

LOCTITE[®] 4902[™]

August 2014

PRODUCT DESCRIPTION

LOCTITE[®] 4902[™] provides the following product characteristics:

Technology	Cyanoacrylate
Chemical Type	Ethyl and octyl cyanoacrylate
Appearance	Clear colorless liquid ^{LMS}
Components	One part - requires no mixing
Viscosity	Low
Cure	Humidity
Application	Assembly of disposable medical devices.
Key Substrates	Plastics, Rubbers and Metals

LOCTITE[®] 4902[™] is a highly flexible cyanoacrylate adhesive designed for the assembly of flexible medical devices. This product facilitates the use of dissimilar and opaque substrates while improving device performance. LOCTITE[®] 4902[™] offers significant performance enhancements compared to standard cyanoacrylates, including strength in flexing bond lines and resistance to leaks with excellent sealing capability. Known performance advantages of cyanoacrylates are maintained, including speed, ease of use and strength.

ISO-10993

An ISO 10993 Test Protocol is an integral part of the Quality Program for LOCTITE[®] 4902[™]. LOCTITE[®] 4902[™] 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.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.03
Flash Point - See SDS	
Viscosity, Cone & Plate, mPa·s (cP): Temperature: 25 °C, Shear Rate: 100 s ⁻¹	150 to 250 ^{LMS}

TYPICAL CURING PERFORMANCE

Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The time to develop a shear strength of 0.1 N/mm² on different materials at 22 °C and 50% relative humidity

Fixture Time, seconds:

Aluminium	≤20 ^{LMS}
ABS	<5 to 10
Acrylic	30 to 45
Neoprene	120 to 210
Nitrile	20 to 45
Polycarbonate	5 to 10
PVC	15 to 45
Steel	10 to 30

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 may 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 7 days @ 22 °C

Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K ⁻¹ :	
Below Tg	110×10 ⁻⁶
Above Tg	425×10 ⁻⁶
Glass Transition Temperature ISO 11359-2, °C	50
Shore Hardness, ISO 868, Shore A	65
Tensile Modulus	N/mm ² 400 (psi) (57,900)

Electrical Properties:

Surface Resistivity, IEC 60093, ohms	145×10 ¹⁵
Volume Resistivity, IEC 60093, ohm-cm	11×10 ¹⁵
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	32
Dielectric Constant / Dissipation Factor, IEC 60250:	
@ 1 KHz	3.34/0.04
@ 1 MHz	2.86/0.04
@ 10 MHz	2.76/0.04

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 24 hours @ 22 °C / 50% RH

Lap Shear Strength, ISO 4587:

Grit Blasted Mild Steel (GBMS) N/mm² ≥10.3^{LMS}
(psi) (≥1,495)

Cured for 72 hours @ 22 °C / 50% RH

Tensile Strength, ISO 6922:

Buna-N N/mm² 16
(psi) (2,250)

Lap Shear Strength, ISO 4587:

Grit Blasted Mild Steel (GBMS) N/mm² 12
(psi) (1,745)

Aluminum (etched) N/mm² 14
(psi) (2,000)

Nitrile N/mm² 0.4
(psi) (65)

Neoprene N/mm² 0.6
(psi) (83)

ABS * N/mm² 8
(psi) (1,160)

PMMA * N/mm² 4.3
(psi) (625)

Polycarbonate N/mm² 7.9
(psi) (1,150)

PVC * N/mm² 5.8
(psi) (840)

* substrate failure

Block Shear Strength, ISO 13445:

ABS N/mm² 25
(psi) (3,675)

PVC N/mm² 4
(psi) (575)

Acrylic N/mm² 8
(psi) (1,190)

Polycarbonate N/mm² 15
(psi) (2,220)

TYPICAL ENVIRONMENTAL RESISTANCE

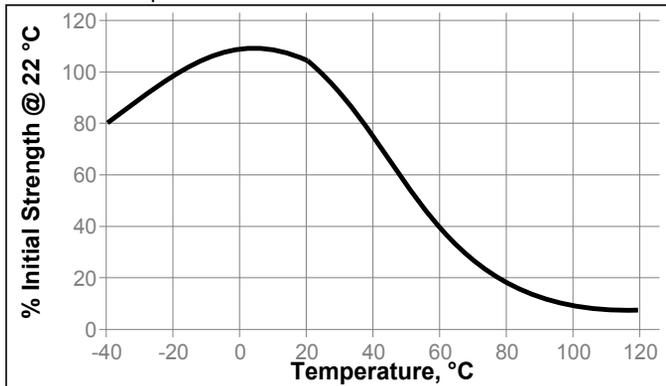
Cured for 72 hours @ 22 °C / 50% RH

Lap Shear Strength, ISO 4587:

Grit Blasted Mild Steel (GBMS)

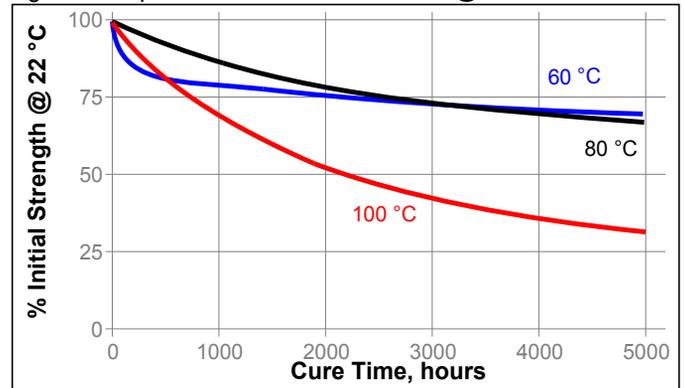
Hot Strength

Tested at temperature



Heat Aging

Aged at temperature indicated and tested @ 22 °C



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength			
		100 h	500 h	1000 h	5000 h
Motor oil	40	85	70	65	60
Unleaded gasoline	22	65	10	25	0
Ethanol	22	75	45	15	0
Isopropanol	22	80	105	110	20
Water	22	70	65	60	45
98% RH, 40°C	40	55	50	65	50

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	5000 h
Air	22	80	95	140	105
98% RH, 40°C	40	140	140	150	140

Sterilization Resistance of Needle Assemblies

Sterilized as indicated and tested @ 22 °C

% of initial strength:

	Gamma	ETO	Autoclave	
	30kGy	1 Cycle	1 Cycle	5 Cycles
Polycarbonate	115	110	130	125

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. 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 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).
8. This product performs best in thin bond gaps (0.05 mm / 2 mil).

Loctite Material Specification^{LMS}

LMS dated October 30, 2013. 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 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.

Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

In case products are delivered by Henkel Belgium NV, Henkel Electronic Materials NV, Henkel Nederland BV, Henkel Technologies France SAS and Henkel France SA please additionally note the following:

In case Henkel would be nevertheless held liable, on whatever legal ground, Henkel's liability will in no event exceed the amount of the concerned delivery.

In case products are delivered by Henkel Colombiana, S.A.S. the following disclaimer is applicable:

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. 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.

Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

In case products are delivered by Henkel Corporation, Resin Technology Group, Inc., or Henkel Canada Corporation, the following disclaimer is applicable:

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 0.0