



# LOCTITE® 435™

December 2010

## PRODUCT DESCRIPTION

LOCTITE® 435™ provides the following product characteristics:

<b>Technology</b>	Cyanoacrylate
<b>Chemical Type</b>	Ethyl cyanoacrylate
<b>Appearance (uncured)</b>	Colorless to straw colored, slightly cloudy liquid <sup>LMS</sup>
<b>Components</b>	One part - requires no mixing
<b>Viscosity</b>	Low
<b>Cure</b>	Humidity
<b>Application</b>	Bonding
<b>Key Substrates</b>	Metals, Plastics and Rubbers

LOCTITE® 435™ is a rubber toughened adhesive with increased flexibility and peel strength along with enhanced resistance to shock. The product provides rapid bonding on a wide range of materials, including metals, plastics and elastomers, as well as porous and absorbent materials like wood, paper, leather and fabric.

## ISO-10993

An ISO 10993 Test Protocol is an integral part of the Quality Program for LOCTITE® 435™. LOCTITE® 435™ 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. **Note:** This is a regional approval. Please contact your local Technical Service Center for more information and clarification.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Flash Point - See MSDS	
Viscosity, Cone & Plate, mPa·s (cP):	
Temperature: 25 °C, Shear Rate: 1,000 s <sup>-1</sup>	100 to 250 <sup>LMS</sup>

## 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/mm<sup>2</sup>.

Fixture Time, seconds:	
Steel (degreased)	30 to 45
Aluminum (Isopropanol wiped)	≤60 <sup>LMS</sup>
Zinc dichromate	90 to 105
Neoprene	30 to 45
Rubber, nitrile	<5
SBR	90 to 105
ABS	10 to 20
PVC	60 to 75

Polycarbonate	45 to 60
Phenolic	10 to 20
G-10 Epoxy	45 to 60
Wood (oak)	75 to 90
Wood (balsa)	<5

## Cure Speed vs. Bond Gap

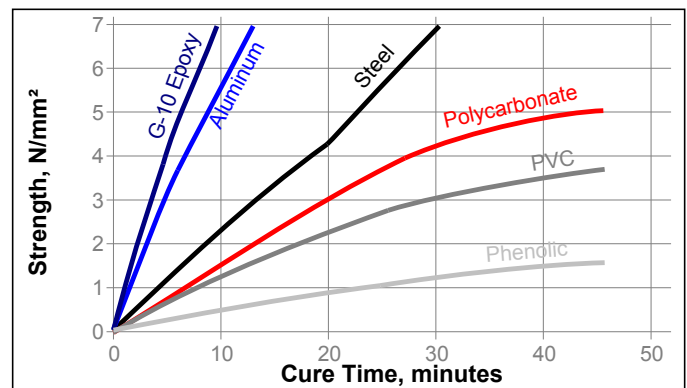
The rate of cure will depend on the bondline gap. Thin bond lines result in high cure speeds, increasing the bond gap will decrease the rate of cure.

## 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.

## Cure Speed vs. Time

The graph below shows the shear strength developed over time at 22 °C / 50 % RH on various substrates and tested according to ISO 4587.



## TYPICAL PROPERTIES OF CURED MATERIAL

Cured for 24 hours @ 22 °C

### Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K <sup>-1</sup>	80×10 <sup>-6</sup>
Coefficient of Thermal Conductivity ISO 8302, W/(m·K)	0.1
Glass Transition Temperature ISO 11359-2, °C	130

### Electrical Properties:

Surface Resistivity, IEC 60093, Ω	10×10 <sup>15</sup>
Volume Resistivity, IEC 60093, Ω·cm	10×10 <sup>15</sup>
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	25
Dielectric Constant / Dissipation Factor, IEC 60250:	
0.1 kHz	2.65 / <0.02
1 kHz	2.75 / <0.02
10 kHz	2.75 / <0.02



**TYPICAL PERFORMANCE OF CURED MATERIAL**

**Adhesive Properties**

Cured for 24 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm <sup>2</sup>	19
	(psi)	(2,700)
Aluminum	N/mm <sup>2</sup>	15
	(psi)	(2,200)
Nitrile	N/mm <sup>2</sup>	0.4
	(psi)	(60)
EPDM	N/mm <sup>2</sup>	0.5
	(psi)	(80)

Block Shear Strength, ISO 13445:

ABS	N/mm <sup>2</sup>	14
	(psi)	(2,000)
PVC	N/mm <sup>2</sup>	9
	(psi)	(1,300)
Polycarbonate	N/mm <sup>2</sup>	6
	(psi)	(840)
Phenolic	N/mm <sup>2</sup>	13
	(psi)	(1,800)
G-10 Epoxy	N/mm <sup>2</sup>	20
	(psi)	(2,900)

Tensile Strength, ISO 6922:

Steel (grit blasted)	N/mm <sup>2</sup>	30
	(psi)	(4,400)
Buna-N	N/mm <sup>2</sup>	3
	(psi)	(400)

Side Impact Resistance, J:

Aluminum	≥4 <sup>LMS</sup>
----------	-------------------

Cured for 48 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm <sup>2</sup>	≥15 <sup>LMS</sup>
	(psi)	(≥2,175)

180° Peel Strength, ISO 8510-2:

Steel (grit blasted)	N/mm	4
	(lb/in)	(20)

**TYPICAL ENVIRONMENTAL RESISTANCE**

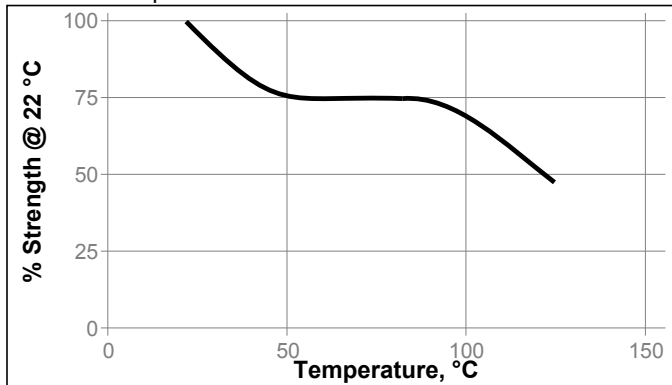
Cured for 72 hours @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)

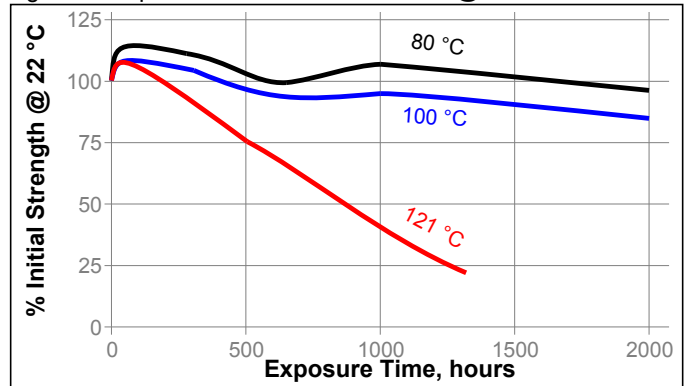
**Hot Strength**

Tested at temperature



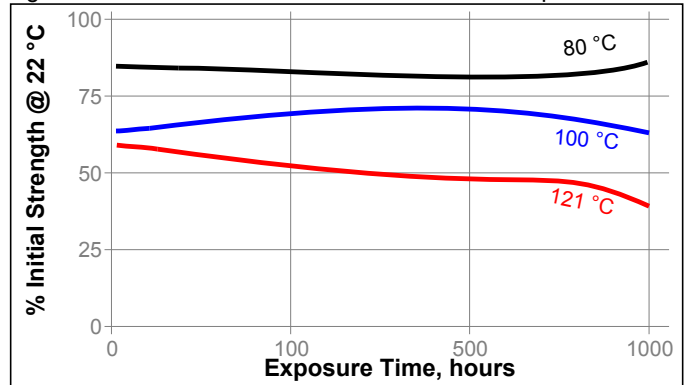
**Heat Aging**

Aged at temperature indicated and tested @ 22 °C



**Heat Aging/Hot Strength**

Aged under conditions indicated and tested at temperature



**Chemical/Solvent Resistance**

Aged under conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength		
		100 h	500 h	1000 h
Motor oil	40	100	100	100
Gasoline	22	100	100	90
Ethanol	22	100	100	100
Isopropanol	22	100	100	100
Heat/humidity 95% RH	40	100	100	100

Cured for 72 hours @ 22 °C

Block Shear Strength, ISO 13445:

Polycarbonate

**Chemical/Solvent Resistance**

Aged under conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength		
		100 h	500 h	1000 h
Heat/humidity 95% RH	40	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 oxidizing materials

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

**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<sup>LMS</sup>**

LMS dated November 01, 2005. 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**

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$   
 $\text{kV/mm} \times 25.4 = \text{V/mil}$   
 $\text{mm} / 25.4 = \text{inches}$   
 $\mu\text{m} / 25.4 = \text{mil}$   
 $\text{N} \times 0.225 = \text{lb}$   
 $\text{N/mm} \times 5.71 = \text{lb/in}$   
 $\text{N/mm}^2 \times 145 = \text{psi}$   
 $\text{MPa} \times 145 = \text{psi}$   
 $\text{N}\cdot\text{m} \times 8.851 = \text{lb}\cdot\text{in}$   
 $\text{N}\cdot\text{m} \times 0.738 = \text{lb}\cdot\text{ft}$   
 $\text{N}\cdot\text{mm} \times 0.142 = \text{oz}\cdot\text{in}$   
 $\text{mPa}\cdot\text{s} = \text{cP}$

**Note**

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

**Trademark usage**

Except as otherwise noted, all trademarks in this document are trademarks of Henkel Corporation in the U.S. and elsewhere. ® denotes a trademark registered in the U.S. Patent and Trademark Office.

Reference 1.1