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New mechanised laying techniques of MV cables with geosynthetic protection

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Summary

In rural areas, mechanised laying technique for the MV underground networks operated by EDF requires most of the time sand to mechanically protect the cable in the trench. Because this sand has many disadvantages, a new laying technique has been developed in order to use a geosynthetic protection instead of sand. Different aspects including mechanical and thermal behaviour are presented in this paper.

Introduction

In rural areas, mechanised laying techniques for the MV underground networks have been widely used in France for 10 years to decrease the laying costs as well as installation duration. Most of the time, quarry or river sand is needed in the laying area in order to protect the cable from mechanical damage when the ground contains aggressive gravel or rocks.

Nevertheless, such sand has many disadvantages : it becomes increasingly costly due to increasing quarries closure. It presents furthermore some difficulties to get to site because of the required quantities and the associated logistics such as trucks, and human operators. In some cases, environmental degradation (road, fields) can be very important because of the sand delivery and processing in the trenching machine.

Furthermore, the cables ampacity is suffering from the high thermal resistivity of the non-compacted sand which is likely to dry out, or to be washed out during the rainy season, especially in sloping areas.

For all these reasons, a particular development effort has been carried out with different partners in order to find a new technical solution to replace the sand by a special protection around the cable.

Résumé

Dans les zones rurales, la technique de pose mécanisée des câbles Moyenne Tension nécessite la plupart du temps du sable pour protéger mécaniquement le câble dans la tranchée. Toutefois, ce sable présente de nombreux inconvénients. C'est pourquoi, une nouvelle technique de pose a été mise au point. Elle utilise une enveloppe de protection géosynthétique à la place du sable. Ce papier en présente les différents aspects, notamment mécaniques et thermiques.

A new cable geosynthetic protection

Historically, many cable protections have been tested in the past. These materials, generally made of non-woven textile, have led to severe cable ampacity reductions. The air trapped in the textile has a very high thermal resistivity and the textile global thermal resistivity can reach as high as 20 K.m/W, to be compared with 1 K.m/W of an average soil.

A new geosynthetic protection [1] based on a specification [2], has been manufactured and tested in different facilities. This protection consists in a mattress of sand compressed in a mechanically protective outer textile (figure 1).

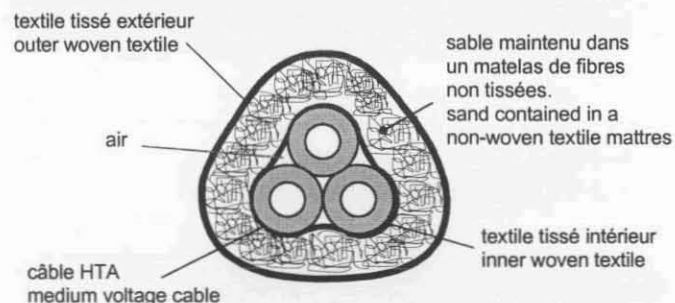


Figure 1 - The new product protection construction scheme, wrapped around the cable