

Meghalaya Power Distribution Corporation Limited

Expression of Interest

For

Supply of Static Whole Current Energy Meters with LCD display

To

Meghalaya Power Distribution Corporation Limited

And

Its Consumers

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- Volume I - Invitation for EOI
- Volume II - Instructions and Terms & Conditions
- Volume III - Technical Specifications

Volume I - Expression of Interest (EOI) for supply of Static Whole Current Energy Meters with LCD display to Meghalaya Power Distribution Corporation Limited and its Consumers

The Meghalaya Power Distribution Corporation Limited (MePDCL) intends to approve manufacturers of the Static Whole Current Energy Meters with LCD display with MRI communication facility with data downloading features and meter boxes for MePDCL and its consumers for the following current range:-

- 5 -30 A for single phase energy meter
- 10 -60 A for three phase energy meter

Manufacturers of these types of meters are requested to submit 3 (three) samples each of three phase and single phase meters (2 sample meters without ultrasonic welding and 1 sample meter with ultrasonic welding) along with their serial numbers/meter constant and 1 (one) sample meter box.

The sample meters and box shall be tested in MePDCL Lab in order to examine their acceptability. Further, the shortlisted firms may be asked to get their sample meters tested from any of the CPRI lab or National Test Houses at their cost. The detailed EOI document along with Instructions and Terms & Conditions and related technical specifications of the meter and box are available on MePDCL website www.meecl.nic.in.

Interested parties may submit their EOI as required in the EOI document along with sample meters and box, required type test reports from Government accredited laboratory, at the address given below during office hours on working days on or before **14:00 hours of 8th March 2021.**

A meeting prior to the submission of EOI shall be held on **14:00 hours of 25th February 2021.**

Chief Engineer (Planning, Monitoring & Commercial)
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1. Scope of the EOI :

For empanelment of approved list of Manufacturers of Static Whole Current Energy Meters with LCD display.

2. Instructions and Terms & Conditions:

- i) Interested parties are advised to study & understand the technical specification of the Meters carefully. Applying for EOI shall be deemed to have been done after careful study and examination of the documents with full understanding of its implications, terms and conditions.
- ii) The response should be full and complete in all respects. Incomplete, partial or conditional response shall be rejected.
- iii) MePDCL reserves the right to clear any doubt/ contradiction/ ambiguity/ in the stipulations of this EOI. MePDCL's decision on this account will be absolute, final and binding.
- iv) The Interested parties shall bear all costs associated with the preparation of the documents and submission of the samples, including cost of presentation and verification of claims made by the applicant for the purposes of clarification, if so desired by MePDCL. MePDCL will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the process.
- v) Interested parties are required to fill up only the performa " Guaranteed Technical Particulars for Static whole current energy meters only as per enclosed Annexure- 1A (single phase meter), 1B (three phase meter) & 1 C (meter box), duly sign on each page. The GTPs are to be submitted on letter head of the company duly signed by the authorized person (valid legal power of attorney in favour of signatory must be attached). Interested parties are advised not to submit the GTP in their own formats.

3. Pre-qualifying requirements:

- i) Manufacturers should have all the facilities 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.
- ii) The average annual turnover of the manufacturer for the three best financial years out of the last five financial years should not be less than Rs. 25 Crores. Balance

sheet certified by statutory auditor for the same has to be attached. Certificate from Chartered Accountant indicating his turn over for the last three financial years has also to be attached.

- iii) The manufacturer should have supplied more than 1 (one) lakh Single and Three phases Static whole current solid state electronic energy meters with backlit LCD display. Documentary proof in support of the claim needs to be attached.
- iv) The firm should either have in house manufacturing facility based on surface mounting technology (SMT) for fixing various electronic components on PCBs or if surface mounting is outsourced, then at least the firm should be making procurement by itself of all vital components to be mounted on the PCBs proof for which shall be submitted along with the EOI.
- v) Manufacturer should possess fully computerized automatic test bench system for carrying out routine and acceptance tests as per IS-14697:1999 (Amended up to date). Documentary proof in support of the same needs to be attached.
- vi) Firms with whom business has been suspended, black listed firms, debarred firms shall not be considered.
- vii) The calibration curve and routine test certificates should also be submitted with sample meters. No subsequent change in design shall be allowed. The EOI of the firm (s) shall only be opened if sample meters are submitted within the stipulated date and time.
- viii) The manufacturer shall submit along with the EOI the type test certificates of meters, issued by one of CPRI/ NTH for all type tests covered in IS-14697:1999 & CBIP-325 with latest amendments and these test certificates shall pertain to meters of required accuracy class and for each ratio as per required specification. Further these tests must not have been conducted earlier than three years from the original scheduled date of EOI opening. In case, required type test certificates are not attached with the EOI, the EOI of the firm shall be rejected.
- ix) The manufacturers must have valid BIS certificates for meters.
- x) The manufacturer should submit certificate from power utilities that they have been listed as approved manufacturer of static energy meters in at least three (3) power utilities.

4. Works Appraisal:

The work appraisal, if necessary, of the short listed firms shall be carried out by MePDCL. The recommendation of the work appraisal does not give any right to

the firm to be on the empaneled list of MePDCL. The decision of the Competent Authority of MePDCL in this regard shall be final and binding.

NOTE:

The Manufacturer shall: -

- a) Submit GST registration number.
- b) Submit particulars of the firm i.e. Names & addresses of Directors of the firm, their income tax permanent Account Number. Income tax return of the firm for the last three years and any other specific allied information should be supplied along with the EOI.
- c) Facilitate inspection of manufacturing facility by MePDCL as deemed necessary.

5. Submission of necessary documents:

The documents submitted are to be arranged in the following order:

1. GST registration number.
2. Names & addresses of Directors of the firm,
3. Income tax permanent Account Number.
4. Income tax return of the firm for the last three years.
5. Average annual turnover of the manufacturer for the three best financial years out of the last five financial years.
6. Balance sheet duly certified by statutory auditor.
7. Certificate in respect of turn over from Chartered Accountant for the last three financial years.
8. Guaranteed Technical Particulars as per enclosed Annexure-1A (single phase meter), 1B (three phase meter) & 1 C (meter box).
9. Documentary proof in support of supplying more than 1 (one) lakh Single and Three phases Static whole current solid state electronic energy meters with backlit LCD display.
10. Documentary proof in support of in house manufacturing facility.
11. Documentary proof in support of possessing fully computerized automatic test bench system.
12. Calibration curve and routine test certificates of sample meters.
13. Type test certificates of meters, issued by one of CPRI/ NTH for all type tests covered in IS-14697:1999 & CBIP-325.
14. Valid BIS certificates for meters.
15. Certificate from power utilities that they have been listed as approved manufacturer of static energy meters in at least three (3) power utilities.

Volume III - TECHNICAL SPECIFICATION FOR SINGLE & THREE PHASE WHOLE
CURRENT STATIC ENERGY METER WITH LCD DISPLAY OF CLASS
1.0 ACCURACY

1.0 SCOPE OF WORK:

1.1 Selection of manufacturers of energy meter for use in the state of Meghalaya. This specification covers the design, engineering, manufacture, assembly, testing, inspection and sale of Single Phase & Three Phase static energy meter of class 1.0 accuracy. The meters shall be suitable for connection to 1-phase 2-wires and 3-phase 4-wires, 240/415 Volt systems of basic current range of 5A for single phase and 10A for three phase meters. The meter shall be capable of recording and displaying energy in KWh, KVAh, demand (KW&KVA) current & voltages, tamper, etc for power factor range of zero lag – unity- zero lead. Meters should also have facility/capability of recording tamper information and MRI connectivity.

1.2 It is not intended to specify completely herein all the details of the design and construction of the meter. However, the meter shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing operations continuously. The meters shall be complete with all components, accessories necessary for their effective and trouble free operation. Unless otherwise stated elsewhere the word meter shall be inclusive of single phase and three phase meters.

2.0 SERVICE CONDITION

The meters to be sold against this specification should be suitable for satisfactory continuous operation and capable of maintaining required accuracy under the following conditions:

1	Maximum ambient temperature	70 ⁰ C
2	Minimum ambient temperature	-10 ⁰ C
3	Relative humidity (%)	10-100 (non-condensing)
4	Max-wind velocity	47 m/sec
5	Maximum altitude above sea level	>1000 metres
6	Iso-ceramic level	50 days/year
7	Average annual rainfall	1200 mm

The climate is prone to wide variations in the ambient conditions with lightning occurring frequently during rainy seasons. The climatic conditions is moderately hot and humid, conducive to rust and fungus growth.

3.0 APPLICABLE STANDARDS:

Unless otherwise stated elsewhere in this specification the energy meter shall be of accuracy class 1.0 or better and conform to relevant clauses of following standards or reports to be read with up-to –date and latest amendments/revision thereof. Further, meters from ISO certified manufacturers shall be preferred:-

Sl. No	Standard no.	Title
1	IS 13779, 1999 read with latest amendments	Specification of AC Static Watt hours Meters Class 1.0 and 2.0.
2	CBIP Report No: 325 read with latest amendments	Specification of AC Static Electrical Energy Meters
3	IEC 62053 - 21	Alternating current static watt-hour meters for active energy (Class 1.0&2.0)
4	IS 12346 (1988)	Specification for testing equipment for AC static Electrical Energy Meters
5	IS 14434 (1998)	Polycarbonate Moulding & Extrusion Materials
6	IS : 15959	DLMS - Indian Companion Standard
7	IS: 15707	Testing, evaluation, installation, maintenance of AC Electricity meters.

4.0 METER FRAME:

As per latest IS 13010 (2002) or latest amendments.

5.0 ELECTRICAL SPECIFICATIONS:

Class of Accuracy	Class 1.0 & should not drift with time.
Supply Voltage	240V AC (Phase-Neutral); 415V (Phase-Phase) \pm 5%
Frequency	50 Hz \pm 5%
Current range (basic) I _b	5.0A, for single phase

	10A for three phase
Maximum Current	600% of I_b for single phase 600% of I_b for three phase
Starting Current	As per IS:13779
Power factor	0.5 lag – unity- 0.8 lead
Power loss	As per IS:13779
Resistance to surge voltage	1.2/50 microsec > 6KV peak As per IS:13779/IEC 1036/CBIP 325
Test Voltage at 50Hz for 1 min	2 KV rms
Clock time accuracy	± 3 min/year – as per CBIP Tech Rep 325.

6.0 POWER SUPPLY VARIATION:-

The meter should be suitable for working with following supply system variations:

SYSTEM	1 Phase 2 Wire	3 Phase 4 Wire
Specified range of operation	70 % to 120 % of V_{ref}	70 % to 120 % of V_{ref}
Frequency	50 Hz \pm 5%	50 Hz \pm 5%

7.0 TEMPERATURE RISE:

As per IS: 13779.

8.0 POWER CONSUMPTION:

8.1 VOLTAGE CIRCUIT: The active and apparent power consumption in the voltage circuit including power supply of meter at reference voltage, reference temperature and reference frequency should not exceed 1.5 Watt and 10VA for single phase and poly phase (per phase) meters.

8.2 CURRENT CIRCUIT: The apparent power taken by each current circuit at basic current, reference frequency and reference temperature should not exceed 4.0 VA for single phase and polyphase (per phase) meters.

9.0 STARTING CURRENT & RUNNING AT NO LOAD:

The meter should start registering energy at 0.4% of basic current at unity power factor and shall be fully functional within five seconds after the rated voltage is applied.

When 70% and 120% of the rated voltage is applied with no current flows in the current circuit, the test output of the meter shall not produce more than one output pulse count.

10.0 MAXIMUM CONTINUOUS CURRENT:

The maximum continuous current in Meters shall be the current at which the meter is purported to meet the accuracy requirement of the specification.

11.0 GENERAL & CONSTRUCTIONAL REQUIREMENTS:

11.1 Meters shall be designed and constructed in such a way so as to avoid causing any damages during use and under normal conditions. However, the following should be ensured:

- (a) Personal safety against electric shock.
- (b) Personal safety against effects of excessive temperature.
- (c) Protection against spread of fire.
- (d) Protection against penetration of solid objects, dust & water.
- (e) Protection against pilferage.
- (f) Protection against meter jamming by spurious signal injection/high magnetic field application.

11.2 The meter shall be designed with Application Specific Integrated Circuit (ASIC) and shall be manufactured using SMT (surface mount technology) components, power supply and voltage divider circuits may be of PTH (pin through hole) technology. The base material of the meter should be of high impact strength, non-hygroscopic, fire retardant, fire resistant, UV stabilized poly carbonate (LEXAN 503R or equivalent).

11.3 The meter shall be housed in a safe, unbreakable virgin polycarbonate casing of LEXAN 143A/943A or equivalent grade having properties of VO inflammability level and UV stabilized. The casing shall be of projection mounting type. The meter

cover shall be transparent, for easy reading of displayed parameters and observation of operation indicators. The meter casing should not change in shape, colour, size or dimension when subjected to 200hrs on UV test as per ASTM D 53. It should withstand 650⁰C glow wire test and heat deflection test as per ISO 75 or as per IEC 60068 -2-5.

- 11.4 The meter shall conform to the degree of protection IP51 or IP54 as per IS/ IEC 60529 for protection against ingress of dust, moisture and vermin.
- 11.5 The meter should be supplied with a transparent extended terminal block cover (ETBC). The ETBC should not be easily detachable from the base. The terminal block should be made of high grade non-hygroscopic, fire retardant, fire resistant, glass reinforced polycarbonate with terminal holes of minimum dia. 10 mm and should be suitable to accommodate the insulation of the conductors meeting the requirement of IS13779/CBIP Report-325. The minimum centre-to-centre distance clearance between adjacent terminals should be 18 mm. The holes in the insulating material shall be of sufficient size to accommodate the insulation of conductor also. Terminal cover should have provision for sealing with at least one seal.
- 11.6 All insulating materials used in the construction of meters should be non-hygroscopic, non- ageing and of tested quality. All parts that are likely to develop corrosion should be effectively protected against corrosion during operating life by providing suitable protective coating.
- 11.7 The meter should be capable of providing phase to neutral protection up to 440 volts for 4 hours.
- 11.8 The manner of fixing the cables to the terminal block should ensure adequate and durable contact such that there is no risk of loosening or undue heating. Meter should have 2 screws of size not less than M4 and head having 6 mm. diameters in each terminal for effective clamping of cables. The screw shall have a flat head and cover tip. It shall be of uniform cylindrical shape and shall not have pointed ends at the end of threads. Screw fixing which may be loosened and tightened several times during the life of the meter should be such that the risk of corrosion resulting from contact with any other material part is minimized. Electrical connections should be so designed that contact pressure is not transmitted through insulating material. All

terminals and connecting screws and washers should be of tinned / nickel plated brass material. The terminal should withstand glow wire test at 960 ± 15 °C and the terminal should withstand at least 135 °C as per IS.

The terminals should be capable to withstand, a current of 150% I_{max} for two hours continuously.

11.9 The meter should be compact in design. The entire construction should be capable of withstanding stresses likely to occur in actual service and rough handling due to transportation. The meter should be convenient to transport and be immune to shock and vibration during transport.

11.10 The meter should have fixing holes, at least one at top and two at bottom. The top holes should be such that the holding screw is not accessible after fixing the meters. The lower fixing screws should be provided under the sealable terminal cover. Each lower fixing screws should have at least one hole for sealing arrangement. The arrangement should be in such a manner that any access to the working part of the meter body will not be possible without breaking/removing/tamper the said seals.

11.11 The meter should be fitted with SHUNT for measuring current in the phase element. The neutral element may have either CT or SHUNT or HALL EFFECT SENSOR with proper isolation.

The shunts used in the current circuit must be of high quality having high thermal stability and temperature co-efficient. They should be E-beam/spot welded.

In case of Hall Effect Sensor, the meter should record as per requirement of Technical Specification in normal & tamper conditions and life of battery used for recording & display during single wire operation should be guaranteed for 10 years.

11.12 For voltage element, PT less design is highly preferred for power supply to PCB.

11.13 The meter cover should be fixed by using ultra sonic welding and break-to-open type. The meter shall have top cover opening detection mechanism. The cover opening event shall be indicated display continuously in auto scroll mode with KWh or through LED and shall be logged in memory. The detection and logging mechanism shall work even when meter is not energized.

11.14 The marking on the meter should be in accordance with relevant clauses of IS 13779.

12.0 TAMPER & ANTI-FRAUD DETECTION/EVIDENCE FEATURES:

12.1 TAMPER CONDITIONS:

The meter should not get affected by any remote control device & shall continue recording energy under any one or combination of the following conditions.

SINGLE PHASE:-

Sl no	Tamper Condition	Meter behaviour
i.	Incoming (I/C) & Outgoing (O/G) inter change	Meter should record forward energy.
ii.	Phase & neutral interchanged	
iii.	I/C Neutral disconnected, O/G Neutral & load connected to earth	
iv.	I/C Neutral disconnected, O/G Neutral connected to earth through resistor & load to earth	
v.	I/C (phase & neutral) inter-changed, load connected to earth	
vi.	I/C & O/G (phase to neutral) inter-changed, load connected to earth	

THREE PHASE:-

The meter should have the following anti-tamper features:

- i) The meter shall be capable of recording energy correctly even if the input and output terminals are interchanged.
- ii) The meter shall work correctly irrespective of phase sequence of supply.
- iii) The meter shall work correctly even in absence of neutral. The Meter should record accurate energy even if load is drawn partially or fully through a local earth.
- iv) The meter shall work correctly if one, two and all three phase current direction is reversed.
- v) The meter should work in absence of two phase and record relevant energy on any one phase & neutral or any one phase & earth.
- vi) The Potential link shall not be accepted.
- vi) Meter should record energy with maximum error of $\pm 4\%$ on injection of DC in neutral.

- vii) Meter should meet accuracy under magnetic influence as per CBIP 304 latest amendments. No abnormal behaviour like flickering, switching on-off of display, abnormal heating etc should be observed during magnet test. Meter should record energy at I_{max} with Tamper logged, if it gets affected from magnetic influence.
- ix) Meter should record energy with maximum error of $\pm 4\%$ on injection of chopped AC in Neutral. However meters which are immune or maintain better accuracy, will be preferred. Maximum chopping for AC injection will be 25% to 30% at peak end.
- x) The registration shall not be affected more than $\pm 4\%$ if external A.C. or high frequency Voltage is applied to the meter neutral w.r.t. earth (up to 450 volt,1khz)
- xi) The meter should be immune to Electro Static Discharge or Sparks of up to 35 KVp (approx) induced by using frequency-generating devices having very high output voltage. 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 and meter should record under this condition. After application of spark discharge meter should record correctly within the specified limits of errors. Beyond 35 KV_{peak}, meter should record as tamper if not immune.
Test Clause: During neutral missing mode, starting test will be done at 1A and accuracy shall be within 2% of I_b and above.

Single Wire Metering: Meters shall also record energy when only one phase or neutral current is passing through the meter at 1amp or more. Meter recording shall be within $\pm 2\%$ accuracy.

12.2 The meter shall work satisfactorily with guaranteed accuracy as per limit of IS: 13779 (Clause No.9.2.1 and 11.2) under the presence of the following influence quantities:-

- i. External magnetic field
- ii. Electromagnetic field induction
- iii. Radio frequency interference
- iv. Vibration, etc

- v. Waveform 10% of 3rd harmonics
- vi. Voltage variation (70% - 120% of Vref.) in 0.5 lag and upf both in 5% and 100% of Ib.
- vii. Frequency variation $\pm 5\%$ of 50 Hz in 0.5 lag and upf both in 5% and 100% of Ib
- vii. Electromagnetic H.F. field
- viii. D. C. immunity test.

External magnetic field test shall be done as per IS and CBIP report 325 for AC abnormal field at 0.5 Tesla for DC magnetic field.

12.3 TAMPER LOGGING:

- a. The meter should be immune to electro static discharge or sparks up to 35KV peak. The meter should record as tamper if not immune. Meter should record correctly within the specified limit of error under this condition.
- b. The meter shall log all events when AC/DC/Pulsating voltage is injected in neutral circuit especially when the same can disturb recording of energy.
- c. The meter should log on the events of attempts of tampering by external magnetic field as mentioned in the IS: 13779

The meter shall record as per actual load once the external abnormal magnetic field is removed.

12.4 EVENT LOGGING:

The meter shall be capable of recording occurrences and restoration with date and time irrespective of the following tamper conditions:

- a. Missing Potential for all phases (phase wise), even without any load drawal.
- b. Voltage unbalance
- c. Current reversal for all phases (phase wise), when threshold value must be 10% of Ib (It must not be restored without threshold current).
- d. All potential missing or Power failure.
- e. Magnetic Disturbances (IS 13779 & CBIP 325)

- f. Neutral Disturbances (If it logged).
- g. Current Terminal open

The meter should log all the following events:-

- i. Neutral Disturbance : 40 events
- ii. Selection of “one wire power” : 40 events
- iii. Events top cover opening : 1 event
- iv. Magnetic event : 40 events
- v. Abnormal external field/ESD : 40 events
- vi. Low voltage (below 180V) : 40 events

Note: The event count is minimum.

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.

The occurrence and restoration of tamper should be equal to 5 min. (except Magnetic and Neutral Disturbances tampers)

All authenticated commands should be Base Computer Software controlled.

All transactions with meter should be date and time logged in the downloaded data (minimum 25 transactions).

13.0 DISPLAY

- 13.1 The meters shall have bright LCD electronic display with minimum 6+1 digits. The height X width of the digit should be 8.0 x 5.0 mm (minimum). The display should have backlit capability for easy reading. The LCD shall be of STN (Super Twisted pneumatic) type. When the LCD is placed at a constant temperature of 65⁰C for a period of 30 minutes in operating condition and 80⁰C for 30 minutes under de-energised/storage condition, it should not get deformed.
- 13.2 Display should have viewing angle of 120⁰ and up to 1 m distance.
- 13.3 The registered parameter should not be affected by loss of power. The display shall not be affected by electrical or magnetic disturbance.

13.4 The meter shall have a test output (blinking LED) accessible from the front and be capable of being monitored with suitable testing equipment. The operation indicator must be visible from the front. Test output device should 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).

14: DATA STORAGE AND MEMORY

14.1 The data should be stored in non-volatile memory (NVM). The NVM should retain data for a period of not less than 10 years under un-powered condition. Battery back-up memory will not be considered as NVM. It should not be possible to change the data stored in the NVM through any standard serial communication.

15.0 SCROLLING DISPLAY PARAMETERS:

The manufacturer should provide 2(two) push button for scrolling of the parameter in which one is for forward scrolling and the other for backward scrolling and this would be applicable for capacitive type scrolling mode.

15.1 In addition to the display of instantaneous parameters such as load, power factor, voltage and current, the meter should also be capable to measure and display continuously:-

Auto-Display parameters for Single Phase shall be in the following order:

- a. LCD test
- b. Meter serial number
- c. Real Date (dd mm yy)
- d. Real Time (hh mm ss)
- e. Cumulative Active Forwarded Energy (KWH)
- f. Cumulative Apparent Energy (KVAH)
- g. Maximum Active Demand (Current month)
- h. Date of occurrence of Maximum Active Demand (Current month)
- i. Time of occurrence of Maximum Active Demand (Current month)
- j. Maximum Apparent Demand (Current month)
- k. Date of occurrence of Maximum Apparent Demand (Current month)
- l. Time of occurrence of Maximum Apparent Demand (Current month)

- m. instantaneous power factor
- n. Frequency
- o. Instantaneous Voltage (phase to Neutral)
- p. Instantaneous Current
- q. Cumulative Active Energy of last billing month
- r. Cumulative Apparent Energy of last billing month
- s. Maximum Active Demand of last billing month
- t. Date of occurrence of Maximum Active Demand (last billing month)
- u. Time of occurrence of Maximum Active Demand (last billing month)
- v. Maximum Apparent Demand of last billing month
- w. Date of occurrence of Maximum Apparent Demand (last billing month)
- x. Time of occurrence of Maximum Apparent Demand (last billing month)
- y. Power OFF Hours (Previous Month ,i.e. . . since the last M.D. reset).
- z. Cumulative Billing Count
- aa. Cumulative Tamper Count
- ab. Last Billing reset Date & Time
- ac. Connection check
- ad. Self Diagnosis

Auto-Display parameters for Three Phase Meters shall be in the following order:

- a) LCD test
- b) Meter serial number
- c) Real Date (dd mm yy)
- d) Real Time (hh mm ss)
- e) Cumulative Active Forwarded Energy (Kwh)
- f) Cumulative Apparent Energy (Kvah)
- g) Maximum Active Demand (Current Month)
- h) Date of occurrence of Maximum Active Demand (Current month)
- i) Time of occurrence of Maximum Active Demand (Current month)
- j) Maximum Apparent Demand (Current month)
- k) Date of occurrence of Maximum Apparent Demand (Current month)
- l) Cumulative Reactive Energy (Lag Kvarh)
- m) Cumulative Reactive Energy (Lead Kvarh)
- n) Time of occurrence of Maximum Apparent Demand (Current month)
- o) Cumulative Active Demand (24 Hours)

- p) Cumulative Apparent Demand (24 Hours)
- q) Instantaneous power factor
- r) Frequency
- s) Instantaneous Voltage 1,2,3 (phase to Neutral)
- t) Instantaneous Current 1,2,3
- u) Cumulative Active Energy of last billing month
- v) Cumulative Apparent Energy of last billing month
- w) Maximum Active Demand of last billing month
- x) Date of occurrence of Maximum Active Demand (last billing month)
- y) Time of occurrence of Maximum Active Demand (last billing month)
- z) Maximum Apparent Demand of last billing month
- aa) Date of occurrence of Maximum Apparent Demand (last billing month)
- bb) Time of occurrence of Maximum Apparent Demand (last billing month)
- cc) Cumulative TOD Active Energy Zone-1.2.3
- dd) Cumulative TOD Apparent Energy Zone-1.2.3
- ee) Cumulative Billing Count
- ff) Cumulative Tamper Count
- gg) Power OFF Hours (Previous Month i.e since the last M.D. reset).
- hh) Last Billing reset Date & Time
- ii) Phase Sequence
- jj) Connection check
- kk) Self Diagnosis

Each parameter should be on home display for 15 seconds.

[The meter should also have provision for automatic recording of cumulative KWh & KVAH reading at 2400hours daily and the same should be stored to memory]. The display shall never be blanked out in all conditions.

15.2 PUSH BUTTON DISPLAY PARAMETERS

The display parameters shall be in the same order as that in the Auto-Display mode both for Single phase and Three phase Meters. The display parameters should be instantaneous on pressing the push button with no time lag.

15.3 PUSH BUTTON DISPLAY PARAMETERS DURING POWER OUTAGE

Single Phase:

- a. Meter serial number

- b. Real Date (dd mm yy)
- c. Real Time (hh mm ss)
- d. Cumulative Active Forwarded Energy (24 Hours)
- e. Cumulative Apparent Energy (24 Hours)
- f. Maximum Active Demand (Current month)
- g. Maximum Apparent Demand (Current month)
- h. Cumulative Active Energy of last billing month
- i. Cumulative Apparent Energy of last billing month
- j. Maximum Active Demand of last billing month
- k. Maximum Apparent Demand of last billing month

Three Phase Meters :

- a. Meter serial number
- b. Real Date (dd mm yy)
- c. Real Time (hh mm ss)
- d. Cumulative Active Forwarded Energy (24 Hours)
- e. Cumulative Apparent Energy (24 Hours)
- f. Maximum Active Demand (Current month)
- g. Maximum Apparent Demand (Current month)
- h. Cumulative Active Energy of last billing month
- i. Cumulative Apparent Energy of last billing month
- j. Maximum Active Demand of last billing month
- k. Maximum Apparent Demand of last billing month
- l. Cumulative TOD Active Energy Zone-1.2.3
- m. Cumulative TOD Apparent Energy Zone-1.2.3

16.0 TIME OF DAY FACILITIES:

The meter should have facilities to record Active, Apparent Energies and MD in 3 zones with Zone-1 (0600-1700Hrs), Zone-II (1700-2300Hrs) & Zone-III (2300-0600 Hrs) but it should be user programmable through **authenticated MRI/ Laptop/RMR command** for future redistribution/reallocation of Zones/time. Necessary software for the same is to be provided by the manufacturer.

17.0 METER READING AT POWER OUTAGE AND BATTERY:

- 17.1 The meter should be able to display the parameters in no-power condition by the use of push button and also should be able to upload the data to the MRI. This provision

should be made in the form of rechargeable super capacitor back-up and primary battery.

17.2 The super capacitor shall be capable of back-up for display of parameters up to 48 hours from the instant of power failure.

17.3 The primary battery should be able to support more than 50,000 push-button operations during the meter life. No power shall be consumed from this circuit when mains are available.

17.4 The performance of super capacitor shall be verified by removing the battery from the circuit in any meter during sample testing or inspection.

18.0 **MAXIMUM DEMAND REGISTRATION AND RESET:**

Meter shall continuously monitor and calculate the average maximum demand in KW and KVA for each demand interval time of 30 minutes and maximum of these in a calendar month should be stored along with date and time when it occurred. The maximum demand should automatically reset at 24:00 hours of the last date of each calendar month. The cumulative KWh and KVAH reading should also be recorded at 24:00 hours on the last date of each calendar month for previous 12 months.

19.0 **LOAD SURVEY & BILLING POINT REQUIREMENTS:**

The Meter shall record load survey of minimum 45 days (Power-On days) for KWH, KVAH, KW, KVA & Power Factor with integration period of 30 minutes. It shall be possible to select either demand or energy view at the BCS end (Load survey report should be available for all the available parameters). Also snap shot of Instantaneous values of Voltage, Phase Current, KWh reading, KW/KVA and PF shall be available with load survey. However manufacture may provide more Nos. of parameters in addition to KWH & KVAH in load survey report. There shall be provision of selection of either single parameters or more Nos. of parameters in software. There shall also be provision of particular date /day selection in software. There shall be provision to view and print the load survey (LS) report on daily basis, weekly basis or monthly basis.

The load survey data shall be available in the form of line, bar charts as well as in spread sheets. The BCS shall have the facility to give complete load survey data both in numeric and graphic form.

The load survey data must be available in FIFO manner (First In First Out)

19.1 It shall be possible to retrieve these data via communication port on to hand-held meter reading instrument (MRI) and it shall be possible to off load these data on to computer and get complete details of the load/demand pattern in terms of KW/KWh both in numeric data form and in graphic form for all the 24 hours a day divided as per the pre-set integration period of 30 minutes in each individual case. Necessary software for this purpose must be provided by the supplier. The total time in minutes to be taken by meter for retrieval of all above data shall have to be clearly indicated.

20.0 COMMUNICATION PORT:

20.1 (a) Optical port will be provided for local communication and RS-232 in the form of RJ-11. The port for local communication and baud rate shall be as per IS 15959. The RS-232 port should be able to operate on Low Power Radio with RF Mesh (directly up to DCU). Different communication technologies shall follow relevant National or International Standard as applicable.

(b) It should not be possible to reset the energy reading in the meter or make any change in the data stored in the meters either current or historical, with the MRI.

(c) The compatibility of transferring data from the meter to MRI and then to the base computer system (BCS) should be easily established.

21.0 TEST OUTPUT:

The meter shall have a separate pulse emitter or high resolution display for testing purpose as described in CBIP Report No: 325.

The resolution of the test output shall be sufficient, to enable the conduction of the starting current in less than 10 minutes and accuracy test at the lowest load shall be completed with desired accuracy within 5 minutes (as per CBIP Report No: 325).

22.0 CONNECTION DIAGRAM:

Every meter shall be indelibly marked with a connection diagram for which it is intended and shall be attached to the inner side of the extended terminal cover. In case any special precautions need to be taken at the time of testing the meter, the same may be indicated along with the circuit diagram.

23.0 GUARANTEED TECHNICAL PARTICULARS:

The guaranteed technical particulars shall be as detailed in the specification at ANNEXURE-IA, IB & IC respectively.

24.0 TECHNICAL DEVIATIONS:

Any deviation in technical specification as specified in the specification shall not be entertained.

25.0 TEST:

A) TYPE TEST:

The offered meters to be tested should be type tested at any CPRI or National Test House, in accordance with IS: 13779 with latest amendments/CBIP report, should not be more than 3 years old. A copy of the Type Test results shall be enclosed.

B) ACCEPTANCE TEST:

The acceptance tests as stipulated in IS: 13779/CBIP 325 (with latest amendments) shall be carried out in the presence of MePDCL representative. The following tests shall be carried out:-

- i. Physical examination of Meters
- ii. AC High voltage test
- iii. Insulation resistance test
- iv. Power consumption test
- v. Test of starting current
- vi. Test of no-load condition
- vii. Repeatability of error test at 5 % of I_b (UPF) & 100% I_b (UPF)
- viii. Test on limits of error any of the above tests, the lot shall be rejected.
- ix. Dry heat test as per clause 12.6.1 of IS: 13779.
- xii. Any other as may be proposed as per relevant standards.

C) ROUTINE TEST:

Each and every meter shall undergo the routine tests as per IS: 13779 (1999)/CBIP 325.

D) SPRING HAMMER TEST:

The mechanical strength of the meter case shall be tested with a spring hammer as per IS 13779 (latest edition).

26.0 TESTING FACILITIES

The manufacturers shall have at least the following test facilities to ensure high quality and accurate calibration of meters.

- i. Insulation resistance measurement at no-load.
- ii. Running at no-load
- iii. Starting current test
- iv. Limits of error
- v. Range of adjustment
- vi. Low load run test
- vii. Power loss in voltage and current circuits
- viii. Heating test
- ix. Magnetic disturbance/interference

27.0 SOFTWARE:

Licensed copies of the following software shall be made available to MePDCL and shall be installed on each Hand Held Unit (HHU) or Common Meter Reading Instrument (CMRI) and Base computer software (BCS) by the manufacturer.

27.1 HHU or CMRI Software for reading, downloading meter data. The software shall be user friendly with latest windows operating system.

27.2 Windows based user interactive Base Computer Software (BCS) for receiving data from HHU or CMRI and downloading instructions from base computer software to CMRI.

27.3 Necessary software for loading application program into meter via CMRI.

27.4 The manufacturer should ensure that software supplied with this package works properly with HHU or CMRIs of other manufacturers.

- 27.5 The downloaded data shall be converted to the ASCII or database file format for easy integration with the existing billing software of MePDCL. It should be user configurable as per selective parameters. It should be group in ASCII & scalable.
- 28.0 The manufacturer may provide new and additional details / parameters of design and construction of which are of better technology than those specified in the document.
- 29.0 Manufacturers shall also include in the meter nameplate the wording “ For sale in Meghalaya only”.

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TECHNICAL SPECIFICATION OF METER BOX SUITABLE FOR SINGLE & THREE PHASE STATIC ENERGY WHOLE CURRENT METER WITH LCD DISPLAY

1.0 SCOPE

1.1 This specification covers the design, engineering, manufacture, assembly, testing, inspection and sale of meter box having base made out of Sheet moulding compound or transparent polycarbonate in the State of Meghalaya. The meter box shall be suitable for housing Single & Three phase meters on wall mounting indoor as well as outdoor application (SMC conforming to IS:13410) and cover made of fully transparent polycarbonate material conforming to IS:14772/2000 (amended up to date).

2.0 SERVICE CONDITIONS:

The meter boxes against this specification should be suitable for satisfactory continuous operation and capable of maintaining required accuracy under the following conditions:

1	Maximum ambient temperature	55 ⁰ C
2	Minimum ambient temperature	-10 ⁰ C
3	Relative humidity (%)	10-100
4	Max-wind velocity	47 m/sec
5	Maximum altitude above sea level	>1000M
6	Iso-ceramic level	50 days/year

3.0 APPLICABLE STANDARDS:

Unless otherwise stated elsewhere in this specification the meter box shall generally conform to IS:14772/2000 (amended up-to –date) and material of construction i.e. SMC / polycarbonate shall conform to IS:13410/1992 & IS:14434 respectively and requirement of this specification.

4.0 DESIGN & CONSTRUCTION:

4.1 The meter box shall be so constructed as to have roof tapering down to both sides for easy flow of rainwater. It should be moulded from 100% virgin raw material, SMC as well as polycarbonate.

- 4.2 The meter box shall be dust proof, rust proof, vermin and water proof capable to withstand temperatures of Glow wire test at 650⁰C as per IS:11000. HDT of meter box material shall be minimum 85⁰C.
- 4.3 The meter box shall be such that there shall be minimum 70 mm clearance at the bottom, 40 mm clearance on all top & both sides, 30 mm clearance at the front and 10mm clearance at the back between meter and meter box inner wall.
- 4.4 The wall thickness of the meter box base and cover shall be 2 mm. The base of the meter box shall be raised by about 10 mm for easy wiring for fixing the meter. The meter screws shall not project outside.
- 4.6 The meter box base shall be made from thermo setting plastic i.e. glass reinforced polyester sheet moulding compound conforming to IS:13410/1992, Grade S1. In case of SMC, the cover shall be made from fully transparent polycarbonate material grade ISPCXXXILRC 11243F34 as per IS:14434 & requirement of this specification.
- 4.7 The base and cover of the box shall be all UV stabilized to ensure that it does not get “yellow” over a period of time. It should not change in colour, shape, size, dimensions when subjected to 200 hours on UV ageing test as per ASTM:G53 (Cl no:9.3), 4 hours UV at 600⁰C and 4 hours condensation at 500⁰C.
- 4.8 The base and cover shall be capable of withstanding temperature of boiling water for five minutes continuously without distortion or softening.
- 4.9 The cover of transparent polycarbonate material (except for SMC) shall have light transmission of 80% or more (to be tested as per ASTM D1003). This will facilitate photo meter reading as well as transparency.
- 5.0 The meter box and cover shall have minimum 2nos. of matching wire sealing holes.
- 5.1 All corners of the meter box should be round and not pointed ones.
- 5.2 The meter box shall be moulded in single piece forming the body of the meter box. The cover shall be fitted to the base by 2 nos. concealed stainless steel hinges. The cover shall rest on the collar of the meter box base in such a way that any access from outside of the meter is not possible. The hinges shall be fitted with the meter box body base and cover rigidly, thereby making the meter box pilfer resistant.

- 5.3 For holding and sealing the door 2 nos. U-shaped clamps shall be provided. These clamps/latches would hold the box cover with base.
- 5.4 The door in closed position should be overlapped in such a manner that no direct entry or access is possible.
- 5.5 The monogram of MePDCL shall be engraved on the mould of the meter box cover.
- 5.6 The meter box should have an opening (holes) on both the lower portion of the left & right hand part of the meter box for direct entry of the service pipe (40mm dia) in the box. These two holes should be provided with polymeric materials collapsible gland for the incoming and outgoing cables.
- 5.7 The meter box shall comply with IP protection class with IP-54 or higher.
- 5.8 The mounting arrangement of the meter in the meter box shall be by way of adjustable slotted stainless steel strips of thickness 3mm which shall be fixed on the base by providing raised groove with internal threads and 4 nos. of 4mm diameter, 8mm long full thread screws to suit mounting of the meters.
- 5.9 4 nos. of key holes of diameter 6 mm shall be provided at the backside of the meter box to facilitate mounting of the meter box on the wall or pole 4 nos. of 75mm long, 6 mm diameter mounting screws with washers shall be provided along with the meter box.
- 5.10 The surface appearance of the meter box must be smooth, non-porous and homogenous, free from ripples, defects and marks. No fillers or fibres should be visible at any place.
- 5.11 The meter box shall comply with magnetic influence of AC/DC/0.5 Tesla permanent magnet where tested as per Meter Testing Method of CBIP Report No: 325 with meter having 0.5 Tesla magnetic immunity mounted in it.
- 6.0 1 no. earth bolt of 6mm diameter x 20mm length with 2 nos. nuts and 2 nos. washers & a spring washer shall be provided. The irremovable earthing symbol is to be provided near earth bolt.
- 7.0 MARKING: Shall be as per the provision of IS: 5133(Part-II).

8.0 The dimensional drawings giving details of the meter box shall be enclosed in the EOI.

9.0 TESTS:

The following tests are to be conducted on the box at any accredited laboratory and test reports are to be furnished as per IS:5133 (Part-II) or its latest amendments.

9.1 TYPE TEST:

i. Test for dimension.

ii. Test for mechanical strength

iii. Test for water absorption

iv. Test for stability at high temperature

v. Test for withstanding temperature of boiling water for 5 minutes continuously for non-distortion or softening of material as per IS:5133(Part-II)

vi. Glow wire test at 650⁰C as per IS: 11000

vii. Test of HDT minimum 85⁰C

9.2 ACCEPTANCE TESTS:

i. Physical verification of dimension of the box.

ii. Compatibility of the box for housing the meter and ensuring ease of connecting and reading the meter.

10.0 THE GUARANTEED TECHNICAL PARTICULARS: The guaranteed technical particulars as detailed in Annexure-IC shall be a guaranteed and a statement of the GTP shall be furnished in format along with the EOI. EOI without the GTP shall be treated as non-responsive.