B.1.5. Technical and economical evaluation of different cable design for 1 kV distribution cables in Spain

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Abstract

1 kV electric public distribution in Spain uses single core cable with aluminum stranded conductor, XLPE insulation and PVC sheath. Often cable insulation and sheath are damaged leaving bare aluminum in contact with the soil, causing electrolytical corrosion of the conductor and subsequent failure of the cable. A study was launched to select a cable type with a better performance.

Study methodology

The steps followed were:
1) To select cable types to be considered.
2) To define performance of cables through 12 parameters. Each parameter is "weighed" from 1 to 10 according to their relative interest for users.
3) To establish a four-point level (i.e. from 1= poor, to 4= very good) to evaluate the expected performance of each cable type against each parameter.
4) To select five representative cable types for a deeper study
5) To establish for the selected types and common cross sections, the basic electrical and dimensional characteristics, and their approximate cost level. Select one cable type.
6) To establish a complete dimensional specification of the cable selected and estimated cost of complete circuit (cable itself plus laying operations).
7) Conclusion.

Cable types considered.

Eleven cable types were considered. All cables have been used for long time in Spain or other European countries and should be regarded as well known and field tested. A short description of selected cables follows:
1- Single core XLPE/PVC
Stranded aluminum conductor
XLPE insulation and PVC sheath.
2- Single core EPR/PCP
Stranded aluminum conductor
EPR insulation and water-resistant PCP sheath
3- Four single core XLPE/PVC bundles
4 single core XLPE/PVC cables (described under №1) laid with a long lay length
4- Four core XLPE/PVC full neutral