

LUMOS TEST REPORT

SCOPE OF WORK

FM 4473 IMPACT RESISTANCE TESTING OF VISION MODULE SYSTEM, TYPE L AND S

REPORT NUMBER

S1476.01-801-44 R0

TEST DATE(S)

01/16/25

ISSUE DATE **[REVISED DATE]**

01/23/25 MM/DD/YY

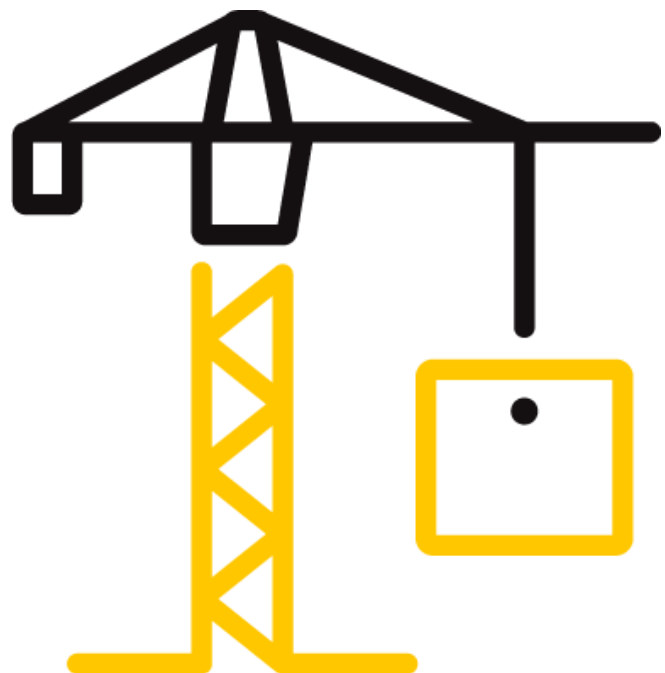
PAGES

12

DOCUMENT CONTROL NUMBER

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TEST REPORT FOR LUMOS

Report No.: S1476.01-801-44 R0

Date: 01/23/25

REPORT ISSUED TO LUMOS

555 Aspen Ridge Dr
Lafayette, CO 80026

SECTION 1 SCOPE

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by Lumos, 555 Aspen Ridge Dr, Lafayette, CO 80026 to perform impact resistance testing in accordance with FM 4473 on their Vision Modules, Type L and S. 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 Plano, TX.

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.

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.

SECTION 2 SUMMARY OF TEST RESULTS

Product Type: Solar Panel
Series/Model:
Product Classification Achieved: Class 4

For INTERTEK B&C:

COMPLETED BY:	Jacob MacMaster
TITLE:	Project Manager
SIGNATURE:	
DATE:	01/23/25

REVIEWED BY:	Jeffrey Crump FMPC
TITLE:	Laboratory Manager
SIGNATURE:	
DATE:	01/23/25

JM:jc

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SECTION 3

TEST METHOD(S)

The specimens were evaluated in accordance with the following:

ANSI/FM 4473-2011 (R2020), *American National Standard for Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice*

SECTION 4

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.

Installation of the tested product was performed by Intertek.

SECTION 5

EQUIPMENT

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

Missile: 50.8 mm (2.0") diameter ice balls

Cannon Identification Number: 005469

Timing Device: Electronic Beam Type

Timing Device Calibration Date: 08/08/24

SECTION 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Jacob MacMaster	Intertek B&C
Jovica Cijuk	Intertek B&C

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TEST SPECIMEN DESCRIPTION

Test Unit #1

Product Type: Solar Panel

Series/Model: Vision Module System, L Type

Color: N/A

Finish: N/A

Panel Size: 1079.5 mm (42.5") width by 2133.6 mm (84") length

Panel Weight: 46,720 g (103 lb)

Nominal Thickness: 6 mm (0.25")

Test Unit #2

Product Type: Solar Panel

Series/Model: Vision Module System, S Type

Color: N/A

Finish: N/A

Panel Size: 1073.2 mm (42.25") width by 1797.1 mm (70.75") length

Panel Weight: 37,194 g (82 lb)

Nominal Thickness: 6 mm (0.25")

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SECTION 8

TEST RESULTS

FM 4473, Ice Ball Impact Resistance

Sample Conditioning Temperature: 21°C (69°F) for at least 4 hours

Sample Conditioning Relative Humidity: 34.1% for at least 4 hours

Ice Ball Conditioning Temperature: -28°C (-18°F) for at least 48 hours

Muzzle Distance from Test Specimen: 1,524 mm (60")

The ambient temperature during testing was 21°C (69°F). The results are tabulated as follows.

Test Unit #1

IMPACT	MISSILE VELOCITY m/s (fps)	ORIENTATION	WEIGHT g (lbs)	DIAMETER mm (in.)	ENERGY ft-lb	IMPACT AREA	OBSERVATIONS	RESULTS
1	31 (103)	Vertical	64.0 (0.141)	50.8 (2.0)	23.27	Lower right	No visible cracking or breakage	Pass
2	32 (105)	Vertical	63.5 (0.140)	50.8 (2.0)	23.99	Lower right	No visible cracking or breakage	Pass
3	33 (107)	Vertical	63.0 (0.139)	50.8 (2.0)	24.72	Center	No visible cracking or breakage	Pass
4	33 (107)	Vertical	63.5 (0.140)	50.8 (2.0)	24.91	Center	No visible cracking or breakage	Pass
5	34 (111)	Vertical	63.5 (0.140)	50.8 (2.0)	26.81	Left middle	No visible cracking or breakage	Pass
6	32 (105)	Vertical	63.5 (0.140)	50.8 (2.0)	23.99	Left middle	No visible cracking or breakage	Pass
7	37 (120)	Vertical	63.0 (0.139)	50.8 (2.0)	31.09	Upper left corner	No visible cracking or breakage	Pass

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IMPACT	MISSILE VELOCITY m/s (fps)	ORIENTATION	WEIGHT g (lbs)	DIAMETER mm (in.)	ENERGY ft-lb	IMPACT AREA	OBSERVATIONS	RESULTS
8	32 (105)	Vertical	65.5 (0.144)	50.8 (2.0)	24.74	Upper left corner	No visible cracking or breakage	Pass
9	31 (101)	Vertical	64.5 (0.142)	50.8 (2.0)	22.55	Upper right, on solar cell	No visible cracking or breakage	Pass
10	30 (99)	Vertical	65.0 (0.143)	50.8 (2.0)	21.83	Upper right, on solar cell	No visible cracking or breakage	Pass
11	29 (94)	Vertical	64.5 (0.142)	50.8 (2.0)	19.53	Upper middle, on rail	No visible cracking or breakage	Pass
12	31 (102)	Vertical	64.0 (0.141)	50.8 (2.0)	22.82	Upper middle, on rail	No visible cracking or breakage	Pass

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Test Unit #2

IMPACT	MISSILE VELOCITY m/s (fps)	ORIENTATION	WEIGHT g (lbs)	DIAMETER mm (in.)	ENERGY ft-lb	IMPACT AREA	OBSERVATIONS	RESULTS
1	30 (99)	Vertical	63.5 (0.140)	50.8 (2.0)	23.08	Center	No visible cracking or breakage	Pass
2	32 (106)	Vertical	63.5 (0.140)	50.8 (2.0)	23.99	Center	No visible cracking or breakage	Pass
3	31 (100)	Vertical	67.5 (0.149)	50.8 (2.0)	23.13	Right middle, on solar cell	No visible cracking or breakage	Pass
4	31 (101)	Vertical	64.5 (0.142)	50.8 (2.0)	22.55	Right middle, on solar cell	No visible cracking or breakage	Pass
5	31 (101)	Vertical	63.5 (0.140)	50.8 (2.0)	22.20	Upper right corner	No visible cracking or breakage	Pass
6	32 (104)	Vertical	66.0 (0.146)	50.8 (2.0)	24.46	Upper right corner	No visible cracking or breakage	Pass
7	31 (102)	Vertical	63.0 (0.139)	50.8 (2.0)	22.46	Upper middle, on rail	No visible cracking or breakage	Pass
8	32 (105)	Vertical	64.5 (0.142)	50.8 (2.0)	24.37	Upper middle, on rail	No visible cracking or breakage	Pass

**SECTION 9
CONCLUSION**

The samples tested met the performance requirements set forth in the referenced test procedures for a Class 4.

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SECTION 10
SKETCH(ES)



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 Project Number Owner Discipline
 I umimex
 Client
 Project

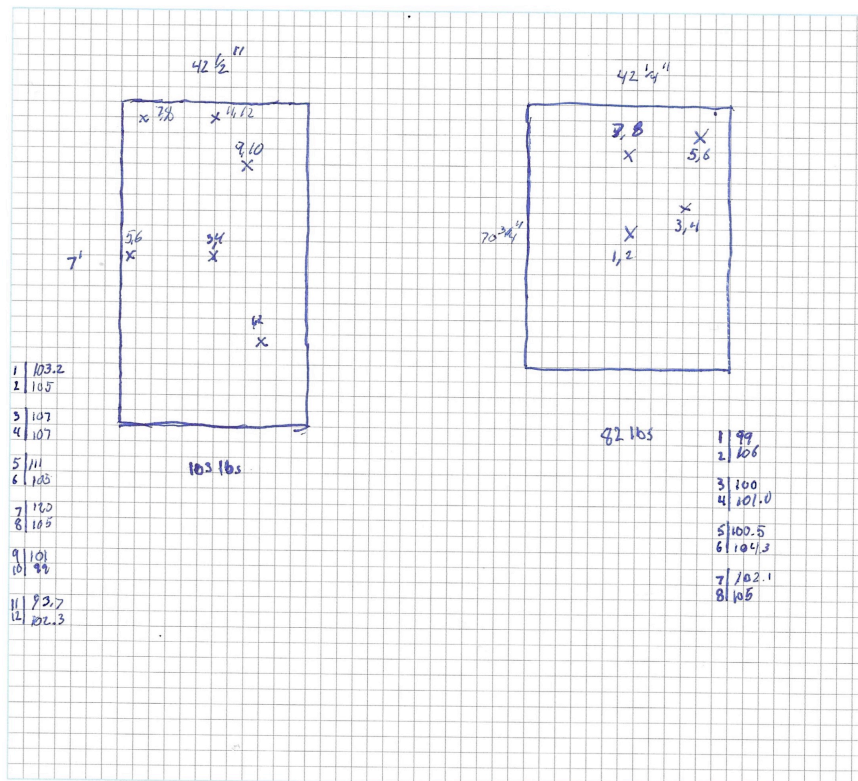
Test Equipment:

Asset #	Description	Cal Due

Test Data Sheet

1/16/25
 Date
 JM / JC
 Technician(s)
 69
 Temperature
 34.108
 Barometric Pressure
 R.H. 75

Asset #	Description	Cal Due



Sketch No. 1
Brief Description

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SECTION 11

PHOTOGRAPHS



Photo No. 1
Test Unit #1

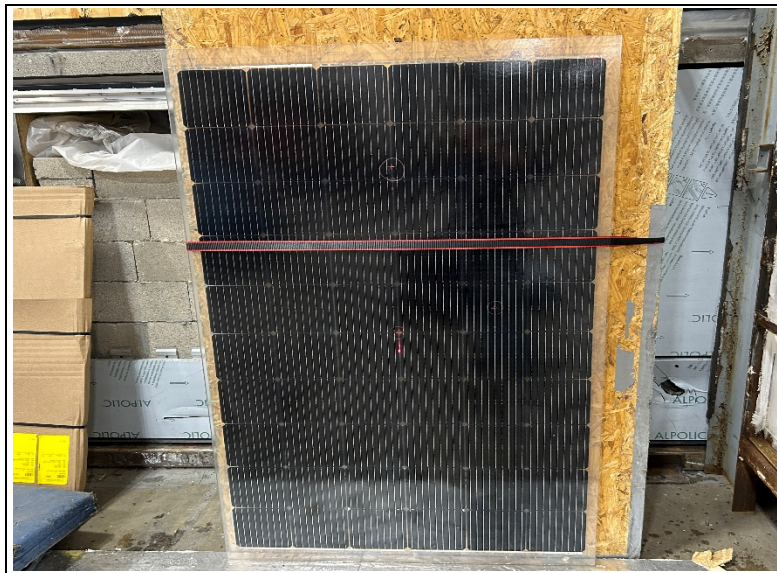


Photo No. 2
Test Unit #2

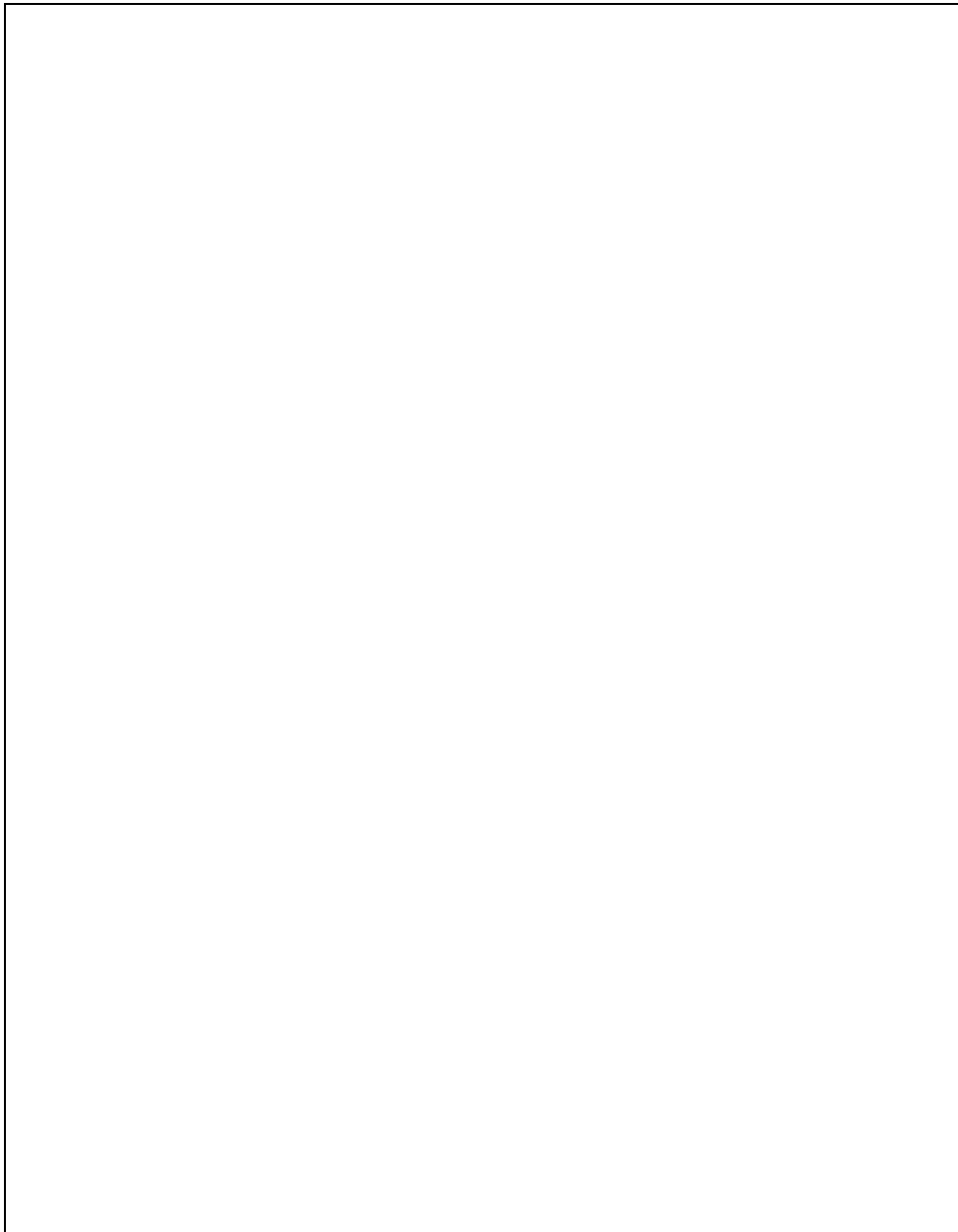
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SECTION 12

BILL OF MATERIALS



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SECTION 1 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.

Note: Complete drawings packet on file with Intertek B&C.

PDF with blank page for each drawing which will be inserted into the report to ensure final pagination of report matches number of pages of final PDF once drawings are inserted in place of blank pages.



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SECTION 2

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	01/23/25	N/A	Original Report Issue