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FIRE PERFORMANCE OF EXTERNAL THERMAL INSULATION - CLASSIFICATION REPORT No EFR-19-004382

1. INTRODUCTION

This classification report defines the classification assigned to the system described in the report below in accordance with the procedures given in BS 8414-2-2015+A1-2017 and BR 135 third edition 2013.

FIRE PERFORMANCE OF EXTERNAL THERMAL INSULATION CLASSIFICATION IN ACCORDANCE WITH BS 8414-2-2015+A1-2017 and BR 135 third edition 2013.

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2. DETAILS OF CLASSIFIED SYSTEM

Technical data and drawings concerning the sample and its composition have been supplied by the sponsor who attests their accuracy.

All test materials were supplied and installed by the sponsor. The test was performed by BRE Global Ltd. at their laboratory in Watford, United Kingdom.
EFECTIS France was not involved in the sample selection process or any of the testing process and therefore cannot take any responsibility for the relationship between samples supplied for testing and product placed on the market.

2.1. GENERAL

2.1.1. Substrate

The system described in this report is a ventilated rainscreen cladding system composed of 100mm thick Rockwool Rainscreen Duo Slab insulation fixed on a lightweight steel frame system. The rainscreen cladding system is made of Vitradual solid aluminium installed on aluminium rails.
On the non-exposed side of the specimen, two layers of plasterboards are fixed to the lightweight steel frame.
The lightweight steel frame is fixed on the structural concrete beams.

2.1.2. Description of system

Based on the information provided by the test sponsor, the materials as used on the as-built façade system are given in the following table.

Description	*Reference*	*Material*	*Characteristics*
Gypsum PlasterBoards	British Gypsum Gyproc Wallboard	Gypsum	Thickness = 12.5mm
Horizontal track – lightweight steel frame	'U' – shaped horizontal tracks	Galvanized Steel	Depth = 90mm Height = 50mm Thickness = 1.2mm
Vertical track – lightweight steel frame	'C' – shaped horizontal tracks	Galvanized Steel	Depth = 90mm Width = 50mm Thickness = 1mm
Sealant between the lightweight steel frame system and the concrete slabs	Dow Corning 400 Fire Stop sealant and 4Trade Fire and Acoustic sealant	Sealant	
Fixing of the plasterboards on the frame	4Trade 3.5 x 50mm Bright Zinc Plated Drywall Screw	Zinc plated	∅ = 3.5mm Length = 50 mm
Fixing of the steel profiles on the concrete	Ejot 4H32 (floor) Hilti X-U 16 PS (soffit)	Steel	∅ x L = 6.3 x 32mm (floor) Length = 16mm (soffit)
Fixing of the lightweight steel frame (steel/steel)			∅ = 5.5mm Length = 20mm
Intumescent sealant	3C intumescent acoustic sealant	Emulsion acrylic based sealant	/
Insulation	Rockwool Rainscreen Duo Slab	Rockwool	Thickness = 100mm EUROCLASS A1
Sheating boards	RCM Y-Wall	Calcium Silicate based fibre cement building boards	Thickness = 12mm

Description	*Reference*	*Material*	*Characteristics*
Fixing of the sheating boards	ABA 4.8 x 38 mm	Steel / Zinc plated	∅ = 4.8mm Length = 38mm
Air Tightness Barrier	Wraptite SA	/	/
Vertical Cavity Barriers Support brackets	SIDERISE B65/110	Galvanised Steel	Depth = 220mm Height = 25mm Thickness = 1mm
Fixation to the sheathing boards and the floor slabs	Fixfast DF3-SS-A15 5.5 x 55	Stainless Steel	∅ = 5.5 mm Length = 55mm
Vertical Cavity Barriers	SIDERISE RVG-090/030/139-150	Stonewool with aluminium	Depth = 160mm Width = 75mm
Aluminium tape	/	/	/
Aluminium top hat section channels	/	Aluminium	Depth = 15mm Height = 80mm Thickness = 2mm
Horizontal Cavity Barriers Support brackets	SIDERISE RGH350	Galvanised Steel	Depth = 355mm Height = 25mm Thickness = 1mm
Horizontal Cavity Barriers	SIDERISE RH25G-090/030/144-156	Stonewool with aluminium and intumescent strip	Depth = 125mm Width = 75mm
Fixation of the insulation to the sheathing boards	BS-A4 4.8x160 + Fixfast SF-P-SS-70-D	Stainless Steel	∅ = 4.8mm Length = 160mm ∅washer = 70mm
Insulation retaining disc	SureFast SF-T	Plastic	∅ = 75mm Length = 75mm
Aluminium L-shaped brackets	Vitrafix 125mm Helping Hand Brackets	Aluminium + plastic insulation pad	Depth = 125mm Height = 75mm Width = 55mm Thickness = 3mm
Fixation of the L brackets to the section channels	Fixfast DF3-SS 5.5 x 25	Stainless Steel	∅ = 5.5mm Length = 25mm
Aluminium T-shaped rails	Vitrafix T rail, 100x60mm	Aluminium	Depth = 60mm Width = 100mm Thickness = 2mm
Aluminium L-shaped rails	Vitrafix L rail, 40x60mm	Aluminium	Depth = 60mm Width = 40mm Thickness = 2mm
Fixation of the rails to the brackets	/	/	∅ = 4.8mm Length = 20mm
Cladding	Vitradual Aluminium panels	Aluminium	Thickness = 3mm
Cladding fixing	Rivets	/	∅ = 4.8mm
Edge capping	/	Aluminium	Depth = 300mm Width = 75mm Thickness = 2mm

Description	*Reference*	*Material*	*Characteristics*
Combustion chamber surround flashing	/	Steel	Depth = 295mm Width = 70mm Thickness = 1.5mm
Profiled capping	/	Aluminium	Depth = 185mm Height = 105mm Thickness = 2mm

2.1.3. Installation sequence

Galvanised steel 'U'-shaped horizontal tracks were fixed to the 'soffit' of the floor slabs using Hilti X-U 16 PS 16mm-long shot nails and to the ground and 'floor' of the floor slabs using Ejot 4H32 masonry anchors at 220-600mm centres.

Galvanised steel 'C'-shaped studs were positioned between the horizontal tracks at 600mm horizontal centres and fixed using 5.5x20mm self-drilling screws through the front and rear at the base of the studs. The spacing between the vertical studs was reduced to 100mm at the edges of the system. The top of the vertical studs were pinned with fixings through track either side of studs to allow for vertical deflection.

At the edges of the combustion chamber opening, double vertical studs were fitted which were fixed together on the front face using plates cut from horizontal tracks.

Galvanised steel 'U'-shaped horizontal tracks were cut to size and fixed in rows between the studs at locations approximately mid-height between the 'floors' of the system and approximately 80mm from the top of the 'floors' of the system.

Below the first floor slab, a lightweight steel frame partition was installed either side of the combustion chamber opening. A rectangular truss section (1925mm-widex470mm-high) was assembled from horizontal track (top and bottom), vertical 'C' studs (left and right) which framed a zig-zag arrangement of 'C' studs installed at approximately 45°.

The truss section was installed between the combustion chamber opening and the first floor slab, fixed at each end to the adjacent steel studs with 5.5x20mm self-drilling screws.

The 16mm-high gap between the first floor slab and the top of the truss section was filled with 3C intumescent acoustic sealant and packed with Rockwool Rainscreen Duo Slab insulation cut to size.

Dow Corning 400 Fire Stop and 4Trade Fire and Acoustic sealant were applied within the gaps between the lightweight steel framework partition and the floor slabs on the internal and external faces of the partition.

A double layer of British Gypsum Gyproc Wallboard was fixed to the rear face of the partition using 4Trade 3.5x50mm bright zinc plated drywall screws through each layer at 300mm vertical centres with horizontal centres in line with the studs of the partition.

The steel framework partition was packed with Rockwool Rainscreen Duo Slab insulation and a single layer of RCM Y-Wall calcium silicate based fibre cement building board (sheathing board) was fixed to the external face of the partition (long edge horizontal) using Index ABA 4.8x38mm self-drilling screws at 90-300mm vertical and 110-600mm horizontal centres.

A layer of sheathing board (approximately 130mm-deep) was fixed to the outer edges of the cladding system using Index ABA 4.8x38mm self-drilling screws at 300mm nominal vertical centres. A layer (approximately 130mm-deep) was also fixed to the edges of the partition forming the combustion chamber surround using Index ABA 4.8x38mm self-drilling screws in two rows/columns 60-80mm apart at 200-300mm centres.

Sheathing board was not fitted to the exposed face of the concrete floor slabs. All joints were sealed using 3C intumescent acoustic sealant.

Wraptite-SA self-adhesive external air tightness barrier was attached vertically to the external face of the sheathing board and floor slabs with 150mm overlap between adjacent sheets. The external air tightness barrier was wrapped around the outer edges of the cladding system and the internal edges of the combustion chamber surround.

Siderise B65-110 galvanised steel folded skewers (folded to 110mm-widex110mm-deep) were fixed to the sheathing board using Fixfast DF3-SS-A15 5.5x55mm self-drilling screws at 400mm nominal vertical centres.

The skewers were fixed in four full-height columns located at the outer edges of the test specimen (2810mm (main wall), 1685mm (wing wall) from the main-wing wall junction) and at the main-wing wall junction (0mm and 75mm from the main-wing wall junction).

The skewers were also fixed in two columns spanning a height of 115mm above the top of the combustion chamber opening located either side of the combustion chamber opening.

Siderise RVG-090/030/139-150 stone wool vertical cavity barriers were pressed onto the skewers in columns.

Aluminium tape was applied to the junction between each section of vertical cavity barrier.

Siderise RHG350 galvanised steel folded skewers (folded to 175mm-highx180mm-deep) were fixed to the floor slabs using Fixfast DF3-SS-A15 5.5x55mm self-drilling screws at 400mm nominal horizontal centres in five rows located; 40mm, 525mm, 2995mm, 5460mm and 6945mm above the top of the combustion chamber.

Siderise RH25G-090/30/144-156 stone wool open state horizontal cavity barriers with intumescent strip were pressed onto the skewers in rows. A cut was made along the length of the skewers local to the tip and the ends were folded to opposite sides to secure the intumescent cavity barriers in place.

Aluminium top hat section channels were fixed horizontally to the sheathing board across the width of the main and wing walls using Fixfast DF3-SS-A15 5.5x55mm self-drilling screws at 470-600mm horizontal centres. The rails were installed at 620-1080mm vertical centres.

Vitrafix 125mm Helping Hand Brackets each with plastic isolation pad were fixed in rows to the aluminium top hat sections at 255-400mm horizontal centres. Each bracket was fixed using two DF3-SS 5.5x25mm self-drilling screws.

A single layer of Rockwool Rainscreen Duo Slab insulation was fixed to the sheathing board using Global BS-A4 4.8x160mm stainless steel self-drilling screws with; a Fixfast SF-P-SS-70-D 70mm-diameter steel insulation retaining disc at the center and a SureFast SF-T 75mm-longx75mm-diamater plastic head flange at the corners of each full-size slab.

Vitrafix T rails, 100x60mm and Vitrafix L rails, 40x60mm were fixed vertically to the Vitrafix Helping Hand Brackets using two 4.8x20mm self-drilling screws per bracket. The Vitrafix T rails were fixed along the centerline of the main and wing wall and Vitrafix L rails were fixed at the eleven other locations at 255-400mm horizontal centres.

The rails at the main-wing wall junction comprised three columns of Vitrafix L rails: one fixed to the main wall brackets, one fixed to the wing wall brackets and one that was fixed to both rails to create a corner section.

Vitradual aluminium panels, long edge vertical, were fixed to the rails using 4.8mm-diameter rivets at 300-440mm horizontal and 150-600mm vertical centres.

There was a measured gap of 8-10mm between adjacent Vitradual aluminium panels.

There was a cavity of 50mm between the inner face of the aluminium panels and the external face of the insulation.

Aluminium edge capping was fixed to the outer edges of the cladding system using Fixfast DF3-SS-A15 5.5x55mm self-drilling screws at 400mm vertical centres.

Stainless steel combustion chamber surround flashing was fixed to the top and sides of the combustion chamber using Fixfast DF3-SS-A15 5.5x55mm self-drilling screws at 500mm horizontal/vertical centres.

Aluminium profiled capping was fitted to the top of the cladding system and fixed through 200mm-long sections of aluminium Vitrafix L rails fixed to the 'I'-beams of the steel test frame. The capping was fixed using Fixfast DF3-SS-A15 5.5x55mm self-drilling screws at 1000mm horizontal centres

The tested specimen tested during test referenced P111627-1000 performed by test laboratory 'BRE Global Ltd.' also included three Quelfire QWR 125/CE Fire collars with stainless steel slotted vents. These fire collars were situated 210mm from the outside edge of the main wall at three different heights (2580mm, 4900mm above the top of the combustion chamber and 500 mm below the top of the combustion chamber).

To establish this certification report, and due to their position, the three fire collars were considered as not affecting the behaviour of the ventilated rainscreen cladding system during the test.

The three fire collars are therefore not included in this certification report.

2.2. SYSTEM IDENTIFICATION

Figure 1. System photos (Main face on the right - Wing face on the left) at the beginning of the test

3. REPORTS AND RESULTS IN SUPPORT OF THIS CLASSIFICATION

3.1. REPORTS

Name of Laboratory	*Name of sponsor*	*Report ref. no*	*Test method and date*
BRE Global Ltd	Valcan Ltd	P111627-1000 Issue 1	BS 8414-2-2015+A1-2017

3.2. RESULTS

3.2.1. Fire spread

Fire-spread start time, t_s = 01:20 min

Test method and test number	*Parameter(s)*	*No. Tests*	*Results*	
			Fire spread test result time, ts (min)	*Compliance with parameters in Annex B of BR135:2013*
BS 8414-2-2015+A1-2017 EFR-19-BS-000167	**External fire spread**	**1**	**> 15 minutes**	**Compliant**
	Internal fire spread (cavity layer)		**> 15 minutes**	**Compliant**
	Internal fire spread (Rockwool Rainscreen insulation layer)		**> 15 minutes**	**Compliant**
	Internal fire spread (sheathing board layer)		**> 15 minutes**	**Compliant**

3.2.2. Mechanical performance

During the test, molten aluminium droplets were observed during the test. Flaming from the small pile of debris at the base of the cladding system was also observed.
Partial detachment of aluminium panels was observed.

The cladding system has been examined when cooled (within 24 h of the test). Examination compromised external surface and internal layers. The performance of the cladding system is described in the following subsections.

Where the heights of horizontal cavity barriers are referenced see the following for height (above top of combustion chamber opening):
First – 40mm, Second – 525mm, Third – 2995mm, Fourth – 5460mm, Fifth – 6945mm.

3.2.2.1. Aluminium panels

The aluminium panels in line with the combustion chamber were consumed in an area approximately 2.75m^2 (1020mm-widex2700-high). Adjacent to the area of panel consumption the panel coating had been removed up to a height of 4170mm above the top of the combustion chamber. The remaining panels were intact with minor distortion and dark discolouration up to 5500mm above the top of the combustion chamber.

The wing wall panels remained intact and in place. The panel coating had been removed from -700mm-1700mm above the top of the combustion chamber to approximately mid-width. Dark discolouration extended from -1700mm-2940mm above the top of the combustion chamber to approximately mid-width and to ¾-width adjacent to where the coating had been removed.

3.2.2.2. Combustion chamber surround

Top flashing was distorted and discoloured. Side flashings were discoloured approximately 600mm-high towards the top of the combustion chamber.

3.2.2.3. Aluminium vertical rails

Main wall rails were consumed immediately above the combustion chamber within an area 2000mm-widex2700mm-high. There was discolouration from 500mm above the top of the combustion chamber to the top of the cladding system.

Wing wall rails remained intact and in place. There was an area of discolouration (approximately 2100mm-widex1500mm-high) from the top of the combustion chamber to a height of the third horizontal cavity barrier.

3.2.2.4. Insulation

The insulation remained intact and in place. There was significant discolouration on the centre line of the combustion chamber up to the height of the fourth horizontal cavity barrier. There was minor discolouration to the top of the system, at the edges and above the fourth horizontal cavity barrier.

Wing wall insulation remained intact and in place. There was an area of dark discolouration (approximately 2100mm-wide) and minor discolouration to ¾-width immediately below the third horizontal cavity barrier.

3.2.2.5. Horizontal (intumescent) cavity barriers

The horizontal cavity barrier above the combustion chamber had evidence of activation of the intumescent strip across the width of the barrier and was partially detached. Second row horizontal cavity barrier had evidence of activation of the intumescent strip across the width of the barrier (except for a section 300mm-wide at the outside edge of the main wall). The intumescent strip had fully detached on the main wall across a width of approximately 2100mm and partially detached on the wing wall towards the main-wing wall junction. Third row horizontal cavity barrier had evidence of activation of the intumescent strip across the full width of the barrier. The intumescent strip had partially detached on the main wall within a width of approximately 1000mm. Fourth row horizontal cavity barrier had evidence of activation of the intumescent strip across the full width of the barrier. On the wing wall and at the outside edges of the main wall the barrier had initial stages of activation of the intumescent strip. Fifth row horizontal cavity barrier had evidence of initial stages of activation of the intumescent strip across the full width of the barrier.

3.2.2.6. Vertical (compression) cavity barriers

The vertical cavity barrier located at the outside edge of the main wall remained intact and in place with localised areas of discolouration between a height of approximately 2500-3000mm above the top of the combustion chamber.

The vertical cavity barriers located at either side of the combustion chamber opening remained intact and in place with localised areas of discolouration.

The vertical cavity barriers located at the inside edge of the main wall remained intact and in place with discolouration between a height of approximately 500-3000mm above the top of the combustion chamber.

The vertical cavity barrier located at the outside edge of the wing wall remained intact and in place with localised areas of discolouration at a height of approximately 3000mm above the top of the combustion chamber.

3.2.2.7. Vitrafix 125mm Helping Hand Brackets

Main wall Vitrafix 125mm Helping Hand Brackets remained intact and in place with discolouration between a height of approximately 0-5460mm above the top of the combustion chamber and partial consumption to exposed ends of brackets located within the flame impingement zone up to a height of approximately 1500mm above the top of the combustion chamber.

Wing wall Vitrafix 125mm Helping Hand Brackets remained intact and in place with discolouration between a height of 525-2995mm above the top of the combustion chamber.

3.2.2.8. Horizontal top hat channels

Main wall top hat channels remained intact and in place with discolouration between a height of approximately 0-5460mm above the top of the combustion chamber.

Wing wall top hat channels remained intact and in place discolouration between a height of approximately 525-2995mm above the top of the combustion chamber.

3.2.2.9. Air tightness barrier

The air tightness barrier had a strip of partial detachment and consumption 700mm-wide approximately 600mm above the top of the combustion chamber (detachment partially due to removal of top hat channels). The remainder of the air tightness barrier had localised areas of discolouration on the main and wing wall across the full height of the cladding system.

3.2.2.10. Sheathing board

The sheathing board remained intact and in place with localised areas of minor discolouration from the ground to a height of 3000mm above the top of the combustion chamber.

3.2.2.11. Steel frame partition and insulation

The steel frame partition and insulation remained intact and in place with localised areas of discolouration around the combustion chamber opening.

3.2.2.12. Plasterboard

The plasterboard remained intact and in place with no visible damage.

4. CLASSIFICATION AND FIELD OF APPLICATION

4.1. REFERENCE OF CLASSIFICATION

This classification has been carried out in accordance with BS 8414-2-2015+A1-2017 and BR 135 third edition 2013.

4.2. CLASSIFICATION

The system described in this classification report and in the test report referenced in section 3.1 has been tested and met the performance criteria set in Annex B of BR135:2013.

4.3. FIELD OF APPLICATION

This classification is valid only for the system as installed and detailed in this classification report and in the test report referenced in section 3.1.

5. LIMITATIONS

This classification document does not represent type approval or certification of the system.

The classification applies only to the system as tested and detailed in the classification report. The classification report can only cover the details of the system as tested.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons, it is recommended that the relevance of test and classification reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test or classification to ensure that they are consistent with current practices, and if required may endorse the report.

Les Avenières, 18 November 2019

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