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Technical Data Sheet
Product 3514

Electronics Products, December 2002

PRODUCT DESCRIPTION

LOCTITE(TM) Product 3514 is a single component, epoxy adhesive designed for use as an underfill resin for CSP and BGA. It cures rapidly at low temperature on exposure to heat. It is designed to give excellent protection of assembled devices from failure due to physical impact and/or thermal cycling. The low viscosity allows easy filling in gap under CSP or BGA.

PROPERTIES OF UNCURED MATERIAL

	Typical Value
Chemical Type	Epoxy
Appearance	Brown liquid
Specific gravity @ 25°C	1.16
Viscosity @ 25°C, mPa·s (cP)	3,500
HAAKE viscometer, PK1, 2° Constant shear rate @ 36 1/s	
Pot life @ 25°C, hrs	48

RECOMMENDED CURING CONDITIONS

10 minutes at 150°C bondline temperature
15 minutes at 120°C bondline temperature
30 minutes at 100°C bondline temperature

Note: Sufficient time must be added to allow the bond location to reach the desired cure temperature. Curing profiles should be developed for each device.

TYPICAL PROPERTIES OF CURED MATERIAL

(Cured 60 min. @ 100°C)

Physical Properties

Density, g/cm^3	1.19
Shrinkage, %	3.0
Hardness (Shore D), ASTM D2240	89
Glass transition temperature (Tg) via DMTA, ASTM E1640, °C	140
Coefficient of thermal expansion, ASTM E831,	
Pre Tg, /°C	57 x 10^{-6}
Post Tg, /°C	170 x 10^{-6}
Coefficient of thermal conductivity, ASTM E1530, W/(m·°C)	0.21
Water absorption, ASTM D570, 24 hrs @ 25°C , %	0.25
Tensile strength at break, ASTM D882, N/mm^2	80
Elongation at break, ASTM D882, %	4.3
Modulus, ASTM D882, N/mm^2	2,800

Electrical Properties

Dielectric constant, ASTM D150	
@ 100 kHz	3.5
@ 1 MHz	3.4
@ 10 MHz	3.3
Dissipation factor, ASTM D150	
@ 100 kHz	0.017
@ 1 MHz	0.023
@ 10 MHz	0.028
Volume resistivity, ASTM D257, Ω·cm	3.4 x 10^{16}
Surface resistivity, ASTM D257, Ω	1.3 x 10^{16}
Dielectric strength, ASTM D149, kV/mm	23
Surface insulation resistance, IPC-TM650 2.6.3.3., Ω	
Initial	1.2 x 10^{13}
5 DCV loaded for 96 hrs @ 85°C, 85% Relative Humidity	1.4 x 10^{11}

PERFORMANCE OF CURED MATERIAL

(Cured 60 min. @ 100°C)

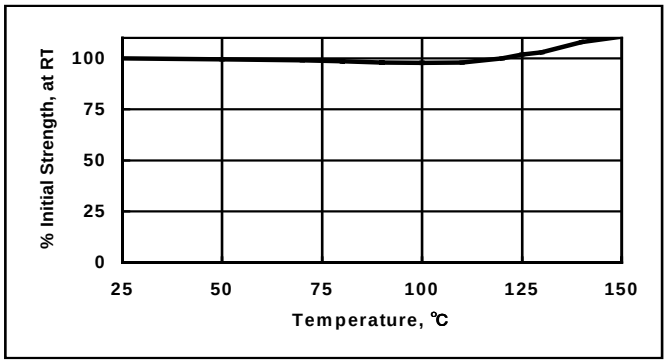
	Typical Value
Shear strength, ASTM D1002, N/mm^2	
Grit blasted mild steel	18
Epoxy-Glass	22

TYPICAL ENVIRONMENTAL RESISTANCE

Test Procedure: ASTM D1002
Substrate: Epoxy-Glass
Cure Procedure: 60 min. @ 100°C

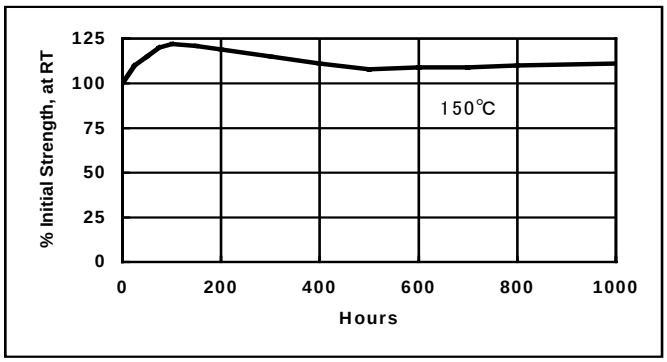
Hot Strength

Tested at temperature.



Heat Aging

Aged at temperature indicated and tested at RT.



Typical Chemical Resistance

Aged under condition indicated and tested at RT.

Condition	% of initial strength retained at 100hrs	500hrs	1000hrs
85%Relative Humidity@85°C	110	100	100

NOT FOR PRODUCT SPECIFICATIONS
THE TECHNICAL DATA CONTAINED HEREIN ARE INTENDED AS REFERENCE ONLY.
PLEASE CONTACT HENKEL JAPAN LTD. LOCTITE DIVISION, QUALITY DEPARTMENT FOR ASSISTANCE AND RECOMMENDATIONS
ON SPECIFICATIONS FOR THIS PRODUCT. YOKOHAMA, JAPAN FAX: +81 (45)-758- 1828

A Henkel Company

Storage
Product shall be ideally stored in a cool, dry location in unopened containers at a temperature between 2°C to 10°C unless otherwise labelled. Optimal storage is at the lower half of this temperature range. To prevent contamination of unused product, do not return any material to its original container. For further specific shelf life information, contact your local Technical Service Centre.

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 oxidising materials.

Irritanting to eyes and skin. May cause sensitization by skin contact. In case of eye contact, flush with water for at least fifteen minutes; get medical attention. Wash with plenty of soap and water after skin contact.

Excessive or repeated skin contact may cause skin irritation and skin sensitizer. If skin reaction occurs, discontinue use and consult a physician. To avoid skin contact, use the applicator nozzle provided. Other applicators are available from Loctite.

KEEP MATERIAL AWAY FROM CHILDREN.
For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Data Ranges
The data contained herein may be reported as a typical value and/or range. Values are based on actual test data and are verified on a periodic basis.

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, Loctite specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loctite’s products. Loctite 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 Loctite patents which may cover such processes or compositions. We recommend that each prospective user test his proposed applications before repetitive use, using this data as a guide. This product may be covered by one or more patents or patent applications.