Close and Return

FRENCH EXPERIENCE IN ALUMINIUM LAMINATED SCREENS

Frédéric LESUR, EDF R&D, France, frederic-der.lesur@edf.fr
Pierre ARGAUT, Silec Cable, France, pierre.argaut@sileccable.com
Laurent BENARD, Prysmian Cables and Systems, France, laurent.benard@prysmian.com
Pierre MIREBEAU, Nexans France, Calais, France, pierre.mirebeau@nexans.com

ABSTRACT

France was one of the first countries to operate underground extruded cables, and now has gained almost forty years experience with high and extra high voltage levels. Synthetic insulated cable systems were installed on the French transmission network since early 1962 (63 kV). Cross-linked polyethylene has gradually replaced thermoplastic insulation materials since 1981.

The design of the underground system is based on a reliable moisture radial barrier. It allows the use of basic polyethylene, with no retardant additives. The whole cable system validation relies on a strong specification and an exhaustive qualification process, especially with long-term tests.

Initially, synthetic extruded cables had a lead sheath. The use of aluminium laminated screens was encouraged to decrease the weight of the cable and make possible the use of mechanical laying techniques. This technique was first developed with MV cables in rural areas. The resulting cost reduction of the new system was significant, and this system still meets a large success. In the early nineties, this design and mechanical laying have been extended to the 63 and 90 kV cables. It was possible to increase the delivery length, to improve new pulling techniques, and to decrease the number of joints (improving reliability and mounting duration), with a significant impact on the cable system cost.

The success in France of aluminium laminated moisture barrier is the result of nearly 8 years of intensive investigation and tests, achieved by complex design, industrial process and control of cable construction.

The paper describes the advantages of the laminated moisture barrier, the qualification process, the technical solutions and improvements provided by the manufacturers to withstand the intrinsic issues, as well as the essential bonding to a polyethylene jacket to avoid crease or corrosion.

Laminated aluminium thickness may be increased up to 2.0 mm, with nevertheless satisfying bending radius. For extra high voltage systems, an additional layer of wires may be provided, in order to meet high short-circuit current requirements.

Finally, the authors illustrate their report with comparative figures about losses in different metallic screen technologies.