LOCTITE® 460™

PRODUCT DESCRIPTION

LOCTITE® 460™ provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Alkoxyethyl cyanoacrylate
Appearance (uncured)	Transparent, colorless to pale yellow liquid[LMS]
Components	One part - requires no mixing
Viscosity	Medium
Cure	Humidity
Application	Bonding
Key Substrates	Metals, Plastics and Elastomers

LOCTITE® 460™ has low odor and low blooming properties and is particularly suitable for applications where vapor control is difficult.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Flash Point - See MSDS	
Viscosity, Cone & Plate, mPa·s (cP):	
Temperature: 25 °C, Shear Rate: 3,000 s^{-1}	20 to 55[LMS]
Viscosity, Brookfield - LVF, 25 °C, mPa·s (cP):	
Spindle 1, speed 30 rpm	30 to 60

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, ISO 4587, seconds:

Steel (degreased)	30 to 70
Aluminum	5 to 20
Zinc dichromate	60 to 180
Neoprene	<5
Rubber, nitrile	<5
ABS	20 to 60
PVC	20 to 50
Polycarbonate	20 to 60
Phenolic	30 to 60

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.
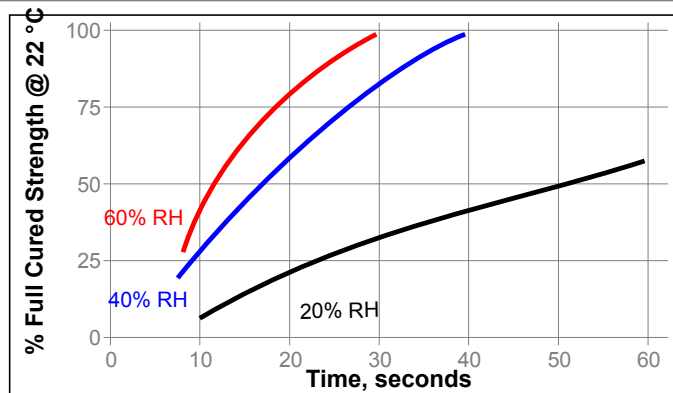
Cure Speed vs. Activator

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 C177, W/(m·K)	0.1
Glass Transition Temperature, ASTM E 228, °C	130

Electrical Properties:

Surface Resistivity, IEC 60093, Ω	10×10^{15}
Volume Resistivity, IEC 60093, Ω·cm	10×10^{15}
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	25
Dielectric Constant / Dissipation Factor, IEC 60250:	
0.1 kHz	2.65 / <0.02
1 kHz	2.75 / <0.02
10 kHz	2.75 / <0.02

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 10 seconds @ 22 °C
Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥4.5[LMS]
	(psi)	(≥655)

Cured for 24 hours @ 22 °C
Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	14 to 22
	(psi)	(2,030 to 3,190)
Aluminum (etched)	N/mm²	9 to 15
	(psi)	(1,305 to 2,175)
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	2 to 8
	(psi)	(290 to 1,160)
Polycarbonate	N/mm²	3 to 10
	(psi)	(435 to 1,450)

Phenolic	N/mm²	5 to 15	
	(psi)	(725 to 2,175)	
Neoprene	N/mm²	5 to 15	
	(psi)	(725 to 2,175)	
Nitrile	N/mm²	5 to 15	
	(psi)	(725 to 2,175)	

Tensile Strength, ISO 6922:

Steel (grit blasted)	N/mm²	10 to 25	
	(psi)	(1,450 to 3,625)	
Buna-N	N/mm²	5 to 15	
	(psi)	(725 to 2,175)	

TYPICAL ENVIRONMENTAL RESISTANCE

Cured for 1 week @ 22 °C
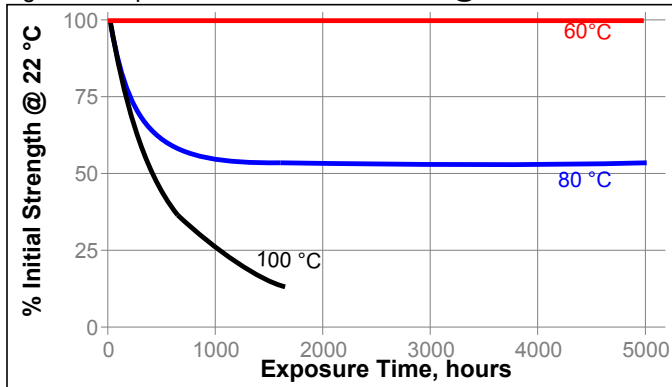Lap Shear Strength, ISO 4587:
Mild steel (grit blasted)

Hot Strength
Tested at temperature
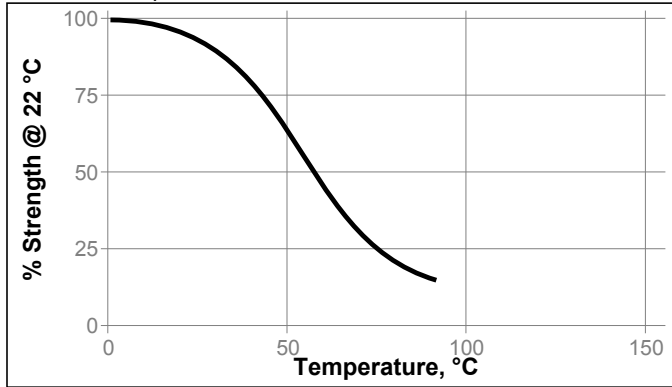
Heat Aging
Aged at temperature indicated and tested @ 22 °C

Chemical/Solvent Resistance
Aged under conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength		
		100 h	500 h	1000 h
Motor oil	40	75	75	65
Gasoline	22	100	90	75
Ethanol	22	100	95	95
Isopropanol	22	90	90	90
Freon TA	22	100	100	100
Heat/humidity 95% RH	40	15	0	0
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.

Loctite Material Specification^{LMS}

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LMS dated May 06, 2004. 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 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

Note
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Reference 1.1

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