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3M™ VHB™ Tape LSE-160WF

Product Description

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

3M™ VHB™ Tape LSE-160WF is a 0.062 (1.6 mm) thick white, conformable, double-coated acrylic foam tape with high initial tack and a very conformable foam core. Its design enables bonding of many low surface energy substrates/materials without the use of a primer or adhesion promoter. 3M™ VHB™ Tape LSE Series is available in three diuerent thicknesses with a 3M™ branded red polyethylene film liner.

Product Features

- Double-coated acrylic foam tape
- 100% closed cell acrylic foam
- Multi material bonding for high, medium or low surface energy substrates including many metals and plastics (i.e. PP, PA, TPO, Composites)
- Enables bonding of many LSE substrates without primer or adhesion promoter
- Good low temperature tack
- Soft foam core enables stress relaxation & an easy application
- High initial tack
- For indoor and outdoor applications

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		Method
Color	White		
Total Tape Thickness	1.6 mm	0.062 in	ASTM D3652
Adhesive	Acrylic		
Adhesive Carrier	Very Conformable Acrylic Foam (closed cell)		
Density	710 kg/m³	45 lb/ft³	
Liner	Red PE film with 3M™ VHB™ print		

Typical Performance Characteristics

Property	Values		Method	Dwell/Cure Time	Test Condition	Substrate	Notes
Normal Tensile	450 kPa	65 lb/in²	ASTM D897	72 hr @ Room Temperature	Room Temperature	Aluminum	1 in² (6.45 cm²), Jaw Speed 2 in/min (50.8 mm/min). Peak force to separate is measured.
Dynamic Overlap Shear	530 kPa	75 lb/in²	ASTM D1002	72 hr @ Room Temperature	Room Temperature	Stainless Steel	1 in² (6.45 cm²), Jaw speed 0.5 in/min (12.7 mm/min). Peak force to separate is measured.
Short Term Temperature Tolerance	150 °C	300 °F					No change in room temperature dynamic shear properties following 4 hours conditioning at indicated temperature with 100 g/static load. (Represents minutes, hours in a process type temperature exposure).
Long Term Temperature Tolerance	100 °C	200 °F					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 days or weeks).

Typical Performance Characteristics (continued)

Static Shear	Test Condition	Substrate
1000 g	Room Temperature	Stainless Steel
500 g	66°C (150°F)	Stainless Steel
250 g	93°C (200°F)	Stainless Steel
1000 g	Room Temperature	Polypropylene
500 g	66°C (150°F)	Polypropylene
500 g	93°C (200°F)	Polypropylene

Property: Static Shear
Method: ASTM D3654
notes: Tested at various temperatures and gram loadings. 0.5 in² (3.23 cm²). Will hold listed weight for 10,000 minutes (approximately 7 days).

90° Peel Adhesion		Substrate
54 N/cm	30 lb/in	Stainless Steel
51 N/cm	29 lb/in	Polypropylene (PP)
51 N/cm	29 lb/in	Glass
47 N/cm	26 lb/in	ABS

Property: 90° Peel Adhesion
Method: ASTM D3330
Dwell/Cure Time: 72 hr @ Room Temperature

Available Sizes

Property	Values	
Standard Length	32.9 m	36 yd
Minimum Available Width	6.4 mm	0.25 in
Maximum Available Width	1118 mm	44 in
Normal Slitting Tolerance	± 0.8 mm	± 1/32 in
Core Size (ID)	76.2 mm	3.0 in

Converted Parts

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.

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™ LSE series tapes bond well to high (HSE), medium (MSE), and low (LSE) 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 stiuness 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 diuerentially. Assuming good adhesion to the substrates, the tapes can typically tolerate diuerential movement in the shear plane up to 3 times their thickness.

Bond Flexibility: While an advantage for many applications where allowing diuerential 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 stiuness 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.

Design Considerations (continued)

This illustration demonstrates the effect of surface energy on adhesive interfacial contact. High surface energy materials draw the adhesive closer for high bond strength.

(High)		(Medium)		(Low)
		Surface Energy (Dynes/cm)		
Aluminum	Polyimide	ABS	PVA	EVA
Stainless Steel	Phenolic	Polycarbonate	Polystyrene	Polyethylene
Copper	Nylon	PVC	Acetal	Polypropylene
Zinc	Alkyd Enamel	PPE	PVDF Paint	PVF
Tin	Polyester	Acrylic	Powder Paint	Silicone
Lead	Epoxy Paint	PU Enamel		PTFE
Anodized Aluminum	Polyurethane	Powder Paint		
Glass				

NOTES: There are a wide variety of formulations, surfaces finishes and surface treatments available on substrate materials which can affect adhesion. This chart is intended to provide only a rough estimate of the adhesion levels which can be expected on some common materials relative to a reference surface such as aluminum.
Foam type can affect and/or limit maximum adhesive strength.

Handling/Application Information

Application Techniques

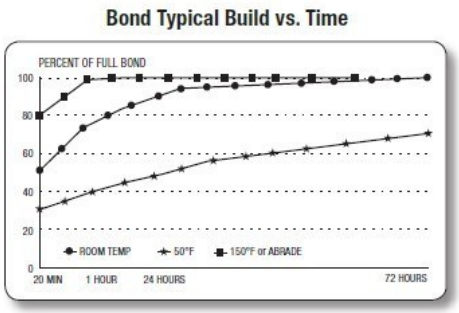
Clean: Most substrates are best prepared by cleaning with a 50:50 mixture of isopropyl alcohol (IPA*) and water prior to applying 3M™ VHB™ Tapes. Exceptions to the general procedure that may require additional surface preparation include:
• Heavy Oils: A degreaser or solvent-based cleaner may be required 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 50°F to 100°F (21°C to 38°C). 3M™ VHB™ LSE can be applied at temperatures as low as 32°F (0°C) provided the surface is frost free. Testing on application-specific substrates is recommended to confirm adhesion 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 euect of increasing bond strength and achieving ultimate bond strength more quickly.



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.

Trademarks

3M and VHB are trademarks of 3M.

References

Safety Data Sheet (SDS)

https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=lse-060

3M™ VHB™ Tape LSE-160WF

Family Group

	LSE-060WF	LSE-110WF	LSE-160WF
Color	White	White	White
Total Tape Thickness (mm)	0.6	1.1	1.6
Adhesive	Acrylic	Acrylic	Acrylic
Adhesive Carrier	Very Conformable Acrylic Foam (closed cell)	Very Conformable Acrylic Foam (closed cell)	Very Conformable Acrylic Foam (closed cell)
Liner	Red PE film with 3M™ VHB™ print	Red PE film with 3M™ VHB™ print	Red PE film with 3M™ VHB™ print

ISO Statement

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

Information

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