Technical Specification

For

Static 3 Phase 4 Wire CT & PT Operated AMR Compatible DLMS Compliant Category-C Static Tri-vector Energy Meter For 11kv Bulk Consumer

1.0 SCOPE

This specification shall cover design, engineering, manufacture, assembly, inspection, testing at manufacturers works before dispatch, supply and delivery at destination anywhere in the state of West Bengal of 0.5s accuracy class static 3 phase 4 wire CT&PT operated AMR compatible DLMS compliant Category – C Tri-Vector Energy Meter fitted with Pilfer Proof Meter Box for 11 KV Bulk Consumers for measurement of different electrical parameters listed elsewhere in the document including Active Energy(KWH), Reactive Energy (RKVAH), Apparent Energy(KVAH) etc. over a Power Factor range of Zero Lag to Unity to Zero Lead. Meters shall have facility of recording tamper information & load survey of active energy, apparent energy, reactive energy, phase currents, phase voltages & other parameters in non volatile memory. These meters shall have communication port to interface for remote meter reading.

2.0 APPLICABLE STANDARDS

Unless specified elsewhere in this specification, the performance & testing of the CT&PT operated meters of accuracy class 0.5s shall conform to the following Indian / International standards, to be read with up-to-date and latest amendments / revisions thereof as on 90 days prior to floating of tender.

IS 14697: 1999 read with latest amendments	Specification for AC Static Transformer operated Watt Hour & VAR Hour meters, Class 0.5s
CBIP Report No. 325 & its latest amendments, if any	Specification for AC Static Electrical Energy Meters
IS 15959: 2011 read with latest amendments	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification
IEC 62056(Part 21, 31, 61)	Electricity metering: Data exchange for meter reading, tariff and load control: Direct local data exchange, Local Area Network data exchange, Object identification system (OBIS)
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)
IS-15707	Specification for Testing, evaluation, installation & maintenance of AC Electricity Meters-Code of Practice
IS 13410 :1992 with latest amendment	Specification for Pilfer Proof Meter box suitable for 3 Phase Static Energy Meter
IS 12346 :1988	Specification for testing equipment for AC Static Electrical Energy Meter (latest amendment)

3.0 CLIMATIC CONDITION:

The meter shall be suitably 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. The meter shall be suitable for satisfactory continuous operation under the following tropical conditions.

3.1 Maximum ambient air temperature : 550 C
3.2 Minimum ambient air temperature : -100 C
3.3 Maximum Relative Humidity : 95%(non-condensing)
3.4 Minimum Relative Humidity : 10%
3.5 Maximum altitude above mean seal level : 3000 meters
3.6 Average number of tropical monsoon per annum : 5 months
3.7 Maximum Annual Rainfall : 1500 mm

3.8 Maximum Wind Pressure : 150 Kg/m. sq.

4.0 SUPPLY SYSTEM

System	3 Phase 4 Wire
Rated voltage (V_{ref})	63.5 V – Phase to Neutral
Rated Current	Basic current -/1 Amps (I_b), Maximum current 2 Amps (I_{max})
Rated Frequency	50 Hz

5.0 POWER FACTOR RANGE:

The meter shall be lag only suitable for full power factor range from zero (lagging) through unity to zero (leading).

6.0 POWER SUPPLY VARIATION:

The meter shall be suitable for working with following supply system variations.

System	3 Phase 4 Wire
Specified range of operation	70% to 120% of reference Voltage i.e. 63.5 Volt
Frequency	50Hz ±5%

7.0 ACCURACY:

7.1 Class of accuracy of the meter shall be 0.5S The accuracy shall not drift with time

7.2 Maximum error limit at 1% Ib, UPF shall not exceed ±1%

7.3 There shall be no drift in accuracy, at least for a period of ten years from the date of supply. In case any drift is noticed which is beyond the permissible limits, the bidder shall have to replace the meter with a new one free of cost.

8.0 POWER CONSUMPTION:

8.1 Voltage Circuit: The active and apparent power consumption in the voltage circuit/phase including the power supply of meter along with split unit at reference voltage, reference temperature and reference frequency shall be as per IS 14697.

8.2 Current Circuit: The apparent power taken by current circuit/phase at basic current, reference frequency and reference temperature shall be as per IS 14697.

9.0 STARTING CURRENT & RUNNING AT NO LOAD:

9.1 The meter shall start registering energy at 0.1% of basic current at unity power factor and first pulse must appear within 10 minutes.

9.2 Running at no load: When 70% & 120% voltage is applied and no current flows in the current circuit, the test output of the meter shall not produce more than one pulse.

10.0 MAXIMUM CONTINUOUS CURRENT: The maximum continuous current in meters shall be the current at which the meter purports to meet the accuracy requirement of the specification. The same is indicated in table in Supply System Clause of this specification.

11.0 GENERAL & CONSTRUCTIONAL REQUIREMENTS:

11.1 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 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 i.e. break to open type. This is to be achieved by using continuous Ultrasonic welding on all the four sides of the Meter base and cover or any other technology which is either equally or more efficacious.

11.2 The meter shall comply with latest technology such as Microcircuit or Application Specific Integrated Circuit (ASIC) to ensure reliable performance. The mounting of the components on the PCB shall compulsorily be of Surface Mounted Technology (SMT) type. Power supply component shall 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.

11.3 The meter shall be housed in a safe, high grade, unbreakable, fire resistant, UV stabilized, virgin Polycarbonate casing of projection mounting type. The meter cover shall be transparent / translucent. But the viewing portion shall be transparent for easy reading of displayed parameters and observation of operation indicators. The meter base may not be transparent but it shall not be black in colour. The meter casing shall not change in shape, colour, size and dimensions when subjected to 72 hrs on UV test as per ASTMD 53. It shall withstand 650 ˚C glow wire test and heat deflection test as per ISO 75 or as per IEC 60068 -2-5.

11.4 In addition to the above, the meter cover shall be sealable to the meter base with at least 2 nos. bar coded seals bearing the identification marks of the Manufacturer. Suitable arrangement shall be made for fitting/fixing of utility seal at two sides of meter terminal cover in such a manner that any access to the terminal cannot be made possible without removing the seal. There shall also be provision for sealing at the optical port.

11.5 The polycarbonate material of only the following manufacturers shall be used:

11.5.1 **G.E. PLASIC :** LEXAN 943A or equivalent like 943, 123R, 143 for meter cover & terminal cover / LEXAN 503R or equivalent like 500, 143R, 500R for meter base and terminal block.

11.5.2 **BAYER :** Grade corresponding to above

11.5.3 **DOW Chemical :** **--do--**

11.5.4 **MITSUBISHI :** **--do--**

11.5.5 **TEJIN :** **--do--**

11.5.6 **DUPONT :** **--do—**

12.0 METER CASE AND COVER:

12.1 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. The manufacturer's logo shall be embossed on the strip / plate. The material of the meter body (case and cover) shall be of Engineering Plastic.

12.2 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. These unidirectional screws shall be covered with transparent caps (not required for screw less design), ultrasonically welded with the meter body and the screw covers shall be embedded in the meter body in a groove. The meter shall withstand external magnetic influence as per latest amendments of CBIP Technical Report No.325 including 0.2T AC Magnet, 0.5T Permanent magnet.

13.0 TERMINAL BLOCK AND COVER:

13.1 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. It shall be rigidly fixed to the base of the meter so that it cannot be separated from the meter base without breaking either the meter base or the terminal block and this fixing arrangement shall be in parallel to the meter base in such a way that it cannot be viewed or approached from any part of the meter without breaking the meter.

13.2 The terminals in the terminal block shall be of adequate length in order to have proper grip of conductor. The screws shall have thread size not less than M4 and head having 6 mm. Diameters. The screws shall not have pointed ends at the end of threads. All terminals and connecting screws and washers shall be of tinned / nickel plated brass material. The terminal shall withstand glow wire test at 960 + 15˚C and the terminal shall withstand at least 135˚C as per IS.

13.3 The internal diameter of terminal hole shall be minimum 5.5 mm and center to center distance is 13 mm. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also.

13.4 The terminal cover shall be transparent re-enforced Polycarbonate, Engineering 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.

13.5 The terminals and all connecting screws will be of suitable material capable of withstanding a current of 150% of Imax for two hours, continuously and the meter shall be capable of providing phase to neutral protection up to 433 V for 1(one) hours.

14.0 MARKING OF THE METER: The marking on the meter shall be in accordance with relevant clauses of IS 14697. The basic marking on the meter nameplate shall be as follows. All other markings as per IS shall also be there.

14.1 Manufacturer's name & trade mark
14.2 Type Designation
14.3 No. of phases & wires
14.4 Serial number (Size not less than 5mm)
14.5 Month & Year of manufacture
14.6 Reference Voltage
14.7 PT Ratio
14.8 CT Ratio
14.9 Rated Secondary Current
14.10 Rated Maximum Current
14.11 Operating Frequency

14.12 Principal unit(s) of measurement

14.13 Meter Constant (imp/kwh)

14.14 Class index of meter

14.15 "Property of WBSEDCL"

14.16 Purchase Order No. & Date

14.17 Guarantee (Guaranteed for a period of 5 ½ years from the date of delivery)

14.18 BIS marking

14.19 Place of manufacture

14.20 Firmware Version

14.21 Barcode for meter serial no. in alpha numeric form, date of manufacture, current rating of the meter and PO reference, readable by single layer barcode reader.

14.22 The reference temperature if different from 27 0C.

14.23 The sign of Double Square for insulating encased meters

15.0 CONNECTION DIAGRAM AND TERMINAL MARKING:

Every meter shall be indelibly marked with a diagram of connection. For this poly-phase meter, this diagram shall also show the phase sequence for which the meter is intended. It is permissible to indicate the connection diagram by an identification figure in accordance with relevant standards. The marking of meter terminals shall appear on this diagram.

16.0 DISPLAY OF MEASURED VALUES:

16.1 The meter shall have alphanumeric display with at least 7 full digit with LCD backlit display, having minimum character height of 10 mm. The data shall be stored in nonvolatile memory (NVM). The NVM shall retain data for a period of not less than 10 years under unpowered condition. Battery backup memory will not be considered as NVM.

16.2 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 which shall be self explanatory and symmetric.

16.3 Serial number of the meter shall be displayed on the display plate. It shall also be programmed into meter memory for identification through communication port(Optical / RS232 /RS11) for CMRI / laptop / meter reading printout.

16.4 Visibility of display in poor light conditions is an important criterion. STN or TN or any better type of advanced LCD to be used. Proper legends for the displayed parameters to be provided (Factory programmable). Back lit provided for clear visibility shall be uniform throughout all part of the LCD.

16.5 The meters shall have auto-display mode for pre-selected parameters. The push-button mode of display shall display all parameters and it shall have priority over auto-display mode.

16.6 The meter shall give clear message on display to indicate that the meter has experienced tampers and the nature of tamper with date and time of first occurrence, last occurrence and last restoration, if the last tamper status is not restored, then meter will indicate first occurrence, last restoration and last occurrence.

16.7 Connection check, phase sequence and self diagnostic shall give clear message on display. The meter shall have a test output (blinking LED) accessible from the front and be capable of being monitored with suitable testing equipment.

16.8 The operation indicator must be visible from the front.

16.9 Test output device shall be provided in the form of one common LED for active and reactive energy with the provision of selecting the parameter being tested (separate LED may also be used with proper separation).

17.0 DISPLAY SEQUENCE:

The meter shall display the required parameters in two different modes as follows. Display sequence for both auto and Push button must be maintained, no interchange in sequence or display parameter will be accepted. All the display shall have proper legend to identify the same.

17.1 Auto Display Mode: The following parameters shall be displayed in auto cycle mode, in the following sequence:

17.1.1 LCD test
17.1.2 Meter serial number
17.1.3 Real Date (dd mm yy)
17.1.4 Real Time (hh mm ss)
17.1.5 Rising Apparent Demand with elapsed time
17.1.6 Cumulative Active Energy
17.1.7 Cumulative Apparent Energy
17.1.8 MD Active
17.1.9 MD Apparent
17.1.10 TOD Active Energy
17.1.11 TOD Apparent Energy
17.1.12 MD reset and bill count
17.1.13 Cumulative Tamper count
17.1.14 Cover Open Information with date and time
17.1.15 Power OFF Hours of present month
17.1.16 Instantaneous Phase Voltages
17.1.17 Instantaneous Phase Currents
17.1.18 Instantaneous Neutral Current* i.e. Actual Current flowing through the Neutral*
17.1.19 Instantaneous Power Factor

17.2 Push Button mode: In addition to the auto display mode parameters, the following parameters shall be displayed on pressing the push button i.e. all display of auto mode and the display as per following:

17.2.1 History1 Cumulative Active Energy
17.2.2 History1 TOD Active Energy
17.2.3 History1 Cumulative Apparent Energy
17.2.4 History1 TOD Apparent Energy
17.2.5 Reactive lag Energy
17.2.6 Reactive lead Energy
17.2.7 History1 reactive lag Energy
17.2.8 History1 reactive lead Energy
17.2.9 History1 Active MD
17.2.10 History1 Apparent MD
17.2.11 History1 TOD Apparent MD
17.2.12 Connection Check
17.2.13 Self Diagnosis
17.2.14 Battery Status
17.2.15 Cumulative Programming Count
17.2.16 Last MD Reset Time & Date
17.2.17 Instantaneous Average Power Factor
17.2.18 Instantaneous Power Factor
17.2.19 Instantaneous Load Active

17.2.20 Instantaneous Load Apparent
17.2.21 Supply Frequency
17.2.22 Present PT Tamper Status
17.2.23 Present CT Tamper Status
17.2.24 Present Other Tamper Status
17.2.25 First Occurrence Tamper ID
17.2.26 First Occurrence Tamper Date
17.2.27 First Occurrence Tamper Time
17.2.28 Last Occurrence Tamper ID
17.2.29 Last Occurrence Tamper Date
17.2.30 Last Occurrence Tamper Time
17.2.31 Last Restoration Tamper ID
17.2.32 Last Restoration Tamper Date
17.2.33 Last Restoration Tamper Time
17.2.34 History 1 Billed Average Power Factor
17.2.35 Front Cover Open Count
17.2.36 Last Cover Open Date
17.2.37 Last Cover Open Time
17.2.38 High Resolution Energy Total Active Forwarded
17.2.39 High Resolution Energy Reactive Lag Forwarded
17.2.40 High Resolution Energy Reactive Lead Forwarded
17.2.41 High Resolution Energy Total Apparent Forwarded

17.3 Power Off Mode Display:

17.3.1 Meter Serial No.
17.3.2 Real Time
17.3.3 Date
17.3.4 History1 Cumulative Active Energy
17.3.5 History1 Cumulative Apparent Energy
17.3.6 History1 TOD wise KWh
17.3.7 History1 TOD wise KVAh
17.3.8 Cumulative Billing Count
17.3.9 Cumulative Tamper Count
17.3.10 Cumulative Active Energy

17.4 Display for Auto and manual mode must be listed by two headers.

17.4.1 “Auto Display Mode”
17.4.2 “Push Button Mode” (Parameters shall be pasted in front of the PP Box)

17.5 Display: Other requirements:

17.5.1 Each parameter shall be on meter display for 10 sec and the time gap between two auto display cycles shall be 120 sec.
17.5.2 The register shall be able to record and display starting from zero, for a minimum of 1500 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.
17.5.3 High resolution display can be given in separate mode and its registers required in display min 2+4 digits (for kWh) after decimal in case of Energy.

17.5.4 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.

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

17.6.1 History 1 TOD wise KWh
17.6.2 History 1 TOD wise KVAh
17.6.3 History 1 TOD wise MD in KVA
17.6.4 TOD Wise Cumulative Active Forwarded Energy (up to date Zone 1, 2, 3)
17.6.5 TOD Wise Cumulative Apparent Energy (up to date Zone 1,2,3)

18.0 MEASUREMENT OF HARMONICS:

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 shall be used for billing purpose. Provision for measuring Fundamental energy shall be kept for utilization in future. The total energy and Fundamental energy shall be logged in the meter memory and be capable of downloading to the BCS through the CMRI and be available for viewing at the BCS end.

19.0 INFLUENCE QUANTITIES:

The meter shall be designed and protected such that all external effects and influences shall not change its performance & shall work satisfactorily within guaranteed accuracy limits, as specified in IS 14697: 1999 / CBIP technical report – 325, under the presence of the following influence quantities.

19.1 Electromagnetic field
19.2 External magnetic field
19.3 Radio frequency interference
19.4 Vibration
19.5 Voltage variation (70% - 120% of Vref.)
19.6 Frequency variation (+/-) 5% of 50 Hz

20.0 RESETTING OF MAXIMUM DEMAND:

20.1 The meter shall be capable of recording the Apparent MD with integration period of 15 minutes
20.2 MD reset shall be through each of the three means:

20.2.1 Automatic resetting at preset date & time (at present it will be at 00.00 hrs of the first day of the month)
20.2.2 Manually i.e., by push button
20.2.3 Through authenticated command from CMRI or through Remote Communication

20.3 The means by which the reset has been done shall be made available to downloaded data. Facility to invoke any of the above through authenticated MRI command shall be provided at BCS.
20.4 MD reset button shall have proper sealing arrangement.
20.5 There shall be separate Push button for scrolling display (up and down) and MD reset. If only two Push buttons are used minimum 180sec pressing is required for MD reset.

21.0 LOAD SURVEY:

The meter shall be capable of recording load survey for the following parameters for a period of minimum 60 days - subject to availability of all parameters listed below with 15 minutes integration period.

21.1 Energy in KWh & KVAh

21.2 Demand in KVA and KW

21.3 Current – phase-wise

21.4 Voltage – phase-wise

22.0 NON VOLATILE MEMORY & REAL TIME CLOCK BATTERY:

The Non Volatile Memory (NVM) shall not require any additional battery backup to retain the data in case of power failure at least for up to 10 years and the data storage shall be independent of battery backup unit. The life of the Real Time Clock (RTC) battery in circuit condition shall be minimum 10 years in case of power failure. It shall be possible to transfer this data to base computer software through MRI/Laptop or RMR. The data so obtained shall be displayed in both graphical & numeric form in the BCS. The BCS with all details is to be provided by the supplier at no extra cost.

23.0 TIME OF DAY FACILITIES:

The meter shall have facility to record Active & Apparent Energy and MD in at least 8 time zones. The time zones shall be user programmable through authenticated CMRI/Laptop/RMR command. Necessary software for the same is to be provided by the successful bidder. At present TOD timings will be programmable as follows:

23.1 TOD 1: 06:00 Hrs to 17:00 Hrs.

23.2 TOD 2: 17:00 Hrs to 23:00 Hrs.

23.3 TOD 3: 23:00 Hrs to 06:00 Hrs.

24.0 METER READING DURING POWER OFF:

It shall be possible to read the meter-display visually and with MRI/Lap top in absence of input voltages with the help of internal battery for display in power off condition or external battery pack/ PPU. If internal battery is used then it shall be capable of supplying the required power at least two years under meter un-powered condition and subsequent powering up of the battery shall guarantee it's life till the expiry of guarantee period. In case of external battery the arrangements shall be such that hands free operation is possible. In case of external battery 10 years guarantee must be given for external battery/power pack. Separate battery shall be used for this purpose (Not RTC or processor battery). In case of Lithium battery rating shall be more than 500mAh. Any downloading problem due to battery shall be treated as defective within Guarantee Period.

25.0 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 Memory status (NVM) and Battery status, RTC Status etc. and it shall be in display.

26.0 COMMUNICATION CAPABILITY:

26.1 The meter shall have a galvanically Isolated optical communication port as per IEC 1107/ANSI/PACT so that it can be easily connected to a hand-held common meter reading instrument (CMRI) for data transfer. The data downloading time shall be less than 5 minutes. The optical port shall be provided with proper sealing arrangement so that the optical cover shall not be opened without breaking the seal. The

stored data in the meter shall be available through CMRI even when the display of the meter is not available.

26.2 A separate suitable serial port (RS-232/RJ11) capable of being hooked into a remote metering device such as modem,. shall be provided inside the terminal cover to enable Automatic Meter Reading in such a way that the same cannot be accessed without opening the Terminal Cover and Seal.

26.3 Both the ports will have equal priority in terms of data accessing. Data transmission rate shall be 9600 bps for both ports.

26.4 It shall not be possible to alter date in the meter bypassing commands from the CMRI or Laptop. Correction of RTC time, change of TOD timing, etc. shall be possible through CMRI/Laptop using authenticated command sets from BCS after scheduling for particular meter serial no. Billing parameters shall be factory programmable. No change shall be possible using CMRI only, i.e. the control has to be with the BCS.

27.0 BASE COMPUTER SYSTEM & SOFTWARE REQUIREMENTS:

27.1 The Common Meter Reading Instrument (CMRI) shall be loaded with user-friendly MS-DOS 5.0(or Its higher version) compatible software for reading and/or downloading meter data.

27.2 Windows 7.0 (or its higher version) based Base Computer Software (BCS) shall be provided for receiving data from CMRI and downloading instructions from BCS to CMRI.

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

27.4 Only one BCS shall be provided for downloading data and authenticated command from CMRI/ Laptop.

27.5 The BCS shall have facility to convert meter reading data into user definable ASCII file format so that it can be integrated with the billing system or any other third party software. The user shall have the flexibility to select the parameters to be converted into ASCII file.

27.6 All the data available in the meter including energy, MD etc. with date and time stamp, new TOD time zones and historical data shall be available in BCS after downloading.

27.7 The bidder shall supply the necessary CMRI software during sample meter testing.

27.8 The bidder has to supply the meter reading protocol and API free of cost. The bidder shall indicate the relevant standard to which the protocol is compliant.

27.9 Transfer of data from the meter to CMRI & then to the PC shall have to be easily executed.

27.10 Any change or up gradation of CMRI software or BCS in future, required for any reason, has to be done by the supplier at his own cost.

27.11 The same software shall be capable of preparing CMRI to read the meter information or to reconfigure the meter for change of TOD timings and / or time setting of the meter etc.

27.12 The exhaustive online help shall be available with the software so that user can use all the features of the software by just reading the help contents.

27.13 In BCS, data for KWh, KVAh, MD & KVA (total & TOD wise), average load factor, average power factor for at least twelve months must be available.

28.0 SUPPLY OF POWER PACK, HHU/ CMRI, COMMUNICATION CORD (HHU TO PC AND METER TO LAPTOP / PC): For every 100 nos. of meters and part thereof one power pack (if internal battery is not used for reading in Power Off condition) and one CMRI with not less than 32 MB memory (DOS based). Meter to PC USB type communication cord with Moxa converter for each type should be supplied free of cost with each CMRI. The guarantee period of HHU/CMRI and Power Pack shall be 66 months from the date of supply.

29.0 ANTI TAMPER FEATURES: The meter shall have the following anti-tamper features:

29.1 The meter shall be capable of recording energy correctly even if the input and output terminals are interchanged.

29.2 The meter shall work correctly irrespective of phase sequence of supply. There must be an indication of reversal of phase sequence in display as well as in downloaded data.

29.3 The meter shall work correctly even in absence of Neutral.

29.4 The meter shall record energy within maximum error of + 4% on injection of DC, pulsating DC (7-10 Hz), chopped AC in Neutral along with logging of ND tamper. In case tamper event is not logged, i.e, meter is immune to neutral disturbance, accuracy of the meter must not get affected. Maximum chopping for AC injection will be 25% to 30% at peak end.

29.5 The energy registration shall not be affected more than + 4% if high frequency (55Hz to 100Hz) or low frequency (45Hz to 30 Hz) AC signal w.r.to earth is applied to the meter neutral.

29.6 The meter shall be immune to Electro Static Discharge or sparks of 35 KV (approx) induced by using frequency-generating devices having very high output voltage.

29.7 Tests in this respect will be conducted by using commonly available devices and during spark discharge test, spark will be applied directly at all vulnerable points of the meter for a period of 10 minutes (at an interval of 1minute (approx) between two consecutive strokes) and meter shall maintain accuracy after the test under this condition. Accuracy will be checked during and after application of spark discharge Test. Meter shall record correctly within the specified limits of errors. Beyond 35 KV the meter shall record tamper if not immune.

29.8 The meter shall be capable of recording occurrence and restoration with date and time in respect to the following tamper events:

29.8.1 Power failure (Tamper count not to be increased)
29.8.2 Invalid Voltage
29.8.3 Missing Potential (phase wise)
29.8.4 High Voltage
29.8.5 Low Voltage
29.8.6 Voltage Unbalance
29.8.7 CT Open
29.8.8 CT Bypass/ CT Short
29.8.9 CT Unbalance
29.8.10 CT Reversal
29.8.11 Over Current
29.8.12 Low Power Factor
29.8.13 Neutral Disturbances (If it is logged)
29.8.14 Magnetic Disturbances
29.8.15 Invalid Phase Association
29.8.16 Cover Open (no restoration)

29.9 Threshold values of all above occurrence and restoration are attached elsewhere in this document. Snapshot values of Phase Voltage, Phase Current & Phase wise Power Factor, Active Energy value during occurrence & restoration to be provided in all the above mentioned tamper conditions in BCS with date and time. (In Event logging Snapshots shall be considered when the actual phenomenon occurred). The logging time for recording occurrence and restoration of all tamper events except Magnetic & Neutral Disturbance tamper, shall be 5 min. Magnetic tamper shall appear instantaneously, Neutral Disturbance within 3 min.

29.10 All authenticated commands shall be Base Computer Software (BCS) controlled. All transactions with meter shall be date and time logged, in the downloaded data (Last 12 month's transactions).

29.11 Properly designed meter tamper logic shall be provided and clearly explained in the bid. More than one tamper (CT related/ PT related/ others) shall not be logged at a time.

29.12 A minimum of 300 events (one event means either occurrence or restoration) of all types of tamper with date & time stamping shall be available in meter memory compartment wise.

29.13 The logging of events will be on FIFO basis. The events will be divided into three compartments like CT related (148 Events), PT related (88 Events) and others (64 Events).

29.14 Meter shall have a continuous and clear indication in its display if top cover is removed / opened and shall be logged in BCS.

30.0 MANUFACTURING ACTIVITIES:

30.1 All the materials, electronics and power components, ICs used in the manufacture of the meter shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy. The manufacturer shall use Application Specific Integrated Circuit (ASIC) or Micro controller for metering functions.

30.2 The electronic components shall be mounted on the printed circuit board using latest Surface Mounted Technology (SMT) except power components by deploying automatic SMT pick and place machine and re flow solder process. The electronic components used in the meter shall be of high quality **and there shall be no drift in the accuracy of the meter at least up to 10 years.**

30.3 Further, the Bidder shall own or have assured access (through hire, lease or sub-contract) of the mentioned facilities. The PCB material shall be of glass epoxy FR-4 grade conforming to relevant standards.

30.4 All insulating materials used in the construction of meters shall be non-hygroscopic, non-ageing and tested quality. All parts that likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating. Quality shall be ensured at different stages. At PCB manufacturing stage, each board shall be subjected to bare board testing. At insertion stage, all components shall undergo testing for conforming to design parameters and orientation. Complete assembled and soldered PCB shall undergo functional testing using test equipments (testing jig).

30.5 Prior to final testing and calibration, all meters shall be subjected to accelerated ageing test to eliminate infant mortality, i.e., meters are to be kept in ovens for 72 hours at 55 deg Centigrade temperature & atmospheric humid condition. After 72 hours meters shall work correctly. Facilities / arrangement for conducting ageing test shall be available with the manufacturer.

30.6 The calibration of meters shall be done in-house.

30.7 The bidder shall submit the list of components used in the meter along with the offer. A detailed list of bought-out items, which are used in the manufacture of the meter, shall be furnished indicating the name of firms from whom these items are procured. The bidder shall also give the details of quality assurance procedures followed by him in respect of the bought-out items.

30.8 The details of testing facilities available for conducting the routine and acceptance tests and other special tests on the meter shall be furnished with the bid. The facility available if any for conducting type test may also be furnished.

31.0 GUARANTEE:

31.1 The Meters and Pilfer Proof Meter Boxes shall be guaranteed for a period of 5½ years from the date of supply against faulty design, poor materials, bad workmanship. However, Bank Guarantee shall remain valid for 7½ years with a claim period of 6 months. The Meters and Pilfer Proof. Meter Boxes found defective within the above guarantee period shall have to be replaced by the supplier free of cost within one month on receipt of intimation. If the defective Meters and / or Pilfer Proof Meter Boxes are not replaced within the above specified period, WBSEDCL will recover twice the cost of Meters and/or Pilfer Proof Meter Boxes from the supplier.

31.2 Name plate of the meter is to be marked with "Guarantee of the Meter": 5½ years from the date of supply.

32.0 TYPE TESTING OF METER:

The offered meters shall be type tested at any NABL accredited laboratory in accordance with IS 14697:1999 and CBIP Report 325 with their latest amendments. The type test report shall not be more than 3 (three) years old. A copy of the Type Test report shall have to be enclosed with the offer. If there is any modification in the design / parameters of the specifications or use of constituent materials in the offered meter submitted with the offer, from the meter which was submitted type tested, that may affect the characteristics as well as parameters of the meter, revised type test certificate as per the design, parameters and constituent material used in the offered meter, shall have to be submitted failing which the offer may be liable to be rejected. Type Test Certificate from any NABL accredited Lab shall only be considered. Type test certificate shall contain the following information clearly:

32.1 Type of display or LCD
32.2 Class of accuracy
32.3 Meter constant
32.4 Type of meter

33.0 ACCEPTANCE TEST:

The acceptance tests as stipulated in CBIP / IS (with latest amendments) shall be carried out by the supplier in presence of purchaser's representative. In case of failure of Meters as specified in Recommended Sampling Plan of IS-14697:1999, the entire lot will be treated as rejected. Also the following additional tests are to be carried out on one meter randomly selected from each lot offered for inspection / acceptance testing. In case of failure of any single meter the entire lot will be rejected.

33.1 Magnetic induction of external origin (AC & DC)
33.2 Tamper & Fraud protection, as per relevant Clause of this specification.
33.3 Test of endurance up to 150% of Imax, for two hours, followed by verification of limits of error
33.4 Verification of internal components
33.5 Dry Heat Test under Test of Climatic Influences in IS 14697: 1999 of one meter from the offered lot is to be arranged by the supplier at any NABL accredited laboratory, at his cost.

34.0 ROUTINE TEST:

Each and every meter of the offered lot shall undergo the routine tests as well as functional tests as per IS: 14697:1999, CBIP Report 325 and after sealing the meters, the manufacturers will have to submit the routine test report of all the meters as well as a statement showing seal Sl. Nos. against each meter Sl. No. of offered lot in soft copy (MS WORD or EXCEL format), to the Chief Engineer(Procurement and Contract) and the Chief Engineer(DTD), along with offer letter for acceptance test.

35.0 TEST FACILITIES:

35.1 The tests of equipment / instrument shall be carried out as per relevant Standards and test certificates shall be furnished for scrutiny. The Bidder shall indicate the details of the equipment available with him for carrying out the various tests as per relevant Standards. The bidder shall indicate the sources of all equipment / instruments.
35.2 The standard meters used for conducting tests shall be calibrated periodically at any NABL Accredited Test Laboratories and test certificates shall be available at Works for verification by purchasers' representative.
35.3 The manufacturer shall have at least the following testing facilities to ensure accurate calibration:-

35.3.1 AC high voltage test
35.3.2 Insulation test
35.3.3 Test of no load condition
35.3.4 Test of Starting current
35.3.5 Test on Limits of error (Automatic Testing facility with ICT)
35.3.6 Power loss in voltage and current circuit
35.3.7 Test of Repeatability of error
35.3.8 Test of meter constant
35.3.9 Test of magnetic influence (As per CBIP 325 & Permanent Magnet)

36.0 INSPECTION:

36.1 The purchaser may carry out the inspection 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. All acceptance tests and inspection shall be made at the place of manufacturer unless otherwise especially agreed upon by the Bidder and purchaser at the time of purchase. The Bidder shall provide all reasonable facilities without charge to the inspector, to satisfy him that the equipment is being furnished in accordance with this specification.

36.2 The supplier shall keep the purchaser informed in advance, about the manufacturing programme for each lot so that arrangement can be made for inspection. The purchaser reserves the right to insist for witnessing the acceptance / 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.

36.3 The purchaser reserves the right to get type test any meter, for meter casing etc. from any of the offered lots, reserve at any destination stores.

37.0 SUBMISSION OF SAMPLE METER

37.1 The bidder will submit his sample Meters in sealed casing / cartoon along with relevant Meter documents (As per Annexure-IV), on any working day, from 11.00 A.M. to 04.00 P.M. on weeks days & from 11.00 A.M. to 01.00 P.M. on Saturday within the specified period of submission latest by 01.00 P.M. on the last day of submission of bid to **the Office of the Chief Engineer (DTD), Abhikshan, Sec-V, Salt Lake, Kolkata-91.** The bidder will be given a receipt, jointly signed by the bidder and DTD officials, mentioning the samples and papers submitted by the bidder as per check list.

37.2 While submitting the samples and required documents as per Annexure-IV, the bidder shall submit three number of sealed meters as per the specifications stated herein before, 2 number of meters welded ultrasonically or by any other accepted technique and 1 number of meter , not welded, and another dummy meter case (for checking welding) and one P.P. Box.

37.3 They shall also submit one prototype of meter base and cover (with body screw caps) properly welded.

37.4 The date of testing of sample meters will be intimated to the bidders by CE (DTD) and during such test other bidders will also be allowed to witness the testing. Sample submission and Test procedure may be changed due to emergency requirement.

37.5 On the date of testing of sample meters of a particular bidder, he shall come prepared with the following:

37.5.1 BCS (as per specification)
37.5.2 CMRI compatible with BCS and loaded with CMRI software
37.5.3 laptop compatible with BCS
37.5.4 Modem and accessories for testing the remote meter reading
37.5.5 Any other accessories required for observing the performance and capabilities of the meters

38.0 QUALITY ASSURANCE PLAN:

38.1 The design life of the meter shall be minimum 20 years and to prove the design life the firm shall have at least the following quality Assurance Plan.
38.2 The factory shall be completely dust proof.
38.3 The test rooms shall be temperature and humidity controlled as per relevant standards.
38.4 The test and calibrating equipments shall be automatic and all test equipment shall have their valid calibration certificates.
38.5 Meter will be tested (in case of lot test) in fully automatic test bench with ICT. No. human intervention will be allowed during test.
38.6 Power supplies used in test equipment shall be distortion free with sinusoidal wave forms and maintaining constant voltage, current and frequency as per the relevant standards.

39.0 THE CHECKS TO BE CARRIED OUT DURING MANUFACTURING OF THE METERS:

39.1 Meter frame dimensions tolerances shall be minimal.
39.2 The assembly of parts shall be done with the help of jigs and fixtures so that human errors are eliminated.
39.3 The meters shall be batch tested on automatic, computerized test bench and the results shall be printed directly without any human errors.

40.0 INFORMATION TO BE FURNISHED WITH THE BID:

The Bidder shall invariably furnish the following information along with the bid, failing which the bid shall be liable for rejection. Information shall be separately given for individual type of material offered.

40.1 Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials.
40.2 Information and copies of test certificates in respect of bought out accessories.
40.3 List of manufacturing facilities available.
40.4 Level of automation achieved and lists of areas where manual processing exists.
40.5 List of areas in manufacturing process, where stage inspections are normally carried out of quality control and details of such tests and inspections.
40.6 List of testing equipment available with the bidder for final testing of equipment specified and test-plant limitations, if any, vis-à-vis type, special acceptance and routine tests specified in the relevant standards and this specification. These limitations shall be very clearly brought out in schedule of deviations.
40.7 The list of components used in the meter.
40.8 A detailed list of bought-out items, which are used in the manufacturing of the meter indicating the name of firms from whom these items are procured. The details of quality assurance procedures followed in respect of the bought-out items.
40.9 The details of testing facilities available for conducting the routine and acceptance tests and other special tests on the meter.
40.10 The facility available if any for conducting type test.

40.11 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.

40.12 The relevant documents regarding the procurement of polycarbonate material.

41.0 LAB FACILITY: The laboratory of manufacturer 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).

42.0 DOCUMENTATION

42.1 Twenty sets of operating manuals shall be supplied to the office of the CE (DTD) for distribution at sites.

42.2 One set of routine test certificates shall accompany each dispatch consignment.

42.3 The acceptance test certificates in case pre-dispatch inspection or a routine test certificate in cases where inspection is waived shall be approved by the purchaser.

43.0 REPLACEMENT OF DEFECTIVE METERS

The Meters declared defective by WBSEDCL within its guarantee period shall be replaced by the supplier with new ones free of cost within one month on receipt of intimation. Failure to do so within the prescribed time limit shall lead to imposition of penalty of twice the cost of meter. The same may lead to black listing even, as decided by WBSEDCL. In this connection the decision of WBSEDCL shall be final.

44.0 PACKING & FORWARDING

44.1 The equipment shall be packed in cartons / 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. Supplier without any extra cost shall supply any material found short inside the packing cases immediately.

44.2 The packing shall be done as per the standard practice as mentioned in IS 15707: 2006. Each package shall clearly indicate the marking details (for e.g, manufacturer's name, Sl. Nos. of meters in the package, quantity of meter, and other details as per supply order). However, the supplier shall ensure the packing is such that, the material shall not get damaged during transit.

45.0 COMPONENT SPECIFICATIONS

The meters shall be designed and manufactured using SMT (Surface Mount Technology) components, except for power supply components, LED / 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. The Components used for manufacture of meter shall be of high quality and the bidders shall confirm component specification as specified below in Annexure-III. Bidders shall compulsorily fill Annexure-I, Annexure-II & Annexure-III for technical qualification.

Sl.	Component	Requirement	Make / origin

no.	Function / Feature		
1	Current Element	E-beam /spot welded CT shall be provided in the phase element and in the neutral with proper isolation.	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 along with the ASICs.	Analog Devices, AMS, Cyrus Logic, Atmel, SAMES, Texas Instruments, Teridian, NEC, Freescale, Renesas, Phillps
3	Memory chips	The memory computing chips shall not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	National Semi Conductor, Atmel, SAMES, Texas Instruments, Teridian, ST, Microchip, Hitachi, OKI, Freescale, Renesas, 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 70o.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	Bonafied Technologies, Advantek , Hitachi, SONY, Hijing, Truly Semiconductor, Tianma
5	Communication modules	Communication modules shall be compatible for the RS 232 ports	National Semiconductors, HP, ST, Texas Instruments, Agilent, Avago, Fairchild, Philips, Ligitek, Hitachi, Siemens, 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.	National Semiconductors, Texas Instruments, HP, Agilent, Avago, Osram, Hitachi, Siemens, Philips, 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.	As specified.
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.	National Semiconductors, Atmel, Phillips, Texas Instruments, ST, Onsemi, Hitachi, Oki, Toshiba, Freescale, Samsung.
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.	N.A.
10	Battery	Lithium-ion with guaranteed life of 10 years	Renata, Panasonic, Varta, , Sanyo, National, Tadiran, Sony, Duracell,

			Tekcell, Mitsubishi, EVE, SAFT , XENO
11	RTC / Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	Dallas, Atmel, Motorola, NEC, Teridian Renesas, Texas Instruments, ST, Micro chips, Epson, Philips, NEC, OKI, Hitachi, Mitsubishi, Freescale,

46.0 ANNEXURE:

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

46.1 Annexure-I: Guaranteed Technical Particulars of Meter

46.2 Annexure-II: Pre-Qualification Criteria

46.3 Annexure-III: Component details

46.4 Annexure-IV: List of Documents to be submitted during sample submission

Annexure-I

GUARANTEED TECHNICAL PARTICULARS FOR 11KV STATIC BULK METERS

Sl. No.	Item Description	Required Specification
1	Name of manufacturer	Bidder to specify
2	Type (Model No.), name, number	Bidder to specify
3	Standards Applicable	IS 14697: 1999 read with latest amendments, IS 15707, IS 13410:1992 along with latest amendments, IS 12346:1988, CBIP Report No. 325 & its latest amendments
4	Ratings	
(i)	Accuracy class	0.5S
(ii)	Rated Voltage	Ph-N : 110 / √3 V (63.5 V)
(iii)	Basic Current (I_b)	-/ 1 A
(iv)	Rated Frequency	50 Hz ± 5%
(v)	Power Factor Range	0 Lag-unity-0 Lead

(vi)	Meter Constant (imp/KWH)	Bidder to specify
5	Minimum Starting Current	0.1% of I_b
6	Power Loss at Rated Frequency & Reference Temperature in :	
(i)	Current Circuit	Less than 1.0 VA
(ii)	Voltage Circuit	Less than 1.5 W & 10 VA
7	Allowable Voltage Variation	70% to 120% of Rated Voltage
8	Parameters displayed	To be mentioned
9	Dynamic range	As per IS 14697
10	MD reset Provisions	Provisions to reset MD: a) Using CMRI through authenticated Command b) Using Remote Communication Command b) Automatic Resetting at preset date & time c) Manual Resetting through push button
11	Display :	
(i)	Type of Register	LCD suitable for operation up to 60°C
(ii)	No. of Digits of Display	7 Full Digits (minimum)
(iii)	Height of character	10 X 5 mm (minimum)
(iv)	Auto display mode & scroll mode	Both required
(v)	Type of Push Button for scroll mode	Spring loaded push button to be provided on top cover of meter
12	Non Volatile Memory	To be provided as per IS specification
13	Provision for taking reading during power off condition	During power off condition also, meter shall display reading with backup power through the push button provided on the meter. All data downloading facility shall have to be provided in power off condition
14	Principle of operation	As per applicable standards
15	MD Integration period	15 min
16	Weight of meter	Bidder to specify
17	Dimension	Bidder to specify
18	Guarantee	5 & ½ years from the date of supply
19	Outline drawings & Leaflets	Bidder to provide
20		
(i)	Remote meter readout facility	Must have provision
(ii)	Communication Protocol used	DLMS
(iii)	Sealing provision for Meter & Optical Port	At least two fixing screws for fixing meter cover with the meter base shall be provided. Each Screw shall have two holes; one for fitting/fixing of manufacturer's seal and the other for utility seal. The arrangement shall be in such a manner that any access to the working part of the meter body will not be possible without breaking/ tampering / removing the said seals. Suitable arrangement shall be made for fitting/fixing of utility seal at two sides of meter terminal cover in such a manner that any access to the terminal cannot be possible without removing the seals. There shall also be provision for sealing the optical port. The meter cover shall be permanently fixed to the base by ultrasonic welding or by any other technic which is either equally or more efficacious so that cover cannot be opened without breaking, i.e. the meter shall be break to open type. Meter shall have an indication in its display if top cover is removed.
(iv)	Baud rate of data transmission	9600 bps
(v)	Required software to be resident in HHU	Bidder to provide
(vi)	Ultrasonic welding (or any other technology, equally or more efficacious)	Must be provided

	of body	
(vii)	Manufacturer's Seal	Must be provided
21	Base Computer Software	Compatible with Windows 7 or higher
22	Type Test Certificates	Bidders to provide
23	Time of Day Zones (Selectable)	3 Zones to be provided with provision of 8 Zones
24	Whether meter measures both fundamental & harmonic energy	As per specification
25	Real Time Clock Accuracy	Maximum drift +5 min per annum
26	Battery for Real Time Clock	It shall be Lithium-ion / Lithium battery having at least 10 years of life
27	Anti Tamper Features	Must be as per Tamper Logic provided by WBSEDCL
28	Effect of Accuracy under tamper condition	
29	Drift in Accuracy of measurement with time	No Drift with time
30	Name plate details	As per relevant IS and specified Technical Specification
31	Type of calibration	Meter shall be software calibrated at factory & there shall not have any provision for mechanical form of calibration
32	Type of mounting	Projection Type
33	Testing facility	
(i)	Fully automatic computerized meter test bench with print out facility shall be available	Must be available
(ii)	Make and Sl. No. of Test bench with calibration validity	Bidders to specify
(iii)	Accuracy of ESS duly calibrated	Bidders to specify
(iv)	Following in house testing facility shall be available:	
	(i) AC high voltage test	Must be available
	(ii) Insulation test	Must be available
	(iii) Test of no load condition	Must be available
	(iv) Test of Starting condition	Must be available
	(v) Test on Limits of error	Must be available
	(vi) Power loss in voltage and current circuit	Must be available
	(vii) Test of Repeatability of error	Must be available
	(viii) Test of meter constant	Must be available
	(ix) Power loss in voltage & current circuit	Must be available
	(x) Test of Magnetic influence	Must be available
34	Data retention by NVM without battery backup and under power off condition	10 years
35	Type of material used	
(i)	Base	High impact strength, non-hygroscopic, fire retardant, fire resistant, UV stabilized poly carbonate (LEXAN 503R or equivalent). Meter base with LEXAN 500R/143R may be accepted subject to verification
(ii)	Cover	High impact strength, non-hygroscopic, fire retardant, fire resistant, UV stabilized transparent poly carbonate (LEXAN 943A or equivalent)
(iii)	Terminal Block	Material High impact strength not hygroscopic, fire

		retardant, fire resistant, UV stabilized poly carbonate (LEXAN 503R or equivalent) Barrier of adequate size shall be provided between phase and neutral. Terminal block with LEXAN 500R/143R may be accepted subject to verification
(iv)	Terminal Cover	High Impact strength, non-hygroscopic, fire retardant, fire resistant, glass reinforced poly carbonate (Transparent) & non detachable with hinging arrangement (LEXAN 943A or equivalent). Terminal cover with LEXAN 143 may be accepted subject to verification
36	Screw	
(i)	Material	Tin/Nickel-plated Brass
(ii)	Size	As per relevant IS Standards
37	Internal Diameter of Terminal Hole	5.5 mm (minimum)
38	Center to Center clearances between adjacent terminals	13 mm
39	Security Profiles	
(i)	Basic Security	To be provided
(ii)	Advance Security	To be provided

Annexure-II

Pre-Qualification Conditions for Three Phase Static Meters

Sl. No.	Requisite Qualification	Remarks
1	Bidder shall have valid BIS certification for the offered meter	Yes / No
2	Bidder shall have ISO 9001 certification	Yes / No
3	Bidder shall be manufacturer of static meters having supplied Static 1-phase or 3-phase meters with memory and LCD display to Electricity Utilities in last 2 years	Yes / No
4	Bidder shall have Type Test certificate from any NABL accredited laboratory for the type of offered meter not older than three years	Yes / No
5	Bidder shall have dust free, static protected environment for manufacture, assembly and testing of meters	Yes / No
6	Bidder shall have automatic computerized test bench for lot testing of meters	Yes / No
7	Bidder shall have facilities of Oven for ageing test	Yes / No
8	Bidder shall have certificate from any NABL accredited laboratory for immunity of the type of meter offered, against magnetic influence of 0.2 T AC & 0.5 T DC	Yes / No

Annexure-III

Sl. No.	Component Function / Feature	As per Requirement	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		

Annexure-IV

Sl. No.	LIST OF DOCUMENTS TO BE SUBMITTED DURING SAMPLE SUBMISSION
1	Attested copy of type test reports from NABL accredited laboratory
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 document
5	Annexure – III as per tender document
6	Operating manual of the meter submitted

Tamper Logic: 3 Phase 4 Wire 11 KV Bulk Meter

Sl. No.	TAMPERS	Occurrence Condition	Restoration Conditions	Occurrence Time (Min/Sec)	Restoration Time (Min/Sec)
1	Missing Potential	V_x < 15% V_{ref}	Vx > 40% V_{ref}	5 min.	5 min.
		Any other phase voltage > 70% of V_{ref}	Any other phase voltage > 70% of V_{ref}		
		Current >10% I_b	Current > 10% I_b		
		Missing potential tamper detection will be phase wise			
2	Invalid Voltage	V_{3x} >70% V_{ref}	V_{3x} >70% V_{ref}	5 min.	5 min.
		Angle difference of any two phase ≤10^o	Angle difference of any two phase > 10^o		
3	Voltage Unbalance	V_{3x} > 70% V_{ref}	V_{3x} > 70% V_{ref}	5 min.	5 min.
		V_{max}-V_{min} > 10% V_{ref}	V_{max}-V_{min}< 10% V_{ref}		
		Current ignored	Current ignored		
4	Low Voltage	V_x < 70% V_{ref}	V_{3x} > 71% V_{ref}	5 min.	5 min.
		Current Ignored	Current Ignored		
5	Power Failure	If power goes off for more than the persistence time	Power restores	5 min.	Immediate
6	CT Open	Residual Current >20% I_b	Residual Current < 20% I_b	5 min.	5 min.
		I_x < 2 % I_b	I_x Ignored		
		Average line Current :Ignored	Average Current > 10% of I_b		
7	CT Bypass	Residual Current > 20% I_b	Residual Current < 20% I_b	5 min.	5 min.
		I_x >2 % I_b	I_x Ignored		
		Average line Current :Ignored	Average Current>10 % I_b		
8	Current Unbalance	Residual Current < 20% I_b	Residual Current <20%I_b	5 min.	5 min. .
		I_{max} - I_{min}> 30% of I_{max} for that period	I_{max} - I_{min}< 29 % of I_{max} for that period		
		Average Line Current > 5 % I_b	Average Line Current > 10% I_b		
		Calculated I_n > 5% of Ib	Calculated I_n > 5% of I_b		
9	CT Reversal	Ix > 10 % I_b	Ix > 10 % I_b	5 min.	5 min.
		Direction : Negative	Direction: Positive		
		Net Power Factor> 0.3	Net Power Factor> 0.3		
	CT Reversal detection will be phase wise				
10	Low PF	I_{3x} > 10% I_b	I_{3x} > 10% I_b	5 min.	5 min.
		Avg. PF < 0.3	Avg. PF ≥ 0.3		
		V_{3x} >70% V_{ref}	V_{3x} >70% V_{ref}		
11	Magnet	Whenever the meter functionality gets affected on account of magnetic field, meter log it as an event and recording starts on I_{max} or it remains immune. Same shall be logged with date and time stamp.		20 sec.	20 sec.
12	Cover Open	On removal of meter cover the meter will log cover open event along with date and time		Immediate, No restoration	

Please note:
V_{3x} = Voltage in all Phases
V_x = Voltage In any Phase
I_{3x} = Current in all Phases
I_x = Current in any phase