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Technical Data Sheet

3M™ VHB™ Tape GPH-160GF

English-US

Last Revision Date: June, 2024

Supersedes: February, 2024

Product Details

Product Description

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

3M™ VHB™ Tape GPH-160GF is a 0.062 in (1.6 mm) thick gray double-sided acrylic foam tape with a red polyethylene film liner. The conformable foam provides good contact between substrates even when they are slightly mismatched. 3M™ VHB™ Tape GPH-160GF tape is part of the 3M™ VHB™ Tape GPH series which bonds a variety of substrates including many metal, plastic and painted materials. This tape family has superior high-temperature performance, making it often suitable for assembly prior to powder coat or liquid paint processes involving a paint bake cycle and applications with high operating temperatures. Ideal for stiffeners applied to architectural metal panels, elevator door panels, equipment enclosures, metal cabinets, appliance, signage etc.

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
• High temperature resistance (short term (minutes, hours) to 450°F (230°C)) allowing assembly prior to powder coat or liquid paint processes involving a paint-bake cycle
• High initial tack
• Eliminates drilling, grinding, refinishing, screwing, welding and associated re-work
• 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		Acrylic
Density	ASTM D3574	710 kg/m³ (45 lb/ft³) [1]
Adhesive Carrier		Conformable Acrylic Foam (closed cell)
Total Tape Thickness	ASTM D3652	1.6 mm (62 mil) (0.062 in)
Thickness Tolerance		±10 %

[1] Foam with adhesive

Attribute Name	Value
Liner	Red PE film with 3M™ VHB™ print

Typical Performance Characteristics

Temperature: 22 °C (72 °F)
Dwell Time: 72 h

Attribute Name	Test Method	Substrate	Backing	Value
90° Peel Adhesion	ASTM D3330	Stainless Steel	5 mil Aluminum Foil	34 N/cm (19 lb/in) [1]
Normal Tensile	ASTM D897	Aluminum		720 kPa (105 lb/in²) [2]

Attribute Name	Test Method	Substrate	Backing	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	Stainless Steel		570 kPa (80 lb/in²) [3]

[1] 12 in/min (300 mm/min)

[2] 1 in.² (6.45 cm²), Jaw Speed 2 in./min. (50 mm/min.)

[3] 1 in² (6.45 cm²), Jaw Speed 0.5 in/min (12.7 mm/min)

Static Shear

Substrate: Stainless Steel
Test Method: ASTM D3654

Temperature	Value
22 °C (72 °F)	1,000 g [1]
177 °C (350 °F)	500 g [1]

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

Attribute Name	Value
Minimum Application Temperature	10 °C (50 °F)
Short Term Temperature Resistance	230 °C (450 °F) [1]
Long Term Temperature Resistance	150 °C (300 °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 250 g load per 0.5 in² in static shear for 10,000 minutes. (Represents continuous exposure for day or weeks).

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.

Special Considerations

1. 3M™ VHB™ GPH Series Tapes can be used with or without 3M primers and promoters to enhance adhesion. However, when used at elevated temperatures greater than 121 °C or 250 °F, 3M™ VHB™ GPH Series Tapes should be adhered directly to cleaned substrates or used in conjunction with 3M™ Adhesion Promoter 111.
2. 3M GPH Tapes are compatible with chemicals typically used in paint pre-treatment processes (spray and dip). Tests, completed by a supplier of pre-treatment chemicals have determined that the tape does not cause premature degradation of chemical solutions. It is understood that paint pre-treatment processes may differ between systems and it may be advisable to conduct compatibility and/or degradation tests to confirm compatibility with your specific system.

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

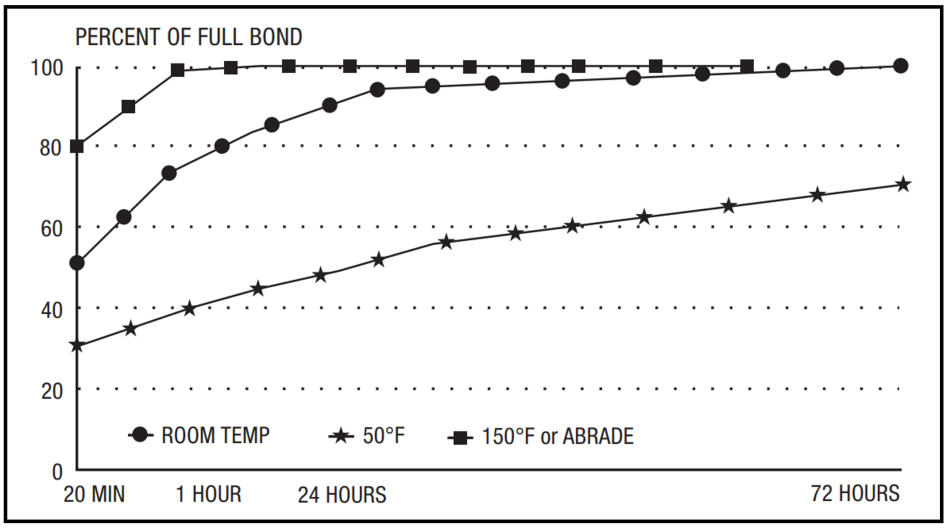
Initial and Final Pressure Application:
Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and helps improve bond strength. Typically, good surface contact can be attained by applying enough pressure to ensure 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.

Industry Specifications

UL 879 (File E65361)
EN 45545 test report details (ISO 5659-2, ISO 9239-1, ISO 5660-1, ISO 5658-2), UL 746C (File MH17478)

UL 746C Listings

3M™ VHB™ Tapes
UL746C Listings - File MH 17478
Category QOQW2 Component - Polymeric Adhesive Systems, Electrical Equipment

3M™ VHB™ Tapes/ Product Families	Substrates	Temperature Rating Minimum	Maximum
4914, 4920, 4930, 4950	Aluminum, Galvanized Steel, Enameled Steel, Stainless Steel, Ceramic, Glass/Epoxy	-35°C	110°C
	PBT	-35°C	90°C
	ABS, Polycarbonate, Rigid PVC	-35°C	75°C
4920, 4930, 4950,	Acrylic	-35°C	90°C
4955, 4959, 4959F	Glass / Galvanized Steel*, Glass / Glass*, Galvanized Steel / Aluminum*, Aluminum / Aluminum*	-35°C	120°C
4945	Phenolic, Aluminum, Galvanized Steel, Alkyd Enamel, Enameled Steel	-35°C	110°C
	ABS, Polycarbonate, Polyamide, Stainless Steel, Acrylic/Polyurethane Paint, Polyester Paint	-35°C	90°C
	Unplasticized PVC	-35°C	75°C
4905, 4910	Polycarbonate, Aluminum, Acrylic/Polyurethane Paint	-35°C	90°C
GPH-060GF, GPH-110GF, GPH-160GF	Acrylic/Urethane Paint, Aluminum, Enameled Steel, Epoxy (glass filled), Epoxy Paint, Polyester Paint, Galvanized Steel, Glass, Phenolic. PBT, Stainless Steel, Polyethylene Ether/Polystyrene	-35°C	90°C
	Acrylic	-35°C	80°C
	ABS, Rigid PVC	-35°C	75°C

*Substrates can be used with or without primer(s)/Coating. 3M Silane Coating, 3M Adhesion Promoter 4298UV and 3M Tape Primer 94 are used with glass substrate. 3M Primer AP111, 3M Adhesion Promoter 4298UV and 3M Tape Primer 94 are used with aluminum and galvanized steel substrates. Comprehensive list available on UL Product iQ™ website

Storage and Shelf Life

All 3M™ VHB™ Tapes have a shelf life of 24 months from date of manufacture when stored at 4°C to 38°C (40°F to 100°F) and 0-95% relative humidity. The optimum storage conditions are 22°C (72°F) 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.

Available Sizes

Attribute Name	Value
Core Size (ID)	76.2 mm (3 in)
Maximum Available Width	1118 mm (44 in)
Minimum Available Width	6.4 mm (0.25 in)
Normal Slitting Tolerance	± 0.8 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.

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ISO Statement

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