Technical Data Sheet

# LOCTITE® AA 3311™

September 2024

## Product description

LOCTITE® AA 3311™ provides the following product characteristics:

| | |
|---|---|
| **Technology** | Acrylic |
| Chemical type | Acrylated urethane |
| Appearance (uncured) | Transparent liquid |
| Components | One component - requires no mixing |
| Viscosity | Low |
| Flexibility | Enhances load bearing & shock absorbing characteristics of the bond area. |
| **Cure** | Ultraviolet (UV)/ visible light |
| **Application** | Bonding |
| Specific benefits | Production - high speed curing |

LOCTITE® AA 3311™ is primarily designed for bonding rigid or flexible PVC to polycarbonate, while not inducing stress cracking under typical molded stress levels. It enables easy assembly of components with close fitting tolerances (i.e. joining polycarbonate to flexible PVC tubing), and is recommended for applications involving small gaps less than 0.25mm. It has also shown excellent adhesion to a wide variety of substrates including glass, many plastics and most metals. Suitable for use in the assembly of **disposable medical devices**.

## ISO-10993

LOCTITE® AA 3311™ has been tested to Henkel's test protocols based on ISO-10993 biocompatibility standards, as a means to assist in the selection of products for use in the medical device industry.

## Typical properties of uncured material

| | |
|---|---|
| Specific Gravity @ 25°C | 1.1 |
| Viscosity, Brookfield - RVT, 25°C, mPa·s (cP) | |
| Spindle 1, Speed 20 rpm | 300 |

## Typical curing performance

LOCTITE® AA 3311™ 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 and depth 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: | |
| 7 N/mm$^2$ stress on bar | 15 |
| 12 N/mm$^2$ stress on bar | 4 |

## 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: | |
| LED flood light, CL42: | |
| 514 mW/cm$^2$, measured @ 405nm | 5 |
| 100 mW/cm$^2$, measured @ 365nm | 5 |
| UV Fixture Time, Glass microscope slides, seconds: | |
| Black light, Zeta® 7500 light source: | |
| 6 mW/cm$^2$, measured @ 365nm | 15 |
| UV Fixture time, Polycarbonate, seconds: | |
| Metal halide bulb (doped): | |
| 30 mW/cm$^2$, measured @ 365nm | 5 |
| Electrodeless, H & V bulbs: | |
| 50 mW/cm$^2$, measured @ 365nm | 5 |
| Electrodeless, D bulb: | |
| 50 mW/cm$^2$, measured @ 365nm | 5 |

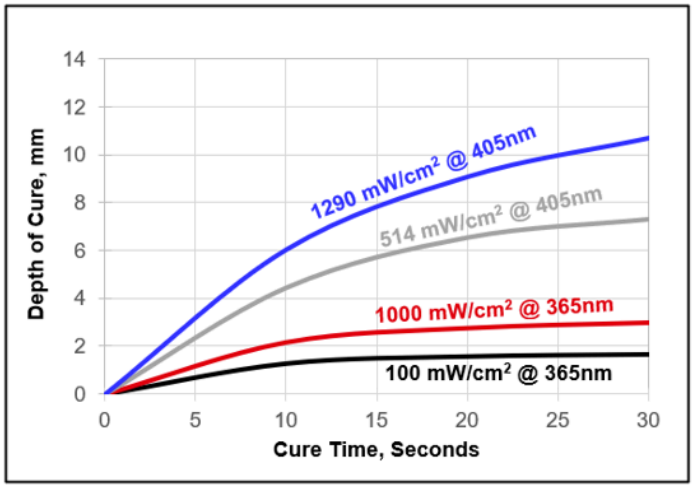
## Tack free time

Tack free time is the time required to achieve a tack free surface.

Tack free time, seconds:

| | |
|---|---|
| LED flood light, CL42: | |
| 514 mW/cm$^2$, measured @ 405nm | 60 |
| 1290 mW/cm$^2$, measured @ 405nm | 60 |
| 100 mW/cm$^2$, measured @ 365nm | 60 |
| 1000 mW/cm$^2$, measured @ 365nm | 60 |

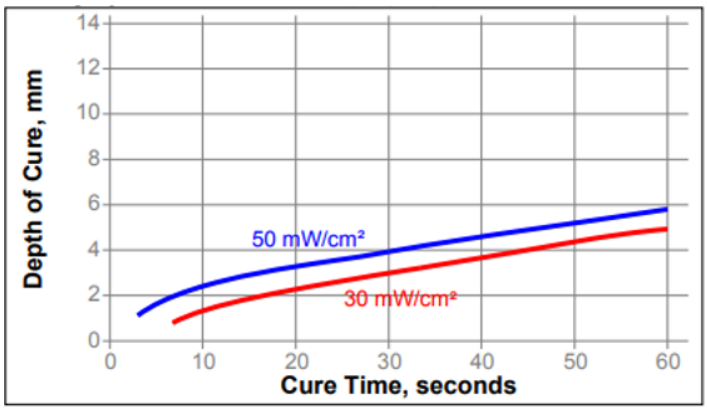
**Depth of cure vs. irradiance (LED)**
The graph below shows the increase in depth of cure with time at various light intensities as measured from the thickness of the cured product formed.



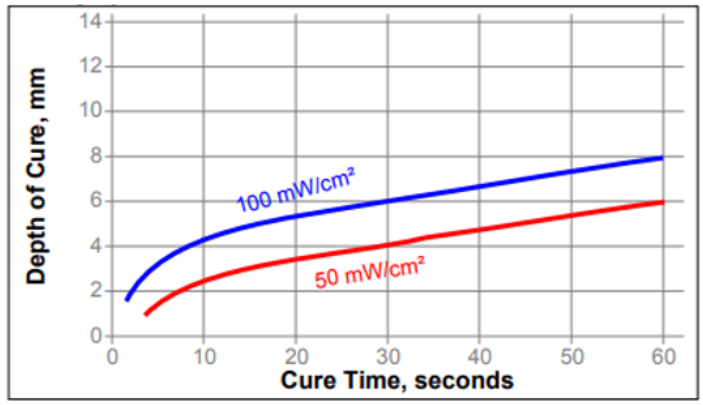

**Depth of cure vs. irradiance (365 nm)**
The graph below shows the increase in depth of cure with time at 30 $mW/cm^2$ – 100 $mW/cm^2$ as measured from the thickness of the cured product formed in a 9.5mm diameter PTFE die.

**Note:**
When exposed to a V Bulb at irradiances of 50 and 100 $mW/cm^2$ for 30 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.

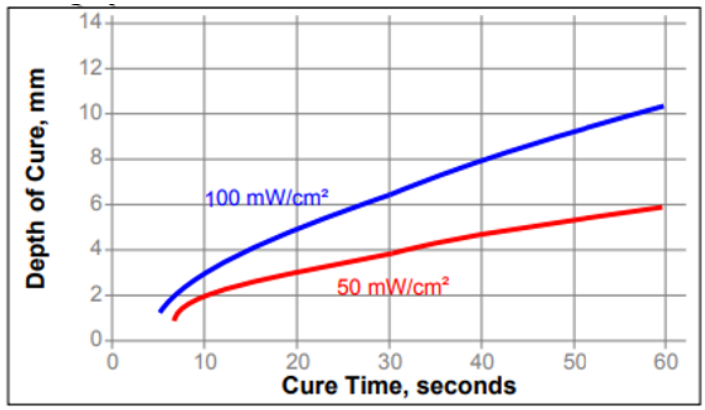
**Curing system: metal halide (doped)**




**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 Hardness, ISO 868, Durometer D | | 64 |
| Refractive index | | 1.5 |
| Water Absorption, ISO 62, %<br>2 hours in boiling water | | 5.36 |
| Elongation, at break, ISO 527-3, % | | 265 |
| Tensile strength at break, ISO 527-3 | $N/mm^2$ (psi) | 23 (3,300) |
| Tensile modulus, ISO 527-3 | $N/mm^2$ (psi) | 669 (97,000) |

**Electrical properties:**

| | |
|---|---|
| Dielectric constant/dissipation factor, IEC 60250: | |
| 100Hz | 4.56 / 0.05 |
| 1kHz | 4.41 / 0.02 |
| 1MHz | 4.02 / 0.03 |
| Dielectric breakdown strength, kV/mm | 31 |
| Surface resistivity, IEC 60093, Ω | $1.0\times10^{15}$ |
| Volume resistivity, IEC 60093, Ω·cm | $8.4\times10^{14}$ |

## Adhesive properties

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

Lap shear strength:

Polycarbonate

| | | |
|---|---|---|
| 0.5mm gap | $N/mm^2$ (psi) | *5.2 (750) |

* Substrate failure

## Typical environmental resistance

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

Lap shear strength:

Polycarbonate

0.5mm gap

## Heat aging

Lap shear strength, % 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 |

* Substrate failure

## Chemical/solvent resistance

Aged under conditions indicated and tested @ 23°C.

| | | % of initial strength | | |
|---|---|---|---|---|
| **Environment** | °C | 2 h | 24 h | 170 h |
| Boiling water | 100 | * 100 | | |
| Water immersion | 49 | | | * 100 |
| Isopropanol immersion | 21 | | * 100 | |
| Heat/humidity | 38 | | | * 100 |

## Effects of sterilization

In general, products similiar in composition to LOCTITE® AA 3311™ subjected to standard sterilization methods, such as EtO and Gamma Radiation (25 to 50 kiloGrays cumulative) show excellent bond strength retention. LOCTITE® AA 3311™ 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 Material Safety Data Sheet.**

## 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 transmission of the substrate through which the radiation must pass.
5. Cooling should be provided for temperature sensitive substrates such as thermoplastics.
6. Plastic grades should be checked for risk of stress cracking when exposed to liquid adhesive.
7. Excess uncured adhesive can be wiped away with organic solvent (e.g. Acetone).
8. Bonds should be allowed to cool before subjecting to any service loads.

## 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 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 Henkel representative.

## Product specification

The technical data contained herein are intended as reference only and are not considered specifications for the product. Product specifications are located on the Certificate of Analysis or please contact Henkel representative.

## Approval and certificate

Please contact Henkel representative for related approval or certificate of this product

## Data ranges

The data contained herein may be reported as a typical value. Values are based on actual test data and are verified on a periodic basis.
Temperature/Humidity Ranges: 23°C / 50% RH = 23±2°C / 50±5% RH

## 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

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