138kV Insulated Cable System for Temporary Connection of Transmission Lines and Substations.

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The aim of this paper is to present the experience acquired and the results obtained during the execution of an R&D project development of equipment, with insulated cables and terminations, for temporary connection between sections of overhead subtransmission lines and substations of AES Eletropaulo that is the electricity distribution utility of Sao Paulo City, Brazil.

In Brazil, the regulatory requirements that reflect the aspirations of the society regarding the continuity of electricity supply are increasing. Thus it is essential that the maintenance services, construction and expansion of the electrical system are executed by reducing outages, mainly due to scheduled services.

Nowadays, one way used for this purpose when performing maintenance on overhead transmission lines towers is to build variants, employing in its implementation temporary structures and all the infrastructure (foundations, grounding, etc.) required. These variant constructions require time, space and loss of materials and services used therein.

The lack of space in the right-of-way of transmission lines and substations of AES Eletropaulo creates considerable difficulties, even it is impossible, to implement these variants, which increases the time needed for scheduled outages and maneuvers as well as increases the risk of accidental shutdowns during construction or reconstruction of sections of lines and substations. Another not less important aspect is the amount of waste during the construction, which increases costs and enhances the environmental problems.

Aiming to solve this problem AES Eletropaulo decided to invest in a research and development project that has as main objective the development of new equipment in Brazil to be used in variants of overhead subtransmission lines and substations. Currently there is not in the Brazilian market a device with 138kV insulated cables that can be used as variants in the reconstruction of overhead subtransmission lines.

It is noteworthy that the major difficulties encountered in developing this type of equipment were related to:

- The constitution of the insulated cable, which should be more flexible than the cables used permanently in underground lines, and can be moved without damage to it. Stands out as the main hindrance the high level of short circuit required by the electrical system of AES Eletropaulo;
- Dry and easy connection terminations;
- Development of a reel to accommodate the cable and terminations, and a system for pulling and winding the cable that could be used in places with limited space as the available areas in the right-of-ways of the subtransmission lines and substations of AES Eletropaulo.
- Development of the procedure for installation taking into account the particularities of the transmission overhead lines of the AES Eletropaulo system and in particular that its lines are located in densely populated regions.

In this paper the obtained results and the studies that were the basis for the development of the equipment to make temporary connections between sections of overhead subtransmission lines and feeding lines to substations of AES Eletropaulo will be presented.