

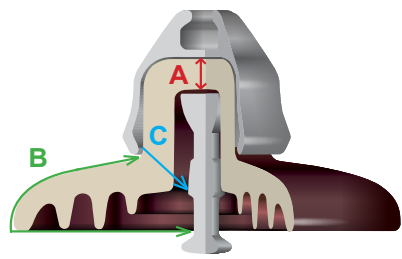
PPC Porcelain Long Rod Insulators

The Best Solution for Transmission Lines

- **Trouble-free Grid Operation**
- **Superior Reliability and Undisputable Material Strength**
- **Life Time >60 Years**
- **Lowest Life Cycle Costs**
- **Optimized Design for All Environmental Conditions**
- **Easy Installation**



PORCELAIN CAP & PIN



A = Puncture distance
B = Flashover distance
C = Most common puncture

— **Creepage Distance:**
Porcelain Long Rod Insulators can offer up to 30% longer creepage distance per length than standard Cap & Pin strings, and provide better insulation performance.

— **Puncture Distance:**
Unlike Porcelain Long Rod Insulators, Cap & Pin insulators have two conductive iron parts isolated by a thin porcelain body. The possible puncture path through the porcelain (A) is shorter than the flashover path (B) through the air. Puncture of Porcelain Long Rod is impossible

— **Flashover Distance:**
Since porcelain has several times the dielectric breakdown strength of air, flashover, if any, always occurs in the air outside the porcelain body of Porcelain Long Rod Insulators.



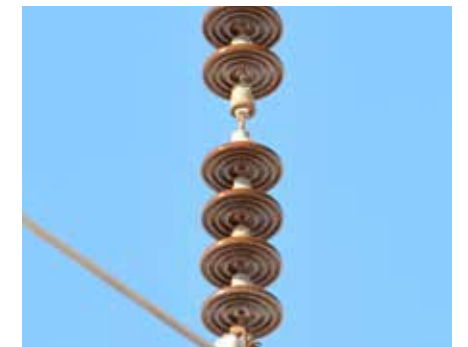
— **Self-cleaning Ability:**
The creepage distance of Porcelain Long Rod Insulators is made up of sheds and core parts which have good self-cleaning properties under rain, because no underribs like on most Cap & Pins. Underribs on sheds are not required as the core parts between the sheds contribute to creepage distance.



— **Use of Metal Parts / Weight:**
Minimum use of metal parts by Porcelain Long Rod Insulators reduces corrosion problems and also gives lower weight for a complete insulator string and simplifies stringing of towers. Long Rod insulators can be up to 40% less in weight than the equivalent weight of a Cap & Pin insulator string, where the major portion of weight is made up of metal parts and cement. The major portion of a porcelain long rod's weight is insulating porcelain, approx. 90%.

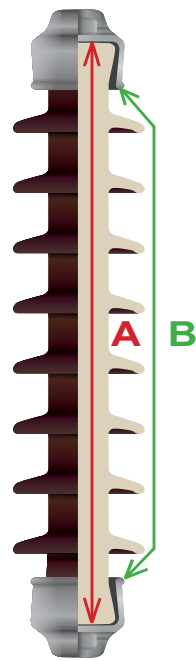


— **Suitability for Compact Line:**
The compact line presents a cost-effective solution for overhead high-voltage line projects. The insulators used on the compact lines have to be both - in tension and compression position. Since Cap & Pin insulators are not appropriate for the compression application, they can't be applied on compact lines.



— **Reduced Stock for Maintenance:**
Stocking Cap & Pins is common due frequent failures caused by puncture. Because Long Rods have such a low fail rate, most users keep minimal quantities as spare parts or even nothing. Typically, an user of Porcelain Long Rod Insulators keep maybe few pieces of insulators article on stock for ultimate safety, which is practically never used for the reparations.

PORCELAIN LONG ROD



— **Tracking Erosion Resistance:**
Alumina porcelain is the strongest insulating material with good resistance against UV radiation, wind, rain, ice, temperature changes and sand. In highly polluted areas, an option to improve the pollution resistance is to coat the insulators with RTV. The RTV has a hydrophobic surface and reduces dry band arcing.

— **No Flash-Under Risk:**
In high-voltage systems under wet and contaminated conditions, corona discharge is very common. Withstanding high electrical stresses, porcelain remains unaffected by corona unlike composite material, which might get damaged and consequently might lose its mechanical strength.

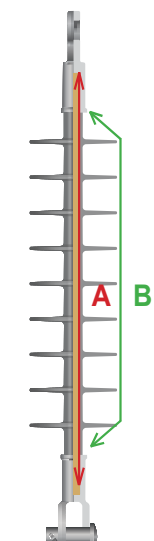
— **No Brittle Fracture Risk:**
High strength alumina porcelain insulators are non-porous and thus not influenced by moisture penetration. Unlike, fiber glass rods in composite insulators absorb moisture over time and lose their mechanical characteristics. When moisture reaches the rod, in a combination of exposure to the nitric acid environment near high electromechanical fields brittle fracture failure occurs.

— **No Biological Factor Risk:**
Porcelain is the most rigid, stable and durable material on the market. There are no known predators, which can damage porcelain. The composite insulators are frequently attacked and damaged by animals, birds and rodents. This issues can occur by transportation, in warehouses, and in worst case as installed risking and imminent flash-over.

— **Safe Handling & Transport:**
Due to the nature of porcelain and polymers, insulators must be handled with care. The advantage of porcelain is damaged is visually detectable. Whereas improper handling of polymers can cause undetectable internal damage that can lead to failure in service.



COMPOSITE LONG ROD



Lowest Aging Risk

— PPC Porcelain Long Rod Insulators are the most reliable and safe solution versus other insulator technologies, thanks to their superior porcelain strength (high AL_2O_3 of insulator materials) and advanced²₃ design for various demanding environmental conditions.

— PPC special emphasis on porcelain composition free of quartz residue, guaranteeing porcelain body to contain less than 1% quartz residue.

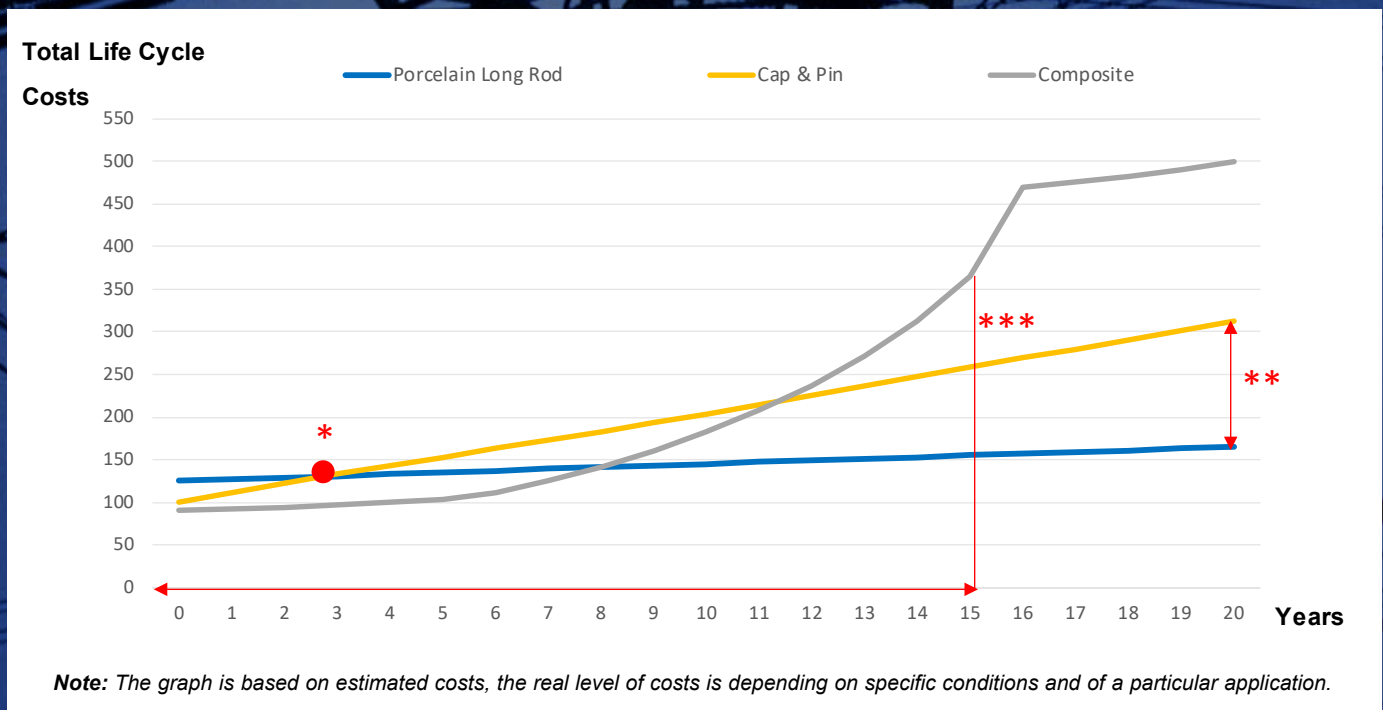
— Under regular conditions mechanical failures of PPC Porcelain Long Rod Insulators are unknown during the last 60 years.

Total Life Cycle Costs

* After approx. 3 years the total costs of Cap & Pin applications reach the level of Porcelain Long Rod applications. With Composite Insulators, it happens roughly in year 8.

** After 20 years of application estimated costs related to Cap & Pin are almost twice as high compared to Porcelain Long Rod Insulators.

*** After approx. 15 years lifetime of Composite insulators the costs are about 2 times higher than the costs of Porcelain Long Rod Insulators at that time. Often new composite insulators need to be installed and the old scrapped, which present additional high costs.



PPC Insulators is a leading manufacturer of porcelain insulators for more than 130 years. Learn more about our company and the full product portfolio here:

www.ppcinsulators.com

PPC Austria Holding GmbH
Plankengasse 7
1010 Vienna
Austria
info@ppcinsulators.com