

**TECHNICAL SPECIFICATION FOR 33 KV SINGLE PHASE CURRENT TRANSFORMERS OUTDOOR TYPE**

1:0 TYPE/RATING The current transformers should have the following ratings.

NOMINAL SYSTEM VOLTAGE	33 KV
HIGHEST SYSTEM VOLTAGE	36 KV
FREQUENCY	50 HZ
EARTING OF THE SYSTEM	EFFECTIVE
BASIC IMPULSE LEVEL	170 KV
SHORT TIME RATING (3 SEC.)	13.1 KA (RMS)

Voltage rating	Transformation ratio	Cores	Rated output	Class of accuracy	Resistance of sec. Winding at HR not more than (corrected to 75 °C)	Knee point Volt not less than	Magnetizing current not more than mA	Remark
33 KV	(200-100)/ (400-200), 1-1-1A	Core -I	15 VA	0.5	4.0	400V	30 at 25% knee-point volt.	Metering Protection
		Core-II	-	P.S. Class				
		Core-III	-	P.S. Class				

Note: Rated outputs should be guaranteed on both the ratios.

1.1 **STANDARD**

The current transformers shall comply with the latest issue of following Indian Standard and amendments thereof except where specified otherwise.

1. IS 2705 (Part I to IV) Specification for CTs & IEC 60444-1
2. IS 2099 Specification for High Voltage porcelain bushing
3. IS 3347 Specification for dimensions for porcelain T/F bushings
4. IS 335 Specification for Insulating oil for T/F & switchgear
5. IS 3202 Code of practice : climate proofing of electrical Equipment.

2.0 **GENERAL**

The separately mounted CTs out door type shall be of single phase oil immersed, hermetically sealed and self cooled suitable for installation at secondary sub-station and complete in all respects conforming to the modern practice of design and manufacture.

The protection care shall be of high grade, non ageing, electrical silicon laminated steel of low hysteretic loss and high permeability to ensure high accuracy at both normal and over currents. The CTs shall be hermetically sealed to entering the tank. These shall be provided

with the oil level gauge and pressure relieving device capable for releasing abnormal internal pressures.

### 3.0 **WINDINGS**

The instrument security factor of the CTs core to be used for metering shall be low enough not to cause any damage to measuring instruments on account of maximum short circuit current. (ISF shall not exceed 5.0). CTs core to be used for protective relaying purposes shall be of accuracy class specified.

The continuous current rating of the secondary winding shall be one (1) ampere. The Secondary terminal box should also be partitioned so as to house the metering terminals separately with the provision of sealing and locking of the metering terminals. "METERING" & "PROTECTION" should be clearly indicated on each compartment cover respectively by engraving or by providing the metallic plate. The secondary terminals shall be provided with short circuiting arrangements. The secondary leads shall be adequately reinforced to withstand normal handling without damages.

### 4.0 **SPECIAL FEATURES OF CTs:**

The protection cores should be of high grade non-aging electrical silicon laminated steel of low hysteresis loss and high permeability to ensure high accuracy at both, normal and over current. The CTs should be hermetically sealed to eliminate breathing and prevent air moisture from entering the tank. These should be provided with the oil level gauge and pressure relieving device capable of releasing at normal internal pressure.

### 5.0 **INSULATION**

The CTs shall withstand satisfactorily the dielectric test voltage corresponding to basic impulse level of 170 KV for 36 KV CTs.

### 6.0 **INSULATION OIL**

The oil shall conform to the requirement of IS-335, 1983 and amendments thereof.

### 7.0 **TYPE OF MOUNTING**

The CTs shall be suitable for mounting on steel structures having 4 nos. holes of 15 MM  $\phi$  at 300 mm X 300 mm square spacing being procured with the circuit breakers.

Necessary galvanised flanges etc. for the base of the CTs shall be supplied and these shall be galvanized.

### 8.0 **CABLE GLANDS AND PLATE**

Necessary cable glands alongwith a gland plate for the cable are to be provided. The sizes of glands are given below:

#### **CABLE GLANDS FOR CABLE SIZE**

a) 33 KV CTs – 6X2.5 mm<sup>2</sup> cu conductor PVC control cable

### 9.0 **TERMINAL CONNECTORS**

Two nos. bi-metallic terminal connectors suitable for ACSR 'PANTHER' conductor for CTs shall be supplied with each current transformers. Means are to be provided for earthing of the base frame of CT.

#### 10.0 **DESIGN :**

The design of the connectors shall be such as to give intimate contact between connector and conductor and offer protection to contact surfaces against effects of electrolytic (between two dissimilar metals) and atmospheric corrosion. The connector shall have sufficient mechanical strength and shall completely enclose the conductor and terminal. The connector shall hold the conductor and terminal very tightly so that the connector withstands the mechanical stresses set up by vibration, wind and short circuit current. The conductivity of connectors shall be high to minimise power loss.

The connectors should be designed with the large factor of safety and should comply in all respects of temperature rise resistance and tensile strength withstand capacity as per ISS 5561-1970 or amendment thereof.

The tenderer is required to furnish copy of routine and type tests of terminal connectors carried out by them or their Sub-suppliers in the past. Drawings of the connector shall also be submitted with tender.

The steel bolts nuts, washers and check nuts shall be hot dip-galvanized marked with ISI certification mark. Steel bolts and nuts shall conform to IS-1365-1967 and IS-1367-1961 or amendment thereof. Bolts and nuts shall be manufactured a reputed concern (GKW or TATA).

#### 11.0 **TEMPERATURE RISE**

The maximum temperature attained by any part of the equipment when in service at site under continuous full load condition and exposed to the direct rays of sun shall not exceed the permissible limits fixed by approved specification.

#### 12.0 **BUSHING / INSULATORS**

The basic impulse level of the bushings and insulators shall be as specified and they shall be suitable for installation in heavily polluted atmospheres having creepage distance (minimum) of 900 mm and protected creepage distance shall not be more than 50% of total creepage distance. The porcelain used shall be homogeneous and free from cavities or other flaws. Bushing shall be designed to have ample insulation, mechanical strength and rigid for satisfactory operation under the condition specified. The puncture strength of bushing shall be greater than the flash over value.

The bushing shall be entirely free from external and internal corone.

Oil filled bushing shall be free from oil leakage and designed to prevent accumulation of explosive gases and to provide adequate oil circulation to remove internal heat. Adequate means shall be provided to accommodate conductor expansion and there shall be a due stressing of any part due to temperature changes. The CT shall be equipped with liquid level indicators and means for sampling and drawings oil from the busing.

#### 13.0 **MATERIAL AND WORKMANSHIP**

All material to be used in the manufacture or requirement shall be selected as best available for the purpose for which used, considering strength and durability and test engineering practice.

All equipment supplied shall be manufactured in a thorough workman like manner and shall follow the modern practice. All equipment supplied under this contract shall be capable of

satisfactory operation and performance when exposed to tropical sum-atmosphere conditions and heavy rainfall.

#### 14.0 **IDENTIFICATION DETAILS**

A name plate carrying the following information shall be fixed on the CT:

- i) Specification No.
- ii) Order No and date.
- iii) Property of PVVNL.

A rating plates as per clause 8.1 IS:2705 (Part-I)-1992 or amendment thereof shall also be fixed showing the rating, ratio and connections arrangements etc. All the marking on name/rating plate should be made by engraving.

#### 15.0 **TESTS**

The following tests shall be carried out on CT at the manufacturer cost at their works/other institute of repute, before dispatch.

#### 13.1 **ROUTINE TESTS**

- i) Verification of terminal marking & polarity (9.2)
- ii) High voltage power frequency test on primary windings (9.3)
- iii) High Voltage power frequency test on secondary windings (9.4)
- iv) Over Voltage inter-turn test (9.5)
- v) Determination of error according to the requirements of appropriate accuracy class (as per relevant parts of the standard).

#### 13.2 **TYPE TESTS**

The offered equipment must be of proven design through successful type testing as per IS:2705 during last 5 years counted from the date of opening of tender. The type tests required to be conducted on the equipment offered shall be as given below:-

- a) Verification of terminal marking and polarity (9.2)
- b) High Voltage power frequency test on primary windings (9.3)
- c) High Voltage power frequency test on secondary windings (9.4)
- d) Over-voltage inter turn test (9.5)
- e) Determination of error according to the requirements or appropriate accuracy class (as per relevant parts of the standard).
- f) Short time current test (9.6)
- g) Temp. rise test (9.7)
- h) Impulse Voltage test (9.8)

#### 13.3 **SPECIAL TEST**

High voltage power frequency wet withstand voltage test an outdoor current transformer (7.9): If the bushing has already been tested at Govt. laboratory for this test separately, then full assembly need not be tested. The testing report should be shown to the inspecting officers at the time of inspection of the current transformer.

- 13.4 Copies of all type test detailed reports (excluding routine tests) alongwith the relevant approved drawing from the test house of the equipment shall necessarily be enclosed with the tender to prove the successful type testing of CT, failing which it will be presumed that the prequalifying condition of type testing is not fulfilled and offer shall be rejected.

- 13.5 Purchaser at his discretion may consider relaxation in type testing if the CT with similar parameters as mentioned in tender, has already been type tested within last five years from the date of opening of the tender.
- 13.6 The design of the CT having passed successfully through above mentioned tests shall be considered as acceptable design. The physical dimensions of these CT as measured at CPRI or any approved test house and if necessary, supplemented by purchaser's representative shall from lines for the supply of subsequent pieces.
- 13.7 The purchaser reserves the right to conduct different tests including type test as per IS by his authorized representative/agency on any piece during the currency of the contract. In such cases actual test house charges shall be reimbursed by the purchaser. However TO & FRO transportation shall be to tenderers account. In the event of failure of current transformer in such tests, the testing charges shall also be to suppliers account. The failed unit will not be accepted for supply to the Discom even after repairs.
- 13.8 In case the CT fails in any of the above tests, the purchaser shall be at liberty to take any action including cancellation of contract.
14. **INSPECTION & TESTING OF TESTING INSTRUMENTS, RAW MATERIALS & STAGE INSPECTIONS.**
- 14.1 All the measuring instruments i.e. wattmeter, Volt meter, evometer, CT, PTs and other instruments used in inspection & testing shall be properly calibration and sealed once a year. Calibrations certificates when demanded by the inspection officer shall be produced for verification purpose. In case of dispute regarding calibration of instruments, instruments shall be sealed and signed by the representative of supplier and purchaser and will be sent to institution/lab. of repute or its own lab. for calibration at the cost of supplier. The result of such testing shall be binding on the supplier.
- 14.2 The purchaser reserves the right to draw required number of supplies of raw materials. These samples shall however be drawn and sealed in the presence of the contractor. These samples shall be tested from the Govt. test house/lab. or any Govt. recognized test house. The supplier shall have to produce requisite test certificates for major raw materials/accessories used in the current transformers.
- 14.3 The purchaser reserves the right to depute his representative/ agency for carrying out stage inspections at any stage of manufacturing process for ensuring quality of manufacture be also the raw materials. The contractor shall offer all reasonable facilities for such inspection. The contractor shall furnish detailed production schedule including different phases of material procurement, manufacture and fabrication to facilitate the purchase for de-putting his representative/agency for carrying out stage inspection, if necessary.
- 14.4 Records shall be maintained of all the tests carried out by the supplier on current transformer offered for inspection and testing and shall produce when demanded by the inspection officer to satisfy that the current transformers are being offered after carrying out all the necessary tests by the supplier.
- 14.5 The purchaser reserves the right of having other expenses either before dispatch or at site to ensure that the current transformer complies with the requirements of this specifications.

14.6 During inspection, the contractor may be required to produce acceptance and type test reports of the manufacturer of all the bought out items to satisfy the inspecting officers that it conform to the standard contained in technical specification and guaranteed technical particulars.