

Technical Report – R4790619980 CWCT – Standard for systemised building envelopes – 2005

Smart Systems Ltd

MC600 - System Test






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1. Introduction

This report describes the tests carried out in order to determine the impact resistance of the sample supplied as follow:

Test Details	
Customer:	Smart Systems Ltd Arnolds Way Bristol BS49 4QN
Product Tested:	MC600 – System Test
Date of Test:	9 th and 10 th August 2023
Test Conducted at:	UL International (UK) Limited Halesfield 2 Telford Shropshire TF7 4QH
Test Conducted by:	K Alden <i>Senior Engineering Technician</i> J Dove <i>Senior Laboratory Assistant</i> L Jervis <i>Laboratory Assistant</i> D Walmsley <i>Laboratory Assistant</i>
Test Supervised by:	M Witkowska <i>Laboratory Manager</i> 
Test Witnessed by:	M Walford Smart Systems Ltd

Report Authorisation	
Report Compiled by:	D Price <i>Senior Engineering Associate</i> 
Authorised by:	M Wass <i>Business Manager</i> 

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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	
Impact – Safety (Soft body)	CWCT Section 15

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 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	Result	Test Date	Classification
Impact Resistance – Safety	Pass	09.08.23 10.08.23	I5 & E5

The test sample successfully passed all of the above CWCT test requirements.

More comprehensive details are reported in Section 6.

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

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 Smart Systems Ltd.

Product Description

Full product name:	MC 600
Product type:	Curtain Wall
Product description:	Stick Build Curtain Wall
Manufactured by:	Smart Systems

Framing Members

Material:	Aluminium
Finish:	Powder Coated
Mullion Ref:	MC619
Transom Ref:	MC614, MC616
Mullion/Transom Jointing method:	2 Part Fixing Bracket, Anti Rotation Spring Pin
Fixing Screw Ref:	ACIM 062, ACET060
Max Span of Mullion between floors:	3900mm
Max Span of Transom between Mullions:	1695mm
Expansion joint:	10mm
Thermal Breaks:	Vertical MC601, Horizontal MC668
Construction tolerance allowed between framing members (+/-)	1mm

Glazing & Infills

Glazing unit thickness as tested	28mm
Max glazing weight:	160 Kg
Infill types:	Double Glazed Units
Glazing retention method:	Pressure Plate
Pressure Plate Ref:	MC655
Pressure Plate Screw Ref:	ACMC610

Interface Details (curtain wall to window/door inserts)

Window interface detail:	Glazed-in Parallel Opening Window
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Sealing

Gasket Materials:	EPDM
Internal gasket ref:	ACMC713
Pressure plate gasket ref:	ACMC151
External EPDM perimeter Seal	Obex Cortex 0500FR Class B Membrane
Internal EPDM Perimeter Seal	Obex Cortex 0500FR Class B Membrane
External Silicone Seal	ACSIL014
External sealant type:	Formoa Polymer Sealant
External sealant supplier and ref:	Forgeway

Drainage

Drainage type (pressure equalised etc.):	Drain and equalised through pressure plate
Specification and weep holes etc.	7mm x 25mm Slots

Brackets & Fixings

Fixing bracket ref:	Bespoke, 10 mm Steel L type brackets. M10 Bolts, Washers, Nyloc Nuts
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Opening Vent full description

Product range name:	Alitherm 700
Configuration:	Parallel Opening
Opening direction:	Outwards

Outer Frame

Outer frame width:	1325mm	Outer frame material:	Aluminium
Outer frame height:	1475mm	Outer frame gasket	
Outer frame Part Numbers		Gasket type:	EPDM
Top:	ETC717	Manufacturer:	Aliplast
Bottom:	ETC717	Product name:	Flipper Gasket
Lock side:	ETC717	Product code:	ACVL031N
Hinge side:	ETC717	Threshold	
Outer frame section size		Manufacturer:	
Width:	67mm	Product name:	
Depth:	70mm	Product code:	
Reinforcing:	N/A	Material:	
Manufacturer:		Outer frame joint method	
Product name:		Head:	Glue and Crimp
Product code:		Foot:	Glue and Crimp

Leaf

Leaf width:	1247mm	Leaf material:	Aluminium
Leaf height:	1397mm	Leaf gasket	
Leaf Part Numbers		Gasket type:	EPDM
Top:	ETC721	Manufacturer:	Aliplast
Bottom:	ETC721	Product name:	Flipper Gasket
Lock side:	ETC721	Product code:	ACVL031N
Hinge side:	ETC721	Leaf midrail:	N/A
Leaf section size		Manufacturer:	
Width:	70.5mm	Product name:	
Depth:	70mm	Product code:	
Reinforcing:	N/A	Material:	
Manufacturer:		Leaf joint method	
Product name:		Head:	Glue and Crimp
Product code:		Foot:	Glue and Crimp

Glazing

Glass unit		Glazing gasket	
Manufacturer:	Cornwall Glass	Gasket type:	EPDM
Inner thickness:	6mm	Manufacturer:	Veker
Spacer material:		Product name:	E Gasket, Wedge
Outer thickness:	6mm	Product code:	ACVG31, ACVG34
Unit sizes:	1130mm x 1230mm	Glazing clip	N/A
Bead		Manufacturer:	
Manufacturer:	Smart Systems	Product name:	
Product name:	Alitherm 700	Product code:	
Product code:	ETC766	Glazing tape details	N/A
Bead size:	31mm x 16.5mm	Manufacturer:	
Bead material:	Aluminium	Product name:	

Hardware

	Manufacturer:	Product description:	Product code:	Quantity:
Hinges:	Securistyle	Parallel, Opening Control Stays	ACETPPS59L	1
Hinge fixing:		Righton	ACETPPS59R	1
Window lock:		ERA	ACETPPS67R	1
Hinge fixing:	Righton	Flange Head Screw	ACET068	20
Window lock:	ERA	Basic Lock Kit	ACET710	1 Set
Window lock fixings:	Righton	No.7 csk	ACET060	
Handle:	Winlock	Cranked Handle	ACET165	1 Pair
Handle fixings:	Righton	M5 Machine Screw	ACET069	4
Keeps:	J Banks	Corner and Centre Keeps	ACET710	1 Set
Keep fixings:	Righton	No7 csk	ACET060	
Drip bar:	Smart Systems	Drip Bar	VI72	1
Drip bar fixings:	Smart Systems	Revit	ACVL061	6 off
Locking Shoot Bolts	ERA	Shoot Bolts	ACET714	2 off
Drain Caps	Smart Systems	Drain Caps	ACET131	6 off

Drawings

Drawing/s must be provided covering the below; <ul style="list-style-type: none"> - Full drawing of sample including front elevation - Cross Sections - Hardware Locations - Fixings - Drainage Points Note: Drawings are required to show all relevant dimensions	As detailed in Section 7
Test sample size:	As detailed in Section 7

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:	Smart Systems Ltd
Name:	Kevin Cole
Position:	Senior Project Engineer
Date:	19 th September 2023

Sample during testing

Photograph No. 1 – During external impacting



Photograph No. 2 – During internal impacting



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.

4.2 Instrumentation

4.2.1 Temperature & Humidity

A digital data logger capable of measuring temperature with an accuracy of $\pm 1^{\circ}\text{C}$ and humidity with an accuracy of $\pm 5\% \text{Rh}$ was used.

4.3 Impactor

4.3.1 Soft Body Impactor (as specified in BS EN 12600:2002)

The BS EN 12600 impactor, as per the requirement of CWCT Section 15 & BS EN 13049:2003 was used and calibrated at appropriate intervals and traceable to National Standards.

It comprised of two specified pneumatic tyres; two equal steel weights and a means of their connection, to give a total mass of $50 \text{ Kg} \pm 0.1 \text{ Kg}$. It was suspended by means of a steel cable of 5 mm diameter. The tyres were inflated to a pressure of $0.35, \pm 0.02 \text{ MPa} - 3.5 \text{ bar}$.

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

5. Test Procedures

5.1 Sequence of Testing

Impact Resistance – Safety

5.2 Impacting

5.2.1 Impact Test Procedure

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

The Impactor, as described in section 4.3.1, was suspended on a wire cord and allowed to swing freely, without initial velocity, in a pendulum motion until it hit the sample normal to its face. Only one impact was performed at any single position.

Tests were conducted at the specified drop height of 950 mm to the selected impact points and the impactor was not allowed to strike the sample more than once.

Following each impact, an additional impact was conducted at a drop height of 100 mm as per the requirements of BS EN 14019:2016.

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

6. Test Results

6.1 Impacting

6.1.1 Impact – Safety (Soft Body) - Internal

Test Date	10.08.23
Ambient Temperatures (°C)	19.1
Humidity (%RH)	61.0

Class Achieved	I5
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Impact Reference	Test Classification	Drop Height (mm)	Observations	Result
I1	I5	950	No Damage	Pass
I2	I5	950	No Damage	Pass
I3	I5	950	No Damage	Pass

Photograph No. 3 - During the test, no damage was observed.



6.1.2 Impact – Safety (Soft Body) - External

Test Date	09.08.23
Ambient Temperatures (°C)	12.8
Humidity (%RH)	62.0

Class Achieved	E5
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Impact Reference	Test Classification	Drop Height (mm)	Observations	Result
E1	E5	950	No Damage	Pass
E2	E5	950	Corner of capping bent, safely retained	Pass
E3	E5	950	Capping dented	Pass
E4	E5	950	No Damage	Pass
E5	E5	950	No Damage	Pass

Photograph No. 4 - Corner of capping bent following impact reference E2, safely retained



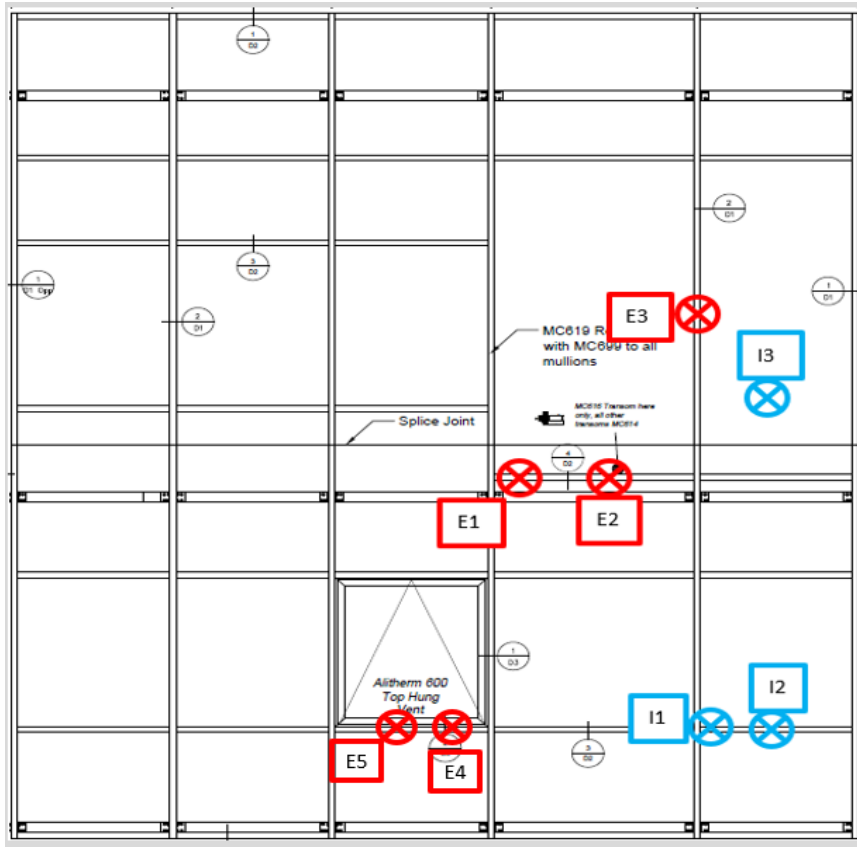
Photograph No. 5 - During the test, no damage was observed.



Note: *Following each of the above impacts, an additional impact was conducted at a drop height of 100 mm as per the requirements of BS EN 14019:2016 and no damage was found.*

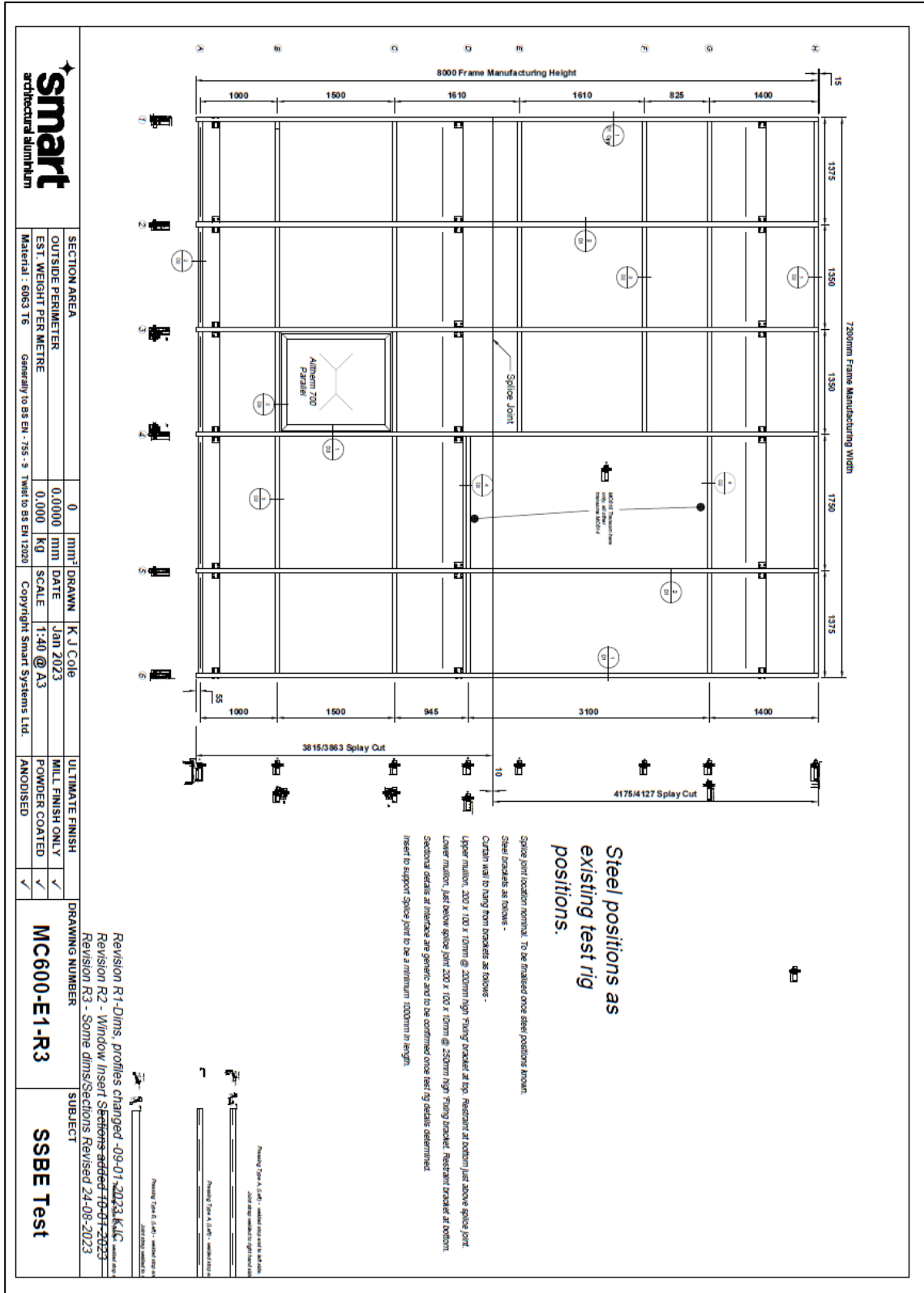
6.1.3 Impact Locations

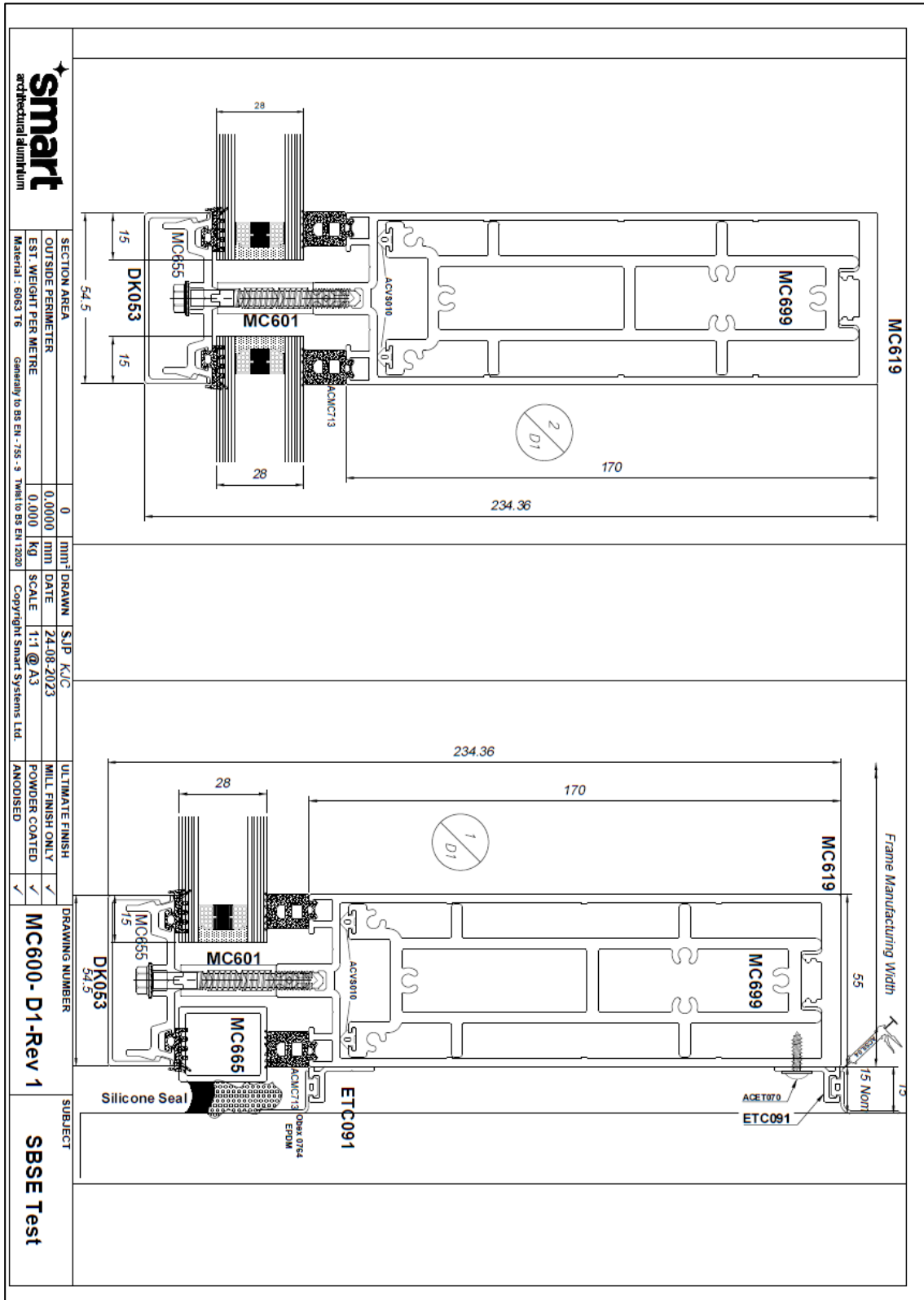
Figure 1

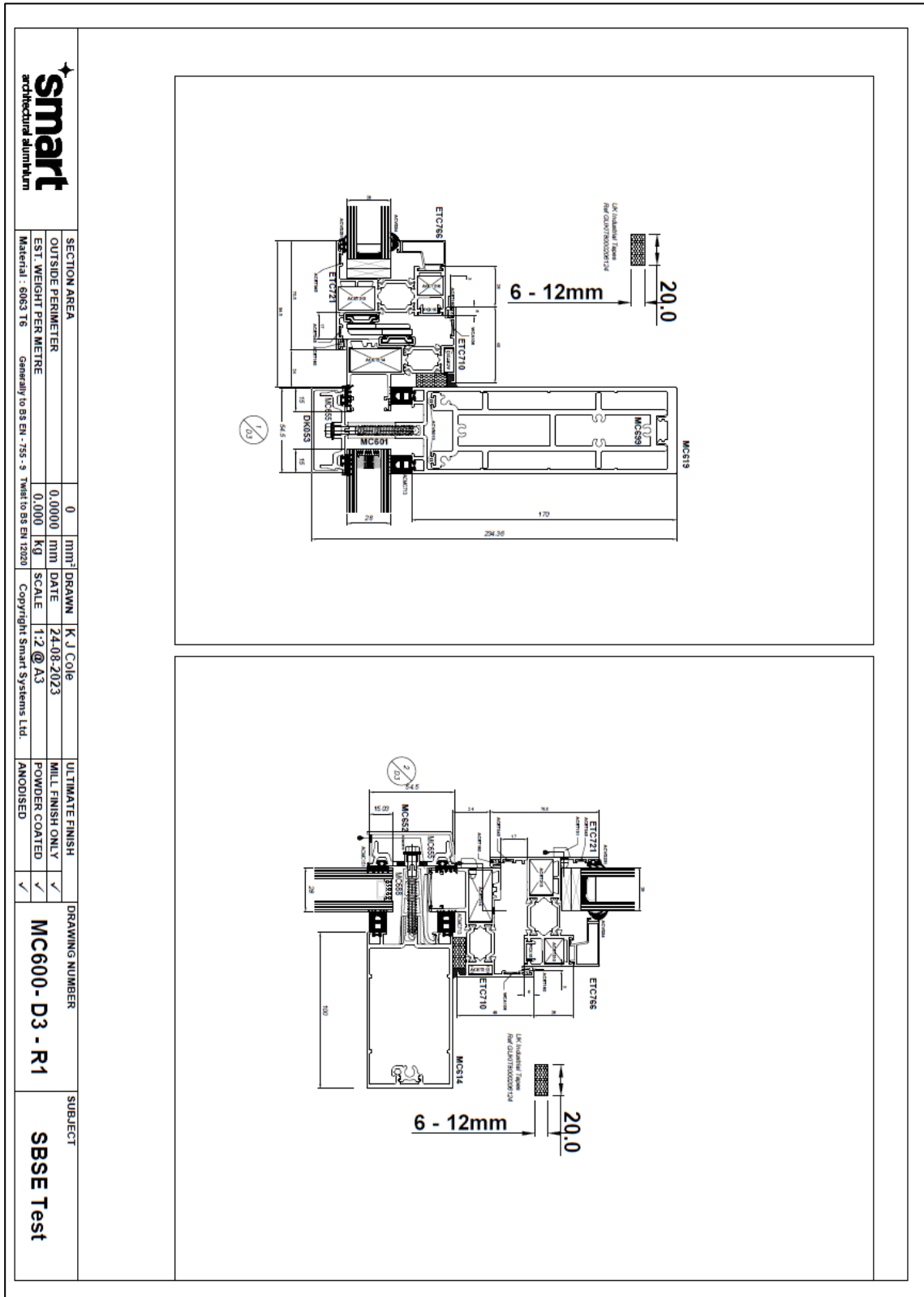


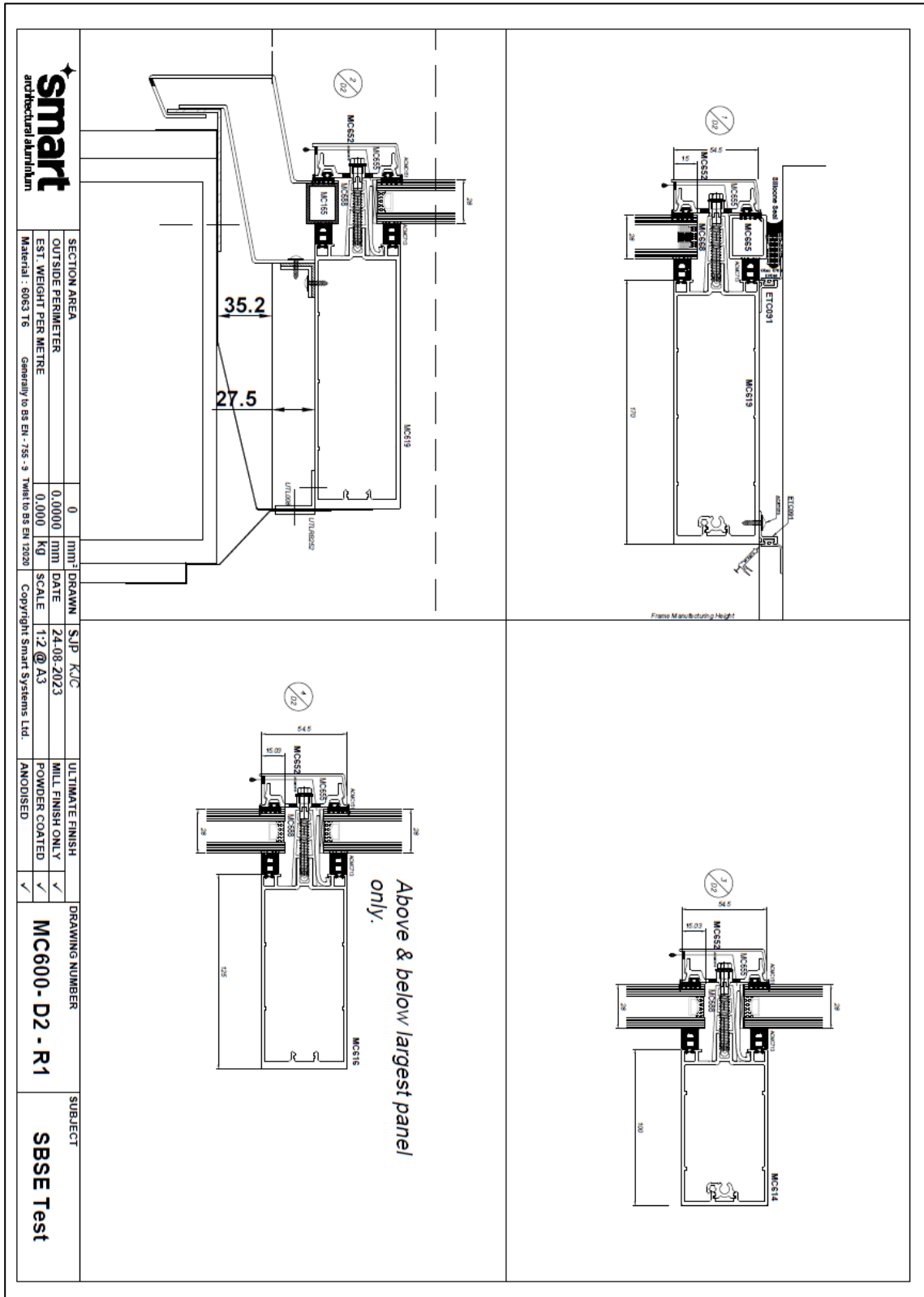
View from Outside
 Not to Scale

7. System Drawings

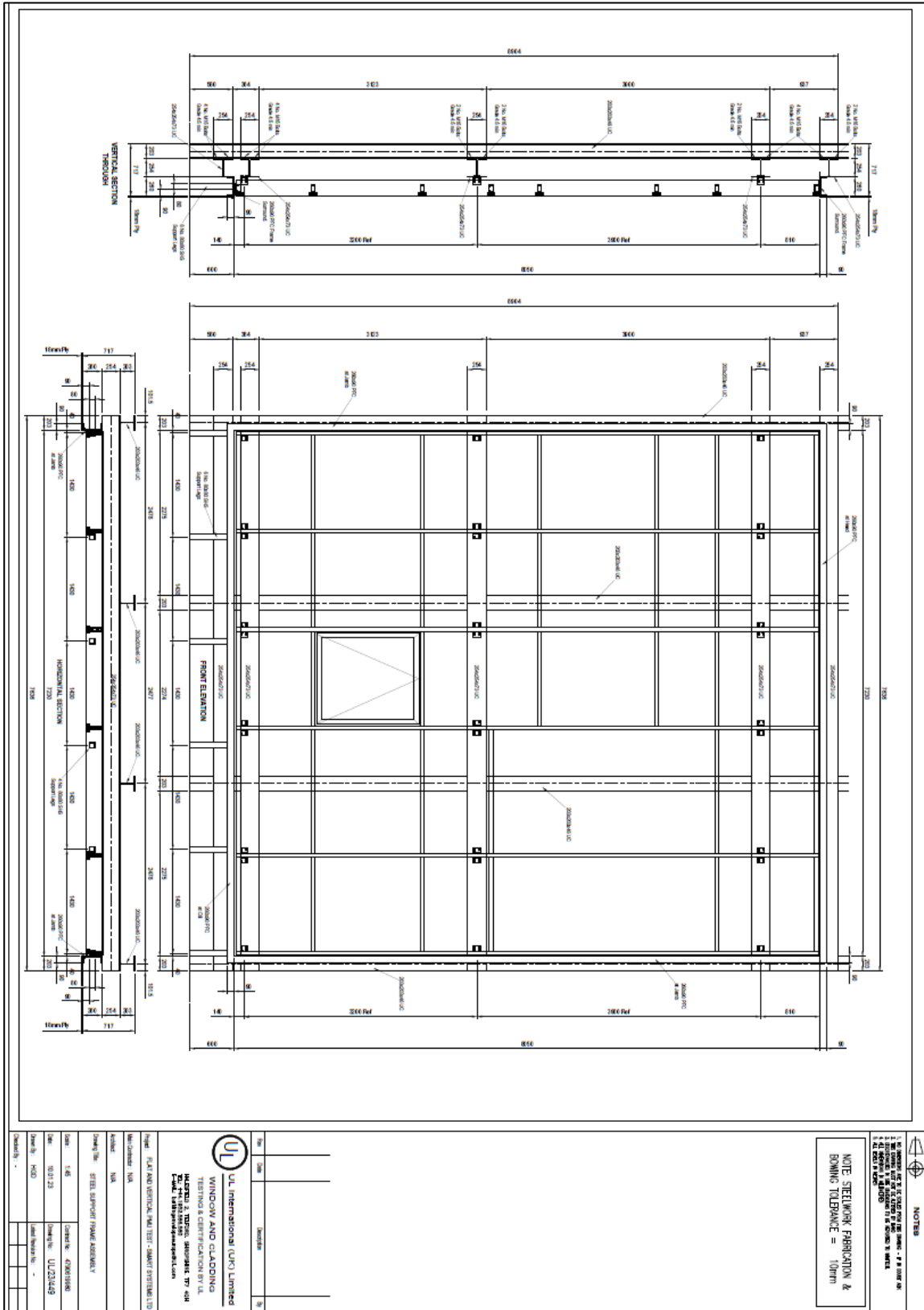








8. Support Steelwork Drawing



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



Facade Testing



Onsite Testing




UL Mark Certification



Window & Door Testing

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