PROGETTO DEFINITIVO DELL'IMPIANTO AGRIVOLTAICO DELLA POTENZA DI PICCO DI 360MW CON SISTEMA DI ACCUMULO DI CAPACITA' PARI A 82,5MWH E RELATIVE OPERE DI CONNESSIONE ALLA RETE RTN, DA REALIZZARSI NEL COMUNE DI SASSARI NELLE FRAZIONI DI "PALMADULA, LA CORTE, CANAGLIA, LI PIANI, SAN GIORGIO, SCALA ERRE"

PROGETTO DEFINITIVO

COMMITTENTE: PALMADULA SOLAR S.R.L.

GRANGE SABATE JOATHAM JOHN
2023.10.11 16:15:03
CN=GRANGE SABATE JOATHAM JOHN
C=IT
2.5.4.4=GRANGE SABATE
2.5.4.42=JOATHAM JOHN
RSA/2048 bits

PROGETTISTA: TECHNITAL

ORDINE INGEGNERI VERONA E PROVINCIA
A 2515
Dott. Ing. SIMONE VENTURINI

DIRETTORE TECNICO
Dott. Ing. Simone Venturini

TITOLO ELABORATO:

BROCHURE CAVI AT

ELABORATO n°: BI028F-D-PAL-SH-07-r00

NOME FILE:

SCALA: ----

DATA: AGOSTO 2023

REVISIONE

N.	DATA	DESCRIZIONE	ELABORATO	CONTROLLATO	APPROVATO
00	Agosto 2023	Prima Emissione	E. Guiot	M. Sandri	S. Venturini
01					
02					
03					
04					

A TERMINE DI LEGGE CI RISERVIAMO LA PROPRIETA' DI QUESTO ELABORATO CON DIVIETO DI RIPRODURLO RENDENDOLO NOTO A TERZI ANCHE PARZIALMENTE SENZA NOSTRA AUTORIZZAZIONE

CARATTERISTICHE DEI CAVI AT 380 kV e 150 kV IN ESTRUSO

(parti generali e data sheet estratti da catalogo Nexans)

Caratteristiche generali costruttive

This brochure deals with underground power circuits featuring three-phase AC voltage insulated cable with a rated voltage between 60 and 500 kV. These lines are mainly used in the transmission lines between two units of an electricity distribution grid, a generator unit and a distribution unit or inside a station or sub-station. These insulated cable circuits may also be used in conjunction with overhead lines.

The voltage of a circuit is designated in accordance with the following principles:

Example:

Uo/U (Um) : 130/225 (245)

Uo	= 130 kV phase-to-ground voltage,
U	= 225 kV rated phase-to-phase voltage,
Um	= 245 kV highest permissible voltage of the grid

Phase-to-ground voltage, designated **Uo**, is the effective value of the voltage between the conductor and the ground or the metallic screen. **Rated voltage**, designated **U**, is the effective phase-to-phase voltage. **Maximum voltage**, designated **Um**, is the permissible highest voltage for which the equipment is specified (see also standard IEC 38).

A high voltage insulated cable circuit consists of **three single-core cables** or one three-core cable with High Voltage sealing ends at each end. These sealing ends are also called **"terminations" or terminals.** When the length of the circuit exceeds the capacity of a cable reel, **joints** are used to connect the unit lengths. The circuit installation also includes **grounding boxes, screen earthing connection boxes** and the related **earthing and bonding cables.**

The structure of high voltage cable with synthetic cross-linked polyethylene insulation will always involve the following items:

Conductor core

The aluminium or copper conductor carries the electrical current.

The conductor behaviour is characterized by two particularly noteworthy phenomena: **the skin effect and the proximity effect.**

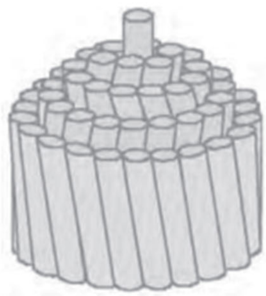
The skin effect is the concentration of electric current flow around the periphery of the conductors.
It increases in proportion to the cross-section of conductor used.
The short distance separating the phases in the same circuit generates **the proximity effect**.
When the conductor diameter is relatively large in relation to the distance separating the three phases, the electric current tends to concentrate on the surfaces facing the conductors. The wires of the facing surfaces indeed have a lower inductance than wires that are further away (the inductance of a circuit increases in proportion to the surface carried by the circuit).
The current tends to circulate in the wires with the lowest inductance.
In practice, the proximity effect is weaker than the skin effect and rapidly diminishes when the cables are moved away from each other.

The proximity effect is negligible when the distance between two cables in the same circuit or in two adjacent circuits is at least 8 times the outside diameter of the cable conductor.

There are two designs of conductor, **compact round stranded** and **segmental "Milliken" stranded.**

1. Compact round conductors, composed of several layers of concentric spiral-wound wires.

In round stranded compact conductors, due to the low resistance electrical contacts between the wires, the skin and proximity effects are virtually identical to those of solid plain conductor.

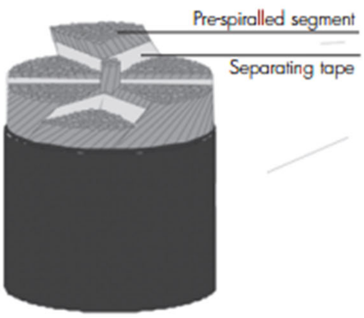


2. **Segmental conductors, also known as "Milliken" conductors are composed of several segment-shaped conductors assembled together to form a cylindrical core.**

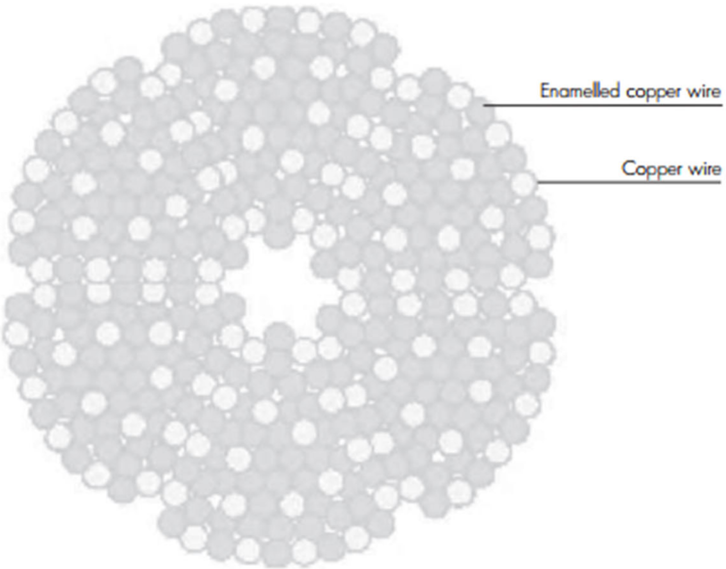
The large cross-section conductor is divided into several segment-shaped conductors. There are from 4 to 7 of these conductors, which are known as segments or sectors. They are insulated from each other by means of semi-conductive or insulating tape.

The spiral assembly of the segments prevents the same conductor wires from constantly being opposite the other conductors in the circuit, thus reducing the proximity effect.

This structure is reserved for large cross-sections greater than 1200 mm^2 for aluminium and at least 1000 mm^2 for copper.
The Milliken type structure reduces the highly unfavourable skin effect and proximity effect.



Milliken conductor construction



Typical diagram of an enamelled wire conductor

Enamelled copper wire
For copper conductors with a cross-section greater than 1600 mm^2, enamelled wires (around two thirds of the wires) are included in the structure of the Milliken type segmental conductor.

The proximity effect is almost completely **eliminated**, as each conducting wire follows a path alternating between areas that are far away from and areas close to the other phases conductors.

The skin effect is reduced owing to the small cross-section of the wires used, each insulated from the others. In practice, a **structure containing enamelled wires adds roughly a whole conductor cross-section.**
For example, a 2000 mm^2 enamelled copper cable is equivalent to a 2500 mm^2 non-enamelled copper cable.
The connection of enamelled copper conductors requires a different technology, which Nexans has recently developed.

Reduction of the skin effect

AC_{90} resistance / DC_{90} resistance	Conductor structure		
Cross-section (mm²)	Compact round stranded	Milliken segmental stranded	Milliken enamelled stranded
1600	1.33	1.24	1.03
2000	1.46	1.35	1.04
2500	1.62	≈ 1.56	1.05
3000	1.78	≈ 1.73	1.06

Semi-conductor screen on conductor.

To prevent electric field concentration, there is an interface of ultra-smooth semi-conductor XLPE between the conductor and the insulation.

XLPE insulation.

As its name suggests, the insulation insulates the conductor when working at high voltage from the screen working at earthing potential. The insulation must be able to withstand the electric field under rated and transient operating conditions.

Semi-conductor screen on insulation.

This layer has the same function as the conductor screen:
Progressive transition from an insulating medium, where the electric field is non- null, to a conductive medium (here the metal cable screen) in which the electric field is null.

Metallic screen.

When the voltage reaches tens or even hundreds of kV, a metallic screen is necessary.

Its main **function** is to **nullify the electric field outside the cable.**
It acts as the second electrode of the capacitor formed by the cable.

Use of a metallic screen implies:

- **The need to connect it to earth at least at one point along the route.**

- **Draining the capacitive current that passes through the insulation.**

- Draining the **zero-sequence short-circuit currents,** or part of them. This function is used to determine the size of the metallic screen.

- **The circulation of the currents induced by the magnetic fields from other cables in the vicinity.** These circulating currents cause further energy loss in the cables and have to be taken into account when assessing the transmission capacity of a cable system.

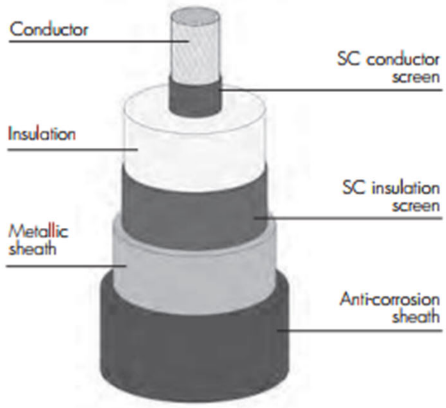
- **The need to electrically insulate the metallic screen from earth** over the greater part of the length of cable installed.

- **The need to protect the metallic screen** from chemical or electrochemical corrosion.

The second **function** of the metallic screen is to form a **radial barrier to prevent humidity** from penetrating the cable, particularly its insulation system.

The synthetic insulation system should not be exposed to humidity. When humidity and a strong electric field are present together, the insulation deteriorates by what is called watertreeing, which can eventually cause the insulation to fail.

Note:
In the case of an overhead line, the insulation is formed by the air between the bare conductor and the ground.
Several metres between the powered conductors and the ground are required to ensure adequate electrical insulation and to prevent arcing between the high voltage conductors and objects or living beings on the ground.



Cable components

Different types of metallic screen

Extruded lead alloy sheath

Advantages:

- Waterproofing guaranteed by the manufacturing process,
- High electrical resistance, therefore minimum energy loss in continuous earthing links,
- Excellent corrosion resistance.

Drawbacks:

- Heavy and expensive,
- Lead is a toxic metal whose use is being restricted to a minimum following European directives,
- Limited capacity to expel zero-sequence short-circuit currents.

Concentric copper wire screen with aluminium tape bonded to a polyethylene or PVC jacket

Advantages:

- Lightweight and cost effective design,
- High short-circuit capacity.

Drawbacks:

- Low resistance necessitating special screen connections (earthing at one point or cross-bonding) in order to limit circulating current losses.

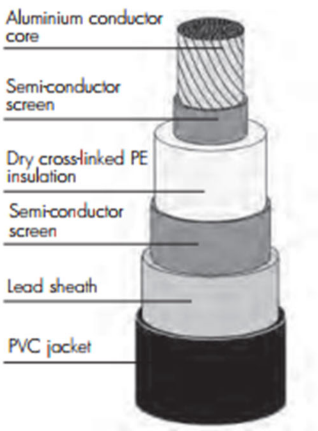
Aluminium screen welded longitudinally and bonded to a polyethylene jacket

Advantages:

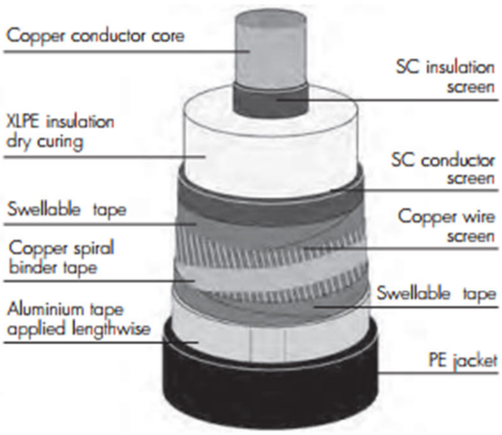
- Lightweight structure
- High short-circuit capacity,
- Impervious to moisture, guaranteed by the manufacturing process.

Drawbacks:

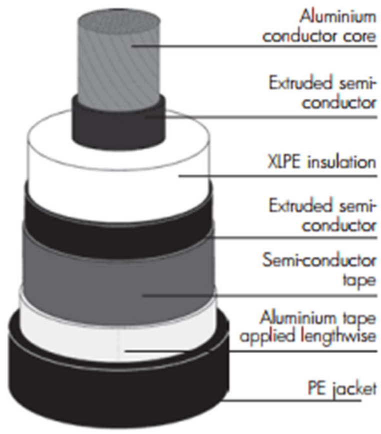
- Low resistance necessitating special screen connections (earthing at one point or cross-bonding) in order to limit circulating current losses.
- Higher Eddy Current losses than with the previous screen types.



Lead screen



Copper wire/alu sheath



Smooth aluminium sheath

Copper wire screen with extruded lead sheath

This is a combination of the above designs. It combines the advantages of the lead sheath and concentric copper wire screen.

Its main drawbacks lie in its cost and the lead content.

The copper wire screen is placed under the lead sheath thus enabling it to share the anti-corrosion properties of the latter.

Anti-corrosion protective jacket

The jacket has a dual function:

- **It insulates the metallic screen from ground** (particularly for lines with special screen connections)
- **It protects the metal components of the screen from humidity and corrosion.**

The outer jacket must also withstand the **mechanical stresses** encountered during installation and service, as well other risks such as termites, hydrocarbons, etc.

The most suitable material for this is polyethylene.

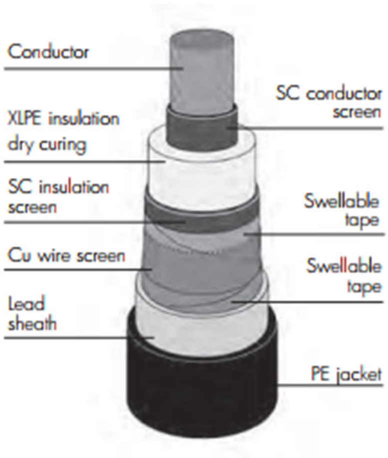
PVC is still used but increasingly less so. Indeed, one of the advantages of PVC is its fire-retardant properties, although the toxic and corrosive fumes released are prohibited by many users.

If **"fire-retardant"** is specified in accordance with IEC standards 332, **HFFR** (Halogen-Free Fire Retardant) materials will be used in preference to PVC.

These materials however have mechanical properties that are inferior to those of polyethylene and are more costly. They should be reserved for installations or parts of installations where fire protection is required.

To verify the integrity of the outer jacket, a semi-conducting layer is often applied to this jacket.

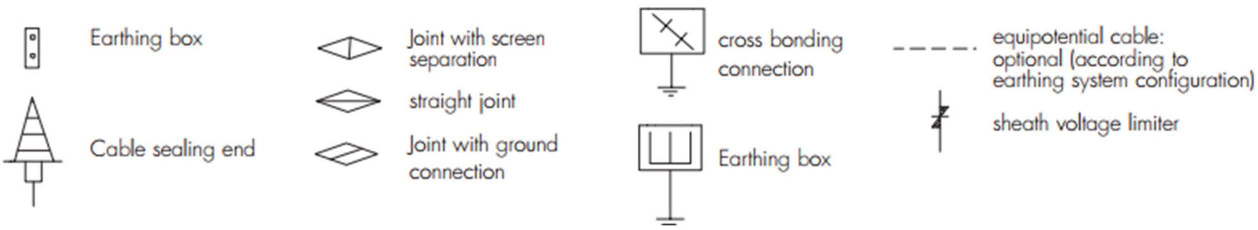
This layer is made of semi-conducting polymer co-extruded with the outer jacket.



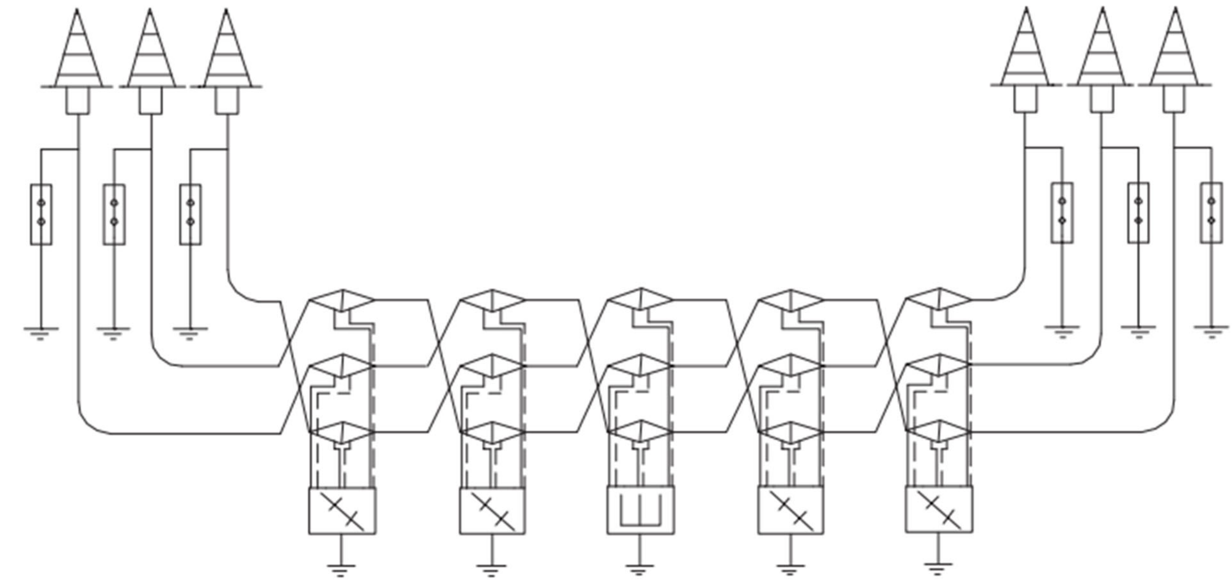
Copper wire/lead sheath

Item	Function	Composition
Conductor	• to carry current - under normal operating conditions - under overload operating conditions - under short-circuit operating conditions • to withstand pulling stresses during cable laying.	**S≤1000mm² (copper) or ≤1200mm² (aluminium)** Compact round stranded cable with copper or aluminium wires **S≥1000mm² (copper)** segmental **S>1200mm² (aluminium)** segmental
Internal semi-conductor	• To prevent concentration of electric field at the interface between the insulation and the internal semi-conductor • To ensure close contact with the insulation. To smooth the electric field at the conductor.	**XLPE semi-conducting shield**
Insulation	• To withstand the various voltage field stresses during the cable service life: - rated voltage - lightning overvoltage - switching overvoltage	**XLPE insulation** The internal and external semi-conducting layers and the insulation are co-extruded within the same head.
External semi-conductor	To ensure close contact between the insulation and the screen. To prevent concentration of electric field at the interface between the insulation and the external semi-conductor.	**XLPE semi-conducting shield**
Metallic screen	To provide: • An electric screen (no electric field outside the cable) • Radial waterproofing (to avoid contact between the insulation and water) • An active conductor for the capacitive and zero-sequence short-circuit current • A contribution to mechanical protection.	• **Extruded lead alloy, or** • **Copper wire screen with aluminium bonded to a PE jacket** • **Welded aluminium screen bonded to a PE jacket** • **Combination of copper wires and lead sheath**
Outer protective sheath	• To insulate the metallic screen from the surrounding medium • To protect the metallic screen from corrosion • To contribute to mechanical protection • To reduce the contribution of cables to fire propagation.	**Insulating sheath** • Possibility of semi-conducting layer for dieletric tests • Polyethylene jacket • HFFR jacket

Connessioni degli schermi a terra



Cross-bonding system



Accessori – giunti

JOINTS

These accessories are used to join two sections of a cable together in order to allow the power lines to stretch over many kilometers.

There are many different solutions for joining cables. They may differ with regard to the core, materials or thicknesses of the cables. It is nevertheless essential to know the types of cables to be joined.

The joints are named according to their technology as well as the available connections for earthing the screens.

The most commonly used technology for all voltages is the **PREMOULDED** joint.

The taped joint is the technique that has been around the longest and is still used when there are low electrical stresses in the cable insulation.

A **transition** joint is used to join cables with different types of insulation. When the only difference is in the dimensions or type of core (same type of insulation) the joint is called an **adapter** joint.

THE TECHNOLOGY

PREMOULDED JOINT

This consists of a premoulded elastomer body. It is pretested in the factory to ensure its reliability.

The properties of the synthetic material of the premoulded joint ensures that sufficient pressure is maintained at the interface between the cable and the joint throughout the cable's service life.

The dielectric properties of the material offer good electrical esistance under alternating current as well as to lightning and switching overvoltages.

They are mounted either by expanding the premoulded joint or by slipping it onto the cable.

Although the design of the premoulded joint is based on an assembly of prefabricated items, the preparation of the interfaces requires the skills of well-trained technicians.

TAPED JOINTS

The cable insulation is made of synthetic tapes with good dielectric properties and self-bonding abilities. Its use is limited to maximum voltages of 110 kV. As this joint is made manually, its efficiency is directly related to the skill of the electrician.

TRANSITION JOINT

This is used to join cables based on different technologies, such as a paper-insulated cable with a synthetic cable.

It consists of the same components as those used in the to be joined cables and ensures their physical and electrical continuity.

ADAPTER JOINT

This is used when the cables which are to be joined, have the same type of insulation but are of different dimensions.

There are several different methods, some of which are patented, for making these joints.
Among these are:

- A bi-metal joint to join an aluminium core to a copper core.
- A tapered electrode to join two insulated cables of slightly different diameters using a standard premoulded joint.
- A dissymmetrical premoulded joint to join cables with very different dimensions.

Transition joints and adapter joints always require specific design studies.

MODELS OF JOINTS ACCORDING TO THE EARTHING OF THE SCREENS

STRAIGHT JOINT

Not earthed: This joint offers electrical continuity of the metal screens of the two cables to be joined. It is used in the case where earthing is at two points, or as an intermediate joint in other earthing systems.

Earthed: this joint ensures the continuity of the metal screens. There is also a connection which allows the screens to be connected to a local earthing point.
This type of joint can be found in mid-point earthing systems and in screen switching systems.

Straight joint

JOINT WITH SCREEN SEPARATION

Joint with screen separation

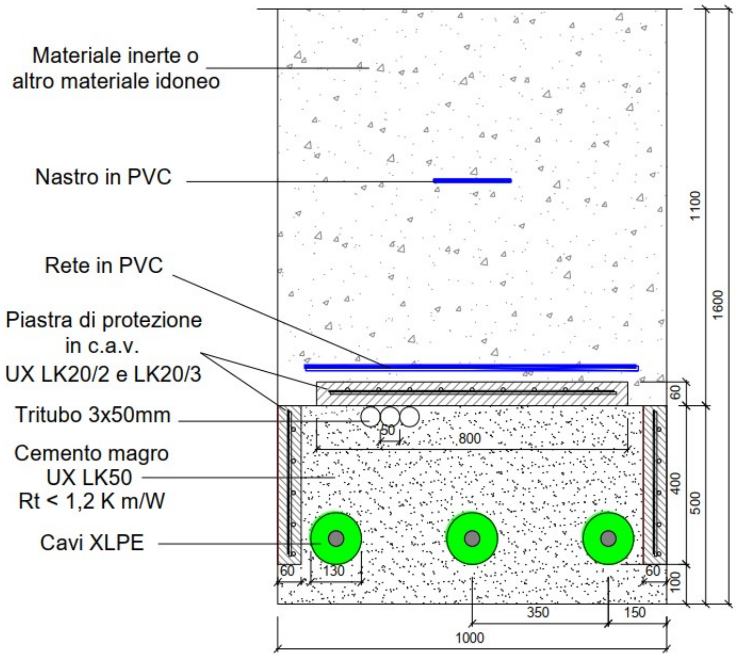
This joint separates the screen of the right hand cable from that of the left hand cable.

It is used in the case of earthing with cross-bonding

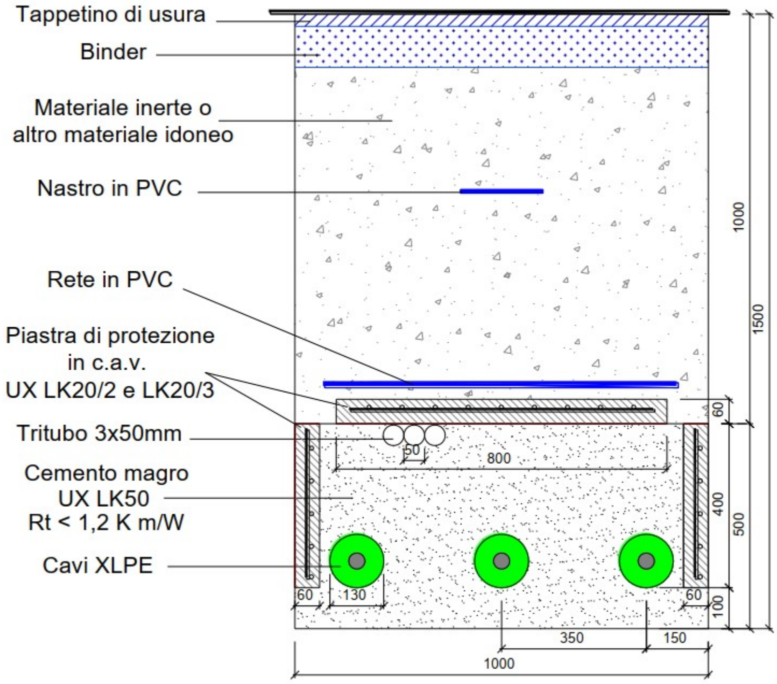
Cross-bonding involves creating interruptions in the screen circuits and making connections between the circuits of different phases in order to cancel out the induced voltages between two earthing points.
Joints with screen separation have two earth connections using two single pole cables or a coaxial cable.

Criteri di posa adottati

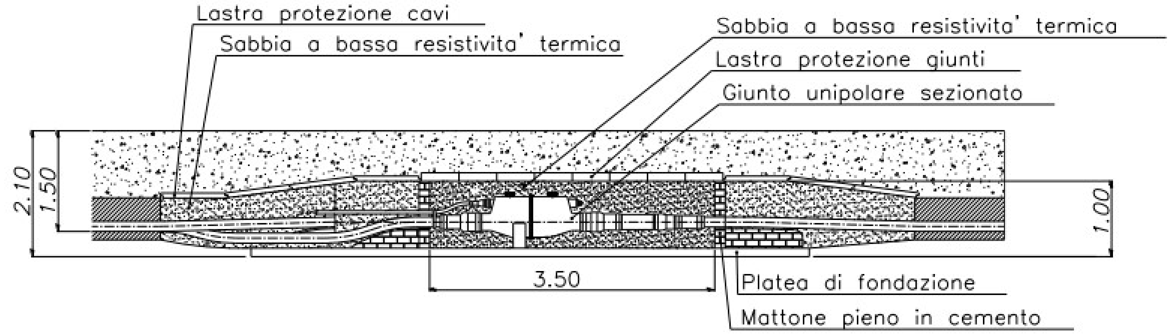
ESEMPIO DI POSA IN PIANO IN TERRENO AGRICOLO

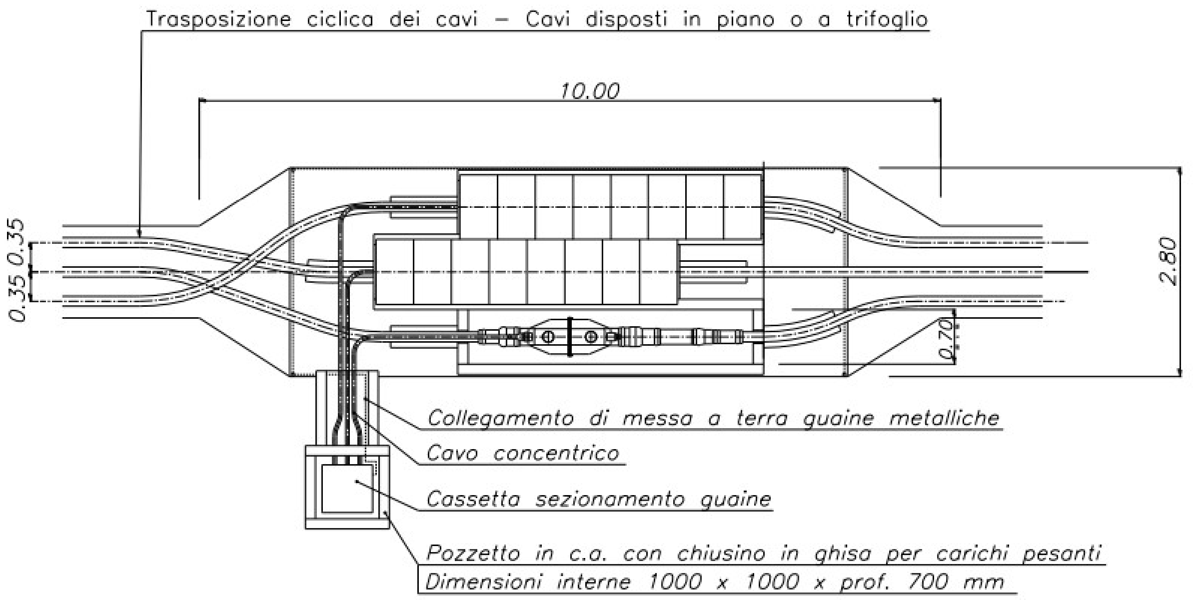


ESEMPIO DI POSA IN PIANO SU SEDE STRADALE



PARTICOLARE BUCA GIUNTO





Data sheet cavo 150 kV

(sezione individuata: 400 R)

Voltage 87/150 (170)kV Copper Conductor

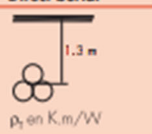
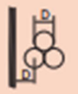
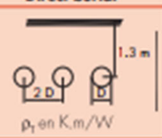
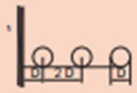
Constructional data (nominal)

Nominal section area	Conductor diameter	Thickness of insulation	DC conductor resistance at 20°C	Electrostatic capacitance	Aluminium screen: Sectional area*	Aluminium screen: Outside diameter of cable*	Aluminium screen: Weight of cable*	Copper wire/lead sheath: Sectional area* copper screen	Copper wire/lead sheath: Outside diameter of cable*	Copper wire/lead sheath: Weight of cable*	Copper wire/alu sheath: Sectional area* copper screen	Copper wire/alu sheath: Outside diameter of cable*	Copper wire/alu sheath: Weight of cable*	Corrugated Alu sheath: Sectional area*	Corrugated Alu sheath: Outside diameter of cable*	Corrugated Alu sheath: Weight of cable*	Lead sheath: Sectional area*	Lead sheath: Outside diameter of cable*	Lead sheath: Weight of cable*
mm²	mm	mm	Ω/km	µF/km	mm²	mm	kg/m	mm²	mm	kg/m	mm²	mm	kg/m	mm²	mm	kg/m	mm²	mm	kg/m
400 R	23.2	20.8	0.0470	0.15	180	82	8	65	88	15	85	85	9	470	95	9	810	87	17
500 R	26.7	19.5	0.0366	0.17	190	83	9	65	89	16	85	86	10	480	96	10	790	88	18
630 R	30.3	18.5	0.0283	0.19	190	85	11	65	91	17	85	87	11	490	98	12	810	90	20
800 R	34.7	17.6	0.0221	0.21	200	88	12	60	94	20	85	90	13	500	101	13	810	92	21
1000 R	38.8	17.0	0.0176	0.23	200	91	15	55	97	22	85	93	15	550	105	16	780	95	23
1000 S	40.0	16.7	0.0176	0.25	170	92	15	55	99	23	80	95	15	560	107	16	800	97	24
1200 S	42.5	16.7	0.0151	0.26	170	95	16	50	102	25	80	98	17	580	110	18	800	100	25
1600 S	48.9	16.4	0.0113	0.29	180	101	22	40	108	31	80	104	22	740	117	23	790	105	30
1600 S En	48.9	16.4	0.0113	0.29	180	101	22	40	108	31	80	104	22	740	117	23	790	105	30
2000 S	57.2	16.4	0.0090	0.32	160	110	25	25	117	35	75	113	25	870	126	27	830	114	34
2000 S En	57.2	16.4	0.0090	0.32	160	110	25	25	117	35	75	113	25	870	126	27	830	114	34

*Indicative value

R : round stranded
S : segmental stranded
S En : segmental stranded enamelled

Continuous current ratings (Amperes)

Nominal section area	Laying conditions : Trefoil formation – Earthing conditions: induced current in the metallic screen	Trefoil – Direct burial 		Trefoil – In air, in gallery 		Laying conditions : Flat formation – Earthing conditions: induced current in the metallic screen	Flat – Direct burial 		Flat – In air, in gallery 		Nominal section area
mm²		ρ_T = 1,0 T = 20°C	ρ_T = 1,2 T = 30°C	T = 30°C	T = 50°C		ρ_T = 1,0 T = 20°C	ρ_T = 1,2 T = 30°C	T = 30°C	T = 50°C	mm²
400 R	With circulating currents	640	550	835	665	Without circulating current	710	615	960	775	400 R
500 R		715	615	955	760		810	700	1 125	900	500 R
630 R		860	740	1 145	910		920	795	1 305	1 045	630 R
800 R		780	670	1065	845		835	715	1225	980	800 R
1000 R	Without circulating current	1 040	895	1 445	1 150		1 140	980	1 700	1 360	1000 R
1000 S		1 130	970	1 575	1 250		1 220	1 045	1 815	1 455	1000 S
1200 S		1 210	1 040	1 705	1 355		1 315	1 130	1 980	1 585	1200 S
1600 S		1 275	1 090	1 840	1 460		1 395	1 200	2 160	1 730	1600 S
1600 S En		1 375	1 180	1 990	1 580		1 520	1 305	2 360	1 885	1600 S En
2000 S		1 385	1 185	2 050	1 625		1 530	1 310	2 435	1 945	2000 S
2000 S En		1 535	1 315	2 290	1 815		1 725	1 480	2 750	2 200	2000 S En

Data sheet cavo 380 kV

(sezione individuata: 2500 S En)

Voltage 230/400 (420)kV Copper Conductor

Constructional data (nominal)

Nominal section area (mm²)	Conductor diameter (mm)	Thickness of insulation (mm)	DC conductor resistance at 20°C (Ω/km)	Electrostatic capacitance (µF/km)	Aluminium screen: Sectional area* (mm²)	Aluminium screen: Outside diameter of cable* (mm)	Aluminium screen: Weight of cable* (kg/m)	Copper wire/lead sheath: Sectional area* copper screen (mm²)	Copper wire/lead sheath: Outside diameter of cable* (mm)	Copper wire/lead sheath: Weight of cable* (kg/m)	Copper wire/alu sheath: Sectional area* copper screen (mm²)	Copper wire/alu sheath: Outside diameter of cable* (mm)	Copper wire/alu sheath: Weight of cable* (kg/m)	Corrugated Alu sheath: Sectional area* (mm²)	Corrugated Alu sheath: Outside diameter of cable* (mm)	Corrugated Alu sheath: Weight of cable* (kg/m)	Lead sheath: Sectional area* (mm²)	Lead sheath: Outside diameter of cable* (mm)	Lead sheath: Weight of cable* (kg/m)
500 R	26.7	31.5	0.0366	0.12	400	110	13	195	117	25	240	113	15	860	124	15	1840	119	34
630 R	30.3	29.8	0.0283	0.13	400	110	15	195	117	26	240	113	16	860	124	16	1850	119	35
800 R	34.7	27.7	0.0221	0.15	400	110	16	195	118	28	240	113	18	860	125	18	1850	119	36
1000 R	38.8	25.8	0.0176	0.17	410	111	18	195	118	29	240	113	19	860	125	19	1860	119	38
1000 S	40.0	24.6	0.0176	0.18	410	111	18	195	118	30	240	113	20	860	125	19	1860	119	38
1200 S	42.5	25.3	0.0151	0.18	420	115	20	185	123	32	240	118	21	930	129	21	1860	123	40
1600 S	48.9	25.8	0.0113	0.20	420	122	26	170	131	39	230	125	27	1030	137	27	1840	130	46
1600 S En	48.9	25.8	0.0113	0.20	420	122	26	170	131	39	230	125	27	1030	137	27	1840	130	46
2000 S	57.2	25.5	0.0090	0.22	450	131	29	155	139	44	230	133	30	1180	146	31	1840	138	49
2000 S En	57.2	25.5	0.0090	0.22	450	131	29	155	139	44	230	133	30	1180	146	31	1840	138	49
2500 S En	63.5	25.8	0.0072	0.24	430	138	35	140	146	51	220	140	37	1290	154	38	1860	144	56
3000 S En	70.0	26.1	0.0060	0.25	420	145	39	120	154	57	220	148	40	1450	162	42	1830	152	59

*Indicative value

R : round stranded
S : segmental stranded
S En : segmental stranded enamelled

Continuous current ratings (Amperes)

Nominal section area (mm²)	Trefoil formation: Earthing conditions (induced current in the metallic screen)	Trefoil: Direct burial (1.3 m; ρ_T en K.m/W) ρ_T = 1,0 T = 20°C	Trefoil: Direct burial ρ_T = 1,2 T = 30°C	Trefoil: In air, in gallery T = 30°C	Trefoil: In air, in gallery T = 50°C	Flat formation: Earthing conditions (induced current in the metallic screen)	Flat: Direct burial (1.3 m; ρ_T en K.m/W) ρ_T = 1,0 T = 20°C	Flat: Direct burial ρ_T = 1,2 T = 30°C	Flat: In air, in gallery T = 30°C	Flat: In air, in gallery T = 50°C	Nominal section area (mm²)
500 R	Without circulating current	735	630	960	765	Without circulating current	785	680	1 065	850	500 R
630 R		825	705	1 100	875		890	765	1 235	990	630 R
800 R		910	780	1 250	990		995	855	1 420	1 135	800 R
1000 R		985	840	1 385	1 100		1 095	935	1 605	1 285	1000 R
1000 S		1 050	895	1 490	1 180		1 160	990	1 715	1 370	1000 S
1200 S		1 115	950	1 600	1 270		1 245	1 060	1 860	1 485	1200 S
1600 S		1 170	995	1 720	1 360		1 320	1 125	2 015	1 610	1600 S
1600 S En		1 255	1 065	1 855	1 470		1 430	1 220	2 195	1 755	1600 S En
2000 S		1 245	1 055	1 890	1 495		1 430	1 215	2 255	1 800	2000 S
2000 S En		1 360	1 150	2 090	1 650		1 590	1 355	2 540	2 025	2000 S En
2500 S En		1 470	1 245	2 325	1 835		1 765	1 495	2 880	2 295	2500 S En
3000 S En		1 510	1 275	2 425	1 915		1 825	1 545	3 025	2 410	3000 S En