

## DOW CORNING® 996 Varnish

### FEATURES

- Silicone resin in xylene
- Can be cured at temperatures as low as 150°C
- Proven reliability over a decade of extensive use
- Long service life even at 220°C hottest spot temperature
- Combines in one varnish, excellent electrical properties, bond strength and moisture resistance
- Good drainage factor (little varnish runoff during cure)

### General purpose impregnating varnish

#### APPLICATION

- General purpose impregnating varnish for motors, coils and transformers.

#### TYPICAL PROPERTIES

Specification writers: These values are not intended for use in preparing specifications. Please contact your local Dow Corning sales representative prior to writing specifications on this product.

Property	Unit	Value
Color		Clear blue
Solids, after 3hrs at 135°C, min.	%	49
Relative density at 25°C		1.00 to 1.02
Viscosity at 25°C	cSt	100 to 200
Drying time at 150°C, max.	hours	3
Solvent		Xylene
Flash point - closed cup	°C	27

#### TYPICAL PROPERTIES OF CURED FILM, cured 16 hours at 150°C

##### As supplied

Dielectric strength, 50mm electrodes	kV/mm	64
Permittivity at 25°C, 100Hz		3.1
Permittivity at 25°C, 100kHz		3.0
Dissipation factor at 25°C, 100Hz		0.008
Dissipation factor at 25°C, 100kHz		0.005
Surface resistivity	ohm	$1 \times 10^{14}$
Volume resistivity	ohm.cm	$1 \times 10^{14}$
Weight loss after 3 hours at 250°C	%	4
Heat endurance at 250°C - flex life	hours	700
Heat endurance at 250°C - craze life	hours	1800
Thermal life, curved electrode method at 300°C/275°C/250°C <sup>1</sup>	hours	200/1000/5000

##### After immersion in distilled water for 24 hours

Dielectric strength, 50mm electrodes <sup>2</sup>	kV/mm	40
Permittivity at 25°C, 100Hz		3.2
Permittivity at 25°C, 100kHz		3.1
Dissipation factor at 25°C, 100Hz		0.02
Dissipation factor at 25°C, 100kHz		0.01

##### After 96 hours at 23°C and 96% relative humidity

Surface resistivity	ohm	$1 \times 10^{12}$
Volume resistivity	ohm.cm	$1 \times 10^{14}$

1. Hours necessary to reduce the electric strength of glass cloth impregnated with DOW CORNING 996 varnish to 12kV/mm when the varnish film is elongated two percent.  
2. Tested on aluminium panels because copper oxidizes too rapidly.

## HOW TO USE

Electrical equipment should be kept clean at every step of insulation to prevent contamination of the impregnating varnish. After the equipment has been insulated but before it is dipped in DOW CORNING 996 Varnish, it should be prebaked at between 150°C and 200°C to drive out moisture and to cure new insulating components.

After prebaking, the equipment should be allowed to cool to 80°C or below. It should then be dipped in this product for 5 to 10 minutes (or until most of the bubbling stops). Immersion time should not be longer than 10 minutes.

The first coat of varnish must be air dried, partially cured, and then cooled to room temperature before any further impregnation. Two dips will usually give sufficient build-up of varnish.

## Curing

The curing time and temperature will vary with the size and complexity of the impregnated unit, the properties desired in the varnish film, and the characteristics of the circulating air curing oven.

Although it is not necessary to begin the cure in a preheated oven, curing time should be measured from the time both the oven and the impregnated equipment reach the curing temperature.

The following general rules should be kept in mind when establishing curing schedules for specific equipment:

1. The final cure temperature should be 20°C to 30°C above the maximum operating temperature of the impregnated equipment. Equipment intended for AIEE Class 180°C service should be cured at 200°C; if intended for AIEE Class 220°C service, it should be cured at 250°C.
2. When maximum bond strength is required, equipment should be given a final cure at 250°C for at least 6 hours.
3. Immersion time of electrical equipment in this product must be

kept to a minimum to prevent solvent damage to the insulating components.

## Oven ventilation

Xylene, the principal solvent in DOW CORNING 996 Varnish, is flammable and proper precautions are necessary. At the recommended curing temperature, the solvent evaporates quickly and may present an explosive hazard if allowed to accumulate in the oven. Therefore, a well ventilated circulating air oven must be used. If there is any doubt about the adequacy of the oven ventilation, the air drying period should be extended to between 8 and 10 hours.

## Proper care

At the time of shipment, DOW CORNING 996 Varnish meets rigid specifications which ensure high standards of quality. It is supplied at a viscosity of 100 to 200 centipoises to assure proper initial consistency. Like any other electrical impregnating varnish, this varnish will deteriorate rapidly if the proper viscosity is not maintained. If dirt is allowed to accumulate in the dip tank, it can seriously affect the dielectric properties, reduce bond strength between the cured resin film and the windings, and may cause voids through which moisture can penetrate.

It is very important, therefore, that DOW CORNING 996 Varnish in the dip tank be kept as clean as possible and the proper viscosity maintained by following the procedures outlined below.

## Maintaining cleanliness

Dip tanks should be fitted with tight covers to exclude dust and to help maintain varnish consistency by minimising evaporation. Welded black iron construction should be used for dip tanks. Tanks with soldered joints are not satisfactory because silicone varnish has a tendency to gel in contact with solder or soldering flux.

Dip tanks should be cleaned at least twice a year. Drain the varnish from the tank into a clean container. Remove sludge or dirt by straining the

varnish through several layers of cheese cloth before returning it to the tank. Check varnish viscosity and add thinner if necessary.

## Maintaining proper viscosity

DOW CORNING 996 Varnish should be kept at a viscosity between 100 to 200mm<sup>2</sup>/s to assure good penetration and adequate build up during impregnation.

If the viscosity of DOW CORNING 996 Varnish is allowed to exceed 200mm<sup>2</sup>/s, the varnish may not penetrate the windings, and air spaces may be left unfilled. Build up may be too great, leading to crazing of the thick varnish sections. If the varnish in the dip tank becomes too thick, it will deteriorate and may have to be discarded.

The viscosity of DOW CORNING 996 Varnish in a dip tank should therefore be checked frequently. If motors are dipped in the tank daily, the viscosity should be checked daily. Even if the dip tank is seldom used, the varnish viscosity should be checked at least every other week. The viscosity can be conveniently measured with a Zahn cup No. G-2 or a Demmler cup No.1. The following procedure should be used:

1. DOW CORNING 996 Varnish should be at room temperature for accurate viscosity measurement. The more the temperature varies from 25°C, the more inaccurate the measurement becomes.
2. Stir the varnish in the tank to be sure of a representative sample. Immerse the clean viscometer cup until it is completely filled with DOW CORNING 996 Varnish.
3. Lift the cup quickly out of the tank and start timing as soon as the cup is lifted above the surface. Count the number of seconds that pass before the stream of varnish pouring through the hole in the bottom of the cup starts to break. Check the first measurement with a second sample taken from the middle of the tank.
4. If the absolute viscosity is above 200mm<sup>2</sup>/s, thinner will have to be added.
5. DOW CORNING 996 Varnish should be at room temperature when mixed. Add the thinner to the varnish

slowly, and stir constantly until they are thoroughly mixed. Incomplete mixing is indicated by streaks in the surface of the varnish, or by a separation of the faster flowing solvent from the varnish on a spatula blade.

6. After the thinner has been added. The viscosity should be measured again.
7. If the absolute viscosity is less than 100mm<sup>2</sup>/s, too much thinner has been added, and an extra dip may be required to produce adequate build up.
8. The viscometer cup should be thoroughly cleaned after each use by rinsing in a solvent and drying with a clean cloth.

Xylene or Xylok are recommended thinners for DOW CORNING 996 Varnish. Other specific solvents may be equally satisfactory. Any thinner used to reduce the viscosity of DOW CORNING 996 Varnish should meet the following requirements:

1. Kauri-Butanol Value: >50.
2. Initial boiling point: >104°C
3. Final boiling point: >169°C
4. Corrosion: none

## **HANDLING PRECAUTIONS**

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED. 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 FROM YOUR LOCAL DOW CORNING SALES REPRESENTATIVE.

## **USABLE LIFE AND STORAGE**

When stored at or below 25°C in the original unopened containers, this product has a usable life of 24 months from the date of production.

## **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 Corning has an extensive Product Stewardship organization and a team of Health, Environment and Regulatory Affairs specialists available in each area.

For further information, please consult your local Dow Corning representative.

## **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 Dow Corning's products are safe, effective, and fully satisfactory for the intended end use. Dow Corning's sole warranty is that the product will meet the Dow Corning 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. Dow Corning specifically disclaims any other express or implied warranty of fitness for a particular purpose or merchantability. Unless Dow Corning provides you with a specific, duly signed endorsement of fitness for use, Dow Corning disclaims liability for any incidental or consequential damages. Suggestions of use shall not be taken as inducements to infringe any patent.

