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Development of 275 kV XLPE cable with aluminium laminated tape and radial moisture Barrier

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Abstract: To prevent moisture penetration from outside of the cable, lead or aluminium laminated tapes have been widely used for the XLPE cables up to the 154kV class in Japan. The 275kV XLPE cable has employed aluminium laminated tape as a moisture barrier instead of metal sheaths for the purpose of cost reduction and the cable has been confirmed to have excellent mechanical performance by various tests simulating mechanical stresses during the cable laying and in service.

Keywords: 275kV XLPE cable, Aluminium laminated tape

Résumé: Afin de prévenir la pénétration d'humidité extérieure dans le câble, des rubans stratifiés de plomb ou d'aluminium ont été couramment utilisés pour les câbles isolés au polyéthylène réticulé jusqu'à une classe de 154 kV au Japon. Le câble isolé au polyéthylène réticulé de 275 kV a employé un ruban stratifié d'aluminium comme gaine d'étanchéité au lieu des gaines métalliques en vue de la réduction du coût, et a démontré un excellent rendement mécanique à travers les essais divers simulant les efforts mécaniques qui s'exercent durant la pose et l'utilisation du câble.

Mots clés: Le câble isolé au polyéthylène réticulé de 275 kV, un ruban stratifié d'aluminium

1. Introduction

Lead laminated tapes have been employed widely as the moisture barrier for XLPE cables up to the 154kV class in Japan. However, in response to the recent movement toward environmental care and cost reduction, aluminium laminated tapes have been employed since 2000 at The Kansai Electric Power Co., Inc. (KEPCO). In Japan, extra high voltage (EHV) cable which contains 275 kV has employed metallic sheaths such as corrugated aluminium and stainless sheaths in Japan in respect of strong mechanical protection and effective moisture barrier, giving top priority to reliability. After reviewing the field experience and cost comparison, KEPCO decided to employ aluminium laminated tapes instead of metallic sheaths as the moisture barrier for 275kV cables, as well.

This paper describes the development of the 275kV XLPE-insulated and PVC-sheathed cable with aluminium laminated tapes.

2. Cable Construction

2.1 Construction of aluminium laminated tapes and cable

The construction of aluminium laminated tapes, which are employed for XLPE cables up to 154kV, is shown in Fig.1. The inside layer of the tape is a semi-conductive PVC film which contacts the metallic shielding (copper wire shield) electrically with

aluminium foil, and sticks to the outermost adhesive layer at the lapped portion with heat. The PET film layer retains heat expansion of the aluminium layer during the extrusion of the PVC sheath to prevent creases. The outermost adhesive layer is melted and adheres to the PVC sheath.

The construction of 275kV XLPE cable with aluminium laminated tape is shown in Fig.2 and Table 1.

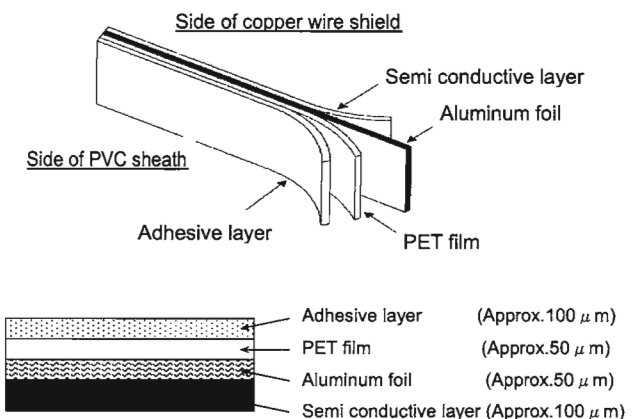


Fig.1 Structure of aluminium laminated tape