STANDARD

TECHNICAL SPECIFCATION

FOR

3Ph 4 WIRE HT CT/PT OPERATED FULLY STATIC

AMR COMPATIBLE DLMS COMPLIANT – CATEGORY 'A'

TRI-VECTOR ENERGY METER

FOR

11 KV FEEDER

TECHNICAL SPECIFCATION FOR 3PHASE 4 WIRE CT, PT OPERATED 3PHASE LAG PLUS LEAD ONLY FULLY STATIC AMR COMPATIBLE TRI-VECTOR ENERGY METER FOR 11 KV FEEDER

1.0 SCOPE

Design, manufacturing, testing, supply and delivery of AC, 3 Phase, 4 Wire CT,PT operated lag plus lead only fully Static and AMR compatible Tri-Vector Energy Meters for measurement of different electrical parameters listed elsewhere in the document including Active Energy (kWh), Reactive Energy (kVArh), Apparent Energy (kVAh) etc.

2.0 APPLICATION

FEEDER METER – **Category "A"**

3.0 STANDARDS TO WHICH METERS SHALL COMPLY

IS-14697:1999(2004) Specification for AC Static Transformer operated Watt Hour & VAR-Hour meters (class 0.5S);

IS-15959:2011 Data Exchange for Electricity Meter Reading Tariff & Load Control – Companion Specification

CBIP – 304 & 325 Manual on Standardization of AC Static Electrical Energy Meter

IEC 62052-11 Electricity metering equipment (AC) –General requirements, tests and test conditions -Part 11: Metering equipment;

IEC 62053-22 Electricity metering equipment (AC) –Particular requirements - Part-22: Static Meters for Active Energy (Class 0.5S);

IEC 62053-23 Electricity metering equipment (AC) –Particular requirements - Part-23: Static Meters for Reactive Energy;

IS 15707 Specification for Testing, evaluation, installation & maintenance of AC Electricity Meters-Code of Practice.

Guidelines on "Data Exchange for Electricity Meter Reading, Tariff and Load Control – Companion Specification"

IEC 62056-21 Electricity metering: Data exchange for meter reading, tariff and load control- Part 21: Direct local data exchange

IEC 62056-31 Electricity metering: Data exchange for meter reading, tariff and load control -Part 31: Local Area Network data exchange

IEC 62056-61 Electricity metering: Data exchange for meter reading, tariff and load control- Part 61: Object identification system (OBIS)

The equipment meeting with the requirements of other authoritative standards, which ensure equal or better quality than the standard mentioned above, also shall be considered; in case of conflict the Guidelines on "Data Exchange for Electricity Meter Reading, Tariff and Load Control – Companion Specification" shall prevail upon.

4.0 GENERAL TECHNICAL REQUIREMENTS

1	**TYPE**	AMR Compatible Static, 3Ph, 4Wire 11KV Tri-Vector Energy Meter for Feeder.
2	**FREQUENCY**	50 Hz ± 5%
3	**ACCURACY CLASS**	0.5S
4	**SECONDARY VOLTAGE RATING**	110V Ph-Ph, (3P, 4W) 63.5V Ph - N
5	**VOLTAGE VARIATION**	(-) 30% to (+) 20%
6	**BASIC CURRENT (Ib) & CURRENT RATING**	Ib- 1A, Imax – 2A, CT Ratio : -/1 A
7	**MAXIMUM CONTINUOUS CURRENT**	As per IS 14697:1999(2004)
8	**STARTING CURRENT**	0.1% of Ib at UPF
9	**POWER CONSUMPTION**	The active and apparent power consumption, in each voltage circuit, at reference voltage, reference temperature and reference 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.
10	**POWER FACTOR**	0 Lag – Unity – 0 Lead
11	**DESIGN**	Meter shall be designed with application specific integrated circuit (ASIC) or micro controller; shall have no moving part; electronic components shall be assembled on printed circuit board using surface mounting technology; factory calibration using high accuracy (0.05 class) software based test bench. Assembly of electronic components shall be as per ANSI /IPC-A-610 standard.
12	**DLMS TEST CERTIFICATE**	Manufacturer must have test certificate for **Category - A**meter for conformance to DLMS from CPRI

5.0 TEMPARATURE RISE

Under normal condition of use, winding and insulation shall not reach a temperature, which might adversely affect the operation of the meters. IS14697:1999(2004) to be followed.

6.0 CLIMATIC CONDITIONS

Temperature : -10° C to 55° C (in shade)
Humidity : up to 95% RH non-condensing
Average annual rainfall : 150 cm

Max Wind Pressure : 150 kg/sqm
Max. Altitude above MSL : 3000 m

7.0 TROPICAL TREATMENT

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

8.0 CONSTRUCTIONAL REQUIREMENT/ METER COVER & SEALING ARRANGEMENT

Wherever poly carbonate cover is specified, it shall conform to IS 11731 (FH-1category) besides meeting the test requirement of heat deflection test as per ISO 75, glow wire test as per the IS:11000 (part 2/SEC-1) 1984 OR IEC PUB,60695-2-12, Ball pressure test as per IEC--60695-10-2 and Flammability Test As per UL 94 or As per IS 11731(Part-2) 1986.

9.0 CONSTRUCTION

The case, winding, voltage circuit, sealing arrangements, registers, terminal block, terminal cover & name plate etc. shall be in accordance with the relevant standards. The meter shall be compact & reliable in design, easy to transport & immune to vibration & shock involved in the transportation & handling. The construction of the meter shall ensure consistence performance under all conditions especially during heavy rains / very hot weathers. The insulating materials used in the meter shall be non-hygroscopic, non-ageing & have tested quality.

The meter shall comply latest technology such as Microcontroller or Application Specific Integrated Circuit (ASIC) to ensure reliable performance. The mounting of the components on the PCB shall compulsorily be Surface Mounted Technology (SMT) type. Power supply component may be of PTH type. The electronic components used in the meter shall be of high quality and there shall be no drift in the accuracy of the meter for at least ten years. The circuitry of the meter shall be compatible with 16 Bit (or better) ASIC with compatible processor and meter shall be based on Digital measuring and sampling technique.

The meter shall be housed in a safe, high grade, unbreakable, fire resistant, UV stabilized, virgin Polycarbonate/ High grade engineering plastic/Thermosetting Plastic casing of projection mounting type. **The meter cover shall be transparent,** for easy viewing of displayed parameters and observation of operation indicators. The meter base may or may not be transparent, **but it shall not be black in colour**. The meter casing shall not change shape, size, and dimensions when subjected to 200 Hrs. on UV test as per ASTMD 53. It shall withstand 650°C. glow wire test and heat deflection test as per ISO 75.

Meters must be supplied with 2 (two) nos. manufacturers' seals between meter base and meter cover at both the sides.

Both the communication ports (Optical and RS 485 port) shall have proper sealing arrangement.

The bidder shall submit relevant documents (collected form Meter Manufacturer) regarding the procurement of polycarbonate material. The polycarbonate material of only the following manufacturers shall be used.

a) G.E. Plastics/Sabic: LEXAN 943A or LEXAN 143 or LEXAN 123R or equivalent for Meter & Terminal cover, and LEXAN 503R or 500R or equivalent for base.

b) BAYER/SABIC: Grade corresponding to above

c) DOW Chemicals: -Do-

d) MITSUBISHI: -Do-

e) TEJIN: -Do-

f) DUPONT: -Do-

10.0 METER CASE AND COVER

The meter shall be sealed in such a way that the internal parts of the meter becomes inaccessible and attempts to open the meter shall result in viable damage to the meter cover. **This is to be achieved by using continuous Ultrasonic welding on the Meter body, fully flushed between case and cover.** In case, ultrasonic welding using plate/strip is used the material of plate/strip shall be same as that of cover and base and the strip shall**flush with meter body.** The manufacturer's logo shall be embossed on the strip / plate.

The meter cover shall be fixed to the meter base (case) with Unidirectional Screws, so that the same cannot be opened by use of screwdrivers. The meter shall withstand external magnetic influence as per latest amendments of CBIP Technical Report No. 304.

11.0 TERMINAL BLOCK AND COVER

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) with nickel plated brass inserts / alloy inserts for connecting terminals.

The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor with the help of screw adjustable metal plates to increase the surface of contact and reduce the contact resistance. The screws shall have thread size not less than M 4 and head having 4-6mm. diameters. The screws shall not have pointed ends at the end of threads. All terminals and connecting screws shall be of tinned/nickel plated brass material.

The internal diameter of terminal hole shall be minimum 5.5 mm. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also.

The terminal cover shall be transparent High grade Engineering Plastic/Polycarbonate/ Thermosetting Plastic with minimum thickness 2.0 mm and the terminal cover shall be of extended type completely covering the terminal block and fixing holes. The space inside the terminal cover shall be sufficient to accommodate adequate length of external cables.

12.0 WORKING ENVIRONMENT

As per IS 14697:1999(2004). Meter to perform satisfactorily under Non-Air Conditioned environment (within stipulations of IS) IP51 housing for indoors.

The meter shall be suitable designed for 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.

13.0 MANUFACTURING PROCESS, ASSEMBLY AND TESTING

Meters shall be manufactured using latest and 'state of the art' technology and methods prevalent in electronics industry. The meter shall be made from high accuracy and reliable surface mount technology (SMT) components. All inward flow of major components and sub assembly parts (CT, PT, RTCs / Crystal, LCDs, LEDs, power circuit electronic components etc.) shall have batch and source identification. Multilayer 'PCB' assembly with 'PTH' using surface mounted component shall have adequate track clearance for power circuits. SMT component shall be assembled using automatic 'pick-and-place' machines, Reflow Soldering oven, for stabilized setting of the components on 'PCB'. For soldered PCBs, cleaning and washing of cards, after wave soldering process is to be carried out as a standard practice. Assembly line of the manufacturing system shall have provision for testing of sub-assembled cards. Manual placing of components and soldering, to be minimized to items, which cannot be handled by automatic machine. Handling of 'PCB' with ICs / C-MOS components, to be restricted to bare minimum and precautions to prevent 'ESD' failure. Complete assembled and soldered PCB shall undergo functional testing using **Computerized Automatic Test Equipment.**

Fully assembled and finished meter shall under go 'burn-in' test process for 24 Hours at 55°C (Max.temperature not to exceed 60°C) under base current (Ib) load condition.

Test points shall be provided to check the performance of each block/stage of the meter circuitry.

RTC shall be synchronized with NPL time at the time of manufacture. Meters testing at intermediate and final stage shall be carried out with testing instruments, duly calibrated with reference standard, with traceability of source and date.

14.0 DISPLAY OF MEASURED VALUES

The meter display shall have 7 digits(complete) for energy counter with alphanumeric digits for parameter identifier and tamper indication with backlit Liquid Crystal Display (LCD) of minimum 10 mm height, wide viewing angle suitable for temperature withstand of 70° C. LCD to be of 'STN' (super twisted nematic) type construction.

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 backup. The NVM shall have a minimum retention period of 10 years.

Meter shall have Scroll Lock facility to display any one desired parameter from display parameters continuously.

Auto display cycling of each parameter shall be 10-12 Seconds. The time between two auto display cycles shall be 20 sec. OBIS code in display is not required.

It shall be possible to easily identify the single or multiple displayed parameters through symbols/legend on the meter display itself or through display annunciation.

All active Energy parameters shall be displayed in kWh.

Display in AUTO Mode:

i) LCD Test
ii) Meter Serial Number
iii) Real Time & Date (dd/mm/yyyy)
iv) Rising Apparent Demand with elapsed time
v) Power Failure Event Duration in current month (hh:mm:ss)
vi) Power Failure Event Count in current month
vii) Cumulative Power Failure Event Duration (dddd:hh:mm)
viii) Cumulative Power Failure Count
ix) Cumulative Active Energy (Cumulative sign/legend must be given)
x) Cumulative Reactive Energy Lag (do)
xi) Cumulative Reactive Energy Lead (do)
xii) Cumulative Apparent Forward Energy
xiii) Present Month Apparent Forward Max. Demand (0-24 hrs) (with minimum 2 decimal)
xiv) TOD Wise Total Active Forward Energy
xv) TOD Wise Apparent Energy
xvi) TOD Wise Apparent Max. Demand (with 2 decimal)
xvii) Cumulative Apparent Maximum Demand (Cumulative sign/legend must be given)
xviii) Cumulative Billing Count
xix) Cumulative Tamper Count
xx) Phase sequence & phase correspondences of Voltage & Current
xxi) Connection Check
xxii) Self-Diagnosis

Display in PUSH BUTTON Mode:

All the Auto Display Mode Parameters under serial no. I to xvii and then,

xxiii) Cumulative Active Forward Energy (History 1)
xxiv) TOD wise Cumulative Active Forward Energy (History 1)
xxv) Cumulative Apparent Forward Energy (History 1)
xxvi) TOD wise Cumulative Apparent Forward Energy (History 1)
xxvii) History 1 Apparent Forward MD (0-24hrs) with Date & Time
xxviii) History 1 TOD Apparent Forward MD with Date & Time
xxix) Last Billing Date and Time
xxx) Power Failure Event Duration (History 1)
xxxi) Power Failure Event Count (History 1)
xxxii) Phase Sequence & phase correspondences of Voltage & Current
xxxiii) Connection Check
xxxiv) Self-Diagnosis
xxxv) Battery Status
xxxvi) Cumulative Programming Count
xxxvii) Present/ Last MD Reset Time and Date
xxxviii) Instantaneous Secondary Voltages –Phase wise (P-N)
xxxix) Instantaneous Secondary Currents – Phase wise
xl) Signed Instantaneous Power Factor – Phase wise
xli) Instantaneous Net Power Factor
xlii) Billed Average Power Factor (History 1)
xliii) Signed Instantaneous Active Power

xliv) Instantaneous Apparent Power
xlv) Instantaneous Frequency
xlvi) Present Tamper Status
xlvii) First Tamper EventOccurrence with Date & Time
xlviii) Last Tamper EventOccurrence with Date & Time
xlix) Last Tamper EventRestoration with Date & Time
l) Front Cover Open with Date and Time
li) High Resolution Cumulative Forward Active Energy
lii) High Resolution Cumulative Forward Reactive Energy (Lag)
liii) High Resolution Cumulative Forward Active Energy (Lead)
liv) High Resolution Cumulative Forward Apparent Energy

Display in Power OFF Mode

i) Meter Serial Number
ii) Real Time & Date (dd/mm/yyyy)
iii) Cumulative Active Forward Energy
iv) Cumulative Reactive Energy(Lag)
v) Cumulative Reactive Energy(Lead)
vi) Cumulative Apparent Energy
vii) Current Apparent Forward MD with Date & Time
viii) Cumulative Active Forward Energy (History 1)
ix) Cumulative Apparent Forward Energy (History 1)
x) Apparent Forward MD (History 1)
xi) Power Failure Event Count (History 1)
xii) Power Failure Event Duration (History 1)

The register shall be able to record and display starting from zero, for a minimum of 2500 hours, the energy corresponding to rated maximum current at reference voltage and unity power factor. The register shall not roll over in between this duration.

High resolution registers shall display minimum 4 digits after decimal in case of Energy.

No decimal is required for main kWh, kVAh, kVArh (lag & lead) display.

Push button mechanism shall be of high quality and shall provide trouble free service for a long span of time. Up and Down scrolling facility shall be there for Push Button Mode. If there is separate button for MD reset, it shall also have scrolling facility.

15.0 MAXIMUM DEMAND

The meter shall be capable of recording the Apparent/Active MD with integration period of 15 minutes.

MD RESET OPTION

i. Automatic resetting at 00:00 Hrs. of 1st day of everyMonth (Programmable)
ii. Push Button resetting
iii. By issuing authenticated command from BCS through HHU or directly from PC/REMOTE

MD reset button shall have proper sealing arrangement.

Specific MD Reset operation data for Present Month and History Wise (Auto/Push Button/Authenticated Command) shall be made available for/ in downloaded data

16.0 PERFORMANCE UNDER INFLUENCE QUANTITIES

Performance of the meters under influence quantities shall be governed by IS 14697:1999 (2004). The meter shall not exceed the permissible limits of accuracy as per standard IS 14697:1999(2004).

17.0 OUTPUT DEVICE

Energy Meter shall have test output, accessible from the front, and be capable of being monitored with suitable testing equipment while in operation at site. The operation indicator must be visible from the front and test output device shall be provided in the form of LED. Resolution of the test output device shall be sufficient to enable the starting current test in less than 10 minutes. Minimum gap shall be maintained between Active & Reactive Test LED.

18.0 REAL TIME INTERNAL CLOCK (RTC)

RTC shall be pre-programmed for 30 years day/date without any necessity for correction. The maximum drift shall not exceed ± 300 Sec. per year.

The clock day/date setting and synchronization shall only be possible through password/Key code command from one of the following:

a) Hand Held Unit (HHU) or directly through BCS and this shall have authentication from BCS for individual meter
b) From remote server through suitable communication network with authentication from BCS.

19.0 TIME OF DAY FACILITIES

The meter shall have facilities to record Active, Apparent Energies and MD with a facility of 8 time zones. The time zones shall be user programmable through authenticated command from BCS with the help of HHU. At present only 3 (Three) TOD zones to be activated in following manners;

TOD – 1	06:00 Hrs to 17:00 Hrs
TOD – 2	17:00 Hrs to 23:00 Hrs
TOD – 3	23:00 Hrs to 06:00 Hrs

20.0 METER READING DURING POWER OFF

It shall be possible to read the meter-display visually and with MRI and in absence of input voltages with the help of internal battery for display in power off condition or external battery pack/PPU. The interface shall be inductive coupling.

21.0 SELF DIAGNOSTIC FEATURES

The meter shall be capable of performing complete self-diagnostic check to monitor the circuits for any malfunctioning to ensure integrity of data memory location all the time. If possible, the details of malfunctioning shall be recorded in the meter memory. The bidder shall furnish the details of self-diagnostic capability feature, viz (i) Memory status, (ii)Battery status (iii) NVM & (iv) RTC Status in BCS as well as it shall be available in display.

22.0 BASE COMPUTER SOFTWARE (BCS):

The BCS shall be compatible with Windows 10, 8.0 & 7.0 OS (or its higher version) based and user friendly.

The data stored in the meter memory including defrauded energy shall be available on the BCS.

The data transfer shall be reliable and fraud proof.

BCS shall give all details pertaining to billing and load survey data. The meter condition details shall also be transferred into the BCS including abnormalities/anomalies of voltage current conditions or tamper conditions which can occur due to mistake in connections or intentionally done for the purpose of tamper.

The software shall show electrical conditions existing at the time of reading the meter in tabular forms as well as in graphical format (Phase diagram) i.e. Phase diagram is required for voltage, current & PF only.

In BCS, data, like, total & TOD wise energy and maximum demand (i.e, kWh, kVAh, MD in kW & kVA), average power factor, average load factor, month wise power failure count & duration shall be available atleast for twelve months.

All the information about energy, maximum demand and their respective TOD register readings, billing register readings and billing history readings shall be shown in a manner which user can understand quickly, preferably in tabular format.

All the load survey data shall be available in numerical as well as graphical format. It shall also be possible to view this data in daily, weekly and monthly formats. The load survey graph shall show the respective values.

All the information about tamper events shall be accompanied with date and time stamping along with the 'SNAPSHOT' (details) of the respective electrical conditions. This information shall be displayed in the sequence in which it happened, in cumulative format as well as in summary format. The cumulative format shall segregate a particular tamper information and summary report shall show count of tamper occurrence, restoration and the duration for which meter has remained under tamper condition.

Besides other details, the following parameters shall be available in BCS through downloaded data:

i) Month wise Power Failure Event Count (History 1 – History 12)
ii) Month wise Power Failure Event Duration (hh:mm:ss) (History 1 – History 12)
iii) Power failure event count for current month
iv) Power failure duration (hh:mm:ss) for current month

In BCS, tamper events must be followed as per Table 32-38 as per IS 15959. However, final tamper logic will be given at the time of sample testing. Before issuing the purchase order bidder has to confirm with letter to comply the said tamper logic. In display, first tamper occurrence & last tamper occurrence & restoration with date & time and total tamper count must be available.

Facility to view data incorporating External multiplying factor due to Installed CTs & PT shall be provided.

The software shall be capable of preparing CMRI to read the meter information or to reconfigure the meter for change the setting of the meter as per IS 15959:2011.

The BCS shall have the facility for ASCII conversion of all recorded meter data. There shall be user friendly approach for viewing meter data for the reading collected now or for the reading collected in the

past. All information about a particular consumer shall be segregated and available at one place so that locating any consumer's past data is easy. It shall be possible to locate/retrieve data on the basis of one of the following particulars:

a) Consumer ID/Number.
b) Meter Sr. No.
c) Date of meter reading.
d) Location

The BCS shall have multilevel password for data protection and security. The first level shall allow the user to enter the system. The different software features shall be protected by different passwords. The configuration of passwords shall be user definable. The software installed on one PC shall not be copy-able on to another PC.

It is very important that the BCS has the feature to export available data to ASCII format for integrating with the WBSEDCL billing system. Here again a wizard shall be available whereby user can select file format (for ASCII), what data to export, the field width selection (whether 8 characters or 10 characters, to include decimal point or not, number of digits after decimal point etc).

Help shall be available with the software so that user can use all the features of the software by just reading the Help contents.

23.0 LOAD SURVEY

The meter shall be capable of recording load survey data of Phase wise Average Voltage, Phase wise Average current, Average Power Factor, Active Energy and Apparent Energy, Active and Apparent Demand for a period of minimum 45 days for 15-minute integration period. Real time & date shall be shown in all the load survey graphs and tables.

24.0 MEASUREMENT OF ENERGY

The meter shall be capable of measuring Fundamental Energy as well Total Energy i.e. Fundamental plus Harmonics energy. Total Energy shall be made available on meter-display and the same only shall be used for billing purpose. Fundamental Energy shall be provided in display / BCS.

The Fundamental Energy shall be logged in the meter memory and be capable of downloading to the BCS through the HHU and be available for viewing at the BCS end.

25.0 MARKING OF METERS

Every meter shall have a nameplate clearly visible and indelible and distinctly marked in accordance with the relevant Standard mentioning "Category – A". The following information shall appear on an external plate attached to the meter cover.

i) Manufacturers' name or trademark and place of manufacture
ii) Designation of type
iii) Number of phases and wires
iv) Serial number of meter
v) Month and year of manufacture
vi) Principal unit of measurement
vii) PT Ratio
viii) CT Ratio
ix) Basic current and rated maximum current
x) Reference frequency in Hz

xi) Meter constant (impulse/unit) i.e. impulse/kWh
xii) Class index of meter
xiii) Reference temperature
xiv) "Property of WBSEDCL"
xv) Purchase Order No. & Date
xvi) Guarantee for 5&1/2 years from the date of last supply
xvii) Sign of insulation
xviii) Barcoded Serial number of meter, month & year of manufacture

The meter shall also store name plate details as given in the Table - 30 of IS 15959:2011

26.0 COMMUNICATION CAPABILITY

The meter shall be provided with two ports for communication of the measured/collected data. The hardware port (with sealing facility) compatible with RS 485 specifications which shall be used for remote access through suitable Modem and an Optical port complying with hardware specifications detailed in IEC-62056-21. This shall be used for local data downloading through a DLMS compliant HHU or direct through BCS.

Both ports shall support the default and minimum baud rate of 9600 bps.

Optical Cord (i.e. OpticalPort of Meter to PC) must be USB type.

Data downloading time from meter to HHU/PC shall be within 2 min for meter data (without load survey) and within 6 min for meter data with load survey.

27.0 HAND HELD UNIT (HHU)

To enable local reading of meters data a **DLMS compliant HHU (DOS Based)** shall be used. The HHU shall be as per IS 15959:2011. It shall be compatible to the DLMS compliant energy meters that areprocured/supplied on the basis of the specification having at least one USB communication port.

28.0 TAMPER & FRAUD MONITORING FEATURES

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, and Electromagnetic High Frequency Fields etc. The meter shall be immune to abnormal voltage/frequency generating devices and shall record the occurrence and restoration of all tampers and related snapshots as per Annexure – G of IS 15959:2011

The meters shall work even in the presence of any two Potential wires.

Meter shall work correctly irrespective of phase sequence.

Tamper details shall be stored in internal memory for retrieval by authorized personnel through either of the following:

a) DLMS compliant HHU.
b) Remote access through suitable communication network.
c) Direct by PC

Meter shall have a continuous and clear indication / annunciation in its display if top cover is removed/open and even refixed (nonrollover)and only cover open must be logged in BCS without any restoration. Auto scroll display may be sacrificed for that **COVER OPEN.**

Minimum 400 no. of events (compartment wise) i.e. 200 no. of events for occurrences & 200 no. of events for restoration with date & time and snapshot shall be available in the meter memory. Out of 400 no. of events 300 (150 each for occurrence & restoration) shall be for Power Failure events only.

Default occurrence and restoration time shall be 5 minutes. But it shall have to be programmable. Final tamper Logic and threshold values as per our requirement is enclosed (Annexure-VI).

All the tamper information logged by the meter shall be available in BCS with snapshot, Date & Time as per Table 39 of IS 15959:2011 with occurrence and restoration.

Properly designed meter tamper logic with threshold value, shall be provided and clearly explained in the bid. The tamper logic shall be capable of discriminating the system abnormalities from source side and load side and it shall not log / record tamper due to source side abnormalities. The meter shall be able to distinguish between HT PT fuse blowing and Single Phasing and record the former.

29.0 TYPE TESTS

Meters shall be fully type tested as per relevant Standard (IS 15959) (latest version). The type test certificates shall be submitted as per IS 15959 along with the offer. Offer without Type Test Report shall be liable for rejection. The type test certificate shall not be more than five years old from the Due date of submission of Tender.

30.0 ACCEPTANCE & ROUTINE TESTS

All acceptance tests as per relevant standards shall be carried out at Meter Manufacturer's Works in the presence of WBSEDCL representatives.

Further Purchaser shall reserve the right to pick up energy meters at random from the lots offered and get the meter tested from NABL accredited lab. The supplier has no right to contest the test results NABL accredited lab or for additional test and has to replace/take corrective action at the cost of the supplier.

31.0 INSPECTION

The inspection shall be carried out at any stage of manufacture, by the WBSEDCL authorized representatives, with prior intimation to the supplier. The manufacturer shall grant all reasonable facilities for testing free of charge for inspection and testing to satisfy the purchaser that the materials to be supplied are in accordance with their specification.

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

The representative / Engineer of the WBSEDCL attending the above testing shall carry out testing as per relevant standards and issue test certificate approval to the manufacturer and give clearance for dispatch.

32.0 QUALITY ASSURANCE

The meter manufacturer shall have a comprehensive quality assurance program at all stages of manufacture for ensuring products giving reliable, trouble free performance. Details of the Manufacturer's quality assurance and test set up shall be furnished with the bid. A detailed quality assurance program shall be finalized with the successful bidder during the award stage.

Bidder (collected from Meter Manufacturer) shall furnish following information along with his bid:

a) Organization structure of the manufacturer and his main sub-suppliers (PCBs, SMT cards, CT/PT) with details of 'QA' setup, overall workflow.

b) Copy of system manual showing 'QAP' (Quality Assurance Plan) as actually practiced during manufacturing and final testing.

c) **List of raw materials and critical components (ASIC chip, crystal clock, memory register Chip, transformers, optical ports etc.) with their suppliers and procurement details.**

d) Stage inspection of product before final testing.

e) Procedure adopted for 'In-situ' testing of PCBs, after placement of surface mounted component, for quantitative parametric variation of tolerance by self or sub-contractor.

f) Testing and calibration facility, date of calibration of test bench, manpower data of bench operators;

g) Sample copies of test certificate of bought out components.

33.0 TESTING FACILITIES

The Bidder (Meter Manufacturer) shall have at least the following testing facilities to ensure accurate calibration:

a) Insulation resistance measurement
b) Running at no load
c) Starting current test
d) Limits of error
e) Dial Test
f) Power loss in voltage and current circuit
g) Repeatability of error
h) Transportation test
i) Tamper Test
j) Ageing Test

The Bidder (Meter Manufacturer) shall give a detailed list of bought out items with name of themanufacturer and details about quality control.

34.0 GUARANTEE

Equipment (Meter & CMRI) supplied shall be guaranteed for a period of 5 & ½ years from the date of last despatch. Bidders shall guarantee to replace the meters, which are found to be defective/inoperative at the time of installation, or become inoperative/ defective during guarantee period. Replacements shall be effected within 1 month from the date of intimation.

35.0 FIXING & SEALING ARRANGEMENT

Every meter shall have three fixing holes one at the 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. The requisite fixing screws shall be supplied with each meter.

Necessary provision may be kept for fixing the utility seal also.

The manufacturers seal provided with the meter shall be of high quality with tamper proof features.

36.0 SUBMISSION OF SAMPLE ENERGY METER & DOCUMENTS

Bidder has to submit sample Meters, as per date mentioned in NIT, to the office ofthe CE,DTD,WBSEDCL, for sample testing as part of technical evaluation of the NIT.

37.0 SCHEDULES

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

Schedule A Guaranteed Technical Particulars
Schedule B List of Raw Materials (as per enclosed format)
Schedule C Pre Qualification Condition
Schedule D List of Documents to be submitted during sample submission

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

14.12.20	14/12/2020	14/12/2020	14/12/2020	14/12/2020	14/12/2020
P K Banerjee	A Banerjee	S K Ghosh	S Chakraborty	A Bir	D K Pal
CE: P&E-Dist	Advisor(Engg)	CE: P&CD	CE:DTD	CE: CCD	CE: REM

14/12/20		14/12/2020	14/12/2020		
S K Ghatak	A Mitra	S Das	P K Nayek	M M De	D K Pal
ACE: REM	ACE:DTD	ACE: P&CD	ACE: Project-III	ACE: Dist	ACE: Comn

14/12/2020	14/12/2020	
S K Guha	S N Mukherjee	A K Biswas
ACE: P&E	SE(E): P&E	DE(E): DTD

Schedule - A

GUARANTEED TECHNICAL PARTICULARS FOR 11KV STATIC TRIVECTOR METERS

Sl.No.	Description	Required Specification	Manufacturer's particulars
1	Maker's name and country	To be mentioned	
2	Type of meter/model	To be mentioned	
3	Accuracy class	0.5s	
4	Parameters displayed	To be mentioned	
5	P.F. Range	0 Lag – Unity - 0 Lead	
6	Basic Current (Ib)	1A CT Ratio: -/1A	
7	Maximum Current	200 % of Ib	
8	Minimum starting current	0.1% of Ib	
9	Rated Voltage	Ph-Ph : 110V, Ph–N;63.5V	
10	Variation of voltage at which meter functions normally	-30% to + 20% of Vref	
11	Rated Frequency	50Hz	
12	Power Loss in Voltage & Current circuits	Voltage Circuit Less than 1.5W/8VA, Current Circuit Less than 1VA. (Less VA/ Watt getting the preference)	
13	Dynamic range	To be mentioned	
14	MD reset Provisions	a) Through authenticated CMRI or Remote Communication Command. b) Automatic resetting at preset date & time.	
15	No. of digits of display and height of character	Seven segment, minm. 7 digit Liquid Crystal Display (LCD) with backlit or LED, having minimum character height of 10 mm.	
16	Size of Non volatile memory	To be mentioned	
17	Principle of operation	To be mentioned	
18	MD Integration period	15 Minutes	
19	Weight of meter	To be mentioned	
20	Dimensions	To be mentioned	
21	Warranty	5 & ½ years from date of last dispatch.	
22	Outline drawings & Leaflets	To be furnished	
23	a) Remote meter-readout facility	To be mentioned	
	b) Communication protocol used.	To be mentioned	
	c) Sealing provision for meter & optical port.	To be mentioned	
	d) Baud rate of data transmission	To be mentioned	

	e) Required software to be resident in CMRI and BCS.	To be mentioned	
	f) Ultrasonic welding of body	To be mentioned	
	g) Manufacturer's Seal provided	To be mentioned	
24	Base Computer Software	Windows 8/7 based	
25	Type Test Certificates	To be furnished	
26	Time of Day Zones (Selectable)	To be mentioned	
27	Whether meter measures both fundamental & Harmonic Energy	Both required	
28	Real Time Clock Accuracy	Max. drift per annum ±300 sec for Class 0.5S.	
29	Anti Tamper Features	To be mentioned in details.	
30	Data retention by NVM without battery back up and un-powered condition.	10 years	
31	Guarantee period of meter	66 months from the date of last despatch. Guarantee period shall be printed on the nameplate.	
32	BIS license	To be mentioned	
32.1	BIS license No. & dt. with its validity for ISI certification mark on offered meter.	To be mentioned	
32.2	Details of meter design for which above BIS certification has been obtained: -	To be mentioned	
(i)	Ratio of Ib to Imax		
(ii)	Material of meter body		
(iii)	Grade of printed circuit Board material		
(iv)`	Type of assembly of component used (SMT)		
(v)	Meter constant (IMP / KWh)		
(vi)	Auxiliary power circuit (with PT or PT less)		
(vii)	Accuracy class		
33	ISO accreditation no. & dt. with its validity		
34	Other parameters / features not covered in the above GTP	Conform to specification of IS-14697 / 1999 & CBIP technical report No.88 (with its latest amendment).	
35	Past Experience	Copies of order executed in last three years along with GTP of the supplied meters to be enclosed. Past experience to be considered for manufacturing meter as per IS: 14697 & CBIP-88/304	

SHEDULE-B

Sl. No.	Component Function / Feature	Make / Origin
1	Current Element	
2	Measurement /Computing chips	
3	Memory chips	
4	Display modules	
5	Communication modules	
6	Optical port	
7	Power Supply	
8	Electronic components	
9	Mechanical parts	
10	Battery	
11	RTC / Micro controller	

SCHEDULE-C

Pre-Qualification Conditions for HT Static Meters

Sl. No.	Particulars	Remarks
1	Bidders (Meter Manufacturer) must have valid BIS certification for the offered meter. If it has started to issue by appropriate authority.	Yes / No
2	Bidder (Meter Manufacturer) preferably posses ISO 9001 certification	Yes / No
3	Bidder (Meter Manufacturer) shall be manufacturers of static meters having supplied Static LT, 11/33 KV H.T. Meters with memory and LCD display as per IS 14697 & CBIP 304 to Electricity Boards / Utilities in the past 3 years.	Yes / No
4	Bidders(Meter Manufacturer) shall have dust free, static protected environment for manufacture, assembly and Testing.	Yes / No
5	Bidder(Meter Manufacturer) shall have automatic computerized test bench for lot testing of meters.	Yes / No
6	Bidder (Meter Manufacturer) has facilities of Oven for ageing test.	Yes / No

ANNEXURE - V

Component Specifications:

The meters shall be designed and manufactured using SMT (Surface Mount Technology) components, except for power supply components, LCD etc., which are PTH type.
All the material and electronic power components used in the manufacture of the meter shall be of highest quality and reputed makes so as to ensure higher reliability, longer life and sustained accuracy.

Sl. no.	Component Function / Feature	Requirement	Make / origin
1.	Current Element	Current Transformer	Any make or origin conforming to IS-2705
2.	Measurement / computing chips	The Measurement / computing chips used in the meter shall be with the Surface mount type.	USA:Analog Devices, AMS, Cyrus Logic, Atmel, SAMES, Texas Instruments,Teridian, Japan: NEC,Freescale, Renesas, Holland: Phillps
3.	Memory chips	The memory computing chips shall not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	USA: National Semi Conductor, Atmel, SAMES, Texas Instruments,Teridian, ST Japan: Hitachi, OKI, Freescale, Renesas, Holland / Korea: Phillps
4.	Display modules	The display modules shall be well protected from the external UV radiations. The display shall be clearly visible over an angle of at least a cone of 70°.The construction of the modules shall be such that the displayed quantity shall not disturbed with the life of display. The display shall be TN type industrial grade with extended temperature range.	Singapore: Bonafied Technologies, Korea: Advantek, Japan : Hitachi, SONY, Hijing,Truly Semiconductor.
5.	Communication modules	Communication modules shall be compatible for the RS 232 ports.	USA: National Semiconductors, HP, ST, Texas Instruments, Agilent, USA / Korea: Fairchild Holland/ Korea: Philips, Japan: Ligitek, Hitachi, Germany: Siemens, Tiwan: Everlight,

6.	Optical port	Optical port shall be used to transfer the meter data to meter reading instrument. The mechanical construction of the port shall be such to facilitate the data transfer easily.	USA: National Semiconductors, Texas Instruments, HP, Agilent, Japan: Hitachi, , Germany:Siemens, Holland / Korea:Philips, Tiwan:Everlight
7.	Power Supply	The power supply shall be with the capabilities as per the relevant standards. The power supply unit of the meter shall not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	SMPS Type
8.	Electronic components	The active & passive components shall be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	Philips, Toshiba, Fairchild, Murata, Rohm, Siemens. National Semiconductors, ATMEL, Texas Instruments, Hitachi. Ligitec, OKI, EPCOS
9.	Mechanical parts	The internal electrical components shall be of electrolytic copper &shall be protected from corrosion, rust etc. The other mechanical components shall be protected from rust, corrosion etc. by suitable plating / painting methods.	
10.	Battery	Lithium / Lithium-ion /NiMh with guaranteed life of 10 years	Renata, Panasonic, Varta, Tadiran, Sanyo, National, Tekcell, Duracell, Maxell, Elegance, Mitshubishi,
11.	RTC / Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Dallas, Atmel, Motorola, NEC, Renesas, Texas Instruments, ST, Micro chips, Teridian Holland / Korea: Philips, Japan: NEC, OKI,Hitachi, Mitsubishi, Freescale,

Components used in accepted sample meters shall be maintained in offered meters. If any change is essential during offer of the meters, prior approval is to be taken from the Ordering Authority.

SCHEDULE - D

Sl. No.	LIST OF DOCUMENTS TO BE SUBMITTED DURING SAMPLE SUBMISSION			
1	Attested copy of type test reports from NABL accredited laboratory as per new IS(If Published)			
2	Attested copy of BIS certificates of the same type of meter submitted as sample			
3	Attested certificates as regards material used for meter case, cover & terminal block.			
4	Annexure – II as per tender documents			
5	Annexure – III as per tender documents			
6	Operating manual & Tamper logic of the meter submitted			

ANNEXURE-VI

Tamper Logic:
Feeder Meter CAT A

	TAMPERS	Occ Condition	REST. CONDITIONS	OCC TIME(MIN)	REST. TIME(MIN)
1	**Missing potential**	Vx<15% Vref	Vx> 40% Vref	5	
		Any other phase voltage > 70% of Vref	Any other phase voltage > 70% of Vref		
		I3x> 10 % of Ib	I3x> 10 % of Ib		
		Missing potential tamper detection will be phase wise			
2	**Voltage Unbalance**			5	
		V3x> 70% Vref	V3x> 70% Vref		
		Vmax-Vmin>10% Vref	Vmax-Vmin<10% Vref		
		Current Ignored	Current Ignored		
3	**Low Voltage**	Vx< 60% Vref	V3x>60% Vref	5	
		Current Ignored	Current Ignored		
4	**High Voltage**	Vx>120% Vref	V3x< 120% Vref	5	
		Current Ignored	Current Ignored		
		Voltage Unbalance shall not occur with high voltage event.			
5	**Power Failure**	If power goes off for more than the persistence time or all phase voltage goes less than 30% of Vref		5	Immediate
6	**Current Open**	Residual Current >20% Ib	Residual Current<20% Ib	5	
		Ix< 2% Ib	Ix Ignored		
		Average line Current :Ignored	Average Current > 10% of Ib		
		V3x>60% Vref	V3x> 60% Vref		
7	**Current Bypass**	Residual Current >20% Ib	Residual Current <20% Ib	5	
		Ix>5% Ib	Ix Ignored		
		Average line Current :Ignored	Average Current > 10% Ib		
		V3x>60% Vref	V3x>60% Vref		
8	**Current Unbalance**	Residual Current < 20% Ib	Residual Current < 20% Ib	5	
		Imax- Imin> 30% 0f Imax for that period	Imax- Imin<29% 0f Imax for that period		
		Average Line Current> 10% Ib	Average Line Current> 10% Ib		
		In> 5% of Ib	In> 5% of Ib		

		V3x>60 % Vref	V3x>60 % Vref	
	Current Unbalance tamper shall occur only on activation of Neutral CT			
9	**Current Reversal**	Ix> 10 % Ib	Ix> 10 % Ib	5
		Direction : Negative	Direction: positive	
		Net Power Factor> 0.3	Net Power Factor> 0.3	
	Current Reversal detection will be phase wise			
10	**Over Current**	Ix> 120 % Ib	I3x< 120 % Ib	5
	No Current Unbalance tamper further log with Over Current			
11	**Low PF**	V3x> 60% Vref	V3x> 60% Vref	5
		Ix> 10% Ib	Ix> 10% Ib	
		P.F.< 0.3	P.F.> 0.3	
12	**Cover Open**	On removal of meter cover the meter will log cover open event along with date and time.		Immediate. No Restoration
	In case of Low and High Voltage Tamper, no current related tamper will be logged except CT Reverse Tamper			

V3x= Voltage in All Phases
Vx= Voltage In Any Phase
I3X= Current in All Phases
IX= Current in any phase