1A33
Polyurethane Coating

TECHNICAL DATA SHEET

System Description

A single component, fast oxygen curing polyurethane coating well suited for general printed circuit board applications. Contains no free isocyanates. This coating is MIL-I-46058C and IPC-CC-830 qualified. Contains fluorescent tracer for inspection purposes. U.L. recognized under the component program of Underwriters Laboratory. File No. E105698. HumiSeal 1A33 is in full compliance with the RoHS Directive (Directive 2002/95/EC).

Properties of Liquid HumiSeal

Specific weight, (lb. per gal.) per ASTM, Meth. D1475	7.9
Solids Content, % by weight per Fed-Std-141, Meth.4044	44 ± 2
Viscosity, centipoise per Fed-Std-141, Meth.4287	180 ± 20
Flashpoint, ^{0}C (^{0}F) per ASTM, Meth. D56	-1 (30)
VOC (grams / liter)	521
Recommended Coating Thickness	1 - 3 mils
Drying Time to Handle per Fed-Std-141, Meth.4061	15 minutes
Optional curing conditions to reach optimum properties	30 days at room temp. *
*(To resist a 2 minute immersion in Methyl Ethyl	30 hours @ 170^0 F *
Ketone at 25°C per IPC CC 830, Sect 4.8.9	20 hours @ 190^0 F *
Thinner, if needed (dipping, brushing, spraying)	Thinner 521
Recommended Stripper	Stripper 1063
Pot Life at Room Temperature	12 months
Shelf Life at Room Temperature	18 months from date of shipment.

Properties of Cured HumiSeal

Thermal Properties	
Continuous Use Operating Range ^{0}C(^{0}F)	-65^{0}C (-85^{0}F) to +125^{0}C (257^{0}F)
Thermal Shock, per MIL-I-46058C	Passes
Solderability	Excellent
Coefficient of Thermal Expansion - DMA	193ppm / ^{0}C
Glass Transition Temperature - TMA	26^{0}C
Young's Modulus - DMA	3942psi
Physical Properties	
Clarity	Transparent
Build per Dip, mils, per ASTM, Meth.D823	2
Flexibility, per MIL-I-46058C	Excellent
Adhesion, per ASTM, Meth.D2197	Excellent
Flammability, per ASTM, Meth. D635	Self-Extinguishing
Weather Resistance	Very Good
Electrical Properties	
Dielectric Withstand Voltage, volts per MIL-I-46058C	>1,500
Dielectric Breakdown Voltage, volts, per ASTM, Meth. D149	7500
Dielectric Constant, at 1MHz and 25^{0}C, per ASTM-D150-65T	3.6
Dissipation Factor, at 1MHz and 25^{0}C, per ASTM-D150-65T	0.03
Insulation Resistance, ohms, per MIL-I-46058C	200 x 10^{12} (200T)
Moisture Resistance, ohms, per MIL-I-46058C	16 x 10^9 (16G)
CTI @ 2 mils, 5 mils, 10 mils, PLC	3
Chemical Properties	
Main Constituent	Polyurethane
Fungus Resistance, per ASTM-G21	Passes
Resistance to Chemicals	Good

Values are not intended for use in preparation of specifications.

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APPLICATION

Cleanliness of the substrate is of extreme importance for the successful application of a conformal coating. Surfaces must be free of moisture, dirt, wax, grease and all other contaminants. Contamination under the coating will cause problems that may lead to assembly failures.

Dipping

Depending on the complexity, density and configuration of components on the assembly, it may be necessary to reduce the viscosity of HumiSeal 1A33 with HumiSeal Thinner 521 in order to obtain a uniform film. Once optimum viscosity is determined, a controlled rate of immersion and withdrawal (2 to 6" per minute) will further insure even deposition of the coating and ultimately a uniform film. During the application, evaporation of solvent causes an increase in viscosity that should be adjusted by adding small amounts of Thinner 521. Viscosity in the dip tank should be regularly checked by the use of a simple measuring device such as a Zahn or Ford viscosity cup.

Spraying

HumiSeal Type 1A33 can be sprayed using conventional spraying equipment. As a rule, the addition of Thinner 521 is necessary to assure a uniform spray pattern resulting in pinhole free film. The amount of thinner and spray pressure will depend on the specific type of spray equipment used. The spraying should be done under an exhaust hood so that the vapor and mist are carried away from the operator. The ratio of HumiSeal Type 1A33 to HumiSeal Thinner 521 is 1 to 1 by volume as a starting point.

Brushing

HumiSeal Type 1A33 may be brushed with a small addition of HumiSeal Thinner 521. Uniformity of the film depends on component density and operator's technique.

Storage

HumiSeal Type 1A33 should be stored at room temperature, away from excessive heat, in tightly closed containers. HumiSeal products may be stored at temperatures of 0-100°F. Avoid direct sunlight. Prior to use, allow the product to equilibrate for 24 hours at 65-90°F.

Caution

The solvents in Type 1A33 are flammable. Do not use in presence of open flame or sparks. Avoid inhalation of vapors or spray. Use only in well-ventilated areas. Avoid contact with skin and eyes. If contact occurs, wash with soap and water. If swallowed, call physician immediately. HumiSeal Type 1A33 contains no traces of monomeric isocyanate. Refer to MSDS before use.

Cure Mechanism 1A33

1A33 dries to the touch in less then one half-hour. After this initial solvent evaporation prepolymers will react with oxygen in the air to cure to its distinctive coating properties. This type of oxidation cure is similar to that of many traditional paints. The reaction depends on exposure to oxygen to cure properly; if oxygen is not available or refreshed the coating will not cure properly or according to spec. Also when baking the stipulation that a constant oxygen supply is necessary for curing.

1A33 should be completely cured prior to testing. If they are to be in an enclosed housing the coated boards should be baked to ensure completion. One way to identify completely cured 1A33 is that when exposed to isopropyl alcohol cured 1A33 will not show signs of wear.

1A33 should be applied at a thickness between 1 to 3 mils (1 to 3 thousandths of an inch); thickness' exceeding 5 mils may crack.

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