

Dual-Cure 9482 Light/Moisture-Cure Conformal Coating

APPLICATIONS	FEATURES	OTHER FEATURES
Conformal Coating	- UV/Visible Light Cure - Secondary Moisture Cure - Superior Re-workability - Thermal Shock Resistance - Low VOC	- Bright Blue Fluorescence - Chemical Resistance - Meets MIL-I-46058C - Meets IPC-CC-830B - UL 94V-0 Flammability - UL 746-E

Dymax Dual-Cure 9482 is a light- and moisture-cure re-workable conformal coating, especially 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 ideal 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 RoHS2 directives 2015/863/EU and 2011/65/EU.

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
	A60 ^Ω	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 [‡]
CTE _{α1} , μm/m/°C	100	DSTM 610 [‡]
CTE _{α2} , 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 x 10 ¹⁴	ASTM D257
Surface Resistivity, ohm	2.06 x 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.)



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Technical Data collected prior to 2012

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Dymax Corporation
+1.860.482.1010 | info@dyamax.com | www.dyamax.com

Dymax Europe GmbH
+49 611.962.7900 | info_de@dyamax.com | www.dyamax.de

Dymax Engineering Adhesives Ireland Ltd.
+353 21.237.3016 | info_ie@dyamax.com | www.dyamax.ie

Dymax Oligomers & Coatings
+1.860.626.7006 | info_oc@dyamax.com | www.dyamax-oc.com

Dymax UV Adhesives & Equipment (Shanghai) Co. Ltd.
+86.21.37285759 | dymaxasia@dyamax.com | www.dyamax.com.cn

Dymax UV Adhesives & Equipment (Shenzhen) Co. Ltd.
+86.755.83485759 | dymaxasia@dyamax.com | www.dyamax.com.cn

Dymax Asia (H.K.) Limited
+852.2460.7038 | dymaxasia@dyamax.com | www.dyamax.com.cn

Dymax Asia Pacific Pte. Ltd.
+65.6752.2887 | info_ap@dyamax.com | www.dyamax-ap.com

Dymax Korea LLC
+82.2.784.3434 | info_kr@dyamax.com | www.dyamax.com/kr

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.

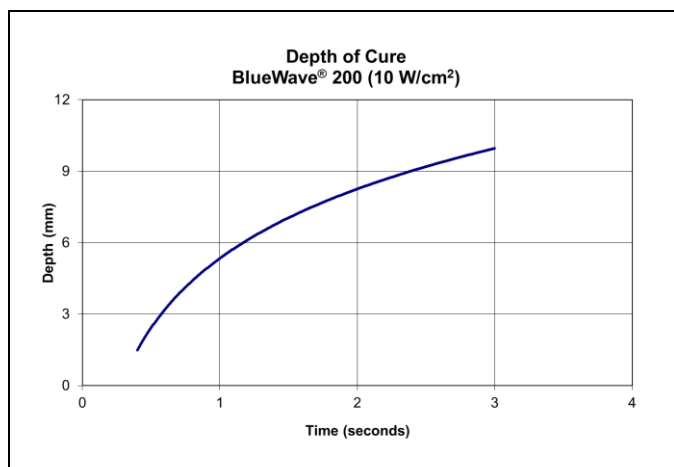
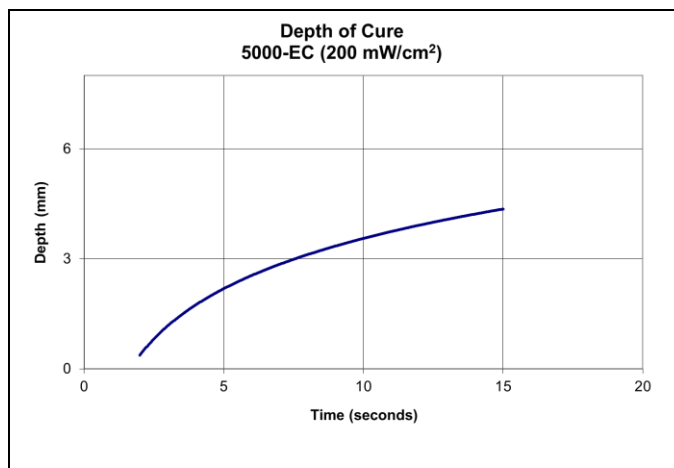
Dymax recommends that customers employ a safety factor by curing longer and/or at higher intensities than required for full cure. Although Dymax Application Engineering can provide technical support and assist with process development, each customer ultimately must determine and qualify the appropriate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

A combination of light and moisture cure is required to achieve full cured mechanical properties. Moisture is also used as a secondary cure mechanism for shadowed areas that cannot be cured with light. While moisture cure time in shadowed areas is typically 2-3 days at 25°C [77°F], 50% RH, actual moisture cure time is application specific and may vary. For adhesive that has been light cured, typical full property development is after 7 days at 25°C [77°F], 50% RH. Cure time for both light cured and shadow areas 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.

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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.



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 ($>100 \text{ mW/cm}^2$) 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. Light curing generally produces some heat. If necessary, cooling fans can be placed in the curing area to reduce the heating effect on components.
7. At the point of light curing, an air exhaust system is recommended to dissipate any heat and vapors formed during the curing process.
8. Resealing opened containers under a dry, inert gas, such as nitrogen, extends shelf life.
9. Light cure is recommended prior to moisture cure. Full cure develops after light and moisture cure.

DISPENSING THE RESIN

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 such as ultrasonic bath, water jet, vacuum tweezers, air knife and/ or warming to aid in the removal.

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. This material has a ten-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 Safety Data Sheet before use.

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