Technical Data Sheet

DOWSIL™ EA-4700 CV Adhesive

A two-part, fast room temperature cure adhesive.

Features & Benefits

- Durable adhesion to typical substrates used in automotive electronics (i.e., aluminum, PBT, PPS)
- Room temperature fast cure or heat accelerated cure
- Controlled silicone volatility
- Good sealing against the environment
- High temperature stability after curing
- Stable performance under typical operational environment (150°C, Thermal shock and 85°C/85% rh)
- Dispensable for easy application with standard dispense equipment

Applications

- DOWSIL™ EA-4700 CV Adhesive provides critical adhesive and sealing performance in a variety of automotive applications, including electronics control units, sensors modules, or battery pack applications where lid seal, base plate attaching, gasketing or connector sealing is required and where reliable adhesion is necessary.

Typical Properties

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

Test	Property	Unit	Result
CTM[1] 0176 B	One or two-part		Two
CTM 0176 B	Mix ratio (weight or volume)		1:1
CTM 0176 B	Color A/B		White/black
CTM 1094 R	Viscosity at 10 s^{-1}, part A/part B	Pa.s	24/18
CTM 1094 R	Viscosity at 10 s^{-1}, mixed	Pa.s	27
CTM 1094 R	Thixotropic index (1 s^{-1}/10 s^{-1}), mixed		3.8
CTM 1094 R	Working time @ 25°C	minutes	20
CTM 0022 B	Density (cured) at 25°C	g/cm^3	1.16
CTM 0099	Cure time at 25°C (hardness completion; adhesion not completed)	hours	2
CTM 0099 M	Hardness[2]	JIS Type A	19
CTM 0137AAH	Tensile strength[2]	MPa	3.7
CTM 0137ABH	Elongation[2]	%	630

1. CTM: Corporate Test Method, copies of CTM's are available on request.
2. Cure condition for hardness, tensile strength and elongation: 25°C for 3 days.

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Typical Properties (Cont.)

Test	Property	Unit	Result
JIS[3] K 6249	**Unprimed adhesion lap shear**		
	Aluminum (anodized A5052P)		
	2 hours @ 25°C	MPa	1.2
	8 hours @ 25°C	MPa	2.2 (CF100%)
	24 hours @ 25°C	MPa	3.1 (CF100%)
	72 hours @ 25°C	MPa	3.9 (CF100%)
	5 min @ 80°C	MPa	1.3 (CF100%)
	PBT (unfilled)		
	2 hours @ 25°C	MPa	1.8
	8 hours @ 25°C	MPa	2.0 (CF100%)
	24 hours @ 25°C	MPa	2.1 (CF100%)
	72 hours @ 25°C	MPa	2.7 (CF100%)
	5 min @ 80°C	MPa	1.5 (CF100%)
JIS K 6249	Dielectric strength	kV/mm	25
JIS K 6249	Volume resistivity	ohm.cm	1.5E+15
JIS K 6249	Dielectric constant @ 1 MHz		3.2
JIS K 6249	Dissipation factor @ 1 MHz		1.8E-03
CTM 0839 B	Volatile siloxane content (D4-D10)[4]	ppm	130
	Shelf life at < 30°C	months	12
	UL flammability classification	NA	94–HB

3. JIS: Japanese Industrial Standard
4. Extracted by hexane for 24 hours

Description

DOWSIL™ EA-4700 CV Adhesive is a two-part, room temperature cure adhesive enabling assembly production savings due to a fast cure at room temperature. Addition-cure silicones are formulated with all necessary ingredients for cure and there are no by-products generated during the cure process. Deep-section or confined cures are possible as cure reactions progress evenly throughout the material. Dow silicone adhesives retain their original physical and electrical properties over a broad range of operating conditions which enhance the reliability of and service life of devices.

How to Use

Two-part materials should be mixed in the proper ratio either by weight or volume. Static mixer is recommended for manual and automated mixing.

The presence of light-colored streaks, or marbling, indicates inadequate mixing. Automated airless dispense equipment can be used to reduce or avoid the need to de-air. If de-airing is required to reduce voids in the cured elastomer, consider a vacuum de-air schedule of > 203 mm of Hg (or a residual pressure of 10 to 0 mm of Hg) for 10 minutes, or until bubbling subsides.

Although the formulation design of DOWSIL™ EA-4700 CV Adhesive is made to minimize the risk of filler settlement, upon standing, in rare occasions, some filler may settle to the bottom of the liquid after several months. Should that be the case, in order to ensure a uniform product mix, the material in each container should be thoroughly mixed prior to use.

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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, polyethylene or polypropylene. 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. Poor adhesion may be experienced on plastic or rubber substrates that are highly plasticized, because the mobile plasticizers act as release agents. Small-scale laboratory evaluation of all substrates is recommended before production trials are made.

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, polysulfide, polysulfone 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.

Preparing Surfaces

All surfaces should be thoroughly cleaned and/or degreased with Dow OS fluids, naphtha, mineral spirits, methyl ethyl ketone (MEK) or other suitable solvent. Solvents such as acetone or isopropyl alcohol (IPA) do not tend to remove oils well, and any oils remaining on the surface may interfere with adhesion. Light surface abrasion is recommended whenever possible, because it promotes good cleaning and increases the surface area for bonding. A final surface wipe with acetone or IPA is also useful. Some cleaning techniques may provide better results than others; users should determine the best techniques for their particular applications.

Substrate Testing

Due to the wide variety of substrate types and differences in substrate surface conditions, general statements on adhesion and bond strength are impossible. To ensure maximum bond strength on a particular substrate, cohesive failure of the product in a lap shear or similar test is needed to ensure 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

Addition-cure materials can be cured at room temperature or with heat. The cure rate is rapidly accelerated with heat (see cure times in Typical Properties table). Cure progresses evenly throughout the material.

Addition-curing materials contain all the ingredients needed for cure with no by-products from the cure mechanism. Deep-section or confined cures are possible.

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 its final state. Working time is defined as the time required for viscosity to double after DOWSIL™ EA-4700 CV Adhesive Part A and DOWSIL™ EA-4700 CV Adhesive B are mixed.

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Useful Temperature Ranges

For most uses, silicone adhesives should be operational over a temperature range of -45 to 150°C (-49 to 302°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.

Solvent Exposure

The silicone adhesive discussed in this literature is intended only to survive splash or intermittent exposures. It is not suited for continuous solvent or fuel exposure. Testing should be done to confirm performance of the adhesives under these 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 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. The product should be stored in its original packaging with the cover tightly attached to avoid any contamination. Store in accordance with any special instructions listed on the product label. The product should be used by its Use Before date as indicated on the product label.

Packaging Information

Multiple packaging sizes are available for this product. Please contact your local distributor or Dow.

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.

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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.

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