



## A.2.5

### Large projects of EHV underground cable systems

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#### Résumé

Les câblers européens ont largement contribué à la préparation de la Spécification CEI 62067, acceptée maintenant dans le monde entier. Plusieurs grands projets de liaisons souterraines jusqu'au niveau 500 kV ont été ou sont en train d'être mis en œuvre par les câblers européens à travers le monde. Les recommandations CIGRE, puis la spécification CEI 62067 ont été dans tous les cas la seule exigence du client. Cependant, chaque projet, de par ses spécificités, a conduit à réaliser des essais additionnels selon différentes recommandations CIGRE: essai de court-circuit, essai de cycles thermiques en triphasé, etc.

Ce rapport résume l'expérience acquise par les câblers européens.

**Mots clés:** Câbles THT, CEI 62067, Recommandations CIGRE

#### **1. INTRODUCTION**

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 up to 400 kV [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), now renamed Study Committee B1, 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

#### **Abstract**

European manufacturers have greatly contributed to the preparation of IEC 62067, now accepted worldwide. Several big projects of underground cable systems up to 500 kV have now been or are being carried out by European manufacturers throughout the world. CIGRE recommendations and later on IEC 62067, have been in all cases the only customer technical requirements. 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 tests, etc.

This paper summarizes this experience developed by European Companies.

**Keywords:** EHV Cable systems, IEC 62067, CIGRE Recommendations

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 publication [4].

All this development started at the beginning of the 90's has been possible also thanks to the extensive testing, manufacturing and service experience developed during the previous decades at lower voltages by the European Cable Industry. This same experience will play a prominent role in the further improvement and fine tuning of IEC 62067 for the years to come in order to optimize EHV underground cable systems reliability.

#### **2. NEW IEC 62067 STANDARD**

##### 2.1 PREAMBLE

As indicated in the preamble of IEC 62067, according to the recommendations of CIGRE WG 21.03, the extension of IEC 840, now renamed IEC 60840[5], to voltages above 150 kV, needed extra considerations because of the following factors: