LOCTITE® 4204

June 2004

PRODUCT DESCRIPTION

LOCTITE® 4204 provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl cyanoacrylate
Appearance (uncured)	Colorless to slightly pale yellow 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 and improved resistance to heat and humidity.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.10
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 5, speed 20 rpm	2,000 to 6,000 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, ISO 4587, seconds:

Steel (degreased)	20 to 30
Aluminum	5 to 10
Rubber, Nitrile	5 to 10
ABS	5 to 10
Phenolic	60 to 90
SBR (smooth)	10 to 20
EPDM	45 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. 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 72 hours @ 22 °C

Physical Properties:

Coefficient of Thermal Expansion, ASTM D 696, K^{-1}	310×10^{-6}
Coefficient of Thermal Conductivity, ASTM C 177, W/(m·K)	0.20
Glass Transition Temperature, ASTM E 228, °C	130

Electrical Properties:

Dielectric Constant / Dissipation Factor, ASTM D 150:

0.10 kHz	4.20 / <0.05
1 kHz	4.00 / <0.05
10 kHz	3.70 / <0.04
Volume Resistivity, ASTM D 257, Ω·cm	1.9×10^{15}
Surface Resistivity, ASTM D 257, Ω	18×10^{15}
Dielectric Breakdown Strength, ASTM D 149, kV/mm	32.50

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 72 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	12 to 16
	(psi)	(1,740 to 2,320)
Aluminum	N/mm²	1 to 3
	(psi)	(145 to 435)
Polycarbonate	N/mm²	5 to 6
	(psi)	(725 to 870)
Phenolic	N/mm²	10 to 13
	(psi)	(1,450 to 1,885)
G-10 Epoxyglass	N/mm²	9 to 12
	(psi)	(1,305 to 1,740)
SBR (rough)	N/mm²	0.90 to 1.10
	(psi)	(130 to 160)

Cured for 48 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	≥12.40 LMS
	(psi)	(≥1,800)

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	≥5.60 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	≥18.60 LMS
	(psi)	(≥2,700)

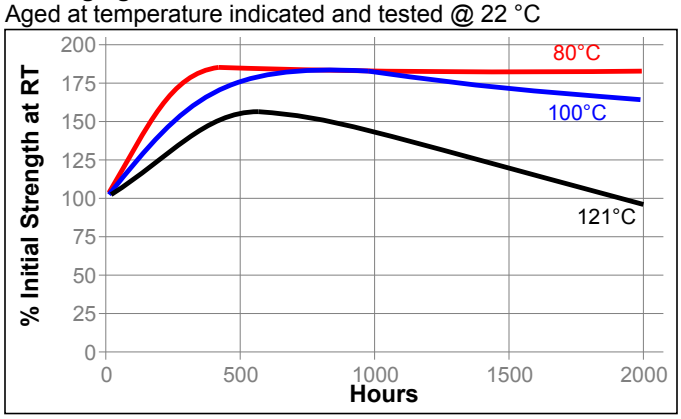
TYPICAL ENVIRONMENTAL RESISTANCE

After 3 days @ 22 °C

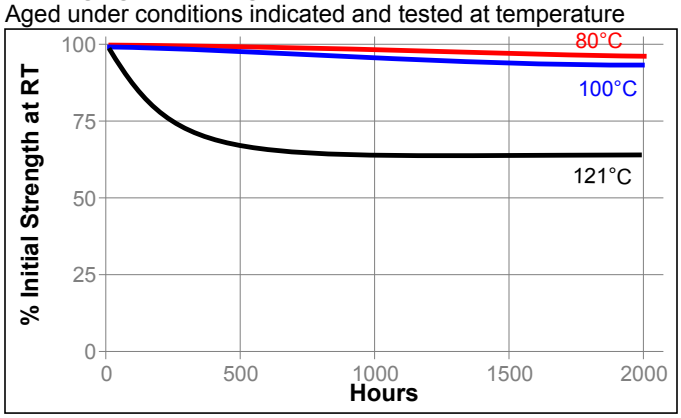
Lap Shear Strength, ISO 4587:

Mild steel (grit blasted)

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



Heat Aging/Hot Strength
Aged under conditions indicated and tested at temperature



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 July 26, 2002. 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.

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
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·mm x 0.142 = oz.in
mPa·s = cP

Note
The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

Trademark usage

Reference N/A