

### PRODUCT DESCRIPTION

LOCTITE® Product 648 is a single component anaerobic retaining adhesive which develops high strength rapidly when confined in the absence of air between close fitting metal surfaces. This product has high temperature resistance properties.

### TYPICAL APPLICATIONS

Used to bond cylindrical fitting parts, particularly where strength at elevated temperatures is required. Applications include holding gears and sprockets onto gearbox shafts and rotors on electric motor shafts.

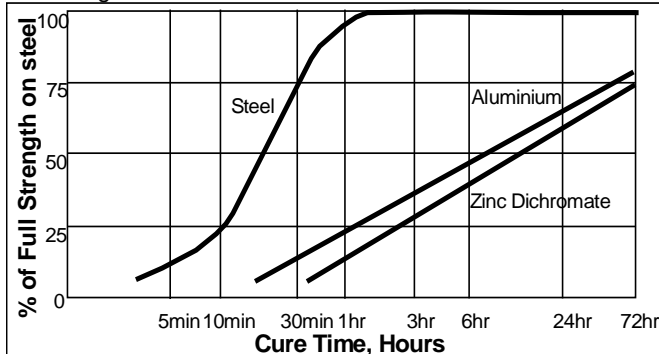
### PROPERTIES OF UNCURED MATERIAL

	Value	Typical Range
Chemical Type	Urethane methacrylate	
Appearance	Green, fluorescent liquid	
Specific Gravity @ 25°C	1.13	
Viscosity @ 25°C, mPa.s (cP)		
Brookfield RVT		
Spindle 2 @ 20 rpm	500	400 to 600
DIN 54453, MV		
D = 129 s <sup>-1</sup> after t=180secs	450	300 to 600
Flash Point (COC), °C	>100	

### TYPICAL CURING PERFORMANCE

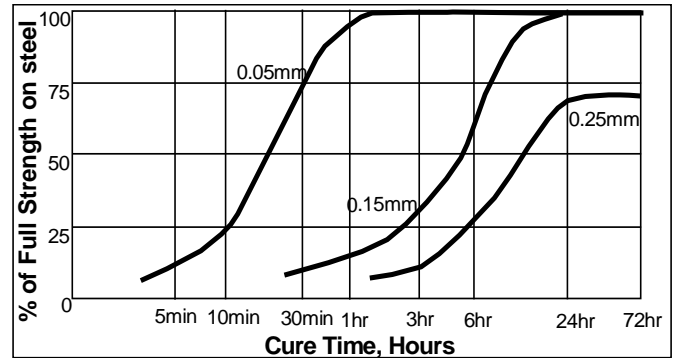
#### Cure speed vs. substrate

The rate of cure will depend on substrate used. The graph below shows shear strength developed with time on steel pins and collars compared to different materials and tested according to ISO 10123.



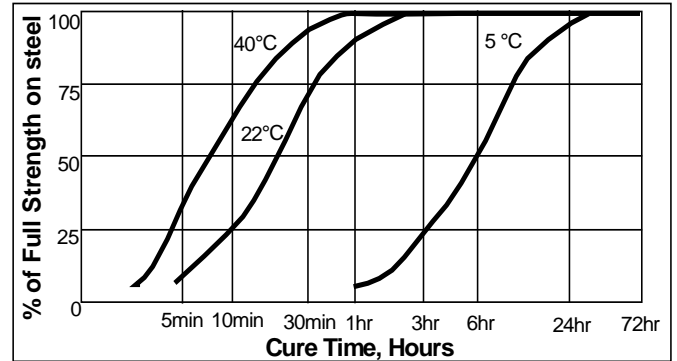
#### Cure speed vs. bond gap

The rate of cure will depend on the bondline gap. The following graph shows shear strength developed with time on steel pins and collars at different controlled gaps and tested according to ISO 10123.



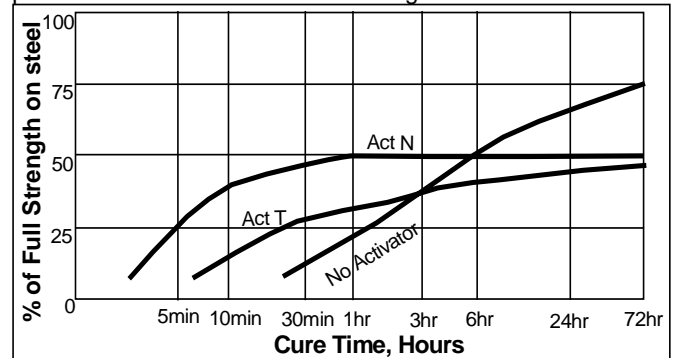
#### Cure speed vs. temperature

The rate of cure will depend on the ambient temperature. The graph below shows shear strength developed with time on steel pins and collars at different temperatures and tested according to ISO 10123.



#### Cure speed vs. activator

Where cure speed is unacceptably long, or large gaps are present, applying activator to the surface will improve cure speed. The graph below shows shear strength developed with time using ACTIVATOR N and T on zinc dichromated steel pins and collars and tested according to ISO 10123.



### TYPICAL PROPERTIES OF CURED MATERIAL

#### Physical Properties

Coefficient of thermal expansion, ASTM D696, K <sup>-1</sup>	80 x 10 <sup>-6</sup>
Coefficient of thermal conductivity, ASTM C177, W.m <sup>-1</sup> K <sup>-1</sup>	0.1
Specific Heat, kJ.kg <sup>-1</sup> K <sup>-1</sup>	0.3

**PERFORMANCE OF CURED MATERIAL**

(After 24 hr at 22°C on steel)

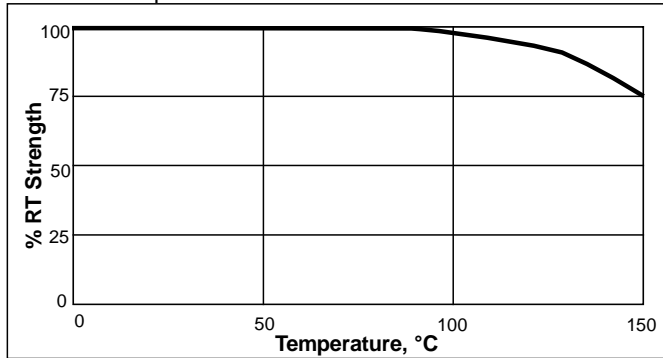
	Typical	
	Value	Range
Shear Strength, ISO 10123, N/mm <sup>2</sup>	26.5	18 to 35
(psi)	(3900)	(2600 to 5100)
Shear Strength, DIN 54452, N/mm <sup>2</sup>	23	16 to 30
(psi)	(3300)	(2300 to 4400)

**TYPICAL ENVIRONMENTAL RESISTANCE**

Test Procedure : Shear Strength, ISO 10123  
 Substrate: Steel Pins and Collars  
 Cure procedure: 1 week at 22°C

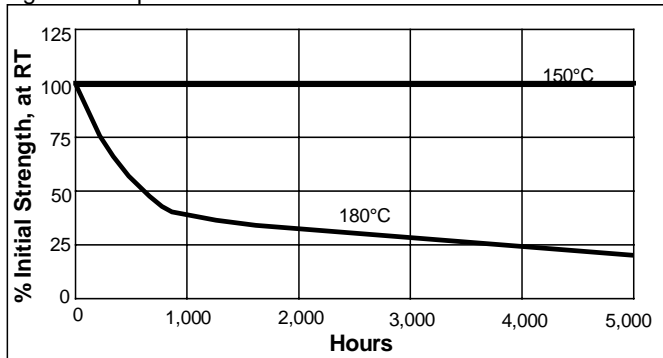
**Hot Strength**

Tested at temperature.



**Heat Ageing**

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	125°C	100	100	100
Unleaded Petrol	22°C	100	100	100
Brake Fluid	22°C	100	100	100
Water/Glycol (50%/50%)	87°C	100	90	75
Ethanol	22°C	100	100	100
Acetone	22°C	100	100	100

**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 oxidising materials.

For safe handling information on this product, consult the Material Safety Data Sheet, (MSDS).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

This product is not normally recommended for use on plastics (particularly thermoplastic materials where stress cracking of the plastic could result). Users are recommended to confirm compatibility of the product with such substrates.

**Directions for use**

For best performance surfaces should be clean and free of grease. Ensure joint is completely filled with adhesive. For slip fitted assemblies this is achieved by applying adhesive around the pin and the leading edge of the collar and using a rotating motion during assembly to ensure good coverage. For press fitted assemblies adhesive should be applied thoroughly to both bond surfaces and assembled at high press on rates. For shrink fitted assemblies the adhesive should be coated onto the pin, the collar should then be heated to create sufficient clearance for free assembly. Parts should not be disturbed until sufficient handling strength is achieved. For more detailed information on using retaining adhesives contact your local Technical Service Centre.

**Storage**

Product shall be ideally stored in a cool, dry location in unopened containers at a temperature between 8°C to 28°C (46°F to 82°F) unless otherwise labelled. Optimal storage is at the lower half of this temperature range. To prevent contamination of unused product, do not return any material to its original container. For further specific shelf life information, contact your local Technical Service Centre.

**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 licence 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.