New Solutions in EDP
Distribuição Medium Voltage
Overhead Lines

José Cardoso - Portugal - Session 1 – Paper 312
Introduction

EDP Distribuição, a company of EDP – Energias de Portugal group, maintains about 168 000 km of overhead distribution power lines, supplying 6 million customers in Portugal.
Introduction

• Environmental concerns
• Improvement of the energy supply quality
• Increasing service safety levels
• Company image
Introduction

Several different technologies were analysed and EDP Distribuição decided to implement a pilot, a small 15 kV network with spacer cable system, a compact network system of covered conductors from Hendrix Wire & Cable.
Spacer cable system

- A high-strength grounded messenger supports a 3-phase distribution system
- Covered conductors in a close triangular configuration
Spacer cable system

• The conductors are suspended by high density polyethylene spacers from the messenger
• Spacers have a diamond design and are placed at approximately 10 m intervals
• The spacers separate, compact and maintain the phase conductors configuration
Field installation

During 2007, EDP D. pilot experience consists in building two 15 kV overhead lines connecting two distinct substation feeders of Mangualde, in the center region of Portugal. The lines are along municipal roads and close to heavily treed areas.
Field installation

• Poles are framed with required materials and stringing equipment
• The messenger is installed and correctly tensioned
• The phase conductors are strung
• The phase conductors are tensioned
• Stringing equipment is removed and spacers are installed
Field installation
Field installation

The installation of the spacer cable system is a simple process and easily learned by line crews. Hendrix provided technical assistance.
• A low voltage circuit with public lighting was built, at the same concrete poles.

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Field installation

- It is important to install surge arresters at all locations where the spacer cable system is connected to a bare conductor system.
- Covered conductors are included in the category of nonshielded cables.
- For safety reasons they shall always be considered as bare conductors.
Project analysis

• Improve service quality (better SAIFI and TIEPI)
• Network reliability (lower number of incidents, thus lower number of linemen involved)
• Safety of personnel
• Environmental protection
  – reduction of tree trimming – just in a 80 cm radius around the conductors
  – collisions and electrocution of birds
• Electromagnetic fields (EMF) (due to the “compacted” disposition of the conductors)
• Cost reduction (in the same pole several voltage levels and services can be supported)
Other MV experiences

• 30 kV Tree Wire system (2007) in a wildlife protection zone with small trees, with covered conductors (similar to spacer cable, but with no messenger wire and spacers)
• 15 kV 50 mm² ACSR conductors with one layer of covering (2008)
• Aerial Bundled Conductors (ABC) (2008/9)
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Conclusions

- Allowed to know *in loco* some of the spacer cable system advantages
- It demonstrate to be an important contribution to minimize the impact of the root causes of outages on MV overhead distribution networks, in particular in hard jobs
- The magnetic field reduction allowed by compact network may also be an important contribution to the actual discussion about health and electromagnetic fields due to overhead power lines
Conclusions

- The various solutions have different design and operating characteristics. These differences must be carefully considered when choosing for different applications.
- Although more onerous than traditional networks, these solutions permit EDP D. to answer in a more adequate way to the quality and reliability challenges settled actually by several factors, mainly environmental, to overhead distribution networks, with the respective economies coming from its advantages.