

Dual Cure 3401 Light/Moisture-Cure PC and ABS Plastic Bonder

APPLICATIONS	FEATURES	RECOMMENDED SUBSTRATES
- Plastic Assembly - Appliance Assembly - Bonding, Sealing or Encapsulating PC and ABS components	- UV/Visible Light Cure - Secondary Moisture Cure - Blue Fluorescing for Easy In-line Inspection - Shadowed Area Performance - Moisture and Thermal Resistance	- ABS - PC - PCTG - PEI - PETG - PI - PSU - PVC - Brass - Glass

Dymax Dual-Cure 3401 is designed for rapid bonding of a wide variety of plastic and metal substrates. The product is formulated with a UV/visible light and secondary ambient moisture-cure system for curing in shadow areas and fluoresces blue for in-line inspection under low-intensity "black light" (365 nm). Dymax Dual-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, supplemented by secondary moisture cure, they deliver optimum speed and performance for plastic bonding, sealing, and encapsulation. 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 and 2011/65/EU.

UNCURED PROPERTIES *		
Property	Value	Test Method
Solvent Content	No Nonreactive Solvents	N/A
Chemical Class	Acrylated Urethane	N/A
Appearance	Transparent Liquid	N/A
Soluble in	Organic Solvents	N/A
Density, g/ml	1.07	ASTM D1875
Viscosity, cP (20 rpm)	150 (nominal)	DSTM 502

CURED MECHANICAL PROPERTIES (after UV cure + 7 days @ 25°/50% RH)		
Property	Value	Test Method
Durometer Hardness	D55-D75	ASTM D2240
Tensile at Break, MPa [psi]	30 [4,400]	ASTM D638
Elongation at Break, %	13	ASTM D638
Modulus of Elasticity, MPa [psi]	506 [73,400]	ASTM D638
Tensile Compression Shear, Lbf		
PC-to-Stainless Steel	216	DSTM D251 [‡]
PC-to-PC	400	DSTM 255 [‡]

* Not Specifications

N/A Not Applicable

‡ DSTM Refers to Dymax Standard Test Method

OTHER CURED PROPERTIES *		
Property	Value	Test Method
Refractive Index (20°C)	1.48	ASTM D542
Boiling Water Absorption, % (2 h)	2.6	ASTM D570
Water Absorption, % (25°C, 24 h)	0.7	ASTM D570
Linear Shrinkage, %	0.2	ASTM D2566
Glass Transition T _g , °C	68	DSTM 256 [‡]

ADHESION	
Substrate (UV Cured)	Recommendation
ABS acrylonitrile-butadiene-styrene	✓
PC polycarbonate	✓
PCTG poly(cyclohexylene dimethylene terephthalate)glycol	✓
PEI polyetherimide	✓
PETG poly(ethylene terephthalate)glycol	✓
PI polyimide	✓
PSU polysulfone	✓
PVC poly(vinyl chloride)	✓
Brass	✓
Glass	✓

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



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-EC (50 mW/cm ²) ^B	<1 s
5000-EC (200 mW/cm ²) ^B	<1 s
BlueWave [®] LED Prime UVA (10 W/cm ²) ^C	0.1 s
BlueWave [®] 75 (5.0 W/cm ²) ^B	0.2 s
BlueWave [®] 200 (10 W/cm ²) ^B	0.2 s
UVCS Conveyor with one 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% light-transmitting substrates. Light-obstructing substrates 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.

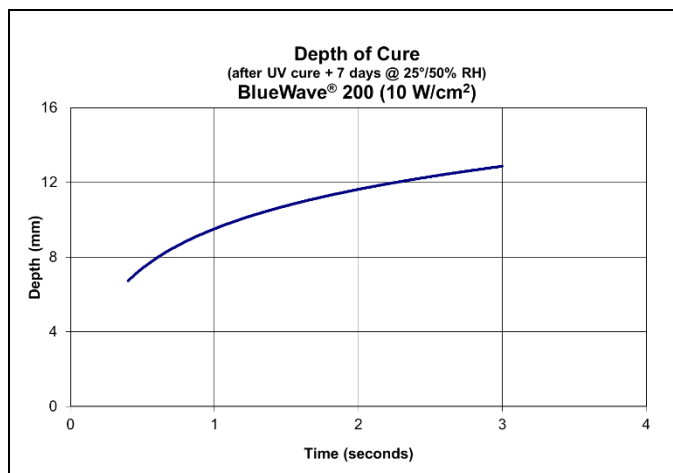
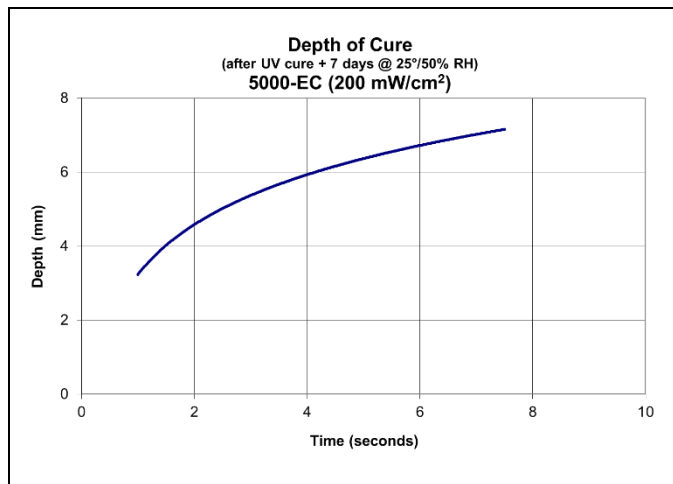
Dymax recommends that customers employ a safety factor by curing longer and/or at higher intensities than required for full cure. Although Dymax Applications Engineering can provide technical support and assist with process development, each customer ultimately must determine and qualify the appropriate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

Moisture Cure

Moisture is used as a secondary cure mechanism for shadowed areas that cannot be cured with light. While moisture cure time is typically 2-3 days at 25°C [77°F], 50% RH, actual moisture cure time is application specific and may vary. Cure time 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.

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, 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 ($>100 \text{ mW/cm}^2$) 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 THE ADHESIVE

This material may be dispensed with a variety of manual, semi-automated, and fully automated fluid delivery systems. Small area applications including beads and small dots can be achieved using hand-held Dymax dispensing systems like our SD-100 syringe dispenser and our Model 400 needle valve systems. The value system can be used in a manual, semi-automated or fully automated application. Dymax has several other dispensing systems that may be suitable for use with our adhesive materials. 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 of 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. Resealing the container under dry inert gas, such as nitrogen, extends shelf life. This material has a six-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. If the product is exposed to colder temperatures, allow it to equilibrate at room temperature for 24 hours prior to use.

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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