

Study Committee B1

Insulated Cables

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Evolution of Dry Type Outdoor Cable Terminations Based on Field Experience

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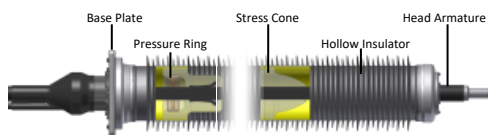
Motivation

- Driven by the diversity of applications different design concepts of dry outdoor terminations evolved
- Compared to fluid filled solutions dry solutions can offer a variety of advantages like no leakage, eco-friendly, failure behaviour, ...
- A new dry outdoor termination has been developed with focus on high level of pre-fabrication and easy assembly, hence reliability
- New concepts needs to be proven by development testing, product qualification and continuous review of field experience

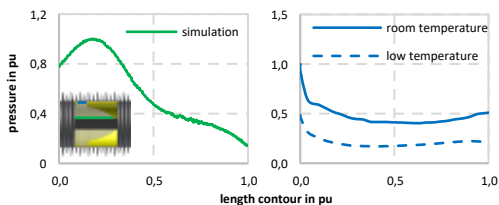


A New Approach of a Dry Outdoor Composite Termination

- Approach without additional insulating materials incorporating the design principles of oil filled composite outdoor terminations and dry type pluggable cable terminations for GIS & transformer



- Comprises a size adapted stress cone made of silicone mechanically fixed in the insulator by friction
- Well-adjusted design of the stress cone considering its dielectric and mechanical requirements supported by FEM simulation
- Validation of mechanical simulation results (fixation of stress cone, assembly forces, contact pressure)



- Dielectric limit tests proved the electric simulations results



Product Qualification & Testing

- Standard tests according to IEC 60840, IEEE 48, ICEA-S108-720 and AEIC CS9-15
- Climatic behaviour of dry outdoor terminations proven by climate chamber test with temperatures up to -60°C
- Customer specific tests for flexible dry terminations for temporary installations up to 245 kV
- A higher integrity of dry outdoor terminations by routine testing is possible



Field of Application

- The dry outdoor terminations offer solutions for
 - Emergency routing and maintenance work
 - Tower installation without usage of scaffolding
 - Substation and very narrow space conditions in rural areas, including surge arrester applications
 - Environment friendly applications
 - Refurbishment solutions (e.g. replacement of oil filled terminations)



Conclusion

- The gained knowledge in the range up to 170 kV in affordable designs will support future development for higher voltage ranges
- The consideration of different aspects like system design, ambient and installation conditions, safety requirements as well as the involved costs is important to choose the suitable type of dry type termination
- The variety of dry type termination will further increase the demand and market percentage

