A.2.5.

Large projects of EHV underground cable systems

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In the Issue No 139 of Electra, dated December 1991, CIGRE WG 21.09 published a report on the working electrical stress of HV and EHV cables with extruded insulation. [1].The survey carried out by WG 21.09 led to a number of conclusions concerning the working electrical stresses of cable systems with synthetic insulation:

- Electrical stresses increase with the voltage levels
- Availability of prefabricated accessories permits the increase of maximum stress levels
- New materials and strict quality control at all production phases play a decisive role in electrical stress evolution
- Absence of performance specifications constitute the largest obstacle to the development of cables operating at high electrical stresses

In the meantime, during 1990 CIGRE Study Committee 21 (HV Insulated Cables) created a Working Group whose task was to prepare a set of recommendations concerning the testing of extruded cables and accessories for voltages above 150 kV and up to 400 kV inclusive. The resulting recommendations, published in Electra N°151 in December 1993 [2], became the common reference which the vast majority of EHV tests have been based upon since then. Furthermore said recommendations, coupled with their extension to the 500 kV level [3], have constituted an important input for IEC in the preparation of its 62067 standard [4].

Starting from their wide in-service experience on extruded cable systems, European manufacturers have greatly contributed to the preparation of IEC 62067, now accepted worldwide. Several big projects of underground cable systems up to 420 kV have now been carried out by European manufacturers throughout the world. IEC 62067, and the tests specified in this standard, has been in all cases the only customer technical requirement. However every specific project, due to its specificities, required special additional tests in order to demonstrate the performance of the proposed cable system in the proposed installation configuration according to various CIGRE recommendations: short-circuit tests, three phase heat cycle test, etc.

This paper summarizes this experience developed by European Companies through practicle examples and highlights the main criticalities in EHV underground cable projects design and execution.