WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED

TECHNICAL SPECIFCATION

FOR

3-PHASE 4-WIRE CT OPERATED FULLY STATIC AMR COMPATIBLE TRI-VECTOR ENERGY METERS

FOR DISTRIBUTION TRANSFORMERS

TECHNICAL SPECIFICATION FOR 3-PHASE 4-WIRE CT OPERATED FULLY STATIC AMR COMPATIBLE TRI- VECTOR ENERGY METERS

1.0 SCOPE

Design, manufacturing, testing, supply and delivery of AC, 3 Phase, 4 Wire, CT operated fully Static and AMR compatible Tri-Vector **lag plus lead /lag only** (programmable)Energy Meters for measurement of different electrical parameters listed elsewhere in the document including Active Energy (KWH), Reactive Energy (KVARH), Apparent Energy (KVAH) etc. The detail scope is given below.

2.0 APPLICATION

- On Distribution Transformers

3.0 STANDARDS TO WHICH METERS SHALL COMPLY

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

Companion Specification" enclosed with this document as annexure.

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)

IS-14697 Specification for AC Static Transformer operated Watt Hour & VAR-Hour meters

(class 0.5S);

IS – 15959:2011 Data Exchange For Electricity Meter Reading, Tariff And Load Control –

Companion Specification.

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

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" enclosed with this document as annexure shall prevail upon.

4.0 GENERAL TECHNICAL REQUIREMENTS

1	TYPE	AMR Compatible Static, 3 Ph, 4 Wire Tri-Vector Energy Meter for Distribution Transformers
2	FREQUENCY	50 Hz ±5%
3	ACCURACY CLASS	0.5S
4	SECONDARY VOLTAGE	Suitable for operation from 240 Volt Ph-N or 415 Volt Ph-Ph
5	BASIC CURRENT (Ib)	-/5 Amps.
6	MAXIMUM CONTINUOUS CURRENT	2.0 Ib; Starting and Short time current shall be as per IS-14697
7	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
8	POWER FACTOR	0.0 Lag -Unity- 0.0 Lead
9	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.

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) should 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/sq.m.
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 should be compact & reliable in design, easy to transport & immune to vibration & shock involved in the transportation & handling. The construction of the meter should ensure consistence performance under all conditions especially during heavy rains / very hot weathers. The insulating materials used in the meter should be non-hygroscopic, non-ageing & have tested quality.

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

The meter should 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 should be transparent,** for easy reading of displayed parameters, and observation of operation indicators. The meter base may or may not be transparent, **but it should not be black in colour**. The meter casing should not change shape, size, and dimensions when subjected to 200 hrs on UV test as per ASTMD 53. It should withstand 650 deg. 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 port (Optical and RS232 port) should have proper sealing arrangement.

The bidder shall submit relevant documents 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 equivalent for cover & Terminal cover/ LEXAN 503R or equivalent base.
b) BAYER/SABIC : Grade corresponding to above
c) DOW Chemicals : -Do-
d) MITSUBISHI : -Do-
e) TEJIN : -Do-
f) DUPONT : -Do-

METER CASE AND COVER

The meter should 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 use of **Ultrasonic Welding** (Ultrasonically continuously welded at three sides so that the cover cannot be separated from the base without breaking/damaging the case and cover) i.e. break to open type**.** In case, ultrasonic welding using plate/strip is used the material of plate/strip should be same as that of cover and

base and the strip should **flush with meter body.** The manufacturer's logo should be embossed on the strip / plate.
The meter cover should 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. 325.

10.0 TERMINAL BLOCK AND COVER:

The terminals may be grouped in a terminal block having adequate insulating properties and mechanical strength. The terminal block should 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 should be of tinned/nickel plated brass material.
The internal diameter of terminal hole should 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 terminal cover should preferably be detachable.** The space inside the terminal cover should be sufficient to accommodate adequate length of external cables.

11.0 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.

12.0 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 should 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 degree Celsius (Max. temperature to not exceed 60 degree Celsius) under base current (Ib) load condition.
Test points should 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.

13.0 DISPLAYS

The meter shall have Alphanumeric display with at least **8 full digit** with LCD backlit display, having minimum character height of 10 mm. 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 numeric) 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 continuously from display parameters.

Auto display cycling of each parameter should be minimum 10-12 Seconds. The time between two auto display cycles shall be 100-120 sec. OBIS code in display is optional.

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

Auto Display Mode:

i) All Segment Display
ii) Meter Serial Number
iii) Date and Day
iv) Real Time
v) Rising demand with elapsed time with KW
vi) Rising demand with elapsed time with KVA (with 2 decimal)
vii) Cumulative Active Energy
viii) Cumulative Reactive Energy (Lag)
ix) Cumulative Active Energy (Lead
x) Cumulative Apparent Energy
xi) Maximum Demand in KW
xii) Maximum Demand in KVA
xiii) Active Power
xiv) Reactive Power
xv) Apparent Power
xvi) Cumulative Tamper Count
xvii) Instantaneous Phase to Neutral Voltage(V_{RN},, V_{YN}, V_{BN})
xviii) Instantaneous Current (I_R, I_Y, $I_{B,,}$,I_N)
xix) Average Power Factor

***Push Button Mode of Display**:*

Along with all auto display parameters the following parameters should be scrolled in push button mode of display.

i) to xix) of Auto Display mode
xxi) Frequency
xxii) TOD wise KW (Zone 1, 2 & 3)
xxiii) TOD wise KVA (Zone 1, 2 & 3)
xxiv) TOD wise KWh (Zone 1, 2 & 3)
xxv) TOD wise KVAh (Zone 1, 2 & 3)
xxvi) High Resolution Active Energy
xxvii) High Resolution Reactive) Energy(Lag
xxviii) High Resolution Reactive Energy(Lead)t
xxix) High Resolution Apparent Energy
xxx) Cumulative Maximum Demand in KW
xxxi) Cumulative Maximum Demand in KVA
xxxii) Cumulative Power Failure Duration in Hours
xxxiii) Cumulative Power Failure Count
xxxiv) Phase sequence
xxxv) First Tamper occurrence status with date and time

xxxvi) Last Tamper occurrence status with date and time
xxxvii) Last Tamper restoration status with date and time
xxxviii) Cumulative Programming Count
xxxix) Self Diagnosis
xl) Connection Check

Power OFF Condition Display:

1. *Date and Day*
2. *Real Time*
3. *Cumulative Active Energy*
4. *Cumulative Reactive Energy (Lag)*
5. *Cumulative Active Energy (Lead*
6. *Cumulative Apparent Energy*

14.0 PERFORMANCE UNDER INFLUENCE QUANTITIES

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

15.0 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 should be maintained between Active & Reactive Test LED.

16.0 REAL TIME INTERNAL CLOCK (RTC)

RTC shall be pre-programmed for 30 Years Day and date without any necessity for correction. The maximum drift shall not exceed ± 300 Seconds per year.

Meter may be lying in power off condition for two years (less than 730 days) from date of supply but RTC should not drift more than ± 300 seconds.

The clock day and 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 authentication from BCS for individual meter**.

b) From remote server through suitable communication network with authentication from BCS.

17.0 QUANTITIES TO BE MEASURED & DISPLAYED

The meter shall be capable of measuring and displaying the following electrical quantities within specified accuracy limits for polyphase balanced or unbalanced loads:

a) Instantaneous Parameters such as phase and line voltages, currents, power factors, overall kVA, kW, kVAr, power factor, frequency etc as per details given in the table 22 of IS
15959.

b) Block Load Survey Parameters such as kVAh, kWh, kVArh (lag, lead), phase voltages, currents etc as per details given in the table 23 of IS 15959.Minimum Load survey days should be 60 days.

In addition to above the meter shall also record the Name plate details, programmable parameters (readable as profile), occurrence and restoration of tamper events along with the parameters (Table 30 to 39 as per IS 15959)

18.0 Measurement of Energy

The meter should be capable of measuring fundamental energy as well harmonics energy i.e. total energy. Total energy shall be made available on meter-display

The **Fundamental as well as *Total*** 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

19.0 DEMAND INTEGRATION PERIOD

Considering 15 minute Integration Period .

20.0 MD RESET

It should be possible to reset MD by any of the following options:

- Auto MD Reset, generally 00:00 Hours of 1st day of the month.
- Local MD Reset for manually triggered at site.
- Remote MD Reset / MD reset by HHU through Authenticated command.

21.0 MARKING OF METERS

The marking of meters shall be in accordance with IS: 14697 /1999 (reaffirmed 2004).

The meter shall also store name plate details as given in the table A5.1 of annexure. These shall be readable as a profile as and when required.

22.0 COMMUNICATION CAPABILITY

The meter shall be provided with two ports for communication of the measured/collected data as per document enclosed in the annexure, i.e. a hardware port compatible with RS 232 or RS
485 specifications which shall be used for remote access through suitable Modem
(GPRS/GSM/EDGE/CDMA/ PSTN/LPR) 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.

The RS 485 port shall be used at Substations suitable for multi-drop connections of the meter for exporting data to sub-station data logger/DCU/Computer and the remote end server. The RS 232 port shall be used at boundary points meters and Distribution Transformer meters capable to transfer and export data to the remote end server

through suitable communication mediums (GPRS/GSM/EDGE/CDMA/ PSTN/LPR). Both ports shall support the default and minimum baud rate of 9600 bps.

23.0 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 are to be procured/supplied on the basis of the specification having **at least one USB communication port.**

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

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The meters should work even in the presence of any two Potential wires.
Meter should work correctly irrespective of phase sequence.

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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 should have a continuous and clear indication / annunciation in its display if top cover is removed /open and even refixed **(non roll over)** and only cover open must be logged in BCS without any restoration. Auto scroll display may be sacrificed for that ***COVER OPEN*** **.**
Minimum 400 numbers of events preferable (compartment wise) i.e. 200 no. events for occurrences & 200 no. events for restoration with date & time and snapshot should be available in the meter memory.
Default occurrence and restoration time shall be 5 minutes but it shall be programmable.
All the tamper information logged by the meter should 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, should be provided and clearly explained in the bid. The tamper logic should be capable of discriminating the system abnormalities from source side and load side and it should not log / record tamper due to source side abnormalities. The meter should be able to distinguish between HT PT fuse blowing and Single Phasing and record the former. The logging of the various event in each compartments should be such once one or more compartments have become full, the last event pertaining t the same compartment will be entered and the earliest (First One) events should disappear (FIFO basis).Thus in this manner each succeeding event will replace the earliest recorded event ,Compartment wise. Events of one compartment/category should override the events of their own compartment/category only

25.0 TYPE TESTS

Meters shall be fully type tested as per relevant Standard (latest version). The type test certificates should be submitted 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**.

26.0 .ACCEPTANCE & ROUTINE TESTS

All acceptance tests as per relevant standards shall be carried out in the presence of utility representatives. Criteria for selection for such tests and performance requirements shall be as per IS 14697:1999 (reaffirmed 2004

Additional acceptance shall include Surge withstand (SWC) for 6 kVp as per IEC 62052-11, Lightning impulse and HF disturbance as per IS 14697. One sample meter per order from one of the offered lot shall be subjected to these specified tests. Meters subjected to these tests shall not be used after tests.

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

Accuracy tests shall be performed at the beginning and at the end of the acceptance tests specified.

27.0 INSPECTION

T The supplier shall keep the WBSEDCL informed in advance, about the manufacturing programme so that the arrangement can be made for 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

.All Inspection will be carried out in Auto Test Bench. No manual intervention will be allowed during testing of Meter at Auto Test Bench.

28.0 QUALITY ASSURANCE

The manufacturer shall have a comprehensive quality assurance program at all stages of manufacture for ensuring products giving reliable, trouble free performance. Details of the bidder'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 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.

29.0 TESTING FACILITIES:

The Bidder 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 ckt.

g) Repeatability of error

h) Transportation test

i) Tamper Test

j) Ageing Test

The Bidder shall give a detailed list of bought out items with name of the manufacturer and details about quality control

30.0 QUALIFYING REQUIREMENTS

ii) Bidder should be a manufacturer;

iii) He should have all the facility in his works for design, assembly, quality assurance, burn- in test (Fully assembled Energy Meter), testing (all routine and acceptance tests), automatic calibration of Energy Meter on software based test bench, qualified team of technical and software engineers;

iv) The average annual turnover of the manufacturer for Energy meters for the three (3) best financial years out of last five (5) years, should be at least Rs 6.0 Crore.

v) Notwithstanding anything stated herein under, the Purchaser reserves the right to assess the capacity and capability of the bidder to execute the work, should the circumstances warrant such assessment in the overall interest of the Purchaser.

31.0 GUARANTEE

Equipment (Meter) supplied shall be guaranteed for a period of 66 months from the date of supply. Bidders shall guarantee to repair or replace the meters and meter boxes (if supplied), 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.

The bidder shall extend the guarantee period for another 5 years for the replaced meters. However the backup bank guarantee provided by the bidders shall be valid for 2 years only.

32.0 FIXING & CONNECTION ARRANGEMENT

Manufacturer shall ensure following technical points :

i) Meter shall be suitable for mounting on Simplex type vertical panel with front door; CAT-M4 disconnecting type TBs to be used for Current circuit; Panel wiring to be properly dressed and harnessed; External cables to enter panel from bottom gland plate using double compression glands.

ii) Energy Meter terminals block shall be adequately sized with regard to maximum conductor dimension, commensurate with current rating of Energy Meter.

33.0 SUPPLY OF POWER PACK & HHU

For every 100 nos. of meters and part thereof one HHU (DOS Based) Analogic Make/ Tab (Reputed make) & 100 nos. communication cord for each type(Optical to Serial Port and Optical to USB Port) should be supplied free of cost. The guarantee period of HH/Tab will be of 66 months from the date of supply. Bidders shall guarantee to repair or replace Power pack unit & HHU (if supplied), 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

34.0 SUBMISSION OF SAMPLE & DOCUMENTS

Tender paper will be submitted to the office of the Chief Engineer(P&C), WBSEDCL, Bidyut Bhavan, 4th floor, Block – B & D, Salt Lake, Kol-91, on any working day, from(11.00 Hrs to 16.00 Hrs. on week days & from 11.00 Hrs to 12.00 Hrs on Saturday within the specified period of submission of the tender document for which he will be given a receipt by the Office of the Chief Engineer(P&C), .

The bidder will submit his sample Meters in sealed casing / cartoon along with relevant documents as per Schedule - D, on any working day, from 11.00 Hrs to 16.00 Hrs. on weeks days & from 11.00 Hrs. to 13.00 Hrs. on Saturday within the specified period of submission of tender documents latest by 16.00 Hrs. 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.

a) While submitting the samples and required documents as per Schedule D, the bidder has to submit two numbers of sealed meters as per the specifications stated herein before, without the welding of and cover and body screw caps.

b) They should also submit one prototype of meter base and cover (with screw caps) properly welded.

c) The date of testing of sample meters will be intimated to the bidders C.E.(DTD) and on the date of testing of sample meters of a bidder, he shall come prepared with the following :

- Ø BCS (as per specification)
- Ø HHU compatible with BCS and loaded with HHU software and compatible with BCS.
- Ø Any other accessories required for observing the performance capabilities of the meters.
- Ø Hard Copy and Soft copy of Display parameter List.
- Ø Operating/threshold value at which the meter will record energy as per specified limits of errors and also logic at which meter log tamper
- Ø at different tamper conditions both in Soft and Hard copy..
- Ø Modem with SIM Card

A small Junction Box with 5 points terminal to be fixed at suitable places of right side of PPMB with strong adhesive. In this case Modems will be energized with415/230 V supply. During testing it will be checked.

During such testing, other bidders will also be allowed to witness the testing.

35.0 DOCUMENTATION

Sets of operating manuals shall be supplied to the office of the Chief Engineer (DTD) and to different consignees at the time of delivery of meters.

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

36.0 PACKING & FORWARDING

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.

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, he should ensure the packing is such that, the material should not get damaged during transit by Rail / Road.

SCHEDULES:

The Bidder shall submit the following schedules, which is part and parcel of the Specification.

Schedule A Guaranteed Technical Particulars (as per enclosed Standard Format)

Schedule B List of Raw Materials (as per enclosed Standard Format)

Schedule C Pre-qualification Conditions.

Schedule D List of Documents to be submitted during sample submission.

Schedule E Deviations from Specified Standards (as per standard format of the bidder).

Schedule F Deviations from Specified test Requirements (as per standard format of the bidder).

Schedule G Deviations from Technical Specification (as per Annexure-IV – Deviation Sheet of GCC)

Schedule H Bidder's experience (as per standard format of the bidder and also Copies of orders executed along with GTP of the supplied meters)

Schedule-I :- Tamper Logic

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SCHEDULE A

GUARANTEED TECHNICAL PARTICULARS

Sl.No.	Description	To be specified by Manufacturer
1	Maker's name and country	
2	Type of meter/model	
3	Standards Applicable	
4	Accuracy/Interface class	
5	Parameters displayed	
6	P.F. Range	
7	Basic Current (Ib) (-/5A)	
8	Maximum Current (I_{max})	
9	Minimum starting current	
10	Rated Voltage	
11	Meter constant	
12	Variation of voltage at which meter functions normally	
13	Rated Frequency	
14	Power Loss in Voltage circuit (VA & watt) & Current circuits (VA)	
15	Dynamic range	
16	MD reset Provisions	
17	Display :	
	a) Type of Register	
	b) No. of digits of display and height of character	
	c) Auto display mode & scroll mode	
	d) Type of push button for scroll mode	
18	Non volatile memory	

19	Details of provision for taking reading during power off condition	
20	Principle of operation	
21	MD Integration period	
22	Weight of meter	
23	Dimensions	
24	Warranty	
25	Outline drawings & Leaflets	
26	a) Remote meter-readout facility	
	b) Communication protocol used.	
	c) Sealing provision for meter & optical port.	
	d) Baud rate of data transmission	
	e) Required software to be resident in HHU and BCS.	
	f) Ultrasonic welding of body	
	g) Manufacturers Seal provided	
27	Base Computer Software	
28	Type Test Certificates	
29	Time of Day Zones (Selectable)	
30	Whether meter measures both fundamental & Harmonic Energy	
31	Real Time Clock Accuracy	
32	Battery for Real Time Clock	
33	Anti Tamper Features	
34	Effect of accuracy under tamper conditions	
35	Drift in accuracy of measurement with time	
36	Name plate details	
37	Type of calibration	

38	Type of mounting	
39	Testing facility	
40	Data retention by NVM without battery back up and un-powered condition	
41	Type of material used	
42	Base	
43	Cover	
44	Terminal Block	
45	Terminal cover	
46	Screw	
	(i) Material	
	(ii) Size	
47	Internal diameter of Terminal Hole	
48	Centre to Centre clearances between adjacent terminals	
49	Security Profiles	
	a) Basic Security	
	b) Advance Security	
50	Past experience	Copies of order executed in last 3 (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

SCHEDULE B

LIST OF RAW MATERIALS & CRITICAL COMPONENTS

Sl. no.	Raw Materials / Component	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	

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*	*E1-beam /spot welded shunts shall be provided in the phase element and C.T. in the neutral. Alternatively, both the current elements (phase & neutral) shall have Shunts with proper isolation*	*Any make or origin conforming to IS-2705*
2.	*Measurement / computing chips*	*The Measurement / computing chips used in the meter should be with the Surface mount type.*	*Analog Devices, AMS, Cyrus Logic, Atmel, SAMES, NEC, Texas Instruments, ST, Infinion, Phillips, Teridian, Siemens Freescale, TI*
3.	*Memory chips*	*The memory computing chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.*	*Atmel, National Semiconductors, Microchip, Texas Instruments, Phillips, Hitachi, Teridian ,ST.*
4.	*Display modules*	*The display modules should be well protected from the external UV radiations. The display should be clearly visible over an angle of at least a cone of 70^{o}.The construction of the modules should be such that the displayed quantity should not disturbed with the life of display. The display should be TN type industrial grade with extended temperature range.*	*Haijing, Holtek, Bonafied Technologies, Advantek, Truly Semiconductor, Hitachi, SONY, Tianma*
5.	*Communication modules*	*Communication modules should be compatible for the RS 232 ports.*	*National Semiconductors, Hitachi, Texas Instruments, Philips, HP, Agilent, Everlight, Fairchild*
6.	*Optical port*	*Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.*	*National Semiconductors, Hitachi, Texas Instruments, Siemens, Agilent, Philips, Hp, Everlight, Siemens*
7.	*Power Supply*	*The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.*	*SMPS Type*

8.	*Electronic components*	*The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes.*	*Philips, Toshiba, Fairchild, Murata, Rohm, Siemens. National Semiconductors, ATMEL, Texas Instruments, Hitachi. Ligitec, OKI, EPCOS*
9.	*Mechanical parts*	*The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. The other mechanical components should 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, Xeno Energy, EVE*
11.	*RTC / Micro controller*	*The accuracy of RTC shall be as per relevant IEC / IS standards*	*Philips, Dallas, Atmel, Motorola, NEC, Renesas, Hitachi, Xicor, Texas Instruments, NEC or OKI, ST,Mitsubishi, Freescale chip, Teridian*

SCHEDULE C

PRE-QUALIFICATION CONDITIONS

Sl. No.	Particular	Remarks
1	Bidder should certify that as the basic design of the meter as per IEC 62056 protocol & DLMS compliant has not been changed & only firmwire has been modified, no fresh type test for such type of meter is	Yes / No
2	Bidder should submit Conformity Test Certificates with DLMS logo issued by CPRI, Bangalore i.r.o. additional features/tests should be submitted with the bid as per guideline of CEA dt. 25.01.2010.	Yes / No
3	Bidder has Type Test certificate for the type of offered meter not more than 3 (three) years old.	Yes / No
4	Bidder preferably posses ISO 9001 certification.	Yes / No
5	Bidder should be manufacturers of static meters having supplied Static 1-ph or 3-phase meters with memory and LCD display to Electricity Boards / Utilities in the past 3 (three) years.	Yes / No
6	Bidders should have dust free, static protected environment for manufacture, assembly and Testing.	Yes / No
7	Bidder should have automatic computerized test bench for lot testing of meters.	Yes / No
8	Bidder has facilities of Oven for ageing test.	Yes / No

SCHEDULE D

LIST OF DOCUMENTS TO BE SUBMITTED DURING SAMPLE SUBMISSION

Sl. No.	DOCUMENTS TO BE SUBMITTED	
1	Attested copy of type test reports from NABL accredited laboratory	
2	Attested copy of type test certificates as regards material used for meter case, cover & terminal block.	
3	Tender Documents under Schedule B	
4	Tender Documents under Schedule C	
5	Operating manual & tamper logic of the sample meter submitted	

Bidder's Name and Address

To
The Chief Engineer (P&C),
West Bengal State Electricity Distribution Company Limited
Vidyut Bhavan (4TH FLOOR, , Block-'B & D',
Bidhannagar, Block-DJ, Sector-II: Kolkata: 700 091

Dear Sirs,

[If the bid has any deviation from the Technical Specification, the bidder shall tabulate those deviations here clause by clause]

S. No.	Clause No:	Description	Deviation	Remarks

[If the bid has any deviation from the commercial terms, the bidder shall tabulate those deviations here clause by clause]

S. No.	Clause No:	Description	Deviation	Remarks

NOTE :**When there is no deviation, this sheet is to be submitted duly signed with an endorsement indicating "No Deviation". Deviations not indicated here will not be taken into consideration.**

Date: (Signature).....

Place: (Printed Name).....

(Designation).....

(Seal).....

SCHEDULE G

Bidder's Name & Address:

To
The Chief Engineer (P&C),
West Bengal State Electricity Distribution Company Limited
Vidyut Bhavan,, Block-'D',
Bidhannagar, Block-DJ, Sector-II: Kolkata: 700 091

We have carefully gone through the Technical Specifications and the General Purchase Conditions and we have satisfied ourselves and hereby propose certain modifications as mentioned below:

S.No.	Sec./Clause & Page No.	Existing Clause	Modified clause (proposed by Bidder)	Reasons for modification

Date:

Place:

(Signature).....

(Authorised Representative of bidder).....

(Designation).....

Name of the bidder: .....

Note:***This format is to be used for submission of Pre-bid queries only and this will not be considered as bidding document***.

SCHEDULE I

TAMPER LOGIC

	TAMPERS	Occurrence. Condition	Reset. Conditions	OCC Time (min)	Reset 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		
		Current Ignored	Current Ignored		
		Missing potential tamper detection will be phase wise			
2	Voltage Unbalance	V_{3x}> 70% Vref	V_{3x} > 70% Vref	5	
		Vmax-Vmin> 10% Vref	Vmax-Vmin<10% Vref		
		Current Ignored	Current Ignored		
3	Low Voltage	Vx< 70% Vref	V3x> 71% Vref	5	
		Current Ignored	Current Ignored		
4	Power Failure	If power goes off for more than the persistence time	Power Restores	5	Immediate
5	CT Open	Residual Current >20% Ib	Residual Current< 20% Ib	5	
		Ix< 2% Ib	Ix Ignored		
		Average line Current :Ignored	Average Current > 10% of Ib		
6	CT Bypass	Residual Current >20% Ib	Residual Current <20% Ib	5	
		Ix>2% Ib	Ix Ignored		
		Average line Current :Ignored	Average Current > 10% Ib		
7	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> 5% Ib	Average Line Current> 10% Ib		
		Calculated In> 5% of Ib	Calculated In> 5% of Ib		
8	CT Reversal	Ix> 10 % Ib	Ix> 10 % Ib	5	
		Direction : Negative	Direction: Positive		
		Net Power Factor> 0.3	Net Power Factor> 0.3		
		CT Reversal detection will be phase wise			
	TAMPERS	**Occurrence. Condition**	**Reset. Conditions**	**OCC Time (min)**	**Reset Time (min)**

9	**Invalid Phase Association**	When Voltage or current sequence is different. For Example: Voltage sequence is RYB and current sequence is YBR	When Voltage or current sequence is same. For example: Voltage sequence is RYB and current sequence is RYB	5
10	**Cover Open**	On removal of meter cover the meter will log cover open event along with date and time.		Immediate. No Restoration
V_{3X}= Voltage in All Phases V_X= Voltage In Any Phase I_{3X}= Current in All Phases I_X= Current in any phase				

WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED

TECHNICAL SPECIFCATION

FOR

PILFER PROOF METER BOX (PPMB)

FOR

3-Phase 4-WIRE CT OPERATED
FULLY STATIC AMR COMPATIBLE TRI-VECTOR ENERGY METERS
FOR DISTRIBUTION TRANSFORMERS

WBSEDCL

TECHNICAL SPECIFICATION FOR PILFER PROOF METER BOX FOR DTR METER

1.0 SCOPE:

1.1 This specification covers manufacture and supply of Pilfer Proof Meter Box (PPMB) suitable to house Three Phase Static Energy Meter for DTR, TTB & Modem. The Meter Box shall be suitable for outdoor installation & pole mounted type and shall have ability to offer protection of electrical equipment against harsh weather. The box shall be anti-corrosive, dust proof, shock, vermin & waterproof, pilfer proof, fire proof and UV stabilized. The enclosures shall not deform or melt when exposed to fire.

2.0 TECHNICAL REQUIREMENT :

2.1 The Meter Box i.e base and cover shall be made of hot press moulded, unbreakable, high grade, fire retardant sheet moulded compound (SMC), with minimum thickness 2.5 mm having good di-electric and mechanical strength. The material must be UV stabilized such that the Meter Box should not change in colour, shape. size, dimensions when subjected to 200 Hrs. of UV Ageing Test. The Meter Box should have top tapered surface and round corners to prevent any water logging on the top of meter box cover.

A small Junction Box with 5 points terminal to be fixed at suitable places of right side of PPMB with strong adhesive. In this case Modems will be energized with 415/230 V supply.

2.2 The Meter Box should be capable of withstanding the mechanical, electrical and thermal stresses well as the effects of humidity which are likely to be encountered in service. At the same time the box should ensure desired degree of safety. The material used should be adequately stabilized against detrimental effect of light and weather. The surface appearance of the moulded parts must be smooth, non-porous and homogeneous, free of ripples, defects and marks. No fillers of fibers should be visible at any place.

2.3 The box should comply in all respect with the requirement of latest amendments of IS 13410-1992 for “General requirements for enclosure for accessories for fixing electric installation. Applicable degree of protection shall be IP 55.

2.4 All accessories like nuts, bolts, washers etc. shall be galvanized.

3.0 CONSTRUCTION :

3.1 The enclosure shall be single piece moulded with hot process compression moulding.

3.2 Dimension : Minimum inside dimensions of meter box are 540 mm(Height) X 310 mm (Width) X 200 mm (Depth).

3.3 The inside dimension of the meter box should be such that there should be minimum clearance in between meter surface and inside wall of meter box as below :

a) 55±2 mm clearance from at top.
b) 70±2 mm clearance at both sides.
c) 75±2 mm clearance from the bottom of the extended terminal cover of the TTB.
d) 25±2 mm at the front of the meter.

3.4 Meter Box with higher dimensions may be considered if found suitable.

3.5 The meter enclosure shall have 4 nos. of mounting brackets made out of same material as meter box with provision for 6 mm dia hole for mounting the enclosure on a pole/wall. Suitable nuts, bolts & washers are to be provided for mounting the meter box.

3.6 There should be provision of 2 nos. Metallic "U" clamp at a distance of 100 mm from the top and the bottom of the meter box with hole for sealing of meter box.

3.7 The cover of meter box should be fitted with base with 2 nos. brass/stainless steel hinges in left side of the box. The hinges of the door shall be concealed and they shall be fixed to the flanges provided on the body and cover of the enclosure in such a manner that the door opens by a minimum of 120 degrees.

3.8 Suitable handle/knob with locking arrangement shall be provided for opening of the enclosure door.

3.9 Earthing Bolt :

1 no. G.I Earthing Bolt with double nuts & washers of 3 mm thickness are to be provided at both sides of meter box for earthing of all metal parts. Size of the Earthing Bolt will be of dimension M6 X 25 mm.

4.0 Incoming and outgoing cable arrangement :

Suitable 2 (two) Nos. of holes, one for entry of 2.5 Sq.mm 12 core control cable and other for entry of 2.5 Sq.mm 4 core cable to be used for connection at meter terminal from CT secondary and busbar voltage, with single compression M.S/Aluminium Alloy/ Brass Gland shall be provided at bottom of the box.

4.1 Base and Cover details :

Thickness of the meter box shall not be less than 2.5 mm on all sides including door. The meter box cover shall be made overlapping type having collars on all four (4) sides and shall be provided with Neoprene rubber gasket of minimum 2.5 mm dia. to fit completely in the grooves of the base. The base of the meter box must have a groove to hold the gasket and the overlap of the top cover with base should be 6 mm. The cover shall rest on the collar of the Meter base in such a way that any access to inside the meter box is not possible from outside. The tongue of the base shall ensure proper sealing arrangement against ingress of rainwater and dust inside the box.

Detachable base supports of suitable dimensions & thickness should be provided for mounting meter and TTB inside the box. The base supports should be raised by 10±2 mm from the rear wall of meter box for ease of wiring.

4.2 Viewing Window :

For convenient manual & remote meter reading, viewing window of scratch proof, break resistant, UV resistant , transparent polycarbonate of size 180 mm x100 mm having thickness of at least 2 mm (Minimum) engraved with the word "WBSEDCL" in the lower right corner shall be provided in the door of the meter box.

Fixing the polycarbonate shall be only from inside and should be properly fixed by using metal supporting clamps & Neoprene Rubber Gasket. No screw/ rivets should be visible from outside of the meter box surface. Replacement of viewing material (Polycarbonate) should be possible only on opening the door breaking the seals. Arrangement for taking MRI reading should not be available from outside of the meter Box. It should be done after opening the meter box.

4.3 Soft neoprene/nitride rubber gaskets shall be provided all round wherever required for protection against entry of dust and water. The gasket shall confirm to Type-III as per IS-11149. The enclosure shall comply with IP-55 degree of protection.

4.4 The enclosure shall be off admiral grey / ivory or as specified by the owner.

4.5 A metallic name plate with following marking shall be fixed on the front door of the meter box in a suitable position :

i) Property of WBSEDCL

ii) Purchase Order No. & Date

iii) Name of Manufacturer

iv) Meter Box Sl. Nos.

A separate metallic plate of size 4" x 3" with marking of "Sign of Danger" etc. as per ISS shall be fixed on the front door of the box in a suitable position.

4.6 Internal wiring with proper colour code (for phase identification) for connection in between Meter & TTB inside the meter box are to be provided.

5.0 Submission of Sample :

5.1 The bidder shall submit a sample Meter Box as per our specification with a meter & TTB mounted & connected with internal wiring inside the meter box to the office of the Chief Engineer (DTD), Abhikshan Bhavan, Sector-V, Salt Lake, Kolkata-91 before the last day of submission of bid.

5.2 Submission of sample meter box as per size available with the bidder but conforming to our specification towards its quality is acceptable.

6.0 Guarantee:

The Pilfer Proof Meter Box should be guaranteed against any manufacturing defects arising out of faulty design or bad workmanship or component failure for a period of 5 years from the date of supply.

The meter box found defective within the above guarantee period shall be replaced by the supplier free of cost within one month of the receipt of intimation of failure/defect. Defective meter box are to be replaced by new one with new sl. nos. as allotted by Chief Engineer (DTD).

7.0 Replacement of defective Meter Box :

The Meter Box declared defective by the WBSEDCL shall be replaced by the supplier up to the full satisfaction of the WBSEDCL at the cost of supplier. Failure to do so within the time limit prescribed shall lead to imposition of penalty of twice the cost of meter box. The same may lead to black listing even, as decided by WBSEDCL. In this connection the decision of WBSEDCL shall be final.

8.0 Testing:

a) Type Test:

The bidder must furnish type test report including material verification of the offered/sample meter box from any NABL/Govt. approved laboratory as available with them along with technical bid without which the offer will not be considered. **Type test report should not be more than 5 (five) years old.**

Type testing including material identification (IR Spectrometry test) of one meter box manufactured as per specification is to be conducted at any NABL accredited laboratory/CIPET by the supplier at their own cost after placement of order. For type testing the meter box will be selected from the first offered lot of meter with meter box. If the type test results are not found satisfactory, the offered lot of meter along with meter box will be rejected.

b) Acceptance Test:

The acceptance test as stipulated in Annexure-I shall be carried out at the time of inspection of the offered material.

c) Routine Test:

The routine tests as stipulated in the Annexure-I shall be carried out and routine test certificate/reports shall be submitted to Chief Engineer (DTD), WBSEDCL, Abhikshan, Sector-V, Salt Lake City, Kolkata-700091 while offering inspection & testing of the meter with meter box.

Notes :

1) Where facilities do not exist at supplier's works for carrying out one or more of the Acceptance Tests as per Annexure-I, such tests may be carried out at any of the approved laboratories such as CIPET/IIT/National Test House/Govt. approved laboratory etc. in presence of WBSEDCL's representative.

2) The sampling plan for carrying out the acceptance tests shall be as per IS.

9.0 Submission of Drawing:

Three (3) copies of drawing complete in all respect should be submitted to the Chief Engineer (DTD) under intimation to the Material Controller for accordance of approval immediately after placement of order. 25 copies of approved drawing are to be submitted for distribution to sites.

10.0 Inspection:

The inspection will be carried out as per inspection & testing clause of General Conditions of Contract (GCC).

11.0 Guaranteed Technical Particulars:

The tenderer shall furnish all the necessary information as per Annexure-II - Guaranteed Technical Particulars. If the tenderer desire to furnish any
other information in addition to the details as asked for, the same may be furnished.

ANNEXURE-I

1.1.2 LIST OF TESTS TO BE CARRIED OUT ON PILFER PROOF METER BOX

Sl. No.	Name of Indian standard/equivalent international standard	Test requirement	Test particulars		
			Type test	Routine Test	Acceptance Test
1.	IS : 14772	Marking	T	R	A
2.	IS : 14772	Dimensions	T	R	A
3.	IS / ASTM	Protection against electric shock	T	R	A
4.	IS / ASTM	Construction	T	R	A
5.	IS / ASTM	Resistance to ageing, to humid conditions, to ingress of solid object and to harmful ingress of water	T		
		Water absorption			
		Glow wire test at 960^0 C			
		Flammability test			
6.	IS / ASTM	Mechanical strength	T		
		Resistance to tracking at 175 Volts			
7.	IS :14772-2000	Resistance to heat at 130^0 C	T		
	IS :14772-2000	Resistance of insulating material to abnormal heat & fire (960^0 C)			
8.	IS / ASTM	Resistance to rusting	T		
9.	IS / ASTM	Resistance to tracking	T		
10.	IS / ASTM	Test for resistance to heat & fire (Glow wire test at 650^0 C)	T		
11.	IS : 13411	Heat deflection temp. (Above 150^0 C)	T	R	A

12.	IS : 4249	Exposure to flame (Self Extinguishing)	T	R	A
13.	ASTMD 3418	Melting point (Does not melt up to 400^0 C)	T	R	A
14.	IS : 8623	Verification of di-electric properties, insulation test with 500V DC megger	T		
	ASTM G154/155	UV ageing for 200 Hrs.			
15.	CIPET/IR Spectrometry	Material identification	T		
16.	IS / ASTM	Physical water absorption (Max. 0.35%)	T		
	Note : Applicable degree of protection shall be IP42 or better. Legend : T- Type Test, R- Routine Test, A- Acceptance Test				

ANNEXURE-II

GUARANTEED TECHNICAL PARTICULARS OF PILFER PROOF METER BOX

Sl. No.	Description	Detailed requirement	Offered by the bidder
1.	Material used for moulded meter box	Sheet moulded Compound (SMC)	
2.	Grade of Material	Fire Retardant, Self Extinguishing	
3.	Properties of material for meter box		
(a)	Heat Deflection Temperature (Min. 140^0 C @ 1.8 MPa) (Ref. Std. IS/ASTM)	Above 150^0 C	
(b)	Exposure to flame (Ref. Std..IS/ASTM)	Self-extinguishing	
(c)	Melting Point (Ref. Std. IS/ASTM)	Does not melt upto 400^0 C	
(d)	Resistance to heat & fire	Glow wire test at 650^0 C	
(e)	Mechanical Property		
i)	Tensile Strength (MPa)	To be specified by the bidder	
ii)	Flexural Strength (MPa)	- Do -	
iii)	Modulus of Elasticity (MPa)	- Do -	

4.	Constructional features of the box			
(a)	Clear inside dimensions (minimum) of Meter Box		Refer Drawing	
	i)	Height	540 mm	
	ii)	Width	310 mm	
	iii)	Depth	200 mm	
	iv)	Rust & Vermin proofing	Neoprene Rubber Gasket (NRG)	
(b)	Thickness		2.5 mm	
(c)	Minimum clearance from meter on all 4 sides		i) 55±2 mm clearance from at top. ii) 70±2 mm clearance at both sides. iii) 75±2 mm clearance from the bottom of the extended terminal cover of the TTB.	
			iv) 25±2 mm at the front of the meter.	
(d)	Minimum clearance from back of meter		10±2 mm	
	Viewing Window :			
(e)	i)	Material of transparent cover	Polycarbonate	
	ii)	Thickness	2.0 mm (Minimum)	
	iii)	Size of opening (Min.)	180 mm x 100 mm	
	iv)	Fixing method	Fixed from inside by metal supporting clamps & neoprene rubber gasket	
(f)	Earthing arrangement		1 No. M6x25 mm GI Earthing Bolt with double nuts & washers of 3 mm thickness to be provided.	
(g)	Sealing Arrangement		2 nos. U clamps with holes for wire seal.	
(h)	Colour of Meter Box (base & cover)		Grey / Off-White / Ivory	
(i)	Box mounting arrangement			
	i)	Mounting bracket	4 Nos. brackets with holes	
	ii)	Dimension of holes	6 mm	

	iii)	Dimension of bolts, nuts & washers for fixing of box	To be specified by the bidder	
	iv)	Total no. of fixing bolts, nuts & washers to be provided	4 nos. bolts and 8 nos. nuts & washers	
(j)	Hinges		2 nos. brass/stainless steel concealed hinges	
(k)	Door opening		120^0 (minimum)	
(l)	Incoming & outgoing cable holes		2 No. holes (one for entry of 12 core 2.5 sq.mm cable & other for 4 core 2.5 sq.mm cable) to be provided at bottom with single compression M.S/Aluminium Alloy/ Brass gland.	
(m)	Whether the cover is overlapping type having collars on all four sides		Yes	
(n)	Whether the cover/base provided with semicircular/circular neoprene rubber gasket of 2.5 mm dia (Min.) to completely fit in the grove of the		Yes	

	base		
(o)	Weight of complete box in Kg with +/- tolerance	To be specified by the bidder	
5.	Type test report as per Technical Specification	To be submitted by the bidder	
6.	Degree of protection	IP 55	
7.	Locking arrangement	Handle/Knob with locking arrangement to be provided	
8.	Detachable base support for meter & TTB mounting	To be provided	
9.	Name Plate	Metallic name plate with marking as per Specification	
10.	Danger Plate	4" x 3" metallic plate with sign of danger.	
11.	Any other information		

ANNEXURE
- III

TESTI
NG

1. Sample selected from first lot should be type tested at any NABL accredited laboratory for compliance of performance parameters as given in GTP including material identification to be carried out by CIPET (IR Spectrometry test).
2. The test report should be submitted to WBSEDCL before offering inspection of second lot.
3. Inspection of each lot & sampling plans for acceptance test : 1 no. selected randomly from lot for testing at works.

Sl. No.	Test Requirement for moulded meter box	Reference Standards
a)	Marking	IS : 14772
b)	Dimensions & construction	IS : 14772
c)	Protection against electric shock	IS/ASTM
d)	Heat Deflection Temperature – above 150^0 C	IS : 13411
e)	Exposure to flame (Self Extinguishing)	IS : 4249
f)	Melting point – Does not melt up to 400^0 C	ASTMD 3418

WEST BENGAL STATE ELECTRICITY DISTRIBUTION COMPANY LIMITED

TECHNICAL SPECIFCATION

FOR

LT CURRENT TRANSFORMER

AND

CT BUSBAR CHAMBER

FOR

DISTRIBUTION TRANSFORMER METERING

TECHNICAL SPECIFICATION FOR RESIN CAST L.T. CURRENT TRANSFORMER

A set of 4 nos. Resin Cast LT Current Transformers (CT) of Accuracy Class 0.5 for low tension energy metering shall be supplied with each meter. The CTs are to be housed in the Bus-Bar chamber as per specification enclosed.

1.0 REFERENCE STANDARD

As per IS:2705, 1992 (Part 1 & Part 2) or latest version thereof

2.0 GENERAL TECHNICAL REQUIREMENT :

a) Type of Current Transformer	:	i) Ring type for CT ratio 600/5 and 200/5A,
b) Rated Voltage	:	240 Volts (Phase to Neutral), 433V (Ph-Ph)
c) Supply System Variation	:	Voltage Vref + 20% to -40%
d) Rated Current (I Basic)	:	5 Amps balanced & Unbalanced load
e) Rated Frequency	:	50 Hz.
f) Accuracy Class	:	0.5
g) Power Factor	:	Unity to Zero (all power factor lag/ or lead)
h) Max/Min Ambient Temperature	:	+ 55 ^{o} C / - 10 ^{o}C
i) Supply System Variation Frequency	:	50 Hz ± 5 %
j) Highest System Voltage	:	600V
k) Current Transformer Ratio		: 600/5A, & 200/5A
l) ISF	:	Less than 5
m) Rated Output Burden	:	5 VA at 0.8 pf (lag)
n) Rated Continuous thermal Temperature rise overAmbient temperature	:	Maximum temp. rise limit of 50deg C at 1.2 times rated primary current.
o) One minute withstand of Power Frequency Voltage	:	3 KV
p) Between primary and secondary Insulation level voltage (HV Test)	:	3 KV
q) Short time current rating (STC)	:	5 KA for 1 second.
		HV test and accuracy test to be performed after 24 hours of carrying out STC test.

r) Dynamic peak current : 2.5 times STC

s) Power frequency withstand voltage (Primary to Secondary) : 3 KV for 1 min., 50 Hz shall be carried out on unit after submerging unit in salty water for 6-8 hours.

3.0 CONSTRUCTIONAL REQUIREMENTS :

3.1 SECONDARY TERMINATION

The CT Secondary terminals shall be of studded type so that lead wires can be connected for metering purpose.

3.2 RATING PLATE

Primary & Secondary terminal identification scheme shall be embossed on the CT. Beside this there shall be self adhesive laminated paper rating plate suitable for outdoor installations. Rating plate to be secured on the body such that it is retained for outdoor applications and it should not come out easily. The rating plate shall carry following information:

1. Type, Ratio, Burden & Accuracy Class
2. Applicable Standard
3. I.L
4. STC Rating
5. ISF
6. Continuous thermal current
7. Caution against open secondary.
8. Batch No.
9. Manufacturer's Name
10. Manufacturing month and year
11. Serial No.

4.0 TESTS

4.1 TYPE TEST :

The offered CTs should be type tested at any NABL accredited / Govt. approved laboratory in accordance with IS:2705, 1992 (Part 1 & Part 2) or latest version thereof. The type test report should not be more than 5 (Five) years old. A copy of the Type Test results should 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 CTs which may affect the characteristics as well as parameters of the CTs from the CTs which was type tested, revised type test certificates as per the design, parameters and constituent material used in the offered CTs shall have to be submitted failing which the offer may be liable to be rejected.

i) Schedule of type tests for CT (As per Reference Standard) to be conducted are as below :

a) Verification of terminal marking and polarity. b) High voltage power frequency test.

c) Over voltage inter turn test.

d) Determination of error according to the requirement of appropriate accuracy class at 5%, 20%, 100% and 120% with full and quarter burden.

e) Short Time current test and peak dynamic current test.

f) Temperature rise test.

g) ISF test.

Beside this the following tests shall also be conducted :

a) Extended Life Cycle test.

b) Ingress protection.

4.2 ROUTINE & ACCEPTANCE TESTS :

Schedule of Routine & Acceptance test for CT :

a) Verification of terminal marking and polarity.

b) Determination of error according to the requirement of appropriate accuracy class at 5%, 20%, 100% and 120% with full and quarter burden.

c) ISF test.

4.3 TEST FACILITIES :

The tests for CTs shall be carried out as per relevant Standards and test certificates shall be furnished for scrutiny. The Bidder shall indicate the details of the instruments available with him for carrying out the various tests as per relevant Standards. The bidder shall indicate the sources of all equipments/ instruments.

The standard instruments used for conducting tests shall be calibrated periodically at any NABL Accredited / Govt. approved Test Laboratories and valid calibration test certificates shall be available at Works for verification by purchasers representative.

4.4 RETESTING AFTER DELIVERY :

WBSEDCL may carry out re-testing of the supplied CTs at their laboratory. Re-testing of the supplied CTs will be conducted on sample CTs collected from different stores of the consignees as per the procedure followed for acceptance test during inspection & testing of the supplied CTs at manufacturer's works. Re-testing of the supplied CTs will be completed within one month from the date of receipt of CTs at different stores.

In case the CTs are not in order as per our observation during inspection and testing of the supplied CTs, the lot will be declared defective and in that event CTs supplied are to be replaced by the manufacturers free of cost including free transportation from the site to their works and back. The replaced CTs are to be offered for inspection & testing and Acceptance test of will have to be carried out by the supplier in presence of purchaser's representative.

5.0 SUBMISSION OF SAMPLE CT :

One no. sample CT for ratio 200 /5 A and One no. sample CT for ratio 600 /5 A are to be submitted in sealed casing/cartoon to the Office of the Chief Engineer (DTD), Abhikshan, Sector-V, Salt Lake, Kolkata-91 as per dates mentioned in NIT.

6.0 GUARANTEE :

The CTs should be guaranteed against any manufacturing defects arising out of faulty design or bad workmanship or component failure for a period of 5 years from the date of supply.

The CTs found defective within the above guarantee period shall be replaced by the supplier free of cost within 60 days of the receipt of intimation of failure / defect.

The CTs declared defective by the WBSEDCL shall be replaced by the supplier up to the full satisfaction of the WBSEDCL at the cost of supplier. Failure to do so within the time limit prescribed shall lead to imposition of penalty of twice the cost of CTs. The same may lead to black listing even, as decided by WBSEDCL. In this connection the decision of WBSEDCL shall be final.

5.0 PACKING AND FORWARDING :

The equipment shall be packed in crates suitable for vertical/horizontal transport as the case may be and suitable for handling during transport and outdoor storage in transit. The easily damageable materials shall be packed carefully and marked with appropriate caution symbol. Any material found short inside the packing cases, supplier shall provide short material without any extra cost.

GUARANTEED TECHNICAL PARTICULARS FOR RESIN CAST LT CURRENT TRANSFORMER

Sl. No	Item	Requirement as per Specification	Bidders to specify
1.	Manufacturer's name, address, country of origin		
2.	Class of Accuracy	0.5 (As per I.S.)	
3.	Type of CT	Ring type for CT ratio 600/5A, & 200/5A,	
4.	Rated voltage & Frequency	433 Volts (phase to phase), 50 Hz ± 5%	
5.	Maximum system voltage	600V	
6.	No. of phases	Single	
7.	Current transformer ratio (Rated primary current)	• 200 A • 600A	
8.	Rated secondary current	5 Amps(Balance and unbalance load)	
9.	Supply frequency	50 Hz ± 5%	
10.	Temperature	Ref. Temp. 27 deg C	
11.	Supply system variation	V ref. +20% to –40%	
12.	Highest system voltage	600V	
13.	ISF	Less than 5	
14.	Number of secondary winding	One	
15.	Rated output burden	5VA at 0.8 p.f. (Lag)	
16.	Rated continuous thermal current temperature rise over ambient	1.2 times rated primary current with maximum temp. rise limit of 50 deg C.	
17.	One minute withstand of power frequency voltage between primary and secondary	3 KV	
18.	Insulation level voltage (HV test)	3 KV	

Sl. No	Item	Requirement as per Specification	Bidders to specify
19.	Material of core	Low loss CRGO high grade Core loss should not exceed 0.8 watt/Kg at 1.5 tesla)	
20.	Short time current rating	5KA for 1 second	
21.	Dynamic peak current	2.5 times STC	
22.	Primary frequency withstand voltage (primary to secondary)	3KV for 1 min. , 50 Hz.	
23.	Material of conductor	Super enameled copper wire as per IS 4800 Part IX/ IEC 317	
24.	Material of insulation	Class of insulation “F” for outdoor application. Provide details on properties of material.	
25.	Secondary termination	Stud type terminal.	
26.	Polarity marking	Indelibly marked/ coded for primary and secondary.	
27.	Internal Diameter of CT	For 200/5Amp--- 40mm For 600/5Amp--- 55mm	
28.	Weight	To be furnished	
29.	Outline drawing/ leaflet	To be furnished	
30.	Type test certificate	To be furnished	
31.	Guarantee	5 years from the date of supply	

TECHNICAL SPECIFICATION FOR METALLIC ENCLOSURE FOR HOUSING BUS-BAR AND L.T. CURRENT TRANSFORMERS

The Metallic Enclosure should be designed suitable for housing Bus-bar and 4 nos. L.T C.Ts of appropriate ratings in accordance with the rating of the transformers.

A) Construction :

1. Enclosure should be designed suitably for housing ring type CTs of ratio 200/5A & 600/5A.

1 The enclosure shall be suitable for outdoor installation & pole mounted type and shall have ability to offer protection of electrical equipment against harsh weather. For pole mounting type the enclosure shall have 4 nos. of mounting brackets made out of same material as of enclosure with provision of suitable size holes and nuts, bolts & washers for mounting the enclosure. Suitable nuts, bolts & washers are to be provided for mounting the meter box. The enclosure should be made of M.S/CRCA sheet metal of 18 SWG. The roof of the enclosure should be tapered at both sides from the middle

2. In case of Ring type CTs, four nos. Bus-bar for phase & neutral made of copper/aluminium of appropriate sizes matching with current carrying capacity and thermal capacity in accordance with the rating of the transformers should be provided. Arrangement for firm fixing of CTs inside the enclosure should be provided. Necessary arrangement for connecting 2.5Sq.mm wire on the busbars is to be provided.

3. The Bus bars should be placed on porcelain/epoxy/resin insulators of appropriate size and clearances. The fixing of the Bus-bars to the porcelain insulators should be made with non-corrosive nuts and bolts of appropriate material, size and ratings. Insulating sleeves are to be provided on the busbars.

4. Both ends of the busbars should be extended outside the enclosure sufficiently so that incoming and outgoing cables can be connected properly to the busbars. For extension of the busbar outside the enclosure, proper sealing of the enclosure against ingress of moisture & rain water should be made. On the extended portion of busbars suitable holes of proper size subject to CT ratio and suitable nut & bolts are to be provided for connecting the cable.

5. All the surfaces of the enclosure shall be sand blasted etc. to produce a smooth clean surface free of any scale, grease and rust. The surface should be given a coat of high quality Red-Oxide or steel chromate primer and then shall be finished with super enamel paint.

6. Earthing arrangement with markings on either side is to be provided. Two nos. GI Earthing Bolts with 2 nos. nuts and washers are to be provided for earthing. Size of Earthing bolt should be M6x40 mm.

9. A metal plate with marking of the name of the supplier, CT ratio, Box Serial number and also with marking of "PROPERTY OF WBSEDCL" along with Purchase Order No. & date with year of manufacturing shall be fixed with rivet on the front of the enclosure at a suitable portion. A Danger Plate 3"x2" should be provided at a visible location of the enclosure.

10. The door of the enclosure should be fitted with the base of the enclosure by using 2 nos. non-corrosive & non-detachable type internal hinges in such a manner that the door opens by minimum 120^0. Neoprene rubber gasket should be provided at door of the enclosure for protection against entry of moisture & rain water.

11. Two numbers of holes with suitable single compression MS glands are to be provided on the enclosure for cable entry. Dimension of the holes should be such that holes are suitable forentry of one 2.5Sq.mm 12 core control cable and other for 2.5Sq.mm 4 core cable to be used for wiring of CT secondary and busbar voltage to meter.

12. Suitable handle/knob and locking arrangement should be provided for opening of the enclosure door.
Necessary arrangements for sealing of the door at two points are also to be provided.

13. Colour of the enclosure should be admiral gray/off white/ivory.

14. The CT ratio should be paint marked at the bottom of the enclosure.

15. The enclosure should comply with IP54 or better degree of protection.

However for 200/5 C.T., fixing at lower Chamber inside the Meter Box is preferable, where no busbar are required. Instead of C.T. fitted with busbar, only C.T. will be fitted inside the Chamber/ Box. In this case 4 nos piercing screw will be given for Potential Terminal Connection.

B) Submission of Sample :

The bidder shall submit samples for enclosure mounted with 600/5A & 200/5A CTs & busbars as per our specification to the office of the Chief Engineer, (DTD), Abhikshan Bhavan, Sector-V, Salt Lake, Kolkata-91 before the last day of submission of bid.

C) Guarantee :

The enclosure should be guaranteed against any manufacturing defects arising out of faulty design or bad workmanship or component failure for a period of 5 years from the date of supply.

The enclosure found defective within the above guarantee period should be replaced by the supplier free of cost within one month of the receipt of intimation of failure/defect. Defective enclosure are to be replaced by new one with new sl. nos. as allotted by Chief Engineer (DTD).

D) Replacement of defective Meter BOX :

The Meter Box declared defective by the WBSEDCL shall be replaced by the supplier up to the full satisfaction of the WBSEDCL at the cost of supplier. Failure to do so within the time limit prescribed shall lead to imposition of penalty of twice the cost of meter box. The same may lead to black listing even, as decided by WBSEDCL. In this connection the decision of WBSEDCL shall be final.

E) Submission of Drawing :

Three copies of the drawings as per specified constructional features showing details of the dimensions of the enclosure along with the fixing arrangements of bus-bar, CT etc. are to be submitted at the time of submission of tender.

Three (3) copies of drawing complete in all respect should be submitted to the Chief Engineer (DTD) under intimation to the Chief Engineer (Procurement & Contracts) for accordance of approval immediately after placement of order. Sufficient copies of approved drawing are to be submitted for distribution to sites

F) <u>Inspection</u> :

The inspection will be carried out as per inspection & testing clause of General Conditions of Contract (GCC)

G) <u>Guaranteed Technical Particulars</u> :

The tenderer shall furnish all the necessary information as per Annexure-I – Guaranteed Technical Particulars. If the tenderer desire to furnish any other information in addition to the details as asked for, the same may be furnished.

ANNEXURE I

GUARANTEED TECHNICAL PARTICULARS FOR ENCLOSURE FOR HOUSING BUS-BAR AND L.T. CURRENT TRANSFORMERS

Sl. No	Item	Requirement as per Specification	Bidders to specify
1.	Manufacturer's name, address, country of origin.	To be furnished	
2.	Enclosure :		
a)	Material used for enclosure.	MS/CRCA	
b)	Dimension of enclosure (Height x Width x Depth)	To be specified	
c)	Thickness of sheet metal.	18 SWG	
d)	i) Colour of enclosure ii) Type of paint used.	i) Admiral gray/off white/ ivory ii) To be specified	
e)	Whether suitable for outdoor installation	To be specified	
f)	i) Whether gasket provided for door ii) Type of gasket used	i) To be provided ii) Neoprene Rubber Gasket	
g)	Whether mounting brackets provided.	4 nos. mounting brackets with holes, bolts, nut & washers	
h)	Hinges	2 nos. internal hinges	
i)	Cable entry	2 nos. holes with single compression MS gland	
3.	CT mounting arrangement	To be furnished	
4.	Busbar :		
a)	Material used for Busbar.	Copper/Aluminium	

b)	Dimension of different size Busbars used for different CT ratio (600/5A, & 200/5A,100/5A, 50/5A)	To be specified	
c)	Current carrying capacity & thermal capacity for of different size Busbars.	To be specified	
d)	Length of extended portion of Busbars outside the enclosure	To be specified	
e)	Size of holes on the extended portion of Busbars & dimension of nuts & bolts	To be specified	
f)	Whether arrangement for connecting voltage wires at busbars provided.	To be provided	
5.	i) Earthing arrangement ii) Size of Earthing Bolt	i) 2 nos. GI Bolt with 2nos. nuts & washers. ii) M6x40 mm	
6.	Name Plate & Danger Plate details	As per specification	
7.	Handle/Knob	2 nos. holes with MS gland	
8.	Locking arrangement	To be provided	
9.	Sealing arrangement	To be provided	
10.	Degree of protection	IP54 or better	
11.	Guarantee	5 years from the date of supply	
12	Drawing	To be furnished	