

A guide for rating calculations of insulated cables

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Cigre SC B1 set up Working Group B1-35 to consider the subject of cable rating in 2010. Cable rating is a very important topic for all in the cable industry. The goal of the working group has been to provide guidance to a user trying to calculate, or to understand the current rating of a power cable system in any occurring situation. This article is one of the first deliverables of the working group and introduces in a concise yet precise way the contents of the work, important eye openers and needed considerations for the user in the quest to understand the current rating of the power cable in his or her situation.

From a utility perspective, the cable rating is amongst the most important requirements for a power cable. Therefore, utilities often focus on the subject of cable rating during:

1. The design and engineering phase, where the cable rating is usually calculated by the manufacturer, and has to be in correspondence with a certain requirement (either stationary or dynamic) set by the utility. This theoretical exercise is often the only background of a cable's current rating as testing the cable rating is not an often used option.
2. The operation phase of power cables, where cables often become increasingly loaded. For utilities it is not easy to set the current rating requirements for the 30 - 50 years to come, as there are very many rapid changes in the world of electric energy generation and transmission & distribution. Existing power cables may come in a situation where the load is more than allowable according to the (old) engineering calculations. In these situations it is becoming very important to know the exact limitations regarding the cable rating, in order to prevent acute overloading, and to invest in time in new transmission facilities.

This utilisation leads to the need to establish an accurate cable rating for each power cable system whatever its situation or age. There are however difficulties with this, as the variety in cable designs and installation situations differs to a much larger extend than the breadth of the calculation options in existing standards. For this reason, WGB1-35 considered the current rating of insulated power cables, including buried, submarine and in-air installations, in detail, addressing problems with establishing the ampacity of new and existing power cables.

The workgroup focused on the following three major topics:

- A consideration of the starting points for cable rating calculations
- A guide to methods for calculating the current rating in situations which are not (fully) described in the existing IEC standards
- A discussion concerning the tools and techniques available for performing cable rating calculations.

The important learning points, insights, eye openers and proposals on these three major topics will be shared in this Jicable article as a concise summary in order to provide further guidance in the topic of cable current rating calculations.