Technical Data Sheet

LOCTITE 3612

January 2014

PRODUCT DESCRIPTION

LOCTITE 3612 provides the following product characteristics:

Technology	Epoxy
Chemical Type	Epoxy
Appearance (uncured)	Yellow viscous liquid[LMS]
Fluorescence	Positive under UV light
Components	One component - requires no mixing
Cure	Heat cure
Application	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

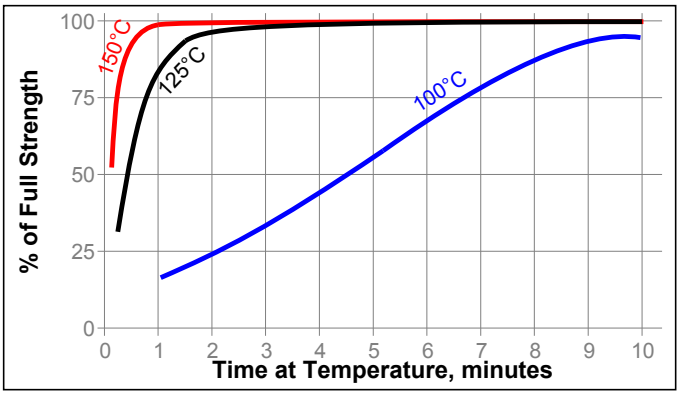
Specific Gravity @ 25 °C	1.36
Yield Point, 25 °C, Pa	350 to 725[LMS]
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	
Casson Viscosity @ 25 °C, Pa·s	15 to 55
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	
Flash Point - See SDS	

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[LMS]

TYPICAL PROPERTIES OF CURED MATERIAL

Cured for 30 minutes @ 150 °C

Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K^{-1}	52×10^{-6}
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/cm³	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^{15}
Surface Resistivity, IEC 60093, Ω	22×10^{15}
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^{9}
Aged for 7 days @ 85 °C, 85 % RH	10×10^{9}
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 (in.oz)	30 to 70 (4 to 10)

Pull-off Strength, Siemens norm SN59651:

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

Push-off Strength:

C-1206 on bare FR4 board	N (lb)	≥30[LMS] (≥6.75)

Cured for 30 minutes @ 150 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm² (psi)	≥15[LMS] (≥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

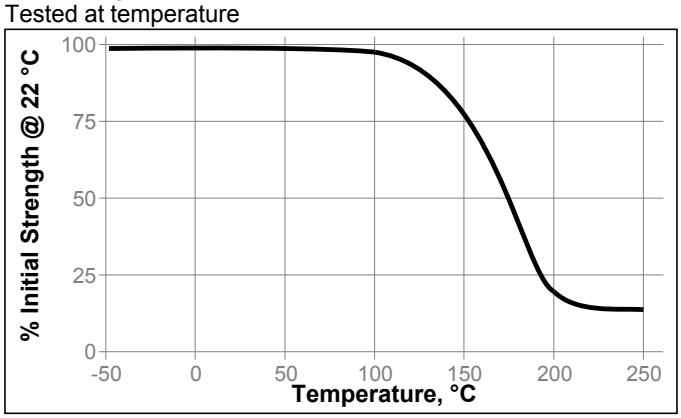
Cured for 30 minutes @ 150 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)

Hot Strength

Tested at temperature



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength		
Environment	**°C**	**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 Solder time on turbulent and laminar wave: 15 - 20 seconds	Pass

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[LMS]

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
(°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:
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Reference 1.2