LOCTITE® 4204™

March 2010

PRODUCT DESCRIPTION

LOCTITE® 4204™ provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl cyanoacrylate
Appearance (uncured)	Colorless to slightly pale yellow homogeneous liquid[LMS]
Components	One part - requires no mixing
Viscosity	High
Cure	Humidity
Application	Bonding
Key Substrates	Rubbers, Plastics and Metals

LOCTITE® 4204™ is a general purpose adhesive suitable for applications where heat resistance is required. LOCTITE® 4204™ is toughened with elastomers for flexibility, impact resistance and improved resistance to heat and humidity.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C 1.1

Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):

Spindle 5, speed 20 rpm 2,000 to 6,000[LMS]

Viscosity, Cone & Plate, 25 °C, mPa·s (cP):

Physica MC100, Cone MK 22, shear rate 100 s^{-1} 180 to 600[LMS]

Flash Point - See MSDS

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)	120 to 150
Aluminum	5 to 10
ABS	30 to 45
SBR (smooth)	90 to 105
NBR	10 to 20
EPDM	150 to 180
Phenolic	20 to 30
Zinc dichromate	25 to 35
Neoprene	30 to 45
PVC	150 to 180
Polycarbonate	45 to 60
G-10 Epoxy	5 to 10
Wood (pine)	105 to 210
Rubber, nitrile	10 to 20

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 PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 24 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	17.2 to 19.3
	(psi)	(2,490 to 2,800)
Aluminum	N/mm²	14.3 to 15.9
	(psi)	(2,070 to 2,300)
SBR	N/mm²	0.9 to 1.0
	(psi)	(130 to 145)
Nitrile	N/mm²	0.8
	(psi)	(115)
Neoprene	N/mm²	0.7
	(psi)	(110)

Block Shear Strength, ISO 13445:

ABS	N/mm²	18 to 20
	(psi)	(2,610 to 2,900)
Phenolic	N/mm²	16.8 to 17.4
	(psi)	(2,440 to 2,520)
G-10 Epoxy	N/mm²	16 to 21
	(psi)	(2,320 to 3,045)
Polycarbonate	N/mm²	3.1 to 3.4
	(psi)	(450 to 490)
PVC	N/mm²	4.8 to 7.7
	(psi)	(700 to 1,120)

Cured for 24 hours @ 22 °C, followed by 24 hours @ 121 °C, tested @ 121 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	≥5.6[LMS]
	(psi)	(≥810)

Cured for 24 hours @ 22 °C, followed by 24 hours @ 121 °C, tested @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	≥18.6[LMS]
	(psi)	(≥2,700)

Cured for 48 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	≥12.4[LMS]
	(psi)	(≥1,800)

180° Peel Strength, ISO 8510-2:

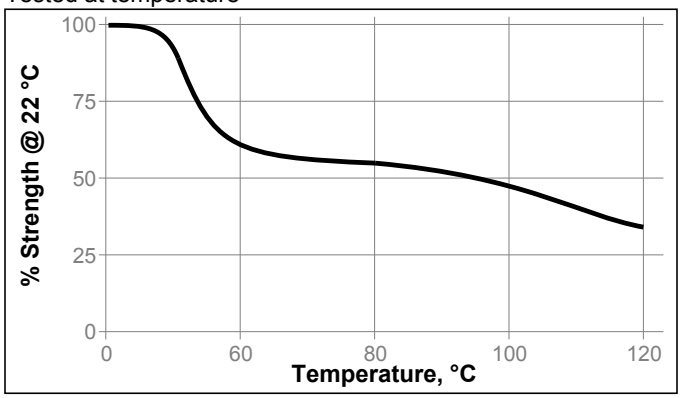
Steel (grit blasted)	N/mm	2.3
	(lb/in)	(13)

TYPICAL ENVIRONMENTAL RESISTANCE

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

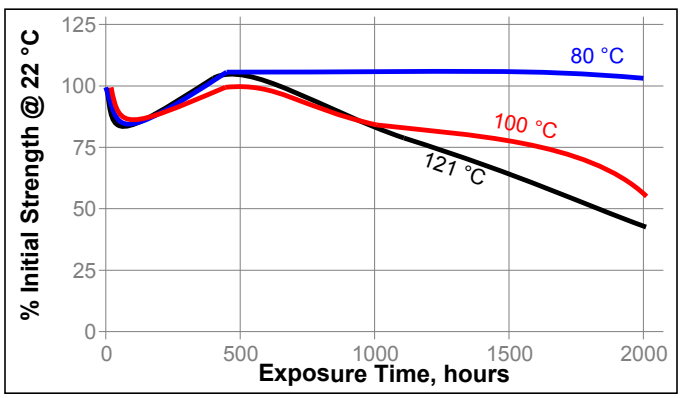
Hot Strength

Tested at temperature



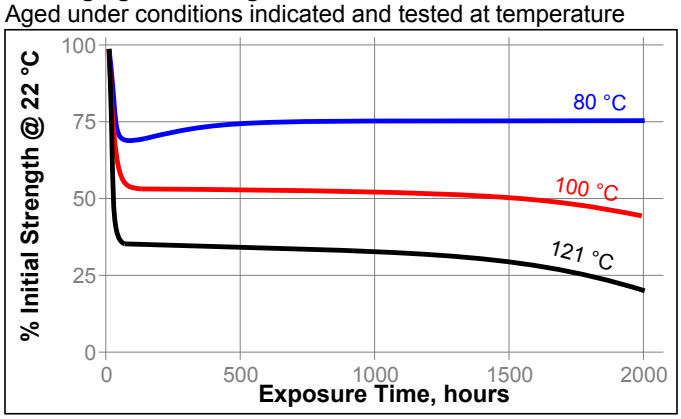
Heat Aging

Aged at temperature indicated and tested @ 22 °C



Heat Aging/Hot Strength

Aged under conditions indicated and tested at temperature



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C

		% of initial strength		
Environment	**°C**	**100 h**	**500 h**	**100 h**
Motor oil	40	105	115	110
Gasoline	22	105	100	90
Ethanol	22	100	110	105
Isopropanol	22	100	110	110
Heat/humidity 95% RH	40	105	110	105

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 19, 2009. 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