



# Technical Data Sheet

## 3M™ VHB™ Tape - Specialty Tape 4950

### Product Description

**Finite Element Analysis (FEA)** data is available for this product at: [3m.com/FEA](https://www.3m.com/FEA)

3M™ VHB™ Tape 4950 is a 0.045 inch (1.1 mm) thick white double coated acrylic foam tape with paper liner. The general purpose acrylic adhesive on both sides bonds to a broad range of high surface energy substrates including metals, glass and easier to bond paints and plastics. 3M™ VHB™ Tape 4950 is part of the 4950 tape family. Each product in this family has general purpose acrylic adhesive and firm foam but varies in thickness, color and liner type.

### Product Features

- Fast and easy-to-use permanent bonding method provides high strength and long-term durability
- Virtually invisible fastening keeps surfaces smooth
- Can replace mechanical fasteners (rivets, welds, screws) or liquid adhesives
- White, 0.045 in (1.1 mm), general purpose adhesive and firm acrylic foam core
- Eliminate drilling, grinding, refinishing, screwing, welding and associated clean-up
- Creates a permanent seal against water, moisture and more
- Pressure sensitive adhesive bonds on contact to provide immediate handling strength
- Allows the use of thinner, lighter weight and dissimilar materials

### Technical Information Note


The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

### Typical Physical Properties

Property	Values	Additional Information
Adhesive Type	General Purpose Acrylic	
Foam Type	Firm Acrylic	
Liner	DK Paper	
Liner Thickness	0.08 mm	
Color	White	
Liner Color	White (printed)	

View 


Test Name: Primary

Total Tape Thickness (mil) 45 mil View 

Test Method: ASTM D3652


Total Tape Thickness (mm) 1.1 mm View 

Test Method: ASTM D3652

Total Tape Thickness 0.045 in View 

Test Method: ASTM D3652

Thickness Tolerance ±10 %

Density 800 kg/m<sup>3</sup> View 

Test Method: ASTM D3574

Notes: Foam with adhesive

Density 50 lb/ft<sup>3</sup>

Liner Thickness 0.003 in

## Typical Performance Characteristics

Property	Values	Additional Information
90° Peel Adhesion	25 lb/in	View 
Test Method: ASTM D3330  Dwell/Cure Time: 24.0 Dwell Time Units: hr Temp C: 23C Temp F: 72F Environmental Condition: 50%RH Backing: 5 mil Aluminum Foil  Notes: 12 in/min (300 mm/min)		
90° Peel Adhesion	44 N/cm	View 
Test Method: ASTM D3330  Backing: 2 mil Aluminum Foil  Notes: 12 in/min (300 mm/min)		

Normal Tensile

970 kPa

View 

Test Method: ASTM D897

Dwell/Cure Time: 72.0  
Dwell Time Units: hr  
Temp C: 23C  
Temp F: 73F  
Substrate: Aluminum

Notes: 1 in.<sup>2</sup> (6.45 cm<sup>2</sup>), Jaw Speed 2 in./min. (50 mm/min.)

Normal Tensile

140 lb/in<sup>2</sup>

View 

Test Method: ASTM D897

Dwell/Cure Time: 72.0  
Dwell Time Units: hr  
Temp C: 23C  
Temp F: 73F  
Substrate: Aluminum

Notes: 1 in.<sup>2</sup> (6.45 cm<sup>2</sup>), Jaw Speed 2 in./min. (50 mm/min.)

Overlap Shear Strength

550 kPa


View 

Test Method: ASTM D1002

Notes: 1 in<sup>2</sup> (6.45 cm<sup>2</sup>), Jaw Speed 0.5 in/min (12.7 mm/min)

Overlap Shear Strength

80 lb/in<sup>2</sup>

View 

Test Method: ASTM D1002

Notes: 1 in<sup>2</sup> (6.45 cm<sup>2</sup>), Jaw Speed 0.5 in/min (12.7 mm/min)

Short Term Temperature Resistance

149 °C

View 

Notes: No change in room temperature dynamic shear properties following 4 hour conditioning at indicated temperature with 100 g/static load. (Represents minutes, hour in a process type temperature exposure).

Short Term Temperature Resistance

300 °F

View 

Notes: No change in room temperature dynamic shear properties following 4 hour conditioning at indicated temperature with 100 g/static load. (Represents minutes, hour in a process type temperature exposure).

Long Term Temp C

93 °C

View 

Notes: Maximum temperature where tape supports at least 250 g load per 0.5 in<sup>2</sup> in static shear for 10,000 minutes. (Represents continuous exposure for day or weeks).

Long Term Temp F

200 °F

View 

Notes: Maximum temperature where tape supports at least 250 g load per 0.5 in<sup>2</sup> in static shear for 10,000 minutes. (Represents continuous exposure for day or weeks).

Static Shear

1500 g

View 

Test Method: ASTM D3654

Temp C: 23C  
Temp F: 73F  
Substrate: Stainless Steel

Notes: Tested at various temperatures and gram loadings. 0.5 in<sup>2</sup> (3.23 cm<sup>2</sup>). Will hold listed weight for 10,000 minutes (approximately 7 day).

Static Shear

500 g

View 

Test Method: ASTM D3654

Temp C: 66C

Temp F: 150F

Substrate: Stainless Steel

Notes: Tested at various temperatures and gram loadings. 0.5 in<sup>2</sup> (3.23 cm<sup>2</sup>). Will hold listed weight for 10,000 minutes (approximately 7 day).

Static Shear

500 g

View 

Test Method: ASTM D3654

Temp C: 93C

Temp F: 200F

Substrate: Stainless Steel

Notes: Tested at various temperatures and gram loadings. 0.5 in<sup>2</sup> (3.23 cm<sup>2</sup>). Will hold listed weight for 10,000 minutes (approximately 7 day).

## Available Sizes


Property	Values	Additional Information
Standard Roll Length	32.9 m	
Standard Roll Length	36 yd	
Minimum Available Width	6.4 mm	
Minimum Available Width	0.25 in	
Maximum Available Width	1219 mm	
Maximum Available Width	48 in	
Normal Slitting Tolerance	±0.79 mm	
Normal Slitting Tolerance	±1/32 in	
Core Size (ID)	76.2 mm	
Core Size (ID)	3 in	

Available Sizes





UL 746C Listings

Solvent and Fuel Resistance





Additional Performance Characteristics

Property	Values	Additional Information
Water Vapor Transmission	14 g/m <sup>2</sup> /24 hr	View 
Test Method: ASTM F1249 Temp C: 38C Environmental Condition: 100%RH		
Shear Modulus	6 x 10 <sup>5</sup> Pa	
Coefficient of Thermal Expansion	180 x 10 <sup>-6</sup> m/m/°C	
Coefficient of Thermal Expansion	100 x 10 <sup>-6</sup> in/in/°F	

Electrical and Thermal Properties

Property	Values	Additional Information
Dielectric Constant 1KHz	2.28	View 
Test Method: ASTM D150 Temp C: 23C Temp F: 72F		
Dielectric Constant 1MHz	1.99	View 
Test Method: ASTM D150 Temp C: 23C Temp F: 72F		
Dissipation Factor 1KHz	0.0227	View 
Test Method: ASTM D150 Temp C: 23C Temp F: 72F		
Dissipation Factor 1MHz	0.037	View 
Test Method: ASTM D150		

Temp C: 23C  
Temp F: 72F

Dielectric Strength	18 V/μm	View 
Test Method: ASTM D140		
Dielectric Strength	460 V/mil	View 
Test Method: ASTM D140		
Thermal Conductivity	0.09 W/m/K	
Thermal Conductivity	0.6 (btu-in)/(h-ft²-°F)	
Volume Resistivity	1.5 x 10 <sup>15</sup> Ω-cm	View 
Test Method: ASTM D257		
Temp C: 23C Temp F: 73F		
Surface Resistivity	>10 <sup>16</sup> Ω	View 
Test Method: ASTM D257		

## Design Considerations

Adhesion to the substrate is important in achieving bonding success. Adhesives must flow onto the substrate surfaces in order to achieve intimate contact area and allow the molecular force of attraction to develop. The degree of flow of the adhesive on the substrate is largely determined by the surface energy of the substrate. 3M™ VHB™ 4950 family tapes bond well to high (HSE) surface energy materials. The image below shows typical materials in these categories.

Achieving good contact is also important. The necessary thickness of tape depends on the rigidity of substrates and their flatness irregularity. While the 3M™ VHB™ Tapes will conform to a certain amount of irregularity, they will not flow to fill gaps between the materials. For bonding rigid materials with normal flatness, consider use of tapes with thickness of 45 mils (1.1 mm) or greater. As the substrate flexibility increases thinner tapes can be considered.

Using the right amount of tape is important to handle the expected stresses. Because 3M™ VHB™ Tapes are viscoelastic by nature their strength and stiffness is a function of the rate at which they are stressed. They behave stronger with relatively faster rate of stress load (dynamic stresses) and will tend to show creep behavior with stress load acting over a long period of time (static stresses). As a general rule, for static loads, approximately four square inches of tape should be used for each pound (57 cm<sup>2</sup> of tape per kg) of weight to be supported in order to prevent excessive creep. For dynamic loads a useful design factor is 12 lb/in<sup>2</sup> (85 kPa) for most dynamic stresses in general applications.

Allow for thermal expansion/contraction. 3M™ VHB™ Tapes can perform well in applications where two bonded surfaces may expand and contract differentially. Assuming good adhesion to the substrates, the tapes can typically tolerate differential movement in the shear plane up to 3 times their thickness.

Bond Flexibility: While an advantage for many applications where allowing differential movement is a benefit, the tape bonds are typically more flexible than alternative bonding methods. Suitable design modifications or periodic use of rigid fasteners or adhesives may be needed if additional stiffness is required.

Performance in Severe Cold Temperature can be challenging. Applications which require performance at severe cold temperatures must be thoroughly evaluated by the user if the intended use will subject the tape product to high impact stresses. A technical bulletin “3M™ VHB™ Tape Cold Temperature Performance” (70-0707-3991-0) is available for additional information.

## Converting

In addition to standard and custom roll sizes available from 3M through the distribution network, 3M™ VHB™ Tapes are also available in limitless shapes and sizes through the 3M Converter network. For additional information, contact 3M Converter Markets at 1-800-223-7427 or on the web at [www.3M.com/converter](http://www.3M.com/converter).

## Storage and Shelf Life

All 3M™ VHB™ Tapes have a shelf life of 24 months from date of manufacture when stored at 40°F to 100°F (4°C to 38°C) and 0-95% relative humidity. The optimum storage conditions are 72°F (22°C) and 50% relative humidity. Performance of tapes is not projected to change even after shelf life expires

## Industry Specifications

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UL 746C (File MH 17478)

UL 879 (File E65361)

## Automotive Disclaimer

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Automotive Applications: This product is an industrial product and has not been designed or tested for use in certain automotive applications, including, but not limited to, automotive electric powertrain battery or high voltage applications. This product does not fully adhere to typical automotive design or quality system requirements, such as IATF 16949 or VDA 6.3. This product may not be manufactured in an IATF certified facility and may not meet a Ppk of 1.33 for all properties. The product may not undergo an automotive production part approval process (PPAP). Customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's automotive application and for conducting incoming inspections before use of the product. Failure to do so may result in injury, death, and/or harm to property. No written or verbal statement, report, data or recommendation by 3M related to automotive use of the product shall have any force or effect unless in an agreement signed by the Technical Director of 3M's Automotive Division. Customer assumes all responsibility and risk if customer chooses to use this product in an automotive electric powertrain battery or high voltage application, and 3M will not be liable for any loss or damage arising from or related to the 3M product or customer's use of the product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity or recall costs), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability. In no event shall 3M be liable for any damages in excess of the purchase price paid for the product.

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## Bottom Matter

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3M

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## Trademarks

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3M and VHB are trademarks of 3M Company

## Handling/Application Information

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### Application Techniques

Clean: Most substrates are best prepared by cleaning with a 50:50 mixture of isopropyl alcohol (IPA\*) and water prior to applying 3M™ VHB™ Tapes.

Exceptions to the general procedure that may require additional surface preparation include:

- Heavy Oils: A degreaser or solvent-based cleaner may be required to remove heavy oil or grease from a surface and should be followed by cleaning with IPA/water.
- Abrasion: Abrading a surface, followed by cleaning with IPA/water, can remove heavy dirt or oxidation and can increase surface area to improve adhesion.
- Adhesion Promoters: Priming a surface can significantly improve initial and ultimate adhesion to many materials such as plastics and paints.
- Porous surfaces: Most porous and fibered materials such as wood, particleboard, concrete, etc. need to be sealed to provide a unified surface.
- Unique Materials: Special surface preparation may be needed for glass and glass-like materials, copper and copper containing metals, and plastics or rubber that contain components that migrate (e.g. plasticizers).

Refer to 3M Technical Bulletin "Surface Preparation for 3M™ VHB™ Tape Applications" for additional details and suggestions. (70-0704-8701-5)

\*Note: These cleaner solutions contain greater than 250 g/l of volatile organic compounds (VOC). Please consult your local Air Quality Regulations to be sure the cleaner is compliant. When using solvents, be sure to follow the manufacturer's precautions and directions for use when handling such materials.

Pressure: 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. Typically, good surface contact can be attained by applying enough pressure to insure that the tape experiences approximately 15 psi (100 kPa) pressure. Either roller or platen pressure can be used. Note that rigid surfaces may require 2 or 3 times that much pressure to make the tape experience 15 psi.

Temperature: Ideal application temperature range is 70°F to 100°F (21°C to 38°C). Pressure sensitive adhesives use viscous flow to achieve substrate contact area.

Minimum suggested application temperature for the 3M™ VHB™ Tape 4950 family is 50°F (10°C). Minimum application temperature does vary by 3M™ VHB™ tape family and ranges from 32°F to 60°F (0°C to 15°C)

Note: Initial tape application to surfaces at temperatures below these suggested minimums is not recommended because the adhesive becomes too firm to adhere readily. However, once properly applied, low temperature holding is generally satisfactory. To obtain good performance with all 3M™ VHB™ Tapes, it is important to ensure that the surfaces are dry and free of condensed moisture.

Time: After application, the bond strength will increase as the adhesive flows onto the surface (also referred to as “wet out”). At room temperature approximately 50% of ultimate bond strength will be achieved after 20 minutes, 90% after 24 hours and 100% after 72 hours. This flow is faster at higher temperatures and slower at lower temperatures. Ultimate bond strength can be achieved more quickly (and in some cases bond strength can be increased) by exposure of the bond to elevated temperatures (e.g. 150°F [66°C] for 1 hour). This can provide better adhesive wetout onto the substrates. Abrasion of the surfaces or the use of primers/ adhesion promoters can also have the effect of increasing bond strength and achieving ultimate bond strength more quickly.

## References

Property	Values
3m.com Product Page	<a href="https://www.3m.com/3M/en_US/p/d/b40065670/">https://www.3m.com/3M/en_US/p/d/b40065670/</a>
Safety Data Sheet SDS	<a href="https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&amp;msdsLocale=en_US&amp;co=ptn&amp;q=4950">https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&amp;msdsLocale=en_US&amp;co=ptn&amp;q=4950</a>

## ISO Statement

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001 standards.

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