

## Development of a 345kV XLPE extruded cable for HVDC applications

Marie-Laure **PAUPARDIN** (1), Mohamed **MAMMERI** (1)

1 GENERAL CABLE, Montereau France, [mlpaupardin@generalcable-fr.com](mailto:mlpaupardin@generalcable-fr.com), [mmammeri@generalcable-fr.com](mailto:mmammeri@generalcable-fr.com)

For many years, there is a strong attraction in the use of submarine and underground for high voltage direct current (HVDC) cables. This request involves the cable and accessories qualification whose voltage level rises gradually with market demand. The choice of extruded cable reinforces this growing interest in achieving high voltage links without maintenance and low impact for environment.

The first developments were performed for voltage level ranging from 270kV up to 320kV and recent on 345kV. This technical study presents a test of qualification for this voltage level with both LCC and VSC technology. This voltage increasing is due to an understanding of space charge formation and behavior under direct current stress. The electric field distribution modeling, the choosing of right materials and appropriate design accessories allow achieving these results.

The tested cable is a 2500mm<sup>2</sup> aluminum conductor with extruded insulation of 21.5mm thickness. The loops include accessories with molded and premoulded joints and composite outdoor terminations.

The electrical test has been performed according to the technical brochure CIGRE n°496 combining the VSC and LCC protocols for electrical test which recommend type test and prequalification test. VSC technology, the most used with extruded cable, is based on the principle of the power flow reversal by not changing cable polarity.

The cable system passed successfully the tests for the nominal voltage  $U=345kV$ .

The interest of this double qualification is to show that the cable system can be used independently of the conversion technology chosen. This also proves the reliability of the cable system by allowing the change in the link operating.

The authors will present the main characteristics of the system and the detail of electrical tests results.

Keywords: HVDC, 345kV, LCC, VSC, TB 496, extruded cable