A.7.5.

HVDC extruded cables: testing of cable systems aiming at VSC or LCC applications.

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A reliable cable design, that enables to meet more than 30 years service operation needs (a) to use suitable relationships that allow to foresee long term behaviour of the insulating system, (b) to set up experiments to check the relevance of available relationships and (c) to submit the cable system to various tests to prove its timelessness.

Electric field and space charge distributions in a dc extruded cable are important features regarding the cable design, as they control the cable behaviour and its life expectancy.

The calculation of the field and space charge distribution in the permanent state has been treated in the early 80's. The transient state has been also considered, and recently extended to the case of a conductivity that depends on both temperature and electric field. On the other hand, space charge and field distribution on flat samples or short cable samples have been studied and measured since the 80's by the mean of numerous characterisation techniques, but have never been measured on a HVDC cable under service conditions (E, T gradients).

This paper relates a set of tests performed on extruded cable systems for dc application, taking aim for line commutated converter (LCC) or voltage source converter (VSC) configurations, which are respectively converters that have the feature of changing, or not, voltage polarity on the cable system. Attention will be paid to withstand and type tests performed according to CIGRE recommendations as well as to space charge measurements on energised and loaded cables.

All these tests, together with the insulating system characteristics, partly displayed in another paper of this conference, clearly show a strong influence of the insulating system on the cable performances and give direction towards a reliable cable system design depending upon requirements on type of converter.