



A.1.6. Une nouvelle génération de systèmes de câbles extrudés haute et très haute tensions

WILLEMS H., GEENE H., VERMEULEN M., NKF Kabel, Delft, Pays Bas

Résumé

Bien que la génération actuelle de systèmes de câbles extrudés ait déjà montré des avantages comparée avec les systèmes conventionnels; autres développements en ce qui concerne des générations plus nouvelles avec même une meilleure performance seront possibles. Ces développements basés sur une nouvelle génération d'accessoires surtout préfabriqués, sur des techniques de montage moins homme-dépendantes et sur la disponibilité de méthodes-test et de méthodes diagnostiques plus avancées meneront à des systèmes de câbles extrudés à une fiabilité plus haute et à une meilleure utilisation durant leur durée de vie. Cet article traitera ces développements et leur influence sur la performance de systèmes de câbles extrudés à (extra-) haute tension.

1. Introduction

Recent developments towards a new generation of accessories, based on prefabricated components and simple, rapid and man-independent jointing techniques emphasize the advantages of (E)HV extruded cable systems. Their installation is easier and cheaper and the reliability during their lifetimes higher. The characteristics of these accessories increase the design flexibility and the access to tailor-made solutions.

Several new diagnostics to safeguard an extruded cable system have been developed or are under development. They ensure the user a reliable and more economic utilization of these cable systems and are the first steps towards intelligent power cable systems.

An integral test program is essential for the qualification of new (E)HV XLPE cable systems. Especially, the compatibility between the various components of the system has to be tested extensively. A combination of type-, routine-, special- and after laying tests ensure a reliable operation during the lifetime of such a cable system.

The new generation of accessories, new diagnostics and integral testing increase the performance of (E)HV XLPE cable systems and reduce the costs of ownership.

2. Characteristics of modern (E)HV XLPE cable systems

During the last decades many development programs were focused on the design and the manufacturing process of (E)HV extruded cables. These programs resulted in a highly reliable product. More recently, the attention is focused on the development of new accessories and diagnostics to benefit fully of the potentialities of (E)HV extruded cable systems.

In general the characteristics of these new accessories are as follows:

- The components of the accessories are prefabricated and

A.1.6. A new generation of HV and EHV extruded cable systems

WILLEMS H., GEENE H., VERMEULEN M., NKF Kabe

Abstract

Although the present generation of extruded cable systems already has clear advantages compared with the conventional systems, further developments towards newer generations with an even better performance are possible. These developments, based on a new generation of mainly prefabricated accessories, on less man-dependent installation techniques and on the availability of more advanced test and diagnostic methods, will lead to extruded cable systems with a higher reliability and a better utilization during their lifetime. This paper will discuss these developments and their influence on the performance of the (E)HV extruded cable systems.

(routine)tested before installation (see e.g. the Dutch KEMA Specification S 10-2)

- The jointing techniques are simple, rapid and man-independent (e.g. the Click-fit principle [4]).
- The design of these accessories is based on the fail-safe principle [4].
- Maximum compatibility between the different parts, and of course with the XLPE cable, is essential for a reliable operation.
- The installation time and costs can be considerably reduced.
- The structure is modular. This means less stock and shorter delivery times.
- The design is uniform for all voltage ranges, HV and EHV, (see e.g. figure 1).
- An integration of different functions, e.g. cross-bonding or transitions from one to another system [4], in one accessory is possible.
- The new accessories provide a high flexibility in the design of cable systems and give easy access to tailor-made solutions.
- The new accessories meet the requirements according to the national and international specifications (e.g. KEMA S 10-2, IEC 859 and IEC 840).

The application of new diagnostics, e.g. temperature registration by means of an integrated optical fibre or high frequency partial discharge measurement during operation can substantially improve the performance of a cable system. However, one should keep in mind that one of the main features of XLPE cable systems is that they are free of maintenance. So, the application of new diagnostics should only be considered if there is a significant added value e.g.:

- maximum utilisation of a power cable system
- to locate and safeguard critical spots in the cable circuit
- a controlled introduction of new system components
- the monitoring of ageing phenomena e.g. at the end of a components lifetime or in case of a high failure rate.