SECTION: 2.16

MEDIUM VOLTAGE CABLING

1.0 Scope

1.1 The scope of work shall cover supply, laying, connecting, testing and commissioning of low and medium voltage power and control cabling.

2.0 Standards

2.1 The following standards and rules shall be applicable:

1) IS: 1554 Parts I & II	PVC Insulated Heavy duty cable
2) IS: 3961	Recommended current Rating of cable
3) IS: 7098	XLPE Insulated cables

All codes and standards mean the latest.

3.0 Cables

3.1 All cables shall be 1100 Volt grade PVC insulated, sheathed with or without steel armouring as specified and with an outer PVC protective sheath. All cables shall have Flame Retardant, Low Smoke Sheath (FRLS) and meet, ASTM norms for the smoke density and Oxygen Index norms. Cables shall have high conductivity stranded aluminium or copper conductors and cores colour coded to the Indian Standards.

3.2 XLPE cables shall be same as PVC with an FRLS outer sheath.

3.3 All cables shall be new without any kinks or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on the surface of the cable at every 600mm centres.

4.0 Installation

4.1 Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the site and obtain the approval of the Architect/Consultant before laying the cable. Procurement of cables shall be on the basis of actual site measurements and the quantities shown in the schedule of work shall be regarded as a guide only.

4.2 Cables, running indoors shall be laid on walls, ceiling, inside shafts or trenches. Single cables laid shall be fixed directly to walls or ceiling and supported at not more than 500 mm. Where number of cables are run, necessary perforated cable trays shall be provided wherever shown. Perforated cable trays shall be minimum 2mm thick galvanised steel as specified in the schedule of work. Perforated trays shall not be directly suspended but supported on mild steel frame work or as approved. Cables laid in built-up trenches shall be on steel supports. Plastic identification tags shall be provided at every 30m.

4.3 Cables shall be bent to a radius not less than 12 (twelve) times the overall diameter of the cable or in accordance with the manufacturer's recommendations whichever is higher.

4.4 In the case of cables buried directly in ground, the cable route shall be parallel or perpendicular to roadways, walls etc. Cables shall be laid on an excavated, graded trench, over a sand or soft earth cushion to provide protection against abrasion. Cables shall be protected with brick or cement tiles as shown on drgs. Width of excavated trenches shall be as per drawings. Backfill over buried cables shall be with a minimum earth cover of 600mm. The cables shall be provided with cable markers at every 35 meters and at all loop points.

4.5 The general arrangement of cable laying is shown on drawings. All cables shall be full runs from panel to panel without any joints or splices. Cables shall be identified at end terminations indicating the feeder number and the Panel/Distribution board from where it is being laid. All cable terminations for conductors upto 4 sqmm may be insertion type and all higher sizes shall have tinned copper compression lugs. Cable terminations shall have necessary brass glands and all lugs shall be double compression type whether so specified or not. The end terminations shall be insulated with a minimum of six half-lapped layers of PVC tape. Cable armouring shall be earthed at both ends.

5.0 **Testing**

5.1 MV cables shall be tested upon installation with a 500V Meggar and the following readings established:

1) Continuity on all phases

2) Insulation Resistance
   (a) between conductors
   (b) all conductors and ground

All test readings shall be recorded and shall form part of the completion documentation.

6.0 **Mode of measurement**

6.1 Cable will be measured on the basis of a common rate per unit length indoor or outdoor and shall include the following:

For cables laid indoors:

i) Cables and clamps

ii) Installation, commissioning and testing

iii) Cable marking

OR

For cable buried underground:

i) Cables and protective bricks & tiles

ii) Installation, commissioning & testing

iii) Cable markers

6.2 Cable trays/racks will be measured on the basis of unit length for individual sizes and shall include

i) Galvanised steel perforated tray with necessary suspenders and frame supporting the tray.

ii) Installation and painting in 2 coats of black bituminous paint on one coat of red oxide primer.

6.3 Each cable termination will be measured as one unit for payment. Certain cable sizes are grouped together and rates shall be furnished against each group. The item shall include the following:

i) Lugs, glands, bolts, nuts

ii) All jointing materials

iii) Installations, testing and commissioning

iv) Earthing the glands

6.4 For cables buried under ground excavation shall be paid for additionally for the following per unit volume:

i) Excavation and back filling

ii) 6" Soft Earth Cushioning below and above cable

The cost of laying protective tiles shall be part of cable cost as stated above.