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Technical Data Sheet

Product 3103

Worldwide Version, July 1999

PRODUCT DESCRIPTION

LOCTITE® Product 3103 is a one component, thixotropic adhesive which cures rapidly to form flexible, transparent bonds when exposed to ultraviolet radiation and/or visible light of sufficient intensity.

TYPICAL APPLICATIONS

Loctite Product 3103 is primarily designed for bonding polycarbonate to itself, while not inducing stress cracking under typical molded in stress levels. Its flexibility enhances the load bearing and shock absorbing characteristics of the bond area. It has also shown excellent adhesion to a wide variety of substrates including glass, many plastics and most metals.

PROPERTIES OF UNCURED MATERIAL

	Value	Typical Range
Chemical Type	Acrylated Urethane	
Appearance	Pale, yellow liquid	
Specific Gravity @ 25°C	1.10	
Viscosity @ 25°C, mPa.s (cP)		
Brookfield RVT D		
Spindle 6 @ 20 rpm	10,000	
Refractive index, n_D	1.48	
Flash Point (TCC), °C	92	

Stress Cracking

Liquid adhesive was applied to a polycarbonate bar 6.4cm by 13mm by 3mm which had been flexed to induce different stress levels. The time it took for signs of crazing or stress cracking to appear was recorded.

Stress Cracking, ASTM D3929, 17 N/mm ² (2500 psi)	>15 minutes
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TYPICAL CURING PERFORMANCE

This product can be cured through irradiation with ultraviolet and/or visible light of sufficient intensity. To obtain full cure on surfaces exposed to air, the intensity of energy at 260nm is particularly important. The cure rate and ultimate depth of cure will depend on light intensity, the spectral distribution of the light source, the exposure time and the light transmittance of the substrates.

NOTE: UV intensities where quoted are measured at 365nm using an OAI 306 UV Powermeter.

Fixture Time

The fixture time is the time required for a 1cm lap joint of polycarbonate and polycarbonate with 13mm overlap and 0.5mm gap to be irradiated with light energy so it has sufficient strength to support a 3 kg weight for 10 seconds.

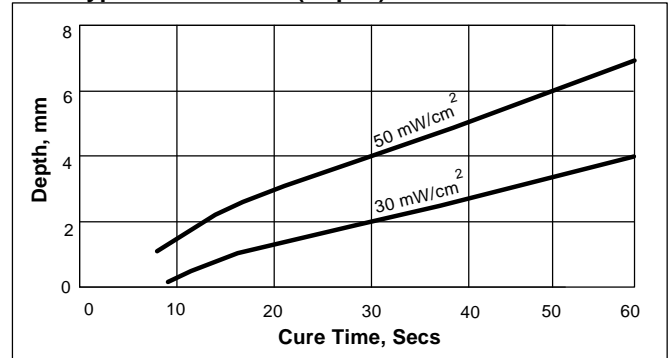
FIXTURE TIME, secs	UV Intensity, mW/cm ²	
LAMP TYPE	30	50
Metal Halide (Doped)	5-10	5-10
Fusion H & V Bulbs		<5
Fusion D Bulb		<5

Depth of Cure vs. UV Irradiance

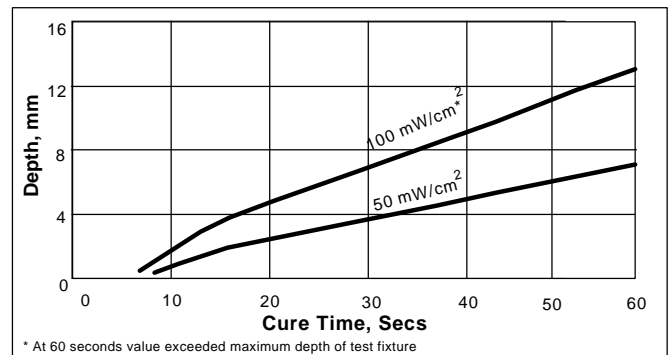
The graphs below show the increase in depth of cure with time at 30mW/cm² - 100mW/cm² as measured from the thickness of the cured pellet formed in a 15mm diameter PTFE die.

When exposed to a V Bulb at irradiances of 50 and 100mW/cm² for 30 seconds, a depth of cure greater than 13 mm was achieved. The performance for Medium Pressure Hg will be similar to Fusion H Bulb.

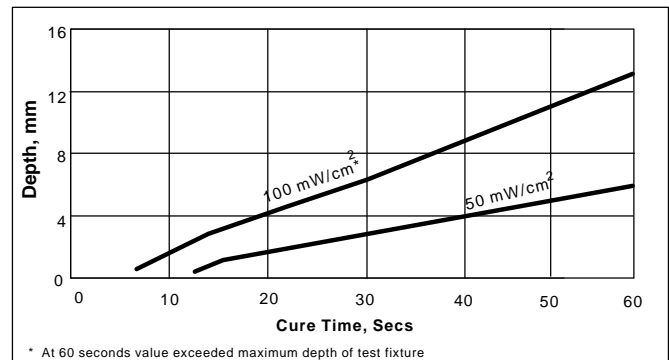
Bulb Type: Metal Halide (Doped)



Bulb Type: Fusion D



Bulb Type: Fusion H



NOT FOR PRODUCT SPECIFICATIONS

THE TECHNICAL DATA CONTAINED HEREIN ARE INTENDED AS REFERENCE ONLY.

PLEASE CONTACT LOCTITE CORPORATION QUALITY DEPARTMENT FOR ASSISTANCE AND RECOMMENDATIONS ON SPECIFICATIONS FOR THIS PRODUCT.
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TYPICAL PROPERTIES OF CURED MATERIAL(Cured 80 seconds @ 30 mW/cm² using a metal halide light source)**Physical Properties**

Tensile strength at break, N/mm ²	17
(psi)	(2,500)
% Elongation to break ASTM D882,	260
Modulus, ASTM D882, N/mm ²	207
(psi)	(30,000)
Hardness (Shore D):	51
Water absorption, ASTM D570, 2hrs in boiling water, %	2.72
Refractive index, N _D	1.50

Electrical Properties

	Constant	Loss
Dielectric constant & loss, ASTM D150 @ 100 Hz	5.697	0.0426
@ 1 kHz	5.605	0.0188
@ 1 MHz	5.131	0.0419
Volume resistivity, ASTM D149, Ω.cm		8.9 x 10 ¹⁴
Surface resistivity, ASTM D149, Ω		8.7 x 10 ¹⁴
Dielectric strength, ASTM D257		
kV/mm		23

PERFORMANCE OF CURED MATERIAL

Shear strength in tensile mode tested on 1" x 1" bond area. Lap shear assemblies were cured for 80 seconds @ 30mW/cm² using a metal halide light source.

Shear Strength, psi

	Initial	300 hr 49°C/cond. humidity	500 hr 49°C/cond. humidity
PC/Etched Al	692	864	695
PC/ as received Al	588	200	221
PC/Steel	517	607	732
PC/Glass	869	803	742
PC/Phenolic	708	765	786
PC/PC	2849	1118	585
PC/Epoxyglass	879	806	772
PC/PVC	519	704	726
PC/ABS	664	657	631
PC/Acrylic	461	615	570
PC/Nylon	745	401	683
PC/Valox	793	726	775

TYPICAL ENVIRONMENTAL RESISTANCE

Test Procedure: ASTM D3136,
Substrate: Polycarbonate with 0.5mm gap
Cure Procedure: 80 secs @ 30mW/cm² Metal Halide

Solvent	% of initial strength retained at		
	Temp	2hr	24hr 170hr
Boiling Water		70	
Water Immersion	49°C		60
Isopropanol immersion	RT		95
Humidity Resistance	38°C		75

Heat Aging on polycarbonate substrates

	Temp.	170hr	340hr
Bonded polycarbonate	71°C	100 ¹	100 ¹
Bonded polycarbonate	93°C	100 ¹	100 ¹
Bonded polycarbonate	121°C	75 ¹	60 ¹

¹Substrate failure**GENERAL INFORMATION**

This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.

For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Directions for use

This product is UV sensitive. Exposure to daylight, UV light and artificial lighting should be kept to a minimum during storage and handling. Agitate before use. Product should be dispensed from applicators with black feed lines. For best performance bond surfaces should be clean and free from grease. UV cure rate is dependent on lamp intensity, distance from light source, depth of cure needed or bondline gap and light transmittance of the substrate through which the radiation must pass.

Recommended intensity for cure in bondline situation is 5 mW/cm² minimum (measured at the bondline) with an exposure time of 4-5 times the fixture time at this same intensity. For dry curing of exposed surfaces higher intensity UV is required (100 mW/cm² minimum). Cooling should be provided for temperature sensitive substrates such as thermoplastics.

Crystalline and semi-crystalline thermoplastics should be checked for risk of stress cracking when exposed to liquid adhesive. Excess adhesive can be wiped away with organic solvent. Bonds should be allowed to cool before subjecting to any service loads.

Storage

Product shall be ideally stored in a cool, dry location in unopened containers at a temperature between 8°C to 28°C (46°F to 82°F) unless otherwise labeled. Optimal storage is at the lower half of this temperature range. To prevent contamination of unused product, do not return any material to its original container. For further specific shelf life information, contact your local Technical Service Center.

Data Ranges

The data contained herein may be reported as a typical value and/or range (based on the mean value ±2 standard deviations). Values are based on actual test data and are verified on a periodic basis.

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Loctite Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loctite Corporation's products. Loctite Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Loctite Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.