

# Halogen-free Security Cables and Wires

- The danger of toxic gases caused by fire is far inferior
- Low caloric load
- Remarkable longer electrical functionality and flame influence
- Insulation integrity for at least 30 minutes as well as 180 minutes at 800°C under fire condition
- Suitable for emergency service up to 180 minutes
- Radiation resistance up to  $200 \times 10^6$  cJ/kg (up to 200 Mrad)

These characteristics are obtained by using of a flexible halogen-free basis material – aluminium hydroxide  $\text{Al}(\text{OH})_3$ .

## Caloric load values (heat of combustion)

For designing a building the criterions of the caloric load values are very important. The caloric load values of the modern halogen-free cables are reduced by corresponding additives.

The specific heating values of the non-metallic raw materials for cables are specified to DIN 51900. The values of the caloric load or heat of combustion for electrical cables are given per running meter in the following tables.

Combustible cable insulations or open building materials of class B1 are regarded as harmless so far as the resulted caloric load is distributed as proportionale as possible and is valid  $\geq 7$  kWh/m<sup>2</sup>

The conversion of the values:

$$\begin{aligned} 1 \text{ MJ/m}^2 & \triangleq 0,278 \text{ kWh/m}^2 \\ 1 \text{ kWh/m}^2 & \triangleq 3,6 \text{ MJ/m}^2 \end{aligned}$$

## Regulations

According to DIN VDE 0108 supplement 1:

- The total caloric load of the cables are allowed up to 14 kWh per m<sup>2</sup> of the field areas if only halogen-free cables with improved characteristics in the case of fire are used.

If you use PVC cables the total caloric load is only up to 7 kWh per m<sup>2</sup>

## Tests

The characteristics of the security cables are tested according to DIN VDE specifications:

## Behaviour in fire

According to DIN VDE 0472 part 804, test method A, test method B and test method C.

## • Test method A – test on single cable IEC 60332-2

- Test sample of 600 mm cable length shall be in a position vertically hanging. A propane gas burner ( $\varnothing$  8 mm) shall be at an angle of 45° to the axis and the flame of approx. 100 mm below the lower edge of the sample. Flame influence max. 20 s.
- The test is passed, if the sample has not burned or the flame extinguished by itselfs and the damage by fire doesnt reach the remotest upper side of the sample.

## • Test method B – test on single cable IEC 60332-1, HD 405.1, EN 50265-2-1, DIN VDE 0482 part 265-2-1

- Test sample of 600 mm cable length shall be in a position vertically hanging. A propane gas burner ( $\varnothing$  8 mm) shall be at an angle of 45° to the axis and the flame of approx. 100 mm below the lower edge of the sample. Flame influence, depending on cable weight, 1 to 2 minutes.
- The test is passed, if the sample has not burned or the flame extinguished by itselfs and the damage by fire doesnt reach the remotest upper side of the sample.

## • Test method C – test on bunched cables similar IEC 60332-3, HD 405.3, EN 50266-2, DIN VDE 0482 part 2

- Test samples of 360 cm cable length are laying parallel side-by-side attached to a test-ladder, which is hanging vertically with a distance of 150 mm to the furnace. The sample should be flamed with a flame length of 60 cm on the test sample at approx. temperature 800°C by a burner width of approx. 250 mm. The test duration should be 20 minutes.
- The test is passed, if the sample has not burned or the flame extinguished by itself and the damage by fire does not reach the remotest upper side of the sample.

## Corrosivity of cumbustion gases

According to DIN VDE 0472 part 813, IEC 60754-2 and HD 602, DIN VDE 0482 part 267, EN 50267-2-2 For the performance of the test procedure the insulation and sheath materials are to be put in the moveable furnace, preheated to 750 to 800°C. The burning gas is conducted through two gas-washing bottles.

- The test shall be regarded as passed when the measured pH-value is  $\geq 4,3$  and the electrical conductivity  $\geq 100 \mu\text{S}\cdot\text{cm}^{-1}$ .
- During this test all the not desired components of the materials are precipitated such as all halogens, sulphur and nitrogen.