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# TOPSOLAR PV H1Z2Z2-K

## 1. Object

This document defines the design and manufacturing characteristics of the cables type TOP SOLAR PV H1Z2Z2-K manufactured by Top Cable.

## 2. Design

This type of cables are designed, manufactured and tested according to the latest revision of EN 50618 and IEC 62930 standard.

Approvals available:

EN 50618 (TÜV Rheinland) and IEC 62930 (TÜV Rheinland, in process).

## 3. Applications

Low smoke halogen-free, flexible, single-core power cables with cross-linked insulation and sheath. In particular for use at direct current (d.c.) side of photovoltaic systems, with a nominal d.c. voltage of 1,5 kV between conductors and between conductor and earth.

The cables are suitable to be used with Class II equipment.

The cables are designed to operate at a normal maximum conductor temperature of 90 ºC, but for a maximum of 20 000 hours a max. conductor temperature of 120 ºC at a max. ambient temperature of 90 ºC is permitted. The expected period of use under normal usage conditions as specified in the standard EN 50618 is at least 25 years.

Suitable for submerged installations (AD8).

## 4. Characteristics

Rated voltage DC: nominal 1,5 kV, both between conductors as well between conductors and earth.The maximum permitted operating d.c. voltage of the systems shall not exceed 1,8 kV.

Rated voltage AC: voltage rating is 1,0/1,0 kV ($U_0$/U). $U_0$ is the r.m.s. value between any insulated conductor an earth. U is the r.m.s. value between any two phases.

Ambient temperature range: -40 °C to + 90 ºC

Maximum conductor temperature: 120 ºC

Maximum short-circuit temperature: 250 °C (maximum 5 s)

Minimum bending radius (fixed): 5 x cable Ø

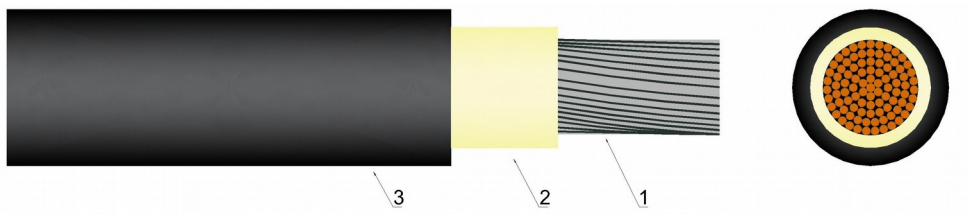
No flame propagation: according to EN 60332-1-2/ IEC 60332-1-2

No fire propagation: according to EN 50399

Halogen free: according to EN 50525-1 (Annex B)
HCl content < 0,5%; pH > 4,3; conductivity < 10 µS/mm

Reaction to fire CPR: Dca-s2,d2,a2 according to EN 50575

## 5. General make-up of the cable




### 5.1 Conductor (1)

Electrolytic annealed tinned copper conductor, class 5 according to EN 60228.

### 5.2 Insulation (2)

Halogen free cross-linked rubber insulation. Requirements of insulation of table B.1 in Annex B of EN 50618 and IEC 62930.

### 5.3 Outer sheath (3)

Halogen free cross-linked rubber outer sheath. Requirements of sheath of table B.1 in Annex B of EN 50618 and IEC 62930. Black or red colour.

## 6. Current-carrying capacities

### 6.1 Nominal current-carrying capacities

Table 1 show the current-carrying capacities and electric parameters detailed for every cable.

Current-carrying capacities, in amperes, are according to EN 50618, and for the following conditions:

- Single cables free in air installation: one single-core cable and ambient temperature of 60 °C; with adequate ventilation (supported by cleats and hangers or on perforated tray).
- Single cable on surfaces installation: one single-core cable directly on a wall with low thermal conductivity, ambient temperature of 60 °C.
- To cables adjacent on surfaces installation: ambient temperature of 60 °C.
- In all cases it is supposed a direct current circuit.

Voltage drop is calculated with conductor temperature of 120 ºC.

For conditions other than this apply the adequate correction factors (point 6.2).

| Cross-section mm² | Single cable free in air A | Single cable on surfaces A | To cables adjacent on surface A | Voltage drop V/A·km |
|---|---|---|---|---|
| 1 x 1,5 | 30 | 29 | 24 | 38,2 |
| 1 x 2,5 | 41 | 39 | 33 | 23,0 |
| 1 x 4 | 55 | 52 | 44 | 14,3 |
| 1 x 6 | 70 | 67 | 57 | 9,49 |
| 1 x 10 | 98 | 93 | 79 | 5,46 |
| 1 x 16 | 132 | 125 | 107 | 3,47 |
| 1 x 25 | 176 | 167 | 142 | 2,23 |
| 1 x 35 | 218 | 207 | 176 | 1,58 |
| 1 x 50 | 276 | 262 | 221 | 1,10 |
| 1 x 70 | 347 | 330 | 278 | 0,772 |
| 1 x 95 | 416 | 395 | 333 | 0,585 |
| 1 x 120 | 488 | 464 | 390 | 0,457 |
| 1 x 150 | 566 | 538 | 453 | 0,368 |
| 1 x 185 | 644 | 612 | 515 | 0,301 |
| 1 x 240 | 775 | 736 | 620 | 0,228 |

Table 1

## 6.2 Correction factors

The current-carrying capacities must be multiplied with the adequate correction factor when the installation conditions differs from point 6.1

Correction factors for air temperatures other than 60°C.

| Air Temp. (ºC) | Up to 60 | 70 | 80 | 90 |
|---|---|---|---|---|
| Factor | **1** | 0,92 | 0,84 | 0,75 |

Table 2

## 6.3 Groups

For groups reduction factors according to IEC 60364-5-52, Table A.52-17 shall apply.

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## 7. Dimensions

Table 3 show diameters and weight detailed for every cable.

| Cross-section $mm^2$ | Outer Ø (1) mm | Weight kg/km |
|---|---|---|
| 1 x 1,5 | 4,6 | 35 |
| 1 x 2,5 | 5,0 | 45 |
| 1 x 4 | 5,4 | 60 |
| 1 x 6 | 6,0 | 80 |
| 1 x 10 | 7,0 | 120 |
| 1 x 16 | 8,2 | 180 |
| 1 x 25 | 10,2 | 280 |
| 1 x 35 | 11,5 | 375 |
| 1 x 50 | 13,3 | 525 |
| 1 x 70 | 15,0 | 720 |
| 1 x 95 | 17,0 | 930 |
| 1 x 120 | 18,7 | 1.175 |
| 1 x 150 | 21,0 | 1.475 |
| 1 x 185 | 23,5 | 1.805 |
| 1 x 240 | 26,3 | 2.345 |

Table 3

(1) The tolerances on the nominal outer diameters are:

Cables with outer diameter d ≤ 7 mm. → -0,1 +0,2 mm

Cables with outer diameter 7 < d < 10 mm. → -0,1 +0,3 mm

Cables with outer diameter d ≥ 10 mm. → -0,2 +0,4 mm