

## **TECHNICAL SPECIFICATION OF 11KV METERING CTPT SETS OF RATIO**

### **20/5A ( indoor Type)**

**1. SCOPE :** The specification provides for manufacture, testing before dispatch, supply and delivery of **10/5A ( Indoor) & 20/5A(Indoor) ratios of 11KV Metering cubicles of 0.2S class accuracy** as per the particulars given in the schedule attached.

**2. STANDARD:** Except where modified by this specification the component parts of the equipment shall comply with the following IS (with latest amendments from time to time in case of IS)

i) Voltage & Current Transformers : IS- 3156 & IS-2705

ii) Transformer Oil: IS-335/2018

i) HV Porcelain Bushing: IS-2099

ii) Galvanization: IS2633

iii) Primary Terminals: IS-10601

**3. TYPE:** The metering transformer equipment should be of pole mounting type for outdoor use. They are to be used in 11KV Three phase with solidly earthed neutral and suitable for 3 phase 3 wire 50 cycles networks. The equipment is required for operation of trivector meters and should be oil cooled.

The CTPT sets shall have the following ratings:-

i. Rated Voltage: 11KV

ii. Highest systems voltage: 12KV

iii. Insulation level: 12KV

iv. Standard impulse withstand voltage: 75KV

v. One minute power frequency withstand voltage

a. primary: 28KV

b. Secondary: 3KV

vi. Short time thermal current and its duration: 6KA for 1sec for 10/5A ratio of 11KV

Metering cubicles and 9KA for 1sec for 20/5A, 40/5A & 75/5A ratios of 11KV Metering cubicles.

vii. Class of accuracy: 0.2S

viii. Rated burden per phase

1. For CTs: The rated burden for CTs is 5VA\_per phase

2. For PTs: The rated burden for PTs shall be 10VA per phase.

IX. Frequency: 50HZ

### **4. DESIGN:**

- a) The equipment shall be designed to ensure satisfactory operation under all conditions of service to facilitate easy inspection, cleaning and repairs.
- b) The design shall incorporate every reasonable precaution and provisions for safety of all those concerned in the operation and maintenance of the equipment.
- c) All out-door apparatus shall be so designed that water cannot be collected at any point and enter the CT/PT set. The top cover of the tank, secondary terminal cover, cable box and inspection cover are suitably bent at the edges so that gaskets are not exposed to moisture.

- d) All connections and terminals shall be of sufficient size for carrying the specified currents continuously without undue heating.
- e) On outdoor equipment all bolts, nuts, washers in contact with non-ferrous parts shall be of brass.
- f) All ferrous parts including bolts & nuts liable to corrosion, forming integral parts of the equipment shall be smoothly and continuously hot dip galvanized.
- g) The secondary terminal box, inspection cover and oil gauge shall be arranged as shown in the drawing.
- h) The core shall be high grade non-ageing electrical silicon laminated steel of low hysteresis loss and high permeability to ensure high accuracy, at both normal and over current/voltage.
- i) All winding shall be of insulated high grade electrolytic copper wire and the manufacturing of the units shall be done in completely closed and air-conditioned room otherwise fiber glass insulation sleeves are to be provided for primary winding. Details of winding and core shall be furnished.
- j) The CTPT set should have three CTs and one three phase PT with star/star connection.

**5. SEALING:** Provision for sealing at 4 points on the secondary terminal box, inspection cover, the top cover of the tank and cable box shall be made. This may be made by providing a hole of adequate size to pass the sealing wire, of above 14 SWG.

A hole on tail of corner bolts shall be provided.

**6. FLUCTUATION IN VOLTAGE AND FREQUENCY:** For continuous operation, entire equipment shall be subjected to variation of voltage up to plus 20% and -30% and frequency of plus or minus 5 percent.

#### **7. INSTRUMENT TRANSFORMERS:**

- a) The voltage and current transformers shall have normal continuous rating as per the schedule of requirement. Voltage transformer shall be provided with bridged current limiting resistance fuses on the high voltage side.
- b) The voltage transformer shall be so designed that the increased magnetizing currents due to any persisting over voltage does not produce injurious over heating. Phase barriers shall be provided.
- c) The peak value of the rated dynamic current shall not be less than 2.5 times the rated short time thermal current unless stated otherwise (4.62 of ISS 2705/Part I of 1992 or latest version).
- d) Modified polyester enamel copper wire is to be used for winding and it shall conform to IS-4800/Part-V (latest version).
- e) The terminals of the instrument transformer shall be clearly marked by distinctive letters as stated in Appendix C of ISS/3156/Part-I/1965 (latest version) for voltage transformer and Appendix 'C' of IS-2705/Part-I/1992 (latest version) for current transformers.
- f) The winding shall be neatly laid and anchored.
- g) The metering set tank and other metal parts shall be galvanized, as per latest IS applicable.

#### **8. Cable Box for incoming side of material and cable box for outgoing side and bushings for outgoing side in schedule of Requirements (Generally applicable for outdoor type MC's):**

- 1. Non - Detachable cable box shall be provided on HT side for incoming and outgoing side bushings. The position of cable shall be located such that it will not foul with the belting angles. Provision for sealing at 4 points shall be made. Suitable cable glands shall be

supplied along with boxes. The cable box shall be suitable for M-seal indoor and terminations of 11KV XLPE 35sq.mm cables. The minimum clearance between phases and phases to earth shall be minimum of 135mm or as per IS. The tenderer shall quote for CT/PT sets having cable box for incoming side for item No. 1.a & 1.b in the schedule of requirements, cable box for outgoing side for item No. 1.b in the schedule of requirements and bushing on the out-going side for item No. 1.a in the schedule of requirements.

2. Bushings for out-going side of CT/PT Set for item No. 1.a in schedule of requirements:

The porcelain portion of HT bushings shall be of standard make and conform to IS-2099/1996. Insulation sheet barriers like Bakelite or fiber glass shall be provided in between the phases to cover the length of bushing stud.

The dimensions of the bushings shall confirm to IS-3347/part-III/1972. The minimum phase to phase clearance shall be minimum of 360mm or as per IS.

The bushings shall be of reputed manufacturers like M/s.Jayshree Insulators, M/s.WS Industries, M/s.BHEL, M/s.Allied Ceramics, M/s.India Potteries, M/s.Venkateswara Ceramic Industries, M/s.IEC, CJI / Prime Insulator and Sampath Ceramics who are having complete testing facilities.

Or

The bushings shall be of reputed manufacturers who are having complete testing facilities.

**All the collar bolts & nuts for Bushings shall be GI/Steel only.**

The bushing stems shall be provided with suitable bimetallic connectors so as to connect the jumper without disturbing the bushing stem. Insulation sheet barriers like Bakelite or Fiberglass shall be provided in between the phases to cover the length of bushing stud in cable box.

The minimum clearance between indoor bush rod to cable box cover shall be 50 mm.

TERMINALS: Brass rods 12mm dia. for Primary and 6 mm dia. for secondary.

Bushing for outgoing side of CTPT set:

The porcelain portion of HT bushings shall be of standard make and confirm to IS-2099/1996.

**Cable Box Bushing (Incoming side of CTPT set):**

Cable Box Bushing of incoming side shall be of porcelain type.

The tests as per IS-2099/1962 shall be conducted on the transformer bushings as detailed below:

- a) Dry flash over voltage.
- b) Wet flash over voltage.
- c) Dry 1 Minute withstand voltage.
- d) Impulse withstand voltage (1.2/50 Micro Seconds –ve wave)
- e) Manufacturer's test certification may be furnished for every lot of offer.

SECONDARY TERMINAL BOX: The hole provided in the secondary terminal box shall be minimum of **25.4mm (1 inch) size**.

**The clearance between secondary CT terminal and PT terminal should be 50 mm minimum.**

## **9. STEEL TANK:**

- a) The Oil filled container incorporating the voltage transformers and current transformers should be fitted with incoming and outgoing primary terminals and secondary terminal box. The secondary terminal box shall be arranged on sides. The general arrangement shall be with cable box on the incoming side and 3 bushings on the outgoing side for item No. 1.a and with cable box on incoming & outgoing side for item 1.b of schedule of requirements.
- b) The tank shall be built with plate of 5 mm thick top and 3.15mm sides and bottom and with all fittings shall be capable of withstanding without leakage or distortion at the standard test pressure. All joints of the tank and fittings shall be hot oil tight and no leaking should occur during service.
- c) It shall be provided with an oil gauge. The oil gauge glass shall be fixed appropriately. The tank shall be provided with necessary lifting lugs.
- d) The secondary terminal box cover, cable box cover, tank cover and inspection cover and other vertical joints where gaskets are used shall be suitably bent with necessary sealing arrangement. This will have to safeguard against seepage of water into tank in case of damaged gasket.
- e) The Gasket shall be dovetailed without joints to prevent moisture entry. In case of dovetailed joint, they shall not be more than two. The Gasket shall be of good quality Neoprene or rubberized gasket.
- f) EARTHING: Two earthing terminals shall be adequate size protected against corrosion and metallically clean and identified by means of the sign marked in a legible and indelible manner on or adjacent to the terminals.
- g) All bolts should be provided with 2 flat washers and a spring washer with a nut.
- h) Conservator should not be provided for these CTPT sets.
- i) The Secondary terminal box incoming hole should be 25.4 mm (1inch) diameter and at a height of 330 mm +/- 5 mm from bottom to avoid replacement/ modification of secondary wires pipe when CTPT set is replaced. The secondary terminals size should be 6 mm diameter, 25 mm stem length, 2 flat washers with 3 nuts of brass material should be provided. The terminals should be provided at least 70 mm height from incoming hole and clearances shall be as per IS to avoid shorting terminals due to secondary wires pipe.
- j) The following details of equipment shall be provided on a name plate with at least 10 mm letters. The name plate is to be welded to the tank after galvanization.  
1. Make, 2. Ratio, 3. Class of accuracy, 4. Serial No: & 5. Month & year of manufacturing.
- k) 18 months guarantee embossed plate shall be welded opposite side of name plate.
- l) MOUNTING ARRANGEMENT : The under base of all CTPT sets shall be provided with two 75x40mm GI channels and foundation dimensions shall be as per enclosed drawing and uniform for all sets with only +/- 2 mm tolerance, to avoid modification of structure/ plinth, whenever CTPT set is replaced.

**10. OIL:** The insulation oil used in the tank shall comply with the requirements specified in latest relevant IS-335/2018.

**11. GUARANTEED TECHNICAL PARTICULARS:** The technical particulars as specified in IS shall be guaranteed. Every tenderer should furnish the particulars required without fail and guarantee the values so furnished for the supplies.

## **12 TESTS:**

**12.1 TYPE TESTS:** The equipment offered shall be fully type tested from recognized standard accredited NABL laboratory by the bidder as per the relevant standards. The bidder shall furnish three copies of type test certificates with the bid. These type test certificates shall be got approved by the purchaser before commencement of supply. The bidders also furnish type test certificates for bushings and oil along with the bid.

The type tests shall be conducted and type test certificates for the tests carried out on prototype of same specification shall be enclosed with tender. The type tests Certificates shall not be more than 10 years old as on the date of opening of bid.

**12.2. ACCEPTANCE AND ROUTINE TEST:**

All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in presence of purchaser's representatives.

Immediately after finalization of the programme of acceptance/routine testing, the manufacturer shall give advance intimation to the purchaser, to enable him to depute his representative for witnessing the tests.

**12.3. TYPE TESTS FOR CTs :**

- a) Short time current Test.
- b) Temperature rise test.
- c) Lightning Impulse Test.
- d) High Voltage Power frequency wet withstand voltage test.
- f) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

**12.4 TYPE TESTS FOR PTs:**

- a) Determination of errors according to the requirements of the appropriate accuracy class.
- b) Temperature rise test.
- c) Impulse Voltage test.

**12.5. TYPE TESTS FOR TRANSFORMER BUSHINGS:**

- a) Dry flash over voltage.
- b) Wet flash over voltage.
- c) Dry 1 Minute withstand voltage.
- d) Impulse withstand voltage (1.2/50 Micro Seconds –ve wave)

**12.6. ACCEPTANCE AND ROUTINE TESTS:**

The following shall be conducted as per IS: 3156 (Latest version).

- a) Verification of Terminal marking and polarity.
- b) Power frequency dry withstand tests on primary windings.
- c) Power frequency dry withstand tests on secondary windings.
- d) Determination of errors according to the requirements of the appropriate

accuracy class.

e) Temperature rise test.

f) Air pressure test on empty tank of transformer opened for physical verification test (One for every lot offered)

One CTPT from the offered lot for inspection shall be subjected to temperature rise test irrespective of ratios.

Accuracy test (Determination of errors) shall be conducted on 100% offered quantity in the presence of Discom representative.

**13. INSPECTION :** All acceptance tests shall be conducted at the time of inspection and at the place of manufacture unless otherwise specifically agreed upon by the manufacturer and purchaser at the time of purchase. The manufacturer shall afford the inspector representing the purchaser all reasonable facilities without charges to satisfy him that the material is being furnished in accordance with the specification.

The purchaser has the right to have the tests carried at supplier's cost by an independent agency whenever there is a dispute regarding the quality of supply.

The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. The supplier shall give 15 days for local supply/30 days (in case of foreign supply) advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine tests.

The lot will be accepted into stock only if the materials satisfy the above tests and will be rejected if fails to conform to the standards. The same process will be followed for II-consignment (in case of rejection of I-lot) and if the materials fail in 2<sup>nd</sup> time also the total order will be cancelled.

**14. DRAWINGS AND LEAFLETS:** Two sets of drawings showing clearly the general arrangements, sectional views, fitting details, electrical connection and design features of each component part should accompany the tender. Technical leaflets giving the operating instructions should also be furnished along with the tender. Tenders without details are liable to be rejected. The literature and drawing are to be sent along with each equipment while dispatching, after approval by this office.

**15. DEPARTURE FROM SPECIFICATION:** If the tenderer wishes to depart from this specification in any respect, he shall draw the attention to such points of departure explaining fully the reasons there for. Unless this is done the requirements of this specification will be deemed to have been accepted in every respect.

**16. Name Plate:** The purchase order No. and Date of the purchase order, the words "PROPERTY OF EASTERN POWER DISTRIBUTION COMPANY OF AP Ltd." should be etched on the Name plate.

The name plate is to be welded to the tank after galvanization.