TECHNICAL SPECIFICATION FOR 11 KV COMBINED CURRENT & POTENTIAL TRANSFORMER SUITABLE FOR THREE ELEMENT METER

1. SCOPE *:*

This specification covers the design, manufacture, assembly, testing at the manufacturer's works, supply & delivery at site of combined current & potential transformers of 11KV voltage class as specified in Schedule - A for metering services in three phase system for three element meter.

2. STANDARD :

The combined current & potential transformers unit 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:2705 (Part-I-IV)	:	Specification for current Transformers.
IS:3156	:	Specification for Potential Transformers.
IS:2099 & IS:5621	:	Specification for HV Porcelain bushings.

3. 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 duly supported by documentary evidence. Such deviations suggested may or may not be accepted by the Company. Deviations not mentioned in Deviation schedule will not be considered.

4. DESIGN & CONSTRUCTION OF 11 KV COMBINED CURRENT & POTENTIAL TRANSFORMERS:

The design features and construction details of combined current & potential transformer shall be in accordance with the requirement stipulated in Schedule - A :

i) The combined current & potential transformers shall be complete in all respects and shall conform to the modern practice of design and manufacture.

ii) The combined current & potential transformers shall be of low Reactance outdoor type, three phase, 50 Hz, self cooled with shaded porcelain bushing suitable for operation under the service conditions as specified in the general condition of site suitable for outdoor operation.

iii) The maximum permissible temperature rise of the combined current & potential transformer winding when carrying a primary current equal to the rated continuous current at rated frequency and with rated burden over an ambient temperature shall not exceed $55^{o}C$.

iv)The combined current and potential transformer shall be oil type .The combined current & potential transformers shall be suitable for up right mounting on PCC POLE DP structures. Necessary flanges, bolts, clamps fittings etc. for base of combined CT & PT Unit shall also be supplied by the Manufacturer.

v) The combined CT & PT Unit shall be complete with all accessories like primary terminal connectors, weather proof terminal box for secondary connection, lifting lugs, grounding terminals and name plate.

vi) The combined CT & PT Unit shall be oil type provided with class - A insulation. It shall be of hermetically sealed type construction to prevent air & moisture from entering the tank. The design and construction of combined CT & PT Unit shall be sufficient to withstand the thermal and mechanical stresses resulting from the specified short circuit currents and specified duration as mentioned in General Technical Specification.

vii) The core of the combined CT & PT Unit shall be high grade non-ageing, electrical, silicon laminated steel of low hysteresis loss and high permeability to ensure high accuracy at both normal and over current.

viii) The exciting current shall be as low as possible and the combined CT & PT Unit shall be capable of maintaining its rated accuracy at different burdens and within saturation limits.

ix) Rating plate marking shall be provided as per relevant clause of IS:2705 & 3156.

x)The combined CT & PT Unit 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 combined CT & PT Unit cores .

xi)The combined CT & PT Unit secondary terminals shall be brought out in a weather proof terminal box. The terminal box shall be provided with glands suitable for 1.1 KV grade, steel armoured PVC sheathed two numbers 4 core 4 Sq. mm stranded copper conductor cable.

xii)The combined CT & PT Unit secondary to be used for metering and instruments shall be of accuracy class and I S F 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.

xiii)The ratio changing arrangement shall be provided on secondary side of the combined CT & PT Unit.

5. BUSHING :

i) The insulation of bushings shall be co-ordinated with that of the combined CT & PT Unit such that the flashover, if any will occur only external to the combined CT & PT Unit.

ii) Each of the bushings porcelain shall have creepage distance suitable for voltage class as specified in specified IS.

6. GROUNDING TERMINALS :

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

7. SECONDARY TERMINAL BOX :

i) All secondary terminals shall be brought out in a compartment on one side of the combined CT & PT Unit for easy access.

ii) The exterior of this terminal box shall be hot-dip galvanized/painted.

iii) Arrangement for shorting of CT secondary terminals shall be provided in the CT secondary terminal box with supply of shorting link made of copper.

iv) The terminal box shall be provided with removable cable gland plate with provision of punching at bottom for mounting required number of cable glands of 1.1 KV grade steel wire armoured, PVC insulated PVC sheathed 4 sq.mm 4core stranded copper conductor cables. The cable glands shall be included within the scope of supply.

v) The terminal box shall be provided with a door in front so as to have easy access of secondary terminals. The door shall have a sealing/ locking arrangement and shall be suitable to prevent penetration of moisture and rain water.

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

8. PAINTING :

i) The tank and top metallic cover shall be 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.

ii) 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 as per shade 631 of IS:5)

iii) Paints shall be carefully selected to withstand tropical heat, rain etc. The paints shall not scale off or crinkle or be removed by abrasion due to normal handling.

9. TESTS AT FACTORY AND TEST CERTIFICATES :

i) Each combined C.T/PT shall comply with the requirements of routine test as specified in the relevant Clause of IS:2705: 1992 & IS :3156

ii) Routine test at manufacturer's works shall be carried out in presence of representative of WBSEDCL as per relevant IS.

iii) All Acceptance tests shall be carried out at the manufacturer's works on every lot offered for inspection as per relevant IS. In addition to above, all routine tests are also to be carried out on combined CT & PT Unit as per relevant IS. Selection of samples for acceptance test as well as rejection and retesting shall be guided by relevant IS.

10. TEST REPORTS AND TYPE TESTS :

The Bidder shall submit complete Test Reports of all tests (including Type Test) for identical design as per Tender Specification, as per IS 2705 & IS 3156, carried out in a CPRI/NABL accredited/Govt. recognised Test House or Laboratory on 11KV Combined CT&PT(Oil Type) suitable for Three Element Meter. The submitted Test Reports shall amply prove that the Tests have been carried out within 5 years from the due date of Tender.

COPIES OF TYPE TEST REPORTS AS PER LATEST IS, CARRIED OUT WITHIN FIVE (5) YEARS (FROM DUE DATE OF TENDER) FROM CPRI/ NABL ACCREDITED/GOVERNMENT RECOGNISED TEST HOUSE OR LABORATORY, SHALL HAVE TO BE SUBMITTED ALONG WITH TENDER DOCUMENTS AS PRE-REQUISITES, FAILING WHICH THEIR OFFER MAY NOT BE TECHNICALLY ACCEPTABLE. THE CERTIFICATES OF THE NABL ACCREDITED/GOVT. RECOGNIZED TEST HOUSE OR LABORATORY SHOULD, HOWEVER, BEAR THE LOGO OF NABL ACCREDITATION.

Each Type Test Report shall comply 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.
iii) Lightning Impulse Voltage Withstand Test conducted on 3 phases with standard Lightning Impulse Voltage of +ve & -ve polarities.
iv) Short time Current Test conducted on three phases.
v) Temperature Rise Test.

The Bidder shall have to quote the testing charges only for carrying out Type Tests, mentioned in the Schedule,on combined CT & PT Unit so that the same can be carried out as per option of WBSEDCL

11. **TENDER DRAWING, CATALOGUE AND TEST REPORTS :**

One copy of the following drawings and catalogue shall be submitted with each copy of tender for evaluation :

i)General arrangement drawings showing front elevation, side view, plan along with all accessories, mounting arrangement, creepage distance of the bushing, electrical diagram of primary and secondary connection with polarity marking, terminal arrangement of secondary terminal box, size of primary terminals, grounding terminals and lifting lugs, net and shipping weight, dimension etc.

ii) Name and rating plate diagram .

iii) The bidder shall submit complete test reports of all tests (including Type Test) as stipulated in the relevant IS carried out in a NABL accredited / Govt. recognised Test House or Laboratory on combined CT & PT Unit of identical design as per Tender Specification. The submitted test report shall amply prove that the tests have been carried out within 5 years from the date of submission of tender.

12. CONTRACT DRAWINGS AND MANUALS :

12.1 In the event of placement of order the following drawings and manuals shall be submitted in six (6) copies to the Chief Engineer, P&C,WBSEDCL, Vidyut Bhavan (4th floor), Kolkata – 700091 for approval.

a) General outline dimension drawing of current transformers furnishing front and side elevation, top and bottom plan, views showing all accessories, mounting arrangement on DP structures, including dimension of the bolts, total creepage distance of bushing, electrical diagram for primary and secondary connections with polarity mark, terminal arrangement for secondary terminal box, size of primary terminals, grounding terminals and lifting lugs, quantity of insulating oil, net and shipping weight, shipping dimension etc.

b) Name and rating plate diagram of combined CT & PT Unit.

12.2 After approval, ten (10) sets of approved drawings and operating and maintenance manual including the instruction manual shall be submitted for our record and distribution to site. (Two complete sets should be directly sent to Chief Engineer, (Dist.), Vidyut Bhavan (1st floor), Kolkata – 700091)

Instruction manual should contain :

a) A brief description of combined CT & PT Unit. furnishing the constructional features.

b) Instruction for handling, storing, erection, commissioning and operation and maintenance of combined CT & PT Unit

c) General outline drawing of the combined CT & PT Unit along with all components and accessories.

d) Marked erection points identifying the component parts of combined CT & PT Unit.

e) Detailed dimensions of assembly and description of all accessories.

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

g) List of spares and other necessary information for combined CT & PT Unit

h) A set of approved test certificate.

i) All notes and legends of the drawings shall be furnished in English and all dimensions shall be marked in metric units.

13.00 **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 contractor 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.

14.00 **Documents to be submitted at the time of physical delivery at consignee stores :**

The following documents to be submitted by the Vendors to the Consignee Stores at the time of physical delivery :-

a) Copy of Purchase Order.
b) Copy of Despatch Instruction.
c) Inspection Test Certificate.
d) Guarantee Certificate.
e) Proforma Invoice.
f) Calculation Sheet for price Variation on the basis of IEEMA or CACMAI as applicable with base date of order.
g) Seal list and packing list.
h) Challan in triplicate.
i) Way bill, if applicable.

SCHEDULE-A

SPECIFIC TECHNICAL PARTICULARS OF CURRENT TRANSFORMER

Sl. No.	Description		
i)	Rated system voltage KV (rms)	:	11
ii)	Highest system voltage KV (rms)	:	12
iii)	CT Ratio	:	200-100/1A & 300-150/1A suitable for 3 Phase 4 Wire meter, rating -/1A & -/110V, 0.5 class
iv)	Burden (VA)	:	10 VA, Accuracy Class-0.5
v)	System frequency (Hz)	:	50
vi)	System neutral earthing	:	Effectively Earthed
vii)	Installation	:	outdoor
viii)	Extended current rating	:	120 % Max.
ix)	Rated short time thermal current 1 second (KArms)	:	18.4
x)	Rated Dynamic current KA (peak) (should be at least 2.5 times of above rating)	:	46
xi)	Rated Insulation level :		
	a) 1.2/50 microsecond impulse withstand voltage (KVpeak)	:	75
	b) One minute power frequency withstand voltage (KVrms) on primary winding	:	28
xii)	Power frequency over voltage withstand requirements for secondary winding for one minute (KVrms)	:	3
xiii)	Over voltage interturn test	:	As per clause 7.5 of IS: 2705 Part-I
xiv)	Creepage Distance (Heavily polluted atmosphere) Total mm	:	300
xv)	Limit of temp. rise(^{O}C) of windings at rated current	:	55^{O}C
xvi)	Instrument security factor	:	Less than 5 for metering core at Lower Ratio.
xvii)	Type of Insulation	:	Class A
xviii)	Mounting Dimension (mm) of C.T.P.T combined unit	:	300x300
xix)	Weight of CT&PT Combined Unit	:	115 Kg $\pm$ 10%

SPECIFIC TECHNICAL PARTICULARS OF POTENTIAL TRANSFORMER

Sl. No.	Description	
i)	Rated system voltage KV (rms)	: 11
ii)	Highest system voltage KV (rms)	: 12
iii)	PT Ratio	: 11000/√3/110/√3 V
iv)	Burden (VA)	: 30 VA/phase , Accuracy Class-0.5
v)	System frequency (Hz)	: 50
vii)	Installation	: Outdoor
viii)	No. of phase/ Connection	: 3 Ph, Star/star with Earthed Neutral (3 phase 5 Limb PT).
ix)	Rated Insulation level	:
	a) 1.2/50 microsecond impulse withstand voltage (KV peak)	: 75
	b) One minute power frequency withstand voltage (KV rms) on primary winding	: 28
x)	Power frequency voltage withstand requirements for secondary winding for one minute (KV rms)	: 3
xi)	Limit of temp. rise of winding (°C)	: 55° C above ambient temperature.
xii)	Voltage factor	: 1.2 cont. & 1.9 for 8 hours

GUARANTEED TECHNICAL PARTICULARS FOR CURRENT TRANSFORMER

SL No.	Description	
1)	Make	:
2)	Type	:
3)	Reference Standard	:
4)	Voltage Grade	:
5)	Ratio	:
6)	Frequency	:
7)	No of core	:
8)	Rated VA Burden	:
9)	Accuracy Class	:
	a) Class of Insulation	:
	b) Temperature rise above ambient	:
	c) Insulation level-KV (peak/rms)	:
10)	a) Short time current rating for 1.0 sec KA	:
	b) Dynamic current rating-KA peak	:
11)	Accuracy limit factor	:
12)	Instrument security factor	:
13)	Magnetizing curve furnished	:
14)	Mounting Dimension of combined C.T.P.T unit	:
15)	Weight of Combined CT&PT Unit	:

Signature with office seal of the Bidder

GUARANTEED TECHNICAL PARTICULARS FOR POTENTIAL TRANSFORMER

SL. No.	Description	:
1)	Make	:
2)	Type	:
3)	Reference Standard	:
4)	Frequency	:
5)	a) Rated Primary Voltage	:
	b) Rated Secondary Voltage	:
	c) Winding Connection	:
6)	a) Rated VA Burden per phase	:
	b) VA Burden Thermal Limit	:
7)	Accuracy Class	:
8)	a) Class of Insulation	:
	b) Temperature Rise above Ambient	:
9)	Over Voltage Factor	:
	a) Continuous	:
	b) 8 Hours	:

Signature with office seal of the Bidder