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BRE Global Classification Report

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

Prepared for: Kingspan Insulation Ltd

Date: 31st October 2018

Report Number: P112065-1001 Issue: 1

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

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: Brickwork cladding system with Kingspan Kooltherm K15 insulation

Classification report No.: P112065-1001

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This classification report consists of 18 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 B 2013. This classification should be read in conjunction with this document and the associated test reports referenced in section 4.

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2 Details of the Classified Product

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 90º angle to and at one side of the main test wall.

2.2 Description of product

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

Item	Description
1	British Gypsum Gyproc Wallboard (12.5mm-thick boards, double layer, fitted to internal face of partition).
2	Kingframe galvanised steel horizontal 'C'-shaped head channel (104mm-deep×67mm-high×1.8mm-thick).
3	Kingframe galvanised steel horizontal 'C'-shaped base channel (104mm-deep×55mm-high×1.2mm-thick).
4	Kingframe galvanised steel vertical 'C'-shaped stud (100mm-deep×50mm-wide×1.2mm-thick).
5	Euroform Versapanel cement particle board (12mm-thick).
6	Kingspan nilvent breather membrane.
7	Galvanised steel profiled capping brackets (297mm-deep×35mm-high×3mm-thick).
8	Aluminium 'U'-shaped capping (420mm-deep×40mm-high×3mm-thick).
9	Galvanised steel skewers (320mm-long×25mm-wide×1mm-thick).
10	Siderise EW-CB30 stone wool vertical cavity barrier (75mm-wide×155mm-deep).

11	Galvanised steel skewers (355mm-long×25mm-wide×1mm-thick).
12	Siderise RH25G-090/030 stone wool horizontal open state cavity barrier with intumescent strip (75mm-high×125mm-deep).
13	Kingspan Kooltherm K15 phenolic insulation (80mm-thick & 100mm-thick).
14	Ancon 25/14 wall tie support channel (14mm-deep×25mm-wide).
15	Aluminium combustion chamber surround side flashing (245mm-deep×65mm-wide×3mm-thick).
16	Aluminium combustion chamber surround top flashing (245mm-deep×65mm-high×3mm-thick).
17	Catnic LA/L10 galvanised steel external wall lintel (95mm-deep×158mm-high×2400mm-wide×2mm-thick).
18	Ancon SD25/100 wall ties (105mm-deep×20mm-wide×2mm-thick).
19	Wienerberger Waresley Red Stock bricks (102mm-deep×219mm-wide×63mm-high).

2.2.1 Installation sequence

A Kingframe SFS (Steel Framing System) was constructed using Items 2-4 in *Table 1*. The partition was fitted flush with the front face of the floor slabs, fixed to the slabs and ground using 6×70mm countersunk Tapcon self-drilling screws at 100-400mm centres.

The vertical studs of the partition were set at 600mm centres and fixed to the horizontal channels using 4×25mm self-drilling screws. The stud spacing was reduced to 90mm at edge of framing.

A double layer of British Gypsum Gyproc Wallboard was fitted to the internal face of the partition (long edge horizontal) using Easydrive 3.5×50mm drywall screws at nominal 500mm vertical centres for the first layer, 230-600mm vertical centres for the second layer with horizontal centres in line with the studs of the partition.

A single layer of Euroform Versapanel cement particle board was fitted to the external face of the partition (long edge horizontal) and around the combustion chamber surround using 5.5×50mm self-drilling screws with horizontal centres in line with the studs of the partition and 100-300mm vertical centres (five fixings per column per board).

There was a 5-8mm gap between adjacent cement particle boards.

Euroform Versaseal-FS grey sealant was applied to gaps between adjacent cement particle boards.

Kingspan nilvent breather membrane was fitted to the external face of the cement particle board using Arrow 14mm T50 staples.

Aluminium profiled brackets were fixed to the top of the partition using 5.5×50mm self-drilling screws (two per bracket), the brackets were fitted at 400-500mm centres.

Aluminium capping (Item 8 in *Table 1*) was fixed to the aluminium profiled brackets using 5.5×50mm self-drilling screws at 400-500mm centres in two rows 240mm apart.

Galvanised steel folded skewers (Item 9 in *Table 1*) were fixed to the cement particle board using 5.5×45mm self-drilling screws at 300mm centres in three columns located either side of the combustion chamber opening (290mm and 2320mm from the main-wing wall junction) and towards the outside edge of the wing wall (1615mm from the main-wing wall junction).

Siderise EW-CB30 stone wool vertical cavity barriers were pressed onto the skewers in columns.

Galvanised steel folded skewers (Item 11 in *Table 1*) were fixed to the cement particle board using 5.5×45mm self-drilling screws at 300mm centres in four rows located: 80mm, 365mm, 2940mm and 5450mm above the top of the combustion chamber.

Siderise RH25G-090/030 stone wool horizontal open state 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 horizontal cavity barriers in place. Each row was interrupted by the vertical cavity barriers. All gaps between insulation boards and cavity barrier were sealed with aluminium tape.

A single layer of 100mm-thick Kingspan Kooltherm K15 insulation was fixed to the cement particle board using 4.8×100mm self-drilling screws with Ø75mm plastic insulation retaining discs and 5.5×150mm self-drilling screws with Fixfast SP-SS-50-F1 Ø50mm metal insulation retaining discs. Aluminium tape was applied over the heads of insulation fixings and gaps between insulation boards.

From the outside edge of the combustion chamber to the outside edge of the main wall up to a height of the second row horizontal cavity barrier a single layer of 80mm-thick Kingspan Kooltherm K15 insulation was fitted.

Nine insulation fixings were used per full size board (three along both outer edges and three along the vertical centreline of the board). Smaller sections of insulation were secured using six fixings (two along both outer edges and two along the horizontal/vertical centreline of the board).

Aluminium flashing (Items 15 and 16 in *Table 1*) was fitted around the combustion chamber opening. The flashing was fixed to the external face of the cement particle board using 5.5×50mm self-drilling screws at 380mm centres. The flashing was fixed with 10mm-thick spacers and stone wool packed within the gap between the cement particle board and the flashing. Intumescent acrylic sealant was also used to seal the 10mm gap. Stone wool insulation was packed into the 20-30mm gap between the aluminium flashing and the cavity barriers surrounding the combustion chamber.

Ancon 25/14 wall tie support channels were fixed to the external face of the insulation, cement particle board and studs using 5.5×150mm self-drilling screws at 340-450mm vertical centres. The channels were fixed at 370-600mm centres on the main wall and 410-600mm on the wing wall.

A brick wall was constructed from Wienerberger Waresley Red Stock bricks and a standard sand/cement mortar mix 60-70mm from the external face of the insulation. At 450mm vertical centres and horizontal centres in line with wall tie support channels, Ancon SD25/100 wall ties were slotted into the support channels and embedded within the mortar.

A galvanised steel lintel spanned the combustion chamber opening to support the bricks as they were built above. Dowsil 719 Weather Proofing sealant was used to seal the perimeter of the combustion chamber surround flashing once the masonry wall was complete.

2.3 Installation of specimen

All test materials were supplied and installed by the Test Sponsor. BRE Global were not involved in the sample selection process and therefore cannot comment upon the relationship between samples supplied for test and the product supplied to market.

3 Product Specification

Figure 1. Full-height photograph of cladding system prior to test.

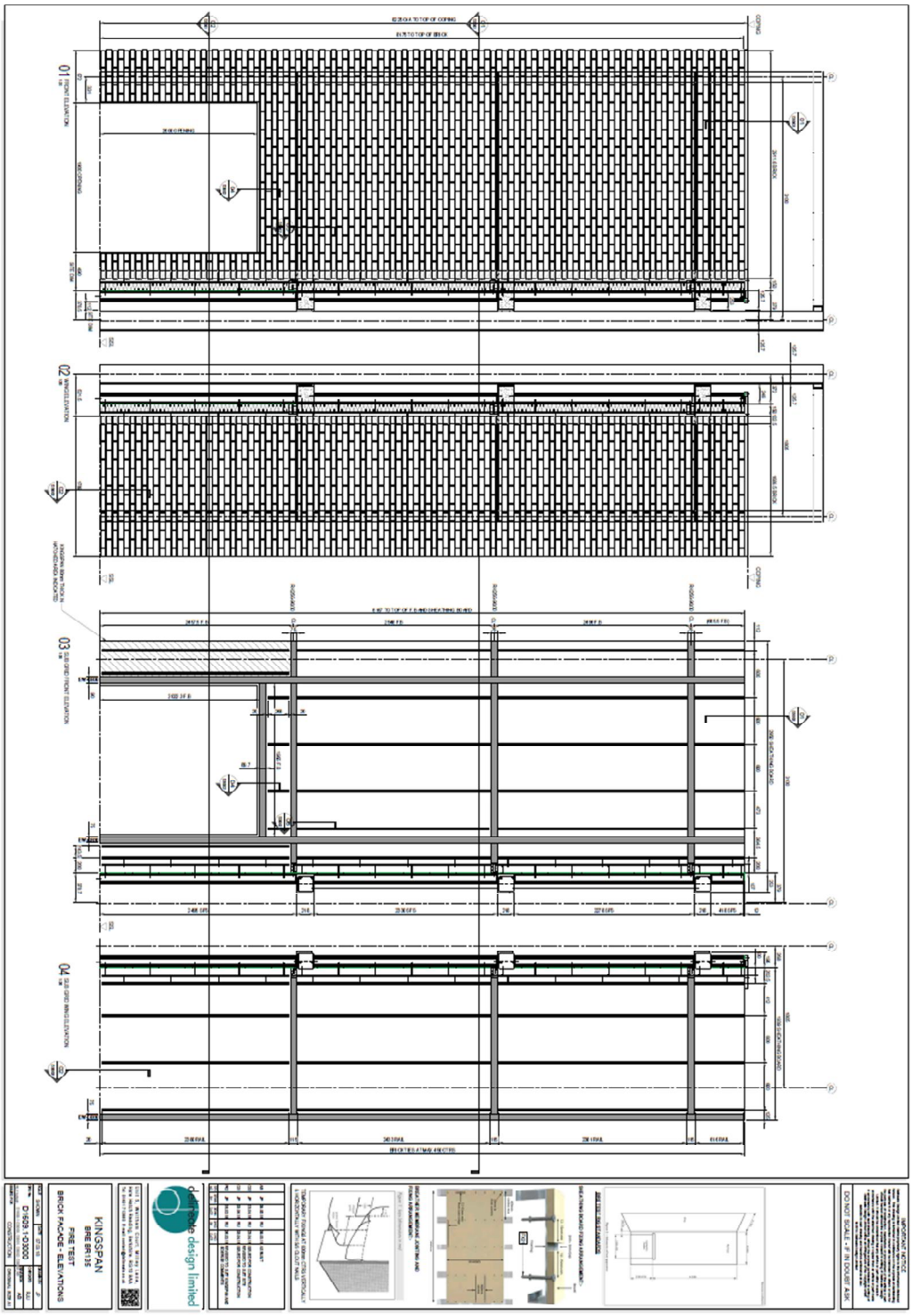

Figure 2. Brick façade and locations if barriers (supplied by Test Sponsor).

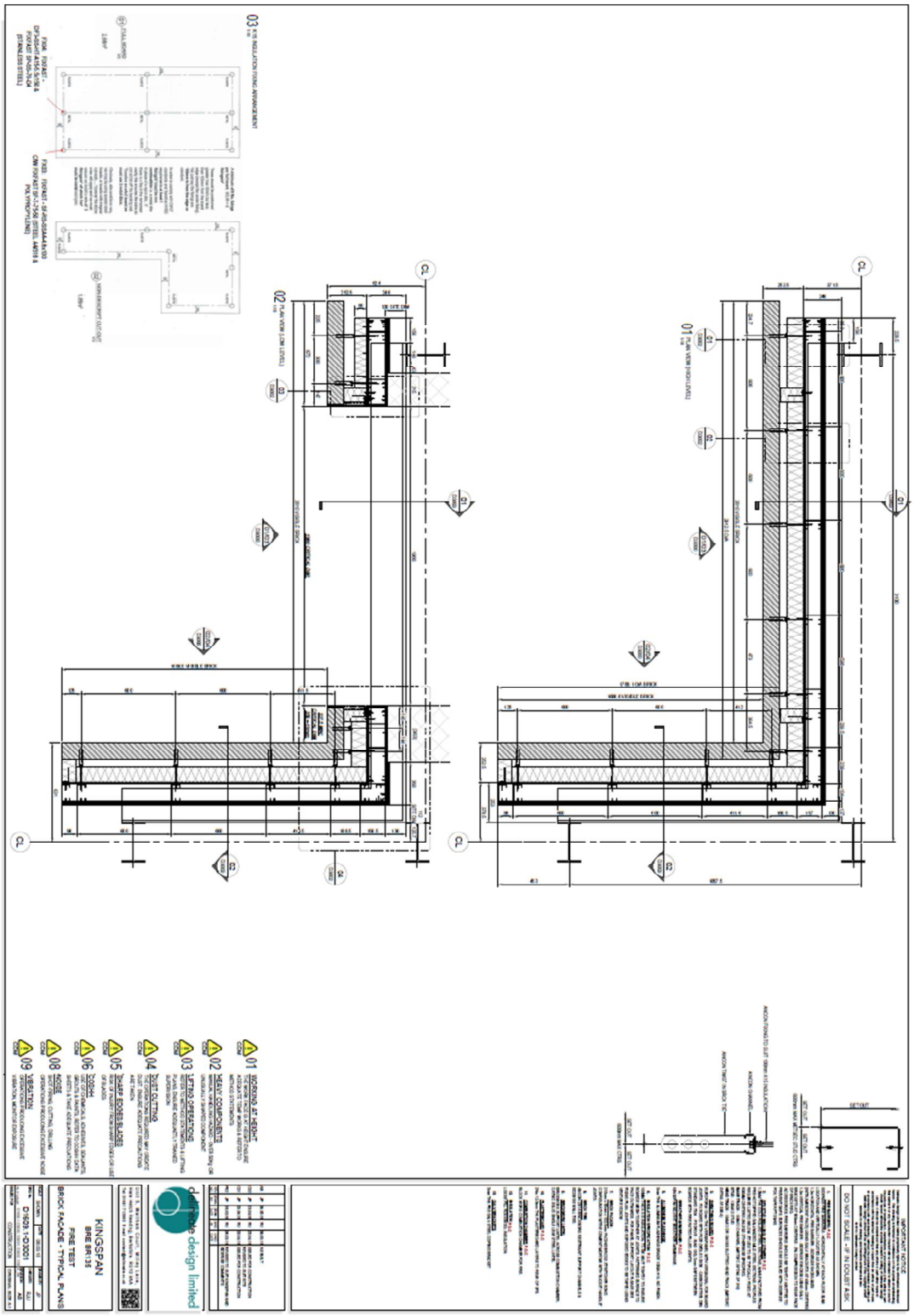

Figure 3. Plan view cross sections (supplied by Test Sponsor).

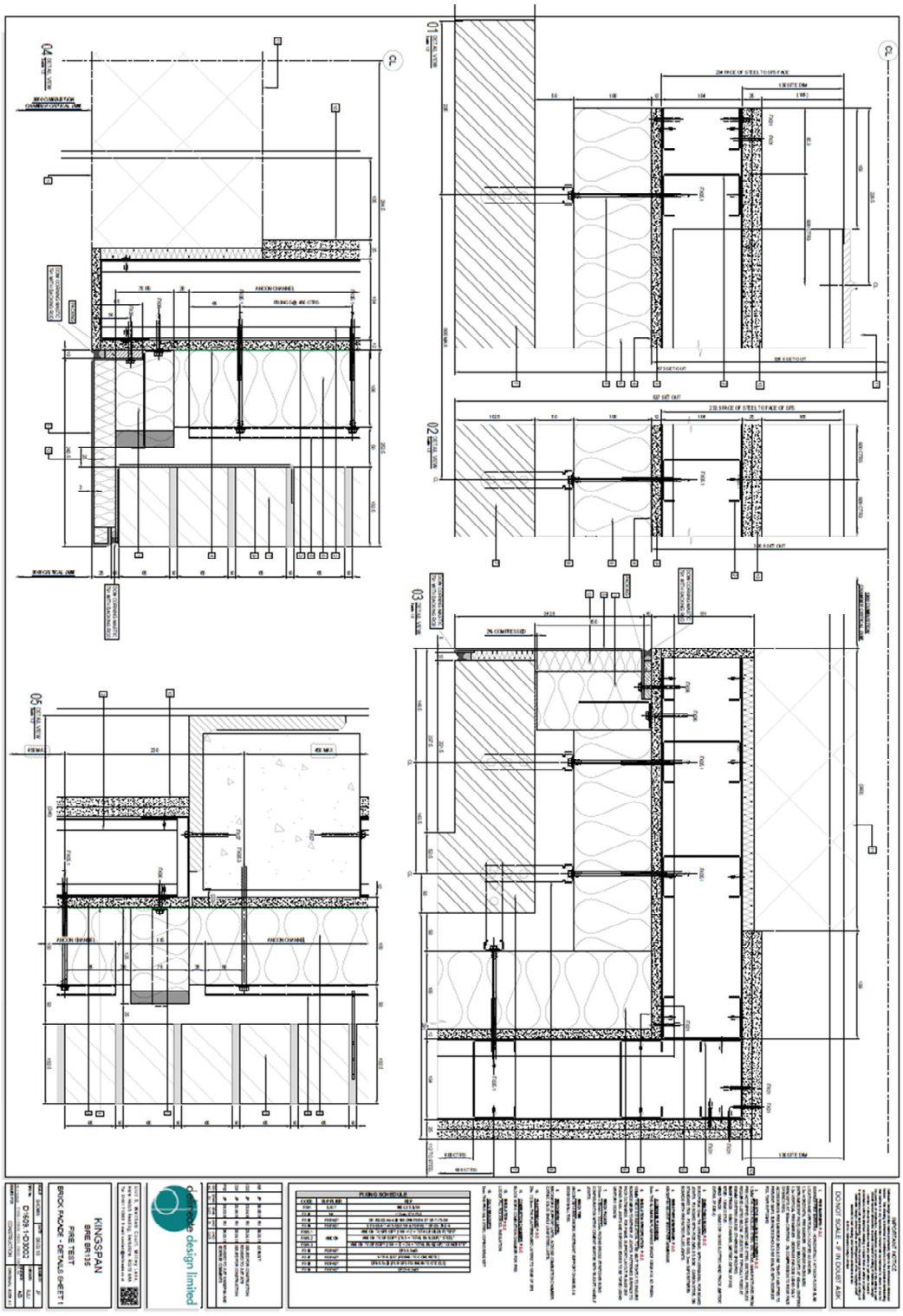

Figure 4. Cross sections (supplied by Test Sponsor).

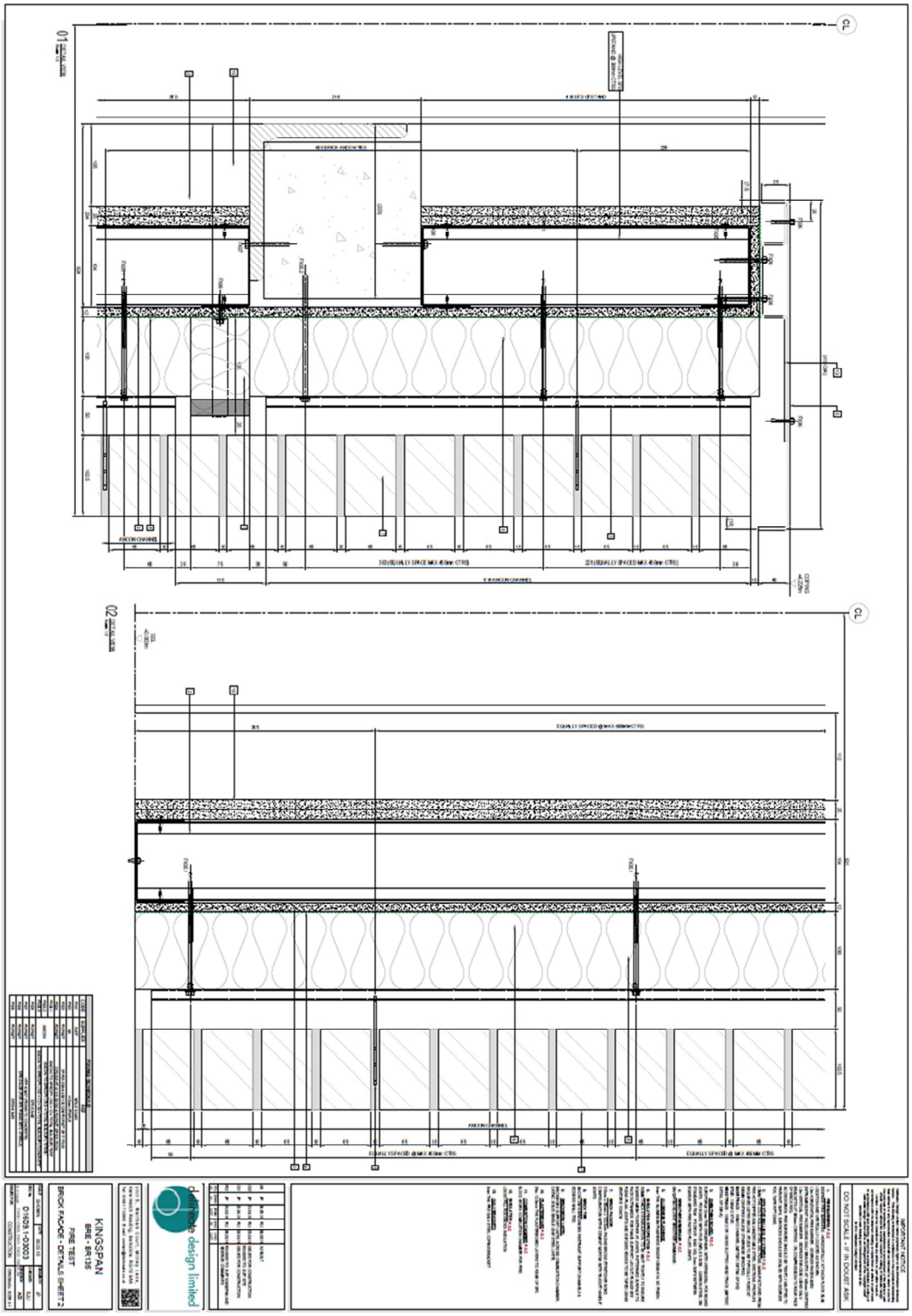

Figure 5. Cross sections (supplied by Test Sponsor).

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 Ltd	P112065-1000	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		>15 minutes	Compliant
	System burn through		>15 minutes	Compliant

4.3 Mechanical performance

Flaming debris from the top edge of the combustion chamber surround was recorded between 11 minutes 25 seconds and 11 minutes 35 seconds. Non-flaming debris from the combustion chamber surround was recorded between 14 minutes 25 seconds and 28 minutes 20 seconds. At 28 minutes 40 seconds most of the top edge had been consumed.

Ongoing combustion was limited to the vicinity of the combustion chamber surround and continued until 31 minutes 25 seconds.

4.4 System damage

4.4.1 External brick wall

There was cracking in the brickwork and mortar surrounding the combustion chamber. There was a 700mm-long vertical crack in the brickwork adjacent to the inside edge of the combustion chamber. There was minor cracking along the mortar from each corner of the combustion chamber joining at approximately 1m above the centre line of the combustion chamber. There were vertical hairline cracks in the bricks from approximately 1-1.4m above the top of the combustion chamber.

There was discolouration from the top of the combustion chamber to the top of the main wall tapering up from approximately 1900mm to 1500mm-wide.

4.4.2 Combustion chamber surround

The top edge was more than 90% consumed.

The sides were distorted and discoloured towards the top with a small area of consumption (approximately 20mm-wide×150mm-high) on the edge furthest from the wing wall.

4.4.3 Galvanised steel lintel

Discolouration across full-width with minor distortion.

4.4.4 Phenolic insulation

Insulation remained intact and in place with localised areas of discolouration to surface of outer foil immediately above the combustion chamber opening.

4.4.5 Vertical rails

No visible damage.

4.4.6 Horizontal (intumescent) cavity barriers

All horizontal cavity barriers remained intact and in place. Evidence of intumescent expansion was observed on the first and second rows.

4.4.7 Vertical (compression) cavity barriers

All vertical cavity barriers remained intact and in place. There were localised areas of discolouration on the main wall vertical cavity barriers from the ground to the height of the first row horizontal cavity barrier.

4.4.8 Breather membrane

The breather membrane remained intact and in place with localised areas of discolouration around the combustion chamber opening.

4.4.9 Cement particle board

The cement particle board remained intact and in place with localised areas of discolouration around the combustion chamber opening.

4.4.10 Lightweight steel framework partition

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

4.4.11 Plasterboard

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 Section 2 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.

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.

Report Ends