

## LOCTITE® 211™

September 2008

### PRODUCT DESCRIPTION

LOCTITE® 211™ provides the following product characteristics:

|                                      |   |
|--------------------------------------|---|
| <b>Technology</b>                    | Acrylic                                       |
| <b>Chemical Type</b>                 | Dimethacrylate                                |
| <b>Appearance</b>                    | Pink fluorescent opaque liquid <sup>LMS</sup> |
| <b>Viscosity</b>                     | Low   |
| <b>Cure</b>                          | Anaerobic                                     |
| <b>Application</b>                   | Coating                                       |
| <b>Recommended Gap</b>               | 0.1 mm  |
| <b>Maximum recommended bolt size</b> | M16   |

LOCTITE® 211™ is a preapplied coating for threaded fasteners and fittings. . During assembly microcapsules, which are contained within the coating, are crushed thereby releasing an active ingredient which initiates the curing process. The product prevents loosening through vibration and leakage of threaded fasteners.

### TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C 1.07

Flash Point - See SDS

Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):  
Spindle 6, speed 20 rpm, 20,000 to 40,000<sup>LMS</sup>

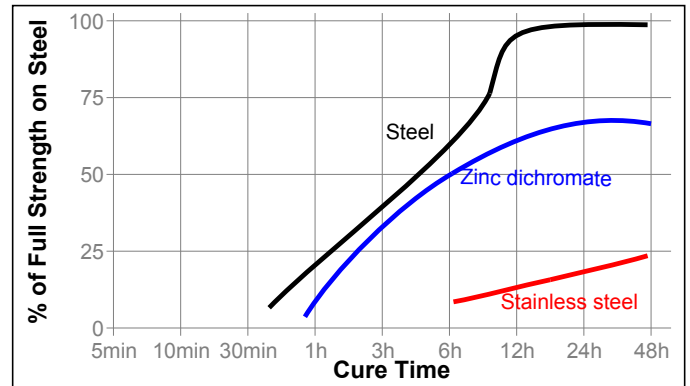
Vapour Pressure, hPa <2

### TYPICAL CURING PERFORMANCE

#### Cure Speed vs. Substrate

The graph below shows the breakaway strength developed with time on M10 black oxide bolts and steel nuts compared to different materials

The breakaway strength was determined according to ISO-10964

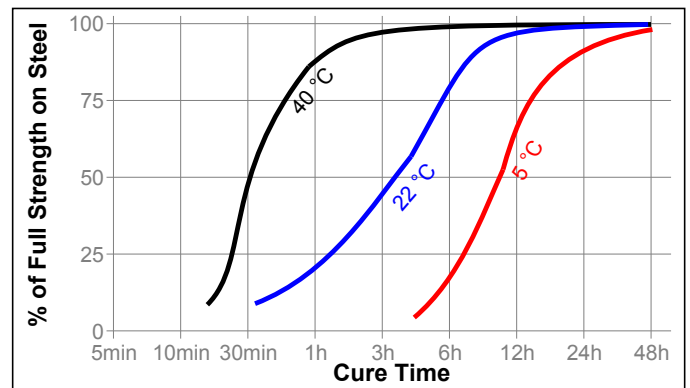


#### Cure Speed vs. Bond Gap

Large gaps should be avoided. Close fitting threads are required to crush the microcaps which are necessary for cure.

#### Cure Speed vs. Temperature

Tests were made on M10 black oxide bolts and steel nuts according to ISO 10964.



### TYPICAL PROPERTIES OF CURED MATERIAL

#### Physical Properties:

|  |                      |
|--|----------------------|
| Coefficient of Thermal Expansion, ISO 11359-2, K <sup>-1</sup> | 100×10 <sup>-6</sup> |
| Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)         | 0.1                  |
| Specific Heat, kJ/(kg·K)                                       | 0.3                  |

### TYPICAL PERFORMANCE OF CURED MATERIAL

Cured for 24 hours @ 22 °C.

**Prevail Torque, ISO 10964:**

M10 black oxide bolts and mild steel nuts (unseated) N·m ≥10<sup>LMS</sup> (lb.in.) (≥88.5)

**Breakaway Torque, ISO 10964:**

M10 black oxide bolts and mild steel nuts (unseated) N·m ≥8<sup>LMS</sup> (lb.in.) (≥71)

**Breakaway Torque, MIL-S-46163**

N·m 6 to 24 (lb.in.) (53 to 212)

**Prevail Torque, MIL-S-46163**

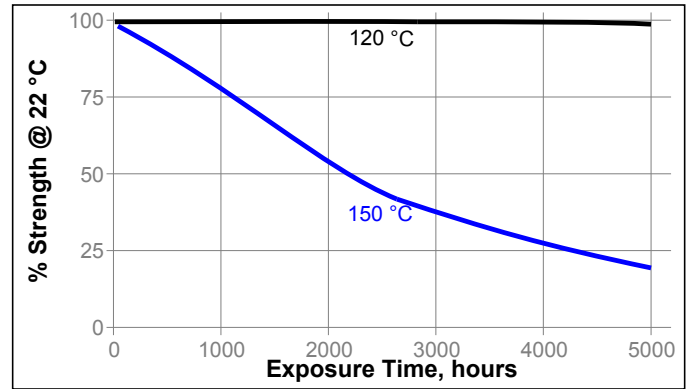
N·m 8 to 30 (lb.in.) (70 to 265)

**Breakloose Torque, DIN 54454**

N·m 20 to 40 (lb.in.) (177 to 354)

**Max. Prevail Torque, DIN 54454**

N·m 20 to 40 (lb.in.) (177 to 354)



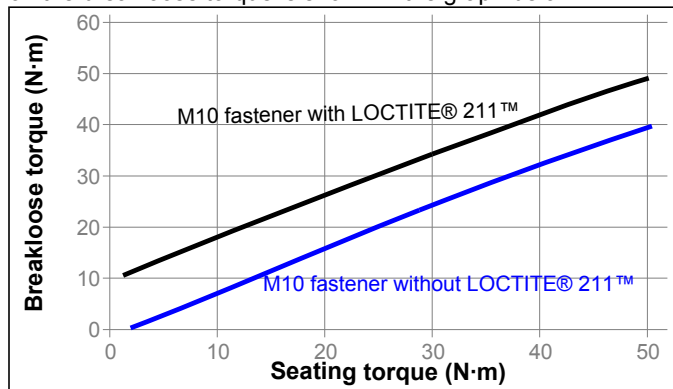
**Chemical/Solvent Resistance**

Cured for 168 hours @ 22 °C.

| Environment             | °C  | % of initial strength |       |        |
|-------------------------|-----|-----------------------|-------|--------|
|                         |     | 100 h                 | 500 h | 1000 h |
| Motor oil (MIL-L-46152) | 87  | 100                   | 100   | 100    |
| Motor oil (MIL-L-46152) | 125 | 100                   | 100   | 100    |
| Unleaded gasoline       | 22  | 100                   | 100   | 100    |
| Leaded Gasoline         | 22  | 100                   | 100   | 100    |
| Brake fluid             | 22  | 100                   | 100   | 100    |
| Ethanol                 | 22  | 100                   | 100   | 100    |
| 1,1,1 Trichloroethane   | 22  | 100                   | 100   | 100    |
| Water/glycol 50/50      | 87  | 100                   | 100   | 100    |

**Torque Augmentation**

Breakloose torque of an uncoated fastener will normally be 15 to 30% less than the on-torque. The effect of LOCTITE® 211™ on the breakloose torque is shown in the graph below.

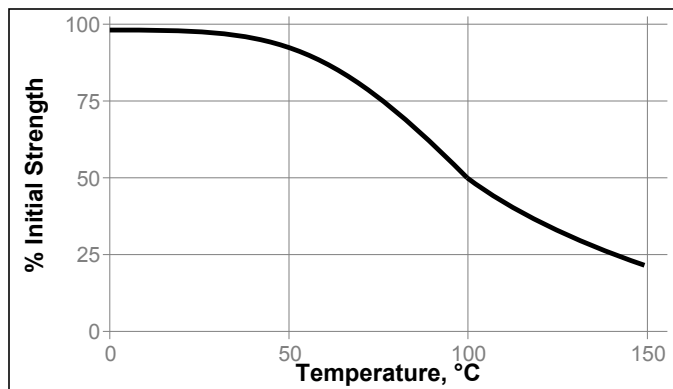


**TYPICAL ENVIRONMENTAL RESISTANCE**

Cured for 1 week @ 22 °C.

Breakloose Torque, DIN 54454:

M10 zinc phosphate steel nuts and bolts



**Heat Aging**

**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).

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:**

1. For best performance bond surfaces should be clean and free from grease.
2. Apply sufficient product to fill the threads in the area where the nut will be engaged on the bolt.
3. This product performs best in thin bond gaps (0.05 mm). Very large thread sizes may create large gaps which will affect cure speed and strength.
4. This product is designed to give controlled friction, (torque/tension ratio), during assembly. In critical tightening applications this ratio should be confirmed.

**Loctite Material Specification<sup>LMS</sup>**

LMS dated May 28, 1999. 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**

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

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

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

$\mu\text{m} / 25.4 = \text{mil}$

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

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

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

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

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

$\text{N}\cdot\text{m} \times 0.738 = \text{lb}\cdot\text{ft}$

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

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

**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 0.3