

EASTMAN PERFORMANCE FILMS, LLC.

AIRBLAST LOADING TEST REPORT

SCOPE OF WORK

ASTM F1642/GSA TS01 TESTING ON *LLUMAR SCL SR PS8* SAFETY AND SECURITY FILM
INSTALLED ON A WINDOW SYSTEM
(SINGLE PANE, TEMPERED, SILICONE GLAZING ATTACHMENT)

REPORT NUMBER

I4621.03-119-12 R0

TEST DATE(S)

09/18/18 - 09/19/18

ISSUE DATE

11/13/18

RECORD RETENTION END DATE

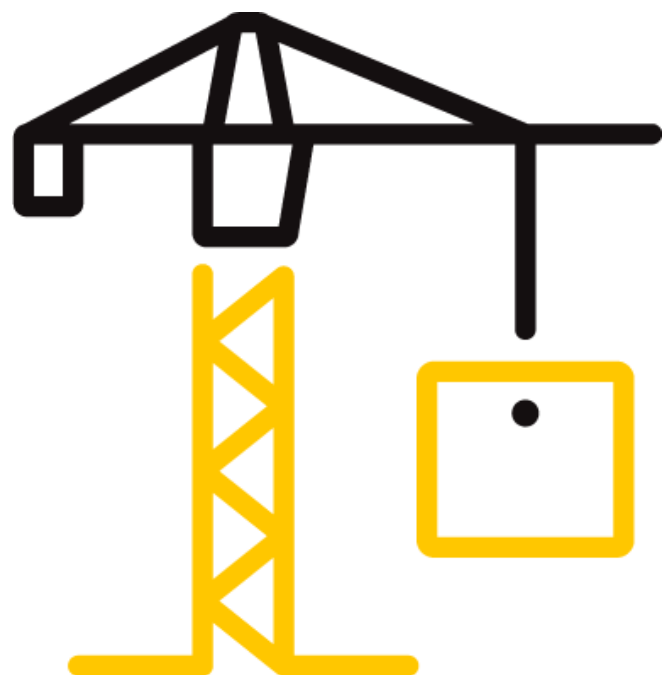
09/19/22

PAGES

25

DOCUMENT CONTROL NUMBER

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RT-R-AMER-Test-2783
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TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

REPORT ISSUED TO

EASTMAN PERFORMANCE FILMS, LLC.

4210 The Great Road

Fieldale, VA 24089

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Eastman Performance Films, LLC., Fieldale, Virginia to perform airblast loading tests in accordance with ASTM F1642 and GSA-TS01 on *Llumar SCL SR PS8* safety and security film installed on a fixed window system (single pane, tempered, silicone glazing attachment). Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at the 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: Fixed Window (Single Pane, Tempered, Silicone Glazing Attachment)

Series/Model Number: *LLumar SCL SR PS8*

TITLE	SPECIMEN #1	SPECIMEN #2	SPECIMEN #3
ASTM Hazard Rating	Minimal Hazard	Minimal Hazard	Minimal Hazard
GSA Performance Condition	2	2	2
Average Peak Reflected Pressure	6.15 psi	6.20 psi	6.10 psi
Average Positive Phase Impulse	41 psi-msec	41 psi-msec	40 psi-msec
Average Positive Phase Duration	11.48 msec	12.39 msec	12.41 msec

For INTERTEK B&C:

COMPLETED BY: Alva R. Baker

TITLE: Technician III

SIGNATURE:

DATE: 11/13/18

REVIEWED BY:

Virgal T. Mickley, Jr., P.E.

TITLE:

Senior Staff Engineer

SIGNATURE:

DATE: 11/13/18

ARB:ecr/vtm/aaa

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TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

SECTION 3

TEST METHOD(S)

The specimens were evaluated in accordance with the following:

ASTM F1642/F1642M-17, *Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading*

ASTM F2912-17, *Standard Specification for Glazing Systems Subject to Airblast Loadings*

GSA-TS01-2003, *US General Services Administration Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings*

SECTION 4

TEST FACILITY

Intertek B&C's shock tube is housed in a 10,000 square foot state-of-the-art test facility located in York, Pennsylvania. A photograph of the shock tube is provided in Figure #1.



Figure #1
Shock Tube and Test Facility

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

SECTION 5

TEST PROCEDURE

Blast loadings are produced on the specimen to simulate the effects of a high explosive charge at a specified standoff distance. Shock waves are generated by the sudden rupturing of a thin aluminum membrane. The shock wave expands as it travels down the tube, and impacts the target with a specific positive pressure and impulse.

SECTION 6

MATERIAL SOURCE/INSTALLATION

The 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 placed directly into the shock tube test frame.

SECTION 7

EQUIPMENT

In accordance with ASTM F1642 and GSA TS01, four reflective pressure transducers were utilized for data acquisition at a 1MHz sample rate. Two reflective pressure transducers were located on the specimen holder at the top and right side (when viewed from the interior). A third pressure transducer was located on the shell to the exterior of the specimen, and a fourth was located in the witness chamber, directly to the interior of the specimen holder. A sketch of the specimen holder and corresponding reflective pressure sensor locations is provided in Figure #2.

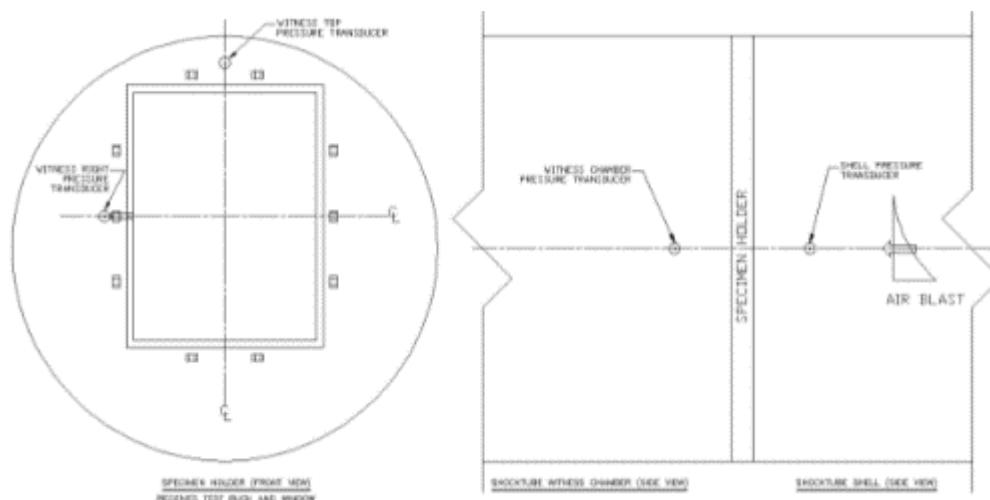


Figure #2
Pressure Sensor Locations

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

SECTION 8

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Steve DeBusk	Eastman Performance Films, LLC.
Charles Adiasor	Eastman Performance Films, LLC.
Isaiah W. Gebhart	Intertek B&C
Emily C. Riley	Intertek B&C
Cory E. Straub	Intertek B&C
Alva R. Baker	Intertek B&C

SECTION 9

TEST SPECIMEN DESCRIPTION

The following descriptions apply to all specimens.

Product Type: Fixed Window (Single Pane, Tempered, Silicone Glazing Attachment)

Series/Model Number: LLumar SCL SR PS8

Product Sizes

MEASURED DIMENSIONS	WIDTH (inches)	HEIGHT (inches)
Overall Size	48	66
Fixed Day Lite Opening	42-1/2	60-1/2

Frame Construction

FRAME MEMBER	MATERIAL	DESCRIPTION
Head, Sill, and Jamb	Aluminum	Extruded, poured and debridged for thermal improvement
Glass Stop	Aluminum	Extruded, snaps into place on sill frame member to secure the glazing

LOCATION	JOINERY TYPE	DETAIL
All Corners	Square cut and butted	Secured using two #12 x 1 in long pan head screws

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

Glazing

GLASS TYPE	GLAZING BITE
1/4" Tempered	1/4"

Glazing Method: The glass was channel glazed from the exterior and was secured in place with snap-fit extruded aluminum glazing stop at the sill and a flexible rubber gasket around the glazing perimeter. An 8 mil thick safety and security film was adhered to the interior lite (film applied on the room side) and a bead of silicone was applied around the perimeter of the frame at the glazing edge.

Hardware: No hardware was utilized.

Reinforcement: No reinforcement was utilized.

SECTION 10

TEST RESULTS

Test Date: 09/18/18 - 09/19/18

Ambient Temperature: 82±2°F

Relative Humidity: 67%

The results are tabulated as follows. Pressure time plots are presented for each specimen. Pre-test and post-test photographs are provided in Section 12.

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

Test Specimen #1

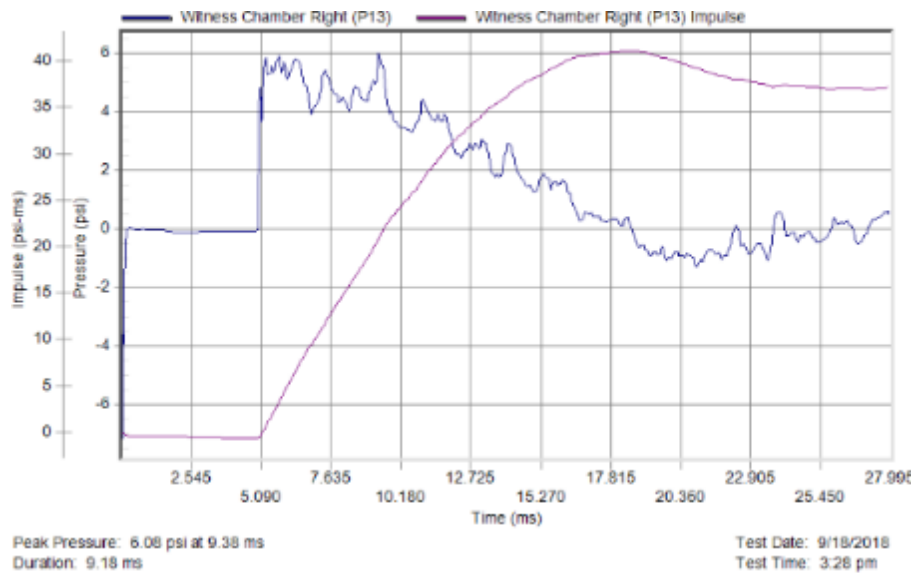
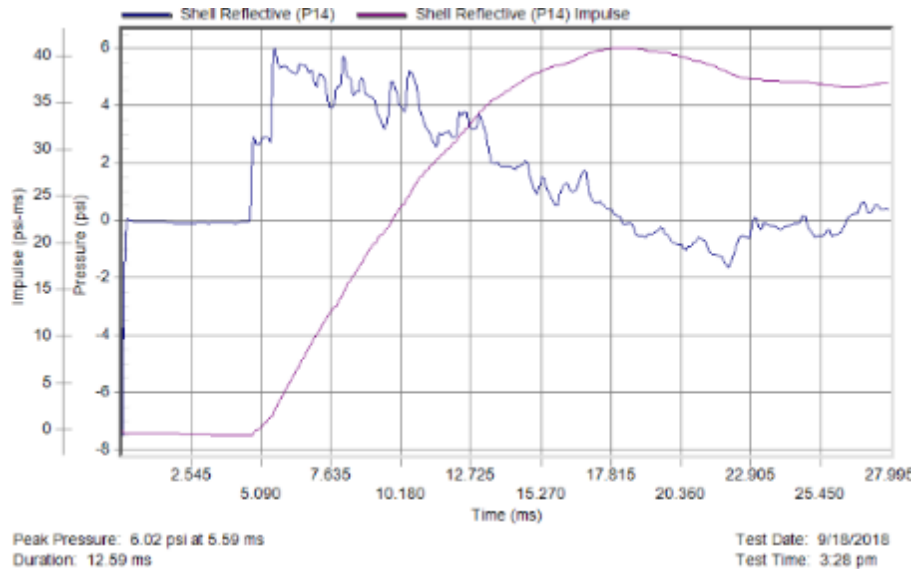
DESCRIPTION	RESULTS
Ambient Temperature	82°F
Glazing Temperature	83°F
ASTM Hazard Rating	Minimal Hazard
GSA Performance Condition	2
PEAK POSITIVE PRESSURE	
Top Pressure	6.36 psi
Right Pressure	6.08 psi
Shell Pressure	6.02 psi
Average Pressure	6.15 psi
Witness Chamber Pressure	0.29 psi
PEAK POSITIVE PHASE DURATION	
Top Duration	12.68 msec
Right Duration	9.18 msec
Shell Duration	12.59 msec
Average Duration	11.48 msec
PEAK POSITIVE PHASE IMPULSE	
Top Impulse	41 psi*msec
Right Impulse	41 psi*msec
Shell Impulse	41 psi*msec
Average Impulse	41 psi*msec
GLAZING RESPONSE	
Exterior Lite	Fractured
Interior Lite	N/A
Glazing Pullout Length and Location	None
Glazing Tearing	1-1/4" at top left interior, 5/8" at top right interior, 1/2" at lower left interior
WITNESS CHAMBER RESULTS	
Glazing dust	

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

Test Specimen #1 - Pressure Time Plots

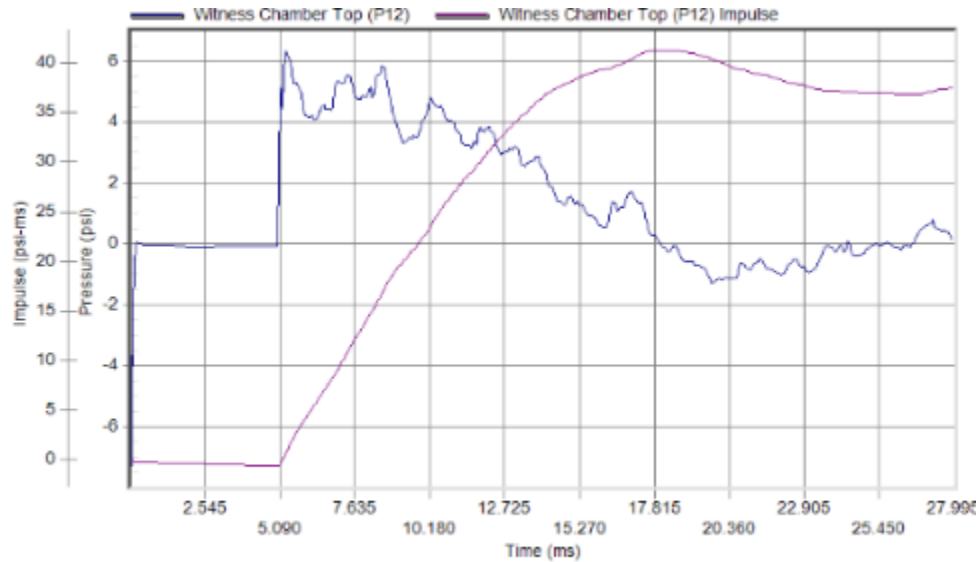


TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

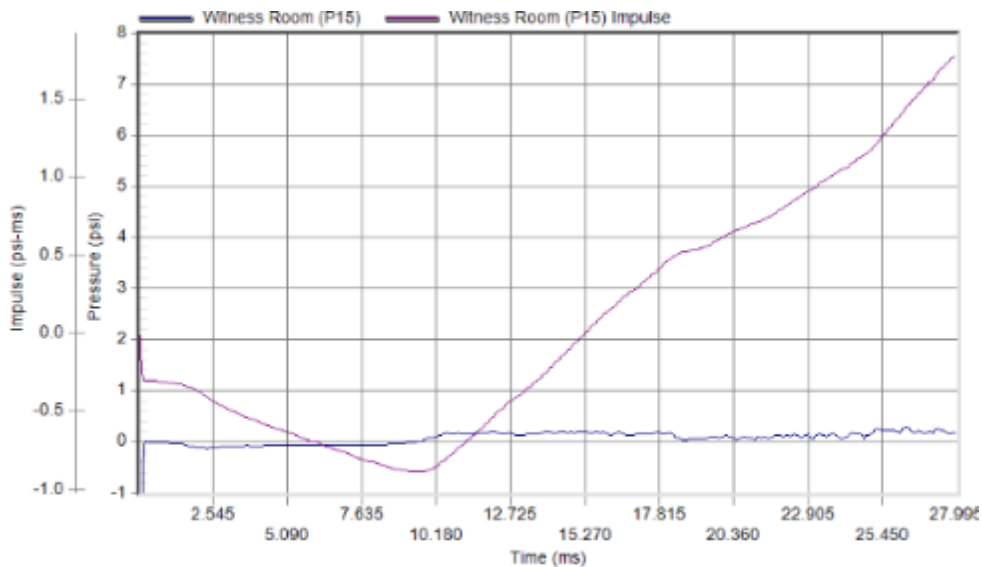
Date: 11/13/18

Test Specimen #1 - Pressure Time Plots (continued)



Peak Pressure: 6.36 psi at 5.32 ms
Duration: 12.68 ms

Test Date: 9/18/2018
Test Time: 3:28 pm



Peak Pressure: 0.29 psi at 26.22 ms
Duration: 0.00 ms

Test Date: 9/18/2018
Test Time: 3:28 pm

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

Test Specimen #2

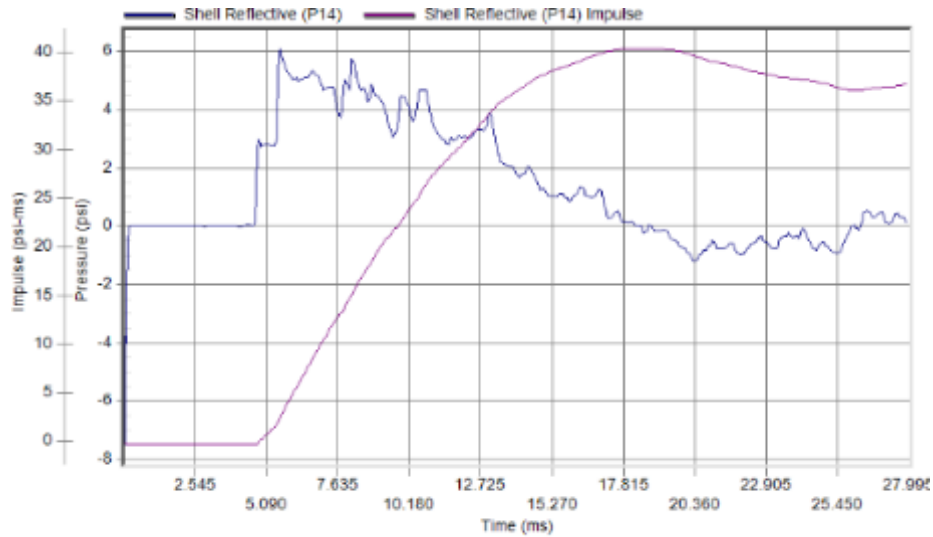
DESCRIPTION	RESULTS
Ambient Temperature	81°F
Glazing Temperature	82°F
ASTM Hazard Rating	Minimal Hazard
GSA Performance Condition	2
PEAK POSITIVE PRESSURE	
Top Pressure	6.39 psi
Right Pressure	6.12 psi
Shell Pressure	6.10 psi
Average Pressure	6.20 psi
Witness Chamber Pressure	0.24 psi
PEAK POSITIVE PHASE DURATION	
Top Duration	12.77 msec
Right Duration	11.79 msec
Shell Duration	12.61 msec
Average Duration	12.39 msec
PEAK POSITIVE PHASE IMPULSE	
Top Impulse	41 psi*msec
Right Impulse	41 psi*msec
Shell Impulse	40 psi*msec
Average Impulse	41 psi*msec
GLAZING RESPONSE	
Exterior Lite	Fractured
Interior Lite	N/A
Glazing Pullout Length and Location	None
Glazing Tearing	5" at bottom left interior, 1-1/8" at bottom right interior, 5/8" at top right interior, 1/8" at top left interior
WITNESS CHAMBER RESULTS	
Glazing dust	

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

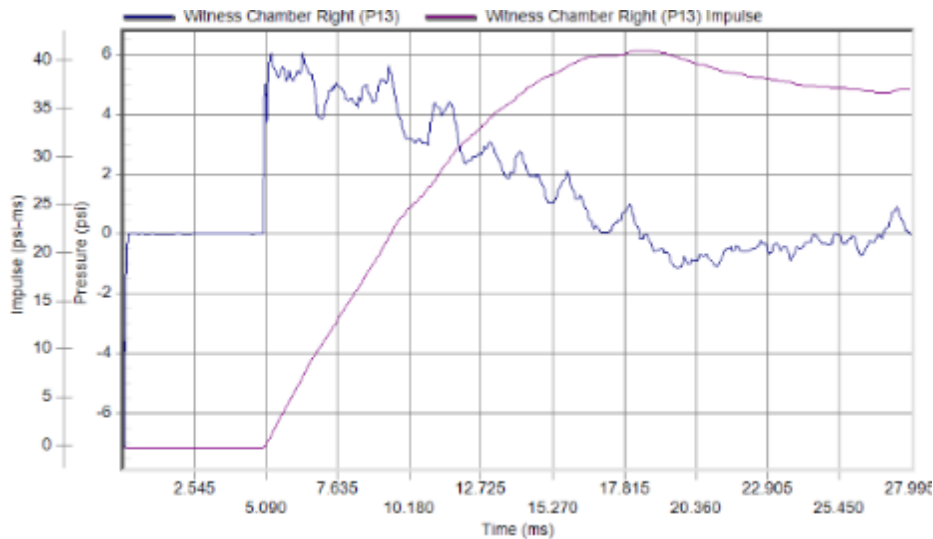
Date: 11/13/18

Test Specimen #2 - Pressure Time Plots



Peak Pressure: 6.10 psi at 5.59 ms
Duration: 12.61 ms

Test Date: 9/19/2018
Test Time: 8:33 am



Peak Pressure: 6.12 psi at 5.27 ms
Duration: 11.79 ms

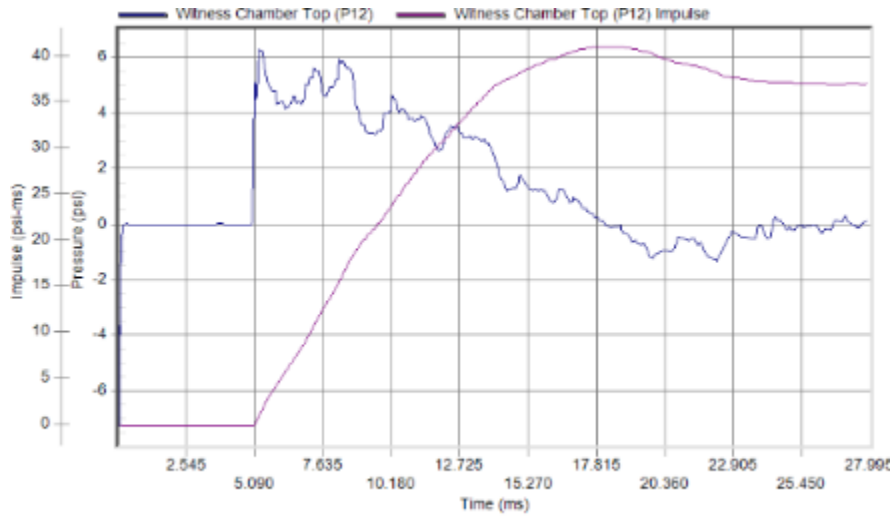
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TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

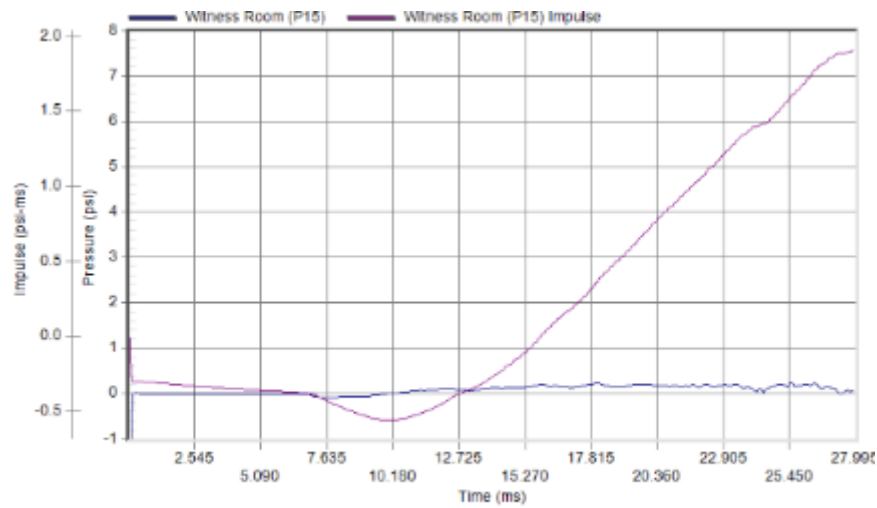
Date: 11/13/18

Test Specimen #2 - Pressure Time Plots (continued)



Peak Pressure: 6.39 psi at 5.32 ms
Duration: 12.77 ms

Test Date: 9/19/2018
Test Time: 8:33 am



Peak Pressure: 0.24 psi at 25.52 ms
Duration: 1.86 ms

Test Date: 9/19/2018
Test Time: 8:33 am

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

Test Specimen #3

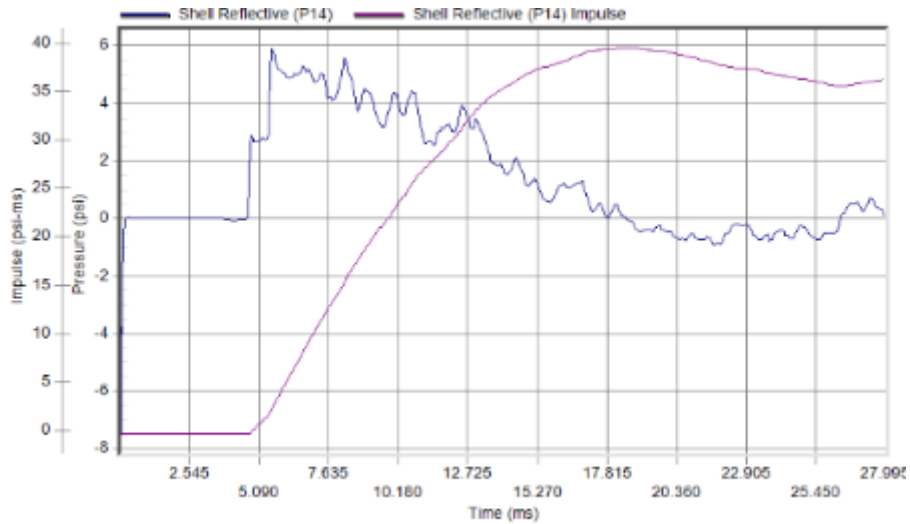
DESCRIPTION	RESULTS
Ambient Temperature	80°F
Glazing Temperature	80°F
ASTM Hazard Rating	Minimal Hazard
GSA Performance Condition	2
PEAK POSITIVE PRESSURE	
Top Pressure	6.33 psi
Right Pressure	6.01 psi
Shell Pressure	5.95 psi
Average Pressure	6.10 psi
Witness Chamber Pressure	0.27 psi
PEAK POSITIVE PHASE DURATION	
Top Duration	13.26 msec
Right Duration	11.77 msec
Shell Duration	12.20 msec
Average Duration	12.41 msec
PEAK POSITIVE PHASE IMPULSE	
Top Impulse	40 psi*msec
Right Impulse	40 psi*msec
Shell Impulse	40 psi*msec
Average Impulse	40 psi*msec
GLAZING RESPONSE	
Exterior Lite	Fractured
Interior Lite	N/A
Glazing Pullout Length and Location	None
Glazing Tearing	1-3/8" by 6" at bottom left interior, 1-7/8" at top right interior
WITNESS CHAMBER RESULTS	
Glazing dust, no fragments	

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

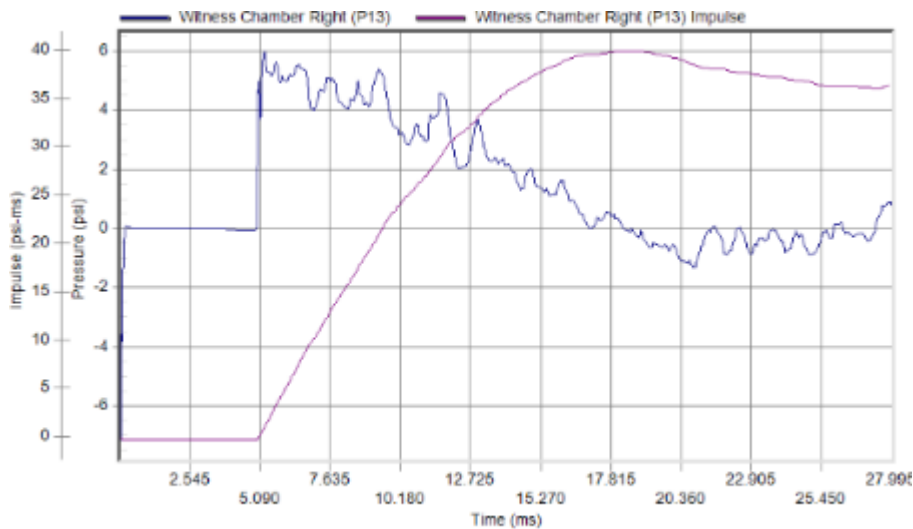
Date: 11/13/18

Test Specimen #3 - Pressure Time Plots



Peak Pressure: 5.95 psi at 5.59 ms
Duration: 12.20 ms

Test Date: 9/19/2018
Test Time: 9:57 am



Peak Pressure: 6.01 psi at 5.26 ms
Duration: 11.77 ms

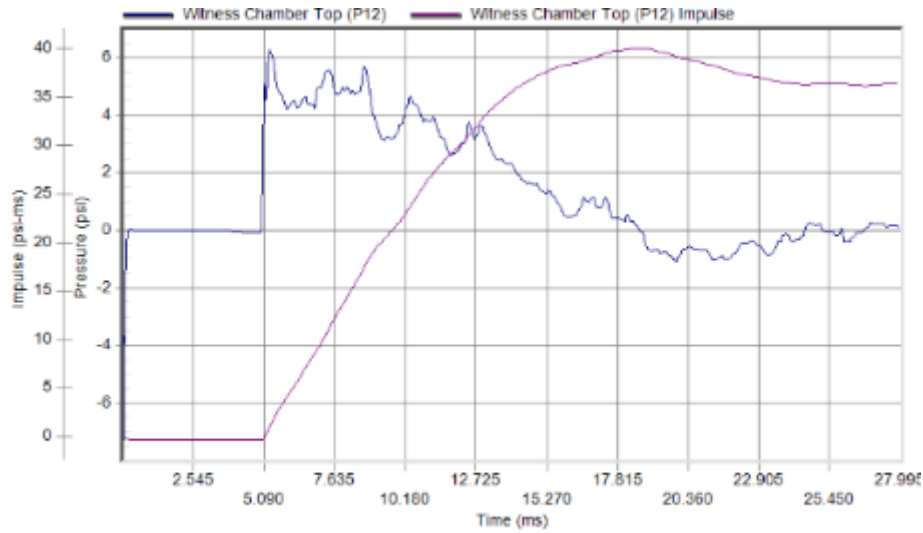
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Test Time: 9:57 am

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

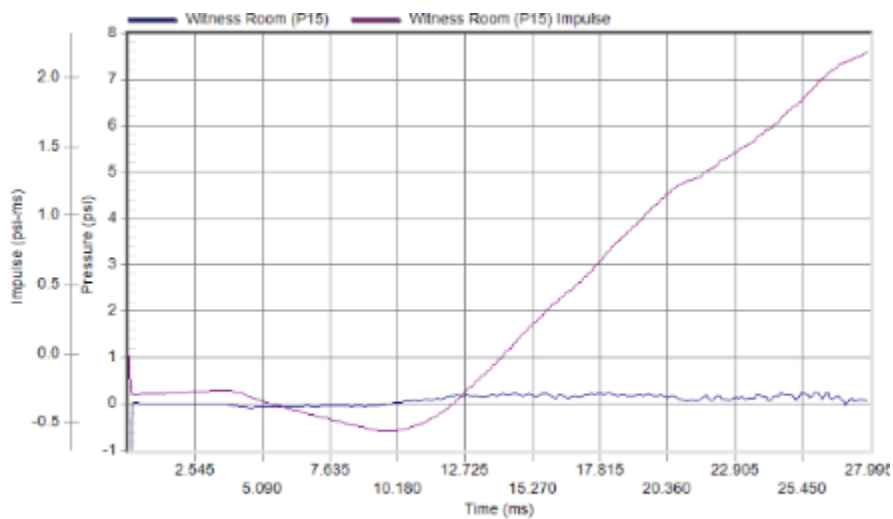
Date: 11/13/18

Test Specimen #3 - Pressure Time Plots (continued)



Peak Pressure: 6.33 psi at 5.32 ms
Duration: 13.26 ms

Test Date: 9/19/2018
Test Time: 9:57 am



Peak Pressure: 0.27 psi at 25.96 ms
Duration: 1.06 ms

Test Date: 9/19/2018
Test Time: 9:57 am

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

SECTION 11 CONCLUSION

The test specimen(s) achieved the following ratings:

TITLE	SPECIMEN #1	SPECIMEN #2	SPECIMEN #3
ASTM Hazard Rating	Minimal Hazard	Minimal Hazard	Minimal Hazard
GSA Performance Condition	2	2	2

SECTION 12 PHOTOGRAPHS



Photo No. 1
Pre-test Specimen #1, Interior

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18



Photo No. 2
Post-test Specimen #1, Interior

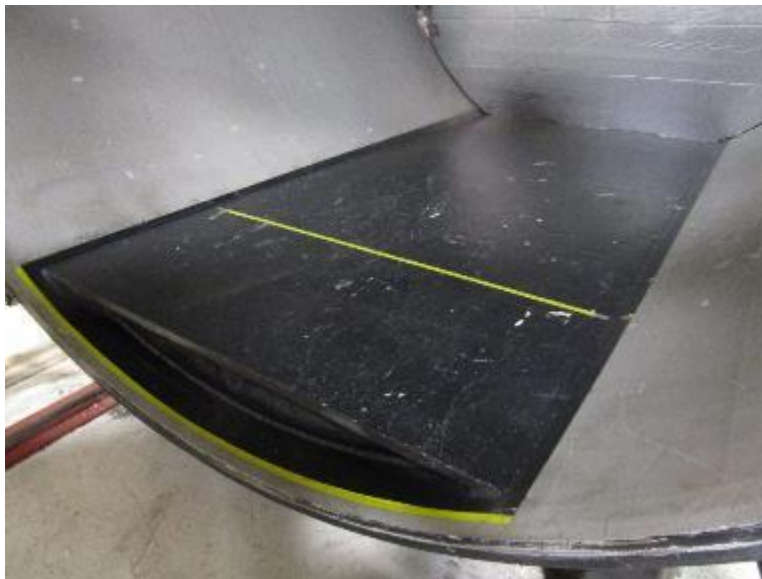


Photo No. 3
Post-test Specimen #1, Witness Chamber

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

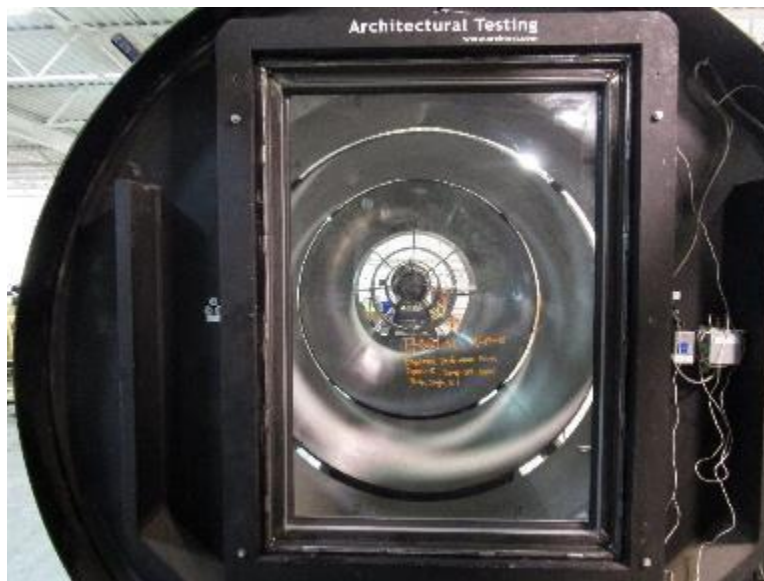


Photo No. 4
Pre-test Specimen #2, Interior



Photo No. 5
Post-test Specimen #2, Interior

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18



Photo No. 6
Post-test Specimen #2, Witness Chamber

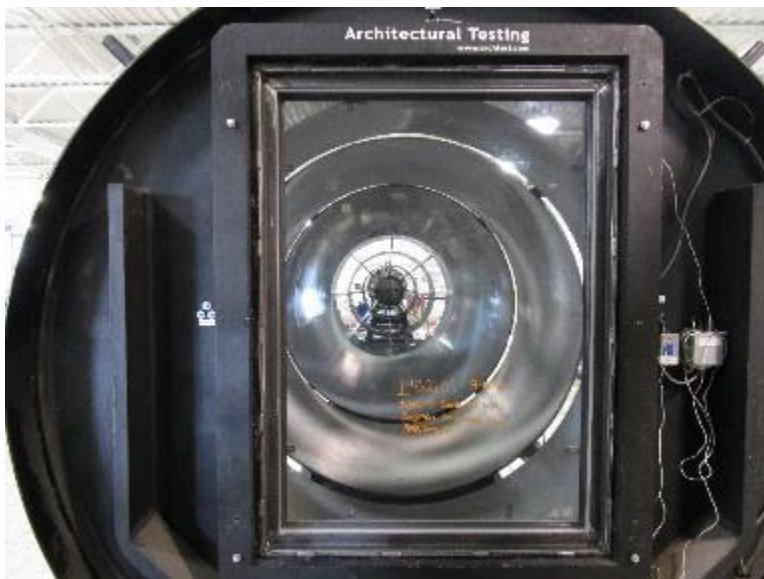


Photo No. 7
Pre-test Specimen #3, Interior

TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

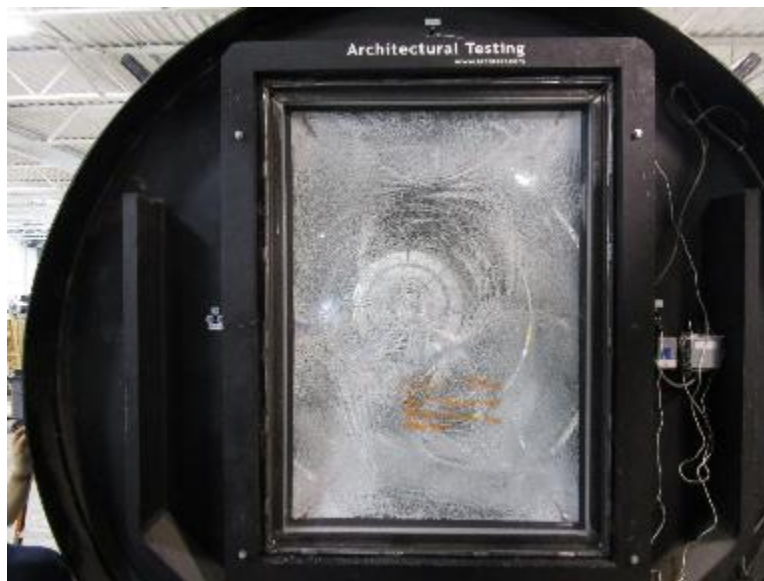


Photo No. 8
Post-test Specimen #3, Interior



Photo No. 9
Post-test Specimen #3, Witness Chamber



Total Quality. Assured.

130 Derry Court
York, Pennsylvania 17406

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TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

SECTION 13

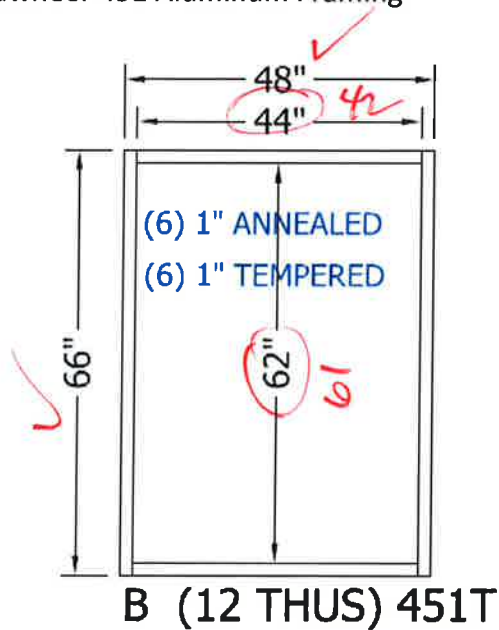
DRAWINGS

The test specimen drawings which follow 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 199023R4
Shock Tube Test Sample Details

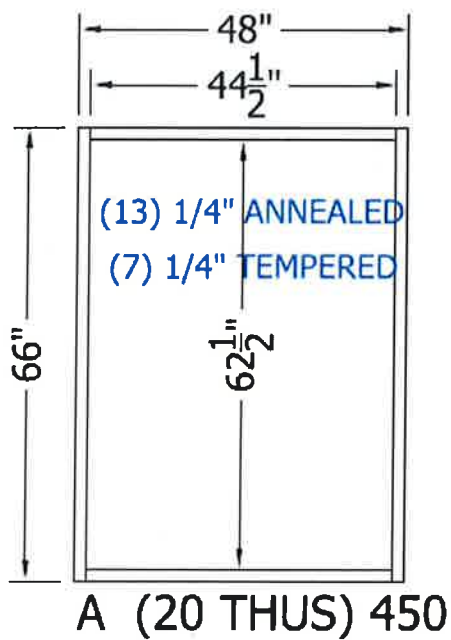
Dual-pane unit frames

Kawneer 451 Aluminum Framing



Single-pane unit frames

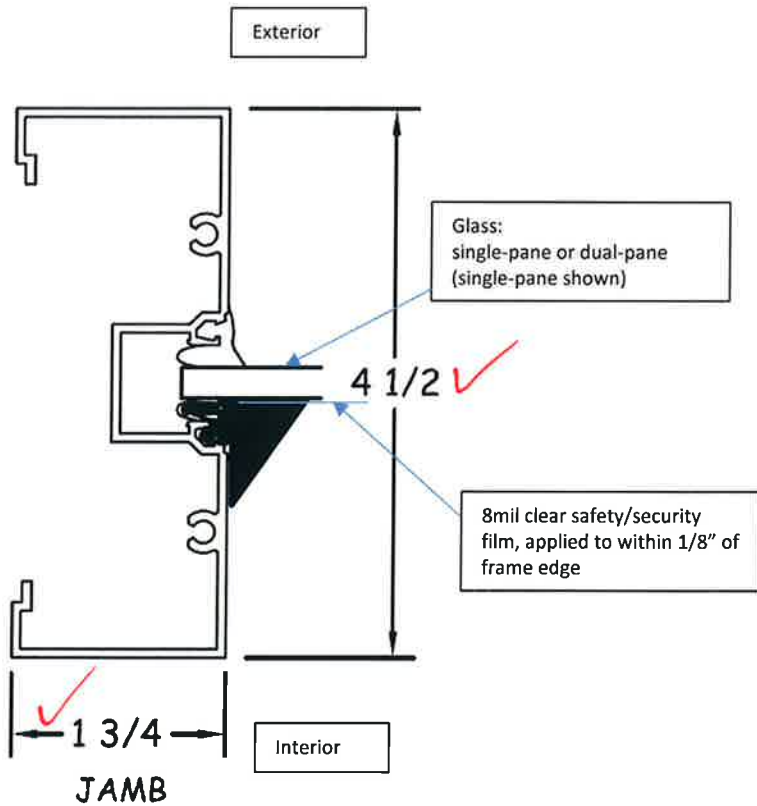
Kawneer 450 Aluminum Framing



intertek

Test sample complies with these details.
Deviations are noted.

Report # 14621
Date 11/9/18 Tech CAK



DETAIL F10

Test Sample Schedule

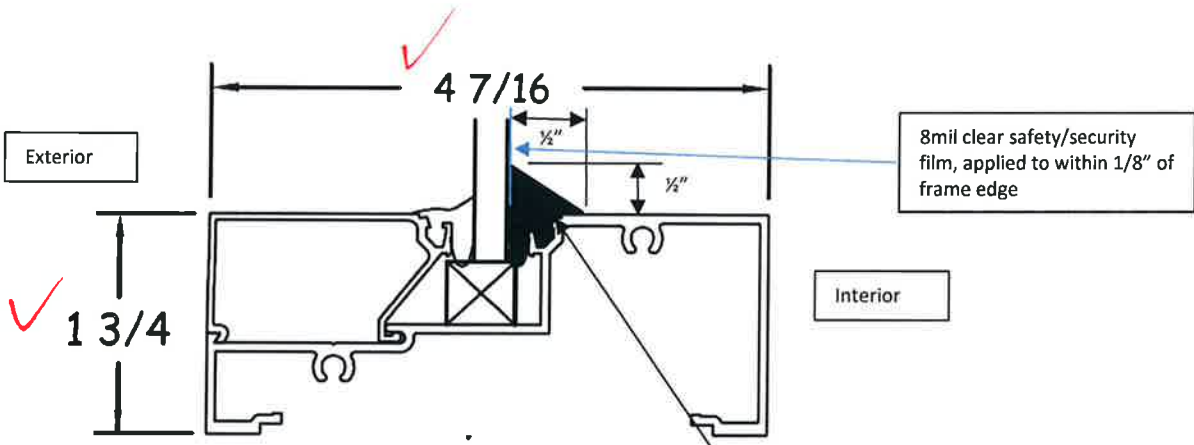
Sample No.*	Glass Type	No of panes	Silicone?	No samples
40,41,42	Annealed	Single	Yes	3
28,29,30	Tempered	Single	Yes	3
34,35,36	Annealed	Single	None	3
1,2,3	Annealed	Dual	Yes	3
7,8,9	Tempered	Dual	Yes	3
No Number	Annealed	Single	No Film	1
No Number	Tempered	Single	No Film	1

* written on side of each unit

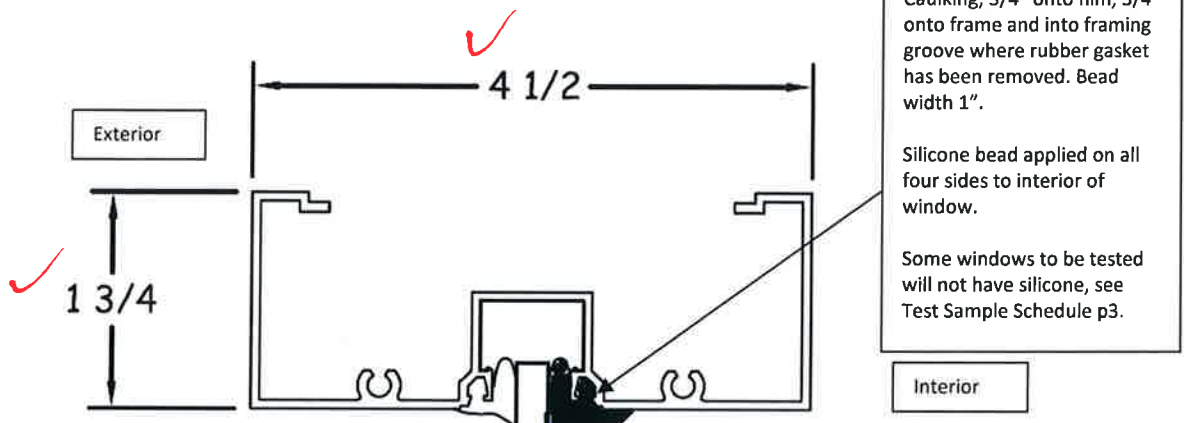
intertek

Test sample complies with these details.
Deviations are noted.

Report # I4621
Date 11/9/18 Tech CRK



SILL
DETAIL F9



HEAD
DETAIL F12

Glass:
single-pane or dual-pane
(single-pane shown)

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



Test sample complies with these details.
Deviations are noted.

Report # I4621
Date 11/9/18 Tech COE



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TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC.

Report No.: I4621.03-119-12 R0

Date: 11/13/18

SECTION 14

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	11/13/18	N/A	Original Report Issue