CONTENTS

1.0 SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at store/site of CT-PT units having one number three phase Potential transformer and three number Current transformers with all accessories for efficient and trouble free operation. The ratings shall be as per the following:

CTR: 5/5,10/5,15/5,20/5,30/5,60/5,75/5,150/5,200/5,300/5 of accuracy class 0.5S or better for Consumer Metering
PTR: 11 KV/√3 / 110/√3 Volts of accuracy class 0.5 or better for Consumer Metering

2.0 APPLICABLE STANDARDS:

The equipment covered by this specification shall conform to the requirements stated in latest editions of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.

a) IS 2705-1992 : Specification for Current transformer
b) IS 3156-1992 : Specification for Voltage transformer
c) IS 5621-1980 : Specification for hollow insulators for use in Electrical equipment
d) IS 2099-1986 : Specification for bushings for AC Voltages above 1000 Volts
e) IS 8603- 2008 : Dimensions for Porcelain Transformer Bushings for use in Heavily Polluted Atmospheres
f) IS 1271-1985 : Specification for Thermal evaluation and classification of Electrical insulation
g) IS 5561 : Specification for Electric Power connectors
h) IEC 60137-0-1 : General requirements – Enameled round copper wire
i) IEC 296 : Specification for new Insulating Oil
j) IS 335- 1993 : Specification for new Insulating Oil
k) IS 6792:1992 : Specification for Determination of Electric strength of Insulating Oil
l) IS 9335, 1984, Part 3: Specification for Cellulosic papers for electrical purposes

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION:

The material shall be suitable for following climatic conditions,

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 150cm
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.

The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.

4.0 GENERAL TECHNICAL REQUIREMENTS:

S. No.	Description	Requirement
4.1	**General for CT-PT**	
4.1.1	Rated Voltage	12 (KV rms)
4.1.2	Service Voltage	11 (kV rms)
4.1.3	Frequency	50 Hz
4.1.4	No. of phases	3
4.1.5	Impulse withstand voltage (On assembled CT-PT set)	75 (KVP)
4.1.6	Insulation levels a) One minute power frequency withstand voltage (On assembled CT-PT) primary Secondary b) One minute wet withstand voltage (On assembled CT-PT set)	 28 (KV rms) 3 (KV rms) Rt. 2*28 (KVP)
4.2	**Current Transformer**	
4.2.1	Transformation Ratio (CT ratio)	5/5A ,10/5A, 15/5A, 20/5A, 30/5A, 60/5, 75/5A, 150/5A, 200/5A & 300/5A
4.2.2	Rated Output (VA burden)	15 VA
4.2.3	Class of Accuracy	0.5S or better – For Consumer Metering
4.2.4	Rated Continuous Thermal Current	1.2 times Primary Current
4.2.5	Short Time Thermal Current Rating for 0.5S	5/5A,10/5A, 15/5A,20/5A & 30/5A – 6.4 kA for 1 Sec, 60/5A & 75/5A– 13.1 kA for 1 Sec 150/5A & 200/5A – 18.4 kA for 1 sec 300/5A – 26.2 kA for 1 sec
4.2.6	Rated Dynamic Current	2.5 times Short time thermal current rating
4.2.7	Number of Cores	one
4.2.8	Instrument security factor	≤5

4.2.9	Limits of Current (ratio) Error and phase displacement	Percentage of rated current	±Percentage current (ratio) error	±Phase displacement in minutes
		1	1.5	90
		5	0.75	45
		20	0.5	30
		100	0.5	30
		120	0.5	30
4.2.10	Maximum temperature rise over ambient temperature	55 deg C as per IS 2705-1		
4.3	**Potential Transformer**			
4.3.1	Transformation ratio	11KV/ 110 Volts		
4.3.2	Rated Output (VA burden)	50 VA per phase		
4.3.3	Rated Voltage factor and time	1.2 continuous and 1.9 for 8 hours		
4.3.4	Class of accuracy	0.5 or better – For Consumer Metering		
4.3.5	Winding connection	Y Yn		
4.3.6	Limit of Voltage (ratio) error	±0.5		
4.3.7	Limit of phase displacement (minutes)	±20		
4.3.8	Maximum temperature rise over ambient temperature	55 deg C as per IS 3156, Part 1		
4.4	**Bushings**			
4.4.1	Material of Bushings	Porcelain		
4.4.2	Dimensions of Bushings	As per IS 8603-2008		
4.4.3	Minimum Creepage distance between phase and earth	25 mm/ KV		
4.4.4	Material for Rod of Bushings	Copper/ Brass		

5.0 GENERAL CONSTRUCTIONAL REQUIREMENTS:

5.1 General

The 11kV CT/PT unit shall comprise of one number three phase potential transformer and three numbers single phase current transformers contained in a fully weather proof outdoor, pole mounting type MS tank, The CTPT unit design shall be hermetically sealed & maintenance free. The combined tank shall be of rectangular shape with round edges and fabricated from tested quality of mild steelof minimum thickness 3 mm. The top cover of the tank shall have sideward slope to allow drainageof rainwater. The min breadth of the CT PT Unit Tank shall be 350mm and the min breadth of the mounting channel of the CT PT Unit Tank 500mm.

The tank body shall be welded with 4 numbers lifting lugs of adequate strength at suitable diagonal locations for balanced lifting of the tank. Adequate electrostatic and electromagnetic shielding shall be provided to eliminate the effect of electromagnetic induction/ electrostatic discharge between the CT and the PT secondary windings. Normal current density shall not be more than 1.6 A/ sq mm. in primary winding of the CT.

The tank shall be electrically welded for accommodating instrument transformers with suitable bolted cover. No fuses either on primary or secondary side of PT shall be provided. The PT shall have three phase star connection with HV neutral floating. The primary winding shall be designed for unearthed

neutral, i.e. for the highest system voltage 12 KV and the winding may have uniform insulation from terminal to neutral and not graded insulation. The Entry of incoming and outgoing cable of the HT Bushing shall be marked by R1, B1, C1 & R2, B2, C2 and the same shall be reflected in the top view of the drawing. The respective Sides shall be painted 'INCOMING' and 'OUTGOING' along with the Ratio of the CT PT Units of font size 50 minimum visible by at least 30 feet. The Size of the Earthing Bolt shall be M16. Pressure Release Value of min 1 inch dia shall be provided along with the arrangement of splash guard. The material of the PRV shall be brass. Oil Level indicator along with Nitrogen fitting valve shall also be provided.

5.2 Windings and Core

Both primary and secondary winding of CT and PT must be resin cast. The PT primary winding conductor shall be of Grade 3 conductors/wires. Conductor insulation used for CT primary must be of class H only. All windings of CT and PT must undergo vacuum pressure impregnation with 'H' class varnish of reputed make. After varnish impregnation all coils to be undergo epoxy resin casting with 'F' class resin of reputed make. Leads shall be brought out from epoxy casting. Leads shall be brought out from resin casting or Resin casting unit shall have automatic making unit for resin and filler with vacuum chamber. The lead size shall be same as per conductor diameter.

The core material of CT PT unit shall be of high grade non ageing electrical silicon CRGO steel of first quality having low hysteresis loss and high permeability to ensure accuracy at both terminal and over current/ voltage. B-H curve of the core material to be used shall be provided by the bidder. All clearances and safety measures shall be taken in compliance of relevant sections of IE rule, 1956. The grade of the Core shall be ZDKH or better.

The insulating paper / polyester film used for insulation shall be of high insulation grade, excellent mechanical strength (tensile, tear, and stretch), high purity, chemical stability, and heat resistance. The paper density if the used shall be approx 60-190 g/m2. The insulating paper shall be used of Weidmann or better/ polyester film shall be used of Gharware Polyster Limited or better. The insulating materials for winding between HV and LV and between interlayer of the winding and for end turn shall be as per. However, end turns shall be provided with reinforced insulation and lead connecting the bushing shall be provided with extra insulation. The lugs shall be properly crimped and soldered.

The conductor in secondary winding of CT shall not be less than 40 sq.mm. and shall be of adequate cross-section to defined carry rated current for respective ratios. The primary winding conductor shall also be of adequate cross section area to carry 120% of full load current continuously without damaging the insulation due to overheating.

To prevent moisture entry in the bushing chamber, the nuts on the top of the stem shall be properly sealed. For HT Termination, 6 nos high performance material insulation cap which is UV stable and track resistant shall be provided by the bidder.

5.3 Bushings

The metering equipment shall be supplied with 6 Nos. outdoor single terminal, porcelain bushings of reputed make (as approved by the Purchaser) without arcing horns, 3 nos. for incoming and 3 nos. for outgoing, with Copper/ Brass studs as per the rating. The bushings shall be rated for 12 KV and shall be suitable for use in heavily polluted atmosphere. The bushings shall confirm to IS: 8603-2008 for the dimensions and IS: 5621and IS: 2099 for other electrical requirements. To prevent moisture entry in the bushing chamber the nuts on the top of the stem shall be properly sealed. The bidder shall provide high performance material insulation cap which is UV stable and track along with CT PT Units for use on bare termination during installation. The Size of the HT Bushing shall be 12 mm for Ratios 5/5A,10/5A,15/5A,20/5A,30/5A, 60/5A & 75/5A and 16 mm bushing for 150/5A, 200/5A& 300/5A. The bushing shall be vertical.

5.4 Terminal Box

All secondary terminals shall be brought out in a weather proof secondary terminal box on one side of the combined CT/PT unit for easy access. The exterior of this terminal box shall be hot dip galvanized. Arrangement for shorting of CT secondary terminals shall be provided in the CT secondary terminal box through shorting link made of copper. The secondary terminals shall be clearly marked with identification number and polarity indications to facilitate connection to external wiring and shall comply with the requirements of the relevant standards. The terminal box shall be provided with removable cable glands suitable for 1.1 KV, 10 core X 2.5 sq mm, PVC insulated, multi strand, armoured, Copper cable with colour coding, thimble (bottle type one side and ring type another side) and ferrule along with marking shall be provided from secondary terminal box of CT PT unit to meter box through GI pipe. The cable glands shall be of brass and shall be included within the scope of supply. Secondary terminal box cover shall have nuts and bolts with hole for sealing arrangements. The secondary terminal box shall be placed at the left side of the outgoing HT terminals w.r.t. equipment.

5.5 Painting

All interior and exterior of tanks, meter box 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 powder coating shall be done. The coating shade shall be PENTON E2727C/ TPSODL Blue with thickness not less than 80 microns. It shall not shed off or wrinkle or be removed by abrasion due to normal handling.

5.6 Oil

The oil shall be filled to the required level with new, unused, clean, standard mineral oil in compliance IEC 296 and shall be free from all the traces of Polychlorinated Biphenyl (PCB) compounds. In casethe Oil shall be of Class 1, with Naphthenic contents > 50%.This shall be more preferable. However,the oil complying to the IS 335 shall also be acceptable. The use of recycled oil is not acceptable. The oil shall be filtered and tested for break down voltage (BDV) and moisture content before filling.Oil shall be filled under vacuum.

6.0 NAME PLATE AND MARKING:

The unit shall be provided with a name plate clearly visible and effectively secured against removal. The name plate shall be indelibly and distinctly marked with all essential particulars as per relevant standards along with the following.

i) Manufacturer's name
ii) Month and Year of manufacture
iii) Serial number and Type designation
iv) Rated primary and secondary currents
v) Rated frequency
vi) Rated output and the corresponding accuracy class
vii) Highest system voltage
viii) Rated insulation level
ix) Rated short time thermal current
x) Rated dynamic current if different than 2.5 times the rated STC rating
xi) Rated primary and secondary voltage
xii) Rated voltage factor and corresponding rated time
xiii) Number of phases and method of connection
xiv) Earthed or unearthed
xv) Guarantee period.
xvi) Reference standard

7.0 TESTS:

All routine, acceptance & type tests shall be carried out separately in accordance with the relevant IS/IEC. All routine/acceptance tests shall be conducted on every unit and the reports has to be sent to TPSODL in case issuance of MDCC or shall be produced at the time of inspection in case of material inspection at factory. All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. For Bushings all the tests defined in IS: 2099-1986 shall be conducted. TPSODL reserve the right to get the type test done on any of the supplied LOT by the bidder. If the Units fail the testing, the bidder shall replace the entire LOT free of cost. For CT/PT unit following tests shall be necessarily conducted on CTs and PTs in addition to the tests specified in IS/IEC:

7.1 Routine Test

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 test in accordance with IS 11322-1985
vi) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class

7.2 Acceptance test:

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 test in accordance with IS 11322-1985
vi) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class

7.3 Type test:

i) Short time current tests
ii) Temperature rise test
iii) Lightning impulse test for voltage transformers for service in electrically exposed installation
iv) High voltage power frequency wet withstand voltage tests on outdoor voltage transformers up to and including 245 kV
v) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class
vi) Chopped lighting impulse test as type test
vii) Short circuit withstand capability test as a type test
viii) Commissioning test on non-earthed voltage transformers and new current transformers
ix) Voltage factor test of PT

For Bus bar following tests shall be necessarily conducted in addition to the tests specified in IS/IEC:

7.4 Type tests :

i) Impulse voltage test
ii) Temperature rise test
iii) Short time current test
iv) Power frequency voltage withstand tests

7.5 Routine tests:

i) Power frequency voltage withstand tests

8.0 TYPE TESTS CERTIFICATES:

The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA/ certified In-house Labs 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, same shall be carried out without any cost implicationto the Purchaser.

9.0 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 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 the Purchaser's representatives at all times when the work is in progress. Bidder shall allow type testing on one no. complete unit per LOT during pre-dispatch inspection. Inspection by the Purchaser 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 the Purchaser.
Following documents shall be sent along with material

a) Test reports
b) MDCC issued by the Purchaser
c) Invoice in duplicate
d) Packing list
e) Drawings & catalogue
f) Guarantee / Warrantee card
g) Delivery Challan

h) Other Documents (as applicable)

10.0 INSPECTION AFTER RECEIPT AT STORE:

The material received at the Purchaser's 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.

11.0 RE- INSPECTION :

If it has been noticed that during inspection, the supplier fails to manufacture the materials or accessories as per the TPSODL Specification, the cost of the inspection shall be borne by the vendor.

12.0 TERMINATION OF CONTRACT:

In case the supplier fails to deliver the materials or any consignment thereof within Contracted period of delivery or in case the materials are found not in accordance with the Specification, the TPSODL management shall exercise its discretionary power either:

a) To recover from the supplier the damages as provided in the penalty of general conditions of tender.

Or

b) To Purchase elsewhere after giving due notice to the supplier at the risk & cost of the supplier without canceling the contract in respect of consignment yet to be delivered.

Or

c) To cancel the contract reserving TPSODL management's right to recover damages.

13.0 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 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, 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 Company'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.

14.0 PACKING:

Bidder shall ensure that all material covered under 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.

15.0 TENDER SAMPLE:

Not applicable

16.0 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/manufacturer's works to carry out inspections.

17.0 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.

18.0 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 shall 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.

19.0 SPARES, ACCESSORIES & TOOLS:

Not Applicable

20.0 DRAWINGS:

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

a. Completely filled-in Technical Parameters.
b. General arrangement drawing of the unit
c. Terminal Block dimensional drawing
d. General description of the equipment and all components with makes and technical requirement
e. Type Test Certificates
f. Experience List
g. Manufacturing schedule and test schedule

After the award of the contract, four (4) copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval.

S.No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	GA Drawing	√		√
3	Internal wiring Diagram		√	√
4	Foundation plan		√	√
5	Installation Instruction		√	√
6	Transport / Shipping dimension drawing		√	√
7	QA & QC Plan	√	√	√
8	Test Certificates	√	√	√

Bidder shall be subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to purchaser.

All the documents & drawings shall be in English language.

Instruction Manuals: Bidder shall furnish two softcopies (CD) and four (4) hard copies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

21.0 GUARANTEED TECHNICAL PARTICULARS:

S. No.	Description	Units	As specified by Bidder
19.1	**General for CT-PT**		
19.1.1	Type		
19.1.2	Application		
19.1.3	Rated Voltage	KV rms	
19.1.4	Service Voltage	KV rms	
19.1.5	Frequency	Hz	
19.1.6	Impulse withstand voltage (On assembled CT-PT set)	KVP	
19.1.7	Insulation levels a) One minute power frequency withstand voltage (On assembled CT-PT) primary Secondary b) One minute wet withstand voltage (On assembled CT-PT set)	 KV rms KV rms KVP	
19.1.8	Paint shade and thickness		

19.1.9	Make of the Insulation Paper/ Polyester Film		
19.1.10	Density of the Insulation Paper/ Polyester Film		
19.1.11	Thickness of the Insulation Paper/ Polyester Film		
19.2	**Current Transformer**		
19.2.1	Transformation Ratio (CT ratio)		
19.2.2	Rated Output (VA burden)	VA	
19.2.3	Class of Accuracy		
19.2.4	Rated Continuous Thermal Current	A	
19.2.5	Short Time Thermal Current Rating	kA	
19.2.6	Rated Dynamic Current	A	
19.2.7	Number of Cores	Nos.	
19.2.8	Instrument security factor		
19.2.9	Limits of Current (ratio) Error and phase displacement		
19.2.10	Maximum temperature rise over ambient temperature	deg C	
19.2.11	Size of Primary Conductor with Rating(s)		
19.3	**Potential Transformer**		
19.3.1	No. of Phases		
19.3.2	Transformation ratio	Ratio	
19.3.3	Rated Output (VA burden)	VA	
19.3.4	Rated Voltage factor and time		
19.3.5	Class of accuracy		
19.3.6	Winding connection		
19.3.7	Winding grade and impregnation		
19.3.8	Limit of Voltage (ratio) error	Ratio	
19.3.9	Limit of phase displacement (minutes)	Minutes	
19.3.10	Maximum temperature rise over ambient temperature	Deg C	
19.4	**Tank**		
19.4.1	Thickness of the CT/ PT tank	mm	
19.4.2	Dimensions of tank	Mm X mm X mm	
19.4.3	Total weight of CT-PT unit	kG	
19.4.4	Weight of core and winding of CT	kG	
19.4.5	Weight of core and winding of PT	kG	
19.4.6	Resistance of winding at 75 C per phase at HV	Ohms	
19.4.7	Resistance of winding at 75 C per phase at LV	Ohms	

19.4.8	Bushing distance between metal part and earth	Mm	
19.4.9	Clearance between HV to earth	Mm	
19.4.10	Lifting lugs	Nos.	
19.5	**Bushings**		
19.5.1	No. and Material of Bushings		
19.5.2	Dimensions of Bushings	mm	
19.5.3	Minimum Creepage distance between phase and earth	mm/ KV	
19.5.4	Material for Rod of Bushings		
19.5.5	Make of Bushing		
19.6	**Terminal box**		
19.6.1	Material		
19.6.2	Cable glands		
19.6.3	Nut and bolts with sealing arrangement	Yes/ No	
19.7	**Meter Box**		
19.7.1	Material and Thickness of the Meter Box	mm	
19.7.2	Protection against penetration of dust and water.		
19.7.3	Dimensions		
19.7.4	Locking and sealing arrangement	Yes/ No	
19.8	**G I Pipe**		
19.8.1	Size	Mm	
19.8.2	Length	Mm	
19.9	**Secondary wiring**		
19.9.1	Size	mm	
19.9.2	Type		
19.9.3	Lugs provided	Yes/ No	
19.9.4	Ferrule Provided	Yes/ No	

22.0 SCHEDULES OF DEVIATIONS:

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

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.

Designation:

Signature:

CONTENTS

1.0 SCOPE:

This specification covers the technical requirements of design, manufacture, testing at manufacturer's works, packing, forwarding, supply and unloading at store/site of 33KV CT PT Combined Metering unit Sets of class of accuracy 0.2s for 33 KV MU with all accessories for efficient and trouble-free operation. The ratings shall be as per the following:

CTR: 5/5,10/5,15/5,20/5,25/5,30/5,50/5,75/5,100/5,200/5 & 400/5 of accuracy class 0.2s or better
PTR: 33 KV/√3 / 110/√3 Volts of accuracy class 0.2 or better

2.0 APPLICABLE STANDARDS:

The equipment covered by this specification shall conform to the requirements stated in latest editions of relevant Indian/ IEC Standards and shall conform to the regulations of local statutory authorities.

Current Transformers	: IS 2705/1992
Potential Transformers	: IS 3156/1992
HV Porcelain Bushing	: IS 2099/1986
Oil	: IS 335/1983
Galvanization	:IS 2633
Primary Terminals	:IS 10601

3.0 CLIMATIC CONDITIONS OF THE INSTALLATION:

The material shall be suitable for following climatic conditions,

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	150cm
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 (g being acceleration due to gravity)	0.15g
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
The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1 g.

4.0 GENERAL TECHNICAL REQUIREMENTS:

The metering transformer equipment should be of pole mounting type for outdoor use. They are to be used in 33 kV Three Phase with solidly earthed neutral and suitable for 3 Phase 4 Wire 50 cycles network. The equipment is required for operation of HT Trivector Meters and should be oil cooled.

Sr. No.	Detail	Requirement
1	**Rated Voltage**	**33 kV (rms)**
2	**Highest system voltage**	36 kV (rms)
3	**Insulation Level**	36 kV (rms)
4	**Frequency**	50 Hz
5	**Current Transformer**	
	a) Type	Oil Immersed
	b) Class of Accuracy	0.2s negative (-ve) errors will not be acceptable
	c) Rated Output	10 VA
	d) Insulation Level	70 kV (rms) / 170 kV(peak)
	e) Short time thermal current and its duration	6 KA for CT ratio< 50/5A for 1Sec 13.1 KA for CT ratio ≥50/5A for 1Sec
	f) Saturation Factor	To be indicated
	g) Normal current density of primary winding	≤1.6 Amps per mm^2
	h) Knee point Voltage	To be indicated
	i) Continuous percentage overload	120 %
	j) Instrument Safety Factor	As per IS 2705/02-1992
6	**Potential Transformer**	
	a) Type	Oil Immersed
	b) PT ratio	33 kV/√3 V / 110/√3 V
	c) Rated output VA/phase	50 VA
	d) Class of Accuracy	0.2 negative (-ve) errors will not be acceptable
	e) Insulation Level	70 kV(rms)/ 170 kV(rms)
	f) Winding connection	Star/Star
	g) Rated voltage factor and its duration	1.2 continuous 1.5 for 30 sec
7	**Dimension of MS hot dip**	
	a) Height (mm)	
	b) Breadth (mm)	

	c) Length (mm)	
	d) Thickness of MS tank	Minimum 5 mm for TOP cover & 3.15 mm for BOTTOM and all other sides
	e) Edge bending in the Top cover	To be provided
8	**Maximum attainable winding temperature**	85˚C
9	**Minimum phase to phase distance**	430 mm
10	**Shortest distance between metal part and earth**	380 mm
11	**Make and type of HV bushing**	Porcelain
12	**Creepage distance of HV bushing**	900 mm (minimum)
13	**Identification marking of**	
	i. Primary terminals	
	a) Incoming	RM, YM, BM
	b) Outgoing	
	ii. Secondary terminals	
	a) CT's	1s1-1s2, 2s1-2s2, 3s1-3s2 for single ratio
	b) PT's	r,y,b,n
14	**Size of:**	
	a) Primary studs	M16
	b) Secondary studs	M10
15	**Additional Requirements**	a) Entire tank shall be hot dip galvanized b) Bi-metallic terminal connector with a nut, plain washer, spring washer & check nut suitable for aluminum conductor required for different rating of metering units. Six nos. to be provided with each metering units. c) Secondary Chamber shall have double door type & sealing arrangement in both the doors. (Inner door Acrylic and outer door Metallic)

5.0 GENERAL CONSTRUCTIONAL REQUIREMENTS:

a) The equipment shall be designed to ensure satisfactory operation under all conditions of service to facilitate easy inspection, cleaning and repairs.

b) The design shall incorporate every reasonable precaution and provisions for safety of all those concerned in the operation and maintenance of the equipment. A pressure relief valve shall be invariably provided to the CTPT set. It shall be provided at the top cover of the tank.

c) PT core shall not be combined with CT, individual core of PT shall be provided.

d) PT shall be provided with resin cast molded type for better insulation.

e) Nitrogen gas filling shall be done to prevent absorption of moisture in the field for longer life of MU

f) All outdoor apparatus shall be so designed that water cannot collect at any point and enter the CT/PT set. The top cover of the tank, secondary terminal cover, inspection

chamber cover plate is suitable bent at the edges *(at least 25mm bent)* so that the gaskets are not exposed to moisture.

g) All connections and terminals shall be of sufficient size for carrying the specified currents continuously without undue heating.

h) All bolts, nuts, washers in contact with non-ferrous parts shall be of brass.

i) All ferrous parts including bolts & nuts liable to corrosion, forming integral part of the equipment shall be smoothly and continuously hot dip galvanized.

j) The secondary terminal box, inspection cover and oil gauge shall be arranged with MU.

k) The core shall be high grade non-ageing electrical silicon laminated steel or of better grade of low hysteretic loss and high permeability to ensure high accuracy, at both normal and over current/ voltage.

l) All winding shall be of insulated high grade Electrolytic copper wire and the manufacturing of the units shall be done in completely closed and air conditioned room otherwise fibre glass insulation sleeves are to be provided for primary winding. Details of winding and core shall be furnished.

m) The CTPT set should have Three CTs and Three PTs with star / star connection.

n) All bolts should be provided with 2 flat washers and a spring washer with a nut.

o) Conservator should not be provided for these CTPT sets.

p) The Secondary terminal box incoming hole should be 32 mm diameter and at a suitable height from bottom to avoid replacement/ modification of secondary wires pipe when CTPT set is replaced. The secondary terminals size should be 6 mm diameter, 25 mm stem length, 2 flat washers with 3 nuts of brass material should be provided. The terminals should be provided at least 70 mm height from incoming hole and clearances shall be as per IS to avoid shorting terminals due to secondary wires pipe.

q) Secondary chamber shall have double door (inner & outer) with suitable arrangement for sealing of both the doors. The inner door shall be of transparent Polycarbonate so that secondary terminal connections can be viewed without breaking the inner door seals.

r) The under base of all CTPT sets shall be provided with two 75x40mm GI channels and foundation dimensions shall be suitable placing with tank base uniform for all sets with only ±2 mm tolerance, to avoid modification of structure / plinth, whenever CTPT set is replaced.

5.1 SEALING:

Sealing bolts for sealing at 4 points on the secondary terminal box (both inner & outer door), inspection cover, the top cover of the tank shall be provided. This may be made by providing a hole on tail of corner bolts of adequate size to pass the sealing wire or above13 SWG.

5.2 FLUCTUATION IN VOLTAGE AND FREQUENCY: For continuous operation, entire equipment shall be subjected to variation of voltage up to ***plus 20 minus30*** percent and frequency of plus or minus ***5*** percent.

5.3 INSTRUMENT TRANSFORMERS:

a) The voltage and current transformers shall have normal continuous rating as per the schedule of requirement.

b) The voltage transformer shall be so designed that the increased magnetizing currents due to any persisting over voltage, does not produce injurious over heating. Phase barriers shall be provided.

c) The peak value of the rated dynamic current shall not be less than 2.5 times the rated short time thermal current unless stated otherwise. (4.62 of ISS: 2705/Part-I of 1992, latest version).

d) Modified polyester enamel copper wire is to be used for winding and it shall conform to IS-4800/Part-V (latest version).

e) The terminals of the instrument transformer shall be clearly marked by distinctive letters as stated in Annex "C" of ISS: 3156/Part.I/1992 (latest version) for voltage transformer and Annex "C" of IS-2705/Part.I/1992 (latest version) for current transformers.

f) The winding shall be neatly laid and anchored.

g) The metering set tank and other metal parts shall be galvanized both inside & outside as per latest IS applicable.

5.4 BUSSINGS:

a) Incomming Terminals: Brass rods 16mm dia for Primary and 10 mm dia for secondary.
b) Bushing for outgoing side of CT/PT set:The porcelain portion of HT bushings shall be of standard make and conform to IS-2099/ 1996.
c) The dimensions of the bushings shall conform to IS- 3347/Part.III/19.
d) The minimum phase-to-phase clearance shall be as per IS.
e) The bushings shall be of reputed manufacturers like M/s. Jayashree Insulators, M/s. WS Industries, M/s. BHEL, M/s. Allied Ceramics, M/s. India Potteries, and M/s. IEC which are having complete testing facilities.
f) The bushing stems shall be provided with suitable bimetallic connectors so as to connect the jumper without disturbing the bushing stem.
g) The bush rod stem length should be at least 100 mm and 3 nuts with 2 flat washers of brass material should be provided with each bush rod.

5.5 STEEL TANK:

a) The oil filled container incorporating the voltage transformers and current transformers should be fitted with incoming and outgoing primary terminals and secondary terminal box. The secondary terminal box shall be arranged on sides. The general arrangement drawing with 3 bushing on the incoming side and 3 bushings on the outgoing side shall be submitted along with tender.

b) The tank shall be built with a plate of 5 mm thick top and 3.15 mm sides and bottom and with all fittings shall be capable of withstanding without leakage or distortion at the standard test pressure. All joints of the tank and fittings shall be hot oil tight and no leakage should occur during service.Both side of the joint should have continuous welding.

c) It shall be provided with an oil gauge as shown. The oil gauge glass shall be fixed to the side of the raised wall of the inspection box.

The tank shall be provided with necessary lifting lugs. Tank including top cover shall be hot deep Galvanized.

d) The secondary terminal box cover, tank cover and inspection cover and other vertical joints where gaskets are used shall be suitably bent at least 25 mm bent with necessary sealing arrangement with sealing bolts at all corners and bolts should be at least 10 mm diameter GI bolts spaced maximum 70 mm apart. This is to safeguard against seepage of water into tank in case of damaged gasket.

e) The 6 mm gaskets shall be dovetailed without joints to prevent moisture entry. In case of dovetailed joint, they shall not be more than two. The gaskets shall be of good quality Neoprene or superior quality rubberized gasket.

5.6 EARTHING: Two earthing terminals shall be adequate size protected against corrosion and metallically clean and identified by means of the sign marked in a legible and indelible manner on or adjacent to the terminals.

5.7 Oil

The oil shall be filled to the required level with new, unused, clean, standard mineral oil in compliance IEC 296and shall be free from all the traces of Polychlorinated Biphenyl (PCB) compounds. In case the Oil shall be of Class 1, with Naphthenic contents > 50%.This shall be more preferable. However, the oil complying to the IS 335 shall also be acceptable.The use of recycled oil is not acceptable. The oil shall be filtered and tested for break down voltage (BDV) and moisture content before filling. Oil shall be filled under vacuum.

6.0 NAME PLATE AND MARKING:

The unit shall be provided with a name plate clearly visible and effectively secured against removal. The name plate shall be indelibly and distinctly marked with all essential particulars as per relevant standards along with the following.

i) Manufacturer's name
ii) Month and Year of manufacture
iii) Serial number and Type designation
iv) Rated primary and secondary currents
v) Rated frequency
vi) Rated output and the corresponding accuracy class
vii) Highest system voltage
viii) Rated insulation level
ix) Rated short time thermal current
x) Rated dynamic current if different than 2.5 times the rated STC rating
xi) Rated primary and secondary voltage
xii) Rated voltage factor and corresponding rated time
xiii) Number of phases and method of connection
xiv) Earthed or unearthed
xv) Guarantee period.
xvi) Reference standard

7.0 TESTS:

All routine, acceptance & type tests shall be carried out separately in accordance with the relevant IS/IEC. All routine/acceptance tests shall be conducted on every unit and the reports has to be sent to TPSODL in case issuance of MDCC or shall be produced at the time of inspection in case of material

inspection at factory. All routine/acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. For Bushings all the tests defined in IS: 2099-1986 shall be conducted.TPSODL reserve the right to get the type test done on any of the supplied LOT by the bidder. If the Units fail the testing, the bidder shall replace the entire LOT free of cost. For CT/PT unit following tests shall be necessarily conducted on CTs and PTs in addition to the tests specified in IS/IEC:

7.1 Routine Test

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 test in accordance with IS 11322-1985
vi) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class

7.2 Acceptance test:

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 test in accordance with IS 11322-1985
vi) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class

7.3 Type test:

i) Short time current tests
ii) Temperature rise test
iii) Lightning impulse test for voltage transformers for service in electrically exposed installation
iv) High voltage power frequency wet withstand voltage tests on outdoor voltage transformers up to and including 245 kV
v) Determination of errors or other characteristics according to the requirements of the appropriate designation or accuracy class
vi) Chopped lighting impulse test as type test
vii) Short circuit withstand capability test as a type test
viii) Commissioning test on non-earthed voltage transformers and new current transformers
ix) Voltage factor test of PT

For Bus bar following tests shall be necessarily conducted in addition to the tests specified in IS/IEC:

7.4 Type tests:

i) Impulse voltage test
ii) Temperature rise test
iii) Short time current test
iv) Power frequency voltage withstand tests

7.5 Routine tests:

i) Power frequency voltage withstand tests

8.0 TYPE TESTS CERTIFICATES:

The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI / ERDA/ certified In-house Labs 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, same shall be carried out without any cost implication to the Purchaser.

9.0 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 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 the Purchaser's representatives at all times when the work is in progress. Bidder shall allow type testing on one no. complete unit per LOT during pre-dispatch inspection. Inspection by the Purchaser 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 the Purchaser.
Following documents shall be sent along with material

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

10.0 INSPECTION AFTER RECEIPT AT STORE:

The material received at the Purchaser's 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.

11.0 RE- INSPECTION :

If it has been noticed that during inspection, the supplier fails to manufacture the materials or accessories as per the TPSODL Specification, the cost of the inspection shall be borne by the vendor.

12.0 TERMINATION OF CONTRACT:

In case the supplier fails to deliver the materials or any consignment thereof within Contracted period of delivery or in case the materials are found not in accordance with the Specification, the TPSODL management shall exercise its discretionary power either:

a) To recover from the supplier the damages as provided in the penalty of general conditions of tender.

Or

b) To Purchase elsewhere after giving due notice to the supplier at the risk & cost of the supplier without canceling the contract in respect of consignment yet to be delivered.

Or

c) To cancel the contract reserving TPSODL management's right to recover damages.

13.0 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 60 months from the date of commissioning or 66 months from the date of last supplies made under the contract whichever is earlier, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, 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 Company'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.

14.0 PACKING:

Bidder shall ensure that all material covered under 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.

15.0 TENDER SAMPLE:

Not applicable

16.0 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/manufacturer's works to carry out inspections.

17.0 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.

18.0 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 shall 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.

19.0 SPARES, ACCESSORIES & TOOLS:

Not Applicable

20.0 FITTINGS:

The following standard fittings shall be provided.

a) Rating and terminal marking plates non detachable -1no.
b) Earthing terminals with bolt, nuts & washers for connecting earth wire - 2Nos.
c) Lifting lugs -4Nos.for main tank and 2Nos. for top cover.
d) Pressure relief valve. – 1 no.
e) Bimetallic terminal connectors on the HV bushings – 6 Nos.
f) HV bushings Outdoor – 6 Nos.
g) Secondary terminals bushings – 10 Nos
h) Base channels 75 x 40 mm.
i) 66 months guarantee embossed plate welded to tank opposite side of name plate.
J) Tank and over all dimensions.
k) Weight content of a) core b) windings c) tank & fittings d) weight/qty. of oil e) over all weight.

21.0 DRAWINGS:

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

a. Completely filled-in Technical Parameters.
b. General arrangement drawing of the unit
c. Terminal Block dimensional drawing

d. General description of the equipment and all components with makes and technical requirement
e. Type Test Certificates
f. Experience List
g. Manufacturing schedule and test schedule

After the award of the contract, four (4) copies of following drawings, drawn to scale, describing the equipment in detail shall be forwarded for approval.

S.No.	Description	For Approval	For Review Information	Final Submission
1	Technical Parameters	√		√
2	GA Drawing	√		√
3	Internal wiring Diagram		√	√
4	Foundation plan		√	√
5	Installation Instruction		√	√
6	Transport / Shipping dimension drawing		√	√
7	QA & QC Plan	√	√	√
8	Test Certificates	√	√	√

Bidder shall be subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to purchaser.
All the documents & drawings shall be in English language.
Instruction Manuals: Bidder shall furnish two softcopies (CD) and four (4) hard copies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

22.0 GUARANTEED TECHNICAL PARTICULARS:

Sr. No.	Detail	Requirement	Vendors to Furnish the Details
1	**Rated Voltage**	**33 kV (rms)**	
2	**Highest system voltage**	36 kV (rms)	
3	**Insulation Level**	36 kV (rms)	
4	**Frequency**	50 Hz	
5	**Current Transformer**		
	k) Type	Oil Immersed	
	l) Class of Accuracy	0.2s negative (-ve) errors will not be acceptable	

	m) Rated Output	10 VA	
	n) Insulation Level	70 kV (rms) / 170 kV(peak)	
	o) Short time thermal current and its duration	6 KA for CT ratio< 50/5A for 1Sec 13.1 KA for CT ratio ≥50/5A for 1Sec	
	p) Saturation Factor	To be indicated	
	q) Normal current density of primary winding	≤1.6 Amps per mm^2	
	r) Knee point Voltage	To be indicated	
	s) Continuous percentage overload	120 %	
	t) Instrument Safety Factor	As per IS 2705/02-1992	
6	**Potential Transformer**		
	h) Type	Oil Immersed	
	i) PT ratio	33 kV/√3 V / 110/√3 V	
	j) Rated output VA/phase	50 VA	
	k) Class of Accuracy	0.2s negative (-ve) errors will not be acceptable	
	l) Insulation Level	70 kV(rms)/ 170 kV(rms)	
	m) Winding connection	Star/Star	
	n) Rated voltage factor and its duration	1.2 continuous 1.5 for 30 sec	
7	**Dimension of MS hot dip**		
	f) Height (mm)		
	g) Breadth (mm)		
	h) Length (mm)		
	i) Thickness of MS tank	Minimum 5 mm for TOP cover & 3.15 mm for BOTTOM and all other sides	
	j) Edge bending in the Top cover	To be provided	
8	**Maximum attainable winding temperature**	85˚C	
9	**Minimum phase to phase distance**	430 mm	
10	**Shortest distance between metal part and earth**	380 mm	
11	**Make and type of HV bushing**	Porcelain	
12	**Creepage distance of HV bushing**	900 mm (minimum)	
13	**Identification marking of**		
	iii. Primary terminals		

	c) Incoming	RM, YM, BM	
	d) Outgoing		
	iv. Secondary terminals		
	c) CT's	1s1-1s2, 2s1-2s2, 3s1-3s2 for single ratio	
	d) PT's	r,y,b,n	
14	**Size of:**		
	c) Primary studs	M16	
	d) Secondary studs	M10	
15	**Additional Requirements**	d) Entire tank shall be hot dip galvanized e) Bi-metallic terminal connector with a nut, plain washer, spring washer & check nut suitable for aluminum conductor required for different rating of metering units. Six nos. to be provided with each metering units. f) Secondary Chamber shall have double door type & sealing arrangement in both the doors.(Inner door Acrylic and outer door Metallic)	

23.0 SCHEDULES OF DEVIATIONS:

The Bidders shall set out all deviations from this specification, Clause by Clause in this schedule. Unless specificallymentioned in this schedule, the tender shall be deemed to confirm the purchaser's specifications.

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.

Designation:

Signature: