

SCHEDULE-III (VOLUME-'A')

TECHNICAL SPECIFICATION FOR A.C. STATIC SINGLE PHASE, TWO WIRE, HAVING DLMS PROTOCOL WITH OPTICAL, & ADDITIONAL RS-232 Port and BLUETOOTH LOW ENERGY (BLE) COMMUNICATION 5-30 A RATING WHOLE CURRENT, CLASS 1.0 ACCURACY, KWH ENERGY PRE-PAYMENT METERS HAVING SEPARATE POLYCARBONATE METER BOX AND BACKLIT LCD DISPLAY AGAINST TN-2569.

1.0 SCOPE : -

- a) This specification covers the design, engineering, manufacture, assembly stage-testing, inspection and testing before supply of A.C. single phase two wire Having DLMS Protocol solid state (static) whole current electronic energy Pre-Payment meters of accuracy class 1.0 and current rating 5-30 Amps, with backlit LCD display as per requirement given in this specification. These meters should be provided with one optical communication port additional RS-232 which should be suitable for establishing local communication with CMRI. Also meter should have Bluetooth low energy communication facility which should be compatible for communicating with mobile having requisite application / software. The meter shall be supplied in suitable packing so as to withstand transit shock.

The single phase two wire, two element type meters should be capable to display energy in KWh & record energy in KWh, demand in KW, power on hours and power factor for single phase two wire AC loads for power factor range of Zero Lag-Unity-Zero Lead, as per requirement given in this specification.

- b) It is not the intent to specify completely herein all the details of the 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 a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the right to reject any work or material which in his judgment is not in accordance therewith. The offered materials shall be complete with all components, accessories necessary for their effective and trouble free operation of the system for energy measurement. 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.
- c) The bidder shall have BIS Certification for offered item as on date of bid opening and copy of which must be submitted along with the bid, failing which offer of the bidder shall be treated as non-responsive.
- d) A prepaid metering solution shall be maintained by the bidder at their end for service life of these meters. A token shall be generated to energize the meter. The tariff configuration shall be prepared by manufacturer's authorized person. The necessary information required for tariff configuration shall be supplied by JVVNL authorized person from time to time (based) upon regulatory directives. The prepaid metering solution shall be integrated with JVVNL's billing solutions, JVVNL website & payment gateway. The bidder shall

provide JVVNL with the API through which token shall be generated when requested by the JVVNL.

- 2.0** The offered meter shall have BIS certification i.e. the offered meters shall be ISI marked and bidder shall have to furnish the notarized ISI license as on date of bid opening.

REQUIREMENT:-

5,00,000 Nos.

3.0 STANDARDS APPLICABLE : -

Unless otherwise specified elsewhere in this specification, the meter (s) shall conform to relevant requirement including performance and testing thereof to the following Indian / International Standards to be read with up to-date and latest amendments / revisions thereof.

S .No.	Standard No.	Title
1.	IS:15884/ 2010 of the latest version (AC Direct connected Prepayment meters for Active Energy)	Specification for AC static watt hour meters Class 1 & 2
2.	IS:13779-1999 (with latest amendments)	Specification for AC static watt hour meters Class 1 & 2
3.	Central Board of Irrigation and Power New Delhi technical Report No. 325 read with latest amendments issued till date	Specification for AC static electrical energy meters.
4.	IS : 9000	Basic Environmental testing Procedures for Electronic & Electrical items.
5	CEA Regulation	On installation and operation of meters dated 17.03.2006.
6	RERC Regulation	On installation and operation of meters dated 29.05.2007.
7	IS: 15959:2011 (with latest amendment No-2)	"Data Exchange for Electricity Meter Reading, Tariff And Load Control Companion Spec having all amendment (DLMS requirement is applicable only to optical port)"

In case of any conflict or discrepancy the order of precedence shall be (i) IS (ii) IEC (iii) CBIP technical report-325 (read with latest amendments). In case of any difference between the provisions of these standards and the provisions of this specification, the provisions contained in this specification shall prevail.

4.0 SERVICE CONDITIONS (CLIMATIC CONDITIONS):

The meters to be supplied against this specification should be capable of performing and maintaining required accuracy under extreme hot, cold, tropical and dusty climate and solar radiation typically existing in state of Rajasthan (India). The meter shall be

required to operate satisfactorily and continuously under the following tropical climatic conditions:-

a) Maximum ambient air temperature	:55 deg.C
b) Maximum ambient air temperature in shade	:45 deg.C
c) Maximum temperature attainable by the meter exposed to sun.	:60 deg. C
d) Minimum ambient temperature	:(-) 5 deg.C
e) Average daily ambient air temperature	:40 deg.C
f) Maximum relative humidity	: 95 %
g) Number of months of tropical monsoon condition	:4 months
h) Maximum altitude above mean sea level	:1000 meters
i) Average annual rain fall	:10-100 cms
j) Maximum wind pressure	:200 kg/sq.m
k) Isoceraunic level (days per year)	:40
l) Seismic level (horizontal accn.)	:0.30 g
m) Permitted noise level	:45. Db

5.0 PRINCIPLE PARAMETERS :

The meter shall conform to following parameters:

S. No.	Item	Specification
1.	Type of installation	: Outdoor installation
2.	System Voltage	: 240 V,-40% to +20% (phase to neutral)
3.	System frequency	: 50 Hz \pm 5%
4.	No. of phases	: Single phase two wire
5.	System of Earthing	: solidly grounded.
6.	Accuracy class	: 1.0
7.	Power Factor	: Unity to Zero (all power factor lag / or lead)

If phase to phase voltage (415V \pm 10%) is applied continuously 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.

6.0 TECHNICAL REQUIREMENTS :

- a) Rated voltage (Vref) 240 V phase to neutral
(Single phase, two wire system)
- b) Rated current 1. Basic current 5 A (Ib)
Max. Current 30 A (Imax)

6.1 SUPPLY SYSTEM & POWER SUPPLY VARIATION :

The supply system shall be LT 240 volts, phase to neutral, single phase two wire.

The extreme power supply variation for which an operating meter should withstand without damage and without degradation of its metrological characteristics when it is subsequently operated under its normal operating conditions shall be as follows:

Specified operating range :	0.80 to 1.1 Vref
Limit range of operation	0.60 to 1.2 Vref

However, the bidder can offer meters which can withstand higher variations.
The limits of error for +20% to -40% Vref shall be as under:-

Influence quantities		Value of current	Power factor	Limits of variation in % error
i)	Voltage variation between – 40% to +20%	Ib Ib	1 0.5 lag	0.7 1.0
ii)	10% of 3rd harmonic in current circuit	0.6 Ib 0.6 Imax	UPF UPF	0.6 0.6

However, the meter shall be functional and able to register energy even if the voltage falls up to 60% of the rated voltage i.e. 96 Volts at 800 mili Amps. (No accuracy is required)

6.2 POWER FACTOR RANGE :

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

6.3 ACCURACY :

Class of Accuracy of the meter shall be 1.0. The accuracy should not drift with time.

6.4 POWER CONSUMPTION :

- Voltage circuit: The active and apparent power consumption in each voltage circuit including the power supply of meter at reference voltage, reference frequency and reference temp. shall not exceed 3.0 watt per phase and 10 VA per phase respectively as per IS 15884 on balance load condition.
- Current circuit: The apparent power taken by each current circuit at basic current, reference frequency and reference temp. shall not exceed 11 VA as per IS-15884.

6.5 STARTING CURRENT :

Meter should start registering energy at 0.2% Ib at UPF in main element as well as in neutral element as per the clause No. 11.5 and table 19 of IS:13779:1999.

6.6 RUNNING WITH NO – LOAD :

When 70% and 120% of rated voltage is applied with no current flowing in current circuit, the test output of the meter shall not produce more than one pulse / count. The minimum test period for this test shall be as per relevant clause 8.3.2 of IEC 62053-21-2003.

6.7 AUXILIARY POWER

The meter shall draw power for working of electronic circuit from phase and neutral. In the case of neutral missing, power shall be drawn from a current transformer or through battery. Maximum power consumption of the Auxiliary Ckt shall be 5 watt.

6.8 MAXIMUM CONTINUOUS CURRENT

The rated maximum current for the meter shall be 100% of I_{max} at which the meter purports to meet the accuracy requirement. Meter terminals should be suitable to carry 150% of I_{max} .

7.1 SYSTEM ARCHITECTURE:

The prepayment metering system shall comprise of four components.

- i) Meter
- ii) Prepayment Server (maintained by bidder)
- iii) Payment gateway (maintained by JVVNL or through its partners)
- iv) Master Data of meters (maintained by JVVNL)

7.2 GENERAL & CONSTRUCTIONAL REQUIREMENTS

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

- a) Personnel safety against electric shock.
- b) Personnel safety against effects of excessive temperature.
- c) Protection against spread of fire.
- d) Protection against penetration of solid objects, dust and water
- e) Protection against fraud.
- f) Prevention against pilferage.

7.3 The meter shall be designed with application specific integrated circuit and shall be manufactured using SMT (Surface Mount Technology) components. Power supply and voltage divider circuits may be of PTH technology. The meter should be housed in a safe, high grade engineering Polycarbonate casing of projection mounting type.

7.4 All insulating material used in the construction of meters shall be non-hygroscopic, non-ageing and of tested quality. All parts that are likely to develop corrosion shall be effectively protected against corrosion during operating life by providing suitable protective coating.

7.5 The meter shall at least conform to the degree of protection IP 54 for protection against ingress of dust, moisture and vermin's.

- 7.6 The meter shall be supplied with a transparent extended terminal block cover (ETBC). Extended terminal cover shall have top side hinge arrangement so that it remains associated with meter always.
- 7.7 The meter case, terminal block and ETBC shall be made of unbreakable, high grade non-flammable polycarbonate or equivalent high grade and good quality engineering plastic. The terminal block should have terminal holes and shall be of sufficient size to accommodate the conductors, meeting the requirement of IS 13779.
- 7.8 The meter case shall have one full transparent window for display. The window shall be integrated part with the meter case in such a way that it cannot be removed undamaged.
- 7.9 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 terminals shall be made of brass to provide better conductivity. The clearance and creepage distance shall conform to relevant clause of IS 13779:1999.
- 7.10 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 as per IS 13779 during transportation and handling.
- 7.11 Meter should have no push button and shall have a capacitive touch arrangement to avoid water/fluid injection inside of meter circuit.

7.12 METER CASE :

- a) Meter case (base and cover) and extended terminal block Cover (ETBC) shall be made of unbreakable high grade flame retardant polycarbonate of good dielectric and mechanical strength with minimum thickness of 2.0 mm, however, due to manufacturing process, the negative tolerance of 0.2 mm may be allowed.
- b) Meter case (base and cover) and extended terminal block Cover (ETBC) should be injection moulded in UV stabilized poly-carbonate. The base of meter shall be of any colour but cover shall be transparent and easy to reading of all the displayed values/ parameters, nameplate details and calibrating LED. It should not fade in due course of time and become opaque causing inconvenience for reading. The ETBC shall also be kept fully transparent.
- c) The moulded meter case should not change in color, shape, size, dimensions when subjected to 200 hrs on UV test as per ASTM D 53. It should withstand 650 deg. C. glow wire test and heat deflection test as per ISO 75.

- d) The manufacturer shall emboss/Laser marked/engraved on the base and cover or terminal cover the name of the material they have used in an abbreviated form e.g. PCFR (to denote what they have used - flame retardant poly carbonate). In case embossing is not provided, the manufacturer should submit relevant test report of material.
- e) It is preferable that meter shall be made of single enclosure type design. If not, Meter cover shall be permanently fixed to the base such that cover cannot be opened without breaking. The meter cover shall be permanently fixed to the base by heat staking/ultrasonically welding in such a manner that cover cannot be opened without breaking i.e. the meter should be break to open type. The meter base and top shall have distinct contour to identify, if any tampering attempt has been made for opening of cover with some tool or by using hot wire or similar device. In case any attempt to open the meter cover from base there should be visible evidence of opening/tampering of ultrasonic welding in case when two distinct cover and base are utilized. In case, single enclosure type design is used there should be clear evidence of tampering or opening or attempt to opening/tampering.
- f) The meter case shall have the following properties of plastic material:

S. No.	Property	Units	Value	Standards
1.	Physical water absorption	%	Max. 0.35	ASTMD 570/ IS:5133(part 2) :1969
2.	Electrical Dielectric strength at 90 deg. C. in oil.	KV/ MM	Min 16	ASTMD 149
3	Thermal HDT	Deg.C	Min. 125	ASTMD 648/ ISO 75
4.	Flammability a) Rating b) Glow wire test 650 deg.C.		FV 2 Passes	UL94/ IS:11000(part 2-sec-1) IEC-60695-2-1-12 & IS:11000-2-1
5.	Mechanical a) Tensile strength b) Flexural strength c) Modulus of Elasticity d) Izod impact strength notched 23 Deg. C.	MPa MPa MPa KJ/Sq.M	Min. 50 Min. 90 Min. 2000 Min. 8	ISO 527/equivalent standard ISO 178 / equivalent standard ISO 178 / equivalent standard ISO 180/1A or any equivalent standard

7.13 TERMINAL BLOCK, TERMINAL AND EXTENDED TERMINAL BLOCK COVER :

- a) The terminal block shall be moulded type made of non-hygroscopic, flame-retardant material having good dielectric and mechanical strength.
- b) The moulded terminal block shall be made from best quality phenol formaldehyde/Poly carbonate conforming to IS:13779-1999 (latest amended) & IS:15884/ 2010 of the latest version having adequate insulating properties and mechanical strength with brass inserts for connecting terminals.

The terminal block should satisfy all the conditions specified in IS:13779, IS:15884/ 2010 of the latest version and IEC 62052 - 11. The material of the terminal block should fulfill the requirement of following tests:

- 1) The flame retardant rating of V0 as per UL 94 testing.
 - 2) The glow wire test for temperature of 960 deg. C as per IS:11000 (Part - 2/Sec.1) or IEC 60695-2-1.
 - 3) Heat deflection temperature (HDT) test of 135 deg. C. as per ISO 75 or ASTM D-648
 - 4) Ball pressure test at 125 deg. C. as per IEC 60335-1.
- c) The base of the meter should extend to enclose three sides (back and two sides) of the terminal block Any other method which meets these requirements in a better manner/way shall also be considered. The bidder should elaborate the arrangement adopted.
- d) The current circuit conductors of the meter shall be connected to its current terminals from inside the meter terminal block adopting procedure prescribed in either B-1 or B-2 of the recommended methods under IS:13779 & IS:15884/ 2010 of the latest version. Any other method which meets these requirements in a better manner/way shall also be considered. The bidder should elaborate the arrangement adopted.
- e) The meter terminal block shall have nickel / tin-plated / brass terminal inserts. The terminals shall have suitable construction with barriers and cover to provide firm and safe connections of incoming and outgoing leads. The terminal screws shall have flat bottom so as not to pierce in the external conductors. The terminals shall be of suitable rating to carry continuously 150% I max. Current and made of electroplated (or tinned) brass. Any other provision which meets this in a better manner / way shall also be considered. The bidder should elaborate the provision adopted.
- f) The manner of fixing the external conductors to the terminal block shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. All parts of each terminal shall be such that the risk of corrosion is minimized. Two screws shall be provided in each incoming and outgoing terminal for effectively clamping the external leads or thimbles. Each screw shall engage at least 3 threads in the terminal. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. It should be possible to directly insert the solid or stranded wire into the terminals. Electrical connections shall be so designed that contact pressure is not transmitted through insulating material. The manner of fixing of incoming and outgoing leads into the terminals shall be through thimbles / lugs / reducer type terminals and the supplier shall supply the same along with each meter without any extra cost.
- g) The internal diameter of the terminal holes should be adequately designed to accommodate copper/ aluminum armoured PVC cable of size up to 16 sq.mm and shall be capable of carrying continuous current up to 150% of I_{max}. The holes in the insulation material of the terminal block, which form an extension of the terminal holes, shall be of sufficient size to accommodate the insulation of the conductors also. The clearance and Creepage distances shall not be less than values specified in clause 6.6. of IS:13779:1999. Further, the supporting webs between the two terminals of the terminal block should be sufficiently high to ensure that the two neighboring terminals do not get bridged by dust or a flash over does not take place.

- h) The voltage circuit and the current circuit shall be solidly connected inside the meter body without any link. A firm connection shall be established within the meter case to energize the voltage circuit.
- i) The termination of current circuit wires, if used, inside the meter (i.e. CT primary conductor / shunt) on the terminal block should be through lugs and washers of proper size. The loop length of the primary current circuit should be kept minimum. Alternatively the CT primary conductor / shunt may be flattened to form a 'lug' like shape for proper terminating on terminal block without using lug or any other better arrangement may also be provided.
- j) The meter shall be supplied with extended terminal block cover (ETBC). The ETBC shall be extended by minimum 35mm below plane surface of the terminal block with suitable sealing arrangement of terminal cover for providing numbered double anchor polycarbonate lash wire seal, which shall be supplied loose by the bidder as per technical specification of Polycarbonate Seals.
- k) The terminal cover of the meter should be hinged either at the top or left side so that it opens from bottom to top or hinged at the left side so that it opens from right to left of the meter.

7.14 DISPLAY PARAMETERS AND TYPE OF DISPLAY :

- A. The meter should have bright LCD electronic display with backlit having minimum description of parameters (e.g. words like KWh, KW etc)/ legends (alphabets) height X width of 5mm X 3mm minimum and with minimum 6 digits (numerals) of size 8.5mm X 3.4mm in auto scroll mode.

The decimal digit shall be of smaller size but not less than 5mm x 3mm and shall be clearly distinguished from integral digits or if the digit size is same then the decimal digit shall be clearly distinguished from the integral digits.

The LCD shall be of STN (Super Tested Pneumatics) or FSTN or HTN type, construction suitable for withstanding temperature as per IS.

LCD Specifications:

Type: STN, FSTN, HTN, Seven segment Industrial grade type.

Viewing angle: 45 deg to 60 deg cone

Background type: Yellow/Green/Grey/white

Connector: Pin Type

Polarizer mode: Trans reflective /Transmissive

Segment Colour: Black / Dark Blue

Life time: Preferably 10 years

Temp range Operative: - 20 to 65Degree C

Temp range Storage: - 40 to 80 Degree C

Voltage: 3.0/5.0V

Drive method: 1/4 / 1/3 bias

Testing: High temp test as per specs for 72 Hrs

Low temp test as per specs for 72 Hrs

Result: After test the LCD should not get damaged.

Temperature Shock Test : as per IS 13779 (latest amendment)

- B. The accuracy of display parameters on LCD display for all parameters shall be matching with the accuracy Class of the meters as per IS, if not specifically

mentioned elsewhere in this specification. This shall be verified during inspection/testing of meters.

The display of various parameters in capacitive button mode shall be scrolling one after another. The meter shall be capable to measure & display continuously 'Active energy KWH' at all the loads & power factors i.e. Zero lag – Unity – zero lead.

Meter Data Display : The software shall show electrical condition existing at the time of reading the meter in tabular forms as well as graphical format (phase diagram) at BCS end.

C. Display Sequence:

The meter shall display the required parameters in two different modes No additional display parameters (push button or auto) will be acceptable. The details are as follows:-

a) Continuous Display:

- (i) Real Date & time
- (ii) LCD check
- (iii) Cumulative Active forward energy kWh(Total Energy)
- (iv) Credit balance at the instant.
- (v) Days left, based on the last seven days average consumption

All the above parameters shall be displayed for minimum 10 seconds including LCD check.

b) Capacitive Touch Display:-

The following parameters in the similar sequence shall be displayed one after the other, with press of capacitive touch or any other suitable capacitive key (out of 9, 0, *, #) each time. Each parameter shall display for minimum 10 seconds for respective measured values, except LCD Segment Check, which shall have display for 5 Seconds under auto scrolling of push button parameters:-

1. LCD Segment Check
2. Sr. No. of meter
3. Date & Time.
4. Current Cumulative Active forwarded Energy (Total Energy), 6 whole digits (without decimal digits).
5. Maximum demand in KW since last reset (2 Whole Digit+ 2 decimal digits) .
6. Instantaneous voltage with one digit after decimal.
7. Instantaneous Current with two digit after decimal.
8. Instantaneous active load in KW with three digits after decimal.
9. High resolution display of current cumulative active forwarded energy in Wh
10. Cumulative Active Energy (kWh forwarded) reading of pre-defined date and time for billing purpose (BP kWh), 6 Whole Digit for previous month.
11. Maximum demand kW of pre-defined date and time for billing purpose (BP KW), 2 Whole Digit+ 2 decimal digits for previous month.
12. Software version of meter

13. No. of transactions accepted & rejected
14. Power ON Hours
15. No. of switch open or close operations
16. Start & end time of happy hours credit
17. Maximum current & load limit set in meter
18. Maximum current recorded
19. Total credit added till date
20. Consumption history for previous month (kWh).
21. KW MD for previous month.
22. Tamper Events
23. Cumulative Tamper Count.

c) DISPLAY AFTER PRESSING Capacitive Touch BUTTONS:
The parameters on pressing keypad nos. shall be as below

Sr. No.	Key No.	Description
i	1	Date / Time and Retained credit codes
ii	2	Days Left (based on consumption of last seven days)
iii.	3	Currently active rates, the prices charged for consumption at each rate, and the number of units consumed at each rate and the daily charges
iv.	4	Current load and the cost of that load
v.	5	"Authenticated Billing Code" [#] and the total amount vended.
vi.	6	Daily charge shown for previous day
Vii	7	Maximum Demand with occurrence of time
viii.	8	kWh unit

The parameters on pressing Capacitive Touch buttons nos. shall be as below.
"Authenticated Billing Code"

The meter shall display the authenticated meter reading code on pressing key 5.
The token shall contain the following frozen value at midnight (00:00Hrs) of month end.

- i. 6 digit cumulative kWh energy register.
- ii. The tamper flag, which only indicates whether there is any tamper or not.
- iii. Date of frozen data
- iv. Credit balance

D. LCD least count :

The internal least count of energy recording shall not be more than 0.01 kWh. Hence, every 0.01 kWh consumption will be internally stored. Also, there be no loss of energy registration on account of frequent power outages due to high start up time of the meter.

To verify the above, the meter will be switched ON/OFF 40 times at rated parameters and energy recording on display with decimal digit should be within 0.4 kWh of the energy, it should register, as per its accuracy at that load. This will be verified during inspection of meters.

E. MAXIMUM DEMAND REGISTRATION AND MD RESETS :.

Meter shall continuously monitor and calculate the average maximum demand of each demand interval time of 30 minutes and maximum of these in a calendar month shall be stored. The maximum demand shall automatically reset at 24.00 hrs. of the last date of each calendar month for which minimum 30 years calendar shall be programmed by the manufacturer. The cumulative kWh should also be recorded at 24.00 hrs. on the last date of each calendar month for previous Twelve months.

F. Meter reading at power outage :

Provision to read the meter in no power condition for displaying the parameters. Such provision shall be provided in the form of Capacitive Touch activated Primary / Rechargeable Battery.

- I. No Power shall be consumed from this circuit when mains are available.
- II. Under no power condition when the meter is powered through Battery, Back-Lit of LCD is not required.
- III. In any case, RTC battery power shall not be used for display under power off condition.

7.15 OUTPUT DEVICE :

The meter shall have a test output device in the form of calibration LED of red colour and minimum intensity 10 mCD (milli-Candela) accessible from the front and shall be capable of being monitored conveniently with suitable testing equipment while in operation at site. The location of calibration LED should be such that the calibration pulses can be sensed easily through the sensor.

The relation between test output and the indication on display shall comply with the marking on the name plate (impulse per kWh).

The bidder shall state the necessary number of pulse count(s) to ensure measurement accuracy of at least 1/10th of class of the meter at the different test points.

The resolution of the test output pulse(s) should be sufficient to enable conduction of the starting current in less than 10 minutes and accuracy test at the lowest load with desired accuracy within 5 minutes.

7.16 COMMUNICATION CAPABILITY:**(A) Through Optical Communication Port / RS-232:-**

The meters shall have a galvanically isolated optical communication Port as per IEC1107 provided on the front of the meter to facilitate downloading the history data to a CMRI / Base computer.

READINGS TO BE DOWNLOADED WITH CMRI through optical port and RS-232 port

The following parameters should be downloaded by CMRI.

- i. Meter Sr. No.
- ii. Time & Date
- iii. Instant Load (Kilo-watt), Voltage, Current & Power Factor
- iv. Current cumulative forwarded KWH energy(total)
- v. Billing kWh (BP kWh) for the last **12 months at 24.00 Hrs. of the last day of the month.**
- vi. MD KW with 30 min. integration on real time basis with date and time for the last **12 months.**
- vii. Average power factor of the last consumption month up to pre-defined date & time for the last **12 months.**
- viii. Power on Hours and minutes for each of previous **12 months.**
- ix. The snap shot of total events with date and time of minimum 40 events (Either occurrence or restoration considered as an event) except cover open tamper which is non roll over tamper for following tamper conditions:
 - a) The tamper data as per Cl. 7.18 (e), (h) & (i) of this specification
 - b) Neutral missing (Single wire condition) as per cl no.7.18(f)

The meter shall also have a storage capacity for 75 days load survey with 30 minute IP for the following parameters (as per table 44 provided in IS:15959:2011.)

- 1) Real time clock, date and time
- 2) Average voltage
- 3) Block energy- KWh

At BCS end twelve month billing data with all energies including demand and all tamper event with their snap shot value should be provided.

The provision of RS-232 is for connecting modem to the meter, in case required for making meters smart, in future.

x. MIDNIGHT ENERGY SNAPSHOT RECORDING

The meter shall be capable of recording active energy (Total Energy) snapshot for at least 35 days.

(B). Through Bluetooth Low Energy (BLE) Feature:

Bluetooth Module technical Specification

Antenna Options	Internal
Networking topologies	Point to Point,
BLE version	4.1 and above
Android Version	6.0 and above

The meter shall be capable of being read by mobile (Android or Windows or iOS) utilizing designated Application or software.

The bidder shall quote for the 5-30 Amp. meters with LCD Display with communication facility for meter reading with Bluetooth Communication Facility. The meter shall be compatible for spot billing. The meter shall have facility for communicating with a Meter reading instrument / Mobile through designated Application /software through Bluetooth with proper security & without error to facilitate for auto-reading and transfer the billing and history data to the network / server. The credentials / details required for remote reading feature of Base Computer Software with necessary security provisions shall also be supplied free of cost with following features:

- a. Able to read complete meter data.
 - b. Able to read billing data
 - c. Reading mode i.e. Auto and Manual.
- (i) The meter shall use license free frequency band for communication so that license for use Bluetooth equipment to read energy meter at site is not required.
 - (ii) The Bluetooth module of the meter shall be completely enclosed in the meter body having no physical access from outside the meter without opening.
 - (iii) The communication software must be capable to transfer the billing data and meter Sr No. required for billing using any standard Bluetooth module enabled spot billing machine (SBM), within 60 seconds, to automatically generate the energy consumption bills at consumer's premises without any human intervention. The meter manufacturer should provide the protocol and other information to decipher the transmitted billing data and meter Sr No. for the spot billing purpose through SBM. The data communication with the meter shall be encrypted so that there is no possibility of tampering with the downloaded data
 - (iv) There should not be any degradation or interference on internal circuitry of meter because of Bluetooth module.
 - (v) Through BLE, if in-correct entry is made 5 times then the meter should communicating for next 15 minutes.
 - (vi) Readings To Be Downloaded With Bluetooth Receiver Through Bluetooth Port
The following parameters should be downloaded by Mobile Application.
 - a. Billing Data
 - b. Complete Meter Data including Load Profile
 - c. Tamper Data

(C). General requirement for Optical Port & Bluetooth Low Energy (BLE) feature:-

- a. **One No. DOS based CMRI with optical port interface to read meters for communication between meter and CMRI along with communication cable & its accessories, shall be supplied free of cost for every 1000 Nos. meters supplied.**

Minimum Salient features of CMRI shall be as under:-

i)	Display	-	15 lines.
ii)	Internal flash memory(RAM)	-	256 MB.(minimum)
iii)	ROM	-	8 GB(minimum)
iv)	Speed of processor	-	400 MHz & above.
v)	Battery backup	-	24 hours.
vi)	Operating system	-	DOS
vii)	Communication Port	-	USB & RS-232 Serial Port

- b.** It shall be the responsibility of the meter manufacturer to provide the required software and all the facilities required by purchaser to use the CMRI for reading and retrieving the data from the meter and to download the data to PC free of cost upto guarantee period
- c.** Any other information if manufacturer proposes to record may indicate in their offer. The BCS shall have the facility to give complete load survey data both in numeric and graphic form with option for either of them.
- d.** It should not be possible to reset the energy reading in the meter with the CMRI / mobile Application / Bluetooth.
- e.** It shall not be possible to re-programme or make any change in the meter through CMRI.
- f.** No editing shall be possible on CMRI and base computer by any means. The software shall have capability to convert the entire data into ASCII format
- g.** The protocol used in the meter shall have to be provided at the time of supply for the purpose of automatic meter reading system.
- h.** It shall be responsibility of the meter manufacturer to provide the required software and all the facilities free of cost to enable the use of optical port for reading and retrieving the data from the meter through CMRI and to necessary upgrades of software shall be supplied free of cost for downloading simultaneously the existing parameters and any parameters added in future specifications of meters.
- i.** Indication on CMRI shall be provided for confirmation of successful data transfer from meter to CMRI. During this period the energy recording should not be affected.
- j.** The software supplied by the bidder for common meter reading instrument should read the various makes of static energy meters and should be capable to download the data in the computer station having manufacturer base computer stations for the purpose of exchange of data.
- k.** The meter reading instrument shall be capable of retrieving data and capable of transferring them to the base computer service center for energy audit and billing purpose.
- l.** The compatibility of CMRI with the meter and the base computer system due to any change in language or any other reasons, the manufacturer/ supplier shall modify it at their own cost within guarantee period. The CMRI along with battery charger and for direct communication cords shall be supplied free of cost in the ratio of one for each 1000 Nos. meters supplied. The CMRI shall possess a specific Serial No. which cannot be changed. The guarantee of supplied CMRI would be 5 years.

- m. The CMRI shall have facility to store 200 Nos. of meter data. Further, there should be facility to be provided to transfer the meter data to computer through RS 232 / USB Port.
- n. The above mentioned all sorts of communication shall be of "One way" type i.e one can download the meter data through CMRI and data alteration facility in CMRI and from CMRI to meter should not be possible in any case and one can download the meter data through Mobile Application and data alteration facility in mobile Application and from mobile Application to meter should not be possible in any case.
- o. The bidder has to give an undertaking that the CMRI supplied by them shall be capable for downloading reading of other make of meters in the instant tender as well as for next 5 years of any make of meters as well as existing DLMS make single phase meters. Also the meters should be capable of being downloaded from any Bluetooth device built in last 5 years and to be built in next 5 years.
- p. The bidders shall furnish undertaking on Rajasthan's NJS of Rs.500 that the meters shall remain immune / tamper free, in case attempt is made to tamper the functionality of the meter / illegal recharge / illegal tariff change. In case even one meter is found tampered in respect of aforementioned parameters, then the firm is liable for being blacklisted by JVVNL.

7.17. VENDING SYSTEM REQUIREMENTS:

This section specifies the requirements of the vending system for currency based prepayment metering solution.

- a) The meter shall work on the latest currency transfer keypad technology supported by an online vending system. Since the keypad technology is future proof, cost effective and in this communication age, enables consumers to buy electricity over the multiple vending options like Utility billing centers, Utility website, Payment Apps, through third party POS providers based vending and many other vending options such as IVR, bank ATM, etc which enables 24x7 anywhere anytime vending faculties, hence the system provided by the bidder shall have such capabilities to integrate with utility / any third party service providers based upon mutual agreement with utility.
- b) The vending system shall use Triple DES standard, i.e. it provides three levels of encryption for the vend code. The code shall be meter specific and can't be used in any other meter. Triple DES standard is widely used in banking systems worldwide due to the high level of security provided by the algorithm.
- c) The vending system shall be the online vending system from where the vend codes shall be issued. It shall be possible to integrate various

vending options like SMS based vending, POS terminals based vending, Payment App based vending, website based vending etc.

- d) In order to have vending system interoperable provision to integrate the prepaid system with the utility's website & payment gateway through web services technology should be made available.

7.18 VENDING PROCESS:

- The consumer shall request JVVNL through various agencies to install / recharge meter. The payment shall be deducted/ adjusted by the JVVNL in lieu of recharge. In case of any dues/ surcharge to be deducted and not known earlier shall be deducted by the JVVNL.
- The JVVNL shall forward Meter Serial Number and the amount for which Token has to be generated through the API /link provided by the bidder.
- On receipt of the vend request the system, of bidder, shall have a provision to ascertain the identity of the consumer. The keys to identify the consumer shall be the meter serial number.
- The vend terminal/API shall send the request to a central database, maintained by bidder, that shall authenticate the transaction and generate an encrypted code.
- In order to provide maximum security to the system the encryption shall not be done on the vend terminal.
- On receipt of each request the vend terminal/API shall connect to the central database and get the code generated.
- The code so generated shall be passed on the JVVNL through the API / Link, which shall be communicated to the consumer.
- The vending system shall be used to transfer current values (Rupees) to the meter.
- The consumer shall pay the money to the JVVNL, this information when fed to the vend terminal shall be send to the central database that shall encrypt the token using Triple DES, or Data encryption standard algorithm.

7.19 Scope of Work

1. JVVNL (IT wing)

- a. Develop common app to read reading through Bluetooth Low Energy
- b. Develop common app to recharge meters through Bluetooth Low Energy

- c. If needed, to specify additional parameters required for the data transfer other than IS:15959 (DLMS)
 - d. common system to initialise meters of different make for installing them at the consumer premises
 - e. System to recharge meters through Bluetooth via common app of JVVNL
 - f. Integration of various payment gateways / Payment app for recharging of meters and to develop system and method for the same.
 - g. Maintaining master data for all the consumers
 - h. In case of any request to be sent to bidder, through their website link (API), the requisite information for generation of recharge/ initialise / MCO token to be made.
 - i. Access to different wing / agencies for requisite access
 - j. To develop system to collect various types of meter reading through Bluetooth and CMRI or manual.
 - k. Various type of MIS report shall be generated by the system
- l. Various tasks that should be performed from the DMC (Data Management Center), maintained by JVVNL, are outlined below:
- a. Consumer Database Management
 - i. Entry of new consumers and their details
 - ii. Existing consumer database
 - b. Meter Database Management
 - i. Uploading of meter database
 - c. Tariff Management
 - i. Tariff structure definition
 - ii. Rate Price definition
 - iii. Tariff category
 - iv. Tax percentage
 - v. Fixed Charge value
 - vi. Minimum charge value
 - vii. Slab reset period
 - viii. Tariff change administration
 - d. Limit Parameters management
 - i. Define Load Limit
 - ii. Current Limit value
 - iii. Emergency Credit
 - e. Debt (previous charges) Management
 - i. Transaction management :
 - ii. Cash vend transaction
 - f. Retained credit transaction
 - i. Refund Money Transaction
 - ii. Previous Charge Transaction

- g. Reports
 - i. Debt collection and outstanding report
 - ii. Tax and duties accounts report
 - iii. Customer's Vend Report
- h. Import of data by the vending station from the master station / Export of data by the main station to the vending stations:
 - i. Import of data from Comma separated values(CSV) format files
 - ii. Export of data in CSV format.
- i. Message Management
 - i. Entry of System Message
 - ii. Entry of Customer Specific Messages
 - iii. Entry of Predefined Messages
- j. User Security Management
 - i. Group rights definition
 - ii. Entry of system users and allocation of group rights

2. Bidder

- a. The master data shall be maintained by the Vendor where against every meter serial number, tariff code (every tariff code shall amount to tariff template maintained by the vendor), all last recharges, history of tariff changes, category of consumer (linked to tariff code applicable) and connection type (Single Phase or three phase).
- b. The vendor should provide API link through which meter recharge, or initiation process or tariff change (in case tariff template needs to be revised), to change connection type can be made. In case of issue of Meter change order (MCO) or removal of meter from any site, the token to settle all the existing amount in the meter be also provided.
- c. For generation of initialising token, JVVNL shall transfer Meter Number, Tariff Code, category of consumer and connection type
- d. The bidder shall provide Triple DES encrypted token through which meter shall be initialised
- e. For generation of token, JVVNL shall transfer Meter Number, Tariff Code, category of consumer and connection type and Amount for recharge of meters.
- f. The bidder shall provide Triple DES encrypted token through which meter shall be recharged
- g. For generation of token for MCO to settle the balance amount , JVVNL shall transfer Meter Number, Tariff Code, category of consumer and connection type and Amount balance in the meter.

- h. The bidder shall provide Triple DES encrypted token through which meter shall be de-initialised and balance be made zero.
- i. Apart from in case of de-initialisation, no negative token shall be generated.
- j. Various type of MIS report shall be generated by the system
- k. Various tasks that should be performed from the DMC (Data Management Center), maintained by Bidder, are outlined below:
 - a. Consumer Database Management
 - i. Entry of new consumers and their details
 - ii. Existing consumer database
 - b. Tariff Management
 - i. Tariff structure definition
 - ii. Rate Price definition
 - iii. Tariff category
 - iv. Tax percentage
 - v. Fixed Charge value
 - vi. Minimum charge value
 - vii. Slab reset period
 - viii. Tariff change administration
 - c. Debt (previous charges) Management
 - d. Retained credit transaction
 - i. Refund Money Transaction
 - ii. Previous Charge Transaction
 - e. Reports
 - i. Debt collection and outstanding report
 - ii. Tax and duties accounts report
 - i. Customer's Vend Report
 - f. Import of data by the vending station from the master station / Export of data by the main station to the vending stations:
 - i. Import of data from Comma separated values(CSV) format files
 - ii. Export of data in CSV format.
 - g. Message Management
 - i. Entry of System Message
 - ii. Entry of Customer Specific Messages
 - iii. Entry of Predefined Messages
 - h. User Security Management
 - i. Group rights definition
 - ii. Entry of system users and allocation of group rights

7.20 SECURITY ASPECT:

The vending system shall be a sophisticated system with reliable security features.

- a) The token created for particular meter with the defined tariff shall not be used for any other meter.
- b) The meter shall accept the valid token only once. The token generated shall be meter specific and shall be used only on the particular meter for which it is intended.
- c) The token in not be reusable, i.e. once entered in the meter shall not be utilized again.
- d) The token shall be re-issued in case of losing the same.
- e) Whenever a tariff change takes place the meter should not accept new vends without entering the new tariff. The new tariff in the meter shall be entered by means of token.
- f) The token generated shall be authenticated as well as encrypted so that no decoding is possible.
- g) The Vending system must be certified to ISO/IEC 27001 which is the only auditable international standard which defines the requirements for an Information Security Management System (ISMS). The standard is designed to ensure the selection of adequate and proportionate security controls.

7.21 Vending Charges

The DISCOM shall make the payment per vending transaction done with the bidder maintained servers and the payment shall be made on monthly basis after getting the invoice from the bidder. The manufacturer shall ensure to provide the uninterruptible services like generating vend token, tariff management, report generation etc. to JVVNL. A penalty of Rs.1000.00 (Rs one thousand) per consumer per day will be imposed for the delay in getting vends token responses or server breakdown.

7.22 TOKEN CARRIER INTERFACE – Capacitive Touch Keypad:

- a) The token carrier interface in the form of Capacitive Touch keypad shall be provided on the meter front cover for token punching to energize the meter and view display details of various parameters provided on respective key.

- b) The Capacitive Touch Keypad shall have Capacitive Touch buttons which enables the user to press and view various displays available on the meter.
- c) The Capacitive Touch keypad buttons shall have numbers / letters on them, which shall be clearly visible and resistant to wear.
- d) The layout of the numbering shall be same as that used on standard telephones for numbers '1' through '9' and buttons such as '*', '0', and '#'.
- e) Button '5' shall have some form of physical identification (raised printing or a pip) to aid customers with poor sight.
- f) The Capacitive Touch keypad IP rating shall be adequate to permit use with moist or wet hands whilst ensuring the safety of the user and preventing ingress of dirt and water to the unit. The Capacitive Touch keypad shall also be intrinsically safe and provide protection from damage by means of sharp objects and electrostatic discharges.
- g) The Capacitive Touch keypad buttons shall provide audible feedback for token entry with differing tones to distinguish between valid and invalid entry.
- h) The entry of codes for credit or commands associated with programming functions such as tariff change shall be via numeric codes.
- i) Code encryption/decryption must be carried out using an internationally recognized standard (i.e. Triple DES).
- j) The meter shall permit a time delay of up to 20 seconds between keystrokes.
- k) The Capacitive Touch keypad interface shall be designed to operate for a minimum of 20,000 operations of each individual key.

7.23 TARIFF:

- a) It shall be possible in the meter that the Tariff Order in force at the relevant time shall be made applicable and shall continue till the consumer approaches for next recharge.
- b) Following are the features required in the meter for Tariff. It shall be possible to change all the tariff related parameter through vending code.

(i) Fixed Charges:

Meter shall be able to deduct fixed charges on daily basis subject to adjustment for full month at the end of the month. Also fixed charges should be deducted on the basis of load/consumption slabs as applicable in the existing tariff structure and modified by the regulator in future. The fixed charges shall be defined using the online vending system.

(ii) Slab Tariff:

The meter shall have capability for defining minimum six tariff slabs. It shall be possible to change the slabs through the portable device or through the online vending system. The tariff shall be applicable for the month as per the tariff structure.

(iii) Tax/Duty:

It shall be possible to define the tax percentage through online vending system which has to be levied on the amount of the energy purchased.

(iv) Rebate:

The System shall have facility to provide Rebate on purchase of vending tokens. Rebate shall be defined through online vending systems. Rebate deduction function shall facilitate to provide rebate to prepaid consumers, such that deduction can be done at the vending end on the basis of amount of energy purchased. However, it does not exist in present tariff structure but this function may be utilized if regulator allows to provide any rebate for prepaid consumers in future.

(v) Debt Management:

It shall be possible to collect the debt from the consumers with the use of the online vending system. The debt percentage shall be defined in the vending system.

(vi) Software Feature:

The meter shall be programmable for tariff structure, tariff slabs, etc. as per the order given by JVVNL from time to time. The end result of the tariff made applicable shall be as per JVVNL orders.

7.24 PREPAID FEATURES:

7.24.1 TOKEN AND CREDIT AMOUNT:

- a) Debit limit upto five digits INR shall be provided into the meter.
- b) The meter shall display message on accepting valid token transaction and on rejecting invalid token transaction with an additional sound.
- c) If the token is not accepted due to the disturbance caused by the latching relay, then it shall not be invalidated and shall be accepted when presented to the payment meter subsequent to the disappearance of the disturbance.
- d) The meter shall be capable to accept numeric token via Capacitive Touch Keypad and credit the purchased amount to the meter. This credit shall be added to the existing balance available in the meter and the same amount shall also be added to cumulative amount credited to meter.
- e) The credit shall be debited by the meter based on the electricity consumption according to the rate including the fixed charges, etc. as defined in tariff configuration.
- f) Meter shall be able to deduct fixed charges on daily basis as per the tariff applicable. Fix charges should not be deducted when the meter is lying unused

in store. There shall be no need of any token transaction to stop fixed charge recovery while meter is removed from the site and kept in store.

- g) A visible low credit warning shall be provided with bi-color LED / LCD indication (Prefer Green for healthy zone, else change from Green to flickering Red color) when the credit falls below defined alarm limit.
- h) An audible low credit warning shall be provided to sound for 30 seconds, alarm shall be raised at every half an hour till the alarm is acknowledged by the consumer by pressing meter key. There shall be no alarm during night hours.
- i) When the credit reaches to zero, the meter shall disconnect the output supply except emergency credit limit of "happy hours" (from 1730 hours of previous day of all Saturdays & Sundays, National Holidays, state fixed holidays & Night Time till 1100 hours of next working days) is provided to consumer or meter is charged with a new token which has additional amount than zero. It shall give alarm when the credit balance is Rs. 100.00.
- j) Meter shall be capable to configure for Emergency credit limit so that some defined amount could be provided to consumer after zero balance. After this defined amount, meter shall disconnect the output supply and restore only when meter balance reach to the amount additional than zero.
- k) The meter shall disconnect supply after end of such happy hours. When meter is recharged with new credit, it shall adjust the debited amount first and then normal operation shall go on.

7.25 DEMONSTRATION:

The purchaser reserves the right to ask for the demonstration of the equipment offered at the purchaser's place.

7.26 NODAL OFFICER

The Chief Engineer (O&M) of Discom will be the Nodal Officer for monitoring the installation and successful operation of pre-payment meters in their respective zones.

The Chief Engineer (M&P-IT) of Discom will be the Nodal Officer for monitoring the installation and successful operation of pre-payment meters and vending stations.

7.27 Certified standard- CBIP-111

- a) The CMRI shall possess easily replaceable battery and shall be capable of storing data for at least 200 Nos. meters at one time. It shall be possible to read the meter from outside the meter box. The data transfer (from meter to CMRI) rate for Billing data downloading shall be less than 60 Sec. and for total data within 5 Minutes for each meter.

- b) The Supplier shall supply Software (compatible with Windows XP system or higher) and training free of cost for the use of software at multiple data collection and billing premises of the utility.
- c) 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, and history data should be convertible to user defined ASCII file format for integration with third party software. 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.

7.28 LATCHING RELAY (LOAD SWITCH):

- a) Meter shall have one latching relay for each phase to protect against the common tamper as well as to disconnect the full load.
- b) The latching relay shall be bi-stable type latching switch designed and manufactured in accordance with international standard of IEC and DIN EN 61810 part 1 / VDE 0435 part 201 as well as they shall meet the overload and short circuit requirement of IEC, DIN EN 61036 / 61037 & ANSI C12. The Latching relay shall conform to the load switching capabilities as per relevant IS. The latching relay shall be with trip-free design as given in IS.
- c) Precautionary measures shall be taken to protect the latching relay from adverse effects resulting from the ingress or vermin into the payment meter.
- d) The latching relay shall be designed and rated to make and break at V_{ref} , I_{max} with a linear resistive load and at V_{ref} , I_b , 0.4 inductive power factor for 3,000 operations.
- e) As the balance credit decreases beyond pre-defined level, the latching relay shall disconnect the supply to the load.
- f) The reading process of a valid token shall not be adversely affected by coincident switching of the latching relay while making or breaking currents under rated operating values of voltage and current.
- g) Once the load is interrupted by low credit in the meter accounting process, the latching relay shall only be operable to restore the load after a further appropriate manual intervention, for example by manually presenting a further credit token.

- h) The meter shall be able to disconnect the load in case of exceeding the current limit (130% I_{max} for 10-60A meter meter) after 1 minute on stabilizing the current.

7.29 TAMPER AND FRAUD PROTECTION :

The meter should have tamper and fraud protection features so as to continue to register active energy accurately under the following conditions.

- a. On reversal (interchange) of input (line) and output (load) terminals –. meter should continue to register in forwarded direction
- b. On reversal (interchange) of phase and neutral at the mains or incoming supply side of meter terminals meter will log tamper or metering will be accurate
- c. Single earth in place of neutral (i.e. when 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 icon or LED shall be switched on, if neutral current is more than the phase current.
- d. Any combination of the conditions described above under (a), (b) & (c).
- e. The meter shall either remain immune to tamper through application of external magnetic field (AC electro magnet or DC magnet) as per value specified in CBIP 325 or if the metering gets affected then meter shall record energy at I_{max} , rated voltage and unity P.F. as per CBIP 325 and same should also be logged as event with date & time.

Also In case of abnormal permanent magnetic field, meter shall either remain immune or if the metering gets affected then meter shall record energy at I_{max} , rated voltage and unity P.F and same should also be logged as event with date & time.

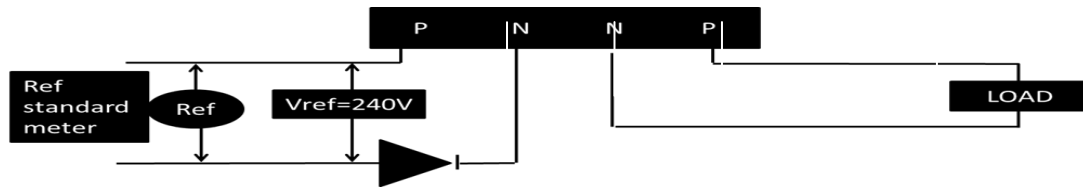
The meter shall be provided with built in logic/ indication and sensor to detect tamper beyond meter's magnetic immunity level and display of such occurrences. The meter accuracy or display accuracy shall not be affected by permanent magnetic field up to meter's magnetic immunity level.

At the time of occurrence of magnetic tamper, meter should record tamper event with I_{max} , rated voltage and unity P.F and at the time of restoration it should logged with actual parameters .

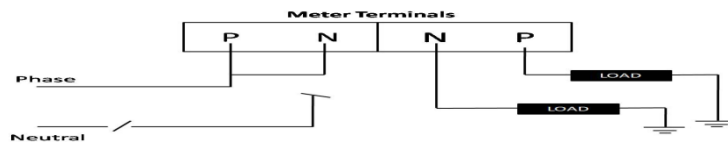
- f. When the neutral from both incoming & outgoing side are disconnected and the load is taken through earth, the meter should record energy as per rated voltage, rated frequency and 0.866 Power Factor (Lag) or Unity Power Factor, in proportion to the current drawn with accuracy of meter within $\pm 3\%$. The test will be conducted through pulse output with/without use of push button. Under such condition, the energy recording should start at load current minimum 20% of I_b . Power CT or battery shall be used for this purpose. Pulse output should come for 5 minutes.
- g. Even in the tamper condition, i.e. when DC signal is injected on the neutral terminal of the meter through Diode, the meter should record energy accurately i.e. within class of accuracy ($\pm 3\%$) in the range of V_{ref} applied to the incoming phase & input terminal of the Diode." The test will be conducted at load current minimum 20% of I_b . Alternately, in this tamper condition, the voltage at meter's terminal will be drop down nearly half (depends on diode rating) and Same

voltage will be seen across load side. So metering will be on actual voltage, actual current and actual PF. Meter will log low voltage event in this case.

For above, the test shall be carried out by connecting reference meter at input terminal of the diode with reference voltage applied to the incoming phase & input terminal of the diode. The test in this condition will be carried out as per the following diagram:-



- h. Even if the incoming phase and neutral terminal of meter are connected to phase wire of the supply and the load is connected on both phase and neutral or either of the two element of the meter separately and is being run through earth, the meter should record as per rated voltage , rated frequency and 0.866 (lag) power factor or Unity Power Factor, in proportional to the current drawn with accuracy of meter with in +/-3%. The test will be conducted at load current minimum 20% of I_b . The test will be conducted with/without use of push button. Pulse output should come for 5 minutes. Same should also be logged as event with date & time. Detailed circuit diagram is as under:-



i. Cover Open Tamper: –

- a. If the meter cover is opened, the meter shall log at BCS end this as tamper and shall display status for Cover open like Open or C-Open etc. with date and time of such opening (in power on as well as power off condition) in display on the LCD continuously with other display parameters so that it is immediately noticed by the meter reader.
- j. The accuracy of the meter should not be affected with the application of abnormal voltage/frequency generating device having spark discharge of approximately 35 KV. The meter shall be tested by feeding the output of this device having Voltage discharge with 0-10 mm spark gap to meter in any of the following manner for a total period of 10 minutes:

- a. On any of the phases or neutral terminals
- b. Spark on meter body

The accuracy of meter shall be checked before and after the application of above device.

Also after application of Spark, no abnormality on functionality of meter shall be observed otherwise sample shall be treated as failed.

- k.** The threshold values for different tamper features shall be as under:-
1. The starting current of main measuring element and neutral element shall be 0.2 % of I_b as per the clause no 11.5 and table 19 of IS:13779:1999..
 2. The threshold value for recording of energy under tamper condition (c) above shall in no case be more than 0.2% I_b .
 3. Occurrence time for logging of tamper shall be minimum 5 minutes. and restoration of tamper shall be less than 2 minutes except magnetic (approx. 15-20 seconds) and cover open tamper which shall be logged instantaneously.
 4. Logging of snap shot values of tamper events at BCS end for occurrence & restoration should be as per minimum logging time of occurrence/ restoration of tamper events.

7.30 SELF DIAGNOSTIC FEATURE

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

- a) Time and date
- b) Real Time Clock (RTC) status
- c) Battery status

7.31 SEALING ARRANGEMENT OF THE METER :

- a) In case the meter has distinct meter base and cover then the meter cover shall be permanently ultrasonically welded to the meter. It shall not be possible to open the meter cover without permanently damaging the meter cover or base, easily visible from the front. At least two one way driving head sealing screws of Nickel plated steel or Nickel plated Brass shall be provided for proper fixing of meter cover. Each one way driving head sealing screw shall have an independent sealing hole. However better alternate arrangement other than unidirectional sealing screws for sealing arrangement shall also be accepted after the approval of MM wing. Manufacturer has to provide one polycarbonate seal on either side/front of the meter and two hologram sticker seals on both sides of meter with word JVVNL / logo of JVVNL & manufacturer and the polycarbonate and sticker seals having the same number as that of the meter Sr. No. and one no. polycarbonate seal in loose condition to be provided for terminal cover of the meter.
- b) In case the meter is of single enclosure type above provisions as mentioned at Cl. a) may be relaxed and only one Hologram Sticker shall be required. The Serial Number of Meter, Poly-carbonate Body Seal/ Sticker Seal and Loose Seal for Terminal Cover shall be same.

7.32 FIXING ARRANGEMENT OF METER :

The meter shall have minimum Two fixing holes, one at the top for mounting and one at the bottom, inside the terminal cover. The top hole shall be key-hole type on the back of the meter base so that hanging screw is not

accessible after fixing of the meter and it shall not be possible to remove the meter from the hanging screw without removing the terminal cover and screws behind the terminal block cover. The lower fixing hole/s shall be provided under the ETBC. Any alternate better arrangement shall also be considered for acceptance. All the fixing holes shall be such designed that once the meter is mounted; the screw heads shall not be accessible.

Manufacturer shall provide the appropriate fixing screws along with the meters

7.33 MARKING OF METER :

The meter terminal marking and mounting arrangement should be as per Indian installation practices. The marking on every meter shall be in accordance with IS:13779/IEC 62052-11& IS:15884/ 2010 of the latest version.

Every meter shall have name plate beneath the meter cover window portion such that the name plate cannot be accessed without opening the meter cover. The marking on the name plate shall be indelible, distinct and readable from outside the meter housed inside the box. The name plate marking should not fade or otherwise be adversely affected by UV exposure with lapse of time. The basic markings on the meter name plate shall be as follows and **Additional parameters/ marking will not be acceptable on the name plate:-**

- a. Manufacturer's name or trade mark and place of manufacture
- b. Designation of type
- c. Number of phases and wires for which the meter is suitable
- d. Serial number
- e. Month and year of manufacture
- f. Reference voltage and frequency.
- g. Basic current and rated maximum current in Amps
- h. Principal unit(s) of measurement
- i. Meter constant (imp/ kwh)
- j. Class index of meter
- k. Property of JVVNL
- l. Purchaser's order Number & date
- m. Guarantee period - 5 years
- n. Bar Coding of serial number, month & year of manufacture of the meter
- o. Sign of insulation
- p. UltraSonic Welding (in case of distinct base and cover)
- q. ISI mark with license number
- r. DLMS Meter

7.34 CONNECTION DIAGRAM AND TERMINAL MARKINGS :

The connection diagram of the meter shall be clearly shown on the meter name plate and shall be of permanent nature. Alternatively, connection diagram can be permanently engraved/embossed/laser etched on the inside/outside portion of terminal cover.

8.0 SALIENT FEATURES : -

The meter shall have following additional salient features:

- a) The meter shall be compact in design. The entire design and 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.
- b) Even if phase to phase voltage i.e. 450 volts is applied for 5 minutes between phase and neutral of the meter, the meter should not get damaged and continue to record correctly within class 1 accuracy after restoration of normal supply.
- c) The meter should not saturate up to 900% I_b if applied for 30 minutes and should record energy accurately for P.F. range zero lag – unity – zero lead.
- d) The meter should not have any form of mechanical adjustments such as trim-pots, potentiometer etc. for calibration. The meter shall be tested, calibrated and sealed at manufacturer's works before dispatch. Further, no modification of calibration shall be possible at site by any means what so ever. The meter should be software calibrated

All important data such as such as calibration data, billing parameters, and cumulative kWh should be stored in NVM internal to the main processing circuit and it should not be possible to change it through any standard serial communication. This may be verified by removing the non-volatile memory of the meter and check the working of the meter during sample testing or inspection.

- e) The short-time over current rating shall be 30 I_{max} for one half cycle at rated frequency as per clause No. 9.2.3 of IS:13779/ Clause 7.2 of IEC 62053-21
- f) LEDs shall be provided for following indications
 - 1) LED for Test output pulse (imp/kWh) – RedIt should not be provided as icons on the LCD display.
- g) Indication for Relay Status shall be provided
- h) The location of calibration LED (preferably at the center) should be such that the calibration pulses can be sensed easily through the sensor.
- i) The meter shall display as well as record total Energy and same shall be available at BCS end.
- j) **Temperature Rise:**
Under normal conditions of use at I_{max} current and 1.20 times rated voltage, the winding and insulation shall not reach a temperature, which might adversely affect the operation of these LT Meters.

9.0 GENERAL: -All electrically live screws shall be of brass/ nickel tin plated. All other screws shall be electro plated.

- a) The meter shall draw power for its working through phase and neutral.
- b) The terminal inserts shall be of heavily nickel/tinned brass.

- c) The meter shall conform to the degree of protection IP 54 of IS:12063/ IEC 62052-11 clause 5.9 for protection against ingress of dust, moisture and vermin.
- d) There should not be any Creepage in the meter even at 120% & 70 % of supply voltage.
- e) The meter should be free from jumps during sudden switching of heavy loads / or transient voltage spikes.
- f) Meter shall display direct reading and without multiplying factor.

10.0 ELECTROMAGNETIC COMPATIBILITY AND INTERFERENCE REQUIREMENT :

The meter shall meet EMI/EMC requirements as specified in the relevant standards described in clause 3.0 of this specification and shall also be protected against radiated interference from either magnetic or radio frequency sources.

The offered whole current meter shall also withstand DC Immunity test as per relevant standard so as to ensure that the meter current circuits (main and neutral) do not saturate on passage of direct current.

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:

- a) Harmonics.
- b) Voltage dips and short interruptions.
- c) Fast transient burst test
- d) External D.C. and A.C. magnetic fields
- e) Electromagnetic H.F. fields
- f) Electrostatic discharges.
- g) Radio frequency interference suppression.

11.0 MANUFACTURING ACTIVITIES: -

All the material, electronics and power components, ICs used in the manufacture of the meter shall be of highest quality and reputed make (as per Annexure-A-3) to ensure higher reliability, longer life and sustained accuracy. However, components of other reputed make may also be acceptable after prior approval of purchaser. The verification of the components shall be carried out at manufacturer's works by purchaser before offering material for inspection for every lot. The supplier is required to intimate purchaser whenever any lot taken up for manufacturing assembly. The Purchaser reserve the right to waive off the verification of components/ activity.

- I. The manufacturer should use application specific integrated circuit (ASIC) or Micro controller for metering functions.
- II. The electronic components shall be mounted on the printed circuit board using latest surface mounted technology (SMT) except power components by deploying automatic SMT pick and place machine and re-flow solder process.
The electronic components used in the meter shall be of high quality and there shall be no drift in the accuracy of the meter at least up to 10 years. Further, the Bidder should own or have exclusive access (through hire, lease or sub-contract) of the afore-mentioned facilities.

Adequate documents regarding exclusive hire or exclusive lease shall be made available. In case of sub-contract, it shall be ensured that the sub-contractor is not carrying out sub-contracting for any other bidder in the above tender. The bidder shall indicate with the name and location of such facility along with an undertaking and certificate from the utility and any ambiguity on such a confirmation shall result in immediate disqualification of the bidder.

The above shall be verified during works inspection or material inspection also and if any ambiguity is found, it shall be considered as a breach of contract by the successful bidder.

Bidders without in-house design, development and manufacturing facility as above or who are buying populated PCBs will not be considered as meter manufacturers. The PCB material should be of glass epoxy FR-4 grade conforming to relevant standards.

- III. All insulating materials used in the construction of meters shall be non-hygroscopic, non-aging and of tested quality. All parts that are likely to develop corrosion shall be effectively protected against corrosion by providing suitable protective coating.
- IV. Quality should be ensured at the following stages:
 - a) At PCB manufacturing stage, each board shall be subjected to bare board testing.
 - b) At insertion stage, all components should undergo testing for conforming to design parameters and orientation.
 - c) Complete assembled and soldered PCB should undergo functional testing using test equipments (testing jig).
 - d) Prior to final testing and calibration, all meters shall be subjected to accelerated ageing test to eliminate infant mortality.
- V. The calibration of meters shall be done in-house.
- VI. The bidder should submit the list of all components used in the meter along with the offer.
- VII. A detailed list of bought-out items which are used in the manufacture of the meter should be furnished indicating the name of firms from whom these items are procured. The bidder shall also give the details of quality assurance procedures followed by him in respect of the bought – out items.
- VIII. The details of testing facilities available for conducting the routine and acceptance tests and other special tests on the meter shall be furnished with the bid. The facility available if any for conducting type test may also be furnished.

12 TYPE TEST: -

- a) The bidders shall be required to furnish valid type test reports in respect of single phase static energy meters with optical port as per the requirement of IS 13779:1999 from CPRI, ERDA or any third party Govt. Approved NABL accredited Lab (not in-House Lab) which should not be older than **three years** as on the date of opening of techno-commercial bid. For this purpose date of conducting **(test starting date) type test will be considered. Type test carried out after opening of techno-commercial Bid shall not be considered.**

- b) The type test certificates shall be furnished either in original or copy duly attested by notary.
- c) The bids of only those bidders shall be considered to be meeting the type test criteria who furnishes complete type test certificates along with the bid as per above provision.

d) Verification of testing of materials supplied:

- i) After receipt of approval of pre- commencement sample meters with box (cup board) and seals, the successful bidder shall offer first lot of meters with box comprising minimum 5,000 Nos. of meters (or 20% of ordered quantity, whichever is less) within 30 days. After clearance from purchaser, the material shall be dispatched to Nigam's stores.
- ii) After receipt of first lot of meters, samples shall be selected for all the Type Tests, additional type tests and Tamper Tests as incorporated in the technical specification from CPRI (Bhopal/Bangalore)/ERDA.
- iii) Four samples for conducting tests (3 Nos for Electrical Mechanical and additional Type Test and 1 Nos for Communication testing) as above shall be selected & sealed by a Committee consisting of the XEn (O&M) to be nominated by the circle SE (O&M), XEN(M&P) to be nominated by the concerned SE(M&P) and ACOS from the first lot received in stores. The samples so selected shall be sealed by at least 3-4 seals/ stickers by the Committee Members. The selected samples shall be sent to SE(MM) along with complete details of meters & seals (including manufacturer's seals) provided by the Committee members. The SE(MM) shall further send the meters with complete details for type tests, additional type tests and tamper tests, as per specification at CPRI (Bhopal/Bangalore)/ERDA only. The complete type test report under a cover of registered letter shall be sent directly to the purchaser.
- iv) In addition to above **selected samples**, two lot of three sample of meter with meter Box, and the **two lot of** samples of 6 Kg. raw material of each of meter case, Meter Box and terminal block shall be drawn by the inspecting officers during the 1st inspection & sealed by the aforesaid procedure which shall be sent to CIPET/ any NABL accredited test house for verification of properties of plastic material **used for base and cover of** meter case , Meter Box & Terminal Block as mentioned at clause 7.13 & 7.14 of specification.
- v) The type test charges shall be borne by the supplier. The purchaser however in first instance may pay testing charges to the testing agency which shall be recovered by Sr. AO(CPC) from the bill of the supplier alternatively a sum of Rs. 5 Lac may be got deposited by the supplier with first inspection call.
- vi) The supplies, at the option of purchaser, may be utilized in the field after successful testing of sample meters in respect of the tests as mentioned at clause 12.0 (b) (ix) below, at purchaser's MT lab. The supplier can continue supplying material in anticipation of successful type test(s) results. 70% of the payment shall be released after receipt of successful purchaser's MT lab tests report and balance payment shall be released after receipt of successful type test reports.
- vii) In case of successful type test results, supplies shall be continued. However, in case the meter(s) do not meet the requirement as per ISS/CBIP/ Specification in type test(s), three more samples shall be selected from the supplies already received to get them type tested as per clause 12 (d) (iii). **In case material**

fails in CIPET, another set of three meters sample and another lot of 6 kg sample already selected by inspecting officers be tested as per Clause 12 (d) (iv) above at supplier's cost. In case of repeat failure in type test(s) (either in meter type test or in material type test or in both), the order of balance quantity including the quantity lying unused in the stores/ field shall be cancelled. The guarantee period of quantity already supplied & used shall be doubled and payment for used meters shall be arranged after deducting 10% cost.

- viii) However, purchaser may allow the supplier to re-offer the material after change/ modification in the design of meters. The balance material shall be accepted only after successful type testing. The type testing charges shall be borne by the supplier.
- ix) Besides above type tests, samples from each lot/ sub-lot shall be selected and subjected to the following test(s) at purchaser's lab on an automatic test bench of ERSS 0.02 class. The samples shall be as per sampling plan indicated at Annexure-H of IS:13779/1999 (considering lot of 10,000 Nos. meters) if quantity offered for inspection is 20,000 Nos. or more , if less than this, the lot shall remain 5,000 Nos.) on pro-rata basis. The samples shall be selected by the committee consisting of XEn (SPO-IV) and T.A. To Chief Engineer (MM) with the Computer PSUEDO –RANDOM method & be intimated to the concerning ACOS. The samples so selected shall be sealed by seals/ stickers by the ACOS and put in the primary packing of the meter and box (which shall be sealed by sticker seals) and then all the meters selected to be put in the primary packing corrugated box supplied with the meters and again sealed by sticker seals by the committee members consisting concern ACOS & AEN(MST) at ACOS Head Quarter. The selected samples shall be sent to SE(M&P), Jaipur/Kota along with complete details of meters & seals. The supplies shall be utilized in the field only after successful testing (in respect of under mentioned tests) of sample meters:-

S. No	Particulars of Tests	No. of samples to be tested
1.	No load test and minimum starting current test	32 Nos.
2	A.C. High Voltage Test, Limits of error (Both main & neutral elements), test of meter constant & Power consumption test for voltage and current circuits.	8 Nos. out of above 32 Nos.
3.	Repeatability of error test.(main & neutral element)	3 Nos. out of above 8 Nos.
4.	Voltage Variation, Tamper & fraud protection, D.C. Component in A.C. Circuit (both for phase & neutral), Magnetic Immunity Test, Accuracy test after application of 450 Volts for 5 minutes, D.C. Injection at neutral using diode, Saturation Test as per clause 8.0 (b) and 35 KV high voltage / frequency test of specification, cover open.	3 Nos. out of above 8 Nos. subjected to the condition that all the 8 meters pass the tests at S. No. 2 above successfully otherwise whole lot shall be considered rejected without going for further testing.

The acceptability criteria of the lot or otherwise shall be generally as per relevant ISS :13779-99 (latest amended) for only the tests at at Sr. No. 1, 2 & 3 above. **In other tests, as mentioned in the specification, if any meter fails then the lot shall be rejected.**

- x) In case of failure of samples of lot/ sub-lot in the test(s) detailed at clause No. 12(b)(ix) above, the similar testing shall be repeated on fresh samples selected by the committee & fresh testing as mentioned at clause No. 12(b) (ix) 1 to 4 above shall be carried out. If the samples meet the requirement of above tests, the lot shall be accepted and if it fails consecutive second time, the entire quantity of respective lot/sub-lot shall be rejected and shall have to be replaced by the supplier at his own cost. Repeated failure/ poor results in the testing may render cancellation of order.
- xi) Due notice shall be given to supplier for testing thereof to enable them to be present for the same if so desired by them. If the supplier or his authorized representative fails to attend the sample testing, the same shall be carried out unilaterally by the purchaser and the results thereof shall be binding upon the supplier.
- xii) The purchaser also reserves the right to get additional samples for all or any of the selected tests at purchaser's cost at any independent test house at any stage of supply if so considered necessary to ensure that the quality of meters being offered for inspection is same as already got type tested. In case of failure, the guarantee period of the quantity already supplied by the supplier shall be doubled and purchaser reserve the right to cancel the balance quantity.

13.0 GUARANTEED TECHNICAL PARTICULARS: -

The bidder shall furnish all the necessary information as desired in the schedule of Guaranteed Technical Particulars and data, appended at Annexure A-I, A-II & A-III of this specification. If the bidder desire to furnish any other information(s) in addition to the details as asked for, the same may be furnished against the last item of this Annexure.

14.0 INSPECTION AND TESTING:

- a) In case material/equipment is not found ready in good / acceptable condition by the representative(s) of the purchaser deputed for inspection to the extent of the quantity indicated in the inspection call with tolerance of (-) 10% or if the inspection is not got carried out by any reasons on account of the supplier an amount of Rs.7,500/- for the supplier's works located in Rajasthan, and an amount of Rs.15,000/- for the supplier's works located outside Rajasthan will become payable by the supplier on this account to the Accounts Officer (MM), Jaipur Discom, Jaipur.
All Acceptance tests as laid down in the ISS/IEC and this specifications shall be carried out. The supplier shall provide all routine test reports for entire offered quantity of energy meters in CD to the inspecting officers.
- b) Following tests shall also be carried out as Acceptance tests by adopting methods specified in ISS:13779/IS:9000/ relevant IEC standard / CBIP 325 (latest

amended) on Automatic meter test bench with electronic reference sub-standard of preferably 0.02 class accuracy or better.

- i) AC voltage test.
 - ii) Test of meter constant
 - iii) Tests of limits of error clause. 11.11 of IS:13779 at 400 % Ib, 600% Ib and 800 % Ib at pf 0.5 lag, 0.8 lead & unity.
 - iv) Vibration Test(IS13010/1990/IS:9000)
 - v) Shock Test Vibration & shock test shall be carried out as acceptance test by adopting procedure laid down in related Standard and its latest amendments.
 - vi) Test of Voltage variation as per this specification.
 - vii) Test of no load condition at 70% and 120 % of rated voltage. The minimum test period shall be as per Clause 8.3.2 of IEC : 62053 – 21-2003.
 - viii) Test of DC components in AC circuit- The limit of variation in percentage error shall be 3.0% for class 1.0 meter as per Annex-D of IS: 13779/IEC 62053 -21 for phase & neutral circuit (s).
 - ix) Diode test
 - x) Accuracy test under anti tamper conditions mentioned at Cl. 7.6.
 - xi) Permanent magnet test (as specified in Clause 7.6d of this specification)
 - xii) Acceptance test of poly-carbonate seals shall be carried out as per specification of Poly-carbonate seals
 - (xiii) The inspecting officer shall verify that no DC supply/ signal is given to reference meter during the DC injection test.
 - (xiv) Display parameters shall be verified at the time of inspection.
 - (xv) Test of application of abnormal Voltage/frequency generating devices(electronic gadgets) as per this specification.
 - (xvi) Verification of continuous ultrasonic welding.
 - (xvii) When the meter is placed in oven at a constant temperature of 65° C for period of 120 minutes during power ON condition, the character of LCD should not deform. After keeping the meter at a constant temperature of 80 ° C for period of 120 minutes during power OFF condition and when restored at normal temperature, the LCD should work satisfactorily.
- c) Number of samples for test from each lot shall be selected as per provision of IS. The criteria for selection of No. of samples and for acceptance of lot will be as under.

S.No.	Particular of tests	Sampling plan for the lot of 1001 and above	Criteria for acceptance of lot
1	HV. A.C. test & I.R. test. No load test and minimum starting current test	32 nos.	As per clause C-3.1 of ISS
2.	All other acceptance tests as per cl.14(b) above (except repeatability of error test, vibration test and shock test) in sequence to be mutually	8 nos out of above 32 samples passing tests at s. no. 1.	As per clause C-3.2 of ISS Annex.C

	agreed between manufacturer and inspecting officer.		
3.	Repeatability of error test, vibration test and shock test, in sequence.	3 Nos. out of above 8 samples passing tests at s. no. 2	Each sample should pass all three tests.

The sampling plan shall be as per IS:13779 except that maximum lot size may be read as 10,000 Nos. meters in place of 5,000 Nos. meters only for minimum offered quantity of 20,000 Nos. for Inspection otherwise the maximum lot size shall remain 5,000 Nos. meters. The sub-lot size shall be taken accordingly i.e. either 5,000 Nos. or 10,000 Nos. as applicable.

32 Samples shall be selected at random from the each sub lot of meters and acceptance tests as per relevant standards and additional acceptance tests as per technical specification shall be carried out on these samples.

In case of failure of samples of lot/ sub-lot in the test(s) detailed at clause No. (c) above, the similar testing shall be repeated on fresh samples selected by the committee & fresh testing as mentioned at clause No. 12 (ix) Sr. No. 1 to 4 above shall be carried out. If the samples meet the requirement of above tests, the lot shall be accepted and if it fails consecutive second time, the entire quantity of respective lot/sub-lot shall be rejected and shall have to be replaced by the supplier at his own cost. Repeated failure/ poor results in the testing may render cancellation of order.

15.0 PACKING AND FORWARDING OF ENERGY METERS: -

Each meter with meter box shall be packed in superior quality three ply corrugated cardboard carton or thermocol packing box. Such single cartons shall be additionally packed in five (5) ply corrugated cardboard carton accommodating 12-24 meters with meter boxes for easy transportation, storage & handling. **Foam/ any other mechanism should be supplied between meter box base and meter box cover so that during transportation meter box does not accidentally locks. Alternatively any superior packing method as proposed by the bidder may be accepted.**

16.0 SAMPLES:

- (a) Samples along with bid – The bidder shall furnish Eight meters and one meter box conforming to this specification duly sealed along with routine test certificates in the office of SE(MM-II),JVNL, Jaipur one day prior to the date of opening of Tender. If the samples are not received, the bid shall be considered as Non-responsive. Out of the above Eight sample meters, Six sample meters (one set of 3 samples for Electrical testing and another set of 3 samples for Environmental & Mechanical tests) and one sample shall be tested as per IS 15959 for one port (optical port) at CPRI, Bhopal/ Bangalore in the presence of firm's representative. The testing charges shall be borne by the bidder. The tentative testing charges Rs. 7 lac shall be deposited by the bidder in the form of Demand Draft in favour of the Account Officer (MM), Jaipur Discom, Jaipur.
- (b) One sample meter with meter box shall be checked / tested for mechanical/ physical features in Nigam's Lab. Sample meter shall be broken to verify components of the meter. In case sample meters submitted with bid don't conform the Type tests, Addl. Type Tests and Tamper tests of specification/ IS, the financial bid shall not be opened.

- (c) Bid stage samples shall be accepted in the office of SE(MM), JVVNL, Bani Park, Jaipur, by the committee of following officers.
- i. XEn(NABL), JVVNL, Jaipur.
 - ii. XEn-TA to CE(MM), JVVNL, Jaipur.
 - iii. XEn(SPO-IV), JVVNL, Jaipur
 - iv. AEn-II (SPO-IV Division), JVVNL, Jaipur.

The officers/committee which is authorised to accept the bid samples shall physically examine & match the details of sample items i.e. its make, SL. No., Seal no. etc. with the letter having the detail of the sample submitted by the bidder. RTC check shall also be performed on all sample meters while physically examining & accepting the bid stage samples. The received samples shall not be checked by powering up with AC supply.

After physically examining the details, the sample accepting officers/ committee & bidders representative shall put their signatures with permanent marker or provide sticker seals on the samples. There after samples of meter shall be packed by the committee, in the same carton boxes in which these were received from the bidder. The committee members & bidders representative will again put their signature/sticker seal on the sample carton box at various positions. This sample acceptance and sealing procedure shall be done one day before the bid opening date.

The committee shall prepare a sample sealing statement and hand over the sealed samples to AEn in-charge of sample room, for safe custody in the sample room.

There shall be a separate sample room with proper lock and key arrangement in the office of SE(MM-II) for safe custody of samples. It can only be opened by opening of two locks simultaneously, key of one lock will remain in the custody of SPO-IV and key of other lock will remain in the custody of AEn in-charge of sample room.

In-charge of the sample room shall maintain a register and shall enter the detail of sample item, TN, SI. No., Seal etc. in the register. When the independent test agency is decided, the in-charge of the sample room shall hand over the samples to the same committee which has accepted & sealed the samples for packing in big cartons for safe transportation. The committee shall get the samples packed in its presence and then hand over these packed samples to the courier agency for transporting these samples to the independent Test House.

Whenever, the sample room will be opened, the reason of opening with date and time of opening and closing and signature of persons in presence of room was opened will be recorded in register also. In case of delay in sending the packed samples by courier agency, the packed cartons will again be stored in the sample room.

At the independent test house the samples shall be opened in presence of Nigam's representative. After verification, the test house shall accept the sample for type test etc. and issue acknowledgment of receipt to the Nigam's representative.

(d) Additional Type Tests to be carried out upon bid stage samples: -

In addition to the tests prescribed in IS: 13779/1999, following additional Type Tests shall also be carried out upon bid stage samples:-

- i. DC influence test as per IS: 13779-1999 or IEC 62053-21, in phase and neutral circuit (s).
- ii. The test of influence of supply voltage shall be carried out as per clause no. 12.7.2.1 of IS: 13779/1999, except the interruption time should be variable from 10 m sec. to 5 sec. instead of fixed time.
- iii. Test of voltage variation as per this specification.
- iv. Compliance of anti-tamper features as per Clause 7.6 of this specification.

(e) SAMPLES BEFORE COMMENCEMENT OF SUPPLIES:

The supplier shall furnish duly sealed three sample meters with box along with CMRI having all the features conforming to specification within one month from the date of receipt of PO, for Electrical testing, verification of physical features and communication capability of meters in Nigam's lab. Sample meter shall be broken to verify components of the meter. In case of major deviation in Electrical testing ,physical features and communication capability, the supplier be allowed to furnish second set of sample. In case of failure of second set of sample order may be cancelled with penalty @5% of Ex-Works plus taxes as applicable on ordered quantity..

The delay in submission of before commencement samples beyond one month from the date of receipt of PO will be on supplier's account.

Before commencement, samples will be deposited by the supplier directly in the office of the Superintending Engineer (MM) Jaipur Discom, Jaipur.

Note:- A committee comprising of M&P wing and IT wing will examine the Communication capability of sample meter and CMRI and Bluetooth application with different make of meters supplied in the Discom as per requirement of the technical specification at the time of approval of pre commencement sample. The bidders are required to furnish one No. CMRI along with communication cables **at the time of sample submission** so that the bid stage sample may be got checked/verified

17.0 REPLACEMENT OF DEFECTIVE METERS:

The meters and/or meter box declared defective by the consignees and /or by meter testing lab shall be replaced by the supplier up to the full satisfaction of the purchaser at the cost of supplier as per clause no. 1.18 of GCC within one month of intimation by purchaser.

18.0 MAINTENANCE & GUARANTEE: -

- a) It shall be governed by clause 1.40 of GCC except that the guarantee shall be for a period of 5 years (**for meter as well as CMRI**) from the date of receipt of last consignment **in Nigam's store**. The meter/ CMRI found defective within the guarantee period shall be replaced by the supplier free of cost within 45 days from the date of receipt of information. If defective

meter/ CMRI is not replaced within the specified period as above, the cost of GP failed meters shall be deducted from firm's financial hold and Performance Bank Guarantee shall be operated to recover the cost. **In case firm fails to lift Energy Meter(s) within 45 days from date of intimation, the ground rent clause as enumerated in Cl No. 18.(b) shall be applicable.**

b) MATERIAL / EQUIPMENT DECLARED DEFECTIVE DURING GUARANTEE PERIOD NOT LIFTED BY THE CONTRACTOR / SUPPLIER TIMELY:

If the contractor / supplier fails to lift the material / equipments declared defective during Guarantee Period or any part thereof, within a period of 45 days from the date of dispatch of information regarding defects. The date of E-mail/ FAX of complaint /letter by the stores/ Purchaser shall be date of dispatch of information. The purchaser shall be entitled at his option :

- (i) To effect recovery @ 1% per week or part thereof (for actual delay in lifting the material beyond 45 days from the due date of dispatch of information), subject to a maximum of 15%. The amount of recovery will be worked out on the basis of Ex-works price of the material indicated in the purchase order. In case where Ex-works prices have not been indicated, then the recovery shall be worked out on the basis of prices as shown in the purchase order.
- (ii) In case a contractor / supplier fails to lift the material / equipments declared rejected and any part thereof, from the consignee within a period of 150 days from the date of dispatch of information from the purchaser, Jaipur Vidyut Vitran Nigam Limited may dispose off such material / equipments declared defective and any part thereof, upon such terms and in such manner as it deems appropriate, at the risk and responsibility of the contractor / supplier.
- (iii) If such material / equipments declared defective and any part thereof is disposed off through sales, 5% of the sale value liable to be deducted on account of cost incurred in sales proceedings and after deduction, the balance value shall be "Net realized sale value".
- (iv) If such material / equipments declared defective and any part thereof is disposed off in other manner on 'Nil' price, the actual expenditure incurred in disposal proceedings shall be recovered from the contractor / supplier.
- (v) The contractor / supplier shall be required to deposit the amount of recoveries finalized within a period of 30 days of receipt of information, failing which the dues shall be recovered from the Net Realized Sales Value or from the financial hold of the contractor / supplier available with the Nigam. In case where the amount of recoveries against a firm / contractor / supplier exceeds its financial hold / Net realized sales value, the Nigam will be at the liberty to effect such recovery out of the financial hold /

- pending payments of the contractor / supplier available with other successor companies of the erstwhile RSEB.
- (vi) Jaipur Vidyut Vitran Nigam Limited, at its discretion, may allow the contractor / supplier to lift the material / equipments declared defective and any part thereof even after expiry of period of 150 days from the date of dispatch of information from the purchaser, on contractor / supplier's request if material could not be disposed after recovery on a/c of delay in lifting the same as per (1) and after paying amount of recoveries.
- c) If the performance period of the supplied material is over and some quantity of guarantee period defective meters are still lying pending for want of repair / replacement than fresh Bank Guarantee equal to the cost of these guarantee period defective meters may be accepted by Nigam and original PBG shall be released.

19.0 QUALITY ASSURANCE PLAN:

The design life of the meter shall be minimum 20 years and to prove the design life, the firm shall have at least the following quality Assurance Plan:

- (i) The factory shall be completely dust proof.
- (ii) The testing rooms shall be temperature and humidity controlled as per relevant standards.
- (iii) The testing and calibrating equipments should be automatic and all test equipment shall have their valid calibration certificates.
- (iv) Power supplies used in testing equipment shall be distortion free with sinusoidal wave- forms and maintaining constant voltage current and frequency as per the relevant standards.
- (v) During the manufacturing of the meters the following checks shall be carried out.
 - a) Meter frame dimensions tolerance shall be minimum.
 - b) The assembly of parts shall be done with the help of jigs and fixtures so that human errors are eliminated.
 - c) The meters shall be batch tested on automatic, computerized test bench and the results shall be printed directly without any human errors.
- vi) The bidder shall invariably furnish the following information alongwith his bid, failing which his bid shall be liable for rejection. The information shall be separately given for individual type of material offered.
 - a) Statement giving list of important raw materials, names of sub-suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw material in presence of bidder's representative and copies of test certificates.
 - b) Information and copies of test certificates as in (i) above in respect of bought out accessories.
 - c) List of manufacturing facilities available.
 - d) Level of automation achieved and list of areas where manual processing exists.
 - e) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

- f) List of testing equipment available with the bidder for final testing of equipment specified and test-plant limitations, if any, vis-a-vis the type, special acceptance and routine tests specified in the relevant standards and this specification. These limitations shall be very clearly brought out in schedule of deviations provided with the tender.

20.0 ACCURACY OF METERS: - The supplier shall furnish written undertaking on Rs. 500.00 Non Judicial Rajasthan Govt. Stamp paper that there will be no drift in the accuracy of the meters supplied against this purchase order for a period of 10 year (life time) from the date of supply. In case any drift is noticed/found beyond permissible limits during this period, he shall recalibrate such meter (s) correct accuracy, and in the event recalibration is not possible, replace such meter (s) with box with new meter(s) with box without any extra cost.

21.0 Delivery: -

Commencement period 30 days from the date of receipt of purchase order and completion within 7 months at equal monthly rate from the date of approval of pre commencement sample. Firm is required to furnish pre commencement sample within 15 days of receipt of purchase order. The delay in furnishing of pre commencement sample beyond 15 days shall be on the part of the supplier and such delayed period shall be reduced from the stipulated delivery schedule. It will be ensured by Nigam to convey approval of pre-commencement sample within 15 days of receipt of sample.

22.0 ADDITIONAL ORDER

Repeat orders for additional quantities, upto 50% of original ordered quantities, may be placed by the Nigam, on the same rates, terms and conditions given in the contract.

23.0 Qualification Requirements

The qualification requirements shall be as per Schedule-III

24.0 Prices:

Tenderer must quote 'FIRM' prices. The quoted prices shall be exclusive of Goods and Service tax. If any duty and/ or tax is applicable at concessional rate, the same shall be clearly mentioned.

25.0 General Information:

- i) Frequent changes in specifications during currency of contract will be avoided and if required the same shall be effected on mutually agreed basis.
- ii) Nigam is not averse to deciding tenders on differential prices to get better quality meters.

ANNEXURE A-I**Guaranteed Technical Particulars of Single Phase Static Energy Meters of rating 5-30A Having LCD Back-Lit Display against TN-2569.**

S. NO	Particulars	<u>To be furnished by the bidder</u>
1.	Name & Address of Manufacturer	
2.	Work's Address	
3	Type / Designation of meter offered	
4	Class of Accuracy	
5	Standard Applicable	
6	Type of Meter (no. Of phase & wire / elements)	
7	Rating and General Particulars	
	i) Reference Voltage	
	i) Basic current (I_b)	
	iii) Maximum current (I_{max})	
	iv) Maximum withstand current (i.e.150% of I_{max})	
	v) Does meter withstand 450 V for 5 minutes.	
	vi) Power supply variation (-40% to +20% Vref)	
8	Whether meter is suitable for working with following supply system variation range	
	i) Specified operating range	
	ii) Limit range of operation	
	iii) Frequency	
	iv) Power factor range	
	v) Ambient temperature range	
9.	Insulation resistance between:	
	a) Meter current circuit and voltage circuit	
	b) Current and voltage circuit coupled and all non-current carrying parts connected together	
10	Min. starting current (in Amps)	
11	Details of meter fixing arrangements:	

	Is the meter fixing arrangement with the base of meter box, is as per the provision of this specification?	
12.	A) Detail of sealing arrangement:	
	i) No. of Tamper proof transparent polycarbonate security seals provided on meter body and its colour	
	ii) The name/ logo of manufacturer and purchaser is printed on the seals?	
	iii) The Sr No on the seals is same as meter Sr No?	
	iv) Is the Sr No. on seals is laser etched?	
	B) Whether base and cover are ultrasonically welded or of single enclosure type	
	C) Whether seals are visible from front side of meter?	
13.	Details of meter base and cover	
	a) Degree of protection of meter case? Whether Type Test Certificate enclosed?	
	b) Thickness and material of Meter base and cover	
	c) Whether the base of meter is in Grey colour and cover is transparent or same colour in case of single enclosure type. In case of single enclosure type there should be transparent window for viewing	
14.	Details of terminals block and its cover	
	a) Whether Material of terminal block used, conforms to clause 7.13 of this specification?	
	b) Thickness and material of Terminal cover	
	c) Minimum center to center distance between adjacent terminals	
	d) Details of screws provided on each terminal for fixing aluminum stranded wires (no. & dimensions)	
	e) i) Minimum internal diameter of the terminal holes ? ii) Is it adequately designed to accommodate copper/ aluminum armoured PVC cable of size up to 16 sq.mm	
	f) Whether terminal cover is of extended type. Please give extended length of terminal cover below terminal block.	

	g)	Please give details of arrangement of terminal cover and its sealing.	
15.		Whether voltage & current circuits are solidly connected inside the meter body without any link?	
16		Whether window portion is as per specification?	
17		Details of CT's / Shunts provided	
	a)	CT(s)/ Shunt(s) provided:	
		i) In Main element	
		ii) In Neutral element	
	b)	Size of secondary wire of CT / Size of Shunt(s) used	
	c)	No. of turns of secondary winding of CT	
	d)	Whether CTs and Shunts have been properly fixed on base/PCB/ current terminals?	
18		Whether components on the PCB are surface mounted except power components?	
19.		Whether PCB material is glass epoxy FR-4 grade?	
20		Whether all parts those are likely to develop corrosion effectively protected against corrosion?	
21		Whether the name plate provided on meter bears the following information in addition to marking required as per specification:	
	i)	Manufacturer's name or trade mark	
	ii)	Designation of type	
	iii)	Number of phases and wires for which the meter is suitable	
	iv)	Serial Number	
	v)	Month and year of manufacture	
	vi)	Reference voltage & frequency	
	vii)	Principal unit(s) of measurement	
	viii)	Basic current and rated maximum current in Amps	
	ix)	Meter constant (Imp/kWh)	
	x)	Accuracy class	
	xi)	Property of JVVNL	
	xii)	For the use of DDUGJY/IPDS* * For the meters to be procured under DDUGJY/IPDS	
	xiii)	Purchase Order Number and Date	
	xiv)	Guarantee period	
	xv)	The sign of insulation	

	xvi)	Bar coding of Sr. No., month & year of manufacture	
	xvii)	Ultrasonic welded	
	xviii)	ISI mark with license number	
	xix)	DLMS meter	
	xx)	All communication ports a. Optical Port b. RS-232 Port c. BLE enabled	
22		Power consumption of voltage circuit (watt & VA)	
23		Power consumption of current circuit (VA)	
24		Overall dimension of the meter with \pm % tolerance	
25		Weight of the meter with \pm % tolerance	
26		Does meter has Short time over current withstand capability of 30 I _{max} for one half cycles at reference frequency?	
27		Does the meter comply with Impulse voltage withstand capacity of 6KV?	
28		a) Does the meter have any type of mechanical adjustment (trim-pots, potentiometer etc) for calibration?	
		b) Are the meters software calibrated? (Yes/No)	
29		(A)Continuous Display parameter.	
a)		(i) Real Date & time (ii) LCD check (iii) Cumulative Active forward energy kWh(Total Energy) (iv) Credit balance at the instant. (v) Days left, based on the last seven days average consumption All the above parameters shall be displayed for minimum 10 seconds including LCD check.	

b)	Capacitive Touch display Parameters:-			
	i. LCD Segment Check ii. Sr. No. of meter iii. Date & Time. iv. Current Cumulative Active forwarded Energy (Total Energy) ,6 whole digits(without decimal digits) v. Maximum demand in KW since last reset(2 Whole Digit+ 2 decimal digits) vi. Instantaneous voltage with one digit after decimal. vii. Instantaneous Current with two digit after decimal. viii. Instantaneous active load in KW with three digit after decimal. ix. High resolution display of current cumulative active forwarded energy at least three digits after decimals. x. Cumulative Active Energy (kWh forwarded) reading of pre-defined date and time for billing purpose (BP kWh), 6 Whole Digit for previous month. xi. Maximum demand kW of pre-defined date and time for billing purpose (BP KW), 2 Whole Digit+ 2 decimal digits for previous month xii. Software version of meter xiii. No. of transactions accepted & rejected xiv. Power ON Hours xv. No. of switch open or close operations xvi. Start & end time of happy hours credit xvii. Maximum current & load limit set in meter xviii. Maximum current recorded xix. Total credit added till date xx. Consumption history for previous month (kWh). xxi. KW MD for previous month. xxii. Tamper Events xxiii. Cumulative Tamper Count.			
B)	Is meter capable of displaying Capacitive Button Keypad reading as per CI No. 7.14.C.(c)			
	S. No	Key No.	Description	
	i)	1	Date/Time and Retained credit codes	
	ii)	2	Days Left(Based on consumption of last seven days)	

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	iii)	3	Currently active rates, the prices charged for consumption at each rate, and the number of units consumed at each rate and the daily charges.	
	iv)	4	Current load and the cost of that load	
	v)	5	"Authenticated Billing Code" and the total amount vended.	
	vi)	6	Daily Charge shown for previous day.	
	vii)	7	Maximum demand with occurrence of time	
	viii)	8	KWh units.	
	ix)	#	"Authenticated Billing Code" .	
	C	In power-off condition, the above parameters shall be displayed on Capacitive Touch Mode also.		
30	A)	Type of Display, minimum character height & no. of Digits(as per specification)		
	B)	Is the display having back lit?'		
	C)	Accuracy of RTC (minutes/year)?		
	D)	Internal Least count of energy recording?		
	E	Is the display having back lit?		
	F	Provision to read the Meter two times in no Power condition is provided with inbuilt Battery for taking Meter reading in Power-Off condition		
		a	With primary / rechargeable battery for taking meter reading in power-off condition.	
		b	Is the above provision capable of 50,000 such operation during the meter life time of 15 years	
31.		FOR COMMUNICATION CAPABILITY		
	(a)	i.	Whether It is possible to read the meter through optical port by CMRI.	
		ii.	Whether It is possible to read the meter through RS-232 port by CMRI	
		iii.	Whether It is possible to read the meter through BLE port by Mobile Application of JVVNL	
		iv.	Whether It is possible to read the all make of meter through optical port & RS-232 port by CMRI.	
		v.	Whether CMRI have facility to store 200 nos. of meter data	

	<p>(b) 1) Whether the following parameters can be downloaded by CMRI through optical port.</p> <ul style="list-style-type: none"> xi. Meter Sr. No. xii. Time & Date xiii. Instant Load (kilowatt), Voltage, Current & Power Factor xiv. Current cumulative forwarded KWH energy(total) xv. Billing kWh (BP kWh) for the last 12months. xvi. MD KW with 30 min. integration on real time basis f (BP MD) with date and time for the last 12 months. xvii. Average power factor of the last consumption month upto pre-defined date & time for the last 12 months. xviii. Power on Hours and minutes for each of previous 12 months. xix. The snap shot of occurrence with date and time of minimum 40 events for following tamper conditions: <ul style="list-style-type: none"> 1. The tamper data as per Cl. 7.29 (e), (h)&(i), of specification 2. Neutral missing (Single wire condition)as per cl no.7.29(f) xx. Indicate any other information if manufacturer proposes to record. xxi. The meter shall also have a storage capacity for 75 days load survey with 30 minute IP for the following parameters (as per table 44 provided in IS:15959:2011.) <ul style="list-style-type: none"> 1) Real time clock, date and time 2) Avarage voltage 3) Block energy- Kwh 4) Block energy- Kvah. xxii. At BCS end twelve month billing data with all energies including demand and all tamper event with their snap shot value should be provided. 	
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		<p>2) Whether the following parameters can be downloaded by Mobile Application through BLE port.</p> <p>Meter Sr. No.</p> <p>Time & Date</p> <p>Current cumulative forwarded KWH energy(total)</p> <p>Billing kWh (BP kWh) for the last 12months.</p> <p>Average power factor of the last consumption month upto pre-defined date & time for the last 12 months</p> <p>The snap shot of occurrence with date and time of last tamper events for following tamper conditions:</p> <p>The tamper data as per Cl. 7.29 (c), (g) & (h), of specification</p>	
	(d)	Whether total reading time for each meter does not exceed more than 60 seconds for Billing Data and 5 Minutes for total data.	
	(e)	Relevant standard to which the protocol for communication between meter and CMRI shall comply.	
	(f)	Whether it is possible to recharge the meter through Capacitive Touch Keypad	
	(g)	Whether it is possible to recharge the meter through BLE Port using Mobile Application	
32.	Whether indications provided for following:		
	a)	LED for Test output pulse (imp/KWh) – Red	
	b)	LED/ LCD icon for healthy RYB phases	
	c)	Indication for healthy relay	
33.	a)	Year since when the design offered is in vogue	
	b)	Whether the offered design is completely type tested and certified by BIS.	
34.	a)	Please confirm that meter does not get damaged even if 450V is applied for 5 minutes between phase and neutral and continue to record correctly after restoration of normal supply?	
	b)	Whether meter perform within class 1.0 accuracy up to 900% Ib for power factor range 0.5 lagging, 0.8 leading & unity?	
	c)	Whether meter remains functional and is capable to record energy even if voltage falls up to 60% of rated voltage at 500mA.	
35	Indicate guaranteed accuracy of meters at different ranges of voltages / P.F.		

36		Influence quantity	Current P.F.	Limits of variation of % error
	a)	Voltage variation between – 40% to + 20%	Ib unity Ib 0.5 lag	
37.	Whether meter is packed in corrugated Box / Thermocol packing boxes as per specification			
38.	Does the meter comply to running with no load of 70% and 120% of rated voltage - as per this specification?			
39.	Mention the value up to which meter can withstand Direct Current in A.C. circuit without getting CT's saturated resulting in measurement errors of more than permissible limit			
40	<p>Does meter either remain immune to tamper through application of external magnetic field (AC electro magnet or DC magnet) as per value specified in CBIP 325 or if the metering gets affected then meter shall record energy at I_{max}, rated voltage and unity P.F. as per CBIP 325 and same should also be logged as event with date & time.</p> <p>In case of abnormal permanent magnetic field, meter shall either remain immune or if the metering gets affected then meter shall record energy at I_{max}, rated voltage and unity P.F and same should also be logged as event with date & time</p>			
41	Does meter record energy proportionate to current drawn through the meter even when the neutral from incoming and/or outgoing side is disconnected in normal or in reverse condition?			
42	Does the meter record energy as per voltage measured between incoming phase and neutral terminals when DC signal is injected on neutral terminal, through diode?			
43	<p>Does the bidder own the facilities of SMT manufacturing or have access thru' hire, lease or sub-contract the facilities?</p> <p>Does the bidder have exclusive access to these facilities and have furnished adequate documents as proof?</p>			
44	Does the bidder have in-house design, development and manufacturing facilities?			
45	Whether LCD Least count is as per cl. No.7.14 D of specification?			
46	Does the manufacturer has manufacturing activities as per cl. 11 of specification			
47	Does Cover open tamper occurred with date & time.			

48	The communication software must be capable to transfer the billing data and meter Sr. No. required for automatic spot billing using optical Port enabled to spot billing machine (SBM), within 60 seconds.	
49	Prepaid Features	
A	Whether meter have feature of interoperability/inter portability at vending end.	
B	Whether the vending system is web based.	
c	i. Does the meter capable to configure for emergency credit limit?	
	vi. Define the amount of emergency credit limit.	
D	Minimum and maximum Recharge capacity in INR.	
E	Does meter is based on load limiting and price limiting operation?	
F	Whether meter having a facility for Low Credit Warning as per specification.	
G	A visible low Credit warning provided with LED/LCD.	
H	An Audible low credit warning provided with sound for 30 seconds.	
I	Whether the alarm is repeated or not.	
J	The Keypad is provided on meter front cover for token punching as per specification	
K	Is it possible to change all the tariff related parameters through vend code as per specification.	
50	Whether the token generation facility shall be available throughout Life Cycle of meters	

ANNEXURE-A-3**COMPONENT SPECIFICATION**

S. No.	Component	Requirement	Makes & Origin
1.	Current Element	E-beam/spot welded shunts shall be provided in the phase element and C.T. in the neutral. Alternatively, both the current elements (phase & neutral) shall have shunts with proper insulation. The meters should be with the current transformers / shunt as measuring elements.	Any make or origin conforming to IS-2705 and other make i.e. Redbourn Engg/ Isabelle.
2.	Measurement of computing chips.	The measurement or computing chips used in the meter should be with the surface mount type along with the ASICs.	Analog Devices, Cyrus Logic, AMS, Atmel, Phillips. SAMES, NEC, Texas Instruments
3.	Memory Chips.	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Microchip, Texas Instruments, Phillips, ST Hitachi or Oki, Teridian
4.	Display modules	a) The display modules should be well protected from the external UV radiations. b) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display. c) The display should be clearly visible over an angle of at least a cone of 70°. c) It should be trans-reflective FSTN or STN Type industrial grade with extended temperature range.	Genda, Haijing, Holtek, Bonafied Technologies Korea : Advantek, Truly Semiconductor Success Hitachi, Sony.
5.	Electronic Components.	The active & passive components should be of the surface mount type and are to be handled & soldered by the state of art assembly processes.	National Semiconductors, Atmel, Phillips, Texas Instruments, Toshiba, Fairchild, Murata, Rohm, Siemens. Hitachi, Oki, AVX or Ricoh. Samsung.
6.	Battery	Lithium with minimum guaranteed life of 15 years.	Varta, Tedirun, Sanyo or National, Durocell

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7.	RTC & Micro Controller.	The accuracy of RTC shall be as per relevant IEC / IS Standards.	Phillips, Dallas Atmel, Motorola, Microchip. NEC or Oki.
8.	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm.	-
9.	Communication modules	Communication modules should be compatible for the RS232 ports	National Semiconductors, Hitachi, Texas Instruments, Philips, HP, Agilent
10.	Optical port	Optical port should be used to transfer the meter data to meter reading instrument. The mechanical construction of the port should be such to facilitate the data transfer easily.	National Semiconductors, Hitachi, Texas Instruments, Siemens, Agilent, Philips, Hp
11.	Power supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected incase the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	
12.	Mechanical parts	The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.	-

The components equivalent or better than those mentioned in the list of components of existing specification of Single Phase Meters are also acceptable.

SECTION – III (VOLUME-'B')

**TECHNICAL SPECIFICATION FOR PUSH FIT TYPE MOULDED METER BOX
SUITABLE FOR SINGLE PHASE STATIC ENERGY METERS AGAINST TN-2569**

1. SCOPE:

The meter box will 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 will be made of Transparent Polycarbonate material which complies following properties:

Meter box will be weather proof, capable to withstanding temperatures of boiling water for 5 minutes continuously without distortion or softening. It will withstand Glow wire test at 650°C as per IS : 11000. HDT of Polycarbonate material will be minimum 120° C ± 5° C (at 1.8 MPa),

3. CONSTRUCTION:

- i. The meter Box will have roof tapering down for easy flow of rainwater.
- ii. The thickness of the box will be minimum $2.0 \pm 0.2\text{mm}$ on all sides.
- iii. The overall dimensions of the box will be such that a minimum 10 mm clearance from left, right side and top, 10 mm from front and back side & 70 mm from meter terminals will be maintain in between meter and box surface.
- iv. The box cover and base will have 4 Nos. snap type locking arrangement.
- v. Meter Box would comply with IP 54.
- vi. All metallic parts will be well protected against corrosion. (Zn passivation)
- vii. Push button arrangement will be required on the cover of the box to operate the meter display capacitive touch button from outside the meter box for reading the meter display parameters without opening the meter box cover.
- viii. Barrier plate will be provided to protect meter terminal from outside.
- ix. The provision for meter reading through CMRI will provide on the cover of meter box without opening the meter box cover.
- x. Meter shall be readable without using any optical cable inside box
- xi. **Colour:**
The front cover and base of meter box would be made of transparent Polycarbonate material.
- xii. **Box Mounting:**
Box will have 3 nos. holes of 6 ± 1 mm diameter for fixing the meter box on wall / wooden board.
- xiii. **Cable Entry:**
Suitable provision would be available at the bottom side of the meter box bottom for cable inlet & outlet and the same will be capable of accommodating cable of 14-18mm (5-30A) / 18-24 mm (10-60A)diameter,

two nos. engineering plastic cable gland will be provide for cable incoming & outgoing

Suitable provision shall be provided for Capacitive touch Keypad.

xiv. **Marking:**

- Manufacturer Logo & danger sign will be engraved/ embossed on the front cover of meter box.
- Name plate details of meter should be readable from outside of meter box.

4. TESTS FOR BOXES:

The following tests are to be conducted on the box at any independent NABL accredited laboratory and test reports will be carried out as per IS : 14772.

- i. Test of HDT minimum $120 \pm 5^{\circ} \text{C}$ (at 1.8 MPa ° C),
- ii. Test for mechanical strength
- iii. Glow wire test at 650°C as per IS: 11000
- iv. Material Identification test

5. 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.

6. 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.

**GUARANTEED TECHNICAL PARTICULARS FOR SINGLE PHASE METER
BOX – PUSH TO FIT TYPE**

S.N.	Characteristics	Bidders particulars
1	Manufacture's Name	
2	Material used for box body	
3	Color of box for base and cover	
4	Dimension of box (LXWXH)	
5	Clarence from meter surface a) Left, Right & Top side : 10mm b) Bottom : 70mm c) Front & back : 10mm	
6	Thickness of Meter Box Minimum 2 mm from all sides	
7	Display push Button operating arrangement at cover of the box	
8	Provision for meter reading through CMRI without opening the Box cover	
9	Sealing arrangement: minimum 2 Nos.	
10	Material withstanding temperature as per IS 14772 a) Boiling water test b) Glow wire test at 650deg. C	
11	Inlet & Outlet Glands	
12	Suitable for outdoor installation IP class : IP 54	
13	Meter reading arrangement without opening meter box cover	
14	Embossing details of cover	-
15	Cable entry from bottom side	
16	Mounting hole	
17	Push to fit type arrangement: 4 Nos.	

TECHNICAL SPECIFICATION FOR DOUBLE ANCHOR TAMPER EVIDENT POLYCARBONATE SEALS TO BE PROVIDED ON BODY SEAL OF METER AND LOOSE SEAL FOR TERMINAL COVER AGAINST TN-2569.

SCOPE:

The specification covers the design, manufacture, testing at manufacturers works, supply and delivery at destination stores of Double Anchor Tamper Evident Poly-carbonate Seals for sealing of Meter body and terminal covers of energy meters, Meter Box, etc. with non-corrosive, non-magnetic stainless steel sealing wire. These seals shall also be used for sealing the meters, metering equipments and inspected materials.

The Double Anchor Tamper Evident Poly-carbonate Seals shall conform to the Nigam's specification as under:

1. Material of Double Anchor Tamper Evident Poly-carbonate Seals :

The raw material used for Double Anchor Tamper Evident Poly-carbonate Seals shall be of M/s. Dow Caliber Ltd., Switzerland (Grade-201- 15), M/s.GE Plastic, Singapore (Grade 143R), M/s. Dupont, Japan (Grade IV-20) or any other manufacturer having better properties as under :-

Sr.No.	Properties	Poly-carbonate
1.	Melting temperature	280° C to 295°C
2.	USE	Engineering
3.	Softness	Hard
4.	Durability	Weather effect resistance
5.	Transparency	Fully transparent (long time transparency)

2. Service Conditions (Climatic Conditions) :

The meters to be supplied against this specification should be capable of performing and maintaining required accuracy under extreme hot, cold, tropical and dusty climate and solar radiation typically existing in state of Rajasthan (India). The meter shall be required to operate satisfactorily and continuously under the following tropical climatic conditions.

1	Maximum ambient air temperature	55 deg.C.
2	Maximum ambient air temperature in shade.	45 deg.C
3	Maximum temperature attainable by the meter exposed to sun.	60 deg.C.
4	Minimum ambient temperature	(-) 5 deg.C.
5	Average daily ambient air temperature	40 deg.C.
6	Maximum relative humidity	95%
7	Number of months of tropical monsoon condition	4 months.
8	Maximum attitude above mean sea level	1000 meters.
9	Average annual rain fall	10-100 cm.
10	Maximum wind pressure.	200 kg/sq.m

3. Colour of Seal :

The Polycarbonate Seal(s) shall be of any colour and should be transparent (see through) type, which shall give complete visualization of its fixing mechanism and shall show clear indication if tampered.

4. Design and Construction of Seal :

- a) **Design :** The seal shall be Double Anchor (Push Fit) type tamper evident with double locking. **The seal should be patented/ design registered.** There shall not be any change in size, shape or design of the seal than the approved samples. If the seal is found different than the approved design / shape / size, the same shall be out rightly rejected. The double anchor should not be so soft that it can be easily pressed before sealing, so that after pressing the seal can not be opened.
- b) **Thickness :** The wall thickness of seal should be minimum one (1)mm.
- c) **Serial No. of the Seal :** Serial No. of the Seal shall be as per Meter serial No. and shall be laser etched / embossed during moulding (it shall not be screen printed) in contrast colour on one side of capsule body (female). The Sr. No. shall also be laser etched / embossed on top of the male part . The laser etched printing shall be through complete thickness of the polycarbonate.
- d) **Monogram :** The seal shall have embossed/ laser etched printed of monogram of JVVNL/**AVVNL/JdVVNL/monogram of purchaser** on front side and month and year of manufacture **of seal** in figure embossed on the backside. The laser etched printing should be through complete thickness of polycarbonate.
- e) **Seal Wire :** The non-corrosive, non-magnetic stainless steel twisted wire (26 gauge) confirming to IS : 280 shall be used . The seal wire shall not have affect of magnet i.e. it should not attract to magnet. The length of the sealing wire should be minimum 8" twisted two strand pull resistant stainless steel wire fixed to the seal. The diameter of each individual stand should be of 0.4 to 0.5 mm. dia. and overall diameter of the seal wire shall be 0.9 to 1.0 mm. The No. of turns shall be minimum 20 per inch. The seal wire should be inserted at the female and male part during the process of moulding itself. It should be continuous and visible throughout the length of the wire. The wire shall be intact such that it can not be pulled out after sealing.

The seal wire insert hole should be just sufficient for passing the seal wire and hole of larger dia. is discouraged.

- f) **Tolerance :-** Tolerance to the tune of +/- 10% is allowed in respect of various dimensions and number of turns per inch of seal wire

5. General Construction :

The seal shall be capable to withstand temperature upto 147° C without any damage / deformation.

The seal shall be designed for a single use only and if tampered with the help of plier, knife or any other sharp instruments, the seal shall be damaged and due to its transparent property, the sign of internal tampering shall be easily detected. Also once opened, it can not be re-used. The seal shall be made in such a way that, it can be

easily locked with the help of finger and thumb pressing no tools shall be required to close the seal in the laboratory or at site. Both the parts shall be designed in such a way that they can not be separated and the attachment shall be flexible and shall not break. After inserting the seal wire through female part, the cap of the male part shall be fitted in the female part in such a way that it should not leave any space to avoid insertion of any sharp tools for opening of seal body of the female part in hot or cold condition. The seal shall have also the following features:-

- a) Tamper resistance and reliable.
- b) Environmentally safe as it does not contain any lead.
- c) Withstand long-term exposure to direct sunlight.
- d) Required no tools for installation.
- e) Transparent.
- f) Heat resistance.

Annexure A-III

GUARANTEED TECHNICAL PARTICULARS FOR DOUBLE ANCHOR TAMPER EVIDENT
TRANSPARENT POLYCARBONATE SEALS AGAINST TN-2569

S. NO.	PARTICULARS	TO BE FURNISHED BY BIDDER
1	NAME & ADDRESS OF MANUFACTURER	
2	WORK'S ADDRESS	
3	RAW MATERIAL OF POLYCARBONATE SEALS	
4	PROPERTIES OF MATERIAL	
i)	USE	
ii)	SOFTNESS	
iii)	DURABILITY	
iv)	TRANSPARENCY	
5	WHETHER DESIGN & CONSTRUCTION OF SEAL IS AS PER SPECIFICATION(GIVE DETAILS)	
6	THICKNESS OF SEAL	
7	WHETHER ETCHING/EMBOSSING OF SERIAL NO.IS AS PER SPECIFICATION (GIVE DETAILS)	
8	HETHER PRINTING OF MONOGRAM IS AS PER SPECIFICATION	
9	MAX. WITHSTAND TEMPERATURE (UPTO 147DEG.C.)	
10	WHETHER SEAL HAVE FOLLOWING PROVISIONS	
a)	TAMPER RESISTANT AND RELIABLE	
b)	ENVIRONMENTALLY SAFE AS IT DOES NOT CONTAIN ANY LEAD	
c)	WITHSTAND LONG TERM EXPOSURE TO DIRECT SUNLIGHT	
d)	REQUIRED NO TOOLS FOR INSTALLATION	
e)	TRANSPARENT	
f)	HEAT RESISTANCE	
11	GUARANTEE OF SEAL(MIN.2 YRS.)	
12	WHETHER SEAL IS PATENTED/ DESIGN REGISTERED & COPY OF SAME IS ENCLOSED.	
13	WHETHER SEAL WIRE IS PROVIDED IN THE SEALS AS PER SPECIFICATION.	