Electrical Data

Conductor Resistance

Resistance formula:

$$R = \rho \frac{L}{A} \qquad [\Omega]$$

p = specific resistance, Ω.mm²/m
A = conductor area, mm²
L = conductor length, m

Resistance as a function of temperature:

$$R = R_0[1 + \alpha(t - 20)]$$

R_0= Resistance at t=20°C
t = conductor temperature °C
α= 0.00393 for copper

Short circuit ratings

The following short circuit currents are for cables normally operating at a maximum conductor temperature of 90°C.

The theoretical temperature that arises in the conductor during a short circuit, which is used as a basis of the calculation, is 250°C. EPR and XLPE insulation are capable of withstanding short term temperatures up to 250°C.

Reactance

The reactance of a cable operating in an AC system depends on many factors, including, in particular, the axial spacing between conductors and the proximity and magnetic properties of adjacent steelwork. The former is known for multicore cable, but may vary for single core cables depending upon the spacing between them and their disposition when installed.

Reactance of cables in certain dispositions remote from steelwork is calculable and is shown. The values are for cables with circular conductors.

The value for a sector-shaped conductor should be taken as 90% of the calculated value.

Induction for 2-, 3- and 4- conductor cables is given by the formula:

$$L = 0.2 \times \left[\ln \left(2a/d \right) + 0.25 \right] \times 10^{-6} \quad [H/m]$$

a = Axial space between conductors in mm.
d = conductor diameter in mm.

Reactance for 2-, 3- and 4-conductor cables is given by the formula:

$$X = 2\pi fLl \quad [\Omega]$$

f = frequency in Hz
L = Induction in H/m
l = Conductor length in m

Impedance

Induction for 2-, 3- and 4- conductor cables is given by the formula:

$$Z = \sqrt[3]{(R^2 + X^2)} \quad [\Omega]$$

R = Resistance at operating temprature in Ω
X = Reactance in Ω