

UNIENICE CO. LTD. (ALFREX) TEST REPORT

SCOPE OF WORK

MODIFIED FM 4473 IMPACT RESISTANCE TESTING OF
ALFREX SOLID 3 MM FLUOROPOLYMER PRE-FINISHED, ALUMINIUM PANEL
(ALLOY 3003-H14)

REPORT NUMBER

K8433.01-109-44

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TEST REPORT FOR UNIENCE CO. LTD. (ALFREX)

Report No.: K8433.01-109-44

Date: 05/20/20

REPORT ISSUED TO

UNIENCE CO. LTD. (ALFREX)

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Heungdeok-gu, Cheongju-si

Chungcheongbuk-do

SOUTH KOREA

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Unience Co. Ltd. (Alfrex) to perform impact resistance testing in accordance with FM 4473 on their Alfrex Solid 3 mm Fluoropolymer Pre-finished, aluminium panel (Alloy 3003-H14). 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.

For INTERTEK B&C:

COMPLETED BY:	Richard E. Hartman III	REVIEWED BY:	Timothy J. McGill
TITLE:	Technician – Product Testing	TITLE:	Manager – Product Testing
SIGNATURE:		SIGNATURE:	
DATE:	05/20/20	DATE:	05/20/20

REH:nls

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SECTION 2

TEST METHOD(S)

The specimen was evaluated in general accordance with the following:

ANSI/FM 4473 (2011), *Specification Test Standard for Impact Resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls*. American National Standard, FM Approvals (January 2011).

SECTION 3

MATERIAL SOURCE/INSTALLATION

Test specimen(s) was 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 B&C. A 36" (914.4 mm) x 36" (914.4 mm) nominal 2x4 (50.8 mm x 101.6 mm) frame with one center stud was utilized for the panel installation. #8 x 1-5/8" (M4 x 41 mm) flat head screws were placed at the installation rails spaced 1" (25.4 mm) from ends and at midspan of each side.

SECTION 4

EQUIPMENT

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

Missile: 1-1/4" (31.8 mm), 1-1/2" (38.1 mm), 1-3/4" (44.5 mm), and 2.0" (50.8 mm) diameter ice balls

Cannon Identification Number: A1207

Timing Device: Radar Gun - 63028

Timing Device Calibration Date: 1/3/20

SECTION 5

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Andrew P. Mehalick	Intertek B&C
Vicki L. McElwain	Intertek B&C
Timothy J. McGill	Intertek B&C
Richard E. Hartman III	Intertek B&C

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TEST SPECIMEN DESCRIPTION

Product Type: Aluminium Panel

Series/Model: Alfrex Solid 3 mm Fluoropolymer Pre-finished Aluminium Panel (Alloy 3003-H14)

Color: Dark Grey (Monument – AS-1004)

Finish: Smooth (Solid)

Overall Assembly Size: 36" (914.4 mm) width by 36" (914.4 mm) length

Nominal Thickness: 0.121" (3.1 mm)

Tile Description:

Individual Panel Weight: 21 lb (9525 g)

Individual Panel Size: 35-3/8" (890 mm) width by 35-3/8" (890 mm) length

Exposed Panel Size: 35-3/8" (890 mm) width by 35-3/8" (890 mm) length

Number of Panels: One

Deck Construction:

The wood test deck was 3' (914.4 mm) wide by 3' (914.4 mm) high and was constructed from nominal 2x4 (50.8 mm x 101.6 mm) Spruce-Pine-Fir lumber with one stud located at midspan. Nominal 15/32" (11.9 mm) plywood was secured to the deck using #8 x 1-5/8" (M4 x 41 mm) flat head screws spaced 8" (203.2 mm) on center.

Panel Construction:

The panel was constructed from a 0.121" (3.1 mm) thick aluminium sheet. The panel utilized a 90 degree return leg, 7/8" (22.2 mm) wide, running the length of all sides and sealed with sealant at the corners. 0.065" (1.7 mm) thick steel installation rails were butted and secured to the return legs using 3/16" (4.8 mm) diameter rivets spaced 2" (50.8 mm) from the ends and one at midspan.

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TEST RESULTS

FM 4473, Ice Ball Impact Resistance

Ice Ball Conditioning Temperature: -7°F (-22°C) for at least 48 hours

Muzzle Distance from Test Specimen: 60" (1524 mm)

The ambient temperature during testing was 62° - 64°F (17° - 18°C). The results are tabulated as follows.

Test Unit #1

IMPACT	MISSILE					IMPACT AREA	OBSERVATIONS	RESULTS
	VELOCITY fps (m/s)	ORIENTATION	WEIGHT lbs (g)	DIAMETER in. (mm)	ENERGY ft-lb (Nm)			
1-1 (Class 1)	88.2 (26.9)	15° of vertical	0.031 (14.0)	1.25 (31.75)	3.73 (5.1)	Top left corner of panel, 3-15/16" (100.0 mm) from the top and left edges	No visible cracking, breakage, or indentation	Pass
1-2 (Class 1)	88.1 (26.9)	15° of vertical	0.031 (14.0)	1.25 (31.75)	3.73 (5.1)	Center of panel, 11-13/16" (300.0 mm) from the top and left edges	No visible cracking, breakage, or indentation	Pass

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IMPACT	MISSILE					IMPACT AREA	OBSERVATIONS	RESULTS
	VELOCITY fps (m/s)	ORIENTATION	WEIGHT lbs (g)	DIAMETER in. (mm)	ENERGY ft-lb (Nm)			
1-3 (Class 1)	88.1 (26.8)	15° of vertical	0.031 (14.0)	1.25 (31.75)	3.72 (5.0)	Top edge of panel, 17-3/4" (450.9 mm) from the left edge and 3-15/16" (100.0 mm) from the top edge	No visible cracking, breakage, or indentation	Pass
2-1 (Class 2)	96.8 (29.5)	15° of vertical	0.058 (26.5)	1.46 (37.1)	8.51 (11.5)	Top right corner, 3-15/16" (100.0 mm) from the top and right edges	No visible cracking, breakage, or indentation	Pass
2-2 (Class 2)	96.8 (29.5)	15° of vertical	0.058 (26.5)	1.47 (37.3)	8.51 (11.5)	Center of panel, 11-7/8" (301.6 mm) from the top edge and 11-3/4" (298.5 mm)" from the right edge	No visible cracking, breakage, or indentation	Pass
2-3 (Class 2)	95.3 (29.0)	15° of vertical	0.058 (26.5)	1.47 (37.3)	8.25 (11.2)	Right edge of panel, 17-3/4" (450.9 mm) from the top edge and 3-7/8" (98.4 mm) from the right edge	No visible cracking, breakage, or indentation	Pass

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IMPACT	MISSILE					IMPACT AREA	OBSERVATIONS	RESULTS
	VELOCITY fps (m/s)	ORIENTATION	WEIGHT lbs (g)	DIAMETER in. (mm)	ENERGY ft-lb (Nm)			
3-1 (Class 3)	99.7 (30.4)	15° of vertical	0.093 (42.1)	1.75 (44.5)	14.34 (19.4)	Center of panel, 11-7/8" (301.6 mm) from the bottom edge and 11-3/4" (298.5 mm) from the right edge	No visible cracking, breakage, or indentation	Pass
3-2 (Class 3)	99.7 (30.4)	15° of vertical	0.093 (42.1)	1.75 (44.5)	14.34 (19.4)	Bottom edge of panel, 3-7/8" (98.4 mm) from the bottom edge and 17-5/8" (447.7 mm) from the right edge	No visible cracking, breakage, or indentation	Pass
3-3 (Class 3)	101.2 (30.8)	15° of vertical	0.093 (42.1)	1.75 (44.5)	14.77 (20.0)	Bottom right corner, 3-7/8" (98.4 mm) from the bottom and right edges	No visible cracking, breakage, or indentation	Pass
4-1 (Class 4)	114.4 (34.9)	15° of vertical	0.139 (62.9)	1.99 (50.6)	28.21 (38.2)	Left edge of panel, 3-7/8" (98.4 mm) from the left edge and 17-5/8" (447.7 mm) from the top edge	No visible cracking or breakage, 0.056" (1.4 mm) deep dent at impact location	Pass

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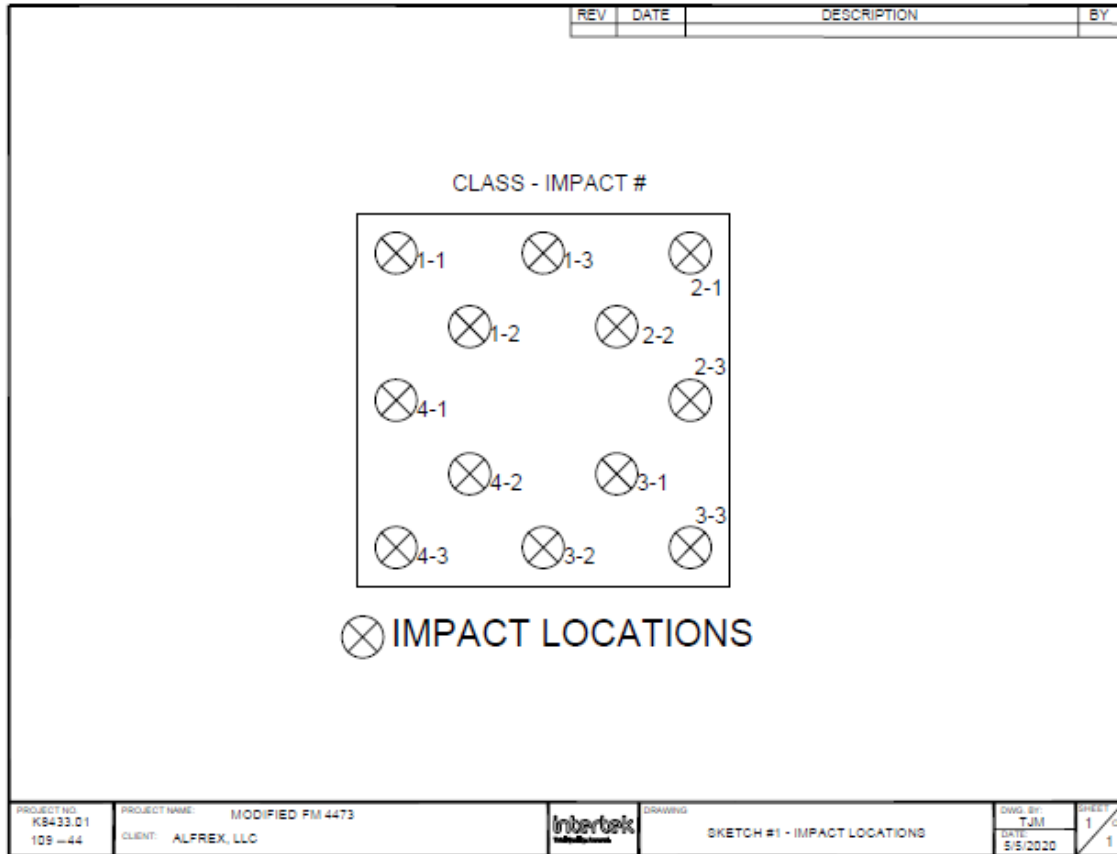
IMPACT	MISSILE					IMPACT AREA	OBSERVATIONS	RESULTS
	VELOCITY fps (m/s)	ORIENTATION	WEIGHT lbs (g)	DIAMETER in. (mm)	ENERGY ft-lb (Nm)			
4-2 (Class 4)	112.9 (34.4)	15° of vertical	0.139 (62.9)	1.97 (50.0)	27.49 (37.3)	Center of panel, 11-15/16" (303.2 mm) from the left edge and 11-3/4" (298.5 mm) from the bottom edge	No visible cracking or breakage, 0.045" (1.1 mm) deep dent at impact location	Pass
4-3 (Class 4)	35.3 (115.9)	15° of vertical	0.139 (62.9)	1.97 (50.0)	28.94 (39.2)	Bottom left corner, 3-15/16" (100.0 mm) from the bottom and left edges	No visible cracking or breakage, 0.069" (1.8 mm) deep dent at impact location	Pass

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SECTION 8 SKETCH(ES)



**Sketch No. 1
Impact Locations**

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SECTION 9 PHOTOGRAPHS



Photo No. 1
View of Test Specimen Before Testing

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Photo No. 2
View of Test Specimen After Testing



Total Quality. Assured.

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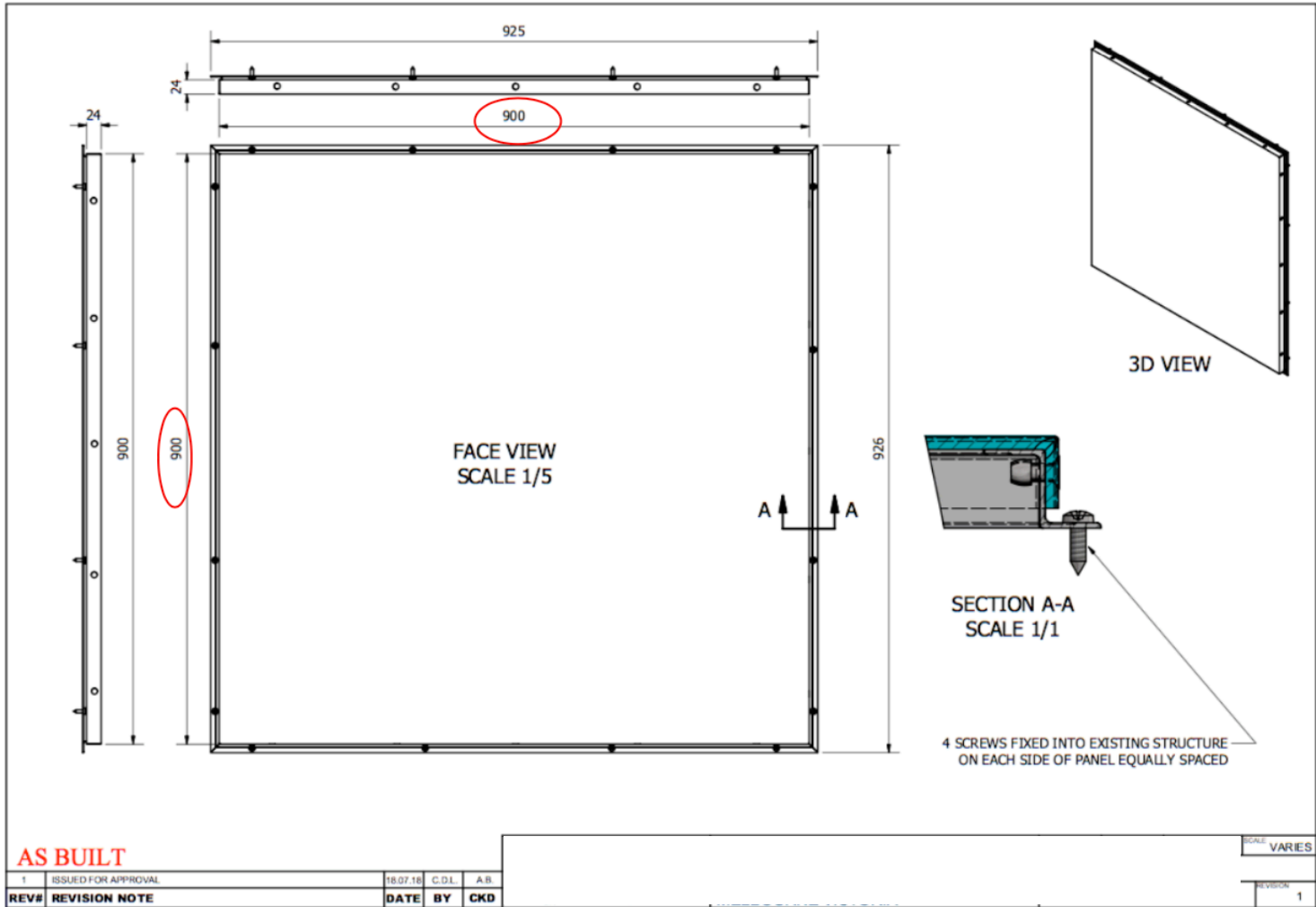
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SECTION 10 DRAWINGS

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.



AS BUILT

REV#	REVISION NOTE	DATE	BY	CHKD
1	ISSUED FOR APPROVAL	18.07.18	C.D.L.	A.B.

SCALE	VARIES
REVISION	1



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SECTION 11

REVISION LOG

REVISION #	DATE	PAGES	REVISION
0	05/20/20	N/A	Original Report Issue