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EASTMAN PERFORMANCE FILMS, LLC

PENDULUM IMPACT TEST REPORT

SCOPE OF WORK
PENDULUM IMPACT TESTING AND CLASSIFICATION OF LLUMAR SCL SR PS8 FILM ON 4 MM GLASS

REPORT NUMBER
H6344.03-119-37-R1

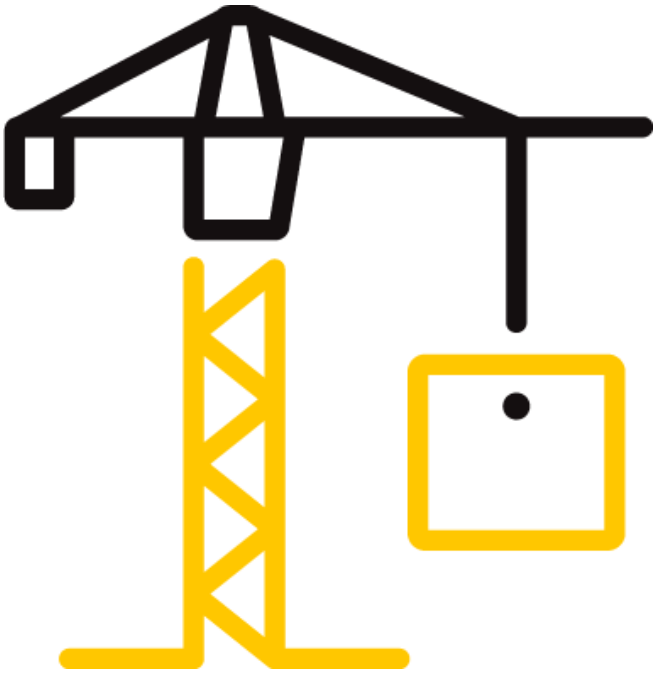
TEST DATE(S)
01/04/18

ISSUE DATE **REVISED DATE**
01/22/18 02/08/18

RECORD RETENTION END DATE
01/04/22

PAGES
6

DOCUMENT CONTROL NUMBER
ATI 00856 (08/08/17)
RT-R-AMER-Test-2890



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TEST REPORT FOR EASTMAN PERFORMANCE FILMS, LLC
Report No.: H6344.03-119-37-R1
Date: 01/22/18

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, Fieldale, Virginia to perform safety glazing material performance testing in accordance with DIN EN 12600: 2002 on their LLumar SCL SR PS8 film on 4 mm thick annealed glass. Results obtained are tested values and were secured by using the designated test method. Testing was conducted at the Intertek 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

Film: LLumar SCL SR PS8
Glass: 4 mm annealed glass
Glazing Type: Film-Backed (Organic Coated) Glass
Material Type: Asymmetric
Performance Classification:
Film Side - 1(B)1
Glass Side - 2(B)2

For INTERTEK B&C:

COMPLETED BY:	Todd M. Wilt	**REVIEWED BY:**	Virgal T. Mickley, Jr., P.E.
TITLE:	Lead Technician	**TITLE:**	Senior Staff Engineer
SIGNATURE:	Digitally Signed by: Todd M. Wilt	**SIGNATURE:**	Digitally Signed by: Virgal Thomas Mickley, Jr.
DATE:	02/08/18	**DATE:**	02/08/18

TMW:vtm/aaa

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SECTION 3
TEST METHOD

The specimens were evaluated in accordance with the following:

> **BS EN 12600 - 2002**, *Glass in building, Pendulum test - Impact test method and classification for flat glass,* European Standard (April 2003)

SECTION 4
MATERIAL SOURCE

Clear, annealed glass lites were delivered to Intertek from United Plate Glass on 11/06/17. Film (organic coating) supplied by Eastman Performance Films, LLC was applied to the annealed glass lites by Eastman Performance Films, LLC authorized installers at our test facility on 11/14/17 and allowed to condition for approximately seven (7) weeks prior to testing. The specimens were conditioned before and during testing between 20° to 29°C.

SECTION 5
SAMPLE RETENTION

All test specimens were destroyed by test or by personnel and have been disposed of as trash.

SECTION 6
EQUIPMENT

ASSET #	DESCRIPTION	CAL DUE DATE	ASSET #	DESCRIPTION	CAL DUE DATE
63303-1	Impact Frame	03/26/18	INT00433	Thermometer	01/11/18
005310	Impactor (50kg/110lb)	10/13/18	62039	Weight Scale	09/13/18
65852	Calipers/Thickness Gauge	09/13/18			

The test rig (impact frame and impactor) was last calibrated in accordance with Annex B of EN 12600 on 03/26/15. Per BS EN 12600 section B.4, the calibration shall be in effect for three years.

SECTION 7
LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Charles Adiasor	Eastman Chemical
Todd M. Wilt	Intertek B&C
Cory E. Straub	Intertek B&C

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SECTION 8
TEST PROCEDURE

Each test specimen was mounted within the test fixture, the film edges were captured by the specimen mounting clamps, and impacted in accordance with DIN EN 12600:2002.

The specimens were impacted from the lowest drop height and continued to next drop height as long as the specimen remained unbroken or, when broke, broke in accordance with the test performance requirements (BS EN 12600, clause 4a). Tested specimens which remained unbroken were tested again at the next sequentially higher drop height. Tested specimens which broke in accordance with the test performance requirements at the designated drop height were not impacted again, the damaged specimen was replaced by an untested specimen and impacted at the next sequentially higher drop height. Specimens were impacted on both sides.

Impact testing continued until all 3 drop heights were completed 4 times or until a specimen failed to meet the test performance requirements. Specimens were impacted from the following drop heights.

Impact Drop Heights

IMPACT CLASSIFICATION	3	2	1
DROP HEIGHT	190 mm	450 mm	1200 mm

Performance Classification

Glazing conforming to this standard is classified as follows:

- Its performance under the impact test;
- The drop height at which breakage occurred;
- The drop height at which the product passed in accordance with clause 4a;
- The mode of breakage of the material if it remains unbroken after impact test.

The performance classification of a glass product under this standard is expressed as **α (β) ϕ**:

α - Denotes the highest drop height (impact classification) at which the product either did not break or broke in accordance with the applicable clauses of BS EN 12600.

β - Denotes the mode of breakage.

ϕ - Denotes the highest height (impact classification) at which the product either did not break or when broke, broke in accordance with the test requirements (clause 4 a).

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SECTION 9
TEST SPECIMEN DESCRIPTION

Product: LLumar SCL SR PS8 on 4 mm glass
Glazing Type: Film-Backed/Organic Coated Glass
Glass Type: Annealed Glass
Sample Dimensions: 876 mm wide x 1937 mm high (±2 mm)
Overall Glazing Thickness: 4 mm
Glazing Make-up: 0.32 mm film applied to 4 mm annealed glass
Film Manufacturer: Eastman Performance Films, LLC
Film Brand: LLumar SCL SR PS8
Glass Manufacturer: United Plate Glass
All above thicknesses are nominal.

SECTION 10
TEST RESULTS

Test Date: 01/04/18
Lab Temperature: 22°C

Film-Side Test Results

IMPACT LEVEL	SPEC. NO.	OVERALL THICKNESS (MM)	ACCEPTANCE CRITERIA (GRAMS)		RESULTS & OBSERVATIONS AFTER IMPACT (GRAMS)		
			TOTAL	SINGLE	TOTAL	SINGLE	OBSERVATION
3	1	4.20	96.8	42.6	NA	NA	Glass did not break
	3	4.12	96.8	42.6	NA	NA	Glass did not break
	5	4.15	96.8	42.6	NA	NA	Glass did not break
	7	4.14	96.8	42.6	NA	NA	Glass did not break
2	1	4.20	96.8	42.6	Dust	Dust	Glass broke
	3	4.12	96.8	42.6	Dust	Dust	Glass broke
	5	4.15	96.8	42.6	Dust	Dust	Glass broke
	7	4.14	96.8	42.6	Dust	Dust	Glass broke
1	2	4.16	96.8	42.6	90.2	4.7	Glass broke
	4	4.13	96.8	42.6	81.7	2.0	Glass broke
	6	4.11	96.8	42.6	79.2	2.2	Glass broke
	8	4.15	96.8	42.6	85.8	1.5	Glass broke

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TEST RESULTS (continued)

Glass-Side Test Results

IMPACT LEVEL	SPEC. NO.	OVERALL THICKNESS (MM)	ACCEPTANCE CRITERIA (GRAMS)		RESULTS & OBSERVATIONS AFTER IMPACT (GRAMS)		
			TOTAL	SINGLE	TOTAL	SINGLE	OBSERVATION
3	1	4.13	96.8	42.6	NA	NA	Glass did not break
	3	4.12	96.8	42.6	NA	NA	Glass did not break
	4	4.13	96.8	42.6	NA	NA	Glass did not break
	5	4.13	96.8	42.6	NA	NA	Glass did not break
2	1	4.13	96.8	42.6	Dust	Dust	Glass broke
	3	4.12	96.8	42.6	Dust	Dust	Glass broke
	4	4.13	96.8	42.6	Dust	Dust	Glass broke
	5	4.13	96.8	42.6	Dust	Dust	Glass broke
1	2	4.14	96.8	42.6	**236.6**	17.8	Glass broke

Acceptance Criteria (Clause 4a):

Criterion 1: No openings develop that permit a 76 mm diameter sphere to pass when a maximum force of 25N (≈5.62 ft-lbs) is applied.

Criterion 2: All detached particles shall weigh, in total, no more than a mass equivalent to 10,000 mm^2 of the original test piece ("Total").

Criterion 3: No single fragment shall weigh more than 4,400 mm^2 of the original test piece ("Single").

SECTION 11
CONCLUSION

The specimens meet the impact test requirements of the referenced standard:

- Film Side - 1(B)1 performance classification
- Glass Side - 2(B)2 performance classification

SECTION 12
REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	01/22/18	N/A	Original Report Issue
1	02/07/18	2, 6	Add Film Side 1(B)1