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BRE Global Test Report

BS 8414-2:2015 + A1:2017 Test on Trespa FR panel ventilated rainscreen system with Kingspan K15 Insulation.

Prepared for: **Kingspan Insulation**

Report Number: **P114901-1000 Issue 1**

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1 Introduction

The test method, BS8414-2:2015 + A1:2017 [1] describes a method of assessing the behaviour of non-load bearing external cladding systems, rainscreen over cladding systems and external wall insulation systems when applied to the face of a building and exposed to an external fire under controlled conditions. The fire exposure is representative of an external fire source or a fully developed (post-flashover) fire in a room, venting through an opening such as a window aperture that exposes the cladding to the effects of external flames.

All materials and products used in the test 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 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 Test Details

Name of Laboratory:	BRE Global Ltd.
Laboratory Address:	Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX, UK.
Test reference:	P114901-1000
Date of test:	24th July 2019
Method:	The test was carried out in accordance with BS 8414-2:2015 + A1:2017. Extra data was recorded, and observations made to facilitate classification to AS 5113:2016[2].
Deviations:	None

3 Details of Test Apparatus

The product was installed on to wall number 3 of the BRE Global 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 - see *Figure 1*. The main wall includes the combustion chamber.

4 Description of the System

Product names and system drawings were supplied by the Test Sponsor and were not independently verified by BRE Global. The validity of the test results is conditional on the accuracy of the system details, the component specification and the installation of the system components.

The details in sections 4.1, 4.2 and 4.2.1 were recorded during installation by BRE Global and take precedence over the Test Sponsor supplied drawings (section 10.4).

The Test Sponsor has been asked to review the test report and takes responsibility for any discrepancies and inaccuracies in the supplied drawings (section 10.4).

4.1 Summary

Generic cladding type	Rainscreen on a lightweight steel frame system
Relevant test method	BS 8414-2:2015 + A1:2017
Total cavity depth (insulation to rainscreen)	65-70mm
Insulation (Partial filled cavity)	Kingspan K15 insulation (80mm-thick) Batch nr: 8100326848 dated 06-06-2019
Horizontal (ventilated) cavity barriers	Siderise RH25G-090/30/144-156 stone wool open state cavity barrier with intumescent strip (75mm-high×125mm-deep), max 25mm air gap
Vertical (full fill) cavity barriers	Siderise RVG-090/030/139-150 stone wool cavity barrier (75mm-wide×160mm-deep)
External finish	Trespa Meteon FR (13mm-thick) (high-pressure compact laminate - HPL)

4.2 Description of product

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

Item	Description
1	Kingspan Kingframe steel base track (104mm-deep×55mm-high×1.2mm-thick) Ref: U104055120
2	Kingspan Kingframe steel head track (104mm-deep×67mm-high×1.8mm-thick) Ref: U104067180
3	Kingspan Kingframe steel stud (100mm-deep×50mm-wide×1.2mm-thick) Ref: C100050120
4	British Gypsum Saint-Gobain Gyproc Wallboard (2400mm-high×1200mm-wide×12.5mm-thick)
5	Versapanel cement bonded particle board (2400mm-high×1200mm-wide×12mm-thick)
6	Single 'L'-shaped aluminium bracket with thermal pad (120mm-deep×40mm-wide×80mm-high×3mm-thick)
7	Double 'L'-shaped aluminium bracket with thermal pad (120mm-deep×40mm-wide×150mm-high×3mm-thick)
8	'L'-shaped aluminium combustion chamber surround pod (160mm-deep×50mm-wide×5mm-thick). Overall dims as a connected pod – 2005mm-high sides×1950mm-wide top
9	Aluminium 'L'-shaped angle (5mm-thick): A. 100mm-wide×50mm-deep×2100mm-high B. 50mm-wide×160mm-deep×100mm-high
10	Siderise B65 galvanised steel skewer (220mm-long×25mm-wide×1mm-thick) folded to 150mm-deep
11	Siderise B195G galvanised steel skewer (320mm-deep×25mm-wide×1mm-thick) folded to 150mm-deep
12	Siderise RVG-090/030/139-150 stone wool cavity barrier (75mm-wide×160mm-deep)
13	Siderise RS450G galvanised skewer with split end (cut to 325mm-deep×25mm-wide×1.5mm-thick) folded to 135mm-deep
14	Siderise RH25G-090/30/144-156 stone wool open state cavity barrier with intumescent strip (75mm-high×125mm-deep)

15	Kingpsan K15 insulation (2400mm-high×1200mm-wide×80mm-thick) Batch nr: 8100326848 dated 06-06-2019
16	Aluminium 'L'-shaped rail (50mm-wide×50mm-deep×2.5mm-thick)
17	Aluminium 'T'-shaped rail (110mm-wide×50mm-deep×2.5mm-thick)
18	Trespa Meteon FR (13mm-thick)
19	Aluminium horizontal panel joint flashing (50mm-high×1mm-thick with 6mm 'bird beak' profile at mid-height)
20	Profiled aluminium capping – 285mm-deep×68mm-high×3mm-thick
21	'U'-shaped aluminium over clad capping – 327mm-deep×35mm-high×40mm-high×3mm-thick

4.2.1 Installation sequence

200mm×200mm×6mm Square Hollow Section (SHS) steel beams were fitted as part of the BRE test rig at 2540mm, 5090mm and 7590mm from ground to underside of section. At the top of the apparatus was a steel angle, 9190mm from ground. These were the primary attachment points of the cladding system to the test rig.

Steel base track (Item 1) was fixed to the ground with EJOT Bi Met Masonry Anchor 7.5×45mm screws and fixed to the top face of the SHS with EJOT SAPHIR HS 5.5×38mm screws. Steel head track (Item 2) was fixed to the underside of the SHS sections with EJOT SAPHIR HS 5.5×38mm screws. The fixing centres were at nominal 500mm horizontal centres. The base and head track were 12mm proud of the SHS sections. *See Figure 3.*

Steel stud (Item 3) was fixed in between the steel base and head track (Item 1 & 2) with EJOT SAPHIR LSCF 5.5×25mm screws, one at top and base of stud (external side). Nominal centres of studs were at 600mm, with additional studs placed in between, reducing the centres to 186mm-302mm on the main wall. In line with wing wall edge of combustion chamber opening, two studs were fixed back to back. On the wing wall studs were fixed back to back. The stud locations and centres are in line with drawing 'D3001'. *See Figure 3.*

TFS Fire45AS Fire rated intumescent acoustic acrylic sealant was applied between the steel framing system (SFS) forming the combustion chamber surround and the blockwork. *See Figure 4.*

Two layers of plasterboard (Item 4) were fixed to the rear of the system with EASYDRIVE 3.5×42mm screws at nominal 250mm vertical centres. The first layer of plasterboard was fixed long edge horizontal and the second layer long edge vertical boards. *See Figure 3.*

Cement board (Item 5) was fixed as vertical boards to the external face of the SFS, covering both the SFS and SHS sections. The boards were fixed with a mixture of EJOT JT3-WD-6-5.5×45mm-R screws and EJOT TBF 4.8×45mm bulk head screws, at nominal 300mm vertical centres. Two layers of cement board were used at the combustion chamber surround face, at the left hand-side, horizontal top edge, and three layers of cement board was used on the right-hand side up to approx. 1600mm from ground,

due to unevenness to the combustion chamber blockwork. Versaseal-FS Grey sealant was applied to the vertical and horizontal cement board joints. *See Figure 5 & 8.*

Single and double aluminium brackets (Item 6 & 7) were fixed with EJOT JT3-3-5.5×50mm screws (two per bracket). Brackets directly above combustion chamber opening had one fixing replaced with one EJOT Bi Met Masonry Anchor 7.5×45mm screw with washer. Vertical centres of brackets were at nominal 650mm-750mm. Brackets were installed in rows that alternated between a single/single/double/single up to 5600mm from ground, followed by single/double/single (Item 6 & 7) up to the top of system. Directly above the combustion chamber, a row of double brackets was fitted in line with the combustion chamber opening. *See Figure 6.*

Aluminium pod (Item 8) came prefabricated and was fixed to the combustion chamber surround, with Spit 6×70mm tapcon screws at nominal 400mm centres on the left hand-side and top. There was a 100mm gap between the bottom of the aluminium pod and the floor. *See Figure 7*

Aluminium angle (Item 9A) was fixed with FixFast R-SS-LF-4.8×22mm rivets at nominal 300mm vertical centres to the right hand-side of the aluminium pod (Item 8), for fixing locations into the combustion chamber blockwork. The angle was then fixed to the wall with Spit 6×70mm tapcon screws at nominal 400mm vertical centres *See Figure 12.*

Aluminium angle (Item 9B) was placed at the base of the aluminium pod (Item 8) at both sides to close the 100mm gap between the floor and aluminium pod. The angle and pod were braced together by an aluminium plate (100mm-high×50mm-wide×5mm-thick) with FixFast R-SS-LF-4.8×22mm rivets. *See Figure 13.*

A mixture of galvanised steel skewers (Item 10 & 11) were used across the system. Skewers were folded to 150mm-deep and fixed at 500mm vertical centres, with EJOT JT3-3-5.5×50mm screws and EJOT Bi Met Masonry Anchor 7.5mm×45mm screws in line with the combustion chamber blockwork, in three columns located: 385mm (main wall), 2550mm (main wall) and 1290mm (wing wall) measured from the main-wing wall junction.

Vertical cavity barriers (Item 12) were pressed onto the galvanised steel skewers (Item 10 & 11) in continuous columns. Aluminium tape was applied to the barrier sections joints on the foil face. *See Figure 9.*

Galvanised skewers with split end (Item 13) were folded to 135mm-deep and fixed at 500mm horizontal centres, with EJOT JT3-3-5.5×50mm screws in three continuous rows located at: 2885mm, 5985mm and 8675mm from ground. Another row of galvanised steel skewers were fixed directly above the combustion chamber opening (2170mm from ground) in between both vertical cavity barriers, with EJOT Bi Met Masonry Anchor 7.5mm×45mm screws at 500mm centres.

Horizontal cavity barriers (Item 14) were pressed onto the galvanised steel skewers in rows, and the split ends folded to secure barrier in place. The barriers were bisected by the vertical cavity barrier (Item 12). Aluminium tape was applied to the barrier sections joints and joints lining up with the vertical cavity barriers on the foil face. *See Figure 9.*

Insulation boards (Item 15) were fixed long edge vertical boards over the brackets (Item 6 & 7). Slits were made to the insulation to allow for the brackets to protrude through. The insulation was fixed with a mixture of EJOT SWSR 4.8×120mm and EJOT JT3-D6H-5.5×127mm screws with EJOT SBH-T 65/25 plastic washers and EJOT HTV 40 S/S 8mm hole metal washers. Nine fixings, three metal washers along the centre line at nominal 1000mm vertical centres and six plastic washers at nominal 500mm horizontal centres from the metal washers per full insulation board. Aluminium tape was applied to seal the joints between insulation boards, insulation board and cavity barriers joints and where brackets protruded through the insulation board. *See Figure 10.*

On the main wall aluminium rails 'T' & 'L'-shaped rails (Item 16 & 17) were fixed alternating. 'T'-shaped rails were in line with the Item 18 vertical panel joints. On the wing wall one 'T'-shaped rail was used at the main-wing wall junction, and two 'L'-shaped rails were used at remaining locations. The rails were fixed to the brackets (Item 6 & 7) with EJOT JT4-FR-4-5.5×19mm screws, two per single bracket and four per double bracket. 'L'-shaped rails (Item 16) were fixed either side of the combustion chamber surround pod (Item 8) with FixFast R-SS-LF-4.8×22mm rivets at nominal 400mm vertical centres. *See Figure 11.*

The panels (Item 18) were fixed to aluminium rails with Plasticlad 5×20mm rivets at nominal 500mm vertical centres with horizontal centres in line with 'T' and 'L'-shaped rails. Aluminium flashings (Item 19) were installed horizontally with 'bird beak' positioned within the gap between adjacent row of panels. Panel gaps were measured to be 10-15mm vertical and 7-15mm horizontal. There was a 10mm gap between the combustion chamber detail and panels. The cavity from the rear of the panel to the insulation front face, was 70mm. *See Figure 14 & 17.*

Profiled aluminium capping (Item 20) was fixed to the head track (Item 2) at the top of the system, with two EJOT JT3-3-5.5×50mm screws per location at nominal 600mm horizontal centres. *See Figure 15 & 20.*

'U'-shaped aluminium over clad capping (Item 21) was fixed over the aluminium capping, with two EJOT JT3-3-5.5×50mm screws per location, 270mm apart at nominal 600mm horizontal centres. There was a 10mm air gap between the front face of the capping and panels. *See Figure 16 & 20.*

TFS Fire45AS Fire rated intumescent acoustic acrylic sealant was applied between the system and the combustion chamber surround joints.

The cladding system measured:

Requirement	Actual measurement
≥6000mm above the top of the combustion chamber	6700mm
≥2400mm width across the main wall	2625mm
≥1200mm width across the wing wall	1256mm
260mm (±100mm) wing wall-combustion chamber opening	331mm
2000mm×2000mm (±100mm) combustion chamber opening	1945mm-wide× 2100mm-high
Horizontal joint (if present) placed 2400 (±100mm) above combustion chamber opening	2398mm
Vertical joint (if present) located on centre line of combustion chamber (±100mm)	30mm*

*offset 30mm to right of centre line.

5 Test Results

5.1 Test conditions

Test Date: 24th July 2019

Ambient Temperature: 28°C

Wind speed: <0.1m/s (test undertaken indoors).

Frequency of measurement: Data records were taken at ten second intervals.

Thermocouple locations:

Level 1 – External (50mm proud of the finished face).

Level 2 – External (50mm proud of the finished face).

Level 2 – Midpoint of panel.

Level 2 – Midpoint of cavity.

Level 2 – Midpoint of insulation.

Level 2 – Midpoint of cement board.

Level 2 – Midpoint of steel framing system (SFS).

Level 2 – Midpoint of plasterboard.

AS5113 – 900mm above combustion chamber opening on rear face of cladding system

5.2 Temperature profiles

Figures 21-29 provide the temperature profiles recorded during the test. *Figure 17* shows the system before the test.

Parameter	Result (whole test)	Result (t_s+15mins)
T_s, Start Temperature	28˚C	n/a
t_s, Start time (mm:ss) Test terminated at	01:40 after ignition of crib. 22:00 (t_s+20:20).	n/a
Peak temperature / time at Level 2, External	791˚C (t_s+18:20).	699˚C (t_s+15:00).
Peak temperature / time at Level 2, Panel	328˚C (t_s+20:10).	199˚C (t_s+15:00).
Peak temperature / time at Level 2, Cavity	585˚C (t_s+20:00).	175˚C (t_s+10:00).
Peak temperature / time at Level 2, Insulation	308˚C (t_s+20:20).	127˚C (t_s+11:00).
Peak temperature / time at Level 2, Cement board	255°C (t_s+19:50).	88°C (t_s+11:10).
Peak temperature / time at Level 2, SFS	112˚C (t_s+20:10).	72˚C (t_s+11:10).
Peak temperature / time at Level 2, Plasterboard	55˚C (t_s+20:20).	47˚C (t_s+11:10).
Peak temperature / time at AS5113	28˚C (t_s+20:20).	n/a

5.3 Visual observations

Table 2. Visual Observations – Refer to *Figure 2* for system schematic. Height measurements are approximate and given relative to a zero at the top of the combustion chamber. Unless otherwise specified, observations refer to the centre line above the combustion chamber on the main wall.

Time* (mm:ss)	t_s (mm:ss)	Description
00:00		Ignition of crib.
01:20		Flame tips to cladding system.
01:40	00:00	Start time (t_s) criteria achieved: External temperature 2.5m above the top of the combustion chamber in excess of 228˚C (=200˚C+T_s).
01:50	00:10	Flame tips to level 1 thermocouples.
03:20	01:40	Flame tips to level 2 thermocouples.
05:00	03:20	Flame tips to top of panel 4B/4C.
06:30	04:50	Distortion of combustion chamber surround top edge.
07:00	05:20	Flame tips to base of panel 5B/5C.
08:50	07:10	Flame tips to mid height of panel 5B/5C.
09:10	07:30	Further distortion of combustion chamber surround top edge.
09:50	08:10	Falling debris.
10:00	08:20	Flame tips to top of the system.
11:00	09:20	Discoloration of and vapour from surface at wing wall panel 1E/0E.
11:55	10:15	Falling debris.
14:20	12:40	Surface cracking of panels 1B and 1C.
14:50	13:10	Falling debris.
15:30	13:50	Flame tips to top of system.
16:00	14:20	Flaming debris at the base of system.
16:10	14:30	Falling debris.

Time* (mm:ss)	t_s (mm:ss)	Description
16:30	14:50	Flame tips to top of system
16:35	14:55	Flaming debris at base of system.
17:00	15:20	Debris from panels 1B and 1C.
17:20	15:40	Flame tips to top of system.
17:50	16:10	Debris from base of panel 2B and 2C.
18:00	16:20	Falling debris.
18:15	16:35	Flaming debris.
18:30	16:50	Flaming debris at base of system.
19:20	17:40	Flame tips to top of system.
19:40	18:00	Falling debris.
20:00	18:20	Falling debris.
20:20	18:40	Falling debris.
20:30	18:50	Flaming behind panels 4B/4C.
20:50	19:10	Debris from base of 4B/4C.
21:20	19:40	Flaming at top of system.
21:55	20:15	Flaming of wing wall panel 1E/2E.
22:00	20:20	Test terminated.

*Time from point of ignition.

The total mass of debris at the base of the test specimen exceeded 2kg at test termination.

Continuous flaming from sample debris on the ground at the base of the test specimen exceeded 20s.

6 Post-Test Damage Report

6.1 Mechanical performance

Time references given from point of ignition in the format mm:ss.

Falling debris was observed from 09:50 - 20:50. Cracking of surface of panels was observed at 14:20. Flaming debris was observed from 16:00 -18:15. A pool fire was observed from 16:00 to test termination.

Flaming above the sample was observed from 21:20 (mm:ss) until early test termination at 22:00 (mm:ss).

6.2 System damage

6.2.1 Panels

On the main wall, the panels had fallen/burnt away exposing the insulation beneath. This was an approximately triangular area ($2.7\mathrm{m}^2$) of max dimensions 1.4m-wide$\times$3.8m-high that tapered from the top of the combustion chamber opening. The panels had surface charring to 5.3m above the combustion chamber in line with the fire plume. Panels were discoloured to top of system in line with combustion chamber opening.

On the wing wall, the panels had surface charring between 0.5m-6m from ground with discolouration up to top of system along the main-wing wall junction.

See Figure 30.

6.2.2 Aluminium top capping

The profiled aluminium capping was discoloured to full width on the main wall and discoloured along the front face on the wing wall.

The ‘U’-shaped aluminium over clad capping was discoloured at main-wing junction.

See Figure 31.

6.2.3 Aluminium rails

On the main wall, the rail in line with the combustion chamber centre line was melted to 5.3m from ground. The rails either side of the centre rail were melted to 4.5m and 3.7m respectively. The rails between both vertical cavity barriers were discoloured to the top of system.

On the wing wall, both rails located at the main-wing wall junction and centre of wall were discoloured from 1.7m from ground to top of system.

See Figure 32.

6.2.4 Insulation

On the main wall, the insulation had burnt/fallen away to approx. 2m-wide$\times$5.5m-high from ground, in a tapering fashion reducing to 1m-wide. The surrounding insulation was charred to 7m from ground and remaining insulation was discoloured the top of system, between the vertical cavity barriers.

On the wing wall, the insulation remained in place and was discoloured from 1.6m from ground to top of system.

See Figure 33.

6.2.5 Horizontal cavity barriers

On the main wall, the horizontal cavity barrier located at 2170mm from ground had activated with detached patches of intumescent strip. The horizontal cavity barriers located at 2885mm, 5985mm and 8675mm from ground were activated between the vertical cavity barriers.

On the wing wall, the horizontal cavity located at 2885mm from ground had activated. The horizontal cavity barriers located at 5985mm and 8675mm from ground remained intact but were discoloured.

See Figure 34.

6.2.6 Vertical cavity barriers

On the main wall, both vertical cavity barriers remained intact and in place but were discoloured from 1.8m from ground to top of system. On the wing wall, the vertical cavity barrier remained intact and in place with no visible damage.

See Figure 34.

6.2.7 Combustion chamber surround pod

The combustion chamber surround pod top edge was melted approx. 1m-wide. The vertical edges were distorted and discoloured.

6.2.8 Aluminium brackets

On the main wall, the three central columns of brackets were melted in line with the combustion chamber opening to approx. 2m. The brackets were discoloured to top of system in line with the combustion chamber width.

On the wing wall, the column of brackets located at centre and the main-wing wall junction were discoloured from 2.2m from ground to top of system.

See Figure 35.

6.2.9 Cement board

On the main wall, the cement board had charred in localised areas from above the combustion chamber, to top of system in line with the aluminium bracket locations. The cement board was also discoloured in that area.

On the wing wall, the cement board remained intact and in place but had discoloured in localised areas from 2.2m from ground to top of system.

See Figure 36.

6.2.10 Plasterboard

The plasterboard remained in place with no visible damage. *See Figure 37.*

6.2.11 Steel Framing System (SFS)

On the main wall, the base track directly above the combustion chamber opening had discoloured in localised areas. The head track and vertical studs at the top of the system had discoloured in localised areas. On the wing wall, the SFS had no visible damage. *See Figure 38.*

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7 Conclusion

BS8414-2:2015 + A1:2017 [1] does not contain acceptance criteria and therefore this test report does not indicate a pass or fail of the product.

The test was terminated early (22:00 (mm:ss)) in accordance with clause 8.6a) of the test standard.

8 Limitations

Because of the nature of fire testing and the consequent difficulty in quantifying the uncertainty of measurement of fire testing, it is not possible to provide a stated degree of accuracy of the results.

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9 Reference

1. BS 8414-2:2015 + A1:2017, 'Fire performance of external cladding systems – Part 2: Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame', British Standards Institution, London, 2017.

2. AS 5113:2016, 'Fire propagation testing and classification of external walls of buildings' Standards Australia, 2016.

10 Figures

10.1 Dimensions of test apparatus

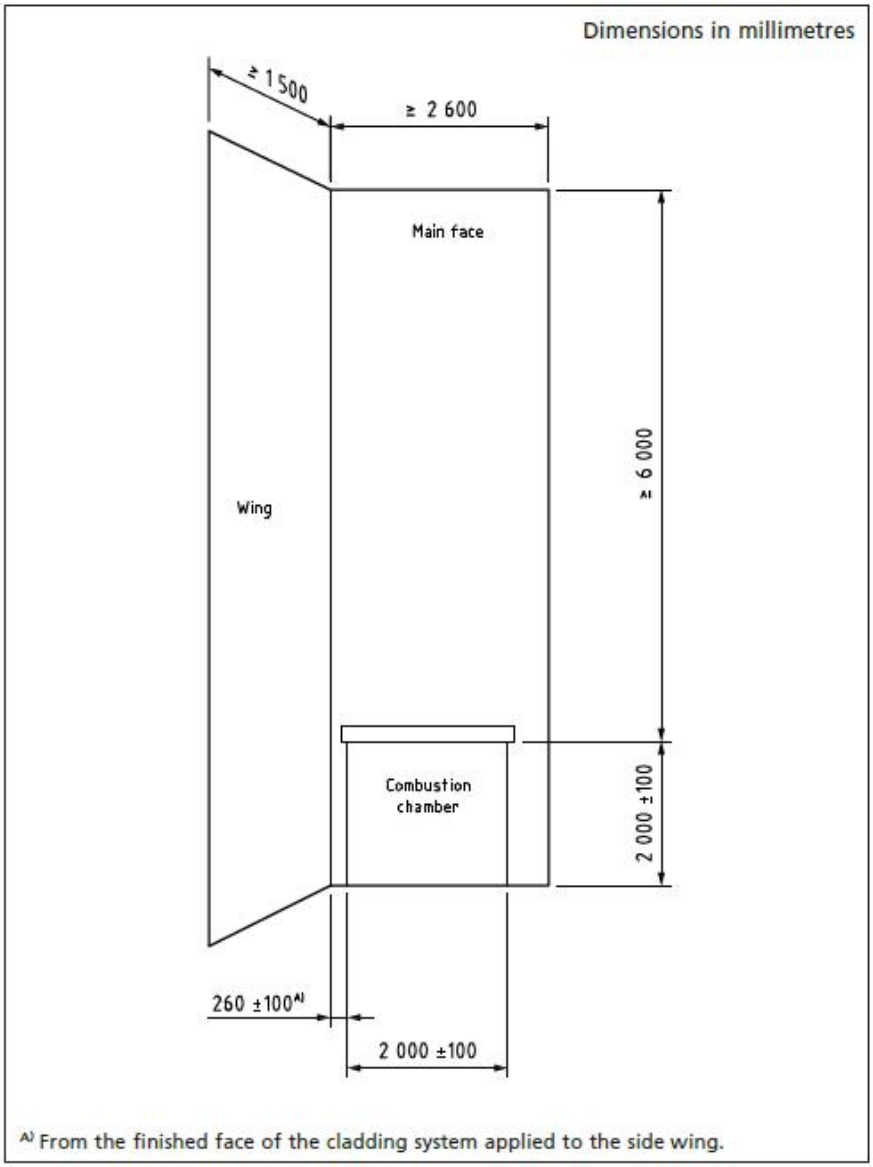

Figure 1. Test apparatus dimensions as specified by test Standard[1].

Note: The test apparatus may be constructed left- or right-handed.

10.2 Diagrams of finished face of the cladding system

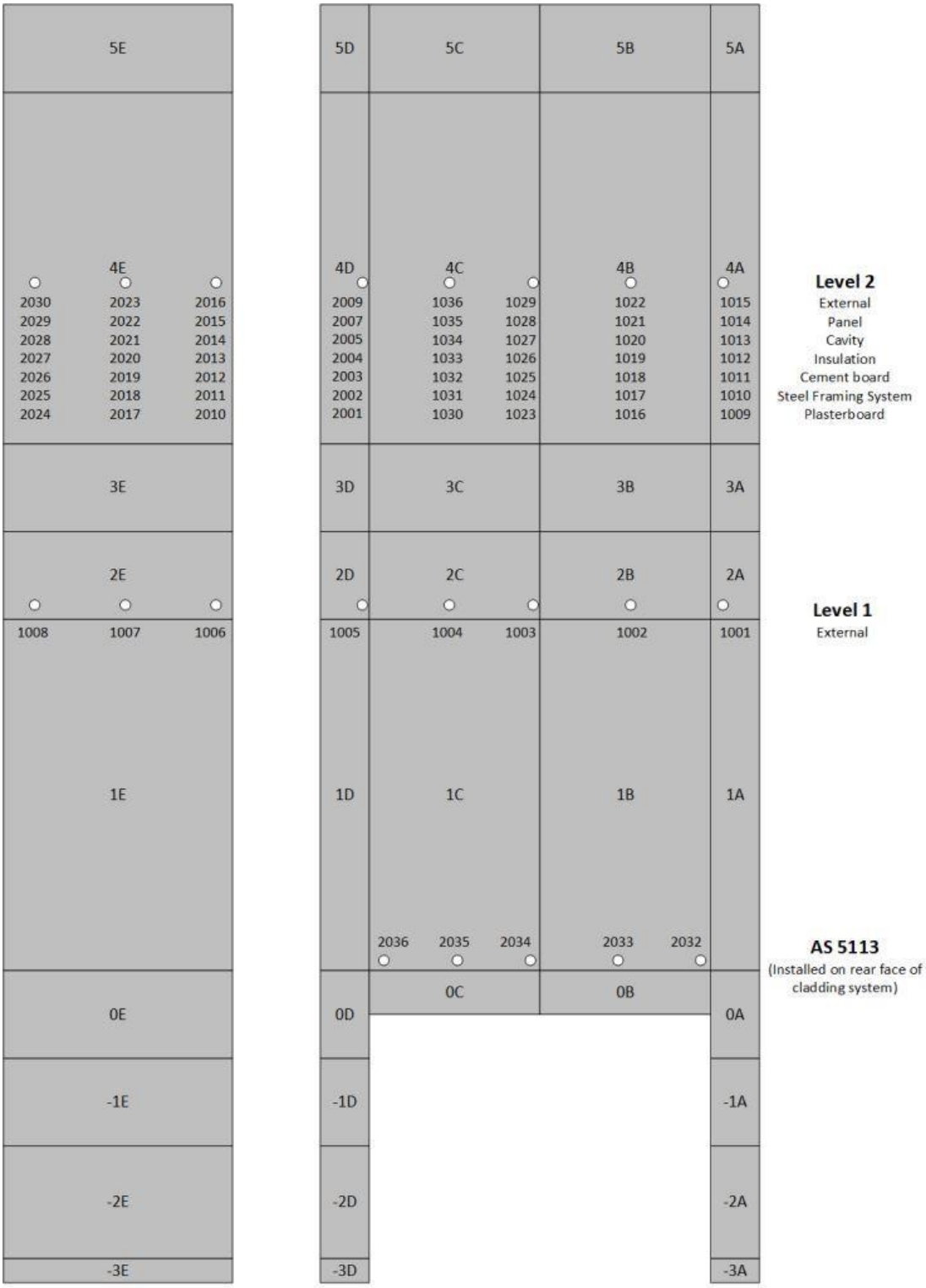

Figure 2. Layout of panels, TC positions and panel numbering (-3A – 5E). Not to scale.

10.3 Installation photographs

Figure 3. Installation of SFS and plasterboard.

Figure 4. Sealant between SFS and combustion chamber blockwork joint.

Figure 5. Installation of cement bonded particle board.

Figure 6. Installation of ‘L’-shaped brackets.

Figure 7. Installation of combustion chamber surround pod.

Figure 8. Double (left & top)/triple (right) layer of cement board around combustion chamber opening.

Figure 9. Installation of vertical and horizontal cavity barriers and aluminium brackets.

Figure 10. Installation of insulation.

Figure 11. Installation of ‘L’ and ‘T’-shaped rails.

Figure 12. Additions to combustion chamber surround pod.

Figure 13. Additions to combustion chamber surround pod base.

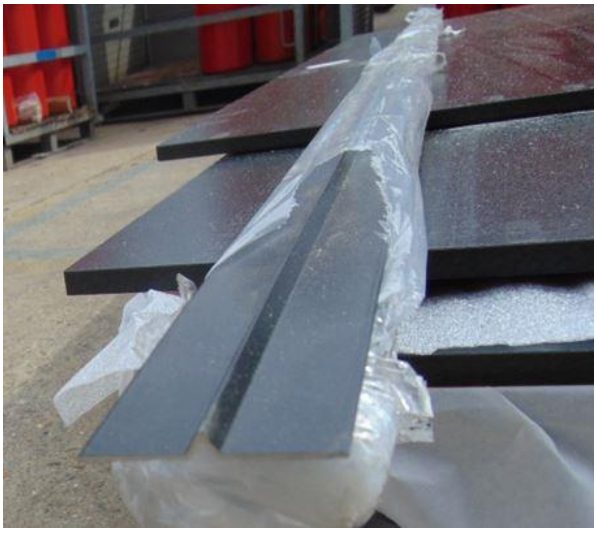

Figure 14. Horizontal panel joint flashing.

Figure 15. Profiled capping.

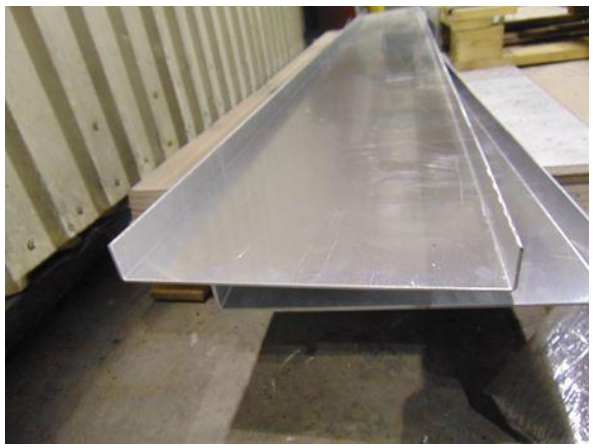

Figure 16. ‘U’-shaped overclad capping.

Figure 17. Completed installation prior to test.

10.4 System drawings

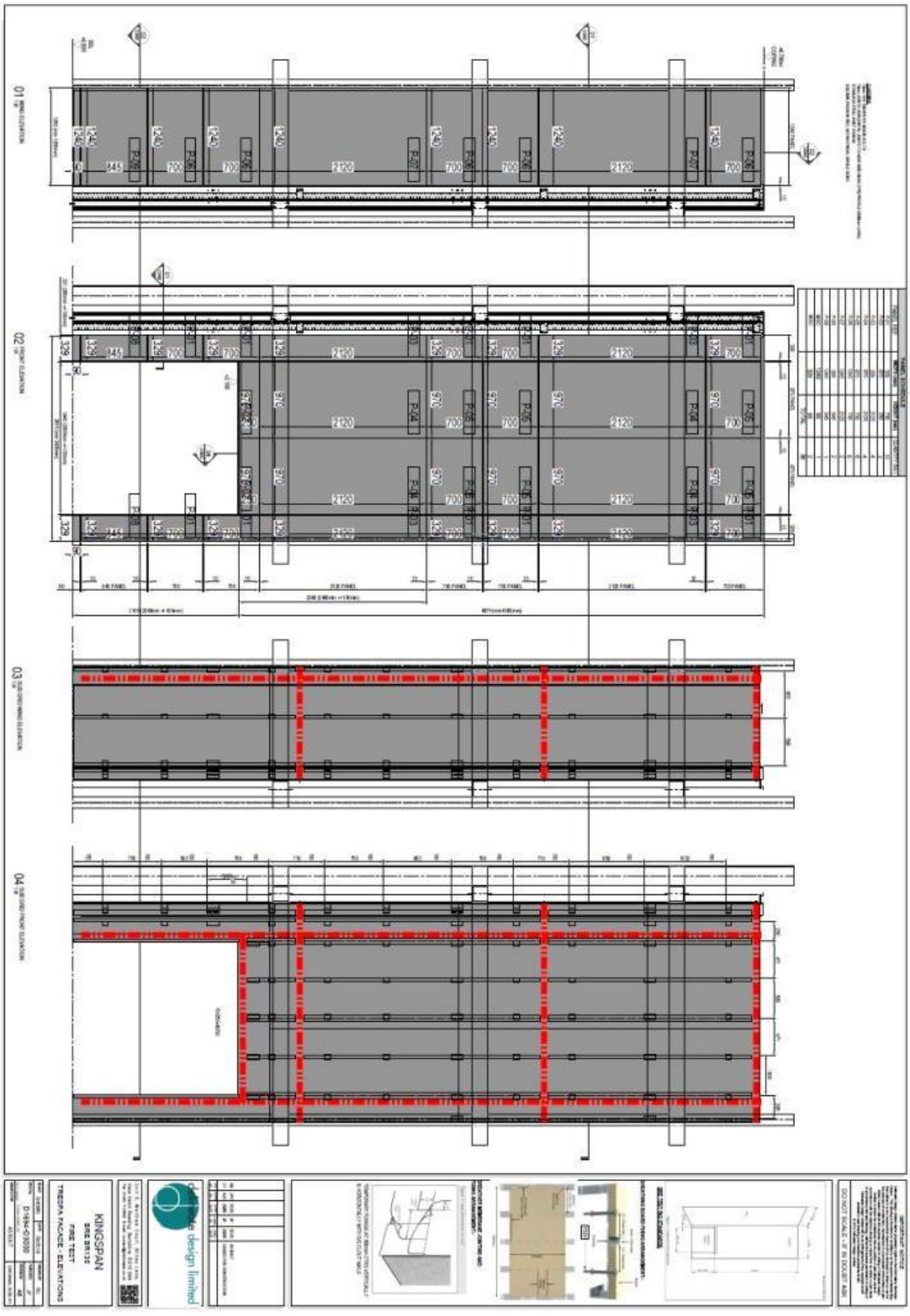

Figure 18. System layout (supplied by Test Sponsor).

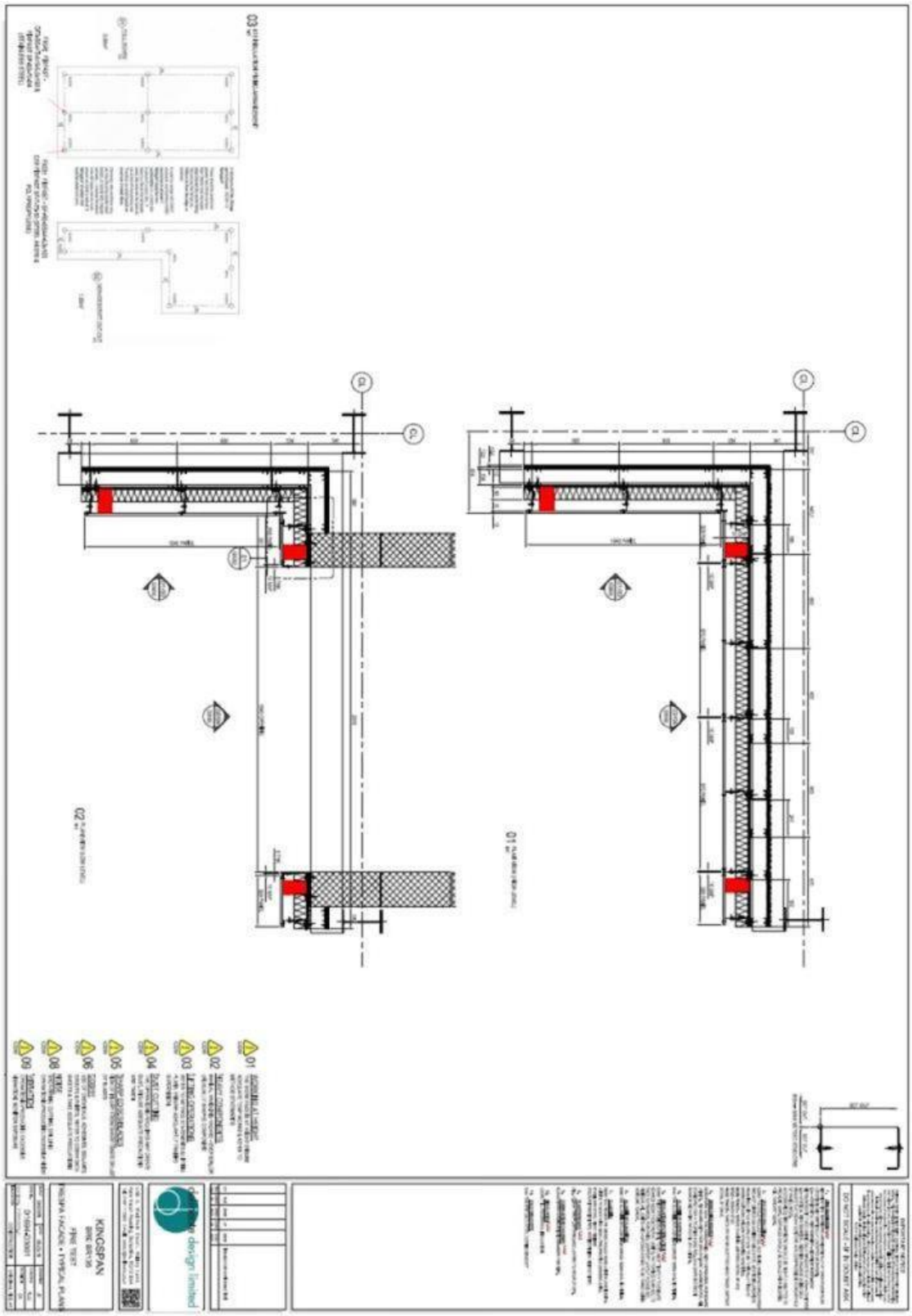

Figure 19. Top view of system (supplied by Test Sponsor).

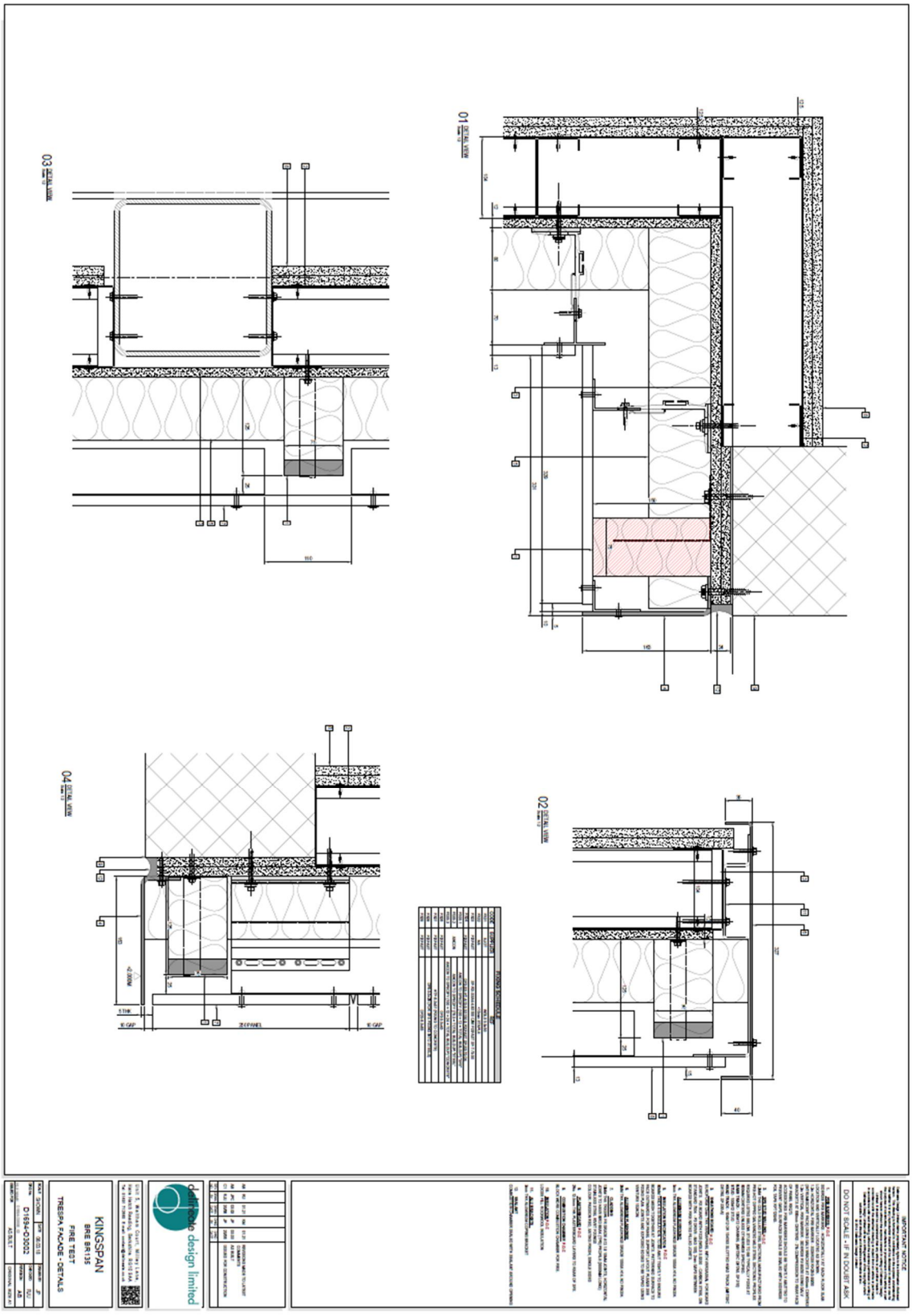

Figure 20. Close up of sections (supplied by Test Sponsor).

10.5 Temperature data

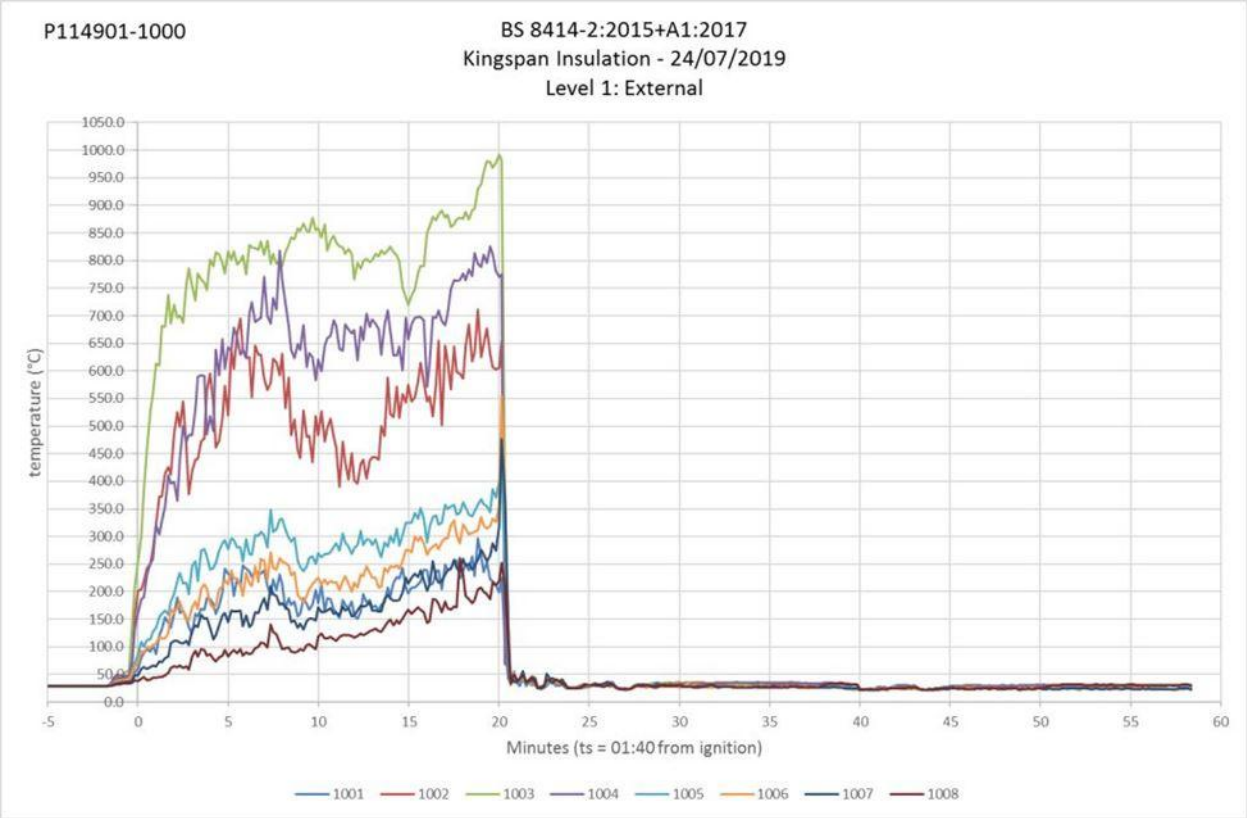

Figure 21. Level 1 external thermocouples.

Note: Test terminated at (t_s+20:20).

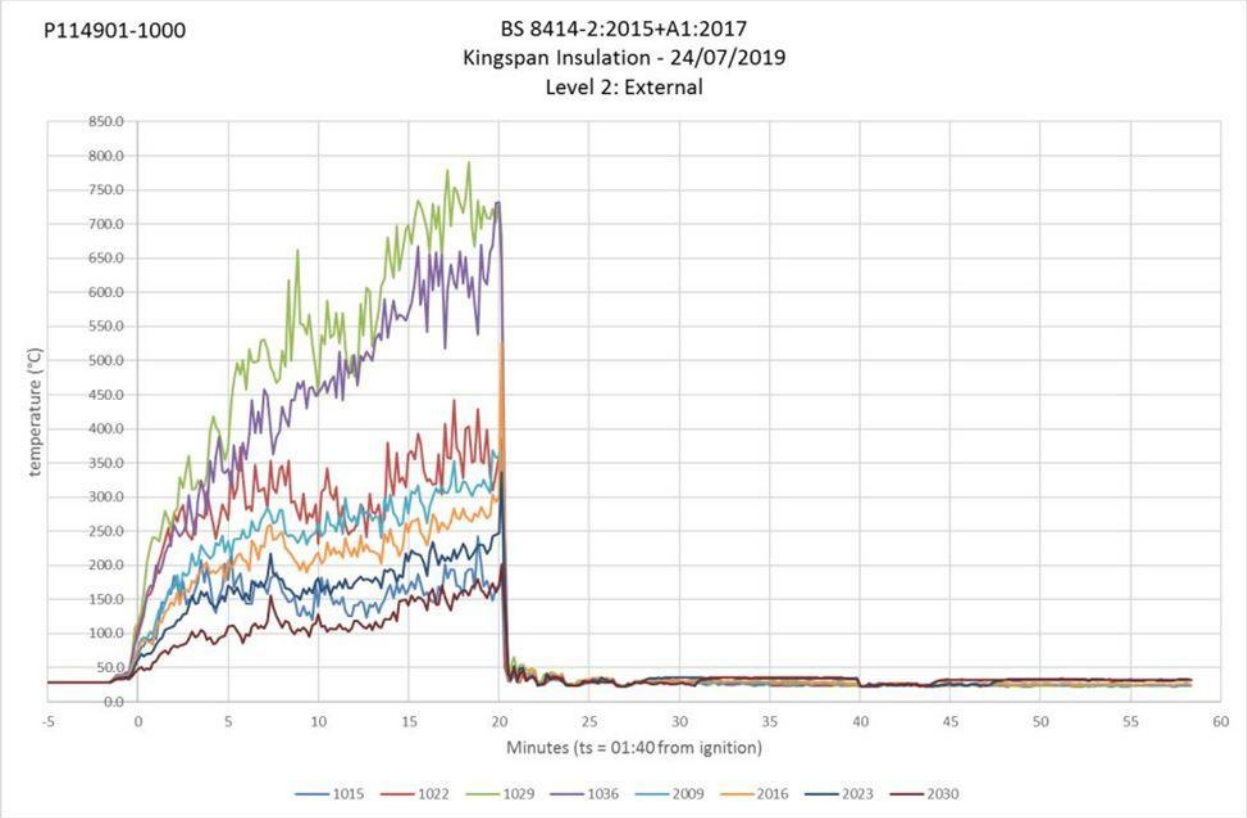

Figure 22. Level 2 external thermocouples.

Note: Test terminated at (t_s+20:20).

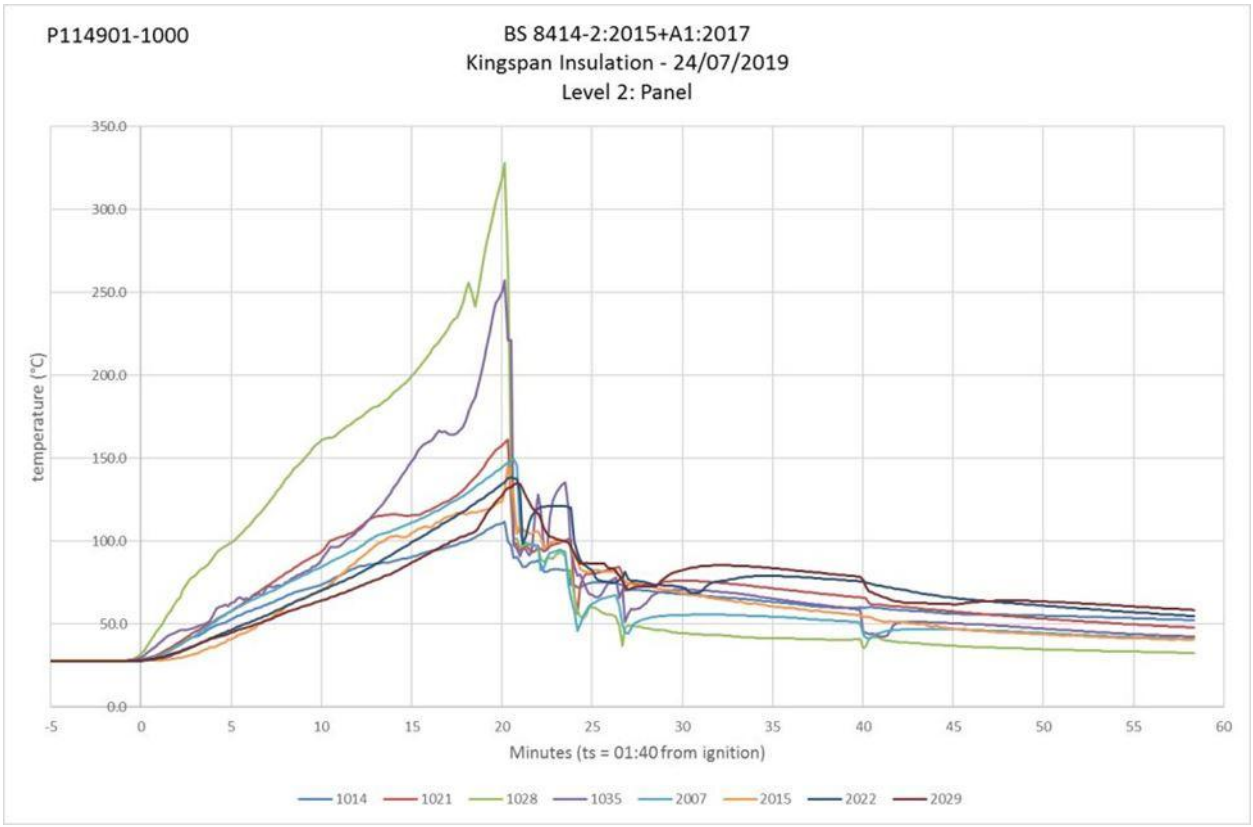

Figure 23. Level 2 panel layer thermocouples.

Note: Test terminated at (t_s+20:20).

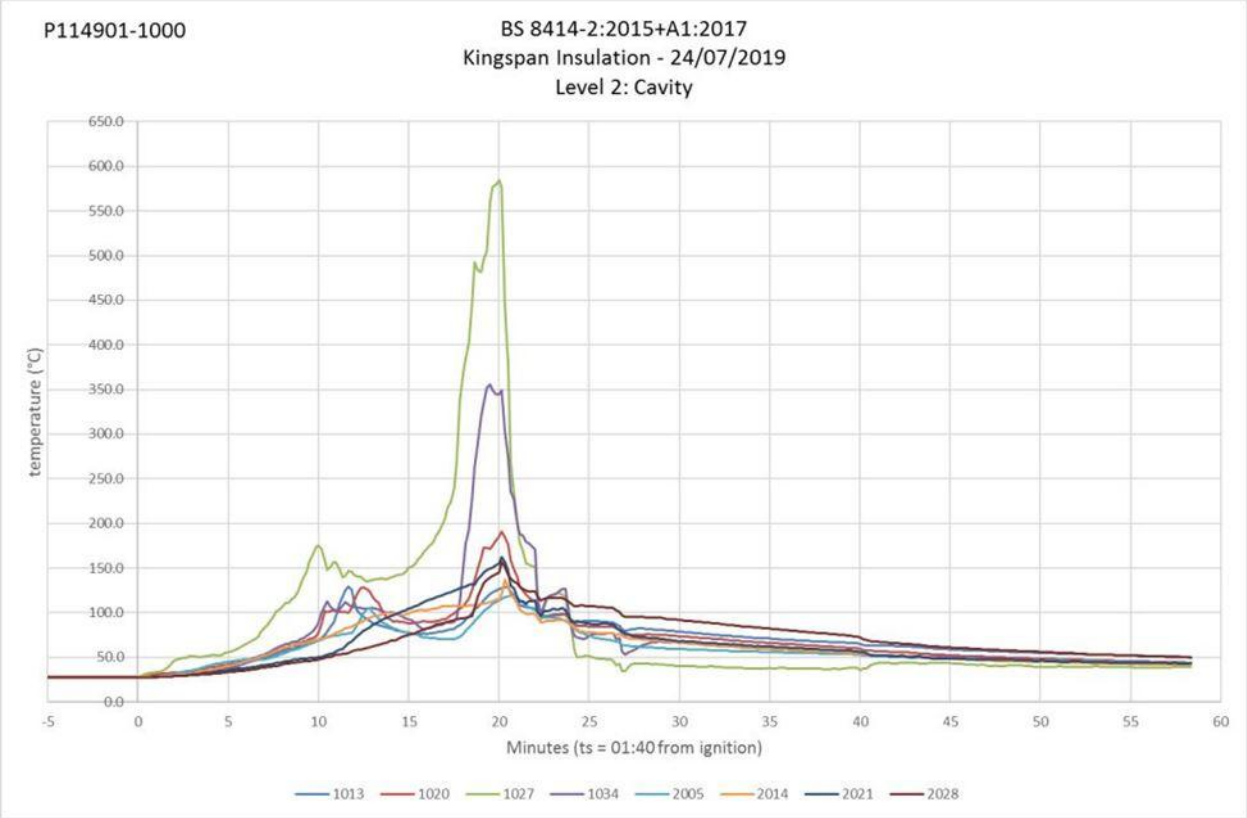

Figure 24. Level 2 cavity layer thermocouples.

Note: Test terminated at (t_s+20:20).

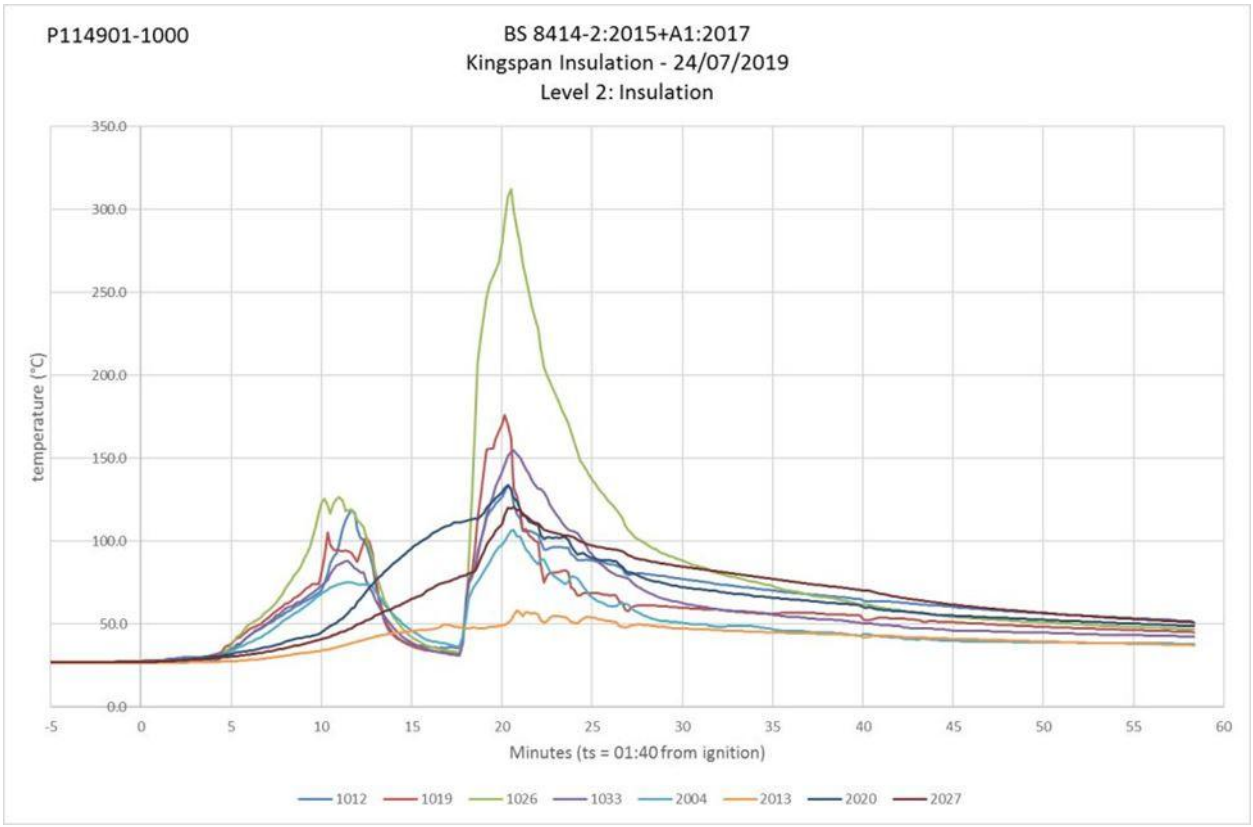

Figure 25. Level 2 insulation layer thermocouples.

Note: Test terminated at (t_s+20:20).

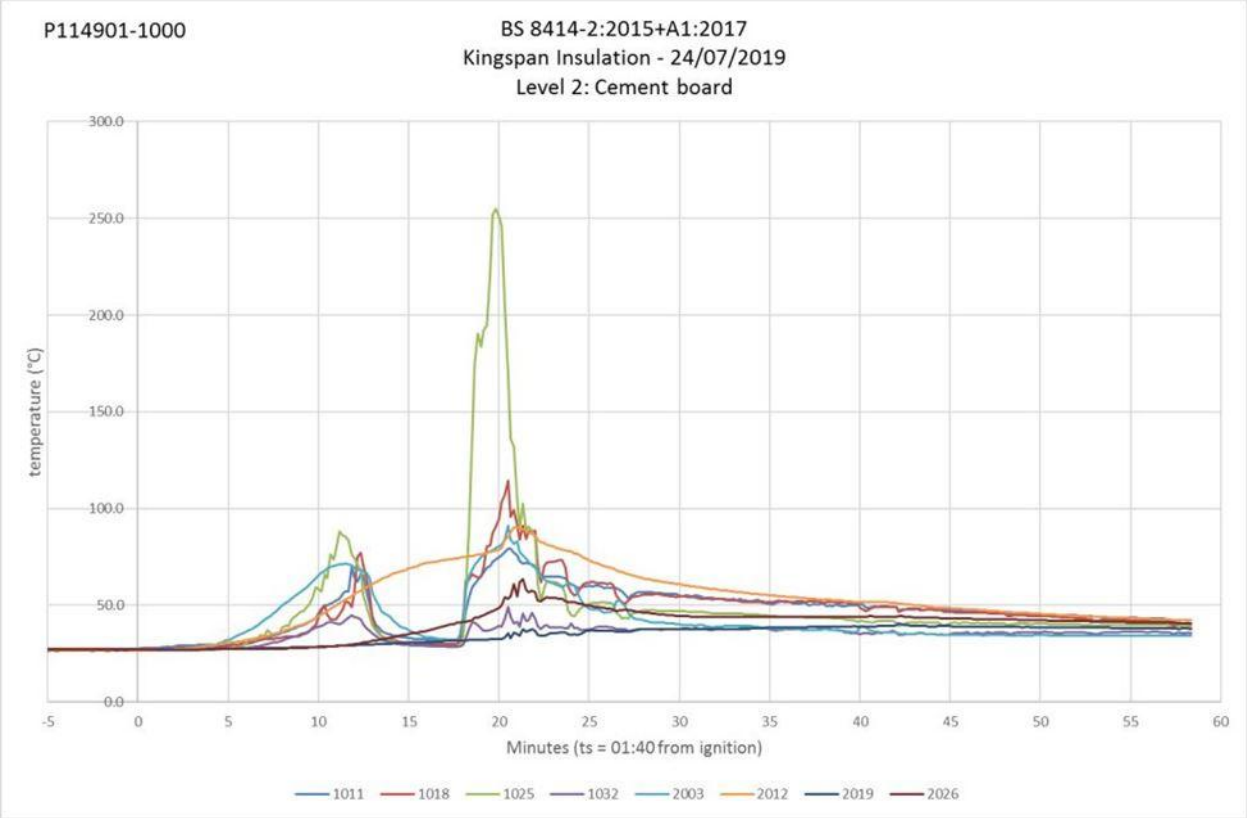

Figure 26. Level 2 cement board layer thermocouples.

Note: Test terminated at (t_s+20:20).

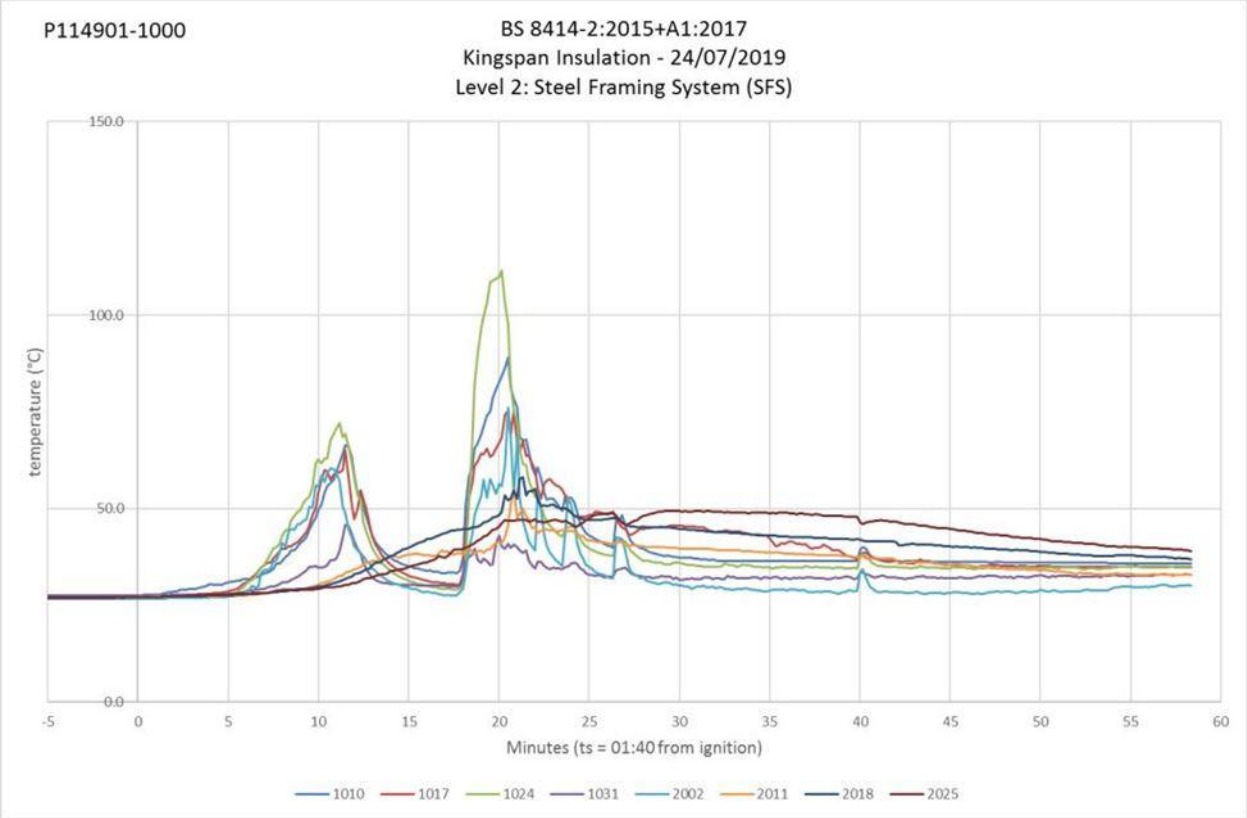

Figure 27. Level 2 steel framing system layer thermocouples.

Note: Test terminated at (t_s+20:20).

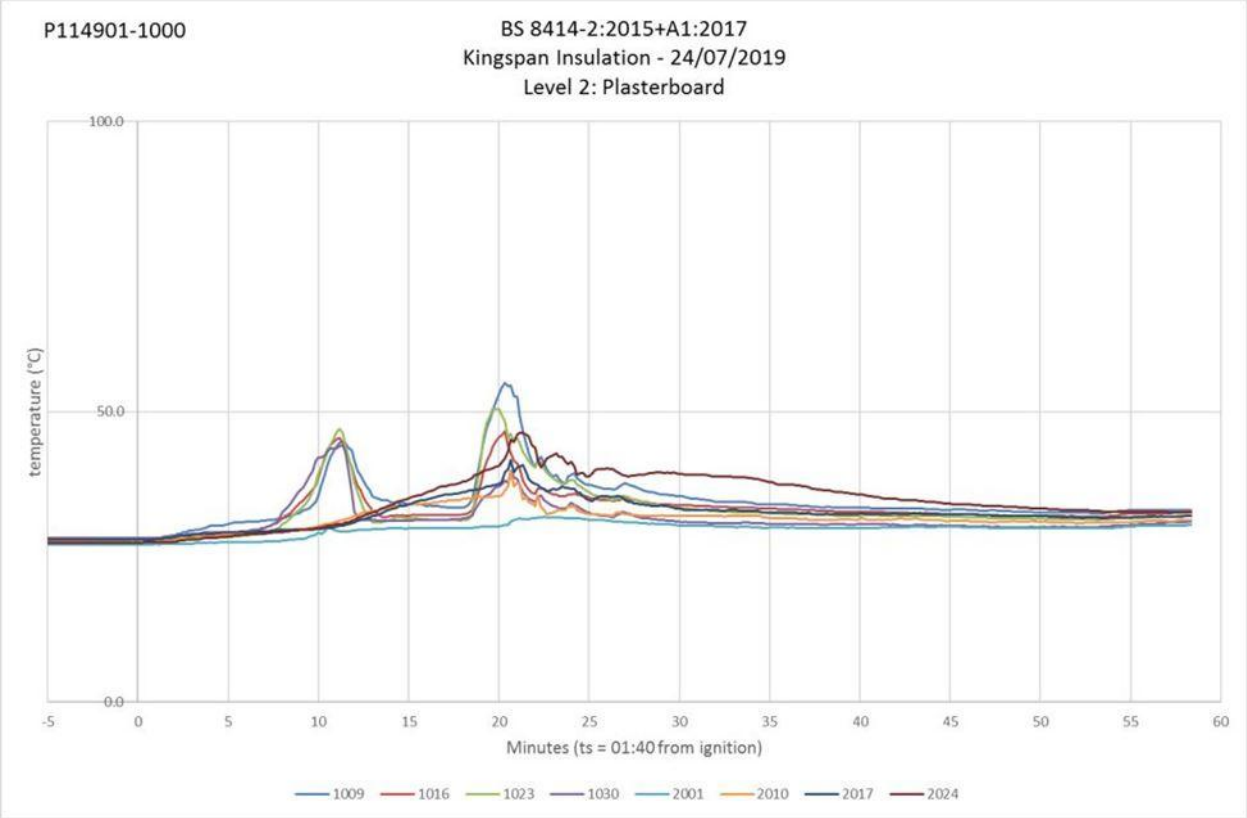

Figure 28. Level 2 plasterboard layer thermocouples.

Note: Test terminated at (t_s+20:20).

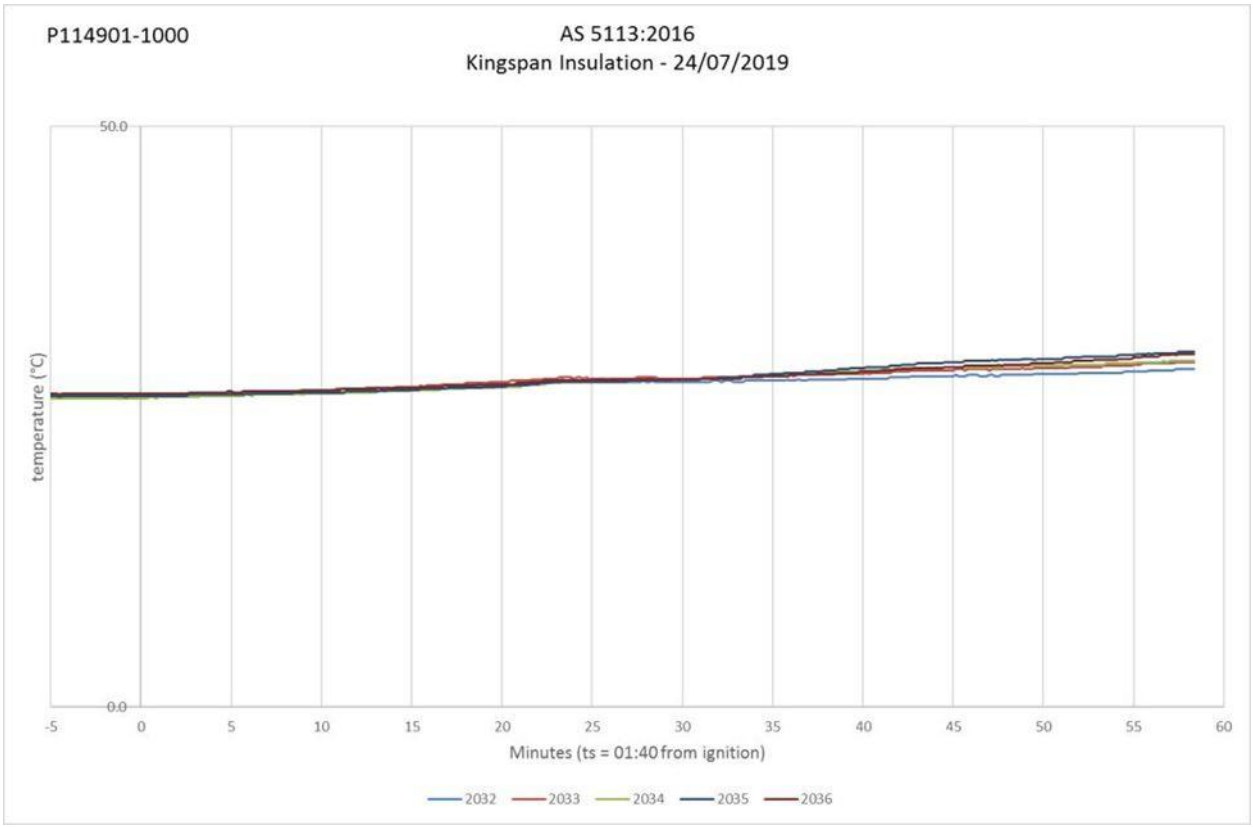

Figure 29. AS5113 thermocouples.

Note: Test terminated at (t_s+20:20).

10.6 Post-test photographs

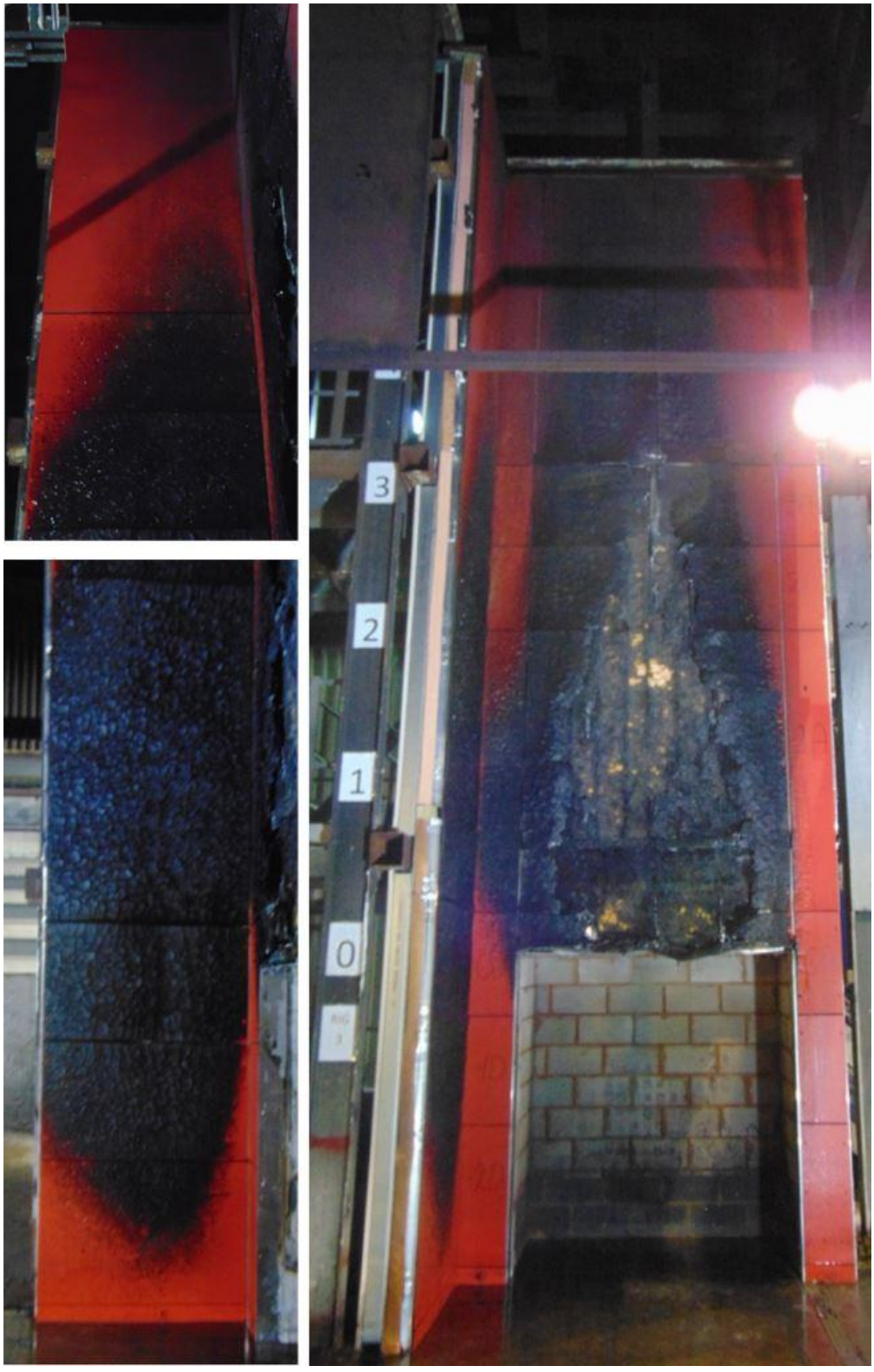

Figure 30. Full-height photograph of cladding system immediately after test.

Figure 31. Underside of capping from the top of system.

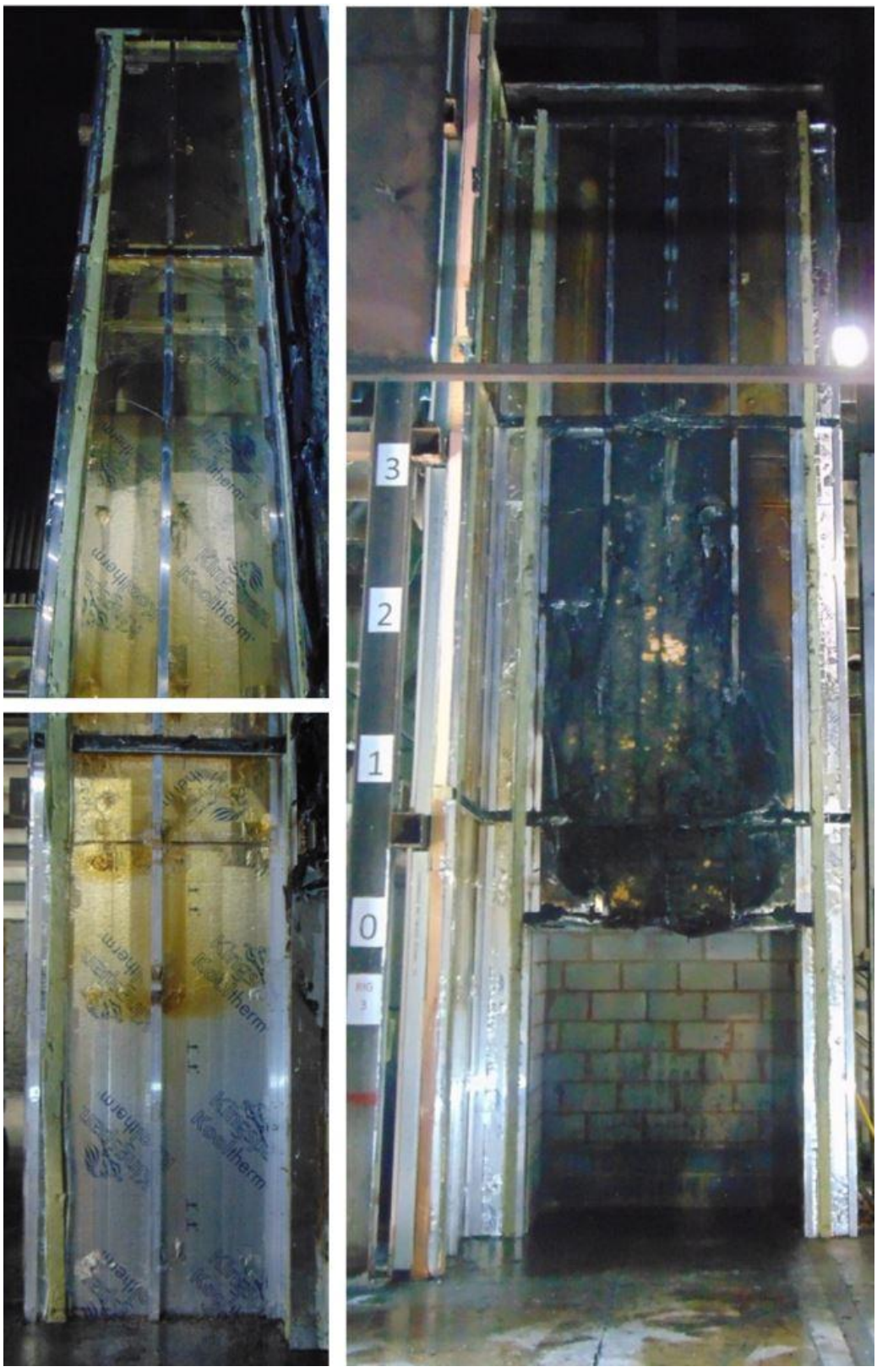

Figure 32. Post-test photograph following removal of panels.

Figure 33. Post-test photograph following removal of rails.

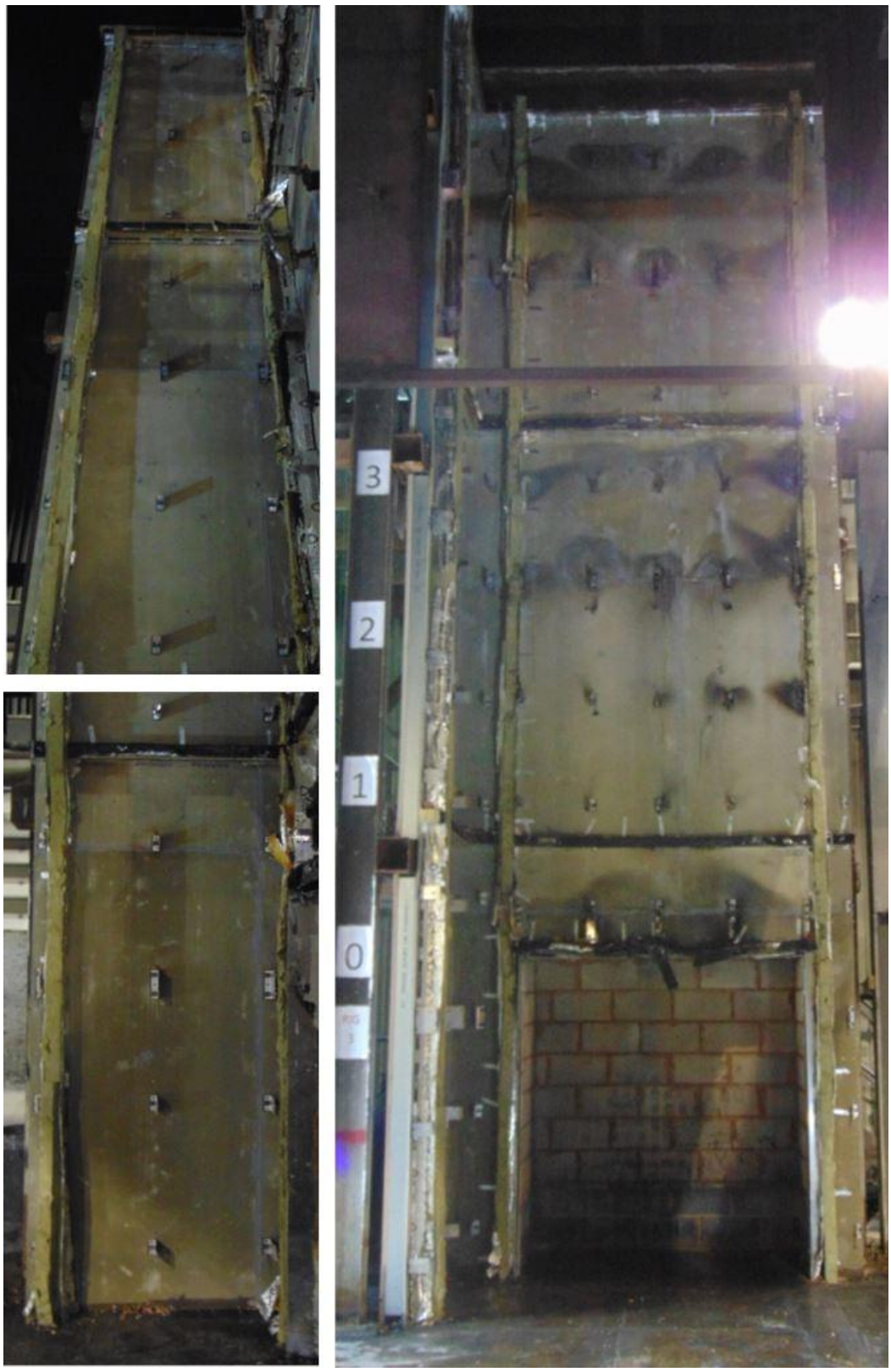

Figure 34. Post-test photograph of the horizontal and vertical cavity barriers.

Figure 35. Post-test photograph of ‘L’-brackets.

Figure 36. Post-test photograph of the cement board.

Figure 37. Post-test photograph following removal of cement board.

Figure 38. Post-test photograph of the SFS.

Report Ends