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EVALUATION CENTER
16015 Shady Falls Road
Elmendorf, TX 78112
Phone: (210) 635-8100
Fax: (210) 635-8101
www.intertek.com

RENDERED TO

Unience Co., Ltd.
8F S08, Garden5 Tool, 292,
Munjung-dong, Songpa-gu,
Seoul 135-884
Korea

PRODUCT EVALUATED: 4-mm Alfrex ACM Panels
EVALUATION PROPERTY: Fire Resistance

Report of Testing 4-mm Alfrex ACM Panels for compliance with the applicable requirements of the following criteria: *ASTM E119-12a Standard Test methods for fire Test of Building Construction and materials, January 2012 Edition.*

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TEST REPORT

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2 Introduction

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for Unience Co., Ltd. on a façade panel system which used 4-mm thick Alfrex ACM panels manufactured by Unience Company, Ltd. This testing was conducted to evaluate its fire resistance. Testing was conducted in accordance with the applicable requirements and following the standard methods of **ASTM E119–12a Standard Test Methods for Fire Tests of Building Construction and Materials, 2012 Edition**. This evaluation took place June 9, 2014.

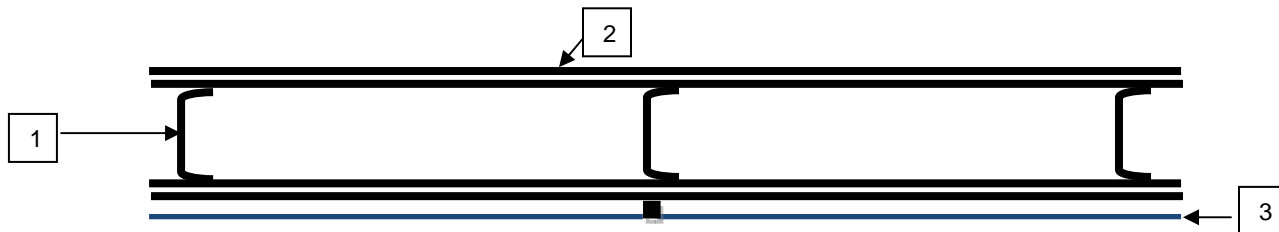
3 Test Samples

3.1. SAMPLE SELECTION

Samples were selected on April 8, 2014 by Intertek representative Roy Lee at the Unience Co, Ltd. manufacturing facility, located at 46, Gwahaksaneop1-ro, Oksan-myeon, Cheongwon-gun, Chungcheongbuk-do, Korea. Samples marked with Mr. Lee's signature and the selection date were brought to the Evaluation Center on June 5, 2014 by EF&I Panels (installer).

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

A symmetrical, 10' x 10', non-load bearing wall was constructed of steel studs, gypsum board, and the 4-mm Alfrex ACM Panels (see Appendix A).



1. Steel Framing - The wall was framed using 2-1/2" x 1-3/8", 25 gauge galvanized steel studs spaced 24" o.c floated between the top and bottom 25 gauge steel track.
2. Interior and Exterior Gypsum Board – Two layers of 4' x 10' x 5/8" American Gypsum Firebloc TYPE XT™ gypsum installed with the long dimension oriented perpendicular to the studs. The base layer was fastened to the framing with 1-1/4" Type S self-drilling drywall screws spaced 16" o.c. The face layer was installed with the long dimension oriented horizontally offset 24" from the base layer and secured using 1-5/8" self-tapping Type S drywall screws spaced 16" o.c., 8" offset from those of the base layer. The opposite side of the wall assembly received the gypsum board in the same manner, but with the joints offset 24". The joints and fasteners of the face layers received a Level 2 finish.
3. Interior and Exterior Cladding – Two nominal 5' x 10' 4-mm Alfrex ACM Panels Lot # 2014M04D008 were installed on the interior and exterior surface of the wall assembly. The panels were installed with the long dimension oriented vertically leaving a nominal 1/2" between panel edges. Panels were secured using #12 x 3" long TEK screws spaced nominally 24" o.c. through the pre-installed angles around the perimeter of the panels. 7/8" diameter Tundra

Foam (Industrial Thermo Polymers Limited) was then pressed into the ½" gap between the two panels. Once the foam was pressed into place a bead of Dow Corning® 795 Silicone Building Sealant (Lot No. 0007774313) was used to fill the rest of the void between the panels. Once the sealant was brought level with the exterior of the wall, all the excess sealant material was removed leaving a clean seal along the joint.

4 Testing and Evaluation Methods

4.1. INSTRUMENTATION

The unexposed surface of the assembly was instrumented with a total of ten (10) 24 GA, Type K, fiberglass jacketed thermocouples installed on the unexposed surface of the wall. TC#s 1-9 were evenly distributed across the surface of the wall and TC# 10 was installed over the vertical joint (see Appendix A). The output of the thermocouples and the furnace probes was monitored by a 100-channel Yokogawa, Inc., Darwin Data Acquisition Unit. The computer was programmed to scan every 6 and save data every 30 seconds. Following the test, the files were imported into MS Excel for tabular and graphical display (presented in Appendix B).

4.2. TEST STANDARD

Testing was conducted in accordance with the applicable requirements and following the standard methods of **ASTM E119–12a Standard Test Methods for Fire Tests of Building Construction and Materials, 2012 Edition.**

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The test was initiated on June 9, 2014. Karl Reilmann and Steve Kalosis representing Intraco Corporation and Mr. Kim and Mr. Yang representing Unience Co., Ltd. were present to witness the test. The ambient temperature at the time of the test was 81° F and the relative humidity was 79%.

Observations made during the test are listed below:

Time (min:sec)	Observation
0:00	The test was started at 8:45am
2:55	Panels began rippling on exposed surface
4:00	Heavy flaming in furnace due to ignition of ACM panels on exposed surface
26:00	Joints on face layer of gypsum began to open
40:00	The face layer of the gypsum joint opened approximately a 1/2" wide
60:00	An opening had developed on joint on the exposed surface
65:00	The face layer was beginning to fall
80:00	There was an opening on the base layer on exposed side approximately a 1/2" wide
92:00	The base layer beginning to fall exposing base layer of unexposed surface
120:00	The test was terminated

Immediately following the fire test, the assembly was removed from the furnace, and the exposed surface was subjected to the impact, cooling and erosion effects of the standard hose stream test. The water stream was applied from a distance of 20 feet, at an angle of 90°, at a pressure of 30 psig for 2-1/2 minutes, in compliance with the standard.

Time (min:sec)	Hose Stream Observations
0:00	The test was initiated
2:30	The test was terminated; there was no projection through to the unexposed surface

The test assembly withstood the effects of the fire resistance test without passage of flame, or gases hot enough to ignite cotton waste, or with passage of water from the hose stream test through to the unexposed surface. Transmission of heat across the wall did not raise the average temperature on the unexposed surface more than 250°F above the average initial ambient temperature, or the temperature at any single thermocouple more than 325°F above the initial ambient temperature.

Assembly drawings, the test data and photographs documenting the test are located in the Appendices of this test report.

5.2. EXAMINATION OF RESULTS

Surface Deflection

The deflection of the unexposed surface was measured at 3 equidistant locations, 30", 60", and 90" from left to right, across the horizontal midline, during the span of the test. The amount of that deflection is presented in the table below.

Time (min)	Position 1 (in)	Position 2 (in)	Position 3 (in)
0:00	3 1/8	3 1/4	3 1/4
18:00	3/8	1/4	1/4
30:00	3/8	1/4	1/4
45:00	3/8	1/4	1/4
60:00	7/8	3/4	3/4
75:00	7/8	3/4	3/4
90:00	1/2	1/4	1/4
105:00	5/8	1/4	1/4
118:00	7/8	3/4	3/4

5.2.1. Correction Factor for the Fire Endurance Test

In accordance with the E119 test standard, a calculation for any correction to the indicated fire resistance period was done. The correction factor was then mathematically added to the indicated fire resistance period, yielding the fire resistance period achieved by this specimen:

ITEM	DESCRIPTION	TEST VALUE
C	correction factor	0.07 minutes 4 seconds
I	indicated fire-resistance period	120 minutes
A	area under the curve of indicated average furnace temperature for the first three fourths of the indicated period	132888 (°F•min)
As	area under the standard furnace curve for the same part of the indicated period	132770 (°F•min)
ITEM	DESCRIPTION	TEST VALUE
L	lag correction	3240
	FIRE RESISTANCE PERIOD ACHIEVED BY THIS SPECIMEN ==>	120 minutes

Note: The standard specifies that the fire resistance be determined to the nearest integral minute.

6 Conclusion

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for Unience Co., Ltd. on a façade panel system which used 4-mm thick Alfrex ACM panels manufactured by Unience Company, Ltd. This testing was conducted to evaluate its fire resistance. Testing was conducted in accordance with the applicable requirements and following the standard methods of **ASTM E119–12a Standard Test Methods for Fire Tests of Building Construction and Materials, 2012 Edition**. This evaluation took place June 9, 2014.

Based on the data from this test, the 4-mm Alfrex ACM Panels met the conditions of acceptance of the above mentioned standard and achieved a 120 minute fire resistance rating.

The conclusions of this test report may be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA, INC.

Tested by: *Signature on File*
Jeffrey Patterson
Project Engineer, Fire Resistance

Reviewed by: 
Mike Dey
Staff Engineer