



3M™ VHB™ Tape 4991B

Last Revision Date: June, 2022

Product Description

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

3M™ VHB™ Tape 4991B is a 0.09 inch (2.3 mm) thick black double coated acrylic foam tape with PE film liner. The multi-purpose acrylic adhesive on both sides bonds to a broad range of high and medium surface energy substrates including metals, glass and a wide variety of paints and plastics as well as Plasticized Vinyl. The conformable foam provides good contact between substrates even when they are slightly mismatched. 3M™ VHB™ Tape 4991B is part of the 4941 tape family. Each product in this family has multi-purpose acrylic adhesive and conformable 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
- Black, 0.090 in (2.3 mm), multi-purpose adhesive and conformable acrylic foam core offers a good balance of strength and conformability
- 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
- UL GREENGUARD and UL GREENGUARD Gold Certified, contributing to LEED Credit

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	Multi-Purpose Acrylic	
Foam Type	Conformable Acrylic Foam	
Liner	PE Film	
Liner Thickness	0.13 mm	
Color	Black	

Liner Color	Red (printed)	View 
Test Name: Primary		
Total Tape Thickness	90 mil	View 
Test Method: ASTM D3652		
Total Tape Thickness	2.3 mm	View 
Test Method: ASTM D3652		
Total Tape Thickness	0.09 in	View 
Test Method: ASTM D3652		
Thickness Tolerance	±10 %	
Density	720 kg/m ³	View 
Test Method: ASTM D3574		
Notes: Foam with adhesive		
Density	45 lb/ft ³	
Liner Thickness	5 mil	
Liner Thickness	0.005 in	

Typical Performance Characteristics

Property	Values	Additional Information
90° Peel Adhesion	22 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	39 N/cm	View 

Test Method: ASTM D3330

Dwell/Cure Time: 72.0

Dwell Time Units: hr

Temp C: 70C

Temp F: 158F


Environmental Condition: 50%RH

Substrate: Stainless Steel

Backing: 2 mil Aluminum Foil

Normal Tensile

480 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.² (6.45 cm²), Jaw Speed 2 in./min. (50 mm/min.)

Normal Tensile

70 lb/in²

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.² (6.45 cm²), Jaw Speed 2 in./min. (50 mm/min.)

Overlap Shear Strength

450 kPa

View 

Test Method: ASTM D1002

Notes: 1 in.² (6.45 cm²), Jaw Speed 0.5 in/min (12.7 mm/min)

Overlap Shear Strength

65 lb/in²


View 

Test Method: ASTM D1002

Notes: 1 in.² (6.45 cm²), Jaw Speed 0.5 in/min (12.7 mm/min)

Short Term Temperature Resistance

121 °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

250 °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 Temperature Resistance

93 °C

View 

Notes: Maximum temperature where tape supports at least 250 g load per 0.5 in² in static shear for 10,000 minutes. (Represents continuous exposure for day or weeks).

Long Term Temperature Resistance

200 °F

View 

Notes: Maximum temperature where tape supports at least 250 g load per 0.5 in² in static shear for 10,000 minutes. (Represents continuous exposure for day or weeks).

Minimum Application Temperature	15 °C
---------------------------------	-------

Minimum Application Temperature	60 °F
---------------------------------	-------

Static Shear	1000 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 in² (3.23 cm²). 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 in² (3.23 cm²). 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 in² (3.23 cm²). 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	

Special Considerations


Plasticized Vinyl – Plasticizers compounded in soft vinyl can migrate into adhesives and significantly change their performance characteristics. 3M™ VHB™ Tapes 4941 family has very good plasticizer resistance and adhesion to many vinyl formulations. Because of the wide variation in vinyl formulations, however, evaluation by the user must be conducted with the specific vinyl used to ensure that performance will be satisfactory over time. Problems related to plasticizer migration can often be predicted by accelerated aging of assembled parts at 150°F (66°C) for one week).

Solvent and Fuel Resistance

Additional Performance Characteristics

Property	Values	Additional Information
Water Vapor Transmission	See 3M™ VHB™ Tape 4941 g/m ² /24 hr	View 
Test Method: ASTM F1249 Temp C: 38C Environmental Condition: 100%RH		
Shear Modulus	See 3M™ VHB™ Tape 4941 Pa	
Poisson's Ratio	See 3M™ VHB™ Tape 4941	
Coefficient of Thermal Expansion	See 3M™ VHB™ Tape 4941 m/m/°C	

Electrical and Thermal Properties

Property	Values	Additional Information
Dielectric Constant 1KHz	See 3M™ VHB™ Tape 4941	View 
Test Method: ASTM D150		

Temp C: 23C
Temp F: 72F

Dielectric Constant 1MHz

See 3M™ VHB™ Tape 4941

View 

Test Method: ASTM D150

Temp C: 23C
Temp F: 72F

Dissipation Factor 1KHz

See 3M™ VHB™ Tape 4941

View 

Test Method: ASTM D150

Temp C: 23C
Temp F: 72F

Dissipation Factor 1MHz

See 3M™ VHB™ Tape 4941

View 

Test Method: ASTM D150

Temp C: 23C
Temp F: 72F

Dielectric Strength

See 3M™ VHB™ Tape 4941 V/μm

View 

Test Method: ASTM D140

Thermal Conductivity

See 3M™ VHB™ Tape 4941 W/m/K

Volume Resistivity

See 3M™ VHB™ Tape 4941 Ω-cm

View 

Test Method: ASTM D257

Temp C: 23C
Temp F: 73F

Surface Resistivity

See 3M™ VHB™ Tape 4941 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™ 4941 family tapes bond well to high (HSE) and medium (MSE) 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 cm² 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/in² (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.

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; however, 3M does suggest that 3M™ VHB™ Tapes are used prior to the shelf life date whenever possible.

The manufacturing date is available on all 3M™ VHB™ Tapes as the lot number, typically marked on the core or on a label on the outer roll lap. The lot number, typically a 4 digit code, is a Julian date (Y D D D). The first digit refers to the year of manufacture, the last 3 digits refer to the days after January 1. Example: A lot number of 7266 (or 17266) would translate to a date of manufacture of Sept. 23 (266th day of year) in 2017.

Industry Specifications

UL GREENGUARD and UL GREENGUARD Gold Certified, contributing to LEED Credit

Bottom Matter

3M
 Industrial Adhesives and Tapes Division
 3M Center, Building 225-3S-06
 St. Paul, MN 55144-1000
 800-362-3550 • 877-369-2923 (Fax)
www.3M.com

Trademarks

3M and VHB are trademarks of 3M Company.

Automotive Disclaimer

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.

NOTWITHSTANDING ANY OTHER STATEMENT TO THE CONTRARY, 3M MAKES NO REPRESENTATIONS, WARRANTIES OR CONDITIONS WHATSOEVER, EXPRESS OR IMPLIED, REGARDING THE PRODUCT IF USED IN AN AUTOMOTIVE ELECTRIC POWERTRAIN BATTERY OR HIGH VOLTAGE APPLICATION, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTY ON PERFORMANCE, LONGEVITY, SUITABILITY, COMPATIBILITY, OR INTEROPERABILITY, OR 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.

Handling/Application Information

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 4941 family is 60°F (15°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	https://www.3m.com/3M/en_US/p/d/b40072036/
Safety Data Sheet SDS	https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=4991B

Family Group

Link Tags:



Products	Adhesive Type	Foam Type	Liner	Liner Thickness	Color	Liner Color	Total Tape Thickness
4991	Multi-Purpose Acrylic	Conformable Acrylic Foam	PE Film	0.13 mm	Gray	Red (printed)	2.3 mm
4972 to 35	Multi-Purpose Acrylic	Conformable Acrylic Foam	PE Film	0.22 mm	Gray	Green	3.5 mm
4936F	Multi-Purpose Acrylic	Conformable Acrylic Foam	PE Film	0.13 mm	Gray	Red (printed)	0.6 mm
4941F	Multi-Purpose Acrylic	Conformable Acrylic Foam	PE Film	0.13 mm	Gray	Red	1.1 mm
4991B	Multi-Purpose Acrylic	Conformable Acrylic Foam	PE Film	0.13 mm	Black	Red (printed)	2.3 mm

4956F	Multi-Purpose Acrylic	Conformable Acrylic Foam	PE Film	0.13 mm	Gray	Red (printed)	1.6 mm
4979F	Multi-Purpose Acrylic	Conformable Acrylic Foam	PE Film	0.13 mm	Black	Red (printed)	1.6 mm

ISO Statement

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

Information

Technical Information: The technical information, guidance, and other statements contained in this document or otherwise provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.

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: 3M warrants for 24 months from the date of 3M manufacture that 3M™ VHB™ Tape will be free of defects in material and manufacture. 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. 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 (except to the extent 3M approves and issues a specific application warranty, for which the customer must apply, receive 3M approval, and meet all applicable warranty and process requirements, the additional details, terms, and conditions of which are available from 3M). 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.

Disclaimer: 3M industrial and occupational products are intended, labeled, and packaged for sale to trained industrial and occupational customers for workplace use. Unless specifically stated otherwise on the applicable product packaging or literature, these products are not intended, labeled, or packaged for sale to or use by consumers (e.g., for home, personal, primary or secondary school, recreational/sporting, or other uses not described in the applicable product packaging or literature), and must be selected and used in compliance with applicable health and safety regulations and standards (e.g., U.S. OSHA, ANSI), as well as all product literature, user instructions, warnings, and limitations, and the user must take any action required under any recall, field action or other product use notice. Misuse of 3M industrial and occupational products may result in injury, sickness, or death. For help with product selection and use, consult your on-site safety professional, industrial hygienist, or other subject matter expert. For additional product information, visit www.3M.com.