A.9.2.

Effect of power cable installation on current rating, magnetic fields and reliability

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Utilities often deal with increasing power demands and an increasingly higher loaded infrastructure. Also, local governments sometimes urge utilities to diminish magnetic fields around their infrastructure. Together with clients demanding both more energy and a higher reliability, these issues result in complex considerations about the electrical infrastructure.

To aid utilities to reach decisions regarding underground power cables, taking into account transport capacity, magnetic fields and reliability, a number of power cable installation methods are presented and discussed in this article. This overview of power cable installation methods enables utilities to evaluate the advantages and drawbacks of certain underground power cable installation methods.

Regarding the current carrying capacity, calculated in this article, the installation methods will be evaluated both based on the maximum current carrying capacity as well as on their dynamic 'overload' possibilities.

Magnetic fields around power cables decrease when the three phases are placed close together, when the opposite current in the cable screens and armour is significant (earthed at both sides), or when the cable is installed far below the soil surface. These situations however, decrease also the current carrying capacity of cable circuits. These contradictions and the choices that can be made, will be discussed in detail.

The reliability of a power cable circuit is determined to a large extend by the possibility of cable failure due to internal (ageing, overloading) and external (excavator, soil subsidence) causes. The possibility of cable failure due to external causes depends on the cable installation, and the effect of this cable installation on reliability will be described in relation with the transport capacity versus exerted magnetic field discussion.