LOCTITE

LOCTITE® 4860™

September 2005

PRODUCT DESCRIPTION

LOCTITE® 4860™ provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl / butyl cyanoacrylate
Appearance (uncured)	Transparent, colorless to straw colored liquid[LMS]
Components	One part - requires no mixing
Viscosity	Medium
Cure	Humidity
Application	Bonding
Key Substrates	Paper, Leather and Fabric

LOCTITE® 4860™ is designed for the assembly of difficult to bond materials and is specifically formulated to provide flexible bondlines. The product provides rapid bonding of a wide range of materials, including metals, plastics and elastomers. When used to bond rubbers, for example, this product maintains the full compressibility of the joint. LOCTITE® 4860™ is particularly suited for bonding porous or absorbent materials such as paper, leather and fabrics.

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: 50 s^{-1}	3,000 to 5,500[LMS]

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 (grit blasted)	7 to 15
Steel (degreased)	20 to 25
Aluminum (grit blasted)	10 to 20
Aluminum (degreased)	7 to 15
Zinc dichromate	10 to 15
Rubber, nitrile	10 to 15
ABS	3 to 5
PVC	3 to 5
Polycarbonate	5 to 10
Epoxy FR4	3 to 7
Leather	7 to 15
Paper	1 to 3
Wood (teak)	50 to 90

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

Cured for 24 hours @ 22 °C

Physical Properties:

Coefficient of Thermal Expansion, ASTM D 696, K^{-1}		100×10^{-6}
Glass Transition Temperature, ASTM E 228, °C		60
Shore Hardness, ISO 868, Durometer A		80 to 90
Tensile Modulus, ISO 527	N/mm²	280 to 580
	(psi)	(40,610 to 84,120)

Electrical Properties:

Volume Resistivity, IEC 60093, Ω·cm	158×10^{12}
Surface Resistivity, IEC 60093, Ω	$>1\times10^{15}$
Dielectric Constant / Dissipation Factor, IEC 60250:	
0.1 kHz	2.74 / 0.04
100 kHz	2.44 / 0.04
1,000 kHz	2.3 / 0.05

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 30 seconds @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥5[LMS]
	(psi)	(≥725)

Cured for 7 days @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	11 to 17
	(psi)	(1,595 to 2,465)
Aluminum (grit blasted)	N/mm²	8 to 12
	(psi)	(1,160 to 1,740)
Zinc dichromate	N/mm²	7 to 11
	(psi)	(1,015 to 1,595)
ABS	N/mm²	5 to 9
	(psi)	(725 to 1,305)
PVC	N/mm²	3 to 6
	(psi)	(435 to 870)
Polycarbonate	N/mm²	6 to 8
	(psi)	(870 to 1,160)
Epoxy FR4	N/mm²	8 to 12
	(psi)	(1,160 to 1,740)
Wood (teak)	N/mm²	6 to 10
	(psi)	(725 to 1,305)

TYPICAL ENVIRONMENTAL RESISTANCE

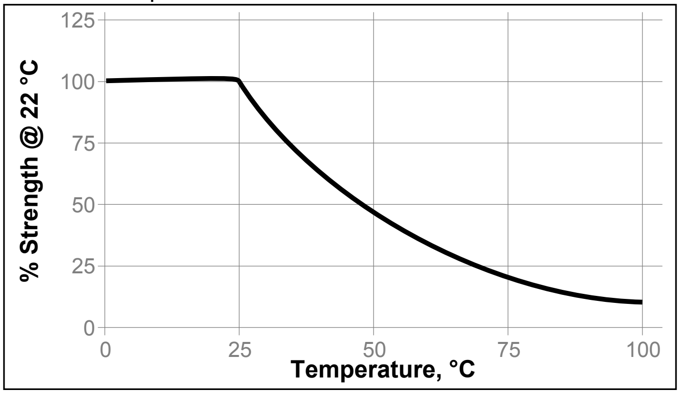
Cured for 1 week @ 22 °C

Lap Shear Strength, ISO 4587:

Mild steel (grit blasted)

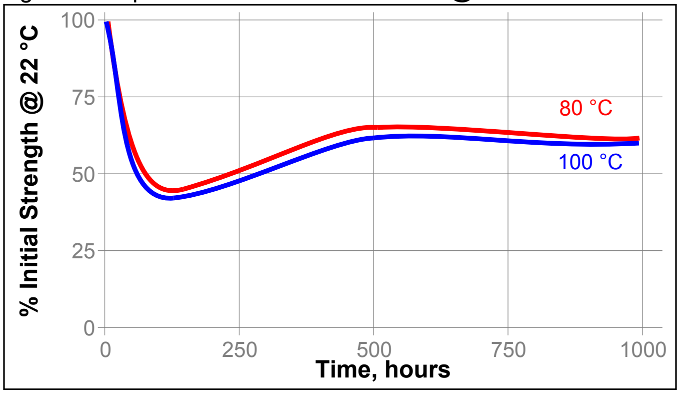
Hot Strength

Tested at temperature



Heat Aging

Aged at temperature indicated and tested @ 22 °C



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength		
Environment	**°C**	**100 h**	**500 h**	**1000 h**
Motor oil (MIL-L-46152)	40	80	80	65
Gasoline	22	95	85	60
Ethanol	22	110	75	30
Isopropanol	22	120	105	75
Heat/humidity 95% RH	40	50	50	50
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]

LMS dated May 17, 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