MacLean Power Systems (MPS) is the world leader in the manufacture and supply of solid core silicone rubber composite insulators for T&D applications. MPS is also a leader in composite Hollow Core Insulators. These insulators directly replace porcelain insulators used on substation apparatus applications. Composite Hollow Core Insulators offer significant benefits such as seismic resistance, lighter weight, better contamination performance, and increased safety against a catastrophic failure. MPS Hollow Core Insulators are manufactured at the MacLean Power France (MPF) facility in St. Yorre, France and have over 15 years of field experience with a wide range of users and in severe application environments.

The core of the product is the fiberglass tube made using electrical grade glass fibers and epoxy resin in a special “wet wind” filament winding process. The tubes are machined and fitted into high strength aluminum alloy flanges using a patented process that guarantees a gas tight and leak proof seal. The subassembly is then coated with silicone rubber weathersheds using a patented “spiral wrap” extrusion process, which allows insulators to be customized for virtually any application from 72 to 800kV.

**Spiral Wrap Shed Profiles**

- 12 available optimized extrusion dies
- Single or alternating shed profile
- Light (16 mm/kV) to extreme (>45mm/kV) creepage

**Filament Wound Tube Profiles**

- Cylindrical, conical or combination profiles
- 33 available tube mandrels
- 0.3 m to 6.1 m (1-20 ft) length
Advantages

- **High Mechanical Strength**
  - Fiber Reinforced Plastic (FRP) tubes can be customized (wall thickness and wind angle) for high pressure performance and resistance to bending motion
  - The highest strength to weight ratio of any apparatus insulator on the market

- **High Temperature Resistance**
  - Materials used for sheds, tube and interfaces allow high permanent working temperatures of the apparatus
  - Stable behavior at extreme climatic conditions -50° to +110°C

- **High Dielectric Strength**
  - Same HTV silicone rubber used on overhead line insulators offers the best tracking and erosion resistance
  - Silicone rubber hydrophobicity insures higher flashover values in heavily contaminated environments
  - Custom shed profiles in single or alternating designs to meet various IEC pollution categories

Benefits

- **Increased Safety**
  - Reduced risk of breakage during assembly and installation
  - Fault current failure mode is delamination of the housing without launching of destructive fragments
  - Minimized risk of damage due to vandalism
  - Reduced risk of catastrophic failure in the event of vandal induced fault
  - Higher safety especially in contained substations or highly populated areas

- **Enhanced Economy**
  - Lighter weight means easier handling with lighter equipment and less labor at the job site
  - Lower transportation and installation costs
  - Lighter structural components needed
  - Apparatus may be shipped fully assembled (including SF₆ filled) - saving installation time
  - Shorter lead times, especially for non-standard or EHV requirements
  - Reduced life cycle cost due to reduced maintenance - no washing or coatings needed (which also means no maintenance outages required)
  - Conical insulators reduce gas volume by 40% on SF₆ breaker bushings v cylindrical designs
  - Reduced electrical losses in polluted areas

- **Greater Reliability**
  - Better contamination performance due to HTV silicone rubber
  - Silicone rubber sheds can be customized for any contamination zone without the need for washing or coating
  - Unlike ceramics, minor shed damage can be field repaired

- **Resistance to Seismic Shock**
  - Seismic withstand > 1 g without damage
  - No shock absorbers or high strength special designs required
  - Allows for optimized design of apparatus with optimized dimensions
Product Applications

Measuring Transformers

Cable Terminations

Optical Insulators

Live Tank Breakers

Dead Tank Breakers

Station Posts

Bushings
Standards

- IEC 61109 - 1992 (Composite Insulators)
- IEC 61462 - 1998 (Composite Hollow Core)
- IEEE 693 - 1997 (Seismic)
- NEMA SG4 - 2000 (Pressure & Temperature cycling - Fatigue Test)
- ISPESL Qualification
- ANSI C29.9 - 1983 (Support Standard)
- IEC 60168 - 1983 (Support Standard)
- IEC 60815 - 2001
- ISO 9000 - 2000

Field Tests

- EDF Test Station, Martiques, Ballaruc (France)
- Sollac Steel Industry, Dunkerque (France)
- NGC Dungeness Test Station (UK)
- Hydro Quebec North Canada Test Station (Canada)
- ESKOM Koeberg Test Station (South Africa)

References

Switches/Breakers
- Live Tank Breakers: ABB; AREVA (Alstom); Vatech
- Dead Tank Breakers: ABB; AREVA (Alstom); Mitsubishi; Siemens
- Switch Interrupters: Southern States; S&C Electric

Bushing Insulators:
- ABB; AREVA (Alstom); Passoni-Villa; Trench; Vatech

Cable Terminations:
- ABB; Pirelli; Sagem

Measuring Transformers:
- ABB; AREVA (Alstom); Arteche; Passoni-Villa; Ritz; Schniewindt; Trench

Optical Insulators:
- ABB; AREVA (Alstom); ComEd; NxtPhase; Schniewindt

Surge Arresters:
- Sediver

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