

Creative Materials, Inc.  
 12 Willow Road  
 Ayer, MA 01432

 T 978.391.4700  
 F 978.391.4705

## 111-27

### DIELECTRIC COATING AND ENCAPSULANT

**DESCRIPTION:** 111-27 is an electrically insulating coating and encapsulant suitable for application by spraying, dipping, syringe dispensing, pouring, and screen printing. This product features excellent adhesion to Kapton, Mylar, glass, and a variety of other surfaces. Unlike conventional insulating materials, this product is very resistant to flexing and creasing when used as a coating. Some applications for 111-27 include, but are not limited to, insulating polyimide flexible circuits, polymer thick film circuitry, environmental and humidity protection of surface mount components, insulating and diffusive layers of LEDs, and membrane switches. 111-27 also protects components from moisture, salts, and abrasion and features a high surface hardness with good toughness which reduces the risk of stress-fracturing bonded components. 111-27 is suitable for UV inspection.

#### TYPICAL PROPERTIES:

|                               |              |
|-------------------------------|--------------|
| Consistency                   | Thick liquid |
| Crease resistance             | Excellent    |
| Moisture vapor transmission   | Low          |
| Optical transmission          | High         |
| Fungus resistance             | Non-nutrient |
| Useful temperature range (°C) | -55 to +110  |
| Thermal stability (°C)        | +200         |

#### ELECTRICAL PROPERTIES PER MIL-I-46058C:

|  |               |                      |
|--|---------------|----------------------|
| Insulation resistance, ohms (1 to 3 mil film): |               |                      |
| Cycle 1  | 25°C/50% R.H. | $1 \times 10^{15}$   |
| Cycle 4  | 65°C/95% R.H. | $4 \times 10^{10}$   |
| Cycle 7  | 65°C/95% R.H. | $5 \times 10^{10}$   |
| Cycle 10                                       | 65°C/95% R.H. | $2 \times 10^{10}$   |
| 24 hours after cycle 10                        | 25°C/50% R.H. | $2 \times 10^{13}$   |
| Leakage rate:                                  |               |                      |
| Before thermal shock, microamperes             |               | < 10                 |
| After thermal shock, microamperes              |               | < 10                 |
| Dielectric withstand at 1,500 volts, 50 Hz:    |               |                      |
| Before thermal shock and moisture exposure     |               | Pass                 |
| After thermal shock and moisture exposure      |               | Pass                 |
| Volume resistivity (ohm-cm)                    |               | $1.1 \times 10^{14}$ |
| Dielectric strength (volts/mil)                |               | 1,300                |
| Dissipation factor (100 Hz)                    |               | 0.011                |
| Dielectric constant (100 Hz)                   |               | 4.1                  |
| Ionic Content:                                 |               |                      |
| Chloride (Cl)                                  |               | < 40 ppm             |
| Bromine (Br)                                   |               | < 5 ppm              |
| Sulfate (SO <sub>4</sub> )                     |               | < 10 ppm             |
| Phosphate (PO <sub>4</sub> )                   |               | < 30 ppm             |
| Nitrogen (NO <sub>x</sub> )                    |               | < 5 ppm              |

*All technical information is based on data obtained by CMI personnel and is believed to be reliable. No warranty is either expressed or implied with respect to results or possible infringements on patents.*

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**THERMAL AND MECHANICAL PROPERTIES:**

|   |       |
|---|-------|
| Tensile modulus (-40°C, MPa)              | 4,000 |
| Tensile modulus (+25°C, MPa)              | 2,000 |
| Tensile modulus (+80°C, MPa)              | 670   |
| Glass transition temp. (°C)               | 103   |
| Coefficient of thermal expansion (ppm/°C) | 100   |
| Shore Hardness (25°C cure)                | ~55D  |

**SUGGESTED HANDLING:** 111-27 can be used as-is but further thinning for spray and/or dip coating may be accomplished by adding MEK or acetone for faster drying or xylene or 127-22 for slower drying. Thinned material should be used within 12 – 16 hours.

**SUGGESTED CURING:** 111-27 features a quick setup time at elevated temperatures but also can be cured at ambient temperatures. For good, cured properties one of the following cure schedules will be a good starting profile but end user is advised to experimentally determine temperature and time best suited for individual applications.

| <u>Condition</u>                | <u>Time</u>  | <u>Temp.</u>        |
|---------------------------------|--------------|---------------------|
| Tack-free time (0.001 – 0.003") | 30 – 90 min. | 25°C (@30 – 50% RH) |
| Bulk properties develop         | 24 hr.       | 25°C (@30 – 50% RH) |
| Full cure                       | 7 days       | 25°C (@30 – 50% RH) |
| Full cure                       | 2 hr.        | 60°C                |
| Full cure                       | 3 min.       | 130°C <sup>1</sup>  |

<sup>1</sup>When used as an encapsulant bubbles may form using 130°C cure.

**STORAGE:** Shelf Life: 6 months at 21°C. Product is moisture sensitive so keep containers closed to avoid contamination. It is highly recommended to purge opened containers with an inert gas blanket (N<sub>2</sub>, Ar, etc.) before resealing to preserve shelf life as moisture may cause polymerization.

**SAFETY & HANDLING:** Use with adequate ventilation. Keep away from sparks and open flames. Avoid prolonged contact with skin and breathing of vapors. Wash with soap and water to remove from skin.

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