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BRE Global Classification Report

Classification of fire performance in accordance with BR 135: 2013 Annex A for a ventilated façade system with Kingspan Kooltherm K15 insulation and Alpolic/fr panels.

Prepared for: **Kingspan Insulation Limited**

Date: **11th January 2017**

Report Number: **P107017-1001 Issue 2**

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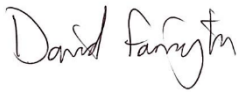
Signature 

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Date 11 January 2018

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CLASSIFICATION OF FIRE PERFORMANCE IN ACCORDANCE WITH BR 135:2013 Annex A

Sponsor: Kingspan Insulation Limited. Pembridge, Leominster, Herefordshire, HR6 9LA, UK

Prepared by: BRE Global Ltd, BRE, Bucknalls Lane, Garston, Watford, WD25 9XX, England

Product name: Ventilated façade system with Kingspan Kooltherm K15 insulation and Alpolic/fr ACM panels installed with a 4mm ventilation gap between panels on all sides.

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This classification report consists of 16 pages and may only be used or reproduced in its entirety.

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 A 2013. This classification should be read in conjunction with this document and the associated test reports referenced in Section 4.

This is issue 2 of classification report P107017-1001. Minor editorial changes have been made to the Classification report. Report P107017-1001 dated 13th December 2017 has been withdrawn from the date of this classification report.

2 Details of the Classified System

2.1 Description of substrate

The test apparatus is representative of the face of a building and consists of a masonry structure with a vertical main test wall and a vertical return wall at a 90º angle to and at one side of the main test wall.

2.2 Description of system

Item	Description
1	150mm-long x 90mm-wide x 5mm-thick 'L'-shaped aluminium brackets fixed to the wall using one apoloMEA MFR FB 10-80 SSKS.
2	155mm-deep x 75mm-thick Siderise RSV 90/30 vertical cavity barriers - labelled 'Lamatherm'. Secured to ¾ depth using B65/110 galvanised steel brackets fixed to the wall using one apoloMEA MFR FB 10-80 SSKS.
3	125mm-deep x 75mm-thick Siderise RH25G 90/30 horizontal open state cavity barriers with intumescent strip. Skewered onto face turned RS 350 galvanised steel brackets fixed to the wall using one apoloMEA MFR FB 10-80 SSKS.
4	100mm-thick Kingspan Kooltherm K15 insulation. Aluminium Foil faced on both sides. Supplied in 2.4m x 1.2m sheets. The insulation was secured to the wall using 4.8mm x 160mm A4 stainless steel screws (BS-A4-4.8 x 160) with washers (SP-SS-70-D4) and 4.8mm x 160mm A4 stainless steel screws (BS-A4-4.8 x 160) with Fixfast DHK120 plastic fixings.
5	40mm-wide x 60mm-deep x 2mm-thick aluminum 'L' shaped rails.
6	120mm-wide x 60mm-deep x 2mm-thick aluminum 'T' shaped rails.
7	4mm-thick ACM (aluminum composite material) panels. Mitsubishi Alpolic/fr made of 0.5mm aluminum sheet, a fire retardant Cat2[3] core material, 0.5mm aluminum sheet with a calorific value of 13.6 MJ/Kg when tested to EN1716[2]

2.3 Installation sequence

'L'-shaped brackets to carry the 'T' and 'L'-shaped rails were fixed to the masonry structure using one apoloMEA MFR FB 10-80 SSKS per bracket. The combined aluminium substructure was referenced Allface System F1.10.

Three rows of brackets were installed between the first Siderise RH25G 90/30 horizontal open state cavity barriers (located at the top of the combustion chamber opening) and the second horizontal cavity barrier. Three rows of brackets were installed between the second and third horizontal cavity barriers and a further three rows between the third and fourth horizontal cavity barrier. The horizontal spacing between brackets ranged 300-700mm.

The Siderise RSV 90/30 vertical cavity barriers were skewered to ¾-depth on B65/100 galvanised steel brackets and fixed onto the masonry wall at nominal 300mm vertical centres using one apoloMEA MFR FB 10-80 SSKS fixing. On the main wall, the vertical cavity barriers were aligned vertically such that the inner edge was aligned with the vertical edges of the combustion chamber.

On the wing wall, a single Siderise RSV 90/30 vertical cavity barrier was located at the outside edge of the system approximately 1350mm from the face of the main wall.

Siderise RH25G 90/30 horizontal open state cavity barriers were fitted to the masonry wall on RS 350 galvanised steel skewers secured with one apoloMEA MFR FB 10-80 SSKS at 350mm–400mm horizontal centres. The barriers were pushed over the fixings such that they protruded through the cavity barrier. The protruding end was turned through 90^0 by hand to secure the barrier in place.

Siderise RH25G 90/30 horizontal open state cavity barriers were fitted at approximate heights above the combustion chamber opening of: 0m, 2400mm, 4600mm and 6500mm.

100mm-thick Kingspan Kooltherm K15 insulation was supplied in 2.4m x 1.2m sheets and cut to size where necessary. Each full-size sheet was secured to the masonry wall using 15 fixings across 3 rows (see *Table 1*). The washers in each row alternated between metal (SP-SS-70-D4) and plastic (Fixfast DHK120). The insulation was push fitted over the 'L'-shaped brackets. The joints, screw heads and openings formed for the brackets were covered with self-adhesive aluminium tape.

'T' and 'L'-shaped rails were fixed to the 'L'-shaped brackets to form Allface System F1.10. On the main wall, the 'T'-shaped rails were installed vertically and aligned with the centre and the vertical edges of the combustion chamber. 'L'-shaped rails were installed at mid-width between the 'T'-shaped rails and at the outside edge of the system. On the wing wall, only 'L'-shaped rails were installed – located centrally and at the outside edge of the system. At the main-wing wall junction, 'T' and 'L'-shaped rails were coupled to create a corner section.

Mitsubishi Alpolic/fr ACM panels were installed on to the aluminium rail substructure (Allface System F1.10). The flat panels were Booth Muirie BML 400 Rivet fixed (4.8mm x 16mm steel rivets) into the Allface System F1.10 at nominal 300mm vertical centres and 400mm horizontal centres. A 4mm ventilation gap was left between adjacent panels on all sides.

With reference to *Figure 2*, the panel widths were:

Column 'A' (wing wall) - 1340mm

Column 'B' - 388mm

Column 'C' - 968mm

Column 'D' - 969mm

Column ‘E’ - 231mm

The panel heights were:

Row 0 - 1988mm,

Row 1- 2326mm,

Row 2 - 2326mm

Row 3 - 1833mm

2.4 Installation of Specimen

All test materials were supplied and installed by the test sponsor. BRE was not involved in the sample selection process and therefore cannot comment upon the relationship between samples supplied for test and the products supplied to market.

3 Product Specification

Figure 1. The main wall of system prior to test.

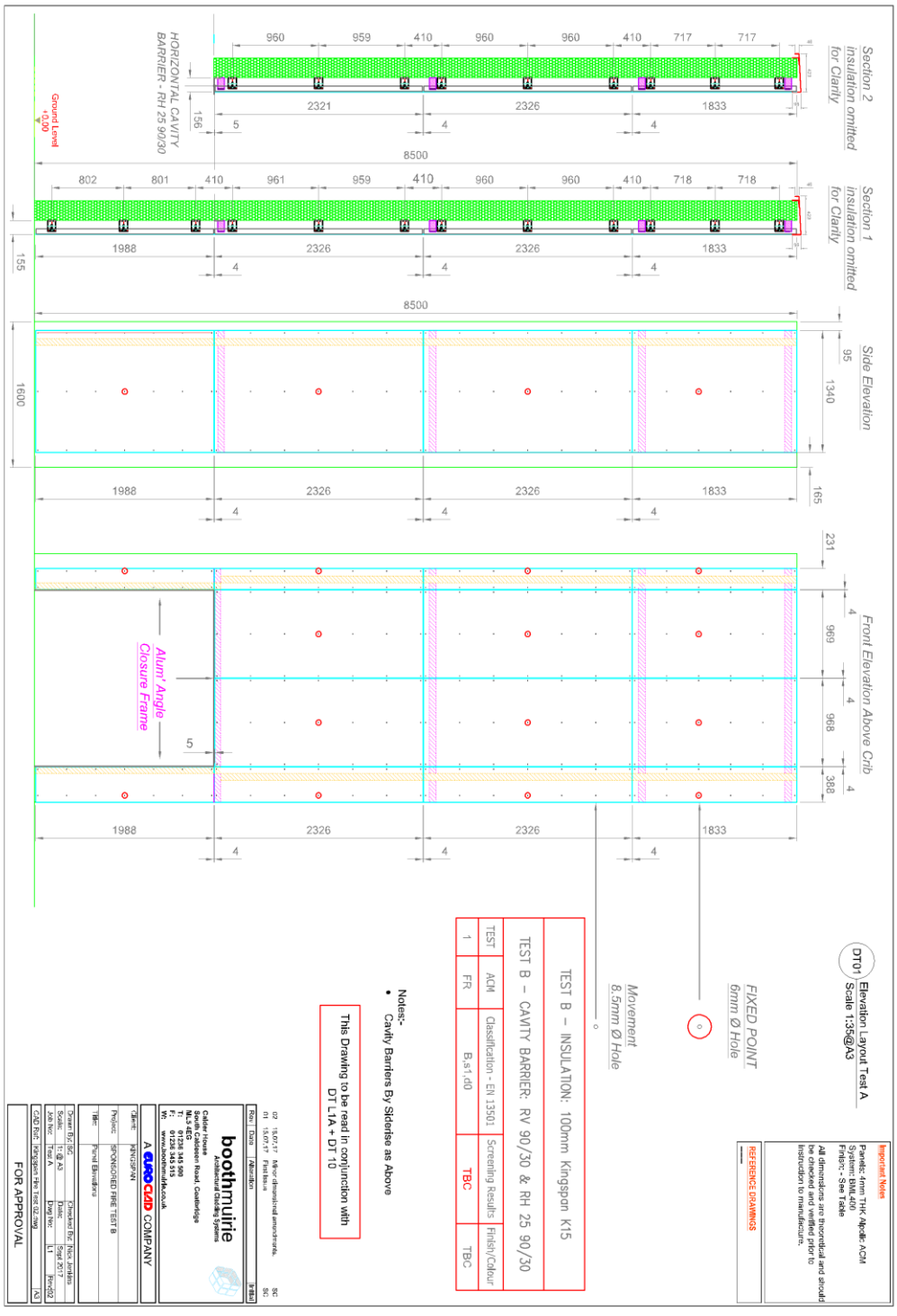

Figure 2. Elevation drawings – (supplied by the test sponsor).

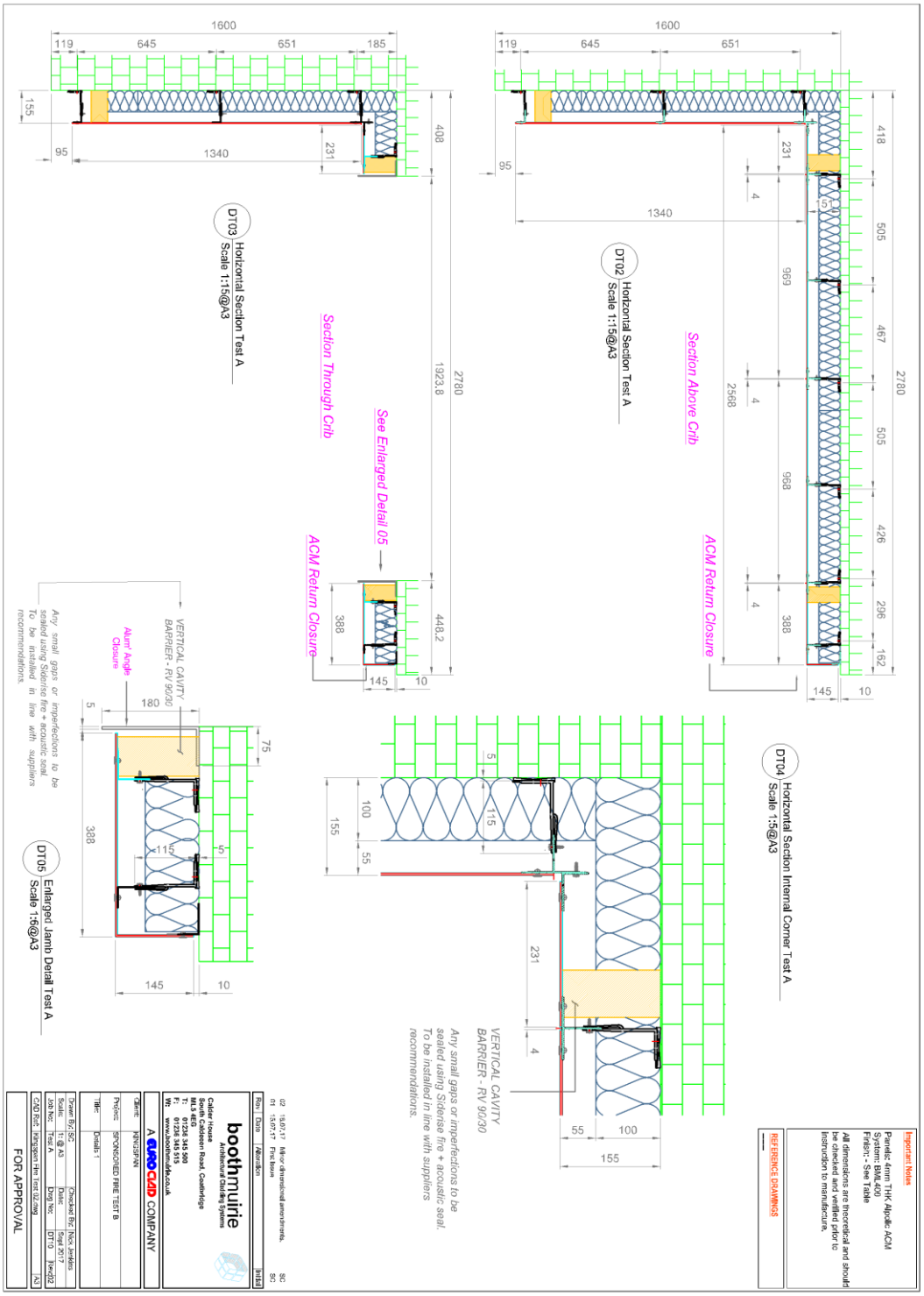

Figure 3. Cross sectional drawing. (Supplied by the test sponsor).

4 Supporting Evidence

4.1 Test reports

Name of Laboratory	Name of sponsor	Test reports/extended application report Nos.	Test method
BRE Global, BRE	Kingspan Insulation	P107017-1000 issue 1	BS 8414-1: 2015[1]

4.2 Test results

Test method & test number	**Parameter**	**No. tests**	**Results**	
			Fire spread test result time, t_s (min)	**Compliance with parameters in Annex A BR135:2013**
BS 8414-1: 2015	External fire spread	1	>15 minutes	Compliant
	Internal fire spread Cavity		>15 minutes	Compliant
	Internal fire spread Insulation layer		>15 minutes	Compliant

4.3 Mechanical Performance

There was ongoing system combustion following the extinguishing of the ignition source. The system continued to burn until the test was terminated at 60 minutes.

Flaming debris fell from the system during the first 30 minutes of the test.

A pool fire was observed during the first 30 minutes of test.

4.4 System Damage

4.4.1 ACM panels

Row 0 – Panel 0A was significantly distorted and discoloured (approximately 70% panel coating removed, 25% dark discolouration). On panel 0B there was a small area (approximately 300mmx150mm) of dark discolouration in the top left hand corner of the panel (adjacent to the combustion chamber). Panel OE was not visibly damaged.

Row 1 – Panel 1A was significantly distorted and discoloured (approximately 50% panel coating removed, 25% dark discolouration). Panel 1B was significantly distorted and discoloured (approximately 50% panel coating removed, 50% dark discolouration). Panels 1C and 1D were both almost fully consumed. Panel 1E was distorted and darkly discoloured in a 50mm-wide full-height vertical strip in line with the combustion chamber opening.

Row 2 – Panel 2A was distorted and discoloured (<10% panel coating removed, 50% dark discolouration). Panel 2B was distorted and discoloured at the base of the panel (small areas of panel coating removed, 40% dark discolouration). Panels 2C and 2D were damaged across the full panel surface: panel consumed (55% and 40% respectively), distorted and discoloured across the remaining panel. An area approximately 1500mm x 400mm of panel 2D remained loosely attached with consumption of the panel core. Small holes approximately 50mm x 300mm and 50mm x 50mm were observed in panel 2D approximately 3750mm above combustion chamber. Panel 2E was distorted and slightly discoloured.

Row 3 – Panels 3A&3B had minor distortion. Panel 3C was distorted and discoloured (small areas of panel coating removed, approximately 30% dark discolouration). Panel 3D was distorted and discoloured (small areas of panel coating removed, approximately 25% dark discolouration). Panel 3E had minimal visible damage.

4.4.2 Aluminium rail substructure

The central aluminium ‘T’-shaped rail on the main wall was fully consumed up to a height of approximately 4m. Partial consumption and distortion continued to the top of 2C-2D panel junction.

The ‘L’-shaped rails to the left and right of centre on the main wall were fully consumed up to a height of approximately 3.5m. Partial consumption and distortion continued for approximately 500mm.

4.4.3 Phenolic Insulation

On the main wall face, at the location of panel/s (refer to *Figure 2)*:

- 0E. The foil facing on the insulation remained intact
- 1B. Dark discolouration towards the second horizontal cavity barrier and small areas of detachment/consumption of foil facing.
- 1C&1D. Small amount of charred insulation remains. Rear foil facing visible across approximately 10%, mostly intact.
- 1E. Foil facing of insulation intact Slight discolouration in places.
- 2B. Minor discolouration of the foil facing.

- 2C. Charring of the insulation occurred in decreasing severity between the second and third cavity barrier. External foil facing and some uncharred insulation remained adjacent to the third horizontal cavity barrier. The internal foil facing was not visible.
- 2D. Damage to the insulation was similar to that observed beneath panel 2C, however; a band of significant insulation consumption and detachment extended from approximately mid-height to approximately 300mm below the third cavity barrier. The blockwork was exposed in an approximately 300mm-width which would have been directly below the damaged edge of the remains of panel 2D.
- 2E. Insulation appeared to be undamaged.
- 3B. Insulation appeared to be undamaged.
- 3C&3D. Discolouration of the foil facing most pronounced along centre line of combustion chamber opening.
- 3E. Insulation appeared to be undamaged.

On the wing wall face, beneath panel (refer to *Figure 2)*:

- 0A. The foil facing on the insulation remained intact.
- 1A. Blistering and slight discolouration of the foil facing up to mid-width adjacent to the main wall. Minimal damage from outside edge of wing wall to mid-width.
- 2A. Minor blistering and discolouration was observed in patches directly adjacent to the main wall
- 3A. Insulation appeared to be undamaged.

4.4.4 Vertical cavity barriers

The Siderise RSV 90/30 vertical cavity barriers on the main and wing wall remained intact throughout the height of the system. On the main, there was minor surface discolouration up to the height of the third horizontal cavity barrier. The wing wall vertical cavity barrier sustained no visible damage.

4.4.5 Horizontal (intumescent) cavity barriers

Directly above the combustion chamber, the intumescent strip of the Siderise RH25G 90/30 horizontal open state cavity barrier had activated but was destroyed (directly in line with the combustion chamber opening) up to the vertical cavity barriers, beyond these there was evidence of activation across the full width of main and wing walls.

The second-row horizontal cavity barrier had activated but was significantly damaged (directly in line with the combustion chamber opening) up the vertical cavity barriers, beyond these there was evidence of activation across the full width of main and wing walls.

The third-row horizontal cavity barrier had fully activated across the central 2000mm-width (directly in line with the combustion chamber opening). Partial activation of the intumescent strip occurred across the wing wall. Evidence of slight heat damage was visible at the outside edge of the main wall.

The fourth-row horizontal cavity barrier had partially activated across the central 2000mm-width (directly in line with the combustion chamber opening). Partial activation of the intumescent strip occurred up to mid-width on the wing wall. At the outside edge of the main wall there was no evidence of activation.

5 Classification and field of application

5.1 Reference of classification

This classification has been carried out in accordance with Annex A 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 A of BR 135:2013.

5.3 Field of application

This classification is valid only for the system as installed and detailed in Section 2 of this classification report and the associated details found in the related test reports, referenced in Section 4. It is important to note that the fire performance of this type of system depends on the specification of the external ACM panel element. Specifically, the ACM panel element shall be Cat2[(3)](with a calorific content of 13.6 MJ/Kg or less) and shall be installed with a ventilation gap between panels of 4mm.

6 Limitations

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

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.

7 References

1. BS 8414-1: 2015 + A1: 2017. Fire performance of external cladding systems. Test method for non-loadbearing external cladding systems applied to the masonry face of a building. BSI, London. 2017.

2. EN ISO 1716: 2010. Reaction to fire tests for building products – Determination of the gross heat of combustion (calorific value) (ISO 1716: 2010). CEN, Avenue Marnix 17, B-1000 Brussels. 2010.

3. Government Building Safety Programme – Explanatory Note, Published by Department for Communities and Local Government (DCLG) following Grenfell Tower fire on 14 June 2017, document undated.

Report Ends