MD® 211-CTH-SC

LED-Curable, Plastic-Bonding Adhesive with See-Cure Technology

APPLICATIONS

- Catheter Assembly
- Y-Connector Assembly
- Balloon Bonding
- Connectors to Tubing

FEATURES

- UV/Visible Light Cure
- 385 nm LED Compatible
- Blue-to-Colorless Upon Full Cure
- Ideal for 0.1-0.2 mm Gaps
- Adhesion to Wide Variety of Plastics
- Able to Cure Tack Free

RECOMMENDED SUBSTRATES

- ABS
- PC
- PU
- PVC

BIOCOMPATIBILITY

- ISO 10993-4 Hemolysis
- ISO 10993-5 Cytotoxicity
- ISO 10993-6 Implantation
- ISO 10993-10 Intracutaneous
- ISO 10993-11 Systemic Toxicity

Dymax MD® 211-CTH-SC is designed for rapid bonding of a wide variety of plastics typically used in the manufacture of medical devices. 211-CTH-SC contains patented See-Cure technology with built-in visual cure validation that makes it easy for operators, or simple automated optical inspection systems, to confirm cure without the need for additional specialized equipment. Adhesives with See-Cure technology are blue prior to cure, enabling the user to confirm adhesive placement. During the light-curing process, the blue color disappears and provides an obvious confirmation that the adhesive is cured and the bond is secure. Dymax MD® Medical Device 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 or focused-beam lamps, they deliver optimum speed and performance for medical device assembly. 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	Blue Transparent Liquid	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.03	ASTM D1875
Viscosity, cP (20 rpm)	450 (nominal)	DSTM 502‡
Shelf Life at Recommended Conditions from Date of Manufacture	8 months	N/A

CURED MECHANICAL PROPERTIES *

Property	Value	Test Method
Durometer Hardness	D70	ASTM D2240
Tensile at Break, MPa [psi]	16 [2,400]	ASTM D638
Elongation at Break, %	100	ASTM D638
Modulus of Elasticity, MPa [psi]	320 [46,000]	ASTM D638
Tensile at Break, MPa [psi]	14 [2,350]	N/A

OTHER CURED PROPERTIES *

Property	Value	Test Method
Appearance	Clear/Straw Color	N/A
Refractive Index (20°C)	1.50	ASTM D542
Boiling Water Absorption, % (2 hr)	6.0	ASTM D570
Water Absorption, % (25°C, 24 hr)	4.4	ASTM D570
Linear Shrinkage, %	0.6	ASTM D2566

CURING EQUIPMENT RECOMMENDATIONS *

Process Method	Spot Lamp	Flood Lamp	Conveyor
LED Curing/Wavelength	BlueWave® MX-150 PrimeCure® 385 nm	BlueWave® AX-550 PrimeCure® 385 nm	UVCS Conveyor with BlueWave® AX-550 PrimeCure® 385 nm
Broad Spectrum	BlueWave® 200	5000-ECE	UVCS Conveyor with Fusion F300S

ADHESION

Substrate	Recommendation
ABS acrylonitrile-butadiene-styrene	✓
CAP cellulose acetate propionate	✓
PA polyamide	✓
PC polycarbonate	✓
PCTG poly(cyclohexylene dimethylene terephthalate) glycol	✓
PMMA poly(methyl methacrylate)	✓
PS polystyrene	✓
PU polyurethane	✓
PVC poly(vinyl chloride)	✓
SAN styrene-acrylonitrile	✓
TPU thermoplastic polyurethane	✓
PCB printed circuit board	✓

✓ Recommended o Limited Applications

st Requires Surface Treatment (e.g. plasma, corona treatment, etc.)

* Not Specifications

N/A Not Applicable

‡ DSTM Refers to Dymax Standard Test Method

Technical Data Collected PRIOR TO 2011 Rev.02/10/2023

CURING GUIDELINES

The vivid blue color of this adhesive transitions to colorless when fully cured. The charts below provide information on cure time required to transition from blue to colorless using different light sources and adhesive thicknesses. Cure rate is dependent upon many variables including lamp intensity, distance from the light source, and required depth of cure. The times and belt speed for the transition listed below are based on lab results and are intended for reference only.

Dymax Curing System (Intensity)	5000-EC (200 mW/cm^2) [B]
Adhesive Thickness, mm [mil]	Time to complete transition, s [A]
0.10 [4.0]	8
0.20 [8.0]	20
0.41 [16]	30
0.81 [32]	35

Dymax Curing System (Intensity)	BlueWave® 200 (10 W/cm^2) [B E]
Adhesive Thickness, mm [mil]	Time to complete transition, s [A]
0.10 [4.0]	1
0.20 [8.0]	1
0.41 [16]	1
0.81 [32]	10

Dymax Curing System (Intensity)	BlueWave® MX-150 PrimeCure® 385 nm (15 W/cm^2) [C E]
Adhesive Thickness, mm [mil]	Time to complete transition, s [A]
0.10 [4.0]	4
0.20 [8.0]	3
0.41 [16]	2
0.81 [32]	1

Dymax Curing System (Intensity)	UVCS Conveyor with Fusion F300S (2.5 W/cm^2) [D]
Adhesive Thickness, mm [mil]	Belt speed to complete transition, m/min [ft/min] [A]
0.10 [4.0]	0.8 m/min [2.5 ft/min]
0.20 [8.0]	0.8 m/min [2.5 ft/min]
0.41 [16]	1.2 m/min [4 ft/min]
0.81 [32]	1.5 m/min [5 ft/min]

A Curing through light-blocking substrates may limit the ability of See-Cure adhesives to transition from blue to clear and may require longer light exposure at critical wavelengths (320-400 nm for UV light curing; 20-450 nm for UV/Visible light curing). These time s/speeds are typical for curing through 100% light-transmitting substrates.

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 (250-450 nm) using a Dymax ACCU-CAL™ 50-LED Radiometer.

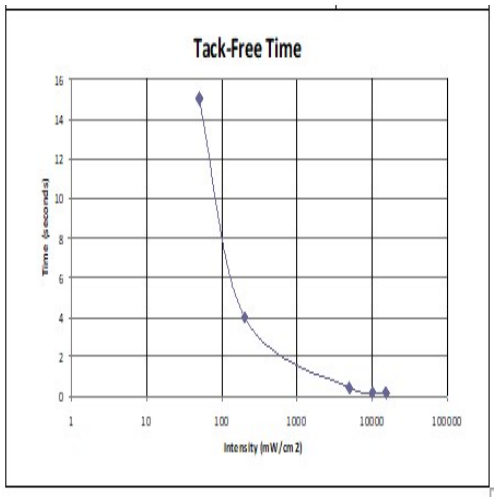
D At 53 mm [2.1 in] focal distance. Maximum speed of conveyor is 8.2 m/min [27 ft/min]. Intensity was measured over the UVA range (320-395 nm) using the Dymax ACCU-CAL™ 160 Radiometer.

E Due to the distance between the end of the lightguide and adhesive, intensity at the curing area was measured as 4.0W/cm^2.

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 adhesives.

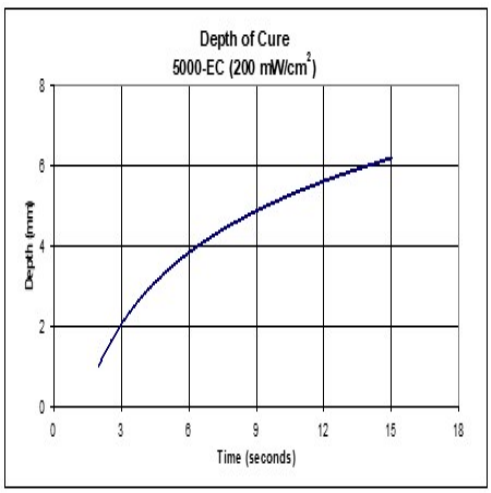
Dymax recommends that customers employ a safety factor by curing longer and/or at higher intensities than required for full cure. Although Dymax Application Engineering can provide technical support and assist with process development, each customer ultimately must determine and qualify the appropriate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

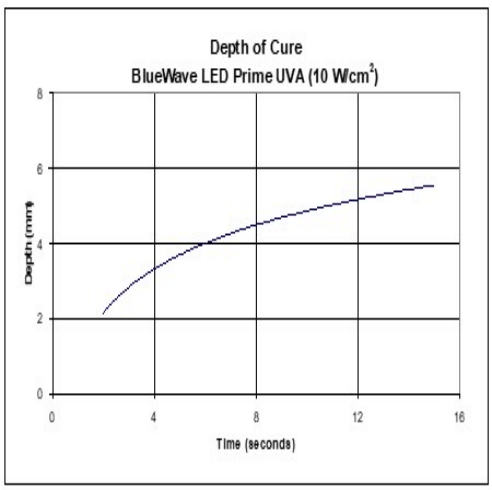
TACK-FREE TIME



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 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, and other contaminants prior to dispensing the adhesive.
3. Cure and color transition speed are 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 (>150 mW/cm^2) 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 noted on page 1 of this document, when stored between 10°C (50°F) and 32°C (90°F) in the original, unopened container.

STERILIZATION

Compatible sterilization methods include gamma irradiation and ethylene oxide. Sterilization by autoclaving may be limited to certain applications. It remains the user's obligation to ascertain the effect of sterilization on the cured adhesive.

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.

BIOCOMPATIBILITY

Polymerized Dymax MD® medical device adhesives are biocompatibility tested in accordance with ISO 10993 and/or USP Class VI. The completed tests are listed on each product data sheet. Copies of the test reports are available upon request. In all cases, it is the user's responsibility to determine and validate the suitability of these adhesives in the intended medical device. These adhesives have not been tested for prolonged or permanent implantation and are only intended for use in short-term (<29 days) or single-use disposable-device applications. Dymax does not authorize their use in long-term implant applications. Customers using these materials for such applications do so at their own risk and take full responsibility for ensuring product safety and biocompatibility.

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 General Terms & Conditions of Sale. 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.

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 | dymaxasia@dymax.com
Hong Kong | +852.2460.7038 | dymaxasia@dymax.com
Korea | +82.31.608.3434 | info_kr@dymax.com