Technical Specification For 33 KV, Single Phase, Dead Tank Type Out Door Current Transformer Of Different Ratio

1. SCOPE: This section covers the design, manufacturing, assembly, testing at the manufacturer's works, supply & delivery of Current Transformers as specified in Schedule-A for protection and metering system in three phase power network of WBSEDCL.

2. STANDARD: The Current Transformers and accessories covered by this specification shall comply with the requirement of the latest edition of the following standards unless otherwise stated in this Specification.

- IS / IEC Title IS:2705 (Part-I-IV) :Specification for Current Transformers.
- IEC:185, IEC-60044 :Current Transformers.
- IS:4201 :Application guide for Current Transformers.
- IS:2099 :Specification for HV porcelain bushings.
- IS : 5621 : Specification for porcelain hollow insulator.
- IS:335 :Specification for new insulation oil for Transformers and Switchgears
- IS : 8603: Specification for Dimension for Porcelain Transformer Bushing for use in heavily polluted area.
- IS : 3347: Specification for Dimension for Porcelain Transformer Bushing for use in normal and lightly polluted area.
- IS : 2633: Specification for method for testing uniformity of coating on Zinc coated articles
- . IS : 5561 : Specification for Electrical Power Connectors
- IS : 2147: Specification for Degree of Protection

Equipments meeting the requirement of any other authoritative standards other than ISS which ensure equal or better quality shall also be acceptable. The salient points of difference between the standard opted and the ISS standard given shall be brought out in the tender along with a copy of relevant portions of the said standard.

3. GENERAL CLIMATIC AND ISOCERAUNIC CONDITION OF SITE : The climatic and isoceraunic conditions at site are given below :

a) Max. Ambient temp :45 ˚C
b) Minimum ambient temp. : 4 ˚C
c) Maximum relative humidity :100%
d) Average number of thunderstorm day per annum. :75
e) Max. No. of rainy days/annum :120 days
f) Average Rainfall :1000 mm. to 3000 mm.
g) Max. Wind pressure/wind speed :150 Kg. Per Mtr. sq
h) Height above sea level(m)not exceeding :1000
i) Earthquake acceleration horizontal seismic co-efficient : As per IS:1893(1984) For Class-III & IV Zones

4. DESIGN & CONSTRUCTION OF CURRENT TRANSFORMERS :

The design features and construction details of Current Transformer shall be in accordance with the requirement stipulated in Schedule –A :

4.1 GENERAL REQUIREMENT:

4.1.1 The Current Transformers shall be completed in all respects and shall conform to the modern practice of design and manufacture.

4.1.2 The Current Transformers shall be of low Reactance outdoor type, Single Phase,50 Hz, mounted in oil filled, self cooled, shaded porcelain bushing , suitable for operation under the service conditions as specified in the general condition of site without protection from sun, rain & dust.

4.1.3 The maximum permissible temperature rise of the Current Transformer winding with rated continuous primary current at rated frequency and burden over an ambient temperature should be as per IS :2705 (Part-I) : 1992, considering ambient temperature40 ° Celsius for design purpose.

4.1.4 .The Current Transformers shall be suitable for up right mounting on steel structures and shall preferably be suitable for horizontal transportation. Necessary flanges, bolts, clamps fittings etc. for base of CT shall be arranged by the manufacturer to match with WBSEDCL's standard base structure. Fixing Hole center to center distance in 'X' & 'Y' direction shall be 330 mm. (± 5 mm by slotted holes).

4.1.5 .The CT shall be complete with all accessories like terminal connectors, weather proof terminal box for secondary connection, lifting lugs, grounding terminals, oil level gauge glass, filling and draining plugs and name plate.

4.1.6 .The CT shall be oil immersed type provided with Class-A insulation. The design and construction of CTs shall be sufficient to withstand the thermal and mechanical stresses resulting from the specified short circuit currents.

4.1.7 .The core of the CTs shall be high grade non-ageing, silicon laminated steel of low hysteresis loss and high permeability to ensure high accuracy confirming to IS:3024.The core material used for metering shall be stated in tender.

4.1.8 The exciting current shall be as low as possible and the CTs shall be capable of maintaining its rated accuracy at different burdens and saturation limits.

4.1.9 .CT characteristics shall be such as to provide satisfactory performance for burdens ranging from at least 25% to 100% of rated burden in case of metering CT cores and knee point voltage in case of Protection Special CT core.

4.1.10 .Necessary markings for connections shall be marked on each CT and load terminations at the associated terminal block. Provision shall be provided for short circuiting and grounding of CT secondary at the terminal blocks.

4.1.11 The CT secondary terminals shall be brought out in a weather proof secondary terminal box. The secondary terminal box shall be fixed in the P2 side of CT.

4.1.12 The oil immersed type CT shall be hermetically sealed to eliminate breathing and to prevent ingression of air and moisture from the

environment .Each CT shall be provided with oil level gauge, which can be read from the ground level and a pressure-releasing device to just release the abnormal internal pressure. If any inert gas is used particulars of gas above oil and means of separation of oil from gas to be indicated.

4.1.13 Oil level indicator should be fixed in such a position so that oil level should confirm that the Primary studs inside the CT are emerged in oil.

4.1.14 . The CT secondary to be used for metering and instruments shall be of accuracy class and ISF as specified. The saturation factor of this core shall be low enough so as not cause any damage to measuring instruments in the event of maximum short circuit current.

4.1.15 The CT secondary to be used for protective relaying purpose shall be of accuracy class as specified. The magnetization curve of the cores shall be furnished with tender.

4.1.16 The ratio changing arrangement shall be provided on secondary side of the CT. Terminal marking for connections shall be marked on both primary and secondary terminals of each CT.

4.1.17 Above oil immersed type CTs must be Dead Tank type.

4.1.18 Primary& Secondary windings shall be of copper. Size, No. of Turns etc are to be mentioned in GA drawing in line with Short Circuit Test Report.

4.1.19 C.T. Stud sizes shall be as follows :

a) Primary Terminal :Primary Stud of the CT will be of plain solid round(threading is not required) with Tin Plate Electrolytic Copper having minimum Diameter of 30 mm (negative tolerance is not allowed) and minimum outside length of 80 mm.

b) Secondary Terminal : M8 type with 70 mm long Nickel Plated Brass with suitable size along with suitable nuts & washers.

4.2 BUSHING :

4.2.1 Porcelain bushing conforming to latest edition of IS:8603 & IS:3347 shall be used for the CT.

4.2.2 . Cast metal end caps for the bushing shall be of high strength & made ofbrass. They shall have smooth surface to prevent discharge taking place between the metal parts and porcelain as a result of ionisation.

4.2.3 . The insulation of bushings shall be co-ordinated with that of the current transformer such that the flashover, if any will occur only external to the CT.

4.2.4 Each of the primary terminals shall be complete with suitable rigid type terminal connector suitable for CT Stud to ACSR Panther.

4.2.5 . Each of the porcelain bushing shall have Creepage distance for specified voltage class.

4.3 TERMINAL CONNECTORS :

4.3.1 The primary terminal connector shall be made of Aluminium alloy.

4.3.2 All castings of connectors shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges or corners shall be rounded off.

4.3.3 No part of the connectors shall be less than 10 mm. thick.

4.3.4 All ferrous parts shall be hot dip galvanised conforming to IS:2633.

4.3.5 Bi-metallic strips and sleeves, if require, shall be provided loose of about 2 mm. thickness as a part of connector.

4.3.6 All current carrying parts of the connectors shall have minimum contact resistance.

4.3.7 Connectors shall be corona controlled and shall conform to IS:5561. 4

4.3.8 Connectors shall conform to type test as well as to routine test as per IS:5561.

4.3.9 Connectors shall be suitable for connection with ACSR 'PANTHER' to CT terminal along with suitable nuts bolts & washers.

4.4 **GROUNDING TERMINALS** :

Two grounding terminals on diagonally opposite sides of adequate size suitable for connecting M.S. Flat of size of 50 mm. x 6 mm.

4.5 **SECONDARY TERMINAL BOX** :

4.5.1 All secondary terminals shall be brought out in a compartment on P2 side of each current transformer for easy access.

4.5.2 The exterior of this terminal box shall be hot-dip galvanized / painted with weather proof paint.

4.5.3 The secondary terminal box shall be provided with a removable cable gland plate at bottom for mounting cable glands of 1.1 KV grade steel wire armoured, PVC insulated PVC sheathed 4 core (4 sq.mm.) stranded copper conductor cables. The cable glands shall be included within the scope of supply. The number of cable glands are equal to number of cores in the CT.

4.5.4 The terminal box shall be provided with a detachable cover plate in front so as to have easy access of secondary terminals. The cover shall have a sealing arrangement and shall be suitable to prevent ingration of moisture and rain water. The sealing arrangement shall be done by drilling holes in the tightening bolts of the cover. The degree of protection shall be not less than IP-55 as per IS- 2147.

4.5.5 . All terminals shall be clearly marked with identification number to facilitate connection to external wiring with sufficient space in between.

4.6 **INSULATING OIL** :

The insulating oil to be used for CT shall comply in all respect with the provisions of the latest edition of IS : 335.

4.7 **PAINTING** :

4.7.1 C.T. Tank wherever applicable, along with top metallic shall be either hot dip galvanized or painted. All steel surfaces shall be cleaned by sand blasting or chemical process as required to produce a smooth surface,

free of scale, grease and dirt. Steel surfaces in contact with insulating oil shall be painted with heat resistant oil insoluble insulating varnish.

4.7.2 . External surfaces shall be given a coat of high quality red or yellow chromate primer and finished with two coats of synthetic enamel paints [Light Grey (colour code-631) as per IS-5] / Epoxy paint. The paints shall not scale off or crinkle or be removed by abrasion due to normal handling.

4.8 **RATING PLATE / NAME PLATE PARTICULARS** :

The name plate shall be fixed in non detachable portion of the CT. It shall contain the following data engraved / painted on it

a) . Name of the manufacturer.
b) . Purchase order reference.
c) . Electrical diagram of CT.
d) . Ratio, Class, Burden, STC, ISF/ALF, HSV etc.
e) . Serial number
f) . Year of manufacturer
g) . Property label " Property of WBSEDCL
h) . Guarantee for Five Years
i) Any other information as deem feet.
j) The name plate diagram shall be submitted along with the drawing for approval.

5. DEVIATION :

Normally the offer should be as per Technical Specification without any deviation. But any deviation felt necessary to improve performance, efficiency and utility of equipment must be mentioned in the 'Deviation Schedule' with reasons of such deviation. Such deviation suggested may or may not be accepted. Deviations not mentioned in Deviation Schedule will never be considered.

6. TEST REPORTS AND TYPE TESTS :

The bidder shall submit complete test reports of all tests (including Type Test) as stipulated in relevant IS/ IEC with Complete identification, date and serialno., carried out in CPRI/ NABL accredited/ Government recognized Test House or Laboratory on tendered item/items for each items of identical design.

The Type Test Certificates should, however, bear the Logo of NABL accreditation.

Copies of following type test report for each item as per latest IS / IEC, carried out within five (5) years, from due date of tender, from CPRI, NABL accredited/ government recognized test house or laboratory shall be submitted along with tender documents as pre-requisites. Failing which their offer may not be technically acceptable.

a) High voltage Power frequency wet withstand voltage test
b) Short time current test.

c) Lightning impulse voltage withstand test
d) Temperature rise Test
e) Determination of error.

Each Type Test Report shall comply with the following information with Test results

I. Complete identification, date and serial no.
II. Method of application where applied, duration and interpretation of each Test.

7. TESTS AT FACTORY AND TEST CERTIFICATES & ACCEPTANCE TEST :

7.1 .Each CT shall comply with the requirements of Type Tests & Routine Test as specified in relevant Part-(I-IV) of IS-2705.

7.2 . All routine test at manufacturer's works on all CTs shall be carried out and Test Reports are to be submitted to CE, Procurement & Contract Dept. WBSEDCL.

7.3 .All Acceptance tests shall be carried out at manufacturer's works on every lot offered for inspection as per relevant IS in presence of the WBSEDCL's and Contractors' representatives. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IS. In addition to above, all routine tests are also to be carried on the tendered items as per relevant IS. The entire cost of acceptance and routine test that to be carried out shall be treated as included in the quoted price of tendered items.

7.4 . Six copies of test reports duly signed by the inspecting officers, shall be submitted to the Chief Engineer, Procurement & Contract Department , Bidyut Bhavan (4th floor) Salt Lake, Kolkata -700091.

7.5 The manufacturer shall give at least 21(twenty one) days advance notice intimating the actual date of inspection and details of all tests that are to be carried out, to the CE Distribution Testing Department, WBSEDCL with a copy to SE (Inspection) P&C

8. TYPE TESTS (after issuance of order) :

Besides submission of Type test Report, carried out within five years as per tender specification, Type Test at the discretion of Ordering authority, shall have to be arranged by the successful Bidder from any lot offered for inspection, sample chosen at random after successful routine test by our inspection team, as per relevant ISS from CPRI/ NABL accredited/ Government recognized Test House or Laboratory in presence of WBSEDCL'S representative. However the necessary cost of the type test Charges will be reimbursed to the party on production of necessary supporting documents.

9. ACCEPTANCE TEST :

The following Acceptance tests shall be carried out at manufacturer's works on every lot offered for inspection as per relevant IS in presence of the WBSEDCL's and Contractors' representatives. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IS. In addition to above, all routine tests are also to be carried on the tendered items as per relevant IS. The entire cost of acceptance and routine test that to be carried out shall be treated as included in the quoted price of tendered items.

9.1 Visual checking and verification of dimension including verification of terminal marking and polarity.

9.2 Determination of errors and other characteristics as per specification

9.3 Power Frequency voltage withstand test on both primary & secondary winding.

10. DRAWINGS :

10.1 The bidder shall submit to WBSEDCL the following tender purpose drawing along with tender documents. The drawings in line with tender specification shall also to be submitted after issuance of order for approval :

10.2 General outline dimension drawing of current transformers furnishing front and side elevation top and bottom plan views, showing all accessories, mounting arrangement on steel structures, spacing and size of the bolts, details of expansion chamber, total and protective creepage distance of bushing, electrical diagram for primary and secondary windings with polarity mark, technical arrangement for secondary terminal box, size of primary terminals, grounding terminals and lifting lugs, quantity of insulating oil, net and shipping weight, shipping dimension, fixing hole centre dimensions etc.

10.3 Magnetisation characteristics curve of the protection core of the CT furnishing knee point voltage and secondary winding resistance, rise etc.

10.4 It should be noted that :

10.4.1 . All notes and legends of the drawings shall be furnished in English and all dimensions shall be marked in metric units. Purchase Order No. shall be mentioned in the drawings.

10.4.2 Equipment shall be manufactured as per approved drawings.

10.4.3 Terminal Connectors & Bushings.

10.4.4 . Four sets of approved drawings shall be submitted for our record. One set of drawing to be sent to each Consignee.

11. . INSTRUCTION MANUALS :

Four bound copies of instruction manuals and literatures of the CTs in English language shall be supplied to the purchaser and one set for each consignee prior to despatch of CTs. The manuals shall contain the following :

a) .A brief description of CT furnishing the constructional features.

b) Instruction for handling, storing, erection, commissioning and operation and maintenance of C.Ts.

c) General outline drawing of the C.Ts along with all components and accessories.

d) Marked erection points identifying the component parts of C.T.

e) Detailed dimensions assembly and description of all accessories.

f) .Detailed views of Core, winding assembly, winding connections and its tapping.

g) List of spares and other necessary information for C.Ts.

h) .A set of approved test certificate.

Schedule –'A'

Specific Technical particulars of 33 KV Outdoor Type Current Transformer

Sl. No	Description	Particulars	
1	. Rated system voltage	33KV	
2	. Highest system voltage	36 kV	
3	Applicable Standard	IS:2705-1992 (Part -I-IV) /IEC- 185,IEC-60044	
4	. System neutral earthing	Non-effectively earthed	
5	System freq	50HZ	
6	Extended current rating	120% maximum	
7	. Installation	Outdoor	
8	. Class of Insulation	A	
9	Type	Single phase Outdoor Dead Tank Type	
10	Basic Insulation Level	HV: 36 KV / 70 KV / 170 KV(P)	
		LV:3 KV (rms.)	
11	Instrument Security Factor for Metering Core	.< 5 at lower ratio	
12	Minimum Creepage Distance	900 mm	
13	Primary Terminal Connector	Rigid type CT stud to ACSR 'PANTHER'	
14	Rated Short Circuit thermal current	20 KA for 3 Sec	
15	Rated Dynamic current	50 KA (Peak)	
16	. CT Ratio, Class, Burden **etc**		
b)	Ratio : 200-100-50/ 1-1 A	Core-1: metering core	Burden- 15VA, Accuracy class- 0.5S
		Core-2: protection core	Burden- 30VA, Accuracy class- 5P20
17	. Temperature Rise	As per relevant IS/IEC	
18	Suitability	Should be suitable for upright mounting on Steel Structure in outdoor Switch yard with matching to WBSEDCL's Standard base structure	
19	Fixing hole center	330 mm both in X & Y direction	
20	Fixing Position of Secondary terminal box	. On P2 Side of the CT	

Schedule of Guaranteed Technical Particulars for 33 kVoutdoor Current Transformer.

(To be submitted by the Bidder)

Sl. No				
1	. Name of the Manufacturer			
2	. Address			
3	Type of CT			
4	. Rated Voltage			
5	Applicable Standard			
6	CT Ratio			
7	Ratio change over details			
8	Core details	Class	Burden	ISF / ALF
	Metering Core (Core – I)			
	Protection Core (Core – II)			
	Protection Core (Core – II)	.. Min. Vk at lower ratio	Max. Ie at Vk/2	RCT
9	STC (KA for 3 Sec)			
10	. Rated continuous Thermal Current			
11	Temp. rise over ambient (° C)	Winding	Oil	Exposed current carrying part
12	Rated Insulation Level			
	a) 1.2/50 micro second Impulse withstand voltage on Primary Winding (KV Peak)			
	. b) One minute Power Frequency withstand voltage (Dry) on Primary Winding (KV rms)			
	c) One minute Power Frequency withstand voltage (Wet) on Primary Winding (KV rms)			
	d) One minute Power Frequency withstand voltage on Secondary Winding (KV rms)			
13	Minimum Creepage Distance (mm)			
14	Insulation Class			
15	Material of Core			
16	Material & Size of Stud			
	(i) Primary Terminal			
	(ii) Secondary terminal			
17	Whether bushing is hermetically sealed			

Sl no		
18	Whether Nitrogen Gas cushion is provided	
19	Whether Pressure Relief Device provided	
20	. Cantilever Strength (Kgf)	
21	Weight of oil (Kg)	
22	Volume of oil (Lts)	
23	Fixing hole centre dimension in X & Y direction (mm)	
24	Mounting details	
25	Type of connector	
26	. Painting process Paint shed Paint Thickness	
27	Fixing position of Secondary Terminal Box	
28	. Degree of Protection of Secondary Terminal Box	
29	Guarantee	