Multi-Cure® 9-20676-F
Thermal Shock Resistant Conformal Coating

APPLICATIONS

- Conformal Coating

FEATURES

- UV/Visible Light-Cure
- Secondary Heat-Cure
- Solvent Free
- Low VOCs
- Blue Fluorescing

OTHER FEATURES

- MIL-1-46058C Listed
- IPC-CC-830-B Approved
- UL Recognized
- Excellent Shock and Vibrational Performance

Multi-Cure® 9-20676-F forms a tough clear coating upon exposure to light. 9-20676-F is excellent for conformal coating. This coating has performed well through vibration, impact, and thermal shock testing. The coating exhibits excellent adhesion to most solder masks. 9-20676-F has secondary heat-cure capability. 9-20676-F contains a UV tracer for fluorescing capabilities. 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 bonding. Dymax lamps offer the ideal balance of UV and visible light for the fastest, deepest cures. This product is in full compliance with RoHS directives 2015/863/EU..

UNCURED PROPERTIES *

Property	Value	Test Method
Solvent Content	No Nonreactive Solvents	N/A
Chemical Class	Acrylated Urethane	N/A
Appearance	Colorless Transparent Liquid	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.06	ASTM D1875
Viscosity, cP (20 rpm)	400 (nominal)	ASTM D1084

CURED MECHANICAL PROPERTIES *

Property	Value	Test Method
Durometer Hardness	D45	ASTM D2240
Tensile at Break, MPa [psi]	9.0 [1,300]	ASTM D638
Elongation at Break, %	250	ASTM D638
Modulus of Elasticity, MPa [psi]	13.7 [2,000]	ASTM D638
CTEα_1, µm/m/°C	98	DSTM 610
CTEα_2, µm/m/°C	268	DSTM 610

OTHER CURED PROPERTIES *

Property	Value	Test Method
Refractive Index (20°C)	1.50	ASTM D542
Boiling Water Absorption, % (2 h)	2.6	ASTM D570
Water Absorption, % (25°C, 24 h)	0.9	ASTM D570
Linear Shrinkage, %	2.1	ASTM D2556

* No Specifications
N/A Not Applicable

ELECTRICAL PROPERTIES *

Property	Value	Test Method
Dielectric Constant, 1 MHz	3.27	ASTM D-1304
Dissipation Factor, 1 MHz	0.046	ASTM D-1304
Dielectric Strength, kV/mm [V/mil]	500	ASTM D-1304
Volume Resistivity, ohm-cm	$555x10^{12}$	ASTM D-1304
Surface Resistivity, ohm-cm	$6,300x10^{12}$	ASTM D-1304

ADHESION

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

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

RoHS Compliant

Technical Data Collection in 2016 REV. 12/19/2018

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

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

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

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

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

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

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

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

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

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]	1s
5000-EC (200 mW/cm^2)[B]	1s
BlueWave® 75 (5.0 W/cm^2)[B]	2s
BlueWave® 200 (10 W/cm^2)[B]	2s
UVCS Conveyor with one 5000-EC (200 mW/cm^2)[C]	8.2 m/min [27ft/min]
UVCS Conveyor with Fusion F300S (2.5 W/cm^2)[C]	8.2 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]	minutes
120˚C [250˚F]	minutes
150˚C [300˚F]	minutes

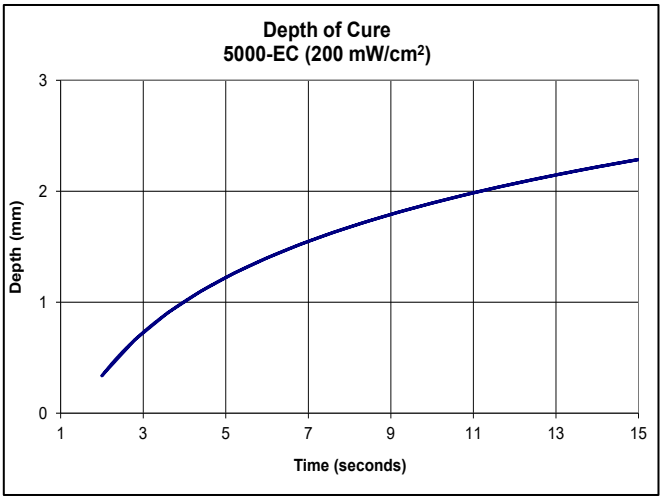
*Note: Actual heat cure time may vary due to part configuration, volume of adhesive applied, and oven efficiency.

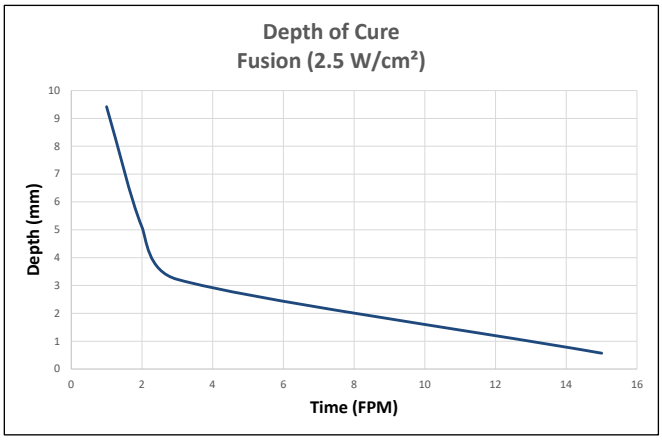
CURING GUIDELINES (CONTINUED)

Dymax recommends that customers employ a safety factor by curing longer, at higher intensity, and/or at higher temperature 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.





OPTIMIZING PERFORMANCE AND HANDLING

1. This product cures with exposure to UV 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. 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.

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.

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 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 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 an 18-month shelf life from date of manufacture, unless otherwise specified, when stored between 10°C (50°F) and 35°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.

Numerous factors—including, without limitation, transport, storage, processing, the material with which the product is used, and the ultimate function or purpose for which the product was obtained—may affect the product's performance and/or may cause the product's actual behavior to deviate from its behavior in the laboratory. None of these factors are within Dymax's control. Conclusions about the behavior of the product under the user's particular conditions, and the product's suitability for a specific purpose, cannot be drawn from the information contained in this document.

It is the user's responsibility to determine (i) whether a product is suitable for the user's particular purpose or application and (ii) whether it is compatible with the user's intended manufacturing process, equipment, and methods. Under no circumstances will Dymax be liable for determining such suitability or compatibility. Before the user sells any item that incorporates Dymax's product, the user shall adequately and repetitively test the item in accordance with the user's procedures and protocols. Unless specifically agreed to in writing, Dymax will have no involvement in, and shall under no circumstances be liable for, such testing.

Dymax makes no warranties, whether express or implied, concerning the merchantability of this product or its fitness for a particular purpose. Nothing in this document should be interpreted as a warranty of any kind. Under no circumstances will Dymax be liable for any injury, loss, expense or incidental or consequential damage of any kind allegedly arising in connection with the user's handling, processing, or use of the product. It is the user's responsibility to adopt appropriate precautions and safeguards to protect persons and property from any risk arising from such handling, processing, or use.

The specific conditions of sale for this product are set forth in Dymax's Conditions of Sale which are available at https://www.dymax.com/index.php/en/resources/sales-terms-conditions. Nothing contained herein shall act as a representation that the product use or application is free from patents owned by Dymax or any others. Nothing contained herein shall act as a grant of license under any Dymax Corporation Patent.

Except as otherwise noted, all trademarks used herein are trademarks of Dymax. The "®" symbol denotes a trademark that is registered in the U.S. Patent and Trademark Office.

The contents of this document are subject to change. Unless specifically agreed to in writing, Dymax shall have no obligation to notify the user about any change to its content.