

Multi-Cure® 9452-FC Very Low Viscosity Conformal Coating

APPLICATIONS

- Thin Conformal Coating
- Film Coating/Flow Coating Dispensing

FEATURES

- UV/Visible Light Cure
- Secondary Heat Cure
- LED Curable
- Flammability (V0 Internal)

OTHER FEATURES

- Blue Fluorescing
- Shadow Area Cure
- Very Good Thermal Shock Resistance
- Excellent Wettability
- 100% Solids

Dymax Multi-Cure® 9452-FC is a thin 100% solids conformal coating that cures upon exposure to light and is designed for applications using film coating/flow coating or similar dispensing methods. Dymax 9452-FC is a Multi-Cure® material specially formulated to cure with secondary heat in applications where shadowed areas exist. Dymax Multi-Cure® materials contain no nonreactive solvents and cure upon exposure to light. Their ability to cure in seconds enables faster processing, greater output, and lower processing costs. In addition, Dymax 9452-FC is LED curable at wavelengths of 365nm, 385nm and 405nm. When cured with Dymax light-curing spot lamps, focused-beam lamps, or flood lamps, they deliver optimum speed and performance. Dymax lamps offer the ideal balance of UV and visible light for the fastest, deepest cures. This product is in full compliance with the RoHS2 Directives 2015/863/EU and 2011/65/EU.

UNCURED PROPERTIES		
Property	Value	Test Method
Solvent Content	No Nonreactive Solvents	N/A
Chemical Class	Acrylic/Epoxy	N/A
Appearance	Clear to Yellow	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.06g/ml	ASTM D1875
Viscosity, cP (20 rpm)	20 (nominal)	DSTM 502

CURED MECHANICAL PROPERTIES *		
Property	Value	Test Method
Durometer Hardness	D60	ASTM D2240
Tensile at Break, MPa [psi]	34 [4,950]	ASTM D638
Elongation at Break, %	6	ASTM D638
Modulus of Elasticity, MPa psi	1,137 [165,000]	ASTM D638
Glass Transition T _g , °C	80	DSTM 256 [‡]
CTE _{α1} , μm/m/°C	105	DSTM 610 [‡]
CTE _{α2} , μm/m/°C	225	DSTM 610 [‡]

* After heat cure at 120°C for 30 minutes. No Specifications

N/A Not Applicable

‡ DSTM Refers to Dymax Standard Test Method

ELECTRICAL PROPERTIES *		
Property	Value	Test Method
Dielectric Constant (1 MHz)	2.77	ASTM D150
Dissipation Factor (1 MHz)	0.03	ASTM D150
Dielectric Breakdown Voltage, kV/mm [V/mil]	40 [1,000]	ASTM D149
Volume Resistivity, ohm-cm	3.55E +14	ASTM D257
Surface Resistivity, ohm	1.50E +12	ASTM D257

ADHESION	
Substrate	Recommendation
PCB Soldermasks (most common)	Good

THERMAL SHOCK	
Thickness @ 2 mils (300 cycles of -35°C to 135°C, 30 minutes dwell at each temperature.)	Pass



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CURING GUIDELINES

LIGHT CURING

Thickness	1 – 2 mil							
Wavelength (nm)	405 ^c		385 ^c		365 ^c		Broad Spectrum ^a	Fusion D Bulb ^b
Intensity (mW/cm ²)	150	300	150	300	150	300	225	2250
Time (seconds)	75	30	40	30	25	20	25	6 ft/min

SECONDARY HEAT CURE

Heat can be used as a secondary cure mechanism where the adhesive cannot be cured with light. Light curing must be done prior to heat cure. The following heat cure schedule may be used:

Temperature	Time*
120°C [250°F]	30 minutes
150°C [300°F]	20 minutes

CURING GUIDELINES

- A** Curing through light-blocking substrates may require longer cure times if they obstruct wavelengths used for light curing (320-400 nm for UV light curing, 320-450 nm for UV/Visible light curing). These fixture times/belt speeds are typical for curing thin films through 100% light-transmitting substrates.
- B** Intensity was measured over the UVA range (320-395 nm) using a Dymax ACCU-CAL™ 50 Radiometer.
- C** Intensity was measured over the UVA/Visible range (350-450 nm) using a Dymax ACCU-CAL™ 50-LED Radiometer.
- D** At 53 mm [2.1 in] focal distance. Maximum speed of conveyor is 8.2 m/min [27 ft/min]. Intensity was measured over the UVA range (320-395 nm) using the Dymax ACCU-CAL™ 150 Radiometer.

DISPENSING THE MATERIAL

This material may be dispensed with a variety of manual, semi-automated and fully automated fluid delivery systems. Dymax has several dispensing systems that may be suitable for use with conformal coating materials such as our model 110 mountable atomizing needle valve or SG-100-RS handheld spray gun. Small area applications including beads and small dots can be achieved using hand-held dispensers such as our SD-100 syringe dispenser and our Model 400 needle valve systems. These valve systems can be used in a manual, semi-automated or fully automated application. Questions relating to and defining the best fluid delivery system and curing equipment for specific applications should be discussed with the Dymax Application Engineering Team.

CLEANUP

Uncured material may be removed from dispensing components and parts with organic solvents. Cured material will be impervious to many solvents and difficult to remove. Cleanup of cured material may require mechanical methods of removal.

OPTIMIZING PERFORMANCE AND HANDLING

1. This product cures with exposure to UV and visible light. Exposure to ambient and artificial light should be kept to a minimum before curing. Dispensing components including needles and fluid lines should be 100% light blocking, not just UV blocking.
2. All surfaces in contact with the material should be clean and free from flux residue, grease, mold release, or other contaminants prior to dispensing the material.
3. Cure speed is dependent upon many variables, including lamp intensity, distance from the light source, required depth of cure, thickness, and percent light transmission of components between the material and light source.
4. Oxygen in the atmosphere may inhibit surface cure. Surfaces exposed to air may require high-intensity (>100 mW/cm²) UV light to produce a dry surface cure. Flooding the curing area with an inert gas, such as nitrogen, can also reduce the effects of oxygen inhibition.
5. Parts should be allowed to cool after cure before testing and subjecting to any loads or electrical testing.
6. In rare cases, stress cracking may occur in assembled parts. Three options may be explored to eliminate this problem. One option is to heat anneal the parts to remove molded-in stresses. A second option is to open any gap between mating parts to reduce stress caused by an interference fit. The third option is to minimize the amount of time the liquid material remains in contact with the substrate(s) prior to curing.
7. Light curing generally produces some heat. If necessary, cooling fans can be placed in the curing area to reduce the heating effect on components.
8. At the point of curing, an air exhaust system is recommended to dissipate any heat and vapors formed during the curing process.

PERFORMANCE AFTER TEMPERATURE EXPOSURE

Dymax light-curable materials typically have a lower thermal limit of -54°C [-65°F] and an upper limit of 150°C [300°F]. Many Dymax products can withstand temperatures outside of this range for short periods of time, including typical wave solder processes and reflow profiles. Please contact Dymax Application Engineering for assistance.

STORAGE AND SHELF LIFE

Store the material in a cool, dark place when not in use. Do not expose to light. This product may polymerize upon prolonged exposure to ambient and artificial light. Keep covered when not in use. This material has a six-month shelf life from date of shipment, unless otherwise specified, when stored between 10°C [50°F] and 32°C [90°F] in the original, unopened container.

GENERAL INFORMATION

This product is intended for industrial use only. Keep out of the reach of children. Avoid breathing vapors. Avoid contact with skin, eyes, and clothing. Wear impervious gloves. Repeated or continuous skin contact with uncured material may cause irritation. Remove material from skin with soap and water. Never use organic solvents to remove material from skin and eyes. For more information on the safe handling of this material, please refer to the Material Safety Data Sheet before use.