

Paris Session 2022



HVDC test experience with different installation methods

SC B1 Insulated Cables – PS2 – Q3

To what extent do enhanced test methods, perhaps including more variable environmental scenarios offer benefits to enhanced reliability and system integrity? What possible further recommendations and guiding documents are needed to standardise procedures of enhanced tests?

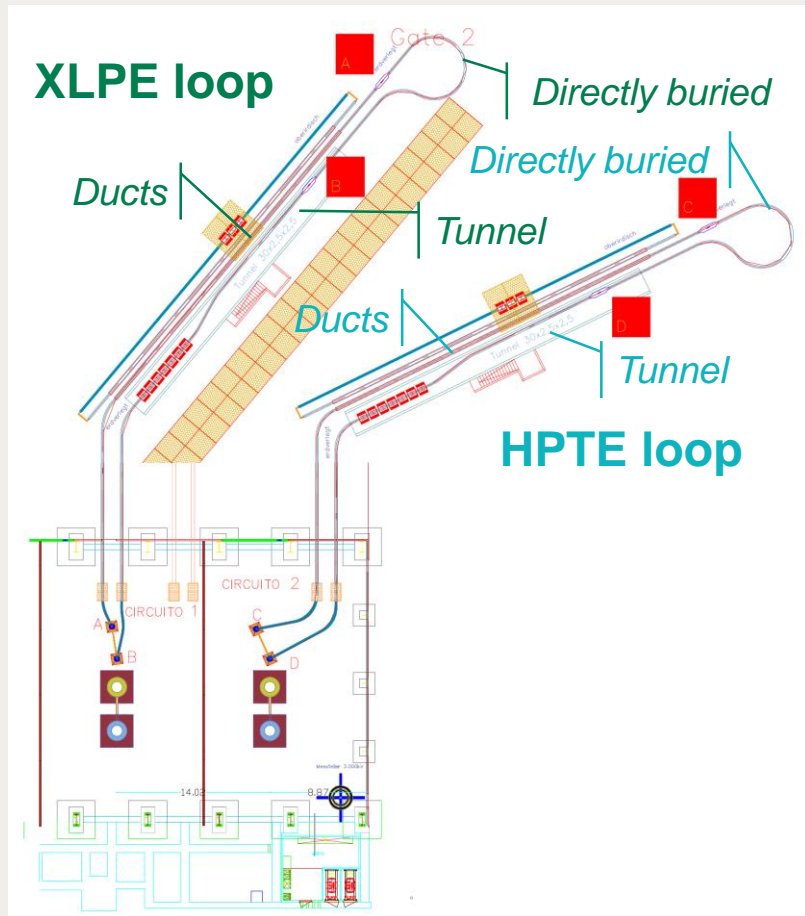
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CIGRE current approach to Pre-Qualification Tests (PQTs) Methods

- TB 852 already allows two possible testing conditions, one with freely changing ambient temperature and one in a controlled laboratory environment.
- The first setup poses the problem of uncontrolled ΔT_{MAX} : the current needed to keep $T_{cond} \geq T_{cond,MAX}$ with varying ambient temperature may lead to exceed or fall short of ΔT_{MAX} .
- This is not necessarily a worst condition for the test, as electric field in new HVDC insulations are less sensitive to ΔT and the insulation average temperature is lower (hence insulation electrical resistivity is higher).
- Also, this condition may be reached only in one point of the test loop.

525kV land PQT mimicking installation conditions



- Two 525kV PQT on land systems insulated with XLPE and HPTE were successfully completed mimicking the installation conditions.
- As PQT lasts 1 year, in the coldest months it was necessary to increase the heating current, leading to a ΔT_{MAX} of 40 K across insulation in certain loop locations.
- This condition isn't representative of the cable operation, as during cold months the conductor temperature is lower than $T_{cond,MAX}$ and consequently ΔT_{MAX} as well.

Group Discussion Meeting

525kV sub PQT/TST in laboratory conditions / Conclusions



Group Discussion Meeting

- A test setup in laboratory conditions is used on a submarine 525kV XLPE cable PQT.
- Test parameters are controlled by means of current and thermal insulation as per TB 496. However, new TB 852 allows to control ΔT_{MAX} also by external heating or cooling.
- In parallel to the PQT, a TST with low ΔT was also setup to verify absence of any thermal instability phenomena.
- **In conclusion, both setups are feasible and there seem not to be different test outcomes based on the setup used.**
- **TB 852 test scheme covers well all possible failure modes and allow for better control of the test parameters.**