English-US

Last Revision Date: September, 2024

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Technical Data Sheet

3M™ VHB™ Tape - Specialty Tape 4957F

Product Details

Regulatory Info/SDS

Product Description

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

3M™ VHB™ Tape 4957F is a 0.062 inch (1.6 mm) thick gray double-sided acrylic foam tape with PET liner. The low temperature appliable acrylic adhesive on both sides can be bonded down to temperatures of 32°F (0°C) and bonds to a broad range of high surface energy substrates including metals, glass and easier to bond paints and plastics. The conformable foam provides good contact between substrates even when they are slightly mismatched. 3M™ VHB™ Tape 4957F is part of the 4951 tape family. Each product in this family has low temperature appliable acrylic adhesive but varies in thickness, color and foam 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 for transparent applications
- Gray, 0.062 in (1.6 mm), low temp applicable acrylic adhesive on a conformable, 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

Attribute Name	Test Method	Value
Color		Gray
Adhesive Type		Low Temperature Appliable Acrylic
Foam Type		Conformable Acrylic
Density	ASTM D3574	720 kg/m³ (45 lb/ft³) [1]

[1] Foam with adhesive

Attribute Name	Test Method	Value
Total Tape Thickness	ASTM D3652	1.6 mm (0.062 in) (62 mil)
Liner		PET
Primary Liner Color		Clear

Attribute Name	Value
Liner Thickness	0.05 mm (0.002 in)
Thickness Tolerance	±10 %

Typical Performance Characteristics

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	480 kPa (70 lb/in²) [1]

[1] 6.45 cm² (1 in²), Jaw Speed 12.7 mm/min (0.5 in/min)

Substrate: Stainless Steel

Attribute Name	Test Method	Dwell Time	Temperature	Backing	Value
90° Peel Adhesion	ASTM D3330	72 h	23 °C (73 °F)	5 mil Aluminum Foil	20 lb/in [1]
90° Peel Adhesion	ASTM D3330	72 h	23 °C (73 °F)	2 mil Aluminum Foil	35 N/cm [1]
Static Shear	ASTM D3654		23 °C (73 °F)		1,000 g [2]
Static Shear	ASTM D3654		66 °C (150 °F)		500 g [2]
Static Shear	ASTM D3654		93 °C (200 °F)		500 g [2]

[1] 304 mm/min (12 in/min)

[2] Tested at various temperatures and gram loadings. 3.23 cm² (0.5 in²). Will hold listed weight for 10,000 minutes (approximately 7 day).

Substrate: Aluminum
Temperature: 23 °C (73 °F)
Dwell Time: 72 h

Attribute Name	Test Method	Value
Normal Tensile	ASTM D897	520 kPa (75 lb/in²) [1]

[1] 6.45 cm² (1 in²), Jaw Speed 51 mm/min (2 in/min)

Attribute Name	Value
Short Term Temperature Resistance	149 °C (300 °F) [1]
Long Term Temperature Resistance	93 °C (200 °F) [2]

[1] 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).

[2] Maximum temperature where tape supports at least 78g/cm² (500 g/in²) in static shear for 10,000 minutes. (Represents continuous exposure for day or weeks).

Typical Environmental Performance

90° Peel Adhesion

Substrate: Stainless Steel
Dwell Time: 72 h
Backing: 5 mil Aluminum Foil

Environmental Condition	Value
Water	100 % [1]
Salt Water	100 % [1]
Hydraulic Fluid	100 % [1]
10W30 Motor Oil	100 % [1]
Ethylene Glycol	100 % [1]
Kerosene	90 % [1]
Isopropyl Alcohol (IPA)	50 % [1]
Jet Fuel	50 % [1]
Gasoline	35 % [1]
MEK	5 % [1]

[1] 72 hr dwell after adhesion followed by 72 hr immersion in solvent and testing within 45 min of removal at 12 in/min (300mm/min). Peel adhesion measured as relative to control.
Continuous submersion in chemical solutions is not recommended. The above information is presented to show that occasional chemical contact should not be detrimental to tape performance in most applications in ordinary use.

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.

Handling/Application Information

Surface Preparation

Clean: Most substrates should be cleaned with a 70/30 mixture of (IPA*)/Water prior to applying 3M™ VHB™ Tape.

Exceptions 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__: Please consult with your local Air Quality District to ensure compliance. When using solvents, be sure to follow the manufacturer’s precautions and directions for use.

Application Techniques

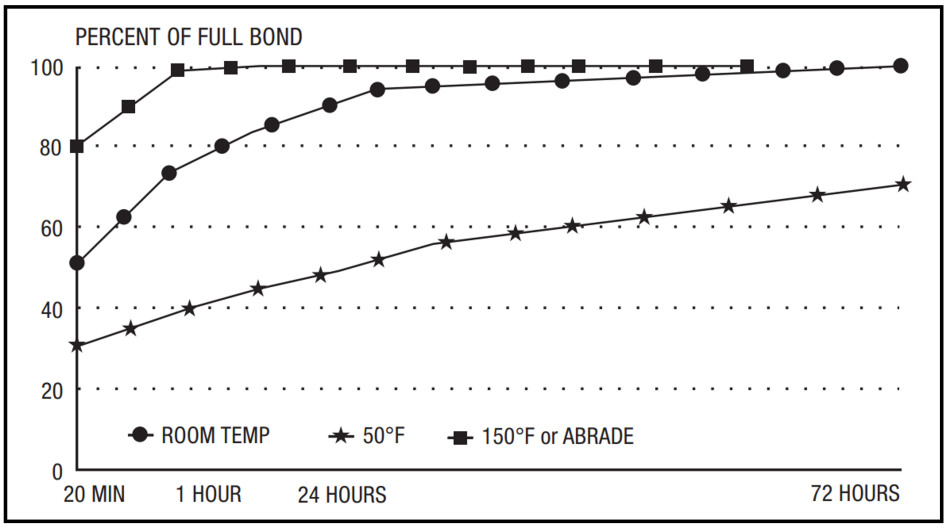
Initial and Final Pressure Application:
Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and helps improve bond strength. Typically, good surface contact can be attained by applying enough pressure to ensure that the tape experiences approximately 100 kPa (15 psi) of pressure. Either roller or platen pressure can be used. When bonding two rigid parts, additional final pressure is often required to ensure that the bond line experiences 100 kPa (15 psi).

Tape Application Temperature:
The ideal tape application temperature range for 3M™ VHB™ Tapes is generally 21°C to 38°C (70°F to 100°F). Pressure sensitive adhesives use viscous flow to achieve substrate contact area. The minimum suggested application temperature for most 3M™ VHB™ Tapes is 10°C to 15°C (50°F to 60°F)

***Note:** Initial tape application to surfaces at temperatures below these suggested minimums is not suggested because the adhesive becomes too firm to adhere readily. Ideally, all substrates and tape should be conditioned above the minimum application temperature in covered, weatherproof conditions until it is verified the substrates are at or above the minimum temperature. Once properly applied, low temperature holding is generally satisfactory.

Bond Build Rate:
After application, the bond strength will gradually increase as the adhesive flows onto to the surface (also referred to as “wet out”). The bond build rate will depend on both tape and substrate, but generally, at room temperature, approximately 50% of ultimate bond strength will be achieved after 20 minutes, 90% after 24 hours, and 100% after 72 hours. Adhesive flow is faster at higher temperatures and slower at lower temperatures. Ultimate bond strength can be accelerated (and in some cases bond strength can be increased) by exposure to elevated temperature (e.g. 66°C [150°F] for 1 hour). This can provide better adhesive wet out onto the substrates. Abrasion (~180 grit), or the use of primers/adhesion promoters can also increase both bond strength as well as the bond build rate.

Typical Bond Build vs. Time



***Note:** Chart describes general performance of 3M™ VHB™ Tapes. Actual bond strength vs. time will depend on several factors including tape and substrate

Design Considerations

Adhesion:
Adhesion to the substrate is critical to achieving high bond strength. 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.

Tape Usage:
Use the right amount of VHB™ Tape 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 when experiencing a higher rate of stress load (dynamic stresses) and will tend to show creep behavior with stress loads that act 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^2 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.

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

Thermal Expansion/Contraction:
3M™ VHB™ Tapes perform well in applications where two bonded surfaces may expand and contract at different rates. Assuming good adhesion to both substrates, VHB™ Tape can typically tolerate differential movement in the shear plane up to 3 times (300%) of 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 fastening methods. Suitable design modifications or periodic use of rigid fasteners/adhesives may be necessary if additional stiffness is required.

Storage and Shelf Life

Store in original cartons at 4-38°C (40-100°F) and 0-95% relative humidity. Optimum storage conditions are 22°C (72°F) and 50% relative humidity. When stored under proper conditions, product retains its performance and properties for 24 months from date of manufacture.

Available Sizes

Attribute Name	Value
Core Size (ID)	76.2 mm (3 in)
Maximum Available Width	1219 mm (48 in)
Minimum Available Width	6.4 mm (0.25 in)
Normal Slitting Tolerance	±0.79 mm (±1/32 in)
Standard Roll Length	32.9 m (36 yd) [1]

[1] Longer roll lengths are available for most 3M™ VHB™ Tapes. Exact length will depend on caliper and width.

Automotive Disclaimer

Select Automotive Applications:
This product is an industrial product and has not been designed or tested for use in certain automotive applications, such as automotive electric powertrain battery or high voltage applications, which may require the product to be manufactured in a IATF certified facility, meet a Ppk of 1.33 for all properties, undergo an automotive production part approval process (PPAP), or fully adhere to automotive design or quality system requirements (e.g., IATF 16949 or VDA 6.3). Customer assumes all responsibility and risk if customer chooses to use this product in these applications.

Information

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ISO Statement

This product was manufactured under a 3M quality system registered to ISO 9001 standards.

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