

The very Best.



**Ultra High Voltage**



**PPC INSULATORS**

# Ultra High Voltage. The Specialist



## Global Trend: Green Energy

Worldwide energy demand is projected to continue to increase rapidly in the next decades, particularly in Non-OECD countries. This is especially true in China, India, Latin America, Africa, as well as in the United States. Strong economic growth and increases in energy consumption, define the need for greater production and efficient distribution of electricity. Research has demonstrated a solution to increased transmission capacity with minimal environmental impact.

"Ultra High Voltage" (UHV)\* is that solution. UHV is designed to deliver large quantities of power over long distances. Centers with growing demand, located far from the power generation resources, can enjoy significantly increased energy supply without a proliferation of transmission lines and with minimal loss of power.

This is not new. UHV networks have been installed in various parts of the world since the 1970s, involving both alternating current (AC) and direct current (DC) systems. While UHV AC systems generally provide short distance power transmissions at higher voltages, UHV DC systems are attractive for bulk power transmissions over long distances.

- › More power
- › Fewer lines
- › Longer lines
- › Reduced energy loss
- › High voltage
- › AC/DC

\* in this paper defined as 765kV or higher in alternating current and 600 kV or higher in direct current

# at Your Service.

## PPC Solution: The very Best

With more than 100 years experience in designing and producing electro porcelain, it is not surprising that **PPC Insulators** has become the primary supplier to UHV equipment producers.

Our extensive knowledge and production technology enables **PPC Insulators** to produce the best designs for both UHV hollow and solid core post insulators for up to 1200kV AC and 800kV DC system voltages.



**PPC** is able to produce numerous shed designs defined by IEC 60815 standards including alternating shed, plain shed, under rib shed and rain shed. Additionally we have unique shed designs for 800kV DC applications. Further, optimized insulator designs have been developed by **PPC** with ultra high mechanical strengths and maximum extended creepage distances. These cannot be manufactured by conventional porcelain production technology – but are made possible by **PPC Insulators ISOSTATIC TECHNOLOGY**. This technology was invented by and successfully utilized by **PPC Insulators** for more than 40 years.



Significant effort is applied in continuous research and development by **PPC Insulators** to further improve the design and performance of our UHV porcelain insulators. The very best. That's what we deliver.

### Hollow Insulators

- › Power Transformer Bushings
- › Instrument Transformer Bushings
- › Circuit Breakers Bushings
- › Surge Arrester Bushings
- › Cable Termination Bushings

### Post Insulators

- › Disconnectors
- › Bus Bars
- › Earth Switches
- › Line Traps
- › Capacitor Bank Platforms

# Hollow Insulators.

## Advanced design. Large

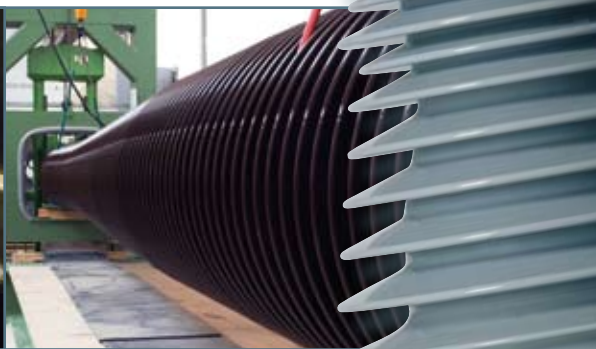


### PPC Development

**PPC** Insulators has been producing High Voltage and Ultra High Voltage bushings for system voltages above 245 kV since the 1950's. The epoxy jointing technology introduced in the 1970's enabled **PPC** Insulators to extend the height of the single porcelain design. Having produced epoxy jointed porcelain up to 765 kV in the 70's (8.450 mm height and 755 mm shed diameter), our continuous development and investment has enabled **PPC** to now manufacture insulators up to 1100kV for switchgear (DTB, LTB and GIS), instrument transformers (CT and CVT), power transformers and cable sealing ends.



Temperature Cycle Test



Bending Test

Decades of experience and continuous development in the high voltage insulators production as well as more than four decades of jointing knowledge shows proof of **PPC's** ability to produce the best available UHV solutions. More than 60,000 jointed hollow insulators have been delivered to Original Equipment Manufacturers (OEM's) all over the world.

Tailored inside and outside – according to customer request!





# dimensions. Close tolerances.



| HEIGHT<br>Single Porcelain | HEIGHT<br>Jointed Porcelain | OUTSIDE<br>DIAMETER | INSIDE<br>DIAMETER |
|----------------------------|-----------------------------|---------------------|--------------------|
| 2900 mm                    | unlimited                   | 800 mm              | 650 mm             |
| 114 inches                 |                             | 32 inches           | 26 inches          |

## Dimensions

PPC hollow insulators are designed, engineered and manufactured to meet, and even surpass the exacting demands of OEM and industry customers in many applications and geographic areas.

Dimensional values are general and may vary according to design. Many parameters must be considered, as ratio between height and core diameter, weight and wall thickness, and different inner diameters. Dimensions are continuously subject to improvements.

Continuous investment to enhance the production capabilities enables PPC Insulators to offer single porcelains up to 362 kV, where no limits in height are given for epoxy jointed hollow insulators.



## References

For more than two decades Ultra High Voltage bushings, up to the highest system voltages, have been supplied to ABB, Alstom, Areva, New Northeast Electric (Shenyang) High Voltage Switchgear (NHVS), Passoni & Villa, Siemens and Xi'an Shiky XD amongst others.

# Post Insulators. Highest Performance

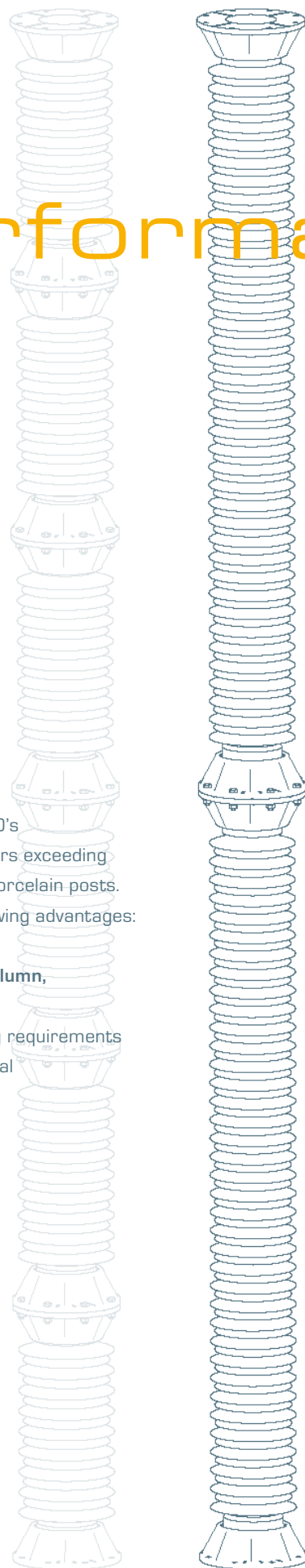
## PPC Development

Extra High Voltage and Ultra High Voltage solid core post insulators have been produced by PPC Insulators since the 1980's. Continuous development and investment allows us to manufacture insulators up to 1200kV AC and 800kV DC for bus bars support, disconnectors, earth switches, smoothing reactors, line traps, platform banks and any other type of post insulator application in this voltage range.



The isostatic technology introduced in the 1970's enables **PPC** Insulators to deliver insulators exceeding the size of conventional manufactured porcelain posts. Our advanced post designs include following advantages:

- Fewer single sections per insulator column,** therefore fewer metal parts allows for shorter column heights while maintaining requirements given in IEC 60815 and fulfilling all additional electrical requirements
- improved flashover distance**
- improved pollution performance** by improved Form Factor acc. to IEC 60815
- reduced weight, better utilization of material** simplifies handling
- less use of metal** (fewer points of exposure to corrosion)
- less field concentrating positions**
- improved mechanical stability, stiffness**



| HEIGHT<br>Single Porcelain | HEIGHT<br>Total Stack | SHED<br>DIAMETER |
|----------------------------|-----------------------|------------------|
| 2850 mm                    | unlimited             | 530 mm           |
| 112 inches                 |                       | 21 inches        |

## Dimensions

Continuous investment to enhance the production capabilities enables PPC Insulators to manufacture 765 kV porcelain columns for BIL 2100 kV to BIL 2550 kV in two section designs.

For outdoor UHV DC applications, insulators have extremely high creepage distance requirements dictating the need for increased support post insulator heights. These increased heights require an increased bending moment at the bottom of the insulator, resulting in larger porcelain core diameters. This in many cases has not been possible to produce in the past.

PPC's Insulite designs using our isostatic manufacturing process allow for higher specific creepage distances and cantilever strengths for UHV DC applications. These new technologies make it possible for PPC to design and manufacture UHV DC large post insulators columns with – as an example – the following main parameters:

| main parameters                     |            |
|-------------------------------------|------------|
| System voltage                      | 800 kV DC  |
| Lightning Impulse Withstand Voltage |            |
| dry                                 | > 2550 kV  |
| wet                                 | > 1550 kV  |
| Specific creepage distance          | > 60 mm/kV |
| Total creepage distance             | > 49200 mm |
| Cantilever strength                 | 12.5 kN    |
| Bending moment at bottom            | 150 kNm    |
| Configuration                       | tapered    |
| Total height                        | 12 m       |

## References



For many years, post Insulators  $\geq 765$  kV AC and  $\geq 600$  kV DC have been delivered to customers like ABB, Areva, Actom, Coelme, Hapam, New Northeast Electric (Shenyang) High Voltage Switchgear and Siemens.

# The very Best.



## That's what we deliver.

Only a company that develops, produces and delivers products worldwide can provide the optimal solution for your requirements.

The specialists of **PPC** Insulators are dedicated to supplying you with superior advice and global support.

**PPC** Insulators quality products and service provide time-tested value to fulfill your needs!

Please visit us on the web at [www.ppcinsulators.com](http://www.ppcinsulators.com)



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