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EASTMAN PERFORMANCE FILMS, LLC
TEST REPORT

SCOPE OF WORK
ASTM E1886 AND ASTM E1996 TESTING ON LLUMAR SCL SR PS8, SAFETY FILM

REPORT NUMBER
I9781.03-109-44

TEST DATE(S)
10/16/18 - 10/17/18

ISSUE DATE
10/25/18

RECORD RETENTION END DATE
10/17/22

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18

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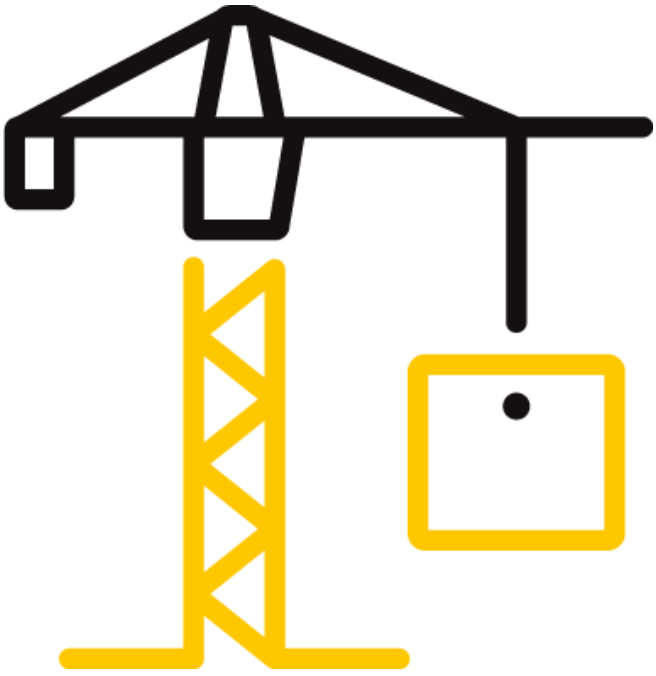

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TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC
Report No.: I9781.03-109-44
Date: 10/25/18

REPORT ISSUED TO

EASTMAN PERFORMANCE FILMS, LLC
4210 The Great Road
Fieldale, Virginia 24089

SECTION 1

SCOPE

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 LLumar SCL SR PS8, Safety Film. 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.

SECTION 2

SUMMARY OF TEST RESULTS

Product Type: Safety Film
Series/Model: LLumar SCL SR PS8

TITLE	RESULTS
±2394 Pa (±50.00 psf) Design Pressure	Met performance requirements
Missile Impacts	Missile Level C Wind Zone 2

For INTERTEK B&C:

COMPLETED BY:	Richard E. Hartman III	**REVIEWED BY:**	Timothy J. McGill
TITLE:	Technician – Product Testing	**TITLE:**	Manager – Product Testing
SIGNATURE:	Digitally Signed by: Richard Hartman III	**SIGNATURE:**	Digitally Signed by: Timothy J. McGill
DATE:	10/25/18	**DATE:**	10/25/18

REH:wnl

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SECTION 3
TEST METHOD(S)

The specimens were evaluated in accordance with the following:

ASTM E1886-13a, *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 E1996-17, *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*

SECTION 4
MATERIAL SOURCE/INSTALLATION

Test specimen(s) 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.

LOCATION	ANCHOR DESCRIPTION	ANCHOR LOCATION
Head, sill, and jambs	1-1/2" x 1-1/2" wood blind stops secured using #8 x 3" flat head screws	Blind stops located at the head, sill, and jambs on the interior and exterior, fasteners located 2" from each end and spaced 6" on center

The specimens were blind stopped into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the windows were sealed with sealant.

Tape and film were not used to seal against air leakage during cyclic windload testing.

SECTION 5
EQUIPMENT

Cannon: Constructed from steel piping utilizing compressed air to propel the missile
Missile: 2x4 Southern Pine
Timing Device: Electronic Beam Type
Cycling Mechanism: Computer controlled centrifugal blower with electronic pressure measuring device

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SECTION 6
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Steve DeBusk	Eastman Performance Films, LLC
Timothy J. McGill	Intertek B&C
Richard E. Hartman III	Intertek B&C

SECTION 7
TEST SPECIMEN DESCRIPTION

Product Type: Safety Film
Series/Model: LLumar SCL SR PS8

Product Size(s):

Test Specimens #4 - #6

OVERALL AREA:	WIDTH		HEIGHT	
2.0 m^2 (22.0 ft^2)	millimeters	inches	millimeters	inches
Overall size	1219	48	1676	66

The following descriptions apply to all specimens.

Frame Construction:

FRAME MEMBER	MATERIAL	DESCRIPTION
Head, sill, and jambs	Aluminum	Extruded and thermally broken

	JOINERY TYPE	DETAIL
All corners	Butted	The corners were secured together using two #12 x 1" pan head screws through the jambs and into the head and sill screw bosses

Reinforcement: No reinforcement was utilized.

Weatherstripping: No weatherstripping was utilized.

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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 0.008" LLumar SCL SR PS8	1/4" annealed	Exterior glazed against a bead of Dow Corning 995 structural silicone and secured in place using a snap-in aluminum glazing bead at the sill with a vinyl glazing strip against the glazing

LOCATION	QUANTITY	DAYLIGHT OPENING		GLASS BITE
		millimeters	inches	
Fixed window	1	1080 x 1543	42-1/2 x 60-3/4	1/2"

Drainage: No drainage was utilized.

Hardware: No hardware was utilized.

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SECTION 8
TEST RESULTS

The temperature during testing was 18°C (64°F). The results are tabulated as follows:

ASTM E1886, *LARGE MISSILE IMPACT*

Conditioning Temperature: 18°C (64°F)
Missile Weight: 1973 g (4.35 lbs)
Missile Length: 1.1 m (3' 8")
Muzzle Distance from Test Specimen: 2.4 m (8' 00")

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

IMPACT	#1
MISSILE VELOCITY	12.1 m/s (39.8 fps)
IMPACT AREA	Center of glazing
OBSERVATIONS	Missile hit target area, shattered exterior glazing, fractured interior glazing, no tears or penetrations observed
RESULTS	Pass

Test Specimen #4: Orientation within ±5° of horizontal

IMPACT	#1
MISSILE VELOCITY	12.3 m/s (40.3 fps)
IMPACT AREA	Top right corner of glazing
OBSERVATIONS	Missile hit target area, shattered exterior glazing, fractured interior glazing, no tears or penetrations observed
RESULTS	Pass

Test Specimen #6: Orientation within ±5° of horizontal

IMPACT	#1
MISSILE VELOCITY	12.5 m/s (40.9 fps)
IMPACT AREA	Bottom left corner of glazing
OBSERVATIONS	Missile hit target area, shattered exterior glazing, fractured interior glazing, no tears or penetrations observed
RESULTS	Pass

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

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ASTM E1886, AIR PRESSURE CYCLING

Test Specimen #5:
Design Pressure: ±2394 Pa (±50.0 psf)

Positive Pressure

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
479 to 1197 (10.0 to 25.0)	3500	3.00	No additional damage observed
0 to 1436 (0 to 30.0)	300	2.81	No additional damage observed
1197 to 1915 (25.0 to 40.0)	600	2.39	No additional damage observed
718 to 2394 (15.0 to 50.0)	100	2.99	No additional damage observed

Negative Pressure

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
718 to 2394 (15.0 to 50.0)	50	2.90	No additional damage observed
1197 to 1915 (25.0 to 40.0)	1050	2.91	No additional damage observed
0 to 1436 (0 to 30.0)	50	2.91	No additional damage observed
479 to 1197 (10.0 to 25.0)	3350	2.76	No additional damage observed

Result: Pass
Note: Test Specimens #4 - #6 were cycled in a common chamber.

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ASTM E1886, AIR PRESSURE CYCLING

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1197 to 1915 (25.0 to 40.0)	600	2.39	No additional damage observed
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Negative Pressure

PRESSURE RANGE Pa (psf)	NUMBER OF CYCLES	AVERAGE CYCLE TIME (seconds)	OBSERVATIONS
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0 to 1436 (0 to 30.0)	50	2.91	No additional damage observed
479 to 1197 (10.0 to 25.0)	3350	2.76	No additional damage observed

Result: Pass
Note: Test Specimens #4 - #6 were cycled in a common chamber.

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ASTM E1886, AIR PRESSURE CYCLING

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718 to 2394 (15.0 to 50.0)	100	2.99	No additional damage observed

Negative Pressure

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718 to 2394 (15.0 to 50.0)	50	2.90	No additional damage observed
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0 to 1436 (0 to 30.0)	50	2.91	No additional damage observed
479 to 1197 (10.0 to 25.0)	3350	2.76	No additional damage observed

Result: Pass
Note: Test Specimens #4 - #6 were cycled in a common chamber.

SECTION 9
CONCLUSION

The specimen(s) tested met the performance requirements set forth in the referenced test procedures for a ±2394 Pa (±50.0 psf) Design Pressure with missile impacts corresponding to Missile Level C and Wind Zone 2. The specimens met the requirements of Section 7 of ASTM E1996.

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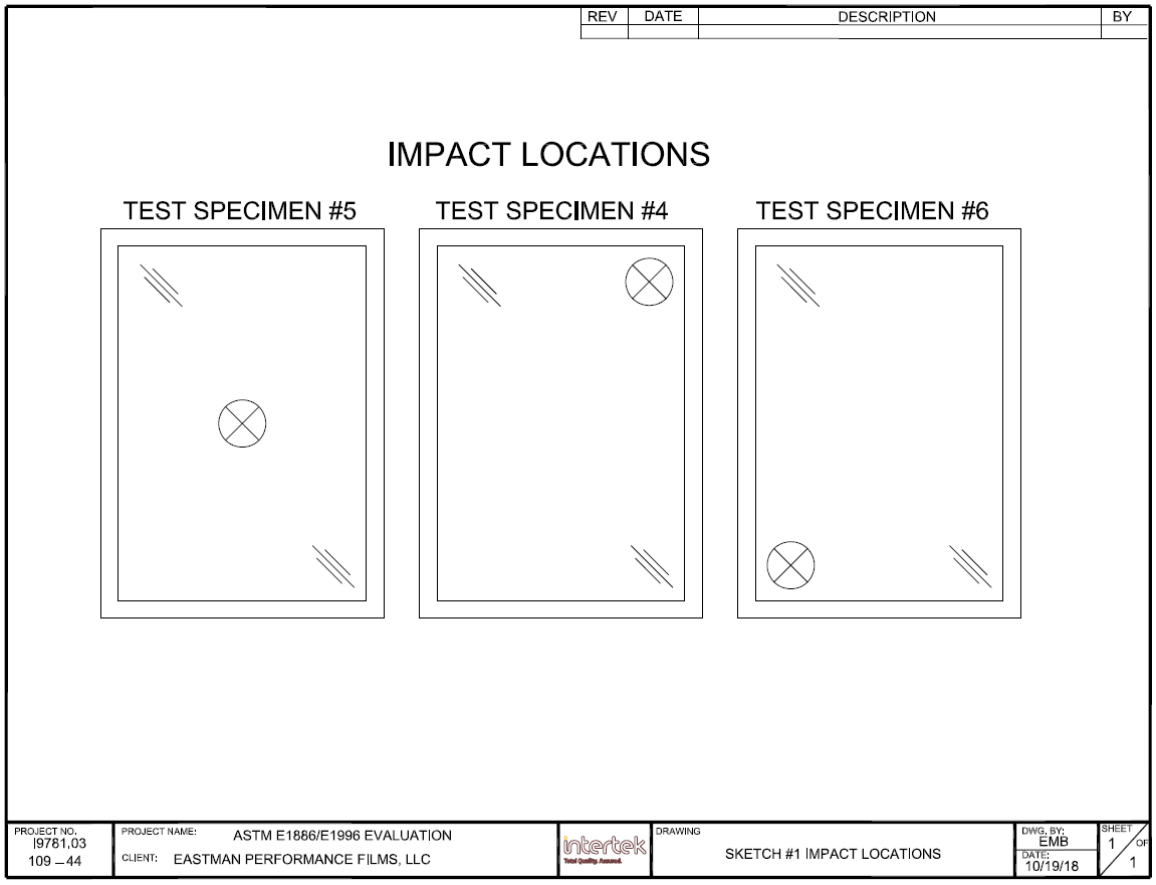
SECTION 10
SKETCH



Sketch No. 1
Impact Locations

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SECTION 11
PHOTOGRAPHS

Photo No. 1
Test Specimen #5

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Photo No. 2
Test Specimen #4

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Photo No. 3
Test Specimen #6

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SECTION 12
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.

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Date:	10/18/2018
Verified by:	

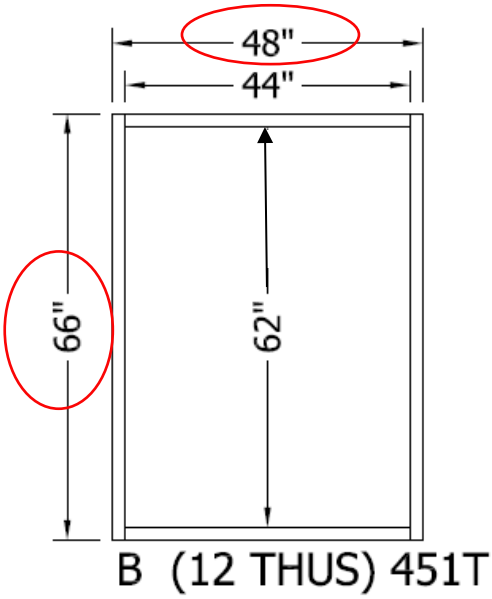
Eastman Performance Films, LLC

Intertek Quote 207215R1

ASTM E1886, E1996, E283, E330, E331 Test Sample Details

Dual-pane unit frames

Kawneer 451 Aluminum Framing



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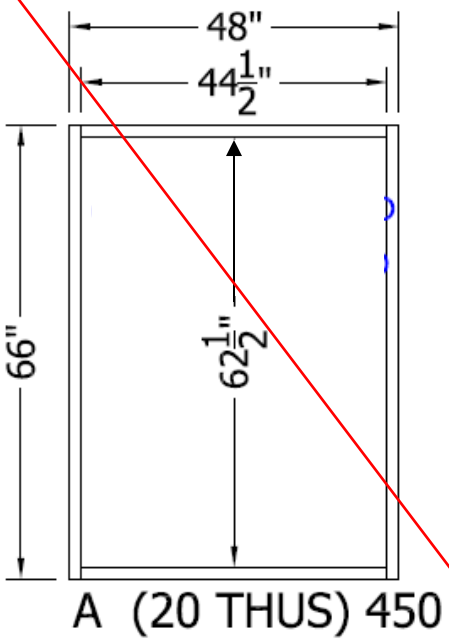
Single-pane unit frames

Kawneer 450 Aluminum Framing



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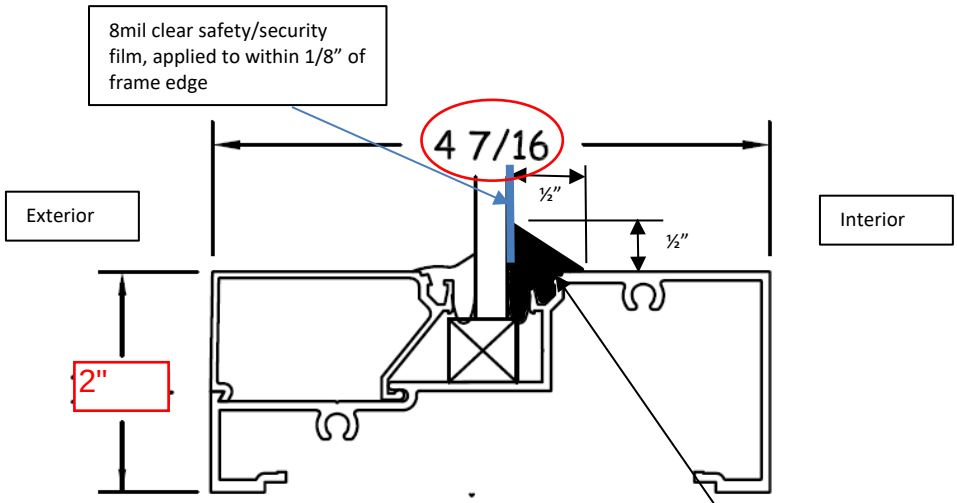
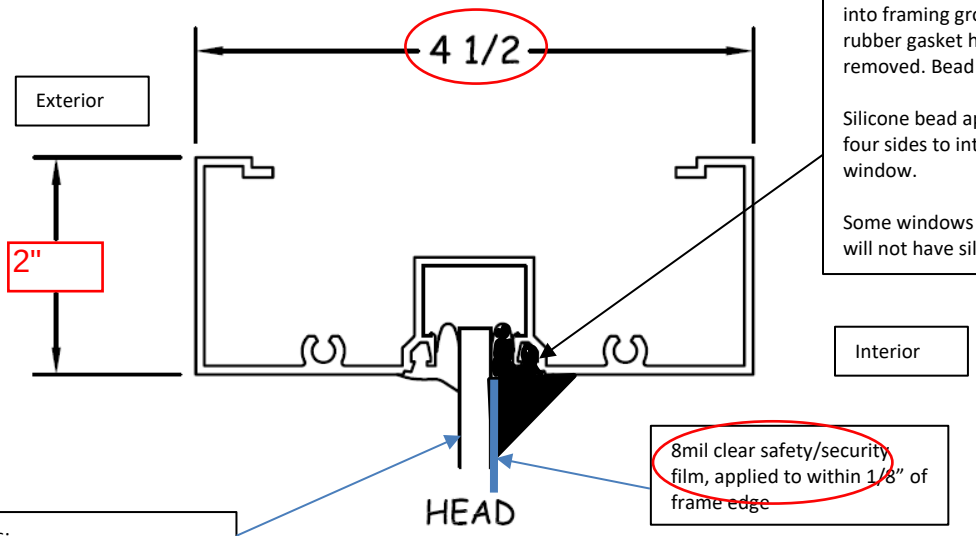


SILL

DETAIL F9



Tremco Proglaze SSG or Dow Corning 995 Structural Silicone caulking, 1/2" onto film, 1/2" onto frame and into framing groove where rubber gasket has been removed. Bead width 3/4".

Silicone bead applied on all four sides to interior of window.

Some windows to be tested will not have silicone.

8mil clear safety/security film, applied to within 1/8" of frame edge

Glass:
single-pane or dual-pane
(single-pane shown)
See sample details next page

DETAIL F12

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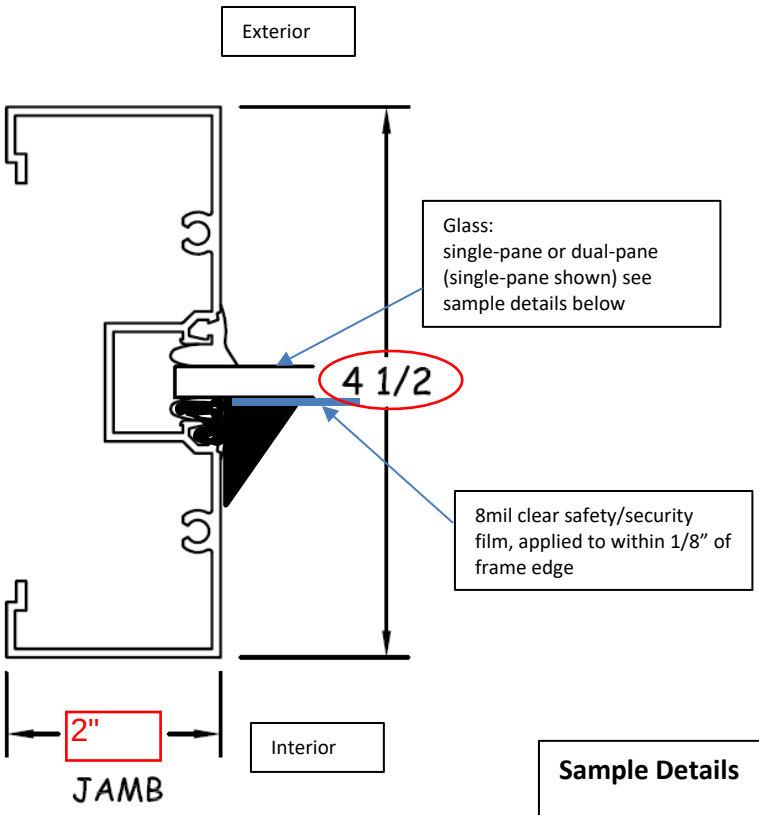

DETAIL F10

Sample Details

Sample ID	Glass Type
43, 44, 45	Single Pane Annealed
31, 32, 33	Single Pane Tempered
4, 5, 6	Dual Pane Annealed
10, 11, 12	Dual Pane Tempered

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SECTION 13
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	10/25/18	N/A	Original Report Issue