LOCTITE® 3565™

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PRODUCT DESCRIPTION

LOCTITE® 3565™ provides the following product characteristics:

Technology	Epoxy
Chemical Type	Epoxy
Appearance (uncured)	Pink viscous liquid LMS
Components	One component - requires no mixing
Cure	Heat cure
Application	Underfill
Dispense Method	Syringe
Key Substrates	Electronic components

LOCTITE® 3565™ is a high reliability, fast cure, liquid epoxy designed for use as a capillary flow underfill for flip chip devices. It is designed for applications that require maximum reliability and moderate flow speed underneath the chip. Its rheology is designed to allow it to penetrate gaps as small as 25 µm. LOCTITE® 3565™ is easily dispensed, minimizes induced stress, provides improved temperature cycling performance and has excellent chemical resistance.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.74
Viscosity, Cone & Plate, mPa·s (cP):	
Temperature: 25 °C, Shear Rate: 5 s^{-1}	45,000
Temperature: 25 °C, Shear Rate: 20 s^{-1}	45,000
Capillary Flow Rate, seconds:	
Flow time, 100 °C, glass to glass, 25 µm: 1/4" flow	≤30 LMS
Flow time, 100 °C, glass to glass, 25 µm: 1/2" flow	≤100
Flow time, 100 °C, glass to glass, 25 µm: 1" flow	≤5
VOC, ASTM D 3960, g/l	135
Moisture Content, ASTM D 4017, %	0.01
Total Volatile Content, ASTM D 2369, %	8
Filler Content, %	60
Particle Size, µm	<10
Flash Point - See MSDS	

TYPICAL CURING PERFORMANCE

Recommended conditions for curing are exposure to heat above 100°C (typically 30 - 60 minutes @ 150°C). Rate of cure and final strength will depend on the residence time at the cure temperature.

TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-2, K^{-1}:	
Pre Tg	25×10^{-6}
Post Tg	80×10^{-6}
Glass Transition Temperature, ISO 11357-2, °C	≥140 LMS
Water Absorption, ISO 62, %:	
2 hours in boiling water:	
Increased weight	<0.5
Soluble matter loss	<0.19
Water absorbed	<0.31
24 hours in water @ 22 °C:	
Increased weight	<0.21
Soluble matter loss	<0.02
Water absorbed	<0.23
Coefficient of Thermal Conductivity ASTM F 433, W/(m·K)	0.48
Extractable Ionic Content, , µg/g:	
Chloride	<10
Potassium	<1
Sodium	<1
Tensile Strength, ISO 527-3	N/mm² (psi) 50 (7,250)
Tensile Modulus, ISO 527-3	N/mm² (psi) 3,500 (507,630)
Elongation, ISO 527-3, %	2
Shore Hardness, ISO 868, Durometer D	88
Volume Shrinkage, ASTM D 792, %	<0.5

Electrical Properties:

Dielectric Breakdown Strength, IEC 60243-1, kV/mm	29.5
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	3.2 / 0.002
10 kHz	3.2 / 0.004
100 kHz	3.2 / 0.008
Volume Resistivity, IEC 60093, Ω·cm	$>1.9\times10^{15}$
Surface Resistivity, IEC 60093, Ω	$>19\times10^{15}$

After 3 weeks @ 85 °C / 85% RH

Electrical Properties:

Dielectric Breakdown Strength, IEC 60243-1, kV/mm	27.6
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	3.3 / 0.003
10 kHz	3.3 / 0.005
100 kHz	3.3 / 0.01
Volume Resistivity, IEC 60093, Ω·cm	$>1.9\times10^{15}$
Surface Resistivity, IEC 60093, Ω	$>1\times10^{15}$

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 1 hour @ 150 °C, tested @ 22 °C

Lap Shear Strength, ISO 4587:	
Epoxyglass:	
0.127 mm gap	N/mm² (psi) >11.7 LMS (≥1,700)

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 Material Safety Data Sheet (MSDS).

Directions for use

1. LOCTITE® 3565™ has a typical work life of 8-12 hours.
2. For best results, the application substrate should be preheated, typically to 100°C. Although not required, the dispense nozzle may be preheated (30°C to 50°C maximum) in order to decrease viscosity/increase flow speed. It is important to note that flow speed is significantly increased by preheating the substrate, but only slightly increased when using nozzle heat.
3. System pressure should typically be between (0.1and 0.3 MPa). Dispense speed should also typically be between (2 and 12 mm/s). In addition, the dispense platform should be able to maintain the needle tip approximately 25 to 75 µm off the substrate surface and 25 to 75 µm offset from the chip edge. This will ensure maximum underfill flow consistency.
4. This product is recommended for higher reliability applications.
5. The high percentage filler content combined with the specific polymer system yields a viscous fluid that requires more precise control of process parameters to ensure consistent underfill flow.
6. The dispense pattern for larger die applications is typically an "L" pattern along 2 sides, focused at the corner. The flow pattern should be designed to start at the location farthest away from the chip center, which helps assure a void free fill underneath the die.
7. In addtion, the dispense pattern may require a 2nd or 3rd bead with time delay for flow underneath the chip.
8. A final perimeter bead/fillet may be dispensed to ensure uniform stress distribution at the chip edges. The typical flow time for LOCTITE® 3565™ is 30 seconds.
9. For assistance, with your application, please contact your local Technical Service Center.

Clean-up

1. Uncured material may be cleaned from dispenser components and surfaces with a variety of slovents; including LOCTITE® 7360™, LOCTITE® Equipment Flushing Solvent™, IPA, acetone, MEK, methylene chloride, etc. .
2. Always wash and dry thoroughly prior to re-use of dispenser components.
3. The cleaning technique should be active cleaning of the components - flush, wash, or wipe, followed by a drying step to ensure a clean dry surface. Do not soak since this can solubilize the hardener within the uncured resin and curing, (very difficult to remove).
4. Contact your equipment supplier to ensure the solvent is compatible with their components. Clean and maintain dispense valves as recommended by the equipment manufacturer.

Storage

Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.

Product shall be ideally stored at °C. **Product is supplied in 10 or 30 ml syringes (larger size cartridges are made to order) compatible with pressure/time and positive displacement dispense platforms. Remove syringe from freezer and set aside, allow to thaw at room temperature until it reaches room temperature (90 minutes maximum for 30 ml syringes)** . 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.

Loctite Material Specification[LMS]

LMS dated August 14, 2002. 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.

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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