



VHB™ Tapes

Design Guide for Alpolic® Composite Metal Panels



3M™ VHB™ Tapes are double-sided, pressure-sensitive, closed-cell acrylic foam tapes that can provide the strength and durability needed in the assembly of Alpolic® Architectural Metal Composite Panels. 3M™ VHB™ Tapes can be used to attach stiffeners or trim to Alpolic® panels and panels to framework and extrusions. They provide the ease of use of a tape and can be used in place of mechanical fasteners (screws, rivets, etc.) and structural glazing sealants. 3M™ VHB™ Tapes offer the following benefits to the Alpolic® panel fabricator and installer:

- Invisible attachment system (improved aesthetics) – eliminates unsightly spot welds, screws and rivets
- Immediate handling strength – no long cure times
- Long-Term durability – acrylic chemistry resists UV and weather
- Separates metals to help prevent corrosion and bond dissimilar materials
- Viscoelastic properties – shock/energy absorbing and sound dampening
- Insulation (thermal break) – provides improved thermal resistance compared to mechanical attachments
- Waterproof seal (with proper assembly)
- Save assembly time and labor
- Thermal expansion/contraction performance for most construction applications
- Backed by industry test data and a long history of construction applications (20+ years)

Application warranty available. Contact 3M at 1-800-362-3550 for more information.

Visit www.3M.com/vhb for more detailed information on 3M™ VHB™ Tape applications and third party testing.

The following 3M™ VHB™ Tapes are recommended for bonding Alpolic® panels:

Product Number	Tape Thickness	Adhesive Type	Temp. Resistance	Solvent Resistance
4941F	0.045" (1.1 mm)	Acrylic	200°F (93°C)	High
4956F	0.062" (1.6 mm)			
4991	0.090" (2.3 mm)			
5952	0.045" (1.1 mm)	Modified Acrylic	250°F (121°C)	High
5962	0.062" (1.6 mm)			

3M™ VHB™ Tapes Design Considerations

Adhesion – 3M™ VHB™ Tapes are ideal for bonding to a variety of substrates, including most metals, composites, glass, plastics, and painted surfaces. Each product in the 3M™ VHB™ Tapes family has specific features, including the ability to bond to different types of materials. Your determination of whether a specific 3M™ VHB™ Tape is fit for a particular application should include adhesion testing with the actual substrates. 3M Technical Service Representatives are available to assist you in testing so you can make this determination.

Static Loads – For static tensile or shear loads (such as dead weight loads, snow loads and other long-term loads), a design strength of 0.25 psi (1.7 kPa) can generally be used. This means that 4 sq in of 3M™ VHB™ Tape per 1 lb (55 sq cm per 1 kg) should be used to support static loads. This guideline provides a safety factor of at least 5.

Dynamic Loads – For dynamic tensile or shear loads (such as wind loads), a design strength of 12 psi (85 kPa) can be used for 4941F, 4956F and 4991 3M™ VHB™ Tapes, while a design strength of 9 psi (60 kPa) should be used for the 3M™ VHB™ Tapes 5952/5962. These guidelines provide a safety factor of at

least 5, typically used for bonding panels to frames. These values can easily be adjusted to incorporate a different safety factor. For example, when bonding a stiffener to a panel a safety factor of 3 is typically used and would result in a design strength of 20 psi (140 kPa) for 3M™ VHB™ Tapes 4941F, 4956F and 4991, and 15 psi (105 kPa) for the 3M™ VHB™ Tapes 5952/5962.

Differential Movement – 3M™ VHB™ Tapes typically perform well in applications where the two bonded surfaces experience movement relative to each other, such as with thermal expansion and contraction. Most 3M™ VHB™ Tapes can tolerate shear movement up to 3 times their original thickness (300% shear strain). Since bonds made with 3M™ VHB™ Tapes will be more flexible than other joining methods, suitable design modifications may be needed to achieve required stiffness.

Tape Thickness – The optimal thickness of 3M™ VHB™ Tapes for a particular application depends on the size, rigidity, and flatness of the substrates, as well as the amount of application pressure applied to mate the surfaces together. In general, thicker tapes will handle greater mismatch and differential thermal movement between surfaces, and provide better contact and sealing.

Note: 3M Technical Service or Sales Representatives are available to assist you in your determination of the suitability of a 3M™ VHB™ Tape for your Alpolic® panel bonding application. Contact 3M at 1-800-362-3550 for more information.

In Canada, phone: 1-800-364-3577.
In Puerto Rico, phone: 1-787-750-3000.
In Mexico, phone: 52-70-04-00.

Surface Preparation and Application Instructions for 3M™ VHB™ Tapes

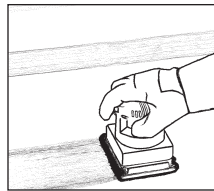
IMPORTANT: To obtain optimum adhesion, the bonding surfaces must be unified, clean and dry. A simple 50/50 mixture of isopropyl alcohol/water (rubbing alcohol) works well for surface cleaning – steps B and C. Avoid the use of cleaning solvents that will leave an oily residue on the surface.

Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and helps improve bond strength – steps E and H. Generally, this means that the tape should experience at least 15 psi (100 kPa) in roll down or platen pressure.

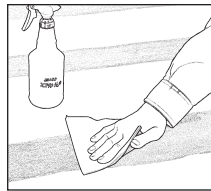
After application, the bond strength will increase as the adhesive flows onto the surface. At room temperature, approximately 50% of the ultimate strength will be achieved after 20 minutes, 90% after 24 hours and 100% after 72 hours. In some cases, bond strength can be increased and ultimate bond strength can be achieved.

*3M™ Adhesion Promoter 111 works well as a cleaning and priming solution with Alpolic® ACM panels. This priming solution cleans and primes in one step and works well with the 3M™ VHB™ Tapes 4941, 4956 and 4991 – see chart at right. It is usually not needed for 3M™ VHB™ Tapes 5952 and 5962. To use this primer replace the IPA/water solution in steps B & C with the Adhesion Promoter 111 solution. After application of the primer wait 2 minutes before applying the 3M™ VHB™ tapes. Call the 3M 800 number listed earlier for information on where to obtain Adhesion Promoter 111.

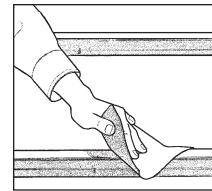
Note: Abrasion is usually not required before priming a surface.



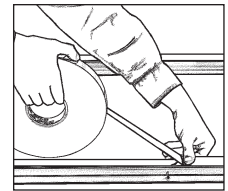
Step A: Surface abrasion (optional – see chart to determine if you should abrade the surface). Use a 3M™ Scotch-Brite™ 7447 pad for light surface abrasion prior to cleaning the surface. The pad can also be used on a handheld random orbit sander.



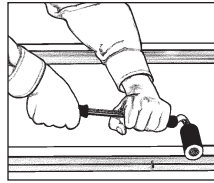
Step B: Surface cleaning Use a 50% solution of isopropyl alcohol (rubbing alcohol) in water and wipe both bonding surfaces with a clean cloth/towel. A white towel works best as this will indicate when the towel is dirty and needs to be replaced.



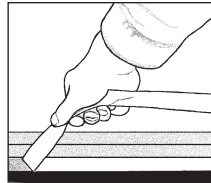
Step C: Wipe dry with clean towel.
*Steps B and C may also be applicable when using a primer – see directions.**



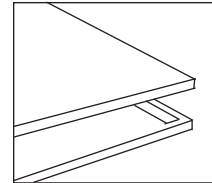
Step D: Position tape on prepared bonding surface.



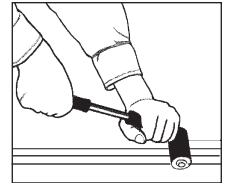
Step E: Apply firm pressure over the entire area of tape. A handheld roller works well for this.



Step F: Remove protective liner.



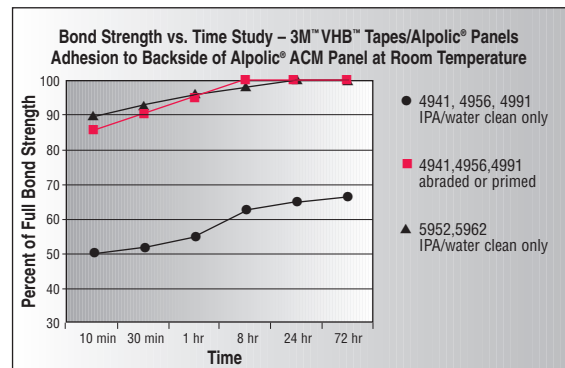
Step G: Position materials to be bonded.



Step H: Apply pressure to the entire bond-line area.

The following chart demonstrates 3M™ VHB™ Tapes bond strength build over time at room temperature. Ideal application temperature range is 70°F to 100°F. Cooler temperatures will increase the amount of time it takes to achieve 100% bond strength. 3M™ VHB™ Tapes 5952/5962 should be applied at a minimum temperature of 50°F. 3M™ VHB™ Tapes 4941, 4956 and 4991 can also be applied at a minimum temperature of 50°F if the surface is abraded or

primed. Conversely, warmer temperatures will decrease the amount of time it takes to achieve 100% bond strength.



Product Use

All statements, technical information and recommendations contained in this document are based upon tests or experience that 3M believes are reliable. However, many factors beyond 3M's control can affect the use and performance of a 3M product in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors 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.

Limited 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 limited warranty does not cover damage resulting from the use or inability to use 3M™ VHB™ Tape due to misuse, workmanship in application, or application or storage not in accordance with 3M recommended procedures.

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.



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