



LOCTITE® 638

May 2004

PRODUCT DESCRIPTION

LOCTITE® 638 provides the following product characteristics:

| | |
|-----------------------------|--|
| Technology | Acrylic |
| Chemical Type | Urethane methacrylate |
| Appearance (uncured) | Green liquid ^{LMS} |
| Fluorescence | Positive under UV light ^{LMS} |
| Components | One component - requires no mixing |
| Viscosity | High |
| Cure | Anaerobic |
| Secondary Cure | Activator |
| Application | Retaining |
| Strength | High |

LOCTITE® 638 is designed for the bonding of cylindrical fitting parts, particularly where bond gaps can approach 0.25 mm (0.01 in.) and where maximum strength at room temperature is required. The product cures when confined in the absence of air between close fitting metal surfaces and prevents loosening and leakage from shock and vibration. Typical applications include locking bushings and sleeves into housings and on shafts.

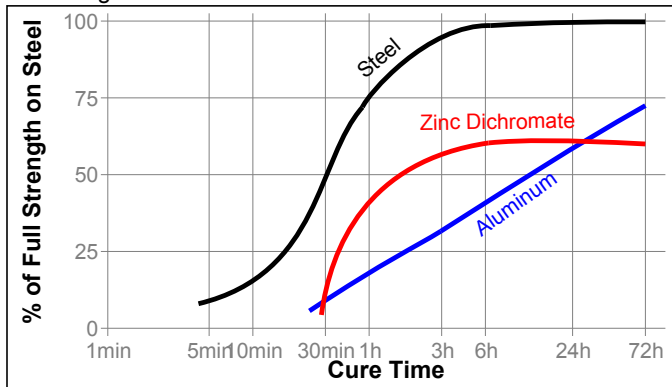
TYPICAL PROPERTIES OF UNCURED MATERIAL

| | |
|---|-------------------------------|
| Specific Gravity @ 25 °C | 1.09 |
| Flash Point - See MSDS | |
| Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP): | |
| Spindle 3, speed 20 rpm | 2,000 to 3,000 ^{LMS} |
| Viscosity, EN 12092 - MV, 25 °C, after 180 s, mPa·s (cP): | |
| Shear rate 129 s ⁻¹ | 1,500 to 3,000 |

TYPICAL CURING PERFORMANCE

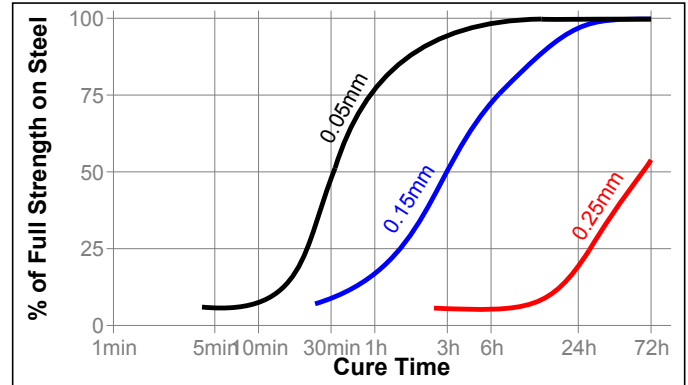
Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The graph below shows the shear strength developed with time on steel pins and collars compared to different materials and tested according to ISO 10123.



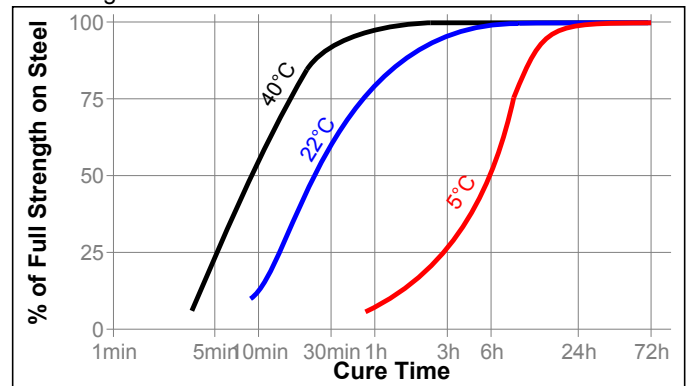
Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. The following graph shows shear strength developed with time on steel pins and collars at different controlled gaps and tested according to ISO 10123.



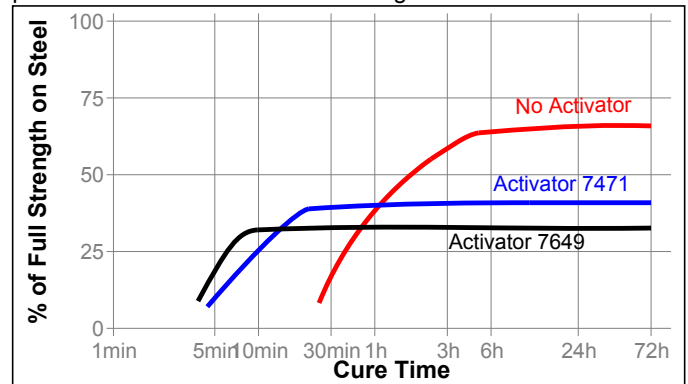
Cure Speed vs. Temperature

The rate of cure will depend on the temperature. The graph below shows the shear strength developed with time at different temperatures on steel pins and collars and tested according to ISO 10123.



Cure Speed vs. Activator

Where cure speed is unacceptably long, or large gaps are present, applying activator to the surface will improve cure speed. The graph below shows shear strength developed with time using Activator 7471 and 7649 on Zinc Dichromate steel pins and collars and tested according to ISO 10123.



TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties:

| | |
|---|---------------------|
| Coefficient of Thermal Expansion, ASTM D 696, K ⁻¹ | 80×10 ⁻⁶ |
| Coefficient of Thermal Conductivity, W/(m·K) | 0.10 |
| Specific Heat, kJ/(kg·K) | 0.30 |

TYPICAL PERFORMANCE OF CURED MATERIAL**Adhesive Properties**

After 24 hours @ 22 °C

Compressive Shear Strength, ISO 10123:

| | | |
|------------------------|-------------------|--------------------|
| Steel pins and collars | N/mm ² | ≥25 ^{LMS} |
| | (psi) | (3,625) |

After 15 minutes @ 22 °C

Compressive Shear Strength, ISO 10123:

| | | |
|------------------------|-------------------|-----------------------|
| Steel pins and collars | N/mm ² | ≥13.50 ^{LMS} |
| | (psi) | (1,960) |

TYPICAL ENVIRONMENTAL RESISTANCE

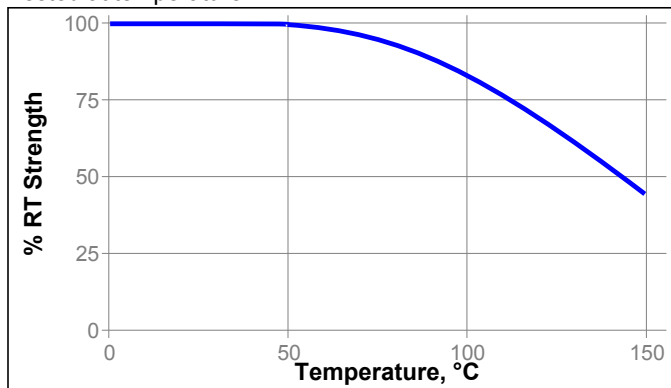
Cured for 1 week @ 22 °C

Compressive Shear Strength, ISO 10123:

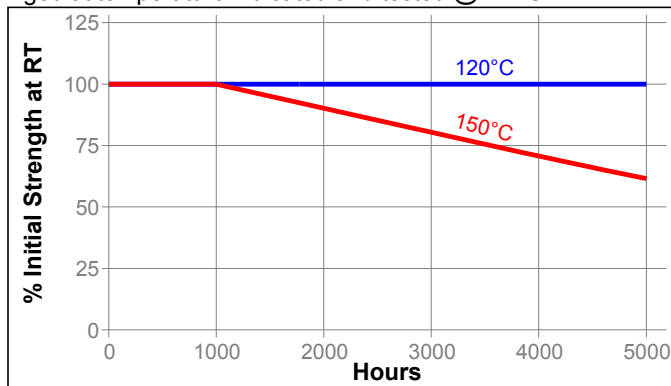
Steel pins and collars

Hot Strength

Tested at temperature

**Heat Aging**

Aged at temperature indicated and tested @ 22 °C

**Chemical/Solvent Resistance**

Aged under conditions indicated and tested @ 22 °C.

| Environment | °C | % of initial strength | | |
|--------------------|-----|-----------------------|--------|---------|
| | | 100 hr | 500 hr | 1000 hr |
| Motor Oil | 125 | 100 | 100 | 100 |
| Unleaded Petrol | 22 | 100 | 90 | 85 |
| Brake fluid | 22 | 100 | 90 | 80 |
| Water Glycol 50/50 | 87 | 95 | 80 | 80 |
| Ethanol | 22 | 100 | 100 | 75 |
| Acetone | 22 | 90 | 90 | 90 |

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).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

This product is not normally recommended for use on plastics (particularly thermoplastic materials where stress cracking of the plastic could result). Users are recommended to confirm compatibility of the product with such substrates.

Directions for use**For Assembly**

- For best results, clean all surfaces (external and internal) with a Loctite cleaning solvent and allow to dry.
- If the material is an inactive metal or the cure speed is to slow, spray with Activator 7471 or 7649 and allow to dry.
- For Slip Fitted Assemblies**, apply adhesive around the leading edge of the pin and the inside of the collar and use a rotating motion during assembly to ensure good coverage.
- For Press Fitted Assemblies**, apply adhesive thoroughly to both bond surfaces and assemble at high press on rates.
- For Shrink Fitted Assemblies** the adhesive should be coated onto the pin, the collar should then be heated to create sufficient clearance for free assembly.
- Parts should not be disturbed until sufficient handling strength is achieved.

For Disassembly

- Apply localized heat to the assembly to approximately 250 °C. Disassemble while hot.

For Cleanup

- Cured product can be removed with a combination of soaking in a Loctite solvent and mechanical abrasion such as a wire brush.

Loctite Material Specification^{LMS}

LMS dated September 01, 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 Loctite 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

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$

$\text{kV/mm} \times 25.4 = \text{V/mil}$

$\text{mm} / 25.4 = \text{inches}$

$\text{N} \times 0.225 = \text{lb}$

$\text{N/mm} \times 5.71 = \text{lb/in}$

$\text{N/mm}^2 \times 145 = \text{psi}$

$\text{MPa} \times 145 = \text{psi}$

$\text{N}\cdot\text{m} \times 8.851 = \text{lb}\cdot\text{in}$

$\text{N}\cdot\text{mm} \times 0.142 = \text{oz}\cdot\text{in}$

$\text{mPa}\cdot\text{s} = \text{cP}$

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, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel 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 Henkel 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.

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Reference 0.2