DOWSIL™ EG-4175 Silicone Gel

Description

Two-part, 1 to 1 mix ratio, self-priming adhesion, addition-curing silicone gel

Uses / Applications

- IGBT modules
- Electronic module assembly
- Industrial and automation
- Industrial sensors and actuators
- Smart meters

Benefits

- Room temperature cure and fast heat cure
- Self-priming adhesion for enhanced module protection
- Excellent heat resistance
- Improved resistance to crack formation
- Excellent resistance to oil migration

Physical Properties

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

Reference[1]	Property	Unit	Result
	One or Two Part	-	Two
CTM0176	Color		Clear
CTM0050	Viscosity of Part A at 25°C	cP	1000
CTM0050	Viscosity of Part B at 25°C	cP	1000
CTM0050	Viscosity of Mixed at 25°C	cP	1000
CTM0044	Specific Gravity	-	0.96
CTM0055	Pot Life (time to double initial viscosity) at 25°C	minutes	60
CTM1098	Cure time (to >90% final properties at 70°C)	minutes	30
CTM1098	Cure time (to >90% final properties at 100°C)	minutes	20
CTM1098	Cure time (to >90% final properties at 125°C)	minutes	10
CTM0155	Penetration (¼ cone)	mm/10	55
CTM0114	Dielectric Strength	kV/mm	23.0
CTM0249	Volume Resistivity	ohm-cm	5.4E+15
CTM0543	Dielectric Constant at 100Hz	-	2.71
CTM0543	Dissipation Factor at 100Hz	-	0.003

1. CTM: Corporate Test Method; copies of CTMs are available on request.

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Descriptions

Dow two-part gels offer more processing flexibility with the options of room-temperature with no need for ovens or heat-accelerated cure if faster processing is desired. These gels have been used extensively to seal and protect by coating, encapsulating or potting various electronic devices, especially those with delicate components. Gels are a special class of encapsulants that cure to an extremely soft material. Gels cure in place to form cushioning, self-healing, resilient materials. Cured gels retain much of the stress relief and self-healing qualities of a liquid while providing the dimensional stability of an elastomer which is increasingly needed for delicate components. Gels have been used to isolate circuits from the harmful effects of moisture and other contaminants and provide electrical insulation for high voltages. Another use is providing stress relief to protect circuits and interconnections from thermal and mechanical stresses. Gels are usually applied in thick layers to totally encapsulate higher architectures. More recently, gels have found application in optoelectronics due to their stress relieving capability and high refractive index, as well as the stability of these properties over time.

Processing and Application Guidelines

Mixing and De-airing

Some gels are supplied in bladder packs that avoid direct air contact with the liquid gel components, allowing use of air pressure over the pack in a pressure pot for dispensing. Do not apply air pressure directly to the liquid gel surface (without the bladder pack) as the gel can become supersaturated with air and bubbling can occur when the material is dispensed and cured. Use of bladder packs prevents bubbling, maintains cleanliness and avoids gel contamination. Gels can be dispensed manually or by using one of the available types of meter mix equipment. Typically, the two components are of matched viscosities and are readily mixed with static or dynamic mixers, with automated meter-mix normally used for high volume processes. For low-volume applications, manual weighing and simple hand mixing may be appropriate. Inaccurate proportioning or inadequate mixing may cause localized or widespread problems affecting the gel properties or cure characteristics. If possible, the potential for entrapment and incorporation of gas (typically air) should be considered during design of the part and selection of a process to mix and dispense the gel. This is especially important with higher-viscosity and faster-curing gels. Degassing at > 28 inches (10-20 mm) Hg vacuum may be necessary to ensure a void-free, protective layer.

Pot Life and Cure Rate

Pot life (or working time) is the time required for the initial mixed viscosity to double at room temperature. The cure reaction begins when Parts A and B are mixed. As the cure progresses, viscosity increases until the material becomes a soft gel. Cure is defined as the time required for a specific gel to reach 90% of its final properties. Gels will reach a no-flow state prior to full cure. Addition-cure silicone gels may be room temperature and heat cure or exclusively heat cure. Adding heat accelerates the cure reaction. Additional time should be allowed for heating the part to near oven temperature. Cure schedules should be verified in each new application.

Compatibility

Certain materials, chemicals, curing agents and plasticizers can inhibit the cure of addition cure gels. Most notable of these include: organotin and other organometallic compounds, silicone rubber containing organotin catalyst, sulfur, polysulfides, polysulfones or other sulfur containing materials, unsaturated hydrocarbon plasticizers, and some solder flux residues. If a substrate or material is questionable with respect to potentially causing inhibition of cure, it is recommended that a small-scale compatibility test be run to ascertain suitability in a given application. The presence of liquid or uncured product at the interface between the questionable substrate and the cured gel indicates incompatibility and inhibition of cure.

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Processing and Application Guidelines (Cont.)

Repairability

In the manufacture of electronic devices, salvage or rework of damaged or defective units is often required. Removal of Dow dielectric gels to allow necessary repairs can be assisted by using Dow OS fluids. Additional information regarding these products is available from Dow. In addition, if only one component needs to be replaced, a soldering iron may be applied directly through the gel to remove the component. After work has been completed, the repaired area should be cleaned with forced air or a brush, dried, and patched with additional silicone gel.

Useful Temperature ranges

For most uses, silicone gels should be operational over a temperature range of -50°C to 200°C (-58 to 392°F). 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.

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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