DIAMON-FUSION INTERNATIONAL
"Innovation that Ignites Business"

Diamon-Fusion® HAB (Hand Applied Version B)

Test Results

Note:

All testing herein unless otherwise noted has been performed by Architectural Testing, Inc. (ATI).

ATI is an internationally recognized lab accredited by IAS (International Accreditation Services) under ISO 17025, the international standard for accreditation of laboratories and calibration facilities.

ATI's scopes of accreditation can be viewed at http://www.iasonline.org/More/search.html scrolling down to "Search by Accredited Entity Name:" and entering Architectural Testing into the field.

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MECHANICAL ABRASION/CONTACT ANGLE TEST

OVERVIEW/METHODOLOGY

Diamon-Fusion International contracted with an independent testing laboratory to evaluate its protective glass coatings for contact angle after mechanical abrasion.

Samples pre-treated with ***Diamon-Fusion®*** HAB coating were provided to the laboratory for testing purposes while competitive products were obtained independently from a commercial fabricator. For contact angle measurement a precisely measured amount of distilled water (0.04ml) was placed on the test surface and the profile of the drop/surface interface was viewed under magnification. A rotating angular scale within the objective of the measuring device was lined up with the advancing angle of the drop and compared to the surface. The resulting angle was then identified on both the left and right sides and recorded.

All preparation and evaluation of the coatings and glass panels were at lab ambient conditions of 70 +/- 2°F and 50 +/- 5% RH. Each test was conducted on three replicate samples to verify the repeatability of findings. Each panel was wiped one time with a lint-free dry cloth prior to the initial evaluation. No other cleaning process was utilized on the glass throughout testing.

Samples were subjected to cyclic linear scrubbing motions of a weighted Scotchbrite® pad. Each sample was placed into the scrub apparatus, and the weighted Scotchbrite® pad was set on top of the coated surface. The weight of the Scotchbrite® pad and scrub head was 1.00 pound.

Water was applied to the mechanism in sufficient quantity to maintain a wet surface. The cyclic scrub operation was repeated for 800 cycles with the contact angles measured and recorded.

TESTING STANDARD(S)

- ASTM D 6578
- ASTM C 813-90

RESULTS

Diamon-Fusion® hand applied coating samples demonstrated significantly higher contact angles than the samples treated with other coating products:

	Initial	400 Cycles	800 Cycles
Diamon-Fusion®	**101°**	**78°**	**71°**
EnduroShield®	92°	74°	61°
ClearShield™	92°	35°	34°
ShowerGuard®	90°	32°	30°

Higher contact angles result in surfaces being more repellent to water and other substances resulting in reduced staining needing less cleaning and maintenance

SLIDING ANGLE TEST

OVERVIEW/METHODOLOGY

Diamon-Fusion International contracted with an independent testing laboratory to evaluate the sliding angle of its protective glass coatings.

Samples pre-treated with ***Diamon-Fusion®*** HAB coating were provided to the laboratory for testing purposes while competitive products were obtained independently from a commercial fabricator.

Sliding angle is the angle at which an object freely slides along a surface as the surface is tilted from a horizontal plane to a vertical plane at a set rate of rotation. This procedure utilized a standard 0.04mL droplet of water as the object of motion and the treated glass surfaces as the base material against which the droplet was placed.

The rotation speed was that of the TAPPI method and was 1.5 degrees per second. The test was terminated when the droplet moved a total distance of 1/8" along the surface of the glass panels. The angle at which this occurred was recorded as the sliding angle.

TESTING STANDARD(S)

- TAPPI T815 om-01

RESULTS

Diamon-Fusion® hand applied coating samples demonstrated significantly lower sliding angles than samples treated with other coating products:

	Sliding Angle
Diamon-Fusion®	13.1°
ClearShield™	25.0°
EnduroShield®	34.1°

Lower sliding angles indicate a greater degree of slipperiness or tendency to allow water to release from the surface thereby improving cleanability and other surface properties

HAZE RESISTANCE TEST

OVERVIEW/METHODOLOGY

Diamon-Fusion International contracted with an independent testing laboratory to evaluate the haze resistance of its glass surface treatments when exposed to multiple cycles of hard water spray exposure.

Samples pre-treated with ***Diamon-Fusion®*** HAB coating were provided to the laboratory for testing purposes while competitive products were obtained independently from a commercial fabricator.

Haze, in transmission, is the scattering of light by a specimen responsible for the reduction in contrast of objects viewed through it and is reported as the percent of transmitted light that is scattered so that its direction deviates more than a specified angle from the direction of the incident beam.

The test consisted of exposing each specimen, singularly and vertically, to three iterations of a 5 minute direct spray of a hard water solution created from the following process:

Calcium hydroxide was added to distilled water until the solution was saturated. Carbon dioxide gas was bubbled through the saturated "limewater" to create Calcium bicarbonate solution. Secondly, calcium chloride was dissolved in distilled water, (at a concentration of about 0.1 M). Three (3) volumes of the "limewater" and one (1) volume of the calcium chloride water were added to two (2) volumes of distilled water creating what is considered a normal hard water solution as found in many residential and commercial facilities.

As noted, the residual water was allowed to dry completely, and the spray process was repeated with follow-up drying for a total of three (3) exposures. At the conclusion of the exposures and the final drying period, each panel was measured for haze.

Haze is determined using a Gretag MacBeth Color i5 spectrophotometer (ICN 004725), illuminant C with a 2º observer (1931).

TESTING STANDARD(S)

- ASTM D 1003-11e1

RESULTS

Diamon-Fusion® hand applied coating samples demonstrated superior resistance to haze than samples treated with other coating products:

	Haze Measurement (3 Cycles)
Diamon-Fusion®	0.84%
EnduroShield®	1.69%

Lower haze measurements indicate a greater propensity to stay clean after exposure to various contaminants and maintain visual clarity on surfaces

SOLAR REFLECTANCE TEST

OVERVIEW/METHODOLOGY

Diamon-Fusion International contracted with an independent testing laboratory to evaluate the solar reflectance properties of its protective glass coatings.

Sample mirrors pre-treated on one half of the surface with ***Diamon-Fusion®*** HAB coating and half untreated were provided to the laboratory for testing purposes.

Testing was conducted at ambient temperature using a portable solar reflectometer.

TESTING STANDARD(S)

- ASTM C 1549

RESULTS

Diamon-Fusion® hand applied coating samples had no effect on the reflective properties of the mirrors within the measurement limits of the testing protocol:

	Solar Reflectance
Diamon-Fusion® Treated	0.743
Untreated	0.743

The performance of solar panels are not impacted in any way once treated with the Diamon-Fusion® coating