



Annexure D
TECHNICAL SPECIFICATION FOR
11KV CAPACITOR BANK:

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 the specification, the 11kV pole mounted switched capacitors shall comply with the latest version of IS:2834(Shunt Capacitors for Power Systems).

4.0 Temperature Category:

Unless otherwise specified, the capacitors shall be suitable for upper limit of temperature category 50° C as per IS-2834.

5.0 Rated Output:

The standard rated output of a switched capacitor bank shall be 660KVAR at 12.65 kV rated voltage. The bank shall comprise of 3 single phase units of 220 KVAR each at 7.3kV phase to earth voltage connected in star with floating neutral.

6.0 Permissible Overloads:

The maximum permissible overloads with regard to voltage, current and reactive output shall conform to IS:2834.

7.0 Power Loss:

The power loss in capacitors shall not exceed 0.2 Watt/kVAR (Subject to a tolerance of plus 10%).

8.0 Discharge Device:

Suitable discharge device shall be connected across the capacitor units in accordance with the provision of IS:2834. The discharge device shall reduce the residual voltage from the cross value of the rated voltage to 50V or less within 5 minutes after the capacitor is disconnected from the source of supply.

9.0 Earth Connection:

The container of each capacitor unit shall be provided with suitable earthing terminal clearly marked as (1).

10.0 Protective Fuses:

The capacitors shall be provided with external fuses. It shall be possible to identify the blown off fuse from outside. The tolerance and the degree of unbalances shall also be indicated as per relevant IS. The manufacturer shall supply a set of external fuses together with fixing accessories and a set of three spare fuse links alongwith the capacitor bank.

11.0 General Requirements:

11.1 The capacitors shall be of non-PCB type, using polypropylene film as the dielectric.

11.2 The containers shall be made from sheet steel of thickness not less than 2mm.(14 SWG).

11.3 The container shall be hermetically sealed by controlled arc welding process. The metal flanges of the bushing should be soldered/welded to the container and covered with epoxy compound providing a strong hermetical seal to the container.

11.4 Suitable mounting brackets, as required by the purchaser shall be welded to the container.

11.5 The outside of the container should have smooth and tidy look and should be coated with weather-proof and corrosion-resistant paint of white or light gray shade. The container/enclosure shall be painted with light gray colour, shade 631 as per IS: 5.

11.6 The fuses and capacitors cells shall be interchangeable.

11.7 The dielectric loss angle (tan delta) shall be less than as per IS 2834.

12.0 Marking:

The capacitor shall be provided with a rating plate and terminal markings as stipulated in IS:2834.

13.0 Tests:

13.1 Routine Tests:

All the individual capacitor units shall be subjected to following routine tests at the manufacturer's works (at the cost of manufacturer) in accordance with IS:2834 with latest amendments.

- 1) Visual inspection
- 2) Sealing Test
- 3) Measurement of output and capacitance
- 4) Insulation resistance between terminals and containers
- 5) Capacitor loss tangent (tan delta) measurement
- 6) Voltage test between terminals and containers
- 7) Test of discharge device

The routine tests at 3 & 4 shall be carried out on the 600 kVAR bank also.

13.2 Type Tests:

The tests indicated in the IS:2834 with latest amendments shall constitute the type tests. All the type tests as under shall be carried out at the laboratories accredited by National Accreditation Board of Testing and Calibration Laboratories (NABL) in accordance with IS:2834 with latest amendments.

- a) Voltage test between terminals
- b) Ac voltage test between terminals and containers
- c) Thermal stability test
- d) Capacitor loss tangent (tan delta) measurement
- e) Lightning impulse test between terminals and container
- f) Short circuit discharge test

13.3 Acceptance Tests:

The inspecting officer will carry out the acceptance tests specified in the IS:2834 with latest amendments.

14.0 Type Test Reports:

The tenderer shall furnish detailed type test reports of the offered Capacitor Banks 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 Capacitor Banks 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 Capacitor Banks 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 Capacitor Banks 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 of Capacitor Banks 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.

- 15.0 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.

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

17.0 Bill of Material:

1) 12.65KV Capacitor Bank (3 x 220 KVAR) - 1 set

2) Expulsion type fuse assembly (3 nos.) - 1 set

3) Structure for capacitor Bank mounting

a) M.S.Channel 75x40x6 - 600mm. - 2 nos.

b) M.S.Channel 75x40x6 - 1400mm. - 2 nos.

18.0 Physical Documents Submission

i) Test Certificate as per Clause no.14.0 of technical specification in accordance to IS 2834 shall be submitted for approval to Chief Engineer (Distribution)

ii) 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.

iii) 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 Capacitor Banks 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 _____