Permissible current calculation

1. Introduction

While a current running through the conductor core, one is experiencing a heat generation by Joule effect. This heat passes the layer(s) of insulation to be evacuated to the exterior eventually.

This heat evacuation occurs either :

- By convection and radiation if the cable is on open air
- By conduction if the cable is in contact with other items or material

When the generated heat equals to the heat evacuated in ambiant environment, we are experiencing a state of balance characterised by a constant core temperature (steady state). This temperature should not exceed the maximum allowable temperature of the insulation to ensure to the cable an optimal lifetime.

The steady state maximum permissible current is the current value which, in a given environment, heats the conductor core to the maximum permissible value.

2. Permissible current calculation as per IEC 60287

IEC 60287 standard title

« Calculation of the continuous current rating of cables (100% load factor) »

Scope

This standard deals solely with the condition of steady-state operation of cables at all alternating voltages, and direct voltages up to 5KV, buried directly in the ground, in ducts, troughs or in steel pipes, as well as cable in air. The term steady-state is intended to mean a continuous constant current (100% load factor) just sufficient to produce asymptotically the maximum conductor temperature, the surrounding ambient conditions being assumed constant.

Basic hypothesis for permissible current calculation as per IEC 60287

- Copper core
- Insulation class temperature "maximum allowable temperature value of the insulation"
- Insulated cable on ladder supports or cleats (no other cable in proximity)
- Outer diameter of the cable not exceeding 150mm
- Cable in open air and protected from solar radiation
- Alternative current or continuous current up to 5 kV
- Decent heat disparsion and ventilation
- No heat source in the immediate vinicity

Remarks

The values indicated in the charts , curves or obtained by calculation, are indicative and theoretical.
They only should be used as an indication, as a starting point of a more precise experiment test.
Indeed, these values can greatly vary depending on the constitution of the core, the type of the insulation, the number of the conductors, the environment, installation…
Our technical department remains at your disposal for any additional or more specific study.