

EASTMAN PERFORMANCE FILMS, LLC TEST REPORT

SCOPE OF WORK

ASTM E1886 AND ASTM E1996 TESTING ON ANNEALED WINDOW WITH PFS ATTACHED
8 MIL FILM, DUAL PANE WET GLAZED FIXED WINDOW

REPORT NUMBER

N9806.01-109-44

TEST DATES

08/11/22 - 08/12/22

ISSUE DATE

02/27/23

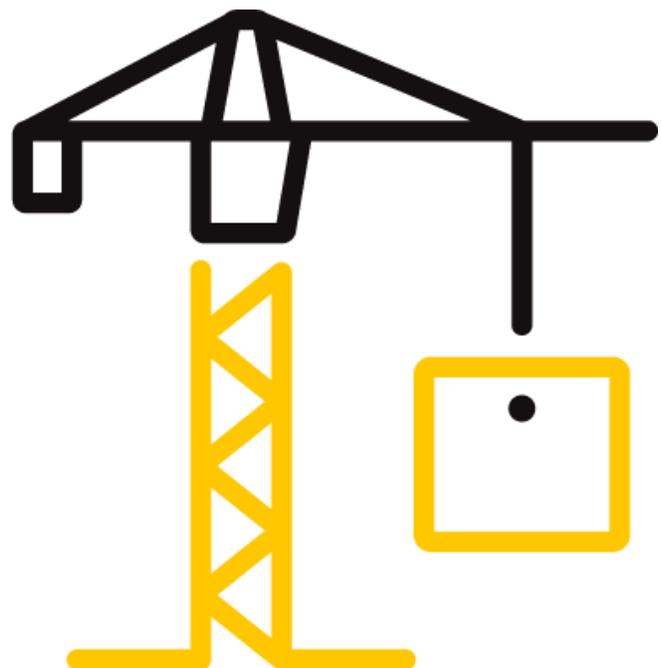
PAGES

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DOCUMENT CONTROL NUMBER

RT-R-AMER-Test-2806 (06/15/21)

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TEST REPORT FOR CUSTOMER NAME OR SIMPLE NAME

Report No.: N9806.01-109-44

Date: 02/27/23

REPORT ISSUED TO

EASTMAN PERFORMANCE FILMS, LLC

4210 The Great Road
Fieldale, Virginia 24089

SECTION 1

SCOPE

Architectural Testing, Inc. (an Intertek company), dba Intertek Building & Construction (B&C) was contracted by Eastman Performance Films, LLC to perform testing in accordance with ASTM E1886 and ASTM E1996 on their Annealed Window with PFS Attached 8 Mil Film, dual pane wet glazed fixed window. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek B&C test facility in York, Pennsylvania.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule, also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

For INTERTEK B&C:

COMPLETED BY:	Ken R. Stough	REVIEWED BY:	Vicki L. McElwain
TITLE:	Project Manager – Product Testing	TITLE:	Lab Supervisor – Product Testing
SIGNATURE:		SIGNATURE:	
DATE:	02/27/23	DATE:	02/27/23

KLW:nls/bsm

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SECTION 2

TEST METHOD(S)

The specimens were evaluated in accordance with the following:

ASTM E1886-19, *Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials*

ASTM E1996-20, *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*

SECTION 3

MATERIAL SOURCE/INSTALLATION

Test specimens were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek B&C for a minimum of four years from the test completion date.

The specimens were blind stopped into a Spruce-Pine-Fir wood buck. The rough opening allowed for no shim space. The interior and exterior perimeters of the window were sealed with foam tape. Installation of the tested product was performed by Intertek B&C.

LOCATION	ANCHOR DESCRIPTION	ANCHOR LOCATION
Interior and exterior jambs, head, and sill	2x4 wood blind stops with #16 x 3" pan head screws	Set continuously along the perimeter of the interior and exterior jambs, head, and sill, secured with two screws in each corner and placed 8" on center.

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.

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SECTION 4 EQUIPMENT

Cannon: Constructed from steel piping utilizing compressed air to propel the missile – A1207

Missile: 2x4 Southern Pine

Timing Device: Electronic Beam Type

Cycling Mechanism: Computer controlled centrifugal blower with electronic pressure measuring device – 003921

Tape Measure Verification: 63788

Weather Station: 63316

SECTION 5 LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Charles Adiasor	Eastman Performance Films, LLC
Ken R. Stough	Intertek B&C
Vicki L. McElwain	Intertek B&C
Kenneth L. Wymer	Intertek B&C

SECTION 6 TEST SPECIMEN DESCRIPTION

Product Type: Dual Pane Wet Glazed Fixed Window

Series/Model: Annealed Window with PFS Attached 8 Mil Film

Product Size(s):

Test Specimens #1 - #3:

OVERALL AREA:	WIDTH		HEIGHT	
2.2 m ² (24.0 ft ²)	millimeters	inches	millimeters	inches
Overall size	1219	48	1829	72

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The following descriptions apply to all specimens.

Frame Construction:

FRAME MEMBER	MATERIAL	DESCRIPTION
Head, sill, and jambs	Aluminum	Extruded, thermally improved, poured, and debridged

	JOINERY TYPE	DETAIL
All corners	Butted	The corners were secured together using #12 x 1" hex head screws through the jambs and into the head and sill screw bosses. Silicone was used to seal the gap in the glazing pocket.

Reinforcement: No reinforcement was utilized.

Weatherstripping: No weatherstripping was utilized.

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	Desiccant-filled aluminum box spacer	1/4" annealed 0.010" PFS attached laminate	1/4" annealed	Interior glazed against a glazing gasket and secured using a snap-in aluminum glazing bead at the sill. The glazing was sealed with structural silicone on the interior edge of the frame at the head, sill, and jambs.

LOCATION	QUANTITY	DAYLIGHT OPENING		GLASS BITE
		millimeters	inches	
Fixed daylight opening	1	1105 x 1715	43-1/2 x 67-1/2	7/16"

Drainage: No drainage was utilized.

Hardware: No hardware was utilized.

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SECTION 7

TEST RESULTS

The temperature during testing was 27°C (80°F). The results are tabulated as follows:

ASTM E1886, LARGE MISSILE IMPACT

Conditioning Temperature: 27°C (80°F)

Missile Weight: 2123 g (4.68 lbs)

Missile Length: 1.2 m (3' 10")

Muzzle Distance from Test Specimen: 1.8 m (6')

Test Specimen #1: Orientation within ±5° of horizontal

IMPACT	#1
MISSILE VELOCITY	12.5 m/s (40.9 fps)
IMPACT AREA	Center of daylight opening
OBSERVATIONS	Missile hit target area, outer glass shattered, and inner glass cracked
RESULTS	Pass

Test Specimen #2: Orientation within ±5° of horizontal

IMPACT	#1
MISSILE VELOCITY	12.4 m/s (40.8 fps)
IMPACT AREA	Lower left of daylight opening
OBSERVATIONS	Missile hit target area, outer glass shattered, and inner glass cracked
RESULTS	Pass

Test Specimen #3: Orientation within ±5° of horizontal

IMPACT	#1
MISSILE VELOCITY	12.3 m/s (40.5 fps)
IMPACT AREA	Top right corner of daylight opening
OBSERVATIONS	Missile hit target area, outer glass shattered, and inner glass cracked
RESULTS	Pass

Note: See Intertek B&C Sketch #1 for impact locations.

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ASTM E1886, AIR PRESSURE CYCLING

Test Specimen #1:

Design Pressure: ±3352 Pa (±70.0 psf)

Positive Pressure:

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
670 to 1676 (14.0 to 35.0)	3500	2.94	Tear started at lower left jamb at glazing
0 to 2011 (0 to 42.0)	300	2.96	No additional damage observed
1676 to 2681 (35.0 to 56.0)	600	2.83	No additional damage observed
1005 to 3352 (21.0 to 70.0)	100	2.78	No additional damage observed

Negative Pressure:

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
1005 to 3352 (21.0 to 70.0)	50	2.99	No additional damage observed
1676 to 2681 (35.0 to 56.0)	1050	2.28	No additional damage observed
0 to 2011 (0 to 42.0)	50	2.97	No additional damage observed
670 to 1676 (14.0 to 35.0)	3350	2.73	No additional damage observed

Result: Pass

Note: Test Specimens #1, #2, and #3 were cycled in a common chamber for the **positive** pressure cycles only.

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ASTM E1886, AIR PRESSURE CYCLING

Test Specimen #2:

Design Pressure: ±3352 Pa (±70.0 psf)

Positive Pressure:

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
670 to 1676 (14.0 to 35.0)	3500	2.94	Tear started at upper right jamb at glazing
0 to 2011 (0 to 42.0)	300	2.96	No additional damage observed
1676 to 2681 (35.0 to 56.0)	600	2.83	No additional damage observed
1005 to 3352 (21.0 to 70.0)	100	2.78	No additional damage observed

Negative Pressure:

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
1005 to 3352 (21.0 to 70.0)	50	3.00	No additional damage observed
1676 to 2681 (35.0 to 56.0)	1050	2.53	No additional damage observed
0 to 2011 (0 to 42.0)	50	3.00	No additional damage observed
670 to 1676 (14.0 to 35.0)	3350	2.57	No additional damage observed

Result: Pass

Note: Test Specimens #1, #2, and #3 were cycled in a common chamber for the **positive** pressure cycles only.

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ASTM E1886, AIR PRESSURE CYCLING

Test Specimen #3:

Design Pressure: ±3352 Pa (±70.0 psf)

Positive Pressure:

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
670 to 1676 (14.0 to 35.0)	3500	2.94	No damage
0 to 2011 (0 to 42.0)	300	2.96	No additional damage observed
1676 to 2681 (35.0 to 56.0)	600	2.86	No additional damage observed
1005 to 3352 (21.0 to 70.0)	100	2.78	No additional damage observed

Negative Pressure:

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
1005 to 3352 (21.0 to 70.0)	50	2.65	No additional damage observed
1676 to 2681 (35.0 to 56.0)	1050	2.53	No additional damage observed
0 to 2011 (0 to 42.0)	50	3.00	No additional damage observed
670 to 1676 (14.0 to 35.0)	3350	2.57	No additional damage observed

Result: Pass

Note: Test Specimens #1, #2, and #3 were cycled in a common chamber for the **positive** pressure cycles only.

SECTION 8

CONCLUSION

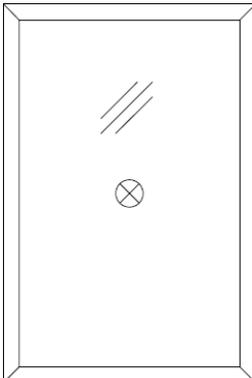
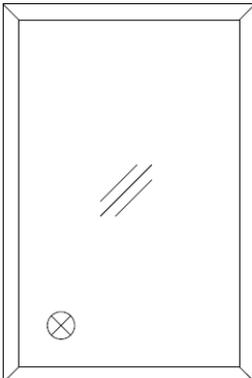
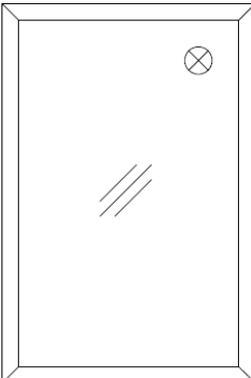
The specimens tested met the performance requirements set forth in the referenced test procedures for a ±3352 Pa (±70.0 psf) Design Pressure with missile impacts corresponding to Missile Level C and Wind Zone 3. The specimens met the requirements of Section 7 of ASTM E1996.

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SECTION 9 SKETCH(ES)

REV	DATE	DESCRIPTION	BY
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>SPECIMEN #1</p> </div> <div style="text-align: center;">  <p>SPECIMEN #2</p> </div> <div style="text-align: center;">  <p>SPECIMEN #3</p> </div> </div>			
PROJECT NO. N9806.01 109-44		PROJECT NAME: ASTM E1886 & ASTM E1996 CLIENT: EASTMAN PERFORMANCE FILMS, LLC	
		DRAWING SKETCH #1 - IMPACT LOCATIONS	
		DWG. BY: TJM DATE: 10/19/22	
		SECRET 1 OF 1	

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SECTION 10 PHOTOGRAPH



Photo No. 1
Annealed Window with PFS Attached 8 Mil Film, Dual Pane Wet Glazed Fixed Window
Prior to Testing



Total Quality. Assured.

130 Derry Court
York, Pennsylvania 17406

Telephone: 717-764-7700
Facsimile: 717-764-4129
www.intertek.com/building

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SECTION 11

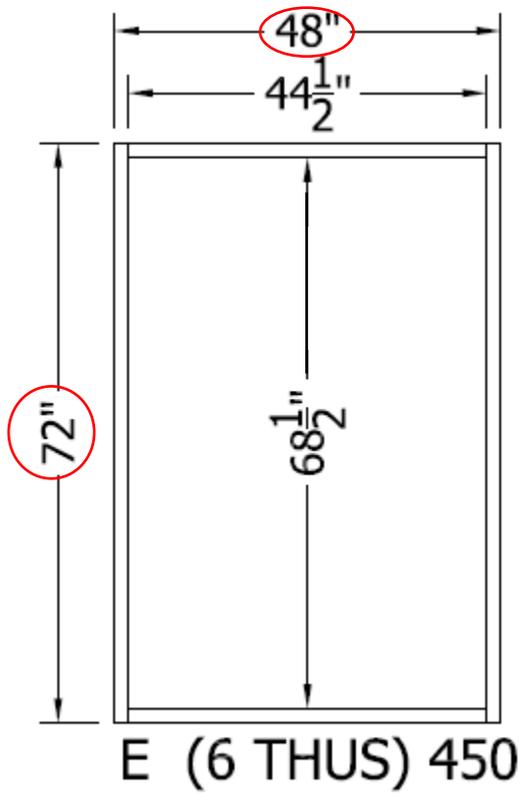
DRAWINGS

The test specimen drawings have been reviewed by Intertek B&C and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.

Eastman Performance Films, LLC

~~Intertek Quote 210800R0~~ Windstorm Testing
Test Sample Details

Kawneer 450 Aluminum Framing

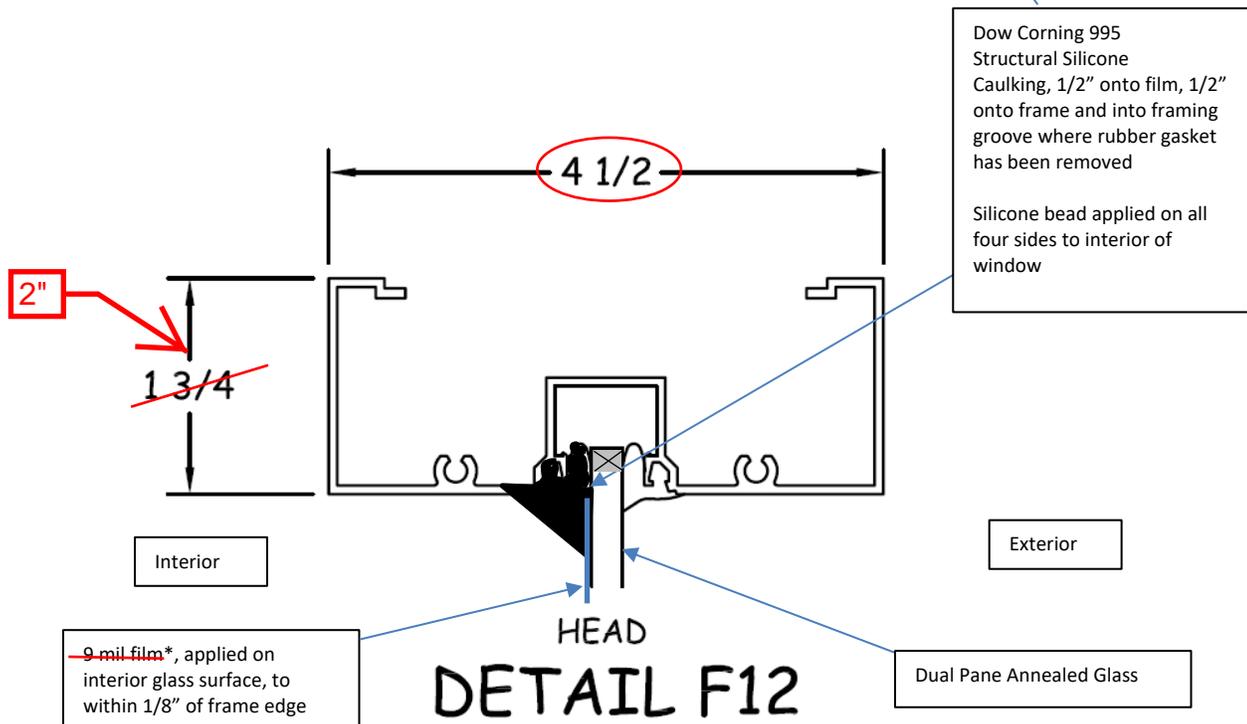
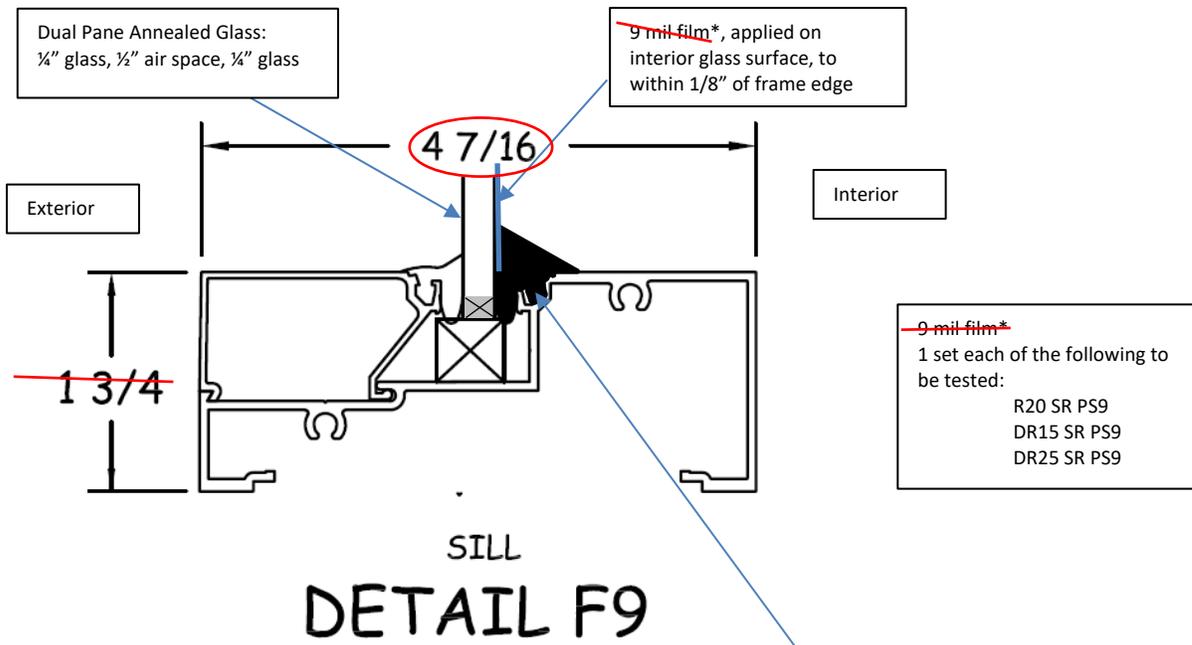


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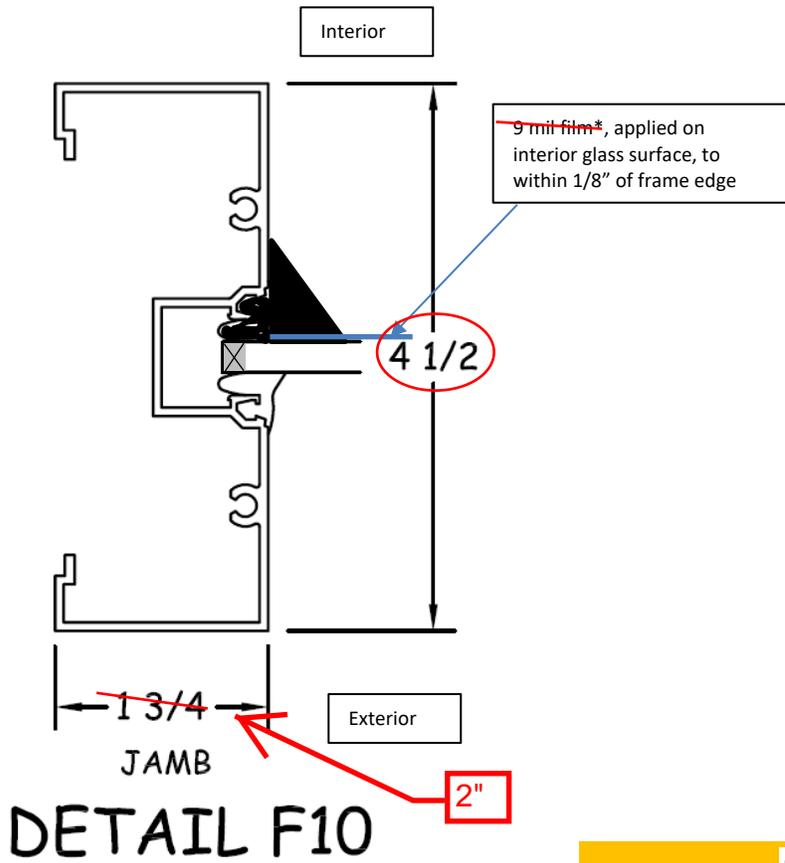
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Verified by: *Ken L. Steyl*



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	Date:	02/27/2023
	Verified by:	<i>Ken L. Stoyl</i>



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	Date:	02/27/2023
	Verified by:	<i>Ken L. Hoyle</i>



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SECTION 12

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	02/27/23	N/A	Original Report Issue