LOCTITE® 3609™

March 2008

PRODUCT DESCRIPTION

LOCTITE® 3609™ provides the following product characteristics:

Technology	Epoxy
Chemical Type	Epoxy
Appearance (uncured)	Dark, red viscous gel[LMS]
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	Syringe
Dispense Speed	Medium 15,000 -25,000 dots/h
Wet Strength	High

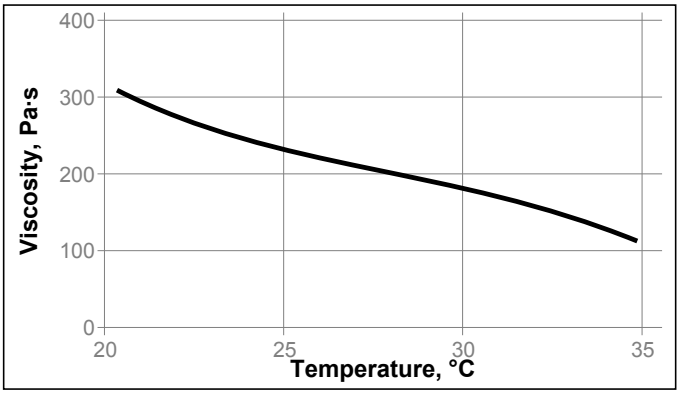
LOCTITE® 3609™ is designed for the bonding of surface mounted devices to printed circuit boards prior to wave soldering. Particularly suited for applications where medium to high dispense speeds, high dot profile, high wet strength and good electrical characteristics are required. LOCTITE® 3609™ has been used successfully in lead free processes with water and alcohol based fluxes under conditions outlined in the Environmental Resistance section.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.2
Particle Size, µm	<150
Flash Point - See MSDS	
Yield Point, 25 °C, Pa	250 to 700[LMS]
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	
Casson Viscosity @ 25 °C, Pa·s	0.16 to 2.0
Cone & Plate Rheometer:	
Haake PK 100, M10/PK 1 2° Cone	

VISCOSITY VS. TEMPERATURE

The following graph shows a typical temperature-viscosity curve as measured using a Haake rotoviscometer PK100, M10/PK1 2° Cone system at a shear rate of 2 s^{-1} which is representative of the shear rate in the dispense nozzle. Increased cabin or nozzle temperature in the 30°C to 35°C range may aid dispense performance at higher dispense speeds.

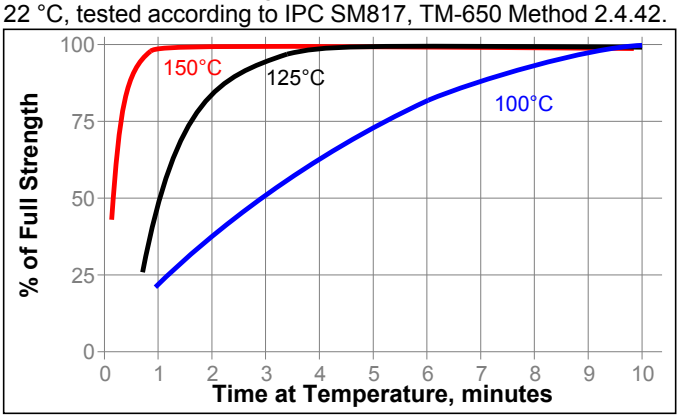


TYPICAL CURING PERFORMANCE

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.



TYPICAL PROPERTIES OF CURED MATERIAL

Cured for 30 minutes @ 150 °C

Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K^{-1}	145×10^{-6}
Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)	0.4
Glass Transition Temperature, ASTM D 4065, °C	73
Specific Heat, kJ/(kg·K)	0.3
Density, BS 5350-B1 @ 25 °C, g/cm³	1.4

Electrical Properties:

Surface Resistivity, IEC 60093, Ω	2×10^{15}
Volume Resistivity, IEC 60093, Ω·cm	2×10^{15}
Surface Insulation Resistance, Ω:	
SN 59651:	
Initial	0.1×10^{9}
Aged for 4 days @ 40 °C, 93 % RH	10×10^{9}
Aged for 21 days @ 40 °C, 93 % RH	1×10^{9}
Electrolytic Corrosion, DIN 53489	AN-1.2
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	3.7 / 0.009
10 kHz	3.3 / 0.03
1,000 kHz	3.2 / 0.03
10,000 kHz	3.1 / 0.03

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 10 minutes @ 110 °C		
Push-off Strength:		
C-1206 on bare FR4 board	N (lb)	≥20[LMS] (≥4.5)
Cured for 5 minutes @ 125 °C		
Pull-off Strength, Siemens norm SN59651:		
C-1206 on bare FR4 board	N (lb)	40 to 80 (9 to 18)
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)
Cured for 30 minutes @ 150 °C		
Lap Shear Strength, ISO 4587:		
Steel (grit blasted)	N/mm² (psi)	≥10[LMS] (≥1,450)

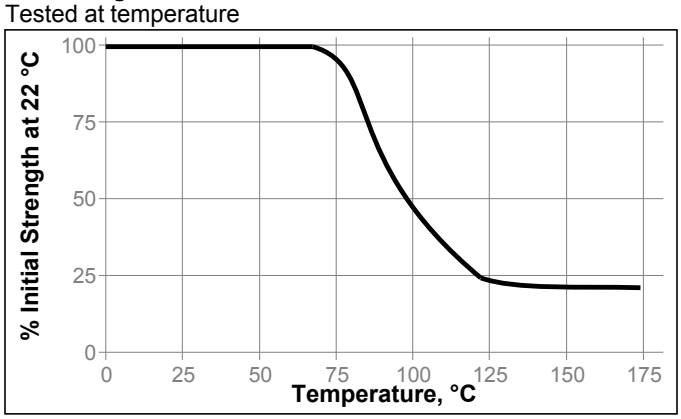
Bond strength achieved in practice will vary considerably depending on the SMD component type, adhesive dot size and the type, grade and degree of cure of the solder mask/resist.

TYPICAL ENVIRONMENTAL RESISTANCE

Cured for 30 minutes @ 150 °C
Lap Shear Strength, ISO 4587:
Mild 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	100	95
Air	150	85	70	70
Heat/humidity 98% RH	40	110	110	100

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 Process Conditions

Cured for 90 seconds @ 150 °C
Torque Strength, IPC SM817 , TM-650 Method 2.4.42, % of initial strength retained:
C-1206 on bare FR4 board:
Aged 30 seconds preheat to 100°C and 3 seconds @ 260°C with flux and wave solder — 100

Resistance to Lead Free Solder

LOCTITE® 3609™ can be used in lead free wave solder with both water based and alcohol based fluxes

Lead Free Solder Test Conditions

Flux Types	Multicore MF200 (alcohol based) and Multicore MF300 (water based)
Wave Condition	100°C pre-heat with dual wave at 260°C
Components	C1608 bonded with twin dot 0.8mm SOD 80 bonded with single dot 1.1mm
Result	No component loss in the wave

GENERAL INFORMATION

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

Directions for use

1. LOCTITE® 3609™ is supplied de-aerated in a range of ready-to-use syringes which fit straight into a variety of air pressure/time dispensing systems commonly available.
2. After storage in a refrigerator the adhesive must be allowed to equilibrate to room temperature before use, typically 2 to 4 hours.
3. Avoid cross contamination with other adhesive residues by ensuring dispense nozzels, adapters etc. are thoroughly cleaned.
4. Do not leave dirty nozzles on dispensing equipment while not in use or soaking in solvents for long periods of time.
5. The quantity of adhesive dispensed will depend on the dispense pressure, time, nozzle size and temperature.
6. These parameters will vary depending on the type of dispensing system used and should be optimised accordingly.
7. Dispensing temperature should ideally be controlled at a value between 30 °C to 35 °C for optimum results, however higher dispense temperatures are possible.
8. LOCTITE® 3609™ can also be dispensed using positive displacement pump systems.
9. The product is not recommended for dispensing by pin

transfer.

10. Uncured adhesive can be cleaned from the board with isopropanol, MEK or ester blends such as LOCTITE® 7360™.

Loctite Material Specification[LMS]

LMS dated February 04, 2004. 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 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.

Reference 1.2