



Technical Data Sheet

DOWSIL™ TC-2022 Thermally Conductive Adhesive

One-part gray, thermally conductive adhesive with high tensile strength and 7 mil glass beads

Features & Benefits

- Heat curable at moderate temperatures
- Good thermal conductivity values
- No added solvents
- No mixing of separate components required
- Improved cost effectiveness with rapid/low temperature cure
- Can be used with heat-sensitive substrates and components
- Heat flow away from PCB module components can increase reliability

Composition

- Polydimethylsiloxane
- Aluminum Oxide

Applications

Suitable for:

- Bonding integrated circuit substrates
- Adhering lids and housings
- Heat sink attach, automated or manual dispensing

Typical Properties

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

Property	Unit	Result
One or Two-Part		One
Color		Gray
Viscosity	cP	190,000
	Pa-sec	190
Thixotropy	NA	3.7
Specific Gravity (Cured)		2.7
Thermal Conductivity	btu/hr-ft-°F	0.98
	W/m-K	1.7
Heat Cure Time at 100°C	minutes	15
Durometer Shore A		90

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Typical Properties (Cont.)

Property	Unit	Result
Unprimed Adhesion - Lap Shear (AI)	Psi	600
	MPa	4.1
	N/cm ²	410
Linear CTE (by TMA)	ppm/°C	125

Description

DOWSIL™ TC-2022 Thermally Conductive Adhesive is a one-part thermally conductive heat cure adhesive whose heat cure rate is rapidly accelerated with heat. Cure schedules shown in the Typical Properties table reflect time once the bond line and adhesive reach the listed temperature. Alternative cure schedules are possible and should be matched to application requirements and cured adhesive performance. These adhesives will develop robust, primerless adhesion to an expansive variety of substrates including metals, ceramics, epoxy laminate boards, reactive materials and many filled plastics. Long-term, reliable protection of sensitive circuits and components is important in many of today's delicate demanding PCB system applications as industry trends move toward smaller, compact modules with increasing power. 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

DOWSIL™ TC-2022 Thermally Conductive Adhesive has been found to bond well to a very wide variety of plastic and metal surfaces. To ensure maximum bond strength for adhesives on a particular substrate, 100 percent cohesive failure of the adhesive in a lap shear or similar adhesive strength test is needed. This ensures compatibility of the adhesive 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.

Processing/Curing

DOWSIL™ TC-2022 Thermally Conductive Adhesive should be cured at 100°C (212°F) or above for 15 minutes (time at temperature in the bondline). The cure of this material can be accelerated with temperature and time.

Adhesion

Dow silicone adhesives are specially formulated to provide unprimed adhesion to many reactive metals, ceramics and glass, as well as to selected laminates, resins and plastics. However, good adhesion cannot be expected on non-reactive metal substrates or non-reactive plastic surfaces such as Teflon. Special surface treatments such as chemical etching or plasma treatment can sometimes provide a reactive surface and promote adhesion to these types of substrates. Dow primers can be used to increase the chemical activity on difficult substrates. For best results, the primer should be applied in a very thin, uniform coating and then wiped off after application.

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Adhesion (Cont.)	After application, primers should be thoroughly cured prior to application of the silicone elastomer. Poor adhesion can be experienced on plastic or rubber substrates that are highly plasticized, since the mobile plasticizers act as release agents. Small-scale laboratory evaluation of all substrates is recommended before production trials are made. In general, increasing the cure temperature and/or cure time will improve the ultimate adhesion.
Useful Temperature Ranges	For most uses, silicone adhesives 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 silicone is time and temperature dependent. As expected, the higher the temperature, the shorter the time the material will remain useable.
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 CONSUMER.DOW.COM, OR FROM YOUR DOW SALES APPLICATION ENGINEER, OR DISTRIBUTOR, OR BY CALLING DOW CUSTOMER SERVICE.
Usable Life and Storage	Refer to product label for storage temperature conditions. Containers should be kept tightly closed and kept in cold storage at all times to extend shelf life. Shelf life is indicated by the "Use By" date found on the product label.
Limitations	This product is neither tested nor represented as suitable for medical or pharmaceutical uses.
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