Temperature correction
for linear resistance measurement

INTRODUCTION

The resistivity ρ of the materials used for cable conductors depends on temperature.
Hence, measurements of the linear resistance *R* of the conductor, that are usually done at ambient, have to be corrected for comparison purposes or to assess conformity with the specifications of the standards (given at 20°C for example in IEC 60228).

This document describes how to correct the measured value.

CORRECTION FACTOR

Material parameters can be given either in terms of α (temperature coefficient of the resistivity) or T_k (correction temperature).

The correction factor *k* then reads

$$k_{T_m,T_0} = \frac{T_0 + T_k}{T_m + T_k} = \frac{1+\propto (T_0 - 20°C)}{1+\propto (T_m - 20°C)}$$

Where

T_m Temperature during the measurement
T_0 Reference temperature

Hence $T_k = \frac{1-\propto 20°C}{\propto}$

or $\propto = \frac{1}{T_k + 20°C}$

The linear resistance at T_0 is then given by

$$R_{T_0} = k_{T_m,T_0} R_{T_m}$$

MATERIAL PARAMETERS

Values for aluminium and copper can be taken from IEC 60228 as

	α	T_k (°C)
Copper	0.00393	234.5
Aluminium	0.00403	228

NOTES

1. These formulas are approximations around common temperatures (-20 to 100°C) and cannot be used at extremely low or high temperatures.
2. Formulas given in IEC 60228, as for instance:

$$k_{T_m,Cu} = \frac{254.5°C}{T_m + 234.5°C} = \frac{1}{1 + 0.00393(T_m - 20°C)}$$

reflect the correction to T_0=20°C , and are only valid in this case.

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References

- IEC 60228
- IEEE Std 62-1995
- ICEA T-27-581