APTEK LABORATORIES, INC.
ISO 9001 / AS9100 Certified

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TECHNICAL DATA & INFORMATION

UVIKOTE™ 7504LM-PMF
UV Curing, Low Modulus, Low Outgassing, Urethane Conformal Encapsulant/Coating

PRODUCT DESCRIPTION

UVIKOTE 7504LM-PMF is 100% solids, medium viscosity, one component, premixed frozen liquid, 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 7504LM-PMF coating will become tack free when exposed to the proper UV light radiation. The coating will fully post cure in both the exposed and shaded areas 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
- Available in pre-mixed frozen syringes for convenient dispensing. Plungers available for hand operation or pneumatic-type syringes for automated dispensing.
- Ready-to-pour viscosity and long pot life for encapsulation, potting, and thick coating applications
- No TDI, no toxic solvents, no free acrylic acid for safety
- Complete companion UV product line available:
  - UVIKOTE 7503LM-PMF - low viscosity, sprayable version for circuit board coatings of ≤3 mils
  - UVISTAKE™7205LM-PMF - thixotropic, non-flow adhesive for wire tacking and component staking

- UVIKOTE 7503LM Thinner - non-photosensitive, non-aromatic
- UVIKOTE 7503LM Stripper - low viscosity removal of cured coating/adhesive for repair operations
- UVIKOTE 7503LM Stripper Gel - thixotropic version for localized removal of cured coating/adhesive

HANDLING INFORMATION

Work Life, after thaw @ 25°C, 10 gm mass, hrs. > 8

Note: - To thaw remove syringe from freezer and allow to warm to room temperature. Do not place in oven or microwave to thaw - this will shorten work life. Typical time to thaw 10cc syringe is approximately 15 minutes.

- Work life adversely affected by heat and humidity.
- Syringes of **UVIKOTE 7504LM-PMF** are shipped in dry ice. Upon receipt transfer frozen syringes to a storage freezer @-40°C or below.

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 ~17.5 joules/cm² of radiation per pass at 1 foot/minute and ~12 joules/cm² 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 ≥36 joules.

U.V. Cure with Spot Cure Equipment

We recommend using an EFOS 100W mercury vapor arc lap or equivalent equipment with similar power generating capabilities. This system is capable of generating the same amount of energy as in cure #1 but may require multiple exposures. 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-

2. **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.

Note:

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)

CHARACTERISTICS	7504LM-PMF	TEST METHOD
Color	Clear yellow/amber	Visual
Specific gravity	0.94	ASTM D-1475
Viscosity @ 25°C ± 3°C,cps	5,000 – 25,000	ASTM D-1824
Flash point, °C	>100°C	TCC
Shelf life @-40°C, or below, months factory sealed containers	6	
CURED PHYSICAL PROPERTIES	**7504LM-PMF**	**TEST METHOD**
Hardness, Durometer A	65A	ASTM D-2240
Glass transition temp., °C	-55	ASTM E831-86
Thermal coefficient of expansion, in/in/°C		
alpha 1	82×10^{-6}	ASTM E831-86
alpha 2	222×10^{-6}	
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
CURED ELECTRICAL PROPERTIES	**7504LM-PMF**	**TEST METHOD**
Volume resistivity, @25°C, ohm-cm	4.0×10^{14}	ASTM D-257
Dielectric constant, @1KH$_z$, @25°C	3.2	ASTM D-150
Dissipation factor @1KH$_z$, @25°C	0.03	ASTM D-150

Dielectric strength, 0.003" thick film, volts/mil	>1500	ASTM D-149
Insulation resistance, ohms	1.0×10^{14}	MIL-I-46058C

SAFETY AND FIRST AID

UVIKOTE 7504LM-PMF is an unfilled organic polyol isocyanate/acrylate resin blend and is considered safe to use when handled properly. Store at -40°C or below 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.

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