Technical Data Sheet

# LOCTITE® 414

November 2010

## PRODUCT DESCRIPTION

LOCTITE® 414 provides the following product characteristics:

| | |
|---|---|
| **Technology** | Cyanoacrylate |
| Chemical Type | Ethyl cyanoacrylate |
| Appearance (uncured) | Transparent, colorless to straw colored liquid[LMS] |
| Components | One part - requires no mixing |
| Viscosity | Low |
| **Cure** | Humidity |
| **Application** | Bonding |
| Key Substrates | Plastics, Rubbers and Metals |

LOCTITE® 414 is a general purpose cyanoacrylate instant adhesive.

### Commercial Item Description A-A-3097:

LOCTITE® 414 has been qualified to Commercial Item Description A-A-3097. **Note:** This is a regional approval. Please contact your local Technical Service Center for more information and clarification.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

| | |
|---|---|
| Specific Gravity @ 25 °C | 1.05 |
| Viscosity, Cone & Plate, mPa·s (cP): | |
| Temperature: 25 °C, Shear Rate: 3,000 $s^{-1}$ | 70 to 110[LMS] |
| Viscosity, Brookfield - LVF, 25 °C, mPa·s (cP): | |
| Spindle 1, speed 30 rpm | 100 to 150 |
| Flash Point - See SDS | |

## TYPICAL CURING PERFORMANCE

Under normal conditions, the atmospheric moisture initiates the curing process. Although full functional strength is developed in a relatively short time, curing continues for at least 24 hours before full chemical/solvent resistance is developed.

### Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The table below shows the fixture time achieved on different materials at 22 °C / 50 % relative humidity. This is defined as the time to develop a shear strength of 0.1 N/mm² .

| Fixture Time, seconds: | |
|---|---|
| Steel (degreased) | 15 to 30 |
| Aluminum | 2 to 10 |
| Neoprene | <5 |
| Rubber, nitrile | <5 |
| ABS | 2 to 10 |
| PVC | 2 to 10 |
| Polycarbonate | 15 to 50 |
| Phenolic | 5 to 15 |

### Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. Thin bond lines result in high cure speeds, increasing the bond gap will decrease the rate of cure.

### Cure Speed vs. Activator

Where cure speed is unacceptably long due to large gaps, applying activator to the surface will improve cure speed. However, this can reduce ultimate strength of the bond and therefore testing is recommended to confirm effect.

## TYPICAL PROPERTIES OF CURED MATERIAL

After 24 hours @ 22 °C

**Physical Properties**:

| | |
|---|---|
| Coefficient of Thermal Expansion, ISO 11359-2, $K^{-1}$ | $80\times10^{-6}$ |
| Coefficient of Thermal Conductivity, ISO 8302, W/(m·K) | 0.1 |
| Glass Transition Temperature, ASTM E 228, °C | 120 |

**Electrical Properties**:

| | |
|---|---|
| Dielectric Constant / Dissipation Factor, IEC 60250: | |
| 0.05 kHz | 2.3 / <0.02 |
| 1 kHz | 2.3 / <0.02 |
| 10 kHz | 2.3 / <0.02 |
| Volume Resistivity, IEC 60093, Ω·cm | $10\times10^{15}$ |
| Dielectric Breakdown Strength, IEC 60243-1, kV/mm | 25 |

## TYPICAL PERFORMANCE OF CURED MATERIAL

**Adhesive Properties**

After 24 hours @ 22 °C

| | | |
|---|---|---|
| Lap Shear Strength : | | |
| Steel (grit blasted) | N/mm² | 18 to 26 |
| | (psi) | (2,610 to 3,770) |
| Aluminum (etched) | N/mm² | 11 to 19 |
| | (psi) | (1,595 to 2,755) |
| ABS | N/mm² | >6 |
| | (psi) | (>870) |
| PVC | N/mm² | >4 |
| | (psi) | (>580) |
| Polycarbonate | N/mm² | >5 |
| | (psi) | (>725) |
| Phenolic | N/mm² | 5 to 15 |
| | (psi) | (725 to 2,175) |
| Neoprene | N/mm² | >10 |
| | (psi) | (>1,450) |
| Nitrile | N/mm² | >10 |
| | (psi) | (>1,450) |
| Tensile Strength, ISO 6922: | | |
| Steel (grit blasted) | N/mm² | 12 to 25 |
| | (psi) | (1,745 to 3,625) |

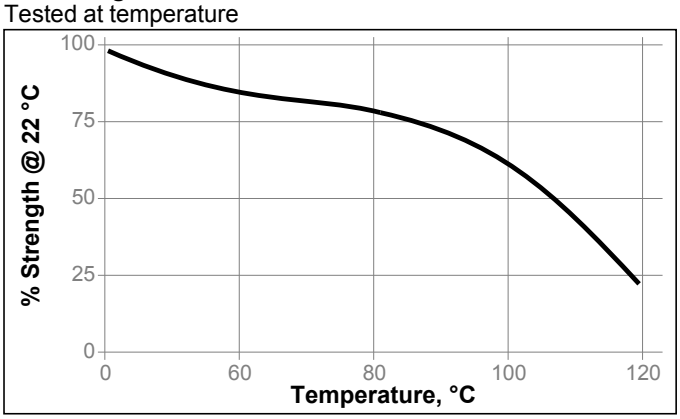
After 10 seconds @ 22 °C
Tensile Strength, ISO 6922:
Buna-N N/mm² ≥6.0[LMS]
(psi) (≥870)

## TYPICAL ENVIRONMENTAL RESISTANCE

Cured for 1 week @ 22 °C
Lap Shear Strength :
Mild Steel (grit blasted)

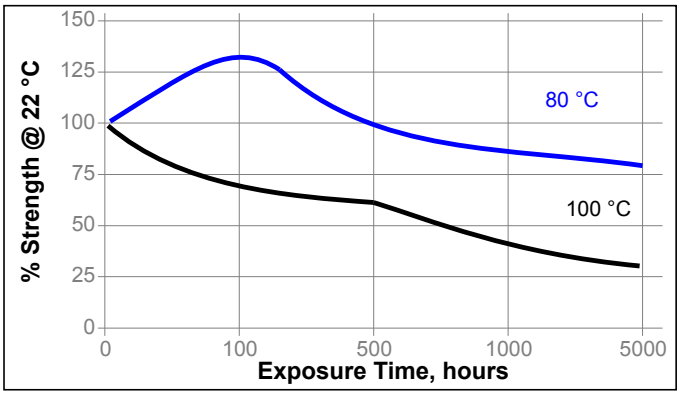
### Hot Strength

Tested at temperature




### Heat Aging

Aged at temperature indicated and tested @ 23 °C




### Chemical/Solvent Resistance

Aged under conditions indicated and tested @ °C

| | | % of initial strength | | |
|---|---|---|---|---|
| **Environment** | **°C** | **100 h** | **500 h** | **1000 h** |
| Motor oil (MIL-L-46152) | 40 | 100 | 100 | 95 |
| Gasoline | 22 | 100 | 100 | 100 |
| Isopropanol | 22 | 100 | 100 | 100 |
| Industrial methylated spirits | 22 | 100 | 100 | 100 |
| 1,1,1 Trichloroethane | 22 | 100 | 100 | 100 |
| Freon TA | 22 | 100 | 100 | 100 |
| Heat/humidity 95% RH | 40 | 80 | 75 | 65 |

## 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. For best performance bond surfaces should be clean and free from grease.
2. This product performs best in thin bond gaps (0.05 mm).
3. Excess adhesive can be dissolved with Loctite cleanup solvents, nitromethane or acetone.

### Loctite Material Specification[LMS]

LMS dated August 29, 2003. 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: 2 °C to 8 °C. Storage below 2 °C or greater than 8 °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 Henkel 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 1.2