

STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-EHV-1015

Specification Name : Technical Specification for 33kV and 11kV Outdoor Current Transformer

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1. SCOPE

This specification covers the technical requirements of design, manufacture, testing at manufacturers works, packing, forwarding, supply and unloading at store/site of 11KV & 33 KV Outdoor Current Transformer complete with all accessories for efficient and trouble free operation of rating.

2. APPLICABLE STANDARDS

The equipment covered by this specification shall unless otherwise stated, be designed, constructed and tested in accordance with latest revisions of relevant Indian/IEC/other applicable standards shall confirm to the regulations of local statutory authorities.

IS 2705-1992/IEC 60044-1	Specification for Current Transformer
IS 5621-1980	Specification for Hollow insulator for use in Electrical Equipment
IS 2099-1986	Specification of Bushings for AC Voltage above 1000 Volts
IS 335-1983	Specification for new insulation oil
IS 11322-1985	Method for partial discharge measurement in instrument transformer
IS 8603-2008	Dimensions for Porcelain Transformer Bushing for use in heavily polluted atmosphere.

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	35 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	95%
5	Average Annual Rainfall	150cm
6	Average No. of rainy days per annum	120
7	Altitude above MSL not exceeding	1000m
8	Wind Pressure	300 Km/hr
9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g



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10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)
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TPCODL/TPNODL/TPSODL/TPWODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed upto 300 Kmph. The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS

GENERAL TECHNICAL REQUIREMENTS									
S.	Description	As specified by TPCODL/TPNODL/TPSODL/TPWODL							
1	Service	33 KV				11 KV			
2	Rated voltage	36 KV				12 KV			
3	Rated	50 Hz				50 Hz			
4	Rated Lightning	170 KVp				75 KVp			
S	Rated primary	800-400-200 A				800-400-200 A			
6	Rated Power frequency dry	70 kV rms				28 KV rms			
7	Rated Power frequency Wet	70 kV rms				28 KV rms			
8	Transformation Ratio (CT)	800-400-200/1-1-1A				800-400-200/1-1-1A			
9	Rated continuous	1.2 times of primary current				1.2 times of primary current			
10	Short time thermal	25 kA for 3 sec				25 kA for 3 sec			
11	Rated dynamic	2.5 times of short time thermal current rating				2.5 times of short time thermal current rating			
12	Core details	Core-1	Core-	Core-		Core-1	Core-2	Core-3	
12.	Accuracy	PS	0.2s	5P20		PS	0.2s	5P20	
12.	Rated burden	---	30VA	30VA		---	30VA	30VA	
12.3	Knee point voltage (Vk) min.	> 500V at 400/1	---	---		> 500V at 400/1	---	---	
12.4	Resistance of Secondary winding,	<6				<6			

12.5	Maximum Exciting Current mA at $V_k/2$	<30mA				<30mA			
12.6	Instrument security factor		<5				<5		
13	Tan Delta Value	Shall be within 0.7% for new and shall remain less than 1% for at least 5 years							
14	Limits of Current (ratio) Error and phase displacement for metering purpose	IS Per IS 2705							
15	Limits of Current (ratio) Error and phase displacement for protection core	Ratio error +/-1% and Phase displacement +/-60deg							
16	Limits of Current (ratio) Error for PS class	Ratio error +/- 0.25%							
17	Maximum temperature rise over ambient temperature	55 deg C as per IS 2705-1							
18	Minimum creepage for HT bushing	25 mm/ KV							
19	Gauge of the tank	3 mm							

20	Dimension of CT Base LXB Hole Centre-Centre Distance (mm)	450 X 450	310 X 310
21	Oil Details		
a	BDV of Oil (KV)		
b	Standard of oil		
c	Color of oil		
d	Qty of oil (L)		
22	Bushing details:		
a	Make		
b	IS standards		
c	Total creepage (mm)		

5. GENERAL CONSTRUCTIONS

5.1 CURRENT TRANSFORMER

Design and construction of current transformer shall be sufficient to withstand the thermal and mechanical stresses resulting from the specified short circuit currents. The core lamination shall be of high grade steel or other equivalent alloy. The exciting current shall be as low as possible and the current transformer shall be capable of maintaining its rated accuracy for burden and saturation limits specified in the technical requirement.

Current transformers shall be of dead tank design. The tank material shall be made of GI with 3 mm thickness and painted. The current transfer area of the terminals shall be adequate enough to meet the temperature rise requirements as per IS: 2705. CT shall be supplied complete with required quantity of insulating oil for installing at site. The insulating oil shall comply to IS: 335. P1 and P2 markings shall be permanently riveted. The alignment and center line of CT primary terminals shall be correct so as to avoid bending connections. The primary terminals of CT shall be of silver coated / tinned Copper.

Current transformers shall be provided with a capacitance test tap in the HV lead to enable future monitoring of conditions of HV insulation. Suitable earthing arrangement to be provided for the tap point. Current transformers shall be provided with nameplate showing the particulars and diagram of the connections. CTs shall be provided with suitable lifting arrangement on all the sides.



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CT characteristics shall be such as to provide satisfactory protection for burdens ranging from 25% to 100% of rated burden in case of metering CTs and up to the accuracy limit factor/ knee point voltage in case of protective CTs. CTs shall be complete with accessories such as grounding lugs, filing and drain plugs, oil sight glass (prismatic type), weather proof terminal box, wedge type terminal connector etc.

5.2 TERMINAL BOX

The secondary terminals shall be brought in a weather proof terminal box (IP-55). The terminal box shall be provided with glands suitable, steel wire armored and PVC sheathed multicore 6 sq. mm. stranded copper conductor cables. For Tan Delta testing separate terminals shall be provided in the terminal box. The value of Tan Delta test shall be within 0.7% for new CTs and shall remain less than 1% for at least 5 years and if the said criterion is not fulfilled then the Bidder shall be liable to replace the CTs without any additional cost to the purchaser. Polarity marks shall be indelibly marked on the primary terminals of the current transformer and on the secondary lead at the associated terminal block. Suitable facility shall be provided for short circuiting and grounding the CT secondary at the terminal blocks.

5.3 BUSHINGS

Bushings shall be made of homogeneous, vitreous, porcelain of high mechanical and dielectric strength. Glazing of porcelain shall be of uniform brown or dark color, with a smooth surface arranged to shed away rain water. Suitable arrangement shall be provided for indicating oil level. The bushings shall be of Oil filled condenser type. Oil filled bushings shall be hermetically sealed to prevent ingress of moisture. Cast metal and caps for bushing shall be of high strength, hot dip galvanized malleable iron. They shall have smooth surface to prevent discharge taking place between the metal parts and porcelain as a result of ionization.

5.4 GROUNDING TERMINALS

Two grounding terminals shall be provided on the tank of current transformers on opposite sides, for connecting to station earth grid. Earthing terminal shall also be provided in the secondary junction box for earthing of secondary winding of CT. The earthing terminals shall be readily accessible and so placed that the earth connection of the current transformer is maintained even when the cover or any other movable part is removed. The earthing terminals shall be of adequate size, be protected against corrosion and shall be metallically clean. Under no circumstances shall a movable metal part of the enclosure be insulated from the part carrying the earthing terminal when the movable part is in place. The earthing terminal shall be identified by means of the symbol "⏏" marked in a legible and indelible manner on case or frame to be earthed; adjacent to the terminals.

5.5 TERMINAL CONNECTOR

Suitable bimetallic connector in scope of Bidder
ACSR Zebra conductor used for 33KV equipment connection
ACSR Panther conductor used for 11KV equipment connection.

5.6 PAINT

All interior and exterior of tanks, and other metal parts shall be thoroughly cleaned to remove all rust, corrosion, grease or other adhering foreign matter. All steel surfaces in contact with

insulating oil as far as accessible shall be painted with not less than two coats of heat resistant, oil insoluble, insulating varnish. Steel surfaces exposed to the weather shall be given a priming coat of zinc chromate and two coats of final paint of shade RAL 7032/ Shade 631 as per 15-5. All metal parts not accessible for painting shall be made of a corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound 'and suitably wrapped, or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather. The paint shall not scale or wrinkle or to be removed by abrasion due to normal handling. Bolts and nuts exposed to the atmosphere shall be of hot dip galvanized steel.

6. NAME PLATE & MARKING

The equipment shall be provided with durable and legible name plate. A stainless steel rating plate, of at least 1 mm thickness, shall be fitted to each current transformer in a visible position and shall carry all the information as specified in the standards. The terminal markings shall also be in line with relevant standards. The letters on the rating plate shall be engraved black on the white/silver background. Fixing screws for outdoor use shall be of stainless steel or any other corrosion resistant metals. The Name plate shall be embossed with "PO no. with date" & "PROPERTY OF TPCODL/TPNODL/TPSODL/TPWODL".

The following information shall be mentioned on the Name Plate

- i) Manufacturer's name and Country
- ii) Type designation
- iii) Serial number
- iv) Month and Year of manufacture
- v) Rated primary and secondary current
- vi) Rated frequency
- vii) Highest system voltage
- viii) Rated insulation level
- ix) Rated short time thermal current
- x) Rated dynamic current
- xi) Rated output and corresponding accuracy class
- xii) Warrantee/guarantee clause
- xiii) PO no. & date
- xiv) "PROPERTY OF TPCODL/TPNODL/TPSODL/TPWODL"
- xv) Relevant standards

7. TESTS

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components and fittings shall also be type tested as per the relevant standards. For Bushings all the tests as defined in IS 2099-1986 shall be conducted. For current transformers following tests shall be necessarily conducted in addition to the tests specified in IS/IEC:

7.1 ROUTINE TEST

- 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) Over voltage inter-turn tests
- e) Partial discharge measurement
- f) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class

Optional tests:

The following optional tests where applicable, shall be carried out by mutual agreement between the purchaser and bidder.

- g) Chopped lightning impulse test as a type test.

7.2 ACCEPTANCE TESTS

- i) Verification of terminal marking and polarity
- ii) Power frequency dry withstand tests on primary windings
- iii) Power frequency dry withstand tests on secondary windings
- iv) Over voltage inter-turn tests
- v) Partial discharge measurement
- vi) Determination of errors or others characteristics according to the requirements of the appropriate designation or accuracy class.
- vii) Tan Delta test as specified in Clause 4

All acceptance tests shall be witnessed by the Purchaser's or his authorized representative. The above mentioned test shall be made on the 100% of arresters to be supplied.

7.3 TYPE TEST

- a) Short time current tests
- b) Temperature rise test ,
- c) Lightning impulse test for voltage transformers for service in electrically exposed installation.
- d) High voltage power frequency wet withstand voltage tests on outdoor current transformers.
- e) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class.

8. 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 tests should 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 same shall be carried out without any cost implication to Purchaser.

9. PRE DISPATCH INSPECTION

Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Inspection may be made at any stage of manufacture at the option 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 Purchaser's representatives at all times when the work is in progress. Inspection by the Purchaser or its



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authorized representatives shall not relieve the supplier 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 the Purchaser.

Following documents shall be sent along with material :

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

10. INSPECTION AFTER RECEIPT AT STORES

The material received at Purchaser store shall 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.

11. GUARANTEE

Bidder shall stand guarantee towards design, materials, workmanship & quality of process/manufacturing of items under the 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 Company up to a period of 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract, whichever is earlier, supplier shall be liable to undertake to replace/rectify such defects at his own costs within the mutually agreed timeframe, and to the entire satisfaction of the Company, failing which the Company will be at liberty to get it replaced/rectified at supplier's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the supplier 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 Company

12. PACKING

Bidder shall ensure that all equipment covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit.

13. TENDER SAMPLE

NA

14. 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 after finishing, bought out items and fully assembled component and equipment including

drives. 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 manufacturer/sub-supplier's works to carry out inspections.

15. MINIMUM TESTING FACILITIES

The Bidder shall have in house testing facilities for carrying out all routine tests and acceptance tests as per relevant international/Indian standards.

16. 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 shall be in line with the Quality assurance plan submitted with the offer. The bar chart will have to be submitted within 15 days from the release of the order.

17. SPARES, ACCESSORIES AND TOOLS

- 1) Double compression gland 25mm dia for each CT unit. (1 no's)
- 2) Suitable size lugs for each CT unit. (10 no's)

18. DRAWINGS AND DOCUMENTS

Following drawings and documents shall be prepared on Purchaser's specifications and statutory requirements and shall be submitted with the bid:

- a) Completely filled in Technical Particulars
- b) General arrangement drawing of the CT
- c) General arrangement drawing of Primary terminal assembly
- d) Terminal Block and connection drawing
- e) Foundation Plan and loading details
- f) General description of the equipment and all components with makes and technical requirement
- g) Type Test Certificate.
- h) Experience List.
- i) Manufacturing schedule and test schedule

Drawings/documents to be submitted after the award of the contract.

S.No.	Description	For Approval	For Review Information	For Final Submission
1	Technical Particulars	✓		✓
2	General Arrangement drawings	✓		✓
3	Terminal block and Connection Drawing	✓		✓

4	General arrangement drawing of Primary terminal assembly	✓		✓
5	Foundation Plan and loading details on Cantilever arrangement of CB	✓		✓
6	Manual/catalogue		✓	
7	Installation/Commissioning Manuals		✓	
8	Instruction for use		✓	
9	Transport I Shipping dimension drawing		✓	
10	QA & QC Plan	✓	✓	✓
11	Routine, Acceptance and Type Test Certificates	✓	✓	✓

All the Documents and Drawings shall be in English Language.

Instruction Manuals: Bidder shall furnish two (2) soft copies and Three (3) hard copies of nicely bound manual (in English Language) covering erection and maintenance instructions and all relevant information pertaining to the main equipment as well as auxiliary devices.

19. SAMPLE DRAWING

NA

20. GUARANTEED TECHNICAL PARTICULARS

GENERAL TECHNICAL REQUIREMENTS			
S.	Description	11kV	33kV
1	Service		
2	Rated voltage		
3	Rated		
4	Rated Lightning		
5	Rated primary current		
6	Rated Power frequency dry withstand voltage		
7	Rated Power frequency Wet withstand voltage		

8	Transformation Ratio (CT								
9	Rated continuous thermal current								
10	Short time thermal current rating for 1 second								
11	Rated dynamic current								
12	Core details	Core-1	Core-2	Core-3		Core-1	Core-2	Core-3	
12.1	Accuracy class								
12.2	Rated burden								
12.3	Knee point voltage (Vk)								
12.4	Resistance of Secondary winding,								
12.5	Maximum Exciting Current mA at Vk/2								
12.6	Instrument security factor								
13	Tan Delta Value								
14	Limits of Current (ratio) Error and phase displacement for metering purpose								
15	Limits of Current (ratio) Error and phase displacement for protection								

	core (As per IS/IEC)		
16	Limits of Current (ratio) Error for PS class (As per IS IEC)		
17	Maximum temperature rise over ambient temperature		
18	Minimum creepage for HT bushing		
19	Gauge of the tank		
20	Dimension of Tank (mm)		
21	Total Weight of Tank (kg)		
22	Weight of core and winding of CT (Kg)		
22	Bushing Distance between Metal Part and Earth		
23	Clearance Between HV to Earth (mm)		
24	Lifting Attangement		



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21.

SCHEDULE OF DEVIATIONS
(TO BE ENCLOSED WITH TECHNICAL 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