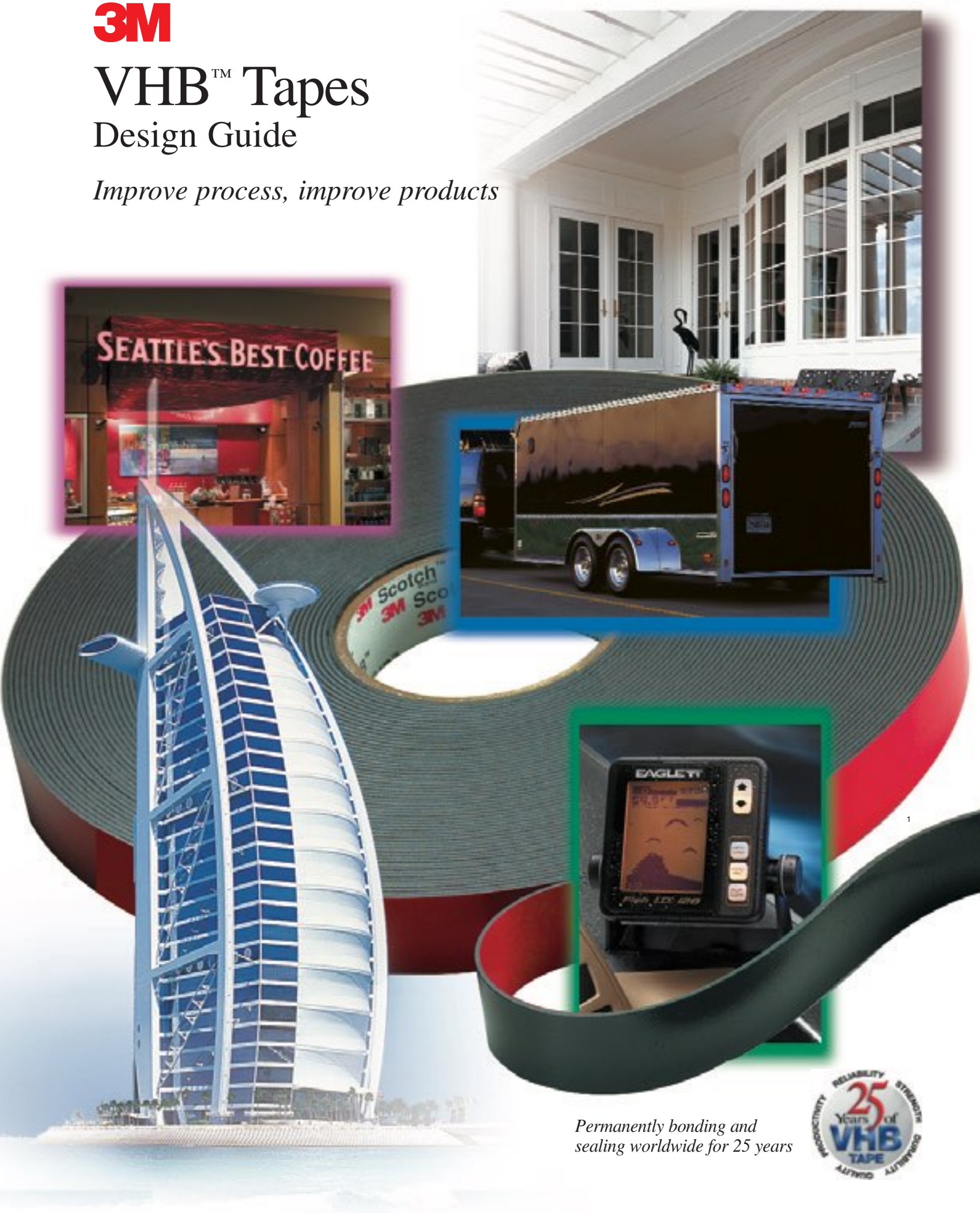
3M

VHB™ Tapes
Design Guide

Improve process, improve products



Permanently bonding and sealing worldwide for 25 years

25 Years of VHB TAPE

3M™ VHB™ Tapes...saving time. enhancing appearance, and assembling wi

For 25 years, industries worldwide have been using 3M™ VHB™ Tapes to permanently bond and seal many substrates for increased productivity, high strength, long term durability, and improved appearance.


Shaffner Building, 1986 2


Sony Sports Cam, 1989 3

Westinghouse Sign, 1986 4


Singapore Treasury, 1984 5


Computer Security Device, 1983 6


University of Michigan
Solar Car, 1990 7

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3M™ VHB™ Tapes Product Information

	Product Number	Tape Thickness w/o liner Mils (mm)	Description	Adhesive Type	Temperature Resistance		Solvent Resistance	Relative Adhesion		Application Ideas	Liner Type
					Minutes Hours	Days Weeks		HSE	LSE		
3M™ VHB™ Conformable Tape	4926 4936 4936F 4941 4941F 4956 4956F 4919F 4947F 4979F 4991	15 (0.4) 25 (0.64) 25 (0.64) 45 (1.1) 45 (1.1) 62 (1.6) 62 (1.6) 25 (0.64) 45 (1.1) 62 (1.6) 90 (2.3)	Gray, closed-cell acrylic foam carrier. Conformable. Good adhesion to many painted metals. Plasticizer resistant. UL 746C. Black version of 4936 tape. Black version of 4941 tape. Black version of 4956 tape.	Acrylic	300˚F (149˚C)	200˚F (93˚C)	High	High	Med.	Bond muntin bars to windows. Bond and seal polycarbonate lens over LCD. Bond pre-painted metals in truck assembly. Bond and seal plastic windows to pre-painted control panels/switch gear. Mount vinyl wiring ducts and conduit channels.	A A B A D A B D D B D
	5925 5952 5962	25 (0.64) 45 (1.1) 62 (1.6)	Dark gray, closed-cell acrylic foam carrier. Conformable. Good adhesion to many painted surfaces, including powder coated paint. UL 746C.	Modified Acrylic	300˚F (149˚C)	200˚F (93˚C)	High	High	Med	Bonds to a variety of plastics and paint systems.	D D D
	4943F 4957F	45 (1.1) 62 (1.6)	Gray conformable foam. Apply as low as 32°F (0°C).	Acrylic	300˚F (149˚C)	200˚F (93˚C)	High	High	Low	Bond cellular phone antennas. Bond automatic toll tags to vehicle.	C C
3M™ VHB™ Tape	4611 4646 4655	45 (1.1) 25 (0.64) 62 (1.6)	Dark gray, closed-cell acrylic foam carrier. High temperature resistance. UL 746C.	Acrylic	450˚F (232˚C)	300˚F (149˚C)	High	High	Low	Pre-powder coat paint applications: hat channels and stiffeners.	D D D
	4920 4930 4950 4955 4959	15 (0.4) 25 (0.64) 45 (1.1) 80 (2.0) 120 (3.0)	White, closed-cell acrylic foam carrier. All-purpose adhesive. UL 746C.	Acrylic	300˚F (149˚C) 400˚F (204˚C)	200˚F (93˚C) 300˚F (149˚C)	High	High	Low	Attach stiffeners in air conditioners, office furniture and telecommunications equipment. Bond aluminum skin to steel support of trucks, vans, ambulances. Bond architectural signs to frames.	A A A C C
	4945 4946	45 (1.1) 45 (1.1)	White, closed-cell acrylic foam carrier. Plasticizer resistant. UL 746C. Film liner version of 4945.	Acrylic	300˚F (149˚C)	200˚F (93˚C)	High	High	Med.	Attach vinyl trim. Bond vinyl extrusions. Bond pre-painted truck and trailer skins.	A B
	4905 4910	20 (0.5) 40 (1.0)	Clear, acrylic construction for joining transparent material.	Acrylic	300˚F (149˚C)	200˚F (93˚C)	High	High	Low	Seal skylight inner/outer dome. Mount back lit translucent signs. Edge-bond resin filled glass.	D D
	4951	45 (1.1)	White, closed-cell acrylic foam carrier. Apply as low as 32˚F (0˚C).	Acrylic	300˚F (149˚C)	200˚F (93˚C)	High	High	Low	Mount panels to aluminum frames in buildings, trucks, and trailers. Mount trim to portable buildings.	C
	4932 4952	25 (0.64) 45 (1.1)	White, closed-cell acrylic foam carrier. Good adhesion to polypropylene and many powder paints.	LSE	200˚F (93˚C)	160˚F (71˚C)	High	High	High	Bond powder painted metal stiffeners to office desks and file cabinets. Bond polypropylene and polystyrene.	A A
Transfer Tape	F-9460 PC F-9469 PC F-9473 PC	2.0 (0.05) 5.0 (0.13) 10 (0.25)	Clear adhesive transfer tape. High shear strength adhesive. UL 746C.	100 MP	500˚F (260˚C)	300˚F (149˚C)	High	High	Low	Bond decorative metal trim. Bond flexible circuits to aluminum rigidizers or heat sinks.	E E E

NOTE: The technical information and data provided here should be considered representative or typical only and should not be used for specification purposes. User should evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for user's method of application.

Liner Types:

A – 3 mil 54# Densified Kraft Paper
B – 5 mil Clear Polyethylene Film
C – 2 mil Polyester Film
D – 5 mil Red Polyethylene Film
E – 4 mil 58# Polycoated Kraft Paper

Relative Adhesion:

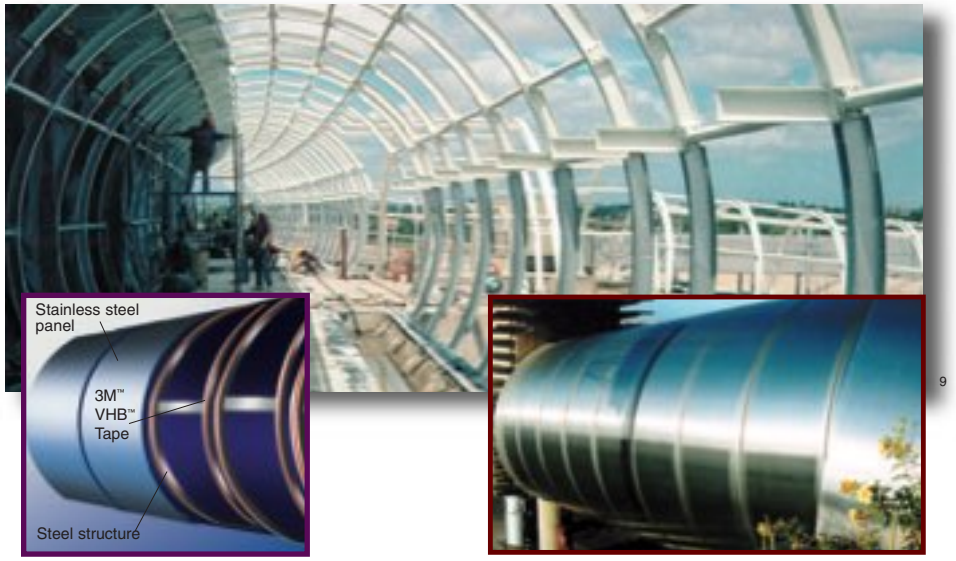
HSE – High Surface Energy
LSE – Low Surface Energy

STRENGTH

to replace spot welds, screws, rivets, and liquid adhesives

3M™ VHB™ Tapes all-acrylic construction provides strength and durability in highly demanding applications.

- Bond with high holding strength for static or dynamic stress
- Provide a continuous bond to distribute stress over the entire surface
- Viscoelastic properties absorb shock and flexing for reliability against wind, vibration, and other stresses
- Eliminate pull-through, dimpling and weld distortion
- Damp vibration



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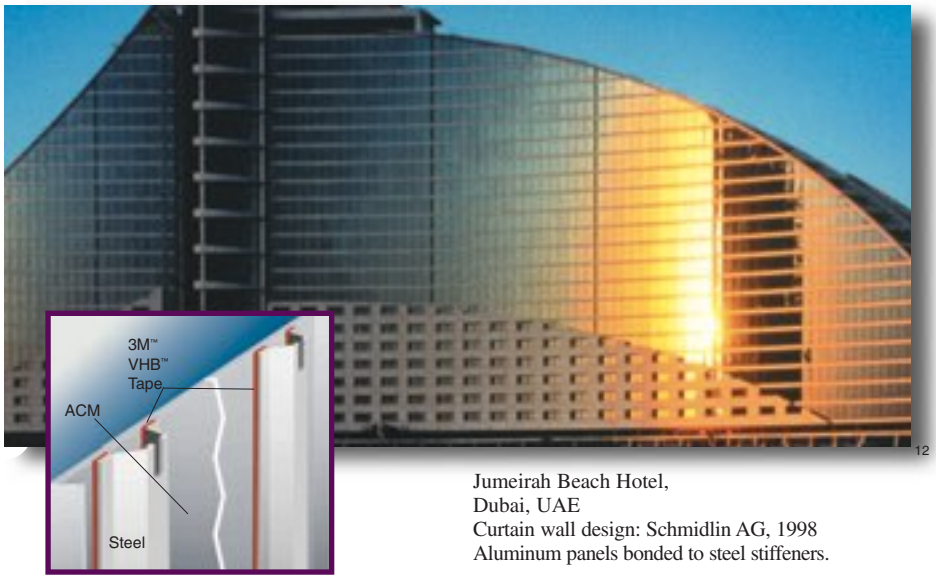
Aeroporto Fortaleza,
Fortaleza, Brazil
Architect: Claudio Silva, 1997
Stainless steel panels bonded to steel frame.

11

Damps vibration and noise producing a quieter ride.



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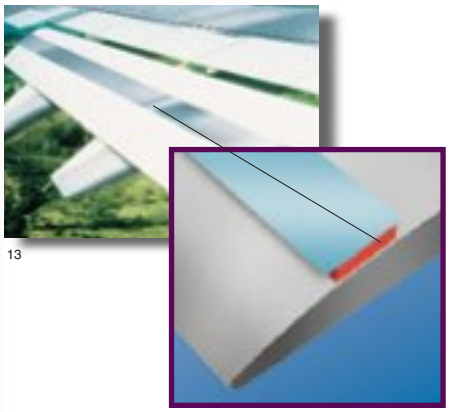
Jumeirah Beach Hotel,
Dubai, UAE
Curtain wall design: Schmidlin AG, 1998
Aluminum panels bonded to steel stiffeners.



13

Securely bonds stainless steel scuff strips to aluminum wing flaps despite extreme ground-to-air temperature swings of 150°F to -40°F (65°C to -40°C).

DURABILITY

for long term performance indoors and out

- Resists all of the following:
  - High temperature
  - Cold
  - Temperature cycling
  - UV light
  - Moisture and solvents
- Seal against environmental conditions
- Prevent bi-metallic corrosion
- Damp vibration to prevent metal fatigue
- Compensate for differential of thermal expansion

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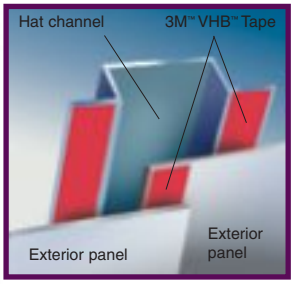

Replace rivets in bonding truck side panels to steel frames for a much smoother, cleaner appearance and a strong bond. VHB tape can also reduce vibration in the box.

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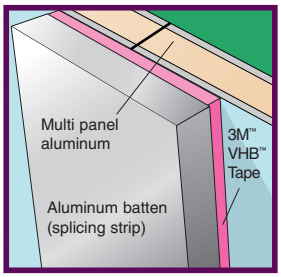
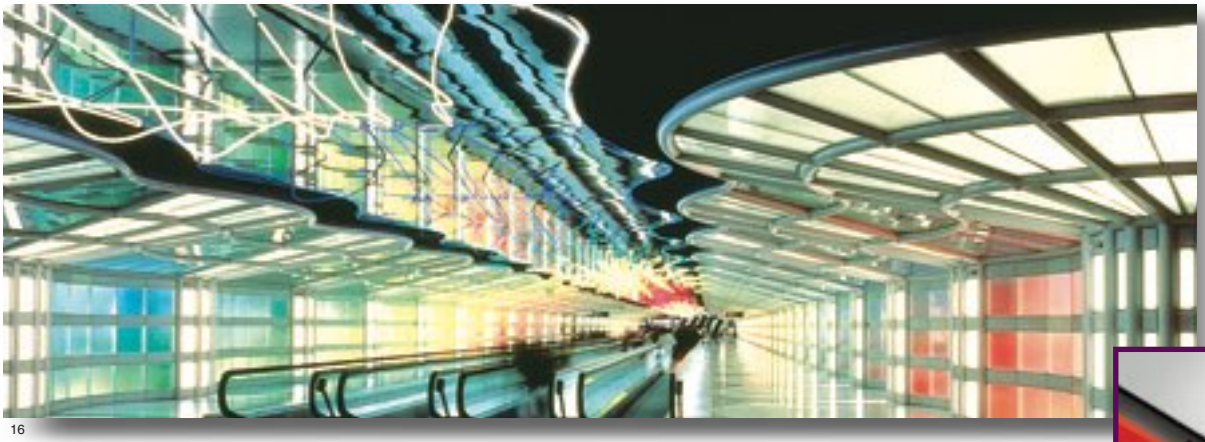


Signs that resist cold winds in Denmark (installed 1985)



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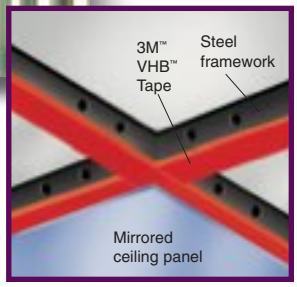


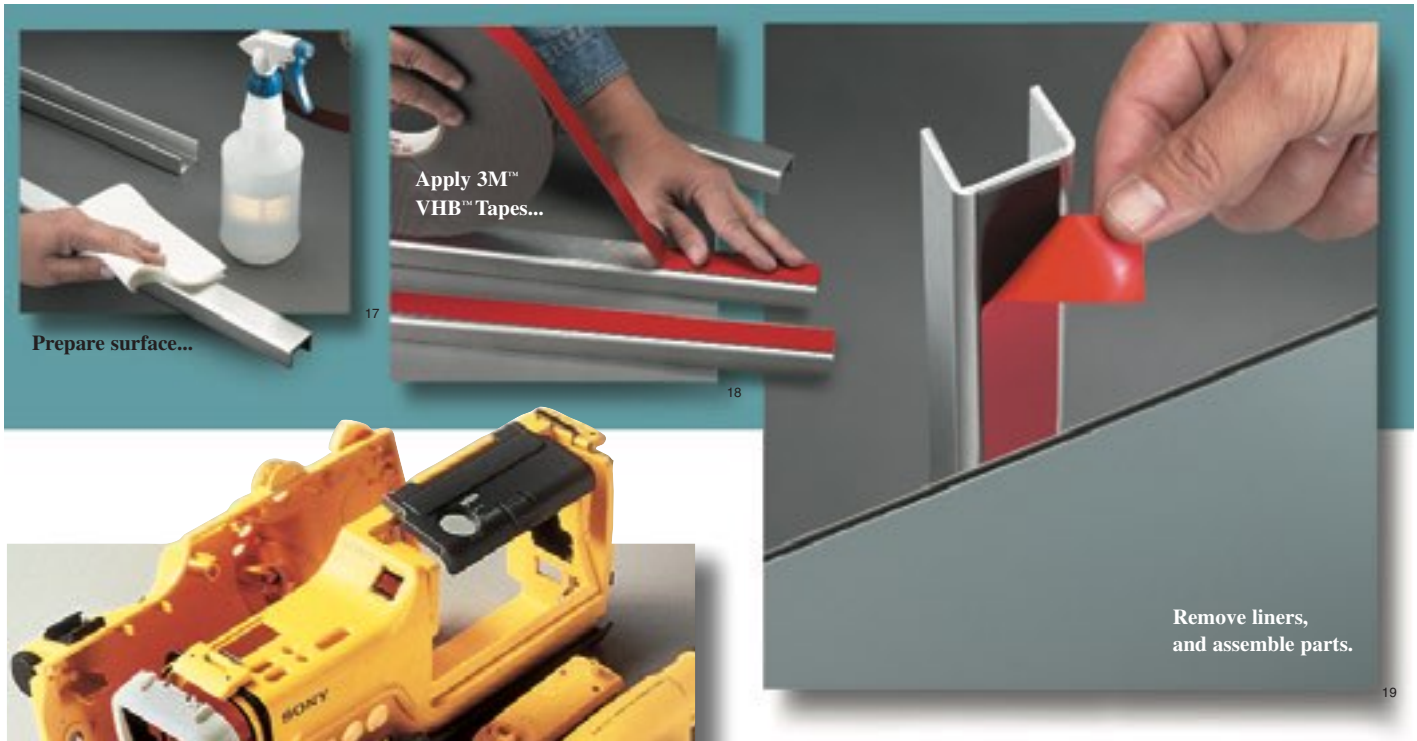
O'Hare Airport,
Chicago, IL, USA

Architect: Custom Products of Southgate, CA, 1987

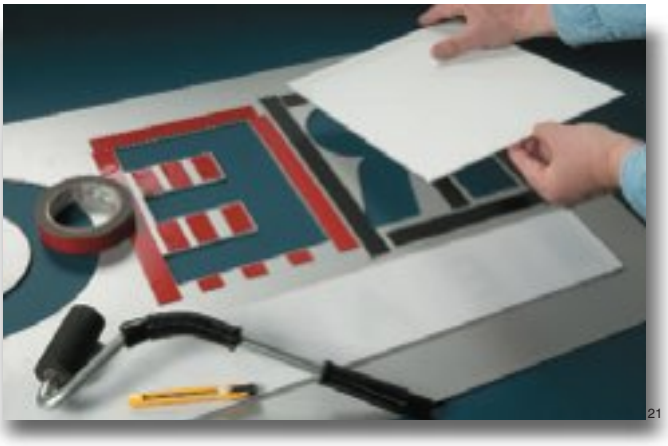
Mirror-finish composite ceiling panels bonded to a suspension frame.

PRODUCTIVITY through application ease and versatility

- Save money and time with increased efficiency
- PSA (pressure sensitive adhesive) bonds on contact with no bottlenecks for drying time or fixturing
- Fast, easy assembly
- Eliminate time consuming labor – drilling, grinding, refinishing, screwing, welding and clean-up
- Die cut to precisely fit any shape, size or profile
- Easy to use with minimal training



For assembly efficiency, die-cut pieces of 3M™ VHB™ Tape bond components in a water-resistant video camera case. The foam conforms to help seal the unit.



Easily cut to size, 3M™ VHB™ Tape 5952 bonds polycarbonate sheets to the back of a routed aluminum face. Surface is simply cleaned prior to application. Tape is pressed with a roller for optimum bonding.

APPEARANCE

with aesthetic improvement you can see and feel

- Virtually invisible fastening helps keep surface smooth and clean to enhance design and appearance
- Expand the range of material options
  - Bond most painted and powder coated surfaces, and plastics such as acrylic, polycarbonate, and ABS
  - Bond metal and most plastics with minimal surface preparation
- Use lighter weight and thinner materials
- Use a wider variety of materials more readily for high impact visual combinations
- Prevent bi-metallic corrosion
- Join dissimilar materials
- Uniform thickness creates repeatable results without expensive equipment

Assembled with rivets.

22

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Assembled with 3M™ VHB™ Tape.

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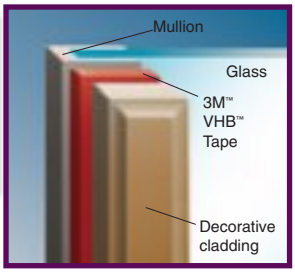
Decorative copper cladding adheres to window system creating a unique appearance.



Gas station canopy,
Sydney, Australia
Fabricator: Albert Smith Signs, 1989

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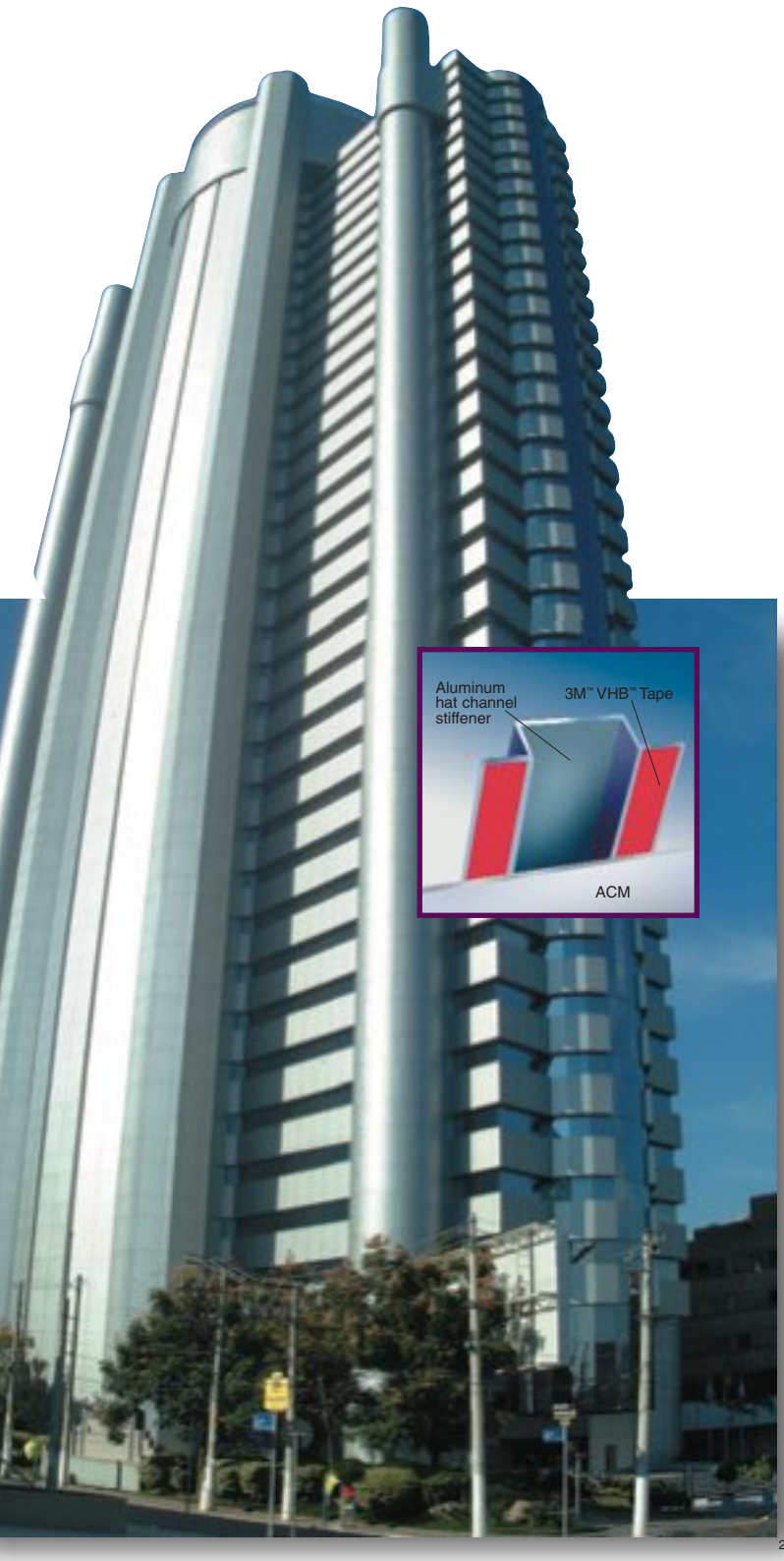
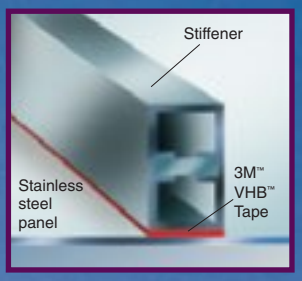
Construction from panels to windows

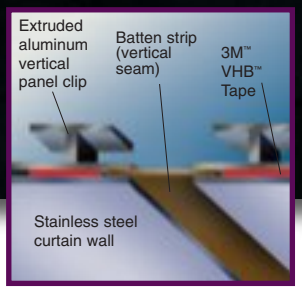
Fast application to permanently bond many materials flat or curved



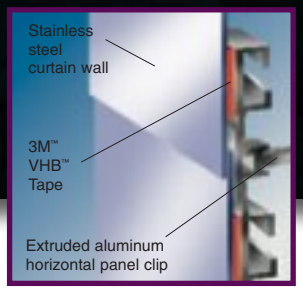
Plaza Centenário,
Sao Paulo, Brazil
Architect: Carlos Bratke, 1995
Aluminum stiffeners bonded to ACM panels.

Walt Disney Concert Hall,
Los Angeles, CA, USA
Curtain wall:
stiffener and frame attachment,





Vertical seam

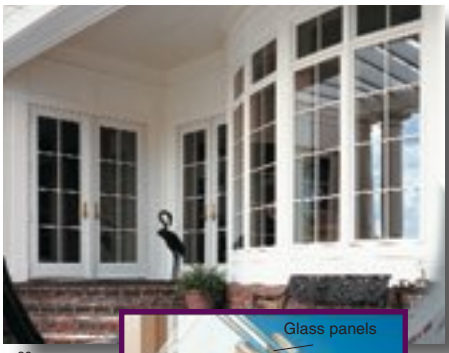


Horizontal seam

29

28

Bond muntin bars made of vinyl, primed wood, or painted aluminum to glass windows or doors. Resists UV exposure.



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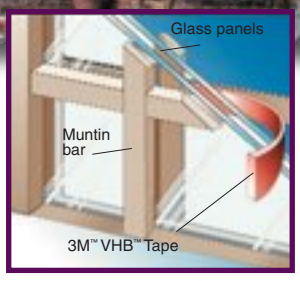
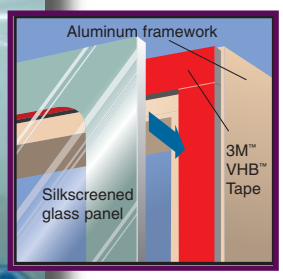
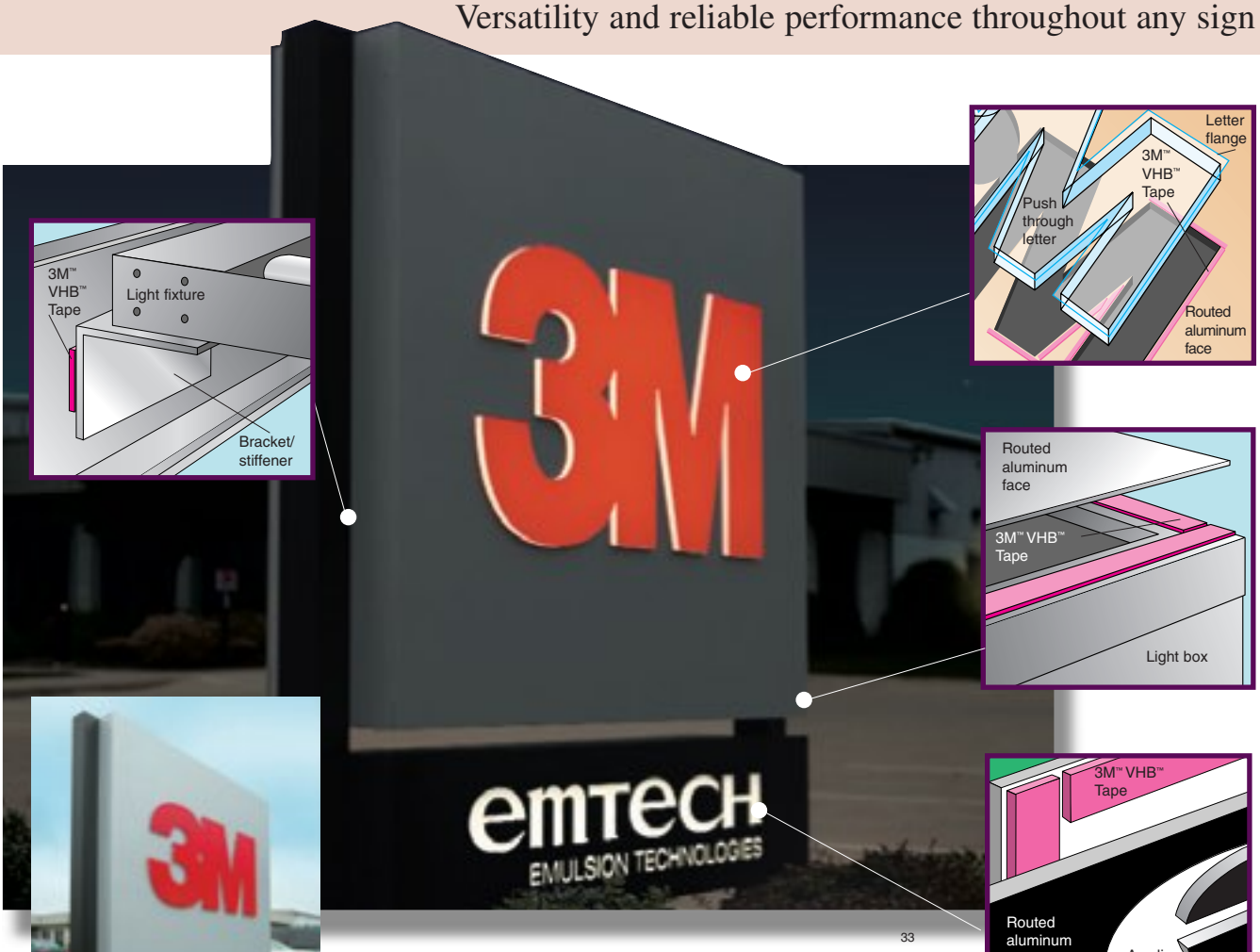




Glass bonded to aluminum framework. Subway station platform door, Korea.

31

Versatility and reliable performance throughout any sign



Twin pole monument sign,
Medina, Ohio
Fabricator: Lawrence Sign, 2003

Channel letter sign with decorative backdrop, Seattle, Washington

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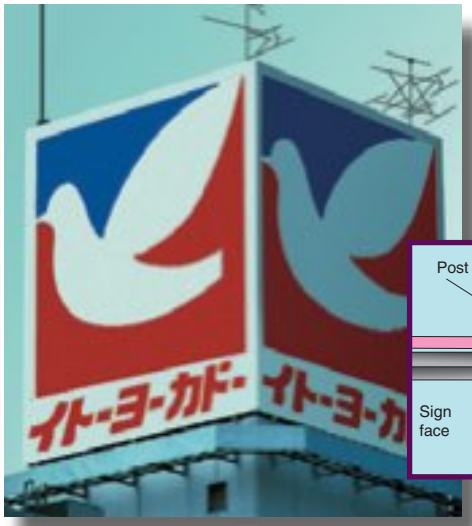
Characters on glass,
Fort Lee, New Jersey
Fabricator: Spanjer
Brothers, Inc., 1989



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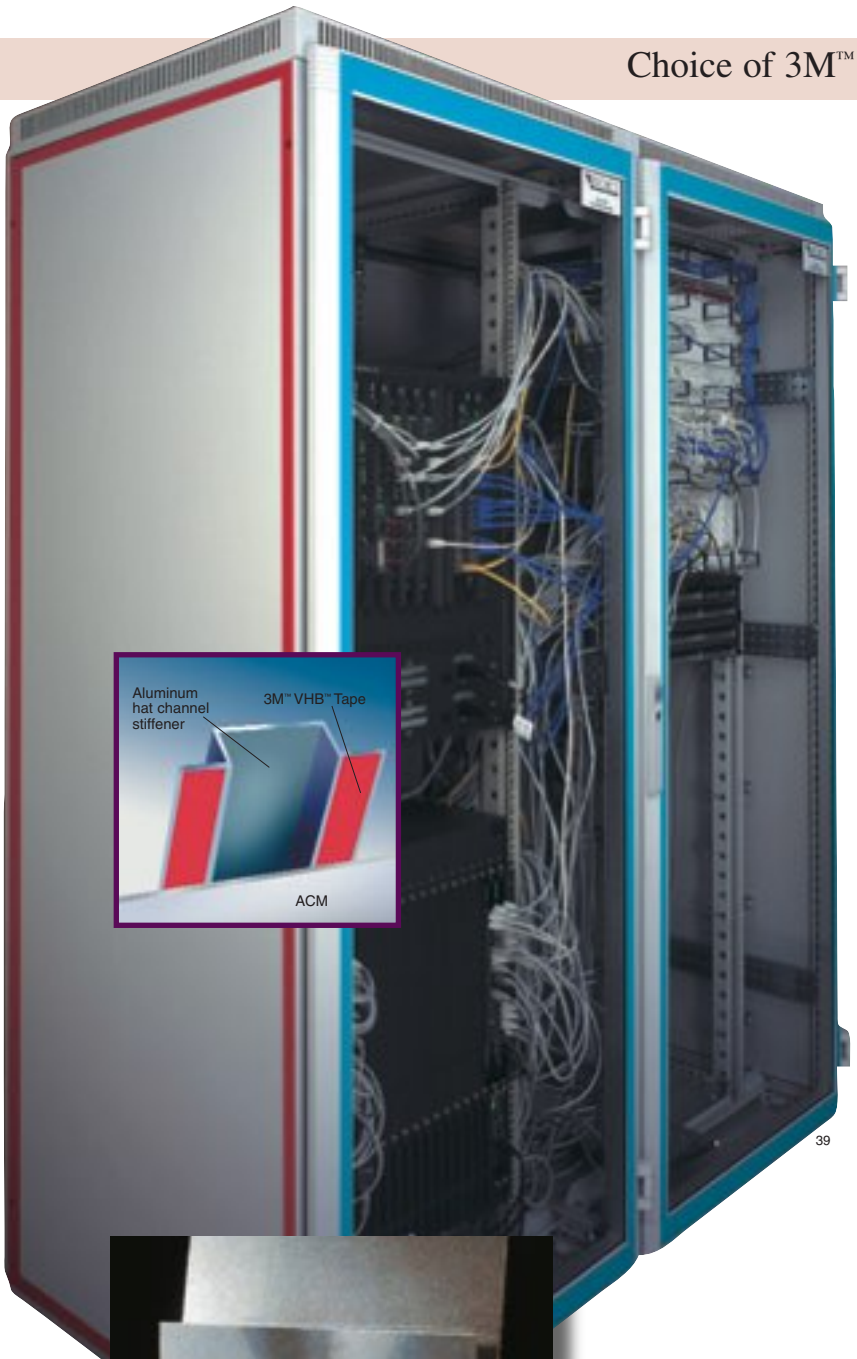
Grocery store signage,
Sagamihara, Japan
Fabricator:
Sanwa Neon,
1993

38

Metal fabrication – strength and durability with ease

Choice of 3M™ VHB™ Tapes for bare or painted metal



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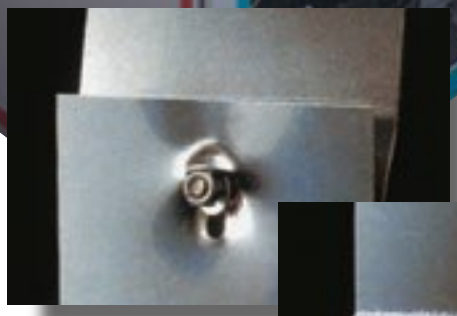


40

Under equal stress conditions, metal panels bonded with VHB tape show no visible signs of stress compared to those with mechanical fasterners.

41

42

Permanently bond metal skin to enclosure frame.

43

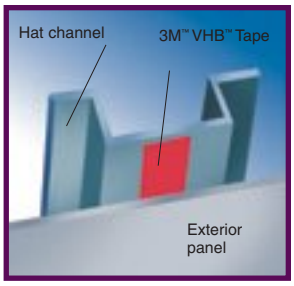
Permanently attach brackets and stiffeners.

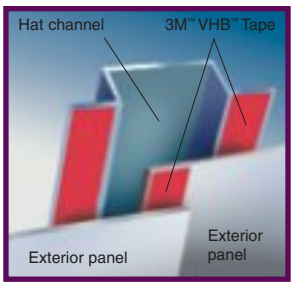
44

Permanently attach plastic pocket to enclosure panel without priming in most applications.

Built tough with smooth sides to look good for the long haul

45

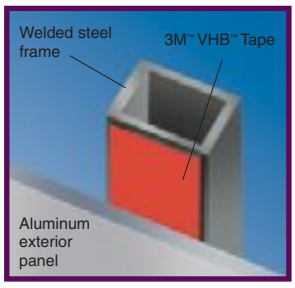




Apply 3M™ VHB™ Tape... 46

Remove liners. 47

- Eliminate rivets and screws that can loosen, rattle, and leak
- Damp vibration and noise for a quieter ride
- Keep sides smooth for graphics
- Separate metals to reduce potential for galvanic corrosion



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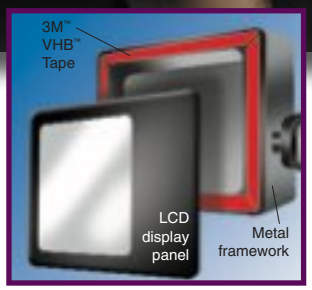
Flexibility to meet rigid standards of the electronics industry

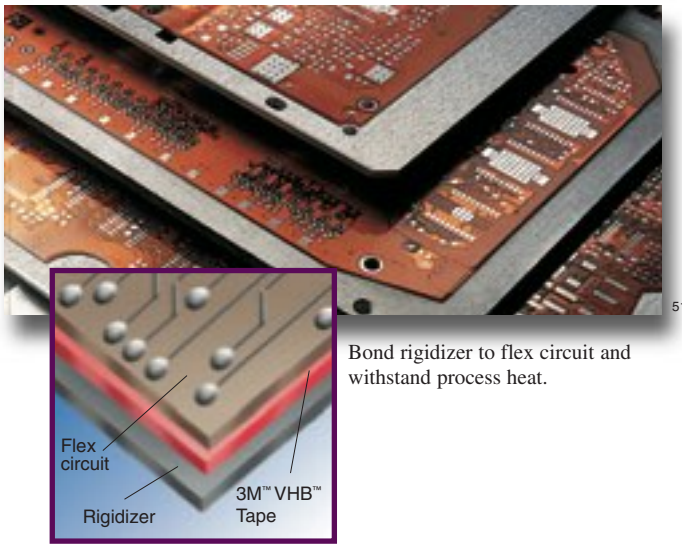
49

Bond and seal polycarbonate viewing window into the door of a process control system.

50

Bond and weather-seal a fish finder lens.





51

Bond rigidizer to flex circuit and withstand process heat.

A precise fit with die-cut VHB tape.

53

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Bond screen to high definition television.

Optimizing 3M™ VHB™ Tape performance on a wider variety of surfaces

3M™ VHB™ Tapes bond permanently to most surfaces when application requirements are met.

Clean

In most cases, simply clean substrate with an IPA/water mixture.


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Pressure

Apply 15 psi at the bond line.


55

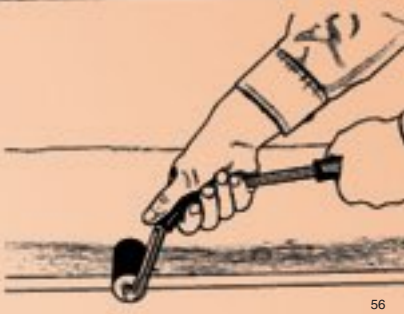
Temperature

Typically apply at 50-60°F (10-26°C). Some VHB tapes can be applied as low as 32°F (0°C).

Time

Instant tack at room temperature.

Time	Bond strength
20 min.	50%
60 min.	75%
24 hrs.	90%
3 days	100%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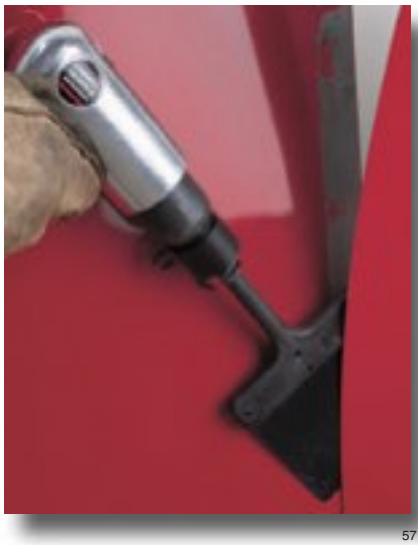
3M™ VHB™ Tape Removal Systems

Easy-to-use for separating bonded parts and removing residue

3M™ VHB™ Tapes bond most surfaces permanently, but if you have to separate the surfaces and remove residue, 3M also has the tools for a fast, effective job.

3M™ SMART Tool

Use by hand or in an air chisel to quickly separate such bonded assembles as overlapped panels and stiffeners.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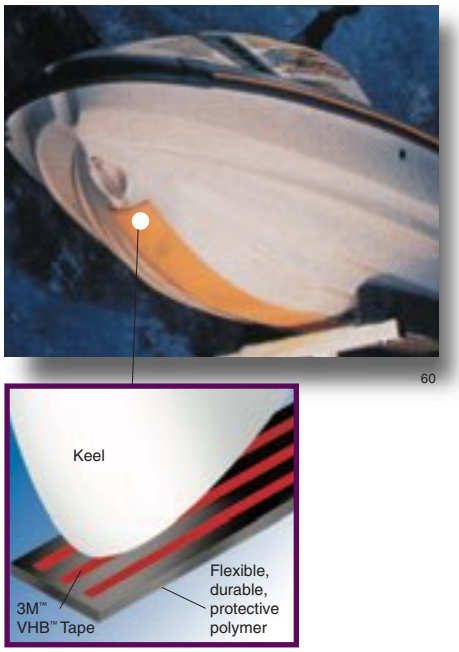
3M™ Stripe Off Wheel

Takes residue off faster and easier than solvents or adhesive cleaners. Resilient rounded edge follows contours and irregular surfaces and cleans without scratches or damage to acrylic enamel or urethane paint.

Wide experience to support you with applications engineering

Highway LED sign, Interstate 70, Colorado



Salt-water resistant Keel Shield™ Hull Protectors

Glass steps bonded to varnished steel frame, Tamedia Building, Zurich, Switzerland

- Technical experts at your service backed with more than 25 years experience in putting 3M™ VHB™ tape to work improving products and processes in many applications
- 3M will be there to make sure you are satisfied
- 3M is constantly developing new solutions for constantly changing customer needs

For Additional Information: To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550. Address correspondence to 3M Industrial Adhesives and Tapes Division, 3M Center, Building 21-1W-10, 900 Bush Avenue, St. Paul, MN 55144. Our fax number is 651-778-4244.

Limited Product 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 due 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.

3M

Industrial Business
Industrial Adhesives and Tapes Division

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St. Paul, MN 55144
www.3M.com/vhb

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10% post-consumer

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