

BRE Global Classification Report

Classification of fire performance in accordance with BR 135: 2013 Annex B

Prepared for: Kingspan Insulation Limited

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1 Introduction

This report presents the classification of the system detailed in section 2. The classification is carried out in accordance with the procedures given in BR 135 – ‘Fire performance of external thermal insulation for walls of multi-storey buildings’, Third edition, Annex B 2013. This classification should be read in conjunction with this document and the associated test reports referenced in section 4.

All materials and products used in the test were supplied and installed by the Test Sponsor. BRE Global was not involved in the sample selection process and therefore cannot comment upon the relationship between samples supplied for test and the samples supplied to market. Results apply to the sample as received and installed.

The validity of the results is conditional on the accuracy of the data. All measurements quoted in this report are nominal unless stated otherwise.



2 Details of the Classified Product

Product names, system drawings and other detailed construction data were supplied by the Test Sponsor and were not independently verified by BRE Global. The validity of the test results is conditional on the accuracy of the system details, the component specification and the installation of the system components.

The details in sections 2.2 and 2.3 were dimensionally/visually verified and recorded during installation by BRE Global and take precedence over the Test Sponsor supplied drawings (section 3).

The Test Sponsor has been asked to review the test report (P119586-1000) and takes responsibility for any discrepancies and inaccuracies in the supplied drawings (section 3).

2.1 Description of substrate

The product was installed on to wall number 4 of the BRE Global cladding test facility.

This apparatus is representative of a structural steel framed building and consists of a structural steel test frame with a vertical main test wall and a vertical return wall at a 90° angle to and at one side of the main test wall.

2.2 Description of product

System summary

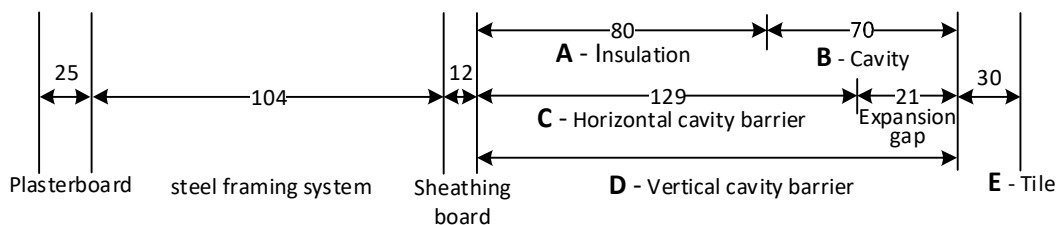


Figure 1. Basic system cross section (not drawn to scale, dimensions given in mm)

Generic cladding type	Terracotta tile rainscreen on a steel framing system
Insulation (A)*	Kingspan Kooltherm K15 (2400mm×1200mm×80mm-thick) Batch nr: 8100414380 dated 11-03-2021
Cavity (B)*	70mm
Horizontal (ventilated) cavity barriers (C)*	Siderise RH25G-090/030/154 open state cavity barrier with intumescent strip (75mm-high×129mm-deep with 25mm intumescent expansion)
Vertical (full fill) cavity barriers (D)*	Siderise RVG-090/030/154 cavity barrier (75mm-high×164mm-deep)
External finish (E)*	Taylor Maxwell Argeton GmbH Tampa Terracotta Tile platinum grey 10mm material thickness (263mm-high×492mm-wide×30mm-profile thickness)

* with reference to Figure 1



Table 1. List of component parts used in the construction of the system.

Item	Description
1	Kingspan kingframe 'U'-shaped steel head track (104mm-deep×55mm-high×1.2mm-thick)
2	Steel base tracks: A. Kingspan King frame 'U'-shaped track (104mm-deep×55mm-high×1.2mm-thick) B. Hadley 'U'-shaped track (104mm-deep×40mm-high×1.2mm-thick)
3	Kingspan kingframe 'C'-shaped steel stud (100mm-deep×50mm-wide×1.2mm-thick, with 13mm return)
4	British Gypsum Gyproc Wallboard (2400mm×1200mm×12.5mm-thick)
5	Euroform Versapanel cement bonded particle board (2400mm×1200mm×12mm-thick)
6	Aluminium top-hat channel (190mm-high×85mm-deep×5mm-thick)
7	Kingspan Kooltherm K15 insulation (2400mm×1200mm×80mm-thick) Batch nr: 8100414380 dated 11-03-2021
8	Combustion chamber surround flashing, made from pre-welded aluminium angle: <ul style="list-style-type: none"> Overall size: 2100mm-wide×2030mm-high Angle size: 100mm-wide×183mm-deep×5mm-thick
9	Siderise RS350G split-end steel bracket (supplied as 350mm-deep×25mm-wide×1mm-thick, cut to 310mm-deep)
10	Siderise RH25G-090/030/154 open state cavity barrier with intumescent strip (75mm-high×129mm-deep, to suit void size 154mm)
11	Siderise B195G steel bracket (330mm-deep×25mm-wide×1mm-thick)
12	Siderise RVG-090/030/154 cavity barrier (75mm-high×164mm-deep, to suit void size 154mm)
13	Aluminium 'L'-shaped brackets: A. Single bracket (85mm-high×40mm-wide×40mm-deep×3mm-thick) B. Double bracket (160mm-high×40mm-wide×40mm-deep×3mm-thick)
14	Aluminium 'T'-shaped rails with two pre-drilled fixing locations 100mm apart at 250mm vertical centres (120mm-wide×45mm-deep×2mm-thick)
15	Aluminium 'L'-shaped angle (70mm-high×50mm-deep×2mm-thick)
16	Taylor Maxwell Argeton tile aluminium clips: A. Base clip (26mm-deep×43mm-high×22mm-wide×2.5mm-thick) B. Double faced centre clip (26mm-deep×63mm-high×22mm-wide×2.5mm-thick) C. Top clip: continuous rail (25mm-deep×40mm-high×15mm-return×2mm-thick)
17	Profiled aluminium drainage rails: A. 60mm-wide×20mm-deep×1mm-thick B. 46mm-wide×14mm-deep×0.5mm-thick
18	Taylor Maxwell Argeton GmbH Tampa Terracotta Tile platinum grey 10mm material thickness (263mm-high×492mm-wide×30mm-profile thickness)
19	Top of system capping: A. Profiled steel bracket (280mm×72mm-high×3mm-thick)



	B. 'U'-shaped aluminum capping (350mm-deep×40mm/35mm-high front/rear×3mm-thick)
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2.3 Installation sequence

200mm×200mm×6mm Square Hollow Section (SHS) steel beams were fitted as part of the BRE test rig at 2530mm, 5070mm and 7550mm from ground to underside of section. At the top of the apparatus was a further SHS 150mm-high×100mm-deep, 9030mm from ground to underside. These were the primary attachment points of the cladding system to the test rig.

Head tracks (Item 1) were fixed to the underside of the SHS beams, with Evolution SuperTek 7 TSBW5.5-50-7 (5.5mm×50mm) self-drilling screws with EDPM washers at nominal 600mm horizontal centres.

A mixture of base tracks (Item 2A & 2B) were fixed to the ground and top side of the SHS beams, with FixFast HTF-6.3mm×70mm screws to ground and Evolution SuperTek 7 TSBW5.5-50-7 (5.5mm×50mm) self-drilling screws with EDPM washers to the SHS at nominal 600mm horizontal centres.

Vertical studs (Item 3) were fixed between the base and head tracks with FixFast DFS-CF-5.5mm×22mm screws, one screw at top and base of stud to front face only. Nominal stud centres were at 600mm horizontally with reduced centres at edge of walls. The Steel Framing System (SFS) oversailed the SHS beams by nominal 10mm.

Two layers of plasterboard (Item 4) were fixed to the rear of the system with FixFast DF3-SSA4-W-4.8mm×40mm stainless steel screws at nominal 300mm vertical centres. Both layers of plasterboard were installed with long edge vertical – joints were staggered.

Head track (Item 1) was fixed at the top of the system to the top face of the SHS (9180mm from ground), with Evolution SuperTek 7 TSBW5.5-50-7 (5.5mm×50mm) screws with EDPM washers. A second head track was fixed on top with FixFast DFS-CF 5.5mm×22mm screws. All fixing centres at nominal 600mm horizontally.

A single layer of cement particle board (Item 5) was fixed to the front face of the SFS. An additional layer of board (Item 5) was packed into the approx. 10mm cavity that formed where the first layer overlapped the blockwork at the front face of the combustion chamber. The boards were fixed to the SFS. On the main wall, the boards were cut to size where required (combustion chamber and at wing wall junction) and installed with long edge vertical (except directly above the combustion chamber). Board joints were not staggered. Fixed with FixFast DF3-SSA4-W-4.8mm×40mm screws at nominal 300mm vertical centres. Board joints were 5mm nominal width and were sealed with Everbuild Everflex Fire Mate intumescent sealant.

On the wing wall, the boards were cut to size and installed with long edge horizontal.

Top-hat channels (Item 6) were infilled with 110mm-high×80mm-thick insulation sections (Item 7) and fixed to the system with FixFast DF3-SS-5.5mm×50mm screws, at nominal 600mm horizontal centres (reduced to 300mm towards edge of walls), through top and bottom flange of channel. 12 rows of channels (Item 6) were installed across full system height at 430mm-810mm vertical centres.

Aluminium flashing (Item 8) was fixed flush to the combustion chamber opening face, with Fischer SXR 10mm×60mm FUS A4 screws with plastics anchors, at approximately 480mm centres. Everbuild Everflex Fire Mate intumescent sealant was applied to flashing and combustion chamber joint.

Steel split-end brackets (Item 9) were cut to 310mm, folded to 140mm-deep and fixed in three full-width rows located at: 3200mm, 6190mm and 9260mm from ground to centre of barrier. Another row was located



at: 2180mm from ground in line with the combustion chamber opening width (2100mm). The brackets were fixed above the barrier location (except at the top of the system) at 400mm horizontal centres with one FixFast DF3-SS-5.5mm×50mm screws.

Horizontal cavity barriers (Item 10) were pressed onto the split-end brackets so that the brackets protruded. The tip of the bracket was trimmed and the split-ends folded back to secure the barrier in place. Aluminium tape was applied to the barrier joints at top and bottom faces in line with the foil face.

Steel brackets (Item 11) were folded to 140mm-deep and fixed in two continuous columns located at: 2950mm (main wall) and 1630mm (wing wall) from the sheathing board face at the main-wing wall junction to centre of barrier. An additional two columns were installed either side of the combustion chamber at: 335mm and 2520mm from the wing wall sheathing board to a height of 2230mm. The brackets were fixed at 600mm vertical centres with one FixFast DF3-SS-5.5mm×50mm screws.

Vertical cavity barriers (Item 12) were pressed onto the brackets in columns. Aluminium tape was applied: at vertical barrier-horizontal barrier joints (top and bottom face of horizontal barrier) and vertical barrier-barrier joints (side faces).

Insulation boards (Item 7) were cut to size and installed between the top-hat channels. Insulation boards were fixed with FixFast SF-T-75×25mm plastic tube washers and FixFast SF-P-SS-70-D pressure plates with FixFast DF3-SS-HT-A15-5.5mm×130mm screws. The vertical centres of fixings were nominally at 500mm and the horizontal centres varied depending on the board sizes but were measured to be between 400mm-1000mm. Aluminum tape was applied: over the fixings, at insulation to top-hat channel joints and at insulation to cavity barrier joints.

Aluminium brackets (Item 13A & 13B) were fixed to the top-hat channels with FixFast DF3-SS-5.5×35mm screws, two per single bracket and three per double bracket. Horizontal bracket centres were measured at 492mm and reduced to 195mm at the combustion chamber sides.

Double brackets were used at locations where two rails adjoined: approx. every 3.5m, reduced to approx. 1m between the first two rows.

Aluminium rails (Item 14) were fixed to the brackets with FixFast DF3-SS-CF-4.8mm×25mm screws, two fixings per single bracket and three fixings per double bracket. The face of the rails had pre-existing fixing holes on front face, 250mm vertical centres×100mm horizontal centres.

Aluminium angle (Item 15) was fixed to the top side of the combustion chamber surround, 40mm short of front face with FixFast DF3-SS-5.5×35mm screws at nominal 500mm horizontal centres.

Base clips (Item 16A) were fixed to the angle located above the combustion chamber surround flashing, with FixFast DF3-SS-CF-4.8mm×25mm screws, two per location 100mm apart. Clips were in line with rail locations.

Base clips (Item 16A) were fixed to 'T'-shaped rails at ground level only, approx. 45mm from ground. Clips were fixed with FixFast R-SS-LF-4.8×16mm rivets, two per location 100mm horizontal centres (pre-existing fixing location).

Double faced centre clips (Item 16B) were fixed to the 'T'-shaped rails at 250mm vertical centres from the base clips, two per location, 100mm horizontal centres (pre-existing fixing location).

Drainage rails (Item 17A) were placed against the face of the 'T'-shaped rails in line with the vertical tile joints.

Drainage rails (Item 17B) were placed against the face of the 'T'-shaped rails at the edge of walls and combustion chamber opening sides.



The first row of tiles (Item 18) were hooked onto the base clips at the base of system, with the top of tiles secured with the centre clips. The next row of tiles were placed onto the centres clips and secured with centre clips at top of tiles, this process was continued to the penultimate row at top of system. The final row of tiles were secured at the top edge using a continuous top clip rail. Panel gaps were measured to be 4mm at vertical joints and 13mm at horizontal joints.

The top clip (Item 16C) was fixed to the front face of profiled bracket (Item 19A) with one FixFast DF3-SS-CF4.8mm×25mm screws per bracket. The top clip was positioned to line up with the top edge of the tiles.

The profiled brackets (Item 19A) were fixed to the SFS head track at the top of system, with two FixFast DF3-SS-CF4.8mm×25mm screws per bracket. The centre of brackets were installed at nominal 1000mm horizontal centres.

Aluminium capping (Item 19B) was fixed to the profiled brackets (Item 19A) with the 40mm-high edge facing the exposed system face. The item was fixed with FixFast DF3-SS-CF4.8mm×25mm screws, two screws per location, 200mm apart.



3 Product Specification

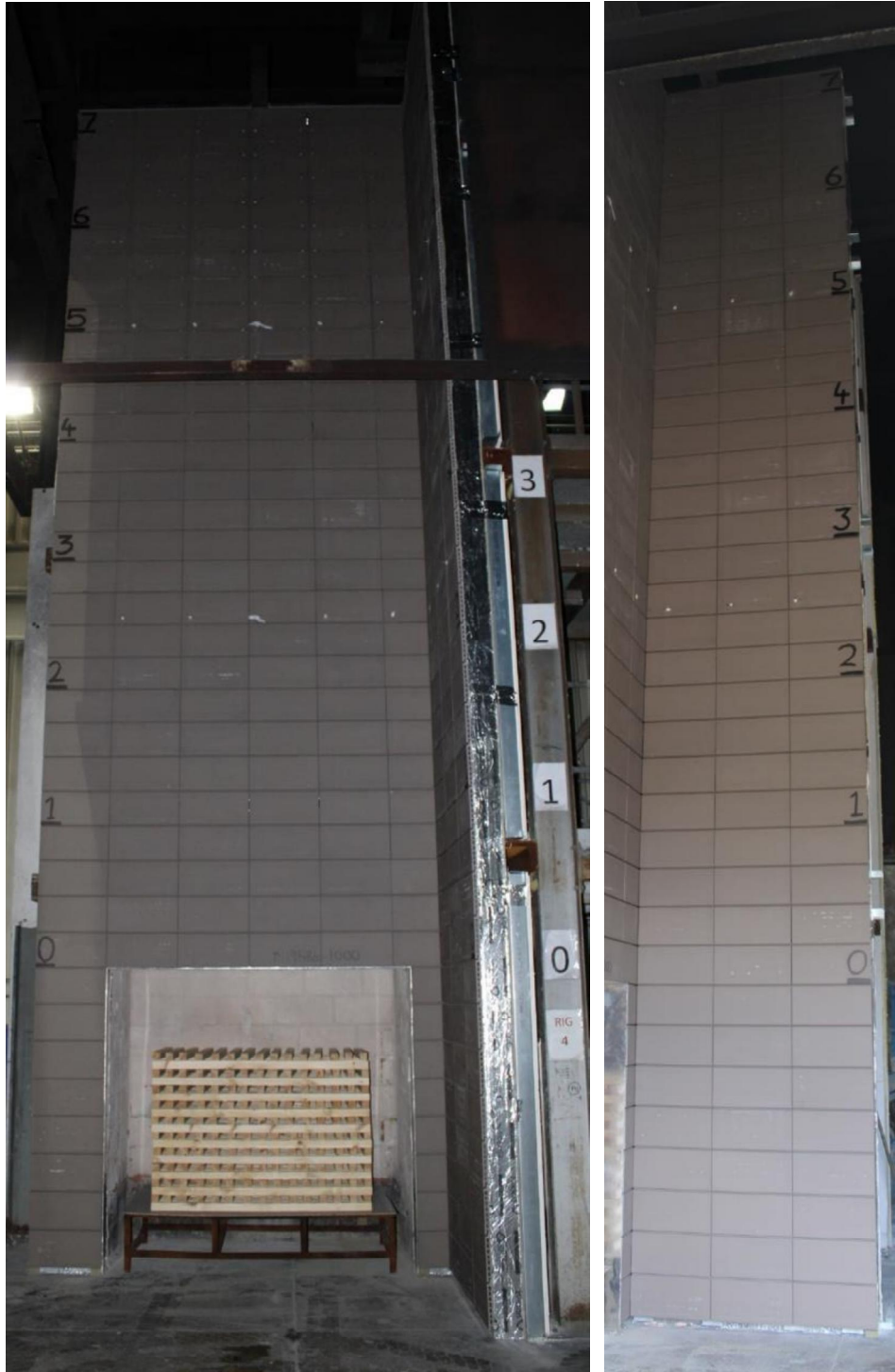


Figure 2. Full-height photograph of completed installation prior to testing.

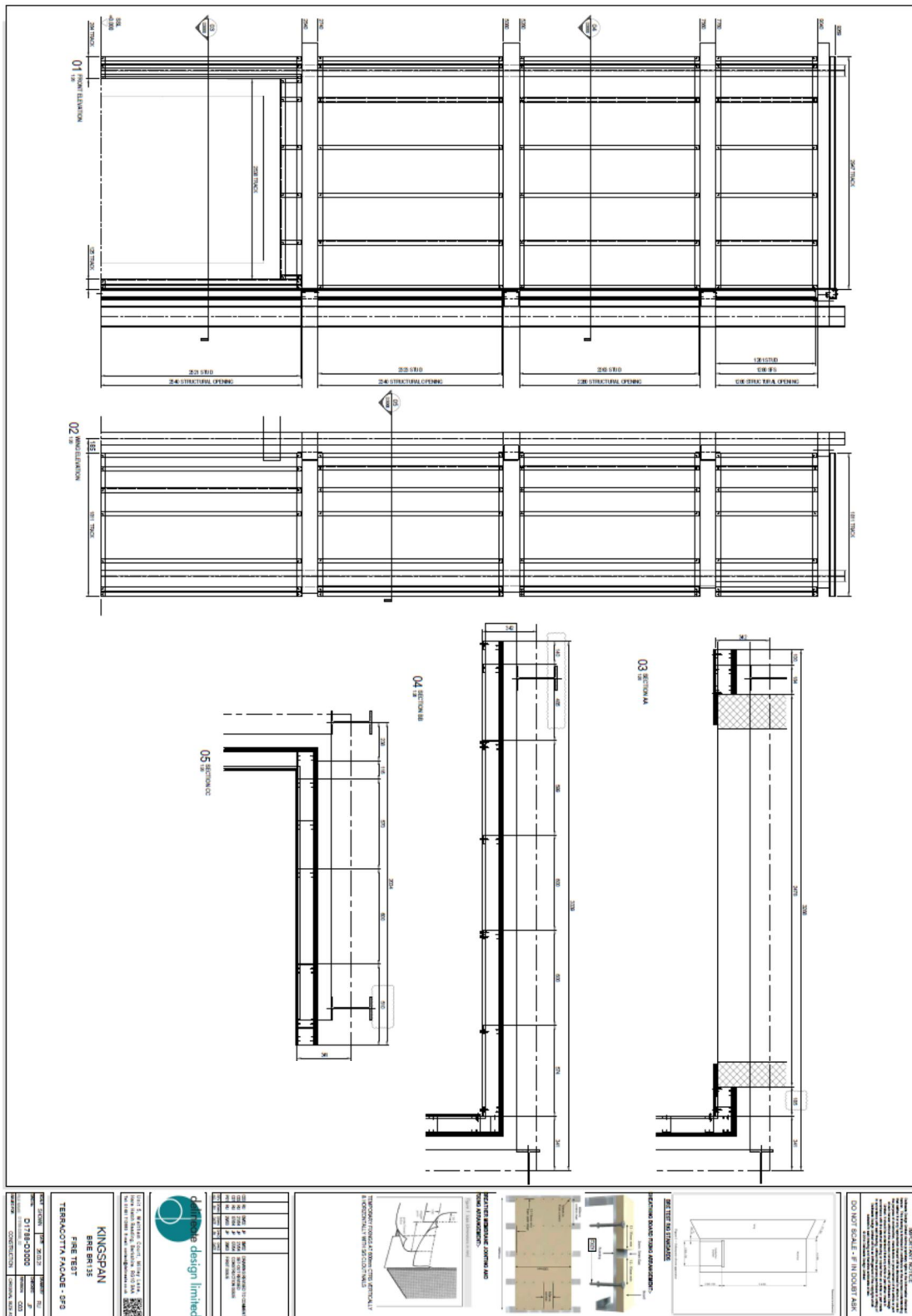


Figure 3. Steel Framing System layout (supplied by Test Sponsor).



4 Supporting Evidence

4.1 Test reports

Name of Laboratory	Name of sponsor	Test reports/extended application report Nos.	Test method / extended application rules & date
BRE Global, BRE	Kingspan Insulation Limited	P119586-1000 Issue: 1	BS 8414-2:2015 + A1:2017

4.2 Test results

Test method	Parameter	No. tests	Results	
			Fire spread test result time, t_s (min)	Compliance with parameters in Annex B BR135:2013
BS 8414-2:2015 + A1:2017	External fire spread	1	>15 minutes	Compliant
	Internal fire spread (Tile)		>15 minutes	Compliant
	Internal fire spread (Cavity)		>15 minutes	Compliant
	Internal fire spread (Insulation)		>15 minutes	Compliant
	Internal fire spread (Sheathing board)		>15 minutes	Compliant
	Internal fire spread (Steel Framing System)		>15 minutes	Compliant
	Internal fire spread (Plasterboard)		>15 minutes	Compliant
	System burn through		>15 minutes	Compliant



4.3 Mechanical performance

Time references given from point of ignition in the format mm:ss.

Observation	Details*
Ongoing system combustion following extinguishing of the ignition source	30:00-57:30
System collapse	16:55-28:05
Spalling	Not observed.
Delamination	Not observed.
Flaming debris	22:00-24:15
Pool fire	Not observed.

4.4 System damage

4.4.1 Tiles

On the main wall, the tiles had detached in an area approx. 1 to 2m-wide (min/max)×3.6m-high (approx. 4.8m²) above the combustion chamber opening. Tiles were discoloured from the combustion chamber opening to top of system.

On the wing wall, tiles were discoloured along the main-wing junction approx. 500mm-wide, 2m from ground to top of system.

Capping at the top of the system remained in place with no visible damage.

4.4.2 Rails

On the main wall, the centre rail in line with the combustion chamber centre line had melted up to 4m, the rails immediately either side of it had melted to 3.2m above the combustion chamber opening. All rails had signs of distortion up to 4m above the combustion chamber opening with discolouration to top of system.

On the wing wall, the rails remained in place with no visible damage.

4.4.3 Insulation & brackets

On the main wall, the insulation was charred or had detached/been consumed up to 4.2m-high×2m-wide above the combustion chamber opening, and was discoloured to top of system. On the wing wall, the insulation remained in place with no visible damage.

The brackets had melted in line with the rails and discoloured in line with the combustion chamber opening width to top of system.



4.4.4 Horizontal & vertical cavity barriers

The vertical cavity barriers either side of the combustion chamber opening were discoloured at the top edge approx. 400mm-high. The vertical cavity barriers located at the outer edges of both walls remained in place with no visible damage.

The horizontal cavity barrier located directly above the combustion chamber had fully activated across the full width. Sections of the intumescent strip had detached.

On the main wall, the 1st full width horizontal cavity barrier had fully activated across the full width.

On the wing wall, the horizontal cavity barrier had signs of expansion at the junction approx. 300mm-wide.

On the main wall, the 2nd full width horizontal cavity barrier had fully activated across the full width.

On the wing wall, the horizontal cavity barrier had signs of expansion at the junction approx. 300mm-wide.

On the main wall, the 3rd full width horizontal cavity barrier had signs of expansion at the centre of barrier.

On the wing wall, the horizontal cavity barrier had no visible signs of damage.

4.4.5 Top-hat channels

On the main wall, the first three top-hat channels above the combustion chamber had melted on the front face across a width ranging from 200-700mm. The channels had distorted up to the fourth row above the combustion chamber. All top-hat channels were discoloured to top of system in line with the combustion chamber opening.

On the wing wall, the top hat channels had no visible signs of damage.

4.4.6 Combustion chamber surround flashing

The combustion chamber surround flashing had melted across the full-width of the horizontal edge. The vertical sides were distorted and discoloured to full height.

4.4.7 Sheathing board

On the main wall, the cement board face was discoloured up to 4.2m above the combustion chamber opening to full width of wall.

On the wing wall, the cement board had no visible signs of damage.

4.4.8 Steel framing system & plasterboard

The SFS and plasterboard remained intact and in place with no visible damage. There was some smoke staining localised to the Level 1 thermocouple holes.

The unexposed face of the plasterboard remained intact and in place with no visible damage.



5 Classification and Field of Application

5.1 Reference of classification

This classification has been carried out in accordance with Annex B of BR 135 – ‘Fire performance of external thermal insulation for walls of multi-storey buildings.’ Third Edition 2013.

5.2 Classification

The system described in this classification report has been tested and met the performance criteria set in Annex B of BR 135:2013.

5.3 Field of application

This classification is valid only for the system as installed and detailed in Sections 2 and 3 of this classification report and the associated details found in the related test reports, referenced in Section 4.



6 Limitations

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

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. It cannot state what is not covered. When specifying or checking a system it is important to check that the classification documents cover the end-use application.