

7. Tests

Cables and accessories shall be subjected to inspections and tests by our inspectors or international inspectors at any time during manufacture. The manufacturers shall provide inspection facilities for the said inspection shall be made at place of manufacture or at international testing facilities.

8. Cables Joints and Termination:

Cable joints and terminations to be slip on or heat shrinkable type complete with all necessary jointing materials suitable for 24 & 36 kV under-ground cable from qualified manufacturers. The terminations and joints should be as follows :-

- 6-1 Straight through joint for cable shown under 5.1.1 complete .
- 6-2 Outdoor terminations suitable for cable shown under 5.1.1 complete
- 6-3 Indoor terminations suitable for cable shown under 5.1.1 complete
- 6-4 straight through joint suitable for cable shown under 5.1.2 complete
- 6-5 Outdoor terminations suitable for cable shown under 5.1.2 complete
- 6-6 Indoor terminations suitable for cable shown under 5.2.1 complete
- 6-7 straight through joint suitable for cable shown under 5.2.1
- 6-8 indoor terminations suitable for cable shown under 5.2.1 complete
- 6-9 Outdoor terminations suitable for cable shown under 5.2.1
- 6-10 indoor terminations suitable for cable shown under 5.2.2
- 6-11 indoor terminations suitable for cable shown under 5.2.3

N.B:-

- 1- The prices shall be based on L.M.E. price for copper bar () U.S.D/M.T. The formula for price variation shall be given.
- 2- Sample of cables to be submitted with the offer.

Table No. (1)

#	cross section area / mm ²	Min. No. of wires	Max. D.C resistance at 20 °C ohm/km	Short circuit current for 1 sec. in KA
1	50	6	0.387	7.5
2	70	12	0.268	10.5
3	95	15	0.193	15
4	150	18	0.124	21.5
5	400	53	0.0470	55

1. Scope of The Tender:

This tender includes for the manufacturing, testing, packing, shipping delivery EX-works, FOB & C&F of 18/30 (36) kV and 12/20 (24) kV cables.

2. General Requirements:

The materials shall be of first class quality and designed for continuous satisfactory operation as continuity of supply is of prime importance and to operate satisfactorily under variation of load, voltage and short circuit or other conditions which may occur on the system provided that these variations are within the assigned rating of the apparatus. The materials used shall be suitable for the following climatic and soil conditions.

2-1 Ambient temperature:

Highest maximum (in the shade) 55 °C for about 6 hours a day

Lowest minimum (-10) °C

Maximum yearly average (+30) °C

Maximum daily average (+40) °C

2-2 Sun Shine temperature:

Black objects under direct sunshine attain a temperature of 80 °C

2-3 Air humidity:

Maximum 92% at 40 °C

Minimum 12%

Yearly average 44%

2-4 Altitudes:

From sea level up to (1000m)

3. Technical Requirement:

3-1 System Data

a. 33KV System	
Nominal voltage	33000 volts
Highest system voltage	36000 volts
System	3-phase, 3 wire with neutral grounding zig-zag transformer to limit the earth fault current to 1000 Amp.
Frequency	50Hz
Short circuit breaking current	25KA. r.m.s at 33000 volts.

b. 11 KV System	
Nominal voltage	11000 volts
Highest system voltage	12000 volts
System	3-phase, 3wire neutral earthed through resistance of 21.1 Ohm limiting the earth fault current to 300A
Short circuit breaking current	25 KA R.M.S at 11000 volts

3-2 Standards:

The cable shall be in accordance with the latest issue of the I.E.C. particularly IEC nos 60502 & 60228 specifications and 60949.

3-3 Deviations

The tenderer shall particularly mention in his tender all deviations of his offer from the specifications described in these tender documents.

4. General Cable Characteristics:

4-1 Conductor:

Compact electrolytic annealed stranded plain circular copper Conductor of high conductivity 99.9% purity according to the attached table as in IEC standards mentioned above.

4-2 Conductor screen:

A layer of extruded semi-conducting compound forming a non metallic screen. The extruded semi- conducting compound shall be firmly bonded to the insulation.

4-3 Insulation:

Extruded XLPE cured with dry curing process:

a- 24kV nominal thickness 5.5 mm

b- 36kV nominal thickness 8 mm

4-4 Insulation screen:

a- Non metallic screen applied directly over the XLPE insulation and shall consist of a layer of extruded semi conducting compound and of 50% overlap semi-conducting swelling tape.

b- The metallic screen must be a combination of copper stranded and copper tape.

For 33kv cable the equivalent cross-section area to be 35 mm^2

For 11kv cable the equivalent cross-section area to be 25 mm^2

4-5 Filler & bedding :

The three cores then laid up with suitable extruded (low thermal resistivity material easy to remove good flexibility and to be mentioned with the offer such as (EPR) or (PP)) fillers, a compact circular assembly and bedded with a layer of extruded P.V.C. 2mm thickness.

4-6 Waterproof tape:

A layer or suitable tape (swelling tape) for water proofing to be laid over the bedding.

4-7 Metallic Armor:

The three cores then armored with double galvanized steel tapes of thickness not less than 0.5mm. 50% overlap.

4-8 PVC Jacket:

Over all extruded PVC seamless sheath to prevent moisture from penetrating and provides good corrosion protection thickness not less than 3 mm and to be antitermite treated (non polluted material).

Marking of (11 kV) or (33 kV) in the Arabic language should be stamped each one meter length and treated. Also name, year of manufacture, Voltage & cross section in the Arabic language. The colors are to be :- RED FOR 33 kV BLACK for 11 kV.

Clause 14.3 IEC 60502

Note: the thickness to be according to the formula:

$$T_s = 0.035D + 1 \text{ mm}$$

where D = Fictitious diameter immediately after the sheath

Ts = thickness in mm

4-9 Packing

The required cables lengths are to be supplied on sea – worthy good quality steel drums of lengths as specified in item 5.

5. Type of Cables:

5-1 36 KV cables:

5-1-1 1x400 mm²

For this cable the applicable paragraphs of article a are :-

4.1,4.2,4.3,4.4,4.6,4.8,4.9-with rated voltage VO/V=18000/30000 V (suitable for highest system voltage of 36000 V) 500 m. length drums

5-1-2 3x150 mm²

For this cable the applicable paragraphs of Article 4 are :-4.1,4.2,4.3 4.4,4.5,4.6,4.7,4.8,4.9 – with rated voltage VO/V =18000/30000V (suitable for highest system voltage of 3600v) on 250m length drums .

5-2 24 kv cables:

5-2-1 1x400 mm²

For this cable the applicable paragraphs of Article 4 are : 4.1,4.2,4.3,4.4,4.6,4.8,4.9 - with rated voltage VO/V =12000/20000 (suitable for highest system voltage of 12000V) with 250m length drums .

5-2-2 1x150 mm²

For this cable the applicable paragraphs of Article 4 are : 4.1,4.2,4.3 (same note as para.5-2-1) 4.4,4.8,4.9 with 500m length drums .

5-2-3

1x95 mm²

1x70 mm²

1x50mm²

(same statement AS 5-2-2)

5-2-4 3x150 mm²

For this cable, the applicable paragraph of Article 4 are :

4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,4.9-with rated voltage 12/20 KV and thickness of , insulation 5.5 mm² with 250 cable drums .

6. Technical Information for Cables:

The tenderer is requested to give following information with his offer:-

7-1 Resistance of copper per km of cable

7-2 Inductance per km of cable

7-3Capacitance per km of cable

7-4 Insulation resistance in M.OHMS between cores / screen

7-5 Weight of copper per km of cable

7-6 Overall weight of cable per km of cable

7-7Overall diameter of finished cable in mm

7-8 Type of chemical treatment against termite in the outer sheath.

7-9 Cross section drawing and details of cable layers and catalogues.

**Ministry of Electricity
Planning and Studies Office
Baghdad – Iraq**

Specification No.	D-03
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**TECHNICAL SPECIFICATION
OF
MEDIUM VOLTAGE POWER CABLES**

REVISION	YEAR 2001	YEAR 2009
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