Technical Data Sheet

DOWSIL™ TC-4535 CV Thermally Conductive Gap Filler

3.5 W/m.K silicone gap filler, two-part material curing at room temperature

Features & Benefits

- Thermal conductivity: 3.5 W/m.K
- Room temperature cure or heat accelerated cure
- Long term performance stability during temperature cycling up to 150°C
- Holds vertical position in the assembly for long service period
- Controlled silicone volatility
- UL 94 V-0

Applications

- DOWSIL™ TC-4535 CV Thermally Conductive Gap Filler is a soft and compressible material once cured, designed to dissipate the heat from PCB module assemblies mounted on printed circuit board to heat sink providing a reliable cooling solution for modules like an engine or transmission control unit.

Typical Properties

Specification Writers: These values are not intended for use in preparing specifications.

Test	Property	Unit	Result
CTM[1] 0176 B	One or two-part		Two
CTM 0176 B	Mix ratio (weight or volume)		1:1
CTM 0176 B	Color A/B		White/blue
CTM 1094 R	Viscosity at 10 s^{-1}, part A / part B	Pa.s	200/230
CTM 1094 R	Viscosity at 10 s^{-1}, mixed	Pa.s	205
CTM 1094 N	Thixotropic index (1 s^{-1}/10 s^{-1}), mixed		3.6
CTM 1094 R	Working time @ 25°C	minutes	60
CTM 0022 B	Density (cured) at 25°C	g/cm^3	3.1
CTM 0099	Cure time at 25°C	minutes	120
CTM 0099	Hardness	Shore 00 / JIS Type E	52/18
CTM 1163 A	Thermal conductivity	W/m.K	3.4
CTM 0839 B	Volatile siloxane content (D4-D10)	ppm	8

1. CTM: Corporate Test Method, copies of CTM's are available on request.

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Typical Properties (Cont.)

Test	Property	Unit	Result
JIS[2] K 6249	Dielectric strength	kV/mm	22
JIS K 6249	Volume resistivity	Ohm.cm	3E+13
JIS K 6249	Dielectric constant / dissipation factor at 1 MHz		6.5/5E-3
	Shelf life at 25°C	months	12

2. JIS: Japanese Industrial Standard

Description

DOWSIL™ TC-4535 CV Thermally Conductive Gap Filler is a soft and compressible material capable to dissipate the heat from the heat source (typically a printed circuit board) to the cold source (typically aluminum housing acting as a heat sink).

This material has been specifically designed to provide reliable cooling performance in automotive PCB modules due to the stability of properties during typical environmental exposure simulating the entire operating life of the module.

DOWSIL™ TC-4535 CV Thermally Conductive Gap Filler is supplied as a two-part liquid component kits. When the liquid components are thoroughly mixed either by weight or volume, the mixture cures to a soft elastomer. These elastomers cure without exothermal reaction at a constant rate regardless of sectional thickness or degree of confinement. Dow thermally conductive gap fillers require no post-cure and can be placed in service immediately at operating temperatures of -45 to 150°C following the completion of the cure schedule. Thermally conductive silicones function as heat transfer media, with long-term, reliable protection of sensitive circuits, provide a durable dielectric insulation, and are barriers against environmental contaminants and as stress-relieving shock and vibration absorbers over a wide temperature and humidity range. In addition to sustaining their physical and electrical properties over a broad range of operating conditions, silicones are resistant to ozone and ultraviolet degradation and have good chemical stability. Good heat transfer is dependent on a good interface between the heat producing device and the heat transfer media. Silicones have a low surface tension that enables them to wet most surfaces, which can lower the thermal contact resistance between the substrate and the material.

How to Use

Two-part materials should be mixed in the proper ratio either by weight or volume. Static mixer is recommended for manual and automated mixing.

The presence of light-colored streaks or marbling indicates inadequate mixing. Automated airless dispense equipment can be used to reduce or avoid the need to de-air. If de-airing is required to reduce voids in the cured elastomer, consider a vacuum de-air schedule of > 203 mm of Hg (or a residual pressure of 10 to 0 mm of Hg) for 10 minutes or until bubbling subsides.

Although the formulation design of DOWSIL™ TC-4535 CV Thermally Conductive Gap Filler is made to minimize the risk of filler settlement, upon standing, in rare occasion some filler may settle to the bottom of the liquid after several weeks. Should that be the case, in order to ensure a uniform product mix, the material in each container should be thoroughly mixed prior to use.

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Processing/ Curing

Addition-cure materials can be cured at room temperature or with heat. The cure rate is rapidly accelerated with heat. Cure progresses evenly throughout the material.

Addition-curing materials contain all the ingredients needed for cure with no by-products from the cure mechanism. Deep-section or confined cures are possible.

Pot Life and Cure Rate

Cure reaction begins with the mixing process. Initially, cure is evidenced by a gradual increase in viscosity, followed by gelation and conversion to its final state. Working time is defined as the time required for viscosity to double after parts A and B are mixed.

Useful Temperature Ranges

For most uses, silicone thermally conductive gap filler should be operational over a temperature range of -45 to 150°C for long periods of time. However, at both the low and high temperature ends of the spectrum, behavior of the materials and performance in particular applications can become more complex and require additional considerations. For low-temperature performance, thermal cycling to conditions such as -55°C (-67°F) may be possible, but performance should be verified for your parts or assemblies. Factors that may influence performance are configuration and stress sensitivity of components, cooling rates and hold times, and prior temperature history. At the high-temperature end, the durability of the cured silicone elastomer is time and temperature dependent. As expected, the higher the temperature, the shorter the time the material will remain useable.

Handling Precautions

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ PRODUCT AND SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE SAFETY DATA SHEET IS AVAILABLE ON THE DOW WEBSITE AT DOW.COM, OR FROM YOUR DOW SALES APPLICATION ENGINEER, OR DISTRIBUTOR, OR BY CALLING DOW CUSTOMER SERVICE.

Usable Life and Storage

Shelf life is indicated by the “Use By” date found on the product label. Any special storage and handling instructions will be printed on the product containers.

For best results, Dow thermally conductive materials should be stored at or below the maximum specified storage temperature. Special precautions must be taken to prevent moisture from contacting these materials.

Containers should be kept tightly closed and head or air space minimized. Partially filled containers should be purged with dry air or other gases, such as nitrogen. Any special storage and handling instructions will be printed on the product containers.

Packaging Information

Multiple packaging sizes are available for this product. Please contact your local distributor or Dow.

Limitations

This product is neither tested nor represented as suitable for medical or pharmaceutical uses.

Health and Environmental Information

To support customers in their product safety needs, Dow has an extensive Product Stewardship organization and a team of product safety and regulatory compliance specialists available in each area.

For further information, please see our website, dow.com or consult your local Dow representative.

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Disposal Considerations

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Technical Representative for more information.

Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

How Can We Help You Today?

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