ABOUT HH-CEP

EMCPA'S DEVELOPMENT OF HH-CEP…
'H-SIL' A WORLD FIRST

During 2006-2008 EMCPA developed a patented silica treatment process (H-SIL) which renders the silica filler permanently water repellant (hydrophobic). In December 2008 we introduced H-SIL to all our products. This unique process significantly addressed the two key drawbacks of CEP insulators whilst retaining or enhancing proven CEP insulator advantages.

Hydrophobic Resin System

By August 2014 EMCPA adopted patented hydrophobic resin systems. This means that in addition to the filler (which is 65% of the formulation) having permanent hydrophobicity, the resin also has the following unique hydrophobic characteristics:
Intrinsic Hydrophobicity – throughout the matrix
Hydrophobic Transfer – pollution becomes hydrophobic
Hydrophobic Recovery – long life

Unlike composite insulators or silicone coated ceramic insulators that rely on silicone oil migration to the surface, which depletes in time, HH-CEP insulators are hydrophobic throughout the entire matrix. Integrity is long lasting and not compromised when chipped or broken.

HH-CEP maintains all the identified benefits of CEP insulators plus reduces discharge activity, virtually eliminates puncturing, prevents tracking/erosion of the surface, and assists natural washing of pollutants. HH-CEP reduces maintenance, line losses (greenhouse gases) and insulator life costs. HH-CEP improves long term network reliability whilst providing safe lower weight components to power utility employees. This technology advance allows EMCPA's HH-CEP products to be suitable for all applications including extreme cold, desert, coastal and high UV environments at voltages up to 72kV with great confidence.

EMCPA HH-CEP insulators are now used in every mainland state of Australia, and in the Philippines, Malaysia, New Zealand, Canada and the USA.

ABOUT HH-CEP

THE IMPORTANCE OF HYDROPHOBICITY

Less wetting of surface

Lower leakage currents → **Lower flash-over probability** → **BETTER RELIABILITY**

Less discharge activity → **Less tracking and erosion** → **IMPROVED LIFE EXPECTANCY**

COMPARISON OF MEDIUM VOLTAGE OUTDOOR INSULATOR PERFORMANCE	INSULATOR TYPE					
	CERAMIC		POLYMERIC		RESIN	
	PORCELAIN	GLASS	EPDM	SILICONE	CEP	HH-CEP
Strength - Compressive	√√√√	√√√√	√√	√√	√√√√	√√√√
Strength – Tensile	√√√	√√√√	√√√√	√√√√	√√√√	√√√√
Strength – Flexural	√√√	√√	√√√√	√√√√	√√√√	√√√√
Impact resistance (Vandalism resistance)	√√	√√	√√√√	√√√√	√√√√	√√√√
Degree of deflection under load	√√√√	√√√	√√√	√√√	√√√√	√√√√
Weight	√√	√√	√√√√√	√√√√√	√√√√	√√√√
Design Versatility (Complexity of insulator geometry	√√	√√	√√√	√√√	√√√√√	√√√√√
Susceptibility to damage during handling	√√	√√	√√√√	√√√√	√√√√	√√√√
Intrinsic hydrophobicity	√	√√	√√√√	√√√√	√√√	√√√√√
Hydrophobic transfer	√	√	√√√√	√√√√√	√√	√√√√
Hydrophobic recovery	√	√	√√√√	√√√√√	√√	√√√√
Thermal shock resistance	√√	√√	√√√	√√√	√√√√√	√√√√√
Bird attack resistance	√√√√√	√√√√√	√	√	√√√√√	√√√√√
Number of material interfaces	√√√	√√	√√√	√√√	√√√√√	√√√√√
Electrical breakdown strength (Puncture resistance)	√√	√√	√√√	√√√√	√√√√√	√√√√√
Corona discharge resistance	√√√√	√√√√	√√√	√√√	√√√√	√√√√
Tracking and erosion resistance	√√√√	√√√√	√√√	√√√√	√√√√	√√√√
Maintenance	√√√	√√√	√√	√√√√	√√√√	√√√√
Insulator life cost	√√√√	√√√√	√√	√√√	√√√√	√√√√

√= Very Poor √√= Poor √√√= Pass √√√√= Good √√√√√= Very Good

CEP = Cycloaliphatic Epoxy

HH-CEP = Hydrophobic Cycloaliphatic Epoxy + Hydrophobic Filler

ABOUT HH-CEP

RESIN HISTORY

1957 – Introduced to electrical market (USA)

1959-CEP resin suitable for outdoors developed

1967 – CEP used in large commercial application – 400,000 pcs (Finland)

1972 – Rapid adoption of CEP with introduction of outdoor pole-mounted switch (Europe)

1969 – Pole circuit breaker – outdoor introduced

1970s – Rapid adoption of Cep outside of Europe

2000s – Circa 13 million MV line post insulators installed globally
Failure rate average better than 1 per million in service insulator years

2008 – EMCPA launches hydrophobic silica filler – H-Sil

2014 – EMCPA adopts hydrophobic resin system and launches 'HH-CEP'

GLOBAL HISTORY

Cycloaliphatic epoxy resin technology (CEP) has been used successfully in outdoor medium voltage application since the mid 1960's in Europe, USA and Mexico and even in transmission applications (above 69kV) South Africa (1970's) and Australia (1996) were relatively late adopters of the CEP technology. The first CEP insulators in Australia were supplied by EMCPA to Ergon in 1996 as part of a series of trial installations in the Townsville region. The most challenging locale is adjacent to a nickel plant in coastal marshes which is exposed to high humidity and full cyclonic conditions with aggressive UV. All trial installations are still operational today.

CEP insulators offer exceptional dielectric characteristics and are the only field prove monolithic insulator with 50+ years of real life service. In addition CEP offers exceptional tracking and erosion characteristics.

The main benefit of the once piece construction is the absence of interfaces between inserts. Chipping of the porcelain or cement breakdown are the common failure points with ceramic insulators, and crimp or sealing points of differing materials is the common failure point in composite insulators. Field experience in Australia presents somewhat unique installation conditions. There is high and constant UV exposure, high incidence of lightning, low to zero rainfall, long line lengths, bushfires and agricultural residue; it was found that CEP lacked long term water repellence and salt pollution shedding characteristics which can significantly compromise insulator performance and longevity. This experience resulted in EMCPA substantially changing the material characteristics of CEP through the development of H Sil.