APPLICATION GUIDE

HOW TO CHOOSE THE RIGHT PV CABLE

Why to choose photovoltaic cable?

One common factor for most of the photovoltaic power systems is outdoor use, which involves high temperatures and high UV radiation. Single-core cables with a maximum permissible DC voltage of 1.8 kV and a temperature range from -40°C to +90°C are generally used [1] . The maximum conductor temperature is 120°C, and Short Circuit Temperature of laying >250°C not more than 5 sec, with Max. Cable storage temperature +40°C and min. installation temperature -25°C. Photovoltaic cables (PV cable) are designed to be UV resistant and weather resistant. They can be used within a large temperature range and are generally laid outside. Hence, only PV cables can meet these severe conditions.

How to choose the right photovoltaic cable?

The cable conductor usually uses tinned copper or bare copper. The insulation and jacket use s125°C XLPO which is environmentally non-toxic. The jacket color is generally black or white and it can be other colors as per customers' request. For the different standards, there are different requirements for the conductor material. For UL4703 (US), EETS and JCS4517 (Japan), the requirement conductor material can be tinned copper or bare copper. For TUV1169, 1990 or EN50618, the conductor must be tinned copper[2].

According to the different standards, Akatsuki offers different part numbers of PV cables to fit the market. Below we will explain the standard in detail to help you to understand how to choose the right PV cable for the projects.

TUV 2PfG 1169 Standard

Type of Description: PV1-F

Working Voltage: AC U0/U 600/1000V; DC 1800 V. If the cable is used in DC-systems the rated voltage between two conductors shall not exceed the 1.5 time value of rated

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1 From https://en.wikipedia.org/wiki/Solar_cable#cite_note-pv-1

2 Standard is quoted from IEC 60228.

voltage U of the cable. In single-phase earthed DC-systems this value shall be multiplied with factor 0.5[3].

Part Number of Akatsuki: 705X, 635X, 650X, E3X

PV cable as a power transmission line, used in large ground plans, distributed power plans in photovoltaic power generation system, such as monocrystalline silicon, polycrystalline silicon solar cell components, such as Honey M, JKM320PP.

TUV 2PfG 1990Standard

Type of Description: PV1500DC-F

Working Voltage: DC 1500V. Maximum permitted voltage: DC 1,8 kV (conductor-earth, circuit not under load)[4].

Part Number of Akatsuki: 650X, 780X, 795X, E3X

PV cable as a power transmission line, used in large ground plans, distributed power plans in photovoltaic power generation system, such as monocrystalline silicon, polycrystalline silicon solar cell components, such as Honey M, JKM320PP.

- **EN 50618Standard**

Type of Description:H1Z2Z2-K

Working Voltage:AC U0/U 1000/1000V, DC 1500V. The cables specified in this standard are particularly designed for use at the direct current (DC) sideof photovoltaic-systems, with a nominal DC voltage up to 1,5 kV between conductors as well as between aconductor and the earth[5].

Part Number of Akatsuki: 900X, 635X, 650X, 780X, 795X, E3X

[3] From: TUV 2PfG 1169

[4] From: TUV 2PfG 1990

[5] From: EN 50618

PV cable as a power transmission line, used in large ground plans, distributed power plans in photovoltaic power generation system, such as monocrystalline silicon, polycrystalline silicon solar cell components, such as Honey M, JKM320PP.

- **UL 4703Standard**

Working Voltage 600V, 1000V, 2000V

Part Number of Akatsuki 635X, 650X, 717X, 795X

PV cable as a power transmission line, used in large ground plans, distributed power plans in photovoltaic power generation system, such as monocrystalline silicon, polycrystalline silicon solar cell components, such as Honey M, JKM320PP.

- **EETS, JCS 4517Standard**

Working Voltage DC 1500V

Part Number of Akatsuki:650X, E0X, E3X

PV cable as a power transmission line, used in large ground plans, distributed power plans in photovoltaic power generation system, such as monocrystalline silicon, polycrystalline silicon solar cell components, such as Honey M, JKM320PP.

- **Current Rating of PV Cable**

Current carrying capacity according to method of installation[6]

Nominal cross sectional area	Single cable free in air A	Single cable on a surface A	Two loaded cables touching, on a surface A
1.5mm2 (16AWG)	30	29	24
2.5mm2 (14AWG)	41	39	33
4mm2 (12AWG)	55	52	44
6mm2 (10AWG)	70	67	57
10mm2 (8AWG)	98	93	79

6 From EN50618

16mm2 (6AWG)	132	125	107
25mm2 (4AWG)	176	167	142
35mm2 (2AWG)	218	207	176

Ambient temperature Conversion factor

up to 60℃	1.0
70℃	0.92
80℃	0.84
90℃	0.75

Using customers should observe the above cable carrying capacity when choosing the appropriate cable specifications. The photovoltaic power plan commonly uses cable specifications 4mm2~6mm2(12AWG~10AWG).