

## Cable quality assurance of offshore projects in the German North Sea

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Following the legal obligation, TenneT Offshore GmbH started with the activities in the grid connection projects in the German North Sea since 2006. Until Today, approximately 3.600 kilometers HVDC and HVAC cables were/are installed in those projects. TenneT is the now the biggest utility for the application of DC XLPE cable worldwide. In the last eight years, we had to face huge challenges and of course gather plenty of experience from the projects. In this paper, the challenges, experiences and some thinking will be presented from the stand point of an offshore TSO in the different projects' phases, especially from the aspect of cable quality assurance.



### Project Initial and negotiation phase

- Qualify and verify the factory and further production line
- Design of cable and accessories (electrical and mechanical requirement and further environmental issues)
- PQ-Tests/EQ-Test, Development Test
- Special accessories for the submarine cable and offshore application
- Spare parts concept

### After the contract awarding and manufacturing

- Type Test (mechanical preconditioning, non-electrical and electrical test according to the IEC/CIGRE and other standards, special requirement)
- Factory test (Routine test, Sample test and FAT)
- Cable loading and intermediate storage (Coiling and bending radii, temperature, pulling force and equipment etc.)

**Cable installation phase**

- Monitoring the installation, e.g. through ODTR-Measurement on FO-cables
- Burial depth (reasonable endeavor) and cable protection
- Filling material of HDD
- Identification of Hot-Spots along the cable route
- Trenching the live cables

**Phase After-Installation till operation**

- After-Installation-Test of the cables, especially for the offshore cable and DC cable
- Wet-storage
- Finger print and further measurements