

CLIENT: **Kreysler & Associates**
501 Green Island Road
American Canyon, CA 94503

Report No: RJ4313-1-REV1

Date: January 25, 2016
Revision Date: February 17, 2016

SUBJECT: Physical testing on Kreysler Fireshield 285.

SAMPLE ID: Kreysler Fireshield 285 fire resistant composite panels constructed from fiberglass and fire retardant resin with a polymer concrete facecoat.

SAMPLING DETAIL: Accelerated weathering samples were submitted to the laboratory directly by the client for testing as approved by ICC ES. No special sampling conditions or sample preparation were observed by QAI. Freeze-thaw, Flexural Strength, Salt Spray and Water Resistance samples were selected from production as witnessed by a QAI representative at the client's manufacturing facility located at 501 Green Island Road, American Canyon, California on October 20, 2015. QAI documented the materials and manufacturing procedures in accordance with ICC-ES AC85, Section 3.1.

DATE OF RECEIPT: Samples were received at QAI Laboratories on October 9, 2015.

TESTING PERIOD: October 9, 2015 thru January 21, 2016.

AUTHORIZATION: QAI Test Proposal MB-2015-083102R1 dated August 31, 2015 signed by Bill Kreysler of Kreysler and Associates on September 21, 2015.

TESTS REQUESTED Accelerated weathering, Freeze-Thaw, Flexural strength, Salt Spray Resistance and Water resistance tests per Sections 4.1, 4.2, 4.4, 4.5 and 4.6 of ICC ES, *Acceptance Criteria For Polymer-Based And Polymer-Modified Exterior And Interior Wall Cladding*, AC 92, Approved April 2002, (Corrected December 2010).

TEST RESULTS: Test results are provided on subsequent pages of this report.

Prepared By



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Project Leader-Physical Testing

**Signed for and on behalf of
QAI Laboratories Inc.**



Drew Mersereau
Laboratory Supervisor

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ACCELERATING- WEATHERING (WEATHEROMETER) TEST PER SECTION 4.1 OF ICC ES AC 92

Test Procedure

Testing was performed in accordance with Section 4.1 of ICBO ES AC 92 Approved April 2002, (Corrected December 2010) and ASTM G 155-05a, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*. Five, 3-inch by 9-inch specimens from three representative coating finishes were subjected to 2,000 hours of accelerated weathering using a 6,500 Watt Xenon, Type B, weatherometer using the Cycle 1 operating schedule. At the conclusion of the test the specimens were examined for cracking, checking, crazing, erosion, or other characteristics that might affect performance as an exterior wall covering.

Test Requirements

After exposure, there shall be no cracking, checking, crazing, erosion, or other characteristics that might affect performance as an exterior wall covering of any specimen when viewed under minimum 5X magnification.

Test Results

After 2,000 hours of exposure, there was no cracking, checking, crazing, erosion or other characteristics that might affect performance as a wall cladding on any of the fifteen specimens when viewed by minimum 5X magnification. A photograph of each of the three representative specimens after exposure is provided in the appendix of this report.

Conclusion:

The Kreysler Fireshield 285 product **passed** the accelerated weathering test and demonstrated compliance with Section 4.1 of ICC ES AC 92.

FREEZE-THAW TEST PER SECTION 4.2 OF ICC ES AC 92

Test Procedure

Testing was performed in accordance with Section 4.2.1 of ICBO ES AC 92 Approved April 2002, (Corrected December 2010). Twenty 6-inch by 12-inch specimens were subjected to 10 freeze-thaw cycles with each cycle consisted of air drying in a convection oven at 120°F for a minimum of 8 hours, immersion in 70°F to 80°F water for 8 hours, and then exposure to -20°F in a cold chamber for a minimum of 16 hours.

Test temperatures were monitored using a Fluke 52 and a Type K thermocouple.

Test Requirements

After exposure, there shall be no cracking, checking, crazing, erosion, or other characteristics that might affect performance as an exterior wall covering of any specimen when viewed under minimum 5X magnification. Delamination or indications of the same between component materials or layers are also defined as failure. The average flexural strength shall be at least 60 percent of the average strength of the dry-control specimens.

Test Results

After 10 freeze-thaw cycles, the specimens did not sustain any cracking, checking, crazing, erosion or other characteristics that might affect performance as a wall cladding when viewed by minimum 5X magnification. No delamination of any of the twenty specimens occurred. Results of Flexural Strength Tests are provided on page 5 of this report.

Conclusion:

The Kreysler Fireshield 285 product **passed** the freeze-thaw test and demonstrated compliance with Section 4.2 of ICC ES AC 92.

FLEXURAL-STRENGTH TEST PER SECTION 4.4 OF ICC ES AC 92

Test Procedure

Testing was performed in accordance with ASTM D1037-99, *Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials*. Twenty dry-control, twenty wet and twenty freeze-thaw specimens, measuring 6-inches by 12-inches, were prepared for this test. Ten specimens from each group were prepared in the machine direction and ten were prepared in the cross-machine direction.

Prior to testing, the specimens were conditioned at 75°F and 50% relative humidity for seven days. In addition, the wet specimens were conditioned in water maintained at 75°F for 48 hours before testing.

Each specimen was individually placed on support rollers, equal to the specimen's width, ten inches apart, having a ¼-inch radius. The specimens were loaded midspan through a ½-inch diameter-loading rod equal to the specimen's width. The load was applied to the specimen at a constant rate of 0.50-inch per minute, which resulted in specimen failure in approximately one minute. The load at which the specimen broke was recorded.

One half of the machine direction specimens and one half of the cross machine specimens were tested with the exterior face in compression (face-up) with the remainder tested with the exterior face in tension (face-down).

Test Requirements

The average flexural strength of the freeze-thaw and wet specimens must be at least 60 percent of the average flexural strength of the dry-control specimens (maximum 40 percent loss in strength). If values obtained for wet and/or freeze-thaw specimens are less than 90 percent of the dry-control specimens (greater than 10 percent loss in strength), allowable positive and negative load capacity from Section 4.7 (Structural-performance Tests) of the criteria will be reduced proportionately.

FLEXURAL-STRENGTH TEST PER SECTION 4.4 OF ICC ES AC 92 (CONT.)

Test Results

| Dry-Control Specimens | | | | |
|------------------------------|--------------------------------|------------------|--------------------------------|------------------|
| Specimen No. | Flexural Strength (psi) | | | |
| | Machine Direction | | Cross-Machine Direction | |
| | Face-up | Face-down | Face-up | Face-down |
| 1 | 12,049 | 10,062 | 11,714 | 9,226 |
| 2 | 12,619 | 9,357 | 10,757 | 10,983 |
| 3 | 12,973 | 9,122 | 12,136 | 10,252 |
| 4 | 12,797 | 11,221 | 12,024 | 9,935 |
| 5 | 11,241 | 10,789 | 11,404 | 9,791 |
| Average | 12,336 | 10,110 | 11,607 | 10,037 |

Average Dry-Control flexural strength: 11,023 psi

| Wet Specimens | | | | |
|----------------------|--------------------------------|------------------|--------------------------------|------------------|
| Specimen No. | Flexural Strength (psi) | | | |
| | Machine Direction | | Cross-Machine Direction | |
| | Face-up | Face-down | Face-up | Face-down |
| 1 | 9,986 | 6,935 | 10,115 | 11,836 |
| 2 | 7,399 | 7,010 | 10,897 | 10,399 |
| 3 | 8,998 | 8,721 | 10,457 | 10,716 |
| 4 | 8,590 | 9,776 | 9,497 | 9,563 |
| 5 | 7,312 | 7,304 | 9,254 | 11,635 |
| Average | 8,457 | 7,949 | 10,044 | 10,830 |

Average Wet flexural strength: 9,320 psi

FLEXURAL-STRENGTH TEST PER SECTION 4.4 OF ICC ES AC 92 (CONT.)

Test Results (Cont.)

| Freeze-thaw Specimens | | | | |
|------------------------------|--------------------------------|------------------|--------------------------------|------------------|
| Specimen No. | Flexural Strength (psi) | | | |
| | Machine Direction | | Cross-Machine Direction | |
| | Face-up | Face-down | Face-up | Face-down |
| 1 | 7,590 | 8,241 | 7,829 | 9,352 |
| 2 | 9,742 | 8,160 | 9,842 | 7,457 |
| 3 | 7,013 | 7,007 | 7,361 | 8,621 |
| 4 | 7,758 | 8,481 | 9,796 | 9,457 |
| 5 | 7,681 | 7,646 | 8,562 | 7,224 |
| Average | 7,957 | 7,907 | 8,678 | 8,422 |

Average Freeze-thaw flexural strength: 8,241 psi

Flexural Strength Retained

Wet Specimens: 85%

Freeze-thaw Specimens: 75%

Conclusion:

The Kreysler Fireshield 285 product **passed** the flexural strength test and demonstrated compliance with Section 4.4 of ICC ES AC 92.

SALT SPRAY RESISTANCE PER SECTION 4.5 OF ICC ES AC 92

Test Procedure

Testing was performed in accordance with ASTM B117-97, *Standard Practice for Operating Salt Spray (Fog) Apparatus*. Three, 4-inch by 5-inch specimens were placed in a salt spray (fog) chamber and subjected to a total of 300 hours of salt spray exposure with visual examinations made every 100 hours.

The salt spray (fog) chamber was calibrated in accordance with ASTM B117.

Test Requirements

At the completion of the test, there shall be no deleterious effects such as cracking, checking, crazing, erosion, delamination or other distress that might affect performance as an exterior wall covering.

Test Results

| Specimen No. | Observations |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | After 100, 200 and 300 hours of salt spray exposure, no cracking, checking, crazing, erosion, delamination or other deleterious effects were observed. |
| 2 | After 100, 200 and 300 hours of salt spray exposure, no cracking, checking, crazing, erosion, delamination or other deleterious effects were observed. |
| 3 | After 100, 200 and 300 hours of salt spray exposure, no cracking, checking, crazing, erosion, delamination or other deleterious effects were observed. |

Conclusion:

The Kreysler Fireshield 285 product **passed** the salt spray test and demonstrated compliance with Section 4.5 of ICC ES AC 92.

WATER RESISTANCE PER SECTION 4.6 OF ICC ES AC 92

Test Procedure

Testing was performed in accordance with ASTM D 2247-97, *Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity*. Three, 4-inch by 6-inch specimens were placed in an environmental chamber, maintained at 100°F (38°C) and 100% relative humidity, for a period of 14 days. The samples were positioned in the test chamber 15 degrees from the vertical and inspected daily for deleterious effects.

Test Requirements

At the completion of the test, there shall be no deleterious effects such as cracking, checking, crazing, erosion, delamination or other distress that might affect performance as an exterior wall covering.

Test Results

| Specimen No. | Observations |
|--------------|----------------------------------------------------------------------------------------------|
| 1 | No cracking, checking, crazing, erosion, delamination or other deleterious effects occurred. |
| 2 | No cracking, checking, crazing, erosion, delamination or other deleterious effects occurred. |
| 3 | No cracking, checking, crazing, erosion, delamination or other deleterious effects occurred. |

Conclusion:

The Kreysler Fireshield 285 product ***passed*** the water resistance test and demonstrated compliance with Section 4.6 of ICC ES AC 92.