Thermal Transfer Acrylate Label Material

3921

Technical Data **April, 2008**

Product Description

3M™ Thermal Transfer Acrylate Label Material 3921 consists of a non-topcoated acrylate facestock designed for thermal transfer printing and withstand high temperatures and resist chemicals such as those found in the fabrication of printed circuit boards (PCBs).

Construction

(Calipers are nominal values.)

Facestock	Adhesive	Liner
2.0 mil (51 micron) Matte White Cast Acrylate Film	1.0 mil (25 micron) #150 Acrylic	3.0 mil (76 micron) 55# Densified Kraft

Features

- Matte white facestock for good print contrast and easy readability of barcodes and variable information.
- Acrylic based film for good dimensional stability at high temperatures.
- 3M™ Acrylic Adhesive 150 will not degrade when exposed to standard printed circuit board assembly conditions.
- 55# densified kraft liner assures consistent die cutting.

Application Ideas

- Printed circuit board tracking labels that see the following conditions:
  - Solder re-flow.
  - Top and/or bottom side wave solder.
  - Most cleaning processes and chemicals.
- Labeling on parts exposed to high temperatures.

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Typical Physical Properties

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

Adhesion: 180° peel test procedure is ASTM D 3330.

	Initial (10 Minute Dwell/RT)		Conditioned for 3 Days at Room Temperature 72°F (22°C)	
	180° Peel		180° Peel	
Surface	**Oz./In.**	**N/100 mm**	**Oz./In.**	**N/100 mm**
Stainless Steel	54	59	53	58
Polycarbonate	66	72	58	63
Polypropylene	4	4.4	51	56
Epoxy PC Board	Facestock tore	–	Facestock tore	–

	Conditioned for 3 Days at 120°F (49°C)		Conditioned for 24 Hours at 90°F (32°C) at 90% Relative Humidity	
	180° Peel		180° Peel	
Surface	**Oz./In.**	**N/100 mm**	**Oz./In.**	**N/100 mm**
Stainless Steel	68	74	Facestock tore	–
Polycarbonate	70	76	68	74
Polypropylene	35	38	50	54
Epoxy PC Board	Facestock tore	–	Facestock tore	–

Liner Release: 180° Removal of Liner from Facestock

Rate of Removal	Grams/Inch Width	N/100 mm
90 inches/minute	22	0.85
300 inches/minute	23	0.89

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Environmental Performance

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

The properties defined are based on 4-hour immersions at room temperature (72°F/22°C) unless otherwise noted. Samples were applied to stainless steel panels 24 hours prior to immersion and were evaluated one hour after removal from the solution for peel adhesion. Adhesion measured at 180° peel angle (ASTM D 3330) at 12 inches/minute.

Chemical Resistance:

	Adhesion to Stainless Steel		Appearance	Edge Penetration
Chemical	**Oz./in.**	**N/100 mm**	**Visual**	**Millimeters**
Isopropyl Alcohol	–	–	Label slipped off	–
Detergent *1% Alconox® Cleaner	83	90	No change	0
Engine Oil (10W30) @ 250°F (121°C)	81	88	No change	0
Water for 48 hours	–	–	Label slipped off	–
pH 4	90	98	No change	0
pH 10	92	100	No change	0
409® Formula	82	89	No change	0
Toluene	–	–	Label slipped off	–
Acetone	–	–	Label slipped off	–
Brake Fluid	–	–	Label slipped off	–
Gasoline	29	32	No change	0
Diesel Fuel	61	66	No change	0
Mineral Spirits	56	61	No change	0
Hydraulic Fluid	72	78	No change	0

Temperature Resistance:

530°F (277°C) for 30 seconds:	no significant visual change
500°F (260°C) for 7 minutes:	slight browning
-40°F (-40°C) for 24 hours:	no significant visual change

Humidity Resistance:

24 hours at 100°F (38°C) and 100% relative humidity:	no significant change in appearance or adhesion

Accelerated Aging:

ASTM D 3611: 96 hours at 150°F (65°C) and 80% relative humidity

	Rate of Removal	Grams/Inch Width	N/100 mm
180° Removal of Liner from Facestock	90 inches/minute	11	.42
	Rate of Removal	**Oz./In. Width**	**N/100 mm**
180° Peel Adhesion from Stainless Steel	12 inches/minute	57	62

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Printed Label Performance

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

Depending upon the ribbon selection and the size of the barcode, adjustments to the printer burn temperature setting, print head pressure, and print speed may be necessary to achieve desired print images. In addition, printer maintenance and print head cleaning should be performed on a routine basis to assure optimal print image quality.

Because of the limited space available on PCBs, labels are typically small and require the use of narrow 6-mil wide bars. To achieve desired resolution on narrow X-dimension barcodes, more heat, slower print speeds, and proper head pressure are required.

The following ribbons have been tested and were found to perform well in PCB board soldering applications, including exposure to some representative de-fluxing and washing solutions.

Ribbon	Burn Temp. Setting (0-30)	Bar Gains (mils)
Armor AXR7+	28	+0.01
Sony TR4070	28	-0.02
Armor AXR7	28	-0.02

All samples were printed on a Zebra 170xi printer at 2-in./min. print speed. Barcodes were 3:1 ratio with a 6-mil bar width. Maximum burn temperature setting on the Zebra printer is a setting of 30. Bar Gain was measured using a PSC QUICKCHECK® PC 600 Verifier with a #03 wand with an aperture of 0.003 in. Target value would be +0.00 with a tolerance of ± 0.03 bar gain.

All printed samples had 100% first read rates and high print contrast signal values. The Armor AXR7+ ribbon performed the best, but required a greater printhead pressure. The Sony TR4070 and the Armor AXR7 required less printhead pressure. Performance was not as good as the Armor AXR7+.

To minimize burn temperature settings and maximize print head life, the print head pressure and print speed need to be optimized. Heating the printed label to reflow or wave solder temperatures increases the image resistance to solvent attack.

Because of variability in printers and run conditions, it is strongly recommended that these ribbons be tested on the user's equipment for suitable run conditions and printability. Printed labels should also be tested in end user's application to determine suitability.

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Processing

Printing:
Facestock is designed for thermal transfer printing. Call 3M Customer Service at 1-800-422-8116 for additional information.

Recommended Ribbons:
The following ribbons can be used but may require higher burn temperatures:
Armor: AXR7+, AXR7
Sony: TR4070

Die-cutting:
Rotary die cutting is recommended.

Dispensing:
Hand dispensing is recommended.

Packaging:
Finished labels should be stored in plastic bags.

Application Techniques

For maximum bond strength, the surface should be clean and dry. Typical cleaning solvents are heptane and isopropyl alcohol.*****

For best bonding conditions, application surface should be at room temperature or higher. Low temperature surfaces, below 50°F (10°C), can cause the adhesive to become so firm that it will not develop maximum contact with the substrate. Higher initial bonds can be achieved through increased rubdown pressure.

*****When using solvents, read and follow the manufacturer's precautions and directions for use.

Storage

Store at room temperature conditions of 72°F (22°C) and 50% relative humidity.

Shelf Life

If stored under proper conditions, product retains its performance and properties for one year from date of manufacture.

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Product Use

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