



UPGRADING AND UPGRATING OF UNDERGROUND EXISTING SYSTEMS



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ABSTRACT

The simplest way to transmit more power in an underground network is to replace the existing line with a larger conductor size, or to install an additional parallel circuit.

However, the high investment cost or extension issues in congested areas justify the study of alternatives with upgrading.

- Upgrading a cable system applies a solution that leads to improve the performance of the system. The performance refers to at least one of the function or property of the system. In this way, transmitted power, service life, environmental impact and safety can be improved.
- Upgrading a cable system applies a solution that allows the system to be operated at a current level above its initial rated current, or applies a method or a calculation that leads to improve the assessment of the performances of the system.

Upgrading and upgrading can be combined.

This is the scope of work of a Cigré working group, dedicated to “Upgrading and upgrading of underground existing systems”, in charge of publishing a Technical Brochure for 2008.

To increase the power, the engineer refers to very basic equations, depending on three variables:

- the voltage level,
- the current rating,
- and the dephasing of voltage and current for AC systems.

The means to improve each factor lead to consider many topics:

- overload conditions, use of sophisticated systems like distributed temperature monitoring and dynamic temperature rating, or refinements of ampacity calculations contributing to a better assessment of the current rating,
- means used to decrease the losses and to increase the heat transfer in cable systems: sheath bonding, hot spot mitigation, etc,
- compensation for reactive power of AC systems, and the interest in changing a AC system to a DC one.

The other part of the work deals with the improvement of service life, environmental impact and safety, considering in particular results of previous Cigré working groups.

The paper presents the work in progress, describes the means available for upgrading a cable system, and concludes with guidelines.