INSULATOR PROTECTION

CHARCOAT IC

COATING FOR THE PROTECTION OF POLLUTION FLASH-OVER ON EXTERIOR AND INTERIOR HIGH VOLTAGE INSULATORS

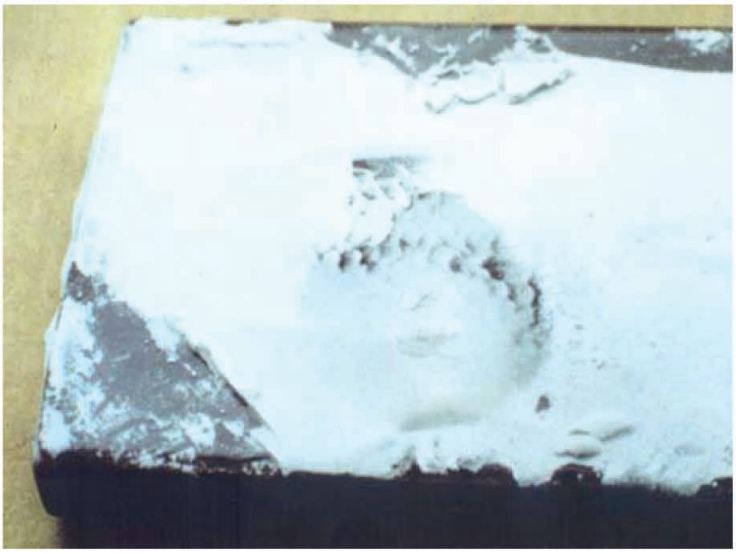
CHARCOAT

GENERAL INFORMATION

CharCoat IC is a unique room temperature vulcanized (rtv) silicone elastomer formulation specifically developed by CharCoat Passive Fire Protection and Mace Technologies in collaboration with the Electric Power Research Group of the University of the Witwatersrand for the prevention of pollution flash-over of high voltage outdoor insulation.

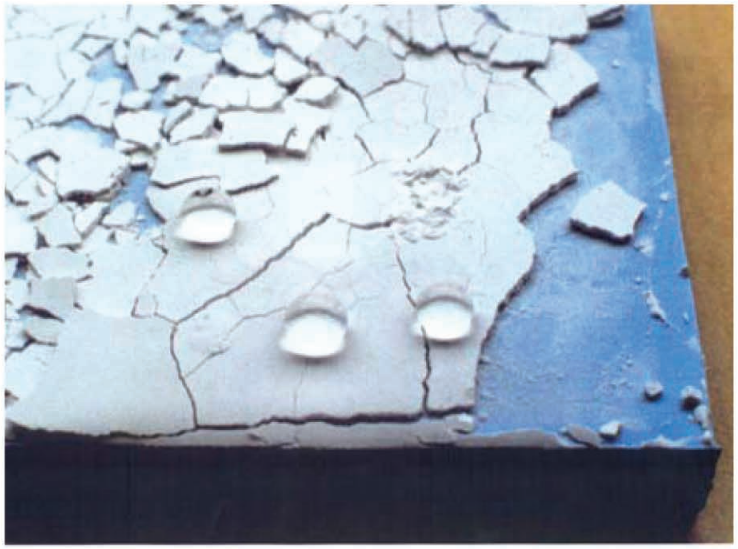
The exceptional hydrophobicity of CharCoat IC inhibits the formation of continuous moist conductive layers on insulator surfaces. This, in turn, limits the flow of leakage currents thus preventing the creation of dry bands and partial discharges – critical steps in the flash-over process.

The superior performance of silicone rubber over other insulating materials in polluted environments is well proven. What makes silicone unique is the fact that, owing to the migration of low molecular weight silanes that exist within the elastomer, the water repellent properties are imparted to contaminants which accumulate on the surface.



HYDROPHOBICITY TRANSFER - UNCOATED PORCELAIN – POLLUTION WETS AND FORMS A CONDUCTIVE LAYER

The constant water-repellency exhibited by CharCoat IC coated insulators, even in the most severe environments, coupled with silicone's inherent resistance to degradation by ultra-violet radiation, ozone and most chemicals, combined with the use of specialized fillers to combat power arc damage, enables the material to provide enhanced system reliability over a period of many years.



ON A SILICONE SURFACE, THE POLLUTION BECOMES HYDROPHOBIC

Since its release to the market in 1991, CharCoat IC has been in service in the most polluted areas of Southern Africa, and has also found application in Europe, North America, Australasia and the Middle East. No flashovers have been experienced at any of the treated sites.

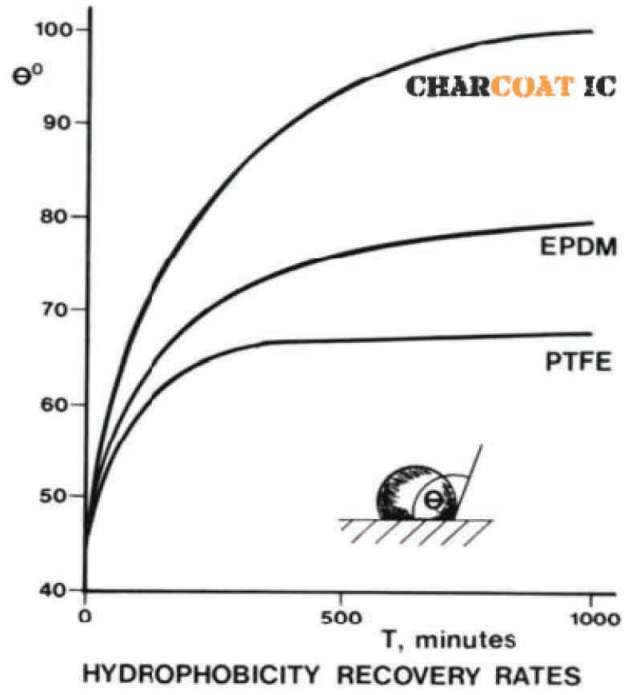
The material's usage has ranged from small 11kV Substations to complete 765kV Transmission Stations and 533kVDC Converter Stations. The operating environments include marine salt fogs, coastal desert conditions, heavily industrialized sites with, for example, acidic emissions, power station fall-out and heavy cement dust contamination, and agricultural areas characterized by regular sugar cane burning and the use of highly conductive fertilizers and weedkillers.

SPECIAL FEATURES

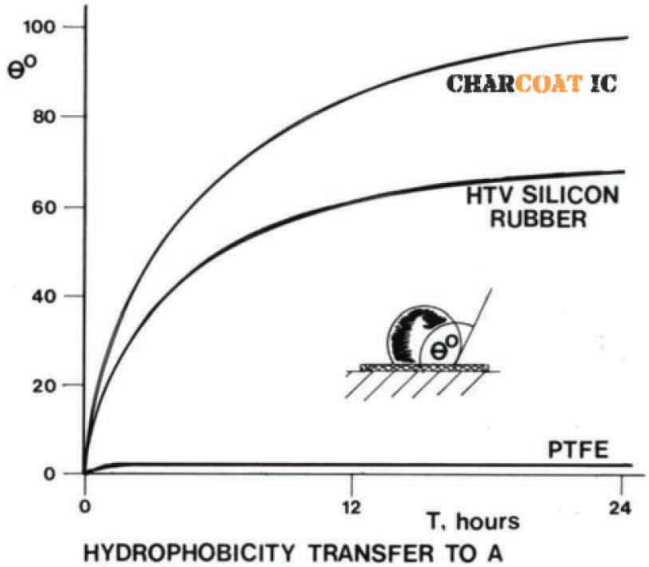
- Excellent arc resistance
- Fast hydrophobicity transfer to contaminating layers
- Fast recovery of hydrophobicity after arcing
- Resistance to damage by corona discharge
- Adhesion to glass, ceramic and resin surfaces
- Resistant to oil, ozone, various chemicals and petrols
- Ageing resistant
- 100% UV resistant
- After completion (full cure) temperature resistant down to -50°C

TECHNICAL DATA

CharCoat IC is extremely hydrophobic displaying a water droplet contact angle greater than 100 degrees. Moreover, the coating has a quick hydrophobicity recovery rate and, by the migration of low molecular weight silanes present in the material, readily transfers its hydrophobic characteristics to any covering contaminating layer. Typical curves illustrating these effects are provided below.



HYDROPHOBICITY RECOVERY RATES



HYDROPHOBICITY TRANSFER TO A POLLUTION LAYER

For improved performance, and a controlled cure at room temperature, CharCoat IC is a two-part material, i.e. a small volume of catalyst is poured into the coating before application. Unlike those materials utilizing an oxime cross-linking agent, CharCoat IC's curing system has the benefits of not requiring any atmospheric moisture for vulcanization to take place, the cure rate is independent of humidity, no by-products are released on curing and there is practically no shrinkage (<0,1% versus 0,5% to 1% for oxime systems).

The shelf life is also much longer than single-part rubbers.

The coating is designed for spray application to give an optimum layer thickness of 0,3 to 0,5mm and is formulated with various solvents of different evaporation rates for ease of application and to yield a smooth, uniform, high quality finish.

The coating has a typical skin-over time of 15 minutes. Unlike the one-part rubbers, its curing time is consistent as it is independent of the ambient humidity. In order to minimize waste and for ease of handling, after addition of the catalyst the coating has a pot life of one hour at 23°C. The equipment can be energized immediately after coating.

Although the coating does have some adhesion to porcelain and glass, the application of CharCoat IC Primer, which is supplied with all coating purchased, is recommended to provide a strong permanent bond to all ceramic, glass and resin materials. If a separate primer is not used, the bonding agent must be included in the coating. This, of course, replaces some of the silicone and thus adversely affects the material performance and longevity.

It is our philosophy that primer be applied only at the interface between the insulator and the coating where it is needed, and leave the rubber layer itself free of unnecessary materials.

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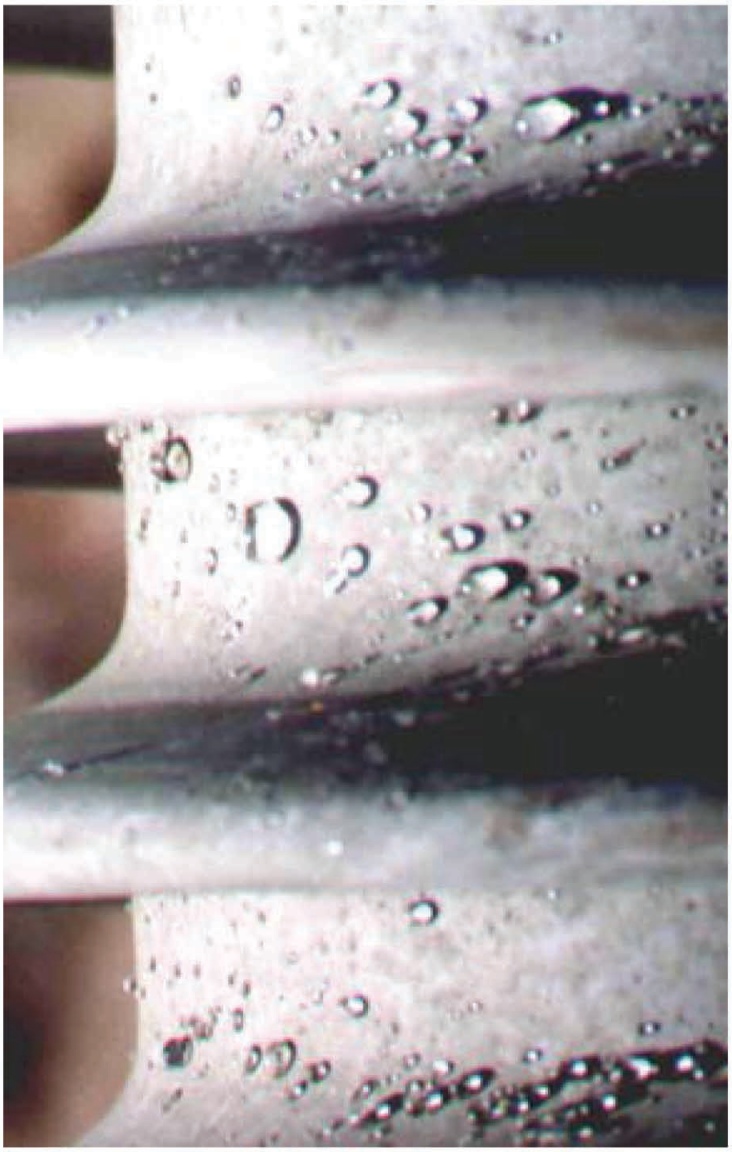
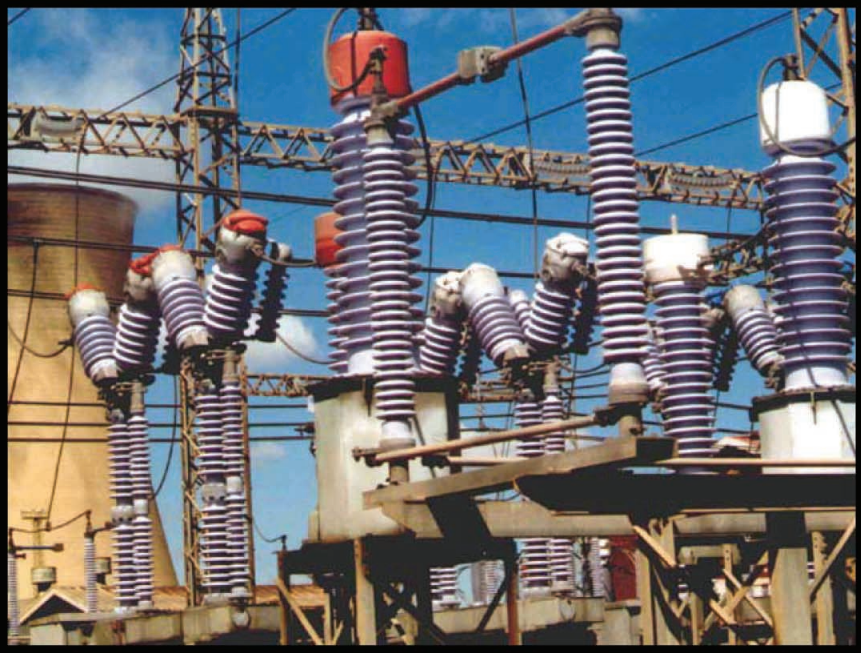


HYDROPHOBICITY AFTER 3 YRS

APPROVALS	DESCRIPTION	VALUE
BS2918	Dielectric Strength @23°C	64 kV/mm
IEC 93	Surface Resistivity	1.5 x 10 Ω ohm
IEC 93	Volume Resistivity	2.29 x 10 Ωm ohm meter
IEC 60273	Hydrophobicity	122° contact angle
ASTM D 495-99	Arc Resistance	> 185 seconds
ADTM D 2303-97	Tracking & Erosion	> 470 minutes @ 2.5kV
CPRI REC Spec.	Hydrophobicity recovery	After 100 hours corona test: HC6
		/ After 48 hours: HC1-HC2
76/2006		Wettability class: HC1 - HC6



TRANSPORT STORAGE

Transport and store free from frost - preferably at a minimum of +5°C to a maximum of +30°C. Shelf-life of unopened pails: 12 months from date of manufacture. Unopened pails must be re-sealed.

PACKAGING

- 5 Litre Drums
- Steel Drums
- Other sizes on request

SURFACE PREPARATION

Please refer to the Technical Data Sheet

APPLICATION

Please refer to the Technical Data Sheet

DRYING TIME

Please refer to the Technical Data Sheet

SAFETY AND ENVIRONMENT

Please refer to the Technical Data Sheet

CHARCOAT

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