MOLYKOTE® 3099 HVIC Compound

Protective coating for electrical insulators

Features

- Non-tracking
- Arc- and flashover-resistant
- Good adhesion
- Easy to use

Composition

- Greaselike silicone compound

Applications

MOLYKOTE® 3099 HVIC Compound (high-voltage insulator coating) is used to give a protective coating to electrical insulators.

The consistency of the compound provides easy application to the required coating thickness. The gray opaque appearance of MOLYKOTE® 3099 HVIC Compound makes it easy to ensure a uniform and complete coating is obtained.

Protective mechanism No. 1 – Water repellency
MOLYKOTE® 3099 HVIC Compound has been specifically formulated to provide a high level of flashover resistance under conditions of high-voltage stress, even after extended periods of exposure to ultraviolet light.

Many conventional silicone compounds quickly lose their flashover resistance when exposed to ultraviolet light and thus perform no better than clean porcelain. MOLYKOTE® 3099 HVIC Compound, however, better retains its resistance to flashover.

The long-term flashover protection of MOLYKOTE® 3099 HVIC Compound is further enhanced by the careful selection and pairing of fillers and stabilizers. This gives a compound that is soft and easy to apply, yet one that forms a tenacious coating that is highly resistant to water erosion. The compound also allows for fluid migration over any trapped particulate contamination, further ensuring a maximum of long-term water repellency and flashover protection.

Protective mechanism No. 2 – arc resistance
Experience shows that silicone insulator coatings are often exposed to arcing early in their service life. Although the conventional silicone compounds will protect against flashover, they do track quite readily under arcing conditions. This can lead to a melting of the insulator glaze. As the silicone insulator compounds begin to lose their water repellency, tracking increases in severity until skirt blow-off occurs or a flashover is experienced. Because of this, conventional silicone compounds are commonly replaced before they actually reach the end of their service life.

Typical properties

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

Standard[1]	Test	Unit	Result
	Appearance		Gray opaque
ASTM D127	Consistency, penetration		
	Unworked		260
	Worked		270
CTM 0001A	Specific gravity at 77°F (25°C)		1.3
CTM 0208	Solids, g/1/°C	%	100
CTM 0006	Flash point, closed cup	°F (°C)	>250 (121)
ASTM D150	Dielectric constant		
	100 Hz		3.88
	1,000 Hz		3.86
ASTM D150	Dissipation factor		
	100 Hz		0.0148
	1,000 Hz		0.0066
ASTM D149	Volume resistivity	ohm-cm	1.46×10^{13}
ASTM D149	Dielectric strength, 50 mils thick	volts/mil	285
ASTM D2303	Arc resistance, time to erode 1/8” coating at 2.5 kv	minutes	800

[1]ASTM: American Society for Testing and Materials. CTMs (Corporate Test Methods) correspond to standard ASTM test methods in most instance. Copies of CTMs are available upon request.

Table 1 – Results of inclined plane arc-track test

Coating	Time to failure, minutes
Conventional silicone compounds	20-100
MOLYKOTE® 3099 HVIC Compound	800

MOLYKOTE® 3099 HVIC Compound has been specifically formulated to resist arcing. Table 1 shows a comparison of conventional silicone compounds with MOLYKOTE® 3099 HVIC Compound. The time to erode through a 1/8-inch-thick coating at 2.5 kv was measured. Results showed that conventional compounds would typically fail after 20-100 minutes by completely tracking the 2-inch gap between electrodes. MOLYKOTE® 3099 HVIC Compound, however, would not support an arc greater than 1/2 inch in length and after 800 minutes had a layer of good compound under the track on the surface. Table 2 gives a relative comparison of the power dissipation of the arc between the conventional and arc-resistant compounds.

Table 2 – Power dissipation of surface arcs

Time, minutes	Conventional silicone compound, watts at 2.5 kv	MOLYKOTE® 3099 HVIC Compound, watts at 2.5 kv
5	84.1	21.4
10	134.2	16.5
15	87.7	15.5
20	Tracked	15.4
50	-	13.6
80	-	53.7
180	-	113.5
1,200	-	150.0

Field test results

1. After 30 months on a 400 kv DC Pacific intertie system (tower 1-4), MOLYKOTE® 3099 HVIC Compound experienced no flashovers and showed no signs of arcing based on recorder data and visual inspection. All other towers in the area must be washed every 30 days to prevent flashover.

2. In a major West Coast utility coastal test station, after 12 months, three suspension strings coated with MOLYKOTE® 5 Compound collectively flashed over 10 times. Four suspension strings coated with the arc-resistant HVIC formulation had no flashovers over the same 12-month period. All units are overstressed, running continuously at approximately 1.4 kv/in.

3. After 12 months on side-by-side bushings in a 34.5 kv substation, both MOLYKOTE® 5 Compound and the HVIC formulation coatings were resisting flashover, and both were still water-repellent. However, an arc track was visible in the MOLYKOTE® 5 Compound, and the insulator glaze under this track was damaged. There were no arc tracks in the arc-resistant MOLYKOTE® 3099 HVIC Compound.

Description

MOLYKOTE® 3099 HVIC Compound is a greaselike silicone coating especially formulated to give electrical insulators long-term resistance to water filming and flashover. Formulation adjustments are incorporated into MOLYKOTE® 3099 HVIC Compound to extend service life by maximizing performance in contact with high-voltage corona stress, ultraviolet light, water erosion, and particulate contamination.

In addition to a high level of flashover resistance, MOLYKOTE® 3099 HVIC Compound incorporates an arc-resistant filler that inhibits arc growth. This helps protect the insulator from glaze damage when the coating's water repellency is significantly diminished and arcing is experienced.

Another benefit of MOLYKOTE® 3099 HVIC Compound is the ease of handling. The compound is easy to spread, not stringy, and shows good adhesion to properly prepared insulators.

How to use

Surface preparation

First, clean the insulator surface.

Traces of organics or cleaning detergents must be removed. It is particularly important that the insulator surface be dry before applying to ensure the best results.

Application

Apply MOLYKOTE® 3099 Compound to the insulator surface by hand, cloth pad, or with a bristle brush. Start with the top insulator, treating the underside first and working down the stack. On fog-type insulators, take care not to overfill between the underside skirts, as this shortens the leakage distance and subjects the insulator to an unnecessarily high voltage stress.

The consistency of MOLYKOTE® 3099 HVIC Compound is such that normal hand application will result in a coating thickness of between 1/16 inch and 1/8 inch. A coating thickness of between 1/16 inch and 1/8 inch can also be obtained by spraying MOLYKOTE® 3099 HVIC Compound. This is ideal for all but the most severely contaminated conditions where the coating thickness should be 1/8 inch. It is important to apply a smooth, complete coating of MOLYKOTE® 3099 HVIC Compound. Its gray, opaque nature aids the user in doing this since s/he can see where it has been applied. MOLYKOTE® 3099 HVIC Compound can be applied with airless spray equipment if diluted with an appropriate solvent to the desired viscosity. Handle solvents per manufacturer's recommendations for safety and in

accordance with local, state, and federal regulations. A dilution ratio of approximately 70 percent compound and 30 percent solvent is recommended as a starting point. Mix thoroughly to ensure a consistent and even application rate.

Properly diluted MOLYKOTE® 3099 HVIC Compound can be sprayed with Alemite models 7877, 7827, and 707-B; Gray Company model 225-877; Lincoln Engineering model 83492 Airless pumps and Aro-model 650-044 pump. Other pump manufacturers supply airless spray equipment that should perform satisfactorily if the compression ratio is at least 26:1.

The air pressure to the pump will vary with the orifice size on the nozzle. Nozzles with orifices from 0.013 to 0.026 inch diameter with fan width angles from 10 to 50 degrees may be used, depending on the size and shape of the insulators to be coated. The larger orifice nozzles require 40 to 60 psi, while the smaller ones require 60 to 80 PSI.

Removal

MOLYKOTE® 3099 HVIC Compound shows little change in consistency under field conditions and remains soft even though contaminated with large quantities of dirt particles. It can be removed without heat or excessive force. Just wipe the insulators with coarse textured rags or paper towels. The surface is then ready for a new coat.

Service life

When a high-voltage insulator coating compound loses a significant portion of its water repellency, the resultant filming leads to arcing conditions. Conventional coatings must be removed at or before the first signs of serious arcing, as they readily track, leading to skirt fracture or flashover. As MOLYKOTE® 3099 HVIC Compound is arc-resistant, a user can determine, through experience at any site, when significant arcing conditions occur by visually inspecting the gray, opaque compound for paths of decomposition. This is not to imply that MOLYKOTE® 3099 HVIC Compound will indefinitely withstand all arcing conditions. However, test data show that the arc resistance, in comparison with conventional insulator compounds, may allow extended usage after the first signs of arcing. As always, the exact service life can only be determined by judgment based on experience. This decision will be a more accurate one with an arc-resistant compound.

Handling precautions

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION.

Usable life and storage

MOLYKOTE® 3099 HVIC Compound has a shelf life of 60 months from date of manufacture.

Packaging

MOLYKOTE® 3099 HVIC Compound is supplied in 4.5 and 22.6 kg (10 and 50 lb) pails, net weight.

Limitations

Do not use flammable or combustible solvents for application to energized circuits.

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