

70 YEARS OF MV CABLES IN BRAZIL, RELIABILITY OF: CABLES; SPLICES AND POTHEADS

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The electrical insulated underground cables have been installed since early 20 in this Country but a massive underground system distribution began in middle 40. In that occasion PILC cables was seen the unique solution until middle of 60 when a lot of EPR and XLPE have been installed till total replacement of PIULC cables at the end of 70.

As the PILC cables still continue to work at present days even the most of them spliced with EPR and XLPE, one need know how long the PILC cable endure in service in the major cities.

This paper treat a large collection of cable failure during the cable life watching the modes of failure and measuring some parameters which given some indication of residual life of the PILC cables.

Introduction

PILC cables can be considered the best cables constructed until this moment, even watching the methods of manufacturing, skilling in splices and potheads and so on. This assessment derives of 70 years of experience and service of this kind of cables in this Country in the worst condition that one can imagine.

Nowadays there is no more a large scale cable manufacture and utilities which have this kind of cables maintain PILC cable splicing them with EPR and XLPE cables. The reliability work took a sample of 70 specimens of PILC and EPR XLPE applying Weibull statistics for time failure. For PILC cable the same treatment have been made for cellulose depolymerization in order to measure the kinetics of degradation, while for EPR and XLPE have been made the amount of water diffusion in its.

This investigation show that PILC cables can be used for further time instead of be replaced by solid dielectric cables

Statistics

For this kind of work Weibull statistics fits very well because the electric breakdown is an extreme value performance.

All PILC cable has shown a minimum life behavior and a three parameter weibull distributions have been used for data treatment.

Most of failure has placed in the transition of cable and hybrid splices (PILC and XLPE cables).

Solid dielectrics do not show clearly the minimum life behavior probably due to water diffusion phenomena.

Discussion and Conclusions

1. PILC cables steel continue work in this Country after 70 years
2. PILC cables presents a minimum life behavior when observed over a sample of 50 specimens
3. XLPE and EPR cables do not present minimum life behavior even in large samples
4. The most of PILC failure has been occurred in splice sites
5. It has been recommended to improve the splice design and sustain the PILC cables.

Key Words : Cables, PILC, EPR, XLPE, Insulated Papers, Reliability,