



Solar Cables

Power cables for
PV installations

High-performance cables for **PV** generation

Worldwide environmental concerns are accelerating the growth of solar power generation. Cables used in solar generation differ from those used in industrial installations in the sense that they must be designed to withstand harsh environmental conditions like rain, long-term exposure to ozone and sunlight, extreme temperature fluctuations and direct ultraviolet (UV) rays.

Building a quality, safe and profitable solar PV plant with a good return on investment (RoI) is the most important objective of investors, project owners and also developers. **Cables only represent around 4-5% of a solar project cost, but it can have a significant impact on the power output.** Cabling is often not considered to be a critical factor, however improper design and/or poor cable selection can lead to safety hazards, reduced power output, and other performance issues that may jeopardize the overall lifetime of a PV system.

On the contrary, a proper cable selection and management are vital to the health of the PV system as it contributes to minimize maintenance, optimize safety and enable longer-lasting PV systems.

To maintain longevity performance and reliability of the PV system, solar cables must have been specifically engineered to optimize efficiency and minimize line losses. All cables in PV installations should be developed to resist UV, ozone, sand abrasion and

water absorption, as well as provide excellent flexibility for extreme low weather conditions and deformation resistance during prolonged exposure at high temperatures. Regardless of their size, all PV installations require high-quality cables that provide excellent mechanical properties and superior sunlight resistance for outdoor installations, easy handling and, depending on the installation type (PV farm or PV floating farm) extra flexibility as well as maximum water performance.

Cable certification is paramount to ensuring the economic viability of PV power systems. The industry has seen a variety of cable designs and practices, many of which may not necessarily support long-term solar needs. In recent years, manufacturers in the photovoltaic industry have upgraded their technology, increasing the operating voltage up to 1500V in DC.

Cables especially engineered to meet the **most exigent solar requirements**

Top Cable has specifically engineered superior electric performance PV cables that resist to UV rays, ozone, sand abrasion and water absorption, as well as provide excellent flexibility for extreme weather conditions during prolonged exposure at sunlight.

The company is continuously developing new cable solutions for new incoming markets to meet its customers' most demanding needs in solar power generation. The solar plants are conceived, designed and manufactured to have 25 years durability and recent Tribunal considers a useful life of 35 years. Of course some minor investment will be needed from the beginning to reach a 35 years lifetime.

For solar tracking panels, our **Topsolar® H1Z2Z2-K cables** have been designed with a rubber cross-linked insulation and outer sheath that makes the cable extremely flexible, as the panels will be moving along with the sun. These cables also meet the most stringent global standards for halogen-free, fire-retardant, and low-corrosive gas emissions, are AD8, direct burial and TÜV certified according to EN 50618 and IEC 62930.

Top Cable has developed an **Aluminium cable** specifically engineered for all types of underground and open-air solar installations, that provides extra durability and prevents the premature ageing of the cable, providing longevity performance and reliability of the PV investment.

In order to connect the PV installation to substations and the power grid we have developed a complete range of **high-performance Medium Voltage cables**.



Planning and designing a **PV Plant**

When planning and designing a PV plant certain factors need to be considered, including the size of the solar array, its geographical location, and other site-specific considerations.

1. PV Plant with string box

In a large solar photovoltaic installation using central inverter and combiner/string box, multiple solar modules are connected in series in a string to build the voltage up to proper levels. Then the power is transmitted in DC from string box that combines the output of multiple strings of PV modules for connection to the central inverter.

- The solar cable must be certified according to EN 50618.
- The aluminium cable must be UV Resistant, directly buried and the cable must support voltage test according to EN 50618.

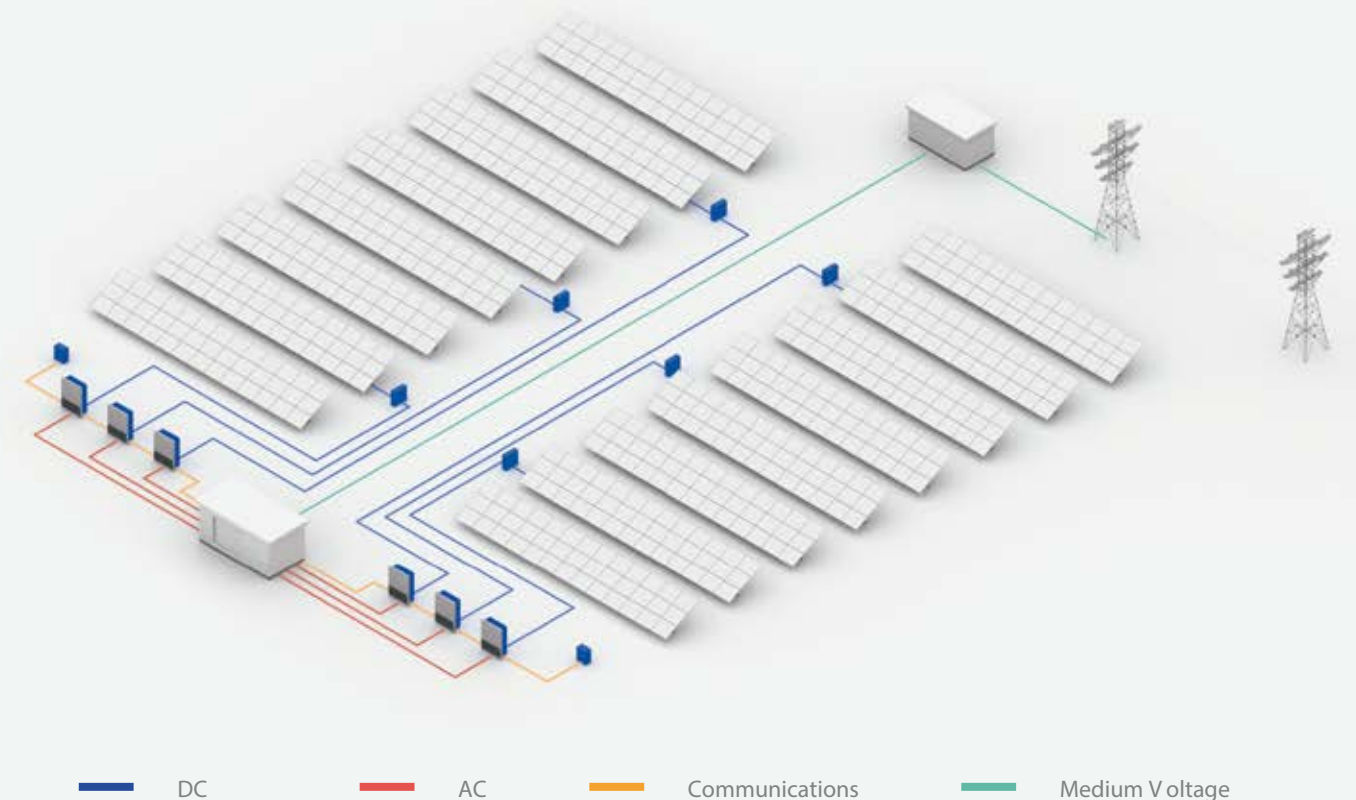
2. PV Plant with string inverter

An increasing number of ground-mount PV systems are built using String Inverter technology. The preference of string inverters over central inverters continues to grow because of the benefits of the modular power electronics design.

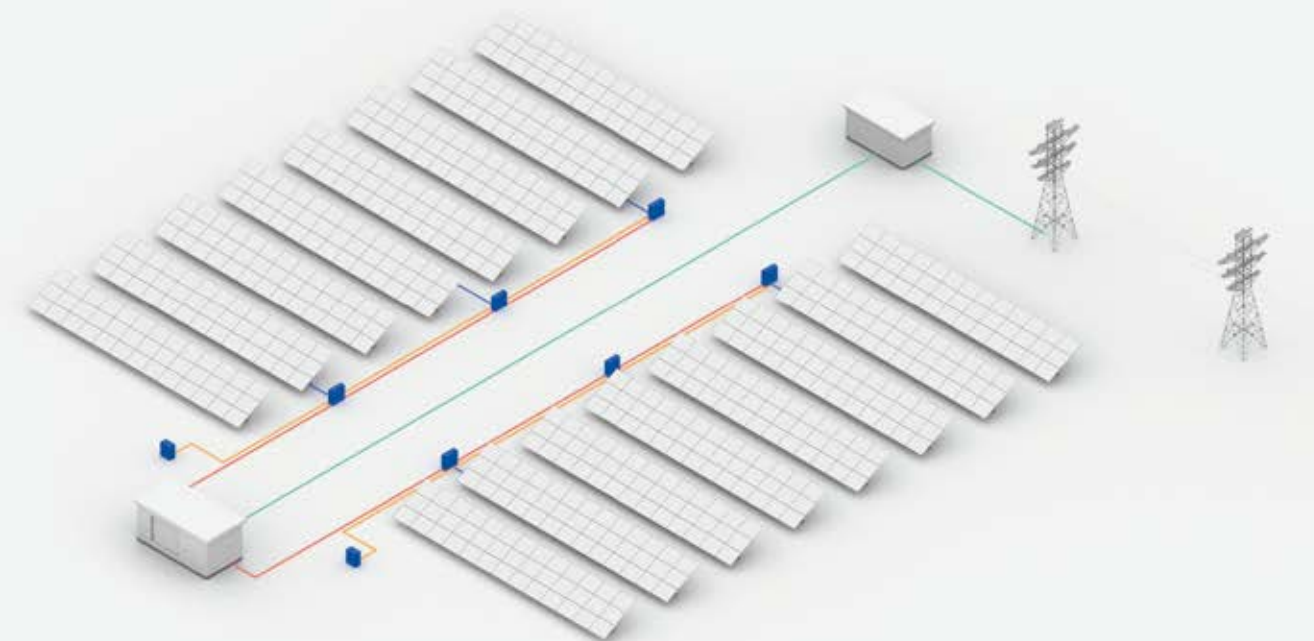
As the previous installation, multiple solar modules are connected in series in a string to build the voltage up to proper levels. Then the power is transmitted in AC from string inverter that combines the output of multiple strings of PV modules for connection to the power station.

- The solar cable must be certified according to EN 50618.
- The aluminium cable must be UV Resistant, directly buried and support voltage test 1,8/3 kV according to IEC 60502-1.

1. PV Plant with string box



2. PV Plant with string inverter



Topsolar®: A complete range of cables for solar installations

At Top Cable you will find a reliable manufacturer and supplier for all power cables required on PV installations. Our comprehensive range of solar cables covers from cable selection or design, project management with our technical expertise to logistics and after-sales service support.

Top Cable is committed to manufacturing products under the highest quality standards and in offering an excellent service to its customers worldwide, highlighting:



Total traceability in our product range.



Cables specifically designed for solar installations.



Worldwide recognized certificates.



Full product range up to 66kV.



CPR certified cables.



After-sales service support.



Large solar cable stock.

Solar cables engineered
to meet the most exigent
safety requirements.



Top Cable



TOPSOLAR[®] PV H1Z2Z2-K

TÜV solar PV cable.

ACCORDING TO: EN 50618 / IEC 62930 / UTE C 32-502



Cca

APPLICATION

The TOPSOLAR[®] PV H1Z2Z2-K cable, which is TÜV certified according to EN 50618 and AENOR certified according to IEC 62930, it is suitable for both fixed and mobile solar installations (solar farms, rooftop solar installations and floating plants). It is a highly flexible cable compatible with all major connectors and specially designed for the connection of photovoltaic panels. This versatile single-conductor cable is designed to meet the varying needs of the solar industry. Suitable for wet, damp and humid locations.

- Solar PV installations string cable.

CONSTRUCTION

Conductor
Electrolytic annealed tinned copper conductor class 5 (flexible) according to IEC 60228 and EN 60228.

Insulation
Halogen free cross linked rubber insulation.
Insulation requirements according to table B1 in Annex B of EN 50618 and IEC 62930.

Outer sheath
Halogen free cross linked flexible rubber outer sheath.
Outer sheath requirements according to table B1 in Annex B of EN 50618 and IEC 62930.
Red or black colour.

CHARACTERISTICS

- Electrical performance**
Low voltage: 1,5/1,5 (1,8) kV DC.
1,0/1,0 kV AC.
- Thermal performance**
Maximum service temperature: 120°C during 20.000 h.
Maximum short-circuit temperature: 250°C (max. 5 s).
Minimum service temperature: -40°C (fixed and protected installations).
- Fire performance**
Flame non-propagation according to EN 60332-1-2 / IEC 60332-1-2.
Fire non-propagation according to EN 50399.
Reaction to fire CPR: C_{ca}-s1b, d2, a1, according to EN 50575.
LSHF (Low Smoke Halogen Free) according to EN 60754-1 / IEC 60754-1.
Low smoke emission according to EN 61034 / IEC 61034:
Light transmittance > 60%.
Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.
- Mechanical performance**
Minimum bending radius:
4 x cable diameter (cable diameter ≤ 8 mm)
5 x cable diameter (8 < cable diameter ≤ 12 mm)
6 x cable diameter (cable diameter > 12 mm).
Impact resistance: AG2 Medium severity.
- Environmental performance**
Chemical & Oil resistance: Excellent.
Grease & mineral oils resistance: Excellent.
Ozone resistant according to EN 50618.
UV Resistant according to EN 50618.
Water resistance: AD8 Submersion.
- Installation conditions**
Open Air.
Buried.
In conduit.

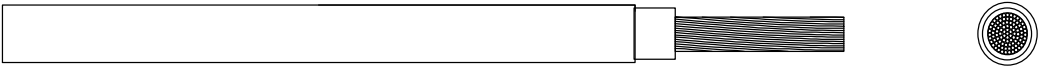
STANDARDS / COMPLIANCE

- According to**
EN 50618/ IEC 62930 / UTE C 32-502
- Standards and approvals**
TÜV (from 2.5 to 25mm² in Black and Red) / RETIE / AENOR/ RoHS / CE
- CPR (Construction Products Regulation)**
C_{ca}-s1b, d2, a1



TOPSOLAR[®] PV H1Z2Z2-K

DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-Section (mm ²)	Diameter (mm)	Weight (kg/km)	Single cable free in air (A)	Single cable on surfaces (A)	To cables adjacent on surface (A)	Voltage drop (V/A · km)
1 x 4	5,4	60	55	52	44	14,3
1 x 6	6,0	80	70	67	57	9,49
1 x 10	7,0	120	98	93	79	5,46
1 x 16	8,2	180	132	125	107	3,47
1 x 25	10,2	280	176	167	142	2,23
1 x 35	11,5	375	218	207	176	1,58
1 x 50	13,3	525	276	262	221	1,10
1 x 70	15,0	720	347	330	278	0,772
1 x 95	17,0	930	416	395	333	0,585
1 x 120	18,7	1.175	488	464	390	0,457
1 x 150	21,0	1.475	566	538	453	0,368
1 x 185	23,5	1.805	644	612	515	0,301
1 x 240	26,3	2.345	775	736	620	0,228

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

Current-carrying capacities, in amperes, are according to EN 50618 (ambient temperature of 60 °C). In all cases it is supposed a direct current circuit. Voltage drop is calculated with conductor temperature of 120 °C.



E_{ca}

APPLICATION

TOPSOLAR® PV DC Feeder Aluminium cable is suitable for all types of underground and open air solar installations. This cable is recommended for connections between string boxes and photovoltaic inverters in large scale rooftops or ground farms.

- Solar PV installations.
- Heavy impact and armoured versions also available.

CONSTRUCTION

- Conductor**
Aluminium conductor, class 2 according to EN 60228 and IEC 60228.
- Insulation**
Cross-linked polyethylene insulation, type XLPE according to IEC 60502-1. Natural colour.
- Outer sheath**
Special UV resistant PVC, type ST2 according to IEC 60502-1. Black colour.

CHARACTERISTICS

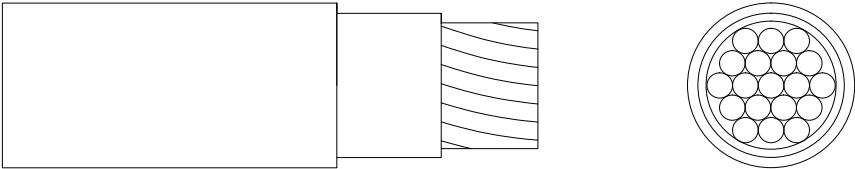
- Electrical performance**
Low voltage: 1,5/1,5 (1,8) kV DC according to EN 50618.
1,8/3 (3,6) kV AC according to IEC 60502-1.
- Thermal performance**
Maximum service temperature: 90°C.
Maximum short-circuit temperature: 250°C (max. 5 s).
Minimum service temperature: -40°C (fixed and protected installations).
Minimum installation and handling temperature: 0°C (on cable surface).
- Fire performance**
Flame non-propagation according to EN 60332-1 and IEC 60332-1.
Reaction to fire CPR: E_{ca}, according to EN 50575
Reduced halogen emission. Chlorine <15%.
- Mechanical performance**
Minimum bending radius: 5x cable diameter.
Impact resistance: AG2 Medium severity.
- Environmental performance**
Chemical resistance: Good.
Grease & mineral oils resistance: Good.
UV Resistant according to EN 50618 and HD 605/A1.
Water resistance: AD8 Submersion.

STANDARDS / COMPLIANCE

- According to
IEC 60502-1
- Standards and approvals
CE / RoHS.
- CPR (Construction Products Regulation)
E_{ca}



DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-section (mm²)	Diameter (mm)	Weight (Kg/km)	R20°C (Ω/km)	Open air (A) ¹	Buried (A) ²	Voltage drop (V/A · km) ³
1 x 16	11,1	140	1,910	87	76	4,894
1 x 25	12,2	175	1,200	121	98	3,075
1 x 35	13,4	215	0,868	150	117	2,225
1 x 50	14,5	255	0,641	184	139	1,643
1 x 70	16,6	340	0,443	237	170	1,135
1 x 95	17,7	425	0,320	289	204	0,820
1 x 120	19,3	520	0,253	337	233	0,648
1 x 150	20,7	610	0,206	389	261	0,528
1 x 185	22,5	740	0,164	447	296	0,420
1 x 240	24,9	930	0,125	530	343	0,320
1 x 300	27,0	1.095	0,100	613	386	0,256
1 x 400	30,0	1.395	0,0778	740	444	0,199
1 x 500	34,3	1.755	0,0605	856	510	0,155
1 x 630	38,4	2.225	0,0469	996	588	0,120
2 x 240	50,2	3.510	0,125	470	343	0,320
3 x 1 x 240	53,5	2.810	0,125	466	257	0,320
4 x 95	42,0	2.300	0,320	257	204	0,820
4 x 120	46,1	2.800	0,253	300	233	0,648
4 x 150	49,3	3.320	0,206	346	261	0,528
4 x 1 x 120	46,5	2.100	0,253	296	195	0,648
4 x 1 x 150	49,9	2.465	0,206	342	196	0,528
4 x 1 x 240	60,0	3.745	0,125	466	257	0,320

¹ Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

² Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.

³ At maximum service temperature and cosφ=1.

For all cables is supposed a single-phase circuit



TOXFREE[®] PV AI 1500 V HEAVY DUTY

Aluminium PV cable.
ACCORDING TO: IEC 60502-1



APPLICATION

Toxfree[®] PV DC Feeder Aluminium cable is suitable for direct buried installations and open air solar installations. This cable is recommended for connections between string boxes and photovoltaic inverters in large scale rooftops or ground farms.

- Solar PV installations.

CONSTRUCTION

Conductor

Aluminium conductor, class 2 according to EN 60228 and IEC 60228.

Insulation

Cross-linked polyethylene insulation, type XLPE according to IEC 60502-1. Natural colour.

Outer sheath

Polyethylene halogen free and UV resistant, type ST7 according to IEC 60502-1 with extra thickness as protection for direct buried cables.
Black colour.

CHARACTERISTICS

⚡ Electrical performance

Low voltage: 1,5/1,5 (1,8) kV DC according to EN 50618.
1,8/3 (3,6) kV AC according to IEC 60502-1.

🔥 Thermal performance

Maximum service temperature: 90°C.
Maximum short-circuit temperature: 250°C (max. 5 s).
Minimum service temperature: -40°C (fixed and protected installations).
Minimum installation and handling temperature: 0°C (on cable surface).

🔥 Fire performance

Halogen free: according to EN 60754/ IEC 60754.

📏 Mechanical performance

Minimum bending radius: 5x cable diameter.
Impact resistance: AG4 (≤ 40 J) Extra high severity according to NF C 33-226.
Abrasion according to NF C 33-226.

🌿 Environmental performance

UV Resistant according to EN 50618.
Water resistance: AD8 Submersion.

STANDARDS / COMPLIANCE



According to
IEC 60502-1

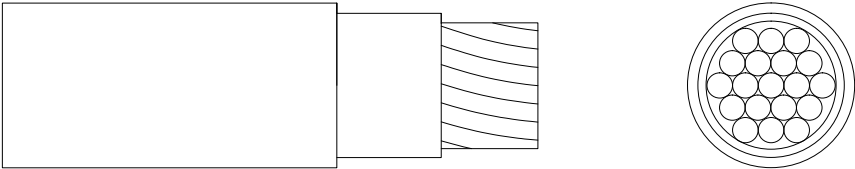


Standards and approvals
CE / RoHS.



TOXFREE[®] PV AI 1500 V HEAVY DUTY

DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-section (mm ²)	Diameter (mm)	Weight (Kg/km)	R20°C (Ω/km)	Open air (A) ¹	Buried (A) ²	Voltage drop (V/A · km) ³
1 x 150	25,3	755	0,206	389	261	0,528
1 x 185	26,9	880	0,164	447	296	0,420
1 x 240	29,0	1.065	0,125	530	343	0,320
1 x 300	31,0	1.240	0,100	613	386	0,256
1 x 400	33,2	1.505	0,0778	740	445	0,199

¹ Reference method F according to IEC 60364-5-52 in open air at 30°C ambient temperature.

² Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K-m/W and 20°C of ground temperature.

³ At maximum service temperature and cosφ=1.

For all cables is supposed a single-phase circuit.



APPLICATION

TOPSOLAR® PV AWA/SWA DC Feeder Aluminium cable is suitable for all types of underground and open air solar installations. This cable is recommended for connections between string boxes and photovoltaic inverters in large scale rooftops or ground farms. Suitable for transport and distribution of electric power where there is the possibility of mechanical aggressions.

- Solar PV installations.

CONSTRUCTION

Conductor
Aluminium conductor, class 2 according to EN 60228 and IEC 60228.

Insulation
Cross-linked polyethylene insulation, type XLPE according to IEC 60502-1.

The standard identification of insulated conductors according to HD 308, is the following:

- 1 x Natural
- 2 x Blue + Brown
- 3 x Grey + Brown + Black
- 4 G Brown + Black + Grey + Green/Yellow
- 4 x Brown + Black + Grey + Blue

Inner covering
Extruded PVC.

Armour
Galvanized steel wire armour (SWA). Aluminium wire armour (AWA) is used in single-core cables to avoid parasite currents that may overheat the cable.

Outer sheath
Special UV resistant PVC, type ST2 according to IEC 60502-1. Black colour.

CHARACTERISTICS

Electrical performance
Low voltage: 1,5/1,5 (1,8) kV DC according to EN 50618.
1,8/3 (3,6) kV AC according to IEC 60502-1.

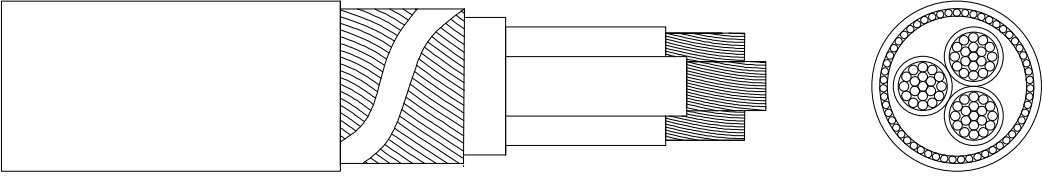
Thermal performance
Maximum service temperature: 90°C.
Maximum short-circuit temperature: 250°C (max. 5 s).
Minimum service temperature: -40°C (fixed and protected installations).
Minimum installation and handling temperature: 0°C (on cable surface).

Fire performance
Flame non-propagation according to EN 60332-1 / IEC 60332-1.
Reduced halogen emission. Chlorine <15%.

Mechanical performance
Minimum bending radius: 10x cable diameter.
Impact resistance: AG4 High severity.

Environmental performance
Chemical resistance: Good.
Grease & mineral oils resistance: Good.
UV Resistant according to EN 50618 and HD 605/A1.

DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-section (mm²)	Diameter (mm)	Weight (Kg/km)	R20°C (Ω/km)	Open air (A) ¹	Buried (A) ²	Voltage drop (V/A · km) ³
1 x 95	24,1	785	0,320	289	204	0,820
1 x 120	25,7	900	0,253	337	233	0,648
1 x 150	26,9	1.005	0,206	389	261	0,528
1 x 185	28,7	1.165	0,164	447	296	0,420
1 x 240	31,4	1.415	0,125	530	343	0,320
1 x 300	33,4	1.610	0,100	613	386	0,256
1 x 400	36,7	2.000	0,0778	740	444	0,199
2 x 240	57,3	5.595	0,125	470	343	0,320
3 x 95	44,7	3.820	0,320	257	204	0,820
3 x 120	48,6	4.440	0,253	300	233	0,648
3 x 150	51,3	4.940	0,206	346	261	0,528
3 x 185	55,0	5.570	0,164	397	296	0,420
3 x 240	60,8	6.685	0,125	470	343	0,320
3 x 300	65,5	7.665	0,100	543	386	0,256
4 x 185	60,5	6.600	0,164	397	296	0,420

¹ Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.
² Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.
³ At maximum service temperature and cosφ=1.
In all cases are supposed a single-phase circuit.

STANDARDS / COMPLIANCE

- According to IEC 60502-1
- Standards and approvals CE / RoHS





XTREM[®] DN-F 1,8/3 kV

Flexible rubber cable, for industrial use.
BASED TO: UNE 21150



E_{ca}

APPLICATION

Xtrem[®] DN-F cables are designed to supply power to low voltage appliances like submersible pumps in deep water installations, mining installations as well as many other types of electrical equipment.

CONSTRUCTION

- Conductor**
Electrolytic annealed copper conductor, class 5 (flexible), according to EN 60228 and IEC 60228.
- Insulation**
Thermosetting rubber insulation, type EPR according to UNE 21150. The standard identification of insulated conductors, according to UNE 21089-1 and HD 308, is the following:
- 1 x Natural
 - 2 x Blue + Brown
 - 3 G Blue + Brown + Green/Yellow
 - 4 G Brown + Black + Grey + Green/Yellow
 - 5 G Brown + Black + Grey + Blue + Green/Yellow

Insulation
Thermosetting flexible rubber outer sheath, type SEI according to UNE 21150. Black colour.

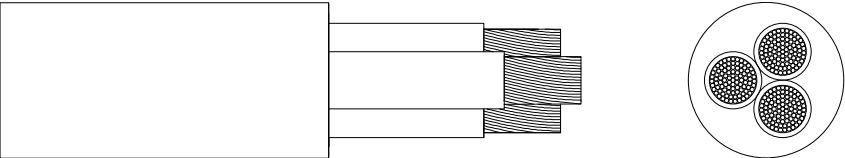
CHARACTERISTICS

- Electrical performance**
Low voltage: 1,8/3 kV.
- Thermal performance**
Maximum service temperature: 90°C.
Maximum short-circuit temperature: 250°C (max. 5 s).
Minimum service temperature: -40°C (static with protection) and -35°C (mobile service).
- Fire performance**
Flame non-propagation according to UNE-EN 60332-1 / IEC 60332-1.
Reaction to fire CPR: E_{ca} according to EN 50575.
- Mechanical performance**
Minimum bending radius:
3 x cable diameter < 12 mm.
4 x cable diameter ≥ 12 mm.
Impact resistance: AG2 Medium severity.
- Environmental performance**
Chemical & Oil resistance: excellent.
Grease & mineral oils resistance: excellent.
Water resistance:
AD8 Submersion.
Submersible pumps.
Deep wells.
Drinkable water.



XTREM[®] DN-F 1,8/3 kV

DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-Section (mm ²)	Diameter (mm)	Weight (kg/km)	Open air (A) ¹	Voltage drop (V/A · km) ²
1 x 185	28,6	2.070	575	0,270
1 x 240	31,3	2.635	679	0,204

¹ Reference method F for single-core and method E for multicore cables according to IEC60364-5-52 in open air at 30°C ambient temperature.
² At maximum service temperature and cosφ=1.
For all cables it is supposed a single-phase circuit.

STANDARDS / COMPLIANCE

- Based to
UNE 21150
- Standards and approvals
RoHS / CE



X-VOLT® AL (-OL/-2OL) RHZ1



Medium Voltage aluminium cable, XLPE insulation.
ACCORDING TO: IEC 60502-2



APPLICATION

X-VOLT® RHZ1 is a Medium Voltage aluminium cable halogen-free for fixed installations. Suitable for transport and distribution of electric power in medium voltage networks.

CONSTRUCTION

- Conductor**
Aluminium conductor class 2 according to EN 60228 and IEC 60228. Optionally, with longitudinal sealing (cable type -2OL).
- Internal semiconductor**
Screen over the conductor, made of thermosetting semiconductor material.
- Insulation**
Cross-linked polyethylene type XLPE according to IEC 60502-2, natural colour.
Cross linked in catenary line with nitrogen atmosphere through a triple layer extrusion process.
- External semiconductor**
Screen over the insulation, made of thermosetting and strippable semiconductor material.
- Metallic screen**
Copper wires and copper tape screen, with a minimum cross-section of 16mm².
- Longitudinal sealing**
Hygroscopic tape completely covering the screen (cable type -OL and -2OL).
- Outer sheath**
Polyethylene outer sheath type ST7 according to IEC 60502-2. Red colour.

CHARACTERISTICS

- Electrical performance**
Medium Voltage: 6/10 kV, 8,7/15 kV, 12/20 kV and 18/30 kV.
- Thermal performance**
Maximum service temperature: 90°C.
Maximum short-circuit temperature: 250°C (max 5 s)
Minimum service temperature: -15°C.
- Fire performance**
Halogen free: according to EN 60754-1 / IEC 60754-1.
- Mechanical performance**
Minimum bending radius: 15x cable diameter.
Abrasion resistant.
Tear resistant.
- Environmental performance**
UV Resistant according to UNE 211605.
- Installation conditions**
Open Air.
Buried.
In conduit.

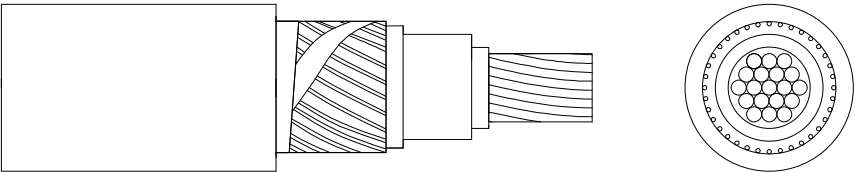
STANDARDS / COMPLIANCE

- According to IEC 60502-2
- Standards and approvals AENOR



X-VOLT® AL (-OL/-2OL) RHZ1

DIMENSIONS & ADMISSIBLE INTENSITIES



X-VOLT® RHZ1 6/10 kV										
Cross-section (mm²)	Screen (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	External Diameter (mm)	Weight (Kg/Km)	R20°C (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²
1 x 50	H16	8,1	15,3	21,2	540	0,641	0,119	0,251	184	152
1 x 150	H16	13,9	21,1	27,0	915	0,206	0,100	0,381	368	281
1 x 240	H16	18,0	25,2	31,5	1.260	0,125	0,094	0,462	502	367
1 x 400	H16	22,8	30,0	36,2	1.760	0,0778	0,090	0,587	673	470
1 x 500	H16	26,3	34,0	41,1	2.135	0,0605	0,087	0,652	777	542

X-VOLT® RHZ1 8,7/15 kV										
Cross-section (mm²)	Screen (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	External Diameter (mm)	Weight (Kg/Km)	R20°C (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²
1 x 95	H16	11,2	20,4	26,3	790	0,320	0,113	0,255	280	221
1 x 150	H16	13,9	23,1	29,2	1.000	0,206	0,105	0,297	368	281
1 x 240	H16	18,0	27,2	33,5	1.355	0,125	0,098	0,363	502	367
1 x 300	H16	20,0	29,2	35,7	1.550	0,100	0,095	0,395	577	414
1 x 400	H16	22,8	32,2	39,2	1.910	0,0778	0,093	0,443	673	470
1 x 500	H16	26,3	36,0	43,3	2.250	0,0605	0,090	0,504	777	542
1 x 630	H16	29,8	39,2	46,7	2.735	0,0469	0,087	0,555	895	615
1 x 800	H16	34,0	43,7	51,4	3.305	0,0367	0,085	0,627	1.036	700

X-VOLT® RHZ1 12/20 kV										
Cross-section (mm²)	Screen (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	External Diameter (mm)	Weight (Kg/Km)	R20°C (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²
1 x 50	H16	8,0	20,0	24,9	660	0,641	0,130	0,174	184	152
1 x 70	H16	10,0	21,0	26,9	765	0,443	0,121	0,201	230	186
1 x 95	H16	11,2	22,2	28,3	870	0,320	0,170	0,217	280	221
1 x 120	H16	12,7	23,7	29,8	980	0,253	0,113	0,237	324	252
1 x 150	H16	13,9	24,9	31,2	1.085	0,206	0,110	0,254	368	281
1 x 185	H16	16,0	28,0	36,3	1.225	0,164	0,106	0,275	424	317
1 x 240	H16	18,0	29,0	35,5	1.455	0,125	0,102	0,308	502	367
1 x 300	H16	20,0	31,0	37,7	1.655	0,100	0,099	0,334	577	414
1 x 400	H16	22,8	34,0	41,0	2.010	0,0778	0,096	0,373	673	470
1 x 500	H16	26,3	37,8	45,3	2.390	0,0605	0,093	0,424	777	542
1 x 630	H16	29,8	41,0	48,7	2.870	0,0469	0,090	0,466	895	615
1 x 1000	H16	39,0	50,5	58,8	4.315	0,0291	0,085	0,591	1.188	795

X-VOLT® AL (-OL/-2OL)
RHZ1

X-VOLT® RHZ1 18/30 kV										
Cross-section (mm²)	Screen (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	External Diameter (mm)	Weight (Kg/Km)	R20°C (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²
1 x 50	H16	8,0	23,6	29,7	845	0,641	0,141	0,135	184	152
1 x 70	H16	10,0	25,6	31,9	970	0,443	0,132	0,154	230	186
1 x 95	H16	11,2	26,8	33,1	1.080	0,320	0,127	0,165	280	221
1 x 120	H16	12,7	28,3	34,8	1.205	0,253	0,122	0,179	324	252
1 x 150	H16	13,9	29,5	36,5	1.325	0,206	0,119	0,190	368	281
1 x 185	H16	16,0	31,6	38,4	1.500	0,164	0,114	0,199	424	317
1 x 240	H16	18,0	33,6	40,7	1.735	0,125	0,110	0,228	502	367
1 x 300	H16	20,0	35,6	42,9	1.950	0,100	0,107	0,247	577	414
1 x 400	H16	22,8	38,6	45,9	2.320	0,0778	0,103	0,274	673	470
1 x 500	H16	26,3	42,4	50,1	2.720	0,0605	0,099	0,308	777	542
1 x 630	H16	29,8	45,6	53,1	3.220	0,0469	0,095	0,342	895	615
1 x 800	H16	34,0	50,1	58,2	3.860	0,0367	0,093	0,378	1.036	700
1 x 1000	H16	39,0	55,1	63,6	4.740	0,0291	0,090	0,423	1.188	795

¹ Three single-core cables in open air at 30°C ambient temperature according to IEC 60502-2.
² Three single-core cables direct buried at 0,8 m depth with soil thermal resistivity of 1,5 K-m/W and 20°C of ground temperature.
Reactance (X) is calculated at 50 Hz and for three single-core cables (in triangle or trefoil formation).
Capacitance values (C) are calculated in base to dimensional items of the cables that are in this specification.
In all cases it is supposed a three-phase circuit.

X-VOLT® AL
RH5Z1
Medium voltage aluminium cable, XLPE insulation,
halogen free with longitudinal aluminium strip screen.
ACCORDING TO: UNE 211620 / ENEL Global Standard GSC 001



APPLICATION

Aluminium cable for fixed installations. Suitable for transport and distribution of electric power in medium voltage networks. Halogen free. This cable is suitable for indoor, outdoor and buried installations.

CONSTRUCTION

- Conductor**
Aluminium conductor class 2 according to EN 60228 and IEC 60228.
- Inner semiconducting screen**
Cross-linked semiconductor screen applied over conductor in a triple-extrusion process.
- Insulation**
Cross-linked polyethylene type DIX-3 according to HD 620-1, natural colour.
Cross-linked in catenary line with nitrogen atmosphere.
- Outer semiconducting screen**
Cross-linked semiconductor screen applied over insulation in a triple-extrusion process. Strippable.
- Water blocking**
Semi-conducting swellable tape, placed on metallic screen.
- Metallic screen**
Aluminium tape of thickness 0,3 mm longitudinally applied on the water-blocking. The tape is overlapped and bonded 5 mm minimum. The screen is longitudinally and continually fixed in the outer sheath.
- Outer sheath**
Polyethylene outer sheath halogen free type DMZI according to HD 620-1.
Red colour.

CHARACTERISTICS

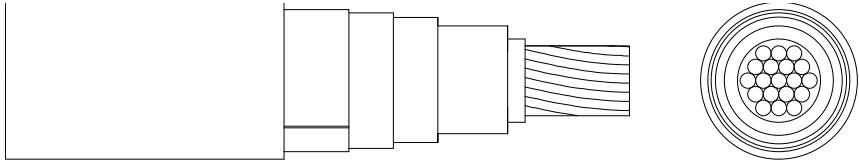
- Electrical performance**
Medium voltage: 12/20 kV and 18/30 kV.
- Thermal performance**
Maximum service temperature: 90°C.
Minimum service temperature: -15°C.
Minimum installation temperature: 0 °C
Maximum short-circuit temperature: 250°C (max 5 s).
- Fire performance**
Halogen free: according to EN 60754 / IEC 60754.
- Mechanical performance**
Minimum bending radius permanently installed: 15x cable diameter.
Minimum bending radius while installation: 20x cable diameter.
Abrasion resistant.
- Environmental performance**
UV Resistant according to UNE 211605.
Water resistance: AD8 Submersion.
- Installation conditions**
Open Air.
Buried.
In conduit.

STANDARDS / COMPLIANCE

-  According to
UNE 211620 / ENEL Global Standard GSC001.
-  Standards and approvals
AENOR.



DIMENSIONS & ADMISSIBLE INTENSITIES



X-VOLT® RH5Z1 12/20 kV												
Cross-section (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	Ext Diameter (mm)	Width tape (mm)	Section screen (mm²)	Weight (Kg/Km)	R (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²	In conduit (A) ³
1 x 50	8,0	18,2	25,3	70	21	585	0,817	0,131	0,185	184	152	144
1 x 95	11,1	21,3	28,4	80	24	795	0,320	0,118	0,231	280	221	210
1 x 120	12,7	22,9	30,0	90	27	915	0,253	0,113	0,254	324	252	240
1 x 150	13,9	24,1	31,2	95	28,5	1.020	0,206	0,110	0,271	368	281	267
1 x 185	15,5	25,9	33,0	100	30	1.165	0,164	0,106	0,296	424	317	303
1 x 240	18,0	28,2	35,3	105	31,5	1.385	0,125	0,102	0,33	502	367	351
1 x 300	20,0	30,2	37,3	110	33	1.580	0,100	0,098	0,368	577	414	397
1 x 400	22,8	33,2	40,3	120	36	1.920	0,0778	0,095	0,401	673	470	451
1 x 500	26,3	37,0	44,1	130	39	2.280	0,0605	0,092	0,456	777	542	519
1 x 630	29,8	40,2	47,3	145	43,5	2.750	0,0469	0,088	0,502	895	615	588

X-VOLT® RH5Z1 18/30 kV												
Cross-section (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	Ext Diameter (mm)	Width tape (mm)	Section screen (mm²)	Weight (Kg/Km)	R (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²	In conduit (A) ³
1 x 50	8,0	22,4	29,5	90	27	770	0,817	0,141	0,143	184	152	144
1 x 95	11,1	25,5	32,6	100	30	995	0,320	0,127	0,175	280	221	210
1 x 120	12,7	27,1	34,2	100	30	1.115	0,253	0,121	0,191	324	252	240
1 x 150	13,9	28,3	35,4	110	33	1.235	0,206	0,118	0,203	368	281	267
1 x 185	15,5	30,6	37,7	110	33	1.405	0,164	0,113	0,222	424	317	303
1 x 240	18,0	32,4	39,5	120	36	1.625	0,125	0,109	0,244	502	367	351
1 x 300	20,0	35,0	41,1	130	39	1.770	0,100	0,103	0,27	577	414	397
1 x 400	22,8	37,4	44,5	140	42	2.195	0,0778	0,101	0,293	673	470	451
1 x 500	26,3	41,2	48,3	150	45	2.580	0,0605	0,097	0,331	777	542	519
1 x 630	29,8	44,4	51,5	160	48	3.060	0,0469	0,094	0,363	895	615	588
1 x 800	34,0	48,9	56,0	170	51	3.680	0.0367	0,090	0,407	1.036	700	670

¹Open air installation according to IEC 60502-2: three single-core cables in trefoil formation and ambient temperature of 30 °C; protected from direct sun radiation and with adequate ventilation (supported by cleats and hangers or on perforated tray).
²Buried installation according to IEC 60502-2: three single-core cables in trefoil formation direct buried at a depth of 0,8 m, ground temperature of 20 °C and soil thermal resistivity of 1,5 K·m/W.
³Buried installation according to IEC 60502-2: three single-core tubed cables (one cable per tube) in trefoil formation and buried tubes in mutual contact at a depth of 0,8 m, ground temperature of 20 °C, soil thermal resistivity of 1,5 K·m/W and thermal resistivity of the tube of 1,2 K · m / W.

Medium Voltage aluminium cable, HEPR insulation.
ACCORDING TO: UNE-HD 620-9E (type 9E-1) / NI 56.43.01



APPLICATION

X-VOLT® HEPRZ1 AL is a Medium Voltage aluminium cable for the transmission and distribution of electricity.

CONSTRUCTION

- Conductor**
Aluminium conductor, class 2 according to EN 60228 and IEC 60228.
- Internal semiconductor**
Screen over the conductor, made of thermosetting semiconductor material.
- Insulation**
High module ethylene propylene rubber (HEPR) type DIH-2 according to HD 620-1, in dry atmosphere catenary tube, through a triple layer extrusion process. Lead-Free version available on request.
- External semiconductor**
Screen over the insulation, made of thermosetting and strippable semiconductor material.
- Metallic screen**
Screen of copper wires and copper tape, with a minimum cross-section of 16mm².
- Separator**
Polyester tape completely covering the screen to facilitate the stripping of the outer sheath.
Optionally, substituted by hygroscopic tape (cables with longitudinal sealing, type -OL).
- Outer sheath**
Polyolefin outer sheath, type DMZ1 according to HD 620-1.
Red colour.

CHARACTERISTICS

- Electrical performance**
Medium Voltage 12/20 kV and 18/30 kV.
- Thermal performance**
Maximum service temperature: 105°C.
Maximum short-circuit temperature: 250°C (max 5 s).
Minimum service temperature: -30°C.
- Fire performance**
Halogen free according to EN 60754-1 / IEC 60754-1.
- Mechanical performance**
Minimum bending radius: 15x cable diameter.
Abrasion resistant.
Tear resistant.
- Environmental performance**
UV Resistant according to UNE 211605.

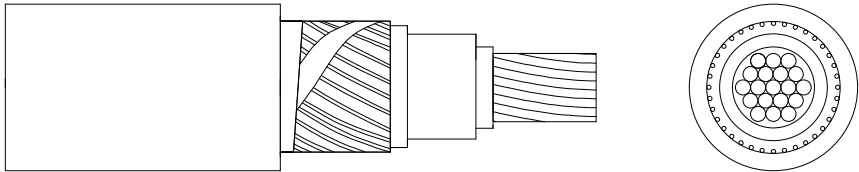
STANDARDS / COMPLIANCE

- According to
UNE-HD 620-9E (type 9E-1) / NI 56.43.01
- Standards and approvals
AENOR



X-VOLT® AL (-OL)
HEPRZ1

DIMENSIONS & ADMISSIBLE INTENSITIES

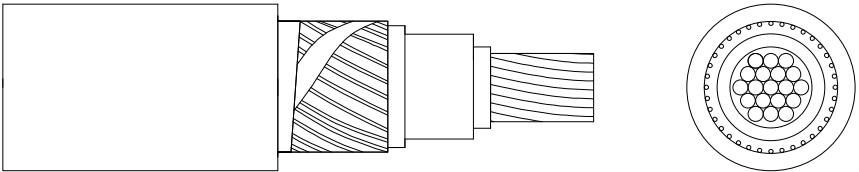


X-VOLT® HEPRZ1 12/20 kV										
Cross-section (mm²)	Screen (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	External Diameter (mm)	Weight (Kg/Km)	R20°C (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²
1 x 50	H16	8,1	17,7	24,1	680	0,641	0,132	0,232	180	145
1 x 70	H16	11,1	20,3	26,7	860	0,443	0,126	0,258	225	180
1 x 95	H25	11,1	20,3	27,4	960	0,320	0,12	0,284	275	215
1 x 120	H16	12,7	21,9	29,1	1.005	0,253	0,117	0,307	320	245
1 x 150	H16	13,9	23,1	30,3	1.110	0,206	0,113	0,331	360	275
1 x 185	H16	15,5	25,1	32,3	1.270	0,164	0,109	0,366	415	315
1 x 240	H16	18,0	27,6	34,4	1.495	0,125	0,105	0,401	495	365
1 x 300	H16	20,0	29,6	36,8	1.690	0,100	0,098	0,428	565	410
1 x 300	H25	20,0	29,6	37,1	1.775	0,100	0,098	0,428	565	410
1 x 400	H16	22,8	32,6	40,3	2.035	0,0778	0,097	0,494	660	470
1 x 500	H16	26,3	36,4	43,6	2.390	0,0605	0,093	0,556	780	540
1 x 630	H16	29,8	39,6	46,8	2.855	0,0469	0,089	0,642	920	620
1 x 800	H16	34,0	44,3	52,5	3.620	0,0367	0,087	0,676	1.065	710
1 x 1000	H16	39,0	49	58,1	4.335	0,0291	0,084	0,762	1.230	805

¹Three single-core cables in open air at 40°C ambient temperature according to UNE 211435.
² Three single-core cables direct buried at 1 m depth with soil thermal resistivity of 1,5 K-m/W and 25°C of ground temperature.
Reactance (X) is calculated at 50 Hz and for three single-core cables (in triangle or trefoil formation).
Capacitance values (C) are calculated in base to dimensional items of the cables that are in this specification.
In all cases it is supposed a three-phase circuit.

X-VOLT® AL (-OL)
HEPRZ1

DIMENSIONS & ADMISSIBLE INTENSITIES



X-VOLT® HEPRZ1 18/30 kV										
Cross-section (mm²)	Screen (mm²)	Conductor Diameter (mm)	Insulation Diameter (mm)	External Diameter (mm)	Weight (Kg/Km)	R20°C (Ω/km)	X (Ω/km)	C (µF/km)	Open air (A) ¹	Buried (A) ²
1 x 50	H16	8,1	24,3	31,5	1.015	0,641	0,143	0,169	180	145
1 x 95	H16	11,1	25,3	32,5	1.140	0,320	0,131	0,204	275	215
1 x 150	H16	13,9	27,1	34,9	1.355	0,206	0,122	0,235	360	275
1 x 150	H25	13,9	27,1	35,2	1.440	0,206	0,122	0,235	360	275
1 x 240	H16	18,0	31,0	38,2	1.705	0,125	0,107	0,300	495	365
1 x 240	H25	18,0	31,0	38,5	1.785	0,125	0,107	0,300	495	365
1 x 400	H16	22,8	36,4	43,7	2.305	0,0778	0,103	0,340	660	470
1 x 400	H25	22,8	36,4	44,0	2.390	0,0778	0,103	0,340	660	470
1 x 500	H16	26,3	40,2	47,5	2.690	0,0605	0,096	0,398	780	540
1 x 500	H25	26,3	40,2	47,8	2.775	0,0605	0,096	0,398	780	540
1 x 630	H16	29,8	43,4	50,7	3.200	0,0469	0,094	0,436	920	620
1 x 630	H25	29,8	43,4	51,0	3.265	0,0469	0,094	0,436	920	620
1 x 800	H25	34,0	48,5	55,8	3.855	0,0367	0,090	0,471	1.065	710
1 x 1000	H25	39,0	53,7	61,3	4.800	0,0291	0,087	0,521	1.230	805

¹Three single-core cables in open air at 40°C ambient temperature according to UNE 211435.
² Three single-core cables direct buried at 1 m depth with soil thermal resistivity of 1,5 K-m/W and 25°C of ground temperature.
Reactance (X) is calculated at 50 Hz and for three single-core cables (in triangle or trefoil formation).
Capacitance values (C) are calculated in base to dimensional items of the cables that are in this specification.
In all cases it is supposed a three-phase circuit.



E_{ca}

APPLICATION

Powerflex® RV-K cable is suitable for all types of low voltage industrial-type connections, in urban grids, building installations, etc. Its high flexibility makes the installation process substantially easier and, as a result, is particularly suitable for use in difficult layouts. It can be buried or installed in a tube as well as outdoors without requiring additional protection. This cable can withstand damp conditions including total immersion in water (AD7).

CONSTRUCTION

- Conductor**
Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.
- Insulation**
Cross-linked polyethylene insulation type DIX-3 according to HD 603-1 and type XLPE according to IEC 60502-1.
- The standard identification of insulated conductors according to HD 308 and UNE-21089-1, is the following:
- | | |
|-----------|---|
| 1 x | Natural |
| 2 x | Blue + Brown |
| 3 G | Blue + Brown + Green/Yellow |
| 3 x | Brown + Black + Grey |
| 3 x + 1 x | Brown + Black + Grey + Blue (reduced cross-section) |
| 4 G | Brown + Black + Grey + Green/Yellow |
| 4 x | Brown + Black + Grey + Blue |
| 5 G | Brown + Black + Grey + Blue + Green/Yellow |
| 6 or more | Black numbered + Green/Yellow |
- Outer sheath**
Flexible PVC outer sheath, type DMV-18 according to HD 603-1 and type ST2 according to IEC 60502-1. Black colour.

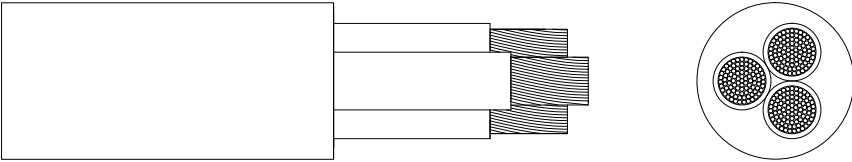
STANDARDS / COMPLIANCE

-  **According to**
IEC 60502-1 / UNE 21123-2
-  **Standards and approvals**
AENOR / BUREAU VERITAS / KEMA-KEUR / RoHS / CE
-  **CPR (Construction Products Regulation)**
E_{ca}

CHARACTERISTICS

-  **Electrical performance**
Low voltage: 0,6/1 kV.
-  **Thermal performance**
Maximum service temperature: 90°C.
Maximum short-circuit temperature: 250°C (max. 5 s).
Minimum service temperature: -40°C (fixed and protected installations).
Minimum installation and handling temperature: 0°C (on cable surface).
-  **Fire performance**
Flame non-propagation according to EN 60332-1/IEC 60332-1.
Reaction to fire CPR: E_{ca} according to EN 50575.
Reduced halogen emission. Chlorine <15%.
-  **Mechanical performance**
Minimum bending radius: 5x cable diameter.
Impact resistance: AG2 Medium severity.
-  **Environmental performance**
Chemical & Oil resistance: Good.
UV Resistant according to UNE 211605.
Water resistance: AD7 immersion.
-  **Installation conditions**
Open Air.
Buried.
In conduit.
In tray.

DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-section (mm²)	Diameter (mm)	Weight (kg/km)	Open air (A) ¹	Buried (A) ²	Voltage drop (V/A · km) ³
1 x 1,5	5,7	45	28	27	33,9
1 x 2,5	6,2	55	39	35	20,3
1 x 4	6,7	70	53	46	12,6
1 x 6	7,3	90	68	58	8,41
1 x 10	8,2	135	93	77	4,87
1 x 16	9,2	190	124	100	3,08
1 x 25	11,0	285	161	129	1,98
1 x 35	12,1	385	200	155	1,41
1 x 50	13,8	520	242	183	0,984
1 x 70	15,7	715	310	225	0,693
1 x 95	17,6	925	377	270	0,525
1 x 120	19,2	1.165	437	306	0,410
1 x 150	21,5	1.450	504	343	0,328
1 x 185	23,9	1.750	575	387	0,270
1 x 240	26,9	2.280	679	448	0,204
1 x 300	29,6	2.830	783	502	0,163
1 x 400	33,8	3.735	930	592	0,123
1 x 500	37,4	4.780	1.070	670	0,097
1 x 630	42,7	6.280	1.232	762	0,073
1 x 800	51,5	8.235	1.426	870	0,056
1 x 1000	59,9	10.410	1.640	988	0,044
2 x 1,5	8,2	90	26	27	33,9
2 x 2,5	9,2	120	36	35	20,3
2 x 4	10,3	165	49	46	12,6
2 x 6	11,3	215	63	58	8,41
2 x 10	13,2	320	86	77	4,87
2 x 16	14,9	450	115	100	3,08
2 x 25	20,8	810	149	129	1,98
2 x 35	22,0	1.000	185	155	1,41
2 x 50	25,7	1.375	225	183	0,984
2 x 70	29,5	1.880	289	225	0,693
2 x 95	33,0	2.430	352	270	0,525
3 G 1,5	8,9	110	26	27	33,9
3 G 2,5	9,8	145	36	35	20,3
3 G 4	11,0	200	49	46	12,6
3 G 6	12,1	265	63	58	8,41
3 G 10	14,3	405	86	77	4,87
3 x 16	16,4	595	115	100	3,08
3 x 25	20,7	955	149	129	1,98
3 x 35	23,1	1.275	185	155	1,41
3 x 50	26,8	1.750	225	183	0,984
3 x 70	29,6	2.370	289	225	0,693
3 x 95	35,0	3.140	352	270	0,525
3 x 120	39,8	4.115	410	306	0,410
3 x 150	44,7	5.130	473	343	0,328
3 x 185	49,9	6.285	542	387	0,270
3 x 240	54,1	7.875	641	448	0,204

Cross-section (mm²)	Diameter (mm)	Weight (kg/km)	Open air (A) ¹	Buried (A) ²	Voltage drop (V/A · km) ³
3 x 300	62,3	10.100	741	502	0,163
3x16+1x10	17,6	700	115	100	3,08
3x25+1x16	22,7	1.140	149	129	1,98
3x35+1x16	25,0	1.480	185	155	1,41
3x50+1x25	29,1	2.050	225	183	0,984
3x70+1x35	33,8	2.850	289	225	0,693
3x95+1x50	38,2	3.700	352	270	0,525
3x120+1x70	42,1	4.750	410	306	0,410
3x150+1x70	46,8	5.800	473	343	0,328
3x185+1x95	53,5	7.200	542	387	0,270
3x240+1x120	58,5	9.100	641	448	0,204
4 G 1,5	9,7	130	26	27	33,9
4 G 2,5	10,7	175	36	35	20,3
4 G 4	12,0	245	49	46	12,6
4 G 6	13,4	330	63	58	8,41
4 G 10	15,7	505	86	77	4,87
4 x 16	18,2	750	115	100	3,08
4 x 25	24,1	1.245	149	129	1,98
4 x 35	26,3	1.675	185	155	1,41
4 x 50	31,3	2.315	225	183	0,984
4 x 70	36,1	3.205	289	225	0,693
4 x 95	40,2	4.130	352	270	0,525
4 x 120	44,6	5.245	410	306	0,410
4 x 150	49,8	6.575	473	343	0,328
4 x 185	56,1	8.050	542	387	0,270
4 x 240	64,5	10.695	641	448	0,204
5 G 1,5	10,4	155	26	27	33,9
5 G 2,5	11,6	215	36	35	20,3
5 G 4	13,2	300	49	46	12,6
5 G 6	14,7	405	63	58	8,41
5 G 10	17,1	625	86	77	4,87
5 G 16	20,2	935	115	100	3,08
5 G 25	26,6	1.555	149	129	1,98
5 G 35	29,3	2.080	185	155	1,41
5 G 50	34,5	2.895	225	183	0,984
5 G 70	38,7	3.930	289	225	0,693
5 G 95	44,6	5.190	352	270	0,525
5 G 120	49,7	6.560	410	306	0,410
5 G 150	55,6	8.145	473	343	0,328
5 G 185	62,5	9.975	542	387	0,270
5 G 240	71,8	13.210	641	448	0,204
7 G 1,5	11,2	190	26	27	33,9
7 G 2,5	12,4	265	36	35	20,3
10 G 1,5	13,2	260	26	27	33,9
10 G 2,5	16,3	380	36	35	20,3
12 G 1,5	14,2	295	26	27	33,9
12 G 2,5	15,7	420	36	35	20,3
14 G 1,5	14,9	315	26	27	33,9
24 G 1,5	20,4	550	26	27	33,9

¹ Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.

² Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.

³ At maximum service temperature and cosφ=1.

In all cases it is supposed a single-phase circuit.

The universal cable for power transmission with improved fire proof properties.
ACCORDING TO: IEC 60502-1



Cca

APPLICATION

Powerflex® Plus YMvKf cable is suitable for all types of industrial low voltage connections, urban grids, building installations, etc. This cable is fire retardant and is recommended for use in public places and hazardous industries. Its flexibility makes installation substantially easier, making it highly suitable for difficult layouts. This cable can also be used in buried installations or in tubes or outdoors without requiring additional protection. This cable withstands damp conditions and even total submersion in water (AD7).

CONSTRUCTION

Conductor
Electrolytic annealed copper conductor, class 5 (flexible) according to EN 60228 and IEC 60228.

Insulation
Cross-linked polyethylene insulation, type XLPE according to IEC 60502-1 and HD 604. The standard identification of insulated conductors, according to HD 308 is the following:

- 1 x Black
- 2 x Blue + Brown
- 3 x Blue + Brown + Grey
- 4 G Brown + Black + Grey + Green/Yellow
- 5 G Brown + Black + Grey + Blue + Green/Yellow

Outer sheath
Flexible PVC/ST2 outer sheath, according to IEC 60502-1 and HD 604.Grey colour.

CHARACTERISTICS

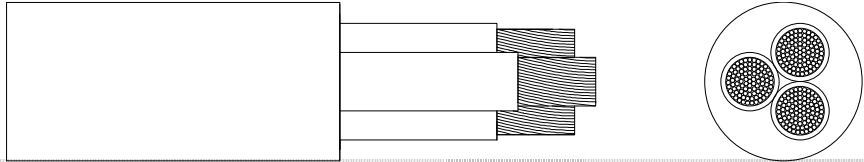
- Electrical performance**
Low voltage 0,6/1kV.
- Thermal performance**
Maximum service temperature: 90°C.
Maximum short-circuit temperature: 250°C (max. 5 s).
Minimum service temperature: -40°C (fixed and prot. installations)
- Fire performance**
Flame non-propagation according to EN 60332-1 and IEC 60332-1.
Fire non-propagation according to EN 60332-3-24/IEC 60332-3-24.
Reaction to fire CPR: Cca-s2,d2,a3 according to 50575.
Reduced halogen emission. Chlorine <15%.
- Mechanical performance**
Minimum bending radius: x5 cable diameter.
Impact resistance: AG2 Medium severity.
- Environmental performance**
Chemical & Oil resistance: Acceptable..
UV Resistant according to UNE 211605.
Water resistance AD7 immersion.

STANDARDS / COMPLIANCE

- According to IEC 60502-1
- Standards and approvals
AENOR / BUREAU VERITAS / KEMA-KEUR / RoHS / CE.
- CPR (Construction Products Regulation)
Cca-s2,d2,a3.



DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-section (mm²)	Diameter (mm)	Weight (kg/km)	Open air ¹	Buried ²	Voltage drop (V/A · km) ³
1 x 10	8,2	145	93	77	4,87
1 x 16	9,2	200	124	100	3,08
1 x 25	10,9	295	161	129	1,98
1 x 35	11,8	385	200	155	1,41
1 x 50	13,6	525	242	183	0,984
1 x 70	15,4	715	310	225	0,693
1 x 95	17,5	925	377	270	0,525
1 x 120	19,1	1.160	437	306	0,410
1 x 150	21,3	1.440	504	343	0,328
1 x 185	23,4	1.735	575	387	0,270
1 x 240	26,2	2.260	679	448	0,204
1 x 300	29,1	2.860	783	502	0,163
1 x 400	33,8	3.765	940	563	0,123
1 x 500	37,5	4.805	1.083	637	0,097
1 x 630	43,7	6.340	1.254	719	0,073
2 x 10	15,4	410	86	77	4,87
2 x 16	17,1	555	115	100	3,08
2 x 25	20,6	815	149	129	1,98
2 x 35	22,9	1.070	185	155	1,41
3 G 10	16,1	495	86	77	4,87
3 x 16	18,1	690	115	100	3,08
3 x 25	21,4	1.015	149	129	1,98
3 x 35	23,8	1.340	185	155	1,41
3 x 50	27,6	1.840	225	183	0,984
3 x 70	30,3	2.460	289	225	0,693
3 x 95	35,6	3.245	352	270	0,525
3 x 120	39,8	4.105	410	306	0,410
3 x 150	43,9	5.080	473	343	0,328
3 x 185	48,6	6.160	542	387	0,270
3 x 240	54,7	8.020	641	448	0,204
3 x 16 + 1 x 10	19,1	795	115	100	3,08
3 x 25 + 1 x 16	23,9	1.165	149	129	1,98
3 x 35 + 1 x 25	25,3	1.580	185	155	1,41
3 x 50 + 1 x 25	28,8	2.060	225	183	0,984
3 x 70 + 1 x 35	32,9	2.810	289	225	0,693
3 x 95 + 1 x 50	37,1	3.675	352	270	0,525
4 G 10	17,5	660	86	77	4,87
4 G 16	19,7	850	115	100	3,08
4 G 25	23,2	1.250	149	129	1,98
4 G 35	25,4	1.655	185	155	1,41
4 G 50	30,8	2.310	225	183	0,984
4 G 70	35,4	3.175	289	225	0,693
4 G 95	39,2	4.095	352	270	0,525

Cross-section (mm²)	Diameter (mm)	Weight (kg/km)	Open air ¹	Buried ²	Voltage drop (V/A · km) ³
4 G 120	44,4	5.215	410	306	0,410
4 G 150	48,7	6.460	473	343	0,328
4 G 185	54,2	7.860	542	387	0,270
4 G 240	61,5	10.265	641	448	0,204
4 x 35 + 1 G 25	28,2	1.940	185	155	1,41
4 x 50 + 1 G 25	32,6	2.575	225	183	0,984
4 x 70 + 1 G 35	37,6	3.545	289	225	0,693
4 x 95 + 1 G 50	42,2	4.620	352	270	0,525
5 G 10	19,0	720	86	77	4,87
5 G 16	21,6	1.030	115	100	3,08
5 G 25	25,9	1.540	149	129	1,98
5 G 35	28,3	2.035	185	155	1,41
5 G 50	34,0	2.830	225	183	0,984
5 G 70	38,6	3.880	289	225	0,693
5 G 95	44,2	5.070	352	270	0,525
5 G 120	48,7	6.395	410	306	0,410
5 G 150	53,9	7.930	473	343	0,328
5 G 185	60,5	9.660	542	387	0,270
5 G 240	68,6	12.635	641	448	0,204

¹ Reference method F for single-core and method E for multicore cables according to IEC 60364-5-52 in open air at 30°C ambient temperature.
² Reference method D2 according to IEC 60364-5-52. Directly buried at 0,7 m depth with soil thermal resistivity of 2,5 K·m/W and 20°C of ground temperature.
³ At maximum service temperature and cosφ=1.
For all cables is supposed a single-phase circuit.



TOXFREE® ZH OUTDOOR H07Z1-K (AS) type 2 CuSn

Flexible and halogen free earthing connections.

ACCORDING TO: EN 50525-3-31 / UNE 211002



B2_{ca}

APPLICATION

Toxfree® ZH Outdoor H07Z1-K is a LSHF safety cable specially engineered for earthing connections in outdoor installations. The tinned copper and the special UV resistant compound make the cable resistant against corrosion and UV rays degradation.

CONSTRUCTION

Conductor

Electrolytic annealed tinned copper conductor class 5 (flexible) according to IEC 60228 and EN 60228.

Insulation

UV resistant (LSHF) polyolefin insulation type T17 according to EN 50363-7.

The standard identification of insulated conductors is the following:

Green/Yellow RAL 6018/1021
Other colours available on request.

CHARACTERISTICS



Electrical performance
Low voltage: 450/750 V.



Thermal performance
Maximum service temperature: 70°C.
Maximum short-circuit temperature: 160°C (max. 5 s).
Minimum service temperature: -40°C (fixed and protected installations).



Fire performance
Flame non-propagation according to EN 60332-1 / IEC 60332-1.
Fire non-propagation according to EN 60332-3-24 / IEC 60332-3-24 and EN 50399.
Reaction to fire CPR: B2_{ca}-s1a, d1, a1, according to EN 50575.
LSHF (Low Smoke Halogen-Free) according to EN 60754-1 / IEC 60754-1.
Low smoke emission according to EN 61034 / IEC 61034:
Light transmittance > 80%.
Low corrosive gases emission according to EN 60754-2 / IEC 60754-2.



Mechanical performance
Minimum bending radius: 5x cable diameter.



Environmental performance
Chemical & Oil resistance: Excellent.
Grease & mineral oils resistance: Excellent.
UV Resistant according to EN 50618.
Ozone resistant according to EN 50618.



TOXFREE® ZH OUTDOOR H07Z1-K (AS) type 2 CuSn

DIMENSIONS & ADMISSIBLE INTENSITIES



Cross-section (mm ²)	Diameter (mm)	Weight (kg/km)	In conduit 2 cond. (A) ¹	In conduit 3 cond. (A) ¹	Voltage drop (V/A · km) ²
1 x 4	4,1	45	32	28	12,2
1 x 6	4,7	65	41	36	8,11
1 x 10	6,0	105	57	50	4,66
1 x 16	7,0	160	76	68	2,97
1 x 25	8,8	250	101	89	1,90
1 x 35	9,9	335	125	110	1,35
1 x 50	11,7	480	151	134	0,94

¹ Reference method B1 for two and three loaded conductors installed in conduit on a wall according to IEC60364-5-52 in open air at 30°C ambient temperature.

² At 70°C conductor temperature, cos φ= 1 and single-phase circuit.

STANDARDS / COMPLIANCE



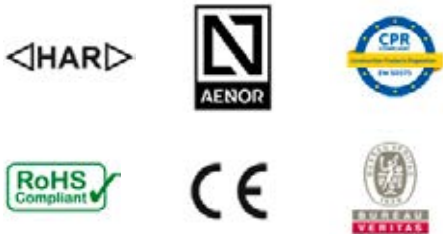
According to
EN 50525-3-31 / UNE 211002



Standards and approvals
HAR / AENOR / BUREAU VERITAS / RoHS / CE



CPR (Construction Products Regulation)
B2_{ca}-s1a, d1, a1



DATALAN® FO

Dielectric Monotube Cable (up to 24 FO)



APPLICATION

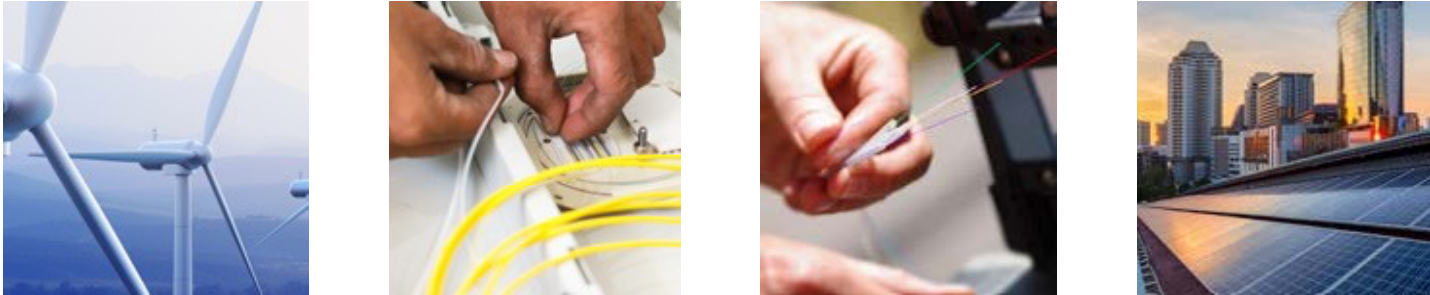
Dielectric cable (Up to 24 FO). Universal (Indoor / Outdoor). The cable is compact, lightweight, flexible, tough, resistant, totally dielectric, watertight, with reduced diameter and rodent protected.

CONSTRUCTION

- Fiber Optics.
- Central Tube (Jelly filled).
- Fiberglass Reinforcements - Water Blocking.
- Ripcord.
- Outer sheath, black colour.

Fibers color up to 12: Red - Green - Blue - Yellow - Grey - Violet - Brown - Orange - White - Pink - Black - Turquoise.

Fibers color >12: same color with black ring.
Loose tube color: White.



DATALAN® FO

Metallic Monotube Cable (up to 12 FO)



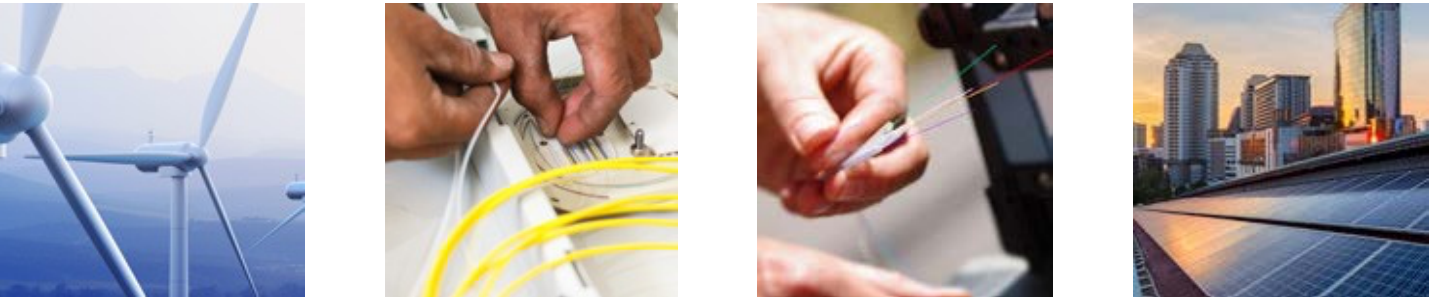
APPLICATION

Metallic cable (Up to 12 FO). Universal (Indoor / Outdoor). The cable is compact, lightweight, flexible, tough, resistant, totally dielectric, watertight, with reduced diameter and rodent protected.

CONSTRUCTION

- Fiber Optics.
- Central Tube (Jelly filled).
- Fiberglass Reinforcements - Water Blocking.
- Corrugated steel tape.
- Outer sheath, black colour.

Fibers color up to 12: Red - Green - Blue - Yellow - Grey - Violet - Brown - Orange - White - Pink - Black - Turquoise.



Cables for floating PV Farms

Floating solar arrays are gaining popularity all over the world. They are the perfect pairing to existing hydropower infrastructures: addressing the intermittent nature of the sun or helping when water availability is running low.

Floating PV plants are likely to be installed on locations such as industrial water ponds, mine lakes, irrigation/ desalination reservoirs, dams, canals, retentions ponds, etc.

Cables on a floating PV plant:



Withstand **severe environmental conditions** (corrosion, weather, cold environments).



Must be **waterproof** (AD8 - permanently).



Must be **extremely flexible**, mechanically strong, as well as torsion and abrasion-resistant.



Shall **not spread toxic chemicals** when in contact with water.



Must be **UV and ozone resistant**.

For these reasons, rubber cables are the best choice on a floating PV plant.

Rooftop PV installations

Rooftop PV systems provide a clean and increasingly affordable option for building owners and occupants to produce their electricity. For this reason, Rooftop Solar installation market is growing exponentially on a global scale. This trend is expected to continue going forward in the coming years, as building designers and engineers are considering solar rooftop installations more frequently on new buildings.

The choice of a solar cable does not only depend on whether it is manufactured according to standards. Manufacturing according to standards does not mean using the right materials, nor does it mean that the cable will afterwards fulfil the purpose for which it was intended.

Out of the 28 pages of the reference solar standard EN 50618 (excluding index), 12 are for tests and trials to be carried out on the cable. Certifying a cable not only implies manufacturing according to a standard but also that an external certifying body carries out all these tests so that it can control the quality of the final product manufactured and ensure its functionality.

Also, a **CPR certificate** is required for local **buildings** and in most cases, not only an E_{ca} declaration type is the one allowed to get legal permission to connect the solar modules to the distribution panels.



Top Cable, an **international manufacturer** of industrial and power cables

Top Cable is a recognized manufacturer of electric cables, always meeting the highest expectations that contractors, developers, grid operators, panel manufacturers and integrators demand when designing a solar installation. The company has supplied cables to worldwide solar installations from residential installations to large scale rooftops, floating solar projects or ground farms.

All Top Cable's manufacturing plants are based around Barcelona, Spain. The organization is a medium-sized, family-owned company manufacturing electric cables on an international scale, with offices and warehouses located around the globe. Therefore, we guarantee customer proximity on a global level.

Customers around the world appreciate Top Cable as a technically leading manufacturer of solar cables of outstanding quality. Customers receive their solar deliveries on schedule from the company's main logistics centre located in Barcelona.

Large PV cable stocks are available there to ensure short lead times and shipment flexibility. Top Cable also manages several solar cable stocks across their worldwide offices and warehouses to avoid out-of-stock situations in the supply chain.

Our PV cables are TÜV certified, meeting the most stringent solar specifications. Check other National Electric Code requirements and PV certificates with your Top Cable technical sales expert.



Innovation

Our R&D Centre and laboratories were established to provide research work and to enable us to constantly provide high-performance cables that are suited for multiple applications in various industries.

Being conscious of the importance of optimal costing, Top Cable has opted for the integration of our processes, through focusing each of our production centres into a specialized production unit, while coordinating with one another to optimize common resources.

Our technical staff are professionally trained and assure the highest quality in the cable production process.



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Top Cable | Solar Cables

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