B.3.5. Essais de longue durée en immersion sur des câbles MT à isolation PR

AUDOUX C., Silec, France
FONDEUR JH., Câbles Pirelli, France
LEROY JH., PINET A., EDF, France
SIMEON E., Alcatel Câble, France

RÉSUMÉ

Bien que comportant une étanchéité radiale et longitudinale, le câble HTA utilisé en France a fait l'objet d'investigations pour connaître son comportement lorsque l'isolant est en présence d'eau.
Les modalités d'essais retenues consistent principalement à faire vieillir le câble dans de l'eau à 50 °C, sous 4 fois sa tension assignée, la tenue diélectrique résiduelle étant mesurée après six mois, un an et deux ans. Il apparaît que la chute de tenue diélectrique se produit surtout au cours des 6 premiers mois de vieillissement. Les résultats détaillés sont donnés dans le présent rapport.
Enfin, les aspects liés à la normalisation de tels essais sont également évoqués.

B.3.5. Long duration immersion tests of cross-linked polyethylene insulated MV cables

AUDOUX C., Silec, France
FONDEUR JH., Câbles Pirelli, France
LEROY JH., PINET A., EDF, France
SIMEON E., Alcatel Cable, France

ABSTRACT

Although the MV cable used in France possesses a high degree of radial and longitudinal watertightness, it has been subjected to further investigations to assess its behaviour when the insulation is in presence of water.
The selected test methods consist mainly of ageing the cable in water at 50 °C under 4 times its rated voltage, with the dielectric residual strength being measured after 6 months, one year and two years. It appears that a drop in the residual voltage strength occurs chiefly during the first 6 months of ageing. The detailed results are given in this report.
Finally, aspects relating to the standardisation of such tests are also mentioned.

1 - INTRODUCTION

The MV cable used in France was originally the subject of an Electricité de France (EDF) specification (HN 33-S-23), later converted to a national standard (C 33-223). Although the cable was designed to be watertight both radially and longitudinally, EDF and the French cable manufacturers (SYCABEL) decided at the beginning of 1992 to start investigations into the behaviour of the cable in water and under a high stress.
The results of these investigations are given below.

2 - REMINDERS CONCERNING THE FRENCH CABLE

2.1 - TECHNOLOGY

The cable was originally designed on the basis of a number of requirements (short-circuit current, ease of installation of accessories, laying of cable directly into the ground, option of mechanical laying, and aerial variant, etc...).
In France, the standard voltage is 12/20(24) kV, and the chosen sections are 50, 95, 150, 240, 630 and 1200 mm^2.
For sections up to 240 mm^2, the link is made up of three laid up cables. The 630 and 1200 mm^2 sections are single-core. The various components of the cable are illustrated in figure 1.

Some relevant points have to be noted :

- the insulation screen is longitudinally grooved, facilitating the fixing of the hygroscopic powder providing **lengthwise watertightness** of the cable in quite economical conditions. Moreover, these grooves absorb the effects of insulation expansion with temperature by crushing, ensuring an improved contact between the semi-conductor and aluminium screen, and facilitating heat dissipation.

- the metal aluminium screen is bonded to a thick sheath in high-strength PVC. This combination stands up well to external attacks of every description. In particular, it provides **radial watertightness** at the sheath.

This combination of hygroscopic powder and aluminium screen bonded to the sheath constitutes an extremely effective barrier to water penetration into the cable, and because of this fact, we considered that the tests would have to be conducted in conditions which were representative of the reality of the network and the special nature of the cable, that is, with the sheath remaining in position.