Technical Report

Title: Product wind, water and impact resistance testing of a LineAL aluminium rainscreen system supplied by Ash & Lacy

Report No: N950-18-17539

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Title: Product wind, water and impact resistance testing of a LinAL aluminium rainscreen system supplied by Ash & Lacy

Customer: Ash & Lacy
Bromford Lane, West Bromwich
West Midlands B70 7JJ

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(confidential) 1 copy to project file

UKAS TESTING
0057

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CONTENTS

1 INTRODUCTION

This report describes tests carried out at VINCI Technology Centre UK Limited at the request of Ash & Lacy.

The test sample consisted of a LineAL aluminium rainscreen system manufactured by Ash & Lacy.

The tests were carried out on 15 January 2018 and were to determine the wind, water and impact resistance of the test sample. The test methods were in accordance with the CWCT Standard Test Methods for building envelopes, 2005, for:

Wind resistance – serviceability & safety.

Watertightness – dynamic pressure.

Impact resistance.

The testing was carried out in accordance with Technology Centre Method Statement C6591/MS rev 0.

This test report relates only to the actual sample as tested and described herein.

The results are valid only for sample(s) tested and the conditions under which the tests were conducted.

The long-term durability of the façade system is not assessed by these test methods.

VINCI Technology Centre UK Limited is accredited to ISO/IEC 17025:2008 by the United Kingdom Accreditation Service as UKAS Testing Laboratory No. 0057.

VINCI Technology Centre UK Limited is Notified Body No. 1766.

VINCI Technology Centre UK Limited is certified for:

- ISO 9001:2008 Quality Management System,
- ISO 14001:2004 Environmental Management System,
- BS OHSAS 18001:2007 Occupational Health and Safety Management System.

The tests were witnessed by Yisheng Tian of Ash & Lacy.

2 SUMMARY AND CLASSIFICATION OF TEST RESULTS

The following summarises the results of the tests carried out. For full details refer to Sections 6, 7 and 8.

2.1 SUMMARY OF TEST RESULTS

TABLE 1

Date	Test number	Test description	Result
15 January 2018	1	Wind resistance – serviceability	Pass
15 January 2018	2	Wind resistance – safety	Pass
15 January 2018	3	Watertightness – dynamic	Pass
15 January 2018	4	Impact resistance	Pass

2.2 CLASSIFICATION

TABLE 2

Test	Standard	Classification / Declared value
Wind resistance	CWCT	±2400 pascals – serviceability ±3600 pascals – safety
Watertightness - dynamic	CWCT	600 pascals
Impact resistance	CWCT	Class 1 serviceability Negligible risk - safety

3 DESCRIPTION OF TEST SAMPLE

3.1 GENERAL ARRANGEMENT

The sample was as shown in the photo below and the drawings included as an appendix to this report.

The test samples measured 5 m high and comprised LineAL rainscreen systems.

PHOTO 6734

TEST SAMPLE ELEVATION

3.2 CONTROLLED DISMANTLING

During the dismantling of the sample no water penetration or discrepancies from the drawings were found.

PHOTO 6670

SUPPORT RAILS

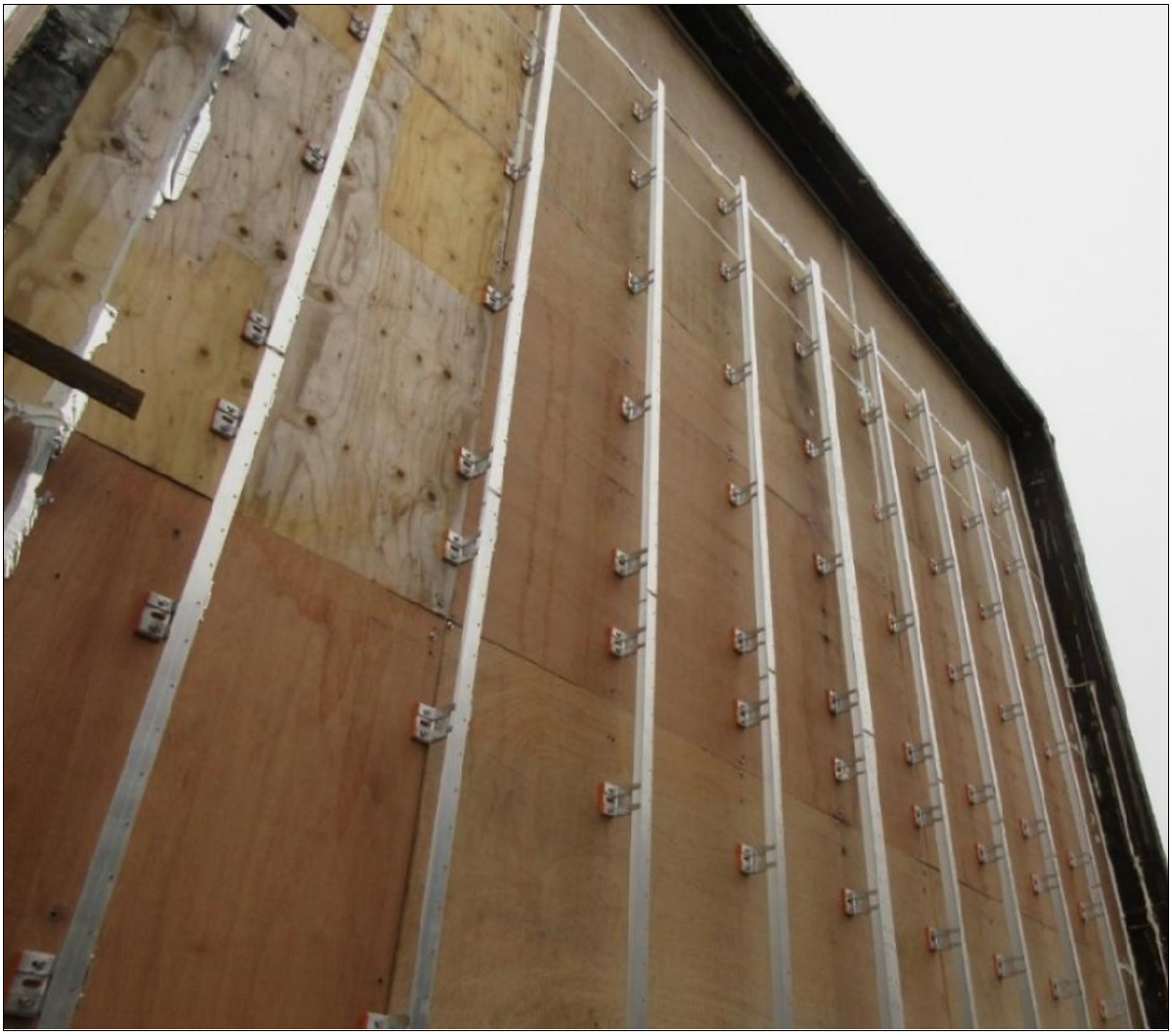


PHOTO 6795

PLANKS REMOVED FROM TEST RIG

PHOTO 6797

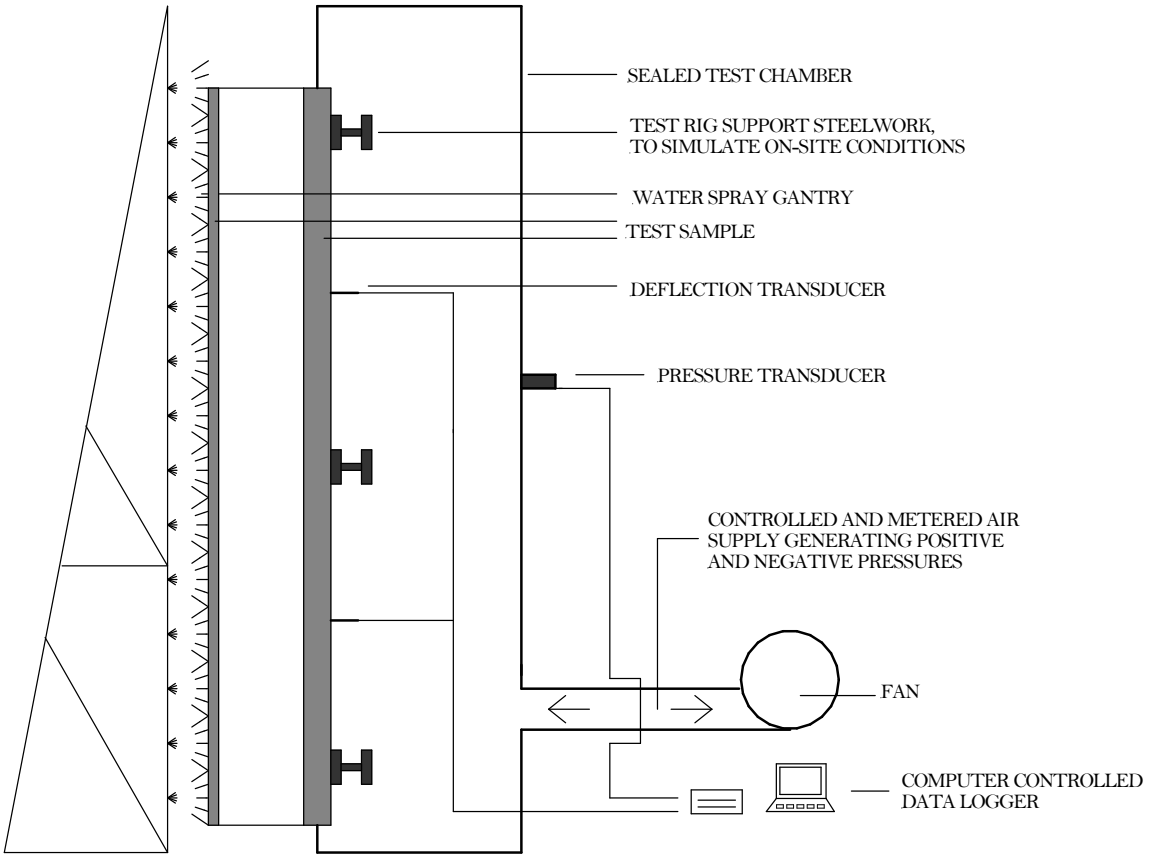
SUPPORT FRAME REMOVED FROM TEST RIG

4 TEST RIG GENERAL ARRANGEMENT

The test sample was mounted on a rigid test rig with support steelwork designed to simulate the on-site/project conditions. The test rig comprised a well sealed chamber, fabricated from steel and plywood. A door was provided to allow access to the chamber. Representatives of Ash & Lacy installed the sample on the test rig. See Figure 1.

FIGURE 1

TEST RIG SCHEMATIC ARRANGEMENT



SECTION THROUGH TEST RIG

5 TEST SEQUENCE

The test sequence was as follows:

(1) Wind resistance – serviceability

(2) Wind resistance – safety

(3) Watertightness – dynamic

(4) Impact resistance

.

6 WIND RESISTANCE TESTING

6.1 INSTRUMENTATION

6.1.1 Pressure

One static pressure tapping was provided to measure the chamber pressure and was located so that the readings were unaffected by the velocity of the air supply into or out of the chamber.

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

6.1.2 Deflection

Displacement transducers were used to measure the deflection of principle framing members to an accuracy of 0.1 mm. The gauges were set normal to the sample framework at mid-span and as near to the supports of the members as possible and installed in such a way that the measurements were not influenced by the application of pressure or other loading to the sample. The gauges were located at the positions shown in Figure 2.

6.1.3 Temperature

Platinum resistance thermometers (PRT) were used to measure air temperatures to within 1⌠C.

6.1.4 General

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

All measuring instruments and relevant test equipment were calibrated and traceable to national standards.

6.2 FAN

The air supply system comprised a variable speed centrifugal fan and associated ducting and control valves to create positive and negative static pressure differentials. The fan provided essentially constant air flow at the fixed pressure for the period required by the tests and was capable of pressurising at a rate of approximately 600 pascals in one second.

6.3 PROCEDURE

6.3.1 Wind Resistance – serviceability

Three positive pressure differential pulses of 1200 pascals were applied to prepare the sample. The displacement transducers were then zeroed.

The sample was subjected to one positive pressure differential pulse from 0 to 2400 pascals to 0. The pressure was increased in four equal increments each maintained for 15 ±5 seconds. Displacement readings were taken at each increment. Residual deformations were measured on the pressure returning to zero.

Any damage or functional defects were recorded.

The test was then repeated using a negative pressure of -2400 pascals.

6.3.2 Wind Resistance – safety

Three positive pressure differential pulses of 1200 pascals were applied to prepare the sample. The displacement transducers were then zeroed.

The sample was subjected to one positive pressure differential pulse from 0 to 3600 pascals to 0. The pressure was increased as rapidly as possible but not in less than 1 second and maintained for 15 ±5 seconds. Displacement readings were taken at peak pressure. Residual deformations were measured on the pressure returning to zero.

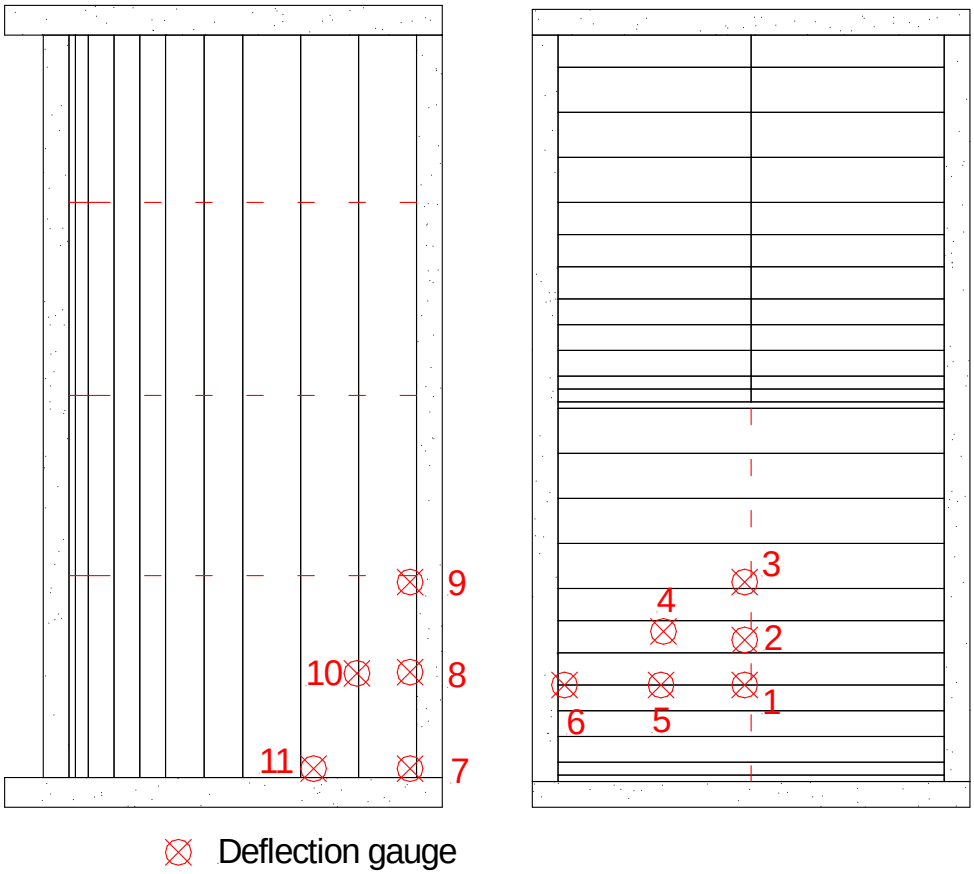
Any damage or functional defects were recorded.

The test was then repeated using a negative pressure of –3600 pascals.

FIGURE 2

DEFLECTION GAUGE LOCATIONS

External View



6.4 PASS/FAIL CRITERIA

6.4.1 Calculation of permissible deflection

Gauge number	Member	Span (L) (mm)	Permissible deflection (mm)	Permissible residual deformation
2	Support rail	600	L/200 = 3.0	1 mm
4	Diagonal span	1386	L/360 = 3.8	1 mm
5	Horizontal span	1250	L/360 = 3.4	1 mm
8	Vertical span	1200	L/360 = 3.3	1 mm
10	Diagonal span	1341	L360 = 3.7	1 mm

6.5 RESULTS

Test 1 (serviceability) Date: 15 January 2018

The deflections measured during the wind resistance test, at the positions shown in Figure 2, are shown in Tables 3 and 4.

Summary Table:

Gauge number	Member	Pressure differential (Pa)	Measured deflection (mm)	Residual deformation (mm)
2	Support rail	2401 -2390	0.4 -0.7	0.0 0.1
4	Diagonal span	2401 -2390	1.7 -1.8	0.0 0.0
5	Horizontal span	2401 -2390	1.8 -1.2	0.1 -0.1
8	Vertical span	2401 -2390	3.0 -3.4	-0.1 0.1
10	Diagonal span	2401 -2390	2.9 -3.0	0.0 -0.1

No damage to the test sample was observed.

Ambient temperature = 9°C
Chamber temperature = 10°C

Test 2 (safety) Date: 15 January 2018

The deflections measured during the structural safety test, at the positions shown in Figure 2, are shown in Table 5.

No damage to the sample was observed.

Ambient temperature = 9°C
Chamber temperature = 11°C

TABLE 3

WIND RESISTANCE – POSITIVE **SERVICEABILITY** TEST RESULTS

Position	Pressure (pascals) / Deflection (mm)				
	597	1197	1794	2401	Residual
1	0.2	0.4	0.6	0.9	0.0
2	0.3	0.6	0.9	1.2	0.0
3	0.2	0.4	0.6	0.8	0.1
4	0.6	1.2	1.7	2.3	0.1
5	0.7	1.3	1.8	2.5	0.1
6	0.1	0.2	0.3	0.5	0.0
7	0.1	0.2	0.3	0.4	0.0
8	0.9	1.8	2.7	3.7	0.0
9	0.2	0.5	0.7	1.0	0.2
10	0.9	1.8	2.6	3.7	0.2
11	0.1	0.1	0.3	0.5	0.2
***2**	0.1	0.2	0.3	0.4	0.0
***4**	0.4	0.9	1.3	1.7	0.0
***5**	0.5	0.9	1.3	1.8	0.1
***8**	0.7	1.5	2.2	3.0	-0.1
***10**	0.8	1.5	2.1	2.9	0.0

*adjusted reading for movement at supports

TABLE 4

WIND RESISTANCE – NEGATIVE **SERVICEABILITY** TEST RESULTS

Position	Pressure (pascals) / Deflection (mm)				
	-619	**-1195**	**-1803**	**-2405**	**Residual**
1	-0.1	-0.3	-0.6	-0.9	-0.3
2	-0.3	-0.7	-1.0	-1.4	0.0
3	-0.2	-0.4	-0.5	-0.6	0.0
4	-0.5	-1.1	-1.7	-2.3	0.0
5	-0.3	-0.7	-1.2	-1.9	-0.2
6	-0.1	-0.1	-0.3	-0.4	0.0
7	-0.2	-0.2	-0.5	-1.0	-0.6
8	-0.9	-1.9	-3.2	-4.6	-0.4
9	-0.2	-0.5	-0.9	-1.3	-0.4
10	-0.8	-1.7	-2.9	-4.3	-0.7
11	-0.1	-0.1	-0.5	-1.2	-0.8
***2**	-0.1	-0.3	-0.5	-0.7	0.1
***4**	-0.4	-0.8	-1.3	-1.8	0.0
***5**	-0.2	-0.5	-0.8	-1.2	-0.1
***8**	-0.7	-1.5	-2.5	-3.4	0.1
***10**	-0.6	-1.4	-2.2	-3.0	-0.1

*adjusted reading for movement at supports

TABLE 5

WIND RESISTANCE - **SAFETY** TEST RESULTS

Position	Pressure (pascals) / Deflection (mm)			
	3604	Residual	-3603	Residual
1	1.6	0.3	-1.6	-0.5
2	1.8	0.1	-2.2	-0.1
3	1.1	0.1	-0.7	0.0
4	3.4	0.1	-3.4	-0.1
5	3.9	0.3	-2.9	-0.4
6	0.8	0.1	-0.7	-0.1
7	1.1	0.5	-1.3	-0.7
8	6.3	0.4	-6.7	-0.7
9	2.0	0.5	-1.9	-0.6
10	6.5	0.9	-6.2	-0.9
11	1.5	0.8	-1.8	-0.9
***2**	0.5	-0.1	-1.1	0.2
***4**	2.5	0.0	-2.6	0.0
***5**	2.7	0.1	-1.8	-0.1
***8**	4.8	-0.1	-5.0	0.0
***10**	4.7	0.2	-4.4	-0.1

*adjusted reading for movement at supports

7 WATERTIGHTNESS TESTING

7.1 INSTRUMENTATION

7.1.1 Pressure

One static pressure tapping was provided to measure the chamber pressure and was located so that the readings were unaffected by the velocity of the air supply into or out of the chamber.

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

7.1.2 Water Flow

An in-line water flow meter was used to measure water supplied to the spray gantry to within 5%.

7.1.3 Temperature

Platinum resistance thermometers (PRT) were used to measure air and water temperatures to within 1⌠C.

7.1.4 General

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

All measuring instruments and relevant test equipment were calibrated and traceable to national standards.

7.2 FAN

A wind generator was mounted adjacent to the external face of the sample and used to create positive pressure differentials during dynamic testing. The wind generator comprised a piston type aero-engine fitted with 4 m diameter contra-rotating propellers.

7.3 WATER SPRAY

The water spray system comprised 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 with a spray angle between 90° and 120°. The spray system delivered water uniformly against the exterior surface of the sample.

7.4 PROCEDURE

Water was sprayed onto the sample using the method described above at a flow rate of at least 3.4 litres/m^2/minute.

The aero-engine was used to subject the sample to wind of sufficient velocity to produce average deflections in the principle framing members equal to those produced by a static pressure differential of 600 pascals. These conditions were maintained for 15 minutes. Throughout the test the inside of the sample was examined for water penetration.

7.5 PASS/FAIL CRITERIA

There shall be no water penetration to the internal face of the sample throughout testing. At the completion of the test there shall be no standing water in locations intended to remain dry.

PHOTO 6549

DYNAMIC WIND GENERATOR

7.6 RESULTS

Test 3 Date: 15 January 2018

No water leakage was observed through the sample.

Chamber temperature= 9°C
Ambient temperature = 8°C
Water temperature = 9°C

8 IMPACT TESTING

8.1 IMPACTOR

8.1.1 Soft body

The soft body impactor comprised a canvas spherical/conical bag 400 mm in diameter filled with 3 mm diameter glass spheres with a total mass of 50 kg suspended from a cord at least 3 m long.

PHOTO 6755

SOFT BODY IMPACTOR

8.1.2 Hard body

The hard body impactor was a solid steel ball of 50 mm or 62.5 mm diameter and approximate mass of 0.5 kg or 1.0 kg.

PHOTO 6763

HARD BODY IMPACTOR

8.2 PROCEDURE

8.2.1 Soft body

The impactor almost touched the face of the sample when at rest. It was swung in a pendular movement to hit the sample normal to its face. The test was performed at the locations shown in Figure 3. The impact energies were 120 Nm for serviceability and 350 Nm and 500 Nm for safety at each location.

8.2.2 Hard body

The impactor almost touched the face of the sample when at rest. It was swung in a pendular movement to hit the sample normal to its face. The test was performed at the locations shown in Figure 4. The impact energies were 3 Nm, 6 Nm and 10 Nm at each location.

8.3 PASS/FAIL CRITERIA

Note: Tables 1 to 2 are taken from CWCT TN76.

Table 1 - Classes for serviceability performance

Class	Definition	Explanation/Examples
1	No damage.	No damage visible from 1m, and Any damage visible from closer then 1m unlikely to lead to significant deterioration.
2	Surface damage of an aesthetic nature which is unlikely to require remedial action.	Dents or distortion of panels not visible from more than 5m (note visibility of damage will depend on surface finish and lighting conditions – damage will generally be more visible on reflective surfaces), and Any damage visible from closer than 5m unlikely to lead to significant deterioration.
3	Damage that may require remedial action or replacement of components to maintain appearance or long term performance but does not require immediate action.	Dents or distortion of panels visible from more than 5m, or Spalling of edges of panels of brittle materials, or Damage to finishes that may lead to deterioration of the substrate.
4	Damage requiring immediate action to maintain appearance or performance. Remedial action may include replacement of a panel but does not require dismantling or replacement of supporting structure.	Significant cracks in brittle materials e.g. cracks that may lead to parts of tile falling away subsequent to test, or Fracture of panels causing significant amounts of material to fall away during test.
5	Damage requiring more extensive replacement than 4.	Buckling of support rails.

Table 2 - Classes for safety performance

Class	Explanation/examples
Negligible risk	No material dislodged during test, and No damage likely to lead to materials falling subsequent to test, and No sharp edges produced that would be likely to cause severe injury to a person during impact, and Cladding not penetrated by impactor.
Low risk	Maximum mass of falling particle 50g, and Maximum mass of particle that may fall subsequent to impact 50g, and No sharp edges produced that would be likely to cause severe injury during impact.
Moderate risk	Maximum mass of falling particle less than 500g, and Maximum mass of particle that may fall subsequent to impact less than 500g, and Cladding not penetrated by impact, and No sharp edges produced that would be likely to cause severe injury during impact.
High risk	Maximum mass of falling particle greater than 500g, or Cladding penetrated by impact, or Sharp edges produced that would be likely to cause severe injury during impact.

8.4 RESULTS

Test 4 Date: 15 January 2018

TABLE 6

IMPACT TEST RESULTS

Impact location	Impactor	Impact energy (Nm)	Observations	Class
1	Soft body	120 x3 350 500	No damage No damage 3 mm indentation	1 Negligible risk Negligible risk
2	Soft body	120 x3 350 500	No damage No damage No damage	1 Negligible risk Negligible risk
3	Soft body	120 x3 350 500	No damage No damage 2 mm indentation	1 Negligible risk Negligible risk
4	Soft body	120 x3 350 500	No damage No damage No damage	1 Negligible risk Negligible risk
5	Soft body	120 x3 350 500	No damage No damage No damage	1 Negligible risk Negligible risk
6	Soft body	120 x3 350 500	No damage No damage No damage	1 Negligible risk Negligible risk
7	Soft body	120 x3 350 500	No damage No damage 3 mm indentation	1 Negligible risk Negligible risk
8	Soft body	120 x3 350 500	No damage No damage No damage	1 Negligible risk Negligible risk
9	Soft body	120 x3 350 500	No damage No damage No damage	1 Negligible risk Negligible risk
10	Hard body	3 6 10	Minor indentation Minor indentation 1 mm indentation	1 2 3 Negligible risk
11	Hard body	3 6 10	Minor indentation Minor indentation 1 mm indentation	1 2 3 Negligible risk
12	Hard body	3 6 10	Minor indentation Minor indentation 1 mm indentation	1 2 3 Negligible risk

Ambient temperature = 6°C

FIGURE 3

SOFT BODY IMPACT TEST LOCATIONS

External View

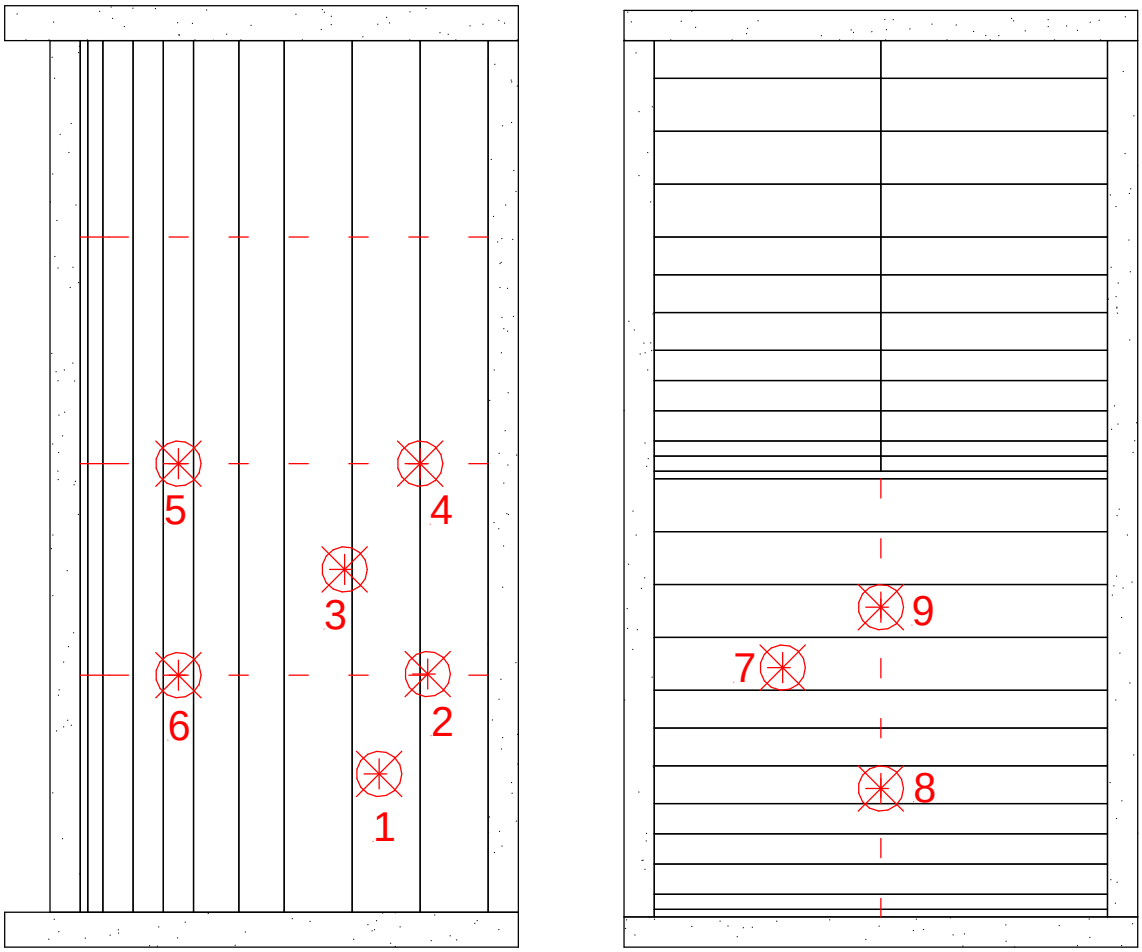
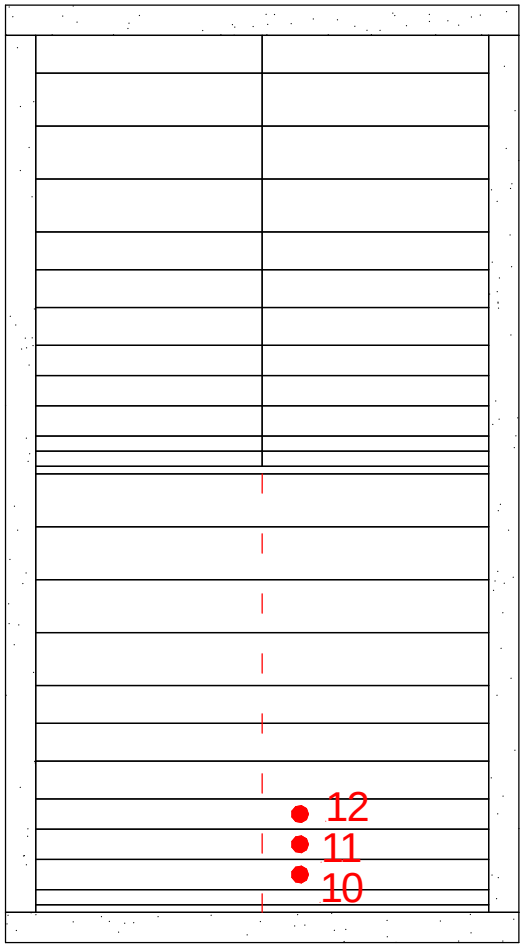


FIGURE 4

HARD BODY IMPACT TEST LOCATIONS

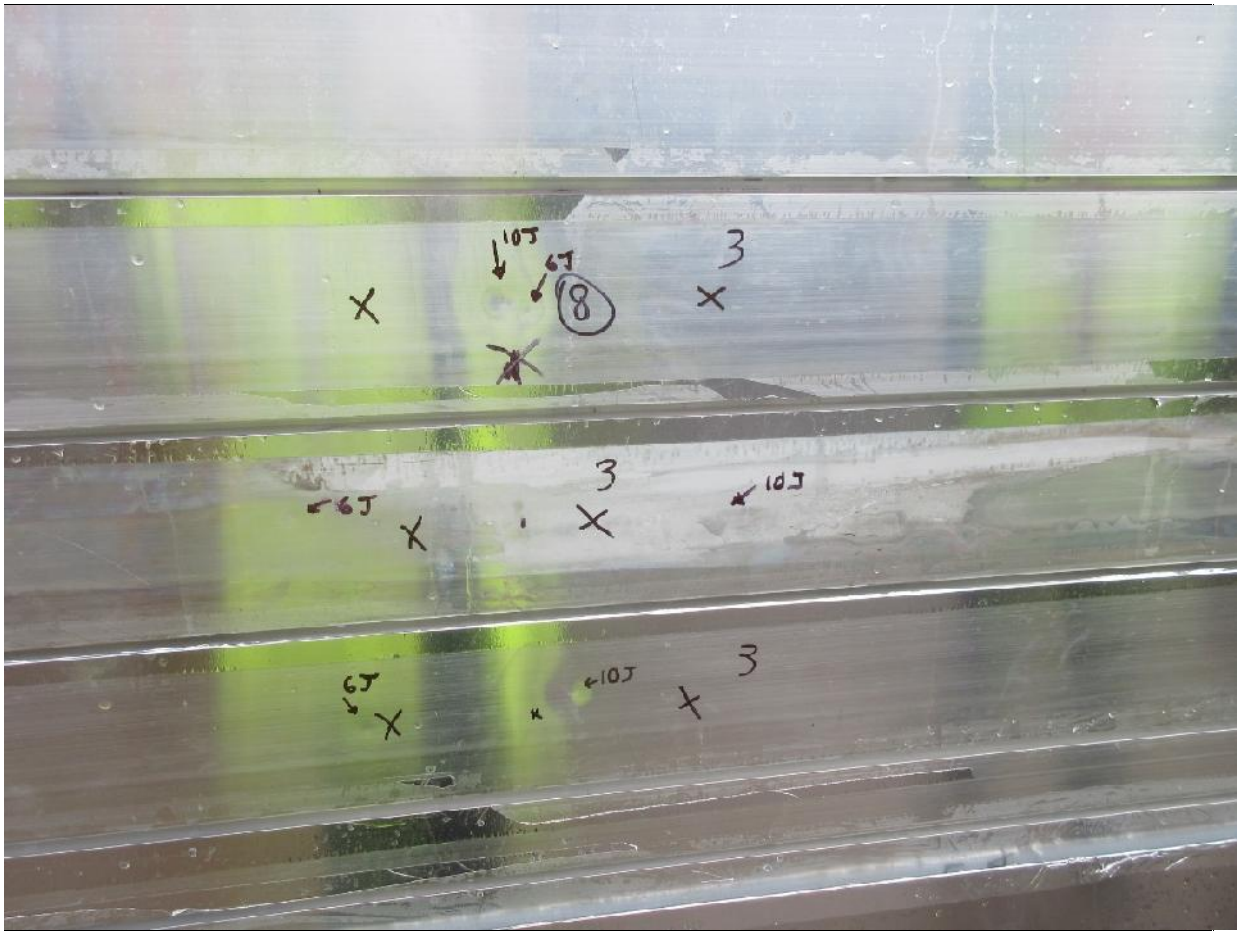
External View



● Impact location

PHOTO 6764

HARD BODY IMPACTS



9 APPENDIX - DRAWINGS

The following 15 unnumbered pages are copies of Ash & Lacy drawings numbered:

ED-Façade-1707.03-01,

ED-Façade-1707.03-02A,

ED-Façade-1707.03-02B,

ED-Façade-1707.03-03,

ED-Façade-1707.03-04,

M14 rev B,

M15 rev B,

B42 rev B,

B46 rev B,

SD.LX.01 rev E,

SD.LX.02 rev E,

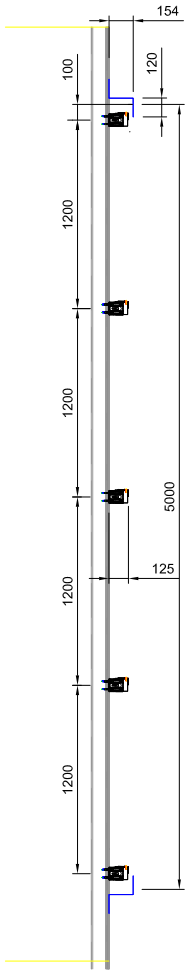
SD.LX.04 rev E,

SD.LX.05 rev A,

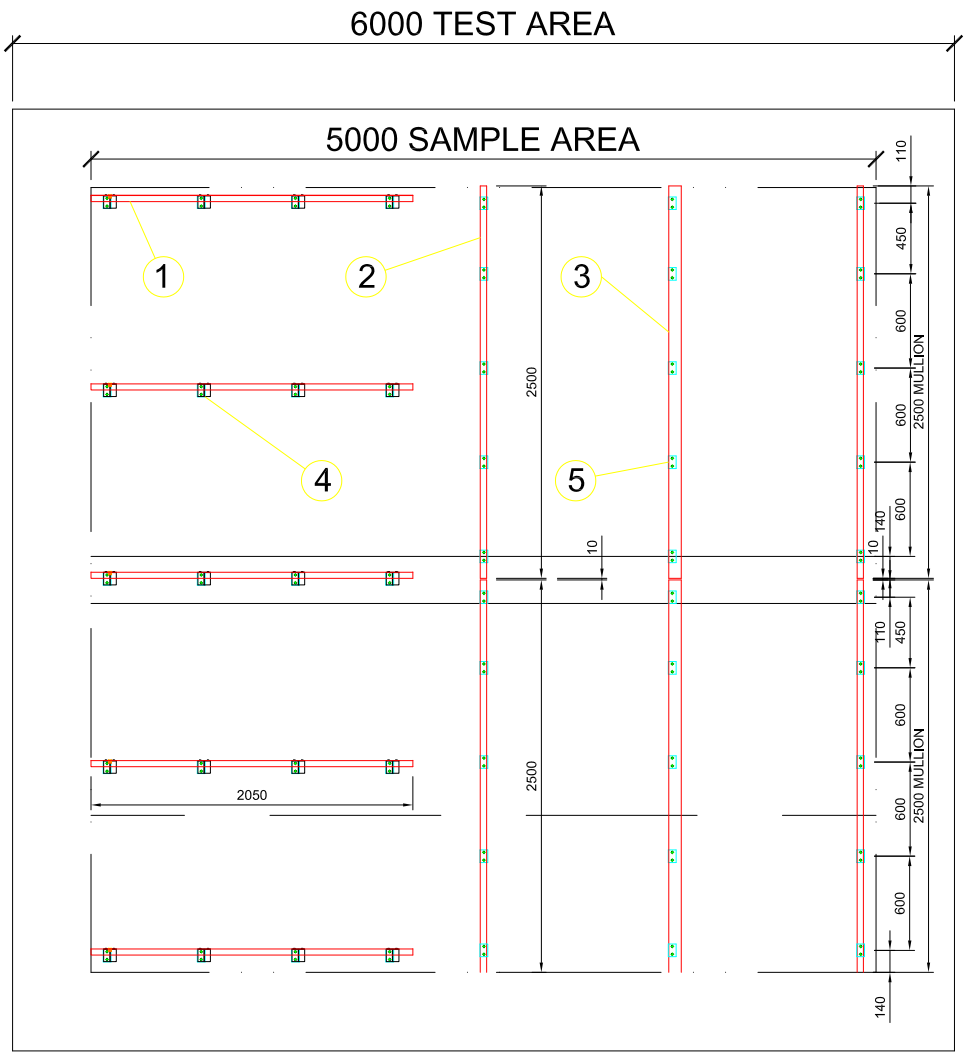
A35 rev C,

A38 rev D.

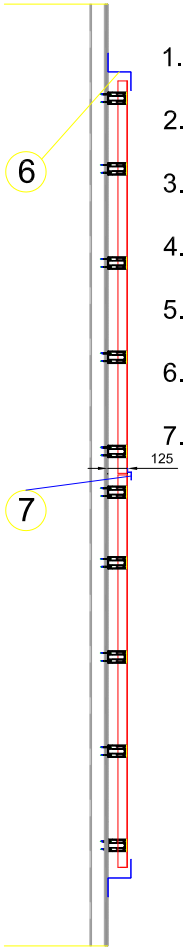
END OF REPORT



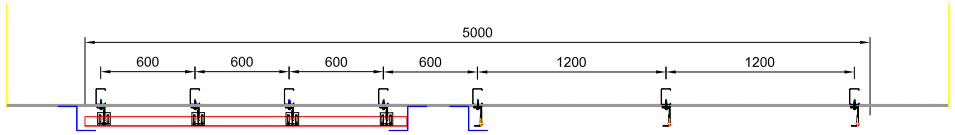
LineAL V Section



Bracket & Mullion Layout Elevation



LineAL H Section



Bracket & Mullion Layout Plan

Material List for Bracket and Mullions

1. 5 off M14 - L60X40X2.2 Rail, 2050 mm long
2. 4 off M14- L60X40X2.2 Rail, 2500 mm long
3. 2 off M15 - T60X80X2.2 Rail, 2500 mm long
4. 20 off HB090HS2-TP Single Adapted H Bracket with Pad
5. 30 off HB120S-TP Single HB Bracket With Pad
6. 12 off Z120X156X120X2 mm Flashing 2500 mm long
7. 1 off Z49X27X26X2 mm Flashing, 2500 mm long

FACADE

General Notes:

All drawings to be read in conjunction with architects and engineers drawings.

Do not scale this drawing - If In doubt contact the Technical Office.

All dimensions to be confirmed prior to commencement of manufacture.

It is the customers responsibility to ensure that Ash & Lacy products are correctly installed and that they are suitable for the customers particular requirement and application.

Drawing errors or omissions are to be reported and checked with the Technical Office.

Drawings will be Issued for construction once Approved, Do not proceed with construction until this drawing clearly states "CONSTRUCTION ISSUE"

Rev	Description	Drawn	Checked	Date
C				
B				
A				

Drawing Status: Approval

ASH & LACY
BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION6 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

Client : Ash & Lacy Ltd.

Project :

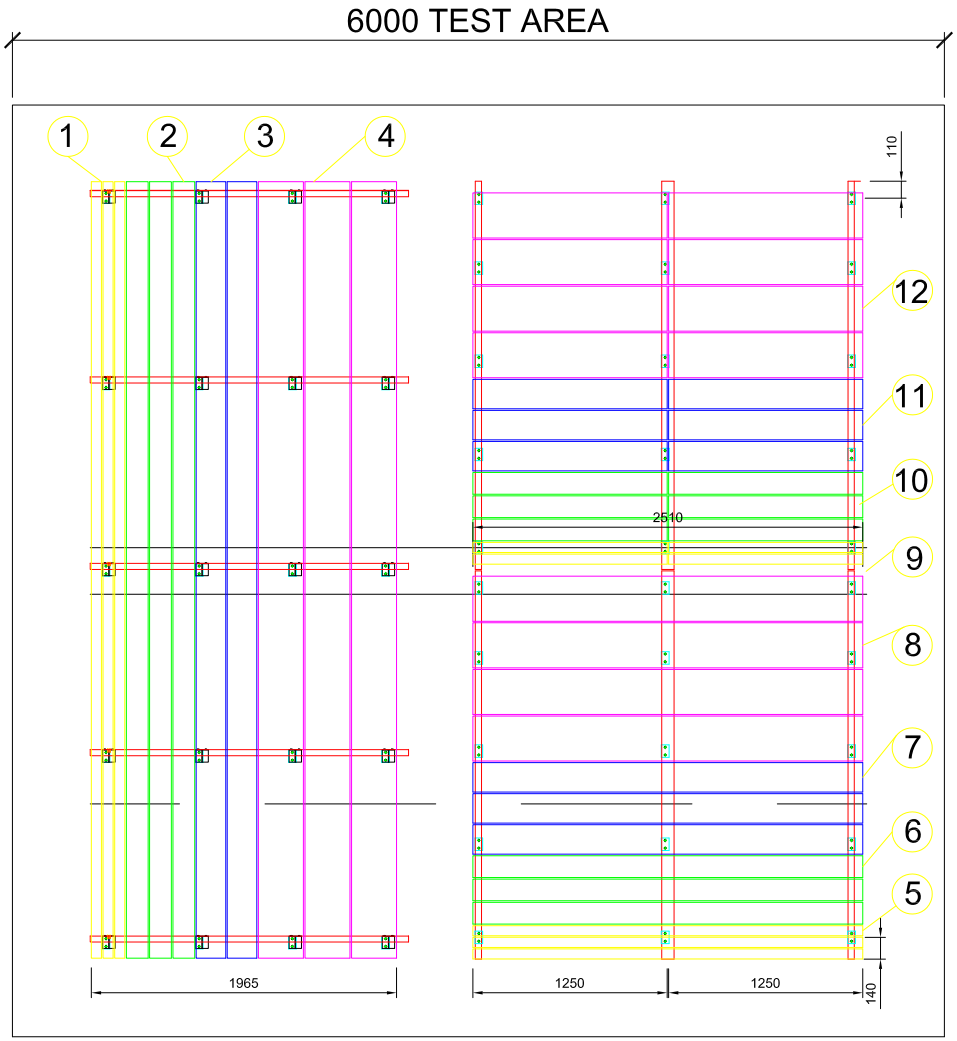
Drawing Title : LineAL-X CWCT Test Rail & Bracket Layout

Drawn By:	Checked By:	Date :
C.J.	YT	28/06/17

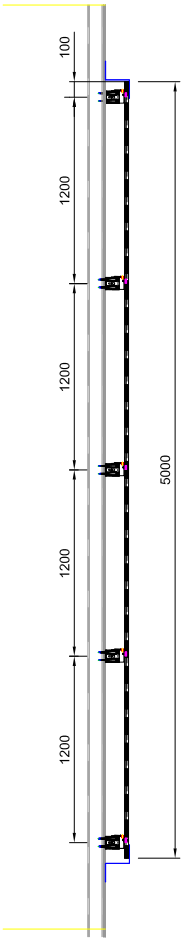
Scale : NTS @ A1

Drawing No : ED-Facade-1707.03-01

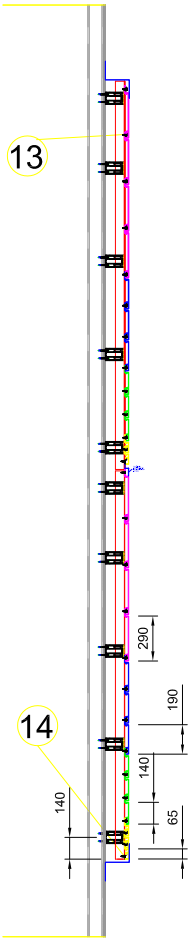
Rev:



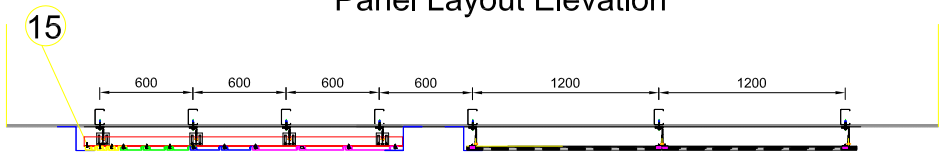
Panel Layout Elevation



LineAL V Section



LineAL H Section



Panel Layout Plan

Material List for Plank

1. 3 off PSD065 Plank, 5000 m long
2. 3 off PS140 Plank, 5000 m long
3. 2 off PS190 Plank, 5000 m long
4. 3 off PS290 Plank, 5000 mm long
5. 3 off PS065 Plank, 2500 mm long
6. 3 off PS140 Plank, 2500 mm long
7. 3 off PS190 Plank, 2500 mm long
8. 4 off PS290 Plank, 2500 mm long
9. 6 off PS065 Plank, 1250 mm long
10. 6 off PS140 Plank, 1250 mm long
11. 6 off PS190 Plank, 1250 mm long
12. 8 off PS290 Plank, 1250 mm long
13. 146 off Clamp Block
14. 2 off Start Bar, 2500 mm long
15. 1 off Start Bar, 5000 mm long

Note

2 off 10 mm dia drainage holes will be drilled on site on the bottom flashing 100 mm from each end

General Notes:

All drawings to be read in conjunction with architects and engineers drawings.

Do not scale this drawing - If in doubt contact the Technical Office.

All dimensions to be confirmed prior to commencement of manufacture.

It is the customers responsibility to ensure that Ash & Lacy products are correctly installed and that they are suitable for the customers particular requirement and application.

Drawing errors or omissions are to be reported and checked with the Technical Office.

Drawings will be Issued for construction once Approved, Do not proceed with construction until this drawing clearly states "CONSTRUCTION ISSUE"

Rev	Description	Drawn	Checked	Date
C				
B				
A				

Drawing Status: Approval

ASH & LACY
BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTIONS FAX: 0121 525 3444 WWW.ASHANDLACY.COM

Client : Ash & Lacy Ltd.

Project :

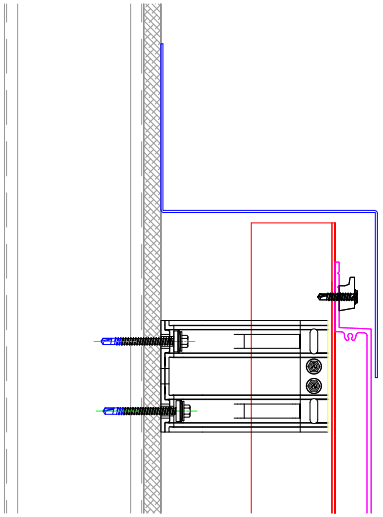
Drawing Title : LineAL-X CWCT Test Plank Layout

Drawn By:	Checked By:	Date :
C.J.	YT	28/06/17

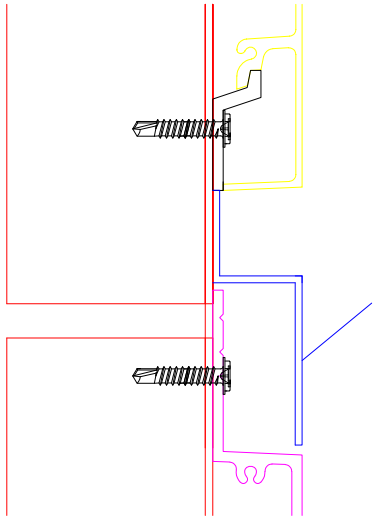
Scale : NTS @ A1

Drawing No : ED-Facade-1707.03-02A

Rev:

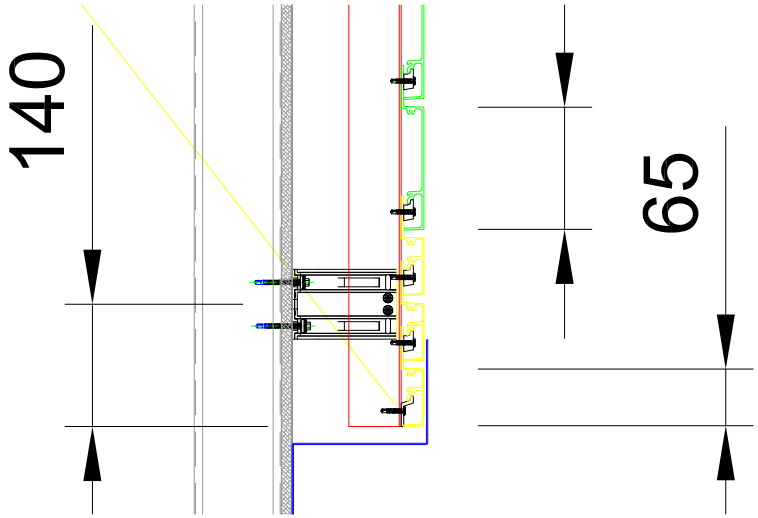


Head Detail of LineAL H Section

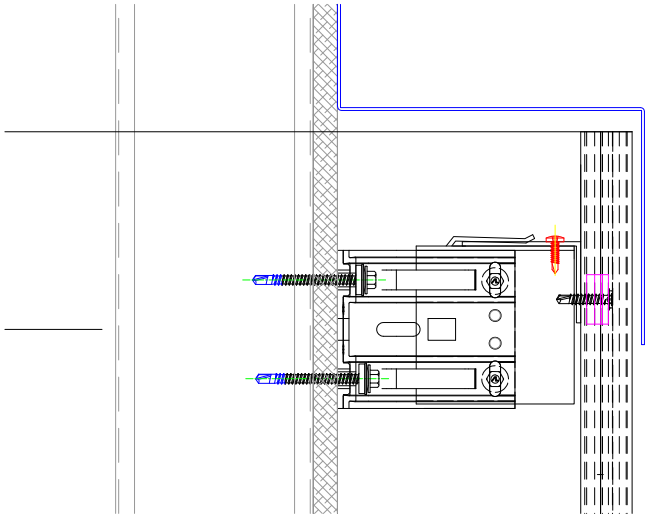


Use Flash to accommodate the movement between two floors

Detail of LineAL Between Two Floors



Bottom Detail of LineAL H Section



Head Details of LineAL V Section

Rev	Description	Drawn	Checked	Date
C				
B				
A				

Drawing Status: Approval

ASH & LACY

BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION6 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

Client : Ash & Lacy Ltd.

Project :

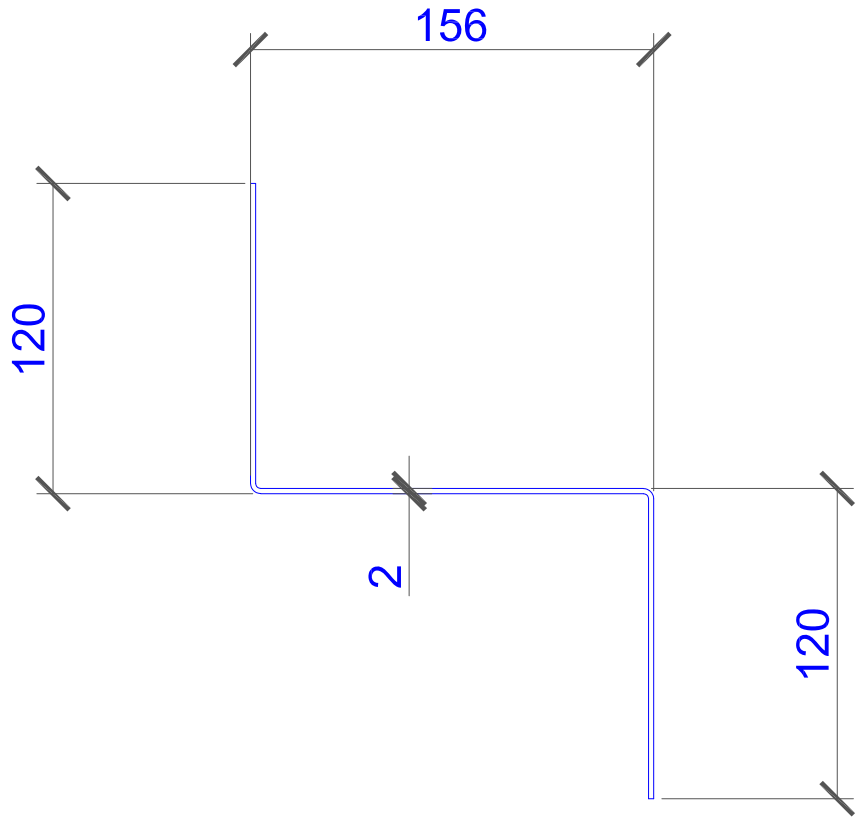
Drawing Title : LineAL-X CWCT Test Plank Layout

Drawn By:	Checked By:	Date :
C.J.	YT	28/06/17

Scale : NTS @ A1

Drawing No : ED-Facade-1707.03-02B

Rev:



Material: Alu 1050H14

General Notes:

All drawings to be read in conjunction with architects and engineers drawings.

Do not scale this drawing - If in doubt contact the Technical Office.

All dimensions to be confirmed prior to commencement of manufacture.

It is the customers responsibility to ensure that Ash & Lacy products are correctly installed and that they are suitable for the customers particular requirement and application.

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Drawings will be issued for construction once Approved, Do not proceed with construction until this drawing clearly states "CONSTRUCTION ISSUE"

Rev	Description	Drawn	Checked	Date
C				
B				
A				

Drawing Status: Approval

ASH & LACY
BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTIONS FAX: 0121 525 3444 WWW.ASHANDLACY.COM

Client : Ash & Lacy Ltd.

Project :

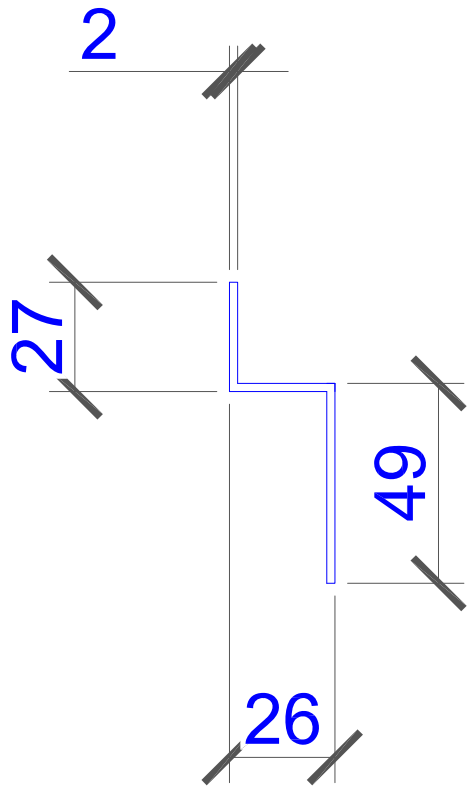
Drawing Title : LineAL-X CWCT Test Z120X156X120X2 Flashing

Drawn By:	Checked By:	Date :
C.J.	YT	28/06/17

Scale : NTS @ A1

Drawing No : ED-Facade-1707.03-03

Rev:



Material: Alu 1050H14

FACADE

General Notes:

All drawings to be read in conjunction with architects and engineers drawings.

Do not scale this drawing - If in doubt contact the Technical Office.

All dimensions to be confirmed prior to commencement of manufacture.

It is the customers responsibility to ensure that Ash & Lacy products are correctly installed and that they are suitable for the customers particular requirement and application.

Drawing errors or omissions are to be reported and checked with the Technical Office.

Drawings will be issued for construction once Approved. Do not proceed with construction until this drawing clearly states "CONSTRUCTION ISSUE"

Rev	Description	Drawn	Checked	Date
C				
B				
A				

Drawing Status: Approval

ASH & LACY
BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION8 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

Client : Ash & Lacy Ltd.

Project :

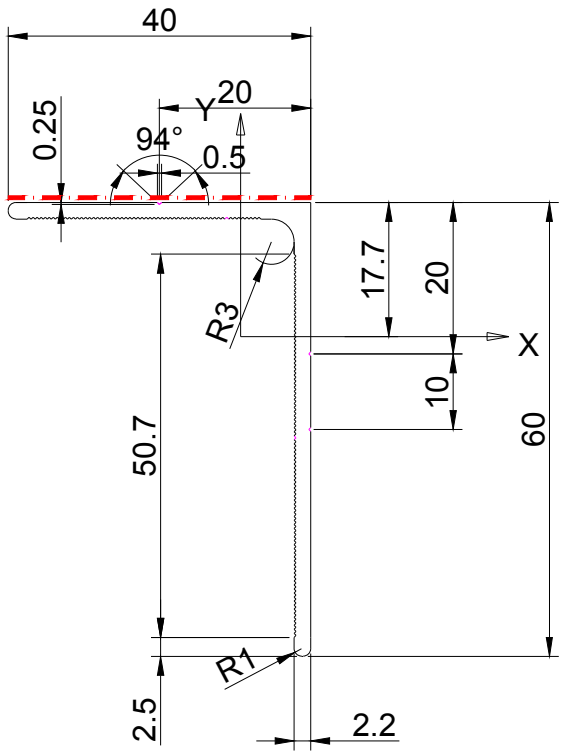
Drawing Title : LineAL-X CWCT Test Z49X27X26X2 Flashing

Drawn By:	Checked By:	Date :
C.J.	YT	28/06/17

Scale : NTS @ A1

Drawing No : ED-Facade-1707.03-04

Rev:



Visible Face

Section Properties:

1. Area: 205.8 mm^2
2. Weight: 0.556 kg/m
3. Moment of Inertia X: 78271.5 mm^4
4. Moment of Inertia Y: 28704.5 mm^4

Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008 unless stated on the drawing
3. Standard extrusion length 3000 mm - 4850 mm - 6000 mm
4. Remove sharp corner with 0.5 mm R

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General Notes:

Rev	Description	Drawn	Check	Date
A		CJB		28/5/14
B	Update tech info	CJB	YT	2/5/17
C				

Drawing Title : L Rail L60X40X2.2

Drawn By: CJB | Checked By: | Date : May 2014

Scale : @ A4

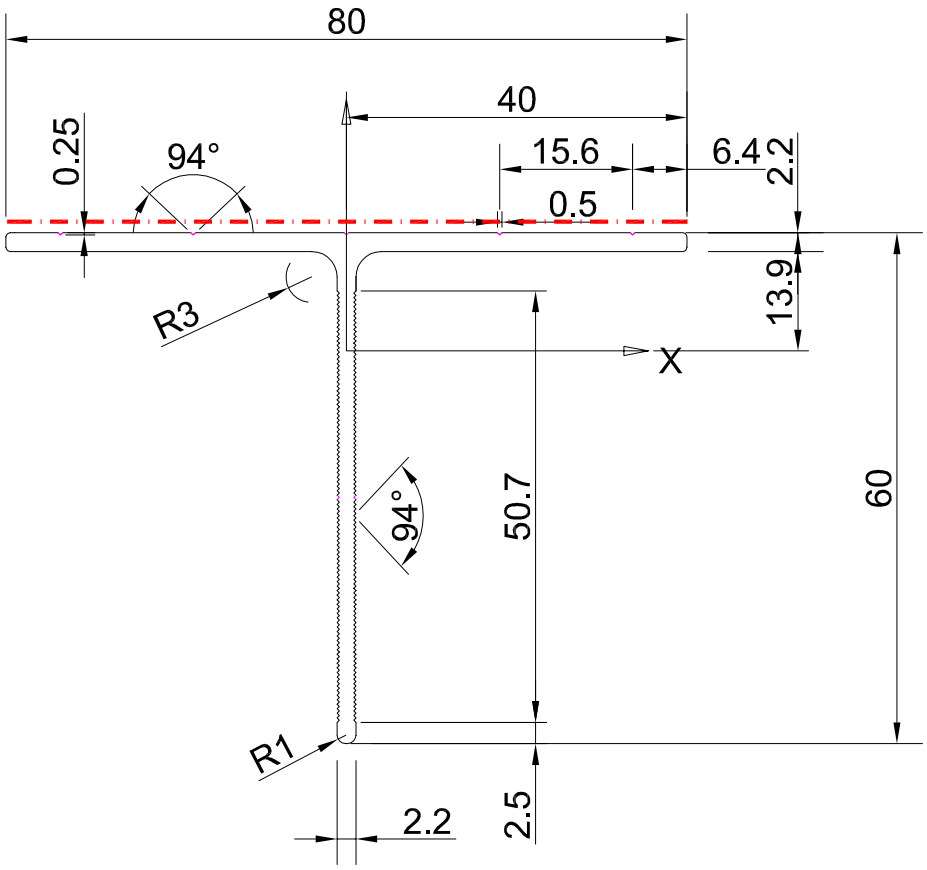
Drawing Status: Construction

Client : Internal

Project : Standard Mullion

Drawing No : M14 | Rev: B

Visible Face



Section Properties:

1. Area: 293.4 mm^2
2. Weight: 0.792 kg/m
3. Moment of Inertia X: 94038.2 mm^4
4. Moment of Inertia Y: 93382.7 mm^4

Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008 unless stated on the drawing
3. Standard extrusion length 3000 mm - 6000 mm
4. Remove sharp corner with 0.5 mm R

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BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTIONS FAX: 0121 525 3444 WWW.ASHANDLACY.COM

General Notes:

Rev	Description	Drawn	Check	Date
A		CJB		28/5/14
B	Update tech info	CJB	YT	2/5/17
C				

Drawing Title: T Rail T60X80X2.2

Drawn By: CJB | Checked By: | Date: May 2014

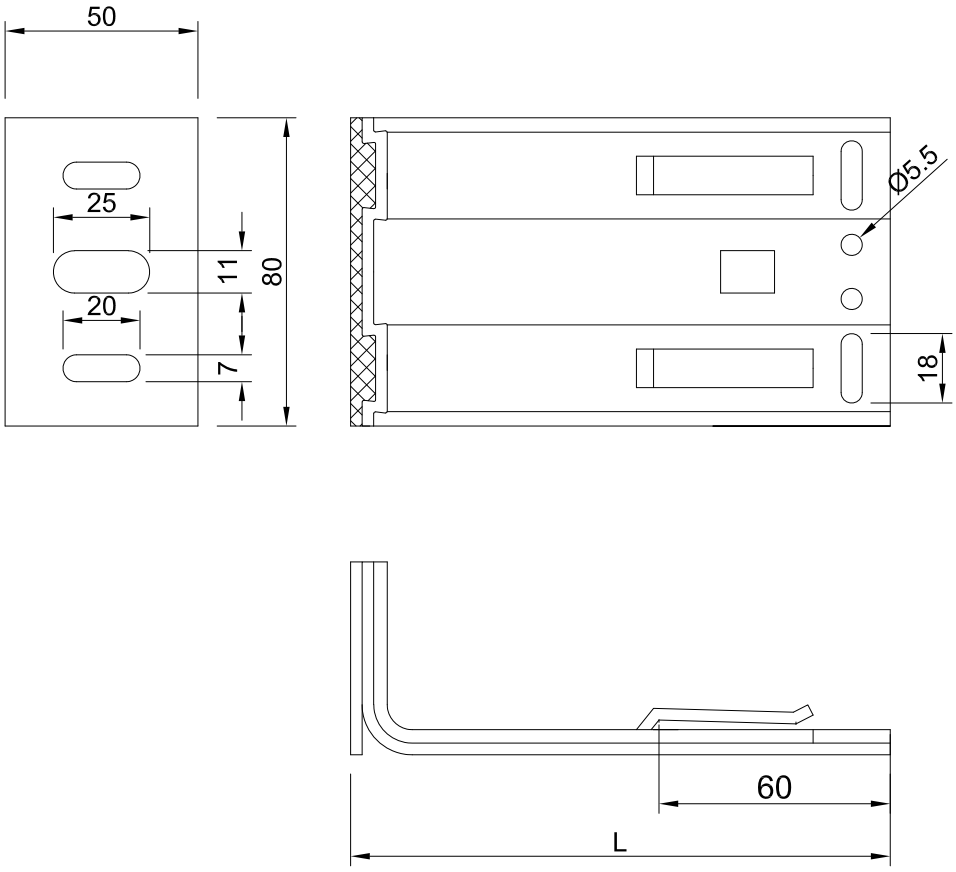
Scale: @ A4

Drawing Status: Construction

Client: Internal

Project: Standard Mullion

Drawing No: M15 | Rev: B



Bracket Ref	L (mm)	Components in Assembly
HB090S-TP	90	HB90S+TP80L
HB120S-TP	120	HB120S+TP80L
HB150S-TP	150	HB150S+TP80L
HB180S-TP	180	HB180S+TP80L
HB210S-TP	210	HB210S+TP80L
HB240S-TP	240	HB240S+TP80L
HB270S-TP	270	HB270S+TP80L
HB300S-TP	300	HB300S+TP80L

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BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION8 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

General Notes:

Rev	Description	Drawn	Check	Date
A	Development version	YT		09/05/2016
B	Update Tech Info	YT		02/05/2017
C				

Drawing Title: Single HB Bracket + Pad

Drawn By: YT | Checked By: | Date: July 2015

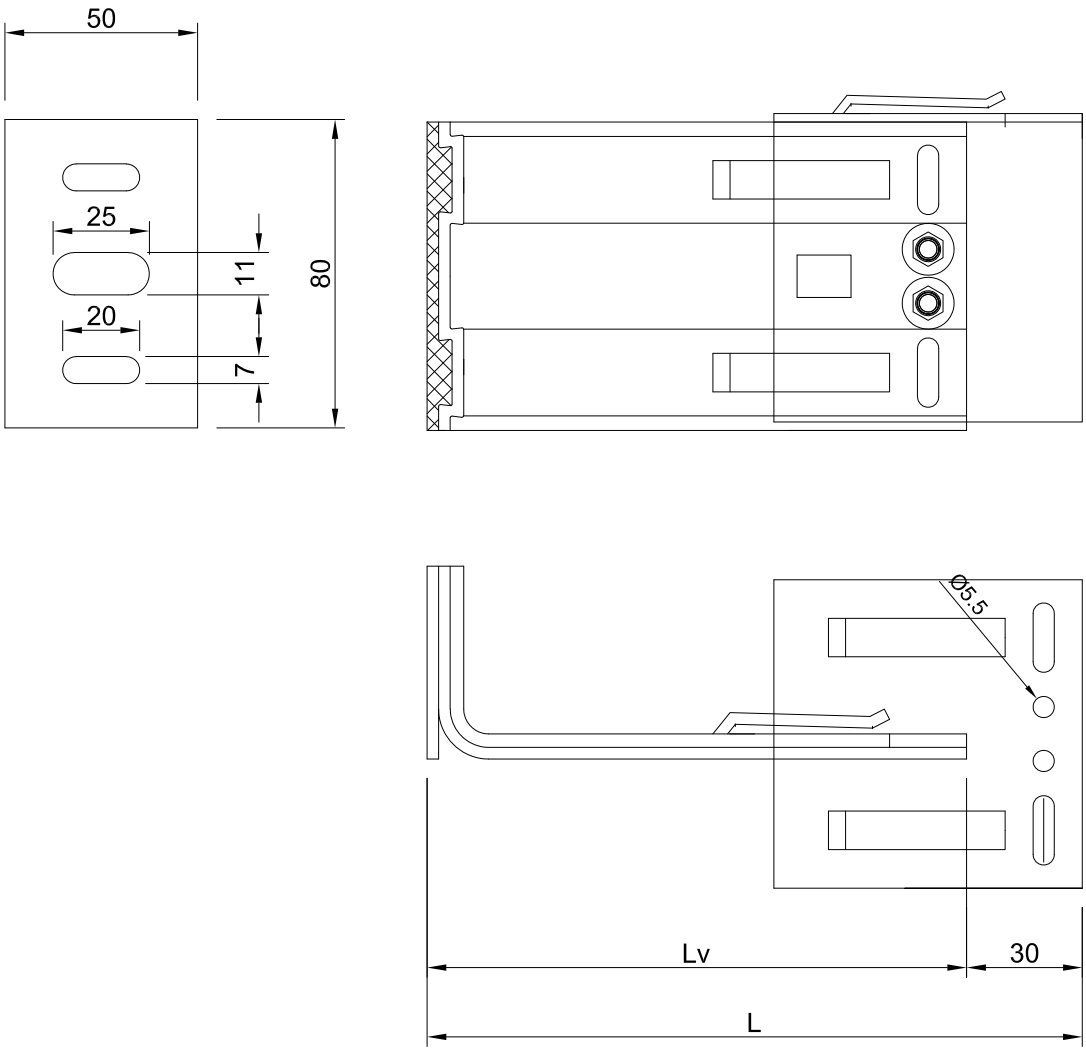
Scale: @ A4

Drawing Status: Construction

Client: Internal

Project: ED-Tech-1602

Drawing No: B42 | Rev: B



Bracket Ref	Lv (mm)	L(mm)	Components in Assembly
HB090SH2-TP	90	120	HBD80+HB090S+TP80L+2 off BM-LS25
HB120SH2-TP	120	150	HBD80+HB120S+TP80L+2 off BM-LS25
HB150SH2-TP	150	180	HBD80+HB150S+TP80L+2 off BM-LS25
HB180SH2-TP	180	210	HBD80+HB180S+TP80L+2 off BM-LS25
HB210SH2-TP	210	240	HBD80+HB210S+TP80L+2off BM-LS25
HB240SH2-TP	240	270	HBD80+HB240S+TP80L+2 off BM-LS25
HB270SH2-TP	270	310	HBD80+HB270S+TP80L+2 off BM-LS25
HB300SH2-TP	300	330	HBD80+HB300S+TP80L+2 0ff BM-LS25

ASH & LACY
BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION#3 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

General Notes:

Rev	Description	Drawn	Check	Date
A	Development version	YT		09/05/2016
B	Update Tech Info	YT		02/05/2017
C				

Drawing Title: Single Adapted Horizontal Bracket

Drawn By: YT | Checked By: | Date: May 2015

Scale: @ A4

Drawing Status: Construction

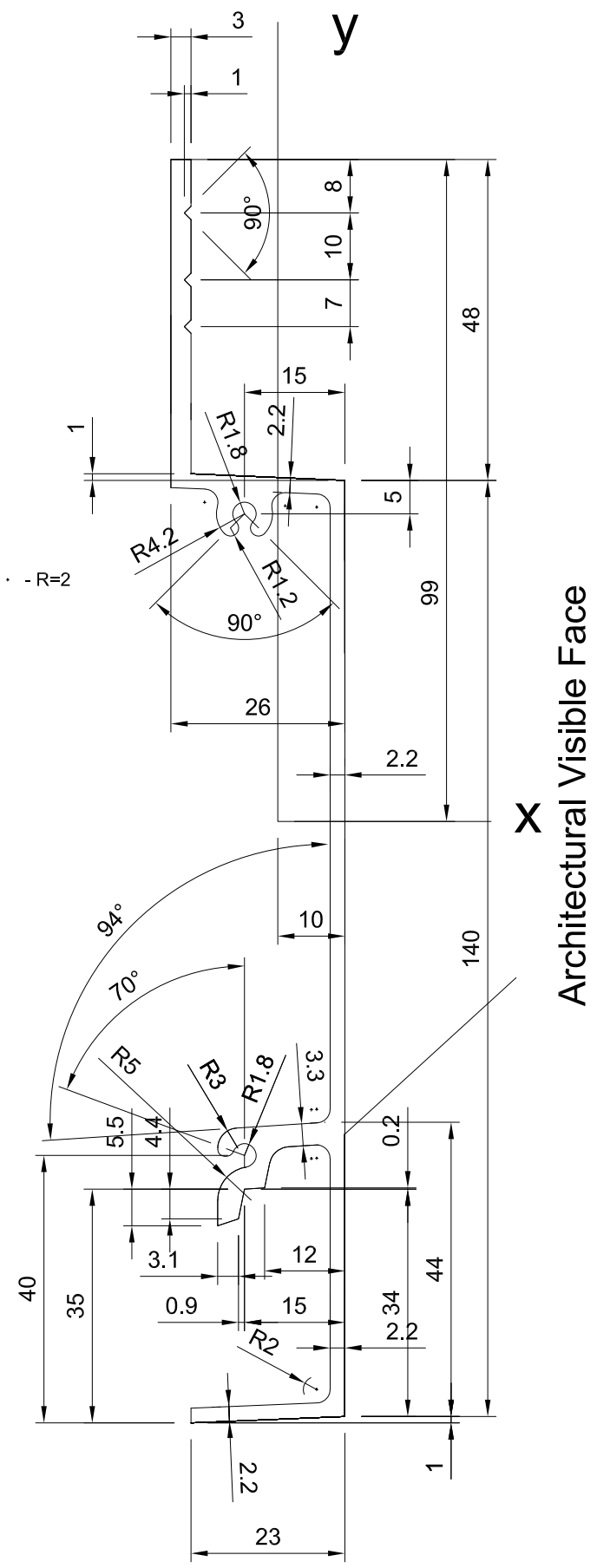
Client: Internal

Project: ED-Tech-1602

Drawing No: B46 | Rev: B

Section Properties

1. Area: 686.1 mm^2
2. Weight: 1.85 kg/m
3. Moment of inertia X: 2266565 mm^4
4. Moment of inertia Y: 63226 mm^4



Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN 755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008
3. Radius for all sharp corners are 0.4 mm
4. Overall dimension tolerance ±0.6 mm except stated on the drawing
5. Standard length: 6 m
6. The test criteria for architectural visible face needs to be agreed with the supplier prior to supply

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BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION#3 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

General Notes:

Rev	Description	Drawn	Check	Date
A	Change the top leg profile	YT		27/02/17
B	Add not 7 for appearance of visible face	YT		28/02/2017
C	Update technical info	YT		24/4/17
D	Add more dimensions	YT		9/5/17
E	Alter the screw hole position and overall height	YT		30/5/17

Drawing Title: LineAL-X PS140 Plank

Drawn By: YT | Checked By: | Date: 24/11/16

Scale: @ A4

Drawing Status: Construction

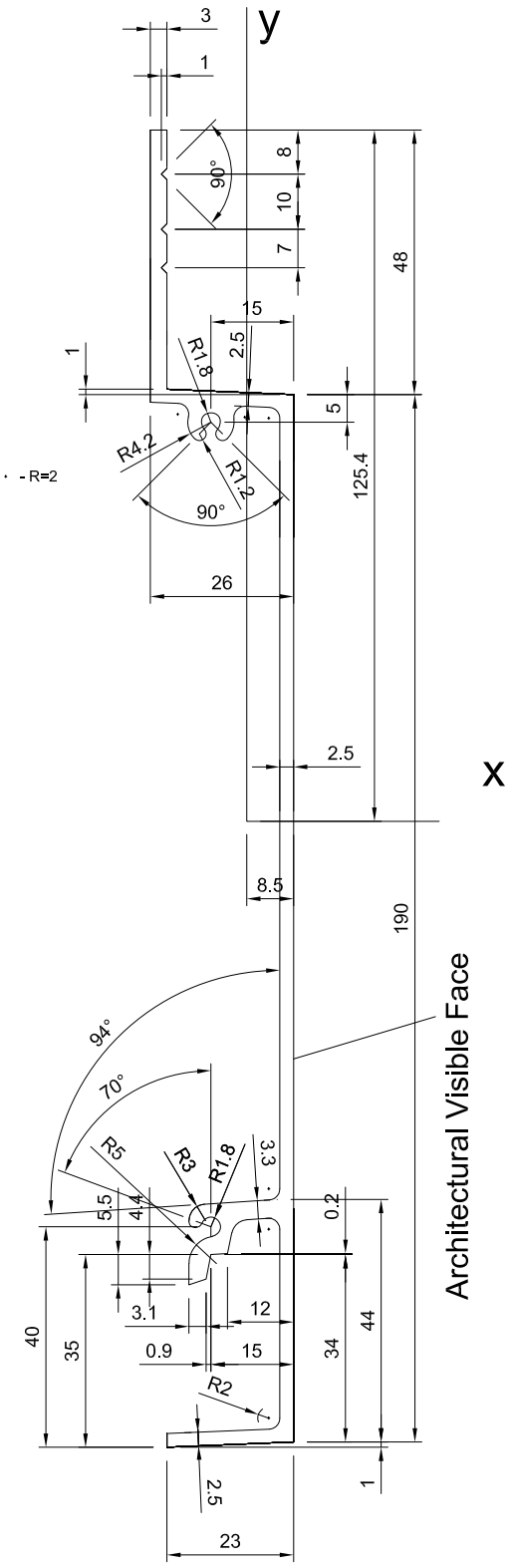
Client: Internal

Project: ED-Tech-1607-02.02

Drawing No: SD.LX.01 | Rev: E

Section Property

1. Area: 861.9 mm^2
2. Weight: 2.33 kg/m
3. Moment of inertia X: 4780806.6 mm^4
4. Moment of inertia Y: 73764.6 mm^4



Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN 755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008
3. Radius for all sharp corners are 0.4 mm
4. Overall dimension tolerance ±0.6 mm except stated on the drawing
5. Standard length: 6 m
6. The test criteria for architectural visible face needs to be agreed with the supplier prior to supply

Rev	Description	Drawn	Checked	Date
E	Alter screw hole position and overall height	YT		30/5/2017
D	Add more dimensions	YT		9/5/2017
C	Update technical info	YT		24/04/2017
B	Add note 7 for appearance of visible face	YT		28/02/2017
A	Change the the top leg profile	YT		27/02/2017

Drawing Status: Construction

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BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION3 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

Client: Internal

Project: ED-Tech-1607-02.03

Drawing Title: LineAL-X PS190 Plank

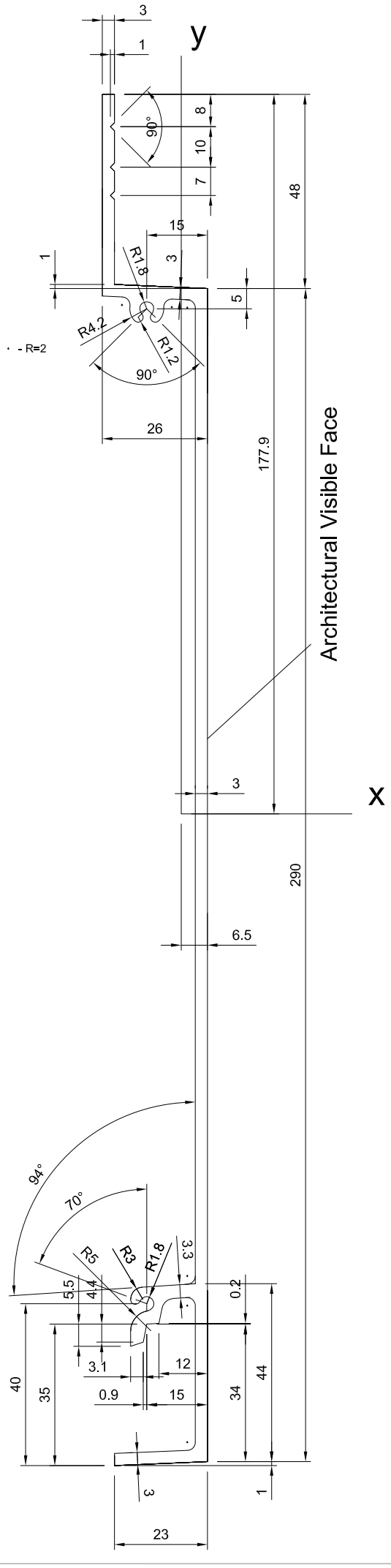
Drawn By:	Checked By:	Date:
YT		27/02/2017

Scale: @ A3

Drawing No: SD.LX.02 Rev: E

Section Property

1. Area: 1270.5 mm^2
2. Weight: 3.43 kg/m
3. Moment of inertia X: 14290299.0 mm^4
4. Moment of inertia Y: 87753.9 mm^4



Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN 755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008
3. Radius for all sharp corners are 0.4 mm
4. Overall dimension tolerance ±0.6 mm except stated on the drawing
5. Standard length: 6 m
6. The test criteria for architectural visible face needs to be agreed with the supplier prior to supply

Rev	Description	Drawn	Checked	Date
E	Alter screw hole position and overall height	YT		30/5/2017
D	Add more dimensions	YT		9/5/2017
C	Update technical info	YT		24/4/2017
B	Add note 7 for appearance of visible face	YT		28/02/2017
A	Change the top leg profile	YT		27/02/2017

Drawing Status: Construction

ASH & LACY
BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION8 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

Client: Internal

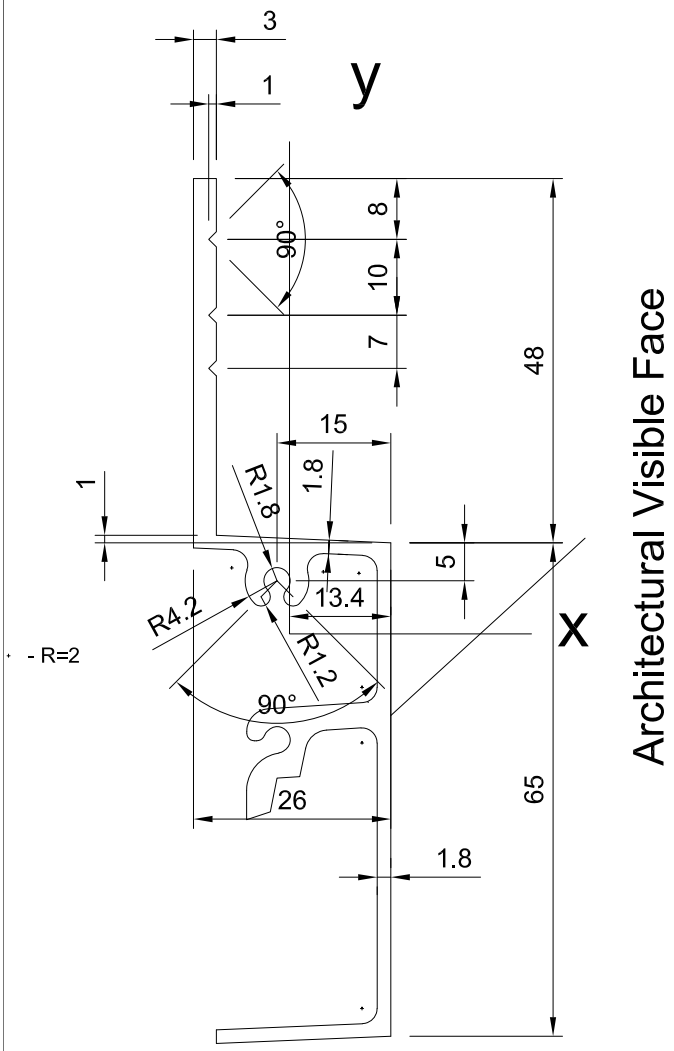
Project: ED-Tech-1607-02.05

Drawing Title: LineAL-X PS290 Plank

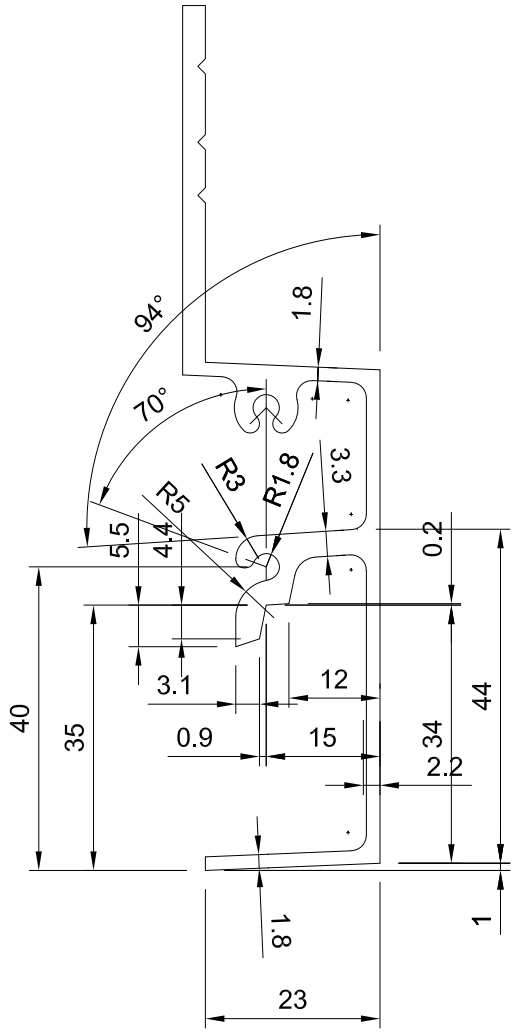
Drawn By: YT | Checked By: | Date: 24/11/2016

Scale: @ A3

Drawing No: SD.LX.04 | Rev: E



Architectural Visible Face



Section Properties

1. Area: 482.6 mm^2
2. Weight: 1.303 kg/m
3. Moment of inertia X: 437704.3 mm^4
4. Moment of inertia Y: 42208.9 mm^4

Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN 755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008
3. Radius for all sharp corners are 0.4 mm
4. Overall dimension tolerance ±0.6 mm except stated on the drawing
5. Standard length: 6 m
6. The test criteria for architectural visible face needs to be agreed with the supplier prior to supply

ASH & LACY
BROMFORD LANE WEST BROMWICH WEST MIDLANDS B70 7JJ TEL: 0121 525 1444 OPTION8 FAX: 0121 525 3444 WWW.ASHANDLACY.COM

General Notes:

Rev	Description	Drawn	Check	Date
A	First version	YT		14/08/17

Drawing Title : LineAL-X PS65 Plank

Drawn By: YT | Checked By: | Date : 14/08/17

Scale : @ A4

Drawing Status: Construction

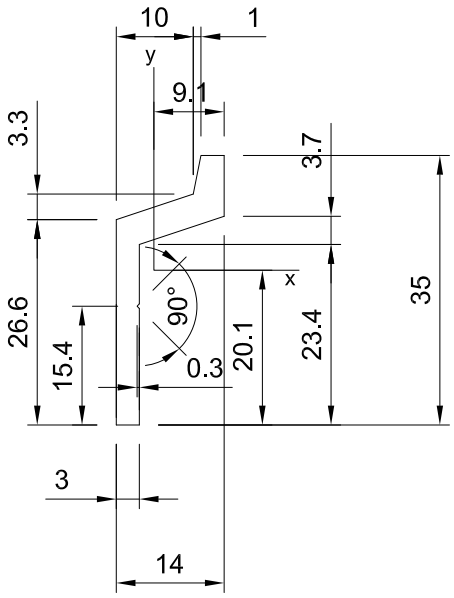
Client : Internal

Project : ED-Tech-1607-02

Drawing No : SD.LX.05 | Rev: A

Section Property

1. Area: 142.5 mm^2
2. Weight: 0.39 kg/m
3. Moment of inertia X: 13397.5 mm^4
4. Moment of inertia Y: 2862.7 mm^4



Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN 755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008
3. Radius for all sharp corners are 0.4 mm
4. Overall dimension tolerance ±0.6 mm except stated on the drawing
5. Standard length: 3 m

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General Notes:

Rev	Description	Drawn	Check	Date
A				
B	Update Technical info	YT		24/4/2017
C	Add grove for screw fixing	YT		30/5/2017

Drawing Title: LineAL-X Start Bar

Drawn By: YT | Checked By: | Date: 24/11/16

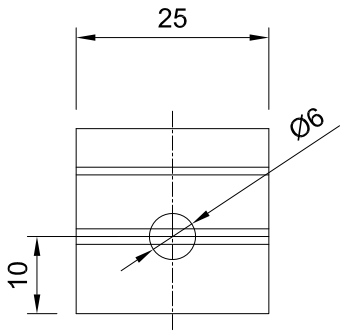
Scale: @ A4

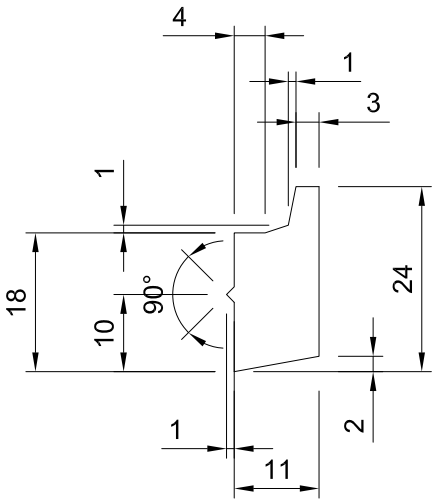
Drawing Status: Construction

Client: Internal

Project: ED-Tech-1607-02.08

Drawing No: A35 | Rev: C





Tech Note:

1. Material: Alum 6063T6 with mechanical properties applied to BS EN 755-2:1997
2. Profile dimension tolerance applied to BS EN 755-9:2008
3. Radius for all sharp corners are 0.4 mm
4. Overall dimension tolerance ±0.6 mm except stated on the drawing
5. Weight: 0.014 kg each

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General Notes:

Rev	Description	Drawn	Check	Date
A	Add a dimension and change the locking profile	YT		27/02/2017
B	Update tech Info and hole size from 5 to 5.5 mm	YT		02/05/17
C	Update the profile and increase length	YT		30/5/2017
D	Update the hole diameter to 6 mm	YT		18/09/2017

Drawing Title: Single Supporting Block

Drawn By: YT | Checked By: | Date: 24/11/16

Scale: @ A4

Drawing Status: Construction

Client: Internal

Project: ED-Tech-1607-02.10

Drawing No: A38 | Rev: D

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