



# APTEK LABORATORIES, INC.

ISO 9001 / AS9100 Certified

28570 Livingston Avenue, Valencia, CA 91355-4171 • (661) 257-1677 FAX (661) 257-8939

## TECHNICAL DATA & INFORMATION

### UVIKOTE™ 7503LM-A/B

UV Curing, Low Modulus, Low Outgassing, Urethane Conformal Encapsulant/Coating

#### PRODUCT DESCRIPTION

**UVIKOTE 7503LM-A/B** is a low viscosity, two component, electrically insulating, transparent, urethane coating designed for the encapsulation and protection of electrical/electronic components mounted on printed circuit boards. This system provides an excellent combination of flexibility and low modulus for demanding applications where the management of thermomechanical stresses is required.

**UVIKOTE 7503LM-A/B** coating will become tack free when exposed to the proper UV light radiation. The coating will fully post cure in exposed and shaded areas will continue to post cure in 14 days at 25°C and 50% relative humidity. As an alternative, the post cure for the coating in both exposed and shaded areas may be accelerated with low to moderate heat.

#### KEY FEATURES AND BENEFITS

- Qualified to **MIL-I-46058C** and **IPC-CC-830C**
- Multicure mechanism for complete cure in shaded areas underneath components
- Excellent flexibility and low modulus for reduced stress in the encapsulation of sensitive components (e.g. glass-bodied diodes)
- Meets NASA condensable volatile requirements for high vacuum environments
- Highly reversion resistant for good physical stability under high heat and humidity environments
- Low Tg (-65°C) for excellent low temperature cycling, storage and performance
- Excellent adhesion to plastic/metal components and substrates. Adheres well to itself for multicoat and repair applications
- Ready-to-spray viscosity and long pot life for encapsulation and coating applications
- No TDI, no toxic solvents, no free acrylic acid for safety
- Also available as two component kits that can be stored at room temperature
- Complete companion UV product line available:
  - UVIKOTE™ 7503LMAUTO-PMF or -A/B for use in automated spray/curtain coating equipment. This system contains approximately 25% less solvent than standard UVIKOTE 7503LM-A/B for reduced bubble entrapment.
  - UVIKOTE 7504LM-PMF – 100% solids for thicker applications like back-side solder joint encapsulation

#### **- DISCLAIMER NOTICE -**

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- UVISTAKE™ 7205LM-PMF – thixotropic, non-flow adhesive for wire tacking and component staking
- APTEK 7503 Thinner – non-photosensitive, non-aromatic
- APTEK 7503 Stripper – low viscosity removal of cured coating/adhesive for repair operations
- APTEK 7503 Stripper Gel– thixotropic version for localized removal of cured coating/adhesive

### **HANDLING INFORMATION**

Mix ratio, parts by weight: 100 (7503LM- A) / 100 (7503LM-B)

Work Life, @ 25°C, 200 gm mass, hrs. > 8

#### **NOTES:**

1. Work life adversely affected by heat and humidity as well as solvent evaporation.
2. Work life can be extended by additions of thinner and/or periodical replenishment with freshly mixed UVIKOTE 7503LM-A/B.
3. Once opened, Part A must be purged with dry air prior to resealing as it is moisture sensitive. **Do Not** purge Part B as this will deactivate the inhibitor.
4. Store Part A and Part B in original containers at 20-25°C.
5. Parts A and B are light sensitive. Care should be taken to avoid any excessive light exposure. It is recommended that containers be stored in a dark place whenever possible.

### **MIXING**

Weigh 100 parts of UVIKOTE 7503LM Part A into a clean dry glass, metal, or plastic container and then add 100 parts of UVIKOTE 7503LM Part B. Machine mix on slow speed or hand stir with glass or metal stirrer until complete and thorough blending is achieved. Care should be taken to avoid any source of moisture contamination or air entrapment during mix.

Notes: 1. For best results and a bubble-free coating, vacuum mixture at less than 10mm Hg for no more than 30 seconds after "break" to avoid boiling the solvent from the mixture.

2. For thin, wet coatings ( $\leq 3$  mils) only minimal solvent evaporation dwell time (5-10 minutes) is usually required prior to UV exposure; whereas, thicker coatings may require a 15-30 minute dwell time to avoid a wrinkled surface after UV-exposure. Customer to test for each application to determine if solvent dwell time is necessary and if so, for how long.

### **CURE SCHEDULE**

#### **U.V. Cure with Conveyor Equipment**

3-4 passes under 300 W/in Fusion UV, D-bulb lamp at rate of 2 feet per min. OR 2-3 passes under 300 W/in fusion UV, D-bulb @ rate of 1 foot per min. Bulb height above coating surface should be adjusted to expose the resin system to approximately  $\sim 17.5$  joules/cm<sup>2</sup> of radiation per pass at 1 foot/minute and  $\sim 12$  joules/cm<sup>2</sup> of radiation per pass at 2 feet/minute. The minimum total amount of joules that needs to be achieved to fully UV-cure this product is  $\geq 36$  joules.

#### **U.V. Cure with Spot Cure Equipment**

We recommend using an EFOS Novacure or equivalent equipment with similar power generating capabilities. This system is capable of generating the same amount of energy as in cure #1. In some applications, diffusers may be necessary to insure even energy distribution and complete cure. Customer should consult Aptek Laboratories and/or equipment supplier to optimize cure for individual applications.

**Postcure**

After curing as indicated in steps 1 or 2 above, the coating can be postcured as follows:

- a) 14 days at 25°C and 50% relative humidity  
OR
- b) 4 hours at 100°C, or 6 hours at 85°C, or 12 hours at 65°C

-PLUS-

One of the two following RT post-cures:

1. **NORMAL PRODUCTION USE:** As typical with urethane systems, a relaxation/stabilization period of 3-5 days at RT, 30-60% RH, after cure is required before normal testing, service, or use.

-OR-

1. **DIRECT MIL-SPEC TESTING:** If the coated circuit boards are to be directly tested to the rigors of Mil I 46058C, let heat-cured boards post cure @ RT and 30-65% RH for a minimum of 14 days prior to testing. If RH is below 30%, longer time may be required for ultimate cure.

**Notes:**

- 1) The above cure schedules are conservative and should be used as guidelines only. User should determine proper cure schedule based on application requirements and properties desired.
- 2) Cured material exposed to excess heat and long term aging may darken in color over time. Please note that this is a natural occurrence and no adverse effects to mechanical or electrical properties take place.

**TYPICAL PROPERTIES**

(not for specification purposes)

<b><u>CHARACTERISTICS</u></b>	<b><u>7503LM-A</u></b>	<b><u>7503LM-B</u></b>	<b><u>TEST METHOD</u></b>
Color	Slightly hazy, yellow/amber	Clear yellow/amber	Visual
Specific gravity	0.91	0.89	ASTM D-1475
Viscosity @ 25°C, cps	35	30	ASTM D-1824
Flash point, °C	>5°C	5°C	TCC
Shelf life @ 25°C, or below, months in factory sealed containers	6	6	
<b><u>CURED PHYSICAL PROPERTIES</u></b>	<b><u>7503LM-A/B</u></b>	<b><u>TEST METHOD</u></b>	
Hardness, Durometer A	55A	ASTM D-2240	
Glass transition temp., °C	-55	ASTM E831-86	
Thermal coefficient of expansion, in/in/°C			
alpha 1	82 x 10 <sup>-6</sup>	ASTM E831-86	
alpha 2	222x 10 <sup>-6</sup>		

Outgassing @  $10^{-6}$  Torr

(Cure schedule:

36 joules per 300 Watt Fusion D bulb +

Post cure of 6 hours @ 85C

OR 4 hours @ 100C)

TML, %	0.45	ASTM E-595
CVCM, %	0.02	ASTM E-595
Young's modulus, psi	@55°C	450
	@25°C	700
	@-40°C	9500
Evidence of haze	None	ASTM E-595
Fungus resistance	Non-nutrient	ASTM G-21

<b><u>CURED ELECTRICAL PROPERTIES</u></b>	<b><u>7503LM-A/B</u></b>	<b><u>TEST METHOD</u></b>
Volume resistivity, @25°C, ohm-cm	$4.0 \times 10^{14}$	ASTM D-257
Dielectric constant, @1KHz, @25°C	3.2	ASTM D-150
Dissipation factor @1KHz, @25°C	0.03	ASTM D-150
Dielectric strength, 0.003" thick film, volts/mil	>1500	ASTM D-149
Insulation resistance, ohms	$1.0 \times 10^{14}$	MIL-I-46058C

### **SAFETY AND FIRST AID**

**UVIKOTE 7503LM-A** is an unfilled organic isocyanate/acrylate blend resin containing solvent and is thus considered a flammable liquid and should be treated with caution. Avoid storage temperatures above 25°C and keep away from flame, sparks, or other sources of ignition. Use in well ventilated area and avoid breathing vapors. In case of eye contact, flush with fresh clean water for at least 15 minutes; for skin contact, wash thoroughly with soap and water. If swallowed, drink at least one pint of water and call a physician. Refer to Material Safety Data Sheet for more details.

**UVIKOTE 7503LM-B** is an organic polyol/acrylate blend containing solvent and is thus considered a flammable liquid and should be treated with caution. Avoid storage temperatures above 25°C and keep away from flame, sparks, or other sources of ignition. May cause severe eye and skin irritation with direct contact. Inhalation of vapors may result in breathlessness, severe coughing, chest discomfort, and irritation of mucous membranes. Avoid skin and eye contact and use in well ventilated, hooded area. In case of eye contact, flush profusely with fresh clean water and contact physician. For skin contact, wash thoroughly with soap and water. If inhaled, move subject to fresh air and provide fresh water to drink. If swallowed dilute, with at least one pint of water and contact physician immediately. Refer to Material Safety Data Sheet for more details.

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