

BRE Global Assessment Report

An assessment of the fire performance of a ventilated façade system with Kingspan Kooltherm K15 insulation and Alpolic/fr panels against the criteria of BR 135, Third Edition when evaluated in accordance with BS 9414:2019

Prepared for: Kingspan Insulation Limited

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1 Introduction

A fire test in accordance with BS 8414-1:2015+A1:2017 has been carried out on a ventilated façade system with Kingspan Kooltherm K15 insulation and Alpolic/fr panels. This assessment report considers the fire performance of this system where the facings on the Kingspan Kooltherm K15 insulation incorporate an alternative scrim and adhesive.

2 Scope

This assessment report considers the fire performance of a ventilated façade system with Kingspan Kooltherm K15 insulation and Alpolic/fr panels against the criteria of BR 135, Third Edition. The evaluation has been carried out in accordance with BS 9414:2019.

3 Supporting data

3.1 BRE Global test report no. P109939-1000 Issue: 1

3.1.1 General

A fire test in accordance with BS 8414-1:2015+A1:2017 was carried out on an external wall system incorporating Kingspan Kooltherm K15 insulation with rainscreen cladding comprising Alpolic/fr panels. The test was carried out on 07 November 2017.

3.1.2 Details of test apparatus

The product was installed on to wall number one of the BS 8414-1 BRE Global test facility. This 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 (see figure 1). The main wall includes the combustion chamber. The test apparatus may be constructed left- or right-handed.



3.1.3 Description of the system

3.1.3.1 Summary

Generic cladding type	Rain screen
Relevant test method	BS 8414-1
Substrate	Masonry
Insulation	Kingspan Kooltherm K15 (100mm thick)
Cavity depth	50mm between insulation and facade
Vertical cavity barriers	Siderise RSV 90/30 vertical cavity barriers (75mm thick x 155mm deep)
Horizontal cavity barriers	Siderise RH25G 90/30 horizontal open state cavity barriers (75mm thick x 125mm deep)
External finish	4mm-thick Mitsubishi Alpolic/fr

Details of the tested system are shown in figures 2 to 5.

3.1.3.2 Description of product

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



Item	Description
6	120mm-wide x 60mm-deep x 2mm-thick aluminum 'T' shaped rails.
7	4mm-thick ACM (aluminium composite material) panels. Mitsubishi Alpolic/fr. Core material mean calorific value was measured at 13.6 MJ/Kg. BRE Global report P110396-1004.

3.1.3.3 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 (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 10mm panel gap was left between adjacent panels.

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

Requirement	Actual measurement
≥6000mm above the top of the combustion chamber	6502mm
≥2400mm width across the main wall	2659mm
≥1200mm width across the wing wall	1345mm
260mm (±100mm) wing wall-combustion chamber opening	256mm
2000mm x 2000mm (±100mm) combustion chamber opening	2002mm x 2008mm

3.2 BRE classification report no. P109939-1001 Issue 1

This report presents the classification of an external wall system incorporating Kingspan Kooltherm K15 insulation with rainscreen cladding comprising Alpolic/fr panels. 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.

The system, as tested, satisfied the criteria as follows:

Test method & test number	Parameter	No. of tests	Results	
			Fire spread test result time, t_s (min)	Compliance with parameters in Annex A BR135:2013
BS 8414-1:2015+A1:2017/ P109939-1000 Issue 1	External fire spread	1	>15 minutes	Compliant
	Internal fire spread cavity		>15 minutes	Compliant



Test method & test number	Parameter	No. of tests	Results	
			Fire spread test result time, t_s (min)	Compliance with parameters in Annex A BR135:2013
BS 8414-1:2015+A1:2017/ P109939-1000 Issue 1	Internal fire spread Insulation layer	1	>15 minutes	Compliant

The system described in this classification report was deemed to meet the performance criteria set in Annex A of BR 135:2013.

3.3 Warringtonfire test report no. 427069

A test in accordance with EN ISO 1716:2018 was carried out on a sample of “5x5 Scrim”, comprising fiberglass filaments, five yarns per inch in both directions, to determine its heat of combustion on 21 May 2019.

For the product tested, the following results relating to the gross calorific potential were obtained.

Gross calorific value per unit mass (MJ/kg)	Gross calorific value per unit area (MJ/m ²)
3.6167	0.1040

3.4 Warringtonfire test report no. 414282

A test in accordance with EN ISO 1716:2018 was carried out on a sample of “4x4 Scrim”, comprising fiberglass filaments, four yarns per inch in both directions, to determine its heat of combustion on 21 May 2019.

For the product tested, the following results relating to the gross calorific potential were obtained.

Gross calorific value per unit mass (MJ/kg)	Gross calorific value per unit area (MJ/m ²)
3.6167	0.0832

3.5 Warringtonfire test report no. 414280

A test in accordance with EN ISO 1716:2018 was carried out on a sample of “Low Smoke Adhesive”, comprising synthetic rubber, to determine its heat of combustion on 21 May 2019.

For the product tested, the following results relating to the gross calorific potential were obtained.



Gross calorific value per unit mass (MJ/kg)	Gross calorific value per unit area (MJ/m ²)
24.1034	0.6990

3.6 Warringtonfire test report no. 414281

A test in accordance with EN ISO 1716:2018 was carried out on a sample of “FR Adhesive”, comprising synthetic rubber, to determine its heat of combustion on 21 May 2019.

For the product tested, the following results relating to the gross calorific potential were obtained.

Gross calorific value per unit mass (MJ/kg)	Gross calorific value per unit area (MJ/m ²)
13.4048	0.3887

4 Description of the proposed systems

The proposed external wall system has the same construction as that tested. The only difference is that facings on the Kingspan Kooltherm K15 insulation incorporate an alternative scrim and adhesive.



5 Assessment

5.1 Applicable rule from BS 9414:2019

Parameter 1: INSULATION LAYER(S)

Tested component/product	Variation proposed	Sub-groups	Option for change	Additional evidence required (of tested and alternative/modified products)	For rule, see clause reference
Facing layer (if applicable), including any adhesive	Alternative facing layer and/or adhesive	All insulation products	Permissible – see note to rule	Reaction-to-fire test data	5.4.10



5.2 Applicable clause from BS 9414:2019 (Clause 5.4.10)

The test result shall be deemed to be valid if the tested facing is replaced with an alternative facing (including the adhesive) with a gross heat of combustion in MJ/m² equal to or less than the tested product.

NOTE If the membrane is used for the purpose of protecting the insulation from the effects of fire, either as a separate membrane or encapsulation of the insulation product, it is not permitted to remove it or replace it with an alternative product.

5.3 Evaluation

5.3.1 General

In this instance, the membrane is not considered to be for the purpose of protecting the insulation from the effects of the fire, so it is permitted to replace it with an alternative product.

5.3.2 Scrim

The gross heat of combustion for the “5x5 Scrim”, which was used in BRE Global report no. P109939-1000 Issue: 1, was found to be 0.1040MJ/m² (see Warringtonfire report no. 427069) and that for the alternative “4x4 Scrim” was found to be 0.0832MJ/m² (see Warringtonfire report no. 414282). The latter is therefore considered a suitable alternative.

5.3.3 Adhesive

The gross heat of combustion for the “Low Smoke Adhesive”, which was used in BRE Global report no. P109939-1000 Issue: 1, was found to be 0.6990MJ/m² (see Warringtonfire report no. 414280) and that for the alternative “FR Adhesive” was found to be 0.3887MJ/m² (see Warringtonfire report no. 414281). The latter is therefore considered a suitable alternative.

6 Conclusion

Therefore, it is our opinion that the ventilated façade system with Kingspan Kooltherm K15 insulation and Alpolic/fr panels, where the facings on the Kingspan Kooltherm K15 insulation incorporate an alternative scrim and adhesive, as described in section 4, will satisfy the criteria of BR 135, Third Edition, if tested to BS 8414-1:2015+A1:2017.

This evaluation has been carried out in accordance with BS 9414:2019.



7 Figures

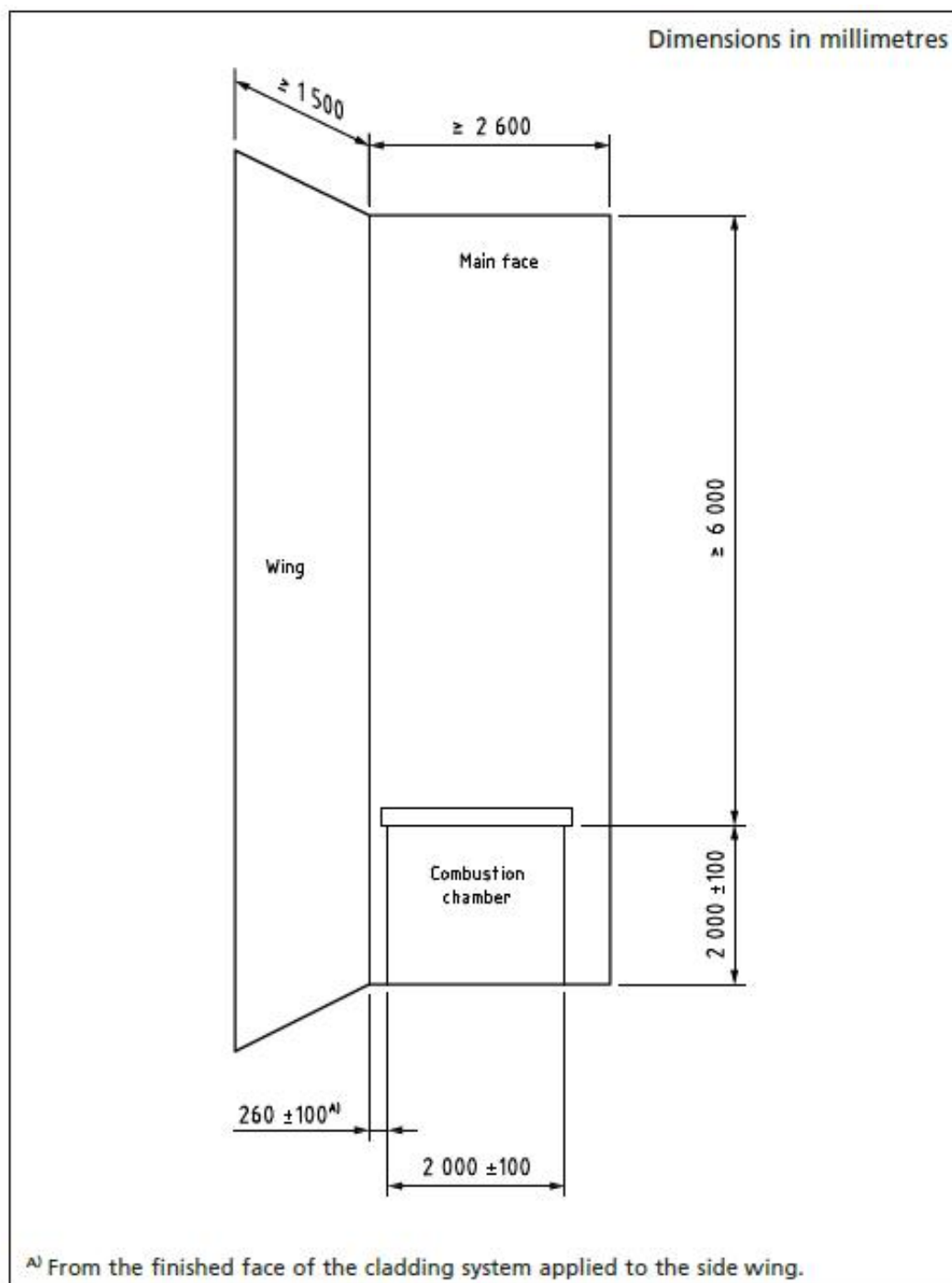


Figure 1 Test apparatus dimensions as specified by test standard

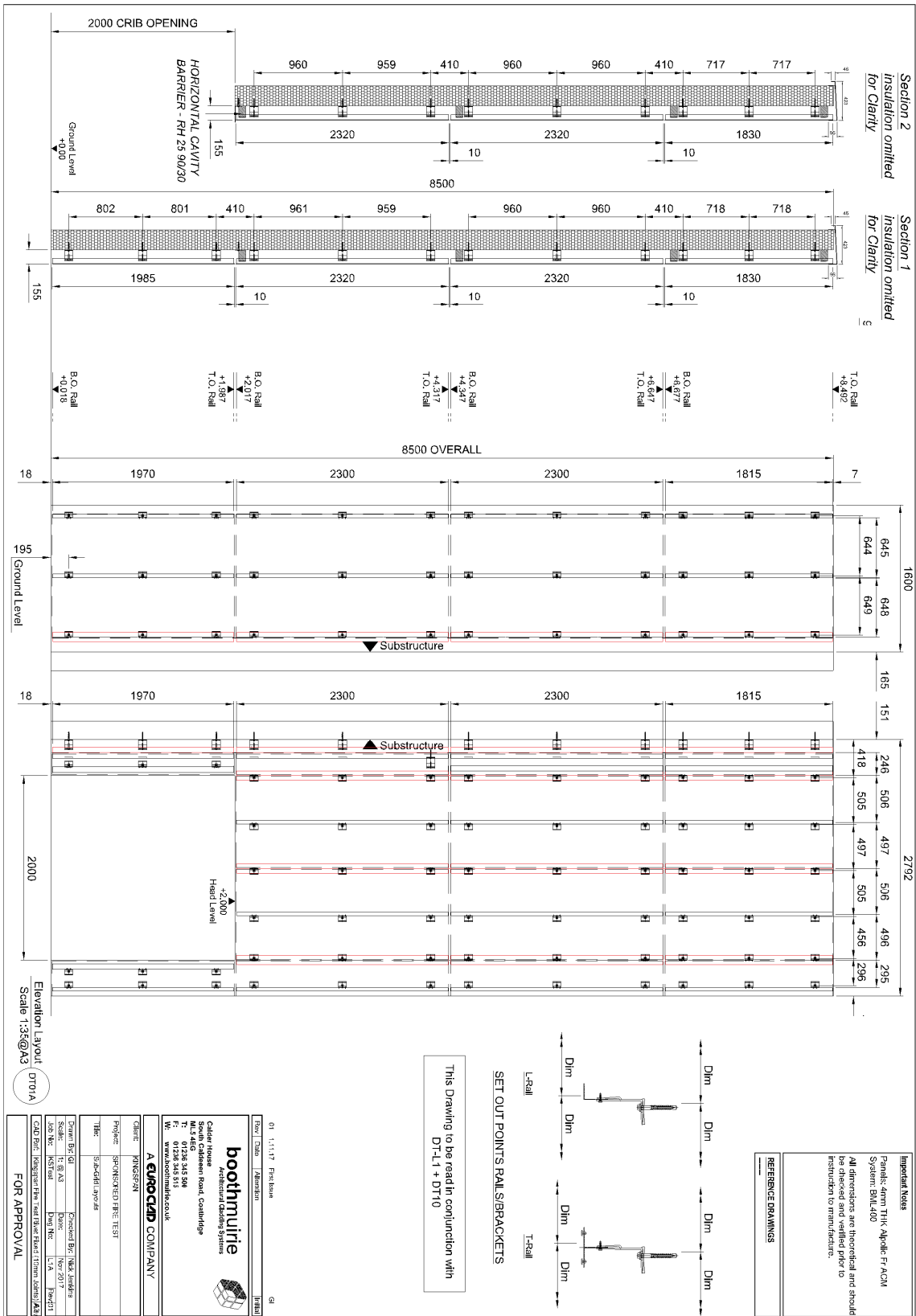


Figure 2 Elevation of system

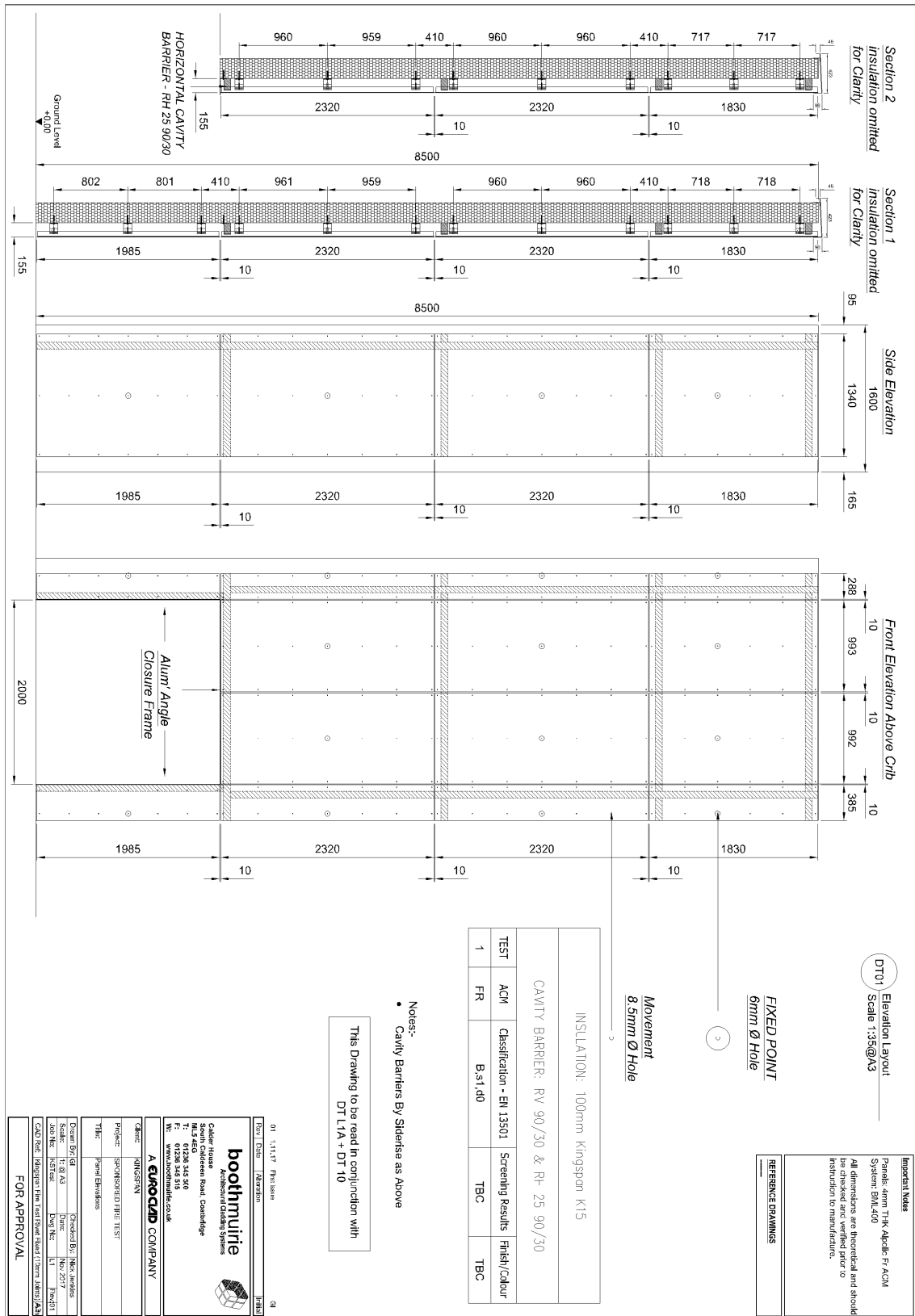


Figure 3 Elevation of system

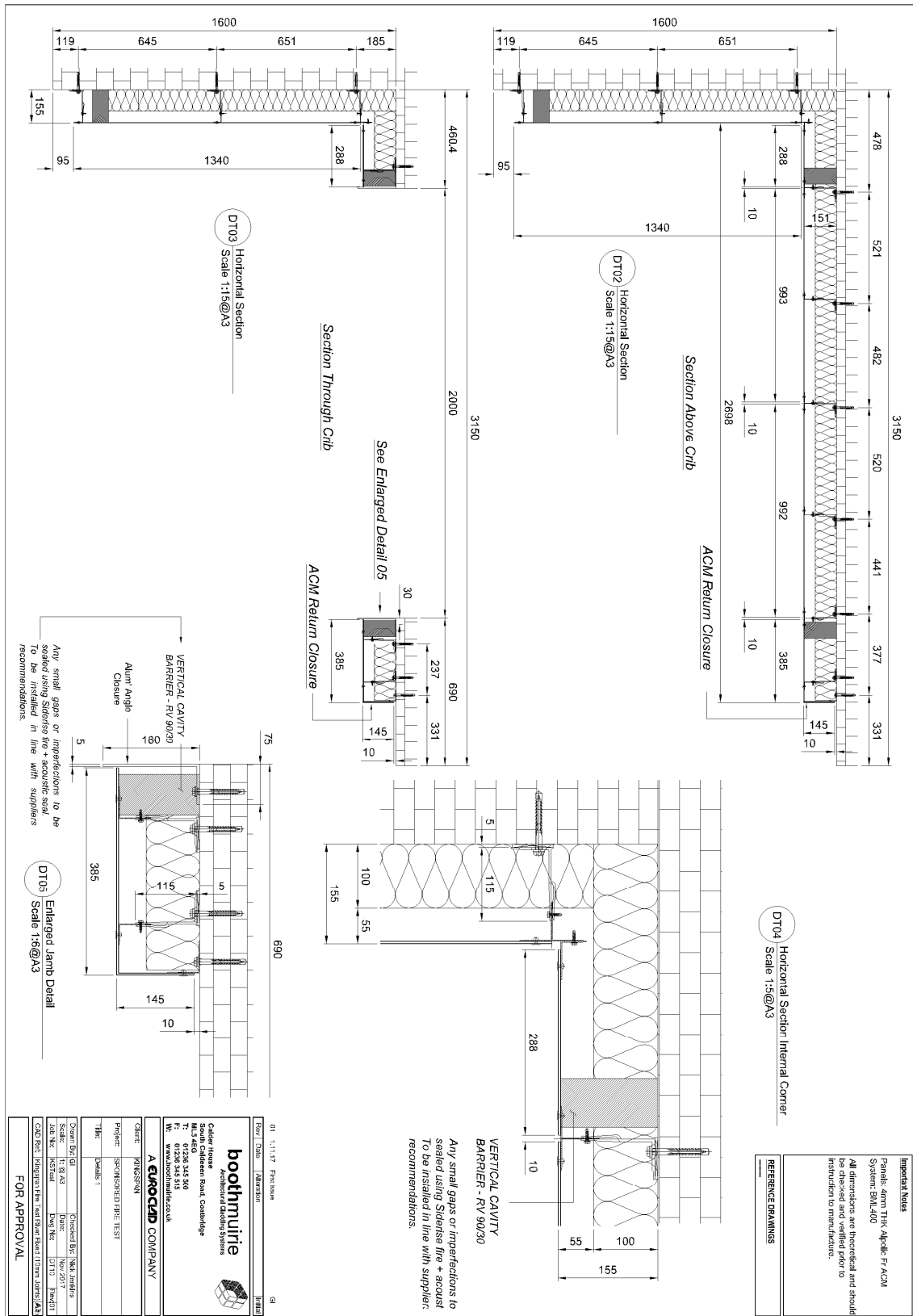


Figure 4 Cross section of the system

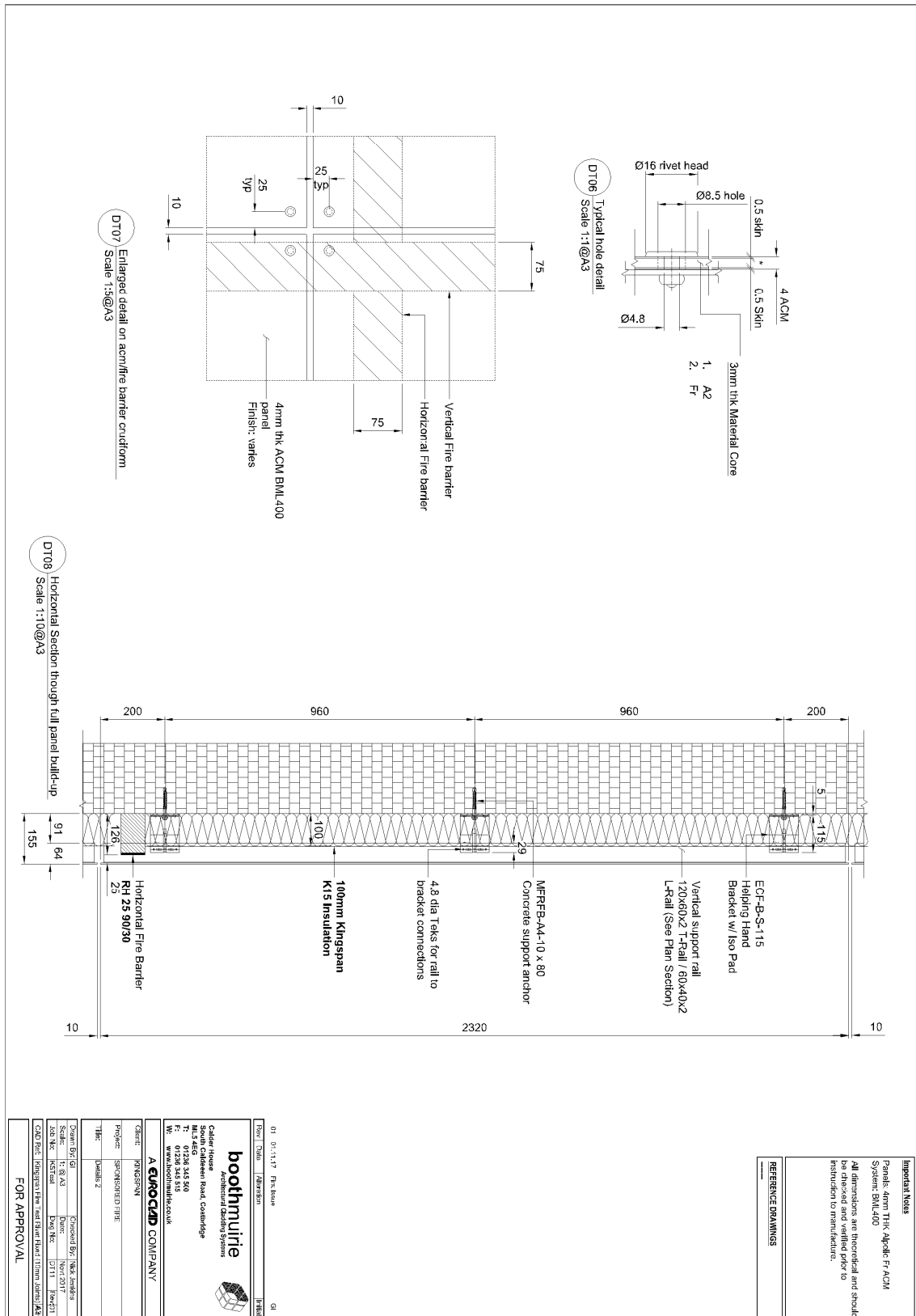


Figure 5 Construction drawings



8 Validity of the assessment

8.1 Declaration by applicant

We the undersigned confirm that we have read and complied with the obligations placed on us by the PFPF Guide to Undertaking Assessments in Lieu of Fire Tests.

We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which this assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the Standard against which this assessment is being made.

We are not aware of any information that could adversely affect the conclusions of this assessment.

If we subsequently become aware of any such information, we agree to cease using the assessment and ask BRE Global to withdraw the assessment.

Signed:

For and on behalf of:

8.2 BRE Global declaration

This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available to BRE Global the assessment will be unconditionally withdrawn and the applicant will be notified in writing. Similarly, the assessment is invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. The assessment is valid for a period of five years after which it should be returned for review to consider any additional data which has become available or any changes in the fire test procedures. Any changes in the specification of the product will invalidate this assessment.

This assessment has been carried out in accordance with Fire Test Study Group Resolution No. 82. It relates to the fire performance of the product and does not cover aspects of quality, durability, maintenance nor service requirements. This assessment relates only to the specimen(s) assessed and does not by itself imply that the product is approved under any Loss Prevention Certification Board approval or certification scheme or any other endorsements, approval or certification scheme.

Next review date: 30 September 2025