LOCTITE® 401™

(TDS for new formulation of Loctite® 401™) February 2012

PRODUCT DESCRIPTION

LOCTITE® 401™ provides the following product characteristics:

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

This Technical Data Sheet is valid for LOCTITE® 401™ manufactured from the dates outlined in the "Manufacturing Date Reference" section.

LOCTITE® 401™ 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® 401™ is also suited for bonding porous materials such as wood, paper, leather and fabric.

NSF International

Registered to NSF Category P1 for use as a sealant where there is no possibilty of food contact in and around food processing areas. **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: 3,000 s^{-1}	70 to 110[LMS]
Viscosity, Brookfield - LVF, 25 °C, mPa·s (cP):	
Spindle 1, speed 30 rpm	100 to 120

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	<5
Aluminum	<5
Neoprene	<5
Rubber, nitrile	<5
ABS	<5
PVC	<5
Polycarbonate	5 to 10
Phenolic	<5
Wood (balsa)	<5
Wood (oak)	15 to 30
Wood (pine)	15 to 20
Chipboard	<5
Fabric	10 to 20
Leather	15 to 30
Paper	<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. Humidity

The rate of cure will depend on the ambient relative humidity. Higher relative humidity levels result in more rapid speed 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.

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 10 seconds @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	≥6.9[LMS]
	(psi)	(≥1,000)

Cured for 72 hours @ 22 °C

Tensile Strength, ISO 6922:

Buna-N	N/mm²	13.7
	(psi)	(1,900)

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	20
	(psi)	(2,900)
Aluminum (etched)	N/mm²	12.4
	(psi)	(1,800)
Zinc dichromate	N/mm²	2.5
	(psi)	(360)
ABS	* N/mm²	7.5
	* (psi)	(1,090)
PVC	* N/mm²	10
	* (psi)	(1,450)
Phenolic	* N/mm²	12.6
	* (psi)	(1,820)
Polycarbonate	* N/mm²	9.6
	* (psi)	(1,400)
Nitrile	* N/mm²	1.2
	* (psi)	(170)
Neoprene	* N/mm²	1.1
	* (psi)	(160)

Block Shear Strength, ISO 13445:

Polycarbonate	N/mm²	11
	(psi)	(1,600)
ABS	* N/mm²	23
	* (psi)	(3,340)
PVC	N/mm²	2.6
	(psi)	(380)
Phenolic	* N/mm²	21.3
	* (psi)	(3,090)

* substrate failure

TYPICAL ENVIRONMENTAL RESISTANCE

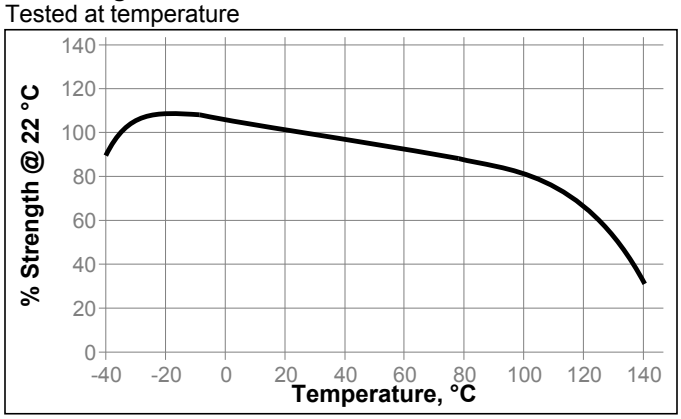
Cured for 1 week @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)

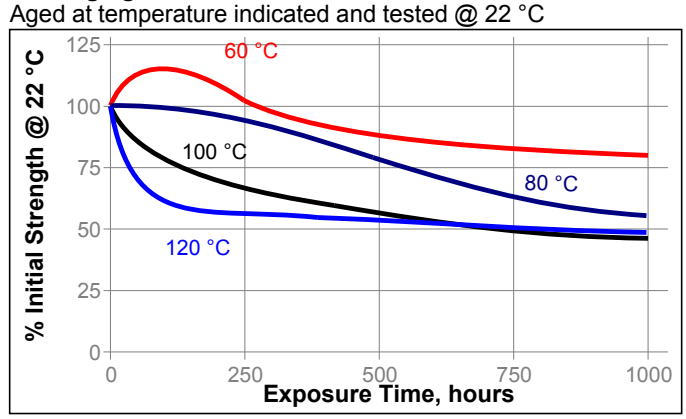
Hot Strength

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**
Motor oil	40	115	85	85
Unleaded gasoline	22	85	90	95
Water	22	75	80	75
Water/glycol	22	85	75	65
Ethanol	22	100	110	130
Isopropanol	22	115	100	120
98% RH	40	80	65	65

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22°C.

Lap Shear Strength, ISO 4587, Polycarbonate

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

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. Bond areas should be clean and free from grease. Clean all surfaces with a Loctite® cleaning solvent and allow to dry.
2. To improve bonding on low energy plastic surfaces, 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 it 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).

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.

Loctite Material Specification[LMS]

LMS dated December 22, 2011. 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.

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

Manufacturing Date Reference

This Technical Data Sheet is valid for LOCTITE® 401™ manufactured from the dates below:

Made in:	**First manufacturing date**:
EU	November 2011
China	Pending
India	Pending
U.S.A.	Pending

The manufacturing date can be determined from the batch code on the pack. For assistance please contact your local Technical Service Center or Customer Service Representative.

Note

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Trademark usage

Reference 2.5