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Investigations of medium voltage polymeric cables aimed at a rationalised european standard

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Abstract

In the framework of a European project, electricity suppliers and cable manufacturers have undertaken work to rationalise the designs of medium voltage cables, and the related European standards. Based on a comparison of designs, tests, requirements and distribution systems existing in European countries, 4 cable designs, have been proposed to cover a major part of the European market. Prototypes have been manufactured and a set of investigation tests have been started, mainly focussed on increased gradient cables. The expected result from this work is a proposal for specifications, that could be the basis for a future rationalisation of existing standards.

Résumé

Dans le cadre d'un projet européen, des compagnies d'électricité et des fabricants de câble ont entrepris de rationaliser la conception des câbles moyenne tension et les normes européennes qui les concernent. A partir d'une analyse comparative des conceptions, essais, besoins fonctionnels et pratiques d'exploitation en Europe, 4 conceptions de câbles, permettant de couvrir la majorité du marché européen, ont été proposées. Ces prototypes ont été fabriqués et une série d'essais d'investigation a été engagée sur ces câbles, portant principalement sur une augmentation du gradient. Le résultat attendu de ces travaux est une proposition de spécifications qui pourrait servir ultérieurement de base à une rationalisation des normes existantes.

1 Introduction

Modern extruded insulation medium voltage (mv) cables have now given more than 20 years of satisfactory experience as against the early products of the 1960s that gave poor performance. Improved conductor and insulation semiconducting screens made the initial gain and later, changes in polymer compounds and extrusion and cross linking technology enhanced reliability to the level enjoyed today. Some of the advances in reliability have been built on two factors, the ability to maintain the radial water tightness with a metallic envelope around XLPE insulation or the use of better grades of XLPE or EPR compound, known to have an improved water-treeing resistance.

The introduction of the European Public Procurement Directive in 1990 encouraged the review of cable specifications and standards but of producing pan-European rationalised standards was soon recognised to be an enormous task so that the compendium approach standards were assembled under the auspices of CENELEC TC20. Any thought of rationalising MV cables was particularly problematical, as the Harmonised Document HD 620 required over 1000 pages to specify the variety of European MV cables in use.

It was in this context that a consortium of European electricity utilities and cable manufacturers was formed to rationalise the design of MV distribution cables in terms of