

**B10.5****Medium and high voltage cables having laminate sheaths with coated copper**  
BOW K.E., The Dow Chemical Company, Midland, USA**Résumé**

L'emploi par services publics de gaines laminées avec revêtement sur cuivre pour les câbles haute et moyenne tension à diélectrique extrudé, est en hausse. Pour les câbles moyenne tension, une tresse en cuivre de 0,3 mm d'épaisseur, avec revêtement sur un côté, est utilisée à la fois comme blindage et comme barrière d'isolement contre l'humidité. Pour les câbles haute tension, une tresse en cuivre de 0,15 mm d'épaisseur, avec revêtement sur un côté, est utilisée comme barrière d'isolement contre l'humidité sur écran métallique. La gaine laminée avec diélectrique extrudé peut assurer le même degré de fiabilité qu'assurait auparavant le câble à gaine plomb isolé au papier imprégné.

**Introduction**

The design parameters for the successful use of laminate sheaths with coated copper were proposed in the first JICABLE Conference [1]. A subsequent paper described the successful testing of a prototype cable which used coated copper as both a shield and moisture barrier [2]. A paper at the last JICABLE Conference described the benefits of using laminate sheaths over extruded dielectrics to replace lead sheathed cables [3]. The environmental and health issues associated with lead sheaths were described. Regulatory pressure has continued in the intervening years creating further uncertainty about the future of paper insulated lead sheathed (PILC) cables. A companion paper described the use of the laminate sheath as a chemical/moisture barrier for petrochemical plants [4]. The laminate sheath was used on both low voltage and medium voltage cables for a hydrocarbon plant. Field experience with medium voltage cable having a laminate sheath with coated copper gained on this project further demonstrated the reliable performance of this sheath design.

A key material development that is complementary to the performance of the laminate sheath was also

**Abstract**

The use of laminate sheaths with coated copper by various utilities for extruded dielectric medium and high voltage cable is increasing. For medium voltage cable a 0.3 mm thick copper, coated on one side, is used as both a shield and moisture barrier. For high voltage cable a 0.15 mm thick copper, coated on one side, is used as a moisture barrier over a wire screen. The laminated sheath with an extruded dielectric can provide the same degree of reliability as provided previously by paper insulated lead sheath cable (PILC) but at a greatly reduced weight with easier installation and reduced cost.

reported at the last conference. This is a hot melt adhesive for the overlap which allows the overlap to move in response to expansion and contraction of the cable core [5]. The combination of hot melt adhesive and coated copper as a moisture barrier in a laminate sheath has moved to commercial status for both medium and high voltage cables. The purpose of this paper is to describe the progress in material and cable developments that has validated the viability of laminate sheaths with coated copper for power cable applications.

**Material Developments****Coated Copper**

The power cable industry is familiar with the use of coated aluminum as a moisture barrier for medium and high voltage cables [6,7]. The copolymer used on the aluminum is ethylene acrylic acid (EAA) copolymer [8]. The bond of this copolymer to aluminum is stable in moist environments. However, this copolymer is not suitable for copper. In warm, moist environments, the bond of EAA copolymer degrades leading to greatly reduced levels of bond strength or even delamination [9]. Extensive investigation of the degradation phenomena indicated