SECTION-V : TECHNICAL

1.0. <u>SCOPE</u>:

The specification covers the design, engineering, manufacture, assembly, testing supply and delivery of Electronic HT tri vector meters suitable for ABT (Availability Based Tariff), Four Quadrant, Bi-Directional power flow, solidly earthed system with balanced and un-balanced loads for a power factor range from zero to unity (lagging and leading), with accuracy class 0.2s. The meter as a self-contained device for measurement of active, apparent and reactive energy and certain other parameters as described in subsequent paragraphs of this specification shall be suitable for being connected directly to voltage transformers (VT)/capacitive voltage transformers (CVT) having a rated secondary line-to-line voltage of 110v and to current transformers (CTS) having a rated secondary current of 1A, 3 element 4 wire. The reference frequency shall be 50 Hz. The energy meter shall be suitable for rack/ panel/ metal box mounting.

2.0 <u>STANDARDS</u>:

2.1 Unless otherwise specified elsewhere in this specification, the meter shall conform in all respects including performance and testing thereof to the following Indian/ International Standards to be read with up-to-date and latest amendments/ revisions there of

Sl.No	Standard No.	Title
1	ISS:14697/1999 Reaffirmed 2004.	AC static transformer operated watt-hour and VAR-Hour meters, class 0.2s, 0.5 S and 1.0 S.
2	CBIP publication No 304, July 2008.	Manual on Standardization of Ac static electrical energy meters
3	IEC 62052-11	Electricity metering equipment (AC) – General requirements , tests and test conditions
4	IEC 62053-22	Static meters for active energy (class 0.2 S and 0.5 s)
5	IEC 62056	The standard for Electricity metering – Data exchange for meter reading, tariff and load control.

Meters matching with requirements of other national or international standards which ensure equal or better performance than the above mentioned standards shall also be considered. When the meters offered by the bidder conforms to standards other than those specified above, salient points of difference between standards adopted and the standards specified in this

specification shall be clearly acceptance brought out in the relevant schedule. A copy of such standards along with their English translation shall invariably be furnished along with the offer.

3.0 <u>Environmental conditions</u>:

3.1 <u>Climatic Conditions</u>:

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following climatic conditions.

Sl. No.	**Parameter**	**Range/ Value**
i.	Max. ambient air temperature (Deg. C)	55
ii.	Min. ambient air temperature (Deg. C)	-10
iii.	Average daily ambient air temperature (Deg. C)	35
iv.	Max. Relative Humidity (%)	95
v.	Max. altitude above mean sea level (m)	1000
vi.	Average Annual rainfall (mm)	925
vii.	Max. wind pressure (kg./sq.m)	200
viii.	Isoceraunic level (days per year)	50
ix.	Seismic level (Horizontal acceleration)	0.3 g.
x.	Average No. of thunderstorms days/years	40
xi.	Average number of rainy days/years	90
xii.	Average number of months/tropical monsoon condition per year	3
xiii.	Noise level	45 dB

Moderately hot and humid tropical climate, conducive to rust and fungus growth. The climatic conditions are also prone to wide variations in the ambient conditions. Smoke is also present in the atmosphere. Heavy lightning also occurs during June to October.

4.0 <u>ELECTRICAL SPECIFICATIONS</u>:

Class of accuracy: 0.2S for KWH and KVARH (Active Energy and Reactive Energy).
Type of Meter: 3 Element, 4 Wire. (3 Phase, 4 Wire)
Supply Voltage and Range (PT Secondary): 3 Phase, Phase to Phase 110V with variation -30% to 20%

Reference Frequency and Range: 50 Hz, +/- 5%

Power factor Range: Zero lagging through Unity to Zero leading.
Basic Current (I_b): 1A.
Maximum Current (I max): 120% of Ib.
Starting Current (Is): 0.1% of Ib at UPF.
<u>Power Loss:</u>
Voltage Circuit: Shall not exceed 1W and 4 VA per Phase.
Current Circuit: Shall not exceed 1VA per Phase.
Clock Time Accuracy: +/- 2 minutes per year drift or better.

5.0. <u>Technical/Functional requirements</u>:

5.1 <u>meter case</u>

The meter shall be made out of high quality materials to ensure higher reliability and long life with a polycarbonate meter casing. It should be compact and of reliable design to make it immune to vibrations and shocks in normal service and transportation and should be capable of withstanding several stresses likely to occur in actual service. The latest state of the art technology of surface mounting of components etc., may be used for the purpose. The soldering if any shall be perfect without dry solders. The components shall be of high quality and comply with international industrial standard practices. The construction of the meter shall be such as to permit sealing of the meter cover, terminal cover etc. independently to ensure that the internal parts are not accessible for tampering etc. without breaking the seals. The meter window shall be transparent and made out of UV Stabilized material so that the window does not turn yellow after some years.

The meter case and meter terminal block and cover shall meet the IS 14697 in all requirements like shock, dust proof, creepage distances and insulation etc.,
The meter shall be totally sealed and tamper proof.

5.2. <u>Type of installation</u>: Indoor

5.3. <u>Energy Measurement</u>

(a) The active energy (Wh) and reactive energy(Varh) measurement shall be carried out on 3-phase, 4-wire principle, with an accuracy as per class 0.2 S of IS 14697, the energy shall be computed directly in CT and VT secondary quantities, and indicated in watt-hours/varh. The harmonics shall be filtered out while measuring Wh, Var and VArh, and only fundamental frequency quantities shall be measured/computed.

(b) The 15-minute Wh shall have a +ve sign when there is a net Wh export from substation busbars, and a –ve sign when there is a net Wh import. The integrating (cumulative) registers for Wh and Varh shall move forward when there is Wh/Varh export from substation busbars, and backward when there is an import.

(c) There shall be exclusive separate reactive energy registers in addition to all other billing parameters, one for the period when average RMS voltage is above 103% and the other for the period the voltage is below 97%.

5.4.1 <u>Immunity to External Factors</u>

The meters shall be immune to external influences like magnetic induction, vibration, electrostatic discharge, switching transients, surge voltages, oblique suspension and harmonics and shall confirm to the standards mentioned in this specification.

5.4.2 The meter accuracy shall not be affected by AC / DC magnetic field up to 0.2 Tesla on all the sides of meter i.e. front, sides, top and bottom of the meter as per CBIP publication No. 304 with latest amendments. Under influence of any magnetic field (AC / DC / Permanent) above 0.2 Tesla, if the accuracy of the meter gets affected, then the same shall be recorded as magnetic tamper event with date & time stamping. The energy recorded during such tamper shall be registered in a separate register in addition to main register.

5.5 <u>Sealing Points</u>

Sealing provision shall be made available to the following:

(i) Meter body or cover
(ii) Meter terminal cover
(iii) MD reset button
(iv) Communication ports

5.6 <u>Auxiliary power</u>

The auxiliary power supply shall be drawn from V.T circuit from all the three phases, preferably equally, so as to ensure meter supply even if any/two of the three phases of the potential supply is lost at a time.

5.7 <u>Name plate and Marking of meter</u>

It shall be as per IS 14697.

5.8. <u>Instantaneous parameters</u>

The meters shall display the following parameters on demand (by pressing the push button) and automatically. In automatic display each parameter shall be displayed for at least 10 sec. Both forward and backward scroll provision shall be available in on demand display.

<u>Parameters:</u>

1. Unique identification number of the meter
2. Date
3. Time
4. Current - IR
5. Current - IY

6. Current – IB
7. Voltage - VRN for 3 Φ / 4W
8. Voltage – VYN for 3 Φ / 4W
9. Voltage – VBN for 3 Φ / 4W
10. Signed Power Factor – R phase
11. Signed Power Factor – Y phase
12. Signed Power Factor – B phase
13. System Power Factor – PF
14. Frequency
15. Signed Active Power – kW (+ Forward, - backward)
16. Signed Reactive Power – kVAr (+ Lag, - Lead)
17. Apparent Power – kVA
18. Cumulative Energy export – kWh
19. Cumulative Energy Import – kWh
20. Cumulative Energy – kVAh – export
21. Cumulative Energy – kVAh – import
22. Kvarh – Quadrant 1
23. Kvarh – Quadrant 2
24. Kvarh – Quadrant 3
25. Kvarh – Quadrant 4
26. Maximum demand – (kVA)export
27. Maximum demand – (kVA)import
28. Cumulative MD (MVA)export
29. Cumulative MD (MVA)import
30. Date and Time of Last MD reset
31. Cumulative MD reset count
32. Raising demand(KVA) and elapsed time
33. Average frequency of the previous 15-minute block
34. Net Wh transmittal in the previous 15-minute block, with +/-sign
35. Average percentage voltage
36. Voltage-high VArh register reading
37. Voltage-low VArh register reading.
38. Cumulative Power Down Time in DD:HH:MM
39. Total Voltage Harmonic Distortion V_{THD}
40. Total Current Harmonic Distortion I_{THD}
41. Cumulative tamper count
42. Cumulative programming count
43. Demand Integration Period
44. Programmed external CT and PT ratios set in the meter

5.9 LOAD SURVEY PARAMETERS

The following parameters for load survey purpose and shall be logged with a block period of 15 minutes. The data storage required for the load survey parameters shall be 45 days in nonvolatile memory with life time of the meter.

1. Average Frequency (Coded 00-99 for 49.00-5 1.00 Hz)
2. Average Power factor (Export)

3. Average Power factor(Import)
4. Net active energy
5. Active Energy (KW/kwh) Import
6. Active Energy (KW/kwh) Export
7. Apparent Energy (KVA/kvah) import
8. Apparent Energy (KVA/kvah) export
9. Kvar/ Kvarh Lag Export
10. Kvar/ Kvarh Lead Export
11. Kvar/ Kvarh Lag Import
12. Kvar/ Kvarh Lead Import
13. Percentage Voltage unbalance
14. Total harmonic distortion of voltage in percentage of fundamental
15. Total harmonic distortion of current in percentage of fundamental
16. Phase wise voltages and currents also shall be made available.
17. Date and time shall also be included
18. Serial number must be 10 digit only.

The Sample Load survey data download format is attached to this specification as an excel sheet named "Load survey data_Sample format", which is present data base format for Energy billing. During Engineering modifications as required shall be carried out.

5.10 Billing parameters

The parameters listed below for billing purpose and are logged at each day midnight (00.00Hrs) and stored in non-volatile memory for 45 days.

01. Cumulative Active Energy (kWh) – Import up to two decimal
02. Cumulative Active Energy (kwh) – Export up to two decimal
03. Cumulative Apparent Energy (kvah) – Import
04. Cumulative Apparent Energy (kvah) – Export
05. Cumulative Reactive Energy (kvarh) (Lag/Lead) - While KW is Import
06. Cumulative Reactive Energy (kvarh) (Lag/Lead) - While KW is Export
07. Kvarh during low voltage <97%
08. Kvarh during high voltage >103% } *
09. T.O.D Parameters:
    - Kwh and kvah- Export
    - Kwh and kvah – Import
    - MD in KVA
    - Power Factor for programmed periods.
10. Power Down Time or Power Off Data (DD:HH:MM)

Note: Scale MF shall be One (1) invariably

Historical Data Recording: Meter shall be capable of recording in its Non-Volatile (NVM) historical data consisting of billing energy, demand, TOD registers, minimum of six such data sets shall be stored and it should be possible to retrieve these data through communication port on common meter reading instrument (CMRI) or RMR.

5.11 PROGRAMMABLE PARAMETERS

1. Real time clock
2. Demand integration Period
3. Block Capture Time
4. Billing Date/MD reset date
5. Time Zones (1 to 8)
6. External CT/PT ratios.
7. events/tampers

Provisions shall be made to program the above parameters at sight using CMRI, Laptop or using Base computer software from remote station with proper security system. Logging of programmable parameter changed event (date & time) along with display of the same under On Demand Display Parameters & snapping of billing data at that time shall be stored and can be retrievable with CMRI and RMR and Laptop.

5.12 Name plate details

1 Manufacturer name
2 Meter serial number
The Meter serial Number must be in 10 digit Order only.
3 Firmware version for meter
4 Firmware version of communication software
The above parameters shall be displayed on demand

5.13 Display:

The meter shall have a display of liquid crystal display (LCD) for measured values with one digit indicating legend. The characters shall be clearly visible. Provision shall be made to read consumption in either whole units or decimal multiples or submultiples of one unit. The display shall be continuously with backlight digital type and with non-destructive read out.

In case of multiple values presented by a single display it must be possible to display the contents of all relevant memories. When displaying the memory, identifications of each tariff/parameter shall be available.

The register shall be able to record and display starting from zero, for a minimum of 1500 h, the energy corresponding to rated maximum current at reference voltage and unity power – factor. Register should not rollover in between this duration.

RESOLUTION:

1. Voltage = 0.1V
2. Current = 0.001A
3. P.F. = 0.001
4. Energy = 0.001 MWH
5. Demand = 0.1 KVA / KW=0.001 MVA/MW.

5.14. Maximum Demand(MD) Recording:

The maximum demand is to be monitored during each demand interval set with 30/15 minutes integration and the maximum of these in a month shall be stored. Whenever MD is reset the maximum demand value so registered shall be stored along with date and time. Under the current integration period, the rising demand should be displayed continuously along with the elapsed time. The registered demand and the number of times the MD is reset up to 10 shall be stored in the memory.

MD Reset:

The meter shall have the following provisions regarding MD reset.

a) Manually by operation of a button, which is to be covered and sealing provision available for such, cover.
b) Resetting shall also be possible through a hand held common meter reading instrument (CMRI), Widows based Laptop capable of communicating with the meter.
c) Provision for automatic resetting at the end of certain period may be made available and it should be possible to invoke this through CMRI, Widows based Laptop with date and time.

5.15. Time Of Day Tariff (TOD)/Time of Use(TOU):

The meter shall contain provisions for differential pricing of energy and/or maximum demand. The meter shall be capable of being set in to minimum of 6 time zones **(00:00 to 06:00 Hrs, 06:00 to 10:00 Hrs, 10:00 to 14:00 Hrs, 14:00 to 18:00 Hrs, 18:00 to 22:00 Hrs, 22:00 to 24:00 Hrs)** optionally more time zones can be offered).The entire hours of one day or seven days of one week or 365 days of one year shall be grouped in specific time slots, each slot being associated with specific metered register(s). The meter shall have a real time clock based on a quartz crystal with a battery totally independent of power supply.

It should be possible to change the time period for the TOD recording through a CMRI, Laptop/remote communication using a proper security system. Meter shall be capable to log such changes with date and time stamping. The main control for this change shall be available in the base computer system.

5.16 <u>Communication Capability</u>:

The meter may be provided with two ports for communication of the measured / collected data, i.e. hardware ports. The meter shall have a galvanically isolated optical communication port as per IEC 1107/ANSI and additional communication port RS 232/RS 485 should be provided for remote meter reading purpose with open standard protocols. Both the ports shall communicate simultaneously. Both the ports shall be of universal type conforming to relevant standard so that these can be easily connected to a DCD, CMRI, MODEM (e.g. GSM, GPRS, CDMA, PLCC, Microwave, Radio, VSAT, Leased Line, PSTN, VPN, Ethernet etc.), Laptop, PC, GPS Time device for data communication/ time synchronization etc. The ports shall be integral part of body and sealable. All of the parameters available in the register of the meter shall be user selectable through CMRI and also with laptop.

The manufacturer shall supply the meter compatible software, Protocol software required for Windows based Laptop, CMRI, Base Computer, RMR. It is the responsibility of the meter manufacturer to provide the required software and all the facilities required by the APTRANSCO to use the Windows based Laptop, DOS based hand held CMRI for reading and retrieving the data from the meter or to retrieve the available data through P&T lines, GSM, VSAT to the central computer station and regenerating appropriate reports required by the APTRANSCO. After loading the software in the purchaser's base computer station/ central computer station, the meter manufacturer shall demonstrate the data transfer through hand held CMRI, Windows based Laptop, P & T lines, GSM, VSAT and regeneration of appropriate reports to the purchaser.

The data element size and its over head speed of transmission shall be such that the entire billing data can be transferred within maximum time of 5 minutes. The baud rate preferable is 9600.

It should not possible to change software configuration and recorded data edit in the meter by any means except for programmable parameters agreed.

"The successful bidder need to supply required APIs to read meters data though GSM/GRPS to AMR project implementers to collect the online MRI data of all boundary meters."

Communication cable:

The Energy meter communication cable of 1500mm length for communicating with Energy meter and Windows based Laptop (Optical to USB). The cable should be flexible shielded and the two ends of the cable shall be stress relieved.

5.17 Tamper Events Records

The following shall be captured when event occurrence and restoration and for each of event captured "Cumulative tamper count" value shall be incremented.

Events	Description
1	R-Phase – PT link Missing (Missing Potential) – Occurrence
2	R-Phase – PT link Missing (Missing Potential) – Restoration
3	Y-Phase – PT link Missing (Missing Potential) – Occurrence
4	Y-Phase – PT link Missing (Missing Potential) – Restoration
5	B-Phase – PT link Missing (Missing Potential) – Occurrence
6	B-Phase – PT link Missing (Missing Potential) – Restoration
7	Phase – R CT reverse – Occurrence
8	Phase – R CT reverse – Restoration
9	Phase – Y CT reverse – Occurrence
10	Phase – Y CT reverse – Restoration
11	Phase – B CT reverse – Occurrence
12	Phase – B CT reverse – Restoration
13	Phase – R CT Open - Occurrence
14	Phase – R CT Open - Restoration
15	Phase – Y CT Open - Occurrence
16	Phase – Y CT Open - Restoration
17	Phase – B CT Open - Occurrence
18	Phase – B CT Open - Restoration
19	Influence of AC / DC or permanent magnet - Occurrence
20	Influence of AC / DC or permanent magnet - Restoration
21	Power failure – Occurrence
22	Power failure – Restoration

Tamper Information: Minimum **100** events (occurrences and restoration) with date and time of event shall be recorded. The Information shall be logged on first in first out basis and total number of tamper events during the period. All these information

should be available in simple and easily understandable format i.e. slot wise (i). Voltage tampers (ii). Current tampers (iii) Other tampers.

5.18. Self Diagnostics Features

The meters shall have indications for unsatisfactory/non-functioning of the following.

1. Time and calendar
2. Real Time clock(RTC)
3. RTC battery
4. Non-Volatile Memory
5. All display segments

5.19 Pulse Outputs

The meter shall have a test output (pulses) accessible from the front and be capable of being monitored with suitable testing equipment. The operation indictor must be visible from the front. The resolution of the test output shall be sufficient to conduct satisfactorily accuracy test at the lowest load in less than 5 minutes and starting current test in less than 10 minutes. Test outputs are required for both kwh, and kvarh.

5.20. Calendar

30-year calendar with automatic leap year adjustment

6.0. TESTS:

6.1 Type tests:

Two copies of Type test reports shall be furnished with the Bid for meters manufactured with same voltage and current reference of this specification. The type tests must have been conducted not earlier than 2 years from the date of opening of the Bid**.** The Bids received without type tests reports will be treated as non-responsive.

6.2 Acceptance and Routine Tests:

6.2.1 Acceptance tests:

The acceptance tests as stipulated in IS 14697 shall be carried out by the supplier in the presence of purchaser's representative. No of samples and criteria for conformity from each lot offered for inspection is also as per IS14697.

ACCEPTANCE TESTS FOR CONFIRMATION OF ABT FEATURE:

1. 15 minutes block average frequency registration.
2. 15 minutes block net active power registration.
3. Net kVArh High registration in all four quadrants when voltage is above 103% of VREF.
4. Net kVArh registration in all four quadrants when voltage is at VREF.
5. Net kVArh Low registration in all four quadrants when voltage is 97% of VREF.
6. Net kVArh Low registration in all four quadrants when voltage is below 97% of VREF.
7. Test for confirmation of midnight energy banking in power ON & power OFF conditions.

6. 2.2. <u>Routine tests</u>:

The routine tests as stipulated in IS 14697 shall be carried out by the supplier for 100% meters supplied and test certificates, technical leaflet shall be enclosed along with each and every meter.

7.0 <u>INSPECTION:</u>

The inspection may be carried out by the purchaser at any stage of manufacture. The manufacturer shall grant free access to the purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser, shall not relieve the supplier of his obligation of furnishing the equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

The supplier shall keep the purchaser informed in advance, about the manufacturing program so that arrangement can be made for inspection.

The purchaser reserves the right to insist for witnessing the routine testing of the bought out items. The supplier shall give 15 days for local supply/30 days (in case of foreign supply) advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine tests.

In the event of order, Supplier shall have to get type tests conducted as per the requirement of relevant standards on one sample Energy meter against each

lot quoted without any additional cost to APTRANSCO at CPRI/NABL. The Energy meter to be type tested is selected at random by inspecting officer 1 No. for each Lot. Type testing is to be conducted even if the bidder submits Type test reports of similar equipment done earlier along with bid.

Material shall be despatched only after approval of these test reports and granting of despatch clearance. After completion of Type testing and acceptance by AP Transco, payment for the delivered consignment against despatch instructions of the Lot will be made."

As described above, the bidder shall offer one additional Energy meter for each lot free of cost. Out of which One No. Energy meter will be randomly selected to arrange Type testing at the Supplier's cost.

8.0 Training of Personnel:

The Supplier shall provide necessary facilities for training of personnel of purchaser at their works/Principal Works relating to design, manufacture, assembly, testing and operation & maintenance of static meters for 4 personnel free of cost including boarding and lodging. However travel and incidental charges of the personnel will be borne by the Purchaser.

9.0 DOCUMENTATION:

9.1 All drawings shall conform to International Standards Organization (ISO) `A' series of drawing sheet India Standards Specifications IS: 656. All drawings shall be in ink and suitable for micro filming. All dimensions and data shall be in S.I. Units. Also a soft copy of Drawings shall be submitted.

9.2 List of drawings and documents:

The bidder shall furnish the following along with bid.

i. Two sets of drawings showing clearly the general arrangements, fitting details, electrical connections etc.,

ii. 10 sets of Technical leaflets (users manual) giving operating instructions.

9.3 The manufacturing of the equipment shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier's risk.

9.4 Approval of drawings/work by purchaser shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the Drawings for meeting the requirements of the latest revision of application standards, rules and codes of practices. The equipment shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and purchaser shall have the power to reject any work or materials which, in his judgment is not in full accordance therewith.

9.5 The successful bidder shall, within 2 weeks of placement of order, submit three sets of final versions of all the drawings as stipulated in the purchase order for purchaser's approval. The purchaser shall communicate his comments/approval on the drawings to the supplier within two weeks. The supplier shall, if necessary, modify the drawings and resubmit three copies of the modified drawings for their approval. The supplier shall within two weeks of intimation of approval submit 10 prints and two good quality report copies of the approved drawings for purchaser's use.

10.0 PACKING & FORWARDING:

10.1 The equipment shall be packed in crates suitable for vertical/horizontal transport as the case may be, and suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbol. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc., shall be provided. Any material found short inside the packing cases shall be supplied immediately by supplier without any extra cost.

10.2 Each consignment shall be accompanied with a detailed packing list containing the following information.

a. Name of the consignee
b. Details of consignment.
c. Destination
d. Total weight of consignment
e. Handling and packing instructions.
f. Bill of material indicating contents of each package.

10.3 The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch.

10.4 The packing shall be done as per the manufacturer's standard practice. However, he should ensure the packing is such that, the material should not get damaged during transit by Rail/Road.

10.5 The marking on each package shall be as per the relevant Standards and shall also contain APTRANSCO, P.O. ref, name of the supplier, make, meter type and number.

11. QUANTITY AND DELIVERY REQUIREMENTS:

The quantity and delivery requirements are indicated in Section-IV.

12 SUPERVISION SERVICES: NIL

The Manufacturer shall arrange for unloading of the consignments.

13 MANDATORY SPARES & TOOLS:

The bidder shall give the list of spares required for the equipment along with price list for them & shall keep a reasonable stock of the same during the warranty period. The bidder shall indicate the sources of spares like battery, interfacing cables in India and also mention the service agencies.

Sample clause removed

14 GUARANTEE:

The meters should be guaranteed for satisfactory operation for a period of 5 years from the date of receipt of material at destination stores by the consignee in good condition. During the guarantee period if the meter while in its normal operation is found defective, it shall be replaced by the supplier with a new meter free of cost with in 15 days. if the meter is not replaced within 30 days of intimation the supplier should note that the guarantee period will be extended to that extent by the number of days delayed beyond 30 days. If the tenderer does not replace within 180 days the cost of the meter(s) will be recovered from the existing bills / future bills / Bank Guarantees available with the APTransco.

For the purpose of ensuring 5 years guarantee, meter may be sealed at manufacturer's premises after inspection by the APTRANSCO representative and dispatched in sealed condition.

15 <u>Other information</u> :

a. Principle of operation of the meter, outlining the methods and stages of computation of various parameters starting from input voltage and current signals including the sampling rate if applicable shall be furnished by the bidder.

b. The bidder shall indicate the method adopted to transform the voltage and current to the desired low values with explanation on devices used such as CT, VT or Potential divider as to how they can be considered superior in maintaining ratio and phase angle for variation of influence quantities during its service period.

c. The bidder shall furnish details of memory used in the meter.

d. Details of testing facilities:
The manufacturer laboratory must be well equipped for testing of the meters.

They must have computerized standard power source and standard equipment calibrated not later than a year (or as per standard practice). The details of testing facilities available for conducting (a) The routine tests and (b) Acceptance tests shall be furnished in a statement. Bids without these details will be treated as Non responsive.

16 <u>SCHEDULES</u>:

The Bidder shall submit the following schedules (as per Standard Format), which is part and parcel of the Specification.

1. Schedule - A : Guaranteed Technical Particulars
2. Schedule-B: Specific confirmation to clauses given in the technical specification.

SCHEDULE - A

GUARANTEED TECHNICAL PARTICULARS FOR

HT ELECTRONIC TRIVECTOR METER suitable for ABT.

S. No	Description	Required in Specification	To be filled by the Bidder
1	Name of the Manufacturer and Origin.	To be filled by the Bidder	
2	Type of meter/model	3phase,4wire	
3	Accuracy class	0.2S	
4	Meter case	polycarbonate	
5	Battery life for clock	To be filled by the Bidder	
6	Parameters in meters		
	a) Instantaneous parameters	As per clause 5.8	
	b) Load profile	As per clause 5.9	
	c) Billing parameters	As per clause 5.10	
7	P.F. Range	0 Lag-unity- 0 Lead	
8	Basic Current (Ib)	1A	
9	Maximum Current	≥ 120% of Ib	
10	Minimum starting current	0.1% of Ib	
11	Rated Voltage	Ph-N : 110/√3 V Phase to Phase 110 V.	
12	Variation of voltage at which meter functions normally	- 30% to + 20% of Vref	
13	Reference Frequency and range	50Hz,+/- 5%	
14	Power Loss in Voltage & Current circuits	Voltage Circuit - Less than 1 W and 4 VA per phase Current Circuit - Less than 1VA per phase	
15	Dynamic range	To be filled by the Bidder	
16	MD reset Provisions	a) Manually b) Through authenticated CMRI or remote communication command c) Automatic resetting at present date & time	
17	No. of digits of display and height of character	Liquid Crystal Display (LCD) with backlit	
		Character height and number of characters to	

		mentioned	
18	Non-volatile memory storage capacity	**45 days**	
19	Principle of operation	To be filled by the Bidder	
20	MD Integration period (Programmable)	15 Minutes/30minutes	
21	Weight of meter	To be filled by the Bidder	
22	Dimensions	To be filled by the Bidder	
23	Warranty	5 years from date of supply in the stores	
24	Outline drawings & Leaflets	To be filled by the Bidder	
25	a) Remote meter-readout facility	RS232/RS485	
	b) Communication protocol used	Open protocol	
	c) Sealing provision	As per clause 5.5	
	d) Baud rate of data Transfer from meter to CMRI/RMR	Preferable 9600	
	e) Manufacturers Seal	Shall be provided	
26	Base Computer Software works on which operating system	To be filled by the Bidder	
27	Type Test Certificates	To be furnished by the Bidder	
28	Time of Day Zones (programmable)	Minimum of 6 time zones (00:00 to 06:00 Hrs, 06:00 to 10:00 Hrs, 10:00 to 14:00 Hrs, 14:00 to 18:00 Hrs, 18:00 to 22:00 Hrs, 22:00 to 24:00 Hrs)	
29	Whether meter measures both fundamental & Harmonic Energy	Fundamental energy required (energy recording corresponding to 50hz duly filtering out Harmonics)	
30	Real Time Clock Accuracy	+/- 2min for per annum.	
31	Anti-Tamper Features	As per clause 5.17	
32	Data retention by NVM without battery backup and unpowered condition	Life time of the meter	
33	Self Diagnostic Feature	As per clause 5.18	
34	Programmable Parameters	As per clause 5.11	
35	Name plate details	As per clause 5.12	