



## Technical Data Sheet

### **DOWSIL™ EG-4200 Blue Dielectric Tough Gel**

Two-part, translucent blue, 1:1 mix ratio, fast room temperature cure tough gel with UV indicator and conditional primerless adhesion.

#### **Features & Benefits**

- Version of DOWSIL™ 3-4207 Dielectric Tough Gel without yellow die for regulatory compliance
- Fast room temperature cure, no ovens required
- Mechanical strength
- Conditional primerless adhesion at room temperature
- UV indicator for inspection
- DOWSIL™ EG-4200 Blue Dielectric Tough Gel A & B parts differ in color for easy identification
- Adhesion obtained at room temperature
- Toughened gel for additional mechanical strength

#### **Typical Properties**

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

Test <sup>1</sup>	Property	Unit	Result
CTM 0050	Viscosity (Part A)	cP	400
		mPa-sec	400
		Pa-sec	0.4
CTM 0050	Viscosity (Part B)	cP	400
		mPa-sec	400
		Pa-sec	0.4
CTM 0540	Specific Gravity (uncured)		0.97
CTM 0674	Gel Time at 25°C	minutes	7
CTM 0092	Working Time at 25°C	minutes	9
CTM 1098	Cure Time at 25°C (Rheometer T90)	minutes	30
CTM 0099	Durometer	Shore 00	61
CTM 0293	Unprimed Adhesion – 180 Degree Peel Strength	ppi	5
		N/cm <sup>2</sup>	3.5
CTM 0114	Dielectric Strength	volts/mil	325
		kV/mm	13

1. CTM: Corporate Test Method, copies of CTM's are available on request.

## Typical Properties (Cont.)

Test	Property	Unit	Result
CTM 0112	Dielectric Constant at 100Hz		2.92
CTM 0112	Dielectric Constant at 100 kHz		2.85
CTM 1139	Dielectric Constant at 1 MHz		2.84
CTM 0112	Dissipation Factor at 100 Hz		0.0072
CTM 0112	Dissipation Factor at 100 kHz		0.0016
CTM 1139	Dissipation Factor at 1 MHz		0.0010
CTM 0249	Volume Resistivity	ohm*cm	2.60E+14
CTM 0585	Linear CTE (by TMA)	ppm/C	450

### Description

Under certain conditions in specific designs or applications, DOWSIL™ EG-4200 Blue Dielectric Tough Gel may lose adhesion. Full environmental exposure testing is recommended. Product can assist cost of ownership improvements due to their room temperature cure that requires no ovens though they can be heat accelerated if desired. These materials have enhanced chemical adhesion and cure slightly harder than standard gels, but may have limited applicability depending on processing conditions, device design, end-use environment and other conditions.

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.

### Mixing and De-Airing

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**

Working time (or pot life) is the time required for the initial mixed viscosity to double at room temperature (RT). The cure reaction begins when DOWSIL™ EG-4200 Blue Dielectric Tough Gel Parts A and B are mixed. As the cure progresses, viscosity increases until the material becomes a soft gel. Cure conditions are shown in the typical properties table. 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 RT 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.

## **Useful Temperature Ranges**

For most uses, silicone elastomers 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, 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.

## **Compatibility**

Certain materials, chemicals, curing agents and plasticizers can inhibit the cure of addition cure adhesives. 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.

## **Repairability**

In the manufacture of PCB system assemblies, salvage or rework of damaged or defective units is often required. Removal of DOWSIL™ dielectric gels to allow necessary repairs can be assisted by using DOWSIL™ OS fluids. Additional information regarding these products is available from Dow.

Digestive stripping agents, such as SU100 from Silicones Unlimited, can also be used. 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.

## **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**

Shelf life is indicated by the "Use Before" date found on the product label. Refer to the product label for storage temperature requirements. 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. Exposure to moisture could reduce adhesion and cause bubbles to form.

## **Packaging Information**

In general, DOWSIL™ dielectric gels are available in batch-matched kits containing both Part A and Part B components. Packages that are typically available include 210 mL dual cartridges, one gallon pails, five gallon pails and 55 gallon drums. Not all gels may be available in all packages, and some additional packages and package sizes may be available.

## **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, [consumer.dow.com](http://consumer.dow.com) or consult your local Dow representative.

[consumer.dow.com](http://consumer.dow.com)

### **LIMITED WARRANTY INFORMATION – PLEASE READ CAREFULLY**

The information contained herein is offered in good faith and is believed to be accurate. However, because conditions and methods of use of our products are beyond our control, this information should not be used in substitution for customer's tests to ensure that our products are safe, effective, and fully satisfactory for the intended end use. Suggestions of use shall not be taken as inducements to infringe any patent.

Dow's sole warranty is that our products will meet the sales specifications in effect at the time of shipment.

Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted.

**TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, DOW SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY.**

**DOW DISCLAIMS LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

