NATIONAL CERTIFIED TESTING LABORATORIES
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ACURLITE STRUCTURAL SKYLIGHTS Report No: NCTL-110-14353-2S
AAMA 1503-09 THERMAL TEST SUMMARY REPORT Expiration Date: 11/16/15

Test Specimen: Acurlite Structural Skylights' Series "SK-1" Aluminum Sloped Curtain Wall measuring 1130.3 mm (44-1/2") wide by 1136.7 mm (44-3/4") high overall; **Thermal Break:** Extruded aluminum with silicone thermal barriers; **Glazing:** 32 mm (1.26") nominal overall, (1) lite of 6 mm (0.220") nominal annealed exterior and (1) l lite laminated interior; **Coating:** A PPG" Solarban70" sputter-type low emissivity coating (e=0.018 per client) was applied to glazing surface no. 2; **Spacer Type/Size:** Steel-reinforced butyl (SS-D) 14.2 mm (0.360"); **Fill:** Argon/ Air - 90% single probe per client; **Glazing System:** Vertical - Exterior pressure plate with (6) evenly spaced screws and gasket back-bedding; Horizontal - Exterior glazed with contracted silicone sealant and gasket back-bedding

Procedure: Condensation Resistance Factor (CRF) and Thermal Transmittance (U Factor) were determined in accordance with AAMA 1503-09 with a temperature of 70.0°± 0.5°F on the room side of the specimen and 0.0°± 0.5°F plus a 15 mph dynamic wind on the weather side of specimen. The test specimen was sealed to produce a net air leakage of 0.0 cfm during the test.

Test Results:

1.	Average warm side air temperature (t_I):	69.8	°F
2.	Average cold side air temperature (t_{II}):	-0.1	°F
3.	Average weighted frame temperature (FT):	43.6	°F
4.	Average glass temperature (GT):	48.1	°F
5.	Condensation Resistance Factor of Frame (CRF_f):	62	
6.	Condensation Resistance Factor of Glass (CRF_g):	69	
7.	Condensation Resistance Factor of Specimen (CRF):	62	

Thermal transmittance (U Factor) @ 15 mph exterior wind velocity: 0.55 BTU/hr/ft^2/°F

Reference should be made to thermal performance test report number NCTL-110-14353-2 dated 11/18/11 for complete specimen description and test data.

NATIONAL CERTIFIED TESTING LABORATORIES

DIGITAL SIGNATURE

STEVEN H. COBLE
Simulator In Responsible Charge

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THERMAL PERFORMANCE TEST REPORT

REPORT NCTL-110-14353-2 TO:	Acurlite Structural Skylights 1015 North Vine St. P.O. Box 5 Berwick, PA 18603
STARTING TEST DATE:	11/16/11
ENDING TEST DATE:	11/16/11
EXPIRATION DATE:	11/16/15
REPORT DATE:	11/18/11
SPECIFICATION:	AAMA 1503-09, *"Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections".*

DESCRIPTION OF SAMPLE TESTED

MODEL/TYPE:	"SK-1"
CONFIGURATION:	Aluminum Sloped Curtain Wall
FRAME SIZE:	1130.3 mm (44-1/2") wide by 1136.7 mm (44-3/4") high
FIXED LITE VIEWING AREAS:	470 mm (18-1/2") wide by 470 mm (18-1/2") high
FRAME TYPE:	Extruded aluminum with silicone thermal breaks
JOINT CONSTRUCTION:	
FRAME:	Horizontal members fastened with (2) screws at each end to the vertical members
GLAZING COMPONENTS:	
OVERALL:	32 mm (1.26") nominal
GLASS THICKNESS:	(1) Lite of 6 mm (0.220") nominal annealed exterior and (1) lite laminated interior
COATING:	A PPG "Solarban 70" sputter-type low emissivity coating (e=0.018 per client) was applied to glazing surface no. 2
LAMINATED GLASS:	(2) Lites of 6 mm (0.220") nominal heat strengthened 1.524 mm (0.060") PVB interlayer
SPACER TYPE/SIZE:	Steel-reinforced butyl (S5-D) 14.2 mm (0.360")
FILL:	Argon/ Air - 90% single probe per client
GLAZING SYSTEM:	**Vertical** Exterior pressure plate with (6) evenly spaced screws and gasket back-bedding **Horizontal** Exterior glazed with contracted silicone sealant and gasket back-bedding

WEATHERSTRIP:	No weatherseals employed
OPERATING HARDWARE:	None employed
AUXILIARY:	
TYPE:	Beauty cover
LOCATION:	Snap-fitted at the pressure plates
TYPE:	Nail fin fastened to the frame with (5) evenly spaced screws and (3) pop rivets
LOCATION:	Jambs
TYPE:	Nail fin fastened to the frame with (3) evenly spaced screws
LOCATION:	Head and sill
REINFORCEMENT:	No reinforcement employed
WEEP HOLES:	No apparent weeps employed
INTERIOR & EXTERIOR FINISH:	Aluminum
SEALANT:	No apparent sealant applied

SPECIMEN PREPARATION PRIOR TO TEST

The test specimen was pre-conditioned at ambient laboratory conditions prior to the test. The surround panel-to-specimen interfaces were sealed with a non-reflective tape. Per section 9.3.4 the specimen was sealed on the exterior with a caulk sealant resulting in a net air leakage of 0.0 cfm per square foot.

TEST PARAMETERS

Tests to determine the thermal transmittance (U-factor) of the specimen were performed in the guarded hot box apparatus located at the York, PA facility. The thermal performance evaluations were completed in accordance with the referenced test methods using a dynamic wind perpendicular to the specimen on the cold side and simulated natural convection on the warm side. A zero static pressure differential (0.00" ± 0.04" H_2O) was maintained across the specimen during the test by pressurizing the metering box on the room side. Data was collected over a 2 hour evaluation period after 4 hours of steady state conditions as defined in section 9.3.8 of the AAMA 1503-09 test procedure were achieved. The test was considered completed when the data of the 2 hour evaluation period also satisfied the criteria defined in section 9.3.8 of the AAMA 1503-09 test procedure.

Glass Thickness and Glazing Deflection:

	Glass Thicknesses	Glazing Deflection Before Test	Glazing Deflection After Test
Fixed Lite - Top Left	0.220”, 0.480”	0.02”	0.05”
Fixed Lite - Top Right	0.220”, 0.480”	0.03”	0.05”
Fixed Lite - Bottom Left	0.220”, 0.480”	0.02”	0.04”
Fixed Lite - Bottom Right	0.220”, 0.480”	0.03”	0.04”

Projected Frame Dimensions Of Members:

Member:	Head	Left Jamb	Right Jamb	Sill
Dimension:	2.5”	2.5”	2.5”	2.5”

Test Duration:

The test chamber environmental systems were initiated at 1137 on 11/16/11. The test conditions were considered stable for a four (4) hour test period from 2256-0256 on 11/17/11. The thermal performance test results were derived from the two (2) hour evaluation period from 0256-0456 on 11/17/11.

Areas:

Test Specimen Projected Area (As):	13.83	ft²
Test Specimen Interior Exposed (Wetted) Surface Area (Aint):	12.82	ft²
Test Specimen Exterior Exposed (Wetted) Surface Area (Aext):	10.91	ft²
Metering Box Opening Area (Amb):	54.39	ft²
Metering Box Baffle Area (Ab1):	46.44	ft²
Surround Panel Interior Exposed Area (Asp):	28.48	ft²
Exposed Area of Mods to Surround Panel Opening:	12.08	ft²

Test Conditions:

Average Room Side Air Temperature:	69.8	°F
Average Weather Side Air Temperature:	-0.1	°F
Average Guard Box Air Temperature:	72.0	°F
Metering Box Average Relative Humidity:	12.0	%
Measured Weather Side Wind Velocity:	14.3	mph
Static Pressure Difference Across Specimen:	0.04	" H2O

Heat Flows:

Heat Input Rate to Metering Box (Qtotal):	677.3	BTU/hr
Surround Panel Heat Flow (Qsp):	89.2	BTU/hr
Heat Flow Through Mods to Surround Panel Opening (k = 0.252):	37.1	BTU/hr
Surround Panel Thickness:	5.375	Inches
Surround Panel Conductance:	0.0466	BTU/hr/ft²/°F
Metering Box Heat Flow (Qmb):	-21.7	BTU/hr
Flanking Loss Heat Flow (Qfl):	37.7	BTU/hr
Net Test Specimen Heat Flow (Qs):	535.0	BTU/hr

Surface Temperature Data

Specimen Area-Weighted Room Side Surface Temperature (t1):	47.5	ºF
Specimen Area-Weighted Weather Side Surface Temperature (t2):	3.7	ºF
Area-Weighted Room Side Frame Surface Temperature:	45.9	ºF
Area-Weighted Weather Side Frame Surface Temperature:	5.0	ºF
Area-Weighted Room Side Edge-of-Glass Surface Temperature:	44.3	ºF
Area-Weighted Weather Side Edge-of-Glass Surface Temperature:	3.5	ºF
Area-Weighted Room Side Center-of-Glass Surface Temperature:	55.8	ºF
Area-Weighted Weather Side Center-of-Glass Surface Temperature:	1.2	ºF

Condensation Resistance Factor (CRF)

Average of Pre-specified Frame Thermocouples (FT_p):	44.5	ºF
Average of Cold Point Thermocouples (FT_r):	35.5	ºF
Calculated Weighting Factor:	0.104	
Weighted Frame Temperature (FT):	43.6	ºF
Average Glazing Temperature, (GT):	48.1	ºF
Condensation Resistance Factor of Frame (CRF_f):	62	
Condensation Resistance Factor of Glass (CRF_g):	69	
Condensation Resistance Factor of Specimen (CRF):	62	

Thermal Transmittance (U Factor)

Measured Room Side Surface Conductance (hI):	1.74	BTU/hr/ft²/°F
Measured Weather Side Surface Conductance (hII):	10.12	BTU/hr/ft²/°F
Test Specimen Thermal Conductance (Cs):	0.88	BTU/hr/ft²/°F
Test Specimen Standardized Thermal Transmittance (U):	**0.55**	**BTU/hr/ft²/°F**

The Condensation Resistance Factor (CRF) for the specimen was determined to be 62, which would satisfy the performance criteria of AAMA 1504-97 for a CRF class of C60. The thermal transmittance (U-Factor) of the specimen was determined to be 0.55 which would satisfy the performance criteria of AAMA 1504-97 for a U-class of U55.

Attachment 1 to this report lists the average measured surface temperatures from the two-hour evaluation period of the test. Attachment 2 to this report is an isometric drawing showing surface thermocouple measurement locations corresponding to the data on Attachment 1.

This test method does not include procedures to determine the heat flow due to either air movement through the specimen or solar radiation effects. As a consequence, the thermal transmittance results obtained do not reflect performances which may be expected from field installations due to not accounting for solar radiation, air leakage effects, and the thermal bridge effects that may occur due to the specific design and construction of the fenestration system opening. Therefore, it should be recognized that the thermal transmittance results obtained from this test method are for ideal laboratory conditions and should only be used for fenestration product comparisons and as input to thermal performance analyses which also include solar, air leakage, and thermal bridge effects.

Detailed drawings were available for laboratory records and compared to the test specimen at the time of this report. A copy of this report along with representative sections of the test specimen will be retained by NCTL for a period of four (4) years. The test specimen was supplied to NCTL by the above named client. The results obtained apply only to the specimen tested. This report may not be reproduced, except in full, without the written approval of National Certified Testing Laboratories. NCTL is a testing lab NCTL is a testing lab accredited by IAS to ISO/IEC 17025 and assumes that all information provided by the client is accurate and does not guarantee or warranty any product tested or installed. This report does not constitute certification or approval of the product, which may only be granted by a certification program validator or recognized approval entity. Testing described in this report was conducted in full compliance with AAMA 1503-09 requirements.

NATIONAL CERTIFIED TESTING LABORATORIES

NCTL DIGITAL SIGNATURE

STEVEN H. COBLE
Simulator In Responsible Charge

NCTL DIGITAL SIGNATURE

ROBERT H. ZEIDERS, P.E.
Vice-President Engineering & Quality
Person-in-Responsible Charge

ZM/hl

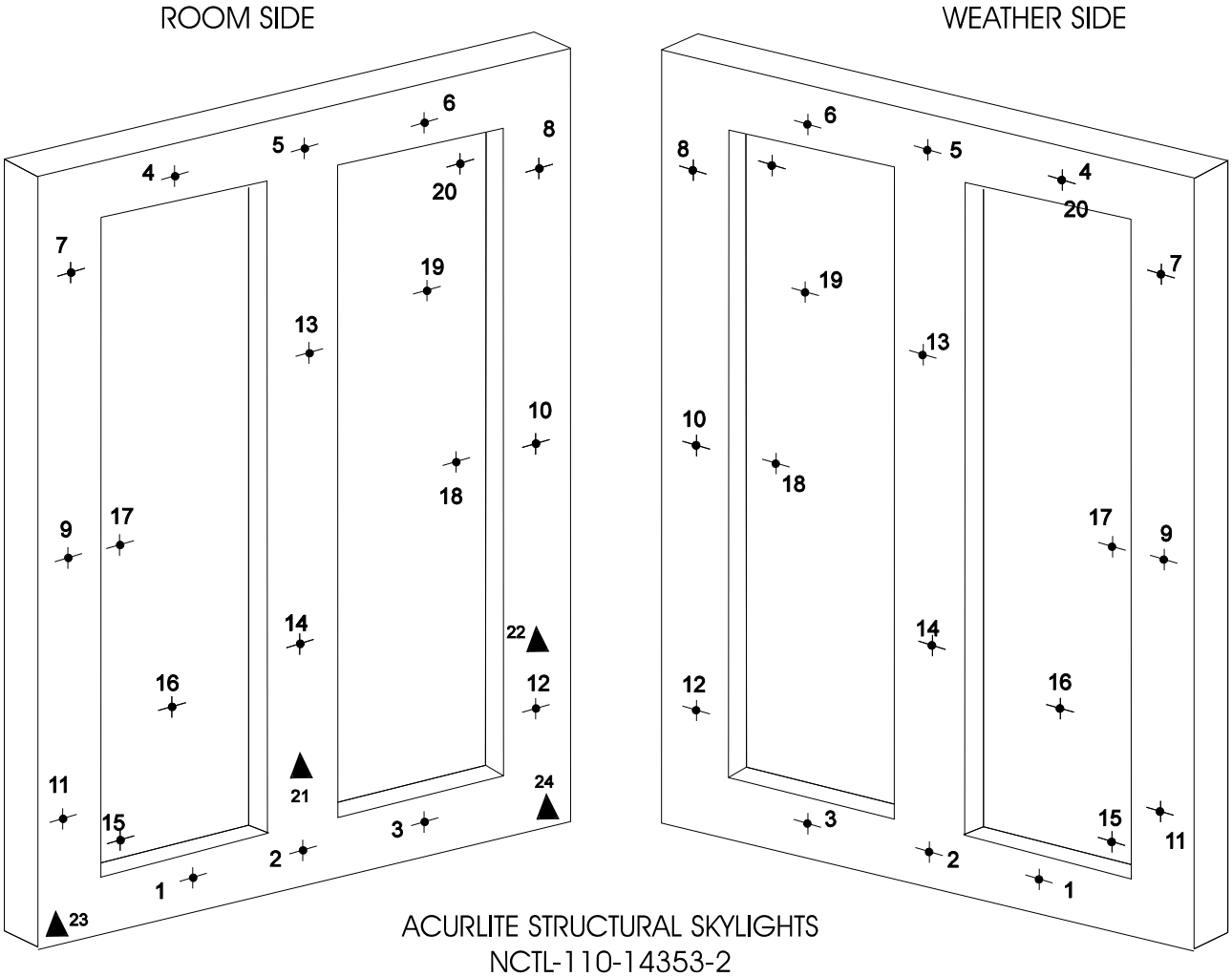
ATTACHMENT 1
SURFACE TEMPERATURE MEASUREMENTS

Acurlite Structural Skylights NCTL-110-14353-2 0256-0456 11/16/11

	Thermocouple Location #	Individual Average Surface Temperatures (°F)	
		Warm Side	Cold Side
FRAME	1	29.8	5.8
	2	48.3	5.8
	3	30.9	5.8
	4	43.2	0.0
	5	52.7	6.4
	6	41.1	7.1
	7	47.4	10.2
	8	47.8	0.5
	9	44.9	3.5
	10	46.2	3.7
	11	44.4	6.6
	12	44.4	6.6
	13	51.9	3.2
	14	49.9	4.4
GLAZING	15	39.8	2.0
	16	56.1	0.0
	17	46.8	4.9
	18	43.8	1.6
	19	55.5	2.4
	20	46.8	5.6
COLD POINTS	21	46.6	
	22	45.1	
	23	40.2	
	24	46.6	

ATTACHMENT 2

SURFACE TEMPERATURE LOCATIONS



ACURLITE STRUCTURAL SKYLIGHTS
NCTL-110-14353-2
11/16/11

ATTACHMENT 3

Section 1:

Component Drawings, with Applicable Part Numbers, Manufacturing and Modeling Details, were Reviewed (as submitted) for Product Verification
(Reference: NCTL-110-14353-2)

See Attached Documentation;
any deviations noted.

Note: The above referenced component drawings along with representative sections of the test specimen will be retained per procedure by NCTL. This testing facility assumes that all information provided by the client is accurate.

Section 2:

Identification	Date	Page & Revision
Original Issue	11/18/11	Not Applicable

UCTURAL STREAKING IS EXPECTED

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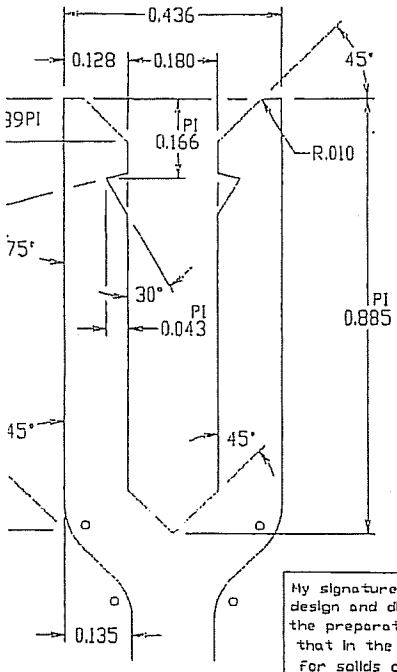
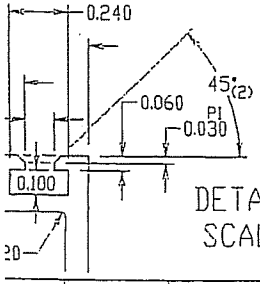
4:1





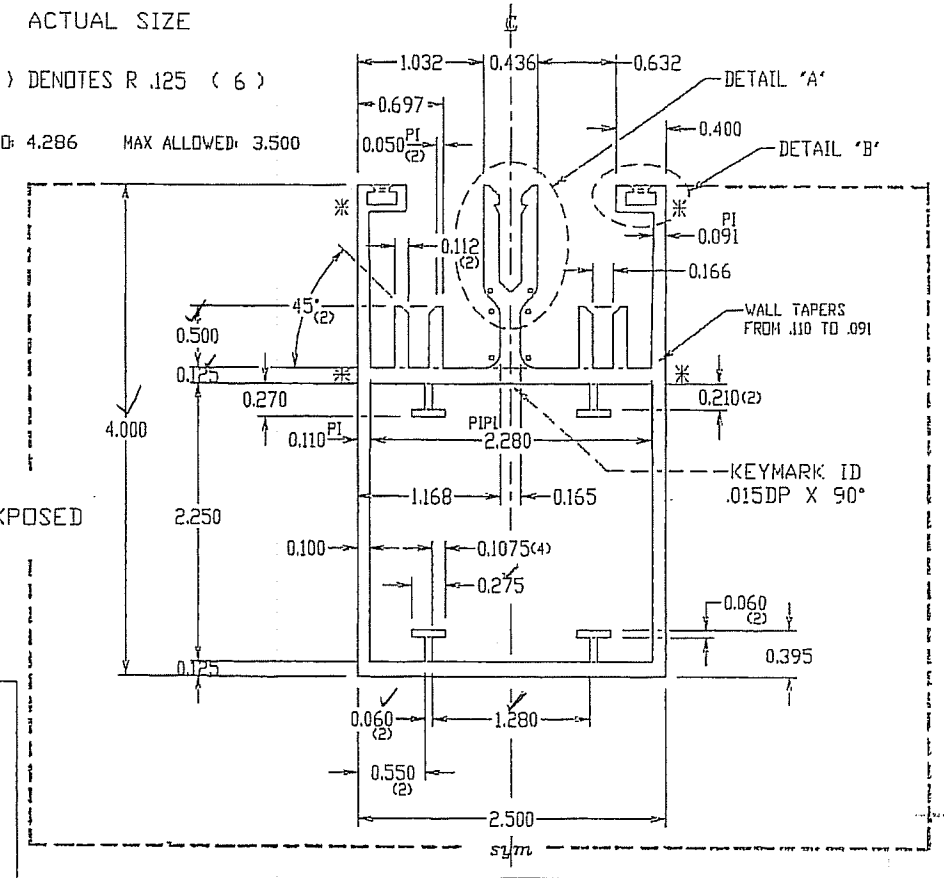
DETAIL "B"
SCALE 2:1

STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED PRODUCTS APPLY UNLESS SPECIFIED OTHERWISE

ACTUAL SIZE

(∘) DENOTES R .125 (6)

S/H RATIO: 4.286 MAX ALLOWED: 3.500



My signature on this print indicates approval of design and dimensions as shown and I authorize the preparation of extrusion die and acknowledge that in the event I do not purchase 25,000 lbs. for solids or 30,000 lbs. for hollows of material within a period of 18 months, that I will pay the cost of making the die, which shall be

s _____

Date _____

Signature _____

INITIAL HERE _____ FOR ID TYPE/LOCATION APPROVAL

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TEL. (518) 853-3421 E-MAIL engny@keymarkcorp.com

Sym.	Revisions	Date
	PRINT CORRECTION	

I_y =	Alodine ☐	Type: 00	Hill ☐	Anc. ☐	Drnr. ☐
S_y =	Crimp	Factor 16	Drcn. ☒		

Solid ☐ Semi-hollow ☐ Class Hollow ☒ Class 2

H-07833
Die Number

Design Number

Unspecified Wall Thickness: .100 .015 Break All Corners Radius or as Noted

Customer: ACURLITE SKYLIGHTS

Customer's Part Number

Job Name

Part Title: 4" RAFTER

Scale: 1:1

Alloy	Est. Area	Finish Perimeter	Date
6063	2.127 In^2	10.600 In	03-23-04
Temper	Est. Wt./Ft.	Est. Perimeter	Drawn
T-5	2.552 Lbs	39.961 In	D.S.S.
Cavity Size	Circle Size	Exterior Perimeter	Checked
	4.7 In	26.969 In	

TEST SPECIMEN COMPLIES WITH THIS DETAILS. ANY DEVIATION IS NOTED.

REPORT NO. NTS-14353-2

TEST DATE 11/16/11

RUCTURAL STREAKING
IS EXPECTED

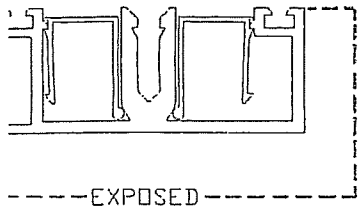
S-31713 MATES WITH:
S-31712

STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED PRODUCTS APPLY UNLESS SPECIFIED OTHERWISE

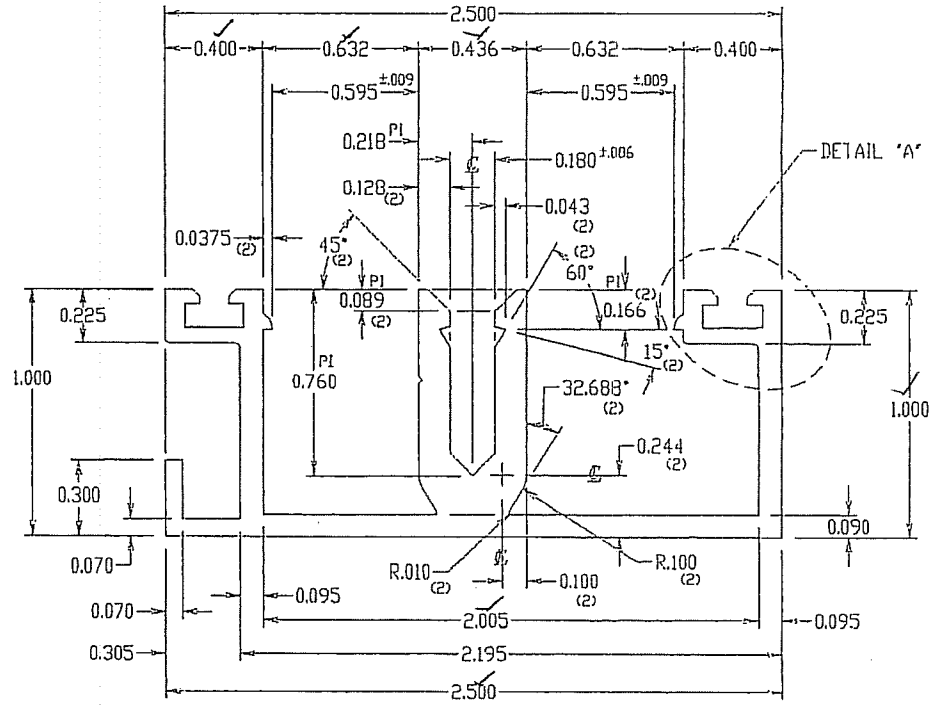
SEMI-HOLLOW

S-31713
Die Number

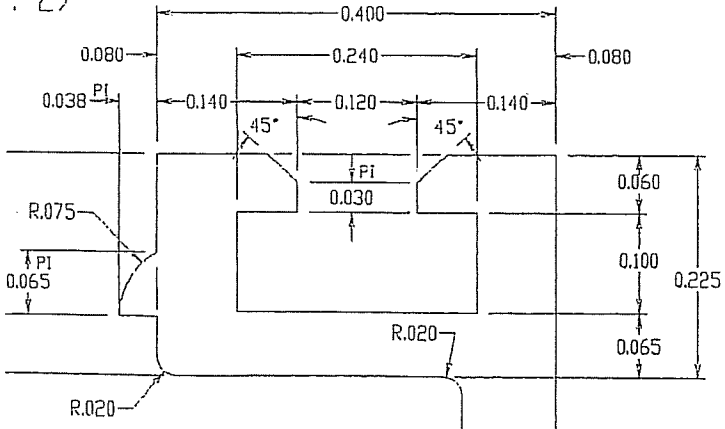
ACTUAL SIZE



ATIO: 3.589 MAX ALLOWED: 3.500



L "A"
E 8:1
: 2)



I_x = 0.080	I_y = 0.418	Factor	Type Of Finish
S_x = 0.134	S_y = 0.332	17	Mill ☐ Ano. ☐ Drnr. ☐ Drcn. ☐

Solid ☐ Semi-hollow ☐ Class 1 Hollow ☐ Class

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Sym.	Revisions	Date
2	PRINT CORRECTION	04-21-02

Unspecified Wall Thickness: AS NOTED
Break All Corners .015 Radius or as Noted

Customer: ACURLITE SKYLIGHTES			Customer's Part Number
Job Name			Scale: 2/1
Part Title			
Alloy: 6063	Est. Area: 0.731 In²	Finish Perimeter: 5.093 In	Date: 07-11-01
Temper: T-5	Est. Wt./Ft.: 0.877 Lbs	Est. Perimeter: 15.021 In	Drawn: M.F.W.
Cavity Size	Circle Size: 2-3 In	Exterior Perimeter: 15.021 In	Checked: S.D.S.

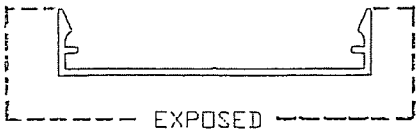
TEST REPORT NO. 10-14353-2 ANY DEVIATIONS FROM TEST WITH TEST DETAILS, COMPLIES AS NOTED.
11/16/11

RUCTURAL STREAKING
IS EXPECTED

STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED
PRODUCTS APPLY UNLESS SPECIFIED OTHERWISE

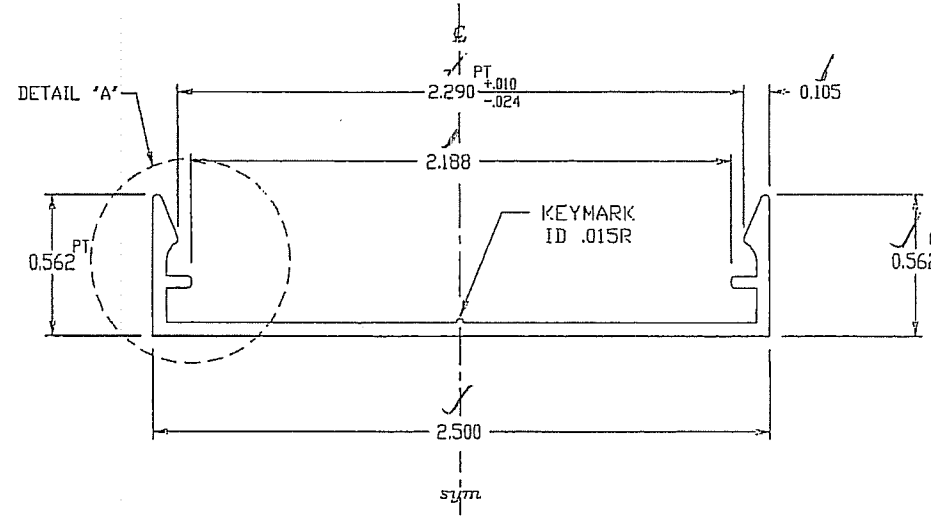
S-08545
Die Number

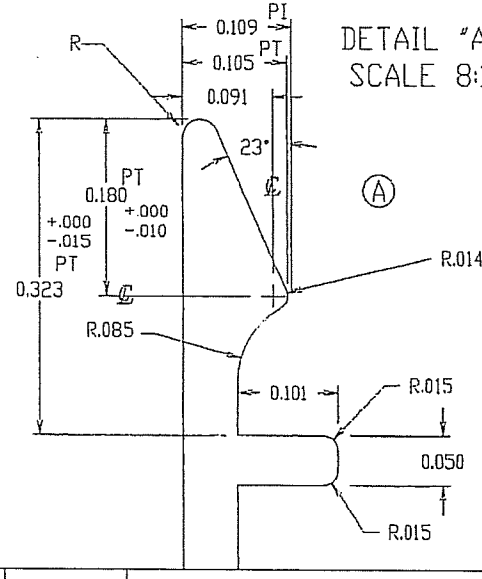
ACTUAL SIZE



MATES WITH:
S-08547
S-08548
S-14747

FOR ASSEMBLY REFER TO S-08547





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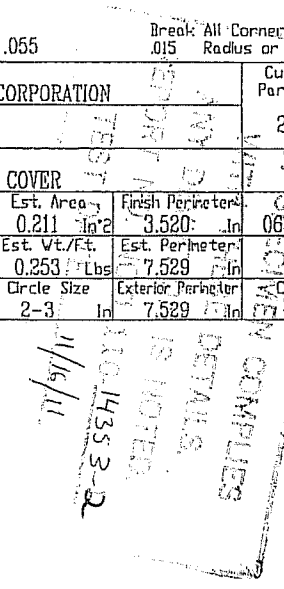
Syn.	Revisions	Date
2	PRINT REVISION	05-04-97
	PRINT REDRAWN SJS	11-01-95
A	SNAP DETAIL REVISED	05-01-91

Unspecified Wall Thickness: .055
Break All Corners .015 Radius or as Noted

Customer: KEYMARK CORPORATION			Customer's Part Number: 252702
Job Name: PW-252			
Part Title: .562 SNAP COVER			Scale: 2:1
Alloy: 6063	Est. Area: 0.211 In^2	Finish Perimeter: 3.520 In	Date: 06-04-85
Temper: T-5	Est. Wt./Ft.: 0.253 Lbs	Est. Perimeter: 7.529 In	Drawn: D.J.M.
Cavity Size	Circle Size: 2-3 In	Exterior Perimeter: 7.529 In	Checked: S.J.S.

I_x = 0.005	I_y = 0.178	Factor	Type Of Finish
S_x = 0.011	S_y = 0.143	30	Mill ☐ Ano. ☐ Drnr. ☐ Drcn. ☐

Solid ☐ Semi-hollow ☐ Class Hollow ☐ Class



RUCTURAL STREAKING
IS EXPECTED

STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED
PRODUCTS APPLY UNLESS SPECIFIED OTHERVISE

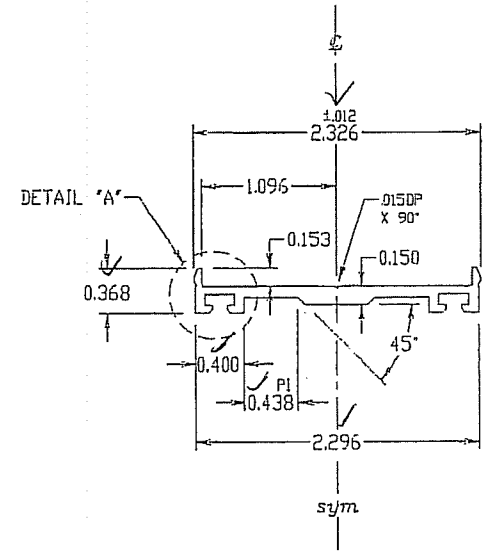
S-35591
Die Number

Design Number

ACTUAL SIZE

NO EXPOSED SURFACES

KEYMARK ID
.015DP X 90°

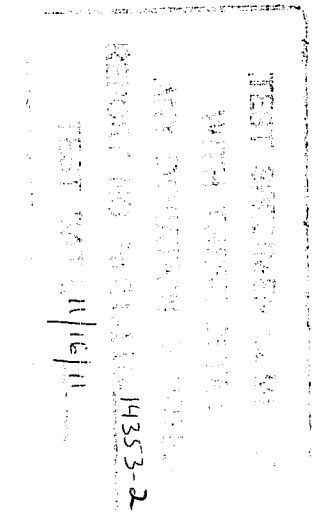


My signature on this print indicates approval of design and dimensions as shown and I authorize the preparation of extrusion die at the cost of:

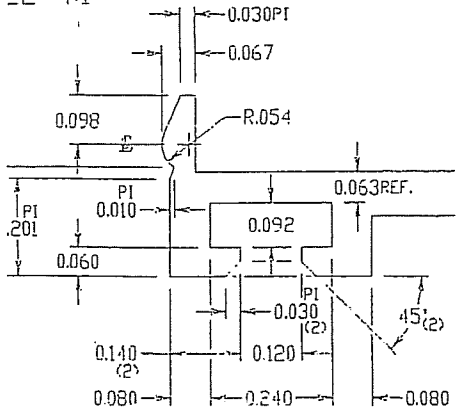
$ 389.00

Date _____

Signature _____



IL "A"
E 4:1



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Sym.	Revisions	Date
	PRINT CORRECTION	

Unspecified Wall Thickness .090 | .015 Break All Corners Radius or as Noted

Customer: ACURLITE SKYLIGHTS | Customer's Part Number:

Job Name:

Part Title: SKYLIGHT PRESSURE CAP | Scale: 1:1

Alloy	Est. Area	Finish Perimeter	Date
6063	0.295 in²	0.000 In	01-14-04
Temper	Est. Wt./Ft.	Est. Perimeter	Drawn
T-6	0.354 Lbs	6.969 In	D.S.S
Cavity Size	Circle Size	Exterior Perimeter	Checked
	2.3 In	6.969 In	

Iy = | Alodine ☐ | Type: 00
Sy = | Crimp | Factor 20 | Mill ☒ | Anod. ☐ | Drwr. ☐ | Drsh. ☐

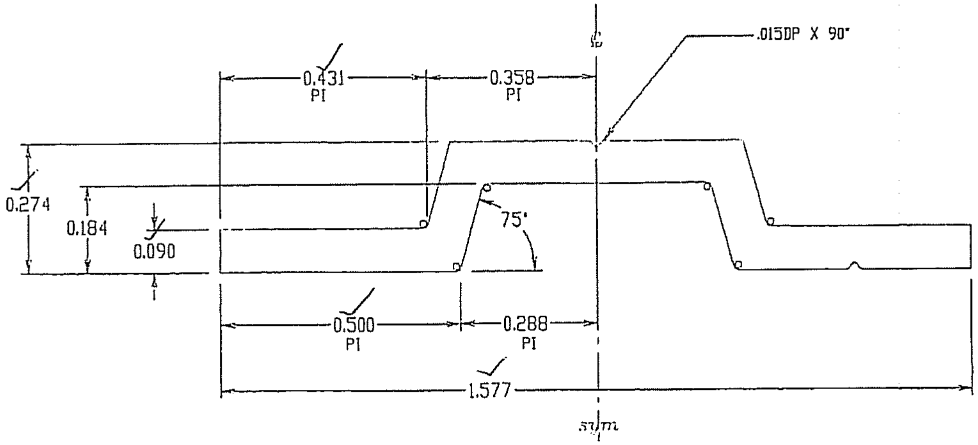
Solid ☒ | Semi-hollow ☐ | Class | Hollow ☐ | Class

*	STRUCTURAL STREAKING IS EXPECTED

UNIFORM PAINT COVERAGE NOT EXPECTED IN THIS AREA	→

STANDARD COMMERCIAL TOLERANCES FOR EXTRUDED PRODUCTS APPLY UNLESS SPECIFIED OTHERWISE

S-38970
KS Number
Design Number



(◦) DENOTES R .010 (6)

775.90
10-17-05

14353-2
11/16/11

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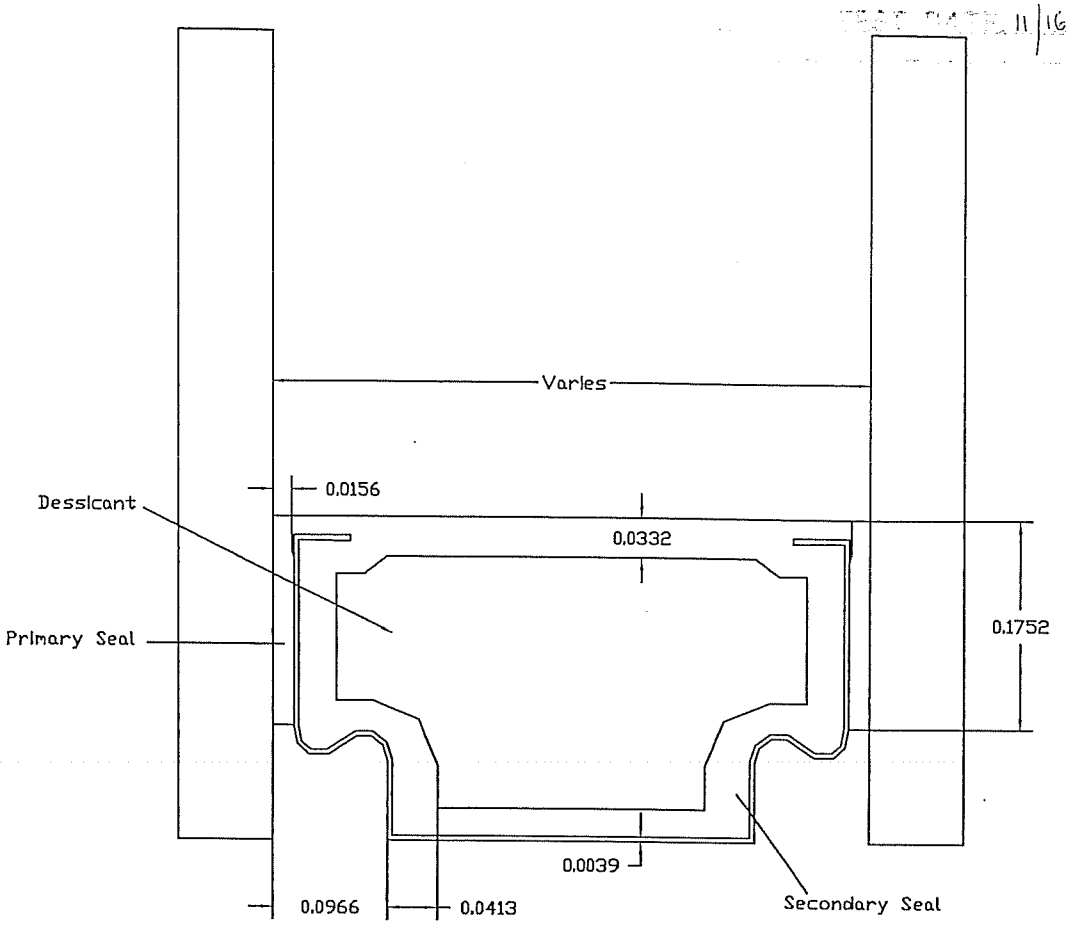
Sym	Revisions	Date
	PRINT CORRECTION	

INITIAL HERE ________ FOR ID TYPE/LOCATION APPROVAL

Unspecified Wall Thickness .090		.010 Break Ext Corners Radius or as Noted	
Customer ACURLITE SKYLIGHTS			Customer's Part Number
Job Name			
Part Title STRUCTURAL SEAL			Scale 4:1
Alloy 6063	Est Area 0.167	Finish Perimeter 3.500 In	Date 10-14-05
Temper T-5	Est Wt/Ft 0.200	Est Perimeter 3.910 In	Drawn A.D.
Cavity Size	Circle Size 1.6	Exterior Perimeter 3.910 In	Checked

Alloy		Type 00	
Group		Factor 20	

Mill [ ] Anc [ ] Drnr [ ] Drcn [X] | Solid [X] Semi-hollow [ ] Class | Hollow [ ] Class



Technoform

Spacer Dimensions -Fill dimensions where applicable - Please fill out a spacer sheet for each spacer used whether spacer type or size.

Primary Seal	Secondary Seal	Material	Fill
☒ Butyl	☒ Butyl	☐ Aluminum	☒ Dessicant
☐ PIB	☐ PIB	☐ Steel - Mild	☐ Air
☐ Polysulphide	☐ Polysulphide	☒ Steel - Stainless	☐ Other _____
☐ Silicone	☐ Silicone	☐ Steel - Galvanized	
☐ Urethane	☐ Urethane	☐ Vinyl	
☐ None	☐ None	☐ Foam _____	
☐ Other _____	☐ Other _____	☐ Other _____	