



# RADOX 125

## Current rating for single core cables

### 1. Scope :

This document provides guidelines for the selection of cable cross-sections with regard to the current rating for continuous operation.

### 2. Definitions :

- Current load : current passed through the cable during operation
- Continuous operation : an operation with constant current whose duration is at least long enough to allow the system to reach thermal equilibrium, but may then go on indefinitely
- Current rating : maximum permissible current under determined operation conditions
- Permissible operating temperature : maximum permissible conductor temperature during continuous operation

### 3. General remarks :

- 3.1. The current rating of a cable depends on the conductor cross-section, on the cable design, on the characteristics of the insulation materials, on the installation conditions and, for larger cross-sections, on the frequency (skin and proximity effects). Also, additional heating effects due to higher ambient temperatures, due to heating elements and due to bunching of cables have to be taken into account.
- 3.2. The conductor cross-section has to be selected in such a way that the actual current load does not exceed the current rating, i.e. the conductor temperature does not exceed the permissible operating temperature. The determining factor is the appropriate, most unfavourable operating condition, encountered during operation over the whole length of the cable.

### 4. Current rating under service conditions :

$$I = I_N \cdot f_1 \cdot f_2 \cdot f_3$$

- $I$  [A] : Current rating for continuous operation under service conditions
- $I_N$  [A] : Current rating for continuous operation under standard conditions
- $f_1$  : Reduction factor for increased ambient temperature ( see # 4.2 )
- $f_2$  : Reduction factor for deviated conductor temperature ( see # 4.3 )
- $f_3$  : Reduktion factor for banded cables ( see tables on pages 3 and 4 )

#### 4.1. Standard conditions for current rating :

- 4.1.1. The tabled values for the current rating were calculated according to IEC 60287 for the following standard conditions:
- continuous operation
  - single circuit for 3-phase current, single conductor for 1-phase current
  - 30°C ambient temperature and sufficiently large and ventilated spaces, whose ambient temperature is not appreciably increased by the heat coming from the cables.
  - 120°C conductor temperature
  - frequency up to 200 Hz


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4.1.2. Installation in air, unrestricted heat dissipation, means that the following installation conditions are observed :

- distance of the cables from the wall, from the floor, from the ceiling > cable diameter
- distance between two adjacent power circuits > 2 x cable diameter
- vertical distance between power circuits laid one upon another for individual cables > 2 x cable diameter and for layers of cables > 200 mm
- perforated tray with a perforation > 30 % of the total surface

4.1.3. Open trays are continuous supports with vertical sides, but without cover. A possible perforation accounts for < 30% of the total surface.

4.1.4. Closed ducts are entirely closed. Pipes belong to this category also.  
The max. filling degree is 60%.

### 4.2. Reduction factors for increased ambient temperature :

Ambient - temperature [°C]	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115
Conversion factor $f_1$	1	0.97	0.94	0.91	0.88	0.85	0.82	0.78	0.75	0.71	0.67	0.62	0.58	0.53	0.47	0.41	0.33	0.22

### 4.3. Reduction factors for different conductor temperature :

Conductor temperature [°C]	120	110	100	90	80
Conversion factor $f_2$	1	0.96	0.91	0.85	0.79



