

LOCTITE[®] 4205[™]

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PRODUCT DESCRIPTION

LOCTITE[®] 4205[™] provides the following product characteristics:

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

LOCTITE[®] 4205[™] is a general purpose adhesive suitable for applications where heat resistance is required. LOCTITE[®] 4205[™] 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 TC, speed 20 rpm,	10,000 to 60,000 ^{LMS}
Viscosity, Cone & Plate, 25 °C, mPa·s (cP):	
Physica MC100, Cone MK 22, shear rate 100 s ⁻¹	400 to 1,600 ^{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)	50 to 65	
Aluminum	10 to 30	
ABS	10 to 20	
SBR (smooth)	150 to 180	
NBR	10 to 20	
EPDM	120 to 180	
Phenolic	80 to 105	
Zinc dichromate	90 to 120	
Neoprene	30 to 45	
PVC	210 to 240	
Polycarbonate	50 to 75	
G-10 Epoxy	15 to 30	
Wood (pine)	180 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 PROPERTIES OF CURED MATERIAL

After 72 hours @ 22 °C, followed by 24 hours @ 50 °C, followed by 2 hours @ 82 °C

Physical Properties:

Glass Transition Temperature (T _g), °C	105
Coefficient of Thermal Expansion, ISO 11359-2, K ⁻¹	77×10 ⁻⁶

Electrical Properties:

Volume Resistivity, IEC 60093, Ω·cm	2.0×10 ¹⁵
Surface Resistivity, IEC 60093, Ω	≥1.3×10 ¹⁷
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	32
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	3.22 / <0.03
100 kHz	3.09 / <0.03
1 MHz	2.86 / <0.03

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 24 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm ² 18.7 to 23.2 (psi) (2,710 to 3,360)
Aluminum	N/mm ² 14.5 (psi) (2,100)
SBR	N/mm ² 0.7 to 0.8 (psi) (100 to 120)
Nitrile	N/mm ² 0.6 to 0.7 (psi) (90 to 100)
Phenolic	N/mm ² 8.6 to 9.5 (psi) (1,250 to 1,380)
Neoprene	N/mm ² 0.6 to 0.7 (psi) (90 to 100)

Block Shear Strength, ISO 13445:

ABS	N/mm ² 11.6 to 13 (psi) (1,680 to 1,885)
Phenolic	N/mm ² 7.7 to 12.1 (psi) (1,120 to 1,750)
G-10 Epoxy	N/mm ² 9.2 to 12 (psi) (1,330 to 1,740)

Conversions

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$

$\text{kV/mm} \times 25.4 = \text{V/mil}$

$\text{mm} / 25.4 = \text{inches}$

$\mu\text{m} / 25.4 = \text{mil}$

$\text{N} \times 0.225 = \text{lb}$

$\text{N/mm} \times 5.71 = \text{lb/in}$

$\text{N/mm}^2 \times 145 = \text{psi}$

$\text{MPa} \times 145 = \text{psi}$

$\text{N}\cdot\text{m} \times 8.851 = \text{lb}\cdot\text{in}$

$\text{N}\cdot\text{m} \times 0.738 = \text{lb}\cdot\text{ft}$

$\text{N}\cdot\text{mm} \times 0.142 = \text{oz}\cdot\text{in}$

$\text{mPa}\cdot\text{s} = \text{cP}$

Note:

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Reference 1.3