



APTEK LABORATORIES, INC.

ISO 9001 / AS9100 Certified

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TECHNICAL DATA & INFORMATION

APTEK® 2503-A/B

Low modulus urethane conformal coating

PRODUCT DESCRIPTION

APTEK 2503-A/B is an unfilled, two component, electrically insulating, transparent, flexible urethane coating system designed for the encapsulation and protection of electronic devices mounted on printed circuit boards. For coating applications that require toughness, this system provides a combination of excellent flexibility and optimum tensile strength/elongation characteristics.

KEY FEATURES AND BENEFITS

- Qualified to **Mil-I-46058C, IPC-CC-830C, and SCD 652898**
- Non-TDI based for safety
- Excellent reversion resistance for good physical stability under high heat and humidity environments
- Tg BELOW -70°C for excellent low temperature cycling performance.
- Wide temperature operating range: -70°C to +100°C continuous in air; up to 150°C for intermittent exposure
- Excellent substrate adhesion; no primer needed; superior to silicones
- Exceeds NASA outgassing requirements for high vacuum environments
- Fluoresces under black-light (UV) to facilitate QC inspection of coating coverage
- Low viscosity and long work life for spraying or dipping operations
- Complete ancillary product line -- APTEK 2503 Thinner, APTEK 2503 Stripper, APTEK 2503R A/B Repair Kit

HANDLING INFORMATION

Mix ratio, parts by weight	100 (2503-A)/ 50 (2503-B)
Work life, @25°C, 300 gm mass, hours	>4
Tack-free time @85°C, ACO, minutes	30

Notes:

1. Work life adversely affected by heat and humidity as well as solvent evaporation.
2. Work life can be greatly extended by additions of thinner and/or periodical replenishment with freshly mixed APTEK 2503 A/B.

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Handling Notes:

1. To reduce mixed viscosity, dilute A/B mixture with APTEK 2503 Thinner or reagent grade toluene as needed.
2. Part B is sensitive to moisture contamination. Use entire bottle of Part B for each application if possible. Unused portion must be blanketed with dry nitrogen or argon and resealed to avoid moisture contamination. Store @ 15-25°C.
3. Prior to use, examine Part B bottle for crystallization, excessive cloudiness, or formation of an insoluble white dimer precipitate. The precipitate is not harmful, however, follow instructions listed below for best results.

- Do not shake bottle. If liquid is clear with precipitate on bottom, then decant and use.
- Place unopened Part B bottles (NOTE: do not loosen cap) into an air circulating oven at 30-40°C until clear liquid is evident (white precipitate layer may also be present). Pint bottles will become clear within 16 hours @35°C.
- Carefully remove bottles from oven without disturbing contents. To use Part B, decant clear liquid out of bottle without disturbing the precipitate.

MIXING

Weigh 100 parts of APTEK 2503 Part A into a clean dry glass, metal, or plastic container and then add 50 parts of APTEK 2503 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.

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

CURE SCHEDULE

8 hrs. @ 85°C*

or

5 hrs. @ 100°C*

or

2 hrs. @ 125°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.

* It is recommended that coated substrates air dry 60 minutes at RT prior to heat cure to allow solvent evaporation which minimizes chance for bubble formation during heat cure.

TYPICAL PROPERTIES

(values not to be used for specification purposes)

<u>CHARACTERISTICS</u>	<u>2503-A</u>	<u>2503-B</u>	<u>TEST METHOD</u>
Color	pale yellow to amber	pale yellow to dark amber*	Visual
Specific gravity	0.90	0.96	ASTM D-1475
Viscosity @ 20°C,cps	45	15	ASTM D-1824
Flash point, °C	7	7	ASTM D-92
Shelf life @ 15-25°C and RH <50%, Months in factory sealed containers	6	6	

* Due to slight variances in raw material coloration, the color of part B may occasionally have a green tint. This has no effect on any cured properties.

Notes: Shelf life may be reduced once containers are opened and material is exposed to air and moisture. To preserve maximum use life, blanket the contents of the containers with dry nitrogen or argon before resealing.

<u>CURED PHYSICAL PROPERTIES</u>	<u>APTEK 2503-A/B</u>	<u>TEST METHOD</u>
Hardness, Durometer A	88	ASTM D-2240
Tensile strength, psi	2800	ASTM D-412
Elongation, %	475	ASTM D-412
Glass transition temp., °C	-74	ASTM E831-86
Thermal coefficient of expansion, in/in/°C	180 x 10 ⁻⁶	ASTM E831-86
Outgassing @ 10 ⁻⁶ Torr		
TML, %	0.84	ASTM E-595
CVCM, %	0.03	ASTM E-595
Fungus resistance	Non-nutrient	ASTM G-21

<u>CURED ELECTRICAL PROPERTIES</u>	<u>APTEK 2503 A/B</u>	<u>TEST METHOD</u>
Volume resistivity, @25°C, ohm-cm	>1x10 ¹⁵	ASTM D-257
Dielectric constant, @1KHz, @25°C	3.2	ASTM D-150
Dissipation factor @1KHz, @25°C	0.025	ASTM D-150
Dielectric strength, 0.003" thick film, volts/mil	>1500	ASTM D-149
Insulation resistance, ohms	3.2 x 10 ¹²	MIL-I-46058C

SAFETY AND FIRST AID

APTEK 2503-A is an unfilled polyol 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.

APTEK 2503-B is an organic isocyanate 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.