Dual-Cure 9482
Light/Moisture-Cure Conformal Coating

APPLICATIONS

- **Conformal Coating**

FEATURES

- **UV/Visible Light Cure**
- **Secondary Moisture Cure**
- **Superior Re-workability**
- **Thermal Shock Resistance**
- **Low VOC**

OTHER FEATURES

- **Bright Blue Fluorescence**
- **Chemical Resistance**
- **Meets MIL-I-46058C**
- **Meets IPC-CC-830B**
- **UL 94V-0 Flammability**

Dymax Dual-Cure 9482 is a light- and moisture-cure re-workable conformal coating, specially formulated to ensure complete cure for coating that flows underneath components on printed circuit boards. Coating in shadowed areas cures over time with ambient moisture. This conformal coating fluoresces a vivid blue when exposed to UV light (365 nm) for easy inspection of coating coverage. Dymax 9482 is engineered for coating thicknesses up to 0.254 mm (0.010 in). Dymax Dual-Cure materials contain no nonreactive solvents. Their ability to UV cure in seconds enables faster processing, greater output, and lower processing costs. When cured with Dymax light-curing spot lamps, focused-beam lamps, or flood lamps, they deliver optimum speed and performance for conformal coating applications. Dymax lamps offer the optimum balance of UV and visible light for the fastest, deepest cures. This product is in full compliance with the RoHS Directives 2002/95/EC and 2003/11/EC.

UNCURED PROPERTIES *

Property	Value	Test Method
Solvent Content	No Nonreactive Solvents	N/A
Chemical Class	Acrylated Urethane	N/A
Appearance	Clear/Light Yellow Liquid	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.09	ASTM D1875
Viscosity, cP (20 rpm)	1,100 (nominal)	DSTM 502‡

CURED MECHANICAL PROPERTIES* ¥

Property	Value	Test Method
Durometer Hardness	D70	ASTM D2240
	A60Ω	ASTM D2240
Tensile at Break, MPa [psi]	15.8 [2,300]	ASTM D638
Elongation at Break, %	26	ASTM D638
Modulus of Elasticity, MPa [psi]	275 [40,000]	ASTM D638
Glass Transition T_g, ˚C	71	DSTM 256‡
CTEα_1, µm/m/˚C	100	DSTM 610‡
CTEα_2, µm/m/˚C	148	DSTM 610‡

* Not Specifications
N/A Not Applicable
¥ Measured after UV cure followed by 10 days at 25°C / 75% RH
Ω Measured after UV only cure
‡ DSTM Refers to Dymax Standard Test Method

OTHER CURED PROPERTIES* ¥

Property	Value	Test Method
Refractive Index (20˚C)	1.51	ASTM D542
Boiling Water Absorption, % (2 h)	1.3	ASTM D570
Water Absorption, % (25˚C, 24 h)	0.4	ASTM D570
Linear Shrinkage, %	2.0	ASTM D2566

ELECTRICAL PROPERTIES * ¥

Property	Value	Test Method
Dielectric Constant (1 MHz)	4.09	ASTM D150
Dissipation Factor (1 MHz)	0.06	ASTM D150
Dielectric Breakdown Voltage, kV/mm [V/mil]	43 [1,100]	ASTM D149
Volume Resistivity, ohm-cm	1.63×10^{14}	ASTM D257
Surface Resistivity, ohm	2.06×10^{13}	ASTM D257

ADHESION

Substrate	Recommendation
Lead Frame	✓
Ceramic	o
PCB	✓
Flex	✓
Silicon	✓

✓ Recommended o Limited Applications
st Requires Surface Treatment (e.g. plasma, corona treatment, etc.)

RoHS Compliant

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CURING GUIDELINES

Light Cure

UV-curing guideline for 9482 at 3 mil:

Dymax Curing System (Intensity)	Cure Time or Belt Speed
5000-EC (225 mW/cm^2)[A]	50 s
UVCS Conveyor with Fusion D lamp (2.5 W/cm^2)[B]	1.5 m/min [5 ft/min]
UVCS Conveyor with one 5000-EC (250 mW/cm^2)[B]	0.3 m/min [1 ft/min]
BlueWave® 200 (10 W/cm^2)[A]	5 s

A *Intensity was measured over the UVA range (320-395 nm) using a Dymax ACCU-CAL™ 50 Radiometer*

B *Intensity was measured over the UVA range (320-395 nm) using a Dymax ACCU-CAL™ 150 Radiometer.*

Full cure is best determined empirically by curing at different times and intensities, and measuring the corresponding change in cured properties such as tackiness, adhesion, hardness, etc. Full cure is defined as the point at which more light exposure no longer improves cured properties. Higher intensities or longer cures (up to 5x) generally will not degrade Dymax light-curable materials.

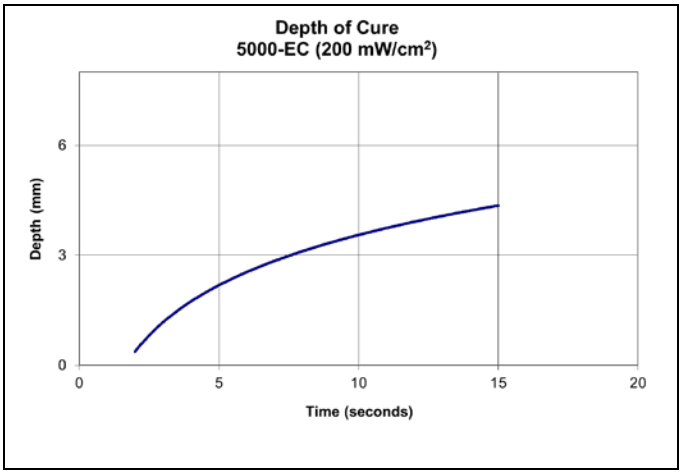
Dymax recommends that customers employ a safety factor by curing longer and/or at higher intensities than required for full cure. Although Dymax Application Engineering can provide technical support and assist with process development, each customer ultimately must determine and qualify the appropriate curing parameters required for their unique application.

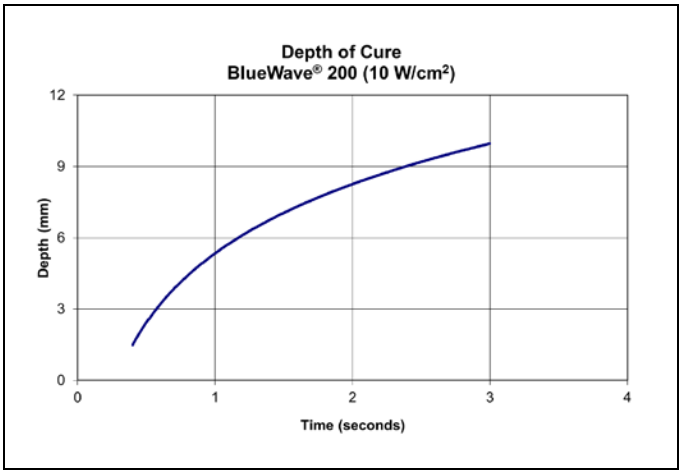
Moisture Cure

Moisture is used as a secondary cure mechanism for shadowed areas that cannot be cured with light. While moisture cure time is typically 2-3 days at 25˚C [77˚F], 50% RH, actual moisture cure time is application specific and may vary. Cure time depends on humidity level, amount of coating in shadowed areas, and proximity of shadowed coating to humidity. Coating entrapped under large components may have a prolonged cure time. Exposure to heat (typically 65˚C-80˚C) and higher relative humidity will accelerate cure. Accelerated moisture cure time is also dependent on the variables listed above.

DEPTH OF CURE

The graphs below show the increase in depth of cure as a function of exposure time with two different lamps at different intensities. A 9.5 mm [0.37 in] diameter specimen was cured in a polypropylene mold and cooled to room temperature. It was then released from the mold and the cure depth was measured.





9482 Product Data Sheet

OPTIMIZING PERFORMANCE AND HANDLING

1. This product cures with exposure to UV light, visible light, and moisture. Exposure to ambient light and ambient moisture 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/cm^2) 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 light curing, an air exhaust system is recommended to dissipate any heat and vapors formed during the curing process.
9. Resealing opened containers under a dry, inert gas, such as nitrogen, extends shelf life.
10. Light cure is recommended prior to moisture cure. Full cure develops after light and moisture cure.

DISPENSING THE MATERIAL

This material may be dispensed with a variety of manual and automatic applicators or other equipment as required. Pressurizing air must be free of moisture to prevent premature curing in dispensing equipment. Pressurizing with an inert gas, such as nitrogen, is recommended. Questions relating to dispensing and curing systems for specific applications should be referred to Dymax Application Engineering.

CLEANUP

Uncured material may be removed from dispensing components and parts with non-alcoholic solvents, like Butyl Acetate and acetone. Cured material will be impervious to many solvents and difficult to remove. Cleanup of cured material may require mechanical methods of removal.

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, and dry place when not in use. Do not expose to light. This product may polymerize upon prolonged exposure to ambient and artificial light as well as atmospheric moisture. Keep covered when not in use. Resealing the container under dry inert gas, such as nitrogen, extends shelf life. This material has a six-month shelf life from date of shipment, unless otherwise specified, when stored between 15˚C [59˚F] and 25˚C [77˚F] in the original, unopened container. The exception is in 5-gallon pails, where this material has an eight-month shelf life from date of shipment, unless otherwise specified, when stored between 15˚C [59˚F] and 25˚C [77˚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.