

3M™ Solar Acrylic Foam Tape Glass Bonding and Silane Coupling Agents used to improve high humidity performance.

When to Use a Glass Primer (Silane Coupling Agent)?

Silane coupling agents should be used any time 3M™ Solar Acrylic Foam Tapes are used to bond to glass that is expected to perform in a high humidity environment or where frequent contact with water is encountered. Examples of some applications utilizing these primers include muntin bars bonded to glass windows, mounting letters to glass storefronts for outdoor signs, attachment of junction boxes to glass backed solar panels and viewing windows for equipment expected to perform in the presence of water.

Which Silane Coupling Agents Work with 3M™ Solar Acrylic Foam Tapes?

There are many silane coupling agents available commercially. Most of them are designed as additives for materials such as fiberglass, since they create a bond between the glass fibers and the matrix resin. For use with 3M™ Solar Acrylic Foam Tapes, we have found that 3-Glycidoxypropyl trimethoxysilane improves the durability of the bond between glass and the 3M Solar Acrylic Foam Tapes when exposed to high humidity environments. The following source list is suggested for the user's evaluation in light of the user's particular purpose and method of application.

How are the Solutions Prepared and Applied?

No special preparation is required for premixed silane coupling agents, such as AP115. For concentrated silane solution, discussions with

the suppliers' technical personnel as well as 3M laboratory evaluation suggests that a 0.5 wt. % level of silane coupling agent diluted in a 91:9 isopropyl alcohol (IPA):water cleaning solution is optimum.* After addition of the silane coupling agent it is important that the solution is mixed thoroughly and allowed to hydrolyze (activate) for 8 hours before applying it to the glass surface. If hot water is used, the solution should be usable in 30 minutes. To apply either the pre-mixed or customer mixed concentrated primer/cleaner solution, spray on the surface of the glass or moisten a clean towel or cloth and treat the glass in the bonding area. Wipe the glass vigorously until it is completely dry and no film, streakiness or residue is visible. Since the silane coupling agent is incorporated into the cleaning solution, no extra process steps are added. However, the glass surface should be cleaned first with a 50:50 blend of IPA: water if the glass is excessively dirty prior to the silane treatment of the glass. Review the coupling agent MSDS for precautions and personal protective equipment to be used during this process.

To achieve a durable bond between the glass and the primer, the primer must react sufficiently. The primer initially hydrogen bonds with the surface of the glass until the reaction is driven to a stronger covalent bond. Some typical variables that impact the creation of a strong covalent bond include primer thickness (thinner is better), temperature, and time. It has been observed that the side of standard float glass can impact the reaction speed to create a durable bond. The side of the float glass that was exposed to the molten tin reacts faster than the side that was exposed to air.

*Be sure to read and follow silane and solvent manufacturer's precautions and directions for use for proper handling and storage information.

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Caution: The following situations must be evaluated thoroughly to determine whether this product is suitable for the intended use.

Suggested Sources for Silane Coupling Agents

	Company	Contact	Products*
Color Thickness	3M	Available through distributors that carry 3M™ Solar Acrylic Foam Tapes. www.3M.com/vhb	3M™ Silane Glass Treatment AP115 (4 oz. pump spray or 1 gal. bottle)
	Custom-Pak Products, Inc. N118 W18981 Bunsen Dr. Germantown, WI 53022	ph: 262-251-6180 fax: 262-251-6243 dberg@custompakproducts.com	Gap-1: one time use pads Gap-4: 4 oz. pump applicator Gap-11: 11 oz. aerosol Gap 128: 1 gallon container
Concentrated (mix by customer)	Lancaster Synthesis, Inc. P.O. Box 1000 Windham, NH 03087	ph: 800-238-2324 fax: 603-889-3326 www.lancastersynthesis.com	4992: 25, 100, & 500 ml container
	Dow Corning Corporation	Phone: 989-496-6000 www.dowcorning.com	Z-6040 silane

*Please consult the manufacturer for further information regarding specific products. Consult local air quality regulations before use.

How Long Will This Solution be Effective?

For premixed silane adhesion promoters, the shelf life is typically 12 months, as these products are manufactured under rigorous conditions and process controls. Be sure to check the expiration date on any premixed or concentrated silane solution before using. When concentrated silane coupling agents are activated with water by the customer, it is best to use this solution within two months. The effectiveness of either premixed or customer mixed silane-cleaner solutions will be reduced if the shelf life is exceeded. It is important to consult the manufacturer for specific shelf life recommendations for each product used.

How is the 3M™ Solar Acrylic Tape Performance Enhanced?

Normally, the hydrophilic or “water-loving” nature of glass surfaces makes acrylic adhesive bond strength unstable under long term high humidity or water contact conditions.

In basic terms, the water vapor undercuts the bond and interferes with the normal adhesion forces. The silane coupling agents change the nature of the glass to hydrophobic or “water-hating”. With the proper use of silane coupling agents the adhesion strength of acrylic adhesive is stable over time, even in high moisture environments.

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34 91 3216000

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Other Areas

800 755 2654

For more information on our solar manufacturing product line, contact 3M Renewable Energy at 800-755-2654 or visit us at www.3M.com/solar.

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