Technical Data Sheet

LOCTITE® 431™

October 2010

PRODUCT DESCRIPTION

LOCTITE® 431™ provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl cyanoacrylate
Appearance (uncured)	Transparent, colorless to straw colored liquid[LMS]
Viscosity	Medium
Components	One part - requires no mixing
Cure	Humidity
Application	Bonding
Key Substrates	Metals , Plastics and Elastomers

LOCTITE® 431™ is designed for the assembly of difficult-to-bond materials which require uniform stress distribution and strong tension and/or shear strength. The product provides rapid bonding of a wide range of materials, including metals, plastics and elastomers. LOCTITE® 431™ is also suited for bonding porous materials such as wood, paper, leather and fabric.

ISO-10993

An ISO 10993 Test Protocol is an integral part of the Quality Program for LOCTITE® 431™. LOCTITE® 431™ 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	1.07
Flash Point - See SDS	
Viscosity, Cone & Plate, mPa·s (cP):	
Temperature: 25 °C, Shear Rate: 3,000 s^{-1}	600 to 1,200[LMS]
Viscosity, Brookfield - LVF, 25 °C, mPa·s (cP):	
Spindle 2, speed 6 rpm,	800 to 1,200

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	180 to 300
Aluminum	10 to 15
Zinc dichromate	50 to 70
Neoprene	15 to 45
Rubber, nitrile	10 to 30
ABS	10 to 15
PVC	15 to 30
Polycarbonate	5 to 10
Phenolic	20 to 45
Wood (balsa)	<3
Wood (oak)	30 to 60
Wood (pine)	45 to 60
Chipboard	30 to 45
Fabric	20 to 45
Leather	15 to 20
Paper	10 to 15

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. Humidity

The rate of cure will depend on the ambient relative humidity. The best results are achieved when the relative humidity in the working environment is 40% to 60% at 22°C. Lower humidity leads to slower cure. Higher humidity accelerates it, but may impair the final strength of the bond.

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

Cured for 1 week @ 22 °C

Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K^{-1}	364×10^{-6}
Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)	0.3
Glass Transition Temperature ISO 11359-2, °C	183

Electrical Properties:

Volume Resistivity, IEC 60093, Ω·cm	10.9×10^{15}
Surface Resistivity, IEC 60093, Ω	1.0×10^{15}
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	25
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	3.65 / 0.04
1 MHz	3.05 / 0.04
10 MHz	2.92 / 0.05

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 10 seconds @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥6.0[LMS]
	(psi)	(≥870)

Cured for 72 hours @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	5 to 19
	(psi)	(730 to 2,800)
Steel (grit blasted)	N/mm²	13 to 20
	(psi)	(1,900 to 2,900)

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	25 to 31
	(psi)	(3,600 to 4,500)
Aluminum (etched)	N/mm²	13 to 24
	(psi)	(1,900 to 3,500)
Zinc dichromate	N/mm²	3 to 10
	(psi)	(440 to 1,500)
ABS	N/mm²	8 to 11
	(psi)	(1,200 to 1,600)
PVC	N/mm²	5 to 13
	(psi)	(730 to 1,900)
Phenolic	N/mm²	2 to 7
	(psi)	(290 to 1,000)
Polycarbonate	N/mm²	7 to 11
	(psi)	(1,000 to 1,600)
Nitrile	N/mm²	0.5 to 1.5
	(psi)	(70 to 220)
Neoprene	N/mm²	1.0 to 1.5
	(psi)	(150 to 220)

TYPICAL ENVIRONMENTAL RESISTANCE

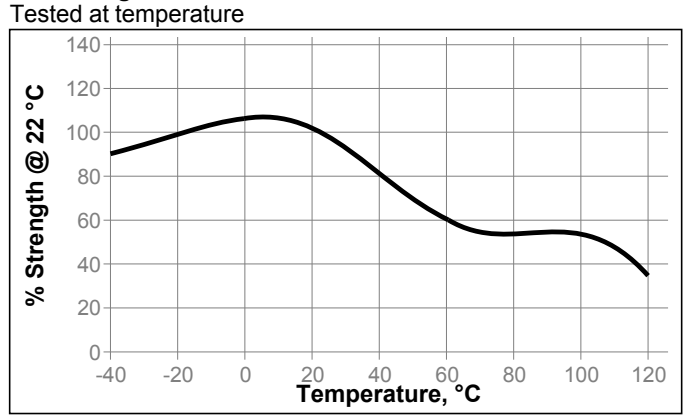
Cured for 1 week @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)

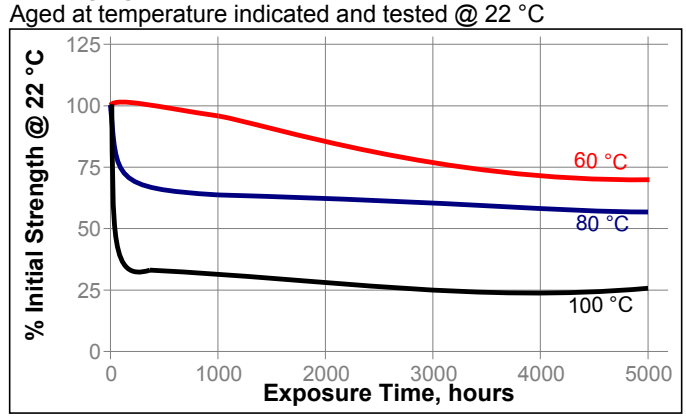
Hot Strength

Tested at temperature



Heat Aging

Aged at temperature indicated and tested @ 22 °C



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength			
Environment	**°C**	**100 h**	**500 h**	**1000 h**	**5000 h**
Motor oil	40	100	115	105	90
Unleaded gasoline	22	90	90	75	80
Ethanol	22	100	125	120	110
Isopropanol	22	120	135	130	140
Water	22	70	60	55	55
98% RH	40	110	50	45	55

Lap Shear Strength, ISO 4587:

Polycarbonate

		% of initial strength			
Environment	**°C**	**100 h**	**500 h**	**1000 h**	**5000 h**
Air	22	105	115	110	125
98% RH	40	110	120	125	120

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 Safety Data Sheet (SDS).

Directions for use:

1. Bond areas should be clean and free from grease. Clean all surfaces with a Loctite® cleaning solvent and allow to dry.
2. Loctite® Primer may be applied to the bond area. Avoid applying excess Primer. Allow the Primer to dry.
3. LOCTITE® Activator may be used if necessary. Apply the LOCTITE® Activator to one bond surface (do not apply activator to the primed surface where Primer is also used). Allow the Activator to dry.
4. Apply adhesive to one of the bond surfaces (do not apply the adhesive to the activated surface). Do not use items like tissue or a brush to spread the adhesive. Assemble the parts within a few seconds. The parts should be accurately located, as the short fixture time leaves little opportunity for adjustment.
5. LOCTITE® Activator can be used to cure fillets of product outside the bond area. Spray or drop the activator on the excess product.
6. Bonds should be held fixed or clamped until adhesive has fixtured.
7. Product should be allowed to develop full strength before subjecting to any service loads (typically 24 to 72 hours after assembly, depending on bond gap, materials and ambient conditions).

Loctite Material Specification[LMS]
LMS dated December 22, 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
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

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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Reference 0.4