LOW TENSION POWER CABLES (PVC INSULATED)

1.0 SCOPE:

This specification governs the quality requirements of design, manufacture, testing packing at manufacturers work and delivery at site, as per requirements complete in all respects.

2.0 APPLICABLE STANDARDS:

IS: 1554/IEC502	- PVC insulated (Heavy duty) electric cables.
IS: 8130	- Conductors for insulated electric cables and flexible cords.
ASTM- D2863	- Standard for critical oxygen index and temperature index test.
IEC-754 – 1	- Standard for acid gas generation test.
ASTM- D2843	- Standard for smoke generation test.
IEC-332.3	- Standard for flammability test (Part 3 Cat 'B')
SS 424 1475 Class F3	- Standard for flammability test.
IS:5831	- PVC insulation and sheath of electric cables
IS: 3975	- Mild steel wires, strips and tapes for armouring of cables.
IS:3961 (Part 2)	- Recommended current ratings for cables; part 2 PVC insulated and PVC sheathed heavy duty cables
IS:10418	- Wooden drums for electric cables.

3.0 CONSTRUCTIONAL REQUIREMENTS:

3.1 Voltage grade : 650/1100 V

3.2 Conductor : Standard aluminum conductor as per IS: 8130

3.3 Insulation : Heat resistant PVC (Type C)

3.4 Core identification : As per IS: 1554

3.5 Inner sheath : Extruded PVC sheath (ST2)/ extruded FRLS PVC sheath (As per enquiry)

3.6 Armour : Aluminium wire for single core cables.
Galvanised round wire for diameter less than 13mm
Galvanised strip for diameter more than 13mm

3.7 Outer sheath : Extruded PVC sheath (ST2)/ extruded FRLS PVC sheath (As per enquiry).

4.0 TESTS:

All acceptance and routine tests shalll be carried out on all cables at vendor's works in the presence of purchaser's representative. Wherever FRLS PVC sheaths are specified, cables shall be tested to demonstrate FRLS properties. Type test reports of similar cables whenever they are called for shall be furnished.

5.0 GENERAL:

5.1 Cables shall be delivered in maximum possible lengths of not less than 500 M neatly rolled on wooden drums (seasoned wood), with both ends sealed with moisture proof sealing.

5.2 Sequential marking of the length of the cable in meters shall be provided on the outer sheath at every one metre. The embossing shall be legible and indelible.

5.3 PVC/ Rubber end caps shall be supplied free of cost for each drum with a minimum of eight per thousand metre length. In addition, ends of the cables shall be properly sealed with caps to avoid ingress of water during transportation and storage.

6.0 CHARACTERISTICS FOR FRLS PVC:

Oxygen index : 29% (min) at room temperature (27±2°C)
Temperature : 250°C (min)
HCL gas emission : 20% (max)
Smoke density : <60%

7.0 DOCUMENTATION:

7.1 2 Copies of filled in technical data sheets (in given format only). Quality scheduled & type test certificates alongwith bid.

7.2 2 Copies of final data sheets for our approval after releasing LOL.

7.3 12 Copies of test certificates and technical data sheets with in one week after inspection.

7.4 QAP shall be furnished along with the offer.

8.0 GUARANTEE:

The cables shall be guaranteed for satisfactory operation of 18 months from the date of despatch or 12 months from date of commissioning whichever is earlier.

9.0 TECHNICAL DATA SHEETS:

Sl. No.	Description
1.	Make
2.	Type
3.	Applicable standards
4.	Voltage grade
5.	Suitable for system with: a) Service Voltage b) Neutral earthed / unearthed
6.	Maximum conductor temperature a) Continuous Deg. C b) Short time Deg. C
7.	Conductor a) Material b) Size (sq.mm) c) No. of wires & diameter of each wire (No./ mm)
8.	Insulation a) Material b) Type c) Thickness (nominal) mm
9.	Inner sheath a) Material b) Type c) Thickness (nominal) mm d) Extruded Yes / No e) Approx. outside dia over inner sheath mm.

10. Armouring
    a) Material
    b) Size
    c) DC Resistance at 20° C (Ohm/KM)

11. Overall sheath
    a) Material
    b) Type
    c) Thickness (nominal) mm

12. Approx. overall diameter (mm)

13. Standard drum length with tolerance (M)

14. Net weight of cable (Kg/ KM)

15. Continuous current rating for standard IS condition laid direct : Amps.

    a) In ground
    b) In duct
    c) In air

16. Short circuit current for 1- sec. (KA)

17. Electrical parameters at maximum operating temp. (Ohm / KM)
    a) Resistance
    b) Reactance at 50 Hz
    c) Impedence

18. Recommended minimum bending radius

19. Dearating factor for following ambient temp. in air ground:

    a) At 30° C
    b) At 35° C
    c) At 45° C
    d) At 50° C

20 Cable identification code

21 List of routine and type tests certificates enclosed.

1. INTENT OF SPECIFICATION:

This specification covers design manufacture, testing at Vendor's works and delivery of L.T. Power Cables.

2. APPLICABLE STANDARDS:

IS 9968 Part-I (1988) : Specification for Elastomer / Ethylene Propylene Rubber(EPR) insulated cables

IS 8130 (1984) : Specification for conductors of insulated electrical cables and flexible cords.

IS 6380 : Specification for elastomer / EPR insulation and sheath of electric cables

3. CLASS F3 CABLE CONSTRUCTION REQUIREMENTS:

3.1	Voltage grade	:	1100 V.
3.2	Conductor	:	Conductor shall be tinned annealed Copper wires complying with requirements of IS : 8130 – 1984.
3.3	Separator Tape	:	A separator tape made of suitable material shall be applied over the conductor.
3.4	Insulation	:	Insulation shall be of elastomeric/EPR compound conforming to Type IE - 2 of IS: 6380- 1984.
3.5	Core identification	:	As per IEC
3.6	Tape	:	Proofed tape or PETP tape or plastic tape or any other suitable tape may be applied over insulation. The tape when provided shall be applied with an overlap.
3.7	Braiding	:	Braiding of suitable material shall be applied reasonably close, but not so tight as to damage the insulation.
3.8	Compounding and Varnishing	:	Proper Compounding and Varnishing shall be done.
3.9	Laying of cores	:	Cores shall be laid together with a suitable right hand lay. Fillers in interstices shall be

used to provide reasonable circularity of laid up cable.

3.10 Binder Tape : Proofed Tape or PETP tape or Plastic tape or any other suitable tape over laid up cores shall be applied.

3.11 Sheath : Sheath shall be applied by extrusion process and the colour of sheath shall be black. Sheath shall consist of elastomeric compound complying with requirements of type SE – 4 of IS : 6380

4. **TESTS:**

All acceptance tests and routine tests shall be carried out on all cables as per IS 9968 part 1, at vendor's work in the presence of purchaser's representative. Type test reports of similar cables wherever they are called for shall be furnished.

5. **CABLE IDENTIFICATION, PACKING AND MARKING**

Manufacturer and cable identification shall be done through out the length of the cable by printing or indenting or embossing or any other suitable method. Distance between any two consecutive printings shall be not more than 1 metre.
Cables shall be delivered in neatly rolled on wooden drums, with both ends sealed with moisture proof sealing.
All information regarding cable shall be marked on cable drum.

6. **DOCUMENTATION:**

- 2 Copies of filled-up Technical data sheets to be furnished along with the bid.
- Quality Assurance Schedules.
- 3 Copies of Test Certificates within one week after the inspection.
- 5 Sets of final documents comprising of TDS, catalogues & certificates.
- Cables offered by Non-Indian vendors shall comply with IEC 502 & other relevant IEC specifications.

TECHNICAL DATA SHEETS

(To be filled in and sent along with the bid for each type of cable)

S.No. Description

Make

Type

Applicable Standard

Voltage Grade

Max. Conductor temperature:

Continuous Deg. C.
Short time Deg. C.

CONDUCTOR:
Material
Size (Sq. mm)
No. of wires & diameter of each wire (No. / mm)

INSULATION:

Material
Size (sq. mm)
Thickness(normal) mm.

INNER SHEATH:

Material
Type
Thickness (normal) mm.
Extruded (Yes/No.)
Approx. outside dia over inner sheath (mm).

Thickness (normal) mm

OVERALL SHEATH:
Material
Type
Thickness (nominal) mm.

APPROX OVERALL DIAMETER (MM):

CONTINUOUS CURRENT RATING FOR STANDARD IS CONDITION LAID
DIRECT : (Amps)

In ground
In duct
In all

SHORT CIRCUIT CURRENT FOR 1 Sec (KA)

ELECTRICAL PARAMETERS AT Max. OPERATING TEMP (Ohm/km)

Resistance (DC/AC)
Reactance at 50 Hz.
Capacitance.

TOTAL LOSSES (WATTS/METER):