



VHB™ Tapes

3M™ VHB™ Tapes Product Information

December 2023

Product Description	<p>3M™ VHB™ Tapes are a family of double-sided foam tapes made from high performance acrylic adhesives. These tapes are able to form bonds of exceptional strength and have greater durability and elasticity than conventional double-sided foam tapes. The VHB Tape product range includes tapes with different core constructions and a variety of adhesives. All 3M VHB Tapes use closed cell technology, and provide outstanding environmental resistance and durability. The superior performance of 3M VHB Tapes means they can often be used to replace mechanical fasteners for joining a wide range of materials.</p>
How 3M VHB Tapes Work	<p>The exceptional performance of these tapes comes from the properties of the acrylic core. The core has the dual properties of behaving like a very viscous liquid and an elastic solid. This property is known as viscoelasticity. The “visco” properties allow the adhesive to flow into the microscopic irregularities of the surface to form very strong bonds. The elastic properties allow these tapes to absorb dynamic loads, accommodate differential expansion between surfaces and help distribute loads over the greatest possible area. The elastic properties are maintained between -40°C and 90°C.</p>
The Benefits of Using VHB Tapes	<ul style="list-style-type: none">• No holes to drill, no riveting, no liquid adhesives to cure, no weld distortion, no clean up.• Prevents corrosion by separating dissimilar metals.• Is invisible and eliminates unsightly rivets, spot welds, screw-heads or nuts and bolts.• Meets a wide range of holding requirements for tough applications involving glass, metals, woods, composites and many plastics.• Damps vibration and reduces noise.• Resists solvents and salt water. Seals and bonds even in extreme environments.• Can compensate for thermal expansion and contraction of bonded parts.• Distributes stress. Excellent for thin materials.• Fast, clean and simple to apply. Reduces assembly costs.
Durability	<p>Acrylic is a very durable chemistry with excellent long term aging resistance. 3M VHB Tape has been used in many long term and demanding applications in varied industries such as construction, signage and transportation.</p> <p>There are examples of successful applications of VHB Tapes dating back to 1980. Locally, VHB Tape was used in 1987 on the exterior cladding panels of the 227 building in Newmarket, Auckland. Durability is dependent on specific application and working conditions, and further detailed information is available in the 3M VHB Tape Durability Technical Bulletin.</p>
Outdoor Weathering	<p>The performance of VHB Tapes is not significantly affected by exposure to sunlight and harsh environments. Outdoor weathering decks in Florida (hot and moist, high UV), and Arizona (hot with high UV) and other locations around the world are used to collect data on the long term performance of these tapes. These harsh tests typically show 100% bond strength retention after 2-5 years.</p>
Fatigue and Vibration Resistance	<p>An example of VHB Tape durability has been generated on the Bendix Automotive Proving Ground in Indiana, USA. A full size semi-truck with a sleeper cab was constructed with all exterior panels and doors taped to an underlying frame with 4950 VHB Tape. After approximately 500,000km on the harsh durability track the VHB Tape bonds remained completely intact. This is particularly impressive as some of the mechanically joined and welded parts failed and required repairs during the test program.</p>
Solvent and Moisture Resistance	<p>Testing has revealed no apparent degradation of any VHB Tape when exposed to splash testing of most common solvents, including water, petrol, white spirits, motor oil, ammonia cleaner, acetone, methyl ethyl ketone (MEK) and isopropyl alcohol.</p> <p>3M VHB Tape acts as a seal against moisture and helps to prevent galvanic corrosion between dissimilar metals. Although laboratory tests have shown no degradation after 10 years submersion in salt water, VHB Tapes are not recommended for applications involving continuous submersion.</p>
Shelf Life	<p>When stored in the original cartons in cool dry conditions (ideal 20°C, 50% relative humidity) the shelf life is 24 months from date of manufacture.</p>

3M™ VHB™ Tapes Product Information

Step 1:	Special Feature products have special performance characteristics.	
Special Feature or General Purpose Product?	<p>Products are available for:</p> <ul style="list-style-type: none"> ● Situations where high dynamic stresses are involved ● Applications to paints and plastics including plasticized vinyl ● Situations that require a transparent tape ● When the tape is applied between 0°C and 10°C ● Components that are bonded before powder coating or need to withstand higher temperatures ● Bonding low surface energy plastics without using a primer ● Applications which require Excellent high temperature resistance <p>General Purpose products are ideal for many interior and exterior industrial applications. These tapes have softer cores and are especially suited for textured surfaces or where sealing is required.</p> <p>The table on the next page describes the properties of the available VHB Tapes.</p>	
Step 2:	<ul style="list-style-type: none"> ● All VHB Tapes provide good adhesion to most metals, glass and high surface energy plastics.* ● For higher performance on paints and plastics** use 4941, 4991, 5925, 5952, 5962 or 4945. The liner side of 4622 has good adhesion to paints and plastics. ● Use General Purpose VHB Tapes or 4941 or 4991 when the surface is textured to get a more complete bond or when sealing the joint is a critical requirement. ● On flexible vinyls use only plasticizer resistant 4941 or 4991 (Note: the liner side of 4622 is also plasticizer resistant). ● LSE-160WF, LSE-110WF and LSE-060WF can be used for bonding hard to stick to Low surface energy substrates including Polystyrene (PP), Thermoplastic Elastomers (TPE), Thermoplastic Olefins (TPO), Composites (GFR, Fiberglass, Carbon fiber), Polyester paints.** ● GPH-160GF, GPH-110GF and GPH-060GF can be used for applications where excellent high temperature resistance (short term 230°C) allows for bonding prior to powder coat or liquid painting processes 	
What are the surfaces to be bonded?	<p>* High surface energy plastics include acrylic (Perspex), ABS, polycarbonate (Lexan), PVC, polyester (Mylar), Polyamide (Nylon), Polyimide (Kapton), Phenolic, Noryl.</p> <p>** Low surface energy plastics include PVA, EVA, polystyrene, acetal and some paints. They may require priming with 3M Tape Primer 94. Very low surface energy plastics such as polypropylene, polyethylene and EPDM are difficult surfaces to stick to. Primer 94 may improve the performance on these surfaces.</p> <p>See also the Surface Preparation Suggestions on the back page.</p>	
Step 3:	<ul style="list-style-type: none"> ● The tape thickness required depends on the mismatch between the surfaces to be joined. ● The more closely the two surfaces fit together the thinner the tape can be. As a general rule the tape can accommodate up to 50% of its thickness in mismatch (i.e. the tape should be at least twice as thick as the mismatch). If in doubt, use a thicker tape to ensure a significant area of the tape forms a bond. ● When bonding sheets or large pieces, the thickness of the material should not be more than twice the tape thickness, e.g 1.1mm thick tape is commonly used to bond sheets up to 2.2mm thick. ● Thermal expansion and contraction or movement in the joint should not exceed three times the tape thickness. 	
How thick does the tape have to be?		
Step 4:	<ul style="list-style-type: none"> ● In shear (e.g. holding a sign or panel to a wall) the suggested amount of tape to hold up 1 kg is about 55cm² or for: 	
How much tape to use?	<p>Standard Tape Widths</p> <p>12.7 mm wide 19.0 mm wide 25.4 mm wide</p>	<p>Tape Length</p> <p>430 mm 290 mm 215 mm</p>
<p>These amounts of tape include a significant factor of safety to allow for the different properties of the tapes in the VHB Tape range. These amounts can be reduced by up to 50% depending on the tape type, if customer evaluation gives satisfactory results.</p>		
Step 5:	<p>The desirable tape <u>application</u> temperature range is 21°C - 38°C. There are VHB Tapes with special properties that allow low temperature application.</p>	
What is the application temperature?	<p>The minimum suggested surface temperatures for tape application are:</p> <p>15°C: 4941, 4945, 4991</p> <p>10°C: 4622, 4905, 4910, 4930, 4950, 4959, 5925, 5952, 5962, GPH-060GF, GPH-110GF, GPH-160GF</p> <p>0°C: 4951 (on high surface energy substrates only), LSE-060WF, LSE-110WF, LSE-160WF</p> <p>Once properly applied, low temperature holding is generally satisfactory down to -40°C.</p>	

Always test and evaluate the suitability of the chosen VHB Tape for your application.

3M™ VHB™ Tapes Product Range

	Adhesive Type	Product Number	Tape Thickness	Colour	Temperature resistance		Relative Adhesion		Liner Type	Application Ideas
					Minutes Hours	Days Weeks	HSE Material	LSE Material		
General Purpose VHB Tapes	Modified adhesive on both sides of a soft foam.	5925	0.64mm	Black adhesive, grey core	149°C	121°C	High	Medium	Red Film	Excellent adhesion to the widest variety of surfaces, including most powder coated paints and plastics.
		5952	1.1mm							
		5962	1.55mm							
	Firm adhesive on one side and a soft adhesive on the other side of a medium foam.	4622	1.1mm	White	121°C	93°C	High	Low	Green Film	Good adhesion to a wide range of surfaces.
Special Feature VHB Tapes	Firm adhesive on both sides of a firm foam.	4930 4950 4959	0.64mm 1.1mm 3.0mm	White	149°C 149°C 204°C	93°C 93°C 149°C	High	Low	Paper Paper Clear Film	Use with metals where high dynamic stresses are involved
	Soft adhesive on both sides of a firm foam.	4945	1.1mm	White	149°C	93°C	High	Low	Paper	Use with metals and HSE plastics where high dynamic stresses are involved.
	Soft adhesive on both sides of a medium foam.	4936 4941 4991	0.64mm 1.1mm 2.3mm	Grey	149°C 149°C 121°C	93°C 93°C 93°C	High	Medium	Paper Paper Red Film	Excellent adhesion to a wide range of materials including plasticised vinyl.
	Clear firm adhesive.	4905 4910 4915 4918	0.5mm 1.0mm 1.5mm 2.0mm	Clear	149°C 149°C 149°C 149°C	93°C 93°C 93°C 93°C	High	Low	Red Film Red Film Red Film Red Film	For high surface energy materials where a clear adhesive is required.
	Low temperature adhesive on both sides of a conformable foam.	4951	1.1mm	White	149°C	93°C	High	Low	Clear Film	For HSE substrates where tape is applied at temperatures down to 0°C.
	High temperature firm adhesive transfer tape.	9473	0.25mm	Clear	260°C	149°C	High	Low	Paper	High temperature resistance. Thin laminating adhesive.
	Modified adhesive on both sides of a conformable foam	LSE-060WF LSE-110WF LSE-160WF	0.6mm 1.1mm 1.6mm	White	150°C	100°C	High	High	Red Film	Excellent adhesion to many low surface energy substrates/ materials without the use of a primer or adhesion promoter.
	High temperature adhesive on both sides of a medium firm foam	GPH-060GF GPH-110GF GPH-160GF	0.6mm 1.1mm 1.6mm	Grey	230°C	150°C	High	Medium	Red Film	High temperature resistance. Allows for bonding prior to powder coat or liquid painting processes

3M™ VHB™ Tapes Product Performance Guide

General Purpose VHB Tapes

Tape #		4622	5925	5952	5962
Peel Adhesion	N/100mm	350	300	350	350
Normal Tensile	kPa	480	620	620	620
Dynamic Shear	kPa	445	620	550	550
Static Shear	g	22°C	1000	1000	1000
		66°C	250	500	500
		93°C	250	500	500
		121°C		250	250

3M™ VHB™ Tapes Product Performance Guide

Special Feature VHB Tapes

Tape #		4905	4910	4941	4945	4950	4951	4959	4991	9473	LSE-060WF	LSE-110WF	LSE-160WF	GPH-060GF	GPH-110GF	GPH-160GF
Peel Adhesion	N/100mm	210	260	350	440	440	315	350	350	160	300	440	540	250	370	340
Normal Tensile	kPa	690	690	585	970	970	760	520	480	690	550	470	450	630	670	720
Dynamic Shear	kPa	480	480	480	550	550	550	380	450	550	810	590	530	840	730	570
Static Shear	g	22°C	1000	1000	1000	1500	1500	1250	1500	1000	1000	1000	1000	1000	1000	1000
		66°C	500	500	500	500	1000	500	1000	500	1000	500	500			
		93°C	500	500	500	500	500	750	500	1000	250	250	250			
		121°C						750		1000						
		149°C						750		1000						
		177°C						750						500	500	500

Test Methods

- 900 Peel Adhesion: Stainless Steel, 72 hours dwell, Peel speed 305mm/min
- Normal tensile: Stainless Steel, 6.45cm², 72 hours dwell, Jaw speed 50mm/min
- Dynamic Shear: Stainless Steel, 6.45cm², 72 hours dwell, Jaw speed 12.7mm/min
- Static Shear: Weight (grams) that 3.23cm², will hold 10,000 minutes (7 days) at stated temperature

3M™ VHB™ Tapes Product Application

Introduction

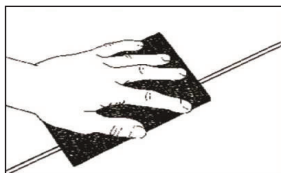
Refer to the Surface Preparation Suggestions below, or to the *Surface Preparation for 3M VHB Tape Applications Technical Bulletin*.

- Most substrates common to VHB Tape applications are best prepared by wiping (in one direction) with a 50:50 mixture of isopropyl alcohol (IPA) and water.
- Where heavy oils or greases are present there may be a need to first cut the oil with a “degreasing” solvent, e.g. 3M Citrus Cleaner or white spirits, but this should always be followed with IPA/water cleaning to remove any residue.
- Abrasion or scuffing* of the surface will in many instances enhance adhesion by increasing the surface area available for bonding. Scuffing must be followed by cleaning with IPA/water mixture.
- The surface must be dry.
A good way to assess cleanliness is that a surface prepared

Making the Bond

Apply the tape to one surface leaving the liner in place. Apply pressure using a roller. This ensures contact and removes air bubbles.

Remove the liner, fit the two surfaces together carefully, and using a suitable roller apply sufficient pressure to ensure the tape experiences 1 kg/cm² (100 kPa) pressure.



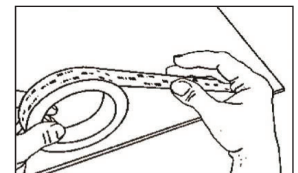
Step A: Some surfaces may need to be abraded using a 3M™ Scotch-Brite™ Abrasive Pad prior to cleaning.



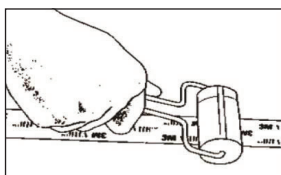
Step B: Solvent Wipe
Note: Be sure to carefully read and follow solvent manufacturer's directions for use and precautions.



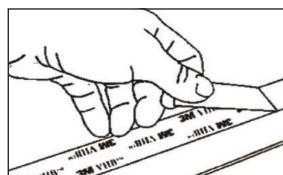
Step C: Wipe dry.



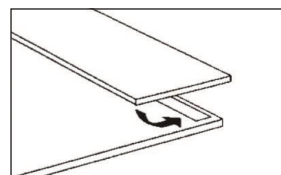
Step D: Position tape. Handle tape by edges only.



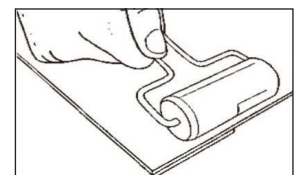
Step E: Squeegee onto surface.



Step F: Remove liner.



Step G: Position materials to be bonded.



Step H: Roll finished joint firmly.

Time/Temperature Bond strengths at the minimum application temperature will be achieved as follows:

20 minutes	50%	24 hours	90%
1 hour	75%	3 days	100%

Assemblies can be handled within 10 minutes but bonds should not be stressed before 72 hours

Surface Preparation Suggestions for Specific Materials

Surface		Surface Preparation Suggestions
Metals		Scuff if oxidized. For copper or brass apply lacquer or varnish to prevent further oxidation
Aluminium, anodized		Clean only with a mixture of isopropyl alcohol (IPA) and water
Some plastics & paints		Scuff, particularly on paints and hard plastics
Plasticised vinyl		Evaluate plasticizer resistant tapes
Wood, concrete, brick		Seal surface with paint, varnish or thin coat of neoprene contact adhesive
Glass/ceramic surfaces		Use Silane Glass Treatment AP115 in high moisture or humidity environments
Low surface energy plastics		Prime with Primer 94 and evaluate suitability of VHB tape
High Surface energy plastics with mould release		Clean with MEK or acetone (ensure solvents do not affect the plastic), then scuff, IPA/water wipe
Fibreglass	Gelcoat	Clean with 3M General Purpose Adhesive Cleaner to remove mould release, scuff
	Non Gelcoat	Sand smooth, prime with thin coat of neoprene contact adhesive or gelcoat
* Scuffing	By hand	Use Scotch-Brite™ 7447 Hand Pads
	By Machine (grinder)	Use Scotch-Brite™ Roloc™ Surface Conditioning Discs, medium or fine



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