



MAHAVITARAN

Maharashtra State Electricity Distribution Co. Ltd.

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SPECIFICATION NO. MSEDCL/ DIST/MM-III/02/2008

SPECIFICATION

FOR

L.T. PIN/SHACKLE INSULATORS

MAHARASHTRA STATE ELECTRICITY DISTRIBUTION COMPANY LTD.

TECHNICAL SPECIFICATION FOR LT PIN/SHACKLE INSULATORS
SPECIFICATION NO: MSEDCL/DIST/MM-III/02/2008
[OLD DIST. : 46/93 REVISED]

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MAHARASHTRA STATE ELECTRICITY DISTRIBUTION COMPANY LTD.

TECHNICAL SPECIFICATION FOR LT PIN/ SHACKLE INSULATORS

[SPECIFICATION NO: DIST/MM-III/02/2008]

1. SCOPE:

The specification cover 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. CLIMATIC CONDITIONS:

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

Sr. No.	Particulars	Value
1	Maximum ambient temperature (Degree C)	50
2	Maximum temperature in shade (Degree C)	45
3	Minimum temperature of Air in shade (Degree C)	3.5
4	Relatives Humidity (Percent)	10-100
5	Maximum annual rainfall (mm)	1450
6	Maximum wind pressure (Kg. /sq. M)	150
7	Maximum altitude above mean sea level (Meter)	1000
8	Isoceranic level (days per year)	50
9	Seismic level (Horizontal Acceleration)	0.3g
10	Moderately hot and humid tropical climate Conductive to rust and fungus growth	

3. SYSTEM PARTICULARS:

3.1 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.

4. DESIGN SPECIFICATIONS:

4.1 The insulators shall conform to provisions under IS : 1445/1977 or its latest version in all respects. The dimensions of the insulators are as

per Drawing No.62.57. The Pin insulators shall be threaded to take mild Steel Pin of dimensions given below :

Pin insulator	Suitable for Head Shank	Dia	Remarks
Type – I	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

- 4.2 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.
- 4.3 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.

5. INSULATION CHARACTERISTICS:

- 5.1 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 power frequency withstand voltage in KV(RMS)		Power frequency puncture withstand voltage KV(RMS)	Min. failing load (Kg.)
	Dry	Wet	Dry	Wet		
Pin	25	10	23	10	1.3 x the actual flashover voltage	860
Shackle Type-I	25	10	22	10	1.3 x the actual flashover voltage	1150
Type-II	25	10	22	10	1.3 x the actual flashover voltage	1600

6. GENERAL REQUIREMENTS :

- 6.1 The porcelain used in the manufacture shall be sound, free from defects, thoroughly vitrified and smoothly glazed.
- 6.2 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.

6.3 The insulator shall be in one piece. The pin type shall have a top groove and shall have dimensions as shown in the drawing. The shackle insulators shall have dimensions as shown in the drawing.6.4

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

7. **TESTING FACILITIES** :

7.1 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.

8. **TESTS:**

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

8.1 **Type tests:**

All the Type tests shall be carried out on the insulator as specified in clause 7.1 of IS:1445/1977. 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.

8.2 Acceptance tests:

8.2.1 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

8.2.2 The insulators selected in accordance with 8.2.1 above shall be divided upto 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

8.3 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.

9. 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 which is reproduced below:

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.

9.1 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.

9.2 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.

9.3 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.

10. **TEST CERTIFICATE:**

10.1 The tenderer shall furnish detailed type test reports of the offered insulators as per clause 8.2 of this Specifications. 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 five years prior to the date of opening of this tender. However, the tenderers who have supplied the insulators to the Board against order from Central Purchase Agency of M.S.E.B./ M.S.E.D.C.L. shall be exempted from submission of Type Test Report against this tender provided.

- i) There offered L.T.Shackle insulators are already fully type Tested at Laboratories accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) within five years prior to the date of opening of the tender.
- ii) There is no change in the design of Type Tested L.T. Shackle insulators and those offered against this tender.
- iii) Such tenders complying (i) and (ii) above shall furnish an undertaking in the format schedule “F” enclosed herewith.

The detailed Type Test Reports along with the relevant certified drawing etc. or undertaking in the format schedule “F” seeking exemption from their submission of the Type Test Reports 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 /waival of Type Test from C.E. (Dist.), M.S.E.B., Prakashgad, Bandra, Mumbai prior to the commencement the supply.

10.2 The successful tenderer shall submit a separate test certificate for each batch of insulators manufactured or consignment or part thereof supplied. The test certificate should clearly indicate the results of the routine, and sample tests carried out and the name of laboratory in which the tests were carried out with date of test etc. The certificate issued by recognized testing laboratory, or from their own works will be only accepted.

10.3 If required, the M.S.E.D.C.L. shall subject the consignment of insulators supplied to the aforementioned test. The testing under this clause will be carried out in any laboratory including M.S.E.D.C.L.’s own laboratory. Notice of such tests will be given by the M.S.E.D.C.L. to the supplier by ordinary post. However, the date of testing will not be postponed or altered at the request of the supplier. The supplier is at liberty to be present during this test.

11. **MARKING:**

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

- a) Name of trademark of the manufacturer
- b) Year of manufacturer
- c) ISI certificate, mark, if any.
- d) Tender Ref.

Marking on porcelain shall be applied before firing.

12. **PACKING** :

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

13. **INSPECTION** :

The M.S.E.D.C.L. may depute an Engineer to witness the routine and sample tests at their manufacturer's works for which advance intimation shall be given to the manufacturers whenever a lot is ready for dispatch. All reasonable facilities, should be made available without any charge to the inspector (representing the purchaser), to satisfy him that the material, is being supplied in accordance with this specification.

14. **SCHEDULES** :

The tenderer shall fill in the following schedule, which is part and parcel of the tender specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule 'A'	- Guaranteed Technical Particulars
Schedule 'C'	- Tenderer's experience
Schedule 'F'	- Proforma of Undertaking.

SEAL & SIGNATURE OF THE TENDERER

SCHEDULE – A

GUARANTEED TECHNICAL PARTICULARS

LT PIN/SHACKLE INSULATORS

SR. NO.	Parameter Name	Parameter type
1.	Type of insulator LT Pin insulator/LT shackle insulator	Text
2.	Are insulators manufactured as per IS 1445/1977 or latest revisions thereof	Boolean
3.	Type of material used in manufacture of the insulator	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.	Text
6.	The dimensions of the insulators are as per the drawing specified in the specification.	Text
7.	Pin insulator Type as per IS 1445/1977 is (Type-1)	Text
8.	Shackle insulator Type as per IS 1445/1977 is (Type-1/Type-2)	Text
9.	Minimum failing load for Pin Insulator KN (3.5KN)	Text
10.	Minimum failing load for Shackle Insulator KN (11.5KN/16.0KN)	Text
11.	Creepage distance (Min.) for pin insulator (mm)	Text
	Electrical characteristics	
12.	Dry One Minute Power frequency withstand voltage KV (rms)	Numeric
13.	Wet One Minute Power frequency withstand voltage KV (rms)	Numeric
14.	Dry Power frequency flashover voltage in KV (RMS)	Numeric
15.	Wet Power frequency flashover voltage in KV (RMS)	Numeric
16.	Power frequency Puncture withstand voltage in KV (rms)	Numeric
17.	Marking on the insulator is as per specification	Text
18.	Weight of insulator (Kg)	Numeric
19.	Insulators are type tested for the type tests as per specifications & relevant IS and Type Test Reports enclosed.	Boolean
20.	Any other particulars which the bidder may like to give	File

SEAL & SIGNATURE OF THE TENDERER

SCHEDULE – ‘C’

SCHEDULE OF TENDERER’S EXPERIENCE

Tenderer shall furnish here a list of similar orders executed / under execution by him to whom a reference may be made by Purchaser in case consider such a reference necessary.

Sr. No.	Name of Client & Description order.	Value of order along with size & qty.	Period of supply and commissioning	Name & Address to whom reference may be made.
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NAME OF FIRM_____

NAME & SIGNATURE OF TENDERER_____

DESIGNATION_____

DATE_____

SCHEDULE – ‘F’

PROFORMA OF UNDERTAKING

We hereby confirm that stay Insulators/Shackle Insulators offered by us against this tender are of the same design and type as have been supplied to M.S.E.B. against earlier order No. _____ dtd. _____ and all the Type Test Reports thereof were approved by C.E. (Dist.) vide letter No. _____ dtd. _____ (copy enclosed.)

We further confirm that the said Type Test have been carried out at _____ within five years prior to the date of opening of present tender.

SEAL AND SIGNATURE OF TENDERER