Technical Data Sheet

DOWSIL™ TC-4060 GB250 Thermal Gel

6 W/m.K silicone gel, two-part 1 to 1 mix ratio

Features & Benefits

- Room temperature cure with optional heat acceleration
- Long term performance stability during temperature cycling up to 150°C
- 100% silicone (PDMS)
- High purity glass beads 250 µm (GB-free option available)
- Easy processing

Applications

- DOWSIL™ TC-4060 Thermal Gel is a soft material with stress-relieving and shock damping properties once cured
- Designed for automotive and telecom applications, this material dissipates the heat from PCB components towards heat sink providing a reliable cooling solution
- This easy processing solution ensures a smooth assembly process line integration ideally suited for automated dispensing with meter mix equipment

Typical Properties

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

Test[1]	Property	Unit	Result
	One or Two-part		Two
	Mix ratio		1:1
CTM 0538	Appearance A/B	mPa-Sec	White/blue
ASTM D 2556	Viscosity Part A $1s^{-1}$	mPa-Sec	390.000
ASTM D 2556	Viscosity Part A $10s^{-1}$		140.000
ASTM D792	Specific Gravity Part A		3,5
ASTM D 2556	Viscosity Part B $1s^{-1}$	mPa-Sec	460.000
ASTM D 2556	Viscosity Part B $10s^{-1}$	mPa-Sec	140.000
ASTM D792	Specific Gravity Part B		3,5
ASTM D 2556	Viscosity Mixed $1s^{-1}$	mPa-Sec	426.000
ASTM D 5289	Cure Time at 22°C	hour	24
ASTM D 5289	Cure Time at 80°C	min	30

1. CTM: Corporate Test Method, copies of CTM's are available on request.
ASTM: American Society for Testing and Materials.

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Typical Properties (Cont.)

Test	Property	Unit	Result
ASTM D 1824	Pot Life at 22°C	min	80
ASTM D 2240	Durometer After 24h at 25°C	Shore 00	55
ASTM D 2240	Durometer After 1h at 110°C	Shore 00	58
	E' Modulus by DMA	MPa	0,2
CTM 0137	Tensile Strength	MPa	0,05
ISO[2] 22007-2	Thermal Conductivity	W/m.K	6,5
ASTM D 5470		W/m.K	5,6
	CTE	ppm/°C	233 ± 59
ASTM F 2466	D3-D12 Volatile Siloxane Content	ppm	< 100
ASTM D 149	Dielectric Strength	kV/mm	8,5
ASTM D 257	Volume Resistivity	Ohm*cm	4E+12
DAK-TL2	Dielectric Constant 10MHz-20GHz		7.78
UL-94	Flammability Rating		V-0
IEC[3] 60112	Comparative Tracking Index	V	> 600
	Shelf Life < 40°C (104°F)	days	270

2. ISO: International Standardization Organization.
3. IEC: International Electrotechnical Commission.

Description

DOWSIL™ TC-4060 GB250 Thermally Conductive Gel is supplied as a two-part liquid component kit. When the liquid components are thoroughly mixed 1 to 1 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. Thermally conductive silicones function as heat transfer medium with long-term reliable protection of sensitive circuits. They provide durable dielectric insulation, and act as physical barriers against environmental contaminants as well 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.

Application Methods

- Automated metered mixing and dispensing

How to Use

Two-part materials should be mixed in the proper ratio either by weight or volume. Static mixer with ≥ 12 elements is recommended for manual and automated mixing.

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How to Use (Cont.)

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-4060 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.

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. Pot life is defined as the time required for viscosity to double after parts A and B are mixed.

Useful Temperature Ranges

For most uses, silicone-based thermally conductive gel should be operational over a temperature range of -40 to 150°C (-40°F to 302°F) 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 (40°C/104°F). 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.

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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.

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.

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To discuss how we could work together to address your specific needs, go to **dow.com** for a contact close to your location. Dow has customer service teams, science and technology centers, application support teams, sales offices, and manufacturing sites around the globe.

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