

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 Alpic/fr panels.**

Prepared for: Kingspan Insulation Limited

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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 10mm ventilation gap between panels on all sides.

Classification report No.: P109939-1001

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



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 90° 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 $\frac{3}{4}$ 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 $\frac{3}{4}$ -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° 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. 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 10mm panel 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' - 288mm

Column 'C' - 993mm



Column 'D' - 992mm

Column 'E' - 385mm

The panel heights were:

Row 0 - 1985mm,

Row 1- 2320mm,

Row 2 - 2320mm

Row 3 - 1830mm

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.

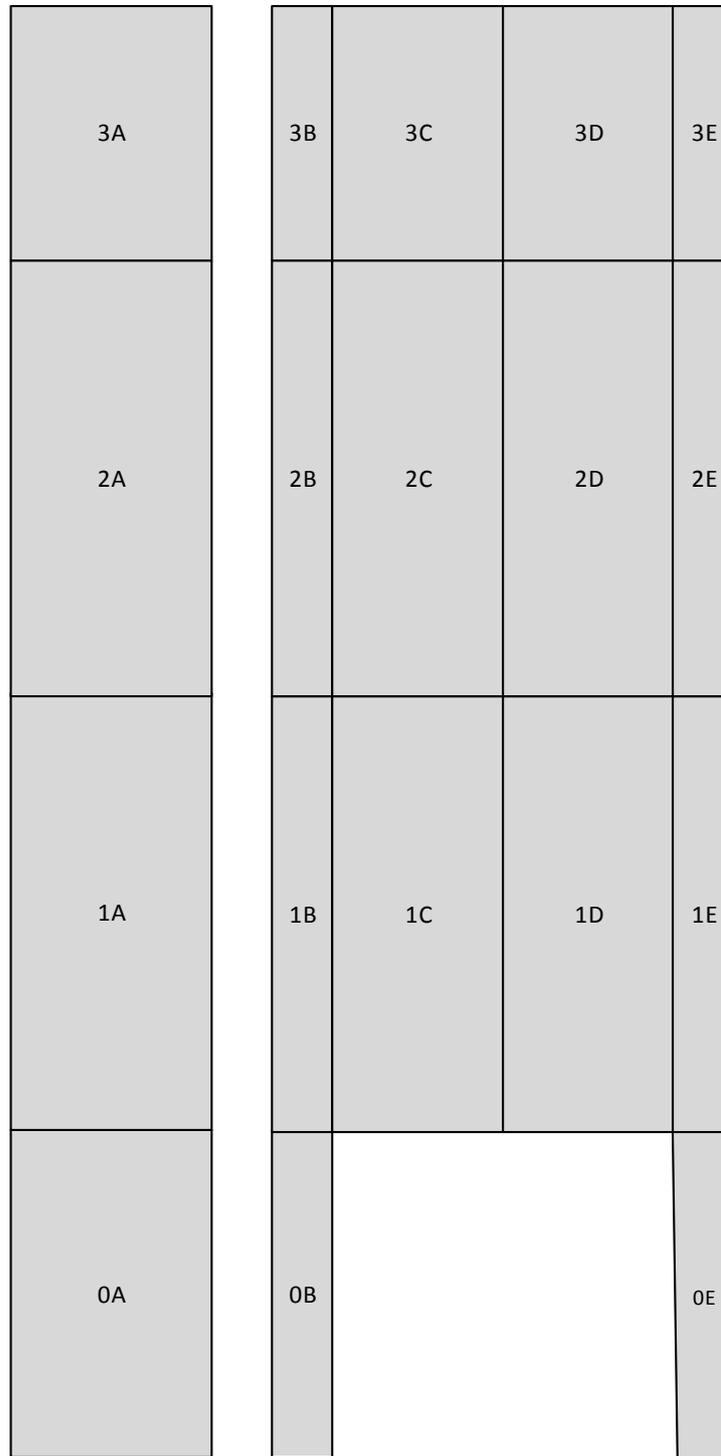


Figure 2. Layout of panels and numbering system used for reporting. Not to scale.

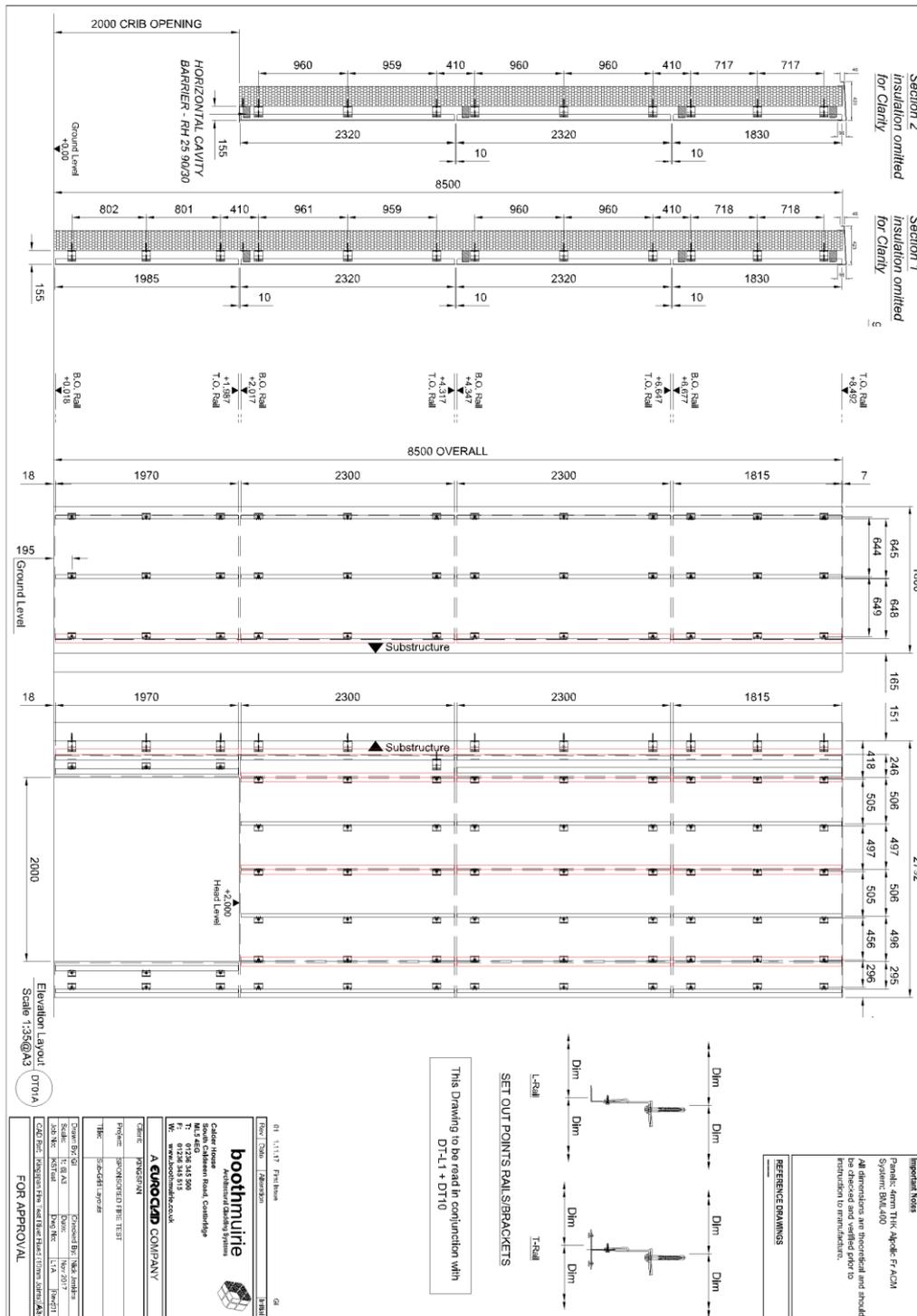


Figure 3. Elevation drawings (supplied by the test sponsor).

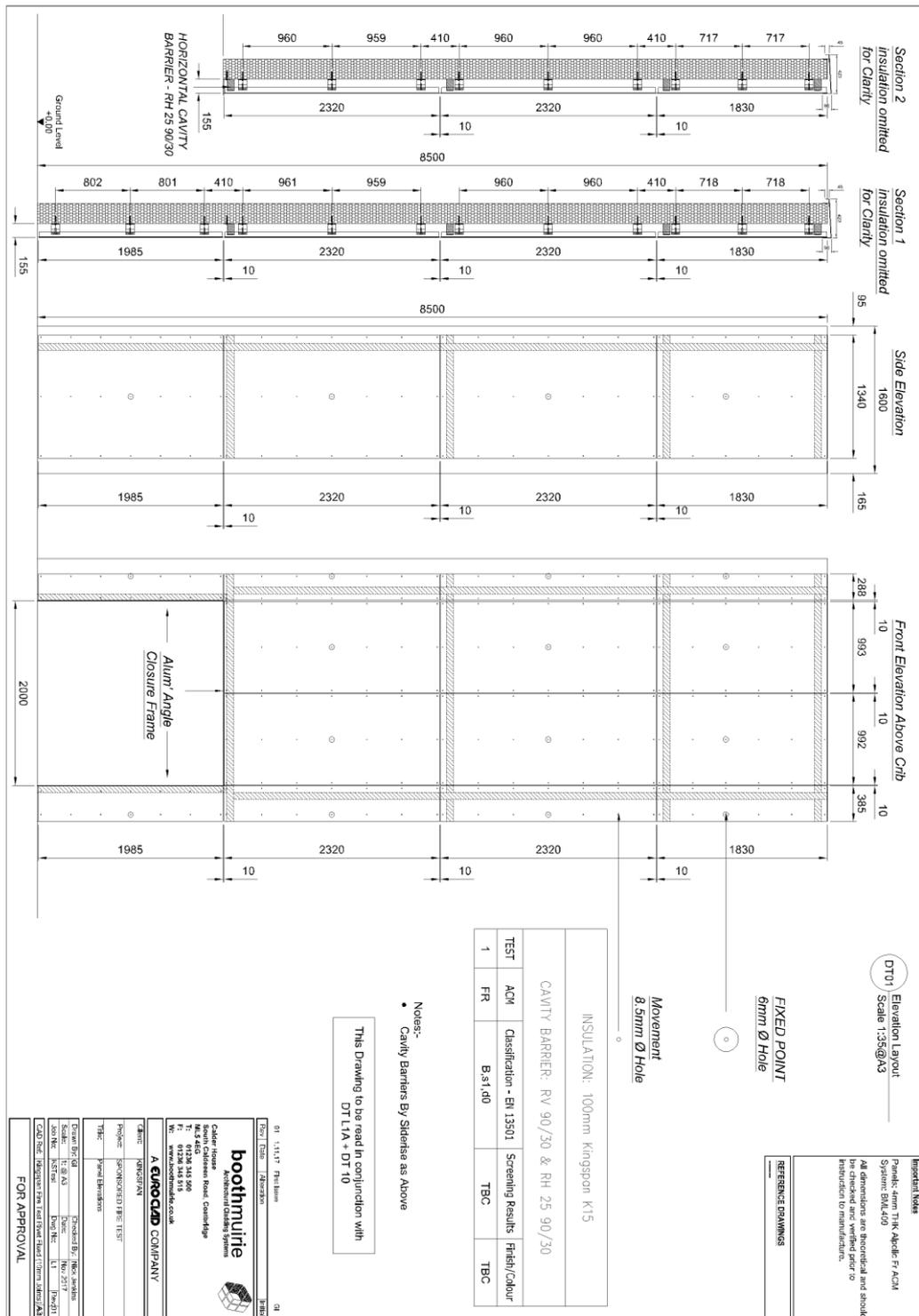


Figure 4. Cross sectional drawing (supplied by the test sponsor).

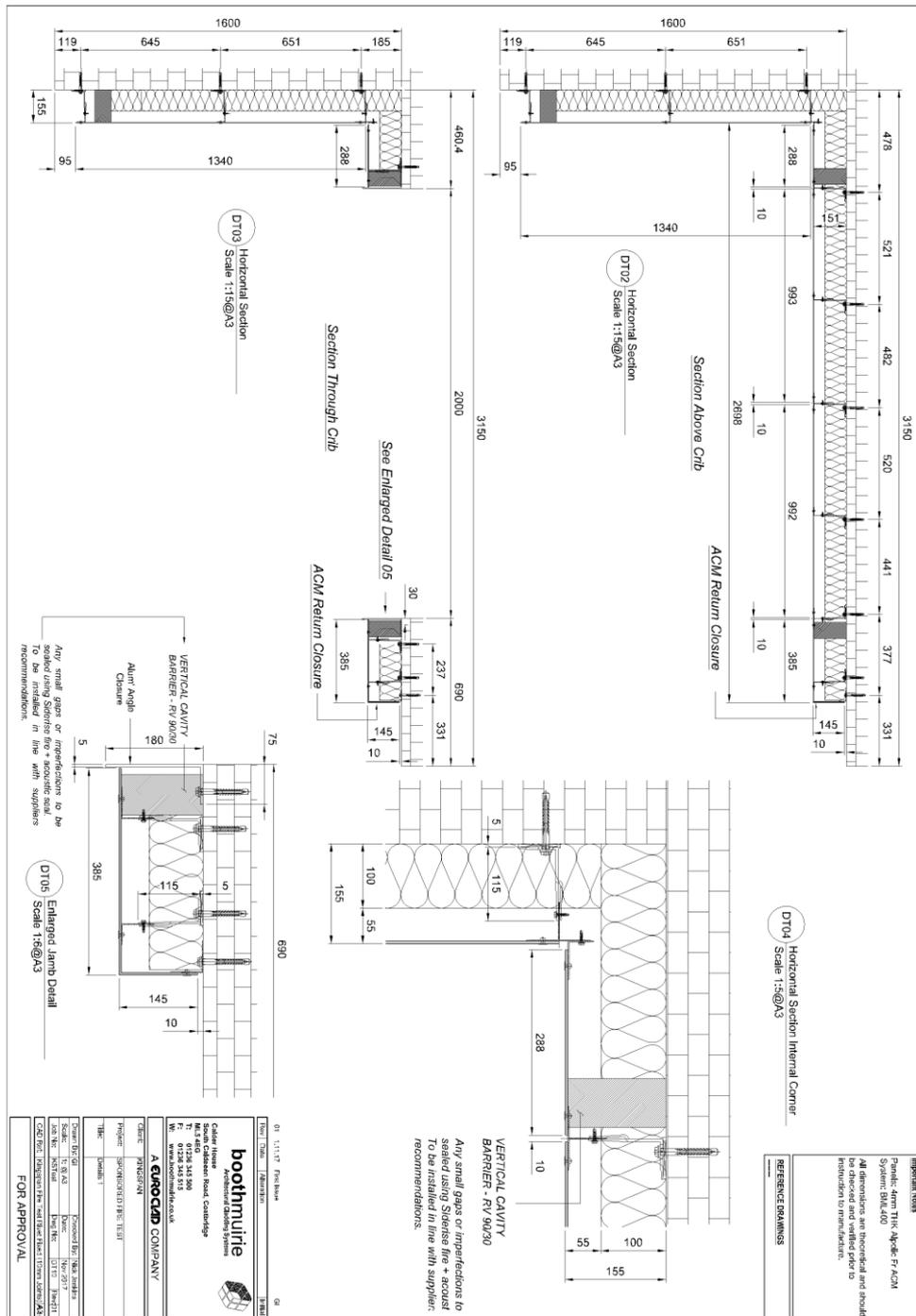


Figure 5. Construction drawings (supplied by the test sponsor).

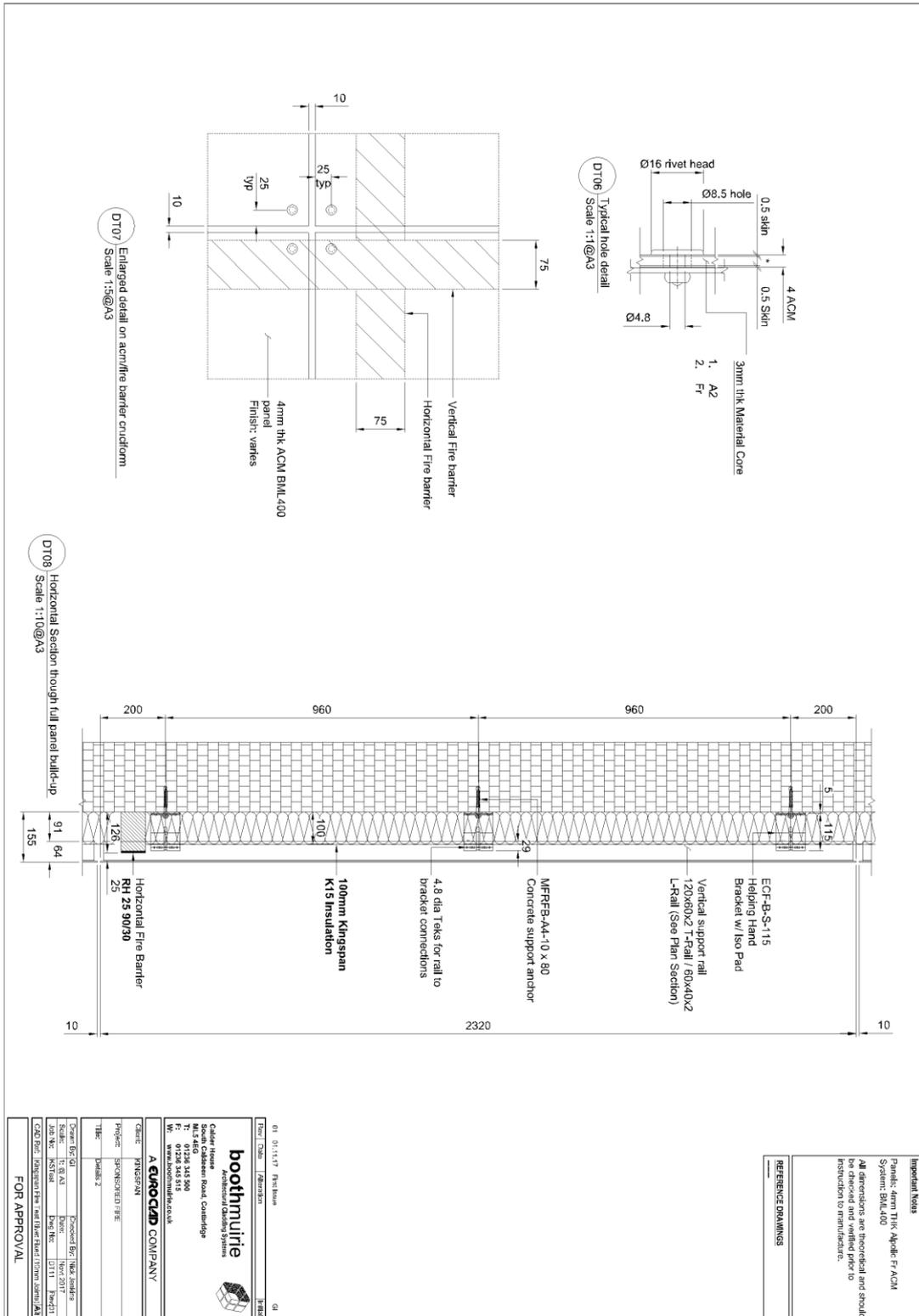


Figure 6. Construction drawings (supplied by the test sponsor).



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	P109939-1000 issue 1	BS 8414-1: 2015

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.

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

4.4 ACM panels

Panel 0A. Intact and in place. Dark discolouration of panel and distortion

Panel 0B. Intact and in place. Minor discoloration top and bottom right hand corner.

Panel 0E. Intact and in place. Minor discoloration top and bottom left hand corner.

Panel 1A. Intact and in place. Dark discolouration of panel and distortion

Panel 1B. Intact and in place. Discoloration and distortion full height of panel.

Panel 1C. Fully consumed.

Panel 1D. Fully consumed

Panel 1E. Intact and in place. Minor discoloration and distortion to left hand edge.

Panel 2A. Intact and in place. Dark discolouration of panel and distortion to $\frac{3}{4}$ of height of panel.

Panel 2B. Intact and in place. Distortion and discoloration to full height of panel.

Panel 2C. Approx 90-95% consumed.

Panel 2D. Approximately 50% consumed. Section remaining in the form of an inverted triangle 600mm width at top x 100mm at base (full panel height). Panel loosely attached at outside vertical edge and distorted away from the wall.

Panel 2E. Intact and in place. Minor discoloration and distortion to left hand edge.

Panel 3A. Intact and in place. Some heat distortion of the panel, but no discolouration.

Panel 3B. Intact and in place. Some heat distortion of the panel, but no discolouration.

Panel 3C. Intact and in place. Some heat distortion of the panel, aluminium exposed at the base of the panel, smoke discolouration to mid height.

Panel 3D. A section at the base of the panel approx. 250mm(w) x 75mm(h) consumed, remaining panel intact and in place. Some heat distortion and discolouration of the panel.

Panel 3E. No visible damage.



4.5 Aluminium rail substructure

Main wall

All of the framing system directly above the combustion chambers up to the height of the third cavity barrier (4600mm above combustion chamber) was consumed. Framing on the main wall above the third cavity barrier was intact and in place. There was some heat damage and discoloration to the central 'T' section.

Left hand 'T' section at the inside edge of the combustion chamber was consumed to the height of second cavity barrier (approx 2400mm above combustion chamber). Intact above this level.

Right hand 'T' section at the outside edge of the combustion chamber was consumed at height approximately 1.5m to 2.2m and 2.5m to 3.0m. Above the third cavity barrier, the framing was intact.

Wing Wall

The framing was intact and in place for the full height of the wing wall. There was some heat distortion and discolouration to the framing at the junction of the main and wing walls between the first and second cavity barriers.

4.1 Phenolic Insulation

The insulation under panels (with reference to figure 2):

0A. Surface discolouration to the foil. The remaining insulation was undamaged.

1A. Surface discoloration to foil.

1B surface discolouration to foil

1C&1D. Insulation largely destroyed. Masonry substrate visible through foam.

1E. Undamaged

2A. Insulation undamaged.

2B. Minor surface discolouration to foil.

2C & 2D Extensive damage and charring to insulation. Masonry substrate visible in places.

2E. Undamaged.

3A. Largely undamaged.

3B Minor surface discolouration.

3C&3D -Surface discoloration to foil facing.

3E Undamaged.



4.2 Vertical cavity barriers

Intact and in place. There was some discoloration to the barriers up to the level 3 cavity barrier on the main wall.

Wing wall vertical cavity barrier was undamaged.

4.3 Horizontal (intumescent) cavity barriers

Cavity barrier 1. (In line with the top of the combustion chamber)

The cavity barrier directly above the combustion chamber was destroyed. At the junction of 0E & 1E it had not activated. On the wing wall, the barrier had activated across the full width.

Cavity barrier 2 (approx. 2400mm above combustion chamber)

The stone wool section of barrier remained attached to the masonry substrate across the width of the main wall. The intumescent section was in longer in place directly above the combustion chamber, the remaining intumescent on the main and wing walls had activated.

Cavity Barrier 3. (approx. 4600mm above combustion chamber)

Intact and in place. The intumescent had activated across the full width of the cavity barrier with the exception of the short section on the outside edge of the main wall.

Cavity Barrier 4. (approx. 6500mm above combustion chamber)

Intact and in place. The intumescent had activated across the central section of the barrier in line with the top of the combustion chamber.



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 10mm.

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.