

MATERIAL SPECIFICATIONS CELL

TECHNICAL SPECIFICATION

SINGLE CORE LT XLPE POWER CABLE OF SIZE

120 SQMM, 300 SQMM & 400 SQMM

I N D E X

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1.00 SCOPE

This specification covers design, manufacture, shop testing, packing and delivery of 1100 Volts grade, Aluminium conductor, XLPE insulated single core power cables by road/rail to the designated Stores in the State of Maharashtra.

The cable shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to purchaser, who will interpret the meaning of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in these specifications and / or the commercial order or not.

2.00 SERVICE CONDITIONS

The cable to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

Maximum ambient temperature (DegreeC)	50
Maximum temperature in shade (DegreeC)	45
Minimum temperature of Air in Shade (DegreeC)	3.5
Relative Humidity (Percent)	10 to100
Maximum annual rainfall (mm)	1450
Maximum wind pressure (Kg/sq.mm.)	150
Maximum altitude above mean sea level (Metre)	1000
Isoceraunic level (days per year)	50
Seismic level (Horizontal Acceleration)	0.3g

Climate: Moderately hot and humid tropical climate conducive to rust and fungus growth.

3.00 STANDARDS

Unless otherwise specified elsewhere in this specification, the rating as well as performance and testing of the LT XLPE power cables shall conform to the latest revisions available at the time of placement of order of all the relevant standards as listed in, but not limited to standards as below.

IS: 7098 (Part 1) / 1988 (amended upto date) suitable for working voltages upto and including 1100 Volts.

IS: 5831 / 1984 modified upto date in all respects with regard to PVC insulation and sheath of electric cables

IS: 8130 / 1984 - PVC insulated for conductors for insulated electric cables and flexible cords.

IS: 3975 / 1988 for Mild Steel wires, formed wires and tapes for armouring of cables

IS: 10462 (Part I) / 1983 - Fictitious calculation method for determination of dimensions of protective covering of cables.

4.00 GENERAL TECHNICAL REQUIREMENT

System Voltage

The cable shall be suitable for operation on three phase, 440 Volts, 50 Hz, solidly earthed system.

For the above system, the cable shall be suitable for continuous 10% over-voltages.

The cable shall bear ISI mark.

5.00 CONSTRUCTION

5.01 ARMOURED CABLES

1100 Volts Grade L.T. cable with stranded H2/H4 grade aluminium conductor, XLPE insulated, colour coded, laid up with fillers and / or binder tape wherever necessary, **Galvanised steel strip armoured** and provided with PVC outer sheath. The outer sheaths shall be of Type ST-2 as per IS: 5831/1984. The cable shall conform to IS:7098 (Part 1) / 1988 (amended upto date) and must bear ISI mark.

5.02 INSULATION AND OUTERSHEATH

Insulation and outer sheath shall be applied by separate extrusion. Colour of outer sheath shall be black. The quality of insulation shall be good and insulation shall not be deteriorated when exposed to the climatic conditions.

5.03 SEQUENTIAL MARKING ON THE LENGTH OF CABLE

Non erasable sequential marking of length shall be provided by embossing on outer sheath of the cable for each meter length as brought out elsewhere in this specification.

5.04 CONTINUOUS AC CURRENT CAPACITY

The continuous ac current capacity shall be as per Table given below.

1.1 KV SINGLE CORE AL/COPPER COND,XLPE INSULATED CABLES as per IS 3961 part (6) Table 2					
Cross-sectional area (Sq MM)	ARMOUR ED CABLE				
	Overall Diameter (mm)	Normal Current Rating in Amps			Short Circuit Current Rating for 1Sec.duration in KA
		Aluminum Conductor			
		Ground	Duct	Air	Aluminium
1cX120	24	230	206	276	11.28
1cX300	33	376	333	500	28.20
1cX400	38	429	378	589	37.60

6.00 TESTS

6.01 TYPE TESTS

The cable offered shall have successfully passed all type tests described in the IS: 7098 (Part 1) / 1988 (amended upto date).

The Type Test Certificate shall clearly indicate the constructional features of the type-tested cable. The Type Test Certificate of the cable shall be same as the cable offered. Separate Type Test Certificate for each offered size of cable shall be submitted.

All the Type Tests shall be carried out from Laboratories which are accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) of Govt. of India such as CPRI, ERDA, ERTL, etc. to prove that the cable meets the requirements of specification.

Type Test conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable.

The Type Test Certificate as per IS: 7098 (Part 1) / 1988 (amended upto date) shall be submitted along with the offer. The Type Test Certificate carried out during last five years shall be valid.

Further purchaser reserves the right to pick up cable at random from the lots offered / supplied and get the cable tested for some or all the Type Tests in presence of purchasers' representative at third party NABL lab at the sole discretion of the purchaser. For this purpose, the tenderer shall quote unit rates for carrying out each Type Test. However, such unit rates will not be considered for evaluation of the offer. It shall be the responsibility of the supplier to arrange such tests and purchaser shall be informed of the date and time of conduction of tests well in advance to enable him to witness such tests. Test charges of the testing authority, for such successful repeat type tests, shall be reimbursed at actual by the Purchaser. The supplier shall have no right to contest the test results of the third party lab for additional tests. In case the cable fails in the type tests, the complete supply shall be rejected. The supplier has to replace / take corrective action at the cost of the supplier.

6.02 ROUTINE TESTS

All the Routine tests as per IS: 7098 (Part 1) - 1988 amended upto date shall be carried out on each and every delivery length of cable. The result shall be given in test report.

The details of facility available in the manufacturer's works in this connection shall be given in the bid.

6.03 ACCEPTANCE TESTS

All Acceptance tests as per IS: 7098 (Part-I) 1988 as amended upto date including the optional test as per clause no 15.4 and Flammability Test as per clause No. 16.3 shall be carried out on sample taken from the delivery lot.

6.04 ADDITIONAL ACCEPTANCE TESTS

The following additional acceptance test shall be carried out on PVC compounds used for outer sheath as per IS: 5831 / 1984 (amended upto date).

- Hot Deformation Test.

7.00 PURCHASER'S AND MANUFACTURER'S IDENTIFICATION

The manufacturer and the Company shall be identified throughout the length of cable by embossing the manufacturer's name, the Company's name on the P.V.C. sheath. The manufacturer's name/ trade mark and M.S.E.D.C.Ltd. shall be embossed at least once on every meter length of cable, along with sequential marking for each meter length.

8.00 SIZE OF CABLE

The size of cables with voltages grade shall be as per schedule of requirement.

9.00 TESTING FACILITIES AND DETAILS OF EQUIPMENT

The supplier / tenderer shall clearly state as to what testing facilities are available in the works of manufacturer and whether the facilities are adequate to carry out type, routine and acceptance tests mentioned in IS: 7098 (Part-1) / 1988 (amended upto date) on the cable including test as per clause No. 6.04 of specification.

The facilities shall be provided by the bidder to purchaser's representative for witnessing the tests in the manufacturer's works.

If any test cannot be carried out at manufacturer's works reason shall be clearly stated in the tender.

10.00 PRE DESPATCH INSPECTIONS

All the type tests in accordance with IS: 7098 (Part-1) - 1988 (amended upto date) and additional acceptance test as per specification shall be performed on a sample of each size of cable ordered from the first lot of supply at the place of manufacturer unless otherwise specially agreed upon by the manufacturer and purchaser at the time of purchase.

The sample for type tests of each size of cable ordered from the first lot of supply shall be drawn by purchaser representative.

The manufacturer shall offer to the inspector representing the purchaser, all the reasonable facilities, free of charge, for inspection and testing, to satisfy him that the material is being supplied in accordance with this specification.

The MSEDCL's representative / Engineer attending the above testing will carry out testing in accordance with IS: 7098 (Part 1) - 1988 (amended upto date) and additional acceptance test as per this specification and issue test certificate approval to the manufacturer and give clearance for dispatch.

11.00 PACKING AND MARKING

11.01 UPTO 120 SQ. MM. SIZE

Cables shall be supplied in continuous standard length of 500 meters with plus minus 5% (five percent) tolerance wound on non returnable wooden drums of good quality or on non-returnable steel drums without any extra cost to the purchaser.

11.02 ABOVE 120 SQ.MM. SIZE

Cables shall be supplied in continuous standard length of 250 meters with plus minus 5% (five percent) tolerance wound on non returnable wooden drums of good quality or on non-returnable steel drums without any extra cost to the purchaser.

11.03 NON STANDARD LENGTH

5% (five percent) of the ordered quantity of respective size shall be acceptable in non-standard length which shall not be less than 100 meters in length.

11.04 In addition to the requirement as per IS, the following particulars shall be properly legibly embossed on the cable sheath at the intervals of not exceeding one meter throughout the length of the cable. The cables

with poor and illegible embossing shall be liable for rejection.

- (a) Manufactures name.
- (b) Voltage grade.
- (c) Year of manufacture.
- (d) Name of purchaser : M.S.E.D.C.L.
- (e) Successive Length.
- (f) Size of cable
- (g) Cable Identification :Electric
- (h) ISI mark

11.05 Packing and marking shall be as per clause No. 18 of IS 7098 (Part I) / 1988 amended up to date.

11.06 Supplier shall provide statistical data regarding cables of all sizes viz.-

- (i) Weight of one meter of finished product of cable of various sizes and ratings.
- (j) Weight of one meter of bare conductor used for cables of various sizes and ratings.

12.00 PERFORMANCE GUARANTEE:

The cable offered shall be guaranteed for satisfactory performance for a period of 30 months from the date of receipt of complete cable at site in good condition or 24 months from the date of satisfactory commissioning, whichever is earlier. In case of failure within this period, the supplier shall make good the faulty cable at no extra cost to the purchaser.

13.00 QUALITY CONTROL

The purchaser shall send a team of experienced engineers for assessing the capability of the firm for manufacturing of cable as per this specification. The team shall be given all assistance and co-operation for inspection and testing at the bidder's works. The cable supplied shall give service for a long period without drifting from the original calibration & performance must be near to zero percent failure.

14.00 QUALITY ASSURANCE PLAN

A detailed list of bought out items which got into the manufacture of

cables shall be furnished indicating the name of the firms from whom these items are procured. The bidder shall enclose the quality assurance plan invariably along with offer followed by him in respect of the bought out items, items manufactured by him & raw materials in process as well as final inspection, packing & marking. The Company may at its option order the verification of these plans at manufacturer's works as a pre qualification for technically accepting the bid. During verification if it is found that the firm is not meeting with the quality assurance plan submitted by the firm, the offer shall be liable for rejection.

TECHNICAL SPECIFICATION OF LT XLPE POWER CABLE FOR DISTRIBUTION NETWORK

GUARANTEED TECHNICAL PARTICULARS OF 120 Sq.mm SINGLE CORE LT XLPE ARMoured CABLE (A2XFaY)		
	DESCRIPTION	Single core, 120 sq.mm. aluminium stranded circular conductor, cross linked polyethylene insulated, aluminium strips armoured and overall extruded PVC type (ST 2) outer sheathed 1.1 kv grade LT LXPE power cable conforming to IS 7098 (part-1) 1988
1	GENERAL	
	Name of Manufacturer	
	Address	
	Brand	
	Applicable Standards	IS-7098 (P-1) 1988 Amended upto date
	Voltage Grade in (KV)	1.1KV
2	CONDUCTOR (Phase)	
	Material	Electrolytic Grade aluminium as per class -2 of IS :8130 - 2013 Amended upto date
	grade	H2/H4
	Shape	Stranded Circular Conductor
	Cross sectional Area (Sq.mm)	120 sq mm
	No. Of Cores	1Core
	Minimum No of Strand (Nos)	19 Nos
	Single strand Dia Before stranding (mm)	2.84 mm
	Max.D.C.resistance at 20 deg.c (Ohm/Km)	0.253 Ohm/Km
3	INSULATION (Phase)	
	Material	Extruded XLPE Insulation as per IS :7098 (part - 1) 1988 amended upto date
	Nominal THICKNES (MM)	1.5 mm
	Colour	Natural
4	ARMOURING	
	Material	Aluminium
	Types of Armouring	Strip
	Nominal size of Armouring (MM)	4.0 x 0.80 mm
5	OUTER SHEATH	
	Material	Extruded PVC as per type ST -2 compound confirming to IS : 5831 -1984amended upto date
	Minimum Thickness (MM)	1.40 mm
	Colour	BLACK
6	Approximate Overall Diameter (MM)	21 mm
7	Approximate Net Weight of cable. (Kg/Km)	560 Kg/ Km

TECHNICAL SPECIFICATION OF LTLXLPE POWER CABLE FOR DISTRIBUTION NETWORK

8	Embossing/Printing on cable at regular interval along its length	Brand-.....1100V GRADE 1C X 120 SQ.MM , MSEDCL, year of manufacturing, ISI Mark , IS-7098 CM/L-..... Successive Length
9	Standard Drum Length(Mtr)	500.mts. +/- 5%
10	Drums Type	IS: 10418 (Non Returnable Wooden Drums)
11	Continuous AC Current Carrying Capacity (Amp)	
	When laid in ground (30 Deg.C) (Amp)	230 Amp
	When laid in air (40 deg.c) (Amp)	276 Amp
12	Short Current Rating Of Conductor KA For -Duration of 1 Sec (KA)	11.28 KA
13	Minimum Bending Radius	15 X D (overall Diameter of Cables)

TECHNICAL SPECIFICATION OF LT XLPE POWER CABLE FOR DISTRIBUTION NETWORK

GUARANTEED TECHNICAL PARTICULARS OF 300 Sq.mm SINGLE CORE LT XLPE ARMoured CABLE (A2XFaY)		
	DESCRIPTION	Single core, 300 sq.mm. aluminium stranded circular conductor, cross linked polyethylene insulated, aluminium strips armoured and overall extruded PVC type (ST 2) outer sheathed 1.1 kv grade LT LXPE power cable conforming to IS 7098 (part-1) 1988
1	GENERAL	
	Name of Manufacturer	
	Address	
	Brand	
	Applicable Standards	IS-7098 (P-1) 1988 Amended upto date
	Voltage Grade in (KV)	1.1KV
2	CONDUCTOR (Phase)	
	Material	Electrolytic Grade aluminium as per class -2 of IS :8130 - 2013 Amended upto date
	grade	H2/H4
	Shape	Stranded Circular Conductor
	Cross sectional Area (Sq.mm)	300 sq mm
	No. Of Cores	1Core
	Minimum No of Strand (Nos)	61 Nos
	Single strand Dia Before stranding (mm)	2.55 mm
	Max.D.C.resistance at 20 deg.c (Ohm/Km)	0.100 Ohm/Km
3	INSULATION (Phase)	
	Material	Extruded XLPE Insulation as per IS :7098 (part - 1) 1988 amended upto date
	Nominal THICKNES (MM)	2.1 mm
	Colour	Natural
4	ARMOURING	
	Material	Aluminium
	Types of Armouring	Strip
	Nominal size of Armouring (MM)	4.0 x 0.80 mm
5	OUTER SHEATH	
	Material	Extruded PVC as per type ST -2 compound confirming to IS : 5831 -1984amended upto date
	Minimum Thickness (MM)	1.56 mm
	Colour	BLACK

TECHNICAL SPECIFICATION OF LTLXLPE POWER CABLE FOR DISTRIBUTION NETWORK

6	Approximate Overall Diameter (MM)	29.4 mm
7	Approximate Net Weight of cable. (Kg/Km)	1230 Kg/ Km
8	Embossing/Printing on cable at regular interval along its length	Brand- 1100V GRADE 1C X 300 SQ.MM , MSEDCL, year of manufacturing, ISI Mark , IS-7098 CM/L- Successive Length
9	Standard Drum Length(Mtr)	250 mts +/- 5%
10	Drums Type	IS: 10418 (Non Returnable Wooden Drums)
11	Continuous AC Current Carrying Capacity (Amp)	
	When laid in ground (30 Deg.C) (Amp)	376 Amp
	When laid in air (40 deg.c) (Amp)	500 Amp
12	Short Current Rating Of Conductor KA For -Duration of 1 Sec (KA)	28.2 KA
13	Minimum Bending Radius	15 X D (overall Diameter of Cables)

TECHNICAL SPECIFICATION OF LT XLPE POWER CABLE FOR DISTRIBUTION NETWORK

GUARANTEED TECHNICAL PARTICULARS OF 400 Sq.mm SINGLE CORE LT XLPE ARMoured CABLE (A2XFaY)		
	DESCRIPTION	Single core, 400 sq.mm. aluminium stranded circular conductor, cross linked polyethylene insulated, aluminium strips armoured and overall extruded PVC type (ST 2) outersheathed 1.1 kv grade LT LXPE power cable conforming to IS 7098 (part-1) 1988
1	GENERAL	
	Name of Manufacturer	
	Address	
	Brand	
	Applicable Standards	IS-7098 (P-1) 1988 Amended upto date
	Voltage Grade in (KV)	1.1KV
2	CONDUCTOR (Phase)	
	Material	Electrolytic Grade aluminium as per class -2 of IS :8130 - 2013 Amended upto date
	grade	H2/H4
	Shape	Stranded Circular Conductor
	Cross sectional Area (Sq.mm)	400 sq mm
	No. Of Cores	1Core
	Minimum No of Strand (Nos)	61 Nos
	Single strand Dia Before stranding (mm)	2.89 mm
	Max.D.C.resistance at 20 deg.c (Ohm/Km)	0.0778 Ohm/Km
3	INSULATION (Phase)	
	Material	Extruded XLPE Insulation as per IS :7098 (part - 1) 1988 amended upto date
	Nominal THICKNES (MM)	2.4 mm
	Colour	Natural
4	ARMOURING	
	Material	Aluminium
	Types of Armouring	Strip
	Nominal size of Armouring (MM)	4.0 x 0.80 mm
5	OUTER SHEATH	
	Material	Extruded PVC as per type ST -2 compound confirming to IS : 5831 - 1984amended upto date
	Minimum Thickness (MM)	1.56 mm
	Colour	BLACK

TECHNICAL SPECIFICATION OF LTLXLPE POWER CABLE FOR DISTRIBUTION NETWORK

6	Approximate Overall Diameter (MM)	34 mm
7	Approximate Net Weight of cable. (Kg/Km)	1230 Kg/ Km
8	Embossing/Printing on cable at regular interval along its length	Brand- 1100V GRADE 1C X 300 SQ.MM , MSEDCL, year of manufacturing, ISI Mark , IS-7098 CM/L- Successive Length
9	Standard Drum Length(Mtr)	250 mts +/- 5%
10	Drums Type	IS: 10418 (Non Returnable Wooden Drums)
11	Continuous AC Current Carrying Capacity (Amp)	
	When laid in ground (30 Deg.C) (Amp)	429 Amp
	When laid in air (40 deg.c) (Amp)	589 Amp
12	Short Current Rating Of Conductor KA For -Duration of 1 Sec (KA)	37.6 KA
13	Minimum Bending Radius	15 X D (overall Diameter of Cables)