

# INSULATOR HYDROPHOBICITY

**'PH CEP' : A revolutionary step forward in providing for unprecedented long term reliability in high pollution environments.**

**W**ith growing pollution levels and an ever growing coastal population, hydrophobicity (water repellence) of insulators has become an important consideration for equipment specifiers. An insulator with hydrophobic properties causes water to bead on its surface and roll off assisting pollution to freely wash away rather than forming a continuous wet sheet or zone and combining with pollutants to form a conductive film. The hydrophobic effect helps to reduce discharge activity and maintenance requirements as well as decreasing the probability of flashover. These are properties that the ideal insulator possesses.



Hydrophobicity demonstrated by beading on the surface of a new polymer insulator.

## GRADUALLY LEACHES OUT

Until now hydrophobic properties have been found to be severely reduced, even lost, well short of an insulators required service life. Compounds or additives used within voltage insulators, for example in Polymer Composite insulators, are designed to migrate to the surface to provide the hydrophobicity. This migratory process means the hydrophobicity gradually leaches out, and is washed away through years of natural weathering. The result is a surface that will eventually wet out.



A loss of Hydrophobicity after several years of service is indicated by the 'wetting out' of the surface, as seen on this polymer insulator.

## ADDITIONAL COST

Field-applied silicone coating is another alternative providing surface hydrophobicity, however this is at additional cost and often with less long term weathering performance.



After accelerated surface ageing on the shed of this insulator manufactured from a standard cycloaliphatic epoxy resin, 'wet zones' begin to form on the surface.

Following years of extensive research and continuous development, EMC Pacific is proud to be able to provide a solution. In November 2007 our plant became 'manufacture ready' to offer outdoor line insulators, station post insulators and transformer bushings in EMC Pacific's revolutionary new 'Permanent Hydrophobic Cycloaliphatic Epoxy Resin' (PH-CEP).



This PH-CEP insulator has been subjected to the same surface ageing. The hydrophobic properties have been retained as seen by the absence of wet zones and high degree of surface tension between the water droplets on the PH-CEP insulator.

## TECHNOLOGY AT A NANO-LEVEL

EMC Pacific's new PH-CEP offers permanent hydrophobic properties locked in throughout the entire core of the insulator, which remain for the design life of the insulator\*. This is achieved with the aid of technology at a nano-level found within EMC Pacific's proprietary (patent applied) hydrophobic silica (HSIL), a highly advanced water repelling filler for resin systems.

## REMAINS NON ABSORBENT


Over time a new insulator surface is weathered away at a micro level. With EMC Pacific's underlying HSIL matrix, not only is

hydrophobic surface recovery maintained, but regardless of weathering, surface damage, or erosion, hydrophobicity is retained throughout the product and the insulator remains non absorbent. Insulators that just rely on surface oil and migration of same can attract oleophilic (oil loving) pollution particles to form a continuous pollution film, as compared to PH-CEP which provides a system which is adequately hydrophobic without extreme levels of oily film present. EMC Pacific believe PH-CEP provides the ultimate low-weight, tough and permanent hydrophobic insulator global utilities have been long searching for.

## ADVANCEMENT IN PERFORMANCE

PH-CEP is a progressive improvement on EMC Pacific's current formulation designed to meet or exceed the electrical and mechanical characteristics of our current cycloaliphatic epoxy resin (CEP) offerings. Compared to EMC Pacific's existing product range there will be no change in weight, appearance or feel of the insulator and no loss of performance. Outstanding dry performance will remain unchanged whilst hydrophobicity will lead to advancement in performance under wet conditions and improve natural insulator washing and pollutant shedding.

PH-CEP retains all the intrinsic properties of CEP where silane treated silica fillers are required, but adds through improved silica treatment (HSIL) the hydrophobic property. Renewed type testing is not required, however in some cases EMC is doing so to refresh specifications and exhibit the improved wet electrical performance, UV tolerance, and mechanical properties.

Once again, the key feature of PH-CEP is long term durability and performance, providing higher reliability than others, with much lower lifetime maintenance and insulator costs. EMC Pacific is now inviting orders for PH-CEP line insulators. 

*\*Provisional claim based on laboratory analysis, QUV-A comparative testing and independent insulator performance tests.*



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