Technical Data Sheet

DOWSIL™ 3-4155 HV Dielectric Gel

Two-part, soft, transparent green, 1:1 mix ratio, high viscosity, low temperature gel

Features & Benefits

- Fast room temperature cure
- Two parts are blue and yellow and turn green when mixed
- High viscosity
- Suitable for very low temperatures (-80 to 200°C / -112 to 392°F)
- Fast RT cure, no ovens required
- Individual parts are blue and yellow to reduce potential for loading errors
- When properly mixed the gel is green
- Gel remains flexible in very low temperature applications

Typical Properties

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

Property	Unit	Result
Viscosity (Part A or Base)	cP	1850
	mPa-sec	1850
	Pa-sec	1.9
Viscosity (Part B or Catalyst)	cP	1875
	mPa-sec	1875
	Pa-sec	1.9
Viscosity (Mixed)	cP	1875
	mPa-sec	1875
	Pa-sec	1.9
Cure Time at 25°C	hrs	1
Working Time at 25°C (Snap Time)	min	8
Gel Hardness	grams	60
Dielectric Strength	volts/mil	400
	kV/mm	16
Dielectric Constant at 100 Hz		2.96
Dielectric Constant at 100 kHz		2.96
Volume Resistivity	ohm*cm	2.8E14

Typical Properties (Cont.)

Property	Unit	Result
Dissipation Factor at 100 hz		0.02
Dissipation Factor at 100 kHz		< 0.0001
Shelf Life at 25°C	months	12

Description

Two-part, low temperature gels such as DOWSIL™ 3-4155 HV Dielectric Gel exhibit the stability of their properties at temperatures down to -80°C allowing PCB system assemblies to operate at these extreme temperatures. The soft nature of these gels can also assist in managing the CTE mismatch between components or materials during such low temperature excursions. This low temperature performance could assist in lowering field failures and warranty costs. 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.

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

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 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 plasitcizers, 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 Dow dielectric gels to allow necessary repairs can be assisted by using Dow 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.

Packaging Information

In general, Dow 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.

Usable Life And Storage

Storage conditions and shelf life (“Use By” date) are indicated on the product label.

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, www.consumer.dow.com or consult your local Dow representative.

Limitations

This product is neither tested nor represented as suitable for medical or pharmaceutical uses.

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 WWW.CONSUMER.DOW.COM, OR FROM YOUR DOW SALES APPLICATION ENGINEER, OR DISTRIBUTOR, OR BY CALLING DOW CUSTOMER SERVICE.

How Can We Help You Today?

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

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

To discuss how we could work together to meet your specific needs, go to www.consumer.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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