Technical Data Sheet

LOCTITE® 4206™

November 2008

PRODUCT DESCRIPTION

LOCTITE® 4206™ 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	Low - Medium
Cure	Humidity
Application	Bonding
Key Substrates	Rubbers, Plastics and Metals

LOCTITE® 4206™ is a general purpose adhesive suitable for applications where heat resistance is required. LOCTITE® 4206™ is toughened with elastomers for flexibility and improved resistance to heat and humidity. Suitable for use in the assembly of **disposable medical devices**.

ISO-10993

An ISO 10993 Test Protocol is an integral part of the Quality Program for LOCTITE® 4206™. LOCTITE® 4206™ has been qualified to Henkel's ISO 10993 Protocol as a means to assist in the selection of products for use in the medical device industry. Certificates of Compliance are available on Henkel's website or through the Henkel Quality Department.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 5, speed 20 rpm,	150 to 600 LMS
Flash Point - See SDS	

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)	10 to 20
Aluminum	5 to 10
ABS	5 to 10
SBR (smooth)	45 to 60
NBR	10 to 20
EPDM	45 to 60
Phenolic	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 PROPERTIES OF CURED MATERIAL

After 72 hours @ 22 °C

Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K^{-1}		210×10^{-6}
Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)		0.2073
Glass Transition Temperature, ASTM E 228, °C		129.5
Tensile Strength, at yield, ISO 527-3	N/mm² (psi)	29.27 (4,245)
Tensile Strength, at break, ISO 527-3	N/mm² (psi)	25.27 (3,664)
Tensile Modulus, ISO 527-3	N/mm² (psi)	829 (120,200)
Elongation, at yield, ISO 527-3, %		5.3
Elongation, at break, ISO 527-3, %		18.3

Electrical Properties:

Dielectric Constant / Dissipation Factor, IEC 60250:	
0.1 kHz	4.2 / <0.05
1 kHz	3.9 / <0.05
10 kHz	3.7 / <0.04
Volume Resistivity, IEC 60093, Ω·cm	2.4×10^{15}
Surface Resistivity, IEC 60093, Ω	1.5×10^{15}
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	31.1

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 72 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm² (psi)	14.1 to 16.7 (2,045 to 2,420)
Aluminum	N/mm² (psi)	1.0 to 1.5 (145 to 215)
ABS	N/mm² (psi)	3.3 to 3.9 (480 to 565)
Phenolic	N/mm² (psi)	8.6 to 9.5 (1,250 to 1,380)
SBR (smooth)	N/mm² (psi)	0.4 to 0.6 (60 to 90)
G-11 Epoxyglass	N/mm² (psi)	9.6 to 12.3 (1,390 to 1,785)

Cured for 48 hours @ 22 °C
Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	≥12.4[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	≥5.6[LMS]
	(psi)	(≥810)

Cured for 24 hours @ 22 °C, followed by 24 hours @ 121 °C, tested @ 22 °C
Lap Shear Strength, ISO 4587:

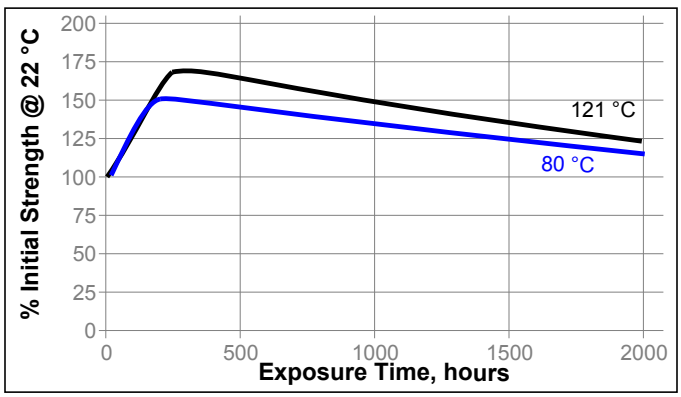
Steel (grit blasted)	N/mm²	≥18.6[LMS]
	(psi)	(≥2,700)

TYPICAL ENVIRONMENTAL RESISTANCE

After 3days @ 22 °C
Lap Shear Strength, ISO 4587:
Mild steel (grit blasted)

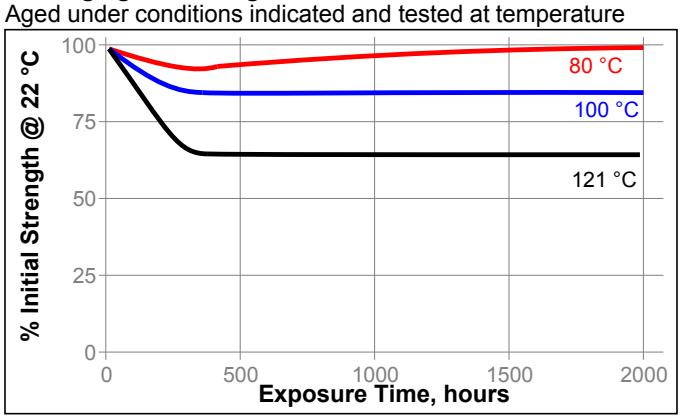
Heat Aging

Aged at temperature indicated and tested @ 22 °C



Heat Aging/Hot Strength

Aged under conditions indicated and tested at temperature



Effects of Sterilization

In general, products similiar in composition to LOCTITE® 4206™ subjected to standard sterilization methods, such as EtO and Gamma Radiation (25 to 50 kiloGrays cumulative) show excellent bond strength retention. LOCTITE® 4206™ maintains bond strength after 1 cycle of steam autoclave. It is recommended that customers test specific parts after subjecting them to the preferred sterilization method. Consult with Loctite® for a product recommendation if your device will see more than 3 sterilization cycles.

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 Safety Data Sheet (SDS).

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 November 01, 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 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:
The information provided in this Technical Data Sheet (TDS) including

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Reference 1.2