# LOCTITE® 5031™

November 2006

## PRODUCT DESCRIPTION

LOCTITE® 5031™ provides the following product characteristics:

| | |
|---|---|
| **Technology** | Silicone |
| Chemical Type | Acetoxy dual cure silicone |
| Appearance (uncured) | Light yellow, translucent liquid[LMS] |
| Fluorescence | Positive under UV light[LMS] |
| Components | One component - requires no mixing |
| **Cure** | Ultraviolet (UV)/ visible light |
| Secondary Cure | Moisture for shadowed areas |
| **Application** | Potting, Coating or Sealing |
| Self-leveling | Uniform cavity fill |

LOCTITE® 5031™ is a flowable sealant with the benefit of deep light cure capability, ultraviolet and visible, combined with a secondary moisture cure mechanism for shadow curing. Upon exposure to sufficient UV light, visible light or atmospheric moisture, this product forms a medium strength, flexible rubber sealant.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

| | |
|---|---|
| Specific Gravity @ 25 °C | 1.0 |
| Solids/Non-Volatile Content, % | 96.9 |
| Aspect Ratio @ 60 seconds, Height/Width | 0.1 |
| Flash Point - See MSDS | |
| Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP): | |
| Spindle 3, speed 10 rpm | 4,000 to 7,500[LMS] |

## TYPICAL CURING PERFORMANCE

Normal processing conditions will include exposure to sufficient UV light irradiance to effectively cure the material. Surface and/or atmospheric moisture will promote the cure of material in shadowed regions. Although functional strength is developed almost instantly due to the UV curing nature of LOCTITE® 5031™, increased cure properties are developed during 72 hours at ambient conditions.

### Surface Cure

### Skin Over Time

Skin over time is the time the surface of the adhesive forms a skin upon exposure to atmospheric moisture at 25 ± 2 °C, 50 ± 5% RH.

| | |
|---|---|
| Skin Over Time, minutes: | |
| Cured @ 23 °C | ≤20[LMS] |

### Tack Free Time

Tack Free Time is the time required to achieve a tack free surface

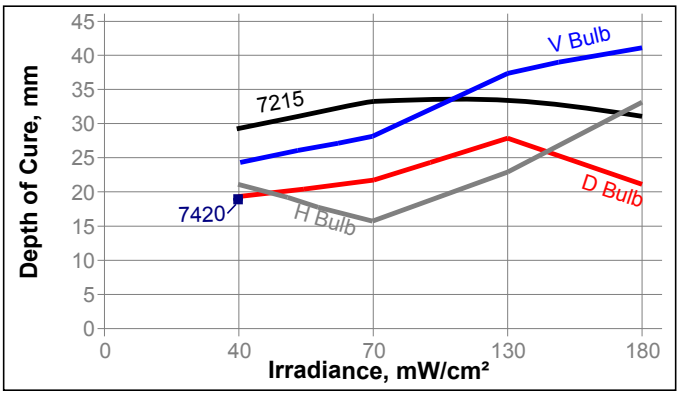
| | |
|---|---|
| Tack Free Time, ASTM C679, seconds: | |
| 70 mW/cm² , measured @ 365 nm | ≤20 |

### Depth of Cure

| | |
|---|---|
| Depth of cure, mm: | |
| 90 seconds @ 70 mW/cm² , measured @ 365 nm | ≥20[LMS] |

### Depth of Cure (light)

Rapid depth of cure can be attained with focused UV and/or visible light. The following graph shows the cure response of some typical light sources as a function of irradiance after 60 seconds. The following data table shows the depth of cure obtained upon exposure to different light sources and intensities over time.

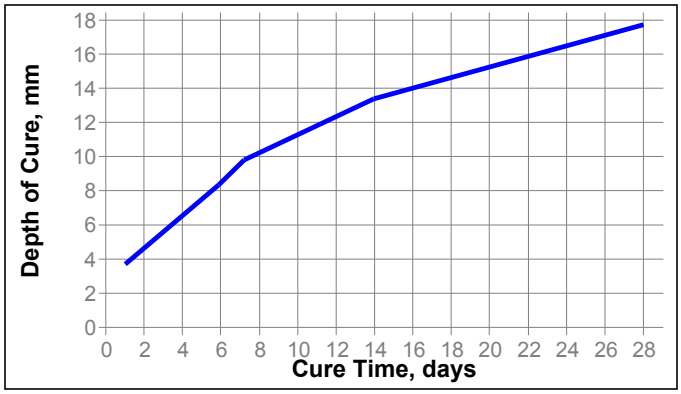



| Light Source | Irradiance UV/VIS | Depth of Cure, mm 30 sec. | 60 sec. | 90 sec. |
|---|---|---|---|---|
| 7411 UV (metal halide) | 179/58 | 7.4 | 23.2 | 31.1 |
| 7411 V (visible enhanced metal halide) | 40/98 | 8.2 | 20.2 | 23.4 |
| 7215 (300-watt medium pressure Hg arc) | 75/95 | 23.3 | 33.2 | 40.7 |
| Electrodeless V bulb | 71/124 | 16.8 | 27.9 | 39.2 |
| Electrodeless D bulb | 76/50 | 10.1 | 22.2 | 33.4 |
| Electrodeless H bulb | 71/68 | 4.6 | 15.8 | 23.9 |
| Electrodeless H+ bulb | 74/64 | 8.5 | 20.9 | 28.0 |
| 7735 (50-watt high pressure Hg arc) | 890/410 | --- | 13.3 | 17.2 |
| 7740 (100-watt high pressure Hg arc) | 797/414 | 2.5 | 14.3 | 17.2 |
| 7760 (200-watt high pressure Hg arc) | 1,146/459 | --- | 9.2 | 12.8 |
| 7700 (LED) | 12/31 | --- | 8.0 | 13.4 |
| 7420 (visible arc lamp) | 20/40 | 8.0 | --- | 26.7 |
| 7500 (fluorescent lamp) | 40/0 | --- | 2.1 | 4.2 |

*Note: Irradiance measured with 7011-A (UV) & 7011-V (VIS) dosimeters*

### Depth of Cure (moisture only)

Moisture cure of shadowed areas rely on surface and/or atmospheric moisture to effect cure. The typical depth of cure from moisture only versus time (days) at 25 °C and 50% relative humidity is shown in the graph below.




## TYPICAL PROPERTIES OF CURED MATERIAL

Cured @ 70 mW/cm² , measured @ 365 nm, for 60 seconds per side , followed by 72 hours @ 23 °C / 50% RH

**Physical Properties**:

| | | |
|---|---|---|
| Coefficient of Thermal Expansion, ISO 11359-2, $K^{-1}$ | | $354\times10^{-6}$ |
| Water Vapor Trans. Rate, ASTM E96, g/(h·m² ) | | 3.03 |
| Water Absorption, ISO 62, %: | | |
| 24 hours in water @ 23 °C | | 0.15 |
| Volume Shrinkage, ASTM D 792, % | | 0.32 |
| Linear Shrinkage, ASTM D 792, % | | 0.11 |
| Shore Hardness, ISO 868, Durometer A | | 28 to 40[LMS] |
| Elongation, at break, ISO 37, % | | ≥60[LMS] |
| Tensile Strength, ISO 37 | N/mm² (psi) | ≥0.55[LMS] (≥79) |
| Tear Strength, ISO 34-1 , Die C | N/mm (lb./in.) | 1.7 (9.7) |
| Gas Permeability, ASTM D1434, cm² /sec/atm: | | |
| Oxygen | | $6.37\times10^{-6}$ |
| Hydrogen | | $6.76\times10^{-6}$ |
| Carbon Dioxide | | $3.45\times10^{-5}$ |

**Electrical Properties**:

| | |
|---|---|
| Volume Resistivity, IEC 60093, Ω·cm | $2.5\times10^{14}$ |
| Dielectric Breakdown Strength, IEC 60243-1, kV/mm | 20.3 |
| Dielectric Constant / Dissipation Factor, IEC 60250: | |
| 1 kHz | 2.85 / 0.008 |
| 1 MHz | 2.85 / 0.005 |

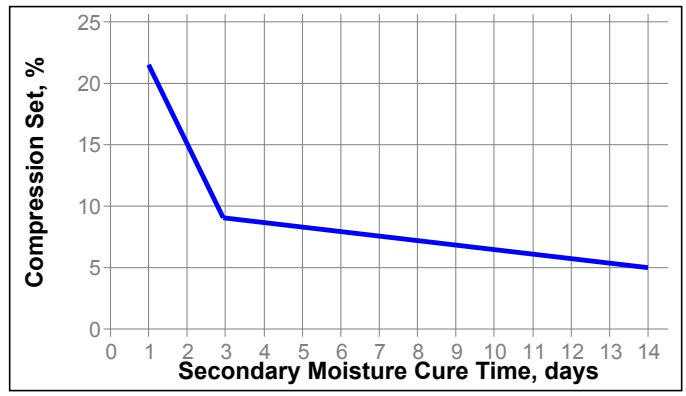
Cured @ 70 mW/cm² , measured @ 365 nm, for 60 seconds per side, followed by 14 days @ 23 °C / 50% RH

**Physical Properties**:

| | |
|---|---|
| Compression Set, ASTM D 395, Method B, %: | |
| Aged @ 22 °C for 70 hours | 4.7 |
| Aged @ 70 °C for 22 hours | 9.0 |
| Aged @ 121 °C for 22 hours | 29.1 |
| Aged @ 150°C for 22 hours | 45.4 |

A comparison of the compression set versus moisture cure condition is shown in the graph below.

Cured @ 70 mW/cm² , measured @ 365 nm, for 60 seconds
Compression set measured after being aged @ 22 °C for 70 hours




## TYPICAL PERFORMANCE OF CURED MATERIAL

**Adhesive Properties**

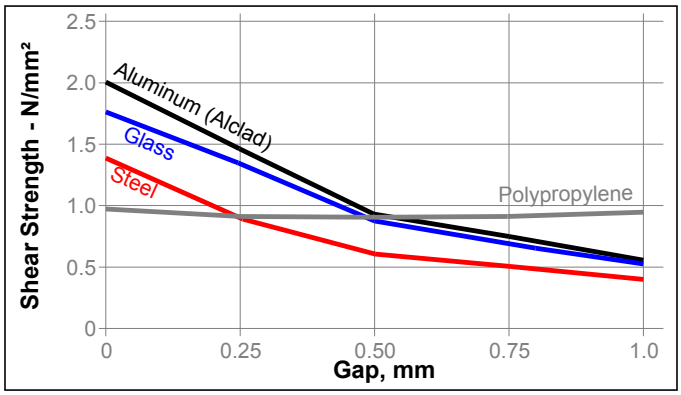
Cured @ 70 mW/cm² , measured @ 365 nm, for 60 seconds followed by 72 hours @ 23 °C / 50% RH, (Isopropyl alcohol wiped substrates)

Lap Shear Strength, ISO 4587:

| | | |
|---|---|---|
| Aluminum (Alclad) to Glass | N/mm² (psi) | 2.0 (295) |
| Steel to Glass | N/mm² (psi) | 1.3 (180) |
| Glass to Glass | N/mm² (psi) | 2.1 (305) |
| Polycarbonate to Polycarbonate | N/mm² (psi) | 0.1 (10) |
| Polycarbonate to Glass | N/mm² (psi) | 0.5 (65) |
| Polycarbonate to Aluminum | N/mm² (psi) | 0.2 (25) |
| Polycarbonate to Steel | N/mm² (psi) | 0.5 (70) |
| PVC to Glass | N/mm² (psi) | 0.8 (120) |
| PVC to Polycarbonate | N/mm² (psi) | 0.4 (55) |
| Polybutylene Terephthalate (PBT) to Glass | N/mm² (psi) | 0.8 (115) |
| Polybutylene Terephthalate (PBT) to Polycarbonate | N/mm² (psi) | 0.2 (30) |
| ABS to Glass | N/mm² (psi) | 0.4 (55) |
| ABS to Polycarbonate | N/mm² (psi) | 0.3 (40) |
| Nylon to Glass | N/mm² (psi) | 0.5 (75) |
| Nylon to Polycarbonate | N/mm² (psi) | 0.1 (15) |

### Shear Strength vs. Gap Thickness

Cured @ 70 mW/cm² , measured @ 365 nm, for 60 seconds followed by 7 days @ 23 °C / 50% RH




### TYPICAL ENVIRONMENTAL RESISTANCE

Cured @ 70 mW/cm² , measured @ 365 nm, for 60 seconds per side , followed by 7 days @ 23 °C / 50% RH

### Heat Aging

Aged at temperature indicated and tested @ 22 °C

| | |
|---|---|
| Aged @ 177 °C for 168 hours: | |
| Change in Durometer, Points (Initial = 36) | -8 |
| Change in Tensile Strength, % | -6.3 |
| Change in Elongation, % | 17.9 |
| Weight Loss, % | -3.4 |
| Aged @ 233 °C for 168 hours: | |
| Change in Durometer, Points (Initial = 36) | 24 |
| Change in Tensile Strength, % | 60.9 |
| Change in Elongation, % | -66.2 |
| Weight Loss, % | -3.3 |

### Typical Fluid Immersion Properties

| | |
|---|---|
| Aged @ 100 °C for 168 hours: | |
| Ethylene glycol/water, 50:50: | |
| Change in Durometer, Points (Initial = 36) | -14 |
| Change in Tensile Strength, % | -42.6 |
| Change in Elongation, % | 25.1 |
| Volume Swell, % | -1.5 |
| Propylene glycol/water (Dex-Cool® ), 50:50: | |
| Change in Durometer, Points (Initial = 36) | -16 |
| Change in Tensile Strength, % | -28.8 |
| Change in Elongation, % | 42.3 |
| Volume Swell, % | -1.9 |
| Aged @ 150 °C for 70 hours: | |
| ASTM IRM 903 oil: | |
| Change in Durometer, Points (Initial = 36) | -20 |
| Change in Tensile Strength, % | -26.0 |
| Change in Elongation, % | 13.8 |
| Volume Swell, % | 47.4 |
| Aged @ 150 °C for 168 hours: | |
| 5W30 oil: | |
| Change in Durometer, Points (Initial = 36) | -31 |
| Change in Tensile Strength, % | -55.3 |
| Change in Elongation, % | 20.3 |
| Volume Swell, % | 24.9 |
| ASTM IRM 901 oil: | |
| Change in Durometer, Points (Initial = 36) | -21 |
| Change in Tensile Strength, % | 30.6 |
| Change in Elongation, % | 325 |
| Volume Swell, % | 5.9 |
| ASTM IRM 902 oil: | |
| Change in Durometer, Points (Initial = 36) | -13 |
| Change in Tensile Strength, % | -16.1 |
| Change in Elongation, % | 23.4 |
| Volume Swell, % | 8.3 |
| ATF (Dexron® III): | |
| Change in Durometer, Points (Initial = 36) | -31 |
| Change in Tensile Strength, % | -61.0 |
| Change in Elongation, % | 93.9 |
| Volume Swell, % | 23.2 |

### 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

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. The product is designed to be initially cured by UV/visible light at a minimum irradiance of 30 mW/cm2 for approximately 20 seconds, increased exposure may be required for curing deeper sections.
5. Functional strength is achieved almost instantly.
6. Full performance properties will develop over 72 hours.
7. Moisture curing begins immediately after the product is exposed to the atmosphere, therefore parts to be assembled should be mated within a few minutes after the product is dispensed.
8. Excess material can be easily wiped away with non-polar solvents.

### Loctite Material Specification[LMS]

LMS dated May 17, 2005. 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

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Reference 1.1