Technical Data Sheet

LOCTITE® 4503

October 2015

PRODUCT DESCRIPTION

LOCTITE® Product 4503 is a medium viscosity, fast curing, single component cyanoacrylate adhesive. It is specifically formulated for difficult to bond substrates. In addition, this product is formulated to have improved cure speed retention over prolonged storage periods, relative to standard grades of cyanoacrylate adhesives.

TYPICAL APPLICATIONS

Rapid bonding of a wide range of metal, plastic or elastomeric materials, particularly suited for bonding porous or absorbent materials such as wood, paper, leather or fabric.

PROPERTIES OF UNCURED MATERIAL

	Typical Value	Range
Chemical Type	Ethyl cyanoacrylate	
Appearance	Clear Colorless liquid	
Specific Gravity @ 25°C	1.1	
Viscosity @ 25°C, cP (mPa.s)	650	500 to 800
Physica Viscometer, MK-22 Cone, 3000 s^{-1}		
Flash Point (TCC), °C	>93	

TYPICAL CURING PERFORMANCE

Under normal conditions, the surface moisture initiates the hardening 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 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 13.2 psi tested on specimens according to ASTM D1002.

	Fixture Time, seconds, 22°C	
Substrate	**Initial**	**2 Years[1]**
Steel (grit-blasted)	<5	5 to 10
Aluminum (grit-blasted)	<5	<5
Zinc dichromate	20 to 30	20 to 30
Neoprene	<5	<5
Nitrile rubber	10 to 20	10 to 20
ABS	<5	<5
PVC	<5	<5
Phenolic materials	<5	<5
Wood (Pine)	10 to 20	30 to 45
Wood (Oak)	20 to 30	20 to 30

1 simulated via heat aging product at 50°C for 8 weeks

Cure speed vs. bond gap

The rate of cure will depend on the bond line gap. Fast cure speed is favored by thin bond lines. Increasing the bond gap will slow down the rate of cure.

Cure speed vs. humidity

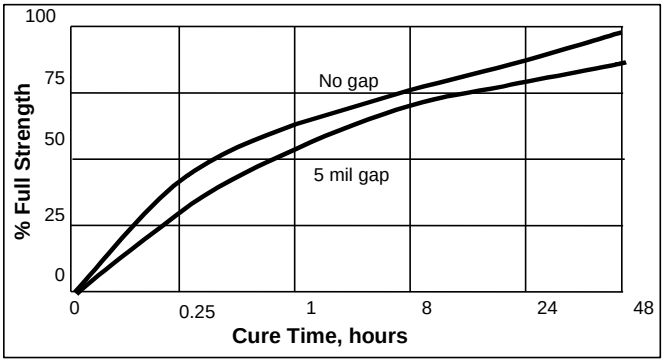
The rate of cure will depend on the ambient relative humidity. Higher relative humidity results in faster cure speed. Although testing is required in each application, relative humidity levels below 20% may result in significantly longer cure times.

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 the ultimate strength of the bond, therefore testing is recommended to confirm effect.

Cure speed vs. Time

The graph below shows the strength developed over time on grit-blasted steel. The testing was conducted in accordance with ASTM D 1002 with no induced gap and at 22°C.



TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties

Coefficient of thermal expansion, ASTM D696, mm/mm°C, pre Tg	84
Glass Transition temperature, ASTM E228, °C	118

Electrical Properties

		Constant	Loss
Dielectric constant & loss, 25°C, ASTM D150, measured at	1 Hz	3.2	0.029
	10 kHz	3.1	0.029
Volume resistivity, ASTM D257, Ω.cm		9.7×10^{15}	
Surface resistivity, ASTM D257, Ω		$>1.1 \times 10^{19}$	
Dielectric strength, ASTM D149, V/mil		780	

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PERFORMANCE OF CURED MATERIAL

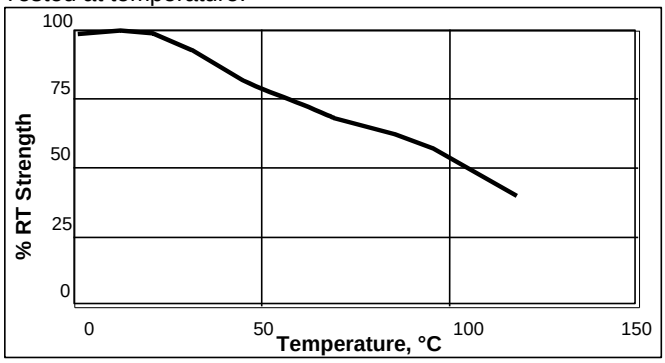
(After 48 hr at 22°C)	Typical Value	Typical Range
Shear Strength, ASTM D1002, DIN 53283		
Grit Blasted Steel, N/mm²	20.1	19.1 to 21.0
(psi)	(2910)	(2770 to 3050)
Grit Blasted Aluminum, N/mm²	15.1	12.9 to 16.5
(psi)	(2130)	(1870 to 2390)
Zinc dichromate, N/mm²	5.7	4.7 to 6.8
(psi)	(830)	(680 to 980)
Neoprene rubber, N/mm²	>0.8	0.75 to 0.8
(psi)	(115)	(110 to 120)
Nitrile rubber, N/mm²	>0.6	0.5 to 0.8
(psi)	(90)	(70 to 110)
Shear Strength, ASTM D4501		
ABS, N/mm²	26.3	24.1 to 28.4
(psi)	(3810)	(3500 to 4120)
PVC, N/mm²	19.0	11.2 to 26.7
(psi)	(2750)	(1630 to 3870)
Polycarbonate, N/mm²	21.6	16.7 to 26.5
(psi)	(3130)	(2420 to 3840)
Phenolic, N/mm²	10.9	7.3 to 14.5
(psi)	(1580)	(1060 to 2100)

TYPICAL ENVIRONMENTAL RESISTANCE

Test Procedure : Shear Strength ASTM D1002/DIN 53283
Substrate: Grit blasted mild steel laps
Cure procedure: 48 hours at 22°C

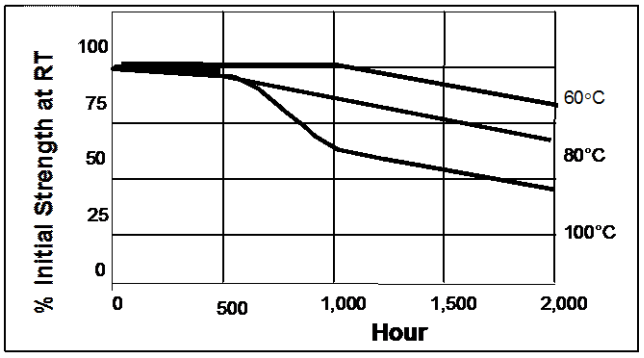
Hot Strength

Tested at temperature.



Heat Aging

Aged at temperature indicated and tested at 22°C.



Chemical / Solvent Resistance

Aged under conditions indicated and tested at 22°C. Substrate is grit-blasted steel except where noted.

Solvent	Temp.	% Initial strength retained at 2 weeks	4 weeks
Motor Oil	40°C	120	125
Gasoline	22°C	115	100
Isopropanol	22°C	95	100
Salt Fog, 5% salt, 95% R.H.	35°C	90	75
Salt Fog, 5% salt, 95% R.H. polycarbonate	35°C	125	95
Humidity 95% RH	40°C	95	75
Humidity 95% RH polycarbonate	40°C	135	125

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

For best performance surfaces should be clean and free of grease. This product performs best in thin bond gaps, (0.05mm). Excess adhesive can be dissolved with Loctite clean up solvents, nitromethane or acetone.

Storage

Product shall be ideally stored in a cool, dry location in unopened containers at a temperature between 8°C to 21°C (46°F to 70°F) unless otherwise labeled. Optimal storage conditions for unopened containers of cyanoacrylate products are achieved with refrigeration: 2°C to 8°C (36°F to 46°F). Refrigerated packages shall be allowed to return to room temperature prior to opening and use. To prevent

contamination of unused product, do not return any material to its original container. For specific shelf life information contact your local Technical Service Center.

Data Ranges
The data contained herein may be reported as a typical value and/or range (based on the mean value ±2 standard deviations). Values are based on actual test data and are verified on a periodic basis.

Note
The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

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