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Development of oil sampling devices for energized oil filled cable system

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Résumé

Pour évaluer la fiabilité des câbles isolés au papier imprégné à l'huile, on fait l'inspection d'analyser les gaz dissous dans l'huile. Grâce à cette inspection, on peut prendre du signe de la détérioration de l'insulation. Mais pour prélever l'huile avec la méthode traditionnelle, on doit arrêter de transmettre de l'énergie.

A l'intention de la résolution de ce problème, on a développé les outils à prélever de l'huile pour les câbles chargés.

Ces outils développés permettent de prélever l'huile immédiatement n'importe quand nous voulons, sans arrêter de la ligne en charge. En conséquence d'analyse, on peut évaluer la fiabilité des câbles à l'huile, et décider les intervalles de l'inspection.

Introduction

The underground transmission facilities have increased as the metropolitan areas grow. Recently, the XLPE cables are mainly employed for the new lines, because of their high reliability, low-cost and easy maintenance.

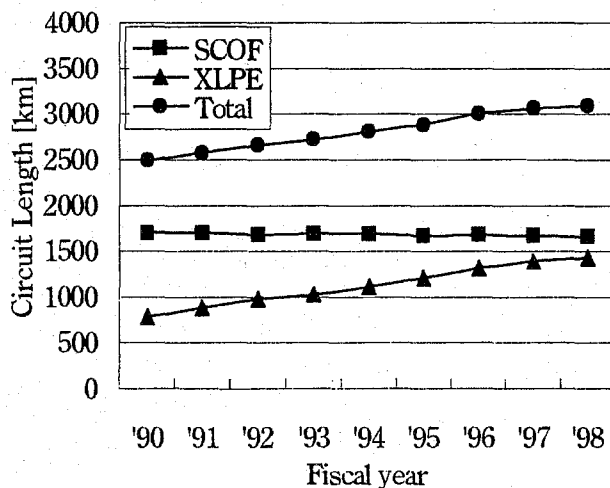


Fig.1 The trend of the cumulative circuit length of the underground lines in KEPCO

Abstract

We adopt the dissolved-gas-in-oil analysis to evaluate the reliability of the oil filled cable systems. Owing to this inspection, we can catch any signs of the deterioration of the insulation. But, to take the insulating oil with the conventional method, we must stop energizing.

To solve this problem, we developed the oil sampling devices for energized the OF cable system.

These developed devices enable us to execute the oil sampling as soon as possible whenever we wish, without stopping energizing the transmission lines. From the gas analyzing result of the sampling insulating oil, we can evaluate the reliability of the OF cable systems and decide the interval of the inspection to maintain the equipment.

The self-contained oil filled cable (SCOF cable or OF cable) systems, however, still remain about half of all the underground lines, in the Kansai Electric Power Co., Inc. The figure 1 shows the trend of the cumulative circuit length of the underground lines in KEPCO. The oldest OF cables have been already in service for more than 20 years.

The deterioration in the insulation of the OF cable is due to the discharge, the partial over-heating, the influence of switching or lightning surge, the low oil pressure, the inferior jointing, the moving of the core and so on.

We think that we'd better inspect the insulating condition of the cable systems used for more than 10 years. Especially, we must pay attention to the joint boxes. Because, judging from the report of the inspection, we find that there are many examples of the deterioration of the joint boxes. So, we execute the detailed inspection for all joint boxes of 154kV cables every 10 years.

We adopt the dissolved-gas-in-oil analysis which is the same as the inspection of the transformer. Owing to this inspection, we can catch any signs of the deterioration of the insulation.