Aluminum Batten System

Load & Span Table

Prepared for:

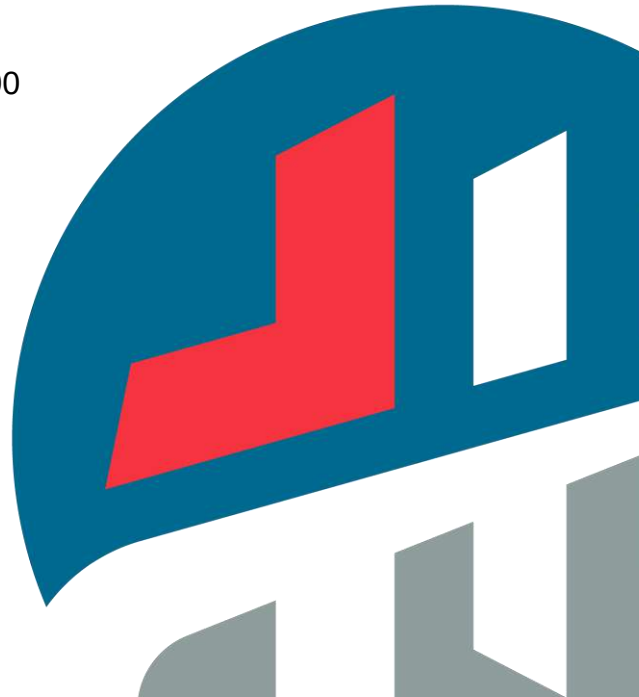
Luxyclad Aluminum Architectural Systems
C-24 Benfield Drive
St. Catharines, ON L2S 3V5

Prepared by:

MTE Consultants Inc.
1016 Sutton Drive, Unit A,
Burlington, ON L7L 6B8

May 12, 2021

MTE File No.: 49185-100



Engineers, Scientists, Surveyors.

MTE Consultants
1016 Sutton Dr., Unit A, Burlington, Ontario L7L 6B8

May 12, 2021

MTE File No.: 49185-100

Luxyclad Aluminum Architectural Systems
C-24 Benfield Drive,
St Catharines, ON L2S 3V5

RE: Aluminum Batten System Load/Span Table

MTE Consultants Inc. (MTE) has been retained Luxyclad Aluminum Architectural Systems (Luxyclad) to provide design calculations for three (3) snap baffles; 2x2, 2x4, & 2x6.

The following drawings were received for the calculations and are shown on Appendix C:

- Drawing no. A-29539 – 2" x 2" Snap Baffles
- Drawing no. A-31497-A – 2" x 4" Snap Baffles
- Drawing no. A-31498-B – 2" x 6" Snap Baffles

Design Codes & Standards

The following codes and standards were applied in performing the design calculations.

- National Building Code of Canada 2015 Division B Part 4 – Structural design
- Canadian Standards Association S157-05/S157.1-05 – Strength design in aluminum / Commentary on CSA S157-05
- The Aluminum Association Inc. Aluminum standards and Data 2009

Scope:

This report covers the structural integrity and serviceability check for each member size with the applied loadings for up to the maximum span of 7.30m (24' approx.). The drawings and models shown on this report shall not be used for fabrication and is for illustrative purposes only.

Physical Properties

Physical properties shall be taken as follows:

- Coefficient of Thermal Expansion, α – 24 x 10^{-6} /ºC;
- Elastic modulus, E – 69000 MPa
- Poisson's ratio, ν – 0.33
- Shear modulus, G – 26000 MPa
- Mass density, ρ – 2700 kg/m^3

Appendix A shows each section property run using the S-Calc software. While Appendix B shows the design checks performed.

The maximum span of each member were identified using a minimum wind pressure of 0.25 kPa up to a maximum of 4.00 kPa applied to the major axis of the member. Each member was also checked with a 1.00 kN (225 lb) concentrated live load applied at midspan. The span was limited to the standard length the baffles come in (7.30m or 24' approx.) and spacing of the baffles are kept at 150mm o/c.

Below is the maximum span for each member size based on the calculations shown on Appendix B.

Spacing (mm)	150		
Designation	2" x 2"	2" x 4"	2" x 6"
Specified Wind Load (kPa)	Maximum Allowable Span (m)		
0.25	2.50	7.00	7.30
0.50	2.50	6.00	7.30
1.00	2.50	4.70	6.90
1.50	2.30	4.10	6.00
2.00	2.10	3.80	5.40
2.50	1.90	3.50	4.80
3.00	1.80	3.30	4.00
3.50	1.70	3.10	3.40
4.00	1.60	3.00	3.00

We trust this provides the information you require at this time. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours Truly,

MTE Consultants Inc.

Dan Finelli, P.Eng.
Manager, Building Structures Division
905-639-2552 ext. 2419
dfinelli@mte85.com

Christopher Demafelis
Designer, Building Structures Division
905-639-2552 ext. 2414
cdemafelis@mte85.com

Limitations

This report has been prepared by **MTE Consultants Inc**. (MTE). The material in it reflects the best judgment of MTE in light of the information available at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. MTE accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this letter.

This assessment does not wholly eliminate uncertainty regarding the potential for existing or future costs, hazards or losses in connection with a property. No physical or destructive testing and no design calculations have been performed unless specifically recorded. Conditions existing but not recorded were not apparent given the level of study undertaken. We can perform further investigation on items of concern if so required. Only the specific information identified has been reviewed. The consultant is not obligated to identify mistakes or insufficiencies in the information obtained from the various sources or to verify the accuracy of the information. The Consultant may use such specific information obtained in performing its services and is entitled to rely upon the accuracy and completeness thereof.

Responsibility for detection of or advice about pollutants, contaminants or hazardous materials is not included in our mandate. In the event the Consultant or any other party encounters any hazardous or toxic materials, or should it become known to the Consultant that such materials may be present on or about the jobsite or any adjacent areas that may affect the performance of the Consultant's services, the Consultant may, at its option and without liability for consequential or any other damages, suspend performance of its services under this Agreement until the Client retains appropriates consultants to identify and abate or remove the hazardous or toxic materials and warrants that the jobsite is in full compliance with all applicable laws and regulations.

Any time frame given for undertaking work represents an educated guess based on apparent conditions existing at the time of our letter. Failure of the item, or the optimum repair/replacement process, may vary from our estimate. We accept no responsibility for any decisions made or actions taken as a result of this letter unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this letter specifically denies any right to claims against the Consultant, Sub-Consultants, their Officers, Agents and Employees in excess of the fee paid for professional services.

Appendix A

Section Properties

Simply-supported Aluminum Battens

Quick Report

Project no. 49185-100

MTE Consultants Inc.
1016 Sutton Drive, Unit A
Burlington, Ontario
Canada L7L 6B8
905-639-2552
www.mte85.com

Table Of Contents

Checked By: _____

Sections - 1						
ID	Name	Geometric Perimeter (mm)	Geometric Area (A) (mm^2)	Geometric Mass (kg/m)	Geometric Centroid Offset (Bottom Left Corner) X (mm)	Geometric Centroid Offset (Bottom Left Corner) Y (mm)
1	2x2	614.1257	568.7588	4.4658	25.3765	25.4045
2	2x4	820.148	694.6284	5.4541	50.8394	25.3992
3	2x6	1,017.229	1,010.413	7.9336	76.3556	25.3995

Sections - 2					
Geometric Moment of Inertia X (Ix) (mm^4)	Geometric Moment of Inertia Y (Iy) (mm^4)	Geometric Product Of Inertia (Ixy) (mm^4)	Geometric Radius of Gyration X (Rx) (mm)	Geometric Radius of Gyration Y (Ry) (mm)	Geometric Section Modulus X (Sx) (mm^3)
1.9575e+5	2.0116e+5	-6.4745e+4	18.5519	18.8065	7,704.7
2.7417e+5	1.0829e+6	-1.4923e+5	19.867	39.4837	1.0794e+4
4.4299e+5	3.2953e+6	-2.0160e+5	20.9387	57.1079	1.7440e+4

Sections - 3						
Geometric Section Modulus Y (Sy) (mm^3)	Principal Theta (deg)	Principal Moment of Inertia Major (mm^4)	Principal Moment of Inertia Minor (mm^4)	Principal Radius of Gyration Major (Rxp) (mm)	Principal Radius of Gyration Minor (Ryp) (mm)	Principal Section Modulus Major Bottom (Sx) (mm^3)
7,927.8466	46.1965	2.6326e+5	1.3366e+5	21.5143	15.3295	7,387.6856
2.1303e+4	79.872	1.1096e+6	2.4751e+5	39.9667	18.8765	2.0396e+4
4.3160e+4	85.977	3.3094e+6	4.2881e+5	57.2306	20.6009	4.2483e+4

Sections - 4				
Principal Section Modulus Major Top (Sx) (mm^3)	Principal Section Modulus Minor Left (Sy) (mm^3)	Principal Section Modulus Minor Right (Sy) (mm^3)	Principal Plastic Section Modulus X (Zx) (mm^3)	Principal Plastic Section Modulus Y (Zy) (mm^3)
7,387.0102	3,740.2457	3,740.2564	1.1111e+4	6,879.0325
2.0393e+4	7,305.8146	7,305.701	2.5937e+4	1.1735e+4
4.2481e+4	1.3983e+4	1.3983e+4	5.2694e+4	1.9178e+4

Sections - 5				
Plastic Centroid Offset (Elastic Neutral Axis) X (mm)	Plastic Centroid Offset (Elastic Neutral Axis) Y (mm)	Plastic Section Modulus X (Zx) (mm^3)	Plastic Section Modulus Y (Zy) (mm^3)	Polar Method
0	0	9,268.4047	1.0058e+4	Polygon
0	0	1.2412e+4	2.5657e+4	Polygon
0	0	1.9552e+4	5.2602e+4	Polygon

Sections - 6			
Polar Moment of Inertia (mm^4)	Polar Radius of Gyration (mm)	Shear Center Centroid Offset (Elastic Neutral Axis) X (Xo) (mm)	Shear Center Centroid Offset (Elastic Neutral Axis) Y (Yo) (mm)
3.9691e+5	26.417	0.01	0.0024
1.3571e+6	44.2002	0.0087	-0.0002
3.7383e+6	60.8255	0.0041	-0.0026

Checked By: _____

Sections - 7				
Shear Center Center Offset (Principal Axis) X (Xop) (mm)	Shear Center Center Offset (Principal Axis) Y (Yop) (mm)	Shear Area Area X (Asx) (mm^2)	Shear Area Area Y (Asy) (mm^2)	Monosymmetry Constant Monosymmetry Constant (Bx) (mm)
0.0087	0.0056	291.26	187.591	0.0019
0.0013	0.0086	363.5908	160.8115	-0.0051
0.0023	0.0043	616.0297	190.9322	-0.0077

Sections - 8						
Torsional Constant Torsional Constant (J) (mm^4)	Warping Constant Warping Constant (Cw) (mm^6)	Stress Points Method	Stress Points Top Left X (mm)	Stress Points Top Left Y (mm)	Stress Points Top Right X (mm)	Stress Points Top Right Y (mm)
1,093.4628	8.4680e+7	Closed Form Solution	-24.7415	25.4067	-24.3746	25.4067
1,062.7058	5.2232e+8	Closed Form Solution	-50.2044	25.4008	50.4529	25.4008
1,715.9566	2.1019e+9	Closed Form Solution	-75.7206	25.4005	75.9696	25.4005

Sections - 9					
Stress Points Bottom Left X (mm)	Stress Points Bottom Left Y (mm)	Stress Points Bottom Right X (mm)	Stress Points Bottom Right Y (mm)	Reference Axis Properties Elastic Centroid Offset X (mm)	Reference Axis Properties Elastic Centroid Offset Y (mm)
24.3721	-25.4045	24.7391	-25.4045	0	0
-50.4584	-25.3992	50.1989	-25.3992	0	0
-75.9746	-25.3995	75.7156	-25.3995	0	0

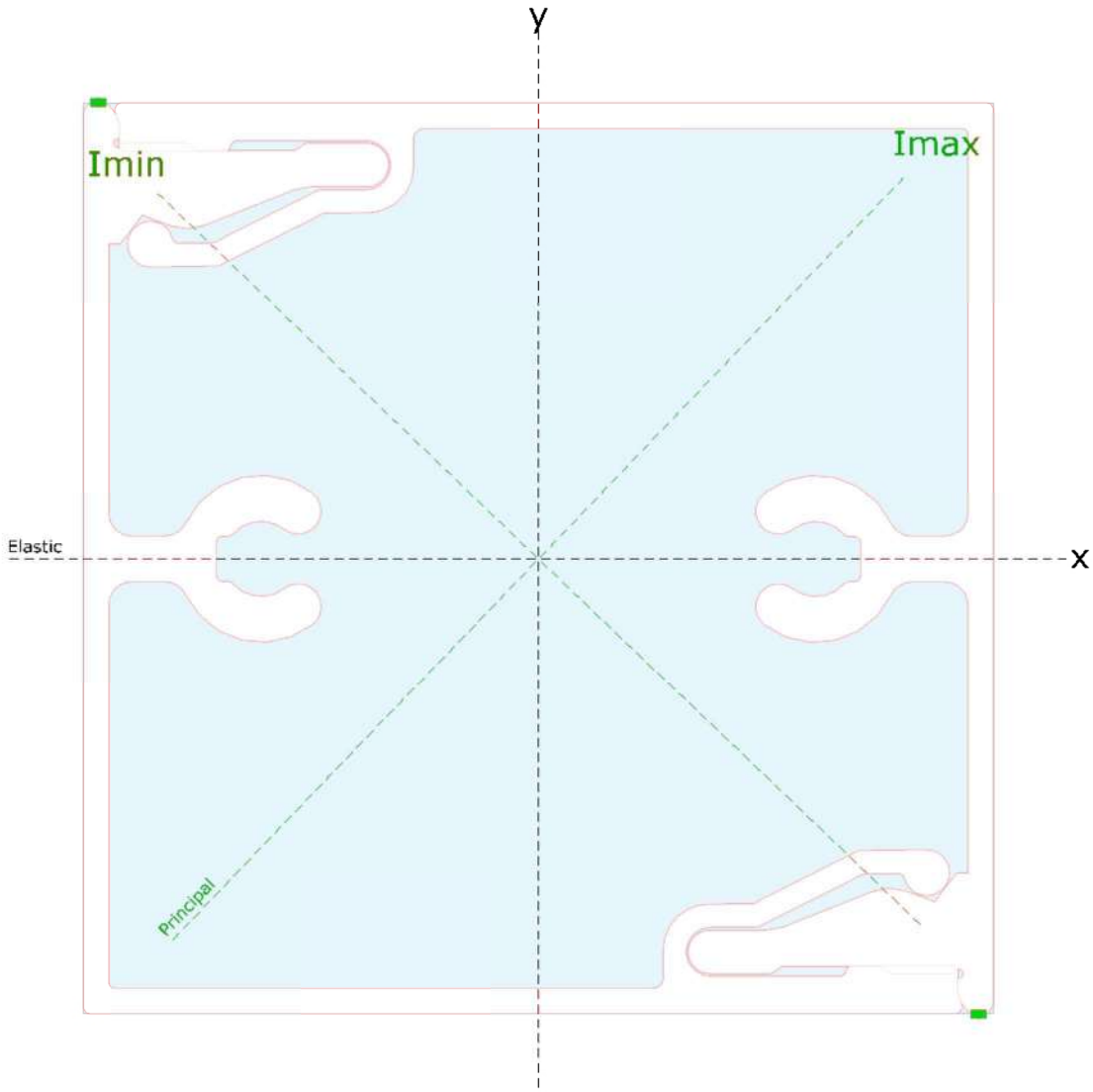
Sections - 10				
Reference Axis Properties Moment of Inertia X (Ix) (mm^4)	Reference Axis Properties Moment of Inertia Y (Iy) (mm^4)	Reference Axis Properties Radius of Gyration X (Rx) (mm)	Reference Axis Properties Radius of Gyration Y (Ry) (mm)	Analysis Factors Area
1.9575e+5	2.0116e+5	18.5519	18.8065	1
2.7417e+5	1.0829e+6	19.867	39.4837	1
4.4299e+5	3.2953e+6	20.9387	57.1079	1

Sections - 11			
Analysis Factors Mass	Analysis Factors Moment of Inertia	Analysis Factors Shear Area	Analysis Factors Torsional Constant
1	1	1	1
1	1	1	1
1	1	1	1

Checked By: _____

Materials					
ID	Name	Young's Modulus (MPa)	Shear Modulus (MPa)	Density (kg/m^3)	Strength (MPa)
1	Steel	2.00e+5	77,000	7,851.815	350
2	Concrete	27,000	11,250	2,447.319	30
3	Rebar Steel	2.00e+5	77,000	7,851.815	400

Checked By: _____



2x2

Checked By: _____

Summary		
Name	Layer GEOMETRY	
Reference Material	Steel	

Dimensions		
Width	50.751	mm
Depth	50.811	mm

Geometric Properties		
Perimeter	614.1257	mm
Area (A)	568.7588	mm^2
Mass	4.4658	kg/m
Centroid Offset (Bottom Left Corner)		
X	25.3765	mm
Y	25.4045	mm
Moment of Inertia		
X (Ix)	1.9575e+5	mm^4
Y (Iy)	2.0116e+5	mm^4
Product Of Inertia (Ixy)	-6.4745e+4	mm^4
Radius of Gyration		
X (Rx)	18.5519	mm
Y (Ry)	18.8065	mm
Section Modulus		
Bottom X (Sx)	7,705.3615	mm^3
X (Sx)	7,704.7	mm^3
Left Y (Sy)	7,927.0897	mm^3
Y (Sy)	7,927.8466	mm^3

Principal Properties		
Theta	46.1965	deg
Moment of Inertia		
Major	2.6326e+5	mm^4
Minor	1.3366e+5	mm^4
Radius of Gyration		
Major (Rxp)	21.5143	mm
Minor (Ryp)	15.3295	mm
Section Modulus		
Major Bottom (Sx)	7,387.6856	mm^3
Major Top (Sx)	7,387.0102	mm^3
Minor Left (Sy)	3,740.2457	mm^3
Minor Right (Sy)	3,740.2564	mm^3
Plastic Section Modulus		
X (Zx)	1.1111e+4	mm^3
Y (Zy)	6,879.0325	mm^3

Plastic Properties		
Centroid Offset (Elastic Neutral Axis)		
X	0	mm
Y	0	mm
Section Modulus		
X (Zx)	9,268.4047	mm^3
Y (Zy)	1.0058e+4	mm^3

Shear Area Properties		
Area		
X (Asx)	291.26	mm^2
Y (Asy)	187.591	mm^2

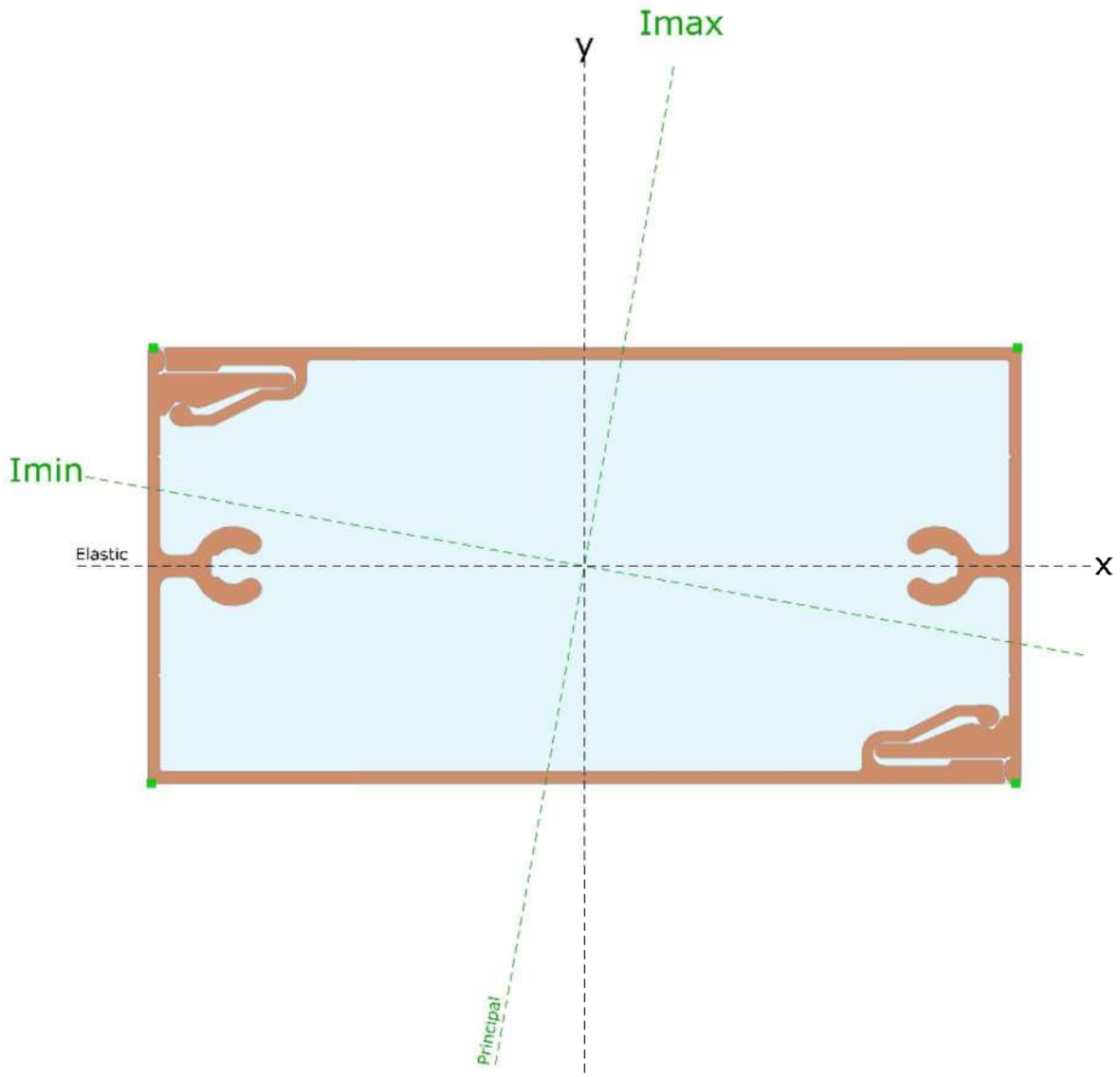
Shear Center Properties		
Centroid Offset (Elastic Neutral Axis)		
X (Xo)	0.01	mm
Y (Yo)	0.0024	mm
Center Offset (Principal Axis)		
X (Xop)	0.0087	mm
Y (Yop)	0.0056	mm

Monosymmetry Constant		
Top Flange In Compression	True	
Monosymmetry Constant (Bx)	0.0019	mm
Error		

Torsional Constant		
Torsional Constant (J)	1,093.4628	mm^4

Warping Constant		
Warping Constant (Cw)	8.4680e+7	mm^6

Checked By: _____



2x4

Checked By: _____

Summary		
Name	Layer GEOMETRY	
Reference Material	Steel	

Dimensions		
Width	101.673	mm
Depth	50.8	mm

Geometric Properties		
Perimeter	820.148	mm
Area (A)	694.6284	mm^2
Mass	5.4541	kg/m
Centroid Offset (Bottom Left Corner)		
X	50.8394	mm
Y	25.3992	mm
Moment of Inertia		
X (Ix)	2.7417e+5	mm^4
Y (Iy)	1.0829e+6	mm^4
Product Of Inertia (Ixy)	-1.4923e+5	mm^4
Radius of Gyration		
X (Rx)	19.867	mm
Y (Ry)	39.4837	mm
Section Modulus		
Bottom X (Sx)	1.0794e+4	mm^3
X (Sx)	1.0794e+4	mm^3
Left Y (Sy)	2.1300e+4	mm^3
Y (Sy)	2.1303e+4	mm^3

Principal Properties		
Theta	79.872	deg
Moment of Inertia		
Major	1.1096e+6	mm^4
Minor	2.4751e+5	mm^4
Radius of Gyration		
Major (Rxp)	39.9667	mm
Minor (Ryp)	18.8765	mm
Section Modulus		
Major Bottom (Sx)	2.0396e+4	mm^3
Major Top (Sx)	2.0393e+4	mm^3
Minor Left (Sy)	7,305.8146	mm^3
Minor Right (Sy)	7,305.701	mm^3
Plastic Section Modulus		
X (Zx)	2.5937e+4	mm^3
Y (Zy)	1.1735e+4	mm^3

Plastic Properties		
Centroid Offset (Elastic Neutral Axis)		
X	0	mm
Y	0	mm
Section Modulus		
X (Zx)	1.2412e+4	mm^3
Y (Zy)	2.5657e+4	mm^3

Shear Area Properties		
Area		
X (Asx)	363.5908	mm^2
Y (Asy)	160.8115	mm^2

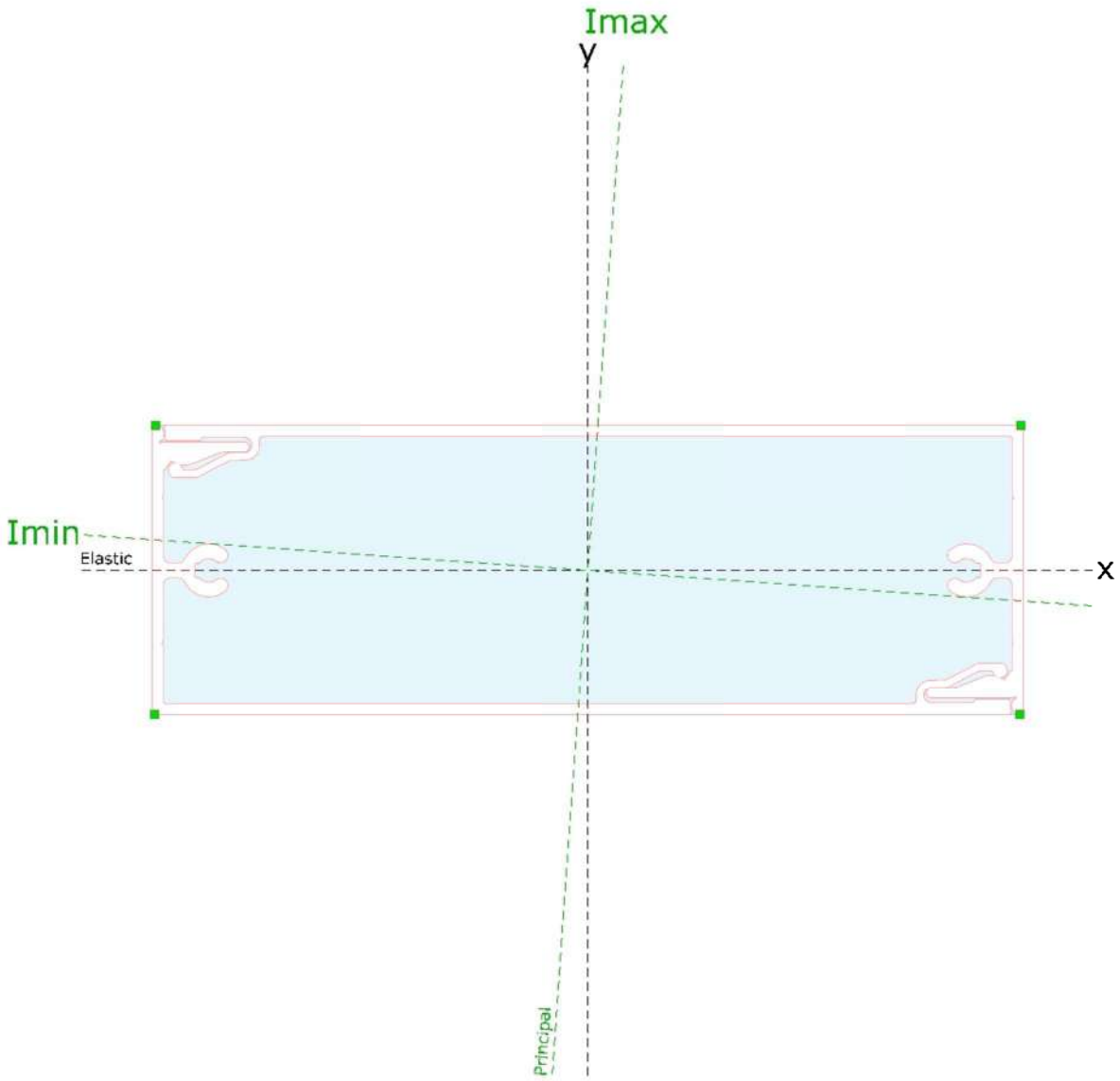
Shear Center Properties		
Centroid Offset (Elastic Neutral Axis)		
X (Xo)	0.0087	mm
Y (Yo)	-0.0002	mm
Center Offset (Principal Axis)		
X (Xop)	0.0013	mm
Y (Yop)	0.0086	mm

Monosymmetry Constant		
Top Flange In Compression	True	
Monosymmetry Constant (Bx)	-0.0051	mm
Error		

Torsional Constant		
Torsional Constant (J)	1,062.7058	mm^4

Warping Constant		
Warping Constant (Cw)	5.2232e+8	mm^6

Checked By: _____



2x6

Checked By: _____

Summary		
Name	Layer GEOMETRY	
Reference Material	Steel	

Dimensions		
Width	152.706	mm
Depth	50.8	mm

Geometric Properties		
Perimeter	1,017.229	mm
Area (A)	1,010.413	mm^2
Mass	7.9336	kg/m
Centroid Offset (Bottom Left Corner)		
X	76.3556	mm
Y	25.3995	mm
Moment of Inertia		
X (Ix)	4.4299e+5	mm^4
Y (Iy)	3.2953e+6	mm^4
Product Of Inertia (Ixy)	-2.0160e+5	mm^4
Radius of Gyration		
X (Rx)	20.9387	mm
Y (Ry)	57.1079	mm
Section Modulus		
Bottom X (Sx)	1.7441e+4	mm^3
X (Sx)	1.7440e+4	mm^3
Left Y (Sy)	4.3157e+4	mm^3
Y (Sy)	4.3160e+4	mm^3

Principal Properties		
Theta	85.977	deg
Moment of Inertia		
Major	3.3094e+6	mm^4
Minor	4.2881e+5	mm^4
Radius of Gyration		
Major (Rxp)	57.2306	mm
Minor (Ryp)	20.6009	mm
Section Modulus		
Major Bottom (Sx)	4.2483e+4	mm^3
Major Top (Sx)	4.2481e+4	mm^3
Minor Left (Sy)	1.3983e+4	mm^3
Minor Right (Sy)	1.3983e+4	mm^3
Plastic Section Modulus		
X (Zx)	5.2694e+4	mm^3
Y (Zy)	1.9178e+4	mm^3

Plastic Properties		
Centroid Offset (Elastic Neutral Axis)		
X	0	mm
Y	0	mm
Section Modulus		
X (Zx)	1.9552e+4	mm^3
Y (Zy)	5.2602e+4	mm^3

Shear Area Properties		
Area		
X (Asx)	616.0297	mm^2
Y (Asy)	190.9322	mm^2

Shear Center Properties		
Centroid Offset (Elastic Neutral Axis)		
X (Xo)	0.0041	mm
Y (Yo)	-0.0026	mm
Center Offset (Principal Axis)		
X (Xop)	0.0023	mm
Y (Yop)	0.0043	mm

Monosymmetry Constant		
Top Flange In Compression	True	
Monosymmetry Constant (Bx)	-0.0077	mm
Error		

Torsional Constant		
Torsional Constant (J)	1,715.9566	mm^4

Warping Constant		
Warping Constant (Cw)	2.1019e+9	mm^6

Appendix B

Member Checks

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x2 Aluminum Battens**

Section Properties (Data from S-Calc)

2x2

A_T = 568.76 mm^2

	Length (mm)		Thk (mm)		
A_{web1} =	50.80	x	1.40	=	70.97 mm^2
A_{web2} =	50.80	x	1.40	=	70.97 mm^2

Centroid x = 25.38 mm — R_x = 21.51 mm

Centroid y = 25.40 mm — R_y = 15.33 mm

S_x = 7387.69 mm^3

S_y = 3740.25 mm^3

I_x = 195750 mm^4

I_y = 201160 mm^4

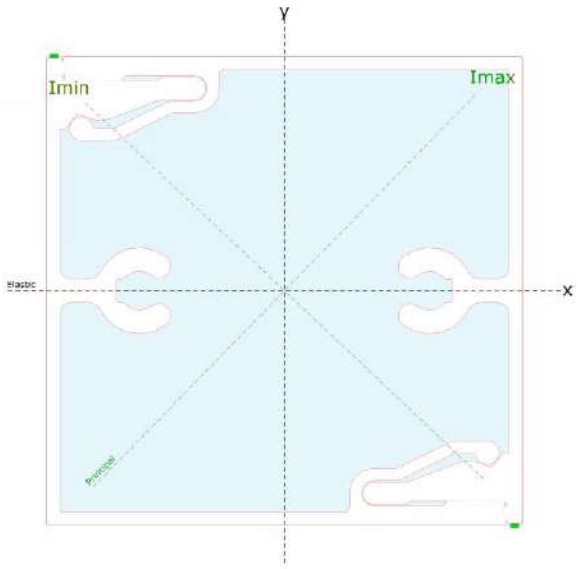
Material Properties

Aluminum Alloy 6063-T5

F_y = 145 MPa

F_U = 185 MPa

E = 69000 MPa



Design Loads

Wind Load, W = 4.00 kPa

Importance Factor, I = 1.00

Spacing, s = 0.15 m

$W_{factored}$ = 1.4W = 0.84 kN/m

$W_{specified}$ = 1.0W = 0.60 kN/m

Dead Load, D = 0.008 kN/m

$D_{factored}$ = 1.25D = 0.01 kN/m

Live Load, L = 1.00 kN

$L_{factored}$ = 1.5L = 1.50 kN

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x2 Aluminum Battens**

Check for Bending

h = 1600 mm W = 4.00 kPa

$M_{f1} = \frac{W_{factored}(h^2)}{8} =$ 0.17 kN-m $M_r = \phi_y S_x F_y =$ 0.96 kN-m

$M_{f2} = \frac{L_{factored}(h^2)}{4} =$ 0.60 kN-m

M_f < M_r

OK

Check for Shear

$V_{f1} = \frac{W_{factored}(h)}{2} =$ 0.67 kN $V_r = \phi_y A_{Web} 0.66 F_y =$ 12.22 kN

$V_{f2} = \frac{L_{factored}}{2} =$ 0.75 kN

V_f < V_r

OK

Check for Deflection

$\Delta_W = \frac{5(W_{specified})(h^4)}{384EIx} =$ 3.79 mm $\frac{h}{360} =$ 4.44 mm

$\Delta_L = \frac{(L)(h^3)}{48EIx} =$ 0.01 mm

Δ < h/360

OK

Check for Fasteners

no. of fasteners = 2 fastener size = #12-14 steel thickness = 1.087 mm

$T_f = \frac{V_f}{\text{no. of fasteners}} =$ 0.38 kN T_r = 0.64 kN (From screw technical data sheet)

$V_f = \frac{D_{factored}(h)}{2(\text{no. of fasteners})} =$ 0.00 kN V_r = 0.99 kN (From screw technical data sheet)

$\frac{T_f}{T_r} + \frac{V_f}{V_r} =$ 0.59 < 1

OK

Summary

Size =	**2x2**
Spacing =	**150 mm**
Specified Wind Load =	**4.00 kPa**
Spec. Point Live Load =	**1.00 kN**
Length =	**1.60 m**

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x2 Aluminum Battens**

Section Properties (Data from S-Calc)

2x2

A_T = 568.76 mm^2

	Length (mm)		Thk (mm)		
A_{web1} =	50.80	x	1.40	=	70.97 mm^2
A_{web2} =	50.80	x	1.40	=	70.97 mm^2

Centroid x = 25.38 mm — R_x = 21.51 mm

Centroid y = 25.40 mm — R_y = 15.33 mm

S_x = 7387.69 mm^3

S_y = 3740.25 mm^3

I_x = 195750 mm^4

I_y = 201160 mm^4

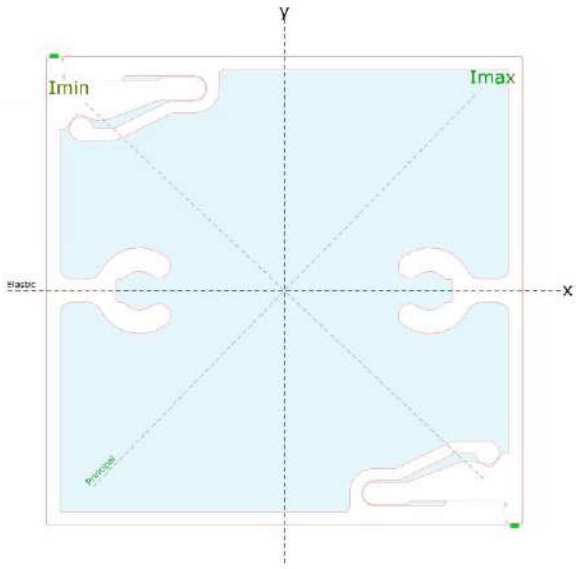
Material Properties

Aluminum Alloy 6063-T5

F_y = 145 MPa

F_U = 185 MPa

E = 69000 MPa



Design Loads

Wind Load, W = 0.25 kPa

Importance Factor, I = 1.00

Spacing, s = 0.15 m

$W_{factored}$ = 1.4W = 0.05 kN/m

$W_{specified}$ = 1.0W = 0.04 kN/m

Dead Load, D = 0.008 kN/m

$D_{factored}$ = 1.25D = 0.01 kN/m

Live Load, L = 1.00 kN

$L_{factored}$ = 1.5L = 1.50 kN

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x2 Aluminum Battens**

Check for Bending

h = 2500 mm W = 0.25 kPa

$M_{f1} = \frac{W_{factored}(h^2)}{8} =$ 0.02 kN-m $M_r = \phi_y S_x F_y =$ 0.96 kN-m

$M_{f2} = \frac{L_{factored}(h^2)}{4} =$ 0.94 kN-m

M_f < M_r

OK

Check for Shear

$V_{f1} = \frac{W_{factored}(h)}{2} =$ 0.07 kN $V_r = \phi_y A_{Web} 0.66 F_y =$ 12.22 kN

$V_{f2} = \frac{L_{factored}}{2} =$ 0.75 kN

V_f < V_r

OK

Check for Deflection

$\Delta_W = \frac{5(W_{specified})(h^4)}{384EIx} =$ 1.41 mm $\frac{h}{360} =$ 6.94 mm

$\Delta_L = \frac{(L)(h^3)}{48EIx} =$ 0.02 mm

Δ < h/360

OK

Check for Fasteners

no. of fasteners = 2 fastener size = #12-14 steel thickness = 1.087 mm

$T_f = \frac{V_f}{\text{no. of fasteners}} =$ 0.38 kN T_r = 0.64 kN (From screw technical data sheet)

$V_f = \frac{D_{factored}(h)}{2(\text{no. of fasteners})} =$ 0.01 kN V_r = 0.99 kN (From screw technical data sheet)

$\frac{T_f}{T_r} + \frac{V_f}{V_r} =$ 0.59 < 1

OK

Summary

Size =	**2x2**
Spacing =	**150 mm**
Specified Wind Load =	**0.25 kPa**
Spec. Point Live Load =	**1.00 kN**
Length =	**2.50 m**

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x4 Aluminum Battens**

Section Properties (Data from S-Calc)

2x4

A_T = 694.63 mm^2

	Length (mm)		Thk (mm)		
A_{web1} =	101.60	x	1.40	=	141.94 mm^2
A_{web2} =	101.60	x	1.40	=	141.94 mm^2

Centroid x = 50.84 mm R_x = 39.97 mm

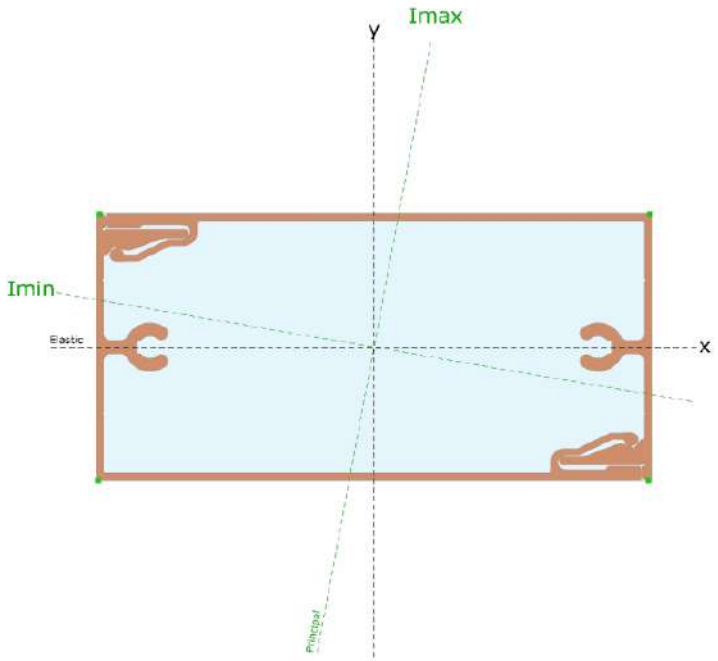
Centroid y = 25.40 mm R_y = 18.88 mm

S_x = 20396.00 mm^3

S_y = 7305.81 mm^3

I_x = 1109600 mm^4

I_y = 247510 mm^4



Material Properties

Aluminum Alloy 6063-T5

F_y = 145 MPa

F_U = 185 MPa

E = 69000 MPa

Design Loads

Wind Load, W = 4.00 kPa

Importance Factor, I = 1.00

Spacing, s = 0.15 m

$W_{factored}$ = 1.4W = 0.84 kN/m

$W_{specified}$ = 1.0W = 0.60 kN/m

Dead Load, D = 0.010 kN/m

$D_{factored}$ = 1.25D = 0.01 kN/m

Live Load, L = 1.00 kN

$L_{factored}$ = 1.5L = 1.50 kN

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x4 Aluminum Battens**

Check for Bending

h = 3000 mm W = 4.00 kPa

$M_{f1} = \frac{W_{factored}(h^2)}{8} =$ 0.32 kN-m $M_r = \phi_y S_x F_y =$ 2.66 kN-m

$M_{f2} = \frac{L_{factored}(h^2)}{4} =$ 1.13 kN-m

M_f < M_r

OK

Check for Shear

$V_{f1} = \frac{W_{factored}(h)}{2} =$ 1.26 kN $V_r = \phi_y A_{Web} 0.66 F_y =$ 24.45 kN

$V_{f2} = \frac{L_{factored}}{2} =$ 0.75 kN

V_f < V_r

OK

Check for Deflection

$\Delta_W = \frac{5(W_{specified})(h^4)}{384EIx} =$ 8.27 mm $\frac{h}{360} =$ 8.33 mm

$\Delta_L = \frac{(L)(h^3)}{48EIx} =$ 0.01 mm

Δ < h/360

OK

Check for Fasteners

no. of fasteners = 2 fastener size = #12-14 steel thickness = 1.087 mm

$T_f = \frac{V_f}{\text{no. of fasteners}} =$ 0.63 kN T_r = 0.64 kN (From screw technical data sheet)

$V_f = \frac{D_{factored}(h)}{2(\text{no. of fasteners})} =$ 0.01 kN V_r = 0.99 kN (From screw technical data sheet)

$\frac{T_f}{T_r} + \frac{V_f}{V_r} =$ 0.99 < 1

OK

Summary

Size =	**2x4**
Spacing =	**150 mm**
Specified Wind Load =	**4.00 kPa**
Spec. Point Live Load =	**1.00 kN**
Length =	**3.00 m**

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x4 Aluminum Battens**

Section Properties (Data from S-Calc)

2x4

A_T = 694.63 mm^2

	Length (mm)		Thk (mm)		
A_{web1} =	101.60	x	1.40	=	141.94 mm^2
A_{web2} =	101.60	x	1.40	=	141.94 mm^2

Centroid x = 50.84 mm R_x = 39.97 mm

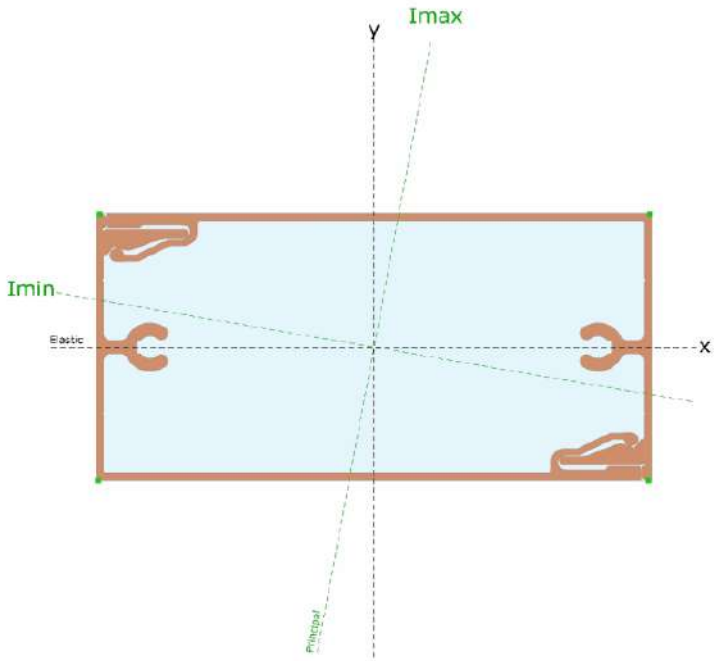
Centroid y = 25.40 mm R_y = 18.88 mm

S_x = 20396.00 mm^3

S_y = 7305.81 mm^3

I_x = 1109600 mm^4

I_y = 247510 mm^4



Material Properties

Aluminum Alloy 6063-T5

F_y = 145 MPa

F_U = 185 MPa

E = 69000 MPa

Design Loads

Wind Load, W = 0.25 kPa

Importance Factor, I = 1.00

Spacing, s = 0.15 m

$W_{factored}$ = 1.4W = 0.05 kN/m

$W_{specified}$ = 1.0W = 0.04 kN/m

Dead Load, D = 0.010 kN/m

$D_{factored}$ = 1.25D = 0.01 kN/m

Live Load, L = 1.00 kN

$L_{factored}$ = 1.5L = 1.50 kN

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x4 Aluminum Battens**

Check for Bending

h = 7000 mm W = 0.25 kPa

$M_{f1} = \frac{W_{factored}(h^2)}{8} =$ 0.05 kN-m $M_r = \phi_y S_x F_y =$ 2.66 kN-m

$M_{f2} = \frac{L_{factored}(h^2)}{4} =$ 2.63 kN-m

M_f < M_r

OK

Check for Shear

$V_{f1} = \frac{W_{factored}(h)}{2} =$ 0.18 kN $V_r = \phi_y A_{Web} 0.66 F_y =$ 24.45 kN

$V_{f2} = \frac{L_{factored}}{2} =$ 0.75 kN

V_f < V_r

OK

Check for Deflection

$\Delta_W = \frac{5(W_{specified})(h^4)}{384EIx} =$ 15.31 mm $\frac{h}{360} =$ 19.44 mm

$\Delta_L = \frac{(L)(h^3)}{48EIx} =$ 0.09 mm

Δ < h/360

OK

Check for Fasteners

no. of fasteners = 2 fastener size = #12-14 steel thickness = 1.087 mm

$T_f = \frac{V_f}{\text{no. of fasteners}} =$ 0.38 kN T_r = 0.64 kN (From screw technical data sheet)

$V_f = \frac{D_{factored}(h)}{2(\text{no. of fasteners})} =$ 0.02 kN V_r = 0.99 kN (From screw technical data sheet)

$\frac{T_f}{T_r} + \frac{V_f}{V_r} =$ 0.60 < 1

OK

Summary

Size =	**2x4**
Spacing =	**150 mm**
Specified Wind Load =	**0.25 kPa**
Spec. Point Live Load =	**1.00 kN**
Length =	**7.00 m**

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x6 Aluminum Battens**

Section Properties (Data from S-Calc)

2x6

A_T = 1017.23 mm^2

	Length (mm)		Thk (mm)		
A_{web1} =	152.40	x	1.40	=	212.90 mm^2
A_{web2} =	152.40	x	1.40	=	212.90 mm^2

Centroid x = 76.36 mm — R_x = 57.23 mm

Centroid y = 25.40 mm — R_y = 20.60 mm

S_x = 42483.00 mm^3

S_y = 13983.00 mm^3

I_x = 3309400 mm^4

I_y = 428810 mm^4

Material Properties

Aluminum Alloy 6063-T5

F_y = 145 MPa

F_U = 185 MPa

E = 69000 MPa

Design Loads

Wind Load, W = 4.00 kPa

Importance Factor, I = 1.00

Spacing, s = 0.15 m

$W_{factored}$ = 1.4W = 0.84 kN/m

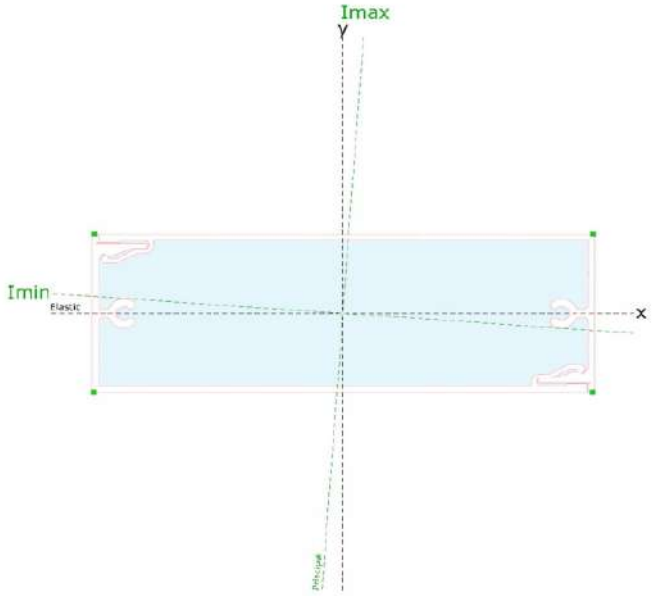
$W_{specified}$ = 1.0W = 0.60 kN/m

Dead Load, D = 0.014 kN/m

$D_{factored}$ = 1.25D = 0.02 kN/m

Live Load, L = 1.00 kN

$L_{factored}$ = 1.5L = 1.50 kN



Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x6 Aluminum Battens**

Check for Bending

h = 3000 mm W = 4.00 kPa

$M_{f1} = \frac{W_{factored}(h^2)}{8} =$ 0.32 kN-m $M_r = \phi_y S_x F_y =$ 5.54 kN-m

$M_{f2} = \frac{L_{factored}(h^2)}{4} =$ 1.13 kN-m

M_f < M_r

OK

Check for Shear

$V_{f1} = \frac{W_{factored}(h)}{2} =$ 1.26 kN $V_r = \phi_y A_{Web} 0.66 F_y =$ 36.67 kN

$V_{f2} = \frac{L_{factored}}{2} =$ 0.75 kN

V_f < V_r

OK

Check for Deflection

$\Delta_W = \frac{5(W_{specified})(h^4)}{384EIx} =$ 2.77 mm $\frac{h}{360} =$ 8.33 mm

$\Delta_L = \frac{(L)(h^3)}{48EIx} =$ 0.00 mm

Δ < h/360

OK

Check for Fasteners

no. of fasteners = 2 fastener size = #12-14 steel thickness = 1.087 mm

$T_f = \frac{V_f}{\text{no. of fasteners}} =$ 0.63 kN T_r = 0.64 kN (From screw technical data sheet)

$V_f = \frac{D_{factored}(h)}{2(\text{no. of fasteners})} =$ 0.01 kN V_r = 0.99 kN (From screw technical data sheet)

$\frac{T_f}{T_r} + \frac{V_f}{V_r} =$ 0.99 < 1

OK

Summary

Size =	**2x6**
Spacing =	**150 mm**
Specified Wind Load =	**4.00 kPa**
Spec. Point Live Load =	**1.00 kN**
Length =	**3.00 m**

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x6 Aluminum Battens**

Section Properties (Data from S-Calc)

2x6

A_T = 1017.23 mm^2

	Length (mm)		Thk (mm)		
A_{web1} =	152.40	x	1.40	=	212.90 mm^2
A_{web2} =	152.40	x	1.40	=	212.90 mm^2

Centroid x = 76.36 mm — R_x = 57.23 mm

Centroid y = 25.40 mm — R_y = 20.60 mm

S_x = 42483.00 mm^3

S_y = 13983.00 mm^3

I_x = 3309400 mm^4

I_y = 428810 mm^4

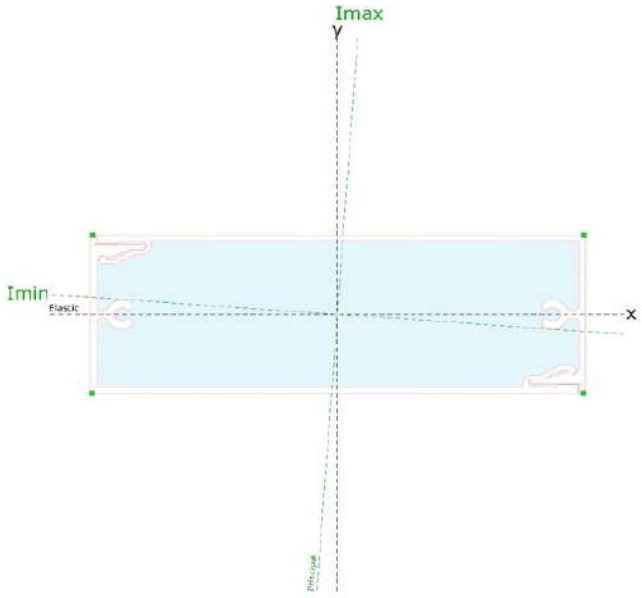
Material Properties

Aluminum Alloy 6063-T5

F_y = 145 MPa

F_U = 185 MPa

E = 69000 MPa



Design Loads

Wind Load, W = 0.25 kPa

Importance Factor, I = 1.00

Spacing, s = 0.15 m

$W_{factored}$ = 1.4W = 0.05 kN/m

$W_{specified}$ = 1.0W = 0.04 kN/m

Dead Load, D = 0.014 kN/m

$D_{factored}$ = 1.25D = 0.02 kN/m

Live Load, L = 1.00 kN

$L_{factored}$ = 1.5L = 1.50 kN

Project #:	**49185-100**
Project Name:	**Luxyclad Aluminum Batten System**
Date:	**May 11, 2021**
Subject:	**2x6 Aluminum Battens**

Check for Bending

h = 7300 mm W = 0.25 kPa

$M_{f1} = \frac{W_{factored}(h^2)}{8} =$ 0.05 kN-m $M_r = \phi_y S_x F_y =$ 5.54 kN-m

$M_{f2} = \frac{L_{factored}(h^2)}{4} =$ 2.74 kN-m

M_f < M_r

OK

Check for Shear

$V_{f1} = \frac{W_{factored}(h)}{2} =$ 0.19 kN $V_r = \phi_y A_{Web} 0.66 F_y =$ 36.67 kN

$V_{f2} = \frac{L_{factored}}{2} =$ 0.75 kN

V_f < V_r

OK

Check for Deflection

$\Delta_W = \frac{5(W_{specified})(h^4)}{384EIx} =$ 6.07 mm $\frac{h}{360} =$ 20.28 mm

$\Delta_L = \frac{(L)(h^3)}{48EIx} =$ 0.04 mm

Δ < h/360

OK

Check for Fasteners

no. of fasteners = 2 fastener size = #12-14 steel thickness = 1.087 mm

$T_f = \frac{V_f}{\text{no. of fasteners}} =$ 0.38 kN T_r = 0.64 kN (From screw technical data sheet)

$V_f = \frac{D_{factored}(h)}{2(\text{no. of fasteners})} =$ 0.03 kN V_r = 0.99 kN (From screw technical data sheet)

$\frac{T_f}{T_r} + \frac{V_f}{V_r} =$ 0.61 < 1

OK

Summary

Size =	**2x6**
Spacing =	**150 mm**
Specified Wind Load =	**0.25 kPa**
Spec. Point Live Load =	**1.00 kN**
Length =	**7.30 m**

Appendix C

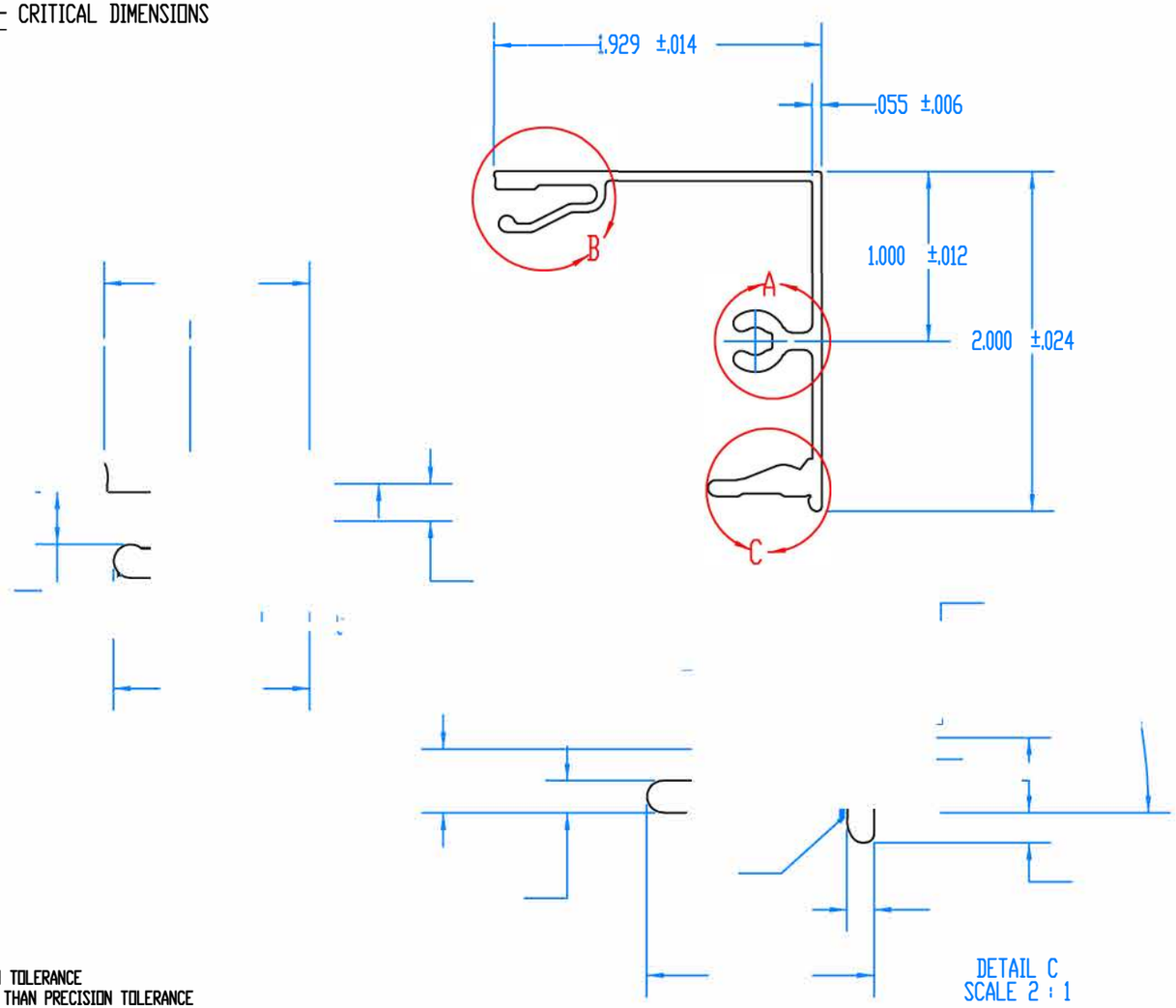
Product Data Sheet

PER ER#523260-1	
CUSTOMER NUMBER	
AREA	0.442 IN^2
WEIGHT	0.521 LBS/FT
PERIMETER OUT.	12.1 IN
PERIMETER INS.	0 IN
CCD	2.762 IN
SolidWorks	
SCALE	1:1
DATE	
DRAWN BY	
DIE TYPE	
DIE SIZE	
BACKER	
BOLSTER	
SUB BOLSTER	
LEAD IN PLATE	
NO. OF HOLES	
RACK NO.	
PRINT APPROVAL	
SHOWN	
DATE	

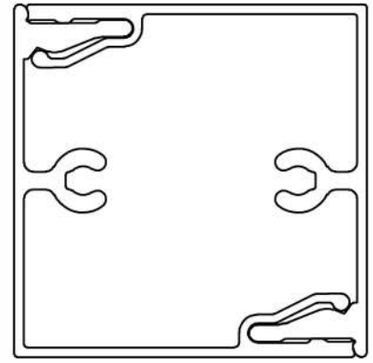
ALLOY: 6063 T5

PAGE 1 OF 1

( ) - CRITICAL DIMENSIONS



DETAIL C
SCALE 2 : 1



OUTSIDE VISUAL B

** - PRECISION TOLERANCE
*** - TIGHTER THAN PRECISION TOLERANCE
UNLESS OTHERWISE NOTED ALL ANGLES ARE ±1°
UNLESS OTHERWISE NOTED ALUMINUM ASSOCIATION TOLERANCES APPLY

ER #523260-1

PROPOSAL NO.	X34054-5

NO. REV.	REVISION	DATE	BY	

TITLE 2" x 2" Snap Baffle

SHEET SIZE 8.5in*14in

C:\Users\sdulku\Desktop\29539\A-29539

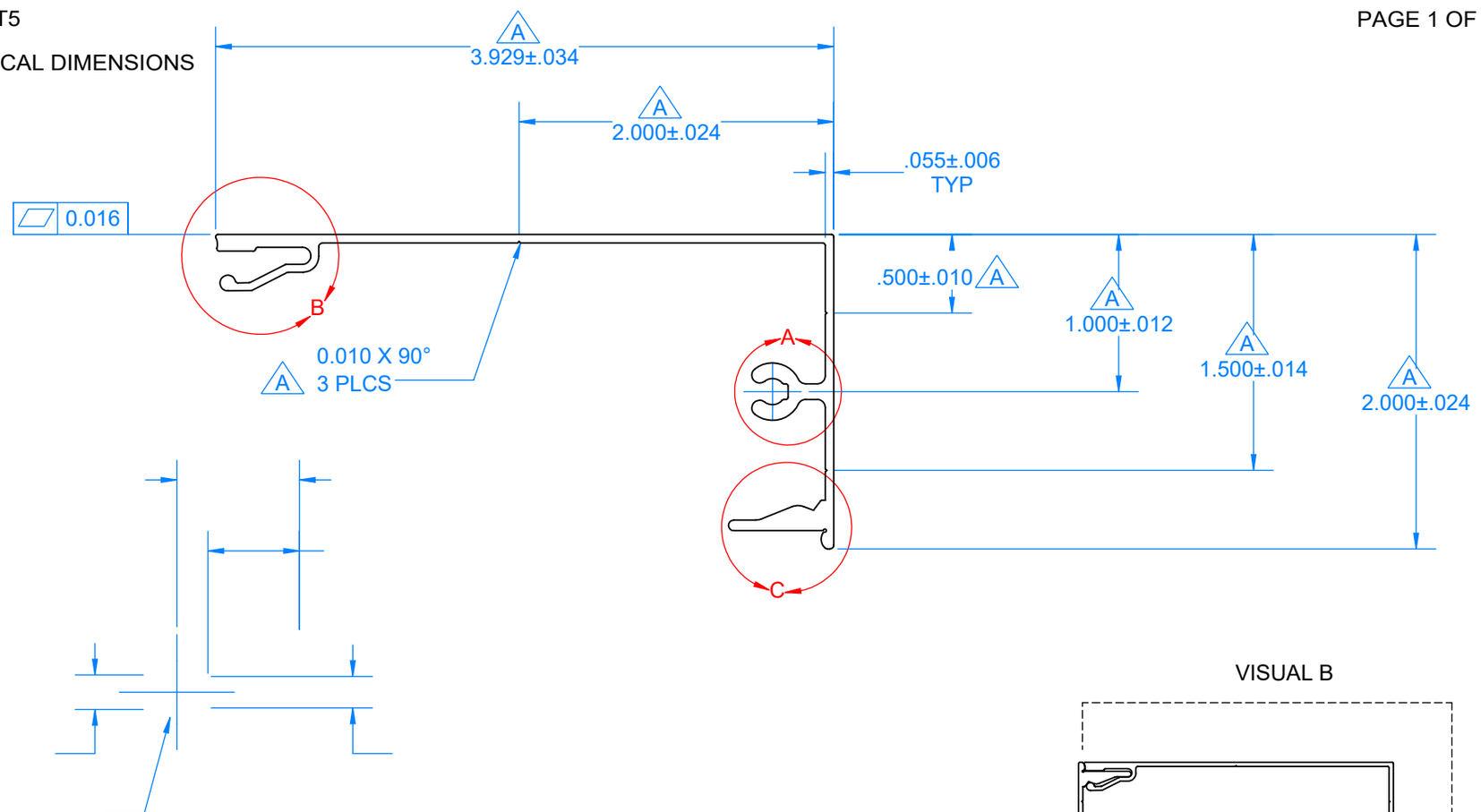
A-31497-A

CUSTOMER NUMBER	
AREA	0.539 IN^2
WEIGHT	0.636 LBS/FT
PERIMETER OUT.	16.155 IN
PERIMETER INS.	NA
CCD	4.395 IN
SolidWorks	
SCALE	1:1
DATE	
DRAWN BY	
DIE TYPE	
DIE SIZE	
BACKER	
BOLSTER	
SUB BOLSTER	
LEAD IN PLATE	
NO. OF HOLES	
RACK NO.	
PRINT APPROVAL	

DATE

ALLOY: 6063 T5

- CRITICAL DIMENSIONS



VISUAL B

1:2 SCALE

** - PRECISION TOLERANCE
*** - TIGHTER THAN PRECISION TOLERANCE
UNLESS OTHERWISE NOTED ALL ANGLES ARE ±1°
UNLESS OTHERWISE NOTED ALUMINUM ASSOCIATION TOLERANCES APPLY

ER #526769-1

PROPOSAL NO.

REVISION	DATE	BY
NO. REV. A		

TITLE ***2"x4" Snap Baffle***

SHEET SIZE 8.5in*14in

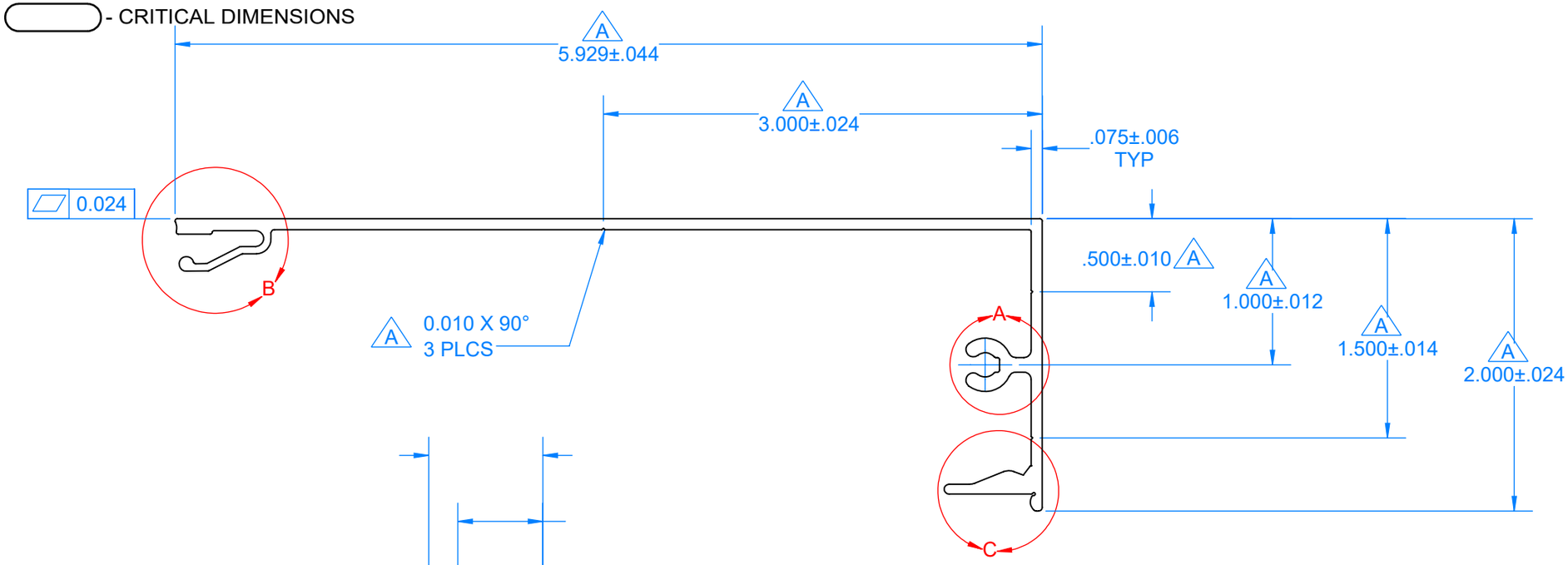
A-31498-A

CUSTOMER NUMBER	
AREA	0.784 IN^2
WEIGHT	0.925 LBS/FT
PERIMETER OUT.	20.035 IN
PERIMETER INS.	NA
CCD	6.247 IN
SolidWorks	
SCALE	1:1
DATE	
DRAWN BY	
DIE TYPE	
DIE SIZE	
BACKER	
BOLSTER	
SUB BOLSTER	
LEAD IN PLATE	
NO. OF HOLES	
RACK NO.	
PRINT APPROVAL	

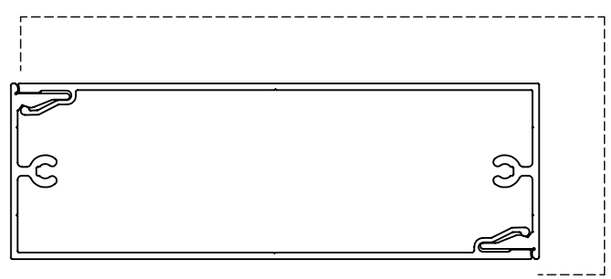
DATE

ALLOY: 6063 T5

- CRITICAL DIMENSIONS



VISUAL B



1:2 SCALE

** - PRECISION TOLERANCE
*** - TIGHTER THAN PRECISION TOLERANCE
UNLESS OTHERWISE NOTED ALL ANGLES ARE ±1°
UNLESS OTHERWISE NOTED ALUMINUM ASSOCIATION TOLERANCES APPLY

ER #526769-2

PROPOSAL NO.

BY	DATE	REVISION	NO. REV.
			A

TITLE ***2"x6" Snap Baffle***

SHEET SIZE 8.5in*14in

L:\Engineering\New Pending Jobs & Old Pending Dwgs\31498\A-31498-A