

THERMAL TIME CONSTANT

The thermal time constant (τ) for the intermittent operation of cables laid underground is calculated using the formula below obtained from the SIEMENS Cable handbook, "Power Cables and their Applications", by L. Heinold: 1970, pages 264/265

The thermal time constant (in seconds) of a cable is calculated as follows:

$$\tau = \frac{x \cdot c \cdot \gamma \cdot \Delta \vartheta_n}{f} \cdot \left(\frac{q}{I_n} \right)^2 \text{ s}$$

Where

$\Delta \vartheta_n$ = temperature rise under normal conditions, deg C

I_n = current rating under normal conditions, A.

q = cross - sectional area of the conductor, mm².

f = temperature factor for the conductor resistance $f = (1 + \alpha_{20} \cdot \Delta \vartheta_n)$.

x = conductance (mean value taking into account the effects of manufacturing) for copper
 56m/Ωmm², for aluminium 34m/Ωmm²

$c \cdot \gamma$ = constant of material for copper conductors 3.5 Ws/cm³ degC
 for aluminium conductors 2.5 Ws/cm³ degC

electric
 african cables