
3M
Science.
Applied to Life.™
3M™ VHB™ Tape
Design Guide
Dream. Design. Deliver.

3M™ VHB™ Tape

Applied to surfaces, never to part

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.

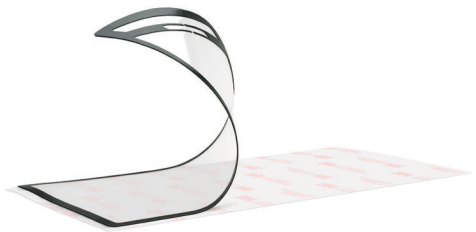
Experience the strength and reliability of 3M VHB Tapes.

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.

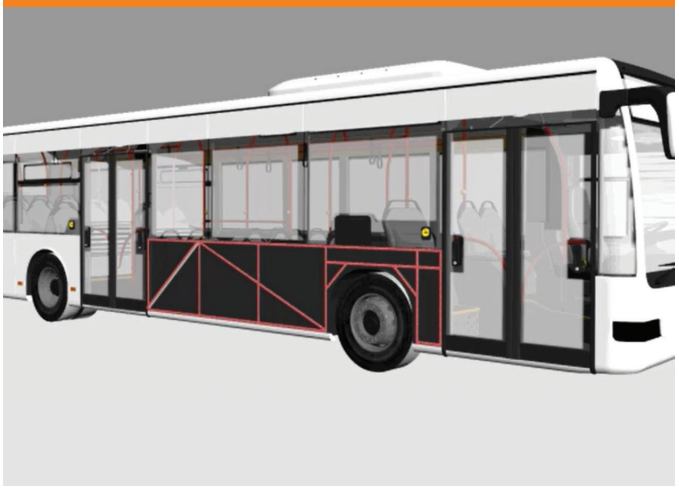
Applications and Innovations

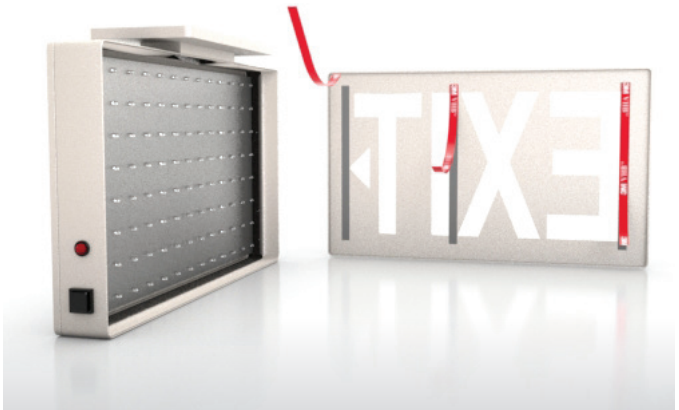
The Proven, High Strength Alternative to Mechanical Fasteners

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.

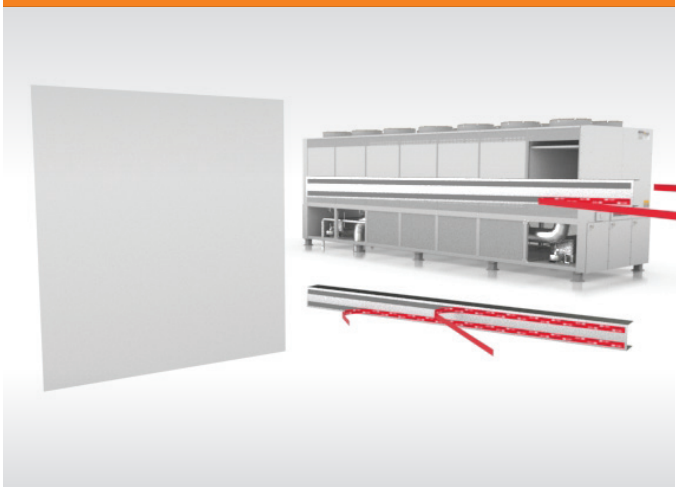
Panel to Frame





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

Stiffener to Panel



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

Dream. Design. Deliver.

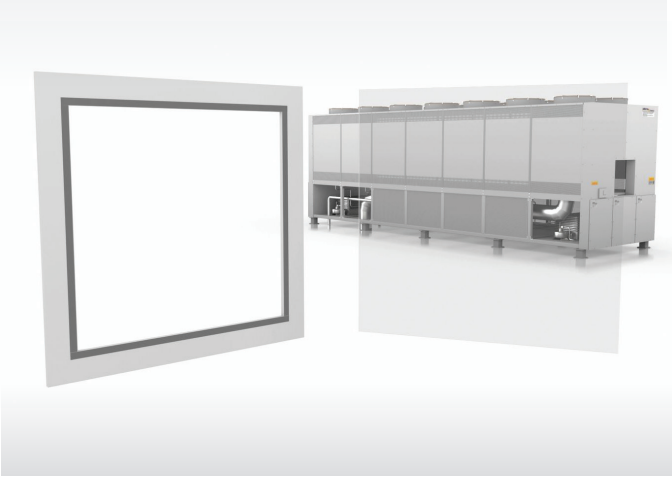
Durability for Long-Term Performance

- 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

Lens Window to Housing



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

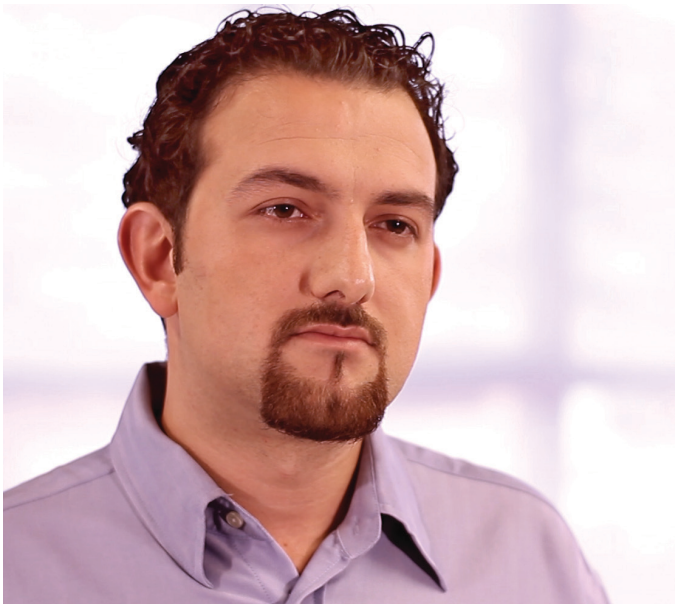
Decorative Material Attachment

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

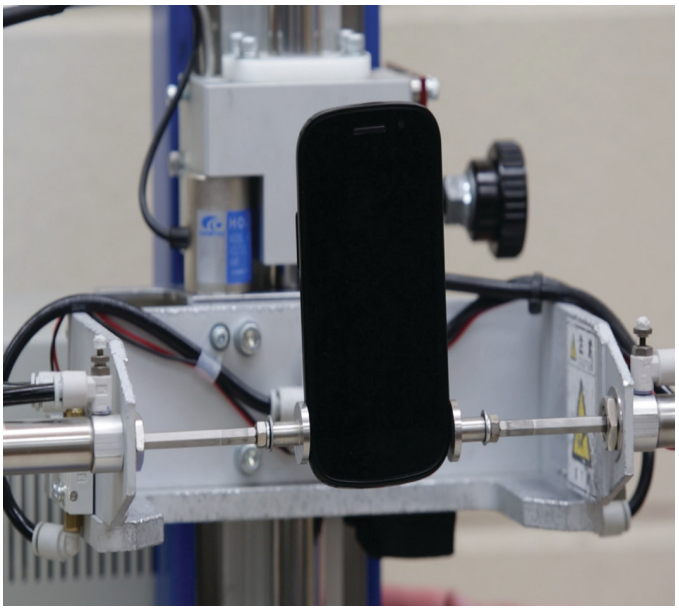
Your Application Advantage – 3M Expertise and Support

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



3M supports every application with an extraordinary team of dedicated Technical Service 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.

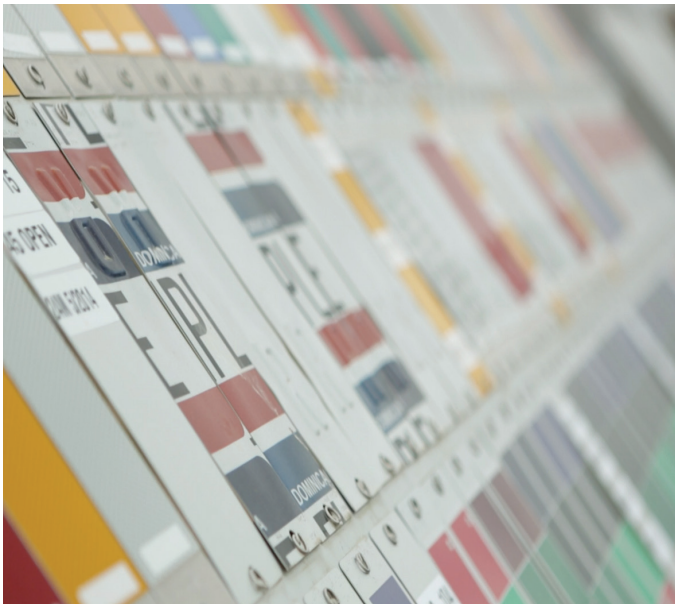


Drop tests allow 3M to compare shock and impact resistance of products used to bond devices.

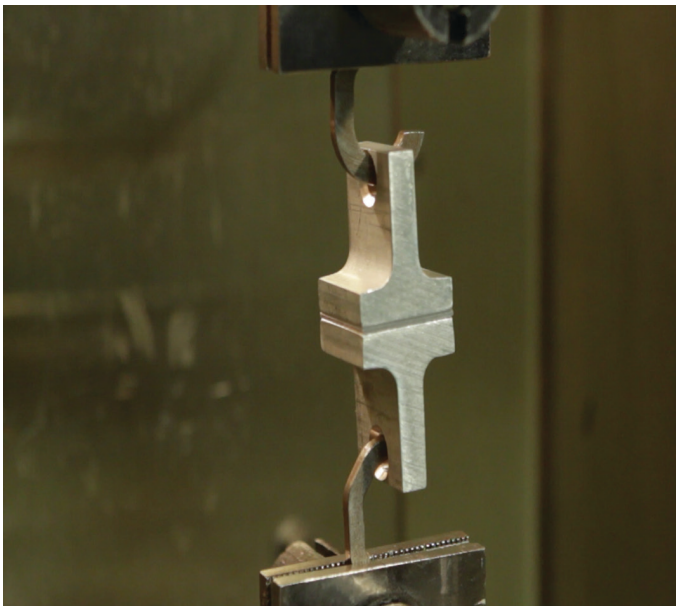
Our experts invest thousands of hours every year testing customers' substrates and designs, ensuring the right products are selected for each application and delivering the best results possible.

confidence that 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.

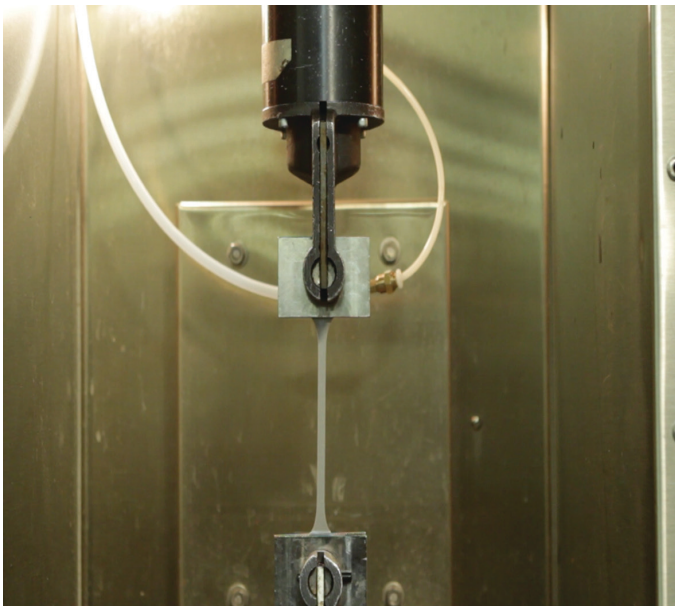
Our deep expertise in bonding dissimilar materials for challenging applications is unmatched. 3M stands alone in its capabilities, facilities and experience. Leverage our expertise to your competitive advantage.



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.



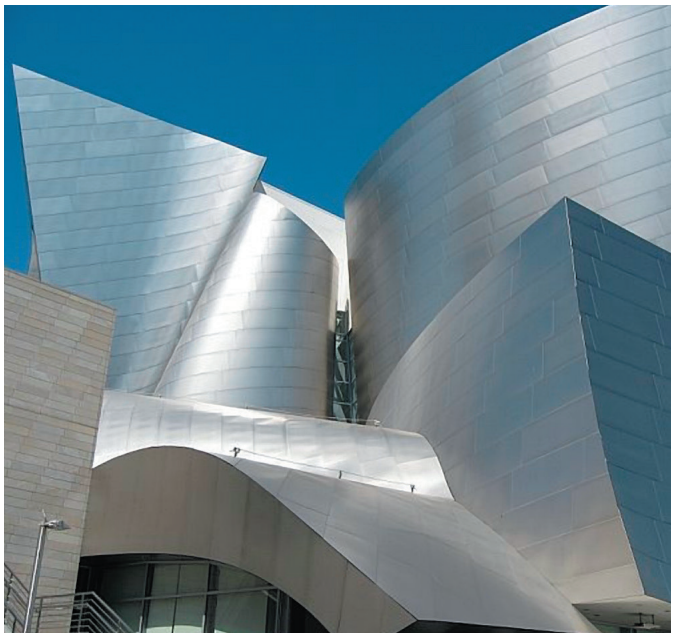
Tensile and elongation tests: Used to compare 3M VHB Tape's elongation versus adhesives. Unlike traditional joining methods, 3M VHB Tape can isolate stresses by allowing them to move independently, while still maintaining a strong hold.

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.



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
4941 Tape Family			
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	25 (0.6)	10	
4936F	25 (0.6)	10	
4941	45 (1.1)	10	
4941F	45 (1.1)	10	
4956	62 (1.6)	10	
4956F	62 (1.6)	10	
4991	90 (2.3)	10	
4991B	90 (2.3)	10	
4919F	25 (0.6)	10	
4947F	45 (1.1)	10	
4979F	62 (1.6)	10	
5952 Tape Family			
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	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
5915P	16 (0.4)	12	
5915WF	16 (0.4)	12	
5925	25 (0.6)	12	
5925P	25 (0.6)	12	
5925WF	25 (0.6)	12	
5930	32 (0.8)	12	
5930P	32 (0.8)	12	
5930WF	32 (0.8)	12	
5952	45 (1.1)	12	
5952P	45 (1.1)	12	
5952WF	45 (1.1)	12	
5962	62 (1.6)	12	
5962P	62 (1.6)	12	
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)
RP Tape Family			
RP16	16 (0.4)	14	Panel bonding Stiffener attachment Trim attachment LED and sign component bonding
RP16F	16 (0.4)	14	
RP25	25 (0.6)	14	
RP25F	25 (0.6)	14	
RP32	32 (0.8)	14	
RP32F	32 (0.8)	14	
RP45	45 (1.1)	14	
RP45F	45 (1.1)	14	
RP62	62 (1.6)	14	
RP62F	62 (1.6)	14	

3M™ VHB™ Tape Selection

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

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

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
4941 Tape Family						
4926	15 (0.4)	A	Gray, closed-cell acrylic foam carrier. Conformable. Good adhesion to many painted metals. Plasticizer resistant. UL 746C.	Multi-purpose Acrylic	300°F (149°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				
4956	62 (1.6)	A				
4956F	62 (1.6)	F				
4991	90 (2.3)	F			250°F (121°C)	200°F (93°C)
4991B	90 (2.3)	F	Black version of 4991.			
4919F	25 (0.6)	F	Black version of 4936F.		300°F (149°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 many plastics and powder coated paints, plus smooth general purpose substrates.

Solvent Resistance	Relative Adhesion		Sample	Product Number
	HSE	LSE		
4941 Tape Family				
High	High	Med		**4926**
				4936
				4936F
				4941
				4941F
				4956
				4956F
				4991
				4991B
				4919F
				4947F
				4979F

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
5952 Tape Family						
5906	6 (0.15)	G	Black, closed-cell acrylic foam carrier. Good adhesion to many painted surfaces, including powder coated paint.	Modified Acrylic	300°F (149°C)	250°F (121°C)
5907	8 (0.2)	G				
5908	10 (0.25)	G				
5909	12 (0.3)	G				
5915	16 (0.4)	F	Black or white, closed-cell acrylic foam carrier. Good adhesion to many painted surfaces, including powder coated paint. UL 746C.			
5915P	16 (0.4)	E				
5915WF	16 (0.4)	F				
5925	25 (0.6)	F				
5925P	25 (0.6)	E				
5925WF	25 (0.6)	F				
5930	32 (0.8)	F				
5930P	32 (0.8)	E				
5930WF	32 (0.8)	F				
5952	45 (1.1)	F				
5952P	45 (1.1)	E				
5952WF	45 (1.1)	F				
5962	62 (1.6)	F		Modified Acrylic	300°F (149°C)	250°F (121°C)
5962P	62 (1.6)	E				
5962WF	62 (1.6)	F				
5958FR	40 (1.0)	F	Meets FAR 25.853 (a) 12 sec vertical burn Appendix F, Part 1 (a) (ii)			200°F (93°C)

Solvent Resistance	Relative Adhesion		Sample	Product Number
	HSE	LSE		
5952 Tape Family				
High	High	Medium		**5906**
				5907
				5908
				5909
				5915
				5915P
				5915WF
				5925
				5925P
				5925WF
				5930
				5930P
				5930WF
				5952
				5952P
				5952WF
High	High	Medium		**5962**
				5962P
				5962WF
				5958FR

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
RP Tape Family						
RP16	16 (0.4)	A	Gray, closed-cell acrylic foam carrier. 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				

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
4945 Tape Family						
4945	45 (1.1)	A	White, closed-cell acrylic foam carrier. Plasticizer resistant.	Multi-purpose	300°F (149°C)	200°F (93°C)
4946	45 (1.1)	B				
4952 Tape Family						
4932	25 (0.6)	A	White, closed-cell acrylic foam carrier. Good adhesion to polypropylene and many powder paints.	Low Surface Energy Adhesive	200°F (93°C)	160°F (71°C)
4952	45 (1.1)	A				
4622 Tape Family						
4618	25 (0.6)	H	White, closed-cell acrylic foam carrier.	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		Sample	Product Number
	HSE	LSE		
RP Tape Family				
High	High	Medium		**RP16**
				RP16F
				RP25
				RP25F
				RP32
				RP32F
				RP45
				RP45F
				RP62
				RP62F

Solvent Resistance	Relative Adhesion		Sample	Product Number
	HSE	LSE		
4945 Tape Family				
High	High	Low		**4945**
				4946
4952 Tape Family				
High	High	High		**4932**
				4952
4622 Tape Family				
High	High	Low		**4618**
				4622
				4624

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
4950 Tape Family						
4914	10 (0.25)	A	Closed-cell acrylic foam carrier. UL 746C.	General Purpose Acrylic	300°F (149°C)	200°F (93°C)
4920	15 (0.4)	A				
4929	25 (0.6)	C				
4930	45 (1.1)	A				
4930F	45 (1.1)	D				
4949	45 (1.1)	C				
4950	45 (1.1)	A				
4955	80 (2.0)	C				
4959	120 (3.0)	C			400°F (204°C)	300°F (149°C)
4959F	120 (3.0)	D				
4951 Tape Family						
4951	45 (1.1)	C	White, closed-cell acrylic foam carrier. Apply at temps as low as 32°F (0°C).	Low Temperature Appliable Acrylic	300°F (149°C)	200°F (93°C)
4943F	45 (1.1)	C	Gray, closed-cell acrylic foam carrier. Apply at temps as low as 32°F (0°C).			
4957F	62 (1.6)	C				
4910 Tape Family						
4905	20 (0.5)	F	Clear, acrylic construction for joining transparent material.	General Purpose	300°F (149°C)	200°F (93°C)
4910	40 (1.0)	F				

Solvent Resistance	Relative Adhesion		Sample	Product Number
	HSE	LSE		
4950 Tape Family				
High	High	Low		**4914**
				4920
				4929
				4930
				4930F
				4949
				4950
				4955
				4959
				4959F
4951 Tape Family				
High	High	Low		**4951**
				4943F
				4957F
4910 Tape Family				
High	High	Low		**4905**
				4910

Product Number	Tape Thickness w/o Liner mils (mm)	Liner Type	Description	Adhesive Type	Temperature Resistance	
					Minutes Hours	Days Weeks
4611 Tape Family						
4646	25 (0.6)	D	Dark gray, closed-cell acrylic foam carrier. High temperature resistance. UL 746C.	General Purpose	450°F (232°C)	300°F (149°C)
4611	45 (1.1)	D	Dark gray, closed-cell acrylic foam carrier. High temperature resistance. UL 746C.	General Purpose Acrylic		
4655	62 (1.6)	D				

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.

3M™ Primers						
Product	**Solvent**	**Active Ingredients**	**VOCs**	**Color**	**Flashpoint**	**Coverage**
AP111	Isopropyl Alcohol (IPA)	Less than 5% by weight	5.91 lbs/gallon (708 g/l)	Clear	52° F (11°C)	800 ft^2/gal (19m^2/liter)
AP115	Isopropyl Alcohol and Water	Less than 1% by weight	6.08 lbs/gallon (728 g/l)	Clear	53° F (12°C)	815 ft^2/gal (20m^2/liter)
Primer 94	See SDS	See SDS	Approximately 6.3 lbs/gallon (755 g/l) less H_2O and exempt solvents	Clear light yellow to clear dark orange	-4° F (-20°C)	600 ft^2/gal (15m^2 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.

Solvent Resistance	Relative Adhesion		Sample	Product Number
	HSE	LSE		
4611 Tape Family				
High	High	Low		**4646**
				4611
				4655

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.

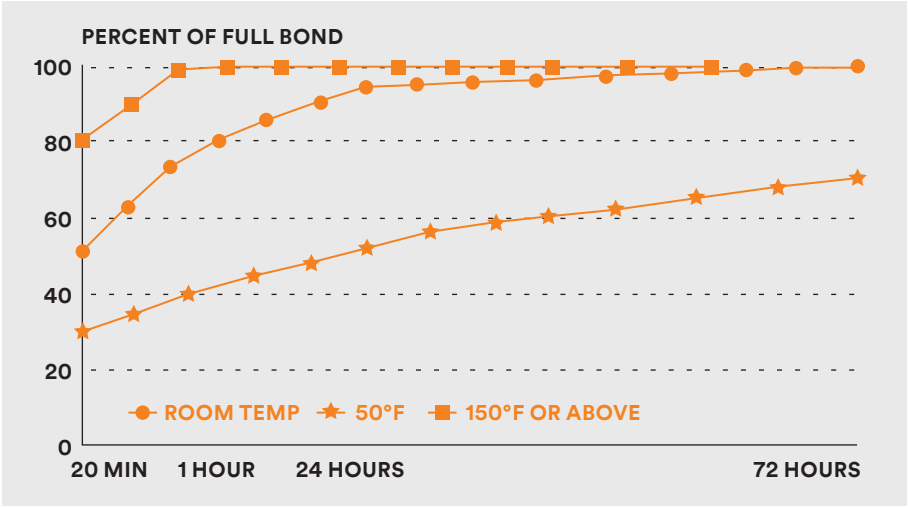
STEP 3: Apply pressure with a J-roller to at least 15 psi (100 kPa). This will help develop high-strength adhesion and bonding. Bond strength will increase after application.

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



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