Three-phase pollution test of diamond-shaped “suspension” insulator arrangement for T-pylon tower

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INSUCON

nationalgrid

STRI

Background and goal

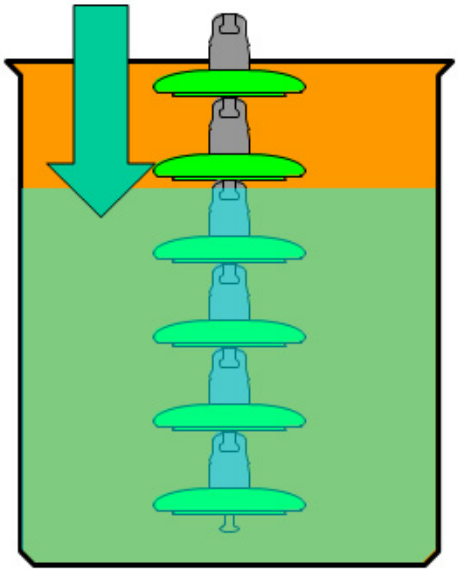
- The National Grid is planning for the new 400 kV overhead line with T-pylon towers
- Dielectric (lightning and switching overvoltages) and ice performance performed by STRI
- **Goal of this paper: verification of pollution performance**
- Full-scale three-phase test to be developed

Challenges

- No IEC test for polymeric (composite) insulators
- No test for three-phase arrangement
- No IEC test for the simulation of recovery of hydrophobicity

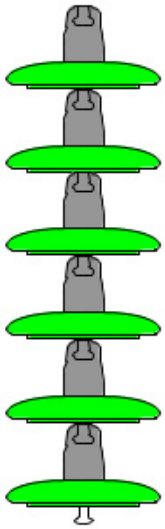
Methodology-1: principles of IEC 60507 (solid layer)

- 1. Dipping in Slurry

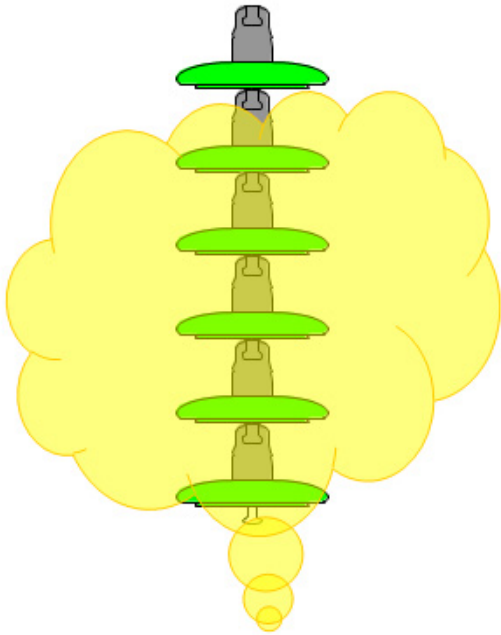


- Salt Water + Kaolin

- 2. Drying

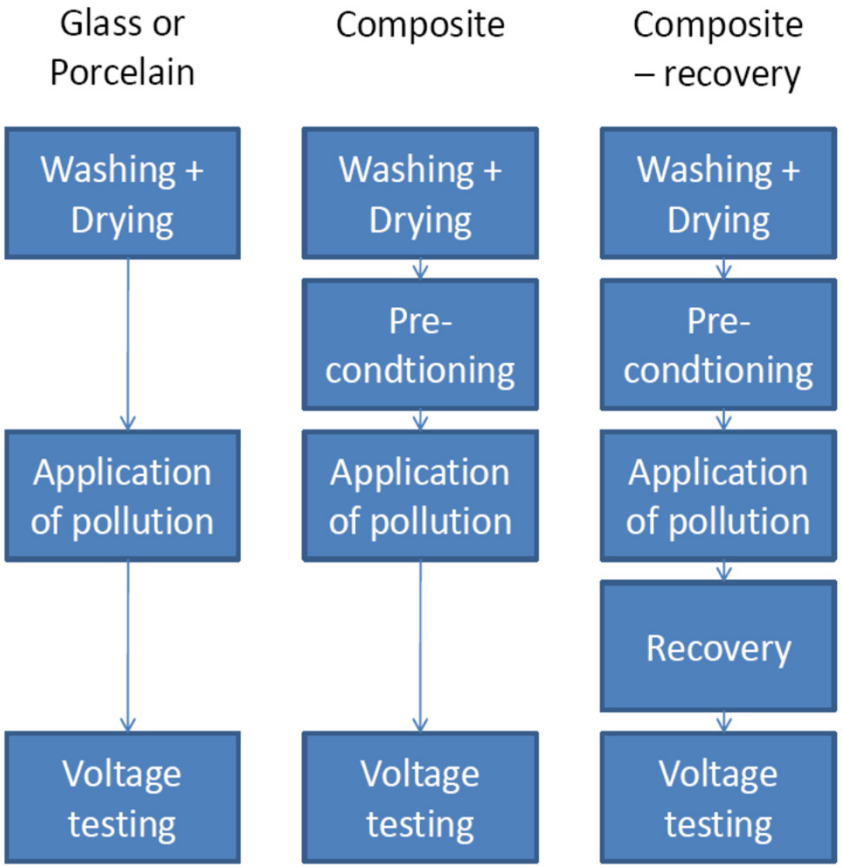


- 3. Wetting (Steam Fog) and Voltage

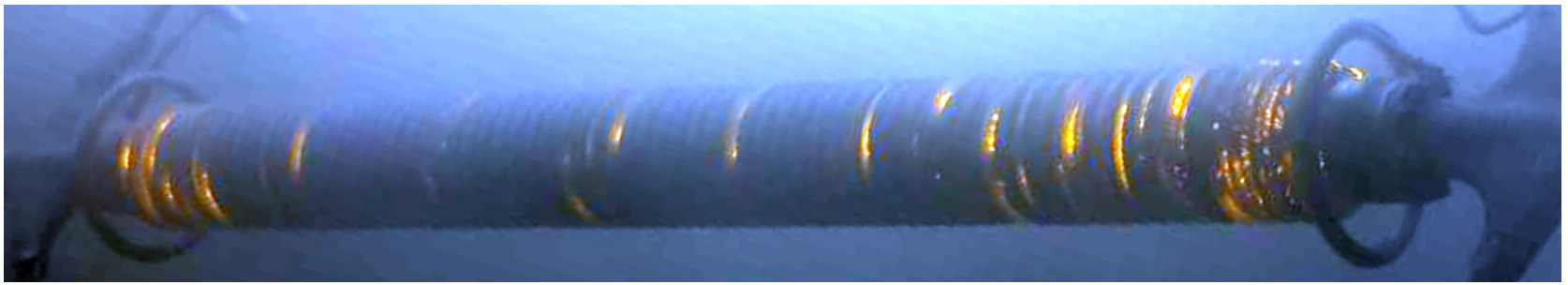


- 100 min.

Methodology-2: principles of CIGRE TB 555



Methodology-3: full-scale three-phase tests from 3 single phase transformers



High repeatability in pollution parameters

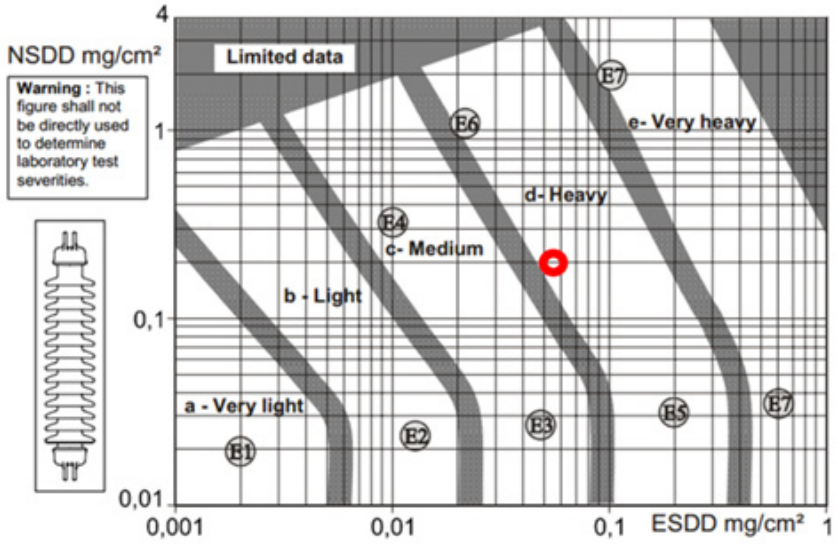
Object	Target SDD/NSDD, mg/cm²	Actual average SDD/NSDD, mg/cm²
1	0,05÷0,06/0,10÷0,20	0,052/0,25
2		0,060/0,20

High repeatability in leakage current parameters

Object	Peak current (charging current plus actual leakage current), mA
1	130-600
2	120-400

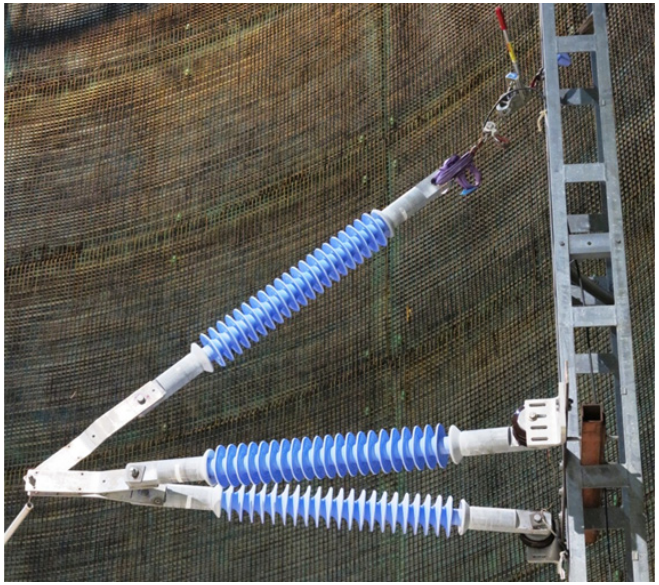
Practical summary

- Unique three phase full-scale pollution test for the complicated geometrical structure for 420 kV OHL equipped with composite insulators with hydrophobic surface has been successfully developed.
- Target pollution level withstood for two structures (no flashovers).



Scientific summary

- The test is applicable for complicated geometrical structures.
- The test is repeatable.
- Reported to CIGRE within working group D1.44
- Verified at different configuration.



Thank You!