

TECHNICAL SPECIFICATION OF 11kV & 33kV CT-PT METERING SETS

1. Scope

This specification covers the design, manufacture, assembly, testing and delivery of three phase four wire 11kV/110V and 33kV/110V oil cooled outdoor type combined CTPT units for metering purpose having one No. three phase potential transformers and 3 Nos. single phase paper impregnated oil immersed current transformers for different phases in common tank equipped with weather proof brushing for outdoor use as per technical data incorporated in this specification.

2. Applicable Standards

Unless otherwise modified in this specification, the CTPT Metering Sets shall comply with the following Indian Standard Specification (latest version):

- IS:2705-1992 Specification for current transformers
- IS:3156-1992 Specification for voltage transformers
- IS:5621-1980 Specification for Insulators/Bushings
- IS:2099-1986 Specification for Insulators/Bushing
- IS:3347-1986 Specification for new Insulators/Bushings
- IS:335-1983 Specification for insulating oil
- IS:5561 Specification for Insulators/Bushings

Equipment conforming to any other international standard(s) which ensure(s) equal or better quality than the standard(s) mentioned above will also be acceptable and in such case(s) the copy of standards (English version) adopted should be provided.

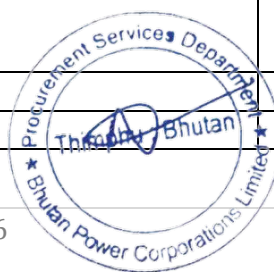
3. CTPT Metering Sets:

11kV & 33kV single phase Current Transformer (3 Nos. for R, Y, & B phases)

The 11kV & 33kV current Transformer shall be paper impregnate oil immersed type, single phase 50Hz conforming to IS:2705/1992 with latest amendment in all respect except wherever mentioned in this specification.

The 11kV & 33kV current Transformer shall have the following technical characteristics/parameters:

SL#	Particulars	Parameters
1	Normal system voltage (kV rms)	11 & 33
2	Highest system voltage (kV rms)	12 & 36
3	Frequency	50 Hz
4	Impulse withstand voltage (KVP) (on assembled CTPT set)	95 & 170
5	Transformation ratio (CT Ratio)	15-50/1A & 25-75/1A (11kV), 150-200/1A(33kV)
6	Rated Output (VA burden)	15VA
7	Class of accuracy	0.5s
8	Rated continuous thermal current	1.2 times rated primary current
9	Rated dynamic current	2.5 times short time thermal current rating
10	Number of cores	One
11	Instrument security factor	Not Exceeding 5



12	Max. ratio error	As per IS:2705/1992
13	Max. phase angle error	As per IS:2705/1992
14	Max. temperature rise over max. ambient temperature of 50 deg. C at rated continuous thermal current at rated frequency and with rated burden.	As per IS:2705/1992

11kV & 33kV Voltage Transformers:

The voltage Transformers will be used along with CTs of description stated above. These shall be paper impregnate oil immersed type conforming in all respect to the Indian Standard specification IS:3156/1992 with latest amendment except wherever modified in this specification.

The voltage transformer shall have the following ratings/technical parameters:

SL#	Particulars	Parameters
1	Nominal system voltage (kV rms)	11 & 33
2	Highest system voltage (kV rms)	12 & 36
3	Nos. of phases	Three
4	Impulse withstand voltage (KVP) (on assembled CTPT set)	95 & 170
5	Frequency	50 Hz
6	Transformation ratio (PT Ratio)	11 kV/110V & 33kV/110V
7	Rated Output (VA burden)	30 VA per phase
8	Class of accuracy	0.5s (As per IS:3156/1992)
9	Winding connection	Star/Star
10	Rated voltage factor and time	1.2 continuous and 1.9 for 30 secs
11	Temperature rise over max. ambient temperature	Within limits of IS:3156/1992
12	Max. phase angle error	Within limits of IS:3156/1992
13	Ratio error (Max.)	Within limits of IS:3156/1992

4. General description of CTPT Metering sets

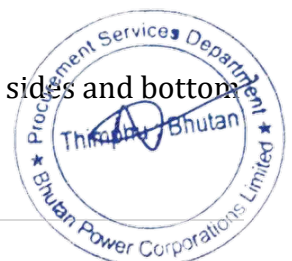
The CT PT Metering set shall comply to the latest standards mentioned in the specification and guaranteed technical particulars.

High voltage winding of instrument transformers shall have paper insulation impregnated with oil under vacuum. The paper used for insulation shall be of high insulation grade. The process of impregnation shall be detailed out in the tender.

The core material of CT-PT sets shall be of high grade, non-ageing, electrical silicon steel having low hysteresis loss and high permeability to ensure accuracy at both normal and over current/voltage.

The instrument transformers shall be contained in a fully weather proof, outdoor type, platform mounting and also suitable for pole mounting type tank with 6 Nos. of 12 KV & 36 KV class weather proof bushing for incoming and outgoing connections.

The thickness of MS sheet used for fabrication of tank shall be min. 3.15 mm for sides and bottom and 5 mm for top cover.



The 33 KV CT-PT set should have compact construction and the General arrangement, Dimensional Drawing, Mounting arrangement shall be got approved before commencement of supplies.

The external surfaces of tanks of CT-PT sets shall be painted with one coat of primer and two coats of synthetic enamel paint of shade No.631 of IS:5. The internal surfaces of the tank shall be painted with two coats of a suitable heat resistant oil insoluble paint.

The metering sets shall be supplied with first filling of insulating oil conforming to IS:335 (including latest amendment).

The bushings used in the CT-PT sets shall conform to IS:2099, IS:5621 and IS:3347 (latest amendments). These shall be suitable for operation in heavily polluted atmosphere with Creepage distance of 25 MM/KV.

The minimum clearance between phases and phase to earth as specified in the relevant ISS should be maintained.

The paper impregnated oil immersed type instrument transformers shall be complete with all fittings and accessories mentioned at Clause No. 3.06 of this specification.

The CT-PT sets shall be hermetically sealed type (should not communicate with atmospheric air) in construction without any oil conservator. The quality and work-man-ship shall be of high standard.

CT-PT sets shall be used for 3 phase 4 wire KWH metering. as such CTPT sets shall have 3 Nos. CTs .

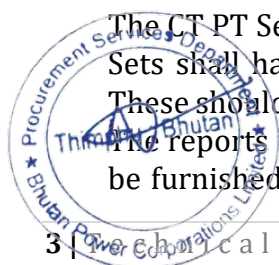
The CT PT sets shall have one No. of Three Phase Potential Transformer. The primary winding of PT shall be connected in star formation in the tank with isolated neutral.

The neutral of primary PT winding shall be floating. The neutral of PT Secondary winding shall be earthed.

The secondary winding neutral of PT and secondary terminals of CTs and PTs shall be brought out in one single secondary terminal box through 3 KV bushings. The terminals shall be marked as per ISS and supporting marking plate with earth terminal shall be provided. The secondary terminal box compartment shall be divided in two portions - One portion containing secondary of all CTs and the other portion shall contain all secondary PT connections with neutral and one body earthed. The whole compartment shall be covered by one bolted cover with sealing arrangement. At least two bolts at diagonally opposite corners of secondary terminal box shall be suitable for sealing arrangement. All other bolted covers and inspection windows covers, where provided shall also have sealing bolts for sealing purpose. Suitably shorting links shall be provided for individual CT shorting and PT secondary neutral.

The secondary terminal box shall have cable gland/ flange suitable to receive two Nos. control cable of size 6 core x 4 sq.mm & 4 core X 2.5 sq. mm at the bottom of the secondary box for metering connections to secondary winding of CT-PT circuits respectively.

The CT PT Set shall have 3 Nos. incoming and 3 Nos. outgoing outdoor type bushing. 33 KV CT-PT Sets shall have 6 Nos. bimetallic terminal connectors suitable for DOG/PANTHER conductor. These should be type tested from CPRI/ NABL accredited Labs and reports be furnished with offer. The reports should not be older than **5 years** for Short Circuit Test. The dimension & drawing to be furnished with offer shall be duly signed and sealed by testing authority. Inspecting officer



shall verify the original type test reports at the time of inspection for terminal connectors & bushings.

No oil drain plug at the bottom of the CT-PT Sets be provided.

Embossing/ punching with minimum height of 10mm of Sr.No., ratio & TN No. be done on the tank of the CT-PT Sets.

Manufacturer's name in short should be embossed/ punched.

CT Ratio should be painted on tank body so that it should be visible clearly.

The under base of CT-PT Sets shall be provided with 2 Nos. 100x50x6mm channels as shown in the figures at Annexure-I to make them suitable for fixing to a platform or plinth. These channels shall be provided through continuous welding with tank of the CT-PT Sets.

The HV metal parts (Primary Terminals) shall be of 16 mm dia and made of copper. The primary terminal shall be along the entire length of bushing.

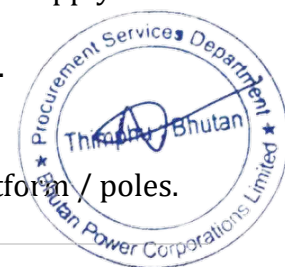
The following sealing arrangement for providing seals on each CT-PT set shall be made by the manufacturer.

- i) 4 Nos. holes of 2.5 mm dia on each bushing clamp bolts of 6 nos. HT bushings for providing two polycarbonate seals at diagonally opposite bolts of each bushing clamp in M&P lab after successful testing as required.
- ii) 4 Nos. holes of 2.5 mm dia on the bolts provided at four corners of top cover for providing two polycarbonate seals at diagonally opposite corner of CT-PT set by the inspecting officer after successful testing and providing polycarbonate seals in M&P lab after successful testing as required.
- iii) 4 nos. sealing holes on the name plate (R&D plate so that our inspecting officer may provide numbered seal on one side of the plate covering top & bottom holes whereas on the remaining two holes of other side, the one numbered seal will be provided by MT Lab after successful testing.

5. Fitting and Accessories

The outdoor platform/ pole mounting type CT-PT metering sets shall be complete with tank, fittings, and accessories as detailed below:

- 1 No. Electrically welded sheet steel tank/ enclosure for accommodating above instrument transformers with suitable bolted cover.
- 6 Nos. Outdoor single terminal porcelain bushing of reputed make without arcing horns. 3 Nos. for incoming and 3 Nos. for outgoing.
- 1 No. secondary terminal box. The terminal box opening door/cover shall have suitable sealing arrangement. The necessary gland/ socket shall be in the scope of supply.
- 1 No. oil filling hole with cap/plug.
- 1 No. Toughened prismatic oil level indicator with min. oil level marking.
- 2 Nos. lifting lugs for lifting the complete CT-PT unit.
- 2 Nos. Earthing terminals.
- 1 set under base channels with suitable fixing holes for mounting on platform / poles.



- 1 set detachable roller assembly.
- 1 No. Rating and diagram plate.
- 6 Nos. Bimetallic terminal connectors suitable for Dog / Panther conductor.

6. Bushing

The bushing shall conform to IS:5621-1980 and IS:2099-1986 and its subsequent amendment, if any, the bushing shall be of standard make. The make and catalogue No. of bushing shall be clearly stated in the guaranteed technical particulars. The type tests certificates of bushings not older than **Five years** shall also be furnished along with tenders. The bushing rods and nuts shall be as per clause 3.05 (xxiv). The dimensions of 33 KV class bushings and their related parts for CT-PT sets shall conform to the relevant Indian Standards as detailed below:

Voltage class	Indian Standard	
12KV & 36KV bushing	For porcelain parts IS:3347 (Part-V) Sec.I-1973 or the latest version thereof	For metal parts IS:3347 (Part-III)Sec.II-1967)

The minimum electrical clearance of 400 mm between phases shall be obtained with the bushings mounted and phase to earth clearance should be maintained as specified in relevant IS/ Indian Electricity rules.

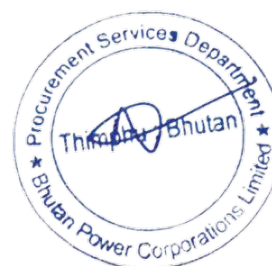
7. Name Plate & Marking

The equipment shall have a non-detachable type name plate which should be clearly visible and effectively secured against removal having markings as per requirement of IS. In addition, Sr.No., Ratio and date of despatch shall have to be engraved on bushing side of tank with letters of suitable depth & 25 mm height filled with red colour.

The main and load are to be stencilled on top cover on main and load side respectively.

A sticker reading as under must be provided in the HV neutral compartment of secondary box.

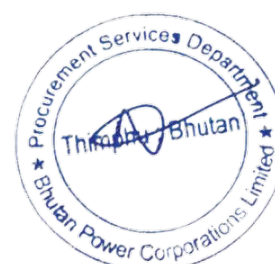
“DO NOT REMOVE EARTH LINK WHEN HV TERMINAL IS LIVE” be given in **Red** colour.



8. Guaranteed and other technical particulars for CT-PT sets

1. For 11kV & 33kV single phase Current Transformers

S.No.	PARTICULARS		TO BE FURNISHED BY BIDDER		
1	NAME & ADDRESS OF MANUFACTURER.				
2	MANUFACTURER'S TYPE & DESIGN				
3	NOMINAL SYSTEM VOLTAGE (KV rms)				
4	HIGHEST SYSTEM VOLTAGE (KV rms)				
5	INSULATION LEVEL :				
	a) IMPULSE WITHSTAND VOLTAGE (KV PEAK)				
	b) ONE MINUTE POWER FREQUENCY DRY WITHSTAND VOLTAGE (KVrms)				
	(i) PRIMARY(KVrms)				
	(ii) SECONDARY (KVrms)				
6	RATED FREQUENCY (Hz)				
7	TRANSFORMATION RATIO.				
8	RATED OUTPUT (VA BURDEN)				
9	CLASS OF ACCURACY.				
10	DETAIL OF WINDINGS.				
	PARTICULARS	CT RATIO	NO.OF TURNS	CROSS SECTIONAL AREA OF EACH TURN IN SQ.MM. (Approx.)	TOTAL WEIGHT OF WDG. IN Kg. PER UNIT
	i) PRIMARY	15-50/1 A			
		25-75/1 A			
	ii) SECONDARY	15-50/1 A			
		25-75/1 A			
11	GUARANTEED RATIO ERROR (MAX.)				
12	GUARANTEED PHASE ANGLE ERROR(MAX.)				



2. For 11kV & 33kV three phase potential transformers

S.No.	PARTICULARS	TO BE FURNISHED BY BIDDER			
1	NAME & ADDRESS OF MANUFACTURER.				
2	MANUFACTURER'S TYPE & DESIGN.				
3	NOMINAL SYSTEM VOLTAGE (KV rms)				
4	HIGHEST SYSTEM VOLTAGE (KV rms)				
5	INSULATION LEVEL :				
	a) IMPULSE WITHSTAND VOLTAGE(KV PEAK)				
	b) ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE (KV PEAK)				
6	RATED FREQUENCY (Hz)				
7	RATED TRANSFORMATION RATIO.				
8	RATED OUTPUT (VA BURDEN PER PHASE)				
9	CLASS OF ACCURACY.				
10	RATED VOLTAGE FACTOR AND TIME.				
11	WINDING CONNECTIONS				
	a) PRIMARY				
	b) SECONDARY				
12	DETAIL OF WINDINGS.				
	Particulars	PT Ratio	No. of Turns	Cross-Sectional Area of Each (Sq.mm)	Total Wt. of winding in KG (Approx.)
	i) PRIMARY WINDING (COPPER).				
	ii) SECONDARY WINDING (COPPER).110 V				
13	GURANTEED RATIO ERROR (MAX.)				
14	GURANTEED PHASE ANGLE ERROR (MAX.)				
15	GURANTEED MAX. TEMP. RISE OF THE WINDING OVER AN AMBIENT TEMP. OF50 DEG. C AT RATED CONTINOUS THERMAL CURRENT, AT RATED FREQUENCY & WITH RATED BURDEN.				

