Technical Data Sheet

# LOCTITE 3517M

April 2018

## PRODUCT DESCRIPTION

LOCTITE 3517M provides the following product characteristics:

| | |
|---|---|
| **Technology** | Epoxy |
| Appearance | Black liquid |
| Product Benefits | • One component<br>• Reworkable<br>• Low halogen content |
| **Cure** | Heat cure |
| **Application** | Underfill |
| Typical Package Application | CSP, Flip Chip BGA and BGA |

LOCTITE 3517M underfill is designed for use as a solder joint protection against mechanical stress in hand held electronic device applications.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

| | |
|---|---|
| Viscosity, HAAKE PK1.2, mPa·s (cP): | |
| @ Shear rate of 36 $s^{-1}$ | 2,600 |
| Flow Rate Glass to Glass, 12.7 mm flow: | |
| @ 25 °C: | |
| 0.1 mm gap | 8 min 49 s |
| 0.15 mm gap | 4 min 56 s |
| @ 50°C: | |
| 0.1 mm gap | 1 min 3 s |
| 0.15 mm gap | 53 s |
| Specific Gravity @ 25ºC | 1.12 |
| Density @ 25ºC, g/cm³ | 1.15 |
| Pot Life @ 22°C, days | 7 |
| Shelf Life - Refer to package label | |
| Flash Point - See SDS | |

## TYPICAL CURING PERFORMANCE

**Cure Schedule**

5 minutes @ 120°C or
10 minutes @ 100°C

For best results, substrate should be preheated (typically to 40°C for 20 seconds) to allow for fast capillary flow and facilitate leveling.

The above cure profile is a guideline recommendation. Cure conditions (time and temperature) may vary based on customers' experience and their application requirements, as well as customer curing equipment, oven loading and actual oven temperatures.

## TYPICAL PROPERTIES OF CURED MATERIAL

**Physical Properties**

| | | |
|---|---|---|
| Shore Hardness, Durometer D | | 87 |
| Coefficient of Thermal Expansion, , TMA, ppm/°C: | | |
| Below Tg | | 65 |
| Above Tg | | 191 |
| Glass Transition Temperature, °C: | | |
| (Tg) by DMTA | | 101 |
| (Tg) by TMA | | 78 |
| Shrinkage, % | | 1.4 |
| Water Absorption, ISO 62, %: | | |
| 24 hours in water @ 25 °C | | 0.1 |
| Flexural Modulus, ASTM D790 | N/mm² (psi) | 3,500 (507,632) |

**Electrical Properties**

| | |
|---|---|
| Volume Resistivity, IEC 60093, ohm-cm | $88\times10^{15}$ |
| Dielectric Constant / Dissipation Factor, IEC 60250: | |
| @ 100 KHz | 3.13/0.01 |
| @ 1 MHz | 3.1/0.01 |
| @ 10 MHz | 3.06/0.02 |
| Surface Resistivity, IEC 60093, ohms | $25\times10^{15}$ |

## TYPICAL PERFORMANCE OF CURED MATERIAL

**Miscellaneous**

| | | |
|---|---|---|
| Flexural Strength at break, ASTM D790 | N/mm² (psi) | 120 (17,404) |

**Shear Strength**

Lap Shear Strength , ISO 4587:

| | | |
|---|---|---|
| Epoxy glass | N/mm² (psi) | 14.4 (2,088) |

## GENERAL INFORMATION

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

**THAWING:**

1. A new package of material can be brought to ambient conditions by allowing container to stand at room temperature for 1 to 2 hours. Actual time required will vary with package size/volume.
2. Do not loosen container lids, caps or covers. Allow syringe packs to equilibrate in tip down orientation.
3. DO NOT attempt to thaw by applying additional heat as partial polymerization (curing) could occur.

**DIRECTIONS FOR USE**

1. Load product into dispensing equipment.
2. A variety of application equipment types are suitable and include: hand dispense/time pressure valve, auger style valve, linear piston pump or jet valve. Selection requirements should be determined by application requirements.
3. Ensure that air is not introduced to the product during equipment set-up.
4. Dispense product at moderate speed (2.5 to 12.7 mm/s).
5. Needle tip should be about 0.025 to 0.076 mm from the substrate surface and from the chip edge to ensure optimal flow conditions for the underfill.
6. The dispense pattern is usually an "I" pattern along one side or a "L" pattern along two sides, focused at the corner. Application should start at the location furthest away from the chip center to help ensure a void-free fill underneath the die.
7. Each leg of the "L" or "I" pattern should not exceed 80% of the length of each die edge being dispensed.
8. In some cases, a second or third application of product may be necessary.

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

**Optimal Storage: 2 to 8°C. Storage below 2°C or above 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
N x 0.225 = lb
N/mm x 5.71 = lb/in
psi x 145 = N/mm²
MPa = N/mm²
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

**Disclaimer**

**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.



Reference 2