

**UTTAR & DAKSHIN HARYANA BIJLI VITRAN NIGAM**



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**Specification No. CSC- XXXII /DH/UH/P&D/2009-2010**

## **TECHNICAL SPECIFICATIONS**

**FOR**

## **STATIC LT / CT OPERATED METERS**

**Issue of the Month: Jan. 2010**

**Common Specifications Committee  
UHBVN & DHBVN**

## **TECHNICAL SPECIFICATION FOR CURRENT TRANSFORMER OPERATED LOW TENSION 3 PHASE 4 WIRE STATIC ENERGY METERS.**

### **1. SCOPE:**

This specification covers the requirement for the design, manufacturing, testing, supply and delivery of AC current transformer operated low tension 3 phase 4 wire static energy meter for measurement of active (KWH) energy with initial and sustained accuracy of class 0.5S for solidly earthed system with balanced and unbalanced loads having power factor in the range of zero to unity (Lagging Leading), supporting Modbus Protocol with latest firmware.

### **2. APPLICABLE STANDARDS:-**

While drawing this specification reference has been made to the following Indian & International Standards: -

IS-13779, IS - 14697, IEC - 687 for AC static watt hour meters for active energy, class 0.5S, IS – 9000, IS - 14001 & CBIP Technical Report No 88 / 1996 with latest amendments as well as CBIP Technical Report No. 111(for Common Meter Reading Instruments & Optical Port in use, refer appendix “C”). In case certain details are not covered in this specification the mentioned Indian / International Standards shall be applicable.

However, equipment, material or workmanship; meeting other standards, which promise at least substantial equivalent, will also be accepted. Further the meters from ISO & ISI certified manufactures shall be preferred.

### **3. CLIMATIC CONDITIONS:**

The Static Energy Meter shall be suitable for satisfactorily working under the following climatic conditions

- |  |                     |
|--|---------------------|
| 1. Max. ambient air temperature                    | 60 <sup>0</sup> C   |
| 2. Min. ambient air temperature                    | (-)5 <sup>0</sup> C |
| 3. Average Max. Daily ambient temperature          | 40 <sup>0</sup> C   |
| 4. Max. yearly weighed average ambient temperature | 32 <sup>0</sup> C   |

5. Max. altitude above mean sea level (Meters)	1000
6. Minimum Relative Humidity (%age)	26
7. Max. Relative Humidity (%age)	95
8. Avg. No. of Rainy days/year	120
9. Avg. annual rainfall	900 mm
10. Maximum wind pressure	195 Kg./m Sq.

The meter shall be suitable designed and treated for normal life and satisfactory operation under the hot and hazardous tropical climate conditions and shall be dust and vermin proof. All the parts and surface which are subject to corrosion shall either be made of such material or shall be provided with such protective finish, which provided suitable protection to them from any injurious effect of excessive humidity.

4. **RATINGS:**

The rating of KWH meter should be as follows:-

Voltage Rating	3 X 240 / 415 Volts.
Current Rating (Basic Current)	5 Amp
Maximum Continuous Current	120 % of Basic Current
Class of Accuracy	0.5S
Frequency	50Hz +/- 5%

5. **SUPPLY SYSTEM:-**

L.T. System Voltage	3 X 240 / 415 Volts.
Voltage variation range	- 40 % to +20 %
Frequency	50Hz +/- 5%
Power Factor	+1 to -1

**6. QUANTITY TO BE MEASURED / MONITORED:-**

- i) Internal diagnostics
- ii) Active Energy (KWH)
- iii) Cumulative Reactive Energy (KVARH, Lag and lead)
- iv) Apparent Energy (KVAH)
- v) TOD
- vi) Maximum Demand (KW)
- vii) Cumulative Max. Demand (KW)
- viii) MD Reset Count (Numbers)
- ix) Instant power factor (Lead/Lag).
- x) Power ON Time in Hours since last MD Reset.

Various instantaneous quantities viz phase wise voltage and current shall also be displayed.

The meter shall give error message on display in case tempering occurs or meter mal-functions.

The meter should have test output device (calibrating LED) so it can be tested with a suitable reference "STANDARD"

Meter shall be provided with the Real Time Clock (Accuracy  $\pm 3$  Min Yr.).

**7. AUTO DISPLAY:**

The display shall be either LED / LCD backlit type with all display parameters available on display. There shall be at least 7 digits, for display of various parameters, of size 10 mm X 5 mm (minimum). The display of various parameters shall be continuously scrolling. The data stored in the meters shall not be lost in the event of power failure. The meter shall have non - volatile memory (NVM), which does not need any battery back up. The NVM shall have a minimum retention period of 10 years.

The meters shall have a rechargeable back up battery for reading the meter reading in the event of failure of power supply and for this an external push button should be provided on the meter cover.

**8. POWER CONSUMPTION:**

The active and apparent power consumption, in voltage circuit per phase, at reference voltage, temperature and frequency shall not exceed 1.5 W and 8 VA.

The apparent power taken by each current circuit, at basic current, reference frequency and reference temperature shall not exceed 1.0 VA

**9. STARTING CURRENT:**

The meter shall start registering energy at 0.2% of basic current. The meter shall be fully functional within 5 seconds after the rated voltage is offered to the meter terminal.

**10. RUNNING WITH NO LOAD:-**

When the rated voltage is applied with no current flowing in the current circuit the test output of the meter shall not be more than one pulse count.

**11. ACCURACY & LIMITS OF ERRORS:-**

The accuracy of meter shall not exceed the permissible limits of accuracy as per standard IS: 14697 / IEC - 736 (latest version) for a period of at least 10 years from the date of supply. In case any drift is noticed beyond the permissible limits, the bidder shall replace the meter with a new meter without any extra cost.

**12. POWER SUPPLY:-**

The meter shall be self powered and thus shall draw its power from all three phases and neutral and shall function accurately in the event of loss of neutral, loss of any two phases and loss of any one phase & neutral. In case of failure of power supply, the meter should display the measured quantities through an in built battery facility.

**13. CALIBRATION:**

The meter shall be factory calibrated and no modification of calibration should be possible at site by any means whatsoever. However, it shall be possible to check the accuracy of the meter in the field, by means of LED output using suitable testing equipment as per IEC – 736

**14. TEST OUTPUT DEVICE:**

The meter shall have a test output device, accessible from the front and capable of being monitored with suitable means i.e. as per IEC - 736 (Testing Equipment).

**15. TEST AND TEST CONDITIONS:**

All Test (Routine and Acceptance) shall be carried out in accordance with IS - 13779 /1993, IEC1036 & IS -14697. The bidder shall submit two sets of complete Type Test Certificates, as per clause 2 of this specification along with the tender. These Type Tests Certificates must not been conducted earlier than three years from the date of bid opening. Bids of the tenders, who do not submit copies of Type Test Certificates along with the tenders, shall be uprightly rejected.

**16. EFFECT OF MAGNETIC FIELD OF EXTERNAL ORIGIN:**

The continuous magnetic induction of 0.2 Tesla +/- 5 % may be obtained, at a distance of 0.5 centimeter from the surface of the pole, by using the electromagnets; energized with DC current. This magnetic field shall be applied to all surface of the meter. The value, of the magneto motive force to be supplied, shall generally be 10,000 AMP Turns. However, considering the non - linearity of magnetization of the core, ampere - turns might require slight adjustment to achieve desired output.

AC induction coil, to be used for test, should be such that it generates 10 milli tesla at the center. This coil is to be placed on all surfaces of the meter and the meter should comply to IEC specification. The magnet should be designed, by the bidder, to satisfy the above conditions.

17. **GENERAL AND CONSTRUCTIONAL REQUIREMENT:-**

**17.1 METER CASE:** The meter case & cover will either be ultrasonically welded or shall have push fit type arrangement with two no. polycarbonate seals, of good quality, one each on either side, so that meter's internal parts are only accessible after breaking seals, ultrasonic welding, push fit arrangement or case cover of the meter and it should become unserviceable. The material for base and cover (transparent / translucent) of the meter shall be of Polycarbonate. The meter shall be factory calibrated and shall have unidirectional screws, fully embedded so that these cannot be unscrewed by means of pliers etc. for sealing. The meter case shall have at least three mounting holes. 2 holes for mounting screws, on the terminal block; sealed beneath the terminal cover and one for hanging screw on the top.

**17.2 WINDOWS:** -The meter cover shall be of Toughened Glass or Reinforced Polycarbonate material with one window. The window shall be of transparent material, ultrasonically welded with meter cover / part & parcel of meter cover so that it cannot be removed undamaged; without breaking the meter cover.

**17.3 TERMINALS AND TERMINAL BLOCK:-**

The terminals may be grouped in a terminal block having adequate insulating properties and mechanical strength. The terminal block shall be made from best quality non - hygroscopic, flame retardant material (capable of passing the flammability tests, as per IS -11731) with nickel-plated brass or aluminium alloy for connecting terminals. The clamping screw should be provided inside the terminal cover and should have metallic sleeve molded within the block to avoid damage during tightening of the screws. The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor with the help of two screws through agency of a plate so as to made cage type arrangement. The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating.

Screw Connections, transmitting contact force and screw fixing, which may be loosened and tightened several times during the life of the meter, shall screw into a meter nut. All parts of each terminal shall be such that the risk of corrosion, resulting from contact with any other meter part, is minimized. Two screws shall be provided in each current terminal for effectively clamping the external leads or thimbles. Each clamping screw shall engage at least 3 threads in the terminal. The ends of screws shall be such as not to pierce the conductor. Electrical connections shall be so designed that the contact pressure is not transmitted through insulating material. For current circuits, the voltage is considered to be the same as for the related voltage circuit. The internal diameter of terminal holes shall be 5.5mm (min.) The clearances and creep age distances shall conform to clause 6.60 of IS: 13779 / 1993.

**17.4 TERMINAL COVER:-**The terminal cover shall be extended type, which can be sealed independently of the meter cover. The terminal cover shall enclose the actual terminals; the conductor fixing screws, the external conductors and their insulation i.e. no part of meter or cable / accessories shall be visible from the front of the meter. When the meter is mounted, no access to the terminal shall be possible without breaking the seal (s) of the meter terminal cover. The terminal cover shall have at least two sealing screws. The fixing screws used on the terminal cover for fixing and sealing shall be kept captive in the terminal cover.

**17.5 THE RESISTANCE TO HEAT AND FIRE:-**

The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They should not be ignited by thermic over-load of live parts in contact with them

**17.6 PROTECTION AGAINST PENETRATION OF DUST & WATER:-**

The meter shall conform to the degree of protection IP 51 against ingress of dust, moisture and vermin.



**17.7 COMMUNICATION PORT & DATA TRANSFER CAPABILITIES:-** Meter should be provided with optical communication port for error free data operation as per IEC-1107/ANSI / PACT, i.e. data downloading from meter. The optical port shall be compatible to RS232. The RS 232 port shall be capable to transfer the data locally i.e. through CMRI, Laptop etc. & transfer the data to the remote end through PSTN/Optical fiber/GSM/CDMA/RF/any other technology to the main computer/Laptop by using Modem. One-meter long cable, of suitable size, having facility at one end, for connecting to the optical port, other end shall be provided with RS – 232 Connector shall be provided, as spare cable, so that the optical port can be brought out the meter box. The meter shall have necessary facilities to transfer the data via the communication port, the hand held data collection device (DCD) and also to download this on a P.C to get complete details in numeric form. The necessary software for this purpose shall be provided by the supplier, without any condition, free of cost. The meter should have RS 485 Port with MODBUS PROTOCOL with latest Firmware in Real Time Unit Mode. The supplier shall update the firmware, as & when required by the purchaser, without any condition, free of cost, during the designed life of the meter. Further the supplier shall supply hard copy as well as the soft copy of the MODBUS Register Address, as & when demanded by the purchaser, without any condition, free of cost.

Every bidder must submit following undertaking along with the bid documents:

**The bidder shall provide complete protocol of Meter reading along with meter supply in case the bidder is considered for the order. The Buyer is free to use this protocol for AMR purposes either internally or through the 3<sup>rd</sup> party service providers. The bidder shall provide necessary help to the buyer / service provider in use of meter reading protocol.**

In case the bidder does not submit this undertaking, his bid shall not be considered for evaluation.

**17.8 ELECTRONIC COMPONENTS:-** The meter shall be made from high accuracy and reliable surface mount technology (SMT) components.

**17.9 FIXING ARRANGEMENT:** Every meter shall have three fixing holes, one at top and two at the bottom. The top hole shall be provided with a special clip at the back of the meter so that holding screw is not accessible to the consumer after the fixing of the meters. The lower fixing screws shall be provided under the sealed terminal cover.

**17.10 SEALING:-** 2 no unidirectional sealing screw shall be provided for proper fixing of meter cover with 2 no good quality polycarbonate seals, one each on either side, so that the meter internal parts are only accessible after breaking the seals, ultrasonic welding, push fit arrangement or case cover of the meter. Separate sealing arrangements shall be provided for MDI reset and communication port. In addition, the firm / supplier shall affix 2 no good quality, numbered hologram, on base and cover; one on each side and its record should be forwarded to the Nigam.

18 **PACKING:**

The meters shall be suitably packed, by the supplier, to ensure safe and sound delivery at the destination. This shall be such that the meter does not exhibit any deterioration in accuracy due to transportation. Further at least 20 individual meters, in individual packing, shall be put in a large carton suitably marked with the name of the supplier, the purchase order number and the address of the consignee

19 **GUARANTEE:**

The meter shall have a designed life of at least 10 years and the supplier shall be responsible to replace, free of cost, with no transportation or insurance - cost to the Nigam, up to destination, the whole or any part of the material which, under normal and proper use, proves defective in quality or workmanship, subject to the condition that the defect is noticed within 78 months from the date of receipt of material by the consignee or 72 months from the date of installation, whichever period may expire earlier. The consignee or any other officer of the Nigam, actually using the material, will give prompt notice of each such defect to the supplier as well as the Purchasing Authority and the Controller of Stores. The replacement shall be effected by the supplier within a reasonable time, but not, in any case, exceeding 45 days. The supplier shall also arrange to remove the defective supply within reasonable period but not exceeding 45 days from the date of issue of the notice in respect thereof. Upon the firm failing to do so, the damages / defects may be got rectified by the Nigam and the cost adjusted from the firm's pending dues and/or security deposit against this or any other contract in force and the balance left be got deposited by the supplier. The Nigam may withhold the amount, equal to cost of defective material. These provisions shall, also equally apply to the replaced material. In case, the material is again found to be defective within warranty period, it shall, also, have to be replaced similarly. The purchaser shall recover an equivalent amount plus 15% supervision charges, if the defective material is not repaired / replaced within the above specified period.

20 **QUALITY ASSURANCE PLAN:**

The design life of the meter shall be minimum 10 years and to prove the design life the firm shall have, at least, the following Quality Assurance Plan.

- 20.1** The factory shall be completely dust proof
- 20.2** The testing rooms shall be temperature and humidity controlled, as per relevant standards.
- 20.3** The testing and calibrating equipment should be automatic and all test equipment shall have their valid calibration certificates.
- 20.4** Power supply, used in testing equipment, shall be distortion free with sinusoidal wave - forms and maintaining constant voltage, current and frequency as per the relevant standards.
- 20.5** During the manufacturing of the meters the following checks shall be carried out
  - 20.5.1** Meter frame dimension tolerance shall be minimum.
  - 20.5.2** The pressure coil shall be totally encapsulated and care shall be taken to avoid ingress of dust and moisture inside the coil;
  - 20.5.3** The assembly of parts shall be done with the help of jigs and fixtures so that human errors are eliminated.
  - 20.5.4** The meters shall be tested, in batches, on automatic computerized testing bench.
  - 20.5.5** The current coil shall be made with the help of jigs and fixtures.
  - 20.5.6** The potential coil shall be made with automatic computerized machine

21 **TAMPER AND FRAUD PROTECTION:**

The meter shall have the following special features to detect common ways of tempers & fraud

- I. Phase Sequence Reversal                      The meter shall keep working accurately, irrespective of the phase sequence of the supply

- |      |                                    |  |
|------|------------------------------------|--|
| II.  | CTs Shorting and Polarity Reversal | The meter shall be capable of recording energy accurately, even if the polarities of C Ts are reversed or current terminals are inter changed and the meter shall be capable of detecting C T shorting / opening.  |
| III. | Missing Potential                  | The meter shall be capable of detecting and recording occurrence of missing potential (One Phase or Two Phases) which can happen due to intentional / accidental disconnection of potential lead(s).   |
| IV.  | Missing Neutral                    | The meter shall continue to record accurately for balanced and unbalanced load even if the neutral is removed / disconnected accidentally or incidentally.   |
| V.   | Tampers                            | The meter shall log and display tamper of injecting current through neutral.   |
| VI.  | Anti Tamper                        | <p>1 Meter should log on the events of attempt of tampering by external magnetic field as mentioned in the CBIP – Technical Report - 88 with latest amendments.</p> <p>2 The meter shall record at max. current (<math>I_{max}</math>) under the influence of abnormal external magnetic field irrespective of actual load. The meter shall record, as per actual load, once the external abnormal magnetic field is removed. In such conditions, the meter shall log the event for presence of abnormal external magnetic field and its restoration with date &amp; time.</p> |
| VII. |                                    | <p>Meter Body Opening:</p> <p>The meter shall also have provision for detection and logging of opening of meter cover. Meter must detect/log with date and time meter body opening tamper, body opening must also be logged in absence of power supply. Incase of meter body opening display of “Cover open” Must appear continuously so that at the time of meter reading it must come in notice. However cover open “date &amp; time” should appear in push button mode.</p>   |

VIII. Facilities

The meter shall record energy accurately:

- 1 In the event neutral, to the meter, is disconnected from both ends of the meter and any phase is connected to the neutral and supply is used with earth from any phase. Meter should function accurately i.e. meter functioning should not at all be effected on all phases.
- 2 Meter must function accurately on all the phases individually when single-phase load is used with earth and neutral to the meter is disconnected at the natural point of the meter.
- 3 Recording of tamper events should have roll over facility.
- 4 Load survey, to display all the billing parameters, should be available for 75 days.
- 5 The meter shall work satisfactorily under presence of various influencing conditions like External Magnetic Field, Electromagnetic Field, Radio Frequency Interference, Vibrations, harmonic distortion, Voltage/Frequency fluctuations, electromagnetic High Frequency Fields etc.
- 6 Meter shall immune to affect by abnormal voltage/frequency generating devices such as consisting of Scooter Ignition coil and Fan Regulator/Filter Circuit etc.
  - 6.1 To this effect a test certificate must be submitted by the bidder from any Govt. approved NABL Lab./Power Utility as per following criteria

IX.

6.2 The accuracy of the meter should not be affected with the application of abnormal voltage/frequency generating device (having spark discharge of approximately 35 KV).

6.3 The meter should be tested by feeding the output of this device to meter in any of the following manner for a total period of 10 minutes:

- On phase of neutral terminals
- On any connecting wires of the meter
- Voltage discharge with 0 -10 mm spark gap
- Spark on meter body
- At any place in load circuit

6.4 The accuracy of meter should be checked before, during & after the application of said devices.

The meter shall record the last duration date, time and the number of such occurrences. The number of such tamper events shall not be less than 200. The meter should not get damaged if the voltage is applied to neutral.

22 **MARKING OF METERS:** The marking of meters shall be in accordance with IS: 13779 /1993 and IEC -1036.

Every meter shall be marked indelibly, on either the meter cover or on the dial plate so that there is no chance of changing the marking. Any sticker kind of arrangement, that is to be used, should be on the dial plate; beneath the meter cover which cannot be accessed without breaking seals of the cover. Such sticker should be of good quality. The basic markings of the meter shall be:

- i) Manufacturer's name and trade mark
- ii) Designation / type.
- iii) Number of phases and wires.
- iv) Serial number and indicating year of manufacture.
- v) Reference Voltage.
- vi) Principal unit of measurement.

- vii) Basic and maximum current rating of the meter.
- viii) Meter constant.
- ix) CT ratio where applicable.
- x) Class of Accuracy index.

In addition the words "Property of DHBVN / UHBVN" along with logo of DHBVN / UHBVN & purchase order no. and date shall also be marked on the name plate

**23 ELECTROMAGNETIC COMPATIBILITY:**

The above shall conform to requirements, listed in IS: 13779 /1993 and IEC - 1036 and should be protected against interference of radiation, generated from either magnetic or ratio - frequency sources. The meter shall also withstand D.C. Immunity Test so as to ensure that the meter does not saturate on passage of Direct Current

**24 INSPECTION AND TESTING:**

The meter shall be inspected and tested at manufacturer's works before dispatch. The manufacturer shall provide all reasonable facilities to the authorized representative of purchaser, without charge, to satisfy him that the material, being offered, is as per specification of the purchase order. The purchaser or his authorized representative shall have access at all reasonable times to manufacturer premises. The purchaser has the right to have the tests carried out, at the cost of the supplier, by an independent agency wherever there is a dispute regarding the quantity of the material supplied.

The supplier shall submit the details of source/agencies from whom purchase of various components of meters used by them, has been done to the authorized representative/team deputed by the Nigam for its verification.

The manufacturer shall be responsible to pay penalty of Rs 20,000/- for each occasion at which the fake inspection call has been made or the material is rejected during testing/inspection by the authorized agency/representative of the Nigam. This penalty would be in addition to the expenses incurred by the Nigam in deputing the Inspecting Officer, carrying out such inspection.

25 **CERTIFICATION MARKING:**

The meter may be marked with BIS certification marking, if any, has been issued to the manufacturer.

26 **CHALLENGE CLAUSE:**

The material offered/received after the inspection by the authorized Inspecting Officer may again be subjected to the test for losses or any other parameters from any testing house/in house technique of the Nigam and the results if found deviating/unacceptable or non-complying to approved GTPs the bidder shall arrange to supply the replacement within 30 days of such detection at his cost including to & fro transportation. In addition to this penalty @10% of cost of the inspected lot of material shall be imposed.

27 **SCHEDULES:**

The bidder shall submit the following schedules (as per standard format, which are part and parcel of the specification:

Annexure A	Guaranteed and Technical particulars.
Annexure B	Deviations from specifications.
Annexure C	Deviations from specified standards.
Annexure D	Deviations from specified test requirements
Annexure E	Bidder's experience.
Annexure F	List of Component Specification

**Director/Technical-I,  
UHBVN, Panchkula**

**Director/Project,  
DHBVN, Hisar**

**CGM/PD&C,  
UHBVN, Panchkula**

**CGM/P&D,  
DHBVN, Hisar.**

**FA & CAO/MM,  
UHBVN, Panchkula**

**FA & CAO/MM,  
DHBVN, Hisar**

**GM/P&D,  
UHBVN, Panchkula**

**GM/P&D,  
DHBVN, Hisar**



## GUARANTEED TECHNICAL PARTICULARS FOR LT CT OPERATED METERS

1)	Maker's Name	
2)	Meter Make & Type	
3)	Fixing Arrangement	
4)	Basic current (Amperes)	
5)	Rated Maximum Continuous Current (Amperes)	
6)	Standard Reference Voltage & Frequency	
7)	Class of accuracy	
8)	Power Loss in each	
	I. Voltage circuit	
	II. Current circuit	
9)	Minimum Starting Current	
10)	Type of display	
11)	No. of Digits	
12)	Type of output Device	
13)	Clearances and creepage distance in the	
	I. Terminal Block	
	II. Terminal cover	
	III. Internal parts of the meter	
14)	Material of	
	I. Terminal Block	
	II. Terminal cover	
15)	Material of Terminals	
16)	Material of Meter Frame/Cover	
17)	Window arrangement & material	
18)	Number of seals provided	
	I. Main Meter Cover	
	II. Meter Terminal Cover	
19)	Total weight of the Meter	

**DEVIATIONS FROM SPECIFICATIONS**

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<b>Sr. No.</b>	<b>Specification Clause No.</b>	<b>Requirement of Deviation</b>	<b>Proposed Specification</b>	<b>Reasons for Deviation</b>
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- 1. Name of firm**
- 2. Name & signature of tenderer**
- 3. Designation**
- 4. Dated**

## DEVIATIONS FROM SPECIFIED STANDARDS

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Sr. No.	Particulars	Stipulation of Specified standard ..... Standard Stipulation Ref.	Stipulation standard adopted By tenderer ..... Standard stipulation Ref.	Remarks
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1. Name of firm
2. Name & signature of tenderer
3. Designation
4. Dated

**DEVIATIONS FROM SPECIFIED TEST REQUIREMENTS SPECIFIED IN  
RELEVANT & PRESENT SPECIFICATION**

<b>Sr. No.</b>	<b>Name of test</b>	<b>Standard No. &amp; Clause No.</b>	<b>Requirement of standard</b>	<b>Proposed Deviation</b>	<b>Reasons for Deviations</b>
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- 1. Type test
- 2. Acceptance test

- 1. Name of firm
- 2. Name & signature of tenderer
- 3. Designation
- 4. Dated

**BIDDER'S EXPERIENCE**

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<b>Sr. No.</b>	<b>P.O. with date</b>	<b>To whom Supplied</b>	<b>Description of material</b>	<b>Qty.</b>	<b>Status of P.O.</b>	<b>Remarks</b>
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- 1. Name of firm
- 2. Name & signature of tenderer
- 3. Designation
- 4. Dated

## List of Component Specification

Sr. No.	Component Function	Requirement	Makes and Origin
1)	Current Transformers	The Meters should be with the current transformers as measuring elements. The current transformer should withstand for the clauses under 5.2h	The current transformer should withstand for the relevant clauses
2)	Measurement or computing chips	The Measurement or computing chips in the meter should be with the Surface mount type along with ASICs.	<u>USA:</u> Analog Devices, Cyrus Logic, Atmel, Phillips, Texas Instruments. <u>South Africa:</u> SAMES <u>Japan:</u> Hitachi or Oki
3)	Memory Chip	The memory chips should not be affected by the external parameters like sparking high voltage spikes or electrostatic discharges.	<u>USA:</u> Atmel, National Semiconductors, Texas Instruments, Phillips, ST. <u>Japan:</u> Hitachi or Oki
4)	Display modules	a) The display modules should be well protected from the external UV radiations. b) The display visibility should be sufficient to read the Meter mounted at height at 0.5 meter as well as at the height of 0.2 meters (ref 3.2d for Viewing angle). c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type) d) It should be trans reflective HTN or STN type industrial grade with extended temperature range.	<u>Honkong:</u> Genda <u>Singapore :</u> Bonafied technologies. <u>Korea:</u> Advantek <u>China:</u> Success <u>Japan:</u> Hitachi, Sony
5)	Communication modules	Communication modules should be compatible for the two	<u>USA:</u> National Semiconductors, HP, Ontonica, ST

Sr. No.	Component Function	Requirement	Makes and Origin
		RS 232 ports (one for optical port for communication with meter reading instruments & the other for the hardwired RS 232 port to communication with various modems for AMR)	<u>Holland/Korea</u> : Philips <u>Japan</u> : Hitachi <u>Taiwan</u> : Ligitek <u>Germany</u> : Siemens
6)	Optical Port	Optical Port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such as to facilitate the data transfer easily.	<u>USA</u> : National Semiconductors, HP, <u>Holland/Korea</u> : Philips <u>Japan</u> : Hitachi <u>Taiwan</u> : Ligitek
7)	Power Supply	The power supply should have the capabilities as per the relevant standards. The power supply unit of the meter should not be affected, in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	It should take care of relevant clauses
8)	Electronic Components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	<u>USA</u> : National Semiconductors, Atmel, Philips, Texas Instruments, Texas, ST, Onsemi <u>Japan</u> : Hitachi, Oki, AVX or Ricoh <u>Korea</u> : Samsung
9)	Mechanical Parts	a) The internal electrical component should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should	

Sr. No.	Component Function	Requirement	Makes and Origin
		be protected from rust, corrosion etc. by suitable plating /painting methods.	
10)	Battery	Lithium with guaranteed life of 15 years.	Verta, Tadiran, Sanyo or National
11)	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC/IS standards	<u>USA:</u> Philips, Dallas, Atmel, Motorola, Microchip <u>Japan:</u> NEC or Oki
12)	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)