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A comparative experimental investigation on various after laying test methods employable to 22.9/kV CN/CV distribution power cables

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Abstract

Defect detection capabilities of various voltage test methods, such as OW, 0.1Hz VLF including the conventional AC and DC voltage test, have been systematically investigated in order to suggest the optimum after laying test method applicable to the underground distribution power cable system in Korea.

The results show that 0.1Hz VLF voltage test has lower defect detection capability, larger equipment and higher cost in comparison with OW voltage test. More over, DC voltage test was proved to be incapable to detect the referencing defects even at $8U_0$.

Therefore, it is pointed out that OW voltage test, with 55kV/50shots, could be the most optimum alternative method applicable to the underground distribution power cable system in KOREA.

Résumé

Différents méthodes d'essais après pose utilisant les ondes oscillantes, la basse fréquence (0.1Hz) mais aussi la fréquence industrielle et la tension continue ont été systématiquement expérimentées en Corée sur des câbles de distribution enterrés afin de déterminer leur efficacité.

Les résultats montrent que l'essai de tension à basse fréquence, qui nécessite des équipements plus importants et coûteux que l'essai en ondes oscillantes, est moins performant que ce dernier. Il a également été établi que l'essai sous tension continue appliquée jusqu'à $8U_0$ ne permet pas détecter les défauts retenus dans notre étude.

C'est l'essai après pose en ondes oscillantes effectué

50fois à 55kV qui s'avère le plus efficace et constitue la méthode recommandée pour les câbles de distribution coréens.

1. Introduction

After laying tests on the power cable system are generally performed in order to prevent failures of newly laid cables ascribed to possible defects taken place during the installation. But most of them are known to be destructive since breakdown of the cable system could occur due to the presence of defects by applying relatively high testing voltage.

As for the conventional ones, such as AC voltage test and DC voltage test, the former is most effective, but somewhat difficult for on-site application due to heavy and large test equipment and its high cost. For these reasons, the latter has been employed. But in connection with the extruded power cables, DC voltage test has been disclosed to retain technical inconveniences : it is incapable to detect severe defects in the cable insulation, giving rise to new damages during the test by relatively high DC voltage level. Therefore, it is necessary to develop alternative after laying test method.[1]

Since nearly ten years, oscillating wave(OW) voltage test and very low frequency(VLF) voltage test have been mainly suggested and each method has some advantages respectively. The former shows better ability to initiate electrical tree from the pre-existing defects than do other alternatives and the latter is effective in detecting defects where electrical trees are already initiated.[2] However,