

BRE Global Classification Report

Classification of fire performance in accordance with BR135:2013 Annex B on a Kingspan BENCHMARK 80mm QuadCore™ Karrier & Dri Design Cassette system.

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Date: 14th June 2018
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CLASSIFICATION OF FIRE PERFORMANCE IN ACCORDANCE WITH BR 135:2013 Annex B

Sponsor: Kingspan Ltd, Greenfield Business Park No.2, Holywell, Flintshire, CH8 7GJ, UK

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Product name: Kingspan BENCHMARK 80mm QuadCore™ Karrier & Dri Design Cassette system.

Classification report No.: P107922-1001

Issue number: 1

Date of issue: 14th June 2018

This classification report consists of 31 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.



2 Details of the Classified Product

2.1 Description of substrate

The test specimen was installed onto wall number 4 of the BRE Global External Cladding Test Facility. This is a multi-faced test facility constructed from steel, the cladding system was affixed to the steel substructure.

2.2 Description of product

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

Item	Description
1	Plasterboard supplied in 2.4m x 1.2m sheets.
2	Kingspan Kingframe steel frame system. Comprising 1.8mm & 1.2mm thick galvanized mild steel in 104mm x 67.5mm sections (channels) and 1.2mm thick 100mm x 70mm sections (studs).
3	BENCHMARK QuadCore™ Karrier panels. 80mm thick with a cover width of 1100mm
4	Flashings for panels. Tata Steel XL Forte Merlin Grey
5	BENCHMARK Dri-Design Cassette system
6	Flashings for cassette. Arcelor Spectrum Metallic Silver
7	Stone wool insulation 25mm thick for packing between cut joints and for insulation behind flashing. Knauf Insulation Ltd Rocksilk Krimpack.

2.3 Installation sequence

2.3.1 Framing system

The framing system and insulated panels were supplied in modular form at the correct size to fit the BS8414 test frame. The module comprised of BENCHMARK QuadCore™ Karrier panels pre-installed on to Kingspan Kingframe steel frame system.

The modules were installed so that the Kingspan Kingframe was installed between and secured to the floor slab edges and the insulated panels formed a continuous façade on the front of the test frame.

The floor slab edge onto which the façade system was installed was 150mm x 150mm steel box section.

2.3.2 Panels

BENCHMARK QuadCore™ Karrier panels was used for the factory pre-assembled modules. Sections of panel were cut to form the combustion chamber surround module. Each section of panel was secured to



Kingframe steel frame using SXC5-L12-5.5 x 115 and a TCW47/6/2 sealing washer. There were two fasteners per section of panel in to each of the upright of the framing system.

The panels were cut and installed so that there was a vertical joint central to the combustion chamber running the full height of the system. This joint was packed with stone wool insulation and covered with 100mm wide mild steel flashing secured to the panel fronts using 4.8mm x 22mm stitching screws at nominal 275mm centres.

At each of the floor levels the panels were cut to form a horizontal 'butt' joint. This joint was packed with stone wool insulation and covered with 100mm wide flashing secured at 275mm centres. The remaining horizontal joints were 'panel' to 'panel' joints. The panel to panel joints were stitched with SXW-L12-5.5 x 42mm screws at 600mm centres.

2.3.3 Flashings

The junction of the main and wing walls was covered with mild steel coated flashing 75mm x 75mm and secured to the front of the panels using 4.8mm x 22mm stitching screws at nominal 275mm spacing on both sides.

The exposed edges of the panels at the edge of both the main and wing walls were finished with 75mm x 180mm coated mild steel flashing secured to the front face of the panels using 4.8mm x 22mm stitching screws at 275mm centres. The 75mm section of flashing was on the front face of the cladding system.

2.3.4 Fire barriers

Tenmat FF102/50 intumescent horizontal fire barrier fitted to rear of BENCHMARK Karrier panel to align with floor slab edge.

2.3.5 Combustion chamber

75mm x 75mm x 0.7mm flashing was installed on the rear of the system and attached to the plasterboard using 4.8mm x 22mm stitching screws at 275mm centres. Stone wool insulation was installed across the width of the wall and this was secured in place with 75mm x 270mm x 0.7mm 'Head/Jamb flashing'.

An aluminium head flashing (35x55 x 30 x 15 x 2) was placed in position across the top of the combustion chamber with the 'Base J Support' BMDD-JEXT05SMFAC/P in front. Both items were secured into place with a single rivet 'Omega Support-KSMR-ACM SSAL 4.8 x 18 x 16mm fixed every 275mm.

The exposed edges of the insulated panels were covered with 75mm x 180mm mild steel coated flashing secured to the front face of the BENCHMARK panels with 4.8mm x 22mm stitching screws.

2.3.6 BENCHMARK Dri-design cassette.

The cassettes on the wing wall were approximately 767mm & 720mm wide x 484mm high and the panels on the main wall were 1006mm & 1236mm x 484mm. The panels to the left of the combustion chamber were 527mm by 484mm.

A carrier bracket, referenced 'Base J Support' BMDD-JEXT05SMFAC/P was installed across the base of the main and wing walls and across the top of the combustion chamber. This bracket supported the base of the cassettes. The first row of cassettes was slotted into this carrier bracket and secured to the steel face of the BENCHMARK panel beneath with rivets at 150mm centres through predrilled holes in the top of the cassette (Omega Support-KSMR-ACM SSAL 4.8 x 18 x 16mm). The second row of cassettes was installed, the bottom edge of which covered the fixing securing the first row of cassettes and the top edge of these cassettes was fixed with rivets to the substrate. The installation of the remaining cassettes followed this pattern until the system was fully clad.



2.4 Installation of specimen

All test materials were supplied and installed by the sponsor. BRE 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

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Figure 1. System prior to test.

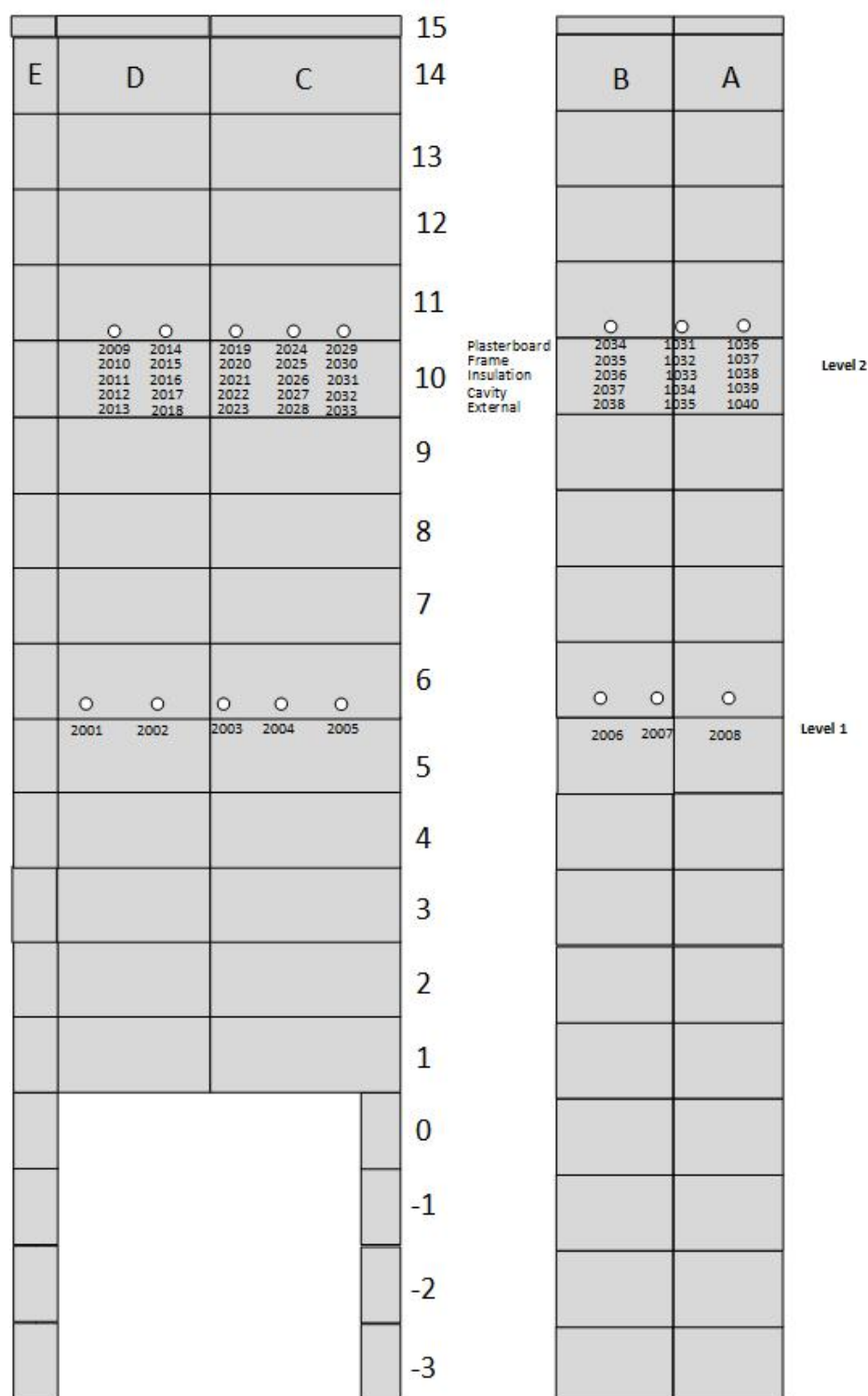


Figure 2. Cassette numbering, references and thermocouple locations. Not to scale.

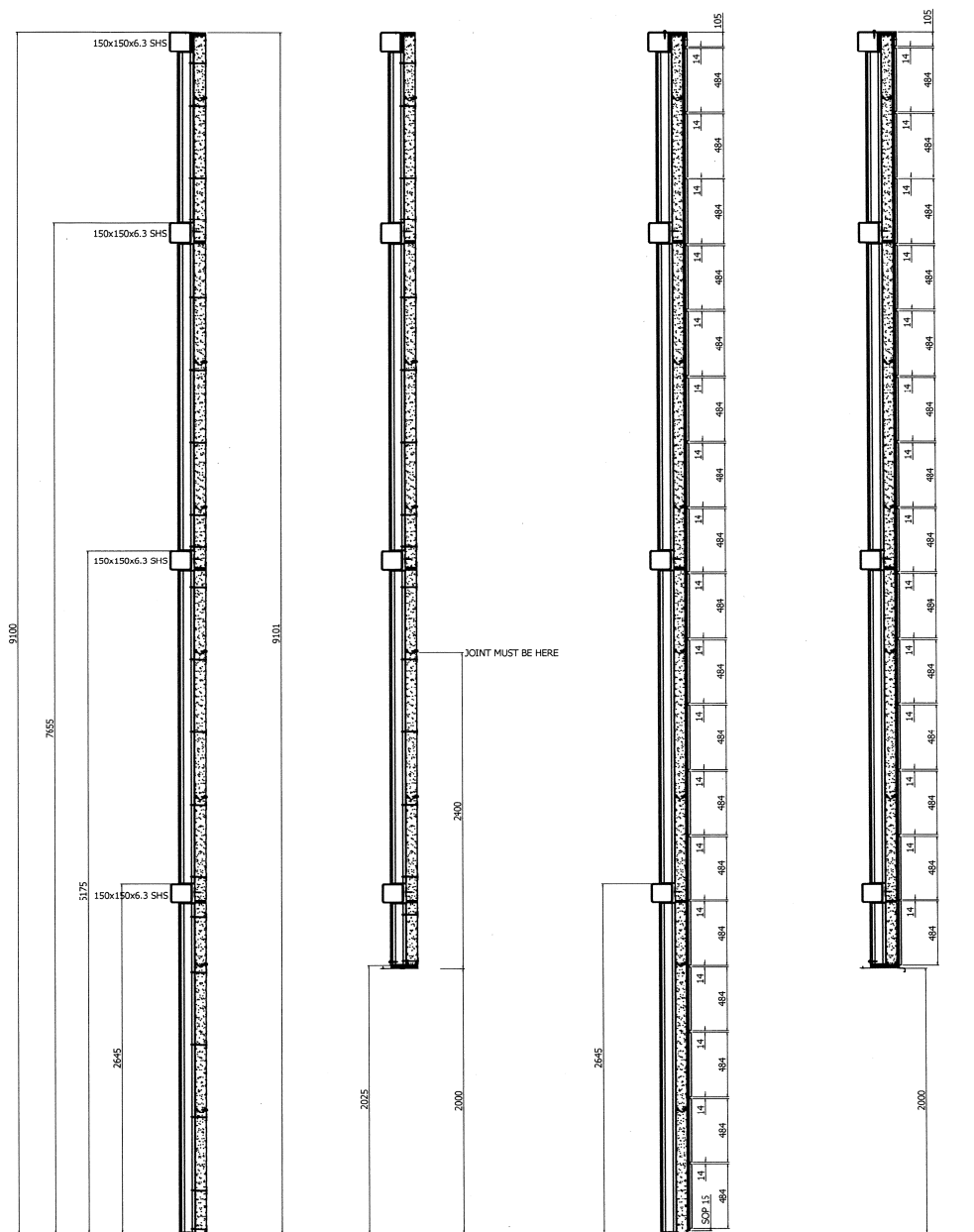


Figure 3. Client supplied drawing - Cross section of the system.

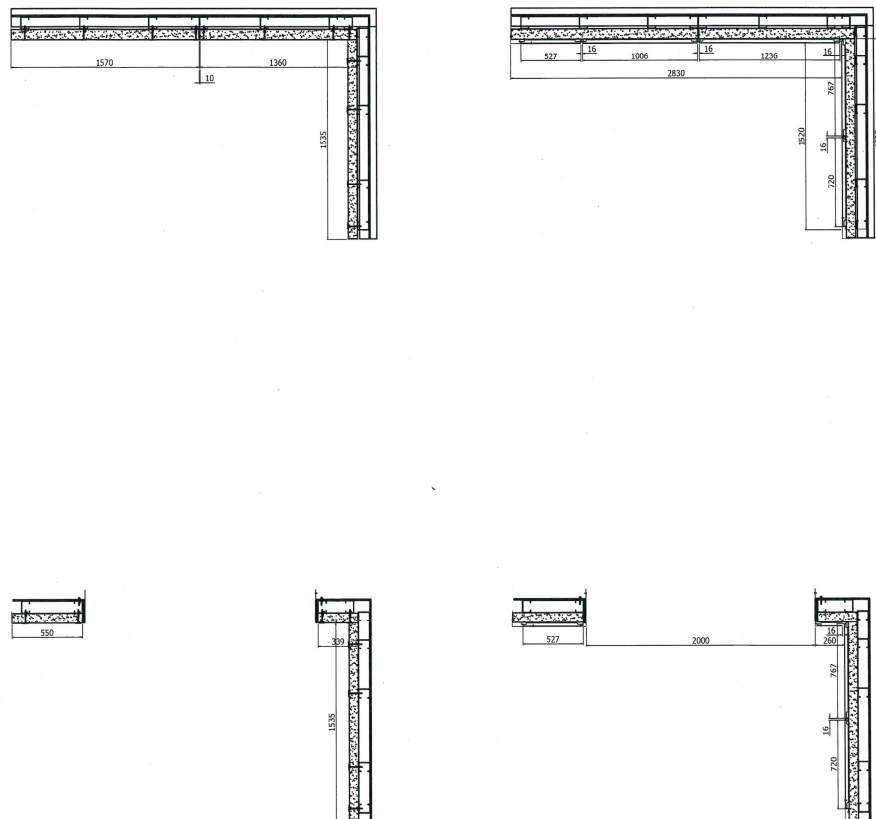


Figure 4. Client supplied drawing – Plan view of the system.

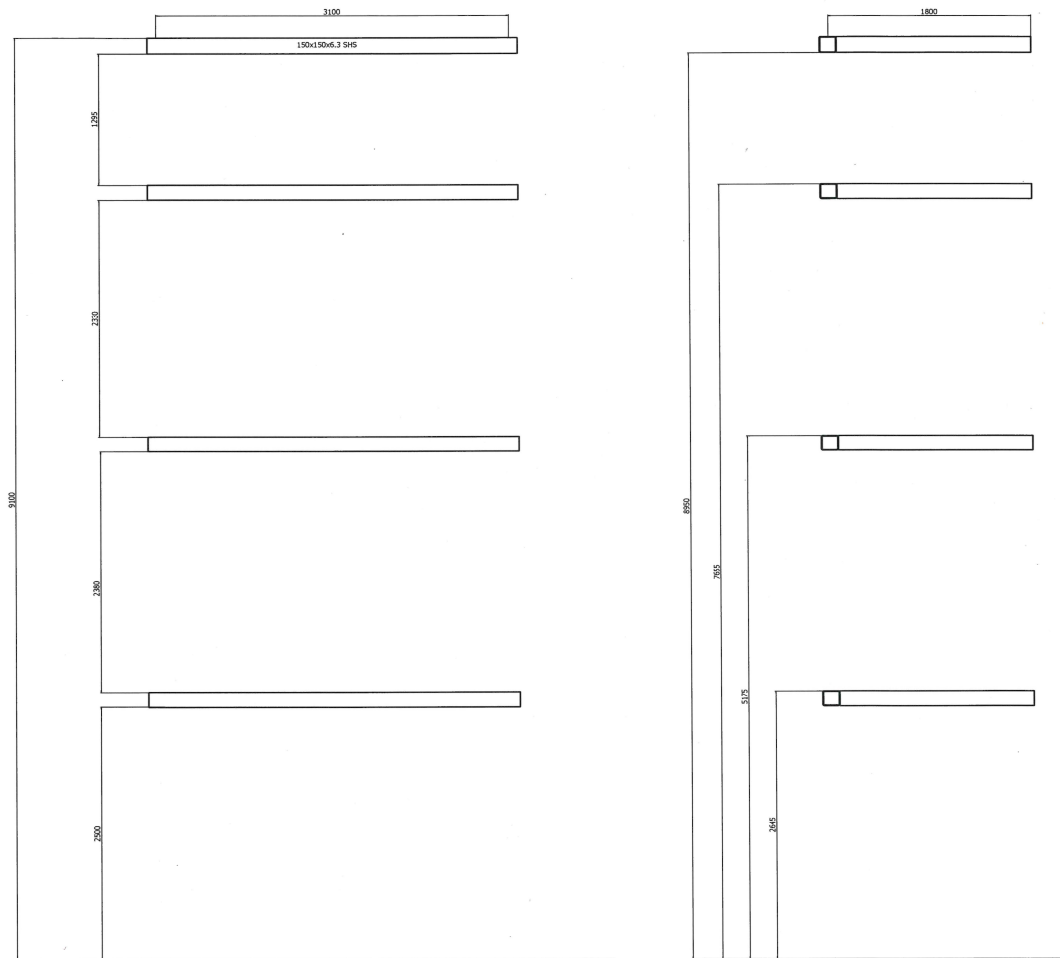


Figure 5. Client supplied drawing – Frame layout showing box sections at floor level.

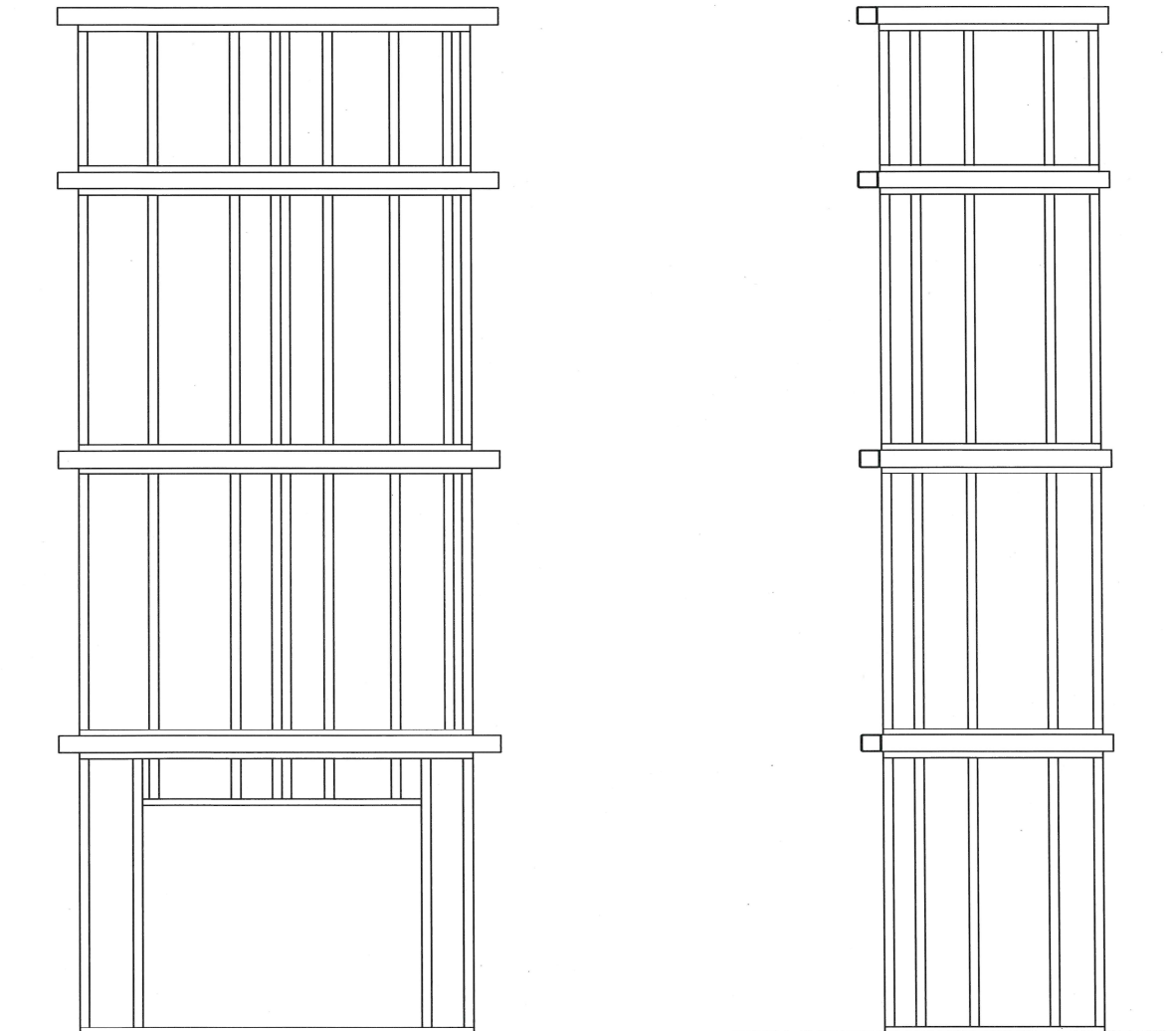


Figure 6. Client supplied drawing – Framing system.



Figure 7. Client supplied drawing – BENCHMARK QuadCore™ Karrier panel layout.



Figure 8. Client supplied drawing – Location of flashings.

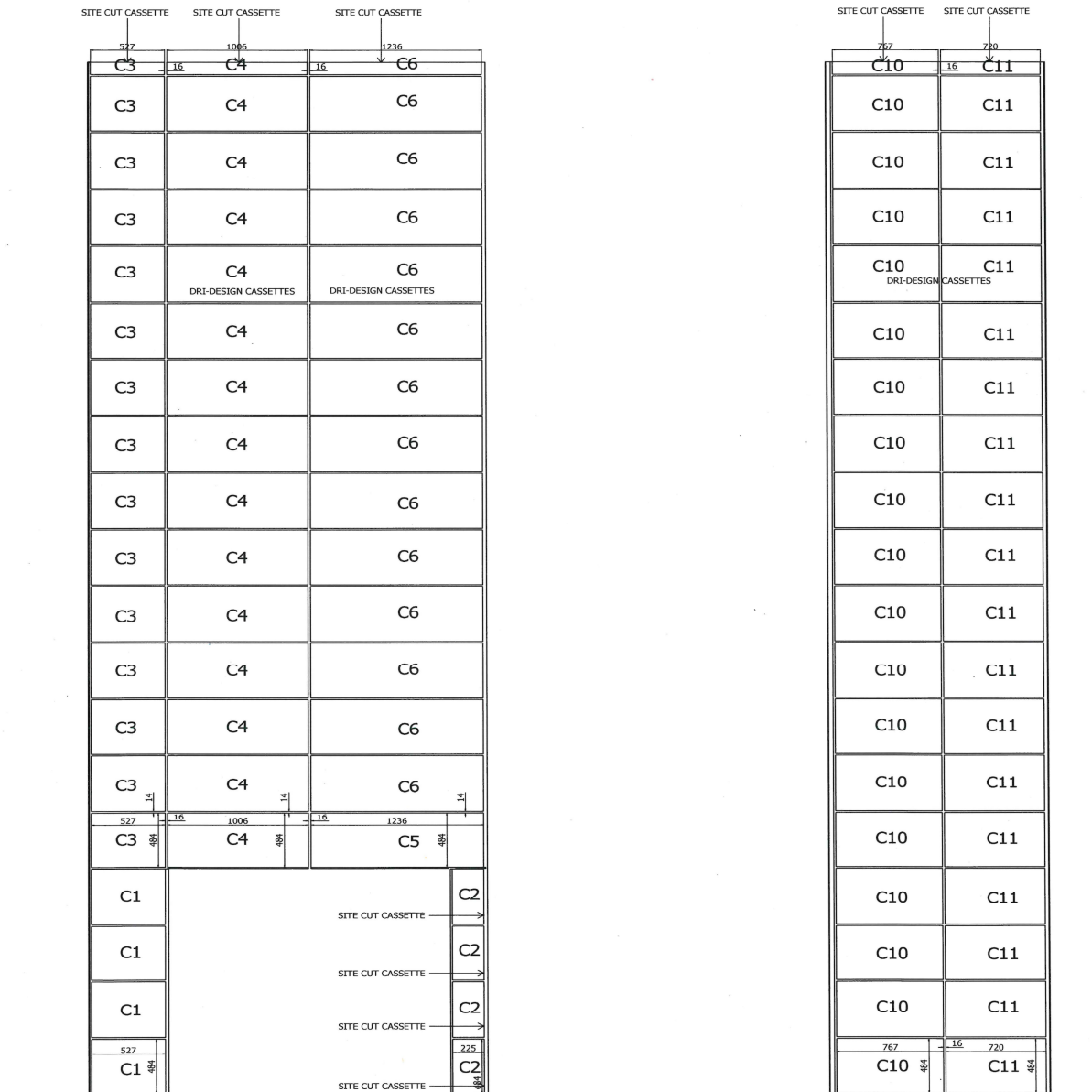


Figure 9. Client supplied drawing – Installation of aluminium cassette.

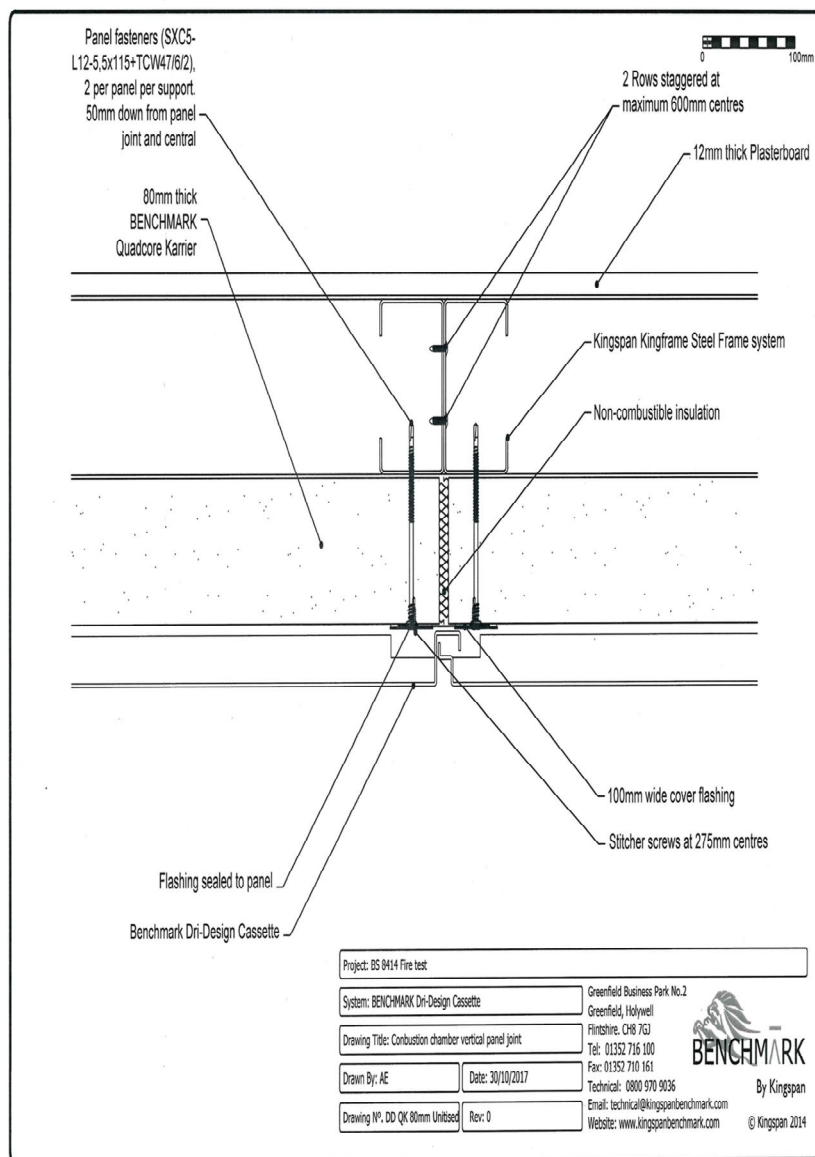


Figure 10. Client supplied drawing – Combustion chamber vertical panel joint.

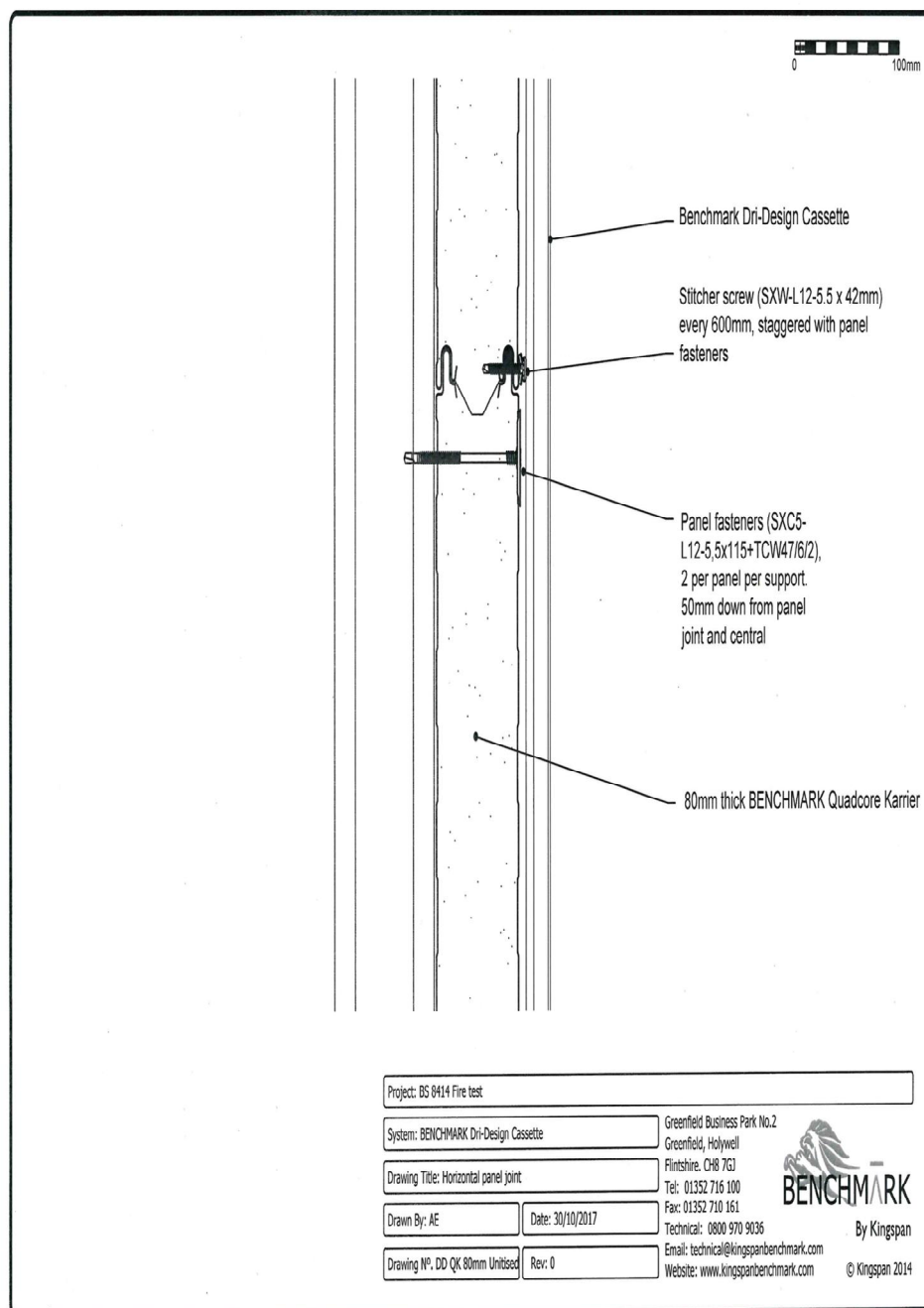


Figure 11. Cross section through system (supplied by Test Sponsor).

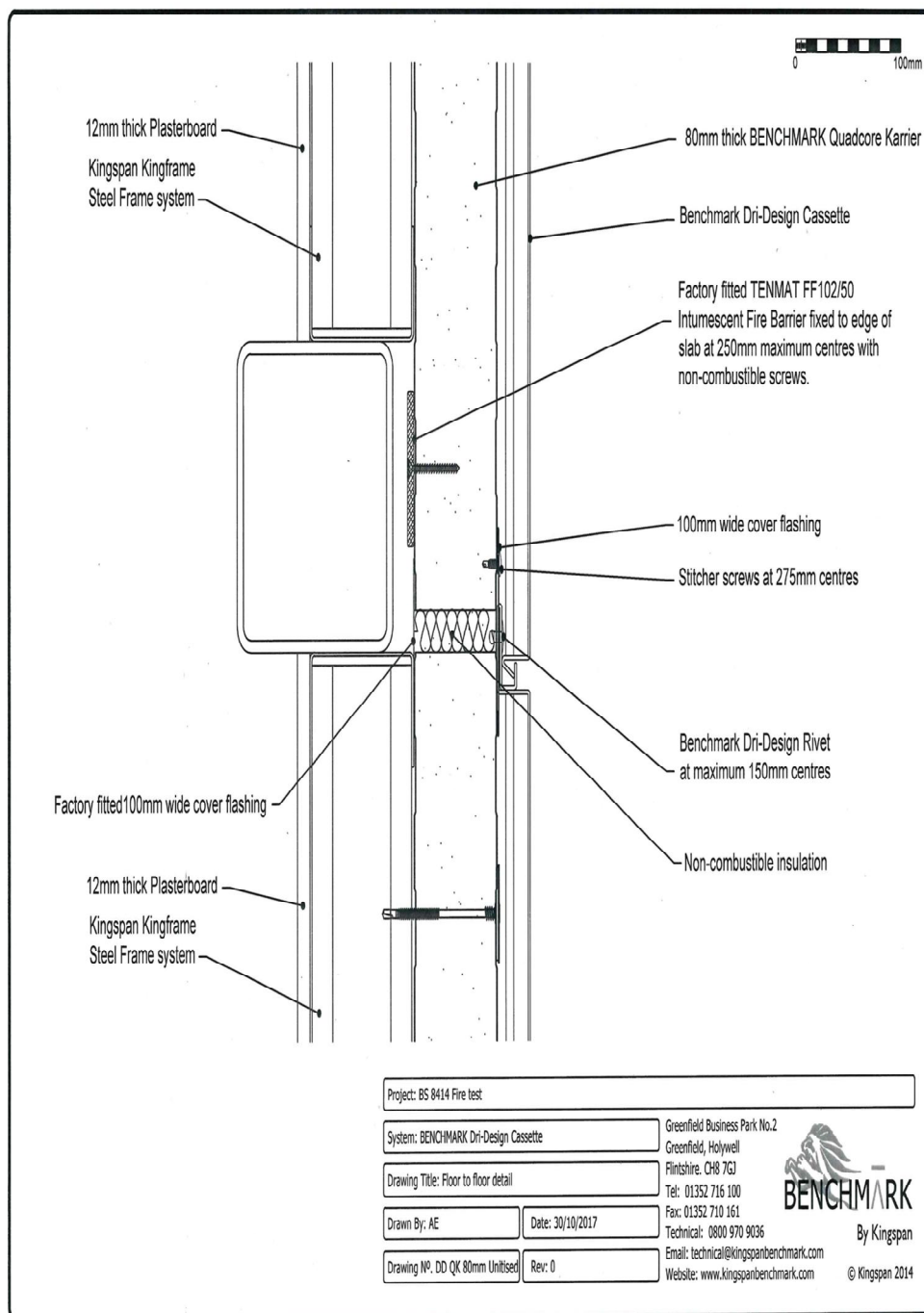


Figure 12. Client supplied drawing - Floor to floor edge detail.

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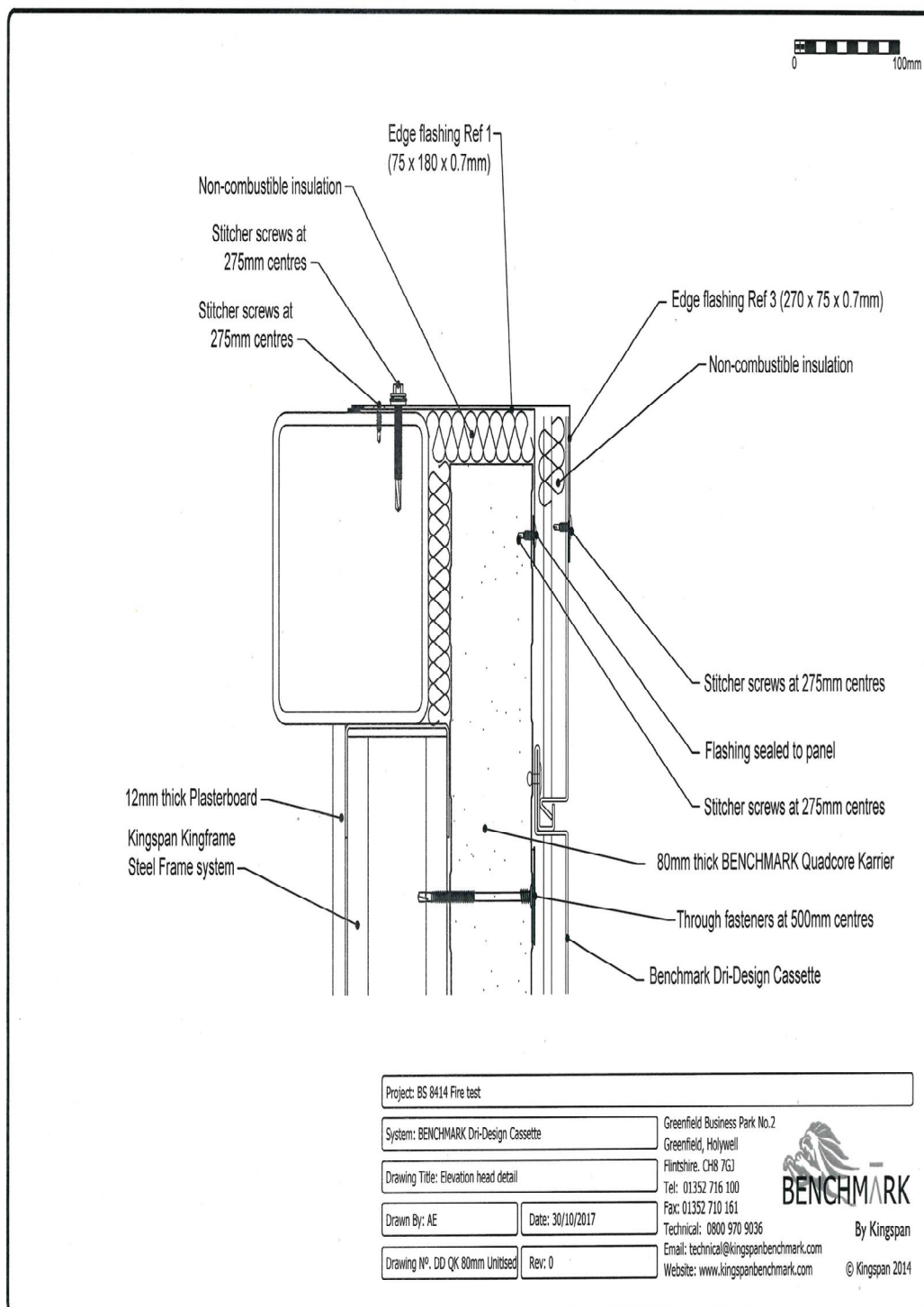


Figure 13. Client supplied drawing – Elevation head detail.

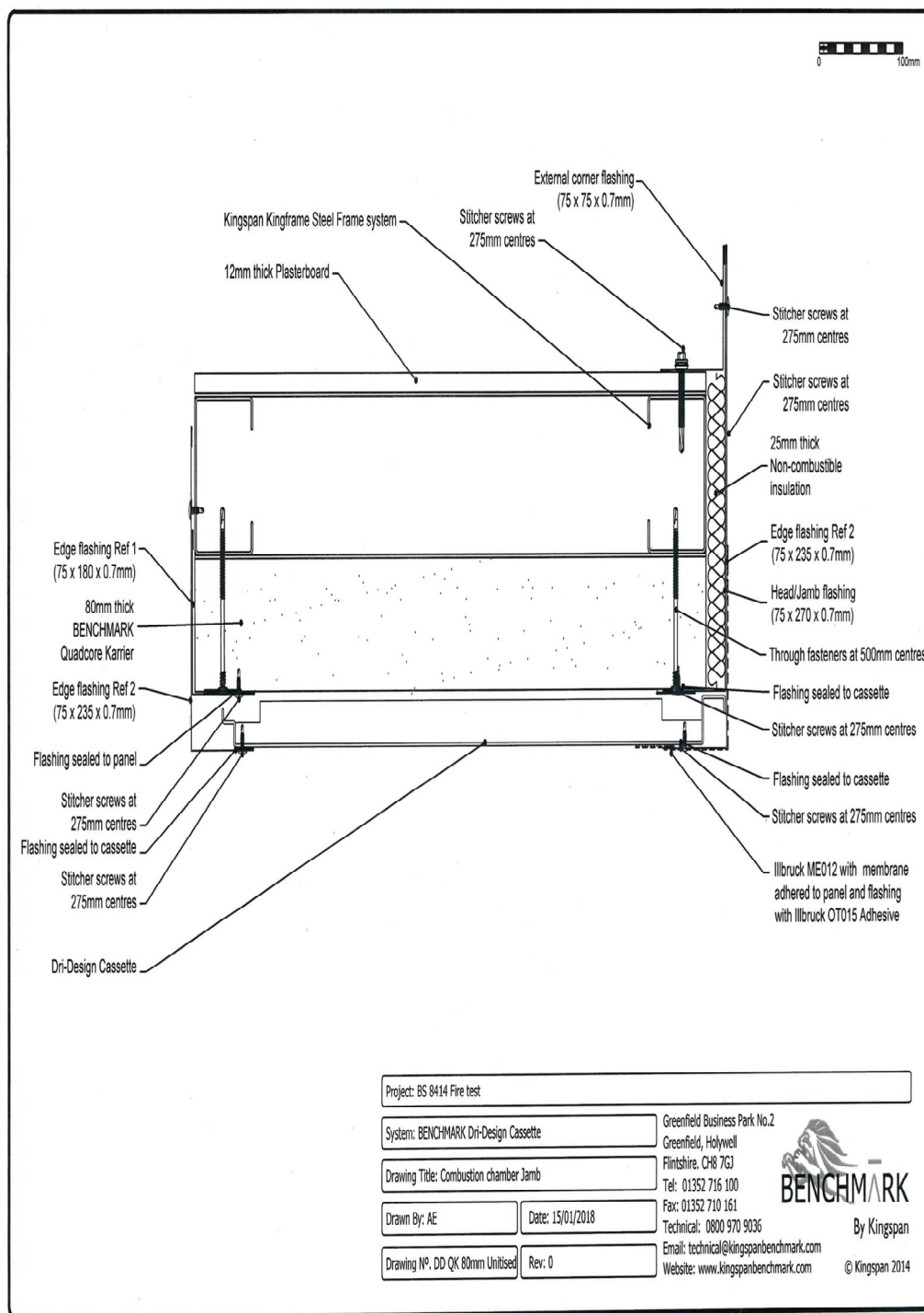


Figure 14 Client supplied drawing -Combustion chamber jamb detail

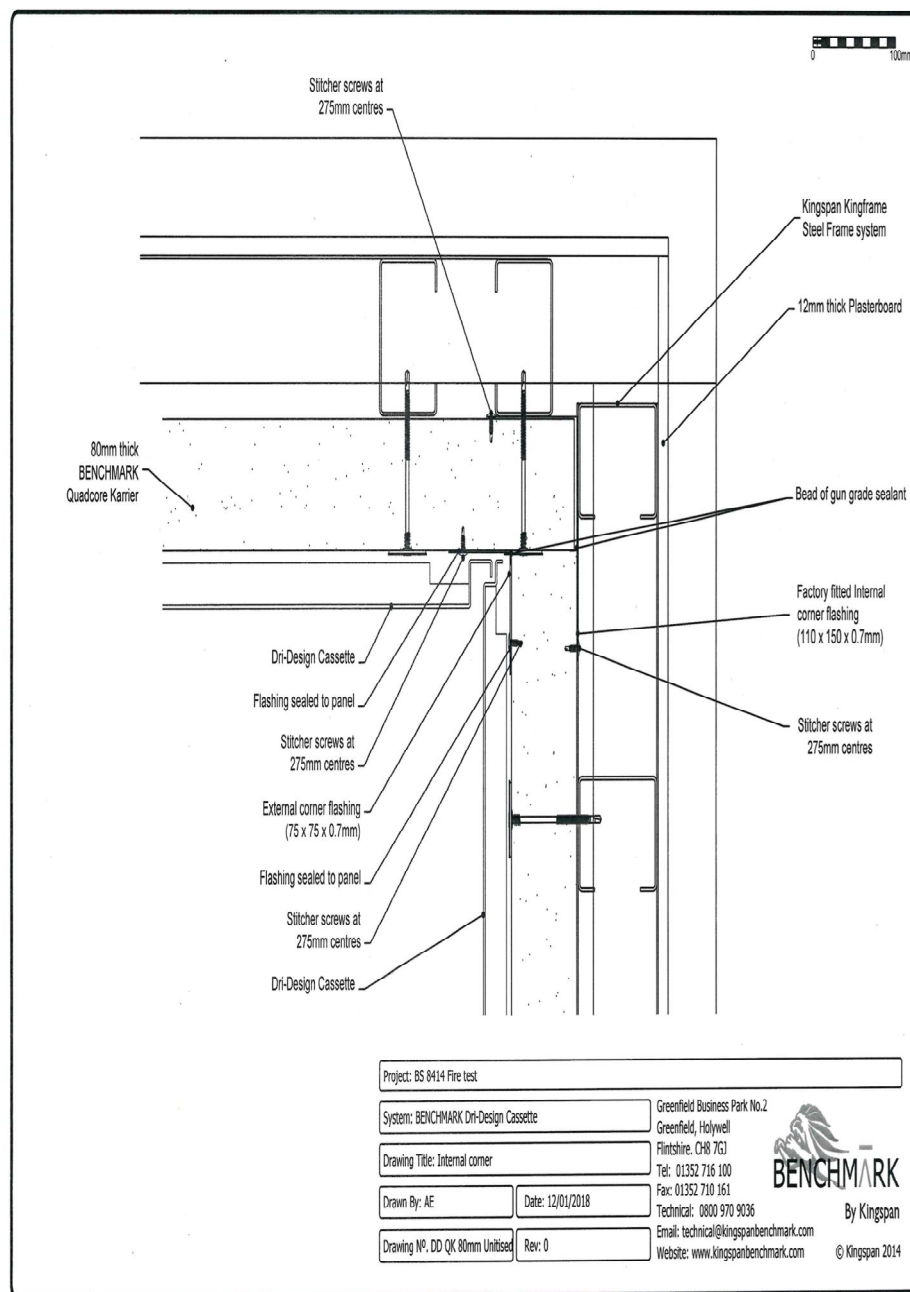


Figure 15. Client supplied drawing - Corner detail.

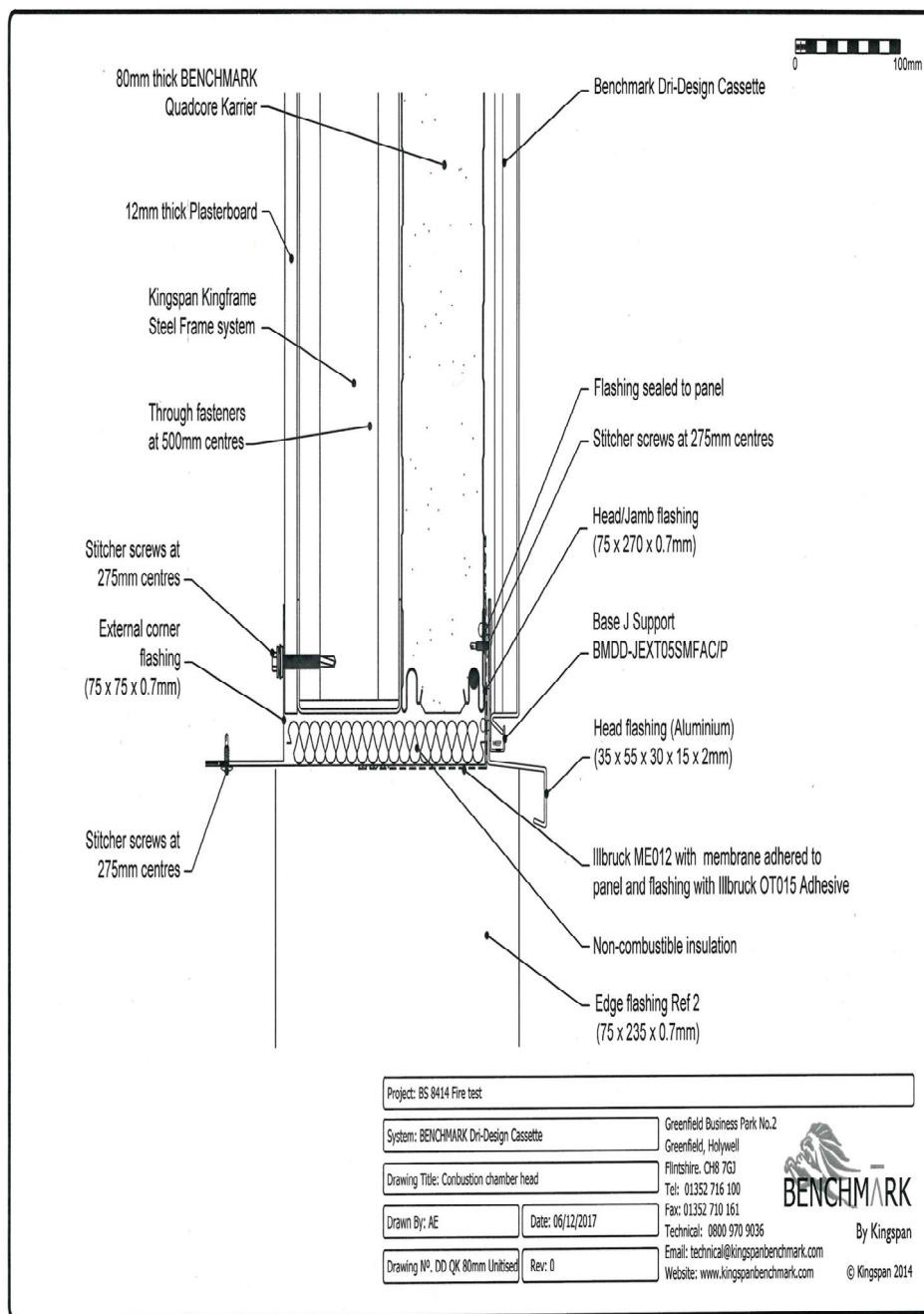


Figure 16. Client supplied drawing – Combustion chamber head

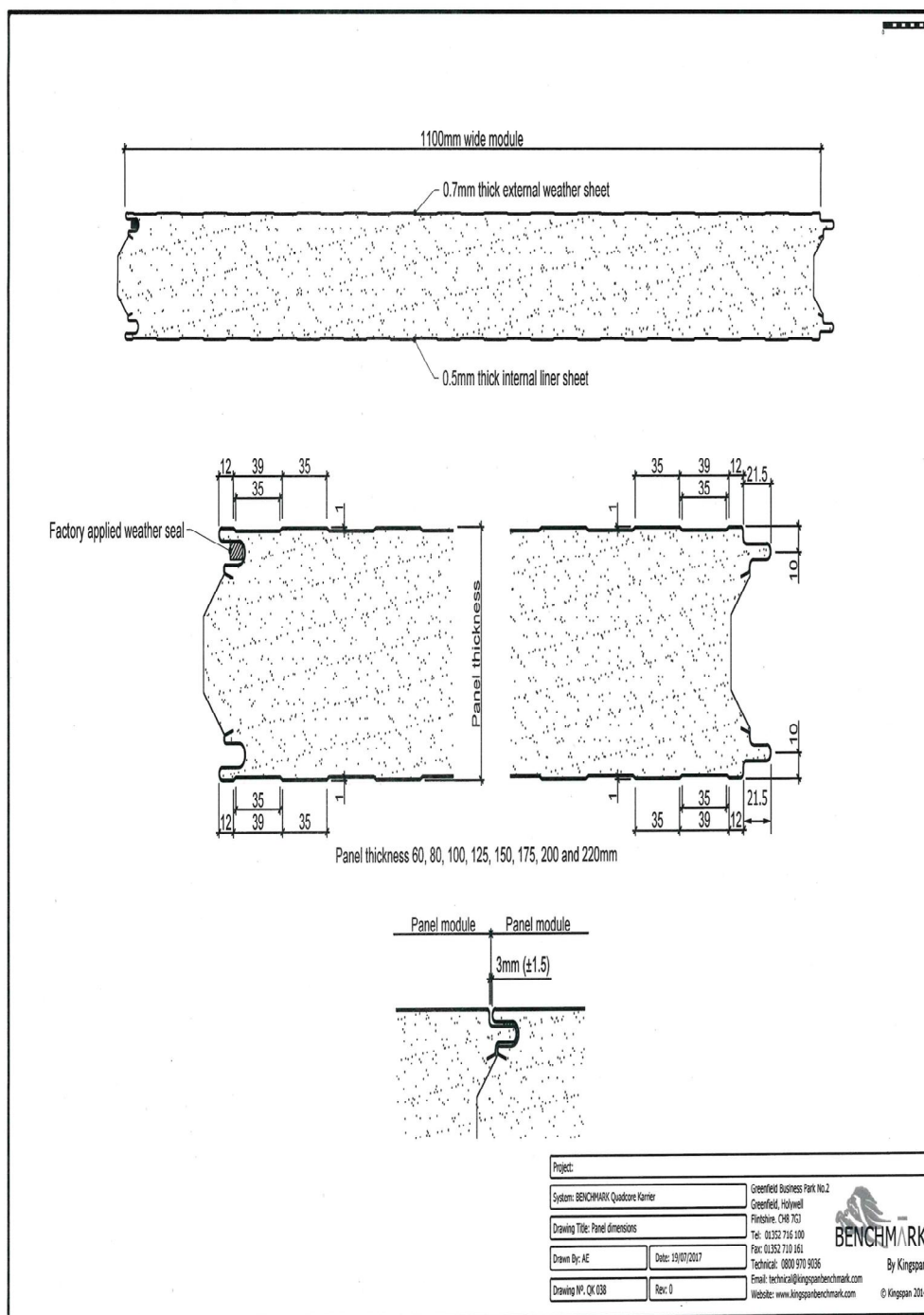


Figure 17. Client supplied drawing – Cross section of BENCHMARK QuadCore™ Karrier panel



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 Ltd	P107922-1000 issue 1	BS 8414-2: 2015 + A1:2017

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 B BR 135:2013
BS 8414-2: 2015 + A1:2017	External fire spread	1	>15 minutes	Compliant
	Internal fire spread Cavity		>15 minutes	Compliant
	Internal fire spread Insulation layer		>15 minutes	Compliant
	Internal fire spread Lightweight steel frame		>15 minutes	Compliant
	System burn through		>15 minutes	Compliant



4.3 Mechanical performance

The BENCHMARK Dri-Design Cassette system melted in the flame plume area leading to aluminium droplets at the base of the test sample.

Flaming debris detached from the combustion chamber opening at 2:40 (mins:secs) after crib ignition.

Flaming droplets were observed at 8:55 (mins:secs) and 11:45 (mins:secs) after crib ignition.



4.4 System damage

4.4.1 Aluminium façade

Main wall

Cassette E-3, E-2, E-1, E0. Cassettes intact and in place. Discolouration to right hand edge.

Cassette E1: Intact and in place.

Cassette D1: 75% destroyed.

Cassette C1: 60% destroyed.

Cassette E2: Intact and in place.

Cassette D2: 75% destroyed.

Cassette C2: 55% destroyed.

Cassette E3: Intact and in place.

Cassette D3: 50% destroyed.

Cassette C3: 50% destroyed.

Cassette E4: Intact and in place.

Cassette D4: 50% destroyed.

Cassette C4: 50% destroyed.

Cassette E5: Intact and in place.

Cassette D5: 20% destroyed.

Cassette C5: 40% destroyed.

Cassette E6: Intact and in place.

Cassette D6: 10% destroyed.

Cassette C6: 40% destroyed.

Cassette E7: Intact and in place.

Cassette D7: 5% destroyed.

Cassette C7: 5% destroyed.

The remaining cassettes above row 7 main wall were intact and in place.

On the wing wall, the cassettes were intact and in place. There was some minor heat distortion of the cassettes and some discolouration or smoke staining at the main and wing wall junctions. There was also some discolouration on the flashing on the wing wall.



4.4.2 Combustion chamber surround

The aluminium bracket supporting the cassettes was completely destroyed. The vertical and horizontal steel flashing was discoloured and distorted but was intact and in place.

4.4.3 BENCHMARK QuadCore™ Karrier panels – steel outer face

On the main wall steel facings beneath panels in rows 1 to 6 was discoloured and was delaminated from the insulation beneath. The area of damage was in line with the combustion chamber. There was reducing levels of damage rows 6 to 11 (discolouration).

On the wing wall, rows 1-10, column B (adjacent to the main wall) had suffered heat damage (paint removed, discolouration). Column 'A' from row 1 up had minor discolouration.

4.4.4 BENCHMARK QuadCore™ Karrier panels – Insulation

The damage to the insulation was confined to an area on the main wall 4m from the top of the combustion chamber and approximately 300mm wider than the combustion chamber (2.3m). The insulation above the combustion chamber was heavily charred, with the char and damage to the insulation reducing at greater distance from the top of the combustion chamber.

There was slight heat discolouration to the exposed foam on the wing wall.

4.4.5 Framing system

The framing system was intact and in place. There was heat damage to the sections of framing centred on the combustion chamber and between the top of the combustion chamber and second floor box section.

4.4.6 Plasterboard

Intact and in place. Heat damage to the paper facing between the top of the combustion chamber and second floor box section.

4.4.7 Cavity barriers

The cavity barrier installed in line with the level 1 floor slab had activated either side of the joint in line with the centre of the combustion chamber (approximately 150mm wide and the full height of the barrier). There were other small areas of discolouration.

The level 2 cavity barrier had not activated. There was some surface discolouration.



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 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.