

SECTION-III**TECHNICAL SPECIFICATION OF 33 KV CT-PT METERING SETS AGAINST
TN-2710****3.01 SCOPE:**

This specification covers the design, manufacture, assembly, testing and delivery of three phase four wire 33 KV/110V oil cooled outdoor type combined CT-PT 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 bushing for outdoor use as per technical data incorporated in this specification.

3.02 APPLICABLE STANDARDS:

Unless otherwise modified in this specification, the 33 KV CT-PT 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 Insulators/Bushings
IS:335-1983	Specification for new insulating oil
IS :5561	Specification for Insulators/Bushings

Equipments 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.

3.03 CLIMATIC CONDITIONS:

The equipment shall be suitable for operation under climatic conditions as mentioned in Clause No. 16 of General Conditions of Contract Section 2 of this specification.

3.04 33 KV CTPT Metering Sets:

A) 33 KV Single Phase Current Transformer (3 Nos. for R, Y & B phases).

The 33 KV current Transformer shall be paper impregnate oil immersed type, single phase 50 HZ conforming to IS:2705/1992 with latest amendment in all respect except where ever modified in this specification.

The 33 KV current Transformer shall have the following technical characteristics/ parameters.

Sr. No	Particulars	Parameters
i)	Normal system voltage (KV rms)	33
ii)	Highest system voltage (KV rms)	36
iii)	Frequency	50 Hz
iv)	Impulse withstand voltage (KVP) (on assembled CTPT set)	170
v)	i) One minute power frequency dry withstand voltage (on assembled CT- PT set) a) primary (KV r.m.s.) b) secondary (KV r.m.s.) ii) One minute frequency wet withstand voltage (KV Peak) (On assembled CT-PT set)	70 3 Root 2x70 Rms
vi)	Transformation ratio (CT Ratio)	200/5A, 150/5 A, 50/5 A
vii)	Rated output (VA burden)	15 VA
viii)	Class of accuracy	0.5S
ix)	Rated continuous thermal current	1.2 times of rated primary current.
x)	Short time thermal current	18 KA for one second for CT ratio 50/5 A 18 KA for 3 seconds for CT ratio 150/5 A & 200/5 A
xi)	Rated dynamic current	2.5 times of short time thermal current rating.
xii)	Number of cores	One
xii)	Instrument security factor	Not exceeding 5
xiii)	Max. ratio error	As per IS:2705/ 1992
xiv)	Max. phase angle error	As per IS:2705/ 1992
xv)	Max. temp. rise over max. ambient temp. of 50 deg. C at rated continuous thermal current at rated frequency and with rated burden.	As per IS:2705/ 1992

B) 33 KV Voltage Transformers:

33 KV 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 Standards specification IS:3156/1992 with latest amendment except where modified in this specification.

The 33 KV voltage transformer shall have the following ratings/ technical parameters:

Sr.No	Particulars	Parameters
i)	Nominal system voltage (KV rms)	33
ii)	Highest system voltage (KV rms)	36
iii)	Nos. of phases	three
iv)	Impulse withstand voltage (KVP) (on assembled CTPT set)	170
v)	i) One minute power frequency dry withstand voltage (on assembled CT-PT set) a) primary (KV r.m.s.) b) secondary (KV r.m.s.) ii) One minute frequency wet withstand voltage (KV Peak) (On assembled CT-PT set)	70 3 Root 2x70 rms
vi)	Frequency	50 Hz
vii)	Transformation ratio (PT Ratio)	33 KV/ 110V
viii)	Rated output (VA burden)	30 VA per phase
ix)	Class of accuracy	0.5 (As per IS :3156/1992)
x)	Winding connection	Star/Star
xi)	Rated voltage factor and time	1.2 continuous and 1.9 for 30 secs.
xii)	Temp.rise over max. ambient temp.	Within limits of IS :3156/1992
xiii)	Max. Phase angle error	Within limits of IS :3156/1992
xiv)	Ratio error (Max.)	Within limits of IS :3156/1992

3.05 **GENERAL TECHNICAL DESCRIPTION OF 33 KV CT-PT METERING SETS:**

- i) The CT PT Metering set shall comply to the latest standards mentioned in the specification and guaranteed technical particulars.
- ii) High voltage winding of 33 KV 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.

- iii) 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.
- iv) 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 36 KV class weather proof bushing for incoming and outgoing connections.
- v) 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.
- vi) 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.
- vii) 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.
- viii) The metering sets shall be supplied with first filling of insulating oil conforming to IS:335 (including latest amendment).
- ix) 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.
- x) The minimum clearance between phases and phase to earth as specified in the relevant ISS should be maintained.
- xi) 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.
- xii) The 33 KV 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.
- xiii) CT-PT sets shall be used for 3 phase 4 wire KWH metering, as such 33 KV CT PT sets shall have 3 Nos. CTs.
- xiv) The 33 KV 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.

- xv) The neutral of primary PT winding shall be floating. The neutral of PT Secondary winding shall be earthed.
- xvi) 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.
- xvii) 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 33 KV CT-PT circuits respectively.
- xviii) The 33 KV 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 **7 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.
- xix) No oil drain plug at the bottom of the CT-PT Sets be provided.
- xx) Embossing/ punching with minimum height of 10mm of Sr. No., ratio & TN No. be done on the tank of the CT-PT Sets.
- xxi) Manufacturer's name in short should be embossed/ punched.
- xxii) CT Ratio should be painted on tank body so that it should be visible clearly.
- xxiii) 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.

- xxiv) 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.
- xxv) The following sealing arrangement for providing seals on each 33 KV 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.

3.06 **FITTING AND ACCESSORIES:**

The outdoor platform/ pole mounting type CT-PT metering sets shall be complete with tank, fittings, 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 / Cycloaliphatic 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 No. 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 plat-form/poles.

1 Set Detachable rollar assembly.

1 No. Rating and diagram plate.

6 Nos. Bimetallic Terminal Connectors suitable for Dog/ Panther conductor.

3.07 **BUSHING:**

The bushing shall confirm 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 **Seven 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 33 KV CT-PT sets shall conform to the relevant Indian Standards as detailed below:

Voltage class	Indian Standard	
36 KV 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 for 33KV sets 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.

3.08 **GUARANTEED TECHNICAL PARTICULARS, DRAWINGS AND QUALITY ASSURANCE PLAN:**

Guaranteed Technical Particulars in the proforma enclosed with this specification shall be furnished along with the detailed general arrangement dimensional drawings mounting arrangements, connection diagrams and quality assurance plan etc. with the tender. Particulars which are subject to guarantee shall be clearly marked in GTP appended at Annexure-A.

3.09 **INSTRUCTION MANUALS:**

The successful tenders shall have to supply required number of operation and maintenance instruction manuals along with the requisite sets of approved drawings of the equipments covered under this specification. One set of above manuals and drawings shall also be sent along with the delivery of each 33 KV unit to the consignee.

3.10 **STAGE INSPECTION**

Each equipment shall comply with and shall be subjected to all routine tests prescribed in the relevant Indian Standard Specification besides routine tests, stage

inspection at firm's works during manufacture shall also be carried out if desired by purchaser with out any extra charges. Production schedule in advance by 15 days shall have to be given to arrange stage inspection.

3.11 **INSPECTION, TESTING AND CHECKING:**

- 3.11.1 In the event of order, the supplier shall have to get conducted all type tests as per requirement of IS:2705-1992 and IS: 3156-1992 with latest amendments/specifications on one sample of CT-PT set of lowest ratio out of first offered lot for inspection, comprising of minimum 25% of ordered quantity of lowest ratio, in presence of JVVNL inspecting officer without any extra cost. **However the supplier who are already having valid type test of lowest ordered ratio or better (lower ratio) conducted in the last 7 years (Reckoning From Technical Bid Opening Date) for similar CT-PT sets having similar specification shall be exempted from conducting type test from first lot.** The impulse test shall be carried out on all the three phases and short circuit test on any one phase selected by the witnessing officer. For this supplier shall make arrangement for type testing to be got conducted from any NABL accredited laboratory and arrange transportation of sample selected from first offered lot for inspection to testing lab & from testing lab to supplier's works. The supplier shall offer the type tested CT-PT set after its re-assembling in subsequent lot. The supplies shall only be accepted & payment against supplies shall be released only after receipt of successful type testing for all type tests on sample.
- 3.11.2 Routine tests as per relevant standard alongwith accuracy test of CT as per IS:2705 (Pt-II)-1992 and that of PT IS:3156 (Pt.II)-1992 shall be carried out on each equipment covered by this specification in the presence of purchaser's representative. All test reports shall be submitted and got approved from the purchaser before despatch of the equipment.
- 3.11.3 The supplier shall simulate single phase condition in their laboratory for testing one 33 KV CT-PT set of any ratio from each lot offered for inspection under such condition for 24 hours. The errors of PT shall be measured before and after application of single phasing condition for at least 24 hours and results shall be within permissible limits of specified accuracy class. This test shall be done as acceptance test.
- 3.11.4 One CT-PT set of each rating in each offered lot should be subjected to temperature rise test .The test shall be carried out simultaneously application of rated current (1.2 lb) and rated voltage (36 KV) and also ISF test, at firm's works free of cost.

- 3.11.5 During routine/ acceptance test, errors for CTs shall be conducted at 1%, 5%, 20%, 100% and 120% of rated current and in case of PT at 80%, 100% and 120% of rated voltage.
- 3.11.6 Algebraic summation of errors of standard CTs/PTs to the errors observed on CTs/PTs under test should be made to get final errors on specified percentage current/ voltage/ burden if class of accuracy of standard CT-PT is less than 10 times of the accuracy of CT-PT set under test.
- 3.11.7 Leak test :- One CT-PT set of each rating in each offered lot should be subjected to 'Leak Test' through Nitrogen gas for a pressure of 10 PSI (Pound sq. inch) for half an hour and pressure shall not drop more than 2 PSI. There should be no leakage observed at any part of CT-PT set.
- 3.11.8 One CT-PT set of each rating in each offered lot shall be opened for verifying the diameter and cross sectional area of primary coil conductors of CT including verification of GTP. The verification of diameter of primary coil conductor of CT shall be carried out for any ratio of one CT-PT set in each lot at stores also. If CT-PT set fails in above verification at stores, entire lot shall be rejected and the supplier shall lift the rejected lot. In case it founds within specific limits, the supplier at his own cost shall reassemble/replace the physically opened CT-PT set at works/stores.
- 3.11.9 One sample of oil shall be taken from each ratio in each lot and shall be tested for
a) Break down voltage b) Tan delta at 90 Deg.C.

The oil supplied with CT PT set shall be of EHV grade Transformer oil suitable for insulation and coding of the electric transformers of extra high voltage and shall conform to IS 335 (with latest amendments)

If CT-PT set fails in any of the above tests/verification at works, entire lot shall be rejected.

- 3.11.10 During the inspection at firm's works, inspecting officer / agency shall provide polycarbonate seals on each CT-PT set as under -
- i) One polycarbonate seal on one side of the plate covering top & bottom holes.
 - ii) Two polycarbonate seal at diagonally opposite corner of top cover of CT-PT set.

3.12 **TYPE TEST:**

3.12.1 Certified copies of all type tests as per IS-2705-1992, IS:3156-1992 with latest amendments listed below obtained from any accredited CPRI/NABL accredited test laboratory on similar equipments included in this specification shall be furnished along **with tenders for lowest offered ratio or better (lower ratio) -**

- i) Short Time Current Test.
- ii) Lightening Impulse voltage withstand Test.
- iii) Temperature Rise Test.
- iv) Wet Power Frequency Voltage Withstand Test.
- v) Determination of Errors according to the requirement of the appropriate Accuracy Class.
- vi) Instrument Security Factor Test.

Participating firms may furnish BG/DD/pay order of Rs. 5 lac in absence of furnishing any type test report alongwith their bid

3.12.2 The bidders shall furnish the latest above type test reports for **lowest offered ratio or better (lower ratio)** of offered material along with tender. The type test reports shall not be older than **seven** years from the date of opening of tender.

3.12.3 Bidder shall furnish the calculations of short time thermal current of all ratios of offered CT PT sets, on the basis of cross-sectional area of primary conductor of Type tested CT PT set.

3.12.4 The purchaser shall have right to get conducted type tests during currency of the contract on the sets received in the Stores at purchaser's cost. In case of failure in type tests, following provisions shall be applicable: -

3.13 **Failure in type tests**

In the event of failure/ unsatisfactory results of the CT-PT Set(s) in Impulse/Short Circuit test, the supplier shall have to replace the supplies already made and no further CT-PT Sets shall be accepted. The purchaser, however, at his option, may accept the CT-PT Sets already supplied with the following conditions:-

- i) Guarantee Period of the supplied CT-PT Sets issued to the field shall be increased by double the normal guarantee period.
- ii) Bank Guarantee shall be extended to cover the additional guarantee period.
- iii) For failure in any of the type tests, i.e. Impulse Withstand test and Short Circuit Test, no further supplies shall be accepted. The type test charges in this case shall be borne by the supplier.

- iv) The CT-PT Sets lying in the stores shall be replaced as per Sub-para (v) below.
- v) The bidder shall, however, be allowed to check the reasons of failure and if need be, to improve/ modify the design. Further supplies, including replacement against supplies already made, shall be accepted only after successful type test(s) are arranged on the fresh CT-PT selected by the purchaser. All the type tests shall be arranged in case there is change in design, otherwise, type test shall be repeated only for the tests in which failure has occurred. Charges for such test(s) shall be borne by the supplier. However, in the event of failure of CT-PT Sets, in the repeat type test, the Company (JVVNL) may take following actions:-
 - a) Cancel pending orders of the rating in which failure(s) has occurred, and
 - b) Not place any order of CT-PT Sets on the firm for one year.

Further, it shall be ensured that all meters and instruments used during inspection/ testing are calibrated from NABL approved test house and date of calibration should not be older than one year at the date of presenting the same to the inspecting officer.

3.14 COMPLETENESS OF EQUIPMENT:

Any fittings, accessories or apparatus which may not have been specifically mentioned in the specification for 33 KV metering sets covered under the scope of this enquiry, but which are usual or necessary in the equipment of similar type shall be deemed to be included in the contract and shall be supplied by the contractor without extra charges. All plants and equipment shall be complete in all respect whether such details are mentioned in the specification or not.

3.15 NAME PLATE AND MARKING:

- a) 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.
- b) The main and load are to be stencilled on top cover on main and load side respectively.
- c) 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.

3.16 MAINTENANCE AND GUARANTEE

Performance guarantee of the equipment shall be for the period of 36 months from the date of receipt in stores. The month & year of expiry of guarantee period shall be marked on the name plate. Equipment failed within such guarantee period shall have lifted from the respective circle stores and after replacement/ repairment to be deposited at the stores of ACOS (JCC)- Kukas Sub store, free of cost within 90 days of intimation. Bidder shall furnish successful routine test reports of the equipment. If purchaser desires inspection prior to despatch an inspecting officer shall be nominated for verification for the test reports. Failed equipment (s) shall only be lifted after receipt of replacement for the same. Transportation for lifting of defective material & delivery of replaced material shall be borne by the supplier.

If defective CT-PT is not replaced within the specified period as above, the following clause shall be applicable-:

- i. Firms shall lift the G.P. failed Instrument Transformer(s) within a period of 60 days from the date of intimation by the respective consignee and will replace Instrument Transformers against G.P. failed within 30 days from the date of lifting positively. In case firm fails to deliver replaced Instrument Transformer(s) within 90 days from date of intimation, the cost of the Instrument transformer(s) shall be withheld from firm's financial hold and in case firm fails to deliver replaced Instrument transformer within 90 days from date of intimation, a penalty at the rate of ½% per week subject to maximum 10%, shall be levied for the late delivery of replaced Instrument Transformer(s).
- ii. In case firm fails to lift the G.P. failed Instrument Transformer(s) beyond 3 months (90 days period as mentioned in point no. (i)) from date of intimation by the consignee, ground rent shall be recovered @ 1% per week or part thereof (for actual delay in lifting the material beyond 3 months (90 days) from the date of intimation from the consignee, subject to a maximum of 15%. This amount of 15% will be in addition to (i). After this clause following clause will also come into effect.
- iii. In case firm fails to lift the G.P. failed Instrument Transformer(s) within 6 months from date of first intimation from consignee, then Nigam may proceed for auction of these GP failed Instrument Transformer at the risk and cost of the supplier after giving 30 days final notice to the firm. The amount recovered

through auction may be adjusted in any type of recoveries (if any). The recoveries of this point will be in addition to recoveries mentioned in point no. (i) and (ii).

- iv. If such material / equipments and any part thereof is disposed off through sales, 5% of the sale value liable to be deducted on account of cost incurred in sales proceedings and after deduction, the balance value shall be "Net realized sale value".

3.15 PRICE VARIATION

The prices of 33 KV CT-PT sets are on 'VARIABLE' basis as per prevailing New IEEMA formula w.e.f. 1.1.2021 (Annexure-D) with base date 01.04.2022. Rates quoted with 'FIRM' prices are likely to be ignored.

3.16 DELIVERY SCHEDULE

The bidder is required to quote monthly delivery. The delivery of quoted quantity should be completed in 5 months period including commencement period of 30 days. In case ordered quantity is different than quoted quantity then monthly delivery shall be adjusted proportionately. Tenders in which monthly delivery schedule is not indicated shall be ignored.

3.17 SCHEDULE OF REQUIREMENT

The following is the requirements for 33 KV CT PT metering sets of various ratios: -

S.No.	Ratio	Quantity
1.	200/5 A	100 Nos.
2.	150/5 A	100 Nos.
3.	50/5 A	100 Nos.
	Total	300 Nos.

Note : The quantities mentioned above are tentative & may be increased or decreased to any extent.

- 3.18** The offer of the bidder shall meet the qualification requirements endorsed at Schedule-III-A.

3.19 ADDITIONAL ORDER

Repeat orders for additional quantities, up to a maximum of 50% of original ordered quantities, may be placed by the Nigam, on the same rates, terms and conditions given in the contract.

GUARANTEED AND OTHER TECHNICAL PARTICULARS FOR 33KV CT-PT SETS TN-2710

(I) FOR 33 KV 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 (KV rms)	
	(i) PRIMARY(KV rms)	
	(ii) SECONDARY (KV rms)	
	c) ONE MINUTE POWER FREQUENCY WET WITHSTAND VOLTAGE (KV rms)	
6	RATED FREQUENCY (Hz)	
7	TRANSFORMATION RATIO.	
8	RATED OUTPUT (VA BURDEN)	
9	CLASS OF ACCURACY.	
10	SHORT TIME THERMAL CURRENT FOR ONE SECOND (KA rms)	
11	RATED DYNAMIC CURRENT (KA peak)	
12	RATED CONT. THERMAL CURRENT (KA rms)	
13	MAX. INSTRUMENT SECURITY FACTOR.	

14	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
	i) PRIMARY	200/5 A			
	ii) SECONDARY	200/5 A			
	i) PRIMARY	150/5 A			
	ii) SECONDARY	150/5 A			
	i) PRIMARY	50/5 A			
	ii) SECONDARY	50/5 A			
15	GUARANTEED RATIO ERROR (MAX.)				
16	GUARANTEED PHASE ANGLE ERROR (MAX.)				
17	MAX. TEMP. RISE OF THE WINDING OVER AN AMBIENT TEMP. OF 50 DEG. C AT RATED CONTINUOUS THERMAL CURRENT AT RATED FREQUENCY & WITH RATED BURDEN.				
18	i) INSULATION CLASS				
	ii) INSULATION MATERIAL USED.				
19	CORE DETAILS:				
	i) MATERIAL				
	ii) WEIGHT OF CORE				
20	TYPE OF INSULTING OIL WHETHER AS PER IS-335 AND LATEST AMENDMENT.				
21	WHETHER SHORT CIRCULATING ARRANGMENT FOR CTs IS AS PER SPECIFICATION.				
22	BUSHING DETAIL				
	a) MAKE				
	b) CATALOGUE NO.				
	c) TOTAL CREEPAGE DISTANCE (mm)				
	d) IS TO WHICH BUSHING CONFORMS.				

	e) ARCING DISTANCE (mm)	
	f) MAX. CREEPAGE FACTOR.	
	g) Type : Porcelain / Cycloaliphatic	
23	WHETHER CURRENT TRANSFORMER USED ARE OF RESIN CAST OIL IMMERSSED TYPE OR OTHERWISE.	
24	IS TO WHICH CT CONFORMS.	
25	MAKE OF TERMINAL CONNECTORS.	

(II) FOR 33 KV THREE PHASE POTENTIAL TRANSFORMERS

S No.	PARTICULARS	TO BE FURNISHED BY BIDDER			
		PT Ratio	No. of Turns	Cross-Sectional Area of Each	Total Wt. of winding in KG (Approx.)
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	Total Wt. of winding in KG (Approx.)

				(Sq.mm)	
	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. OF 50 DEG. C AT RATED CONTINUOUS THERMAL CURRENT, AT RATED FREQUENCY & WITH RATED BURDEN.				
16	BUSHING DETAIL				
	a) MAKE				
	b) CATALOGUE NO.				
	c) TOTAL CREEPAGE DISTANCE (mm)				
	d) IS TO WHICH BUSHING CONFIRMS.				
	e) ARCING DISTANCE (mm)				
	f) MAX. CREEPAGE FACTOR.				
	g) Type : Porcelain / Cylcoaliphatic				
17	i) INSULATION CLASS				
	ii) INSULATION MATERIAL USED.				
18	CORE DETAILS:				
	i) MATERIAL				
	ii) WEIGHT OF CORE				
19	WHETHER ANY FUSE HAVE BEEN PROVIDED IN SECONDARY SIDE OF PT ?				
20	WHETHER NEUTRAL OF PT FOR HT SIDE IS ISOLATED/FLOATED ?				

(III) OTHER PARTICULARS FOR 33 KV COMPLETELY ASSEMBLED CT-PT SETS against TN-2710.

S.No.	PARTICULARS	TO BE FURNISHED BY BIDDER
1	NAME & ADDRESS OF MANUFACTURER.	
2	OVERALL DIMENSIONS OF CT-PT SET.	
3	MOUNTING DETAILS.	
4	i) TOTAL MASS OF COMPLETELY ASSEMBLED CT-PT SET WITH OIL.	
	ii) MASS OF IST FILLING INSULATION OIL.	
	iii) VOLUME OF OIL (LITRES)	
5	i) MATERIAL OF TANK/ENCLASURE SHEET.	
	ii) THICKNESS OF THE TANK SHEET.(mm)	
	a) BOTTOM.	
	b) TOP COVER	
	c) SIDES	
6	MAKE/MANUFACTURER'S NAME FOR INSULATING OIL TO BE USED IN CT-PT SETS.	
7	WHETHER ALL THE FITTINGS AND ACCESSORIES AS PER CLAUSE 3.06 OF SPECIFICATION PROVIDED?	
8	WHETHER SEALING ARRANGEMENT IS AS PER CL.3.05 XXV OF SPECIFICATION	
9	WHETHER CT-PT SETS ARE SUITABLE FOR SATISFACTORY OPERATION UNDER ABNORMAL SYSTEM CONDITION VIZ., SINGLE PHASING SUPPLY ARRANGEMENT BY LOOPING SUPPLY PHASE WITH OTHER LINE PHASE ?	
10	MIN. ELECTRICAL CLEARANCE BETWEEN PHASES. WITH BUSHINGS MOUNTED (MM)	
11	MIN. ELECTRICAL CLEARANCE BETWEEN PHASES. TO EARTH WITH BUSHING MOUNTED (MM)?	

12	WHETHER OIL CONSERVATOR PROVIDED ON CT-PT SET?	
13	ARRANGEMENT PROVIDED TO TAKE CARE OF EXPANSION AND CONTRACTION IN OIL.	
14	WHETHER PRESSURE RELIEF DEVICE PROVIDED?	
15	TEST RESULTS OF OIL AS PER IS : 335	
a)	BREAK DOWN VOLTAGE	
b)	TAN DELTA AT 90 DEG. C	
c)	COLOUR OF OIL (SHALL BE COLOURLESS)	