

# LOCTITE 3612

January 2014

## PRODUCT DESCRIPTION

LOCTITE 3612 provides the following product characteristics:

<b>Technology</b>	Epoxy
Chemical Type	Epoxy
Appearance (uncured)	Yellow viscous liquid <sup>LMS</sup>
Fluorescence	Positive under UV light
Components	One component - requires no mixing
<b>Cure</b>	Heat cure
<b>Application</b>	Surface mount adhesive
Key Substrates	SMD components to PCB
Other Application Areas	Small parts bonding
Dispense Method	Stencil print
Wet Strength	Very high

LOCTITE 3612 is designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering. Particularly suited for applications where medium print speeds, high dot profile, high wet strength and good electrical characteristics are required.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

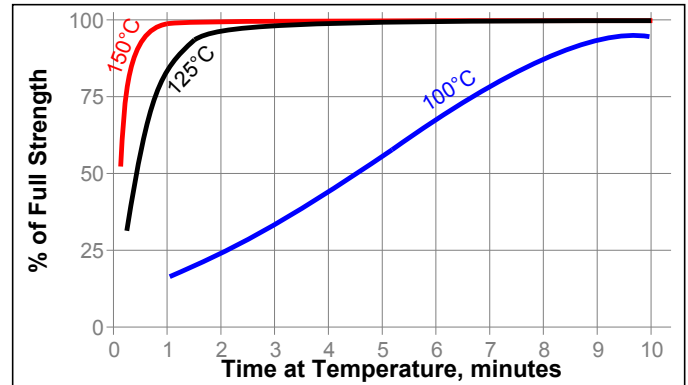
Specific Gravity @ 25 °C	1.36
Yield Point, 25 °C, Pa	350 to 725 <sup>LMS</sup>
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	
Casson Viscosity @ 25 °C, Pa·s	15 to 55
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	
Flash Point - See SDS	

## TYPICAL CURING PERFORMANCE

Recommended conditions for curing are exposure to heat above 100 °C (typically 90-120 seconds @ 150 °C). Rate of cure and final strength will depend on the residence time at the cure temperature.

### Cure Speed vs. Time, Temperature

The following graph shows the rate of torque strength developed with time at different temperatures. These times are defined from the moment the adhesive reaches cure temperature. In practice, total oven time may be longer to allow for heat up period. Strength is measured on 1206 capacitors @ 22 °C, tested according to IPC SM817, TM-650 Method 2.4.42.



## Isothermal DSC Conversion

5 minutes @ 125 °C, %

95 to 100<sup>LMS</sup>

## TYPICAL PROPERTIES OF CURED MATERIAL

Cured for 30 minutes @ 150 °C

### Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K <sup>-1</sup>	52×10 <sup>-6</sup>
Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)	0.3
Specific Heat, kJ/(kg·K)	0.3
Density, BS 5350-B1 @ 25 °C, g/cm <sup>3</sup>	1.4
Glass Transition Temperature, ASTM D 4065, °C	155

### Electrical Properties:

Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	3.1 / 0.02
10 kHz	2.9 / 0.03
1,000 kHz	2.8 / 0.02
10,000 kHz	2.7 / 0.02
Volume Resistivity, IEC 60093, Ω·cm	1.8×10 <sup>15</sup>
Surface Resistivity, IEC 60093, Ω	22×10 <sup>15</sup>
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	40.1
Surface Insulation Resistance, Ω:	
IPC TM 650 2.6.3.1:	
Test Board: IPC-B-25A, comb pattern D:	
Initial	10×10 <sup>9</sup>
Aged for 7 days @ 85 °C, 85 % RH	10×10 <sup>9</sup>
Electrolytic Corrosion, DIN 53489	A - 1

**TYPICAL PERFORMANCE OF CURED MATERIAL**

**Adhesive Properties**

Cured for 5 minutes @ 125 °C

Torque Strength, IPC SM817, TM-650 Method 2.4.42:

C-1206 on bare FR4 board	N-mm	30 to 70
	(in.oz)	(4 to 10)

Pull-off Strength, Siemens norm SN59651:

C-1206 on bare FR4 board	N	32 to 64
	(lb)	(7.2 to 14.4)

Push-off Strength:

C-1206 on bare FR4 board	N	≥30 <sup>LMS</sup>
	(lb)	(≥6.75)

Cured for 30 minutes @ 150 °C

Lap Shear Strength, ISO 4587:

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

Bond strength achieved in practice will vary considerably depending on the SMD component type, adhesive dot size and the type, grade and degree of cure of the solder mask/resist.

**TYPICAL ENVIRONMENTAL RESISTANCE**

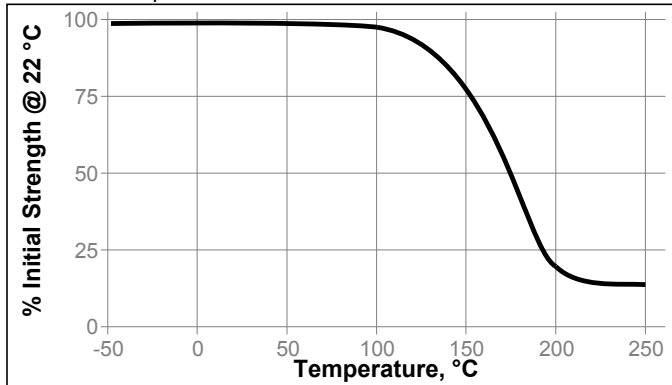
Cured for 30 minutes @ 150 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)

**Hot Strength**

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
Air	22	100	95	90
Heat/humidity 98% RH	40	85	85	85

**Resistance to Hot Solder Dip**

Cured for 90 seconds @ 150 °C

Hot Solder Dip, IPC SM817, TM-650 Method 2.4.42.1, Pass/Fail:

R-1206 on bare FR4 board:

Supported 60 seconds above solder bath @ 260°C and dipped for 10 seconds	Pass
--	------

**Resistance to Wave Solder Process**

Cured for 90 seconds @ 150 °C

Wave Solder, IPC SM817 @ 260°C:

R-1206 on bare FR4 board:

Ramp up conditions: 4 °C/s	Pass
Solder time on turbulent and laminar wave: 15 - 20 seconds	

**GENERAL INFORMATION**

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

**Directions for use:**

1. LOCTITE 3612 is suitable for all common open squeegee and enclosed head stencil printing systems, such as ProFlow®, PumpPrint®, Varidot™. Loctite stencil print Chipbonders are suitable for print speeds of 20 mm/s up to 150 mm/s - this will vary with product selected and printer set-up.
2. After storage in a refrigerator the adhesive must be allowed to equilibrate to room temperature before use, typically 2 to 4 hours.
3. Printing conditions should be about 25°C, and RH less than 70 % for optimum results. Higher temperatures will decrease the viscosity and will effect the printing results. Higher humidity conditions may lead to moisture pick up and will reduce the "on stencil" life of the product: At 25°C, 55 % RH, the product will remain dispensable on the stencil for a maximum of 5 days of continuous operation. The quality of the print results will depend on board support, print gap, print speed, print pressure and separation speed.

4. Typical starting parameters (steel stencil/ steel squeegee/ single stroke mode\*):

Print Speed	60 mm/s
Squeegee Pressure	3 to 4 N/cm (just enough to clean the stencil)
Separation Speed	0.1 to 3 mm/s
Gap between Stencil and PCB	On contact

\*For higher dots Print and Flood Mode can be used. Set up pressure for front squeegee as described above. For flood printing, rear squeegee pressure should be set to 0 kg to leave a sufficient adhesive layer (1 to 2 mm) on the stencil. These parameters will vary depending on type of printing process and should be optimized accordingly.

5. Uncured adhesive should only be cleaned from the board with isopropanol, MEK or ester blends such as LOCTITE® 7360™. Alcohols (e.g. Isopropanol) can cure the adhesive and may lead to blocked apertures if left on the stencil for over 5 minutes. Automatic under-stencil-wipe is not recommended.
6. Cured adhesive can only be removed mechanically with the aid of heat.

**Loctite Material Specification<sup>LMS</sup>**

LMS dated December 13, 2001. 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 1.2