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**Annexure D**  
**TECHNICAL SPECIFICATION FOR**  
**11KV AUTOMATIC CAPACITOR SWITCH**

1.0 Scope:

This specification covers 11kV 50Hz pole-mounted automatically switched capacitor installations comprising of

- (i) 11kV automatic capacitor switches and
- (ii) 12.65kV capacitor banks of 660KVAR rating.

2.0 Operating/service conditions:

The equipment/material offered shall be entirely satisfactory for operation under the conditions indicated below:-

2.1 Service Conditions:

- a) Maximum Ambient Temperature (Degree C) :50
- b) Minimum Ambient Temperature (Degree C) :3.5
- c) Relative Humidity (%) :10 to 100
- d) Maximum annual rain fall (mm) :1450
- e) Maximum wind pressure (Kg/m sq) :150
- f) Maximum wind velocity :45
- g) Isoceraunic level (days/year) :50
- h) Maximum altitude above mean sea level (Meter) :1000
- i) Seismic level (Horizontal acceleration) :0.3g
- j) Moderately hot and humid tropical climate :  
conducive to rust and fungus growth

2.2 Operating Conditions:

- a) Nominal system voltage : 11 kV
- b) Highest system voltage : 12 kV
- c) Normal frequency : 50 Hz

### 3.0 Applicable Standards:

Unless otherwise stipulated in this specification, the capacitor switch shall comply with the latest version of IS:9920 (AC switches for voltage above 1000V).

### 4.0 Control Supply:

The capacitor switch shall be self powered from 11kV line i.e. no AC or DC control supply shall be required to be provided by the utility for its operation. The source of control supply (auxiliary transformer, etc.) should work satisfactorily with voltage fluctuations on the 11kV line from +10% to -20%.

### 5.0 Design & Construction requirements:

5.1 The capacitor switches may be of either single phase or three phase construction as per the standard design of the manufacturer. Preferred switching for single phase construction is as follows :-

In case of single phase construction the switching of capacitor shall be preferably near voltage zero i.e. when system voltage and capacitor voltage is zero.

5.2 The capacitor switch shall be suitable for outdoor installation and shall have sealed weather proof type construction.

5.3 The capacitor switch shall be provided with a mechanical indicator to show the contact position in the open/closed position. Provision shall also be made for manual closing and opening.

5.4 The metallic enclosure of the capacitor switch shall be provided with two earthing terminals (marked with the earth symbol).

5.5 The bushings provided on the switch shall be of higher quality porcelain and shall have clamp type of terminals to directly receive aluminium conductors upto 10mm.dia. in both horizontal and vertical directions. The terminal arrangement shall be such as to avoid bimetallic corrosion.

5.6 The switch should be provided with suitable structures for mounting the switch and control transformers on the double pole structures.

5.7 All nuts, bolts and mounting structures should be hot dip galvanized.

6.0 Control Parameter:

6.1 The control parameter for switching operation shall be the line current at the point of installation of the switch. The maximum value of the line current shall be 150A and accordingly, a current transformer of 150/5A ratio shall be supplied alongwith the switch to monitor the line current in one of the phases for the purpose of control. The switch shall have adjustable current at which the capacitor bank shall be switched on or switched off. This adjustment shall be available in continuous variation or in steps not exceeding 5A each over a minimum range of 10-40 Amps. [line current]. The capacitor bank shall be switched off whenever the 11kV line voltage exceed (+) 10% .The measurement of line voltage should be done by the auxiliary transformer as per clause 4.

7.0 Mechanical and Electrical Endurance:

a) Mechanical Endurance Test :

The switch shall be capable of performing not less than 10,000 mechanical operations.

b) Electrical Endurance Test :

The switch shall be capable of performing successful 10,000 electrical operations at 50A capacitive current.

In lieu of electrical endurance test of 10,000 electrical operations, tenderer should give performance guarantee for sixty months from the date of commissioning or sixty six months from the date of dispatch whichever is earlier.

8.0 Marking:

The capacitor switch shall be provided with a name plate legibly and distinctly marked with the following:

a) Name of the manufacturer.

b) Type, design and serial number.

c) Rated voltage and current.

- d) Rated frequency.
- e) Number of poles.
- f) Rated short time current (symmetrical).
- g) Rated making current.
- h) Rated capacitive switching current.

9.0 Tests:

The switch shall be subjected to the following tests in accordance with the IS:9920(Part-IV ) with latest amendments:

9.1 Type Tests:

- a) Tests to verify the insulation level, including withstand tests at power frequency voltages on auxiliary equipment.
- b) Tests to prove that the temperature rise of any part does not exceed the specified values.
- c) Making and breaking tests.
- d) Tests to prove the capability of the switch to carry the rated short-time current.
- e) Tests to prove satisfactory operation and mechanical / electrical endurance.

9.2 Routine Tests:

- a) Power Frequency voltage dry test.
- b) Voltage tests for auxiliary circuits.
- c) Measurement of the resistance of the main circuits.
- d) Tests to prove satisfactory operation.

10.0 Type Test Reports:

The tenderer shall furnish detailed type test reports of the offered Automatic Capacitor Switches for the tests as per relevant IS

mentioned in this specification. All these Type Tests shall be carried out at laboratories that are accredited by the National Accreditation Board of Testing and Calibration Laboratories (NABL) of Government of India. These tests should have been carried out within 5 years prior to the date of opening of this tender. However, the tenderers who have supplied the Automatic Capacitor Switches to this Distribution Co. / erstwhile Board against order from Purchaser of M.S.E.D.C.L. / erstwhile M.S.E.B. shall be exempted from submission of type test reports against this tender, provided offered Automatic Capacitor Switches are already fully type tested at Laboratories accredited by the National Accreditation Board of Testing and Calibration Laboratories (NABL) within five years prior to the date of opening of the tender and there is no change in the design of already type tested the Automatic Capacitor Switches and those offered against this tender. Such tenderers shall furnish an undertaking in the format scheduled 'F' enclosed herewith.

The detailed type test reports along with the relevant oscillograms/certified drawings, etc. or undertaking seeking exemption from their submission in the format schedule 'F', are to be submitted in sealed cover on or before 15.00 hrs. on the same date of the month one month after the date of tender opening ( e.g. if the tender is opened on 3rd June, the submission of the type test reports shall be on or before 3rd July) or the next working day in case the same day is a holiday, duly super-scribed on it following details:

“Type Test Reports Automatic Capacitor Switches against Tender”

The purchaser reserve the right to demand repetition of some or all the Type Tests 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/waiver of type tests from C.E. (Dist.), M.S.E.D.C.L. Prakashgad, Bandra, Mumbai, prior to commencement of supply.

- 11.0 Bill of Material enclosed alongwith the tender specification incorporating structure, Lightning Arresters, are only indicative

and the scope of the supply is already mentioned in this specification.

12.0 The equipment offered by the manufacturer shall comply with the general safety regulations.

13.0 Bill of Material:

- 1) Capacitor Switch - 1 no.
- 2) 11KV CT for Switch if not built in - 1 no.
- 3) Control Transformer - 1 no.
- 4) Control Box for Capacitor Switch - 1 no.
- 5) Control Cables - As required.
- 6) Structure for control transformer - 1 No.  
mounting on double pole structure
- 7) Structure for mounting of capacitor- 1 No.  
switch on double pole structure

14.0 Physical Documents Submission:

- i) Test Certificate as per Clause No.9.0 of technical specification in accordance to IS 9920:2002 shall be submitted for approval to Chief Engineer (Distribution).
- ii) Performance Guarantee Certificate for Electrical Endurance Test.
- iii) Drawing and Catalogues

Tender must accompany relevant catalogues and sectional drawing showing necessary details of the equipment offered.

One copy of the dimensional drawing and internal construction drawing shall be submitted with the tender. As per the conditions of the tender these drawing shall be of A-3 (420 x 297) size only.

- iv) Past Experience in schedule 'L'.

**SCHEDULE - 'L'**

**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 he considers such a reference necessary.

Sr. No.	Name of the client and Description of items ordered.	Value of order	Period of supply and Commissioning	Name & address to whom reference may be made
1	2	3	4	5

NAME OF FIRM \_\_\_\_\_

NAME & SIGNATURE OF THE TENDERER \_\_\_\_\_

DESIGNATION \_\_\_\_\_

DATE \_\_\_\_\_

**SCHEDULE - 'F'**  
Proforma of Undertaking

We hereby confirm that Automatic Capacitor Switches have been supplied by us to M.S.E.D.C.L. / erstwhile M.S.E.B. against earlier Order No. \_\_\_\_\_ Dated \_\_\_\_\_ and the type test certificates thereof were approved by C.E.(Dist.) vide Letter No. \_\_\_\_\_ Dated \_\_\_\_\_ copy enclosed.

NAME OF FIRM \_\_\_\_\_

NAME & SIGNATURE OF THE TENDERER \_\_\_\_\_

DESIGNATION \_\_\_\_\_

DATE \_\_\_\_\_