

BRE Global Classification Report

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

Prepared for: **Bailey**
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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 B 2013. This classification should be read in conjunction with this document and the associated test reports referenced in section 4.

All materials and products used in the test were supplied and installed by the Test Sponsor. BRE Global was not involved in the sample selection process and therefore cannot comment upon the relationship between samples supplied for test and the samples supplied to market. Results apply to the sample as received and installed.

The validity of the results is conditional on the accuracy of the data. All measurements quoted in this report are nominal unless stated otherwise.



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 90° 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	Bailey steel 'L'-shaped cleats (75mm-wide×50mm-high×2mm-thick)
2	Bailey steel 'U'-shaped channel (50mm×100mm×2mm-thick)
3	Siniat GTEC Standard Wallboard (2400mm-high×1200mm-wide×12.5mm-thick)
4	Rockwool Steel Frame Slab (1200mm-high×600mm-wide×100mm-thick)
5	Hardie Backer board (1200mm-high×800mm-wide×12mm-thick)
6	Bailey 'L'-shaped aluminium single bracket (70mm-high×108mm-long×50mm-wide×4mm-thick)
7	Bailey 'L'-shaped aluminium double bracket (145mm-high×108mm-long×50mm-wide×4mm-thick)
8	Rockwool galvanised steel skewers (205mm-long×25mm-high×1mm-thick)
9	Rockwool SP Firestop OSCB 120/25 horizontal cavity barrier with intumescent strip (85mm-thick×130mm-deep)
10	AIM OSCB 120/25 horizontal cavity barrier with intumescent strip (85mm-thick×130mm-deep)
11	Rockwool SP galvanised steel skewer (405mm-long×25mm-wide×1mm-thick)
12	Rockwool SP120 Firestop slab vertical cavity barrier (supplied as 90mm-thick×650mm-deep×1000mm-long and cut to 90mm-thick×190mm-deep×1000mm-long)
13	Bailey aluminium 'L' rail (80mm-deep×40mm-wide×2mm-thick)
14	Rockwool Duo Slab insulation (1200mm-high×600mm-wide×125mm-thick)
15	Bailey aluminium 'L' angle (100mm-deep×50mm-wide×2mm-thick)
16	Bailey Platinum aluminium cassette panels (3mm-thick panel×40mm-deep profile)
17	Bailey aluminium profiled 'Z' angle (185mm-wide×3mm-thick)



2.3 Installation sequence

The façade system was supported at nominal 2500mm floor-floor heights by 200mm×200mm×6mm square hollow sections (SHS). Steel 'L'-shaped cleats (Item 1) were fixed to the ground and the top edge of combustion chamber lintel using CTF-6.3×57mm concrete screws and to the head and base of steel SHS using BFX18 30mm×5mm screws at 280mm-625mm centres on the main wall and 200mm-430mm centres on the wing wall. The steel framing system (SFS) was formed from 'U'-shaped channel studs (Item 2) fixed between the 'L' shaped steel cleats using 30mm×5mm screws (two per cleat).

Plasterboard (Item 3) was fixed to the unexposed face of the SFS (long edge vertical) using DF3-W-4.8mm×38mm screws at 600mm vertical centres in line with the SFS studs. A second layer of plasterboard (Item 3) was fixed over the first layer (long edge vertical, in line with the first plasterboard layer joint locations) using DF3-W-5.5mm×50mm screws at 600mm vertical centres in line with the SFS studs.

Stone wool insulation slabs (Item 4) were cut to size and friction fitted between the SFS studs. The horizontal joint between insulation slabs either side of an SFS stud were typically staggered.

Cement fibre board (Item 5) was fixed to the SFS studs as vertical boards using DF3-W-4.8×38mm screws at 400mm vertical centres and horizontally in line with the SFS studs. Where the cement fibre board was fixed to the blockwork surrounding the combustion chamber, CTF 57mm×6.3mm concrete screws were used.

Single aluminium brackets (Item 6) and double aluminium brackets (Item 7) were fixed through the cement board to the SFS studs using 38mm×Ø5mm screws, two per single bracket and three per double bracket. The brackets were installed in rows sequenced single/single/double except directly above the combustion chamber and at the top of the system where an additional row of single brackets was used.

Galvanised steel skewers (Item 8) folded to 92mm-long were fixed to the cement board in line with the SHS at 500mm horizontal centres using one CTF-6.3×57mm screw per bracket in three continuous rows located: 2695mm, 5265mm, 7785mm from the ground. Stone wool cavity barriers with intumescent strip (Item 9) were pressed onto galvanised steel skewers.

Galvanised steel skewers (Item 11) folded to 150mm-long were fixed to the cement board using one CTF-6.3×57mm screw per bracket at 500mm vertical centres in continuous columns along the perimeter edges of the main and wing wall. Stone wool cavity barriers (Item 12) were pressed onto the galvanised steel skewers.

Galvanised steel skewers (Item 8) folded to 92mm-long were fixed to the cement board directly above the combustion chamber opening using one CTF-6.3×57mm screw per bracket at 500mm horizontal centres. Stone wool cavity barrier (Item 10) cut to the size of the combustion chamber width and pressed onto the galvanised steel skewers.

Galvanised steel skewers (Item 11) folded to 150mm-long were fixed to the cement board, flush with the vertical edges of the combustion chamber using one CTF-6.3×57mm screw per bracket at 500mm vertical centres. Stone wool cavity barriers (Item 12) were pressed onto the galvanised steel skewers from the ground up the base of the first row of continuous horizontal cavity barriers (Item 9).

Aluminium 'L' shaped rails (Item 13) were fitted to the aluminium brackets using two 38mm-long×Ø5mm screws per bracket.



Stone wool insulation slabs (Item 14) were cut to size and friction fitted (staggered horizontal joints) between the aluminium 'L' shaped rails (Item 13) and fixed in place using:

- one DF3-HT-5.5×180mm screw with SF-P-SS-70D steel insulation spreader washer in the centre of the insulation slab
- one DF3-HT-5.5×180mm screw with SF-T-75×25mm SureFast plastic tube washer at the centre of each horizontal insulation joint (two per full size slab).

Aluminium 'L' angle (Item 15) was fixed to the cement board on the main wall perimeter edge, flush with the vertical cavity barrier unexposed face using CTF-6.3×57mm screws at 500mm vertical centres.

The aluminium cassette panels (Item 16) had a 40mm-deep profile. Where a panel was located in line with a horizontal cavity barrier a 30mm-thick×140mm-high section of stone wool cavity barrier slab (Item-12) was cut to size and attached to the rear face of the aluminium panel (within the 40mm-deep profile) with aluminium foil tape - applied to the full face of cavity barrier.

The vertical cavity barrier at the perimeter edge of the wing wall was notched to allow the aluminium cassette panels (orientated long edge horizontal) to be attached.

On the main wall the aluminium cassettes (Item 16) were installed long edge vertical. They were fixed in the following sequence: the first panel was fixed at the main-wing wall junction, the panel covered the main-wing wall and consisted of a 45mm lip at the top of the panel and a 40mm lip on the vertical right-hand side of panel which were both fixed to the aluminium 'L' rails (Item 13) using DF3-SSA4-PL-S15-5mm×35mm-long screws at 600mm vertical centres, and horizontal centres in line with the aluminium rails (Item 13). The adjoining panel on the main wall (left of corner panel) had a 40mm lip with a 15mm return on the vertical right-hand side edge of the panel which slotted into a 25mm-deep profiled void on the left-hand vertical edge of the corner panel. Each main wall panel had a 45mm lip at the top of the panel, which was fixed to the aluminium 'L' rails (Item 13) using DF3-SSA4-PL-S15-5mm×35mm-long screws at horizontal centres in line with the aluminium 'L' rails (Item 13). This process was repeated to the outside edge of the main wall.

On the main wall outside edge, the panel returned by 190mm and was fixed to the aluminium 'L' angle (Item 15) using DF3-SSA4-PL-S15-5mm×35mm-long screws at 500mm vertical centres.

On the wing wall the aluminium cassettes (Item 16) were installed long edge horizontal. They were fixed in the following sequence: the first panel had a 40mm lip with a 15mm return at the top edge and was fixed using DF3-SSA4-PL-S15-5mm×35mm-long screw in-line with the aluminium 'L' rails (Item 13). The cassette panel directly above had a 25mm profiled void along the horizontal edge which slotted into the panel below. This process was repeated from the base to the top of wing wall.

The wing wall panels did not return at the outside edge; the vertical cavity barrier was visible.

Aluminium profiled 'Z' angle (Item 17) was fixed to the horizontal and vertical edges of the combustion chamber blockwork using CTF-6.3×57mm concrete screws and to the combustion chamber panel edges using DrillFast DF3-SS-A4-PL-S15-5×35mm screws at 450mm horizontal centres and 500mm vertical centres.

On the main wall, the panels sizes ranged in height from 290mm-2198mm, the panels ranged in width from 225mm-550mm. The panel gaps ranged from 14-24mm horizontally and 13-15mm vertically.

On the wing wall, the panels ranged in height from 280mm-540mm, the panels were 1200mm in width. The panel gaps ranged from 14-16mm horizontally and 16-18mm vertically.

Figure 2. SFS stud centres and support frame elevation (supplied by Test Sponsor)

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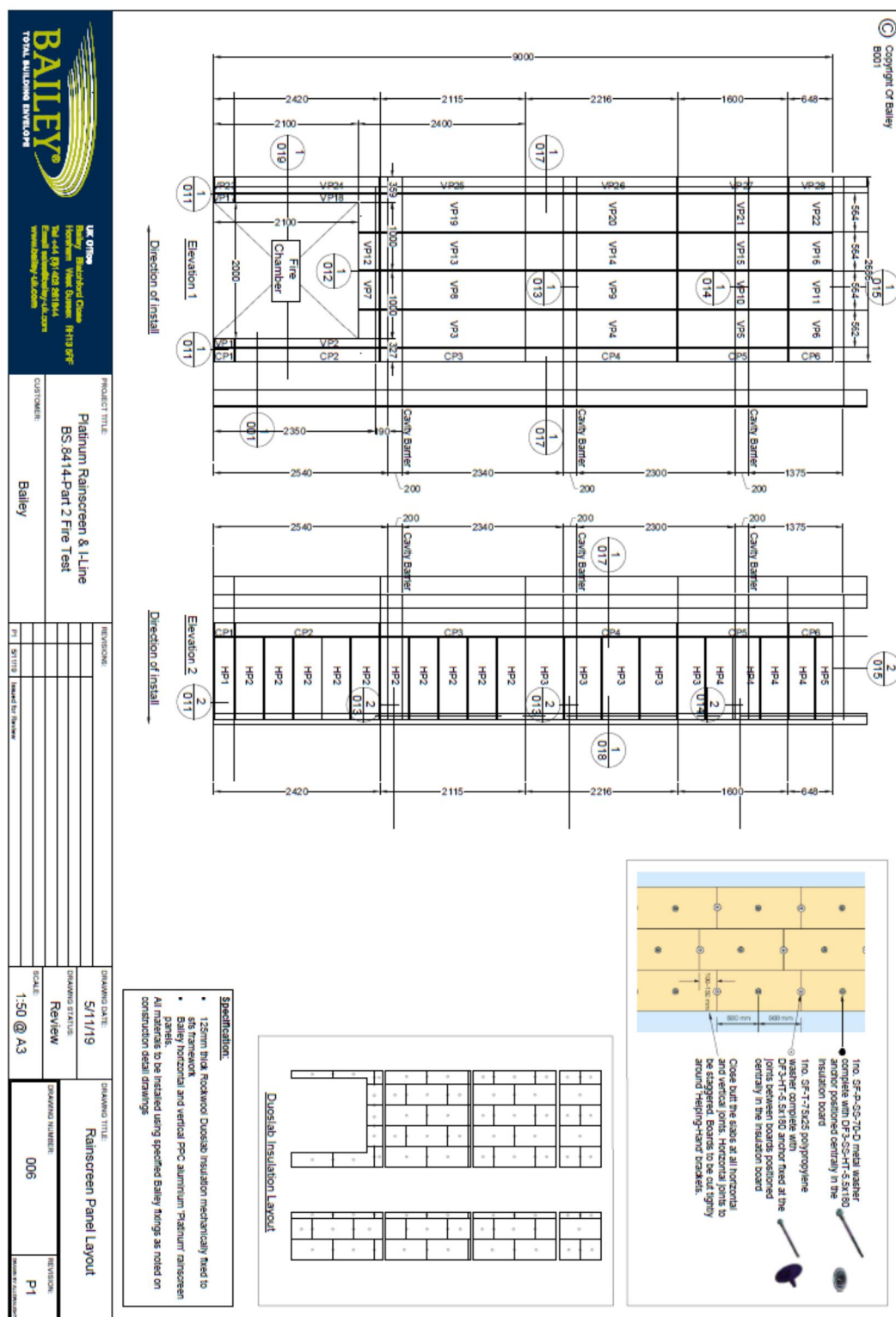


Figure 5. Rainscreen panel layout (supplied by Test Sponsor)

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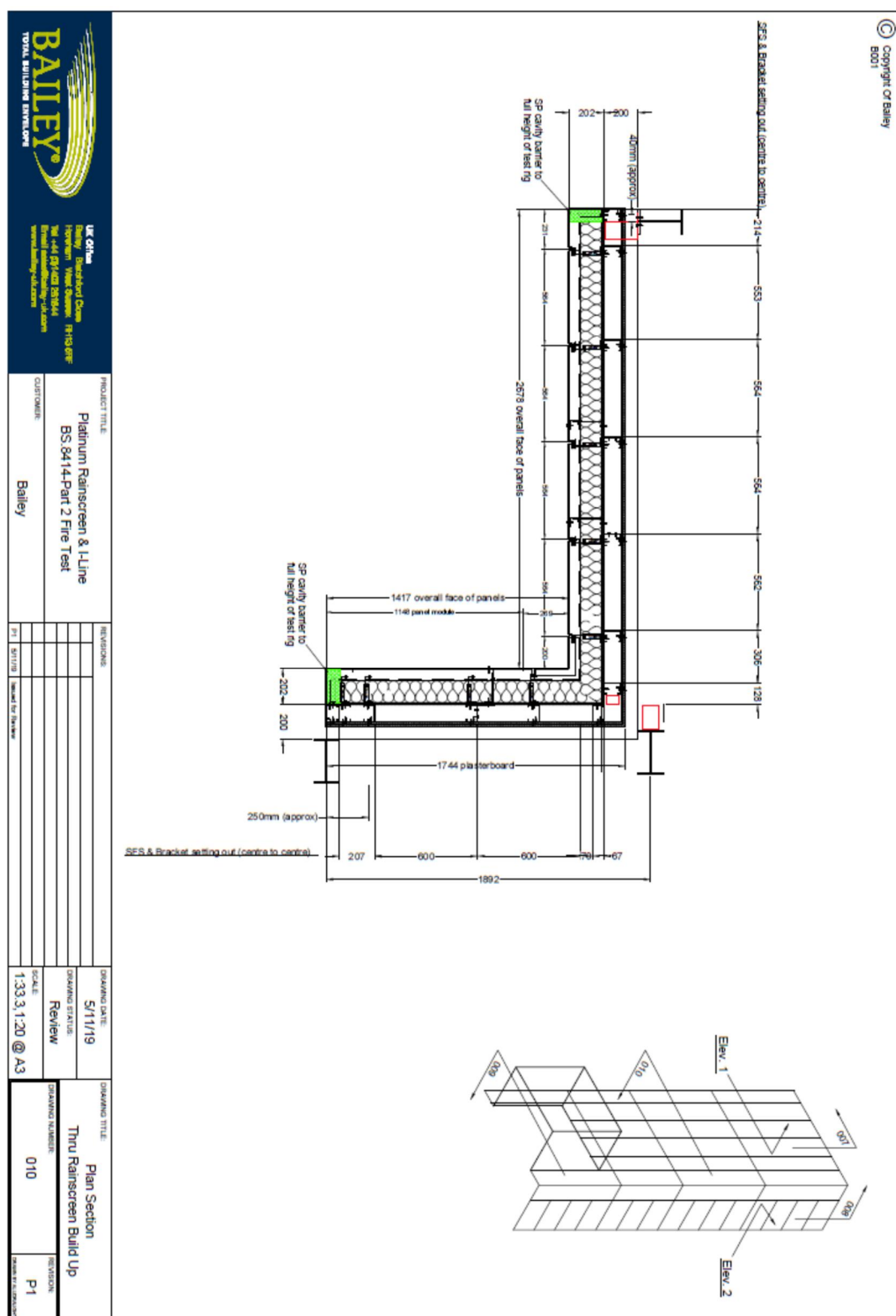
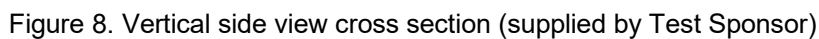


Figure 7. High level cross section (supplied by Test Sponsor)



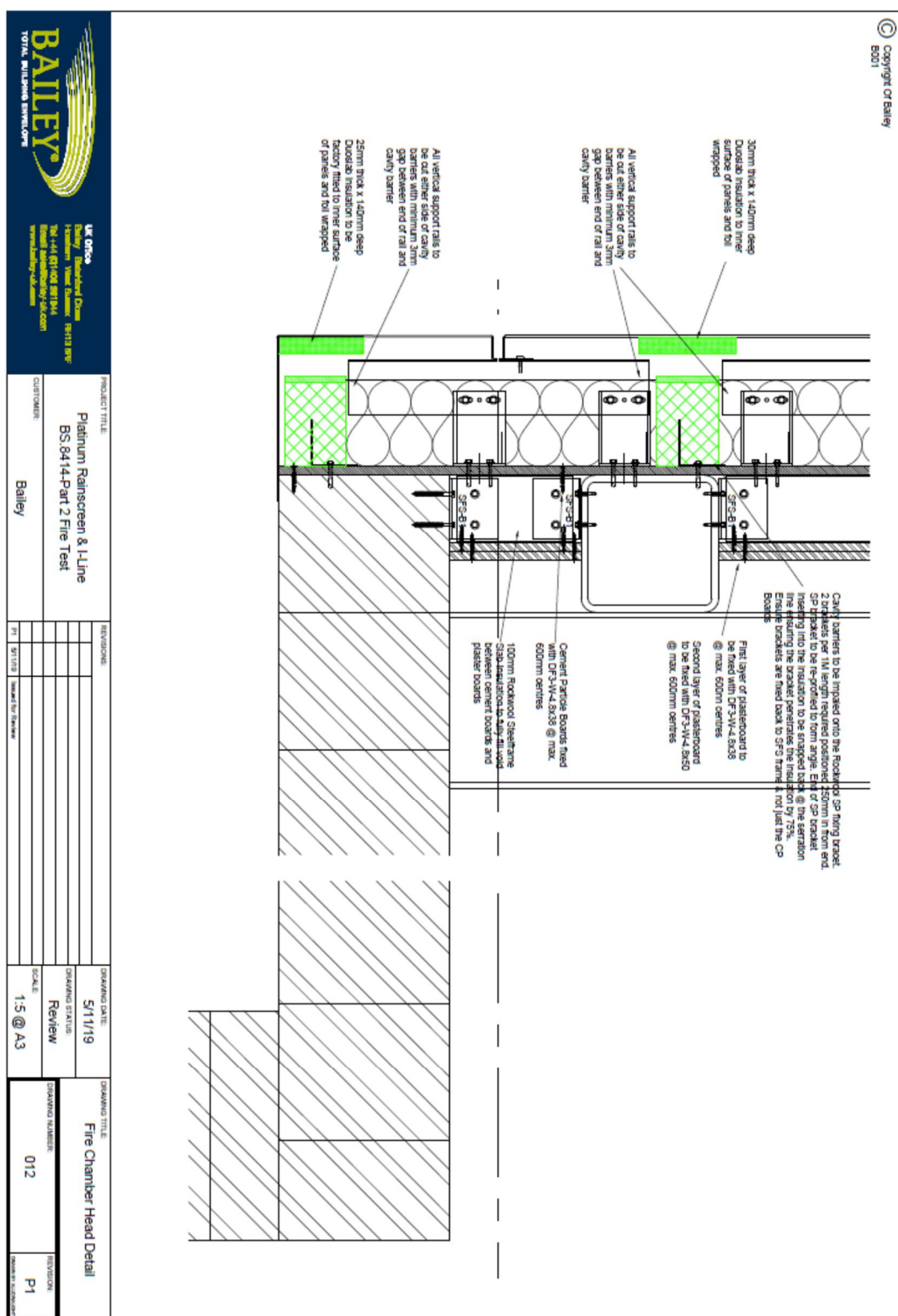
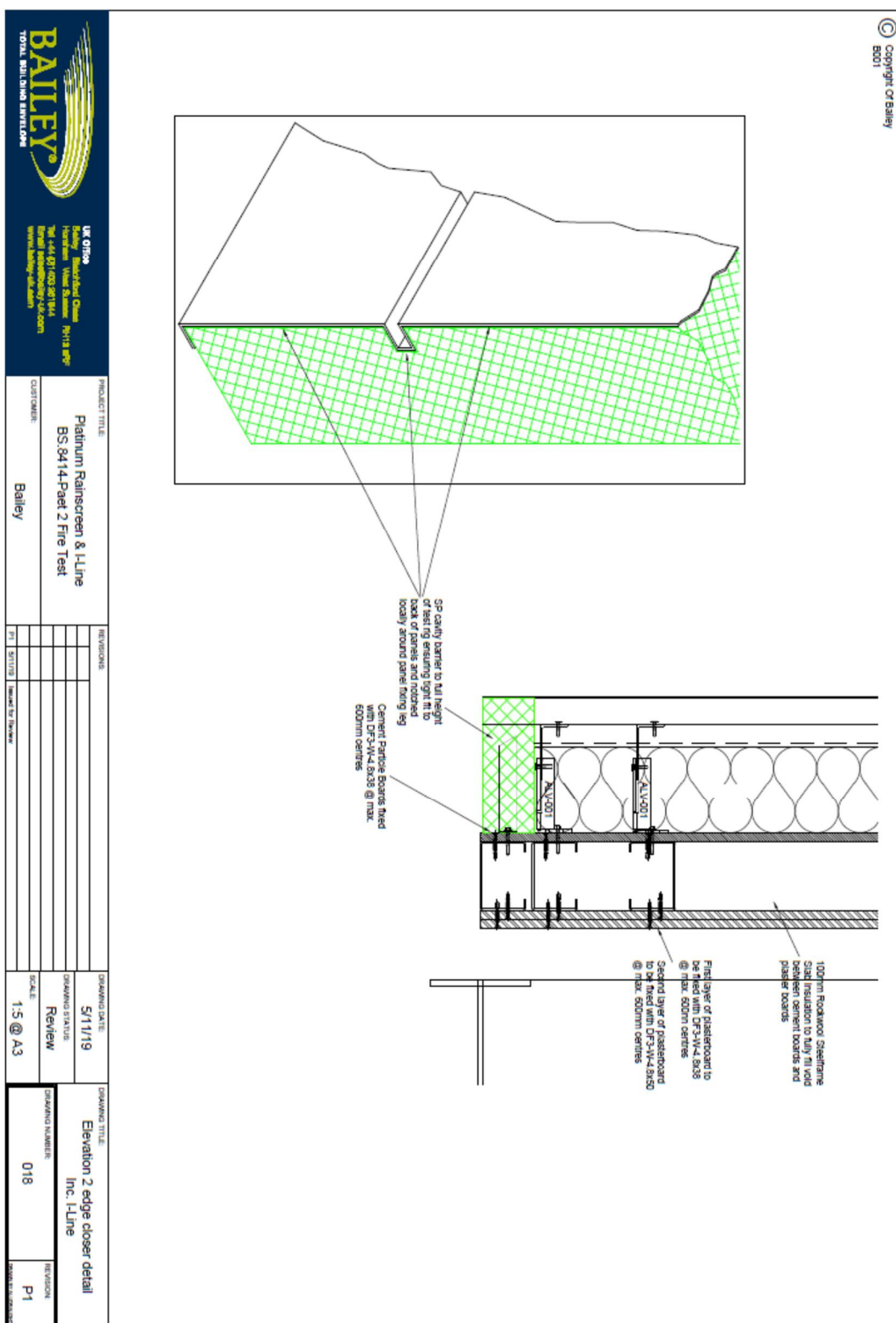


Figure 9. Fire chamber head detail (supplied by Test Sponsor)





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	Bailey	P114910-1000 Issue: 1	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 (Cavity)		>15 minutes	Compliant
	Internal fire spread (Insulation)		>15 minutes	Compliant
	Internal fire spread (Sheathing Cement board)		>15 minutes	Compliant
	Internal fire spread (Steel Framing System)		>15 minutes	Compliant
	Internal fire spread (Plasterboard)		>15 minutes	Compliant
	System burn through		>15 minutes	Compliant



4.3 Mechanical performance

Observation	Details
Ongoing system combustion following extinguishing of the ignition source	30:45-30:50 (not sustained)
System collapse	Falling debris was observed from 08:00-28:40
Spalling	Not observed
Delamination	Not observed
Flaming debris	Flaming debris was observed from 09:00-11:45
Pool fire	Not observed

4.4 System damage

4.4.1 Panels

On the main wall the panels were melted directly above the combustion chamber in an area with maximum dimensions of 1350mm-wide × 3100mm-high (approximately 3.6m²). The panels were distorted up to 3.5m above the combustion chamber.

On the wing wall the panels remained intact and in place. The panels were distorted and discoloured up to 5.5m from the ground.

The combustion chamber surround horizontal edge had completely melted. The combustion chamber surround vertical edges had melted from the top edge extending 400mm downwards, below this the surround was distorted and discoloured to the base of the system.

4.4.2 Insulation

On the main wall, the insulation remained intact and in place. The insulation was discoloured to the full height of the system except at the perimeter edge of the main wall and at the main-wing wall junction. On the wing wall the insulation remained intact and in place. The insulation was discoloured up to 6.6m from the ground.

4.4.3 Full width and height cavity barriers

The intumescent strip of the horizontal cavity barrier located at 2695mm was consumed across the width of the combustion chamber opening on the main wall, on the wing wall the cavity barrier intumescent was consumed up to 1000mm from the perimeter edge. The intumescent strip of the horizontal cavity barrier located 5265mm was consumed across 1000mm on the centre line of the combustion chamber, on the wing wall the cavity barrier intumescent was consumed 750mm from the perimeter edge. The horizontal cavity barrier located at 7785mm on the main wall remained intact and in place and was partially activated on the centre line of the combustion chamber. On the wing wall, the cavity barrier remained intact and in place - the plastic wrapping had melted to reveal the unactivated intumescent strip.

The vertical cavity barrier located at the perimeter edge of the main wall remained intact and in place but was discoloured up to approximately 2.5m above the combustion chamber. The vertical cavity barrier located at the perimeter edge of the wing wall remained intact and in place but was discoloured up to approximately 5m from the ground.



4.4.4 Combustion chamber cavity barriers

The horizontal cavity barrier directly above the combustion chamber intumescent strip was fully consumed, the stone wool of the cavity barrier had 1200mm width of detachment.

The vertical cavity barriers located along the combustion chamber vertical edges remained intact and in place but were discoloured to the full height of the barrier.

4.4.5 Aluminium rails

On the main wall the central aluminium rail had melted up to approximately 1.5m above the combustion chamber, the rails either side had melted up to approximately 600mm above the combustion chamber. The rails on the main wall were distorted to approximately 5m above the combustion chamber and discoloured to full height (except at the perimeter edge of the main wall and main-wing wall junction, which were discoloured up to 5m above the combustion chamber).

On the wing wall the aluminium rails remained intact and in place. The rails were distorted to approximately 3m above ground level and discoloured to full height.

4.4.6 Aluminium brackets

The aluminium brackets remained intact and in place.

On the main wall, the aluminium brackets in line with the centre of the combustion chamber were discoloured to full height. At the main-wing wall junction and the main wall perimeter edge the brackets were discoloured up to 3m above the combustion chamber.

On the wing wall, the aluminium brackets were discoloured at 2-6m from the ground.

4.4.7 Cement fibre board

The cement fibre board remained intact and in place.

On the main wall, cracking was visible to the surface directly above the combustion chamber. The board was discoloured up to full height and 500mm down both vertical edges of the combustion chamber.

On the wing wall, the board was discoloured up to 5m from the ground.

4.4.8 SFS insulation infill

The insulation infill remained intact and in place.

On the main wall, the insulation was discoloured up to 2.5m above the combustion chamber opening. Along the main-wing wall junction the insulation was discoloured 700mm below the combustion chamber horizontal opening.

On the wing wall, there was no visible damage.

4.4.9 Plasterboard

The plasterboard remained intact and in place.

On the main wall, the plasterboard was discoloured up to 1.5m above the combustion chamber in line with the central SFS stud.

On the wing wall, there was no visible damage.



4.4.10 Steel framing system

The SFS remained intact and in place.

On the main wall, the central stud was discoloured up to 1.5m above the combustion chamber.

On the wing wall, there was 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.