17.2.2 Calculations

The volume resistivity shall be calculated from the measured insulation resistance by the following formula:

$$\rho = \frac{2 \times \pi \times l \times R}{\ln \frac{D}{d}}$$

where

ρ is the volume resistivity, in ohms centimetres;

R is the measured insulation resistance, in ohms;

l is the length of the cable, in centimetres;

D is the outer diameter of the insulation, in millimetres;

d is the inner diameter of the insulation, in millimetres.

The insulation resistance constant, K_i, expressed in megaohms × kilometres [MΩ · km] may also be calculated, using the formula:

$$K_i = \frac{l \times R \times 10^{-11}}{\log \frac{D}{d}} = 10^{-11} \times 0{,}367 \times \rho$$

NOTE For the cores of shaped conductors, the ratio D/d is the ratio of the perimeter over the insulation to the perimeter over the conductor.

Table 13 – Electrical type test requirements for insulating compounds

Designation of compounds (see 4.2)	**Unit**	**PVC/A**	**EPR/ HEPR**	**XLPE**
Maximum conductor temperature in normal operation (see 4.2)	**°C**	**70**	**90**	**90**
Volume resistivity ρ				
– at 20 °C (see 17.2)	Ω · cm	10^{13}	–	–
– at maximum conductor temperature in normal operation (see 17.3)	Ω · cm	10^{10}	10^{12}	10^{12}
Insulation resistance constant K_i				
– at 20 °C (see 17.2)	MΩ · km	36,7	–	–
– at maximum conductor temperature in normal operation (see 17.3)	MΩ · km	0,037	3,67	3,67