UVEKOL®
GLASS LAMINATING SYSTEM

The Basics of UV Glass Lamination

Glass laminators have three choices today: (a) they can apply sheets of material and subject them to heat and pressure; (b) mix liquid polymers together and wait for time to set them; or (c) use a one–step liquid quickly cured by ultraviolet light.

The UV curable glass lamination process has been used extensively in Europe for more than two decades, and has recently been adopted in North America. While still accounting for a small proportion of the laminate glass produced in the United States, sales of UV curable polymers have seen double–digit growth. Drivers include productivity gains, and the environmental- and user-friendliness of this technology.

When applied between layers of glass, UV curable products do not dry through evaporation of solvents. Instead, they become solid during a chemical process called polymerization. This curing process only takes place when liquid polymers get exposed to ultraviolet light provided by UV light bulbs. The result: inherently stable laminated glass.

THE ULTRAVIOLET LAMINATING PROCESS

Solvent–free and low–pressure UV technology requires less investment and energy than traditional glass lamination processes.

Glass lamination interlayers—polyvinyl butyral or other kinds of sheets that typically come on a roll, or a series of liquids that must be mixed together, or a one–step liquid—are all plastic materials, also referred to as polymers. With UV technology, the interlayer is not preformed and sold as sheets, but created through polymerization at the time of lamination. Because liquid UV curable products only solidify when exposed to UV light, they can be supplied ready to use. The manufacturing process typically consists of four steps:

1. *Cleaning and drying the glass.*
2. *Applying double–sided tape to the perimeter of one glass lite, and placing the second lite of glass onto the taped lite, creating a cavity.*
3. *Filling the cavity by pumping in the liquid polymer.*
4. *Curing the laminated glass for 20 minutes under low–intensity UV lights.*

The tape serves two purposes. First, it acts as a dam, keeping the liquid in place until the polymers are fully cured. Second, the thickness of the tape defines the total interlayer thickness and thus the impact strength of the laminated glass. For example, while a 0.030 inch interlayer will suffice to make a regular–grade product meeting American National Standard Institute Z97.1, a minimum interlayer of 0.100 inch is required to make hurricane–resistant glass.

Laminating glass through this process may have several benefits: (a) specific components in the formulation foster adhesion to the glass and result in strong chemical and physical bonds; (b) glass can be precut and laminated to required sizes, eliminating waste; (c) glass laminated through UV curing can also be cut. For example, UV cured glass laminates broken during transport or at job sites can be replaced within hours because of the high speed of "just-in-time" manufacturing, resulting in minimal delays.

Coupled with these advantages are the relatively low setup costs which have allowed medium–sized window and door manufacturers to integrate glass lamination into their operations. Others have opted to purchase UV cured laminates from their glass suppliers, who typically run a larger scale unit.

continued on back

APPLICATIONS AND PERFORMANCE

UV cured glass laminates offer strength and durability which are ideal for a variety of applications, including safety, hurricane protection, security, sound control, and design.

The safety grades of UV cured glass laminates meet ANSI Z97.1 and the Consumer Product Safety Commission 16 CFR 1201 Standard for Categories I and II. This type of UV glass laminate helps prevent glass shards from spreading upon impact. Fragments adhere to the interlayer, significantly reducing the risk of serious injuries. Typical applications include elevator shafts, staircases, doors and interior office furnishings.

The market for sound deadening fenestration systems has historically been larger in Europe than in the United States. This has resulted in extensive use of UV cured laminates for projects such as the Paris and Munich airports, railway stations and hotels. Sound Transmission Class values can be increased to 35 with a single–lite, safety–grade product, and up to 45 for acoustical–grade laminates in insulating glass units.

The liquid form of UV curable products makes them suitable for laminating bent glass and other irregular glass surfaces, as they will smoothly fill each cavity, maintaining superior optical clarity. This has led to creative safety applications like those for bus stops in Curitiba, Brazil.

The breakthrough for UV curable glass lamination in North America came with implementation of stringent building codes for windborne debris, inititated by Miami–Dade County in Florida.

Earlier tests—sponsored by manufacturers and window and door makers, and conducted by independent laboratories according to the Miami–Dade County protocols and the Florida Building Code—have proven the performance of UV cured glass laminates for this extreme application. In this rapidly emerging market, now expanding north along the Atlantic Coast with adoption of the International Building Code, speed and flexibility have been assets for the laminators who use UV materials.

For example, Coastal Glass Distributors in Charleston, SC, integrated the UVEKOL® glass laminating technology in its existing operation. Today, the company can produce 1,000 square feet of UV laminated glass per day, a majority of it being hurricane-resistant glass for the Atlantic coastline.

What does the future hold for UV curable glass lamination in North America? While laminators and manufacturers meet the critical needs of the hurricane market, the technology's benefits will soon open the door to other safety and security applications.

This article is a revised version originally authored by Wim Vanderghinste of Cytec Surface Specialties, and published in *Glass Magazine*, February 2003.

• Cytec Surface Specialties Inc. | 1950 Lake Park Drive, Smyrna GA 30080 USA | 1-800-433-2873 | For Customer Service: 1-866-861-7400 •

Pub. No. 210139E Version B