



ETC Laboratories

Measuring Up To Your Standards And More

Corporate Offices / Laboratories

297 Buell Road
Rochester, NY 14624
(585) 328-7668
Fax: (585) 328-7777

Report Number: ETC-08-1014-21649.0

Test Start Date: 09/11/2008

Test Finish Date: 02/19/2009

Report Date: 04/24/2009

Dade County Notification Number: ETC08023

TAS 201, TAS 202, TAS 203 Combined Test Report

Rendered To:

Four Seasons Solar Products
5005 Veterans Memorial Highway
Holbrook, NY 11741

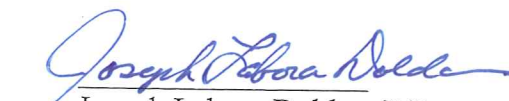
Double Lite Hurricane Impact Roof Window

Summary of Results

Item	Unit	
Overall Design Pressure, Pos./Neg.	psf	65.00
Air Leakage Rate	scfm/ft ²	0.01
Maximum Water Pressure Achieved	psf	10.50
Maximum Structural Pressure Achieved, Pos./Neg.	psf	97.50
Missile Resisted	-	Large
Nominal Missile Speed Resisted	ft/sec	50.00
Maximum Cyclic Pressure Achieved Pos./Neg.	psf	65.00
FER Test	-	Pass

Summary Description:

The tested unit was a fixed aluminum roof window constructed with mechanically fastened frame corners with a horizontal muntin bar dividing the unit into equal sections. Three specimens of identical construction were tested, measuring 39-3/8 in. wide by 66 inches high by 6-1/2 inches deep. The IG units used had a nominal thickness of 7/8 inch an exterior lite of 1/8 inch tempered glass and an interior lite consisting of 1/8 inch annealed glass to either face of a 0.090 inch PVB interlayer and glazed with DOW 995.


Joseph Labora Doldan, P.E.
Florida P.E. #42929
5-27-09

Test Specifications

The testing was conducted in accordance with Florida Building Code test Protocols for High Velocity Hurricane Zones TAS 201-94, TAS 202-94 and TAS 203-94 without deviations.

Note: Safety glass permanent marker identified before testing began

TAS 202-04 Results

	<u>Results</u>	<u>Allowed</u>
Specimen 1		
1. Air Infiltration Test – ASTM E283 @ 1.57 psf	0.01 scfm/ft ²	0.3 scfm/ft ²
2. Uniform Static Air Pressure Test - ASTM E 330		
Design Pressure – 65.00 psf		
Design Load: 65.0 psf (100% x DP)		
Center of rafter, between fasteners		
Positive Deflection	0.100 in.	0.366 in. (L/180)
Negative Deflection	0.065 in.	0.366 in. (L/180)
Center of muntin		
Positive Deflection	0.185 in.	0.195 in. (L/180)
Negative Deflection	0.195 in.	0.195 in. (L/180)
3. Water Resistance Test – ASTM E331		
Design Pressure – 70.00 psf		
Test pressure – 10.50 psf	Pass	No Leakage
Water spray was delivered to the specimen and maintained a rate of 5 gallons per hour per square foot of specimen area for the duration of the water resistance test.		
No water infiltration past the inner most plane of the test specimen occurred during the water resistance test.		
4. Uniform Static Air Pressure Test - ASTM E 330		
Design Pressure – 65.00 psf		
Full Test Load: 97.50 psf (150% x DP)		
Center of rafter, between fasteners		
Positive Permanent Set	0.015 in.	0.264 in. (.4%)
Negative Permanent Set	0.021 in.	0.264 in. (.4%)
Center of muntin		
Positive Permanent Set	0.011 in.	0.264 in. (.4%)
Negative Permanent Set	0.015 in.	0.264 in. (.4%)
5. Forced Entry Resistance – ASTM F588		
Grade: 10		
Disassembly Test	Pass	No Entry
Sash Manipulation Test	Pass	No Entry

Test notes:

The specimen remained in place throughout the tests and no damage to the fasteners was observed.

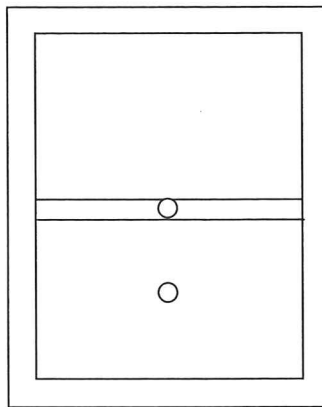
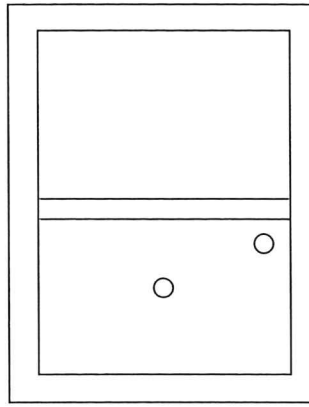
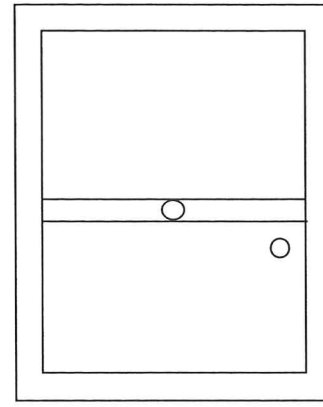
The specimen successfully completed all testing as prescribed by Test Protocol TAS 202-94 and the associated Frequently Asked Questions and sections of the Florida Building Code. No change in the specimen was observed that could be indicative of incipient failure.



Joseph Labora Doldan, P.E.

Florida P.E. #42929

5-27-09

TAS 201-04 & 203-04 Test Results**Specimen 1****Specimen 2****Specimen 3**

Notes: The circles on the diagrams above indicate the impact locations for that specimen.

The X measurement stated below is taken from the left edge of the specimen,

The Y measurement stated below is taken from the top edge of the specimen.

The large missile used was a piece of #2 southern yellow pine, 2 x 4 dimensional lumber, 97 inches long and weighing 9.2 lbs.

Impact Location	Missile Speed (ft/sec)	X Measurement (in.)	Y Measurement (in.)
Specimen 1			
Center of Lower Glass	49.8	19	48-1/2
Center of muntin	50.0	20	34-1/4
Specimen 2			
Center of Lower glass, Lower	50.9	19-1/2	48
Upper Right glass corner, Lower	50.1	31-1/2	40
Specimen 3			
Upper Right glass corner, Lower	49.8	31	39
Center of muntin	50.8	20	33-1/2

Cyclic Wind Pressure Loading Tests:

Notes: The specimen was subjected to pressure cycles of the same sequences, duration and pressure differentials stated below in the Tabulation of Pressure Differences

The maximum inward and outward acting pressures exerted on the specimens were equivalent to the design pressures stated below in the Tabulation of Pressure Differences.

The maximum deflection and permanent set were recorded using a straight edge and steel scale and represent the average deflection over several cycles at maximum pressure differential and the difference between measurements taken before cycling and after cycling respectively.

Joseph Labora Doldan
 Joseph Labora Doldan, P.E.
 Florida P.E. #42929
 5-27-09

TAS 201-04 & 203-04 Tests Results (cont.)

Tabulation of Pressure Differences:

Number of Cycles	Pressure Range of Cycles Inward Acting Cycles -DP = 70.00 psf				Specimen 1	Specimen 2	Specimen 3
	% of DP	Pa (psf)	% of DP	Pa (psf)	(sec/cycle)		
3500	20	14.0	50	35.0	2.0	2.0	2.0
300	0	0.0	60	42.0	2.3	2.9	2.9
600	50	35.0	80	56.0	2.1	2.4	2.4
100	30	21.0	100	70.0	2.2	2.4	2.4
Number of Cycles	Pressure Range of Cycles Outward Acting Cycles -DP = 70.00 psf				Specimen 1	Specimen 2	Specimen 3
					(sec/cycle)		
50	30	21.0	100	70.0	2.2	2.1	2.1
1050	50	35.0	80	56.0	1.6	1.7	1.7
50	0	0.0	60	42.0	2.3	2.7	2.7
3350	20	14.0	50	35.0	2.1	1.7	1.7

Maximum Deflection and Permanent Set from Pressure Cycling:

Location of Measurement		Cycle	Maximum Deflection (in.)	Permanent Set (in.)
Specimen 1	Muntin bar	Inward Acting Pressure	3/4	0
		Outward Acting Pressure	1	0
Specimen 2	Muntin bar	Inward Acting Pressure	1/4	0
		Outward Acting Pressure	1/2	0
Specimen 3	Muntin bar	Inward Acting Pressure	5/8	0
		Outward Acting Pressure	1-5/8	1/8

Condition of Test Specimens:

The specimens remained in place throughout the tests and no damage to the fasteners was observed.

After testing, the specimens exhibited many fractures to the impacted light of glass.

These specimens average recovery over maximum deflection was over 97%.

All three specimens passed impact with no missile penetration and no openings after cyclic testing.

No change in the specimen was observed that could be indicative of incipient failure.

Joseph Labora Doldan
 Joseph Labora Doldan, P.E.
 Florida P.E. #42929
 5-27-09

Product Description of Test SpecimenSpecimen ItemLaboratory VerificationFrame:

Model/Series

Hurricane Impact Roof Window

Size

39-3/8 in. W. x 66 in. H. x 6-1/2 in. D.

Daylight Opening

[2] ea. @ 34-7/8 in. W. x 29-1/4 in. H.

Material

Aluminum

Construction

Two aluminum rafters 2 in. W. x 5 in. D. x 66 in. high forms the sides. The rafters have a [2] 3 legged rubber fins set into extruded T-slot profiles on their top edge. Extruded aluminum muntins (38-3/4 inches) wide are laid on top of the rafters (horizontally) forming top, middle and bottom members, they are fastened at ends with [2] 10-24 x 3/8 in. machine screws.

Aluminum end cover plates 4-1/2 in. D. x 1/8 in. thick are bent at 90 degree angles at either end and the newly formed 1-1/4 inch legs are inserted into the interior ends of the rafters against their outer edges, [2] #8 x 1 in. L. self drilling pan heads are driven horizontally from exterior lateral edges of rafter, 1/2 in. from ends and spaced 3 in. apart into legs of cover plate securing its position.

Glazing:

Overall IG thickness

7/8 in. glass from Cardinal

Thickness of lites

Exterior - 1/8 in. tempered

Interlayer

Interior - 1/8 in. ann. / 0.090 in. PVB / 1/8 in. ann.

Number of lites

0.090 in. PVB, Cardinal, Sea Storm

Spacer ID

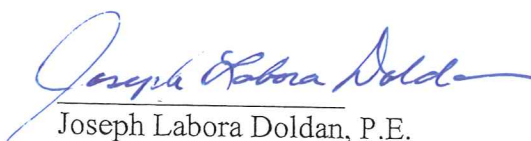
2

SS-D

Glazing Method:

Type

IG units set on top of framework from exterior, compressing 3 legged rubber fins on top edge of vertical rafters and sealed with a cap bead of DOW 995 structural sealant to the interior and exterior edge of the rafters. An aluminum glazing cap with 3 legged rubber fin facing the IG is placed to the exterior and fastened with [7] #10 x 1-1/2 in. L. screws with bushings located 3 in. from ends and spaced on 10 in. centers driven from the exterior, with a snap in aluminum beauty cap covering screws the full length of either rafter.



Joseph Labora Doldan, P.E.

Florida P.E. #42929

5-27-09

Product Description of Test SpecimenSpecimen ItemLaboratory VerificationGlazing Method (con't):

IG unit is sealed to the horizontal muntin bars with dual sided glazing tape 3/8 in. W, x 1/16 in. D. and DOW 995 structural sealant to the edge of the IG and the interior face. Aluminum muntin caps with single sided glazing tape 3/8 in. W, x 1/16 in. D. facing the IG is set on top of units sandwiching 5/16 in. W. x 3/16 in. H. x 36 in. L. pieces of steel stock, [11] 10-24 x 3/4 in. machine screws with bushings, located 2-1/2 in. from ends, then 3-1/16 in on center spacing are driven from the interior of the muntin bars through the steel stock and into the pocket of the muntin caps completing the fastening, with a snap in vinyl cap covering screw heads the full width of the [3] muntins. A 7/8 in. square wood spacer is placed along the exterior perimeter of the exterior frame and sandwiched in position; imitating additional IG units if this were a complete roof system.

Bite depth

1/2 in.

Reinforcement:

5/16 in. W. x 3/16 in. H. x 36 in. L. steel stock centered in muntin bars

Weather-stripping:

[2] Rows of rubber compression seal with 3 legs, 0.365 in. W. x 0.265 in. H. with a 0.187 in. T-extrusion on bottom face of glazing caps

[2] Rows of rubber compression seal with 3 legs, 0.365 in. W. x 0.265 in. H. with a 0.187 in. T-extrusion on top face of rafters

Drainage:

[2] oval slots 7/16 in. W. X 3/16 in. D. through ends of muntin bar at rafter intersection

Test Buck:

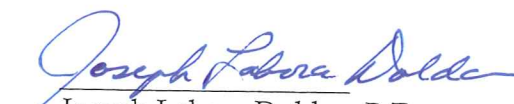
Mounting Gap
Shims
Sealant
Material

0 in. at the head, jambs and sill
Located on lateral edges of rafters, see test buck drawing
Silicone
2 x 6, SPF, #2

Anchorage of Frame to Test Buck:

Type
Quantity
Location

1/4 in. x 2-1/2 in. L. lag bolt
[2] at each corner, horizontal orientation
1-1/4 in. from ends of rafters, spaced 2-3/8 in. apart


Joseph Labora Doldan, P.E.
Florida P.E. #42929
5-27-09

Statement of Compliance: The results of the testing demonstrate the products tested **Meets** the requirements of Chapters 1606, 1619 and 1626 of the Florida Building Code and the requirements of Florida Building Code test Protocols for High Velocity Hurricane Zones TAS 201-94, TAS 202-94 and TAS 203-94

Review of Bill of Materials: As Supplied

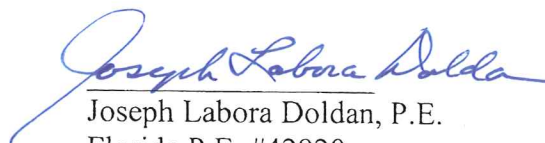
Review of Assembly and Detail Drawings: Plan view, Rafter section, Muntin assembly 2 pages, Steel stock, Bucking, Glazing cap, Rafter, Muntin, Beauty cap, Muntin cap.

Components changed or altered during testing to achieve stated results - None

This report, in its original form contains product drawings and a Bill of Materials.

Persons Witnessing Tests:

Joe Doldan, PE,
Josh Reindl, ETC Laboratories
Mark Sennett, ETC laboratories
Gurjinder Singh Dhami, ETC Laboratories


Joseph Labora Doldan, P.E.
Florida P.E. #42929
5-27-09

Conditions, Terms, and General Notes Regarding These Tests

The product tested **Has Been** compared to the detailed drawings, bill of materials and fabrication information supplied by the client so named herein. Our analysis, which includes dimensional and component description comparisons, indicate the tested product and engineering information supplied by the client "**Are Equivalent**". The report and representative samples will be retained for four years from the date of initial test.

These test results were obtained by employing all requirements of the designated test methods with no deviations. The test results and specimen supplied for testing are in compliance with the referenced specifications. The test results are specific to the product tested by this laboratory and of the sample supplied by the client named herein, and they relate to no other product either manufactured by the client, a Fabricator of the client or of installed field performance.

This report does not constitute a certified product. The program administrator may only grant product certification.

ETC Laboratories makes no opinions or endorsements regarding this product and its performance. This report may not be reproduced or quoted in partial form without the expressed written approval of ETC Laboratories.

ETC Laboratories letters, reports, its name or insignia or mark are for the exclusive use of the client so named herein and any other use is strictly prohibited. The report, letters and the name of ETC Laboratories, its seal or mark shall not be used in any circumstance to the general public or in any advertising.

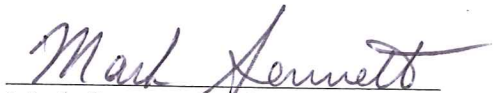
Limitation of Liability: Due diligence was used in rendering this professional opinion. By acceptance of this report, this client agrees to hold harmless and indemnify ETC Laboratories, its employees and offices and owners against all claims and demands of any kind whatsoever, which arise out of or in any manner connected with the performance of work referred to herein.

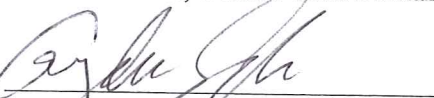
Revision History


<u>Date</u>	<u>Rev. #</u>	<u>Pages Affected</u>	<u>Revisions</u>
01/21/09	.0	N/A	Original report issue

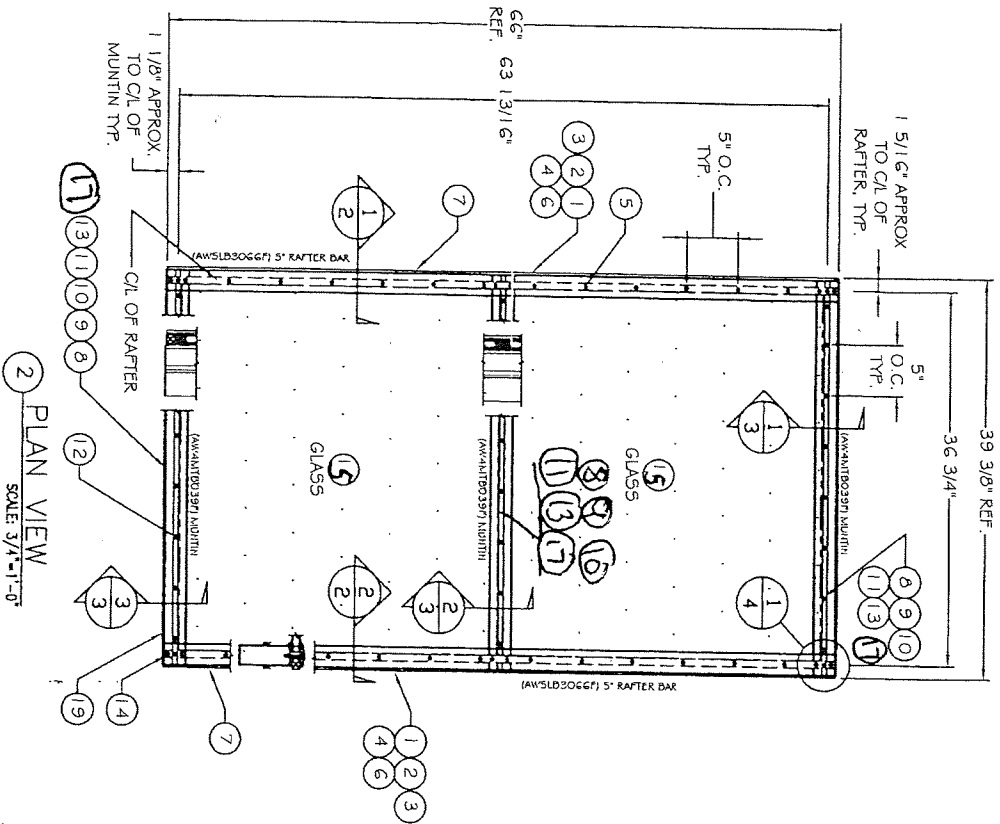
For ETC Laboratories

Josh Reindl, Testing Technician


Mark Sennett, Senior Test Technician


Gurjinder Singh Dhani, Director of Testing
Person in Responsible Charge


Joseph Labora Doldan, P.E.
Florida P.E. #42929
5-27-09



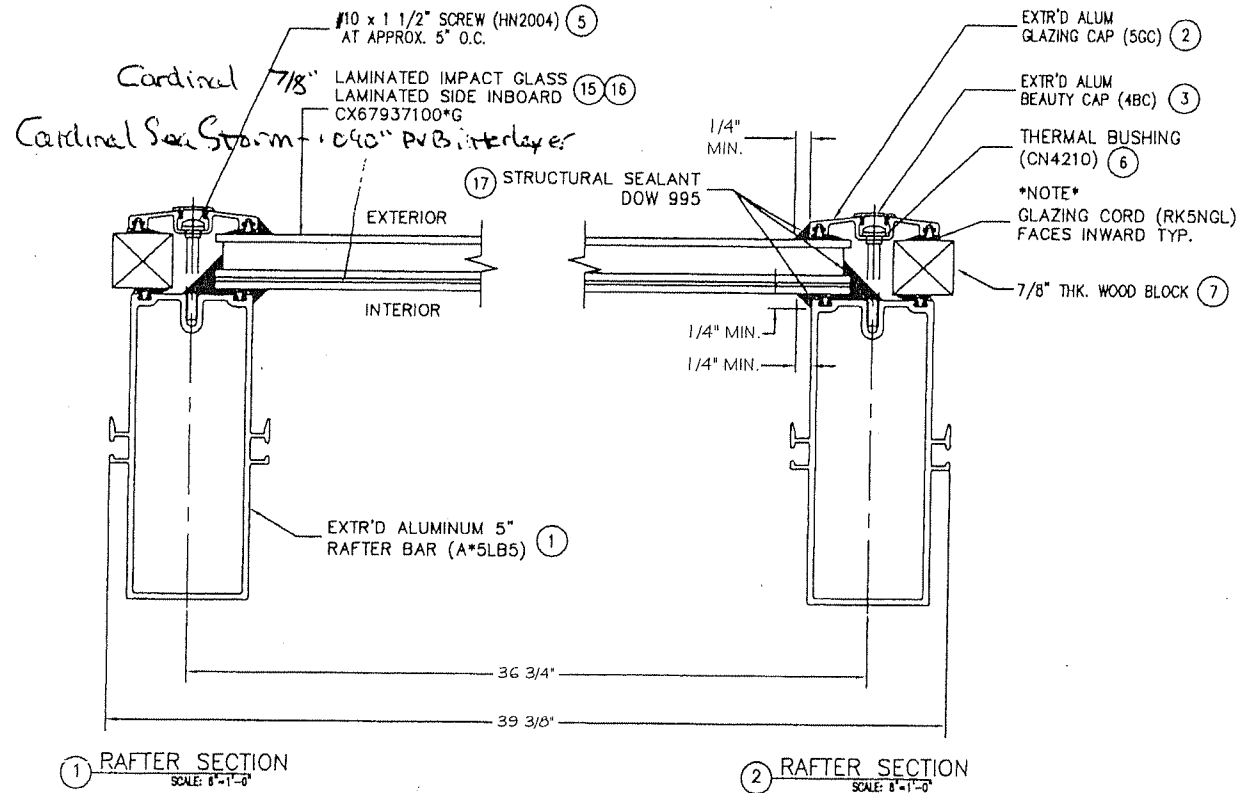
HVHZTESTS1B5 - BILL OF MATERIALS		
PART NUMBER	DESCRIPTION	QTY.
1	AW5LB506GF 5" RAFTER BAR, 66 1/16"	4
2	AW5GCO6GF EXTRD ALUM. GLAZING CAP, 66 1/16"	4
3	AW4BCO6GF EXTRD ALUM. BEAUTY CAP, 66 1/16"	4
4	R5NGL28BU FIN GLAZING CHORD 4 PART	22 FT
5	HN2004-3G #10-24 x 1 1/2" PP M5 NS	56
6	CN4201 THERMAL BREAK BUSHING-BAG OF 100	1
7a	7/8" THK. WOOD BLOCK - 36" LONG	2
7b	7/8" THK. WOOD BLOCK - 66" LONG	2
8	AW4MXD039F EXTRD ALUM. MUNTIN CAP, 38 3/4"	3
9	AW4MTB039F EXTRD ALUM. MUNTIN, 38 3/4"	3
10	HK1023B-12 BL H-SETTING BLOCK	1
11	HK1009ACR 1/16" THK. x 3/8" x 40FT. GLAZING TAPE	1
12	HN2008-20 #10-24 x 3/4" PP M5 NS	40
13	RW4MIO37F EXTRD RUBBER MUNTIN COVER - 38 3/4"	3
14	HN2011-20 #10-24 x 3/8" PP M5 NS	20
15	CK679371002G 36" x 31 3/16 x 7/8" .090 LAMI GLASS	2
16	--- DOW 995 STRUCTURAL SEALANT, 10 oz TUBE	8
17	B695K67 5/16" x 3/16" STEEL STOCK	3
18	--- 38-7/8" x 5" 1/8" THK ALUM. SHEET	2
See Section 0905 P03 by Carolina		

PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED HEREIN IS THE SOLE PROPERTY OF ETC LABORATORIES, LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF ETC LABORATORIES, LLC IS PROHIBITED.		DATE: 04/10/2009 BY: MS	
PROJECT: DOUBLE LITE DESCRIPTION: HURRICANE IMPACT ROOF GLASS TEST BUILD		DATE: 04/10/2009 BY: MS	
SCALE: 3/4"=1'-0"		SCALE: 3/4"=1'-0"	
7-6626		7-6626	



5005 VETERANS MEMORIAL HIGHWAY
 HOLBROOK, IL 61741
 PHONE: (631) 563-4000 FAX: (631) 210-9076

E.C.O. #:	REV.	DESCRIPTION:	DATE:	APPROVED
	A	ORIG. RELEASE	3/25/08	
	B	NOTES, SEALANT DETAIL UPDATED	05/01/08	



PROPRIETARY AND CONFIDENTIAL: THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FOUR SEASONS SOLAR PRODUCTS, LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FOUR SEASONS SOLAR PRODUCTS, LLC IS PROHIBITED.		DESIGNER: HURRICANE IMPACT GLASS TEST BUILD		DATE: 04/10/2009	
PROJECT: DWG		SCALE: 1/2" = 1'-0"		REV: B	
FOUR SEASONS SUNROOMS Outdoor Living...Indoors! 5005 VETERANS MEMORIAL HIGHWAY HOLBROOK, N.Y. 11741 PHONE: (631) 563-4000 FAX: (631) 218-0076		DO NOT SCALE DRAWING		SCALE: 1/2" = 1'-0"	

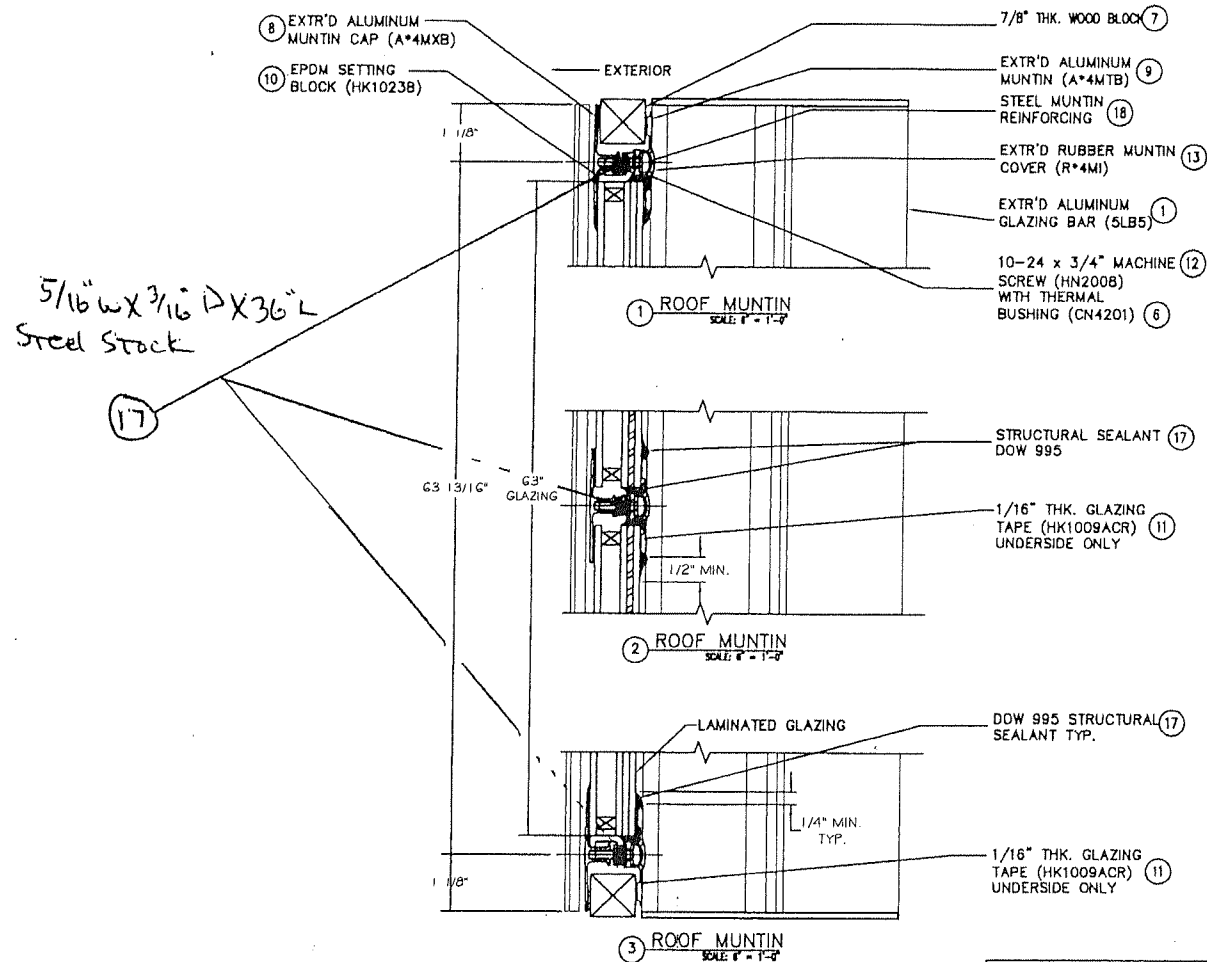
ETC Laboratories

Report #: ETC-08-1014-21649

Verified By: MS

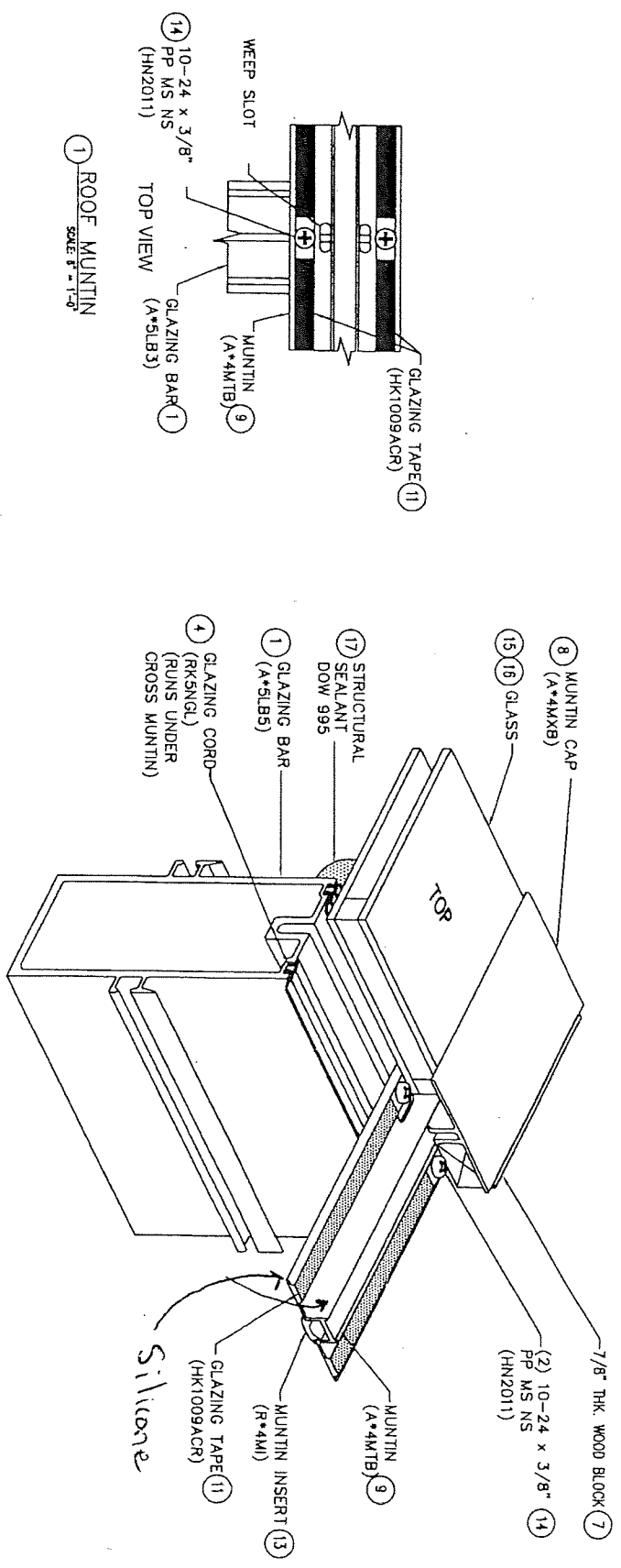
Date: 04/10/2009

E.C.O. #:	REV.	DESCRIPTION:	DATE:	APPROVED
	A	ORIGINAL RELEASE	3/26/08	



PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FOUR SEASONS SOLAR PRODUCTS, LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FOUR SEASONS SOLAR PRODUCTS, LLC. IS PROHIBITED. FILE # 17-11-11 DWG	TOLERANCES: FRACTIONAL & DECIMAL: AS SHOWN ANGLES: AS SHOWN DIMENSIONS: AS SHOWN ALL DIMENSIONS TO BE USED UNLESS OTHERWISE SPECIFIED MATERIAL:	DATE: 02-25-08 DRAWN BY: R. CHECKED BY: ENG. APPROV.: MFG. APPROV.:	DO NOT SCALE DRAWING
	DESCRIPTION: HURRICANE IMPACT GLASS TEST BUILD		
	FOUR SEASONS SOLAR PRODUCTS, LLC. 5005 VETERANS MEMORIAL HIGHWAY HOLLAND, N.Y. 11741 PHONE: (631) 563-1000 FAX: (631) 210-9076		
	FILE NAME: 7-626		
	SCALE: 1/2" = 1'-0"		

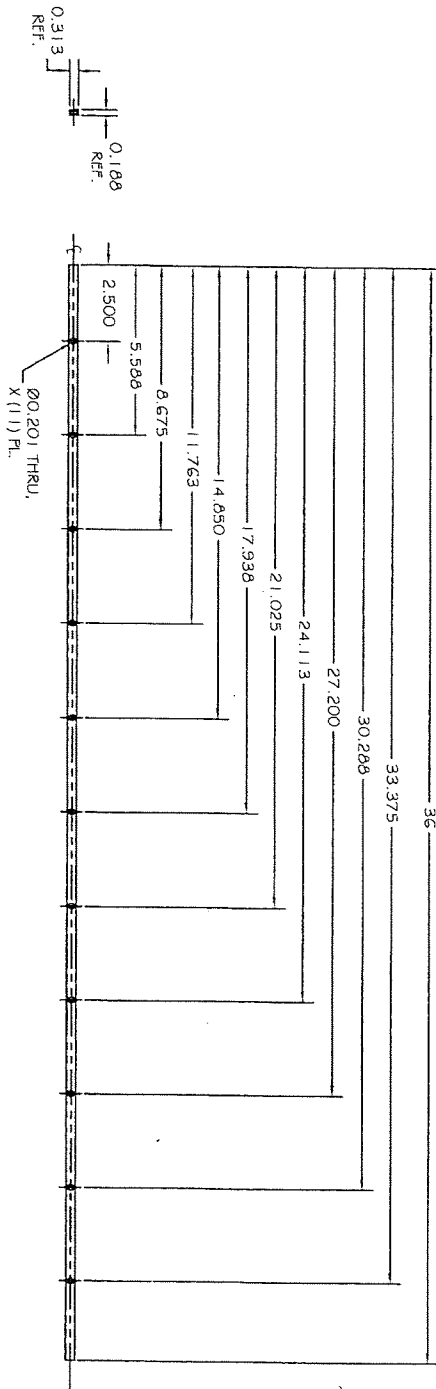
ECO #	REV	DESCRIPTION	DATE	APPROVED
A		ORIGINAL RELEASE	3/26/08	



PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF FOUR SEASONS SOLAR PRODUCTS, LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FOUR SEASONS SOLAR PRODUCTS, LLC IS PROHIBITED.		DATE: 03/28/08 DRAWN BY: [Signature] CHECKED BY: [Signature] DATE: 03/28/08 DESIGNED BY: [Signature] DATE: 03/28/08 DO NOT SCALE DRAWING	
PROJECT: HURRICANE IMPACT GLASS TEST BUILD DRAWN BY: [Signature] CHECKED BY: [Signature] DATE: 03/28/08 DESIGNED BY: [Signature] DATE: 03/28/08 DO NOT SCALE DRAWING		FOUR SEASONS SOLAR PRODUCTS, LLC 5005 VETERANS MEMORIAL HIGHWAY HOLIDAY, FL 32650 PHONE: (904) 563-4000 FAX: (904) 210-9076	

FOUR SEASONS SOLAR PRODUCTS

5005 VETERANS MEMORIAL HIGHWAY
 HOLIDAY, FL 32650
 PHONE: (904) 563-4000 FAX: (904) 210-9076



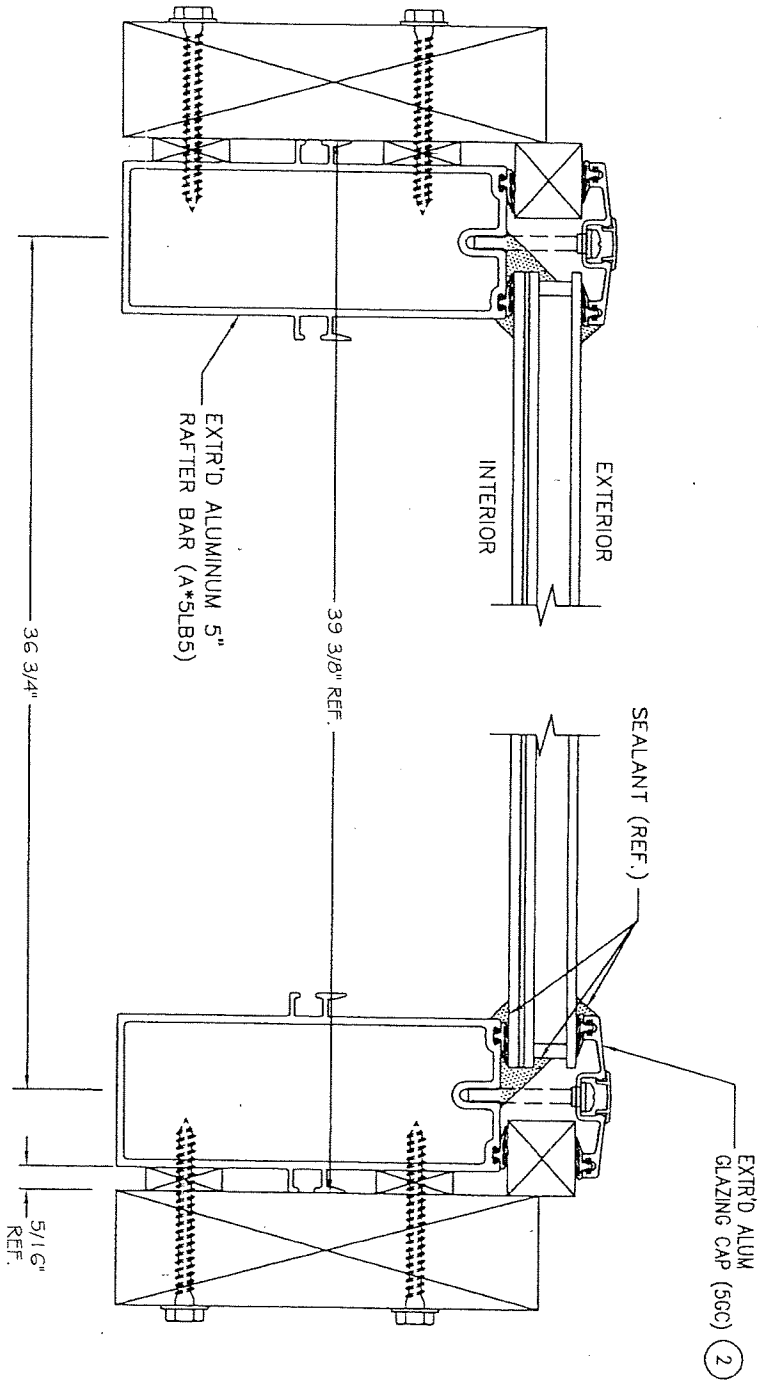
① STEEL INSERT
 SCALE: 3" = 1'-0"

NOTES:

1. MATERIAL IS: W1 TOOL STEEL, MCMASTER-CARR P/N: B095K67
2. PART MUST BE PAINTED AFTER DRILLING TO PREVENT CORROSION.

PROPERTIES MATERIAL: <u>W1 TOOL STEEL</u> CONFIDENTIAL: <u>NO</u> THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ETC LABORATORIES. IT IS TO BE USED FOR THE SPECIFIC PURPOSE AND NOT BE REPRODUCED IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF FOUR SEASONS SOLAR PRODUCTS, LLC. IS PROHIBITED.		DESCRIPTION PART: <u>STEEL INSERT</u> DRAWN BY: <u>MS</u> CHECKED BY: <u>MS</u> DATE: <u>04/10/2009</u> SCALE: <u>3" = 1'-0"</u>	
REVISIONS NO. <u>1</u> OF <u>1</u> DATE: <u>04/10/2009</u> BY: <u>MS</u> REASON: <u>INITIAL DESIGN</u>		APPROVED NAME: <u>MS</u> DATE: <u>04/10/2009</u> SCALE: <u>3" = 1'-0"</u>	

REV	DESCRIPTION	DATE	APPROVED
A	ORIGINAL RELEASE	04/10/2009	



1 RAFTER SECTION
SCALE: 8"=1'-0"

2 RAFTER SECTION
SCALE: 8"=1'-0"

1 TEST BUCKING
SCALE: 3" = 1'-0"

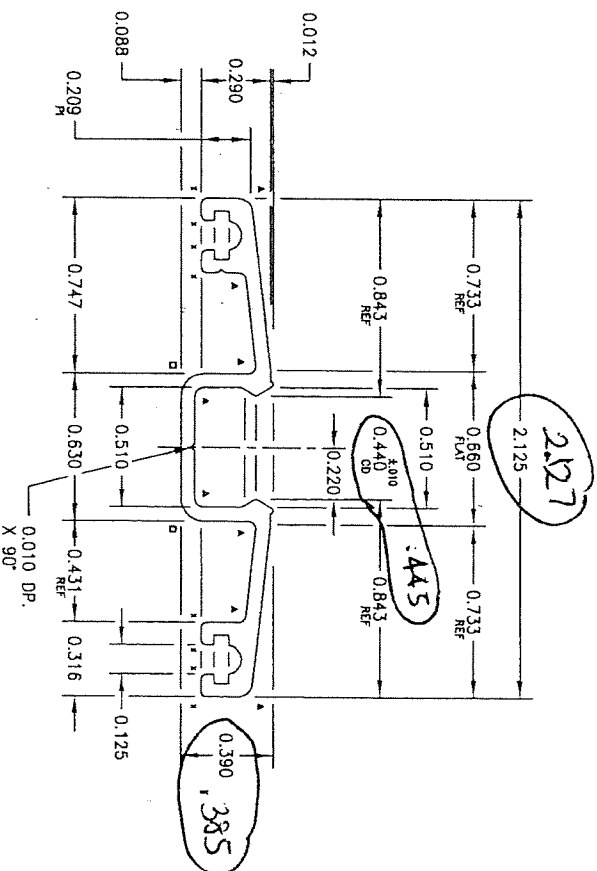
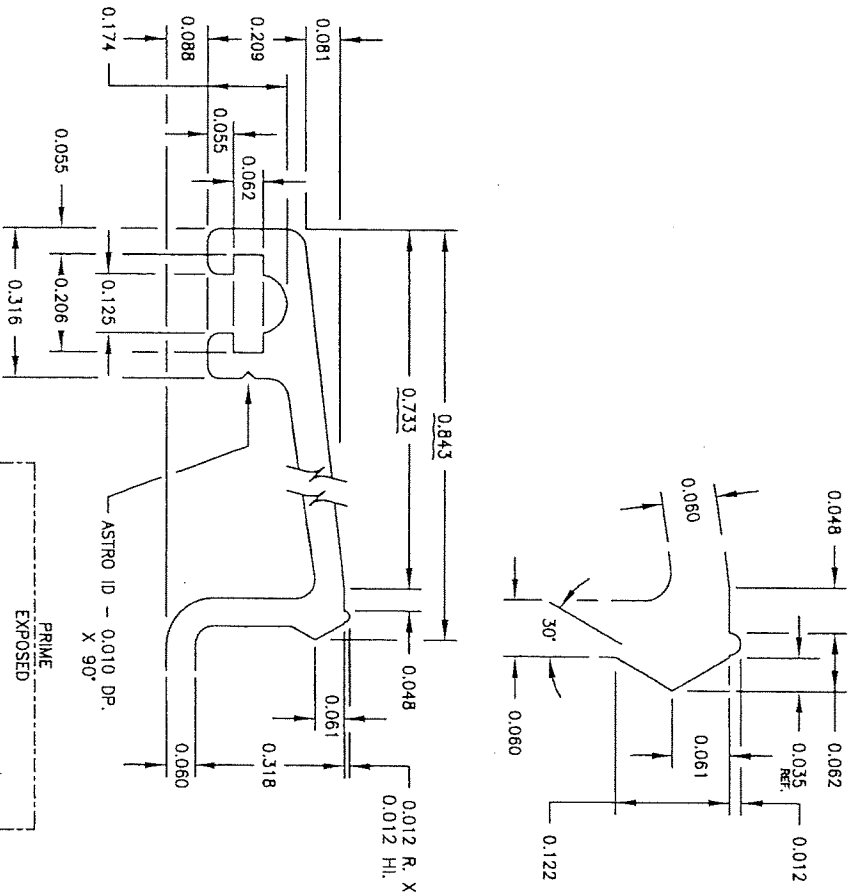
This is not an Astro design. It is Astro's interpretation of the section designed and requested by its Customer. Customer should thoroughly check the drawing and label the design before using. AS ASTRO ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR THE PERFORMANCE OF GOODS OR PRODUCTS PRODUCED THEREFROM. ASTRO MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH REGARD TO DIMENSIONS/PRODUCTS PRODUCED PURSUANT TO THIS DRAWING. ASTRO'S ONLY WARRANTY SHALL BE AS STATED ON ASTRO'S SALES CONTRACT/ORDER FORM.

AS - 00948 / 03300

AS-08948
AS REF. NO.

STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED BAR AND SHAPES APPLY UNLESS SPECIFICALLY SHOWN OTHERWISE

ASTRO DIE NO.	8265
---------------	------



- | | | | | |
|-----|-----------|-------|---|-----|
| (•) | INDICATES | 0.015 | R | (8) |
| (▲) | INDICATES | 0.040 | R | (8) |
| (◻) | INDICATES | 0.100 | R | (2) |

ALL UNSPECIFIED WALL THICKNESS TO BE 0.060 IN.
ALL UNSPECIFIED CORNERS & FILLETS TO BE 0.015 R

TITLE BLOCK TB0002 02/24/99

Revision 0 02/24/08

Approved Number 56215-801

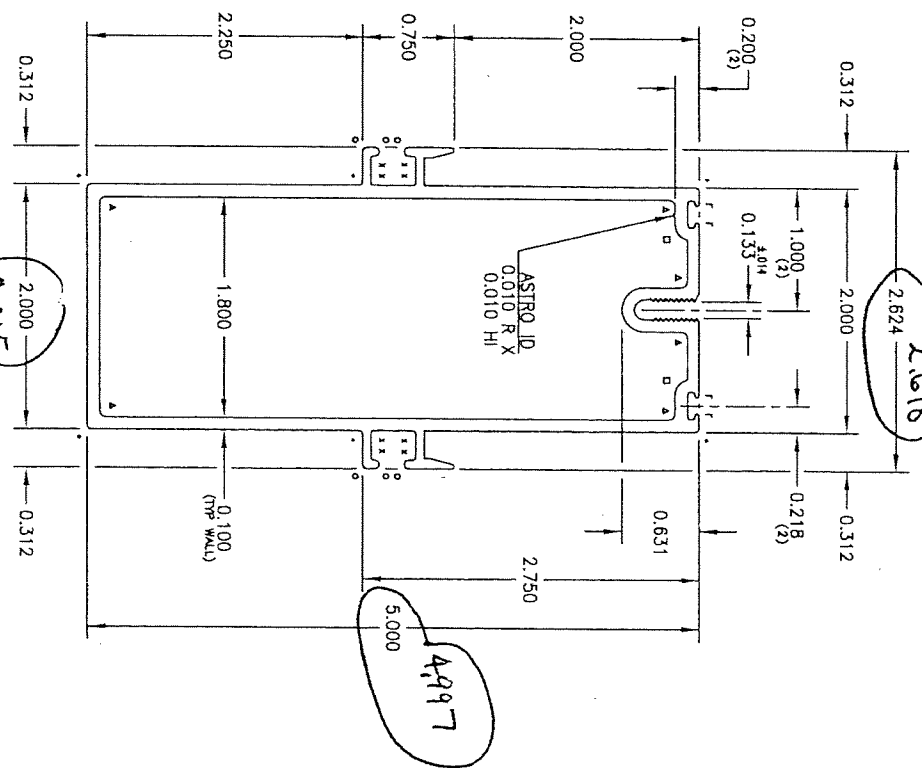
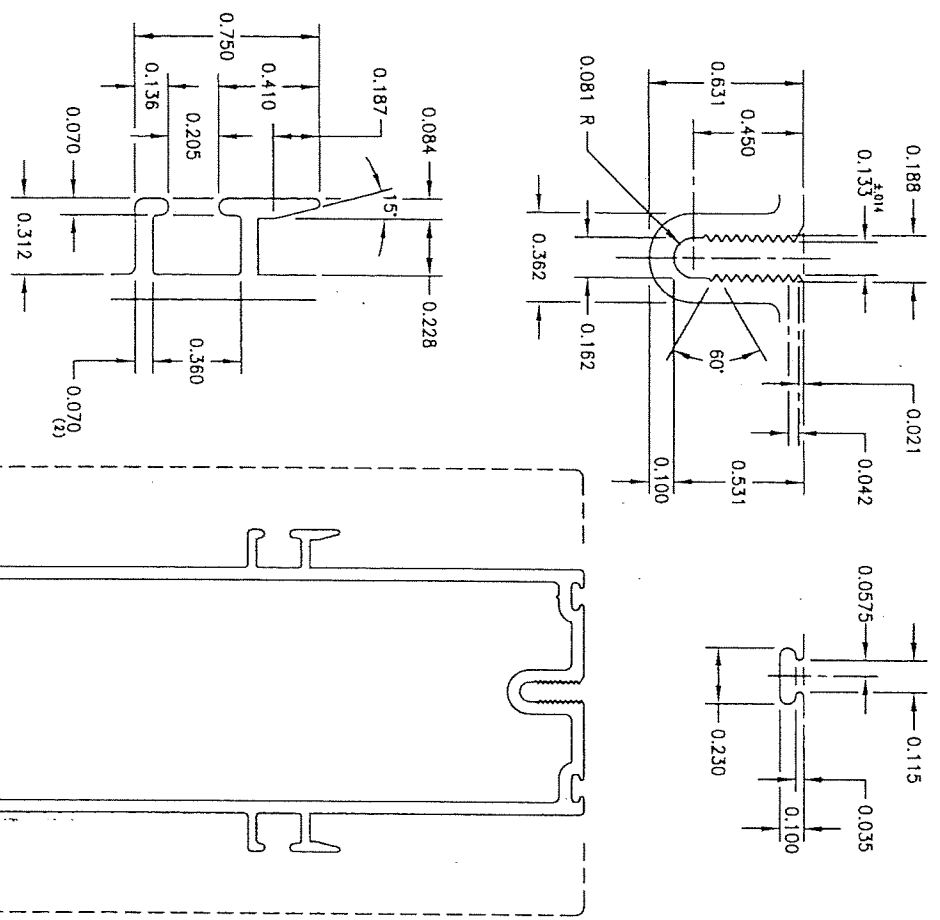
PRIMARY ALLOY & TEMPER : 6063-T5

ACTUAL SIZE
PAINTED FINISH

ASTRO SHAPES, INC.			
65 MAIN STREET			
STRUTHERS, OHIO 44477			
EST. AREA	0.2221	SQ./IN.	EST. WT./LT. 0.266
EST. PER.	7.010	IN.	EST. PER. 7.010
DIAG.	2.13	IN.	FACTOR 26
			SOLID
			CLASS
			110
			APR. NO.
DESCRIPTION 2 1/8" GLAZING CAP			
SCALE 2=1		DRAWN LLL	
DATE 08/21/97			
CUST. PART NO.		56C	
CUSTOMER FOUR SEASONS SOLAR		STATE NY	
REVISIONS			

ASTRO DIE NO. : 8265

AS-08075/01300
 This is not an Astro design. It is Astro's interpretation of the section designed and requested by the Customer. Customer should thoroughly check the drawing and test the design before using. AS ASTRO ACCEPTS NO RESPONSIBILITY OR LIABILITY FOR THE PERFORMANCE OF 6005 OR PRODUCTS PRODUCED THEREFROM. ASTRO MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH REGARD TO EXTRUSIONS/PRODUCTS PRODUCED PURSUANT TO THIS DRAWING. ASTRO'S ONLY WARRANTY SHALL BE AS STATED ON ASTRO'S SALES ACKNOWLEDGMENT FORM.
 AS-08075
 AS REF. NO.
 STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED BAR AND SHAPES APPLY UNLESS SPECIFICALLY SHOWN OTHERWISE
 7767
 A
 ASTRO DIE NO.



(1) INDICATES 0.017 R (4)	(7) INDICATES 0.017 R (4)
(2) INDICATES 0.020 R (8)	(8) INDICATES 0.020 R (8)
(3) INDICATES 0.031 R (2)	(9) INDICATES 0.031 R (2)
(4) INDICATES 0.035 R (6)	(10) INDICATES 0.035 R (6)
(5) INDICATES 0.050 R (6)	(11) INDICATES 0.050 R (6)
(6) INDICATES 0.132 R (2)	(12) INDICATES 0.132 R (2)

ALL UNSPECIFIED WALL THICKNESS TO BE 0.100 IN.
 ALL UNSPECIFIED CORNERS & FILLETS TO BE 0.015 R

PRIMARY ALLOY & TEMPER : 6005-T5

ACTUAL SIZE

EXPOSED

REVISIONS	EST. AREA	EST. WT./FT.	EST. TOT. PER.	EST. CLASS	HOLLOW	ASTRO SHAPES, INC.
1	1.619	1.943	33.720	110	65 MAIN STREET	STRUTTERS, OHIO 44471
2	5.37	17	110	110	DESCRIPTION 5" GLAZING BAR	
3	17	110	110	110	SCALE 1=1	DATE 10/24/96
4	17	110	110	110	CUSTOMER FOUR SEASONS SOLAR	STATE NY
5	17	110	110	110	CUST. PART NO.	5LBS

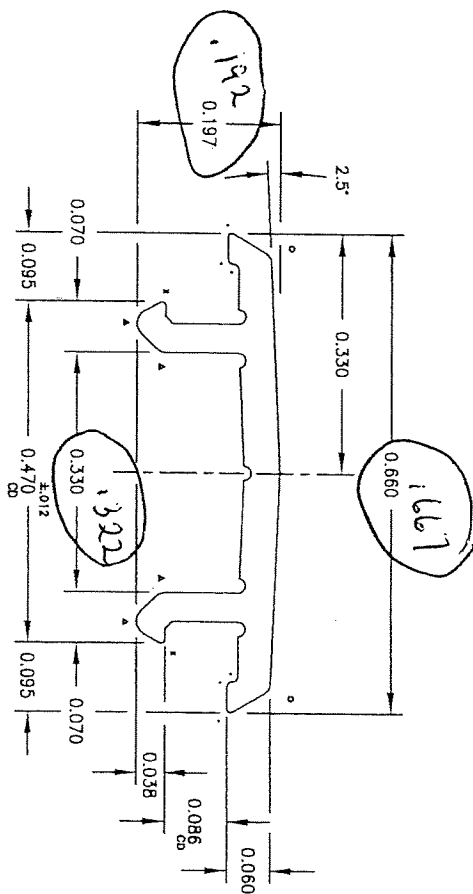
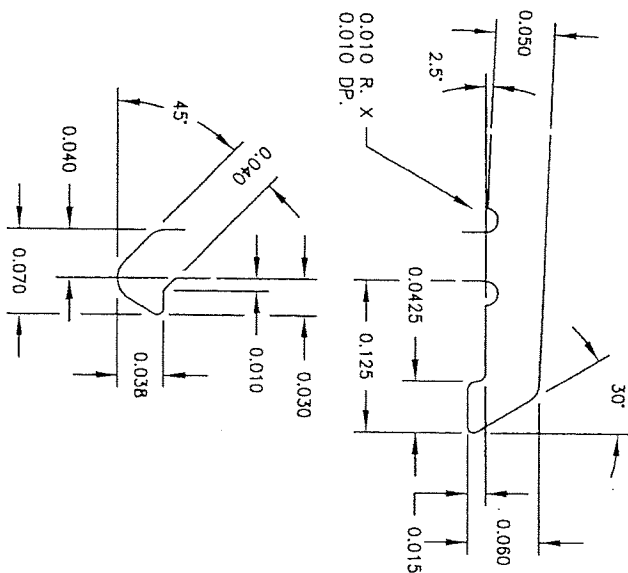
04/14/97 N.K.M.

This is not an Astro design. It is Astro's interpretation of the section designed and requested by its Customer. Customer should thoroughly check his drawing and test the design before using, as Astro accepts no responsibility or liability for the performance of goods or products produced therefrom. Astro makes no warranty or representation of fitness for a particular purpose with regard to customers' products produced pursuant to this drawing. Astro's only warranty shall be as stated on Astro's sales acknowledgment form.

AS-05634
AS REF. NO.

STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED BAR AND SHAPES APPLY UNLESS SPECIFICALLY SHOWN OTHERWISE

ASTRO DIE NO



EXPOSED

ACTUAL SIZE

- ALL UNSPECIFIED WALL THICKNESS TO BE A/5 IN.
ALL UNSPECIFIED CORNERS & FILLETS TO BE 0.015 R

PRIMARY ALLOY & TEMPER : 6063-T5

ASTRO SHAPES, INC.		EST. AREA	0.043	SQ. IN.	EST. WT./LT.	0.051	LB.	SOLID
05 MAIN STREET		EST. PER.	2.050	IN.	EST. TOT. PER.	2.050	IN.	CLASS
STRUTHERS, OHIO 44477		CIRCLE	0.66	IN.	FACTOR	40		110
DESCRIPTION		DI.					APP. NO.	
SCALE	2=1	DRAWN	KMM	DATE	01/07/95			
CUSTOMER	FOUR SEASONS SOLAR	STATE	NY					
CUST. PART NO.	4BC							

