



9501-R

Red Colored LED-Curable Structural Battery Bonding Adhesive

APPLICATIONS

- EV Battery Structural Bonding
- Battery Potting
- Plastic & Dissimilar Substrate Bonding

FEATURES

- UV/Visible Light Cure
- 385 nm LED Curing
- Excellent Adhesion to Metals & Plastics

RECOMMENDED SUBSTRATES

- ABS
- Aluminum
- Nickel Plated Metals
- PC
- PC/ABS

Dymax 9501-R is designed for rapid curing in structural bonding applications such as electric vehicle battery bonding. Dymax adhesives 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 battery assembly and structural applications. 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	Red Gel	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.05	ASTM D1875
Viscosity, cP	8,600 (nominal)	DSTM 502‡
Shelf Life at Recommended Conditions from Date of Manufacture	6 months	N/A

CURED MECHANICAL PROPERTIES *

Property	Value	Test Method
Durometer Hardness	D70	ASTM D2240
Tensile at Break, MPa [psi]	18.6 [2,700]	ASTM D638
Elongation at Break, %	170	ASTM D638
Modulus of Elasticity, MPa [psi]	640 [92,200]	ASTM D638

OTHER CURED PROPERTIES *

Property	Value	Test Method
Boiling Water Absorption, % (2 h)	3.0	ASTM D570
Water Absorption, % (25°C, 24 h)	1.2	ASTM D570
Linear Shrinkage, %	0.5	ASTM D2566
Glass Transition T _g , °C	60	ASTM D5418
CTE _{α1} , μm/m/°C	99	ASTM E831
CTE _{α2} , μm/m/°C	248	ASTM E831

TYPICAL PERFORMANCE OF CURED MATERIAL *

Property	Value	Test Method
Polycarbonate-to-Nickle Plated Steel Tensile, MPa [psi]	15.8 [2,290]	DSTM 255‡

ADHESION

Substrate	Recommendation
ABS acrylonitrile-butadiene-styrene	✓
CAP cellulose acetate propionate	✓
FR4	✓
GL glass	✓
PC polycarbonate	✓
PC/ABS Blend	✓
PCTG poly(cyclohexylene dimethylene terephthalate)glycol	✓
PETG poly(ethylene terephthalate)glycol	✓
PS polystyrene	✓
PVC poly(vinyl chloride)	✓
SAN styrene-acrylonitrile	✓
AL aluminum	✓
Ni Plating nickel plated metals	✓
SS stainless steel, 304, SS-13	✓

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

* Not Specifications

N/A Not Applicable

‡ DSTM Refers to Dymax Standard Test Method

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CURING GUIDELINES

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm² [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-ECE (50 mW/cm ²) ^B	< 1 s
5000-ECE (200 mW/cm ²) ^B	< 1 s
BlueWave® FX-1250 RediCure® 365 nm (425 mW/cm ²) ^C	0.2 s
BlueWave® FX-1250 PrimeCure® 385 nm (800 mW/cm ²) ^C	0.2 s
BlueWave® FX-1250 VisiCure® 405 nm (650 mW/cm ²) ^C	0.2 s
BlueWave® 200 (10 W/cm ²) ^B	0.2 s
BlueWave® MX-150 RediCure® 365 nm (10 W/cm ²) ^C	0.2 s
BlueWave® MX-150 PrimeCure® 385 nm (15 W/cm ²) ^C	0.2 s
BlueWave® MX-150 VisiCure® 405 nm (15 W/cm ²) ^C	0.2 s
UVCS Conveyor with 5000-EC (200 mW/cm ²) ^D	8.2 m/min [27 ft/min]
UVCS Conveyor with Fusion F300S (2.5 W/cm ²) ^D	8.2 m/min [27 ft/min]

^A Fixture times/belt speeds are typical for curing thin films through 100% UV and light-transmitting substrates. Light-obstructing substrates may require longer cure times.

^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.

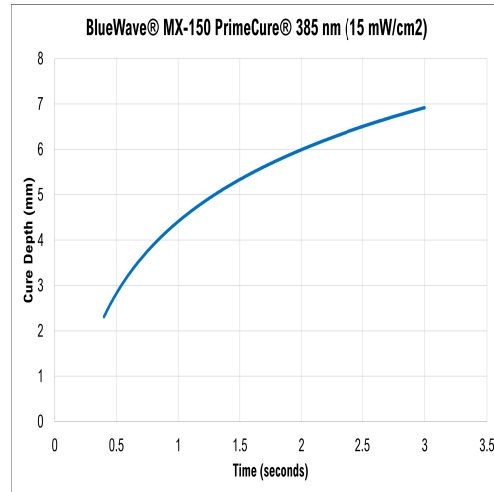
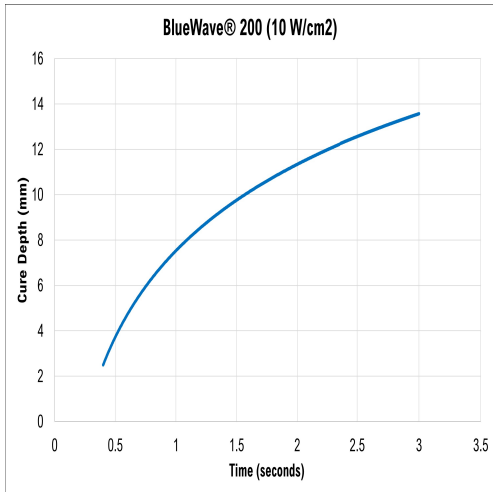
^D At 53 mm [2.1 in] focal distance. Maximum speed of conveyor is 8.2 m/min [27 ft/min]. Intensity was measured over the UVA range (320-395 nm) using the Dymax ACCU-CAL™ 150 Radiometer.

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.

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 must ultimately determine and qualify the appropriate curing parameters required for their unique application.

DEPTH OF CURE

The graph below shows the increase in depth of cure as a function of exposure time. 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 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 bond surfaces should be clean and free from grease, mold release, or other contaminants prior to dispensing the adhesive.
3. Cure speed is dependent upon many variables, including lamp intensity, distance from the light source, required depth of cure, bond gap, and percent light transmission of the substrate.
4. Oxygen in the atmosphere may inhibit surface cure. Surfaces exposed to air may require high-intensity UV light to produce a dry surface cure. Flooding the bond 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.
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 the gap between mating parts to reduce stress caused by an interference fit. The third option is to minimize the amount of time the liquid adhesive 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 SUPPORT

The Dymax Application Engineering team is ready to discuss your application requirements to provide the most appropriate dispensing and/or spraying solution. Visit our current dispensing equipment portfolio [here](#) or consult our [global contact](#) phone numbers and online chat feature (available in North America only) during normal business hours for instant support.

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 shelf life is noted on page 1 of this document, when stored between 10°C (50°F) and 32°C (90°F) in the original container.



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.

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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CONTACT DYMAX

www.dymax.com

Americas

USA | +1.860.482.1010 | info@dymax.com

Europe

Germany | +49 611.962.7900 | info_de@dymax.com

Ireland | +353 21.237.3016 | info_ie@dymax.com

Asia

Singapore | +65.67522887 | info_ap@dymax.com

Shenzhen | +86.755.83485759 | info@hanarey.com

Hong Kong | +852.2460.7038 | dymaxasia@dymax.com

Korea | +82.31.608.3434 | info_kr@dymax.com