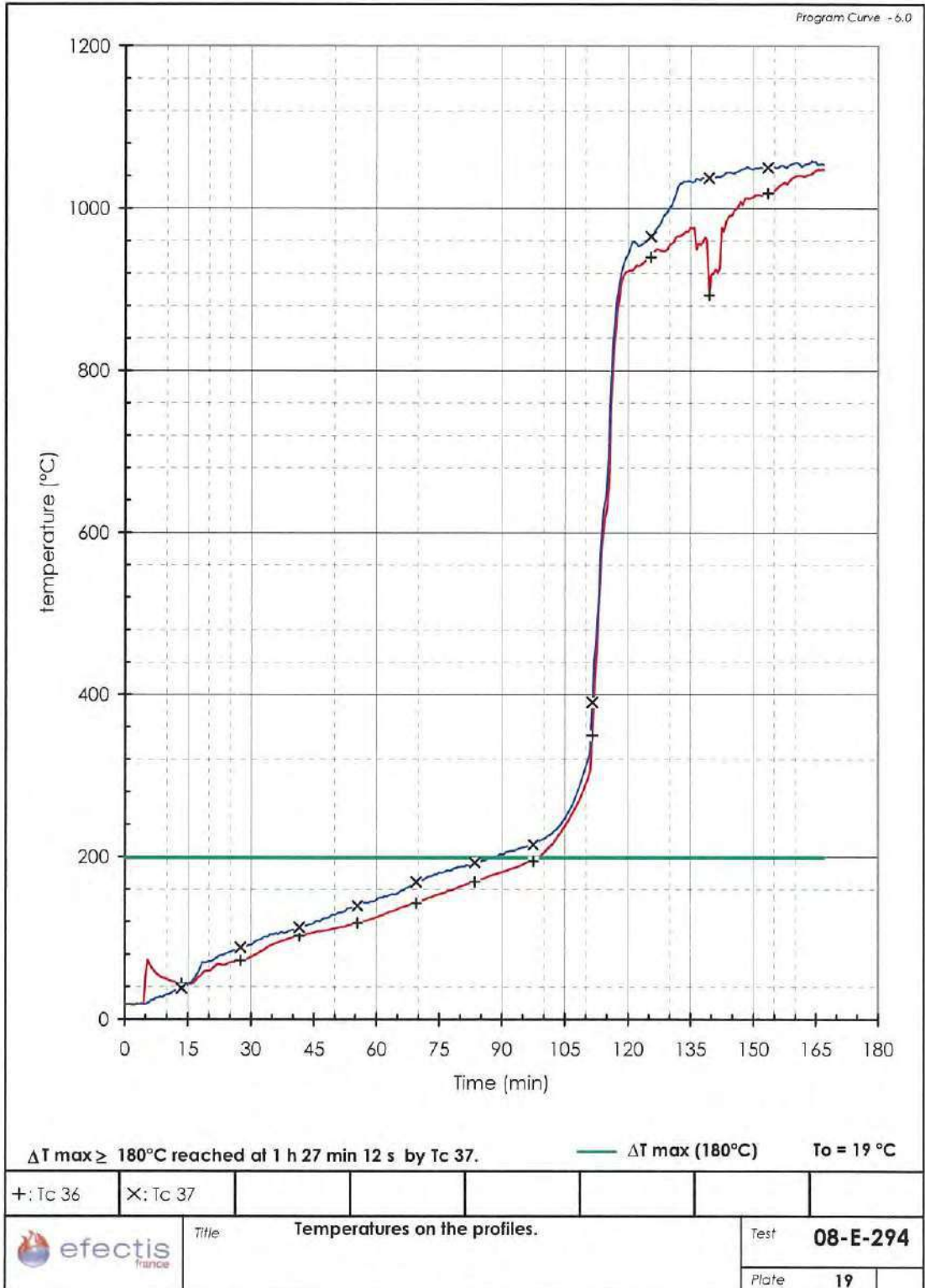


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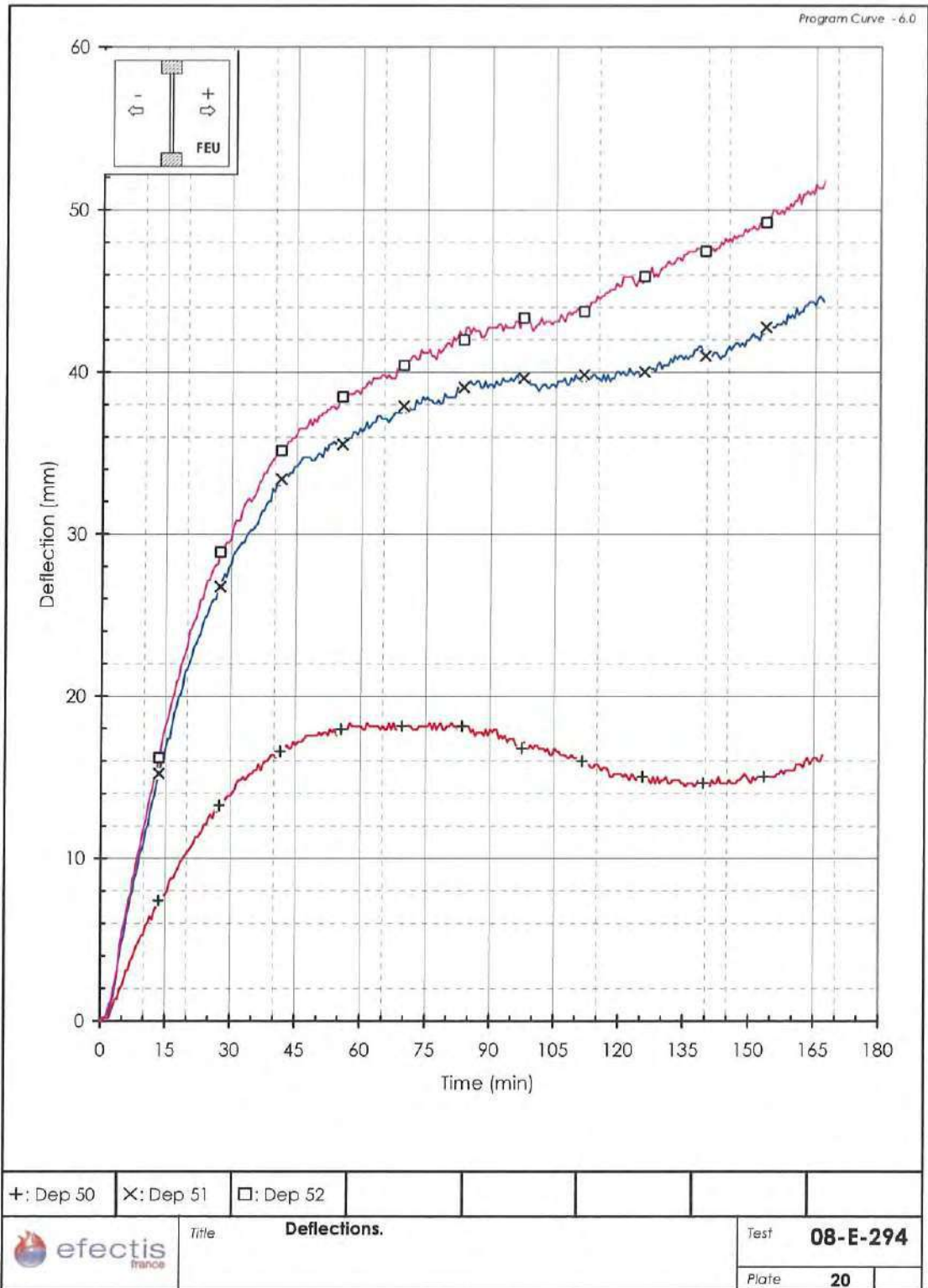


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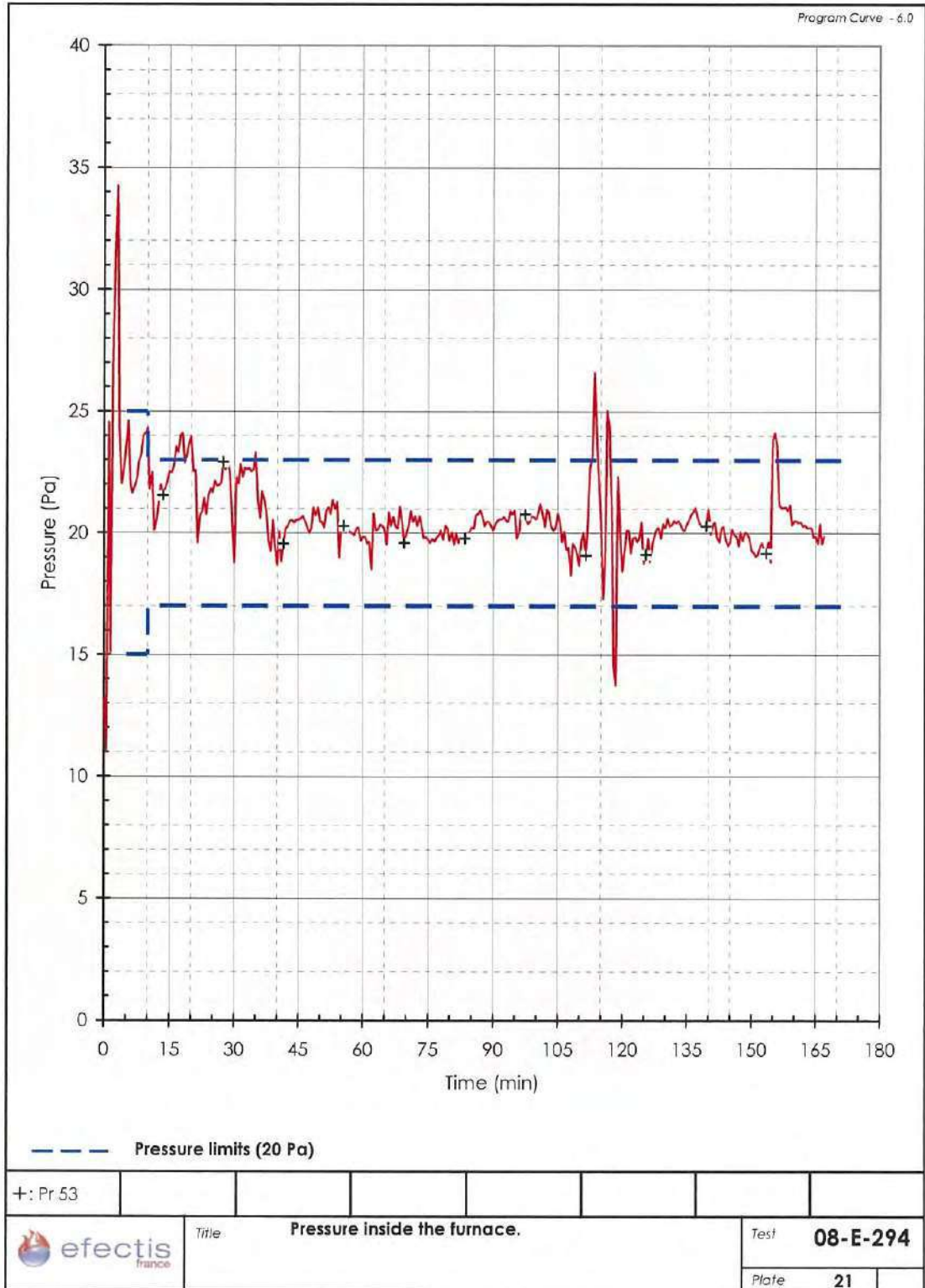




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<b>Picture A</b> (Top) Commencement of test.
<b>Picture B</b> (Bottom) Smelting of the glazing in the centre of the element.



**Picture C (Top)** Cotton pad test positive on the horizontal seal

**Picture D(Bottom)** End of test.

**HILTI ENTWICKLUNGSGESELLSCHAFT MBH**  
Hiltistr. 6

**86916 KAUFERING DEUTSCHLAND**

**Y/Ref** : order date November 18<sup>th</sup> 2010  
(E-LAB 4873/10 A 7862)

Maizières-lès-Metz, november 24<sup>th</sup> 2010

**O/Ref** : E-LAB 4922/10/7862 - HRY

**Object** : modification of CP 672 by CFS-SP WB  
product of a horizontal gap sealing system

**Test report object of the modification: EFECTIS Nr. 08-E-294**

Dear Mr Egon Berghofer,

Following to your request, we have realized a study regarding the modification of your product CP 672 of your horizontal gap sealing system.

On 29.08.2008, Hilti Entwicklungsgesellschaft mbH carries out a fire resistance test in EFECTIS France laboratory of horizontal Linear Gap Sealing System with mineral wool backing and top-sided application of CP 672 spray in a facade system. The test evaluates the integrity and insulation performance in accordance with NF EN 1364-4 : 2008 in combination with DIN EN 1363-1 : 1999-10 to determine the fire resistance of a Horizontal Linear Gap Sealing System (Perimeter Seal) for Curtain Walling.

In the test report 08-E-294, the horizontal seal was made from seven layers of mineral wool board (RPV-40, ROCKWOOL), cut to strips of 200 mm width, with a density of 40 kg/m<sup>3</sup> and a thickness of 60 mm compressed to 50 %. The strips were installed vertically (compression in the direction vertical to the surface of the floor slab). The Mineral wool was covered on top (non-exposed side) with HILTI CP 672 with a dry film thickness of 1,5 mm to 2 mm. During the first 120 minutes of the test, the temperature between the mineral wool and the CP 672 product had not achieved 100°C.

On 16.06.2010, Hilti Entwicklungsgesellschaft mbH carries out a fire resistance test (PB 3.2/10-137-2) in MFPA Leipzig GmbH laboratory of horizontal joint seals with mineral wool backing and top-sided application of Firestop Joint Spray CFS-SP WB in a rigid construction. The test evaluates the integrity and insulation performance in accordance with DIN EN 1366-4 : 2006-08 in combination with DIN EN 1363-1 : 1999-10 to determine the fire resistance in separating building elements during one-sided fire exposure from the underside of the floor.

The test shows that after 240 minutes, the Joint Spray CFS-SP WB started to have a brown discoloration in the area of the overlap onto the rigid joint construction. The Temperature was higher than 180°C. No self inflammation of the product was detected.

Based on these test results, the modification of the product CP 672 by CFS-SP WB product is estimated not change the fire resistance performances during 120 minutes of conventional fire.

We remain at your disposal for further information.  
Yours Sincerely,



**Hervé RYCKEWAERT**  
Product leader of glazing System

Confidential

## FIRE RESISTANCE TEST IN ACCORDANCE WITH BS EN 1364-3: 2006

On a Fully Insulated Curtain Wall System incorporated with 'Hilti CFS-SP WB' Firestop Joint Spray at Linear Gap Seals

**Test Report No.:** R16E18-1A

**Identification No.:** Q16C33

**Issue Date:** 30 August 2016

**Testing Location:**

RED Hong Kong Laboratory  
DD 134, Lung Kwu Tan, Tuen Mun,  
N.T., Hong Kong

**Test Sponsor**

**Hilti (Hong Kong) Limited**

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

**APPROVED SIGNATORY:**



**DATE:** 30 AUG 2016

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

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (HOKLAS 091- TEST) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accreditation laboratories. The results shown in this test report were determined by this laboratory in accordance with its terms of accreditation. This report may not be reproduced except in full.

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## 1 SUMMARY

### Fire resistance test conducted in accordance with BS EN 1364-3: 2006 on a fully insulated curtain wall system incorporated with 'Hilti CFS-SP WB' firestop joint spray at linear gap seals.

A specimen of fully insulated curtain wall system incorporated with 'Hilti CFS-SP WB' firestop joint spray at linear gap seals had been subjected to a test in accordance with BS EN 1364-3: 2006, in order to determine its fire resistance performance. As requested by the test sponsor, the specimen was mounted within concrete lined specimen holder by test sponsor. The specimen was asymmetrical and only one side was tested that was internal exposure.

The specimen had overall dimensions of 3,810 mm wide by 3,795 mm high. It was comprised of a steel frame and six numbers of glazed panels, namely panes 'A' to 'F' and 3 numbers of linear gap seals with 'Hilti CFS-SP WB' firestop joint spray (refer to photo 1). The frame was constructed with 80 mm by 80 mm by 8 mm thick mild steel hollow sections surrounded by 2 layers of nominal 15 mm thick calcium silicate boards at four sides and nominal 25 mm by 25 mm by 3 mm thick mild steel hollows with 3 mm thick G.M.S. pressure bar were welded at unexposed side (refer to test sponsor's drawings). The steel frame was fixed to concrete testing frame by M12 anchor bolts with 150 mm by 500 mm by 8 mm thick G.M.S. steel plates at each mullion at bottom and top edges. Both vertical edges were without fixing. Pane 'A' was with vision sizes of 2,300 mm wide by 3,070 mm high. Pane 'B' was with vision sizes of 670 mm wide by 3,070 mm high. Pane 'C' was with vision sizes of 440 mm wide by 3,070 mm high. Pane 'D' was with vision sizes of 2,300 mm wide by 390 mm high. Pane 'E' was with vision sizes of 670 mm wide by 390 mm high. Pane 'F' was with vision sizes of 440 mm wide by 390 mm high. All panes were comprised of nominal 8 mm thick glazed panel. The glazed panels was sandwiched by 15 mm wide by 5 mm thick ceramic glazing tapes between the frame and panes.

Nominal 100 mm thick with 60 kg/m<sup>3</sup> density mineral wool was filled up the linear gap seals. Approximately 1.5 mm thick dry 'Hilti CFS-SP WB' firestop joint spray applied at unexposed side of right vertical and horizontal linear gap seals and at both sides of left vertical linear gap seals. The linear gaps at the perimeter of the curtain wall system were sealed with the use of nominal 100 mm thick by 150 mm wide mineral wool, the 150 mm wide side being the width of the gap as well. The width of 150 mm was comprised of two layers of wool, each 65 mm thick and 135 mm thick respectively, compressed from the total of 200 mm thick to 150 mm thick, friction fitted into the gap. The original density of the mineral wool was 60 kg/m<sup>3</sup>.

The specimen satisfied the performance requirements specified in BS EN 1364-3: 2006 for the following periods:

Surface or linear gap seal	Integrity			Insulation	
	Cotton pad	Gap gauge	Sustained flaming	Mean temperature rise	Maximum temperature rise
Surface 2^	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 3^	123 Minutes (No failure)	N/A	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 4^	123 Minutes (No failure)	N/A	123 Minutes (No failure)	N/A	123 Minutes
Surface 5^	123 Minutes (No failure)	N/A	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 6^	123 Minutes (No failure)	N/A	123 Minutes (No failure)	N/A	123 Minutes
Horizontal linear gap seal^	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	73 Minutes
Left vertical linear gap seals^	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	87 Minutes
Right vertical linear gap seals^	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	118 Minutes

The test was discontinued after a heating period of 123 minutes.

*^Note: Please refer to photo 1 for the location of surfaces and linear gap seals*

## 2 INTRODUCTION

The objective of the test is to determine the fire resistance performance of specimen of a fully insulated curtain wall system incorporated with 'Hilti CFS-SP WB' firestop joint spray at linear gap seals when tested in accordance with BS EN 1364-3: 2006, 'Fire resistance tests for non-loadbearing elements – Part 3 Curtain walling - Full configuration (complete assembly)'.

This test report should be read in conjunction with BS EN 1363-1: 2012, 'Fire resistance tests – Part 1: General requirements'.

### **3 TEST INFORMATION**

#### **3.1 Test Sponsor**

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

#### **3.2 Testing Location**

Research Engineering Development Façade Consultants Limited, Hong Kong Laboratory of  
DD 134, Lung Kwu Tan, Tuen Mun, New Territories, Hong Kong.

#### **3.3 Date of Test**

29<sup>th</sup> June 2016

#### **3.4 Witness of the test**

The test was led by Mr. Solaris Chan of Research Engineering Development Façade Consultants Limited (RED) and was witnessed by Mr. Jimmy Chen, Ms. Dorothy Wai, Mr. Dennis Yeung, Ms. Kian Kwok, Dr. Selina Lin, Mr. Andrew Lau and Mr. Jeff Leung, the representatives of the test sponsor, Mr. Jeffrey Centend and Mr. Randy Iblasin (ALT Limited), Mr. Chris Li (NWCON), Mr. Jackie Chan (Pyrotech),

### **4 EQUIPMENT**

Nine (9) 'type K' thermocouples to monitor the temperature of the furnace, which were kept at 100 mm from the exposed face of the specimen (see Figure 1).

Forty-two (42) 'type K' thermocouples to monitor the temperature of the unexposed face of the specimen (see Figure 2).

A 'type K' roving thermocouple to measure temperature on hot spots of unexposed surface.

A micro-manometer provided to monitor the furnace pressure.

Cotton pads, 6 mm and 25 mm gap gauges.

A steel ruler relative to a taut wire to monitor the lateral deflection of the specimen.

A radiometer placed at 1,000 mm away from the unexposed surface to measure the radiation of unexposed surface of the specimen.

### **5 CONDITIONING**

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 10 days. Throughout this period of time, both of the temperature and humidity of the laboratory were measured and recorded as being within a range of 27 °C to 40 °C and 53 % to 88 % respectively.

## 6 TEST SPECIMEN CONSTRUCTION

The specimen was installed into a concrete specimen holder with pre-prepared opening to form the test construction. The details of the fixings are outlined in Appendix D.

A comprehensive description of the test specimen construction is presented in the appendix, which is based on a survey of the specimen and information supplied by the test sponsor.

## 7 VERIFICATION OF TEST SPECIMEN

In order to ensure the description of the test specimen, and in particular its construction, is on conformity with the test specimen, the laboratory shall either oversee the fabrication of the test specimens or request an additional test specimen.

In this case, RED's representative went to the factory of the test sponsor to verify the fabrication of the glazed panels. Other constructions details of the specimen were verified on site by RED as shown in 'APPENDIX D - INFORMATION FROM TEST SPONSOR'.

## 8 TEST PROCEDURES

The test was conducted in accordance with the procedures specified in BS EN 1364-3: 2006. The ambient temperature of the test area during the test was measured. After the first 5 minutes of the test, the furnace pressure was maintained at  $0 \pm 3$  Pa relative to atmosphere, at 500 mm from the notional floor level.

The furnace was monitored by nine (9) thermocouples so that the mean furnace temperature complied with the requirements of Clause 4.5.1.1 of BS EN 1363-1: 2012.

The temperature of the unexposed face was monitored by means of forty-two (42) thermocouples fixed to the unexposed surface (see Figure 2 for the locations and reference numbers of the thermocouples). Thermocouples S1 - S4, S6 were fixed on the glazing panels for mean and maximum temperatures of surface 2. Thermocouples S7 - S12 were fixed on the glazing panels and mullions for maximum temperatures of surface 2. Thermocouples S33 - S34 were fixed on the partition boards for mean and maximum temperatures of surface 3. Thermocouples S29 - S32 were fixed on the partition boards and mullions for mean and maximum temperatures of surface 3. Thermocouples S37 - S40 were fixed on the partition boards for maximum temperature rise of surface 4. Thermocouples S35 - S36 were fixed on the glazing panels for mean and maximum temperatures of surface 5. Thermocouples S13 - S16 were fixed on the mullions and glazed panels for maximum temperatures of surface 5. Thermocouples S17 - S18 were fixed on the glazed panels for maximum temperature rise of surface 6. Thermocouples S22 - S28 were fixed on horizontal linear gap seals for maximum temperatures of the unexposed surface of

horizontal linear gap seals. Thermocouples S19 - S21 were fixed on the left vertical linear gap seal for maximum temperatures of left vertical linear gap seal. Thermocouples S41 - S43 were fixed on the right vertical linear gap seal for maximum temperatures of right vertical linear gap seal. The mean and maximum temperatures were recorded.

The cotton pads and gap gauges were used, if considered appropriate, to determine compliance with the integrity criterion of the standard. The occurrence of sustained flaming on the unexposed surface was monitored to determine compliance with this criterion. The lateral deflection of the specimen were measured by a steel rule and recorded. The radiation of the specimen was measured and recorded.

## 9 TEST DATA AND INFORMATION

The ambient temperature of the test area during the test was 34 °C.

The furnace was controlled so that the mean furnace temperature complied with the requirements of Clause 4.5.1.1 of BS EN 1363-1: 2012. The temperature recorded is shown graphically in Figure 5.

The mean and maximum temperatures of the surface 2 are shown graphically in Figure 6.

The mean and maximum temperatures of the surface 3 are shown graphically in Figure 7.

The maximum temperatures of the surface 4 are shown graphically in Figure 8.

The mean and maximum temperatures of the surface 5 are shown graphically in Figure 9.

The maximum temperatures of the surface 6 are shown graphically in Figure 10.

The maximum temperatures of the horizontal linear gap seal are shown graphically in Figure 11.

The maximum temperatures of the left vertical linear gap seal are shown graphically in Figure 12.

The maximum temperatures of the right vertical linear gap seal are shown graphically in Figure 13.

The furnace pressure is shown graphically in Figure 14.

The radiation is shown graphically in Figure 15.

A summary of the observations made on the general behaviour of the specimen is given in the appendix.

The deflection obtained is summarized in Table 1.

The mean furnace temperature obtained is summarized in Table 2.

The temperature rises of specimen obtained are summarized in Tables 3 - 5.

The test was discontinued after a heating period of 123 minutes.

## 10 RESULTS

When tested in accordance with BS EN 1364-3: 2006, the requirements of the standard were satisfied for the following periods:

Surface or linear gap seal	Integrity			Insulation	
	Cotton pad	Gap gauge	Sustained flaming	Mean temperature rise	Maximum temperature rise
Surface 2 <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 3 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 4 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	N/A	123 Minutes
Surface 5 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 6 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	N/A	123 Minutes
Horizontal linear gap seal <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	73 Minutes
Left vertical linear gap seals <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	87 Minutes
Right vertical linear gap seals <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	118 Minutes

<sup>^</sup> see note on page 4

*Insulation - It is required that the mean temperature rise of the unexposed surface shall not be greater than 140 °C and that maximum temperature rise shall not be greater than 180 °C. Insulation failure also occurs simultaneously with integrity failure.*

### Surface 2

The 140 °C rise of the mean temperature of the unexposed surface of specimen did not reach during the test. The 180 °C rise of the maximum temperature of the unexposed surface of specimen did not reach during the test. The maximum temperature rise of the unexposed surface of specimen was 60 °C measured by unexposed thermocouple S11 after a heating period of 39 minutes.

Surface 3

The 140 °C rise of the mean temperature of the unexposed surface of specimen did not reach during the test. The 180 °C rise of the maximum temperature of the unexposed surface of specimen did not reach during the test. The maximum temperature rise of the unexposed surface of specimen was 58 °C measured by the unexposed thermocouple S30 after a heating period of 120 minutes.

Surface 4

The 180 °C rise of the maximum temperature of the unexposed surface of specimen did not reach during the test. The maximum temperature rise of the unexposed surface of specimen was 66 °C measured by the unexposed thermocouple S39 after a heating period of 123 minutes.

Surface 5

The 140 °C rise of the mean temperature of the unexposed surface of specimen did not reach during the test. The 180 °C rise of the maximum temperature of the unexposed surface of specimen did not reach during the test. The maximum temperature rise of the unexposed surface of specimen was 64 °C measured by the unexposed thermocouple S15 after a heating period of 52 minutes.

Surface 6

The 180 °C rise of the maximum temperature of the unexposed surface of specimen did not reach during the test. The maximum temperature rise of the unexposed surface of specimen was 20 °C measured by the unexposed thermocouple S18 after a heating period of 123 minutes.

Horizontal linear gap seal

The 180 °C rise of the maximum temperature of the unexposed surface of specimen reached after a heating period of 73 minutes. The maximum temperature rise of the unexposed surface of specimen was 212 °C measured by thermocouple S27 after a heating period of 123 minutes.

Left vertical linear gap seals

The 180 °C rise of the maximum temperature of the unexposed surface of specimen reached after a heating period of 87 minutes. The maximum temperature rise of the unexposed surface of specimen was 197 °C measured by thermocouple S20 after a heating period of 123 minutes.

Right vertical linear gap seals

The 180 °C rise of the maximum temperature of the unexposed surface of specimen reached after a heating period of 118 minutes. The maximum temperature rise of the unexposed surface of specimen was 183 °C measured by thermocouple S43 after a heating period of 123 minutes.

*Integrity - It is required that there is no collapse for the specimen, no sustained flaming on the unexposed surface and no loss of impermeability.*

No failure was observed regarding to the criteria of cotton pad, sustained flaming and gap gauge during the test.

The specimen met the integrity requirements after a heating period of 123 minutes.

## 11 LIMITATIONS

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in EN 1363-1, and where appropriate EN 1363-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

The test results are valid only for the conditions under which the test was conducted.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result. Therefore, the results are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.



**APPENDIX A – PHOTOS AND TEST RECORD**

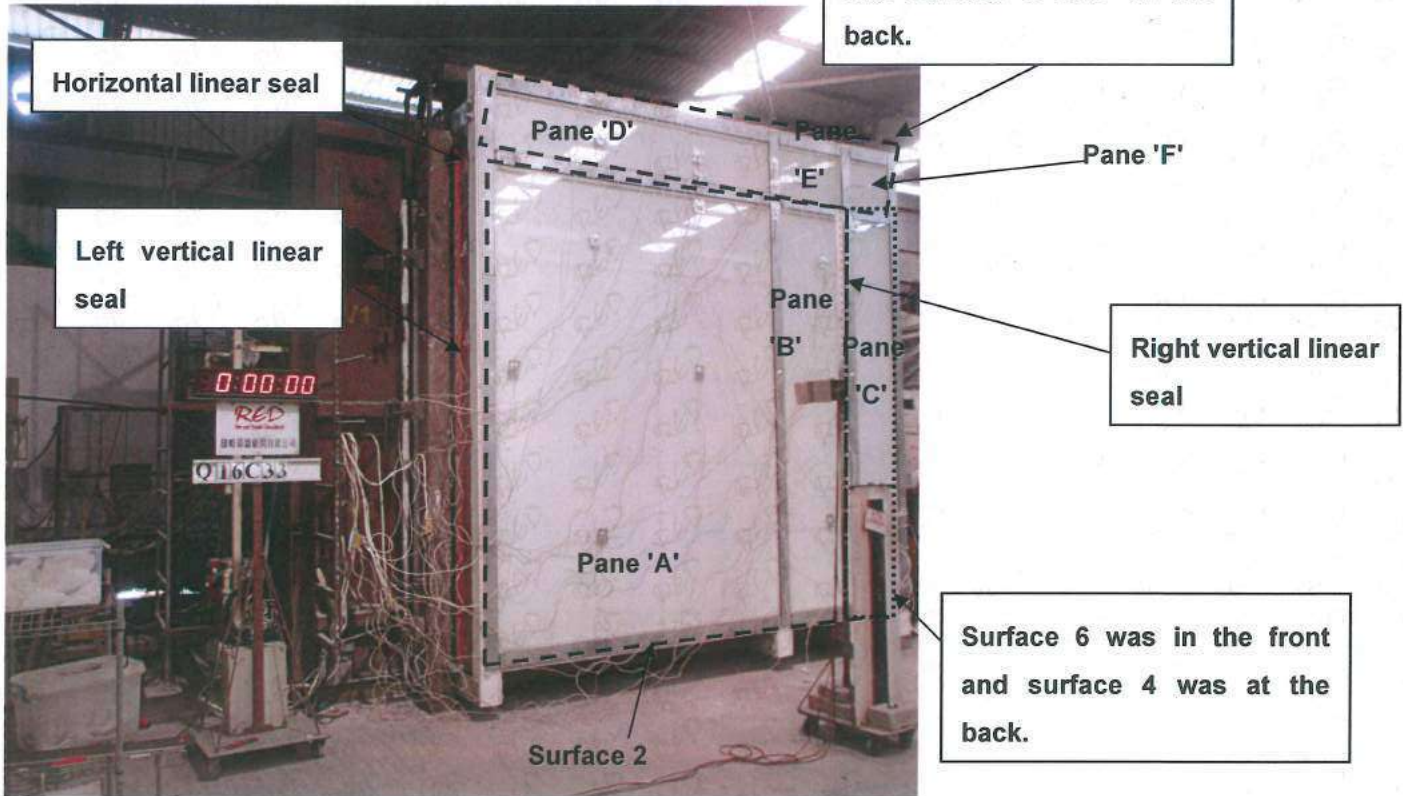


Photo 1: The unexposed face of the specimen before the test.



Photo 2: The unexposed face of the specimen after a heating period of 60 minutes.



Photo 3: The unexposed face of the specimen after the test.



Photo 4: The exposed face of the specimen after the test.

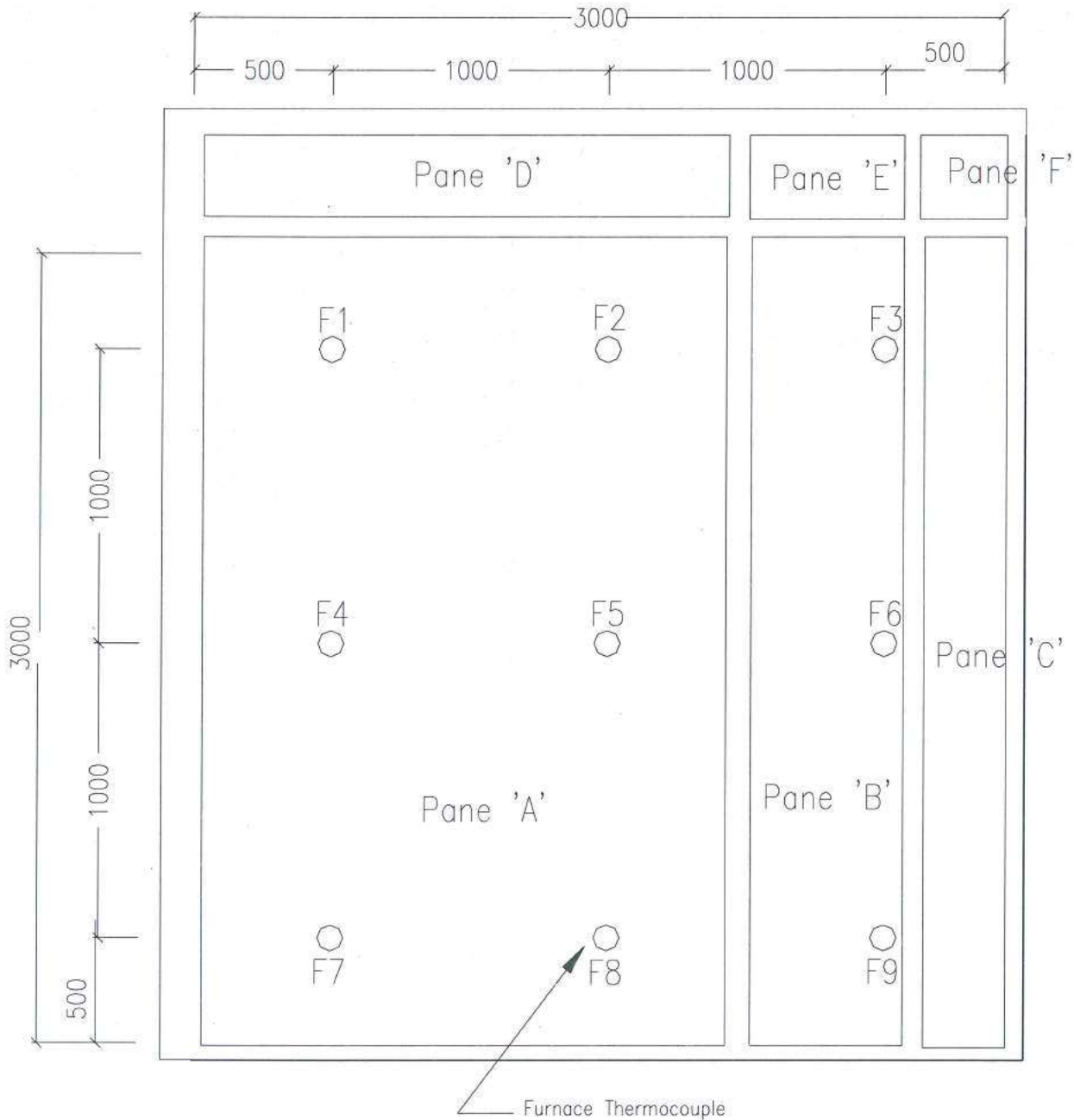


Figure 1 – Locations and reference numbers of furnace thermocouples.  
(This figure is not to scale and all dimensions are in millimetres.)

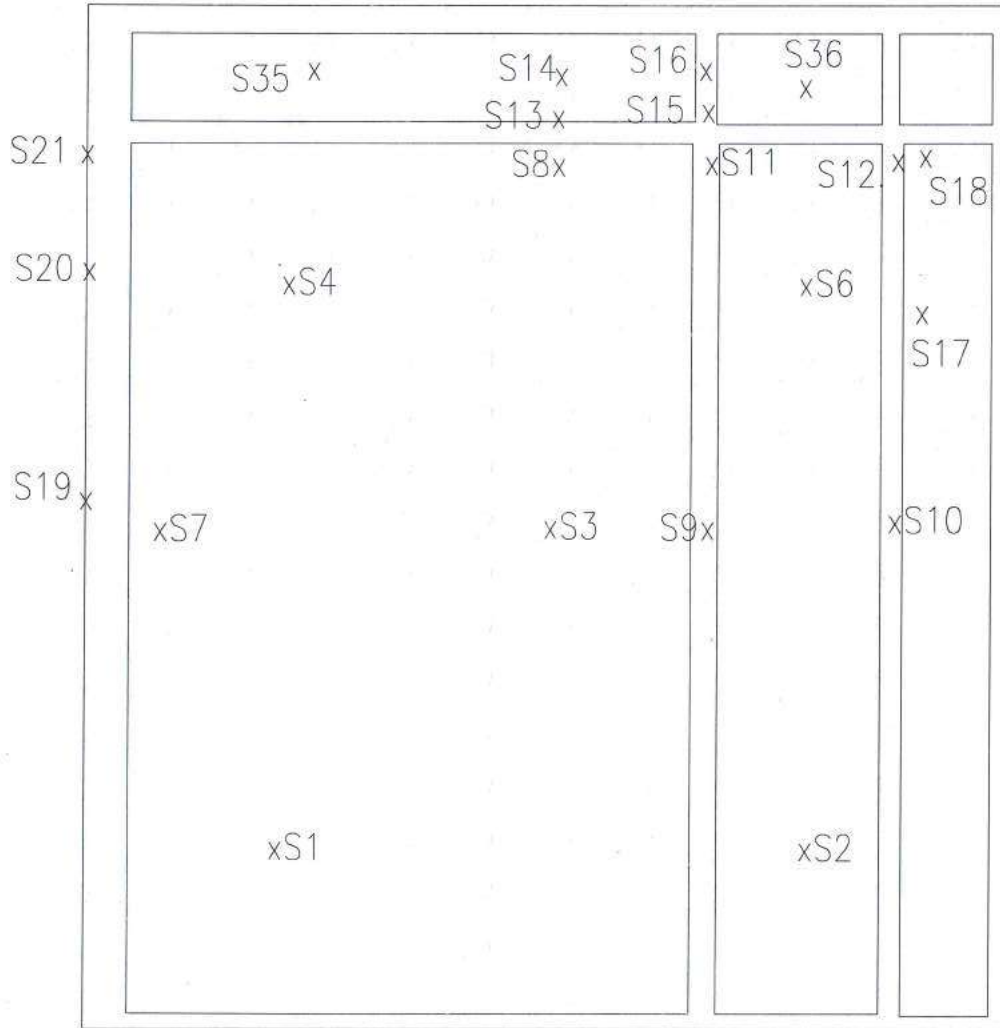


Figure 2 – Locations and reference number of thermocouples to monitor the temperature of unexposed surface (surfaces 2, 5 and 6 and left vertical linear gap seal) of the specimen.

(This figure is not to scale.)

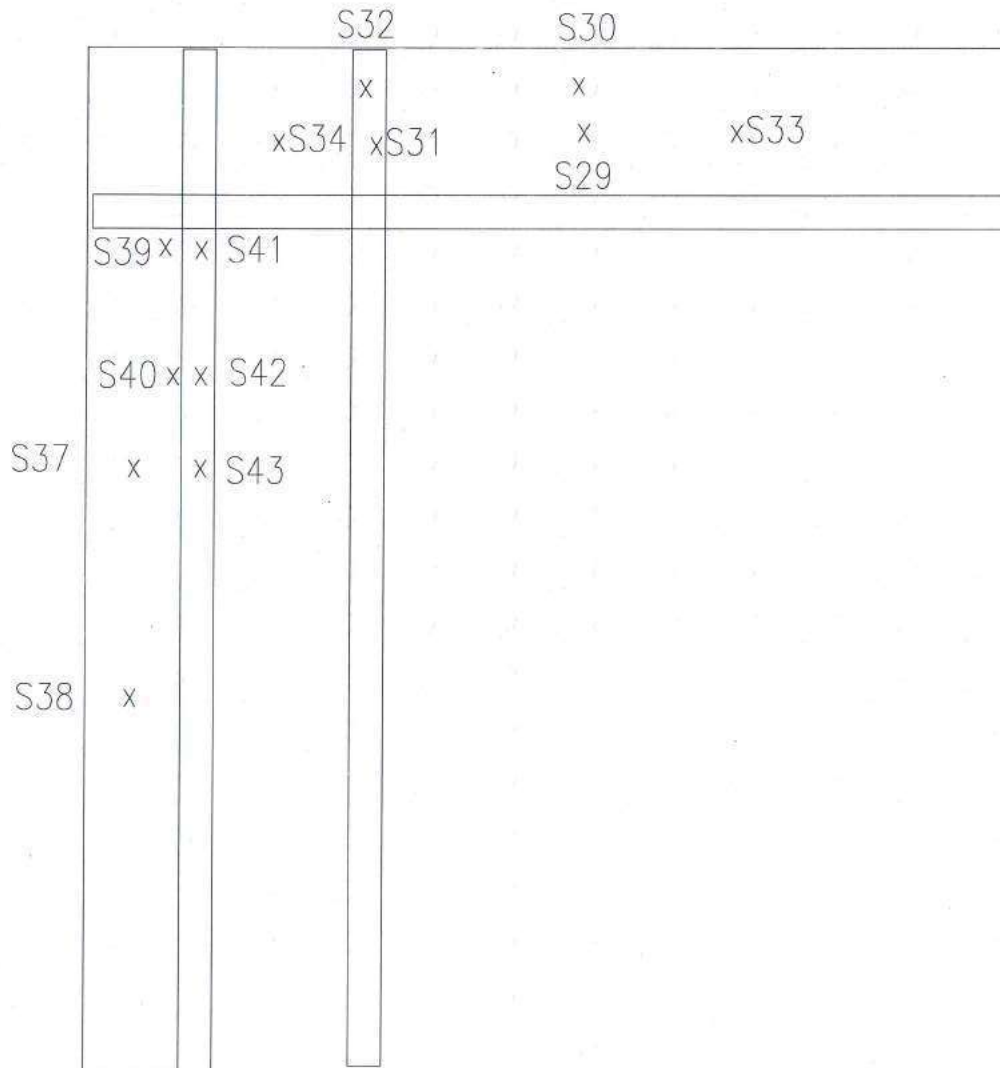


Figure 3 – Locations and reference number of thermocouples to monitor the temperature of unexposed surface (surface 3 and 4, right vertical linear gap seal and horizontal linear gap seal) of the specimen.

(This figure is not to scale.)

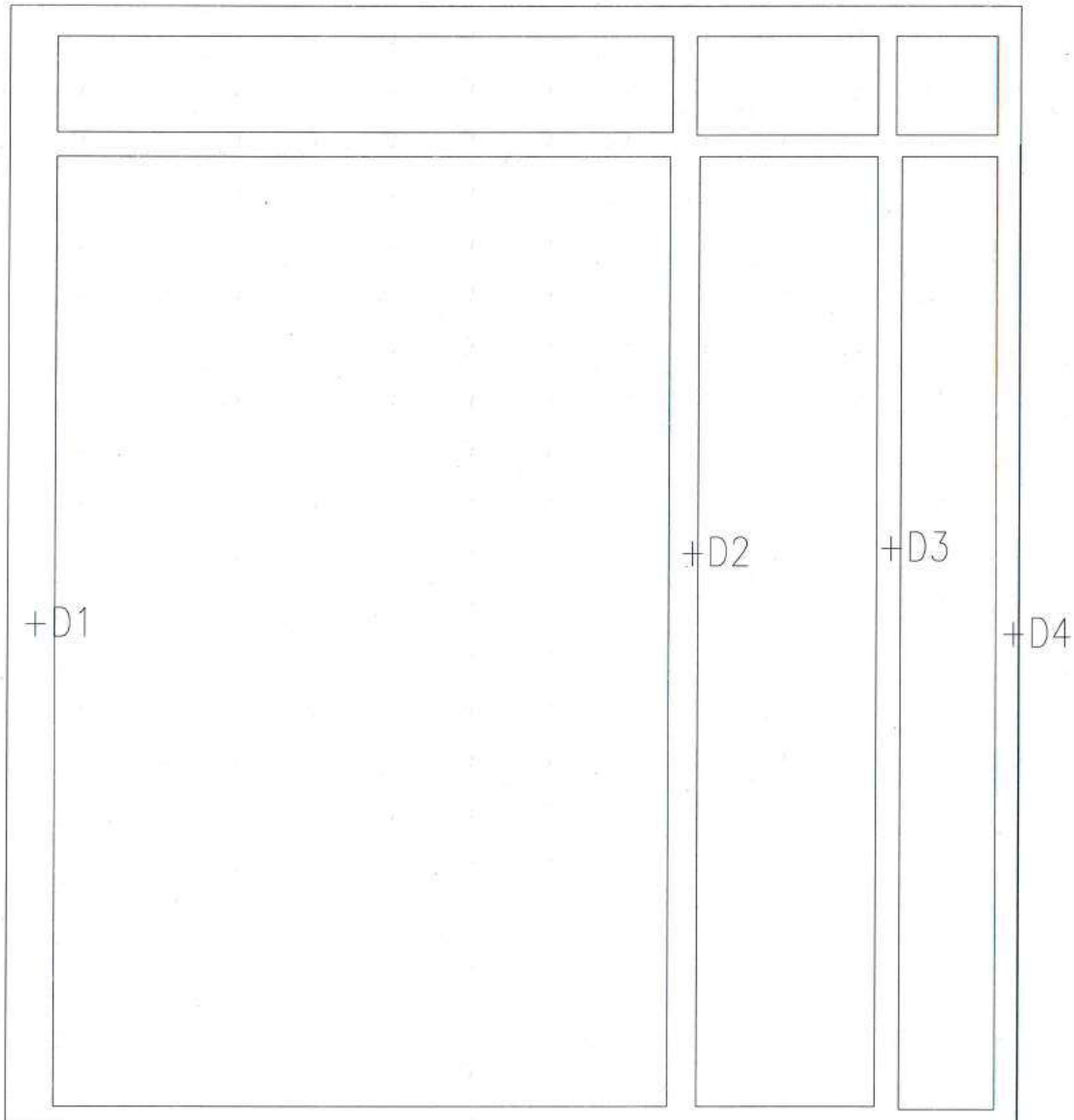


Figure 4 – Locations and reference numbers of displacement measurement.

(This figure is not to scale.)

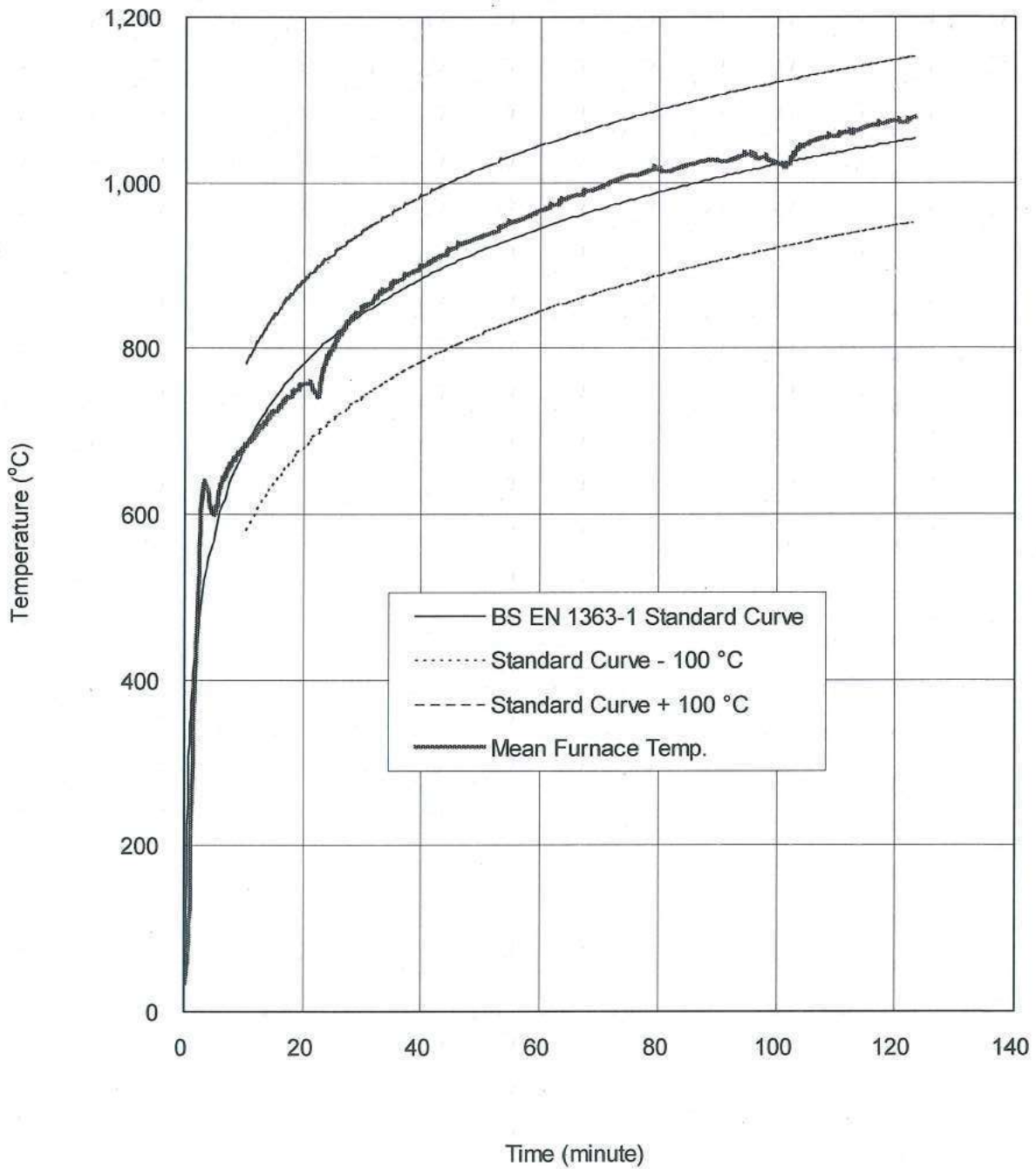


Figure 5 – Mean furnace temperature.

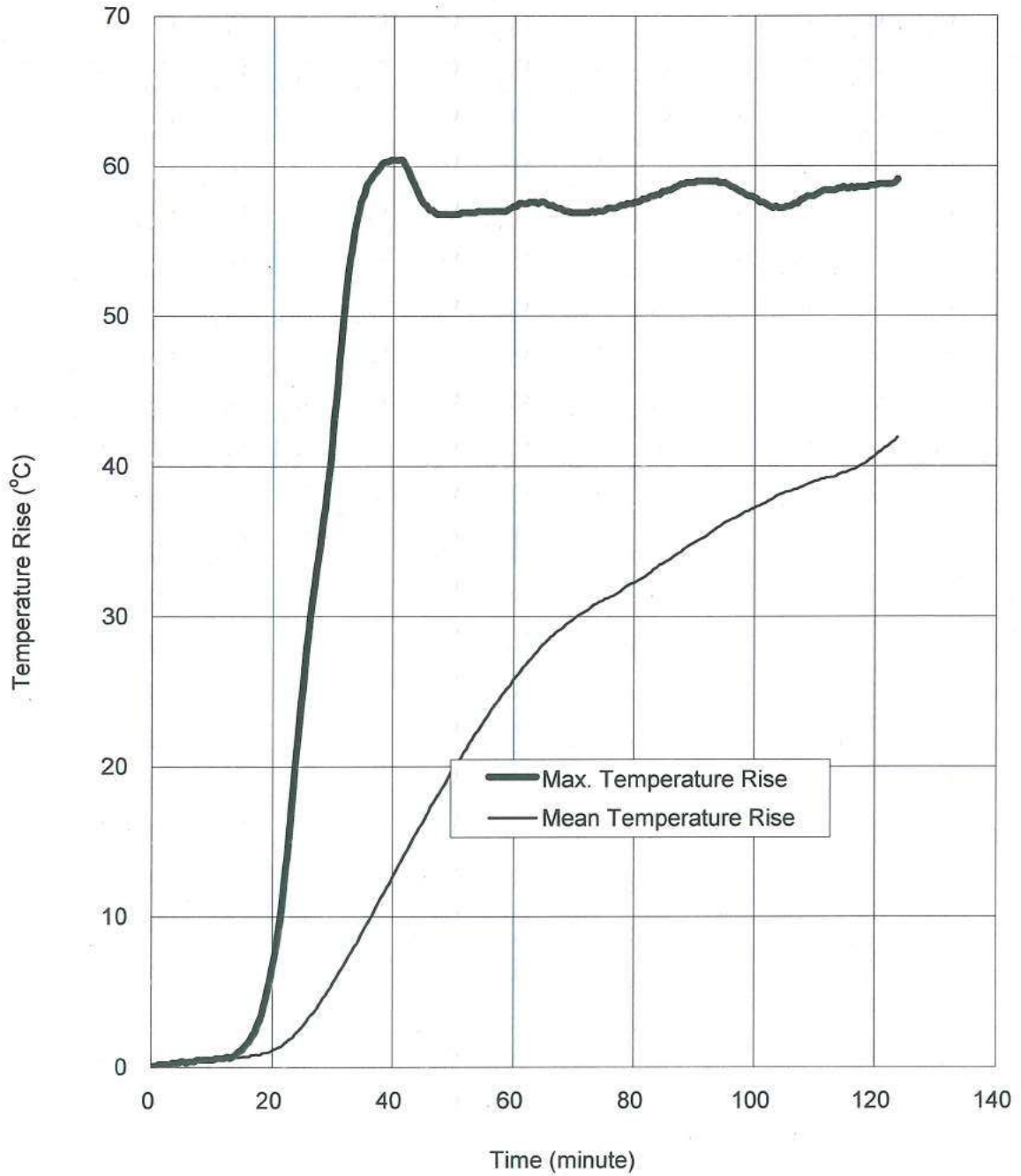


Figure 6 – Temperature rise of unexposed surface of surface 2.



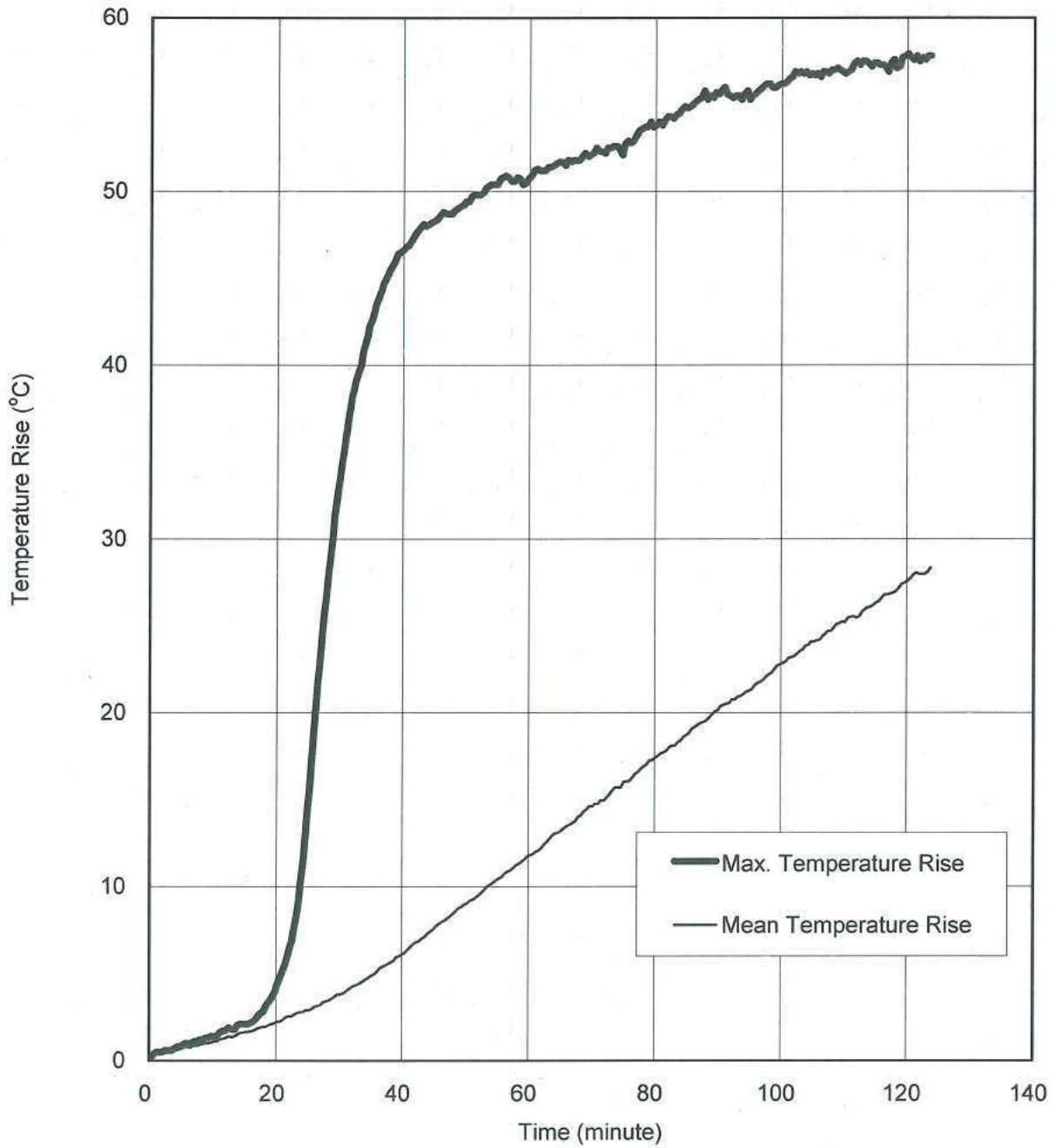


Figure 7 – Temperature rise of unexposed surface of surface 3.

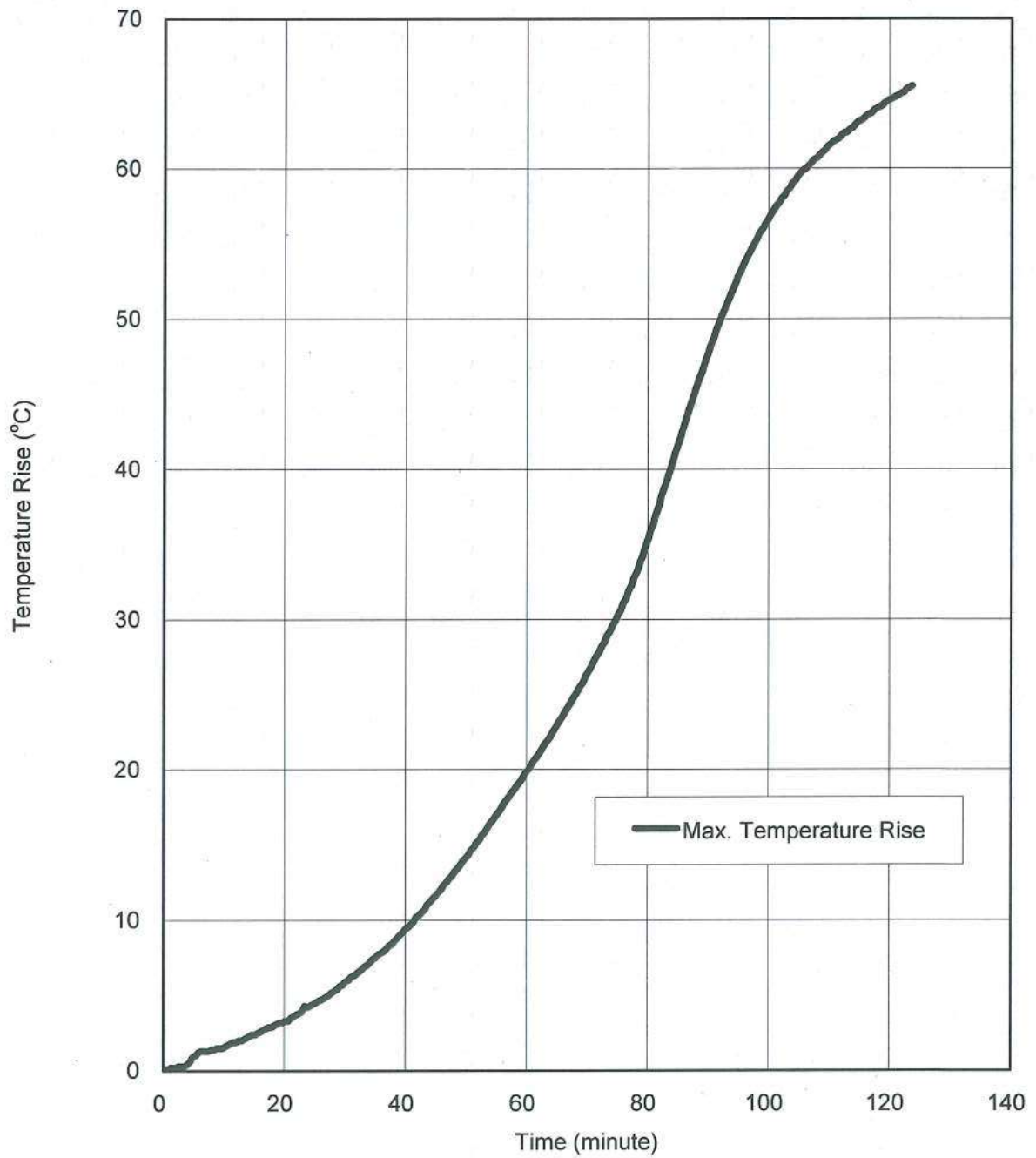


Figure 8 – Temperature rise of unexposed surface of surface 4.

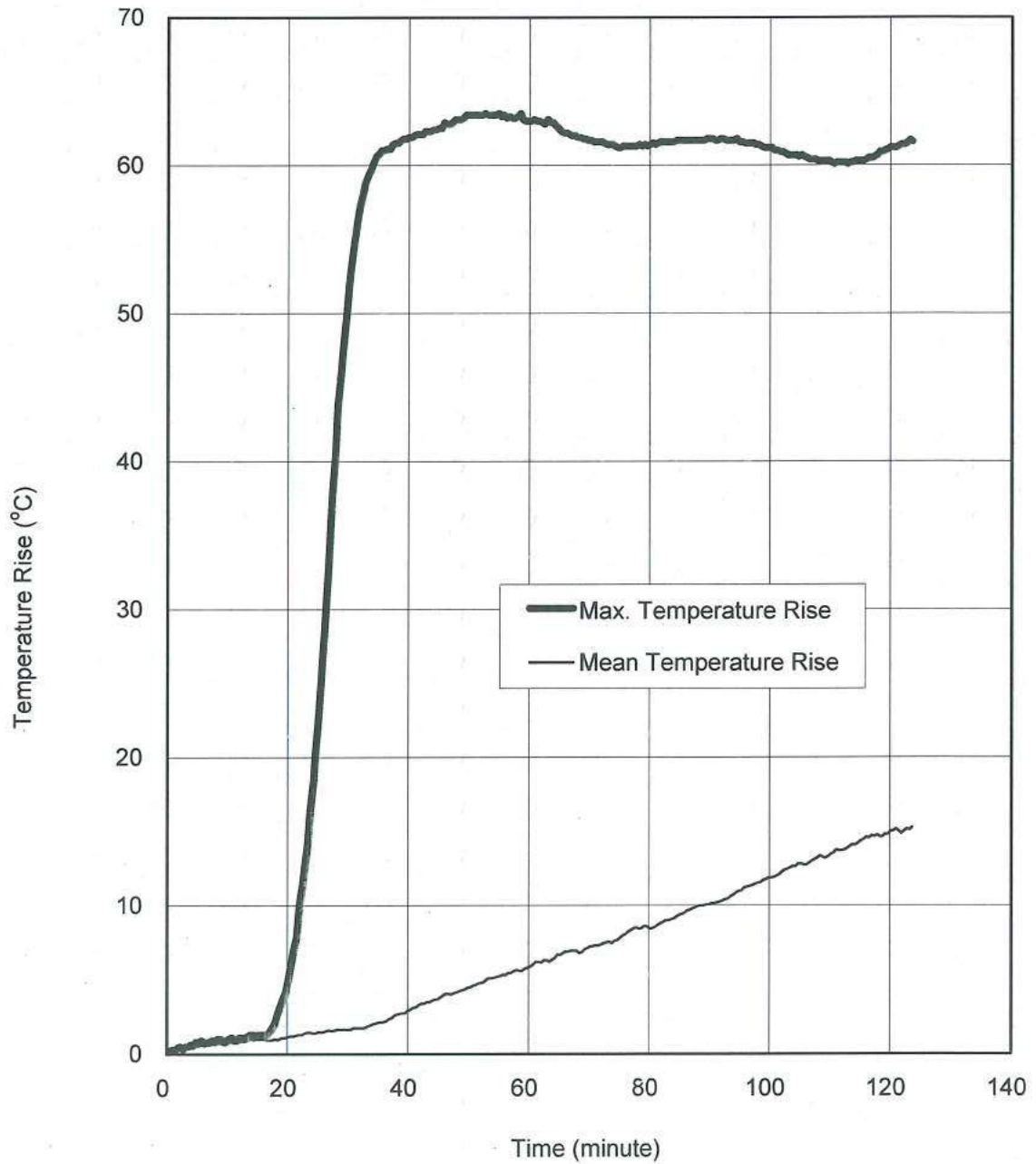


Figure 9 – Temperature rise of unexposed surface of surface 5.

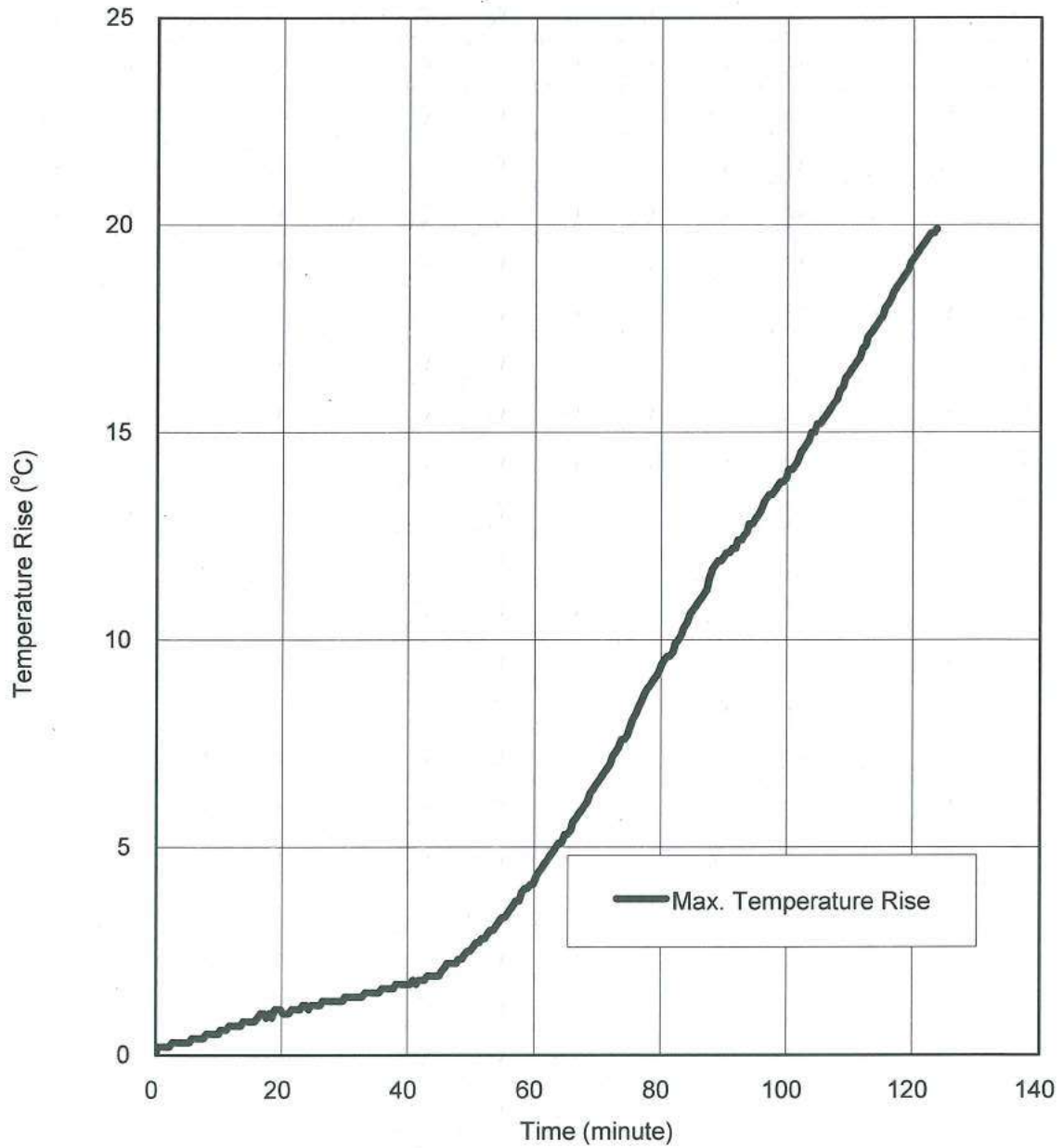


Figure 10 – Temperature rise of unexposed surface of surface 6.

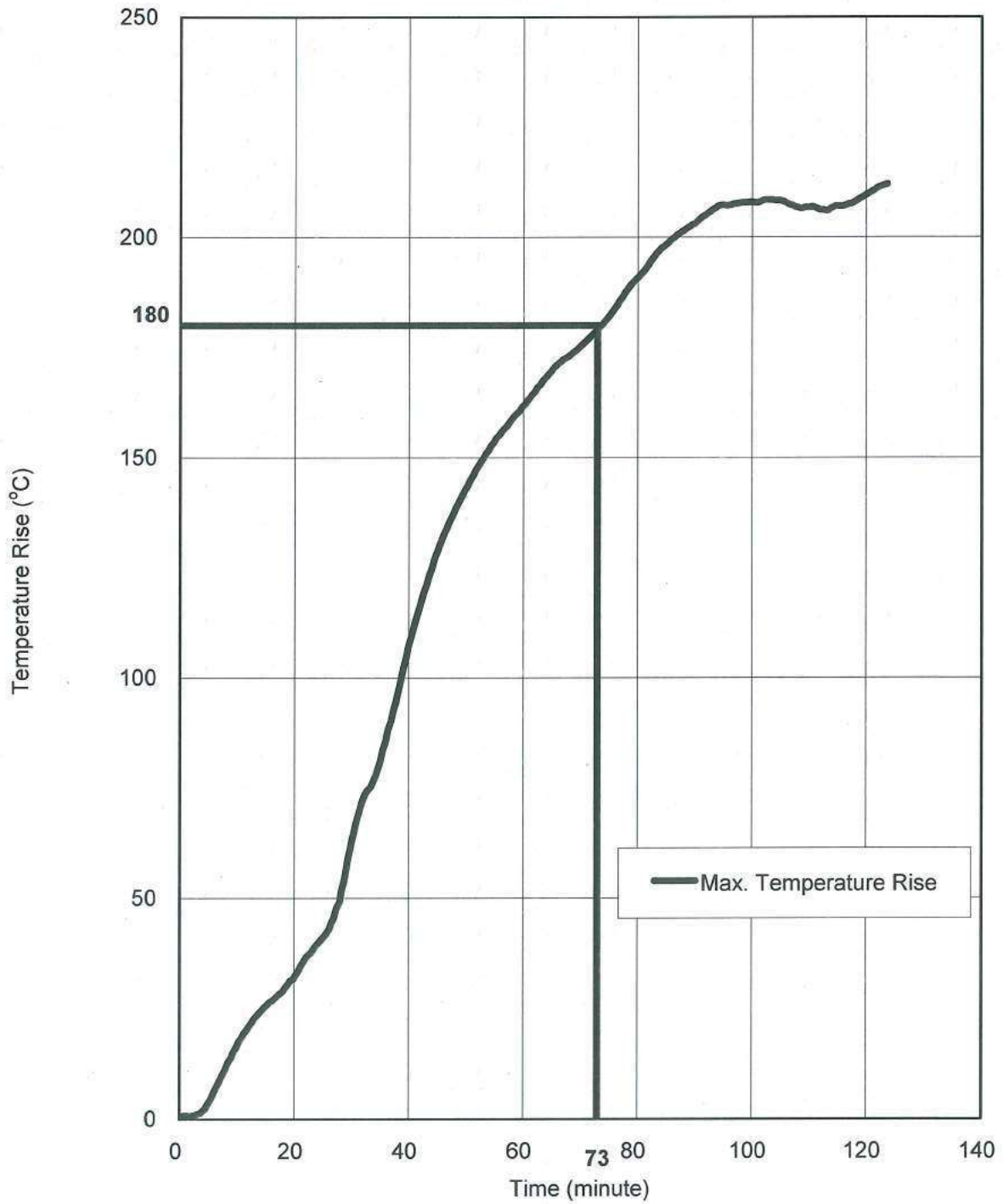


Figure 11 – Temperature rise of unexposed surface of horizontal linear gap seal

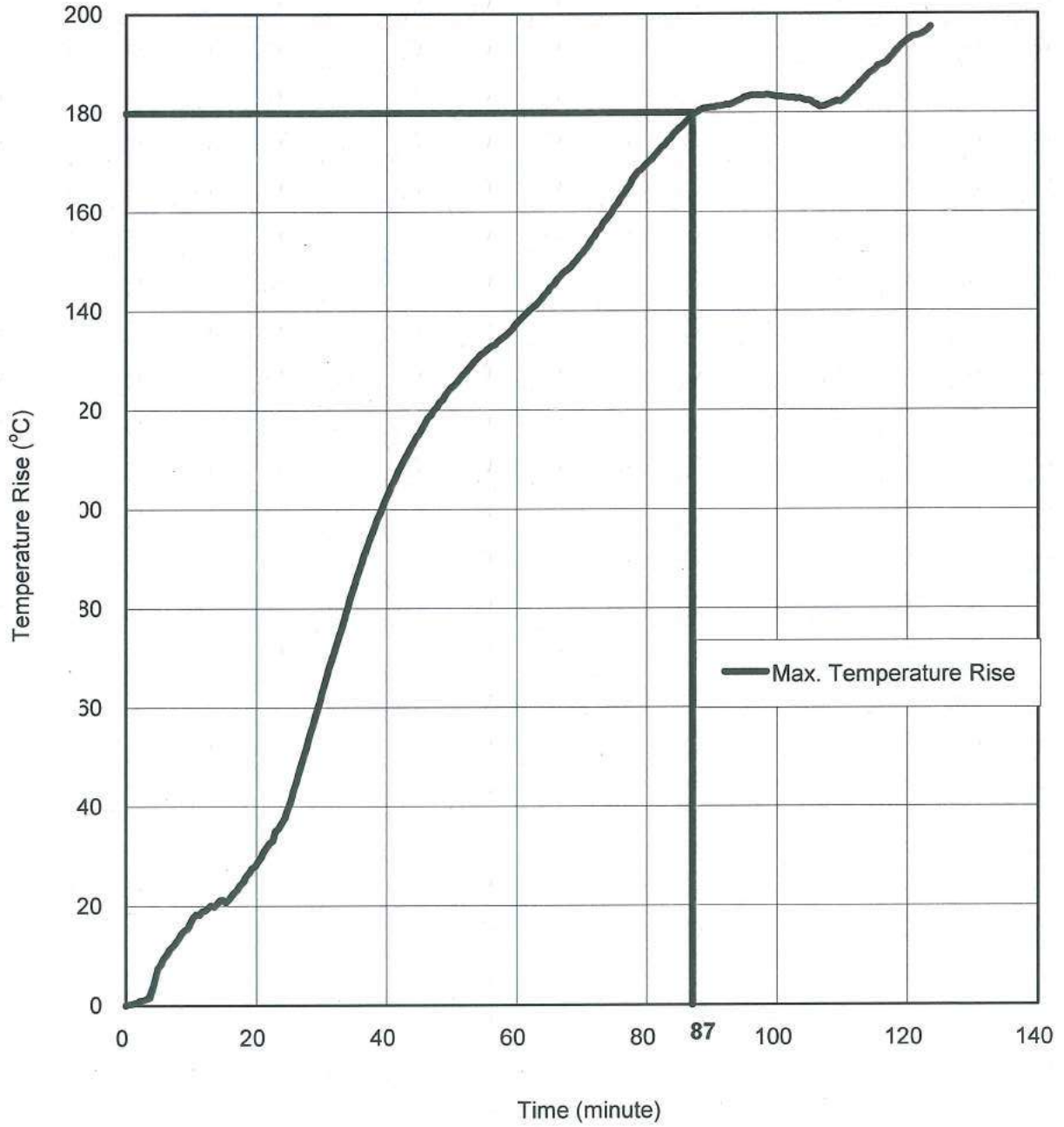


Figure 12 – Temperature rise of unexposed surface of left vertical linear gap seal

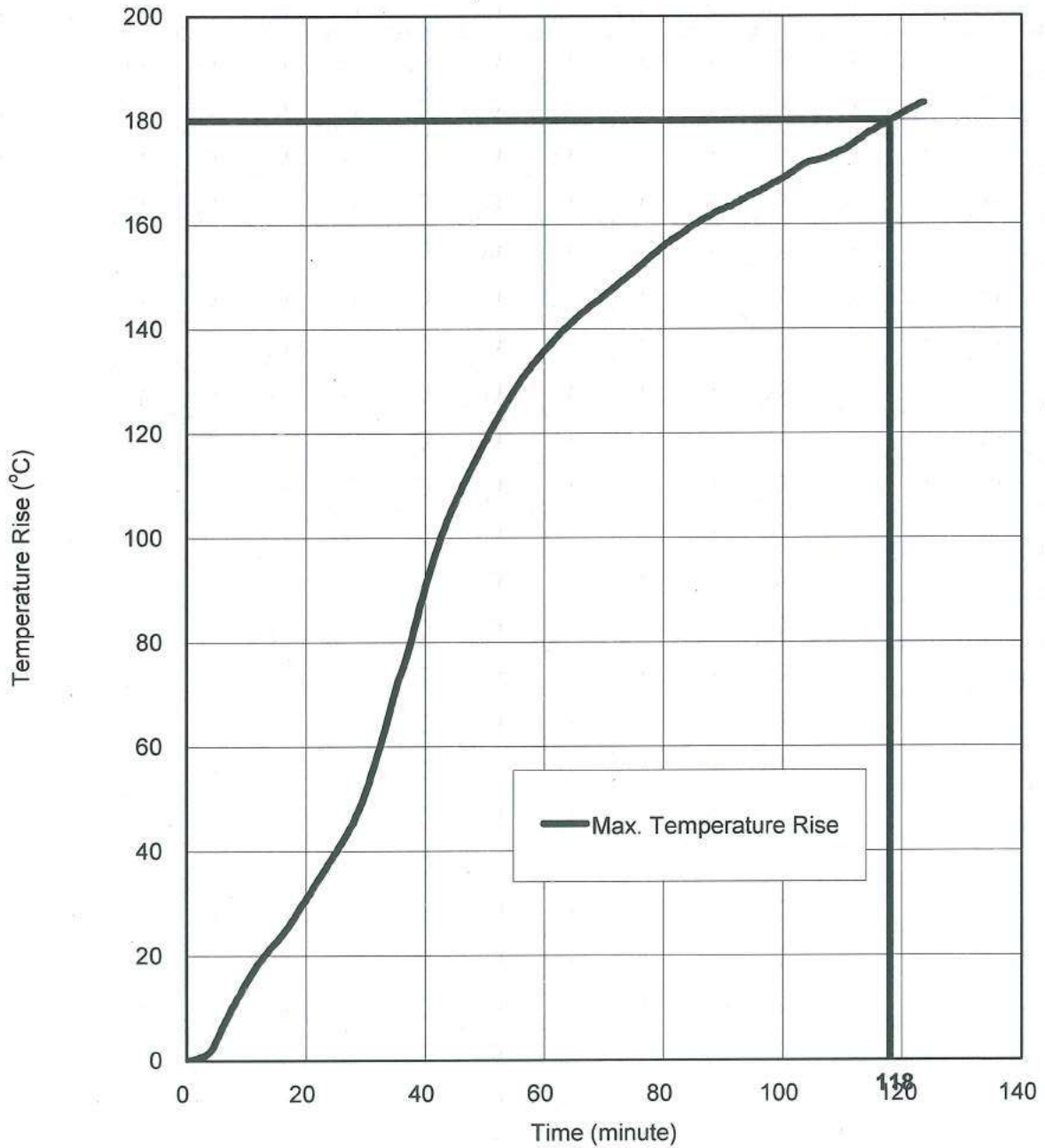


Figure 13 – Temperature rise of unexposed surface of right vertical linear gap seal

After the first 5 minutes of the test, the furnace pressure was maintained at  $0 \pm 3$  Pa relative to atmosphere, at 500 mm from the notional floor level.

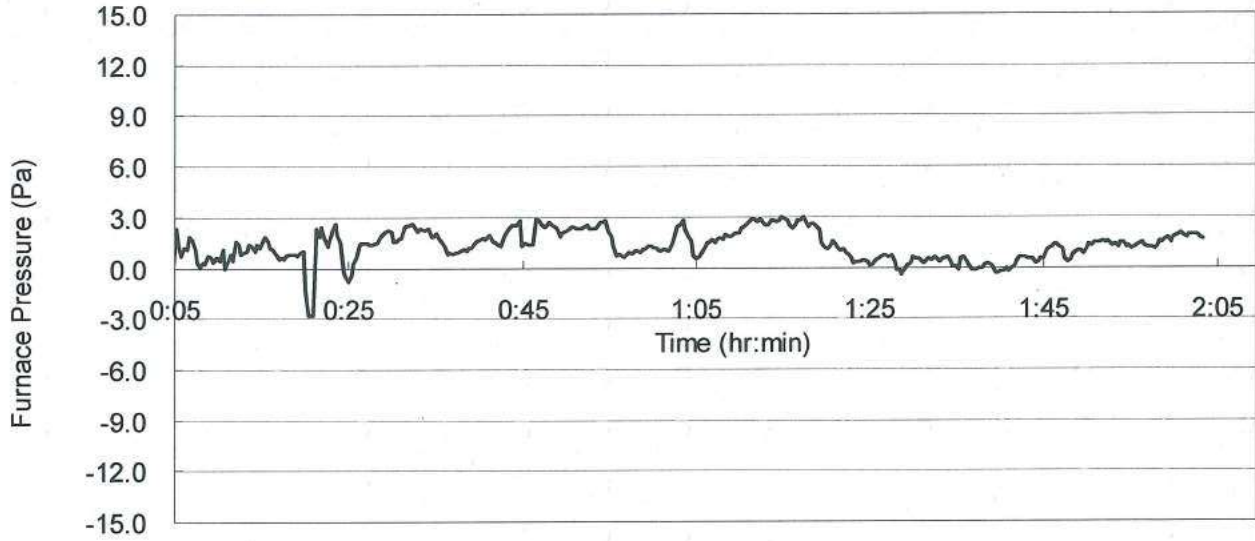


Figure 14 – Furnace pressure.

A radiometer placed at 1,000 mm away from the unexposed surface to measure the radiation of unexposed surface of the specimen.

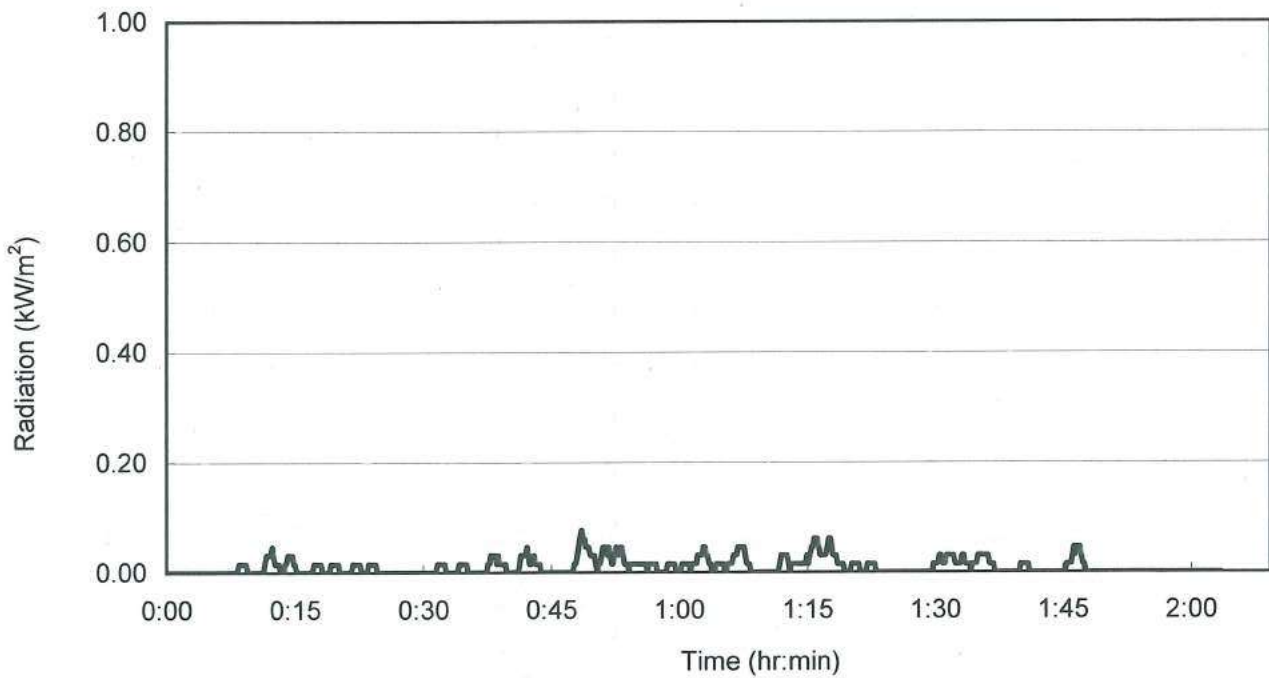


Figure 15 – Radiation.



**APPENDIX B – OBSERVATION**

Time (min.sec)	Exposed (E) or Unexposed (U)	Observation
00.00	-	Test started.
04.24	U	Smoke started releasing from the specimen.
30.00	U	The specimen satisfied the integrity and insulation requirements performance.
30.19	U	A hole developed between unexposed S20 and S21 at left vertical linear seal.
31.10	U	No significant change was at horizontal seal.
58.28	U	Cotton pad test applied at left vertical linear seal, near unexposed thermocouple S20 and the test passed.
60.00	U	The specimen satisfied the integrity and insulation requirements performance.
75.00	U	No significant change was at horizontal seal.
118.05	U	Cotton pad test applied at left vertical linear seal, near unexposed thermocouple S20 and the test passed.
120.00	U	The specimen satisfied the integrity requirements performance.
123.36	--	Test was terminated as requested by the test sponsor.

**APPENDIX C - DATA RECORDED DURING THE TEST**

Table 1 - Lateral deflection (mm) of the specimen during the test, as viewed from the unexposed face.

Location \ Time (mins)	Time (mins)							
	0	10	20	30	60	90	120	
D1	0	0	0	0	7	4	4	
D2	0	2	4	6	7	9	9	
D3	0	-1	1	4	5	5	6	
D4	0	0	0	1	0	3	2	

Positive deflection indicates movement towards the furnace (see also Figure 3 for the locations).

The maximum deflection of the specimen occurred at location D2 was 9 mm moving towards the furnace after a heating period of 90 minutes.

Table 2- Mean furnace temperature

Time (minute)	BS EN 1363-1 Standard Temp. Curve (°C)	Actual Mean Furnace Temp. (°C)
0	20	35
5	576	607
10	678	683
15	739	725
20	781	756
25	815	802
30	842	849
35	865	880
40	885	898
45	902	920
50	918	935
55	932	953
60	945	967
65	957	982
70	968	994
75	979	1009
80	988	1015
85	997	1023
90	1006	1028
95	1014	1034
100	1022	1025
105	1029	1048
110	1036	1057
115	1043	1067
120	1049	1076
123	1053	1080

Notes: Locations of furnace thermocouples are shown in Figure 1.

The test was terminated as requested by the test sponsor after a heating period of 123 minutes.

Table 3 - Time and related temperature rise measured by thermocouples S1 – S4 & S6 - S22.

Time (minute)	S1	S2	S3	S4	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	8	5	1
10	0	0	1	1	0	1	1	1	0	0	0	0	1	1	1	1	1	9	17	17	4
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	21	21	10
20	1	1	1	2	1	1	2	3	1	7	1	1	1	5	1	1	1	21	29	22	17
25	4	1	4	4	1	2	6	6	1	26	1	1	1	23	4	1	1	29	41	29	21
30	9	2	7	7	2	5	12	11	2	43	2	2	2	52	28	1	1	37	63	34	30
35	14	3	13	12	3	10	19	20	3	58	5	4	2	61	58	2	1	56	85	39	38
40	18	4	18	17	6	14	26	27	4	60	13	8	3	62	61	2	2	76	103	44	45
45	21	6	23	22	10	18	31	33	5	58	21	13	4	63	62	2	2	91	115	47	52
50	24	8	26	26	15	22	34	37	7	57	25	17	5	63	63	2	3	100	125	53	69
55	27	11	29	29	19	25	36	40	9	57	30	19	6	64	63	2	3	107	132	62	78
60	29	14	31	31	23	27	38	42	11	57	34	21	7	63	63	3	4	111	137	73	89
65	31	17	33	34	27	29	39	44	13	58	36	23	8	62	62	3	5	116	145	85	98
70	32	20	34	35	29	30	41	44	15	57	36	23	9	62	61	4	7	122	152	93	100
75	33	22	35	36	31	33	42	44	18	57	38	24	11	61	61	4	8	129	161	101	102
80	34	23	35	37	32	34	43	46	20	58	39	25	12	61	61	5	9	138	170	109	110
85	35	24	36	39	34	35	45	47	22	58	40	26	13	62	61	5	11	144	177	117	117
90	36	26	38	41	35	36	46	48	24	59	41	26	14	62	61	6	12	148	181	122	124
95	38	27	39	42	36	37	48	49	26	59	41	27	15	62	61	7	13	151	183	125	118
100	38	28	40	44	36	38	49	51	29	58	42	28	16	61	61	8	14	155	183	128	123
105	39	29	41	45	37	39	49	52	32	57	43	29	17	61	60	9	15	156	183	131	131
110	39	30	42	46	39	40	49	53	34	58	44	30	18	60	60	10	17	159	183	133	133
115	40	31	42	46	40	42	49	53	37	59	45	30	19	60	59	11	18	162	189	137	133
120	41	32	43	47	41	42	51	54	39	59	45	31	20	61	59	12	19	165	195	142	134
123	42	33	44	49	42	42	53	55	40	59	46	31	20	62	60	12	20	166	197	144	135

Notes: Locations of thermocouples S1 – S4 & S6 - S22 are shown in Figure 2.

The test was terminated as requested by the test sponsor after a heating period of 123 minutes.

Table 4 - Time and related temperature rise measured by thermocouples S23 – S43.

Time (minute)	S23	S24	S25	S26	S27	S28	S29	S30	S31	S32	S33	S34	S35	S36	S37	S38	S39	S40	S41	S42	S43
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	2	0	2	2	3	2	1	1	1	0	1	1	1	0	0	0	1	0	1	1	4
10	10	1	11	7	16	8	1	1	1	1	1	1	1	0	1	1	2	1	2	8	15
15	20	1	20	15	25	14	1	2	1	1	1	2	1	1	1	2	1	3	15	22	
20	30	2	31	22	33	19	2	4	2	2	2	3	1	1	1	3	1	4	21	31	
25	39	3	40	31	41	24	2	16	3	2	2	4	2	1	2	1	5	2	6	29	40
30	55	4	58	39	63	29	3	34	6	2	3	5	2	1	2	2	6	3	33	38	52
35	76	5	73	45	81	42	7	43	10	3	4	6	3	2	3	2	8	4	43	48	71
40	99	7	89	57	107	53	16	47	16	4	5	7	4	2	4	3	9	5	51	64	91
45	117	10	104	75	129	101	24	48	23	5	6	9	5	2	4	3	12	6	67	79	107
50	132	15	119	88	143	120	30	49	28	6	8	10	6	3	5	4	14	8	79	92	118
55	141	20	130	101	154	132	34	50	32	6	9	12	7	4	6	5	17	10	89	103	128
60	151	25	136	111	161	140	36	51	35	7	10	14	7	4	7	6	20	14	96	111	136
65	160	30	146	120	170	149	39	52	38	9	11	15	8	5	8	6	23	19	101	118	142
70	169	33	149	127	175	155	40	52	40	9	13	17	8	6	9	7	27	24	105	123	146
75	176	36	152	132	182	162	41	53	41	10	14	18	9	7	10	8	30	29	109	127	151
80	183	38	161	139	191	172	43	54	42	11	15	20	9	8	11	9	35	34	113	132	156
85	187	39	165	144	198	180	44	55	42	12	16	21	10	9	12	9	42	38	116	135	160
90	188	41	170	149	203	186	46	56	43	14	17	23	10	10	13	10	48	42	119	138	163
95	193	42	169	150	207	187	45	55	44	14	18	24	10	12	14	11	53	45	121	141	166
100	197	43	174	153	208	190	47	56	44	15	20	26	11	13	15	11	57	48	123	144	169
105	196	43	180	156	208	193	48	57	44	16	21	27	11	14	16	12	60	50	124	146	172
110	197	44	181	159	207	197	48	57	45	17	22	29	11	16	17	13	62	52	124	147	174
115	200	44	185	164	207	202	49	57	46	18	22	30	12	17	18	13	63	53	125	148	178
120	205	44	188	167	210	205	49	58	46	19	23	32	12	18	19	14	65	54	127	151	181
123	207	44	192	169	212	206	49	58	46	19	24	33	12	19	20	14	66	55	128	152	183

Notes: Locations of thermocouples S23 – S43 are shown in Figure 2.

The test was terminated as requested by the test sponsor after a heating period of 123 minutes.

## APPENDIX D – INFORMATION FROM TEST SPONSOR

(The information provided by the test sponsor, which was not verified by RED or unless specified.)

Item	Description
<b>1</b>	<p><b>Frame Section</b></p> <p>Manufacturer : Pyrotech Fire Proof Engineering Ltd.</p> <p>Overall dimensions : 3,810 mm wide x 3,795 mm high.*</p> <p>Overall section sizes : 140 mm x 140 mm.</p> <p>Materials : Mild steel.</p> <p>Pressure Bar : 3 mm thick G.M.S. at unexposed side</p> <p>Fixing method to frame : 8 mm thick G.M.S. brackets fixed by M12 anchor bolts.</p>
<b>2</b>	<p><b>Hollow Section</b></p> <p>Sizes : 80 mm x 80 mm x 8 mm thick and 25 mm x 25 mm x 3 mm thick.</p> <p>Material : Mild steel.</p> <p>Joint method : Sleeve joints and welding.</p>
<b>3</b>	<p><b>Fire Rated Board</b></p> <p>Brand : Promatect 50.</p> <p>Material : Calcium silicate.</p> <p>Thickness : 2 layers of 15 mm thick.*</p> <p>Applied location : All around the steel hollow and both sides of framework.#</p> <p>Density : 1,100 kg/m<sup>3</sup>.</p> <p>Fixing method : Fixed by M5 x 80 mm machine screws at max. 300 mm c/c.</p>
<b>4</b>	<p><b>Framework</b></p> <p>Material : G.M.S. channels.</p> <p>Sizes : Top and bottom runners: 50 mm by 50 mm by 1 mm thick.* Vertical studs: 53 mm x 30 mm x 1 mm thick.*</p> <p>Fixing method : Fixed by M5 x 80 mm machine screws at max. 300 mm c/c to the hollow sections.#</p>

Notes: \* Verified on site by RED.

# As shown on the test construction.

**Information from Test Sponsor (Con't)**

**(The information provided by test sponsor, which is not verified by RED or unless specified.)**

Item	Description
<p><b>5</b></p>	<p><b>Glazing Panels</b></p> <p>Manufacturer : Wai Shing Glass Industries (HK) Ltd.</p> <p>Nominal thickness : 8 mm clear tempered glass.*</p> <p>Aperture sizes : Pane 'A': 2,360 mm wide x 3,130 mm high.*            Pane 'B': 730 mm wide x 3,130 mm high.*            Pane 'C': 500 mm wide x 3,130 mm high.*            Pane 'D': 2,300 mm wide x 450 mm high.*            Pane 'E': 730 mm wide x 450 mm high.*            : Pane 'F': 500 mm wide x 450 mm high.*</p> <p>Vision sizes : Pane 'A': 2,300 mm wide x 3,070 mm high.*            Pane 'B': 670 mm wide x 3,070 mm high.*            Pane 'C': 440 mm wide x 3,070 mm high.*            Pane 'D': 2,300 mm wide x 390 mm high.*            Pane 'E': 670 mm wide x 390 mm high.*            Pane 'F': 440 mm wide x 390 mm high.*</p> <p>Fixing method : Sandwiched by 15 mm wide by 5 mm thick ceramic glazing tapes.#</p>
<p><b>5</b></p>	<p><b>Setting Board</b></p> <p>Brand : HINGS.</p> <p>Materials : Neoprene Gaskets.</p> <p>Overall sizes : 8 mm by 8 mm by 60 mm long.</p> <p>Applied location : Applied at bottom of all glazing panels.</p>
<p><b>6</b></p>	<p><b>Sealant</b></p> <p>Brand : "Hilti" CP 606 firestop sealant .</p> <p>Applied location : Perimeter of fire rated boards.#</p>

\* and # refer to page 32

**Information from Test Sponsor (Con't)**

(The information provided by test sponsor, which is not verified by RED or unless specified.)

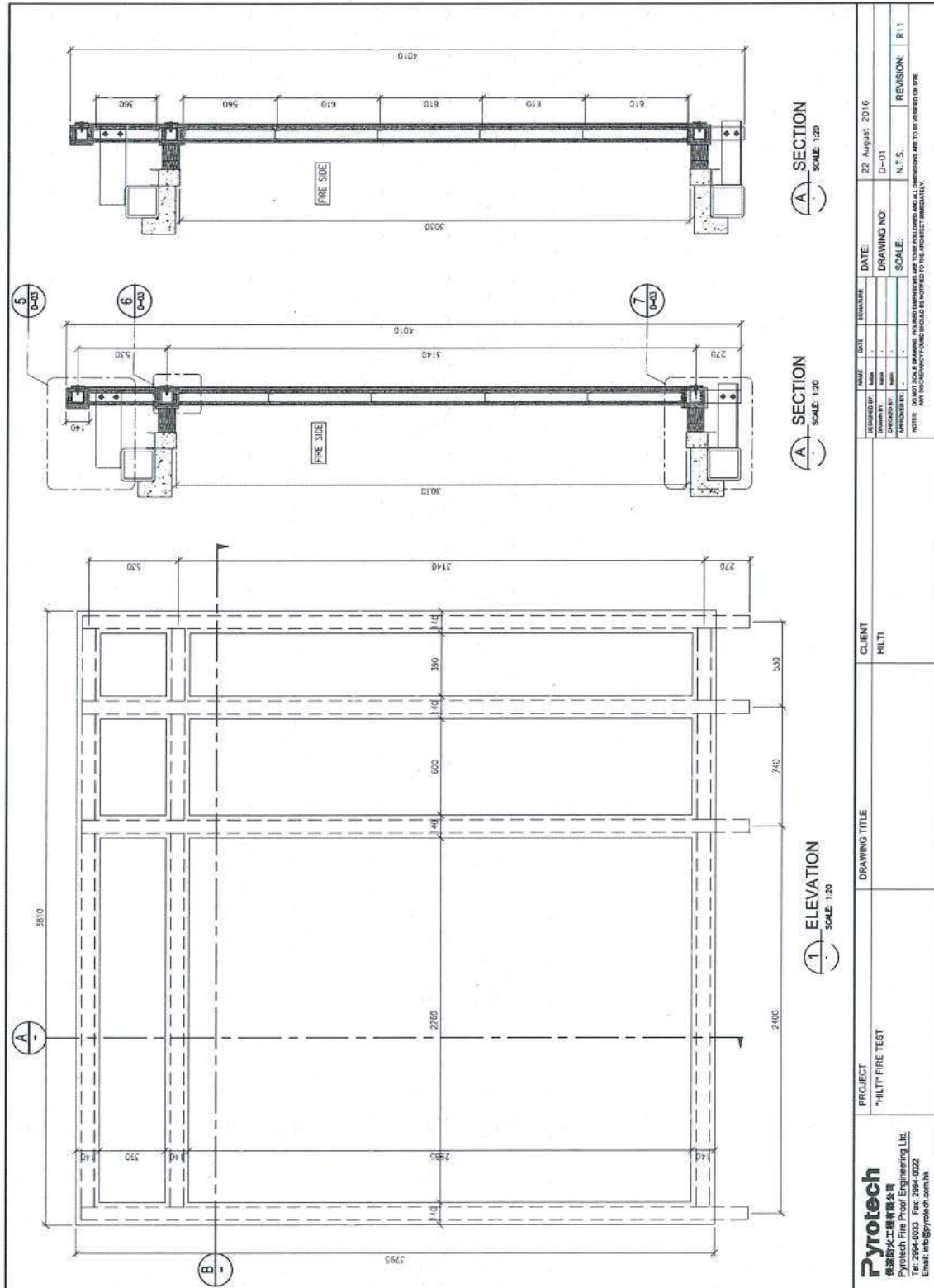
Item	Description
<b>7</b>	<b>Glass Tape</b> Brand : "Kerafix" ceramic paper. Overall sizes : 15 mm wide by 5 mm thick.* Applied location : Edges of the glass were lined on both sides.
<b>8</b>	<b>Expansion joint</b> Size : 50 mm height.
<b>9</b>	<b>Firestop Joint Spray</b> Brand : Hilti CFS-SP WB. Overall thickness : 3 mm wet thickness (approx. 1.5 mm dry thickness). Applied location : Applied both sides of left vertical linear gap seal.# Applied unexposed side of horizontal linear gap seal and right vertical linear gap seal. Minimum 12.5 mm overlap on substrates.#
<b>10</b>	<b>Mineral Wool</b> Brand : ROCKWOOL RockSafe. Dimension : 1,200 mm x 600 mm x 135 mm. Density : 60 kg/m <sup>3</sup> . Applied location : Horizontal and vertical linear joints, for details please refer to the construction drawings.

\* and # refer to page 32

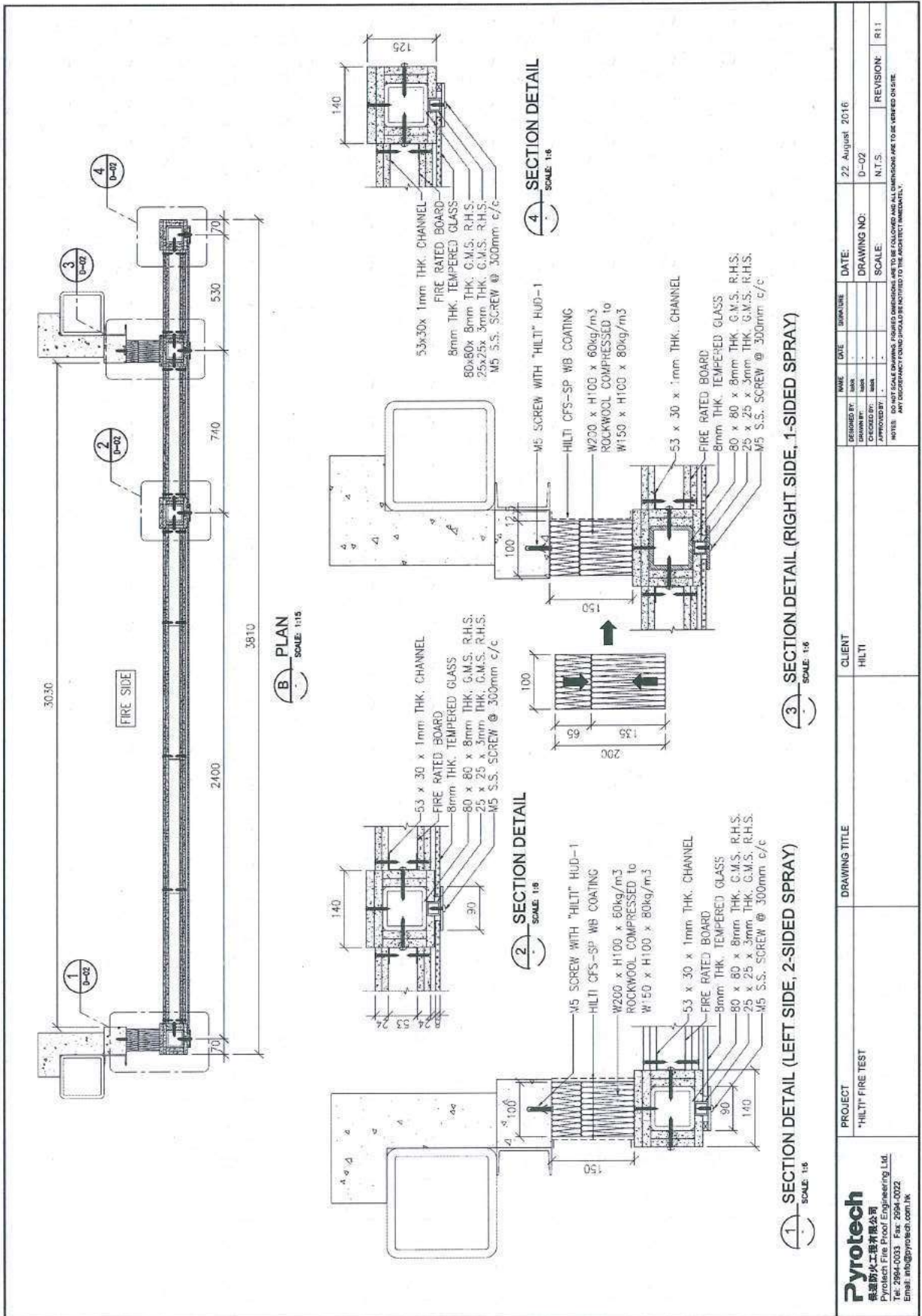


### Drawings from Test Sponsor

(The drawings provided by test sponsor, which was not verified by RED, except those specified and described in 'information from test sponsor'.)

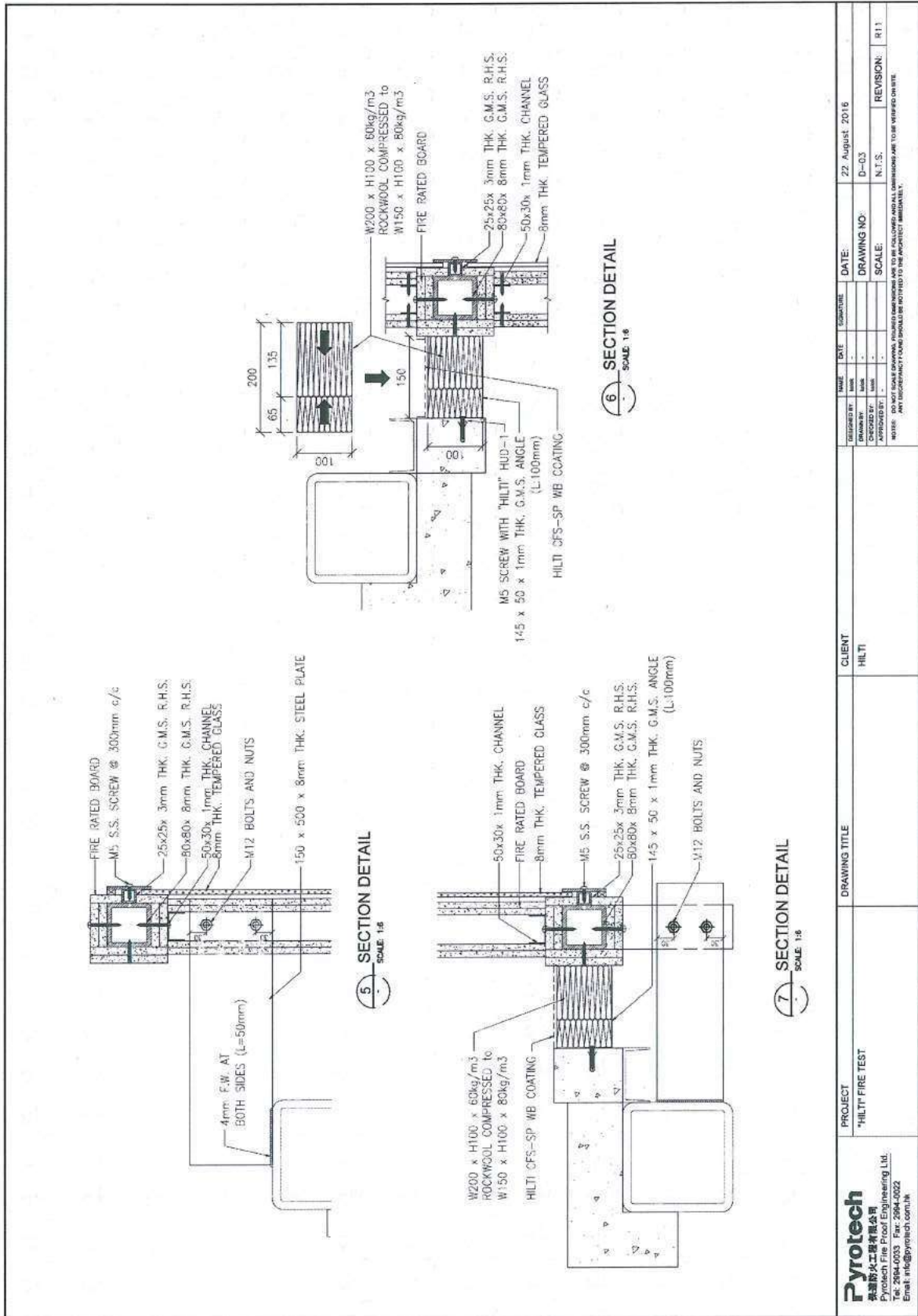


<b>Pyrotech</b> 保源防火工程有限公司 Pyrotech Fire Proof Engineering Ltd. Tel: 2994-0033 Fax: 2994-0022 Email: info@pyrotech.com.hk	PROJECT	"HILTI" FIRE TEST	DRAWING TITLE	CLIENT	HILTI	
	DESIGNED BY	DATE	22 August 2016	DRAWING NO.	D-01	REVISION
CHECKED BY	SCALE	N.T.S.	NOTE: ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE TO BE INTERPRETED AS PER THE PROJECT CONTRACT DOCUMENTS.			



DESIGNED BY: [blank]	DATE: 22 August 2016
DRAWN BY: [blank]	DRAWING NO: D-02
CHECKED BY: [blank]	SCALE: N.T.S.
APPROVED BY: [blank]	REVISION: R11
NOTES: 1. ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN MILLIMETERS AND UNLESS OTHERWISE SPECIFIED ARE TO BE USED ON SITE. 2. ANY DISCREPANCY FOUND SHOULD BE NOTIFIED TO THE ARCHITECT IMMEDIATELY.	
PROJECT: "HILTI" FIRE TEST	CLIENT: HILTI
DRAWING TITLE	

**Pyrotech**  
 保通防火工程有限公司  
 Pyrotech Fire Proof Engineering Ltd.  
 Tel: 2994-0033 Fax: 2994-0022  
 Email: info@pyrotech.com.hk



- End of report -

PROJECT		DRAWING TITLE		CLIENT		DATE		DATE	
"HILTI" FIRE TEST		"HILTI" FIRE TEST		HILTI		22 August, 2018		22 August, 2018	
Pyrotech 華測防火工程師有限公司 Pyrotech Fire Proof Engineering Ltd. Tel: 2884-0033 Fax: 2884-0022 Email: info@pyrotech.com.hk						DRAWING NO:		D-03	
						SCALE:		N.T.S.	
						APPROVED BY:		REVISION:	
						N.T.S.		R11	
						NOTES:		DO NOT SCALE DRAWING. FINISHED DIMENSIONS ARE TO BE FOLLOWED AND ALL DIMENSIONS ARE TO BE VERIFIED ON SITE. ANY DISCREPANCY FOUND SHOULD BE REPORTED TO THE PROJECT MANAGER.	

## ASSESSMENT REPORT

### Fire Resistance Performance of Vertical Fire Barrier Systems

**Report No.:** R16J25-1A  
**Issue Date:** 6 October, 2016  
**Date of Review:** 5 October, 2018

#### 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
06/10/2016	0	Initial version

## FIRE RESISTANCE PERFORMANCE OF VERTICAL FIRE BARRIER SYSTEMS

### 1 INTRODUCTION

This assessment report presents an appraisal of the "Hilti" vertical fire barrier systems that installed at the void between the curtain wall facade and vertical separation wall, which composed of mineral wool backing applied with 'Hilti' CFS-SP WB on single side or double sides. The systems are similar to that as tested and described in R16E18-1A issued by Research Engineering Development Facade Consultants Limited (RED). This assessment 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 vertical fire barrier systems are required to provide a fire resistance performance of up to 120 minutes integrity and insulation with respect to BS EN 1364 - 3: 2006, depends on the design.

### 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 relating to specific modifications will be stated in the report. It is also assumed that the supporting structures to which the perimeter of the target 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 fire 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 Evidences

Report no.	Sections	Description
<b>Primary Test Evidence</b>		
R16E18-1A	4.1	Supporting test evidence for general construction of the vertical linear gap sealing system used with a fire rated curtain wall system

### 3.2. Primary Test Evidence

#### 3.2.1. RED Test Report no. R16E18-1A

A fire resistance test in accordance with BS EN 1364-3: 2006 on a specimen of fully insulated curtain wall system incorporated with 'Hilti CFS-SP WB' firestop joint spray at linear gap seals had been subjected to a test in accordance with BS EN 1364-3: 2006, in order to determine its fire resistance performance. As requested by the test sponsor, the specimen was mounted within concrete lined specimen holder by test sponsor. The specimen was asymmetrical and only one side was tested that was internal exposure.

The specimen had overall dimensions of 3,810 mm wide by 3,795 mm high. It was comprised of a steel frame and six numbers of glazed panels, namely panes 'A' to 'F' and 3 numbers of linear gap seals with 'Hilti CFS-SP WB' firestop joint spray. The frame was constructed with 80 mm by 80 mm by 8 mm thick mild steel hollow sections surrounded by 2 layers of nominal 15 mm thick calcium silicate boards at four sides and nominal 25 mm by 25 mm by 3 mm thick mild steel hollows with 3 mm thick G.M.S. pressure bar were welded at unexposed side. The steel frame was fixed to concrete testing frame by M12 anchor bolts with 150 mm by 500 mm by 8 mm thick G.M.S. steel plates at each mullion at bottom and top edges. Both vertical edges were without fixing. Pane 'A' was with vision sizes of 2,300 mm wide by 3,070 mm high. Pane 'B' was with vision sizes of 670 mm wide by 3,070 mm high. Pane 'C' was with vision sizes of 440 mm wide by 3,070 mm high. Pane 'D' was with vision sizes of 2,300 mm wide by 390 mm high. Pane 'E' was with vision sizes of 670 mm wide by 390 mm high. Pane 'F' was with vision sizes of 440 mm wide by 390 mm high. All panes were comprised of nominal 8 mm thick glazed panel. The glazed panels was sandwiched by 15 mm wide by 5 mm thick ceramic glazing tapes between the frame and panes.

Nominal 100 mm thick with 60 kg/m<sup>3</sup> density mineral wool was filled up the linear gap seals. Approximately 1.5 mm thick dry 'Hilti CFS-SP WB' firestop joint spray applied at unexposed side of right vertical and horizontal linear gap seals and at both sides of left vertical linear gap seals. The linear gaps at the perimeter of the curtain wall system were sealed with the use of nominal 100 mm thick by 150 mm wide mineral wool, the 150 mm wide side being the width of the gap as well. The width of 150 mm was comprised of two layers of wool, each 65 mm thick and 135 mm thick respectively, compressed from the total of 200 mm thick to 150 mm thick, friction fitted into the gap. The original density of the mineral wool was 60 kg/m<sup>3</sup>.



The specimen satisfied the performance requirements specified in BS EN 1364-3: 2006 for the following periods:

Surface or linear gap seal	Integrity			Insulation	
	Cotton pad	Gap gauge	Sustained flaming	Mean temperature rise	Maximum temperature rise
Surface 2 <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 3 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 4 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	N/A	123 Minutes
Surface 5 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	123 Minutes	123 Minutes
Surface 6 <sup>^</sup>	123 Minutes (No failure)	N/A	123 Minutes (No failure)	N/A	123 Minutes
Horizontal linear gap seal <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	73 Minutes
Left vertical linear gap seals <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	87 Minutes
Right vertical linear gap seals <sup>^</sup>	123 Minutes (No failure)	123 Minutes (No failure)	123 Minutes (No failure)	N/A	118 Minutes

The test was discontinued after a heating period of 123 minutes (See R16E18-1A full for details).

## 4 PROPOSAL

### 4.1 Fire Resistance Performance of Vertical Fire Barrier Systems

#### Proposal

The proposed systems are fully insulated vertical fire barrier systems to be fitted in the vertical linear void between the curtain walling system and concrete separation wall. The fitting of the vertical fire barrier systems shall remain the same as that tested in R16E18-1A.

The fire barrier shall be composed of a base mineral wool and sprayed with the 3 mm thick (wet thickness) 'Hilti CFS-SP WB' applies on the non-exposure side only. The maximum gap width that this system can be applied is 150 mm. The design of the mineral wool shall have the dimensions as mentioned below:

Mineral wool	Thickness	Density
Design 1	At least 120 mm thick	At least 80 kg/m <sup>3</sup>
Design 2	At least 100 mm thick	At least 100 kg/m <sup>3</sup>

The vertical fire barrier systems shall satisfy 120 minutes integrity and insulation performance if tested under the BS EN 1364-3: 2006.

#### Discussion

In primary test evidence, R16E18-1A, which reported a test of the curtain walling systems with the perimeter voids between the curtain wall systems and the concrete wall and slab surroundings fitted with the fire barrier systems. For the two vertical perimeter gap, fire barriers with two different designs were used. In this appraisal, only the design of right vertical edge is concerned. For the right vertical edge, the gap was sealed with the use of nominal 100 mm thick by 150 mm wide mineral wool, the 150 mm wide side being the width of the gap as well. The width of 150 mm was comprised of two layers of wool, each 65 mm thick and 135 mm thick, respectively, compressed from the total of 200 mm thick to 150 mm thick, friction fitted into the gap. The original density of the mineral wool was 60 kg/m<sup>3</sup>, with the compression of the mineral wool by 25%, the nominal density of the 150 mm thick mineral wool was calculated as 80 kg/m<sup>3</sup>. The mineral wool was applied with the 3 mm thick (wet thickness) 'Hilti CFS-SP WB' on the non-fire side. The spray overlapped the surrounding substrate by a distance of 15 mm wide. The system achieved the fire resistance performance of 123 minutes integrity and 118 minutes insulation.

The tested system achieved 118 minutes insulation which was just a slight deficiency of 1.7% compared to the required insulation performance of 120 minutes. In order to enhance the insulation performance, it is proposed that either increase the thickness of the mineral wool or the density of the mineral wool. The proposal to increase the density of the mineral wool from nominal 80 kg/m<sup>3</sup> to 100 kg/m<sup>3</sup> which is equivalent to an increase by 20% of the density, compared to the required compensation for the required deficiency of 1.7%, the proposal is considered acceptable. Alternatively, the insulation performance can be improved by increasing the thickness of the mineral wool from 100 mm to 120 mm which is also increase by 20% of the thickness.

## 5 CONCLUSION

The proposed vertical linear gap sealing systems with the general construction referenced to that tested and described in R16E18-1A may be modified as described in section 4. The proposed systems will satisfy a fire resistance performance up to 120 minutes integrity and insulation criteria with respect to BS EN 1364-3: 2006, depends on the design.

## 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 -

**Hilti (Hong Kong) Limited**

701-704 and 708A&B, Tower A Manulife Financial Centre,  
223 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong

Date: 17 July 2023

Our Ref: R23G16-1A Issue 1

TO WHOM IT MAY CONCERN

**Re: Assessment Report no. R16J25-1A – Fire Resistance Performance of Hilti 'CFS-SP WB' Vertical Fire Barrier Systems for 120 Minutes Integrity and Insulation With Respect to BS EN 1364-3: 2006**

The RED assessment report no. R16J25-1A was issued on 6 October 2016 and expired on 5 October 2018. The specification and interpretation of test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. Whilst RED has conducted a review of the procedures adopted for the supporting data to ensure they are consistent with current practices, the assessment report no. R16J25-1A has been reviewed and found satisfactory.

Therefore, it is recommended that the assessment report no. R16J25-1A is valid until 17 July 2026 and another review shall be undertaken by 16 July 2026.

**Declaration by the Applicant:**

By distributing this copy of technical review, we, Hilti (Hong Kong) Limited, confirmed that there have been no changes to the material specifications, nor the methods of construction of the test specimen considered in the original appraisal of assessment report no. R16J25-1A.

Yours Sincerely,

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

This document is confidential and remains the property of RED. If contradictory data or any related evidence becomes available to RED, the assessment will be unconditionally withdrawn and the sponsor will be notified. This document is based on the given information, in which is declared by report sponsor that no contradictory data has become available.

**SMOKE CONTROL TEST IN ACCORDANCE WITH ANNEX C of  
BS EN 12101: Part 1: 2005 + A1: 2006**

On the permeability of materials used for smoke barrier

**Test Report No.:** R16G23-1A  
**Sample Identification:** Q16C34  
**Issue Date:** 4 November, 2016

**Test Sponsor**

**Hilti (Hong Kong) Limited**

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

**APPROVED SIGNATORY:** \_\_\_\_\_



**DATE:** 4 NOV 2016

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

Hong Kong Accreditation Service (HKAS) has accredited Research Engineering Development Façade Consultants Limited (HOKLAS 091- TEST) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accreditation laboratories. The results shown in this test report were determined by this laboratory in accordance with its terms of accreditation. This report may not be reproduced except in full.

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## 1 SUMMARY

### Smoke control test conducted in accordance with Annex C of BS EN 12101: Part 1: 2005 + A1: 2006 on the permeability of materials used for smoke barrier

A specimen of materials used for smoke barrier had been subjected to the tests in accordance with Annex C of BS EN 12101: Part 1: 2005 + A1: 2006 with the test method referred to BS EN 1634-3: 2004, in order to determine the permeability from one side to the other under the ambient and medium temperature at pressure differences of 25 Pa. As requested by the test sponsor, the specimen was mounted within the specimen holder which was concrete lined at the vertical edges and steel plate lined at the horizontal edges. The specimen was fitted to the specimen holder with the fixing details as shown in the test sponsor's drawings (see the appendix). The specimen was asymmetrical and the leakage rates from one side of the material as instructed by the test sponsor was assessed for evaluation.

One specimen of materials used for smoke barrier had been submitted by the test sponsor, which had overall nominal dimensions of 1,000 mm high by 1,000 mm wide by 100 mm thick. The specimen was comprised of two pieces of 100 mm thick by 60 kg/m<sup>3</sup> density 'Roxul' mineral wool splice together. The sizes of the mineral wool were 1,000 mm high by 600 mm wide and 1,000 mm high by 400 mm wide. The mineral wool were installed such that they were flushed with the face of the specimen holder, while at the non-heat exposure face, a nominal 3 mm thick 'Hilti CFS-SP WB' was applied covering the whole surface of mineral wool and with an overlapping of 12.5 mm on the surrounding supporting construction. No any other mechanical fixing was used during the installation.

The smoke leakage rates of the specimens were summarized as below:

Test	Temp	Leakage rate $Q_{spec}$ (m <sup>3</sup> /h) at pressure difference of	Leakage rate per square meter (m <sup>3</sup> /h/m <sup>2</sup> ) at pressure difference of
		25 Pa	25 Pa
1	Ambient	1.64	1.64
2	Medium	1.64	1.64

## 2 INTRODUCTION

The specimen was tested in accordance with BS EN 12101: Part 1: 2005 + A1: 2006 with the test method referred to BS EN 1634-3: 2004, 'Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware – Smoke control test for door and shutter assemblies'. Both ambient and medium temperature leakage rates were considered in the tests.

The specimen was submitted by the test sponsor, and was mounted and constructed by the test sponsor. The test was led by Ms. Ivy Zou of Research Engineering Development Façade Consultants Limited (RED).

## 3 INFORMATION

### 3.1. Testing laboratory

Research Engineering Development Façade Consultants Limited (RED)

No. 111, Jiaoxin Road, Lanhe Town, Nansha District, Guangzhou, China

### 3.2. Test date

27<sup>th</sup> June, 2016

### 3.3. Equipment

A test chamber with an open front of size 3 m by 3 m to mount the test construction and provide a sealed enclosure to generate the necessary heating and pressure condition.

Nine (9) thermocouples to monitor the temperature of the test chamber, which were kept at 100 mm from the face of the specimen (see Figure 1).

A flowmeter to measure the volume flow rate supplied to the apparatus to compensate for the total leakage.

A micro-manometer provided to monitor the furnace pressure.

Displacement transducers provided to measure the deflection of the doorset.

### 3.4. Test environment

The temperature around the test area during the test was in the range of 31.6 °C – 35.3 °C.

The chamber was controlled so that the mean test chamber temperature at medium temperature test complied with the requirement of Clause 10.2.2.2 of BS EN 1634-3: 2004. The temperatures recorded are shown graphically in Figure 2.

Summaries of the observations made on the general behaviour of the specimen are given in the appendix of this report.



## 4 CONDITIONING

The specimen was conditioned to equilibrium as specified in BS EN 1363-1.

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 14 days. Throughout this period of time, both of the temperature and humidity of the laboratory were measured and recorded as being within a range of 29 °C to 35.6 °C and 55 % to 82 % respectively.

## 5 TEST SPECIMEN

### 5.1. Selection of specimen

The specimen was submitted to the test location by the test sponsor. RED did not involve in the selection of the specimens.

### 5.2. Verification of specimen

The specifications of the door assembly provided by the test sponsor were as shown in Appendix D of this report. Items that had been verified by RED were clearly identified.

### 5.3. Supporting construction

The supporting construction was 300 mm thick concrete lined beam with a structural opening of 1,000 mm wide by 1,000 mm high.

### 5.4. Specimen construction

One specimen of materials used for smoke barrier had been submitted by the test sponsor, which had overall nominal dimensions of 1,000 mm high by 1,000 mm wide by 100 mm thick. The specimen was comprised of two pieces of 100 mm thick by 60 kg/m<sup>3</sup> density 'Roxul' mineral wool splice together. The sizes of the mineral wool were 1,000 mm high by 600 mm wide and 1,000 mm high by 400 mm wide. The mineral wool were installed such that they were flushed with the face of the specimen holder, while at the non-heat exposure face, a nominal 3 mm thick 'Hilti CFS-SP WB' was applied covering the whole surface of mineral wool and with an overlapping of 12.5 mm on the surrounding supporting construction. No any other mechanical fixing was used during the installation.

## 6 TEST PROCEDURE

The tests were conducted in accordance with the procedures specified in Section 10 of BS EN 1634-3: 2004.

### 6.1. Pre-test procedure

No pre-test procedure is required for this test.

The leakage rate through the apparatus together with the associated/supporting construction at 50 Pa and ambient temperature was measured to be lower than 10 m<sup>3</sup>/hr.

### 6.2. Air Leakage test

The ambient temperature of the test area during the test was measured. The furnace was monitored by nine (9) thermocouples so that the mean test chamber temperature complied with the requirements of Clause 10.2.2.2 of BS EN 1634-3: 2004.

### 6.3. Sequence of test

The tests were carried out in the following sequence:

- i) Specimen was mounted to the front face of the test chamber;
- ii) Determine the leakage rate through the test chamber and any support or associated construction at ambient temperature;
- iii) Determine the total leakage rate at ambient temperature;
- iv) Determine the total leakage rate at medium temperature; and
- v) Determine the leakage rate through the apparatus and any supporting or associated construction at medium temperature.

### 6.4. Test conditions

The temperature in the test chamber was controlled to be lower than 30 °C before the start of the test. The leakage rates through the test chamber and any supporting or associated construction and the total leakage rate at ambient temperature at pressure difference of 25 Pa was measured. The leakage rates were measured while the pressure difference was maintained 2 minutes.

The temperature of the test chamber was raised to medium temperature (200 °C) in 30 ± 5 minutes at neutral pressure as stated in Clause 10.2.2.2 of BS EN 1634-3: 2004.

The leakage rates through the test chamber and any supporting or associated construction and the total leakage rate at medium temperature at pressures difference of 25 Pa was measured. The leakage rates were measured while the pressure difference was maintained for 2 minutes.

## 7 RESULTS

When tested in accordance with BS EN 1634-3: 2004 as referenced in BS EN 12101: Part 1: 2005 + A1: 2006, the measured leakage rates and the calculated linear leakage rates were summarized below. There was no failure of any components observed during the test. The observations during and after the test were summarized in Appendix B.

**Specimen type:** 100 thick mineral wool applied with Hilti CFS-SPWB on the unexposed side  
**Overall size:** 1,000 mm (high) by 1,000 mm (wide)

The smoke leakage rates of the doorsets were summarized as below:

Test	Temp	Leakage rate $Q_{spec}$ ( $m^3/h$ ) at pressure difference of	Leakage rate per square meter ( $m^3/h/m^2$ ) at pressure difference of
		25 Pa	25 Pa
1	Ambient	1.64	1.64
2	Medium	1.64	1.64

## 8 POST-TEST OBSERVATION

In general, there was no damage to the specimen after the test. After the test, the specimen remained intact in position without significant deterioration.

## 9 LIMITATIONS

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in BS EN 1634-3: 2004. Any significant deviations with respect to size, construction details, loads, stresses, edges or end conditions other than those allowed under the field of application in the relevant test method is not covered by this report.

**APPENDIX A – PHOTOS AND TEST RECORD**



Photo 1: The unexposed face of specimen.

Specimen

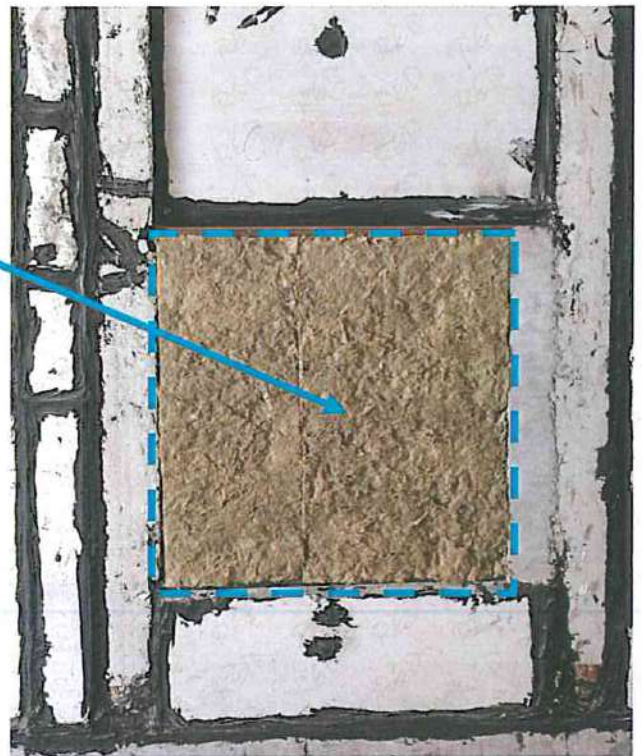


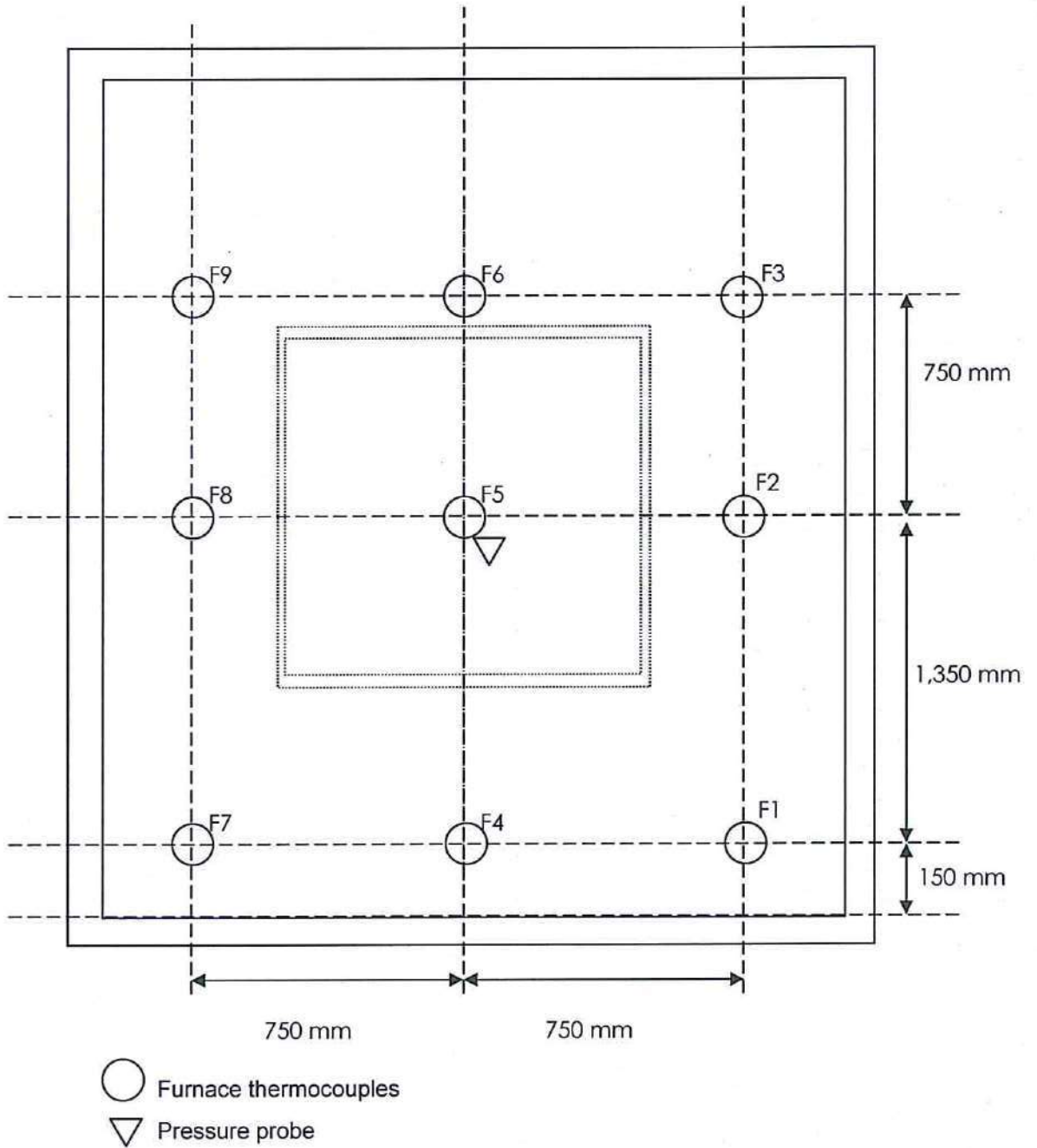
Photo 2: Exposed face of specimen before the test.



Photo 3: The exposed face of specimen after the test



Photo 4: The unexposed face of the specimen during the test



(The illustration not to scale)

Figure 1 – Locations and reference numbers of furnace thermocouples.

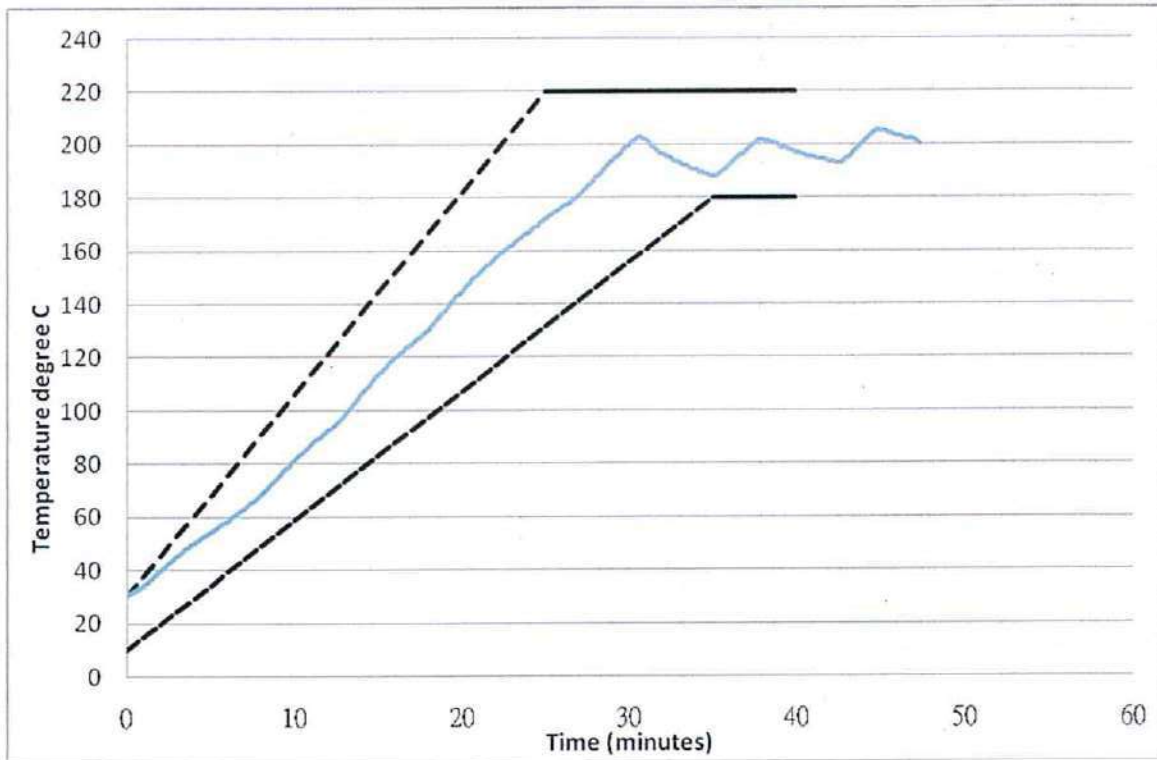


Figure 2 – Test chamber temperature (Medium Test)

Medium Temperature Test									
Time (mins)	Temperature (°C)								
	F1	F2	F3	F4	F5	F6	F7	F8	F9
0	31	28	29	29	30	30	29	30	29
5	51	62	63	52	62	64	55	62	62
10	75	96	98	79	95	97	84	95	96
15	105	130	133	110	129	132	113	127	130
20	132	157	161	133	157	160	138	153	157
25	158	195	201	165	196	199	165	176	181
30	181	217	223	181	218	212	189	215	220
35	173	196	201	174	199	202	172	190	194
40	183	190	195	167	193	196	167	182	186
45	187	212	217	183	214	217	183	206	211
47	188	203	207	177	206	209	174	192	196

Figure 3 – Temperature measured by individual thermocouples

**APPENDIX B – OBSERVATION**

**Table 1 - Ambient and Medium Temperature Test**

<b>Time (min.sec)</b>	<b>Observation</b>
<b>Ambient Temperature Test</b>	
00.00	The specimen was sealed by covering a fire rated board.
00.01	Measurement of leakage rates through apparatus and supporting construction started.
06.10	Measurement of leakage rates through apparatus and supporting construction completed and removal of the physical sealing.
08.20	Measurement of total leakage rates started.
11.30	Ambient temperature test ended
<b>Medium Temperature Test</b>	
00.00	Heat up of the test chamber cavity started.
31.00	The mean temperature of the test chamber reached 200 °C, no further significant change on the specimen was observed.
31.10	Measurement of total leakage rates started.
36.10	Measurement of total leakage rates ended
36.20	The specimen was sealed by covering a fire rated board.
42.00	Measurement of leakages rate through apparatus and supporting construction started.
57.00	Test ended.
<b>Post-test observation</b>	
1. The specimen was remained intact in positions without significant deterioration.	



**APPENDIX C – PRODUCT INFORMATION FROM TEST SPONSOR**

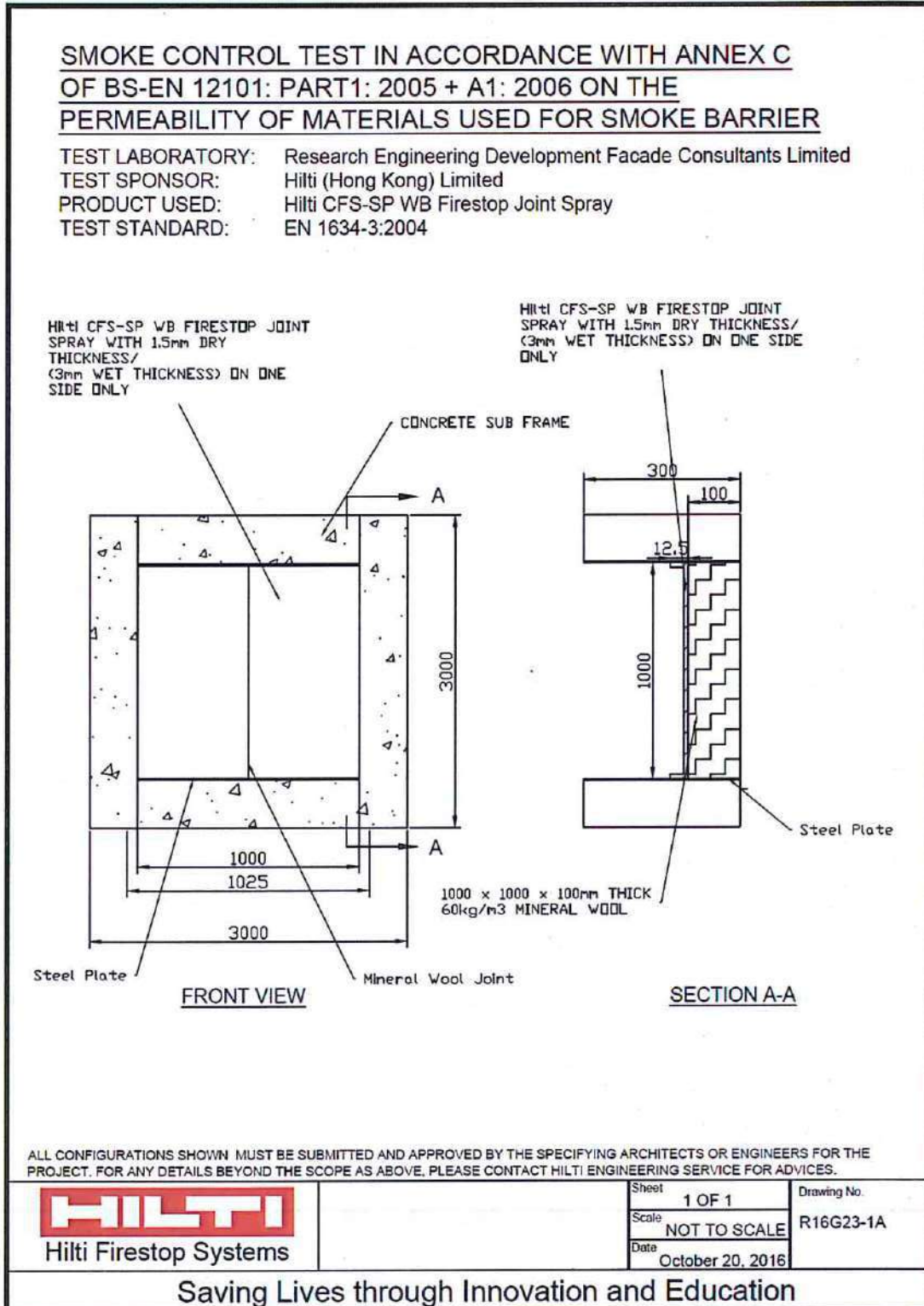
**(The information provided by the test sponsor, which was not verified by RED or unless specified.)**

Item	Description
<p><b>1</b></p>	<p><b>Spray Coating</b></p> <p>Supplier : Hilti (Hong Kong) Limited</p> <p>Model : CFS-SP WB</p> <p>Applied thickness : Nominal 3 mm wet film thickness*</p> <p>Overall area : 1,000 mm by 1,000 mm with 12.5 mm overlapping on the supporting : construction*</p>
<p><b>2</b></p>	<p><b>Insulation Wool</b></p> <p>Brand : Roxul</p> <p>Material : Mineral wool</p> <p>Density : 60 kg/m<sup>3</sup>#</p> <p>Thickness : 100 mm*</p> <p>Overall sizes : 1,000 mm high by 600 mm wide + 1,000 mm high + 400 mm wide*</p> <p>Fixing method : Friction fit in the aperture</p>

Notes: \* Verified on site by RED. # As shown on the test construction.

**Drawing from Test Sponsor**

(The drawings provided by test sponsor, which was not verified by RED, except those specified and described in 'Product information from test sponsor'.)



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- End of report -



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

## VOC Content Test Certificate

May 11, 2011

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

Sample Description: Hilti CFS-SP WB Firestop Joint Spray

Date Tested: May 10, 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
<b>LEED 2009 (LEED 3.0)</b> <b>LEED 2.2</b> IEQ-4.1: Low-Emitting Materials – Adhesives and Sealants	<b>Hilti</b> <b>CFS-SP WB</b> <b>Firestop Joint Spray</b>
<b>Green Building Council of Australia</b> Green Star Office Design 3.0, IEQ-13 Green Star Office Design 2.0, IEQ-13 Green Star Office Interiors 1.1, IEQ-11	
<b>Architectural Sealant;</b> <b>VOC Limit: 250 g/L</b>	

William Welbes  
 Vice President of Laboratory Operations

Tom Barrett  
 Senior Chemist

# Buildings Department

屋宇署

Our Ref. 本署編號: (24) BD GR/BM/2(185)

Your Ref. 來函編號:

Tel. No. 電話: 848 2838

Fax No. 圖文傳真: 840 0451

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

26 May 1994

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.

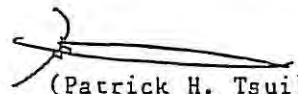
The Buildings Department has a list of recognized laboratories. This is available for reference at our office:

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.

平邊編號 Our Ref.: FPB 207/0005  
來函編號 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,  
Hung Hom, Kowloon.

Dear Sirs,

"HILTI" Fire Prevention System

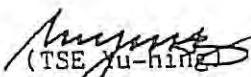
I refer to your letter of 30.3.92 and the enclosures attached thereto.

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

... and data should be quoted in reference to this letter



# 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

Filecode : 95202 - LIST\_LE.DOC  
WMT/WHY/by

21 July 2023  
Ref: 052/IM/LC/23

To whom it may concern,

**Clarification of Hilti Firestop Joint Spray CFS-SP WB in Curtain Wall Joint Application**

I am writing to provide clarification regarding our Hilti Firestop Joint Spray CFS-SP WB in Curtain Wall Joint Application.

In the case of a curtain wall joint where a void is formed between the curtain wall and the perimeter of the building, such as the floor and wall, it is recommended to use CFS-SP WB firestop joint spray. This product has been tested in accordance with the test standards BS EN 1364-3, BS EN 1364-4, and EN 12101-1, and is designed to maintain the fire resistance rating and smoke sealing properties of the perimeter of the building.

To achieve both the integrity and insulation rating, it is necessary to use CFS-SP WB in conjunction with a 100mm thick mineral wool of minimum density, 60kg/m<sup>3</sup>. This mineral wool may be sourced from any supplier, including but not limited to Rockwool and Thermafiber.

Should you have any enquiry, please do not hesitate to contact me at 9723 1157 / lucas.chan@hilti.com or our Customer Service Hotline at 8228 8118 / hksales@hilti.com.

Yours sincerely,



Lucas Chan  
Trade Manager  
Hilti (Hong Kong) Ltd.

10 January 2022  
Ref: 001/FP/JL/22

**Subject: Mineral wool density requirement for CFS-SP WB firestopping system**

To whom it may concern,

Regarding the performance of CFS-SP WB system in linear curtain wall perimeter joint, please refer to fire resistance test report no. 08-E-294 indice A in the CFS-SP WB submission folder.

In test report no. 08-E-294 indice A, fire resistance rating of 165 mins integrity and 155 mins insulation are achieved with mineral wool of 40 kg/m<sup>3</sup> density with 50% compression i.e. nominal density= $40/(1-50\%)=80$  kg/m<sup>3</sup>.

Referring to the expert judgement issued by testing laboratory no. EFR-15-001459 nominal density of mineral wool should not be less than that of the test i.e. 80kg/m<sup>3</sup>.

Mineral wool of minimum 80kg/m<sup>3</sup> density should be used to achieve the firestopping in terms of integrity rating and insulation rating state in the reports.

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

Yours sincerely,



Joanne Lee  
Trade Manager



Attn. : To whom it may concern

Date : 26 September 2023

Ref. : 101/FP/DY/23

Subject : Country of Origin- Hilti CFS-SP WB Firestop Joint Spray

Dear Sir / Madam,

Enclosed please find the information of Hilti CFS-SP WB Firestop Joint Spray.

Brand Name : Hilti

Model Name : Hilti CFS-SP WB Firestop Joint Spray

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](mailto:hksales@hilti.com).

Yours faithfully,



Dennis Yeung  
Head of Product Leadership Strategy, F&P

Date: 24 June 2021

Ref.: 068/FP/BL/21

Subject: Hilti CFS-SP WB Firestop Joint Spray – LEED Information

To Whom It May Concern:

- The Hilti CFS-SP WB Firestop Joint Spray is manufactured in Germany.
- The package of Hilti CFS-SP WB Firestop Joint Spray can be completely recycled
- There is no recycled content in the Hilti CFS-SP WB Firestop Joint Spray and it cannot be recycled.
- The Hilti CFS-SP WB Firestop Joint Spray does not share any rapidly renewable materials.
- The VOC content of the Hilti CFS-SP WB Firestop Joint Spray is 34 g/l.

If you would like to know more about Hilti solutions for LEED buildings or should you have any further questions, please do not hesitate to contact our Customer Service Hotline at 8228-8118 or email us at [hksales@hilti.com](mailto:hksales@hilti.com).

Yours faithfully,



Bill Lee  
Product Portfolio Manager  
Hilti (Hong Kong) Ltd.

**To whom it may concern**

Date: 22<sup>nd</sup> April 2016

Dear Sir / Madam,

**Subject: Hilti Firestop Products non-CFC and Ozone Confirmation**

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

Hilti firestop products, CFS-SP WB Firestop Joint Spray is free of CFC, HCFC nor other ozone depletion elements.

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

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

Yours sincerely,



Andrew Lau  
Product Manger

# CFS-SP WB; CP 672

## Safety Data Sheet

according to the United Nations GHS (Rev. 4, 2011)

Date of issue: 05/03/2019

Version: 4.3

Revision date: 05/03/2019

Supersedes: 12/12/2016

### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1. Product identifier

Product form	Mixture
Product name	CFS-SP WB; CP 672
Product code	BU Fire Protection



Product group	Trade product
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#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	Flexible joint spray
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#### 1.3. Details of the supplier of the safety data sheet

Hilti (Hong Kong) Ltd.  
701-704, 7/F, Tower A, Manulife Financial Centre  
223 Wai Yip Street, Kwun Tong  
Kowloon - Hong Kong  
T +852 27734 700  
[hksales@hilti.com](mailto:hksales@hilti.com)

#### Supplier

Hilti (Hong Kong) Ltd.  
701-704, 7/F, Tower A, Manulife Financial Centre  
223 Wai Yip Street, Kwun Tong  
Kowloon - Hong Kong  
T +852 27734 700  
[hksales@hilti.com](mailto:hksales@hilti.com)

#### 1.4. Emergency telephone number

Emergency number	Schweizerisches Toxikologisches Informationszentrum – 24h Service +41 44 251 51 51 (international) +852 27734 700
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### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

Classification according to the United Nations GHS (Rev. 4, 2011)

Not classified

#### 2.2. Label elements

Labelling according to the United Nations GHS (Rev. 4, 2011)

No labelling applicable

# CFS-SP WB; CP 672

## Safety Data Sheet

according to the United Nations GHS (Rev. 4, 2011)

### 2.3. Other hazards

No additional information available

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Not applicable

### 3.2. Mixtures

This mixture does not contain any substances to be mentioned according to the applicable regulations

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

First-aid measures general	Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
First-aid measures after inhalation	Assure fresh air breathing. Allow the victim to rest.
First-aid measures after skin contact	Wash skin with plenty of water. If skin irritation occurs: Get medical advice/attention. Remove affected clothing and wash all exposed skin area with mild soap and water, followed by warm water rinse.
First-aid measures after eye contact	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
First-aid measures after ingestion	Rinse mouth. Do NOT induce vomiting. Get medical advice/attention if you feel unwell.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects	Not expected to present a significant hazard under anticipated conditions of normal use.
Potential adverse human health effects and symptoms	Based on available data, the classification criteria are not met.

### 4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media	Foam. Dry powder. Carbon dioxide. Water spray. Sand.
Unsuitable extinguishing media	Do not use a heavy water stream.

### 5.2. Special hazards arising from the substance or mixture

No additional information available

### 5.3. Advice for firefighters

Firefighting instructions	Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire fighting water from entering the environment.
Protection during firefighting	Self-contained breathing apparatus. Complete protective clothing. Do not enter fire area without proper protective equipment, including respiratory protection.

# CFS-SP WB; CP 672

## Safety Data Sheet

according to the United Nations GHS (Rev. 4, 2011)

### SECTION 6: Accidental release measures

#### 6.1. Personal precautions, protective equipment and emergency procedures

##### 6.1.1. For non-emergency personnel

Emergency procedures Evacuate unnecessary personnel.

##### 6.1.2. For emergency responders

Protective equipment For further information refer to section 8: "Exposure controls/personal protection". Equip cleanup crew with proper protection.  
 Emergency procedures Ventilate area.

#### 6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

#### 6.3. Methods and material for containment and cleaning up

Methods for cleaning up Collect spillage.

### SECTION 7: Handling and storage

#### 7.1. Precautions for safe handling

Precautions for safe handling Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapour.  
 Hygiene measures Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

#### 7.2. Conditions for safe storage, including any incompatibilities

Storage conditions Keep only in the original container in a cool, well ventilated place away from : Keep container closed when not in use.  
 Incompatible products Strong bases. Strong acids.  
 Incompatible materials Sources of ignition. Direct sunlight.  
 Storage temperature 5 - 25 °C

### SECTION 8: Exposure controls/personal protection

#### 8.1. Control parameters

Additional information The product has a pasty consistency. Exposure limit values for respirable dusts are not relevant for this product.

#### 8.2. Appropriate engineering controls

Other information Do not eat, drink or smoke during use.

#### 8.3. Individual protection measures, such as personal protective equipment (PPE)

Materials for protective clothing Wear protective clothing  
 Hand protection Wear protective gloves.

Type	Material	Permeation	Thickness (mm)	Penetration	Standard
Disposable gloves	Nitrile rubber (NBR)	1 (> 10 minutes)	>0.4		EN 374

# CFS-SP WB; CP 672

## Safety Data Sheet

according to the United Nations GHS (Rev. 4, 2011)

Eye protection Chemical goggles or safety glasses

Type	Use	Characteristics	Standard
Safety glasses			EN 166, EN 170

Respiratory protection No respiratory protection needed under normal use conditions

### 8.4. Exposure limit values for the other components

No additional information available

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state	Solid
Appearance	Pasty.
Molecular mass	Not determined
Colour	white. red. Grey.
Odour	characteristic.
Odour threshold	Not determined
pH	≈ 8.6
Relative evaporation rate (butylacetate=1)	No data available
Melting point	Not applicable
Freezing point	No data available
Boiling point	No data available
Flash point	Not applicable
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Flammability (solid, gas)	Not applicable, Non flammable.
Vapour pressure	No data available
Relative vapour density at 20 °C	No data available
Relative density	No data available
Density	1.28 kg/l
Solubility	No data available
Log Pow	No data available
Viscosity, kinematic	No data available
Viscosity, dynamic	No data available
Explosive properties	No data available
Oxidising properties	No data available
Explosive limits	No data available

### 9.2. Other information

No additional information available

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

### 10.2. Chemical stability

Stable under normal conditions. Not established.

# CFS-SP WB; CP 672

## Safety Data Sheet

according to the United Nations GHS (Rev. 4, 2011)

### 10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use. Not established.

### 10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7). Direct sunlight. Extremely high or low temperatures.

### 10.5. Incompatible materials

Strong acids. Strong bases.

### 10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. fume. Carbon monoxide. Carbon dioxide.

## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

Acute toxicity (oral)	Not classified
Acute toxicity (dermal)	Not classified
Acute toxicity (inhalation)	Not classified

Zinc borate (138265-88-0)	
LD50 oral rat	> 5000 mg/kg bodyweight (FIFRA (40 CFR), Rat, Male / female, Experimental value of similar product, Oral, 14 day(s))
LD50 dermal rabbit	> 5000 mg/kg bodyweight (Equivalent or similar to OECD 402, 24 h, Rabbit, Male / female, Experimental value of similar product, Dermal, 14 day(s))
LC50 inhalation rat (mg/l)	> 4.95 mg/l air (OECD 403: Acute Inhalation Toxicity, 4 h, Rat, Male / female, Read-across, Inhalation (dust), 14 day(s))

Skin corrosion/irritation	Not classified pH: ≈ 8.6
Serious eye damage/irritation	Not classified pH: ≈ 8.6
Respiratory or skin sensitisation	Not classified
Germ cell mutagenicity	Not classified
Carcinogenicity	Not classified
Reproductive toxicity	Not classified
STOT-single exposure	Not classified
STOT-repeated exposure	Not classified
Aspiration hazard	Not classified

Potential adverse human health effects and symptoms      Based on available data, the classification criteria are not met.

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general	The product is not considered harmful to aquatic organisms nor to cause long-term adverse effects in the environment.
Acute aquatic toxicity	Not classified
Chronic aquatic toxicity	Not classified

Zinc borate (138265-88-0)	
LC50 fish 1	169 µg/l (ASTM E729-88, 96 h, Oncorhynchus mykiss, Static system, Fresh water, Read-across)
EC50 Daphnia 1	155 - 413 µg/l (US EPA, 48 h, Ceriodaphnia dubia, Static system, Fresh water, Read-across)



# CFS-SP WB; CP 672

## Safety Data Sheet

according to the United Nations GHS (Rev. 4, 2011)

### 12.2. Persistence and degradability

CFS-SP WB; CP 672	
Persistence and degradability	Not established.
Zinc borate (138265-88-0)	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable

### 12.3. Bioaccumulative potential

CFS-SP WB; CP 672	
Bioaccumulative potential	Not established.
Zinc borate (138265-88-0)	
BCF fish 1	116 - 60960 (21 day(s), Semi-static system, Marine water, Read-across, Fresh weight)
Bioaccumulative potential	High potential for bioaccumulation (BCF > 5000).

### 12.4. Mobility in soil

Zinc borate (138265-88-0)	
Surface tension	Data waiving
Ecology - soil	Adsorbs into the soil.

### 12.5. Other adverse effects

Ozone	Not classified
Other adverse effects	No additional information available
Other information	Avoid release to the environment.

## SECTION 13: Disposal considerations

### 13.1. Waste treatment methods

Waste treatment methods	Dispose in a safe manner in accordance with local/national regulations.
Product/Packaging disposal recommendations	Dispose in a safe manner in accordance with local/national regulations.
Ecology - waste materials	Avoid release to the environment.

## SECTION 14: Transport information

In accordance with ADR / RID / IMDG / IATA / ADN

ADR	IMDG	IATA	RID
14.1. UN number			
Not applicable	Not applicable	Not applicable	Not applicable
14.2. UN proper shipping name			
Not applicable	Not applicable	Not applicable	Not applicable
14.3. Transport hazard class(es)			
Not applicable	Not applicable	Not applicable	Not applicable
14.4. Packing group			
Not applicable	Not applicable	Not applicable	Not applicable
14.5. Environmental hazards			
Not applicable	Not applicable	Not applicable	Not applicable
No supplementary information available			

# CFS-SP WB; CP 672

## Safety Data Sheet

according to the United Nations GHS (Rev. 4, 2011)

### 14.6. Special precautions for user

**- Overland transport**

**- Transport by sea**

No data available

**- Air transport**

No data available

**- Rail transport**

Carriage prohibited (RID) No

### 14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code

## SECTION 15: Regulatory information

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

No additional information available

## SECTION 16: Other information

SDS Major/Minor None  
Date of issue 05/03/2019  
Revision date 05/03/2019  
Supersedes 12/12/2016

Indication of changes:

Section	Changed item	Change	Comments
			layout
			general update

Other information None.

Full text of H-statements:

H361	Suspected of damaging fertility or the unborn child.
H400	Very toxic to aquatic life.
H411	Toxic to aquatic life with long lasting effects.

SDS\_UN\_Hilti

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*



## Hilti CFS-SP WB Firestop Joint Spray Job Reference

Year	Project Name	Customer Name	Project type
2020	TKO LOHAS PARK PH9 (SITE J)	FAR EAST FACADE (HONG KONG) LIMITED	Residential
2020	TAI PO LAI CHI SHAN (221)	FAR EAST FACADE (HONG KONG) LIMITED	Residential
2020	KAI TAK AREA 1F SITE 2, NKIL 6556	JANGHO HONG KONG HOLDINGS LIMITED	Office
2020	TAI WAI STATION NW RES	WAH TUNG FACADE COMPANY LIMITED	Residential
2020	6-8 LAI YING ST, NKIL 6549	FAR EAST FACADE (HONG KONG) LIMITED	Residential
2020	TUNG CHAU ST TREASURY BLDG	FAR EAST FACADE (HONG KONG) LIMITED	Office
2020	KAI TAK AREA 1K1 (6567)	POLYFAIR CONSTRUCTION & ENGINEERING	Residential
2020	SIN FAT RD, KWUN TONG NKIL 6584	ACME METAL WORKS (INTERNATIONAL)	Residential
2020	68 LEE NAM RD	HACELY FACADE ENGINEERING LIMITED	Residential
2020	TIN SHUI WAI AREA 112 LOT 33	ACME METAL WORKS (INTERNATIONAL)	Residential
2021	TAIKOO PLACE PH 2B	FAR EAST FACADE (HONG KONG) LIMITED	Office
2021	CHEUNG SHUN ST (6582)	HIP SENG FACADE ENGINEERING	Office
2021	KAI TAK INLAND REVENUE TOWER	PMB-CYBERWALL LIMITED	Office
2021	CASTLE PEAK RD, AREA 48 (547)	CHEVALIER (ALUMINIUM ENGINEERING)	Residential
2021	KAI TAK AREA 1F SITE 2, NKIL 6556	JANGHO HONG KONG HOLDINGS LIMITED	Office
2021	WONG CHUK HANG STATION PH2 (SITE B)	FORERUNNER SPECIALIST LIMITED	Residential
2021	TAI WAI STATION NW RES	WAH TUNG FACADE COMPANY LIMITED	Residential
2021	YAU MA TEI- KWONG WAH HOSPITAL PHASE 1	FAR EAST FACADE (HONG KONG) LIMITED	Health
2021	6-8 LAI YING ST, NKIL 6549	FAR EAST FACADE (HONG KONG) LIMITED	Residential
2021	21 WANG YIP WEST ST YLTL 461		Residential
2022	HKIA SKYCITY COMPLEX BLDG A2&A3	MINMETALS CONDO (HONG KONG)	Retail
2022	14 Wang Tai Road Office	CHEVALIER (ALUMINIUM ENGINEERING)	Infrastructure
2022	TAIKOO PLACE PH 2B	FAR EAST FACADE (HONG KONG) LIMITED	Office
2022	KAI TAK 1E SITE 2A&B (6557)	PMB-CYBERWALL LIMITED	Office
2022	KAI TAK AREA 4B, SITE 3, NKIL 6574	JANGHO CURTAIN WALL ENGINEERING	Residential
2022	YAU MA TEI- KWONG WAH HOSPITAL PHASE 1	FAR EAST FACADE (HONG KONG) LIMITED	Health
2022	SIN FAT RD, KWUN TONG NKIL 6584	FAR EAST FACADE (HONG KONG) LIMITED	Residential
2022	VICTORIA GARDEN - RENOVATION WORKS	ICGL TECHNICAL WORKS (HK) LIMITED	Residential
2022	226-240 ELECTRIC RD	LIXIL CORPORATION	Office
2022	36 WONG CHUK HANG RD	JANGHO CURTAIN WALL ENGINEERING	Industrial
2022	HK POST HEADQUARTERS	FORERUNNER SPECIALIST LIMITED	Office
2023	91 KING LAM ST, NKIL 6505	WAH TUNG FACADE COMPANY LIMITED	Office
2023	KAI TAK AREA 4E, SITE 1, NKIL 6603	FAR EAST FACADE (HONG KONG) LIMITED	Residential
2023	KAI TAK AREA 4A, SITE 2, NKIL 6554	APEX CURTAIN WALL & ENGINEERING	Residential
2023	24 WONG CHUK HANG RD	PMB-CYBERWALL LIMITED	Office
2023	1 STUBBS RD - AIA URBAN CAMPUS	JANGHO HONG KONG HOLDINGS LIMITED	Office
2023	WAN CHAI HOPEWELL CENTRE 2	WAH TUNG FACADE COMPANY LIMITED	Hospitality
2023	KWAI CHUNG HOSPITAL PH2 & 3	JANGHO CURTAIN WALL ENGINEERING	Health
2023	SIN FAT RD, KWUN TONG NKIL 6584	FAR EAST FACADE (HONG KONG) LIMITED	Residential
2023	350 KWUN TONG RD - EAST 350	FORERUNNER SPECIALIST LIMITED	Office
2023	UNITED CHRISTIAN HOSPITAL	ICGL TECHNICAL WORKS (HK) LIMITED	Health
2023	37-43 SHA TSUI RD	ON TIME BUILDING MATERIAL AND	Office