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Formulas

To be used as a guideline only.

Calculation of the Nominal Overall Diameter

$$D = p \times \sqrt{n} \times d$$

Where:

D	Nominal bunched wire Diameter
p	Nominal bare Diameter of conductor
n	Number of Single Wires
d	Nominal overall diameter of the single wire

Calculation of the Cross Section of Conductor

$$q = \frac{\pi}{4} \times d^2 nom. \times n$$

Where:

q	Nominal cross-section (conductive material)
d nom.	Nominal bare diameter of conductor
n	Number of Single Wires
d	Nominal outer diameter of a single wire

Calculating the area of a Cable

For Single-strand cable, use the following formula to calculate the exact area of the cable where the diameter of the cable-strand is known:

$$S = \pi\left(\frac{D}{2}\right)^2$$

Where:

S = area of single strand
D = diameter of a single strand
p = 3.14

As an example, let's consider a single-strand cable with a wire diameter of 0.9mm. Applying the above formula we get:

$S = 3.14(0.9/2)^2$
$= 3.14(0.45)^2$
$= 3.14 \times 0.20$
$= 0.64mm^2$

Calculation of the Litz Resistance

$$\text{Nominal Resistance} = \frac{\text{Nominal resistance of single wire} \times k_1}{\text{Number of single wires}}$$

$$\text{Minimum Resistance} = \frac{\text{Minimum resistance of single wire} \times k_1}{\text{Number of wires}}$$

Maximum Resistance

a) Number of wires up to and including 25

$$\text{Maximum Resistance} = \frac{\text{Maximum resistance of single wire} \times k_1}{\text{Number of single wires}}$$

b) Number of wires over 25

$$\text{Maximum Resistance} = \frac{\text{Maximum resistance of single wire} \times k_1 \times k_2}{\text{Number of single wires}}$$

The factor k_1 is 1.02 and is taken because of the decrease in length due to bunching k_1 for

- 1 x bunched = 1.02
- 2 x bunched = 1.04
- 3 x bunched = 1.06

The factor k_2 is 1.03 and is taken because of the broken ends which may occur.