Thermal Transfer Acrylate Label Material 3921

Technical Data **September 1, 1999**

Supersedes 1995

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
- #150 acrylic adhesive will not degrade when exposed to standard printed circuit board assembly conditions.
- 55# densified kraft liner assures consistent die cutting.
- 3M™ Label Material 3921 is UL recognized (File MH16411) and CSA accepted (File 99316). See the UL and CSA listings for details.

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

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 Day at 120°F (49°)		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

Environmental Performance

The properties defined are based on four 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®*)	83	90	No change	-
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®* Cleaning Solution	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 (288°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

Printed Label Performance:

Samples were printed with an Armor™* AXR7+ resin ribbon on a Zebra™* 170xi printer at a rate of 2 in./min. and a burn setting of 30. Labels were printed with a 3:1 ratio barcode with 6 mil. X-dimension. Bar gain was –0.04. Printed labels were exposed to the listed conditions, which are representative of PCB assembly conditions. After chemical exposure, labels were rinsed with tap water, dried and examined.

Condition	Print Contrast Signal (PCS)	Read Rate
3921 Control	93	100
530° F, 30 sec.	95	100
500° F, 7 min.	90	100
IPA 75%, 106° F, 15 min[1]	91	100
IPA 100%, RT 2 min.	92	100
Deionized Water, 140°F, 5 min.	91	99
Alconox®* 10%, 135° F, 2 min.	92	100
D-Limonene RT, 2 min.	92	100
Monoethanolamine, 135° F, 2 min.	90	100
BIOACT®* EC-7R, 77° F, 10 min.	92	100
BIOACT®* EC-15, 77° F, 10 min.	92	100
Wave Solder	94	100

The Print Contrast Signal, PCS, was determined using a PSC QUICKCHECK™* 850, with a 0.003" aperture, 660 nm wavelength. The read rate was determined using a PSC laser diode scanner, model 4100. Wave soldering was performed on an Electrovert Co., Microline 250 wave solder machine. Preheat temperature was 250°F, solder temperature was 470°F, line speed was 2 ft./min. Boards were pre-sprayed with a Kester Solder Co. 923 flux.

[1] *Some adhesive delamination*

Shelf Life	One year from date of manufacture of product when properly stored at 72°F (22°C) and 50% relative humidity.
Processing	**Printing:** Facestock is designed for thermal transfer printing. Refer to the 3921 Guide to Thermal Transfer Printing or call 3M Customer Service at 1-800-223-7427 for additional information. **Recommended Ribbons** The following ribbons can be used but may require higher burn temperatures: Armor™*: AXR7+, AXR7 Sony™*: 4070 **Die Cutting:** Rotary die cutting is recommended. **Dispensing:** Hand dispensing is recommended. **Packaging:** Finished labels should be stored in plastic bags.

Special Considerations

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

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

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.

Technical Information and Data

The technical information and data, recommendations, and other statements provided are based on tests or experience which 3M believes to be reliable, but the accuracy or completeness of such information is not guaranteed.

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