Technical data sheet

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Manufacturer:	DOWSIL
Product group:	KLEBSTOFF
Article group:	2-K SILIKON
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DOWSIL TC-4525 GAP FILLER

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Technical Data Sheet

DOWSIL™ TC-4525 Thermal Conductive Gap Filler

Two parts, 2.6 W/m·K thermally conductive silicone gap filler, room temperature curing with accelerated heat curing option.

Features & Benefits

- Thermal conductivity 2.6 W/m·K.
- Room temperature cure or heat accelerated cure.
- Long term performance stability during temperature cycling up to 150°C – peak at 175°C.
- Holds vertical position.
- UL 94 V0 recognition.
- Glass beads option.

Applications

- DOWSIL™ TC-4525 Thermally Conductive Gap Filler is a soft and compliant material once cured, designed to dissipate the heat from components mounted on printed circuit board to heat sink providing a reliable cooling solution for modules like an engine or transmission control unit.
- This material is specifically designed for 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
CTM 0176	One or Two-part		Two
CTM 0176	Mix Ratio (Weight or Volume)		1:1
CTM 0176, ASTM E284	Color - Part A/B		White/ blue
CTM 1094, ASTM D4287	Viscosity at 10 s^{-1}, Part A	Pa·s	210
CTM 1094, ASTM D4287	Viscosity at 10 s^{-1}, Part B	Pa·s	190
CTM 1094, ASTM D4287	Viscosity at 10 s^{-1}, Mixed	Pa·s	220
CTM 1094, ASTM D4287	Thixotropic Index, Mixed (1 s^{-1}/10 s^{-1})		4.3
CTM 1094, ASTM D4287	Working Time at 25°C	Min	40
CTM 0022, ASTM D792	Specific Gravity, Cured		2.9

1. CTM: Corporate Test Method. Available by request.
ASTM: American Society for Testing and Materials.

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Typical Properties (Cont.)

Test	Property	Unit	Result
CTM 0099, ASTM D 2240	Cure Time at 25°C	Min	120
	at 50°C	Min	20
	at 80°C	Min	10
CTM 0099, ASTM D 2240	Durometer	Shore 00	55
CTM 1163, ISO[2] 22007-2	Thermal Conductivity (Hot disk)	W/m·K	2.6
ASTM D5470	Thermal Resistance at 85 µm	°C·cm^2/W	0.42
	at 115 µm		0.73
	at 309 µm		1.23
ASTM E1269	Heat Capacity at 20°C	J/g·°C	0.90
	at 100°C		1.04
	at 150°C		1.09
CTM 1470	Minimum Bond Line Thickness (BLT)	µm	
	at 0.14 MPa		94
	at 0.42 MPa		72
CTM 0114, ASTM D149	Dielectric Strength (Cured)	kV/mm	18
CTM 0249, ASTM D257	Volume Resistivity	Ohm·cm	2.4 E+14
CTM 0112, ASTM D150	Dielectric Constant at 1M HZ		6.6
CTM 0112, ASTM D150	Dissipation Factor at 1M HZ		0.004
CTM 0585, ASTM E831	CTE at -50 to 80°C	ppm/K	95
	-50 to 150°C		120
UL[3] 94	UL Flame Classification		UL 94 V0
	Shelf Life at 25°C.	days	360

2. ISO: International Organization for Standardization.
3. UL: Underwriters Laboratories.

Description

DOWSIL™ TC-4525 Thermally Conductive Gap Filler is supplied as two-part liquid component kits. When the liquid components are thoroughly mixed, the mixture cures to a flexible elastomer, suitable for the protection of electrical/ electronic applications where heat dissipation is critical. These elastomers cure without exotherm at a constant rate regardless of sectional thickness or degree of confinement.

DOWSIL™ thermally conductive elastomers require no post-cure and can be placed in service immediately at operating temperatures of -45 to 175°C (-49 to 347°F) following the completion of the cure schedule. Electronic devices are continually designed to deliver higher performance. Especially in the area of consumer electronics, there is also a continual trend towards smaller, more compact designs. In combination these factors typically mean that more heat is generated in the device. Thermal management of electronic devices is a primary concern of design engineers. A cooler device allows for more efficient operation and better reliability over the life of the device. As such, thermally conductive compounds play an integral role here. Thermally conductive materials act as a thermal “bridge” to remove heat from a heat source (device) to the ambient via a heat transfer media (i.e. heat sink).

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Description (Cont.)

These materials have properties such as low thermal resistance, high thermal conductivity, and can achieve thin Bond Line Thicknesses (BLTs) which can help to improve the transfer of heat away from the device.

Application Methods

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

Mixing and De-airing

DOWSIL™ dispensable thermal material exhibit minor polymer separation during transportation. Before each use ensure the material is homogeneous. Recommendations for re-homogenization can be found in the application guides. Two-part materials should be mixed in the proper ratio either by weight or volume. 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 > 8 inches Hg (or a residual pressure of 10–0 mm of Hg) for 10 minutes or until bubbling subsides.

Processing/Curing

Addition-cure silicones can be cured at room temperature or with heat. The cure rate is rapidly accelerated with heat (see heat-cure times in Typical Properties table). Heat-cure time generally do not include part warm up time. 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. Cure progresses evenly throughout the material.

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 (base and curing agent) are mixed.

Useful Temperature Ranges

For most uses, silicone dispensable thermal pads should be operational over a temperature range of -45 to 200°C (-49 to 392°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 for most products, 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 silicones is time and temperature dependent. As expected, the higher the temperature, the shorter the time the material will remain useable.

Solvent Exposure

In general, the product is resistance to minimal or intermittent solvent exposure, however best practice is to avoid solvent exposure altogether.

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.

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Usable Life and Storage

The product should be stored in its original packaging with the cover tightly attached to avoid any contamination. Store in accordance with any special instructions listed on the product label. The product should be used by the indicated Exp. Date found on the label.

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.

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