chanhvinh.com

Technical Data Sheet

DOWSIL™ EE-3200 Low Stress Encapsulant

Two-part, 1 to 1 mix ratio, low viscosity encapsulant

Features & Benefits

- Soft, low durometer
- Low viscosity
- Room temperature or accelerated heat cure
- Good thermal conductivity
- Mix ratio 1 to 1
- Low internal stress during thermal cycling
- Highly flowable for filling small gaps and fast processing
- Good heat dissipation
- Prevents water ingress
- Electrically insulative
- Low total cost of ownership
- Approved for railways standard EN45545-2: R22/R23/R24/R25/R26 – HL3

Composition

- Two-part
- Polydimethylsiloxane

Applications

DOWSIL™ EE-3200 Low Stress Encapsulant has a very low hardness and viscosity to minimize internal stress generation, fill small gaps, and improve manufacturing speed for complex and high volume devices. Excellent flame resistance and protection against water ingress that improve the safety and reliability under harsh outdoor environments such as:

- Power conversion devices (inverters, converters)
- Junction boxes
- Automotive PCB modules
- Railways PCB systems applications

®™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

© 2018–2024 The Dow Chemical Company. All rights reserved.

chanhvinh.com

Typical Properties

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

Property	Unit	Result
Color		
Part A		Off-white
Part B		Black
Mixed		Dark grey to black
Viscosity[1] (Part A)	cP	1400
Viscosity[1] (Part B)	cP	2000
Mixed Viscosity[1]	cP	1700
Specific Gravity[2] (Part A)		1.48
Specific Gravity[2] (Part B)		1.46
Working Time at 25°C (Pot Life)	minutes	30
Gel Time[3] at 22°C	minutes	50
Gel Time[3] at 50°	minutes	6
Cure Time[4] at 25°C	hours	3
Cure Time[4] at 50°C	minutes	20
Durometer[5]	Type 000	43
Thermal Conductivity[6]	W/mK	0.5
Tensile Strength	psi	33
	MPa	0.2
Elongation	%	340
Secant Modulus (at 100% Elongation)	psi	8
	MPa	0.06
	psi	12.7
	MPa	0.09
Water Absorption[7]	%	0.13
Cured Specific Gravity	gm/cm^3	1.48
Linear CTE	µm/m°C	360
Glass Transition Temperature	°C	-114
Peel Adhesion to FR-4[8]	lbf/in	0.3
Peel Adhesion to Aluminum[8]	lbf/in	0.6
Primed Peel Adhesion to FR-4[9]	lbf/in	0.8
Primed Peel Adhesion to Aluminum[9]	lbf/in	0.8

1. ASTM D4287. HBDV-III ultra, Spindle No. 3,100 RPM.
2. ASTM D792.
3. CTM 0674A. GT-6 Techne Gelation Timer.
4. Parallel Plate Rheometer, 10 rad/sec, 1% strain. Full cure defined as 90% of final modulus.
5. ASTM D2240. 10 mm thickness, cure schedule 50°C for 60 min.
6. Measured via Hot Disk
7. ASTM D570. 24 hr result.
8. ASTM D 903. Aluminum Q-panel Mil Finish. Standard FR-4 for PCB Assemblies.
9. ASTM D 903. Primed with DOWSIL™ 92-023 Primer.

®™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow
DOWSIL™ EE-3200 Low Stress Encapsulant
© 2018–2024 The Dow Chemical Company. All rights reserved.

chanhvinh.com

Typical Properties (Cont.)

Property	Unit	Result
UL Certifications		
Flame Class		V-0
HWI		4
HAI		1
CTI		0
RTI Elec	°C	150
RTI Imp	°C	150
RTI Str	°C	150
Dielectric Strength	volts/mil	350
	kV/mm	14
Volume Resistivity	ohm*cm	1E+15
Dissipation Factor at 100 Hz		0.006
Dissipation Factor at 100 kHz		0.0008
Dissipation Factor at 1 MHz		0.0008
Dissipation Factor at 1 MHz		0.0007
Dielectric Constant at 100 Hz		2.7
Dielectric Constant at 100 kHz		2.7
Dielectric Constant at 1 MHz		2.7
EN 45545-2 Certifications R22 – R23 – R24 – R25 – R26		HL3

Description

Dow silicone encapsulants are supplied as two-part liquid component kits. When liquid components are thoroughly mixed, the mixture cures to a flexible elastomer, which is well suited for the protection of electrical/PCB system applications. Dow silicone encapsulants cure without exotherm at a constant rate regardless of sectional thickness or degree of confinement. Dow silicone encapsulants require no post cure and can be placed in service immediately following the completion of the cure schedule. Standard silicone encapsulants require a surface treatment with a primer in addition to good cleaning for adhesion while primerless silicone encapsulants require only good cleaning.

Mixing and De-airing

These products are supplied in a 1 to 1 mix ratio, which is very robust in manufacturing environments and allows for some process and dispense equipment variation. In most cases de-airing is not required.

Preparing Surfaces

In applications requiring adhesion, priming will be required for many of the silicone encapsulants. For best results, the primer should be applied in a very thin, uniform coating and then wiped off after application. After application, it should be thoroughly cured prior to application of the silicone elastomer. Additional instructions for primer usage can be found in the information sheets specific to the individual primers.

© 2018–2024 The Dow Chemical Company. All rights reserved.

chanhvinh.com

Processing/Curing

Thoroughly mixed Dow silicone encapsulants may be poured/dispensed directly into the container in which it is to be cured. Care should be taken to minimize air entrapment. When practical, pouring/dispensing should be done under vacuum, particularly if the component being potted or encapsulated has many small voids. If this technique cannot be used, the unit should be evacuated after the silicone encapsulant has been poured/ dispensed. Dow silicone encapsulants may be either room temperature (25°C/77°F) or heat cured. Room temperature cure encapsulants may also be heat accelerated for faster cure. Ideal cure conditions for each product are given in the product selection table.

Pot Life and Cure Rate

Cure reaction begins with the mixing process. Initially, cure is evidenced by a gradual increase in viscosity, followed by gelation and conversion to a solid elastomer. Pot life is defined as the time required for viscosity to double after Parts A and B (base and curing agent) are mixed and is highly temperature and application dependent. Please refer to the data table.

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 and should be adequately tested for the particular end use environment. 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 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.

Repairability

In the manufacture of electrical/PCB system devices it is often desirable to salvage or reclaim damaged or defective units. With most non-silicone rigid potting/encapsulating materials, removal or entry is difficult or impossible without causing excessive damage to internal circuitry. Dow silicone encapsulants can be selectively removed with relative ease, depending on the chosen remove method and technique and repairs or changes accomplished, and the repaired area repotted in place with additional product. To remove silicone elastomers, simply cut with a sharp blade or knife and tear and remove unwanted material from the area to be repaired.

®™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow
DOWSIL™ EE-3200 Low Stress Encapsulant
© 2018–2024 The Dow Chemical Company. All rights reserved.

chanhvinh.com

Repairability (Cont.)

Sections of the adhered elastomer are best removed from substrates and circuitry by mechanical action such as scraping or rubbing and can be assisted by applying Dow OS Fluids to swell the elastomer. Before applying additional encapsulant to a repaired device, roughen the exposed surfaces of the cured encapsulant with an abrasive paper and rinse with a suitable solvent and dry. This will enhance adhesion and permit the repaired material to become an integral matrix with the existing encapsulant. Silicone prime coats are not recommended for adhering products to themselves.

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 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. Encapsulant materials which contain higher levels of fillers that have been stored for long periods of time should typically be agitated or rolled prior to mixing to prevent separation and settle-out.

Packaging Information

Multiple packaging sizes are available for this product. Please contact your local distributor or Dow representative for information on packaging size and availability.

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.

chanhvinh.com

®™Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow
DOWSIL™ EE-3200 Low Stress Encapsulant
© 2018–2024 The Dow Chemical Company. All rights reserved.

chanhvinh.com

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.

dow.com

NOTICE: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. References to "Dow" or the "Company" mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

®™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow
DOWSIL™ EE-3200 Low Stress Encapsulant
© 2018–2024 The Dow Chemical Company. All rights reserved.

Form No. 11-3138-01-0724 S2D