

The 3M logo is displayed in its characteristic red, bold, sans-serif font.The VHB logo features the letters 'VHB' in a large, white, bold, sans-serif font. Below it, the word 'Tape' is written in a smaller, white, sans-serif font, and 'Since 1980' is written in an even smaller, white, sans-serif font. A vertical line is positioned to the left of the 'VHB' text.The main title of the document is '3M VHB Tape Design Guide', presented in a large, white, bold, sans-serif font. The text is overlaid on a large, orange, triangular graphic that points downwards from the top right towards the bottom left.The tagline 'Dream. Design. Deliver.' is written in a white, sans-serif font, positioned below the main title.

# 3M™ VHB™ Tape

Open a world of new possibilities.

Bonding product parts with precision, ease, reliability and strength requires an approach that breaks the barriers of traditional construction elements. 3M VHB Tapes open up a world of possibilities — eliminating rivets, screws, bolts and welds — and improving design construction, aesthetics and productivity. With unmatched strength, these tapes increase the overall durability and reliability of every product bond.

**Experience the strength and reliability of 3M VHB Tapes.**



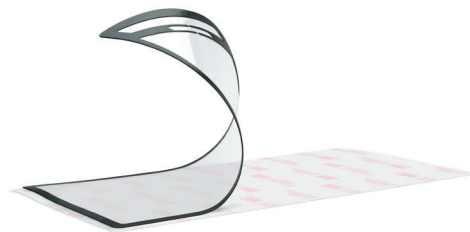
## Invisible bond

Enhance your design appearance with virtually invisible bonding — a game-changing approach for your design concepts. Explore new possibilities and use new, innovative materials to improve the look of your products while optimizing performance, preventing bi-metallic corrosion and streamlining your production processes.



## A durable difference

With a bond that's built to withstand the rigors of exposure, 3M VHB Tapes resist hot, cold and cycling temperatures, UV light, moisture and solvents. They seal against environmental conditions and damp vibration to reduce metallic wear-and-tear.



## Demanding strength

For your most demanding bonding applications, 3M™ VHB™ Tapes distribute dynamic or static stress over the entire surface of the design, improving holding strength and eliminating the need for mechanical fasteners.

## Application efficiency

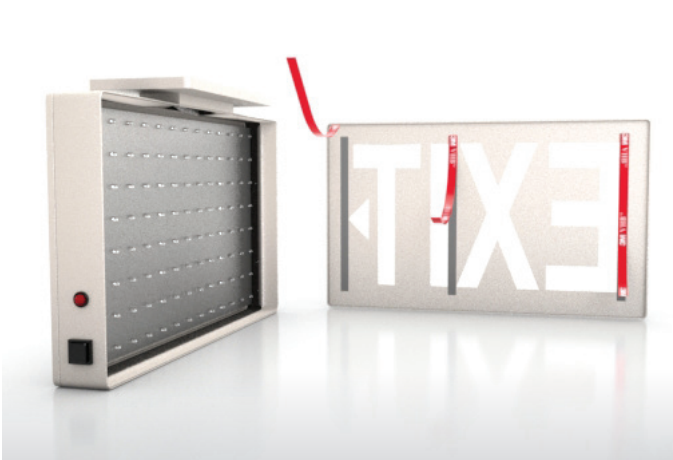
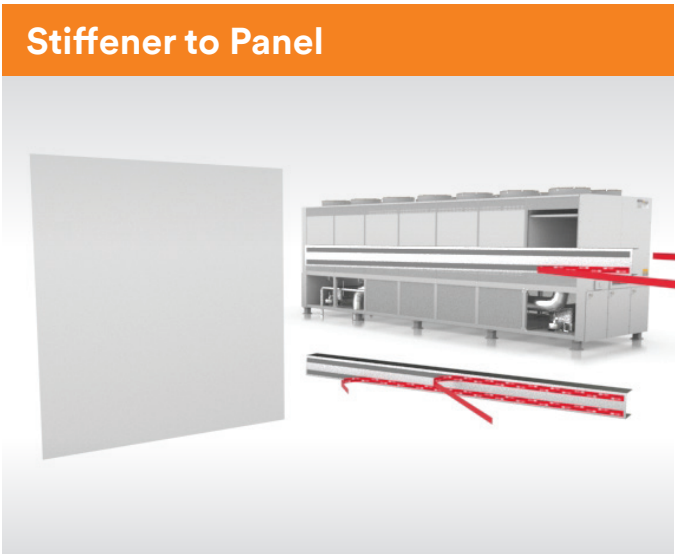
3M VHB Tapes are simple and easy to apply, saving you time and money. The tapes bond on contact, assemble easily and can be cut to precise shapes and sizes for custom applications. 3M VHB Tapes don't require a cure time and can be used in pre-assembly processes.

# Applications and Innovations

## The Proven, High Strength Alternative to Mechanical Fasteners

3M™ VHB™ Tape offers manufacturers a distinct bonding advantage by spreading stress loads across the entire length of the joint, permanently adhering materials with a powerful bond.

It's time to replace screws, rivets, welds and other traditional fasteners with a better solution — 3M VHB Tape.



Solve dynamic force challenges while reducing weight and producing a clean, sharp look.



Experience the freedom to create unique designs with exceptional vibration and corrosion resistance.

# Dream. Design. Deliver.

## Durability for Long-Term Performance

- Resist cold, UV light, temperature cycling, moisture and solvents
- Seal against environmental conditions

## Design Flexibility

- Expand the range of material options for high impact visual combinations
- Use lighter weight and thinner materials to lower component and transportation costs



Apply a secure seal to dissimilar materials, while enhancing productivity and design innovation.



Advance your product performance with increased flexibility in production and design.

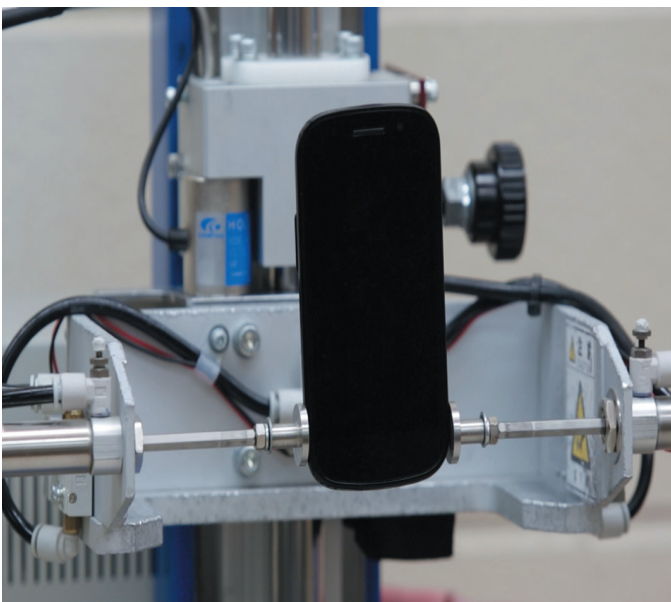
# Your Application Advantage — 3M Expertise and Support

Develop product innovations and improve process efficiencies with the science of 3M™ VHB™ Tape and the support of 3M application specialists.

3M VHB Tape has been tested again and again to ensure ultimate performance. Our experienced application experts stress, pull, dunk, freeze and burn 3M VHB Tape to understand how it reacts in many environments. Engineers, designers, architects and regulators can have confidence that



3M supports every application with an extraordinary team of dedicated Application Engineers who consult with designers to help solve difficult design challenges and reveal new design opportunities. When you choose 3M VHB Tape, you get more than an amazing product, you get access to our global support network of technical expertise.



Drop tests allow 3M to compare shock and impact resistance of products used to bond devices.



Our experts invest thousands of hours every year testing customers' substrates and designs, ensuring the right products are selected for each application and delivering the best results possible.

3M™ VHB™ Tape will perform every day, at the highest level possible. Test after test, the tape's closed cell, acrylic construction stands up to water, dirt, dust and many chemicals.

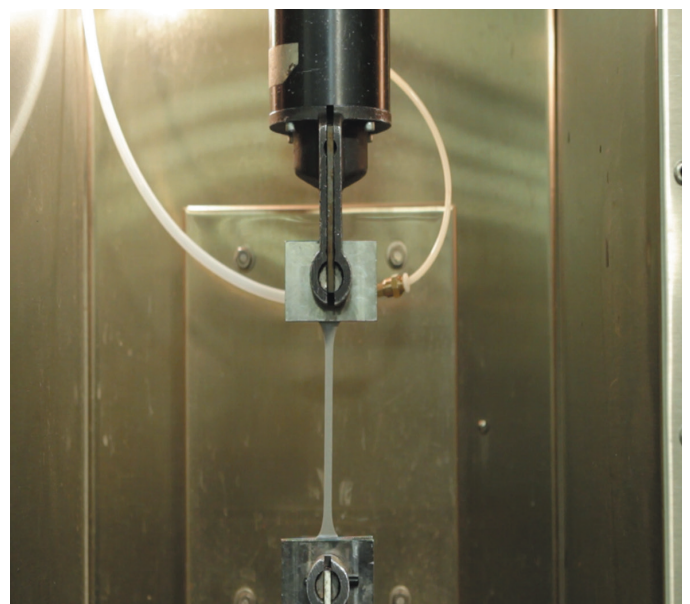
Our deep expertise in bonding dissimilar materials for challenging applications is unmatched. 3M stands alone in its capabilities, facilities and experience. Leverage our expertise to your competitive advantage.



3M performs weathering tests on many of our products using the most advanced weather facilities in the world. Substrates bonded with 3M VHB Tape are subjected to artificial indoor tests and real-world outdoor tests to determine the effects of years of extreme weathering. Exposing them to extreme UV radiation, water and heat ensures your products can stand the test of time.



Dynamic normal tensile test: Quantifies the internal cohesive strength of 3M VHB Tape. Unlike mechanical fasteners, the viscoelastic foam core of 3M VHB Tape absorbs the tensile stress, spreading the stress throughout the entire bond.



Tensile and elongation tests: Used to compare 3M VHB Tape's elongation versus adhesives. Unlike traditional joining methods, 3M VHB Tape can isolate stresses by allowing them to move independently, while still maintaining a strong hold.

# Design and Application Guidelines

## Selecting the Right 3M™ VHB™ Tape for Your Application

Our application experts are here to consult with your team to determine the correct 3M VHB Tapes for your product design and production process. When you're reviewing options, consider these factors:

- **SUBSTRATES** — Surfaces function and interact with adhesives differently, based on their properties and surface energy. Test the surface for both the flow of the adhesive and the ability to achieve contact with the other surface.
- **THICKNESS** — Choose tapes with higher thickness to correspond with higher rigidity and flatness irregularity of your materials. Use thinner tapes when working with more flexible materials.
- **QUANTITY** — Consider the variables of viscoelasticity, strength, stiffness, stress and creep behavior when determining the amount of tape for a dynamic load versus a static load.
- **EXPANSION/CONTRACTION** — Tapes can typically tolerate differential movement in the shear plane up to three times their thickness.
- **BOND FLEXIBILITY** — Because tape bonds can be more flexible, applications that need higher stiffness may benefit from corresponding design modifications.
- **COLD TEMPERATURES** — Evaluate applications that require performance at severe cold temperatures to assure proper adhesion performance.
- **SURFACE PREPARATION** — Ensure your surfaces are clean and pressure is applied after tape application for optimal adhesion.





# Go-To Products Chart

3M™ VHB™ Tapes help you design beyond the limits of mechanical fasteners, to build better products, improve productivity and enhance performance. A great place to get started is the Go-To Products Chart, which offers a range of products well-suited for a variety of projects and applications.

Product Number	Tape Thickness w/o liner Mils (mm)	Page No.	Application Ideas
<b>4941 Tape Family</b>			
4926	15 (0.4)	10	Bond and seal polycarbonate lens over LCD Bond and seal plastic windows to pre-painted control panels/switch gear Mount vinyl wiring ducts and conduit channels Seam vinyl banners
4936   4936F	25 (0.6)	10	
4941   4941F	45 (1.1)	10	
4956   4956F	62 (1.6)	10	
4991   4991B	90 (2.3)	10	
4919F	25 (0.6)	10	
4947F	45 (1.1)	10	
4979F	62 (1.6)	10	
<b>5952 Tape Family</b>			
5906	6 (0.15)	12	Bond and seal polycarbonate lens over LCD Lens and touch panel bonding Logo attachment POP and display construction
5907	8 (0.2)	12	
5908	10 (0.25)	12	
5909	12 (0.3)	12	
5915   5915P   5915WF	16 (0.4)	12	Bonds to a variety of plastics and paint systems Bond architectural signs to frames Attach trim and extrusions Hat channels and stiffeners
5925   5925P   5925WF	25 (0.6)	12	
5930   5930P   5930WF	32 (0.8)	12	
5952   5952P   5952WF	45 (1.1)	12	
5962   5962P   5962WF	62 (1.6)	12	
5958FR	40 (1.0)	12	Bonds to a variety of plastics and paint systems Bond architectural signs to frames Attach trim and extrusions Hat channels and stiffeners Meets FAR 25.853 (a) 12 second vertical burn, Appendix F, Part I (a)(ii)
<b>RP Tape Family</b>			
RP16   RP16F	16 (0.4)	14	Panel bonding Stiffener attachment Trim attachment LED and sign component bonding
RP25   RP25F	25 (0.6)	14	
RP32   RP32F	32 (0.8)	14	
RP45   RP45F	45 (1.1)	14	
RP62   RP62F	62 (1.6)	14	
<b>GPH Tape Family</b>			
GPH-060GF	25 (0.6)	14	Application prior to powder-coat or liquid painting process Panel to Frame bonding Stiffener attachment Mounting and Trim attachment
GPH-110GF	45 (1.1)	14	
GPH-160GF	62 (1.6)	14	
<b>LSE Tape Family</b>			
LSE-060WF	25 (0.6)	14	Bonds to wide variety of medium and low surface energy (LSE) plastics and composites Bonds down to 0°C on frost and condensation free surfaces Outdoor, LED and durable signage bonding Bonding and mounting on plastic housings for transportation and agricultural equipment Appliance bonding and trim attachment
LSE-110WF	45 (1.1)	14	
LSE-160WF	62 (1.6)	14	

# 3M™ VHB™ Tape Selection

## 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
- F – 5 mil Red Printed Polyethylene Film
- G – 3 mil Clear Polyethylene Film
- H – 5 mil Green PE Film

**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.

## Relative Adhesion:

- HSE – High Surface Energy
- LSE – Low Surface Energy

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance		
					Minutes Hours	Days Weeks	
<b>4941 Tape Family</b>							
4926	15 (0.4)	A	Gray, closed-cell acrylic foam tape. Excellent combination of strength, conformability and adhesion to high and medium surface energy materials. Plasticizer resistant. UL 746.	Multi-purpose Acrylic	300°F (150°C)	200°F (93°C)	
4936	25 (0.6)	A					
4936F	25 (0.6)	F					
4941	45 (1.1)	A					
4941F	45 (1.1)	D			250°F (121°C)	200°F (93°C)	
4956	62 (1.6)	A					
4956F	62 (1.6)	F					
4991	90 (2.3)	F			Black version of 4991.	300°F (150°C)	200°F (93°C)
4991B	90 (2.3)	F					
4919F	25 (0.6)	F			Black version of 4936F.	300°F (150°C)	200°F (93°C)
4947F	45 (1.1)	F	Black version of 4941F.				
4979F	62 (1.6)	F	Black version of 4956F.				

**Multi-purpose Acrylic:** Bonds to a wide range of materials including metals, glass and high and medium surface energy plastics and paints. Resists migration of plasticizers in vinyl substrates.

**Modified Acrylic:** Bonds to medium and low surface energy paints and plastics, including many powder coated paints, in addition to the substrates listed with the multi-purpose acrylic adhesive (except plasticized vinyl).

**General Purpose Acrylic:** Bonds to most higher surface energy substrates including metal, glass and high surface energy plastics.

**Low Temperature Acrylic:** Bonds down to 32°F (0°C) compared to 50°F (10°C) for most acrylic adhesives. Bonds most high surface energy substrates including metal, glass and high surface energy plastics.

**Low Surface Energy:** High performance synthetic adhesive bonds to many lower surface energy substrates, including polypropylene, polyethylene, and some powder coated paints.

Solvent Resistance	Relative Adhesion		Color	Product Number
	HSE	LSE		
<b>4941 Tape Family</b>				
High	High	Medium	Gray	<b>4926</b>
			Gray	<b>4936</b>
			Gray	<b>4936F</b>
			Gray	<b>4941</b>
			Gray	<b>4941F</b>
			Gray	<b>4956</b>
			Gray	<b>4956F</b>
			Gray	<b>4991</b>
			Gray	<b>4991B</b>
			Gray	<b>4919F</b>
			Gray	<b>4947F</b>
			Gray	<b>4979F</b>

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
<b>5952 Tape Family</b>						
<b>5906</b>	6 (0.15)	G	Black, closed-cell acrylic foam tape. High dynamic stress resistance and adhesion to multiple surfaces.	Modified Acrylic	300°F (150°C)	
<b>5907</b>	8 (0.2)	G				
<b>5908</b>	10 (0.25)	G				
<b>5909</b>	12 (0.3)	G				
<b>5915</b>	16 (0.4)	F	Black or white, closed-cell acrylic foam tape. Good adhesion to many painted surfaces, including powder coated paint. UL 746C.			
<b>5915P</b>	16 (0.4)	E				
<b>5915WF</b>	16 (0.4)	F				
<b>5925</b>	25 (0.6)	F				
<b>5925P</b>	25 (0.6)	E				
<b>5925WF</b>	25 (0.6)	F				
<b>5930</b>	32 (0.8)	F				
<b>5930P</b>	32 (0.8)	E				
<b>5930WF</b>	32 (0.8)	F				
<b>5952</b>	45 (1.1)	F				
<b>5952P</b>	45 (1.1)	E				
<b>5952WF</b>	45 (1.1)	F				
<b>5962</b>	62 (1.6)	F				
<b>5962P</b>	62 (1.6)	E				
<b>5962WF</b>	62 (1.6)	F				
<b>5958FR</b>	40 (1.0)	F				Meets FAR 25.853 (a) 12 sec vertical burn Appendix F, Part 1 (a) (ii).

Solvent Resistance	Relative Adhesion		Color	Product Number
	HSE	LSE		
<b>5952 Tape Family</b>				
High	High	Medium	Black	<b>5906</b>
			Black	<b>5907</b>
			Black	<b>5908</b>
			Black	<b>5909</b>
			Black	<b>5915</b>
			Black	<b>5915P</b>
			White	<b>5915WF</b>
			Black	<b>5925</b>
			Black	<b>5925P</b>
			White	<b>5925WF</b>
			Black	<b>5930</b>
			Black	<b>5930P</b>
			White	<b>5930WF</b>
			Black	<b>5952</b>
			Black	<b>5952P</b>
			White	<b>5952WF</b>
			Black	<b>5962</b>
			Black	<b>5962P</b>
			White	<b>5962WF</b>
			Black	<b>5958FR</b>

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
<b>RP Tape Family</b>						
RP16	16 (0.4)	A	Gray, closed-cell acrylic foam tape. Conformable. Good adhesion to many painted metals.	Multi-purpose	250°F (121°C)	200°F (93°C)
RP16F	16 (0.4)	F				
RP25	25 (0.6)	A				
RP25F	25 (0.6)	F				
RP32	32 (0.8)	A				
RP32F	32 (0.8)	F				
RP45	45 (1.1)	A				
RP45F	45 (1.1)	F				
RP62	62 (1.6)	A				
RP62F	62 (1.6)	F				
<b>GPH Tape Family</b>						
GPH-060GF	25 (0.6)	F	Gray, closed-cell, conformable acrylic foam. Superior high-temperature performance for powder coat or liquid paint processes and multi material bonding.	Modified Acrylic	450°F (230°C)	300°F (150°C)
GPH-110GF	45 (1.1)	F				
GPH-160GF	62 (1.6)	F				
<b>4945 Tape Family</b>						
4945	45 (1.1)	A	White, closed-cell acrylic foam tape. Plasticizer resistant.	Multi-purpose	300°F (150°C)	200°F (93°C)
4946	45 (1.1)	B				
<b>LSE Tape Family</b>						
LSE-060WF	25 (0.6)	F	Developed specifically for LSE substrates such as polypropylene (PP), thermoplastic elastomers (TPE) and thermoplastic olefins (TPO).	LSE Acrylic	300°F (150°C)	200°F (93°C)
LSE-110WF	45 (1.1)	F				
LSE-160WF	62 (1.6)	F				
<b>4622 Tape Family</b>						
4618	25 (0.6)	H	White, closed-cell acrylic foam tape.	General Purpose Adhesive/ Multi-purpose	250°F (121°C)	200°F (93°C)
4622	45 (1.1)	H				
4624	62 (1.6)	H				

Solvent Resistance	Relative Adhesion		Color	Product Number
	HSE	LSE		
<b>RP Tape Family</b>				
High	High	Medium	Gray	RP16
			Gray	RP16F
			Gray	RP25
			Gray	RP25F
			Gray	RP32
			Gray	RP32F
			Gray	RP45
			Gray	RP45F
			Gray	RP62
			Gray	RP62F
<b>GPH Tape Family</b>				
High	High	Medium	Gray	GPH-060GF
			Gray	GPH-110GF
			Gray	GPH-160GF
<b>4945 Tape Family</b>				
High	High	Low	White	4945
			White	4946
<b>LSE Tape Family</b>				
High	High	High	White	LSE-060WF
			White	LSE-110WF
			White	LSE-160WF
<b>4622 Tape Family</b>				
High	High	Low	White	4618
			White	4622
			White	4624

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
<b>4950 Tape Family</b>						
4914	10 (0.25)	A	Closed-cell acrylic foam tape. UL 746C.	General Purpose Acrylic	300°F (150°C)	200°F (93°C)
4920	15 (0.4)	A				
4929	25 (0.6)	C				
4930	25 (0.6)	A				
4930F	25 (0.6)	D				
4949	45 (1.1)	C			400°F (204°C)	300°F (150°C)
4950	45 (1.1)	A				
4955	80 (2.0)	C				
4959	120 (3.0)	C				
4959F	120 (3.0)	D				
<b>4951 Tape Family</b>						
4951	45 (1.1)	C	White, closed-cell acrylic foam tape. Apply at temps as low as 32°F (0°C).	Low Temperature Applicable Acrylic	300°F (150°C)	200°F (93°C)
4943F	45 (1.1)	C	Gray, closed-cell acrylic foam tape. Apply at temps as low as 32°F (0°C).			
4957F	62 (1.6)	C				
<b>4910 Tape Family</b>						
4905	20 (0.5)	F	Clear, acrylic construction for joining transparent material.	General Purpose	300°F (150°C)	200°F (93°C)
4910	40 (1.0)	F				



Solvent Resistance	Relative Adhesion		Color	Product Number
	HSE	LSE		
<b>4950 Tape Family</b>				
High	High	Low	White	<b>4914</b>
			White	<b>4920</b>
			Black	<b>4929</b>
			White	<b>4930</b>
			White	<b>4930F</b>
			Black	<b>4949</b>
			White	<b>4950</b>
			White	<b>4955</b>
			White	<b>4959</b>
			White	<b>4959F</b>
<b>4951 Tape Family</b>				
High	High	Low	White	<b>4951</b>
			Gray	<b>4943F</b>
			Gray	<b>4957F</b>
<b>4910 Tape Family</b>				
High	High	Low	Clear	<b>4905</b>
			Clear	<b>4910</b>

# Putting it All Together

## Choose the Right Primer for Your Surface

For some challenging substrates, a primer or adhesion promoter may improve the reliability of the bond. Consult with 3M Technical Service to determine if a surface preparation step will be required for your application.

Product	Solvent	Active Ingredients	VOCs	Color	Flashpoint	Coverage
<b>3M™ Primers</b>						
<b>AP111</b>	Isopropyl Alcohol (IPA)	Less than 5% by weight	5.91 lbs/gallon (708 g/l)	Clear	52°F (11°C)	800 ft <sup>2</sup> /gal (19m <sup>2</sup> /liter)
<b>AP115</b>	Isopropyl Alcohol and Water	Less than 1% by weight	6.08 lbs/gallon (728 g/l)	Clear	53°F (12°C)	815 ft <sup>2</sup> /gal (20m <sup>2</sup> /liter)
<b>Primer 94</b>	See SDS	See SDS	Approximately 6.3 lbs/gallon (755 g/l) less H <sub>2</sub> O and exempt solvents	Clear light yellow to clear dark orange	-4°F (-20°C)	600 ft <sup>2</sup> /gal (15m <sup>2</sup> /liter)
<b>Primer UPUV</b>	See SDS	Approximately 5% by weight	3.58 lbs/gallon (429 g/l)	Clear	-5°F (-21°C)	600 ft <sup>2</sup> /gal (15m <sup>2</sup> /liter)

Note: The technical information and data on these pages should be considered representative or typical only and should not be used for specification purposes. Coverage can depend on the application method and the substrate.

## How to Prepare Specific Surfaces

- **HEAVY OILS** — remove oil or grease using a degreaser or solvent-based cleaner.
- **ABRASION** — Abrade the surface to remove heavy dirt or oxidation.
- **HIGHER ADHESION** — Prime surfaces to increase adhesion — especially for paint or plastic surfaces.
- **POROUS SURFACES** — Seal surfaces such as wood, particle board or concrete.
- **GLASS** — Use silane treatment.
- **OTHER MATERIALS** — Consider the potential for special surface preparation for all materials, including metal, copper, plastics, rubber and more.

# Applying 3M™ VHB™ Tapes



**STEP 1:** Align the materials — and make sure all surfaces are clean and dry. Use a 50:50 mix of isopropyl alcohol and water before applying tapes.



**STEP 2:** When surfaces are dry, apply 3M VHB Tape to the surface.



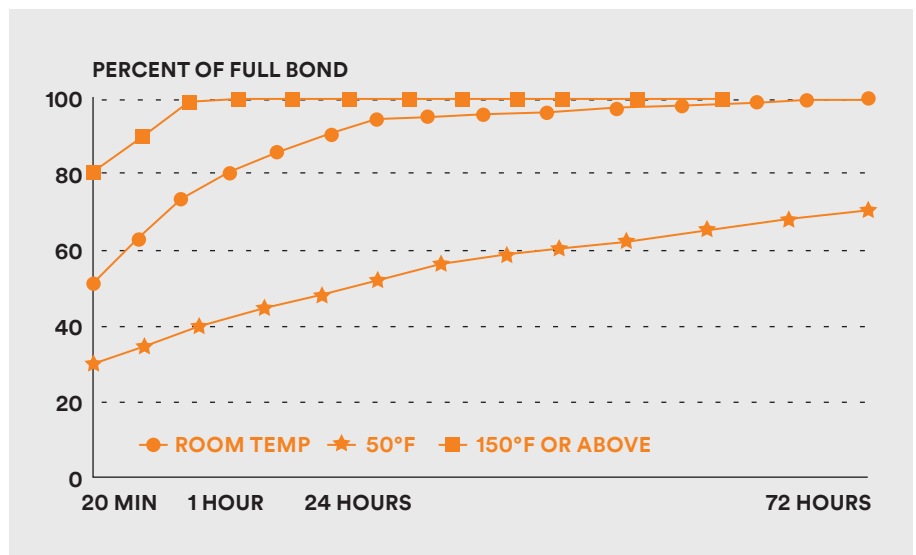
**STEP 3:** Apply pressure with a J-roller to at least 15 psi (100 kPa). This will help develop high-strength adhesion and bonding. Bond strength will increase after application.

## APPROXIMATE TIME TO ACHIEVE ULTIMATE BOND STRENGTH:

- 50% after 20 minutes
- 90% after 24 hours
- 100% after 72 hours

Bond strength may be achieved more quickly and in some cases, may be increased by exposing the bond to elevated temperatures (e.g. 150°F (66°C) for 1 hour).

## BOND TYPICAL BUILD vs. TIME



**Product Selection and Use:** Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (e.g., OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.

**Warranty, Limited Remedy, and Disclaimer:** Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature (in which case such warranty governs), 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF A COURSE OF DEALING, CUSTOM, OR USAGE OF TRADE. If a 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

**Limitation of Liability:** Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.



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