Technical Data Sheet

LOCTITE® AA 3201™

Known as LOCTITE® 3201™
November 2014

PRODUCT DESCRIPTION

LOCTITE® AA 3201™ provides the following product characteristics:

Technology	Acrylic
Chemical Type	Acrylated urethane
Appearance (uncured)	Transparent to slightly hazy liquid[LMS]
Components	One component - requires no mixing
Viscosity	Medium, thixotropic
Cure	Ultraviolet (UV)/ visible light
Cure Benefit	Production - high speed curing
Application	Bonding
Flexibility	Enhances load bearing & shock absorbing characteristics of the bond area.

LOCTITE® AA 3201™ is primarily designed for bonding polycarbonate to itself, while not inducing stress cracking under typical molded stress levels. LOCTITE® AA 3201™ cures rapidly to form flexible, transparent bonds when exposed to ultraviolet light and/or visible light of sufficient irradiance and has shown excellent adhesion to a wide variety of substrates including glass, many plastics and most metals. The thixotropic nature of LOCTITE® AA 3201™ reduces the migration of liquid product after application to the substrate.

ISO-10993

An ISO 10993 Test Protocol is an integral part of the Quality Program for LOCTITE® AA 3201™. LOCTITE® AA 3201™ has been qualified to Henkel's ISO 10993 Protocol as a means to assist in the selection of products for use in the medical device industry. Certificates of Compliance are available on Henkel's website or through the Henkel Quality Department.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.13
Refractive Index	1.48
Flash Point - See SDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 4, speed 20 rpm,	2,500 to 5,000[LMS]

TYPICAL CURING PERFORMANCE

LOCTITE® AA 3201™ can be cured by exposure to UV and/or visible light of sufficient intensity. To obtain full cure on surfaces exposed to air, radiation @ 220 to 260 nm is also required. The speed of cure will depend upon the UV intensity and spectral distribution of the light source, the exposure time and the light transmittance of the substrates.

Stress Cracking

Liquid adhesive is applied to a medical grade polycarbonate bar 6.4 cm by 13 mm by 3 mm which is then flexed to induce a known stress level.

Stress Cracking, ASTM D 3929, minutes:	
17 N/mm² stress on bar	>15

Fixture Time

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm² .

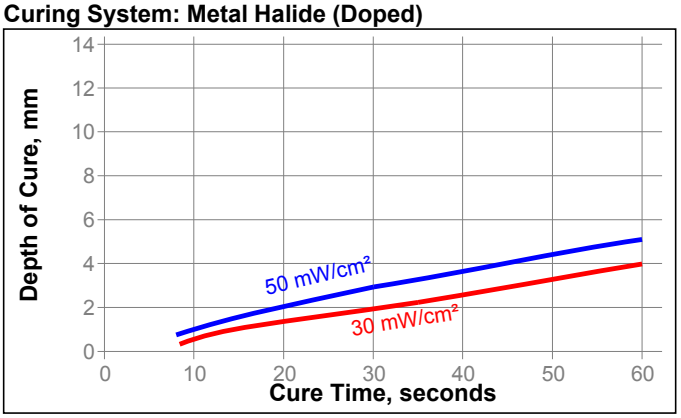
UV Fixture Time, Glass microscope slides, seconds:	
Black light, Zeta® 7500 light source:	
6 mW/cm² , measured @ 365 nm	≤20[LMS]
UV Fixture Time, Polycarbonate, seconds:	
Metal halide bulb (doped), Zeta® 7400:	
30 mW/cm² , measured @ 365 nm,	10 to 15
Electrodeless, H & V bulbs:	
50 mW/cm² , measured @ 365 nm,	5 to 10
Electrodeless, D bulb:	
50 mW/cm² , measured @ 365 nm,	5 to 10

Depth of Cure vs. Irradiance (365 nm)

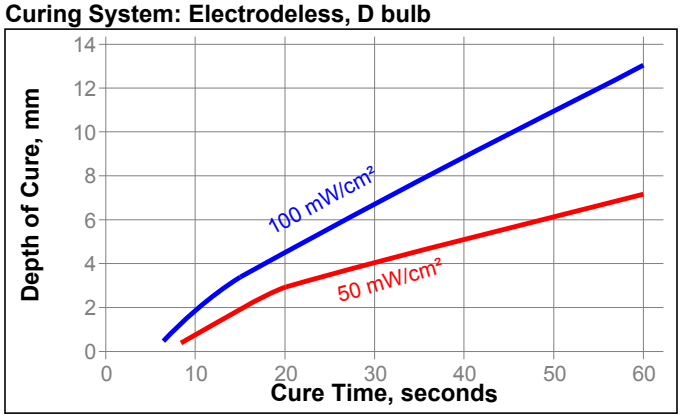
The graph below shows the increase in depth of cure with time at 50mW/cm² - 100mW/cm² as measured from the thickness of the cured pellet formed in a 15mm diameter PTFE die.

Note: When exposed to a V Bulb at irradiances of 50 and 100 mW/cm² for 30 to 60 seconds, a depth of cure greater than 13 mm was achieved. The performance for medium pressure Hg will be similar to Electrodeless system, H bulb.

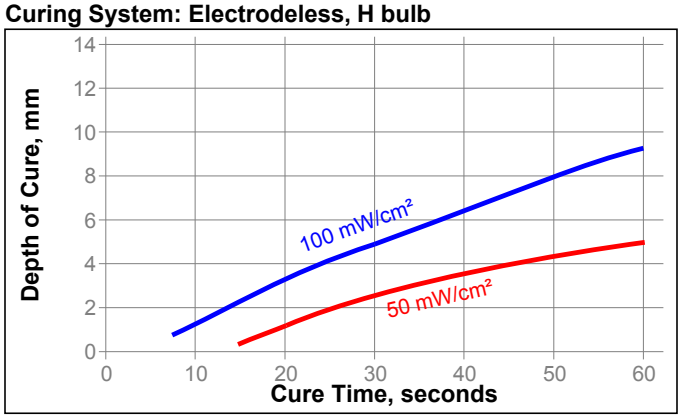
Curing System: Metal Halide (Doped)



Curing System: Electrodeless, D bulb



Curing System: Electrodeless, H bulb



TYPICAL PROPERTIES OF CURED MATERIAL

Cured @ 30 mW/cm² , measured @ 365 nm, for 80 seconds using a glass filtered metal halide light source

Physical Properties:

Shore Durometer D Hardness, ISO		868, 59
Refractive Index		1.5
Water Absorption, ISO 62, %:		
2 hours in boiling water		2.61
Elongation, at break, ISO 527-3, %		265
Tensile Modulus, ISO 527-3	N/mm² (psi)	297 (43,000)
Tensile Strength, at break, ISO 527-3	N/mm² (psi)	18 (2,600)

Electrical Properties:

Dielectric Constant / Dissipation Factor, IEC 60250:	
100 Hz	5.39 / 0.05
1 kHz	5.23 / 0.02
1 MHz	4.86 / 0.04
Volume Resistivity, IEC 60093, Ω·cm	8.7×10^{14}
Surface Resistivity, IEC 60093, Ω·cm	9.0×10^{14}
Dielectric Breakdown Strength, , kV/mm	25

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured @ 30 mW/cm² , measured @ 365 nm, for 80 seconds using a metal halide light source, (samples with 0.5 mm gap).

Lap Shear Strength, ISO 4587:

Polycarbonate	N/mm² (psi)	11.7 (1,700)

TYPICAL ENVIRONMENTAL RESISTANCE

Cured @ 30 mW/cm² , measured @ 365 nm, for 80 seconds using a metal halide light source, (samples with 0.5 mm gap).

Lap Shear Strength, ISO 4587:

Polycarbonate

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength		
Environment	**°C**	**2 h**	**24 h**	**170 h**
Boiling water	100	75	--------	--------
Water immersion	49	--------	--------	60
Isopropanol immersion	22	--------	95	--------
Heat/humidity	38	--------	--------	80

Heat Aging

Aged at temperature indicated and tested @ 22 °C

Lap Shear Strength, ISO 4587, % of initial strength:

Polycarbonate:

Aged @ 71 °C for 170 hours	100
Aged @ 71 °C for 340 hours	100
Aged @ 93 °C for 170 hours	100
Aged @ 93 °C for 340 hours	100
Aged @ 121 °C for 170 hours	75
Aged @ 121 °C for 340 hours	50

Effects of Sterilization

In general, products similiar in composition to LOCTITE® AA 3201™ subjected to standard sterilization methods, such as EtO and Gamma Radiation (25 to 50 kiloGrays cumulative) show excellent bond strength retention. LOCTITE® AA 3201™ maintains bond strength after 1 cycle of steam autoclave. It is recommended that customers test specific parts after subjecting them to the preferred sterilization method. Consult with Loctite® for a product recommendation if your device will see more than 3 sterilization cycles.

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 Safety Data Sheet (SDS).

Directions for use:

1. This product is light sensitive; exposure to daylight, UV light and artificial lighting should be kept to a minimum during storage and handling.
2. The product should be dispensed from applicators with black feedlines.
3. For best performance bond surfaces should be clean and free from grease.
4. 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.
5. 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 the same intensity.
6. For dry curing of exposed surfaces, higher intensity UV is required (100 mW/cm²).

7. Cooling should be provided for temperature sensitive substrates such as thermoplastics.
8. Plastic grades should be checked for risk of stress cracking when exposed to liquid adhesive.
9. Excess uncured adhesive can be wiped away with organic solvent (e.g. Acetone).
10. Bonds should be allowed to cool before subjecting to any service loads.

Loctite Material Specification[LMS]
LMS dated September 1, 1995. Test reports for each batch are available for the indicated properties. LMS test reports include selected QC test parameters considered appropriate to specifications for customer use. Additionally, comprehensive controls are in place to assure product quality and consistency. Special customer specification requirements may be coordinated through Henkel Quality.

Storage
Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.
Optimal Storage: 8 °C to 21 °C. Storage below 8 °C or greater than 28 °C can adversely affect product properties. Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

Conversions
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

Note:
The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.
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Reference 1.1

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