

3M

Membrane Switch

Technical Data

August, 2001

Adhesive Description	3M™ 200MP High Performance Acrylic This adhesive meets the requirements of most long-term applications. It offers temperature resistance to 400°F (204°C). Peel adhesion values are excellent on most membrane switch substrate materials. It features exceptional shear strength and adhesion to high surface energy (HSE) plastics and metal surfaces.
	3M™ 300MP Hi-Strength Acrylic This adhesive is designed for applications requiring greater initial adhesion especially to low surface energy (LSE) plastic substrates. Temperature performance is up to 300°F (149°C) for most applications.
	3M™ VHB™ 600 Very Hi-Bond Acrylic This is the premium adhesive in our 3M™ product line. Its temperature resistance is slightly higher than 450°F (232°C). It offers tremendous shear strength, even in products with greater thickness and in high-temperature applications.

Product Description	Adhesives for Selective Die-Cutting (double-lined) 3M brand laminating adhesives are available with two liners for ease of processing and selective removal of adhesive. 3M™ double-lined adhesives offer: <ul style="list-style-type: none">• High adhesive strength – for a long-lasting durable bond• High cohesive strength – to resist lifting and separation especially in harsh environments• Smooth adhesive – for a uniform graphic appearance• Environmental stability – for a long-aging performance• Moisture stable liner – for easy, layflat processing• Easy release liners – for fast, consistent processing
	Spacers for Circuit Separation (double-coated) 3M brand double-coated membrane switch spacers feature 2.0 or 5.0 mil adhesive layers for industry-standard, high-performance requirements. The #200MP “Hi-Performance” acrylic adhesive provides the assurance your switch will perform through difficult environmental conditions and millions of actuations.
	Spacers for Switch Assembly (single-coated) 3M brand single-coated polyester products are ideal for circuit layers, metal dome placement and lead protection. The #200MP “Hi-Performance” acrylic adhesive provides the assurance necessary for constructing durable, long-lasting membrane switches. 3M™ brand membrane switch spacers feature: <ul style="list-style-type: none">• Smooth adhesive layer – for consistent actuation and excellent sealability of switch• High adhesive strength – to resist moisture penetration, and environmental conditions• High cohesive strength – to resist lifting and separation especially in harsh environments• High temperature resistance – to resist splitting in harsh environments• High chemical resistance – to resist contamination of contacts in harsh environments• Heat stabilized polyester – for dimensional stability through broad temperature range• Moisture stable liners – for easy, layflat processing• Easy liner release – for fast, consistent processing

Membrane Switch Data Page

Adhesives for Selective Die-Cutting (double-lined)

Adhesive Type	Product No.	Description	Construction				
			Liner (Weight/Mils)	Adhesive (Mils)	Polyester (Mils)	Adhesive (Mils)	Liner (Weight/Mils)
#200MP "Hi-Performance" Acrylic	7952MP	Double-lined 467MP.	58# PCK 4.0	2.0	-	-	58# PCK 4.0
	7962MP	Double-lined 467MP with heavy lay-flat liner for added stiffness, controlled kiss-cutting and ease of handling.		2.0	-	-	90# PCK 6.7
	7953MP	Double-coated polyester for adhesive stability and ease of handling.		1.5	0.5	1.5	58# PCK 4.0
	7955MP	Double-lined 468MP.		5.0	-	-	58# PCK 4.0
	7965MP	Double-lined 468MP with heavy lay-flat liner for added stiffness, controlled kiss-cutting and ease of handling.		5.0	-	-	90# PCK 6.7
#300MP "Hi-Strength" Acrylic	7951MP	Double-lined 300MP. High bond to low surface energy plastics.	58# PCK 4.0	2.0	-	-	58# PCK 4.0

Spacers for Circuit Separation (double-coated)

Adhesive Type	Product No.	Description	Construction				
			Liner (Weight/Mils)	Adhesive (Mils)	Polyester (Mils)	Adhesive (Mils)	Liner (Weight/Mils)
#200MP "Hi-Performance" Acrylic	7945MP	Designed to meet the performance requirements of most membrane keyboards. Outstanding resistance to temperature extremes, chemicals and humidity. Also resists oozing, lifting and separation of switch layers. All products feature 2 mils of #200MP on each side.	58# PCK 4.0	2.0	1.0	2.0	58# PCK 4.0
	7956MP			2.0	2.0	2.0	
	7957MP			2.0	3.0	2.0	
	7959MP			2.0	5.0	2.0	
	7961MP			2.0	7.0	2.0	
	9045MP	The 90xx series of products has a layflat liner on each side which improves die-cutting and handling of intricate die-cut parts.	90# PCK 6.7	2.0	1.0	2.0	90# PCK 6.7
	9056MP			2.0	2.0	2.0	
	9057MP			2.0	3.0	2.0	
	9059MP			2.0	5.0	2.0	
	9061MP			2.0	7.0	2.0	
#600 VHB™ Acrylic	7979	Premium performance, particularly in temperature resistance and shear strength.	58# PCK 4.0	2.0	5.0	2.0	58# PCK 4.0

Spacers for Switch Assembly (single-coated)

Adhesive Type	Product No.	Description	Construction				
			Liner (Weight/Mils)	Adhesive (Mils)	Polyester (Mils)	Adhesive (Mils)	Liner (Weight/Mils)
#200MP "Hi-Performance" Acrylic	7993MP	Single side spacers aid in the construction of membrane switch circuitry, i.e. to protect leads, hold domes in place, or build your own spacer	90# PCK 6.7	2.0	1.0	-	-
	7995MP			2.0	3.0	-	-
	7997MP			2.0	5.0	-	-

3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Spacers For Circuit Separation (double-coated)

		Peel Adhesion ASTM D3330 Modified, 90° Peel			
			Initial (20 minutes)	72 hours @ 72°F (22°C)	72 hours @ 158°F (70°C)
Product Number	Adhesive	Film / Substrate	Typical Value oz./in. (N/100mm)	Typical Value oz./in. (N/100mm)	Typical Value oz./in. (N/100mm)
7945MP 9045MP (2-1-2)	200MP	PET/Stainless Steel	64 (70)	112 (123)	164 (180)
		PET/Aluminum	42 (46)	84 (92)	168 (185)
		PET/PET	49 (54)	67 (74)	126 (139)
		PET/Polycarbonate	50 (55)	72 (79)	84 (92)
7956MP 9056MP (2-2-2)	200MP	PET/Stainless Steel	50 (55)	113 (124)	156 (172)
		PET/Aluminum	32 (35)	75 (83)	157 (173)
		PET/PET	44 (48)	73 (80)	118 (130)
		PET/Polycarbonate	47 (52)	76 (84)	67 (74)
7957MP 9057MP (2-3-2)	200MP	PET/Stainless Steel	54 (59)	95 (105)	153 (168)
		PET/Aluminum	66 (73)	73 (80)	148 (163)
		PET/PET	37 (41)	60 (66)	136 (150)
		PET/Polycarbonate	41 (45)	66 (73)	72 (79)
7959MP 9059MP (2-5-2)	200MP	PET/Stainless Steel	30 (33)	83 (91)	134 (147)
		PET/Aluminum	31 (34)	68 (75)	124 (137)
		PET/PET	33 (36)	53 (58)	118 (130)
		PET/Polycarbonate	36 (40)	54 (59)	66 (73)
7961MP 9061MP (2-7-2)	200MP	PET/Stainless Steel	30 (33)	101 (111)	135 (148)
		PET/Aluminum	30 (33)	70 (78)	134 (147)
		PET/PET	35 (39)	61 (67)	124 (137)
		PET/Polycarbonate	37 (41)	55 (60)	67 (74)
7979MP (2-5-2)	600MP	PET/Stainless Steel	34 (37)	102 (112)	127 (140)
		PET/Aluminum	29 (32)	60 (70)	117 (129)
		PET/PET	29 (32)	54 (59)	101 (111)
		PET/Polycarbonate	34 (37)	54 (59)	58 (64)

***Note:** This technical information and data should be considered representative or typical only and should not be used for specification purposes.

3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Spacers For Circuit Separation (double-coated)

		Cohesion Static (shear) ASTM D3654 (0.5 in. sq.)		
		72°F (22°C)/1000g		
Product Number	Adhesive	Film / Substrate	Typical Value Minutes ¹	Typical Value Minutes ¹
7945MP 9045MP (2-1-2)	200MP	PET/Stainless Steel	10,000+	10,000+
7956MP 9056MP (2-2-2)	200MP	PET/Stainless Steel	10,000+	10,000+
7957MP 9057MP (2-3-2)	200MP	PET/Stainless Steel	10,000+	10,000+
7959MP 9059MP (2-5-2)	200MP	PET/Stainless Steel	10,000+	10,000+
7961MP 9061MP (2-7-2)	200MP	PET/Stainless Steel	10,000+	10,000+
7979MP (2-5-2)	600MP	PET/Stainless Steel	10,000+	10,000+

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Spacers For Circuit Separation (double-coated)

		Cohesion Dynamic (shear) ASTM D1002 (1 in. sq.)		Tensile Strength (Yield) ASTM D2370	
		158°F (70°C)/500G		72°F (22°C)	
Product Number	Adhesive	Film / Substrate	Typical Value PSI / MPa	Typical Value Mils (Microns)	Typical Value PSI
7945MP 9045MP (2-1-2)	200MP	PET/Stainless Steel PET/Polycarbonate	68 (0.47) 70 (0.48)	5 (125)	2556
7956MP 9056MP (2-2-2)	200MP	PET/Stainless Steel PET/Polycarbonate	103 (0.72) 78 (0.54)	6 (150)	3971
7957MP 9057MP (2-3-2)	200MP	PET/Stainless Steel PET/Polycarbonate	79 (0.55) 66 (0.46)	7 (175)	5062
7959MP 9059MP (2-5-2)	200MP	PET/Stainless Steel PET/Polycarbonate	78 (0.54) 69 (0.48)	9 (225)	6462
7961MP 9061MP (2-7-2)	200MP	PET/Stainless Steel PET/Polycarbonate	76 (0.52) 66 (0.46)	11 (275)	7945
7979MP (2-5-2)	600MP	PET/Stainless Steel PET/Polycarbonate	78 (0.54) 72 (0.50)	9 (225)	7178

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Spacers For Circuit Separation (double-coated)

Product Number	Adhesive	Dielectric Strength ASTM D149	Dielectric Constant/ Dissipation Factor	Volume / Surface Resistivity	
		Short time method (air)	ASTM D150 72°F (22°C)	ASTM D257 72°F (22°C)	
		Typical Value Volts/Mil	Typical Value D.C. / D.F.	Typical Value V.R. Ohm - cm	Typical Value S.R. Ohms
7945MP 9045MP (2-1-2)	200MP	1500	3.48 / 0.016	5.7 x 10 ¹⁴	> 5.6 x 10 ¹⁶
7956MP 9056MP (2-2-2)	200MP	1700 P	3.40 / 0.015	8.9 x 10 ¹⁴	> 5.6 x 10 ¹⁶
7957MP 9057MP (2-3-2)	200MP	1700 P	3.33 / 0.013	1.3 x 10 ¹⁵	> 5.6 x 10 ¹⁶
7959MP 9059MP (2-5-2)	200MP	1600 P	3.32 / 0.011	1.5 x 10 ¹⁵	> 5.6 x 10 ¹⁶
7961MP 9061MP (2-7-2)	200MP	1500	3.42 / 0.010	2.2 x 10 ¹⁵	> 5.6 x 10 ¹⁶
7979MP (2-5-2)	600MP	1600	3.43 / 0.011	2.0 x 10 ¹⁵	> 5.6 x 10 ¹⁶

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Spacers For Circuit Separation (double-coated)

		Insulation & Moisture Resistance	Coefficient of Thermal Expansion
		Mil-I-46058C (100VDC, 60 sec.)	ASTM D696 25-175°C
Product Number	Adhesive	Typical Value Ohms	Typical Value M/M/°C
7945MP 9045MP (2-1-2)	200MP	1.0 x 10 ¹³	6.1 x 10 ⁻⁴
7956MP 9056MP (2-2-2)	200MP	1.1 x 10 ¹³	5.1 x 10 ⁻⁴
7957MP 9057MP (2-3-2)	200MP	1.1 x 10 ¹³	5.4 x 10 ⁻⁴
7959MP 9059MP (2-5-2)	200MP	1.9 x 10 ¹³	4.7 x 10 ⁻⁴ 9059MP (2-5-2)
7961MP 9061MP (2-7-2)	200MP	1.6 x 10 ¹³	4.1 x 10 ⁻⁴ 9061MP (2-7-2)
7979MP (2-5-2)	600MP	0.9 x 10 ¹³	4.7 x 10 ⁻⁴ (2-5-2)

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Adhesives For Selective Die Cutting (double-lined)

		Peel Adhesion ASTM D3330 Modified, 90° Peel			
			Initial (20 minutes)	72 hours @ 72°F (22°C)	72 hours @ 158°F (70°C)
Product Number	Adhesive	Film / Substrate	Typical Value oz./in. (N/100mm)	Typical Value oz./in. (N/100mm)	Typical Value oz./in. (N/100mm)
7952MP 7962MP (2-0-0)	200MP	PET/Stainless Steel	31 (34)	97 (107)	156 (172)
		PET/Aluminum	41 (45)	76 (84)	157 (173)
		PET/PET	38 (42)	66 (73)	118 (130)
		PET/Polycarbonate	43 (47)	70 (71)	67 (74)
7953MP (1.5-0.5-1.5)	200MP	PET/Stainless Steel	50 (55)	113 (124)	160 (176)
		PET/Aluminum	32 (35)	75 (83)	152 (167)
		PET/PET	44 (48)	73 (80)	125 (138)
		PET/Polycarbonate	47 (52)	76 (84)	75 (83)
7955MP 7965MP (5-0-0)	200MP	PET/Stainless Steel	69 (76)	112 (123)	167 (184)
		PET/Aluminum	77 (85)	115 (127)	169 (186)
		PET/PET	77 (85)	95 (105)	164 (180)
		PET/Polycarbonate	84 (92)	102 (112)	94 (103)
7951MP (2-0-0)	300MP	PET/Stainless Steel	37 (41)	77 (85)	95 (104)
		PET/Aluminum	47 (52)	61 (67)	88 (97)
		PET/PET	37 (41)	59 (65)	77 (85)
		PET/Polycarbonate	41 (45)	57 (63)	71 (79)

Spacers For Circuit Separation (single-coated)

7993MP (2-1-0)	200MP	PET/Stainless Steel	40 (44)	68 (75)	82 (90)
		PET/Aluminum	36 (40)	64 (70)	79 (87)
		PET/PET	36 (40)	46 (51)	72 (79)
		PET/Polycarbonate	38 (42)	51 (56)	62 (68)
7995MP (2-3-0)	200MP	PET/Stainless Steel	33 (36)	73 (80)	148 (163)
		PET/Aluminum	48 (53)	84 (92)	186 (205)
		PET/PET	44 (48)	63 (69)	195 (215)
		PET/Polycarbonate	42 (46)	64 (70)	147 (162)
7997MP (2-5-0)	200MP	PET/Stainless Steel	24 (26)	94 (104)	232 (255)
		PET/Aluminum	32 (35)	75 (83)	262 (288)
		PET/PET	39 (43)	66 (73)	257 (283)
		PET/Polycarbonate	36 (40)	68 (75)	135 (149)

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Adhesives For Selective Die Cutting (double-lined)

		Cohesion Static (shear) ASTM D3654 (0.5 in. sq.)		
			72°F (22°C)/1000g	158°F (70°C)/500g
Product Number	Adhesive	Film / Substrate	Typical Value Minutes ¹	Typical Value Minutes ¹
7952MP 7962MP (2-0-0)	200MP	PET/Stainless Steel	10,000+	10,000+
7953MP (1.5-0.5-1.5)	200MP	PET/Stainless Steel	10,000+	10,000+
7955MP 7965MP (5-0-0)	200MP	PET/Stainless Steel	10,000+	10,000+
7951MP (2-0-0)	300MP	PET/Stainless Steel	258	92

Spacers For Circuit Separation (single-coated)

7993MP (2-1-0)	200MP	PET/Stainless Steel	10,000+	10,000+
7995MP (2-3-0)	200MP	PET/Stainless Steel	10,000+	10,000+
7997MP (2-5-0)	200MP	PET/Stainless Steel	10,000+	10,000+

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Adhesives For Selective Die Cutting (double-lined)

Product Number	Adhesive	Film / Substrate	Cohesion Dynamic (shear) ASTM D1002 (1 in. sq.)		Tensile Strength (Yield) ASTM D2370	
			72°F (22°C)		Sample Thickness Mils (Microns)	Typical Value PSI
			Typical Value PSI / MPa			
7952MP 7962MP (2-0-0)	200MP	PET/Stainless Steel PET/Polycarbonate	103 (0.72) 80 (0.55)		2 (50)	51
7953MP (1.5-0.5-1.5)	200MP	PET/Stainless Steel PET/Polycarbonate	105 (0.72) 88 (0.61)		3.5 (88)	1593
7955MP 7965MP (5-0-0)	200MP	PET/Stainless Steel PET/Polycarbonate	97 (0.67) 80 (0.55)		5 (125)	51
7951MP (2-0-0)	300MP	PET/Stainless Steel PET/Polycarbonate	95 (0.66) 77 (0.53)		2 (50)	NA

Spacers For Circuit Separation (single-coated)

7993MP (2-1-0)	200MP	PET/Stainless Steel PET/Polycarbonate	NA NA		3 (75)	3609
7995MP (2-3-0)	200MP	PET/Stainless Steel PET/Polycarbonate	NA NA		5 (125)	6749
7997MP (2-5-0)	200MP	PET/Stainless Steel PET/Polycarbonate	NA NA		7 (175)	6273

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Adhesives For Selective Die Cutting (double-lined)

		Dielectric Strength ASTM D149	Dielectric Constant/ Dissipation Factor	Volume / Surface Resistivity	
		Short time method (air)	ASTM D150 72°F (22°C)	ASTM D257 72°F (22°C)	
Product Number	Adhesive	Typical Value Volts/Mil	Typical Value D.C. / D.F.	Typical Value V.R. Ohm - cm	Typical Value S.R. Ohms
7952MP 7962MP (2-0-0)	200MP	880	3.40 / 0.021	1.0×10^{15}	$> 5.6 \times 10^{16}$
7953MP (1.5-0.5-1.5)	200MP	1400	3.29 / 0.017	5.8×10^{14}	$> 5.6 \times 10^{16}$
7955MP 7965MP (5-0-0)	200MP	600	4.06 / 0.022	1.1×10^{15}	$> 5.6 \times 10^{16}$
7951MP (2-0-0)	300MP	470	3.36 / 0.011	1.8×10^{14}	$> 5.6 \times 10^{16}$

Spacers For Circuit Separation (single-coated)

7993MP (2-1-0)	200MP	1700	2.77 / 0.012	2.7×10^{15}	$> 5.6 \times 10^{16}$
7995MP (2-3-0)	200MP	1700	3.03 / 0.009	3.3×10^{15}	$> 5.6 \times 10^{16}$
7997MP (2-5-0)	200MP	1700	3.05 / 0.008	4.8×10^{15}	$> 5.6 \times 10^{16}$

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3M™ Membrane Switch Data Page

Typical Physical, Mechanical & Electrical Properties*

Adhesives For Selective Die Cutting (double-lined)

		Insulation & Moisture Resistance	Coefficient of Thermal Expansion
		Mil-I-46058C (100VDC, 60 sec.)	ASTM D696 25-175°C
Product Number	Adhesive	Typical Value Ohms	Typical Value M/M/°C
7952MP 7962MP (2-0-0)	200MP	1.3×10^{13}	7.2×10^{-4}
7953MP (1.5-0.5-1.5)	200MP	1.7×10^{13}	6.7×10^{-4}
7955MP 7965MP (5-0-0)	200MP	8.8×10^{12}	9.2×10^{-4}
7951MP (2-0-0)	300MP	1.1×10^{13}	4.9×10^{-4}

Spacers For Circuit Separation (single-coated)

7993MP (2-1-0)	200MP	6.5×10^{12}	4.5×10^{-4}
7995MP (2-3-0)	200MP	9.4×10^{12}	3.9×10^{-4}
7997MP (2-5-0)	200MP	6.5×10^{12}	2.8×10^{-4}

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3M™ Membrane Switch Data Page

Environmental Performance

Typical values – not for specification use.

Temperature Range:

- Low: -40°F (-40°C)
- High long term (days, weeks): 250°F (121°C)
- High short term (min., hours): 300°F (149°C)

Chemical Resistance:

Solvent resistance is excellent when this product is properly applied to impervious materials. The adhesive resists softening through edge contact with mild acids, alkalies, oil, gasoline, kerosene, JP-4 fuel, cleaning solutions, germicides, etc. NOT RECOMMENDED FOR TOTAL IMMERSION.

Moisture and Humidity Resistance:

No adverse effect on the bond after exposure to 100% R.H. at 100°F (38°C).

Shelf Life:

Twenty-four months from date of manufacture by customer when stored in cartons at 70°F (21°C) at 50% R.H.

Bond Build-up:

The bond strength of 3M #200MP “Hi-Performance” acrylic adhesive generally increases as a function of time and temperature.

UV Resistance:

Adhesive is resistant to oxidation and ozone when exposed to air or sunlight (UV).

Processing

Cutting:

Steel rule, punch press die-cuttable, digital cutter-plotter, and laser.

Roll Laminating:

Use rubber over steel roll set up with firm application pressure. Make adhesive to substrate contact at nip area only to exclude air entrapment. Use large radius platen press type system. Laminating heat assist is desirable to achieve best bond.

Special Considerations

Bond strength is dependent upon the amount of adhesive-to-surface contact developed. Firm application pressure develops better adhesive contact and thus improves bond strength.

To obtain best adhesion, the bonding surfaces must be clean, dry, and smooth. Some typical surface cleaning solvents are isopropyl alcohol or heptane. Consult manufacturer’s Material Safety Data Sheet for proper handling and storage of solvents.

Ideal tape application temperature range is 70°F (21°C) to 100°F (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 satisfactory.



Membrane Switch Data Page

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550 or visit www.3M.com/converter. Address correspondence to: 3M Engineered Adhesives Division, 3M Center, Building 220-7E-01, St. Paul, MN 55144-1000. Our fax number is 651-733-9175. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

Important Notice

3M MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of application. Please remember that many factors can affect the use and performance of a 3M product in a particular application. The materials to be bonded with the product, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given the variety of factors that can affect the use and performance of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

Limitation of Remedies and Liability

If the 3M product is proved to be defective, THE EXCLUSIVE REMEDY, AT 3M'S OPTION, SHALL BE TO REFUND THE PURCHASE PRICE OF OR TO REPAIR OR REPLACE THE DEFECTIVE 3M PRODUCT. 3M shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including, but not limited to, contract, negligence, warranty, or strict liability.



This Engineered Adhesives Division product was manufactured under a 3M quality system registered to ISO 9002 standards.



Converter Markets Engineered Adhesives Division

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1-800-362-3550
www.3M.com/converter



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10% post-consumer

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