

**GE Silicones**

## SF97-50

### *Silicone Transformer Fluid*

**Product Description** SF97-50 silicone dielectric fluid is a 50 centistoke viscosity grade of polydimethylsiloxane fluid which has been processed and controlled to meet certain electrical specifications. Although dimethyl silicone fluids are available in a wide range of viscosities, the 50 centistoke fluid provides an optimum combination of relative flammability\* and heat transfer properties. It has been classified by UNDERWRITERS LABORATORIES INC.® and approved by Factory Mutual for use as a transformer fluid, with batches being retested periodically by them to assure consistency. In addition to these safety features, SF97-50 fluid exhibits excellent dielectric, thermal and chemical properties which makes it a high-performance, environmentally safe replacement for PCB containing askarels as the dielectric coolant for liquid-filled transformers.

SF97-50 dielectric fluid may be considered for use in all types of transformer applications, where safety, toxicity and environmental hazards are of primary concern. Applications for SF97-50 dielectric fluid include power distribution transformers installed indoors or in close proximity to buildings, railroad and electrostatic precipitator transformers, pulse transformers, TV fly-back transformers, capacitors and many other high-reliability TV and radar circuit components. SF97-50 fluid may also be considered for use in systems where heat transfer properties are as necessary as good dielectric behavior.

#### **Key Performance Properties**

- Dielectric properties
- Low viscosity change
- Low volatility
- Thermal oxidation resistance
- Self-extinguishing\*
- Chemically inert

\* SF97-50 fluid has an oxygen index of 21.4. The oxygen index is the minimum amount of oxygen required to sustain burning of a material after it has been ignited. Silicone fluid with an oxygen index higher than 21% (% O<sub>2</sub> in air) self-extinguished in air when the flame source was removed. The UNDERWRITERS LABORATORIES INC.®. Fire Hazard Classification for SF97-50 fluid is 4-5. This compares to a scale where water has a classification of 0, askarel is 2-3, paraffin oil is 10-20, and diethyl ether is 100.

#### **CHEMICAL PROPERTIES**

- SF-97-50 dielectric fluid is chemically non-reactive to most common materials of construction used in electrical apparatus. It contains no acid producing chemicals to cause staining or corrosion and is compatible with insulation systems.
- The oxidative and thermal stability of SF97-50 fluid is outstanding even when exposed to air. It has operated almost indefinitely at 150°C (302°F). The oxidation threshold (the

temperature at which a significant amount of oxidation by-products start to appear) for SF97-50 fluid is about 200°C (392°F). Under thermal conditions, where oxidation is not a factor, the activation temperature (the temperature where the bonds linking silicone and oxygen are broken forming lower molecular weight volatile silicones) for SF97-50 fluid is about 300°C (572°F). In hermetically sealed systems, preferable with an inert atmosphere such as nitrogen, SF97-50 fluid has remained serviceable for over 500 hours, even at 300°C (572°F). However, at high temperatures, (200°C (392°F) or over,) and in contact with air, oxidation will cause the viscosity to increase until gelation occurs.

- The chemical stability of SF97-50 fluid enables it to perform reliably in electrical apparatus for long periods of time at temperatures and under adverse conditions.

**Typical Product Data**

<b>Physical Properties</b>	<b>Value</b>
Appearance	Clear
Color APHA	15 max
Viscosity @ 25°C (77°F) cstk (ASTM D-445)	50
Specific Gravity @ 25°C (77°F) (ASTM D-1298)	0.96
Refractive Index @ 25°C (77°F) (ASTM D-1807)	1.40
Volatility @ 150°C (302°F) 24 hrs (weight loss)	0.5
Water Content, as shipped, ppm (ASTM D-1533 modified <sup>1</sup> )	50 max
<b>Electrical Properties</b>	<b>Value</b>
Dielectric Breakdown Voltage KV, 25°C (77°F) (ASTM D-877 modified <sup>2</sup> )	35 min
Volume-Resistivity ohm-cm, 25°C (77°F) (ASTM D-1169)	1 x 10 <sup>14</sup> min
Power Factor @ 60 Hz @ 25°C (77°F) .0001 @ 100°C (212°F) (ASTM D-924)	0.005
Dielectric Constant, 60 Hz, 25°C (77°F) (ASTM D-924)	2.7
<b>Thermal Properties</b>	<b>Value</b>
Pour Point, °C (F) (ASTM D-97)	-55 (-67)
Flash Point (COC) °C (°F) (ASTM D-92)	300 (572) min
Fire Point (COC), °C (°F) (ASTM D-92)	340 (644) min
Oxygen Index, TDL01	21.4
Thermal Capacity cal/gm/°C (Specific heat)	.36
Thermal Conductivity gm-cal/sec/cm <sup>2</sup> /°C/cm	3.7 x 10 <sup>-4</sup>
Coefficient of Expansion cc/cc/°C 25-250°C (77°-302°F)	10.55 x 10 <sup>-4</sup>

<sup>1</sup> A 1:1 blend (by volume) of dry formamide and dry methanol is used instead of the usual chloroform-methanol titration solvent.

<sup>2</sup> Dielectric fluid is first conditioned to a maximum of 30 ppm water.

**Specifications** Typical product data values should not be used as specifications. Assistance and specifications are available by contacting GE Silicones at 800/255-8886.

**Handling and Safety** Material Safety Data Sheets are available upon request from GE Silicones. Similar information for solvents and other chemicals used with GE products should be obtained from your suppliers.

Prior to shipment, SF97-50 dielectric fluid has been specially processed to meet specific electrical test requirements. If maximum electrical properties are to be retained, extreme care must be taken to avoid contamination of SF97-50 fluid with moisture or dirt during

transport, subsequent handling and storage.

Drums and tank wagons of SF97-50 fluid are shipped under a nitrogen blanket, as the fluid will absorb moisture from the air. If possible, fluid contact with air during handling should be avoided. Before opening, all bungs or spouts on the fluid containers must be cleaned and dried.

The container must be allowed to stand until the liquid is at least as warm as the surrounding air. All spigots, transfer lines, funnels, or other equipment which comes into contact with the fluid must be clean and dry. Maintain the apparatus used in sampling, filtering, storing, or transporting SF97-50 fluid for its exclusive use. To eliminate the possibility of moisture entering a partially used container of fluid as the fluid is withdrawn, a drying tube should be inserted into the air vent of the container.

In the event that SF97-50 fluid is exposed to atmospheric humidity for any appreciable time, a number of drying methods are available to regain maximum electrical properties. Specific recommendations on drying methods can be supplied depending on individual application needs. Refer to GE publication CDS4020.

Should a spill of SF97-50 fluid occur, the fluid should be soaked up with absorbent materials such as sawdust or fuller's earth, followed by a clean-up of the affected area with rags soaked with kerosene. All clean up materials should be disposed of in an environmentally safe manner.

When solvents are used, proper safety precautions must be observed. All solvents must be considered toxic and must be used only in well ventilated areas. Exposure to high vapor concentrations must be avoided. When flammable solvents are used, storage, mixing and use must be in areas away from heat, sparks, flame and other sources of ignition.

**Storage and Warranty Period**

Shipping drums are to be stored indoors in an area especially selected for this purpose. If it is necessary to store drums or cans containing silicone fluid outdoors, protect the container from the weather and direct contact with water. Regardless of location, all drums are to be stored in a position which results in the bungs being under a positive pressure.

Do not open a drum or can until the liquid is actually needed. Any change in temperature while the containers are open will cause an exchange of air with the possibility of moisture entering the liquid. Partially emptied drums must be tightly resealed and stored in the same manner as above. Bulk storage of SF97-50 fluid is preferable.

The warranty period for SF97-50 is 12 months from date of shipment from GE Silicones if stored in the original unopened container at 27°C (80°F) or below.

**Availability**

Products may be ordered from GE Silicones, Waterford, NY 12188, the GE Silicones sales office nearest you or where appropriate, an authorized GE Silicones product distributor.

**Government Requirement**

Prior to considering use of a GE Silicones' product in fulfilling any government requirement, please contact the Government and Trade Compliance office at 413-448-4624.

**CDS5446**

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