P-LASER: 10.000 KM OF INSTALLED CABLES BASED ON A WORLDWIDE NEW TECHNOLOGY

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ABSTRACT

The development of new insulating materials based on thermoplastic compounds, High Performance Thermo-plastic Elastomer (HPTE), represents a breakthrough in the field of MV and HV power cables.

A new technology converted polypropylene into a versatile and reliable insulating material with benefits related to thermoplasticity, such as no need of degassing treatments and no scorch phenomena. Besides that, HPTE can be filtered at high level without incurring degradation phenomena that are typical of crosslinkable compounds for cable insulation.

The absence of degassing treatments makes possible the manufacturing of MV complete cables in one step process, starting from the conductor and producing in one shot the finished cable.

The production of 10,000 km of these new MV cables for the Italian electrical grid now also offers a relevant feedback from market.

KEYWORDS

Polypropylene; power cable; thermoplastic; degassing; scorch; crosslinking;

INTRODUCTION

The main base material for the manufacturing of medium voltage and high voltage power cables is currently polyethylene, because of very good processing, mechanical and electrical characteristics.

With the aim of improving thermo-mechanical properties and in particular for guaranteeing an operating temperature of 90°C, low density polyethylene is subjected to chemical crosslinking. However, the crosslinking process limits the manufacturing speed and the amount of material that can be extruded during a production campaign to prevent scorch phenomena.

It is well known, in fact, that the extrusion of crosslinkable polyethylene via organic peroxides can be accompanied by scorch phenomena [1]. In particular nearby the filters ambers can be easily observed, therefore their formation must be kept carefully under control.

As well known, scorch is related to premature crosslinking reactions that take place locally, where temperature or residence time of the material are for any reasons increased.

Filtration of crosslinkable polyethylene can be therefore carried out at en extent that is an acceptable compromise between the goal of a thorough filtration for increasing cable reliability and the need of limiting scorch phenomena.

Besides that, XLPE cables require a degassing treatment with the aim of evacuating peroxide by-products. In particular, the residual pressure of methane can affect the reliability of accessories such as premolded joints [2], if not properly reduced.

As these drawbacks of XLPE cables can limit, if not adequately controlled, both productivity and quality of cables, we identified the need of developing thermoplastic, new generation materials to overcome the limits of crosslinked polyethylene for the production of power cables.

In this concern polypropylene was selected as a base material because of very good electrical properties. However, a main constrain related to the choice of polypropylene for manufacturing high performance and reliable insulating materials for power cables regarded the morphological defects that can be found in thermoplastic polyolefin insulating layers and in polypropylene in particular.

Fig. 1 This new MV cable

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