

Extension of Qualification applied on a MV extruded submarine cable in France.

Mohamed **MAMMERI** (1), Romain **MAURY**, Yves **MAUGAIN**, Gabriel de **ROBIEN** (2), Vincent **BELLOIR** (3)

- 1 General Cable. Rue de Varennes Prolongée 77876 MONTEREAU Cedex France
mmammeri@generalcable-fr.com , rmaury@generalcable-fr.com
- 2 EDF, 2 rue Michel Faraday 93200 Saint Denis France,
yves.maugain@edf.fr, gabriel.de-robien@edf.fr
- 3 ERDF, Les Halles - 64 boulevard Voltaire - BP 90937 - 35009 Rennes Cedex France,
vincent.belloir@erdf.fr

Belle Ile is an island in the Atlantic Ocean along the French west coast which is fed by 3 MV submarine links. One link is out of and it was decided to replace it. The project called "BELLE ILE 4" consist in implementing a new MV subsea power link substituting one of the three cable system out of occurred on of "Belle Ile" Island currently energized with the two operational cable.

The Ministry of Environment forbade the use of lead. As a consequence the contract asked for a production of 15 kilometers with two non-crossed armored layers without splices of a 20 kV coilable 3x150 mm² copper extruded Cable System with a laminated copper bonded to the outer outersheath.

To improve the communication means on the island, it was asked by the local authorities to add 24 pairs of optical fiber in Mono-mode type to the cable.

The group GENERAL CABLE (GC) was awarded by ErDF as main supplier to conduct and drive this project based on knowhow and the innovative program that demonstrate his competence in the field of subsea applications.

The cable design has been developed in accordance with the requirements of EDF standards HN 33 S 26 based on the French standard NF C 33 226 and UIT G652.

This paper introduces the newest technology based on the development of coilable hybrid Cable design with copper laminated screen longitudinally applied and bonded to the outersheath which demonstrates high reliability for currently envisioned Subsea systems.

The focus of the paper is to assess the reliability of XLPE insulation cable system subjected to extensive qualification program. This paper describes the development process MV XLPE Cable systems with the results of the type tests qualification process.

Indeed, the cable system has been submitted to mechanical and electrical type tests qualifications mainly focus on, Coiling Tests, Traction Tests, Tensile and Bending Tests followed by Electrical Type Tests. The non-Electrical Type tests have been performed as well. Several European laboratories have been involved along the process of the qualification.

The authors will introduce in the paper a new "Extended Prequalification sequence" based on the recommendation of CIGRE TB 303 and the standard CEI 60840 Ed 2004 that was applied on the MV submarine cable. Such a specific protocol adapted for the project was a pioneer methodology in the cable manufacturing industry for MV cable system.

The tests protocol is articulated according to the following sequence:

- a) Bending Test
- b) Partial Discharge
- c) 20 Heating Cycles
- d) Tan δ Measurement
- e) 80 Heating Cycles under voltage (2 U₀)
- f) Partial Discharge test
- g) Lightning Impulse voltage tests
- h) Power test frequency voltage test
- i) Examination of the cable system

The full Cable system 3 x 150 mm² copper XLPE passed successfully the qualification program.

Key words

Extruded cables; Submarine Cables, Extension of Qualification, Medium Voltage