BSES Yamuna Power Limited

NOTICE INVITING TENDER (NIT)

FOR

RATE CONTRACT FOR SUPPLY

OF

VARIOUS TYPE OF ENERGY METER'S

NIT NO: CMC/BY/22-23/RS/SS/36

Due Date for Submission: 04.10.2022, 15:00 HRS

BSES YAMUNA POWER LIMITED (BYPL)
CONTRACTS & MATERIALS DEPT.,
SHAKTI KIRAN BUILDING, KARKARDOOMA,
DELHI-110032
CIN: U40109DL2001PLC111525
WEBSITE: www.bsesdelhi.com

BSES Yamuna Power Limited

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SECTION – I: REQUEST FOR QUOTATION

1.00 EVENT INFORMATION

1.01 BSES Yamuna Power Ltd (hereinafter referred to as **"BYPL"**) invites sealed tenders in 2 envelopes for establishing Rate Contract from reputed manufacturers valid for a period of one year.

Sl. No.	Item Description	Estimated Cost (Rs)	Cost of EMD (Rs)	Delivery at
1	RATE CONTRACT FOR SUPPLY OF VARIOUS TYPE OF ENERGY METER'S	4.61 Crore	9.22 Lakh	Delhi Stores

The bidder must qualify the requirements as specified in clause 2.0 stated below.

All envelopes shall be duly super scribed "**BID FOR RATE CONTRACT FOR SUPPLY OF VARIOUS TYPE OF ENERGY METER'S" "NIT NO: CMC/BY/22-23/RS/SS/36 DUE ON 04.10.2022, 15:00 Hr.**"

Bid shall be submitted in two (02) parts. Details of part are as follow:
Part A – Techno Commercial Bid
Part B – Price Bid

1.1. The schedule of specifications with detail terms & conditions can be obtained from address given below against submission of non-refundable demand draft of **Rs 1,180/-** drawn in favour of BSES Yamuna Power Ltd, payable at Delhi or Online transfer of requisite amount through IMPS/ NEFT/ RTGS. The tender documents & detail terms and conditions can also be downloaded from the website www.bsesdelhi.com **--> BSES YAMUNA POWER LTD --> Tender --> Open Tenders**
In case tender papers are downloaded from the above website, then the bidder has to enclose a demand draft covering the cost of bid documents.

1.2. Bids will be received up to **04.10.2022, 15:00 Hr.** at the address given below.
Part A of the Bid shall be opened on **05.10.2022, 15:30 Hr.**

Part B of the Bid will be opened in case of Techno-Commercially Qualified Bidders and the date of opening of same shall be intimated in due course. It is the sole responsibility of the bidder to ensure that the bid documents reach this office on or before the last date.

Head of Department
Contracts & Materials Deptt.
BSES Yamuna Power Ltd
Reception, Ground Floor
Shaktikiran Building, Karkardooma
Delhi 110032

1.3 BSES Yamuna Power Ltd reserves the right to accept/reject any or all tenders without assigning any reason thereof in the event of following:

a) Tender is received after due date and time.
b) Tender fee of requisite value is not submitted.
c) Earnest Money Deposit (EMD) of requisite value & validity is not deposited in shape of Bank Guarantee drawn in favor of BSES Yamuna Power Ltd, payable at Delhi or Online transfer of requisite amount through NEFT/RTGS.

d) Price Bid as per the Price Schedule mentioned in Annexure-I is not submitted.
e) Incomplete Bids.
f) Necessary documents against compliance to Qualification Requirements mentioned at Section 1 Clause 2.0 of this Tender Document.
g) Complete Technical details are not enclosed as per the Technical Bid Submission Checklist.
h) Filled in Schedule of Deviations as per Annexure.

2.00 QUALIFICATION CRITERIA

The prospective bidder must qualify all of the following requirements and shall be eligible to participate in the bidding who meets following requirements and management has a right to disqualify those bidders who do not meet these requirements.

2.01 **Technical Criteria:**

Sl No.	Criteria	Documents to be submitted by bidder
1	The bidder should have own manufacturing facility in India for various type of static /smart energy meters of similar accuracy class or better since last 3 years.	i) Details of the manufacturing units, locations and works from where supply against this tender is proposed. ii) Self Undertaking in support of this criteria.
2	The Bidder should have supplied at least 50,000 Nos three phase static/smart energy meters of accuracy class min 0.5s or better and 500 nos energy audit static/smart energy meters of minimum accuracy class 0.2s or better in last 5 years (from the date of Technical bid opening) to any Electricity Distribution Utilities/ SEB's/ PSU's in India.	i. Summary list of executed Purchase orders ii. Purchase order copies
3	The Bidder should have supplied at least 1000 Nos each of various type of meters (except three phase whole current meter) of similar rating or higher with electronic display and communication facility in last 5 years from the date of bid opening to any utilities/ SEB's/ PSU's.	i. Summary list of executed Purchase orders ii. Purchase order copies
4	Performance certificate for minimum 2 year satisfactory performance for meters of similar rating or higher supplied in last 5 years from the date of bid opening from at least two utilities/ SEB's/ PSU's. In case the bidder has a previous association with BRPL/BYPL for supply of similar product and service, the performance feedback for that bidder by BRPL/BYPL shall only be considered irrespective of performance certificate issued by any third party organization.	Performance certificates
5	The bidder should have plant installed capacity to supply 1000 nos of energy meter per month.	Installed Capacity Certificate/ Self Undertaking
6	The bidder must possess following certificates valid as on date of bid submission.: i. ISO 9001:2015 certification for meter manufacturing ii.ISO 27001:2005 for information security management system	Valid copy of Certification

	iii. ISO 14001:2004 for environmental management system	
7	Bidder must possess valid BIS licensee for the offered meter.	Valid copy of Certification

2.02 **Commercial Criteria:**

Sl No.	Criteria	Documents to be submitted by bidder
1	Bidder should have Average Annual Sales Turnover of Rs 20 Crores or more in last three (3) Financial Years (i.e., FY 2019-20, 2020-21 & 2021-22).	Balance Sheet and Duly certified CA certificate with UDIN to be submitted
2	The Bidder shall submit an undertaking that "No Litigation" is pending with BYPL or its Group/Associates Companies as on the date of bid submission.	Self Undertaking
3	An undertaking (self-certificate) that the bidder has not been blacklisted/debarred by any central/state government institution/Electricity utilities as on the date of bid submission.	Self Undertaking
4	The bidder must have valid PAN No., GST Registration Number, in addition to other statutory compliances. The bidder must submit the copy of registrations and submit an undertaking that the bidder shall comply all the statutory compliances as per the laws/rules etc. before the start of the supply/work.	Copy of relevant Documents /Self Undertaking

Notwithstanding anything stated above, BYPL reserves the right to assess bidder's capability to perform the contract, assess the capability and installed capacity of the Bidder for carrying out the supplies, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final.

3.00 BIDDING AND AWARD PROCESS

Bidders are requested to submit their offer strictly in line with this tender document. Normally, the deviations to tender terms are not admissible and the bids with deviation are liable for rejection. Hence, the bidders are advised to refrain from taking any deviations on this Tender. Still in case of any deviations, all such deviations shall be set out by the Bidders, clause by clause in the 'Annexure - Schedule of Deviations' and same shall be submitted as a part of the Technical Bid.

3.01 BID SUBMISSION

Please mention our NIT Number: - …… on the Tender and drop the same in our Tender Box placed at:
BSES Yamuna Power Ltd, Reception, Security Main Gate, Shaktikiran Building, Karkardooma, Delhi 110032

The bids and the outer envelope shall be addressed to:
Head of Department
Contracts & Materials Deptt.
BSES Yamuna Power Ltd, Shaktikiran Building, Karkardooma, Delhi 110032

Kindly Note:

- Bidder will inform BYPL through email immediately after the submission or before the due date & time of submission to TPC & Buyer:
  1. Mr Rakesh Sharma, E-mail: Rakesh.Ku.Sharma@relianceada.com
  2. Mr Sisir Kumar Sahu , E-mail: sisir.sahu@@relianceada.com
- Tender documents shall be submitted at main gate in tender box.
- Authorized person of TPC will collect the documents from tender box at scheduled time of tender submission and verify the bid documents with mails received. A confirmation of receipt shall be sent to bidder through mail by TPC on the same day.
- Bidder has to ensure that tender copy is dropped in correct box designated for tender submission only.
- BYPL shall not be responsible for any wrong placement of tender document by bidder.
- Online Payment made for EMD shall be informed by email along with Transaction proof or online receipt generated to Rakesh.Ku.Sharma@relianceada.com & sisir.sahu@relianceada.com. While remitting EMD online please mention NIT No……..

PART A :: TECHNICAL **BID** comprising of following:

Sr. No	Descriptions	Type of Documents
Commercial :		
1	**Tender Fee - Demand Draft (Rs.1180/-) (Incl GST)**	Non-refundable demand draft for Rs 1180/- in case the forms are downloaded from website
2	**EMD**	In prescribed stamp paper & format
3	**Power-of-Attorney**	In prescribed stamp paper & format
4	**PQR Compliances**	Documentary evidence in support of qualifying criteria like: 1. Details of constitution of the company (Proprietary/Limited/etc along with the details), Memorandum of Association of the company 2. Bidders shall submit the certified annual Balance sheets for the last completed three (3) financial years 3. Supportive document on Positive Net worth. Credit rating/solvency certificate from competent authority. 4. Copies of Orders, Execution /Performance Certificate & Other Documents to support qualification Criteria
5	**Signed Tender document**	Original Tender documents duly stamped & signed on each page as token of acceptance
6	**Black listing undertaking**	Bidder should submit a Self-undertaking signed by its Authorized Signatories that the Bidder or any of their sub-contractor has not been blacklisted/barred by any Govt. Organization or Regulatory Agencies in India or abroad.
7	**Commercial Terms and Conditions**	Acceptance on Commercial Terms and Conditions viz Delivery schedule/period, Payment terms, PBG etc.
8	**Acceptance on Reverse Auction**	Duly signed Acceptance Form For Participation In Reverse Auction Event as per attached format
9	**Bid Form (Unpriced) Duly Signed**	Duly Signed Bid Form as per attached format

Sr. No	Descriptions	Type of Documents
10	**Un price Bid Duly Signed**	Duly Signed Un price Bid as per attached format
Technical:		
11	**Technical Details/ Filled in GTP/Drawings**	Bidder shall submit duly filled GTP with all Technical documents and Drawings.
12	**Type Test Reports**	Bidders shall submit the copy of type test reports in their technical bids in support of technical specifications
13	**Testing Facilities**	Bidder shall submit the details of testing facilities available at their works/factory.
14	**Organization Chart & Manpower Details.**	Bidder shall submit the details of Organization & Manpower with qualification and experience.

PART B : PRICE BID comprising of (01 original only)
Price strictly in the Format enclosed indicating Break up of basic price, taxes & duties, transportation etc.

3.02 TIME SCHEDULE

The bidders should complete the following within the dates specified as under:

S. No.	Events	Due date & Time
1	Date of sale/ availability of tender documents from BYPL Website	upto 04.10.2022, 15:00 Hours
2	Date & Time of Pre-Bid Meeting Pre-Bid Meeting will be done online, Register in advance for this meeting, Zoom Meeting link: https://zoom.us/meeting/register/tJ0tdeirpjsqE9G69OQrlJhjqe9GXJkjEZQ6 After registering, you will receive a confirmation email containing information about joining the meeting.	20.09.2022, 10:00 Hours
3	Last Date of receipt of pre-bid queries, if any (Queries to be submitted via e-mail)	23.09.2022 up to 17:00 Hours
4	Last Date of replies to all the pre-bid queries as received	29.09.2022 up to 18:00 Hours
5	Last date and time of receipt of Complete Bids (Tender Fees, EMD, Part A & Part B)	04.10.2022, 15:00 HRS
6	Date & Time of Opening of PART A – EMD and Technical Bid	05.10.2022, 15:30 HRS
7	Date & Time of opening of Price/RA of qualified bids	Will be notified to the qualified bidders through our website / e-mail

Note :- In the event of last date specified for submission of bids and date of opening of bids is declared as a closed holiday for BSES office, the last date of submission of bids and date of opening of bids will be the following working day at appointed times.

This is a two part bid process. Bidders are to submit the bids in 2 (Two) parts
Both these parts should be furnished in separate sealed covers super scribing NIT no. DUE DATE OF SUBMISSION, with particulars as **PART-A TECHNICAL BID & COMMERCIAL TERMS & CONDITIONS** and **Part-B PRICE BID** and these sealed envelopes should again be placed in another sealed cover which shall be submitted before the due date & time specified.

Part A: Technical Bid should not contain any cost information whatsoever and shall be submitted within the due date**.**

PART B- Price Bid. This envelope will be opened internally after techno-commercial evaluation and only of the qualified bidders.

Bidder has to submit the item wise price bifurcation in bid. Un priced copy must be attached with the Part A (Technical Bid). Reverse Auction will be carried out on individual item wise rates.

REVERSE AUCTION CLAUSE :: Purchaser reserves the right to use reverse auction as optional tool through SAP – SRM as an integral part of the entire tendering process. All techno-commercially qualified bidders shall participate in reverse auction.

Notwithstanding anything stated above, the Purchaser reserves the right to assess bidder's capability to perform the contract, should the circumstances warrant such assessment in the overall interest of the purchaser. In this regard the decision of the purchaser is final. Bidder to submit their acceptance as per format attached ANNEXURE-C

4.00 AWARD DECISION

4.01 Purchaser intends to award the business on a lowest bid basis, so suppliers are encouraged to submit the bid competitively. The decision to place purchase order/LOI solely depends on purchaser on the cost competitiveness across multiple lots, quality, delivery and bidder's capacity, in addition to other factors that Purchaser may deem relevant.

4.02 In the event of your bid being selected by purchaser (and / or its affiliates) and you subsequent DEFAULT on your bid; you will be required to pay purchaser (and / or its affiliates) an amount equal to the difference in your bid and the next lowest bid on the quantity declared in NIT/RFQ.

4.03 In case any supplier is found unsatisfactory during the delivery process, the award may be cancelled and BYPL reserves the right to award other suppliers who are found fit.

4.05 Rate Contract: The rate contract shall have a validity period of 12 months from the date of LOI/PO issued to the responsive, techno-commercially acceptable and evaluated to be the lowest bidder. Purchase Order (PO) shall be placed as per the requirement of BYPL.

4.06 Quantity Variation: The purchaser reserves the rights to vary the quantity by **(±)** 30% of the tender quantity during the execution of the rate contract.

4.07 Quantity Splitting: The purchaser reserves the right to distribute the procurable quantity on one or more than one of the eligible tenders. If the quantity is to be split, quantity distribution shall be in the manner detailed below:
a) If the quantity is to be split among 2 bidders, it will be done in the ratio of 70:30 on L1 price.
b) It the quantity is to be split among 3 bidders, it will be done in the ratio of 50:30:20 on L1 price.

Note: In case quantity needs to be distributed and order splitting is required, distribution of quantity shall be maximum among three (3) bidders

5.00 MARKET INTEGRITY

We have a fair and competitive marketplace. The rules for bidders are outlined in the Terms & Conditions. Bidders must agree to these rules prior to participating. In addition to other remedies available, we reserve the right to exclude a bidder from participating in future markets due to the bidder's violation of any of the rules or obligations contained in the Terms & Condition. Bidders who violate the marketplace rules or engage in behavior that disrupts the fair execution of the marketplace restricts a bidder to length of time, depending upon the seriousness of the violation. Examples of violations include, but are not limited to:

- Failure to honor prices submitted to the marketplace.
- Breach of the terms of the published in Request for Quotation/NIT.

6.00 SUPPLIER CONFIDENTIALITY

All information contained in this RFQ is confidential and shall not be disclosed, published or advertised in any manner without written authorization from BYPL. This includes all bidding information submitted.

All RFQ documents remain the property of BYPL and all suppliers are required to return these documents to BYPL upon request.

Suppliers who do not honor these confidentiality provisions will be excluded from participating in future bidding events.

7.00 CONTACT INFORMATION

Technical clarification, if any, as regards this RFQ shall be sought in writing and sent by e-mail/post/courier to following addresses. The same shall not be communicated through phone

Address	Name/ Designation	E-mail Address
Technical		
CES Dept. 3rd Floor, B-Block, BSES Yamuna Power Ltd Shaktikiran Building, Karkardooma, Delhi 110032	Ashish Kumar Joshi	Ashish.K.Joshi@relianceada.com
	Puneet Duggal	Puneet.Duggal@relianceada.com
	Gaurav Sharma (HOD-CES)	gaurav.a.sharma@relianceada.com
Commercial		
C&M Dept. 3rd Floor, A-Block, BSES Yamuna Power Ltd Shaktikiran Building, Karkardooma, Delhi 110032	Sisir Kumar Sahu	sisir.sahu@relianceada.com
	Santosh Kumar Singh Head-Procurement	santosh.kum.singh@relianceada.com
	Robin Sebastian (HOD-C&M)	robin.sebastian@relianceada.com

SECTION – II: INSTRUCTION TO BIDDERS

A. GENERAL

1.00 BSES Yamuna Power Ltd, hereinafter referred to as "The Purchaser" are desirous of implementing the various Systems Improvement/Repair & Maintenance works at their respective licensed area in Delhi The Purchaser has now floated this tender for procurement of material notified earlier in this bid document.

2.00 SCOPE OF WORK

The scope shall include Design, Manufacture, testing at works conforming to the Technical Specifications/IS along with Packing, Forwarding, Transportation and Unloading and proper stacking at Purchaser's stores/site.

3.0 DISCLAIMER

3.01 This Document includes statements, which reflect various assumptions, which may or may not be correct. Each Bidder/Bidding Consortium should conduct its own estimation and analysis and should check the accuracy, reliability and completeness of the information in this Document and obtain independent advice from appropriate sources in their own interest.

3.02 Neither Purchaser nor its employees will have any liability whatsoever to any Bidder or any other person under the law or contract, the principles of restitution or unjust enrichment or otherwise for any loss, expense or damage whatsoever which may arise from or be incurred or suffered in connection with anything contained in this Document, any matter deemed to form part of this Document, provision of Services and any other information supplied by or on behalf of Purchaser or its employees, or otherwise a rising in any way from the selection process for the Supply.

3.03 Though adequate care has been taken while issuing the Bid document, the Bidder should satisfy itself that Documents are complete in all respects. Intimation of any discrepancy shall be given to this office immediately.

3.04 This Document and the information contained herein are Strictly Confidential and are for the use of only the person(s) to whom it is issued. It may not be copied or distributed by the recipient to third parties (other than in confidence to the recipient's professional advisors).

4 COST OF BIDDING

The Bidder shall bear all cost associated with the preparation and submission of its Bid and Purchaser will in no case be responsible or liable for those costs.

B. BIDDING DOCUMENTS

5.01 The Scope of Work, Bidding Procedures and Contract Terms are described in the Bidding Documents. In addition to the covering letter accompanying Bidding Documents, the Bidding Documents include:

(a) Request for Quotation (RFQ)
(b) Instructions to Bidders
(c) General Terms & Conditions of Contract (T&C)

(d) Delivery schedule
(e) Price Formats & Summary T&C
(f) Bid Form
(g) Acceptance Format – RA
(h) EMD BG Format
(i) Vendor code of conduct
(j) Appendix
(k) Technical Specifications (TS)

5.02 The Bidder is expected to examine the Bidding Documents, including all Instructions, Forms, Terms and Specifications. Failure to furnish all information required by the Bidding Documents or submission of a Bid not substantially responsive to the Bidding Documents in every respect will may result in the rejection of the Bid.

6.0 AMENDMENT OF BIDDING DOCUMENTS

6.01 At any time prior to the deadline for submission of Bids, the Purchaser may for any reasons, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bidding Documents by Amendment.

6.02 The Amendment shall be part of the Bidding Documents, pursuant to Clause 5.01, and it will be notified in web site **www.bsesdelhi.com** and the same will be binding on them.

6.03 In order to afford prospective Bidders reasonable time in which to take the Amendment into account in preparing their Bids, the Purchaser may, at its discretion, extend the deadline for the submission of Bids. The same shall be published as a corrigendum in website **www.bsesdelhi.com**

6.04 Purchaser shall reserve the rights to following:
a) extend due date of submission,
b) modify tender document in part/whole,
c) cancel the entire tender

6.05 **Bidders are requested to visit website regularly for any modification/clarification/corrigendum/addendum of the bid documents.**

C. PREPARATION OF BIDS

7.0 LANGUAGE OF BID

The Bid prepared by the Bidder, and all correspondence and documents relating to the Bid exchanged by the Bidder and the Purchaser, shall be written in the English Language. Any printed literature furnished by the Bidder may be written in another Language, provided that this literature is accompanied by an English translation, in which case, for purposes of interpretation of the Bid, the English translation shall govern.

8.0 DOCUMENTS COMPRISING THE BID

The Bid prepared and submitted by the Bidder shall comprise the following components:

(a) Bid Form, Price & other Schedules (STRICTLY AS PER FORMAT) and Technical Data Sheets completed in accordance with Technical Specification.

(b) All the Bids must be accompanied with the required EMD as mentioned in the Section-I against each tender.

(c) Tender documents duly stamped and signed on each page by authorized signatory.

9.0 **BID FORM**

9.01 The Bidder shall submit Bid Form and the appropriate Price Schedules and Technical Data Sheets duly filled in as per attached specification enclosed with the Bidding Documents.

9.02 **EMD**

Pursuant to Clause 8.0(b) above, the bidder shall furnish, as part of its bid, a EMD amounting to as specified in the Section-I. The EMD is required to protect the Purchaser against the risk of Bidder's conduct which would warrant forfeiture.
The EMD shall be denominated in any of the following form**:**

(a) Bank Guarantee drawn in favour of BSES Yamuna Power Ltd, payable at Delhi.
(b) EMD shall be valid for One Hundred Twenty (120) days from due date of bid submission drawn in favour of BSES Yamuna Power Ltd.

The EMD may be forfeited in case of:

(a) the Bidder withdraws its bid during the period of specified bid validity

or

(b) the case of a successful Bidder, if the Bidder does not

(i) Accept the Purchase Order, or

(ii) Furnish the required performance security BG.

10.0 **BID PRICES**

10.01 Bidders shall quote for the entire Scope of Supply with a break-up of prices for individual items. The total Bid Price shall also cover all the Supplier's obligations mentioned in or reasonably to be inferred from the Bidding Documents in respect of Design, Supply, Transportation to site, all in accordance with the requirement of Bidding Documents the Bidder shall complete the appropriate Price Schedules included herein, stating the Unit Price for each item & total Price.

10.02 The prices offered shall be inclusive of all costs as well as Duties, Taxes and Levies paid or payable during execution of the supply work, breakup of price constituents, should be there.

Prices quoted by the Bidder shall be **"Firm"** and not subject to any price adjustment during the performance of the Contract. **A Bid submitted with an adjustable price/ Price Variation Clause will be treated as non -responsive and rejected.**

11.0 **BID CURRENCIES**

11.01 Prices shall be quoted in Indian Rupees Only.

12.0 **PERIOD OF VALIDITY OF BIDS**

12.01 Bids shall remain valid for 120 days from the due date of submission of the Bid.

12.02 Not withstanding Clause 12.01 above, the Purchaser may solicit the Bidder's consent to an extension of the Period of Bid Validity. The request and the responses thereto shall be made in writing and sent by post/courier

13.0 **ALTERNATIVE BIDS**

13.01 Bidders shall submit Bids, which comply with the Bidding Documents. Alternative Bids will not be considered. The attention of Bidders is drawn to the provisions regarding the rejection of Bids in the terms and conditions, which are not substantially responsive to the requirements of the Bidding Documents.

14.0 **FORMAT AND SIGNING OF BID**

14.01 The original Bid Form and accompanying documents (as specified in Clause 5.0), clearly marked "Original Bid" plus Duplicate Soft copy in USB flash drive must be received by the Purchaser at the date, time and place specified pursuant to Clauses 15.0 and 16.0. In the event of any discrepancy between the original and the copies, the original shall govern.

14.02 The original and copy of the Bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to sign on behalf of the Bidder. Such authorization shall be indicated by written Power-of-Attorney accompanying the Bid. The Bid submitted on behalf of companies registered with the Indian Companies Act, for the time being in force, shall be signed by persons duly authorized to submit the Bid on behalf of the Company and shall be accompanied by certified true copies of the resolutions, extracts of Articles of Association, special or general Power of Attorney etc. to show clearly the title, authority and designation of persons signing the Bid on behalf of the Company. Satisfactory evidence of authority of the person signing on behalf of the Bidder shall be furnished with the bid. A bid by a person who affixes to his signature the word 'President', 'Managing Director', 'Secretary', 'Agent' or other designation without disclosing his principal will be rejected.

The Bidder's name stated on the Proposal shall be the exact legal name of the firm.

14.03 The Bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the Bid.

D. SUBMISSION OF BIDS

15.0 **SEALING AND MARKING OF BIDS**

15.01 Bid submission: One original (hard copies) & One Duplicate Soft copy in USB flash drive of all the Bid Documents shall be sealed and submitted to the Purchaser before the closing time for submission of the bid.

15.02 The Technical Documents and the EMD shall be enclosed in a sealed envelope and the said envelope shall be superscribed with — "Technical Bid & EMD". The price bid shall be inside another sealed envelope with superscribed "PRICE BID". Both these envelopes shall be sealed inside another big envelope. All the envelopes should bear the Name and Address of the Bidder and marking for the Original and Copy. The envelopes should be superscribed with — "Tender Notice No. & Due date of opening".

15.03 The Bidder has the option of sending the Bids in person. Bids submitted by Email/Telex/Telegram

/Fax will be rejected. No request from any Bidder to the Purchaser to collect the proposals from Courier/Airlines/Cargo Agents etc shall be entertained by the Purchaser.

16.0 **DEADLINE FOR SUBMISSION OF BIDS**

16.01 The original Bid, together with the required copies, must be received by the Purchaser at the address on or before the due date & time of submission.

16.02 The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with Clause 6.0, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended

17.0 **ONE BID PER BIDDER**

17.01 Each Bidder shall submit only one Bid by itself. No Joint venture is acceptable. A Bidder who submits or participates in more than one Bid will cause all those Bids to be rejected.

18.0 **LATE BIDS**

18.01 Any Bid received by the Purchaser after the deadline for submission of Bids prescribed by the Purchaser, pursuant to Clause 16.0, will be declared "Late" and may be rejected and returned unopened to the Bidder.

19.0 **MODIFICATIONS AND WITHDRAWAL OF BIDS**

19.01 The Bidder is not allowed to modify or withdraw its Bid after the Bid's submission subject to any corrigendum/addendum/modifications in the tender documents uploaded in website.

E. EVALUATION OF BID

20.0 **PROCESS TO BE CONFIDENTIAL**

Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence the Purchaser's processing of Bids or award decisions may result in the rejection of the Bidder's Bid.

21.0 **CLARIFICATION OF BIDS**

To assist in the examination, evaluation and comparison of Bids, the Purchaser may, at its discretion, ask the Bidder for a clarification of its Bid. All responses to requests for clarification shall be in writing and no change in the price or substance of the Bid shall be sought, offered or permitted.

22.0 **PRELIMINARY EXAMINATION OF BIDS / RESPONSIVENESS**

22.01 Purchaser will examine the Bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bids are generally in order. Purchaser may ask for submission of original documents in order to verify the documents submitted in support of qualification criteria.

22.02 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the

unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price per item will be corrected. If there is a discrepancy between the Total Amount and the sum of the total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected.

22.03 Prior to the detailed evaluation, Purchaser will determine the substantial responsiveness of each Bid to the Bidding Documents including production capability and acceptable quality of the Goods offered. A substantially responsive Bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviation.

22.04 Bid determined as not substantially responsive will be rejected by the Purchaser and/or the Purchaser and may not subsequently be made responsive by the Bidder by correction of the non - conformity.

23.0 **EVALUATION AND COMPARISON OF BIDS**

23.01 The evaluation of Bids shall be done based on the delivered cost competitiveness basis.

23.02 The evaluation of the Bids shall be a stage-wise procedure. The following stages are identified for evaluation purposes: In the first stage, the Bids would be subjected to a responsiveness check. The Technical & qualifying Proposals and the Conditional ties of the Bidders would be evaluated.

Subsequently, the Financial Proposals along with Supplementary Financial Proposals, if any, of Bidders with Techno-commercially Acceptable Bids shall be considered for final evaluation.

23.03 The Purchaser's evaluation of a Bid will take into account, in addition to the Bid price, the following factors, in the manner and to the extent indicated in this Clause:

(a) Delivery Schedule

(b) Conformance to Qualifying Criteria

(c) Deviations from Bidding Documents

Bidders shall base their Bid price on the terms and conditions specified in the Bidding Documents.

The cost of all quantifiable deviations and omissions from the specification, terms and conditions specified in Bidding Documents shall be evaluated. **The Purchaser will make its own assessment of the cost of any deviation for the purpose of ensuring fair comparison of Bids.**

23.04 Any adjustments in price, which result from the above procedures, shall be added for the purposes of comparative evaluation only to arrive at an "Evaluated Bid Price". Bid Prices quoted by Bidders shall remain unaltered.

F. AWARD OF CONTRACT

24.0 **CONTACTING THE PURCHASER**

24.01 If any Bidder wishes to contact the Purchaser on any matter related to the Bid, from the time of Bid opening to the time of contract award, the same shall be done in writing only.

24.02 Any effort by a Bidder to influence the Purchaser and/or in the Purchaser's decisions in respect of Bid evaluation, Bid comparison or Contract Award, will result in the rejection of the Bidder's Bid.

25.0 **THE PURCHASER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS**

Submission of bids shall not automatically construe qualification for evaluation. The Purchaser reserves the right to accept or reject any Bid and to annul the Bidding process and reject all Bids at anytime prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Purchaser's action.

26.0 **AWARD OF CONTRACT**

The Purchaser will award the Contract to the successful Bidder whose Bid has been Determined to be the lowest-evaluated responsive Bid, provided further that the Bidder has been determined to be qualified to satisfactorily perform the Contract. Purchaser reserves the right to award order to other bidders in the tender, provided it is required for timely execution of project & provided he agrees to come to the lowest rate. Purchaser reserves the right to distribute the entire tender quantity at its own discretion without citing any reasons thereof.

27.0 **THE PURCHASER'S RIGHT TO VARY QUANTITIES**

The Purchaser reserves the right to vary the quantity i.e. increase or decrease the numbers/quantities without any change in terms and conditions during the execution of the Order.

28.0 **LETTER OF INTENT/ NOTIFICATION OF AWARD**

The letter of intent/ Notification of Award shall be issued to the successful Bidder whose bids have been considered responsive, techno-commercially acceptable and evaluated to be the lowest (L1). The successful Bidder shall be required to furnish a letter of acceptance within 7 days of issue of the letter of intent /Notification of Award by Purchaser.

29.0 **PERFORMANCE BANK GAURANTEE**

The successful Bidder shall furnish the Performance Bank Guarantee within fifteen(15) days, for an amount of 10% (Ten percent) of the Total Contract value . The Performance Bond shall be valid for a period of Sixty months (60) from the date of the commissioning or Sixty six months (66) from the date of receipt of material (last consignment) at site/stores whichever is earlier plus 3 months towards claim period. Upon submission of the performance security, the EMD shall be released.

30.0 **CORRUPT OR FRADULENT PRACTICES**

30.01 The Purchaser requires that the Bidders observe the highest standard of ethics during the procurement and execution of the Project. In pursuance of this policy, the Purchaser:

(a) Defines, for the purposes of this provision, the terms set forth below as follows:

(i) "Corrupt practice" means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and

(ii) "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Purchaser, and includes collusive practice among Bidders (prior to or after Bid submission) designed to establish Bid prices at artificial non -competitive levels and to deprive the Purchaser of the benefits of free and open competition .

(b) Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

(c) Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a contract.

30.02 Furthermore, Bidders shall be aware of the provision stated in the Terms and Conditions of Contract.

APPENDIX I

(FORMAT FOR EMD BANK GUARANTEE)

(To be issued in a Non Judicial Stamp Paper of Rs.50/-purchased in the name of the bank)

Whereas [name of the Bidder] (herein after called the "Bidder") has submitted its bid dated [date of submission of bid] for the supply of [name and/or description of the goods] (here after called the "Bid").

KNOW ALL PEOPLE by these presents that WE [name of bank] at [Branch Name and address], having our registered office at [address of the registered office of the bank] (herein after called the "Bank"), are bound unto BSES Yamuna Power Ltd., with its Corporate Office at Shaktikiran Building, Karkardooma, Delhi -110032, (herein after called —the "Purchaser") in the sum of Rs…… (Rupees……. only) for which payment well and truly to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents.

Sealed with the Common Seal of the said Bank this_____ day of_____ 20____.

The conditions of this obligation are:

1 If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or

2. If the Bidder, having been notified of the acceptance of its Bid by the Purchaser during the period of bid validity:

(a) fails or refuses to execute the Contract Form, if required; or

(b) fails or refuses to furnish the performance security, In accordance with the Instructions to Bidders/ Terms and Conditions;

We undertake to pay to the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that is its demand the purchaser will note that amount claimed by it is due to it, owing to the occurrence of one or both of the two condition(s), specifying the occurred condition or condition(s).

This guarantee will remain in force up to and including One Hundred Twenty (120) days after the due date of submission bid, and any demand in respect thereof should reach the Bank not later than the above date.

(Stamp & signature of the bank)

Signature of the witness

BID FORM

To

Head of Department
Contracts & Material Deptt.
BSES Yamuna Power Ltd
Shaktikiran Building, Karkardooma,
Delhi 110032

Sir,

1 We understand that BYPL is desirous of procuring…….. for it's licensed distribution network area in Delhi

2 Having examined the Bidding Documents for the above named works, we the undersigned, offer to deliver the goods in full conformity with the Terms and Conditions and technical specifications for the sum indicated in Price Bid or such other sums as may be determined in accordance with the terms and conditions of the contract. The amounts are in accordance with the Price Schedules attached herewith and are made part of this bid.

3 If our Bid is accepted, we under take to deliver the entire goods as) as per delivery schedule mentioned in Section IV from the date of award of purchase order/letter of intent.

4 If our Bid is accepted, we will furnish a performance bank guarantee for an amount of 10% (Ten)percent of the total contract value for due performance of the Contract in accordance with the Terms and Conditions.

5 We agree to abide by this Bid for a period of 120 days from the due date of bid submission and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

6 We declare that we have studied the provision of Indian Laws for supply of equipments/materials and the prices have been quoted accordingly.

7 Unless and until Letter of Intent is issued, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.

8 We understand that you are not bound to accept the lowest, or any bid you may receive.

9 There is provision for Resolution of Disputes under this Contract, in accordance with the Laws and Jurisdiction of Contract.

Dated this..... day of..... 20XX

Signature..... In the capacity of ……

.....duly authorized to sign for and on behalf of

(IN BLOCK CAPITALS) .....

ACCEPTANCE FORM FOR PARTICIPATION IN REVERSE AUCTION EVENT

(To be signed and stamped by the bidder)

BSES Yamuna Power Ltd (hereinafter referred to as **"BYPL"**) intends to use the reverse auction through SAP-SRM tool as an integral part of the entire tendering process. All the bidders who are found as techno commercial qualified based on the tender requirements shall be eligible to participate in the reverse auction event.

The following terms and conditions are deemed as accepted by the bidder on participation in the bid event:

1. BYPL shall provide the user id and password to the authorized representative of the bidder. (Authorization letter in lieu of the same be submitted along with the signed and stamped acceptance form)
2. BYPL will make every effort to make the bid process transparent. However, the award decision by BYPL would be final and binding on the bidder.
3. The bidder agrees to non-disclosure of trade information regarding the purchase, identity of BYPL, bid process, bid technology, bid documentation, bid details, and etc.
4. The bidder is advised to understand the auto bid process to safeguard themselves against any possibility of non-participation in the auction event.
5. In case of bidding through internet medium, bidders are further advised to ensure availability of the entire infrastructure as required at their end to participate in the auction event. Inability to bid due to telephone line glitch, internet response issues, software or hardware hangs; power failure or any other reason shall not be the responsibility of BYPL.
6. In case of intranet medium, BYPL shall provide the infrastructure to bidders, further, BYPL has sole discretion to extend or restart the auction event in case of any glitches in infrastructure observed which has restricted the bidders to submit the bids to ensure fair & transparent competitive bidding. In case of an auction event is restarted, the best bid as already available in the system shall become the start price for the new auction.
7. In case the bidder fails to participate in the auction event due any reason whatsoever, it shall be presumed that the bidder has no further discounts to offer and the initial bid as submitted by the bidder as a part of the tender shall be considered as the bidder's final no regret offer. Any offline price bids received from a bidder in lieu of non-participation in the auction event shall be out rightly rejected by BYPL.
8. The bidder shall be prepared with competitive price quotes on the day of the reverse auction event.
9. The prices as quoted by the bidder during the auction event shall be inclusive of all the applicable taxes, duties and levies and shall be FOR Landed Cost basis at BYPL site.
10. The prices submitted by a bidder during the auction event shall be binding on the bidder.
11. No requests for time extension of the auction event shall be considered by BYPL.
12. The original price bids of the bidders shall be reduced on pro-rata basis against each line item based on the final all-inclusive prices offered during conclusion of the auction event for arriving at contract amount.

Signature & seal of the Bidder

ANNEXURE - SCHEDULE OF DEVIATIONS

Vendor shall refrain from taking any deviations on this TENDER. Still in case of any deviations, all such deviations from this tender shall be set out by the Bidder, Clause by Clause in this schedule and submit the same as a part of the Technical Bid.

Unless **specifically** mentioned in this schedule, the tender shall be deemed to confirm the BYPL's specifications:

Technical Deviations:-

SL No.	Clause No.	NIT Page No.	NIT Clause descriptions	Details of Clarification/deviation with justifications

Commercial Deviations:-

SL No.	Clause No.	NIT Page No.	NIT Clause descriptions	Details of Clarification/deviation with justifications

By signing this document we hereby withdraw all the deviations whatsoever taken anywhere in this bid document and comply to all the terms and conditions, technical specifications, scope of work etc. as mentioned in the standard document except those as mentioned above.

Seal of the Bidder:

Signature:

Name:

Technical Bid Submission Check List

S. No.	Description	BYPL Requirement	Bidder's Compliance
1	**Tender No.**	Required	
2	**Technical Specification reference number**	Required	
3	**Communication Details**		
3.1	Name of the Bidder	Required	
3.2	Name of Authorized contact person	Required	
3.3	Contact No. of Authorized contact person	Required	
3.4	E-mail id of Authorized contact person	Required	
4	**Document Submission Format**		
4.1	Documents shall be submitted in Box file/spiral binding. Any other format is not acceptable	Required	
4.2	Index of documents with page numbers for each document	Required	
4.3	Separator with document description shall be provided before each document	Required	
5	**Qualifying Requirement Compliance**		
5.1	Summary of compliance of qualifying criteria in tabular form along with summary of documentary proof provided	Required	
5.2	Detailed Documents supporting compliance of qualifying criteria	Required	
6	**Drawings/ Documents as per Technical Specification.**		
6.1	Signed copy of technical specification	Required	
6.2	Type Test reports of offered model/ type/ rating	Required	
6.3	Guaranteed Technical particulars (GTP)	Required	
6.4	Deviation Sheet	Required	
6.5	Detailed Drawings	Required	
6.6	Manufacturer's quality assurance plan	Required	
6.7	Other drawing/ documents mentioned in technical specification	Required	
7	**Soft copy of complete technical bid in pen drive**	Required	
8	**Each category samples will be submitted by bidder as per technical specification (if any sample requirement mentioned in technical specification) and it will return after finalize the order**	Required	

Note: Submission of Technical bid check list along with all items mentioned in the check list is mandatory. Order of documents shall be strictly as per the technical bid check list. Bids with incomplete/ wrong information are liable for rejection.

VENDOR CODE OF CONDUCT

Purchaser is committed to conducting its business in an ethical, legal and socially responsible manner. To encourage compliance with all legal requirements and ethical business practices, Purchaser has established this Vendor Code of Conduct (the "Code") for Purchaser's Vendors. For the purposes of this document, "Vendor" means any company, corporation or other entity that sells, or seeks to sell goods or services, to Purchaser, including the Vendor's employees, agents and other representatives.

Fundamental to adopting the Code is the understanding that a business, in all of its activities, must operate in full compliance with the laws, rules and regulations of the countries in which it operates. This Code encourages Vendors to go beyond legal compliance, drawing upon internationally recognized standards, in order to advance social and environmental responsibility.

I. Labour and Human Rights

Vendors must uphold the human rights of workers, and treat them with dignity and respect as understood by the international community.

. Fair Treatment - Vendors must be committed to a workplace free of harassment. Vendors shall not threaten workers with or subject them to harsh or inhumane treatment, including sexual harassment, sexual abuse, corporal punishment, mental coercion, physical coercion, verbal abuse or unreasonable restrictions on entering or exiting company provided facilities.

. Antidiscrimination - Vendors shall not discriminate against any worker based on race, colour, age,gender,sexual orientation, ethnicity, disability, religion, political affiliation, union membership, national origin, or marital status in hiring and employment practices such as applications for employment, promotions, rewards, access to training, job assignments, wages, benefits, discipline, and termination. Vendors shall not require a pregnancy test or discriminate against pregnant workers except where required by applicable laws or regulations or prudent for workplace safety. In addition, Vendors shall not require workers or potential workers to undergo medical tests that could be used in a discriminatory way except where required by applicable law or regulation or prudent for workplace safety.

. Freely Chosen Employment - Forced, bonded or indentured labour or involuntary prison labour is not to be used. All work will be voluntary, and workers should be free to leave upon reasonable notice. Workers shall not be required to hand over government-issued identification, passports or work permits as a condition of employment.

. Prevention of Under Age Labor - Child labor is strictly prohibited. Vendors shall not employ children. The minimum age for employment or work shall be 15 years of age, the minimum age for employment in that country, or the age for completing compulsory education in that country, whichever is higher. This Code does not prohibit participation in legitimate workplace apprenticeship programs that are consistent with Article 6 of ILO Minimum Age Convention No. 138 or light work consistent with Article 7 of ILO Minimum Age Convention No. 138.

. Juvenile Labor - Vendors may employ juveniles who are older than the applicable legal minimum age for employment but are younger than 18 years of age, provided they do not perform work likely to jeopardize their health, safety, or morals, consistent with ILO Minimum Age Convention No. 138.

. Minimum Wages - Compensation paid to workers shall comply with all applicable wage laws, including those relating to minimum wages, overtime hours and legally mandated benefits. Any Disciplinary wage deductions are to conform to local law. The basis on which workers are being paid is to be clearly conveyed to them in a timely manner.

. Working Hours - Studies of good manufacturing practices clearly link worker strain to reduced productivity, increased turnover and increased injury and illness. Work weeks are not to exceed maximum set by local law. Further, a work week should not be more than 60 hours per week, including

overtime, except in emergency or unusual situations. Workers should be allowed at least one day off per seven-day week.

. Freedom of Association - Open communication and direct engagement between workers and management are the most effective ways to resolve workplace and compensation issues. Vendors are to respect the rights of workers to associate freely and to communicate openly with management regarding working conditions without fear of reprisal, intimidation or harassment. Workers' rights to join labour unions seek representation and or join worker's councils in accordance with local laws should be acknowledged.

II. Health and Safety

Vendors must recognize that in addition to minimizing the incidence of work-related injury and illness, a safe and healthy work environment enhances the quality of products and services, consistency of production and worker retention and morale. Vendors must also recognize that ongoing worker input and education is essential to identifying and solving health and safety issues in the workplace.

The health and safety standards are:

. Occupational Injury and Illness - Procedures and systems are to be in place to prevent, manage, track and report occupational injury and illness, including provisions to: a) encourage worker reporting; b) classify and record injury and illness cases; c) provide necessary medical treatment; d) investigate cases and implement corrective actions to eliminate their causes; and e) facilitate return of workers to work.

. Emergency Preparedness - Emergency situations and events are to be identified and assessed, and their impact minimized by implementing emergency plans and response procedures, including: emergency reporting, employee notification and evacuation procedures, worker training and drills, appropriate fire detection and suppression equipment, adequate exit facilities and recovery plans.

. Occupational Safety - Worker exposure to potential safety hazards (e.g., electrical and other energy sources, fire, vehicles, and fall hazards) are to be controlled through proper design engineering and administrative controls, preventative maintenance and safe work procedures (including lockout/ragout), and ongoing safety training. Where hazards cannot be adequately controlled by these means, workers are to be provided with appropriate, well-maintained, personal protective equipment. Workers shall not be disciplined for raising safety concerns.

. Machine Safeguarding - Production and other machinery is to be evaluated for safety hazards. Physical guards, interlocks and barriers are to be provided and properly maintained where machinery presents an injury hazard to workers.

. Industrial Hygiene - Worker exposure to chemical, biological and physical agents is to be identified, evaluated, and controlled. Engineering or administrative controls must be used to control overexposures. When hazards cannot be adequately controlled by such means, worker health is to be protected by appropriate personal protective equipment programs.

. Sanitation, Food, and Housing - Workers are to be provided with ready access to clean toilet, facilities potable water and sanitary food preparation, storage, and eating facilities. Worker dormitories provided by the Participant or a labour agent are to be maintained clean and safe, and provided by the Participant or a labour egress, hot water for bathing and showering, and adequate heat and ventilation and reasonable personal space along with reasonable entry and exit privileges.

. Physically Demanding Work - Worker exposure to the hazards of physically demanding tasks, including manual material handling and heavy or repetitive lifting, prolonged standing and highly repetitive or forceful assembly tasks is to be identified, evaluated and controlled.

III. Environmental

Vendors should recognize that environmental responsibility is integral to producing world class products In manufacturing operations, adverse effects on the environment and natural resources are to be minimized while safeguarding the health and safety of the public.

The environmental standards are:

. Product Content Restrictions - Vendors are to adhere to applicable laws and regulations regarding prohibition or restriction of specific substances including labeling laws and regulations for recycling and disposal. In addition, Vendors are to adhere to all environmental requirements specified by Purchaser.
. Chemical and Hazardous Materials -Chemical and other materials posing a hazard if released to the environment are to be identified and managed to ensure their safe handling, movement storage, recycling or reuse and disposal.
. Air Emissions - Air emissions of volatile organic chemicals, aerosols, corrosives, particulates, ozone depleting chemicals and combustion by-products generated from operations are to be characterized, monitored, controlled and treated as required prior to discharge.
. Pollution Prevention and Resource Reduction -Waste of all types, including water and energy, are to reduced or eliminated at the source or by practices such as modifying production, maintenance and facility processes, materials substitution, conservation, recycling and re-using materials.
. Wastewater and Solid Waste - Wastewater and solid waste generated from operations industrial processes and sanitation facilities are to be monitored, controlled and treated as required prior to discharge or disposal.
. Environmental Permits and Reporting - All required environmental permits (e.g. discharge monitoring) and registrations are to be obtained, maintained and kept current and their operational and reporting requirements are to be followed.

IV. Ethics

Vendors must be committed to the highest standards of ethical conduct when dealing with workers, Vendors, and customers.
. Corruption, Extortion, or Embezzlement - Corruption, extortion, and embezzlement, in any form, are strictly prohibited. Vendors shall not engage in corruption, extortion or embezzlement in any form and violations of this prohibition may result in immediate termination as an Vendor and in legal action.
. Disclosure of Information - Vendors must disclose information regarding its business activities, structure financial situation, and performance in accordance with applicable laws and regulations and prevailing industry practices.
. No Improper Advantage - Vendors shall not offer or accept bribes or other means of obtaining undue or improper advantage.
. Fair Business, Advertising, and Competition - Vendors must uphold fair business standards in advertising, sales, and competition.
. Business Integrity - The highest standards of integrity are to be expected in all business interactions. Participants shall prohibit any and all forms of corruption, extortion and embezzlement. Monitoring and enforcement procedures shall be implemented to ensure conformance.
. Community Engagement - Vendors are encouraged to engage the community to help foster social and economic development and to contribute to the sustainability of the communities in which they operate.
. Protection of Intellectual Property - Vendors must respect intellectual property rights; safeguard customer information; and transfer of technology and know-how must be done in a manner that protects intellectual property rights.

V. Management System

Vendors shall adopt or establish a management system whose scope is related to the content of this Code. The management system shall be designed to ensure (a) compliance with applicable laws, regulations and customer requirements related to the Vendors' operations and products; (b)

conformance with this Code; and (c) identification and mitigation of operational risks related to this Code. It should also facilitate continual improvement.

The management system should contain the following elements:

. Company Commitment - Corporate social and environmental responsibility statements affirming Vendor's commitment to compliance and continual improvement.

. Management Accountability and Responsibility - Clearly identified company representative[s]responsible for ensuring implementation and periodic review of the status of the management systems.

. Legal and Customer Requirements - Identification, monitoring and understanding of applicable laws, regulations and customer requirements.

. Risk Assessment and Risk Management - Process to identify the environmental, health and safety and labour practice risks associated with Vendor's operations. Determination of the relative significance for each risk and implementation of appropriate procedural and physical controls to ensure regulatory compliance to control the identified risks.

. Performance Objectives with Implementation Plan and Measures - Areas to be included in a risk assessment for health and safety are warehouse and storage facilities, plant/facilities support equipment, laboratories and test areas, sanitation facilities (bathrooms), kitchen/cafeteria and worker housing /dormitories. Written standards, performance objectives, and targets an implementation plans including a periodic assessment of Vendor's performance against those objectives.

. Training - Programs for training managers and workers to implement Vendor's policies, procedures and improvement objectives.

. Communication - Process for communicating clear and accurate information about Vendor's performance, practices and expectations to workers, Vendors and customers.

. Worker Feedback and Participation - Ongoing processes to assess employees' understanding of and obtain feedback on practices and conditions covered by this Code and to foster continuous improvement.

. Audits and Assessments - Periodic self-evaluations to ensure conformity to legal and regulatory requirements, the content of the Code and customer contractual requirements related to social and environmental responsibility.

. Corrective Action Process - Process for timely correction of deficiencies identified by internal or external assessments, inspections, investigations and reviews.

. Documentation and Records - Creation of documents and records to ensure regulatory compliance and conformity to company requirements along with appropriate confidentiality to protect privacy.

The Code is modeled on and contains language from the Recognized standards such as International Labour Organization Standards (ILO), Universal Declaration of Human Rights (UDHR), United Nations Convention against Corruption, and the Ethical Trading Initiative (ETI) were used as references in preparing this Code and may be useful sources of additional information

GENERAL CONDITIONS OF CONTRACT
(GCC-SUPPLY)

GENERAL CONDITIONS OF CONTRACT (GCC)-SUPPLY

The General Condition of Contract shall form a part of specifications, contract document.

1.0 General Instructions

1.01 All the Bids shall be prepared and submitted in accordance with these instructions.

1.02 Bidder shall bear all costs associated with the preparation and delivery of its Bid, and the Purchaser will in no case shall be responsible or liable for these costs.

1.03 The Bid should be submitted by the Bidder in whose name the bid document has been issued and under no circumstances it shall be transferred/sold to the other party.

1.04 The Purchaser reserves the right to request for any additional information and also reserves the right to reject the proposal of any Bidder, if in the opinion of the Purchaser, the data in support of RFQ requirement is incomplete.

1.05 The Bidder is expected to examine all instructions, forms, terms & conditions and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a Bid not substantially responsive to the Bid Documents in every respect may result in rejection of the Bid. However, the Purchaser's decision in regard to the responsiveness and rejection of bids shall be final and binding without any obligation, financial or otherwise, on the Purchaser.

2.0 Definition of Terms

2.01 "Purchaser" shall mean BSES Yamuna Power Limited, on whose behalf this bid enquiry is issued by its authorized representative / officers.

2.02 "Bidder" shall mean the firm who quotes against this bid enquiry issued by the Purchaser. "Supplier" or "Supplier" shall mean the successful Bidder and/or Bidders whose bid has been accepted by the Purchaser and on whom the "Letter of Acceptance" is placed by the Purchaser and shall include his heirs, legal representatives, successors and permitted assigns wherever the context so admits.

2.03 "Supply" shall mean the Scope of Contract as described.

2.04 "Specification" shall mean collectively all the terms and stipulations contained in those portions of this bid document known as RFQ, Commercial Terms & Condition, Instructions to Bidders, Technical Specifications and the Amendments, Revisions, Deletions or Additions, as may be made by the Purchaser from time to time.

2.05 "Letter of Acceptance" shall mean the official notice issued by the Purchaser notifying the Supplier that his proposal has been accepted and it shall include amendments thereto, if any, issued by the Purchaser. The "Letter of Acceptance" issued by the Purchaser shall be binding on the "Supplier" The date of Letter of Acceptance shall be taken as the effective date of the commencement of contract.

2.06 "Month" shall mean the calendar month and "Day" shall mean the calendar day.

2.07 "Codes and Standards" shall mean all the applicable codes and standards as indicated in the Specification.

2.08 "Offer Sheet" shall mean Bidder's firm offer submitted to BYPL in accordance with the specification.

2.09 "Contract" shall mean the "Letter of Acceptance/Purchase Order" issued by the Purchaser.

2.10 "Contract Price" shall mean the price referred to in the "Letter of Acceptance/Purchase Order".

2.11 "Contract Period" shall mean the period during which the "Contract" shall be executed as agreed between the Supplier and the Purchaser in the Contract inclusive of extended contract period for reason beyond the control of the Supplier and/or Purchaser due to force majeure.

2.12 "Acceptance" shall mean and deemed to include one or more of the following as will be stipulated in the specification:

a) The written acceptance of material by the inspector at suppliers works to ship the materials.
b) Acceptance of material at Purchaser site stores after its receipt and due inspection/ testing and release of material acceptance voucher.
c) Where the scope of the contract includes supply, acceptance shall mean issue of necessary equipment / material takeover receipt after installation & commissioning and final acceptance.

3.0 Contract Documents & Priority

3.01 Contract Documents: The terms and conditions of the contract shall consist solely of these RFQ conditions and the offer sheet.

4.0 Scope of Supply -General

4.01 The "Scope of Supply" shall be on the basis of Bidder's responsibility, completely covering the obligations, responsibility and supplies provided in this Bid enquiry whether implicit or explicit.

4.02 Bidder shall have to quote for the Bill of quantities as listed in Section – IV of this RFQ.

4.03 Quantity variation and additional requirement if any shall be communicated to successful bidder during project execution.

4.04 All relevant drawings, data and instruction manuals.

5.0 Quality Assurance and Inspection

5.01 Immediately on award of contract, the bidder shall prepare detailed quality assurance plan / test procedure identifying the various stages of manufacture, quality checks performed at each stage, raw material inspection and the Customer hold points. The document shall also furnish details of method of checking, inspection and acceptance standards / values and get the approval of Purchaser before proceeding with manufacturing. However, Purchaser shall have right to review the inspection reports, quality checks and results of suppliers in house inspection department which are not Customer hold points and the supplier shall comply with the remarks made by purchaser or his representative on such reviews with regards to further testing, rectification or rejection, etc.

5.02 Witness and Hold points are critical steps in manufacturing, inspection and testing where the supplier is obliged to notify the Purchaser in advance so that it may be witnessed by the

Purchaser. Final inspection is a mandatory hold point. The supplier to proceed with the work past a hold point only after clearance by purchaser or a witness waiver letter from BYPL.

5.03 The performance of waiver of QA activity by Purchaser at any stage of manufacturing does not relieve the supplier of any obligation to perform in accordance with and meet all the requirements of the procurement documents and also all the codes & reference documents mentioned in the procurement document nor shall it preclude subsequent rejection by the purchaser.

5.04 On completion of manufacturing the items can only be dispatched after receipt of dispatch Instructions issued by the Purchaser.

5.05 All in-house testing and inspection shall be done with out any extra cost. The in-house inspection shall be carried out in presence of BSES/BSES authorized third party inspection agency. Cost of Futile/abortive visit(s) shall be debited from the invoices.

5.06 Purchaser reserves the right to send any material being supplied to any recognized laboratory for testing, wherever necessary and the cost of testing shall be borne by the Bidder. In case the material is found not in order with the technical requirement / specification, the charges along with any other penalty which may be levied is to be borne by the bidder. To avoid any complaint the supplier is advised to send his representative to the stores to see that the material sent for testing is being sealed in the presence of bidder's representative.

6.0 Inspection & Test Charges

6.01 GOODS shall be inspected by BUYER and/or third party inspection agency nominated by BUYER. Inspection shall carry out stage wise/final inspection as per agreed QA /QC procedure.
In addition, inspection of GOODS shall be carried out at our Site/stores. SELLER shall, however, repair/replace the damaged/rejected GOODS to the satisfaction of BUYER at no extra cost.

6.02 Inspection charges are included in total order value, however BUYER will bear third party inspection charges. In case of futile/abortive visit of BUYER's inspector at SELLER'S works, the cost towards the same shall be debited from the SELLER's invoices.

6.03 GOODS covered by this PURCHASE ORDER shall not be dispatched in whole or in part until SELLER has received a written Release for Shipment Notice from BUYER or their designated representative.

6.04 Inspection call shall be raised minimum 15(fifteen) days in advance from delivery schedule mentioned in PO and duly filled Format issued by BYPL

7.0 Handling and Storage

7.01 Material Safety Data Sheet (MSDS), detail handling & storage instruction sheet/manual, wherever applicable, to be furnished before commencement of supply and one copy is to be submitted in store/site with First Lot.

8.0 Packing, Packing List & Marking

8.01 **Packing:** Supplier shall pack or shall cause to be packed all Commodities in crates/boxes/drums/containers/cartons and otherwise in such a manner as shall be reasonably suitable for shipment by road or rail to BYPL, Delhi/New Delhi stores/site without undue risk of

damage in transit. All the packaging materials as prescribed shall be supplied preferably with bio-degradable packing- materials.

8.02 **Packing List:** The contents of each package shall be itemized on a detailed list showing the exact weight, extreme outside dimensions (length, width & weight) of each container/box/drum/carton, Item SAP Code, PO No & date. One copy of the packing list shall be enclosed in each package delivered.

9.0 Prices/Rates/Taxes

9.01 **Price basis for supply of materials**

a) Bidder to quote their prices on Landed Cost Basis and separate price for each item for supply to BYPL Delhi/New Delhi stores inclusive of packing, forwarding, loading at manufacturer's premises, payment of GST, Freight, any other local charges. **Octroi is presently not applicable in Delhi and however if applicable shall be reimbursed at actuals.**

b) The above supply prices shall also include unloading at BYPL Delhi/New Delhi stores/site.

c) Transit insurance will be arranged by Bidder

10.0 Taxes & Duties

10.01 Prices for Goods are on Ex- Works basis. For the Goods covered under the GST laws, all taxes that are applicable under CGST, SGST, UGST, IGST and GST Compensation Cess shall be payable extra.

10.02 For the Goods not covered in the GST laws, the applicable ED, VAT / CST shall be payable extra at applicable rates.

10.03 GSTIN of BSES YAMUNA POWER LTD - 07AABCC8569N1Z0
CST No. of BSES YAMUNA POWER LTD -07740254593
TIN No. of BSES YAMUNA POWER LTD - 07740254593
PAN No. of BSES YAMUNA POWER LTD - AABCC8569N
TAN No. of BSES YAMUNA POWER LTD - DELB05956G

10.04 At the end of each month, the SELLER must submit their detail of invoices and amount thereof to the concerned officer in charge, within 07 days after the close of the respective month of which supply relates. Non submission of the said request would be treated as good as that the SELLER has no requirement of reconciliation.

11.0 Invoicing Instructions

11.01 Invoices in triplicate [1) Original for recipient, 2) Duplicate for Transporter, 3) Triplicate for supplier] shall be made out and delivered to the following address: BSES YAMUNA POWER LIMITED, SHAKTI KIRAN BUILDING, KARKARDOOMA, DELHI-110032.
MDCC will be released separately for Capex & Opex. Invoice will be submitted by supplier as per the MDCC.

11.02 Vendor shall obtain GST registration in the State from where the supply will be carried out. Vendors supplying Goods to the Purchaser shall have a valid GST registration number and shall submit GST Tax Invoice and other documents as per SGST Act, CGST Act, IGST Act, UTGST Act, GST Compensation Cess Act and Rules made there under. Failure to submit GST Tax Invoice shall be liable for withholding SGST, CGST, IGST, UTGST, GST Compensation Cess amount charged by the vendor while releasing the payment.

11.03 Invoice will be in the name of BSES YAMUNA POWER LIMITED & address of the store/site mentioned in the MDCC. Invoice should contain all information as required under GST Invoice, Debit Note and Credit Rules. The government has notified rules of invoicing under GST along with a template of invoice(GST INV-01) covering the elements such as supplier's details, GSTIN No, HSN Codes, item details, GST tax rates, etc that need to be presented by the supplier.

11.04 Vendor to carefully examine and charge relevant CGST / SGST, UGST, IGST and GST compensation cess as applicable to the transactions.

11.05 Timely provision of invoices / Debit Notes / Credit Notes:

11.05.1 Vendor to timely provide invoice / Debit note / Credit note to enable Purchaser to claim tax benefit on or before stipulated time period. All necessary adjustment entries (Credit Note, Purchase Returns, Debit Notes) shall be made within the time lines prescribed under the GST Laws.

11.05.2 In case of receipt of advance, the Vendor undertakes to raise the tax invoice. Purchaser, upon payment of advance, shall issue payment voucher as per applicable GST laws and rules. Four copies of the invoices need to be provided by suppliers and wherever the law requires, an Electronic Reference Number for each invoice.
Documents and devices to be carried by a person-in-charge of a conveyance under.

11.06 E Way Bills / transit documents for movement of Goods:
Wherever applicable, the Vendor shall be responsible to issue required transit documents / E Way Bills for movement of Goods and the logistic partner / transporter shall not be liable for any loss arising due to confiscation of goods by government agencies on account of lack of proper documents or any mis-declaration. The Supplier is responsible to comply with rules applicable for E-way bill. Any violation in provision of E-way Bill will attract penalty and seizure of Transit Material. Any Penalty and Pre-Deposit due to violation of rules/provision shall be paid and borne by Supplier. Also, Supplier is responsible for releasing of goods from Authority whether CGST/SGST. Delay in supply from the contractual date due to seizure of goods shall also attract liquidated damages.

12.0 Terms of payment and billing

12.01 For Supply of Equipment's:
100% payment shall be made within 45 days from the date of receipt & acceptance of material at store/site on against submission of following documents against dispatch of each consignment at our Vendor Support Cell (VSC):

a) Signed copy of accepted Rate Contract / Purchase Order (for first payment)
b) LR / RR / BL as applicable
c) Challan as applicable
d) Two (02) copies of Supplier's detailed Recipient Invoice showing Commodity description, quantity, unit price, total price and basis of delivery, and being 100% of the value of the consignment claimed.
e) Two (02) copies of Supplier's transporter invoice duly receipted by BYPL Stores & Original certificate issued by BYPL confirming receipt of the subject material at Stores/Site and acceptance of the same as per the provisions of the contract.
f) Two (02) copies Packing List / Detailed Packing List
g) Approved Test certificates / Quality certificates, if applicable
h) Certificate of Origin, if applicable
i) Material Dispatch Clearance Certificate (MDCC)
j) Insurance Policy / Certificate, if applicable

k) Warranty / Guarantee Certificate, if applicable
l) Check list for bill submission.

12.02 Purchaser has the right to recover tax loss, interest and penalty suffered due to any non-compliance of tax laws by the Vendor. In the event, Purchaser is not able to avail any tax credit due to any short coming on the part of the Vendor (which otherwise should have been available to Purchaser in the normal course), then the Vendor at his own cost and effort will get the short coming rectified. If for any reason the same is not possible, then the Vendor will make 'good' the loss suffered by Purchaser due to the tax credit it lost . In such event, any amount paid to the Vendors shall be first attributable to the tax (GST) charged in the invoice and the balance shall be considered towards the 'value' of supply of goods/ services.

12.03 Purchaser shall deduct "Tax Deducted at Source" wherever applicable and at the rate prescribed under the GST Laws or any other Indian law and remit the same to the Government. Necessary TDS certificates as per law shall be issued by the purchase to the vendor.

12.04 Any liability arising out of dispute on the tax rate, classification under HSN, calculation and payment of tax to the Government will be to the Vendor's account.

12.05 Where the supply of Goods are liable to GST under reverse charge mechanism, then the supplier should clearly mention the category under which it has been registered and also that "the liability of payment of GST is on the Recipient of Supply".

13.0 Tax Indemnity Clause

13.01 Vendor (along with its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such affiliates for the purpose of this agreement) agrees that it will be solely responsible for performing all compliances and making payments of all taxes (direct tax or indirect tax including but not limited to income-tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess custom duty, excise duty, Research and Development Cess, etc.), cesses, interest, penalties or any other tax/ duty/ amount/ charge/ liability arising either out of laws/ regulations applicable in India and overseas or because of a demand/ recovery initiated by any revenue authority under laws/ regulations applicable in India or overseas.

13.02 In case any tax liability (including but not limited to income-tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess custom duty, excise duty, Research and Development Cess, etc.), cesses, interest, penalties or any other tax/ duty/ amount/ charge/ liability becomes payable by Purchaser due to failure of the Vendor, or any of its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such affiliates for the purpose of this agreement, to comply with the relevant laws/ regulations applicable in India or overseas, Vendor undertakes to indemnify Purchaser for an amount equal to amount payable by Purchaser.

13.03 Further, Vendor undertakes to keep Purchaser indemnified at all times against and from all other actions, proceedings, claims, loss, damage, costs and expenses which may be brought against Purchaser or suffered or incurred by Purchaser and which shall have arisen either directly or indirectly out of or in connection with failure of The Vendor, or any of its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such affiliates for the purpose of this agreement, to comply with relevant obligations/ compliance under any law/ regulations applicable in India and overseas.

13.04 The parties agree to follow the following process in case any communication of demand, arising out non-compliance by Vendor (along with its affiliates in India or overseas including any agent/ third party contractor or any other person appointed by such affiliates for the purpose of this agreement), is received by Purchaser:

13.04.1 On Purchaser receiving any communication from a competent authority demanding tax liability (including but not limited to income-tax, transfer pricing, value added tax, SGST, CGST, IGST, UTGST, GST Compensation Cess custom duty, excise duty, Research and Development Cess, etc.), cesses, interest, penalties or any other tax/ duty/ amount/ charge/ liability, Purchaser shall, within 5 common working days from the date of receipt of such communication (save where the period to respond to the relevant authority is less than five days, in which case, as soon as reasonably possible) inform Vendor in writing of such communication.

13.04.2 Pursuant to receiving communication from Purchaser, Vendor shall suggest to accept the communication and pay the demand amount to the competent authority. In such an event, Vendor shall reimburse such amount paid to Purchaser within 5 working days from the date of payment by Purchaser to the competent authority.

13.04.3 If Vendor advises in writing and Purchaser agrees to dispute the demand, then Purchaser shall dispute the matter with competent authority as per due process prescribed under the regulations and Purchaser shall not pay the Tax Demand. In such scenario, cost of litigation including but not limited to Counsel cost, filing fees, other related charges, should be reimbursed by Vendor to Purchaser. Additionally, If any coercive steps of recovery are initiated by the department, then Purchaser would pay such amount (including by way of adjustment of refunds due to it) and the same would be reimbursed by Vendor within 5 working days from date of such recovery from Purchaser. Purchaser will take all necessary steps to avoid such recovery measures.

13.04.4 On determination of the demand through an Order issued by a Tribunal or any other similar Authority, by whatever name called, under any law applicable in India or overseas, if the demand or any part thereof becomes payable and is paid by Purchaser, then Vendor undertakes to reimburse such amount to Purchaser within 10 days from the date of payment. Alternatively, if on determination of the demand through an Order, no amount is payable by Purchaser then any refund arising to Purchaser due to such an Order shall be passed on to Vendor within 10 days from the date of receipt of refund.

14.0 The Micro, Small and Medium Enterprises (MSME)

14.01 If the SELLERS establishment is covered under the purview of The Micro, Small and Medium Enterprises Development Act, 2006 and its amendments, he shall declare so within the bid of its status failing which it will be presumed that it is a non-MSME unit. Also submit a copy of Udyog Aadhaar (UA) & Udyam Registration Number.

15.0 Price Validity

15.01 All bids submitted shall remain valid, firm and subject to unconditional acceptance by BYPL Delhi for 120 days from the due date of bid submission. For awarded suppliers, the prices shall remain valid and firm till contract completion.

16.0 Performance Guarantee

16.01 The successful Bidder shall furnish the Performance Bank Guarantee within fifteen(15) days from the issuance of Purchase Order, for an amount of 10% (Ten percent) of the Total Contract value . The Performance Bond shall be valid for a period of Sixty months (60) from the date of the

commissioning or Sixty six months (66) from the date of receipt of material (last consignment) at site/stores whichever is earlier plus 3 months towards claim period. Upon submission of the performance security, the EMD shall be released

16.02 Bank guarantee shall be drawn in favour of BSES Yamuna Power Ltd as applicable. The performance Bank guarantee shall be in the format as specified by BYPL.

17.0 Forfeiture

17.01 Each Performance Bond established under Clause 10.0 shall contain a statement that it shall be automatically and unconditionally forfeited without recourse and payable against the presentation by BYPL of this Performance Bond, to the relevant bank referred to above, together with a simple statement that supplier has failed to comply with any term or condition set forth in the Contract.

17.02 Each Performance BG established under will be automatically and unconditionally forfeited without recourse if BYPL in its sole discretion determines that supplier has failed to comply with any term or condition set forth in the contract.

18.0 Release

18.01 All Performance Bonds will be released without interest within seven (7) days from the last date up to which the Performance Bond has to be kept valid (as defined in Clause 16.0) except for the case set forth in Clause 22.0.

19.0 Defects Liability Period/Guarantee/Warranty

19.01 The bidder to Guarantee the materials / items supplied against any defect of failure, which arise due to faulty materials, workmanship or design for the entire defects liability period. The Defect liability period shall be 66 months from the date of delivery.

19.02 If during the Defects Liability Period any GOODS are found to be defective, they shall be promptly replaced or rectified by BIDDER at its own cost (including the cost of dismantling and (reinstallation) on the instructions of BUYER and if removed from SITE for such purpose, shall be removed and re-delivered to SITE by BIDDER at its own cost.

20.0 Return, Replacement or Substitution

20.01 BYPL shall give Supplier notice of any defective Commodity promptly after becoming aware thereof. BYPL may in its discretion elect to return defective Commodities to Supplier for replacement, free of charge to BYPL, or may reject such Commodities and purchase the same or similar Commodities from any third party. In the latter case BYPL shall furnish proof to Supplier of the cost of such substitute purchase. In either case, all costs of any replacement, substitution, shipping, labour and other related expenses incurred in connection with the return and replacement or for the substitute purchase of a Commodity hereunder should be for the account of Supplier. BYPL may set off such costs against any amounts payable by BYPL to Supplier. Supplier shall reimburse BYPL for the amount, if any, by which the price of a substitute Commodity exceeds the price for such Commodity as quoted in the Bid. BUYER at its sole discretion shall have the opinion to dispose the material or GOODS so rejected and not taken back within forty-five days from the date of intimation of rejection.

21.0 Effective Date of Commencement of Contract

21.01 The date of the issuance of the Letter of Acceptance/Purchase Order shall be treated as the effective date of the commencement of Contract.

22.0 Time – The Essence Of Contract

22.01 The time and the date of completion of the "Supply" as stipulated in the Letter Of Acceptance / Purchase order issued to the Supplier shall be deemed to be the essence of the "Contract". The Supply has to be completed not later than the aforesaid Schedule and date of completion of supply.

23.0 The Laws and Jurisdiction of Contract:

23.01 The laws applicable to this Contract shall be the Laws in force in India.

23.02 All disputes arising in connection with the present Contract shall be settled amicably by mutual consultation failing which shall be finally settled as per the rules of Arbitration and Conciliation Act, 1996 at the discretion of Purchaser. The venue of arbitration shall be at Delhi in India

24.0 Events of Default

24.01 Events of Default. Each of the following events or occurrences shall constitute an event of default ("Event of Default") under the Contract:

(a) Supplier fails or refuses to pay any amounts due under the Contract;

(b) Supplier fails or refuses to deliver Commodities conforming to this RFQ/ specifications, or fails to deliver Commodities within the period specified in P.O. or any extension thereof

(c) Supplier becomes insolvent or unable to pay its debts when due, or commits any act of bankruptcy, such as filing any petition in any bankruptcy, winding-up or reorganization proceeding, or acknowledges in writing its insolvency or inability to pay its debts; or the Supplier's creditors file any petition relating to bankruptcy of Supplier;

(d) Supplier otherwise fails or refuses to perform or observe any term or condition of the Contract and such failure is not remediable or, if remediable, continues for a period of 30 days after receipt by the Supplier of notice of such failure from BYPL.

25.0 Consequences of Default.

(a) If an Event of Default shall occur and be continuing, BYPL may forthwith terminate the Contract by written notice.

(b) In the event of an Event of Default, BYPL may, without prejudice to any other right granted to it by law, or the Contract, take any or all of the following actions;

(i) present for payment to the relevant bank the Performance Bond;

(ii) purchase the same or similar Commodities from any third party; and/or

(iii) recover any losses and/or additional expenses BYPL may incur as a result of Supplier's default.

26.0 Penalty for Delay

26.01 If supply of items / equipments is delayed beyond the supply schedule as stipulated in purchase order then the Supplier shall be liable to pay to the Purchaser as penalty for delay, a sum of 1% (one percent) of the basic (ex-works) price for every week delay of undelivered units or part thereof for individual mile stone deliveries.

26.02 The total amount of penalty for delay under the contract will be subject to a maximum of ten percent (10%) of the basic (ex-works) price of total undelivered units.

26.03 The Purchaser may, without prejudice to any method of recovery, deduct the amount for such damages from any amount due or which may become due to the Supplier or from the Performance Bond or file a claim against the supplier.

26.4 If Penalty is levied as per the Order terms & conditions; BYPL will raise Invoice of the penalty amount along with applicable GST rates. Accordingly, after set off of the penalty Invoice amount, net payment shall be made.

27.0 Variation in Taxes, Duties & Levies

27.1 The total order value shall be adjusted on account of any variations in Statutory Levies imposed by Competent Authorities by way of fresh notification(s) within the stipulated delivery period only. In case of reduction in taxes, duties and levies, the benefits of the same shall be passed on to BUYER.

27.2 No other Taxes, Duties & Levies other than those specified above will be payable by BUYER except in case of new Levies, Taxes & Duties imposed by the Competent Authorities by way of fresh notification(s) subsequent to the issue of PURCHASE ORDER but within the stipulated delivery period.

27.3 Notwithstanding what is stated above, changes in Taxes, Duties & Levies shall applied only to that portion of PURCHASE ORDER not executed on the date of notification by Competent Authority. Further, changes in Taxes, Duties & Levies after due date of Delivery shall not affect PURCHASE ORDER Terms and Value.

27.4 PURCHASE ORDER value shall not be subject to any variation on account of variation in Exchange rate(s).

28.0 Taxes & Duties on raw materials & bought out components

28.01 Taxes & Duties on raw materials & bought out components are included in Order Value and are not subject to any escalation or variation for any reason whatsoever.

28.02 Taxes & Duties on raw materials & bought out components procured indigenously are included in Order Value and are not subject to any escalation or variation for any reason whatsoever.

29.0 Force Majeure

29.01 General

An "Event of Force Majeure" shall mean any event or circumstance not within the reasonable control directly or indirectly, of the Party affected, but only if and to the extent that:

(i) Such event or circumstance materially and adversely affects the ability of the affected Party to perform its obligations under this Contract, and the affected Party has taken all

reasonable precautions, due care and reasonable alternative measures in order to prevent or avoid the effect of such event on the affected party's ability to perform its obligations under this Contract and to mitigate the consequences thereof.

(ii) For the avoidance of doubt, if such event or circumstance would not have materially and adversely affected the performance of the affected party had such affected party followed good industry practice, such event or circumstance shall not constitute force majeure.

(iii) Such event is not the direct or indirect result of the failure of such Party to perform any of its obligations under this Contract.

(iv) Such Party has given the other Party prompt notice describing such events, the effect thereof and the actions being taken in order to comply with above clause.

29.02 Specific Events of Force Majeure subject to the provisions of above clause, Events of Force Majeure shall include only the following to the extent that they or their consequences satisfy the above requirements :

(i) The following events and circumstances :

a) Effect of any natural element or other acts of God, including but not limited to storm, flood, earthquake, lightning, cyclone, landslides or other natural disasters.

b) Explosions or fires

(ii) War declared by the Government of India.

(iii) Dangers of navigation, perils of the sea.

29.03 Notice of Events of Force Majeure If a force majeure event prevents a party from performing any obligations under the Contract in part or in full, that party shall:

i) Immediately notify the other party in writing of the force majeure events within 7(seven) working days of the occurrence of the force majeure event

ii) Be entitled to suspend performance of the obligation under the Contract which is affected by force majeure event for the duration of the force majeure event.

iii) Use all reasonable efforts to resume full performance of the obligation as soon as practicable

iv) Keep the other party informed of all such efforts to resume full performance of the obligation on a regular basis.

v) Provide prompt notice of the resumption of full performance or obligation to the other party.

29.04 Mitigation of Events of Force Majeure Each Party shall:

(i) Make all reasonable efforts to prevent and reduce to a minimum and mitigate the effect of any delay occasioned by an Event of Force Majeure including recourse to alternate methods of satisfying its obligations under the Contract;

(ii) Use its best efforts to ensure resumption of normal performance after the termination of any Event of Force Majeure and shall perform its obligations to the maximum extent practicable as agreed between the Parties; and

(iii) Keep the other Party informed at regular intervals of the circumstances concerning the event of Force Majeure, with best estimates as to its likely continuation and what measures or contingency planning it is taking to mitigate and or terminate the Event of Force Majeure.

29.05 Burden of Proof In the event that the Parties are unable in good faith to agree that a Force Majeure event has occurred to an affected party, the parties shall resolve their dispute in accordance with the provisions of this Agreement. The burden of proof as to whether or not a force majeure event has occurred shall be upon the party claiming that the force majeure event has occurred and that it is the affected party.

29.06 Termination for Certain Events of Force Majeure. If any obligation of any Party under the Contract is reasonably expected to be delayed or prevented by a Force Majeure event for a continuous period of more than 3 months, the Parties shall promptly discuss in good faith how to proceed with a view to reaching a solution on mutually agreed

basis. If a solution on mutually agreed basis cannot be arrived at within a period of 30 days after the expiry of the period of three months, the Contract shall be terminated after the said period of 30 days and neither Party shall be liable to the other for any consequences arising on account of such termination.

The Purchaser may terminate the contract after giving 7 (seven) days' notice if any of following occurs:

i. Bidder fails to complete execution of works within the approved schedule of works, terms and conditions.
ii. In case the Bidder commits any Act of Insolvency, or adjudged insolvent
iii. Has abandoned the contract
iv. Has failed to commence work or has suspended the progress of works
v. Has failed to proceed the works with due diligence and failed to make such due progress

29.07 Limitation of Force Majeure event. The Supplier shall not be relieved of any obligation under the Contract solely because cost of performance is increased, whether as a consequence of adverse economic consequences or otherwise.

29.08 Extension of Contract Period due to Force Majeure event The Contract period may be extended by mutual agreement of Parties by way of an adjustment on account of any period during which an obligation of either Party is suspended due to a Force Majeure event.

29.09 Effect of Events of Force Majeure. Except as otherwise provided herein or may further be agreed between the Parties, either Party shall be excused from performance and neither Party shall be construed to be in default in respect of any obligations hereunder, for so long as failure to perform such obligations shall be due to and event of Force Majeure."

29.10 Severability

If any provision of this Agreement is or becomes invalid or unenforceable by the courts of any jurisdiction to which it is subject, such invalidity or unenforceability shall not prejudice the remaining provisions of this Agreement, which shall continue in full force and effect.

30.0 Termination for Purchaser Convenience

30.01 The Purchaser may terminate this contract for its convenience at any time upon providing thirty (30) days written notice to the supplier. In such case, the supplier shall be entitled to receive as full compensation for all obligation performed under the Contract prior to the date of termination, together with all retainage withheld in accordance with this Contract.

30.02 Payment of such compensation is the sole and exclusive remedy of the supplier for termination of this Agreement by Purchaser hereunder and the supplier shall not be entitled to, and hereby waives, claims for lost profits and all other damages and expenses.

30.03 Supplier hereby agrees that substantiation for settlement of any claims submitted by supplier shall be complete and in sufficient detail to allow Purchaser's evaluation. Terminate all sub contracts except those have been/ to be assigned to the Purchaser all rights, title and benefits of the Suppliers/Vendor as the case may be".

31.0 Transfer and Sub-Letting

31.01 The Supplier shall not sublet, transfer, assign or otherwise part with the Contract or any part thereof, either directly or indirectly, without prior written permission of the Purchaser.

32.0 Recoveries

32.01 Whenever under this contract any money is recoverable from and payable by the bidder, the purchaser shall be entitled to recover such sum by appropriating in part or in whole by detecting any sum due to which any time thereafter may become due from the supplier in this or any other contract. Should the sum be not sufficient to cover the full amount recoverable the bidder shall pay to the purchaser on demand the remaining balance.

33.0 Waiver

33.01 Failure to enforce any condition herein contained shall not operate as a waiver of the condition itself or any subsequent breach thereof.

34.0 Indemnification

34.01 Notwithstanding contrary to anything contained in this RFQ, Supplier shall at his costs and risks make good any loss or damage to the property of the Purchaser and/or the other Supplier engaged by the Purchaser and/or the employees of the Purchaser and/or employees of the other Supplier engaged by the Purchaser whatsoever arising out of the negligence of the Supplier while performing the obligations under this contract.

35.00 Documentation

35.01 The Bidder shall procure all equipment from BYPL approved sources as per attached specifications. The Bidder's shall submit 5 copies of Material/Type Test Certificates, O&M Manuals, and Approved & As-built drawings, related to various equipment. The Bidder's shall ensure for the strict compliance to the specifications and Field Quality Procedures issued by BYPL Engineer in-charge.

36.0 Transit Insurance

36.01 Transit Insurance shall be arranged by the Bidder.

36.02 DAMAGE / LOSS OF CARGO IN TRANSIT: Vendor shall be solely responsible for coordinating with the concerned insurance company for procuring insurance for material and/or Goods, processing claim lodgment and settlement. Notwithstanding the insurance cover, in case of loss / damage to material and/or Goods, in any manner and for any cause whatsoever, Vendor shall cause the damaged cargo to be replaced and delivered to the Purchaser with new material and/or Goods within 30 days of such loss / damage. The Vendor shall be solely responsible for all expenses in relation to the replacement and delivery in such circumstances.

37.0 Limitation of Liability

37.01 Except as provided otherwise in the Contract and except for willful misconduct or gross negligence, neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or any other indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract. The total liability of the Supplier to the Purchaser under the Contract shall not exceed the Contract Value. Except that this Clause shall not limit the liability of the Supplier:

(a) Under any other provisions of the Contract which expressly impose a greater liability,

(b) In cases of fraud, willful misconduct or illegal or unlawful acts, or

(c) In cases of acts or omissions of the Supplier which are contrary to the most elementary rules of diligence which a conscientious Supplier would have followed in similar circumstances.

38.0 Liability of Suppliers

38.1 Subject to the due discharge of its obligations under the Contract and except in case of gross

negligence or willful misconduct on the part of the Supplier or on the part of any person acting on behalf of the Supplier, with respect to any loss or damage caused by the Supplier to the Purchaser's property or the Site, the Supplier shall not be liable to the Purchaser for the following:

(a) For any indirect or consequential loss or damage; and

(b) For any direct loss or damage that exceeds:

(i) The total payments made and expected to be made to the Supplier under the Contract including reimbursements, if any; or

(ii) The insurance claim proceeds which the Supplier may be entitled to receive from any insurance purchased by the Supplier to cover such a liability, whichever is higher.

38.2 This limitation of liability shall not affect the Supplier's liability, if any, for damage to any third party, caused by the Supplier or any Person or firm acting on behalf of the Supplier in executing the Works.

38.3 Notwithstanding anything contained in the Contract, the Supplier shall not be liable for any gross negligence or willful misconduct on the part of the Purchaser or any of its affiliates, any vendor, or any party, other than Supplier and/or, its directors, officers, agents or representatives or its affiliates, or SubSupplier, or the vendor or any third party engaged by it.

38.4 Notwithstanding anything contained in the Contract, including but not limited to approval by the Purchaser of any drawings, documents, vendor list, supply of information or data or the participation of the Purchaser in any meeting and/or discussion or otherwise, shall not absolve the Supplier from any of its liabilities or responsibilities arising in relation to or under the Contract.

39.0 Intellectual Property Rights and Royalties

39.1 The Supplier shall indemnify the Purchaser and the Purchaser's Representative from and against all claims and proceedings on account of infringement (or alleged infringement) of any patent rights, registered designs, copyright, design, trademark, trade name, know-how or other intellectual property rights (hereinafter collectively referred to as "**Intellectual Property Rights**") in respect of the Works, Supplier's Equipment, machines, Works method, Plant, Materials, or anything whatsoever required for the execution of the Works and from and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto. In the event of infringement of any Intellectual Property Rights of any third party as a result of the execution of the Works (or any part thereof) by the Supplier, the Supplier shall rectify, modify or replace, at its own cost, the Works, Plant or Materials or anything whatsoever required for the Works so that infringement ceases to exist or, in the alternative, the Supplier shall procure necessary rights/ licenses from the affected third party so that there is no infringement of Intellectual Property Rights.

39.2 The Supplier shall be promptly notified of any claim made against the Purchaser. The Supplier shall, at its cost, conduct negotiations for the settlement of such claim, and any litigation or arbitration that may arise from it. The Purchaser or the Purchaser's Representative shall not make any admission which might be prejudicial to the Supplier, unless the Supplier has failed to take over the conduct of the negotiations, litigation or arbitration within a reasonable time after having been so requested. In the event of Supplier failing to act at the Purchaser's Representative's notice, the Purchaser shall be at full liberty to deduct any such amount of pending claim from any amount due to the Supplier under the Contract or any other contract and the balance portion of claim shall be treated as debt due from the Supplier.

39.3 All Intellectual Property Rights in respect of any Plant, Materials, Drawings and Designs, plans, documents, specifications, data, materials, know how, charts, information, etc., provided to the Supplier by the Purchaser pursuant to this Contract for the execution of the Works, belongs to and shall continue to belong to the Purchaser and the Supplier shall not have any rights in the same

other than the limited right for its use for the purpose of execution of the Works.

39.4 Intellectual Property Rights in respect of any Plant, Materials, Drawings and Designs, plans, calculations, drawings, documents, know-how and information relating to the Works which are proprietary to the Supplier and/ or its third party licensors ("**Supplier's IPR**") shall continue to vest with the Supplier and/ or its third party licensors and the Supplier shall grant and/ or procure from its third party licensors, at its own cost, a worldwide, perpetual, royalty free, non-exclusive license (along with the right to sub-license) to use and reproduce such Supplier's IPR for the use, operation, maintenance and repair of the Works.

39.5 If any patent, trademark, trade name, registered design or software is developed by the Supplier or its SubSupplier specifically for the execution of the Works, then all Intellectual Property Rights in respect of such design, trademark, trade name or software shall be the absolute property of the Purchaser and shall not be utilized or retained by the Supplier (or its SubSuppliers) for any purpose other than with the prior written consent of the Purchaser.

39.6 If the Supplier uses proprietary software (whether customized or off the shelf) for the purpose of storing or utilizing records in relation to the Works, the Supplier shall obtain at its own expense, the grant of a worldwide, royalty-free, perpetual licence or sublicence (including the right to sublicense) to use such software, in favour of the Purchaser provided that the use of such software under the licence or the sublicense may be restricted to use any such software only for the design, construction, reconstruction, manufacture, installation, completion, reinstatement, extension, repair and operation of the Works or any part thereof.

39.7 If any software is used by the Supplier for the execution of the Works over which the Supplier or a third party holds pre-existing title or other rights, the Supplier shall obtain for the Purchaser, a worldwide, royalty free, perpetual license for the right to use and apply that software (together with any modifications, improvements and developments thereof).

40.0 Acceptance

40.01 Vendor confirms to have gone through the Policy of BYPL on legal and ethical code required to be followed by vendors encapsulated in the "Vendor Code of Conduct" displayed on the official website of BYPL (www.bsesdelhi.com) also, which shall be treated as a part of the contract/PO/WO.
Vendor undertakes that he shall adhere to the Vendor code of Conduct and also agrees that any violation of the Vendor Code of Conduct shall be treated as breach of the contract/PO/WO.
In event of any such breach, irrespective of whether it causes any loss/damage, Purchaser (BYPL) shall have the right to recover loss/damage from Vendor.
The Contractor/Vendor herby indemnifies and agrees to keep indemnified the Purchaser (BYPL) against any claim/litigation arising out of any violation of Vendor Code of Conduct by the Contractor/Vendor or its officers, agents & representatives etc.

40.02 Acceptance of the CONTRACT implies and includes acceptance of all terms and conditions enumerated in the CONTRACT in the technical specification and drawings made available to Contractor consisting of general conditions, detailed scope of work, detailed technical specification, detailed equipment drawing and complete scope of work.

40.03 Contractor and Company contractual obligation are strictly limited to the terms set out in the CONTRACT. No amendments to the concluded CONTRACT shall be binding unless agreed to in writing for such amendment by both the parties

40.04 We expect your services and supplies are aligned to our Vision, Mission and Values. Please refer to the following link to know about our Vision, Mission and Values; https://www.bsesdelhi.com/web/bypl/about-bses

QUANTITY AND DELIVERY REQUIREMENTS

Sl. No.	BYPL SAP Code	Item Description	Specification	Total Qty. (Nos)	Tentative Delivery Schedule	Destination
1	2100005346	Supply of Three Phase Meter whole current with box, as per enclosed GTP	BSES-TS-033-TPWM-R0	5580	Delivery within 02 Month from the LOI/PO date.	BYPL Stores Delhi
2	2100169051	Supply of LTCT Meter,IS14697,LT W/ CT MODM IN BOX Composite Conventional Type , as per enclosed GTP	BSES-TS-111-LTCTM-R0	450		
3	2100169209	Supply of ENERGY METER 3 PH 4W-/5A STATIC Thread Through (LTCT) /Prodigy meter, as per enclosed GTP	BSES-TS-111-LTCTM-R0	150		
4	2100065861	Supply of M.PWR DIGITAL63.5 VA 3PH.(HT Meter-5A), as per enclosed GTP	BSES-TS-36-HTCTM-R0	122		
5	2100044704	Supply of M,ENERGY, DIGTL, 0.2S,3 (HT Meter Consumer 1 A, 0.2 S) , as per enclosed GTP	BSES-TS-36-HTCTM-R0	15		
6	2100228262	Supply of MTR,PWR, 63.5V, 0.2S,1A, (Net Meters- HT 1A, 0.2S class), as per enclosed GTP	BSES-TS-36-HTCTM-R0	5		
7	2100065905	Supply of Single Phase Prepaid Meter, as per enclosed GTP	SP-EMPP-13-R0	3000		
8	2100239971	Supply of Single Phase Smart Prepaid Meter with box, as per enclosed GTP	BSES-TS-26-SPWSM-R0	1750		
9	2100065914	Supply of Three Phase Prepaid Meter, as per enclosed GTP	SP-EMPP-13-R0	80		

The delivery schedule shown above is tentative. PO(s) will be released as per the actual requirement. However, supplier has to deliver the material within the delivery schedule provided.

Schemes may be executed in the phased manner.

APPENDIX II

FORMAT OF PERFORMANCE BANK GUARANTEE
(To be executed on a Non-Judicial Stamp Paper of appropriate value)

This Guarantee made at _____ this [___] day of [_____] 20XX

1. WHEREAS M/s BSES Yamuna Power Limited, a Company incorporated under the provisions of Companies Act, 1956 having its Registered Office at Shaktikiran Building, Karkardooma, Delhi 110032, India hereinafter referred to as the " Owner ", (which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns).

2. AND WHEREAS the Owner has entered into a contract for _____(Please specify the nature of contract here) vide Contract No. _____dated _____(hereinafter referred to as the "Contract") with M/s._____, (hereinafter referred to as "the Supplier", which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include each of their respective successors and assigns) for providing services on the terms and conditions as more particularly detailed therein.

3. AND WHEREAS as per clause ____of conditions of Contract, the Suppliers are obliged to provide to the Owners an unconditional bank guarantee for an amount equivalent to ten percent (10%) of the total Contract Value for the timely completion and faithful and successful execution of the Contract from **[_____]** pl. specify the name of Bank) having its head/registered office at **[_____]** through its branch in _____(pl. specify the name of Branch through which B.G is issued) hereinafter referred to as "the Bank", (which expression shall unless it be repugnant to the context or meaning thereof be deemed to include its successors and permitted assigns).

4. NOW THEREFORE, in consideration inter alia of the Owner granting the Suppliers the Contract, the Bank hereby unconditionally and irrevocably guarantees and undertakes, on a written demand, to immediately pay to the Owner any amount so demanded (by way of one or more claims) not exceeding in the aggregate [Rs.].....(in words) without any demur, reservation, contest or protest and/or without reference to the Supplier and without the Owner needing to provide or show to the Bank ,grounds or reasons or give any justification for such demand for the sum/s demanded.

5. The decision of the Owner to invoke this Guarantee and as to whether the Supplier has not performed its obligations under the Contract shall be binding on the Bank. The Bank acknowledges that any such demand by the Owner of the amounts payable by the Bank to the Owner shall be final, binding and conclusive evidence in respect of the amounts payable by the Supplier to the Owner. Any such demand made by the Owner on the Bank shall be conclusive and binding, notwithstanding any difference between the Owner and the Supplier or any dispute raised, invoked, threatened or pending before any court, tribunal, arbitrator or any other authority.

6. The Bank also agrees that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor without proceeding against the Suppliers notwithstanding any other security or other guarantee that the Owner may have in relation to the Supplier's liabilities.

7. The Bank hereby waives the necessity for the Owner first demanding the aforesaid amounts or any part thereof from the Suppliers before making payment to the Owner and further also waives any right the Bank may have of first requiring the Owner to use its legal remedies against the Suppliers, before presenting any written demand to the Bank for payment under this Guarantee.

8. The Bank's obligations under this Guarantee shall not be reduced by reason of any partial performance of the Contract. The Bank's obligations shall not be reduced by any failure by the Owner to timely pay or perform any of its obligations under the Contract.

9. The Bank further unconditionally and unequivocally agrees with the Owner that the Owner shall be at liberty, without the Bank's consent and without affecting in any manner its rights and the Bank's obligation under this Guarantee, from time to time, to:

   (i) vary and/or modify any of the terms and conditions of the Contract;

   (ii) Forebear or enforce any of the rights exercisable by the Owner against the Suppliers under the terms and conditions of the Contract; or

   (iii) Extend and/or postpone the time for performance of the obligations of the Suppliers under the Contract;

   and the Bank shall not be relieved from its liability by reason of any such act or omission on the part of the Owner or any indulgence shown by the Owner to the Suppliers or any other reason

whatsoever which under the law relating to sureties would, but for this provision, have the effect of relieving the Bank of its obligations under this Guarantee.

10. This Guarantee shall be a continuing bank guarantee and shall not be discharged by any change in the constitution or composition of the Suppliers, and this Guarantee shall not be affected or discharged by the liquidation, winding-up, bankruptcy, reorganisation, dissolution or insolvency of the Suppliers or any of them or any other circumstances whatsoever.

11. This Guarantee shall be in addition to and not in substitution or in derogation of any other security held by the Owner to secure the performance of the obligations of the Suppliers under the Contract.

12. NOTWITHSTANDING anything herein above contained, the liability of the BANK under this Guarantee shall be restricted to _____(insert an amount equal to ten percent (10%) of the Contract Value) and this Guarantee shall be valid and enforceable and expire on _____(pl. specify date) or unless a suit or action to enforce a claim under this Guarantee is filed against the Bank on or before the date of expiry.

13. On termination of this Guarantee, all rights under the said Guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities hereunder.

14. The Bank undertakes not to revoke this Guarantee during its validity except with the prior written consent of the Owner and agrees that any change in the constitution of the Bank or the Suppliers shall not discharge our liability hereunder.

15. Owner may assign this Guarantee to any Person or body whether natural, incorporated or otherwise under intimation to the Bank. The Bank shall be discharged of its obligations hereunder by performance in accordance with the terms hereof to such assignee without verifying the validity / legality / enforceability of the assignment.

16. This Guarantee shall be governed by the laws of India. Any suit, action, or other proceeding arising out of, connected with, or related to this Guarantee or the subject matter hereof shall be subject to the exclusive jurisdiction of the courts of **Delhi,** India.

Dated this …… day of …….. …20XX at …….

(Signature)

.....

(Name)

.....
(Designation with Bank Stamp)
Attorney as per
Power of Attorney No.....
Date.....

BYPL BANK DETAIL WITH IFSC & SWIFT CODE:

1. Name of the Bank:	Axis Bank Limited
2. Branch Name & Full Address:	Swasthya Vihar, New Delhi 110092
3. Branch Code:	055
4. Bank Account No:	911030003596085
5. IFSC Code:	UTIB0000055
6. Swift Code:	AXISINBB055

FORMAT OF WARRANTY/GUARANTEE CERTIFICATE

BSES YAMUNA POWER LIMITED Shaktikiran Building, Karkardooma, Delhi -110032.

Ref. Purchase Order No. :

Dear Sir,

We hereby confirm that the.....dispatched to BSES YAMUNA POWER LTD vide invoice no..... DT.....is exactly of the same nature and description as per above mentioned Purchase Order.

We further confirm that we will replace/repair our.....free of cost If found any manufacturing defect during.....months from the date of dispatch of material or.....months from the data of commissioning whichever is earlier.

Vendors Name & Signature

UNDERTAKING GST

The Vendor shall give an undertaking in the following words on each invoice in the absence of which tax payment as on the Vendor's invoice may be withheld.

"The tax component as mentioned in the invoice shall be deposited with GST Department as per law by way of actual payment or by way of legal set off as per law. The turnover billed shall be duly declared in my GST returns a copy of which shall be filed with the Purchaser. Should the input tax credit to the Purchaser be denied by way of any lapse on the part of the Vendor, the same shall be paid on demand and in any case the Purchaser is authorized to deduct the tax equivalent amount from the amount payable to the Vendor"

SUMMARY OF COMMERCIAL TERMS AND CONDITIONS

Sl No	Item Description	AS PER BYPL	BIDDER'S CONFIRMATION
1	Validity	120 days from the date of submission of bid.	
2	Price basis	a) **"Firm"**, FOR Delhi store basis. Prices shall be inclusive of all taxes & duties, freight upto Delhi stores. b) Unloading at stores shall be in vendor's scope c) Transit insurance in Bidders scope.	
3	Payment terms	100% payment shall be made within 45 days from the date of receipt & acceptance of material at store/site against submission documents	
4	Delivery schedule	GTP/Drawings/QAP/etc to be submitted within 10 days to the concern official in BYPL for Transmittal approval. BYPL shall approve/ provide comments on the submitted drawings within 7 days of first submission. Delivery shall be within 02 Months from the LOI/PO date.	
5	Defect Liability period	66 months from the date of delivery.	
6	Penalty for delay	1% (One) of the basic value (ex-works value) of undelivered units per week of delay or part thereof, subject to maximum of 10% (Ten) of the total basic value (ex-works value) of undelivered units.	
7	Performance Bank Guarantee	The successful Bidder shall furnish the Performance Bank Guarantee within fifteen(15) days from the issuance of Purchase Order, for an amount of 10% (Ten percent) of the Total Contract value . The Performance Bond shall be valid for a period of Sixty months (60) from the date of the commissioning or Sixty six months (66) from the date of receipt of material (last consignment) at site/stores whichever is earlier plus 3 months towards claim period. Upon submission of the performance security, the EMD shall be released.	

VOLUME – II

PRICE BID FORMAT

ALL PRICES IN INR (Rs)

S. No.	DESCRIPTION OF GOODS	HSN CODE (8 Digit Mandatory)	UoM	QTY **(A)**	UNIT BASIC PRICE INCL FREIGHT (Rs) **(B)**	UNIT GST & CESS AS APPLICABLE (CGST & SGST/UTGST or IGST) (Rs) **(C)**		UNIT LANDED RATE (All Inclusive) (Rs) **(D = B+C)**	TOTAL LANDED VALUE (Rs) **(E = DXA)**
						%	AMT		
1	Supply of Three phase 4 Wire Static LT Whole Current 10-100 Amps, 3x 240 Volts , Accuracy class:1.0 with box		Nos	5580					
2	Supply of LTCT Meter,IS14697,LT W/ CT MODM IN BOX Composite Conventional Type		Nos	450					
3	Supply of ENERGY METER 3 PH 4W-/5A STATIC Thread Through (LTCT) /Prodigy meter		Nos	150					
4	Supply of M.PWR DIGITAL63.5 VA 3PH.(HT Meter-5A)		Nos	122					
5	Supply of M,ENERGY, DIGTL, 0.2S,3 (HT Meter Consumer 1 A, 0.2 S)		Nos	15					
6	Supply of MTR,PWR, 63.5V, 0.2S,1A, (Net Meters- HT 1A, 0.2S class)		Nos	5					
7	Supply of Single Phase Prepaid Meter		Nos	3000					
8	Supply of Single Phase Smart Prepaid Meter with box		Nos	1750					
9	Supply of Three Phase Prepaid Meter		Nos	80					
GRAND TOTAL LANDED VALUE (Rs)									
In words ……..									

NOTE: Cost of all tests as per technical specification is to be included. No separate charges will be paid.

The Un-priced bid should be marked as **"Quoted"** and to be submitted with Part – A

We declare that the following are our quoted prices in INR for the entire packages.

Date: Bidders Name:

Place: Bidders Address:

Signature: …… Designation: ……..

Printed Name: …… Common Seal: …….

VOLUME – III

TECHNICAL SPECIFICATIONS

BSES

Technical Specification for

Three Phase Whole Current meter

Specification no – BSES-TS-033-TPWM-R0

Rev		0
Date		20 May 2022
Prepared BY	Ashish Joshi	
Reviewed BY	Puneet Duggal	
	Vikas Srivastava	
	Lalit Mukhriya	
Approved BY	Gaurav Sharma	
	Manish Jain	

INDEX

RECORD OF REVISION

Revision No	Item / clause no.	Nature of Change	Approved By

1.0 SCOPE OF SUPPLY

This specification cover the following for Three Phase 4 wire 20-100 Amps Static Watt hour meters of accuracy class 1.0 with and without enclosure.

a. Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.
b. Any accessories / hardware required for installation and operation for the meter.
c. Software (BCS and CMRI).

2.0 CODES & STANDARDS

Following codes and standards (with latest amendments) are applicable-

S No.	Code/Standard	Title
2.1	Indian Electricity Act	IE Act 2003
2.2	CEA Metering Regulations	With latest amendments
2.3	CBIP Manual (Pub no.-325)	Standardization of AC Static Electrical Energy Meters
2.4	IS- 11448	Application guide for AC Electricity meters
2.5	IS- 13779: 1999	AC Static Watt-hour Meters, Class 1 and 2 – Specification
2.6	IS- 15707	Testing, evaluation, installation and maintenance of ac electricity meters - Code of practice.
2.7	IEC 62056-21	Electricity metering - Data exchange for meter reading, tariff and load control - Part 21: Direct local data exchange
2.8	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods
2.9	IEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)
2.10	IEC 60736	Testing Equipment for electrical Energy meter
2.11	IS 15959 (Part 1): 2011	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification
2.12	IS 14772	General requirement for Enclosure for Electrical Requirement.

In the event of direct conflict between various order documents, the precedence of authority of documents shall be as follows -

i. Guaranteed Technical Particulars (GTP)
ii. Specification including applicable codes & standards
iii. Approved Vendor Drawings
iv. Other documents

3.0 SERVICE CONDITIONS

3.1	Temperature Range	Operation range: -10 Deg C to 55 Deg C Limit range of operation: -25 to 60 Deg C Limit range of storage / transport : -25 to 70 Deg C

3.2	Relative Humidity	0 to 96 %

4.0 DISTRIBUTION SYSTEM DATA

4.1	Supply	3 phase 4 wire system
4.2	Voltage	11KV
4.3	Frequency	50 Hz ± 5%
4.4	System neutral	Solidly Earthed

5.0 ELECTRICAL AND ACCURACY REQUIREMENTS

5.1	Meter Type	Type 1. 3 phase 4 wire static energy meter with 50 mm extended type terminal cover. Type 2: 3 phase 4 Wire static energy meter along with short type terminal cover fitted in polycarbonate enclosure as per annexure 'E'.
5.2	Accuracy Class	1.0 as per IS13779 (accuracy class for reactive energy should be same as that for active energy)
5.3	Connection	Direct / whole current
5.4	Rated Voltage	240V (P-N), 415V (P-P) with variation of +30% & -40%. However meter should withstand the maximum system voltage across terminals.
5.5	Rated basic current	20A
5.6	Rated maximum Current	100A
5.7	Rated Frequency	50Hz +/- 5%
5.8	Power factor range	Zero Lag – unity – Zero lead
5.9	Power Consumption in Voltage circuit	Less than 1 Watt & 4 VA per phase
5.10	Power consumption in Current circuit	1 VA per phase
5.11	Starting current	0.2% of Ib
5.12	Meter constant	To be specified by bidder
5.13	Process Technology	Surface Mounting Technology or better
5.14	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.15	Accuracy	Meter shall comply as per IS 13779.
5.16	Repeatability of error test	As per IS 13779
5.17	Starting and Running with No-Load	Meter shall be fully functional within 5 seconds of applying rated voltage to meter terminals. Meter shall not produce more than one output pulse count when voltage is applied with no current flowing in the current circuit. Meter shall pass test for No-load condition.
5.18	Voltage dips and interruptions	Voltage dips and interruptions shall not produce a change in the register of more than 0.001KWH and test output shall not produce a signal more than 0.001KWH as per IS 13779.
5.19	Short time over current	Meter shall not get damaged due to short time over currents. Meter shall perform correctly when back to its initial working conditions and the variation in error shall not exceed 0.1% @ I_b and unity power factor. Meter shall be able to carry a short time over current of 20 times the maximum current for a period of 0.5 second as per IS 13779.

5.20	Influence of heating and self-heating	As per IS 13779
5.21	Immunity to earth/phase fault	As per IS 13779
5.22	Limits of error due to Current variation	As per IS 13779
5.23	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 13779/ CBIP325 (most stringent standard to be followed) under and after influence of following :- a. Voltage variation b. Frequency variation c. 10% third harmonic in current d. Reversed phase sequence e. Voltage unbalance f. Harmonic components in current and voltage circuit g. DC and even harmonics in AC current circuit h. Odd harmonics in AC current circuit i. Sub harmonics in AC current circuit j. Continuous (DC) “stray” magnetic induction of 67mT+/-5%. k. Continuous (DC) “abnormal” magnetic induction of 0.27T+/-5%. l. Alternating (AC) “stray’ magnetic induction of 0.5mT+/-5% m. Alternating (AC) “abnormal’ magnetic induction of 10mT. n. Alternating (AC) “abnormal’ magnetic induction of 0.2T+/-5%. o. External magnetic field 0.5 T p. Electromagnetic HF fields q. Radio frequency interference r. DC immunity test
5.24	Limits of error due to ambient temperature variation	As per IS 13779
5.25	Electromagnetic compatibility	Meter shall remain immune to electrostatic discharge, electromagnetic HF field and fast transient burst as per IS 137 79
5.26	Radio Interference	Meter shall not generate conducted or radiated noise which interferes with other equipment

6.0 CONSTRUCTION REQUIREMENTS

6.1	General	Construction should be in accordance with IS13779.
6.2	Base Body	Opaque, UV stabilized polycarbonate of grade LEXAN 142A/ 943AA or Equivalent with V0 inflammability level
6.3	Top Cover	Transparent, UV stabilized polycarbonate of grade LEXAN 142A/ 943AA or Equivalent with V0 inflammability level It should so be designed so as the internal components should not be visible.

6.4	Assembly of base body and top cover	By ultrasonic welding
6.5	Terminal block	a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall form Integral part of the meter base c. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.6	Terminal Cover	a. Type 1: 50 mm extended type terminal cover with U cut suitable for 50 mm^2 Cable. b. Type 2: Short type terminal cover suitable for 50 mm^2 Cable. c. Material - UV stabilized transparent polycarbonate cover. LEXAN 143A/943AA or equivalent grade d. Provision of sealing at two points through sealing screw. e. The terminal cover shall be extended type with baffle wall above the cable entry base wall so that access to the terminals is not possible (even with thin metallic wire) without breaking the seal. Terminal cover should have provision for cable entry from bottom. f. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable.
6.7	Terminals	a. Suitable for 50mm^2 aluminium cable. b. Material of terminals, screws and washers should be brass or tinned copper. Two flat head screws of appropriate size should be provided per terminal. c. Terminals shall be tested for continuous current of 150 % Imax. d. Terminals shall be clearly marked for phase/neutral/incoming/outgoing etc.
6.8	Ingress Protection	IP 51 or better, but without suction in the meter.
6.9	Meter Enclosure	Meter shall be factory fitted using unidirectional screw in a polycarbonate enclosure confirming specifications provided in annexure 'E' for Meter 'Type 1' only.
6.10	Output device	Meter should have flashing LED visible from the front as output device to represent energy recording. LED shall be configurable for KWH, KVAh and KVArh. The resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.11	RTC	Meter shall have internal real time clock to set date and time. Time accuracy should be as per relevant IS/IEC. Meter should have facility for time synchronization locally through CMRI. It is preferable to have facility for remote synchronization through AMR. Clock correction events shall be registered in meter's memory.

6.12	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Battery removal or total discharge should not affect the working of the meter.
6.13	Memory	a. Non volatile memory independent of battery backup to store complete meter data. Data should be retained in the memory up to 10 year without any auxiliary power. b. Memory chip of a meter shall not work in circuit of another meter. Hardware/ firmware level security in microcontroller of meter shall be provided in this regard.
6.14	Self Diagnostic feature	Meter shall have self diagnostic for the following a. Date and RTC b. Battery c. Non volatile memory d. Display
6.15	Clearance and Creepage distance	As per IS 13779
6.16	Mounting	Surface / Flush mounted
6.17	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 13779.
6.18	Electronic components	All active & passive components should be surface mounting type and shall be assembled by state of the art assembly processes.
6.19	Power Supply	The power supply should comply with the relevant standards. Power supply unit of the meter should not be affected in case maximum voltage of the system appears across the terminals due to faults or due to wrong connections.
6.20	Measurement/ computing chips	Measurement/computing ASICs should be surface mounting type.
6.21	Protection against Corrosion	a. Internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b. Mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.
6.22	Meter Sealing Arrangement	Sealing should be in accordance with IS and CEA metering regulations with latest amendments. Approval shall be taken from purchaser for location of seals.
6.22.1	Manufacturer's Seals	One Polycarbonate seal to be provided on meter cover.
6.22.2	BSES Seals	a. One Hologram seal should be provided on each side of meter i.e two hologram seals should be provided. Meter sides should not have sharp edges to avoid damage to hologram seals. b. Polycarbonate seal should be provided on top cover. c. Seals will be issued to manufacturer free of cost.
6.22.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.23	Guarantee/ Warranty	66 months from the date of dispatch or 60 months from date of commissioning, whichever is earlier

7.0 FUNCTIONAL REQUIREMENTS

7.1	Meter category	Meter shall comply C2 category as per IS 15959 part 1 with additional parameters specified in this specification.
7.2	Tariff Basis	Lag only: KVAh is computed based on KVArh and KWH value. If PF=1, or leading, then KVAh = KWH. At no instance KVAh < KWh.
7.3	MD Registration	Meter shall store and display MD upto two decimal in every 30 min. period along with date & time. At the end of every 30 min, new MD shall be computed & compared with previous MD and store whichever is higher and the same shall be displayed. It is preferred that MD is computed using separate counter rather than by difference of initial and final energy counter.
7.4	Auto Reset of MD	Auto resetting shall be 1st of every month at 00:00hrs.
7.5	TOD Metering	a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. Meter shall be capable of doing TOD metering for kWh, kVARh, kVAh and MD in kW, kVAR and kVA . Reactive parameter should be recorded separately for Lag and Lead. c. TOD programmable on site through CMRI or AMR remotely. d. At Display as well as BCS end meter TOD values shall be shown as per cumulative values of TOD Zones of respective registers. e. TOD metering shall be implemented by the activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 f. Special Day table shall be defined as per IEC/ DLMS UA-1000-1 g. Default TOD programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BSES for the same. h. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal R3: Rate Register for Off Peak

7.6	Security	a. Reading and writing data into meter memory via optical and remote communication port shall be through DLMS security keys only. b. Bidder shall ensure to safeguard high security keys used for configuring parameters into meter. c. Once the meter memory is locked during manufacturing process, only parameters mentioned in IS 15959 shall be configurable even in factory. It should not be possible to configure any other parameters. d. Please note that there shall be no other mechanism/ method to interface with meter through optical and remote communication port except mentioned in IS 15959, even for manufacturer. e. It should not be possible to change data stored in meter memory even after accessing meter memory physically. In case of any change in memory data, a flag/alert shall be generated. Flag/Alert shall be indicated over display and in remote communication also.
7.7	Parameters profiles	Meter shall support all the parameters profile as per IS 15959 part 1 with additional parameters specified in this specification:
7.7.1	Instantaneous parameters	All the parameters as per table 27 of IS 15959 Part 1 shall be continuously updated by the meter hardware/software as per internal sampling and computation time and last updated value shall be available for downloading as and when required along with following additional parameters: i. Neutral Current ii. % THD in R Phase Voltage iii. % THD in Y Phase Voltage iv. % THD in B Phase Voltage v. % THD in R Phase Current vi. % THD in Y Phase Current vii. % THD in B Phase Current viii. Displacement PF ix. Maximum Demand in kVAR x. Voltage angles all phases xi. High resolution kWh xii. High resolution kVArh xiii. High resolution kVAh All the energies shall be measured and recorded with and without harmonics.
7.7.2	Billing Parameters	All the parameters mentioned in Table 29 of IS 15959 part along-with following additional parameters: i. Cumulative Energy, kVArh (lag) for R1 to r8 ii. Cumulative Energy, kVArh (lead) for R1 to r8 iii. MD in kVAr (lag) iv. MD, kVAr (lag) for R1 to R8 v. MD in kVAr (lead) vi. MD, kVAr (lead) for R1 to R8 vii. Cumulative Power interruption counts in all billing history data viii. Monthly power on/off duration

		All the energies shall be measured and recorded with and without harmonics. 12 no's billing cycle parameters shall be remain in meter memory along with current cycle parameters and shall be available for reading as well as profile
7.7.3	Block load survey parameters	a. All the parameters as per Table 28 of IS 15959 part 1 for 60 power ON days. b. Default profile capture period shall be 1800 sec. c. Following additional parameters shall be provided: i. Current- Neutral I_N ii. Activbe Current- R phase iii. Active Current -Y Phase iv. Active Current -B Phase v. Reactive Current- R Phase vi. Reactive Current- Y Phase vii. Reactive Current- B Phase viii. Three Phase Power Factor ix. R phase Active Power x. Y phase Active Power xi. B phase Active Power xii. R Phase Apparent Power xiii. Y Phase Apparent Power xiv. B Phase Apparent Power xv. Power Off time in integration period All the energies shall be measured and recorded with and without harmonics.
7.7.4	Daily Load Profile	a. All the parameters as per table 57 of IS 15959 Part 1 shall be measured and recorded at each midnight i.e. 00:00 hrs for last 60 power ON days. b. All the energies shall be measured and recorded with and without harmonics.
7.7.5	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter.
7.7.5.1	Name plate details	Provided As per table 30 of IS 15959 Part 1.
7.7.5.2	Programmable parameters	a. Parameters mentioned in table 31 of IS 15959 part 1 shall be provided. b. These parameters can be programmed by BCS or CMRI via proper security. Every transaction shall be logged in non volatile memory of the meter with date and time stamp.
7.7.6	Transaction events	All transaction shall be logged in memory of meter as per table 35 of IS 15959 part 1.

8.0 EVENT AND TAMPER MONITORING

8.1	Top Cover Open	Meter shall have top cover open detection and same shall be logged. Detection and logging mechanism shall work even when the meter is de-energized. Top cover open event should not get reset.
8.2	External Magnetic tamper	1. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS13779/ CBIP 325 with latest amendments. 2. If the working of the meter gets affected under the influence of external magnetic field, meter should record

		energy at Imax and UPF. Meter should not compute MD during this period. Counter for reactive energy should not increase in this case. The meter shall record energy as per actual load once the magnetic field is removed.
8.3	Protection against HV spark/ESD	If the meter is subjected to HV spark/ ESD, meter shall continue to record energy or log the event. Upto 35 KV meter should remain immune. Communication port shall also be immune upto 35KV. Bidder should have valid test report from Sameer/ UL lab or any other NABL accredited Lab for the same.
8.4	Neutral disturbance	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.
8.5	Phase sequence reversal	Meter should work accurately irrespective of the phase sequence of the supply. Meter should log the event.
8.6	Detection of missing potential	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end.
8.7	Low Voltage	Meter should log low voltage event if average voltage is below 75% of Vref.
8.8	High Voltage	Meter should log high voltage event if average voltage is above 115% of Vref.
8.9	Voltage Imbalance	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than 10% of Vref.
8.10	Abnormal/Invalid Voltage	Meter should log invalid voltage if phase angle between voltages deviates from the standard values by more than +/-10 degrees i.e. 120 +/- 10 degrees.
8.11	Reversal of Current Coil Polarity	Meter should log the event of reversal of C.C polarity. Meter should register energy consumed correctly with any one, two or all three current coils reversed.
8.12	Current Circuit Shorting / Bypass	Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at factory end.
8.13	Current Circuit Open	Meter should log the event of current coil open. Threshold value of current should be programmable at factory end.
8.14	Over current	If the current in any phase exceeds the rated current, meter should log overcurrent event.
8.15	Current Imbalance	Meter should log current imbalance event when the difference between minimum and maximum phase current is more than 30% of I average.
8.16	Invalid Phase Association	Meter should log invalid phase association event if the voltage sequence does not match with the current sequence.
8.17	High neutral Current	Meter should log high neutral current when neutral current is greater than 50% of I basic.
8.18	Power On/Off	Meter shall detect power OFF (minimum power off period 5 mins) if all phase voltages are absent. This event shall be

		recorded at the time of each power OFF. At the same time power ON event shall be recorded.
8.19	Harmonic events	Meter shall log high harmonic events if meter detect %THD in phase voltage or current more than 5%. Threshold value and occurrence/ restoration time should be factory programmable. Meter shall capture detailed harmonic profile while logging of this event.
8.20	Tamper Logging	Last 200 nos. tamper events shall be recorded in meter memory on FIFO basis excluding top cover open. Last 20 events of top cover open tamper should be recorded in the memory including the first occurrence.
8.20.1	Parameter Snapshot	a. Snapshot of Date, time, voltages, Phase currents, neutral current, power factor, active power, apparent power, signed reactive power, cumulative kWh, cumulative kVAh, cumulative kVArh (lag and lead) etc should be recorded for each tamper event b. Detailed harmonic profile shall be captured at occurrence of High harmonic events.
8.20.2	Tamper Indication	For each tamper event, appropriate Indication/Icon should appear on the meter display either continuously or in auto display mode. Icons appearing continuously are preferable.
8.21	Tamper Logics	Logic sheet for tamper/ event detection and logging should be submitted for purchaser's approval. Following details should be provided for each tamper in tabular form a. Detailed Tamper logic b. Threshold values c. Persistence time d. Restoration time e. Snapshot details

9.0 DISPLAY

9.1	Type	STN Liquid crystal, Pin type with backlight
9.2	Viewing angle	Minimum 160 degrees
9.3	UV Protection	The display modules should be well protected from the external UV radiations
9.4	Size	Minimum 10X5mm
9.5	Digits	Minimum 8 digits
9.6	Language	English
9.7	Display Parameters	Parameters to be displayed are given below
9.7.1	Auto scroll mode	• Display test • Meter SL No. • Real Date • Real Time • Cumulative active energy (Forwarded) • Cumulative Apparent Energy (Forwarded) • Cumulative reactive energy Lag & Lead • Instantaneous load in kW, kVAr & kVA • Active maximum demand with date and time • Apparent maximum demand with date and time • Instantaneous average power factor with sign for lag/

		lead • R phase voltage (P-N) • Y phase Voltage (P-N) • B phase Voltage (P-N) • R Phase Current • Y Phase Current • B Phase Current • Neutral Current • R Phase power Factor • Y Phase power Factor • B Phase power Factor • TOD Total Active Forward Energy Register(Reg 1) • TOD Total Active Forward Energy Register(Reg 2) • TOD Total Active Forward Energy Register(Reg 3) • TOD Total Active Forward Energy Register(Reg 4) • TOD Total Active Forward Energy Register(Reg 5) • TOD Total Active Forward Energy Register(Reg 6) • TOD Total Active Forward Energy Register(Reg 7) • TOD Total Active Forward Energy Register(Reg 8) • TOD Apparent Forward Energy Register(Reg 1) • TOD Apparent Forward Energy Register(Reg 2) • TOD Apparent Forward Energy Register(Reg 3) • TOD Apparent Forward Energy Register(Reg 4) • TOD Apparent Forward Energy Register(Reg 5) • TOD Apparent Forward Energy Register(Reg 6) • TOD Apparent Forward Energy Register(Reg 7) • TOD Apparent Forward Energy Register(Reg 8) • Frequency (Hz) • Cumulative tamper count. • Tamper Status Scroll time should be 6 Sec.
9.7.2	Manual Display mode (push button mode)	Following parameters should be displayed in addition to parameters displayed in Auto display mode – • Signed Active Power – kW • Signed Reactive Power – kVAr (Lag/Lead) • Apparent Power – kVA • Cumulative billing count • Cumulative programming count • Billing date • Last month billing Active energy reading • Last month billing reactive energy reading • % THD in Voltage • % THD in Current Bidder to submit details of display with technical bid. The meter display should return to Default Display mode (mentioned above) if the 'push button' is not operated for more than 10 seconds. Scroll lock facility should be provided by pressing scroll push button for long duration (10-15 sec). Lock should be released by repeat action.
9.7.3	Tamper indications	As per clause 8.20.2.

9.7.4	Self Diagnostic Indications	Appropriate indication for each self diagnostic feature should be displayed continuously irrespective of display mode (auto/manual).
9.7.5	Connection check	Appropriate indication to be displayed continuously in case of current/voltage connection error

10.0 SOFTWARE AND COMMUNICATION

10.1	Base computer software	The BCS shall ensure that data downloaded / displayed cannot be tampered. BCS shall be able to display data in tabular (text) as well as graphical format. Software shall have polling feature with optional selection of parameters to be downloaded through AMR in daily / weekly / monthly / annual format. Any software upgrade shall also be provided free in future by the bidder. Licensed Software with the following features should be supplied for free
10.1.1	Operating System	BCS should be compatible for latest Windows OS with backward compatibility.
10.1.2	Security	System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security.
10.1.3	Data access	BCS shall be capable of accessing complete data stored in meter memory locally through PC and remotely through modem (RF/GPRS/NBIoT/4G etc.) for connectivity to AMR.
10.1.4	Database	BCS shall maintain master database according to desired area, location, and region etc.
10.1.5	Reporting	a. BCS shall have option of user defined report generation in format of Excel, Word and CSV , XML, PDF etc. b. BCS shall have capability to export data in ASCII, CSV and XML format at desired location so that the same could be integrated with our billing data for processing. c. All the data available in the meter shall be convertible to user defined ASCII, CSV and XML file format.
10.2	CMRI Software	Manufacturer has to provide software capable of downloading data through CMRI. . Software required for CMRI shall be supplied by the supplier for free of cost. Training in the use of software shall be provided by the manufacturer. The software shall be compatible to latest windows systems.
10.2.1	Integration	In the event of order, bidder shall work with BSES IT team to integrate CMRI software with BSES AMR and billing system i.e meter downloading, uploading data on computer etc. Meter reading protocols shall be shared with BSES.
10.2.2	Data access	CMRI software should be capable of downloading complete data stored in the meter memory. Software should have option for selection of parameters to be downloaded from meter i.e billing data, event/tamper logging data etc. Billing data should be downloadable using CMRI within 1 minute.
10.2.3	Suitability	CMRI software shall work both on SANDS & Analogic make CMRI.
10.3	Training	Manufacturer shall impart training to BSES personnel for usage of software

10.4	Communication Ports	Communication ports required in meter are as follows
10.4.1	RJ11 Port	RS232 compatible RJ11 6P4C shall be provided. PIN configuration shall be as per annexure 'A'
10.4.1	Optical Port	Meter shall have optical port in the front for data download. Portable hand held device shall also be provided along with meter for meter reading.
10.4.2	Port protection	All ports shall be galvanically isolated from the power circuit.
10.4.3	Operation	Both ports should work independently. Failure of one port (including display) should not affect the working of other port.
10.5	Communication protocol	a. IS 15959 part 1. b. Integration of meters with BSES system will be supplier's responsibility.
10.6	Data transfer rate	BCS and communication ports should support data transfer rate of 9600 bps (minimum).

11.0 NAME PLATE

11.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour. Embossing is not acceptable. (Should also be stored in meter memory and should be downloadable). Name plate shall be printed preferably by laser.
11.2	Size of the digit shall be minimum 5X3mm
11.3	Bar code shall be printed below serial number
11.4	BIS registration mark (ISI mark)
11.5	'BSES' logo should be printed above LCD display. With property of BSES
11.6	BSES PO No. & date
11.7	Manufacturers name and country of origin
11.8	Model type / number of meter
11.9	Month and Year of manufacturing (Should also be stored in meter memory and should be downloadable)
11.10	Reference voltage and current rating
11.11	The number of phases and the number of wires for which the meter is suitable. Graphical symbol as per IS 12032 can be used.
11.12	Principal units in which meter reads
11.13	Meter constant Impulse/kWh, Impulse/kVAh
11.14	Class index of meter
11.15	Reference frequency
11.16	Warranty period
11.17	Reference temperature if different from 27 Deg C
11.18	Connections, diagrams and terminals shall be marked / provided in accordance with Indian Standard.

12.0 APPROVED MAKES OF COMPONENTS

12.1	Measurement or 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, Atmel, Phillips, Texas Instruments, SAMES, NEC
12.2	Memory chips	The memory chips should not be affected by the external	USA: Atmel, National Semiconductors, Texas

		parameters like sparking, high voltage spikes or electrostatic discharges.	Instruments, Phillips, ST,Microchip Japan: Hitachi or Oki
12.3	Display modules	a) The display modules should be well protected from the external UV radiations. b) The display visibility should be sufficient to read the Meter mounted at height of 0.5 meter as well as at the height of 2 meters (refer 3.2.d for Viewing angle). c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). d) It should be trans-reflective HTN or STN type industrial grade with extended temperature range minimum 70	Japan: Hitachi, Sony Holland / Korea: Phillips Truly Semiconductor Tianma/Hijing Electronics
12.4	Communication modules		USA: National Semiconductors, HP, Optonica,ST, Holland / Korea: Phillips Japan: Hitachi Germany: Siemens
12.5	Optical port	a) Optical port should be used to transfer the meter data to meter reading instrument. b) The mechanical construction of the port should be such to facilitate the data transfer easily. 9 pin connector of optical port shall be FCI copper type.	USA: National Semiconductors ,HP Holland / Korea: Phillips Japan: Hitachi, Truly Semiconductor, Agillent, OSRAM, Everlight
12.6	Power supply unit	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	SMPS Type, reputed make
12.7	Active & passive components	The active & passive components should be of the	USA: National Semiconductors, Atmel, Phillips, Texas Instruments, ST, Onsemi,

		surface mount type & are to be handled & soldered by the state of art assembly processes. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal wires. LED	Japan: Hitachi, Oki, AVX or Ricoh, Samsung, Everlight, Agillent
12.8	Battery	Lithium with guaranteed life of 15 years.	Varta, Texcell, SAFT
12.9	RTC	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Philips, Dallas Atmel, Motorola, Microchip , NEC or Oki
12.10	Note		a. Manufacturer shall intimate deviation if any from make of components. Any deviation is subject to approval of BSES based on supporting documents and performance feedback of the components. b. Manufacturer should have complete tracking of material used in meter. BSES reserve the right to carry out audit of inventory/ manufacturing process at manufacturer's works and sub vendor's work. c. The components used by manufacturer shall have "Minimum Life" more than the 10 years. d. Even for existing/ par suppliers – fresh approval is needed for all deviations

13.0 QUALITY ASSURANCE, INSPECTION AND TESTING

13.1	Quality Assurance Plan (QAP)	To be submitted for Purchaser's approval.
13.1.1	Inspection Hold-Points	To be mutually identified, agreed and approved in QAP.
13.1.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.
13.2	Type Tests	a. The meter shall be of type tested quality as per relevant IS/IEC/CBIP. Type test conducted at CPRI/

		ERDA labs will be treated as valid. b. The test report should not be more than 5 years old. In case any modification affecting only part of meter is made after type test, only specific type tests on the affected parts shall be repeated. c. Type test certificate should be submitted along with offer for scrutiny. d. For a manufacturer supplying meter for the first time, complete type tests will have to be carried out on sample randomly selected from the lot offered for inspection in event of order. 35kV ESD test will also be carried out on the sample at Sameer/UL lab. e. For regular suppliers, revalidation of meter design should be carried out by repeating the type tests on sample randomly selected from BSES lot at CPRI/ERDA every three years f. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. g. Conformance test report of IS15959 part 1 shall be submitted.
13.3	Routine tests	All test marked “R” as per IS13779
13.4	Acceptance Tests	a. All tests marked “A” as per IS13779. b. Dimensional and drawing verification. c. Display parameters/ sequence. d. Data Downloading from CMRI and PC. e. Tamper detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. f. Burn in chamber test. g. Component verification. h. Testing of Profile parameters and communication protocol. i. Purchaser reserves the right to formulate any other test method to verify guaranteed parameters of Meter.
13.5	Inspection	a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller’s works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests as per IS during inspection. All the testing equipment should be calibrated. c. In-process and / or final inspection call intimation shall be given at least 15 days in advance to the purchaser.
13.6	General Requirements	a. The internal potential links should be in closed position or link less meters will be preferred and there shall not be any external link. b. Terminal cover should be fixed on the meter before dispatch. c. The bidder shall maintain a web site where routine test

		results of all meter supplied against these tender will be maintained and will be accessible to buyer/ buyer representative. d. For any false events recorded in meter, vendor shall depute their representative for field visit within one week and provide the root cause analysis in 4 weeks time.

14.0 SHIPPING, HANDLING AND SITE SUPPORT

14.1	Packing	Every meter shall be properly sealed / packed in environmental friendly boxes/ cartons for protection against damage, vibration and ingress of dust and moisture.
14.2	Packing for accessories and spares	Robust non returnable packing case with all the above protection & identification Label.
14.3	Marking	Following details are required on each packing case: a. Individual serial number b. Purchaser's name c. PO number (along with SAP item code, if any) & date d. Equipment Tag no. (if any) e. Destination f. Manufacturer / Supplier's name g. Address of Manufacturer / Supplier / it's agent h. Type , rating and other description of equipment i. Country of origin j. Month & year of Manufacturing k. Case measurements l. Gross and net weights in kilograms m. All necessary slinging and stacking instructions
14.4	Test reports	Routine test report to be provided with each meter
14.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.
14.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.

15.0 DEVIATIONS

15.1	Deviation	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.

16.0 DOCUMENT AND DRAWING SUBMISSION

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in soft copy with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre Dispatch
1	Guaranteed Technical particulars (GTP)	Required	Required	

2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections (eg: Terminal Block dimensional drawing, Mounting arrangement drawings, Meter box drawing and dimensions)	Required	Required	
6	Samples of each type and rating offered.	2 no's	4 no's	
8	Any software and accessories required for installation/ operation of meter	Required	Required	
9	Manufacturer's quality assurance plan and certification for quality standards	Required	Required	
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		
13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
15	Specification documents containing all parameters, Services, Methods in addition to companion specification of IS 15959 (part 1).		Required	
16	Program for production and testing (A)		Required	Required
18	Detailed installation and commissioning instructions		Required	Required
19	As Built Drawing		Required	Required
20	Operation and maintenance Instruction as well as trouble shooting charts/ manuals		Required	Required
21	Inspection and test reports, carried out in manufacturer's works			Required
22	Routine Test certificates			Required
23	Test certificates of all bought out items			Required
24	Meter Seal data			Required

ANNEXURE – A GUARANTEED TECHNICAL PARTICULARS (DATA BY SUPPLIER)

Bidder shall furnish the GTP as per format provided below. All the clauses of the specification shall be covered in GTP. Any deviation or comments shall be specifically mentioned against each clause. No comments or deviation will be treated as acceptance.

Complete GA drawing, technical literature, operation and maintenance manual of hardware/ software shall be provided with technical bid.

Incomplete technical bids are liable to be rejected without any intimation.

Clause no	Description	Compliance of the clause YES / NO	Deviation / Remarks
1			
2			

3			
4			
5			
6			

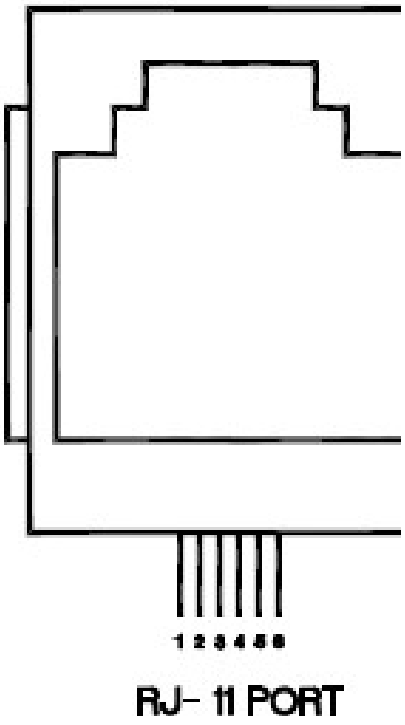
Bidder / Vendor seal / signature ----------

Name of the bidder	
Address of bidder	
Name of contact person	
Telephone no & email id	

ANNEXURE – B RECOMMENDED ACCESSORIES / SPARES (DATA BY SUPPLIER)

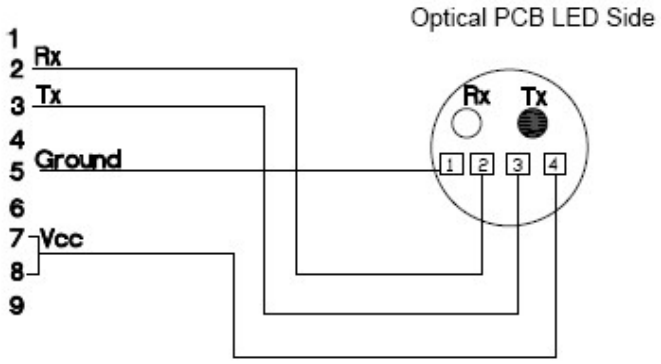
S No	Description of spare part	Unit	Quantity
1			
2			
3			
4			
5			
6			

ANNEXURE – C – RJ11 PORT DETAILS



ANNEXURE- D- CONFIGURATION OF OPTICAL CABLE

9 PIN D Type male Connector



ANNEXURE – E- SPECIFICATION OF METER ENCLOSURE:

Sl	Clause	Clause Description
1	Meter Box Type	Flush type with Completely transparent top cover and base with Incoming and Outgoing cable entry and data downloading arrangement.
2	Codes and Standards	
2.1	IS 14772	General Requirements For Enclosures For Accessories For Household And Similar
2.2	IS 4249	Classification And Methods Of Tests For Non-Ignitable And Self-Extinguishing Properties Of Solid Electrical Insulating Materials
2.3	IS 8623	Specification For Low Voltage Switchgear And Control gear Assemblies
3	Design	Meter box shall comply following requirement.
3.1	General Requirement	The meter box shall be designed in such a way that no access to the meter body, terminals and hardwired port of the meter shall be possible after installation and sealing of the box without breaking the box itself.
3.2	Theft Protection	a. Meter box shall be theft proof i.e. meter box cannot be opened without breaking the seals or meter itself. b. On breaking of the box, clear evident of the physical tempering shall be visual.
3.3	Parts of the box	a. The meter box shall be designed in 02 parts i.e. base and top cover. b. Meter shall be mounted inside the base on fixed moulded pillars by unidirectional screw. c. Meter top cover should be hinge type. d. Cable glands and earthing bolt shall be provided at the base as per construction requirement. e. Proper stiffeners shall be provided in the body of the base and top cover to provide mechanical strength against transportation and installation vibrations.
3.4	Ingress protection	The meter box shall be completely dust and vermin proof.. The meter box shall comply with the requirement of IP-55 & IS: 14772 & its latest version.
3.5	Collar of base and cover	a. 'U' shaped groove shall be provided in the collar of the base body, in which UV stabilized rubber 'O' shall be installed. The design of lining shall be such that it provides proper sealing between the cover & base of box to avoid penetration of dust and ingress of water. b. All around projection provided inside the cover periphery which keeps the ‘O’ ring pressed. c. The outside collar shall also be provide which cover outer surface of the collar.
3.6	Fixing of 'O' ring	a. Rubber ‘O’ Ring should be fixed with suitable adhesive so that the same does not get removed. b. Rubber 'O' ring shall be fixed in a single piece with out any gap between open ends. Open end of the 'O' ring shall be provided at the bottom side only.
4	Material	The material shall be as follow:

4.1	Box material	The material of meter box shall be flame retardant with inflammability level V0 having good dielectric and mechanical strength. The top Cover and Base of the box shall be made out of transparent polycarbonate with minimum 90% visibility so as to ease installation and monitoring of box against any tampering. The plastic shall be 'UV' stabilized to ensure that the moulded meter box should not change in colour, shape, size or should not get brittle after exposure to UV rays.
4.2	Hardware	All the metal hardware including hinges, U latches, mounting screws, downloading port ring etc shall be of rust proof stainless steel.
4.3	Cable glands	Polyamide Nylon-66 with flammability level V0.
5	Construction	Meter box shall be constructed by moulding of polycarbonate material as specified in clause no. 3.1. Thickness of meter box shall be minimum 3.0 mm.
5.1	Moulding	The box shall be made through Injection Moulding or better method.
5.2	Base	Meter shall be factory fitted inside base body using unidirectional screws, on fixed mounting pillars, moulded in to the base of sufficient strength, so that removing of meter shall not possible without breaking the meter box or meter itself.
5.3	Top cover	Hinge type
5.3.1	Hinge type	a. Minimum 02 no's concealed / internal hinges, not visible or accessible from outside the box without breaking the box itself. b. Minimum 02 no's U latches shall be provided to closed the box with sealing arrangement at each U latch. c. After closing the U latches no play/ gap shall exist between base and top cover.
6	Padlocking	The box shall also have padlocking facility.
7	Cable entry	At bottom suitable for 4CX50 Sqmm cable through cable glands
7.1	Cable Gland	a. Two nos. of Elbow shaped glands made out of Polyamide Nylon-66 suitable upto 4CX50 sqmm aluminium armoured cable shall be provided on both cable entries in the box. b. Glands shall be designed in such a manner that the same cannot be unscrewed / removed from the box from outside. Manufacturer may either supply two nos. of check nuts or any other alternate design to meet this requirement.
8	Earthing bolt	Earthing bolt of M8 with nut and washer shall be provided on left side of the body of meter box. The arrangement shall be such that one earth point shall be available for customer and external earthing provided by BSES can be terminated. Necessary symbol shall be provided for earth terminal.
9	Gland Plate	MS gland plate of minimum thickness 3.0 mm shall be provided at the bottom of the box.
10	Termination Height	Height of the meter terminals from gland plate shall be 150 mm minimum.
11	Mounting	As follow

11.1	Meter mounting pillars	a. Fixed type, moulded in to the base body as per the requirement of meter mounting holes. b. Stiffeners shall be provided at the base of the mater mounting pillars.
11.2	Meter box mounting	Four (4) nos. fixing holes of 6 to 6.5 mm diameter at the back surface of box shall be provided to fix the same on flat wall. Mounting holes shall not be obstructing by Incoming or Outgoing cables.
11.3	Box Mounting accessories	Long pan head self taping SS screws and washers shall be provided by the supplier with every box. 4 no's plastic fixing plugs suitable for self tapping screws shall also be provided.
12	Data Downloading arrangement	a. DB9 RS232 connector shall be provided at the top cover of box to download meter. b. Meter shall be downloadable without opening of the box/ breaking of seals. c. This arrangement shall not de-rate the IP rating of meter box. A Top hinges and bottom sealable cover shall be provided on the data downloading slot. d. Data downloading shall not be affected by scratches on data downloading port or with ageing of box. Data downloading shall not be affected by visible light conditions.
12.1	Optical to RS232 cable.	Optical reader with 9 pin D-type female connector cable shall be provided in each meter box.The optical meter reader with 9 pin D-type male connector cable of the entire meter boxes (100%) shall be tested for meter downloading before dispatch.
13	Marking	Following marking shall be provided on both top cover and base by indiligible laser printing/ screen printing or embossed from inside of the box. a. BSES insignia shall be embossed on the base & cover of meter box. b. Meter serial no. c. purchaser's PO no. and date. d. Purchaser's Name. e. Name or trade mark of seller f. Any other detail required at the time of approval.
14	Type Tests and Acceptance tests	a. All the below mentioned tests shall be carried out on 01 no randomly selected sample by BYPL representative from the lot offered for inspection at CPRI/ ERDA/ CIPHET. b. Following tests shall be carried out on sampled meter enclosure from the offered lot for inspection as per QAP approved by BYPL as acceptance tests. c. 01 no's box sealed by BYPL representative from the lot offered for inspection shall be tested for mentioned tests at CPRI/ ERDA/ CIPHET.
14.1	Visual examination	As Per GTP/ approved drawing
14.2	Verification of dimensions & Marking	As Per Spec/GTP/approved drawing

13.3	Protection against electric Shock	IS:14772
14.4	Resistance to ingress of solid object & to harmful ingress of water (IP-55)	IS:14772
14.5	Test of Mechanical Strength / Impact Resistance Test	IS:14772
14.6	Resistance to heat	IS:14772
14.7	Resistance to Rusting	IS:14772
14.8	Glow Wire Test at 950 degree Centigrade	IS:14772/ IEC 695-2-1
14.9	Verification of Dielectric Properties at 5 KV	IS:8623
14.10	Heat Deflection Test at 125 degree Centigrade at 0.45 Mpa	
14.11	Test for Self Extinguishing Properties	IS:4249
14.12	Flammability Test	IS:11731 II
14.13	U V Resistance Test	DIN 53387

BSES

Technical Specification For

Three Phase LTCT Operated Consumer Meter

Specification no – BSES-TS-111-LTCTM-R0

Rev		**0**
Date		**20 July 2022**
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Index

Record of Revision

Item/Clause No.	Change in Specification	Reason of Change	Approved By	Rev

1.0 Scope of Supply

This specification covers the following for Three Phase Four Wire 240 V, Ib-/-5A (Imax shall 200% Ib) AC Static transformer operated Watt hour and Var Hour meters (With and Without LTCT box and NBIOT/ 4G modem) of accuracy class 0.5s/ Three Phase Thread through meter (Three Phase Four Wire 240 V, 40A- 200A, cl. 1.0s)

A. Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.

B. Any accessories / hardware required for installation and operation for the meter.

2.0 Codes & standards

Materials, equipment and methods used in the manufacturing of above mentioned equipment shall conform to the latest edition/ of following

S No.	Standard Number	Title
2.1	Indian Electricity Act	IE Act 2003
2.2	CEA Metering Regulations	With latest amendments
2.3	CBIP Manual (Pub no.-325)	Standardization of AC Static Electrical Energy Meters
2.4	IS- 14697	ac Static Transformer Operated Watt-hour and Var-hour Meters, Class 0.2 S and 0.5 S
2.5	IS-15959 (Part 1)	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification
2.6	IS- 11448	Application guide for AC Electricity meters
2.7	IEC- 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
2.8	IEC- 62053-21	Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)
2.9	IEC- 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols
2.10	IEC 62053-61	Electricity metering equipment (A.C.) - Particular requirements - Part 61: Power consumption and voltage requirements

2.11	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods
2.12	IEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)
2.13	IEC 60736	Testing Equipment for electrical Energy meter
2.14	IS/IEC/TR 62051:Part 1:2004	Electricity Metering — Data Exchange For Meter Reading, Tariff And Load control — Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM
2.15	IEC 62056-1-0:2014	Smart metering standardisation framework
2.16	IEC 62056-3-1:2013	Use of local area networks on twisted pair with carrier signalling
2.17	IEC 62056-4-7:2014	DLMS/COSEM transport layer for IP networks
2.18	IEC 62056-5-3:2017	DLMS/COSEM application layer
2.19	IEC 62056-6-1:2017	Object Identification System (OBIS)
2.20	IEC 62056-6-2:2017	COSEM interface classes
2.21	IEC 62056-6-9:2016	Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols
2.22	IEC 62056-7-3:2017	Wired and wireless M-Bus communication profiles for local and neighbourhood networks
2.23	IEC 62056-7-5:2016	Local data transmission profiles for Local Networks (LN)
2.24	IEC 62056-7-6:2013	The 3-layer, connection-oriented HDLC based communication profile
2.25	IEC TS 62056-8-20:2016	Mesh communication profile for neighbourhood networks
2.26	IEC TS 62056-	Communication profile using web-services to access a DLMS/COSEM

	9-1:2016	server via a COSEM Access Service (CAS)
2.27	IEC 62056-9-7:2013	Communication profile for TCP-UDP/IP networks
2.28	IEC 62056-21:2002	Direct local data exchange
2.29	DLMS- White Book	Glossary of DLMS/COSEM terms
2.30	DLMS- Blue Book	COSEM meter object model and the object identification system
2.31	DLMS- Green Book	Architecture and protocols to transport the model
2.32	DLMS- Yellow Book	Conformance testing process
Order of precedence between different standards shall be as follow:		
I	Indian Standards Issued By BIS	
Ii	IEC standard	
Iii	Other standards like CBIP, DLMS etc.	

3.0 Service Conditions

3.1	Temperature Range	Operation range: -10 Deg C to 55 Deg C Limit range of operation: -25 to 60 Deg C Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4.0 Distribution System Data

4.1	Supply	3 Phase AC, 4 wire
4.2	Voltage	415 V ± 6%
4.3	Frequency	50 Hz ± 5%
4.4	System Neutral	Solidly Earthed

5.0 Electrical and Accuracy Requirement

5.1	Meter Type -1	a. 3- ø, 4 wire static Transformer Operated Smart Meter without LTCT box. b. 3- ø, 4 wire static Transformer Operated Smart Meter with LTCT box as per annexure 'F
5.1.1	Connection	Current Transformer Operated
5.1.2	Rated Voltage	240V (phase to neutral) with variation of +30% & -40%. However meter should withstand the maximum system voltage.
5.1.3	Rated Current	Ib -5A and Imax- 10 A
5.1.4	Power factor range	Zero lag – Unity – Zero lead
5.1.5	Starting current	0.1 % of base current
5.1.6	Rated Frequency	50Hz +/- 5%
5.1.7	Accuracy Class	0.5s (IS14697 applies for accuracy requirements)
5.2	Meter Type-2	3 ø, 4 wire thread through meter with inbuilt CTs suitable for outdoor application
5.2.1	Connection	Direct Connected (Whole Current)
5.2.2	Rated Voltage	240V (phase to neutral) with variation of +30% & -40%. However meter should withstand the maximum system voltage.
5.2.3	Rated Current	Ib -40A and Imax- 200 A
5.2.4	Power factor range	Zero lag – Unity – Zero lead
5.2.5	Starting current	0.1 % of base current
5.2.6	Rated Frequency	50Hz +/- 5%
5.2.7	Accuracy Class	1.0 s (IS13779 applies for accuracy requirements)
5.3	Meter type selection	Selection between meter type -1 and meter type -2 will be based on requirement and purchaser's requition.
5.4	Power Consumption	As per relevant IS
5.5	Meter constant	Imp/ unit (Bidder to specify meter constant)
5.6	Calibration	Meter shall be software calibrated at factory and modification in calibration shall not be possible at site by any means or external influence.

5.7	Test Output Device	Separate kWh & kVAh/kVArh Flashing LED visible from the front
5.8	Process Technology	Surface Mounting Technology or better
5.9	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.10	Influence of supply voltage	As per relevant IS
5.11	Short time over current	As per relevant IS
5.12	Immunity to phase and earth fault	As per relevant IS
5.13	Influence of Self Heating	As per relevant IS
5.14	Influence of Heating	As per relevant IS
5.15	Electromagnetic compatibility	a. Meter shall remain immune to electrostatic discharge (upto and including 35KV), electromagnetic HF field and fast transient burst. b. The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter. c. Meter shall be type tested for electromagnetic compatibility. d. Meter shall comply requirement of relevant IS
5.16	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS/ CBIP325 (most stringent standard to be followed) under and after influence of following :- a. Current Variation b. Ambient Temperature variation c. Voltage variation d. Frequency variation e. 10% third harmonic in current f. Reversed phase sequence g. Voltage unbalance h. Harmonic components in current and voltage circuit i. DC and even harmonics in AC current circuit

		j. Odd harmonics in AC current circuit. k. Sub harmonics in AC current circuit l. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. m. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. n. Alternating (AC) "stray' magnetic induction of 0.5mT+/-5% o. Alternating (AC) "abnormal' magnetic induction of 10mT. p. External magnetic field 0.5 T q. Electromagnetic HF fields r. Radio frequency interference s. DC immunity test Note: BSES reserves the right to formulate any other test method to check magnetic immunity/ logging of meter. Meter with logging provision will be preferred.

6.0 Construction

6.1	Base Body	Material - Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level.
6.2	Top Cover	a. Material: Transparent/Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level. b. Top cover and base should be Ultrasonically/Chemically welded. c. Top cover should be designed so as the internal components should not be visible.
6.3	Assembly of Base body and top cover	By ultra-sonic welding
6.4	Terminal and Connection details for Meter type-1 (as per clause 5.1)	

6.4.1	Terminal Block	a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall form Integral part of the meter base c. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.4.2	Terminal cover	a. Material - UV stabilized transparent/Opaque polycarbonate cover of grade LEXAN 143A/943AA or equivalent. b. Provision of sealing at two points through sealing screw. c. The sealing screws shall be held captive in the terminal cover. d. The terminal cover shall be extended type with baffle wall above the cable entry base wall so that access to the terminals is not possible (even with thin metallic wire) without breaking the seal. Terminal cover should have provision for cable entry from bottom. e. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable.
6.4.3	Terminals	a. Terminals shall be suitable for 6 Sqmm copper wire. b. Two no's flat head screws per terminal shall be provided c. Material of terminals, screws and washers should be brass or tinned copper. Terminals shall be tested for continuous current of 150 % Imax. d. Terminals shall be clearly marked for phase / neutral / outgoing etc. e. Clearances and creepage shall be as per IS 14697.
6.4.4	Meter Enclosure	a. Polycarbonate meter enclosure suitable for outdoor use (IP55) and LTCT's as per annexure 'F' shall be provided with meter.
6.4.5	Ingress Protection	IP 51 or better, but without suction in the meter.

6.5	Terminal and Connection details for Meter type-2 (as per clause 5.2)	
6.5.1	Connection	a. Provision should be made to pass the connection power cable directly through the meter (Thread through type) for measurement. There should be no need to remove insulation of connecting cable for current measurement. Meter should not have provision for meter terminal connection as well as terminal block similar to conventional meters. b. A set of piercing screws shall be used in the meter for voltage connection c. Meter shall be suitable for to accommodate XLPE insulated aluminum cable up to 150 mm^2
6.5.2	Terminal Cover	a. Material - UV stabilized transparent polycarbonate cover b. Provision of sealing at two points through sealing screw. c. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable.
6.5.3	Ingress Protection	IP 55 or better, but without suction in the meter
6.6	Output device	Meter should have flashing LED visible from the front to represent energy recording. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.7	RTC	a. The meter shall have internal real time crystal clock to set date and time. b. Drift in time of this clock shall not be more than ±5minutes/ year at a reference temperature of 27°C. c. Meter should have facility for time synchronization locally through CMRI.

		d. Metering equipment shall have facility for remote synchronization. Any time correction events shall be registered in meter's memory and data acquisition software.
6.8	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Lithium thioyl Chloride battery will be preferred. In case battery removal or total discharge same should not affect the working & memory of the meter.
6.9	Memory	Non volatile memory independent of battery backup, memory should be retained up to 10 year without any auxiliary power.
6.10	Self Diagnostic feature	Meter shall have self diagnostic for the following a. Date and RTC. b. Battery. c. Non volatile memory. d. Display e. Status of Communication card
6.11	Optical port	Meter shall have an optical port with a metal ring to hold magnet of probe. Optical port shall comply with hardware specifications provided in IEC-62056-21.
6.12	Clearance and Creepage distance	As per relevant IS.
6.13	Mounting	Surface / Flush mounted.
6.14	Electronic components	All active & passive components should be surface mounting type and shall be assembled by state of the art assembly processes
6.15	Power Supply	The power supply should comply with the relevant standards. Power supply unit of the meter should not be affected in case maximum voltage of the system appears across the terminals due to faults or due to wrong connections.
6.16	Protection against Corrosion	a. Internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc.

		b. Mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.
6.17	Meter Sealing Arrangement	Sealing should be in accordance with IS and CEA metering regulations with latest amendments. Approval shall be taken from purchaser for location of seals.
6.17.1	Manufacturer's Seals	c. One Polycarbonate seal to be provided on meter cover. d. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram).
6.17.2	BSES Seals	a. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram). Meter sides should not have sharp edges to avoid damage to hologram seals. b. Minimum one Polycarbonate seal should be provided on top cover. c. Seals will be issued to manufacturer free of cost.
6.17.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.18	Insulation	A meter shall withstand an insulation test of 4 KV and impulse test at 6 KV
6.19	Name Plate and marking	a. Meter should have clearly visible, indelible and distinctly marked name plate in accordance with relevant IS clause no. 10.0 of this specification. b. All markings and details shall be printed by laser only. c. Paper stickers are not allowed for name plate.
6.20	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per relevant IS.

6.21	Guarantee	a. 5.5 years from the date of dispatch or 5 year from date of commissioning, whichever is earlier b. Manufacturer shall undertake a guarantee to replace meter up to a period of 5 Year from the date of supply. The meters which are found defective/inoperative within the guarantee period shall be replaced.

7.0 Functional Requirement

7.1	Meter category	Meter should comply with C1 category of IS 15959 (Part 1).
7.2	Mode of metering	Forwarded Only: In this mode any export active energy shall be treated as import energy and shall be recorded in forward only register. Apparent energy calculation in this mode shall be as per Lag Only.
7.3	kVAh Calculation	Lag only: KVAh is computed based on KVArh and KWH value. If PF=1, or leading, then KVAh = KWH. At no instance KVAh < KWh.
7.4	MD calculation	Block window with default demand integration period of 1800 s configurable to 900 s as per requirement. Extended register shall be used for MD recording. It should be possible to reset MD automatically at the defined date (or period) or through CMRI with proper security. Meter shall store and display MD upto two decimal
7.5	TOD Metering	i. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. ii. Meter shall be capable of doing TOD metering for kWh, kVARh, kVAh and MD in kW, kVAR and kVA . Reactive parameter should be recorded separately for Lag and Lead. iii. TOD programmable on site through CMRI or

		AMR remotely. iv. At Display as well as BCS end meter TOD values shall be shown as per cumulative values of TOD Zones of respective registers. v. TOD metering shall be implemented by the activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 vi. Special Day table shall be defined as per IEC/ DLMS UA-1000-1 vii. Default TOD programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BSES for the same. viii. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal R3: Rate Register for Off Peak
7.6	Instantaneous Parameters	All the parameters mentioned in table '27' of IS 15959 (Part 1) along with following additional parameters shall be supported by meter. a. Neutral Current (I_N) b. % TDH in R Phase Voltage c. % THD in Y Phase Voltage d. % THD in B Phase Voltage e. % THD in R Phase Current f. % THD in Y Phase Current g. % THD in B Phase Current h. temperature i. GSM signal Strength in milli db. j. Voltage angles for phasor representations. Method of Measurement for harmonic parameters at sl no. 'b' to 'g' shall confirm to the IEEE 519, 2014. All the energies should be measured and recorded with and without harmonics.

7.6.1	Association Rights	As per Clause 7 and annexure E of IS 15959 (Part 1).
7.7	Billing data	a. Billing parameters shall be generated at the end of each billing cycle and stored in memory as per provisions provided in clause no. 10 of IS 15959 (Part 1). b. 12 no's billing cycle parameters shall remain in meter memory along with current cycle parameters and shall be available for reading as well as profile and or 'by entry' for selective access. c. All the energies should be measured and recorded with and without harmonics. d. All the parameters mentioned in table '29' of IS 15959 (Part 1) shall be supported by meter along with following additional parameters: i. Cumulative power interruption counts in all monthly history data ii. Monthly Power off duration in all history data.
7.7.1	Association Rights	As per Clause 7 and annexure E of IS 15959 (Part 1).
7.7.2	Selective access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.7.3	Billing period reset/ MD reset	00:00 Hrs of Ist of every month
7.7.4	Billing period reset mechanism	As per clause 10 of IS 15959 (Part 1)
7.7.5	Billing period counter	Cumulative billing period counter since installation and available billing periods shall be provided as per clause 11.2 of IS 15959 (Part 1).

7.8	Load survey Data	a. Load survey parameters shall be measured and recorded at the end of each profile capture period for last 60 Power ON days. b. All the parameters mentioned in table '28' of IS 15959 (Part 1) along with following additional parameters shall be supported by meter: i. % THD in R Phase Voltage ii. % THD in Y Phase Voltage iii. % THD in B Phase Voltage iv. % THD in R phase Current v. % THD in Y Phase Current vi. % THD in B Phase Current vii. Phase wise Voltage and Current (Line, Active, Reactive) with instant and average value. viii. All three phase active, reactive (lag and lead) and apparent power and energy ix. power-off time in integration period x. Neutral Current Note: All the energies should be measured and recorded with and without harmonics.
7.8.1	Profile capture period	Default 1800 s programmable to 900 s.
7.8.2	Selective Access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.8.3`	Association Rights	As per of IS 15959 (Part 1)
7.9	Daily load profile	Daily load profile parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 60 Power ON days. All the parameters mentioned in table 57 of annexure E IS 15959 (Part 1) alongwith following additional parameters shall be supported by meter as Daily load profile parameters. i. All three phase active, reactive (lag and lead)

		and apparent energy All the energies shall be measured and recorded with and without harmonics.
7.9.1	Association Rights	As per Clause 7 and annexure E of IS 15959 (Part 1).
7.10	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per Annexure F of IS 15959 (Part 1).
7.10.1	Name Plate Detail	As per Table '30' of IS 15959 (Part 1) along with following additional parameter a. Manufacturing month of meter.
7.10.2	Association Rights	As per Annexure F clause F-2 of IS 15959 (Part 1)
7.10.3	Programmable parameters	These parameters can be programmed remotely by AMR system and locally by CMRI via proper access writes. Every transaction shall be logged in non volatile memory of the meter with date and time stamp. Programming of any of the parameters shall increment the 'Cumulative programmable count' value. All the parameters mentioned in table '31' of IS 15959 (Part 1) shall be supported by meters with following additional parameters.
7.10.4	Association rights	As per Annexure F clause F-2 of IS 15959 (Part 1)
7.15	Security	a. Advanced security outlined in clause 7.1.2 of IS 15959 (Part 1) shall be provided. b. Reading and writing data into meter memory via optical and remote communication port shall be through DLMS security keys only. c. Bidder shall ensure to safeguard high security keys used for configuring parameters into meter. d. Once the meter memory is locked during manufacturing process, only parameters mentioned in IS 15959 shall be configurable even in factory. It should not be possible to

		configure any other parameters. e. Please note that there shall be no other mechanism/ method to interface with meter through optical and remote communication port except mentioned in IS 15959, even for manufacturer. f. It should not be possible to change data stored in meter memory even after accessing meter memory physically. In case of any change in memory data, a flag/alert shall be generated. Flag/Alert shall be indicated over display and in remote communication also.
7.18	Event and tamper detection	Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be identified by an event ID.
7.18.1	Association Rights	Each event shall be available to download as per following association rights. a. Public Client: No access b. Meter Reader: Read only c. Utility Settings: Read only
7.18.2	Compartments of events	Meter shall be able to log events in following compartments a. Voltage Related Events b. Current Related Events c. Power Related Events d. Others Events e. Non Roll Over Events f. Transaction related events

		a. Occurrence and Restoration of Voltage Related, current related, power related and other events shall be logged in meter memory as per IS 15959 (Part 1). Please refer annexure 'A' for description of events, Event ID, Logics of events and threshold values of events. b. Threshold values shall be factory programmable. c. Selective access shall be provided as per clause 11.3 of IS 15959 (Part 1). d. For each of the events a certain list of parameters shall be captured. e. For each occurrence event captured, the cumulative tamper count shall be incremented.
7.18.3	Parameter Snapshot	Meter shall capture all the parameters mentioned in table '39' of IS 15959 (part 1) including following parameters when event occurrence and restoration is logged a. Meter Date, time, b. voltages, c. Phase currents, d. Neutral current, e. Power factor, f. Active power, g. Apparent power, h. Signed reactive power, i. Cumulative kWh, cumulative kVAh, cumulative kVArh (lag and lead) etc Detailed harmonic profile shall be captured at occurrence of High harmonic events.
7.18.4	Event Logging	The meter shall log minimum 100 tamper events (ensuring at least 20 events for each tamper).

7.18.5	Tamper Indication	Appropriate Indications/Icons for all tampers should appear on the meter display either continuously or in auto display mode.
7.19	Phasor Representation	Meter shall support parameters required to develop phasors of currents and voltages. BCS/HES shall be capable to draw correct phasor diagram.
7.20	Harmonic Energies	All the energies measured and recorded with and without harmonics.

8.0 Meter Display

8.1	LCD Type	STN Liquid crystal with backlit
8.2	Viewing angle	a. Minimum 120 Degree. b. The display visibility should be sufficient to read the Meter mounted at height of 0.5 m as well as at the height of 2 m.
8.3	Size of LCD	Minimum 10X5mm PIN Type
8.4	LCD Digits	Total 7 digits
8.5	LCD language	English
8.6	Display modes	a. Auto Mode b. Manual Mode c. Sub active mode Please refer annexure D for parameters list.
8.7	Display indications	Appropriate indications/flags for all tampers and self diagnostic features should be provided.

9.0 Data and communication protocol/ HES/Integrations/ Software

9.1	Data Exchange protocol	a. Meter should comply Indian companion of data exchange and tariff control specification IS 15959 (Part 1). b. In case of additional requirement from IS 15959 (part 1), they shall be as per DLMS standards/ IEC DLMS protocols suite (62056). c. Bidder shall explain in detail the additional parameters/

		services/ methods used in meters from IS 15959 (part 1) and its reference to DLMS books/ IEC. d. Prior to manufacturing of meters' bidder shall provide a detailed specification explaining all parameters/ services/ methods used in meter in addition to IS 15959 (Part 1).
9.3	Base computer software	Licensed Software with the following features should be supplied for free to download meter through optical port. The software should have capability to transfer data from single CMRI to PC and the multiple CMRI data download to PC with a loader charger.
9.3.1	Operating System	BCS should be compatible for latest Windows operating system.
9.3.2	Security	System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security.
9.3.3	Database	BCS shall maintain master database according to desired area, location, and region etc.
9.3.4	Reporting	a. BCS shall have option of user defined report generation in format of Excel, Word and CSV, XML, PDF etc. b. BCS shall have capability to export data in ASCII, CSV and XML format at desired location so that the same could be integrated with our billing data for processing. c. All the data available in the meter shall be convertible to user defined ASCII, CSV and XML file format.
9.3.5	Data transfer rate	BCS and communication ports should support data transfer rate of 9600 bps (minimum).
9.4	Hand Held Unit Software	a. The manufacturer has to provide software capable of downloading all the data stored in meter memory through DOS based, operating system handheld units (HHU/ CMRI) through optical port. b. In the event of order, bidder shall work with BSES IT team to develop HHU software for meter downloading

		and its integration with our SAP billing system. c. HHU software should have option for selection of parameters to be downloaded from meter. d. Meter data consisting of all parameters and complete load survey for all parameters shall be read by HHU in minimum possible time as provided by BSES user template. e. Meter data consisting of all parameters and 60 days load survey for above parameters shall be read by CMRI/AMR and downloaded on desktop PC in minimum possible time and it shall be indicated at the time of finalizing GTP. (The meter reading time should not be more than 5 minutes for complete set of data). f. Necessary provision shall be made in the software for converting all the parameters available for new and old meters if supplied earlier. g. Copy of operation manual shall be supplied. The software should have selection of meters by date, serial number,data file name or groups of files for data conversion to text file process. d. The Supplier shall provide meter reading protocols. Same need to be confirmed and mutually agreed before supply. h. Vendor to jointly work with BSES IT team to develop CMRI software for meter downloading and further uploading on computer i. Training in the use of software shall be provided by the manufacturer.
9.5	Training	Manufacture shall impart training to BSES personnel for usage of software
9.6	Modem	
9.6.1	For Meter type-1 (as per clause 5.1)	Inbuilt or external 4G/ NBIOT with 2G fall back modem compatible for accessing complete meter data through AMR of energy meters installed at the consumer premises. If external type modem is provided, same should be mounted in the

		LTCT box. Refer Annexure – F for details of LTCT box.
9.6.2	For Meter type-2 (as per clause 5.2)	Inbuilt 4G/ NBIOT with 2G fall back modem compatible for accessing complete meter data through AMR of energy meters installed at the consumer premises. The modem shall be accessible only after opening the front cover of the meter. SIM Card Holder shall be accessible only after removal of terminal cover.

10.0 Name Plate

10.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour. Embossing is not acceptable.
10.2	Size of the digit shall be minimum 5X3 mm . Details shall be printed by laser printing preferably.
10.3	Bar code shall be printed below the serial number
10.4	BIS registration mark (ISI mark)
10.5	'BSES' insignia shall be printed above LCD display.
10.6	BSES PO No. & date and Property of BSES
10.7	Manufacturers name and country of origin
10.8	Model type / number of meter
10.9	Month and Year of manufacturing
10.10	Reference voltage / current rating
10.11	The number of phases and the number of wires for which the meter is suitable. Graphical symbol as per IS 12032 can be used.
10.12	Meter constant Impulse/kWh Impulse/kVAh/kVArh
10.13	Class index of meter
10.14	Reference frequency
10.15	Warranty period

11.0 Component Specification

11.1	Current Transformers	The Meters should be with the current transformers as measuring elements.	To meet accuracy requirement
11.2	Measurement or computing chips	The Measurement or computing chips used in the Meter should be	Analog Devices, Cyrus Logic, Atmel, Phillips,

		with the Surface mount type along with the ASICs.	SAMES ,NEC,TEXAS
11.3	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Hitachi, Compiled
11.4	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 (PIN Type). c. It should be STN type industrial grade with extended temperature range min 70 ºC.	Hongkong: Genda Singapore: Bonafied technologies Korea: Advantek China: Success Japan: Hitachi, Sony
11.5	Optical port	The mechanical construction of the port should facilitate the data transfer. Communication shall not disturbed by external light.	USA: National Semiconductors, HP Holland/ Korea: Phillips Japan: Hitachi, Ligitek
11.6	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	SMPS Type

11.7	Electronic components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal wires.	USA: National Semiconductors, Atmel, Phillips, Texas Instruments. Japan: Hitachi, Oki, AVX or Ricoh Korea: Samsung
		LED	Everlight, Agillent
11.8	Mechanical parts	a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.	
11.9	Battery	Lithium with guaranteed life of 15 years	Texcell, SAFT, Varta, Tedirun, Sanyo
11.10	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Philips, Dallas Atmel, Motorola, Microchip, TEXAS, Japan: NEC, Oki
11.11	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)
11.12	Note	a. The components used by manufacturer shall have “Minimum Life” more than the 10 years. b. Incase vendor want to use other make components; same shall	

		be approved by BSES before use. c. Even for existing supplier – fresh approval is needed for all deviations. d. Manufacturer should have complete tracking of material used in meter. BSES reserve the right to carry out audit of inventory/ manufacturing process at manufacturer's works and sub vendor's work.	

12.0 Quality Assurance, Inspection and Testing

12.1	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.
12.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.
12.3	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.
12.4	Type Tests	a. The meter shall be of type tested quality including all tests specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS relevant shall be carried out on sample selected from BSES lot.

		f. Type test report should not be more than 3 years old.
12.5	Routine tests	All test marked “R” as per relevant IS
12.6	Acceptance Tests	a. All tests marked “A” as per relevant IS b. Smart meter functional tests as per relevant IS. c. Test for data exchange protocol as per relevant IS.. d. All the routine and acceptance tests shall be carried out as per relevant standards. e. Following tests in addition to IS shall be conducted during lot inspection. I) Dimensional and drawing verification. II) Display parameters/ sequence. III) Data Downloading from CMRI and PC. IV) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. f. Purchaser reserves the right to formulate any other test method to verify guaranteed parameters of Meter.
12.7	ESD and Magnetic Interference test	ESD and magnetic interference test will be conducted at Samir lab, Chennai/ CPRI/ ERDA/ ERTL or NABL authorized Lab
12.8	Inspection	a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller’s works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests as per relevant standards and tampers logics as per approved GTP. All the equipments including tamper logs kits/ jigs should be calibrated. c. In-process and / or final inspection call intimation shall be given in advance to purchaser.
12.9	General	a) The internal potential links should be in closed

	Requirements	position or link less meters will be preferred and there shall not be any external link. b) Deliverable with Meters. i. Hard copies for Routine test certificates with each meter till alternate is provided by vendor and approved BSES. ii. Terminal cover should be fixed on the meter before dispatch. iii. Report of seal & initial reading record. (soft copy as per BSES format) c) Box number, meter serial number, type, rating should be mentioned on cases / cartons. d) Meters shall be suitably packed with environmental friendly material in order to avoid damage or disturbance during transit or handling and to prevent in grace of moisture and dust. Also refer CEA Metering Regulation. e) In case battery removal/ total discharge same should not affect the working & memory of the meter. f) The bidder shall maintain a web site where routine test results of all meter supplied against these tender will be maintained and will be accessible to buyer/ buyer representative. g) The supplier shall give 15 day advanced intimation to enable BSES to depute representative for lot inspection. h) Vendor shall ensure that patch required for HHU/CMRI shall be provided within 4 weeks. Vendor shall also ensure to deliver solution to meet DERC mandate within mutually agreed timeline. i) Delivery of software for reading through HHU/CMRI before meter delivery is required. j) For any false events recorded in meter, vendor shall

		depute their representative for field visit within one week and provide the root cause analysis in 4 weeks time.

13.0 Packing, Marking, Shipping, Handling and Storage

13.1	Packing	a. Each meter must be packed, together with its terminal cover, in a separate environmental friendly cardboard box, which can be opened and re-closed without needing adhesives. b. Up to 4 to 5 three-phase meters must be packed together with their terminal covers in a group cardboard box, which can be opened and re-closed without needing adhesives. c. The box shall prevent, as much as possible, penetration of dust during long storage periods. The box must be designed for multiple use and be robust, with wall thickness of at least 4 mm. d. Maximum weight of a group meter box shall not be more than 25 Kg. e. The packaging will protect the meters against shock and vibration, preventing damage due to the road conditions during transport and distribution in the field. The electrical and mechanical properties shall not be affected by these disturbances. f. For shipping the boxed meters will be close packed by stockpiles of suitable quantities on pallets. The meters numbers sequence (without partition) shall be kept in each pallet. A pallet will be protected against moisture by a polyethylene hood, covered with a cardboard cover (hood), and fixed onto the pallet by parallel polypropylene bands, using protection angle bars at the corners. The hood shall be marked – on the front (wide side), on the narrow side and on the top as per clause 13.3. g. Each pallet should contain between 70 and 300 meters. The actual number of meters on each pallet will be agreed with the BSES in the event of order. h. Visual indications (stickers) shall be attached to the cardboard hood of several pallets in each container/ transport

		truck, to warn of possible rough handling during shipment, transport and storage.
13.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label.
13.3	Marking	On each group box and pallet, following details are required both on front (wide side) and top: a. BSES logo. b. Meter serial number range along with bar code. c. Unique number of box/ pallet. d. Purchaser's name e. PO number (along with SAP item code, if any) & date with bar code f. Equipment Tag no. (if any) g. Destination h. Manufacturer / Supplier's name i. Address of Manufacturer / Supplier / it's agent j. Type , rating and other description of equipment k. Country of origin l. Month & year of Manufacturing m. Case measurements n. Gross and net weights in kilograms o. All necessary slinging and stacking instructions
13.4	Test reports	Routine test report to be provided with each meter
13.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.
13.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.

14.0 Deviations

14.1	Deviations	a. Deviations from this specification can· be acceptable, only where the Seller has listed in his quotation the requirements he cannot, or does not, wish to comply with and which deviations the Buyer has agreed to in writing, before any order is placed.

		b. In the absence of any list of deviations from the Seller, it will be assumed by the Buyer that the Seller complies with the Specification fully.

15.0 Drawing Submission

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in box file with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre Dispatch
1	Guaranteed Technical particulars (GTP)	Required	Required	
2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections	Required	Required	
6	Detail of network interface i.e. pin out, standard, voltage level etc and its integration requirement.	Required	Required	
7	Samples of each type and rating offered along with box (Highest rating offered) and communication.	2 no's	1 no's	
8	Any software and accessories required for installation/ operation of meter	Required	Required	
9	Manufacturer's quality assurance plan and certification for quality standards	Required		
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		
13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
15	Specification documents containing all parameters,		Required	

	Services, Methods in addition to companion specification of IS 15959 (part 2).			
16	Program for production and testing (A)		Required	Required
17	Makes of components		Required	Required
18	Detailed installation and commissioning instructions		Required	Required
19	As Built Drawing		Required	Required
20	Operation and maintenance Instruction as well as trouble shooting charts/ manuals		Required	Required
21	Inspection and test reports, carried out in manufacturer's works			Required
22	Routine Test certificates			Required
23	Test certificates of all bought out items			Required
24	Meter Seal data			Required
25	Mapping of meter serial no to Communication card.			Required

16.0 Delivery

16.1	Delivery	Despatch of Material: Vendor shall despatch the material, only after the Routine Tests/Final Acceptance Tests (FAT) of the material witnessed/waived by the Purchaser, and after receiving written Material Despatch Clearance (MDC) from the Purchaser.

17.0 METER REPLACEMENT

1. Manufacturer shall undertake to replace meter and box in case of failure within the guarantee period.
2. Faulty meters under Guarantee shall be verified by manufacturer at site at their own cost.
3. Manufacturer will replace the meters with the Serial numbers provided by BSES and manufacturer shall provide an excel sheet with details of returned meters, replaced meter, PO no., PO date,seals etc for mapping purpose by BSES. Format of the same can be taken from Stores if required.
4. Manufacturer shall lift the Faulty Meters from BSES Stores within 30 days of intimation.
5. Manufacturer shall inspect the meter within 5 days of intimation at Stores and inform authorized representative of BSES of any observation in writing. If manufacturer fails to inform BSES then all meters will be considered for replacement.

6. The meters which are found defective/inoperative within the guarantee period, shall be replaced within six weeks of receipt of report for such defective/inoperative meters.
7. If the defective meters are not replaced within the specified period then the same shall be treated as breach of performance and shall be liable for penalty.

Annexure- A- Guaranteed Technical Particulars

Bidder shall furnish the GTP format with all details against each clause of this specification.
Bidder shall not change the format of GTP or clause description.
Bidder to submit duly filled GTP in hard copy format with company seal.

Clause No.	Clause Description	Manufacturer's Reply
1		
2		
3		
4		
5		

Bidder / Vendor seal / signature ----------

Name of the bidder	
Address of the bidder	
Name of contact person	
Telephone number and email id	

Annexure - B- Recommended Accessories / Spares

SL	Description of spare part	Unit	Quantity
1		No	
2		No	
3			

Annexure - C- Tamper and Fraud Detection/ Events

1. Voltage Related Events:			
Description of event	**Logic Of Event**	**Logic Expression/ Threshold values**	**Persistence Time**
R Phase Voltage Missing (Occurrence/ Restoration) Y Phase Voltage Missing (Occurrence/ Restoration) B Phase Voltage Missing (Occurrence/ Restoration)	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end	Occurrence: If Vpn<10% Vref and Ip>10% Ib Restoration: If Vpn>=10% Vref and Ip>10% Ib	Occurrence: 5 Min Restoration: 5 Min
Over Voltage (occurrence/ restoration)	Meter should log high voltage event if voltage in any phase is above a threshold value.	Occurrence: If Vpn>10% Vref Restoration: If Vpn<=10% Vref	Occurrence: 5 Min Restoration: 5 Min
Low Voltage (occurrence/ Restoration)	Meter should log low voltage event if voltage in any phase is below a threshold value. Threshold value if factory programmable.	Occurrence: If Vpn<75% Vref Restoration: If Vpn<=75% Vref	Occurrence: 5 Min Restoration: 5 Min
Voltage Unbalance (Occurrence/ Restoration)	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than a threshold value. Threshold value should be factory programmable.	Occurrence: If Vmax-Vmin>30% Vref Restoration: If Vmax-Vmin<=30% Vref	Occurrence: 5 Min Restoration: 5 Min
R Phase high Voltage Harmonics Y Phase high Voltage Harmonics B Phase high Voltage Harmonics	Meter should log occurrence of high voltage harmonic event when % THD in voltage of phase will be more than threshold value. Threshold value should be factory programmable.	Occurrence: If % THD in Vpn>5% of fundamental. Restoration: If % THD in Vpn<5% of fundamental.	Occurrence: 5 Min Restoration: 5 Min
Invalid Phase association	Meter should log invalid phase association event if the voltage sequence does not match with the current sequence		Occurrence: 5 Min Restoration: 5 Min
Abnormal/Invalid Voltage	Meter should log invalid voltage if phase angle between voltages deviates from the standard values by more than +/-10 degrees i.e. 120 +/- 10 degrees.		Occurrence: 5 Min Restoration: 5 Min
2. Current Related Events:			
Description of event	**Logic Of Event**	**Logic Expression/ Threshold values**	**Persistence Time**
Current Reverse/ R Phase Current Reverse (occurrence/	Meter should log the event of reversal of C.C polarity. Meter should register energy consumed correctly with any one,	Occurrence: If Ip = -ve direction Restoration: If Ip=+ve direction	Occurrence: 5 Min Restoration: 5 Min

Restoration)	two or all three current coils reversed. This event shall not be valid in bidirectional mode of metering.		
Y Phase Current Reverse (occurrence/ Restoration)			
B Phase Current Reverse (occurrence/ Restoration)			
R Phase Current Open (Occurrence/ Restoration)	Meter should log the event of current coil open. Threshold value of current should be programmable at factory end.	Vector Sum($I_R+I_Y+I_B+I_N$)*>20% Ib and I<10% Ib* *Vector Sum($I_R+I_Y+I_B+I_N$)>20% Ib*	Occurrence: 5 Min Restoration: 5 Min
Y Phase Current Open (Occurrence/ Restoration)			
B Phase Current Open (Occurrence/ Restoration)			
Current Unbalance (Occurrence/ Restoration)			
Current Bypass (Occurrence/ Restoration	Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at factory end.	Vector Sum($I_R+I_Y+I_B+I_N$)*>20% Ib and I (any Phase) >5% Ib* *Vector Sum($I_R+I_Y+I_B+I_N$)>10% Ib*	
Over current (occurrence/ restoration)	If the current in any phase exceeds the specified threshold current, meter should log over current event.	Occurrence: If Ip>Imax Restoration: If Ip<=Imax	Occurrence: 5 Min Restoration: 5 Min
R Phase high Current Harmonics	Meter should log occurrence of high voltage harmonic event when % THD in voltage of phase will be more than threshold value. Threshold value should be factory	Occurrence: If % THD in I_P>5% of fundamental. Restoration: If % THD in I_P <5% of fundamental.	Occurrence: 5 Min Restoration: 5 Min
R Phase high Current Harmonics			
R Phase high Current Harmonics			
3. Power Related Events:			
Description of event	**Logic Of Event**	**Logic Expression/ Threshold values**	**Persistence Time**
Power OFF (occurrence/ restoration)	Meter shall detect power OFF if all phase voltages are absent. This event shall be recorded at the time of each power OFF. At the same time power ON event shall be recorded.		

Abnormal Power Off (Occurrence/ restoration)	If meter micro detect power off whereas phase voltage is present than abnormal power will be recorded. Meter sall continue to record energy as per phase voltage and current.	Occurrence: If voltages at meter power supply<10% Vref and Vp>20% vref. Restoration:	NA
4. Other Events:			
Description of event	**Logic Of Event**	**Logic Expression/ Threshold values**	**Persistence Time**
Abnormal External Magnetic Influence (Occurrence/ Restoration)	a. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS14697/ CBIP 325 with latest amendments. b. If the working of meter gets affected under the influence of external magnetic field, meter should record energy at Imax. Meter should not compute MD during this period. The meter shall record energy as per actual load once the magnetic field is removed.	As per IS 14697/ CBIP 325	As per IS 14697
Neutral Disturbance- HF, DC and Alternating (occurrence/ restoration)	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.	As per manufacturing standard.	Bidder shall define threshold values
Low Power Factor	Meter shall able to detect and log the low PF event if power factor of the load found in between 0.2 to 0.5 for a load above than a % threshold value for a threshold time value. Event shall restore if PF factor of load remain out of range 0.2 to 0.5 for a load above than % threshold value for		10% of I basic
Overload (Occurrence/ Restoration)	Meter should able to log the status of overload in KW		
HV Spark (Occurrence/ restoration)/ Jammer	Meter with communication card should be immune or log the event in the case of application of ESD upto and including 35 KV.	Immediately	NA
High neutral Current	Meter should log event of high neutral current if measured neutral current should be more than predefined threshold value.	Occurrence: If I_N > 50% of average phase current Restoration: If I_N < 50% of average phase current	Occurrence: 5 Min Restoration: 5 Min
Distorted PF	Meter shall log the event if difference between displacement		Occurrence: 5 Min

	PF and actual PF is more than a predefined value		Restoration: 5 Min
5. Non Roll over events:			
Event Description			
Occurrence of cover open			
6. Transaction Related Events:			
Detail of Transaction			
Real Time Clock- Date and Time			
Demand Integration Period			
Profile Capture Period			
Single Action schedule for billing date			
Activity calendar for time zones			
New firmware activated			
LLS secret (MR) change			
HLS key (US) change			
HLS key (FW) change			
Global key change			
MD reset			

Note:

1. Event ID's shall be defined as per BSES specification/ IS 155959 (part 1). Approval shall be taken from BSES prior to manufacturing for Event ID's
2. Logics of tampers can be changed/ upgraded via firmware up gradation from remote via proper authentication.

Annexure- E- Display Sequence and parameters list

a) Default Display (Auto Mode)

i. LCD test
ii. Meter serial no.
iii. Date
iv. Real time
v. Cumulative kWh
vi. Cumulative kVARh Lag
vii. Cumulative kVARh lead
viii. Cumulative kVAh
ix. Instantaneous load in kW, kVArh & kVA
x. TOD MD for kWh and kVAh
xi. Phase wise voltage and current (R, Y, B phases)
xii. Power factor
xiii. Neutral current
xiv. TOD Total Active Forward Energy Register(Reg 1)
xv. TOD Total Active Forward Energy Register(Reg 2)
xvi. TOD Total Active Forward Energy Register(Reg 3)
xvii. TOD Total Active Forward Energy Register(Reg 4)
xviii. TOD Total Active Forward Energy Register(Reg 5)
xix. TOD Total Active Forward Energy Register(Reg 6)
xx. TOD Total Active Forward Energy Register(Reg 7)
xxi. TOD Total Active Forward Energy Register(Reg 8)
xxii. TOD Apparent Forward Energy Register(Reg 1)
xxiii. TOD Apparent Forward Energy Register(Reg 2)
xxiv. TOD Apparent Forward Energy Register(Reg 3)
xxv. TOD Apparent Forward Energy Register(Reg 4)
xxvi. TOD Apparent Forward Energy Register(Reg 5)
xxvii. TOD Apparent Forward Energy Register(Reg 6)
xxviii. TOD Apparent Forward Energy Register(Reg 7)
xxix. TOD Apparent Forward Energy Register(Reg 8)
xxx. Temperature
xxxi. Total tamper count

b) Default Display (Push button Mode)

After using pushbutton the following parameters should be displayed.

i. LCD test
ii. Meter serial no.
iii. Date
iv. Real Time
v. Cumulative kWh

vi. Cumulative kVARh
vii. Cumulative kVAh
viii. Current MD in kW
ix. Current MD in kVA
x. MD in kVAR
xi. TOD MD for kW and kVA
xii. TOD MD occurrence for kW and kVA
xiii. Instantaneous Power factor
xiv. Instantaneous voltage R phase
xv. Instantaneous voltage Y phase
xvi. Instantaneous voltage B phase
xvii. Instantaneous current R phase
xviii. Instantaneous current Y phase
xix. Instantaneous current B phase
xx. Last month billing Date
xxi. Last month billing kWh reading
xxii. Last month billing kVARh reading
xxiii. Last month billing kVAh reading
xxiv. Last month billing Maximum Demand in kW
xxv. Last month billing Maximum Demand in kW occurrence Date
xxvi. Last month billing Maximum Demand in kW occurrence Time
xxvii. Last month billing Maximum Demand in kVA
xxviii. Last month billing Maximum Demand in kVA occurrence Date
xxix. Last month billing Maximum Demand in kVA occurrence Time
xxx. THD for both Voltage and Current
xxxi. Total Active Energy, Apparent Energy
xxxii. Fundamental Reactive Lag and Fundamental Reactive Lead Energy
xxxiii. Neutral Current
xxxiv. Temperature
xxxv. Battery status
xxxvi. PT/CT status
xxxvii. Self diagnostic flag
xxxviii. Connection check (Phase sequence)
xxxix. Cumulative Tamper count
xl. Cumulative Power off hours
xli. Note: The meter display should return to Default Display mode (mentioned above) if the 'push button' is not operated for more than 6 seconds. Provision for scroll lock by pressing for 15 sec and sent to normal after 5 minutes.

Annexure- F- Technical Specification Of LTCT Box

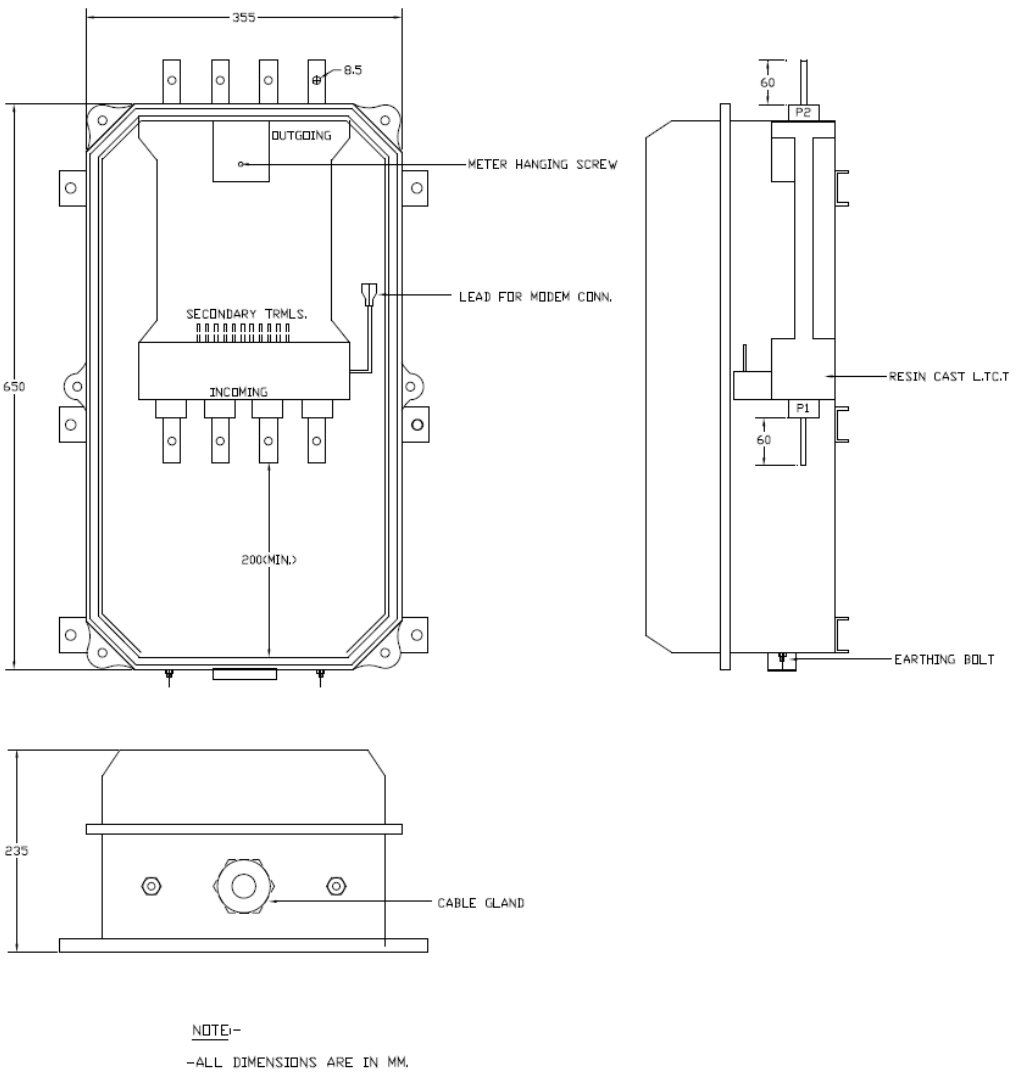
1.0	Constructional Requirement	
1.1	CT Ratio	LTCT of ratio 200/5 A,
1.2	Material	a. Polycarbonate of flammability grade V0 for both top cover and base. b. Top cover shall be transparent and base shall be of grey shade. c. Minimum thickness of sheet shall for both top cover and base shall be 3.0 mm. d. Proper stiffeners shall be provided in both base and top cover.
1.3	Method of closing box	Top cover shall be fixed by sealable bolts on base of box.
1.4	Ingress Protection	IP55 for outdoor use.
1.5	Modem mounting	a. Metallic mounting strip shall be provided to mount modem and its antenna inside the same compartment of box. b. Arrangement shall be provided to power up modem through incoming side of primary busbar using fork type terminals.
1.6	LTCT	a. 3 Phase Cast resin low tension current transformer (LTCT) with bar type primary. b. LTCT shall be mounted inside box with suitable mounting arrangement. c. Secondary terminals of LTCT shall be non removable stud type suitable for 3 Phase energy meter.
1.7	Earth Bus bar	a. Suitable for 8 KA for 1 sec. b. All the metallic hardware/ parts except bus bar and secondary terminals shall be connected to earth bus bar using bolted connection or suitable jumpers.

		c. 2 no's earthing bolt of size M16 shall be provided to connect armour of incoming cable and consumer side earthing.
1.8	Gland plate	Min 3 mm.
1.9	Incoming	Double compression PVC cable gland suitable for cable type A2XFY of size 150 Sqmm
1.10	Outgoing	a. Outgoing of primary bus bar shall be protruded outside the box. b. Suitable sealing shall be provided at exit of bus bars for outdoor use.
1.11	Box mounting arrangement	At least 03 numbers Galvanized Channels. Required hardware shall be provided.
1.12	Drawing	Reference drawings for boxes have been enclosed.
1.13	Bus Bar	Bus bar shall be tinned copper. Size of bus bar shall be suitable according to the CT ratio.
2.0	Technical Parameters of LTCT	
2.1	Type	3 Phase and Neutral CTs in a single mould of cast resin.
2.2	CT Ratio	200/5 A
2.3	Accuracy Class	0.5s
2.4	Instrument Security factor (ISF)	<=10
2.5	Burden	5VA
2.6	Insulation Level	660V/ 3kV
2.7	Power Frequency Withstand voltage	415 V/660 V
2.8	Short Time Rating	20 Times of rated primary current
2.9	Class of insulation	E
2.10	Max Temperature Rise	As per IS
2.11	Marking of terminals	a. Primary winding shall be designated as P1 and P2 to identify incoming and outgoing respectively.

		b. Secondary winding shall be marked as SR1, SR2, SY1, SY2, SB1, SB2 and SN1, SN2 for CT connections and R, Y, B for voltage connections. These marking details shall be engraved on cast resin at suitable place.
2.12	Primary Winding Type	Bar
2.8	Material of Conductor	Aluminium
1.9	Size of Conductor	Bidder need to specify. Calculation need to be provided in support of these this size.
2.10	Secondary winding	Wound
2.11	Material of conductor	Copper.
2.12	Size of conductor	Bidder need to specify. Calculation need to be provided in support of these this size.
2.13	Secondary terminals	Non removable stud type of material brass.
3.0	Name Plate	
3.1	Box	a. Following details shall be provided on name plate of box i. Name of Purchaser's and Place ii. Name of Buyer/ Logo/ Trademark and Place iii. Serial no of equipment iv. PO no and Date v. Serial no of LTCT. vi. Ratio of LTCT b. Type 1: Name plate shall be laser printed on top cover of Box.
3.2	LTCT	a. Following information shall be provided on non-removable name plate of LTCT i. Serial no of LTCT ii. Ratio iii. Accuracy Class iv. Burden

		v. ISF vi. Insulation level vii. Frequency viii. STC
4.0	Testing	
4.1	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.
4.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.
4.3	Inspection Hold-Points	To be mutually identified, agreed and approved in Quality Plan.
4.4	Type Tests	g. Box- IS 14772 h. LTCT- IS16227 i. Flammability Test on Box- IS 11731 Part 2
4.5	Routine tests	a. Box- IS 14772 b. LTCT- IS 16227
4.6	Acceptance Tests	a. Box- IS 14772 b. LTCT- IS 16227 c. Purchaser reserves the right to formulate any other test method to verify guaranteed parameters of equipment.
4.7	Inspection	d. Purchaser reserves the right to inspect /witness all test at Seller's works at any time, prior to dispatch, to verify compliance with the specification/ standards. e. Manufacturer should have all the facilities/ equipment's to conduct all the acceptance tests. All the testing equipment should be calibrated. f. In-process and / or final inspection call intimation shall be given at least 15 days in advance to the purchaser.

5.0 LTCT Box layout and CT Detail:



NOTE:-

-ALL DIMENSIONS ARE IN MM.

BSES

Technical Specification For
HT Consumer Meters

Specification No. –
BSES-TS-36-HTCTM-R0

Rev		0
Date		April 11, 2022
Prepared BY	Ashish Joshi	
Reviewed BY	Puneet Duggal	
	Vikas Srivastava	
	Lalit Mukheriya	
Approved BY	Gaurav Sharma	
	Manish Jain	

Index

Record of Revision

Revision No	Revision Date	Item / clause no.	Nature of Change	Approved By

1.0 SCOPE OF SUPPLY

1.1 Design, engineering, manufacture, testing, inspection at manufacturer's works before dispatch, packing and delivery of HT consumer meters in accordance with this specification.
1.2 Any accessories / hardware required for installation and operation for the meter.
1.3 Software required for operation of meter and its interfacing with BSES system.
1.4 All relevant drawings/documents/manuals for the meters and its accessories

2.0 CODES & STANDARDS

Following codes and standards (with latest amendments) are applicable-

S No.	Code/Standard	Title
2.1	Latest Edition	Indian Electricity Rules 1956
2.2	Latest Edition	Indian Electricity Act 1910
2.3	IS 722-1	Specification for AC Electricity Meters General Requirements & Tests
2.4	IS 1401	Protection of Persons and Equipment by Enclosure
2.5	IS 4905	Methods of Random Sampling
2.6	IS 11448	Application Guide for AC Electricity Meters
2.7	IS 14697	AC Static Transformer Operated Watthour & Var-hour Meter
2.8	IEC 60050	International Electro Technical Vocabulary
2.9	IEC 60736	Testing Equipment for Electrical Energy Meters
2.10	IEC 61000	Electromagnetic Compatibility
2.11	IEC 62052	Electricity Metering Equipment General Requirement, Tests & Test Conditions
2.12	IEC 62053	Electricity Metering Equipment Particular Requirements
2.13	IEC 62058	Electricity Metering Equipment - Acceptance Testing
2.14	CBIP304	With latest amendments

In the event of direct conflict between various order documents, the precedence of authority of documents shall be as follows -

i. Guaranteed Technical Particulars (GTP)
ii. Specification including applicable codes & standards
iii. Approved Vendor Drawings
iv. Other documents

3.0 SERVICE CONDITIONS

3.1	Temperature Range	Operation range: -10 Deg C to 55 Deg C Limit range of operation: -25 to 60 Deg C Limit range of storage / transport : -25 to 70 Deg C

3.2	Relative Humidity	0 to 96 %

4.0 DISTRIBUTION SYSTEM DATA

4.1	Supply	3 phase 3 wire system
4.2	Voltage	11KV
4.3	Frequency	50 Hz ± 5%
4.4	System neutral	Solidly Earthed.

5.0 ELECTRICAL AND ACCURACY REQUIREMENTS

5.1	Meter Type	3 phase 4 wire static energy meter
5.2	Accuracy Class	0.5s as per IS14697
5.3	Connection	Transformer operated
5.4	Rated Voltage	3 x 63.5V (+30% & -40%)
5.5	Rated basic current	- / 5A
5.6	Rated maximum Current	Shall be two times of basic current.
5.7	Rated Frequency	50Hz +/- 5%
5.8	Power factor range	Zero Lag – unity – Zero lead
5.9	Power Consumption in Voltage circuit	Less than 1 Watt & 5 VA per phase
5.10	Power consumption in Current circuit	1 VA per phase
5.11	Starting and running with No load	As per IS14697
5.12	Starting current	0.1% of Ib
5.13	Meter constant	To be specified by bidder
5.14	Calibration	Meter shall be software calibrated at factory and modification in calibration shall not be possible at site by any means or external influence
5.15	Test Output Device	Separate kWh & kVAh/kVArh Flashing LED visible from the front
5.16	Process Technology	Surface Mounting Technology or better
5.17	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.18	Voltage dips and interruptions	As per IS14697
5.19	Short time over current	As per IS14697
5.20	Influence of heating and self-heating	As per IS14697
5.21	Immunity to earth/phase fault	As per IS14697
5.22	Limits of error due to Current variation	As per IS14697
5.23	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 14697/ IEC62053/ CBIP304 (most stringent standard to be followed) under and after influence of following :- a. Voltage variation

		b. Frequency variation c. 10% third harmonic in current d. Reversed phase sequence e. Voltage unbalance f. Harmonic components in current and voltage circuit g. DC and even harmonics in AC current circuit h. Odd harmonics in AC current circuit i. Sub harmonics in AC current circuit j. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. k. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. l. Alternating (AC) "stray' magnetic induction of 0.5mT+/-5% m. Alternating (AC) "abnormal' magnetic induction of 10mT. n. Alternating (AC) "abnormal' magnetic induction of 0.2T+/-5%. o. External magnetic field 0.5 T p. Electromagnetic HF fields q. Radio frequency interference r. DC immunity test
5.24	Limits of error due to ambient temperature variation	As per IS14697
5.25	Electromagnetic compatibility	As per IS14697
5.26	Other features	Mid night data: The meter should record midnight Cumulative kWh & kVAh, kVARh lag and kVARh lead reading for last min 60 days load survey data. Total Harmonic Distortion: Meter to record harmonic components in both current and voltage circuits. And should be available in on demand display. Meter to record events in case harmonic component in both V&I if it exceeds predefined limits.

6.0 CONSTRUCTION REQUIREMENTS

6.1	General	Construction should be in accordance with IS14697.
6.2	Base Body	Opaque, UV stabilized polycarbonate of grade LEXAN 142A/ 943AA or Equivalent with V0 inflammability level
6.3	Top Cover	Transparent, UV stabilized polycarbonate of grade LEXAN 142A/ 943AA or Equivalent with V0 inflammability level It should so be designed so as the internal components should not be visible.
6.4	Assembly of base body and top cover	By ultrasonic welding
6.5	Terminal block	a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall form Integral part of the meter

		base c. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.6	Terminal Cover	a. Material - UV stabilized transparent polycarbonate cover. LEXAN 143A/943AA or equivalent grade b. Provision of sealing at two points through sealing screw. c. Provision for cable entry from bottom. d. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable.
6.7	Terminals	a. Suitable for 6mm^2 stranded copper wire b. Material of terminals, screws and washers should be brass or tinned copper. Two flat head screws of appropriate size should be provided per terminal. c. Terminals shall be tested for continuous current of 150 % Imax. d. Terminals shall be clearly marked for CT/PT etc.
6.8	Ingress Protection	IP 51 or better, but without suction in the meter.
6.9	Output device	Meter should have flashing LED visible from the front to represent energy recording. LED shall be configurable for KWh, KVAh and KVArh. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.10	RTC	Meter shall have internal real time clock to set date and time. Time accuracy should be as per relevant IS/IEC. Meter should have facility for time synchronization locally through CMRI. It is preferable to have facility for remote synchronization through AMR. Clock correction events shall be registered in meter's memory.
6.11	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Battery removal or total discharge should not affect the working of the meter.
6.12	Memory	Non volatile memory independent of battery backup to store complete meter data. Data should be retained in the memory up to 10 year without any auxiliary power.
6.13	Self Diagnostic feature	Meter shall have self diagnostic for the following a. Date and RTC b. Battery c. Non volatile memory d. Display
6.14	Clearance and Creepage distance	As per IS 14697
6.15	Mounting	Surface / Flush mounted
6.16	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by

		thermal overload of live parts in contact with them as per IS 14697.
6.17	Electronic components	All active & passive components should be surface mounting type and shall be assembled by state of the art assembly processes.
6.18	Power Supply	The power supply should comply with the relevant standards. Power supply unit of the meter should not be affected in case maximum voltage of the system appears across the terminals due to faults or due to wrong connections.
6.19	Measurement/ computing chips	Measurement/computing ASICs should be surface mounting type.
6.20	Protection against Corrosion	a. Internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b. Mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.
6.21	Meter Sealing Arrangement	Sealing should be in accordance with IS and CEA metering regulations with latest amendments. Approval shall be taken from purchaser for location of seals.
6.21.1	Manufacturer's Seals	One Polycarbonate seal to be provided on meter cover.
6.21.2	BSES Seals	a. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram). Meter sides should not have sharp edges to avoid damage to hologram seals. b. One Hologram seal should be provided on each side of meter i.e two hologram seals should be provided. Meter sides should not have sharp edges to avoid damage to hologram seals. c. Polycarbonate seal should be provided on top cover. Seals will be issued to manufacturer free of cost.
6.21.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.21.4	Insulation	A meter shall withstand an insulation test of 4 KV and impulse test at 6 KV
6.22	Guarantee/ Warranty	66 months from the date of dispatch or 60 months from date of commissioning, whichever is earlier

7.0 FUNCTIONAL REQUIREMENTS

7.1	Billing data	a. Meter serial number b. Date and time c. Cumulative forwarded active energy d. Cumulative forwarded reactive energy (lag) &(Lead) e. Cumulative forwarded apparent energy f. Cumulative TOD energy values g. Cumulative Maximum Demand in kW , kVAr & kVA with date and time h. Last tamper occurrence and restoration details

		i. History for last 12 months i.e kWh, kVArh, kVAh, MD (in kW, kVAr and kVA with date and time), TOD energy readings. j. Monthly power on/off data for last 12 months Above data should be stored in meter memory. Instant profile : As per IS15959 part 1. In addition of following parameters Phase angles, Phasor diagram: Both for amplitude and angle of all 3V & I wrt to R phase voltage
7.2	Tariff basis	Lag only
7.3	MD Registration	Meter should store and display maximum demand in kW/kVA/kVAr with date and time. Demand integration period should be 30 minutes. It is preferred that MD is computed using separate counter rather than by difference of initial and final energy counter. Meter shall store MD in every 15/30 min. period along with date & time with sliding window (5 min interval) programmable. At the end of every 15/30 min, new MD shall be previous MD and store whichever is higher and the same shall be displayed. MD and load survey to be programmable in future. On a later date both MD and load survey can be programmed for 15/30 minutes. However accordingly load survey days shall vary.
7.4	Auto Reset of MD	Default auto reset date should be 00:00Hrs 1st day of month. Date and Time of MD reset should be programmable through CMRI. It should be possible to reset MD automatically at the defined date (or period) or through CMRI or through manual MD resetting push button.
7.4.1	kVAh Calculation	Lag only: KVAh is computed based on KVArh and KWH value. If PF=1, or leading, then KVAh = KWH. At no instance KVAh < KWh.
7.5	TOD metering	a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. Meter shall be capable of doing TOD metering for kWh, kVARh, kVAh and MD in kW, kVAR and kVA . Reactive parameter should be recorded separately for Lag and Lead. c. TOD programmable on site through CMRI or AMR remotely. d. At Display as well as BCS end meter TOD values shall be shown as per cumulative values of TOD

		Zones of respective registers. e. TOD metering shall be implemented by the activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 f. Special Day table shall be defined as per IEC/ DLMS UA-1000-1 g. Default TOD programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BSES for the same. h. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal R3: Rate Register for Off Peak
7.6	Load survey	15/30 min integration period, load profile of phase voltage (R, Y, B) with instant and average value and line, active and reactive current (R, Y, B) with instant and average value, and all three phase active, reactive (lag and lead) and apparent power and energy of 60 days (MD integration should be 15/30 min.) Apparent Energy, load, PF, THD in both current and voltage, phase-wise demand, power-off time integration period.
7.7	Time required for data reading from meter and downloading on desktop PC	a) Meter data consisting of all parameters and 60 days load survey for above parameters shall be read by CMRI /AMR and downloaded on desktop PC in minimum possible time. (The meter reading time should not be more than 5 minutes for complete set of data for CMRI and not more than 10 minutes for AMR). b) The software should have capability to transfer data from single CMRI to PC and the multiple CMRI data download to PC with a loader charger.
7.7	Security	a. Programmable facility to restrict the access to the information recorded at different security level such as read communication, write communication etc. b. Only RTC and TOD zone timing should be programmable in field. Every transaction for RTC and TOD change shall be logged in non volatile memory of the meter with date and time stamp.
7.8	Note	Please refer draft on CBIP proposal for meter standardization for definitions and requirement of MD, Power OFF, TOD, Load Survey and meter output for field testing. Meter should comply with the requirements.

8.0 EVENT AND TAMPER MONITORING

S No.	Parameters	BSES Requirement
8.1	Top Cover Open	Meter shall have top cover open detection and same shall be logged. Detection and logging mechanism shall work even when the meter is de-energized. Top cover open event should not get reset.
8.2	External Magnetic tamper	a. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS14697/ CBIP 304 with latest amendments. b. If the working of meter gets affected under the influence of external magnetic field, meter should record energy at Imax. Meter should not compute MD during this period. The meter shall record energy as per actual load once the magnetic field is removed.
8.3	Protection against HV spark/ESD	If the meter is subjected to HV spark/ ESD, meter shall continue to record energy or log the event. Upto 35 KV meter should remain immune. Communication port shall also be immune upto 35KV. Bidder should have valid test report from Sameer/ UL lab or any other NABL authorize Lab for the same.
8.4	Neutral disturbance	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.
8.5	Phase sequence reversal	Meter should work accurately irrespective of the phase sequence of the supply. Meter should log the event.
8.6	Detection of missing potential	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end
8.7	Low Voltage	Meter should log low voltage event if average voltage is below 75% of Vref.
8.8	High Voltage	Meter should log high voltage event if average voltage is above 115% of Vref.
8.9	Voltage Imbalance	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than 10% of Vref.
8.10	Abnormal/Invalid Voltage	Meter should log invalid voltage if phase angle between voltages deviates from the standard values by more than +/-10 degrees i.e. 120 +/- 10 degrees.
8.11	Reversal of Current Coil Polarity	Meter should log the event of reversal of C.C polarity. Meter should register energy consumed correctly with any one, two or all three current coils reversed.
8.12	Current Circuit Shorting / Bypass	Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at factory end.

8.13	Current Circuit Open	Meter should log the event of current coil open. Threshold value of current should be programmable at factory end.
8.14	Over current	If the current in any phase exceeds the rated current, meter should log over current event.
8.15	Current Imbalance	Meter should log current imbalance event when the difference between minimum and maximum phase current is more than 30% of I average.
8.16	Invalid Phase Association	Meter should log invalid phase association event if the voltage sequence does not match with the current sequence.
8.17	Power On/Off	Meter shall detect power OFF (minimum power off period 5 mins) if all phase voltages are absent. This event shall be recorded at the time of each power OFF. At the same time power ON event shall be recorded.
8.18	Tamper Logging	Last 200 nos. tamper events shall be recorded in meter memory on FIFO basis excluding top cover open. Last 20 events of top cover open tamper should be recorded in the memory including the first occurrence.
8.18.1	Parameter Snapshot	Snapshot of Date, time, three phase voltage, three phase current, neutral current, three phase power factor, active power, apparent power, cumulative kWH, cumulative KVAH etc should be recorded for each tamper event
8.18.2	Tamper Indication	For each tamper event and wrong wiring connection as sequence error. Phase association error, CT reversal, Phase- CT mismatch, one/two phase no voltage , appropriate Indication/Icon should appear on the meter display either continuously or in auto display mode. Icons appearing continuously are preferable.
8.19	Tamper Logics	Logic sheet for tamper/ event detection and logging should be submitted for purchaser's approval. Following details should be provided for each tamper in tabular form a. Detailed Tamper logic b. Threshold values c. Persistence time d. Restoration time e. Snapshot details

9.0 DISPLAY

9.1	Type	STN Liquid crystal, Pin type with backlight
9.2	Viewing angle	Minimum 160 degrees
9.3	UV Protection	The display modules should be well protected from the external UV radiations
9.4	Size	Minimum 10X5mm
9.5	Digits	8 digits
9.6	Language	English
9.7	Display Parameters	Parameters to be displayed are given below

9.7.1	Auto scroll mode	a. LCD test b. Meter serial no. c. Date d. Time e. Cumulative Active Energy (forwarded) f. Cumulative Apparent Energy (forwarded) g. Cumulative Reactive Energy Lag & Lead h. Instantaneous load in kW, kVAr & kVA i. Phase wise voltage and current (R, Y, B phases) j. Instantaneous average power factor with sign for lag/lead k. Active Maximum demand with date and time l. Apparent Maximum demand with date and time m. TOD Total Active Forward Energy Register(Reg 1) n. TOD Total Active Forward Energy Register(Reg 2) o. TOD Total Active Forward Energy Register(Reg 3) p. TOD Total Active Forward Energy Register(Reg 4) q. TOD Total Active Forward Energy Register(Reg 5) r. TOD Total Active Forward Energy Register(Reg 6) s. TOD Total Active Forward Energy Register(Reg 7) t. TOD Total Active Forward Energy Register(Reg 8) u. TOD Apparent Forward Energy Register(Reg 1) v. TOD Apparent Forward Energy Register(Reg 2) w. TOD Apparent Forward Energy Register(Reg 3) x. TOD Apparent Forward Energy Register(Reg 4) y. TOD Apparent Forward Energy Register(Reg 5) z. TOD Apparent Forward Energy Register(Reg 6) aa. TOD Apparent Forward Energy Register(Reg 7) bb. TOD Apparent Forward Energy Register(Reg 8) cc. Cumulative tamper count dd. Tamper status Scroll time should be 6 Sec
9.7.2	Manual Display mode (push button mode)	Following parameters should be displayed in addition to parameters displayed in Auto display mode - a. Cumulative power on hours b. Cumulative power off hours c. Number of power failures d. Instantaneous phase wise power factor with sign for lag/lead e. Frequency f. Cumulative Billing counts g. Cumulative programming count h. Billing date i. Last month billing Active energy reading j. Last month billing Reactive energy reading-Lag k. Last month billing apparent energy reading l. Last month billing Maximum Demand in Active with date and time m. Last month billing Maximum Demand in Apparent with date and time n. High resolution active forwarded energy o. High resolution reactive lag forwarded energy p. High resolution reactive lead forwarded energy

		q. High resolution apparent forwarded energy r. Present PT Status s. Present CT Status t. THD for both Voltage and Current u. Last occurred and restored tamper with date and time The meter display should return to Default Display mode (mentioned above) if the 'push button' is not operated for more than 6 seconds. Scroll lock facility should be provided by pressing scroll push button for long duration (10-15 sec). Lock should be released by repeat action
9.7.3	Tamper indications	As per clause 8.18.2.
9.7.4	Self Diagnostic Indications	Appropriate indication for each self diagnostic feature should be displayed continuously irrespective of display mode (auto/manual).
9.7.5	Connection check	Appropriate indication to be displayed continuously in case of current/voltage connection error

10.0 SOFTWARE AND COMMUNICATION

10.1	Base computer software	Licensed Software with the following features should be supplied for free
10.1.1	Operating System	BCS should be compatible for Windows XP, Vista, 7 and 8.
10.1.2	Security	System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security.
10.1.3	Data access	BCS shall be capable of accessing complete data stored in meter memory locally through PC and remotely through modem (RF/NBIOT/4G/GPRS etc.) for connectivity to AMR. BCS shall also be capable of reading CMRI data. BCS should have polling feature with option of selecting parameters to be downloaded i.e billing data, event/tamper logging data etc.
10.1.4	Database	BCS shall maintain master database according to desired area, location, and region etc.
10.1.5	Reporting	a. BCS shall have option of user defined report generation in format of Excel, Word and CSV, XML, PDF etc. b. BCS shall have capability to export data in ASCII, CSV and XML format at desired location so that the same could be integrated with our billing data for processing. c. All the data available in the meter shall be convertible to user defined ASCII, CSV and XML file format.
10.2	CMRI Software	Manufacturer has to provide software capable of downloading data through CMRI. Software required for CMRI shall be supplied by the supplier for free of cost. Training in the use of software shall be provided by the manufacturer. The software shall be compatible to latest windows systems.

10.2.1	Integration	In the event of order, bidder shall work with BSES IT team to integrate CMRI software with BSES billing system i.e meter downloading, uploading data on computer etc. Meter reading protocols shall be shared with BSES.
10.2.2	Data access	CMRI software should be capable of downloading complete data stored in the meter memory. Software should have option for selection of parameters to be downloaded from meter i.e billing data, event/tamper logging data etc. Billing data should be downloadable using CMRI within 1 minute.
10.2.3	Suitability	CMRI software shall work both on SANDS & Analogic make CMRI.
10.3	Training	Manufacturer shall impart training to BSES personnel for usage of software
10.4	Communication Ports	Communication ports required in meter are as follows
10.4.1	Optical Port	Meter shall have one optical port. It should be compatible for data transfer over RS 232 standard
10.4.2	RJ11 Port	One RJ11 (6P4C) port should be provided. Please refer Annexure - B for pin configuration. Port should be compatible for communication on RS232 standard and should have cover with provision of sealing. It is preferable to have RJ11 port outside the terminal cover subject to ESD immunity upto 35 KV.
10.4.3	Port protection	All ports shall be galvanically isolated from the power circuit.
10.4.4	Operation	Both ports should work independently. Failure of one port (including display) should not affect the working of other port.
10.5	Communication protocol	DLMS/ Proprietary protocol. Integration of meters with BSES system will be supplier's responsibility.
10.6	Data transfer rate	BCS and communication ports should support data transfer rate of 9600 bps (minimum).
10.7	Data downloading cable	a. Meter reading cable of 1m length with optical sensor at one end and D type female 9 pin connector on other end should be provided with each meter. b. Optical port on meter and optical sensor should have mechanical arrangement so that the sensor can be securely placed on the optical port of meter at the time of installation for hassle free data downloading. c. D type female connector should be suitable for mounting on meter box. Suitable mounting accessories should be supplied alongwith the cable. d. Refer Annexure – C for detailed cable configuration.
10.8	Software & communication compatibility	a) Optical port with RS 232 compatible to transfer the data locally through CMRI & remote through GSM /GPRS/3G/4G technology to the main computer. b) The supplier shall supply Software required for CMRI & for the connectivity to AMR modules. The supplier shall also provide training for the use of software. The software should be compatible to Microsoft Windows systems

		(latest). Reading can be done through scheduling in BCS or through manual polling for AMR. c) Necessary provision shall be made in the software for converting all the parameters available for all open protocol meters. d) The data transfer (from meter to CMRI / AMR equipment) rate should be 9600 bps or more. e) Offered meter be DLMS protocol compliant. Bidder shall share additional vendor specific protocol if used in meter.
10.9	Memory	Non volatile memory independent of battery backup, memory should be retained up-to 10 year in case of power failure.

11.0 NAME PLATE

11.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour. Embossing is not acceptable**.** (Should also be stored in meter memory and should be downloadable)
11.2	Size of the digit shall be minimum 5X3mm. Details shall be laser printed.
11.3	Bar code shall be printed below the serial number
11.4	BIS registration mark (ISI mark)
11.5	'BSES' logo should be printed above LCD display. Property of BSES
11.6	BSES PO No. & date
11.7	Manufacturers name and country of origin
11.8	Model type / number of meter
11.9	Month and Year of manufacturing (Should also be stored in meter memory and should be downloadable)
11.10	Reference voltage and current rating
11.11	The number of phases and the number of wires for which the meter is suitable. Graphical symbol as per IS 12032 can be used.
11.12	Meter constant Impulse/kWh, Impulse/ kVAh, Impulse/ kVArh
11.13	Class index of meter
11.14	Reference frequency
11.15	Warranty period
11.16	Connections, diagrams and terminals shall be marked / provided in accordance with Indian Standard.

12.0 APPROVED MAKES OF COMPONENTS

SN	Component Function	Requirement	Makes and Origin
12.1	Measurement or 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, Atmel, Phillips, Texas Instruments, SAMES, NEC
12.2	Memory chips	The memory chips should not be affected by the external parameters like	USA: Atmel, National Semiconductors, Texas Instruments, Phillips, ST,Microchip Japan: Hitachi or Oki

		sparking, high voltage spikes or electrostatic discharges.	
12.3	Display modules	a) The display modules should be well protected from the external UV radiations. b) The display visibility should be sufficient to read the Meter mounted at height of 0.5 meter as well as at the height of 2 meters (refer 3.2.d for Viewing angle). c) The construction of the modules should be such that the displayed quantity should not disturbed with the life of display (PIN Type). d) It should be trans-reflective HTN or STN type industrial grade with extended temperature range minimum 70	Japan: Hitachi, Sony Holland / Korea: Phillips Truly Semiconductor Tianma/Hijing Electronics
12.4	Communication modules		USA: National Semiconductors, HP, Optonica,ST, Holland / Korea: Phillips Japan: Hitachi Germany: Siemens
12.5	Optical port	a) Optical port should be used to transfer the meter data to meter reading instrument. b) The mechanical construction of the port should be such to facilitate the data transfer easily. 9 pin connector of optical port shall be FCI copper type.	USA: National Semiconductors ,HP Holland / Korea: Phillips Japan: Hitachi, Truly Semiconductor, Agillent, OSRAM, Everlight
12.6	Power supply unit	The power supply should be with the capabilities as per the relevant standards. The	SMPS Type, reputed make

		power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	
12.7	Active & passive components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal wires. LED	USA: National Semiconductors, Atmel, Phillips, Texas Instruments, ST, Onsemi, Japan: Hitachi, Oki, AVX or Ricoh, Samsung, Everlight, Agillent Everlight, Agillent
12.8	Battery	Lithium with guaranteed life of 15 years.	Varta, Texcell, SAFT
12.9	RTC	The accuracy of RTC shall be as per relevant IEC / IS standards	USA: Philips, Dallas Atmel, Motorola, Microchip , NEC or Oki
12.10	Mechanical parts	a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.	
12.11	Current Transformers	The meters should be with the current transformers as measuring elements. The current transformer should withstand as per	The current transformer should withstand as per specifications/standards.

		specifications/standards.	
12.12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	
12.13	Note		a. Manufacturer shall intimate deviation if any from make of components. Any deviation is subject to approval of BSES based on supporting documents and performance feedback of the components. b. Manufacturer should have complete tracking of material used in meter. BSES reserve the right to carry out audit of inventory/ manufacturing process at manufacturer's works and sub vendor's work. c. The components used by manufacturer shall have "Minimum Life" more than the 10 years. d. Even for existing/ par suppliers – fresh approval is needed for all deviations

13.0 QUALITY ASSURANCE, INSPECTION AND TESTING

13.1	Quality Assurance Plan (QAP)	To be submitted for Purchaser's approval.
13.1.1	Inspection Hold-Points	To be mutually identified, agreed and approved in QAP.
13.1.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.
13.2	Type Tests	a. The meter shall be of type tested quality as per relevant IS/IEC/CBIP. Type test conducted at CPRI/ ERDA/ ERTL labs will be treated as valid. b. The test report should not be more than 5 years old. In case any modification affecting only part of meter is made after type test, only specific type tests on the affected parts shall be repeated. c. Type test certificate should be submitted along with offer for scrutiny. d. For a manufacturer supplying meter for the first time, complete type tests will have to be carried out on sample randomly selected from the lot offered for inspection in event of order. 35kV ESD test will also be carried out on the sample at Sameer/UL lab. e. For regular suppliers, revalidation of meter design

		should be carried out by repeating the type tests on sample randomly selected from BSES lot at CPRI/ERDA every three years f. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable.
13.3	Routine tests	All test marked "R" as per IS14697
13.4	Acceptance Tests	a. All tests marked "A" as per IS14697. b. Dimensional and drawing verification. c. Display parameters/ sequence. d. Data Downloading from CMRI and PC. e. Tamper detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. f. Burn in chamber test. g. Component verification. h. Purchaser reserves the right to formulate any other test method to verify guaranteed parameters of Meter.
13.5	Inspection	a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller's works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests as per clause 13.4 during inspection. All the testing equipment should be calibrated. c. In-process and / or final inspection call intimation shall be given at least 15 days in advance to the purchaser.
13.6	General Requirements	**a)** The internal potential links should be in closed position or link less meters will be preferred and there shall not be any external link. **b)** Terminal cover should be fixed on the meter before dispatch. **c)** The bidder shall maintain a web site where routine test results of all meter supplied against these tender will be maintained and will be accessible to buyer/ buyer representative. **d)** Vendor shall ensure that patch required for HHU/CMRI shall be provided within 4 weeks. Vendor shall also ensure to deliver solution to meet DERC mandate within mutually agreed timeline. **e)** Delivery of software for reading through HHU/CMRI before meter delivery is required. **f)** For any false events recorded in meter, vendor shall depute their representative for field visit within one week and provide the root cause

		analysis in 4 weeks time.

14.0 SHIPPING, HANDLING AND SITE SUPPORT

14.1	Packing	Every metes shall be properly sealed / packed in environmental friendly boxes/ cartons for protection against damage, vibration and ingress of dust and moisture.
14.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label.
14.3	Marking	Following details are required on each packing case: a. Individual serial number b. Purchaser's name c. PO number (along with SAP item code, if any) & date d. Equipment Tag no. (if any) e. Destination f. Manufacturer / Supplier's name g. Address of Manufacturer / Supplier / it's agent h. Type , rating and other description of equipment i. Country of origin j. Month & year of Manufacturing k. Case measurements l. Gross and net weights in kilograms m. All necessary slinging and stacking instructions
14.4	Test reports	Routine test report to be provided with each meter
14.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.
14.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.

15.0 DEVIATIONS

15.1	Deviation	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.

16.0 DOCUMENT AND DRAWING SUBMISSION

16.1	The seller has to submit following along with bid
16.1.1	GTP (duly filled-in) (as per Annexure — A)
16.1.2	Deviation sheet, if any.
16.1.3	GA / cross sectional drawing of Meter showing all the dimensions
16.1.4	4 no's samples along with software and accessories.
16.1.5	Tamper logic sheet.
16.1.6	Detailed reference list of customers using the offered product during the last 5 years with similar design and rating
16.1.7	Manufacturer's quality assurance plan and certification for quality standards
16.1.8	Type test reports for the same type, size & rating of Meter offered

16.1.9	Complete product catalogue and Manual.
16.1.10	Details of recommended accessories / software or any other hardware for five years of operation.
16.2	Seller has to submit following drawings for buyer's Approval/ Reference after award of contract -
16.2.1	Program for production and testing
16.2.3	4 no's samples along with software and accessories for Lab testing
16.2.4	Guaranteed Technical Particulars
16.2.5	GA / cross sectional drawing of Meter showing all the dimensions
16.2.6	Tamper logic sheet.
16.2.7	Makes of components
16.2.8	Terminal arrangement with dimensions
16.2.9	Detailed installation and commissioning instructions
16.2.10	Quality assurance plan
16.3	Submittals required prior to dispatch
16.3.1	Inspection and test reports, carried out in manufacturer's works
16.3.2	Test certificates of all bought out items
16.3.3	Operation and maintenance Instruction as well as trouble shooting charts/ manuals
16.3.4	Drawing and document sizes Standard size paper A4
16.3.5	Duly signed & stamped copies of the drawings / documentation
16.3.6	Consolidated report including routine test, seal record and initial reading record as per BSES format.
16.3.7	Other documents: a. Completely filled-in Technical Parameters b. General arrangement drawing of the meter c. Rating plate d. Terminal Block dimensional drawing e. Mounting arrangement drawings f. Meter box drawing and dimensions g. Display parameter h. PIN configuration of Optical to RJ11 connector i. Manual and SOP/DWI for operation

ANNEXURE – A - GUARANTEED TECHNICAL PARTICULARS (DATA BY SUPPLIER)

Bidder shall furnish the GTP as per format provided below. All the clauses of the specification shall be covered in GTP. Any deviation or comments shall be specifically mentioned against each clause. No comments or deviation will be treated as acceptance.

Complete GA drawing, technical literature, operation and maintenance manual of hardware/ software shall be provided with technical bid.

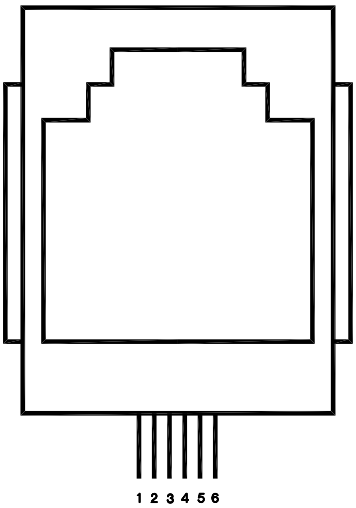
Incomplete technical bids are liable to be rejected without any intimation.

Clause no	Description	Compliance of the clause YES / NO	Deviation / Remarks
1			
2			
3			
4			
5			
6			

Bidder / Vendor seal / signature ----------

Name of the bidder	
Address of bidder	
Name of contact person	
Telephone no & email id	

ANNEXURE – B – RJ11 PORT DETAILS

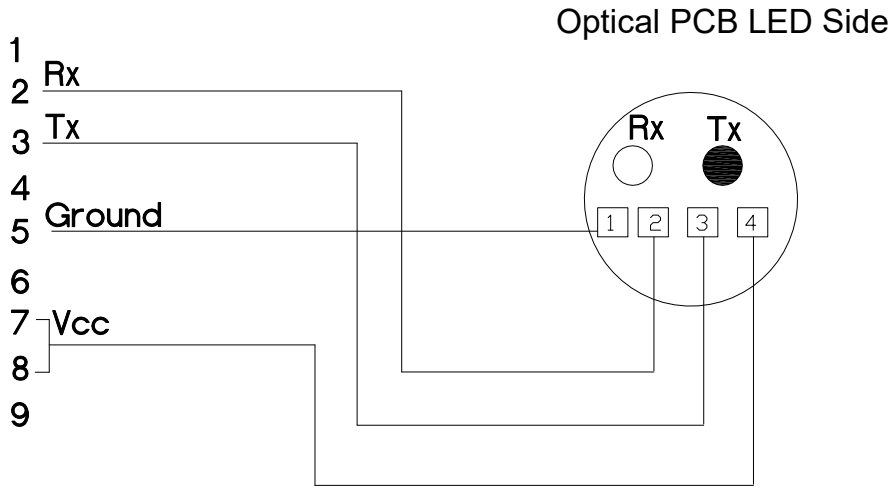


RJ- 11 PORT

PIN OUT DETAIL		
PIN	SIGNAL	DISCRIPTION
1	NC	———
2	GND	GROUND
3	TXD	RS 232 TRANSMIT
4	GND	GROUND
5	RXD	RS 232 RECEIVE
6	NC	———

ANNEXURE – C – CONFIGURATION OF OPTICAL CABLE

D-Female connector



BSES

Technical Specification for

Single Phase Whole Current Smart Meter

Specification no –

BSES-TS-26-SPWSM-R0

Rev		0
Date		13 April 2022
Prepared By	Shweta Dixit	Shweta
	Ashish Joshi	Ajoshi
Reviewed By	Puneet Duggal	
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	Lalit Mukhriya	Lalit Mukhriya
Approved By	Gaurav Sharma	Gaurav
	Manish Jain	MKJain

Index

Record of Revision

Item/Clause No.	Change in Specification	Approved By	Rev

1.0 Scope of Supply

This specification covers the following for Single Phase 240 V, 10A-60 A Static Watt hour smart meters of accuracy class 1.0 with plug in communication modules suitable for cellular communication module (4G with fallback on 2G / NBIoT with fallback on 2G) and integrated load control switches.

A. Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.

B. Any accessories / hardware required for installation and operation for the meter.

2.0 Codes & standards

Materials, equipment and methods used in the manufacturing of above mentioned equipment shall conform to the latest edition/ of following

SL	Standard Number	Title
2.1	Indian Electricity Act	IE Act 2003
2.2	CEA Metering Regulations	With latest amendments
2.3	CBIP Manual (Pub no.-325)	Standardization of AC Static Electrical Energy Meters
2.4	IS- 16444 (Part 1)	AC Static Transformer Operated Watt-hour Smart Meters, Class 1.0 and 2.0 Part 1 Specification
2.5	IS- 13779	AC Static Watt-hour Meters, Class 1 and 2 – Specification
2.6	IS-15959 (Part 1)	Data Exchange for Electricity Meter - Reading Tariff and Load Control - Companion Specification
2.7	IS-15959 (Part 2)	Data Exchange for Electricity Meter - Reading Tariff and Load Control (Part 2)- Companion Specification for smart meter
2.8	IS- 11448	Application guide for AC Electricity meters
2.10	IEC- 62052-11	Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: Metering equipment
2.11	IEC- 62053-21	Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2)
2.12	IEC- 62053-52	Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols
2.13	IEC 62053-61	Electricity metering equipment (A.C.) - Particular requirements - Part 61: Power consumption and voltage requirements
2.14	IEC 62058-11	Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods
2.15	IEC 62058-31	Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2)
2.16	IEC 60736	Testing Equipment for electrical Energy meter
2.17	IS/IEC/TR 62051:Part 1:2004	Electricity Metering — Data Exchange For Meter Reading, Tariff And Load control — Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM

2.18	IEC 62056-1-0:2014	Smart metering standardisation framework
2.19	IEC 62056-3-1:2013	Use of local area networks on twisted pair with carrier signalling
2.20	IEC 62056-4-7:2014	DLMS/COSEM transport layer for IP networks
2.21	IEC 62056-5-3:2017	DLMS/COSEM application layer
2.22	IEC 62056-6-1:2017	Object Identification System (OBIS)
2.23	IEC 62056-6-2:2017	COSEM interface classes
2.24	IEC 62056-6-9:2016	Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols
2.25	IEC 62056-7-3:2017	Wired and wireless M-Bus communication profiles for local and neighbourhood networks
2.26	IEC 62056-7-5:2016	Local data transmission profiles for Local Networks (LN)
2.27	IEC 62056-7-6:2013	The 3-layer, connection-oriented HDLC based communication profile
2.28	IEC TS 62056-8-20:2016	Mesh communication profile for neighbourhood networks
2.29	IEC TS 62056-9-1:2016	Communication profile using web-services to access a DLMS/COSEM server via a COSEM Access Service (CAS)
2.30	IEC 62056-9-7:2013	Communication profile for TCP-UDP/IP networks
.31	IEC 62056-21:2002	Direct local data exchange
2.32	DLMS- White Book	Glossary of DLMS/COSEM terms
2.33	DLMS- Blue Book	COSEM meter object model and the object identification system
2.34	DLMS- Green Book	Architecture and protocols to transport the model
2.35	DLMS- Yellow Book	Conformance testing process
2.36	IEEE 802.15.4	Standard for Local and metropolitan area networks.
2.37	IEEE 802.15.4u	Standard for Local and metropolitan area networks (Use of the 865 MHz to 867 MHz Band in India)
In the event of direct conflict between various order documents, the precedence of authority of documents shall be as follows-		
i	Guaranteed Technical Particulars (GTP)	
ii	Specification including applicable codes & standards	
iii	Approved Vendor Drawings	
iv	Other documents	

3.0 Service Conditions

3.1	Temperature Range	Operation range: -10 Deg C to 55 Deg C Limit range of operation: -25 to 60 Deg C Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4.0 Distribution System Data

4.1	Supply	1 Phase AC, 2 wire
4.2	Voltage	240 V ± 6%
4.3	Frequency	50 Hz ± 5%
4.4	System Neutral	Solidly Earthed

5.0 Electrical and Accuracy Requirement

5.1	Meter Type	a. Type 1: 1- ø, 2 wire Static Watt-hour Smart Meter b. Type 2: 1- ø, 2 wire Static Watt-hour Smart Meter fitted in polycarbonate enclosure. c. Meter Type 1/ Type 2 shall be offered as per purchaser's requisition.
5.2	Connection	Direct / whole current
5.3	Rated Voltage	240V (phase to neutral) with variation of +30% & -40%. However meter should withstand the maximum system voltage.
5.4	Rated Current	Ib -10A and Imax- 60 A
5.5	Starting current	0.2 % of base current
5.6	Rated Frequency	50Hz +/- 5%
5.7	Accuracy Class	1.0 (IS16444 Part 1 applies for accuracy requirements)
5.8	Power Consumption	As per IS 16444 (Part 1) Meter with lowest power consumption shall be preferred.
5.9	Meter constant	a. Imp/ unit (Bidder to specify meter constant) b. Separate output LED for kWh and kVAh shall be provided for testing of meter in field.
5.10	Calibration	Meter shall be software calibrated at factory and modification in calibration shall not be possible at site by any means or external influence.
5.11	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.12	Influence of supply voltage	As per clause 4.4.2 of IS 15884
5.13	Short time over current	As per clause no. 4.4.3 of IS 15884
5.14	Immunity to phase and earth fault	As per clause no. 9.6 of IS 13779
5.15	Influence of Self Heating	As per clause no. IS 4.4.4 of IS 15884
5.16	Influence of Heating	As per clause no. IS 4.4.5 of IS 15884

5.17	Electromagnetic compatibility	a. Meter shall remain immune to electrostatic discharge (upto and including 35KV), electromagnetic HF field and fast transient burst. Along with NIC b. The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter. c. Meter shall be type tested for electromagnetic compatibility. d. Meter shall comply requirement of clause no. 4.5 and 5.5 of IS 15884.
5.18	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 13779/ CBIP 325 (most stringent standard to be followed) under and after influence of following :- a. Current Variation b. Ambient Temperature variation c. Voltage variation d. Frequency variation e. 10% third harmonic in current f. Reversed phase sequence g. Voltage unbalance h. Harmonic components in current and voltage circuit i. DC and even harmonics in AC current circuit j. Odd harmonics in AC current circuit k. Sub harmonics in AC current circuit l. Continuous (DC) “stray” magnetic induction of 67mT+/-5%. m. Continuous (DC) “abnormal” magnetic induction of 0.27T+/-5%. n. Alternating (AC) “stray’ magnetic induction of 0.5mT+/-5% o. Alternating (AC) “abnormal’ magnetic induction of 10mT. p. External magnetic field 0.5 T q. Electromagnetic HF fields r. Radio frequency interference s. DC immunity test Note: BSES reserves the right to formulate any other test method to check magnetic immunity/ logging of meter. Meter with logging provision will be preferred.

6.0 Construction

6.1	General	Construction of meters shall confirm to the IS 16444 (Part 1)
6.2	Base Body	Material - Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level.
6.3	Top Cover	a. Material – Transparent/Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V0 inflammability level. b. Top cover and base should be Ultrasonically/Chemically welded. c. Mechanism shall be provided to log event in case of top cover is opened. Bidder shall explain its mechanism.

6.4	Terminal Block	a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The minals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.5	Terminal cover	a. Type 1: The terminal cover shall be extended type with 2 no's holes of minimum 30 mm in diameter for cable entry. b. Type 2: Short terminal cover with U cut suitable for entry of 2CX25 Sqmm Cable. c. Material - UV stabilized transparent/Opaque polycarbonate cover. d. Provision of sealing through sealing screws. e. The sealing screws shall be held captive in the terminal cover. f. Terminal cover should have provision for cable entry from bottom. g. Diagram of external connections should be embossed on terminal cover. Sticker is not acceptable. h. Mechanism shall be provided to record an event with occurrence and restoration in case of terminal cover is opened. Bidder shall explain its mechanism.
6.6	Terminals	a. Terminals shall be suitable upto 25 Sqmm aluminium stranded cable. b. Two no's flat head screws and washers per terminal shall be provided c. Material of terminals, screws and washers should be brass or tinned copper. Terminals shall be tested for continuous current of 150 % Imax. d. Terminals shall be clearly marked for phase / neutral / outgoing etc. e. Clearances and creep age shall be as per IS 13779.
6.7	Ingress Protection	IP 51 or better, but without suction in the meter.
6.8	Test Output device	Meter should have flashing LED visible from the front to represent energy recording. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.9	RTC	a. The meter shall have internal real time crystal clock to set date and time. b. Drift in time of this clock shall not be more than ±5minutes/ year at a reference temperature of 27°C. c. Meter should have capability of Time synchronization through optical port/ remote communication with proper security. d. Meter RTC shall be corrected automatically by the system in synchronization to the network RTC. e. HES will sync RTC at least once a day.

6.10	Battery	a. Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Lithium thionyl Chloride battery will be preferred. In case battery removal or total discharge same should not affect the working & memory of the meter even in case of single wire power condition.
6.11	Memory	b. Non volatile memory independent of battery backup, memory should be retained up to 10 year without any auxiliary power.
6.12	Self Diagnostic feature	a. Meter shall have self diagnostic for the following b. Date and RTC. c. Battery. d. Non volatile memory. e. Display
6.13	Load Control Switch	a. Smart meter shall be equipped with integrated load control switches to control flow of electricity to the load at the instance of connect/ disconnect commands as per functional need of the system. b. Load switch for connect/ disconnect purpose shall be mounted inside the meter with suitable arrangement. c. Load Switches shall be provided in both phase and neutral d. The rating of switches used shall be in line with meter rating. e. Utilization category of the load switch shall be UC2 as per IS 15884. f. Bidder to provide details of load switch (make, type) with technical document.
6.13.1	Performance requirement for load switching	a. Utilization category of the load switch shall be UC3 as per clause no. 4.6.6.2 of IS 15884. However switch shall comply minimum UC2 category with complete meter unit. b. Minimum 5000 operations/cycles shall be supported (5000 make and 5000 break operations) as per UC3 category. c. All load switches shall operate simultaneously.
6.14	Optical port	Meter shall have an optical port with a rust resistance coated metal ring to hold magnet of downloading probe. Optical port shall comply with hardware specifications provided in IEC-62056-21.

6.15	Communication Module Interface	a. Meter should have the provision for 01 no's plug in communication module for connectivity. The same interface shall be compatible with Cellular, RF and PLC communication technologies interchangeable in field. b. Interface shall support data transfer between meter and network interface card over standard interface (e.g. UART/ RS232). Bidder shall explain its pin out and Voltage and current standard in detail. c. Meter shall have mechanism to log communication module removal as an event in its memory with date and time stamp. d. Meter Vendor shall work with BSES designated RF, provider to integrate their module in the meter e. Requirement of RF I ntegration with communication system.. f. Preferred location of communication card module shall be on top of meter. g. Communication module shall be held in a casing which can be directly plugged in the meter. Sealing screw shall be provided. h. Module shall be hot swappable on field.
6.15.1	Communication modules (NIC)	a. Smart meter shall have 01 no's plug-in type communication modules/ Network Interface card (NIC) for connectivity of meter to HES from following options as per tender requirement: b. Communication Module/ NIC Type 1: Only NAN/ WAN: RF based suitable for communication Network of BSES designated RF canopy provider. c. Communication Module/ NIC Type 2: Only WAN: LTE 4G/ NBIOT with 2G fall back as per Indian telecom Standards. d. Communication Module/ NIC Type 3 : Only NAN/ WAN: RF and cellular communication module (LTE 4G/ NBIOT and 2G fall back as per Indian telecom Standards). e. Communication Module/ NIC Type 4 : NAN/ WAN: Integrated RF and cellular communication module (LTE 4G/ NBIOT with 2G fall back as per Indian telecom Standards) and HAN: Zigbee / Bluetooth. f. Meter shall have separate indications on display/ for remote and local communication. g. Network Interface card (NIC) shall be transparent type. h. Communication module shall held in a casing which can be directly plugged in the meter. Sealing screw shall be provided.
6.16	Super capacitor	Meter shall have super capacitors to provide power supply for communication module in the absence of power failure for last gasp signal. The Super capacitor rating should be suitable for supply power to communication module without the use of battery backup.
6.17	Meter Sealing Arrangement	a. Sealing should be in accordance with IS and CEA metering regulations with latest amendments. b. Sealing arrangement shall be such that sealed parts shall

		not be opened without breaking the seal or sealed part itself. There should be clear evidence of the breaking in case sealed parts shall be opened without breaking the seal. c. Approval shall be taken from purchaser for location of seals and number of seals.
6.17.1	Manufacturer's Seals	a. One Polycarbonate seal to be provided on meter cover. b. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram).
6.17.2	BSES Seals	a. Minimum one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. Seal should not be just Hologram sticker (100% hologram). Meter sides should not have sharp edges to avoid damage to hologram seals. b. Minimum one Polycarbonate seal should be provided on top cover. c. Seals will be issued to manufacturer free of cost. d. Minimum 01 no's polycarbonate seals shall be provided for communication module.
6.17.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.18	Name Plate and marking	a. Meter should have clearly visible, indelible and distinctly marked name plate in accordance with IS 16444 (Part 1) & clause no. 9.0 of this specification. b. All markings and details shall be printed by laser only. c. Paper stickers are not allowed for name plate.
6.19	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 13779.
6.20	Meter Enclosure	As per Annexure 'E' if required in purchaser's requisition. Meter shall be factory fitted in meter enclosure by unidirectional screws.
6.21	Guarantee	a. 7.5 years from the date of dispatch or 7 year from date of commissioning, whichever is earlier b. Manufacturer shall undertake a guarantee to replace meter up to a period of 7 Year from the date of supply. The meters which are found defective/inoperative within the guarantee period, these defective/inoperative meters shall be replaced within one month of receipt of report for such defective/inoperative meters.

7.0 Functional Requirement

7.1	Meter category	Smart meter comply with D1 category of IS 15959 (Part 2).

7.2	Mode of metering	It should be possible to configure meters in following modes of metering: a. Forwarded Only: In this mode any export active energy shall be treated as import energy and shall be recorded in forward only register. Apparent energy calculation shall be as per tariff basis mentioned in clause '7.4' b. Bidirectional: Both Import and export energy recording shall be applicable in this mode of metering and relevant registers shall be updated. Any change in metering mode shall be logged in events with date and time stamp. Default mode of metering shall be forwarded only until specified otherwise.
7.3	Payment Mode	It should be possible to configure meter in following modes of payment: a. Post payment mode b. Prepayment Mode Any change in payment mode shall be logged in events with date and time stamp. Prepayment facility shall be achieved by server / HES. Default mode of metering shall be post payment until specified otherwise.
7.4	KVAH Calculation	Lag only: KVAh is computed based on KVArh and KWH value. If PF=1, or leading, then KVAh = KWH. At no instance KVAh < KWh.
7.5	MD calculation	Block window with default demand integration period of 1800 s configurable to 900 s as per requirement. Meter should be configurable for block window at the time of manufacturing. This change should not be possible in the field. Extended register shall be used for MD recording.
7.6	TOD Metering	a. Meter shall be capable of doing TOD metering in minimum 4 tariff rate registers programmable for minimum 8 time zones and 4 seasonal profiles. b. Meter shall be capable of doing TOD metering for kWh, kVARh, kVAh and MD in kW, kVAR and kVA . Reactive parameter should be recorded separately for Lag and Lead. c. TOD programmable on site through CMRI or AMR remotely. d. TOD metering shall be implemented by the

		activity colander method of IS 15959 Part 1 clause 9/ DLMS UA-1000-1 e. Special Day table shall be defined as per IEC/ DLMS UA-1000-1 f. Default TOD programming shall be as per latest DERC guidelines. Prior approval shall also be taken from BSES for the same. g. Tariff rate registers shall be as follow R1: Rate register for Peak R2: Rate register for Normal R3: Rate Register for Off Peak
7.7	Instantaneous Parameters	All the parameters mentioned in table 'A1' of IS 15959 (Part 2) along with following additional parameters shall be supported by meter: a. RF/ GPRS/4G signal Strength in milli db. b. Displacement PF. c. GPS coordinates. d. Temperature in Deg C. e. Cumulative kVArh- Q1 f. Cumulative kVArh- Q2 g. Cumulative kVArh- Q3 h. Cumulative kVArh- Q4 i. Maximum Demand, in kVAr Parameter mentioned on 'g; and 'h' will be applicable in bidirectional mode only.
7.7.1	Association rights	As per clause 11.1.1 of IS 15959 (Part 2).
7.8	Billing data	a. Billing parameters shall be generated at the end of each billing cycle and stored in memory as per provisions provided in clause no. 14 of IS 15959 (Part 2). b. 6 no's billing cycle parameters shall be remain in meter memory along with current cycle parameters and shall be available for reading as well as profile and or 'by entry' for selective access. All the parameters mentioned in table 'A4' of IS 15959 (Part 2) shall be supported by meter c. Meter serial number, Date and time, kWH, kVAh, kVArh (lag & lead), MD in kW, KVAr(lag & lead) & kVA, History of kWh & kVAh , MD with occurrence detail for last at least 6 months along with TOD readings & meter shall log monthly ON/ Off hrs as history. It will be possible to change TOD in future using handheld device.

7.8.1	Association Rights	As per clause 14 of IS 15959 (Part 2).
7.8.2	Selective access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.8.3	Billing period reset/ MD reset	00:00 Hrs of Ist of every month
7.8.4	Billing period reset mechanism	As per clause 10 of IS 15959 (Part 1)
7.8.5	Billing period counter	Cumulative billing period counter since installation and available billing periods shall be provided as per clause 11.2 of IS 15959 (Part 1).
7.9	Load survey Parameters	a. Load survey parameters shall be measured and recorded at the end of each profile capture period for last 35 Power ON days. b. All the parameters mentioned in table 'A2' of IS 15959 (Part 2) shall be supported by meter along with following additional parameters: i. Average Neutral Current ii. Average Frequency iii. Average PF iv. Block kVArh- Q1 v. Block kVArh- Q2 vi. Block kVArh- Q3 vii. Block kVArh- Q4 Parameter mentioned on 'vii; and 'viii' will be applicable in bidirectional mode only. c. Temperature: The meter should have capability to measure meter temperature and can log high temperature events if it is more than 60 deg C with date and time. d. Load survey: Load survey for min 35 days for voltage, phase and Neutral current, active, apparent energy, reactive lag and lead energy, active, apparent and reactive load, power factor, temperature. e. Power off duration in integration period f. Cumulative power interruption count in all history data
7.9.1	Association Rights	As per clause no. of IS 15959 (Part 2)
7.9.2	Selective Access	Support for selective access shall be provided for billing parameters as per clause no 11.3 of IS 15959 (part 1).
7.9.3	Profile capture period	Default 1800 s programmable to 900 s.
7.10	Daily load profile	Daily load profile parameters shall be measured and recorded at each midnight i.e. 00:00 hrs for last 35 Power ON days. All the parameters mentioned in table 'A3' of IS 15959 (Part 2) shall be supported by meter as Daily load profile parameters along with following additional parameters: a. Cumulative kVArh- Q1 b. Cumulative kVArh- Q2 c. Cumulative kVArh- Q3 d. Cumulative kVArh- Q4

		Parameter mentioned on ‘c; and ‘d’ will be applicable in bidirectional mode only. Mid night data: The meter should record midnight Cumulative kWh, kVAh and KVArh (lag & lead) reading for last min 35 days
7.11	General Purpose Parameters	Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per clause 16 of IS 15959 (Part 2).
7.11.1	Name Plate Detail	As per Table ‘A12’ of IS 15959 (Part 2) with following additional parameters. a. Month of manufacturing.
7.11.1.1	Association rights	As per clause 22.1 of IS 15959 (Part 2).
7.11.2	Programmable parameters	a. These parameters can be programmed remotely by HES and locally by CMRI via proper access writes. Every transaction shall be logged in non volatile memory of the meter with date and time stamp. b. Programming of any of the parameters shall increment the ‘Cumulative programmable count’ value. c. All the parameters mentioned in table Table ‘A13’ of IS 15959 (Part 2) shall be supported by meters.
7.11.2.1	Association rights	As per clause 22.2 of IS 15959 (part 2)
7.11.3	Push Services	a. Smart meter is able to automatically notify data, event, and messages to a destination client system in an unsolicited manner (without a request from a client) as per clause no 6 of IS 15959 (Part 2). b. Randomization: Data from different endpoints shall be pushed intelligently on the network in order to avoid excessive traffic on the network for example in case all the endpoints will push load survey data simultaneously, then it may result in network choking or inefficient performance. Therefore with the help of intelligent techniques such field scenarios shall be handled effectively. c. It shall also be possible to configure push services for all profiles i.e instantaneous, billing, load survey, daily energy and events. Bidder should explain its capability to configure push services. However following push services shall be available by default. i. Load survey profile data at after every 4 hours configurable to any predefined interval. ii. Mid night data at 00:00 hrs of every day. iii. Billing profile data on occurrence of billing.
7.11.3.1	Periodic push (Smart meter to HES)	Meter shall be able to push following instantaneous parameters to HES at predefined intervals.

		i	Device ID
		ii	Push setup ID
		iii	Real Time clock- Date and time
		iv	Voltage
		v	Phase current
		vi	Neutral Current
		vii	Signed Power factor
		viii	Apparent power KVA
		ix	Active power KW
		x	Cumulative Energy, KWH (Forwarded/ Import)
		xi	Cumulative energy KVAH (Forwarded/ Import)
		xii	Cumulative Energy KVAH (While Active Export)
		xiii	Cumulative Energy KVAH (While Active Export)
		Xiv	Temperature
		xv	GPS coordinates
		Other attributes as per IS 15959 (Part 2) i.e. Send Destination, Communication window, Randomization time interval, number of retries and repeat delay shall be decided in the event of manufacturing.	
7.11.3.2	Event Push (Smart meter to HES)	a. Meter is able to report HES, the status change of any of the identified events mapped in to event status word (ESW) of size 128 bits by pushing following objects to HES. i. Device ID ii. Push Setup ID iii. Real time clock- Date and Time iv. Event Status Word 1 (ESW 1). b. Each of the bits in ESW shall reflect the current state of the event and are mapped against each of the identified events. c. An event status word filter (ESWF) of 128 bit shall also be provided to configure events for event push. Events which are supported in meter shall only be configured for event push. Bit value 1 in ESWF shall indicate that the event is supported and value 0 indicates that event is not supported for event push. Position of the event bit in ESWF shall be same as in ESW.	
7.11.3.3	Event status Bit mapping	As Per IS 15959 (Part 2)	
7.12	Firmware upgrade	a. Smart meter shall support remote firmware upgrade feature for meter firmware without loss of any data and metrology. b. Firmware upgrade shall use the Image transfer classes and mechanisms specified in IEC62056-6-2 and IEC62056-5-3. c. Broad cast facility shall be supported in HES for simultaneously upgrading the firmware of a group of meters installed in field. d. Firmware upgrade feature shall be provided with	

		proper security. The design shall take into account field scenarios such as power failure during F/W upgrade. e. Once the firmware is upgraded, meter shall send an acknowledgment to HES. It shall also log it as an event in its memory. f. Meter shall support capability to self register the meter with new firmware. g. The execution time of the change of the firmware within the meter should be below 1 minute
7.14	Disconnection mechanism	a. The Smart meter shall support disconnection (all the switches shall operate simultaneous) on the following conditions as per clause 11 of IS 16444 (Part 1): i. Over current (105 % of Imax in any element for predefined persistence time.) ii. Load control limit (Programmable) iii. Pre-programmed tamper conditions (Factory programmed) iv. Disconnection signal from Head end system. v. Pre paid function for prepayment mode. b. Meter shall use the disconnection control object as defined in clause 10 of IS 15959 (Part 2).
7.15	Local reconnection Mechanism	a. Meter shall be able to reconnect load switches locally only for Overload and load control limit disconnections. b. The meter will try to reconnect the load up to predefined time, with predefined interval (Time and interval is programmable). c. If the consumption is still more than the programmed limits, it will lock out and wait for 30 minutes. d. If the consumption is still above the limit, the procedure defined above in 1 and 2 shall be repeated. e. It shall be possible to remotely connect/disconnect the relay via commands from HES. The remote reconnect shall not interrupt the normal connect/disconnect cycle. f. In case of relay malfunction i.e., connect/disconnect action of relay is not taking place due to welding of contacts or any other reason, then it shall be logged as an event in the Non-rollover compartment. Same shall be sent as an alert to HES. g. Remote command shall have priority over local communication.

7.16	Reconnection mechanism	a. Reconnection shall be done from HES except for over current and load control limit. In case of failure of communication / HES, reconnection shall be possible through Hand Held Device (CMRI) locally via proper security. Tool shall be provided for reconnection of meter locally. b. Reconnection in case of prepayment meter shall be as per prepayment profile.
7.17	Status of load switch	a. Indication of status of relay i.e. connected/ disconnected should be available on display as well as through communication to HES. b. Connection and disconnection should be logged as events.
7.18	First breath and last gasp	a. Status indication of switch i.e. connected/ disconnected should be available on display as well as through communication to HES. b. In Last Gasp endpoint shall send the power outage notification with Time Stamp. In case of power failure meter communication module shall not draw power from the backup battery. c. For the purpose of sending the Last Gasp, meter shall have proper power backup (like a super capacitor).
7.19	Security	Advanced security outlined in clause 7.1.2 of IS 15959 (Part 1) shall be provided.
7.19.1	Encryption for data communication	As per clause 7.1 of IS 15959 (Part 2)
7.19.2	Encryption/ Authentication for data transport	As per clause 7.2 of IS 15959 (Part 2)
7.19.3	Key requirement and handling	As per clause 7.3 of IS 15959 (Part 2)
7.19.4	NIC security	a. Proper security at end points as well as network level shall be present to prevent unauthorized hacking of the end points or the network itself. b. The meter password is required to open a session between NIC and meter and is required to gain clearance from the meter to perform requested operation. c. If clearance not gains, the meter locks out communication for 1 minute. The meter maintain counter for monitoring of unsuccessful attempts of performing meter operations and alerts to HES. The counter is incremented each time a password clearance operation fails. d. Up to 3 no's successful attempts are allowed, after which the port is locked out until authenticated from system administrator.
7.20	IP communication profile support	Meter shall support TCP-UDP/ IP communication profile for smart meter to HES. Please refer clause 8 of IS 15959.
7.21	Consumer display unit (Optional)	Provision of consumer interface unit (CIU) to access meter from consumer premises. Wireless IHD powered by battery.

7.22	Connection/ Tamper Conditions	The meter shall continue to record forward energy under any one or combinations of the following conditions: a. I/C & O/G Interchanged b. Phase & Neutral Interchanged c. I/C Neutral Disconnected, O/G Neutral & Load Connected To Earth. d. I/C Neutral Disconnected, O/G Neutral Connected To Earth Through Resistor & Load Connected To Earth. e. I/C Neutral connected, O/G Neutral Connected to Earth through Resistor & Load Connected to Earth. f. I/C (Phase & Neutral) Interchanged, Load Connected To Earth. g. I/C & O/G (Phase or Neutral) Disconnected, Load Connected To Earth. During bidirectional mode for condition mentioned at sl no. 'a' meter shall record in export registers
7.23	Event and tamper detection	Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be identified by an event ID.
7.23.1	Association Rights	Each event shall be available to download as per following association rights. i. Public Client: No access ii. Meter Reader: Read only iii. utility Settings: Read only iv. Push Services: Read Only for identified events as per ESWF

7.23.2	Compartments of events	a. Meter shall be able to log events in following compartments i. Voltage Related Events ii. Current Related Events iii. Power Related Events iv. Others Events v. Non Roll Over Events vi. Transaction related events vii. Control Events b. Occurrence and Restoration of Voltage Related, current related, power related and other events shall be logged in meter memory as per IS 15959 (Part 2). Please refer annexure 'A' for description of events, Event ID, Logics of events and threshold values of events. c. Threshold values shall be factory programmable. d. Selective access shall be provided as per clause 11.3 of IS 15959 (Part 1). e. For each occurrence event captured, the cumulative tamper count shall be incremented. f. Only Real clock (date and time) and event code shall be captured events in compartments mentioned at sl no. 'd', 'f', 'g', 'h'.
7.23.3	Parameter Snapshot	Parameters mentioned below are to be captured when event occurrence and restoration is logged: a. Date and time of event b. Event code c. Current (Phase and Neutral) d. Voltage e. Power factor f. Cumulative energy- kWh g. Cumulative Energy kVAh h. Cumulative Energy kVARh- Q1 i. Cumulative Energy kVARh- Q2 j. Cumulative Energy kVARh- Q3 k. Cumulative Energy kVARh- Q4 l. Temperature Logging m. Neutral current Captured parameters are to be captured at the time of logging of event occurrence and restoration
7.23.4	Event Logging	The meter shall log minimum 100 tamper events (ensuring at least 20 events for each Tamper).
7.23.5	Tamper Indication	Appropriate Indications/Icons for all tampers should appear on the meter display either continuously or in auto display mode.
7.24	Security	a. Reading and writing data into meter memory via optical and remote communication port shall be through DLMS security keys only. b. Bidder shall ensure to safeguard high security keys used for configuring parameters into meter. c. Once the meter memory is locked during manufacturing process, only parameters

		mentioned in IS 15959 shall be configurable even in factory. It should not be possible to configure any other parameters. d. Please note that there shall be no other mechanism/ method to interface with meter through optical and remote communication port except mentioned in IS 15959, even for manufacturer. e. It should not be possible to change data stored in meter memory even after accessing meter memory physically. In case of any change in memory data, a flag/alert shall be generated. Flag/Alert shall be indicated over display and in remote communication also.

8.0 Meter Display

8.1	LCD Type	STN Liquid crystal with backlit
8.2	Viewing angle	a. Minimum 160 Degree. b. The display visibility should be sufficient to read the Meter mounted at height of 0.5 m as well as at the height of 2 m.
8.3	Size of LCD	Minimum 10 mm X 6 mm
8.4	LCD Digits	Total 6 +1 digits
8.5	LCD language	English
8.6	Display mode	Following parameters should be displayed in Auto scroll with programmable interval

Sr No.	Parameter	Display Time
1	Meter Sr. No.(8 digits)	5 Sec
2	Date	5 Sec
3	Real time	5 Sec
4	Current balance in INR (for prepaid mode)	5 sec
5	Last Recharge Amount in INR	5 sec
6	Last Recharge Date and Time	5 sec
7	Relay Status- Relay On/Relay OFF	5 sec
8	Cumulative kWh	15 Sec
9	Cumulative kVAh	15 Sec
10	Current month MD kW	10 Sec
11	Current month MD kVA	5 Sec
12	Neutral current (Instantaneous value)	5 Sec
13	Instantaneous PF	5 Sec

14	Instantaneous kW	10 Sec
15	Instantaneous kVA	10 Sec
16	Temperature	5 sec
17	High Resolution value (kWh, KVAh)	5 sec
18	Error Type	5 sec
19	Signal Strength	5 sec
20	TOD active and apparent energy	5 sec
21	Top cover open date & time	5 sec

		Meter with push button for manual display shall not be acceptable. Touch button can be acceptable.
8.7	Display indications	Appropriate indications/flags for all tampers and self diagnostic features should be provided.

9.0 Data and communication protocol/ HES/Integrations/ Software

9.1	Data Exchange protocol	a. Meter should comply Indian companion of data exchange and tariff control specification IS 15959 (Part 2). b. In case of additional requirement from IS 15959 (part 2), they shall be as per DLMS standards/ IEC DLMS protocols suite (62056). c. Bidder shall explain in detail the additional parameters/ services/ methods used in meters from IS 15959 (part 2) and its reference to DLMS books/ IEC. d. Prior to manufacturing of meters bidder shall provide a detailed specification explaining all parameters/ services/ methods used in meter in addition to IS 15959 (Part 2).
9.2	Integration with HES	a. Bidder shall work with BSES IT team/ BSES designated system integrator to integrate its meter with BSES HES system. b. Bidder shall prepare detailed documents as mentioned in above clause and submit it for BSES approval and integration with HES.
9.3	Base computer software	Licensed Software with the following features should be supplied for free to download meter through optical port.
9.3.1	Operating System	BCS should be compatible for latest Windows operating system.
9.3.2	Security	System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security.
9.3.3	Database	BCS shall maintain master database according to desired area, location, and region etc.

9.3.4	Reporting	a. BCS shall have option of user defined report generation in format of Excel, Word and CSV, XML, PDF etc. b. BCS shall have capability to export data in ASCII, CSV and XML format at desired location so that the same could be integrated with our billing data for processing. c. All the data available in the meter shall be convertible to user defined ASCII, CSV and XML file format.
9.3.5	Data transfer rate	BCS and communication ports should support data transfer rate of 9600 bps (minimum).
9.4	Hand Held Unit Software	a. The manufacturer has to provide software capable of downloading all the data stored in meter memory through window/ android operating system based handheld units (HHU) through optical port. b. In the event of order, bidder shall work with BSES IT team/ BSES designated system integrator to develop HHU software for meter downloading and further uploading on HES. c. HHU software should have option for selection of parameters to be downloaded from meter. d. Meter data consisting of all parameters and complete load survey for all parameters shall be read by HHU and downloaded on HES in minimum possible time (not more than 5 minutes).
9.5	Training	Manufacture shall impart training to BSES personnel for usage of software

10.0 Name Plate

10.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour. Embossing is not acceptable.
10.2	Size of the digit shall be minimum 5X3mm
10.3	Bar code shall be printed along with serial number
10.4	BIS registration mark (ISI mark)
10.5	'BSES' insignia shall be printed above LCD display.
10.6	BSES PO No. & date
10.7	Manufacturers name and country of origin
10.8	Model type / number of meter
10.9	Month and Year of manufacturing
10.10	Reference voltage / current rating
10.11	The number of phases and the number of wires for which the meter is suitable. Graphical symbol as per IS 12032 can be used.
10.12	Meter constant in Imp/ kWh and Imp/ kVAh
10.13	Class index of meter
10.14	Reference frequency
10.15	Warranty period
10.16	Symbol of load switch
10.17	Name plate of NIC a. Serial no of NIC along/ IMEI no/MAC address with bar code b. Name of purchaser's c. Communication technology with carrier frequency d. Manufacturing year and month.

	e. Warranty period.
	f.

11.0 Component Specification

11.2	Shunt element	Data sheet should be submitted.	Reputed
11.3	Measurement or 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, Atmel, Phillips, SAMES ,NEC,TEXAS, Freescale, Renesas, Instruments, ST
11.4	Memory chips	The memory chips should not be affected by the external parameters like sparking, high voltage spikes or electrostatic discharges.	Atmel, National Semiconductors, Texas Instruments, Phillips, ST, Hitachi, Compiled,, Renasas, Onsemi, ROHM, Microchip
11.5	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 (PIN Type). c) It should be STN type industrial grade with extended temperature range min 70 ºC. d.The display visibility should be sufficient to read the Meter mounted at height of 0.5 meter as well as at the height of 2 meters (refer 3.2.d for Viewing angle).	Truly semiconductor, Tianma / Haijing Electronics, China, Hitachi,
11.6	Optical port	The mechanical construction of the port should facilitate the data transfer. Communication shall not disturbed by external light. 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.	Everlight, Osram, Agillent, NFC

11.7	Power Supply	The power supply should be with the capabilities as per the relevant standards. The power supply unit of the meter should not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections.	
11.8	Electronic components	The active & passive components should be of the surface mount type & are to be handled & soldered by the state of art assembly processes. The PTH components should be positioned such a way that the leads of components should not be under stress and not touching the internal wires.	National Semiconductors, Atmel, Phillips, Texas Instruments. Hitachi, Compiled, AVX or Ricoh Samsung, EPCOS, Vishay Everlight, Agillent, Panasonic, Rohm, Toshiba, Siemens
		LED	Everlight, Agillent
11.9	Mechanical parts	a) The internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b) The other mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.	
11.10	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years.	Texcell, SAFT, Varta, Mitsubishi, EVE, Entracell
11.11	RTC & Micro controller	The accuracy of RTC shall be as per relevant IEC / IS standards	Philips, Dallas Atmel, Motorola, Microchip, TEXAS, NEC or Compiled , Free scale, Maxim, Renasas, Prolific, ST , EPSON
11.12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm	(BBT test is must)
11.13	Load Switch	Utilization Category UC2/ UC3 Latching relay Can withstand 120% of Vref and 120% of Imax current. As per IS 15884	Gruner/ KG/ any other reputed make subject to BSES approval.
11.13	Note	a. The components used by manufacturer shall have “Minimum Life” more than the 10 years. b. Incase vendor want to use other make components; same shall be approved by BSES before use. c. Even for existing supplier – fresh	

		approval is needed for all deviations. d. Manufacturer should have complete tracking of material used in meter. BSES reserve the right to carry out audit of inventory/ manufacturing process at manufacturer's works and sub vendor's work.	

12.0 Quality Assurance, Inspection and Testing

12.1	Vendor's Quality Plan (QP)	To be submitted for Purchaser's approval.
12.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.
12.3	Inspection Hold- Points	To be mutually identified, agreed and approved in Quality Plan.
12.4	Type Tests	a. The meter shall be of type tested quality including all tests specified in this specification which are beyond IS / IEC or CBIP. b. Type test conducted from CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid. c. Type test certificate should be submitted along with offer for scrutiny. d. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable. e. Complete type test as per IS 16444 (Part 1) shall be carried out on sample selected from BSES lot. f. Type test report shall not be older than 5 years from the date of tender submission.
12.5	Routine tests	All test marked "R" as per table 20 of IS 13779.
12.6	Acceptance Tests	a. All tests marked "A" as per table 20 of IS 13779. b. Smart meter functional tests as per IS 16444 Table 1 c. Test of load switch as per clause 10.4 of IS 16444 (Part 1) d. Test for data exchange protocol as per clause 10.5 of IS 16444. e. Test for Smart meter communicability as per clause no. 10.6 of IS 16444 (Part 1). f. All the routine and acceptance tests shall be carried out as per relevant standards. g. Following tests in addition to IS shall be conducted during lot inspection. I) Dimensional and drawing verification. II) Display parameters/ sequence. III) Data Downloading from CMRI and PC. IV) Tamper/ fraud detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. V) Burn in chamber test. VI) Component verifications. h. Purchaser reserves the right to formulate any other test

		method to verify guaranteed parameters of Meter.
12.7	ESD and Magnetic Interference test	ESD and magnetic interference test will be conducted at Samir lab, Chennai/ CPRI/ ERDA/ or any other lab specified by BIS/ CEA for smart meter testing will be treated as valid.
12.8	Inspection	a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller's works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests as per relevant standards/ this specification and tampers logics as per approved GTP. All the equipments including tamper logs kits/ jigs should be calibrated. c. In-process and / or final inspection call intimation shall be given in advance to purchaser.

13.0 Packing, Marking, Shipping, Handling and Storage

13.1	Packing	a. Each meter must be packed, together with its terminal cover, in a separate environmental friendly cardboard box, which can be opened and re-closed without needing adhesives. b. Up to 10 single-phase meters in case of type 1 and 5 no's meters with enclosure in case of Type 2 must be packed together with their terminal covers in a group cardboard box, which can be opened and re-closed without needing adhesives. c. The box shall prevent, as much as possible, penetration of dust during long storage periods. The box must be designed for multiple use and be robust, with wall thickness of at least 4 mm. d. Maximum weight of a group meter box shall not be more than 25 Kg. e. The packaging will protect the meters against shock and vibration, preventing damage due to the road conditions during transport and distribution in the field. The electrical and mechanical properties shall not be affected by these disturbances. f. For shipping the boxed meters will be close packed by stockpiles of suitable quantities on pallets. The meters numbers sequence (without partition) shall be kept in each pallet. A pallet will be protected against moisture by a polyethylene hood, covered with a cardboard cover (hood), and fixed onto the pallet by parallel polypropylene bands, using protection angle bars at the corners. The hood shall be marked – on the front (wide side), on the narrow side and on the top as per clause 13.3. g. Each pallet should contain between 70 and 300 meters. The actual number of meters on each pallet will be agreed with the BSES in the event of order. h. An impact detector ("Shock-Watch") label shall be attached to the cardboard hood of several pallets in each container/ transport truck, to warn of possible

		rough handling during shipment, transport and storage.
13.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label.
13.3	Marking	On each group box and pallet, following details are required both on front (wide side) and top: a. BSES logo. b. Meter serial number range along with bar code. c. Unique number of box/ pallet. d. Purchaser's name e. PO number (along with SAP item code, if any) & date with bar code f. Equipment Tag no. (if any) g. Destination h. Manufacturer / Supplier's name i. Address of Manufacturer / Supplier / it's agent j. Type , rating and other description of equipment k. Country of origin l. Month & year of Manufacturing m. Case measurements n. Gross and net weights in kilograms o. All necessary slinging and stacking instructions
13.4	Test reports	Routine test report to be provided with each meter
13.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.
13.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.

14.0 Deviations

14.1	Deviations	a. Deviations from this specification can· be acceptable, only where the Seller has listed in his quotation the requirements he cannot, or does not, wish to comply with and which deviations the Buyer has agreed to in writing, before any order is placed. b. In the absence of any list of deviations from the Seller, it will be assumed by the Buyer that the Seller complies with the Specification fully.

15.0 Drawing Submission

Drawing submission shall be as per the matrix given below. All documents/ drawing shall be provided on A4 sheet in soft copy with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection

SL	Detail of Document	Bid	Approval	Pre Dispatch
1	Guaranteed Technical particulars (GTP)	Required	Required	
2	Deviation Sheet, if any	Required	Required	
3	Tamper Sheet	Required	Required	
4	Display Parameters	Required	Required	
5	GA / cross sectional drawing of Meter showing all the views / sections	Required	Required	
6	Samples of each type and rating offered.	2 no's	4 no's	
7	Environment for testing sample meters with head end system to be install at BSES premises.	Required	Required	
8	Any software and accessories required for installation/ operation of meter	Required	Required	
9	Manufacturer's quality assurance plan and certification for quality standards	Required	Required	
10	Type Test reports of offered model/ type/ rating	Required		
11	BIS certificate	Required		
12	Complete product catalogue and user manual.	Required		
13	Customer Reference List	Required		
14	Recommended list of spare and accessories	Required		
15	Specification documents containing all parameters, Services, Methods in addition to companion specification of IS 15959 (part 2).		Required	
16	Program for production and testing (A)		Required	Required
18	Detailed installation and commissioning instructions		Required	Required
19	As Built Drawing		Required	Required
20	Operation and maintenance Instruction as well as trouble shooting charts/ manuals		Required	Required
21	Inspection and test reports, carried out in manufacturer’s works			Required
22	Routine Test certificates			Required
23	Test certificates of all bought out items			Required
24	Meter Seal data			Required

16.0 Delivery

16.1	Delivery	Despatch of Material: Vendor shall despatch the material, only after the Routine Tests/Final Acceptance Tests (FAT) of the material witnessed/waived by the Purchaser, and after receiving written Material Despatch Clearance (MDC) from the Purchaser.

ANNEXURE- A- GUARANTEED TECHNICAL PARTICULARS

Bidder shall furnish the GTP format with all details against each clause of this specification.
Bidder shall not change the format of GTP or clause description.
Bidder to submit duly filled GTP in hard copy format with company seal.

Clause No.	Clause Description	Manufacturer's Reply
1		
2		
3		
4		
5		

Bidder / Vendor seal / signature ----------

Name of the bidder	
Address of the bidder	
Name of contact person	
Telephone number and email id	

ANNEXURE - B- RECOMMENDED ACCESSORIES / SPARES

SL	Description of spare part	Unit	Quantity
1		No	
2		No	

ANNEXURE- D- TAMPER AND FRAUD DETECTION EVENTS

1. **Voltage Related Events:**

Event ID	Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
7/8	Over Voltage (occurrence/ restoration)	Meter should log high voltage event if voltage in any phase is above a threshold value. Threshold value is factory programmable.	Occurrence: If Vpn>110% Vref Restoration: If Vpn<=110% Vref	Occurrence: 5 Min Restoration: 5 Min
9/10	Low Voltage (occurrence/ Restoration)	Meter should log low voltage event if voltage in any phase is below a threshold value. Threshold value is factory programmable.	Occurrence: If Vpn<75% Vref Restoration: If Vpn<=75% Vref	Occurrence: 5 Min Restoration: 5 Min

2. **Current Related Events:**

Event ID	Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
51/52	Power Reverse (occurrence/ Restoration)	Meter should log the event of reversal of flow of active Power Meter should register energy consumed correctly with any one, two or all three current coils reversed. This event shall not be valid in bidirectional mode of metering.	Occurrence: If Ip = -ve direction Restoration: If Ip=+ve direction	Occurrence: 5 Min Restoration: 5 Min
67/68	Over current (occurrence/ restoration)	If the current in any phase exceeds the specified threshold current, meter should log over current event.	Occurrence: If Ip>Imax Restoration: If Ip<=Imax	Occurrence: 5 Min Restoration: 5 Min
69/70	Earth Loading (occurrence/ restoration)	Meter shall able to detect and log of earth loading condition if difference in phase and neutral current found less than a specified % of basic current rating of meter for a specified time threshold value. This event will be restored if this difference remain less than the specified threshold value for a specified restoration	Occurrence: If |Ip-In|>10% Ib Restoration: if |Ip-In|<=10% Ib	Occurrence: 5 Min Restoration: 5 Min

3. **Power Related Events:**

Event ID	Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time
101/102	Power OFF (occurrence/ restoration)	Meter shall detect power OFF if all phase voltages are absent. This event shall be recorded at the time of each power OFF. At the same time power ON event shall be recorded.		
103/104	Abnormal Power Off (Occurrence/ restoration)	If meter micro detect power off whereas phase voltage is present than abnormal power will be recorded. Meter sall continue to record energy as per phase voltage and current.	Occurrence: If voltage at meter power supply<10% vref and Vpn>20% vref. Restoration:	NA

4. Other Events:

Event ID	Description of event	Logic Of Event	Logic Expression/ Threshold values	Persistence Time

201/202	Abnormal External Magnetic Influence (Occurrence/ Restoration)	a. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS13779/ CBIP 325 with latest amendments. b. If the working of meter gets affected under the influence of external magnetic field, meter should record energy at Imax. Meter should not compute MD during this period. The meter shall record energy as per actual load once the magnetic field is removed.	As per IS 13779/ CBIP 325	As per IS 13779/ CBIP 325
203/204	Neutral Disturbance- HF, DC and Alternating (occurrence/ restoration)	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.	As per manufacturing standard.	Bidder shall define threshold values
205/206	Low Power Factor	Meter shall able to detect and log the low PF event if power factor of the load found between 0.2 to 0.5 for a load above than a % threshold value for a threshold time value. Event shall restore if PF factor of load remain out of range 0.2 to 0.5 for a load above than % threshold value	Occurrence: 0.2<PF<=0.5 and Iphase>10%Ib Restoration: (PF<0.2 or PF>0.5) and Iphase>10%Ib	Occurrence: 5 Min Restoration: 5 Min
207/208	Single Wire Operation (occurrence/ Restoration)	In case of single wire power is detected , event shall be logged.	If Ip or Ip >100 mA and Vpn<10% vref.	Occurrence: 5 Min Restoration: 5 Min
209/210	Plug in Communication module removal (Occurrence/ Restoration)	Meter should log the removal of communication card. Meter should also log insertion of communication card.	By NC switch/ sensor	
211/212	Configuration change to post-paid mode/ pre-paid mode	Meter should log the change in payment mode configuration.		
213/214	Configuration change to “Forwarded” only" mode/ “Bidirectional” mode	Meter should log the change in metering mode configuration.		
215/216	Overload (Occurrence/	Meter should able to log the status of overload in		

	Restoration)	KW		
	HV Spark (Occurrence/ restoration)			On detection of HV spark
	Snapshot	Meter shall log event of snapshot at a programmable time	When RTC =programmable time	NA

5. Non roll over Events:

Event ID	Event Description
251	Occurrence of cover open

6. Transaction Events:

Event ID	Detail of Transaction
151	Real Time Clock- Date and Time
152	Demand Integration Period
153	Profile Capture Period
154	Single Action schedule for billing date
155	Activity calander for time zones
157	New firmware activated
158	Load Limit (Kw) Set
159	Enable Load Limit Function
160	Disable load limit function
161	LLS secret (MR) change
162	HLS key (US) change
163	HLS key (FW) change

164	Global key change
165	ESWF change
166	MD reset

7. Control Events:

Event ID	Event Description
301	Load Switch Status- Disconnected
302	Load Switch Status- Connected

ANNEXURE -E- METER ENCLOSURE

SL	Clause	Clause Description
1.0	Meter Box Type	Flush type with Completely transparent top cover and base with Incoming and Outgoing cable entry and data downloading arrangement.
2.0	Design	Meter box shall comply following requirement.
2.1	General Requirement	The meter box shall be designed in such a way that no access to the meter body, terminals and hardwired port of the meter shall be possible after installation and sealing of the box without breaking the box itself.
2.2	Theft Protection	a. Meter box shall be theft proof i.e. meter box cannot be opened without breaking the seals or meter itself. b. On breaking of the box, clear evidence of the physical tempering shall be visual.
2.3	Parts of the box	a. The meter box shall be designed in 02 parts i.e. base and top cover. b. Meter shall be mounted inside the base on fixed moulded pillars by unidirectional screw. c. Meter top cover should be hinge type. d. Cable glands and earthing bolt shall be provided at the base as per construction requirement. e. Proper stiffeners shall be provided in the body of the base and top cover to provide mechanical strength against transportation and installation vibrations.
2.4	Ingress protection	The meter box shall be completely dust and vermin proof. Ingress protection rating of the box shall be minimum IP55.
2.5	Collar of base and cover	a. A 'U' shaped groove shall be provided in the collar of the base body, in which UV stabilized rubber 'O' shall be installed. The design of lining shall be such that it provides proper sealing between the cover & base of box to avoid penetration of dust and ingress of water. b. All around projection provided inside the cover periphery which keeps the ‘O’ ring pressed. c. An outside collar shall also be provided, which shall cover outer surface of the collar.
2.6	Fixing of 'O' ring	a. Rubber ‘O’ Ring should be fixed with suitable adhesive so that the same does not get removed. b. Rubber 'O' ring shall be fixed in a single piece without any gap between open ends. Open end of the 'O' ring shall be provided at the bottom side only.
3.0	Material	The material shall be as follow:
3.1	Box material	a. The material of meter box shall be flame retardant with inflammability level V0 having good dielectric and mechanical strength. b. The top Cover and Base of the box shall be made out of transparent polycarbonate with minimum 90% visibility so as to ease installation and monitoring of box against any tampering. The material shall be ‘UV’ stabilized to ensure that the moulded meter box should not change in colour, shape, size or should not get brittle after exposure to UV rays.
3.2	Hardware	All the metal hardware including hinges, U latches, mounting screws, downloading port ring etc shall be of rust proof stainless steel.
3.3	Cable glands	Polyamide Nylon-66
4.0	Construction	a. Meter box shall be constructed by moulding of polycarbonate material as specified in clause no. 3.1

SL	Clause	Clause Description
		b. Thickness of meter box shall be minimum 2.0 mm.
4.1	Moulding	The box shall be made through Injection Moulding or better method.
4.2	Base	Meter shall be factory fitted inside base body using unidirectional screws, on fixed mounting pillars, moulded in to the base of sufficient strength, so that removing of meter shall not possible without breaking the meter box or meter itself.
4.3	Top cover	Hinge type
4.3.1	Hinge type	a. Minimum 02 no's concealed / internal hinges, not visible or accessible from outside the box without breaking the box itself. b. Minimum 02 no's U latches shall be provided to closed the box with sealing arrangement at each U latch. c. After closing the U latches no play/ gap shall exist between base and top cover.
5.0	Padlocking	The box shall also have padlocking facility.
6.0	Cable entry	a. 02 no's as incoming and outgoing at the 45 Deg Chamfer bottom corners suitable for 2CX25 Sqmm armoured aluminum cable. b. Cable entry must be at the bottom diagonal ends of the meter box. Appropriate clearance shall be provided between the cable entry and position of meter terminals for proper cable bending and connection. c. Minimum 60 mm vertical space shall be provided from the terminals of meter to centre of cable gland to provide sufficient bending radius and working space.
6.1	Cable Gland	a. Two nos. of Elbow shaped glands made out of Polyamide Nylon-66 suitable for 2CX10 / 2CX25 sqmm aluminium armoured cable shall be provided on both cable entries in the box. b. Glands shall be designed in such a manner that the same cannot be unscrewed / removed from the box from outside. Manufacturer may either supply two nos. of check nuts or any other alternate design to meet this requirement.
7.0	Earthing bolt	a. Earthing bolt of M6 with nut and washer shall be provided on left side of the body of meter box. b. The arrangement shall be such that one earth point shall be available for customer and external earthing provided by BSES can be terminated. c. Necessary symbol shall be provided for earth terminal.
8.0	Mounting	
8.1	Meter mounting pillars	a. Fixed type, moulded in to the base body as per the requirement of meter mounting holes. b. Stiffnners shall be provided at the base of the mater mounting pillars.
8.2	Meter box mounting	a. Four (4) nos. fixing holes of 6 to 6.5 mm diameter at the back surface of box shall be provided to fix the same on flat wall. b. Mounting holes shall not be obstructing by Incoming or Outgoing cables.
8.3	Box Mounting spacers	04 no's, 25 mm minimum mounting spacer moulded at the mounting holes of back surface of the meter box in order to provide space between meter back surface and wall.

SL	Clause	Clause Description
8.4	Box Mounting accessories	Long pan head self taping SS screws and washers shall be provided by the supplier with every box. 4 no's plastic fixing plugs suitable for self tapping screws shall also be provided.
9.0	Data Downloading arrangement	a. Option 1: Slot for optical head with non removable corrosion ferromagnetic metal ring. b. Data downloading shall not be affected by scratches on data downloading port or with ageing of box. c. Data downloading shall not be affected by visible light conditions. d. Option 2: DB9 RS232 connector shall be provided at the top cover of box to download meter as specified in clause no. 9.1 e. Meter shall be downloadable without opening of the box/ breaking of seals. f. This arrangement shall not de-rate the IP rating of meter box. g. A Top hinges and bottom sealable cover shall be provided on the data downloading slot. h. Data downloading shall not be affected by visible light conditions.
9.1	Optical to RS232 cable (If option 2 as per clause no. 9.0	Optical reader with 9 pin D-type female connector cable shall be provided in each meter box. Push fit type protective cover with sealing arrangement for data downloading port on the cover of the meter box has to be provided. The optical meter reader with 9 pin D-type female connector cable of all the meter boxes (100%) shall be tested for meter downloading before dispatch.
10.0	Marking	Following marking shall be provided on both top cover and base by indiligible laser printing/ screen printing or embossed from inside of the box. a. BSES insignia shall be embossed on the base & cover of meter box. b. Meter serial no. (Both on base and cover of meter box) c. Purchaser's PO no. and date. d. Purchaser's Name. e. Name or trade mark of seller f. Any other detail required at the time of approval.

Technical Specification

For

Single Phase & Three Phase Prepaid Meters

Specification No. – SP-EMPP-13-R0

Prepared by		Reviewed by		Approved by		Rev	Date
Name	Sign	Name	Sign	Name	Sign		
Ashish Joshi		Gaurav Sharma		Devendra Sharma		R0	24.02.2014

Index

Record of Revision

Revision No	Revision Date	Item / clause no.	Nature of Change	Approved By

1.0 SCOPE OF SUPPLY

1.1 Design, manufacture, testing, inspection at manufacturer's work before dispatch, packing and delivery of Single phase/Three phase Prepaid meters in accordance with this specification.
1.2 Customer interface unit with each meter.
1.3 All accessories / hardware required for installation and operation for the meter.
1.4 Software required for operation of payment meter.
1.5 All relevant drawings/documents/manuals for the meters and its accessories.

2.0 CODES & STANDARDS

Following codes and standards (with latest amendments) are applicable-

S No	Code/Standard	Title
2.1	Latest Edition	Indian Electricity Rules 1956
2.2	Latest Edition	Indian Electricity Act 1910
2.3	IS 722-1	Specification for AC Electricity Meters General Requirements & Tests
2.4	IS 1401	Protection of Persons and Equipment by Enclosure
2.5	IS 4905	Methods of Random Sampling
2.6	IS 11448	Application Guide for AC Electricity Meters
2.7	IS 15884	AC Direct Connected Static Prepayment Meters for Active Energy
2.8	IEC 60050	International Electro Technical Vocabulary
2.9	IEC 60736	Testing Equipment for Electrical Energy Meters
2.10	IEC 61000	Electromagnetic Compatibility
2.11	IEC 62052	Electricity Metering Equipment - General Requirement, Tests & Test Conditions
2.12	IEC 62053	Electricity Metering Equipment – Particular requirements
2.13	IEC 62055	Electricity metering – Payment systems
2.14	IEC 62058	Electricity Metering Equipment - Acceptance Testing
2.15	CBIP304	With latest amendments

In the event of direct conflict between various order documents, the precedence of authority of documents shall be as follows -
i. Guaranteed Technical Particulars (GTP)
ii. Specification including applicable codes & standards
iii. Approved Vendor Drawings
iv. Other documents

3.0 SERVICE CONDITIONS

3.1	Temperature Range	Operation range: -10 Deg C to 55 Deg C Limit range of operation: -25 to 60 Deg C Limit range of storage / transport : -25 to 70 Deg C
3.2	Relative Humidity	0 to 96 %

4.0 DISTRIBUTION SYSTEM DATA

4.1	Supply	3 phase AC, 4 wire
4.2	Voltage	415 volt ±6%
4.3	Frequency	50 Hz ± 5%
4.4	System neutral	Solidly Earthed.

5.0 ELECTRICAL AND ACCURACY REQUIREMENTS

5.1	Meter Type	a. Single phase static meter b. Three phase four wire static meter
5.2	Accuracy Class	1.0 as per IS15884 (For three phase meters, accuracy class for reactive energy should be same as that for active energy)
5.3	Connection	Direct / whole current
5.4	Rated Voltage	240V (phase to neutral) with variation of +30% & -40%. Meter should be capable of withstanding the maximum system voltage
5.5	Rated Current	
5.5.1	Single phase meter	Ib -10 A and Imax- 60 A
5.5.2	Three phase meter	Ib -20 A and Imax- 100 A
5.6	Starting current	0.004 Ib
5.7	Rated Frequency	50Hz +/- 5%
5.8	Power factor range	Zero Lag – unity – Zero lead
5.9	Power consumption in voltage circuit	As per IS15884
5.10	Power consumption in current circuit	As per IS15884
5.11	Meter constant	To be specified by bidder
5.12	Calibration	Meter shall be software calibrated at factory and modification in calibration shall not be possible at site by any means or external influence.
5.13	Insulation Level	Meter shall withstand an insulation test of 4 KV and impulse test at 8 KV
5.14	Voltage dips and interruptions	As per IS15884
5.15	Short time over current	As per IS15884
5.16	Influence of heating and self-heating	As per IS15884
5.17	Immunity to earth fault	As per IS15884
5.18	Limits of error due to Current variation	As per IS15884
5.19	Limits of error due to influence quantities	Meter shall work within guaranteed accuracy as per IS 15884/ IEC62053/ CBIP304 (most stringent standard to be followed) under and after influence of following :- a. Voltage variation b. Frequency variation c. 10% third harmonic in current

		d. Reversed phase sequence e. Voltage unbalance f. Harmonic components in current and voltage circuit g. DC and even harmonics in AC current circuit h. Odd harmonics in AC current circuit i. Sub harmonics in AC current circuit j. Continuous (DC) "stray" magnetic induction of 67mT+/-5%. k. Continuous (DC) "abnormal" magnetic induction of 0.27T+/-5%. l. Alternating (AC) "stray' magnetic induction of 0.5mT+/-5% m. Alternating (AC) "abnormal' magnetic induction of 10mT. n. Alternating (AC) "abnormal' magnetic induction of 0.2T+/-5%. o. External magnetic field 0.5 T p. Electromagnetic HF fields q. Radio frequency interference r. DC immunity test
5.20	Limits of error due to ambient temperature variation	As per IS15884
5.21	Electromagnetic compatibility	As per IS15884

6.0 CONSTRUCTION REQUIREMENTS

6.1	General	Construction should be in accordance with IS15884
6.2	Base Body	Opaque, UV stabilized polycarbonate of grade LEXAN 142A/ 943AA or Equivalent with V0 inflammability level
6.3	Top Cover	Transparent, UV stabilized polycarbonate of grade LEXAN 142A/ 943AA or Equivalent with V0 inflammability level
6.4	Assembly of base body and top cover	By ultrasonic welding
6.5	Terminal block	a. Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent. b. Terminal block shall be capable of passing the tests as per ISO-75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating.
6.6	Terminal Cover	a. Material - UV stabilized transparent polycarbonate cover b. Provision of sealing at two points through sealing screw c. Provision for cable entry from bottom. d. Diagram of external connections should be embossed on terminal cover. Sticker is not

		acceptable.
6.7	Terminals	a. Material of terminals, screws and washers should be brass or tinned copper. Two screws of appropriate size should be provided per terminal. b. Terminals shall be tested for continuous current of 150 % Imax. c. Terminals shall be clearly marked for phase/neutral/incoming/outgoing.
6.8	Ingress Protection	IP 51 or better, but without suction in the meter.
6.9	Output device	Meter should have flashing LED visible from the front to represent energy recording. LED shall be configurable for KWh, KVAh and KVArh for three phase meter. Resolution shall be such that satisfactory accuracy test can be conducted at the lowest load in less than 5 minutes and starting current test in less than 10 minutes.
6.10	RTC and Time Keeping	Meter shall have internal real time clock to set date and time. Time accuracy should be as per relevant IS/IEC. Meter should have facility for time synchronization locally through CMRI. It is preferable to have facility for remote synchronization through AMR. Clock correction events shall be registered in meter's memory.
6.11	Battery	Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. In case battery removal or total discharge same should not affect the working & memory of the meter even in case of single wire power condition.
6.12	Memory	Non volatile memory independent of battery backup to store complete meter data. Data should be retained in the memory up to 10 year without any auxiliary power.
6.13	Disconnection Switch	Meter shall be provided with internal disconnection relay / switch programmable to disconnect supply in case of tamper, overload, over voltage, under voltage, no credit etc.
6.13.1	Switch rating	Utilization category UC4 capable and tested for making and breaking 6000 nos. operations at- a. Rated breaking current and rated voltage b. 10A at power factor of 0.4 inductive. The rated breaking current of switch shall be equal to or greater than Imax of the meter. The minimum switched current shall be equal to the nominal starting current of the meter. The rated breaking voltage shall be equal to the upper limit of the extended operating voltage of the meter. Refer IS 15884/IEC 62055-31.
6.13.2	Switch reset	Once disconnected the switch shall be operable to restore power by single switch / button operation through local and remote. Switch reset through local and remote shall be password protected.
6.14	Auxiliary output switches	If provided, shall have minimum rated current of 2A. The switches shall be suitable for 20000 operations (make and break) as per IEC.
6.15	Self Diagnostic	Meter shall have self diagnostic for the following

	feature	a. RTC b. Battery c. Non volatile memory d. Display e. Switch failure
6.16	Mounting	Surface / Flush mounted
6.17	Resistance against heat and fire	The terminal block and Meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IS 15884.
6.18	Electronic components	All active & passive components should be surface mounting type and shall be assembled by state of the art assembly processes.
6.19	Power Supply	The power supply should comply with the relevant standards. Power supply unit of the meter should not be affected in case maximum voltage of the system appears across the terminals due to faults or due to wrong connections.
6.20	Measurement/ computing chips	Measurement/computing ASICs should be surface mounting type.
6.21	Protection against Corrosion	a. Internal electrical components should be of electrolytic copper & should be protected from corrosion, rust etc. b. Mechanical components should be protected from rust, corrosion etc. by suitable plating/painting methods.
6.22	Meter Sealing Arrangement	Sealing should be in accordance with IS and CEA metering regulations with latest amendments. Approval shall be taken from purchaser for location of seals.
6.22.1	Manufacturer's Seals	One Polycarbonate seal to be provided on meter cover.
6.22.2	BSES Seals	a. One Hologram seal should be provided on each side of meter i.e two hologram seals should be provided. Meter sides should not have sharp edges to avoid damage to hologram seals. b. Polycarbonate seal should be provided on top cover. Seals will be issued to manufacturer free of cost.
6.22.3	Seal record	Record of all seals shall be forwarded to purchaser with each lot.
6.23	Guarantee/ Warranty	66 months from the date of dispatch or 60 months from date of commissioning, whichever is earlier

7.0 FUNCTIONAL REQUIREMENTS

7.1	Billing data	a. Meter serial number b. Date and time c. Cumulative forwarded active energy d. Cumulative forwarded reactive energy (lag) e. Cumulative forwarded apparent energy f. Cumulative TOD energy values

<table>
<tr><td></td><td></td><td>g. Cumulative Maximum Demand in kW and kVA with date and time
h. History for last 12 months i.e kWh, kVArh, kVAh, MD (in kW and kVA with date and time), TOD energy readings.
i. Consumption details of previous 12 months in terms of rupees
j. Power on/off data with event log for last 12 months
k. Switch on/off “due to insufficient credit” data with event log for last 12 months
l. Monthly power on/off data for last 12 months
m. Last tamper occurrence and restoration details
Above data (except instantaneous values) should be stored in meter memory. Reactive and apparent energy parameters specified above are valid for three phase meters only.</td></tr>
<tr><td>7.2</td><td>Tariff basis</td><td>Lag only (for three phase meter).</td></tr>
<tr><td>7.3</td><td>MD Registration</td><td>Meter should store and display maximum demand in kW/kVA with date and time. Demand integration period should be 30 minutes. It is preferred that MD is computed using separate counter rather than by difference of initial and final energy counter.</td></tr>
<tr><td>7.4</td><td>Auto Reset of MD</td><td>Default auto reset date should be 00:00Hrs 1st day of month. Date and Time of MD reset should be programmable through CMRI.</td></tr>
<tr><td>7.5</td><td>TOD metering</td><td>Meter shall be capable of doing TOD metering for KWH and MD in KW with 6 time zones (programmable at site through CMRI). Following are the default T&D time zone
<table>
<tr><th>Tariff</th><th>Timings</th><th>1st April-30th Sep</th><th>1st Oct-31st Dec</th><th>1st Jan-31st Mar</th></tr>
<tr><td>1</td><td>00:00 to 06:00</td><td>Tnp</td><td>Tnp</td><td>Tnp</td></tr>
<tr><td>2</td><td>06:00 to 09:00</td><td>Tn</td><td>Tn</td><td>Tn</td></tr>
<tr><td>3</td><td>09:00 to 15:00</td><td>Tn</td><td>Tn</td><td>Tn</td></tr>
<tr><td>4</td><td>15:00 to 17:00</td><td>Tp</td><td>Tn</td><td>Tn</td></tr>
<tr><td>5</td><td>17:00 to 23:00</td><td>Tp</td><td>Tp</td><td>Tp</td></tr>
<tr><td>6</td><td>23:00 to 24:00</td><td>Tp</td><td>Tnp</td><td>Tnp</td></tr>
</table>
Tnp – Tariff for non - peak
Tn – Tariff for normal
Tp – Tariff for peak

Above TOD plan is being implemented. Each time zone should be programmed for separate tariff at the time of supply.</td></tr>
<tr><td>7.6</td><td>Load survey</td><td>Load profile of phase wise voltage, phase wise current, forwarded active power, forwarded reactive power (lag) and forwarded apparent power for 60 days. Integration period shall be 30 minutes.</td></tr>
<tr><td>7.7</td><td>Security</td><td>a. Programmable facility to restrict the access to the information recorded at different security level such</td></tr>
</table>

		as read communication, write communication etc. b. Only RTC and TOD zone timing should be programmable in field. Every transaction for RTC and TOD change shall be logged in non volatile memory of the meter with date and time stamp.
7.8	Note	Please refer draft for CBIP proposal for meter standardization for definitions and requirement of MD, Power OFF, TOD, Load Survey and meter output for field testing. Meter should comply with the requirements.

8.0 PREPAID SYSTEM REQUIREMENTS

8.1	Tariff structure	Following features are required in tariff structure
8.1.1	Consumer details	Tariff configuration shall include provision to denote it as Consumer type, Category type in desired alphanumeric characters.
8.1.2	Fixed charges	Fixed charges shall be sum of meter rent, minimum charge, fixed charge according to sanction load and any other fixed amount for whole month.
8.1.3	Slab and TOD tariff	Meter shall supports in general 8 slab boundaries with 8 non-overlapping rate registers for slab and TOU tariff.
8.1.4	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 consumed.
8.1.5	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.
8.1.6	Tariff publication /activation	The Tariff shall support both instant and delayed tariff publication and activation as desired. Instant activation means activation on very first midnight after tariff is configured and updated into meter by token transaction. While delayed tariff means activation on any defined date of the calendar month.
8.1.7	Tariff category	Single tariff category shall be used for single phase and three phase meters if slab/TOD boundaries, rates, fixed charges etc. parameters are same.
8.1.8	Parameter changes	It shall be possible to change the tariff related parameters through vend code. Tariff change shall be possible through CMRI as well as remote.
8.2	Token handling	
8.2.1	Token characteristic	Token shall be meter specific and it shall not be decrypted/ accepted by another meter. Token code should be such that it can be re-issued if lost but re-use should not be possible.
8.2.2	Token entry	The meter shall be capable to accept numeric token via Keypad (meter and CIU) and through remote via BSES server.
8.2.3	Token acceptance	The acceptance of valid token should always result in exact amount of credit on the token carrier being transferred to appropriate register and available credit

		limit should be incremented by exactly the same amount (As per IS 15884/IEC 62055-31)
8.2.4	Token rejection	Under normal conditions, any invalid token shall be rejected or ignored by payment meter and should not result in change to information in the accounting register in the meter. Rejection or ignoring should not lead to any token cancellation. Meter shall reject in-valid token under any prevailing conditions (As per IS 15884/IEC 62055-31).
8.2.5	Token handling and data integrity	As per IS15884/IEC62055-31
8.3	Credit limit	Single vending, maximum limit shall be programmable. Denomination for recharge shall be in steps of Rs 10 with maximum limit of Rs 500000.
8.4	Customer Database	Consumer database, Tariff, Sanction Load, Debit credit limit etc. shall transfer to meter memory by the initial token transaction. Any modification in consumer profile shall update through subsequent token transactions.
8.5	Accounting process	The meter should have in-built accounting process in accordance with IS 15884/IEC 62055-31.
8.6	Fixed charges	Fixed charge shall be deducted on daily basis and irrespective of the consumption. It shall be deducted even after disconnection of supply and stored as negative value (Credit amount) which shall be adjusted in the next token transaction.
8.7	Consumption charges	As per IS 15884/IEC 62055-31. Consumption charges shall be deducted as per applicable tariff structure & present slab rate. The consumption based charge function should be tested for a sufficient amount of energy consumption to ensure correct deductions from available credit.
8.8	Low credit warning	When credit falls below a predefined limit, an audible low credit warning shall be provided every half hour for a period of 30 seconds till the alarm is acknowledged by consumer by pressing any key either on meter or CIU. A visible indication for low credit should also be provided on meter and CIU display.
8.9	Zero credit	When the credit reaches to zero, the meter shall disconnect the output supply. Supply shall reconnect only if emergency credit is available or if meter is charged with a new token to credit sufficient amount into the meter.
8.10	Emergency Credit limit	Emergency credit limit shall be programmable. It shall be used only when enough credit is not available in the meter. Emergency credit amount shall be recovered from next recharge token.
8.11	Friendly Credits	The meter shall not disconnect consumers supply even if their credit falls down to emergency credit limit during night hours, on Weekly-offs or pre-defined public holidays (factory programmed only). These facilities shall be called as Friendly credits. The meter shall disconnect supply after end of such friendly hours and

		days. When meter is recharged with new credit, friendly credit amount should be adjusted from it.
8.12	Load Violation	The meter shall disconnect supply to the consumer if load exceeds the predefined load limit for a predefined duration. Threshold values of load and time shall be programmable. Supply shall be restored only if load is reduced below the predefined limit and acknowledged.
8.13	Message facility	Message facility shall be provided for individual consumer or for all consumers linked with the system. The activation and expire date of the message shall be defined as desired. The message shall intimate to consumer till valid date range. After expire of date, it shall in-effective.
8.14	Effect of Power outage	In case of power outage there shall be no malfunction in the operation of the meter accounting process. All registers should retain their values prior to the power outage.
8.15	Functional test within Voltage and temperature range limits	As per IS 15884/IEC 62055-31.
8.16	Functional test within the limit range of operation with voltage	As per IS 15884/IEC 62055-31.
8.17	Functional test within the limit range of operation with temperature	As per IS 15884/IEC 62055-31.
8.18	Token handling and data integrity requirements	As per IS 15884/IEC 62055-31.
8.19	Vending System	
8.19.1	Technology	Meter shall work on latest currency transfer keypad technology
8.19.2	Data encryption	Triple Data Encryption Standard (TDES) shall be used and token shall be meter specific that can't be used by any other meter. In order to provide maximum security to the system the encryption shall be done at the central server level and not at the vending terminal.
8.19.3	Tariff information	All tariff related information shall be configurable by BSES representative
8.19.4	Slab range and TOD period	Slab range & TOD time period (Starting and ending value) shall be configurable and the same shall be updated to meter through token only.
8.19.5	Token generation	a. On receipt of the vend request the system shall have a provision to ascertain the identity of the consumer. The keys to identify the consumer shall be the meter serial number or consumer connection number. b. The vend terminal shall send the request to a central server that shall authenticate the

		transaction and generate an encrypted code using TDES. c. Vending system shall be capable to generate grouped tokens against single cheque for group of consumers. d. Token generation should be possible directly from internet using our company website.
8.19.6	Ledger generation	a. There shall be provision for upto date ledger generation by cashier to reconcile the amount before he leaves cash counter. The collected amount shall be in form of Cash, Cheque or DD that shall be submitted with this ledger report. b. Provision shall be made for amount deposit to head cashier by cashier on daily basis. Only head cashier have authorization to tally balance amount to be paid by cashier till date and amount still remaining with him to recover.
8.19.7	Report Generation	Vending system shall have provision to produce necessary management reports that shall manage all administrative as well as revenue relevant information.
8.19.8	Consumer Database Management	a. Entry of new consumers and their details. b. Existing consumer database
8.19.9	Meter Database Management:	a. Uploading of meter database b. Meter in stock c. Meter issue details d. Meter tracking while sent for repairing e. Meter change
8.19.10	Configurable Tariff Management	a. Tariff structure b. Slab rate definition. c. Slab range &TOU definition d. Tax percentage. e. Rebate parentage f. Fixed Charge value g. Tariff change h. Penalty on MD
8.19.11	Limit Parameters management	a. Configurable Load Limit (Fixed load or percentage) b. Current Limit value. c. Emergency Credit limit (Fixed or per kW)
8.19.12	Debt (previous charges) Management	a. Direct debt (cash paid) b. Recovery per recharge token
8.19.13	Transaction management	a. Cash vend transaction b. Retained credit transaction c. Refund Money Transaction d. Previous Charge Transaction
8.19.14	Reports	a. Debt collection and outstanding report b. Consumer database report c. Meter issue report d. Meter in stock report

		e. Meter change report f. POS ledger & summary
8.19.15	Import/ Export of data to the vending stations:	a. Import of data b. Export of data
8.20	Meter operation modes	
8.20.1	Prepayment Mode	This is the default mode of meter. In this mode, meter should perform all prepayment functions as per sections 8.1 to 8.19 of this specification.
8.20.2	Test Mode	The meter should support a test mode that is activated from a dedicated test token. Activation of test mode should not be possible by any other means. This test should be automated in the meter and should include a full diagnostic test, testing of the all the active and inactive functionality, metering accuracy test (1 minute load test), and connection validation tests. Meter test mode shall also display following information: a. Meters software version b. Current limit c. Switch open and close count d. Token acceptance & rejection count

9.0 EVENT AND TAMPER MONITORING

S No.	Parameters	BSES Requirement
9.1	Top Cover Open	Meter shall have top cover open detection and same shall be logged. Detection and logging mechanism shall work even when the meter is de-energized. Top cover open event should not get reset.
9.2	External Magnetic tamper	a. Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IS/ CBIP 304 with latest amendments. b. If the working of meter gets affected under the influence of external magnetic field, meter should record energy at Imax. Meter should not compute MD during this period. The meter shall record energy as per actual load once the magnetic field is removed.
9.3	Protection against HV spark/ESD	If the meter is subjected to HV spark/ ESD, meter shall continue to record energy or log the event. Upto 35 KV meter should remain immune. Communication ports shall also be immune upto 35KV. Bidder should have valid test report from Sameer/ UL lab for the same.
9.4	Neutral disturbance	Meter should log the event when AC/DC/ Pulsating voltage is injected in neutral circuit.
9.5	Phase sequence reversal	Meter should work accurately irrespective of the phase sequence of the supply. Meter should log the event.

9.6	Detection of missing potential	Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded. The threshold value of voltage should be programmable at factory end
9.7	Low Voltage	Meter should log low voltage event if average voltage is below 75% of Vref.
9.8	High Voltage	Meter should log high voltage event if average voltage is above 115% of Vref.
9.9	Voltage Imbalance	Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than 10% of Vref.
9.10	Abnormal/Invalid Voltage	Meter should log invalid voltage if phase angle between voltages deviates from the standard values by more than +/-10 degrees i.e. 120 +/- 10 degrees.
9.11	Reversal of Current Coil Polarity	Meter should log the event of reversal of C.C polarity. Meter should register energy consumed correctly with any one, two or all three current coils reversed.
9.12	Current Circuit Shorting / Bypass	Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at factory end.
9.13	Current Circuit Open	Meter should log the event of current coil open. Threshold value of current should be programmable at factory end.
9.14	Overcurrent	If the current in any phase exceeds the rated current, meter should log overcurrent event.
9.15	High Neutral Current	Meter should record high neutral current when neutral current is greater than 50% of I basic.
9.16	Power On/Off	Meter shall detect power OFF (minimum power off period 5 mins) if all phase voltages are absent. This event shall be recorded at the time of each power OFF. Power ON event shall also be recorded.
9.17	Missing neutral	Meter shall disconnect the supply and log the event with date and time
9.18	Connection Related Tamper Conditions for single phase meters	The meter shall continue recording energy under any one or combinations of the following conditions:
9.18.1	Single wire power	Meter should log this tamper when incoming and outgoing neutral/ phase are disconnected and load connected to earth. Meter should record energy as per load, Vref and UPF.
9.18.2	I/C & O/G Interchanged	Meter should record forward energy within limits of accuracy class 1.0.
9.18.3	Phase & Neutral Interchanged	Meter should record forward energy within limits of accuracy class 1.0.
9.18.4	I/C (Phase & Neutral) Interchanged, Load Connected To Earth.	Meter should record forward energy within limits of accuracy class 1.0

9.18.5	I/C Neutral Disconnected, O/G Neutral & Load Connected To Earth.	Meter should record forward energy
9.18.6	I/C Neutral Disconnected, O/G Neutral Connected To Earth Through Resistor & Load Connected To Earth.	Meter should record forward energy
9.18.7	I/C Neutral connected, O/G Neutral Connected To Earth Through Resistor & Load Connected To Earth.	Meter should record forward energy
9.19	Tamper Logging	Last 200 nos. tamper events shall be recorded in meter memory on FIFO basis excluding top cover open. Last 20 events of top cover open tamper should be recorded in the memory including the first occurrence.
9.19.1	Parameter Snapshot	Snapshot of Date, time, voltage, Phase current, neutral current, power factor, active power, apparent power, cumulative kWH, cumulative KVAH etc should be recorded for each tamper event
9.19.2	Tamper Indication	For each tamper event, appropriate Indication/Icon should appear on the meter display either continuously or in auto display mode. Icons appearing continuously are preferable.
9.20	Disconnect on Tamper	Buyer shall be free to program any tamper for switch disconnection.
9.21	Tamper Logics	Logic sheet for tamper/ event detection and logging should be submitted for purchaser's approval. Following details should be provided for each tamper in tabular form a. Detailed Tamper logic b. Threshold values c. Persistence time d. Restoration time

10.0 METER DISPLAY AND KEYPAD

10.1	Type	STN Liquid crystal, Pin type with backlight
10.2	Viewing angle	Minimum 160 degrees
10.3	UV Protection	The display modules should be well protected from the external UV radiations
10.4	Size	Minimum 10X5mm
10.5	Digits	8 digits
10.6	Language	English

10.7	Keypad	a. Keypad should be provided on meter. Keypad buttons shall have numbers, which shall clearly visible and resistant to wear. 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 '#'. Button '5' should have physical identification of raised printing to aid consumers having poor sight. b. The meter shall permit a time delay up to 20 seconds between two key strokes while entering token for recharging. Error message shall be displayed if delay time is more than 20 second.
10.8	Display Parameters	Parameters to be displayed are given below
10.8.1	Auto scroll mode	a. LCD test b. Date c. Time d. Cumulative Active Energy (forwarded) e. Cumulative Apparent Energy (forwarded) f. Cumulative Reactive Energy Lag g. Active Maximum demand with date and time h. Apparent Maximum demand with date and time i. Switch status and reason if switch status is off j. Warning message for overload/ overcurrent k. Credit balance in Rupees l. Load cost per hour m. Credit low warning n. Instantaneous average power factor with sign for lag/lead o. Phase wise Voltage p. Phase wise current q. Neutral Current r. Cumulative tamper count s. Tamper status Scroll time should be 10 Sec
10.8.2	Manual display mode	Following parameters should be displayed manually using keypad and stored in meter memory (except instantaneous values). Parameters displayed through keypad given below are indicative and may change based on requirement. Hence display parameters through keys should be programmable.
10.8.2.1	Key -1	Displays the Days Left (based on consumption of last seven days) and Credit balance.
10.8.2.2	Key -2	Displays value of recent consumption in rupees i.e today's consumption, last day's

		consumption, last week's consumption and last 12 months consumption (including current month).
10.8.2.3	Key -3	Displays the currently active rates, the prices charged for consumption at each rate, and the number of units consumed at each rate, slab boundaries (only if slab tariff is active) and the daily charges.
10.8.2.4	Key -4	Displays Last 5 Codes entered
10.8.2.5	Key -5	Displays the Authenticated Billing Code (ABC) and the total amount vended. The full 20 digit ABC shall contain the following frozen value at midnight (00:00 Hr) of month end a. Cumulative KWh energy register b. Date of frozen data c. Credit balance, it may be positive or negative d. The tamper flag, which only indicates whether there is any tamper or not.
10.8.2.6	Key -6	Cumulative credit amount and emergency credit value in rupees
10.8.2.7	Key -7	Power ON hours, No. of switch open or close operations, Reason for switch opening, accepted token count and rejected token count
10.8.2.8	Key -8	Displays instantaneous load (kW/KVA), load cost, sanctioned load (kW/KVA), maximum demand for last 12 months (in KW/KVA including current month) with occurrence date and time.
10.8.2.9	Key -9	kWH unit register and KVAH unit register (for both prepaid and test modes) alongwith last twelve months KWH and KVAH (including current month)
10.8.2.10	Key- 0	LCD test, meter serial number, date, time, active power, apparent power, phase wise voltage, phase wise current, phase wise power factor, supply frequency and tamper details
10.8.2.11	Key - '*'	Used to start token entry and deletion of wrong entry
10.8.2.12	Key - '#'	Scroll back button and confirmation for token punching
10.9	Tamper indications	As per clause 9.19.2.
10.10	Self diagnostic indications	Specific indication should be provided on meter display for each self diagnostic feature. Self diagnostic indications shall appear permanently on display irrespective of display mode (manual/auto).

11.0 CUSTOMER INTERFACE UNIT (CIU)

11.1	Provision	With each meter
11.2	Display	Same as meter display. Refer section 10.0
11.3	Keypad	Same as meter keypad. Refer section 10.0
11.4	Auto display mode	Same as auto mode for meter. Refer section 10.0
11.5	Manual display mode	Same as manual mode for meter. Refer section 10.0
11.6	Audible Alarm	Built-in alarm to alert during low credit and overload. Alarm should sound every half hour for 30 seconds till it is acknowledged by consumer by pressing any key either on meter or on CIU.
11.7	Communication and power	The CIU shall have an RJ11 port for connection with the meter. This port should be used to- a. Power up the CIU b. Communicate with the meter up to a distance of 100 meters.

12.0 SOFTWARE AND COMMUNICATION

12.1	Base computer software	Licensed Software with the following features should be supplied for free
12.1.1	Operating System	BCS should be compatible for Windows XP, Vista, 7 and 8.
12.1.2	Security	System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security.
12.1.3	Data access	BCS shall be capable of accessing complete data stored in meter memory locally through PC and remotely through modem (RF/ GSM/ GPRS/ PSTN etc.) for connectivity to AMR. BCS shall also be capable of reading CMRI data. BCS should have polling feature with option of selecting parameters to be downloaded i.e billing data, event/tamper logging data etc.
12.1.4	Token transactions	BCS shall be capable to transfer token directly into the meter for recharging, tariff change etc. both locally and remotely (through modem).
12.1.5	Database	BCS shall maintain master database according to desired area, location, and region etc.
12.1.6	Reporting	a. BCS shall have option of user defined report generation in format of Excel, Word and CSV etc. b. All the data available in the meter shall be convertible to user defined ASCII file format. c. BCS shall have capability to export data in ASCII format at desired location so that the same could be integrated with BSES billing

		data for processing.
12.2	CMRI Software	Manufacturer has to provide software capable of downloading data through CMRI.
12.2.1	Integration	In the event of order, bidder shall work with BSES IT team to integrate CMRI software with BSES billing system i.e meter downloading, uploading data on computer etc. Meter reading protocols shall be shared with BSES.
12.2.2	Data access	CMRI software should be capable of downloading complete data stored in the meter memory. Software should have option for selection of parameters to be downloaded from meter i.e billing data, event/tamper logging data etc. Monthly billing data should be downloadable using CMRI within 1 minute.
12.2.3	Token transactions	CMRI shall be capable to transfer token directly into the meter for recharging, tariff change etc.
12.2.4	Suitability	CMRI software shall work both on SANDS & Analogic make CMRI.
12.3	Training	Manufacturer shall impart training to BSES personnel for usage of software
12.4	Communication Ports	Communication ports required in meter are as follows
12.4.1	Optical Port	Meter shall have one optical port. It should be compatible for data transfer over RS 232 standard
12.4.2	RJ11 Port	One RJ11 (6P4C) port should be provided. Please refer Annexure - B for pin configuration. Port should be compatible for communication on RS232 standard and should have cover with provision of sealing. It is preferable to have RJ11 port outside the terminal cover subject to ESD immunity upto 35 KV.
12.4.3	Port protection	All ports shall be galvanically isolated from the power circuit.
12.4.4	Operation	Both ports should work independently. Failure of one port (including display) should not affect the working of other port.
12.5	Communication protocol	DLMS/ Proprietary protocol. The payment meter is operated as part of an overall payment system. The token interface, service port and any remote communications port may be involved in data exchanges for both payment and system management purposes. Protocol for these data exchanges may be manufacturer-specific or of a proprietary nature. Such protocols shall be shared with us and support shall be provided for integration with our existing system. Integration of meters with BSES system will be supplier's responsibility.
12.6	Data transfer rate	BCS and communication ports should support data transfer rate of 9600 bps (minimum).
12.7	Data downloading cable	a. Meter reading cable of 1m length with optical sensor at one end and D type female 9 pin connector on other end should be provided with each meter.

		b. Optical port on meter and optical sensor should have mechanical arrangement so that the sensor can be securely placed on the optical port of meter at the time of installation for hassle free data downloading. c. D type female connector should be suitable for mounting on meter box. Suitable mounting accessories should be supplied alongwith the cable. d. Refer Annexure – C for detailed cable configuration.

13.0 NAMEPLATE

13.1	Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour. Embossing is not acceptable. (Should also be stored in meter memory and should be downloadable)
13.2	Size of the digit shall be minimum 5X3mm
13.3	Bar code shall be printed along with serial number
13.4	BIS registration mark (ISI mark)
13.5	'BSES' logo should be printed above LCD display.
13.6	BSES PO No. & date
13.7	Manufacturers name and country of origin
13.8	Model type / number of meter
13.9	Month and Year of manufacturing (Should also be stored in meter memory and should be downloadable)
13.10	Reference voltage and current rating
13.11	The number of phases and the number of wires for which the meter is suitable. Graphical symbol as per IS 12032 can be used.
13.12	Meter constant
13.13	Class index of meter
13.14	Reference frequency
13.15	Warranty period
13.16	Connections, diagrams and terminals shall be marked / provided in accordance with Indian Standard.

14.0 APPROVED MAKES OF COMPONENTS

14.1	Measurement or computing chips	Anolog Devices, Cyrus Logic, Atmel, Phillips, Texas Instruments, SAMES, NEC
14.2	Memory chips	USA: Atmel, National Semiconductors, Texas Instruments, Phillips, ST,Microchip Japan: Hitachi or Oki
14.3	Display modules	Japan: Hitachi, Sony Holland / Korea: Phillips Truly Semiconductor Tianma/Hijing Electronics
14.4	Communication modules	USA: National Semiconductors, HP, Optonica,ST, Holland / Korea: Phillips Japan: Hitachi

		Germany: Siemens
14.5	Optical port	USA: National Semiconductors ,HP Holland / Korea: Phillips Japan: Hitachi, Truly Semiconductor, Agillent,OSRAM, Everlight
14.6	Power supply unit	SMPS Type, reputed make as per manufacturer standard.
14.7	Active & passive components	USA: National Semiconductors, Atmel, Phillips, Texas Instruments, ST, Onsemi, Japan: Hitachi, Oki, AVX or Ricoh, Samsung, Everlight, Agillent
14.8	Lithium Battery	Varta, Texcell, SAFT
14.9	RTC	USA: Philips, Dallas Atmel, Motorola, Microchip , NEC or Oki
14.10	Disconnection Switch	Gruner or equivalent subject to approval of BSES.
14.11	Manufacturer shall intimate deviation if any from make of components. Any deviation is subject to approval of BSES based on supporting documents and performance feedback of the components.	

15.0 QUALITY ASSURANCE, INSPECTION AND TESTING

15.1	Quality Assurance Plan (QAP)	To be submitted for Purchaser's approval.
15.1.1	Inspection Hold-Points	To be mutually identified, agreed and approved in QAP.
15.1.2	Sampling Method	Sampling Method for quality checks shall be as per relevant IS/ IEC/ CBIP guidelines and Purchaser's prior approval shall be taken for the same.
15.2	Type Tests	a. The meter shall be of type tested quality as per relevant IS/IEC/CBIP. Type test conducted at CPRI/ ERDA/ ERTL labs will be treated as valid. b. The test report should not be more than 5 years old. In case any modification affecting only part of meter is made after type test, only specific type tests on the affected parts shall be repeated. c. Type test certificate should be submitted along with offer for scrutiny. d. For a manufacturer supplying meter for the first time, complete type tests will have to be carried out on sample randomly selected from the lot offered for inspection in event of order. 35kV ESD test will also be carried out on the sample at Sameer/UL lab. e. For regular suppliers, revalidation of meter design should be carried out by repeating the type tests on sample randomly selected from BSES lot at CPRI/ERDA every three years f. Any other component supplied in addition to meter shall also be type tested as per IS /IEC if applicable.
15.3	Routine tests	All test marked “R” as per IS15884
15.4	Acceptance Tests	a. All tests marked “A” as per IS15884.

		b. Dimensional and drawing verification. c. Display parameters/ sequence. d. All functional tests related to accounting process of prepayment meter as per IS15884/IS 15884/IEC 62055-31 shall be performed on meters sampled for acceptance test. e. Data Downloading from CMRI and PC. f. Tamper detection/logging features as per approved documents. Tamper conditions will be simulated at varying load up to Imax. Accuracy will also be checked during tamper simulation. g. Burn in chamber test. h. Component verification. i. Purchaser reserves the right to formulate any other test method to verify guaranteed parameters of Meter.
15.5	Inspection	a. Purchaser reserves the right to inspect /witness all tests on the meters at Seller's works at any time, prior to dispatch, to verify compliance with the specification/ standards. b. Manufacturer should have all the facilities/ equipments to conduct all the acceptance tests as per clause 13.4 during inspection. All the testing equipment should be calibrated. c. In-process and / or final inspection call intimation shall be given at least 15 days in advance to the purchaser.

16.0 SHIPPING, HANDLING AND SITE SUPPORT

16.1	Packing	Every metes shall be properly sealed / packed in environmental friendly boxes/ cartons for protection against damage, vibration and ingress of dust and moisture.
16.2	Packing for accessories and spares	Robust wooden non returnable packing case with all the above protection & identification Label.
16.3	Marking	Following details are required on each packing case: a. Individual serial number b. Purchaser's name c. PO number (along with SAP item code, if any) & date d. Equipment Tag no. (if any) e. Destination f. Manufacturer / Supplier's name g. Address of Manufacturer / Supplier / it's agent h. Type , rating and other description of equipment i. Country of origin j. Month & year of Manufacturing k. Case measurements l. Gross and net weights in kilograms m. All necessary slinging and stacking instructions
16.4	Test reports	Routine test report to be provided with each meter

16.5	Shipping	The seller shall be responsible for all transit damage due to improper packing.
16.6	Handling and Storage	Manufacturer instruction shall be followed. Detail handling & storage instruction sheet /manual to be furnished before commencement of supply.

17.0 DEVIATIONS

17.1	Deviation	Deviations from this Specification shall be stated in writing with the tender by reference to the Specification clause/GTP/Drawing and a description of the alternative offer. In absence of such a statement, it will be assumed that the bidder complies fully with this specification.

18.0 DRAWINGS SUBMISSION

18.1	The seller has to submit following along with bid
18.1.1	GTP (duly filled-in) (as per Annexure — A)
18.1.2	Deviation sheet, if any.
18.1.3	GA / cross sectional drawing of Meter showing all the dimensions
18.1.4	4 no's samples along with software and accessories.
18.1.5	Tamper logic sheet.
18.1.6	Detailed reference list of customers using the offered product during the last 5 years with similar design and rating
18.1.7	Manufacturer's quality assurance plan and certification for quality standards
18.1.8	Type test reports for the same type, size & rating of Meter offered
18.1.9	Complete product catalogue and Manual.
18.1.10	Details of recommended accessories / software or any other hardware for five years of operation.
18.2	Seller has to submit following drawings for buyer's Approval/ Reference after award of contract -
18.2.1	Program for production and testing
18.2.3	4 no's samples along with software and accessories for Lab testing
18.2.4	Guaranteed Technical Particulars
18.2.5	GA / cross sectional drawing of Meter showing all the dimensions
18.2.6	Tamper logic sheet.
18.2.7	Makes of components
18.2.8	Terminal arrangement with dimensions
18.2.9	Detailed installation and commissioning instructions
18.2.10	Quality assurance plan
18.3	Submittals required prior to dispatch
18.3.1	Inspection and test reports, carried out in manufacturer's works
18.3.2	Test certificates of all bought out items
18.3.3	Operation and maintenance Instruction as well as trouble shooting charts/ manuals
18.3.4	Drawing and document sizes Standard size paper A4
18.3.5	Duly signed & stamped copies of the drawings / documentation
18.3.6	Consolidated report including routine test, seal record and initial reading record as per BSES format.

ANNEXURE- A- GUARANTEED TECHNICAL PARTICULARS (DATA BY SUPPLIER)

Bidder shall furnish the GTP format with all details against each clause of this specification.

Bidder shall not change the format of GTP or clause description.

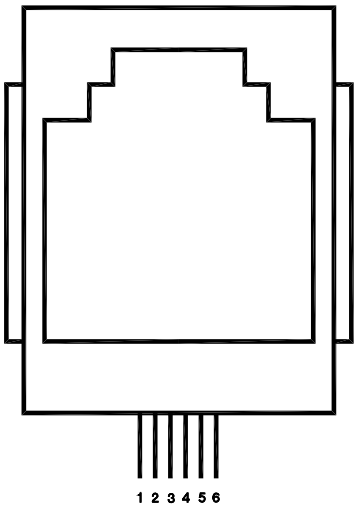
Bidder to submit duly filled GTP in hard copy format with company seal.

Clause. No.	Clause Description	Manufacturer's reply
1		
2		
3		
4		
5		
6		

Bidder / Vendor seal / signature ----------

Name of the bidder	
Address of bidder	
Name of contact person	
Telephone no & email id	

ANNEXURE- B – RJ11 PORT DETAILS



RJ- 11 PORT

PIN OUT DETAIL		
PIN	SIGNAL	DISCRIPTION
1	NC	———
2	GND	GROUND
3	TXD	RS 232 TRANSMIT
4	GND	GROUND
5	RXD	RS 232 RECEIVE
6	NC	———

ANNEXURE- C – CONFIGURATION OF OPTICAL CABLE