

المواصفات الفنية الخاصة بالمناقصة العامة

رقم المناقصة : (٢٠١٢/٤)

الخاصة بشراء وتوريد كابلات متنوعة للتغذية

الكهربائية

المؤسسة العامة للاتصالات السلكية واللاسلكية

الإدارة العامة للمشتريات والمخازن

إدارة المشتريات - قسم العقود والمناقصات



PTC Specification

DC Cable

Low Voltage single core Cable Specifications (flexible cables)

1. SCOPE :-

- a) This specification covers the design, manufacture, testing supply & delivery of LV (450/750V) single core Cable for used in out door service for switching and distribution installation, the size and quantities as given in attached requirements schedule.
- b) This specification defines the requirements.

2. STANDARDS :-

- a) The cables shall comply for all respects to requirements contained in the latest BS. Standard or other standard internationally approved (ANSI, DINetc).

3. SERVICE CONDITIONS:-

Conductor shall be suitable to ensure satisfactory operation for the following site conditions:

- | | |
|---|------------------------|
| a) Altitude: | 2500 m above sea level |
| b) Ambient temperature: | -5 °C up to 50°C. |
| c) Relative humidity: | 5-100 % |
| d) Average thermal resistivity of soil: | 1.5°C.m/W |

4. DETAILED REQUIREMENTS :-

Construction:

- a) Conductor of soft annealed copper fine wires (flexible cables), high conductivity, circular shape, PVC Insulation heat resistive adheres tightly to conductors, yet strips easily, leaves conductor clean.





5. Jacket marking informations:-

The cables outer marking should be consist of the following:

- a) Name of manufacture.
- b) Type design, size of conductor, rated voltage and standard.
- c) Continuous length marking every meter.
- d) Year of manufacture.

6. Availability of the samples:-

- a) The bidder must to provide samples of the quantity required, it should be enough length that contain all above jacket marking, and this samples must be provide at envelopes opening.

The samples must be stamped by manufacture company.

7. TESTS:-

- a) All required tests shall be done in accordance with the latest issue of standards IEC, BS, tests shall be performed at the manufacture's plant at bidder expense.
- b) In addition to the above tests on component wires, the complete conductor shall be tested for its conformity to this specification.
- c) Failure of any of the test specimens to comply with the requirements of this specification shall constitute ground for rejection of the lot as represented by the specimen.
- d) Certified test reports in (2) copies shall be furnished for each lot of conductor before shipment.

8. INFORMATION TO BE FURNISHED:-

- a) The bidder shall furnish sufficient information to fulfil this specification, including in attached schedule.
- b) Shipping details, including drawings, showing dimensions and construction details of the shipping reels and complete catalogue information



PTC Specification

DC Cable

no	Technical specifications (description)	PTC Specifications	Tender Spec
1	nominal cross section area		
2	quantity requested (km)	See the schedule quantities	
3	name of manufacture		
4	Year of manufacture		
5	Continues length marking every meter		
6	Country of origin		
7	Rated Voltage (v)	450 - 750	
8	Standard of design		
9	Conductor Materials	soft annealed copper fine wire (flexible)	
10	Type	CU/ (XLPE or PVC)/ PVC	
11	Conductor shape	circular	
12	Actual cross section area (mm ²)		
13	Insulation Thickness (mm)		
14	Insulation Material	XLPE	
15	Max. operating temperature	90°C for XLPE and 70°C for pvc	
16	short circuit temperature	250°C for XLPE and 160°C for pvc	
17	color of Insulations	black	
18	(wire number X wire Diameter) of conductor (NO X mm)		
19	conductor Weight (kg/m)		
20	Completed cable Overall diameter (mm)		
21	Cable Weight (Kg/Km)		
22	Max DC Resistance of conductor at 20°C (Ω /Km)		
23	current carrying capacity in ground at 30°C(A)		
24	current carrying capacity in air at 30°C(A)		
25	Density at 20°C		
26	Color of outer sheath	(50% of qty black , 50% of qty blue)	
27	Thickness of outer sheath mm		
28	Availability of samples with Jacket marking information	(Must be provided)	



SPECIFICATIONS FOR MULTICORE UNDERGROUND CABLES WITH STRANDED
COPPER CONDUCTOR, (XLPE) INSULATED, STEEL WIRE ARMoured AND PVC
SHEATHED (11-15 kV)

1. SCOPE :-

1. This specification defines the requirements of the design, manufacture, testing, delivery of 11kv-15KV class cross-linked polyethylene (XLPE) insulated to supply, high voltage, multicore power cables, for use underground, circuits 3 phase 11kv- 15kV solidly grounded system and operating at 50Hz.

2. STANDARDS :-

1. Specified here in the high voltage cables shall comply with BS or the latest issue of IEC, standard or other standard internationally approved (ANSI, DINetc).

3. Armor Bedding:-

1. The core cables, the armour bedding shall consist of 1 layer or alternatively, may be in the form of extruded PVC compound accordance with the latest issue IEC, BS standards or other standard internationally approved (ANSI, DIN, etc).

4. Armour :-

1. The armor for the cable shall be consist of one layer of galvanized steel wire complying with BSEN1, BS, IEC or with the latest issue of this standard or other standard internationally approved (ANSI,DIN,.....etc).
2. Outer covering shall be embossed with name of manufacturer, "ELECTRIC CABLES" as per the latest issue of BS &IEC standard or other standard internationally approved (ANSI, DINetc).
3. Cables should be designed & tested according to the latest issue BS, IEC standards or other standard internationally approved (ANSI, DINetc).



5. SERVICE CONDITIONS:-

Conductor shall be suitable to ensure satisfactory operation for the following site conditions:

- | | |
|---|------------------------|
| 1. Altitude: | 2500 m above sea level |
| 2. Ambient temperature: | -5 °C up to 50°C. |
| 3. Relative humidity: | 5-100 % |
| 4. Average thermal resistivity of soil: | 1.5°C.m/W |

6. DETAILED REQUIREMENTS:-

Construction:

1. Conductor of stranded annealed copper wires, high conductivity, circular shape,
2. XLPE Insulation heat resistive adheres tightly to conductors, yet strips easily, leaves conductor clean. In four different colours i.e. Red, Yellow and Blue.

7. Cable Length Markings:-

1. The cables outer marking should be consist of the following:
2. Name of manufacture.
3. Type design, size of conductor, rated voltage and standard.
4. Continuous length marking every meter.
5. Year of manufacture.

8. Availability of the specimen:-

1. The bidder must to provide specimen of the quantity required, it should be enough length that contain all above jacket marking.

9. Conditions of Operation:-

1. All cables shall be suitable for operation at the guaranteed maximum sustained rating, through all seasons of the year.



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2. The nominal system voltages which the power cables will be connected, is $U = 15\text{KV}$ with the highest operating voltage $U_m = 36\text{kV}$.
3. The A.C system neutrals are present solidly earthed. Resistance earthing may be employed in future and all plant shall be suitable for use the either method of earthing.
4. The maximum three-phase symmetrical fault current which the cables may be subjected is 25kA for one second, i.e. each conductor shall be able to carry the specified current for the specified time and its final temperature shall not exceed 250°C .
5. The maximum foreseeable earth fault current will be 11kA for one second, i.e. the metal armour/screen shall be capable of carrying for the specified time the specified fault current.
6. The final temperature of the metal armour/screen shall not exceed 250°C .

10. Current Rating:-

1. The maximum continuous current rating and the maximum permissible conductor temperature for the cable routes and conditions of installation shall be stated in the Schedule Particulars and Guaranties. Details of permissible overloads that can be applied to the cables with respect to the "in service" conditions. Shall also be stated.
2. The specified ratings shall be guaranteed with two circuits at full load.

11. Reliability:-

1. All cables shall be designed for operation where Continuity of supply is the prime consideration.
2. All cables shall be satisfactory in operation under the atmospheric and climatic conditions prevailing at the site and under such variations of current, voltage and frequency as may be met under fault and surge conditions on the system.
3. All cables shall be designed for operation on systems where continuity of supply is the prime consideration. They shall also be satisfactory in operation under the atmospheric and climatic conditions prevailing at the site and under such variations of current, voltage and frequency as may be met under fault and surge conditions on the system.

12. Outer Coverings:-

1. The specified of the cable outer coverings shall be provided in the form of an extruded black sheath, as a protection against termite attack.



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2. The outer coverings shall contain an evenly dispersed mixture of Adrian and dieldrin in the ratio of 0.25 per cent each by weight of PVC, or another suitable deterrent which shall be stated in Schedule.
3. The supplier shall state in Schedule and on the cable test certificate the amounts of insecticide added. The PTC reserves the right to select samples of such outer coverings for analysis to check the quantities added.
4. The outer covering on all cables shall have been subjected to abrasion penetration and saline bath tests in accordance with the latest issue IEC, B.S standards or other standard internationally approved (ANSI,DIN,.....etc) during the type approval program of tests and approved.
5. The surface of the outer covering of cables shall preferably be coated with a baked-on graphite layer to form an electrode for the H.V.d.c. sheath integrity tests to be applied at the factory and for the periodic HV. D.C. tests after installation.
6. If there is any damage to the outer covering which in the opinion of the PTC, appears to be repairable the supplier may after receiving agreement attempt to affect repair by an approved method. The agreement to attempt repair shall not bind the PTC to accept the repaired cable length when it is re-offers for inspection and test.

13. Cable Length:-

1. Where applicable cable shall be supplied in maximum drum lengths not exceeding 500 meter, the drum shall not contain more than one length.

14. Cable Drums:-

1. Cable drums shall be non-returnable and shall be made of timber, should impregnate against fungal and insect attack, or made of steel suitably protected against corrosion.
2. They shall be with closely fitting battens in accordance with the latest issue IEC, B.S standards or other standard internationally approved (ANSI,DIN,.....etc).
3. Each cable drum shall bear distinguishing number on the outside of one flange.
4. Particulars of the cable, i.e. manufacture name, PTC name, voltage, conductor size and material, number of cores, type, length, gross and net weights shall be clearly shown on one flange.
5. The actual method of drum marking shall be with the PTC approval.



15. TESTS :-

1. All test requirements contained, applicable the latest issue of IEC,BS standards or other standard internationally approved (ANSI,DIN,.....etc) are to be performed and manufacturer's plant at his expense Testing requirements includes, but are not necessarily limited to the following:
2. All test requirements contained approved (ANSI,DIN,.....etc) are to be performed and manufacturer's in applicable IEC 60502-2 or the latest issue of IEC,BS standards or other standard internationally plant at his expense Testing requirements includes, but are not necessarily limited to the following.

16. Sample Tests at Works:-

1. One sample length shall be cut from each complete cable length and tested in accordance with the latest issue of IEC & BS Standards or other standard internationally approved (ANSI, DINetc).
2. During the H.V. test, the discharge inception and extinction voltages shall be recorded. The extinction voltage shall not be less than $1.2U_0$.
3. Flame test to the latest issue IEC & BS Standards or other standard internationally approved (ANSI, DINetc).
- 4 -The samples must be stamped by Manufacture Company.

17. INFORMATION TO BE FRNISHED :-

1. The supplier shall furnished sufficient information as given in the schedule of particulars guarantee, shipping, details, including drawings, showing dimensions and construction details of the shipping reels and complete catalogue information.

18. JOINTING ACCESSORIES :-

General :-

1. Jointing accessories shall include all necessary internal and external fittings, insulating materials, glands, armour clamps, earth bounding terminals and fitting compounds.
2. An approved spilt outer joint box of glass fibber reinforced plastic or an approved shrinkable type shall be provided to contain each straight through joint. The space between inner and outer box shall be compound filled or other suitable type.



19. Cable Jointing Instructions and Drawings:-

1. Copies of the jointing instructions of each type of cable terminating and jointing accessories should be submitted. One copy of each instruction should be bound into each set.

20. SHIPPING AND MARKING:-

1. Conductor shall be furnished on reels designed for shipment in Accordance with requirements presented in the General Instruction for Conductors included in this specification document.
2. The drum barrel shall be covered with a layer of waterproof sheet plastic or shall be painted with aluminum flake paint secured immediately under the circumstance battens so that it is not in contact with the conductor.
3. The standard length of each piece of the conductor to be shipped in each reel shall be as follows: 250 - 500m according the conductor sizes required in schedule.
4. Drums shall be non returnable and shall be made of timber; pressure impregnated against fungal and insect attack, or made of steel suitably protected against corrosion. They shall be lagged with closely fitting battens in accordance with the latest issue IEC, B.S or other standard internationally approved (ANSI, DINetc). Standards. The required information shall be clearly shown on the flange.
5. Each reel shall be durably marked on the outside and tagged on the inside with the following information, in addition to other shipping information as may be required.
 - a) Manufacture's name,
 - b) PTC name,
 - c) Type of conductor,
 - d) Size of conductor,
 - e) Length of conductor,
 - f) Gross and net weight.

The attached schedules should be filled by the Manufacture

High Voltage Armoured power cable specifications.

no	Specifications Description	PTC Specifications	Tender Spec
1	quantity requested KM	See the schedule quantities	
2	No. Of cores X nominal cross section area	See the schedule quantities	
3	Manufacture company		
4	Country of origin		
5	Date of manufacture		
6	Continuous length marking every meter		
7	Rated voltage	(11-15) KV	
8	Voltage between phases of three phase Circuit =U KV		
9	Standard of design		
10	Type	CU/XLPE/SWA/PVC With screen and PVC layer	
11	CONDUCTOR		
	- Cross sectional area mm²		
	- Material	COPPER	
	- Design		
	- Overall diameter mm		
	- Number and diameter of wires No/mm		
	-shape		
12	CONDUCTOR SCREEN		
	- Material		
	- Thickness mm		



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13	Insulation		
	- Type	XLPE	
	- Operating temperature	90°C	
	- Short circuit temperature	250°C	
	- Thickness	mm	
	- Colours	Red/yellow/blue	
14	CORE SCREEN		
	- Material		
	- Thickness	mm	
	-Diameter over screen	mm	
15	METALLIC LAYER		
	- Material		
	- Thickness		
	- Protection tape		
	- Nominal diameter over metallic screen		
16	ARMOUR LAYER		
	- Material/type	Steel /wire	
	- No of wire dimensions	No/mm	
	- Nominal diameter over armour layer	mm	
17	FILLER – Material		
18	OUTER COVERING		
	- Material	PVC (termite repellent)	
	- Thickness	mm	
19	COMPLETED CABLE		
	- Overall diameter	mm	
	- Cable weight	kg/km	



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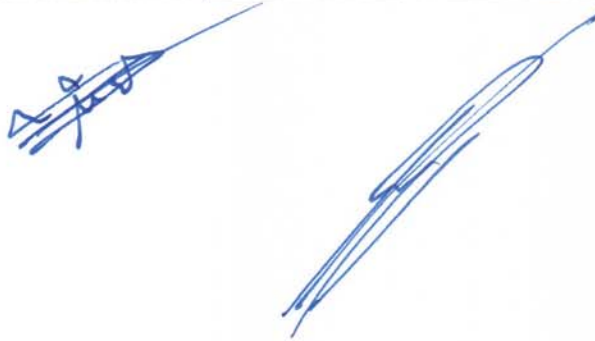
20	CABLE DRUMS:		
	- Material		
	- Overall diameter	m	
	- Width	m	
	- Weight loaded with maximum drum length		
21	Maximum dielectric stress at the conductor screen (assumed smooth)	MV/m	
22	Minimum radius of bend around which cable can be laid		
	- Laid direct	m	
	- in ducts	m	
	- in air	m	
23	Nominal internal diameter of pipes or ducts through which cable may be pulled	mm	
24	Maximum DC resistance Per km of cable at 20°C		
	- of conductor	Ω	
	- of metallic layer	Ω	
25	Maximum AC resistance of conductor Per km of cable at maximum conductor temperature	Ω	
26	INSULATION RESISTANCE per km of cable at		
	- 20°C	M Ω	
	- Max. rated temp	M Ω	
27	EQUIVALENT STAR REACTANCE per meter of 3-phase circuit at nominal frequency	$\mu\Omega$	
28	MINIMUM ELECTROSTATIC CAPACITANCE Per meter of cable	pF	
29	MAXIMUM CHARGING CURRENT Per meter of cable at nominal voltage U_o	ma	
30	Samples with cable length marking in formation	Must be provided	

المعايير الأساسية للكابلات (المرنة)

Single Flexible Cable(DC)

- ١- يجب أن تحتوي الكابلات على طبقتين للعازل (العازل + الطبقة الخارجية).
- ٢- أن تكون الكابلات مرنة (Flexible) ونسبة النحاس لأقل عن 90% .
- ٣- يجب تحديد معيار التصنيع .
- ٤- توفير عينات مكتملة ومطابقة للعرض الفني ومحدد عليها بيانات الشركة المصنعة وتسلم قبل فتح المظاريف .
- ٥- مقاومة الناقل وسماكة العازل يجب أن تكون وفقا للجدول الآتي :-

رقم	المقاومة DC/R Ω/Km	سماكة العازل (m.m)	مساحة قطع الناقل (m.m ²)
1	0.206	1.6	1x95m.m ²
2	0.272	1.4	1x70m.m ²
3	0.554	1.2	1x35m.m ²
4	0.78	1.2	1x25mm ²
5	1.21	1	1x16mm ²
6	1.91	1	1x10mm ²



المعايير الأساسية لكابلات (الضغط العالي)

High Voltage Cable (11-15) KV

- (1) يجب أن تكون نوع مادة العازل XLPE.
- (2) نسبة النحاس في الناقل يجب أن لا تقل عن 90%.
- (3) سماكة العازل والمقاومات (AC,DC) يجب أن تكون وفقاً للجدول الآتي

مساحة قطع الناقل (m.m) ²	سماكة العازل (m.m)	المقاومة Ω/Km	
		DC/R @ 20 C°	AC/R @ 90 C°
3x50 m.m ²	5.5	0.387	0.494

- (4) تحديد معيار التصنيع.
- (5) توفر عينات مكتملة ومطابقة للعرض الفني ومحدد عليها بيانات الشركة المصنعة وتسلم قبل فتح المظاريف.

جدول الكميات للكابلات الكهربائية

أولا : كابلات التغذية الكهربائية AC (ضغط عالي)

م	اسم الصنف وأنوعه	الكمية بالمتر	سعر المتر \$	السعر الإجمالي \$	ملاحظات
1	كابلات تغذية كهربائية ضغط عالي معزول 11KV/AC مسلح معزول 3X50m.m ²	1500			

ثانيا : كابلات التغذية الكهربائية DC (Flexible cable)

م	اسم الصنف وأنوعه	الكمية بالمتر	سعر المتر الطولي \$	السعر الإجمالي \$	ملاحظات
1	كابل تغذية (شعيرات) معزول Flexible/ DC ثون ازرق 1X95m. m ²	500			
2	كابل تغذية (شعيرات) معزول Flexible/ DC ثون اسود 1X95m. m ²	500			
3	كابل تغذية (شعيرات) معزول Flexible/ DC ثون ازرق 1X70 m ² . m ²	5000			
4	كابل تغذية (شعيرات) معزول Flexible/ DC ثون اسود 1X70 m ² . m ²	5000			
5	كابل تغذية (شعيرات) معزول Flexible/ DC ثون ازرق 1X35 m ² . m ²	800			
6	كابل تغذية (شعيرات) معزول Flexible/ DC ثون اسود 1X35 m ² . m ²	800			
7	كابل تغذية (شعيرات) معزول Flexible/ DC ثون ازرق 1X25 m ² . m ²	1000			

			1000	كابل تغذية (شعيرات) معزول Flexible/ DC ثون اسود 1X25 m ² . m ²	8
			2000	كابل تغذية (شعيرات) معزول Flexible/ DC ثون ازرق 1X16 m ² . m ²	9
			2000	كابل تغذية (شعيرات) معزول Flexible/ DC ثون اسود 1X16 m ² . m ²	10
			2000	كابل تغذية (شعيرات) معزول Flexible/ DC ثون ازرق 1X10 m ² . m ²	11
			2000	كابل تغذية (شعيرات) معزول Flexible/ DC ثون اسود 1X10 m ² . m ²	12
				الإجمالي	

ملاحظات :

1- يجب توفير عينات مع العرض مدون عليها بيانات الشركة المصنعة

2- يجب ان يتم ترقيم أطوال الكابل .