

Electrical Specification

Cable Joint Specification

Rated 36kV, straight through, Heat Shrinkable, Cable Joint, suitable for 1x500 mm², 36kV/AI/XLPE/AWA/PVC, suitable for both wire screen and tape screen, stranded compacted circular conductor, with armor kit and with all materials required for make earthing to the both wire and tape metallic screen.

1. XLPE insulated 36 kV straight through joints

1.1 General Description for Joints:

Cable joints of 36 & rating shall Heat shrinkable tubing with suitable stress control will be required to joint the cable. Such tubing must be none—tracking, erosion resistance electrically insulating, weather resistance and flexible at low temperatures. All necessary components for joint shall be supplied including Armor and all components required for the armoring process of the joint, all required earthing materials for make earthing to the Copper Screens, those earthing materials shall be include a tinned copper earthing braid, mesh copper and a mechanical roll spring for each phase and other all required earthing materials, and connectors. All test requirements on accessories for cables should be in accordance IEC 60502-4 and IEC-61238 Class A .

1.2 Straight Joints

- a) The termination kit shall be complete in all respects including Sheer bolt mechanical lugs, those connectors must be Aluminum suitable for Aluminum conductors and copper for copper cable (or bimetallic material) and shall have corrosion inhibiting compound filled inside and ends closed with protection caps for conductor jointing. However the connector design should have been tested in accordance with IEC-61238 Class A.
- b) High permittivity void filler mastic shall be used over the screen end to fill the voids that may exist below the stress control tubing.

The stress control function over the connectors and at the screen cut back shall be achieved by a combination of stress grading filler and thermally stable heat shrinkable stress control tubing.

The impedance of the stress control tubing shall not change over a range of temperature from 0° C to 125° C. Which is the temperature range over which an XLPE cables is expected to operate The impedance shall also remain constant irrespective of the differences in stress which will exist within the tubing due to the heating effect within the conductor and the ambient temperature.

- c) Heat shrinkable tubing with suitable stress control will be required to joint the cable or to ensure avoid free interface between the insulation & screen and to eliminate the possibility of electric discharges between different layers of insulation tubes , an elastomeric, triple - extruded single joint sleeve component with inner elastomeric insulating and an outer conductive layer must be used to reinstate the insulation and screen in a single step.

The material and design of the joint sleeve should have a high recovery force to achieve tight electrical interfaces and perfect sealing ability .

A joint design with mechanical sheer bolt connectors and triple extruded elastomeric tubing,

duly tested as a complete system, in accordance with IEC-60502-4 ,or CENELEC HD 629.1 S2 , or other approved standard.

- d) Electrical continuity of the copper tape screen across the joint shall be provided by means of tinned copper mesh of adequate cross section and constant force stainless steel roll springs.

In case of cables with wire shield, the required connectors should be included in the kit for connection of the shield wires across the joint.

- e) In 3 core cables, the electrical continuity of the armor shall be reinstated by use of a steel armor case with adequate short circuit withstand capability. The steel armor case shall also withstand the external mechanical forces that may otherwise damage the cable components.

The design of the steel armor case shall ensure reduced overall diameter and minimum air entrapment in the joint to improve heat dissipation and increased rating factor of the cable. The armor case shall be secured over the armor with 2 no of stainless steel worm drive clamps on either side. An adjustable stainless steel support ring or support ring shall be placed under the armor to enable adequate electrical contact and to avoid the penetration of wire armor into the cable bedding.

To ensure a reliable connection of the cable armor in single core cables, the aluminum wires must be joined across the joint with sheer bolt mechanical connectors.

- f) To prevent the joint and cable components from external environment and water ingress, the encapsulation of the joint shall be achieved by thick wall adhesive lined sealing sleeves. each kit shall be provided with complete detailed installation instruction and be clearly marked to show its application.

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2. Mechanical Connectors, Lugs for Low and Medium voltage .

Cable connectors and lugs shall be manufactured from one piece of alloy material, which shall be suitable for bimetallic applications. The manufacturer shall provide us with technical properties about the Alloy material to be submitted in order to evaluate it. All lugs and connectors shall be tested in accordance with the latest standards of IEC 61238-1 class A.

- a) Connectors and lugs are to be supplied with contact bolts made from a special alloy, Contact bolts are irremovable once their heads have been sheared off when a specific level of torque is applied.
- b) Connectors and Lugs shall be supplied with inserts for smaller conductors. This Alloy guarantees a perfect function against the corrosion that can be produced due to the humidity.
- c) Connector and lug bodies are made of a high-tensile alloy. The internal surfaces of the conductor holes are grooved.

- d) Lugs are suitable for outdoor and indoor applications and are available with different palm hole sizes.
- e) Contact bolts are irremovable once their heads have been sheared off

Schedule (1)
Technical particulars and guarantees
Rated 33 K.V 1x500mm² XLPE AL-Cable AWA, single core

Description	Unit	Particulars
1- voltage between phase of 3-phase circuit	KV	33
2- number of cores		1
3- Conductor (cross sectional area (Material (Design (Over all dimension (Soldering temperature	mm ² mm c ^o	500 AL 500 26.7 -
4- Conductor screen (Material (Nominal thickness	mm	Semi- conductive compound
5- Insulation (Type of curing (Minimum radial thickness	mm	.....
6- Core screen (Material (Nominal thickness (Diameter over screen Cross sectional area per phase	mm mm mm ²	Dray curing Semi – conductive compound
7- Fillers (Material (Three core only)		..... ..... .....
8- Binders over (Material Laid –up cores (Nominal thickness (Three core only) (Diameter over binder	mm mm	.....
9- PVC anti-corrosion (Material (Sheath thickness	mm	..........
10- Armor bedding (Material (Nominal thickness	mm	
11- Armor (Material of wire or tape (Number of wires or tapes (Diameter of wire (Thickness and width of tapes	mm mm	..... PV 1.0 as per IEC 60502-2 wire aluminum

Description	Unit	Particulars
12- Outer covering (Material (minimum average thickness (Type of termite repellent	mm	PV Lead naphathnate
13- Completed cables(Over all diameter (Weight per meters (Maximum drum length	mm kg m	...............
14- Maximum dielectric stress at the conductor screen (assumed smooth)	Mv /m	.....
15- Maximum (laid direct in ground Conductor (Drawn in to duct Temperature (Erected in air	c c c	90 90 90
16- Minimum radius of (laid direct Bend around which cable can(In ducts Be laid (In air	m m m	...............
17- Nominal internal diameter of pipes or ducts Through which cable may be pulled	mm	.....
18- Maximum Dc (of conductor Resistance per (of metallic layer Meter of cable At 20 C	Micro-ohm Micro- ohm	..........
19-Maximum AC resistance of conductor per Meter of cable at maximum conductor Temperature	Micro-ohm	.....

Description	Unit	Particulars
20- Insulation (At 20 C resistance per (At maximum rated Meter of cable (temperature Per core	Mega-ohm Mega-ohm	As per iec 60502-2 As per iec 60502-2
21- Equivalent star reactance per meter of three phase circuit at 50 HZ	Mega-ohm	
22-Maximum electrostatic capacitance per phase per meter of cable	PF	
23-Maximum charging current per conductor Per meter of cable at nominal Voltage and frequency	mA	.....
24- Current carrying capacity - Laid directed in ground: One circuit Two circuits Three circuits - Drawn in to single way ducts One circuit Two circuits Three circuits In air One circuit	amps amps amps amps amps amps amps amps	........................................
25-Conductor short circuit Carrying capacity for one second, cable loaded as above before short circuit and final conductor temperature 250 C	KA	...............
26-Metallic layer loss (including armor if applicable) Of cable per meter of three phase circuit at nominal voltage and normal frequency at circuit rating as stated in reference 24	w/m	..........

Description	Unit	Particulars
27-Maximum dielectric loss of cable per meter of three Phase circuit when laid direct in the ground at Nominal voltage and normal frequency at maximum Conductor temperature	W	.....
28-Maximum dielectric loss angle of charging VA of Cable when laid direct in ground at nominal Voltage and normal frequency: - A conductor temperature of 20 C - Maximum conductor temperature	TAN	As per IEC 60502-2
29-Maximum dielectric loss angle of charging VA cable At normal frequency and conductor temperature of 20 C at: - 50 % rated voltage - 200 % rated voltage		AS PER IEC 60502-2
30-Creepage distance of sealing and porcelain	mm	
31-Metallic layer earth fault current Carrying capacity for one second , cable fully Temperature of 250 C	KA	...../ 1 second ... / 3 second
32-Cable drum (Diameter (Width (Weight loaded	m m kg	..........
33-Conditions upon which current carrying Capacities are based: - Axial spacing between phase cables -Axial spacing between circuits - Soil thermal resistivity - Ground temperature - Air temperature - Burial depth - Type of earth bonding	mm mm c-m/w c c m	........................................

شركة كهرباء اربد

مواصفات حفريات كوابل الضغط المتوسط

1- الحفر

يمنع استخدام الغارفات لقطع الطبقة العلوية من سطح الطريق او الرصيف بل يجب قطع حواف الخندق باستخدام منشار قص للأسفلت او الات قطع مناسبة للحصول على خط مستقيم وعمودي على سطح الطريق، وتزال نواتج الحفر اولاً بأول ولا تترك نواتج تؤدي الى الاساءة الى باقي جسم الطريق او الحاق الاذى بالمواطنين.

- يتم حفر الخنادق لمد كوابل الضغط المتوسط بابعاد (50 سم عرض x 140 سم عمق) ولدائرة واحدة.
- يتم الحفر بزيادة مقدارها 30 سم عرض لكل كابل ضغط متوسط اضافي (دائرة اضافية) وذلك ايما ورد بالعبء

2- الطمم

يتم طم خنادق الحفريات والتي تم مد الكوابل بها ويجب ان يكون الطمم المستخدم من النوع المطابق للمواصفات الفنية سواء كان الطمم (رمل، سيليك، عدسية، او بيس كورس) كما يجب ان تكون الصبة الاسمنتية (خلطة جاهزة) وبقوة 250 كغم / سم² وبالسماكات المطلوبة كما يجب ان يورد ويركب المقاول البلوك المسلح بالبعد المطلوب وان يتم تصنيعه بنسبة صبة اسمنتية 6:1.

تستعمل المواد التالية لطم كوابل الضغط المتوسط والتي اعماق حفرياتها 140 سم وبدون مواسير بلاستيك:-

- رمل صويلح ناعم او سيلكا ناعمة وخالي من الحصى والشوائب ويمر جميعه بمنخل نمرة (10) وقطره 2 ملم بسماكة 15سم تحت الكابل و 15 سم فوق الكابل. ويتم القياس من سطح الكابل السفلي والعلوي.
- يوضع بلوك اسمنتى مسلح بعد وضع رمل صويلح على الكابل (الدائرة) ويكون البلوك الاسمنتى المسلح بعرض 30 سم وطول 50 سم وبسماكة مقدارها 8 سم ونسبة الخلطة الاسمنتية (6 : 1) ويوضع البلوك طوليا فوق الكابل (الدائرة)، وفي حال تمديد كابل اضافي (دائرة اضافية) يتم تمديده وبوضع نفس سماكة رمل الصويلح المذكور اعلاه على كل كابل (دائرة) ويوضع البلوك الاسمنتى المسلح طوليا على كل دائرة منفصل عن الدائرة الاخرى .
- بعد وضع البلوك الاسمنتى يتم طم الخندق فوق البلوك حسب المواصفات المعتمدة بطبقة 50 سم عن مستوى الارض كما كان عليه الوضع قبل الحفر ويتم توريد وتركيب شريط تحذيري ويتم متابعة الطم بنفس المواصفات المعتمدة.

تستعمل المواد التالية لطم كوابل الضغط المتوسط والتي اعماق حفرياتها 140 سم ويتم تمديد الكوابل داخل مواسير (8) انش:-

- يتم عمل صبة اسمنتية على هذه المواسير بنسبة الخلطة (6 : 1) وبسماكة الصبة 5 سم تحت مستوى المواسير و 10 سم فوق مستوى المواسير بحيث تصبح سماكة الصبة الاسمنتية 35 سم وفي حالة وضع اكثر من ماسورة في خندق واحد يتم زيادة عرض الخندق 20 سم لكل ماسورة اضافية يتم وضعها لتمديد الكوابل بها وعمل الصبة الاسمنتية على هذه المواسير حسب ما جاء اعلاه. ويضاف ماسورة احتياطية لكل كابل (دائرة).
- بعد عمل الصبة الاسمنتية على هذه المواسير يتم الطم فوق الصبة حسب المواصفات المعتمدة بطبقة تنقص 50 سم عن مستوى سطح الارض كما كان قبل الحفر ويتم تمديد شريط بلاستيكي تحذيري ثم يتم متابعة الطم بنفس المواصفات.
- ملاحظة :- تعني الخلطة الاسمنتية بنسبة 6:1 ايما وردت ام كل 12 تنكة (0.24) م 3م رمل مخلوطة بحاجه الى كيس اسمنت وزن 50 كغم . وتعني الخرسانة ايما وردت (خلطة جاهزة وبقوة (نسبة كسر) 250كغم / سم 2).