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Technical Data Sheet

DOWSIL™ SE 4445 CV Gel

Two-part, gray, 1-to-1 mix ratio, controlled volatility thermally conductive gel

Features & Benefits

- Soft, stress-relieving gel provides shock dampening
- Thermally conductive for heat transfer away from PCB system assemblies
- Controlled silicone volatility

Composition

- Two-part
- Polydimethylsiloxane gel

Applications

- DOWSIL™ SE 4445 CV Gel is designed to provide efficient thermal transfer for the cooling of PCB system modules, including applications in power supply.

Typical Properties

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

Test	Property	Unit	Result
CTM[1]0176	One-part or Two-part		Two-part
CTM0176	Color A/B		White/black
CTM0176	Mix Ratio		1:1
CTM0050	Viscosity[2] (Mixed)	cP mPa-sec Pa-sec	15025 15025 15
	Working Time at 25°C (Pot Life)[3]	hours	6
	Heat Cure at 120°C	minutes	30
CTM0022	Density[4] (Cured)	g/cm^3	2.36
CTM0155	Penetration[5]	mm/10	50
	Thermal Conductivity[6]	W/m・K	1.3

1. CTM: Corporate Test Method, copies of CTM's are available on request.
2. Compliant with ASTM D 1084 (ASTM: American Society for Testing and Materials).
3. Time required for viscosity to double after Parts A and B are mixed at room temperature.
4. Compliant with ASTM D 792.
5. Compliant with JIS K 2207 (JIS: Japanese Industrial Standards).
6. How wire method (JIS R 2618-1992).

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Typical Properties (Cont.)

Test	Property	Unit	Result
	Dielectric Strength[7]	kV/mm	6
	Volume Resistivity[7]	ohm*cm	3E+15
	Dielectric Constant[7] at 1 MHz		6.2
	Dissipation Factor[7] at 1 MHz		0.009
	Content of Low Molecular Siloxane (D4-D10)	ppm	900
	Shelf life at 25°C	months	6

7. Compliant with JIS K 6249.

Description

Dow silicone gels are soft and become cushioning, low Young's modulus gel-like materials after cured. The cured gels exhibit dimensional stability as an elastomer while retaining the stress relief properties. DOWSIL™ SE 4445 CV Gel is a thermally conductive gel that further provides the ability to dissipate heat from a device in contact.

DOWSIL™ SE 4445 CV Gel can be used as potting materials for transformers, power sources, coils, relays, and other electronic devices that require low Young's modulus materials for heat dissipation. It can also be used as a compounding material for thermally conductive gel sheets.

DOWSIL™ SE 4445 CV Gel cures without exotherm at a constant rate regardless of sectional thickness or degree of confinement.

Long-term, reliable protection of sensitive circuits and components is important in many of today's delicate and demanding PCB systems applications. With the increase in processing power and the trend toward smaller, more compact PCB system modules, the need for thermal management is growing. Thermally conductive silicones function as heat transfer media, durable dielectric insulation, 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.

Substrate Testing

To ensure maximum bond strength for adhesives on a particular substrate, 100 percent cohesive failure of the gel in a lap shear or similar adhesive strength test is needed. This ensures compatibility of the gel with the substrate being considered. Also, this test can be used to determine minimum cure time or to detect the presence of surface contaminants such as mold release agents, oils, greases and oxide films.

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Mixing and De-airing

Upon standing, some filler may settle to the bottom of the liquid after several weeks. To ensure a uniform product mix, the material in each container should be thoroughly mixed prior to use. 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

Cure rates are rapidly accelerated with heat (see heat-cure times in Typical Properties table). 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. These materials generally have long working times.

Pot Life and Cure Rate

Cure reaction begins with the mixing of Part A and B. 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 DOWSIL™ SE 4445 CV Gel A and DOWSIL™ SE 4445 CV Gel B are mixed.

Useful Temperature Ranges

For most uses, silicone gels should be operational over a temperature range of -45 to 150°C (-49 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 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.

Repairability

A gel can simply be poured into the cleaned repaired area and cured.

Solvent Exposure

Although highly filled silicones such as those discussed in this data sheet are generally more resistant to solvent or fuel exposure, standard silicones are intended only to survive splash or intermittent exposures. Testing should be done to confirm performance of the adhesives in the application and under the specified environmental conditions.

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. 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.

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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.

How Can We Help You Today?

Tell us about your performance, design, and manufacturing challenges. Let us put our silicon-based materials experience, application knowledge, and processing experience to work for you.

For more information about our materials and capabilities, visit **dow.com**.

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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