

MATERIAL SPECIFICATION CELL

TECHNICAL SPECIFICATION
OF
LT PIN/SHACKLE INSULATORS

TECHNICAL SPECIFICATION OF LT PIN/SHACKLE INSULATORS

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TECHNICAL SPECIFICATION OF LT PIN/SHACKLE INSULATORS

1.00 SCOPE:

This specification covers the manufacture, testing at works, supply and delivery of Porcelain insulators for overhead power lines with a nominal voltage below 1000 volts. Both Pin and Shackle type insulators are covered.

2.00 SERVICE CONDITIONS:

The insulators specified herein shall be suitable for outdoor use under the following climate conditions.

- a) Maximum ambient temperature 50° C
- b) Maximum ambient temperature in shade 45° C
- c) Minimum temperature of air in shade 35° C
- d) Relative Humidity 10 to 100 %
- e) Maximum Annual rainfall 1450 mm
- f) Maximum wind pressure 150 Kg/m²
- g) Maximum altitude above mean sea level 1000 meters
- h) Isoceraunic level 50 days/year
- i) Seismic level (Horizontal acceleration) 0.3 g
- j) Climate: Moderately hot and humid tropical climate conducive to rust and fungus growth.

3.00 APPLICABLE STANDARDS:

IS 1445-1977(second revision including amendment Nos. 1,2,3,4 & 5) & its latest amendments if any.

4.00 SYSTEM PARTICULARS:

4.01 The insulators will be installed on three-phase, 433 volts AC & 50 Hz system in which the neutral is effectively grounded. The insulators shall be designed to work continuously at a voltage 10% in excess of the normal rated voltage.

5.00 DESIGN SPECIFICATIONS:

5.01 The insulators shall conform to provisions under IS 1445-1977 & its latest version in all respects. The Pin insulators shall be threaded to take mild Steel Pin of dimensions given below :

Pin insulator	Suitable for Head Shank	Dia.	Remarks
Type - 1	Steel Head threads as per profile of threads as insulators as given in Fig.5 of IS : 1445-1977	16 mm	Pin insulators Threads as per profile given in Fig.5 of IS 1445-1977

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5.02 The design of the insulators shall be such that stresses due to expansion and contraction in any part of the insulators shall not lead to its deterioration.

5.03 The insulators shall be suitable for use with all Aluminum Conductor or copper conductor or ACSR upto 100 sq.mm. The insulators should withstand the conductor tension the reversible wind load as well as the high frequency vibrations set due to wind.

6.00 INSULATION CHARACTERISTICS:

6.01 The insulators shall have the electrical and mechanical characteristic given in the table below:

Type of Insulator	Power frequency flashover voltage in kV (rms)		One minute powerfrequency withstand voltage in kV(rms)		Power frequency puncture withstand voltage kV(rms)	Min. failing load (kN)
	Dry	Wet	Dry	Wet		
Pin	25	>10	23	10	1.3 x the actual dry flashover voltage	3.5
Shackle Type-1	25	>10	23	10	1.3 x the actual dry flashover voltage	11.5
Type-2	25	>10	23	10		16.0

7.00 GENERAL REQUIREMENTS:

7.01 The porcelain used in the manufacture shall be sound, free from defects, thoroughly vitrified and smoothly glazed.

7.02 The glaze on the insulator shall generally be white/cream/brown except for the screw threads and the parts on which the porcelain is supported during fitting, which may be left unglazed, all other surfaces of the insulator, shall be efficiently glazed.

7.03 The insulator shall be in one piece. The Pin type Insulators shall have a top groove and dimensions as per IS 1445-1977 amended upto date. The shackle insulators shall have dimensions as per IS 1445-1977 amended upto date.

7.04 The insulator shall be marked properly in accordance with clause 6 of IS: 1445.

8.00 TESTING FACILITIES:

8.01 The tenderer must clearly indicate what testing facilities are available in the works of the manufacturer and whether the facilities are adequate to carry out all the routine as well as type tests. These facilities should be made available to M.S.E.D.C.L's Engineers, if deputed to carry out or witness the tests. If any tests cannot be carried out at the manufacturer's works, the reasons should be clearly stated in the tender.

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9.00 TESTS:

The insulators shall be tested in accordance with the procedures detailed in IS: 1445-1977 amended upto date, which are reproduced below:

9.01 Type Tests:

All the Type tests shall be carried out on the insulator as specified in IS 1445 - 1977 amended up to date. Following tests shall constitute the type tests:

- 1) Visual Examination
- 2) Verification of dimensions
- 3) Dry power frequency Voltage withstand test
- 4) Wet power frequency Voltage withstand test
- 5) Temperature cycle test
- 6) Mechanical failing load test
- 7) Power frequency puncture withstand test
- 8) Porosity test

All above Type test reports shall be submitted along with the offer.

9.02 Acceptance Tests:

9.02.1 The insulators, after having withstood the routine test shall be subjected to the following acceptance tests in the order given below:

- a) Verification of dimensions
- b) Temperature cycle test
- c) Mechanical failing load test
- d) Power frequency puncture withstand test
- e) Porosity test

9.02.2 The insulators selected in accordance with 9.02.1 above shall be divided into two equal parts and subjected to the tests indicated as below:

Tests	Part of sample
a) & b)	Both parts
c) & e)	First part
d)	Second part

9.02.3 Routine Tests:

This test shall apply to all the insulators. A visual examination of the insulator shall be made, the insulator shall be free from physical distortion of shape and the vitrified glaze shall be hard and smooth free from cracks or any other defect likely to be prejudicial to the satisfactory performance in service.

10.00 SAMPLING & REJECTION:

The number of insulators for the acceptance tests mentioned below shall be selected at random from the lot in accordance with the table 3 of IS 1445-1977 amended upto date, which is reproduced below:

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Lot size	First Sample Size	Second Sample Size	Acceptance Number	First Rejection Number	Second Rejection Number
(1)	(2)	(3)	(4)	(5)	(6)
Up to 500	8	8	0	2	2
501 to 1000	13	13	0	3	4
1001 to 3000	20	20	1	4	5
3001 to 10000	32	32	2	5	7
10001 to 35000	50	50	3	7	9
35001 and above	80	80	5	9	13

The number of insulators selected at random in accordance with column (1) & (2) of table shall be subjected to the acceptance tests. An insulator failing to meet any of the requirements for acceptance tests shall be termed as defective.

- 10.01** The lot shall be considered as conforming to the requirements for acceptance tests if the number of defectives found in the first sample is less than or equal to the corresponding acceptance number.
- 10.02** The lot shall be rejected if the number of defectives is greater than or equal to the corresponding first rejection number as per Column (5) of the table.
- 10.03** If the number of defectives is in between acceptance number and first rejection number, then a second sample of same size shall be selected from the lot at random and subjected to all the acceptance tests. The lot shall be considered as conforming to the requirements for acceptance tests, if the combined number of defectives in both the samples is less than the second rejection number as per column (6) of above Table, otherwise not.

11.00 TYPE TESTS:

The tenderer shall furnish detailed type test reports of the offered insulators as per clause 9.01 of this Specification. All the above Type Tests shall be carried out at laboratories, which are accredited, by the National Accreditation Board of Testing and Calibration Laboratories (NABL) of Government of India to prove that the insulators offered meet the requirements of the specification. These type tests should have been carried out within ten years prior to the date of opening of this tender.

The detailed Type Test Reports along with the relevant certified drawing are to be submitted along with the offer.

The purchaser reserves right to demand repetition of some or all the Type Test in presence of purchaser's representative at purchaser's cost. 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. In case the unit fails in the Type Tests, the complete supply shall be rejected.

The successful tenderer shall take approval of Type Test from CE (Testing), MSEDCL, Prakashgad, Bandra, Mumbai as per tender conditions.

12.00 MARKING:

Each insulator shall be legibly and indelibly marked to show the following:

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- a) Name of trademark of the manufacturer
- b) Year of manufacturer
- c) ISI certificate, mark, if any.
- d) 'MSEDCL' Marking.

Marking on porcelain shall be applied before firing.

13.00 PACKING:

All insulators shall be packed in suitable double gunny bags and shall be transported by road.

14.00 INSPECTION

The inspection may be carried out by the MSEDCL at any stage of manufacture. The successful Tenderer shall grant free access to the MSEDCL's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the MSEDCL, shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective. The supplier shall keep the MSEDCL informed in advance, about the manufacturing programme so that arrangement can be made for inspection.

15.00 SCHEDULE:

The tenderer shall fill in the following schedule which form part of tender Specification & offer. If the schedule is not submitted duly filled in with the offer, the offer shall be liable for rejection.

SCHEDULE 'A' – GUARANTEED TECHNICAL PARTICULARS

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SCHEDULE - 'A'
GUARANTEED TECHNICAL PARTICULARS
LT PIN INSULATOR

Sr. No.	Particulars	MSEDCL Requirement	To be offered by Bidder
1.	Type of insulator	LT Pin insulator	Text
2.	Are insulators manufactured as per IS 1445-1977 & latest revisions thereof	Yes	Text
3.	Type of material used in manufacture of the insulator	Porcelain	Text
4.	Colour of the insulator	(white/cream/brown)	Text
5.	Porcelain used in the manufacture is sound, free from defects, thoroughly vitrified and smoothly glazed	Yes	Text
6.	The dimensions of the insulators are as per the drawing specified in the specification	Yes	Text
7.	Pin insulator Type	Type-1, as per IS 1445-1977 amended upto date	Text
8.	Minimum failing load (kN)	3.5kN	Text
9.	Creepage distance (Min.) mm	Mfg. to give details	Text
Electrical Characteristics			
10.	Dry One Minute Power frequency withstand voltage kV (rms)	23 kV (rms)	Text
11.	Wet One Minute Power frequency withstand voltage kV (rms)	10 kV (rms)	Text
12.	Dry Power frequency flashover voltage in kV (rms)	25 kV (rms)	Text
13.	Wet Power frequency flashover voltage in kV (rms)	>10 kV (rms)	Text
14.	Power frequency Puncture withstand voltage in kV (rms)	Mfg. to give details	Text
15.	Whether marking on the insulator is as per specification	Yes	Text
16.	Weight of insulator (Kg)	Mfg. to give details	Text
17.	Whether insulators are type tested for the type tests as per specifications & relevant IS and Type Test Reports enclosed	Yes	Text
18.	Any other particulars which the bidder may like to give	Mfg. to give details	File

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SCHEDULE - 'A'
GUARANTEED TECHNICAL PARTICULARS
LT SHACKLE INSULATOR (TYPE-1/TYPE-2)

Sr. No.	Particulars	MSEDCL Requirement	To be offered by Bidder
1.	Type of insulator	LT Shackle insulator	Text
2.	Are insulators manufactured as per IS 1445-1977 & latest revisions thereof	Yes	Text
3.	Type of material used in manufacture of the insulator	Porcelain	Text
4.	Colour of the insulator	(white/cream/brown)	Text
5.	Porcelain used in the manufacture is sound, free from defects, thoroughly vitrified and smoothly glazed	Yes	Text
6.	The dimensions of the insulators are as per the drawing specified in the specification	Yes	Text
7.	Shackle insulator Type	Type-1 /Type-2 as per IS 1445-1977 amended upto date	Text
8.	Minimum failing load (kN)	11.5 kN (Type-1)/ 16.0 kN (Type-2)	Text
9.	Creepage distance (Min.) mm	Mfg. to give details	Text
Electrical Characteristics			
10.	Dry One Minute Power frequency withstand voltage kV (rms)	23 kV (rms)	Text
11.	Wet One Minute Power frequency withstand voltage kV (rms)	10 kV (rms)	Text
12.	Dry Power frequency flashover voltage in kV (rms)	25 kV (rms)	Text
13.	Wet Power frequency flashover voltage in kV (rms)	>10 kV (rms)	Text
14.	Power frequency Puncture withstand voltage in kV (rms)	Mfg. to give details	Text
15.	Whether marking on the insulator is as per specification	Yes	Text
16.	Weight of insulator (kg)	Mfg. to give details	Text
17.	Whether insulators are type tested for the type tests as per specifications & relevant IS and Type Test Reports enclosed	Yes	Text
18.	Any other particulars which the bidder may like to give	Mfg. to give details	File