



SUBMITTAL REVIEW

H&A JN: 1614.03
Project: MSBA Accelerated Repair Program
Halifax Elementary School – Windows, Doors & Siding Replacement
464 Plymouth Street
Halifax, MA 02338

ITEMS:

1. 08 4113-2 EFCO WINDOW 450X PRODUCT DATA
2. 08 4113-2 SAMPLE WARRANTY
3. 08 4113-2 WINDOW THERMAL TESTING REPORT
4. 08 4113-2 WINDOW STRUCTURAL TESTING

COMMENTS:

HABEEB & ASSOCIATES ARCHITECTS INC. 150 LONGWATER DRIVE NORWELL, MA 02061	
NO EXCEPTIONS TAKEN	X
NOTE MARKINGS RESUBMITTAL NOT REQ'D	
NOTE MARKINGS RESUBMITTAL REQ'D	
REJECTED	
This review is given for design concept only and does not relieve the contractor from meeting the provisions of the contract, drawings and specifications. The Contractor is responsible for verifying all dimensions, schedules, quantities and field conditions.	
DATE 03-08-18	BY SB

To: Habeeb & Associates Architects
 150 Longwater Drive
 Norwell, MA 02061

Contractor: Lambrian Construction Corporation
 384 Washington Street
 Westwood, MA 02090
 Tel: (781) 461-1100 Fax: (781) 461-9885

Submittal No:	2
Date Submitted:	3/06/2018
Manufacturer:	EFCO
Product Name:	EFCO Series 450
Specification Section:	08 5113 - Aluminum Windows - Par. 1.03D & PART 2
Approved By:	PL
Description:	Product Data

COMMENTS:

PROJECT: Halifax Elementary School
 LAMBRIAN CONSTRUCTION CORP.
 Approved by: PL

**WINDOWS, DOORS & SIDING REPLACEMENT
HALIFAX ELEMENTARY SCHOOL
464 PLYMOUTH STREET
HALIFAX, MASSACHUSETTS 02338**



EFCO CORPORATION LIMITED WARRANTY

EFCO CORPORATION warrants to the first retail purchaser only, that all articles, materials and work will be free from material defects in manufacture. EFCO Corporation's liability extends only to its buyer and is limited by the Terms and Conditions stated on the reverse side of this form.

EFCO CORPORATION'S warranty on the product(s) shall extend from the issue date as follows:

Glass	10 years
Window	10 years
Storefront	5 years
Curtainwall	Not Applicable
Door	5 years
Finish	20 years
Anodize	Not Applicable

EFCO CORPORATION excludes any implied warranties of merchantability and fitness for a particular purpose.

EFCO's liability will not extend beyond repair or replacement of the defective material. EFCO will not be responsible for any consequential damages caused by its products. There are no warranties which extend beyond the description on the face hereof.

Job Name:	HALIFAX ELEMENTARY SCHOOL
EFCO Job No.:	H553801
Customer Name:	LAMBRIAN CONSTRUCTION CORP.
Issue Date:	3/5/2018

Architectural Window, Curtain Wall
& Storefront Systems
See attached for additional terms and conditions.

WARRANTY TERMS AND CONDITIONS

PRODUCTS LIMITED WARRANTY

The limited warranty for INSULATED GLASS UNITS warrants the glass units will be free from obstruction of vision as a result of dust or film formation on the internal glass surfaces caused by failure of the hermetic seal due to defects in material or workmanship.

The limited warranty for BAKED-ON FLUOROPOLYMER PAINT COATINGS warrants that paint finishes will not chip, crack, blister, or peel. EFCO CORPORATION does not warrant any paint finishes for filiform corrosion in Coastal environment.

Corrosion of any product or component caused by exposure to salt atmosphere, acid rain, alkaline, or other extreme conditions is not covered. EFCO disclaims all liability for and with respect to any material which has been subject to abuse, alteration, modification, neglect, misuse, abnormal use, accident, fire, war, flood, earthquakes, or acts of God.

This warranty covers factory-applied finishes on exposed aluminum surfaces against peeling, checking, cracking, chalking, and change of color, per applicable AAMA standards 2603, 2604, 2605, or 611 in force at the time of bidding. This limited warranty applies only when the finish types recommended for the atmospheric environment of the project site are used. EFCO reserves the right to refinish defective components in the field or replace at its sole discretion.

WHAT EFCO CORPORATION WILL DO

If any material shall be found to be defective by EFCO in material or workmanship, such material shall be replaced or repaired at EFCO's discretion without charge, after inspection by a representative of EFCO. This is a materials only warranty, labor will only be provided in cases of repair. Any warranty for labor must be separately negotiated by purchaser.

If after inspection by EFCO, it is determined the organic coating became defective under the conditions of this warranty, EFCO agrees to refinish the defective material on the site, with a conventional refinishing material as specified by EFCO.

EXCLUSIONS TO THE LIMITED WARRANTY

EFCO CORPORATION will not be responsible for defects caused by accidents, modifications to products, abuse, (including failure to perform reasonable and necessary maintenance), failure to follow instructions, exposure to salt spray, corrosive chemicals, lightning, fire, and other acts of nature. All outside manufactured parts will be limited to the specific manufacturer's warranty and are expressly excluded from the EFCO limited warranty.

EFCO shall not be liable for material damaged in handling or installation; or not installed in accordance with the EFCO Installation Manual Guidelines.

EFCO assumes no responsibility for failure of insulated glass units due to faulty installation, building construction, or building design; or failure of units installed in high moisture environments such as swimming pool enclosures and greenhouses. EFCO does not assume responsibility for glass breakage caused by stresses resulting from temperature differentials over the glass surfaces or edges.

The EFCO limited warranty excludes any damage caused to the material or finish due to posting.

The EFCO limited warranty excludes any liability for environmental hazards including but not limited to mold.

The EFCO limited warranty extends to EFCO manufactured product only, as outlined in AAMA 502-90, test method A. Perimeter conditions, caulking, sealants, etc. are explicitly excluded from the EFCO limited warranty. The EFCO limited warranty is based upon the system itself, it does not warrant the installation of the system.

EFCO CORPORATION excludes any implied warranties of merchantability and fitness for a particular purpose. EFCO will not be responsible for incidental or consequential damages.

WHAT EFCO WILL NOT DO

EFCO CORPORATION will not be responsible or liable for any incidental, consequential, or collateral damages or for any expense incurred by anyone as a result of the use, or sale of defective or unsatisfactory material.

Any implied warranty arising from course of performance, course of dealing, or usage of trade is hereby excluded or disclaimed.

EFCO shall not be liable for back charges nor any work performed or materials placed by anyone other than EFCO in connection with the installed products covered by this warranty, except when authorized by the signature of an officer of EFCO CORPORATION.

Materials will not be repaired or replaced until paid for in full.

The warranty sets forth all the responsibilities of EFCO CORPORATION regarding the products. EFCO will not be responsible for any costs or damages resulting from removal, installation or reinstallation of any products or components. Replacement of defective parts at the EFCO factory is the exclusive remedy. There are no other express or implied warranties from EFCO CORPORATION.

LIMITED LIFETIME WARRANTY FOR EFCO ENTRANCE DOOR CORNER CONSTRUCTION

Limited Lifetime Warranty and Remedy for EFCO Doors with a welded corner. This warranty is in addition to EFCO's current five (5) year warranty and applies solely and exclusively to EFCO doors with a welded corner.

This is to certify that EFCO Corporation (EFCO) warrants to its customers and all subsequent purchasers and users that: The corner construction of the doors shall be free from material defects in workmanship and material for the normal, useful life of the door.

The warranty set forth above commences at the date of shipment from EFCO's factory and applies only if EFCO's doors are installed and maintained according to EFCO's recommended practices and installation instructions, and only if EFCO is notified in writing within sixty (60) days after such defects appear. This warranty is non-transferable.

What EFCO Will Do:

If any material shall be found to be defective by EFCO in material or workmanship, such material shall be replaced or repaired at the option of EFCO, after inspection by EFCO, and with the consent of EFCO, without charge.

Exclusions To The Limited Warranty:

EFCO will not be responsible for defects caused by accidents, modifications to products, abuse, (including failure to perform reasonable and necessary maintenance), failure to follow instructions, exposure to salt spray, corrosive chemicals, lightning, fire, and other acts of nature.

All outside manufactured parts will be limited to the specific manufacturer's warranty and are expressly excluded from the EFCO limited warranty.

EFCO shall not be liable for the material damaged in handling or installation; or not installed in accordance with the EFCO Installation Manual Guidelines.



REV-5-2015-EFCO



Series 450X, 450G Thermal 4 1/2" Heavy Commercial Projected Flush-Face Window



CONFIGURATIONS

Project-In • Project-Out • Casement In • Casement Out • Fixed

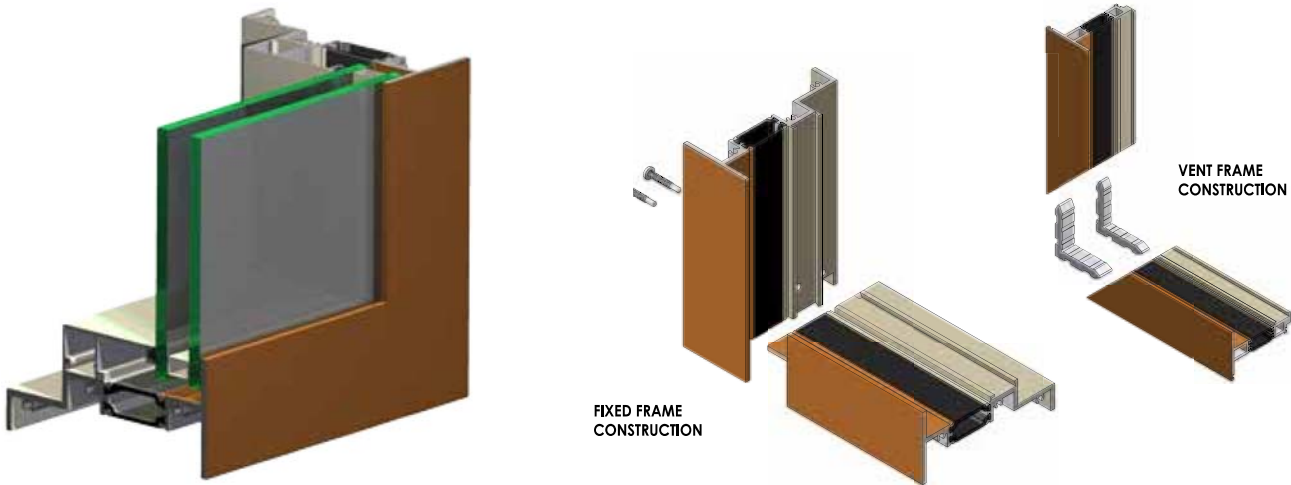
The 450X and 450G XTherm™ window series, were developed to meet the increasing energy efficiency demands of today's marketplace. The deeper strutted thermal break allows for triple glazing while also providing superior thermal separation of the framing materials. This window system is an attractive and versatile product that can be utilized on a wide range of applications from educational, to office and healthcare facilities. Offered with a complete line of thermal subframes, mullions and architectural sills, the 450X and 450G provides the complete solution for your fenestration needs.

Features

Benefits

35 mm E-Strut™ thermal isolator	Exceptional U-Value performance Dual finish capability Eliminates potential for dry shrinkage
Vertical or horizontal stacking members	Increases configuration options
Dual glazing with optional integral blinds	Improved energy savings and interior light or privacy control with low maintenance
Pressure equalization	Superior water resistance
Angle reinforced vent corners	Improves sash/vent rigidity
Wide variety of locking and operating hardware available	Permits hardware options to address specific requirements
Accessory line of subframes, mullions, and architectural sills	Allows custom designs with standard product
Anodized or painted finishes available	Multiple options to answer economic and aesthetic concerns
Screen frames of extruded aluminum alloy are available	Stronger, more durable screens
Snap-In grid available with 450G version	Removes grid from glazing pocket Easily removed for exterior glass cleaning

Series 450X, 450G Thermal 4 1/2" Heavy Commercial Projected Flush-Face Window



PERFORMANCE DATA

FIXED ARCHITECTURAL GRADE

AAMA RATING	AW-PG140-FW
AIR INFILTRATION	<.10 CFM/SF @ 6.24 PSF
WATER	NO LEAKAGE @ 15.0 PSF
CRF-FRAME	73
CRF-GLASS	67

VENTED ARCHITECTURAL GRADE

AAMA RATING PROJECT IN	AW-PG135
AAMA RATING PROJECT OUT	AW-PG120
AAMA RATING INSWING	AW-PG145
AAMA RATING OUTSWING	AW-PG135
AIR INFILTRATION	<.10 CFM/SF @ 6.24 PSF
WATER	NO LEAKAGE @ 15.0 PSF
CRF-FRAME	72
CRF-GLASS	65

Note: All performance value data is based on laboratory testing per AAMA 101/15.2/ A440 for Air/Water/Structural, ASTM E90 and or E413 for Acoustical, AAMA 507 and or NFRC 100/200/500 for UFactors and AAMA 1503 for Condensation Resistance Factor (CRF). Printed values are subject to change pending the frequency of recertification testing. Field results will vary depending on size, the field test method, the addition of sub-frames, panning, mullions, accessories and installation into the surrounding condition.

450X THERMAL U-FACTORS*

CENTER OF GLASS U-FACTOR	CONFIGURATION AND SIZE					
	PO**	PO	PO Csm**	PO Csm	FX**	FX
	59" X 24"	60" X 66"	24" X 59"	54" X 84"	47" X 59"	65" X 77"
0.46	0.57	0.52	0.58	0.52	0.53	0.51
0.34	0.50	0.43	0.50	0.42	0.42	0.40
0.28	0.46	0.39	0.47	0.38	0.38	0.36
0.24	0.44	0.35	0.44	0.35	0.34	0.32
0.20	0.41	0.32	0.42	0.31	0.31	0.28
0.16***	0.33	0.26	0.34	0.25	0.24	0.22
0.12***	0.31	0.23	0.32	0.23	0.21	0.19

*BASED ON NFRC 100

**NFRC GATEWAY SIZE

***TRIPLE LITE INSULATED UNIT

S-450X HARDWARE CHART	BUTT HINGES	4-BAR ARMS	FRICTION ADJUSTER	KEY RELEASE LIMIT ARM	ROTOR OPERATOR*	CAM HANDLE	POLE RING CAM HANDLE	POLE RING PULL**	ACCESS CONTROLLED LOCK	LIFT LOCK
PROJECT-IN		S				S				O
PROJECT-OUT		S				S	O		O	O
CASEMENT INSWING WITH 4-BAR ARMS		S				S	O	O	O	O
CASEMENT OUTSWING WITH 4-BAR ARMS		S				S	O		O	O
CASEMENT INSWING WITH BUTT HINGES	S		O	O		S	O		O	O
CASEMENT OUTSWING WITH BUTT HINGES	S		S	O	O	S	O		O	O

Some size restrictions may apply depending on hardware selected.

* Casements requiring roto operators will be furnished with lift locks, providing vents meet minimum width requirements.

** Pole ring pull will be furnished on project-out vents when optional pole ring cam handle is selected.

O - Optional

S - Standard

Blank - N/A

S-450X GLAZING CHART		POLYCARBONATE		GLASS OR PANEL											
		3/16"	1/4"	3/16"	.200"	1/4"	1/4"	7/8"	1"	1-1/8"	1-1/4"	1-1/2"	1-3/4"	2"	
INSULATED GLASS								A	A	A		A	A	A	
DUAL GLAZING	EXTERIOR LITE							I	A	A		A	A		
	INTERIOR LITE	A	A	A	A	A	A								

* Obscure glass thickness

** Laminated glass thickness

A - Available glazing option
I - Internal blinds can be used with this type of dual glazing
Blank - N/A

S-450G GLAZING CHART		POLYCARBONATE		GLASS OR PANEL											
		3/16"	1/4"	3/16"	.200"	1/4"	1/4"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"	1-1/2"	1-3/4"
INSULATED GLASS										A	A	A	A	A	A
DUAL GLAZING	EXTERIOR LITE							A	A		A		A		
	INTERIOR LITE	A	A	A	A	A	A								



Series 450X, 450G Thermal 4 1/2" Heavy Commercial Projected Flush-Face Window

Main Frame Construction

The frame is constructed from .125" nominal material wall thickness aluminum of 6063-T6 alloy with a depth of 4 1/2". An equal leg frame is standard. Corners are of screw spline construction and back sealed with a small-joint seam sealer. See Illustration 1.

Vent Frame Construction

The 4 1/2" deep vent consists of tubular aluminum members with .125" nominal material wall thickness of 6063-T6 alloy. Vent corners are mitered, angle reinforced, crimped, cold epoxy welded and back sealed with a small-joint seam sealer. Vents present a flush appearance with the frame in the closed position. See Illustration 2.

Weather Stripping

All vents are dual weather-stripped with a dual-durometer Santoprene® gasket. Exterior gasket is intentionally omitted at vent bottom rail for project-out vents and at vent top rail for project-in vents allowing air to pressure equalize the void between the vent and frame. Each vent utilizes the pressure equalization technique for superior water resistance.

Screens

Screen frames are extruded 6063-T6 aluminum alloy frames. Full width hinged wickets or fully hinged screens are available. 18 x 16 mesh screens are available in fiberglass and in .011" diameter aluminum. 18 x 18 mesh screens are available in .009" diameter stainless steel.

Thermal Barrier

All frames and vents are thermally isolated with two thermal struts which consist of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions. See Illustration 3.

Hardware

Locking cam handles, access controlled locks, and keepers are of cast white bronze in a US25D finish. 4-bar arms are fabricated from stainless steel meeting AAMA 904.1 requirements. Butt hinges are fabricated from extruded aluminum of 6063-T6 alloy with stainless steel pins. See Hardware Chart for available hardware types.

Glazing

Windows are inside glazed with an extruded aluminum snap-in glazing bead. Glazing of 3/16" to 2" can be accommodated. Dual glazing is also available in 1/8", 3/16", and 1/4" glass. Between the glass aluminum blinds are available with dual glazed windows. See the Glazing Chart for the exact size.

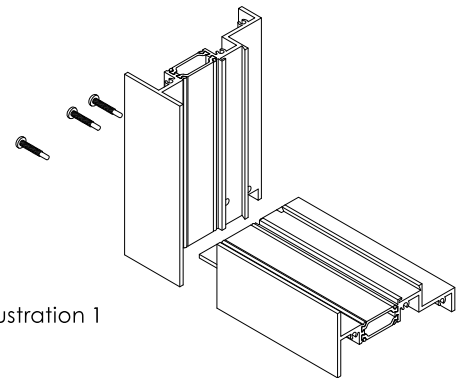


Illustration 1

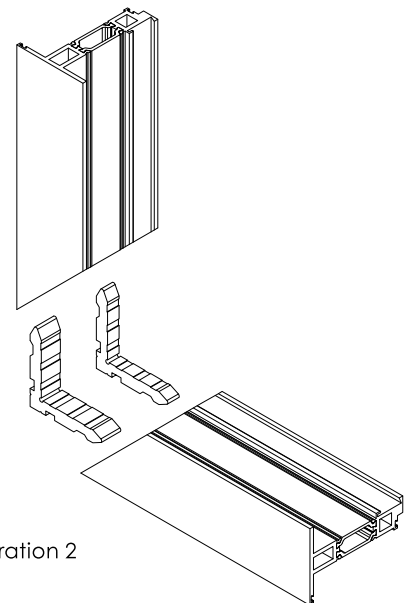


Illustration 2

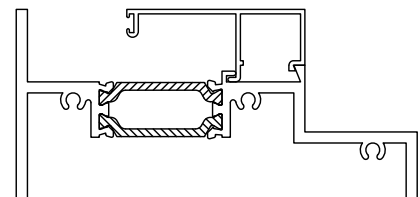


Illustration 3



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HURRICANE TEST LABORATORY, LLC
162 ROCKY CREEK LANE
HILLSBORO, TN 37342
PHONE: (931) 315-0103
FAX: (561) 881-0075
www.htltest.com

Report #: H046-1206-10
Simulation Date: 12/15/2010
450G Project Out
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- 1.0 Product Manufacturer:** EFCO Corporation
1000 County Road
Monett, MO 65708
- 2.0 Product Model:** 450G Project Out
- 3.0 Operator Type:** Casement Single X
- 4.0 Simulations Performed:** Thermal simulations were performed in accordance with AAMA 507-07, *Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems Installed in Commercial Buildings*, using NFRC-approved simulation programs WINDOW5.2 and THERM5.2, and current versions of NFRC 100-2010 and NFRC 200-2010.
- 5.0 Framing Type:** Painted thermally broken aluminum (AT)
- 6.0 Sash Type:** Painted thermally broken aluminum (AT)
- 7.0 Grilles:** None modeled.
- 8.0 Weatherstripping:** Single EPDM bulb at interior frame/sash junction.
- 9.0 Hardware:** None modeled.
- 10.0 Edge-of-Glass Construction:** Inside glazed with interior EPDM bulb glazing gaskets and aluminum snap-in bead, and exterior silicone to glazing leg
- 11.0 I.G. Spacer Type:** GED Intercept Galvanized Steel spacer with 0.025 in. hot melt butyl primary sealant and 0.035 in. hot melt butyl secondary sealant, was utilized for all simulations.
- 12.0 Grouping:** None used.
- 13.0 Drawings:** This report is incomplete if not accompanied by component and assembly drawings of the indicated product, provided by EFCO, totaling 11 pages, bearing the initialed stamp of Hurricane Test Laboratory, LLC.
- 14.0 Simulation Results:** Please see following charts and tables.

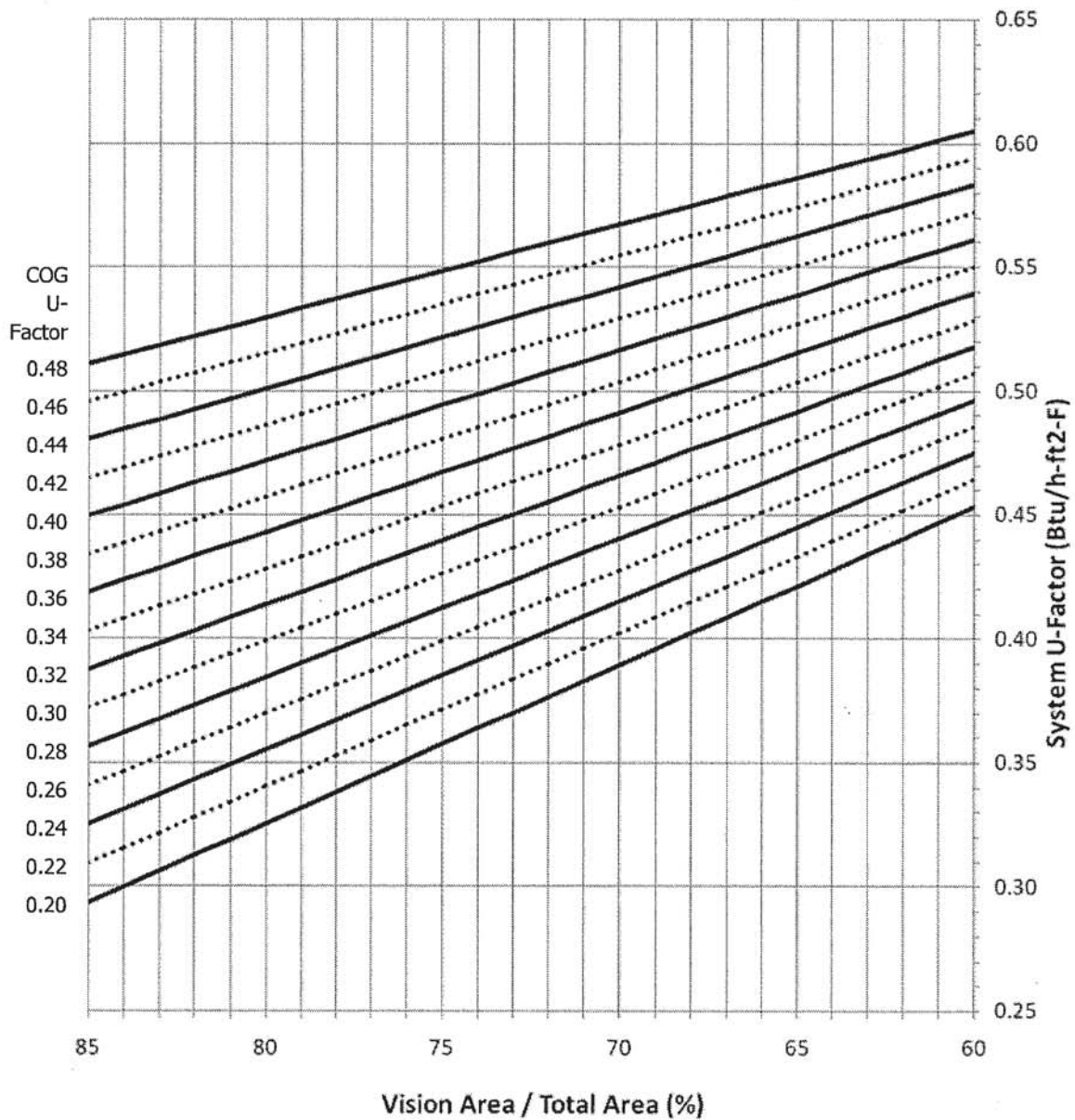


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System U-Factor vs. Percentage of Vision Area

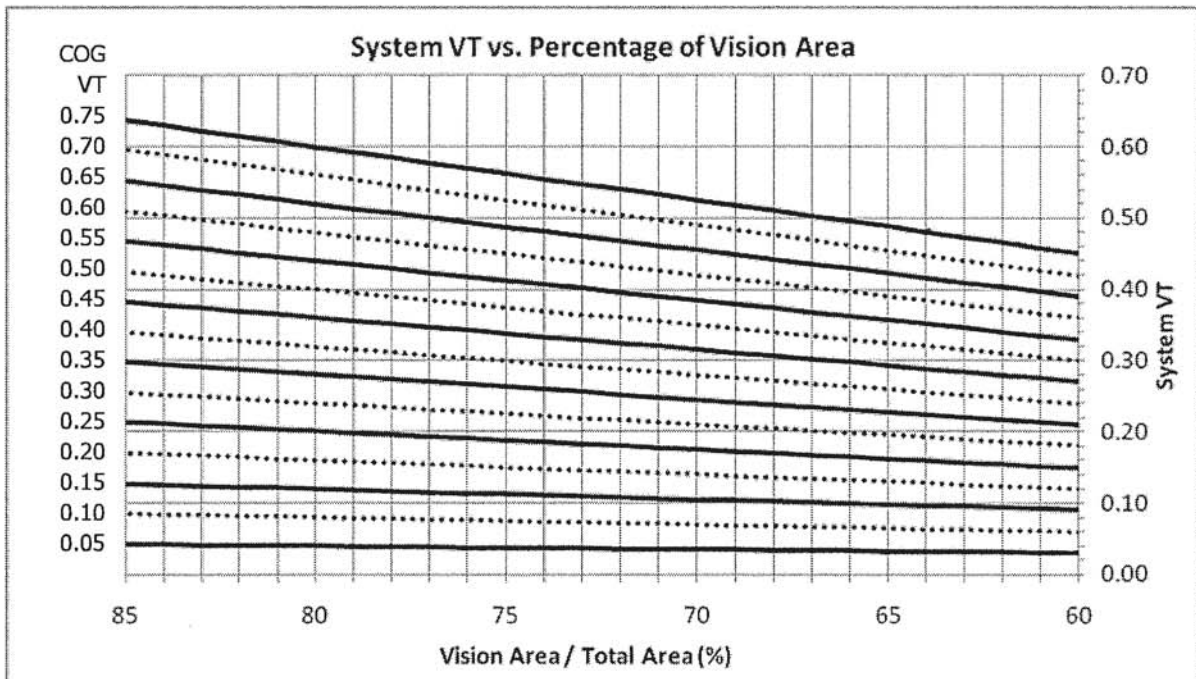
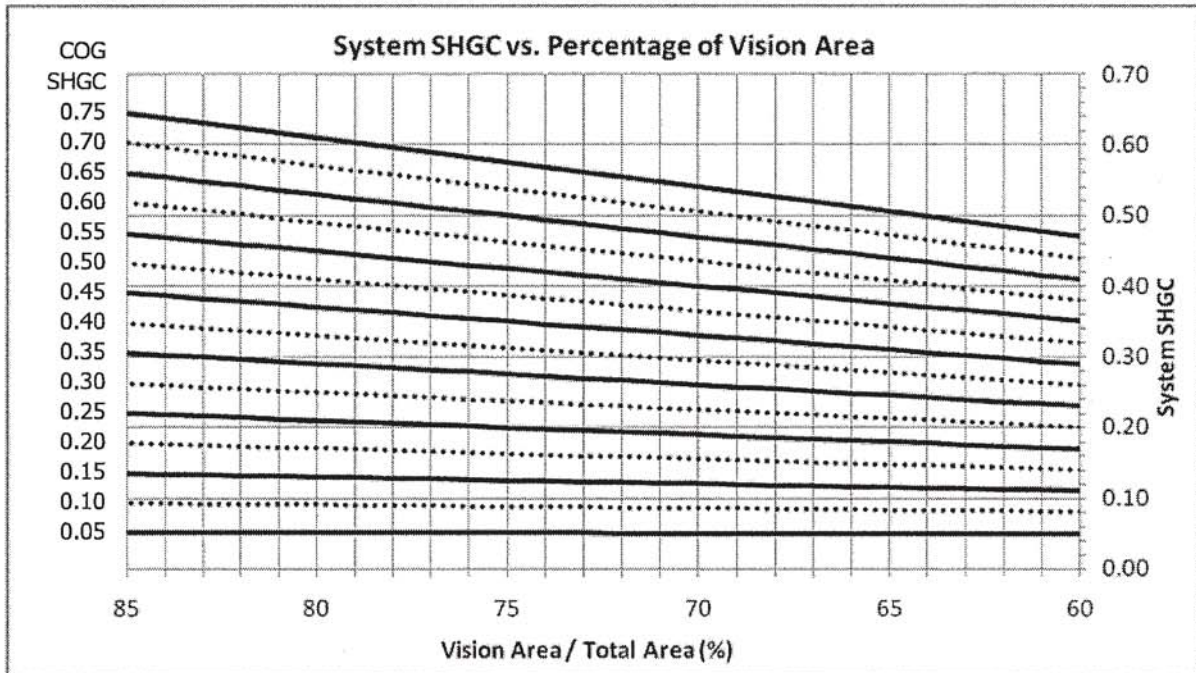




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Size-Specific U-Factor Matrix: NFRC Standard Size (23.62" x 59.05")

Glazing Option	Center-of-Glass U-Factor	Overall U-Factor
1	0.48	0.59
2	0.46	0.58
3	0.44	0.57
4	0.42	0.56
5	0.40	0.55
6	0.38	0.54
7	0.36	0.52
8	0.34	0.51
9	0.32	0.50
10	0.30	0.49
11	0.28	0.48
12	0.26	0.47
13	0.24	0.46
14	0.22	0.44
15	0.20	0.43

Size-Specific SHGC Matrix:

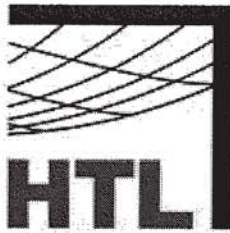
NFRC Standard Size (23.62" x 59.05")

Center-of-Glass SHGC	Overall SHGC
0.75	0.49
0.70	0.46
0.65	0.43
0.60	0.40
0.55	0.37
0.50	0.33
0.45	0.30
0.40	0.27
0.35	0.24
0.30	0.21
0.25	0.18
0.20	0.14
0.15	0.11
0.10	0.08
0.05	0.05

Size-Specific VT Matrix:

NFRC Standard Size (23.62" x 59.05")

Center-of-Glass VT	Overall VT
0.75	0.47
0.70	0.44
0.65	0.41
0.60	0.38
0.55	0.35
0.50	0.32
0.45	0.28
0.40	0.25
0.35	0.22
0.30	0.19
0.25	0.16
0.20	0.13
0.15	0.09
0.10	0.06
0.05	0.03



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Glazing Option	NFRG COG U-Factor (Btu/h-ft ² -F) *	NFRG COG Temperature (F) *	Frame Section	Frame Width (in.)	Frame U-factor (Btu/h-ft ² -F)	Edge U-Factor (Btu/h-ft ² -F)	Size Specific Data		
							60% Vision Area	NFRG 100 Standard Size (63.2% Vision Area)	85% Vision Area
							21.513" x 53.783"	23.620" x 59.050"	61.030" x 152.575"
1	0.48	43.7	Head	3.376	0.7278	0.5014	COG U-factors *		
			L Jamb	3.376	0.8041	0.5003	0.4744	0.4728	0.4572
			R Jamb	3.376	0.8041	0.5003	Total Product U-factors		
			Sill	3.376	0.7301	0.5031	0.60	0.59	0.51
2	0.46	44.8	Head	3.376	0.7268	0.4870	COG U-factors *		
			L Jamb	3.376	0.8031	0.4860	0.4549	0.4534	0.4390
			R Jamb	3.376	0.8031	0.4860	Total Product U-factors		
			Sill	3.376	0.7290	0.4886	0.59	0.58	0.50
3	0.44	45.8	Head	3.376	0.7258	0.4722	COG U-factors *		
			L Jamb	3.376	0.8023	0.4713	0.4353	0.4340	0.4209
			R Jamb	3.376	0.8023	0.4713	Total Product U-factors		
			Sill	3.376	0.7279	0.4737	0.58	0.57	0.48
4	0.42	46.8	Head	3.376	0.7248	0.4575	COG U-factors *		
			L Jamb	3.376	0.8012	0.4568	0.4157	0.4144	0.4024
			R Jamb	3.376	0.8012	0.4568	Total Product U-factors		
			Sill	3.376	0.7268	0.4589	0.57	0.56	0.46
5	0.40	47.9	Head	3.376	0.7237	0.4429	COG U-factors *		
			L Jamb	3.376	0.8001	0.4423	0.3961	0.3949	0.3840
			R Jamb	3.376	0.8001	0.4423	Total Product U-factors		
			Sill	3.376	0.7256	0.4443	0.56	0.55	0.45
6	0.38	48.9	Head	3.376	0.7229	0.4283	COG U-factors *		
			L Jamb	3.376	0.7993	0.4279	0.3764	0.3754	0.3654
			R Jamb	3.376	0.7993	0.4279	Total Product U-factors		
			Sill	3.376	0.7246	0.4296	0.55	0.54	0.43
7	0.36	50.0	Head	3.376	0.7220	0.4139	COG U-factors *		
			L Jamb	3.376	0.7985	0.4136	0.3569	0.3560	0.3473
			R Jamb	3.376	0.7985	0.4136	Total Product U-factors		
			Sill	3.376	0.7237	0.4151	0.54	0.52	0.42
8	0.34	51.0	Head	3.376	0.7210	0.3996	COG U-factors *		
			L Jamb	3.376	0.7975	0.3994	0.3371	0.3363	0.3282
			R Jamb	3.376	0.7975	0.3994	Total Product U-factors		
			Sill	3.376	0.7225	0.4007	0.53	0.51	0.40



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450G Project Out
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Glazing Option	NFRC COG U-Factor (Btu/h-ft ² -F) *	NFRC COG Temperature (F) *	Frame Section	Frame Width (in.)	Frame U-factor (Btu/h-ft ² -F)	Edge U-Factor (Btu/h-ft ² -F)	Size Specific Data		
							60% Vision Area	NFRC 100 Standard Size (63.2% Vision Area)	85% Vision Area
							21.513" x 53.783"	23.620" x 59.050"	61.030" x 152.575"
9	0.32	52.0	Head	3.376	0.7202	0.3853	COG U-factors *		
			L Jamb	3.376	0.7967	0.3852	0.3175	0.3168	0.3097
			R Jamb	3.376	0.7967	0.3852	Total Product U-factors		
			Sill	3.376	0.7216	0.3863	0.52	0.50	0.39
10	0.30	53.1	Head	3.376	0.7194	0.3711	COG U-factors *		
			L Jamb	3.376	0.7960	0.3711	0.2978	0.2972	0.2910
			R Jamb	3.376	0.7960	0.3711	Total Product U-factors		
			Sill	3.376	0.7207	0.3720	0.51	0.49	0.37
11	0.28	54.2	Head	3.376	0.7186	0.3570	COG U-factors *		
			L Jamb	3.376	0.7952	0.3571	0.2781	0.2775	0.2721
			R Jamb	3.376	0.7952	0.3571	Total Product U-factors		
			Sill	3.376	0.7198	0.3578	0.50	0.48	0.36
12	0.26	55.2	Head	3.376	0.7178	0.3429	COG U-factors *		
			L Jamb	3.376	0.7946	0.3432	0.2584	0.2579	0.2534
			R Jamb	3.376	0.7946	0.3432	Total Product U-factors		
			Sill	3.376	0.7190	0.3436	0.49	0.47	0.34
13	0.24	56.3	Head	3.376	0.7171	0.3290	COG U-factors *		
			L Jamb	3.376	0.7939	0.3293	0.2386	0.2382	0.2344
			R Jamb	3.376	0.7939	0.3293	Total Product U-factors		
			Sill	3.376	0.7181	0.3295	0.47	0.46	0.33
14	0.22	57.3	Head	3.376	0.7163	0.3150	COG U-factors *		
			L Jamb	3.376	0.7932	0.3155	0.2189	0.2185	0.2153
			R Jamb	3.376	0.7932	0.3155	Total Product U-factors		
			Sill	3.376	0.7173	0.3155	0.46	0.44	0.31
15	0.20	58.4	Head	3.376	0.7152	0.3010	COG U-factors *		
			L Jamb	3.376	0.7917	0.3016	0.1991	0.1988	0.1961
			R Jamb	3.376	0.7917	0.3016	Total Product U-factors		
			Sill	3.376	0.7161	0.3014	0.45	0.43	0.29

* NFRC COG U-factor and Temperature are calculated at the standard NFRC size of 1 meter glazing height. The Size Specific COG values are all calculated at the actual product height.



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HURRICANE TEST LABORATORY, LLC
162 ROCKY CREEK LANE
HILLSBORO, TN 37342
PHONE: (931) 315-0103
FAX: (561) 881-0075
www.htltest.com

Report #: H046-1206-10
Simulation Date: 12/15/2010
450G Project Out
Page 7 of 8

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16.0 Simulator: Lucas A. Turner, P.E.

17.0 Simulator in Responsible Charge: Lucas A. Turner, P.E., attests to the technical accuracy and content of this report.

Simulator Signature

Simulator in Responsible Charge Signature



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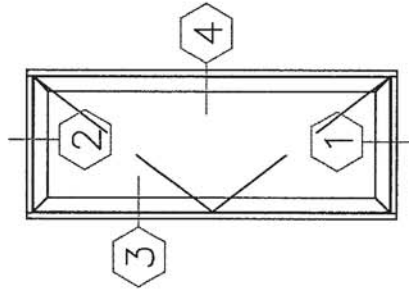
HURRICANE TEST LABORATORY, LLC
162 ROCKY CREEK LANE
HILLSBORO, TN 37342
PHONE: (931) 315-0103
FAX: (561) 881-0075
www.htltest.com

Report #: H046-1206-10
Simulation Date: 12/15/2010
450G Project Out
Page 8 of 8

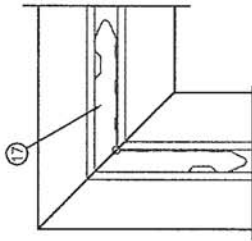
Drawing Appendix

**Following drawings and data provided
by Client, totaling 11 pages**

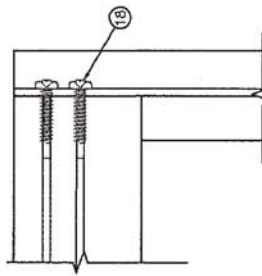
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1	4	2B72	FRAME	EFCC
2	4	2762	GLAZING BEAD	EFCC
3	AS REQD	WA04	GLAZING BEAD VINYL	EFCC
4	AS REQD	JH66	OXO BONDALFLEX SILICONE	EFCC
5	4	2B27	SASH	EFCC
6				
7				
8				
9	2	HNI7	SETTING BLOCKS	EPG
10	2	HU92	CAM HANDLE	PROFAS
11	4	MFH6	#10-24 PL-FH-MS	PROFAS
12	2	HK74	KEEPER	PROFAS
13	4	MFH6	#10-24 PL-FH-MS	EFCC
14	2	HAG3	BUTT HINGE	AMC
15	6	MTH3	1/4-20 PL-RH-MS	PROFAS
16	10	MFM3	10-24 PH-MS	PROFAS
17	4/4	FEH/REH	EXT/INT CORNER KEYS	EFCC
18	12	STK2	10-18 x 1" PL-PH-SMS	PROFAS
19	2	HB32	LIFT BLOCK	PROFAS
20	2	SPZ1	#6-15 PL-TL-SMS	PROFAS
21				
22				



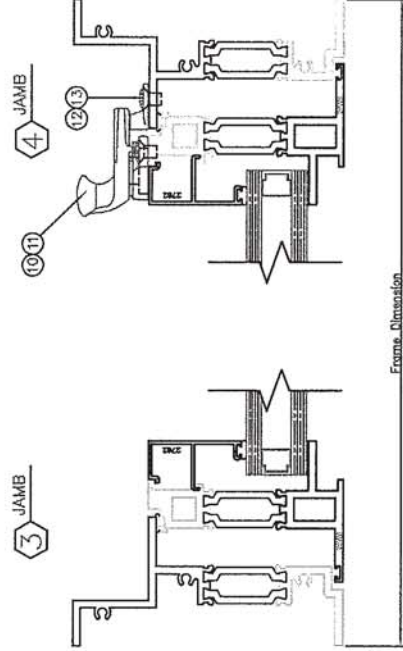
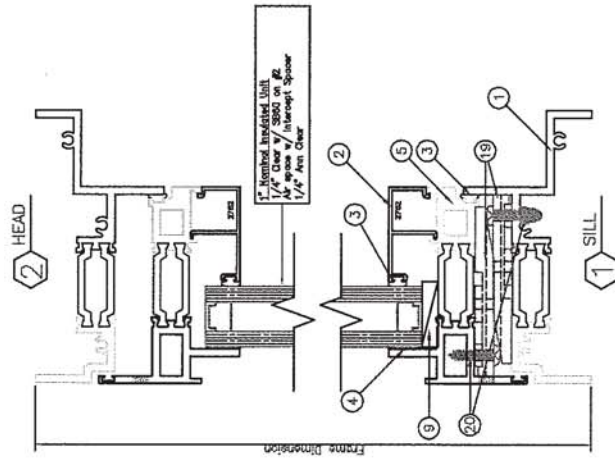
ELEVATION



SASH CORNER ASSEMBLY -
MITERED AND CORNER KEYED



FRAME CORNER ASSEMBLY -
SQ. CUT, END COPED, AND MECH. FASTENED.



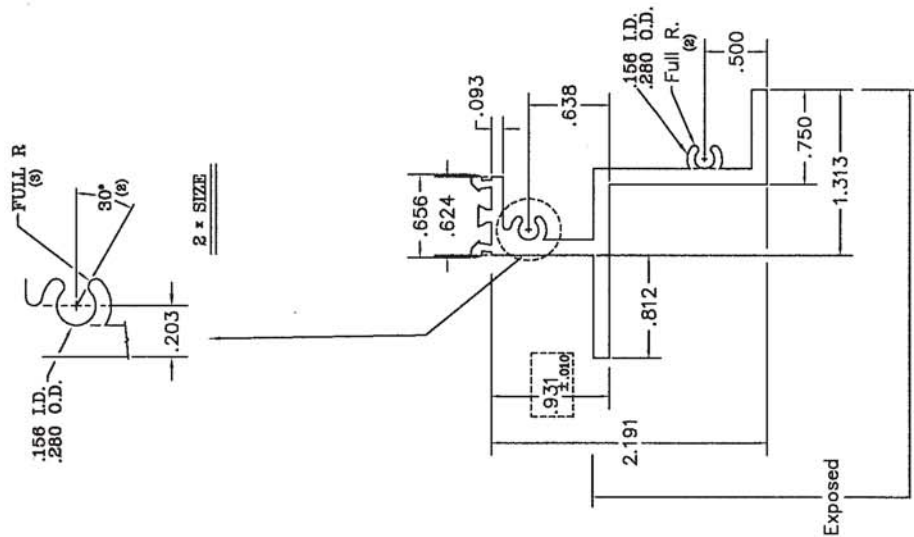
The information on this page, unless otherwise noted, is representative of the materials and profiles used in modeling performed for Report H046-1206-10
HTL
 Note: no hardware, fasteners, or setting blocks were modeled. Intercept spacer was used for all models.
 Initials: *LL*

STD. EXTRUSION TOLERANCES AS DEFINED BY THE ALUMINUM ASSOCIATION UNLESS OTHERWISE STATED. CORNER RADII .015 EXCEPT AS NOTED.

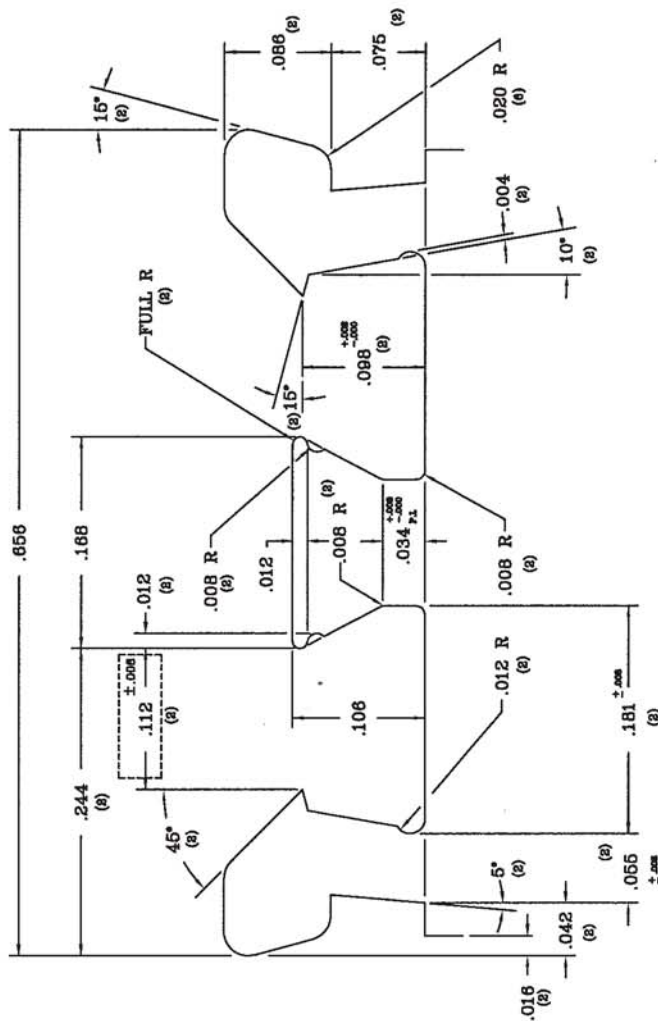


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Initials: *ZZ*



ACTUAL SIZE



10 x SIZE

DO NOT SCALE PRINT

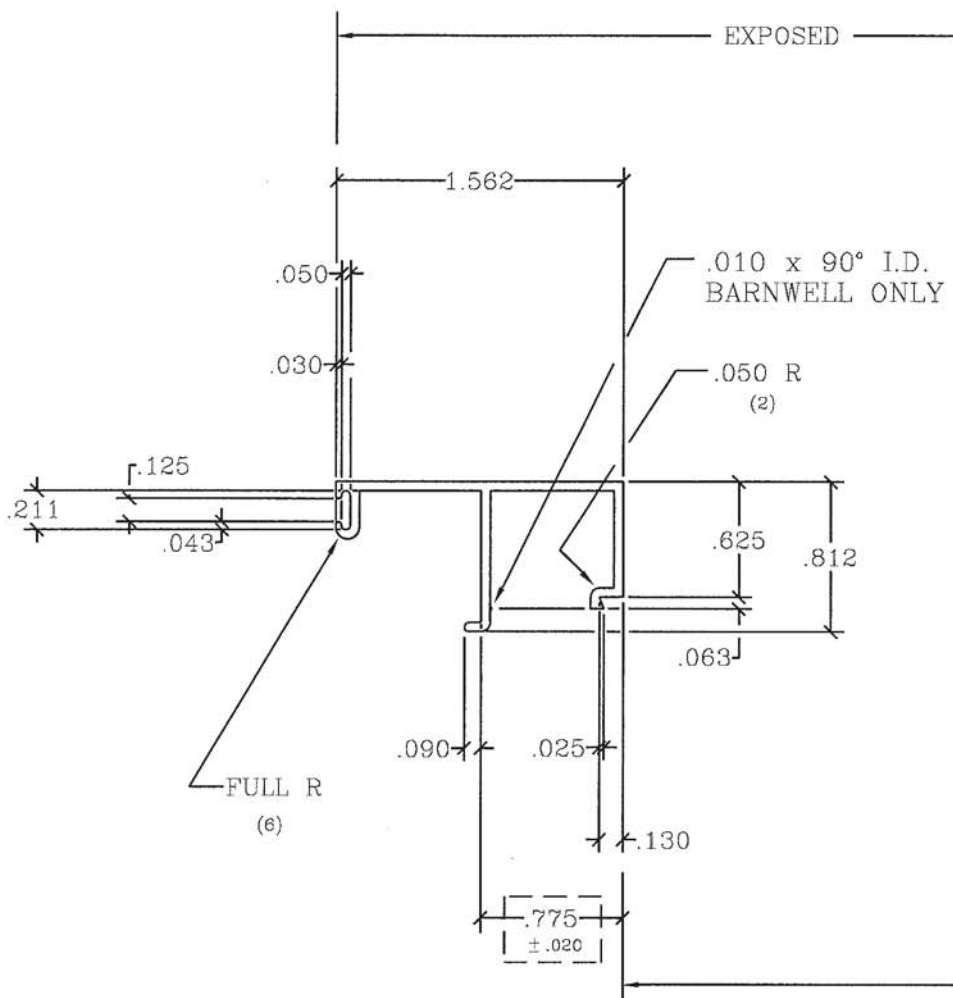
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MATERIAL: 6063-T6 ALUM.		DRAWN BY: trh	
WALL THICKNESS: .125 & AS NOTED		DATE: 3-3-10	
TOTAL PERIMETER: 11.908		APPROVED:	
PAINTED PERIMETER: 3.510		DATE:	
AREA: .663		JOB REF. NO.:	
WT/FT: .796		SCALE: 450	
FACTOR: 15		SHEET NO.:	
THERMAL CAVITY:		TITLE: Frame	
		DWG NO. 22L4	



EFCO CORPORATION
1000 County Road
Monett, Missouri 65708
1-800-221-4169
Fax: 417-235-7313

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Report H046-1206-10

Initials: *ZZ*

.010 x 90° I.D. MARK TO BE INCORPORATED
INTO DIE @ EFCO BARNWELL ONLY. EFCO
MONETT IS NOT TO HAVE I.D. MARK.

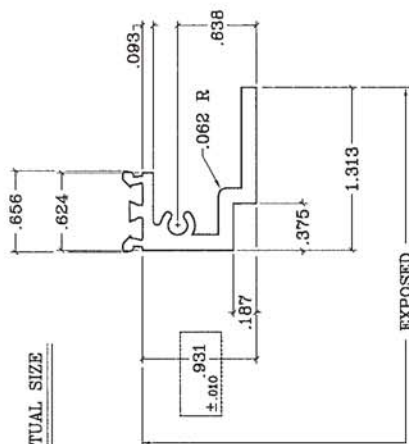
REF. JOB# 1-4193-00

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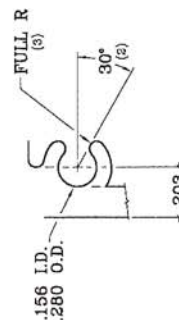
MATERIAL = 6063-T6 ALUM.		EFCO CORP.		1000 COUNTY ROAD MONETT, MO. 65708	
WALL THICKNESS = .050 UNSPEC.					
PERIMETER = 7.159	OS = IS =	DRAWN: SCC	REVISIONS W/DATES:		
AREA = .177		DATE: 8/27/99	A ADDED TOLERANCES AND BARNWELL I.D. 8/27/99 SCC		
WT/FT = .213		APPROVED:			
FACTOR = 34		DATE:	SCALE: FULL	DIE CIRCLE =	
lx =		TITLE	NO.		REV.
ly =		GLAZING BEAD	2762		A

STD. EXTRUSION TOLERANCES AS DEFINED BY THE ALUMINUM ASSOCIATION UNLESS OTHERWISE STATED. CORNER RADII .015 EXCEPT AS NOTED.

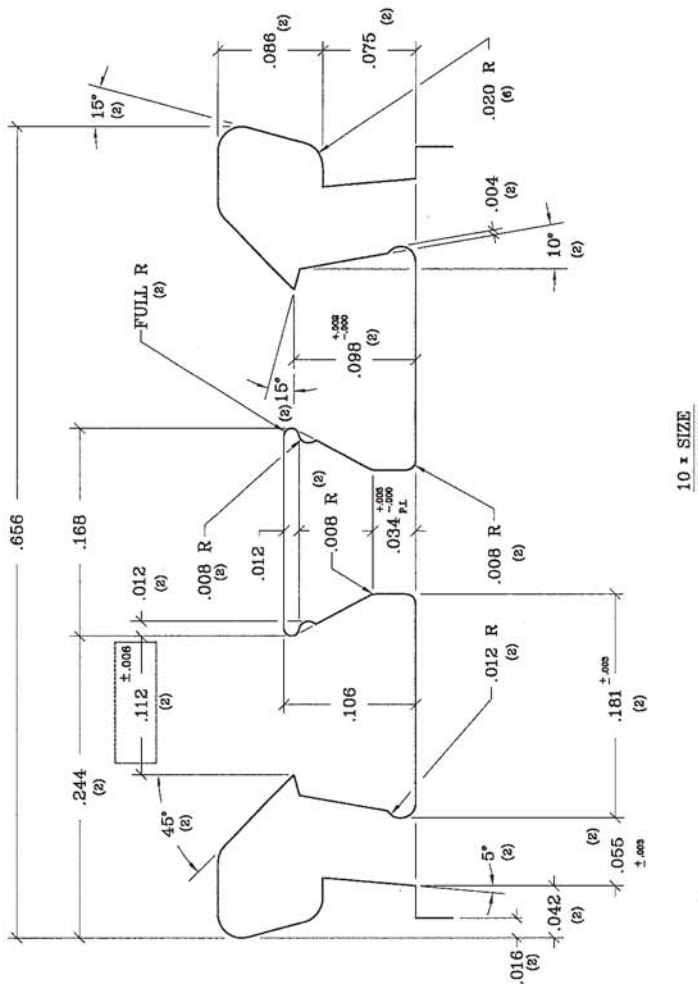
ACTUAL SIZE



EXPOSED



2 x SIZE




10 x SIZE

DO NOT SCALE PRINT

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MATERIAL: 6063-T6 ALUM.		DRAWN BY: KB		REVISIONS W/ DATES:	
WALL THICKNESS: .125 & AS NOTED		DATE: 7-20-06		② DRAWING FOR CLARITY AS 7-20-06	
TOTAL PERIMETER: 7.034		APPROVED: KB		ORIGINAL DWG. BY SEC 7-17-00	
PAINTED PERIMETER: 2.270		DATE: 7-20-06		JOB REF. NO.:	
AREA: .379		SERIES: 550-1		SCALE: AS NOTED	
FACTOR: 15		TITLE: FRAME		DIE CIRCLE: 2"	
				DWG NO. 5160	
				REV. A	

EFCO CORPORATION
1000 County Road
Monett, Missouri 65708
1-800-221-4169
Fax 417-235-7313



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Initials: *ZZ*



Initials:

ACTUAL SIZE

EXPOSED

Dimensions (inches):

- Overall Width: .656
- Overall Height: .875
- Top Flange Thickness: .167
- Distance from Left Edge to Center of Hole: .626
- Hole Width: .125
- Hole Height: .375
- Small Rectangular Feature Width: .031
- Small Rectangular Feature Height: .010

EXPOSED



Initials:

ACTUAL SIZE

EXPOSED

Dimensions (inches):

- Overall Width: .656
- Overall Height: .875
- Top Flange Thickness: .167
- Distance from Left Edge to Center of Hole: .626
- Hole Width: .125
- Hole Height: .375
- Small Rectangular Feature Width: .031
- Small Rectangular Feature Height: .010

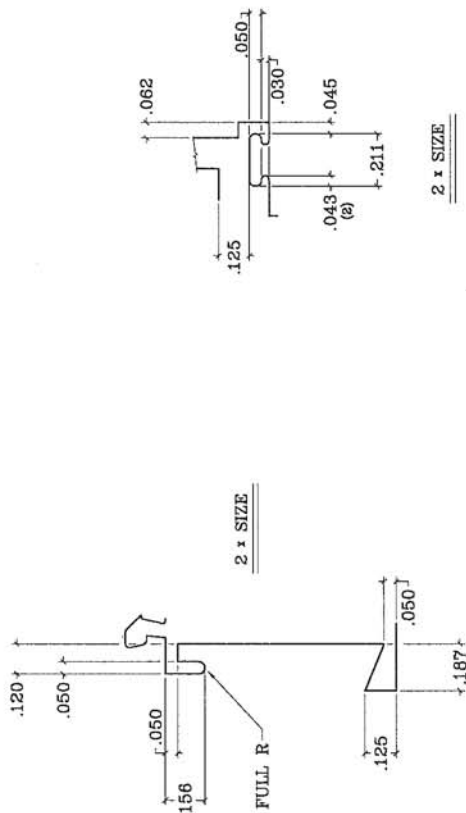
EXPOSED



DO NOT SCALE PRINT

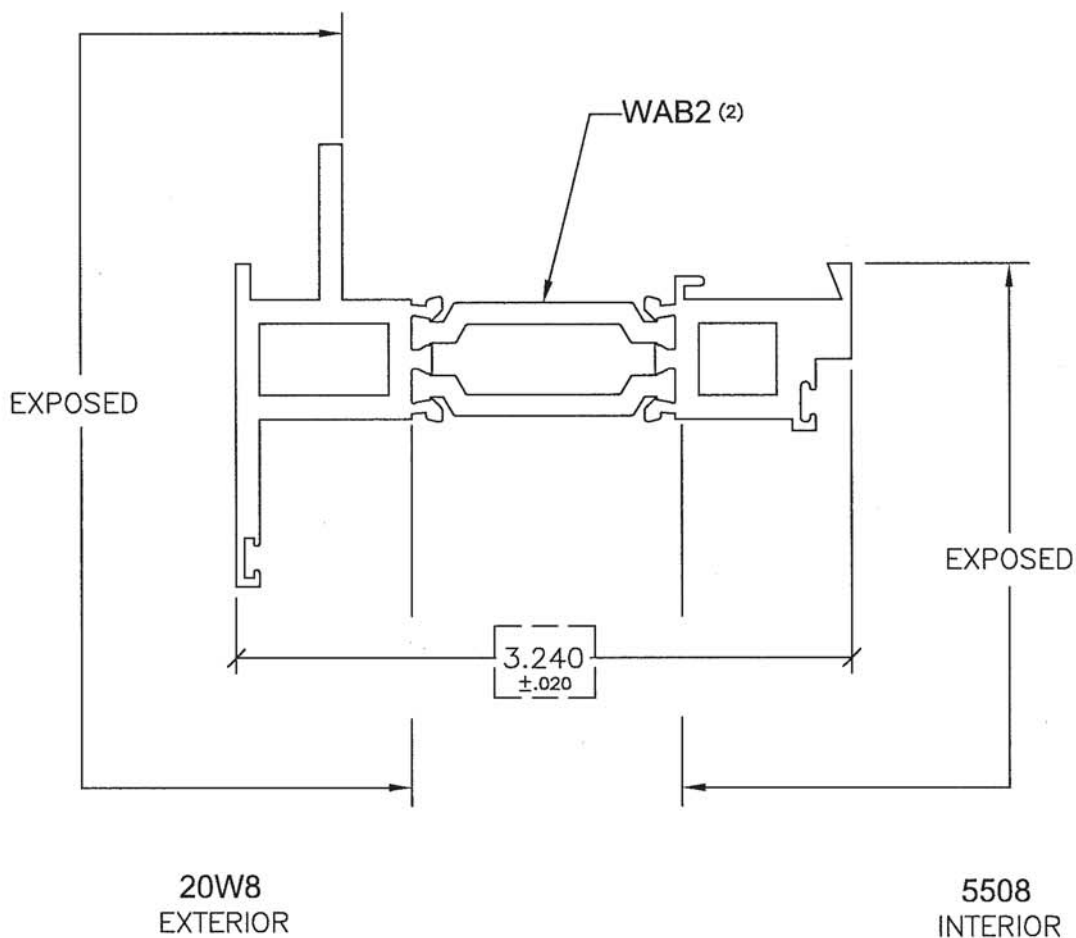
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MATERIAL: 6063-T6 ALUM.		 EPCO CORPORATION 1000 County Road Monett, Missouri 65708 1-800-221-4169 FAX: 417-235-7313		DRAWN BY: KB DATE: 7-26-06 APPROVED: KB DATE: 7-26-06 JDD REF. NO.: SCALE: AS NOTED SERIES: 550-I TITLE: P.O. SASH RAIL		DIMENSIONS W/ DATES: ① REQUESTED SHAPE 4 1/2" x 9" x 500 ② CHANGED INSIDE HOLLOW T.I.A. 4-12-06 ③ 428 WAS 424 & RESUBMIT FOR CLARITY KB 7-26-06	
WALL THICKNESS: .125 & AS NOTED		TOTAL PERIMETER: 7.055 ④ OS = 5.475 IS = 1.580 ④		DIE CIRCLE: 2"		REV: 5508 C	
PAINTED PERIMETER: 2.158		AREA: .428		WT/FT: .514		FACTOR: 14	



2 x SIZE

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Initials: *ZZ*

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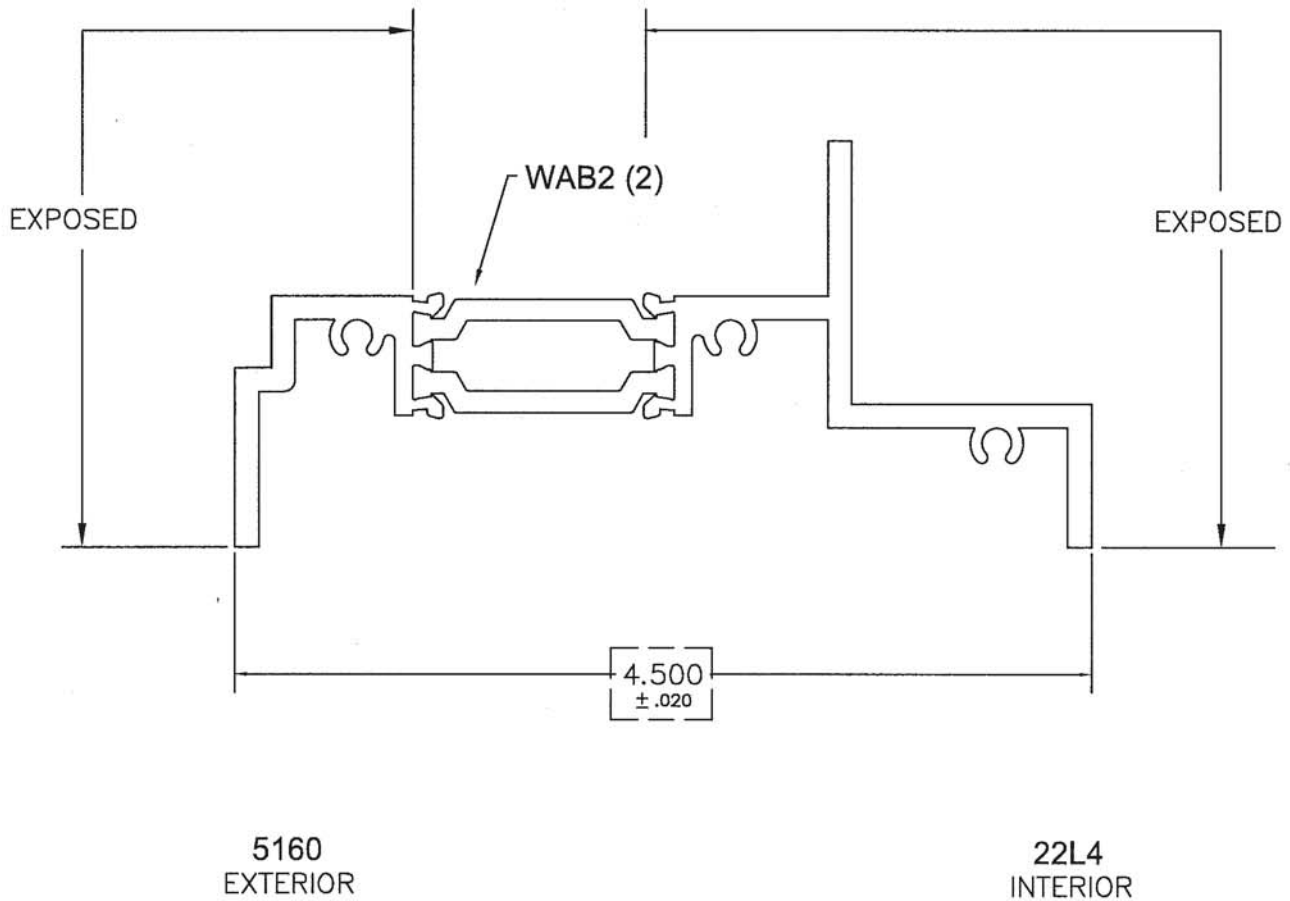
EFCO

A PELLA COMPANY 1000 COUNTY ROAD
MONETT, MO. 65708

REVISIONS W/DATES:

DRAWN: trh	APPROVED:	SCALE: Full	TITLE P.O. SASH	NO. 2B27
DATE: 6-29-09	DATE:			

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Report H046-1206-10

Initials: *ZZ*

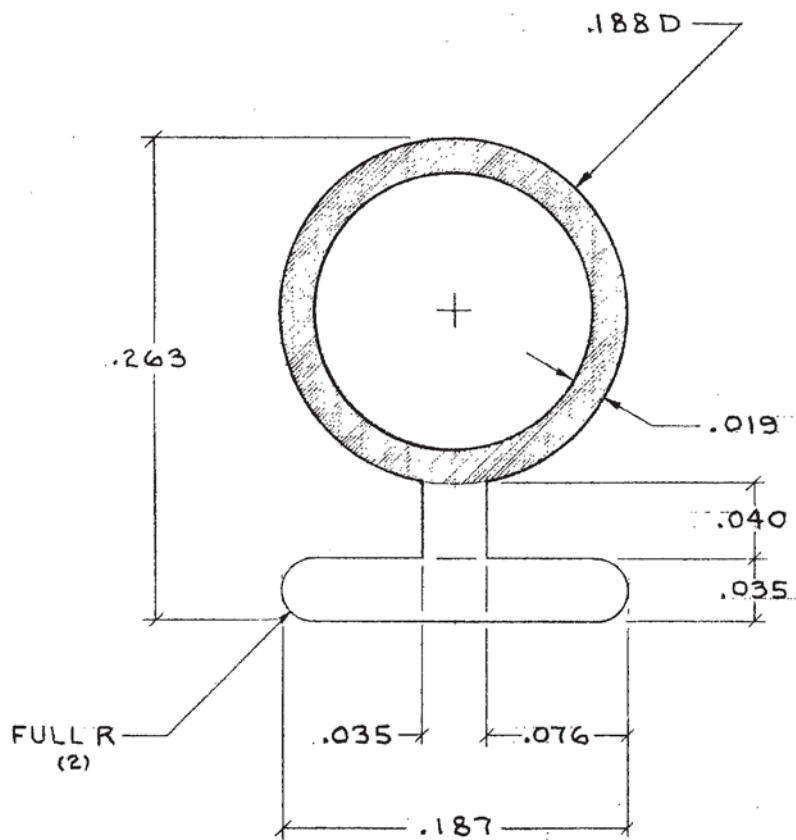
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EFCO CORP.

1000 COUNTY ROAD
MONETT, MO. 65708

REVISIONS W/DATES:

DRAWN: trh	APPROVED:	SCALE: Full	TITLE Project Out FRAME	NO. 2B72
DATE: 3-3-10	DATE:			



NOTE: SHADED AREA TO BE
60 TO 70 DUROMETER,
REMAINDER TO BE RIGID.

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Initials: *ZZ*

MATERIAL		EFCO CORPORATION COUNTY ROAD & BRIDLE LANE • MONETT, MISSOURI			
WALL THICKNESS					
PERIMETER	DRAWN M.W.	SCALE 10x SIZE	REVISIONS		DATE
AREA	CHECKED				
WT/FT.	APPROVED				
FACTOR	DATE 5-2-91		WA04		
CENTRAL PLASTIC DIE # 9010		TITLE DUAL DUROMETER WSTP.			NO. WA04



Initials: *ZZ*

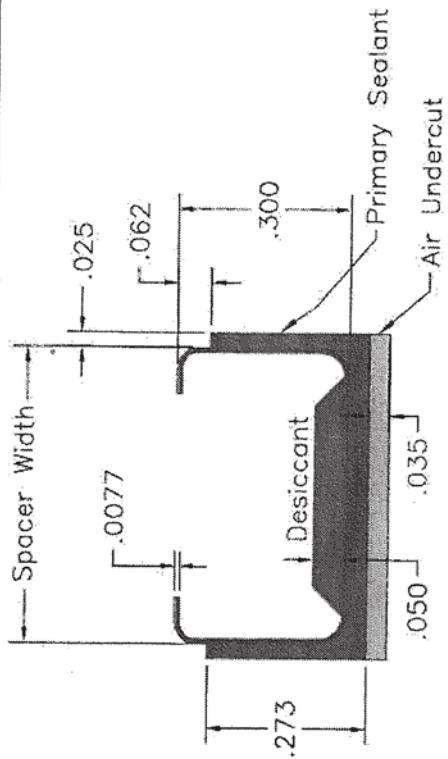
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<div style="border: 1px solid black; padding: 5px;"> 3 <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-left: 10px;"> Flessione asse X +/- 15 mm/m asse Y +/- 50 mm/m Torsione +/- 15° </div> </div> </div>			<div style="border: 1px solid black; padding: 5px;"> 4 Quote non specificate <div style="display: flex; align-items: center; justify-content: center; margin-top: 10px;"> </div> </div>																																														
<div style="border: 1px solid black; padding: 5px;"> 6 Cliente _____ </div>			<div style="border: 1px solid black; padding: 5px;"> 5 <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;"> (Q. costr.) </div> <div style="margin-left: 10px; border: 1px solid black; padding: 5px; writing-mode: vertical-rl; transform: rotate(180deg);"> Q. check </div> </div> </div>																																														
<div style="border: 1px solid black; padding: 5px;"> 7 N° articolo cliente _____ </div>			<div style="border: 1px solid black; padding: 5px;"> 8 Marchiatura <div style="text-align: right; margin-top: 5px;">secondo le specifiche del cliente</div> </div>																																														
<div style="border: 1px solid black; padding: 5px;"> 9 <div style="display: flex; align-items: center; margin-bottom: 5px;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>			<div style="border: 1px solid black; padding: 5px;"> 10 Tolleranze non specificate DIN 16941 part 2 </div>																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 25%; height: 20px;"></td><td style="width: 25%; height: 20px;"></td><td style="width: 25%; height: 20px;"></td><td style="width: 25%; height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> <tr><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td><td style="height: 20px;"></td></tr> </table>																																			<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">2001</td> <td style="width: 25%;">Data</td> <td style="width: 25%;">Nome</td> </tr> <tr> <td>Disegn.</td> <td>06.07.01</td> <td>HSch</td> </tr> <tr> <td>Check</td> <td></td> <td></td> </tr> <tr> <td>Norma</td> <td></td> <td></td> </tr> </table>			2001	Data	Nome	Disegn.	06.07.01	HSch	Check			Norma		
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Norma																																																	
<div style="border: 1px solid black; padding: 5px;"> 11 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>			<div style="border: 1px solid black; padding: 5px;"> 12 Tolleranze non specificate DIN 16941 part 2 </div>																																														
<div style="border: 1px solid black; padding: 5px;"> 13 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>			<div style="border: 1px solid black; padding: 5px;"> 14 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>																																														
<div style="border: 1px solid black; padding: 5px;"> 15 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>			<div style="border: 1px solid black; padding: 5px;"> 16 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>																																														
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<div style="border: 1px solid black; padding: 5px;"> 19 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>			<div style="border: 1px solid black; padding: 5px;"> 20 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>																																														
<div style="border: 1px solid black; padding: 5px;"> 21 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>			<div style="border: 1px solid black; padding: 5px;"> 22 <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <div>= 85.27 mm</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 30px; height: 15px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>= 92.82 mm²</div> </div> </div>																																														



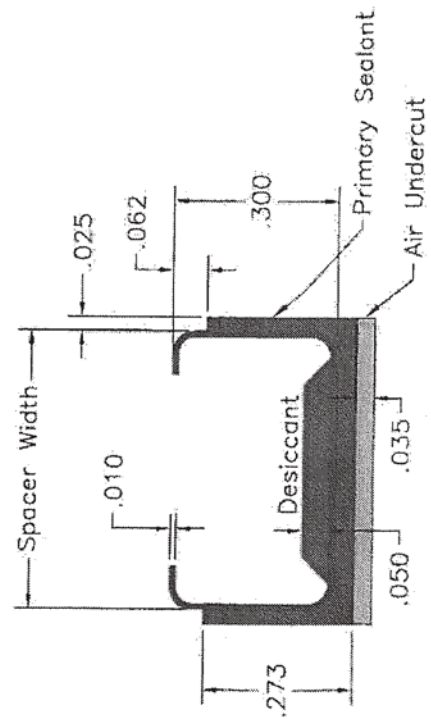
Integrated Solutions

Intercept® Technologies —Correct Geometry

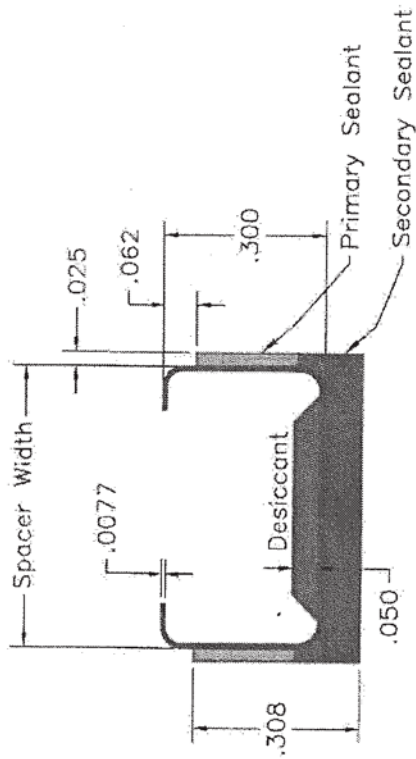
Intercept® ULTRA Stainless Steel—Standard Profile
SINGLE SEAL



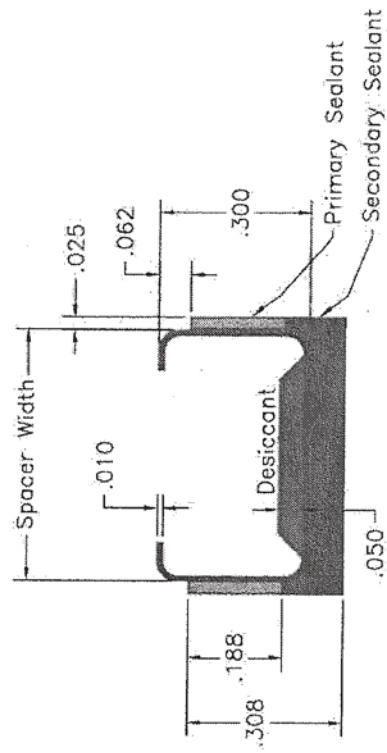
Intercept® Blackline or Electrolytic Tin Plated Steel—Standard Profile
SINGLE SEAL



Intercept® ULTRA Stainless Steel—Standard Profile
DUAL SEAL



Intercept® Blackline or Electrolytic Tin Plated Steel—Standard Profile
DUAL SEAL





All performance values shown on this report are for products of a standard configuration, tested in accordance with AAMA specifications, in a laboratory environment under optimum conditions. They are provided for purposes of comparison only. Performance values will vary according to project specifications, such as but not limited to, quality installation workmanship, product size, configuration, hardware, glass type, and accessories. When field testing is required, it is recommended that all EFCO products be tested in accordance with AAMA 502-02 unless otherwise specified.

TEST REPORT

Report No.: E3499.01-801-47

Rendered to:

EFCO, A PELLA COMPANY™
Monett, Missouri

PRODUCT TYPE: Aluminum Project-In Window
SERIES/MODEL: 450X Project-In Window

SPECIFICATION: AAMA/WDMA/CSA 101/1.S.2/A440-08, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

Title	Summary of Results
Primary Product Designator	Class AW-PG135 1524 x 914 (60 x 36) - Type AP
Design Pressure	±6480 Pa (±135.34 psf)
Air Infiltration	0.10 L/s/m ² (0.02 cfm/ft ²)
Water Penetration Resistance Test Pressure	720 Pa (15.04 psf)

Test Completion Date: 12/9/2014

Reference must be made to Report No. E3499.01-801-47 dated 1/9/14 for complete test specimen description and detailed test results.



1.0 Report Issued To: EFCO, A Pella Company™
1000 County Road
Monett, Missouri 65708

2.0 Test Laboratory: Architectural Testing, Inc.
2865 Market Loop
Southlake, TX 76092
(817) 410-7202

3.0 Project Summary:

3.1 Product Type: Aluminum Project-In Window

3.2 Series/Model: 450X Project-In Window

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 AW-PG135 1524 x 914 (60 x 36) – Type AP rating.

3.4 Test Date: 12/9/14

3.5 Test Location: EFCO test facility in Monett, MO. Calibration of test equipment was performed by Architectural Testing in accordance with AAMA 205-01 "In-Plant Testing Guidelines for Manufacturers and Independent Laboratories".

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 A. Any deviations are documented herein or on the drawings.

3.8 List of Official Observers:

<u>Name</u>	<u>Company</u>
Chad Bolin	EFCO Corporation
Terry Kee	EFCO Corporation
Jeffrey Crump	Architectural Testing, Inc.

4.0 Test Specification(s):

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 AW Class Architectural Windows and Doors*

5.0 Test Specimen Description:

5.1 Product Sizes:

Overall Area: 1.4 m ² (15.0 ft ²)	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	1524	60	914	36
Vent size	1461	57-7/8	851	33-7/8
Vent Daylight Opening	1346	53-1/4	737	29-1/4

5.2 Frame Construction:

Frame Member	Material	Description
Head, sill and jamb	Aluminum	Extruded aluminum thermally broken with thermal struts.

	Joinery Type	Detail
All corners	Mechanical	Corners are square cut, end coped and mechanically fastened with two (2) #8-18 x 1" PL-PH-SMS 18-8 and sealed.

5.3 Vent Construction:

Vent Member	Material	Description
Top rail, Bottom rail and stiles	Aluminum	Extruded aluminum thermally broken with thermal struts.

	Joinery Type	Detail
All corners	Mechanical	Mitered and corner keyed, sealed.

5.0 Test Specimen Description: (Continued)

5.4 Weatherstripping:

Description	Quantity	Location
Bulb vinyl	1	Full perimeter at vent interior leg exterior face.
Bulb vinyl	1	Full span bottom rail, exterior leg exterior face. Bulb cut short 2" from top of vent rails and one 4" pc. located at center of top rail exterior leg, exterior face.

5.5 Glazing: *No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made.*

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
1" IG	Molded Aluminum	1/4" clear annealed	1/4" clear annealed	Interior Glazed with glazing dam tape and silicone located at the exterior face of glass and aluminum glazing bead with vinyl bulb located at the interior face of glass.

5.6 Drainage:

Drainage Method	Size	Quantity	Location
Weep Slot	1/2" x 3/16"	2	4" from each end of frame sill exterior face.

5.0 Test Specimen Description: (Continued)

5.7 Hardware:

Description	Quantity	Location
Cam lock (part #HU93/HU50)	2	Located 7" from each end of vent top rail, with gasket, attached with two (2) #10-24 x 3/8" PL-FH-MS 18-8.
Keepers (part #HK99)	2	Located 6-1/2" from each end of frame head, attached with two (2) #10-24 x 1/2" PL-FH-MS 18-8.
4-Bar Arm (part #LA15)	2	Attached to frame jamb and vent rail with six (6) #10-16 x 3/8" SQ-TH-SMS each. Sealed at jamb exterior.

5.8 Reinforcement: No reinforcement was utilized.

5.9 Screen Construction: Screen was not utilized.

6.0 Installation:

The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the window was sealed with sealant.

Location	Anchor Description	Anchor Location
Frame	F-Anchor (part #1880)	Anchors located 12" from each end of frame jambs. Frame head and sill are anchored 6" from each end and 16" O.C. Anchors are attached to buck with two (2), #14-10 x 1" HW-SMS 18-8A and attached to frame with one (1) #8-16 x 1" PL-PH-SMS tek screw.

7.0 Test Results: The temperature during testing was 19°C (66°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: 53 N (12 lbf) Maintain motion: 40 N (9 lbf)	Report Only 135 N (30lbf) max.	
Air Leakage, Infiltration per ASTM E 283 at 300 Pa (6.27 psf)	0.10 L/s/m ² (0.02 cfm/ft ²)	0.5 L/s/m ² (0.10 cfm/ft ²) max.	1
Air Leakage, Exfiltration per ASTM E 283 at 300 Pa (6.27 psf)	0.15 L/s/m ² (0.03 cfm/ft ²)	0.5 L/s/m ² (0.10 cfm/ft ²) max.	1
Canadian Air Infiltration/Exfiltration Level	Fixed	N/A	
Water Penetration, per ASTM E 547 and ASTM E 331 at 290 Pa (6.02 psf)	N/A	N/A	2
Water Penetration, per ASTM E 547 and ASTM E 331 at 720 Pa (15.04 psf)	Pass	No leakage	
Sash/Vent Cycling, per AAMA 910 1250 cycles	Vent: Pass	No damage	
Locking Hardware Cycling, per AAMA 910 1250 cycles	Lock: Pass	No damage	
Misuse Testing: per AAMA 910			
Ventilator Torsion Test at 223 N (50 lbf)	Passed 5 Loads	No damage	
Balance Arm Load Test at 223 N (50 lbf)	Passed 5 Loads Left and Right	No damage	
Vent Lateral Racking Test at 223 N (50 lbf)	Passed 5 Loads Both Directions	No damage	

7.0 Test Results: (Continued)

Title of Test	Results	Allowed	Note
Sash/Vent Cycling, per AAMA 910 1250 cycles	Vent: Pass Vent: Pass	No damage No damage	
Locking Hardware Cycling, per AAMA 910 1250 cycles	Lock: Pass Lock: Pass	No damage No damage	
Operating Force, per ASTM E 2068	Initiate motion: 49 N (11 lbf) Maintain motion: 36 N (8 lbf)	Report Only 135 N (30lbf) max.	
Air Leakage, Infiltration per ASTM E 283 at 300 Pa (6.27 psf)	0.05 L/s/m ² (0.01 cfm/ft ²)	0.5 L/s/m ² (0.10 cfm/ft ²) max.	1
Air Leakage, Exfiltration per ASTM E 283 at 300 Pa (6.27 psf)	0.05 L/s/m ² (0.01 cfm/ft ²)	0.5 L/s/m ² (0.10 cfm/ft ²) max.	1
Canadian Air Infiltration/Exfiltration Level	Fixed	N/A	
Water Penetration, per ASTM E 547 and ASTM E 331 at 290 Pa (6.02 psf)	N/A	N/A	2
Water Penetration, per ASTM E 547 and ASTM E 331 at 720 Pa (15.04 psf)	Pass	No leakage	
Uniform Load Deflection, per ASTM E 330 taken at lock rail +1920 Pa (+40.10 psf) -1920 Pa (-40.10 psf)	N/A	N/A	2
Uniform Load Structural, per ASTM E 330 taken at lock rail +2880 Pa (+60.15 psf) -2880 Pa (-60.15 psf)	N/A	N/A	2
Forced Entry Resistance, per ASTM F 588, Type: B - Grade: 40	Pass	No entry	

Optional Performance			
Uniform Load Deflection, per ASTM E 330 +7920 Pa (+165.41 psf) -7920 Pa (-165.41 psf)	3.6 mm (0.14") 0.3 mm (0.01")	8.4 mm (0.33") max. 8.4 mm (0.33") max.	3, 4
Uniform Load Structural, per ASTM E 330 +9720 Pa (+203.01 psf) -9720 Pa (-203.01 psf)	0.5 mm (0.02") 0.3 mm (0.01")	3 mm (0.12") max. 3 mm (0.12") max.	3, 4
Sash/Leaf Torsion 90 N (15 lbf)	25 mm (1")	41 mm (1.63") max.	
Concentrated Load on Latch Rail 134 N (30 lbf)	Horizontally In 1 mm (0.04") Horizontally Out 1 mm (0.04") Vertically Up 1 mm (0.04") Vertically Down 1 mm (0.04")	1.5 mm (0.06") max. 1.5 mm (0.06") max 1.5 mm (0.06") max 1.5 mm (0.06") max	

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

Note 2: The client opted to start at a pressure higher than the minimum required. Test results are reported under Optional Performance.

Note 3: Loads were held for 10 seconds.

Note 4: 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.

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: Jeffrey Crump

Jeffrey Crump
Sr. Project Manager



Digitally Signed by: Andy Cost

Andy Cost
Laboratory Manager

JC:hd

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Drawings (8)

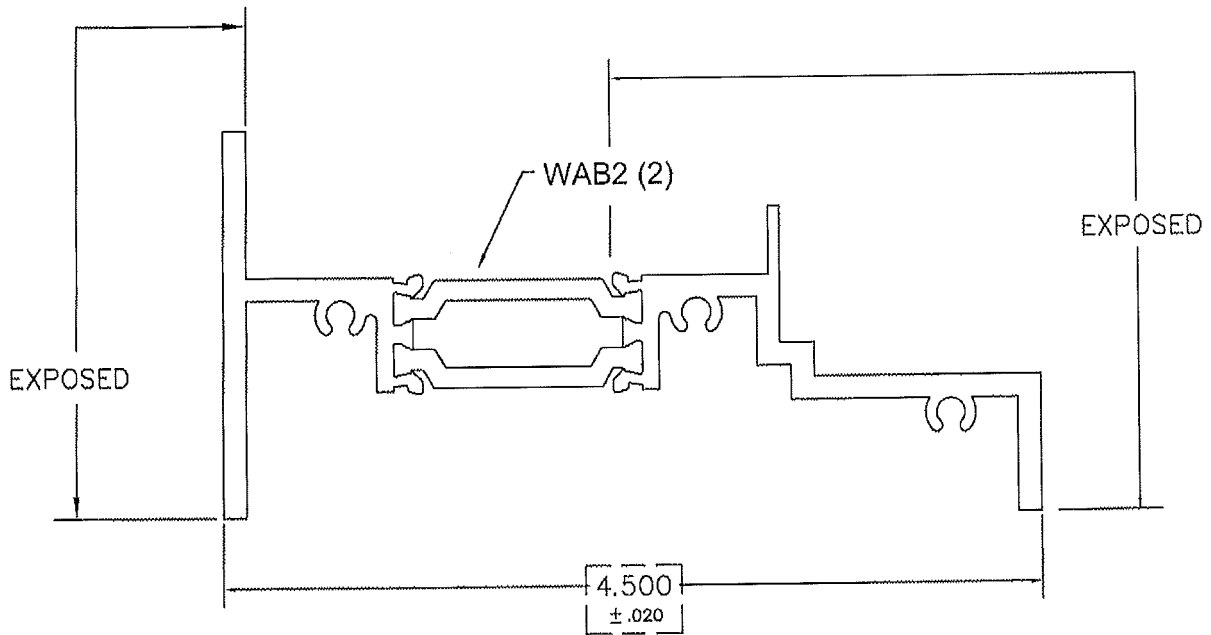


Test Report No.: E3499.01-801-47
Report Date: 01/09/15
Test Record Retention End Date: 12/09/18

Appendix A

Drawings

STD. EXTRUSION TOLERANCES AS DEFINED BY
THE ALUMINUM ASSOCIATION UNLESS OTHERWISE
STATED. CORNER RADII .015 EXCEPT AS NOTED.



Architectural Testing

Test sample complies with these details.
Deviations are noted.

5158
EXTERIOR

22L6
INTERIOR

Report# 13099.21.801-47
Date 1/9/15 Tech 8

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EFCO CORP.

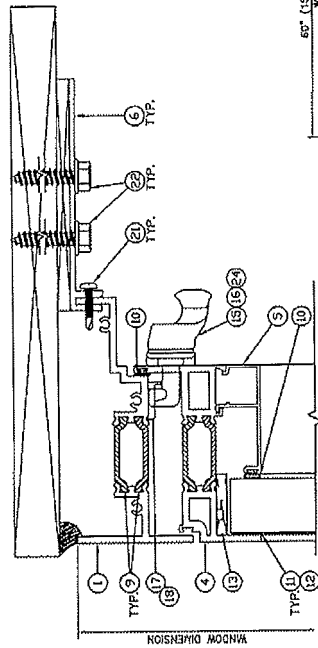
1000 COUNTY ROAD
MONETT, MO. 65708

REVISIONS W/DATES:

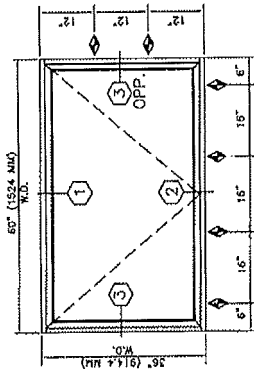
DRAWN: trh	APPROVED:	SCALE: Full	TITLE Frame	NO. 2B73
DATE: 3-3-10	DATE:			

INSULATED GLASS DESCRIPTION

1" NOMINAL GLASS THICKNESS
1/4" ANNEALED
1/2" AIR SPACE
1/4" ANNEALED



1	HEAD
	SERIES: 400X
	1 1/2" AIR SPACE
	4-BAY-ARMS



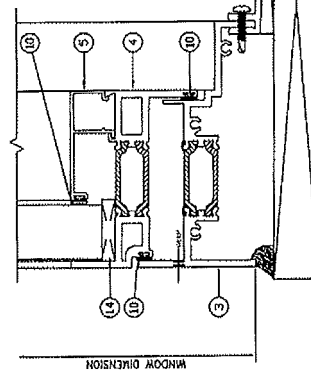
ELEVATION
* DIMENSIONS LOCK LOCATION

At Structural Testing

Test sample complies with these details.
Deviations are noted.

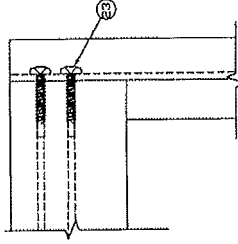
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Date 1/1/15

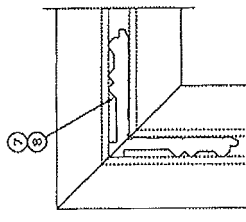


2	SILL
	SERIES: 400X
	1 1/2" AIR SPACE
	4-BAY-ARMS

ITEM #	REQD	PART #	DESCRIPTION	MFG.
1	1	2874	HEAD	EFCO
2	2	2874	JAMB	EFCO
3	1	2873	SILL	EFCO
4	4	2842	SASH	EFCO
5	4	2875	GLAZING BEAD	EFCO
6	12	KR24	1" ANGLE 1800 # 2"	EFCO
7	4	FE18	CORNER KET 2453 # 458"	EFCO
8	4	FE18	CORNER KET 2453 # 284"	EFCO
9	AS REQD	V404	1/4" VINYL SEALANT	EFCO
10	AS REQD	J657	WET GLAZE SEALANT	EFCO
11	AS REQD	W492	GLAZING DAN TAPE	EFCO
12	6	PH22	EDGE BLOCKS	EFCO
13	2	PH17	SETTING BLOCKS	EFCO
14	1	PH17	SETTING BLOCKS	EFCO
15	4	PH16	10-24 X 3/8 PL-FH-MS 18-8 UC	EFCO
16	2	PH16	10-24 X 1/2 PL-FH-MS 18-8	EFCO
17	2	PH16	10-24 X 1/2 PL-FH-MS 18-8	EFCO
18	2	LA15	4-BAY ARM	EFCO
19	2	LA15	4-BAY ARM	EFCO
20	12	ST15	10-16 X 3/8 SQ-TH-SMS 18-8 B	EFCO
21	12	ST15	10-16 X 1 PL-PH-SMS TEK	EFCO
22	24	ST15	14-10X1 HW-SMS 18-8A	EFCO
23	8	STK2	10-16 X 1 PL-PH-SMS 18-8 B-LP	EFCO
24	2	HM44	GASKET	EFCO



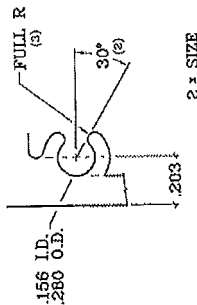
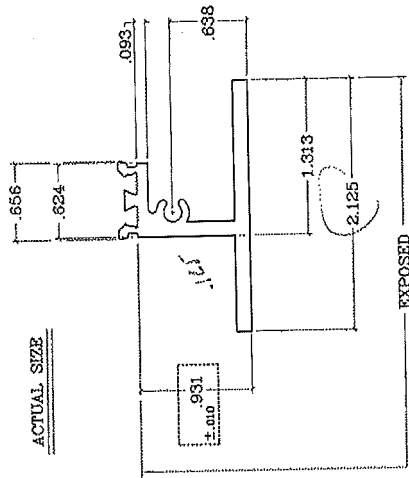
FRAME CORNER ASSEMBLY -
SOR, CUT, END COPE, AND MECH. FASTENED.



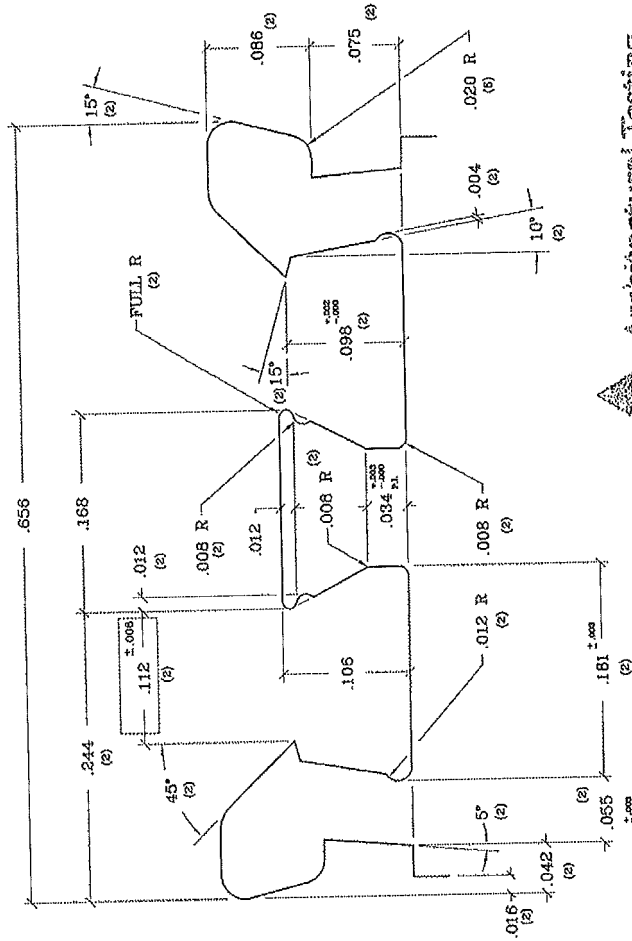
SASH CORNER ASSEMBLY -
MITERED AND CORNER KEYED

STD. EXTRUSION TOLERANCES AS DEFINED BY THE ALUMINUM ASSOCIATION UNLESS OTHERWISE STATED. CORNER RADII .015 EXCEPT AS NOTED.

ACTUAL SIZE



2 = SIZE



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# E3449.11-801.47

Date: 1/9/15 Tech: [Signature]

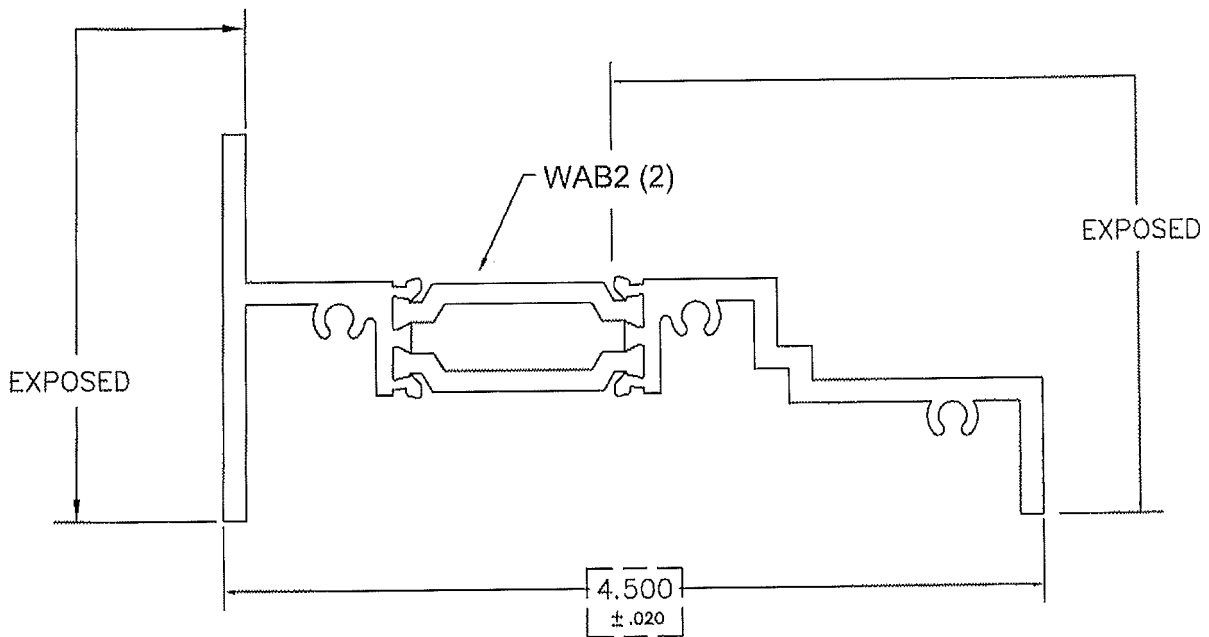
DO NOT SCALE PRINT

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TOTAL PERIMETER: 8.684 @		DATE: 7-20-06		JOB REF. NO.	
PAINTED PERIMETER: 3.894		SERIES: 550-1		SCALE: AS NOTED	
AREA: .482		WT./FT.: .578		DIE CIRCLE: 3"	
FACTOR: 15		TITLE: FRAME		DWG NO: 5158	
				REV: A	

EFCO CORPORATION
1800 County Road
Mooresville, NC 28138
Tel: 704.661.1111
Fax: 704.661.7313

STD. EXTRUSION TOLERANCES AS DEFINED BY
THE ALUMINUM ASSOCIATION UNLESS OTHERWISE
STATED. CORNER RADII .015 EXCEPT AS NOTED.



Architectural Testing

5158
EXTERIOR

Test sample complies with these details.
Deviations are noted.

22L7
INTERIOR

Report# E3499.01-801-47
Date 1/4/10 1002 Q

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EFCO CORP.

1000 COUNTY ROAD
MONETT, MO. 65708

REVISIONS W/DATES:

DRAWN: trh
DATE: 3-3-10

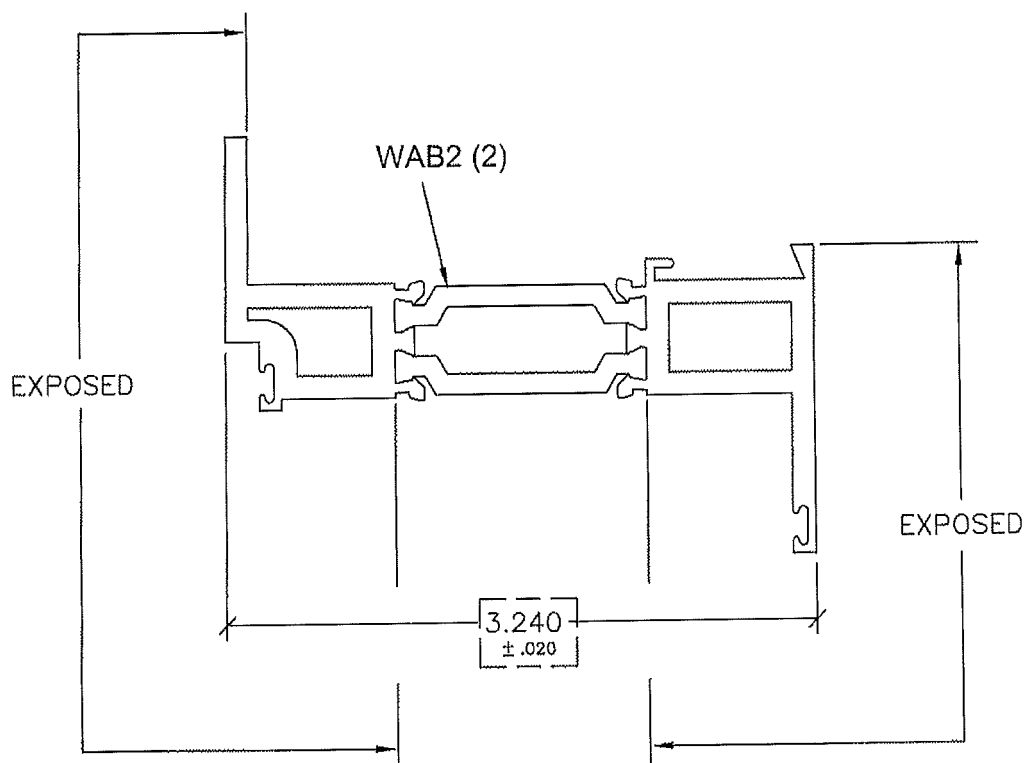
APPROVED:
DATE:

SCALE:
Full

TITLE
Frame

NO.
2B74

STD. EXTRUSION TOLERANCES AS DEFINED BY
THE ALUMINUM ASSOCIATION UNLESS OTHERWISE
STATED. CORNER RADII .015 EXCEPT AS NOTED.



5505
EXTERIOR



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# E3499.01-801-47
Date 1/9/15 Test [Signature]

5506
INTERIOR

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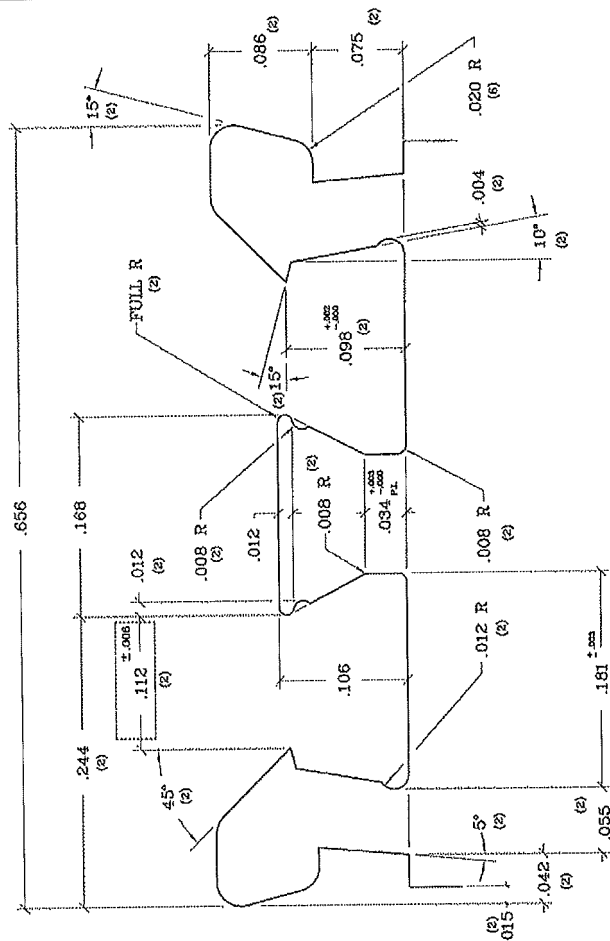
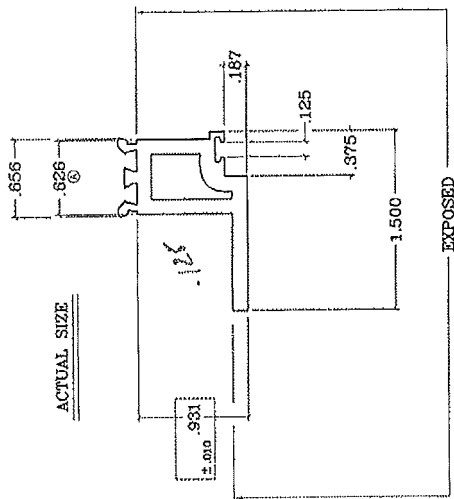
EFCO CORP.

1000 COUNTY ROAD
MONETT, MO. 65708

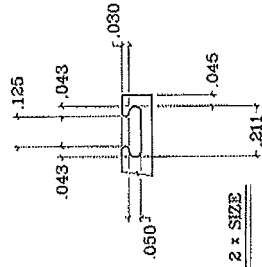
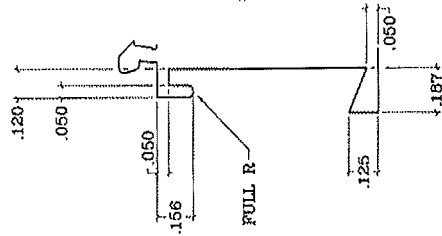
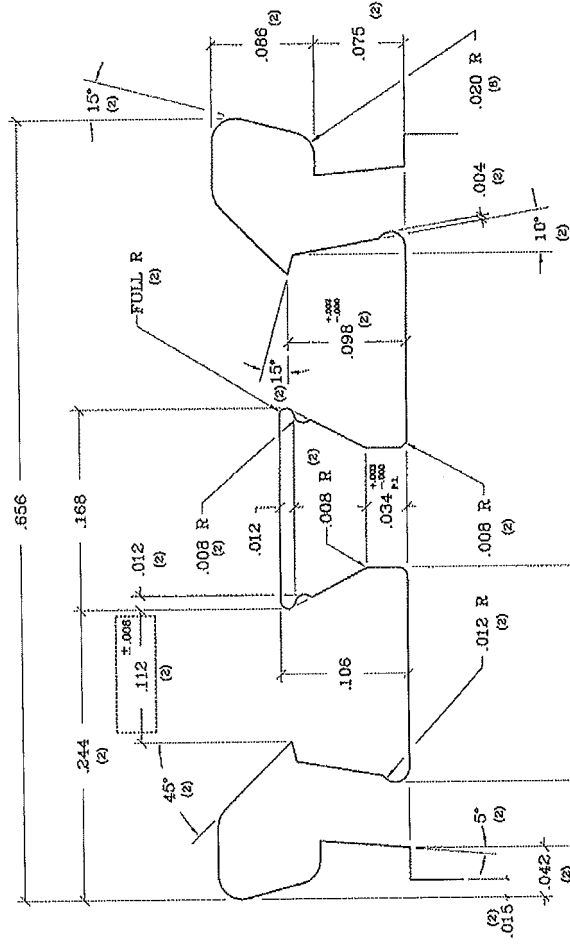
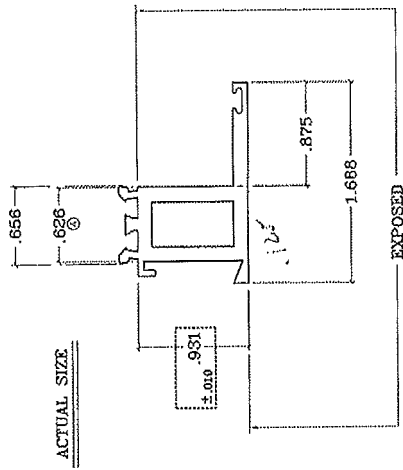
REVISIONS W/DATES:

DRAWN: trh	APPROVED:	SCALE: Full	TITLE P.I. SASH	NO. 2B42
DATE: 6-29-09	DATE:			

STD. EXTRUSION TOLERANCES AS DEFINED BY THE ALUMINUM ASSOCIATION UNLESS OTHERWISE STATED. CORNER RADII .015 EXCEPT AS NOTED.



STD. EXTRUSION TOLERANCES AS DEFINED BY THE
ALUMINUM ASSOCIATION UNLESS OTHERWISE
STATED. CORNER RADIUS .015 EXCEPT AS NOTED



Architectural Testing
10x SIZE

Test sample complies with these details.
Deviations are noted.

Report E 3499.01-801-47

11/11/02

DO NOT SCALE PRINT

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MATERIAL: 6063-T6 ALUM.		REVISIONS W/ DATES	
WALL THICKNESS: .125 & AS NOTED		DATE	7-25-06
TOTAL PERIMETER 9.215		APPROVED:	KB
PAINTED PERIMETER 3.784		DATE	7-25-06
AREA .488		SERIES	550-1
FACTOR: 16		TITLE	P.I. SASH RAIL
		SCALE	AS NOTED
		ONE CIRCLE	3"
		DWG NO.	5506
		REV.	1



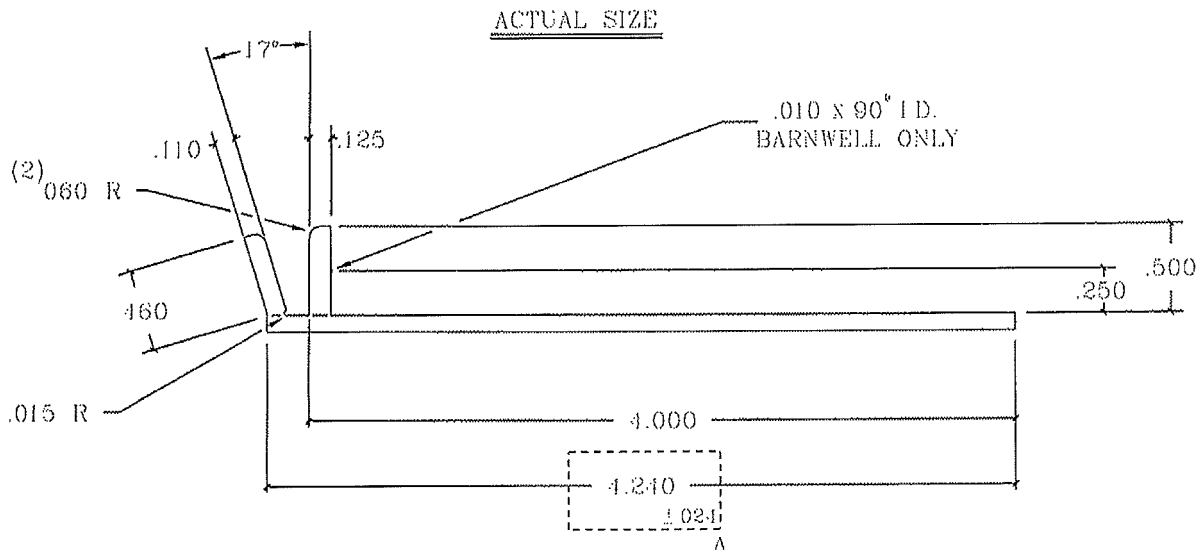
EFCO CORPORATION
11811 County Road
Minnetonka, Minnesota 55345
1-800-221-4164
Fax: 952-835-7313

[illegible]

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MATERIAL: 6063-T6 ALUM.		 <i>a Pella Company</i> 1000 County Road Monett, Missouri 65708 1-800-221-4189 FAX: 417-235-7313 www.ifcocorp.com	DRAWN BY: SCC		REVISIONS W/ DATES:	
WALL THICKNESS: .361 & AS NOTED			DATE: 1/25/2011			
TOTAL PERIMETER: 10.099			APPROVED: SCC			
PAINTED PERIMETER: N/A			DATE: 1/25/2011		JOB REF. NO.:	
AREA: 1.120	WT/FT: 1.344		1000 County Road Monett, Missouri 65708 1-800-221-4189 FAX: 417-235-7313 www.ifcocorp.com	SERIES: PROJECTED	SCALE: AS NOTED	DIE CIRCLE: 4"
FACTOR: 8		TITLE: CORNER KEY		DWG NO. 24B3	REV.	

STD. EXTRUSION TOLERANCES AS DEFINED BY A
THE ALUMINUM ASSOCIATION UNLESS OTHERWISE
STATED. CORNER RADII .015 EXCEPT AS NOTED.



NO EXPOSED SURFACES



Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# E3499.01-801.47

Date 1/9/15 102

DO NOT SCALE PRINT

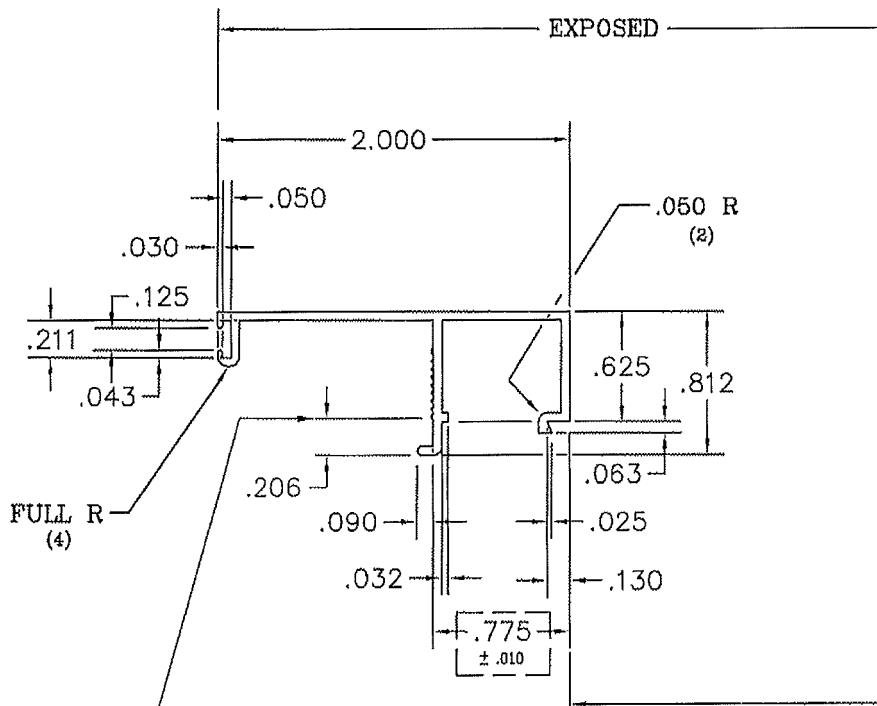
010 x 90° I.D. MARK TO BE INCORPORATED
INTO DIE @ EFCO BARNWELL ONLY. EFCO
MONETT IS NOT TO HAVE I.D. MARK

A

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MATERIAL: 6063 T1 ALUM			EFCO CORP.		1000 COUNTRY ROAD	
WALL THICKNESS .096 & AS NOTED					MONETT, MO 65708	
PERIMETER	10.586	④	K BAKER	REVISIONS W/DATES A ADDED BARNWELL I.D. NOTES & TOLERANCES. REDRAWN K BAKER 7 29 00		
AREA	.520	A	DATE: 7-29-00			
WT/LF	.624	A	APPROVED			
FACTOR:	17		DATE:	SCALE: AS NOTED	ORIGINAL DWN BY JDB 2-3-92	
			WINDOW CLIP			NO 1880

STD. EXTRUSION TOLERANCES AS DEFINED BY THE ALUMINUM ASSOCIATION UNLESS OTHERWISE STATED. CORNER RADII .015 EXCEPT AS NOTED.



ACTUAL SIZE



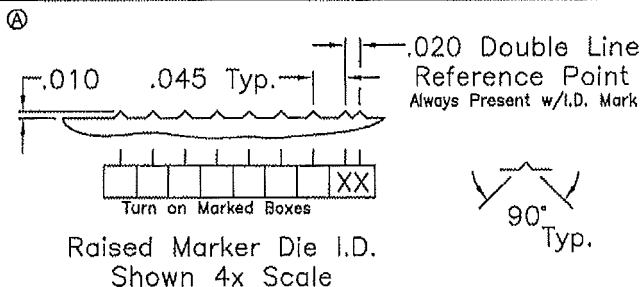
Architectural Testing

Test sample complies with these details.
Deviations are noted.

Report# F-3499.01-801-41

Date 1/9/15 Tech [Signature]

DO NOT SCALE PRINT



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MATERIAL: 6063-T6 ALUM.	
WALL THICKNESS: .050 & AS NOTED	
TOTAL PERIMETER:	8.142
PAINTED PERIMETER:	2.625
AREA:	.200
WT/FT:	.240
FACTOR:	34



1000 County Road
Monett, Missouri 65708
1-800-221-4169
FAX: 417-235-7313
www.efcoinc.com

DRAWN BY: trh		REVISIONS W/ DATES:	
DATE: 12-11-09		Ⓐ ADDED DIE ID MARK, 9/11/12 SD	
APPROVED:			
DATE:			
SERIES: 325	SCALE: AS NOTED	DIE CIRCLE: 3"	
TITLE: Glazing Bead		DWG NO. 22F6	REV. A