

Let it shine.

On land or floating at sea, we have all the cables that'll bring sunshine to societies.





Connecting
the world.

Today and in
the future.

Prysmian – the world leader in the energy and telecom cables and systems industry.

With 140 years' experience, Prysmian is strongly positioned in high-tech markets and offers the widest possible range of products, services, technologies and know-how.

140
YEARS OF
EXPERIENCE

25
R&D CENTRES
AROUND
THE WORLD



We specialise in underground and submarine cables and systems for power transmission and distribution, special cables for applications in many different industries, and medium and low voltage cables for the construction and infrastructure sectors.



For the telecommunications industry, Prysmian is the world's largest provider of cutting-edge cables and accessories for voice, video and data transmission, offering a comprehensive range of optical fibres, optical and copper cables and connectivity systems.



We are committed to environmental responsibility in our production processes, the protection of the global environment, and the responsible management of relations with the local communities in which we work.



For us, innovation means meeting the needs of our customers and communities by understanding their business drivers as quickly as they do. To do that, our team of over 900 Research & Development professionals is constantly looking to the future, predicting and identifying emerging trends in each of our industries and sectors. Acting on this intelligence from 25 R&D centres around the world, we're constantly close to our customers in their own local markets.


Solar Photovoltaic Cables

To meet an ever-growing need for power, the world is increasingly turning to renewable and sustainably sourced solar energy. Prysmian's cables are helping businesses in the renewable industry around the globe to convert this opportunity into reality. Our technologies – which cover cables used in photovoltaic plants – support the operations of contractors and developers, grid operators, transmission and distribution system operators and panel makers. Always aware of our responsibility to the planet, we are constantly driving innovation in our industry, aiming to help renewable industry partners deliver projects with benefits for the future of both our world and their businesses.

The choice of components is critical in any PV system. Good quality and properly sized cables provide optimized safety and longer-lasting systems.

Solar PV cables are often exposed to harsh environmental conditions: UV radiation, moisture, temperature fluctuations as well as wind, snow and rain. Inadequate or low-quality cables can deteriorate quickly, thus reducing a system's power generation capacity and, therefore, its revenues. Every KW lost in generation due to poor quality cables is a loss in terms of return on investment.

Cables are one of the first components of a system to show failures, causing power generation disruptions and implying high replacement costs related not only to the replacement of cables, but also, and mostly, to the works required and the possible collateral damages to panels or other components.



We have all the photovoltaic cables that you might need.

On land or floating at sea, with our cables you can bring sustainable sun power all the way from the solar panels, through the distribution grids and into the many homes and offices. Our one-stop-shop-strategy supports you with all that you need to feed societies with renewable energy. Let the sunshine in.

What we offer.

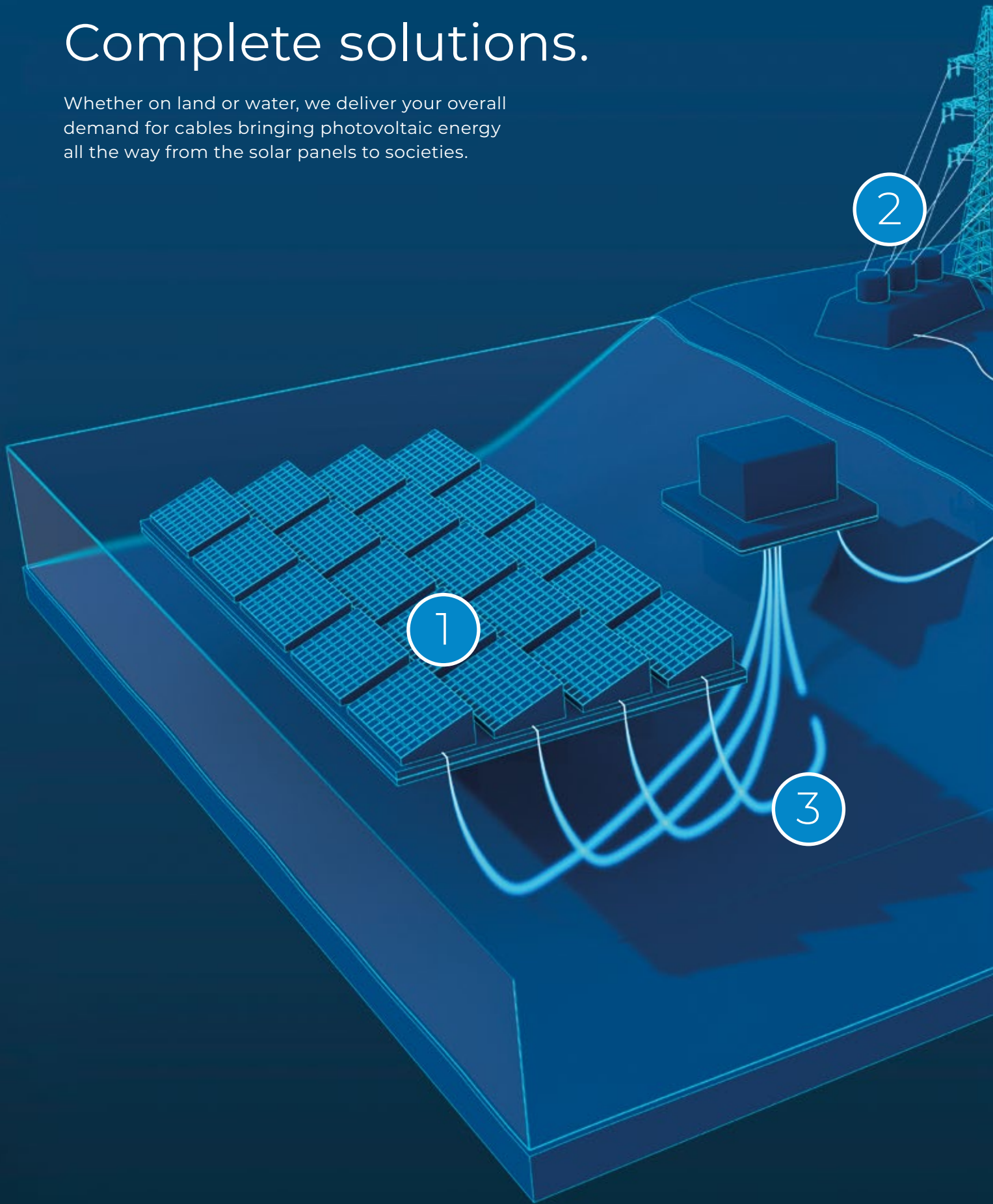
Prysmian offers complete cable solutions to enable the production and supply of solar photovoltaic power. In addition to the Solar PV cables, our cable portfolio includes low, medium and high voltage cables according to the most known standards of each region, as well as special cables for communication and control. In addition to cables, Prysmian offers electrical asset management solutions with PRY-CAM, the revolutionary technology for on-line, accurate and reliable partial discharge measurements, diagnosis and defect localization.

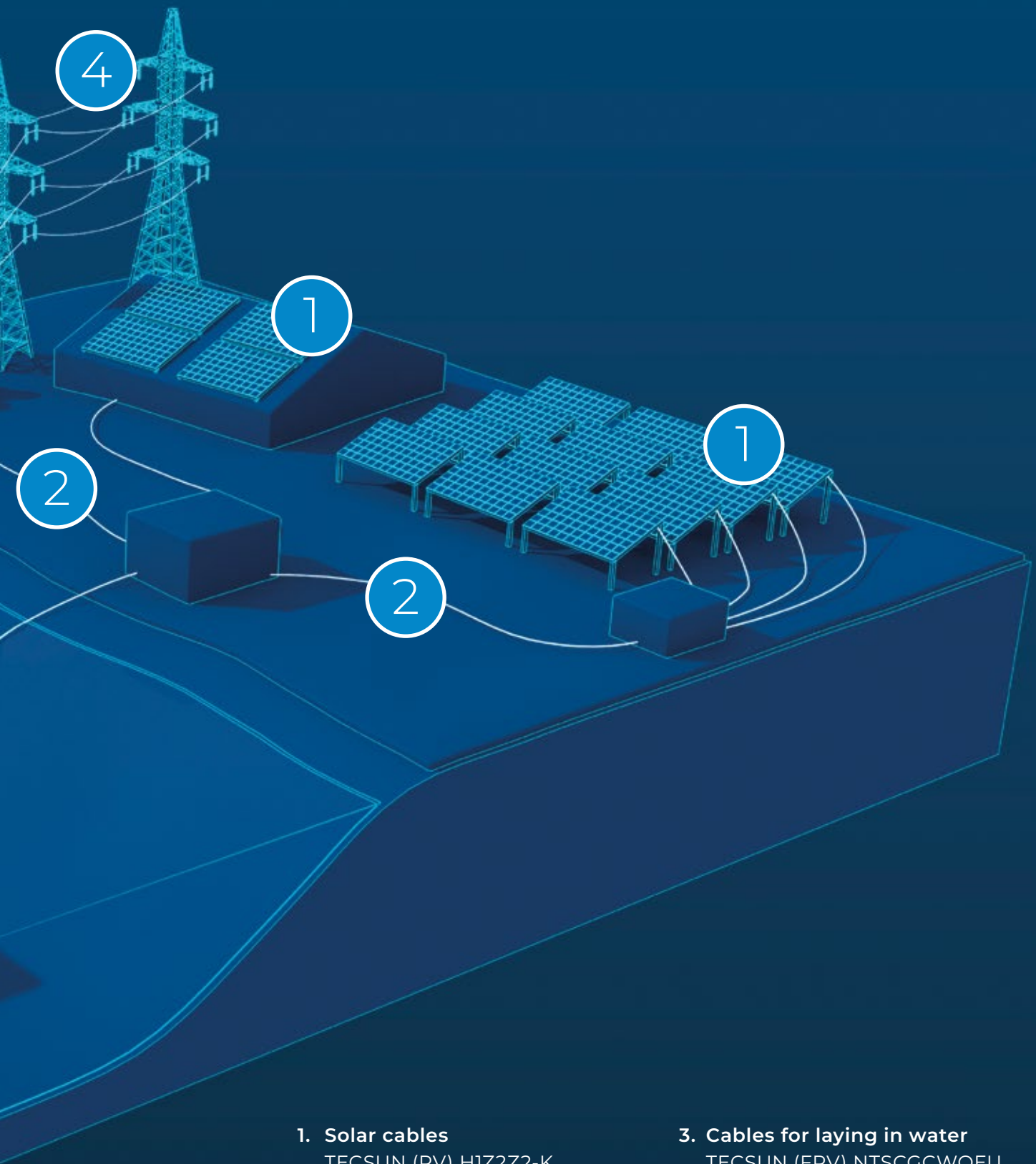
Global group, local force.

Prysmian is world leader in the energy and telecommunications cable systems industry. No matter how large, we are always present to serve both our global and our local customers and business partners. In order to offer bespoke and tailor-made solutions, we appreciate the importance of understanding local pre-conditions and special needs. This is why we believe that it is crucial to be present within local geographies, while being backed-up by the capacity that only a truly global group possesses.

Complete solutions.

Whether on land or water, we deliver your overall demand for cables bringing photovoltaic energy all the way from the solar panels to societies.





1. Solar cables

TECSUN (PV) H1Z2Z2-K
 TECSUN URBAN H1Z2Z2-K
 TECSUN (PV) S3Z2Z2-K
 TECSUN (PV) ALU

2. Energy cables

Low voltage
 Medium voltage
 High voltage
 Extra-high voltage
 Accessories and components

3. Cables for laying in water

TECSUN (FPV) NTSCGCWOEU
 TECSUN (FPV) (N)TMCGCWOEU
 Hydrofirm
 TML
 Ozoflex
 Tecwater

4. Overhead Lines

One-stop shop.

We have a vast and unabridged photovoltaic cable offer that can be tailor-made to fit specific customer needs.

Solar cables

Reflecting our commitment to both innovation and sustainability, we offer a full range of quality photovoltaic products, renowned in the field for their easy installation, reliability and longevity attributes and complying with all major international standards.

Our technologies are hard at work across the renewables sector, supporting the operations of contractors, developers, grid operators, PV panel makers, PV power generation system integrators and even entire solar parks.



Water cables

To bring the electricity from water based solar farms to mainland, you need waterproof cables that can resist heavy seas. We offer a complete range of high performance and reliable solutions that ensure a long lifetime, compliance with the demanding off-shore environment. The reliability and service life of our submersible cables are thanks to our extensive know-how of the special operational conditions, gained from decades of close cooperation with significant manufacturers within both the submerged pumps and photovoltaic industries.



Energy cables

Prysmian supports grid operators and utilities, industrial companies, and installers transmit and distribute renewable energy all over the world.

We design, produce and install high and extra high voltage underground and submarine cable systems, providing network components, value added engineering as well as monitoring and maintenance systems and services. We similarly design and produce low and medium voltage cables for use in distribution networks.



A buried treasure.

TECSUN – flawless since 2003 and suitable for direct burial.

TECSUN® features



VDE certified

Only photovoltaic DC cable on the market according to EN 50618 with both VDE and TÜV certification.



Designed for DC application

Adheres to standard for DC application of PV single-core cables according to IEC 62930.



Water resistant

High resistance against water penetration. Suitable for permanent submersion in fresh (AD8) water.



Direct burial

Since 2003 TECSUN has been suitable for direct burial in soil in the presence of water and aggressive earth conditions.



Expected lifetime

Operational lifetime of 300,000 hours corresponding to approximately 30 years.



Red and blue outer sheath

The red and blue cable versions have the same UV resistance and non-discolouration over time as the black version.



Additional tests

In addition to standard tests required acc. to EN 50618, TECSUN has been tested for further 17 properties to document its superior performance.



The TECSUN World Tour.

Did you know that already today there is 2 000 000 000 meters of TECSUN cables installed in the world! If you laid it all in one line, the cables would reach about 50 times around Earth.

Here are some examples where TECSUN was installed during the last four years:

Angola	400 MW	Netherlands	2,750 MW
Chile	650 MW	Poland	2,350 MW
Egypt	600 MW	Portugal	1,250 MW
Germany	8,900 MW	Spain	5,750 MW
Japan	400 MW	Ukraine	400 MW
Kazakhstan	300 MW	And the World Tour	
Mexico	470 MW	continues ...	

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TECSUN (PV) H1Z2Z2-K 1/1 kV AC (1.5/1.5 kV DC)



PV cables, rubber insulated, VDE and TÜV certified as per EN 50618.

Application

PRYSMIAN Solar cables TECSUN (PV) H1Z2Z2-K acc. to EN 50618, are intended for use in Photovoltaic Power Supply Systems at nominal voltage rate of 1.5/1.5 kV DC. They are suitable for applications indoor and/or outdoor, in industrial and agriculture areas, in/at equipment with protective insulation (Protecting Class II), in explosion hazard areas (PRYSMIAN Internal Testing). They may be installed fixed, freely suspended or free movable, in cable trays, conduits, on and in walls.

Prysmian's additional internal tests are carried out at regular intervals – including the type tests according to EN 50618 – in our own test laboratories and confirm the outstanding properties of the TECSUN (PV) H1Z2Z2-K.

In addition, we guarantee consistent quality for 20 years with the world's only VDE-certified solar cable.

TECSUN (PV) H1Z2Z2-K cables are suitable for direct burial (PRYSMIAN Internal Testing and successful installation in PV plants worldwide), where the corresponding guidelines for direct burial shall be considered.

TECSUN (PV) H1Z2Z2-K	
Brand	TECSUN (PV)
Type designation	H1Z2Z2-K
Standard	EN 50618 IEC 62930
Certifications / Approvals	VDE Approval Mark (<VDE>) TÜV-Rheinland Certificate no. 60103637
Construction product regulation (CPR)	CPR acc. to DIN EN 50575, class and DoP-Code: see data table. DoP: see www.prysmiangroup.com/cpr
Electrical tests, PRYSMIAN internal test	AD8 (acc. to UL44 sec. 5.4 (>92 weeks)) Dielectric strength Insulation resistance at 120 °C in air
Weather resistance, PRYSMIAN internal test	Water Absorption (Gravimetric) per EN 60811-402. AD8 (acc. to EN 50525-2-21 appendix E)
Abrasion resistance, PRYSMIAN internal testing	Acc. to DIN ISO 4649 against abrasive paper Sheath against sheath Sheath against metal Sheath against plastics
Rodent resistance	Safety can be optimized by utilizing protective hoses, or protective element, such as a metallic screen braid.



Link Web catalogue:
https://de-catalogue.prysmiangroup.com/s/#/family/TECSUN_H1Z2Z2-K_1-1KV

TECSUN (PV) H1Z2Z2-K													
Number of cores x cross section	Colour	Part number	Conductor diameter max. mm	Outer diameter mm		Bending radius fixed min. mm	Weight (approx.) kg/km	Permissible tensile force max. N	Conductor resistance at 20 °C max. Ω/km	Current carrying capacity for single cable*1 A		Short circuit current*2 kA	CPR fire class
				min.	max.					free in air	on surface		
1x4	black	20149014	2.4	5.3	5.9	18	61	60	5.09	55	52	0.57	D _{ca} -s2,d2
1x6	black	20149015	2.9	5.8	6.5	20	80	90	3.39	70	67	0.86	D _{ca} -s2,d2

*1 60 °C ambient temp. *2 1 s. from 90 °C to 250 °C.

Standard delivery length is 500 m. Other lengths are available on request. All cross sections are also available in red and blue colours.

Note: If required, TECSUN (PV) H1Z2Z2-K cables are also available in other cross sections and also with customized surface marking.

TECSUN URBAN H1Z2Z2-K 1/1 kV AC (1.5/1.5 kV DC)



PV cables, TÜV certified as per EN 50618.

Application

The new TECSUN Urban is an UV-resistant, halogen free solar cable, suitable for outdoor use. With its class 5 conductor, the cable offers excellent flexibility even in cold conditions. The TECSUN Urban is an excellent choice for rooftop installations. An eco-friendly and 3rd party approved solution for residential, industrial and commercial areas.



TECSUN URBAN H1Z2Z2-K	
Brand	TECSUN URBAN
Type designation	H1Z2Z2-K
Standard	EN 50618
Conductor	Tinned copper, finely stranded class 5 in accordance with IEC 60228
Insulation	Halogen free, heat resistant, cross-linked special compound
Outer sheath	Halogen free, heat resistant, cross-linked special compound
Outer sheath colour	Black and red
Water resistance, PRYSMIAN internal test	AD8 (DC stability and insulation resistance test)



Link Web catalogue:
https://hu-catalogue.prysmiangroup.com/s/#/family/TECSUN_URBAN_H1Z2Z2-K_CPR_E

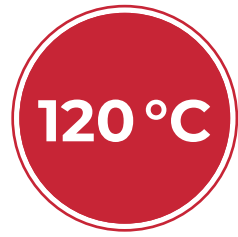
TECSUN URBAN H1Z2Z2-K											
Number of cores x cross section	Colour	Part number	Conductor diameter max. mm	Outer diameter max. mm	Bending radius fixed min. mm	Weight (approx.) kg/km	Conductor resistance at 20 °C max. Ω/km	Current carrying capacity for single cable*1		Short circuit current*2 kA	CPR fire class
								free in air	on surface		
1x4	black	20432556	2.4	5.9	22.8	55.9	5.09	55	52	0.57	E _{ca}
1x4	red	20432567	2.4	5.9	22.8	55.9	5.09	55	52	0.57	E _{ca}
1x6	black	20432569	2.9	6.5	24.8	75.1	3.39	70	67	0.86	E _{ca}
1x6	red	20432570	2.9	6.5	24.8	75.1	3.39	70	67	0.86	E _{ca}
1x10	black	20432642	4	7.6	28.4	116	1.95	98	95	1.43	E _{ca}
1x10	red	20432634	4	7.6	28.4	116	1.95	98	95	1.43	E _{ca}

*1 60 °C ambient temp. *2 1 s. from 90 °C to 250 °C.

Delivery lengths are available in 100 m rings or 500 m bobbins.

Note: If required, TECSUN Urban H1Z2Z2-K cables are also available in other cross sections and also with customized surface marking.

TECSUN (PV) S3Z2Z2-K 1.8/3 kV AC



Heat resistant cables, rubber insulated, for inverter-trafo interconnection.

Application

Halogen free single core cables, sheathed, for junction boxes and inverters, with improved fire performance, increased heat resistance and suitable for direct burial. These cables are intended for use in photovoltaic power supply systems, at nominal voltage rate of 1.8/3 kV AC, as interconnection between central inverter and transformer station.

Can be used indoor, outdoor, in explosion hazard areas, in industry and agriculture and are suitable for applications in/at equipment with protective insulation (protecting class II). To be considered as short and ground fault protection.

Also usable for unfused connections in switchgear and distribution boards up to 1000 V (DIN VDE 0100-520 and DIN VDE 0660-500) and in accumulator circuits (DIN 5510 part 5).

TECSUN (PV) cables are suitable for direct burial in ground (PRYSMIAN internal testing). The installation guidelines shall be taken in consideration.

TECSUN (PV) S3Z2Z2-K	
Brand	TECSUN (PV)
Type designation	S3Z2Z2-K
Standard	Based on DIN EN 50618
Conductor	Tinned copper, finely stranded class 5 in accordance with IEC 60228
Insulation	Halogen free, heat resistant, cross-linked elastomeric special compound, requirements based on DIN EN 50618 and DIN VDE 0250-606
Outer sheath	Halogen free, heat resistant, cross-linked elastomeric special compound, requirements based on DIN EN 50618 and DIN VDE 0250-606
Outer sheath colour	Black
Rated voltage	1.8/3 kV
Max. permissible operating voltage	AC: 2.1/3.6 kV DC: 2.7/5.4 kV
Test voltage	AC: 6.5 kV (5 min.)
Current carrying capacity description	According to DIN VDE 0298-4
Max. operating temperature of the conductor	Rec. operating temp.: 90 °C Max. permissible operating temp.: 120 °C, for max. 20.000 hours
Max. short circuit temperature of the conductor	250 °C
Ambient temperature for fixed installation	-40 °C up to 90 °C
Ambient temperature in fully flexible operation	-40 °C up to 90 °C
Rodent resistance	Safety can be optimized by utilizing protective hoses, or protective element, such as a metallic screen braid.



Link Web catalogue:
<https://de-catalogue.prysmiangroup.com/s/#/category/a1q3Y000006bUvhQAE/subcategory/a1q3Y000006bUwDQAU>

TECSUN (FPV) NTSCGCW0EU 12/20 kV



Medium voltage flexible cables for the shore connection of Floating PV docks.

Application

Power supply cable for use in water, e.g. for the shore connection of floating docks, where high mechanical stresses are to be expected.

Suitable for use in drinking, sewage, salt and brackish water at water depths of up to 500 m.

These cables are designed to meet the requirements of the AD8 classification.

TECSUN (FPV) NTSCGCW0EU	
Brand	TECSUN(FPV)
Model	Single core
Standard	Based on DIN VDE 0250-813
Maximum submersing depth	500 meters
Conductor	Electrolytic copper, not tinned, very finely stranded (class 5)
Insulation	EPR, Compound type: Special compound, 3GI3
Electrical field control	Inner and outer layer of semi-conductive rubber compound
Outer sheath	Basic material: Special synthetic elastomer compound, colour: red
Water resistance	Meets AD8 classification
Max. operating temperature of the conductor	90°C
Ambient temperature for fixed installation min.	-40°C



Link Web catalogue:
[https://de-catalogue.prysmiangroup.com/s/#/family/TECSUN_\(FPV\)_NTSCGCW0EU_12-20KV](https://de-catalogue.prysmiangroup.com/s/#/family/TECSUN_(FPV)_NTSCGCW0EU_12-20KV)

TECSUN (FPV) (N)TMCGCW0EU 12/20 kV



Medium voltage flexible cables for semiflexible installation e.g. for the use on Floating PV docks.

Application

Power supply cable for use on Floating PV docks e.g. for the interconnection of inverters.

Suitable for use in drinking, sewage, salt and brackish water at water depths of up to 500 m.

These cables are designed to meet the requirements of the AD8 classification.

TECSUN (FPV) (N)TMCGCW0EU	
Brand	TECSUN(FPV)
Model	Single core
Standard	Based on DIN VDE 0250-813
Maximum submersing depth	500 meters
Conductor	Electrolytic copper, not tinned, very finely stranded (class 5)
Insulation	EPR, Compound type: Special compound, 3GI3
Electrical field control	Inner and outer layer of semi-conductive rubber compound
Outer sheath	Basic material: Special synthetic elastomer compound, colour: red
Water resistance	Meets AD8 classification
Max. operating temperature of the conductor	90°C
Ambient temperature for fixed installation min.	-40°C



Link Web catalogue:
[https://de-catalogue.prysmiangroup.com/s/#/family/TECSUN_\(FPV\)_N\)TMCGCW0EU_12-20KV](https://de-catalogue.prysmiangroup.com/s/#/family/TECSUN_(FPV)_N)TMCGCW0EU_12-20KV)

HYDROFIRM(T) S1BB-F 0.6/1 kV



These cables are suitable for connections of electrical equipment, submerged in water under medium mechanical stress.

Application

Likewise for indoor, outdoor, industrial and agricultural applications, e.g. Floating PV docks. For protected fixed installation in pipes, equipment, as rotor connections to motors or in well systems.

Suitable for use in drinking, sewage, salt and brackish water at depths of up to 2000 m.

These cables are designed to meet the requirements of the AD8 classification.

HYDROFIRM(T) S1BB-F	
Brand	HYDROFIRM(T)
Type designation	S1BB-F
Standard	Based on DIN EN 50525-2-21
Maximum submersing depth	2000 meters
Conductor	Bare copper, finely stranded (class 5)
Insulation	HEPR rubber, special compound
Outer sheath	Special synthetic elastomer rubber
Outer sheath colour	Blue
Max. operating temperature of the conductor	90 °C
Ambient temperature for fixed installation	-50 °C
Water resistance	AD8 classification



Link Web catalogue:
[https://de-catalogue.prysmiangroup.com/s/#/family/HYDROFIRM\(T\)_S1BB-F_0,6-1KV](https://de-catalogue.prysmiangroup.com/s/#/family/HYDROFIRM(T)_S1BB-F_0,6-1KV)

SUNCONNECT (N)A2XY-J/O 1.8/3 kV AC | 1.5 (1.8) kV DC



Application

SUNCONNECT is a new brand of cables, manufactured by Prysmian, designed for their use in PV solar plants. Typically, the maximum voltage of the PV systems is either 600V, for residential systems, or 1000 V (or 1500 V), for utility-scale systems

SUNCONNECT are power cables with aluminium conductors, XLPE insulation and PVC outer sheath, designed for 1.8/3(3.6) kV AC | 1.5/1.5(1.8) kV DC. They are for fixed indoor / outdoor electrical installations, laying in ground, in open air, in concrete, in cable ducts, and in water, where mechanical protection is not required during installation and operation, and where the PVC outer sheath is not attacked by corrosive agents. In case of corrosive ground, extra protection for the cables is requested.

Features

- Designed for AC | DC applications
- High dielectric strength given by cross-linked polyethylene insulation
- Lead-free materials
- Flame-retardant according to IEC 60332-1 series of standards
- Withstand high temperatures and UV-exposure
- Work with the new smart inverters & related external equipment, and withstand the reverse potential applied during night-time to the panels (see PID, Chapter 6).

SUNCONNECT (N)A2XY-J/O	
Brand	SUNCONNECT
Type description	(N)A2XY-J/O
Standard	IEC 60502-1
Conductor	Aluminium
Insulation	Cross-linked polyethylene (XLPE)
Rated voltage	1.8/3 kV AC 1.5/1.5 kV DC
Max. permissible operating voltages	AC: 3.6 kV DC: 1.8 kV
Water resistance	Meets AD8 classification
Max. operating temperature	90°C
Min. laying temperature	-5°C
Short circuit temperature	250°C



Link Web catalogue:
<https://ro-catalogue.prysmiangroup.com/s/#/category/a1q7S000000IhviQAC/subcategory/a1q7S000000IhvnQAC>

PROTODUR NYY-O/-J 0.6/1 kV



Distribution, connecting and installation cable. The laying can be in earth, in tube, free in air, indoors, in concrete and in water. It is also UV-resistant and flame retardant.

PROTODUR NYY-O/-J 0.6/1 kV	
Brand	PROTODUR
Type designation	NYY
Standard	DIN VDE 0276-603, IEC 60502-1
Conductor	Bare copper
Insulation	Polyvinyl chloride (PVC)
Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage	AC: 1.2 kV DC: 1.8 kV
Laying temperature min.	-5 °C
Max. operating temperature	70 °C
Short circuit temperature	160 °C ≤ 300 mm ² 140 °C ≥ 300 mm ²

PROTODUR NAYY-O/-J 0.6/1 kV



Distribution cable. The laying is possible directly in ground, in tubes, free in air, indoors, in concrete and in water. It is lead-free, UV-resistant and flame retardant.

PROTODUR NAYY-O/-J 0.6/1 kV	
Brand	PROTODUR
Type designation	NAYY
Standard	DIN VDE 0276-603, IEC 60502-1
Conductor	Aluminium
Insulation	Polyvinyl chloride (PVC)
Rated voltage	0.6/1 kV (600/1000V)
Max. permissible operating voltage	AC: 1.2 kV DC: 1.8 kV
Laying temperature min.	-5 °C
Max. operating temperature	70 °C
Short circuit temperature	160 °C ≤ 300 mm ² 140 °C ≥ 300 mm ²

PROTOTHEN X NA2XY



Distribution and interconnection cable for industry and power generation networks. Laying: in ground, in tubes, free in air, indoors and in water. UV-resistant.

PROTOTHEN X NA2XY	
Brand	PROTOTHEN-X
Type designation	NA2XY
Standard	DIN VDE 0276-603, IEC 60502-1
Conductor	Aluminium
Insulation	Cross-linked polyethylene (XLPE)
Rated voltage	0.6/1 (1.2) kV
Max. permissible operating voltage AC	-
Laying temperature min.	-5 °C
Max. operating temperature	90 °C
Short circuit temperature	250 °C

PROTOTHEN X NA2XS(F)2Y



Distribution cable. Suitable to be laid direct burial, in ducts, in water, outdoor above ground and indoor. The ingress of water in case of a damaged outer sheath is limited by the longitudinal watertight screen area.

PROTOTHEN X NA2XS(F)2Y			
Brand	PROTOTHEN-X		
Type designation	NA2XS(F)2Y		
Standard	DIN VDE 0276-620		
Conductor	Aluminium		
Insulation	Cross-linked polyethylene (XLPE)		
Rated voltage	6/10 kV	12/20 kV	18/30 kV
Max. permissible operating voltage AC	12 kV	24 kV	36 kV
Laying temperature min.	-20 °C		
Max. operating temperature	90 °C		
Short circuit temperature	250 °C		

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Electrical parameters

Properties of TECSUN (PV) H1Z2Z2-K acc. to DIN EN 50618.

Voltage rating

Voltage rating				
Rated voltage DC U_0/U	Rated voltage AC U_0/U	Max. permissible operating voltage DC U_0/U	Max. permissible operating voltage AC U_0/U	Test voltage
1.5/1.5 kV	1.0/1.0 kV	1.8/1.8 kV	1.2/1.2 kV	AC: 6.5 kV (5 min.) DC: 15 kV (5 min.)

Current carrying capacity

The current carrying capacity values (in ampere) for each installation method at an ambient temperature of 60 °C are according to EN 50618, table A3.

Current carrying capacity			
Number of cores x nominal cross section	Single cable free in air	Single cable on surface	Two loaded cables touching, on a surface
1 x 1.5	30	29	24
1 x 2.5	41	39	33
1 x 4	55	52	44
1 x 6	70	67	57
1 x 10	98	93	79
1 x 16	132	125	107
1 x 25	176	167	142
1 x 35	218	207	176
1 x 50	276	262	221
1 x 70	347	330	278
1 x 95	416	395	333
1 x 120	488	464	390
1 x 150	566	538	453
1 x 185	644	612	515
1 x 240	775	736	620

De-rating factors

De-rating factors are used to properly calculate the current carrying capacity, taking into account the installation and operating conditions. In case of use at an ambient temperature greater than 60 °C, please consider the de-rating factors indicated in EN 50618, table A4. For installation in groups, the de-rating factors from HD60364-5-52 shall apply.

De-rating factors	
Ambient temperature (°C)	Reduction factor
Up to 60	1.00
70	0.92
80	0.84
90	0.75

Long-term immersion in water

TECSUN (PV) cables are tested for minimum 10 days completely immersed in water at 85 °C, with 1.8 kV DC voltage applied.



Mechanical parameters

Properties of TECSUN (PV) H1Z2Z2-K acc. to DIN EN 50618.

Tensile load

The maximum tensile load on the TECSUN (PV) cables is equal to 15 N/mm² in operation and 50 N/mm² only during installation, according to HD 516, DIN VDE 0298-3 and DIN VDE 0298-300.

Bending radius

The minimum bending radius is indicated as the product of the overall diameter of the finished cable (D) and a factor (i.e. 3 x D). For TECSUN (PV) the minimum bending radius according to EN 50565-1, is 3 x D (for D ≤ 12 mm) or 4 x D (for D > 12 mm). Smaller bending radii than permitted can cause a reduced service lifetime.

Mechanical characteristics of insulation and sheathing materials

The properties of the materials (tensile strength and elongation at break) are tested before and after ageing. Hot-Set test and thermal endurance test are performed in addition.

Abrasion resistance

TECSUN (PV) cables are tested against several abrasive materials:

- Sheath against abrasive paper
- Sheath against sheath
- Sheath against metal
- Sheath against plastics

Additional tests

- Shrinkage test
- Pressure test at high temperature
- Dynamic penetration test
- Durability of print
- Shore-hardness



Tensile testing equipment.



Test against abrasive paper.



Test cage:
Sheath against metal/plastic.

Thermal parameters

Properties of TECSUN (PV) H1Z2Z2-K acc. to DIN EN 50618.

Maximum temperature of the conductor during operation

TECSUN (PV) cables are designed to operate at 90 °C for a total lifetime equal to 30 years, according to Arrhenius-Diagram (EN 50618 requires a minimum of 25 years).

For a maximum of 20,000 hours (= 2.3 years) the cables can operate at a maximum conductor temperature of 120 °C.

Maximum temperature of the conductor during short circuit

The maximum permitted short-circuit temperature is 250 °C, for a duration of 5 seconds.

Ambient temperature

The temperature range on the surface of the cable during operation is from -40 °C to +90 °C. During installation and handling, the range is from -25 °C to +60 °C.

Resistance to cold

The following tests are performed on TECSUN (PV) cables:

- Cold impact at -40 °C
- Cold bending at -40 °C
- Cold elongation at -40 °C

Damp heat test

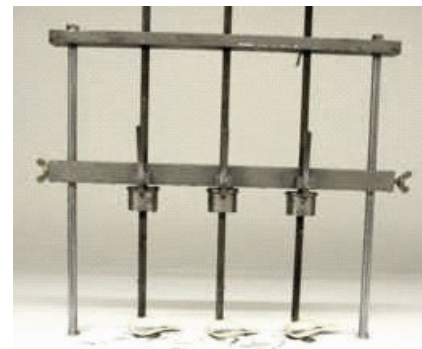
Mechanical properties of the materials are tested after a 1000 hours conditioning at +90 °C and 85 % relative humidity.



Test chamber (temperature range from -70 °C to +80 °C).



Test equipment for cold impact test.



Test equipment for cold bending.

Chemical parameters

Properties of TECSUN (PV) H1Z2Z2-K acc. to DIN EN 50618.

Behaviour against fire

TECSUN (PV) cables are tested for flame propagation on single cable according to EN 60332-1-2 and on multiple cables according to EN 50305-9.

The smoke evolution is tested according to EN 61034-2, with Light transmittance > 70 %.

The cables are halogen free according to EN 50525-1 - Annex B, and with a toxicity index < 3 (per EN 50305).

Oil resistance

In addition to the normative requirements, sheathing material is tested for 24 hours immersion in oil at 100 °C.

Weather resistance

External agents related to weather conditions (such as UV radiations, ozone and water) can degrade the rubber materials, causing a reduction of the performances of the cables.

Therefore TECSUN (PV) cables are tested in order to ensure:

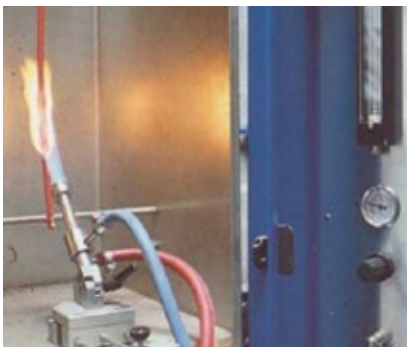
- Ozone resistance: complete cable has no cracks after 72 hours at 40 °C, with 55 % relative humidity and 2 ppm of ozone concentration
- UV resistance: tensile strength and elongation at break are measured after a conditioning of 720 hours (360 cycles) exposed to UV light.

Acid and alkaline resistance

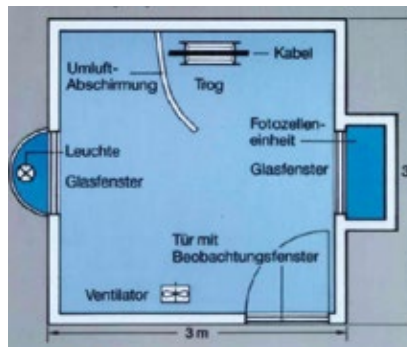
Resistance of the sheathing material against a 23 °C acid (N-Oxalic Acid) and alkaline solution (N-Sodium Hydroxide) is tested for 7 days.

Ammonia resistance

In addition to the normative requirements, TECSUN (PV) is tested for 30 days in saturated ammonia atmosphere.



Propagation of vertical flame on complete single cable (acc. to EN 60332-1-2).



Test chamber for evaluation of smoke evolution.



Test chamber for UV test.



Equipment for measuring light conductivity and pH-value (halogen free).



Test equipment for measuring corrosivity of gases (halogen free).



Test chamber for ozone test.

Environmental conditions simulator

A weather chamber is a reliable instrument that artificially replicates the environmental conditions a solar PV cable may be exposed to.



Ultra-violet (UV) exposure at 900–1000 nm UV

The insulation and outer sheath of cables used outdoors is well known to be prone to rapid degradation by ultra-violet exposure.

Heat up to 90 °C

Elevated temperature cause deterioration due to irreversible changes in chemical structure of insulation and sheath materials which lead to degradation of mechanical and electrical properties, and thus shortening of cable service life.

Humidity between 60–80%

During their operating service, solar cables can be exposed to wet environment. The presence of moisture in cables surroundings leads to eventual degradation of materials used and may affect properties and reliability of solar cables.

Ozone at 0.04 ppm

Solar cables are exposed to ozone effects and other atmospheric influences. Light and oxygen penetrate the molecular chains of cable jacket causing them to split. This results in the formation of highly reactive radicals which continue to attach molecular structures.

The weather chamber test highlights the most common faults in a photovoltaic cable such as:

- **Discolouration**
Areas loose UV and ozone resistancy
- **Cable shrinkage**
Connectors become loosely attached
- **Outer sheath cracks**
Humidity penetrates to insulation and cable conductor
- **Gap between sheath and insulation**
Humidity spreads longitudinally inside the cable and to connected equipment



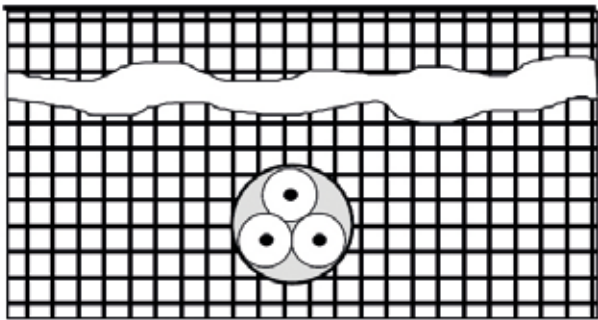
In 15–20 minutes, our weather simulator demonstrates how different PV cables handle 15–20 years of workload in real life.

Installation instruction

TECSUN (PV) – for direct burial in ground.

The following instructions, in reference to VDE 0800-174 and VDE 0891-6, are intended to guide the direct burial in ground of TECSUN (PV) cables for photovoltaic application. These cables, as a matter of fact, cannot be installed under any given ground condition and the characteristics of the soil and few protection measures should be considered, in order to prevent damages to the cable and thus to guarantee a long life-time in service.

TECSUN (PV) cables shall not be used as power distribution connections for general supply of electrical appliances or consumers. The direct burial of TECSUN (PV) applies only to the use in PV systems.



General

- When a cable has to be buried directly in the ground, the soil conditions shall be carefully considered.
- In case of corrosive ground, extra protection for the cable is then requested and the cable supplier should be consulted.
- For each cable directly buried in the ground, an identification thread should be laid (acc. to EN 12613).
- In case of high probability of lightning strike, additional protection measures are highly recommended.

Laying

- The trench bottom must be made of the original or subsequently compacted soil and must be free of stones.
- Before laying the cable, a layer of approx. 5 cm shall be first filled with sand or fine-grained soil.
- The laying depth (depth of the trench bottom) must be at least 0.6 m.
- The burial depth can be disregarded in special cases, for example due to localized obstacles or if the ground conditions create significant impediments (and no objections are raised). When the minimum depth of 0.6 m is not met, the cable shall be especially protected (e.g. with cable ducts).
- The laying of underground cables longitudinally under driveways is permitted only in exceptional cases. In such cases the underground cables shall be protected with cable ducts.
- The laying of the cable shall be done manually. The aid of mechanical feeders (e.g. cable pulling machines) is not allowed.
- After laying the cable, an additional layer of stone-free material (ground or sand) shall be piled up, covering at least 5 cm above the cable and gently compacted.
- To avoid damages the buried cable shall be protected with additional covering, such as cable protective hood or plate.
- To fill up the cable trench, it shall be used material free of components which could chemically or mechanically be harmful to the cables.
- A mechanical compacting of the cable trench is not allowed.

Intact drums secure fully functional cables.

A cable is a valuable product and it is normally transported on a cable drum. The battens on the drum seem thick enough to remain unbroken, but with a cable weighing more than four tons, it becomes very vulnerable. If the handling is done correctly, the drum will protect the cable from transportation damages.

If the drum is damaged, the cable can also be damaged. And it might not be discovered until after installation, when repairs can be extremely expensive. Scan the QR-code below and learn how damages can be avoided by correct drum handling.



Drum handling brochure
www.prysmiangroup.de



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