



उत्तर प्रदेश पावर कारपोरेशन लिमिटेड

(उ0प्र0 सरकार का उपक्रम)

शक्ति भवन, 14-अशोक मार्ग, लखनऊ।

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संख्या : 1851-रेस्पो/सौभाग्य/मीटर विशिष्टि

दिनांक: 30 जून, 2020

विषय- 5-30 एम्पीयर इलेक्ट्रॉनिक स्टैटिक एनर्जी मीटर की मानक तकनीकी विशिष्टि के सम्बन्ध में।

प्रबन्ध निदेशक,

विद्युत वितरण निगम लि०,

पश्चिमांचल- मेरठ/दक्षिणांचल- आगरा/

मध्यांचल-लखनऊ/पूर्वांचल-वाराणसी एवं

केस्को- कानपुर।

महोदय,

कृपया उपरोक्त विषयक उत्तर प्रदेश पावर कारपोरेशन लि० के पत्र संख्या- 2992-रेस्पो/सौभाग्य/मीटर विशिष्टि दिनांक 02.09.2019 का संदर्भ ग्रहण करने का कष्ट करें जिसके द्वारा वितरण निगमों द्वारा क्रय किये जा रहे सिंगल फेज मीटरों की 5-30 एम्पीयर इलेक्ट्रॉनिक एनर्जी मीटर की मानक तकनीकी विशिष्टि प्रेषित की गयी थी। उपरोक्त तकनीकी विशिष्टि में द०वि०वि०नि०लि०-आगरा से प्राप्त सुझावों को सम्मिलित करते हुए पत्रांक 1061-रेस्पो/सौभाग्य/मीटर विशिष्टि दिनांक 15.04.2020 के द्वारा संशोधन निर्गत किये गये थे। तदोपरान्त दिनांक 18.06.2020 को अध्यक्ष, उत्तर प्रदेश पावर कारपोरेशन लिमिटेड की अध्यक्षता में आहूत विडियो कान्फ्रेंस का कार्यवृत्त आपको पत्र संख्या- 1812-रेस्पो/सौभाग्य/मीटर विशिष्टि दिनांक 27.06.2020 से प्रेषित कर दिया गया है।

उत्तर प्रदेश पावर कारपोरेशन लिमिटेड के पत्र संख्या- 2992 दिनांक 02.09.2019 के द्वारा निर्गत 5-30 एम्पीयर सिंगल फेज एनर्जी मीटर की तकनीकी विशिष्टि में अद्यतन तक किये गये संशोधनों को समाहित करते हुए संशोधित मानक तकनीकी विशिष्टि (प्रति संलग्न) आपको इस अनुरोध के साथ प्रेषित है कि कृपया इस सम्बन्ध में आवश्यक कार्यवाही कराने का कष्ट करें।

संलग्नक : यथोपरि।

भवदीय,


(र० के० श्रीवास्तव)
निदेशक (वितरण)

प्रति :-

1. निजी सचिव सम्बद्ध अध्यक्ष, उ0प्र0 पावर कॉरपोरेशन लिमिटेड, शक्ति भवन, लखनऊ।
2. निजी सचिव सम्बद्ध प्रबन्ध निदेशक, उ0प्र0 पावर कॉरपोरेशन लिमिटेड, शक्ति भवन, लखनऊ।
3. निदेशक (वाणिज्य), उ0प्र0 पावर कॉरपोरेशन लिमिटेड, शक्ति भवन, लखनऊ।
4. समस्त निदेशक (वाणिज्य), , विद्युत वितरण निगम लि०, दक्षिणांचल-आगरा/ मध्यांचल-लखनऊ/ पश्चिमांचल-मेरठ/ पूर्वांचल-वाराणसी एवं केस्को- कानपुर।

**TECHNICAL SPECIFICATION FOR SINGLE PHASE TWO WIRE
(05-30A) CLASS 1.0 ACCURACY FULLY STATIC WATT HOUR
METER WITH LCD DISPLAY AND DATA DOWNLOADING**

1.0 SCOPE:

This specification covers design, engineering, manufacture, assembly, stage testing, inspection and testing before supply and delivery at site store (for Indian Bidders) and CIF Indian Port (for foreign Bidders) of Single Phase Two Wire solid state (static) Electronic KWh Energy Meters of accuracy Class 1.0 of current range 05-30A. The meter should record total energy (fundamental energy + harmonic energy) having facility/capability for recording tamper information in LT-1 phase consumers. The meter shall be supplied along with pilfer proof box as per the details given in this specification.

- 1.1 It is not the intent to specify completely herein all the details of tech design and construction of material. However, the material shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance therewith. The offered material shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.

2.0 Standards

- 2.1 The Meters shall conform (for performance and testing thereof) in respects to the relevant Indian/International Standard Specifications with latest amendments thereto unless otherwise specifically mentioned in the specification.

Indian Standard No.	Title	International & Internationally Recognized Standard.
IS: 13779/1999 with latest amendments thereof.	Specification for AC Static Watt-hour Meters Claus 1&2	IEC62052-11 (2003) & 62053-21(2003)
IS: 14772:2000	Specification for boxes for the enclosure of electrical accessories	
Reference is made to CBIP Technical Report No., 325 read with latest Amendments (Copy enclosed)	Specification for AC Static Electrical Energy Meters.	
Reference is also made to CBIP Technical Report No. 111 (Copy enclosed)	Specification for Common Meter Reading Instrument for optical Communication with meter.	
IS : 15959 with latest amendments thereof.	Data exchange for electricity meter, reading, tariff and load control companion specification	

Equipment conforming to other internationally accepted standards, which ensure equal or higher quality than standards mentioned above would also be acceptable. In case the Bidders who wish to offer material conforming to the other standards, Salient points of difference between the standards adopted and the specific standards shall be clearly brought out in relevant schedule. Four copies of such standards with authentic English Translations shall be furnished along with the offer. In case of conflict the order of precedence shall be (i) as per IS, (ii) CBIP Technical

Report 325, (iii) IEC, (iv) Other standards. In case of any difference between, provisions of these standards and provisions of this specification, the provisions contained in this specification shall prevail.

3. **Service Conditions:**

The meters to be supplied against this specification shall be required to operate satisfactorily and continuously under the following tropical conditions. Meters shall be capable of maintaining required accuracy under hot, tropical and dusty climate.

Location	At Various locations in the state of Uttar Pradesh
Max. Ambient air temperature (deg.C)	50
Max. Ambient temperature in a closed box (deg.C)	60
Max. Ambient air temperature in shade (deg.C)	45
Min ambient air temperature (deg.C)	(-) 5
Average daily ambient air temp. (deg.C)	40
Max. Relative Humidity (%)	95
Max. altitude above mean sea level (m)	2200
Average Annual Rainfall (mm)	1500
Isoceraunic level (days per year)	50
Seismic level (Horizontal accn.)	0.30 g.

Moderately hot and humid tropical climate, conducive to rust and fungus growth.

4.0 Principal Parameters

4.1 The material shall conform to the following specific parameters.

Sl. No.	Item	Specification
1.	Type of installation	Outdoor in the box
2.	System Voltage	240V, +20% to -40% Phase to neutral
3.	System Frequency	50Hz \pm 5%
4.	No. of phases	Single phase two wire
5.	System of earthing	Solidly grounded

5.0 Technical Requirements:

5.1 Meters shall be rated as follows

- (a) Voltage 240 V Phase to Neutral
- (b) Current Basic current 05 A, Max. Current 30A
- (c) Resistance to Surge Voltage of 1.2/50 μ Sec – 10 Kv Peak

5.2 **Supply System :**

The meters should be suitable for use on 240 V (Phase to Neutral), single phase two wire systems.

5.3 **Power Supply Variation**

The extreme supply variation, which an operating meter should withstand without damage and without degradation of its metrological characteristics when it is subsequently operated under its operating conditions.

Voltage -40% to + 20%

- Frequency $\pm 5\%$
- Power Factor Range Zero lag - Unity - Zero Lead*
- However manufacturers can offer meters, which can withstand higher variations.
- * The meter shall work over wide PF range and limit of errors with the variation of PF shall be as per IS 13779 with latest amendment thereof.
- However, if phase to phase voltage (i.e., 440 volts) is applied for 30 minutes between phase and neutral of the meter, the meter should not get damaged and continue to record correctly within class 1.0 accuracy after restoration of normal supply.
- 5.4 **Accuracy**
- Class of accuracy of the KWh meters shall be 1.0. The accuracy should not drift with time.
- 5.5 **Power Consumption:**
- 1- **Voltage Circuit:** The active/ and apparent power consumption in each voltage circuit including the power supply of meter of reference voltage, reference temperature and reference frequency shall not exceed 1.0 watts and 4 VA.
- 2- **Current Circuit:** The apparent power taken by Current circuit at basic current reference and reference temperature shall not exceed 1VA.
- 5.6 **Starting Current**
- The meter should start registering the energy at 0.2% of basic current.
- 5.7 **Maximum Current**
- The maximum current of the meters is 30A at which the meter support to meet the accuracy requirement. **However Meter should work at 150% of Imax.**
- 5.8 **Measuring Parameters**
- (1) Real time and date
- (2) Active energy KWh (Fundamental + Harmonic)
- (3) Maximum demand with date and time with 30 minutes integration period KW.
- The meter should also have provision for automatic recording of cumulative KWh at 24.00 hours on the last day of the month for each calendar month and the same should go to memory. Display of real date & time shall also be provided in auto scroll along with recording in memory.
- Note :** At the start of each sequence of display LCD healthiness / anomaly shall be displayed.
- 5.9 **Display parameters & type of Display**
- 5.9.1 **Auto Scroll Display**
- Meter shall be capable of displaying the following parameters in the same cyclic order. The display of various parameters shall be continuously scrolling after another. The display shall have 'ON' time of at least 10 sec. for each measured values for auto display cycling.
- | | | |
|-----|---|----------------|
| 1.0 | LED Check | |
| 2.0 | Real time | |
| 3.0 | Date | or Date & Time |
| 4.0 | Meter Serial Number | |
| 5.0 | Active Cumulative Forward Energy (KWh) | |
| 6.0 | Kw (Cumulative Maximum Demand) | |
| 7.0 | KVAh (Cumulative Apparent Energy Reading) | |
- The display of various parameters shall be continuously scrolling one after another.
- 5.9.2 **Display Parameters (Push button)**
- The Meter push button should be pilfer proof push button design i.e. without any scope of tampering or liquid injection through the same.

In addition to the auto display mode parameters, the following parameters shall be displayed (on same cyclic order) on pressing the push button as well as downloadable to the BCS through the CMRI.

- i 6 month active cumulative kwh history for each calendar month for previous Six (06) months or more. However at BCS end 12 months or more histories should be available.
- ii. 6 month maximum demand (kw) history for each calendar month. However at BCS end 12 months or more histories should be available.
- iii. 6 month apparent cumulative kwh history for each calendar month for previous Six (06) months or more. However at BCS end 12 months or more histories should be available.
- iv. Instantaneous voltage p-n.
- v. Instantaneous current.
- vi. Instantaneous Load (Kw).
- vii. Instantaneous Power Factor (pf)
- viii Average P.F. of current and last month.
- ix Cumulative power ON hours.
- x. Cumulative tamper occurrence count.
- xi Present status of tamper
 - a) Voltage Related.
 - b) Current Related.
 - c) Other Tamper
- xii Date & time of last tamper (occurrence).
- xiii Date & time of last tamper (Restoration).
- xiv **The meter shall have a minimum 6-digit backlit liquid crystal display (LCD), with another digit for legend. The display of LCD should be bright color. The minimum character height shall be 8 mm. KWh will be read upto 6 complete digits only. The display shall be digital type with non-destructive read out. However recording in memory in decimal after six digits will continue.**

PARAMETERS	ON DISPLAY	ON BCS
KWH (FORWARD)	6+0	6+2
MAX. DEMAND(KW)	2+2	2+2

The display unit shall be permanently backlit LCD. It should be visible in daylight. The decimal unit shall not be displayed for cumulative kWh in auto scroll mode. However it shall be displayed in push button mode for high resolution display for testing. The backlit should not glow during power off conditions. The LCD shall be off STN (Super Twisted Nematic type)/ HTN (High Twisted Nematic type) construction suitably for temperature withstand of 80 °C (storage) & 65 °C (operation) i.e. (i) when the meter is placed over a constant temperature of 65 °C for a period of 30 minutes, the character of LCD should not deform (ii) After keeping the meter at a constant temperature of 80 °C and when restores at normal temperature, LCD display should work satisfactorily. The LCD display should have a wide angle of 120 °C and upto 1 meter distance for clear visibility of the display of the meter reading at distance. Large viewing area with large display icon is preferred. The registered parameters shall not be affected by loss of power. The display shall not be affected by electrical & magnetic disturbances.

Dot matrix display shall not be accepted. It shall be possible to display contents of relevant parameters tamper events with another digit displaying legend for identification.

The meter should have non-volatile memory (**Read only i.e. one way communication**), so that the registered parameters will not be affected by loss of power. The non-volatile memory should have a minimum retention time of 12 years. It should be possible to retrieve the data from NVM in case meter is burnt/damaged. Battery backup memory will not be considered as NVM.

5.9.3 **Meter reading display during power outage:**

Provision to read the meter in no power condition shall be made. In case of power failure Auto mode shall not function. The same push button shall be used for displaying the Current KWh, Current month maximum demand KW , Average PF last Month & Power ON Hours shall be displayed . But in any case rechargeable capacitor back up power shall not be used for display under Power off condition. No power shall be consumed from this circuit when mains are available. In case of power failure data downloading for Historical energy, maximum Demand & all the tamper events through CMRI (common meter reading instrument) shall be possible. **Battery life shall be 15 years. To verify that the sample meters are not having capacitor rechargeable battery, the samples will be kept in power off conditions for 48 Hrs and then meters will be checked by pressing the push button and the CMRI shall be done.”**

5.9.4 **CMRI/BCS REQUIREMENTS**

The Common Meter Reading Instrument (CMRI) should be capable of being loaded with user friendly software compatible for reading/downloading meter data. Windows based Base Computer Software (BCS) with updated operating platform or higher operating system. This BCS should have, amongst other requirements, features and facilities described later in this specification, the facility to convert meter reading data into user definable ASCII file format so that it may be possible for the user to integrate the same with the user's billing data and process the selected data in desired manner. All the data available in the meter including energy, MD, , 12 (Twelve) Months history , 60 days Load survey & tamper events with snap shots should be convertible to user defined ASCII file format for integration with third party software. The vendor shall supply necessary base computer software for reading / viewing of meter data and converting to user defined ASCII files formats. The user shall have the flexibility to select the parameters to be converted into ASCII file. The vendor shall also supply the necessary CMRI software.

Meter reading through Common meter reading Instrument (CMRI) shall be possible for all make of CMRI. Software shall be supplied free of cost which when loaded in CMRI meter reading of the supplied make shall be possible. **“Bidder shall download software in CMRI available during samples testing to prove that their software is compatible with Common meter reading Instrument (CMRI).”**

5.9.5 **COMMUNICATION PORT**

“Meter CMRI port should essentially be placed at the front side of meter box.”

The meter shall have additional RJ11 (RS232)/ Micro USB (RS232) port along with optical port for reading data through CMRI and AMR Modem. The port shall be compatible with IEC 1107/ PACT/ ANSI and shall be capable of being hooked to a remote metering device such as modem, etc. for future to enable Automatic meter reading.

“For local meter reading, it shall be possible to do entire meter data download within 3 minute (containing instantaneous values, load survey, 12 histories and events) but billing data within one minute. Bidder shall prove communication with all type of available Modems with their meter in front of samples Testing team.” The bidder shall provide meters as per DLMS compliance i.e. meters with open protocol as per IS:15959 Category “C3” for consumer metering.

5.9.6 **Self Diagnostic Features :**

The meter shall be capable of performing self diagnostic check to monitor integrity of data memory location at all time. The meter shall have indication for unsatisfactory/ non functioning/ malfunctioning of following.

- (i) All display segments on meter display. Time & date on meter display.
- (ii) Real time clock (RTC) status in meter reading print out at B.C.S. (Base Computer Software) end.
- (iii) Non-Volatile Memory (NVM) Status in meter reading print out BCS end.
- (iv) Battery status.

5.9.7 **LED/LCD INDICATORS/ PRESENT TAMPER Status:** Meter should indicate following indicators of size 5 mm

- i) LED Indicator for meter calibration (RED).
 - ii) LCD indicator for current reverse indication.
 - iii) LCD Indicator for Earth tamper indication.
 - iv) LCD indicator for one line drawl (neutral missing) tamper indicator.
 - v) LCD indicator magnetic influence tamper indicator.
 - vi) LCD indicator for top cover open. It should be continuously blinking.
- The LCD notation must be easily interpretable.

5.9.8 **ELECTROMAGNETIC COMPATIBILITY AND INTERFERENCE REQUIREMENT:-**

The meter shall meet EMI/EMC requirements as specified in the relevant standards and shall also be protected against radiated interference from either magnetic or radio frequency sources. The meter shall be designed in such a way that the conducted or radiated electromagnetic disturbance as well as electrostatic discharge do not damage or substantially influence the meter. The disturbance(s) to be considered are:-

- i) Harmonics.
- ii) Voltage dips and short interruptions
- iii) Fast transient bursts.
- iv) External DC & AC magnetic fields.
- v) Electromagnetic H.F. fields.
- vi) Electrostatic discharge & HVHF field.
- vii) Radio frequency interference suppression.

5.9.9 **Insulation Requirements:-**

- i) **Insulation Resistance:-** The insulation resistance between both current circuits and voltage circuits connected together and earth (frame) shall be more than 5 Mega ohms.
- ii) **Impulse Voltage:-** The meter shall withstand 1.2/50 microsecond impulse voltage of peak 10 kV peak without any damage in line with clause 12.7.6.2 of IS 13779:1999. Error at Ib, Upf before & after will be measured & after the test, variation in % error of the meter shall not exceed 50% of class of index.
- iii) **A.C. Voltage:-** The meter shall withstand 4kV A.C. Voltage for one minute. This is applicable during lot inspection also.

5.9.10 **ACCURACY REQUIREMENT:-**

- i) **Limits of Error:-** The meter shall comply all the requirements of limits of error as per IS 13779/99 on all the points mentioned in table no. 15 of IS including special test at 0.25 lag & 0.5 lead of Discom requirement. % error at 0.25 lag and 0.5 lead is $\pm 3.5\%$ and $\pm 2.5\%$ respectively for range from 0.1Ib to Imax. Same tests are to be carried out on neutral circuit also with the procedure and limits as per phase circuits.
- ii) **Meter Constants:-** Meter constants shall comply relation between test output and indication in the display with marking on the name plate. The manufacturer/bidder shall state necessary number of pulse/count to ensure measuring accuracy of at least 1/10 of the accuracy class at different test points.
- iii) **Running with No Load:-** This test shall be carried out as per provisions of IS 13779/99 or IEC 62053-21 (2003).
- iv) **Repeatability of error Test (For Acceptance):-** Repeatability test at 5%Ib, 10%Ib & Ib at unity power factor as per IS 13779/99 shall be carried out during inspection of lot and the difference of maximum and minimum value should not be more than half of the limit of class of index.
- v) **Auxiliary Power:-** The meter shall draw power for working of electronic circuit from phase & neutral.
- vi) **Short Time Over Current:-** The meter shall be able to carry short time over current of 30 Imax for half cycle at rated frequency.

5.9.11 **Temperature Rise:-**

- i) Under Normal conditions of use, measuring element and insulation shall not reach a temperature, which might adversely affect the operations of the meter.
- ii) With each current circuit of meter carrying rated maximum current and with each

voltage circuit (and those auxiliary voltage circuits which are energized for periods of longer duration than their normal time constants) carrying 1.25 times the reference voltage, the temperature rise of the respective parts shall not exceed the value given below over and above an ambient temperature of 50 °C:-

- a) Measuring element:- 50 °C.
- b) External Surface of the case: 15 °C

5.10 Maximum Demand Registration and MD Resets:

Meter shall continuously monitor and calculate the average maximum demand for each demand interval time of 30 minutes and maximum of these in a calendar month shall be stored along with date and time when it occurred. The maximum demand shall automatically reset at 24.00 hrs. or the last date of each calendar month for which minimum 30 years calendar shall be programmed by the manufacturer.

The integration period shall be set as 30 minutes, on real-time basis.

The billing purpose parameters (active forwarded energy, maximum demand in kW) shall be registered and shall be available for a minimum period of last 12 (Twelve) months on same sheet through BCS.

Midnight data (KWH, KVAH) of last 60 days shall be provided in MRI.

5.11 General Requirement

Meters shall be designed and constructed in such a way as to avoid introducing any danger in use and under normal conditions, so as to ensure specially.

- (1) Personnel safety against electric shock
 - (2) Personnel safety against effects of excessive temperature.
 - (3) Protection against spread of fire.
 - (4) Protection against penetration of solid objects, dust and water.
 - (5) Anti power saver device be provided.
- 5.11.1 All the materials used in the manufacture of meters shall be of highest quality. The entire design and construction shall be capable of withstanding stresses likely to occur in actual service and rough handling during transportation.
- 5.11.2 All insulating materials used in the construction of meters shall be non hygroscopic, non aging and of tested quality. The meter shall be designed on Application Specific Integrated Circuit /or has the micro controller and shall be manufactured using SMT (Surface Mount Technology) components.
- 5.11.3 The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They should not be ignited by thermic over load of live part in contact with them.
- 5.11.4 The meter shall conform to the degree of protection IP 51 as per IS: 12063 against of dust, moisture and vermin's.
- 5.11.5 In case meter gets damaged /burnt the last reading must remain in memory of the meter if meter not completely burnt. If only LCD is damaged, it should be possible to down load the reading through MRI on site or lab. In case meter gets damaged /burnt the last reading must remain in memory of the meter.
- 5.11.6 The meter shall be supplied with a transparent extended terminal block cover (ETBC).
- 5.11.7 The meter-base, meter cover shall be high Grade UV stabilized Polycarbonate , terminal block and ETBC shall be made of unbreakable, high grade, fire resistant, reinforced, non-flammable, polycarbonate material.
- 5.11.8 The meter cover shall be fully transparent. In case of integrated base and cover it may be transparent/ opaque with transparent window to see LCD display. The window shall be welded with the meter cover such that it can not be undamaged removed without breaking the meter

- cover seals.
- 5.11.9 The terminal block shall be made of high grade non-hygroscopic, fire retardant, low tracking, fire resistant, reinforced poly-carbonate or equivalent high grade engineering plastic with terminal holes of dia 5.5 mm and shall be suitable to accommodate the insulation of the conductors, Terminal should be as per requirement of IS-13779. Terminal should be suitable for carrying 30A continuously without damaging the terminals/terminal block. In each terminal there should be at least two screw for secure connection of the conductor. **Terminal block should be fixed with meter body in such a manner that it becomes integral part of the body & in no manner it can be detached from meter body.**
- 5.11.10 The manner of fixing the conductors to the terminal block shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Screw connections transmitting contact force and screw fixing which may be loosened and tightened several times during the life of the meter shall be such that the risk of corrosion resulting from contact with any other metal part is minimized. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. The clearance and creepage distance shall conform to relevant clause of IS 13779:1999/CBIP technical report No. 325
- 5.11.11 The meter shall be compact in design. The entire construction shall be capable of withstanding stresses likely to occur in actual service and rough handling during transportation. The meter shall be convenient to transport and immune to shock and vibration during transportation and handling.
- 5.11.12 The meter shall have minimum 2 fixing holes. All the holes shall be such that the holding screw is not accessible to the consumer after fixing the meters and it supports the self load of meter after fixing. The lower fixing screws shall be provided under the sealed terminal cover.
- 5.11.13 The meter should have internal real time clock with back up of Lithium maintenance free battery of minimum life of ten (10) years from the operation of the time clock. The real time clock shall be based on quartz crystal timer so as to make it independent of line frequency variations. The clock shall factory calibrated. The clock accuracy shall not vary more than ± 3 min. per year and it will be temperature compensated from 0 °C to 50 °C.
- The RTC battery & the battery for display in case of power failure should be separate.
- 5.11.14 The meter shall record and display total forwarded energy including harmonic energy in following functions:-
- (a) Voltage and Current both in phase.
 - (b) Voltage and current out of phase
 - (c) Voltage in Phase and current out phase.
 - (d) Voltage out phase and current in phase.
- 5.11.15 The provision shall be made on the meter for atleast two seals (only one seal for encapsulated/integrated design). The supplier shall have to supply meters duly sealed with two nos. of polycarbonate seals (only one seal for encapsulated/integrated design) having suppliers logo and serial number.

5.12 **Constructional Requirements:**

5.12.1 **Meter Case and sealing arrangement:**

The meter shall have a transparent/opaque/Integrated base and cover (Single case cover enclosure) base UV stabilized made of unbreakable high, fire resistant, reinforced polycarbonate which can be sealed in such a way that the internal parts of the meter are accessible only after breaking the Meter Cover seals. The meter cover shall have at least two sealing holes, Meter cover should be physically jointed by ultra sonic welding in such a way that meter cover cannot be opened without breaking. In case the meter is

opened by breaking the welding, clear physical evidence shall be visible on the front side. Such an event, both in **power-on** or **power-off** condition, shall be permanently recorded in the meter memory and shall be visible as tamper event with date and time of opening on the display of the LCD and can be downloaded through CMRI. "Meter cover open" indication must appear continuously on the display or under present other tamper status so that at the time of meter reading it must come in notice. However cover open date & time should appear in push button mode. The Meter case shall have at least three mounting holes. Two holes for mounting screws on the terminal block sealed beneath the terminal cover and one for hanging screw on the top. Base & cover shall be sealed by unidirectional screws on both sides with sealing holes & head screw after tightening shall not be accessible.

5.12.2 Terminal Arrangements

Connecting terminal shall be in the following sequence:-

1. Phase (in) 2. Neutral (in) 3. Neutral (out) 4. Phase (out)

The terminals shall be marked properly on terminal block for giving external connections. A diagram of connections should be provided inside the cover of terminal block. The terminal cover shall be extended such that when it is placed in position it is not possible to approach the connections or connecting wires. The terminals and the screws shall be suitable to carry up to 150% of I_{max} for maximum safety. The terminal shall have a suitable construction with barriers and covers to provide secure and safe connections. The alignment of incoming cable terminals on meter terminal block should be such that it is not directly in-line with the cable hole/gland on the meter box body, so that there is no chance of inserting any wire/cable from the gland hole directly to the incoming terminal on the TB to avoid probability of theft by making direct connection.

5.12.3 Connections diagram

The connection diagram of the meter shall be clearly shown on the name plate and shall be of permanent nature. Alternatively, connection diagram can permanently engraved near the terminal block on the base of the ETBC. In case of any special precautions need to be taken at the time of testing the meter, the same may be indicated along with the circuit diagram.

5.12.4 Output Device

The meter shall have a test output accessible from the front. The meter shall be provided with flashing LED to represent the pulse output for testing the meter as described in CBIP Technical Report No. 88 and latest amendment clause 4.2.2.10.

- i) The meter shall have suitable blinking LED test accessible from the front.
- ii) The test output should be suitable for use with sensing probe used with test bench or electronic reference standard meter.
- iii) The test output should also work as operating indicator for meter.
- iv) Output device shall be suitable for optical scanning for test purposes.

5.12.5 TIME OF USE MONITORING

The meter shall be capable of time of use monitoring for energy . Minimum 2 profile shall be capable of being configured for minimum four TOD zones

- October to March
1. 00.00 to 06.00
 2. 06.00 to 10.00

3. 10.00 to 17.00
4. 17.00 to 21.00
1. 21.00 to 24.00
- April to September
1. 00.00 to 05.00
2. 05.00 to 09.00
3. 09.00 to 18.00
4. 18.00 to 22.00
1. 22.00 to 24.00

The Discom shall also intimate the latest UPERC guidelines for above.

5.12.6 LOAD PROFILE RECORDING

The meter shall be capable of monitoring and recording load profile information for KW, KWh demand, Voltage & current for every 30 minutes interval for at least 60 days duration.

5.12.7 Authenticated Billing Code

Authenticated Billing Code (ABC) feature is a unique and innovative way to transfer billing and other meter status related information back to the utility in an encrypted form. The ABC is a 20 digit numerical code displayed on the meter which decrypted using compatible software reveals billing and tamper status information..

The provision of Authenticated Billing Code (ABC) shall be at the discretion of the supplier.

5.13 Tamper and fraud protection

The meter should have features to prevent/detect common ways of tamper and fraud.

(1) Reversal of line and load terminals.

Even on interchanging the load and line wires the meter shall register accurate energy. The reverse indication in the form of LCD icon or LED shall be switched on or suitable information will be display under “present status of CT” in push button mode.

(2) Interchanging of phase and neutral wires.

Even on interchanging the phase and neutral wires the meter shall register accurate energy.

(3) Drawing of current through local earth.

The meter shall register accurate energy even if the load is not terminated back to the meter and instead current is drawn partially or fully through a local earth irrespective of the phase and neutral connections to the meter. The earth indication in the form of LCD display should appear.

(4) Drawing of load by disconnecting Neutral of meter & outgoing Earth:

When neutral is disconnected from both load side and supply side, the meter should record Energy as per rated parameters. However, meter shall start registering energy at a current of 1.0 Amps under these tampers conditions.

Common CT technology can be used also as alternate technology to battery technology. However, meter shall start registering energy at a current of 1.0 Amps minimum under tamper condition of neutral missing. Meter should be capable to give pulses in single wire operation (irrespective fo common CT or Battery technology) for at least one minute to take accuracy which can be ascertained by pressing push button or should be able to record energy within limits as per IS.

(5) Influence of external High Magnetic Field

Meter shall be offer compliance to requirements of CBIP-325 and its amendments for tampering using external magnets and meter should record energy at I_{max} during that condition.

The meter shall be capable of recording the following tamper events in memory (minimum 5 each) with date and time stamp along with snapshots of V,I, PF and Kwh except power on/off and cover open.

-Current reversal

-Magnetic influence in case meter is affected.

-Neutral Disturbance in case meter is affected.

-Neutral missing

The meter shall also have the capability of functioning even when only single wire is connected

(Even when neutral wire is removed from both the meter terminals).

(6) Meter Body Opening :

The meter shall also have provision for detection and logging of opening of meter cover. Meter must detect/ log with date and time meter body opening tamper, body opening tamper must also be logged in absence of power supply. **In case of meter body opening display of “Cover open” Must appear continuously on the display or under present other tamper status so that at the time of meter reading it must come in notice. However cover open “date & time” should appear in push button mode.**

(7) D.C. Immunity

The meter should not saturate on passing of direct current, which can cause the meter either to stop recording or record inaccurately as per IS 13779. This test shall be carried in both phase and neutral, Meter shall record accurately within IS-13779 prescribed limits.

- (8)** The meter shall offer a link less design such that there is no isolation link provided between the current and voltage circuit and hence there is no possibility of tampering with the same.

(9) Application of abnormal voltage/frequency :

The accuracy and functioning of the meter should not be affected with the application of chopped signals/DC signals and harmonics, abnormal voltage/frequency such as spark discharge of approximately 35 KV in any of the following manner for 10 minutes : -

- i) On any of the phase or neutral terminals.
- ii) On any connecting wires of the meters.
- iii) Voltage Discharge with 0-10 mm spark gap.
- iv) At any place in load circuit.
- v) Spark on meter body.

In case the meter is not immune , meter can also log the same as tamper event along with recording of Energy at Vref, I_{max} & UPF and record the event as tamper with date and time stamping.

(10) Neutral tampering

The meter shall record energy proportional to the current and 240 V when any of the tamper circuits enclosed as annexure are used to tamper energy using a diode or a variable resistance or a variable capacitance energy saving device.

“The measurement by meter shall not get influenced by injection of AC Voltages/Chopped signal/DC signal/DC pulse of low frequency and harmonics. The meter should be immune to such Neutral Disturbance. In case the meter accuracy is disturbed under Neutral Disturbance, it should be able to log the event and record energy with reference voltage, actual current & unit power factor”. Threshold value should also be provided by the suppliers for variable resistance tampering below which it should switch over to 240 v.

- (11) “Meter should not get affected and record energy if any kind of tampering is done as per the circuit diagrams mentioned in specification,**

- ☐ **If the meter display is switched off during single wire operation, the meter should be able to record energy at reference voltage and measured current.**
- ☐ **Voltage variation test shall be carried out at even without actual load.**

In case any tamper circuit causes interruption in the power supply of the meter and the metering is constantly disturbed, the meter should be able to log it as an tamper event and add fraud energy with reference voltage, actual current with unit

power factor. Every time the interruption occurs, the progressive energy should be updated on the display.

(12) Measurement of Total Energy:-

The meter shall record total forwarded energy i.e. fundamental + harmonics to be used for tariff billing purpose for both in phase and out phase harmonic distortion as per clause 8.2.1 of IEC 62053-21 of 2003 alongwith CBIP 304 version. The bidders are requested to enclose certificate of proof in this regard from the reputed Govt. approved lab viz. CPRI, NPL, ERTL & ERDA for Indian bidder and for foreign bidder the certificate should be from recognized Govt. approved lab of that respective country. Without this certificate, the offer shall not be considered. In case on non availability of separate display for test for fundamental & harmonics, the test should be done by using pulse method.

(13) Dry Heat Test:-

This test will be conducted as per clause 12.6.1 of IS 13779/99. However, instead of meter in non-operating condition, the test will be conducted keeping the meter in operating conditions at basic current at 0.866 lag at 115% of rated voltage. The other conditions of the test will remain same.

- (14) The meter manufacturer shall ensure that in any case whatsoever, the readings shall not jump in either forward or reverse direction, abnormally. Such behavior in the meter shall be treated as defect for penal action as stipulated in clause – 14 (Guarantee). In addition to this, the Discom shall also recover revenue loss from the meter manufacturer, if current reading is less than past reading.

5.14 Sealing of Meter :

On each of the left and right side, the manufacturer shall provide an unbreakable Polycarbonate Seal (Only one seal for encapsulated/ integrated design) with unique serial number embossed on it. The seal will be supplied with high rise in molding with manufacturer's name/logo.

Provision for all the seals should be made only on front side of the meter body. The meter shall be permanently affixed to the ETBC base before supply.

In addition to 02 nos. of polycarbonate seals (Only one seal for encapsulated/ integrated design), further 02 nos. of tamper proof void seals are to be provided on the meter body in such a way that both the sides covers shall be sealed by the tamper proof void seals. The tamper proof void seals to be provided on meters shall be as per the following specification:-

- i) Size of the Seal:- 50x19 mm (minimum)
- ii) The seal should be digitally printed on white void film having UV destructive inks printed with thermal resin ribbon technology.
- iii) The seal should be sticker type and applied on both the side of the meter which connects the body and the box.
- iv) The seal should be waterproof and should withstand all the weather conditions. The seal should have adhesive of sufficient strength to avoid peeling off under extreme temperature and environmental conditions.
- v) If someone lifts the seal. "VOID" impression should be transferred on the meter and if this is applied back, "VOID" impression should be readable from the surface of the seal.
- vi) The disturbed portion of the seal should glow under UV light, if the seal is disturbed from any part.
- vii) Barcodes of serial number, should be printed on the seals and the barcode should be readable with a barcode scanner.

- viii) The seals should have continuous variable serial number alongwith security codes of last three digits of serial numbers printed in black and the same serial numbers alongwith code of serial number shall also be printed in a vertical semi-circular shape which should be visible only under UV light.
- ix) Two security cuts should be given on the seal on both the sides, and if someone tries to lift the seal it should tear off from the security cuts. The security should be made with a computer controlled plotter which should put the security cuts on the same positions on each seal.
- x) The name of the supplier and suppliers logo alongwith the security warning or any other information in any language as given the Discom should be printed on the seal.
- xi) There should be a provision of incorporating officers signature on the seal as given by the Discom.
- xii) If someone tries to remove the seal by applying heat, the printing should get disturbed and the shape of the seal should change, if more heat is applied.

The seals to be used for sealing of meters, are to be fixed after inspection is over.

5.15 **Name Plate Marking:**

The nameplate shall be clearly marked/etched/embossed as per clause 7 of IS-13779/1993. The nameplate shall be provided within the meter body and cannot be accessed without opening the meter cover, without breaking the seals of meter cover and the name plate shall be marked indelibly. The name plate marking shall not fade with lapse of time.

The basic markings on the meter nameplate shall be as under:-

- Manufacturer's name & trademark.
- Type designation.
- Serial Number (Provided by Discom).
- Month & Year of Manufacture.
- Reference Voltage.
- Rated & Maximum Current.
- Principle unit of measurement (KWH).
- Meter Constant (imp/KWH).
- 'BIS' mark (Applicable to Indian Meter Manufacturer).
- Accuracy class of meter (Class-1.0)
- Purchase order no. date.
- "Property of (Name of Discom)"
- Guarantee Period.
- Bar code identification shall contain detail of (i) the make, (ii) sr. no. and (iii) Model/type.

5.16 **Environmental Aspects:**

Meter shall be designed and constructed to be capable of withstanding all severe stresses, vibrations and dusty environments likely to be encountered in actual practice, as the meter will be installed outdoor in boxes. The bidder may indicate special precautions required, if any for such installation.

5.17 **Printed Circuit Board:-**

The fully tested double layered glass epoxy shall be used. The latest technology such as hybrid microcircuit or application specific integrating circuit (ASIC) shall be used to ensure reliable performance. The mounting of components on the PCB shall be SMT (Surface mounted technology) type. The electronic components used in the meter shall be of high quality from world renowned manufacturer's and there shall be no drift in accuracy of the meter for at least upto 10 years from manufacturing of meter. The make/grade and the range of the components should be from the following lists:-

Sr	Component function	Requirement	Makes and Origin
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No.			
1.	Current Transformers	If the Meter is with one current transformers as measuring elements. The current transformer should withstand for the clauses under 5&9 of IS- 13779/1999	ORIGIN CONFORMING TO IS-2705 OR RELEVANT STANDARD.
2.	Measurement Chips	The measurement or computing chips used in the Meter should be with the Surface mount type along with the ASICs.	USA: Analog Devices, Cyrus Logic, Atmel, Philips, Motorola, Teredian, Texas Inst., ST, Renasas. South Africa: SAMES Japan: NEC, Hitachi, Oki Siemens, Micrel/Microchip, USA, Maxim Integrated, Frescale NXP, Netherland.
3.	Shunt Bimetal	E-beam welded shunts shall be provided in the phase element and CT/Shunt/Hall effect sensor may be provided in the neutral. Alternatively, both the current elements (phase & neutral) shall have E-beam welded shunts with proper isolation.	Redbourn Engg./Isabelle/Shivalik/NCR
4.	Quartz Crystal		AVX, VANLONG, ADVANCED CRYSTAL EPSON: Japan, GEYER: Germany, ABRACON: US, HONG KONG Crystals: Hongkong, TAITEN: Taiwan, NDK: Japan, MURATA: Japan etc.
5.	Memory chips	The memory chips should not be affected by external parameters like sparking, high voltage spikes or electrostatic discharges.	USA: Atmel, National Semiconductors, Texas instruments, Philips, ST, Ranasas, Japan: Hitachi, Oki Siemens, ONSEMI/Fairchild, US., ADESTO, US, SK Hynix, Korea, SAMSUNG, Korea, ROHM, Japan
6.	Display modules	a) The display modules should be well protected from the external UV radiations. b) The display visibility should be sufficient to read the Meter mounted. c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). d) It should be trans-reflective HTN or STN type industrial grade with extended temperature range.	Display TEK/KCE/RCL Display/ Suzhou heng Xiamen instruments/ Veritronics/ Bona-fide/ Jebon VIZ. Hongkong: Genda Singapore: Bonafide Technologies. Korea: Advantek China: Success, Truly. Japan: Hitachi, Sony, Sharp. TIANMA, Haijing, Holtek.
7.	Communication Modules	Communication modules should be compatible for the optical port/RJ Port for communication with meter reading instruments.	USA: National, Semiconductors HP, Optonica. Holland/ Korea: Phillips Japan: Hitachi, Oki, Ricoh Taiwan: Ligitek Germany- Siemens
8.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument.	USA: National, Semiconductors HP Agilent

		The mechanical construction of the port should be such to facilitate the data transfer easily. The Optical Port should not be adversely affected by influence of electromagnetic field, Static discharge.	Holland/ Korea: Phillips Japan: Hitachi,Taiwan: Ligitek, Maxim, Osram semiconductors, Germany, Fairchild/Onsemi
9.	Power Supply	The Power supply should be with the Capabilities as per the relevant standards. It 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 or better
10.	Electronic Components	The active and passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly process.	USA: National semiconductors, Atmel, Philips, Texas Instruments, Siemens WELWYN, VISHAY DRALORIC, YAGEO, KOA, R OHM, PHYCOMP, FAIRCHI LD, PHILIPS , VISHAY SEMICONDUCTORS, TEXAS INSTRUMENT, EPCOS, OSRAM, INFINION, NATIONAL SEMICONDUCTORS etc. Japan: Toshiba, Hitachi, Oki, AVZ or RICON Korea; Samsung, Lelon, Incap, Allcgro, Melexis, Infencon, AVX, NXP, Royalohm, Yageo, Kemet, Onsemi Steward, Avago, CTR,, ROHM, Murata, Panasonic , TDK, Fairchild, Everlight, EPSON, HKC, Precision electronics components, Samyoung, Alfa omega, HJC Electronics,
11.	Mechanical Parts	a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/ painting methods.	Reputed Manufacturer.
12.	Battery	Chargeable maintenance free guaranteed life of 10 years.	Varta, Tedirun, Sanyo, National, Panasonic, Renata, Maxell, Intersil, Tekcell/ Vitzro Cell: Korea/China, SAFT Batteries/ Eternacell: France/China, Mitsubishi Batteries, Japan/China
13.	RTC & Micro controller.	The accuracy of RTC shall be as per relevant IEC/ IS standards.	USA: Philips, Dallas, ST, Xicor Atmel, Motorola, Microchip Japan: NEC, Oki.Taiwan:

			Prolific Technology Inc. , Intersil, Renesas, Analog Devices: US, Micrel/Microchip/ATMEL: USA, Texas Instruments: USA, Teridian/Maxim Integrated, Vango Technologies: Taiwan, Freescale/NXP: Netherland
14.	PCB	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm.	A class vendor

The bidders are required to submit the list & vendors of above components along with the bid.

5.18 The meter base, meter cover and terminal cover shall be made of virgin polycarbonate material with fire retardant and ultra-violet resistance additives.

5.19 The source of polycarbonate resin shall be from any one of the following manufacturers:-

- i) GE Plastic - LEXAN 943A for Cover and Terminal Cover, Lexan 503R for Base
- ii) Du-pont - Grade corresponding to above
- iii) Bayer - as above
- v) Dow Chemicals - as above
- vi) Mitsubishi - as above
- vii) Tejin - as above.

The meter base shall be manufactured from high quality industrial grade material viz. Polycarbonate with 10% glass filled or better which shall meet following properties to ensure higher reliability and long life of the meter base. Meter base, cover & terminal cover shall conform to the following:-

Sl. No.	Test	10% Glass filled for meter base & terminal block	Transparent for meter cover & terminal cover.
1.	UV ageing for 200 Hrs. as per ASTM : G 53 (Cl. No. 9.3)	4 hours UV at 60 °C, 4 hours condensation at 50 °C	4 hours UV at 60 °C, 4 hours condensation at 50 °C
2.	Boiling Water Test (10 Min)	No softening & whitening & No change in Colour, shape, size & dimensions.	No softening & whitening & No change in Colour, shape, size & dimensions.
3.	Drop Test from 2 Mtrs. height only for casing I.e. base + cover + terminal block + terminal cover (without inside assembly)	Shall not crack or break.	Shall not crack or break.
4.	Glow wire test IS:11000 (part 2/SEC-1) 1984 or IEC PUB,60695-2-12	960±15 °C (Terminal Block)	650±10 °C ({Terminal Cover & Meter Case (Base & Cover)})
5.	Heat Deflection Temp (HDT) HDT/Ae, 1.8 MPa edgew (100 mm) As per ISO 75/Ae	132 °C	125 °C
6.	Ball Pressure Test as per IEC-60695-10-2	125 °C ± 2 °C	125 °C ± 2 °C
7.	Flammability Test (a) As per UL 94 or (b) As per IS 11731(Part-2) 1986	VO FVO	VO FVO
8.	Minimum Thickness	2.0 mm	2.0 mm

The meter manufacturer has to submit test certificates for material used from reputed Lab/original supplier lab. for every lot offered for inspection.

6.0 Test

6.1 Type Tests

6.1.1 Meter

The supplier shall have to submit all type test certificates from the Govt. approved laboratory viz. for Indian bidder:-

- (i) National Physical Laboratory (NPL), New Delhi.
- (ii) ERTL (N), New Delhi.
- (iii) ERTL (W), Mumbai.

- (iv) ERTL (E) Kolkata.
- (v) ERTL (S), Thiruvananthapuram.
- (vi) ERDA-(Vadodara).
- (vii) CPRI, Bengaluru/Bhopal.

For foreign bidder the certificate should be from recognized Govt. approved lab. of that respective country, as per IS No. 13779/1999 or IEC 62053:21 as the case may be along with bid. After opening of Technical Bid, no type test certificate shall be accepted. Type test should not be older than 3 years also the type test certificate as per clause No. 5.13.5 i.e. AC/DC magnetic influence test and cl. no.: 5.13.12 i.e. total energy test shall also be furnished on the same rating of meter. Without above type test certificates, the offer shall not be considered..

Acceptance Tests.

All acceptance tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of purchaser's representative. **At the time of inspection at vendor works, the inspection team of the purchaser shall also ensure that the data is easily downloadable from top of the meter box.**

Also the following additional tests shall be carried out on meters from each lot offered for inspection as per CBIP Technical Report 325 on randomly selected samples.

- (i) Shock test
- (ii) Vibration test
- (iii) Magnetic Induction of external origin (AC & DC)
- (iv) Tamper & Fraud Protection as per clause 5.13 of section VII.

Routine Tests : All routine tests as stipulated in the relevant standards shall be carried out and routine tests certificates shall be submitted for approval of purchaser.

Tests to be conducted:

- (i) Starting Condition Test.
- (ii) Power Consumption Test
- (iii) Repeatability of error test
- (iv) Accuracy Requirements
- (v) Voltage Variation Test (-40% to +20%)
- (vi) Tamper & Fraud Protection Test : Test to prove compliance to clause 5.13
- (vii) D.C. Immunity Test
- (viii) Test on display parameters (Auto scroll & Push button)
- (ix) Influence of high magnetic field as per CBIP-325 as per relevant clause.

6.1.2 AUDIT TESTING:

From any dispatched lot (but before the final lot), Two (02) nos. of meters shall be randomly selected (jointly with supplier's representative) & sent for audit testing according to the type tests mentioned in IS:13779/1999 (and any latest amendments thereof) and dry heat test as per clause 13 of the present technical specification, at any Govt. Lab, decided by Discom. On receipts of test reports acceptability of the lot will be decided in the following manner:-

- i) If the sample pass the type test – No Action.
- ii) If sample fails in the following tests mentioned in table 20 of Schedule of type tests in IS:13779 (1999) (including the dry heat test), the whole referred lot of the meter shall be rejected, the firm has to replace the un-used meters lying in store centers against the order with new one free of cost and no payment against used/installed meters in the referred lot (from which sample is selected) will be made to the firm:-
 - a. AC High Voltage Test.
 - b. Insulation Test.
 - c. Test on Limits of error.
 - d. Test of Meter Constant.
 - e. Test of Starting Condition.

- f. Test of No load conditions.
 - g. Test of repeatability of errors.
 - h. Test of Power Consumption
- iii) In case the sample fails in tests other than the tests mentioned in clause 6.1.2 (ii) above, a penalty @ 30% of the ex-works price (including F&I) shall be deducted from the total cost of the referred lot of meters,
 - iv) In case, the sample selected in clause 6.1.2. (ii & iii) above didn't meet the type tests requirements, again the 02 nos. meters shall be selected from the next supplied lot and sent to any Govt. Lab, decided by Discom for type tests mentioned in IS:13779 (1999) with any amendments thereof, in addition to the penal action mentioned above. If again sample didn't meet the type tests mentioned in clause 6.1.2 (ii) above (including dry heat test), the whole referred lot shall be rejected, no payment of the referred lot shall be made and the firm shall be blacklisted/debarred from business for further next three (03) years including en-cashment of their contract performance guarantee.
 - v) If sample selected in next lot didn't meet tests other than the tests mentioned in clause 6.1.2 (ii) above, a penalty @ 50% of the ex-works price (including F&I) shall be deducted from the total cost of the referred lot of meters including debarring the firm to participate in next 01 year in all the tenders in Discoms of Uttar Pradesh.

The above testing doesn't relieve the firm from ensuring the quality of supplied meters, mentioned in clause 14 of the technical specification

6.2 TECHNICAL SPECIFICATION OF PILFER PROOF METER BOX TO HOUSE SINGLE PHASE ENERGY METER (PUSH TO FIT TYPE)

1. SCOPE:

The fully transparent meter box shall be intended to house one number single-phase electronic energy meter. The meter box complies with IS: 14772:2000 with latest amendment.

2. MATERIAL:

The meter box shall be made of Transparent Polycarbonate material (TPM) which complies following properties:

Meter box shall be weather proof, capable to withstanding temperatures of boiling water for 5 minutes continuously without distortion or softening. It shall withstanding Glow wire test at 650°C as per IS:14772. HDT of Polycarbonate material shall be minimum 120 °C (at 1.8 MPa °C),

3. CONSTRUCTION:

The meter Box shall have roof tapering down to both the sides for easy flow of rainwater.

The thickness of the box shall be minimum 2.0 mm on all sides.

The cover should be fitted with base by non-detachable push fit, self locking type arrangement it should have knobs/anchors provided with the cover so that if shut/press fitted once inside the arrangement in the main body of the base, it becomes the part of the box and cannot be detached from the base without breakage.

The cover shall rest on the base of box in such a way that any access from outside to the meter is not possible. The cover in closed position should be overlapped on collar of base such that direct entry of screw driver or tool is not possible.

The top cover when opened after installation must have visible cracks/damages to make visible that the meter box has been forcibly opened up.

Minimum one Anchor Lock fitting arrangements must be made on each side of box. The anchor fit arrangement should have adequate barriers (Except for cable entry side) around the sealing arrangement such that any attempt to reach the sealing arrangement is not possible.

There shall be no hinges in the box cover.

Meter Box should be comply with IP - 51. Type test report shall be enclosed along with offer.

All metallic parts would be well protected against corrosion.

Push button arrangement shall be required on the cover of the box to operate the meter display push button from outside the meter box to read the meter display parameters without opening the meter box cover.

The provision for connecting optical probe for meter communication through meter reading instrument without opening the box seal shall be provide. It shall have independent sealing arrangement. There should be provision of providing laser printed meter serial number on box cover and base from inside.

Colour:-

The front cover of the meter box shall be transparent so that the connections are visible from outside of the meter box.

Cable Entry:-

Suitable provisions for cable entry is made available at the angular corner of bottom side of the meter box bottom (for angular cable entry) for cable inlet & outlet and the same shall be capable of accommodating cable of 16 mm diameter, engineering plastic gland shall be provided.

Clearance:-

The clearance from meter body to meter box should meet the minimum requirement as below:-

Left & right side	- 20 mm
Bottom side	- 75 mm
Front & back side	- 10 mm
Top	- 35 mm

Box Mounting:-

Box shall have minimum 3 nos. holes of 6 mm diameter for fixing the meter box on wall/wooden board.

Name Plate:-

Printed Metallic name plate shall have details of purchase order & date which shall be embossed/engraved on the meter cover.

2. GUARANTEED TECHNICAL PARTICULARS:

The guaranteed technical particulars as detailed in the specification Annexure-II will be guaranteed and a statement of guaranteed technical particulars will be furnished in the format along with the bid.

3. TESTS FOR BOXES:

The following tests are to be conducted on the box at any independent NABL accredited laboratory and test reports shall be submitted alongwith the tender documentsr.

- i) Test of material identification
- ii) Test for mechanical strength
- iii) Test for water absorption
- iv) Test for stability at high temperature
- v) Test for withstanding temperature boiling water for 5 minutes continuously for non-distortion or softening of material
- vi) Glow wire test at 650°C as per IS : 14772
- viii) Drop Test – from 2 mtr. height – shall not crack.

4. ACCEPTANCE TEST

- i. Physical verification of dimensions of the box.
- ii. Compatibility of the box for housing the single phase meter, and ensuring ease of connecting and reading the meter.
- iii. **At the time of inspection at vendor works, the inspection team of the purchaser shall also ensure that the data is easily downloadable from top of the meter box.**

5. ROUTINE TEST

The routine test certificates for the following will be furnished for approval of the purchaser.

- i. Physical verification of dimensions of the box.
- ii. Compatibility of the box for housing the meter, and ensuring ease of connecting and reading the meter.

7.0 INSPECTION :

The inspection shall be carried out by the purchaser's representative during manufacture and before dispatch. The supplier shall keep the purchaser informed in advance, about the manufacturing programme so that arrangement can be made for inspection.

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

All Acceptance tests and inspection shall be made at the place of manufacturer unless otherwise especially agreed upon by the Bidder and purchaser at the time of purchase.

The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items. The supplier shall give 15 days (for local supply)/ 30 days (in case of foreign supply) advance intimation to enable the purchaser to depute his representative for witnessing the acceptance and routine test. Material shall be dispatched only after getting the dispatch authorization from inspectors representing purchaser, after successful testing.

The Bidder shall afford the inspectors representing the purchaser all facilities without charge, to satisfy him that the equipment is being furnished in accordance with this specification during stage inspection and final inspection.

NOTE FOR FOREIGN BIDDERS :

The bidder shall indicate the name(s) of reputed inspection agencies and the inspection charges clearly for each lot, if any. However the purchaser reserves the right to appoint at his cost any inspection agency to carry out the inspection.

8.0 Quality Assurance Plan :

- 8.1 The Bidder shall invariably furnish the following information along with his bid, failing which his bid shall be liable for rejection. Information shall be separately given for individual type of material offered.
- i. Statement giving list of important raw materials, name of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested. List of test normally carried out on raw materials in presence of Bidder's representative, copies of test certificates.
 - ii. Information and copies of test certificates as in (i.) above in respect of bought out accessories.
 - iii. List of manufacturing facilities available.
 - iv. List of automation achieved and list of areas where manual processing exists.
 - v. List of areas in manufacturing process where stage inspections are normally carried out for quality control and details of such tests and inspections.
 - vi. Lists of testing equipment available with the bidder for final testing of equipment specified and test plant limitation. If any, vis-a-vis the type, special acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in schedule of deviations from specified test requirements.

- 8.2. The successful bidder shall within 30 days of placement of order submit following information to the purchaser.
- i. List of raw materials as well as bought out accessories and the names of sub suppliers selected from those furnished along with offers.
 - ii. Type test certificates of the raw materials and bought out accessories if required by the purchaser.
 - iii. Quality assurance plan (QAP) with hold points for purchaser's inspection. The quality assurance plan purchaser hold points shall be discussed between the purchaser and bidder before the QAP is finalized.
- 8.3 The Contractor shall operate systems, which implement the following.
- i. Hold Point : A stage in the material procurement or workmanship process beyond which work shall not proceed without the document approval of designated individuals or organizations. The purchaser's written approval is required to authorize work to progress beyond the hold points indicated in quality assurance plans.
 - ii. **Notification Point** :
A stage in the material procurement or workmanship process for which advance notice of the activity is required to facilitate witness. If the purchaser does not attend after receiving documented notification in accordance with the agreed procedures and with the correct period of notice then work proceed.
- 8.4 The successful bidder shall submit the routine test certificates of bought out accessories and GST/IGST details for raw material at the time of routine testing if required by the purchaser and ensure that quality Assurance requirements of this specification are followed by the sub-contractors. The Quality Assurance Program of the contractor shall consist of the quality systems and quality plans with the following details.
- i. **Quality System** :
The structure of the organization.
The duties and responsibilities assigned to staff ensuring quality of work.
The system for purchasing, taken delivery and verification of materials. The system of ensuring quality workmanship.
The system for retention of records.
The arrangements for contractor's internal auditing.
A list of administration and work procedures required to achieve and verify contract's quality requirement. These procedures shall be made readily available to the inspecting officers for inspection on request.
 - ii. **Quality Plans**:
An outline of the proposed work and program sequence.
The structure of the contractors organization for the contract.
The duties and responsibilities assigned to staff ensuring quality of work.
Hold and Notification points.

Submission of Engineering documents required by the specification. The

inspection of materials and components on receipt.

Reference to the contractor's work procedures appropriate to each activity.

Inspection during fabrication/construction.

Final Inspection and test.

9.0 Documentation

- 9.1 All drawings shall conform to International Standards Organization (ISO) 'A' Series of drawings sheet/ Indian standards Specifications IS :656. All drawings shall be in ink and suitable for microfilming. All dimensions and data shall be in S.I. Units.

9.2 List of drawings and documents:

The bidder shall furnish the following along with bid.

- i. Two sets of drawings showing clearly the general arrangements, fitting details, electrical connections etc.
 - ii. Technical leaflets (user manual) giving operation instructions.
 - iii. Three copies of dimensional drawings of the box for each quoted item.
- 9.3 The manufacturing of the equipment shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier's risk.
- 9.4 Approval of drawings/work by purchaser shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirements of the latest revision of applicable standards, rules and codes or practices. The equipment shall conform in all respects to high standards of engineering, design workmanship and latest revisions of relevant standards at the time of ordering and purchaser shall have the power to reject any work or materials which in his judgment is not in full accordance therewith.
- 9.5 The successful Bidder shall within 2 weeks of placement of order, submit three sets of final versions of all the drawings as stipulated in the purchase order for purchaser's approval. The purchaser shall communicate his comments/ approval on the drawings to the supplier within two weeks. The supplier shall, if necessary, modify the drawings and resubmit three copies of the modified drawings for their approval. The supplier shall within two weeks, submit 30 prints and two good quality report copies of the approved drawings for purchaser's use.
- 9.6 Eight sets of operating manuals/ technical leaflets shall be supplied to each consignee for the first instance of supply.
- 9.6.1 One set of routine test certificates shall accompany each dispatch consignment.
- 9.6.2 The acceptance test certificates in case pre-dispatch inspection or routine test certificate in cases where inspection is waived shall be got approved by the purchaser.

10. Packing & Forwarding :

- 10.1 The equipment shall be packed in suitable boxes for vertical/ horizontal transport as the case may be and suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit, due to improper and

- inadequate packing. The easily damageable material shall be carefully packed and marked with the appropriate caution symbol. Wherever necessary, proper arrangement for lifting such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied immediately by supplier without any extra cost.
- 10.2 Each consignment shall be accompanied with a detailed packing list containing the following information.
- Name of the consignment.
 - Details of consignment.
 - Destination.
 - Total weight of consignment.
 - Handling and packing instructions.
 - Bill of Material indicating contents of each package.
- 10.3 The supplier shall ensure that the packing list and bill of material are approval by the purchaser before dispatch.
- 10.4 The packing shall be done as per the manufacturer's standard practice; however, he should ensure the packing is such that the material should not get damaged during transit by Rail/Road.
- 10.5 The marking on each package shall be as per the relevant standards and shall also contain " Property of (Name of Discom)".
- 11.0 **Delivery Schedule**
The tentative delivery schedule shall be six months form the date of signing of contract or as per directives of Discom.
- 12.0 **Mandatory Spares & Tools :**
The bidder shall give the list for items and shall keep a reasonable stock of the same, during the warranty period.
- 13.0 **Samples to be supplied by the supplier :**
The supplier shall have to submit 03 (Three) samples of meter along with bid documents. Please note that the sample submitted shall be tested at third party Govt. lab. decided by the Disom for the following tests as per IS 13779/99, IEC 62053-21 (2003) and as per Discom specification, wherever specified.
- Insulation resistance test as per IS.
 - Impulse voltage test at 10 KV as per cl. no. 5.9.9(ii) of specification.
 - AC high voltage test method as per IS but shall be taken at 4 KV for one minute.
 - Test for limit of error as per cl. no. 5.9.10 of specification.
 - Interpretation of test results, if required.
 - Test of meter constant.
 - Test of starting condition at 0.2% of basic current as per specification.
 - Test of no load condition as per IS.
 - Test of repeatability of error as per cl. no. 5.9.10(10) of specification.
 - Test of power consumption as per IS.
 - Test for total energy i.e. fundamental + harmonics as per cl. no. 12 of specification.
 - Test for influence of quantities i.e. Voltage and frequency variation test and 10% of 3rd harmonics as per IS (Strictly as per IS 13779/99)
 - Test for influence of AC /DC (CBIP-325) magnetic field as per cl. no. 8 of specification.

14. Tamper condition tests 1 to 28 as per cl. no. 11.4 of specification, top cover open tamper, injection of chopped A.C./Pulsating D.C in neutral.
15. Dry heat test as per cl. no. 5.13.13 of specification.
16. Test for DC injection in both phase and neutral cl. no. 5.13.7
17. Test of Short time over current test as per IS.
18. 35 KV Test as per cl. no. 5.13.9 of specification.
19. Test of terminals for withstanding 150% I max as per specification.
20. Test for withstanding phase to phase voltage (440V) between phase to neutral for minimum 5 min as per cl. no. 5.3.
21. Verification of Display parameters and Functional requirement.

In event of failure of the sample during any of the tests the offer will be considered as “REJECTED”.

Date of testing will be informed to all bidders. Engineer of the bidder shall come with BCS and CMRI so that tamper information with date & time, load survey and meter readings could be downloaded by CMRI and printout could be taken to verify the internal features also.

However place of sample testing will be at the discretion of UPPCL/Discoms.

Price Part shall be opened only of those suppliers whose Meter samples are found in order in above testing.

Guarantee.

- 14.0 Manufacturer shall undertake a guarantee to replace the meters & boxes up to a period of **66 months from the date of supply & 60 months from the date of commissioning (whichever is earlier)**, which are found defective/inoperative at the time of installation, of become inoperative/ effective within guarantee period. These defective/ inoperative meters shall be replaced within one month of receipt of report for such defective/inoperative meters.

The maximum permissible % of damage/defective meters shall be as under:-

Sl. No.	Time Period	Maximum permissible % of damage/defective	Penal action against the firm
1.	Within one year	1.0%	Replacement defective/damage meter free of cost, within one month of intimation.
2.	Within 3 year	1.5%	If %age of damage/defective meter is more than 1.5%, the firm shall be debarred from participation in tenders for One (01) year including encashment of Contract Performance Guarantee.
3.	Up to 5 year	2.0%	If %age of damage/defective meter is upto 2.0%, the firm shall be debarred from participation in tenders for Two (02) year including encashment of Contract Performance Guarantee.

The firm has to replace all the damaged/defective meters during the guarantee period within one month of intimation. In case of %age of damage/defective meter is more than 2.0%, the firm shall be blacklisted/debarred from business for minimum 3 years, with immediate effect including encashment of Contract Performance Guarantee.

- 15.0 All the bidder should submit the list of components along with manufacturers name used in meter manufacturing to check the quality and reliability of the

meters along with the bid. Documentary proof supporting above claim is mandatory.

General :

- a. Principle of operation of the meter outlining the methods and stages of computation of various parameters starting from input voltage and current signals including the sampling rate if applicable shall be furnished by the bidder.
 - b. The bidder shall indicate the method adopted to transform the voltage and current to the desired low values with explanation on devices used such as CT, VT or Potential divider as to how they can be considered superior in maintaining ratio and phase angle for variation of influence quantities during period.
 - c. **Details of testing facilities.**
The manufacturers laboratory must be well equipped for testing of the meters. They must have computerized standard power source and standard equipment calibrated not later than a year (or as per standard practice). The details of testing facilities available for conduction (a) The routine tests and (b) Acceptance tests shall be furnished in a statement. Bids without these details will be treated as Non-responsive. Facilities available if any for conducting type tests may also be furnished.
 - d. The bidder shall furnish details of memory used in the meter.
16. **Annexure- A**
Five tamper circuits given for testing.
However bidder should give their logic also for each tamper circuit.
17. **Technical Specification of Poly Carbonate Seals.** (As per enclosed sheet ANNEXURE-III.)
18. **Guaranteed Technical Particulars (Schedule-B)**
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ANNEXURE-III

TECHNICAL SPECIFICATION OF POLYCARBONATE SEALS (II)

1. The meter seals made of Polycarbonate are to be used for security of energy meters pilfer proof boxes.
2. Seals should be made of high quality polycarbonate and should not be affected by boiling water, muriatic acid etc., The seal must be able to withstand harsh environment in dirty, sunlight exposure. The seal should withstand heat resistant test at least for 2 hours at 147 deg. Celsius.
3. The seal should be transparent clear red/blue/yellow orange green gray and any other colour to be intimated at the time of order and should be transparent.
4. The seal should be of one-piece polycarbonate body consisting of capsule and locking anchor with integrated non-magnetic non-corrosive stainless steel sealing wire.
5. The offered seal must be patented by the manufacturers offering the seal so that identical seals cannot be manufactured by other manufacturers and similar type of fictitious seals are not available to the counterfeiters.
6. Every seal should have 15 cm. long minimum two strand stainless steel wires permanently fixed to the seal body.
7. The serial no. should be preferably THERMO/LASER engraved printed in highly visible contrast in such a way that the same cannot be erased by using any tool or by any chemical reaction. This should be distinct and can be easy to read without using any lens.
8. The sealing arrangement should be designed in such a way that its original position cannot be restored after any effort of tamper or breaking of the seals. In case of attempt of opening the cap of the seal it will break and its internal part will remain inside.
9. The sealing mechanism should be designed in such a way that it can be sealed without using any pliers or tools. The sealing procedure must be foolproof and there should not be any scope of pre-tampering/malpractice with sealing wire while sealing.
10. **PACKAGING :** Seals should be supplied in packet of 100 seals. Each packet shall be labeled for following information.
 - ☐ Client name
 - ☐ Consignee
 - ☐ P.O. No.
 - ☐ Serial Number Range
 - ☐ Quantity
11. **SAMPLES :** 10 (TEN) No's samples of seal are to be submitted along with the offer.
12. **TEST CERTIFICATE :**

Seals should be tested for the following plastic properties from ERDA. Vadodara or any of the Govt. Approved labs.

 - (1) Heat Resistance at 147 Degree Celsius.
 - (2) Breaking strength : Seals shall be able to withstand a force at least 15.0Kgf.
 - (3) Salt Spray Test.
13. **THE SEALS SHOULD HAVE FOLLOWING ESSENTIAL FEATURES.**
 - (1) Tamper resistance
 - (2) Heat Resistant

- (3) Environmentally safe.
- (4) Should withstand direct sunlight & rain water exposure.
- (5) One end of wire should be loose and other end of wire should be embedded (Permanently) with body of seal.

14. **CONSTRUCTION**

One-piece construction comprising of polycarbonate capsule & anchor and integral connected non-corrosive and- magnetic 7 strand twisted stainless steel sealing wire.

- (1) **Capsule** – Contains an internal locking mechanism, which accepts the 4 anchors (Quad Lock arrangement) anchor locking cap which secures the loose end of the sealing wire into the capsule locking mechanism.
- (2) Wire anchor and permanently secure the sealing wires.
- (3) Passes through and secure the meter.

15. **MATERIAL OF SEAL BODY :**

Seal should be made of specially formulated polycarbonate having very high mechanical strength.

16. **MATERIAL OF SEALING WIRE :** Non Corrosive, Non-Magnetic 2 strand twisted (0.40/0.25mm) stainless Steel sealing wire.

17. **WIRE LENGTH :** 150 MM

18. **SAMPLE TESTING :** 10 No's sample seals submitted by the bidder shall be sent for testing as per clause No. 13(a). charges for testing will have to borne by the bidder.

SCHEDULE-B
GUARANTEED TECHNICAL PARTICULAR OF 5-30A AC SINGLE PHASE STATIC
ELECTRONIC KWH METER

Sr. no.	Particulars	Min. requirement	As per firm offer
1.	Name of manufacture	-	
2.	Type, name & number	-	
3.	Standard applicable	IS:13779/IEC:62053-21/CBIP Tech. Report No. 325 (with latest amendments)	
4.	Type of meter i) Model no. ii) With DLMS/ Without DLMS	-	
5.	Rating	05-30 Amp.	
	i) Accuracy class	Class-1	
	ii) Rated voltage	240V, -40% to +20%	
	iii) Rated Current	Ib= 05 A. I _{max} . = 30 A	
	iv) Rated Frequency	50 Hz. +/-5%	
	v) Power factor	90 Deg. Lag to unity to 90 deg. Lead	
6.	Cut off voltage (at which meter stop working)	-50% or less of rated voltage	
7.	Relative humidity	95% (sometimes approaches to saturation)	
8.	Ref. Temperature	27 deg. C.	
9.	Temperature range of operation (ambient)	-05% deg. C to 50 deg. C	
10.	Drift in accuracy of measurement with time	No Drift in accuracy in measurement with time	
11.	i) Continuous current rating (Amp.)	30 Amps	
	ii) Running with no load & at 115% voltage	No Creeping	
12.	Short time over current for one half cycle at rated frequency.	30 I _{max} .	
13.	Starting current (min) at which meter shall run & continue to run.	0.2% of Ib.	
14.	Power loss at rated frequency & reference temperature		
	a) Current Circuit at rated current.	Shall not exceed 1.0 watts and 4 VA	
	b) Voltage circuit at rated current	Shall not exceed 1 VA	
15.	Type of material used		
	a) Meter cover – Material	Polycarbonate	
	b) Meter base – Material	Polycarbonate with 10% glass filled or better	
	c) Terminal Block – Material	Polycarbonate	
	d) Terminal cover – Material	Polycarbonate	
	e) Screw i) Material ii) Size	Nickel Platted – Brass M-4 with head of 5mm dia.	
16.	Center to Center clearance between adjacent terminals	13 mm (minimum)	

17.	Transducers		
	i) Input	CT/shunt (in phase) and CT/Shunt/hall sensor (in neutral)	
	ii) Output	LCD Display (Blacklit) with NVM.	
18.	Fixing/sealing arrangement		
	i) Fixing of meter	2 fixing holes (one at top & one at bottom under terminal block)	
	ii) Sealing of meter cover to Base	2 nos., tightening from rear	
	iii) Sealing of terminal cover	One	
19.	Type of hinged un detachable terminal cover	To be mentioned	
20.	Performance of meter in tamper conditions (As per Specification)		
21.	Suitability of meter to sustain over voltage i.e. phase to phase voltage injected between phase & neutral	Should sustain	
22.	Size of calibration LED & Color	5 mm for Meter calibration (RED)	
22-A.	LCD indicators for different temper conditions as per cl. no. 5.9.7	1. Reverse Current 2. Earth temper 3. Neutral Missing 4. Magnet tamper 5. Top cover open	
23.	Meter constant(impulse/ kwh)	To be specified by supplier	
24.	Electromagnetic compatibility (EMI/EMC severity level)	As per IS 13779/99	
25.	Effect on accuracy of external magnetic field & harmonics	Should work within accuracy as per specification	
26.	Effect of accuracy in tamper conditions	Should work within accuracy	
27.	Fixing arrangement of name plate	Metallic/non-metallic name plated riveted in front	
28.	Approximate weight of meter	To be mentioned	
29.	Type of body	To be specified	
30.	Manufacturing activity (cl. no. 8)		
	i) Whether mounting of components on PCB shall be SMT type	SMT type and ASIC technology	
	ii) Whether quality assurance plan submitted	Required to submit	
31.	Testing facility (cl. no. 15.c of specification)	Confirmed by the bidder	
32.	a. Whether offered meter type tested as per IS:13779/99 or IEC 62053-21 and as per the requirement of specification. (indicate name of laboratory/Ref. of report no. and date.	Name of lab. Type Test Report	Ref. of page no. of offer
	b. Certificate for (DC influence test of 0.5		

	tesla and total energy test i.e. fundamental + harmonics) is enclosed or not?		
33.	Guarantee (cl.no. 14 of specification)	Confirmed by bidder	
34.	BIS license no. & date with its validity for ISI certificate mark on meter	To be mentioned	
35.	ISO accreditation no. & date with its validity	To be mentioned	
36.	Past experience	Copies of order to be enclosed	
	i) Order received up to date of submission of offer Order No. & Date Quantity Name of SEB/ Power utility a) Single phase static meter 05/30 A Quantity supplied up to date of submission of offer		
	a) Single phase meter (Note- Copy of order be enclosed specifically indicating rating of meter) In qualification criteria qty. mentioned in the order shall only be considered.		
37.	Other parameters/features not covered in the above GTP	Shall conform to specification of IS-13779/IEC:62053-21/CBIP Tech. Report No. 325 (with latest amendments)	
38.	Tamper Conditions as per specification	Must be fulfilled	
39.	List of Components	Annexed for approval.	

Certified that all the information/ parameters indicated above exist in the meter offered by us and shall stood all the tests specified above within the variation of current/ voltage frequency and climatic conditions specified therein.

SIGNATURE OF BIDDER
NAME
DESIGNATION

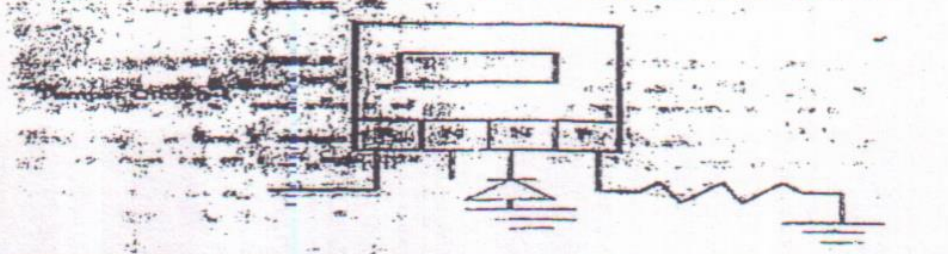
SCHEDULE-C

SOURCE OF MATERIAL AND PLACES OF MANUFACTURING, TESTING AND INSPECTION

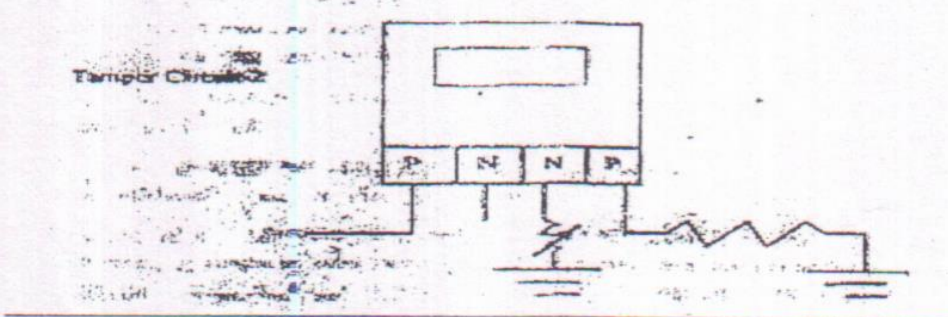
Sr. No.	Item part	Name of manufacturer	Place of manufacturer	Place of testing and inspection	Source of procurement of material not manufactured
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SIGNATURE OF BIDDER
NAME
DESIGNATION

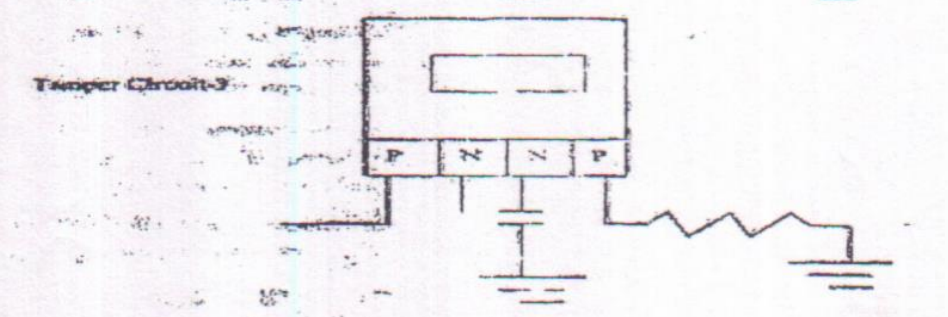
GROUNDING IN MAJOR CITIES AND TOWNS



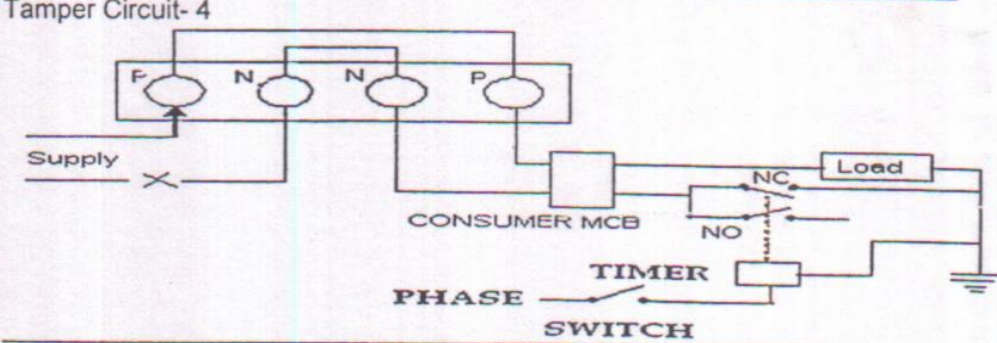
Tamper Circuit-2



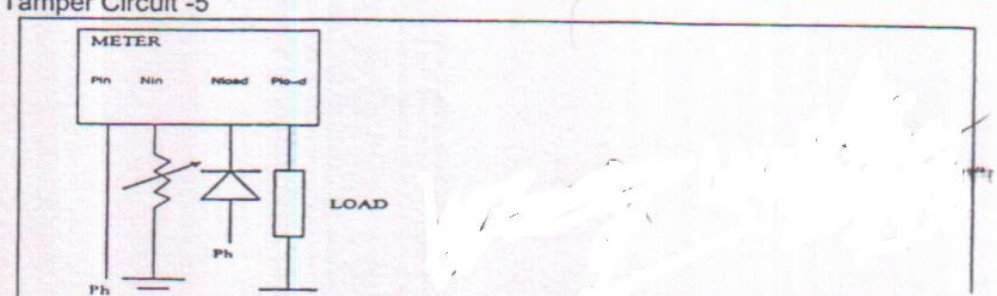
Tamper Circuit-3



Tamper Circuit-4



Tamper Circuit-5



MODIFIED DRAWING AND DETAILS OF ADDITIONAL 2 NOS TEST

ANNEXURE-B

Test No-1

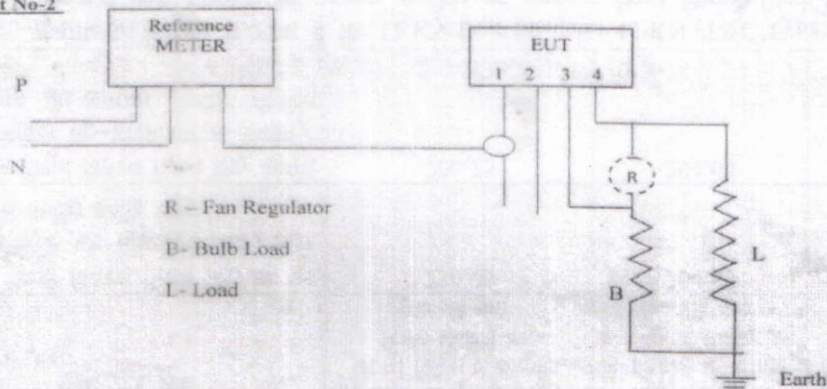
DC components and even harmonics in current circuit

Test procedure as per IS 13779 with additional requirement as below-

Accuracy of the meter shall also be verified at current $5/\sqrt{2}A$, $10/\sqrt{2}A$, $15/\sqrt{2}A$ and $I_{max}/\sqrt{2}A$.

Accuracy of meter shall remain within limit given in IS13779,1999

Test No-2



Voltage to meter terminals 1 and 2 and to the reference standard will be fed from same mains power supply.

Current in the meter under tests shall be measured in reference standard through clamp-on CT of reference standard.

Current in the load L can be between 5 to 10 A. Resistance of regulator shall be varied from minimum to maximum to vary resultant voltage between terminal 3 and 4. % error at different voltage obtained with the above method shall be reported along with the corresponding voltage between terminal 3 and 4 of the meter and the current in phase ie. Terminal 1 of the meter.

Test shall preferably be carried out at 240 volt measured at p-n of reference standard. If test is carried out at voltage other than 240 V, the % error shall be corrected accordingly.