TECHNICAL SPECIFICATIONS FOR

11 KV & 33 KV OUTDOOR TYPE CURRENT TRANSFORMER

Initiator		Approver	

1.0 INTRODUCTION

This section covers the specification of 33 kV and 11kV Current Transformer suitable for outdoor service. Any other parts not specifically mentioned in this specification but otherwise required for proper functioning of the equipment should be included by the tender in the offer.

The current requirement is as below

36kV, 1-Phase, 400-200-100/1-1-1 Amp

12kV, 1-Phase, 600-300-150/1-1-1 Amp

12kV, 1-Phase, 800-400-200/1-1-1 Amp

2.0 APPLICABLE STANDARDS

Unless otherwise modified in this specification, the Current Transformer shall comply with the latest version of relevant standards (IS 2165, IS 2705(I-IV), IS 2099, IS 5621, IS 2071, IS 335, IS 13947(part I), IEC 185, IEC 270, IEC 44(4), IEC 171, IEC 60, IEC 8263, IS 2147, IS 3347, IS 4201, IS 8603, IEC 815, Indian electricity Rules 2003) or better international standards. This list of standards is for guidance only. The contractor shall be solely responsible to design & manufacture the CT suitable for 33kV & /11 kV systems.

3.0 AMBIENT CONDITIONS

The CT supplied against these specifications shall be suitable for satisfactory continuous operation under the tropical conditions. The detail condition is mentioned in General Technical requirement.

CLIMATIC CONDITIONS

The service conditions shall be as follows:

1. Maximum altitude above sea level 1,000m
2. Maximum ambient air temperature 50°C
3. Maximum daily average ambient air temperature 35°C
4. Minimum ambient air temperature 0°C
5. Maximum relative humidity 95%
6. Average number of thunderstorm days per annum (isokeraunic level) 70
7. Average number of rainy days per annum 120
8. Average annual rainfall 2000 mm
9. Earthquakes of an intensity in horizontal direction - equivalent to seismic acceleration of 0.3g
10. Earthquakes of an intensity in vertical direction - equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

11 .Wind velocity: 300 km/hr, 200 km/hr and 160 km/hr. environmentally, some of the regions, where the work will take place includes coastal areas, subject to high relative humidity, which can give rise to condensation. Onshore winds will frequently be salt laden. On occasions, the Combination of salt and condensation may create pollution conditions for outdoor insulators. Some places are in heavily industrial polluted areas. Therefore, Outdoor material and equipment shall be designed and protected for use in exposed, heavily polluted, salty, corrosive and humid coastal atmosphere

4.0 SYSTEM PARTICULARS

a) Nominal System Voltage 33kV & 11kV

b)	Highest system Voltage	36kV & 12kV
c)	Rated Frequency	50Hz & 50Hz
d)	No of phases	Three & Three
e)	System neutral earthing	-Solidly Earthed-
f)	One minute Power Freq. withstand voltage (rms)	70kV & 28kV
g)	Lighting Impulse withstand Voltage	170kVp & 75kVp
i)	System fault level	-26.3kA for 3sec-

5.0 TECHNICAL PARAMETERS OF CT

a)	Type	Single phase, dead tank, outdoor,oil filled & hermetically sealed
b)	Type of mounting	Pedestal type
c)	Rated primary current	As per BPS
d)	Rated Continuous thermal current	120 % of rated Primary current
e)	Rated short time withstand Requirement for sec. Winding	As per IS 2705 Pt. I
f)	Rated short time withstand Current	25kA(RMS) for 3 sec
Duration		
g)	Rated dynamic withstand Current (KA rms)	62.5
h)	Max temp rise	As per IEC-185/ IS 2705

i)	Minimum creepage distance of porcelain housing(mm)	25 mm /KV	
j)	One minute power frequency Withstand voltage between Secondary terminal & earth	3 kV	
k)	Detail of Secondary Cores	Metering	Protn. PS
	Current ratio	(As per BPS)	
	Accuracy class	0.2(33)0.5(11)	5P20 PS
	Burden (VA)	30	30
	Instrument security Factor	≤5	-
	Accuracy Limit Factor	-	≥20
	Knee point voltage	VK≥250V at 200/1A & >=500V at 400/1. Maximum exciting current at Vk/2 shall not be less than 30mA. Rct=5 ohm	

6.0 PORCELAIN HOUSING

It shall be single piece of homogeneous, vitreous porcelain of high mechanical & dielectric strength. It will be glazed with uniform Brown or Dark brown colour with smooth surface finish. The creepage distance for the porcelain housing shall be at least 25 mm per kV.

7.0 WINDING

1 PRIMARY WINDING

It shall be made of high conductivity rigid copper wire. The primary winding current density shall not exceed the limit of 1.6 Amp per sq. mm for normal rating.

The design current density for short circuit current as well as conductivity of metal used for primary winding shall be as per IS 2705. The calculation for the selection of winding cross section shall be furnished by contractor.

The primary terminal shall be of standard size of 30 mm dia x 80 mm length of heavily tinned (min. thickness 15 micron) electrolytic copper of 99.9 % conductivity.

2 SECONDARY WINDING

Shall be made of insulated copper wire of electrolytic grade. Type of insulation used shall be described in the offer. For multi ratio design, the multi ratio will be achieved by reconnection of the primary winding or secondary winding. The excitation current of the CT shall be as low as possible. The contractor shall furnish the magnetization curves for all the cores.

The terminal box shall be dust free & vermin proof. The size of the terminal box shall be big enough to enable easy access and working space with the use of normal tools.

The secondary terminals studs shall be provided with at least 3 nuts and two plain washers, these shall be made of brass duly nickel plated. The min. stud outer dia shall be 6 mm & length 15 mm. The min spacing between the centres of the adjacent studs shall be 1.5 time the outer dia of the stud.

The CT secondary terminals shall be brought out in a weather proof terminal box. The terminal box shall be provided with removable gland plate and gland (s) suitable for 1100 volts grade PVC insulated, PVC sheathed, multicore 4 sq mm stranded copper conductor cable. The terminal box shall be stud-type and

provided with ferrules indelibly marked or numbered. The terminals shall be rated for not less than 10 amp. The terminal box shall be dust and vermin proof. Suitable arrangements shall be made for drying of air inside the secondary terminal box. The dimensions of the terminal box and its openings shall be adequate to enable easy access and working space with the use of normal tools. The secondary terminals shall be provided with shorting arrangements.

3 POLARITY

The polarity shall be marked on each CT at the primary and secondary terminals.

8.0 TANK & HARDWARES

The CT will be dead tank type. The tank shall be fabricated of MS steel sheet of min. 3.15 mm for sides & 5 mm for top & bottom. The tank will be finished with min. 2 coats of zinc rich epoxy paint externally. The inner surface shall be painted with oil resistance white enamel paint.

All ferrous hardwares, exposed to atmosphere shall be hot dipped galvanized.

9.0 INSULATION OIL

The first filling of oil in CT shall be in contractor's scope. The oil shall be as per IS 335.

To ensure prevention of oil leakage, the manufacturer will give following details supported by drawings:

i) Location of emergence of Primary & Secondary terminals

ii) Interface between porcelain & metal tanks

iii) Cover of the secondary terminal box

Any nut & bolt and screw used for fixation of the interfacing porcelain bushing for taking out the terminals shall be provided on flanges cemented to the bushings & not on the porcelain.

If gasket joints are used, Nitrite Butyl Rubber gasket shall be used. The grooves shall be machined with adequate space for accommodating gasket under pressure.

The CT shall be vacuum filled with oil after processing. It will be properly sealed to eliminate breathing & to prevent air & moisture from entering the tank. The sealing methods/arrangement shall be described by the contractor & be approved by the owner.

10.0 OIL LEVEL INDICATOR

The CT shall be fitted with prismatic type oil sight window at suitable location so that the oil level is clearly visible with naked eye to an observer standing at ground level.

To compensate oil volume variation due to temperature variation, Nitrogen cushion or the stainless steel bellows shall be used. Rubber diaphragms are not permitted for this purpose.

11.0 EARTHING

Two earthling terminals shall be provided on the metallic tank of size 16 mm dia & 30 mm length each with one plain washer & one nut for connection to the station earth mat

12.0 Junction Box

The junction box shall be of MS sheet having thickness of 2mm, synthetic enamel painted as per procedure mentioned in General Technical Requirement (Min. thickness 55 micron). The shade of junction box shall be 697 of IS: 5. Disconnecting type terminal blocks for CT secondary lead shall be provided. The junction boxes shall be weather proof type with gaskets, as per section-I (Introduction and general technical requirements) conforming to IP-55 as per IS-13947 (Part-I).

13.0 LIFTING & MOUNTING ARRANGEMENT

The CT shall be provided with two lifting eyes to lift the CT. This shall be so positioned so as to avoid any damage to the CT during lifting for instillation or transportation purpose. This shall be detailed in General Arrangement drawing.

The CT shall be of pedestal mounting type suitable for outdoor installation on steel/cement concrete structures. All the clamps, bolts, nut and washers etc. required for mounting the CT on the structure shall be supplied along with the CT and shall be galvanized. The contractor shall supply all the terminal connectors etc. required for connection to the CT.

14.0 TESTING

All Type and Routine Tests shall be as per relevant IS and/or IEC.

15.0 Terminals and connectors

All the Current Transformers shall be provided with bimetallic solder less clamp type, rigid type terminal connectors, suitable for conductor to be finalized during drawing approval.

Each terminal connector shall be of universal type, suitable for both horizontal and vertical connections to the transmission line conductors / station bus bars.

Terminal connectors shall be manufactured and tested as per IS: 5561.

All castings shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off. No part of a clamp shall be less than 10mm thick. All ferrous parts shall be hot-dip galvanised conforming to relevant standard.

For bimetallic connectors, copper alloy linear of minimum thickness of 2 mm shall be cast integral with aluminium body.

All current carrying parts shall be designed and manufactured to have minimum contact resistance.

Connectors shall be designed to be corona free in accordance with the requirements, stipulated in IS: 5561

16.0 TYPE TEST CERTIFICATES

The bidder shall furnish the type test certificates as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA as per the relevant standards. Type test shall have been conducted in certified Test Laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports i.e. any test report not acceptable or any/all type tests (including additional type tests, if any) not carried out, same shall be carried out without any cost implication to TPNODL.

17.0 PRE-DISPATCH INSPECTION

The Material shall be subject to inspection by a duly authorized representative of TPNODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to TPNODL's representatives at all times when the work is in progress. Inspection by the TPNODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with

the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPNODL.

Following documents shall be sent along with material

a) Test reports
b) MDCC issued by TPNODL
c) Invoice in duplicate
d) Packing list
e) Drawings & catalogue
f) Guarantee / Warrantee card
g) Delivery Challan
h) Other Documents (as applicable).

18.0 INSPECTION AFTER RECEIPT AT STORES

The material received at TPNODL store will be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

19.0 GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process / manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the purchaser up to a period of at least 48 months from the date of commissioning or 60 months from the date of last supplies made under the contract whichever is later, (the time scale of 48/60 months could be enhanced subject to

mutual agreements) bidder shall be liable to undertake to replace/rectify such defects at his own cost, within mutually agreed time frame, and to the entire satisfaction of the purchaser, failing which the purchaser will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the purchaser's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for 'free replacement' for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the purchaser.

20.0 PACKING

Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit.

21.0 QUALITY CONTROL

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The purchaser's engineer or its nominated representative shall have free access to the bidder's works to carry out inspections.

22.0 MINIMUM TESTING FACILITIES

Bidder shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant International / Indian standards.

23.0 MANUFACTURING ACTIVITIES

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

24.0 DRAWINGS AND DOCUMENTS

Following documents shall be prepared based on TPNODL specifications and statutory requirements with complete BOM and shall be submitted with the bid:

a) Completely filled–in Technical Particulars
b) General description of the equipment and all components including brochures
c) General arrangement drawing for lightning Arrestor
d) Bill of material
e) Experience list.
f) Type test Certificates

Drawings/Documents to be submitted after the award of the contract:

S No	Description	For Approval	For Review / Information	For Final Submission
1	Technical Parameters	√	√	√
2	General Arrangement drawings	√	√	√
3	Terminal and connection drawings	√	√	√
4	Manual/Catalogue	√	√	√

5	Installation/Commissioning Manuals	√	√	√
6	Instruction for use	√	√	√
7	Transport/shipping dimension drawing	√	√	√
8	QA & QC Plan	√	√	√
9	Routine, Acceptance and Type test Certificates	√	√	√

All the Documents and Drawings shall be in English Language.

After receipt of the order, the successful bidder will be required to furnish five copies of all relevant drawings/Documents for TPNODL approval.

Instruction Manuals: Bidder shall furnish two (2) soft copies (CD) and four hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the cables.

25.0 Guaranteed Technical Particulars

GUARANTEED TECHNICAL PARTICULARS FOR 33 KV SINGLE PHASE CURRENT TRANSFORMERS

S. No.	Description	Technical particulars
1	Name of Manufacturer & Country of Origin.	
2	Manufacturer Type designation	
a.	Nominal system voltage.	
b.	Highest system voltages.	
3	Class of Insulation	
i.	One minute Power Frequency withstand	

GUARANTEED TECHNICAL PARTICULARS FOR 33 KV SINGLE PHASE CURRENT TRANSFORMERS

S. No.	Description	Technical particulars		
	voltage (KVrms)			
ii.	Impulse withstand Voltage (KVP)			
iii.	One Minute High Voltage Power Frequency test			
a.	Primary winding			
b.	Secondary winding			
4	Frequency.			
5	Transformation ratio(s).			
6	Rated Continuous thermal current rating (kA rms)			
7	Rated Short time thermal current of primary for one second. (kA rms)			
8	Rated Dynamic Current of primary (kA peak)			
9	Temperature rise for rated continuous thermal current over an ambient temperature of 50 Deg. C at rated burden.			
10	Core utilization for CTs having ratio			
a	400-200-100/1-1-1 A	CORE-I	CORE-II	CORE-III
b.	Rated Primary current (in Amp.)			
c.	Rated Secondary Current (in Amp.			
d	Rated burden.			
e	Class of Accuracy.			
f	Max. Instrument Security Factor.			
g	Accuracy limit factor.			
h	Exciting Current.			
i	Maximum resistance of secondary winding corrected to 75 Deg. C at lowest tap.			
j	Core Material.			
11	Winding Details			
a	Material of conductor.			
b.	No. of turns.			
c.	Cross sectional area.			
d	Weight of winding.			

GUARANTEED TECHNICAL PARTICULARS FOR 33 KV SINGLE PHASE CURRENT TRANSFORMERS

S. No.	Description	Technical particulars
12	Whether complete type test reports as per relevant IS enclosed.	
13	Whether magnetization curve enclosed.	
14	IS to which CT conform	
15	Total weight of CT	
16 a	Quantity of oil	
16 b	Governing standard for oil	
17	Overall dimensions.	
18	Mounting details.	
19	Bushing details.	
a	Confirm to IS:	
b.	Make.	
c.	Catalogue No.	
d	Total creepage distance (mm)	
e	Protected creepage distance.	
20	Make of terminal connector	
21	Whether pressure release device provided.	
22	Other Characteristics	
a	Ratio and phases angle curve.	
b.	Ratio correction factor curve.	
23	Current density in primary windings.	
a	Normal rating, Amps per Sq.mm	
b.	Thermal rating of 3 sec. Amps. per sq.mm.	
c.	Dynamic rating Amps. per sq.mm	
24	Test results of oil as per IS:335	
a	Break Down Voltage	
b.	Tan delta at 90 Deg.	
c.	Colour of oil (shall be color less)	
25	Any other specific feature.	

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e	Class of Accuracy.			
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g	Accuracy limit factor.			
h	Exciting Current.			
i	Maximum resistance of secondary winding corrected to 75 Deg. C at lowest tap.			
j	Core Material.			
11	Winding Details			
a	Material of conductor.			

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GUARANTEED TECHNICAL PARTICULARS FOR 11 KV SINGLE PHASE CURRENT TRANSFORMERS

S. No.	Description	Technical particulars		
b.	No. of turns.			
c.	Cross sectional area.			
d	Weight of winding.			
12	Whether complete type test reports as per relevant IS enclosed.			
13	Whether magnetization curve enclosed.			
14	IS to which CT conform			
15	Total weight of CT			
16 a	Quantity of oil			
16 b	Governing standard for oil			
17	Overall dimensions.			
18	Mounting details.			
19	Bushing details.			
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d	Total creepage distance (mm)			
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20	Make of terminal connector			
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b.	Make.			
c.	Catalogue No.			
d	Total creepage distance (mm)			
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a	Break Down Voltage			
b.	Tan delta at 90 Deg.			
c.	Colour of oil (shall be color less)			
25	Any other specific feature.			

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26.0 SCHEDULE OF DEVIATIONS

(TO BE ENCLOSED WITH THE BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature

Designation