



AEROSPACE MATERIAL

Society of Automotive Engineers, Inc. **SPECIFICATION**
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AMS 3137

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Revised

RESIN, CONFORMAL COATING, URETHANE

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. **FORM:** A two-component system composed of a resin and a hardener, supplied in kit form.
3. **APPLICATION:** Primarily for conformally coating printed circuit board assemblies where thin coatings, good moisture resistance, thermal-vacuum stability, mechanical damping characteristics, and elastomeric properties are required over the temperature range -54 C to +95 C (-65.2 F to +203 F) and assemblies which may be subjected to fluorescent penetrant inspection.
 - 3.1 In order to prevent damage to solder joints and to fragile components, the cured coating should be no more than 0.006 in. thick in flat areas and on top of component bodies.
 - 3.2 **Adhesion:** In cases where maximum adhesion of the coating material to the adherend is desired, the use of a polyamide-epoxy primer is recommended.
4. **MATERIAL:** Shall be a thermosetting prepolymer, 100% solids urethane containing a fluorescent material for ultraviolet inspection.
5. **TECHNICAL REQUIREMENTS:**
 - 5.1 **General:**
 - 5.1.1 **Pot Life:** The pot life of a mixture of 100 parts $\pm$ 1 by weight of resin and 100 parts $\pm$ 1 by weight of hardener shall be not less than 4 hr at room temperature.
 - 5.1.2 **Storage:** The material shall meet all the technical requirements of this specification at any time up to 120 days from date of receipt by the purchaser when stored in airtight containers at room temperature (not higher than 30 C (86 F)) and relative humidity not higher than 75%.
 - 5.2 **Properties:** The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with the issue of specified ASTM methods listed in the latest issue of AMS 2350, insofar as practicable.

5.2.1 **Uncured Resin:**

Specific Gravity	1.06 - 1.09	ASTM D1638
Viscosity at 25 C $\pm$ 1 (77 F $\pm$ 1.8), poise	240 - 350	ASTM D1638
Isocyanate Content, %	10.4 - 10.8	ASTM D1638

5.2.2 **Hardener:**

Viscosity at 25 C $\pm$ 1 (77 F $\pm$ 1.8), cp	600 - 1000	ASTM D1638
Acid Value, max	0.8	5.2.2.1
Hydroxyl Value	160 - 167	5.2.2.2

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Volatile Matter, %, max

0.02
(water only)

ASTM D1638

5.2.2.1 Acid Value: Shall be determined in accordance with ASTM D1638 except that the sample shall be dissolved in 100 ml of titration solvent composed of equal volumes of benzene and methanol.

5.2.2.2 Hydroxyl Value: Shall be determined in accordance with ASTM D1638, Method A, except that 10 ml of n-butanol shall be added through the condenser after cooling.

5.2.3 Cured Resin: The mixture of 5.1.1 shall cure within 6 hr at $60\text{ C} \pm 3$ ($140\text{ F} \pm 5.4$) to have the following properties:

Moisture Absorption, %, max	0.38	5.2.3.1
Surface Adhesion	Pass	5.2.3.2
Thermal-Vacuum Stability, weight loss, %, max	0.55	5.2.3.3
Volume Resistivity, ohm-cm, min	1.0×10^{14}	ASTM D257
Hardness, Durometer A or equiv	48 - 54	ASTM D2240
Density, g per cc	1.01 - 1.07	ASTM D792
Shrinkage, %, max	0.95	ASTM D955
Dielectric Constant at 1MHz, max	3.5	ASTM D150
Hydrolytic Stability	Pass	5.2.3.4

5.2.3.1 Moisture Absorption: Three specimens, 1 in. x 3 in. x 1/8 in., shall be placed in a desiccator over dry calcium chloride for 96 hours. After conditioning, specimens shall be weighed, exposed to $96\% \pm 1$ relative humidity for 240 hr, then weighed again. The moisture absorption is the percent increase in weight.

5.2.3.2 Surface Adhesion: Five aluminum or aluminum alloy panels, 3 in. wide x 6 in. long and not less than 0.020 in. thick with edges smooth and uniformly rounded, shall be cleaned by vapor degreasing or washing with a chlorinated solvent and shall be coated with the material under test. The specimens shall be heated in an oven controlled at $105\text{ C} \pm 3$ ($221\text{ F} \pm 5.4$) for 30 min. and then plunged into an alcohol-dry ice bath at $-55\text{ C} \pm 3$ ($-67\text{ F} \pm 5.4$) and left for 10 minutes. After each cycle the alcohol shall be wiped off and the cycling shall continue until the specimens fail or 10 cycles have been completed. Specimens which show cracks, checks, blisters, or other defects in 10 cycles or less shall be considered to have failed.

5.2.3.3 Thermal-Vacuum Stability: Three specimens, 1 in. x 3 in. x 1/8 in., shall be weighed and then suspended for 168 hr in an oven controlled at $85\text{ C} \pm 3$ ($185\text{ F} \pm 5.4$) and a pressure not greater than 2×10^{-5} Torr. The specimens shall be removed from the oven and allowed to cool to room temperature at a relative humidity not higher than 75%. Specimens shall show no evidence of cracking, softening, blistering, flowing, distortion, or charring, and no noticeable qualitative changes in surface outline and general appearance. The specimens shall then be weighed to determine the percent loss in weight.

5.2.3.4 Hydrolytic Stability: Ten dumbbell specimens (ref. ASTM D412, Die C) and two bent loop specimens (ref. ASTM D518, Procedure B) shall be exposed to $95\% \pm 3$ relative humidity at $85\text{ C} \pm 1$ ($185\text{ F} \pm 1.8$). The bent loop samples shall be exposed for a total of 50 days and shall be periodically examined at least every five days for hardness, tackiness, exudate, and cracking. Five dumbbell specimens shall be removed from the test chamber after 3 days, cooled to room temperature and immediately tested for hardness in accordance with ASTM D2240 and for tensile strength and elongation in accordance with ASTM D412. These tests shall also be performed on the remaining five dumbbell specimens at the end of 50 days.