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# Product Description Sheet

## Product 4161

Medical Products, September 1996

### PRODUCT DESCRIPTION

LOCTITE® Product 4161 is a high viscosity, ethyl cyanoacrylate adhesive. It is specifically formulated for general purpose bonding.

### TYPICAL APPLICATIONS

Bonding of a wide range of metal, plastic or elastomeric materials. Loctite 4161 has USP Class VI Certification. Suitable for use in assembly of disposable medical devices.

### PROPERTIES OF UNCURED MATERIAL

	Typical Value	Range
Chemical Type	Ethyl Cyanoacrylate	
Appearance	Colorless	
Specific Gravity @ 25°C	1.05	
Viscosity @ 25°C, mPa.s (cP)		
Brookfield LVF		
Spindle 2 @ 12 rpm	1,500	1,150 to 2,000
Flash Point (TCC), °C	>80	

### TYPICAL CURING PERFORMANCE

Under normal conditions, the surface moisture initiates the hardening process. Although 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 0.1 N/mm<sup>2</sup> (14.5 psi) tested on specimens according to ASTM D1002.

Substrate	Fixture Time, seconds
Steel (degreased)	20 to 50
Aluminum	10 to 30
Zinc dichromate	40 to 100
Neoprene	<5
Nitrile rubber	<5
ABS	15 to 40
PVC	20 to 50
Polycarbonate	30 to 70
Phenolic materials	10 to 40

### Cure speed vs. bond gap

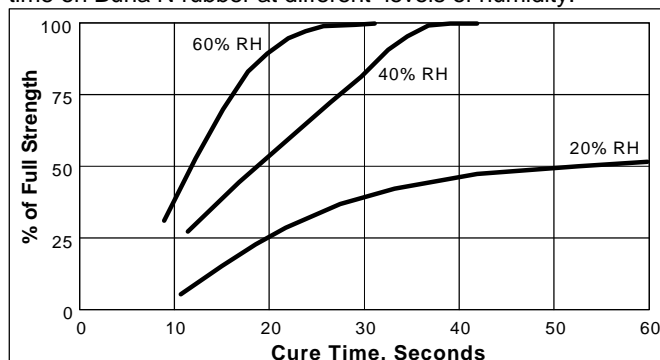
The rate of cure will depend on the bondline gap. High cure speed is favored by thin bond lines. Increasing the bond gap will slow down the rate of cure.

### Cure speed vs. activator

Where cure speed is unacceptably long due to large gaps or low relative humidity 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. humidity

The rate of cure will depend on the ambient relative humidity. The graph below shows the tensile strength developed with time on Buna N rubber at different levels of humidity.



### TYPICAL PROPERTIES OF CURED MATERIAL

#### Physical Properties

Coefficient of thermal expansion, ASTM D696, K <sup>-1</sup>	100 x 10 <sup>-6</sup>
Coefficient of thermal conductivity, ASTM C177, W.m <sup>-1</sup> K <sup>-1</sup>	0.1
Glass transition temperature, ASTM E228, °C	165

#### Electrical Properties

	Constant	Loss	
Dielectric constant & loss, 25°C, ASTM D150, measured at	100Hz	2.65	<0.02
	1kHz	2.75	<0.02
	10 kHz	2.75	<0.02
Volume resistivity, ASTM D257, Ω.cm:		1 x 10 <sup>16</sup>	
Surface resistivity, ASTM D257, Ω:		1 x 10 <sup>16</sup>	
Dielectric strength, ASTM D149, kV/mm		25	

### PERFORMANCE OF CURED MATERIAL

(After 24 hr at 22°C)	Typical	
	Value	Range
Shear Strength, ASTM D1002, DIN 53283		
Grit Blasted Steel, N/mm <sup>2</sup>	22	18 to 26
(psi)	(3200)	(2600 to 3800)
Etched Aluminum, N/mm <sup>2</sup>	15	12 to 19
(psi)	(2200)	(1600 to 2800)
Zinc dichromate, N/mm <sup>2</sup>	10	6 to 13
(psi)	(1450)	(870 to 2000)
ABS, N/mm <sup>2</sup>	13	6 to 20
(psi)	(1890)	(870 to 2900)
PVC, N/mm <sup>2</sup>	13	6 to 20
(psi)	(1890)	(870 to 2900)
Polycarbonate, N/mm <sup>2</sup>	12	5 to 20
(psi)	(1740)	(725 to 2900)
Phenolic, N/mm <sup>2</sup>	10	5 to 15
(psi)	(1450)	(725 to 2900)
Neoprene rubber, N/mm <sup>2</sup>	10	5 to 15
(psi)	(1450)	(725 to 2200)
Nitrile rubber, N/mm <sup>2</sup>	10	5 to 15
(psi)	(1450)	(725 to 2200)

NOT FOR PRODUCT SPECIFICATIONS

THE TECHNICAL DATA CONTAINED HEREIN ARE INTENDED AS REFERENCE ONLY.

PLEASE CONTACT LOCTITE CORPORATION QUALITY DEPARTMENT FOR ASSISTANCE AND RECOMMENDATIONS ON SPECIFICATIONS FOR THIS PRODUCT.

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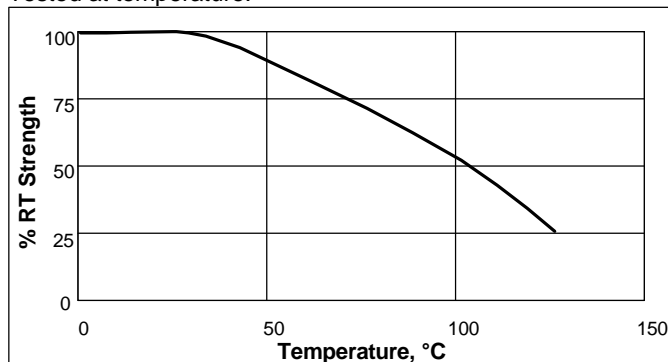
Tensile Strength, ASTM D2095, DIN 53282			
Grit Blasted Steel, N/mm <sup>2</sup>	18.5	12 to 25	
(psi)	(2680)	(1740 to 3630)	
Buna N rubber, N/mm <sup>2</sup>	10	5 to 15	
(psi)	(1450)	(730 to 2200)	
Peel Strength, ASTM D1876, DIN 53282, N/mm <sup>2</sup>			<0.5

**TYPICAL ENVIRONMENTAL RESISTANCE**

Test Procedure : Shear Strength ASTM D1002/DIN 53283  
 Substrate: Grit blasted mild steel laps  
 Cure procedure: 1 week at 22°C

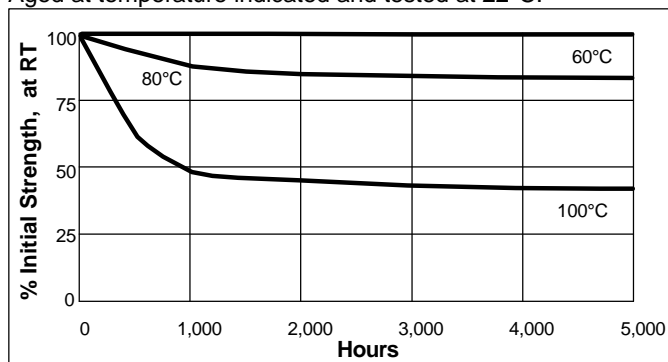
**Hot Strength**

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.

Solvent	Temp.	%Initial strength retained at		
		100 hr	500 hr	1000 hr
Motor Oil	40°C	100	100	95
Leaded Petrol	22°C	100	100	100
Ethanol	22°C	100	100	100
Isopropanol	22°C	100	100	100
Freon TA	22°C	100	100	100
Humidity 95% RH	40°C	80	75	65
Humidity 95% RH polycarbonate	40°C	100	100	100

**Effects of Sterilization**

Products similar in composition to Loctite 4161 subjected to standard sterilization by E.T.O. or Gamma Radiation (2.5 and 5.0 Megarads) show excellent bond strength retention. It is recommended that customers test specific parts after subjecting them to preferred sterilization method.

**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).

**Approvals**

Product 4161 has been granted USP Class VI certification which makes it particularly suited for use in disposable medical device assemblies.

**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 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, **Loctite Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loctite Corporation's products. Loctite 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 Loctite 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.