VHB™ Adhesive Transfer Tapes with High Performance Acrylic Adhesive 100MP

F9460PC • F9469PC • F9473PC

Technical Data — April 2013

Product Description

3M™ VHB™ Adhesive Transfer Tapes F9460PC, F9469PC and F9473PC utilize the 3M™ High Performance Acrylic Adhesive 100MP, which has excellent long term holding power with much higher adhesion strength than typical pressure sensitive adhesive systems. These 3M™ VHB™ Adhesive Transfer Tapes are transparent and are ideal for use in many interior and exterior industrial applications to replace rivets, spot welds, liquid adhesives, and other permanent fasteners.

Construction Information

Products	3M™ VHB™ Adhesive Transfer Tapes F9460PC	F9469PC	F9473PC
Adhesive Thickness	0.002 in. (0.05 mm)	0.005 in. (0.13 mm)	0.010 in. (0.26 mm)
Liner Material	58# Polycoated Kraft 0.004 in. (0.10 mm)		

Electrical and Thermal Properties

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

Products	3M™ VHB™ Adhesive Transfer Tapes F9460PC			F9469PC			F9473PC		
Thermal Coefficient of Expansion	770 x 10^{-6} mm/mm/°C								
Thermal Conductivity (ASTM C-177)	0.092 BTU-ft/ft^2 Hr °F (0.0016 Watts/cm °C)								
Dielectric Strength (Volts per ASTM D-149-97A)	23°C	125°C	175°C	23°C	125°C	175°C	23°C	125°C	175°C
	1200	1000	1000	3000	2600	1900	5500	N/A	N/A
Insulation Resistance (ASTM D-1000)	> 1 x 10^6 megaohms/in^2								
Density	0.04 lb/in^3 (0.98 g/cm^3)								

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Dynamic Mechanical Properties

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

For engineers who have to use adhesive properties for modeling and analysis purpose, we suggest a Young's modulus of 4.5 x 10^2 kPA (measured at 23°C & 1 Hz) and a Poisson's ratio of 0.499. For detailed adhesive modulus and damping properties, please refer to the nomograph for 3M™ VHB™ Adhesive Transfer Tapes, which is available upon request through our technical service group. The nomograph presents adhesive modulus and damping properties as functions of temperature and frequency.

Typical Physical Properties and Performance Characteristics

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

These 3M™ VHB™ Adhesive Transfer Tapes are made from the same adhesive system and are thermoplastic in nature, becoming softer as temperature increases and firmer as temperature decreases. As the adhesive becomes firmer, the adhesion performance generally increases. At low temperatures (lower than -40°F [-40°C]), the 3M™ VHB™ Adhesive Transfer Tapes become very firm and glassy; the ability to absorb impact energy is reduced. In contrast, adhesion strength reduces with increasing temperatures. Typical adhesive strength properties at room temperatures are shown below.

Products	3M™ VHB™ Adhesive Transfer Tapes F9460PC	F9469PC	F9473PC
Peel Adhesion to Stainless Steel (ASTM D3330)	7.0 lb./in. (120 N/10 cm)	8.0 lb./in. (140 N/10 cm)	9.0 lb./in. (160 N/10 cm)
Normal Tensile to Aluminum (T-Block) (ASTM D-897)	100 lb./in.^{2} (690 kPA)	100 lb./in.^{2} (690 kPA)	100 lb./in.^{2} (690 kPA)
Static Shear or Shear Holding Power to Stainless Steel (ASTM D-3654)	Will hold 1000 grams of loading with a time period of more than 10,000 minutes at temperatures up to 300°F (149°C).		
Dynamic Shear to Stainless Steel (ASTM D-1002)	80 lb./in.^{2} (550 kPa)	80 lb./in.^{2} (550 kPa)	80 lb./in.^{2} (550 kPa)
Temperature Tolerance (Short Term)	500°F (260°C): 4-hour conditioning at the indicated temperature with 100 g static load.		
Temperature Tolerance (Long Term)	300°F (149°C): Maximum temperature where tape supports 250 g in static shear for 10,000 minutes.		
Solvent Resistance (3 splash testing cycles: 20 seconds submersion, & 20 seconds air dry.)	No apparent degradation when exposed to splash testing of many common solvents and fluids including gasoline, JP-4 fuel, mineral spirits, motor oil, ammonia cleaner, acetone and methyl ethyl ketone.		
UV Resistance	Excellent UV resistance through outdoor weathering tests and weather-O-meter tests.		

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UL 746C Listings (File MH 17478) and Durability Testing

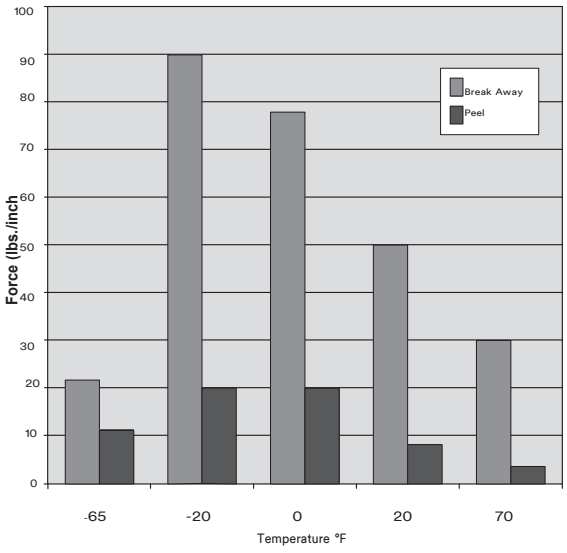
3M™ High Performance Acrylic Adhesive 100MP has UL 746C listings with different temperature ratings on many commonly used substrate materials as indicated in the table below. Qualification for this listing requires high strength retention after extended exposure to high temperatures, humidity, cold, and cyclic conditions.

Substrates	Temperature Rating
Stainless Steel, Glass/Epoxy, Enameled Steel, Ceramic, Phenolic; Nickel Plated Steel (3M™ Adhesive Transfer Tape F9469PC only)	110°C
ABS, Polycarbonate, Aluminum, Galvanized Steel	90°C
Unplasticized PVC	75°C

Our testing has shown that 3M™ High Performance Acrylic Adhesive 100MP yielded 92% retention of peel adhesion after the roll was aged for more than 5 years at an elevated temperature of 150°F (65°C). The initial tack and liner release properties were still excellent. This testing result suggests that the tape is relatively unaffected by long-term exposure to elevated temperatures. Bonds made with 3M™ Adhesive 100MP can tolerate periodic short-term exposures to temperatures up to 500°F (260°C).

3M™ High Performance Acrylic Adhesive 100MP is thermoplastic in nature, becoming softer as temperature increases and firmer as temperature decreases. As the adhesive becomes firmer, the performance generally increases. This performance increase is demonstrated graphically in Figure 1 for 3M™ VHB™ Adhesive Transfer Tape F9473PC. It shows the breakaway and peel forces as a function of temperature. The exception of the performance increase is at very low temperatures when high impact stresses along with high frequency stresses along with high frequencies are encountered. At low temperatures, the tape becomes very firm and glassy; the ability to absorb impact energy is reduced.

Figure 1. T-Peel Performance vs. Temperature
(3M™ VHB™ Adhesive Transfer Tape F9473PC on Aluminum)



Weight Loss and Outgassing Performance

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The testing was done per ASTM E595-77/84/90 as indicated in the NASA Reference Publication 1124, Revision 4, "Outgassing Data for Selecting Spacecraft Materials", June 1997. The results are reported as percentage of total mass loss (TML) and percentage of Volatile Condensible Materials (VCM), respectively, as shown below.

	3M™ VHB™ Adhesive Transfer Tapes		
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TML (%)	0.85	1.29	1.23
VCM (%)	0.00	0.02	0.01

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Application Techniques

Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure helps develop better adhesive contact and improve bond strength.

To obtain optimum adhesion, the bonding surfaces must be clean, dry, and well unified. Some typical surface cleaning solvents are isopropyl alcohol/water mixture or heptane.*

Ideal tape application temperature range is 70°F to 100°F (21°C to 38°C). Initial tape application to surfaces at temperatures below 50°F (10°C) is not recommended because the adhesive becomes too firm to adhere readily. However, once properly applied, low temperature holding is generally satisfactory.

*Note: Be sure to follow the manufacturer's precautions and directions for use when using solvents.

Available Sizes

Available Roll Lengths (subject to minimum order requirements):	
Standard	60 yd. (55 m)
Maximum in:	
1/4 in. to 3/8 in. wide	60 yd. (55 m)
3/8 in. to 1 in. wide	240 yd. (220 m)
1 in. up to 3 in.	360 yd. (330 m)
3 in. and wider	360 yd. (330 m)
Normal Slitting Tolerance	± 1/32 in. (0.8 mm)

Recognition/ Certification

TSCA: These products are defined as articles under the Toxic Substances Control Act and therefore, are exempt from inventory listing requirements.

MSDS: These products are not subject to the MSDS requirements of the Occupational Safety and Health Administration's Hazard Communication Standard, 29 C.F.R. 1910.1200(b)(6)(v). When used under reasonable conditions or in accordance with the 3M directions for use, the products should not present a health and safety hazard. However, use or processing of the products in a manner not in accordance with the directions for use may affect their performance and present potential health and safety hazards.

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Storage

Store under normal conditions of 70°F (21°C) and 50% relative humidity in the original carton.

Shelf Life

To obtain best performance, use this product within 18 months from date of manufacture. If the products have been exposed to severe weather conditions, we suggest to precondition the products at the above storage conditions for at least 24 hours before using them.

Technical Information

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ISO 9001

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

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