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Multi-Cure® 9-20557
Flexible Light-Cure Conformal Coating

APPLICATIONS

- **Conformal Coating**

FEATURES

- **UV/Visible Light Cure**
- **Secondary Heat Cure**
- **Low VOCs**
- **Medium Viscosity, Designed to Enhance Wetting of Leads**
- **Activator Cure Capability**
- **Suitable for Most Types of Spray Equipment**

OTHER FEATURES

- **MIL-I-46058C Listed**
- **IPC-CC-830-B Approved**
- **UL Recognized**
- **Blue Fluorescing**
- **Isocyanate Free**
- **One Part, No Mixing Required**

Dymax Multi-Cure® 9-20557 cures upon exposure to light and is designed for rapid conformal coating of printed circuit boards and other electronic assemblies. This coating has been optimized for coating thicknesses between 51 mic [0.002 in] and 510 mic [0.020 in]. The low modulus of 9-20557 allows it to excel in coating applications where thermal shock performance is critical. Dymax 9-20557 is a Multi-Cure® material especially formulated to cure with 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. When cured with Dymax light-curing spot lamps, focused-beam lamps, or flood lamps, they deliver optimum speed and performance for conformal coating. Dymax lamps offer the ideal 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 to Light Yellow	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.05	ASTM D1875
Viscosity, cP (20 rpm)	2,300 (nominal)	ASTM D1084

CURED MECHANICAL PROPERTIES *

Property	Value	Test Method
Durometer Hardness	D60	ASTM D2240
Tensile at Break, MPa [psi]	10 [1,500]	ASTM D638
Elongation at Break, %	110	ASTM D638
Modulus of Elasticity, MPa [psi]	89 [13,000]	ASTM D638
Glass Transition T_g, ˚C	49	DSTM 256‡

OTHER CURED PROPERTIES *

Property	Value	Test Method
Refractive Index (20˚C)	1.51	ASTM D542
Boiling Water Absorption, % (2 hr)	2.7	ASTM D570
Water Absorption, % (25˚C, 24 hr)	1.0	ASTM D570
Linear Shrinkage, %	1.8	ASTM D2566

* No Specifications
N/A Not Applicable
‡ DSTM Refers to Dymax Standard Test Method

ELECTRICAL PROPERTIES *

Property	Value	Test Method
Dielectric Constant (1 MHz)	4.49	ASTM D150
Dissipation Factor (1 MHz)	0.03	ASTM D150
Dielectric Withstand Voltage, V	>1,500	MIL-I-46058C
Volume Resistivity, ohm-cm	1.48 x 10^{15}	ASTM D257
Surface Resistivity, ohms	8.29 x 10^{14}	ASTM D257

ADHESION

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

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

RoHS Compliant

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ELECTRONIC CIRCUIT BOARD MATERIALS

9-20557 Product Data Sheet

CURING GUIDELINES

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm^2 [10 psi] between glass slides. Actual cure time typically is 3 to 5 times fixture time.

Dymax Curing System (Intensity)	Fixture Time or Belt Speed [A]
2000-EC (50 mW/cm^2)[B]	1 sec
5000-EC (200 mW/cm^2)[B]	1 sec
BlueWave® 200 (10 W/cm^2)[B]	<1 sec
UVCS Conveyor with one 5000-EC (200 mW/cm^2)[C]	7.3 m/min [24 ft/min]
UVCS Conveyor with Fusion F300S (2.5 W/cm^2)[C]	8.3 m/min [27 ft/min]

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 *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™ 100 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.

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:

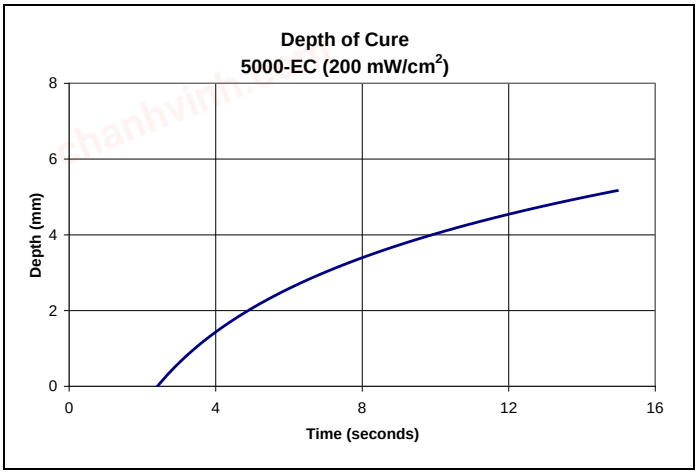
Temperature	Time*
110˚C [230˚F]	60 minutes
120˚C [250˚F]	30 minutes
150˚C [300˚F]	15 minutes

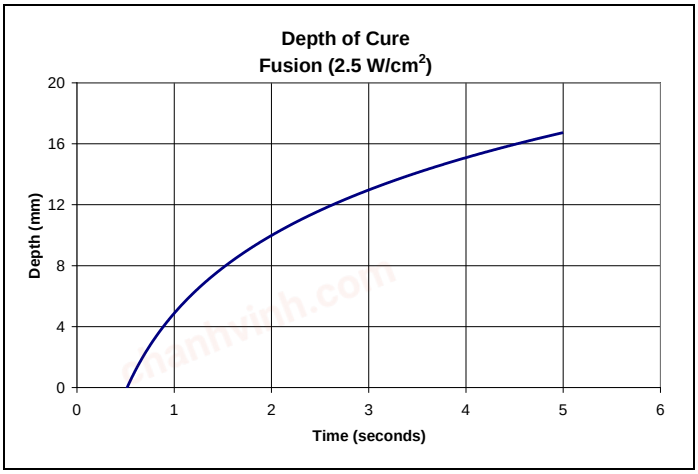
*Note: Actual heat cure time may vary due to part configuration, volume of adhesive applied, and oven efficiency.

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.

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.





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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/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 curing, an air exhaust system is recommended to dissipate any heat and vapors formed during the curing process.

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.

CLEAN UP

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 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 12-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 Safety Data Sheet before use.

The data provided in this document are based on historical testing that Dymax performed under laboratory conditions as they existed at that time, and are for informational purposes only. The data are neither specifications nor guarantees of future performance in a particular application. Dymax does not guarantee that this product's properties are suitable for the user's intended purpose.

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