3M™ VHB™ Tape bonds semi-rigid windows in award-winning soft-sided enclosures

3M™ VHB™ Tapes have a long history of helping designers, engineers, and companies improve products and even make some designs possible. In the award-winning Barrett Bonded Windows™, 3M™ VHB™ Tape 4941 bonds clear semi-rigid polycarbonate into acrylic canvas or marine grade vinyl. Mike Sofie, co-founder of Barrett Windows LLC, Seattle, WA, says the windows were developed as aesthetic, cost-effective replacements for soft-vinyl enclosure windows in applications for marine, restaurant and residential decks and patios, expositions, trade shows, and party tents.

The multi-patented seamless product was honored with an NMMA Innovation award by the National Marine Manufacturers Association for distinctiveness, benefit to the industry or consumer, practicality, and cost effectiveness.

Sofie explains that the window design and production criteria required careful raw material sourcing and selection. The windows had to be clear as glass and stay that way. The entire enclosure had to be flexible, so the window material could not be rigid or shatter. The finished product had to perform for years despite UV exposure, wind, and rain.

“One big challenge was to secure the semi-rigid window into the flexible vinyl,” relates Sofie. “We didn’t want mechanical fasteners for reasons of aesthetics, sealing, and labor. Liquid adhesive required drying time and could run onto the window area and could not be used. That only left us with a tape product.”

The windows are crafted from polycarbonate. One of three different tape products was used depending upon the type of adhesive bond required. In Barrett Bonded Windows™, 3M™ VHB™ Tape 4941 was used for bonding marina grade, clear polycarbonate into acrylic canvas or marine grade vinyl. The multi-patented seamless construction, scratch resistance and optical clarity for a dining environment that’s attractive from the outside, and looks good looking out.
“3M™ VHB™ tape... best choice.”

“Clean and easy to apply. Invisible... And it worked.”

damage the appearance and clarity. Then, the materials we wanted to use – polycarbonate and vinyl – are hard to bond. 3M™ VHB™ Tape was the best choice for many reasons. It was clean and easy to apply. Invisible once the window was assembled. And it worked. And is still working day-in, day-out at our many installations.”

The tape selected, 3M™ VHB™ Tape 4941, was already performance-proven in many similar industry applications: bonding muntin bars into glass windows and doors, bonding and sealing the polycarbonate lens of a fish finder LCD, and holding plastic windows over control panels in manufacturing equipment. For Barrett Bonded Windows™, the 3M pressure sensitive acrylic adhesive bonds and seals on contact to both the semi-rigid polycarbonate window and canvas or vinyl. A variety of characteristics combine to maintain a long-term bond and seal in the sun and wind: flexibility; high shear and peel strengths; short-term high temperature performance up to 300°F; and resistance to plasticizers, solvents, UV light, and weathering.

Silicate-coated 80-mil polycarbonate was selected for optical clarity and scratch resistance. The R-value is 8 times that of glass, screening out 98% of the sun’s UV rays. According to Sofie, this semi-rigid material is highly resistant to yellowing and will not wrinkle like traditional vinyl windows. The finished product sandwiches the polycarbonate between two sheets of acrylic canvas or marine grade vinyl. Insulation or reinforcing material can also be sandwiched between the two sheets depending on the customer’s end use conditions (figure 1).

Figure 1

Some assembly steps are proprietary but the process can be described in general terms. To start, the polycarbonate sheet with paper liner on both sides is cut to size. A one-inch perimeter of the liner is then peeled off each side (figure 2). The exposed polycarbonate is lightly abraded with a custom machine built for the application. One-inch wide VHB Tape 4941 is rolled over the abraded perimeters.

Figure 2

One sheet of the vinyl or canvas is spread and smoothed over a flat work surface. The tape liner is removed from one side of the polycarbonate, exposing the adhesive. The window is then pressed adhesive side down onto the vinyl or canvas and run through a rolling machine built specifically for this purpose. The remaining tape liner is peeled off and the second sheet of vinyl or acrylic is placed over the polycarbonate. The vinyl is then cut out on both sides to open the viewing area.

“With the help of 3M™ VHB™ Tape,” says Sofie, “the result is the unmatched sleek fit and finish of our seamless construction.”
Barrett Windows LLC is an affiliate of Barrett Enclosures Inc., a custom canvas and upholstery fabricator established in 1989 to service the marine market. Today with a 15,000 square foot production facility on the Seattle waterfront, Barrett works with boat owners and marine manufacturers around the world as well as a wide range of enclosure customers in other industries and businesses. Sofie, speaking also as CEO of Barrett Enclosures, says, “We’ve got more ideas on the way and some will use VHB tapes.”

Plasticizer-resistant 3M™ VHB™ Tape invisibly holds the polycarbonate window into the vinyl “framing” with the long term reliability.

Clear as glass, Barrett Bonded Windows™ are specially-coated for maximum UV protection for captain and crew. 3M™ VHB™ Tape holds the window in place against wind, water, sunlight, and weathering.

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**Warranty:** 3M warrants for 24 months from the date of manufacture, that 3M™ VHB™ Tape will be free of defects in material and manufacture. 3M MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. This warranty does not cover damage resulting from the use or inability to use 3M VHB Tape do to misuse, workmanship in application, or application or storage not in accordance with 3M recommended procedures.

**Important Notice:** User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user’s method of application. Please remember that many factors can affect the use and performance of a 3M product in a particular application. The materials to be bonded with the product, the surface preparation of these materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given the variety of factors that can affect the use and performance of a 3M product, some of which are uniquely within the user’s knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user’s method of application.

**Limitation of Remedies and Liability:** If the 3M™ VHB™ Tape is proved to be defective within the warranty period stated above, THE EXCLUSIVE REMEDY, AT 3M’S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OF OR TO REPAIR OR REPLACE THE DEFECTIVE 3M™ VHB™ TAPE. 3M shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including negligence, warranty, or strict liability.