Combined qualification according to IEC IEEE ICEA of 345 - 400 kV cable components and system

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ABSTRACT

The system approach in IEC Very High Voltage standards and the component approach in IEEE, and ICEA standard lead to different tests and scope of tests to type test a cable system and its components, i.e. cable, joint and GIS termination.

The authors will present the different tests, the requirement levels in the different standards, in view of the validation of the system/component design matching real life operation in the network.

- *Installation mechanical stresses*
- *Operation dielectric and thermomechanical stresses*

An envelope qualification scope of tests will be deduced.

Finally, an example of complete qualification will be given for a 345/400 kV cable component and system that meets the requirements of the envelope scope of tests.

KEYWORDS

XLPE Land Cable system, IEC62067 prequalification tests, IEEE 404, IEEE 48, IEEE1300, ANSI/ICEA S-108-720

INTRODUCTION

Globalization of the international market place has shown some limits coming from the environmental impact of transporting heavy item over long distances. For that reason, the construction of a high voltage cable factory in North America became a serious project in the 2010's.

The purpose of the paper is report how the new factory was qualified for HV cable production together with accessories supplied by its mother company.

The specification for this qualification was encompassing the need to comply with international standards (IEC) as well as with North-American standard (IEEE and ANSI/ICEA). [1]

GENERAL QUALIFICATION PROGRAM

Though the factory in question was mainly oriented to the American HV underground cable market it was obvious that it should also comply with the requirements set forth in IEC 62067. This standard requests a system qualification including as a minimum a prequalification test and a type test.

It was decided to carry out the prequalification test at the highest rated voltage currently in use in energy transportation by buried lines, i.e. 290/500(550)kV.

The cross-section of the cable was also selected to cover the whole range of conductor currently used on this market. A 2500 mm² Milliken Copper with insulated wires was chosen. The XLPE insulation thickness was 30.2mm.

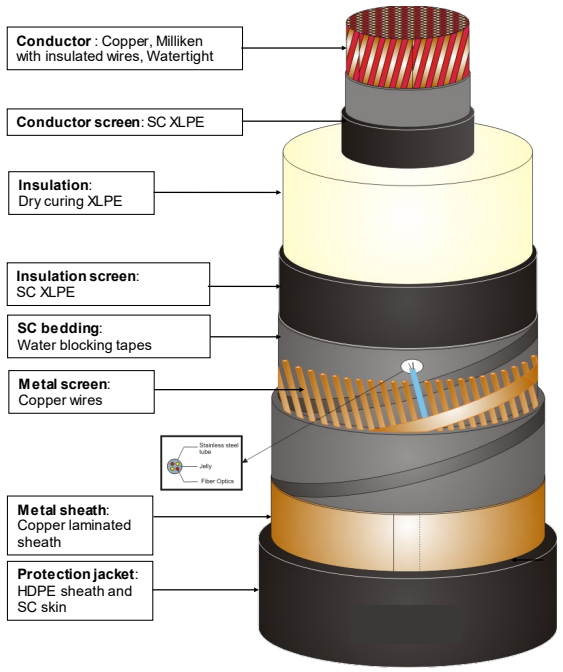

Fig. 1: Prequalification test cable

For type test and qualification test according to both international and American standards it was obvious that not only one type test loop would cover the whole range of requirements, however the design of the test program was made having in mind the aim of minimising the overall costs for this qualification.

The solution was then to specify first a combined type test that would cover the requirements in IEC 62067 for a 400 kV 2500mm² Cu XLPE cable system and those in ANSI/ICEA S-108-720-2012 for a 345 kV 2500 mm² Cu XLPE cable.

In a second step the accessories which are necessary to build-up a complete system were tested as per IEEE 48 for the cable terminations and per IEEE 404 for the joints.