LOCTITE® 401

February 2004

PRODUCT DESCRIPTION

LOCTITE® 401 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	Wood, Paper, Leather and Fabric

LOCTITE® 401 is designed for the assembly of difficult-to-bond materials which require uniform stress distribution and strong tension and/or shear strength. The product provides rapid bonding of a wide range of materials, including metals, plastics and elastomers. LOCTITE® 401 is particularly suited for bonding porous or absorbent materials such as wood, paper, leather and fabric.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.10
Flash Point - See MSDS	
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	90 to 140

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, ASTM D 1002/ EN 1465, seconds:

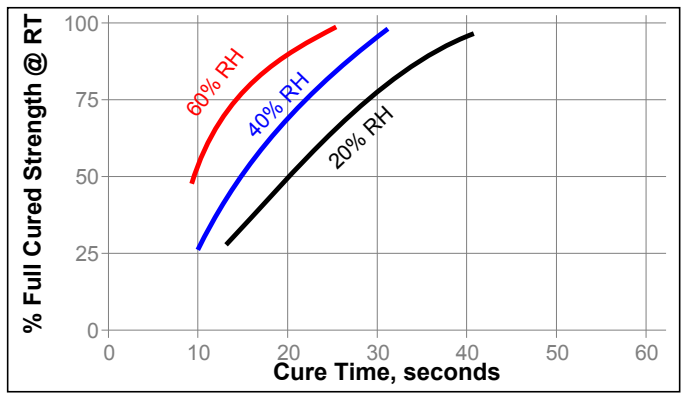
Steel (degreased)	5 to 20
Aluminum	2 to 10
Zinc Dichromate	10 to 20
Neoprene	<5
Rubber, Nitrile	<5
ABS	2 to 10
PVC	2 to 10
Polycarbonate	10 to 40
Phenolic	2 to 10
Wood (Balsa)	2 to 5
Wood (Oak)	90 to 180
Chipboard	30 to 90
Fabric	2 to 20
Leather	5 to 15
Paper	1 to 10

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. Humidity

The rate of cure will depend on the ambient relative humidity. The following graph shows the tensile strength developed with time on Buna N rubber at different levels of humidity.



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

Cured for 24 hours@ 22 °C.

Physical Properties:

Coefficient of Thermal Expansion, ASTM D 696, K^{-1}	80×10^{-6}
Coefficient of Thermal Conductivity, ASTM C 177, W/(m·K)	0.10
Glass Transition Temperature, ASTM E 228, °C	120

Electrical Properties:

Volume Resistivity, ASTM D 257, Ω·cm	1×10^{16}
Surface Resistivity, ASTM D 257, Ω	1×10^{16}
Dielectric Constant / Dissipation Factor, ASTM D 150:	
100 Hz	2.75 / <0.02
1 kHz	2.75 / <0.02
10 kHz	2.75 / <0.02
Dielectric Breakdown Strength, ASTM D 149, kV/mm	25

PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 24 hours@ 22 °C.

Lap Shear Strength, ISO 4587:

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)
Zinc Dichromate	N/mm²	4 to 10
	(psi)	(580 to 1,450)
ABS	N/mm²	6 to 20
	(psi)	(870 to 2,900)
PVC	N/mm²	6 to 20
	(psi)	(870 to 2,900)
Phenolic	N/mm²	5 to 15
	(psi)	(725 to 2,175)
Polycarbonate	N/mm²	5 to 20
	(psi)	(725 to 2,900)
Nitrile	N/mm²	5 to 15
	(psi)	(725 to 2,175)
Neoprene	N/mm²	5 to 15
	(psi)	(725 to 2,175)

Tensile Strength, DIN 53288:

Steel (grit blasted)	N/mm²	12 to 25
	(psi)	(1,745 to 3,625)
Buna-N	N/mm²	5 to 15
	(psi)	(725 to 2,175)

Cured for 10seconds@ 22 °C.

Tensile Strength, DIN 53288:

Buna-N	N/mm²	≥6.00[LMS]
	(psi)	(870)

TYPICAL ENVIRONMENTAL RESISTANCE

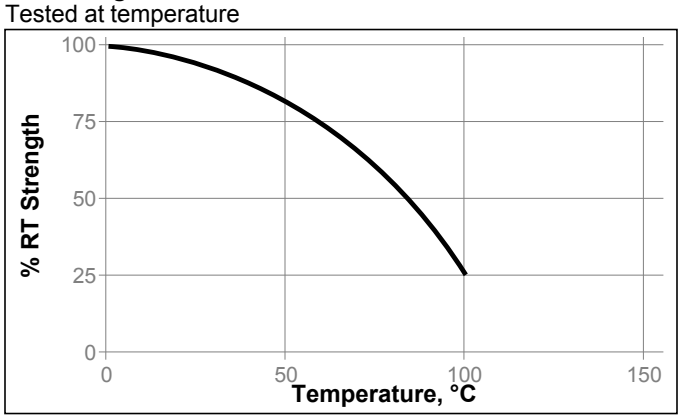
Cured for 1 week@ 22 °C.

Lap Shear Strength, ISO 4587:

Steel (grit blasted)

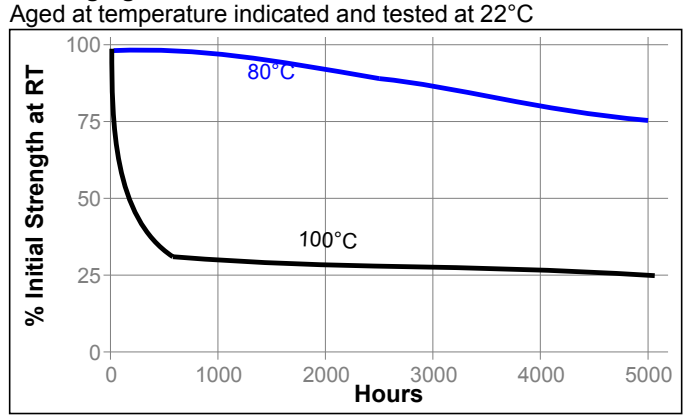
Hot Strength

Tested at temperature



Heat Aging

Aged at temperature indicated and tested at 22°C



Chemical/Solvent Resistance

Aged under conditions indicated and tested at 22°C.

		% of initial strength		
Environment	**°C**	**100 hr**	**500 hr**	**1000 hr**
Motor Oil	40	95	95	95
Gasoline	22	100	100	100
Ethanol	22	100	100	100
Alcohol, Isopropyl	22	100	100	100
Freon TA	22	100	100	100
Heat/Humidity 95% RH	40	70	50	40
Heat/Humidity 95% RH on Polycarbonate	40	100	100	100

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. 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.

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 Technical Service Center or Customer Service Representative.

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 Loctite Quality.

Conversions
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
mPa·s = cP
N/mm² x 145 = psi
MPa x 145 = psi
N x 0.225 = lb
N·m = 8.851 lb·in
N·mm = 0.142 oz·in

Note
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Reference N/A