

**B10.4****Advanced polyethylene jacketing compounds for medium and high voltage cable applications**

GAU Y., Union Carbide Europe SA, Meyrin, Switzerland

PERSON T.J., Union Carbide Corp., Somerset, USA

KMIIEC C.J., Union Carbide Corp., Somerset, USA

**Résumé**

Les compounds polyéthylènes ont été utilisés avec succès depuis plusieurs années comme gaine des câbles de moyenne et haute tension. La raison principale de ce succès est le fait de constater qu'un câble couvert avec une gaine polyéthylène qui a été bien sélectionnée offre une solution très économique pour prolonger la vie des câbles. Ce fait a entraîné une utilisation plus poussée de compounds polyéthylènes comme gaine des câbles enterrés de moyenne tension dans le monde entier.

L'article décrit les propriétés importantes des compounds polyéthylènes pour gaine qui en font les matériaux de choix dans les applications de câble d'énergie. Il présente les critères de sélection des différentes densités des compounds polyéthylènes en fonction du câble et des spécifications demandées. L'utilisation et la performance des gaines polyéthylènes colorées sont aussi abordées. En plus, les nouveaux développements de gaine polyéthylène tels que la gaine semiconductive sont présentés.

**Abstract**

Polyethylene compounds have been successfully used for many years as jacket of medium and high voltage cables. The main reason for the success lies in the recognition that power cable designs which include a jacket made with properly selected polyethylene compound represent a cost effective way to longer life cables. This has led to an increasing trend of using polyethylene compounds in underground medium voltage applications worldwide.

The paper describes the important properties of polyethylene jacket compounds, which make them the material of choice in power cable applications. Furthermore, the criteria for selecting different density polyethylene compounds based on the cable and specifications requirements is provided. The use and performance of colorable polyethylene jacket compounds are also covered. In addition, new developments in polyethylene jacket compounds including semiconductive compounds are presented.

**INTRODUCTION**

Within the last several years, an increased use of polyethylene (PE) jacketing materials has been seen in medium and high voltage applications, at the expense of polyvinyl chloride (PVC) jackets. PE compounds fulfill the requirements of power cable jacket by providing the desired protection of cable cores during transport and service. More importantly, field data [1,2] has consistently supported the fact that a properly selected polyethylene jacket is cost effective in extending the life of power cable. Consequently, usage of polyethylene jackets in medium voltage applications has been more desirable, and a steady growth in the volume of polyethylene jackets in this area has been achieved. In high voltage applications, a jacket is generally included in the cable design, and again polyethylene is the material of choice.

The primary role of a jacket is to protect the cable core. The polyethylene compounds used as power

cable jackets must meet very strict material requirements, including good mechanical properties, barrier properties, abrasion resistance, environmental stress crack resistance (ESCR), weatherability, and compatibility with other components in the cable design. Processability is also an integral part of the selection process. The jacketing operation must be performed at competitive line speeds using standard extrusion equipment offered commercially in the market place.

While the majority of Power and Telecom cable has a black jacket, a number of cable end-users in Europe call for a fully colored jacket, while others in North America call for colored striped jacket. To satisfy these market segments colorable, UV-stabilized jacket compounds have been developed. Specially formulated linear low density (LLDPE) and medium density polyethylene (MDPE) natural compounds have been designed to meet the most demanding weathering specifications when used in combination with a properly selected colored masterbatch.