5772

Technical Report – R4789929447
CWCT – Standard for systemised building envelopes – 2005

BTS Facades & Fabrications Limited

Vantage® IP (Interlocking Plank) Rainscreen System Test

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Contents

1. Introduction

This report describes tests carried in order to determine the weather tightness of the sample with respect to water penetration, wind and impact resistance on sample supplied as follow:

Test Details	
Customer:	BTS Facades & Fabrications Limited Unit 7, Woodham Road Aycliffe Business Park Newton Aycliffe DL5 6HT
Product Tested:	Vantage® IP – Rainscreen System Test
Date of Test:	28th April 2023 9th, 15th, 16th and 17th May 2023 6th and 9th June 2023
Test Conducted at:	UL International (UK) Limited Halesfield 2 Telford Shropshire TF7 4QH
Test Conducted by:	P Seymour *Laboratory Technician* J Dove *Senior Laboratory Assistant* C Niven *Laboratory Assistant* K Alden *Senior Engineering Technician* D Price *Senior Engineering Associate*
Test Supervised by:	M Witkowska *Laboratory Manager*
Test Witnessed by:	R Spreadbury A & R Cladding M Wiper BTS Facades & Fabrications Limited F Negrea BTS Facades & Fabrications Limited

Report Authorisation	
Report Compiled by:	R Cooper *Project Handler*
Authorised by:	M Wass *Business Manager*

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This report and the results shown within are based upon the information, drawings, samples and tests referred to in the report. The results obtained only apply to the sample tested and do not necessarily relate to samples from the production line of the above-named company and in no way constitute any form of representation or warranty as to the performance or quality of any products supplied or to be supplied by them. UL International (UK) Limited or its employees accept no liability for any damages, charges, cost or expenses in respect of or in relation to any damage to any property or other loss whatsoever arising either directly or indirectly from the use of the report.

2. Summary of Results

2.1 The test methods

The performance of the sample tested has been assessed against the criteria described in below standards.

CWCT Standard Test Methods for Building Envelopes - December 2005	
Water Penetration – Static	CWCT Section 6
Water Penetration – Dynamic Aero Engine	CWCT Section 7
Water Penetration – Hose	CWCT Section 9
Wind Resistance – Serviceability	CWCT Section 11
Wind Resistance – Safety	CWCT Section 12
Impact – Retention to Performance & Safety to Persons	CWCT TN 76

2.2 Decision Rule

Classifications reported in Section 5 indicate that the product conforms with the relevant accuracy requirements of the testing standards (as summarised below) and the expanded measurement uncertainty (k= 2 for approximately 95% coverage probability) is no greater in magnitude than the accuracy requirements defined in Section 2 of CWCT Standard Test methods for Building Envelopes.

2.3 Measurement Uncertainty

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%, and for the air leakage measurements and wind resistance measurements is +/- 1.69 %, for the mass of the dislodge fragments is +/- 0.02 % and for the size of the dislodge fragments is +/- 0.05 %.

2.4 Summary of Results

The following summarises the results of testing carried out, in accordance with the relevant testing and classification standards.

Test Type	Peak Test Pressure	Result	Date of Test	Classification
Test 1 – Water Penetration (Static Pressure)	600 Pa	Pass	28.04.23	R7
Test 2 - Wind Resistance – Serviceability – Backing Wall	2400 Pa	Pass	09.05.23	-
Test 3 – Repeat Water Penetration (Static Pressure)	600 Pa	Pass	09.05.23	R7
Test 4 – Water Penetration – Dynamic Aero Engine	600 Pa	Pass	15.05.23	-
Test 5 - Water Penetration – Hose	-	Pass	16.05.23	-
Test 6 - Wind Resistance – Serviceability – Cavity	2400 Pa	Pass	17.05.23	-
Test 7 - Wind Resistance – Safety – Backing Wall	3600 Pa	Pass	06.06.23	-
Test 8 - Wind Resistance – Safety – Cavity	3600 Pa	Pass	06.06.23	-
Test 9 - Impact Resistance – Retention of Performance	Cat B	Class 2	09.06.23	-
Test 10 - Impact Resistance – Safety to Persons	Cat B	Negligible Risk	09.06.23	-
Dismantle, Inspect & Report	**Sample Passed**			

More comprehensive details are reported in Section 6.

These results are valid only for the conditions under which the test was conducted.

Note: The backing wall included in the test sample was to facilitate testing of the rainscreen sample only and did not form part of the tested system.

All measurement devices, instruments and other relevant equipment were calibrated and traceable to National Standards.

3. Description of Test Sample

The description of the test sample in this section has been supplied by the customer and has not been verified by UL International (UK) Limited.

See Section 7 for test sample drawings as supplied by BTS Facades & Fabrications Limited.

Product Description

Full product name:	Vantage® IP (Interlocking Plank)
Product type:	Drained and back ventilated rainscreen
Product description:	Interlocking plank, secret fix rainscreen panel system
Manufactured by:	BTS Fabrications Limited

Support Framing and bracketry (upper floor) - NV1 system, vertical

Material:	EN AW 6005 T6
Finish:	Mill Finish
Vertical rail ref:	100x60x2.2mm T-rail
Horizontal support ref:	EN AW 3103 H14 : Bespoke aluminium bracket carrier
Fixing method (Horiz. support strap to backing wall):	SX5-S16-5.5x41
Bracket to support strap fixing ref:	SX3-S16-6x38+A4 (general areas) SX5-S16-5.5x61+A2 (at SFS stud locations)
Bracket to rail fixings:	Double Bracket - 4 fixings dead fix Single bracket - 2 fixings sliding fix
Bracket to rail fixing ref:	SDA5/3.5-8-H13-S4-5.5x22
Max Span between vertical rails:	690mm
Max Span between horizontal rails:	775mm
Brackets ref:	NVELOPE VB270S & VB270D helping hand bracket & isolator pad
Construction tolerance allowed between fixings, rails and brackets (+/-)	25mm

Support Framing and bracketry (lower floor) – NH3 system, horizontal

Material:	EN AW 6005 T6
Finish:	Mill Finish
Horizontal support ref:	EN AW 3103 H14 : Bespoke aluminium bracket carrier
Fixing method (Horiz. support strap to backing wall):	SX5-S16-5.5x41
Bracket to support strap fixing ref:	SX3-S16-6x38+A4 (general areas) SX5-S16-5.5x61+A2 (at SFS stud locations)
Bracket to rail fixings:	NH3-270 Bracket - 1 fixing dead fix NH3-270 Bracket - 1 fixing sliding fix
Horizontal rail ref:	60x40x2.2mm L-rail
Bracket to rail fixing ref:	SDA5/3.5-8-H13-S4-5.5x22
Max Span between vertical rails:	690mm
Max Span between horizontal rails:	675mm
Brackets ref:	NH3-270
Construction tolerance allowed between fixings, rails and brackets (+/-)	25mm

Panels/tiles/brickslip

Material:	3mm Aluminium sheet
Material ref (source, spec):	EN AW 1050a H14 (3mm thick)
Finish:	PPC Coated

Thickness:	3mm
Reinforcing:	Bespoke panel stiffener
Max height of panel:	3780mm
Max width of panel:	3950mm
Max size of panel by area (m2):	5.214m2
Fixing method:	Panel fixed directly to each under lying T or L rail
Bracket/clip ref:	N/A
Screws/fixings ref:	SX5/12-D12-5.5x35+A4+COLOUR

Interface Details (curtain wall to window/door inserts)

Window interface detail:	Senior Architectural PURe 1200x1200mm
Door interface detail:	N/A

Backing Wall

Structural support type:	SFS (200x65x1.6 - S390)
Insulation type:	Not included in test
Insulation thickness:	Not included in test
Airtight membrane:	Not included in test
Watertight membrane:	Dupont Tyvek Firecurb
Particle board detail:	Siniat Weather Defence 12.5mm
Sealants and tapes:	GTEC fire rated sealant Tyvek single sided acrylic tape Tyvek Flex wrap Ilbrook ME501 Ilbrook ME315 Ilbrook ME508
Fixings ref:	GTEC wet area (sheathing board to SFS) HILTI-S-MD03ZW 5.5x25 (SFS to SFS)
Construction tolerance allowed between SFS (+/-)	-5% / +1%

Drainage

Drainage type (pressure equalised etc.):	Drained and back ventilated
Drainage specification and weep holes etc.	Drainage slots in reverse of panels

Additional brackets & Fixings

Ref:	SX14-S16-5.5x40 (SFS to test rig)

Drawings

Drawing/s must be provides covering the below; -Full drawing of sample including front elevation -Cross Sections (Panels/Rails Etc.) -Hardware Locations -Fixings -Drainage Points Note: drawings are required to show all relevant dimensions.	Test Chamber Installation Drawings BTS-CWCT-IP-INST-P01 – P08b (Attached under separate cover) Panel Fabrications Drawings BTS-CWCT-IP-PFD-P01 - P26 (Attached under separate cover)
Test sample size:	6600mm x 8300mm

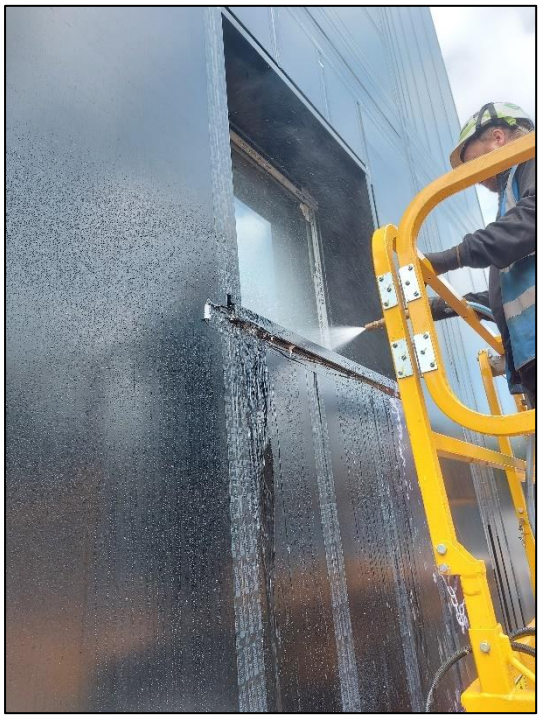
Confirmation

Customer is to confirm that the samples provided for testing are representative of standard production. Please note: the details given above, as well as the drawings supplied by the customer as confirmed as typical of normal production are not verified by UL International (UK) Limited.	
Company:	BTS Fabrications Limited
Name:	Mark Wiper
Position:	Associate Technical Director
Date:	24th July 2023

Sample during testing

Photograph No. 1 – Dynamic Aero Engine

Photograph No. 2 – Hose test



4. Test Arrangement

4.1 Test Chamber

A specimen, supplied for testing in accordance with CWCT requirements, was mounted on to a rigid test chamber constructed from steel, timber and plywood sheeting.

The pressure within the chamber was controlled by means of a centrifugal fan and a system of ducting and valves. The static pressure difference between the outside and inside of the chamber was measured by means of a differential pressure transmitter.

4.2 Instrumentation

4.2.1 Static Pressure

A differential pressure transmitter capable of measuring rapid changes in pressure to an accuracy within 2%, was used to measure the pressure differential across the sample.

4.2.2 Water Flow

An in-line flowmeter, mounted in the spray frame water supply system, was used to measure water flow to the test sample to an accuracy of ± 5%.

4.2.3 Deflection

Digital linear measurement devices with an accuracy of +/- 0.1 mm were used to measure deflection of principle framing members.

4.2.4 Temperature & Humidity

A digital data logger capable of measuring temperature with an accuracy of ± 1°C and humidity with an accuracy of ± 5 %Rh was used.

4.2.5 Barometric Pressure

A digital barometer capable of measuring barometric pressure with an accuracy of ± 1 kPa was used.

4.2.6 General

Electronic instrument measurements were scanned by a computer-controlled data logger, which processed and recorded the results.

4.3 Pressure Generation

4.3.1 Static Air Pressure

The air supply system comprised of a centrifugal fan assembly and associated ducting and control valves and was used to create both positive and negative static pressure differentials. The fan provided a constant airflow at the required pressure and period required for the tests.

Note: *References are made to both positive and negative pressures in this document, it should be noted that in these instances, positive pressure is when pressure on the weather face of the sample is greater than that on the inside face and vice versa.*

4.3.2 Dynamic Aero Engine

A wind generator was mounted adjacent to the external face of the test sample and used to create positive pressure differential during dynamic testing.

4.4 Water Spray System

4.4.1 Spray frame arrangement

A water spray system was used which comprised of nozzles spaced on a uniform grid, not more than 700 mm apart and mounted approximately 400 mm from the face of the sample. The nozzles provided a full cone pattern, as per the requirements outlined by CWCT. The system delivered water uniformly to the entire surface of the test sample at a rate of not less than 3.4 lt/m^2/min.

4.4.2 Hose arrangement

The water was applied using a brass nozzle which produced a solid cone of water droplets with a nominal spread of 30˚. The nozzle was provided with a control valve and a pressure gauge between the valve and the nozzle. The water flow to the nozzle was adjusted to produce 22 $\pm$ 2 litre/min when the water pressure at the nozzle inlet was 220 $\pm$ 20kPa

4.5 Impactors

4.5.1 Soft (S1) Body Impactor

A spherical/conical, glass bead filled impactor with a mass of 50 Kg, as required in CWCT TN76

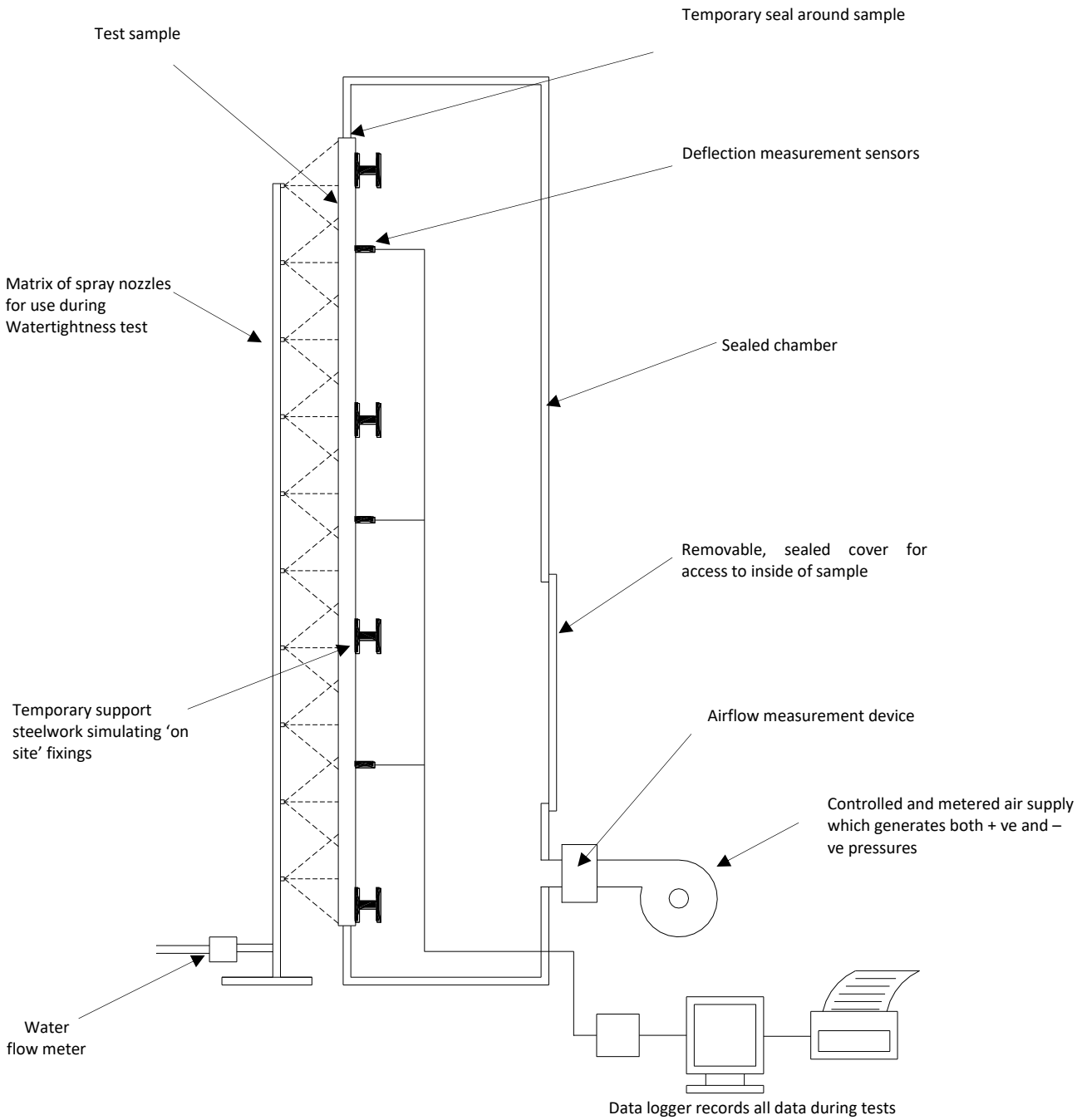
4.5.2 Hard (H2) Body Impactor

A steel ball with a diameter of 62.5 mm and a mass of 1.135 Kg, was released from the height, calculated to result in the required impact energies and allowed to fall under gravity until it impacted the designated test zone of the sample.

All measurement devices, instruments and other relevant equipment were calibrated and are traceable to National Standards.

Figure 1 – Test arrangement

General Arrangement of a Typical Test Assembly



5. Test Procedures

5.1 Sequence of Testing

Test 1 - Water Penetration (Static Pressure)
Test 2 - Wind Resistance – Serviceability – Backing Wall
Test 3 - Repeat Static Water (Static Pressure)
Test 4 - Water Penetration – Dynamic Aero Engine
Test 5 - Water Penetration – Hose
Test 6 - Wind Resistance – Serviceability – Cavity
Test 7 - Wind Resistance – Safety – Backing Wall
Test 8 - Wind Resistance – Safety – Cavity
Test 9 - Impact Resistance – Retention of Performance
Test 10 - Impact Resistance – Safety to Persons

5.2 Watertightness – Static Pressure

Three (3) preparatory pulses of 1200 Pa (50% of design wind load) positive pressure were applied to the test sample.

Water was sprayed on to the sample as described in section 4.4.1 for 15 minutes at zero (0) Pa. The water spray continued, and the pressure was increased in the following positive increments; 50, 100, 150, 200, 300, 450 and 600 Pa, each stage being held for 5 minutes.

The interior face of the sample was continuously monitored for water ingress throughout the test.

5.2.1 Water Penetration – Dynamic Aero Engine

Water was sprayed on to the sample as described in section 4.4.1.

The sample was subjected to airflow from the wind generator, as described in 4.3.2, which achieved average deflections equal to those produced at a static pressure differential of 600 Pa and these conditions were met for the specified 15 minutes.

The interior face of the sample was continuously monitored for water ingress throughout the test.

5.2.2 Water Penetration – Hose

Working from the exterior, the window pod interface detail between the window and SFS backing wall was wetted from the bottom up, progressing from the lowest horizontal joint then the intersecting vertical joints.

Water was applied to the sample for 5 mins per 1.5 m length of joint, as described in section 4.4.2.

Throughout the water penetration testing, and for 30 minutes following the cessation of spraying, the internal face of the sample was examined for water penetration. The emergence of any water on the inside face would be recorded, and the location and extent of any leakage noted on a drawing of the test specimen.

5.3 Wind Resistance

5.3.1 Wind Resistance - Serviceability

Three (3) preparatory pulses of 1200 Pa (50% of design wind load) positive pressure were applied to the test sample. Upon returning to 0 Pa, any opening parts of the test specimen were opened and closed five (5) times, secured in the closed position. All deflection sensors were then zeroed.

The sample was then subjected to positive pressure stages of 600, 1200, 1800 and 2400 Pa (25%, 50%, 75% and 100% of design wind load) and held at each step for 15 seconds (± 5 secs).

The deformation status of the sample was recorded at each step at characteristic points as stated in the standard, following which the pressure was reduced to 0 Pa and any residual deformations recorded within 1 hour of the test.

The above test sequence was then repeated, including preparation pulses, at a negative pressure differential.

Following each of the above tests, the sample was inspected for permanent deformation or damage.

5.3.2 Wind Resistance - Safety

Three preparatory positive air pressure pulses of 1200 Pa (50% of design wind load) positive pressure were applied to the test sample, and the deflection sensors were zeroed.

The sample was subjected to a positive pressure pulse of 3600 Pa (2400 Pa x 150%). The pressure was applied as rapidly as possible but in not less than 1 second and was maintained for 15 seconds (± 5 secs).

Following this pressure pulse and upon returning to zero (0) pressure, residual deformations were recorded and any change in the condition of the specimen was noted.

After the above sequence, a visual inspection was conducted, any moving parts were operated and any damage or functional defects noted.

The above test sequence was then repeated, including preparation pulses, at a negative pressure differential. The deflection sensors were zeroed following the preparation pulses.

Following each of the above tests, the sample was inspected for any permanent deformation or damage.

5.4 Impact Resistance

5.4.1 Impact Test Procedure – Retention of Performance – CWCT TN 76

The test sample was tested using a drop height which corresponded with the required performance level.

The Impactors, as described in section 4.5.1 and 4.5.2, were suspended on a wire/Nylon cord and allowed to swing freely, without initial velocity, in a pendulum motion until they hit the sample normal to its face. Only one impact was performed at any single position during the hard body impacting and three times at each position during the soft body impacting.

Tests were conducted at the required impact energies as shown in section 6.3.1 and 6.3.2 to the selected impact points. Drop heights were set to an accuracy of ± 10 mm.

5.4.2 Impact Test Procedure – Safety to Persons – CWCT TN 76

The test sample was tested using a drop height which corresponded with the required performance level.

The Impactors, as described in section 4.5.1 and 4.5.2 were suspended on a wire/Nylon cord and allowed to swing freely, without initial velocity, in a pendulum motion until they hit the sample normal to its face. Only one impact was performed at any single position.

Tests were conducted at the required impact energies as shown in section 6.3.3 and 6.3.4 to the selected impact points and the impactors were not allowed to strike the sample more than once.

Drop heights were set to an accuracy of ± 10 mm.

6. Test Results

6.1 Watertightness Testing

6.1.1 Watertightness Penetration - Classification

Classification according to CWCT & BS EN 12154:2000	
Tests 1 & 3 – Water Penetration - Static	R7

6.1.2 Test 1 – Water Penetration – Static

Temperatures (°C)	**Water**	10.1
	Ambient	15.6

Observations	
Air Pressure (Pa)	**Comments**
0 x 15 mins	No Leakage Observed
50 x 5 mins	No Leakage Observed
100 x 5 mins	No Leakage Observed
150 x 5 mins	No Leakage Observed
200 x 5 mins	No Leakage Observed
300 x 5 mins	No Leakage Observed
450 x 5 mins	No Leakage Observed
600 x 5 mins	No Leakage Observed

There was no water leakage observed during the water spray.

6.1.3 Test 3 – Repeat Water Penetration – Static

Temperatures (°C)	**Water**	12.6
	Ambient	14.2

Observations	
Air Pressure (Pa)	**Comments**
0 x 15 mins	No Leakage Observed
50 x 5 mins	No Leakage Observed
100 x 5 mins	No Leakage Observed
150 x 5 mins	No Leakage Observed
200 x 5 mins	No Leakage Observed
300 x 5 mins	No Leakage Observed
450 x 5 mins	No Leakage Observed
600 x 5 mins	No Leakage Observed

There was no water leakage observed during the water spray.

6.1.4 Test 4 - Water Penetration – Dynamic Aero Engine

Temperatures (°C)	**Water**	13.1
	Ambient	12.1

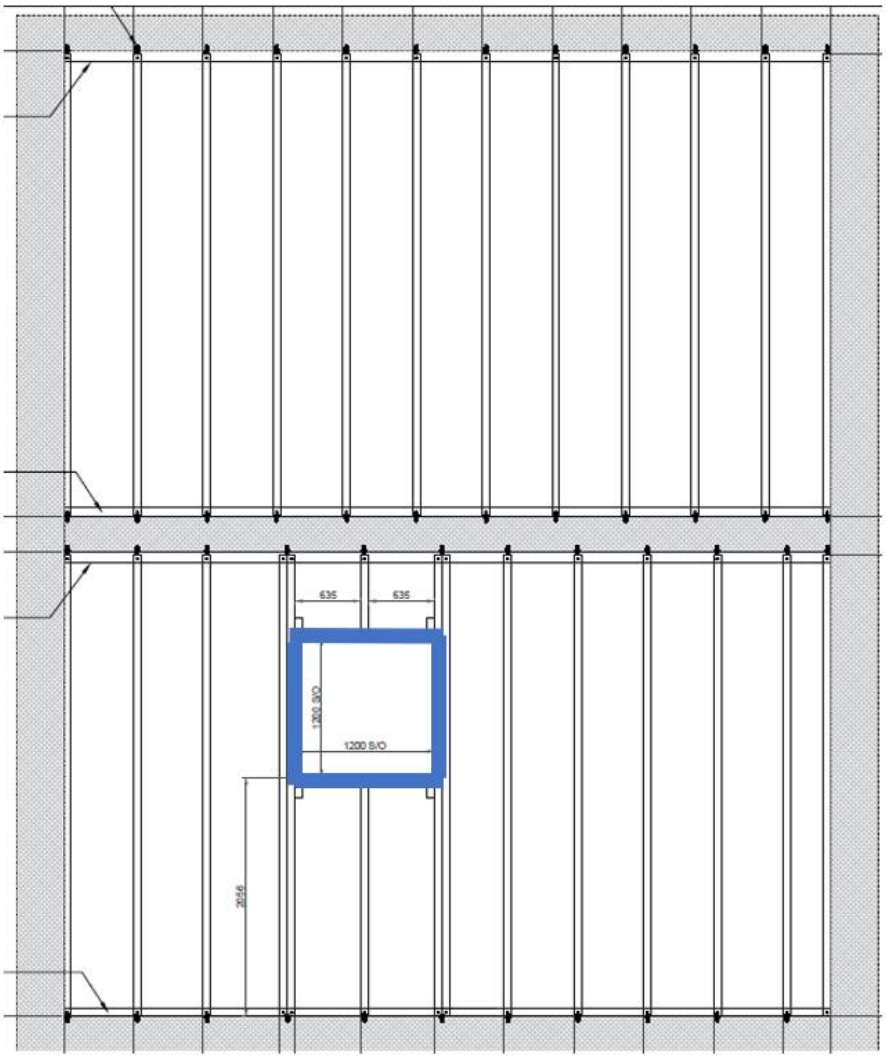
The sample was subjected to testing as described in section 5.2.1, for a period of not less than 15 minutes, during which no water leakage was observed through the sample.

6.1.5 Test 5 – Water Penetration – Hose

The sample was subjected to hose testing, as described in section 5.2.2. During the test, and for 30 minutes following the cessation of spraying, the sample was monitored for water ingress and none was found.

Figure 2

Hose Test Areas



View from Outside
Not to Scale

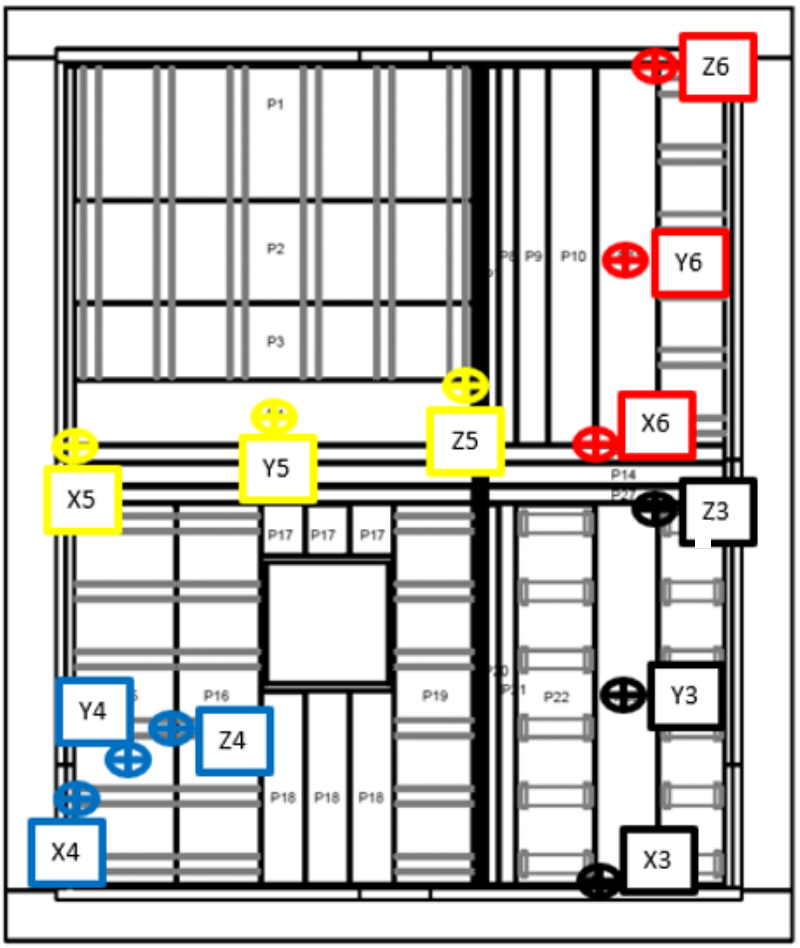
6.2 Wind Resistance

Probe Group Identification	Calculation of deflection
Group A comprised of probes X3, Y3 & Z3	= Probe Y3 – ((Probe X3 + Probe Z3)/2)
Group B comprised of probes X4, Y4 & Z4	= Probe Y4 – ((Probe X4 + Probe Z4)/2)
Group C comprised of probes X5, Y5 & Z5	= Probe Y5 – ((Probe X5 + Probe Z5)/2)
Group D comprised of probes X6, Y6 & Z6	= Probe Y6 – ((Probe X6 + Probe Z6)/2)

An inspection carried out following tests 4, 9, 10 and 11, after both positive and negative pressure testing, showed no evidence of any permanent deformation or damage to the test sample.

Figure 3

Positions of Deflection Measurement Probes



View from Outside
Not to Scale

6.2.1 Tests 2 & 8 - Wind Resistance, Serviceability

Ambient Temperature (°C)	11.4

Measured Length of Framing Member (mm)		Allowable Deflection	
		Ratio	Calculated (mm)
Group A	3770	L/90	41.9
Group B	1206	L/90	13.4
Group C	3950	L/90	43.9
Group D	3750	L/90	41.7

Frontal deflection shall recover by either 95%, or 1mm, whichever the greater.

6.2.1.1 Wind Resistance, Serviceability - Positive Pressure

Positive Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
600	5.7	0.9	7.2	9.5
1200	9.6	1.9	11.6	15.3
1800	13.3	3.0	15.0	19.9
2400	17.3	4.0	18.7	21.7
Residuals Immediately following test	0.7	0.9	0.0	0.7

6.2.1.2 Wind Resistance, Serviceability - Negative Pressure

Negative Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
600	8.8	0.4	7.0	8.2
1200	15.4	1.5	12.0	13.7
1800	21.5	2.4	17.5	19.1
2400	27.3	3.4	22.5	23.9
Residuals Immediately following test	0.9	0.1	0.9	1.8

6.3.2 Tests 7 & 8 - Wind Resistance, Safety

Ambient Temperature (°C)	13.1

Measured Length of Framing Member (mm)		Allowable Residual Deformation	
		Ratio	Calculated (mm)
Group A	3770	L/500	7.5
Group B	1206	L/500	2.4
Group C	3950	L/500	7.9
Group D	3750	L/500	7.5

6.3.2.1 Wind Resistance, Safety - Positive Pressure

Positive Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
3600	25.9	5.6	27.6	27.2
Residuals Immediately following test	0.7	0.8	0.5	2.0

6.3.2.2 Wind Resistance, Safety - Negative Pressure

Negative Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
3600	29.9	5.8	34.7	38.1
Residuals Immediately following test	5.5	0.8	2.2	2.6

Note: *The standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%, for the above measurements is ± 2.4 % of the reading.*

6.4 Impacting

6.4.1 Test 9 – Impact – Retention of Performance (Soft Body S1)

Ambient Temperatures (°C)	14.1
Humidity (%RH)	57

Impact Category	Cat B
Impact Energy	120 Nm
Class Achieved	Class 1

Impact Reference	Test Category	Impactor Type	Impact Energy (Nm)	Drop Height (mm)	Observations	Result
Blue Zone Impact Area						
B1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
C1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
E1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
Orange Zone Impact Area						
A1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
B1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
C1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
Red Zone Impact Area						
A1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
B1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
C1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
D1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1
F1	Cat B	Soft Body (S1)	120	245	No Damage	Class 1

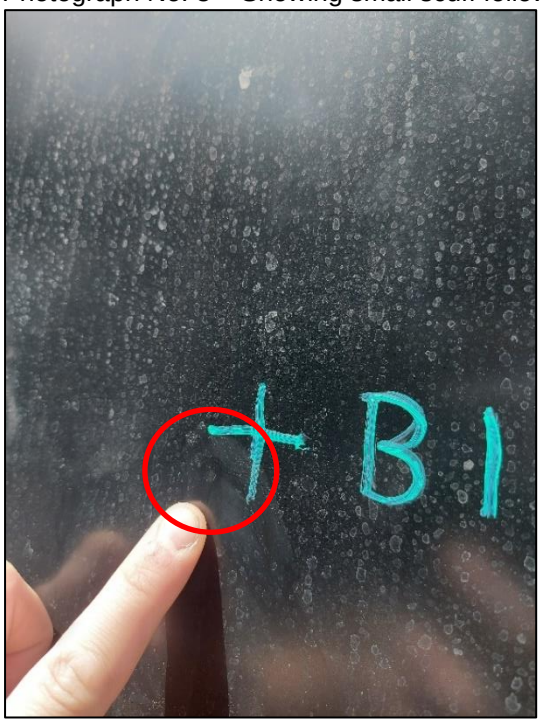
6.4.2 Test 9 – Impact – Retention of Performance (Hard Body H2)

Ambient Temperatures (°C)	14.1
Humidity (%RH)	57

Impact Category	Cat B
Impact Energy	10 Nm
Class Achieved	Class 2

Impact Reference	Test Category	Impactor Type	Impact Energy (Nm)	Drop Height (mm)	Observations	Result
Blue Zone Impact Area						
B1	Cat B	Hard Body (H2)	10	898	Small Scuff	Class 2
C1	Cat B	Hard Body (H2)	10	898	Slight Dent	Class 2
E1	Cat B	Hard Body (H2)	10	898	Slight Dent	Class 2
Orange Zone Impact Area						
A1	Cat B	Hard Body (H2)	10	898	No Damage	Class 1
B1	Cat B	Hard Body (H2)	10	898	No Damage	Class 1
C1	Cat B	Hard Body (H2)	10	898	Small Scuff	Class 2
Red Zone Impact Area						
A1	Cat B	Hard Body (H2)	10	898	Slight Dent	Class 2
B1	Cat B	Hard Body (H2)	10	898	No Damage	Class 1
C1	Cat B	Hard Body (H2)	10	898	Slight Dent	Class 2
D1	Cat B	Hard Body (H2)	10	898	Slight Dent	Class 2
F1	Cat B	Hard Body (H2)	10	898	No Damage	Class 1

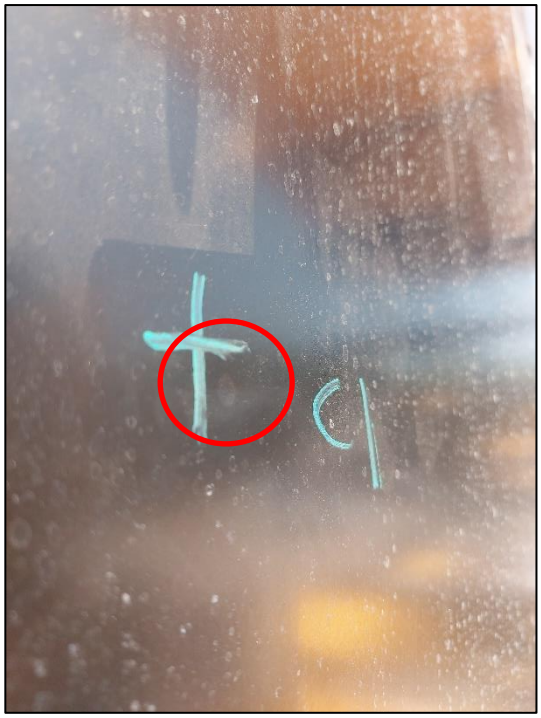
Photograph No. 3 – Showing small scuff following impact reference B1 on the Blue Zone



Photograph No. 4 - Showing small dent following impact reference C1 on the Blue Zone

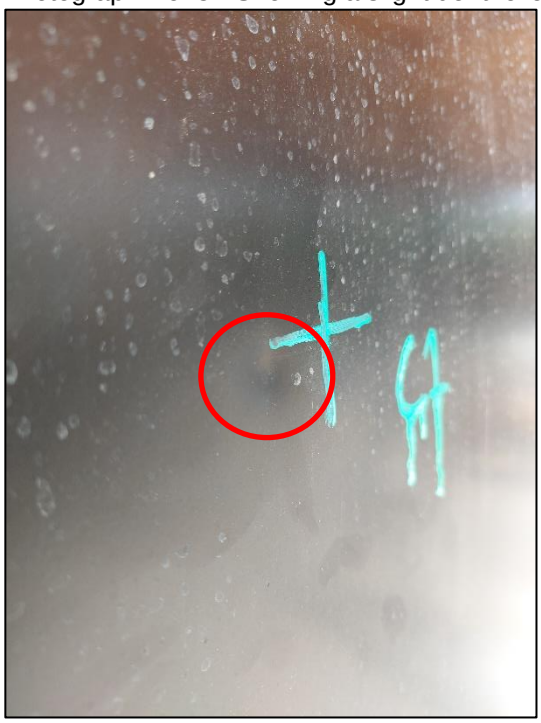
Photograph No. 5 - Showing small dent following impact reference E1 on the Blue Zone

Photograph No. 6 - Showing small scuff following impact reference C1 on the Orange Zone

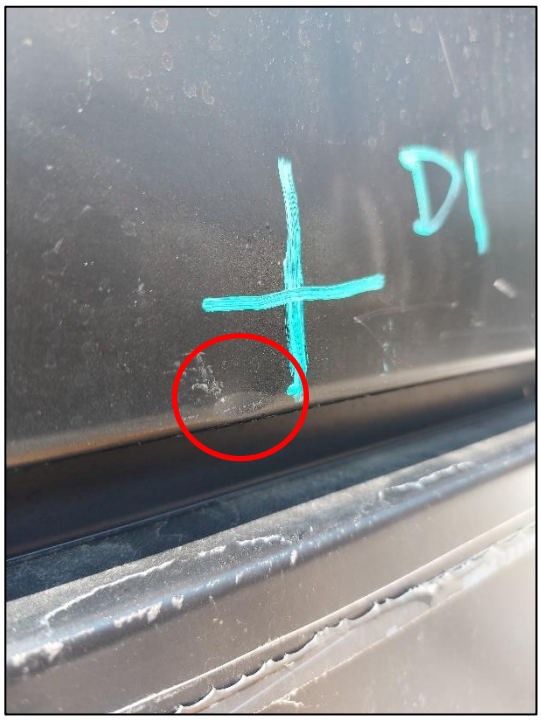


Photograph No. 7 - Showing a slight dent following impact reference A1 on the Red Zone

Photograph No. 8 - Showing a slight dent following impact reference C1 on the Red Zone



Photograph No. 9 - Showing small dent following impact reference D1 on the Red Zone



6.4.3 Test 10 - Impact – Safety to Persons (Soft Body S1)

Ambient Temperatures (°C)	14.1
Humidity (%RH)	57

Impact Category	Cat B
Impact Energy	500 Nm
Risk Category	Negligible Risk

Impact Reference	Test Category	Impactor Type	Impact Energy (Nm)	Drop Height (mm)	Observations	Result
Blue Zone Impact Area						
B1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
C1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
E1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
Orange Zone Impact Area						
A1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
B1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
C1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
Red Zone Impact Area						
A1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
B1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
C1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
D1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk
F1	Cat B	Soft Body (S1)	500	1020	No Damage	Neg Risk

6.4.4 Test 10 – Impact – Safety to Persons (Hard Body H2)

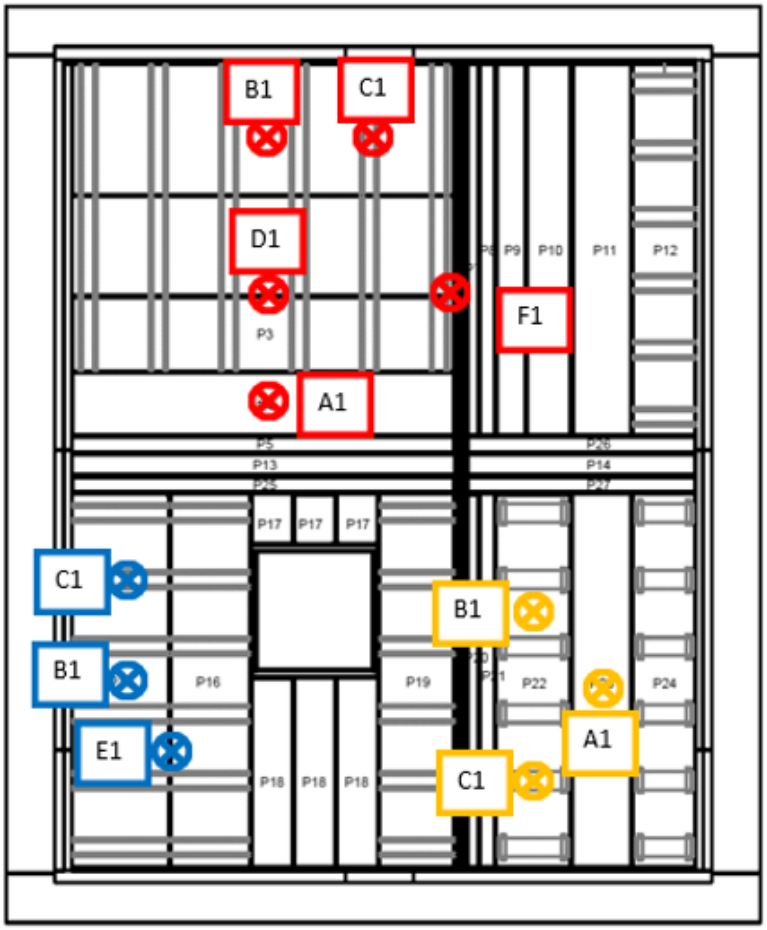
Ambient Temperatures (°C)	14.1
Humidity (%RH)	57

Impact Category	Cat B
Impact Energy	10 Nm
Risk Category	Negligible Risk

Impact Reference	Test Category	Impactor Type	Impact Energy (Nm)	Drop Height (mm)	Observations	Result
Blue Zone Impact Area						
B1	Cat B	Hard Body (H2)	10	898	Small Scuff	Neg Risk
C1	Cat B	Hard Body (H2)	10	898	Slight Dent	Neg Risk
E1	Cat B	Hard Body (H2)	10	898	Slight Dent	Neg Risk
Orange Zone Impact Area						
A1	Cat B	Hard Body (H2)	10	898	No Damage	Neg Risk
B1	Cat B	Hard Body (H2)	10	898	No Damage	Neg Risk
C1	Cat B	Hard Body (H2)	10	898	Small Scuff	Neg Risk
Red Zone Impact Area						
A1	Cat B	Hard Body (H2)	10	898	Slight Dent	Neg Risk
B1	Cat B	Hard Body (H2)	10	898	No Damage	Neg Risk
C1	Cat B	Hard Body (H2)	10	898	Slight Dent	Neg Risk
D1	Cat B	Hard Body (H2)	10	898	Slight Dent	Neg Risk
F1	Cat B	Hard Body (H2)	10	898	No Damage	Neg Risk

6.4.5 Impact Locations

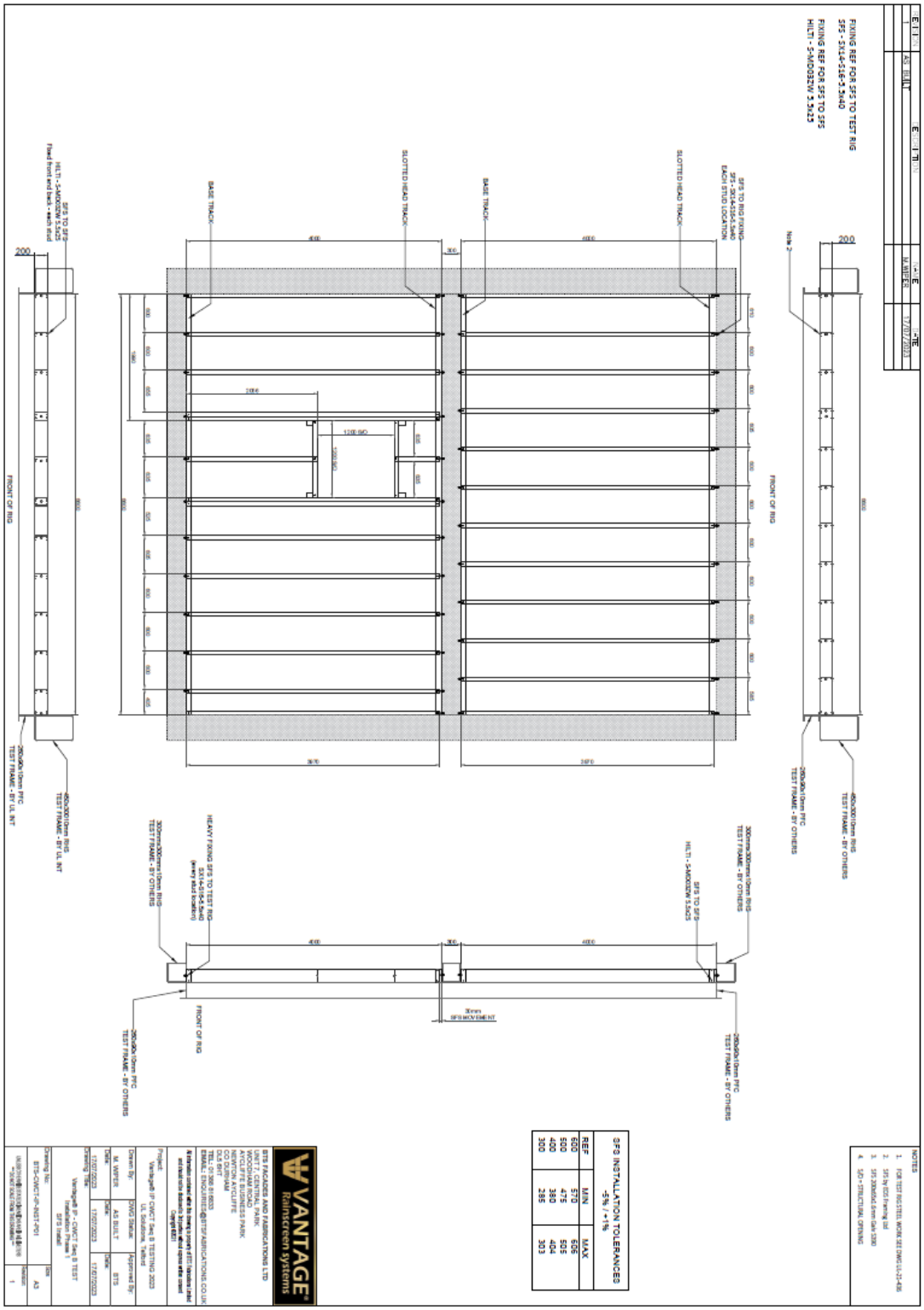
Figure 4

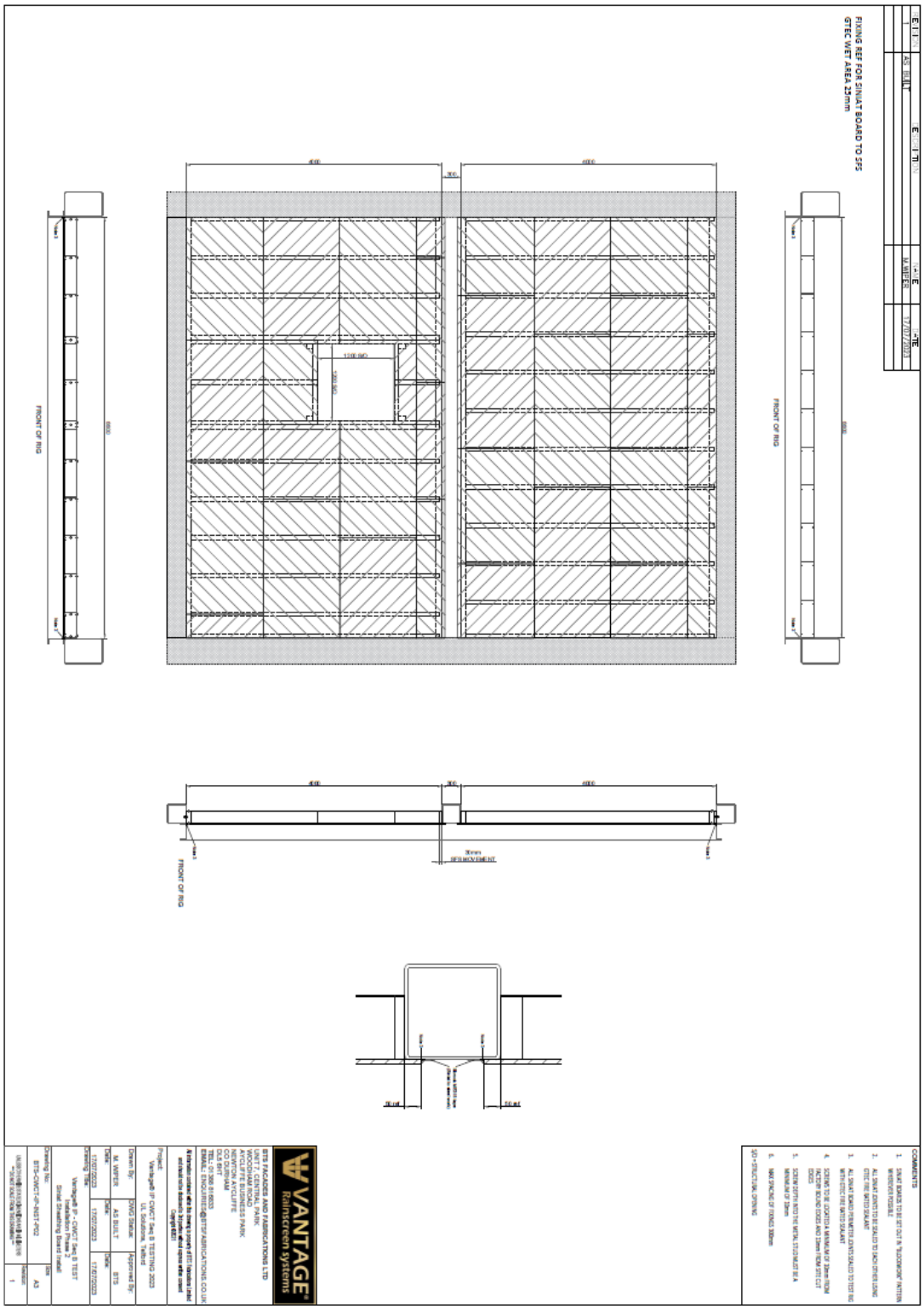


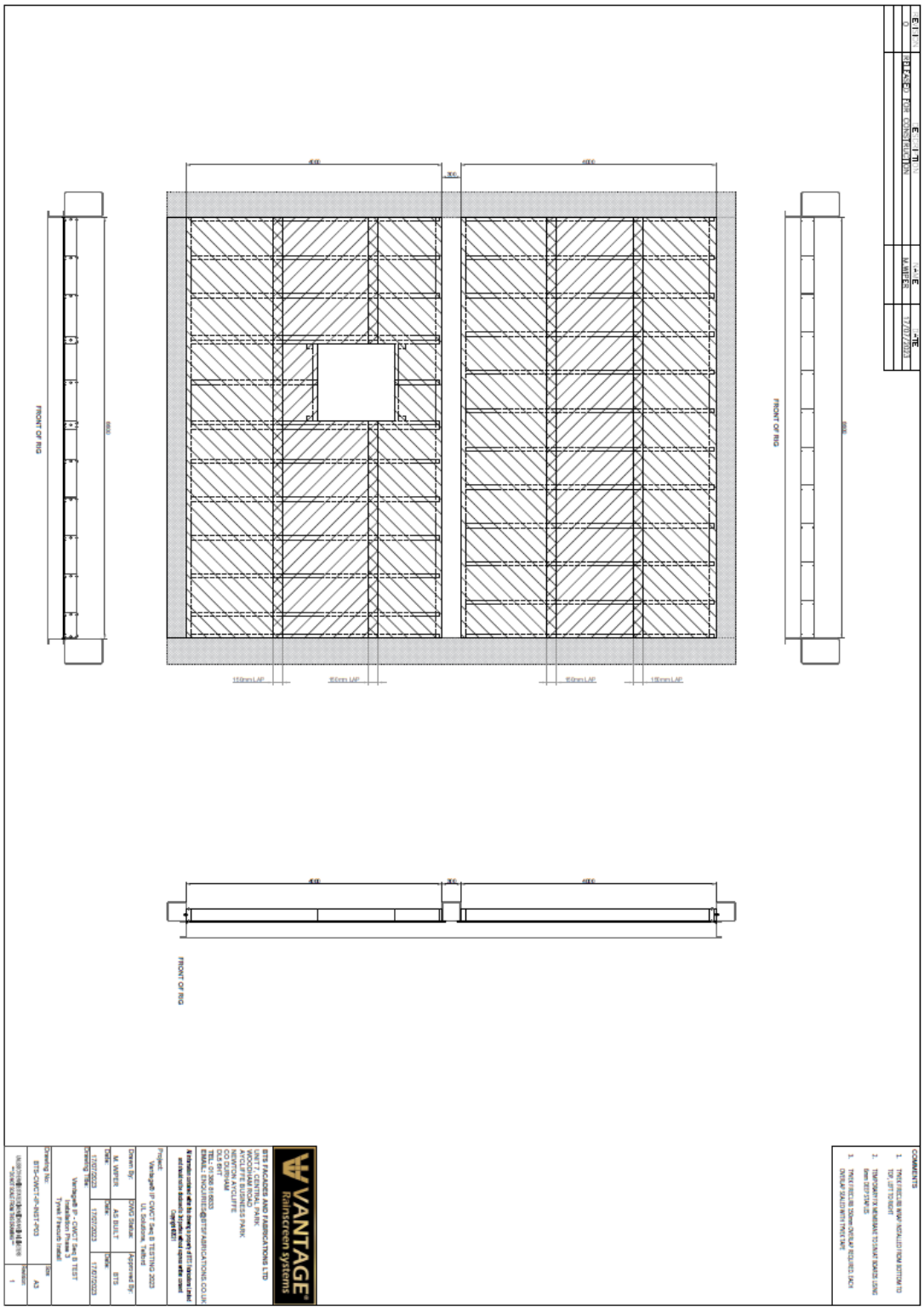
View from Outside
Not to Scale

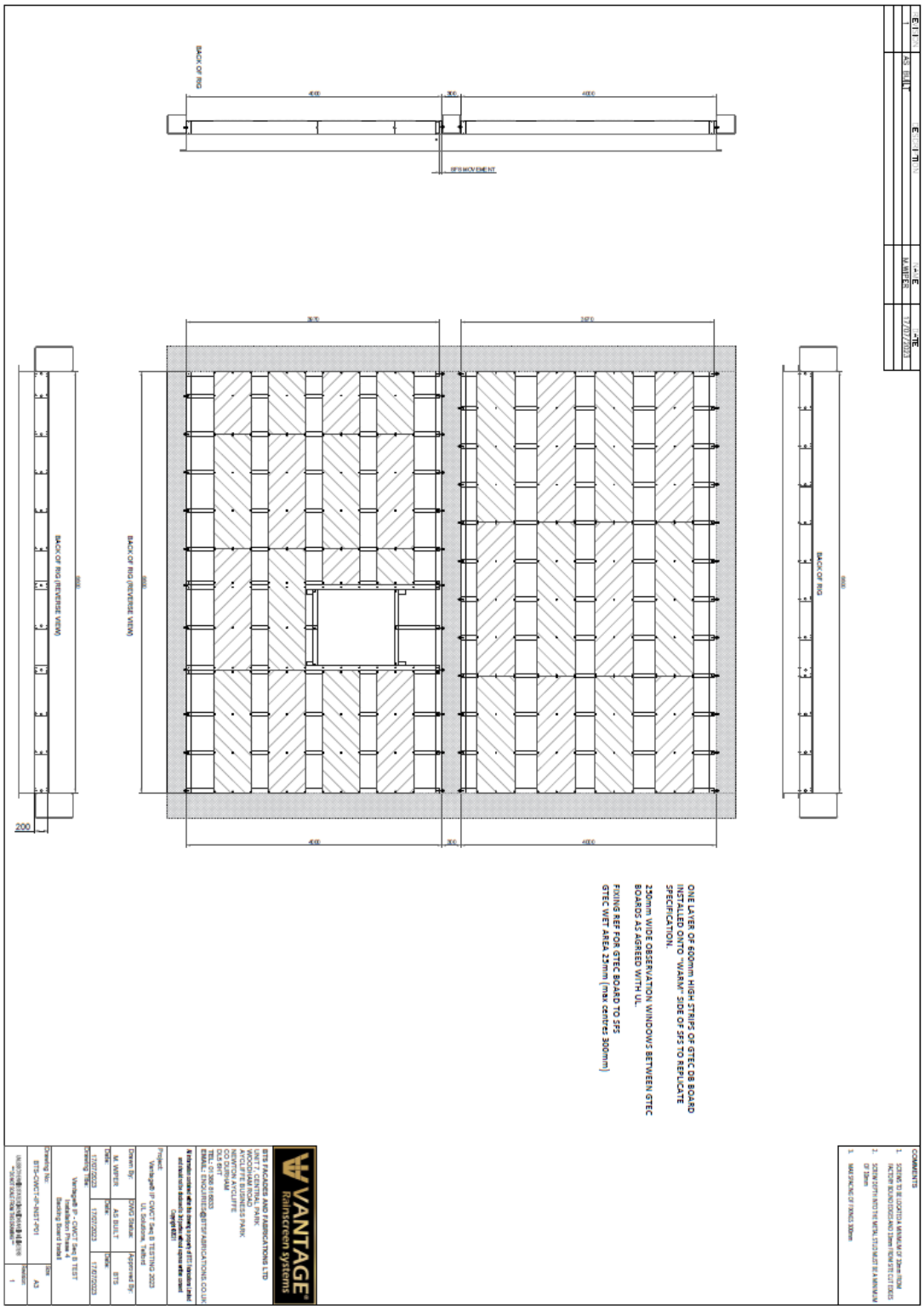
Impact Location	Description
A	Centre of panel
B	Centre of a stiffened panel
C	On a stiffener
D	Unsupported edge
E	Supported edge
F	Corner

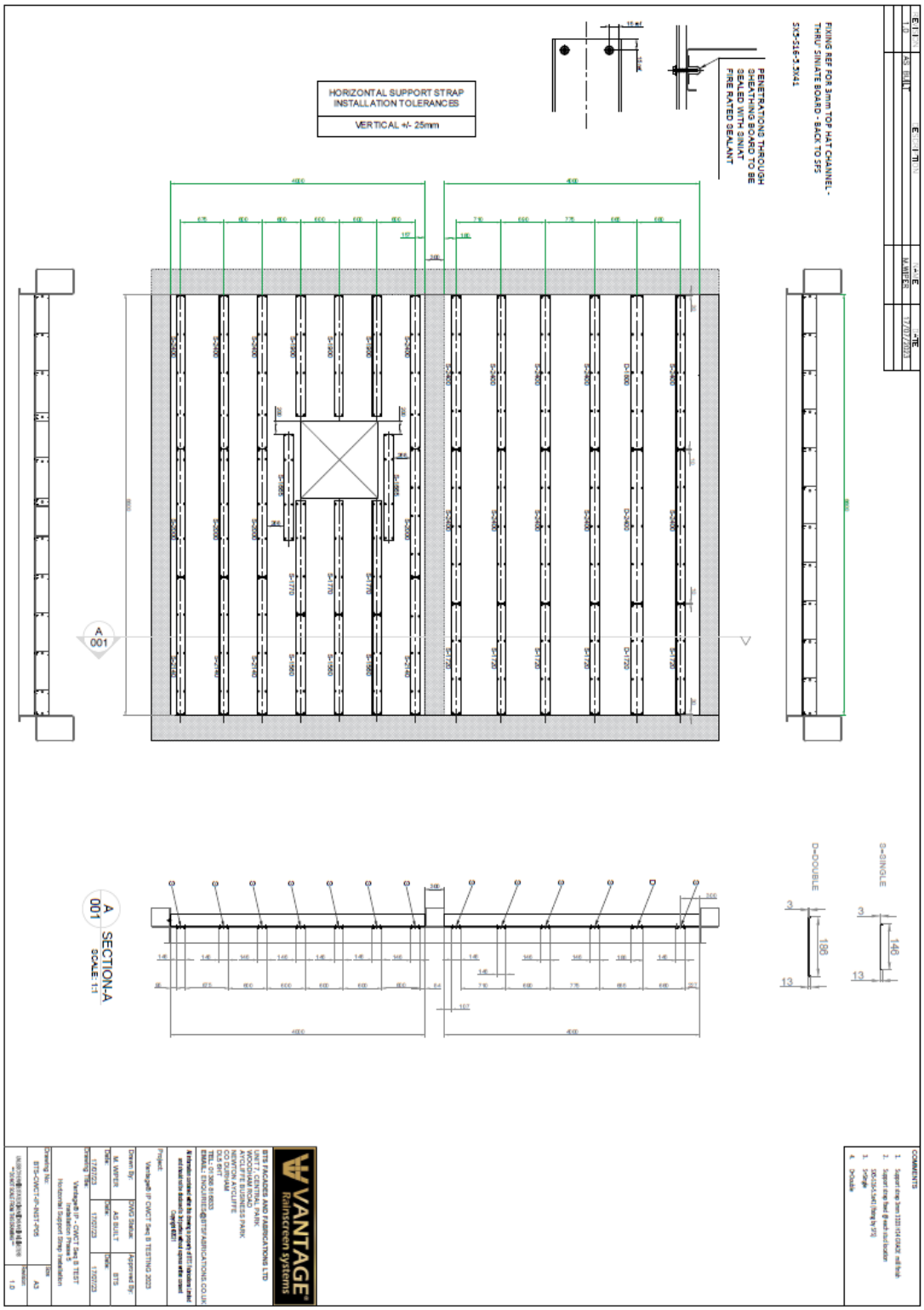
7. System Drawings

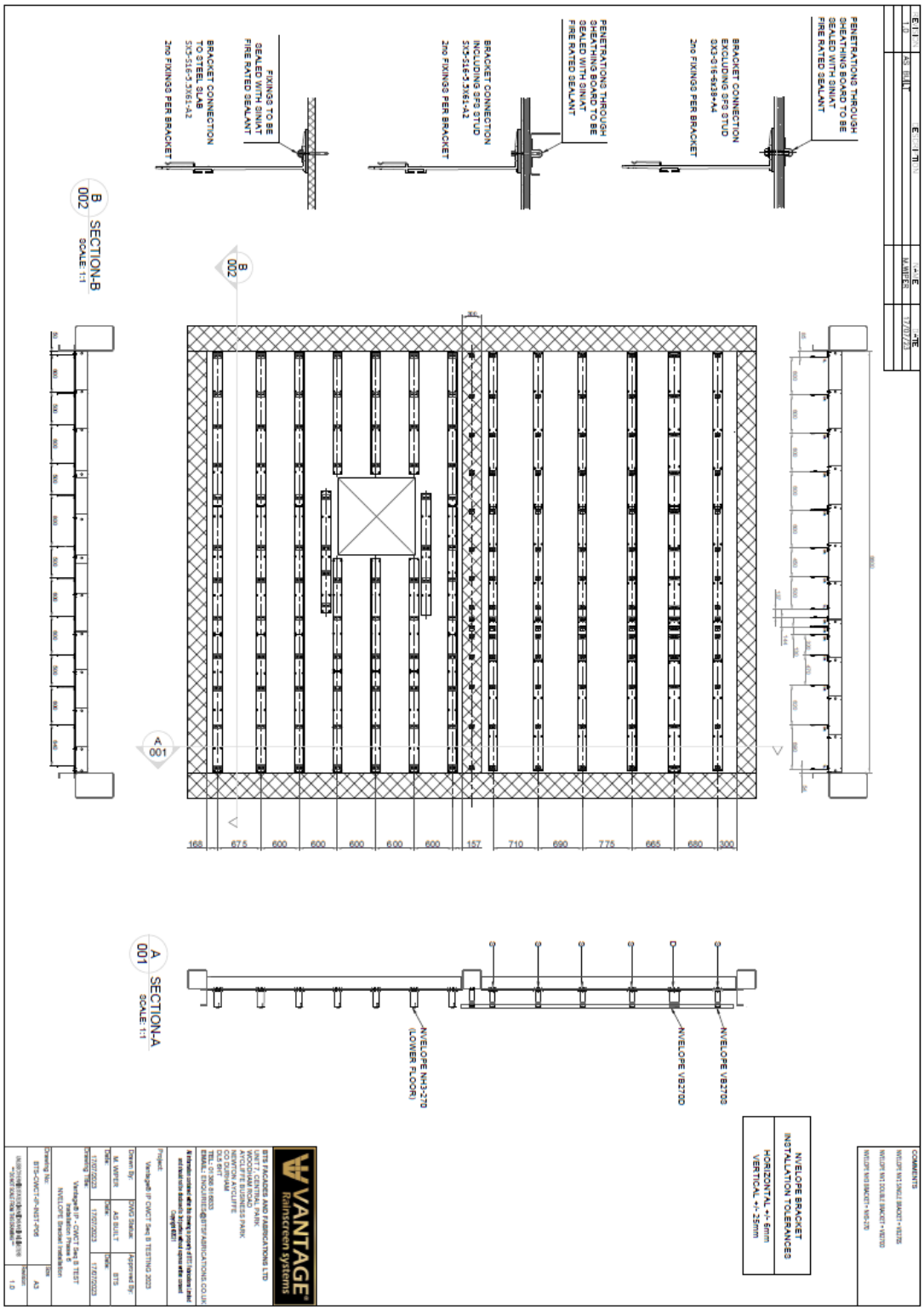


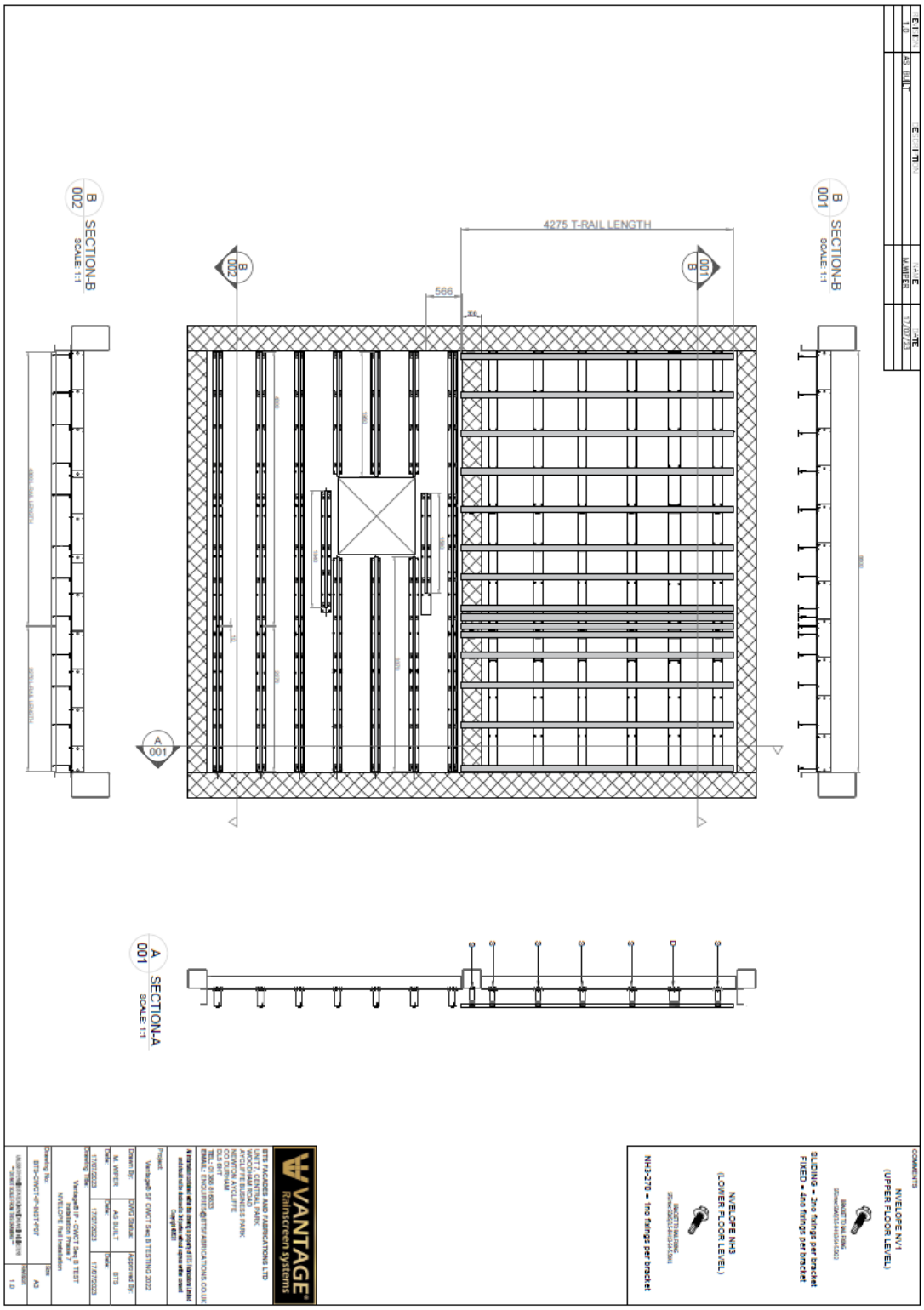


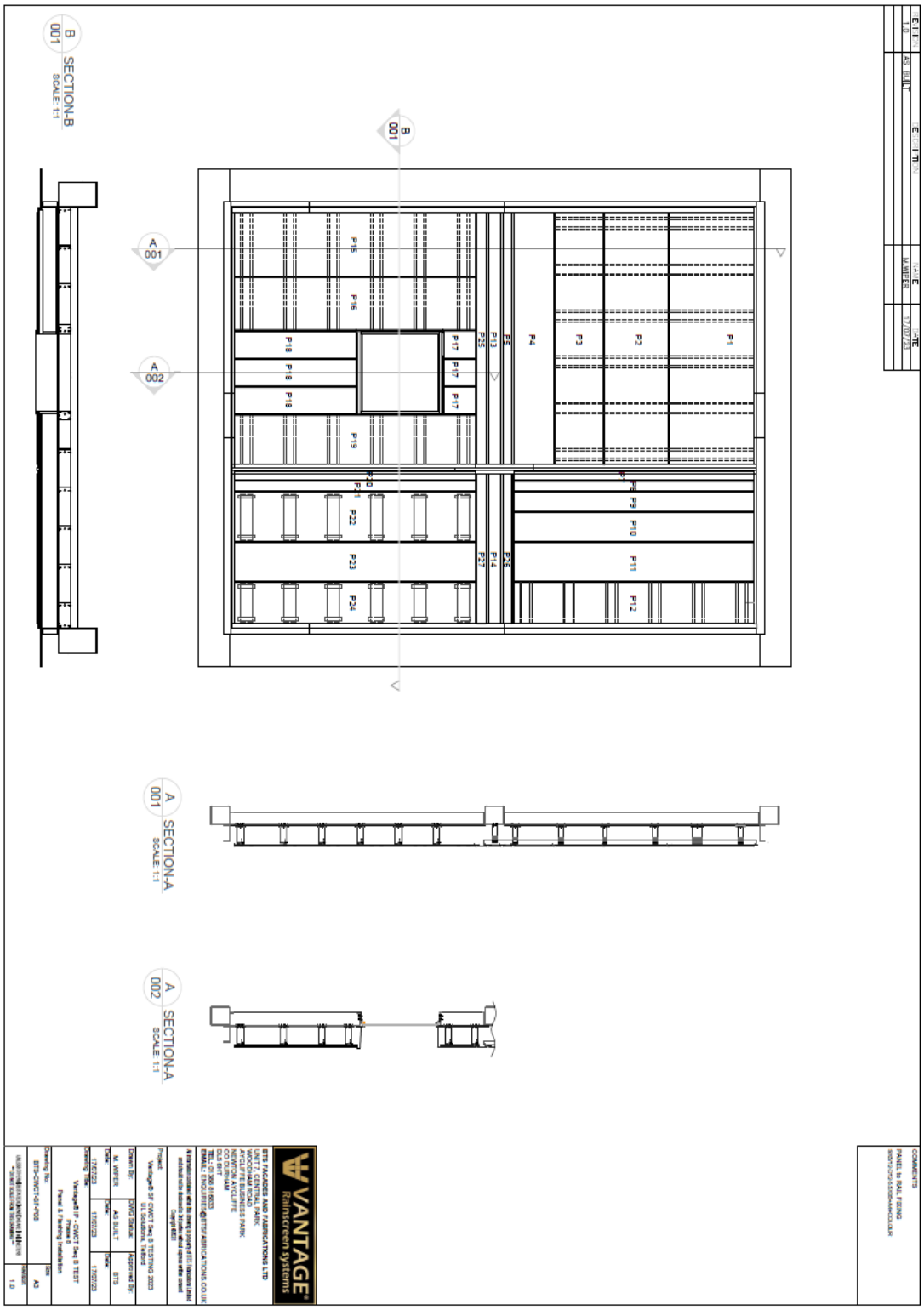


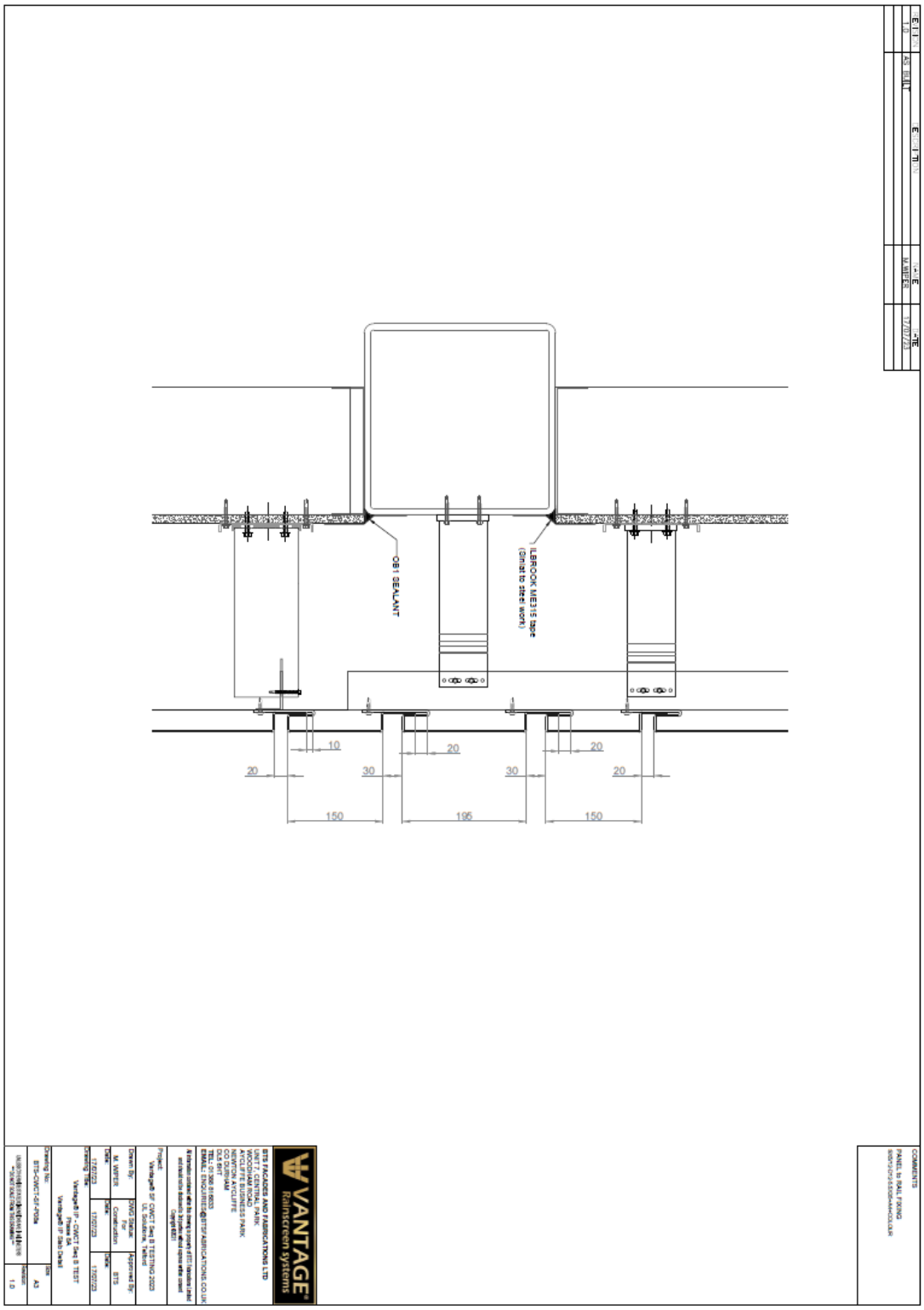


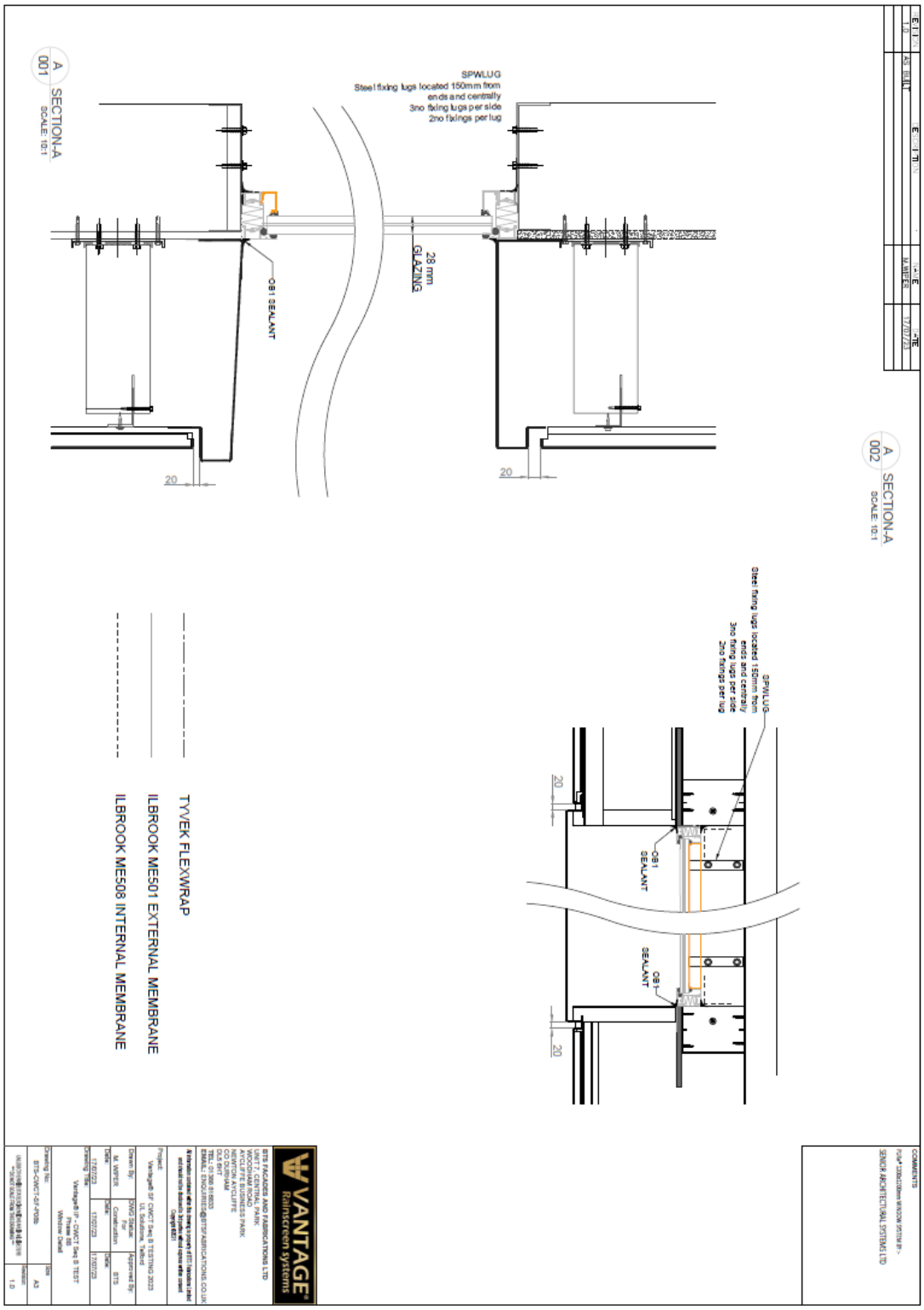












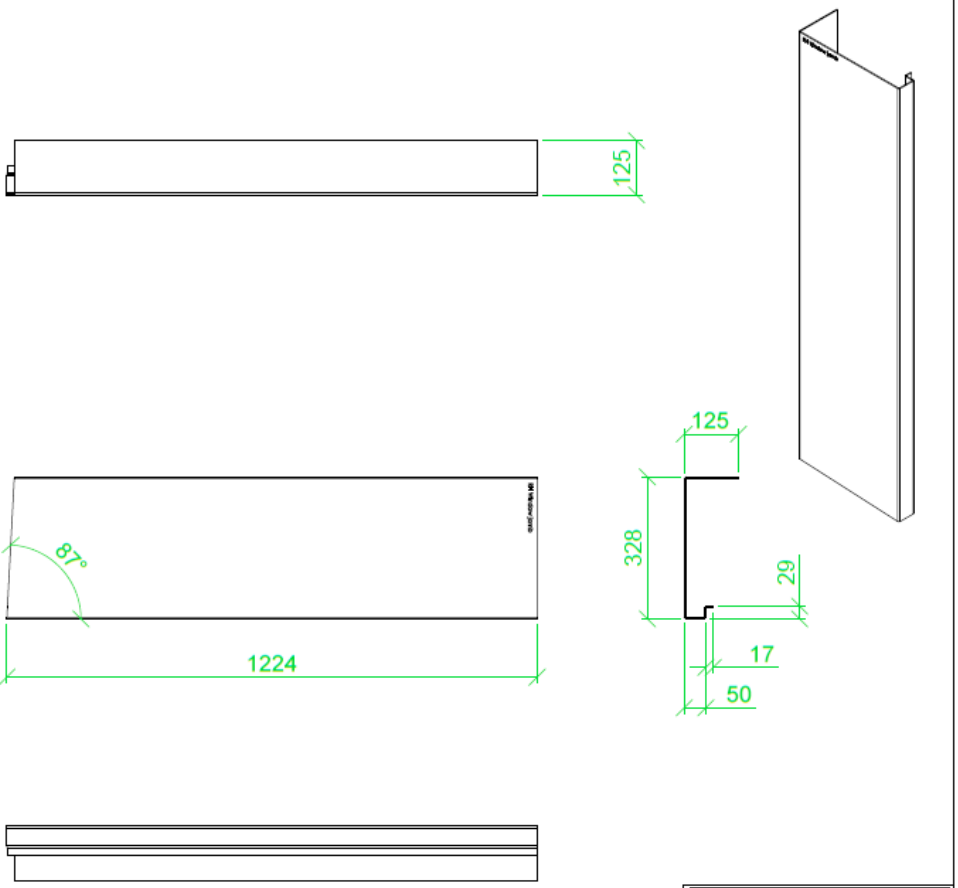
REVISION	DESCRIPTION	NAME	DATE
1.0	AS BUILT	M.WIPER	28/06/2023

PANEL MANUFACTURE TOLERANCES:

Panel Width	±2mm
Panel Length (<2400mm)	±2mm
Panel Length (=>2400mm)	±3mm
Linear (general)	±5mm
Angular (general)	±5º
Squareness	±2mm
Flatness	4mm max

NOTES:

Flashing Material :-
3mm 1050 H14 ALUMINIUM
PPC COATED RAL 9005



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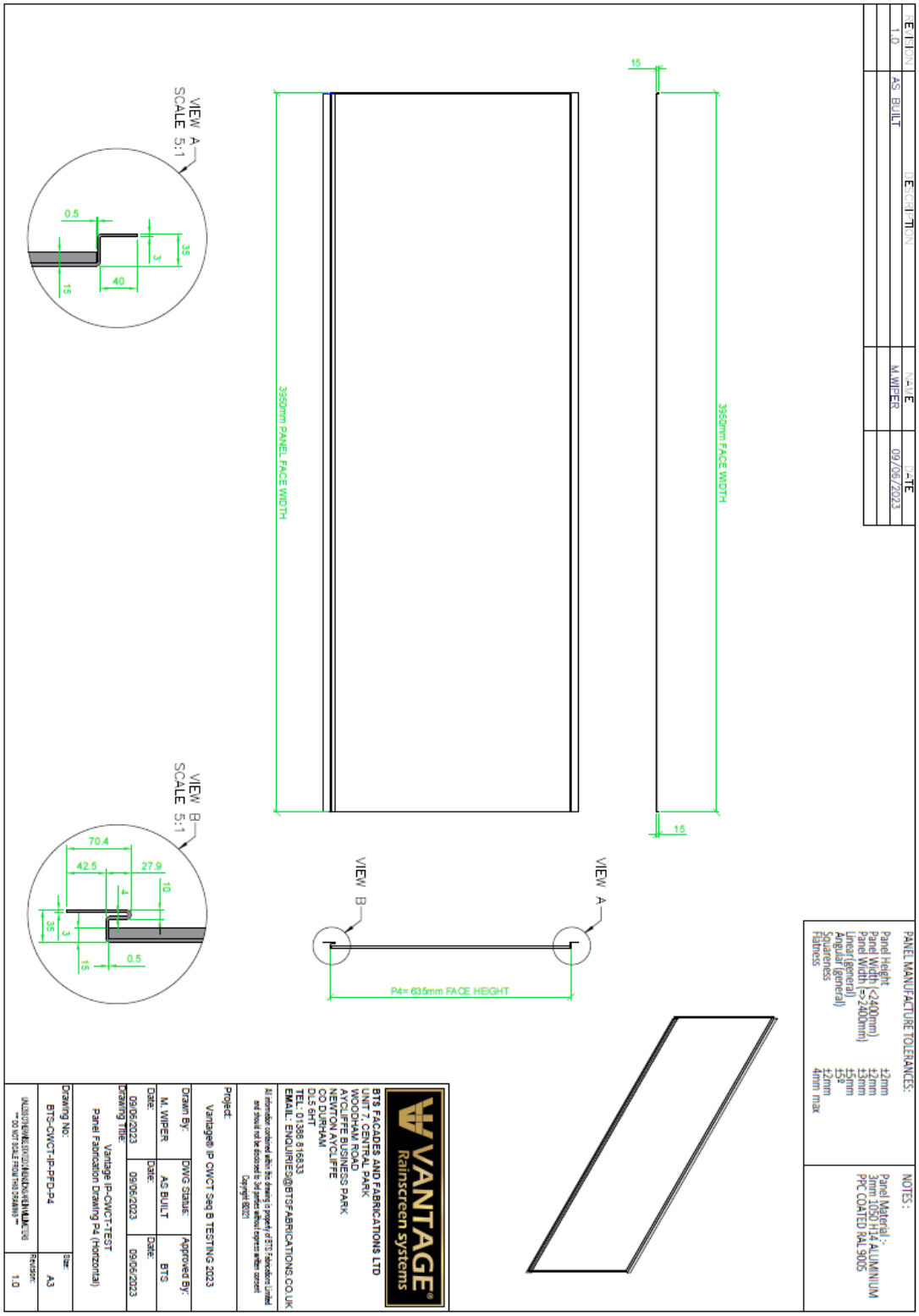
EMAIL: ENQUIRIES@BTSFABRICATIONS.CO.UK

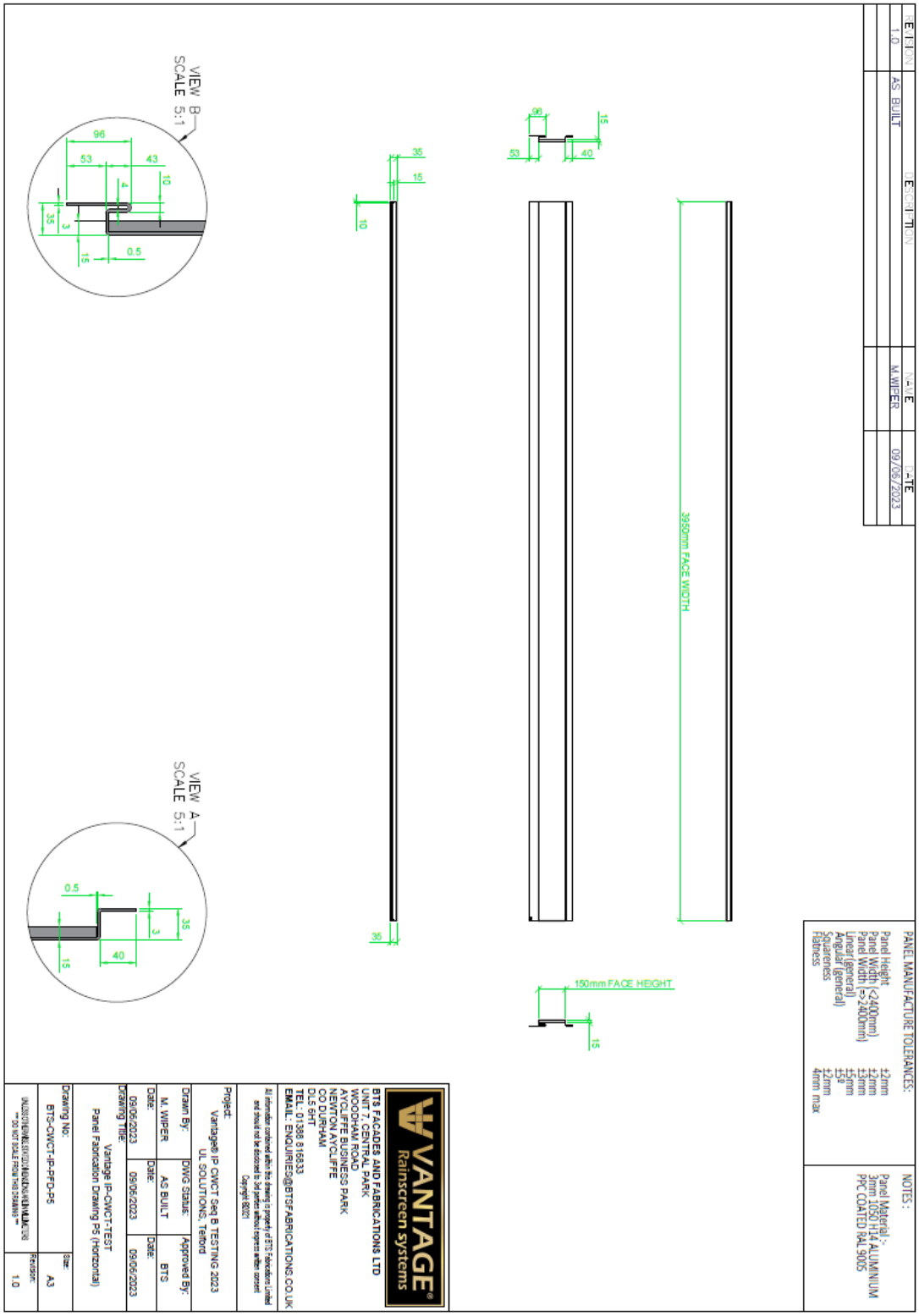
Project:
Vantage® IP CWCT Seq B TESTING 2023
UL SOLUTIONS, Telford

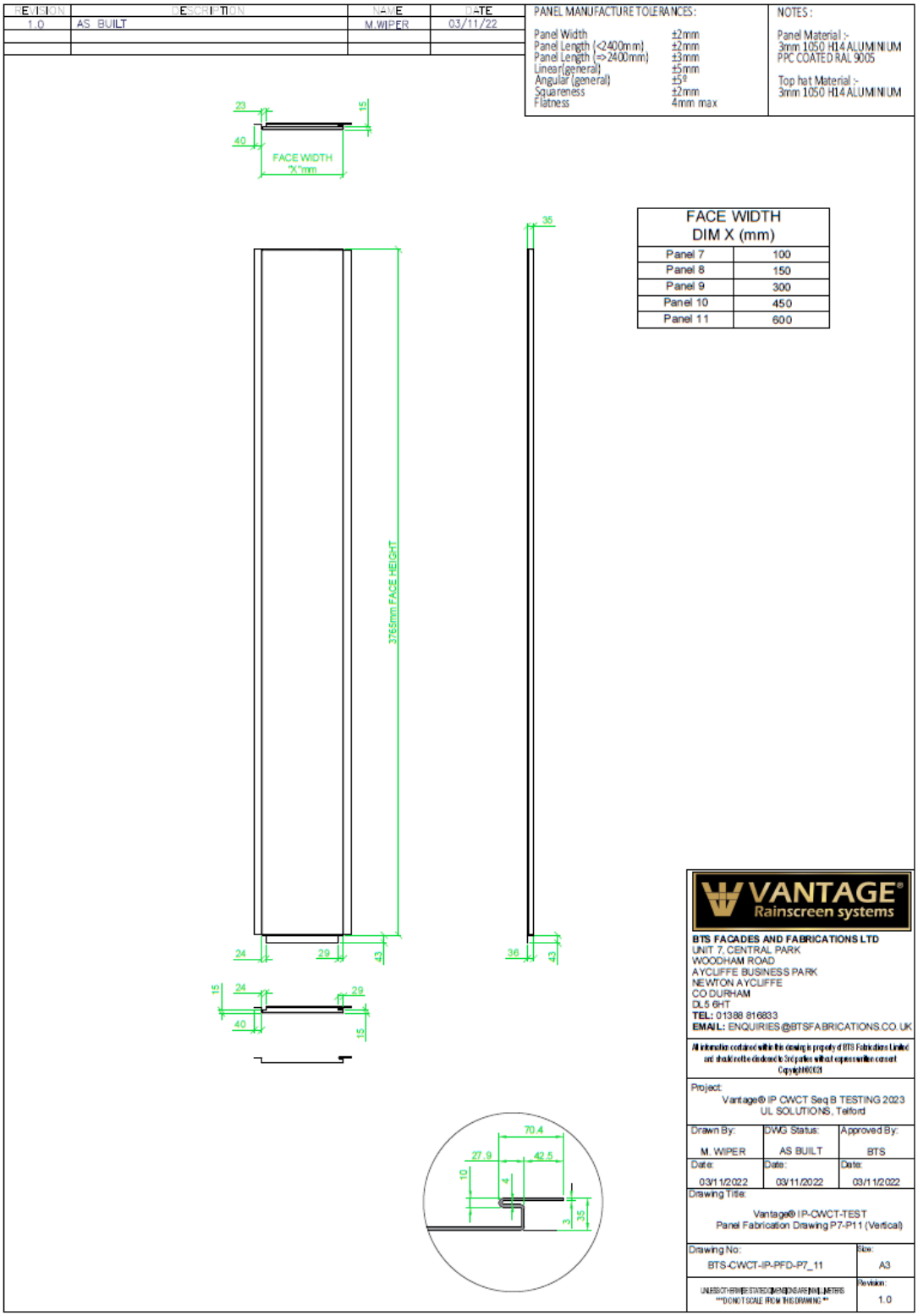
Drawn By:	DWG Status:	Approved By:
M. WIPER	AS BUILT	BTS
Date: 28/06/2023	Date: 28/06/2023	Date: 28/06/2023

Drawing Title:
Vantage® IP-CWCT-TEST
Panel Fabrication Drawing RH Jamb

Drawing No:	Size:
BTS-CWCT-IP-PFD-RHJ	A3
UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETERS ** DO NOT SCALE FROM THIS DRAWING **	Revision: 1.0







REVISION	DESCRIPTION	NAME	DATE
1.0	AS BUILT	M.WIPER	03/11/22

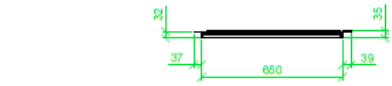
PANEL MANUFACTURE TOLERANCES:

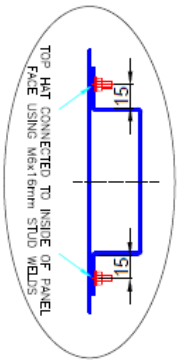
Panel Width	±2mm
Panel Height (<2400mm)	±2mm
Panel Height (=>2400mm)	±3mm
Linear (general)	±5mm
Angular (general)	±5°
Squareness	±2mm
Flatness	4mm max

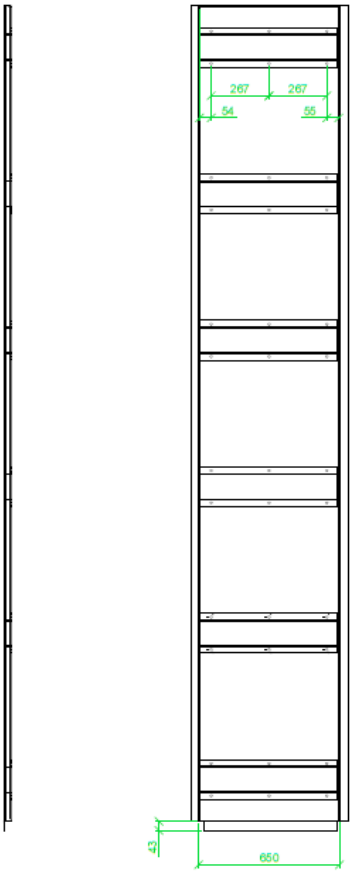
NOTES:

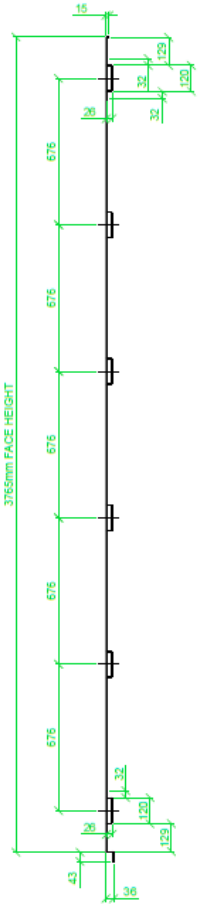
Panel Material :-
3mm 1050 H14 ALUMINIUM
PPC COATED RAL 9005

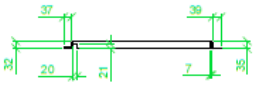
Top Hat Material
3mm 1050 H14 ALUMINIUM
mill finish











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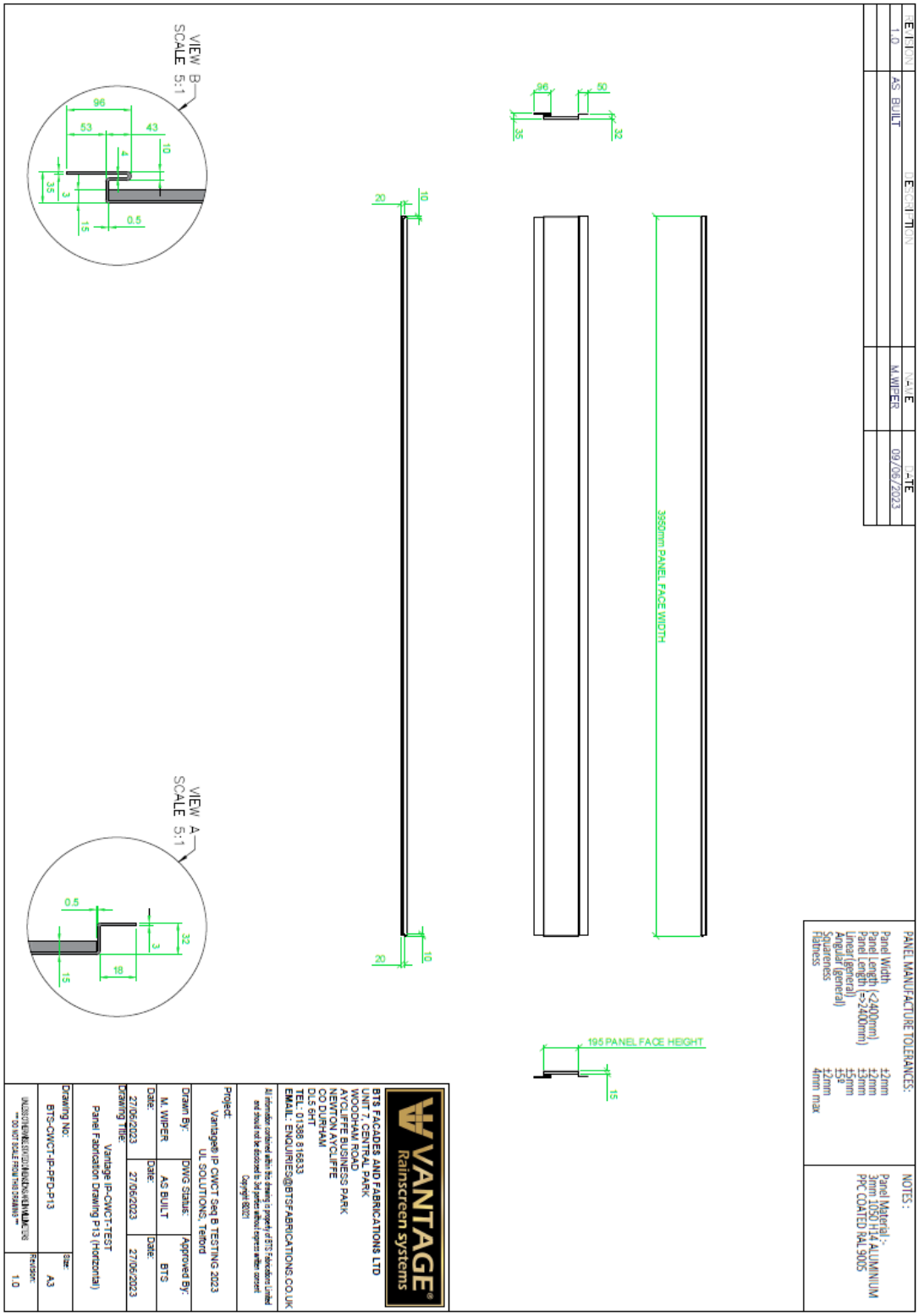
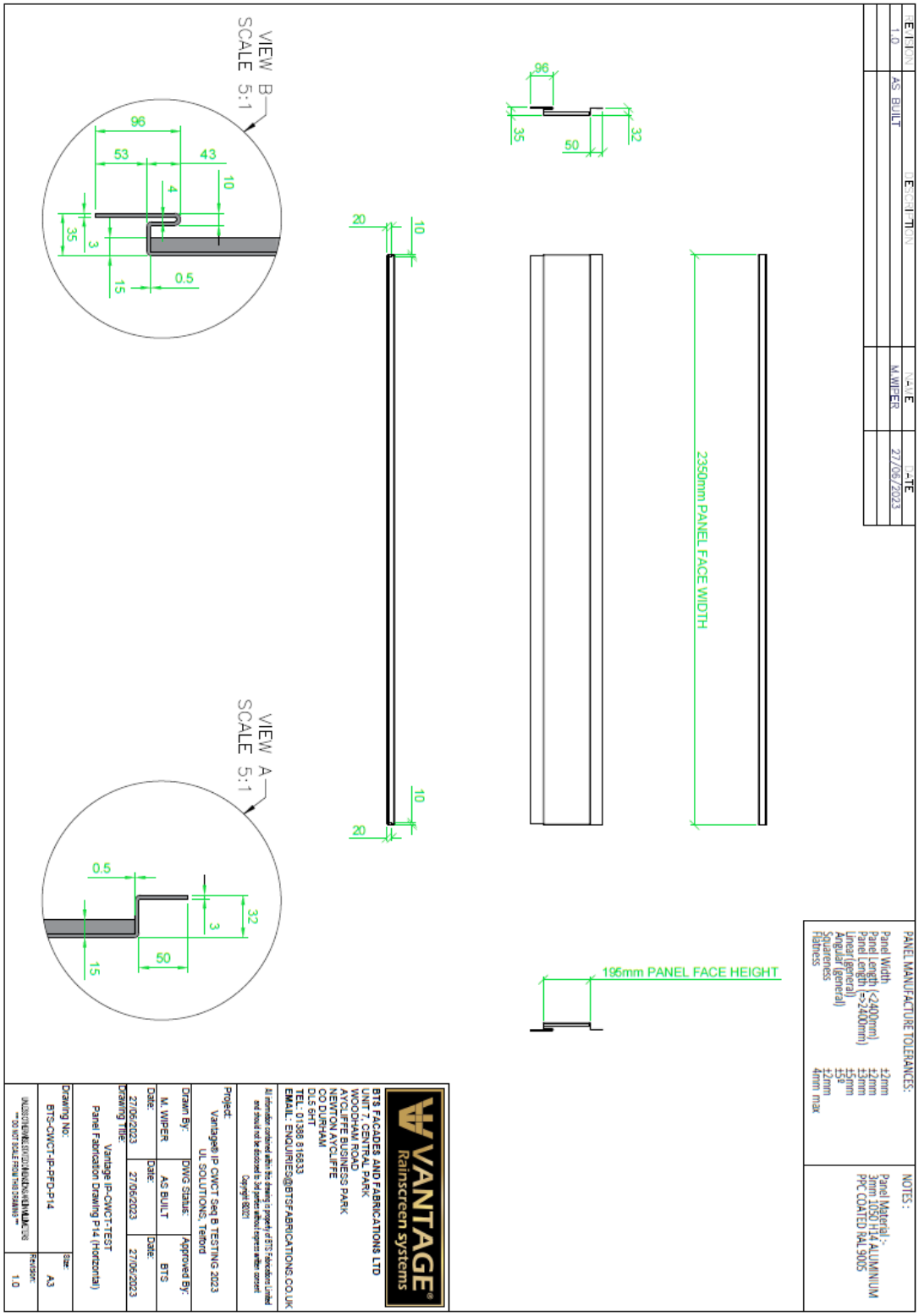
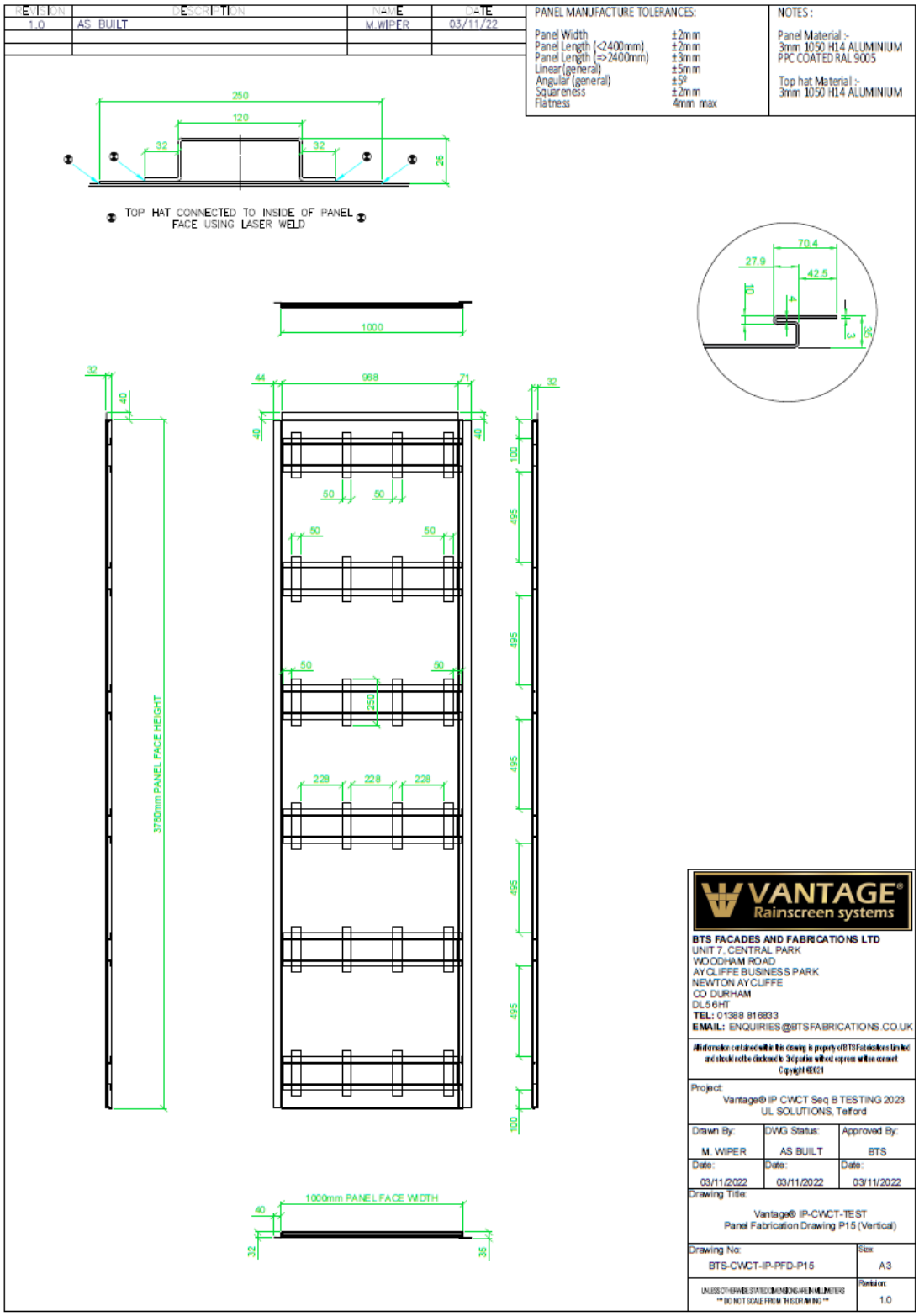
Project:		
Vantage® IP CWCT Seq B TESTING 2023 UL SOLUTIONS, Telford		
Drawn By:	DWG Status:	Approved By:
M. WIPER	AS BUILT	BTS
Date: 03/11/2022	Date: 03/11/2022	Date: 03/11/2022

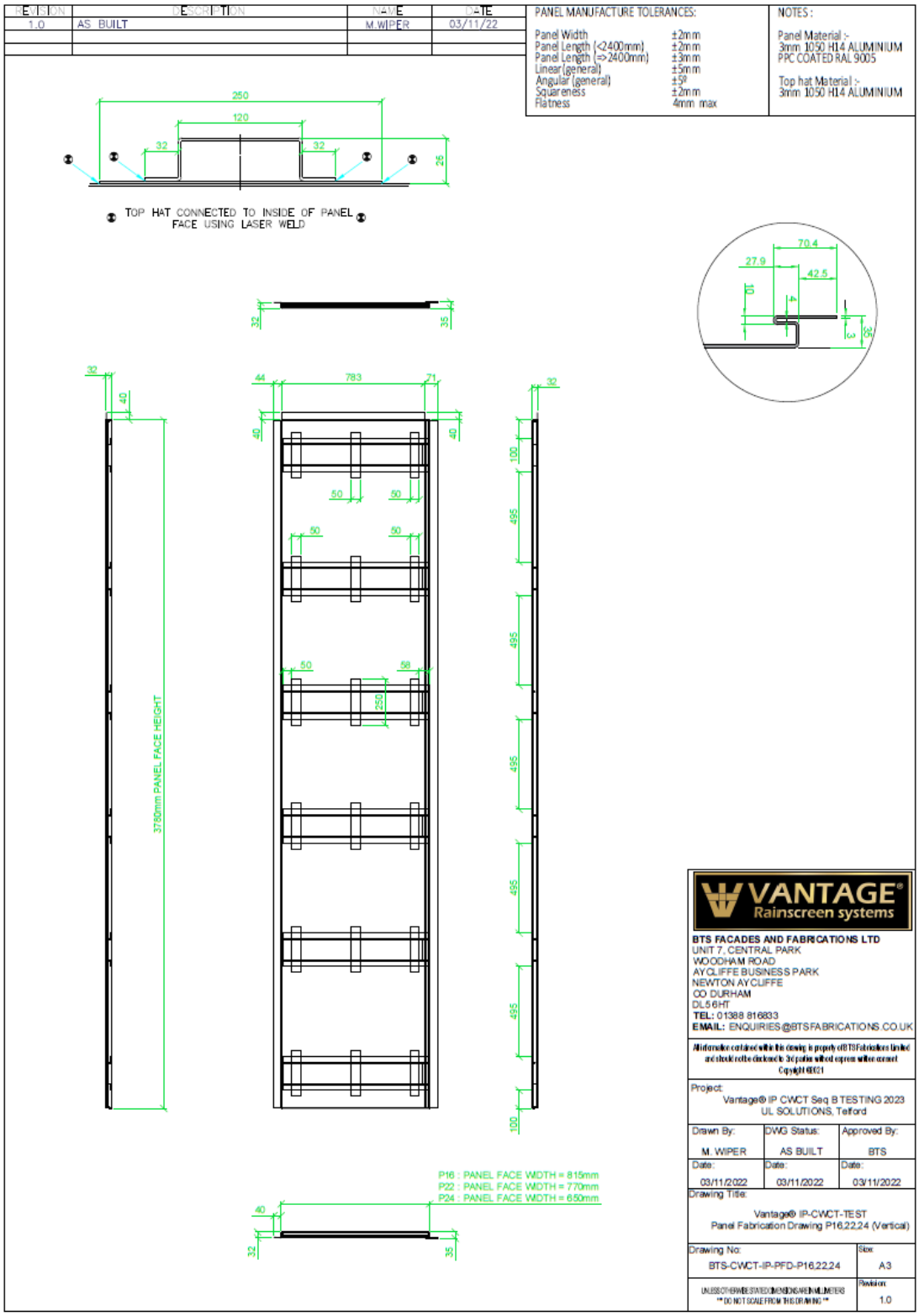
Drawing Title:
Vantage® IP-CWCT-TEST
Panel Fabrication Drawing P12 (Vertical)

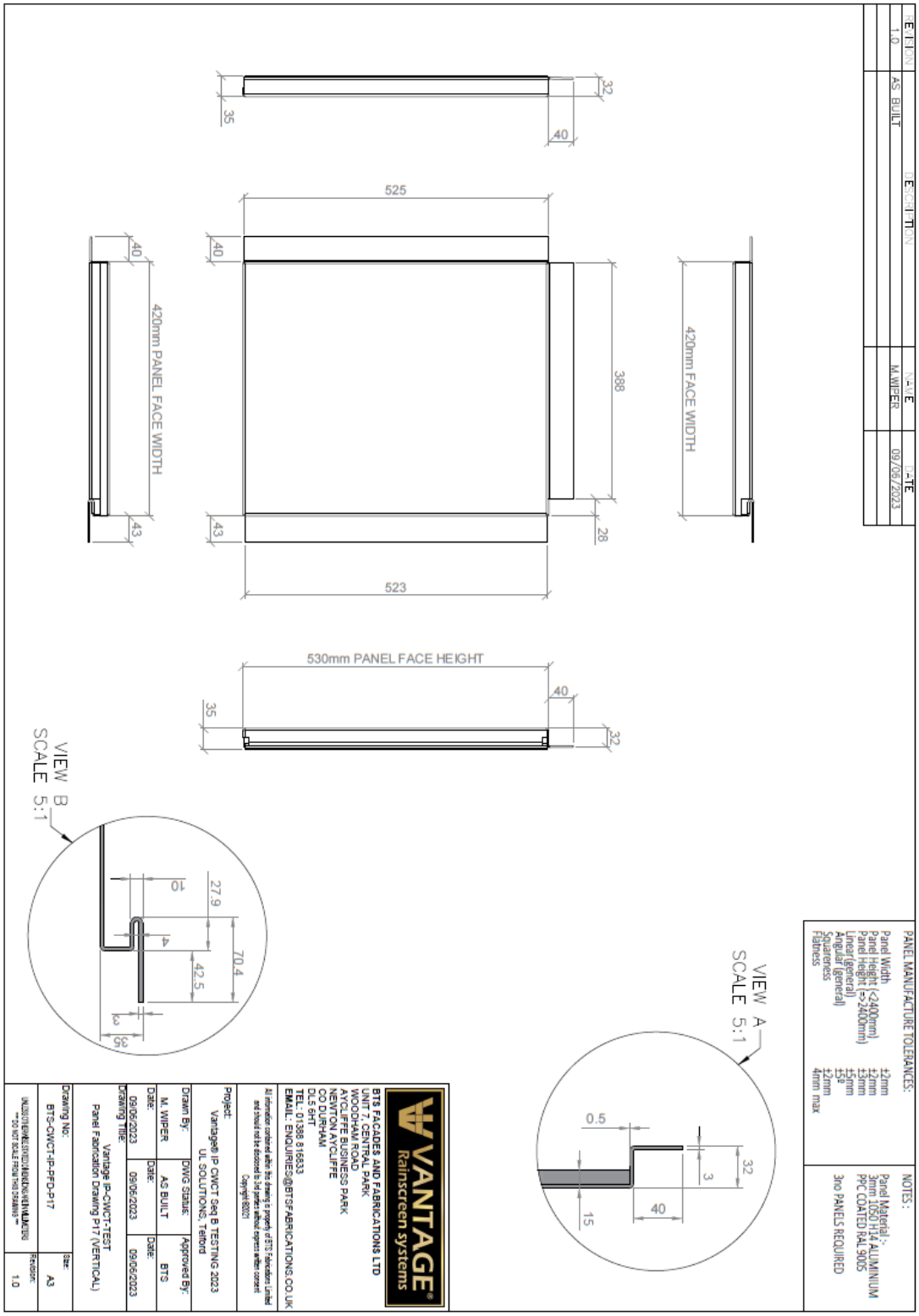
Drawing No:	Size:
BTS-CWCT-IP-PFD-P12	A3
UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETERS ** DO NOT SCALE FROM THIS DRAWING **	Revision: 1.0

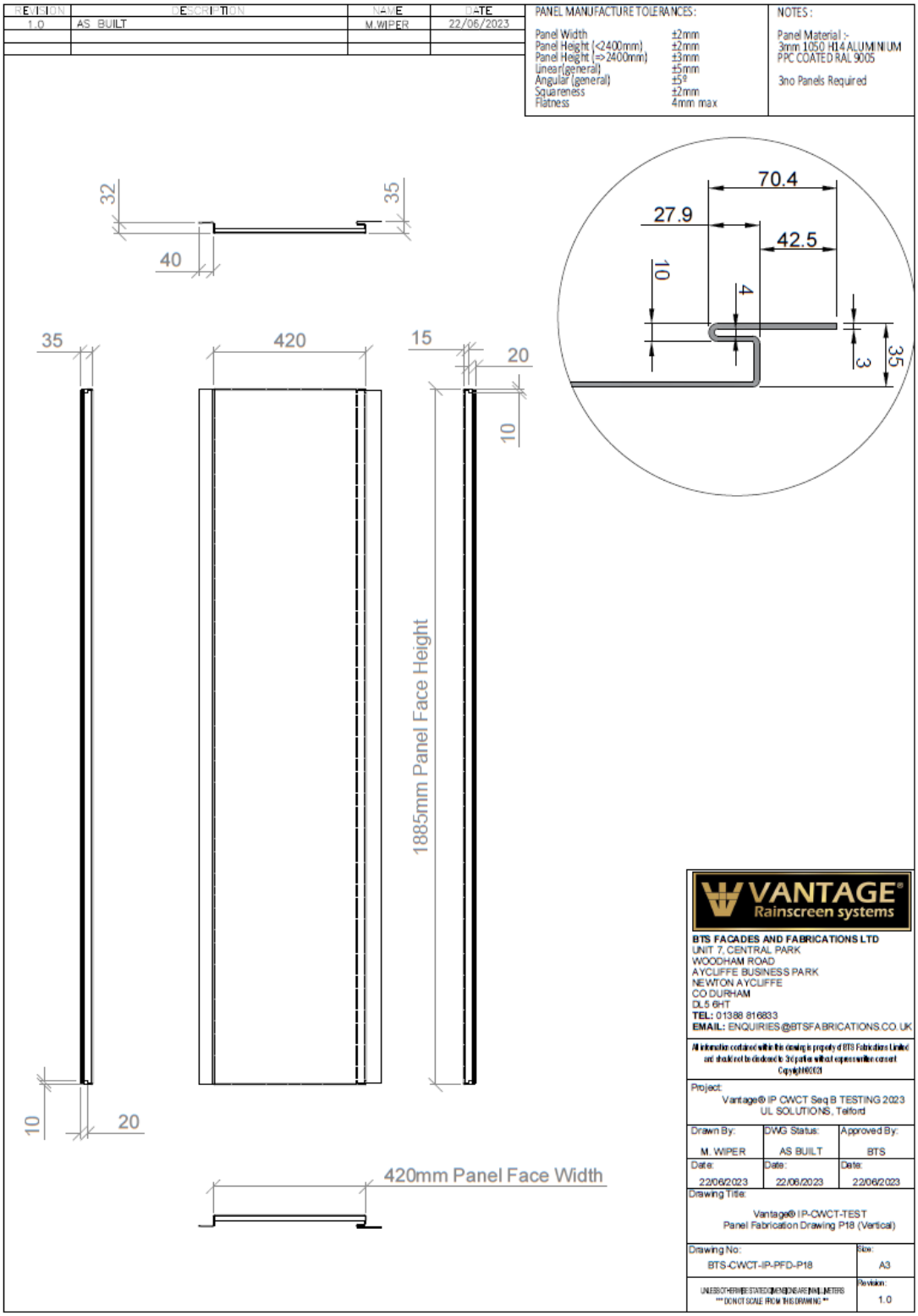


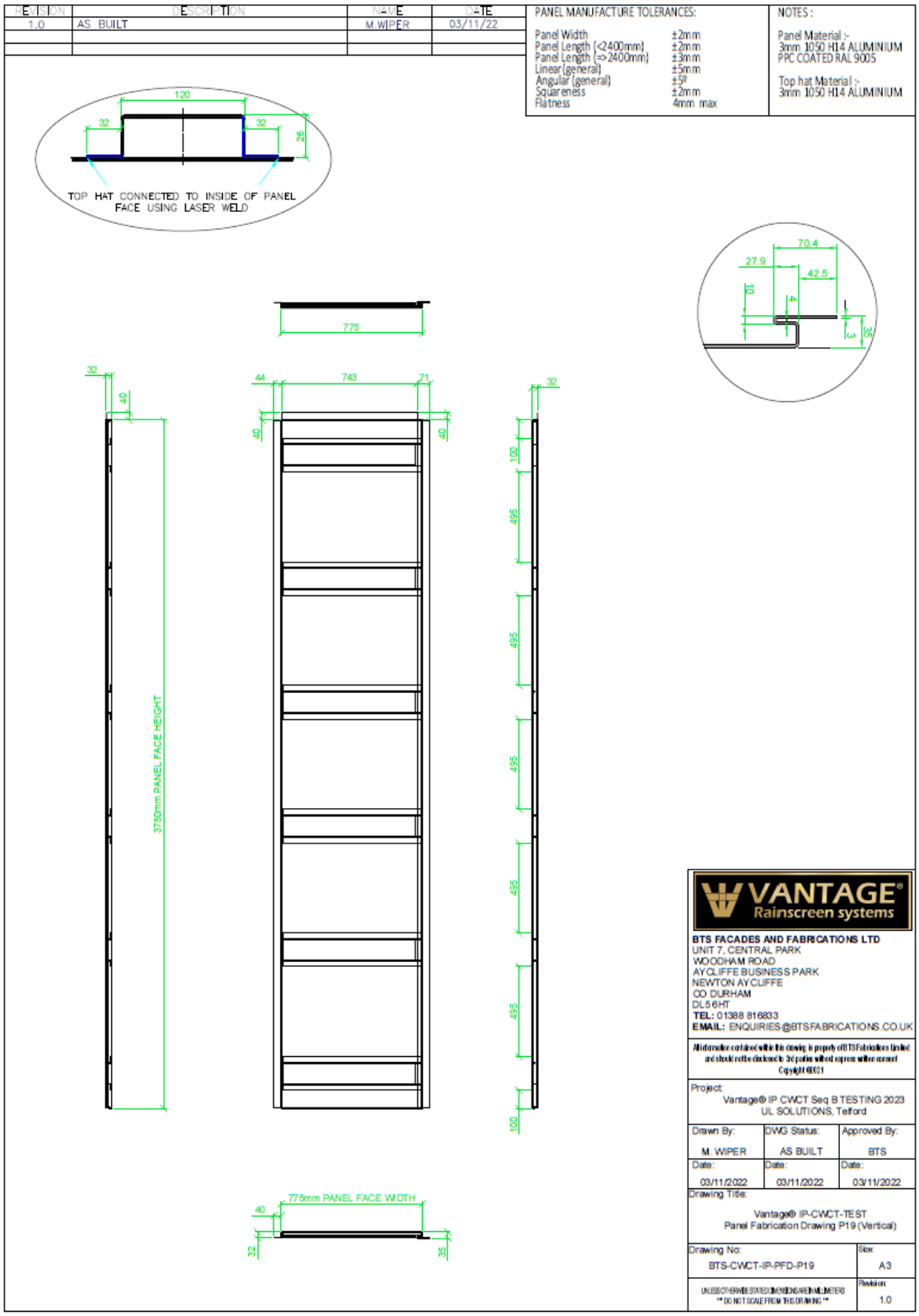












REVISION	DESCRIPTION	NAME	DATE
1.0	AS BUILT	M.WIPER	22/06/2023

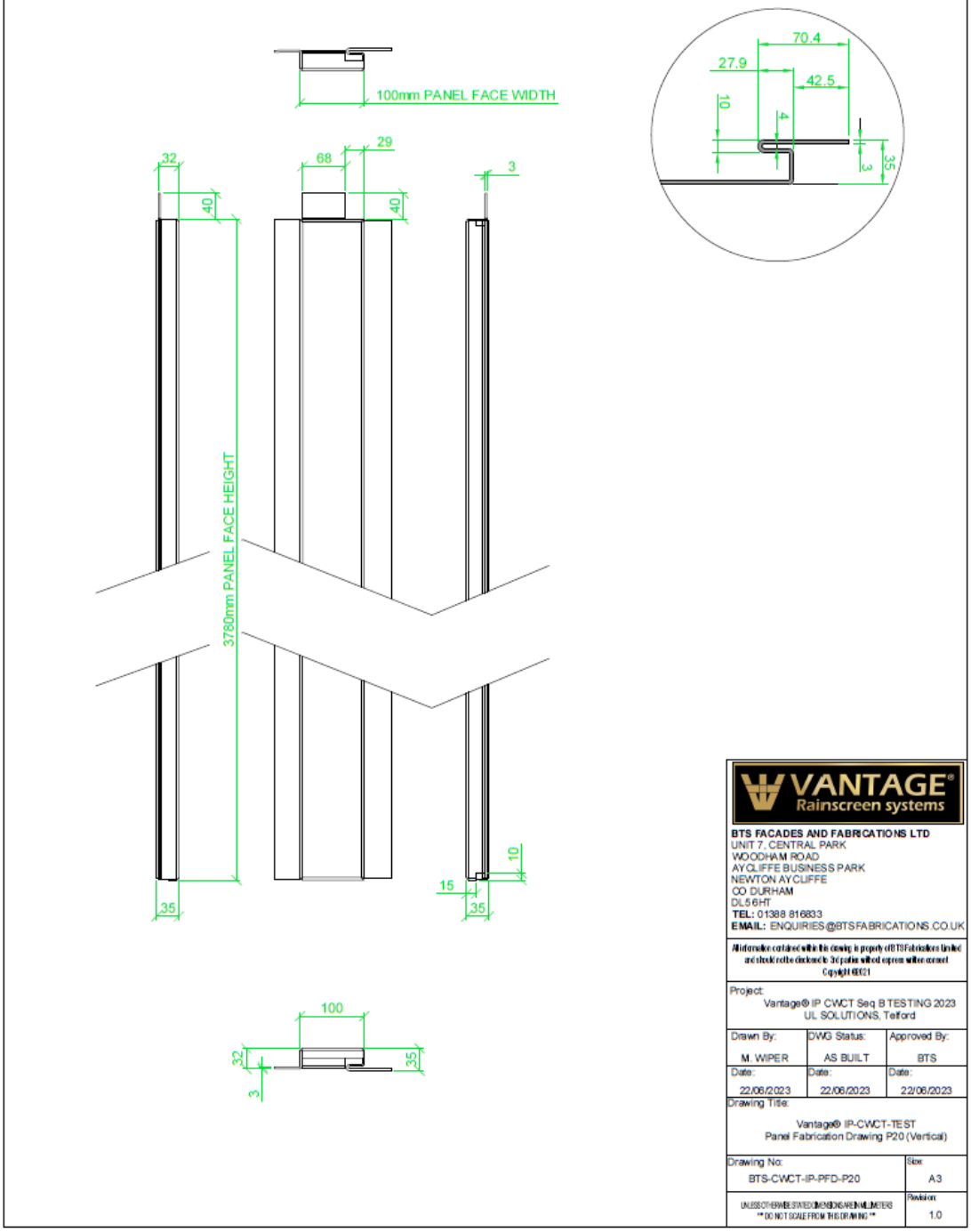
PANEL MANUFACTURE TOLERANCES:

Panel Width	±2mm
Panel Length (<2400mm)	±2mm
Panel Length (=>2400mm)	±3mm
Linear (general)	±5mm
Angular (general)	±5º
Squareness	±2mm
Flatness	4mm max

NOTES:

Panel Material :-
3mm 1050 H14 ALUMINIUM
PPC COATED RAL 9005

3no Panels Required



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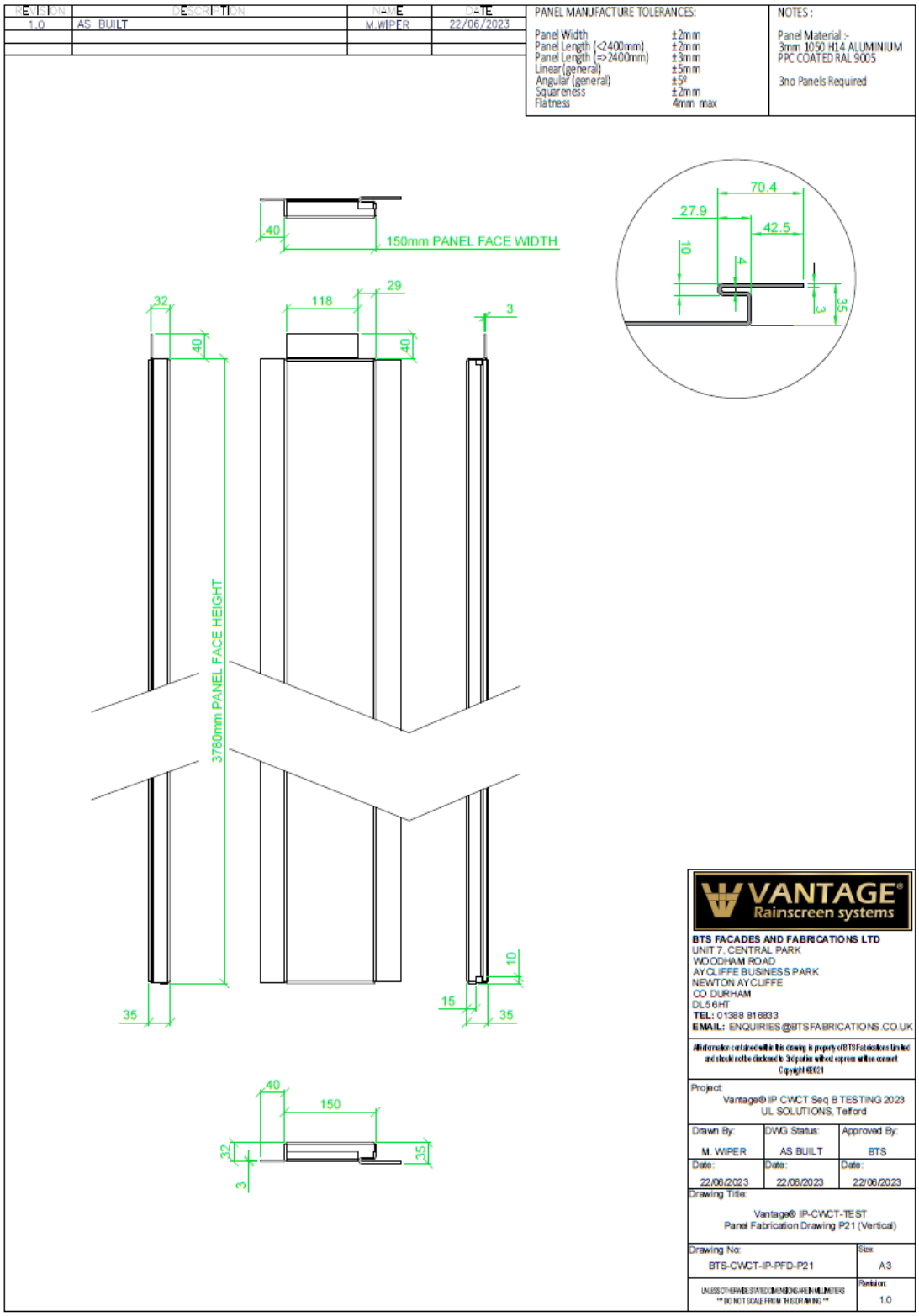
Project: Vantage® IP CWCT Seq B TESTING 2023 UL SOLUTIONS, Telford		
Drawn By: M. WIPER	DWG Status: AS BUILT	Approved By: BTS
Date: 22/06/2023	Date: 22/06/2023	Date: 22/06/2023
Drawing Title: Vantage® IP-CWCT-TEST Panel Fabrication Drawing P20 (Vertical)		
Drawing No: BTS-CWCT-IP-PFD-P20		Size: A3
UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETERS ** DO NOT SCALE FROM THIS DRAWING **		Revision: 1.0



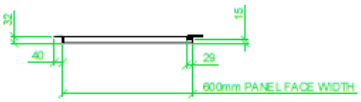
REVISION	DESCRIPTION	NAME	DATE
1.0	AS BUILT	M.WIPER	03/11/22

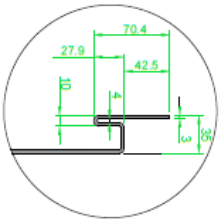
PANEL MANUFACTURE TOLERANCES:

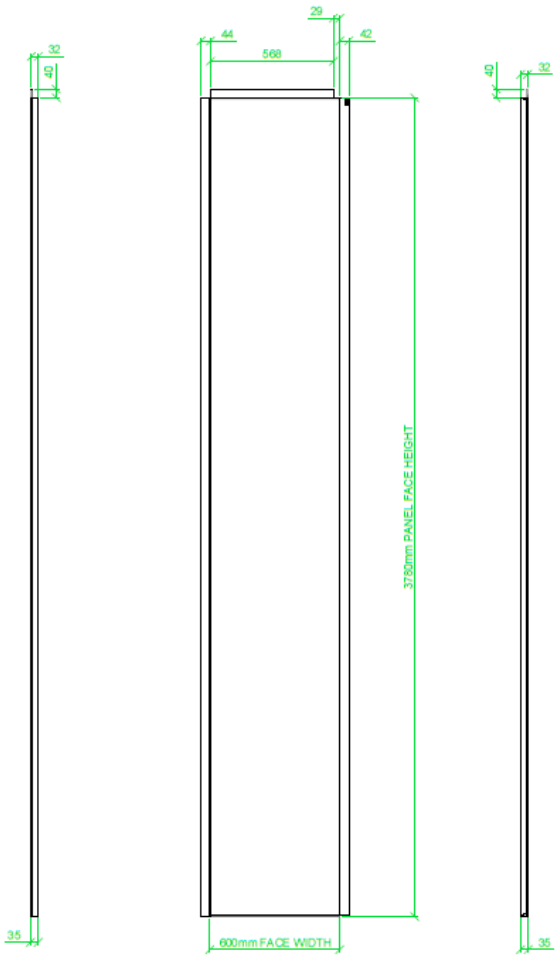
Panel Width	±2mm
Panel Length (<2400mm)	±2mm
Panel Length (=>2400mm)	±3mm
Linear (general)	±5mm
Angular (general)	±5°
Squareness	±2mm
Flatness	4mm max

NOTES:

Panel Material :-
3mm 1050 H14 ALUMINIUM
PPC COATED RAL 9005







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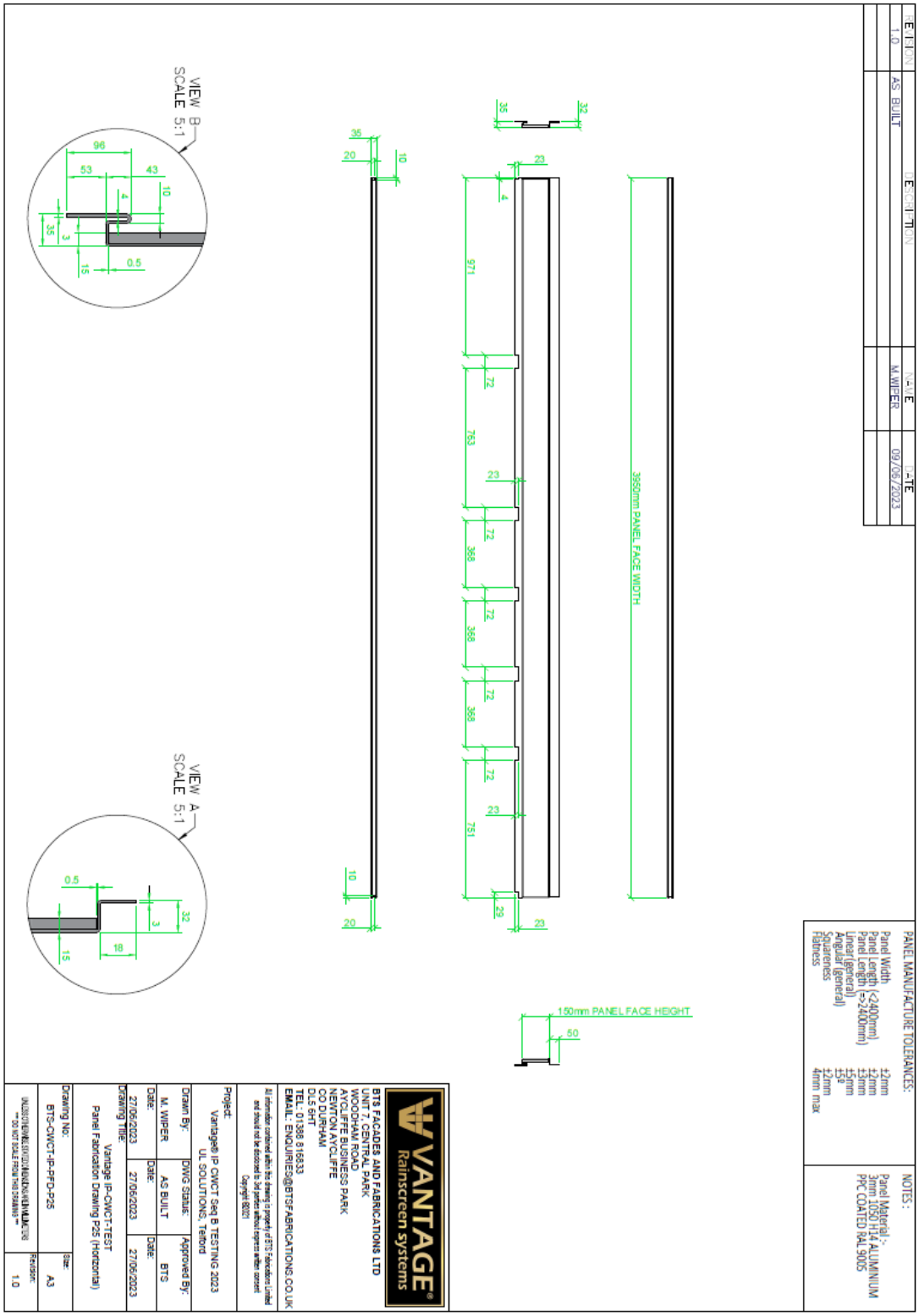
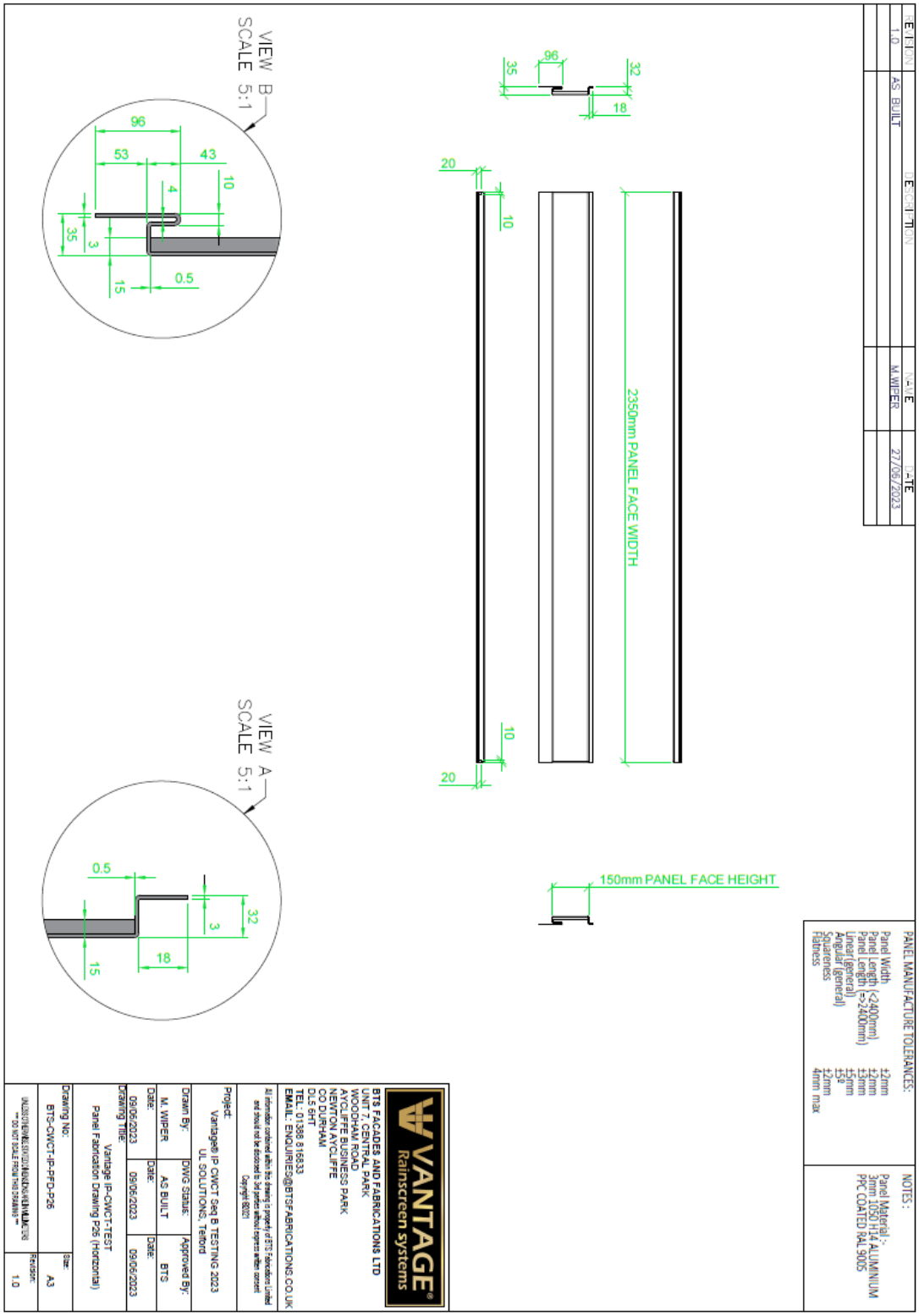
Project:
Vantage® IP CWCT Seq B TESTING 2023
UL SOLUTIONS, Telford

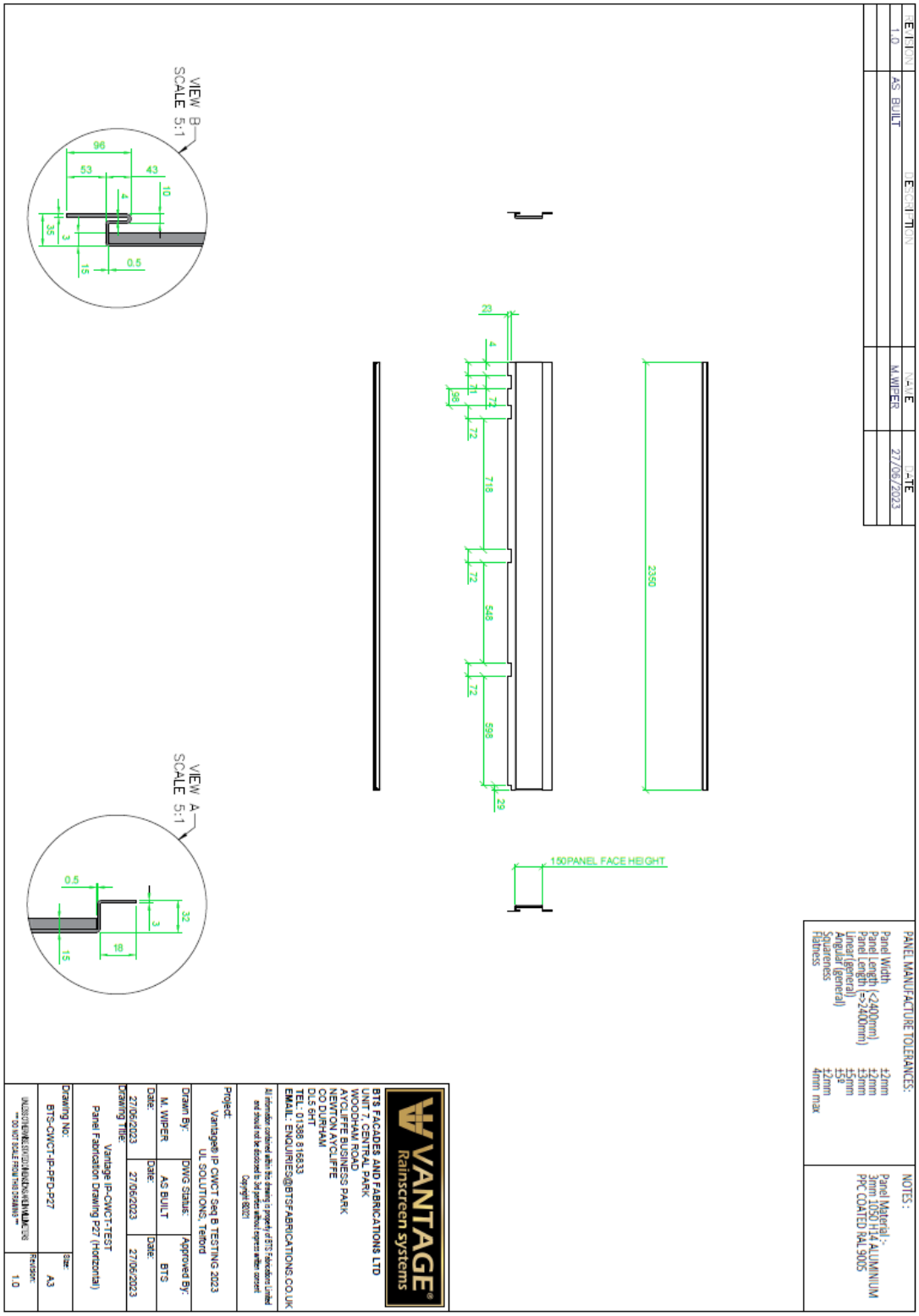
Drawn By:	DWG Status:	Approved By:
M. WIPER	AS BUILT	BTS
Date: 03/11/2022	Date: 03/11/2022	Date: 03/11/2022

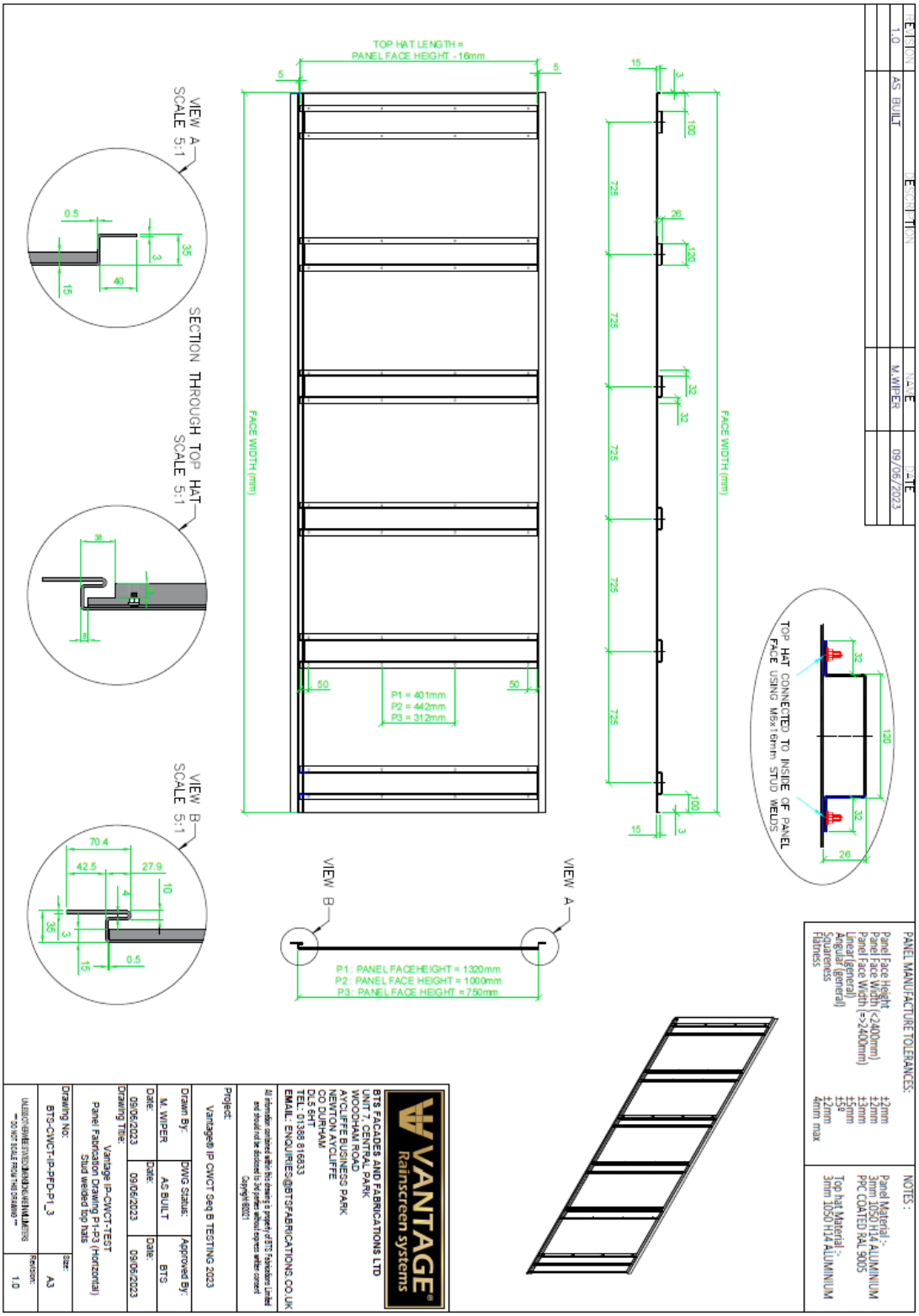
Drawing Title:
Vantage® IP-CWCT-TEST
Panel Fabrication Drawing P23 (Vertical)

Drawing No:	Size:
BTS-CWCT-IP-PFD-P23	A3
UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETERS ** DO NOT SCALE FROM THIS DRAWING **	Revision: 1.0









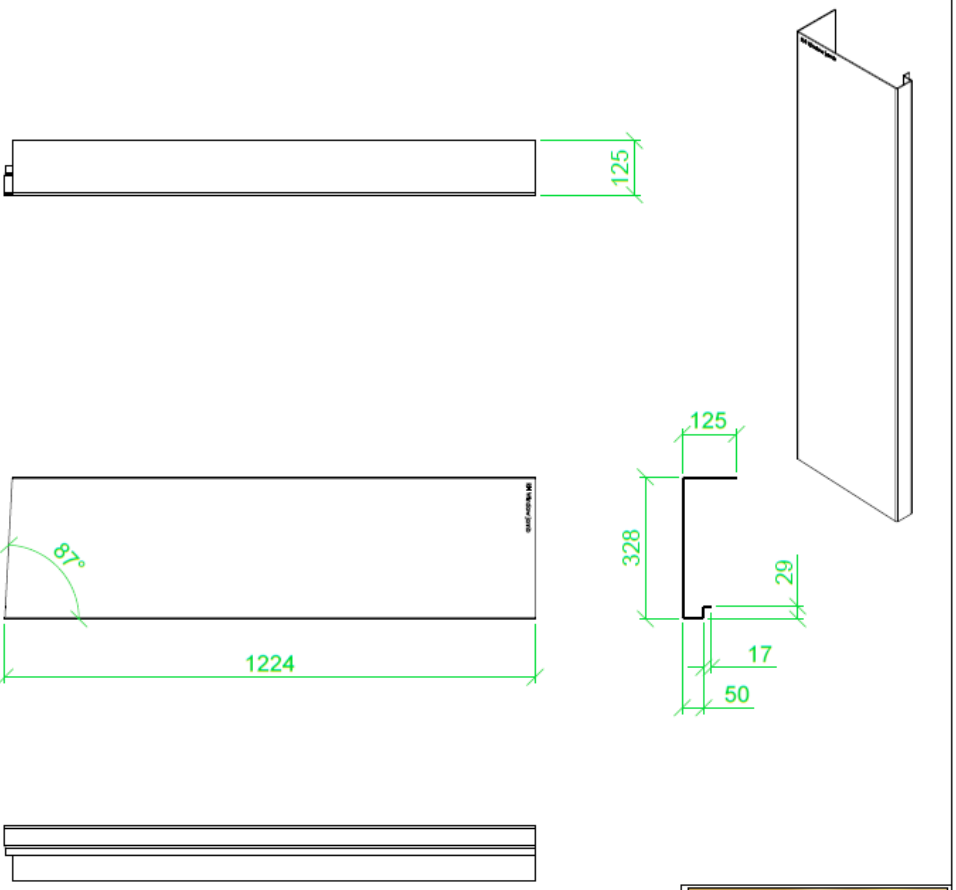
REVISION	DESCRIPTION	NAME	DATE
1.0	AS BUILT	M.WIPER	28/06/2023

PANEL MANUFACTURE TOLERANCES:

Panel Width	±2mm
Panel Length (<2400mm)	±2mm
Panel Length (=>2400mm)	±3mm
Linear (general)	±5mm
Angular (general)	±5º
Squareness	±2mm
Flatness	4mm max

NOTES:

Flashing Material :-
3mm 1050 H14 ALUMINIUM
PPC COATED RAL 9005



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Project:
Vantage® IP CWCT Seq B TESTING 2023
UL SOLUTIONS, Telford

Drawn By:	DWG Status:	Approved By:
M. WIPER	AS BUILT	BTS
Date: 28/06/2023	Date: 28/06/2023	Date: 28/06/2023

Drawing Title:
Vantage® IP-CWCT-TEST
Panel Fabrication Drawing RH Jamb

Drawing No:	Size:
BTS-CWCT-IP-PFD-RHJ	A3
UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETERS ** DO NOT SCALE FROM THIS DRAWING **	Revision: 1.0

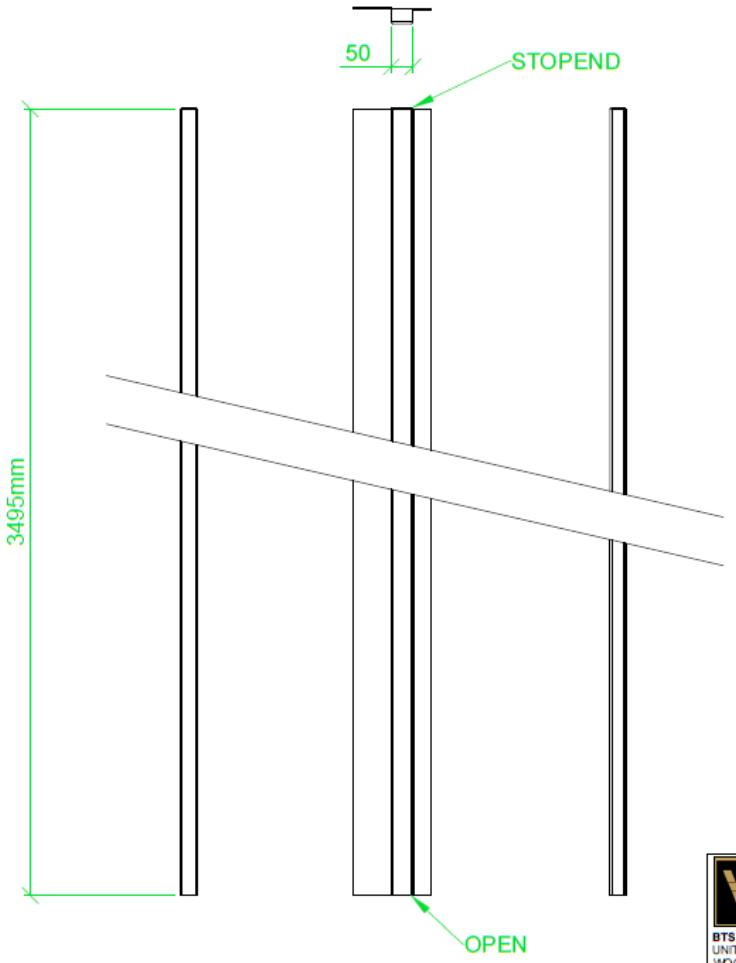
REVISION	DESCRIPTION	NAME	DATE
1.0	AS BUILT	M.WIPER	28/06/2023

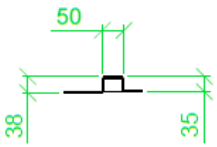
PANEL MANUFACTURE TOLERANCES:

Panel Width	±2mm
Panel Length (<2400mm)	±2mm
Panel Length (=>2400mm)	±3mm
Linear (general)	±5mm
Angular (general)	±5º
Squareness	±2mm
Flatness	4mm max

NOTES:

Panel Material :-
3mm 1050 H14 ALUMINIUM
PPC COATED RAL 9005





VANTAGE® Rainscreen systems

BTS FACADES AND FABRICATIONS LTD
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WOODHAM ROAD
AYCLIFFE BUSINESS PARK
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CO DURHAM
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EMAIL: ENQUIRIES@BTSFABRICATIONS.CO.UK

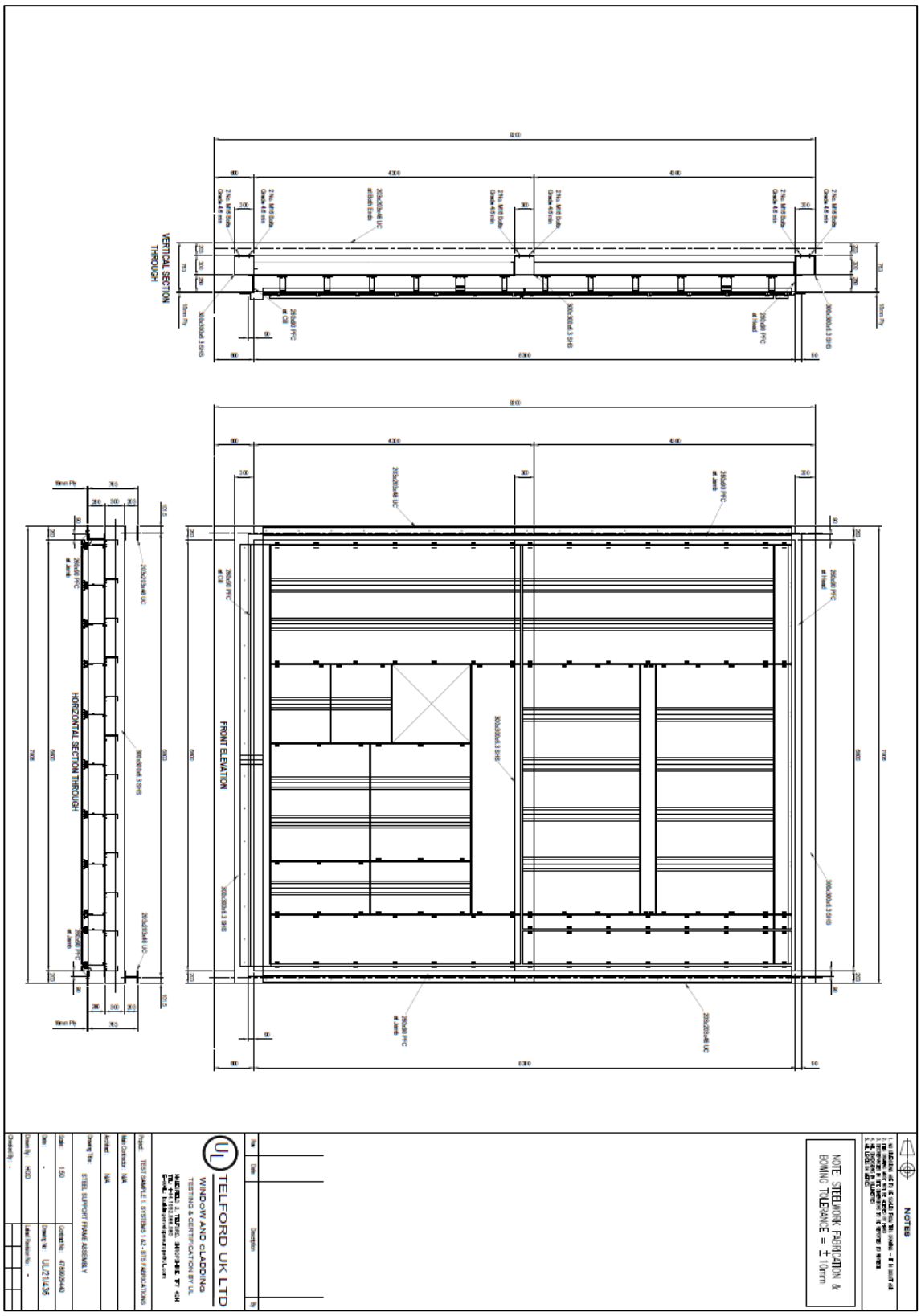
Project:
Vantage® IP CWCT Seq B TESTING 2023
UL SOLUTIONS, Telford

Drawn By:	DWG Status:	Approved By:
M. WIPER	AS BUILT	BTS
Date: 28/06/2023	Date: 28/06/2023	Date: 28/06/2023

Drawing Title:
Vantage® IP-CWCT-TEST
Panel Fabrication Drawing VF01

Drawing No:	Size:
BTS-CWCT-IP-PFD-VF01	A3
UNLESS OTHERWISE STATED DIMENSIONS ARE IN MILLIMETERS ** DO NOT SCALE FROM THIS DRAWING **	Revision: 1.0

8. Support Steelwork Drawing



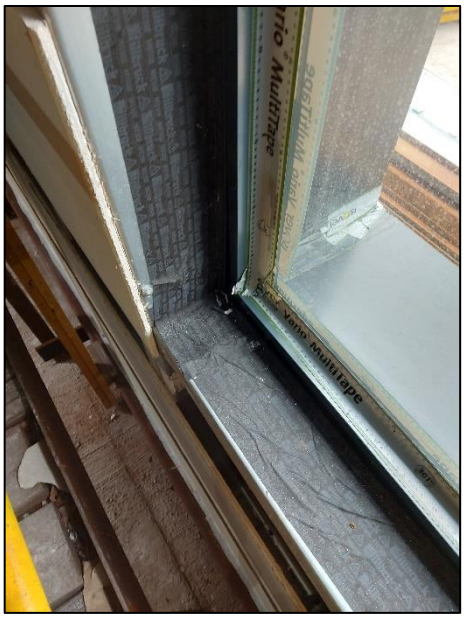
9. Dismantling

The dismantling was conducted on 30th June 2023 and 3rd July 2023 by representatives of BTS Facades & Fabrications Limited and was witnessed by representatives of UL International (UK) Limited.

There was no water evident in the system in parts designed not to be wetted, and it was found that the system fully complied with the system drawings in Section 7 provided by BTS Facades & Fabrications Limited at the time of the dismantle.

Photograph No. 10 - Sample prior to dismantle

Photograph No. 11 – Window interface detail



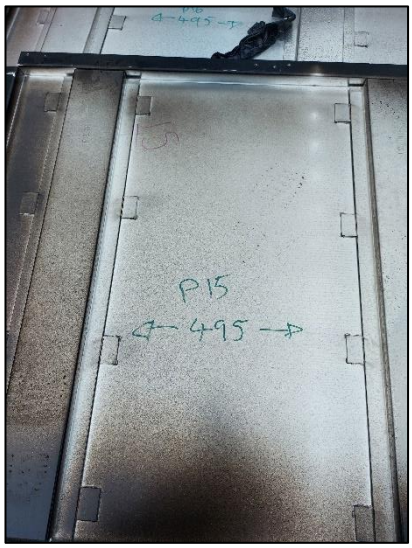
Photograph No. 12 - Window interface detail

Photograph No. 13 - Window interface detail

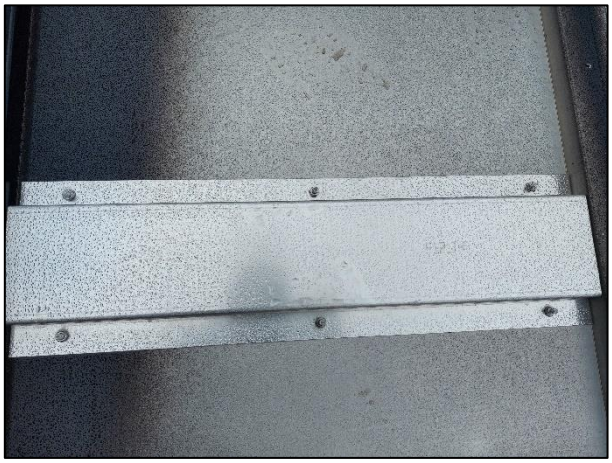
Photograph No. 14 - Window interface detail

Photograph No. 15 – Sample during panel removal

Photograph No. 16 – Stiffeners on rear of panel reference P15



Photograph No. 17 – Studded stiffener type



Photograph No. 18 – Welded stiffener type

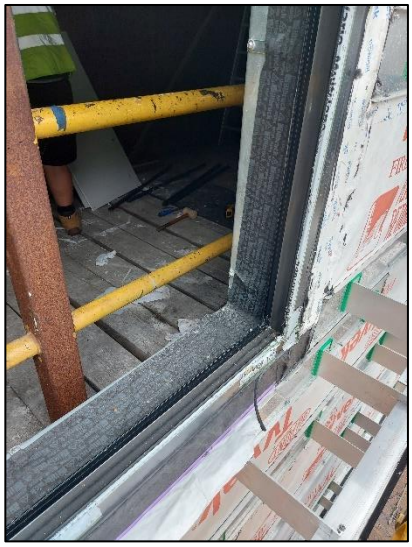
Photograph No. 19 – Sample with all panels removed

Photograph No. 20 – Window prior to removal from sample

Photograph No. 21 – Window interface detail

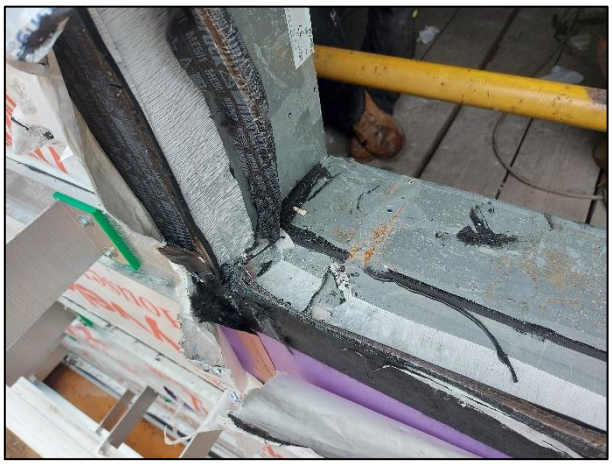
Photograph No. 22 - Window interface detail

Photograph No. 23 – Glazing removed with window frame still in place



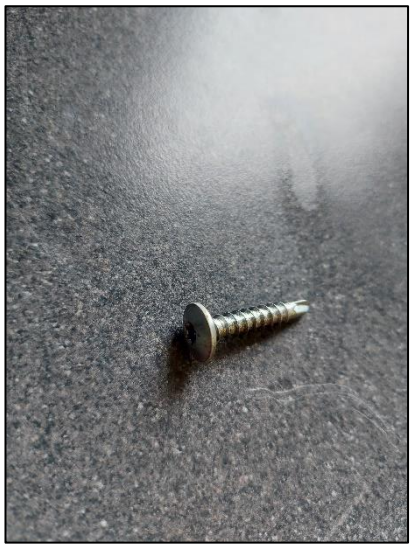
Photograph No. 24 – Window frame removed, and dry zone checked and found to be dry

Photograph No. 25 - Window frame removed, and dry zone checked and found to be dry



Photograph No. 26 - Window frame removed, and dry zone checked and found to be dry

Photograph No. 27 – Typical panel fixing



Photograph No. 28 – Helping hand type 1

Photograph No. 29 – Helping hand type 2

Photograph No. 30 – Helping hand type 3

Photograph No. 31 – Rails and helping hands removed

Photograph No. 32 – Siniat boards partially removed

----- END OF REPORT -----

UL International (UK) Limited is an independent UKAS accredited testing laboratory and certification body. We provide a comprehensive range of services to the building and construction industries, either onsite or at our own state-of-the-art test laboratory in Telford, Shropshire, in the heart of industrial England.

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