

Introduction

Bergquist's liquid Gap Filler 2000 is specifically designed for applications that are sensitive to assembly pressures, static and CTE stresses often associated with pad type gap filling materials. Gap Filler 2000 is an excellent solution for interfacing surfaces with high topography and/or stack-up tolerances to a universal heat sink or housing, not only reducing assembly pressures, but overall thermal impedance within an application. Gap Filler 2000 can eliminate the need for costly heat sinks, fans and other related cooling components. The two part system has a room or elevated temperature cure system.

Good heat transfer in thermal applications is dependent primarily on two characteristics; one, the ability of the material to transfer heat within itself and; two, the ability of the material to wet-out the interfaces it is applied to. Gap Filler 2000 has an inherent thermal conductivity of 2.0 W/m-K. The polymer resins used within its formulation are specifically designed to wet-out, conform and fill even the most rugged of surface topographies.

Pot Life (Working Life)

The curing process begins with the mixing together of the two parts - A and B. The pot life of the material is defined as the time required for the viscosity to double. Pot life is heavily dependent on temperature.

The pot life (working life) and cure time of the Gap Filler 2000 system can be found on the product data sheet. Both pot life and cure time can be accelerated with exposure to heat; for example, Gap Filler 2000 10 hour pot life material can be cured in roughly 1 hour when exposed to an increased temperature of 100°C.

Cure Process

General curing characteristics of Gap Filler 2000 liquid material are evident by a gradual increase in viscosity, followed by gelation and finally conversion to its fully cross-linked state. The addition of heat will significantly reduce the cure time of the material.

Operating Temperature Ranges

Low temperature performance at around -55°C (-67°F) during thermal cycling may be of concern for certain applications, performance should be verified for each individual assembly. Some specific issues that might influence performance include stress-sensitivity, configuration, the heating and cooling rates of components as well as prior component temperature histories.

High temperature performance is related to both time and temperature. Exposure to higher temperatures at or beyond the maximum temperature limit of the material will effect the life expectancy of the material. Longer exposure times to elevated temperatures will further increase these results. See Product Data Sheet for operating temperature ranges.

Viscous/Thixotropic Characteristics

During the application process, Gap Filler 2000's unique formulation maintains bead shape without running, as with other liquids. This stability allows the material to fill gaps in all orientations, horizontal or vertical, without the risk of flowing out of the interfaces. Gap Filler 2000 maintains gel-like properties allowing the liquid to form in place, filling gaps, air voids, crevices and holes, that typically reduces heat flow. Once fully cured, Gap Filler 2000 remains flexible and soft, minimizing the stress placed upon fragile components due to the coefficient of thermal expansion (CTE) mismatch seen with temperature cycling. The material is ideal for applications where pads do not perform adequately and may also be used as a grease or potting compound for power supply, telecom, digital and automotive applications.

Surface Preparation Prior to Application

Standard industrial heat sink and/or circuit board cleaning practices are sufficient for surface preparation of Gap Filler 2000 applications. Customers should determine the best cleaning technique for their individual application.

Gap Filler Adhesion

Though Gap Fillers are not designed as structural adhesives, they will adhere mildly to components. Factors that affect adhesion include surface cleanliness, geometry and textures. Gap Filler 2000 is designed to mildly bond to ceramic and aluminum surfaces. This assists in maintaining surface contact, and maximum wet-out, while residing in temperature cycling environments. Temperature cycling environments have a tendency to cause a pumping action within the interface due to the CTE mismatch. As a cured material, the Gap Filler 2000 formulation is designed to minimize or eliminate pump-out from the interface. Please contact Product Management for details on the bond strength of Gap Filler 2000.

Compatibility and Chemical Exposure

It is important to avoid use of certain compounds in cleaning and/or priming of parts that will become in contact with Gap Filler 2000. See application note on compounds that may inhibit the rate of cure or poison the curing catalyst.



www.bergquistcompany.com

The Bergquist Company -
North American Headquarters
18930 West 78th Street
Chanhassen, MN 55317
Phone: 800-347-4572
Fax: 952-835-0430

The Bergquist Company -
European Headquarters
Bramenberg 9a, 3755 BT Eemnes
Netherlands
Phone: 31-35-5380684
Fax: 31-35-5380295

The Bergquist Company - Asia
Room 15, 8/F Wah Wai Industrial Centre
No. 38-40, Au Pui Wan Street
Fotan, Shatin, N.T. Hong Kong
Ph: 852.2690.9296
Fax: 852.2690.2344

All statements, technical information and recommendations herein are based on tests we believe to be reliable, and THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MARKETABILITY AND FITNESS FOR PURPOSE. Sellers' and manufacturers' only obligation shall be to replace such quantity of the product proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and the user assumes all risks and liability whatsoever in connection therewith. NEITHER SELLER NOR MANUFACTURER SHALL BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, INCLUDING LOSS OF PROFITS OR REVENUE ARISING OUT OF THE USE OR THE INABILITY TO USE A PRODUCT. No statement, purchase order or recommendations by seller or purchaser not contained herein shall have any force or effect unless in an agreement signed by the officers of the seller and manufacturer.
APN_GF2000_0806

Rework and Material Removal

When manufacturing electronic components/devices, it is often desirable to salvage or reclaim undamaged sections of an application. Most rigid potting or epoxy adhesive materials will not allow for any material removal without incurring damage to the electronic components they are applied to. Bergquist's Gap Filler 2000 may be removed with relative ease in many applications, increasing reworkability.

Perform the following steps to remove material from the interface needing rework without damage:

- Separate the two halves of the circuit board/heat sink assembly that the Gap Filler is interfacing. This process is under the customer's discretion depending on the sensitivity of the application. Solvents such as MEK, Toluene and IPA should be used to weaken the interface bond by injecting them into the joint with syringes. Thin putty knives and thread saws, being used against the heat sink side of the interface, may aid disassembly.
- Once disassembled, cut away the bulk material.
- Swell and soften the remaining material with a solvent.
- Use pressurized air or a suitable brush and remove remaining material.
- Proceed with repair work.
- Reapply new material to clean, dry surfaces and reassemble the application.

Air Entrapment

Air entrapment within the material should be avoided whenever possible. The absence of air optimizes thermal and electrical performances and minimizes the possibility of corona and arcing in high-voltage applications. Bergquist takes every precaution to minimize air presence in its liquid materials; however, trace amounts of air may still develop during shipping.

Shelf Life

Gap Filler 2000 has a six month shelf life from date of manufacture (DOM) when stored in the original sealed container. Storage temperature is 25°C +/- 10°C (77°F +/- 28°F).

Shipping & Storage

All cartridges and tubes over 50cc in size should be shipped and stored in Bergquist-defined packaging with the tips down. This will assist in minimizing the formation of air voids within the material as supplied in the standard cartridges and tubes.

Mixing Parts A and B

There is no need for tedious measuring equipment for mixing a two part system. Disposable plastic static mixing tubes automatically combine parts A and B. Static mixers are attached to the ends of cartridges as well as auto dispensing equipment. Static mixers are reliable, accurate and inexpensive to replace after extended down times.

The appearance of light streaks or marbling in the material when exiting the mixer indicates an inadequate mix. Bergquist recommends static mixers with a minimum of 21 mix elements to provide optimal mixing. Bergquist two part systems are always to have matching Part A and Part B lot numbers. Bergquist also recommends always purging newly-tapped containers through a static mixer until color uniformity is attained, assuring proper one-to-one mix ratios.

Mixing Tolerances (Two-Part)

Two-part formulas need to be mixed at a one-to-one ratio, within 5% tolerance to hold tolerances on cured hardness, pot life and cure time. This is the industry's generally accepted tolerance for the mixing of two part systems.

Sample Sizes

Bergquist supplies two-part systems in 12cc (ml) bag packets as well as 50cc cartridges.

Container Sizes

Bergquist offers a wide range of container sizes for their products. Starting at 200cc and 400cc cartridges up to 1200cc, 2 gallon and 10 gallon kit sizes, ideal for volume production. See Product Data Sheet for specific size offerings.

Dispensing

Manual

Bergquist offers applicator guns and static mixing equipment for products supplied in cartridge form. The use of industry standard applicator guns and static mixing nozzles are cost-effective means of dispensing for sampling and low-volume production. Manual hand triggered guns are available for 50cc, 200cc and 400cc cartridge sizes and pneumatic operated guns for 200cc and 400cc cartridge sizes.

Automated

Gap Filler 2000 supplied in high-volume container kits can be dispensed for in-line manufacturing. Bergquist containers are designed for use in dispensing units for fast and easy loading and unloading. High-volume container sizes include 1200cc, 2 gallon and 10 gallons. For information on automated production dispensing equipment, contact Bergquist Product Management.



www.bergquistcompany.com

The Bergquist Company -
North American Headquarters
18930 West 78th Street
Chanhassen, MN 55317
Phone: 800-347-4572
Fax: 952-835-0430

The Bergquist Company - Europe
Bramenberg 9a, 3755 BT Eemnes
Netherlands
Phone: 31-35-5380684
Fax: 31-35-5380295

The Bergquist Company - Asia
Room 15, 8/F Wah Wai Industrial Centre
No. 38-40, Au Pui Wan Street
Fotan, Shatin, N.T. Hong Kong
Ph: 852.2690.9296
Fax: 852.2690.2344

All statements, technical information and recommendations herein are based on tests we believe to be reliable, and THE FOLLOWING IS MADE IN LIEU OF ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MARKETABILITY AND FITNESS FOR PURPOSE. Sellers' and manufacturers' only obligation shall be to replace such quantity of the product proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and the user assumes all risks and liability whatsoever in connection therewith. NEITHER SELLER NOR MANUFACTURER SHALL BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, INCLUDING LOSS OF PROFITS OR REVENUE ARISING OUT OF THE USE OR THE INABILITY TO USE A PRODUCT. No statement, purchase order or recommendations by seller or purchaser not contained herein shall have any force or effect unless in an agreement signed by the officers of the seller and manufacturer.
APN_GF2000_0806