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PRODUCT EVALUATED: 4-mm thick Alfrex ACM Panel

EVALUATION PROPERTY: Fire Propagation

Report of Testing 4-mm thick Alfrex ACM Panel for compliance with the applicable requirements of the following criteria: *NFPA 285 Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 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 evaluated the product's fire propagation characteristics. Testing was conducted in accordance with the applicable requirements and following the standard methods of **NFPA 285 Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 2012 Edition**. This evaluation took place June 9, 2014.

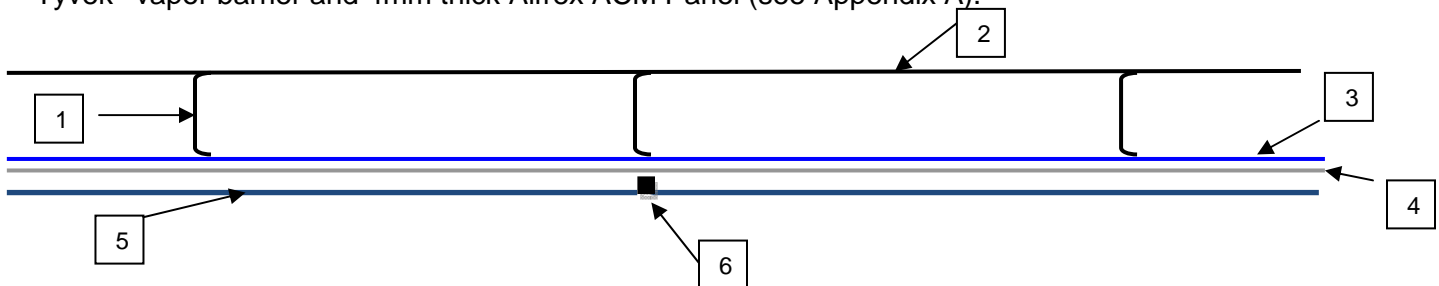
3 Test Samples

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 with Mr. Lee's signature, lot number 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

An 18' high x 14' wide 24" o.c. wall was constructed of Steel Studs, DensGlass® sheathing, Tyvek® vapor barrier and 4mm thick Alfrex ACM Panel (see Appendix A).



1. Studs – 3-5/8" x 1-3/8", 20 GA galvanized steel studs, 24" o.c., secured with 7/16" long, pan head framing screws to 20 GA top and bottom track. Nominal 1-1/2 "x 1/2", 16 GA lateral bracing installed horizontally nominal 48" o.c. up the interior surface of the wall assembly. Nominal 4", 4pcf density safig was installed at the floor lines.
2. Interior Cladding – 4' x 10' x 5/8" American Gypsum® FireBloc TYPE X™ gypsum board installed with the long dimension perpendicular to the studs, fastened to the framing with #6 x 1-1/4" self-drill, zinc-plated Bugle head screws spaced 8" o.c. around the perimeter and 12" o.c. in the field; joints and fasteners received a Level 2 finish.
3. Exterior Sheathing - 4' x 8' x 5/8" DensGlass® Gold Exterior Sheathing (Georgia Pacific) installed over exterior side, with the long edge perpendicular to the studs; secured with #6 1-1/4" self-drilling-zinc plated screws, spaced 8" around the perimeter and 12" in the field. The

inside perimeter of the window was also lined covered with one layer 5/8" DensGlass® sheathing.

4. Vapor Barrier – One layer of DuPont™ Tyvek® vapor barrier was installed over the exterior sheathing with the long dimension oriented horizontally on the wall and stapled into place; seams were overlapped nominal 6" and stapled nominal 24" oc.
5. Exterior Panels – 4-mm Alfrex ACM Panels (Lot # 2014M04D008) installed as shown in Appendix A. The panels were installed leaving a nominal 1/2" between panel edges. Panels were secured using #12 x 3" long TEK screws spaced nominal 24" o.c. through the pre-installed angles around the perimeter of the panels.
6. Joint Treatment – 7/8" diameter Tundra Foam (Industrial Thermo Polymers Limited) was inserted into the joints between the panels. After the Tundra Foam was pressed into the seams, a bead of Dow Corning® 795 Silicone Building Sealant (Lot No. 0007774313) was used to fill the rest of the void between the panels. All excess material was removed from the joints.
7. Flashing (Not Shown) - Nominal 2" x 6" L shaped 0.040" aluminum flashing (not shown) was installed around the window opening with the 2" leg secured to the interior and exterior faces of the wall assembly, fastened with 1-1/4" self-drilling screws 24" o.c.

4 Testing and Evaluation Methods

4.1. INSTRUMENTATION

Fifty-four (54) 24 GA, Type K, fiberglass jacketed thermocouples were installed in compliance with the standard (see Appendix A). The output of the thermocouples was monitored by a 100-channel Yokogawa, Inc., Darwin Data Acquisition Unit. The computer was programmed to scan and save data every 15 seconds. Following the test, those 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 **NFPA 285 Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 2012 Edition.**

The assembly was secured to the test laboratory's Intermediate-Scale, Multi-story Test Apparatus (ISMA), with ceramic fiber insulation installed between the assembly and the furnace to create an effective seal. The window burner was centered on the vertical centerline of the window, 9" below the top of the opening, and with the longitudinal centerline of the burner 3" from the plane of the exterior wall, consistent with the standard and the calibration of the test apparatus. The assembly was tested using commercial grade propane gas at the flow rates determined during the calibration of the apparatus (See Appendix B).

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 82°F and the relative humidity was 74 %.

Observations made during the test are listed below:

Time (min:sec)	Observation
0:00	The test was initiated at 11:18 am
1:18	The paper on the gypsum board ignited and started flaming out the window
2:20	Flaming of the paper on the gypsum board stopped
2:50	The flashing on the header started to buckle
5:00	The exterior window burner was ignited
11:30	Window flashing was melting and dripping, the ACM panel started deflecting above window at the same time
16:00	Right ACM panel above the window opened and the core began melting and dripping onto the floor
18:15	Flames reached the 5' mark and flame tips reached to the 8' mark
20:00	ACM core continued to fall; flames were seen on the floor and sill
22:00	There was flaming at the joint at bottom of the 2nd row of panels above the window
26:00	The panel core continued to fall with flames on the floor and sill
30:00	The test was terminated
35:00	Flaming on the sill continued and flames were flickering at the joint at the bottom of the 2 nd panels
38:00	Glowing at the panel joint had stopped, flaming on the surface continued

Time (min:sec)	Second Story Observations
1:39	There was smoke from the lower left corner
17:51	There was light smoke from the center at the floor
23:53	The smoke was thicker

Flames on the exterior panels were within the established limit during the test (10' above the top of the window, 5' beyond the side of the window); there were no flames that spread through the core components or infiltrated the second story room; none of the thermocouples exceeded their maximum limits.

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 evaluated the product's fire propagation characteristics. Testing was conducted in accordance with the applicable requirements and following the standard methods of **NFPA 285 Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 2012 Edition**. This evaluation took place June 9, 2014.

Based on the data from this test, the 4-mm thick Alfrex ACM Panel system met the conditions of acceptance of the standard.

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.

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