

Long term qualification of XLPE electrical insulation systems for offshore deep water cables

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There is an increasing demand for subsea electrical power transmission in the oil- and gas industry. Electrical power is mainly required for subsea pumps, compressors and for direct electrical heating of flowlines. The majority of subsea processing equipment is installed at water depths less than 1000 meters. However, projects located offshore Africa, Brazil and in the Gulf of Mexico water depths of 3000 meters are reported.

Hence, Nexans Norway and SINTEF Energy Research initiated a long term development programme to qualify deep water XLPE power cable. The long term test programme was mainly based on ANSI / ICEA S-97-682-2007. Some adjustments related to the high hydrostatic test pressure (300 bars) were; however, required.

A 7.2kV XLPE test cable was manufactured and installed in a large hydrostatic test vessel at 45°C and 300 bars. The cable samples were stressed with an electrical test voltage of 17kV; corresponding to an average electrical stress of 5.9kV/mm.

Evaluations are performed after 120, 180, 360 and 900 days of hyperbaric ageing.

Nexans Norway has a long and proven experience of delivering wet designed power cables i.e. without a metallic water barrier. After the hydrostatic ageing of the model cable at 300 bar hydrostatic pressure the cables were tested in order to determine the electrical properties of the insulation system. In addition, water tree analysis were performed after the hydrostatic ageing.

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