Advanced test methods for full-scale ice tests of DC insulators strings intended for ±350 kV

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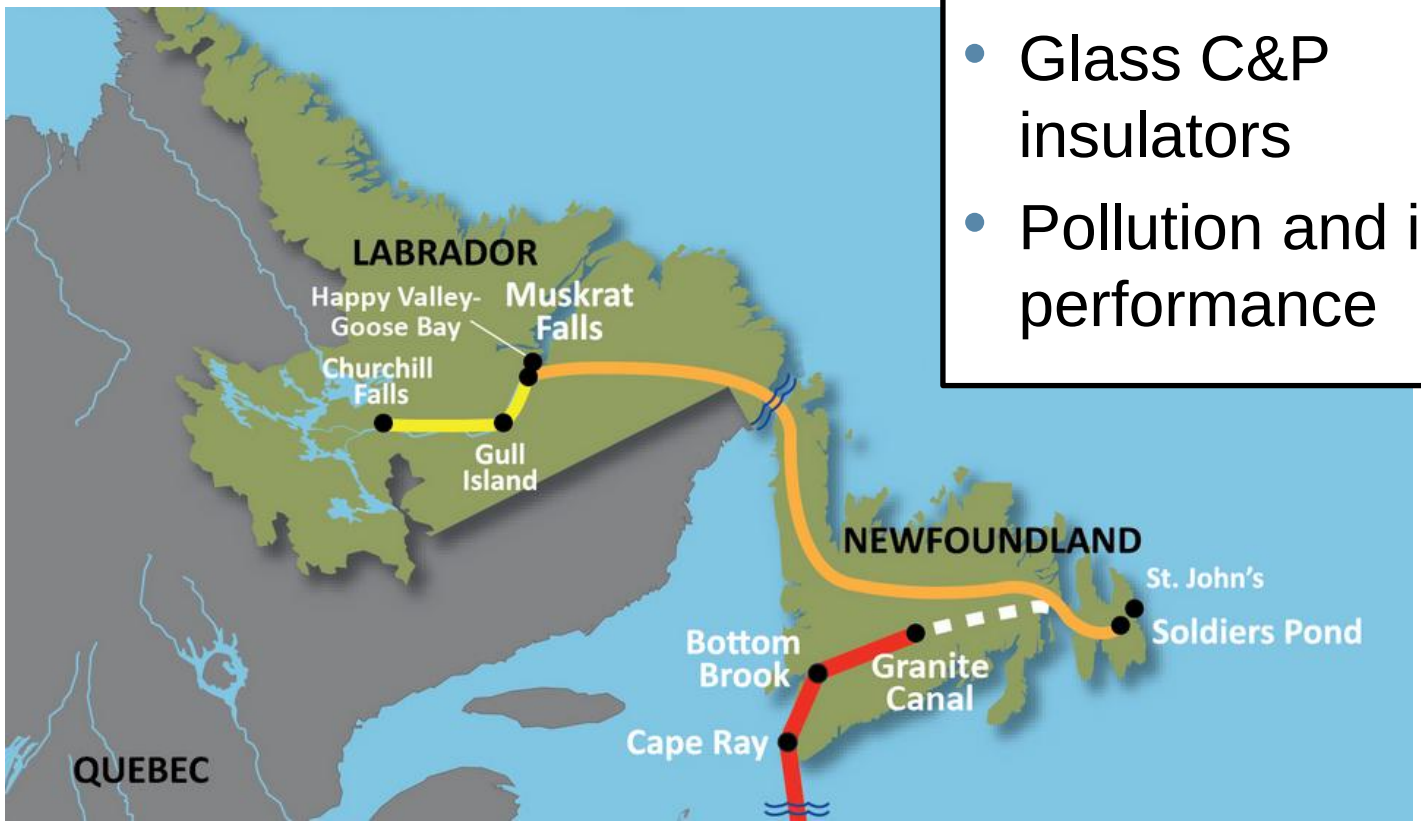
Background

- ±350 kVDC OHL
- Glass C&P insulators
- Pollution and ice performance



Verification of insulator design

Laboratory full scale withstand voltage tests

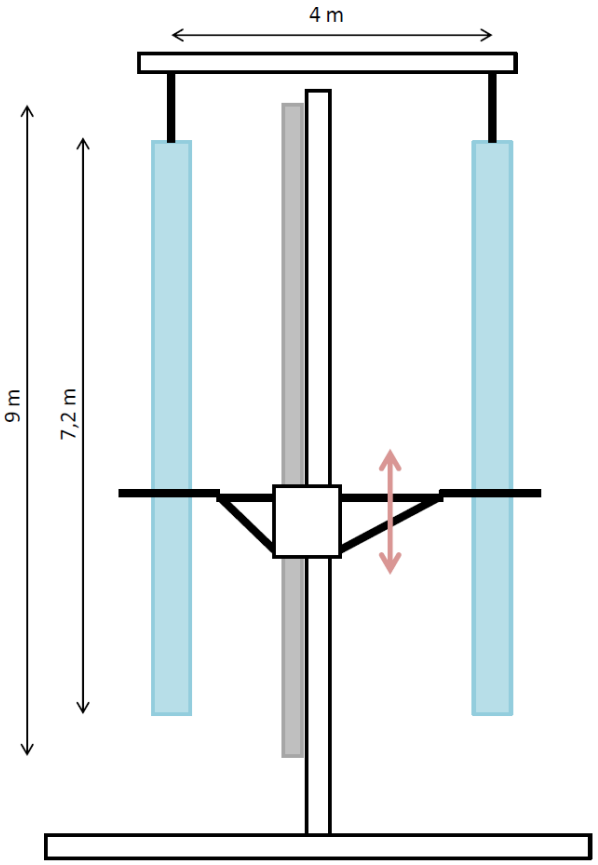
- Pollution & Rime ice
- Pollution & Glaze ice
- Pollution & Glaze ice – accreted under voltage

Different severities (pollution and ice)

Pollution

- IEC 61245, dipping
- SDD: 0,05-0,15 mg/cm^2
- NSDD: 0,1 mg/cm^2
- Dried before mounted

Ice accretion setup



Ice accretion

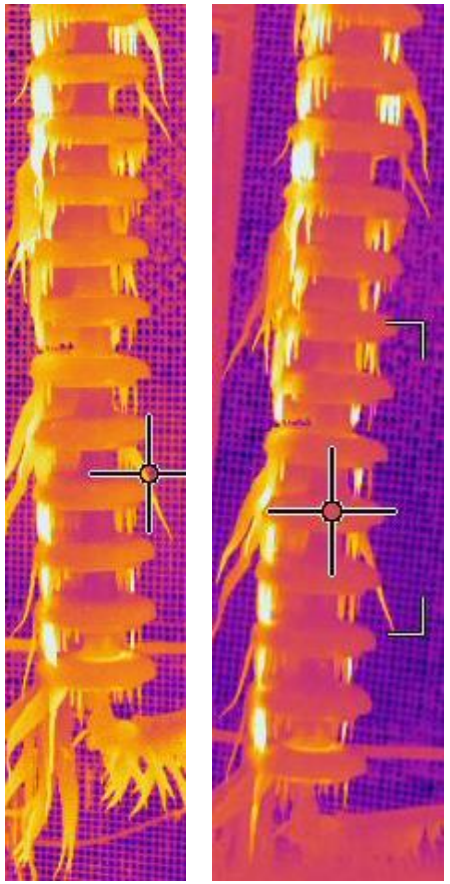
- Fixed ambient temperature (-7 – - 8 °C)
- Low water temperature
- Limited amount of water
- Variable sweeping interval/speed
- Types of nozzles
- Distance from nozzles

- Preserve pollution!

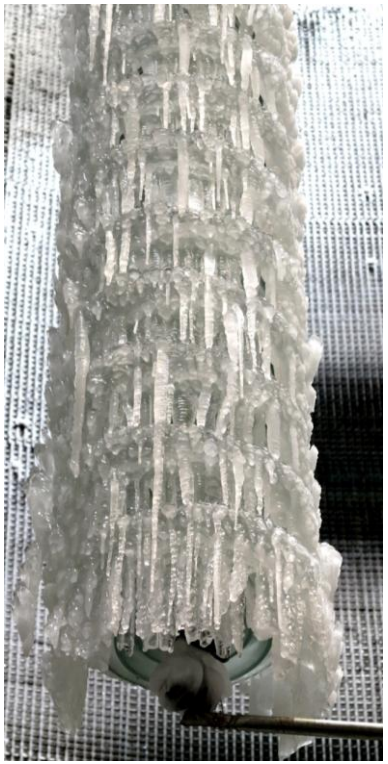
Characterization

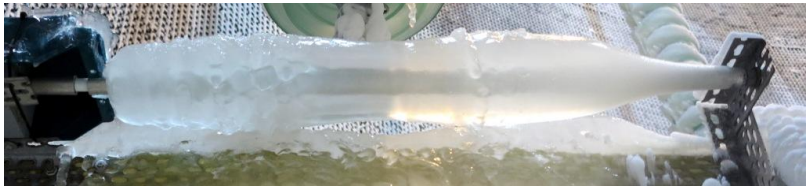
Measured parameters

- Test hall temperature
- Applied water conductivity
- Ice density
- Melting ice water conductivity (at voltage test)
- Melted ice water volume
- DC test voltage
- Leakage current
- Ice temperature (IR)



Example ice accretion – no voltage





Example ice accretion – @ 361 kVDC

Withstand voltage test

- Melting regime (sun-rise service case)
- Maximum service voltage (361 kVDC)
- 4 parallel test objects
- Acceptance criteria acc. to IEC

Summary

Verification of pollution and ice performance of full scale 350 kV HVDC glass strings under three service cases:

- Pollution and rime ice
- Pollution and glaze ice
- Pollution and glaze ice accreted under voltage