Architectural Testing

TEST REPORT

Report No.: A4233.01-109-44

Rendered to:

TUBELITE, INC.
Walker, Michigan

PRODUCT TYPE: Project-Out Casement Window
SERIES/MODEL: CW3700

SPECIFICATION: AAMA/WDMA/CSA 101/I.S.2/A440-08, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

Title	Summary of Results
Primary Product Designator	Class CW-PG60 914 x 1524 (36 x 60)-C
Design Pressure	±2880 Pa (±60.15 psf)
Air Infiltration	<0.1 L/s/m^2 (<0.01 cfm/ft^2)
Water Penetration Resistance Test Pressure	580 Pa (12.11 psf)

Test Completion Date: 10/08/2010

Reference must be made to Report No. A4233.01-109-44, dated 12/09/10 for complete test specimen description and detailed test results.

1.0 Report Issued To: Tubelite, Inc.
3056 Walker Ridge Drive, NW Suite G
Walker, Michigan 49544
616-301-0056

2.0 Test Laboratory: Architectural Testing, Inc.
130 Derry Court
York, Pennsylvania 17406-8405
717-764-7700

3.0 Project Summary:

3.1 Product Type: Project-Out Casement Window

3.2 Series/Model: CW3700

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). The specimen tested successfully met the performance requirements for a **Class CW-PG60 914 x 1524 (36 x 60)-C** rating.

3.4 Test Dates: 10/07/2010 - 10/08/2010

3.5 Test Location: Architectural Testing, Inc. test facility in York, Pennsylvania.

3.6 Test Sample Source: The test specimen was provided by the client. Representative samples of the test specimen(s) will be retained by Architectural Testing for a minimum of four years from the test completion date.

3.7 Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Architectural Testing per the drawings located in Appendix C. Any deviations are documented herein or on the drawings.

3.8 List of Official Observers:

Name	Company
Steve Wilkening	Tubelite, Inc.
Rick Via	Wausau Window & Wall Systems
Michael D. Stremmel, P.E.	Architectural Testing, Inc.
Scott Gill	Architectural Testing, Inc.

4.0 Test Specification:

AAMA/WDMA/CSA 101/I.S.2/A440-08, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

AAMA 910-93, *Voluntary "Life Cycle" Specifications and Test Methods for Architectural Grade Window and Sliding Glass Doors*

5.0 Test Specimen Description:

5.1 Product Sizes:

Overall Area: 1.39 m^2 (15.0 ft^2)	**Width**		**Height**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	914	36	1524	60
Vent	894	35-3/16	1503	59-1/4

5.2 Frame Construction:

Frame Member	**Material**	**Description**
Head, sill, jambs	Aluminum	Poured and debridged thermally improved extruded aluminum

	Joinery Type	**Detail**
All corners	Coped and butted	Sealed with silicone and secured using two #8 x 1-1/2" long pan head screws per corner

5.3 Vent Construction:

Vent Member	**Material**	**Other**
Top rail, bottom rail, and stiles	Aluminum	Poured and debridged thermally improved extruded aluminum

	Joinery Type	**Detail**
All corners	Mitered and keyed	Keyed and sealed. Corners were secured with two corner keys with lanced stakes and sealed with silicone.

5.0 Test Specimen Description: (Continued)

5.4 Weatherstripping:

Description	Quantity	Location
Hollow vinyl bulb seal	2	Perimeter of vent

5.5 Glazing:

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
1" IG	Stainless steel and PVC spacer sealed with butyl	1/4" thick clear tempered	1/4" thick clear tempered	The glass was interior glazed against a bead of butyl and secured with aluminum glazing beads with a wedge rubber gasket. The exterior perimeter was sealed with a heal bead of silicone.

Location	Quantity	Daylight Opening	Glass Bite
Vent daylight opening	1	30" x 54"	1/2"

5.6 Drainage: A step-down sill was utilized.

5.7 Hardware:

Description	Quantity	Location
Multi-point lever lock with keepers	1	Lock located on the jamb, 6" from the sill end, keepers located on the lock stile, 6" from each end
Multi-arm friction hinge	2	Top and bottom rails
Vent guide	1	Bottom rail opposite side to the hinge

5.8 Reinforcement: No reinforcement was utilized.

6.0 Installation:

The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/4" shim space. The exterior perimeter of the window was sealed with silicone.

Location	Anchor Description	Anchor Location
Head, sill, jambs	#8 x 2" long pan head screw	5" from corners and 12" on center

7.0 Test Results: The temperature during testing was 22°C (71°F). The results are tabulated as follows:

Title of Test	Results	Allowed	Note
Life Cycle per AAMA 910			
Operating Force, per ASTM E 2068	Initiate motion: 76 N (17 lbf) Maintain motion: 49 N (11 lbf) Locks: 40 N (9 lbf)	Report Only 135 N (30 lbf) 100 N (22.5 lbf)	
Air Leakage, Infiltration per ASTM E 283 at 300 Pa (6.20 psf)	0.1 L/s/m² (0.01 cfm/ft²)	0.5 L/s/m² (0.1 cfm/ft²) max.	1
Water Penetration, per ASTM E 547 and ASTM E 331 at 580 Pa (12.11 psf)	Pass	No leakage	2
Sash/Vent Cycling, per AAMA 910 1250 cycles	Vent: Pass	No damage	3
Locking Hardware Cycling, per AAMA 910 1250 cycles	Lock: Pass	No damage	3
Misuse Testing: per AAMA 910			
Ventilator Torsion Test at 222 N (50 lbf)	Pass	No damage	
Ventilator Vertical Load Test at 445 N (100 lbf)	Pass	No damage	
Sash/Vent Cycling, per AAMA 910 1250 cycles	Vent: Pass	No damage	3
Locking Hardware Cycling, per AAMA 910 1250 cycles	Lock: Pass	No damage	3

7.0 Test Results: (Continued)

Title of Test	Results	Allowed	Note
Operating Force, per ASTM E 2068	Initiate motion: 80 N (18 lbf) Maintain motion: 58 N (13 lbf) Locks: 27 N (6 lbf)	Report Only 135 N (30 lbf) 100 N (22.5 lbf)	
Air Leakage, per ASTM E 283 at 75 Pa (1.60 psf)	<0.1 L/s/m² (<0.01 cfm/ft²)	0.5 L/s/m² (0.1 cfm/ft²) max.	1
Water Penetration, per ASTM E 547 and ASTM E 331 at 580 Pa (12.11 psf)	Pass	No leakage	2
Uniform Load Deflection, per ASTM E 330 taken at bottom rail +1920 Pa (+40.10 psf) -1920 Pa (-40.10 psf)	 2.0 mm (0.08") 4.6 mm (0.18")	 8.6 mm (0.34") max. 8.6 mm (0.34") max.	 4, 5
Uniform Load Structural, per ASTM E 330 taken at bottom rail +2880 Pa (+60.15 psf) -2880 Pa (-60.15 psf)	 <0.3 mm (<0.01") <0.3 mm (<0.01")	 3.0 mm (0.12") max. 3.0 mm (0.12") max.	 4, 5
Forced Entry Resistance, per ASTM F 588, Type: B - Grade: 10	No entry	No entry	
Sash Vertical Deflection 270 N (60 lbf)	1.3 mm (0.05")	1.8 mm (0.07") max.	
Distributed Load 300 Pa (6.2 psf)	No damage	No damage	

7.0 Test Results: (Continued)

Title of Test	Results	Allowed	Note
Optional Performance			
Uniform Load Deflection, per ASTM E 330 taken at bottom rail			
+2880 Pa (+60.15 psf)	2.5 mm (0.10")	8.6 mm (0.34") max.	
-2880 Pa (-60.15 psf)	7.1 mm (0.28")	8.6 mm (0.34") max.	4, 5
Uniform Load Structural, per ASTM E 330 taken at bottom rail			
+4320 Pa (+90.23 psf)	<0.3 mm (<0.01")	3.0 mm (0.12") max.	
-4320 Pa (-90.23 psf)	<0.3 mm (<0.01")	3.0 mm (0.12") max.	4, 5

Note 1: The tested specimen meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.

Note 2: Without insect screen

Note 3: Observation, minimal wear and tear.

Note 4: Loads were held for 10 seconds

Note 5: Tape and film were used to seal against air leakage during structural testing. In our opinion, the tape and film did not influence the results of the test.

Note: *Test specimen met all the requirements for an AW rating with the exception of the Sash Torsion test.*

The service life of this report will expire on the stated Test Record Retention End Date, at which time such materials as drawings, data sheets, samples of test specimens, copies of this report, and any other pertinent project documentation, shall be discarded without notice.

If test specimen contains glazing, no conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, Inc.

Digitally Signed by: Scott Gill

Scott Gill
Senior Technician

Digitally Signed by: Michael D. Stremmel

Michael D. Stremmel, P.E.
Senior Project Engineer

SG:dem

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Alteration Addendum (1)
Appendix-B: Photograph (1)
Appendix-C: Drawings (5)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
1	12/09/10	Pages 4, 5, and 6	Added AAMA 910 test results

Appendix A

Alteration Addendum

***Note**: No alterations were required.*

Appendix B

Photograph

Photo No. 1
CW3700, Project-Out Casement

Appendix C

Drawings

Architectural Testing

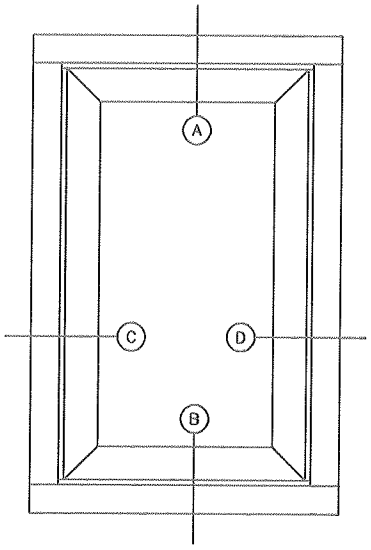
Test sample complies with these details.
Deviations are noted.

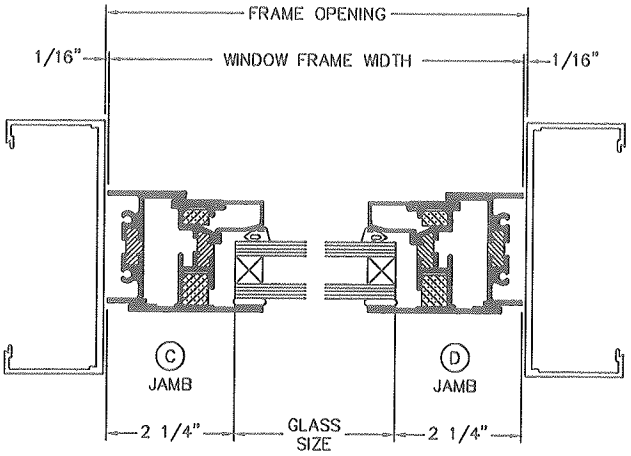
Report# A4233.01-103-94

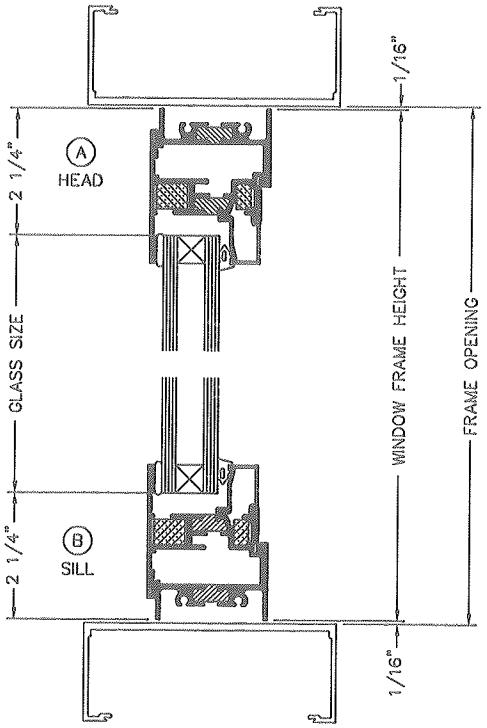
Date 9/20/10 Tech S. Clark

TYPICAL DETAILS

GLASS SIZE = WINDOW FRAME DIM - 4 1/2"







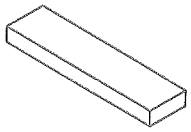
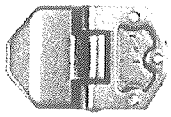
Architectural Testing

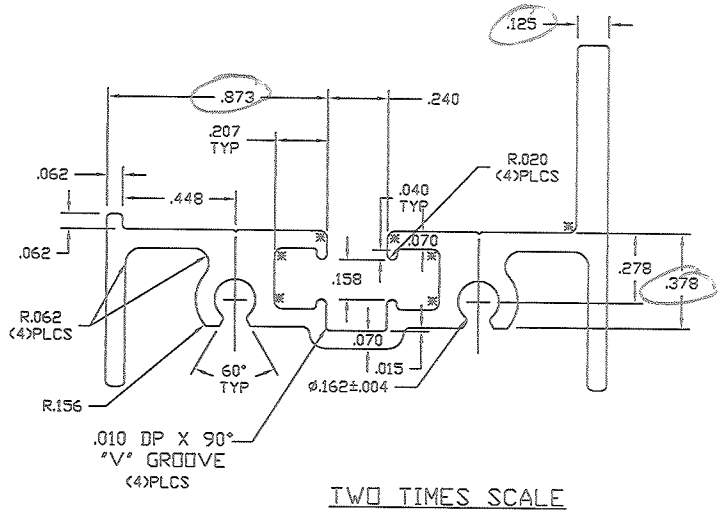
Test sample complies with these details.
Deviations are noted.

Report# A4233.01-109-49

Date 10/20/10 Tech S. Gill

MATERIALS LIST & PARTS IDENTIFICATION

P3702		BULB WEATHERING	N.B.T.		TREMCO POLYSHIM II WITH 1/8" SHIM OR EQUAL
P3703		GLAZING WEDGE	N.B.T.		3/8" x 1" x 4" SETTING BLOCK
P3714		CASEMENT HANDLE			
P3715		ROTO OPERATOR			
P3716		CASEMENT HINGE			
P3706		MULL ADAPTER			
P3707		FLUSH GLAZE ADAPTER			
P3708		CURTAINWALL ADAPTER			



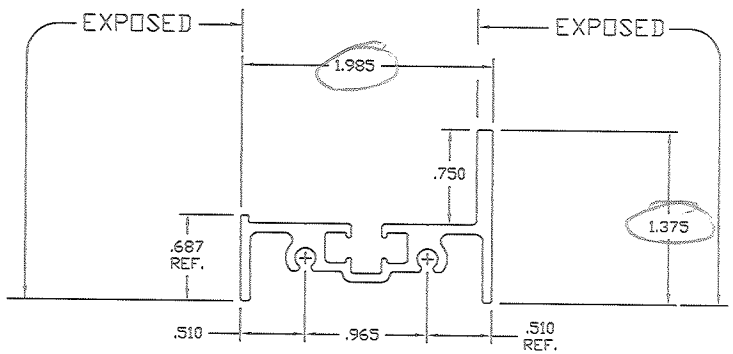
TWO TIMES SCALE

Architectural Testing

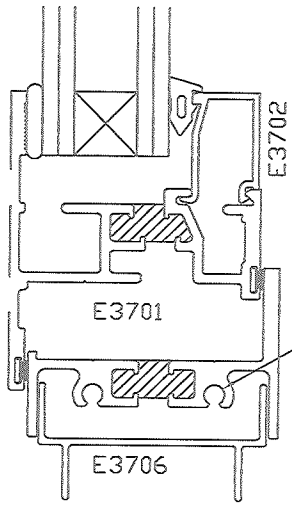
Test sample complies with these details.
Deviations are noted.

Report# A4233.01-109-44

Date 10/26/10 Tech S.Gill



FULL SIZE



SIZED FOR #10-24
THREAD CUTTING
SCREW

ASSEMBLY

AZOBRADE AND FULLY DEBRIDGE

ALUMINUM ASSOCIATION STANDARD TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED RADII .015

※ INDICATES .031 RADIUS

☐ DENOTES CRITICAL DIMENSION

ALL DIES PROPERTY OF TUBELITE

TUBELITE®
DEPENDABLE
LEADERS IN ECO-EFFICIENT STOREFRONT, CURTAINWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G
WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL
	08/25/00	RELEASED FOR TOOLING	CRH
	09/15/00	PART NUMBER WAS E9080033	CRH
	02/13/02	PART NUMBER WAS E908403	SRD
A	04/05/06	REVISED P&D CAVITY FOR AZOBRADE	JEM
	06/06/06	RELEASED FOR TOOLING	JEM

WALL THK .075	SECTION CLASS S	MAT'L 6063-T5	RATIO 111:1		
PERIMETER OUT (TOTAL) 11.054		AREA .504	WGT/FT .592		
FACTOR 20	CIRCLE SIZE 2.415	INFILL VOLUME .1582			
RXX .672	SXX .197	IXX .228	CXX .826		
RYY .284	SYY .048	IYY .041	CYY .528		

COVENTIONAL VENT FRAME 1 3/8" X 2"
VENT WINDOW

DRAWN BY	DWG DATE	APPV'D BY	DATE APPV'D	
CRH	08/23/00			
DWG SCALE NOTED	PRODUCT CODE 120	E3700	REV A	

E3700 A

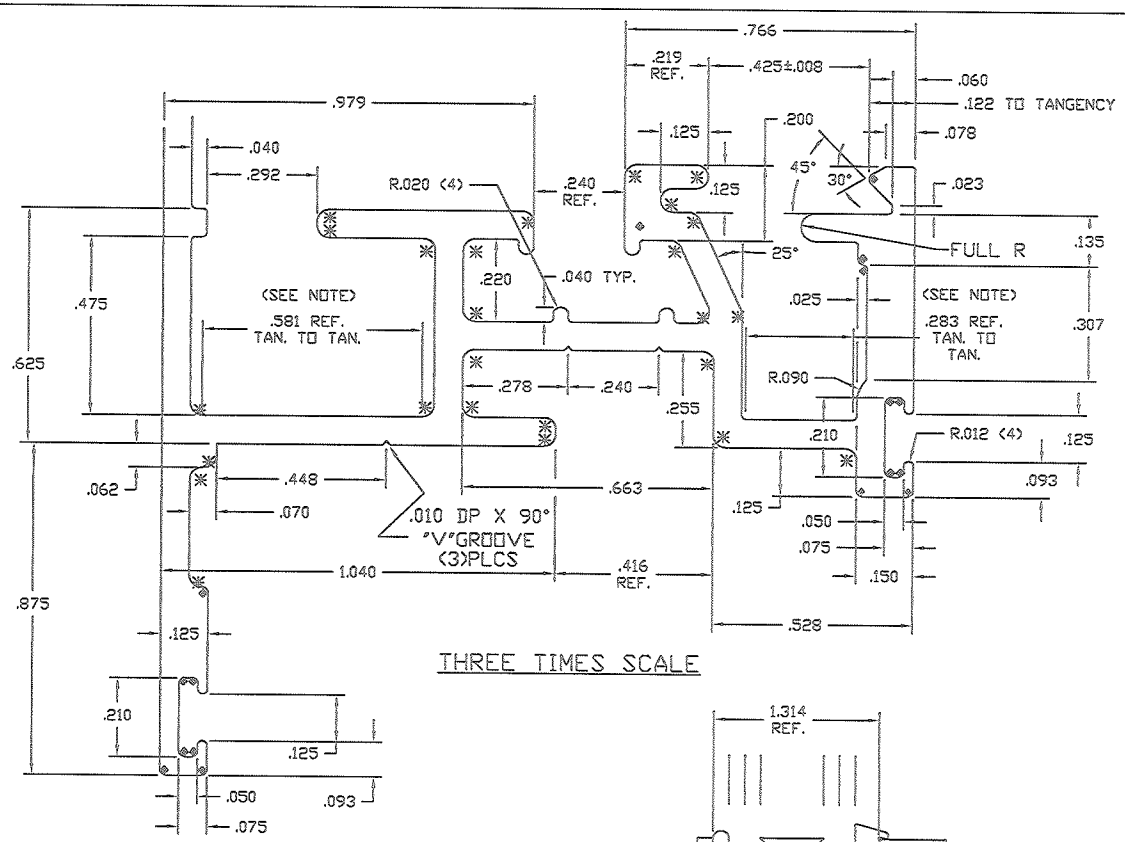
Architectural Testing

Test sample complies with these details.
Deviations are noted.

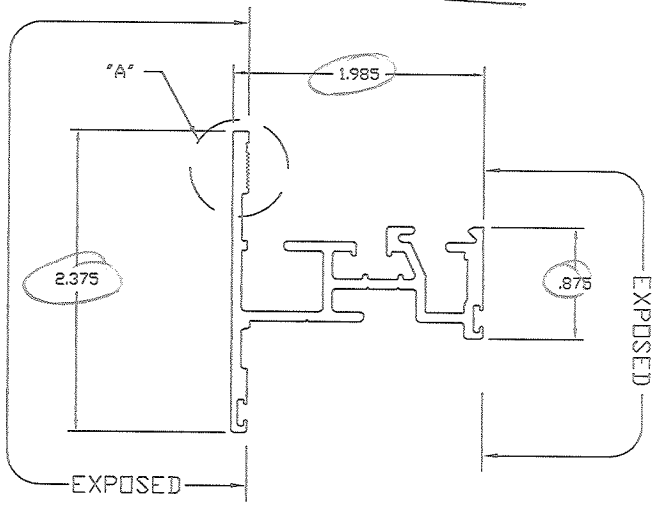
Report# A4233.01-109-99

Date 4/20/10 Tech S.G.

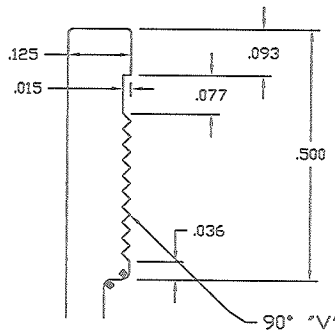
E3701



THREE TIMES SCALE

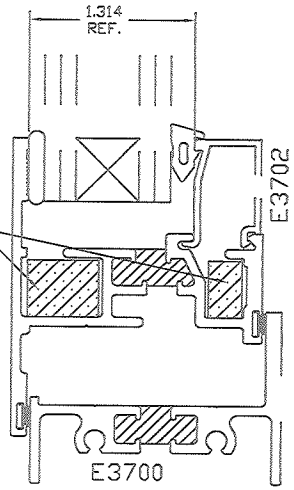


FULL SIZE



DETAIL "A"
FOUR TIMES SCALE

NOTE:
CORNER CLIPS
EXT. #E3706
(CRIMP IN PLACE)



ASSEMBLY

MATES WITH E3700, E3702 AND E3706

ALUMINUM ASSOCIATION STANDARD TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED RADII .015

※ INDICATES .031 RADIUS

☐ DENOTES CRITICAL DIMENSION

ALL DIES PROPERTY OF TUBELITE

TUBELITE® DEPENDABLE
LEADERS IN ECO-EFFICIENT STOREFRONT, CURTAINWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G
WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL
	08/25/00	RELEASED FOR TOOLING	CRH
	09/15/00	PART NUMBER WAS E9080004	CRH
	02/13/02	PART NUMBER WAS E908A04	SRD

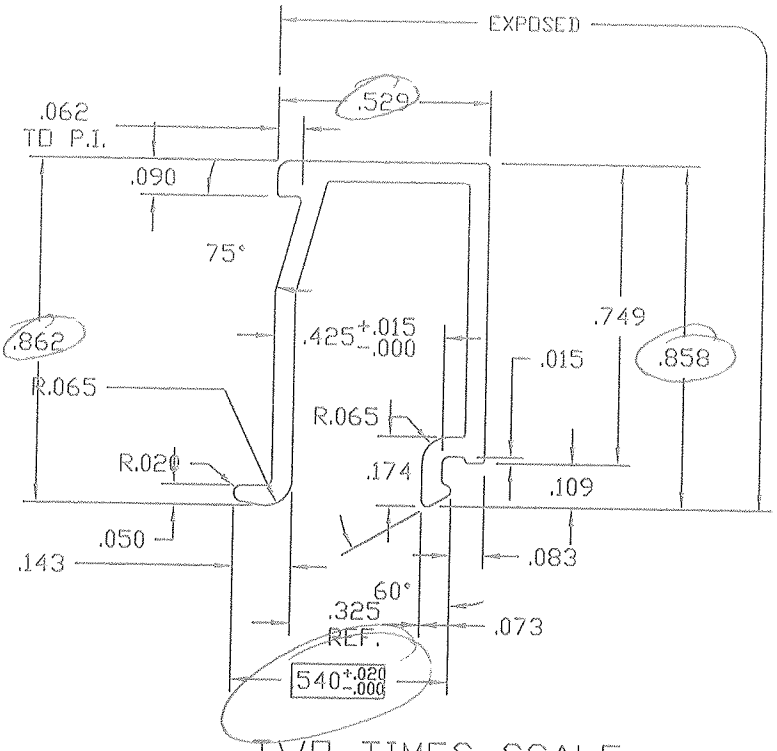
WALL THK .075	SECTION CLASS S	MAT'L 6063-T5	RATIO 87:1		
PERIMETER OUT (TOTAL) 15.987		AREA .639	WGT/FT .751		
FACTOR 21	CIRCLE SIZE 2.737	INFILL VOLUME 1.680			
RXX .714	SXX .283	IXX .326	CXX 1.151		
RYY .460	SYY .112	IYY .135	CYY 1.203		

CONVENTIONAL VENT SASH 2 3/8" X 2" VENT WINDOW

DRAWN BY	DRWG DATE	APPV'D BY	DATE APPV'D
CRH	08/17/00		

DWG SCALE	PRODUCT CODE		REV
NOTED	120	E3701	

E3702



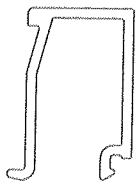
TWO TIMES SCALE

Architectural Testing

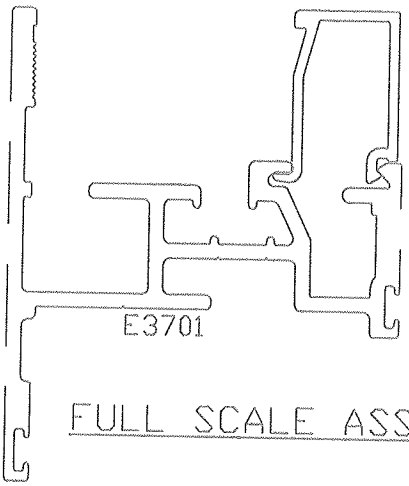
Test sample complies with these details.
Deviations are noted.

Report# A4033.01-109-99

Date 10/20/10 Tech Scott



FULL SCALE



FULL SCALE ASSEMBLY

MATES WITH E3701

ALUMINUM ASSOCIATION STANDARD TOLERANCES APPLY UNLESS NOTED

ALL UNSPECIFIED RADII .015

* INDICATES .031 RADIUS

☐ DENOTES CRITICAL DIMENSION

ALL DIES PROPERTY OF TUBELITE

TUBELITE®
DEPENDABLE
LEADERS IN ECO-EFFICIENT STOREFRONT, CURTAINWALL AND ENTRANCE SYSTEMS

3056 WALKER RIDGE NW, SUITE G
WALKER, MICHIGAN 49544

REV	DATE	DESCRIPTION	INTL
	08/25/00	RELEASE FOR TOOLING	CRH
	09/15/00	PART NUMBER WAS E9080001	CRH
	02/13/02	PART NUMBER WAS E908A01	SRD

WALL THK. .050	SECTION CLASS S	MAT'L 6063-T5	RATIO 464:1
PERIMETER OUT (TOTAL) 4.737		AREA .119	WGT/FT .140
FACTOR 34	CIRCLE SIZE 1.043		INFILL VOLUME N/A

RXX .215	SXX .020	IXX .006	CXX .351
RYY .286	SYY .026	IYY .010	CYY .490

GLASS STOP FOR 1" GLASS
VENT WINDOWS

DRAWN BY CRH	DRWG DATE 08/17/00	APPV'D BY	DATE APPV'D
DWG SCALE NOTED	PRODUCT CODE 120	E3702	REV